UTILITY PLAN

The providing of utilities is a major expense for city government. The number of people served directly affects the amounts of water needed and sewage to be treated, thus defining basic utility needs. Just as the number of people determines utility needs, where the people live also can have a major effect upon the cost of providing these services. When household customers are scattered or are located in improper relationship to the existing facilities, the provision of utilities can become very expensive. For this reason, it is important to locate those areas of the community which can most economically be provided with utility services. Otherwise, an inefficient as well as expensive system may result, which must be supported by everyone in the community through increased revenues and/or taxes.

While this is not an engineering study, it does apply engineering design principles in order to assist community leaders in achieving the most efficient and economical utility systems possible.

WATER

Bates County is in an area in which the quality of ground water is usually below the U.S. Public Health Service standards for drinking water. For the most part, water from shallow wells is high in iron content, and the deeper wells produce mineralized water. Most of the communities in Bates County have converted from well-water to surface-water supplies.[1]

The following information on water supply, the treatment plant and water storage was taken from the Preliminary Engineering Report, Sewerage and Water Works Improvements, Butler, Missouri, 1971 by Larkin and Assoc.; a study which was recommended by the 1968 City Plan.

Water Supply

The Butler city water supply is obtained from three sources. The basic supply is obtained from Miami Creek located three miles west of the city with raw water being pumped from an impoundment created by a low level dam. Miami Creek, at this point, has a 100 sq. mi. watershed and has enough flow to sustain the city during most periods. During extensive dry weather, however, the flow in the creek drops and has, on many occasions, completely stopped.

The flow in Miami Creek is augmented by water stored in a 48 acre reservoir constructed on a tributary to Miami Creek about two creek miles upstream. This reservoir has a watershed drainage area of 2,200 acres and is of itself insufficient in catchment area and storage volume to sustain the full city load for any extensive period of time.

The above two sources of water are augmented by a supply from the Marais des Cygnes drainage canal. In 1967, a 14 inch pipe line

[1]The Geology of Bates County, Missouri, by Richard T. Gentile

was constructed a distance of approximately seven miles to a point on the drainage ditch southwest of the water plant. The flow in the Marais des Cygnes drainage ditch is from an extremely large watershed extending approximately 100 miles to the west.

Water Treatment Plant

The water treatment plant was constructed in 1966-67 at a location near the raw water pumping station near Miami Creek, replacing the older treatment plant located near the power plant. Water is pumped after treatment into a 300,000 gallon above-ground steel clearwell.

The treatment plant has a rated capacity of 1.4 million gallons per day. With the size of units, however, it is believed that the plant should be capable of delivering a somewhat higher quantity of water, with a reasonably safe capacity of 1.8 million gallons per day.

Water Storage

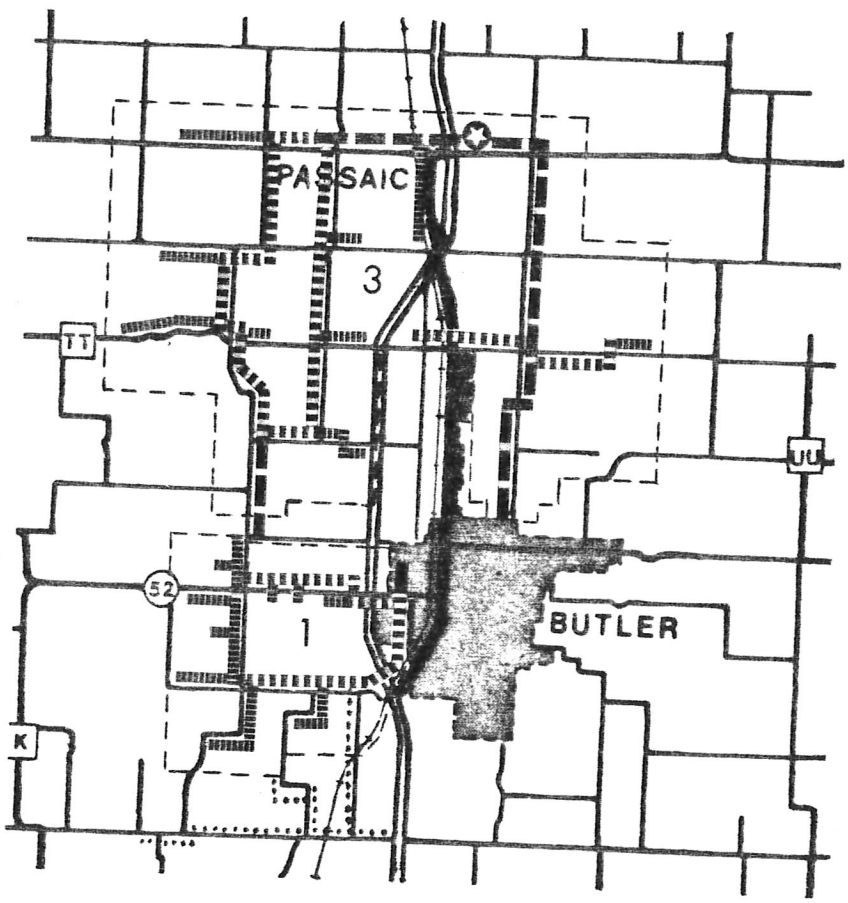
In addition to the 300,000 gallon water storage at the new treatment plant, the Butler water system contains a 200,000 gallon elevated tank located adjacent to the City Hall and two underground concrete structures at the old water plant. The smaller, older structure is a 80,000 gallon circular basin. It is connected by pipe to a recently rehabilitated square underground structure constructed in 1956 and having a capacity of 300,000 gallons; it formerly served as the clearwell under the filters of the old water plant.

Distribution System

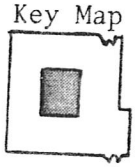
Butler's water system served its 4,107 persons as well as various businesses and industries within the city limits through 1,948 connections in 1980. The city also provides water for approximately 2,650 rural customers in the Bates County Rural Water Districts, numbered 1, 3, 4 and 6; see Rural Water District Maps. The city and districts total average daily water usage was 812,200 gallons. Water consumption by the city residents and rural water district customers totals approximately 1.3 million gallons per day at peak times.

The existing distribution system is shown on the *Water System* map accompanying this study. A 10-inch transmission main from the new water treatment plant to the old plant was constructed in 1956-57. In 1966-67 a new 10-inch pipe loop was constructed circling the center part of the city and connecting to the transmission main. The Butler water system also contains 4800 feet of 8-inch pipe, 6850 feet of 6-inch pipe, 72,000 feet of 4-inch pipe, with a considerable extra length of smaller lines 2-inches and less in diameter. Larkin and Associates report that while the distribution system is adequate in most of the city for delivering ample water for domestic usage, it is very deficient from a standpoint of delivering adequate quantities of fire fighting water because of the very large preponderance of 4-inch and smaller size mains. The 1971 engineering report also points out that there is a considerable part of the city that is served by small mains which are not even capable of delivering ample water for domestic purposes during higher demand periods of the day.

BATES COUNTY
PWSD's #1 & 3



Key Map



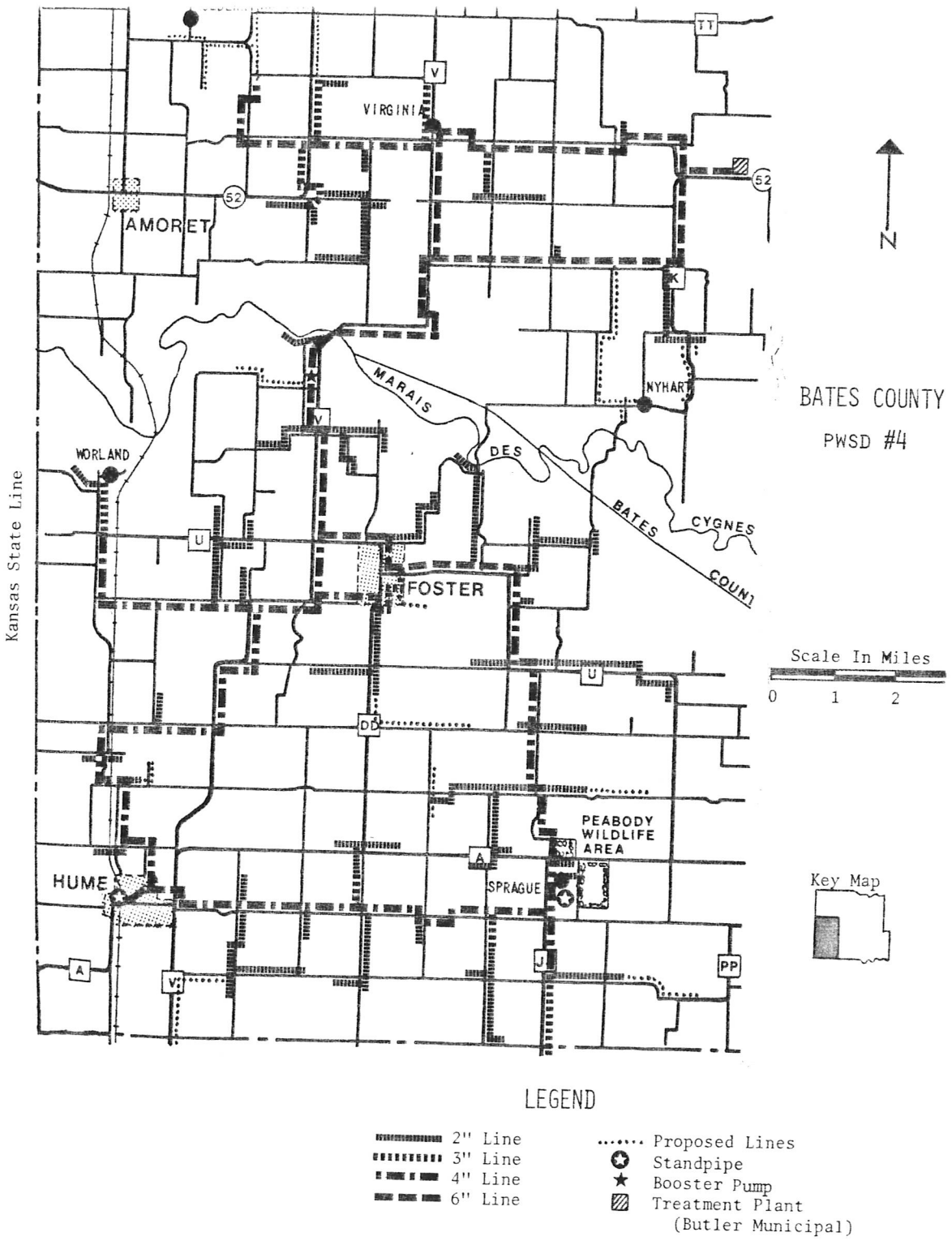
Scale In Miles

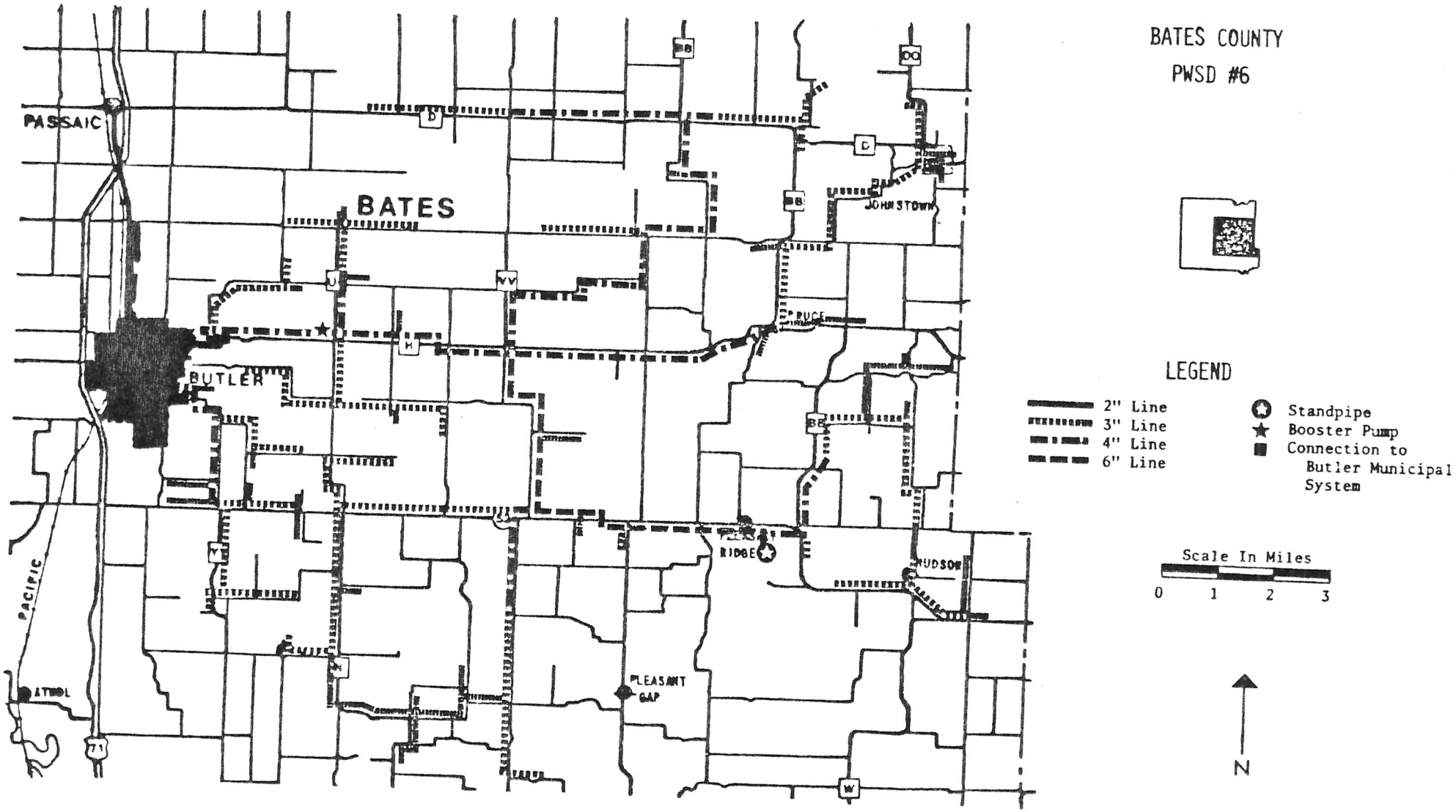
0 1 2 3

N

LEGEND

- Up to 2"
- 2" to 3"
- Over 3"
- Proposed Lines
- Standpipe
- District Boundary


Kansas State Line
VIRGINIA
AMORET
52
TT
V
K
MARAIS
DES
CYGNES
NYHART
WORLAND
U
FOSTER
BATES
COUNT
DD
PEABODY
WILDLIFE
AREA
A
HUME
SPRAGUE
J
PP
N
BATES COUNTY
PWSD #4
Scale In Miles
0 1 2
Key Map
LEGEND
2" Line
3" Line
4" Line
6" Line
Proposed Lines
Standpipe
Booster Pump
Treatment Plant
(Butler Municipal)


BATES COUNTY
PWSD #6
PASSAIC
BATES
BUTLER
PRUCE
JOHNSTOWN
RIDGE
HUDSON
PACIFIC
ATTOL
PLEASANT GAP
LEGEND
2" Line
3" Line
4" Line
6" Line
Standpipe
Booster Pump
Connection to Butler Municipal System
Scale In Miles
0 1 2 3
N

Recommended future water system improvements, taken from the 1968 City Plan, the engineering study and echoed in the 1974 Kaysinger Basin Regional Water and Sewer Plan include:

Within Five Years:

(1) A major main to create a loop in the southwest part of the city.
(2) A major main north to the airport.
(3) A south pipe loop.
*(4) Reconstruct the concrete slab on top of the 300,000 gallon ground storage facility.

Continuing:

(1) Replace many of the smaller lines with six-inch lines.

1980:

(1) Increase treatment plant capacity to meet maximum day use during the 1979-84 period.
(2) Install a permanent intake on the Marais des Cygnes Drainage Canal. It is anticipated that this supply source will be used frequently during the planning period.
(3) Install a new transmission main from the treatment plant to the city.

Future 1980-1990:

(1) A major main and a million gallon elevated storage facility to complete the north loop through the proposed industrial area.
(2) Increase treatment plant capacity to handle maximum peak day usage during 1980-90 period.

Future 1990-2000:

(1) Increase treatment plant capacity to meet maximum peak day use during the 1995-2000 period.

Note: The recommendations contained in the 1971 and 1973 studies by Larkin and Associates were predicated on the following assumptions:

1. *The population would increase as projected, to 9,300 by year 1991;*
2. *Considerable industrial growth will occur, largely centered in the northwest part of the city;*
3. *The sizing of mains and system storage were based on projected peak hour usage and with fire flows necessary for a Class 6 fire rating;*
4. *The increase in population will result in extensive development of new land, especially in the southern and southwestern areas of the city; and,*
5. *Peak day water consumption, .88 MGD** in 1970 is expected to rise to 2.5 MGD by 1991. Average water usage is expected to increase from .46 MGD to 1.32 MGD during the same period.*

* Have completed this improvement.
** Millions of gallons per day.

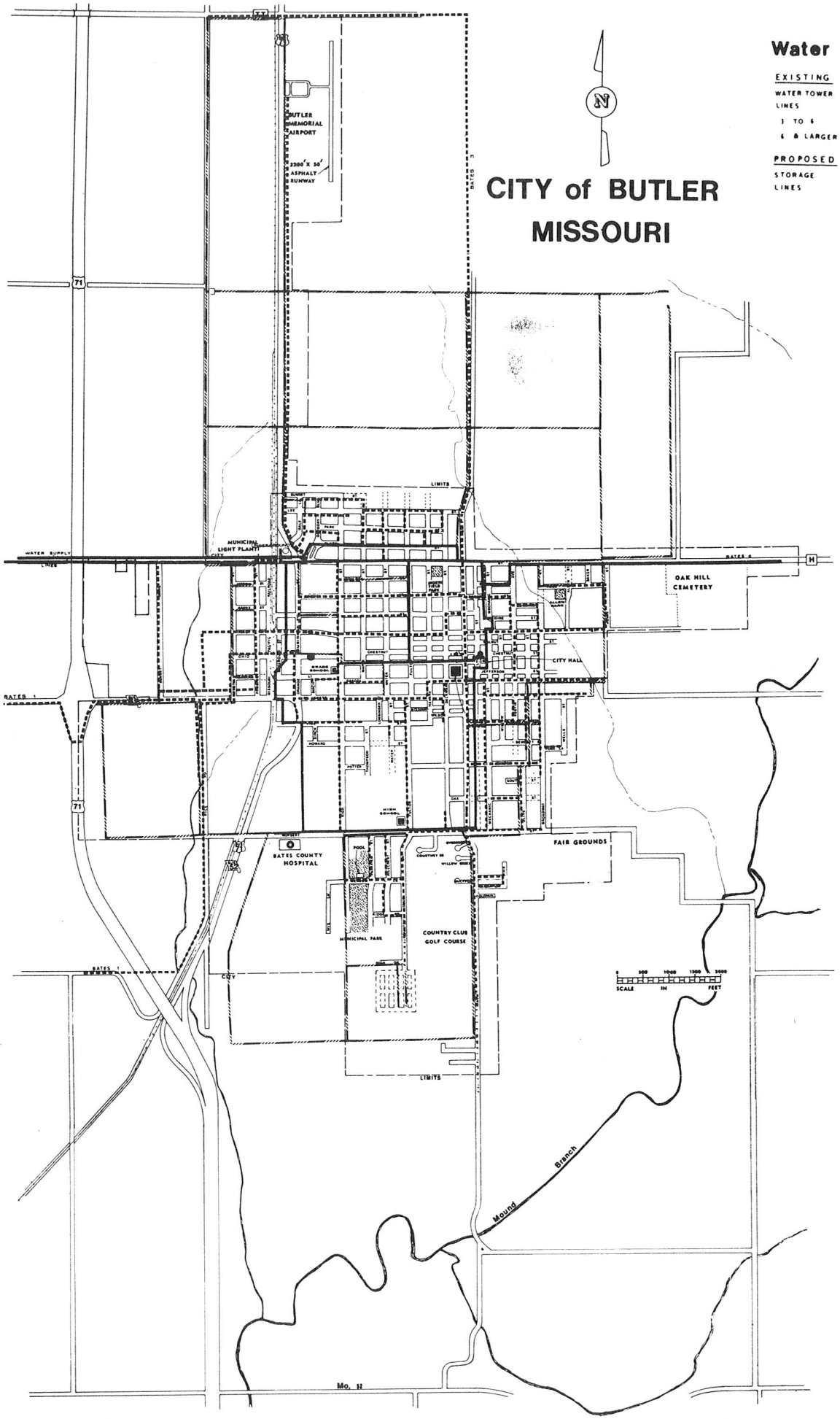
The *Water Consumption* table shows the current and projected amounts of water consumption for the Butler system through the end of the planning period. If the population projections prove to be correct, and significant industrialization (which utilizes large quantities of water) does not occur, the capacity of the water treatment facility may not be exceeded until the mid-1990s. The engineering reports (dated 1971 and 1973) reported the treatment plant could have reached its maximum capacity, with the past population trends, by as early as 1979, and exceed its maximum capacity by 1984. With the apparent halt of rapid growth, it appears the city may wish to complete an update on their waterworks improvements timetable. The improvements listed above, while necessary, may not have to be undertaken as early as originally believed, and perhaps may be deferred for five to fifteen years, if the population and/or industrial growth does not warrant earlier expansion. Yet another factor the city must consider in programming for waterworks improvements is whether the city is to remain the supplier to the rural water districts. The water source as well as the treatment plant capacity should be evaluated and possibly increased if Butler is to remain the water source for a large portion of Bates County. There is some indication that the eastern half of Bates County may have the opportunity of an additional water supply being provided from the Harry S. Truman water district in Henry and St. Clair counties which is being pursued at this time. It is proposed that the raw water supply comes from the H.S. Truman Reservoir, and will be available to tie into Bates County Rural Water District No. 6 prior to 1990.

WATER CONSUMPTION

BUTLER AND RURAL WATER DISTRICTS 1, 3, 4 and 6

	1980	Estimated 1990	Estimated 2000
POPULATION			
CITY OF BUTLER	4,107	6,100	9,300
RURAL WATER DISTRICTS	2,653	2,000	2,220
TOTAL	6,760	8,100	11,520
WATER CONSUMPTION (gallons per day)			
CITY OF BUTLER			
Average Day	761,000	1,128,500	1,720,500
Peak Day	1,233,200	1,829,200	2,788,000
RURAL WATER DISTRICTS			
Average Day	51,200	40,000	55,500
Peak Day	66,300	51,800	71,600
TOTAL			
Average Day	812,200	1,168,500	1,776,000
Per capita	120.1	144	154.2
Peak Day	1,300,000	1,881,000	2,859,600
Per capita	192.3	232.2	248.2

Source: Kaysinger Basin Regional Planning Commission.
Kaysinger Basin Regional Water and Sewer Plan, 1974.
Bill Estes, Water Superintendent, City of Butler.
Bill Tucker, Administrator, City of Butler
Water Districts Representatives


CITY of BUTLER
MISSOURI
Water System
EXISTING
WATER TOWER
LINES
1 TO 4
6 & LARGER
PROPOSED
STORAGE
LINES
BUTLER MEMORIAL AIRPORT
2300' X 50' ASPHALT RUNWAY
LIMITS
MUNICIPAL LIGHT PLANT
WATER SUPPLY LINES
OAK HILL CEMETERY
CITY HALL
BATES COUNTY HOSPITAL
FAIR GROUNDS
COUNTRY CLUB GOLF COURSE
MUNICIPAL PARK
SCALE IN FEET
Mound Branch
Mo. 52

SANITARY SEWERS

The development of an efficient sanitary sewer system is a more critical design problem than that of a water system. Terrain or natural drainage becomes an extremely important design feature for keeping sewer service costs as low as possible.

The city of Butler is located on rolling topography within two seperate watersheds; Mound Branch and Bones Branch. The various natural drainageways from the city necessitates careful planning of new developments in order to minimize future utilization of lift stations and to maximize use of the existing treatment facilities.

The majority of urban development in Butler has occurred in three natural drainage areas of Mound Branch. To serve these areas, the city has developed a gravity flow sanitary sewer system which drains to the sewage treatment facility, located on Mound Branch, south of the city. Some development, most notably the airport, has also occurred to the north, outside the natural sewer service area, within the Bones Branch drainage area.

The city is currently completing improvements to both the sewage collection and treatment systems. Among the improvements completed or soon to be completed, according to Larkin and Associates, the city's consulting engineers for this project, are:

1. Construction of lateral sewers for the northeast part of the city to eliminate individual septic tanks.
2. Construction of the south interceptor and east relief sewer. Although given separate names, this is actually one sewer to convey the sewage of most of the developed part of the city to the treatment plant site. The construction of this interceptor/relief sewer will relieve the overloaded condition of the existing trunk line in the eastern part of the city. This new sewer will also allow the presently developed areas in the northeast and around Butler Recreational Lake to be serviced. This sewer will also intercept the flow of sewers discharging into the existing lagoon and convey this flow to the new sewage treatment site. Because it will make possible the sewering of a large unsewered area and relieve a serious sewage overflow problem, this sewer was probably the most needed improvement.
3. Construction of the west interceptor. This sewer extends from the treatment plant site northerly along the principal waterway of the west part of Butler to the Fort Scott Street lift station. The construction of this sewer will allow this lift station to be abandoned. This lift station had been a source of frequent bypassing of raw sewage to the creeks.
4. Construction of south sewer main. This sewer will provide service to the area south of the "Country South" subdivision, to allow further residential expansion.
5. Construction of new sewage treatment facility at a new site, downstream from the existing single-cell lagoon. The new treatment site allows a larger geographic area to be served by the sewer system. The old site also posed problems, as residential

encroachment was occurring, and the lagoon would have had to been modified considerably in order to meet the current environmental standards. The new treatment plant will be a five-acre oxidation ditch, with a lift station. Should future growth warrant, the facility may be more easily expanded than would the lagoon.

The total interceptor sewer system was designed to serve a population of 9,300; the east relief/south interceptor 5,300 persons, and the west interceptor a population of 4,000. The sewage treatment plant, completed in 1980, was designed to serve a population equivalent of 6,200.

The *Sanitary Sewers* map shows the existing sewer system, including the recent improvements, in Butler. The natural sewer service area is defined on the north and west by the heavy, dashed line. Those areas which could most economically be provided with sanitary sewers, due to the proximity to existing sewer lines, are shown within the diagonal lined area. Also shown are possible locations of future sewage collection lines, taken, in part, from the Kaysinger Basin Regional Water and Sewer Plan.

Urban development outside the natural sewer service area will require additional sewage treatment facilities or expensive lift stations and force mains to be constructed. Lift stations are expensive to install, require regular maintenance, and result in continual expense to the community. It is strongly recommended that Butler avoid additional lift stations, force mains and treatment facilities as long as developable land is available within the gravity flow service area.

It appears Butler has ample area where sewer services can efficiently be provided to meet future land use needs during the planning period. However, future development should be encouraged in the immediate service area of Butler's sanitary sewer system, with development concentrated along a new line when expanding beyond the immediate service area.

Among considerations for the future, as outlined in the Preliminary Engineering Reports by Larkin and Associates as well as the Regional Water and Sewer Plan, are the sewering of areas outside the city's natural sewer service area. The two areas which should be carefully studied are (1) the area around the U.S. Highway 71 interchange, and (2) the airport and northwest area. In order to provide sewers for these areas, lift stations would be required to pump sewage into the city's existing system. Perhaps the expense and continual maintenance of sewering the interchange is justified, if the city is committed to the control of the area. The northwest/airport area, while perhaps amenable to industrial development because of the transportation network and its geographic relationship to the city, should probably be avoided until other industrial areas are filled, because of the numerous lift stations which would be required to sewer this area. The city of Butler should not casually expand into either of these areas, or any others which would be difficult to service, without being fully versed as to the costs as well as the benefits of such expansion.

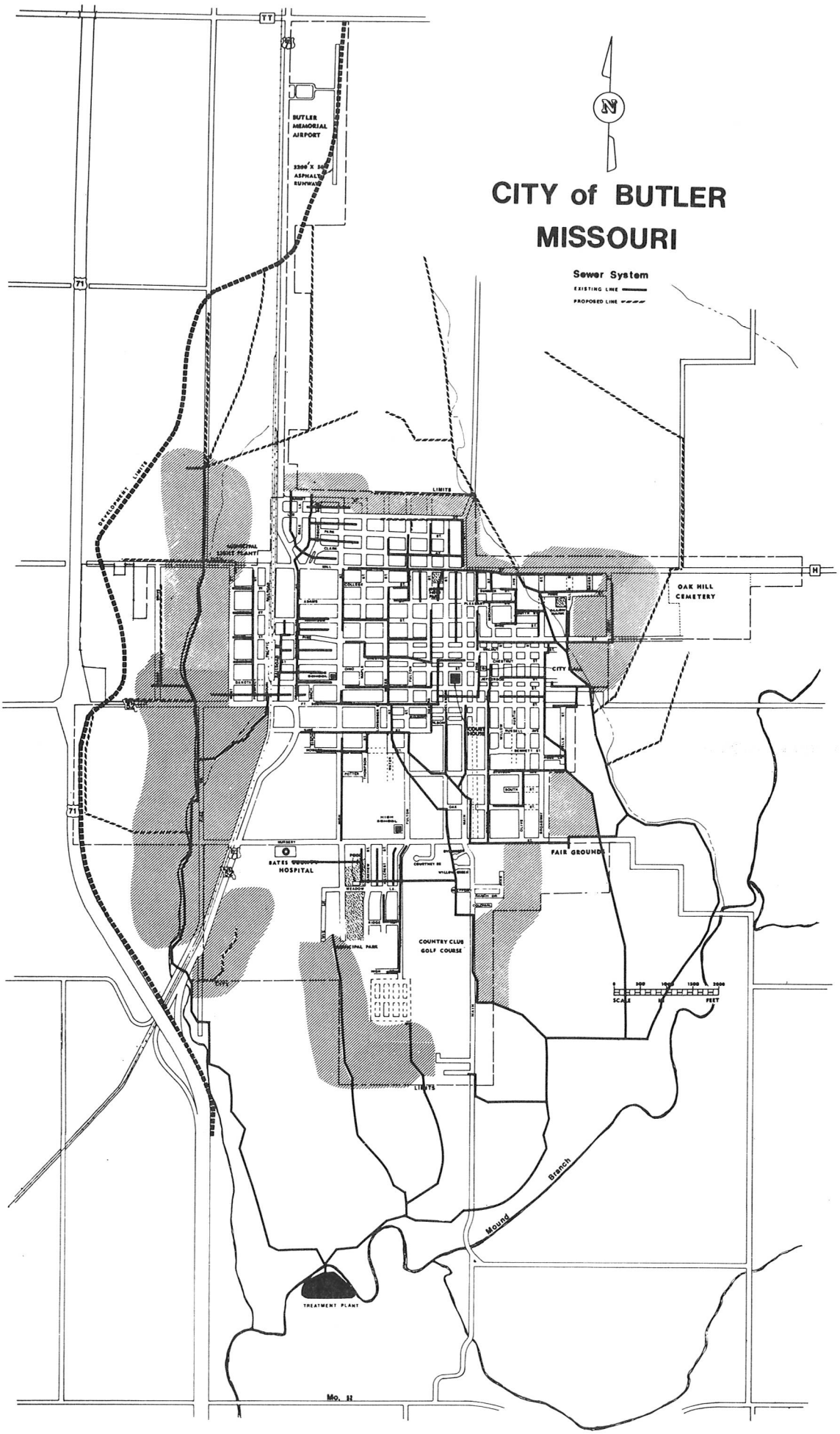
FUTURE UTILITY SERVICE EXPANSIONS

With the passage of SB 1110, requiring that future annexations receive favorable vote from both the city and the area to be annexed, it is recommended that no extensions, of any service, be extended beyond the corporate

limits. If the area to be served is not in the city, the annexation should take place prior to service extensions.

Future Expansions

(1) In 1981, the treatment plant was nearly inundated by flood waters. The plant may require additonal flood protection measures.
(2) Expand treatment plant and lines to serve projected population figures and growth areas (as the plant was designed to serve 6,200 persons, it should be increased by an additional 50%).


CITY of BUTLER
MISSOURI
Sewer System
EXISTING LINE
PROPOSED LINE
BUTLER MEMORIAL AIRPORT
DEVELOPMENT LIMITS
LIMITS
OAK HILL CEMETERY
CITY HALL
COURT HOUSE
FAIR GROUNDS
BATES COUNTY HOSPITAL
COUNTRY CLUB GOLF COURSE
TREATMENT PLANT
Mound Branch
Mo. 52