III. CURRENT CONDITIONS

A. General

The City of Monett is a town of approximately 8,700 people, located in Lawrence and Barry Counties, in the southwest corner of the State of Missouri. Monett operates a water supply system consisting of a series of deep wells that deliver water directly into the City's storage/distribution system. Well water is chlorinated and fluoridated prior to delivery into the system. The water receives no additional treatment.

Monett has a large industrial and commercial base that significantly affects water system demands. Monett's ten industries utilized sixty-eight percent of the water sold by the City in 2007. Of this demand, three industries accounted for sixty percent of the City's water sales.

For calendar year 2007, metered water sales to Monett customers equaled the following:

	Total '07 Water Sales (Gal)	Average Daily Sales (GPD)
Industrial	689,204,000	1,888,000
Commercial	91,682,000	251,000
Residential	207,080,000	567,000
Municipal	5,744,000	16,000
Irrigation	16,214,000	45,000
Total	1,009,924,000	2,767,000

The amount of water that was metered at the individual wells during the same period of time equaled 1,188,331,000 gallons, or an average of 3,256,000 gallons per day. Of this amount, 103,396,000 gallons was intentionally flushed from the distribution system or wells, leaving 75,010,000 gallons of unaccounted for loss from the system. This loss equals 6.3 percent of the total water pumped, and represents a fairly low percentage of loss from the system.

B. Supply Wells

Monett's water supply system consists of eleven deep wells constructed at various locations in the City, as shown in Figure 1, plus one well located at the City's airport. Each in-town well discharges directly into the distribution/storage system. Although the pumping rate varies somewhat depending on length of pump operation and

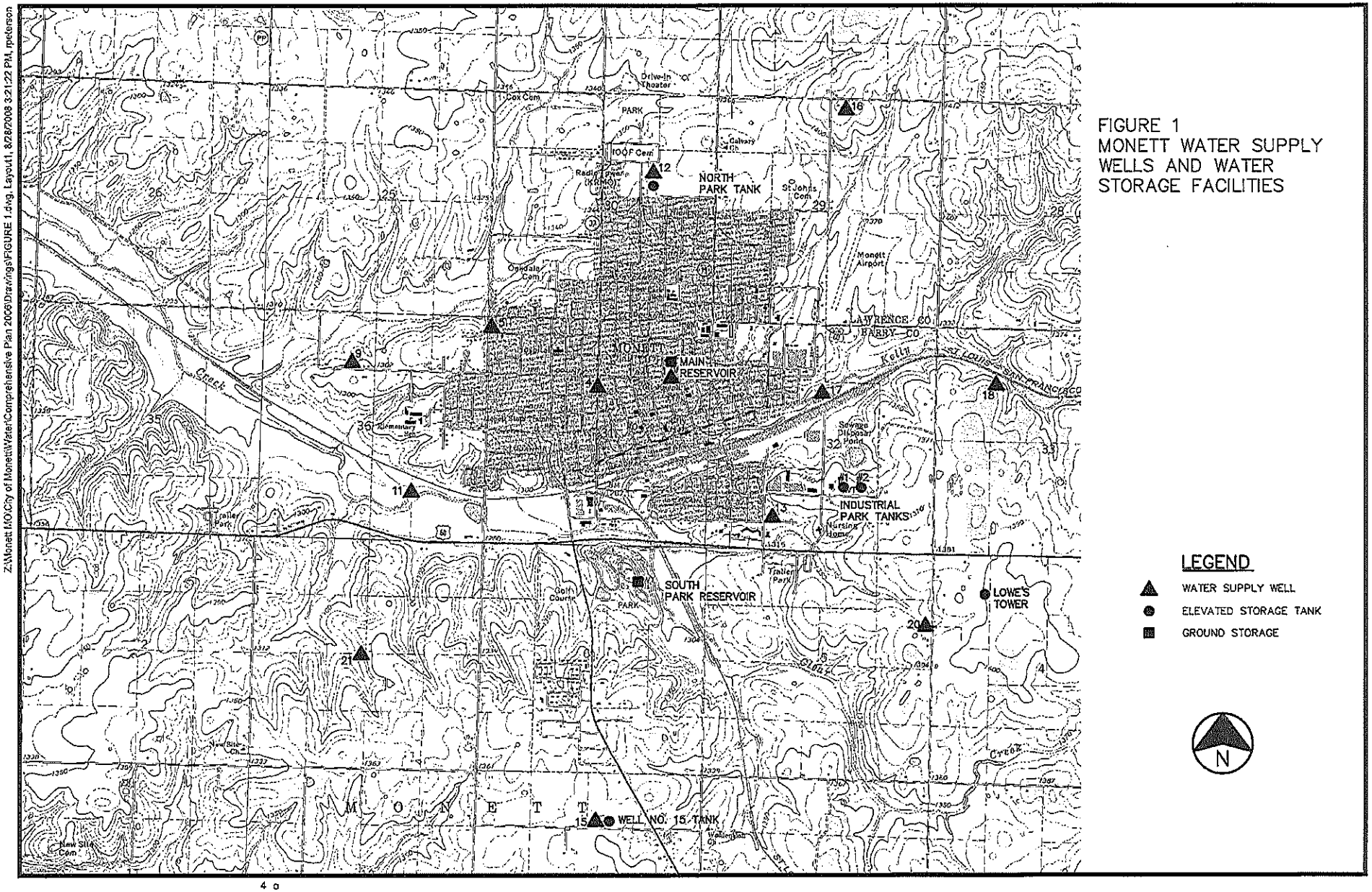


FIGURE 1
MONETT WATER SUPPLY WELLS AND WATER STORAGE FACILITIES

Z:\Monett MO\City of Monett\Water\Comprehensive Plan 2008\Drawings\FIGURE 1.dwg, Layout1, 8/28/2008 3:21:22 PM, mpeterson

seasonal factors, the following tabulation lists the operable wells and the associated pumping rates for those wells serving the City.

Current Pumping Rates of Wells

Well No.	Pumping Rate (gpm)
1	250
4	300
5	300
9	1150
11	300
12	650
13	230
15	300
16	75
17	170
18	300
20	550

The wells vary in depth from 1200 feet to 1630 feet, and have hole diameters ranging from 8- to 12-inches. Well casing depth varies from 308 feet to 640 feet. The wells generally penetrate the Roubidoux, Gasconade, Eminence, and Potosi aquifers, which produce the majority of the water pumped.

Wells No. 9 and 12 produce significantly more water than any of the other wells, however these wells will occasionally produce murky water that must be pumped to waste for a period of time until the water clears. It is possible that Wells No. 9 and 12 intercept geologic faults that are evident in the area and would tend to produce greater quantities of water, but would also be more susceptible to increases in turbidity. The wells have been equipped with chlorination equipment due to past issues with high bacteria counts in the water.

The City of Monett drilled Well No. 21 in 2006, however this well did not clear up after prolonged pumping, and has not been placed in service. The well appears capable of producing in excess of 600 gpm.

Well No. 16 is located in a tight geologic formation that produces a relatively small amount of water. This well is capable of providing only about 75 gallons per minute, with significant levels of drawdown during pumping operations. Well No. 20 is a new installation that produces 550 gpm of clear water, with minimal drawdown. The remainder of the wells generally produce about 300 gpm of water, however, the well

capacities have been seen to decrease with time as the area groundwater level drops. The preceding tabulation shows a total capacity from Monett's eleven in-town wells of 4,575 gpm.

Monett's wells and storage facilities are tied to a SCADA (supervisory, control and data acquisition) system that provides for automatic or manual operation of the various wells. Installation of SCADA equipment has been a multi-year project that is nearing completion. Only Wells No. 11, 13, and 19 remain to be hooked up to the SCADA system at this time. When utilized in the automatic control mode, each well pump is controlled by the water level in a nearby water storage tank, with pump operation initiated by a falling water level in the tank. The control system allows pump operation to be sequenced to take the best advantage of the characteristics of each well. The City may also operate the wells manually.

The SCADA system allows City personnel to monitor the various wells and storage tanks, utilizing either a remote computer or telephone. The system is also set up to notify City personnel of unusual conditions at any well or tank.

Well pump discharges are chlorinated prior to delivery of the water to the nearby storage tank or distribution system. The concentration of chlorine in the water is monitored with residual chlorine analyzers, and the resulting chlorine concentration is monitored by the SCADA system. Fluoride is also added to the water at each well pump discharge. Wells No. 9 and 12 contain instrumentation to measure water clarity, and the SCADA system allows for the shut down of respective well pumps if the level of turbidity increases to unacceptable levels.

The following represents a summary of the City's wells and normal mode of operation of each:

Well No. 1

100 HP submersible pump installed in 1997 (250 gpm)
Submersible pump delivers to ground storage reservoir (658,000 gallon capacity)
High service pumps draw from reservoir and pump to distribution system. The two pumps have capacities of 835 gpm and 200 gpm.
Ground storage is filled by manual or SCADA control of well pump.
SCADA controls shut off high service pumps at minimum water level in reservoir.

Well No. 2

Abandoned and plugged

Well No. 3

Currently not used. Well has inadequate capacity and poor quality (rusty) water, and was used as a USGS monitoring well for a period of time.

Well No. 4

100 HP submersible pump installed in 1999 (300 gpm)
Submersible pump delivers to distribution system
Pump operation is manual or SCADA controlled.

Well No. 5

100 HP submersible pump installed in 2006 (300 gpm)
Submersible pump delivers to distribution system
Pump operation is manual or SCADA controlled

Wells No. 6, 7, and 8

Abandoned and plugged

Well No. 9

Lineshaft turbine type pump with 150 HP motor, installed in 1998 (1150 gpm)
Pump delivers to distribution system via a 16-inch diameter main dedicated to chlorine detention
Pump operation is manual or SCADA controlled, however an installed turbidimeter automatically shuts down the pump at a preset level of turbidity
Backup power produced by standby generator

Well No. 10

Abandoned as a city well. Now used as a USGS monitoring well

Well No. 11

100 HP submersible pump installed in 1990 (300 gpm)
Submersible pump delivers to distribution system
Pump operation is currently manual

Well No. 12

Submersible pump with 125 HP motor, installed in 2006 (650 gpm)
Pump delivers to North Park Tank
Pump operation is manual, however an installed turbidimeter automatically shuts the pump down at a preset level of turbidity.

Well No. 13

75 HP submersible pump installed in 2006 (230 gpm)
Pump delivers to distribution system.
Pump operation is currently manual

Well No. 14

Abandoned and plugged

Well No. 15

100 HP submersible pump installed in 2000 (300 gpm)
Pump delivers to an adjacent water storage tank, with pump operation controlled by SCADA system based on water level in the tank and drawdown in well

Well No. 16

40 HP submersible pump installed in 2004 (75 gpm)
Pump delivers to distribution system
Pump operation is continuous to maintain system pressure in adjacent area

Well No. 17

40 HP submersible pump installed in 2006 (170 gpm)
Pump delivers to distribution system
Pump operation is currently manual

Well No. 18

100 HP submersible pump installed in 2001 (300 gpm)
Pump delivers to distribution system
Pump operation is manual or SCADA controlled from pressure switch at well.

Well No. 19 (Airport)

15 HP submersible pump installed in 2001 (100 gpm)
Pump delivers to distribution system hydropneumatic tanks with pressure switch control

Well No. 20

150 HP submersible pump installed in 2005 (550 gpm)
Pump delivers to nearby water tower, with pump operation controlled by a pressure switch that senses water level in tower
Backup power provided by standby generator

C. Elevated and Ground Storage:

Monett's water supply system contains four elevated storage tanks of a standpipe design, one elevated tower, and two ground storage reservoirs with associated high service pumps. The locations of the seven tanks are shown in Figure 1.

A portion of the elevated storage is provided by four standpipe type tanks, each of which has a matching overflow elevation of 1494 feet above mean sea level. Each tank is of steel construction, with a diameter of 43 feet. The date of construction, total volume, and usable volume of water stored in each tank is tabulated as follows:

	Total Volume (Gal)	*Usable Volume (Gal.)
North Park Tank (1964)	1,250,000	413,000
Ind. Park Tank No. 1 (1964)	1,250,000	413,000
Ind. Park Tank No. 2 (1994)	1,250,000	413,000
Well No. 15 Tank (1994)	1,000,000	186,000
Total	4,750,000	1,425,000

(*Drawdown allowed while still maintaining 35 psi system pressure at base of tank.)

The remainder of the elevated storage is provided by a new (2006) one million gallon tower located in the southeast part of the system near Lowes. The tower has an overflow elevation of 1555, thereby supplying water to the system at a higher pressure than the rest of the distribution system. The tower is of a composite construction, with concrete base and steel tank.

The two ground storage reservoirs provide a total capacity of 1,075,000 gallons, with 658,000 gallons available at the Main Reservoir, and 417,000 gallons stored in the South Park Reservoir. Water must be pumped from each of these reservoirs into the system via high service pumps. The Main Reservoir utilizes two high service pumps, with one capable of delivering approximately 800 gpm to the system and the other 200 gpm. The South Park Reservoir utilizes one high service pump capable of delivering approximately 730 gpm to the system. The main reservoir is a concrete structure in excess of sixty years old that appears to be in fair condition. The South Park Tank is a riveted steel tank of a standpipe design, last inspected, repaired, and painted in 1994, and in fair shape. The reservoir is filled from system pressure, and delivery to the system from the tank is with a high service pump. This tank is used primarily for fire protection only, with water moved through the tank typically twice per month.

So long as the high service pumps are operational, a total of 3.5 million gallons of usable storage is provided by the City's seven water storage tanks. This "usable" volume assumes that 35 psi system pressure is maintained at each standpipe type elevated storage tank, thereby precluding the use of the bottom 81 feet of water in each tank. If, due to a major fire or some other unanticipated occurrence, water is drawn below this level from these tanks, each foot of drawdown on the combined four elevated storage tanks would result in the removal of 43,000 gallons of water from storage.

The City of Monett has contracted with a specialty contractor to provide for the ongoing maintenance of the five elevated storage tanks. Tanks are drained, cleaned, inspected, and painted on a pre-established schedule to insure that the City's investment in these facilities is protected. The South Park Tank has been excluded from this regularly scheduled maintenance program, with the intent that the tank will be removed from service and scrapped out once it is determined that major maintenance is required.

D. Distribution System

Monett's water distribution system is comprised of approximately 83 miles of water lines varying in size from 4 inches to 16 inches diameter. The system is shown in Figure 2, which is located in the pocket bound in the back of this report. The pipe is nearly all cast iron or ductile iron, with only a small amount of heavy-wall PVC pipe utilized in recent years.

The system is generally of a looped layout, which provides adequate flows and pressures throughout the system. Only in areas of high ground elevation have marginal system pressures been experienced. Losses of water from the system due to leaks appear to be moderate, with about 6 percent of the water pumped into the system in 2007 not accounted for in water sales or other metered usage.

In order to evaluate the adequacy of Monett's distribution system for various demand situations, the system was modeled and analyzed through a computer-aided software program identified as Watercad. A model was created of the entire distribution system. Demands for water were placed on the model by first identifying the volumes of water used by industrial customers. City water sales records were used to establish typical demands for all industrial users, and these demands were placed on the corresponding "nodes" of the model. Commercial water usage was then applied to the model, primarily in the downtown area and on the strip along U.S. Highway 60. The remaining residential water usage was then equally dispersed throughout the remainder of the system. Typical scenarios for pump operation were input into the model, along with representative water levels at towers, etc.

Results of one of the representative computer runs for the system evaluation are plotted on Figure 3. The figure shows calculated pressure contours for the system during a peak weekday demand situation, assuming that demands are being met totally by the five full elevated storage tanks (no pumps in operation). Because the Lowe's water tower maintains a higher pressure zone in this part of the distribution system, this area is modeled separately by closing the appropriate valves in the distribution system model. While it is recognized that all tanks would not normally be full, modeling in this fashion allows hydraulic bottlenecks in the distribution system to be readily identified. As is evident from Figure 3, acceptable pressures are available throughout the system, with two exceptions. The waterline that extends to Well No. 16 in the northeast corner of the system exhibits pressures as low as 25 psi, due primarily to its relatively high ground elevation. This portion of the system currently must rely on the continuous operation of

Z:\Monett MO\City of Monett\Water\Comprehensive Plan 2006\Drawings\FIGURE 3.dwg, fig 3, 8/4/2008 8:42:45 AM, Mjones

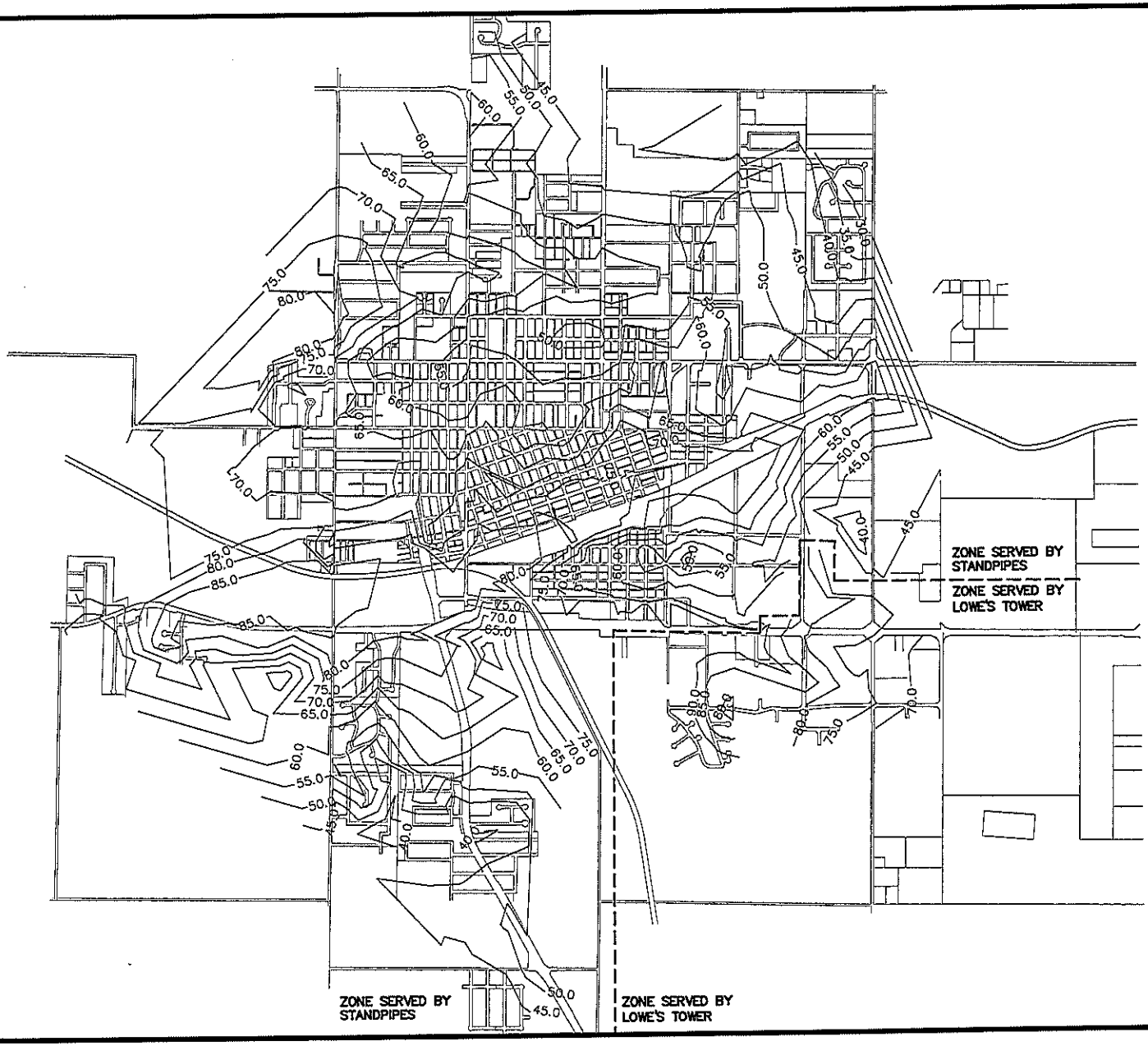


FIGURE 3
MONETT DISTRIBUTION SYSTEM
PRESSURE CONTOURS

ASSUMED CONDITIONS:
EXISTING DISTRIBUTION SYSTEM
PEAK DAY DEMANDS (3685 gpm)
NO PUMPS OPERATING
ELEVATED STORAGE TANKS FULL
STANDPIPES AT ELEV. 1494
LOWE'S TOWER AT ELEV. 1555

Well No. 16 combined with throttling of a system valve to maintain adequate pressures. An area south of the City's golf course has system pressures lower than 40 psi due to the higher ground elevation.

The distribution system was further analyzed to determine its ability to meet fire flow demands. The Watercad computer program determined available fire flows at each system node, with criteria established that the residual pressure elsewhere in the system was not allowed to drop below 20 psi. The system was analyzed under peak day demand conditions, with the five elevated storage tanks nearly full, and Wells No. 4, 5, 9, 11, 12, 13, 15, 16, 17, 18,and 20 in operation.

The model showed that the majority of Monett's distribution system can adequately provide in excess of the 1500 gpm fireflow demand normally associated with residential areas. The areas south and west of the golf course had somewhat lower fireflow capacities, generally in the 800 to 1200 gpm range, as did the Lakewood Terrace area. Several individual developments generally located on the west and northwest sides of town are served by unlooped waterlines, and fireflow capabilities as low as 500 gpm were found in isolated instances.

High value districts typically require a greater fireflow capability than residential areas. Based on National Fire Protection Association guidelines, an estimated 2800 gpm is needed in a town of Monett's size to fight fires in commercially developed areas. The evaluation indicated that demands in excess of 3000 gpm can be met in the downtown area. That portion of the commercial development in the southeast part of the City along U.S. Highway 60 served by the 12-inch diameter water main also has fireflow capabilities in excess of 3000 gpm. The remainder of the commercially developed area along U.S. Highway 60 has more limited fireflow capabilities, generally in the 1000 gpm range.

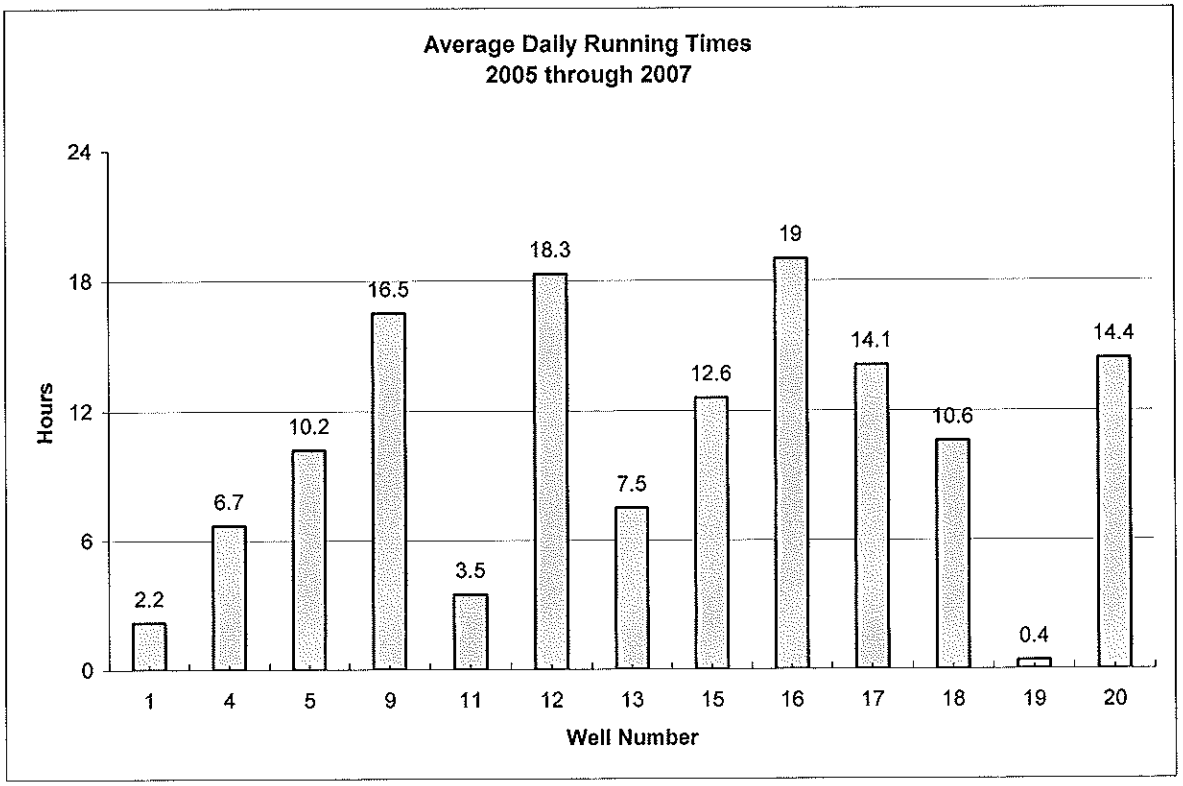
E. Water Usage and Pump Operation

As mentioned previously, Monett's wells can be operated automatically through the SCADA system, or can be manually controlled to insure that an adequate number of pumps are being operated to meet demands and/or to maintain proper levels in storage tanks. The operator monitors the level of water in the wells to insure that the pumps are properly submerged.

Because the characteristics and capabilities of each well are unique, the City attempts to operate the wells in a manner that optimizes overall water production capabilities. In doing so, the City has placed a significant reliance on the use of Wells

No. 9 and 12, which have proven themselves capable of delivering large quantities of water on a sustained basis, with minimal drawdown.

Data on the operation of the City's wells for the calendar years 2003 through 2007 has been summarized and tabulated in Appendix "A" of this report. A summary is provided of the annual hours of operation of each well, and the average daily flow pumped from each well for each year during this five-year period. Charts depicting the average daily running time and volume of water pumped for each well over this time period are shown graphically in Appendix "B". The average daily running time for the City's in-town wells for calendar years 2005 through 2007 is provided in the following chart.



The average hourly operation of the wells and the associated delivery of water to the City's system during 2007, excluding the airport, are summarized as follows:

Well Pump Operation – 2007

Well No.	Avg. Hrs. Operated/Day	Avg. Gallons Pumped/Day	% of Total Pumped
1	0.9	13,730	0.4
4	3.0	45,770	1.4
5	14.5	291,540	9.1
9	12.0	722,590	22.4
11	2.3	40,590	1.3
12	20.6	871,040	27.0
13	7.9	73,750	2.3
15	12.8	201,780	6.3
16	21.9	100,420	3.1
17	18.6	226,680	7.0
18	9.1	176,460	5.5
20	15.2	455,880	14.2
		3,220,230	100.0

Clearly the City relies heavily on Wells No. 9 and 12 to meet system demands. These two wells account for approximately 39 percent of the total usable well capacity in Monett. In 2007 they delivered 49.4 percent of the total water pumped to the system.