EXHIBIT P1

Beaver Falls Area
Regional Sewage Facilities Plan

DARWIN R. MAIN

Prepared for:

City of Beaver Falls
Borough of Homewood
Borough of Big Beaver

June 1993

Prepared by:

Widmer Engineering Inc.
806 Lincoln Place
Beaver Falls, PA 15010

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EXECUTIVE SUMMARY

Recently, the City of Beaver Falls was awarded a PennVEST loan to replace an extremely leaky section of sewer known as the East Trunk Line. During this project, the City decided to enlarge the line to allow for future development. The Pennsylvania Department of Environmental Resources ruled that the City would be required to prepare an official Sewage Facilities Plan to expand the sewer line. DER defined an area to be studied, which included the City of Beaver Falls and the Borough of Big Beaver, Homewood, and Koppel. Beaver Falls then declined the loan and began work on the Plan.

The plan included several alternatives. Several of the alternatives included only the City of Beaver Falls. They include: expansion of the treatment plant, expansion of the interceptor line from the overflow manhole to the treatment plant, and replacement-in-kind of the East Trunk Line. These alternatives would solve the sewage disposal problems within the City, but would not address the sewage disposal needs of Big Beaver or Homewood, and would discourage economic growth. For these reasons, the alternatives including only the City of Beaver Falls were not selected as the chosen alternatives.

Another alternative was considered in which the same Beaver Falls alternatives were implemented with the addition of a pump station to serve Big Beaver Plaza. This alternative would have the same disadvantages as the Beaver Falls alternatives alone: limited economic growth and the lack of service for other needs areas. For these reasons, this alternative was not chosen for implementation.

A further alternative explored the sewering of Homewood and the extension of an interceptor to Homewood to convey their sewage to the City for treatment. This would involve 2 pump stations. This alternative would provide for slight economic growth in the enterprise zone area south of Homewood, but the needs areas would still not be addressed adequately. Therefore, this alternative was not chosen.

An alternative to serve the Holiday Inn on Route 18 as well as sewering Homewood and the connection of Koppel was also considered. This alternative would involve 3 pump stations. This alternative allows for a greater degree of economic growth in the enterprise zone, however the motels to the north of the Holiday Inn would still not be served. Therefore, this alternative was not chosen.

An alternative extending sewer lines to the motels north of the Holiday Inn as well as sewering Homewood was also considered. The alternative would involve 3 pump stations, and would include the following: expansion of the Beaver Falls treatment plant, replacement of leaky 24 inch terra cotta sewer pipe with PVC, and expansion of the existing sewer lines from the northern border of the City to 11th Street as well as the sewer extension to serve the motels. This alternative offers the maximum in economic growth potential, as it will be able to serve the Route 351/Route 60 enterprise zone as well as the entire portion of the Route 18 enterprise zone which can be feasibly served. Capacity is provided for the Borough of Koppel and the rest of the Route 18 enterprise zone which could feasibly flow to Koppel. Capacity is also provided for the Route 551 enterprise zone. Due to the fact that this alternative does serve all of the present and potential needs areas, and because of the potential for economic growth that is provided, this alternative has been selected as the alternative of choice.

The additional alternative of extending sewers to serve the Route 351/Route 60 enterprise zone and the Route 551 enterprise zone has also been considered. However, the small number of service connections which would be added do not justify the additional expense of providing sewers at this time. However, if concrete plans for developing these areas develop, the feasibility of extending these sewer lines should be considered.

INTRODUCTION

The Pennsylvania Sewage Facilities Act (Act 537), enacted by the legislature in 1968, required that every municipality in the state must develop and maintain an up-to-date sewage facilities plan.

The main purpose of the sewage facilities plan of a municipality is to protect the health, safety, and welfare of the citizens living in the municipality. Problems such as malfunctioning on-lot septic systems, overloaded treatment plants or sewer lines create real and immediate threats to the health, safety, and welfare of the citizen. Development and implementation of plans for the sanitary disposal of sewage waste can aid in the resolution of such problems.

Another purpose of the plan is to prevent future problems from occurring where sewage plans are consistent with land use plans, municipal officials are able to direct development to areas that have adequate sewage service, or where sewer service is planned. The planning area is shown on Plate I.

SECTION 1 - PLANNING OBJECTIVES AND NEEDS

The following is a summary of planning studies performed to date in the study area, including wastewater, land and water planning.

1.1 IDENTIFICATION OF WASTEWATER PLANNING

1.1.1 COMPREHENSIVE WATER QUALITY MANAGEMENT PLAN, PADER, 1979

The Comprehensive Water Quality Management Plan for the Ohio Valley study area was published in October, 1979 and identifies the then-existing problems in the Beaver River Drainage Basin as sewage, urban runoff, and industrial wastewater. On-lot disposal problems are also cited. The apparent best alternatives listed are:

a) The Chippewa Township sewage treatment plant was to be upgraded in 1980 to treatment level 2A (activated secondary treatment plus 2-stage nitrification and effluent aeration) and expanded in 1995. Based on the NPDES permit for the facility, upgrading the facility was not necessary and has not been done. The Chippewa Township adopted Sanitary Authority has adopted an Act 537 Plan to expand the plant to 2.5 MGD. No schedule was given, but the plan states that the expansion will occur as soon as possible.

b) The conventional sewage treatment plant in Koppel was to be unchanged. This recommendation has been implemented to date.

c) A sewage treatment plant utilizing lagoon treatment was to be constructed in Eastvale by 1985. This recommendation has not been implemented. It has since been determined

that it would be more feasible, both environmentally and economically, for the Borough to pump its sewage to the City of Beaver Falls. This alternative has been implemented.

d) The Homewood area was to have been tied in with the Beaver Falls sewage treatment plant by 1990. This has not been implemented to date but this study is considering this alternative.

e) Sewer lines and pump stations were to be installed to provide municipal sewage treatment to areas of Big Beaver, West Mayfield, White Township, and Patterson Township. This has been done.

1.1.2 BEAVER COUNTY COMPREHENSIVE SEWAGE FACILITIES PLAN, BEAVER COUNTY PLANNING COMMISSION, 1971

In 1971, the Beaver County Comprehensive Sewage Facilities Plan proposed a three-phase, 10-year plan. The plan divided the county into planning districts. The planning districts addressed in this official plan include: Planning District Number 2, consisting of Big Beaver Borough, Homewood Borough, Koppel Borough, and New Galilee Borough; and Planning District Number 5, consisting of the City of Beaver Falls, the Borough of Eastvale, Patterson Heights, and West Mayfield, and Chippewa, Patterson, and White Townships.

PLANNING DISTRICT NUMBER 2

During Phase I, 0-3 years, a survey of existing on-lot disposal systems was to have been done, and feasibility studies performed for the Route 18 and Shenango and Friendship Road areas. During Phase II, 3-5 years, sewage facilities were to be constructed in Chippewa Township and

Koppel Borough for the Route 18 and Shenanago and Friendship Road areas, if feasible. During Phase III, 5-10 years, additional feasibility studies were to have been completed based on growth and development and health problems.

PLANNING DISTRICT NUMBER 5

During Phase I, it was recommended that the City of Beaver Falls upgrade their sewage treatment plant to secondary treatment. Also recommended were: a collection line investigation for deficiencies and repairs; cooperative participation in feasibility studies with Patterson Heights, White Township, and Patterson Heights Borough; and cooperate in feasibility studies with Eastvale Borough. During Phase II, the following were recommended: the existing collection system be investigated and repaired, if necessary; feasibility studies be conducted in anticipation of growth; and that Eastvale construct a plant, or connect to Beaver Falls if feasible. During Phase III it was recommended that feasibility studies be conducted for growth and that a feasibility study be conducted in Patterson Township. These recommendations were taken into account, and all of the previously mentioned municipalities have connected to the Beaver Falls system, where feasible. In addition, sewer system investigations and improvements have been ongoing since 1964, and the plant has been upgraded.

1.1.3 CITY OF BEAVER FALLS COMPREHENSIVE PLAN, CLIFTON E. RODGERS & ASSOC., 1969

The Beaver Falls Comprehensive Plan has addressed the sewerage system for the City. Several trunk line improvements were recommended, including: a larger line on Third Street; a connection

on Eleventh Avenue between Tenth and Eleventh Streets; a connection on First Avenue between Eleventh and Sixteenth Streets; a trunk line paralleling the river and the railroad from twenty-fourth Street Extension; and a trunk line extension along Ingrich Road from approximately Thirty-Second Street Extended to Thirty-Fourth Street. The plan also recommends that the treatment plant be upgraded to secondary treatment as soon as possible. For unknown reasons, these recommendations were never implemented, other than upgrading the treatment plant.

1.1.4 CITY OF BEAVER FALLS AND ADJACENT COMMUNITIES SEWERAGE NEEDS STUDY UPDATE, WIDMER ENGINEERING INC., 1980

This plan re-recommended the same sewer system improvements that were recommended in the Comprehensive Plan. These problem areas were first noted in 1964 by Consoer, Townshend and Associates and later reaffirmed in 1972 by Michael Baker, Jr., Inc. This study also quoted a 1976 study by Baker which stated that four interceptor sewer segments must be increased in capacity. These four segments are the same segments recommended in 1964 and 1972, with the exception of the line on First Avenue. The study also recommended construction of the treatment plant to allow for recirculation of secondary sludge, and acceptance of sewage from Eastvale and North Sewickley Township, providing that the conveyance to Beaver Falls if feasible.

The City has constructed and owns the sanitary sewer line and pump station serving the Borough of Eastvale. North Sewickley Township is still examining the feasibility of treating its sewage of the City plant, and the sludge recirculation mechanism has been installed at the plant. The sewer system improvements have not been carried out.

1.1.5 COMPREHENSIVE PLAN FOR THE BOROUGH OF BIG BEAVER, BIG BEAVER PLANNING COMMISSION, 1978

In 1978, the Big Beaver Planning Commission developed a comprehensive plan. The plan recognized that public sewerage facilities were a necessity for the Borough, since the majority of soils in the Borough are generally not suitable for on-lot sewage disposal.

The Borough is divided by a major watershed divide. Due to the rural nature of the Borough west of the divide, it was determined that this area should remain rural. Areas to the east of the divide, draining to the Beaver River, are planned for more intense development, including public sewers. The southern portion of Shenango Road from Stell-Rich Heights and the elementary school are proposed to be sewered and treated by the Chippewa Township Sanitary Authority.

The developed areas around Koppel are proposed for sewerage service at Koppel. The Rt 60-Rt 351 interchange area is proposed for sewerage service through Koppel or an individual sewerage system.

The Chippewa Township Sanitary Authority has recently adopted a 537 plan which includes service to the areas proposed in the Big Beaver Comprehensive Plan. The Borough has not been able to accomplish the sewerage service in areas proposed for service by Koppel due to a variety of reasons, including development density, financing, and lack of intermunicipal cooperation. This plan will study the feasibility of sewering these areas through the Beaver Falls system.

1.2 IDENTIFICATION OF PLANNING DOCUMENTS ADOPTED PURSUANT TO ACT 247

No land use planning or zoning has been done at the county level. Comprehensive plans have been completed by the City of Beaver Falls, the Borough of Big Beaver, and the Borough of Koppel. These municipalities have also adopted Zoning and Subdivision and Land Development Ordinances. These planning documents are described below.

1.2.1 CITY OF BEAVER FALLS COMPREHENSIVE PLAN

The land use plan for Beaver Falls recognizes that the City is generally fully developed. Residential land use comprises approximately 608 acres, or 45.2% of the City's 1344 acres. Future construction in residential areas is recommended to prefer multi-family residence over single-family units. This is recommended to cluster development, and to allow for consolidation of open land into communal areas providing for recreation and leisure activities. Commercial land use is divided into three classifications: Downtown, Automotive-oriented, and Neighborhood. The Downtown classification is to be unchanged, and comprises the retail shopping center for the City. The Automotive-oriented uses are planned for the southern portion of the city and approximately in the center of the city at Twenty-fourth Street. These uses include supermarkets, auto sales and service, drive-in facilities, and other uses inappropriate in the Central Business District. The Neighborhood facilities are proposed in the northern portion of the City to serve the low density residential district and students of Geneva College. These uses include: grocery, drugstores, barbers and beauty salons, professional services, branch banks, restaurants, laundromats, and

similar businesses. Total commercial uses would occupy approximately 119 acres. Public and Semi-Public Lands comprise approximately 294 acres and include: library, municipal buildings, fire stations, post office, United Hospital, sewage treatment plant, schools, playgrounds, parks, and conservation areas.

No change is anticipated in this land use. Industrial and railroad uses occupy a total of approximately 323 acres. In an effort to maintain and attract new industry, no recommendations were made to reduce these classified use areas.

1.2.2 THE BEAVER FALLS CITY ZONING ORDINANCE

The City's Zoning Ordinance divides the City into six districts: R-1, Residential-Single Family; R-2, Residential-Multi-family; R-3, Residential Limited Use; C-1, Commercial-Pedestrian; C-2, Commercial-Automotive; and I, Industrial and Railroad. These districts are shown on plate 2. The R-1 District allows a variety of uses, including one and two family dwellings, churches, schools, public parks, municipal buildings, radio & television stations or utility substations, and home occupations. This District is concentrated in the northern portion of the City, which is consistent with the Land Use Plan. The R-2 District allows all of the uses of the R-1 District, as well as multiple dwellings and apartments, clubs and lodges except those which serve alcohol to the public, and community garages and off-street parking for residential uses. This district is concentrated in the central and southern portions of the City, and west of Geneva College and is consistent with the Land Use Plan. The R-3 District was created mainly to protect and preserve natural resources and open space not readily adaptable to economic development. Permitted uses

include preservation of natural amenities, production of forest products and agricultural activities, parks and recreation grounds, utility transmisson and distribution facilities, municipality buildings, single family detached dwellings, and transmission and receiving towers. This district is located on the steep slopes of the western part of the City, as well as along the floodplain of Walnut Bottom Run. Another area is located along the floodplain of the Beaver River in the northeastern portion of the City. The C-1 district represents the Downtown commercial district in the Land Use Plan. It is mainly concentrated along Seventh Avenue in the central to southern portion of the City, although there are areas around Geneva College. The C-2 District represents the automotive oriented commercial uses in the Land Use Plan. It is located in the areas recommended in the land use plan. The I District is located at the extreme edges of the City, basically along existing use areas.

The Beaver Falls City Zoning Ordinance contains no provisions for on-lot sewage disposal. Floodplains are addressed to a limited extent by the R-3 district and Drainage Regulations. The Drainage Regulations are out of date, and should be updated to be consistent with DER Regulations for floodplain management.

1.2.3. BEAVER FALLS SUBDIVISION AND LAND DEVELOPMENT ORDINANCE

This ordinance addresses both flood plains and stormwater. Both of these sections are based on Ordinance 1277, dated February 24, 1970. These sections do not appear adequate in view of recent regulations on floodplains and stormwater, and therefore should be updated.

1.2.4. BOROUGH OF BIG BEAVER COMPREHENSIVE PLAN

The Borough has established a Special Conservation land use category to protect sensitive areas. Areas included in this category are: all major areas with slopes greater than 25%, major 16-24% slope areas adjacent to 25% slope areas, 100-year floodplains, low-lying swampy areas having unique wildlife habitats, and land areas that are environmentally sensitive. Environmentally sensitive areas are: State Game Lands, the Clarks Run Gorge associated with Homewood Falls, scenic steep hillsides of the Beaver River and the steep valley walls and unique wildlife habitat areas of Stockman Run, including the Butternut Falls area. Industrial development in the study area is located between Route 18 and the Beaver River between the Turnpike and Koppel. Also planned for industrial development is an area on the southern corner of the Rt 60 - Rt 351 interchange, and an area on the east side of Route 18 just north of Koppel. Highway Commercial Land uses are planned east of Route 18 south of Homewood, on Rt 18 north of Homewood, at the intersection of Rts 18 & 351 west of Koppel, and the intersection of Rts 60 & 351. General urban development is planned west of Rt 18 north and south of Homewood, west of Koppel, and at the intersection of Rts 60 & 351. Suburban development is planned south of the Conrail right-of-way and in the northeastern part of the Borough. Rural development makes up the remainder of the land use in the Borough.

Some of the proposed land uses are not consistent with sewage facilities planning, especially in the areas around Koppel and the Route 18 corridor. These areas are proposed for high density development, but only on-lot methods are available for sewage disposal. This plan will investigate the feasibility of sewering these areas. Floodplains and wetlands are protected by the Special

Conservation Land Use category. This category should protect all environmentally sensitive areas.

1.2.5. BOROUGH OF BIG BEAVER ZONING ORDINANCE

The Boroughs Zoning Ordinance divides the land area into seven districts: SC, Special Conservation; R-1, Rural Development; R-2, Suburban Residential Development; R-3, General Urban Development; C-1, Highway Commercial Development; C-2, Neighborhood Commercial Development; and I, Industrial Development. These districts are shown on plate 2. The zoning exactly corresponds to the Land Use Plan with the exception of the areas shown on the Land Use Plan as having community facilities. These areas are zoned for Suburban Residential Development. This is not an inconsistent use, since the existing use map shows that only a portion of the land is used for community facilities, while the rest is not currently developed. In addition, R-2 zoning does not preclude use of the land for community facilities - such use is permitted by special exception. Also, the Borough has no zoning district for community facilities. The SC district is unique in that it has no uses permitted by right - all uses in this district are by conditional use. Principal uses include single-family detached residential dwellings, recreational, educational, or agricultural uses. Accessory uses include private garage or parking area, or other uses customarily incidental to the principal uses. Minimum Lot sizes are 1 acre for single-family dwelling units, and 5 acres for other principal uses, and all buildings must cover no more than 30% of the total land area. R-1 district allows single-family detached and semi-detached dwellings, mobile homes, agricultural uses, and private swimming pools. Lot sizes depend on method of sewage disposal, with on-lot disposal requiring one acre per lot, or 30,000 square feet for

single-family semi-detached units. Lot coverage shall be less than 30%. R-2 zoning permits single-family detached residential dwellings by right. Other uses, such as community facilities, are permitted by special exception. On-lot sewage disposal requires 20,000 square foot lots. Lot coverage shall be less than 30%. Principal Uses for the R-3 district include multi-family dwelling units, recreational uses, public uses, general business offices, professional offices, banks, and restaurants. Lot sizes for on-lot sewage disposal are 15,000 sq. ft per dwelling unit for multi-family units and 20,000 sq. ft. for single-family semi-detached units. Lot coverage shall not exceed 50%. The C-1 zoning district allows the following conditional uses: retail uses, wholesale uses, service and professional offices, recreational uses, public uses, and integrated business centers and shopping malls. No minimum lot sizes are required; all developments are handled on a case-by-case basis. Lot coverage shall not exceed 70%. The C-2 district allows retail business, business, service, and professional office buildings, recreational, religion, or educational buildings, or public uses and buildings. Lot sizes are as the C-1 district, and the lot coverage shall not exceed 50%. The I district permits wholesale uses or public uses by right, and manufacturing and industrial activities, auto body repair shops, research and development activities, and junk yards by conditional use. Minimum lot sizes are as the commercial districts, with less than 70% lot coverage. The zoning ordinance has been amended several times since its adoption concerning floodplain regulations. One amendment stated that a certification would be required stating that the project would comply with all requirements of this Ordinance and all applicable laws, codes and regulations as promulgated and enacted by the United States Government, the Commonwealth of Pennsylvania, or their Agencies, Departments and/or Bureaus, as shall be in

effect at the time of the application being submitted and another amendment prohibits any new construction, development, use, activity, or encroachment that would cause any increase in flood heights. The ordinance as amended makes the following statement:

"As to surface water drainage and runoff, reference is hereby made to the Pennsylvania Storm Water Management Act and any regulations as may be promulgated thereunder. The floodplain and storm water control regulations are therefore adequate, since PA DER regulations are effectively incorporated by reference."

It appears that minimum lot sizes for zoning districts R-2 and R-3 are too small to adequately accommodate on-lot disposal systems and protect groundwater quality. Groundwater protection is important in Big Beaver, since the majority of residents utilize on-site wells. It is recommended that these lot sizes be retained for areas proposed for sewers within 10 years, but that the minimum size should be 1 acre for long-term OLDS use.

1.2.6 BIG BEAVER BOROUGH SUBDIVISION ORDINANCE

In order to subdivide in Big Beaver Borough, the subdivision ordinance requires developers to identify existing waterways, flood plains, drainage courses, and existing drainage facilities structure or systems. It is required to maintain a 20' isolation distance from flood plains. If the development is within 1500 linear feet of a sewer line, the development is required to connect to it. The Borough will not issue building permits until it, and the DER, approve of the methods of water supply and sewage disposal.

1.2.7 THE BOROUGH OF KOPPEL ZONING ORDINANCE

The Borough of Koppel Zoning Ordinance was established in 1958. It sets up six different land uses. They are: R1 - single family residential; R2 - General Residential; C1 - General Business; C2 - Heavy Commercial; I - Industrial; and T - Transitional. The transitional zoning creates a 100 foot buffer zone between industrial development and other land uses. There are no known proposed zoning changes at this time.

R1 and R2 zoning establish the minimum required lot area of 6,000 sq. ft. In R2 zones, the lot area must increase 1,500 sq. ft. for each family unit greater than one. Since these zones are sewered, it is consistent with the subdivision ordinance for the Borough.

1.2.8 THE BOROUGH OF KOPPEL SUBDIVISION ORDINANCE

The Borough of Koppel has a sewage treatment plant. The subdivision ordinance enacted in 1958 stipulates the following:

Residential lots that are not served by sanitary sewers or public water shall be not less than 100 feet wide at the building line nor less than 20,000 sq. ft. in area per family;

Residential lots served by either public water or sanitary sewers shall be not less than 100 feet wide at the building line nor less than 15,000 sq. ft. in area per family.

Residential lots where served by both public water and sanitary sewers shall not be less than sixty feet wide at the building line nor less than 6,000 sq. ft. in area per family;

Lots intended for more than one family shall increase minimum lot area size by 1,500 sq. ft. per each family unit more than one; and,

Subdivision of land for uses other than residential shall be subject to review by the Borough Engineer and the Planning Commission for size, depth, and width of lots and parking areas.

The borough is almost fully developed and no additional subdivisions are presently proposed. Storm water drainage plans are subject to the approval of the Borough Engineer for new development. In areas where a sanitary sewer is available, all properties within the subdivision will connect to the sanitary sewer. In areas where a sanitary sewer is not available, individual septic tanks or project sewer systems must be provided, reviewed, and approved by both the Borough Engineer and the State Health Department (now the Department of Environmental Resources).

1.3 ANALYSIS OF EXISTING AND PROPOSED PLANNING FOR CONSISTENCY WITH:

1.3.1 COMPREHENSIVE WATER QUALITY MANAGEMENT PLAN (COWAMP)

As previously detailed, COWAMP recommended Homewood Borough and portions of Big Beaver and West Mayfield Boroughs and White and Patterson Townships be tied into the Beaver Falls plant, that Eastvale Borough build their own plant, and that the plant of Koppel remain unchanged. At the current time, several of these recommendations have been implemented. West Mayfield Borough and White and Patterson Townships have been connected to the Beaver Falls system. The Koppel plant has remained unchanged. The Borough of Eastvale, however, did not construct their own plant as recommended. It was determined to be more feasible, both environmentally and economically, for the Borough to connect to Beaver Falls, and this has been

done. Homewood and Big Beaver Boroughs have not been connected to the City's plant yet, but this plan is being done to investigate the feasibility of connection at this time. This plan will also investigate the possibility of connecting Koppel Borough to the City's system, as opposed to upgrading the Boroughs treatment plant. Connection to the City may prove to be more economically feasible, and is also environmentally the better choice. This connection will allow for the consolidation of treatment, and the elimination of three treatment plants.

1.3.2 ANTI-DEGRADATION OBJECTIVES IN DESIGNATED WATERSHEDS

The study area lies wholly within the Beaver River watershed. This plan is investigating the elimination of three surface water discharges as well as a raw sewage overflow and secondary treatment bypass. If this plan is determined to be feasible, water quality in the Beaver River will improve. The Beaver River is classified for warm water fishes, water supply, irrigation, boating, fishing, water contact sports, and esthetics. The Beaver River is not classified as a high-quality or exceptional value stream in Section 93.9 of the Departments regulations.

1.3.3 CHAPTER 94 MUNICIPAL WASTELOAD MANAGEMENT

Since the City of Beaver Falls has an overloaded interceptor and secondary treatment bypass, they are subject to the overload conditions of Section 94.21 of the Departments regulations.

The City and all of the tributary municipalities have submitted Corrective Action Plans as required by Section 94.21. The stated purpose of this Composite Corrective Action Plan and Schedule (CAP) is the elimination of the overload conditions through the elimination of excess

infiltration and inflow. The City was proposed to have completed their plant upgrade by January 31, 1993. This implies that the City is slightly more than 3 years behind schedule. Since the sewer system is divided into mini-systems, and since manhole numbers are the same in the mini-systems, the following convention will be used to identify manholes: manhole number - mini-system number. The following repair work has been done to date: manholes 21-5 and 23-5 and 300 feet of sewer line; manholes 124-3 and 125-3 and 155 feet of line; 146-3, 122-3, 121-3, and 120-3 and 213 feet of line; manholes 86-3 and 87-3 and 330 feet of line; manholes 140-3 and 141-3 and 365 feet of line; manholes 217-3, 218-3, 29-5, 30-5, 33-8, 34-8, 35-8, 30-8, 31-8, LH, 24-8, 25-8 and 2,435 feet of line; and manholes 8-5, 37-5, 29-5, 16-5, 6-8, 11-8, 95-8, 86-8, 96-8, 155-9, and 158-9. The Borough of Patterson Heights has proposed to rehabilitate every manhole within the Borough by the end of 1994. Patterson and White Townships and West Mayfield Borough are also planning sewer system rehabilitation. The projects are anticipated to be completed by the end of 1994. The Beaver Falls sewer system is enclosed as Appendix A.

1.3.4 STATE WATER PLAN

The State Water Plan was prepared by the Pennsylvania Department of Environmental Resources in 1983. The goal of the plan was to assure water supplies of adequate quantity and quality to meet both short - and long-term needs.

The Beaver Falls Municipal Authority withdraws water from the Beaver River, which has a yield of 102 MGD. The Authority has received an allocation of 16.0 MGD, and has a filtration plant capacity of 16.0 MGD and treated water storage capacity of 13.9 MG. Based on the

projected use in 2010 of 11.2 MGD, there should be no shortage of drinking water available. The Borough of Homewood is served by the Beaver Falls Authority.

Koppel Borough purchases water from the western PA water company - Ellwood District (WPWE), who withdraws water from Slippery Rock Creek, which has a yield of 15.2 MGD. WPWE has received an allocation of 8.0 MGD, and has a filtration plant capacity of 6.4 MGD and treated water storage capacity of 7.05 MG. The company has a projected average use in 2010 of 5.54 MGD, but based on peak usage, the company is projected to have a filtration plant capacity deficiency of 0.412 MGD. The SWP recommends that the deficiency could be completely eliminated if industrial conservation practices are implemented; as an alternative, the plan recommends that the filtration plant could be expanded.

The Borough of Big Beaver depends on on-lot wells to supply drinking water to their residents. Since there is no public water source serving this area, it is not included in the state water plan.

1.3.5 PRIME AGRICULTURAL LAND USE

In order to conserve land that is considered prime agricultural land a list of prime agricultural soils was obtained from the Beaver County Soil Conservation Service. The prime agricultural soils in the study area are:

AgB - Allegheny Silt Loam, 3%-8% slopes

CdB - Canfield Silt Loam, 3%-8% slopes

GnB - Gilpin Silt Loam, 3%-8% slope

MoA - Monagahela Silt Loam, 0%-3% slope

Ph - Philo Silt Loam

RaB - Ravenna Silt Loam, 3%-8% slope

WhB - Wharton Silt Loam, 3%-8% slope

These soils are scattered throughout the study area with the highest concentration occurring in Big Beaver. The prime agricultural soils are clustered along the wetlands and floodplains of Stockman Run (AgB, CdB, GnB, RaB), the Beaver River (east of Homewood: Ph, MoA) and the Clarks Run watershed to the western border of the study area (CdB, GnB, RaB, WhA). These areas are presently zoned as R-1, R-2, SC, Industrial, and Highway Commercial. Prime Agricultural Land that is currently being farmed should be zoned R-1. Prime agricultural soils total approximately 538 acres (7.9%) of the total 6776 acres of the study area.

1.3.6 STORM WATER MANAGEMENT AREA

Beaver County has no formal comprehensive storm water management plan. The subdivision ordinances in the study area state that all subdivision applications must address storm water run-off and are subject to the approval of the Municipality's engineer. It is generally accepted that post-development run-off shall not exceed pre-development run-off. When Beaver County does develop a storm water management plan, all new subdivisions will be forced to comply with it because the County Planning Commission must approve of all new subdivisions.

1.3.7 WETLANDS PROTECTION POLICY

Floodplains and wetlands in the study area are illustrated on Plate 4. The floodplains were taken from Flood Insurance Rate maps (FIRM) developed by the Federal Emergency Management Agency (FEMA). The wetlands were reproduced from the National Wetlands Inventory Maps. Wetlands play an unusual role in nature. They are essential for flood control and provide unique wildlife habitats. In the past, wetlands were regarded as blight that should be eliminated and their destruction was encouraged. Now, development on wetlands is prohibited. If development is planned in areas designated as wetlands, the Army Corps of Engineers and the Department of Environmental Resources should be contacted so the appropriate permits can be obtained.

1.4 IDENTIFICATION OF WASTEWATER TREATMENT NEEDS FOR GROWTH AREAS

The Department of Community Affairs has designated areas in Beaver County as enterprise zones. In this study area, the enterprise zones are along Route 18 from the Beaver/Lawrence County line to Beaver Falls, Route 351 from Koppel Borough to Route 60, and along Rte. 551 from Beaver Falls to Rte 60 (See figure 1.4-1). These enterprise zones were designated as such to promote economic growth. In order for development to occur in the enterprise zones, the feasibility of sewer extensions should be examined. The Beaver County Soils Survey shows that severe limitations for on-lot sewage disposal exist in these enterprise zones. Depending on the density of development, sewer extensions may be the only way to develop these areas.

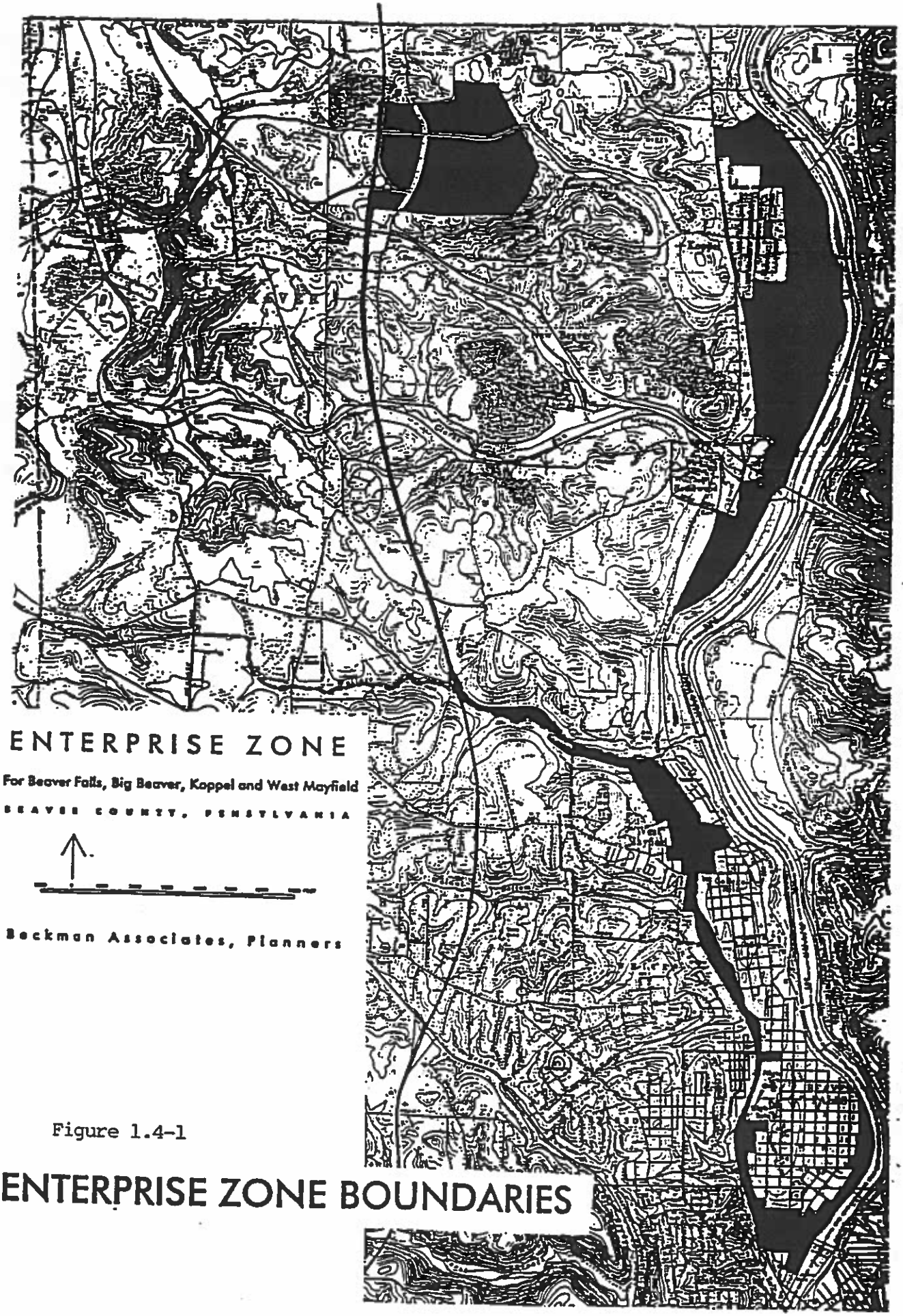


Figure 1.4-1

ENTERPRISE ZONE BOUNDARIES

Manufacturing, industrial, light industrial, and commercial development are being marketed in these enterprise zones. At the present time, actual plans for development have not been proposed in the study area. There has been interest expressed in developing approximately 150 acres in one of the enterprise zones (Rte 351, Rte 60, and the Turnpike) into a business park but no definite plans have been made.

Homewood Borough is planning to construct several new homes, a shopping center, and an apartment building. The Borough has no zoning or subdivision ordinances that establish lot sizes for on-lot sewage disposal. The soils and slopes in the borough are unsuitable for on-lot sewage disposal. A feasibility study for sewering the entire borough should be performed.

Flow estimates for Homewood Borough and the enterprise zones were developed. Wastewater flow from Homewood Borough was based on 100 GPCD, with an ultimate population of 200 people in Homewood (current population 162), an average daily flow of 20,000 GPD was determined.

Flow estimates from Big Beaver Boroughs growth areas/enterprise zones were not determined as easily. The development within the enterprise zones will be business, commercial, or industrial, and flows will vary depending on the type of development in the zone. The areas of the enterprise zones were planimetered from the zoning map. Then, the Big Beaver Borough zoning ordinance was used to evaluate the number of EDUs to be developed within the enterprise zones. Under Big Beaver's R3 zone, a single family detached dwelling (1 EDU) requires a minimum lot area of 9,000 square feet in a municipally sewered area. The total number of EDUs in the enterprise zones is 4,334. Using 350 gal/day/EDU, the average flow is 1.55 MGD.

TABLE 1-1 SUMMARY OF FLOWS

MUNICIPALITY	AVERAGE DAILY FLOW	FLOWS DETERMINED FROM:
Homewood	0.020 MGD	Ult. Pop x 100 gpcd
Koppel	0.220 MGD	NPDES Permit
Beaver Falls & Surrounding Municipalities	2.9 MGD	1992 Max mon avg flow
Big Beaver	1.55 MGD	ent. zone area/9,000 sq. ft. per EDU
TOTAL	**4.69 MGD**	
Big Beaver		
Rt 60/351 Ent Zone	0.510 MGD	
Rt 60/551 Ent Zone	0.053 MGD	
Rt 18 Ent Zone	0.96 MGD	
Holiday Inn	0.02 MGD	Measured
Big Beaver Plaza	0.002 MGD	Measured

SECTION 2: PHYSICAL DESCRIPTION OF PLANNING AREA

2.1 IDENTIFICATION OF PLANNING AREA BOUNDARIES AND PHYSICAL DESCRIPTION

As illustrated on the Study Area Map, the planning area includes the City of Beaver Falls, the Boroughs of Eastvale, West Mayfield, Patterson Heights, Homewood, Koppel, and Big Beaver, and the Townships of Patterson and White. Portions of these municipalities form the natural drainage basin of the Beaver River north of Beaver Falls. The actual study area is bounded by topographical limits defining the drainage basins of streams which drain into the Beaver River and lie to the east of Pennsylvania Route 60. North Sewickley Township is working independently on an Act 537 Plan, and will supply the City with a projected flow figure to be incorporated into the plant and interceptor design.

2.2 ANALYSIS OF SOILS

A comprehensive soils analysis was performed for the study area. The United States Department of Agriculture, Soil Conservation Services's Soil Survey of Lawrence and Beaver Counties (issued April 1982) was used to identify the soil types and slopes within the study area. They were then evaluated to see if they were suitable for On-Lot Disposal Systems (OLDS) with the use of the Sewage Enforcement Officers (SEOs) Manual.

The soil types found in the study area are listed and defined in this section. The soil type and slope, DER Group, and OLDS limitations are tabulated on Table 2-1 and enclosed in this section.

The maps identifying areas unsuitable for OLDS can be found on Plate 3.

Ag - Allegheny silt loam - Slopes range from 2-15%. It is a deep, well drained soil on high stream terraces on major waterways. Slopes are smooth or convex, generally 100-600 feet long. Irregularly shaped areas range from 3-150 acres.

At - Atkins silt loam - It is a nearly level, deep, poorly drained soil on floodplains in long and narrow areas of 3 to 30 acres.

Bk - Brinkerton Silt Loam - Slopes range from 0-15%. It is a deep, poorly drained soil on foot slopes or benches in residual uplands. Smooth or concave slopes 100 to 600 feet long in 2 to 30 acre areas.

Ca - Canadice Silt Loam - It is a nearly level, deep, poorly drained soil on low lying flats and in depressions in glaciated uplands and along stream valleys. Areas are circular or irregular and range from 1 to 50 acres.

Cd - Canfield Silt Loam - Slopes range from 3 to 25%. It is a deep, moderately well drained soil on broad ridge tops - in glaciated uplands. Slopes are smooth, concave, or convex and are generally 200 to 800 feet long. Areas are irregular in shape and range from 3 to greater than 150 acres.

Ce - Cavode Silt Loam - Slopes range from 0-25% - It is a deep, somewhat poorly drained soil on broad ridgetops in residual uplands. Smooth or concave slopes are 200-600 feet long. Areas are irregular in shape and range from 0-100 acres.

Fn - Frenchtown Silt Loam - Slopes range from 0 to 8%. It is a deep, poorly drained soil on flats and in depressions in glaciated uplands. Slopes are smooth and are 200'-600' long. Irregular

Areas range from 2 to 100 acres.

Gn - Gilpin Silt Loam - Slopes range from 3 to 75%. It is a moderately deep, well drained soil on ridges in residual uplands. Smooth or convex slopes range from 150' to 600'. Irregular areas range from 4 to 60 acres.

GS - Gilpin-Weikert Complex - Slopes range from 3 to 70%. They are moderately deep and shallow, well drained soils on ridges and side slopes in residual uplands. Smooth or convex slopes range from 100 to 600 feet. Long, narrow, and irregular shaped areas range from 2 to 100 acres.

Ho - Holly Series - It is a nearly level, deep, poorly drained soil located on floodplains in long narrow areas of 2 to 100 acres.

Mo - Monongahela Silt Loam - Slopes range from 0 to 15%. It is deep, moderately well drained soil on high stream terraces along major waterways. Smooth, concave, and convex slopes range from 200' to 600'. Irregular shaped areas range from 2 to 20 acres.

Ph - Philo Silt Loam - It is a deep, moderately well drained, nearly level soil located on floodplains in long narrow areas of 3 to 50 acres.

Pu - Purdy Silt Loam - It is a nearly level, deep, poorly drained soil on broad terraces, low lying flats, and in depressions in residual areas are irregular in shape and from 3 to 50 acres.

Ra - Ravenna Silt Loam - Slopes range from 0 to 15%. It is a deep, somewhat poorly drained soil on broad flats and in depressions in glaciated uplands. Slopes are smooth, concave, or convex and range from 100-600 feet in length. Areas are irregular to long and narrow in shape and range from 3 to 100 acres.

Ty - Tyler Silt Loam - Slopes range from 0 to 8%. It is a deep somewhat poorly drained soil on

terraces. Smooth or concave slopes range from 200 to 400 feet in length. Irregular shaped areas range from 5 to 100 acres.

UA - Udorthents, strip mines - Slopes are gradual to steep. Soils are very shaly or very channery loamy materials on ridgetops, side slopes, benches, low flats, and flood plains. They formed in areas where the original soils and bedrock were stripped away to remove the underlying coal or limestone. Areas range from 2 to 200 acres.

Ub - Urban Land-Arents Complex - This consists of Urban land and arents on flood plains, terraces, and uplands. It is mostly along major waterways and highways. Areas are irregular and range from 2 to 200 acres.

Uf - Urban Land Conotton Complex - Slopes range from 0 to 25%. It consists of Urban Land and well drained to excessively drained conotton soil on high terraces, benches, and low lands. Areas are irregular in shape and range from 2 to 300 acres.

Uw - Urban land - Wharton Complex - Slopes range from 0 to 25%. It consists of Urban land and deep, moderately well drained soil on broad ridgetops and benches in residual uplands. Areas range from 2 to 200 acres.

We - Weikert Rock outcrop complex - Slopes range from 25-80%. It consists of steep and very steep, shallow, well drained Weikert soil and rock outcrop on hillsides in dissected residual uplands. Most areas are long and narrow and range from 10 to 100 acres.

Wh - Wharton Silt Loam - Slopes range from 0 to 15%. It is deep, moderately well drained soil on broad ridgetops and side slopes in residual uplands. Slopes are smooth or concave and are 200

to 600 feet long. Irregular shaped areas are 2-50 acres.

WnD - Wharton Gilpin Silt Loam - Slopes range from 15 to 25%. It is deep, moderately well drained on hillsides and side slopes in dissected residual uplands. Smooth or convex slopes are generally 200' to 400' long. Long and narrow areas range from 3 to 30 acres.

Wo - Wooster gravelly silt loam - Slopes range from 3 to 25%. It is deep, well drained on hillsides and uplands. Smooth or convex slopes range from 100 to 500 feet in length. Irregular shaped areas range from 2 to 20 acres.

TABLE 2-1

SYMBOL	SOIL	DER GROUP	#OLDS LIMITATIONS
AgB	Allegheny Silt Loam, 3-8%	6	Slight
At	Atkins Silt Loam	13	Severe - flooding hazard
BkB	Brinkerton Silt Loam, 3-8%	15	Severe - high water table
Ca	Canadice	15	Severe - high water table
CdB	Canfield Silt Loam, 3-8%	14	Severe, high water table
CdC	Canfield Silt Loam, 8-15%	14	Severe, high water table
CeA	Cavode Silt Loam, 0-3%	15	Severe - high water table
CeB	Cavode Silt Loam, 3-8%	15	Severe - high water table
CeC	Cavode Silt Loam, 8-15%	15	Severe - high water table
FnA	Frenchtown Silt Loam, 0-3%	15	Severe - high water table
GnB	Gilpin Silt Loam, 3-8%	9	Severe - depth to rock
GnC	Gilpin Silt Loam, 8-15%	9	Severe - depth to rock

TABLE 2-1 Con't

SYMBOL	SOIL	DER GROUP	#OLDS LIMITATIONS
GnD	Gilpin Silt Loam, 15-25%	9	Severe - Slope limitations, depth to rock
GsB	Gilpin-Weikert Complex, 3-8%		Severe - depth to rock
GsD	Gilpin-Weikert Complex, 15-25%		Severe - Slope Limitations - depth to rock
GsF	Gilpin-Weikert Complex, 25-70%		Severe - Slope limitations - depth to rock
Ho	Holly Series	13	Severe - high water table
MoA	Monongahela Silt Loam, 0-3%	14	Severe - seasonal high water table
MoB	Monongahela Silt Loam, 3-8%	14	Severe - Seasonal high water table
MoC	Monongahela Silt Loam, 8-15%	14	Severe - Slope and seasonal high water table
Ph	Philo Silt Loam	13	Severe - high water table
Pu	Purdy Silt Loam	15	Severe - high water table
RaB	Ravena Silt Loam, 3-8%	15	Severe - high water table
TyA	Tyler Silt Loam, 0-3%	15	Severe - high water table
TyB	Tyler Silt Loam, 3-8%	15	Severe - high water table
UAB	Udorthents, strip mine, gently sloping		Slopes

TABLE 2-1 Con't

SYMBOL	SOIL	DER GROUP	#OLDS LIMITATIONS
UAD	Udorthents, strip mine, Moderately steep		Severe - slopes
UAE	Udorthents, strip mine, very steep		Severe - slopes
Ub	Urban land - Arents Complex		
UfB	Urban land - Conotton Complex, 3-8%	1	Severe - rapid perculation, insufficient filtration and renovation of effluent
UfD	Urban land - Conotton Complex, 15-25%	1	Severe - rapid perculation, insufficient filtration and renovation of effluent
UwB	Urban land - Wharton Complex,	14	Moderate - seasonal high water table
WeF	Weikert Rock Outcrop complex 25-30%	12	Severe - slope limitations, depth to rock
WhB	Wharton Silt Loam, 3-8%	14	Severe - seasonal high water table
WhC	Wharton Silt Loam, 8-15%	14	Severe - slopes; seasonal high water table
WnD	Wharton-Gilpin Silt Loam, 15-25%	14	Severe - slopes; seasonal high water table
WoC	Wooster Gravelly Silt Loam, 8-15%	2	Severe - slopes

2.3 IDENTIFICATION OF GEOLOGICAL FEATURES WHICH WOULD INFLUENCE SEWAGE TREATMENT OR DISPOSAL AND WATER SUPPLIES

A. CONSOLIDATED DEPOSITS

The geological structures evident in the northwestern portion of Beaver County are the result of the sequential formation of bedrock and glacial deposits, and the periferal effects of the formation of the Appalachian Mountains to the east. Plate 5 illustrates the locations of the major geologic groups. The sediments forming the bedrock were deposited in the presence of sea water during the time of Pennsylvanias great coal swamps. In the study area, the youngest of these rocks is the Conemaugh, which is also the most extensively exposed group of rocks in the County. Along the Beaver River and the smaller streams, erosion has exposed rock belonging to the Allegheny Group, and in the northern reaches of the Beaver River and along the Connoquenessing Creek, the valleys have deepened to expose rock of the Pottsville Group beneath the Allegheny Group rock.

Each group contains sandstone, shale, and coal, but in the Conemaugh and Pottsville Groups, sandstone is prominent and coal is poorly developed. In the Allegheny Group, coal and shale are prominent and sandstone beds are generally thin and shaly.

The stresses which formed the Appalachian Mountains also affected the structure of Beaver County. Throughout the County, the rock has been warped into folds or structural ridges and troughs. This is important due to the water-bearing qualities of the various rock formations. Shales crumble easily while sandstone develops clean breaks that serve as conduits for water. The relatively small volume of fractured material, however, is unable to store the large quantities of

water that the spaces between grains of unconsolidated material are capable of storing. In the consolidated deposits, water may be pumped from wells located along fracture lines.

B. UNCONSOLIDATED DEPOSITS

The unconsolidated deposits in Beaver County are present chiefly along the valleys and in the extreme northwest corner of the County, of which the study area is a part. Most of these deposits are remnants of materials carried by glaciers. Glaciers moved into this area at least twice and left a heterogeneous layer of clay, silt, sand, and boulders. As the glaciers melted, much of the rock debris was carried away by the meltwater streams and deposited in the stream valleys. The deposits consist chiefly of sand and gravel. Subsequent erosion deepened the valleys and removed most of the outwash deposits, so that the high terraces are marked by scattered rock left by the first glaciation while evidence of the later glaciation is evident in the lower terraces. Some terraces of streams which did not flow from the ice contain only locally derived material consisting of sand and gravel. These are known as the Carmichaels Formation and are considerably thinner than the glacial terraces, ranging from 20 to 30 feet. The alluvium deposits which form the flood plains of the existing streams contain particles ranging in size from clay to gravel. The average thickness is about 50 feet.

C. WATER YIELD AND QUALITY

The sediments laid down by the ice are generally poorly permeable and are capable of yielding only enough water for a domestic supply. The outwash deposits, present today as terraces, are

highly permeable and may have excellent yields, as do the alluvial deposits. Water from the glacial deposits has an average dissolved solids content of about 425 mg/l and ranges from hard to very hard. High levels of calcium, iron, and magnesium are common, and sulfate and chloride are prominent. Higher yields are obtained from wells in unconsolidated material if the well is drilled to bedrock and screens are installed. In the alluvium, wells aligned parallel to a nearby stream will permit better recharge from the stream when the wells are pumped. Minimum well spacing is determined from the saturated thickness and permeability of the alluvium.

Wells drilled in consolidated rock or bedrock must be placed over fractures where water occurs. The quality of water found in consolidated rock is affected by the amount of flushing of the trapped sea water which has occurred over time. When precipitation has percolated through the soil and rock sufficiently to dissolve small amounts of minerals into the ground water, the resultant solution is a calcium magnesium bicarbonate water containing about 200 mg/l dissolved solids and is a good quality ground water. Below the zone of fresh water is the trapped sea water which has become concentrated so that the dissolved solids content may exceed 200,000 mg/l. This water may invade the overlying fresh water through uncapped wells or mines.

A third factor which may affect the groundwater quality is the presence of pyrite, which is an iron sulfide. Pyrite is associated with coal beds and dissolves to produce iron and sulfuric acid in the ground water, forming acid mine water. This process is accelerated when coal is mined, exposing the pyrite to air and water.

2.3.1 SEWAGE TREATMENT

Within the study area, the areas served by the Beaver Falls and Koppel sewage treatment plants include Beaver Falls, Eastvale, Patterson Heights, portions of Patterson Township and White Township, West Mayfield, and Koppel. Homewood and Big Beaver have no public sewers, and the estimated 1,070 households located in those boroughs utilize on-lot disposal systems . The Holiday Inn and Big Beaver Plaza, located in Big Beaver Borough, use small treatment facilities which discharge to surface waters.

For proper septic tank operation, several factors relating to the geologic structure of the soils must be considered. A seasonal high ground water table can cause on-lot systems to fail due to insufficient renovation capacity. Septic tank absorption fields must be unsaturated, permeable, and of sufficient depth to treat wastewater as it moves through the soil. Depths greater than 20 inches are evaluated for on-lot suitability. Absorption fields in hillsides can permit seepage of raw sewage as effluent saturates the soil layers above bedrock and then travels along the top of the impermeable rock to the edge of the hillside.

Treatment of septic tank effluent as it is discharged through the absorption field is accomplished by the decomposition of organic material by bacteria and other organisms in soil. These organisms require oxygen and water in order to live and to convert effluent into harmless chemical compounds. Soils must be sufficiently permeable to permit air and water to pass through. Soil textures with the proper balance of sand, silt, and clay are conducive to the growth of roots and earthworms which aerate the soil and promote the increase of the microbial population. The increased microbial level in turn, modifies the soil structure, making it more friable. When septic

tank effluent is discharged into the soil at the proper rate, the organic material in the effluent is quickly reduced; however, waterlogged soil destroys the aerobic organisms, producing anaerobic conditions. When oxygen in the soil is reduced, decomposition of waste is delayed and the soil becomes clogged with organic matter including slimes and sulfides. A septic condition results. The untreated wastewater then poses a threat to groundwater supplies from the dissolved solids, ammonia nitrogen, fecal coliforms and streptococci, and nitrites and nitrates. Residual phosphate levels may also be high in the saturated soils. Within the study area, areas of high water table exist which hinder proper septic system operation.

Groundwater contamination potential from a septic tank leaching system is determined by the soil characteristics and the depth to groundwater. The Soil Conservation Service classifies study area soils as having severe limitations for on-lot disposal of sewage due to steep slopes, shallowness, or wetness. The subclassifications termed Canfield and Cavode soils are described as severely restrictive due to slow percolation and wetness. Proposed development in unsewered areas must be evaluated on an individual basis to select the best design for existing soils and topography. Options other than individual on-lot systems include small community treatment facilities.

2.3.2 WATER SUPPLIES

In the Glenshaw soils, the sandstones provide a reliable source of small to moderate supplies of water. Sufficient water for domestic purposes can be obtained at most locations from wells drilled 100 to 150 feet below the water table. Yields large enough for industrial and municipal purposes are more difficult to obtain. In the Allegheny group soils, well yields may differ considerably from

place to place. Yields will be small and the well drawdown large where wells do not penetrate sandstone. The permeable sand and gravel of the Alluvium soils are typically good water sources.

2.4 ANALYSIS OF POPULATION INFORMATION AS RELATED TO SEWAGE FACILITIES NEEDS

2.4.1 EXISTING DATA COMPARISON

Area populations as given by the U.S. Census Bureau are presented in Table 2-2 as follows:

TABLE 2-2

STUDY AREA POPULATION PROJECTIONS

	1960	1970	1980	1990	2000	2010
Beaver Falls	16,240	14,375	12,525	10,687	9,472	8,334
Eastvale	513	421	379	328	296	263
Patterson Hgts	816	777	797	576	511	430
Patterson Twp.	2,930	3,442	3,288	3,074	2,941	2,780
West Mayfield	2,201	2,152	1,712	1,312	1,069	981
White Twp.	1,437	1,747	1,870	1,610	1,564	1,433
Koppel	1,389	1,312	1,146	1,024	924	833
Big Beaver	2,881	2,739	2,815	2,298	2,149	1,896
Homewood	305	212	188	162	144	126

Year 2000 service populations as projected by the State Comprehensive Water Quality Management Plan as compared to actual service populations taken from the above data are presented in Table 2-3 as follows:

TABLE 2-3

	2000 COWAMP	1990 ACTUAL
Beaver Falls	29,330	15,503
Koppel	1,440	1,024
Homewood	2,660	162

The COWAMP projections include Beaver Falls with Bennett Run and Eastvale service areas. Homewood includes Koppel and Bellton service areas. The Beaver Falls actual includes Eastvale, Patterson Heights, 50% of Patterson Township, West Mayfield, and 66% of White Township. The actual populations given represent residential population only, while the COWAMP populations include equivalent dwelling units for commercial and industrial populations. With that in mind, the figures given for Koppel and Homewood appear reasonable, but the Beaver Falls population has been overestimated.

Since the COWAMP Plan was completed during a time of growth and development along the Beaver and Ohio Rivers, its projections regarding the population of the Beaver Falls area are understandably optimistic. Since the population has actually declined due to the closing of local industries, the U.S. Census Bureau figures reflect a more realistic picture of population during the coming ten to twenty years. Therefore, this study will use Census Bureau projections along with anticipated development to predict sewage flows from the study areas.

2.4.2 RESIDENTIAL DEVELOPMENT

During the past ten years, the rate of development of residential areas has seriously declined. Information received from the municipalities involved in this study indicates that no large residential developments are planned. Actual data are somewhat sketchy, but the available information is presented in Table 2-4 as follows:

TABLE 2-4

PROJECTED DEVELOPMENT

Beaver Falls	Normal development of light industrial and commercial property is expected to continue. A new downtown office building housing 50 to 60 employees will be built in 1993; Vesuvius-McDanel will construct a new laboratory. No major residential development is planned.
Patterson Township	In the Beaver Falls collection system area, Cortis Homes plan a small development involving 8 sewer taps at 16th. Street and Darlington Road.
Patterson Heights	Area is fully developed.
White Township	No development other than an occasional one- or two-family residence.
West Mayfield	No planned residential development; limited utilization of an existing steel mill is expected.
Eastvale	No planned development.
Homewood	1993-5: Shopping center - 8 taps, Homes - 3, conversion of school to 6 apartments, conversion of motel to bed & breakfast.
Koppel	No planned development.
Big Beaver	Reference Section 2.4.3.E regarding the Enterprise Zone involving portions of Big Beaver.

2.4.3 FACTORS INFLUENCING DEVELOPMENT

Population growth and decline is typically influenced by various factors. These factors will be discussed below along with their possible effect on the eventual sewage collection and treatment facilities which will be required in the study areas.

A. DRINKING WATER SUPPLIES

Public drinking water is presently supplied to residents by the Beaver Falls Municipal Authority and the Koppel Water Company. Areas without public water are supplied by wells. The geology throughout the study area is well suited to supply well water to residences. Along the Beaver River and Connoquenessing Creek terraces, the soils are of the Pottsville Group, which is an excellent source of water of satisfactory quality. Wells in this group provide an average yield of 30 gallons per minute.

Allegheny Group soils are found along stream valleys in the Beaver River Basin. This formation supplies average well yields of over 15 GPM. The Allegheny Group soils may contain residual sea water, and deep drilling may produce water high in dissolved solids and sodium chloride, potassium, bicarbonate, or sulfate.

The balance of soils in the study area consist of the Conemaugh Group. Like the Allegheny Group soils, they may contain residual sea water, with the resultant high dissolved solids levels. Well yields are somewhat lower than in the Allegheny Group.

This information indicates that lack of potable water will not restrict the development of individual residences. However, water in sufficient quantities to support higher demands may

not be available from wells in the inland areas away from the Beaver River and its tributary streams. In order for this area to fully develop, it will be necessary to provide a source of supply of finished, pumped water, probably from a treatment plant located on the Beaver River. There is also the option of purchasing water; however, this may prove to be prohibitively expensive.

B. GEOLOGY AND TOPOGRAPHY

Soils along the river and stream terraces are of the Pottsville Formation, composed more specifically of Tyler silt loam with scattered areas containing more sand and gravel. The Tyler soils are poorly drained, and runoff is slow. The seasonal water table is high. These conditions create severe limitations for on-site waste disposal and construction of roads and buildings due to wetness and low soil strength. Nevertheless, the Beaver River terraces are sites for industries and residential settlement along the gently sloping areas above the more severe slopes and rock outcroppings which characterize the immediate river banks. The maintenance of natural drainageways and installation of subsurface drains permit construction. Along the terraces, development is possible where slopes are not a restriction.

Along the river and stream valleys, broad areas of Allegheny Group soils follow the drainage basins. In the Allegheny soils, the surface layer consists of silt loam about 7 inches thick. The subsoil extends 44 inches, with friable silt loam in the upper levels gradually becoming more gravelly and sandy. The substratum is very gravelly sandy loam. Permeability is moderate and runoff is medium to rapid depending on the severity of the slopes. Because of

the gravelly substratum, groundwater contamination is possible where on-lot waste disposal is used. Severe slopes may also prohibit on-lot systems. During construction activities, erosion control measures must be used. In general, the Allegheny soilsare well suited to development if waste disposal is provided.

The Conemaugh Group soils making up the balance of soil structures in the study area break down further into Cavode, Gilpin silt loam, and Gilpin-Weikert complex soils. The Cavode soils are sloping, deep, somewhat poorly drained soils on side slopes and benches in residual uplands. The seasonal high water table is only 6 to 18 inches below the surface for a good part of the year. Erosion is a hazard, and if the soil is disturbed, measures are needed to control runoff and sediment. On-lot waste disposal is restricted by these limitations.

The Gilpin silt loam soils, also on side slopes and benches in residual uplands, are better drained than the Cavode soils. The 20" to 40" typical depth to bedrock, however, is a limitation to construction. These soils also present a severe erosion hazard and limitations to on-site waste disposal.

The Gilpin-Weikert soils present similar restrictions to construction and habitation, with the most limiting being the depth to bedrock and severe slopes.

Strip mines also exist in several areas of Big Beaver Borough. During mining activities, the formation of sulfate, or acid-mine water, is accelerated. Pyrite or iron sulfide is normally associated with coal beds, and mining exposes the surfaces of broken rock containing pyrite to water and air. The chemical reactions which take place between the pyrite, air and water produce acid-mine water. Thus, surface water supplies may become contaminated.

The topography in the study area is typical of the western part of the Appalachian Plateaus province. The surface is characterized by rounded hills and steep valleys. Flat upland surfaces are small. Flood plains are present along the Beaver River and Connoquenessing Creek. Much of the upland area lies between 1100 and 1200 feet above sea level. Existing development follows lowland stream and river valleys where roads have been constructed. State Route 18 and State Route 60 travel in a north-south direction. Route 18 between Beaver Falls and Lawrence County is somewhat developed, with the boroughs of Koppel and Homewood adjacent to the state route. State Routes 551 and 351, the Pennsylvania Turnpike, and township roads 631 (Hollowvue Road), 655 (Homewood-New Galilee Road), and 667 (Foxwood Road), and Friendship Road run in an east-west direction. All these roads have experienced some development alongside, but large portions of Big Beaver Borough remain undeveloped. If further development occurs, it is reasonable to assume that close access to roads would be a major factor in the choice of locations.

C. WATER AND WASTEWATER TREATMENT CAPACITY

1. WATER TREATMENT CAPACITY

Water treatment facilities within the study area are situated in the City of Beaver Falls. The Beaver Falls Municipal Authority maintains an intake on the Beaver River to serve an estimated 1970 population of 48,249. The total system GPCD in 1970 was 158 gallons per capita per day, and the average daily water use was 7.81 MGD. The maximum yield possible is 107 MGD. Water allocation permitted was 16 MGD, water storage capacity was 13.9 MG;

filtration plant capacity was 16 MGD.

The Koppel Water Company purchases water from the Western Pennsylvania Water Company, Ellwood District. The State Water Plan predicted no deficiencies in yield, allocation, storage or plant capacity for Koppel or Beaver Falls through the year 2020. Should the development of the central portions of Big Beaver Borough and of Homewood accelerate, new sources of potable water and/or additional pumping and distribution systems from existing or new facilities will be necessary.

2. WASTEWATER TREATMENT CAPACITY

Public wastewater treatment facilities are located in the Borough of Koppel and the City of Beaver Falls. The Koppel plant was designed to treat flows originating in the Borough and has a 220,000 gallon per day permitted capacity The Koppel plant accepts flows originating in the Borough of Koppel only. The Beaver Falls plant treats flows originating in the City, Patterson Heights Borough, portions of Patterson and White Townships, West Mayfield Borough, and Eastvale Borough. The plant is permitted to accept flows of 2.5 million gallons per day.

Both plants have experienced overflows resulting from excess inflow/infiltration. Koppel has performed some rehabilitation to its collection system and has reduced peak flows somewhat. The City of Beaver Falls and its sewer users are under a Corrective Action Plan & Schedule to reduce I/I, and the allocation of new sewer taps is restricted by the PA Department of Environmental Resources. This condition will be in effect as long as a raw sewage bypass at

23rd. Street and 6th. Avenue in the City is active. The City also performed rehabilitative work to its collection system during 1992; however, it is unlikely that I/I work alone could significantly reduce peak flows in the extensive collection system extending throughout the City and surrounding municipalities. The City submitted a plan to construct a relief line between the bypass manhole and the 24" trunk line running to the treatment plant, but the PADER did not approve the plan. An analysis of the capacity of that line and other major conveyor lines is included as part of this report.

Additional factors to be considered under this topic include the treatment of industrial wastewater and septage. At present, the City of Beaver Falls Water Pollution Control Plant accepts no industrial waste or septage. Should the analyses contained in this report, however, determine that a regional approach to wastewater treatment with the Beaver Falls and/or Koppel plants expanded to take in additional flows from the study area or modified, these factors will be considered.

Further information on the Beaver Falls and Koppel plants is contained in Sections 3.1.1 and 3.1.2 of this report.

D. ZONING

The City of Beaver Falls and adjacent municipalities and the Boroughs of Big Beaver and Koppel have enacted zoning ordinances. Homewood Borough is not zoned at present. Homewood, with its location near the Route 18-PA Turnpike interchange, has become a focus for the motel/restaurant business, and indications are that this trend will continue. Control of

land use through zoning is normally a positive factor for businesses and families considering relocation. The revision of existing zoning patterns and the enactment of a zoning ordinance in Homewood would further encourage planned development in the study area.

E. ENTERPRISE ZONE DESIGNATION

In 1993, an Enterprise Zone was designated by the Commonwealth of Pennsylvania involving Beaver Falls, Big Beaver, Koppel, and West Mayfield. The Enterprise Zone program provides an agenda for encouraging private businessmen - entrepreneurs - to invest in the local economy of hard-pressed areas such as the Beaver Valley. Designation as an enterprise zone involves incentives and assistance to form partnerships between public and private entities to create jobs and revitalize the economy. With the decline of the steel industry, population and employment in the Beaver Valley also declined sharply between 1980 and 1985. From a 1979 peak of 80,400, total employment dropped to 51,700 by 1982. In 1960, 48% of employment was in manufacturing, while in 1990, only 14.6% of employment was in the manufacturing area. By 1990, the ratio of families living below the poverty line varied from 13.2% to 24.4% within the Enterprise Zone municipalities.

The plan for development of the Enterprise Zone involves several stratagies:

1. BIG BEAVER BUSINESS PARK

An area of about 300 acres east of the Route 60-PA Turnpike interchange is proposed to be developed as a business park. The 49 sites of 6 acres each are projected as being utilized

during both the short-term and long-range future. Water and sewage line to serve the park are estimated to require a $1.75 million investment to be obtained through tax increment financing.

2. STRENGTHENING OF EXISTING INDUSTRIES

Financial incentives for the expansion of local industries are a stated priority, as well as the attraction of additional industries and businesses.

3. ESTABLISHMENT OF AN INCUBATOR

An incubator for industry is a facility which provides space and business advice for start-up enterprises. A host community provides low rent, management advice, centralized services, and flexible leases to entrepreneurs. Incubators are currently located in Vanport and Chippewa and are operated by the Beaver County COOP. The B & W Laboratory Building and adjacent buildings in West Mayfield are proposed to be utilized.

4. DEVELOPMENT OF THE ROUTE 18 CORRIDOR

The Beaver River terrace between Koppel and Beaver Falls is proposed to be developed as an industrial corridor. The land is zoned for industrial use, is available, and is adjacent to rail and highway transport. Installation of trunk line sewer connecting with the Beaver Falls sewer system to serve the area would be required. A 234 acre site is available. Tracts of land south of the interchange are proposed for a regional distribution center.

5. RE-USE OF VACANT BUILDINGS

Vacant and under-utilized buildings within the zone will be promoted for new uses by

small businesses.

The proposals will require subdivision, land use, and zoning regulation review, which is also included in the Enterprise Zone plan.

Extension and improvement of water and sewerage availability is cited as a critical need for the success of the plan. The $1.75 million investment in utilities would occur during 1994, with total investments of $2,300,000 extending through 1997.

F. TRANSPORTATION ROUTES

The Route 60 link between Beaver and Lawrence Counties was completed in 1992. The link also connects with the Pennsylvania Turnpike in Big Beaver Borough. The new interchange could create a corridor of developmental activity between Routes 60 and 18 and Route 351 and the Turnpike. Plans for a light industrial park in this area are in the very preliminary planning stages, according to the Beaver County Corporation for Economic Development. With the coordinated development of water and wastewater facilities, this area could rapidly develop into a major center for business, industry, and residential development.

SECTION 3 - EVALUATION OF EXISTING WASTEWATER TREATMENT AND CONVEYANCE SYSTEMS

3.1 DESCRIPTION OF WASTEWATER TREATMENT SYSTEMS

3.1.1 CITY OF BEAVER FALLS WATER POLLUTION CONTROL PLANT

The City of Beaver Falls owns and operates the Water Pollution Control Plant located on the Beaver River at the southernmost City limit. The plant, permitted under N.P.D.E.S. number PA0026883, has the following permit limits; as shown in Table 3-1:

TABLE 3-1
BEAVER FALLS WATER POLLUTION CONTROL PLANT
PERMIT LEVELS

Flow Through Plant	2.5 MGD monthly average no daily maximum
Suspended Solids, effluent	30 mg/l, monthly average 45 mg/l max. weekly average
Fecal Coliform, effluent	2000/100 ml monthly, geometric mean
CBOD5, effluent	25 mg/l monthly average 37.5 mg/l max. weekly average

The average hydraulic loading over a five-year period is 2.0 MGD, with a maximum monthly flow of 3.37 MGD in June of 1989 and minimum monthly flow of 1.34 in October of 1991. As is to be expected where the existing collection and conveyance system is old and is

composed of materials such as terra cotta pipe with loose joints, the amount of inflow and infiltration into the sanitary system from rain and groundwater is significant, and plant flows reflect the amount of precipitation occurring over a given time period.

No industrial waste or septage is treated at the Beaver Falls plant.

The point of discharge is the Beaver River. The Beaver River is also the receiving stream of the only existing overflow bypass located at 6th. Avenue and 23rd. Street. The plant is currently under a Corrective Action Plan & Schedule imposed by the PA Department of Environmental Resources. The goal of the CAP & S is the reduction of excess inflow and infiltration into the collection system and the subsequent reduction of overflows and closing of the bypass. There is also a plant emergency bypass where excess flow can be discharged from the primary clarifiers directly to the chlorine contact tank, bypassing the trickling filter and secondary settling facilities. A complete report of the unit process capacities is attached to this report as Appendix B. At present, no work is underway to increase any of those capacities.

The plant is a secondary treatment facility using a trickling filter to remove suspended solids and organic matter from the wastewater. Incoming wastewater undergoes the following unit processes before discharge to the river: barscreening to remove large objects, primary settling to remove settleable solids, biological secondary treatment in the trickling filter, secondary settling, and chlorination. Sludge is removed from the primary settling tanks, pumped to anaerobic (in the absence of oxygen) digesters where the remaining organic matter is decomposed, and then dried on sand and gravel beds prior to disposal at a landfill.

BEAVER FALLS TRUNKLINE SURVEY

The Beaver Falls trunkline was surveyed to evaluate the existing hydraulic capacity of the line. The survey was from the treatment plant's influent line to MH40-5 on 9th Avenue and 25th Street. Some manholes could not be located and some could not be opened. Elevations were set at the treatment plant with as-built invert elevations. Trig leveling was used to set elevations of the manholes in the sewer system. Manholes were opened and depths to inverts were measured. Manholes 125-4 and 124-4 could not be located. Manholes 24-5 and 25-5 could not be opened. The overflow manhole, 16-5, had a large amount of debris accumulated inside of it. The invert readings may be slightly off.

Manhole 130-132, manhole 120 c - 120 b, and manhole 16 - 17A are sections of line that were calculated to have negative slopes. This is probably not true. The errors built into the method of surveying combined with the extremely flat slopes of the interceptor line are the probable reason that the slopes are negative. This shows a need for the redesign of the interceptor. Survey information is presented in Table 3-6.

Tax maps were used in conjunction with the sewer maps to evaluate the total flow each manhole should be receiving. Each property was counted as one EDU. At manhole 18A, a total average flow of 1.07 MGD from 3,050 EDUs is entering a section of line capable of handling a maximum flow of 2.55 MGD. Using a peaking factor of 2.5, the maximum flow at manhole 18A is 2.73 MGD. This could be causing an over-accumulation of sewage resulting in the overflow manhole being in operation.

3.1.2 BOROUGH OF KOPPEL WASTEWATER TREATMENT FACILITY

The Koppel Wastewater Treatment Plant is permitted under N.P.D.E.S. Permit Number 0023434 at 220,000 gallons per day hydraulic loading and 400 pounds per day BOD5 organic loading. The Borough has projected a 1993 equivalent population of 931 EDUs as the service population. This figure includes the effect of the Babcock and Wilcox company located in Koppel. This will result in a projected flow of 137,000 GPD flow and 144 ppd organic loading. The average 1989 flow was 156,000 GPD, and the average organic loading was 159 pounds per day.

No industrial waste is treated at the Koppel plant.

In 1989, the Holiday Inn in Big Beaver Borough on SR 18 requested connection to the Koppel system due to malfunctioning of the Inns treatment facility. The request was denied on the basis of flooding in sections of the collection system.

3.1.3 HOLIDAY INN WASTEWATER TREATMENT PLANT

The Holiday Inn located in Big Beaver Borough on SR 18 maintains an extended aeration sewage treatment plant with a rated capacity of 30,000 GPD. The plant is more than 20 years old and has been cited with a Notice of Violation by the PA Department of Environmental Resources due to inadequate treatment. The extended aeration process is used extensively for prefabricated package plants and requires a relatively low organic loading and long aeration time. Primary sedimentation is usually omitted from the process to simplify the sludge treatment and disposal. Separate sludge wasting is generally not provided but operating experience indicates that problems develop more readily in plants where these facilities have not been provided. A 1989 engineering

study of the plant recommended an analytical program to characterize wastewater and aid in the design of sludge wasting facilities. This program was not conducted, but maintenance improvements were made. Following a Notice of Violation in late 1989, the analytical program was performed using a flow recorder and composite samplers. The results of the study are as follows:

1. The average plant flow is 18,400 GPD as compared to The permitted average flow of 23,000 GPD. Flows were much higher on weekends, and daily peaks occurred at 9:00 pm
2. There is no flow equalization facility to counter surges.
3. Morning surges are caused by normal activity of customers, laundry flows, kitchen discharges, and pool filter backwashing. Oil and grease are not excessive. Residual chlorine from the pool backwashing had no adverse effect, and the pH levels were acceptable.
4. BOD removal is improved by sludge removal, as are suspended solids levels. Effluent BOD and solids levels were unacceptable.
5. A recommendation was made to run the aerators continuously during the day and intermittently at night. To minimize surges, it was recommended that the pool filter be backwashed in the afternoon and laundry be washed in the afternoon or night.
6. If Beaver Falls or Koppel were unable to accept the Inn flows, the plant should be upgraded with the installation of a holding tank, a sludge wasting tank, and a filter on the discharge. A new plant was also recommended as a replacement.

3.1.4 BIG BEAVER PLAZA TREATMENT PLANT

The extended aeration treatment plant servicing the Big Beaver Plaza on State Route 18 north of Beaver Falls was permitted by the PADER on September 16, 1980, to treat up to 0.023 MGD. The permit expired on September 16, 1985, but on October 22, 1992, the PADER extended the permit by letter pending permit issuance. The plant treats raw sewage generated at the Plaza and at the adjacent restuarant, currently averaging 1,640 gallons per day. The plant design capacity is 13,185 GPD.

3.2 DESCRIPTION OF SEWER SYSTEM COMPONENTS

Within the study area, only Beaver Falls and its surrounding communities and Koppel are sewered.

3.2.1 BEAVER FALLS AND SEWER USERS SYSTEMS COLLECTION AND CONVEYANCE SYSTEM

All structures having sanitary facilities within the City of Beaver Falls are required by City ordinance to tap into the public sewers. The collection system therefore, networks throughout the entire City. For mapping purposes, the system is divided into mini-systems (see Appendix A). Exclusive of the 24" conveyor line running along the Beaver River from 11th. Street to the treatment plant, the following lines compose the collection system, as shown in Table 3-2:

TABLE 3-2

CITY OF BEAVER FALLS SANITARY SEWER SYSTEM

Mini-System	8"	10"	12"	15"	18"	20"	MH
3	43,925	3,515	1,400	4,100			147
4	45,715		500		800	4,375	136
5	35,176	1,475	2,738	875	2,550		120
6 & 7	2,100	2,250					10
8	22,750		5,800				110
9	8,900	1,600					40
TOTAL	**158,566**	**8,840**	**10,438**	**4,975**	**3,350**	**4,375**	**563**

A total of 190,544 feet or 36 miles of sewer line comprise the Beaver Falls system.

Acquisition of information on the Joint Sewer Users systems including line lengths and diameters is not within the scope of this study, but the following information on contributory flows has been compiled and presented in Table 3-3:

TABLE 3-3

JOINT SEWER USERS CONTRIBUTORY FLOWS

Average Monthly Gallons Per Day During 1992

Month	Eastvale	Patterson Heights	Patterson Township	White Township	West Mayfield
7	29,164	96,670	158,526	119,505	163,628
8	32,734	184,370	204,334	163,861	162,511
9	29,350	142,585	244,454	192,788	160,058
10	28,403	76,945	131,983	188,731	160,767
11	31,523	124,609	326,651	251,787	232,533
12	30,425	137,087	286,040	238,831	154,687

For the listed months, the Joint Sewer Users flows comprised the following percentages of total plant flow shown in Table 3-4:

TABLE 3-4

COMPOSITION OF BEAVER FALLS
WATER POLLUTION CONTROL PLANT FLOWS

Gallons per Day During 1992

Month	Average Daily Plant Flow	Average Daily Sewer Users Flow	Percentage of Sewer Users Flow
7	2,030,000	567,493	28%
8	2,215,800	747,810	34%
9	2,031,300	769,235	38%
10	1,673,500	586,829	35%
11	2,101,300	967,103	46%
12	2,011,300	847,070	42%

The Beaver Falls and Joint Sewer Users sanitary sewer systems are illustrated in Appendix A.

3.2.2 BOROUGH OF KOPPEL COLLECTION AND CONVEYANCE SYSTEM

The Borough of Koppel is completely sewered with all flows conveyed to the treatment plant. The following data give the approximate line lengths of the various-sized pipe, and are presented in Table 3-5:

TABLE 3-5

4,5,6"	7,290
8"	8,955
10"	780
12"	1,430
14"	2,025

The Koppel Borough sewer system is illustrated in Appendix C. Specific data on the capacities of the collectors and conveyor lines is unavailable, but the Borough has experienced flooding during rainfall. In the summer of 1989, lines along Sixth Avenue overloaded, possibly due to surcharging at manhole 6, a confluence point at the end of Arthur Avenue. The effluent line from this manhole is a 12" line, and influent lines include a 14", an 8", and a 4" force main from the Luria Brothers property which was formerly B & W property. The flooding was relieved following cleaning of the affected lines. The Borough also began a program of televised inspections and flow monitoring. Also, smoke testing of the entire system was performed during 1989, identifying sources of extraneous inflow which were then eliminated.

3.3 IDENTIFICATION OF AREAS USING ON-LOT SUBSURFACE SEWAGE DISPOSAL SYSTEMS

Areas using on-lot sewage disposal systems have been identified in Section 4.1.

TABLE 3 - 6

Evaluation of Existing Sewer Line Capacity

From Manhole	To Manhole	Length	From Invert	To Invert	Diameter (Inches)	Slope	Capacity (MGD)
16	17a	46.88	750.11	749.61	18	0.0107	7.0796
17a	17b	213.25	749.75	748.88	24	0.0041	9.4389
17b	18a	170.64	748.73	747.89	24	0.0049	10.3682
18a	50	238.53	747.22	746.89	18	0.0014	2.5498
50	79a	444.18	746.63	745.71	20	0.0021	4.1334
79a	80b	446.12	745.1	744.1	20	0.0022	4.3000
80b	123	522.78	743.88	742.27	20	0.0031	5.0402
123	126	712.26	741.97	736.1	20	0.0082	8.2450
126	127	190.56	736.06	735.66	20	0.0021	4.1611
127	128	363.06	735.07	734.03	20	0.0029	4.8609
128	129	361.86	733.99	732.48	20	0.0042	5.8669
129	130	72.86	732.45	732.48	20	-0.0004	ERR
130	132	20.38	732.25	732.2	20	0.0025	4.4986
132	133	288.05	732.18	730.95	20	0.0043	5.9349
133	135a	358.01	730.95	729.7	20	0.0035	5.3666
135a	135	352.34	729.7	728.32	24	0.0039	9.2484
135	136	151.47	728.3	727.46	24	0.0055	11.0048
136	110	378.33	729.47	728.41	24	0.0028	7.8221
110	109	275.56	728.31	727.59	24	0.0026	7.5538
109	108	658.25	727.59	725.52	24	0.0031	8.2870
108	107	566.29	725.44	723.86	24	0.0028	7.8058
107	106	395.3	723.77	722.72	24	0.0027	7.6162
106	106a	39.1	722.45	722.39	24	0.0015	5.7889
106a	47	643.11	722.31	720.55	24	0.0027	7.7307
47	48	40.33	720.36	720.17	24	0.0047	10.1431
48	49	172.56	720.13	719.68	24	0.0026	7.5464
49	49a	79.89	719.7	719.65	24	0.0006	3.6970
49a	251	415.9	719.26	718.16	24	0.0026	7.5999
251	120e	410.33	717.93	716.93	24	0.0024	7.2952
120e	120d	60.75	716.73	716.46	24	0.0044	9.8518
120d	120c	249.18	715.97	715.07	24	0.0036	8.8812
120c	120b	59.77	714.87	715.47	24	-0.0100	ERR
120b	120a	45.45	714.97	714.45	24	0.0114	15.8067
120a	1	248.1	713.25	713.17	24	0.0003	2.6536

3.4 IDENTIFICATION OF UNPERMITTED COLLECTION AND DISPOSAL SYSTEMS

Unpermitted collection and disposal systems have been identified in Section 4.5

3.5 IDENTIFICATION OF SLUDGE GENERATION, TRANSPORT, AND DISPOSAL METHODS

3.5.1 CITY OF BEAVER FALLS

The Beaver Falls Water Pollution Control Plant produces 1.4 dry tons of sludge per day. The sludge is wasted from the digesters at approximately 5% solids and then is dried on sand and gravel drying beds to over 20% solids. The sludge is landfilled following removal from the drying beds. The treatment plant is owned and operated by the City of Beaver Falls, which is responsible for sludge disposal.

3.5.2 BOROUGH OF KOPPEL

The Koppel Wastewater Treatment Plant produces 3,500 gallons of sludge per year. Sludge is digested in aerated settling tanks until it reaches an approximate 3.2% solids level. The sludge is pumped from the holding tank as required. The treatment plant is owned and operated by the Borough of Koppel, which is responsible for sludge disposal.

3.5.3 HOLIDAY INN TREATMENT PLANT

The extended aeration treatment servicing the Holiday Inn in Big Beaver produces

approximately 3,500 gallons of sludge per month during periods of low occupancy. During the months of July, August, and September when occupancy is highest, as much as 7,000 gallons of sludge may be disposed each month. During May, June, and November of 1992, no sludge was disposed. The sludge is pumped by a private hauler and disposed at a permitted agricultural utilization site in Morgantown, West Virginia.

3.5.4 BIG BEAVER PLAZA

Between 3,000 and 4,000 gallons of sludge at a range of 0.4% to 6.4% solids is removed each month from the Big Beaver Plaza treatment plant. Since the plant has no sludge holding facility, the sludge is removed by a private hauler and disposed at an agricultural utilization site in West Virginia.

3.5.5 BOROUGH OF BIG BEAVER SEPTAGE SLUDGE

The Borough has a 1990 population of 2,298 persons, with all households using septic systems for sewage disposal. Individual homeowners are responsible for arranging for pumping and disposal of septage, with the hauler contracting for disposal at a land application site or treatment plant. Using a sludge generation rate of 90.9 gallons per person per year as calculated in the Beaver County Municipal Waste Management Plan of 1991, the total residential septage sludge generation in the Borough is 208,888 gallons per year. Septic tanks should be pumped every 3 to 5 years, normally by a septage hauler equipped with a vacuum tank truck. Information in the Waste Management Plan indicates that the septage is either applied to land for disposal or agriultural

utilization or is disposed at a treatment plant. Both the Monaca Wastewater Treatment Plant and the New Castle Sewage Treatment Plant accept septage sludge. With all waste haulers required to have a County license as of 1992, the County will be better able to oversee and regulate septage haulers and disposal methods. Since many septage haulers operating in Beaver County are located out-of-state, it is not yet possible to track the quantities and disposal sites of septage sludge.

3.5.6 BOROUGH OF HOMEWOOD SEPTAGE SLUDGE

With a 1990 population of 188, the Borough of Homewood generates 17,090 gallons of septage sludge per year, as calculated using the methods of 3.5.4 above. Homewood septage is similarly pumped and trucked by haulers for disposal on land or at a sewage treatment plant. As in Big Beaver, the individual is responsible for arranging for pumping and disposal.

SECTION 4 - EVALUATION OF WASTEWATER TREATMENT NEEDS

4.1 IDENTIFICATION OF AREAS USING ON-LOT DISPOSAL TECHNOLOGY

Big Beaver Borough and Homewood Borough utilize on-lot disposal technology almost exclusively. The exceptions are the Holiday Inn (north of the Turnpike interchange with Route 18 and west of Route 18) and the Big Beaver Plaza (north of Wallace Run and east of Route 18). These two businesses have small flow sewage treatment plants which ultimately discharge to the Beaver River. Beaver Falls, Eastvale, Patterson Heights, Patterson Township, West Mayfield, and White Township are extensively sewered to the Beaver Falls sewage treatment plant. The Borough of Koppel is also sewered to its own sewage treatment plant. Beaver Falls and Koppel discharge effluent to the Beaver River.

Homewood Borough and the area of Big Beaver just west of Koppel are the most densely populated unsewered areas. The businesses along Route 18 from Beaver Falls to Koppel are also unsewered. Some of these businesses are motels, restaurants, and a truck stop, which are large consumers of water.

4.2 ANALYSIS OF MALFUNCTIONING ON-LOT SYSTEMS

Any household that utilizes on-lot sewage disposal technology must obtain a permit from the local Sewage Enforcement Officer (SEO). Individual lots are checked for soil type, slope, isolation distances, percolation rates, depth to shallowest indication of the water table, and depth to bedrock. The type of on-lot system used would depend on the above site conditions.

A list of the permit applications for approximately the past three years for the study area was obtained from Dan Baker, Jr. He is the SEO for Big Beaver Borough and Homewood. Examination of these applications indicates that denials for new and repair systems are scattered throughout the study area. The depth to first indication of the water table was as low as 6" and the depth to bedrock was as low as 8". Absorption fields must also maintain minimum isolation distances from water supply wells (100 feet), swimming pools (10 feet), driveways (10 feet), surface drainage ways (10 feet), property lines (10 feet), surface water (50 feet), slopes greater than 25% (10 feet), rock outcrops (10 feet), other absorption fields (20 feet), and pressurized water lines (10 feet). The SEO manual severely restricts the use of septic tanks on slopes greater than 25%. This makes the repair of malfunctions in Homewood difficult because the lot sizes are small, many houses were constructed without sewage facilities planning, and the slopes are extremely steep. In addition, Homewood does not have any zoning or subdivision ordinances dictating lot sizes when on-lot systems are used. Therefore, meeting the isolation distance requirements would be extremely difficult in Homewood.

Big Beaver Borough also uses on-lot disposal almost exclusively. It has the same problem as Homewood with slopes and soils. Big Beaver does have zoning and subdivision ordinances. The

zoning ordinance sets the minimum lot size for a single family detached dwelling utilizing on-lot disposal at 30,000 sq. ft. in R1 zones and 20,000 sq. ft. in R2 zones. With lots that are that small, meeting isolation distances could be difficult when repairs of malfunctions are necessary. Also, the soils and slopes in the Borough are not agreeable to on-lot disposal. Therefore, Big Beaver should consider changing its zoning ordinance to set a minimum lot size of one acre in all zoning districts when on-lot disposal is to be used. This will allow for the replacement of absorption areas and help maintain minimum isolation distances when repairs become necessary.

The problems of inadequate soils and site conditions have led to the problem of surface disposal of septic tank effluent. A drive through survey of Homewood and Big Beaver (around Homewood) revealed suspicious looking pipes discharging to road swales. These pipes were noticeably smaller than roof drain pipes. In some instances, the pipes were directly in line with the homes septic tank. In one instance behind a business along Route 18 in Big Beaver just south of Homewood, black water was observed discharging to the ground from three 6" terra cotta pipes. A letter dated May 3, 1984 from Dan Baker, Jr., the SEO, to David W. Borneman, Project Manager - DER Water Quality, documents point source discharges in Homewood and along Route 18 by the turnpike interchange. A recent field survey and discussions with Dan Baker, Jr. revealed that none of these problems have been corrected.

4.3 ANALYSIS OF POTENTIAL MALFUNCTIONS DUE TO SOILS OR SITE CONDITIONS

The soils present in the study area were evaluated for suitability for on-lot sewage disposal. The Department of Environmental Resources Sewage Enforcement Officers Manual lists the following soils

as unsuitable for on-lot disposal:

At - Atkins silt loam
Bk - Binkerton silt loam
Ca - Canadice silt loam
Ce - Cavode silt loam
Fn - Frenchtown silt loam
Ph - Philo silt loam
Pu - Purdy silt loam
Ra - Ravena silt loam
Ty - Tyler silt loam
UAB - Strip mine
UAD - Strip mine
UAE - Strip mine

In addition, soils with slopes greater than 15% would have severe limitations for on-lot sewage disposal.

Examination of the soil survey map for Beaver County shows that the entire study area is a potential malfunction area. Homewood Borough has a high malfunction potential. The soils are unsuitable, the slopes are steep, lot sizes are small, and ordinances regulating lot sizes do not exist. The residential development just west of Koppel is a potential malfunction area because of the population density. The homes along Friendship road, Aley Hill Road, and old Route 18 are also potential malfunction areas.

The area bounded by Beaver Falls, Route 18, the county line, and the Beaver River has been declared an enterprise zone by the Department of Community Affairs. This zone was chosen for development to take advantage of the Pittsburgh-Lake Erie rail system and Route 18. Commercial and industrial development is hoped to occur. Again, soils and slopes would limit the use of on-lot disposal. The best way for development to occur is by extending sewer service.

4.4 ANALYSIS OF OTHER POTENTIALLY MALFUNCTIONING SYSTEMS

Homewood Borough has been developed along steep slopes with no subdivision or zoning ordinances limiting lot sizes. If malfunctions occur, repairs will be extremely difficult because of isolation distances, soils, and slopes. For absorption fields that have reached the end of their useful life, replacement areas will be difficult to find. Additions to homes may have added excessive flows to smaller septic tanks causing malfunctions. Improper installation may have occurred because of a lack code enforcement from Homewood because of no zoning or subdivision ordinances.

Big Beaver does not have the same density of development as Homewood but it does have the same problems of soils and slopes limiting on-lot disposal. Big Beaver's zoning ordinance establishing a minimum lot size of 30,000 sq. ft. in R1 districts, 20,000 sq. ft. in R2 districts, and 20,000 sq. ft. in R3 districts may not give homeowners the ability to correct malfunctions. Also, Big Beaver does not have minimum lot requirements for commercial districts when on-lot disposal is used. This could have led to improper designs of disposal sytems along the commercial district near the turnpike interchange. These businesses are high volume water users (truck stop, motels, restaurants, etc.) and the absorption areas for the initial design of the disposal systems did not coordinate lot size with sewage flow. Without on-lot zoning requirements in the commercial districts, these problems will occur with any future commercial development along Route 18.

4.5 IDENTIFICATION OF AREAS UTILIZING ILLEGAL DISPOSAL SYSTEMS

In a letter dated May 3, 1984 from Dan Baker to David Borneman of the DER, Homewood Borough was documented to have numerous sewer connections to storm drains. The storm drains discharge to Clarks Run. There are also cases in Homewood and the area of Big Beaver adjacent to Homewood where sewer laterals discharge to highway/roadway berms. The extent of this practice is fairly common because of the poor soils and severe slopes. There are no known borehole disposal or community on-lot systems.

SECTION 5 - PLANNING AND FACILITIES ALTERNATIVES

5.1 IDENTIFICATION OF ALTERNATIVES

5.1.1 COLLECTION, CONVEYANCE, AND TREATMENT ALTERNATIVES

a. Alternative H-1

Conventional sewers will be laid in the Borough of Homewood. For this alternative, a small pump station will be required. This alternative will serve 73 existing homes/businesses and a possible 10 future properties. This alternative is shown on Figure 5.1.1. Table 5-1 below provides a cost estimate for this layout.

TABLE 5-1

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
8" PVC Sewer	8495 LF	35.00	297,325.00
Pump Station	1 EA	50,000.00	50,000.00
4" DIP Force Main	3450 LF	25.00	86,250.00
Manholes	31 EA	2,000.00	62,000.00
Railroad Boring	50 LF	150.00	7,500.00
Highway Boring	50 LF	150.00	7,500.00
Pavement Restoration	3500 SY	27.00	94,500.00
Service Connections	73 EA	500.00	36,500.00
		Construction Cost	= 641,575.00
		Engineering	= 77,000.00
		Contingencies	= 64,160.00
		TOTAL PROJECT COST	= $782,735.00

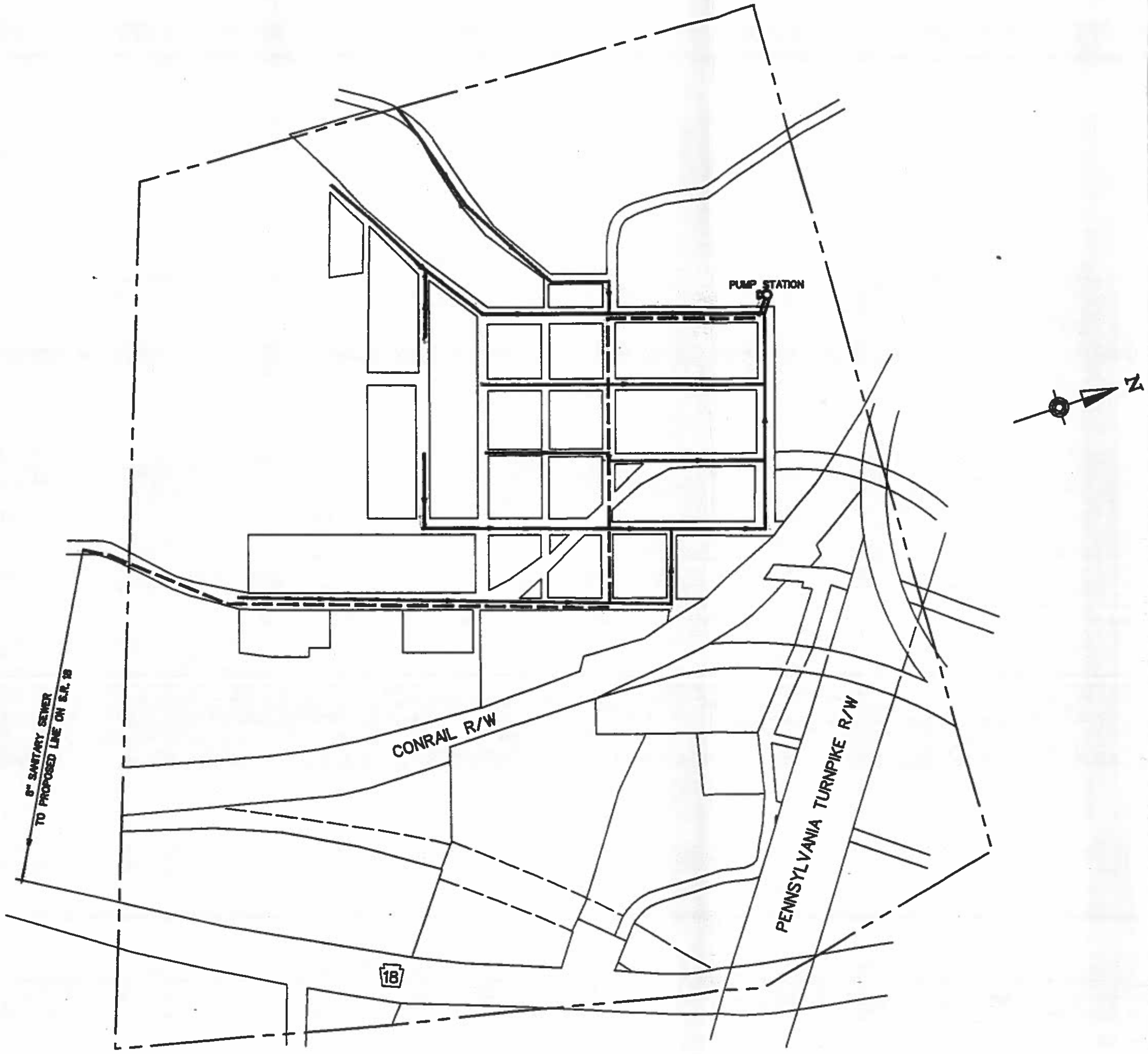


FIGURE 5.1-1 (A)
ALTERNATIVE H-1
CONVENTIONAL SEWERS AND
PUMP STATION

b. Alternative H-2

Small diameter sewers will be laid in the Borough of Homewood. This system will follow the same sewer layout as Alternative H-1. To provide for reduced infiltration and inflow, all existing septic tanks will be replaced. Table 5-2 provides a cost estimate for this alternative.

TABLE 5-2

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
4" PVC Sewer	7610 LF	25.00	$190,250.00
Cleanouts	31 EA	1,000.00	31,000.00
Septic Tanks	73 EA	1,000.00	73,000.00
Pump Station	1 EA	50,000.00	50,000.00
4" DIP Force Main	3450 LF	25.00	86,250.00
8" Receiving Sewer	885 LF	35.00	30,975.00
Manholes	3 EA	2,000.00	6,000.00
Railroad Boring	50 LF	150.00	7,500.00
Highway Boring	50 LF	150.00	7,500.00
Pavement Restoration	2500 SY	27.00	67,500.00
Service Connections	73 EA	500.00	36,500.00
		Construction Costs	= $586,475.00
		Engineering	= 70,400.00
		Contingencies	= 58,650.00
		TOTAL PROJECT COST	= $715,525.00

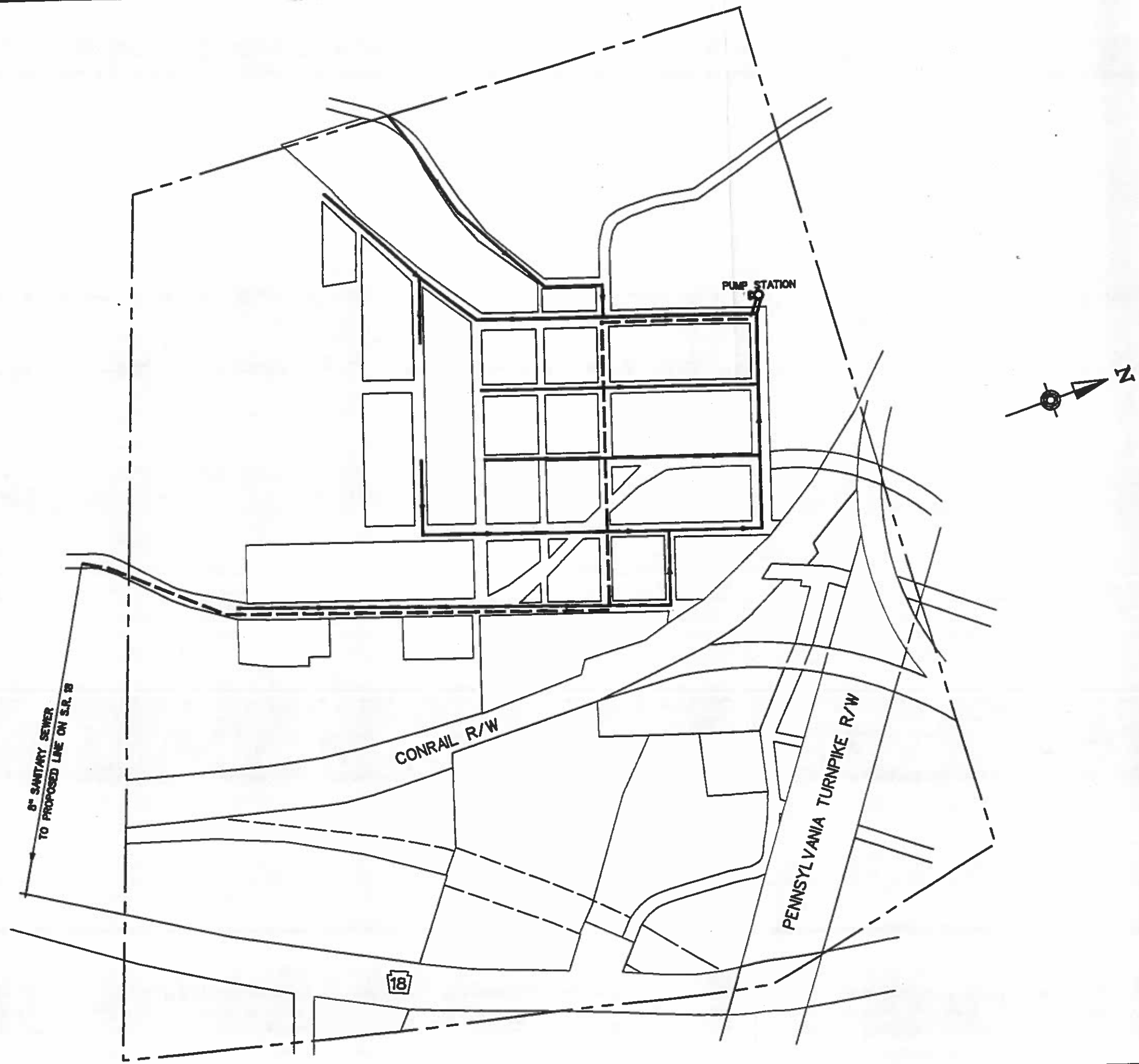


FIGURE 5.1-1 (B)
ALTERNATIVE H-2
SMALL DIAMETER GRAVITY
AND PUMP STATION

c. Alternative H-3

This alternative includes the use of both small diameter gravity and septic tank effluent pumping (STEP) sewers. Like alternative H-2, existing septic tanks will be replaced. It will serve 74 existing homes and a possible 10 future homes. The sewer layout is shown on Figure 5.1-2, and Table 5-3 below lists estimated costs.

TABLE 5-3

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
Septic Tanks	74 EA	1,000.00	74,000.00
STEP Pumps	43 EA	1,000.00	43,000.00
2" STEP Force Main	2,950 LF	20.00	59,000.00
Pump Station	1 EA	50,000.00	50,000.00
3" Force Main	3,000 LF	25.00	75,000.00
4" Sewer	2,714 LF	25.00	67,850.00
Cleanouts	11 EA	1,000.00	11,000.00
8" Receiving Sewer	885 LF	35.00	30,975.00
Manholes	3 EA	2,000.00	6,000.00
Railroad Boring	50 LF	150.00	7,500.00
Highway Boring	50 LF	150.00	7,500.00
Pavement Restoration	1,925 SY	27.00	51,975.00
Service Connections	74 EA	500.00	37,000.00
		Construction Cost	= $520,800.00
		Engineering	= $62,500.00
		Contingencies	= $52,080.00
		TOTAL PROJECT COST	= $635,380.00

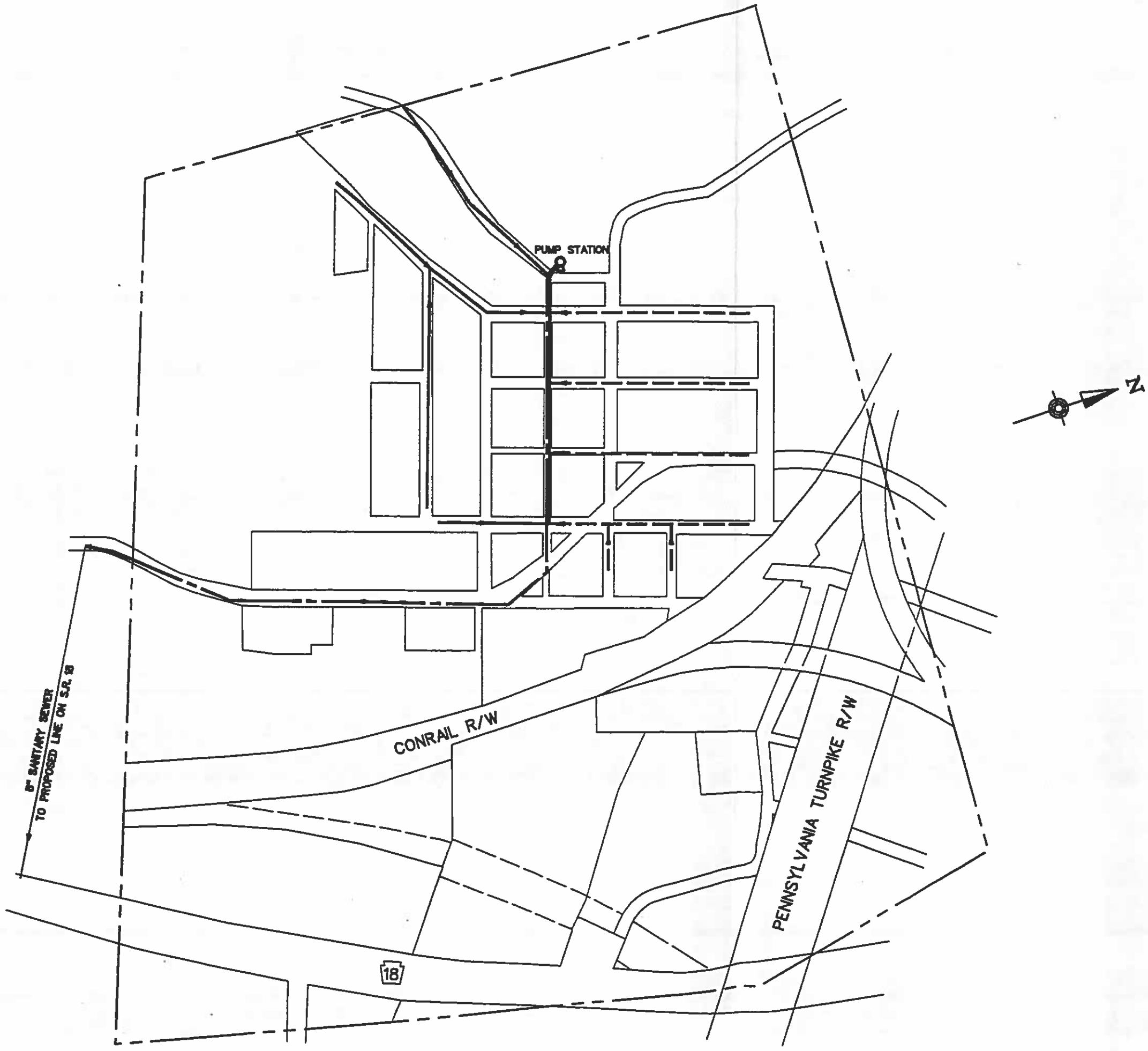


FIGURE 5.1-2
ALTERNATIVE H-3
SEPTIC TANK EFFLUENT PUM
SMALL DIAMETER GRAVITY SE
COMBINATION

d. Alternative H-4

The Borough of Homewood will be sewered as in Alternative H-1, but instead of a pump station to convey the sewage to Beaver Falls, the sewage will be treated in the Borough by a package treatment plant. Due to the small service area, flow equalization will be required. Clark's Run, which is the receiving stream for this alternative, has an upstream drainage area of approximately only 3.8 square miles, so advanced treatment will probably be required. The costs are presented in Table 5-4 and the layout is shown on Figure 5.1-3.

TABLE 5-4

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
8" PVC Sewer	8,000 LF	35.00	280,000.00
Manholes	32 EA	2,000.00	64,000.00
Pavement Restoration	2,700 SY	27.00	72,900.00
Service Connections	73 EA	500.00	36,500.00
Package Treatment Plant	1 EA	200,000.00	200,000.00
Flow Equalization	1 EA	25,000.00	25,000.00
		Construction Cost	= $678,400.00
		Engineering	= $81,410.00
		Contingencies	= $67,840.00
		TOTAL PROJECT COST	= $827,650.00

e. Alternative H-5

Vacuum sewers were considered for Homewood Borough. Information on vacuum sewers was obtained from the EPA's October 1991 Alternative Wastewater Collection Systems manual. Vacuum sewers were recommended for areas that have at least two of the following conditions present:

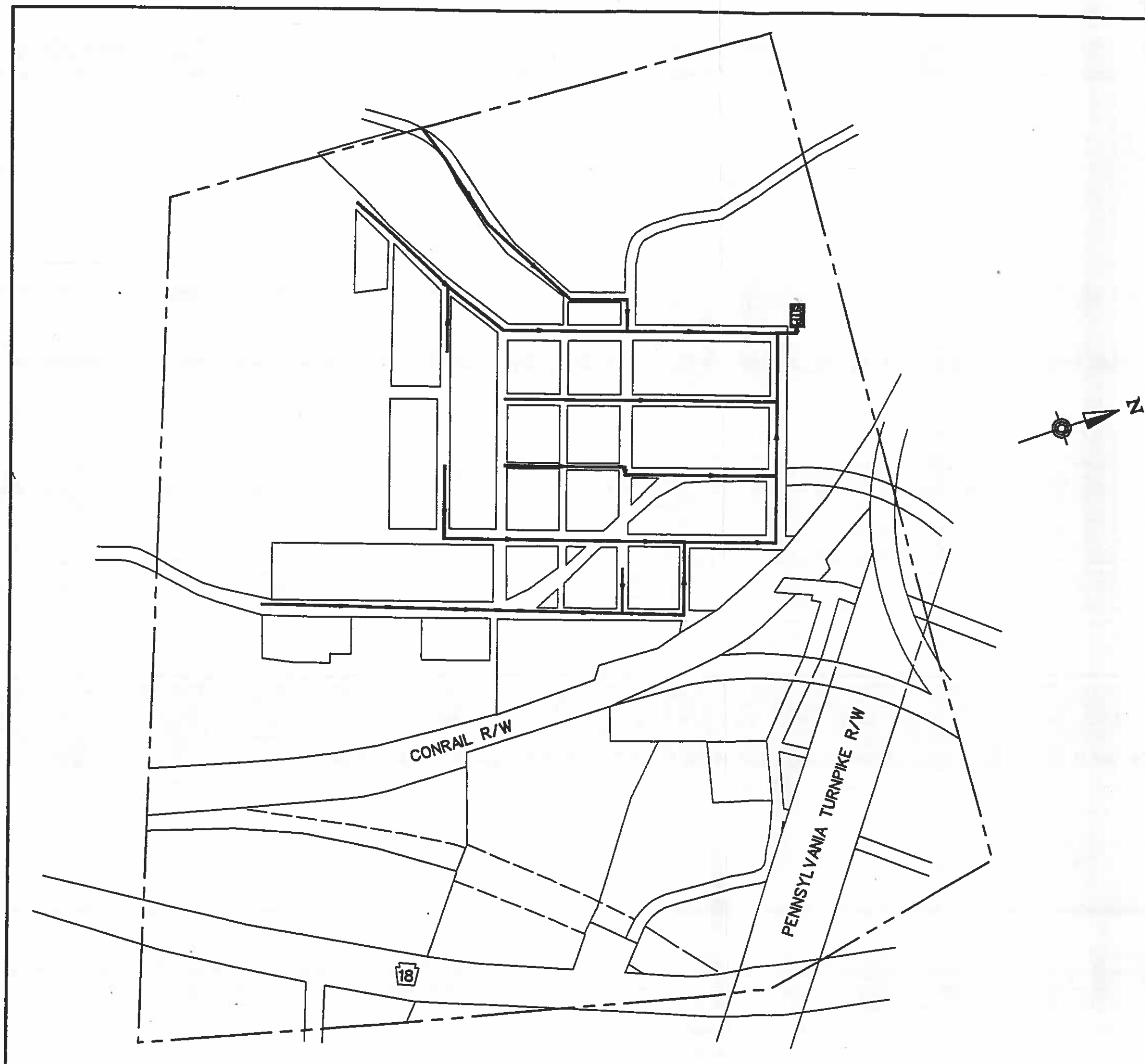


FIGURE 5.1-3
ALTERNATIVE H-4
CONVENTIONAL GRAVITY SEWERS

1. Unstable soil
2. Flat terrain
3. Rolling land with small elevation changes
4. High water table
5. Restricted construction conditions
6. Rock
7. Urban development in rural areas

Homewood has restricted construction conditions, rock, and a high water table, but it also has steep slopes. Because of the slopes, it was determined that vacuum sewers would not be practical in Homewood. It is also known that the vacuum produced by the vacuum station is capable of lifting wastewater only 15-20 feet. Since Homewood has elevation differences much greater than this which must be overcome, vacuum sewers would not be practical in Homewood.

f. Alternative B-1

In this alternative, sanitary sewers will be extended from the City of Beaver Falls to Big Beaver Plaza. This will allow Big Beaver Plaza to convey their sewage to the City. As detailed in Section 1.4, and based on past information, the average daily flow from the Plaza is approximately 0.002 MGD. The peak flow is approximately 0.005 MGD. Based on this flow, a 4" force main would be sufficient to carry the wastewater from Big Beaver Plaza. This alternative is shown on Figure 5.1-4 and cost data is presented in Table 5-5.

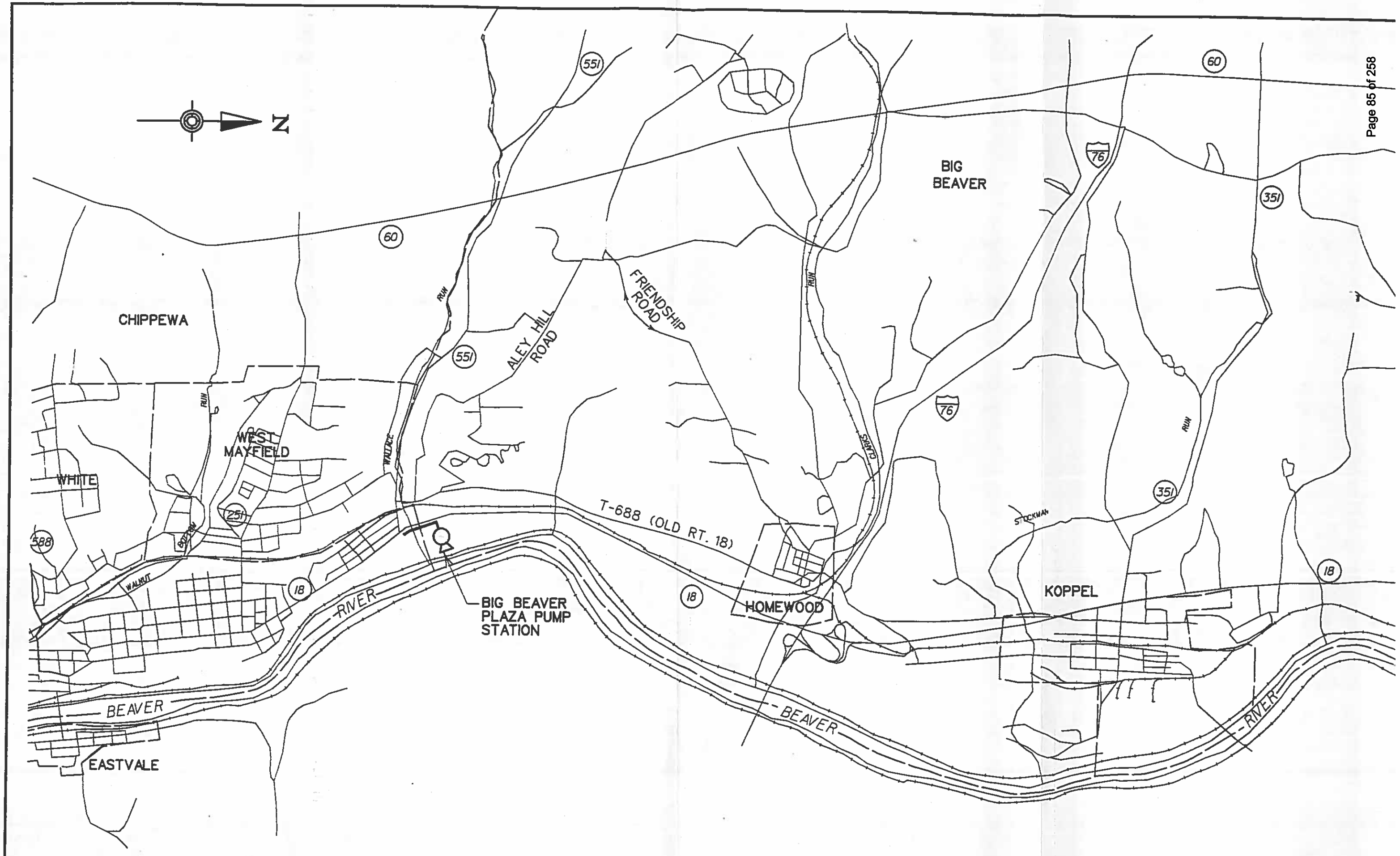


FIGURE 5.1-4
ALTERNATIVE B-1

TABLE 5-5

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
Pump Station	1 EA	70,000.00	70,000.00
4" Force Main	2,500 LF	25.00	62,500.00
Pavement Restoration	650 SY	50.00	32,500.00
		Construction Cost	= $165,000.00
		Engineering	= 19,800.00
		Contingencies	= 16,500.00
		TOTAL PROJECT COST	= $201,300.00

g. Alternative B-2

Sanitary sewers will be extended to the Borough of Homewood. This will allow the Borough, Big Beaver Plaza, and approximately one-fifth of the Route 18 Enterprise Zone to convey sewage to the City of Beaver Falls. From Section 1.4, average flows will be 0.02 MGD for Homewood, 0.002 MGD for Big Beaver Plaza, and 0.192 MGD for the portion of the enterprise zone, for a total of 0.214 MGD. Peak flow is anticipated to be 0.535 MGD. This alternative is shown on Figure 5.1-5. Table 5-6 shows cost estimates for this alternative.

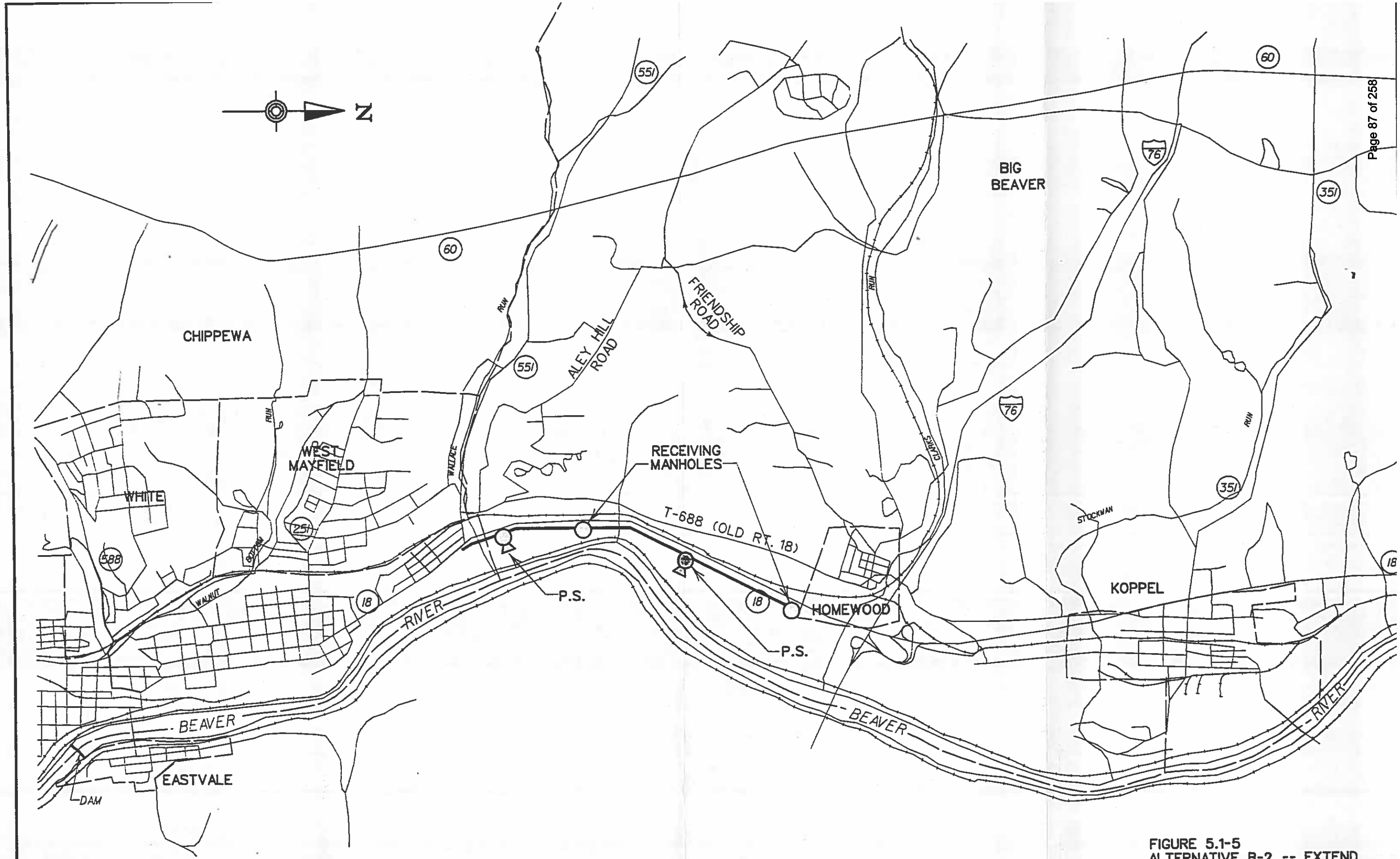


FIGURE 5.1-5
ALTERNATIVE B-2 -- EXTEND SEWER SERVICE TO THE BOROUGH OF HOMEWOOD.

TABLE 5-6

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
8" Sewer Line	5525 LF	35.00	193,375.00
Manholes	22 EA	2,000.00	44,000.00
Pump Station	2 EA	100,000.00	200,000.00
6" Force Main	3,100 LF	25.00	77,500.00
Stream Crossings	150 LF	150.00	7,500.00
Pavement Restoration	2,710 SY	50.00	135,500.00
		Construction Cost	= $657,875.00
		Engineering	= 78,950.00
		Contingency	= 65,790.00
		TOTAL PROJECT COST	= $802,615.00

h. Alternative B-3

Sanitary sewers will be extended to the Holiday Inn on Route 18. This will allow the Holiday Inn, Homewood, Big Beaver Plaza, and approximately one-half of the Route 18 Enterprise Zone to convey their wastewater to Beaver Falls. The flows are anticipated to be 0.02 MGD from the Holiday Inn, 0.02 MGD from Homewood, 0.002 MGD from Big Beaver Plaza, and 0.48 MGD from the enterprise zone, for a total flow of 0.522 MGD. The peak flow is anticipated to be 1.31 MGD. This alternative is shown on Figure 5.1-6, and costs are shown on Table 5-7.

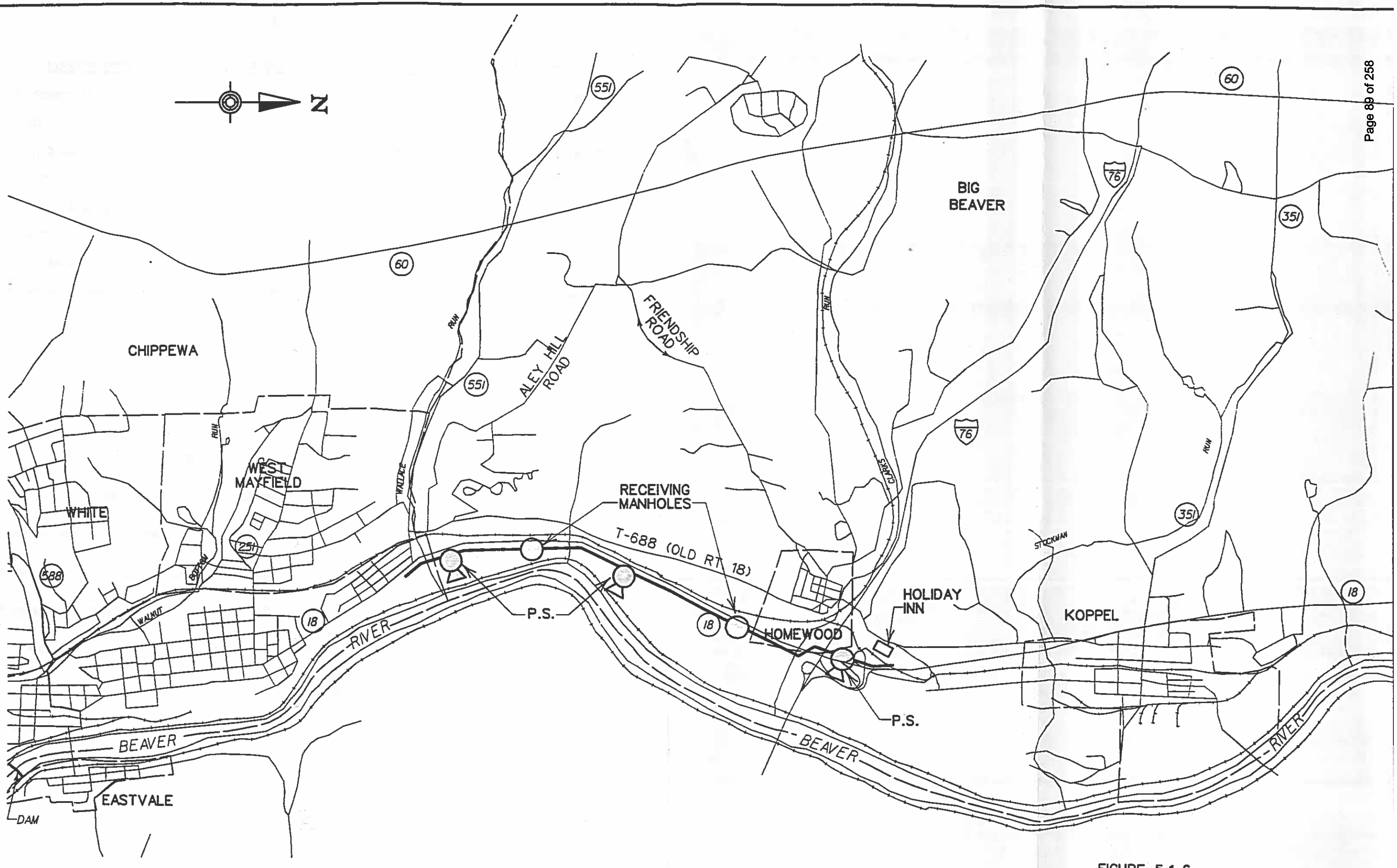


FIGURE 5.1-6
ALTERNATIVE B-3 -- EXTEND SANITARY SEWER SERVICE TO THE HOLIDAY INN SOUTH OF KOPPEL.

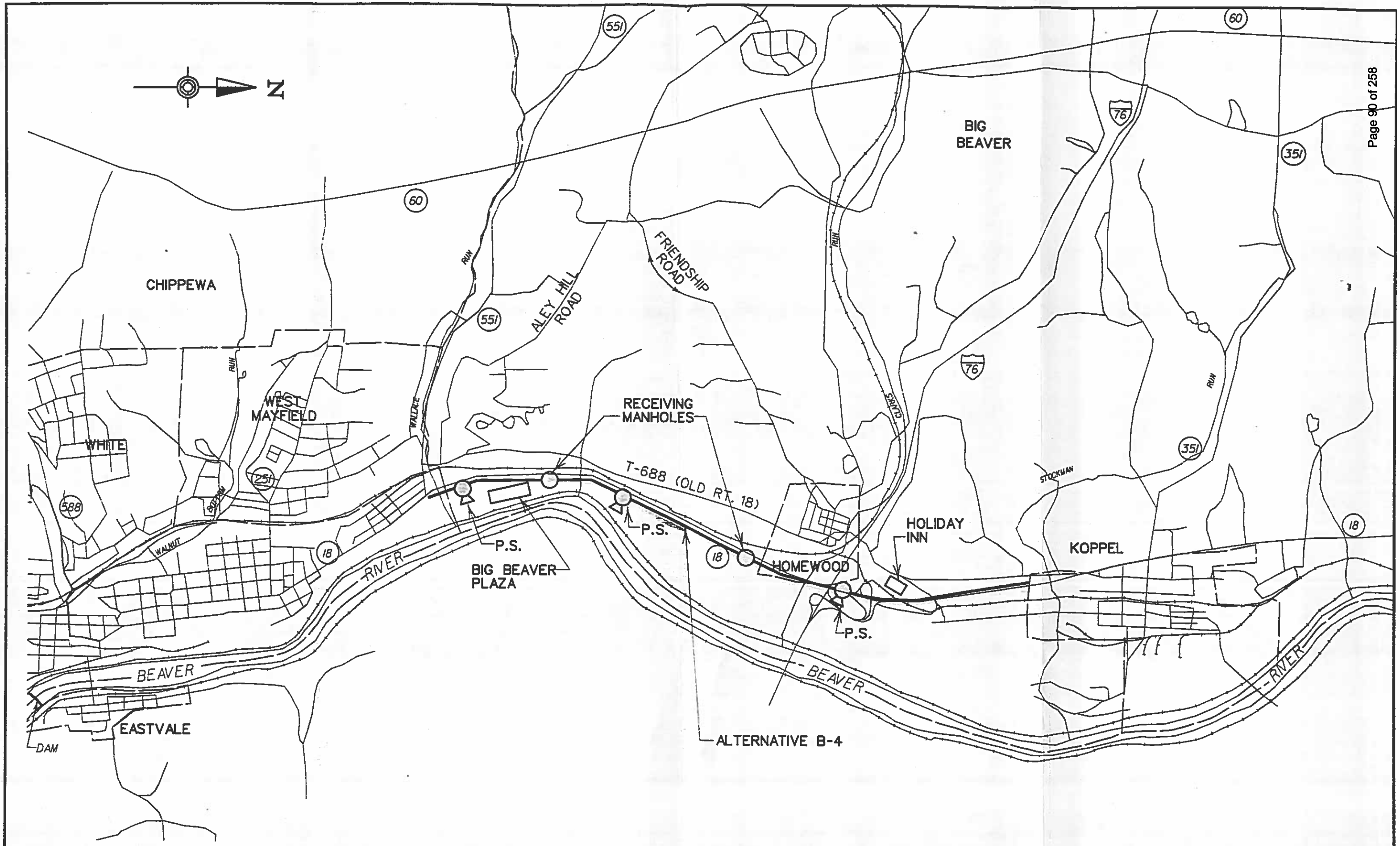


FIGURE 5.1-7
ALTERNATIVE B-4-- EXTEND SANITARY SEWERS TO THE BOROUGH OF KOPPEL.

TABLE 5-7

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
15" Sewer Line	7,050 LF	50.00	352,500.00
Manholes	28 EA	2,000.00	56,000.00
Pump Station	3 EA	100,000.00	300,000.00
8" Force Main	6,000 LF	35.00	210,000.00
Highway Boring	1,500 LF	150.00	225,000.00
Stream Crossing	225 LF	150.00	33,750.00
Railroad Boring	50 LF	150.00	7,500.00
Pavement Restoration	4,350 SY	50.00	217,500.00
		Construction Cost	= $1,402,250.00
		Engineering	= 168,270.00
		Contingency	= 140,225.00
		TOTAL PROJECT COST	= $1,710,745.00

i. Alternative B-4

A sanitary sewer line will be extended to the Borough of Koppel. This will allow Koppel, Homewood, Holiday Inn, Big Beaver Plaza, the Route 18 Enterprise Zone, and the Route 60/351 Enterprise Zone to convey their wastewater to the City of Beaver Falls. The anticipated flows are: Koppel, 0.22 MGD; Homewood, 0.02 MGD; Big Beaver Plaza, 0.002 MGD; Holiday Inn, 0.02 MGD; Rt 18 Enterprise Zone, 0.96 MGD; and Route 60/351 Enterprise Zone, 0.51 MGD. This will result in a total flow of 1.732 MGD with a peak flow of 4.33 MGD. This alternative is shown on Figure 5.1-7 and costs are tabulated in Table 5-8.

TABLE 5-8

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
15" Sewer Line	7,200 LF	50.00	360,000.00
18" Sewer Line	2,400 LF	55.00	132,000.00
Manholes	38 EA	2,000.00	76,000.00
Pump Station	3 EA	100,000.00	300,000.00
10" Force Main	6,000 LF	40.00	240,000.00
Highway Boring	1,500 LF	150.00	225,000.00
Railroad Boring	50 LF	150.00	7,500.00
Stream Crossing	225 LF	150.00	33,750.00
Pavement Restoration	5,640 SY	50.00	282,000.00
		Construction Cost =	$1,656,250.00
		Engineering =	198,750.00
		Contingencies =	165,625.00
		TOTAL PROJECT COST =	$2,020,625.00

j. Alternative B-5

A cost estimate was prepared for sewering the Route 60/Route 551 Enterprise Zone. The flow expected from this area is 52,500 GPD. It was determined from dividing the enterprise zone area of 1,350,000 sq. ft. by 9,000 sq. ft. per EDU. This gave a total of 150 EDU's or 52,500 GPD. Using a peaking factor of 2.5 (131,250 gal/day) and a minimum slope of 0.001 ft/ft, the size of the sewer line is 6.31". Therefore an 8" diameter line would be adequate. The sewer line would follow Wallace Run and pump to a manhole in the Beaver Falls or West Mayfield system.

A total cost breakdown is supplied in Table 5-9 below, and is shown in Figure 5.1-8.

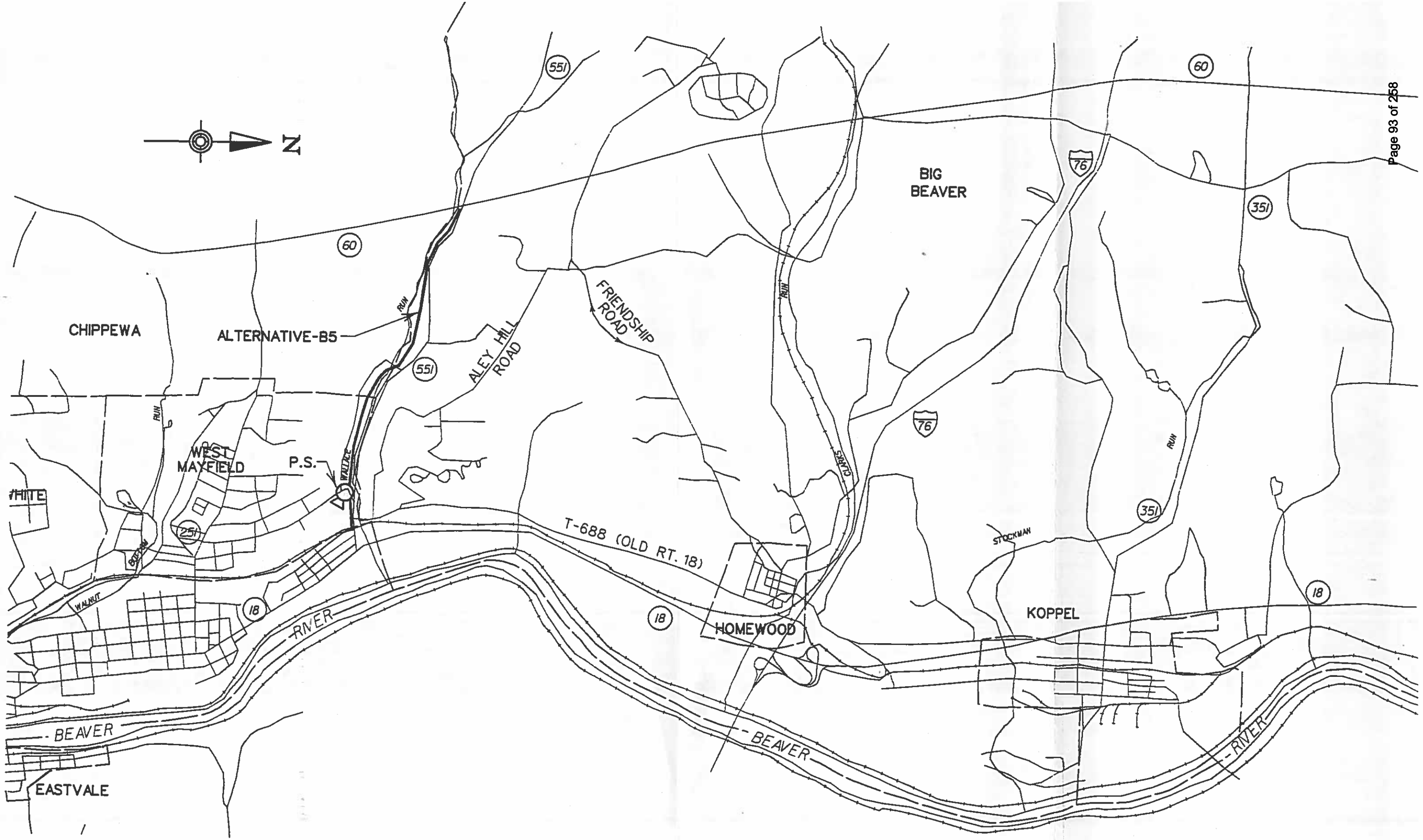


FIGURE 5.1-8
ALTERNATIVE-B5

TABLE 5-9

ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
8" DIA. PVC Sanitary Sewer	7,250	LF	35.00	253,750.00
Manholes	29	EA	2,000.00	58,000.00
Pump Station	1	EA	70,000.00	70,000.00
6" DIA D.I.P. Force Main	1,500	LF	25.00	37,500.00
Stream Crossings	30	LF	150.00	4,500.00
Railroad Crossings	100	LF	150.00	15,000.00
Pavement Restoration	500	SY	50.00	25,000.00
			Construction Cost	= $463,750.00
			Engineering	= 55,650.00
			Contingency	= 46,375.00
			TOTAL PROJECT COST	= $565,775.00

The number of manholes are based on one manhole for every 250 linear feet of sewer line. The line was originally planned to tie into the pump station on Route 18 from Koppel. The extremely steep slopes along Wallace Run made this option unrealistic. So, it was then decided for this line to have its own pump station with a force main connecting to the Beaver Falls system. The pavement restoration was estimated from some encroachment on Route 551 and on local roads in Beaver Falls.

k. Alternative B-6

A cost was estimated for sewering the Route 351/Route 60/Turnpike enterprise zone. The flow expected from this zone is 510,000 GPD. This flow was determined by taking the enterprise zone area of 13,070,000 sq.ft. and dividing by 9,000 sq. ft. per EDU for a total of 1452 EDU's or 510,000 GPD. Using peaking factor of 2.5 and a minimum slope of 0.01, the minimum pipe size is 9.6".

Therefore, a 10" diameter pipe is required. The sewer line would follow Stockman Run and pump to the proposed line on Route 18. An itemized cost breakdown is shown in Table 5-10 below, and the sewers are shown in Figure 5.1-9.

TABLE 5-10

ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
10" DIA. PVC Sanitary Sewer	15,000	LF	40.00	$600,000.00
Manholes	60	EA	2,000.00	120,000.00
Pump Station	1	EA	100,000.00	100,000.00
6" DIP Force Main	1,250	LF	20.00	25,000.00
Stream Crossings	30	LF	150.00	4,500.00
Railroad Crossings	0	LF	150.00	0
Highway Crossings	0	LF	150.00	0
Pavement Restoration	1,333	SY	50.00	66,650.00
			Construction Cost	= $916,150.00
			Engineering	= 109,940.00
			Contingency	= 91,615.00
			TOTAL PROJECT COST	= $1,117,705.00

The number of manholes are based on one manhole for every 250 lf of sewer line. The pavement restoration is estimated from some encroachment along Route 351.

l. Alternative B-7

The Holiday Inn treatment plant will be expanded to accommodate Homewood. The total flow will average 0.04 MGD and the peak flow will be approximately 0.10 MGD. Due to the small size of the sewered population and the great variance in flows from the Holiday Inn, flow equalization

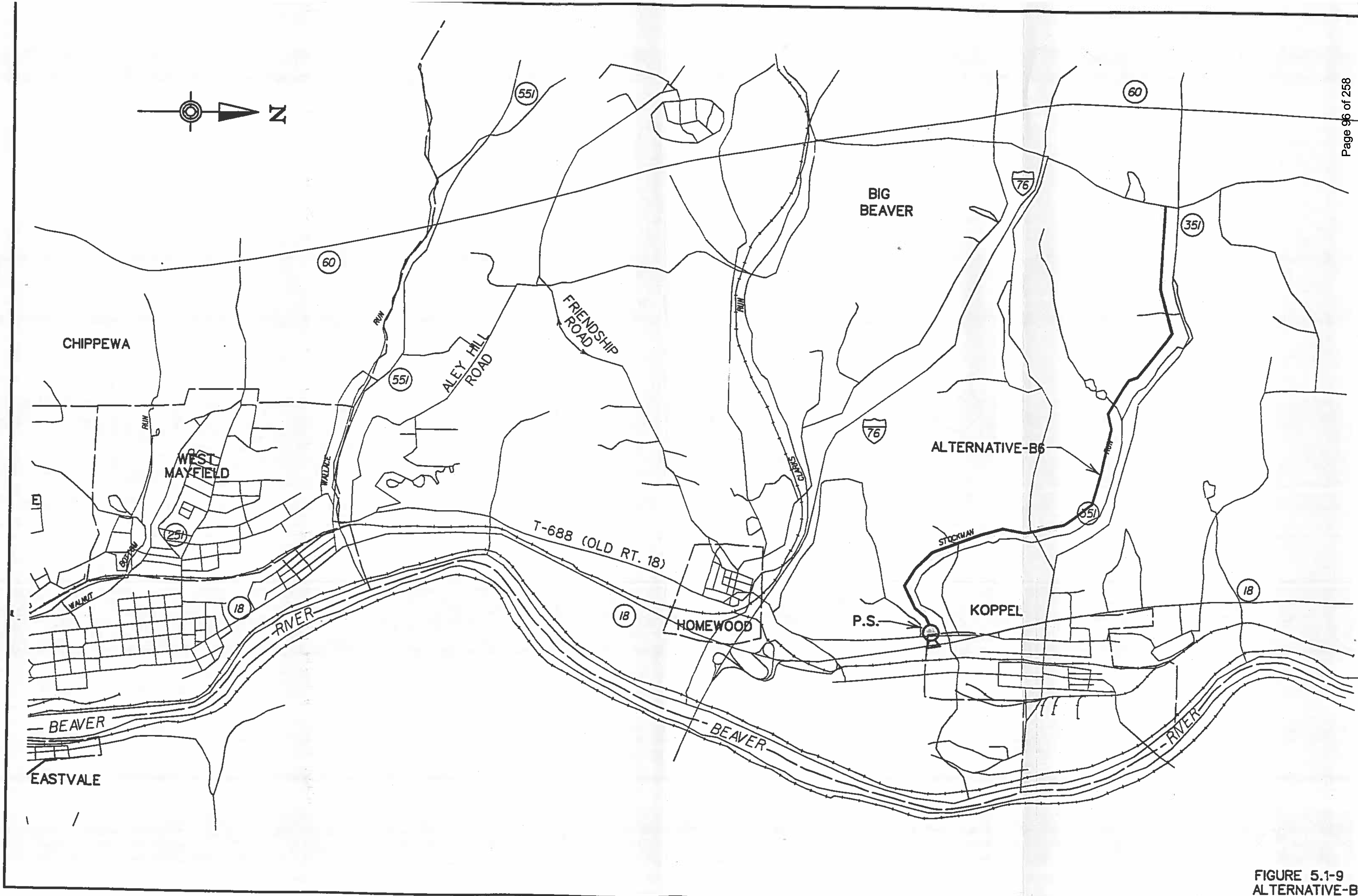


FIGURE 5.1-9
ALTERNATIVE-B6

will be required. The costs associated with this alternative are shown in Table 5-11, and the alternative is shown on Figure 5.1-10.

TABLE 5-11

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
Treatment Plant	1 EA	500,000.00	500,000.00
Flow Equalization	1 EA	75,000.00	75,000.00
Sludge Holding Tank	1 EA	75,000.00	75,000.00
4" Sewers	7,610 LF	25.00	190,250.00
Septic Tanks	73 EA	1,000.00	73,000.00
Pump Station	1 EA	50,000.00	50,000.00
4" Force Main	1,750 LF	25.00	43,750.00
8" Receiving Sewer	500 LF	35.00	17,500.00
Cleanouts	31 EA	1,000.00	31,000.00
Manholes	2 EA	2,000.00	4,000.00
Pavement Restoration	2,250 SY	27.00	60,750.00
		Construction Cost	= $1,120,250.00
		Engineering	= 134,430.00
		Contingency	= 112,025.00
		TOTAL PROJECT COST	= $1,366,705.00

m. Alternate BF-1

In this alternative, the main interceptor in the City of Beaver Falls will be replaced from the raw sewage overflow manhole at the corner of 6th Avenue and 23rd Street to the treatment plant. Replacement of the existing vitrified clay line with a larger diameter PVC line will allow greater flow by providing a larger hydraulic radius and by providing a smoother pipe, resulting in lower friction losses. In addition, the PVC sewer line and precast concrete manholes have fewer joints, and will

Alternate BF-1

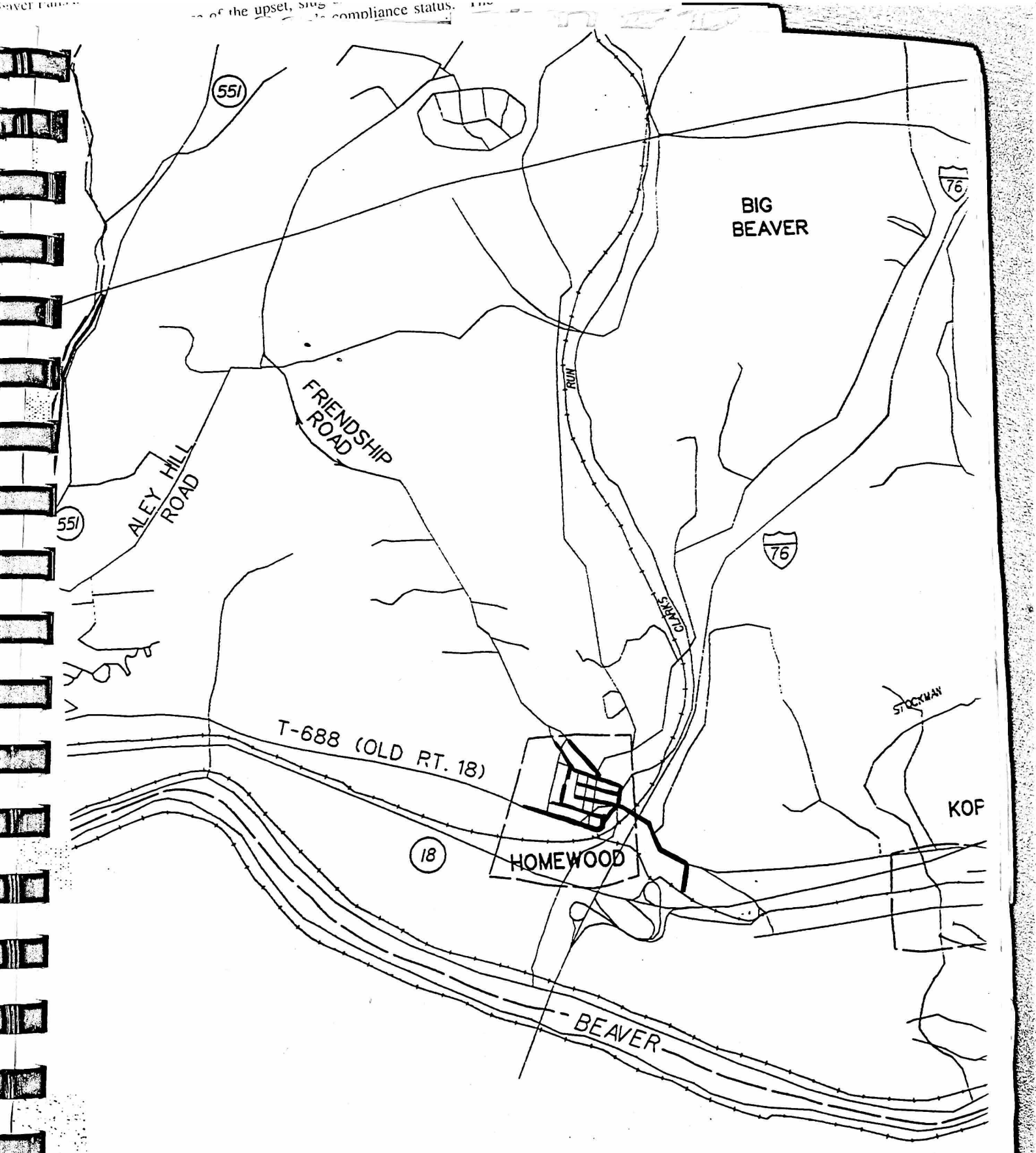


FIGURE 5.1-1
ALTERNATIVE

provide for a reduction in infiltration and inflow. The cost estimate for this alternative is given in Table 5-12 below.

TABLE 5-12

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
24" PVC Sewer	9555 LF	65.00	$621,075.00
Manholes	39 EA	2,000.00	$78,000.00
Railroad Crossing	75 LF	150.00	$11,250.00
Stream Crossing	50 LF	150.00	$7,500.00
State Road Restoration	477 SY	50.00	$23,850.00
Local Road Restoration	2314 SY	27.00	$62,478.00
Unpaved Restoration	1506 SY	10.00	$15,060.00
Reconnect Laterals	30 EA	150.00	$4,500.00
		Total Construction Cost	$823,713.00
		Engineering	$98,845.00
		Contingencies	$82,371.00
		TOTAL PROJECT COST	$1,004,929.00

n. Alternative BF-2

The East Trunk Line in the City of Beaver Falls will be replaced from the city line to Manhole No. 40 at 25th Street and 9th Avenue. From the overflow manhole to be the plant, the line will be replaced with a 24" line and from Manhole 40-8 to the overflow manhole, the line will be replaced with 20" line. This alternative involves increasing the capacity of the line to eliminate the overflow by replacing 275' of 18" line and 4650' of 20" line with 24" line, and replacing 895' of 15" line and 870' of 18" line with 20" line. The East Trunk line is a major source of inflow and infiltration due to its old construction, leaking joints, and cracked and broken pipes. This alternative will serve to

reduce infiltration/inflow and to eliminate a raw sewage overflow. The cost estimate for this alternative is given in Table 5-13.

TABLE 5-13

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
12" PVC Sewer	9206 LF	50.00	$460,300.00
20" PVC Sewer	1765 LF	60.00	$105,900.00
24" PVC Sewer	9555 LF	65.00	$621,075.00
Manholes	100 EA	2,000.00	$200,000.00
Railroad Borings	75 LF	150.00	$11,250.00
Local Road Restoration	5050 SY	27.00	$136,350.00
State Road Restoration	30 SY	50.00	$1,500.00
Unpaved Restoration	2750 SY	10.00	$27,500.00
Stream Crossings	400 LF	150.00	$60,000.00
Reconnection of Laterals	480 EA	150.00	$72,000.00
		Total Construction Cost	$1,695,875.00
		Engineering	$203,500.00
		Contingencies	$169,600.00
		TOTAL PROJECT COST	$2,068,975.00

o. *Alternative BF-3*

The East Trunk Line in the City of Beaver Falls will be replaced as redesigned and previously permitted by the Department of Environmental Resources. This project had received PennVest funding and bids were obtained for the northern portion. This alternative also requires enlargement of portions of the interceptor, from Manhole 40 at 25th Street and 9th Avenue to the plant. The enlargements will be as per Alternative BF-2. Cost estimates are shown in Table 5-14 below.

TABLE 5-14

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
Redesigned Line	1 LS	531,000.00	$531,000.00
12" PVC Sewer	2010 LF	50.00	$100,500.00
20" PVC Sewer	1765 LF	60.00	$105,900.00
24" PVC Sewer	9555 LF	65.00	$625,075.00
Manholes	53 EA	2,000.00	$106,000.00
Railroad Borings	75 LF	150.00	$11,250.00
Local Road Restoration	3991 SY	27.00	$107,757.00
State Road Restoration	30 SY	50.00	$1,500.00
Unpaved Restoration	2072 SY	10.00	$20,720.00
Stream Crossing	400 LF	150.00	$60,000.00
Reconnection of Laterals	480 EA	150.00	$72,000.00
		Total Construction Cost	$1,741,702.00
		Engineering	$209,000.00
		Contingencies	$174,170.00
		TOTAL PROJECT COST	$2,124,872.00

p. *Alternative BF-4*

In this alternative, the sewer line from the north city line to the treatment plant will be enlarged to accommodate flows from Homewood, Big Beaver and Koppel. This was bid as an alternate in the East Trunk Line Project. Cost estimated are shown in Table 5-15.

Chosen By D.E.R.

4-4-94


Chosen By
D.E.R.

TABLE 5-15

DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
Redesigned Line	1 LS	576,025.00	$576,025.00
18" PVC Sewer	2010 LF	55.00	$110,550.00
20" PVC Sewer	1765 LF	60.00	$105,900.00
24" PVC Sewer	9555 LF	65.00	$621,075.00
Manholes	53 EA	2,000.00	$106,000.00
Railroad Borings	75 LF	150.00	$11,250.00
Local Road Restoration	3991 SY	27.00	$136,350.00
State Road Restoration	30 SY	50.00	$1,500.00
Unpaved Restoration	2072 SY	10.00	$27,500.00
Stream Crossing	400 LF	150.00	$60,000.00
Reconnection of Laterals	480 EA	150.00	$72,000.00
		Total Construction Cost	$1,828,150.00
		Engineering	$219,400.00
		Contingencies	$182,815.00
		TOTAL PROJECT COST	$2,230,365.00

q. Alternative STP-1

This alternative proposes to expand the Beaver Falls Water Pollution Control Plant to accommodate present and planned flow by making the process changes identified in the Water Pollution Control Plant Study prepared by Widmer Engineering Inc. The Study is included as Appendix B, and the estimated costs are presented in Table 5-16 below:

Chosen By D.E.R. 4-4-94

TABLE 5-16

ITEM	AMOUNT
Pretreatment Improvements	$100,000.00
Primary Treatment Improvements	$60,000.00
Secondary Treatment Improvements	$1,435,000.00
Biosolids Treatment Improvements	$1,005,000.00
Miscellaneous (Pumps, Piping, etc.)	$1,750,000.00
Ultraviolet Disinfection	$250,000.00
Contingency	$200,000.00
Total Construction Cost	$4,800,000.00
Engineering	$500,000.00
Administration & Legal	$55,000.00
TOTAL PROJECT COST	$5,355,000.00

r. Alternative STP-2

This alternative proposes to convert the Beaver Falls Water Pollution Control Plant to sequencing batch reactors. The existing oxidation tower and final clarifiers will be demolished to provide space for the three SBR units. Due to the change in treatment processes, biosolids production will increase, and biosolids handling facilities will be increased in size. The estimated project costs are presented in Table 5-17 below:

TABLE 5-17

DESCRIPTION	AMOUNT
Pretreatment Improvements	$100,000.00
Secondary Treatment Improvements	$1,220,500.00
Biosolids Treatment Units	$1,344,000.00
Miscellaneous	$1,750,000.00
Ultraviolet Disinfection	$250,000.00
Contingency	$200,000.00
Total Construction Cost	$4,864,500.00
Engineering	$500,000.00
Administration & Legal	$55,000.00
TOTAL PROJECT COST	$5,419,500.00

s. Alternative STP-3

This alternative proposes to convert the Beaver Falls Water Pollution Control Plant to bioaerated filters. This alternative will require the demolition of the existing oxidation tower, the construction of aeration basins, and the addition of blowers. Biosolids generation is anticipated to be approximately equal to that of the oxidation tower in Alternative STP-1. The estimated costs are shown in Table 5-18.

TABLE 5-18

DESCRIPTION	AMOUNT
Pretreatment Improvements	$100,000.00
Primary Treatment Improvements	$60,000.00
Secondary Treatment Improvements	$1,606,400.00
Biosolids Handling Improvements	$1,005,000.00
Miscellaneous	$1,750,000.00
Ultraviolet Disinfection	$250,000.00
Contingency	$200,000.00
Total Construction Cost	$4,971,400.00
Engineering	$500,000.00
Administration & Legal	$55,000.00
TOTAL PROJECT COST	$5,526,400.00

5.1.2 INDIVIDUAL AND COMMUNITY ON-LOT ALTERNATIVES

a) Alternative 0-1

This alternative proposes the continued use of individual on-lot disposal systems. As discussed previously, the vast majority of the soils in the unsewered areas of the study area are unsuitable for on-lot systems. However, it must be realized that the soil survey is very general, and does not necessarily reflect site-specific soil conditions. With the services of a good Sewage Enforcement Officer, and with the help of public education on on-lot disposal systems, individual on-lot disposal systems may continue to provide adequate sewage disposal in these rural areas. The SEO will have a working knowledge of sewage treatment fundamentals and Chapter 73 requirements. His knowledge will allow replacement and repair of malfunctioning systems in rural areas. Public education will consist of informing OLDS owners about proper operation and maintenance procedures

for their systems. This includes fundamentals of operation, recommended frequency of pumping, water conservation practices, and limiting the use of toxic cleaners. This information is available in the DER publication "Consumers Guide to On-Lot Sewage Disposal System Operation and Maintenance". This guide is attached as Appendix D. Owners of OLDS will be made aware of the publication and how they may receive a copy. In addition, the Borough can exercise its duty to assure proper sewage disposal within its borders by adopting an OLDS Management Ordinance. The ordinance should be consistent with Subchapter E of Chapter 71 of the Rules and Regulations of the Department.

b) Alternative O-2

This alternative proposes the use of small flow treatment facilities, land treatment alternatives, or package treatment facilities to serve individual homes or clusters of homes. At the current time, there are no small flow facilities serving clusters of homes, and this alternative should not be encouraged in the future as a method of long-term sewage disposal. A policy allowing this type of development may generate a large number of these facilities for which the municipality is ultimately responsible. This type of sewage disposal method is best restricted to an interim method of sewage disposal in areas scheduled for sewer service within 10 years or to repairs of existing OLDS systems. In this way, higher density development can occur in designated growth areas which will make providing the area with sewers more feasible.

To permit this type of sewage disposal in future sewer service areas, the municipality should require an operation and maintenance agreement and bond to assure adequate care of the system. The municipality may amend the subdivision ordinance to accommodate these requirements, as well as

define the areas in which these systems will be permitted. It should be required that a homeowners association be formed to operate and maintain the treatment facility in residential areas.

c) Alternative O-3

This alternative examines the future use of community on-lot disposal systems. Since the vast majority of soils in the study area are unsuitable for on-lot sewage disposal, it is highly unlikely that an area large enough for a community absorption field could be found. In addition, this type of system should have an available replacement absorption area. This requirement further raises the unlikelihood that such an area will be found. Due to the technical and administrative problems associated with this type of system in this location, it is not recommended that this alternative receive further consideration.

d) Alternative O-4

This alternative examines the future use of holding tanks to provide sewage disposal. Holding tanks are a very expensive method of sewage service. With a 1000 gallon holding tank, the average homeowner generating 275 gpd of sewage would have to have the tank pumped every 3.6 days. If the pumping fee is $0.07/gal, the homeowner must pay $70 to have the tank pumped. This would average $577.50/month. It is not recommended that this alternative receive further consideration.

e) Alternative O-5

This is the No Action Alternative. This alternative would allow raw sewage to discharge to the Beaver River from the overflow manhole in Beaver Falls. It would allow a discharge of inadequately treated wastewater from treatment plants located at the Holiday Inn and Big Beaver Plaza as well as from the Beaver Falls Water Pollution Control Facility. The storm sewers in Homewood would continue to carry raw sewage into Clark's Run. These discharges are a threat to public health. The treatment plants at the Holiday Inn and Big Beaver Plaza, as well as Homewood's sewers discharge inadequately treated wastewater and degrade water quality upstream of the Beaver Falls Municipal Authority's water intake. Since there are no sewers in Big Beaver, if this alternative is implemented, economic growth in the Borough will be inhibited. In addition, the City and DER are negotiating a Consent Order/Agreement. This will require the City to eliminate the raw sewage overflow and secondary treatment bypass. In view of the hefty fines which may be imposed for failing to eliminate these problems (up to $25,000.00/day), this alternative is environmentally, economically, and administratively unacceptable.

5.2 EVALUATION OF SEWAGE MANAGEMENT PROGRAM ALTERNATIVES

a. Alternative 1

This alternative will establish an inspection schedule for on-lot disposal systems. This will allow the Borough to more adequately enforce ordinances related to OLDS system operation and maintenance, and to require the upgrade or repair of any system found to be malfunctioning. While this alternative will provide for increased enforcement of ordinances, it will not necessarily require a

greatly increased administration on the part of the municipalities. The successful administration will require the identification of each OLDS, continued monitoring of the performance of the systems, recordkeeping of inspection reports, notifications to owners of malfunctioning systems, and requiring the repair of malfunctioning systems. It should be noted that the population density in Big Beaver Borough is very low (approximately 0.2 persons per acre) and decreasing, it is not anticipated that this program will be cost-effective for the protection of public health and the environment. In the Borough of Homewood, it is known that there are numerous connections of septic tank effluent to storm sewers. In such a case, this alternative will serve no useful purpose. It is not recommended that this alternative be implemented in either Homewood or Big Beaver.

b. Alternative 2

This alternative will require scheduled maintenance for on-lot disposal systems. This will allow the Borough to more adequately assure proper operation of the systems. Since it is commonly required for septic tanks to be pumped every 3 years in this type of program, the municipality may be divided into thirds, with one third of the municipality being required to pump their septic tanks in any given year. After 3 years, all residents will have had their septic tanks pumped, and the cycle will begin again. Residents are required to submit a copy of their receipt as proof of the required maintenance. In Big Beaver, the number of systems in each district should be known. Generic notices may be sent out with tax bills notifying each system owner as to the year in which they are required to have their tanks pumped. Enforcement may be as simple as counting the number of receipts received. These procedures will be identified in an OLDS Management Ordinance. In Homewood, the number of systems is small, and the additional administrative requirements will be minimal. It is recommended

that this alternative be implemented in both Homewood and Big Beaver.

c. Alternative 3

This alternative proposes municipal ownership or management of individual on-lot disposal systems. In this case, the municipality would arrange for operation, maintenance, and repair of individual on-lot disposal systems. The municipality would then bill the system owner for the costs incurred to the municipality. Due to the additional administrative requirements, and the uncertainty of the collection of reimbursements, it is not recommended that this alternative be implemented.

d. Alternative 4

This alternative proposes the aggressive enforcement of ordinances which require operation and maintenance. At the current time, there are no such ordinances in effect. When these ordinances are adopted, aggressive enforcement is recommended to ensure adequate performance of the on-lot systems.

e. Alternative 5

This alternative proposes the repair, replacement, or upgrading of malfunctioning systems. At the current time, this alternative is being implemented. As malfunctions are discovered, they are repaired to the specifications of Chapter 73, where possible. This alternative is very important in the protection of human health and the environment. It is recommended that this practice be continued.

f. Alternative 6

This alternative proposes the establishment of a joint municipal sewage management program. Although not done by a formal arrangement, this alternative is already being implemented. Both Big Beaver and Homewood currently utilize the same Sewage Enforcement Officer, Daniel Baker. Mr. Baker is doing an excellent job as SEO, has served as SEO for a number of years, and is intimately knowledgeable about conditions in the area. This alternative should be continued in its current form.

5.3 IDENTIFICATION OF NONSTRUCTURAL PLANNING ALTERNATIVES

Comprehensive plans have been prepared for Beaver Falls and Big Beaver Borough. Beaver Falls is fully developed and fully sewered and has little need for revision of the sewage facilities section of its plan. Big Beaver Borough is in the process of developing a new comprehensive plan. In the development of this plan, zoning and land use changes should be made to accommodate the enterprise zone designations. The Borough should update the zoning ordinance to increase the minimum lot size for on-lot sewage disposal from 20,000 sq. ft. to one acre. This way, if malfunctions occur, there is a greater chance for finding a replacement area for an absorption field. This will also reduce the density of the unsewered population and improve the drinking water quality from privately owned wells. An on-lot management program should also be implemented. This program should specify and require proper planning, permitting installation, operation and maintenance, and enforcement procedures. For instance, requiring sewage disposal permit to be obtained from the SEO before a building permit can be issued would be an example of proper planning and permitting. Establishment of an on-lot

maintenance ordinance specifying that septic tanks be pumped and cleaned once every three years would be an example of proper operation and maintenance. Since the soils in the Borough are generally unsuitable for on-lot sewage disposal, the Borough may wish to consider requiring a replacement absorption area before permit issuance. A review of some past on-lot permit applications shows that the sewage enforcement officer is doing on outstanding job of approving and denying applications in Big Beaver, so enforcement is adequate.

Homewood Borough has no comprehensive plans, zoning ordinances, or subdivision ordinances. It is recommended that zoning and subdivision ordinances be adopted by Homewood. The zoning ordinance should set a minimum lot size for on-lot sewage disposal at one acre for a single family residence. The zoning ordinance should also state that a sewage permit must be obtained prior to receiving a building permit. Homewood should adopt an on-lot maintenance ordinance to ensure proper performance of the individual on-lot disposal systems.

5.4 EVALUATION OF LOCAL AGENCY PROGRAM

5.4.1 REGIONAL LOCAL AGENCY PROGRAM

Big Beaver Borough and Homewood Borough are the two municipalities in the study area that will continue to use on-lot sewage disposal systems. These municipalities currently use Dan Baker, Jr., as their sewage enforcement officer. Therefore, Homewood and Big Beaver already have a quasi-regional local agency through Dan Baker, Jr. The regional local agency program does not need to be expanded beyond what is already in place.

5.4.2 TECHNICAL OR ADMINISTRATIVE NEEDS

Big Beaver and Homewood currently rely on Dan Baker, Jr. to keep all on-lot records (permit issuances, denials, and repairs). The Boroughs should start to keep records on file at their offices and keep track of known malfunctioning on-lot disposal systems. This way, if something happens to the SEO's files, a backup file will be on hand at the Borough's office. Also, files will be more accessible to the public if they are kept in the municipal offices.

5.5 EVALUATION OF ALTERNATIVES

a) UPGRADE THE BEAVER FALLS STP AND EXPAND TRUNKLINE SEWER FROM OVERFLOW MANHOLE TO THE TREATMENT PLANT

This option involves no sewer extensions outside of the City of Beaver Falls. It does not provide any capacity for Big Beaver or Homewood. This will involve alternatives BF-1 and STP-1. These alternatives are the bare minimum that Beaver Falls will be required to do in order to eliminate the 6th Avenue/23rd Street overflow. The total project cost of $6,360,000 is evaluated as a Pennvest loan, a bond issue, and a combination of 50% Pennvest and 50% bond issue and estimated users fee are presented in Table 5-19. There will not be any tapping fees because the sewer line is already in service. Grants were not figured into the financing because of the lack of grants available. However, grants should be actively pursued. Available grants are identified in Section 5.6.

TABLE 5-19

	PENNVEST	BOND	PV/BOND
Total Project Cost	$6,360,000.00	$6,360,000.00	$6,360,000.00
Joint Sewer Users Fund	($387,000.00)	($387,000.00)	($387,000.00)
Annual Cost	$357,783.00	$481,424.00	$419,603.00
Plant O & M	$1,041,431.00	$1,041,431.00	$1,041,431.00
Interceptor O & M	$211,214.00	$211,214.00	$211,214.00
Total Annual Cost	$1,610,428.00	$1,734,069.00	$1,672,248.00
Total EDU's	6,441	6,441	6,441
Annual Charge/EDU	$250.03	$269.22	$259.63
Monthly Charge/EDU	$20.84	$22.44	$21.64

This option considers only the 6441 EDU's that are currently being served by the Beaver Falls STP in Beaver Falls, Eastvale, West Mayfield, Patterson Heights, Patterson Township and White Township. The Pennvest loan annual cost was determined at a 1.79% interest rate for a term of 20 years. The bond annual cost was determined at a 7% interest rate for 30 years.

The advantages of implementing this option would be the elimination of a raw sewage overflow at 6th Avenue and 23rd Street, backup secondary treatment capabilities at the Beaver Falls STP, and elimination of an overflow at the Beaver Falls treatment plant. This would improve surface water quality in the Beaver River.

There would be some disadvantages to this alternative. First, it will not allow for any flow allowances for Big Beaver and Homewood. Second, it would increase the monthly sewer bill to the individual homeowner. Finally, it will not eliminate any malfunctioning on-lot systems or small flow

treatment plants.

b) *UPGRADE THE BEAVER FALLS STP, EXPAND TRUNKLINE SEWER FROM OVERFLOW MANHOLE TO THE TREATMENT PLANT, AND REPLACE EAST TRUNKLINE*

This option involves no sewer extensions outside the City of Beaver Falls. It does not provide any capacity for Big Beaver or Homewood. This will involve alternatives BF-2 and STP-1. These alternatives are the bare minimum plus added work which will greatly reduce infiltration and inflow from the rapidly deteriorating East Trunkline. The financing of the total project cost of $7,423,975.00 is evaluated by a Pennvest loan, a bond issue, and a combination of 50% bond and 50% Pennvest loan. Estimated user fees are presented in Table 5-20. No tapping fees will be assessed because the sewer line is already in service. Grants were not figured into the financing because of the lack of grants available. However, grants should be actively pursued. Grant programs are identified in Section 5.6.

TABLE 5-20

	PENNVEST	BOND	PV/BOND
Total Project Cost	$7,423,975.00	$7,423,975.00	$7,423,975.00
Joint Sewer Users Fund	($387,000.00)	($387,000.00)	($387,000.00)
Annual Cost	$421,515.00	$567,180.00	$494,348.00
Plant O & M	$1,041,431.00	$1,041,431.00	$1,041,431.00
Interceptor O & M	$216,883.00	$216,883.00	$216,883.00
Total EDU's	6,441	6,441	6,441
Annual Cost/EDU	$260.80	$283.42	$272.11
Monthly Cost/EDU	$21.73	$23.62	$22.68

The City Council
Choose Plan
'B'

BF-2 & STP-1

This option only considers the 6441 EDU's that are currently being served by the Beaver Falls treatment plant in Beaver Falls, Eastvale, West Mayfield, Patterson Heights, Patterson Township, and White Township. The Pennvest annual cost was determined at a 1.79% interest rate for a term of twenty years. The bond annual cost was determined at a 7% interest rate for a term of 30 years.

The advantages of implementing this option would be the elimination of a raw sewage overflow at 6th Avenue and 23rd Street, back-up secondary treatment capabilities of the Beaver Falls STP, elimination of an overflow at the treatment plant, and I & I reduction from replacing old vitrified clay pipe with PVC pipe. This alternative will improve surface water quality in the Beaver River.

There would be some disadvantages to this option. First, it will not allow for any flow capacity for Big Beaver and Homewood. Second, it would increase the monthly sewer bill to the homeowner. Finally, it will not eliminate any malfunctioning on-lot systems or small flow treatment plants.

c) EXPAND THE TREATMENT PLANT, REPLACE EAST TRUNK LINE WITH REDESIGNED LINE, EXPAND INTERCEPTOR FROM MH-40 TO THE PLANT

This option involves alternatives BF-3 and STP-1. It includes replacing the East Trunk Line with a redesigned line, expansion of the interceptor from MH-40 to the treatment plant, and expansion of the treatment plant. The financing of this option will be evaluated with a Pennvest Loan, a bond issue, and a 50-50 combination Pennvest and bond. Costs are shown on Table 5-21. Grants were not figured into the financing, but they should be actively pursued. Grant agencies are listed in Section 5.6. Tapping fees were not assessed because there will be no new connections with this option.

TABLE 5-21

	PENNVEST	BOND	PV/BOND
Total Project Cost	$7,479,872.00	$7,479,872.00	$7,479,872.00
Joint Sewer Users Fund	($387,000.00)	($387,000.00)	($387,000.00)
Annual Cost	$424,863.00	$571,685.00	$498,274.00
Plant O & M	$1,041,431.00	$1,041,431.00	$1,041,431.00
Interceptor O & M	$217,181.00	$217,181.00	$217,181.00
Total Annual Cost	$1,683,475.00	$1,830,297.00	$1,756,886.00
Total EDU's	6,441	6,441	6,441
Annual Cost/EDU	$261.37	$284.16	$272.77
Monthly Cost/EDU	$21.78	$23.68	$22.73

The Pennvest loan was evaluated at 1.79% for twenty years. The bond was evaluated at 7% for a period of thirty years. The option only considers the 6441 EDUs that comprise the joint sewer users.

There are a couple of advantages to this option. First, a raw sewage bypass will be eliminated. Second, a treatment plant bypass will be eliminated. Third, I & I will be reduced. Finally, back up secondary treatment will be provided at the sewage treatment plant.

This option also has certain disadvantages. First, the replacement of the interceptor does not provide extra flow capacity for Big Beaver and Homewood. Secondly, it does not eliminate any existing malfunctioning septic tanks or small flow treatment plants.

d) *UPGRADE TREATMENT PLANT, EXPAND TRUNK LINE FROM CITY'S BORDER TO TREATMENT PLANT*

This option involves no sewer extensions outside of the city's border. It does provide flow allowances for Big Beaver and Homewood. It also provides capacity for Koppel Borough. This will involve alternatives BF-4 and STP-1. These alternatives will give surrounding municipalities the opportunity to enter the Beaver Falls system when they can afford to construct the sewer lines. The financing of the total project cost of $7,585,365.00 is evaluated with a Pennvest loan, a bond issue, and a 50/50 combination of a Pennvest loan and a bond issue. Estimated user fees are presented in Table 5-20. Tapping fees will not be assessed to the EDU's that are currently connected to the Beaver Falls treatment plant. Tapping fees will be assessed to any future customers in Big Beaver or Homewood. Grants were not figured into the financing because of the lack of grant money available. However, grants should actively be pursued. Grant programs are identified in Section 5.6.

TABLE 5-22

	PENNVEST	BOND	PV/BOND
Total Project Cost	$7,585,365.00	$7,585,365.00	$7,585,365.00
Joint Sewer Users Fund	($387,000.00)	($387,000.00)	($387,000.00)
Annual Cost	$431,182.00	$580,188.00	$505,685.00
Plant O & M	$1,041,431.00	$1,041,431.00	$1,041,431.00
Interceptor O & M	$217,743.00	$217,743.00	$217,743.00
Total Annual Cost	$1,690.356.00	$1,839,362.00	$1,764,859.00
Total EDU's	6,441	6,441	6,441
Annual Cost/EDU	$262.44	$285.57	$274.00
Monthly Cost/EDU	$21.87	$23.80	$22.83

This option is financed by the 6441 EDUs that are currently connected to the Beaver Falls treatment plant but provides capacity for 11,600 EDUs. The 5159 EDUs, when and if they connect, will be assessed a tapping fee to pay for the larger interceptor and treatment plant expansion in Beaver Falls. The Pennvest loan was evaluated at a 1.79% interest rate for a term of twenty years and the bond was evaluated at a 7% interest rate for a term of thirty years.

There are several advantages to this option. First, it will eliminate the raw sewage overflow at 6th Avenue and 23rd Street. Second, it will provide back-up secondary treatment at the Beaver Falls plant. Third, it will eliminate the treatment plant overflow. Fourth, I & I will be reduced with the installation of the new line. Finally, it will provide plenty of capacity for Homewood, Big Beaver and Koppel.

There would be two disadvantages to this option. First, it will not immediately eliminate any existing malfunctioning septic tanks or small flow treatment plants in Big Beaver and Homewood. Second, it will raise the user's monthly sewer bill.

e) EXPANSION OF THE HOLIDAY INN TREATMENT PLANT

This option will require that Homewood be sewered and that the Holiday Inn expand its treatment plant. The cost breakdown is shown in Table 5-11. The total project cost of $1,366,705.00 is evaluated as a PennVest loan with a tapping fee of $2,500 per EDU, and a total of 126 EDUs. It is also evaluated as a bond issue and a combination of bond issue and Pennvest loan. Costs are shown in Table 5-23. The issuance of grant money was not considered because of the lack of grant programs. However, grant money should still be aggressively pursued.

TABLE 5-23

	PENNVEST	BONDS	PV/BONDS
Total Project Cost	$1,366,705.00	$1,366,705.00	$1,366,705.00
Less Tapping Fees	($182,500.00)	($182,500.00)	($182,500.00)
Financed Amount	$1,184,205.00	$1,184,205.00	$1,184,205.00
Plant O & M	$62,500.00	$62,500.00	$62,500.00
Pump STA. O & M	$5,156.00	$5,156.00	$5,156.00
Collector Line O & M	$2,969.00	$2,969.00	$2,969.00
Financing Annual Cost	$70,934.00	$ 95,447.00	$83,190.00
Total Annual Cost	$141,559.00	$166,072.00	$153,815.00
Total EDU's	126	126	126
Annual Cost/EDU	$1,123.00	$1,318.03	$1,220.76
Monthly Charge/EDU	$93.62	$109.84	$101.73

This option considers 73 EDUs in Homewood and 53 EDUs from the Holiday Inn. The PennVest loan annual cost was determined at a 1.79% interest rate over twenty years. The bond annual cost was determined at a 7% interest rate over thirty years.

The advantages of implementing this option would be the elimination of untreated sewage discharges in Homewood, the improvement of groundwater quality in Homewood and Big Beaver, and the elimination of any malfunctioning septic systems in Homewood.

There would be some disadvantages to this alternative. First, it would be a large financial burden on the homeowner. Second, the plant would have to be owned and operated by Big Beaver Borough. Presently, the Borough does not own or operate any treatment plants and the borough (or an authority created by the borough) would have to start out with $1,257,205.00 in debt. Third, the

expansion of the Holiday Inn treatment plant opposes the state's comprehensive water quality management plan. Finally, the treatment plant will have limited capability of extending sewer service to the Rte 60/Rte 351/Turnpike enterprise zone area.

f) UPGRADE THE TREATMENT PLANT, PROVIDE EXTRA CAPACITY, EXTEND SEWER LINES TO BIG BEAVER PLAZA

This option involves extending sewers along Rte 18 to the Big Beaver Plaza just north of the city's border. This involves alternatives STP-1, BF-4, and B-1. This will provide capacity for Big Beaver, Homewood, and Koppel. The financing of the total project cost of $7,625,275.00 is evaluated with a Pennvest Loan, a bond issue, and a 50-50 combination of Pennvest and bond. Grants were not figured into the financing, but they should be actively pursued. Grant programs are identified in Section 5.6. Estimated user fees are shown in Table 5-24 below.

TABLE 5-24

	PENNVEST	BOND	PV/BOND
Total Project Cost	$7,786,665.00	$7,786,665.00	$7,786,665.00
Joint Sewer Users Fee	($387,000.00)	($387,000.00)	($387,000.00)
Tapping Fee	($12,500.00)	($12,500.00)	($12,500.00)
Total Cost Financed	$7,387,165.00	$7,387,165.00	$7,387,165.00
Annual Cost	$442,491.00	$595,405.00	$518,948.00
Plant O & M	$1,041,431.00	$1,041,431.00	$1,041,431.00
Pump Sta. O & M	$9,075.00	$9,075.00	$9,075.00
Sewer O & M	$217,743.00	$217,743.00	$217,743.00
Total Annual Cost	$1,710,740.00	$1,862,654.00	$1,787,197.00
Total EDUs	6,446	6,446	6,446
Annual Cost/EDU	$265.40	$288.96	$277.26
Monthly Cost/EDU	$22.12	$24.08	$23.11

This option provides capacity for the current joint sewer users and Big Beaver Plaza. The Pennvest Loan was evaluated at 1.79% for twenty years and the bond was evaluated of 7% for thirty years.

There are several advantages to this option. First, water quality in the Beaver River will improve because sewage bypasses at the treatment plant and on 6th Avenue and 23rd Street will be eliminated. Second, the Big Beaver Plaza's discharge will be eliminated. Also, I & I will be reduced when the interceptor is replaced.

There would also be some disadvantages to this option. Malfunctioning on-lot systems will not be eliminated. A small flow treatment plant of the Holiday Inn will not be eliminated. The individual homeowner's monthly sewer bill will increase. Also, this option does not provide added

capacity for future extensions along Route 18.

g) EXTEND INTERCEPTOR TO HOMEWOOD, SEWER HOMEWOOD, EXPAND THE TREATMENT PLANT

This option involves the extension of sewers to Homewood, sewering Homewood, expanding the capacity of the interceptor in Beaver Falls, and expanding the treatment plant. The alternatives used for this are B-2, H-3, BF-4, and STP-1. The total project cost of $9,023,360.00 will be evaluated for financing with a Pennvest loan, a bond issue, and a 50-50 combination bond issue and Pennvest loan. Grants were not figured into the financing, but they should be actively pursued. Grant programs are listed in Section 5.6. A cost breakdown for this project is shown below in Table 5-25.

TABLE 5-25

	PENNVEST	BOND	PV/BOND
Total Project Cost	$9,023,360.00	$9,023,360.00	$9,023,360.00
Joint Sewer Users Fund	($387,000.00)	($387,000.00)	($387,000.00)
Tapping Fees	($197,500.00)	($197,500.00)	($197,500.00)
Total Cost Financed	$8,438,860.00	$8,438,860.00	$8,438,860.00
Annual Cost	$505,488.00	$680,172.00	$592,830.00
Plant O & M	$1,041,431.00	$1,041,431.00	$1,041,431.00
Pump Sta. O & M	$25,383.00	$25,383.00	$25,383.00
Sewer O & M	$223,184.00	$223,184.00	$223,184.00
Total Annual Cost	$1,795,486.00	$1,970,170.00	$1,882,828.00
EDUs	6,520	6,520	6,520
Annual Cost/EDU	$275.38	$302.17	$288.78
Monthly Cost/EDU	$22.94	$25.18	$24.06

This option considers 5 EDUs for the Big Beaver Plaza, 74 EDUs for Homewood, and 6441 EDUs for the joint sewer users. The Pennvest loan was evaluated at 1.79% over twenty years and the bond issue was evaluated at 7% over thirty years. Tapping fees were assessed at $2,500.00 per EDU and 79 new EDU's.

This option has several advantages. First, a large number of malfunctioning septic systems will be eliminated. Second, a small flow treatment plant will be eliminated. Third, a raw sewage bypass will be eliminated. This option will improve ground and surface water quality.

There are several disadvantages to this option. First, this option does not provide for any future growth in the area. Second, this option does not eliminate an existing malfunctioning small flow treatment plant. Finally, this will increase the homeowner's monthly sewer bill.

b) EXTEND INTERCEPTOR TO THE HOLIDAY INN, EXPAND BEAVER FALLS STP

This option involves alternatives B-3, H-3, BF-4, and STP-1. This involves extending a 15" sewerline to the Holiday Inn on Route 18, sewering Homewood, and expanding the trunkline and treatment plant in Beaver Falls. The total project cost is $9,931,490.00. Financing will be evaluated for a Pennvest Loan, a bond issue, and a 50-50 bond issue Pennvest loan combination. Grants were not figured into the financing, but they should be actively pursued. Grant programs are listed in Section 5.6. A cost breakdown for the project is shown below in Table 5-26.

TABLE 5-26

	PENNVEST	BOND	PV/BOND
Total Project Cost	$9,931,490.00	$9,931,490.00	$9,931,490.00
Joint Sewer Users Fund	($387,000.00)	($387,000.00)	($387,000.00)
Tapping Fees	($305,830.00)	($305,830.00)	($305,830.00)
Total Financed Cost	$9,238,660.00	$9,238,660.00	$9,238,660.00
Annual Cost	$553,395.00	$744,636.00	$649,016.00
Plant O & M	$1,041,431.00	$1,041,431.00	$1,041,431.00
Pump Sta. O & M	$38,170.00	$38,170.00	$38,170.00
Sewer O & M	$226,053.00	$226,053.00	$226,053.00
Total Annual Cost	$1,859,049.00	$2,040,290.00	$1,954,670.00
Total EDU's	6,593	6,593	6,593
Annual Cost/EDU	$281.97	$310.98	$296.48
Monthly Cost/EDU	$23.50	$25.92	$24.71

The Pennvest Loan was set at a 1.79% interest rate over twenty years and the bond was evaluated at 7% for thirty years. This option considers 6,441 EDUs currently being served, 74 EDUs in Homewood, and 78 EDUs in Big Beaver. The Holiday Inn comprises 53 EDUs. All EDUs were assessed a $2,500.00 per EDU fee. Existing connections were not charged a tapping fee.

This option has several advantages. First, it eliminates malfunctioning septic systems and small flow treatment plants. Second, it eliminates a raw sewage bypass. Third, it provides the Beaver Falls treatment plant with back up secondary treatment. Finally, it will improve ground and surface water quality.

This option also has two disadvantages. First, it will increase the monthly cost to the homeowner. Second, it will not provide for future flow from Big Beaver, enterprise zones, or Koppel.

i) EXTEND INTERCEPTOR TO KOPPEL, EXPAND TREATMENT PLANT

This option involves the extension of an interceptor to Koppel, expansion of the interceptor line in Beaver Falls, and expansion of the sewage treatment plant. It is made up of alternatives B-4, H-3, BF-4, and STP-1. The total project cost is $10,241,370.00. Financing will be evaluated for a Pennvest loan, a bond issue, and a 50-50 combination of Pennvest and a bond. Grants were not figured into the financing, but they should be actively pursued. Grant programs are listed in Section 5.6. A cost breakdown for this option is shown below in Table 5-27.

TABLE 5-27

	PENNVEST	BOND	PV/BOND
Total Project Cost	$10,073,844.00	$10,073,844.00	$10,073,844.00
Joint Sewer Users Fund	($387,000.00)	($387,000.00)	($387,000.00)
Tapping Fees	($332,500.00)	($332,500.00)	($332,500.00)
Total Cost Financed	$9,354,344.00	$9,354,344.00	$9,354,344.00
Annual Cost	$560,325.00	$753,960.00	$657,143.00
Plant O & M	$1,041,431.00	$1,041,431.00	$1,041,431.00
Pump Sta. O & M	$39,820.00	$39,820.00	$39,820.00
Sewer O & M	$150,000.00	$150,000.00	$150,000.00
Total Annual Cost	$1,791,576.00	$1,985,211.00	$1,888,394.00
Total EDU's	6,614	6,614	6,614
Annual Cost/EDU	$270.88	$300.15	$285.52
Monthly Cost/EDU	$22.57	$25.01	$23.79

The Pennvest loan was set at 1.79% interest for twenty years and the bond was set at 7% for thirty years. The tapping fees were set at $2,500.00 per EDU. Current sewer users were not assessed any tapping fee.

The biggest advantage of this option is that capacity for the entire study area will be provided. The malfunctioning and potential malfunctioning on-lot disposal system will be eliminated and two small flow treatment plants will be eliminated. The raw sewage bypass in Beaver Falls will be eliminated. Backup secondary treatment at the plant will be provided.

j) EXTENDING SEWER LINES TO KOPPEL AND THE ENTERPRISE ZONES

This option involves extending sewers out to the Rte. 60/Rte 351/Turnpike and The Rte 60/Rte 551 enterprise zones, expansion of the interceptor in Beaver Falls, and expansion of the Beaver Falls treatment plant. It is comprised of alternatives B-4, B-5, B-6, H-3, BF-4, and STP-1. The total cost for the project is $11,924,850.00. It will be evaluated for financing with a Pennvest loan, a bond issue, and a 50-50 combination of Pennvest and a bond. Grants were not figured into the financing, but they should be actively pursued. Grant programs are listed in Section 5.6. A cost breakdown for this option is shown below in Table 5-28.

TABLE 5-28

	PENNVEST	BOND	PV/BOND
Total Project Cost	$11,924,850.00	$11,924,850.00	$11,924,850.00
Joint Sewer Users Fund	($387,000.00)	($387,000.00)	($387,000.00)
Tapping Fees	($332,566.00)	($332,566.00)	($332,566.00)
Total Financed Cost	$11,205,284.00	$11,205,284.00	$11,205,284.00
Annual Cost	$671,197.00	$903,146.00	$787,171.00
Plant O & M	$1,041,431.00	$1,041,431.00	$1,041,431.00
Pump Sta. O & M	$52,608.00	$52,608.00	$52,608.00
Sewer O & M	$235,425.00	$235,425.00	$235,425.00
Total Annual Cost	$2,000,661.00	$2,232,610.00	$2,116,635.00
Total EDU's	6,614	6,614	6,614
Annual Cost/EDU	$302.49	$337.56	$320.02
Monthly Cost/EDU	$25.21	$28.13	$26.67

This option provides sewer service for the enterprise zones, Big Beaver along Rte 18, and Homewood. Plus, capacity for Koppel is provided. The Pennvest loan was evaluated at 1.79% for twenty years and the bond was evaluated at 7% for thirty years. Tapping fees were assessed at $2,500 per EDU for new connections. The 6441 EDUs that are currently connected were not assessed a tapping fee.

This option will sewer the enterprise zones, eliminate potential malfunctions, eliminate small flow treatments plants, eliminate a raw sewage bypass, provide backup secondary treatment at the Beaver Falls plant, and improve ground and surface water quality. It also provides the capacity for Koppel Borough to tie into the Beaver Falls system. It is also consistent with the state's comprehensive water quality management plan.

This option also has disadvantages. Sewer service will be provided to areas that presently do not have a great need for service. These areas have the potential need for sewer service, but the population is not large enough to help offset the cost per EDU. As a result, a high monthly charge will be assessed to the customers that are connected or will be connected.

5.6 EVALUATION OF CAPITAL FINANCING PLAN

Improvements to the existing sewage facilities within the study area will inevitably involve the financing of rather considerable capital costs. To some extent, these financing activities will be influenced by the type of municipal management selected to oversee those facilities, in that municipal entities are bound by law to acquire funds by prescribed means and up to certain debt limits. Assuming that the necessary administrative structure has the means to acquire the proper financing for the recommended program, the alternatives available to finance the capital improvements must be explored. The following evaluation will compare the effectiveness of each of those alternatives.

5.6.1 TAX INCREMENT FINANCING PROGRAM

The Strategy Plan for the Big Beaver Falls Area Enterprise Zone, which includes most of the Sewage Facilities Plan study area, suggests using a tax increment financing program to construct a $1.75 million project involving water and sewer line installation from Beaver Falls to the Route 60 - Turnpike interchange area. In this type of program, money is borrowed for construction of facilities in the anticipation that the cost of the facilities will eventually be repaid from tax revenues to be generated from new growth which will use those facilities. In effect, it is a tax anticipation loan based on property development not yet in existence. As development progresses, the additional tax revenues increase each year, with increased debt repayments also made each year. The Strategy Plan predicts expenditures of $1.75 million in 1994 for infrastructure improvements, and $110,000.00 annually between 1993 and 1997 for industrial, incubator, and administration and planning expense. The

funding sources are broken down into tax increment financing (loans) of $1.75 million in 1994, and a total of $800,000.00 in enterprise zone funding. Debt service would be $250,000.00 per year for the 10-year $1.75 million loan. New taxes from the projected annual new market value added of $1.67 million would total $64,000.00 the first year and would increase to $700,000.00 by the tenth year. An enterprise zone grant would pay the shortfall in debt service until the rising taxes meet and exceed the debt service in the fifth year. The subsidy would be repaid by the tenth year, and the debt would be retired after eight years. Except for noting the role of the Beaver County Corporation for Economic Development in assisting with loan and grant applications, the Strategy Plan does not specify the implementing entity which would be responsible for the required infrastructure loans and grants; this function could be fulfilled by a non-profit organization.

5.6.2 FARMERS HOME ADMINISTRATION PROGRAM

The Farmers Home Administration (FmHA) is a credit agency of the U.S. Department of Agriculture which provides financial assistance for water and wastewater systems to rural areas. Rural is defined as any area in any city or town having a population under 10,000. This criterium excludes the City of Beaver Falls; however, Homewood and Big Beaver Boroughs are eligible for funding assistance for portions of a project serving their populations. Their applications could be given a low priority due to those Boroughs close proximity to Beaver Falls.

FmHA loans have a maximum term of 40 years, and are secured by bonds or notes pledging taxes, assessments, or revenues as security. The interest rate is adjusted quarterly and is assigned when funds are obligated for a project, but will remain unchanged for the term of the loan. Rates vary in

accordance with the average Bond Buyers Index. Grants varying from 50% to 55% may also be awarded to eligible communities. FmHA also bases awards on the median household income within the applicants community, with income limits being set each fiscal year.

FmHA guidelines for the design of facilities do not necessarily follow those of the PA Department of Environmental Resources. For instance, sewage design flows are based on 2.5 to 2.8 persons per household and 160 to 250 gallons per day per family average, whereas the PADER specifies a flat 100 gallons per capita per day.

Since FmHA grants have become increasingly difficult to obtain due to program cuts, and the loan interest rates have risen, these loans and grants are not considered to be a promising funding source.

5.6.3 PENNSYLVANIA INFRASTRUCTURE INVESTMENT AUTHORITY

PENNVEST awards grants and low interest loans for eligible water and wastewater projects to municipalities or agencies or to a group of governmental units. PENNVEST works closely with the PA Department of Environmental Resources to determine project eligibility. The Board meets semi-annually to review projects and award funding, considering only projects which have received prior approval from PADER, usually in the form of a Part II construction permit. PENNVEST projects are subject to both state and federal guidelines, including the federal wage rates, compliance with requirements for erosion and sedimentation control measures, wetland, Fish and Wildlife, and Historical Preservation investigations. Due to the demand for these low interest loans in recent years and the lower priority assigned to wastewater rather than water projects, applicants have typically been awarded one-half the funding requested, with applicants required to complete the funding from other

sources. Even with these restrictions, however, the low interest rate makes this option attractive.

5.6.4 COMMUNITY FACILITIES PROGRAM

The Department of Commerce Bureau of Grants of the State of Pennsylvania offers competitive grant awards to municipalities for sewage facilities. The program provides funds for collection lines only; sewage treatment facilities are ineligible. Projects must not exceed $2.0 million per municipality, and grants are awarded in amounts up to $75,000 or 75% of the project cost, whichever is less, to distressed communities. All of the municipalities in the study area are classified as distressed.

Applications are reviewed annually. A letter of intent must be received by April 15, with notices of award sent to communities by July 30. During 1992, one of every three applicants was awarded a grant. The awards are based on the number of persons affected and the severity of the problem. The phasing of a construction project over several years may enable a municipality to fund a portion each year through this program.

5.6.5 SITE DEVELOPMENT AND BUSINESS INFRASTRUCTURE GRANTS

The Department of Commerce also administers a grant program for the improvement of public facilities deemed essential for industrial growth and expansion. Grants are awarded to municipalities for projects which will increase private sector industrial employment. Eligible projects include sanitary sewer lines, but not storm sewers or sewage treatment facilities. There is no cap on the total project cost a municipality can claim, although the grant award for distressed communities is limited to $100,000 or 50% or the project cost. Grants cover construction, design and engineering, and legal

costs. Competition for these grants is considerably less than for the Communities Facilities Grants.

The Business Infrastructure Grant Program is a similar program also administered by the Department of Commerce, to the same end of creating jobs. Grant funds are available for projects involving private companies in Enterprise Zones or distressed communities. Private companies must match each dollar of State funding with two dollars in private investment.

5.6.6 ECONOMIC DEVELOPMENT ADMINISTRATION

This program of federal grants and loans for sanitary sewer systems is geared toward infrastructure projects which impact economic growth, specifically, industrial development which creates or preserves jobs. Municipalities designated as distressed are eligible for funding in amounts up to 80% of project costs. The program is administered by EDA under the Public Works and Development Facilities Grants Program.

5.6.7 HUD URBAN DEVELOPMENT ACTION GRANT (UDAG) PROGRAM

Grants for infrastructure development or rehabilitation and site improvements are available through this program to distressed communities. This program encourages joint public and private developments in unique projects which will increase private investment and aid in economic recovery. $2.50 must be contributed by private interests for each $1.00 requested of UDAG.

5.6.8 COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM

This program geared toward small communities is a federally funded HUD program similar to the UDAG program. A wide range of projects are eligible including wastewater collection and transmission and tapping fees, however, the grants are limited to $50,000 and must be supported by individual income data in the specific neighborhood to be sewered. Some communities have extended sewer lines each year using Block Grant funding.

5.6.9 BOND ISSUES

There are three types of bond issues which a municipality could consider for financing a sewage facilities plan: general obligation bonds which are repaid from the entire community's property taxes; special assessment bonds repaid from only the benefitted property owner's taxes; and revenue bonds payable from fees received from the services provided. Revenue bonds are the most commonly used means of financing large sewage projects since they are not considered as debts and therefore are not limited by a community's debt limits. They are generally issued by an authority rather than by a municipality due to the fiscal policies and practices which may be required by the trust indenture. Issuance of bonds involves additional costs and a 20 to 30 year commitment is required. Interest costs may be reduced through the use of credit enhancements such as bond insurance or bank letters of credit. Private bond insurance has been employed quite extensively over the years in Pennsylvania. The cost of the insurance must be balanced against the savings realized through interest rates. The issuer can best decide this by requesting that underwriters bid with and without insurance. A present worth analysis can then be performed to determine its economic feasibility. A bank letter of credit

places responsibility for the credit risk on the bank by pledging the banks credit to make principal and interest payments of a specific amount and term on an issuers debt. The size and type of issue for which the letter of credit can be secured is generally unrestricted. Banks usually charge an annual fee for this service while bond insurance premiums are a one-time cost paid at the time of purchase.

5.6.10 LONG TERM BANK FINANCING

Bank financing of a portion of project construction costs may be considered if financing is not completely acquired elsewhere. Municipal interest rates are usually lower than the prime rate, and loans are typically paid off within a five to ten year period. Bank loans are subject to a municipality's debt limit.

5.6.11 CONNECTION FEES

Connection fees such as impact fees and front foot assessments can help pay operating costs. These charges are better suited for facilities constructed to serve large future populations. Rates too high will slow development, cause idle capacity, and burden present users. This idle capacity must be paid for by present users. This plan does not adopt front foot assessments, and a connection fee of $2,500.00/EDU has been established.

5.6.12 ACT 339

Act 339 offers a subsidy program to assist eligible applicants in offsetting the annual expenses of operating and maintaining their sewage treatment facilities. The grant is requested annually and is

calculated to be 2% of the eligible local costs of acquisition or construction of the sewage treatment facilities.

SECTION 6: INSTITUTIONAL EVALUATION AND RECOMMENDED ALTERNATIVES

6.1 IDENTIFICATION OF PUBLIC ORGANIZATIONS PROVIDING WASTEWATER SERVICE

Public sewers are available within the communities of Beaver Falls and all or portions of its currently existing sewer users in West Mayfield, White Township, Patterson Township, Patterson Heights Borough, and Eastvale Borough, and within the Borough of Koppel. Homewood and the area of Big Beaver Borough within the study area are currently unsewered and no public structures exist in those municipalities to manage wastewater treatment. Residents of Homewood and Big Beaver manage the treatment and disposal of sewage on an individual basis. Permitted municipal wastewater treatment plants are located in Beaver Falls and in Koppel.

6.2 ANALYSIS OF EXISTING WASTEWATER TREATMENT AUTHORITIES

The Koppel Sewage Treatment Plant treats wastewater originating in the Borough of Koppel only and bills its residents for that service directly. The Beaver Falls Water Pollution Control Plant treats City wastewater and wastewater flowing from the outlying communities having public sewers. Both plants are municipally owned and operated.

Beaver Falls outlying communities comprise a loosely organized entity known as the Joint Sewer Users. Municipal ordinances enacted prior to the connection of the outlying

districts specify that the district shall construct, operate, and maintain the sewer lines within the City of Beaver Falls through which the district's sewage flows. Under these conditions, Beaver Falls bills the districts for wastewater treated at its plant at a slightly higher rate in order to pay for maintenance costs to the joint sewer users lines and to the sewage treatment plant. This is common practice for utility owners providing service to non-owners and provides the City a reasonable return from non-owner customers based on the value of its plant required to serve those customers. Beaver Falls budgets these revenues and costs under its Joint Sewer Users Fund. City customers are accounted for under the regular Sewer Fund in the City budget. All billing is based on water usage. This method has functioned well over the years, with Beaver Falls managing all maintenance and improvements to the joint lines and the treatment plant from the revenues in the Joint Sewer Users Fund.

6.3 IDENTIFICATION OF INSTITUTIONAL ALTERNATIVES NECESSARY FOR PLAN IMPLEMENTATION

The purpose of the Act 537 Sewage Facilities Plan is to objectively examine alternatives available to the municipalities in the study area and to make recommendations to those municipalities regarding the best alternative in a given set of circumstances. The existing conditions in the study area are such that those communities having public sewers are much better able to provide for the health and welfare of their citizens and for the general environment than those communities without sewers. While development in the sewered communities is not completely unrestricted, potential developments, whether industrial,

commercial, or residential, can locate in those communities with more confidence that sewage disposal will not be an overriding concern. Therefore, this study will assume at this point that a regional approach to wastewater management will provide for public sewering in some currently unsewered areas.

To manage such a regional facility, an implementing entity is required to oversee items such as construction, operation, maintenance, and capital improvements. There are several options available to provide an institutional entity capable of implementing a regional sewage treatment approach.

6.3.1 MUNICIPAL MANAGER - SATELLITE SYSTEM

Under this method, one municipality would assume a leadership and management role, with the satellite communities benefiting from and contributing support toward the regional sewage facilities developed pursuant to this Plan. The satellite communities would, as in the existing Joint Sewer Users system revolving around the Beaver Falls facilities and management staff, be responsible only for sewer lines and appurtanances within their boundaries. Their financial support to the operation and maintenance of the joint facilities would be commensurate with the populations connected to the joint sewers and would provide for a fair rate of return for maintenance and improvement of the joint facilities.

This type of arrangement would fall under the Intergovernmental Cooperation Law, Act 180, of 1972. This Act allows any government responsibility, power, or function to be transferred to another governmental entity such as a municipal or district government unit or

a new unit. An ordinance must be adopted by each municipality specifying the conditions and length of time of the agreement, its purpose, method of financing, and organizational structure, and the powers of ownership and contracting of agreements. In designating a government entity as the implementing entity for the Sewage Facilities Plan, that entity becomes responsible for the implementation, management, and financing of programs and projects. The financing would be through the means the entity has available, and those means generally include personal property, occupation, and per capita taxes, and bond issues and loans. Any bond issues or loans would be subject to the debt limit of the designated entity. For instance, if the City of Beaver Falls were to assume responsibility for the construction, operation, and maintenance of new sewage facilities for the municipalities of Homewood and Big Beaver, the project construction and initiation costs could not exceed $12,600,000.00, which is the City's current debt limit. Other financing options are explored elsewhere in this report, and may present more feasible options for this type of intergovernmental agreement.

6.3.2 COUNCIL OF GOVERNMENTS

A council of governments or COG is a voluntary approach requiring no ordinances and may be structured as participants desire. It may have no specified purpose; however a COG may own and operate facilities. Funds to conduct planning studies or projects are contributed by the members. Financing of a major project or facility would require a more binding form of agreement. COGs are not authorized to issue bonds and therefore are seldom the implementing agency for major capital projects.

6.3.3 MUNICIPAL AUTHORITY

One or a group of municipalities may form a municipal authority to provide services to its own and outside customers or may be organized on a multi-municipal or regional basis. Such an authority is subject to the requirements of the Municipality Authorities Act of 1945. An authority is a board or commission outside of the regular structure of local government given the power to own property, incur debt and finance projects and activities through user charges.

Authorities must operate and finance projects within the municipalities debt limits as provided by any law of the Commonwealth. The authority sells bonds or makes loans if capital is required, operates a project, and discharges the debt from project revenues. An authority may also accept grants. A municipal authority would be an effective vehicle for handling projects requiring a cooperative municipal arrangement. The authority's members are appointed by the municipalities involved for a specified number of years and cannot be removed except by a Court of Common Pleas. This arrangement protects the authority somewhat from political pressure and enables its members to focus on the specific tasks.

In the creation of an authority, specific powers to regulate the installation and operation of sewage facilities must be granted by the municipalities. An authority, to be truly effective, must have municipal agreements to ensure proper control. When properly structured, authorities have financed, planned and operated a wide variety of project management systems and facilities.

6.4 EVALUATION OF ALTERNATIVES

In order to evaluate the three alternatives for an implementing entity for the Sewage Facilities Plan, an evaluation criteria matrix is used. In the matrix, a number of factors are listed with a weighted rating. The rating assigned to each factor is a number between one and three and weights the factor according to its relative importance. The three alternatives are listed on the left. Each alternative is evaluated for its ability to satisfy each factor. For instance, if an alternative is being rated for its ability to satisfy requirements for capital improvements, the rater would consider that particular management option's ability to finance and manage a major capital improvements program. An authority would probably deserve a higher rating than a COG, simply due to its acceptability within financing agencies such as banks. Authorities have a long history of successfully financing and repaying loans and bond issues, whereas COGs do not. Therefore, on a scale of one to five, the authority would receive a rating closer to five and the COG a rating closer to one. When all the ratings for each alternative have been assigned, each number rating is multiplied by the appropriate rating factor and the results are summed for each alternative. The alternative with the highest total rating would be considered to be the best choice to implement the Sewage Facilities Plan.

6.4.1 RESULTS OF EVALUATION

The three alternatives described above were evaluated by the Consultants, and the results are listed below in tabulated form.

TABLE 6-1

EVALUATION OF MUNICIPAL MANAGEMENT ALTERNATIVES

Rating Factor	Manager-Satellite	Council of Governments	Municipal Authority
Impact on Existing Systems	2.4	2.8	2.5	2.0
Political Acceptability	2.3	2.5	2.2	1.9
Public Acceptability	2.5	2.7	2.5	2.2
Cost to Operate	2.6	2.8	2.0	2.2
Cost Stability	2.3	2.6	2.4	2.5
Capital Investment	1.9	2.3	1.5	2.8
Administrative Requirements	1.3	2.7	1.0	2.8
Municipal Control	2.2	2.5	2.4	1.7
Use of Existing Facilities	2.6	2.6	2.5	2.6
Technical Reliability	2.2	2.3	2.1	2.4
Flexibility	2.1	2.0	2.3	2.3
Dependability	2.4	2.5	1.7	2.8
TOTAL RATING		67.9	57.5	62.4

6.5 IDENTIFICATION OF RECOMMENDED MUNICIPAL MANAGEMENT ALTERNATIVE

The Manager-Satellite method achieves the highest rating, followed closely by the Municipal Authority method. These two methods are both well able to manage the

implementation of any facilities and systems developed pursuant to the Sewage Facilities Plan. The final decision on the selection of a management system will be made by the participating municipal officials and will be based in large part on the financial requirements of the final recommendations of this Plan. In the Consultant's opinion, however, the Manager-Satellite system could best serve the existing and future needs of all parties, unless the financing requirements of the recommended Plan are beyond its capabilities. In that case, the greater flexibility in exploring financial options of a joint municipal authority would favor the selection of that alternative.

6.6 IDENTIFICATION OF ADMINISTRATIVE AND LEGAL ACTIVITIES NECESSARY FOR PLAN IMPLEMENTATION

Under the proposed Sewage Facilities Plan, the implementing entity will be a local municipality capable of implementing the Plan and of operating and maintaining facilities. The logical choice of the municipality is the City of Beaver Falls, since the City has a history of successfully owning and operating a system of public sewers and a sewage treatment plant as well as supplying services to outlying districts.

6.6.1 IMPLEMENTING DOCUMENTS

The affected parties must each enact a formal resolution to ratify and adopt the Beaver Falls Regional Sewage Facilities Plan as each municipality's Plan.

For the City to assume responsibility for two additional municipal districts, formal

agreements must be executed between the City and the Boroughs of Homewood and Big Beaver. These agreements should be similar to those in existence between the City and the districts already served. In addition, Homewood and Big Beaver will enact ordinances requiring residents in the affected areas to connect to public sewers. The ordinances will entail regulations governing the sewer tap installations and tap-in fees. Zoning and subdivision ordinances and regulations will be revised to distinguish the sewered areas, and building permit and planning module regulation will include requirements for acquiring sewer taps in those areas. The satellite municipalities will be required to coordinate the issuance of building permits and sewer taps with the City of Beaver Falls, and the appropriate regulations to effect that must be put in place.

6.6.2 ADMINISTRATIVE REQUIREMENTS FOR PLAN IMPLEMENTATION

The City of Beaver Falls has in place the necessary administrative structure to construct and manage any additional sewage facilities. The Boroughs of Homewood and Big Beaver will join the existing Joint Sewer Users. The Borough Councils of Homewood and Big Beaver will be invited to attend the Joint Sewer Users meetings.

6.7 CONCLUSIONS

If the recommendations of this Plan are implemented, the City of Beaver Falls will continue as manager of sewage facilities, with expanded responsibilities involving the Boroughs of Big Beaver and Homewood. If this is not feasible due to reasons discussed above, then a municipal or joint municipal authority may be formed to implement the Plan. The legal and administrative requirements in that case will involve the organization of the authority and its administrative, technical, and maintenance staffing. The organization of such an authority will involve initial costs such as legal expenses, transfer of property, purchase of equipment, and hiring of staff. The financing of these initial costs is an item which must be discussed prior to the acceptance of the recommendations of this Plan.

SECTION 7: SELECTED WASTEWATER TREATMENT AND INSTITUTIONAL ALTERNATIVES

7.1 SELECTED WASTEWATER TREATMENT ALTERNATIVE

Three wastewater treatment alternatives were examined in this plan: an oxidation tower, a sequencing batch reactor, (SBR) and an aerated biological filter (ABF). All of these alternatives have been combined with a general plant expansion to 4.7 MGD. The estimated costs of the three alternatives are: oxidation tower, $4,800,000 construction cost and $1,041,431 annual operation and maintenance (O & M) costs; SBR, $4,864,000 construction cost and $1,049,431 annual O & M costs; and ABF, $4,971,400 construction cost and $1,512,856 annual O & M costs.

The oxidation tower alternative was chosen because of its lower construction cost as well as its lower O & M costs.

7.2 SELECTED ON-LOT TREATMENT ALTERNATIVES

Several alternatives were evaluated to provide sewage service for areas not served by sewers. These include individual on-lot systems, community on-lot systems, small flow treatment facilities/package plants, and holding tanks. A no action alternative was also considered. The no action alternative was rejected due to environmental and public health reasons. The holding tank alternative was rejected due to administrative and economic

reasons. The community on-lot alternative was rejected due to administrative and technical reasons. The individual on-lot system was selected as the sewage disposal method of choice in areas not serviced by sewers. Small flow treatment facilities/package plants may be utilized only as repairs to existing on-lot systems which cannot be adequately repaired with on-lot methods, or as interim systems in areas scheduled to be sewered within 10 years.

7.3 SELECTED WASTEWATER COLLECTION AND CONVEYANCE ALTERNATIVE

This plan recommends the extension of the Beaver Falls sewer system to Koppel Borough border, and that sewer lines be constructed in the Borough of Homewood. This plan also recommends that Koppel construct a pump station and tie into the system. This alternative will provide sewer service to the identified needs areas of Homewood, the Holiday Inn, and Big Beaver Plaza. In addition, this alternative will provide the most flexibility in that the enterprise zone at the Route 60/Route 351 interchange can be developed and can tie into the sewer system, reducing the user charges. These alternatives are shown in Figures 5.1-2 and 5.1-7.

The Borough of Koppel has expressed a strong desire not to participate in the project. If they did participate, the additional cost to connect the Borough will be offset by the number of additional EDUs (931), and would result in lower user costs. If neither Koppel or the enterprise zone commit to the recommendations in the plan, it will not be cost effective for the City to extend the sewer line into Big Beaver Borough.

7.4 SELECTED INSTITUTIONAL ALTERNATIVE

Three institutional alternatives were investigated in Section 6 of this study. The alternatives were assigned points indicating their effectiveness in each of 12 categories. The categories were then weighted by the application of a rating factor. The alternative with the highest weighted score will be the most appropriate institutional alternative for the case which was evaluated.

In this case, the Municipal Manager - Sattelite system was rated highest, with 67.9 total points, and leading in 6 of the 12 categories. The Municipal Authority ranked second, with 62.4 points and leading in 5 categories. The Council of Governments ranked last with 57.5 points, and not leading in a single category.

To implement this alternative, all municipalities must adopt this plan, and execute agreements with the City of Beaver Falls which designate that the City will assume responsibility for the operation and maintenance of joint portions of the sewerage system. In addition, Big Beaver and Homewood must revise their zoning and subdivision ordinances to require connection to the sewerage system, as well as coordinating the issuance of building permits and sewer taps with the City, furthermore, all planning modules requesting sewer taps should be reviewed by the City to assure that capacity exists in the sewerage system.

7.5 FINANCING METHODS AVAILABLE

Available sources of funding for the selected alternatives have been identified in Section 5.6 of this plan. The financing method of choice will be PennVEST, since the Farmers Home Administration does not consider Beaver Falls to be a rural area, and a bond issue will have higher annual costs. Section 5.6 also identifies numerous grants sources which may be utilized to help defray some of the costs associated with wastwater projects. It is recommended that all affected municipalities apply for as many grants as possible to lower the cost of the project.

7.6 GROWTH AREAS

Since the collapse of the steel industry in the 1970s, the project area has not been growing, rather it has been experiencing a population decline. With the designation as an enterprise zone, and with sanitary sewage made available, it is possible that growth may occur in the study area. Growth is expected to develop in accordance with the schedule below.

7.6.1 5-YEAR GROWTH AREAS

Since sewers will be extended along Route 18, it is anticipated that growth will occur in this area first. The new development is expected to be located within the enterprise zone designation along Route 18 where sewers are provided. The enterprise zone area along Route 18 is shown in Figure 1.4-1. The enterprise zone is bounded by steep slopes, and development is not expected outside of the designated areas.

7.6.2 10-YEAR GROWTH AREA

As the Route 18 corridor begins to develop, and the study area becomes a sought-after location for industry, it is anticipated that the enterprise zone along Route 551 and the enterprise zone at the Route 60/Route 351 intersection will begin to develop. As these areas begin to develop, sewers will be extended into the areas to stimulate further development and job creation for this economically distressed area. The sewage flow from these areas has been considered in the sizing of the sewer lines and the treatment plant.

SECTION 8 - IMPLEMENTATION

8.1 DESIGN AND CONSTRUCTION SCHEDULE

ACTION	DATE
Submit NPDES Application	Immediately after Plan Approval
Begin Design	30 days after Plan Approval
Receive NPDES Application	120 days after Plan Approval
Complete Design	6 months after Plan Approval
Submit Part II Application	190 days after Plan Approval
Submit PennVest Application	7 months after Plan Approval
Advertise for Bids	30 days after PennVEST Notification
Award Bids	10 days after PennVEST Closing
Begin Construction	10 days after award of bids
Progress Reports	Quarterly
End Construction	24 months after Plan Approval
Compliance with Permit Limits	24 months after Plan Approval

8.2 ADMINISTRATIVE ACTIVITIES SCHEDULE

ACTION	DATE
Execute Intermunicipal Agreements	120 days from Plan Approval
Revise Subdivision Ordinances	180 days from Plan Approval
Revise Zoning Ordinances	180 days from Plan Approval

SECTION 9 - PENNVEST REQUIREMENTS

9.1 I & I STUDY OF THE BEAVER FALLS COLLECTION SYSTEM

On August 20, 1991, Widmer Engineering Inc. completed an Infiltration/Inflow study of the Beaver Falls wastewater collection system. The collection system is broken down into nine mini-systems. (See the City of Beaver Falls Collection System Map). Physical inspections of manholes and flow monitoring at strategic manholes was performed. Flow monitoring results were obtained for wet weather and dry weather flows. Infiltration and inflow were calculated as the difference between expected flows and actual flows. I & I estimates were made for both wet weather and dry weather flows. A summary of the estimated I & I for each mini-system is as follows.

Mini-System #1 - Located in Patterson Township not included in the study.

Mini System #2 - Located in Patterson Township not located in the study.

Mini System #3 - Mini-system #3 contains 147 manholes, 43,925 linear feet of 8" dia. sewer, 3,515 linear feet of 10" dia. sewer, 1,400 linear feet of 12" sewer line, and 4,100 linear feet of 15" dia. sewer line. This computes to 88.04 inch-miles of sewer line.

Manholes 136-3, 146-3, 150-3, 159-3, and 221-3 had portable flow meters installed. Tabulated below are the results of the flow meter evaluation:

MH	EXPECTED SEWAGE FLOW	AVG DRY WEATHER FLOW	AVG WET WEATHER FLOW	DRY WEATHER I/I	WET WEATHER I/I
36-3	4,983 GPD	11,883 GPD	243,337 GPD	6,900 GPD	238,354 GPD
46-3	20,730 GPD	70,921 GPD	202,488 GPD	50,191 GPD	181,758 GPD
50-3	17,617 GPD	51,899 GPD	313,114 GPD	34,282 GPD	295,497 GPD
59-3	10,191 GPD	63,223 GPD	177,824 GPD	53,032 GPD	167,633 GPD
21-3	24,574 GPD	50,336 GPD	506,635 GPD	25,762 GPD	482,061 GPD

The expected sewage flow rate was determined by taking 80% of the volume of the average daily metered water sales for the study area.

RECOMMENDATIONS

MH 136-3 - In this service area, manholes 120-3, 130-3, 131-3, 132-3, 133-3, 134-3, and 135-3 were observed to be seeping groundwater. It is proposed to rehabilitate these manholes and the sewer line connecting them.

MH 146-3 - In this service area, repairs to a section of line between MH 120-3 and MH 117 are proposed. This includes replacing 795 linear feet of sewer line and 5 manholes.

MH 150-3 - There are no proposed repairs to this service area. It should be noted that MH 150-3 receives flow from MH 146-3 and MH 136-3.

MH 159-3 - In this service area, 421 linear feet of sewer line and seven manholes from MH 184 to MH 159 are proposed to be reconstructed.

MH 221-3 - In this service area, 336 linear feet of sewer line and 2 manholes are proposed to be replaced from MH 195 to MH 193.

NOTE: Manhole 136-3, Lines from manhole 188 to manhole 184, from manhole 193 to manhole 195, and from manhole 117A to manhole 120 were replaced during 1992

Mini-System #4 - Mini-System #4 contains 136 manholes, 45,715 linear feet of 8" dia. sewer line, 500 linear feet of 12" dia. sewer line, 800 linear feet of 18" dia. sewe line, 4,375 linear feet of 20" dia. sewer line, and 4,275 linear feet of 24" dia. sewer line. This computes to 109.13 inch-miles of sewer line.

Flow monitoring was performed in manholes MH 19-4, MH 51-4, MH 105-4, and MHs 111-4 to 112-4. Tabulated below are the results of the flow meter study:

MH	EXPECTED SEWAGE FLOW	AVG DRY WEATHER FLOW	AVG WET WEATHER FLOW	DRY WEATHER I/I	WET WEATHER I/I
9-4	26,928 GPD	26,724 GPD	31,702 GPD	--	4,774 GPD
51-43	2,165 GPD	61,441 GPD	123,840 GPD	29,276 GPD	91,675 GPD
05-4	24,352 GPD	47,388 GPD	59,519 GPD	23,036 GPD	35,167 GPD
11-4 & 12-4	42,052 GPD	88,294 GPD	129,380 GPD	46,242 GPD	87,328 GPD

RECOMMENDATIONS

MH 19-4 - There appears to be very little I/I in this service area. No major work is proposed.

MH 51-4 - Although there appears to be I/I in this study area, no major work is proposed.

MH 105-4 - Although there appears to be I/I in this study area, no major work is proposed.

MHs 111-4 and 112-4 - It is recommended that televising of this service area be performed to determine problem areas.

Mini-System #5 - Mini-System #5 consists of 120 manholes, 35,176 linear feet of 8" dia. sewer line, 1,475 linear feet of 10" dia. sewer line, 2,738 linear feet of 12" dia. sewer line, 875 linear feet of 15" dia. sewer line, and 2,550 linear feet of 18" dia. sewer line. This computes to 73.49 inch-miles of sewer line.

Flow monitoring was performed in manholes MH 47-5, MH 41-5, and MH 91A-5. Tabulated below are the results of the flow meter study.

MH	EXPECTED SEWAGE FLOW	AVG DRY WEATHER FLOW	AVG WET WEATHER FLOW	DRY WEATHER I/I	WET WEATHER I/I
47-5	4,113 GPD	20,669 GPD	213,977 GPD	16,556 GPD	209,864 GPD
41-5	37,904 GPD	89,109 GPD	941,998 GPD	51,205 GPD	904,094 GPD
91A-5	98,896 GPD	310,343 GPD	1,582,083 GPD	211,447 GPD	1,483,187 GPD

RECOMMENDATIONS

MH 41-5 - This manhole appears to have an I/I problem. It receives flow from the East Trunk Line. The Trunk Line is proposed to be replaced. Once it is replaced, the I/I in this manhole should be reduced.

MH 47-5 - It is recommended that 63 linear feet of sewer (and the two manholes) that cross Walnut Bottom Run be replaced. It is believed that the majority of the I/I occurs in mini systems 6 & 7.

MH 914-5 - It is recommended that 375 linear feet of sewer line (MH 34 - MH 33) be replaced. Again, once the East Trunk Line is replaced, I/I will be reduced.

NOTE: Line from manhole 33 to manhole 34 were rehabiliatated during 1992.

Mini System 6 & 7 - Mini System 6 & 7 consist of 10 manholes, 2100 linear feet of 8" dia. sewer line, and 2250 linear feet of 12" dia. sewer line. This computes to 8.29 inch-miles of sewer line.

Flow monitoring was performed in MH-79. The results are tabulated below.

MH	EXPECTED SEWAGE FLOW	AVG DRY WEATHER FLOW	AVG WET WEATHER FLOW	DRY WEATHER I/I	WET WEATHER I/I
79	2,687 GPD	19,156 GPD	506,164 PD	16,469 GPD	503,477 GPD

RECOMMENDATIONS

MH 79 - This manhole receives flow from mini-system 9. Proposed improvements to mini-system 9 should alleviate some of the I/I. This manhole also receives flow from White Township. It is recommended that White Township perform a survey to try and eliminate I/I.

NOTE: Line between manhole 255 and manhole 81 was sliplined and manhole 255 was replaced during 1992.

Mini-System #8 - Mini-System #8 is entirely contained within the Beaver Falls city limits. It consists of 110 manholes, 22,750 linear feet of 8" dia. sewer line, and 5,800 linear feet of 12" dia. sewer line. This becomes 47.65 inch miles of sewer pipe.

Flow monitoring was performed in manholes MH 54-8, MH 85-8, and MH 91-8. The results of the flow meter study are tabulated below.

MH	EXPECTED SEWAGE FLOW	AVG DRY WEATHER FLOW	AVG WET WEATHER FLOW	DRY WEATHER I/I	WET WEATHER I/I
54-8	54,652 GPD	118,283 GPD	148,934 GPD	63,631 GPD	94,282 GPD
85-8	25,557 GPD	63,937 GPD	432,413 GPD	38,380 GPD	406,856 GPD
91-8	13,017 GPD	156,416 GPD	418,282 GPD	143,399 GPD	405,265 GPD

RECOMMENDATIONS

A survey of the Babcock and Wilcox Steel Mills connections was recommended. During this survey several connections were found that are no longer in use. Several roof drains entered the ground. It is recommended that these roof drains empty above the ground to eliminate the possibility of stormwater entering the system.

It is recommended that the East Trunk Line be replaced. Once the replacement has occurred, it is recommended that another flow monitoring study be performed on all three manholes

simultaneously to see if the I/I has been alleviated.

Mini-System #9 - Mini-System #9 consists of 40 manholes, 8900 linear feet of 8" dia. sewer, and 1600 linear feet of 12" dia. sewer. This gives a total of 17.12 inch-miles of sewer line.

Flow monitoring was performed in manholes MH 129-9, MH 148-9, and MH 158-9. The results of the flow monitoring study are tabulated below.

MH	EXPECTED SEWAGE FLOW	AVG DRY WEATHER FLOW	AVG WET WEATHER FLOW	DRY WEATHER I/I	WET WEATHER I/I
158-9	6,870 GPD	10,298 GPD	16,346 GPD	3,428 GPD	9,476 GPD
129-9	2,157 GPD	48,866 GPD	215,132 GPD	46,709 GPD	212,975 GPD
148-9	12,096 GPD	39,111 GPD	37,241 GPD	27,015 GPD	14,919 GPD

RECOMMENDATIONS

MH 148-9 - Replacement of 3 manholes and 368 linear feet of sewer line crossing Walnut Bottom is recommended. (Between MH 148-9 and MH H7-9).

MH 158-9 - Replacement of two manholes and the line crossing Walnut Bottom Run should be replaced.

MH 129-9 - The majority of I/I in this line appears to be coming from West Mayfield. It is recommended that West Mayfield perform an I/I survey of their collector lines.

NOTE: Manhole 144 and lines between manholes 128 and 158, 135 and 147 were replaced during 1992. A City-wide manhole frame and cover replacement program was also performed during 1992. West Mayfield also completed an I/I survey. The study determined that flows into the Beaver

Falls sewer system increased during rainfall by a factor of 8.09, indicating excessive inflow and infiltration. A peaking factor of 6.25 would be reasonable considering the existing condition of the West Mayfield sewer system. Following completion of the study, inspections of suspect areas were performed and recommended for rehabilitation of selected areas of sewer lines were made.

For all mini-systems, the flow meters were installed for a one month period. The days in which precipitation occurred were considered wet days and days in which no precipitation occurred were considered dry days. The average of the flows received are recorded as the average wet weather flow and the average dry weather flow.

9.2 INNOVATIVE AND ALTERNATIVE TECHNOLOGIES

Innovative and alternatives were identified in Section 5.1, Identification of Alternatives, and evaluated in Section 5.5, Evaluation of Alternatives. Specifically, the alternative sewer technologies identified included: small diameter gravity sewers, step systems, and vacuum sewers. Alternative treatment technologies identified included sequencing batch reactors, aerated biological filters, ozonation disinfection, and ultraviolet disinfection. These technologies were considered to serve the areas of Homewood and Beaver Falls. It was not possible to consider these alternative technologies for Big Beaver, since the area is very sparsely populated, and due to the fact that development in Big Beaver will be largely non-residential, and the wastewater generated may not be amenable to these technologies.

9.3 OPEN SPACE AND RECREATIONAL OPPORTUNITIES

The objective of this item is to evaluate the recommended project's potential to enhance the open space and recreational opportunities of the community. A community facilities map of the study areas was obtained and studied for possible ways in which the proposed project could enhance these areas. It was noted that there were no cultural facilities within the project area with the exception of Homewood Falls. Due to the location of the Falls, it would nto be possible to enhance the recreation opportunities of the community through construction of the project.

It should also be noted that, with the exception of one sewer line from Homewood, the project will be constructed entirely within existing rights-of-way of roadways. In this respect, construction of the project can provide no greater enhancement to recreational opportunities than are currently provided by the existing roadways.

9.4 ALTERNATIVES EVALUATION/COST EFFECTIVE ANALYSIS

Alternatives have been identified in Section 5.1 of this report. Cost data was analyzed in Section 5.5 along with the population served and funding methods to be used. Based on this analysis, the most cost-effective alternative which was environmentally acceptable was chosen.

9.5 ENVIRONMENTAL ASSESSMENT

9.5.1 AIR QUALITY

This project should have minimal impact on air quality. Some dust may be released to the air during construction, but this will be a short term effect and it will be kept to a minimum by using

proper construction techniques. This project will not cause any adverse long term effects on air quality.

9.5.2 NOISE

There will be an increase in noise level during construction as a short term impact. Every effort will be made to minimize the noise level during construction. This project will not increase or reduce the current ambient noise level in the long run.

9.5.3 ENDANGERED OR THREATENED SPECIES

The PA DER - Bureau of Forestry was contacted and a Pennsylvania Natural Diversity Inventory (PNDI) search was requested for the study area. Any comments received on this topic will be included in this report. A copy of the letter requesting the PNDI search can be found in the correspondence appendix.

9.5.4 FISH AND WILDLIFE RESOURCES

Fish and wildlife resources should benefit from the proposed construction. Raw sewage by-passes will be eliminated. This will improve the quality of surface water in the project area. Wherever possible, sewer lines will be placed in roads and highways to minimize impact on wildlife in the area. This project proposes replacing sewers and sewering existing homes.

9.5.5 WETLANDS, FLOODPLAINS, AND COASTAL AREAS

Wetlands and floodplains have been illustrated on Plate 4 for the study area. The construction proposed by this report will not encroach on any known wetlands. Some sewer lines may encroach on floodplains, but since they are below ground, and will be backfilled to preconstruction levels, this will not increase the likelihood of downstream flooding or increase flood elevations. Appropriate permits will be obtained for the encroachment into the floodplains by the sewer lines. Coastal areas will not experience any impacts from the construction proposed by this report.

9.5.6 SURFACE WATER AND GROUNDWATER RESOURCES

Surface water and groundwater quality should see a great improvement in the long run. Raw sewage that is currently entering streams through storm sewer connections and through manhole overflows will be eliminated. Malfunctioning septic systems will be eliminated which will improve groundwater quality. Elimination of malfunctioning small flow treatment plants will also improve long term surface water quality. Negative short term impacts from construction will be minimized by an approved erosion and sedimentation pollution control plan and any stream encroachment permits that may be required.

9.5.7 SLUDGE DISPOSAL

Since the Beaver Falls Treatment Plant will be expanded, more sludge will be generated at the plant. This also means that less sludge will be generated in individual septic tanks and the package plants or piped directly into streams. For sludge generation in unsewered areas, the on-lot disposal

systems maintenance ordinance adopted as part of this plan will ensure that septage will be collected and disposed of routinely and properly. Sludge produced at the Beaver Falls Water Pollution Control Facility is hauled to a landfill.

9.5.8 LOSS OF PRIME AGRICULTURAL LAND

The construction proposed in this report will not encroach upon any prime agricultural land. The prime agricultural soils are highlighted on Plate 3. For development to occur on these soils, the Department of Agriculture should be contacted for a determination on whether or not the land can be developed. The address is:

Department of Agriculture
Agriculture Office Building
2301 N. Cameron Street
Harrisburg, PA 17110

9.5.9 EXCESSIVE ENERGY CONSUMPTION

This project will not excessively increase energy consumption. The pump stations will increase electrical consumption. The Beaver Falls treatment plant will be replacing many of its pumps and motors with variable frequency drives (VFDs). These are more energy efficient and will reduce energy consumption from pumping.

9.5.10 VISUAL AFFECTS AND COMMUNITY AMENITIES

This project will not have any long term impact on visual affects and community amenities.

9.5.11 SOCIO-ECONOMIC CONSIDERATIONS

The Department of Community Affairs has designated certain areas as enterprise zones. These zones are to encourage job growth and economic development in the area. Extending sewer lines to the enterprise zones is the best way for development to occur. The long range economic benefit to the area would be positive. The extension of sewers would also eliminate raw sewage discharges. Therefore, the long term social benefit would also be positive. Every effort will be made to secure grants and low interest loans to keep project costs down.

9.5.12 HISTORICAL OR ARCHAEOLOGICAL SITES

A letter was sent to the Pennsylvania Historical and Museum Commission, Bureau for Historic Preservation, requesting notification of any known areas of archaeological and historic significance within the study area. No comments have been received. A copy of the letter is enclosed in the correspondence appendix. If the Bureau for Historic Preservation does have any comments in the future, they will be incorporated into the report. Until comments are received to the contrary, it is assumed that this project will not impact any areas of archaeological or historical importance.

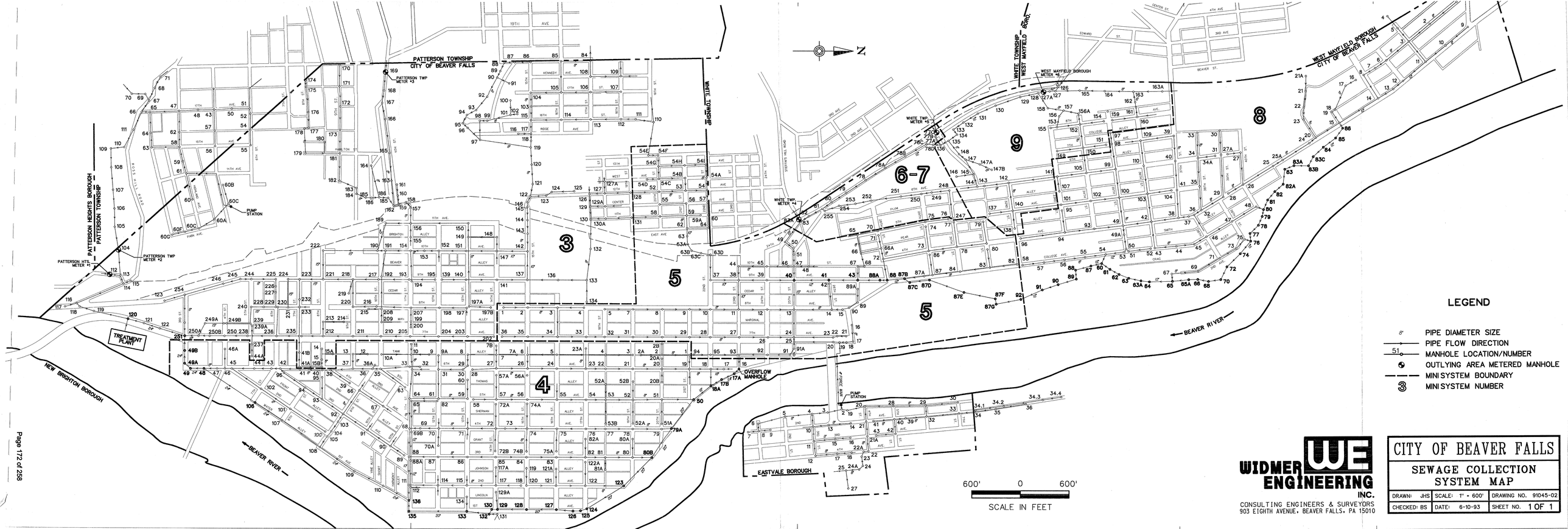
9.5.13 OLD FILL AREAS/LANDFILLS

There are no known old fill areas or landfills in the study area. The construction proposed will not impact them in any way.

9.5.14 OTHER ENVIRONMENTALLY SENSITIVE AREAS

An environmentally sensitive area has been identified in Big Beaver Borough's Comprehensive Plan. It is Homewood Falls on Clark's Run. This project will have a positive long term effect on Homewood Falls because raw sewage entering Clark's Run from Homewood would be virtually eliminated. Sewer lines and force mains will be located to minimize disturbance to the falls. An approved Erosion and Sediment Pollution control plan will help mitigate the short term impacts on Homewood Falls and Clark's Run.

APPENDIX A - BEAVER FALLS SEWER SYSTEM



WIDMER ENGINEERING INC.
CONSULTING ENGINEERS & SURVEYORS
903 EIGHTH AVENUE, BEAVER FALLS, PA 15010

CITY OF BEAVER FALLS

SEWAGE COLLECTION SYSTEM MAP

DRAWN: JHS	SCALE: 1" = 600'	DRAWING NO. 91045-02	
CHECKED: BS	DATE: 6-10-93	SHEET NO. 1 OF 1	

APPENDIX B - BEAVER FALLS WATER POLLUTION CONTROL PLANT STUDY

APPENDIX B - BEAVER FALLS WATER POLLUTION CONTROL PLANT STUDY

WATER POLLUTION CONTROL PLANT STUDY
CORRECTIVE ACTION PLAN
FOR THE
CITY OF BEAVER FALLS

Report Summary

The City of Beaver Falls has been mandated to prepare a Corrective Action Plan by the Pennsylvania D.E.R. The ultimate goals of this plan are to attempt to eliminate Infiltration/Inflow from the contributing sewer systems and modify the City of Beaver Falls Water Pollution Control Plant as required to enable it to treat all incoming flows in compliance with its' N.P.D.E.S. Permit. Although sewer system rehabilitation work can be effective, it is unlikely that all of the extraneous I/I water can be removed from the sewer system, no matter how much work is performed. As stated in Pennsylvania D.E.R.'s letter to the City (August 26, 1991), it may be more cost-effective to deal with some of the I/I problems by expanding the sewage plant rather than trying to exclude all extraneous flows from the system. In addition, some plant capacity should exist for future growth needs. The regulatory agency requested that a determination be made of the existing plant's peak capacity and identification be made of all necessary plant modifications for it to operate at that peak capacity during high flow.

The methodology used for analyzing the plant's peak capacity was to first determine the hydraulic and organic loading capacities of each unit process. Once this was accomplished, the average and peak capacities associated with the unit process possessing the largest rated capacities were used for analyzing the adequacy of the remainder of the plant's facilities. The existing primary sedimentation tanks and chlorine contact tanks were determined to be the units of largest hydraulic capacity. The three (3) primary tanks, after slight modification with additional weir overflow troughs, have the following rated hydraulic capacities:

Primary Sedimentation Tanks Existing Rated Capacity

Q_{Ave} (Average Daily Flow Capacity) = 4.80 MGD

Q_{Peak} (Peak Flow Capacity) = 7.20 MGD

Chlorine Contact Tank
Existing Rated Capacity

Q_{Peak} (Peak Flow Capacity) = 7.92 MGD

The capacities of all other existing treatment plant facilities are significantly less than those previously mentioned. The hydraulic and organic analysis contained in the appendix of this cursory report depict actual and projected capacities of each unit process within the plant. It has been summarized that all other plant facilities have approximately one-half (1/2) the rated capacity of the primary and chlorine contact tank facilities. Therefore, the plant's existing permitted capacity of 2.5 MGD (Q Ave.) can be readily increased to 4.8 MGD (Q Ave.) and the allowable peak flow (Q Peak) can be increased to 7.20 MGD by expansion of the remaining unit processes. Expansion of these facilities would provide an abundance of treatment plant capacity to treat a significant amount of Infiltration/Inflow and also provide excess capacity for future growth within the City and outlying communities. In addition, untreated wastewater which currently is bypassed at the wastewater treatment plant during rainfall events could be virtually eliminated. It is acknowledged that the City will be performing some needed sewer system rehabilitation work during 1992 with a PennVest low interest loan (awarded in late October 1991). Some of this work will address areas of known sources of I/I. The sewer system evaluation survey and flow monitoring program currently being performed by Widmer Engineering Inc. will probably identify additional areas which contribute extraneous water to the sanitary sewer system. Although successful removal of I/I is very desirable, it is unlikely that all or even a substantial portion of it can be cost-effectively removed from any sewer system of the magnitude of the Beaver Falls Wastewater Treatment Plant regional service area.

Conclusions

The conclusions offered herein are presented based on the engineering analysis contained within the appendix of this cursory report. Analytical procedures used to evaluate capacity of each major component of the existing Beaver Falls Wastewater Treatment Plant were performed in accordance with regulations and guidelines set forth in the Pennsylvania Sewerage Manual, Pennsylvania D.E.R. - Bureau of Water Quality Management, Publication No. 1, 6th Edition.

In addition, inquiries were made directly to Pennsylvania D.E.R. for certain items that were site specific to the Beaver Falls Wastewater Treatment Plant. As previously mentioned, the plant modifications and expansion described below will result in the capacities of all plant components being increased to match that of the existing primary sedimentation tanks and chlorine contact tanks. All major plant structures and equipment proposed is itemized. Discussions with the plant superintendent, Mr. Darwin Main, revealed some additional miscellaneous items needed at the plant which have been incorporated into these projections. Minor items may not be specifically mentioned, but are included in the projected construction cost estimates offered under a subsequent section of this report.

Proposed Plant Facilities and Modifications
Required to Increase Beaver Falls WWTP Capacity to
Level of Existing Primary Sedimentation
and Chlorine Contact Tanks

Item	# of Existing Units	# of Proposed Units	Item Description/ Modification
Raw Sewage Screening	-	1	Add mechanical bar screen. Plant currently has comminutor and manual bypass bar screen.
Raw Sewage Pumps	4	2	Replace the 2 smallest capacity pumps with new units rated @ 3400 GPM each. Add variable frequency drive controls (VFD's) to all four (4) units.
Grit Chamber	1	-	No modifications
Primary Sedimentation Tanks	3	-	Add 60 L.F. of weir overflow trough to each primary sedimentation tank and add grease disposal system.

Item	# of Existing Units	# of Proposed Units	Item Description/ Modification
Primary Sludge Pumps	2	2	Replace both units with higher capacity (400 GPM) units equipped with VFD control.
Primary Effluent Pumps	4	4	Replace all four (4) units with higher capacity (3400 GPM) units equipped with VFD control.
Oxidation Tower	1	1	Add duplicate oxidation tower w/interior dimensions of 61'0" dia. X 21'6" media depth. Consideration should be given to using plastic media rather than redwood to allow higher loadings to the towers.
Final Sedimentation Tanks	2	2	Add two units equal in capacity to the two existing units. Dimensions of each tank will be 80'0"L X 20'0"W with 9'8" average S.W.D.
Secondary Sludge Pumps	2	2	Replace both units with higher capacity (600 GPM) units equipped with V.F.D. control
Chlorine Contact Tank	2	-	No modification necessary if chlorination for disinfection is continued. If alternate method of disinfection, such as Ultra Violet (UV) disinfection, is installed, these tanks could be modified and used for sludge storage prior to thickening.

Item	# of Existing Units	# of Proposed Units	Item Description/ Modification
Gravity Belt Thickener	-	1	The existing plant does not have sludge thickening facilities prior to discharge to the digesters. With the proposed plant expansion, thickening will be required so that the loading to the existing digesters is not excessive. A two (2) meter gravity belt thickener is a very cost-effective method of sludge thickening. This unit will require a small building enclosure, sludge feed and discharge pumps, polymer-feed system, and related equipment. If sludge thickening is not incorporated into the plant modifications, additional digesters will be required even after the existing digesters are converted from standard rate to high rate units.
Sludge Holding Tanks	-	2	Two aerated sludge holding tanks will be required. One will be used for storing and mixing primary and secondary sludge prior to gravity thickening. This tank will have approximate dimensions of 80'L X 30'W X 14' depth and will provide sufficient storage so that use of the proposed gravity belt thickener can be limited to once every three days max. The aerated sludge holding tank will be equipped with

Item	# of Existing Units	# of Proposed Units	Item Description/ Modification
Sludge Holding Tank - continued			an adjustable decant device for supernatant drawoff and either mechanical or diffused aeration system. It should be noted that the existing chlorine contact tanks can be used as a sludge holding tank (after some modifications) if the present chlorination system is replaced with UV disinfection. A second smaller sludge holding tank will be required to store the thickened sludge discharged from the gravity belt thickener. Approximate dimensions will be 28'0" X 14'0" X 10'0" depth. This vessel must also be aerated with either mechanical or diffused aeration equipment.
Anaerobic Digesters	2	-	Modifications to the digesters will include roof deck replacement with Duo-Deck steel plate conversion. At least one digester will be equipped with a roof-mounted gas pearth mixing system which will modify the digester from a standard rate unit (moderately mixed) to a high rate (completely mixed) digester.
Sludge Drying Beds	8	-	The existing sludge drying beds will be grossly in-adequate if the plant is expanded to 4.8 MGD capacity as outlined within this report. Considering PA.

Item	# of Existing Units	# of Proposed Units	Item Description/ Modification
Sludge Drying Beds -			D.E.R.'s allowable loading rate for "uncovered" drying beds, an additional 24,534 S.F. of drying bed area wil be required for the projected increased plant capacity. During the design phase of any future expansion project, discussions with PA DER can be held in an attempt to justify higher loading rates onto the existing beds (based on the plant's sludge drying beds past performance) in conjunction with the request for installation of two additional beds. It is doubtful, however, that PA. D.E.R. will agree with this scenario. In all probability, the City will be required to install a mechanical belt filter press for sludge dewatering and utilize some of the existing sand drying beds solely as an emergency backup to the belt filter press. A belt filter press could be installed within the same building used for sheltering the gravity belt thickener.
Belt Filter Press	-	1	As previously mentioned in the preceding item, it is apparent by the engineering analysis performed (refer to appendix) that in all likelihood, a 2.0 meter belt filter press will be required for sludge dewatering at the Beaver Falls WWTP. Computations indicate that a Belt Filter Press could handle all future sludge dewatering

Item	# of Existing Units	# of Proposed Units	Item Description/ Modification
			needs on a one day per week operation schedule. This will also allow many of the existing drying beds to be eliminated and provide needed site area.

31,000 cu ft

PROJECTED CONSTRUCTION COSTS

The following projected costs are anticipated with the implementation of the plant modifications and additions presented herein:

Item No.	Description/Modification	Projected Construction Cost
1	Mechanical Screen @	$ 100,000.00
2	Primary Sedimentation Tank(s) Modifications (i.e., additional overflow weir troughs and grease disposal system) @	$ 60,000.00
3	Oxidation Tower Structure (including underdrain system)	$ 500,000.00
4	Oxidation Tower Plastic Media for both existing and proposed units (replace existing redwood media in existing oxidation tower) @	$ 495,000.00
5	Final Sedimentation Tank(s) Structure @	$ 300,000.00
6	Final Sedimentation Tank(s) Equipment @	$ 140,000.00
7	Aerated Sludge Holding Tank @	$ 190,000.00
8	Aerated Sludge Holding Tank Equipment @	$ 60,000.00
9	Thickened Sludge Storage Tank @	$ 60,000.00
10	Thickened Sludge Storage Tank Equipment @	$ 25,000.00
11	Gravity Belt Thickener Equipment @	$ 100,000.00
12	Belt Filter Press Equipment @	$ 250,000.00
13	Building to House G.B.T., B.F.P., Polymer and Sludge Handling Equipment @	$ 380,000.00
14	Digester Roof(s) Duo-Deck Conversions and Pearth Gas Mixing System @	$ 320,000.00

Item No.	Description/Modification	Projected Construction Cost
15	Ultraviolet (U.V.) Disfinfection equipment and required flume to replace existing chlorination equipment @	$ 250,000.00
16	All Pumps including accessory equipment such as Variable Frequency Drives, Motors, Valves, Fittings, etc., @	$ 240,000.00
17	Other miscellaneous plant equipment, structures and modifications including new garage, gasoline tank and pump, demolition of old storage building, aluminum hand railing, grating, etc. @	$ 140,000.00
18	Plant Yard Piping @	$ 405,000.00
19	Electrical work including emergency generator, switchgear, control panels, timer controls for all primary and secondary tank collectors, fixtures, flow meters w/chart recorders, level controllers, automatic samplers and miscellaneous other instrumentation @	$ 540,000.00
20	Site amenities including concrete sidewalks, asphalt pavement construction and replacement, and site seeding and mulching @	$ 45,000.00
21	Construction contingency @	$ 200,000.00
	Total Projected Construction Cost:	**$4,950,000.00**
	Engineering (Design, securement of permits and full-time construction supervision) @	**$ 495,000.00**
	Legal @	**$ 30,000.00**
	Administration @	**$ 25,000.00**
	TOTAL ESTIMATED PROJECT COSTS:	**$5,500,000.00**

330,000 des
165,000 inspec

The construction cost tabulation shown on the previous pages include an alternate type of disinfection system in lieu of chlorination for the Beaver Falls Wastewater Treatment Plant. There is a strong possibility that the use of chlorine gas will be prohibited by the city within the next few years. Ultra-violet (U.V.) disinfection is the trend that a lot of wastewater treatment plans are now taking. It is capable of 100% disinfection of bacteria and organisms, and does not require contact tanks for detention time. There is possibility that there could be some savings in the overall projected plant modifications cost (tabulated above) by modifying the existing chlorine contact tank (which would no longer be needed with U.V. disinfection) to serve as an aerated sludge holding tank. This would partially offset the cost of constructing a new sludge holding tank (Item No. 7) in the projected construction costs tabulation on the previous page. This item would be studied in detail during the design phase of this project.

Plan Implementation

The implementation of this project as described within this cursory report, would require approximately two and one-half years. The design phase, including securement of permits, would require eight - twelve months; contract bidding and construction would require approximately sixteen months. The scheduling of this project would be coordinated with the outcome of the sewer system evaluation study that is currently being conducted by Widmer Engineering Inc.

Plant Bypass

The Wastewater Treatment Plant contains an emergency bypass located in the primary effluent pump station. When operative this bypass discharges settled sewage directly to the chlorine contact tank and bypasses the oxidation tower (secondary treatment unit). This bypass only becomes operative during periods of intense rainfall. At the request of the PA. D.E.R., the plant personel will be installing a flow meter and chart recorder to monitor bypassed flows

during the week of November 25, 1991. The regulatory agency has also requested that a determination be made as to what flow results in the emergency bypass to become operative. Since year 1991 was an extremely dry (low precipitation) year there were no bypasses observed at the plant. Therefore, the "critical" flow which produces a bypass could not be determined.

Once the new meter is installed on the plant bypass an accurate determination of the critical flow can be determined by correlating the plant bypass occurrence with the plant's existing effluent meter. This will yield the exact flow which produces plant bypasses.

ENGINEERING ANALYSIS

CITY OF BEAVER FALLS
WASTEWATER TREATMENT FACILITY

BASIS OF DESIGN

DESIGN CRITERIA	CONCENTRATION OR LOAD
1990 Population of Service Area:	
City of Beaver Falls	10,687
Eastvale	328
Patterson Township	835
Patterson Heights	576
West Mayfield	352
White Township	611
Total:	13,389
Hydraulic Load	
Year 1990 - 365 Day Average Flow *	2.36 MGD
Highest Three (3) Consecutive Month Average:	
April - June 1989	2.89 MGD*
Per Capita Contribution (based on yearly average)	176 G.P.C.D.
Organic Concentration	
Year 1990 - 365 Day Average Organic Concentration	123 ppm BOD5 (w/peak monthly average = 153 ppm)
Year 1990 -365 Day Average Suspended Solids Concentration	119 ppm Suspended Solids (w/peak monthly average = 148 ppm)
For design purposes the influent BOD5 and suspended solids concentrations used for analysis are	150 ppm BOD5 160 ppm S.S.

* This flow represents the highest 3 consecutive month average.

UNIT PROCESS	DESIGN DATA
Preliminary Treatment	
Existing Preliminary Treatment	Comminutor with bypass bar screen
Proposed Modifications	Replace with a mechanical screen having peak rated capacity of 7 MGD.
Raw Sewage Pumping Facilities:	
Four (4) existing raw sewage pumps rated ●	1 ● 1,100 GPM 1 ● 2,300 GPM 3 ● 3,900 GPM 4 ● 5,600 GPM (standby unit)
Proposed Modifications:	
Replace existing Pump #1 & #2 with higher capacity pumps rated ●	3,400 GPM each *
Provide electronic speed adjustment	Install variable frequency drives on all raw sewage pumps.
* It will be shown later that the plant's proposed capacity (ave. daily flow) should be increased to Qave. = 4.8 MGD & Qpeak = 7.2 MGD.	
Existing Plant Flow Meter consists of monitoring flow over the plant's effluent weirs.	Modifications should include a new Doppler Flow Meter installed on the raw sewage pump's common discharge line. This will yield better accuracy and also record total plant daily intake.

UNIT PROCESS	DESIGN DATA
Primary Treatment:	
Primary Sedimentation Tanks:	
Existing Tanks	3
Proposed Tanks	0
Dimensions (each):	
Width	20'0"
Length	80'0"
Sidewater Depth	9'0" Average
Freeboard	1'6"
Total Capacity for Three (3) Tanks	323,352 Gallons - excluding hopper(s) volume.
Total Existing Weir Length for Three (3) Tanks 3 X 100' Each	300 L.F.
Total Proposed Weir Length for Three (3) Tanks 3 X 160' Each	480 L.F.
Total Surface Area Provided 3 X 20' X 80'	4,800 S.F.
Detention Times:	
Based on Proposed Q Ave. @ 4.80 MGD 323,352 Gallons/4.8 X 10^6 Gallon/24 Hours @	1.62 Hours
Based on Q Peak @ 7.20 MGD 323,352 Gallons/7.20 X 10^6 Gallons/24 Hours @	1.1 Hours

UNIT PROCESS	DESIGN DATA
Surface Settling Rates (SSR):	
Requirement Based on Q Ave.	SSR = 1,000 GPD/S.F.
Requirement Based on Q Peak	SSR = 1,500 GPD/S.F.
Allowable Q Ave. Based on Allowable SSR = 1,000 GPD/ S.F.	
Q Ave. = 1,000 GPD/S.F. X 4,800 S.F. @	4.8 MGD
Allowable Q Peak Based on Allowable SSR = 1,500 GPD/ S.F.	
Q Peak = 1,500 GPD/S.F. X 4,800 S.F. @	7.2 MGD
Weir Overflow Rates (W.O.R.):	
Requirement Based on Q Ave.	10,000 GPD/L.F.
Requirement Based on Q Peak	15,000 GPD/L.F.
Existing Q Ave. Based on Allowable WOR = 10,000 GPD/ Ft.	
Q Ave. = 300 L.F. X 10,000 GPD/L.F. @	3.0 MGD
Proposed Q Ave. Based on Allowable W.O.R. = 10,000 GPD/Ft.	
Q Ave. = 480 L.F. X 10,000 GPD/L.F. @	4.8 MGD*

UNIT PROCESS	DESIGN DATA
Existing Q Peak Based on Allowable WOR = 15,000 GPD/L.F.	
Q Peak = 300 L.F. X 15,000 GPD/L.F. ●	4.5 MGD (existing Q Peak)
Proposed Q Peak Based on Allowable WOR = 15,000 GPD/ L.F.	
Q Peak = 480 L.F. X 15,000 GPD/L.F.	7.2 MGD* (proposed Q Peak)
* Additional F.R.P. Weir Plates and Troughs will be installed to increase total length from 300' to 480 feet.	
Primary Sludge Pumps:	2 Proposed (Replace existing)
Type	Progressive Cavity (variable capacity)
Capacity	0 to 400 GPM
Sludge Pumps Discharge to	Proposed Aerated Sludge Holding Tank where it will be mixed with secondary sludge.
Estimated Primary Sludge Solids Concentration	3%
Estimated Volume of Primary Sludge Production ● 60% Removal Efficiency:	
Weight of Dry Solids:	
(60%)(160 ppm SS)(8.34) (4.80 MGD) ●	3,843 #/Day
Specific Gravity of the Primary Sewage ●	1.03
Estimated Sludge Volume/ Day:	
3,604 #/Day Dry Solids/8.34 X 1.03 X 0.03 ●	14,000 Gal/Day
Estimated BOD5 Reduction ●	30%

UNIT PROCESS	DESIGN DATA
Secondary Treatment Type Process:	
Oxidation Tower	
Existing Secondary Treatment Process Type	Bio (Oxidation) Tower
Number of Units	One (1)
Oxidation Tower Dimensions:	
Height ●	21'6" Effective Media Height
Diameter ●	61'0" Interior
Volume of Media ●	62,801 C.F.
Media Type (Existing)	Redwood
Method of Flow Distribution Distribution	Rotary Arm
Type of Ventilation	Convection - Air plenum beneath media.
Media Type Proposed	Plastic, since the allowable hydraulic and organic loading rates are considerably higher than those for redwood.
Ratio of Surface Areas	Redwood media is approximately the surface area per C.F. of media as plastic media.

UNIT PROCESS	DESIGN DATA
Compute Allowable Hydraulic Loading to One (1) Oxidation Tower using Plastic Media:	
Modified Velz Equation for Munters Plastic Media	$S_2 = e^{\left[\frac{S_1}{(K_{20} * As * D * THETA^{(T-20)})}{Q_I^{N}}\right]}$

Where:

S_1 = Dissolved (soluble) BOD Influent Concentration @	70 ppm
S_2 = Dissolved BOD Effluent Concentration @	16.0 ppm
K_{20} = Reaction Rate Coefficient at 20 degrees C @	0.0024
A_s = Media Specific Surface (SF/CF) @	30
THETA = Temperature Correction Coefficient @	1.035
T = Wastewater Temperature (Coldest Month) Degree C @	10
Q_I = Feed Flux (GPM/SF) = Q/0.785*61^2 @	Q/2,921 S.F.
N = Dimensionless Flow Exponent @	0.50
D = Media Depth @	21.5 Feet
Diameter @	61.0 Feet
Media Volume @	62,833 C.F.
Media Type @	30060

UNIT PROCESS	DESIGN DATA
Solving for QI (Feed Flux - Surface Loading Rate), it is calculated that, based on the parameters listed above, the existing single tower using Munters media will treat ●	1667 GPM or 2.4 MGD
Duplicate Towers will treat ●	4.8 MGD
During peak flow rates there will be a decrease in the influent soluble BOD5 concentration (because of dilution) and the duplicate towers will still have adequate capacity.	

UNIT PROCESS	DESIGN DATA
Final Sedimentation Tanks:	
Existing Tanks	2
Proposed Tanks	2
Dimensions (each):	
Width ●	20'0"
Overall Length ●	80'0"
Effective Length	74'8" (effective length downstream of inlet baffle)
Sidewater Depth ●	9'8" Average
Freeboard ●	2 Feet
Existing Hydraulic Capacity (total)	230,540 Gallons
Proposed Hydraulic Capacity (total)	461,080 Gallons
Existing Surface Area (effective)	2,987 S.F.
Proposed Surface Area (effective)	5,974 S.F.
Existing Total Overflow Weir Length	328 L.F.
Proposed Total Overflow Weir Length	656 L.F.
Detention Times:	
Based on Proposed Q Ave. ● 4.80 MGD	
461,080 Gallons/4.8 X 10^6 Gallons/24 Hours ●	2.31 Hours (w/4 final tanks)
Based on Q Peak ● 7.20 MGD	
461,080 Gallons/7.20 X 10^6 Gallons/24 Hours ●	1.54 Hours

UNIT PROCESS	DESIGN DATA
Surface Settling Rates (SSR):	
Requirement Based on Q Ave.	SSR = 800 GPD/S.F.
Requirement Based on Q Peak	SSR = 1,200 GPD/S.F.
Existing Q Ave. Based on Allowable SSR = 800 GPD/S.F.	
Existing Q Ave. = 800 GPD/S.F. X 2,987 S.F. ●	2.39 MGD
Proposed Q Ave. Based on Allowable SSR = 800 GPD/S.F.	
Proposed Q Ave. = 800 GPD/S.F. X 5,974 S.F. ●	4.80 MGD
Existing Q Peak Based on Allowable SSR = 1,200 GPD/S.F.	
Existing Q Peak = 1,200 GPD/ S.F. X 2,987 S.F. ●	3.584 MGD
Proposed Q Peak = 1,200 GPD/ S.F. X 5,974 S.F. ●	7.2 MGD
Weir Overflow Rates (WOR):	
Requirement Based on Q Peak	15,000 GPD/L.F.
Existing Q Peak Based on Allowable WOR = 15,000 GPD/L.F.	
Q Peak = 328 L.F. X 15,000 GPD/L.F. ●	4.92 MGD
Proposed Q Peak Based on Allowable WOR = 15,000 GPD/L.F.	
Q Peak = 656 L.F. X 15,000 GPD/L.F. ●	9.84 MGD
Secondary Sludge Pumps:	2 Proposed (replace existing)
Type	Progressive Cavity (variable capacity)
Capacity	0 to 600 GPM
Existing Sludge Pumps Discharge to	Digesters
Proposed Sludge Pumps will Discharge to	Sludge Holding Tank

UNIT PROCESS	DESIGN DATA
Chlorine Contact Tank:	
Waste Enters These Units	By Gravity
Forward Flow Q Ave. ●	3.24 MGD
Q Peak ●	7.00 MGD
No. of Existing Units ●	2
Dimensions of Each Tank:	
Length ●	40'0" Interior
Width ●	20'0" Interior
Sidewater Depth ● Q Ave. =	7'6"
Total Capacity Provided (After deduction for baffles)	82,487 Gallons
Detention Time Required at Peak Hourly Flow or Maximum Rate of Pumpage ●	15 Minutes
Allowable Q Peak = 82,487 Gallons/15 Minutes X 1,440 Min/Day/1 X 10^{6} ●	7.92 MGD
Contact Tank Baffles:	
No. of Baffles (Ea. Tank)	3
No. of Chambers (Ea. Tank)	4
Baffle Type ●	Side to Side
Length of Travel (Ea. Tank)	95'4"
Velocity through Contact Tank ● Q Peak (95'4"/15 Min/60 Sec/Min) ●	0.11 FPS
Post Aeration:	Effluent Cascade Wall

UNIT PROCESS	DESIGN DATA
Sludge Production:	
Effluent Limit Required	30 ppm SS and 25 ppm BOD5
Influent Concentration (Conservative)	160 ppm SS and 150 ppm BOD5
Pounds Dry Solids to be removed each day: 4.8 MGD X 8.34 X 130 ppm ●	5,204 Pounds/Solids
Primary Sedimentation Tanks:	
Primary Sludge Solids Concentrations ●	3% Average
Estimated % Removal of Suspended Solids by Primary Tanks ●	60%
Estimated % Removal of BOD5 by Primary Tanks ●	3,843 Pounds/Solids/Day
Specific Gravity of Primary Sludge ●	1.03
Estimated Primary Sludge Volume/Day: 3,843 # Solids/ Day/(8.34 X 1.03 C 0.03) ●	14,912 Gallons/Day
Final Clarifiers:	
Pounds Dry Solids to be removed by Final Clarifiers: 5,204 # - 3,843 # (removed by primary tanks) ●	Approx. 1,361 # Solids
Specific Gravity of Secondary Sludge	1.0
Secondary Sludge Solids Concentration ●	0.7%
Estimated Secondary Sludge Volume/Day:	
1,361# Solids/Day/8.34(1.00) (0.007) ●	23,313 Gallons/Day

UNIT PROCESS	DESIGN DATA
Waste Sludge:	
BOD5 Metabolized within Oxidation Towers @ 0.70 X 150 ppm applied - 25 ppm in effluent then 80 ppm BOD5 X 4.80 MGD X 8.34 #/MGD(ppm)	3,203 # BOD5/Day Metabolized
Waste Sludge Production:	
3,203 #BOD5 Metabolized X 0.25# W.S. Yield/1.0# BOD5 Metabolized =	800 # W.S./Day
Volume of Waste Sludge Produced from Metabolization of BOD5 @ 0.7% Solids Concentration - 800 #W.A.S./ 1.0 X 8.34 X 0.007	13,703 Gallons W.S./ Day
Total Volume of Sludge = Primary Sludge @ 14,912 + Secondary Sludge @ (23,313 + 13,703) Produced on a Daily Basis:	51,928 Gallons/Day
Total Dry Solids Produced Daily - 3,843 Lb. Primary + (1,361 lb. + 800 lb.)	6,004 #/Dry Solids/Day
Proposed Aerated Sludge Holding Tank:	
Forward Flow @	51,928 Gal/Sludge/Day
Dimensions:	
Length @	80'0"
Width @	30'0"
Depth @	Variable up to 14'0" Sidewater Depth
Capacity @ 14'0" SWD (Max.) @	251,500 Gallons
Storage Provided in Sludge Holding Tank @ 251,500 Gal/ 51,928 Gal/Day @	4.8 Days

UNIT PROCESS	DESIGN DATA
This storage will be utilized for holding weekend sludge production.	
Solids Concentration of Aerated Sludge Holding Tank Contents:	
Primary Sludge - 14,912 GPD @ 3% Secondary Sludge - 37,016 GPD @ 0.7%	
Resultant Solids Concentration @	1.36%
Proposed Aeration System Type	Coarse Bubble Diffused Air System (non-clog diffusers)
Proposed Sludge Thickening Facilities	Gravity Belt Thickener
Dimensions:	
Length @	14' 8'7/16"
Width @	2.0 Meters or 9'4"
Effective Drainage Area @	74 S.F.
Allowable Hydraulic Loading for 2 Meter Gravity Belt Thickener	300 GPM
Manufacturer's data and 5 months of actual operation @ City of Connellsville's new wastewater treatment plant facility indicates that the thickened (dewatered) sludge will have a final solids concentration content @	7.0% min. - 9.0% max.

UNIT PROCESS	DESIGN DATA
Volume of Thickened Sludge Produced from Gravity Belt Thickener:	
(6,004 #Dry Solids/Day/0.07 X 8.34 X 1.03 S.G.) @	10,000 Gal/Day
Filtrate is returned to	Head of Plant
Duration that Gravity Belt Thickener is required to operate:	
51,928 GPD/300 GPM @	2.88 Hrs./Day or 8.6 Hours every 3 Days
Solids Loading to Gravity Belt Thickener @ 6,004 #/ Day/74 S.F.	81.1 # Solids/S.F./Day
Proposed Thickened Sludge Storage Tank:	
Dimensions:	
Length @	28'0"
Width @	14'0"
Sidewater Depth @	10'0"
Capacity @	29,361 Gallons
Available Detention Time Provided:	
29,361 Gal/10,000 Gal/Day @	2.94 Days
Provisions to Prevent Septic Conditions:	Diffused Aeration
Type Diffusers	Coarse Bubble Diffusers to Prevent Clogging.
Sludge from this tank is pumped to	Heat Exchanger and then to existing Anaerobic Digestor.
Heat Exchanger:	Replace existing unit with new unit.
Sludge Heating Capacity	400,000 BTU/Hour

UNIT PROCESS	DESIGN DATA
Anaerobic Digesters:	
Number of Units	Two (2) Existing
Dimensions:	
Diameter ●	40'0"
Sidewater Depth ●	18' + Lower Sloped Section (4'9" high)
Digester Capacity Each	25,620 C.F. or 191,644 Gallons
Existing Digester(s) Type	Both are heated - moderately mixed anaerobic digesters.
Volume of Thickened Sludge Produced Daily from Gravity Belt Thickener	10,000 Gallons/Day
Solids Concentration of Thickened Sludge	7% to 9% (use 7% for computations)
Percent Volatile Matter in Thickened Sludge ●	75%
Volatile Solids Produced Daily: 75% X 6,004 Lb. D.S./Day ●	4,503 Lb. Volatile Solids/ Day
PA. DER Digester Criteria for Moderately Mixed Digesters Maximum Permissible Loading Rate ●	50# VSS/1,000 C.F. of Digester Volume
Minimum Sludge Retention Time	30 Days

UNIT PROCESS	DESIGN DATA
Projected Volatile Solids Loading Rate to Existing Digesters:	
4,503 Lb. Volatile Solids/Day/2 Digesters X 25.62 X 10^3 C.F. @	88 Lb. VSS/1,000 C.F.
Projected Sludge Retention Time:	
2 X 191,644 Gallons/10,000 GPD Sludge @	38.3 Days

Conclusions:

Although the existing digesters will provide adequate sludge retention time after the proposed gravity belt thickener is installed, they exceed the maximum permissible volatile solids loading.

Recommended Modifications:

Digester No. 1 - Convert existing moderately mixed Anerobic Digester No. 1 to completely mixed system via:	Install digester roof-mounted gas-pearth mixing system.
Digesters No. 1 and No. 2	Replace existing digester roof coverings with new Duo-Deck (steel plates) conversion.
PA. D.E.R. Criteria for Completely Mixed Digester:	
Maximum Permissible Loading Rate @	100 Lb. VSS/1,000 C.F. Digester Volume
Minimum Sludge Retention Time @	15 Days

UNIT PROCESS	DESIGN DATA
Sludge Dewatering System:	
Number of Existing Sand Drying Beds (uncovered)	8
Dimensions:	
Width @	30'0"
Length @	2 @ 110' Ave., 2 @ 116' Ave., 2 @ 120', 2 @ 140', and 2 @ 160'
Total Existing Bed(s) Surface Area @	31,980 S.F.
Sludge Drying Bed Area Required Based on PA. DER Criteria	1.5 S.F. Bed Area/Capita
Plant Design Solids Loading 4.8 MGD X 160 ppm SS X 8.34	6405 Lb. SS/Day
Total Sludge Bed Area Required:	
37,676 Cap. X 1.5 S.F. Bed Area/Cap.	56,514 S.F.
Existing Sludge Bed Area	31,980 S.F.
Additional Sludge Drying Bed Area Required to Comply with PA DER Regulations (56,514 S.F. - 31,980 S.F.) @	24,534 S.F.

Conclusions:

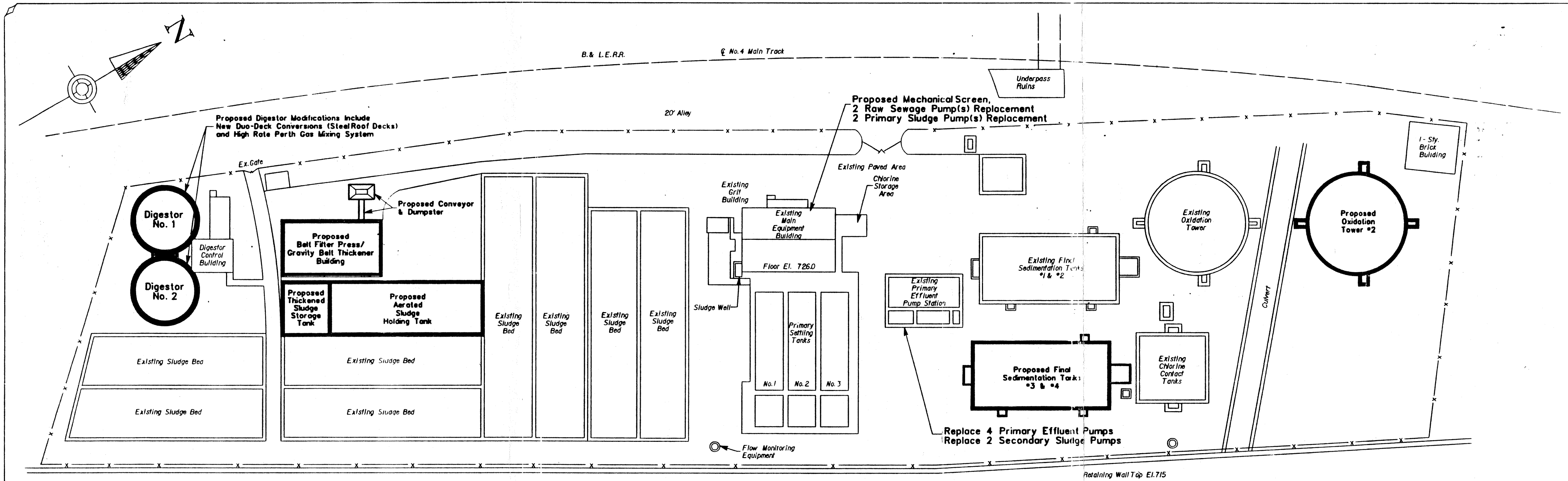
Plant does not have sufficient land area to construct an additional 24,534 S.F. of sludge drying beds to match proposed design flow Q Ave. of 4.8 MGD.

Recommendations:

Install a 2 meter belt filter press for sludge dewatering and utilize some of the existing beds as back-up dewatering units.

UNIT PROCESS	DESIGN DATA
Belt Filter Process	
Proposed Sludge Dewatering Equipment	2 Meter Belt Filter Press
Emergency Backup for Belt Filter Press ●	Sludge Pump discharge piping will be provided with valve arrangement to permit sludge to be diverted to existing sand drying beds.
Belt Filter Press Filtrate will be Discharged to	Head of Sewage Plant
Belt Filter Press Sludge Cake Dry Solids Concentration ●	20% Minimum (Actual % Solids in Filter Cake will likely reach 27 to 30%)
Project Quantity of Dry Solids sent to Anaerobic Digesters Daily	6,004 Lbs. D.S./Day
Volatile Suspended Solids Concentration ● 75%	4,503 Lbs. VSS/Day
Reduction of VSS within Digesters ● 40%	1,801 Lbs./Day
Net Daily Dry Solids Production after Reduction of VSS by Digesters	4,203 Lbs. D.S./Day
Solids Content of Sludge Feed from Digesters to Proposed Belt Filter Press	5% to 7% (Use 6% as conservative average)
Belt Filter Press will be Operated ●	1 Day/Week

UNIT PROCESS	DESIGN DATA
Volume of Wet Sludge to be processed by proposed Belt Filter Press during each work day cycle = 7 Days/Week/1 Operating Day X 4,203 Lb. D.S./ (1.03)(0.06)(8.34) ●	57,082 Gallons Wet Sludge
Manufacturer's recommended Average Hydraulic Loading to Belt Filter Press ●	120 GPM
Required Daily Operation Time of Belt Filter Press - 57,082 Gallons Wet Sludge/ 120 GPM ●	7.9 Hours
Proposed Sludge Handling Facilities ●	Discharge Conveyors
Wet Weight of Sludge Cake produced from each operation cycle is (7 Days X 4,203 # D.S./ 1.03(0.27)(2,000) ●	53 Tons of Filter Cake
Proposed Discharge Conveyors will Discharge to	Either on-site dumpster, dump truck, or to storage bed (existing drying bed can be paved with concrete).
Ultimate Sludge Disposal	Sludge is ultimately trucked to a landfill.



WIDMER ENGINEERING INC.
CONSULTING ENGINEERS & SURVEYORS
930 EIGHTH AVENUE, BEAVER FALLS PA. 15010

REVISIONS	
DATE	TYPE

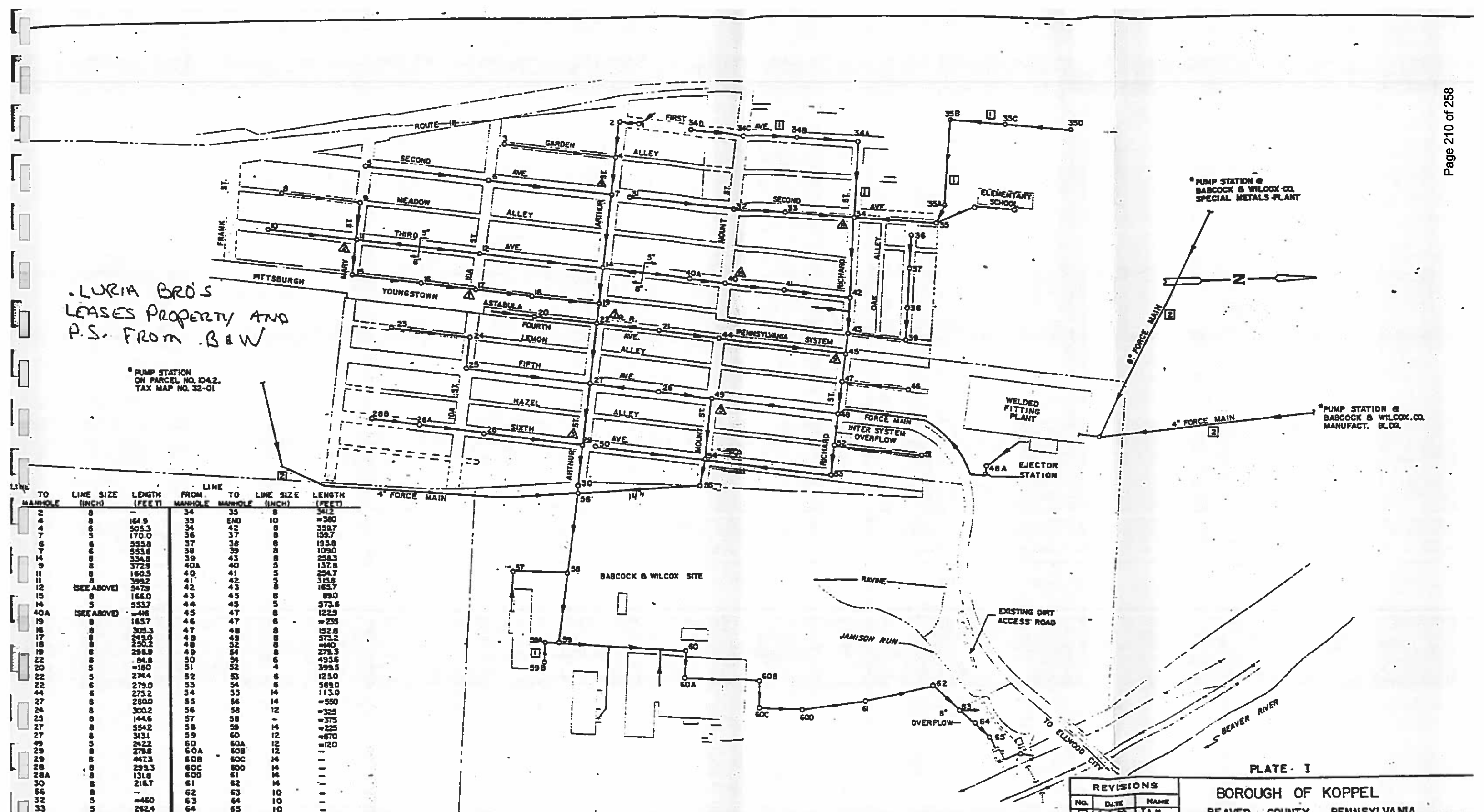
City of Beaver Falls
Beaver Falls, Pennsylvania

Water Pollution Control Plant Upgrade Study

Proposed Plant Layout

FIELD BOOK NO.	
PROJECT NO.	91065-00-2E
DRAWN S.M.Bagley	CHECKED J.G.Tomaro
DATE November 1991	
SCALE 1" = 40'	
DRAWING NUMBER	SHEET NUMBER
91067-P1	1 of 1

APPENDIX C - BOROUGH OF KOPPEL SEWER SYSTEM



- LURIA BRO'S LEASES PROPERTY AND P.S. FROM B&W

LINE FROM MANHOLE	TO MANHOLE	LINE SIZE (INCH)	LENGTH (FEET)
2	4	8	–
4	8	8	164.9
4	6	6	505.3
7	5	5	170.0
6	6	6	555.8
7	6	6	553.6
14	8	8	334.8
9	8	8	372.9
11	8	8	160.5
11	8	8	399.2
12	(SEE ABOVE)		547.9
15	8	8	166.0
14	5	5	553.7
40A	(SEE ABOVE)		≈416
19	8	8	165.7
16	8	8	305.3
17	8	8	249.0
18	8	8	250.2
19	8	8	298.9
22	8	8	84.8
20	5	4	≈180
22	5	5	274.4
22	6	6	279.0
44	6	6	275.2
27	8	14	280.0
24	8	12	300.2
25	8	–	144.6
27	8	14	554.2
27	8	12	313.1
49	5	12	242.2
29	8	12	279.8
29	8	14	447.3
28	8	14	298.3
28A	8	14	131.8
30	8	14	216.7
56	8	10	–
32	5	10	≈460
33	5	10	262.4
34	5	8	285.0
34A	8	8	362.0
34B	8	8	260.0
34C	8	8	266.0
34D	8	8	242.0
END	8	8	STUB OUT
35A	8	8	87.0
35B	8	8	393.3
35C	8	8	244.7
35D	8	8	290.0
35	END	10	≈380
42	8	8	359.7
37	8	8	159.7
38	8	8	193.8
39	8	8	109.0
43	8	8	258.3
40	41	5	137.8
41	42	5	254.7
42	43	8	315.8
43	45	8	165.7
44	45	5	89.0
45	47	8	573.6
46	47	8	122.9
47	48	8	≈235
48	49	8	152.8
49	54	8	573.2
50	54	6	≈140
51	52	4	279.3
52	53	6	495.6
53	54	6	399.5
54	55	14	125.0
55	56	14	569.0
56	58	12	113.0
57	58	–	≈550
58	59	14	≈325
59	60	12	≈375
60	60A	12	≈225
60A	60B	12	≈570
60B	60C	14	≈120
60C	600	14	–
600	61	14	–
61	62	14	–
62	63	10	–
63	64	10	–
64	65	10	–
59	59A	8	≈45
59A	59B	8	≈75

REVISIONS		
NO.	DATE	NAME
1	6-5-89	T.A.H.
2	9-90	T.A.H

PLATE - I

BOROUGH OF KOPPEL
BEAVER COUNTY, PENNSYLVANIA
SEWER SYSTEM EVALUATION SURVEY
COLLECTION SYSTEM INDEX

SHEET 1 OF 1	S.O. 8414-26-ARA
SCALE 1" = 200'	DATE DECEMBER, 1976
MICHAEL BAKER, JR., INC. Consulting Engineers BEAVER, PENNSYLVANIA	DESIGNED T.P.Y. DRAWN/TRACED N.A. CHECKED- T.P.Y. FILE

APPENDIX D

Consumers Guide To On-Lot Sewage Disposal System

Operation And Maintenance

PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

BUREAU OF WATER QUALITY MANAGEMENT

CONSUMERS GUIDE TO ON-LOT
SEWAGE DISPOSAL SYSTEM
OPERATION AND MAINTENANCE

Robert P. Casey, *Governor*
Commonwealth of Pennsylvania

Arthur A. Davis, *Secretary*
Department of Environmental Resources

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On-Lot Sewage Disposal Systems

On-lot sewage disposal systems are designed and constructed based on the soil profile and percolation test results. These on-lot systems have three components that treat, distribute and dispose of domestic sewage. Sewage, both human waste and water used for bathing and washing, flows to the ***septic tank*** where primary treatment of the sewage takes place. The treated septic tank effluent then flows to a ***distribution box*** or a ***solid header*** in gravity flow systems, or to a ***dosing tank*** in a pressurized system. In both of these systems, the septic tank effluent is directed to an ***absorption area*** constructed of pipe placed within a layer of gravel. Septic tank effluent flows from the distribution box, or is pumped from the dosing tank, to the absorption area, and flows through the gravel, percolating through the soil for additional treatment. It is important to note that this effluent, although partially treated, still contains substances which can affect the groundwater, such as viruses, pathogens and nitrates. An efficiently running system will treat these substances and protect groundwater resources. A system that is improperly sited, designed, installed, or improperly maintained may degrade the groundwater supply in the area and affect drinking water quality. This being the case, utmost care should be exercised when siting, designing and installing the system. A permit issued by the municipality Sewage Enforcement Officer (SEO) is required before installing a system. A ***Consumers Guide to On-Lot System Permits*** has been developed by the Department which explains the permitting process. The guide is available from the local office of the Department serving your municipality.

System Installation

The construction of the on-lot system may begin after the lot owner has received a permit for the installation of the sewage disposal system from the SEO. The homeowner should protect the system area from vehicle traffic and stripping of top soil in the area of the system by roping off or marking the area of the proposed system. The homeowner should caution the contractor not to begin or continue excavation of the on-lot system area if the soil is wet. Soil moisture is right for heavy equipment operation when a handful of soil can be molded only with considerable pressure. Work in wet conditions will cause compaction of the soil surface and close soil pores necessary for proper operation of the system.

At the time of installation it is possible to make future maintenance easier. The septic tank should be installed with an extension to grade over the inspection ports and septic tank manhole. This will allow easy access to the tank for inspection and pumping with a minimum of digging. On pressurized systems lateral cleanouts as shown in Figure 11 should be installed on each lateral.

Site Protection

1. A system of the best design installed in the best soils may still malfunction if continually subjected to erosion and saturation caused by storm water accumulation. Storm water should be kept away from the absorption area. Keep surface, downspout, footer-drain and sump pump water out of the system. 2. Keep heavy equipment off the completed absorption area. 3. In grading the lot after the system is installed, do not divert surface water or downspouts in the direction of the system. 4. When backfilling a new system, sufficient soil cover should be placed to crown the disposal area surface. 5. Be sure any future settling over the absorption area surface is followed by additional filling to reestablish the crowned effect. 6. Be sure to hire a reputable contractor to install the system.

If you own property with an existing sewage system, check the disposal area to determine if any swales or depressions exist which would hinder proper surface water diversion. Although minor grading is effective for most system locations, some sites may require construction of upslope drainage trenches or pipes to divert all storm waters flowing from neighboring properties.

The permit will provide the location of each system component relative to your house, road and other landmarks. Keep a copy of the permit in a safe place. Maintenance on any of the system components described below will be easier if you can refer to the permit for system component locations. For future reference, keep a list of the individuals responsible for installation of the system, including the absorption area, dosing tank, pump, etc.

Primary Treatment

Septic Tank

Common to both gravity and pressure systems is the ***septic tank.***

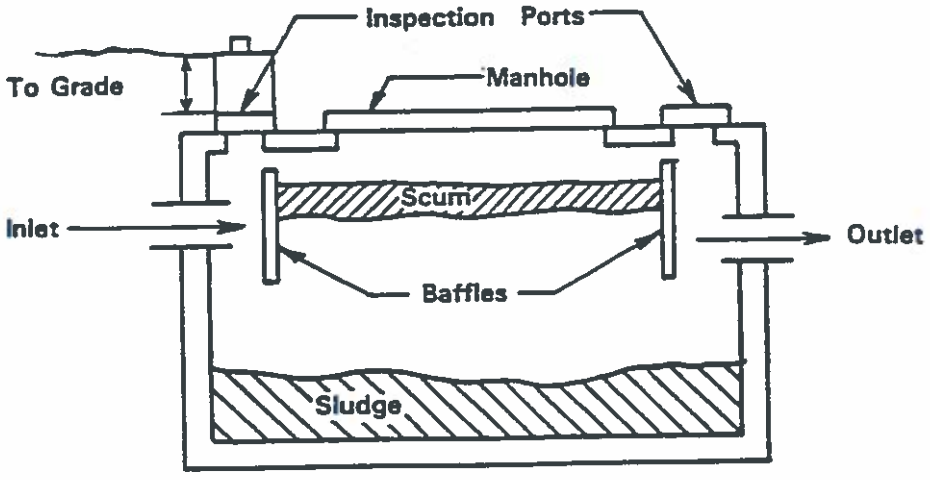
A septic tank is a watertight chamber usually concrete or fiberglass, which separates floating and settleable solids and provides a place for specialized bacteria to decompose sewage. Septic tanks may have one or two compartments. Two compartment tanks or two single tanks in series are not required but do a better job of settling solids.

Another type of treatment tank is aerobic wastewater treatment facilities. These are manufactured by numerous companies. These units require extensive maintenance and the homeowner should consult the manufacturer concerning their use and maintenance.

Among the most important components of a septic tank are the baffles. The inlet baffle forces wastewater down into the tank preventing short-circuiting across the top. The outlet baffle keeps the scum layer from moving into the soil absorption system. This is shown in Figure 1.

Figure 1

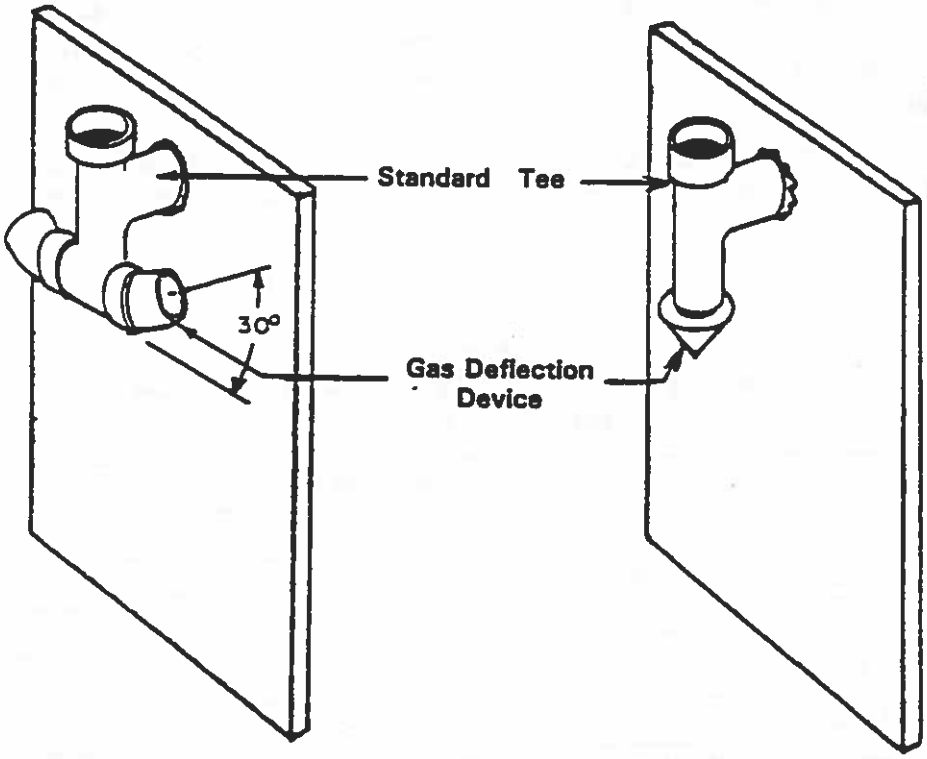
CROSS SECTION OF SEPTIC TANK



Chapter 73 (Sewage Facilities Standards) of the Department's rules and regulations requires that the tank have inlet and outlet baffles, usually a vented tee. As a part of regular maintenance, these baffles should be checked to determine that there is unobstructed flow and they are not broken. To facilitate this activity, inspections ports should be provided for inspection of the baffles. Increased solids retention and therefore longer system life can be accomplished through the use of septic solids retainers (Figure 2). These units not only prevent solids carryover, as baffles would, but also prevent solids from being "burped" out of the tank as a result of gas releases.

Figure 2

SEPTIC SOLID RETAINERS



The size of the tank determines how often maintenance operations should occur. The capacity of the septic tank is based on the size of the house. In Pennsylvania, a 900-gallon tank is the minimum size for a home with three or fewer bedrooms. For each additional bedroom over three, the capacity of the tank must be increased 100 gallons. Septic tanks for other buildings start at 900 gallons and are increased in capacity according to daily sewage flows.

Tank Maintenance

A septic tank accumulates solids and requires periodic cleaning. Septic tank pump and haul contractors can clean your tank. It is a good idea to supervise the cleaning to ensure that it is done properly. To extract all the material from the tank, the scum layer must be broken up and the sludge layer stirred up into the liquid portion of the tank. This is usually done by alternately pumping liquid from the tank and reinjecting it into the bottom of the tank. The septic tank should be pumped out through the large central manhole. **DO NOT USE THE BAFFLE INSPECTION PORTS!**

Before closing the tank, check the condition of the baffles. If they are missing or deteriorated, have them replaced with sanitary tees or septic solid retainers. **IT SHOULD NEVER BE NECESSARY TO ENTER A SEPTIC TANK. THE SEPTIC TANK PRODUCES TOXIC GASES WHICH CAN KILL IN A MATTER OF MINUTES.** Any work to replace the baffles or repair the tank should be made from the outside. When working on a tank make sure the area is well ventilated and someone is standing by. Never go into a septic tank without a self-contained breathing apparatus (SCBA), even to retrieve someone who has fell in and was overcome by toxic gases or the lack of oxygen. If a SCBA is not available, the best thing to do is call for emergency services and put a fan at the top of the tank to blow in fresh air.

To facilitate future cleaning and inspection, install risers from the central manhole and inspection ports to the ground surface before burying the tank. Also mark the location of the tank so it can be easily found.

Recommended pumping frequencies for different size households and tank size are described below in Table 1.

Table 1
Estimated Septic Tank Pumping Frequencies in Years
(For Year-Round Residence)

Tank Size (gal)	Household Size (Number of People)									
	1	2	3	4	5	6	7	8	9	10
500	5.8	2.6	1.5	1.0	0.7	0.4	0.3	0.2	0.1	—
750	9.1	4.2	2.6	1.8	1.3	1.0	0.7	0.6	0.4	0.3
900	11.0	5.2	3.3	2.3	1.7	1.3	1.0	0.8	0.7	0.5
1,000	12.4	5.9	3.7	2.6	2.0	1.5	1.2	1.0	0.8	0.7
1,250	15.6	7.5	4.8	3.4	2.6	2.0	1.7	1.4	1.2	1.0
1,500	18.9	9.1	5.9	4.2	3.3	2.6	2.1	1.8	1.5	1.3
1,750	22.1	10.7	6.9	5.0	3.9	3.1	2.6	2.2	1.9	1.6
2,000	25.4	12.4	8.0	5.9	4.5	3.7	3.1	2.6	2.2	2.0
2,250	28.6	14.0	9.1	6.7	5.2	4.2	3.5	3.0	2.6	2.3
2,500	31.9	15.6	10.2	7.5	5.9	4.8	4.0	4.0	3.0	2.6

For example, if 6 people reside in a 3-bedroom house, a 900 gallon tank should be pumped every 1.3 years. If the same system serves a family of 2, the tank would be ready for pumping every 5.2 years. Systems installed before the current rules and regulations may have septic tanks smaller than 900 gallons. Contact the tank cleaner to determine the size. Some older tanks may need to be pumped as often as once a month. Homes utilizing garbage disposal units will also need more frequent pumping.

Distribution Systems

The distribution system delivers septic tank effluent to the absorption area.

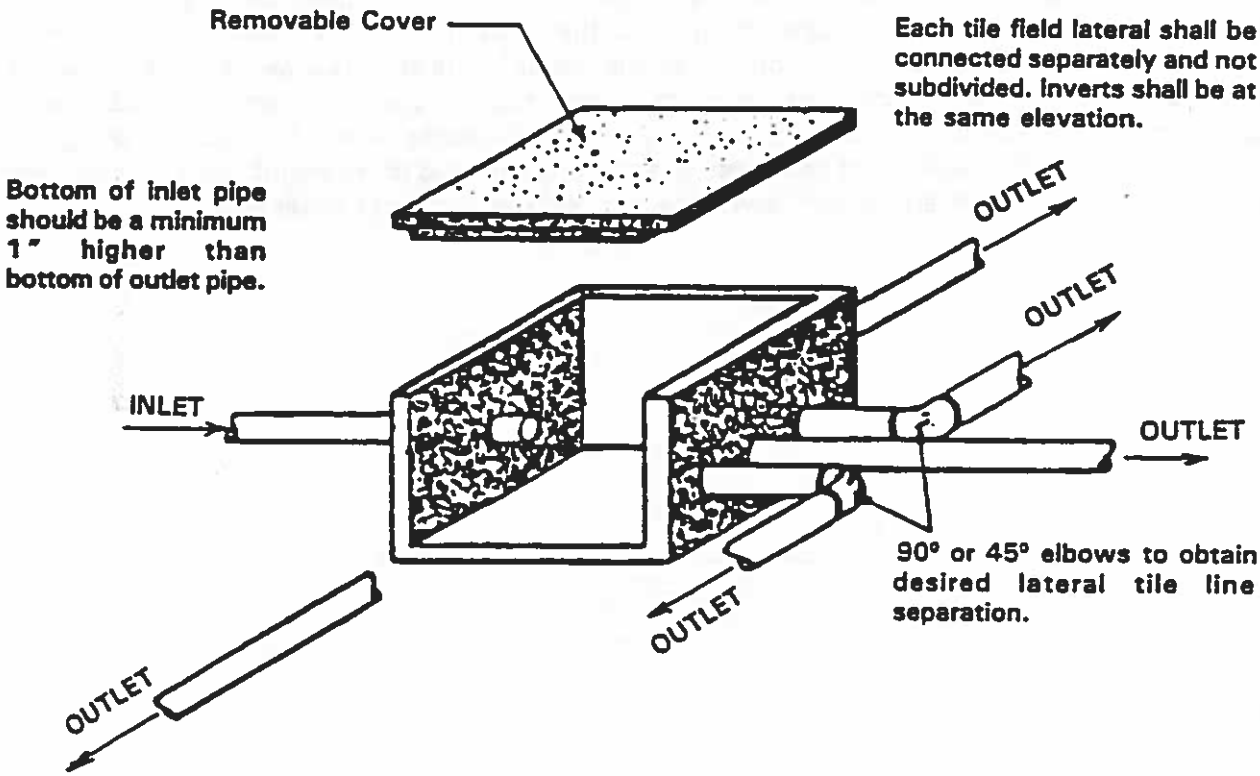
Gravity Distribution

Where limiting zones and percolation test results allow, subsurface systems using ***gravity distribution*** may be permitted. Gravity distribution, as the name implies, relies on the force of gravity to distribute the septic tank effluent to the absorption area.

After the treatment process takes place in the septic tank, the effluent flows into a distribution box, commonly referred to as a ***D-Box*** where the flow is split equally to each lateral pipe. Figure 3 shows a D-box. When installing this type of system it is imperative that the box is level and is tested to assure equal flow to all parts of the subsurface system. D-boxes should be cleaned and checked for level when the septic tank is cleaned.

Figure 3

DISTRIBUTION BOX



Gravity distribution can also be accomplished through the use of a solid header as shown in Figure 7 on page 11.

Pressure Distribution

Where limiting zones or percolation rates do not allow for gravity distribution systems, ***pressurized distribution*** is required.

In a gravity system effluent trickles into the drain field. During this process, a biological layer builds up at the first hole, reducing flow to the soil in that area. This occurs with each successive hole until all the holes are clogged in a particular trench. Creeping failures can also occur as the absorption area is overloaded in one area due to unequal loading.

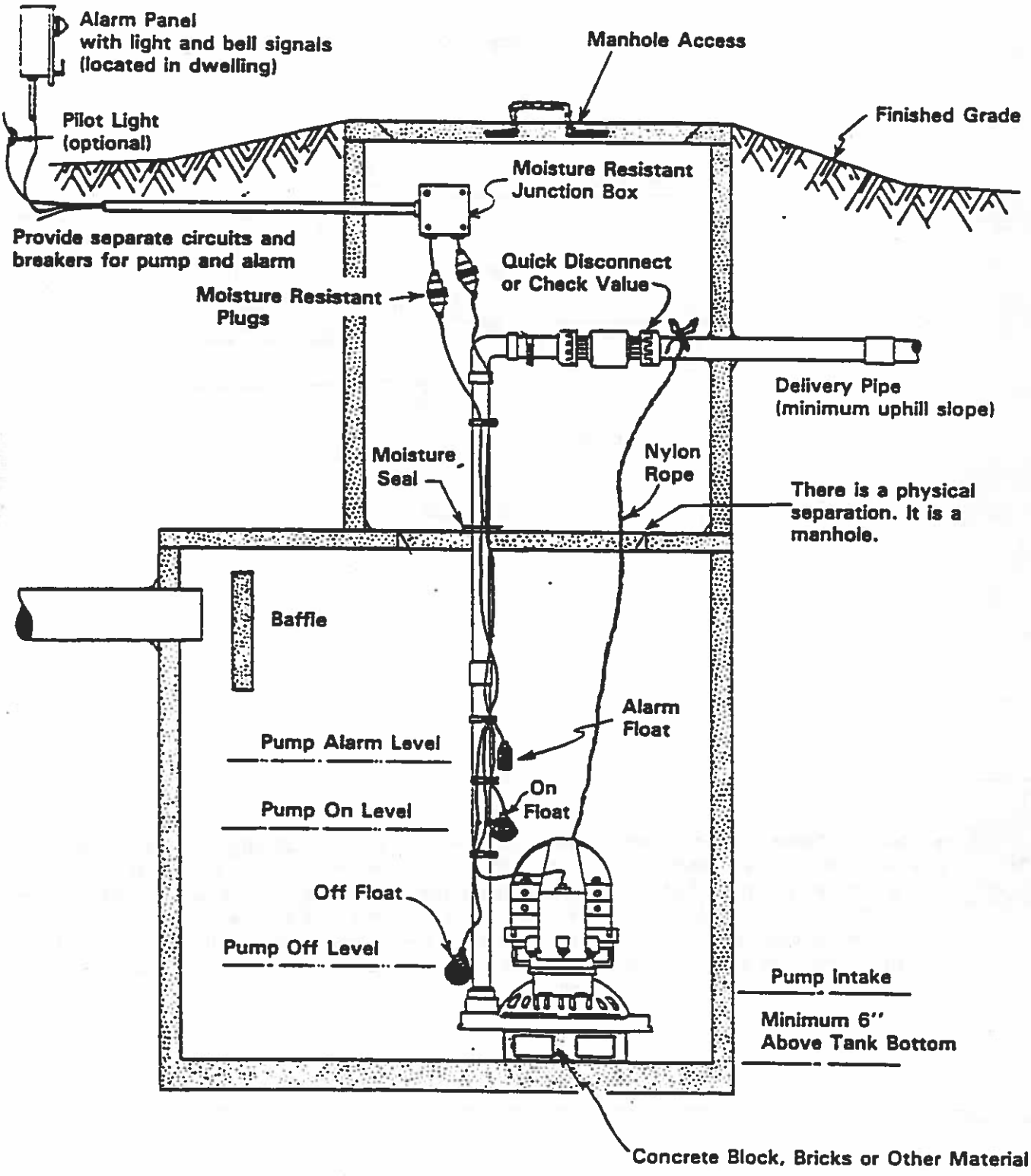
In a **pressurized system** a calculated "dose" is pumped to the absorption area, providing equal distribution to all parts of the absorption area. Clogging of the holes is also reduced due to the suspending of fine material and pressurization of the flow. On-lot systems utilizing pressure distribution also benefit from aerobic (with oxygen) and anaerobic (without oxygen) conditions that result from the dosing and resting periods.

To accomplish this "dosing", a pump or siphon is used to deliver septic tank effluent to the absorption area. This pump is housed in a "**dosing tank.**" (Figure 4). The system must be allowed to drain back to the dosing tank if a pump is used to avoid clogging of the holes in the distribution network. When using a siphon system, the holes in the absorption area piping are larger than those in the pump system to allow for proper draining of the system. Where a pump is used, "float switches" activate or deactivate the pump when the water in the tank reaches a certain level. A switch is also provided which activates an alarm in the house to alert the owner of problems in the dosing tank. The electrical connections for the alarm and switches must be placed at the highest point in the manhole. This will avoid problems due to corrosion and make maintenance easier and safer. Make sure that alarm and on-off switches are tied into separate breakers.

Figure 4

DOSING TANK

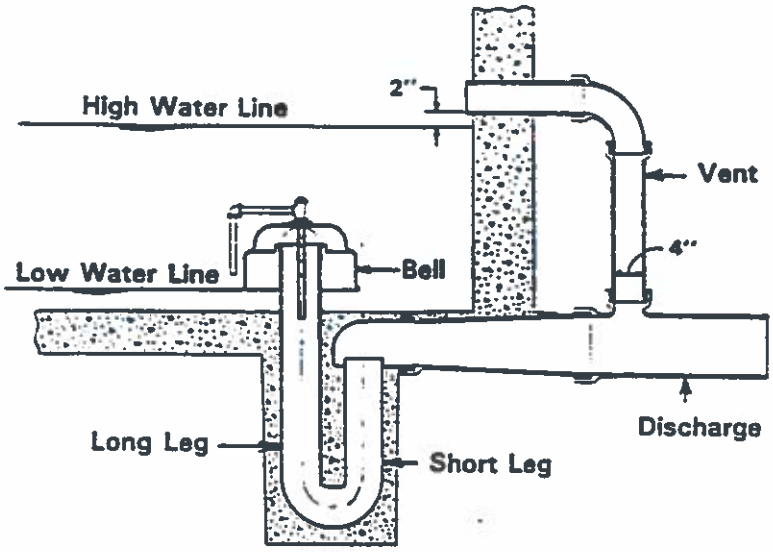
When possible, locate quick disconnect and electrical connections within arm's reach of the surface



A siphon system is used to deliver septic tank effluent to the absorption area in downhill applications (Figure 5). The siphon is purchased in standard sizes. The system and the siphon tank are sized and placed to meet required pressure and delivery rates.

Figure 5

STANDARD DESIGN SINGLE SEWAGE SIPHONS



As sewage flows from the septic tank, the water level in the dosing tank rises and the air under the bell is compressed and forces septic effluent out the long leg into the short leg resulting in the loss of a small amount of effluent out the discharge pipe. When the liquid level reaches the bottom of the trap, any further addition of sewage into the dosing tank creates an imbalance which results in a sudden escape of air out the vent, activating the siphon, and pushing the effluent into the absorption area. The siphon action continues until the liquid level reaches the bottom of the bell, at which time the siphon is broken and effluent stops flowing.

Maintenance

The dosing tank for both siphons and pumps should be cleaned of solids at the same frequency as the septic tank. The pumping system alarm should also be tested semi-annually by simply pulling up the alarm switch with a garden hoe. DO NOT ENTER THE DOSING TANK. This should activate the alarm as if high water had activated the alarm. The other switches, wiring and pump should be visually checked to determine their working order including fraying wires, broken pipes, corrosion and wire ties for slippage.

The siphon system should be inspected annually to determine that a full dose is being discharged and that the siphon is not trickling effluent to the absorption area. This requires observing the water level when the siphon starts and stops. If the siphon is trickling, the siphon must be recharged by filling the trap with water and filling the dose tank until the siphon runs. Filling and running the siphon should be conducted until the siphon is operating properly.

Soil Absorption System

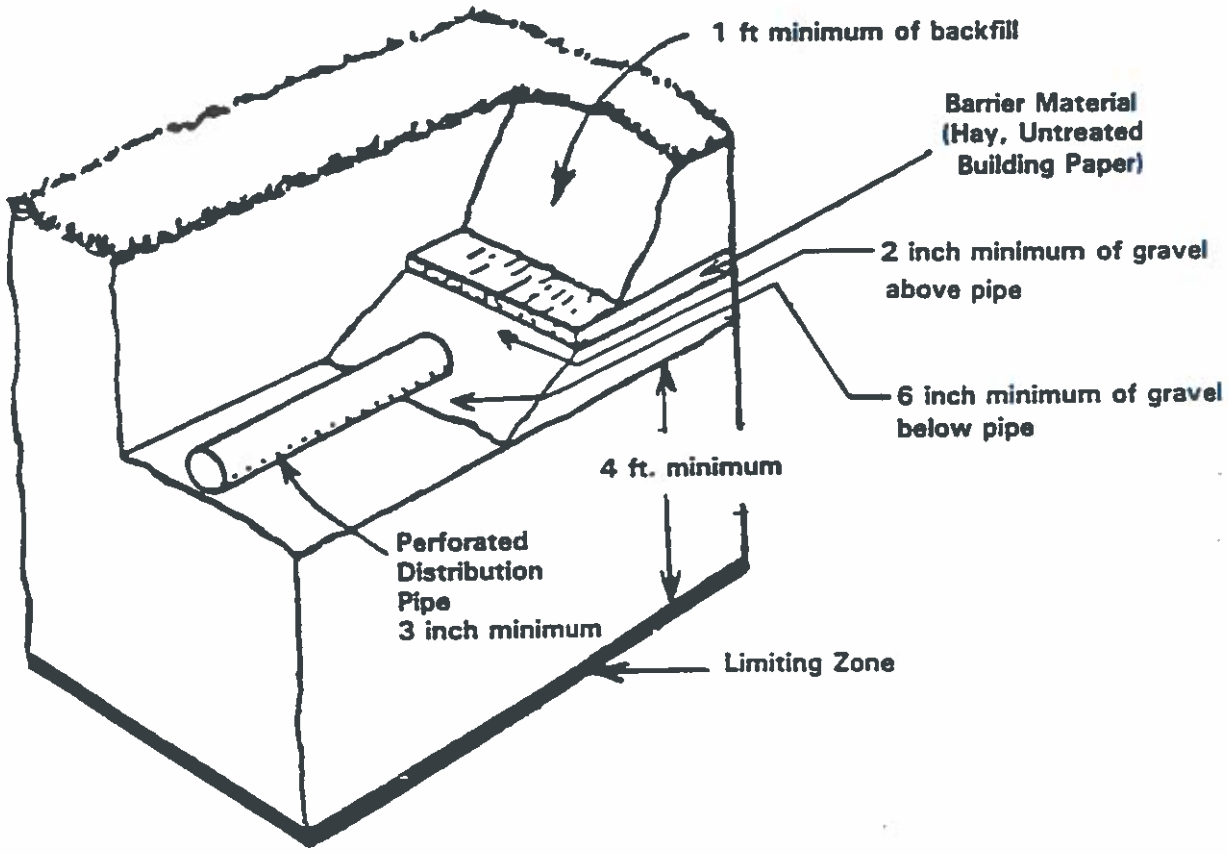
The final component of the on-lot system is the soil absorption system. Septic tank effluent flows to the absorption system from the distribution box or dosing tank to the perforated PVC piping, referred to as laterals, that are placed in the trenches, beds or elevated sand mounds. The soil provides renovation by stripping organic and pathogenic materials from the water. The treated water passes to the groundwater and becomes part of the water cycle. The type of system that is suitable for any particular lot is based on the soil probe examination and the percolation tests. A description of each of these systems and their operation and maintenance requirements are included in this section.

Standard Trenches

The first type of system that is most familiar to homeowners is standard trenches. As the name implies this is a system of trenches which is fed septic tank effluent either through gravity flow or pressure distribution. The trench system is installed by excavating trenches between 12 and 72 inches wide and between 12 to 36 inches deep (Figure 6). The trenches are filled with 6 inches of gravel upon which a minimum 3 inch perforated pipe is layed, in gravity distribution, or a 1½ inch perforated pipe if pressure distribution is used. A minimum of 2 inches of gravel is placed over the laterals and a layer of untreated building paper or hay is placed over the gravel. A minimum of 1 foot of backfill is used to cover the trench.

Figure 6

STANDARD TRENCH

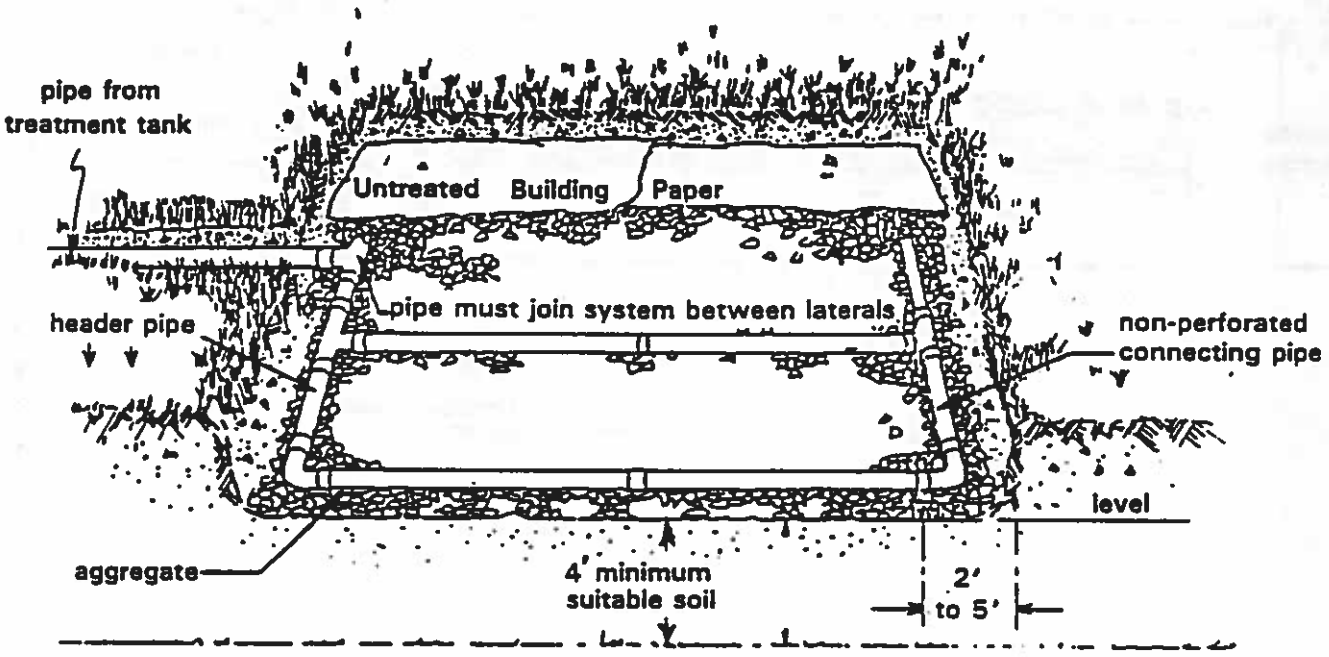


Seepage Beds

In seepage beds (Figure 7) the piping is placed in a bed of gravel as opposed to being in trenches of gravel. Septic tank effluent is fed to the bed either through a D-box, a single header in a closed system or through pressure distribution. These systems may be used when space constraints limit the use of standard trenches. Figure 7 shows a closed header system that can be used instead of a D-box.

Figure 7

SEEPAGE BED SYSTEMS

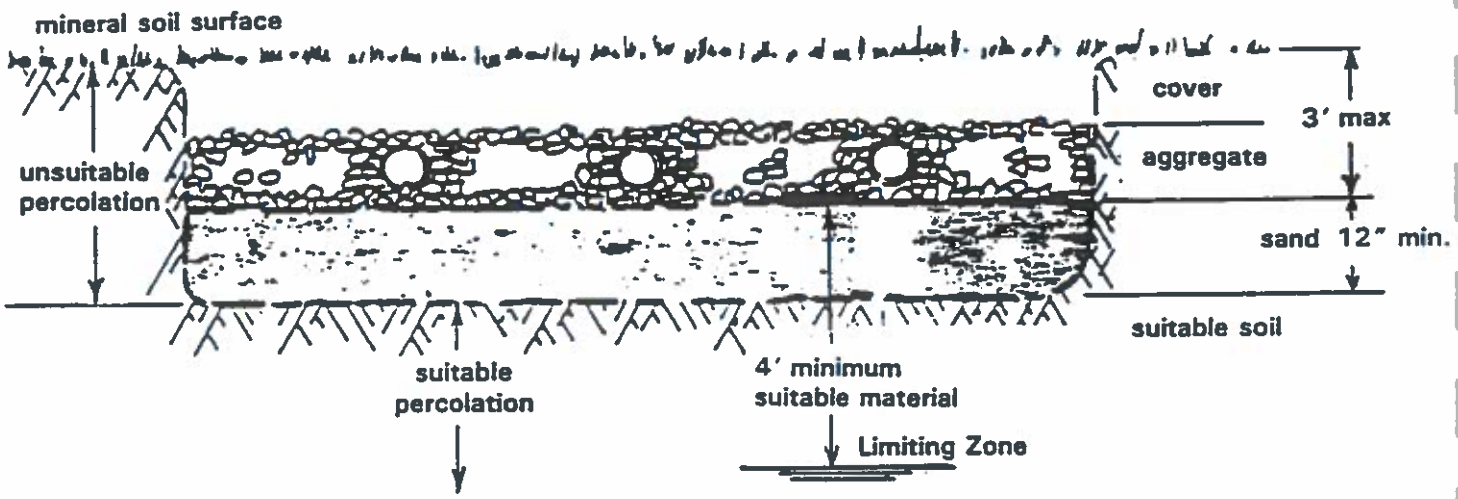


Subsurface Sand Filters

This system is employed on sites where the average percolation rate of the soil between 0 and 36 inches is greater than 90 min./inch and the percolation rate at a depth between 36 and 72 inches from the soil surface is between 3-90 min./inch. This system also requires that the limiting zone must occur at a depth greater than 6 feet from the soil surface. The soil with a percolation rate greater than 90 min./inch is excavated and replaced with sand meeting the standards. The system on top of the sand is constructed following the standards for seepage beds. Figure 8 shows a cross-section of this system.

Figure 8

SUBSURFACE SAND FILTER



Maintenace of Gravity Distribution Systems

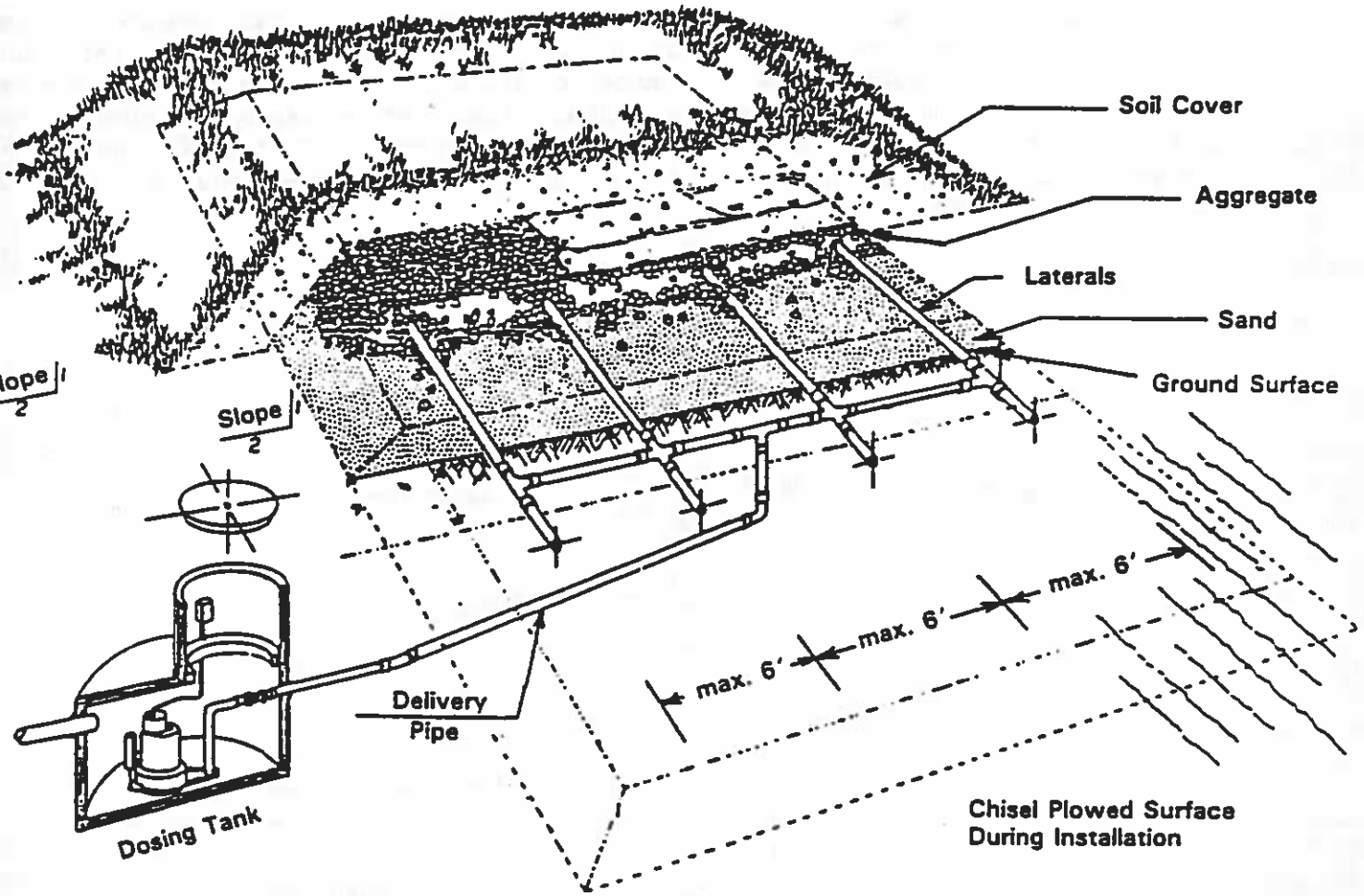
Maintenance on these systems, if gravity distribution is used, is minimal and consists of regular pumping of the septic tank and D-box. A pressurized system should be maintained as described on page 15.

Elevated Sand Mound

This type of system was developed to allow for the use of an on-lot system in situations where the limiting zones occurs at a depth that would preclude the use of the subsurface systems described above. Elevated sand mounds can be used on sites where the percolation rate is between 3 and 120 min./inch and the limiting zone occurs at a depth between 20 and 60 inches from the soil surface. The elevated sand mound system is shown in Figure 9.

Figure 9

ELEVATED SAND MOUND



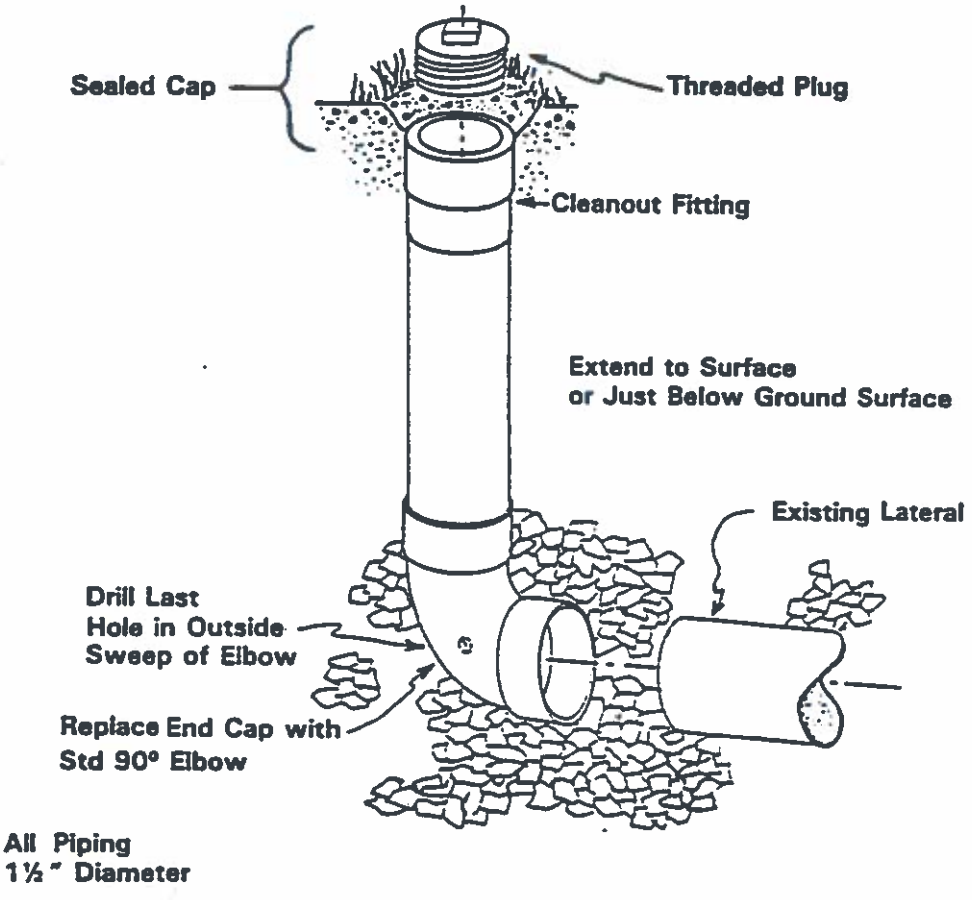
The theory of operation of an elevated sand mound is as follows. In a subsurface system, at least 60 inches of suitable soil is required for on-lot systems as measured from the surface of the ground. This allows 12 inches for installation of the pipe and gravel and a 48 inch soil separation from the bottom of the absorption area to the limiting zone. In an elevated sand mound 20 inches of suitable soil may be acceptable. The additional 28 inches needed to meet the 48 inch separation is made up of sandy fill placed upon the soil surface. Elevated sand mounds rely exclusively on pressurized distribution to evenly distribute septic tank effluent across the absorption area.

Maintenance of Pressure Distribution System

In addition to the pumping of the septic tank and dosing tank, the distribution network may need to be backflushed to the dosing tank, and the pump cycle run to clear to the laterals of scum and grease buildup. **This should be done when inspection of the lines indicates a need to be cleaned or a noticable lengthening of the pump cycle occurs.** The length of the dose cycle should be timed when the system is new and then yearly to determine the cycle time. To facilitate this cleaning operation, pressurized distribution systems should be fitted with lateral cleanouts at the time of installation (Figure 10).

Figure 10

INSTALLATION OF LATERAL CLEANOUT



These cleanouts will have a 1½ inch cleanout plug. The cleanout plugs should be removed and the interior of the lateral checked for accumulations of solids, greases, or other debris, every six months.

Flushing the pressurized system is accomplished in the following manner:

a. Lateral cleanout plugs are removed one at a time starting at the lateral furthest from the dosing tank. A garden hose is inserted into the cleanout. Water from a garden hose is used to flush the lateral through the manifold back to the dosing tank. 3—5 gallons for each lateral should be sufficient.

b. After flushing the lateral, the water is pumped from the dose tank through the lateral, out the lateral cleanout extender (Figure 11) to a 5 gallon bucket. This is done by manually activating the pump by lifting the on-switch. **Do not enter the dosing tank.** A garden hoe can be used to lift the on-switch, which activates the pump. Water from this operation is dumped into the septic tank.

c. Lateral cleanout plugs are replaced on the lateral after the flushing and backflushing operation is completed. The next lateral is flushed using the process described until all laterals are completed.

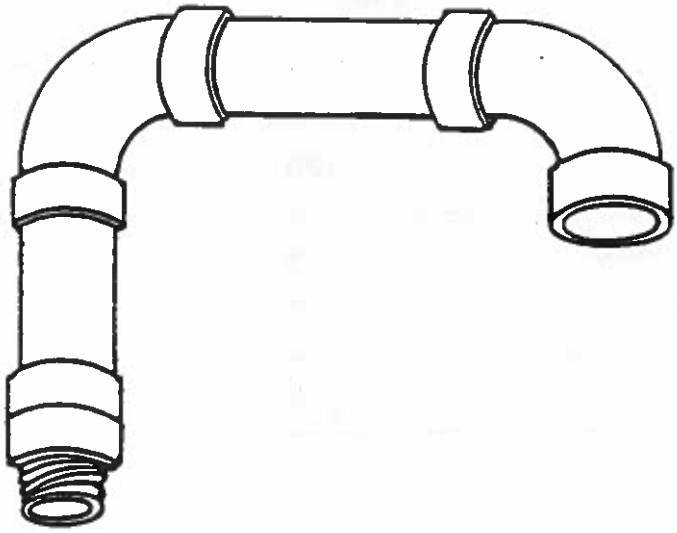
d. Hands and equipment should be thoroughly washed after the cleaning operation is completed.

A septic tank pumping firm can also be retained to flush the system as described above. This is best done during regular septic tank pumping.

Once the system has been flushed, lateral cleanout plugs should be replaced and the system may be used again.

Figure 11

LATERAL CLEANOUT EXTENDER



All piping 1½" diameter

Water Conservation

To assure that the on-lot system does not become hydraulically overloaded, which can cause a malfunction, the system user should practice basic water conservation. The wastewater flow from the residence should be kept as low as possible. Each and every gallon of water which goes down household drains must pass through the septic tank and be treated by the on-lot system. Discharging excessive wastewater to the system is a common cause of on-lot system failure. You can reduce the hydraulic load on your on-lot system by following the practices described below.

1. Fix all leaky faucets and plumbing fixtures.
2. Use the dishwasher only when it is full. This will save energy as well as water.
3. Use the garbage disposal with discretion. Wastes from these units are not digested easily by bacteria in the septic tank. Such wastes may cause quick buildup of solid matter requiring frequent pumping. Compost the garbage wastes and fertilize your garden.
4. Showers usually take less water than a bath and save energy.
5. Reduce the volume of water discharged by each commode flushing. Buy a low water use commode or place a heavy object such as a brick in a plastic bag in the tank.
6. Springs, sump pumps, spouting, french drains or any other water conveyance not involving waste materials should not be discharged into the system.
7. Try to limit the number of wash loads run each day. Running two or three loads of wash in a single day, particularly during wet periods of the year, may cause severe overloading of the system.

By practicing water conservation, the life of a system can be extended. Below in Table 2 and 3 is an outline of expected water use and savings from different available fixtures.

Table 2
Water Use vs. Fixture

Fixture	Gallons Per Day	% of Total Daily Use
Toilet	100	39
Bathing and Hygiene	88	34
Laundry	35	14
Kitchen	27	11
Housekeeping	5	2
TOTAL	255	100

Table 3
Water Savings vs. Fixture

Fixture	Water Use
Conventional Toilet	4-6 gal./flush
Water Saving Toilet	3.5 gal./flush
Conventional Showerhead	3-15 gal./min.
Water Saving Showerhead	2-3 gal./min.
Top Loading Washer	35-50 gal./load
Front Loading Washer	22-25 gal./load
Regular Faucet Aerator	2.5-6 gal./min.
Flow Regulating Aerator	.5-2.5 gal./min.

Hazards to On-lot Systems

On-lot systems are "alive" and a biological mat is constantly decomposing and treating raw sewage. This mat is extremely sensitive to pollutants that it is not able to treat. The homeowner should avoid placing the following down the drain:

1. Oils and grease
2. Harsh drain cleaners
3. Pesticides
4. Paints and thinners
5. Disposable products including sanitary napkins and diapers
6. Paper towels
7. Plastic products (Childrens toys, products wrappers)
8. Septic tanks additives/cleaners. These are not needed and may harm the systems plumbing and/or biological mat.
9. Bones, eggshells, coffee grounds

Eliminating these items from the waste stream will help to increase the life of the on-lot system.

Trouble Shooting

The following table describes problems associated with on-lot systems and their possible remedy.

Trouble Shooting On-Lot Sewage Disposal System Problems

Indication of Problem	Possible Cause	Possible Remedies
Applicable to all systems.		
(1) Raw sewage is backing up into home.	• Line from toilets to septic tank is clogged.	• Contact drain cleaner for investigation and removal of blockage.
	• Septic tank is full and needs pumping.	• Refer to pumping schedule on page 4. Determine location of tank and retain septic tank pumping firm for cleaning operation.
	• Absorption area may be failing.	• Contact local agency Sewage Enforcement Office (SEO) for guidance.
(2) Toilets running sluggish.	• Septic tank is full.	• Contact tank pumper for septic tank cleaning.
	• Absorption area may be failing.	• Contact local agency SEO for guidance.
(3) Sewer odors in house.	• Vent stack may be clogged.	• Contact plumbing professional for removal of blockage.
	• System may be backing into house	• Check septic tank. Pump if needed.
(4) Odor in drinking water.	• Water containing sulfur	• Bacteriological sampling of wells to determine problem
		• Contact local agency SEO for further guidance.
	• Possible system malfunction to ground water and pollution of drinking water supply if individual supply.	• Do not consume water until cause is determined and remedy of problem is completed.
(5) Sponginess or wetness in the following areas: (a) Septic Tank (b) Distribution Box (c) Absorption Area	• Plumbing from or to any of the listed components is broken, crushed, twisted.	• Determine which system component is in the area. Contact system installer to repair problem.
	• Absorption area malfunction.	• Contact local agency SEO for further guidance.
(6) Raw sewage is surfacing within absorption area.	• Absorption area malfunction. Check for increased water use, construction activity around area, improper diversion of surface runoff.	• Contact local agency SEO for repair options.
(7) Raw sewage is surfacing at a point other than within absorption area and other treatment components are known to be operable.	• Poor siting of system has caused sewage to be conveyed to another point without treatment.	• Contact local agency SEO for guidance.

Trouble Shooting On-Lot Sewage Disposal System Problems (Continued)

Indication of Problem	Possible Cause	Possible Remedies
Applicable to pressurized systems. Includes all elevated sand mounds and all other systems designed based on perc. rate between 61-90 min/inch.	• Septic tank effluent is not being lifted by pump.	• Contact pump installer.
(1) Dosing pump runs continuously.	• System may be clogged and pump is pumping same water continually.	• Contact SEO for further guidance.
	• Absorption field failure.	• Flush system as described on page 15.
	• Infiltration of surface water or water from downspouts.	• Reduce infiltration with diversion channels or place downspout away from system.
(2) Dosing pump does not run.	• Power to pump may be off.	• Restore power to pump.
	• Pump is not switching on as a result of faulty on-off switches or mislocated switches.	• Contact pump installer to check on-off switches.
	• Electrical connections corroded.	• Retain qualified professional to replace connections.
(3) Dosing of absorption area is taking long period of time.	• Distribution network may be clogged.	• Flush network as described on page 15 and run dosing cycle.
	• Pump may not be working properly.	• Contact pump installer for guidance.
(4) In systems employing siphons, siphon is trickling, not providing pressurized dose.	• Siphon is operating improperly.	• Recharge siphon bell with air. Run dose cycle. Repeat dose cycle. If system does not pressure dose, contact siphon installer.
	• Siphon system improperly installed.	• Contact siphon installer and SEO for further guidance.
(5) Dosing tank alarm light is on.	• Dosing tank is full.	• Make sure pump is able to run. Consult section above to determine pump trouble shooting.
	• Dosing tank plumbing is clogged resulting in full tank.	• Check plumbing from absorption area to tank.
	• Faulty high water alarm/electrical connections.	• If dosing cycle is operating, and light is still on, contact pump installer for guidance.
(6) Sewage surfacing in dosing tank area	• Pump not running fast enough.	• Have pump installer check pump.
	• Clogging in distribution network.	• Flush distribution network.
	• Extraneous flows downspouts, surface water.	• Divert extraneous flows.

Homeowners should be aware that when remedying problems, a permit is required for any repair or modification of the system. A permit is not required for routine maintenance, such as tank pumping or lateral flushing.

APPENDIX E

Correspondence

DANIEL C. BAKER, JR.
SEWAGE ENFORCEMENT OFFICER
Certificate No. 00092
6150 TUSCARAWAS ROAD, BEAVER, PA. 15009
OFFICE: 495-7020 RESIDENCE: 495-4[illegible]

DER-EP

MAY 8 10 15 AM '84

May 3, 1984

David W. Borneman
Project Manager
Commonwealth of Pennsylvania
Department of Environmental Resources
Bureau of Water Quality Management
600 Highland Building
121 South Highland Avenue
Pittsburgh, PA 15206-3988

Re: Project Priority Rating: Township of Chippewa
Township of Brighton
Borough of Big Beaver

Dear Mr. Borneman:

As Sewage Enforcement Officer for the above municipalities and in accordance with your request by letter dated March 21, 1984, I have outlined on the attached map eleven (11) problem areas in which roughly one (1) out of three (3) households and commercial uses presently have problems with their on-lot sanitary disposal system.

The following is a brief description of each problem area, approximate number of existing dwellings or commercial uses, soil conditions, results in correcting existing systems by using current technology, nature of severity, findings and results from on-site investigations of applications for permits to construct systems on existing vacant properties in these areas. The location of the problem areas are shown on the attached U.S.G.S. Map.

AREA NO. 1

Location: Chippewa Township on Clayton Road and George Street. This area has approximately 24 residential dwellings and soils in this area are mapped and found to be Cavode and Wharton Silt Loams. The dwellings on the south side of Clayton Road are discharging sewage effluent into a PennDOT storm drain and also onto the berm of the road causing an icing condition in the winter. The dwellings on the north side of the road all have point discharges of sewerage effluent running into an unnamed tributary of Walnut Bottom Run. Two (2) systems in this area were required to be repaired during 1984 to comply with the requirements of the loaning institutions. I found that soil mottling was less than 20 inches below the ground surface. These systems were repaired using an experimental pressurized elevated sand mound system with underdrainage inner septor trenches. Replacement costs were approximately $5,000.00 for each of these systems.

AREA NO. 2

Location: Chippewa Township on Lipenwood and Wanda Drives. This area includes approximately 22 residental dwellings and soils in this area are mapped and found to be Canfield, Cavode, Rexford and Wharton Silt Loam. A majority of these dwellings are connected to common drain lines discharging sewage onto the ground surface at the north end of these streets with drainage to Wallace Run. Since 1974 I have made on-site tests on approximately five (5) vacant lots in this area and found that the soil conditions for the installation of on-lot systems does not comply with Department of Environmental Resources' Chapter 73 requirements. Two (2) systems were corrected with standard gravel trenches and provided with an overflow trench filled with sand which allows drainage to run during wet season and prevents back-up in basement of dwellings.

AREA NO. 3

Location: Chippewa Township on Shenango Road and 37th Street Extension. This area includes approximately 70 dwellings and soils in this area are mapped and found to be Gilpin, Canfield and Ravenna Silt Loam. Six (6) dwellings on Shenango Road are all connected to a common drain line discharging into a ravine back of these dwellings which then drains to Wallace Run. On the south side of 37th Street Extension there are locations where sewerage is discharging to the berm of the road or directly into PennDOT inlets. Since 1974 I have inspected and issued permits for five (5) new dwellings within this area. They all were elevated sand mounds and as of March 1, 1984 show no evidence of malfunctioning.

AREA NO. 4

Location: Big Beaver Borough on Wallace Run Road, Shenango Road and in Stell Rich Heights Subdivision, Tragesser Subdivision and the Big Beaver Elementary School. There are approximately 215 dwellings in this problem area and soils in this area are mapped and found to be Gilpin, Canfield, Ravenna and Wharton Silt Loam. The Tragesser Plan consists of single family residential dwellings on small lots, approximately one half of the dwellings in this subdivision are connected to a drainage pipe discharging sewage effluent directly to Wallace Run and the remaining portion are discharging sewage effluent to bituminous pavements on a year round basis. The dwellings in Stell Rich Heights have individual discharge lines running to the berm, ditches and inlets of public streets. The elementary school facilities are discharging sewage effluent to a PennDOT inlet along Friendship Drive. All of the above are located in the Wallace Run drainage basins. I have made only one (1) on-site inspection for a new system in this area and found soils to be unsuitable for any type of system.

AREA NO. 5

Location: Homewood Borough and Commercial District on PA Traffic Route No. 18. The Homewood portion of this area is mainly residential dwellings with numerous point discharges of sewerage to berms and storm drain facilities discharging into Clarks Run. The remaining portion of this area consists of commercial establishments on Traffic Route No. 18 adjacent to the Turnpike Interchange. All of these commercial properties have point discharges of sewage effluent to the highway storm drainage system on Traffic Route No. 18. These establishments on the east side of PA Traffic Route No. 18 are discharging sewage effluent to the storm drainage system of ConRail. These businesses consist of motels, bowling alleys, service station truck stops, restaurants and roller skating rink all of which have high volumes of water usage and discharge.

AREA NO. 6

Location: South Beaver Township on Blackhawk Road, portions of Elmbrook Village Road, Georgetown Road, Pinecrest Drive and Arrowhead Drive. There are approximately 140 dwellings and a mobile home park in this problem area. Soils in this area are mapped and found to be Gilpin, Canfield and Ravenna Silt Loam. On Pinecrest Drive most of the dwellings are connected to a common drain which discharges to a small unnamed tributary of Little Beaver Creek. Records indicate that only two (2) permits for new construction have been issued in this area and three (3) have been denied. Repairs have been made to two (2) systems and appear to have corrected the malfunctioning problems.

AREA NO. 7

Location: Chippewa Drive on Rhodes Drive and Summers Drive. This area consists of approximately 30 residential dwellings and soils in this area are mapped and found to be Wharton, Guernsey and Brinkerton Silt Loam. The major portion of these dwellings are discharging sewage to the berm of the public road. Since 1974 I have made on-site inspections on three (3) existing lots and found that the soils did not meet the requirements of the Department of Environmental Resources' Chapter 73. Two (2) systems have been repaired but I only consider the repairs to be a temporary correction of problem. Lots on high side of street have all systems in front yard and space available for corrections is limited.

AREA NO. 8

Location: Chippewa Township on Park Road, Fineview Drive and Orchard Lane. This area consists of approximately 30 residential dwellings and soils in this area are mapped and found to be Tilsit, Cavode and Brinkert Silt Loam. A majority of these are connected to a drain pipe discharging sewage effluent into an unnamed tributary of the North Branch of Bradys Run. Those dwellings on the northside of Fineview are situated on a high bank with small front yards and no area available for corrections. One (1) system on Fineview was corrected by installing a heavy duty pump in existing seepage pit and constructing a shallow placement system in rear yard.

AREA NO. 9

Location: Chippewa Township on Braden School Road, Braun Road, Mannel Street and James Street. This problem area consists of approximately 100 dwellings and soils are mapped and found to be Wharton, Cavode, Tilsit and Guernsey Silt Loam. Those properties located on Braun Road and east of the Beaver Valley Expressway are currently discharging to the berm of the public highway. On-site inspections made since 1974 in this area has found that most of the soils are unsuitable for any type of system whatsoever. I have issued permits for eight (8) systems in this area and three (3) have been elevated sand mound systems. Permits have been issued to correct existing systems and these have all been elevated sand mound systems.

AREA NO. 10

Location: Chippewa Township on Shenango Road, Lester Drive Charles Street and Geneva Street. This area consists of approximately 25 dwellings and soils are mapped and found to be Cavode and Wharton Silt Loam. The major portion of these dwellings are discharging sewage to the berm of the above public streets. Several vacant lots have been tested since 1974 and found to be unsuitable for the installation of an on-lot septic system as per requirements of Chapter 73.

AREA NO. 11

Location: Chippewa Township on Linden Street. This area consists of approximately 11 dwellings and soils are mapped and found to be Wharton Silt Loam. Three (3) or four (4) of these dwellings are connected to a drain pipe discharging sewage effluent to the ground surface at the lower end of the above street.

The above eleven (11) locations represent those problem areas where the greatest number of complaints of malfunctioning systems have been received by the Municipalities. On-site investigations have been made by the undersigned and in most cases the soil and ground water conditions are such that no system or correction will provide any relief or eliminate the discharging of sewage effluent to the ground surface. These locations were also inspected by Norma English, Department of Environmental Resources Sewage Facilities Sanitation and myself on March 27, 1984, maps were marked with 90 found point discharges or sewerage to public streets or runs.

If you have any questions regarding this report, please contact me at your convenience

Sincerely,

Daniel C. Baker, Jr.
Sewage Enforcement Officer

DCBJr/jem
cc: Bruce Hamer - Chipnewa Township Manager
Carol Miller - South Beaver Township Secretary
Paul B. Rayl - Big Beaver Borough Secretary

WIDMER ENGINEERING INC.

March 29, 1993

Mr. Kurt W. Carr, Chief
Division of Archeology and Protection
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
P. O. Box 1026
Harrisburg, PA 17108-1026

Re: Beaver Falls Area Act 537 Plan

Dear Mr. Carr:

Please find enclosed Form A and a copy of the USGS topographic map for the study area.

This plan is proposing to sewer the Borough of Homewood and to extend a collection system along Route 18 in Big Beaver Borough. Sewer lines will be installed within the right-of-ways of local and state roads.

This plan is also investigating the feasibility of extending sewer lines along Stockman Run and Wallace Run. The locations of all sewer lines are highlighted on the enclosed map.

There are no definite plans for development at this time. If you have any questions, please contact me at the address or phone number given below.

Sincerely,

WIDMER ENGINEERING INC.

James M. Vanek

James M. Vanek

JMV/las

enc.

ENGINEERS AND SURVEYORS

806 Lincoln Place Beaver Falls, Pennsylvania 15010 Phone 412/847-1696

Commonwealth of Pennsylvania
Department of Environmental Resources
Bureau of Water Quality Management

FORM A
NOTIFICATION OF POTENTIAL EFFECT OF PROPOSED ACTION ON ARCHAEOLOGICAL AND HISTORICAL RESOURCES

This is to notify the Pennsylvania Historical and Museum Commission in writing of the potential effect of a proposed action on an archaeological or historical resource in accordance with the Pennsylvania Historic Preservation Act, 37 PA. CSA, Sections 501-512.

This action involves: DER 537 Program

Development Name Beaver Falls Regional Sewage Facilities Plan

Development Location, including County and Municipality: City of Beaver Falls, Borough of Homewood, Big Beaver Borough, Beaver County

Enclosed is a copy of the U.S.G.S. 7.5 minute topographic map which clearly outlines the specific project boundaries. The name of the map is Beaver Falls.

This sewage facility plan encompasses 6,776 acres (total project area).

There are an unknown number of buildings over 40 years old within the project area. Pictures and a description of the plans for these buildings are included.

A brief description of this development project is included that indicates the nature of the development, number and size of lots to be subdivided, previous land use.

It is understood that your agency will advise the applicant within 60 days of the receipt of this notice if the project will not affect a known archaeological or historical resource or, if a significant known archaeological or historic resource, as determined by the PHMC using Secretary of Interior criteria for determining resource significance, requires protection or if a "high probability archaeological area" could be affected by the proposed sewage facilities.

Questions concerning this proposal and the results of the search should be directed to:

Applicant's Name: City of Beaver Falls

Address: 806 Lincoln Place

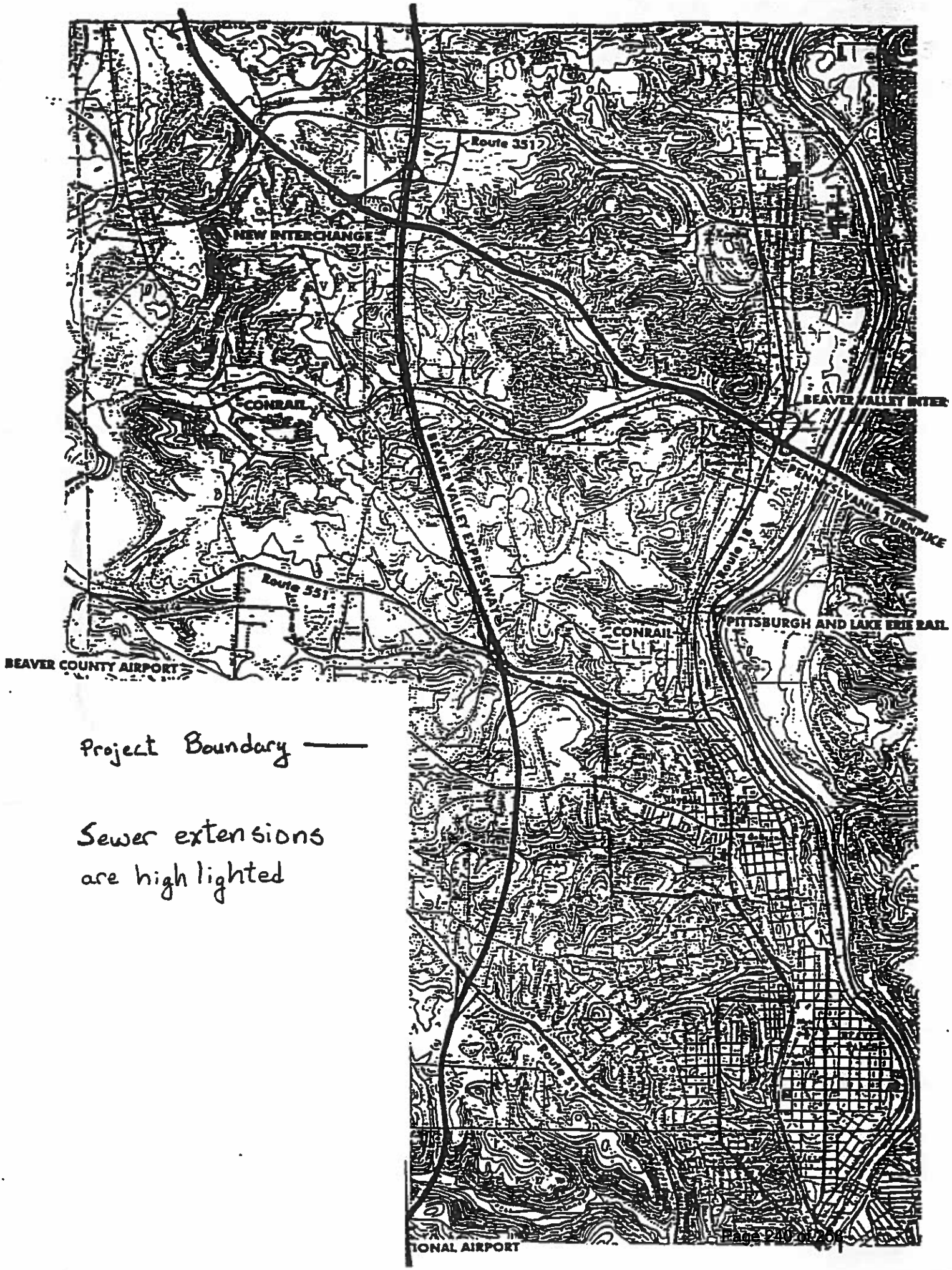
Beaver Falls, PA 15010

Telephone: (412) 847-1696

This form must be forwarded to the:

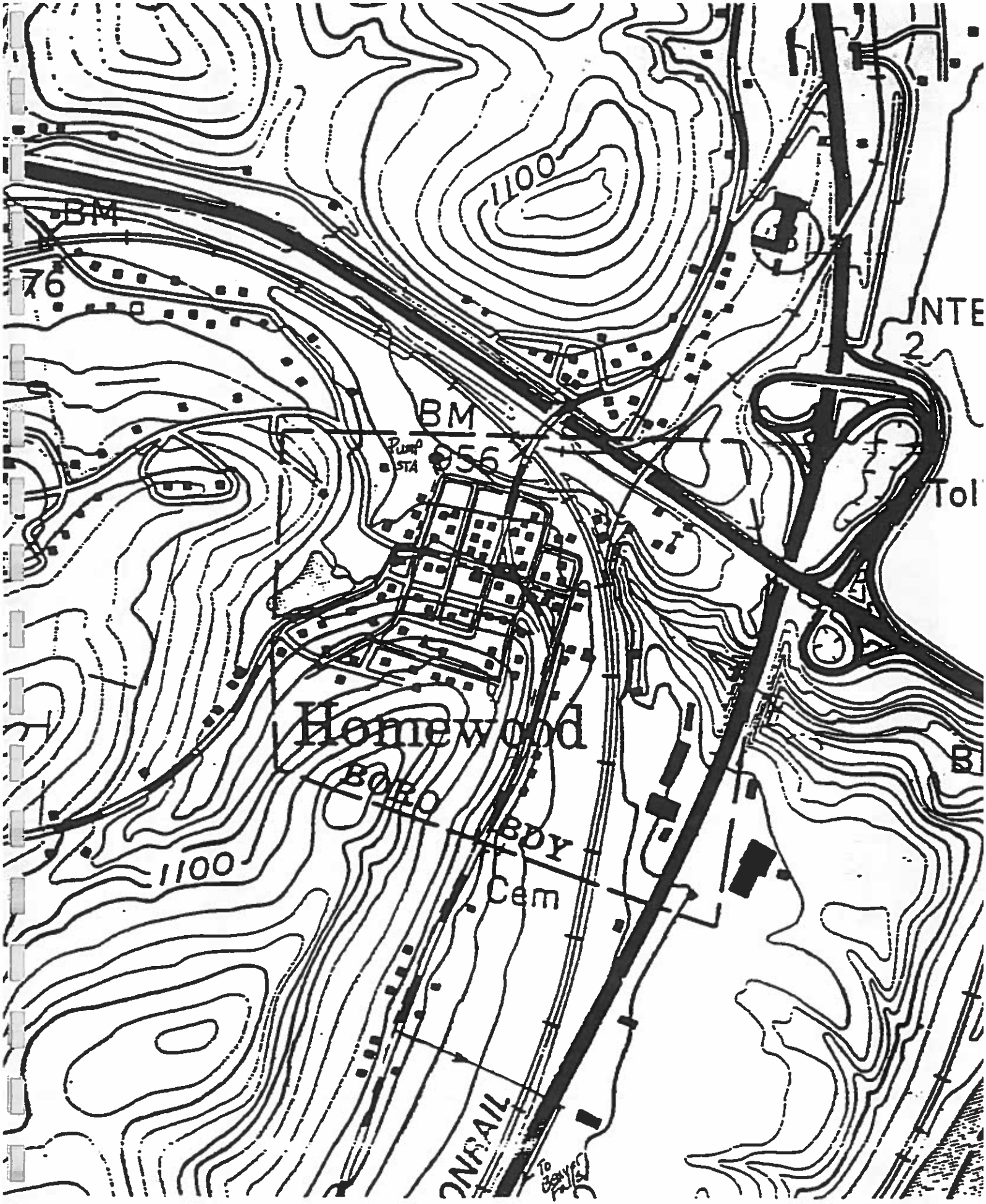
Pennsylvania Historical and Museum Commission
Bureau of Historic Preservation
P.O. Box 1026
Harrisburg, PA 17108
Telephone: 717-783-8946

Revised 3/90



Project Boundary ——

Sewer extensions are highlighted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Boro
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Cem
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ONRAIL
To
Gravity Sewer
Force Main

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

May 10, 1993

James M. Vanek
Widmer Engineers, Inc.
806 Lincoln Place
Beaver Falls, PA 15010

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Re: File No. ER 93-2124-007-A
DER 537 Program
Beaver Falls Regional Sewage
City of Beaver Falls
Homewood & Big Beaver Borough
Beaver County

Dear Mr. Vanek:

The Bureau for Historic Preservation has reviewed this State funded, assisted or licensed project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 507 et. seq. (1988). This review includes comments on the project's potential effect on both historic and archaeological resources.

There is a high probability that archaeological resources are located in the project area and may be affected by project activities. It is the recommendation of the Historical and Museum Commission that the applicant conduct a Phase I survey to locate these sites and to develop a plan for their protection. If a survey is not conducted and the applicant encounters archaeological resources during construction, the applicant must stop the project, conduct the survey and develop a plan acceptable to the Museum Commission to mitigate any effects on these resources. These may delay the completion of the project. If this project will require any federal permit or receive federal funding, the federal agency, under the National Historic Preservation Act will probably require the survey to be conducted. We suggest that you seriously consider conducting the survey early in the process so as to avoid delays in the future. Guidelines and information for survey are enclosed.

There may be properties eligible for the National Register of Historic Places located in the project area. However, due to the nature of the activity, it is our opinion that there will be no effect on these properties. Should the applicant become aware, from any source, that unidentified historic properties are located at the project site, or that the project activities will have an effect on these properties, the Bureau for Historic Preservation should be contacted immediately.

If you need further information in this matter please consult Noel Strattan at (717) 783-9900.

Sincerely,

Kurt W. Carr, Chief
Division of Archaeology
and Protection

Enclosure

KWC/lfa

WIDMER ENGINEERING INC.

May 25, 1993

Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
P. O. Box 1026
Harrisburg, PA 17108-1026

Attn: Mr. Kurt W. Carr

Re: File No. ER 93-2124-007-A
Beaver Falls Regional Act 537 Plan

Dear Mr. Carr:

This letter is in response to your letter dated May 10, 1993. Your letter mentions that there is a high probability that archaeological resources exist in the project area and recommends that a phase I survey be conducted and that a resource protection plan be developed.

Since almost all of the construction will consist of sewer line installation in the rights-of-way of roads, a phase I survey will not be conducted at this time. If archaeological resources are encountered during construction, construction will be stopped and phase I surveys will be conducted.

If you have any questions or comments, please contact me. Thank you for your timely response to the initial submittal.

Sincerely,

WIDMER ENGINEERING INC.

James M. Vanek

James M. Vanek

JMV/las

WIDMER ENGINEERING INC.

March 30, 1993

Pennsylvania Department of Environmental
Resources
Bureau of Forestry
P. O. Box 1467
Harrisburg, PA 17120

Attn: Botanist

RE: Beaver Falls Area Act 537 Plan
Beaver County

Dear Sir:

This is to request that you conduct a search of the Pennsylvania Natural Diversity Inventory to identify any species of concern which may be impacted by an alternative being proposed as part of this plan. This plan proposes the extension of sewer lines from the City of Beaver Falls along Route 18 to the Borough of Koppel. This plan is also investigating the feasibility of extending sewer lines along Stockman Run and along Wallace Run to the Route 18 line. The plan also proposes sewering Homewood Borough. The Beaver Falls Sewage Treatment Plant will be expanded with the extension of sewer lines.

The location of the proposed project components are shown on the attached 7.5 minute U.S.G.S. topographic map.

It is understood that you will notify the City of Beaver Falls of any identified protected species within the project area. It is also understood that your agency will assist this municipality in identifying the appropriate contact agency to provide assistance in the evaluation and mitigation of potential impacts on the protected species under their jurisdiction.

ENGINEERS AND SURVEYORS

806 Lincoln Place Beaver Falls, Pennsylvania 15010 Phone 412/847-1696

If you have any questions, please contact me at (412) 847-1696. If you need to contact the City of Beaver Falls, you can reach Perry Wayne, City Coordinator, at (412) 847-2803.

Sincerely,

WIDMER ENGINEERING INC.

James M. Vanek

JMV/las

enc.

APPENDIX F

Public Comments and Municipal Response

NOTICE

THE CITY OF BEAVER FALLS

Chapter 71 of the Commonwealth of Pennsylvania Department of Environmental Resources Rules and Regulations requires that the City of Beaver Falls, Beaver County, as sponsor of a proposed public sewage system project, notify and allow the general public to comment on the project.

The proposed project consists of the construction of a gravity and pressure sewer system, expansion of the existing sewage treatment plant to 4.7 MGD, and replacement of an overloaded interceptor line and a leaking interceptor line. The project will serve areas in Beaver Falls, Patterson Township, White Township, Eastvale Borough, West Mayfield Borough, Patterson Heights Borough, Big Beaver Borough, and Homewood Borough.

A 30-day comment period has been established to allow the general public to comment on the proposed project. The public may provide comments to the City and view the proposed project's Facility Plan at the Beaver Falls Municipal Building. The City will address the comments before taking any action on the project.

Public comments should be submitted in writing to the City of Beaver Falls, 715 15th Street, Beaver Falls, PA 15010.

City of Beaver Falls
Perry C. Wayne,
City Clerk/Coordinator
5/28/93

PUBLIC COMMENTS AND MUNICIPAL RESPONSE

The Beaver Falls Area Regional Sewage Facilities Plan was advertised in the Beaver County Times on May 28, 1993. A copy of the newspaper clipping is attached. The public comment period concluded on June 28, 1993. No comments were received.

On June 22, 1993, a public meeting was held to explain the recommendations of the plan. An explanation of the minimum project scope within the City of Beaver Falls was given, along with the recommended alternative. The residents of the City had no objections to the project within the City, but concern was raised that the cost to the City residents would be increased if the line were extended to Koppel. Based on a commitment from Koppel or the Route 60/Route 351 enterprise zone with the increased number of users, the revised allocation of costs, and the increased possibility of obtaining full PennVEST financing, the cost to the residents of the City should not be significantly increased.

On June 29, 1993, an additional public meeting was held to explain the plan to the Borough of Homewood and Big Beaver. A question was raised about the possibility of the Boroughs paying for the sewer line extension to increase the project implementation. Based on the cost of this alternative ($1,710,745), the annual debt service would be approximately $102,500, resulting in a user cost in excess of $50/EDU/month. This cost is too high for the residents to afford. Therefore, the alternative was not considered further.

APPENDIX G

Municipal Adoption Resolutions

RESOLUTION FOR PLAN REVISION #1010

RESOLUTION OF THE COUNCIL OF The CITY OF BEAVER FALLS BEAVER COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Resources (Department) adopted thereunder, Chapter 71 of Title 25 of the Pennsylvania Code, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health hazards with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality, and

WHEREAS, Widmer Engineering Inc. has prepared a Regional Sewage Facilities Plan which provides for sewage facilities in a portion of the City of Beaver Falls, and

WHEREAS, The City of Beaver Falls finds that the Facility Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED that the Council of the City of Beaver Falls hereby adopt and submit to the Department of Environmental Resources for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan. The municipality hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

I, PERRY C. WAYNE JR., Secretary, Beaver Falls City Council, hereby certify that the foregoing is a true copy of the City's Resolution No. #1010, adopted AUGUST 16, 1993.

AUTHORIZED SIGNATURE

James C Reynolds
MAYOR

CITY SEAL

Rene C. Wayne Jr.
CITY COORDINATOR

RESOLUTION FOR PLAN REVISION

RESOLUTION OF THE COUNCIL OF HOMEWOOD BOROUGH, BEAVER COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Resources (Department) adopted thereunder, Chapter 71 of Title 25 of the Pennsylvania Code, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health hazards with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality, and

WHEREAS, Widmer Engineering Inc. has prepared a Regional Sewage Facilities Plan which provides for sewage facilities in a portion of Homewood Borough, and

WHEREAS, Homewood Borough finds that the Facility Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED that the Council of the Borough of Homewood hereby adopt and submit to the Department of Environmental Resources for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan. The municipality hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

I, Elayne Buzzelli, Secretary, Homewood Borough Council, hereby certify that the foregoing is a true copy of the Borough's Resolution No. 7-93-2, adopted July 14, 1993.

AUTHORIZED SIGNATURE BOROUGH SEAL

Alfred DeLongo

RESOLUTION FOR PLAN REVISION

RESOLUTION OF THE COUNCIL OF BIG BEAVER BOROUGH, BEAVER COUNTY, PENNSYLVANIA (hereinafter "the municipality").

WHEREAS, Section 5 of the Act of January 24, 1966, P.L. 1535, No. 537, known as the "Pennsylvania Sewage Facilities Act," as amended, and the Rules and Regulations of the Department of Environmental Resources (Department) adopted thereunder, Chapter 71 of Title 25 of the Pennsylvania Code, requires the municipality to adopt an Official Sewage Facilities Plan providing for sewage services adequate to prevent contamination of waters and/or environmental health hazards with sewage wastes, and to revise said plan whenever it is necessary to meet the sewage disposal needs of the municipality, and

WHEREAS, Widmer Engineering Inc. has prepared a Regional Sewage Facilities Plan which provides for sewage facilities in a portion of Big Beaver Borough, and

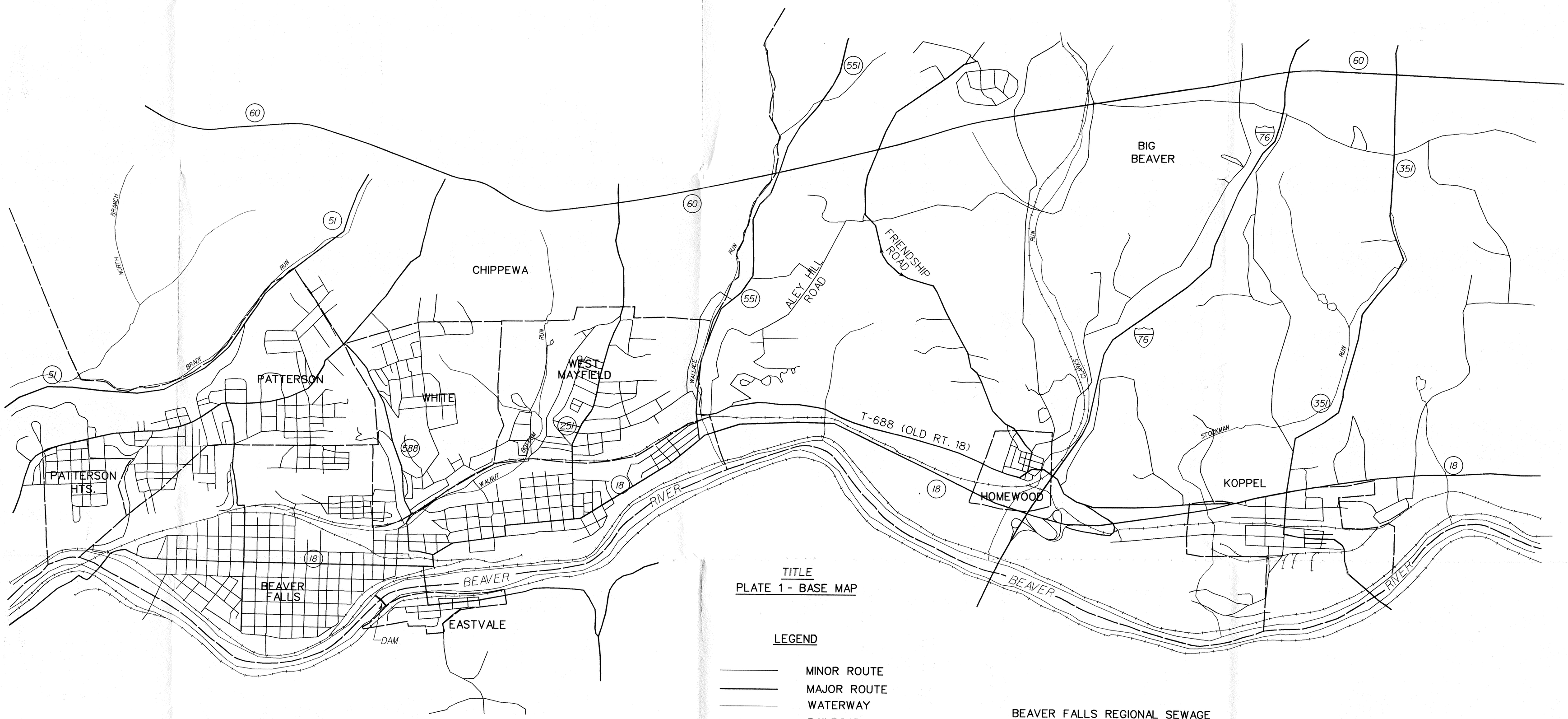
WHEREAS, Big Beaver Borough finds that the Facility Plan described above conforms to applicable zoning, subdivision, other municipal ordinances and plans and to a comprehensive program of pollution control and water quality management.

NOW, THEREFORE, BE IT RESOLVED that the Council of the Borough of Big Beaver hereby adopt and submit to the Department of Environmental Resources for its approval as a revision to the "Official Plan" of the municipality, the above referenced Facility Plan. The municipality hereby assures the Department of the complete and timely implementation of the said plan as required by law. (Section 5, Pennsylvania Sewage Facilities Act as amended).

I, Janet E. Kolson, Secretary, Big Beaver Borough Council, hereby certify that the foregoing is a true copy of the Borough's Resolution No. 005-1993, adopted July 12, 1993.

AUTHORIZED SIGNATURE BOROUGH SEAL

Joseph R. Barbera
President of Council



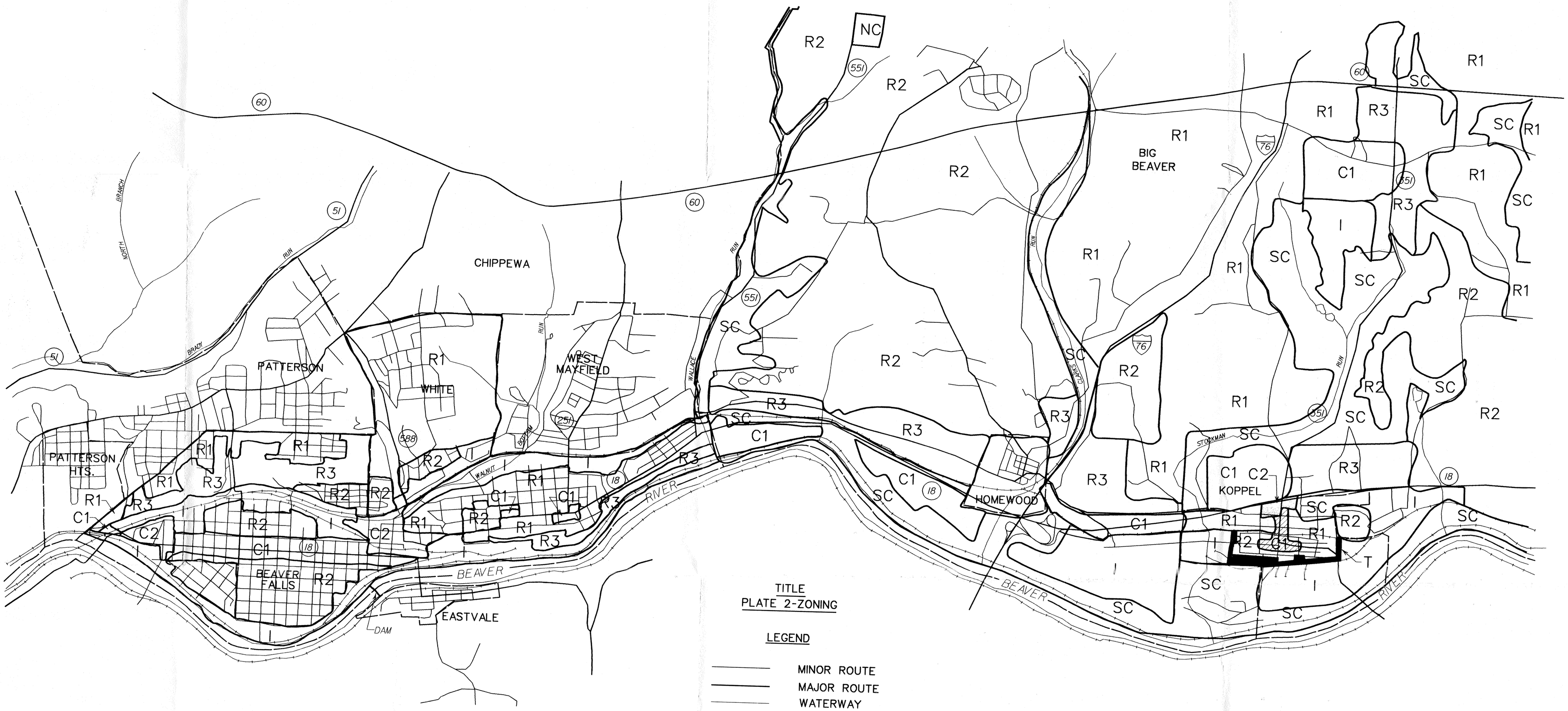
TITLE
PLATE 1 - BASE MAP

LEGEND

- MINOR ROUTE
- MAJOR ROUTE
- WATERWAY
- RAILROAD

BEAVER FALLS REGIONAL SEWAGE FACILITIES PLAN PLATE INDEX

1 - BASE MAP
2 - ZONING
3 - SOILS
4 - WETLANDS/FLOOD PLAINS
5 - GEOLOGY



TITLE
PLATE 2-ZONING

LEGEND

- MINOR ROUTE
- MAJOR ROUTE
- WATERWAY
- RAILROAD

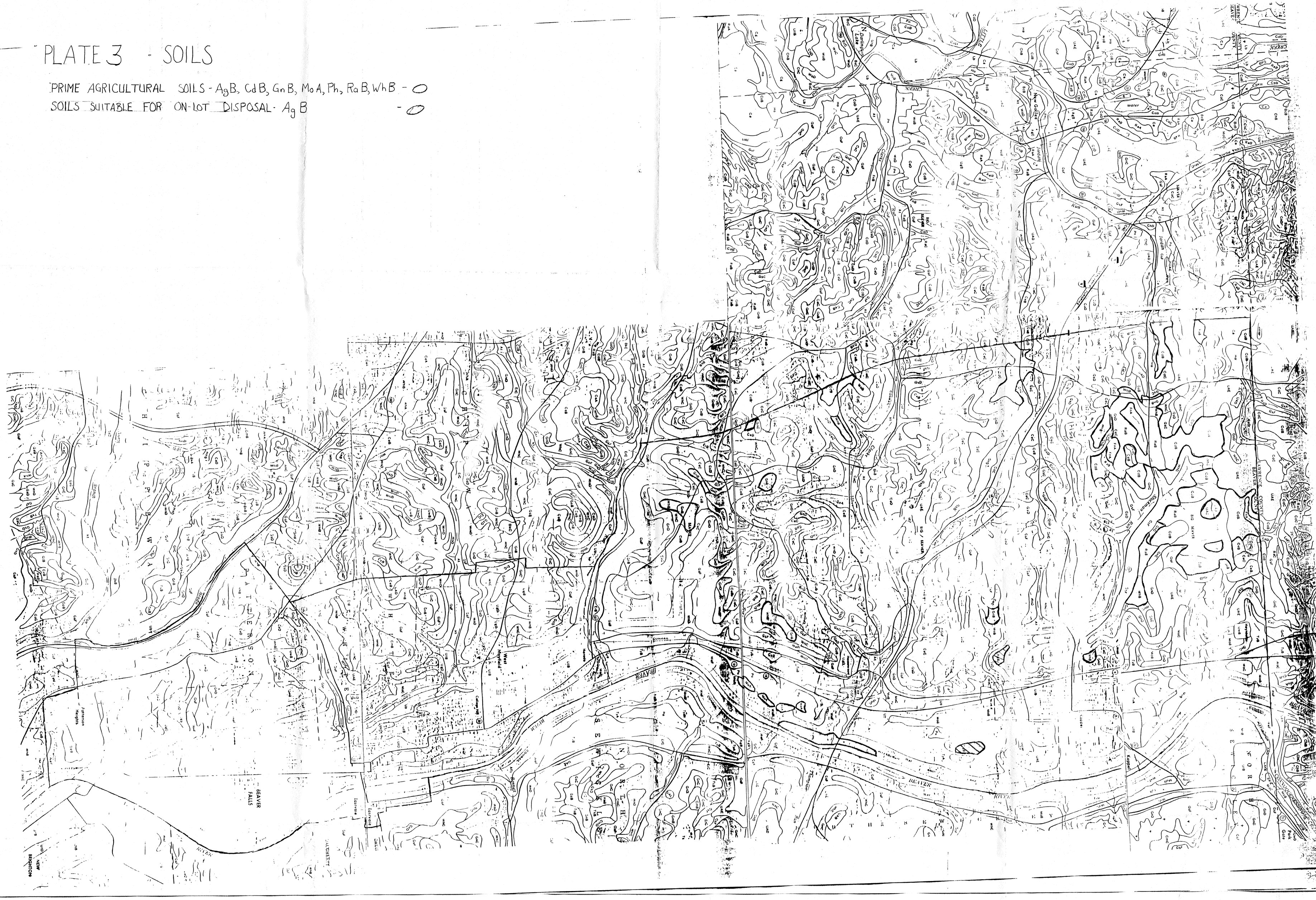
ZONING DISTRICTS

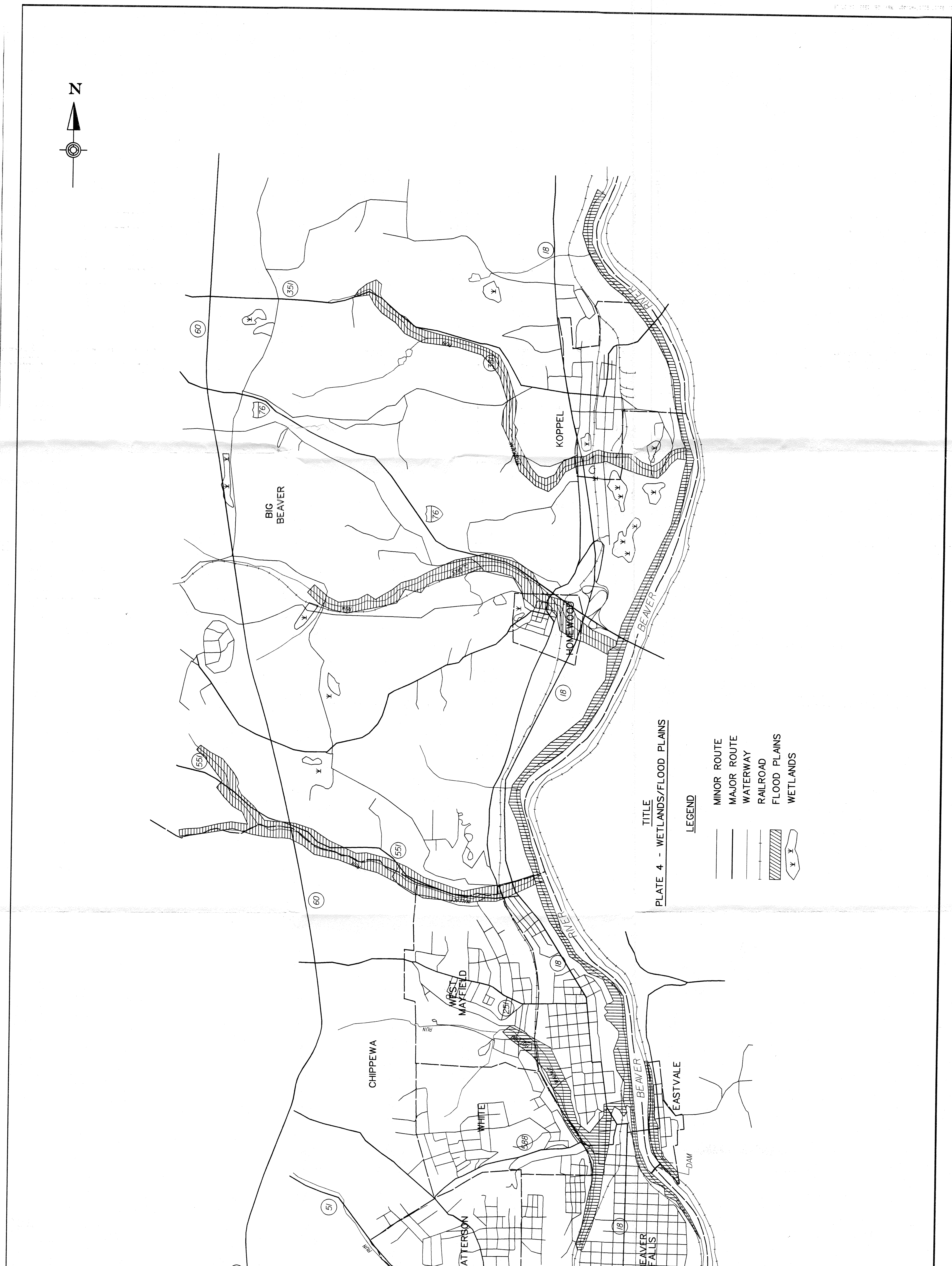
- R1 - RESIDENTIAL-SINGLE FAMILY-RURAL
- R2 - RESIDENTIAL-MULTIFAMILY
- R3 - RESIDENTIAL-LIMITED USE
- C1 - COMMERCIAL
- C2 - HEAVY COMMERCIAL
- I - INDUSTRIAL
- SC - SPECIAL CONSERVATION
- T - TRANSITIONAL

PLATE 3 - SOILS

PRIME AGRICULTURAL SOILS - AgB, CdB, GnB, MoA, Ph, RaB, WhB - 0

SOILS SUITABLE FOR ON-LOT DISPOSAL - AgB - 0




N
TITLE
PLATE 4 - WETLANDS/FLOOD PLAINS
LEGEND
MINOR ROUTE
MAJOR ROUTE
WATERWAY
RAILROAD
FLOOD PLAINS
WETLANDS
BIG BEAVER
KOPPEL
HOMEWOOD
WEST MAYFIELD
CHIPPEWA
WHITE
PATTERSON
PATTERSON HTS.
BEAVER FALLS
EASTVALE
BEAVER RIVER
BEAVER
DAM
NORTH BRANCH
60
351
18
76
551
251
588
51


N
TITLE
PLATE 5 GEOLOGY
LEGEND
MINOR ROUTE
MAJOR ROUTE
WATERWAY
RAILROAD
A ALLEGHENY GROUP
C CONEMAUGH GROUP
P POTTSVILLE GROUP
BIG BEAVER
KOPPEL
HOMEWOOD
WEST MAYFIELD
CHIPPEWA
WHITE
EASTVALE
PATTERSON
PATTERSON HTS.
BEAVER FALLS
BEAVER RIVER
DAM