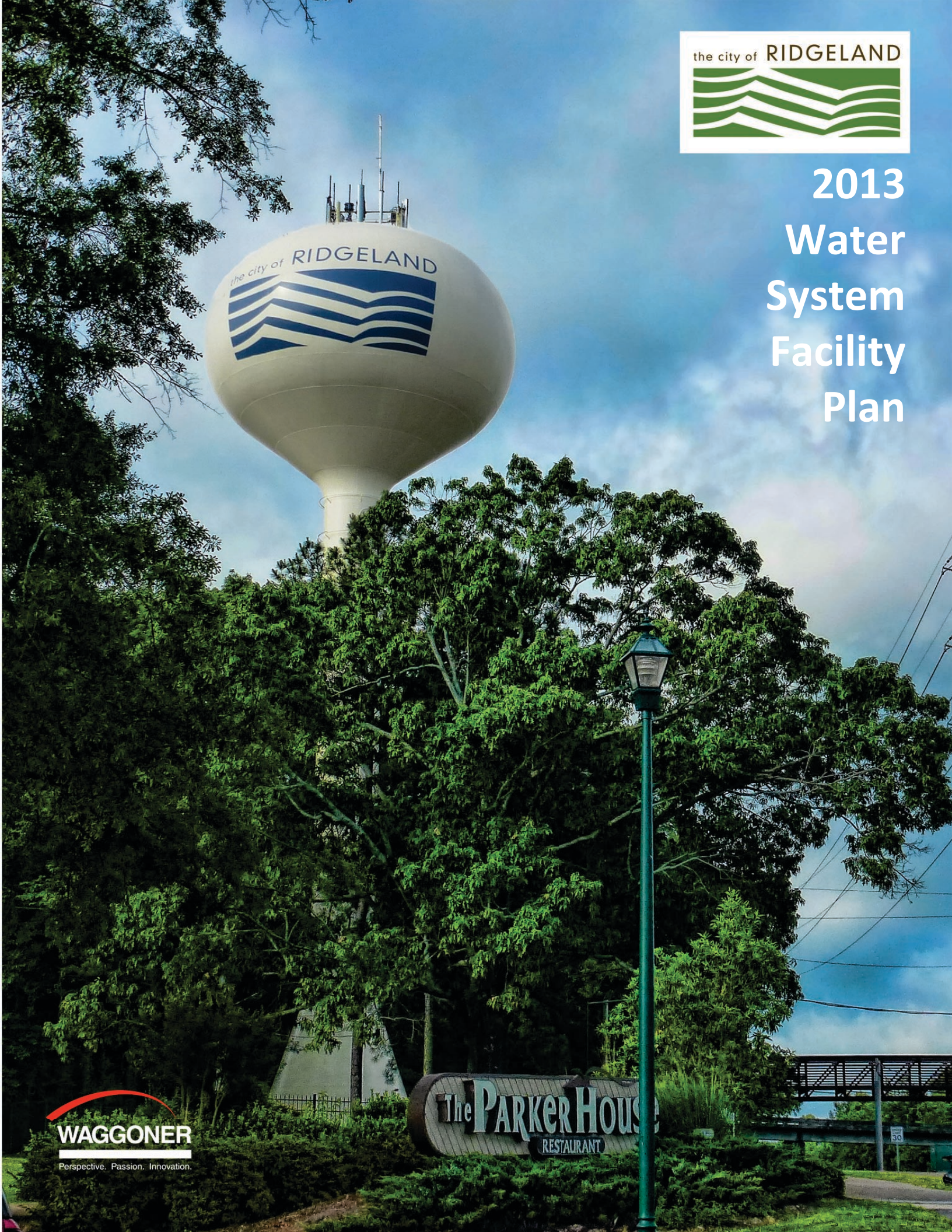

2013 Water System Facility Plan

WAGGONER

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Appendix

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1. Summary, Conclusions, and Recommendations

The City of Ridgeland owns, operates, and maintains a water distribution that serves over its population of over 24,000 through over 8,000 water connections. In recent years, the City expanded its service area by acquiring the Livingston Road Water Association system and combining it with the existing City system. In addition, the City has completed numerous upgrades including a new elevated tank, water supply well, and distribution mains replacement to better serve those citizens in the LRWA area.

Despite these and other improvements throughout the main system, the City's overall system still suffers from numerous deficiencies which affect customers on both systems. These issues include the following:

- **Insufficient back-up supply**
- **Facilities rehabilitation/replacement**

An analysis of the City's supply and storage infrastructure found deficits in both available supply and storage capacity. The details of these evaluations are included in Section 6. To remedy these deficiencies, the City proposes a multi-phase approach which is shown below.

City of Ridgeland Water System Improvements - Phase One		
Samuels Lane Water Supply Well Rehabilitation	$	705,000
West County Line Road Water Main Connection	$	978,600
Midway Road Water Supply Well	$	2,105,000
Olde Towne Water Main Improvements	$	1,528,000
Total Phase One Improvements	$	5,316,600

City of Ridgeland Water System Improvements - Phase Two		
Highland Colony Boulevard Tank and Well	$	4,268,000
Colony Park Tank and Well	$	4,268,000
Hardy Road Tank	$	2,725,000
Distribution System Improvements	$	2,612,000
Total Phase Two Improvements	$	9,605,000

2. Purpose and Need

The water distribution system of the City of Ridgeland serves an area of 20.75 square miles with a population of 24,047 and consists of over 180 miles of transmission and supply mains supplied by its eight existing water wells found in two different confined aquifers. The City stores water in four elevated water storage tanks and in one ground storage tank that functions as an elevated tank. The service area of the City includes the previously acquired Livingston Road Water Association (LRWA). The City has completed numerous improvements to the LRWA system since this acquisition in order to improve service to this area and consolidate the system with the City's system. Due to higher ground elevations, the Livingston Road system cannot be simply connected to the existing City system. This will provide inadequate pressures to these customers. Similar high ground elevations were the reason for low pressures being experienced in the northwest portion of the City. The City has established a separate, higher hydraulic gradeline to serve the current 420 connections. Despite these recent improvements, the City currently has a deficit in firm supply capacity, or the total supply capacity when the largest well is not in service. In addition, numerous distribution improvements are needed to improve service throughout the system. These required improvements to address these needs will be detailed in Development of Alternatives Sections. **These improvements are necessary for addressing the following types of needs:**

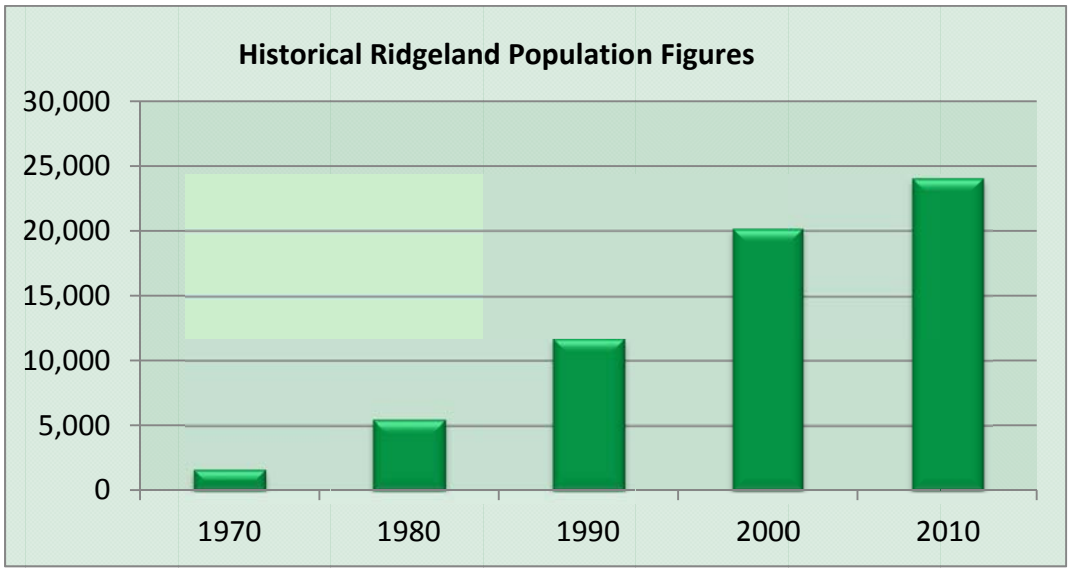
- **insufficient back-up supply**
- **facilities rehabilitation/replacement**

Copies of the most recent MSDH Capacity Assessment Form and Inspection Report can be found in the Appendix. In addition, the City completed a *Comprehensive Water System Plan* in 2004. A copy of this plan is also included in the Appendix. This Facility Plan will provide an update to the results presented in the *Comprehensive Plan*.

3. Existing Situation

General Environment

The planning area for the City's water distribution system is shown in Exhibit 3.1. This area includes the existing City boundaries, the previously acquired Livingston system, and nearby areas within one mile of the existing boundaries. Within the area shown as "Future Expansion", the City will continue to require developers to construct municipal grade distribution system components before allowing connection to the City's system, as required by the City's subdivision ordinance. The planning area is served exclusively by groundwater wells. The system is wholly owned by the City of Ridgeland. The zip codes included in this area are 39157 and 39158. Current and historical population data for the City is presented in the following table. As shown, the City has experienced tremendous growth over the last four decades.



Existing Drinking Water Facilities

As mentioned previously, the existing drinking water facilities for the City include the eight water supply wells and five storage tanks. These facilities are shown on Exhibit 3.2. In addition, these facilities are summarized on the following tables.

City of Ridgeland Well Inventory										
Location	Year Constructed	Source Aquifer	Capacity (gpm)	Screen Depth (ft.)	Casing Diameter (in.)	Static Water Level	Drawdown (ft.)	Pumping Water Level	Pump Setting Depth	Specific Capacity (gpm/ft.)
Peach Orchard	1973	Sparta	630	1,113	16	388 (2011)	35 (2011)	423 (2011)	480	18.0
Charity Church	1973	Cockfield	750	720	16	240 (2011)	32 (2011)	272 (2011)	330	23.4
Lake Harbour	1983	Cockfield	665	587	16	228 (2006)	30 (2011)	258 (2006)	330	22.2
School Street	1986	Sparta	662	1,153	16	350 (2006)	30 (2011)	380 (2006)	430	22.1
Hardy Road	1993	Sparta	1,300	1,335	18	459 (2006)	19 (2002)	478 (2006)	520	68.4
Old Canton Road	1999	Cockfield	1,350	710	16	250 (2005)	40 (2007)	290 (2005)	360	33.7
Western	2010	Sparta	1,600	1,230	16	426 (2010)	61 (2010)	487 (2010)	530	26.2
Samuels Lane	1994	Cockfield	89	695	8	297 (2011)	16 (2011)	313 (2011)	n/a	5.6
Total Supply Capacity			7,046							

City of Ridgeland Tank Inventory							
Location	Year Constructed	Capacity (gals.)	Ground Elevation (ft.)	Bottom Capacity Elevation (ft.)	Head Range (ft.)	Bowl Diameter (ft.)	Overflow Elevation (ft.)
Natchez Trace	1973	300,000	385.0	485.0	22.5	46.0	507.5
North Park	1983	500,000	355.0	476.0	31.5	56.0	507.5
Hardy Road	1992	1,000,000	476.0	476.0	30.5	75.0	507.5
Old Canton Road	1993	1,000,000	353.0	467.5	40.0	74.0	507.5
Western	2010	500,000	444.0	561.5	37.5	55.5	599.0
Total Storage Capacity		3,300,000					

As noted by MSDH calculations the City system is operating at over 91% of design capacity. **As such, all of the City's over 8,000 connections are experiencing this deficiency**. In addition, the LRWA system has an inadequate redundant water supply. The Western Well is the primary source with only the Samuels Lane Well (89 gpm) as an additional supply source. **The approximately 420 connections (LRWA+ existing City connections) on the higher hydraulic gradeline are experiencing this deficiency.** A detailed breakdown of residential, commercial, and public building demand can be found in the Appendix. Exhibits 3.3 show the water certificates in the area and Exhibit 3.4 shows the water storage tanks and zones they serve.

In order to compare the current flow demand to the original hydraulic design capacity, the most recent tests were compared to the original design capacity of the wells. The City has undertaken a successful rehabilitation and maintenance program over the lifespan of its wells as shown by the following results.

Well	Original Design Capacity	Current Capacity
Peach Orchard	495 gpm	630 gpm
Charity Church	700 gpm	750 gpm
Lake Harbour	700 gpm	665 gpm
School Street	950 gpm	662 gpm
Hardy Road	1600 gpm	1300 gpm
Old Canton Road	1300 gpm	1350 gpm
Western	1600 gpm	1600 gpm
Samuels Lane	150 gpm	89 gpm
Total	7495 gpm	7046 gpm

Current system pressures maintained in the distribution system are shown on Exhibit 3.3. The City does not operate any treatment facilities beyond chlorination and fluoridation. The system has no Major Users (MU). At this time, the City can provide service to the entire planning area, provided recommended improvements are implemented.

The City's most recent water loss reports can be found in the Appendix. Throughout this year the City has undertaken a program to calibrate and rebuild well flow meters to increase the accuracy of this reporting. The year to date loss is 12%.

4. Future Environment

If the City chose to not construct the recommended improvements to correct the system deficiencies, the No Action alternative, the following negative impacts will be felt by all users of the City's system:

- LRWA Area System Supply Improvements – Without the recommended improvements, this system **will not have an adequate redundant supply source**. The system is connected to the City system for extreme emergencies, but this connection is not capable of filling the Western Tank.

- City of Ridgeland System Supply Improvements – Without the recommended improvements, this system **cannot meet current demands** within the MSDH recommended runtime conditions. The system will not be able to meet future demands if it ran continuously, 24 hours/day, 7 days/week.

- Both systems need distribution improvements which will serve as facility rehabilitation/replacement in order to increase the hydraulic connectivity of the existing networks. By adding these additional water mains, the systems will be able to provide better service to both existing and future customers. The performance of the system with the future demands is shown in the hydraulic model in the Appendix.

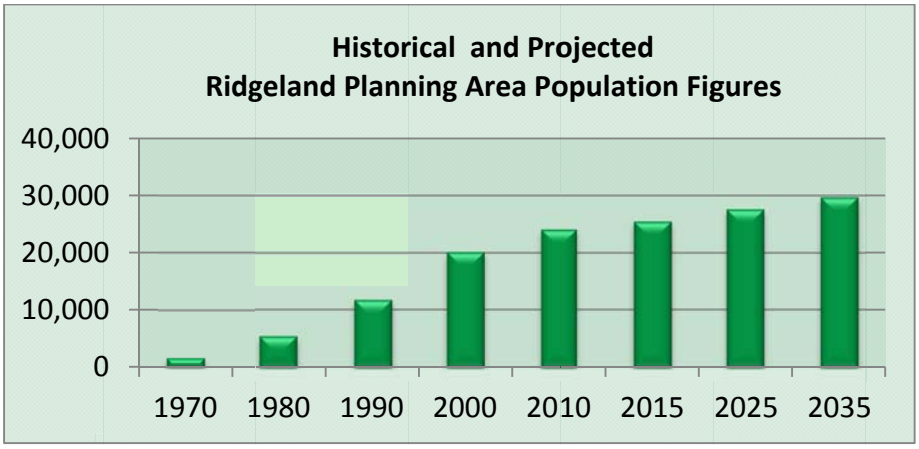
Additionally, the following table compares the environmental impact of the No Action alternative with the alternative recommending construction of the proposed improvements.

Environmental Impact	No Action Alternative	Construct Proposed LRWA and Ridgeland Water System Improvements
Surface/Groundwaters	Can eventually lead to more on-site well systems to serve individual homes	No impact on surface water. Adequate groundwater for these purposes – See Page 4-1 in Appendix A
Archeological/Historical/Cultural Resources	No Impact	No Impact
Vegetative/Wildlife	No Impact	No post-construction impact and all reasonable efforts will be made during construction to prevent disturbance.
Wetlands/Navigable Waterways	No Impact	No post-construction impact and all reasonable efforts will be made during construction to prevent disturbance.
Floodplains	No Impact	No post-construction impact and all reasonable efforts will be made during construction to prevent disturbance.
Coastal Zones	Not Applicable	Not Applicable
Wild/Scenic Rivers	Not Applicable	Not Applicable
Air Quality	No Impact	No Impact

5. Development of Water Demand

RESIDENTIAL

Population projections through 2035 are shown in the following table. These projections were completed by the Central Mississippi Planning and Development District (CMPDD) as one of its responsibilities as the Metropolitan Planning Organization (MPO). As the area MPO, CMPDD is responsible for population projections used to support area transportation projects which are partially federally funded. As shown below, the CMPDD has predicted very conservative growth rates (approximately 8% per decade) when compared to historical rates (approximately 109% per decade). This conservative growth rates are supported by recent building permits issued and new meter installations, also shown below.



City of Ridgeland Building Permit and Meter Installations			
Fiscal Year	Residential Building Permits	Commercial Building Permits	New Meter Installations
FY2007	64	55	127
FY2008	51	31	80
FY2009	10	17	97
FY2010	20	11	35
FY2011	24	12	55
FY2012	33	4	23
Totals	202	130	417

The growth predictions are divided into Traffic Analysis Zones (TAZ). Exhibit 5.1 illustrates the TAZ's and the 2035 population for each. In the hydraulic model, current water billing records were used for present day demands. The TAZ populations were converted to demands based upon current usage per connection. These are detailed in the following table and hydraulic model calculations in the Appendix.

Demand Calculation	
Current Population	24,047
MDOH Equivalent Connections	13,056
Current Peak Monthly Flow, gal	180,184,000
Current Peak Daily Demand, gal	6,006,133
Current Average Monthly Flow, gal	120,050,608
Current Average Daily Demand, gal	4,001,687
Current Peak Daily Demand, gal/connection/day	460
Current Average Daily Demand, gal/connection/day	307
2035 Population	30,000
MDOH Equivalent Connections	16,288
2035 Peak Monthly Flow, gal	224,788,373
2035 Peak Daily Demand, gal	7,492,946
2035 Average Monthly Flow, gal	149,769,019
2035 Average Daily Demand, gal	4,992,301

Commercial/Industrial/Major Users

As previously stated, the system has no "Major Users".

Design Demand

As there are no "Major Users", the design demand will be based solely on the residential demands.

6. Development of Alternatives

CONSOLIDATION

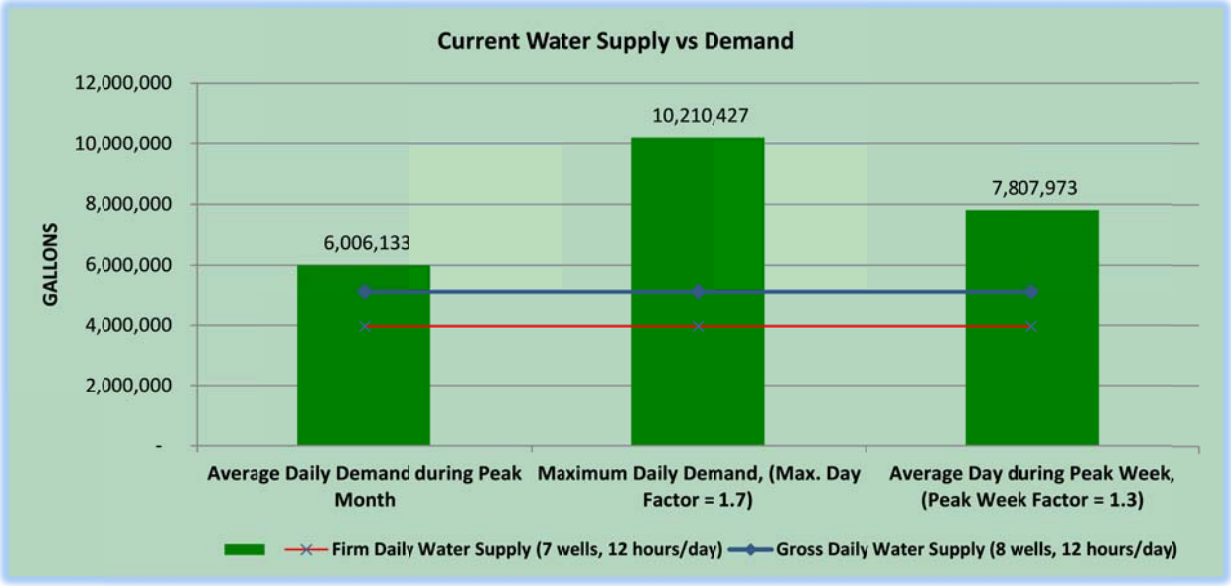
The City has already consolidated its system with the Livingston Road Water Association system. By purchasing this system and providing needed upgrades, the system is now capable of providing a much higher quality of service to the former Livingston Road customers and existing City customers located in the higher ground elevation area. There are no other systems in the area where consolidation will be a practical alternative to completing system improvements.

SUPPLY

The City system is currently composed of entirely groundwater supply wells. It will be cost-prohibitive to move entirely to a surface water supply system. Due to the existing chemical imbalances, it is not recommended to mix the two water supplies. The City should continue to invest in groundwater supply wells as its primary water source. As with all systems that use groundwater as their primary source, aquifer drawdown is a concern. USGS records regarding aquifer drawdown in the metropolitan area are included in the Appendix along with Ridgeland well specific static water level data. The City will continue to monitor these levels and make appropriate adjustments as needed.

Evaluation of the City's supply infrastructure is necessary to determine if there are existing deficiencies within the City's available supply infrastructure. Despite the success of the City's maintenance program for wells, the City's existing wells are not capable of meeting the current or future needs of the City within MSDH recommendations. The evaluation of the supply infrastructure determined that the City's wells are not capable of meeting firm supply capacity (total supply capacity when the largest well is not in service) or gross supply capacity (all wells running) within MSDH recommended well runtimes. The details of the supply evaluation are shown below.

City of Ridgeland Current Supply Evaluation	
Population	24,047
MSDH Equivalent Connections	13,056
Actual Supply Capacity	7,100
Maximum Available Monthly Supply	306,720,000
Maximum Available Daily Supply	10,224,000
Peak Monthly Flow, gals.	180,184,000
Average Daily Demand during Peak Month	6,006,133
Maximum Daily Demand, (Max. Day Factor = 1.7)	10,210,427
Average Week during Peak Month	45,046,000
Average Day during Peak Week, (Peak Week Factor = 1.3)	7,807,973
Gross Daily Water Supply (8 wells, 12 hours/day)	5,112,000
Firm Daily Water Supply *(7 wells, 12 hours/day)*	3,960,000
System Deficiency, Gross Supply Operating at Recommended Runtimes, gpm	3,541
System Deficiency, Firm Supply Operating at Recommended Runtimes, gpm	4,341



This deficiency is further highlighted by an analysis of average runtimes for each well. The results are presented in the following table. As shown there, **most wells must exceed or nearly exceed the recommended run times on a daily basis to meet the annual needs.** The exception

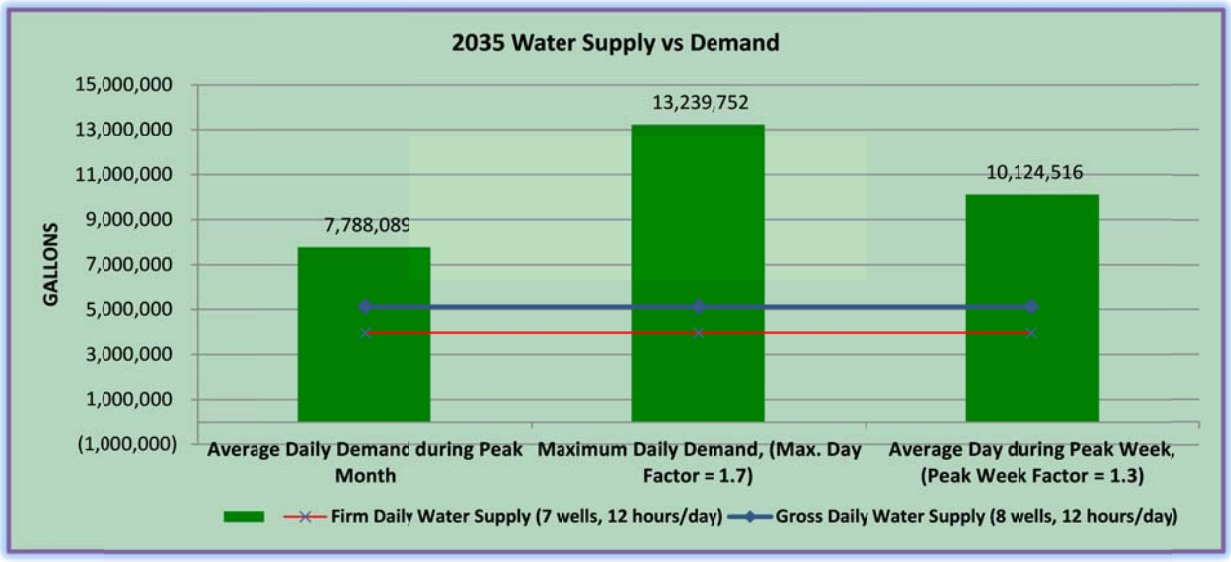
is the Hardy Road well where the City plans to install High-Service pumps in order to more fully utilize this well. Additionally, the City has recently replaced the flow meter at the Old Canton Road Well. Based on the type of meter, it is likely that the reported flows are less than actual pumped flows because of the degrading meter.

Monthly Water Pumped in (1,000 gal.)

Meter Reading Date	School Street	Peach Orchard	Lake Harbour	Charity Church	Old Canton	Hardy Road	Western	Samuels Lane	Monthly Total
10/17/2011	9,113	22,605	22,741	6,604	11,187	16,246	27,789	35	116,320
11/16/2011	1,279	23,452	23,683	5,280	9,624	14,838	28,365	59	106,580
12/15/2011	4,913	19,614	20,382	2,336	4,228	9,587	26,222	0	87282
1/17/2012	5,708	18,292	20,086	24,029	7,108	8,903	32,774	0	116,900
2/15/2012	3,966	20,010	9,534	9,691	13,473	3,909	32,986	0	93,569
3/15/2012	7,662	9,841	10,504	11,660	11,415	6,172	32,038	0	89,292
4/16/2012	15,829	11,452	12,769	8,913	15489	6,253	35,525	0	106,230
5/15/2012	18,209	12,889	11,675	13,187	17374	10,105	32,429	0	115,868
6/18/2012	27,274	19,385	21,292	13,077	21,388	10,016	39,766	0	152,198
7/16/2012	19,749	14,284	15,268	16,580	28,620	19,389	35,038	0	148,928
8/15/2012	21,375	17,534	17,223	18,948	33,248	497	36,765	0	145,590
9/17/2012	21,186	17,244	15,080	17,675	32,156	0	34,840	0	138,181
Annual Well Total	156,263	206,602	200,237	147,980	205,310	105,915	394,537	94	1,416,938
Average Run Time (hrs/day)	10.8	15.0	13.7	9.0	6.9	3.7	11.3	0.0	
Well Capacity, gpm	662	630	665	750	1,350	1,300	1,600	89	7,046
Annual Well Total Using Recommended Runtimes (7 days/wk, 12 hrs/d)	173,497	165,110	174,283	196,560	353,808	340,704	419,328	23,325	**1,846,616**

When evaluating the system's ability to meet future demands, this deficiency becomes more pronounced as shown in the following tables. The current system is unable to meet future maximum day demands if operating 24 Hours/day.

City of Ridgeland Future Supply Evaluation	
Population	30,000
MSDH Equivalent Connections	13,056
Actual Supply Capacity	7,100
Maximum Available Monthly Supply	306,720,000
Maximum Available Daily Supply	10,224,000
Peak Monthly Flow, gals.	233,642,677
Average Daily Demand during Peak Month	7,788,089
Maximum Daily Demand, (Max. Day Factor = 1.7)	13,239,752
Average Week during Peak Month	58,410,669
Average Day during Peak Week, (Peak Week Factor = 1.3)	10,124,516
Gross Daily Water Supply (8 wells, 12 hours/day)	5,112,000
Firm Daily Water Supply *(7 wells, 12 hours/day)*	3,960,000
System Deficiency, Gross Supply Operating at Recommended Runtimes, gpm	5,644
System Deficiency, Firm Supply Operating at Recommended Runtimes, gpm	6,444
Gross Daily Water Supply (8 wells, 24 hours/day)	10,224,000
Firm Daily Water Supply *(7 wells, 24 hours/day)*	7,920,000
System Deficiency, Gross Supply Operating **24 Hrs/Day**, gpm	2,094
System Deficiency, Firm Supply Operating **24 Hrs/Day**, gpm	3,694



In order to correct these supply deficiencies, the City intends to construct multiple new wells and rehabilitate existing wells, where practical. The planned improvements include construction of three new wells at a minimum of 1500 gpm each and rehabilitation of the Samuels Lane Well to 750 gpm. This will provide an additional 5250 gpm of water supply which will address the current and future deficiencies. There are no feasible alternatives other than new well construction.

TREATMENT

The existing groundwater wells in the City's system do not require treatment beyond chlorination and fluoridation. It is expected that additional wells in the area will have similar treatment requirements. However, the Hardy Road Well has a history of producing water with color and organic issues. Because of this possibility, future test wells will include sampling to determine if these issues exist. It is expected that any issues of this type can be treated with additional chlorination.

As with all groundwater, the City's system is susceptible to producing Disinfection By Products (DBP's). The City has experienced some issues with this previously. The City continues to use preventative maintenance and building policies, such as flushing and avoiding dead-end lines, to reduce the possibility of forming DBP's. The City will continue to monitor its system in the future for these issues.

STORAGE

Evaluation of the City's storage infrastructure was performed to determine if any deficiencies exist. The City's storage infrastructure consists entirely of elevated storage tanks. MSDH recommends that a system's elevated storage capacity should be equivalent to at least 50% of the average daily demand. However, MSDH "strongly encourages" systems to have elevated storage equivalent to 100% of the average daily demand. The following table details the available and recommended storage amounts.

City of Ridgeland Supply Evaluation	
Tank Location	Capacity, gal
Natchez Trace	300,000
North Park	500,000
Hardy Road	1,000,000
Old Canton Road	1,000,000
Western	500,000
Total Storage Capacity	3,300,000
Current Average Daily Demand, gals	4,001,687
Capacity as % of Current Average Day Demand	82%
Recommended Storage Amount (50% of Average Day)	2,000,843
"Encouraged" Storage Amount (100% of Average Day)	4,001,687
Current Storage Deficiency (Less than "Encouraged" Amount)	701,687
2035 Average Daily Demand, gals	5,160,370
Capacity as % of Current Average Day Demand	64%
Recommended Storage Amount (50% of Average Day)	2,580,185
"Encouraged" Storage Amount (100% of Average Day)	5,160,370
2035 Storage Deficiency (Less than "Encouraged" Amount)	1,860,370

To correct the deficiencies shown, the City intends to construct two additional elevated storage tanks, each with a capacity of 1,000,000. In addition, a third elevated storage tank will be constructed on the former LRWA system to provide a redundant storage structure. There are no feasible alternatives other than construction of new storage tanks to provide the needed capacity.

DISTRIBUTION

Evaluation of the existing distribution system, including a hydraulic model, was performed to determine the needed improvements throughout the system. Details of this model can be found in the Appendix. In order to meet demands throughout the entire system, numerous distribution system upgrades are recommended. Due to increased demands, some mains are recommended to be increased in size. In other cases, new “loops” are recommended to improve the hydraulic connectivity of the system. In addition, these “loops” reduce the potential of forming DBP’s by providing better water circulation, or reducing the “travel time” of the water between source and user. These loops will allow the system to better serve both existing and future demands. Details of the proposed improvements are included in the “Selected Plan” Section. Without these distribution improvements, the City will not be able to provide the same quality of water service to its customers throughout the planning period. Many of these improvements were originally identified in the *Comprehensive Water System*

Plan previously mentioned. There are no feasible alternatives other than construction of the distribution improvements.

7. Selected Plan

Phase One of the selected plan includes the following improvements, which are shown on Exhibit 7.1: Detailed Opinions of Probable Cost can be found in the Appendix.

- **Samuels Lane Water Supply Well Rehabilitation**- The Samuels Lane Water Supply Well Rehabilitation will increase the capacity of this well from 89 gpm to 750 gpm. This will provide a much needed back-up water supply source on the Western system, which currently has only one water supply well. As previously stated, due to the increased hydraulic gradeline of this system, the other existing City wells are not capable of serving this system. **$0.7 Million**

- **West County Line Road Water Main Connection** - The Western County Line Road Water Main Connection will provide approximately 6,400 linear feet of 12-inch water line along West County Line Road for connecting the recently constructed Western water system on Livingston Road to the City's existing 12-inch water line on Echelon Parkway. With this project, the City will eliminate the need for installing a well to serve the West County Line Road area by connecting to the newly constructed water system. This project also provides the ability to serve residences and businesses on the North side of County Line Road which is currently an unserved area. **$0.98 Million**

- **Midway Road Water Supply Well** - The Midway Road Water Supply Well will be located within the original City system and is needed to meet the demands of this area. This well is essential to mitigate the firm and gross supply capacity deficits the City is currently operating under. The Midway Well project will include installation of a 1,500 gpm water well on Midway Avenue and approximately 3,500 linear feet of 16-inch water line to connect this well to an existing 16-inch water line along School Street. **$2.1 Million**

- **Olde Towne Water Main Improvements** – The Olde Towne Water Main Improvement project will rehabilitate and/or replace 11,000 LF of existing water lines in the oldest part of Ridgeland known as Olde Towne. The original well which supplied water to the City was installed in 1965 and was located at the old concrete plant near the intersection of Moon Street and Madison Drive. The City's original water tank was located on Madison Drive near the Natchez Trace right-of-way. The water lines from the original well and tank on Madison Drive to the Olde Town

residential area along and North of Jackson Street are approximately 50 years old and need to be rehabilitated, repaired, or replaced to upgrade deteriorated water lines and assure safe and reliable operation of the water system. **$1.5 Million**

Phase Two of the selected plan includes the following improvements, which are shown on Exhibit 7.2. Many of the Phase Two projects are remaining Long Term Recommendations from the 2004 Plan mentioned previously.

- **Highland Colony Parkway Tank and Well** – The Highland Colony Boulevard Tank and Well project will include construction of a 1,500 gpm and a 1,000,000 gal elevated storage tank to partially alleviate the supply and storage deficiencies the City is currently experiencing which will only worsen as the City continues to grow. **$4.3 Million**

- **Colony Park Boulevard Tank and Well -** The Colony Park Tank and Well project, located near Ridgeland High School, will include construction of a 1,500 gpm and a 1,000,000 gal elevated storage tank. These facilities will also function to alleviate the deficiencies the City is currently experiencing. **$4.3 Million**

- **Hardy Road Tank and-** The Hardy Road Tank project, located on the site of the existing ground storage tank, will include construction of a 1,000,000 gal elevated storage tank. These facilities will also function to alleviate the deficiencies the City is currently experiencing and provide a redundant storage facility for service area. **$2.7 Million**

- **Distribution System Improvements** – The distribution system improvements includes over 30,000 LF of 12" water main. These improvements will improve hydraulic connectivity throughout the system and reduce the potential for DPB's. In addition, these improvements will allow to City to continue providing the same high level of service to its existing and future customers as growth occurs. **$2.6 Million**

Water Facilities Plan

Exhibit 3.1 - Planning Area

the city of RIDGELAND

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Legend

- Planning Area
- City of Ridgeland Service Area
- Future Expansion

Future Expansion

LAKE CASTLE RD
MADISON AVE
RICHARDSON RD
STEED RD
SUNNYBROOK RD
OLD CANTON RD
JACKSON ST E
NATCHEZ TRACE
SCHOOL ST E
PEAR ORCHARD RD
S WHEATLEY ST
LAKE HARBOUR DR
TOWNE CENTER BLVD
NORTHPARK DR
GREENS CROSSING RD
LIVINGSTON RD N
OLD AGENCY ROAD
DINSMOR XING
W COUNTY LINE RD

51
55
220

N

0 1,000 2,000 4,000 6,000 8,000 Feet

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Water Facilities Plan

Exhibit 3.2 - Existing Pipe Diameter

the city of RIDGELAND

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Future Expansion

LAKE CASTLE RD
MADISON AVE
RICHARDSON RD
STEED RD
GREENS CROSSING RD
LIVINGSTON RD N
OLD AGENCY ROAD
DINSMORE XING
SUNNYBROOK RD
JACKSON ST E
NATCHEZ TRACE
SCHOOL ST E
PEAR ORCHARD RD
S WHEATLEY ST
LAKE HARBOUR DR
TOWNE CENTER BLVD
NORTHPARK DR
OLD CANTON RD
W COUNTY LINE RD
HANGING MOSS
RIDGEWOOD RD
PEAR ORCHARD

51
55
220

Legend

- Tanks
- Wells
- Motorized Valve
- Check Valve

Pipe Diameter

- 2
- 2.5
- 3
- 4
- 6
- 8
- 10
- 12
- 14
- 16

- Planning Area
- City of Ridgeland Service Area
- Future Expansion

N

0 1,000 2,000 4,000 6,000 8,000 Feet

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Water Facilities Plan

Exhibit 3.3 - Existing System Pressures

the city of RIDGELAND

WAGGONER
Perspective. Passion. Innovation.

Future Expansion

LAKE CASTLE RD
MADISON AVE
RICHARDSON RD
STEED RD
SUNNYBROOK RD
OLD CANTON RD
GREENS CROSSING RD
LIVINGSTON RD N
OLD AGENCY ROAD
DUNSMORE RD
JACKSON ST E
NATCHEZ TRACE
SCHOOL ST E
PEAR ORCHARD RD
S WHEATLEY ST
LAKE HARBOUR DR
TOWNE CENTER BLVD
NORTHPARK DR
W COUNTY LINE RD
E COUNTY LINE RD
HANGING MOSS RD
N STATE ST
RIDGEWOOD RD

51
55
220

Legend

Pressure Contours

Pressure

- 20 - 42
- 43 - 67
- 68 - 87
- 88 - 112
- Pipe
- Planning Area
- City of Ridgeland Service Area
- Future Expansion

N

0 1,000 2,000 4,000 6,000 8,000 Feet

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Water Facilities Plan

Exhibit 3.4 - Tank Zones

the city of RIDGELAND

WAGGONER
Perspective. Passion. Innovation.

Future Expansion

LAKE CASTLE RD
MADISON AVE
RICHARDSON RD
STEED RD
SUNNYBROOK RD
OLD CANTON RD
GREENS CROSSING RD
LIVINGSTON RD N
OLD AGENCY ROAD
DINSMOR XING
JACKSON ST E
NATCHEZ TRACE
SCHOOL ST E
S WHEATLEY ST
PEAR ORCHARD RD
LAKE HARBOUR DR
TOWNE CENTER BLVD
NORTHPARK DR
W COUNTY LINE RD
HANGING MOSS
RIDGEWOOD RD

51
55
220

Legend

Tanks

- Existing Tank
- Proposed Tank
- Planning Area

Tank Zones

- High Grade
- Low Grade

N

0 1,000 2,000 4,000 6,000 8,000 Feet

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Water Facilities Plan

Exhibit 3.5 - Water Ceritificates

the city of RIDGELAND

WAGGONER
Perspective. Passion. Innovation.

Legend

- Planning Area

Water Certificates

- Bear Creek Water Assn. Inc.
- City of Madison
- City of Ridgeland
- Richmond Grove Comm. Water System, Inc.
- City of Ridgeland Service Area
- Future Expansion

Bear Creek Water Assn. Inc.
Future Expansion
City of Madison
Bear Creek Water Assn. Inc.
City of Ridgeland
City of Ridgeland
City of Ridgeland
Richmond Grove Comm. Water System, Inc.

LAKE CASTLE RD
MADISON AVE
RICHARDSON RD
STEED RD
SUNNYBROOK RD
GREENS CROSSING RD
LIVINGSTON RD N
JACKSON ST E
NATCHEZ TRACE
PEAR ORCHARD RD
S WHEATLEY ST
LAKE HARBOUR DR
TOWNE CENTER BLVD
OLD CANTON RD
NORTHPARK DR
W COUNTY LINE RD
HANGING MOSS RD
RIDGEWOOD RD

51
55
220

0 1,000 2,000 4,000 6,000 8,000 Feet

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Water Facilities Plan

Exhibit 5.1 - Traffic Analysis Projections

the city of RIDGELAND

WAGGONER
Perspective. Passion. Innovation.

Legend

Planning Area

Future Expansion

TAZ 486
2035 Pop: 1,409
2035 Total Pop: 2781

TAZ 488
2035 Pop: 1,657
2035 Total Pop: 1657

TAZ 490
2035 Pop: 117
2035 Total Pop: 117

TAZ 491
2035 Pop: 409
2035 Total Pop: 1126

TAZ 489
2035 Pop: 274
2035 Total Pop: 431

TAZ 513
2035 Pop: 171
2035 Total Pop: 254

TAZ 514
2035 Pop: 494
2035 Total Pop: 3423

TAZ 511
2035 Pop: 223
2035 Total Pop: 791

TAZ 510
2035 Pop: 1,069
2035 Total Pop: 1235

TAZ 509
2035 Pop: 793
2035 Total Pop: 901

TAZ 516
2035 Pop: 443
2035 Total Pop: 443

TAZ 512
2035 Pop: 1,183
2035 Total Pop: 2216

TAZ 527
2035 Pop: 1,436
2035 Total Pop: 1672

TAZ 526
2035 Pop: 812
2035 Total Pop: 1270

TAZ 530
2035 Pop: 1,491
2035 Total Pop: 1491

TAZ 515
2035 Pop: 2,940
2035 Total Pop: 3315

TAZ 522
2035 Pop: 0
2035 Total Pop: 3334

TAZ 523
2035 Pop: 0
2035 Total Pop: 756

TAZ 524
2035 Pop: 569
2035 Total Pop: 823

TAZ 529
2035 Pop: 2,585
2035 Total Pop: 2585

TAZ 528
2035 Pop: 846
2035 Total Pop: 846

TAZ 525
2035 Pop: 1,828
2035 Total Pop: 2310

TAZ 517
2035 Pop: 559
2035 Total Pop: 559

TAZ 520
2035 Pop: 2,510
2035 Total Pop: 4789

TAZ 539
2035 Pop: 39
2035 Total Pop: 1398

TAZ 536
2035 Pop: 474
2035 Total Pop: 474

TAZ 533
2035 Pop: 0
2035 Total Pop: 207

TAZ 531
2035 Pop: 630
2035 Total Pop: 630

TAZ 535
2035 Pop: 2,729
2035 Total Pop: 3341

TAZ 538
2035 Pop: 286
2035 Total Pop: 988

TAZ 537
2035 Pop: 870
2035 Total Pop: 915

TAZ 534
2035 Pop: 2,247
2035 Total Pop: 3274

TAZ 521
2035 Pop: 0
2035 Total Pop: 1480

TAZ 518
2035 Pop: 253
2035 Total Pop: 384

TAZ 519
2035 Pop: 118
2035 Total Pop: 1992

TAZ 540
2035 Pop: 0
2035 Total Pop: 942

TAZ 545
2035 Pop: 1,664
2035 Total Pop: 1890

TAZ 547
2035 Pop: 2,010
2035 Total Pop: 3990

TAZ 550
2035 Pop: 831
2035 Total Pop: 831

TAZ 541
2035 Pop: 627
2035 Total Pop: 962

TAZ 544
2035 Pop: 1,296
2035 Total Pop: 4192

TAZ 549
2035 Pop: 3,514
2035 Total Pop: 4884

TAZ 543
2035 Pop: 0
2035 Total Pop: 1010

TAZ 546
2035 Pop: 0
2035 Total Pop: 3203

TAZ 542
2035 Pop: 0
2035 Total Pop: 295

TAZ 548
2035 Pop: 1,680
2035 Total Pop: 3830

TAZ 496
2035 Pop: 0
2035 Total Pop: 401

TAZ 497
2035 Pop: 23
2035 Total Pop: 419

2035 Total Pop: 387

2035 Total Pop: 1660

LAKE CASTLE RD
MADISON AVE
RICHARDSON RD
STEED RD
GREENS CROSSING RD
LIVINGSTON RD N
OLD AGENCY ROAD
DINSMORE X
SUNNYBROOK RD
OLD CANTON RD
JACKSON ST E
NATCHEZ TRACE
SCHOOL ST E
PEARL ORCHARD RD
S WHEATLEY ST
LAKE HARBOUR DR
TOWNE CENTER BLVD
NORTHPARK
W COUNTY LINE RD
HANGING MOSS
EDGEWOOD RD
PEARL ORCH

51
55
220

N

0 1,000 2,000 4,000 6,000 8,000 Feet

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Water Facilities Plan

Exhibit 7.1 - Phase One Improvements

the city of RIDGELAND

WAGGONER
Perspective. Passion. Innovation.

Legend

- Phase I Wells
- Phase I Motorized Valves
- Phase I Water Lines
- Tanks
- Wells
- Motorized Valve
- Check Valve

Pipe Diameter

- 2
- 2.5
- 3
- 4
- 6
- 8
- 10
- 12
- 14
- 16

- Planning Area
- City of Ridgeland Service Area
- Future Expansion

Future Expansion

Olde Town Water System Rehab & Replacement Area

Samuels Lane Well

Midway Road Well

West County Line Rd Water Main

LAKE CASTLE RD
RICHARDSON RD
STEED RD
GREENS CROSSING RD
LIVINGSTON RD N
OLD AGENCY ROAD
DINSMOR KING
SUNNYBROOK RD
JACKSON ST E
NATCHEZ TRACE
SCHOOL ST E
PEAR ORCHARD RD
S WHEATLEY ST
LAKE HARBOUR DR
TOWNE CENTER BLVD
NORTHPARK DR
OLD CANTON RD
W COUNTY LINE RD
HANGING MOSS RD
RIDGEWOOD RD

51
55
220

0 1,000 2,000 4,000 6,000 8,000 Feet

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Water Facilities Plan

Exhibit 7.2 - Phase Two Improvements

the city of RIDGELAND

WAGGONER
Perspective. Passion. Innovation.

Legend

- Phase II Tanks and Well
- Phase II Tanks
- Phase II Water Lines
- Tank
- Motorized Valve
- Wells
- Check Valve

Pipe Diameter

- 2
- 2.5
- 3
- 4
- 6
- 8
- 10
- 12
- 14
- 16

- Planning Area
- City of Ridgeland Service Area
- Future Expansion

Hardy Road Tank

Future Expansion

Colony Park Tank & Well

Highland Colony Tank & Well

LAKE CASTLE RD

RICHARDSON RD

STEED RD

GREENS CROSSING RD

LIVINGSTON RD N

OLD AGENCY ROAD

DUNSMORE LN

SUNNYBROOK RD

JACKSON ST E

NATCHEZ TRACE

SCHOOL ST E

PEAR ORCHARD RD

S WHEATLEY ST

LAKE HARBOUR DR

TOWNE CENTER BLVD

NORTHPARK DR

OLD CANTON RD

W COUNTY LINE RD

HANGING MOSS RD

RIDGEWOOD RD

51

55

220

N

0 1,000 2,000 4,000 6,000 8,000 Feet

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WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

WEST COUNTY LINE ROAD 12" WATER LINE IMPROVEMENTS

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization	LS	1	80,000	80,000
2	Maintenance of Traffic	LS	1	20,000	20,000
3	Erosion Control (Temporary Silt Fence and Erosion Checks)	LS	1	80,000	80,000
4	Seeding, Sodding, Fertilizing, and Mulching	AC	3	1,500	4,500
5	Clearing and Grubbing	AC	3	5,000	15,000
6	Select Bedding	CY	1,000	20	20,000
7	Select Backfill	CY	1,000	12	12,000
8	12" C900 PVC Water Main	LF	6,400	24	153,600
9	6" C900 PVC Fire Hydrant Legs	LF	400	15	6,000
10	24" Steel Casing , Bored	LF	100	160	16,000
11	12" Water Main Stream Crossing	LF	150	215	32,250
12	12" Water Main Unencased Bore	LF	100	85	8,500
13	3/4" Service Line Unencased Bore	LF	50	14	700
14	12" Gate Valve and Box	EA	4	1,800	7,200
15	Connection to Existing Water Main	EA	2	1,500	3,000
16	3-Way Fire Hydrant Assembly w/ 6" Valve, 3'-0" Bury	EA	13	2,500	32,500
17	3/4" HDPE Service Line	LF	100	6	600
18	3/4" Service Assembly Reconnection	EA	5	400	2,000
19	Ductile Iron Fittings	LB	5,000	5	25,000
20	Gate Valve Actuator Assembly w/ Electrical Controls and Power Supply	EA	1	40,000	40,000
	Subtotal				***558,850***
	Contingencies @ 15%				91,150
	Subtotal Opinion of Probable Construction Cost				**$650,000**
	DEVELOPMENT				
	Facilities Planning and Design				59,000
	Design Survey				25,600
	ROW and Easement Documents				39,000
	Property Acquisition				150,000
	Construction Phase Services				55,000
	Subtotal Opinion of Probable Development Cost				**328,600**

TOTAL OPINION OF PROBABLE PROJECT COST $978,600

WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

SAMUELS LANE WATER WELL

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization	LS	1	20,000	20,000
2	Removal of Existing Structures and Yard Piping	LS	1	5,000	5,000
3	Capping and Abandoning Water Well	EA	1	2,000	2,000
4	Erosion Control	LS	1	2,500	2,500
5	Test Well, 1,400-feet deep, Complete with Water Sampling and Testing	LS	1	10,000	10,000
6	750 GPM Potable Water Supply Well, 1,400 ft deep complete with TV Inspection Discharge piping and Accessories	LS	1	475,000	475,000
7	Relocation of Chemical Feed Equipment, Including fiberglass building and new concrete slab	LS	1	5,000	5,000
8	Relocation of electrical and SCADA control System, Including fiberglass building and new concrete slab	LS	1	10,000	10,000
9	relocation of emergency generator, Including new concrete slab	LS	1	5,000	5,000
	Subtotal				***534,500***
	Contingencies @ 15%				80,500
	Subtotal Opinion of Probable Construction Cost				**$615,000**
	DEVELOPMENT				
	Facilities Planning and Design				48,000
	Construction Phase Services				42,000
	Subtotal Opinion of Probable Development Cost				**$90,000**

TOTAL OPINION OF PROBABLE PROJECT COST $705,000

WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

MIDWAY ROAD WATER WELL

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization	LS	1	65,000	65,000
2	Clearing and Grubbing	LS	1	5,000	5,000
3	Borrow Excavation	CY	500	20	10,000
4	Crushed Limestone	CY	200	35	7,000
5	Chain Link Fence	LF	75	25	1,875
6	Ornamental Fence and Gate	LS	1	3,000	3,000
7	18" Reinforced Concrete Culvert	LF	25	50	1,250
8	18" Flared End Sections	EA	2	700	1,400
9	Test Well, 1,400-feet deep, Complete with Water Sampling and Testing	LS	1	20,000	20,000
10	1,500 GPM Potable Water Supply Well, 1,200 ft deep complete with TV Inspection Discharge piping and Accessories	LS	1	900,000	900,000
11	Water Sampling and Testing	LS	1	5,000	5,000
12	Well Building and Chemical Feed Equipment	LS	1	100,000	100,000
13	Electrical and Controls	LS	1	100,000	100,000
14	16" C900 PVC Water Main	LF	3,540	60	212,400
15	16" Gate Valve and Box	EA	2	3,500	7,000
16	HDPE Directional Bore Under Creek	LF	160	150	24,000
17	Connection to Existing System	EA	1	2,500	2,500
18	Fire hydrants	EA	8	2,500	20,000
19	SCADA System	LS	1	20,000	20,000
20	Emergency Generator	LS	1	70,000	70,000
	Subtotal				***1,575,425***
	Contingencies @ 15%				236,575
	Subtotal Opinion of Probable Construction Cost				**$1,812,000**
	DEVELOPMENT				
	Facilities Planning and Design				120,000
	Design Survey				25,000
	ROW and Easement Documents				9,000
	Property Acquisition				49,000.00
	Construction Phase Services				90,000
	Subtotal Opinion of Probable Development Cost				**293,000**

TOTAL OPINION OF PROBABLE PROJECT COST $2,105,000

WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

HIGHLAND COLONY BOULEVARD WATER WELL

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization	LS	1	40,000	40,000
2	Erosion Control	LS	1	5,000	5,000
3	Test Well, 1,400-feet deep, Complete with Water Sampling and Testing	LS	1	20,000	20,000
4	1,500 GPM Potable Water Supply Well, 1,200 ft deep complete with TV Inspection Discharge piping and Accessories	LS	1	900,000	900,000
5	Chemical Feed Equipment and Building	LS	1	85,000	85,000
6	Electrical and SCADA control System	LS	1	60,000	60,000
7	Emergency Generator	LS	1	70,000	70,000
	Subtotal				***1,180,000***
	Contingencies @ 15%				175,000
	Subtotal Opinion of Probable Construction Cost				**$1,355,000**
	DEVELOPMENT				
	Facilities Planning and Design				80,000
	Design Survey				5,000
	ROW and Easement Documents				3,000
	Property Acquisition				40,000
	Construction Phase Services				60,000
	Subtotal Opinion of Probable Development Cost				**188,000**

TOTAL OPINION OF PROBABLE PROJECT COST $1,543,000

WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

COLONY PARK BOULEVARD WATER WELL

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization	LS	1	40,000	40,000
2	Erosion Control	LS	1	5,000	5,000
3	Test Well, 1,400-feet deep, Complete with Water Sampling and Testing	LS	1	20,000	20,000
4	1,500 GPM Potable Water Supply Well, 1,200 ft deep complete with TV Inspection Discharge piping and Accessories	LS	1	900,000	900,000
5	Chemical Feed Equipment and Building	LS	1	85,000	85,000
6	Electrical and SCADA control System	LS	1	60,000	60,000
7	Emergency Generator	LS	1	70,000	70,000
	Subtotal				***1,180,000***
	Contingencies @ 15%				175,000
	Subtotal Opinion of Probable Construction Cost				**$1,355,000**
	DEVELOPMENT				
	Facilities Planning and Design				80,000
	Design Survey				5,000
	ROW and Easement Documents				3,000
	Property Acquisition				40,000
	Construction Phase Services				60,000
	Subtotal Opinion of Probable Development Cost				**188,000**

TOTAL OPINION OF PROBABLE PROJECT COST $1,543,000

WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

COLONY PARK BOULEVARD ELEVATED TANK

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization-Demobilization	LS	1	100,000	100,000
2	12" C900 PVC Water Main	LF	500	24	12,000
3	12" Gate Valve and Box	EA	2	2,200	4,400
4	Ductile Iron Fittings	LB	750	5	3,750
5	1,000,000 Gallon Elevated Tank	LS	1	2,000,000	2,000,000
6	Electrical and SCADA control System	LS	1	50,000	50,000
	Subtotal				***2,170,150***
	Contingencies @ 15%				329,850
	Subtotal Opinion of Probable Construction Cost				**$2,500,000**
	DEVELOPMENT				
	Facilities Planning and Design				120,000
	Design Survey				5,000
	Property Acquisition (Included in Well Project)				
	Construction Phase Services				100,000
	Subtotal Opinion of Probable Development Cost				**225,000**

TOTAL OPINION OF PROBABLE PROJECT COST $2,725,000

WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

HIGHLAND COLONY BOULEVARD ELEVATED TANK

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization-Demobilization	LS	1	100,000	100,000
2	12" C900 PVC Water Main	LF	500	24	12,000
3	12" Gate Valve and Box	EA	2	2,200	4,400
4	Ductile Iron Fittings	LB	750	5	3,750
5	1,000,000 Gallon Elevated Tank	LS	1	2,000,000	2,000,000
6	Electrical and SCADA control System	LS	1	50,000	50,000
	Subtotal				***2,170,150***
	Contingencies @ 15%				329,850
	Subtotal Opinion of Probable Construction Cost				**$2,500,000**
	DEVELOPMENT				
	Facilities Planning and Design				120,000
	Design Survey				5,000
	Property Acquisition (Included in Well Project)				
	Construction Phase Services				100,000
	Subtotal Opinion of Probable Development Cost				**225,000**

TOTAL OPINION OF PROBABLE PROJECT COST $2,725,000

WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

OLDE TOWNE 12" WATER LINE IMPROVEMENTS

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization	LS	1	60,000	60,000
2	Maintenance of Traffic	LS	1	30,000	30,000
3	Erosion Control (Temporary Silt Fence and Erosion Checks)	LS	1	50,000	50,000
4	Seeding, Sodding, Fertilizing, and Mulching	AC	10	1,500	15,000
5	Clearing and Grubbing	AC	10	5,000	50,000
6	Select Bedding	CY	1,000	20	20,000
7	Select Backfill	CY	1,000	12	12,000
8	12" C900 PVC Water Main	LF	11,200	24	268,800
9	6" C900 PVC Fire Hydrant Legs	LF	800	15	12,000
10	24" Steel Casing , Bored	LF	1,000	160	160,000
11	12" Water Main Unencased Bore	LF	600	85	51,000
12	3/4" Service Line Unencased Bore	LF	100	14	1,400
13	12" Gate Valve and Box	EA	8	1,800	14,400
14	Connection to Existing Water Main	EA	4	1,500	6,000
15	3-Way Fire Hydrant Assembly w/ 6" Valve, 3'-0" Bury	EA	26	2,500	65,000
16	3/4" HDPE Service Line	LF	200	6	1,200
17	3/4" Service Assembly Reconnection	EA	10	400	4,000
18	Ductile Iron Fittings	LB	11,000	5	55,000
19	Asphalt Repair	TN	1,540	100	154,000
	Subtotal				***1,029,800***
	Contingencies @ 15%				157,200
	Subtotal Opinion of Probable Construction Cost				**$1,187,000**
	DEVELOPMENT				
	Facilities Planning and Design				90,000
	Design Survey				67,400
	ROW and Easement Documents				36,000
	Property Acquisition				77,600
	Construction Phase Services				70,000
	Subtotal Opinion of Probable Development Cost				**341,000**

TOTAL OPINION OF PROBABLE PROJECT COST $1,528,000

WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

MISCELLANEOUS 12" WATER LINE IMPROVEMENTS

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization	LS	1	100,000	100,000
2	Maintenance of Traffic	LS	1	30,000	30,000
3	Erosion Control (Temporary Silt Fence and Erosion Checks)	LS	1	100,000	100,000
4	Seeding, Sodding, Fertilizing, and Mulching	AC	15	1,500	22,500
5	Clearing and Grubbing	AC	15	5,000	75,000
6	Select Bedding	CY	3,000	20	60,000
7	Select Backfill	CY	3,000	12	36,000
8	12" C900 PVC Water Main	LF	30,000	24	720,000
9	6" C900 PVC Fire Hydrant Legs	LF	2,000	15	30,000
10	24" Steel Casing , Bored	LF	800	160	128,000
11	12" Water Main Unencased Bore	LF	500	85	42,500
12	3/4" Service Line Unencased Bore	LF	300	14	4,200
13	12" Gate Valve and Box	EA	20	1,800	36,000
14	Connection to Existing Water Main	EA	14	1,500	21,000
15	3-Way Fire Hydrant Assembly w/ 6" Valve, 3'-0" Bury	EA	55	2,500	137,500
16	3/4" HDPE Service Line	LF	500	6	3,000
17	3/4" Service Assembly Reconnection	EA	25	400	10,000
18	Ductile Iron Fittings	LB	25,000	5	125,000
19	Asphalt Repair	TN	4,125	100	412,500
	Subtotal				***1,680,700***
	Contingencies @ 15%				254,300
	Subtotal Opinion of Probable Construction Cost				**$1,935,000**
	DEVELOPMENT				
	Facilities Planning and Design				130,000
	Design Survey				150,000
	ROW and Easement Documents				90,000
	Property Acquisition				207,000
	Construction Phase Services				100,000
	Subtotal Opinion of Probable Development Cost				**677,000**

TOTAL OPINION OF PROBABLE PROJECT COST $2,612,000

WAGGONER ENGINEERING

PRELIMINARY OPINION OF PROBABLE COST

CITY OF RIDGELAND, MISSISSIPPI

WATER FACILITIES PLAN

WEI No. W011072.000

MAY 2013

HARDY ROAD ELEVATED TANK

ITEM NO	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	CONSTRUCTION				
1	Mobilization-Demobilization	LS	1	100,000	100,000
2	12" C900 PVC Water Main	LF	500	24	12,000
3	12" Gate Valve and Box	EA	2	2,200	4,400
4	Ductile Iron Fittings	LB	750	5	3,750
5	1,000,000 Gallon Elevated Tank	LS	1	2,000,000	2,000,000
6	Electrical and SCADA control System	LS	1	50,000	50,000
	Subtotal				***2,170,150***
	Contingencies @ 15%				329,850
	Subtotal Opinion of Probable Construction Cost				**$2,500,000**
	DEVELOPMENT				
	Facilities Planning and Design				120,000
	Design Survey				5,000
	Property Acquisition (NA)				
	Construction Phase Services				100,000
	Subtotal Opinion of Probable Development Cost				**225,000**

TOTAL OPINION OF PROBABLE PROJECT COST $2,725,000

RECORD OF TEST

LAYNE CHRISTENSEN COMPANY
PO BOX 10206, JACKSON, MS 39289

WELL NO. **MSDH03** PUMP NO. **LAYNE HEAD** DATE **9/8/11**

FOR **CITY OF RIDGELAND**

CITY **RIDGELAND** STATE **MS**

LOCATION **CHARITY CHURCH ROAD OFF LAKE HARBOR**

RUNNING PRESSURE **80** POUNDS GUARANTEED _____ AT _____ FEET/POUNDS

LENGTH OF AIR LINE **330** FEET STATIC LEVEL **240** FEET

TIME	PUMP RPM	PUMP PRESSURE LBS. - FT.	AIR LINE GAGE LBS. - FT.	DRAWDOWN	INCHES ON 6"X5" WEIR OR ORIFICE	FLOW METER GPM	AMPS A	AMPS B	AMPS C	YIELD
A.M. P.M.	○	○	90	○	○	○				
A.M. P.M.		80	58	32.00		750	131	130	126	
A.M. P.M.		90	60	30.00		700				
A.M. P.M.		100	61	29.00		650				
A.M. P.M.		110	63	27.00		600				
A.M. P.M.		120	65	25.00		560				
A.M. P.M.		130	68	22.00		490				
A.M. P.M.		140	70	20.00		425				
A.M. P.M.		150	75	15.00		350				
A.M. P.M.		160	80	10.00		275				
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										

_____ **JOSEPH SAVORGNAN**

REPRESENTATIVE FOR OWNER

REPRESENTATIVE FOR LAYNE CHRISTENSEN COMPANY

LAYNE CHRISTENSEN COMPANY
PO BOX 10206
JACKSON, MS 39289

WELL MAINTENANCE CHECK LIST - SERVICE CREW

NAME OF SYSTEM: CITY OF RIDGELAND DATE: 9/8/11

LOCATION OF WELL: CHARITY CHURCH ROAD OFF LAKE HARBOR

WELL NO: MSDH03 PUMP NO: LAYNE HEAD

ORIGINAL CAPACITY: 635 GPM AT: 60 POUNDS PRESSURE

STATIC WATER LEVEL: 240 FEET OPERATING PRESSURE: 80 POUNDS

CAPACITY AT OPERATING PRESSURE: 750 GPM

PUMPING LEVEL AT OPERATING PRESSURE: 272 FEET

FLOW METER READING: 750 GPM AT 80 PSI

PUMPS INTO: SYSTEM

TESTING EQUIPMENT REQUIRED: 6" GATE; 6" X 5" ORIFICE; 100' HOSE

AMPS: 140 AMPS AT OPEN VALVE:

ANY SAND? NO ANY VIBRATION? SLIGHT IN GEAR DRIVE

COMMENTS ON STARTER PANEL, AUTOMATIC CONTROLS, AND VOLTAGE: 125 HP / 460 VOLTS / 140 AMPS

COMMENTS ON CHLORINATOR: GOOD

COMMENTS ON VALVES AND FITTINGS: GOOD

CLEAN AND INSPECT OILER AND REPACK OR ADJUST PACKING: YES; OIL LUBE

CHANGE OIL IN MOTOR: YES

CLEAN UP HEAD AND MOTOR: GOOD

PAINT HEAD AND MOTOR: GOOD

REMARKS ON WHOLE INSTALLATION: GOOD

RECORD OF TEST

LAYNE CHRISTENSEN COMPANY
PO BOX 10206, JACKSON, MS 39289

WELL NO. **MSDH06** PUMP NO. **115515** DATE **09/08/2011**

FOR **CITY OF RIDGELAND**

CITY **RIDGELAND** STATE **MS**

LOCATION **HARDY ROAD AT STORAGE TANK**

RUNNING PRESSURE **10** POUNDS GUARANTEED _____ AT _____ FEET/POUNDS

LENGTH OF AIR LINE **(BROKEN)** FEET STATIC LEVEL **(UNABLE TO OBTAIN)** FEET

TIME	PUMP RPM	PUMP PRESSURE LBS. - FT.	AIR LINE GAGE LBS. - FT.	DRAWDOWN	INCHES ON WEIR OR ORIFICE	FLOW METER GPM	AMPS A	AMPS B	AMPS C	YIELD
A.M. P.M.	○	○		○	○	○				
A.M. P.M.		10				1300	254	252	250	
A.M. P.M.		20				1200				
A.M. P.M.		30				1000				
A.M. P.M.		40				800				
A.M. P.M.		45								
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										

REPRESENTATIVE FOR OWNER

JOSEPH SAVORGNAN
REPRESENTATIVE FOR LAYNE CHRISTENSEN COMPANY

LAYNE CHRISTENSEN COMPANY
PO BOX 10206
JACKSON, MS 39289

WELL MAINTENANCE CHECK LIST - SERVICE CREW

NAME OF SYSTEM: CITY OF RIDGELAND DATE: 09/08/2011

LOCATION OF WELL: HARDY ROAD AT STORAGE TANK

WELL NO: MSDH06 PUMP NO: 115511

ORIGINAL CAPACITY: 1713 GPM AT: 10 POUNDS PRESSURE

STATIC WATER LEVEL: (UNABLE TO OBTAIN) FEET OPERATING PRESSURE: 10 POUNDS

CAPACITY AT OPERATING PRESSURE: 1300 GPM

PUMPING LEVEL AT OPERATING PRESSURE: (UNKNOWN) FEET

FLOW METER READING: 1300 GPM AT 10 PSI

PUMPS INTO: ABOVE GROUND STORAGE TANK

TESTING EQUIPMENT REQUIRED: FLOW METER

AMPS: 289 AMPS AT OPEN VALVE:

.NY SAND? NO ANY VIBRATION? NO

COMMENTS ON STARTER PANEL, AUTOMATIC CONTROLS, AND VOLTAGE: 250 HP / 460 VOLTS / 289 AMPS

COMMENTS ON CHLORINATOR: GOOD

COMMENTS ON VALVES AND FITTINGS: GOOD

CLEAN AND INSPECT OILER AND REPACK OR ADJUST PACKING: YES; OIL LUBE

CHANGE OIL IN MOTOR: YES

CLEAN UP HEAD AND MOTOR: GOOD

PAINT HEAD AND MOTOR: GOOD

REMARKS ON WHOLE INSTALLATION: GOOD

RECORD OF TEST

LAYNE CHRISTENSEN COMPANY
PO BOX 10206, JACKSON, MS 39289

WELL NO. **MSDH04** PUMP NO. **101990** DATE **9/7/2011**

FOR **CITY OF RIDGELAND**

CITY **RIDGELAND** STATE **MS**

LOCATION **LAKE HARBOR DRIVE AT FRIENDSHIP PARK**

RUNNING PRESSURE **80** POUNDS GUARANTEED _____ AT _____ FEET/POUNDS

LENGTH OF AIR LINE **(UNKNOWN)** FEET STATIC LEVEL **UNABLE TO GET** FEET

TIME	PUMP RPM	PUMP PRESSURE LBS. - FT.	AIR LINE GAGE LBS. - FT.	DRAWDOWN	INCHES ON 8" X 6" WEIR OR ORIFICE	FLOW METER GPM	AMPS A	AMPS B	AMPS C	YIELD
A.M. P.M.	○	○	95	○	○	○				
A.M. P.M.		80	65	30.00		665	109	115	115	
A.M. P.M.		90	66	29.00		625				
A.M. P.M.		100	67	28.00		595				
A.M. P.M.		110	69	26.00		515				
A.M. P.M.		120	72	23.00		450				
A.M. P.M.		130	74	21.00		400				
A.M. P.M.		140	77	18.00		360	90	96	95	
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										

REPRESENTATIVE FOR OWNER

JOSEPH SAVORGNAN
REPRESENTATIVE FOR LAYNE CHRISTENSEN COMPANY

LAYNE CHRISTENSEN COMPANY
PO BOX 10206
JACKSON, MS 39289

WELL MAINTENANCE CHECK LIST - SERVICE CREW

NAME OF SYSTEM: CITY OF RIDGELAND DATE: 9/7/11

LOCATION OF WELL: LAKE HARBOR DRIVE AT FRIENDSHIP PARK

WELL NO: MSDH04 PUMP NO: 101990

ORIGINAL CAPACITY: 1073 GPM AT: 70 POUNDS PRESSURE

STATIC WATER LEVEL: (UNABLE TO OBTAIN) FEET OPERATING PRESSURE: 80 POUNDS

CAPACITY AT OPERATING PRESSURE: 665 GPM

PUMPING LEVEL AT OPERATING PRESSURE: UNABLE FEET

FLOW METER READING: 665 GPM AT 80 PSI

PUMPS INTO: SYSTEM

TESTING EQUIPMENT REQUIRED: (FLOWMETER) 8" Gate 8x6 Orifice

AMPS: 117 AMPS AT OPEN VALVE: NO

ANY SAND? NO ANY VIBRATION? NO

COMMENTS ON STARTER PANEL, AUTOMATIC CONTROLS, AND VOLTAGE: 100 HP / 460 VOLTS / 117 AMPS

COMMENTS ON CHLORINATOR: GOOD

COMMENTS ON VALVES AND FITTINGS: GOOD

CLEAN AND INSPECT OILER AND REPACK OR ADJUST PACKING: YES; OIL LUBE

CHANGE OIL IN MOTOR: YES

CLEAN UP HEAD AND MOTOR: YES

PAINT HEAD AND MOTOR: GOOD

REMARKS ON WHOLE INSTALLATION: GOOD

RECORD OF TEST

LAYNE CHRISTENSEN COMPANY
PO BOX 10206, JACKSON, MS 39289

WELL NO. **OLD CANTON** PUMP NO. **LAYNE HEAD** DATE **09/07/2011**

FOR **CITY OF RIDGELAND**

CITY **RIDGELAND** STATE **MS**

LOCATION **OLD CANTON ROAD AT ELEVATED TANK**

RUNNING PRESSURE **65** POUNDS GUARANTEED _____ AT _____ FEET/POUNDS

LENGTH OF AIR LINE **360** FEET STATIC LEVEL **(UNABLE TO OBTAIN)** FEET

TIME	PUMP RPM	PUMP PRESSURE LBS. - FT.	AIR LINE GAGE LBS. - FT.	DRAWDOWN	INCHES ON WEIR OR ORIFICE	FLOW METER GPM	AMPS A	AMPS B	AMPS C	YIELD
A.M. P.M.	○	○	BROKEN	○	○	○				
A.M. P.M.		65				1350	296	288	300	
A.M. P.M.		70				1300				
A.M. P.M.		80				1250				
A.M. P.M.		90				1240				
A.M. P.M.		100				1210				
A.M. P.M.		110				1200				
A.M. P.M.		120				1150				
A.M. P.M.										
A.M. P.M.										
A.M. P.M.			WELL IS IN BYPASS. VFD IS DOWN 60 HTZ							
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										

REPRESENTATIVE FOR OWNER

JOSEPH SAVORGNAN
REPRESENTATIVE FOR LAYNE CHRISTENSEN COMPANY

LAYNE CHRISTENSEN COMPANY
PO BOX 10206
JACKSON, MS 39289

WELL MAINTENANCE CHECK LIST - SERVICE CREW

NAME OF SYSTEM: CITY OF RIDGELAND DATE: 09/07/2011

LOCATION OF WELL: OLD CANTON ROAD AT ELEVATED TANK

WELL NO: OLD CANTON PUMP NO: LAYNE HEAD

ORIGINAL CAPACITY: ---- GPM AT: ----- POUNDS PRESSURE

STATIC WATER LEVEL: (UNABLE TO OBTAIN) FEET OPERATING PRESSURE: ---- POUNDS

CAPACITY AT OPERATING PRESSURE: 1350 GPM

PUMPING LEVEL AT OPERATING PRESSURE: (UNABLE) FEET

FLOW METER READING: 1350 GPM AT 65 PSI

PUMPS INTO: ELEVATED TANK

TESTING EQUIPMENT REQUIRED: FLOW METER

AMPS: 291 AMPS AT OPEN VALVE:

ANY SAND? NO ANY VIBRATION? NO

COMMENTS ON STARTER PANEL, AUTOMATIC CONTROLS, AND VOLTAGE: 250 HP / 480 VOLTS / 291 AMPS

COMMENTS ON CHLORINATOR: GOOD

COMMENTS ON VALVES AND FITTINGS: GOOD

CLEAN AND INSPECT OILER AND REPACK OR ADJUST PACKING: YES; OIL LUBE

CHANGE OIL IN MOTOR: YES

CLEAN UP HEAD AND MOTOR: GOOD

PAINT HEAD AND MOTOR: GOOD

REMARKS ON WHOLE INSTALLATION: WELL IS RUN AT 60 HTZ

RECORD OF TEST

LAYNE CHRISTENSEN COMPANY
PO BOX 10206
JACKSON, MS 39289

WELL NO. **PEACH ORCHARD** PUMP NO. **ME-576909** DATE **9/7/11**

FOR **CITY OF RIDGELAND**

CITY **RIDGELAND** STATE **MS**

LOCATION **AT EMERGENCY AIR HORN ON PEACH ORCHARD ROAD**

RUNNING PRESSURE **60** Pounds GUARANTEED GPM _____ AT _____ FEET/POUNDS

LENGTH OF AIR LINE **503** Feet STATIC LEVEL **388** FEET

TIME	PUMP RPM	PUMP PRESSURE LBS. - FT.	AIR LINE GAGE LBS. - FT.	DRAWDOWN	INCHES ON 6" X 5" WEIR OR ORIFICE	FLOW METER GPM	AMPS A	AMPS B	AMPS C	YIELD
A.M. P.M.	○	○	115	○	○	○				
A.M. P.M.	CLOSED VALVE									
A.M. P.M.					5"					
A.M. P.M.		60	80	35.00		630	155	154	154	
A.M. P.M.		70	82	33.00		610				
A.M. P.M.		80	84	31.00		590				
A.M. P.M.		90	85	30.00		560				
A.M. P.M.		100	86	29.00		530				
A.M. P.M.		110	87	28.00		510				
A.M. P.M.		120	88	27.00		480				
A.M. P.M.		130	89	26.00		445				
A.M. P.M.		140	90	25.00		430				
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										

REPRESENTATIVE FOR OWNER

JOSEPH SAVORGNAN

REPRESENTATIVE FOR LAYNE-CENTRAL

LAYNE CHRISTENSEN COMPANY
PO BOX 10206
JACKSON, MS 39289

WELL MAINTENANCE CHECK LIST - SERVICE CREW

NAME OF SYSTEM: CITY OF RIDGELAND DATE: 9/7/11

LOCATION OF WELL: PEACH ORCHARD ROAD

WELL NO: PEACH ORCHARD PUMP NO: ME-576909

ORIGINAL CAPACITY: (2010) 577 GPM AT: 60 POUNDS PRESSURE

STATIC WATER LEVEL: 388 FEET OPERATING PRESSURE: ----- POUNDS

CAPACITY AT OPERATING PRESSURE: 630 GPM

PUMPING LEVEL AT OPERATING PRESSURE: 423 FEET

FLOW METER READING: 630 GPM AT 60 PSI

PUMPS INTO: SYSTEM

TESTING EQUIPMENT REQUIRED: 8" X 6" REDUCER 6" GATE 6X5 ORIFICE 6" HOSE

AMPS: 161 AMPS AMPS AT OPEN VALVE: ----

ANY SAND? ---- ANY VIBRATION? NO

COMMENTS ON STARTER PANEL, AUTOMATIC CONTROLS, AND VOLTAGE: 125 HP SUB / 460 VOLTS / 161 AMPS

COMMENTS ON CHLORINATOR: GOOD

COMMENTS ON VALVES AND FITTINGS: GOOD

CLEAN AND INSPECT OILER AND REPACK OR ADJUST PACKING: SUBMERSIBLE

CHANGE OIL IN MOTOR: SUBMERSIBLE

CLEAN UP HEAD AND MOTOR: YES

PAINT HEAD AND MOTOR: GOOD

REMARKS ON WHOLE INSTALLATION: GOOD

RECORD OF TEST

LAYNE CHRISTENSEN COMPANY
PO BOX 10206, JACKSON, MS 39289

WELL NO. 2 PUMP NO. 30 hp SUBMERSIBLE DATE 9/8/11

FOR CITY OF RIDGELAND

CITY RIDGELAND STATE MS

LOCATION NORTH LIVINGSTON ROAD WELL

RUNNING PRESSURE 85 POUNDS GUARANTEED ____ AT ____ FEET/POUNDS

LENGTH OF AIR LINE 357 FEET STATIC LEVEL 297 FEET

TIME	PUMP RPM	PUMP PRESSURE LBS. - FT.	AIR LINE GAGE LBS. - FT.	DRAWDOWN	INCHES ON 4" X 2.5" WEIR OR ORIFICE	GPM	AMPS A	AMPS B	AMPS C	YIELD
A.M. P.M.	○	○	60	○	○	○				
A.M. P.M.	CLOSED VALVE	125					58	60	59	
A.M. P.M.		95	48	12.00	5	55.5				
A.M. P.M.		90	46	14.00	8.5	72.4				
A.M. P.M.	**	80	44	16.00	13	89.5	60	62	61	
A.M. P.M.		70	42	18.00	17	102.3				
A.M. P.M.		60	40	20.00	22.5	117.7				
A.M. P.M.		50	37	23.00	26.5	127.8				
A.M. P.M.		40	35	25.00	26.5	138.2				
A.M. P.M.		30	33	27.00	31	148.9				
A.M. P.M.		20	32	28.00	36	156.0				
A.M. P.M.		10	30	30.00	41.5	159.9				
A.M. P.M.		0	30	30.00	40	157.0	68	69	69	
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										

REPRESENTATIVE FOR OWNER

JOSEPH SAVORGNAN
REPRESENTATIVE FOR LAYNE CHRISTENSEN COMPANY

LAYNE CHRISTENSEN COMPANY
PO BOX 10206
JACKSON, MS 39289

WELL MAINTENANCE CHECK LIST - SERVICE CREW

NAME OF SYSTEM: CITY OF RIDGELAND DATE: 9/8/11

LOCATION OF WELL: CITY OF RIDGELAND LIVINGSTON RD

WELL NO: 2 PUMP NO: 30 HP SUBMERSIBLE

ORIGINAL CAPACITY: 97 GPM AT: 80 POUNDS PRESSURE

STATIC WATER LEVEL: 297 FEET OPERATING PRESSURE: 85 POUNDS

CAPACITY AT OPERATING PRESSURE: 89.5 GPM

PUMPING LEVEL AT OPERATING PRESSURE: 313 FEET

FLOW METER READING: 100 GPM AT 85 PSI

PUMPS INTO: PRESSURE TANK

TESTING EQUIPMENT REQUIRED: 4" GATE; 4" X 2.5" ORIFICE

AMPS: 82 AMPS AT OPEN VALVE: 68 - 69 - 69

ANY SAND? NO ANY VIBRATION? NO

COMMENTS ON STARTER PANEL, AUTOMATIC CONTROLS, AND VOLTAGE: 30HP/230V/82AMPS

COMMENTS ON CHLORINATOR: GOOD

COMMENTS ON VALVES AND FITTINGS: GOOD

CLEAN AND INSPECT OILER AND REPACK OR ADJUST PACKING: SUBMERSIBLE

CHANGE OIL IN MOTOR: SUBMERSIBLE

CLEAN UP HEAD AND MOTOR: GOOD

PAINT HEAD AND MOTOR: GOOD

REMARKS ON WHOLE INSTALLATION: GOOD

RECORD OF TEST

LAYNE CHRISTENSEN COMPANY
PO BOX 10206, JACKSON, MS 39289

WELL NO. **5** PUMP NO. **92021G854** DATE **9/7/11**

FOR **CITY OF RIDGELAND**

CITY **RIDGELAND** STATE **MS**

LOCATION **SCHOOL STREET**

RUNNING PRESSURE **70** POUNDS GUARANTEED _____ AT _____ FEET/POUNDS

LENGTH OF AIR LINE **(UNKNOWN)** FEET STATIC LEVEL **(UNABLE TO OBTAIN)** FEET

TIME	PUMP RPM	PUMP PRESSURE LBS. - FT.	AIR LINE GAGE LBS. - FT.	DRAWDOWN	INCHES ON 8" X 6" WEIR OR ORIFICE	GPM	AMPS A	AMPS B	AMPS C	YIELD
A.M. P.M.	○	○	60	○	○	○				
A.M. P.M.	CLOSED VALVE	100					93	94	94	
A.M. P.M.		95	44	16.00	5	354				
A.M. P.M.		90	40	20.00	9	475				
A.M. P.M.		80	35	25.00	10	500				
A.M. P.M.	**	70	30	30.00	17.5	662	166	167	168	
A.M. P.M.		60	27	33.00	20.5	717				
A.M. P.M.		50	26	34.00	23	759				
A.M. P.M.		40	25	35.00	25	791				
A.M. P.M.		30	24	36.00	26	807				
A.M. P.M.		20	23	37.00	27	822				
A.M. P.M.		10	22	38.00	30	867				
A.M. P.M.		0	20	40.00	38.5	982	181	180	182	
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										
A.M. P.M.										

REPRESENTATIVE FOR OWNER

JOSEPH SAVORGNAN
REPRESENTATIVE FOR LAYNE CHRISTENSEN COMPANY

LAYNE CHRISTENSEN COMPANY
PO BOX 10206
JACKSON, MS 39289

WELL MAINTENANCE CHECK LIST - SERVICE CREW

NAME OF SYSTEM: CITY OF RIDGELAND DATE: 9/7/11

LOCATION OF WELL: SCHOOL STREET

WELL NO: 5 PUMP NO: 92021G854

ORIGINAL CAPACITY: (2009) 881 GPM AT: 70 POUNDS PRESSURE

STATIC WATER LEVEL: (UNABLE TO OBTAIN) FEET OPERATING PRESSURE: 70 POUNDS

CAPACITY AT OPERATING PRESSURE: 662 GPM

PUMPING LEVEL AT OPERATING PRESSURE: (UNKNOWN) FEET

FLOW METER READING: 900 GPM AT 70 PSI

PUMPS INTO: SYSTEM

TESTING EQUIPMENT REQUIRED: 8" X 6" REDUCER 8" GATE 8X6 ORIFICE

AMPS: 176 AMPS AMPS AT OPEN VALVE: 180 - 181 - 182

ANY SAND? NO ANY VIBRATION? NO

COMMENTS ON STARTER PANEL, AUTOMATIC CONTROLS, AND VOLTAGE: 150 HP / 460 VOLTS / 176 AMPS

COMMENTS ON CHLORINATOR: GOOD

COMMENTS ON VALVES AND FITTINGS: GOOD

CLEAN AND INSPECT OILER AND REPACK OR ADJUST PACKING: OIL LUBE

CHANGE OIL IN MOTOR: YES

CLEAN UP HEAD AND MOTOR: GOOD

PAINT HEAD AND MOTOR: GOOD

REMARKS ON WHOLE INSTALLATION: GOOD

GRINER DRILLING SERVICE, INC.

TELEPHONE 736-6347
P. O. DRAWER 825
COLUMBIA, MS 39429

LOG FORM

NAME City of Ridgeland
LOCATION North Livingston Road

ENGINEER Waggoner/Charles King, P.E.
DRILLER Billy Hibley
COMPLETED June 20 10 ACCEPTED
SALES ENGINEER Perry Bridges
FIELD SUPERVISOR Frankie Sistrunk

WELL DATA

Length surface casing 100' Size surface casing 24
Cemented yes No. Sacks 100 Size drilled hole 21
Depth drilled hole 1480' Size well casing 16 Type Steel
Length well casing 1070' Cemented Superior No. of sacks 812
Size underreamed hole 15" Length underreamed hole 150'
Size screen 10.75" Type Munipak Mfg. by Johnson
Slot size .020" 304 Stainless Length screen 130'
Lap pipe size 10.75" Lap pipe length 82' Type Steel Coated
Type gravel 10-30 No. yards 7 Distance to lap 1018'
Distance to screen top 1100' Distance to gravel 1025'
Distance to screen bottom 1230' Type bottom 2 backwash
Connection top of lap RL Collar Static water level 426'

PUMP DATA

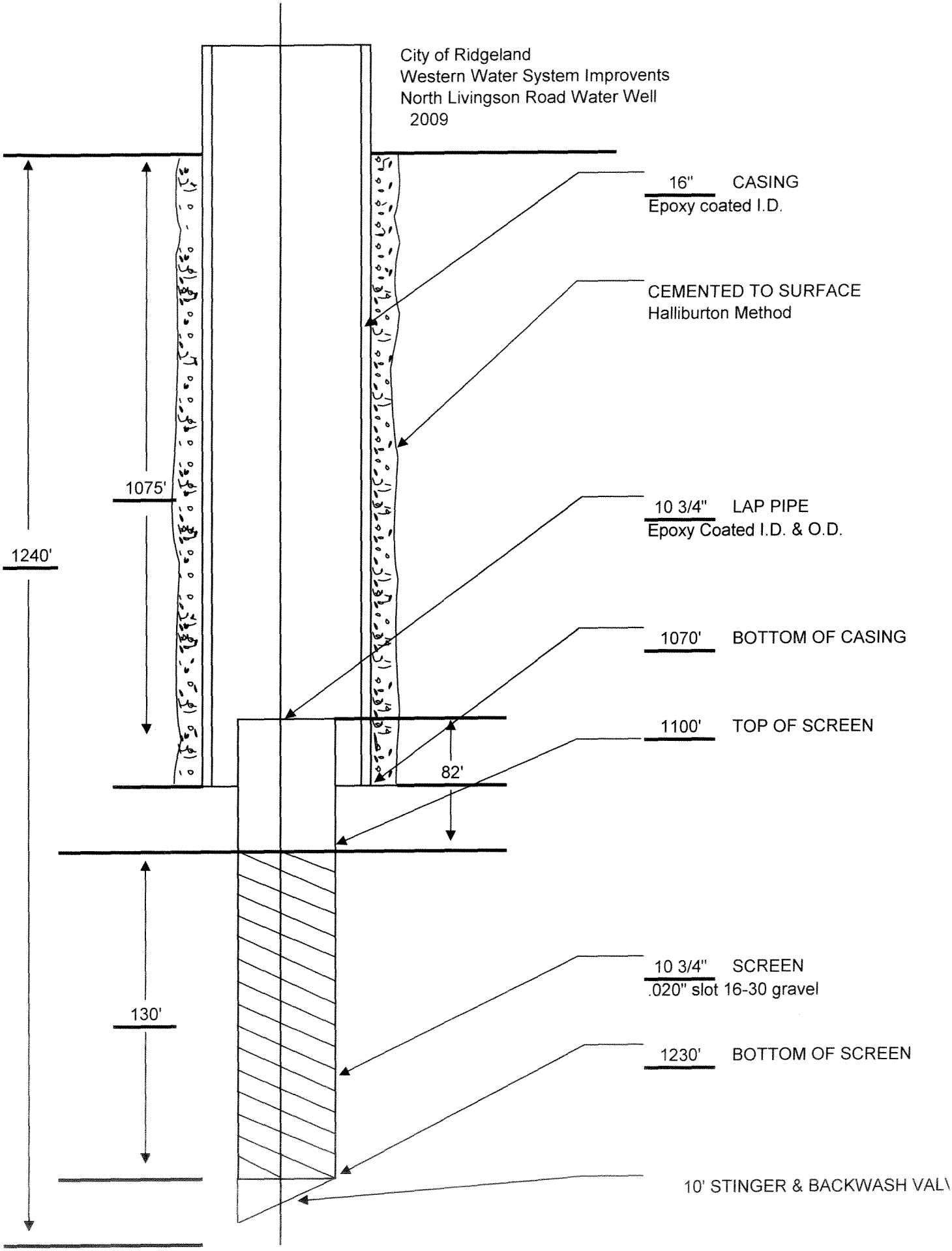
Type Turbine Make Goulds Serial No.
Size bowls 14 No. stages 9 Curve No. RJLC Length bowls 122.88"
Length column 530' Size column 10" Type column TC Coated
Size oil tube 3" Size shaft 1 15/16" Length suction 20'
Size suction 10" Size discharge 12" Head No. A
Overall pump length 562.7' Length headshaft 10'
Type lubrication Oil Type oiler sloenoid Length air line 530'
Rated capacity 1600 GPM Total head 660'
RPM 1760 Size foundation 3' X 3' Height 3'

ELECTRIC MOTOR DATA

Type Hollowshaft Make US Serial No.
HP 350 Voltage 460 RPM 60 Frame 447TPA
Style WP-1 Phase 3 Cycle 60 Amps 383
Height motor 48" Dia. base 16.5 Clutch bore 1 15/16" Clutch No. NRR
Top bearing No. Lower bearing No. Lubrication Oil/Grease

CONTROL PANEL

Type Nema 1 Make CSI
Catalog No. 36696 Starter size SSS Amp rating 600
Volts 460 Phase 3 Cycles 60
Fuse size 400 Size wire 350
Entrance disconnect 600 Fused/Nonfused Fused


City of Ridgeland
Western Water System Improvents
North Livingson Road Water Well
2009
16" CASING
Epoxy coated I.D.
CEMENTED TO SURFACE
Halliburton Method
10 3/4" LAP PIPE
Epoxy Coated I.D. & O.D.
1070' BOTTOM OF CASING
1100' TOP OF SCREEN
10 3/4" SCREEN
.020" slot 16-30 gravel
1230' BOTTOM OF SCREEN
10' STINGER & BACKWASH VAL
1240'
1075'
82'
130'

Bill Oakley, Consulting Hydrologist, Inc.
210 Booker Road
Brandon, MS 39042
Phone 601-939-4385 Fax 601-939-0385

February 20, 2009

Perry Bridges
Griner Drilling Service, Inc.
P.O. Box 825
Columbia, MS 39429

RE: City of Ridgeland Test Hole Livingston Road

Dear Perry:

The electric log for the Ridgeland test hole completed on February 18, 2009 has been reviewed and the following comments are presented.

The test hole was logged to 1,468 feet below ground level. The two primary fresh water-bearing units are the Cockfield Formation from 560 to 880 feet and the Sparta Sand from 1,030 to 1,468 feet. The Cook Mountain confining unit from 880 to 1,030 feet separates the Cockfield from the deeper Sparta Sand aquifer.

The Cockfield and Sparta aquifers are principal sources of water supply in Hinds, Madison and Rankin Counties, most from the Sparta aquifer.

The Sparta is generally the most productive and the quality of water usually exceeds that from the Cockfield. The log showed thick clean sands in the Sparta interval from 1,080 to 1,250 feet. Other sand in the Sparta was indicated from 1,360 to 1,408 feet and near the base of the Sparta Sand from 1,430 to 1,460 feet.

Bear Creek Water Association operates a well (Livingston Road, Sec. 10, T7N, R1E) north of the test hole site. The well appears to be screened in the Ridgeland test hole interval from 1,080 to 1,250 feet. The quality of water from the Bear Creek well is excellent. Analytical results showed color of 20 units. Color is normally higher in the Cockfield Formation and is generally the only water quality concerns in either water-bearing unit.

In summary, the test hole information looks favorable for constructing a 1,500 gallon per minute (gpm) well in the Sparta aquifer. It is suggested that the 130 feet of screen as specified be set from 1,100 to 1,230 feet in the production well.

It is always recommended that a test well be constructed to verify the quality of water at any new site. If you have any questions concerning the information presented, don't hesitate to give me a call.

Sincerely,

Bill Oakley, RPG
Reg. No. 0433

GRINER DRILLING SERVICE, INC
1014 HIGWAY 98 BYPASS
COLUMBIA, MISSISSIPPI 39429
WATER WELL DRILLING AND REPAIR, GEOTECHNICAL, TELEMETRY
1-800-221-4098
pbridges@grinerdrillingservice.com

April 20, 2009

Mr. Charles King, P.E.
Waggoner Engineering, Inc.
143-A LeFleurs Square
Jackson, Mississippi 39211

Re: Pump Submittal for "Ridgeland Western Water System Improvements
Elevated Storage Tank and Well"

Dear Mr. King:

Griner Drilling Service, Inc. has completed a 24 hr. pumping test on the water well located on Livingston Road. The data collected and submittal data is as follows:

1. Contract capacity- 1600 gpm
2. Contract above ground head- 72 psi (166.32')
3. Pumping test capacity 1500 gpm
4. Static Water Level- 426'
5. Pumping Level @ 1500 gpm @ 24 hrs.- 483.60'
6. Drawdown @ 1500 gpm – 57.60'
7. Specific Capacity- 26.04 gal/ft/day
8. Pumping Level @ 1600 gpm – 487.44'
9. Submitted pump setting – 530'
10. Friction Loss in column- 10'
11. Total Head- 659.92'
12. Bowl Head- 660.00'
13. Bowl Horsepower @ design – 318 hp
14. Horsepower provided- 350 hp
15. Bowl submitted- Goulds 14 RJLC 9Stage
16. Column assembly- 530' of 1 15/16" X 3" X 10" oil lubricated
17. Submitted Motor- 350 hp Premium Efficient High Thrust US Motor

Please review and advise me. Thank you.

Sincerely,

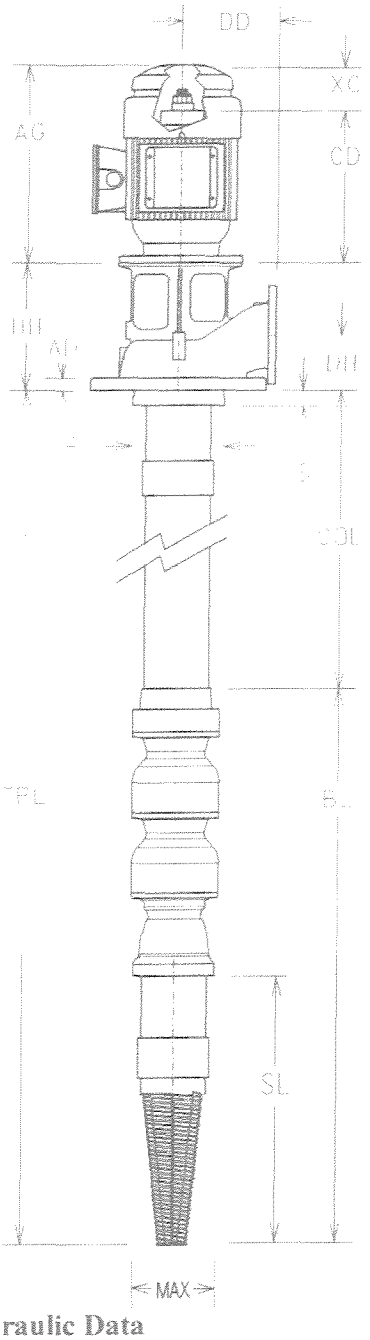
Perry Bridges

Perry Bridges
Sales & Technical Representative

GLOBAL PUMP
RIDGELAND MISSISSIPPI

DIMENSIONAL OUTLINE

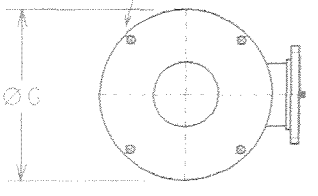
DWT-CATM
9 Stage 10x14RJLC



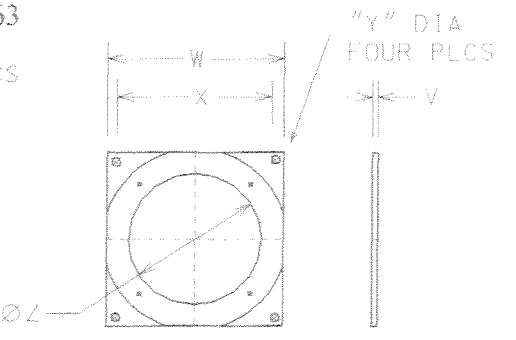
AD:	1.5
AG:	47.81
BD:	24.5
BL:	392.63
CD:	42.66
CL:	N/A
COL:	530.00'
DD:1	16.00
DH:	10.75
G:	32.00
H:	30.00
HH:	23.00
J:	0.88
R:	19.00
S:	4.13
SL:	269.75
TPL:	562.7'
UG:	N/A
V:	1.00
W:	34.00
X:	31.00
XC:	5.13
Y:	0.88
Z:	18.00
MAX:	13.63

Pump Data

Size:	14RJLC
Stages:	9
BowlShaft:	1.94"
LineShaft:	1.94"
LineShaftType:	Enclosed-O/L
Column:	Standard
Column	10" Threaded
Bearing Spacing	5 feet
Section Length	20 feet
Head:	A:Cast
Flange (Disch.):	12"-125# FF
Inlet:	
Seal:	O-Ring
Strainer:	Cone
SubBase:	Yes



DISC HEAD



SOLE PLATE

Hydraulic Data

Flow (gpm):	1600
Pump Head (ft):	213.9
TDH (ft):	660.0
Speed (rpm):	1770
Fluid:	Water
Temperature (F):	60
Viscosity:	1.105
Spec.Grav:	1

Miscellaneous

Thrust At Design (lb):	14406
Thrust At Shutoff (lb):	19801
Min Water Level(in):	5160

Weight

Pump (lb):	32075
Motor (lb):	2200
Total (lb):	34275

Motor Data

Model:	HO350S2SLHX
Make:	USEM
HP:	350
RPM:	1800
Type:	RU
Efficiency:	94.5
Frame:	447TPA
Ratchet:	NRR

Version: 3.53P

Customer:GRINER DRILLING

Date: 04-15-2009

GLOBAL PUMP
RIDGELAND MISSISSIPPI

HYDRAULIC ANALYSIS
DWT-CATM
9 Stage 10x14RJLC

Overall Pump Parameters

Size and Model:	14RJLC	Pump Operating Speed, RPM:	1770
Capacity, GPM:	1600	Total Dynamic Head, Ft.:	660.0
Total Pump Length, In.:	6752.6	Impeller Trim, In.:	9.8
Pump Type:	Well	Head Type:	A:Cast
Pump K-Factor:	13	Number of Stages:	9
		Pumping Level, In.:	5160.0

LineShaft-Related Data

Shaft Diameter, In.:	1.94	Shaft Limit, HP:	492
Shaft Material:	C-1045	Matl Correction Fact:	1
LineShaft Length, In.:	6360.00	Shaft Elongation, w/o Adder:	0.64
LineShaft Type:	Enclosed-O/L	Impeller Running Clearance:	0.13
Enclosing Tube Diameter:	3.00		

Bowl Data

Total Bowl Length, In.:	392.63	Bowl Diameter, In.:	13.625
Bowl Shaft Dia, In.:	1.94	Bowl Shaft Limit, HP:	585
		Bowl Shaft Material:	416SS

Column Data

Column Diameter, In.:	10	Column Load, Lb.:	11154.0
Wall Thickness, In:	0.365	Column Elongation, In.:	0.20

HorsePower Data

Shaft Friction Loss, Hp.:	9.60	Thrust Load Loss, Hp.:	1.91
Bowl HP At Design, Hp.:	318	Motor HorsePower, Hp.:	350

Head Data

Column Loss, Ft.:	15.66	Head Loss, Ft.:	0.49
		Total Loss, Ft.:	16.14

Other Data

Hydraulic Thrust, Lb.:	8580.0	Thrust at Design, Lb.:	14406.0
Thrust at Shutoff, Lb.:	19800.7	Design NPSH, Ft.:	17.1
Available Lateral, In.:	1.00	Design Lateral, In.:	0.57
Shutoff Lateral, In.:	0.84	Actual Head above Grade, Ft.:	213.86
Suction Pressure, psi:	0.0	Shutoff Disc Pressure, psi:	281.8

Efficiency Data (Efficiencies estimated not guaranteed)

Bowl Efficiency:	83.80	Pump Efficiency:	78.90
Motor Efficiency:	94.50	Overall Efficiency:	74.56
		KWH/1000 gallons:	2.78

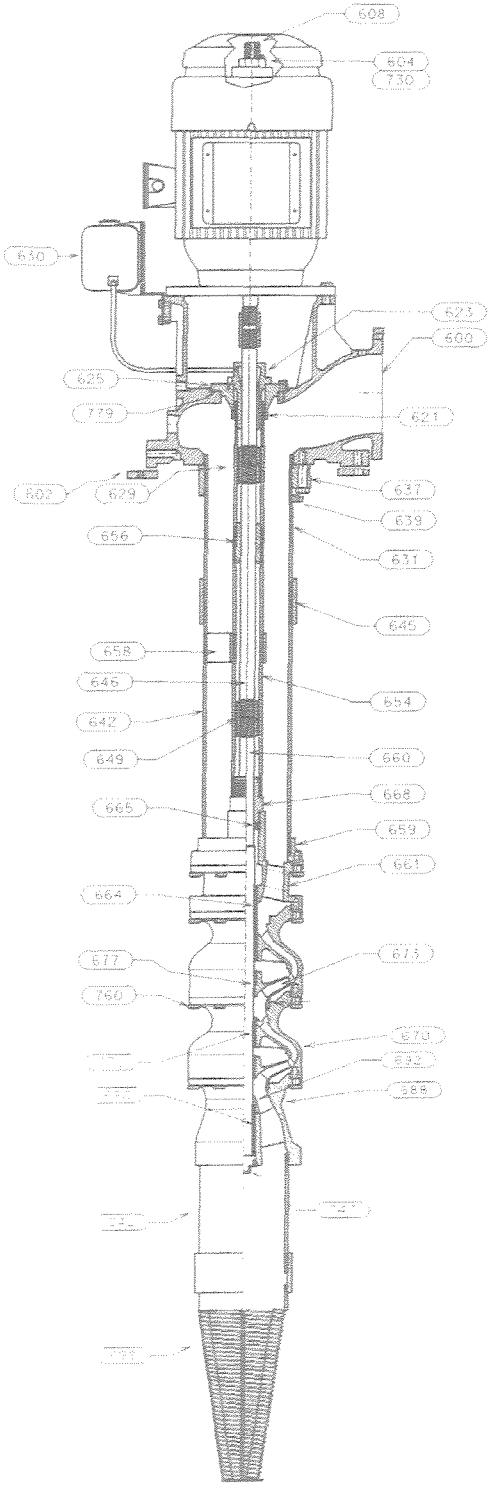
Component Weights

Bowl Weight, Lbs.:	2335	Column Weight,Lbs.:	29150
Head Weight, Lbs.:	590	Can Weight,Lbs.:	0
Motor Weight, Lbs.:	2200	Total Pump Weight,Lbs.:	34275

Version: 3.53P Customer:GRINER DRILLING Date: 04-15-2009

GLOBAL PUMP
RIDGELAND MISSISSIPPI

SECTIONAL
DWT-CATM
9 Stage 10x14RJLC



DISCHARGE HEAD ASSEMBLY

ITEM	NAME	Code	MATERIAL	ASTM
600	HEAD- DISCHARGE	1003	CAST IRON CL30	A48-94ae1
602	SOLEPLATE	3201	CARBON STEEL GR D	A36M-00a
604	NUT- ADJUSTING	2130	BRASS C36000	B16M-00
608	HEADSHAFT	2227	SST 416	A582M-95b
621	O'RING	5302	NITRILE BUNA N	D4322-96
623	NUT- TENSION	1187	BRASS C84400 SEMI-RED	B584-00
625	PLATE- TENSION	1003	CAST IRON CL30	A48-94ae1
630	RESERVOIR- OIL	1425	ALUM 319	B179-96
637	COLUMN FLANGE	1003	CAST IRON CL30	A48-94ae1
730	KEY- MOTOR GIB	2242	CARBON STEEL 1018	A108-99
779	GASKET- HOUSING	5136	ACRYLIC/NITRILE	5136 REV 4

COLUMN AND LINESHAFT ASSEMBLY

629	NIPPLE- TUBE	6518	BLACK PIPE SCH 80	A 53-98
631	COLUMN PIPE NIPPLE	6501	BLACK PIPE SCH 40	A 53-98
639	COLUMN LOCK RING	1003	CAST IRON CL30	A48-94ae1
642	COLUMN PIPE	6501	BLACK PIPE SCH 40	A 53-98
645	COLUMN COUPLING	6501	BLACK PIPE SCH 40	A 53-98
646	LINESHAFT	2205	CARBON STEEL 1045	A108-99
649	LINESHAFT COUPLING	2242	CARBON STEEL 1018	A108-99
654	TUBE- ENCLOSING	6518	BLACK PIPE SCH 80	A 53-98
656	LINESHAFT BEARING	1109	FEDERALLOY BISMUTH BRZ	B584-00
658	RETAINER- TUBE	5121	RUBBER EPDM	D3568-98

BOWL ASSEMBLY

642	COLUMN PIPE	6501	BLACK PIPE SCH 40	A 53-98
659	ADAPTER- COLUMN TO BOWL	1003	CAST IRON CL30	A48-94ae1
660	SHAFT- BOWL	2218	SST 416	A582M-95b
661	BOWL- DISCHARGE	1018	DUCTILE IRON 65-45-12	A536-84(1999)e1
664	BEARING- DISC BOWL	1109	FEDERALLOY BISMUTH BRZ	B584-00
665	SEAL- OIL	0000	VENDOR STANDARD	x
668	BEARING- TUBE ADAPTER	1109	FEDERALLOY BISMUTH BRZ	B584-00
670	BOWL- INTERMEDIATE	6917	DUCTILE IRON ENAMEL	A536-84(1999)e1
672	BEARING- INT BOWL	1109	FEDERALLOY BISMUTH BRZ	B584-00
673	IMPELLER	1102	SILICON BRONZE C87600	B584-00
677	COLLET- IMPELLER	2218	SST 416	A582M-95b
688	BOWL/BELL- SUCTION	1018	DUCTILE IRON 65-45-12	A536-84(1999)e1
690	BEARING- SUCTION	1109	FEDERALLOY BISMUTH BRZ	B584-00
692	SANDCOLLAR	1109	FEDERALLOY BISMUTH BRZ	B584-00
698	STRAINER- SUCTION	6913	SST 316 XPND METAL FL	A555-97
747	PLUG- PIPE	1046	MALLEABLE IRON	A197
760	CAPSCREW- HEX	2298	STEEL BOLTING GR 8	J429-99

GLOBAL PUMP
RIDGELAND MISSISSIPPI

ADDERS
DWT-CATM
9 Stage 10x14RJLC

ADDITIONAL PUMP COMPONENTS

The following is a list of the additional components you ordered.
Consult factory for any other components or services.

Component

Strainer
Tail Pipe:
SST Strainer
Ductile Iron Bowl
416SS Collets

Version: 3.53P Customer:GRINER DRILLING Date: 04-15-2009

PUMP DATA SHEET Turbine 60 Hz

Company: GLOBAL PUMP
Customer:GRINER DRILLING
Name: RIDGELAND MISSISSIPPI
Date: 04/15/09
Order No:

Pump:

Size: 14RJLC (9 stages)
Type: Lineshaft
Speed: 1770 rpm
Synch speed: 1800 rpm
Dia: 9.75 in
Curve: E6614REPC1
Specific Speeds:
Ns: 2750
Pump Notes for Standard Sizes:
Discharge Sizes-8",10",12". Curves are certified for water at 60°F only. Consult factory for performance with any other fluid.
Vertical Turbine:
Bowl size: 13.63 in
Max lateral: 1 in
Thrust K factor: 13 lb/ft

Pump Limits for Standard Construction:

Temperature: 120 °F
Pressure: 340 psi g
Sphere size: 0.98 in

Search Criteria:

Flow: 1600 US gpm
Head: 660 ft

Fluid:

Water
Temperature: 60 °F
SG: 1
Vapor pressure: 0.2563 psi a
Viscosity: 1.105 cP
Atm pressure: 14.7 psi a
NPSHa: --- ft

Motor:

Standard: NEMA
Size: 350 hp
Speed: 1800

Sizing criteria: Max Power on Design Curve

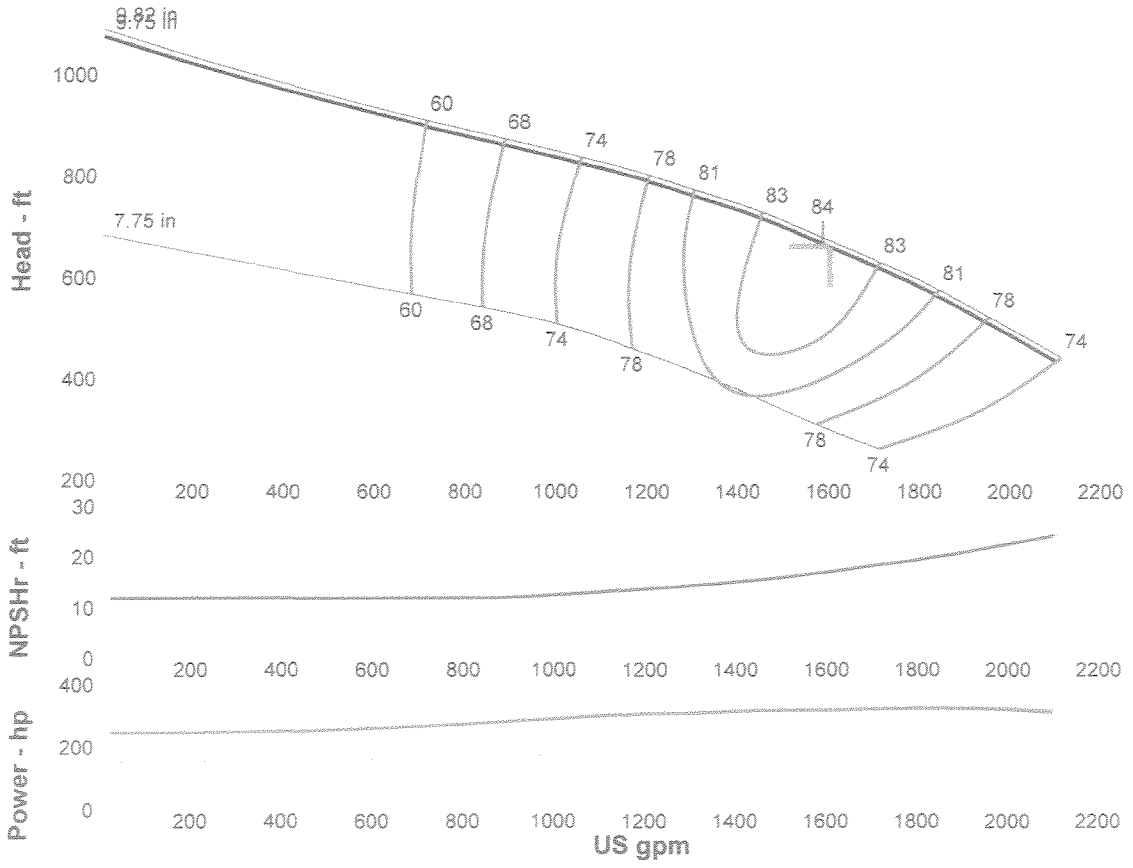
Pump Selection Warnings:

Pump shutoff dP exceeds limit for the pump.

---- Data Point ----
Flow: 1600 US gpm
Head: 660 ft
Eff: 83.8%
Power: 318 hp
NPSHr: 17.1 ft

-- Design Curve --
Shutoff Head: 1075 ft
Shutoff dP: 465 psi
Min Flow: --- US gpm
BEP: 84% eff
@ 1584 US gpm
NOL Pwr: 323 hp
@ 1832 US gpm

-- Max Curve --
Max Pwr: 330 hp
@ 1841 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
1920	1770	523	78.6	323	21.4
1600	1770	660	83.8	318	17.1
1280	1770	767	80.5	308	14.3
960	1770	843	70.9	287	12.4
640	1770	914	54.4	265	12

Double-Bolted Bowl Calculation

Bowl Size	No of Stages	Flow (gpm)	TDH (ft H2O)	Shut-Off Pressure (psig)	Max Allowable Bowl Pressure (psig)
14RJLC	9	1600	660	465	340

The shut-off pressure per stage is 51.67 psig

The maximum number of **Cast Iron, Single-Bolted stages** required is **6**
The minimum number of **Ductile iron, Double-Bolted stages** required is **3**

RINER DRILLING SERVICE INC.

PHONE (601) 736-6347 - FAX (601) 731-1853
1014 HIGHWAY 98 BYPASS
COLUMBIA, MS 39429

PUMPING TEST

DATE March 17, 2010 FORMATION Sparta COUNTY Madison

WELL OBSERVED North Livingston Road OWNER City of Ridgeland

WELL PUMPED North Livingston Road AVERAGE DISCHARGE 1616 GPM

RADIUS N/A PUMP ON 7:00 AM 03-17-10 BY 10" x 8" Orifice

M.P. 3' Above Ground Level PUMP OFF 7:00 PM 03-17-10 STATIC 424.79'

TIME	T (MINS.)	T (MINS.)	TAPE HELD	WETTED	WATER LEVEL		PSI	IN	GPM	
6:40	Static	Level	425	+.08	425.08					
6:50	Static	Level	425	+.79	425.79					
7:00	Pump	On								
7:01	1		485	+.21	485.21		72	27	1613	
7:02	2		485	+.36	485.36		72	27	1613	
7:03	3		485	+.51	485.51		72	27	1613	
7:04	4		485	+.63	485.63		72	27	1613	
7:05	5		486	+.24	486.24		72	27	1613	
7:06	6		486	+.71	486.71		72	27	1613	
7:07	7		487	+.18	487.18		72	27	1613	
7:08	8		487	+.65	487.65		72	27	1613	
7:09	9		487	+.91	487.91		72	27	1613	
7:10	10		488	+.37	488.37		72	27	1613	
7:12	12		488	+.71	488.71		72	27	1613	
7:14	14		489	+.03	489.03		72	27	1613	
7:16	16		489	+.46	489.46		72	27	1613	
7:18	18		490	+.02	490.02		72	27	1613	
7:20	20		490	+.10	490.10		72	27	1613	
7:25	25		490	+.53	490.53		72	27	1613	

OBSERVER S. Chance

RINER DRILLING SERVICE INC.

PHONE (601) 736-6347 - FAX (601) 731-1853
1014 HIGHWAY 98 BYPASS
COLUMBIA, MS 39429

PUMPING TEST

DATE March 17, 2010 FORMATION Sparta COUNTY Madison

WELL OBSERVED North Livingston Road OWNER City of Ridgeland

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TIME	T (MINS.)	T (MINS.)	TAPE HELD	WETTED	WATER LEVEL		PSI	IN	GPM	
7:30	30		491	+.07	491.07		72	27	1613	
7:35	35		491	+.39	491.39		72	27	1613	
7:40	40		491	+.72	491.72		72	27	1613	
7:45	45		492	+.09	492.09		72	27	1613	
7:50	50		492	+.23	492.23		72	27	1613	
7:55	55		492	+.65	492.65		72	27	1613	
8:00	60		492	+.86	492.86		72	27	1613	
8:15	75		493	+.51	493.51		72	27	1613	
8:30	90		493	+.78	493.78		72	27	1613	
8:45	105		494	+.30	494.30		72	27	1613	
9:00	120		494	+.60	494.60		72	27	1613	
9:15	135		494	+.87	494.87		72	27	1613	
9:30	150		494	+.98	494.98		72	27	1613	
9:45	165		495	+.32	495.32		72	27	1613	
10:00	180		495	+.49	495.49		72	27	1613	
10:30	210		495	+.80	495.80		72	27	1613	
11:00	240		496	+.01	496.01		72	27	1613	
11:30	270		496	+.16	496.16		72	27	1613	
12:00	300		496	+.22	496.22		72	27	1613	

OBSERVER S. Chance

RINER DRILLING SERVICE INC.

PHONE (601) 736-6347 - FAX (601) 731-1853
1014 HIGHWAY 98 BYPASS
COLUMBIA, MS 39429

PUMPING TEST

DATE March 17, 2010 FORMATION Sparta COUNTY Madison

WELL OBSERVED North Livingston Road OWNER City of Ridgeland

WELL PUMPED North Livingston Road AVERAGE DISCHARGE 1616 GPM

RADIUS N/A PUMP ON 7:00 AM 03-17-10 BY 10" x 8" Orifice

M.P. 3' Above Ground Level PUMP OFF 7:00 PM 03-17-10 STATIC 424.79'

TIME	T (MINS.)	T (MINS.)	TAPE HELD	WETTED	WATER LEVEL		PSI	IN	GPM	
12:30	330		496	+.72	496.72		72	27	1613	
1:00	360		496	+.76	496.76		72	27	1613	
1:30	390		496	+.85	496.85		72	27	1613	
2:00	420		497	+.01	497.01		72	27	1613	
3:00	480		497	+.25	497.25		72	27	1613	
4:00	540		497	+.52	497.52		72	27	1613	
5:00	600		497	+.57	497.57		72	27	1613	
6:00	660		497	+.75	497.75		72	27	1613	
7:00	720		497	+.89	497.89		72	27	1613	
8:00	780		497	+.96	497.96		72	27	1613	
9:00	840		498	+.04	498.04		72	27	1613	
10:00	900		498	+.27	498.27		72	27	1613	
11:00	960		498	+.38	498.38		72	27	1613	
12:00	1020		498	+.55	498.55		72	27	1613	
1:00	1080		498	+.55	498.55		72	27	1613	
2:00	1140		498	+.56	498.56		72	27	1613	
3:00	1200		498	+.64	498.64		72	27	1613	
4:00	1260		498	+.75	498.75		72	27	1613	
5:00	1320		498	+.82	498.82		72	27	1613	

OBSERVER S. Chance

RINER DRILLING SERVICE INC.

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1014 HIGHWAY 98 BYPASS
COLUMBIA, MS 39429

PUMPING TEST

DATE March 17, 2010 FORMATION Sparta COUNTY Madison

WELL OBSERVED North Livingston Road OWNER City of Ridgeland

WELL PUMPED North Livingston Road AVERAGE DISCHARGE 1616 GPM

RADIUS N/A PUMP ON 7:00 AM 03-17-10 BY 10" x 8" Orifice

M.P. 3' Above Ground Level PUMP OFF 7:00 PM 03-17-10 STATIC 424.79'

TIME	T (MINS.)	T (MINS.)	TAPE HELD	WETTED	WATER LEVEL		PSI	IN	GPM	
6:00	1380		498	+.87	498.87					
7:00	1440	Pump Off	499	+.07	499.07					

OBSERVER S. Chance PAGE 4 of 4

Bill Oakley Consulting Hydrologist, Inc.
210 Booker Road
Brandon, MS 39042
Phone 601-939-4385 Fax 601-939-0385

May 18, 2012

Chris Bryson, PE
Waggoner Engineering, Inc.
143-A LeFleurs Square
Jackson, MS 39211

City of Ridgeland Water Supply Madison County

Dear Chris:

In response to our meeting at your office on Tuesday May 10, 2012 the following information is presented as requested.

Proposed water well sites:

- Livingston Road (Old Livingston Rd W.A., Sec. 28, T7N, R1E)

  The site located west of Livingston Road north of County Line Road shows a ground elevation of about 400 feet (above MSL). The base of good quality groundwater at the site occurs at the base of the Sparta Sand aquifer about 1,600 feet below ground level. Two major water-bearing units capable of providing large volumes of water to properly constructed wells are present in the area. These included in descending order the Cockfield Formation and Sparta Sand aquifers. Water from the Sparta is generally good quality and can produce higher yielding wells where thick sands are present.

  Livingston Road Water Association operated three Cockfield wells at the site for many years before being acquired by Ridgeland. The two older wells constructed in 1968 are small diameter (6-inch) and pumped about 60 gallons per minute (gpm) each. In 1994 Layne Central constructed an (8-inch) well with a reported pumping rate of 148 gpm @ 50 psi. The

quality of water is excellent; however the yield is low, showing a specific capacity of 4 gallons per minute per foot (gpm/ft).

The site looks favorable to investigating the deeper and generally higher yielding Sparta Sand. The base of the Sparta Sand unit at the site is about 1,600 feet below ground level. However, the thicker more consistent sand interval should occur from 1,200 to 1,400 feet.

Although the site looks favorable for exploration a test hole to identify depth and sand thickness and test well to verify water quality is always recommended.

If you have any questions concerning the information presented, don't hesitate to give me a call.

- Richmond Grove (North of I-55 Hwy 51 Overpass, Sec. 35, T7N, R1E)

The site located east of I-55 and west of Adcock Street is at elevation 340 feet (above MSL). Two primary water-bearing units underlie the south Ridgeland site. These units in descending order include the Cockfield Formation and Sparta Sand aquifers. The base of suitable groundwater occurs at the base of the Sparta Sand about 1,500 feet below ground level.

The Richmond Grove area prior to 1980 was served by a 8-inch, 150 gallons per minute (gpm) well withdrawing from the Cockfield (532-574 feet). Records indicate the well was cemented (decommissioned in 1988).

The Sparta Sand should be present at the site and a test hole to 1,500 feet would be required to explore the entire Sparta section. Two nearby wells, Pear Orchard, 1 mile east and School Street, 1 mile north withdraw from the Sparta. Records indicate the wells pump 495 to 950 gpm respectively.

Although the Richmond Grove site should be considered it is noted that a test hole for the City was drilled in 1992 to a depth of 1,516 feet on Brane Road. The site is about 2,200 feet northwest of the area of interest. The electric log showed sand 1,040 to 1,075 feet, 1,110 to 1,155 feet and 1,290 to 1,335 feet. Probably could pump 500 gpm if multiple screens utilized. Furthermore, as we discussed the MSDEQ-OLWR has emphasized the

need for Ridgeland and Madison to locate future water wells west of Interstate 55.

This site would be somewhat unfavorable due to nearby test hole showing limited sand thickness, nearby wells withdrawing from the Sparta and possible permitting issues.

- New High School Site (I-55 North near City Limits, Sec. 18, T7N, R2E)

  The site is located on the east side of I-55 near the north Ridgeland city limits at elevation 380 feet above MSL. The Cockfield Formation and Sparta Sand aquifers are the sources of groundwater in the area.

  The base of the Sparta at elevation 380 feet is about 1,450 feet below ground level. Several deep oil exploratory hole less than a mile north show thick Cockfield sand 580 to 720 feet. Broken Sparta sands are shown 1,080 to 1,400 feet with the thickness most continuous water-bearing unit from 1,230 to 1,310 feet. The Sparta unit does not appear to be as thick and uniform as those units to the west.

  The City of Madison operates a Sparta well in NW ¼ of Sec. 18, T7N, R2E. The well is probably a mile or less from your area of interest. The well pumped about 600 gpm when constructed in 2006.

  Although information in the area looks somewhat favorable primarily in the Cockfield, drawdown space is limited. Withdrawals from the Sparta could be unfavorable due to nearby pumping, limited sand thickness and possible permitting issues.

- Parkway Site (South of Bluebird Lane, Sec. 27, T7N, R1E)

  The site is located near Highland Colony Parkway and Market Ridge intersection at elevation 380 feet above MSL.

  The Cockfield Formation and Sparta Sand units are the primary water-bearing units in the area. The quality of water from both units is generally good but the Sparta is generally more productive. The base of the Cockfield is about 800 feet below ground level. The top of the Sparta is about 1,000 feet and the base at 1,550 feet. One deep electric log in Sec.

27, T7N, R1E shows good sands in the Sparta 1,000 to 1,050 feet, 1,160 to 1,340 feet and broken sand 1,400 to 1,460 feet.

The Parkway site looks favorable for exploration with the possibility of constructing a high yielding well withdrawing from the Sparta unit. There does not appear to be any large diameter wells in the general area and should get favorable evaluations from the permitting division of DEQ.

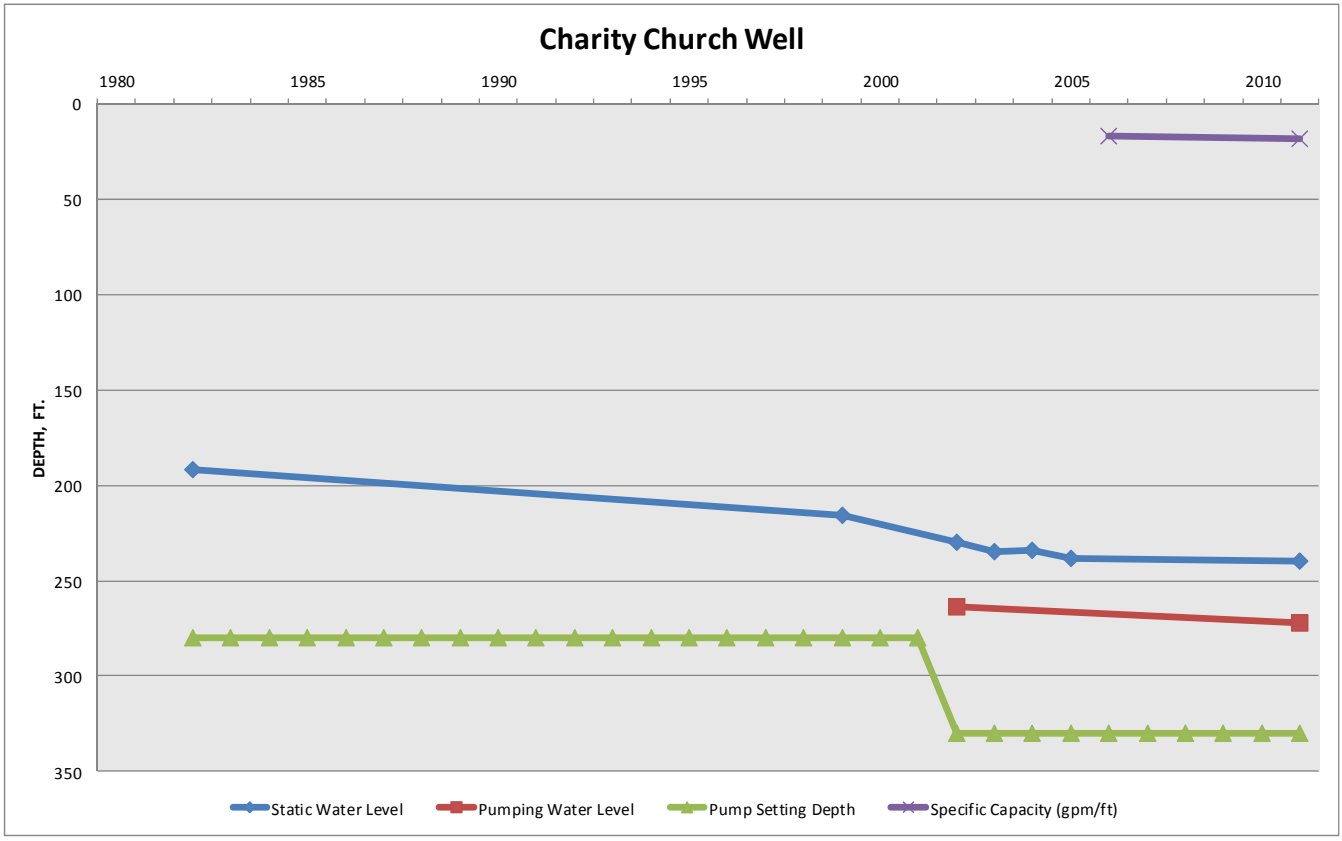
From a quality of water aspect colored water is always of concern in the Metro area. At Ridgeland color units in the Sparta Sand range from 10 to 55 units. Several test wells, one at the Reservoir near the Yacht Club, and a well near downtown Madison reported red water.

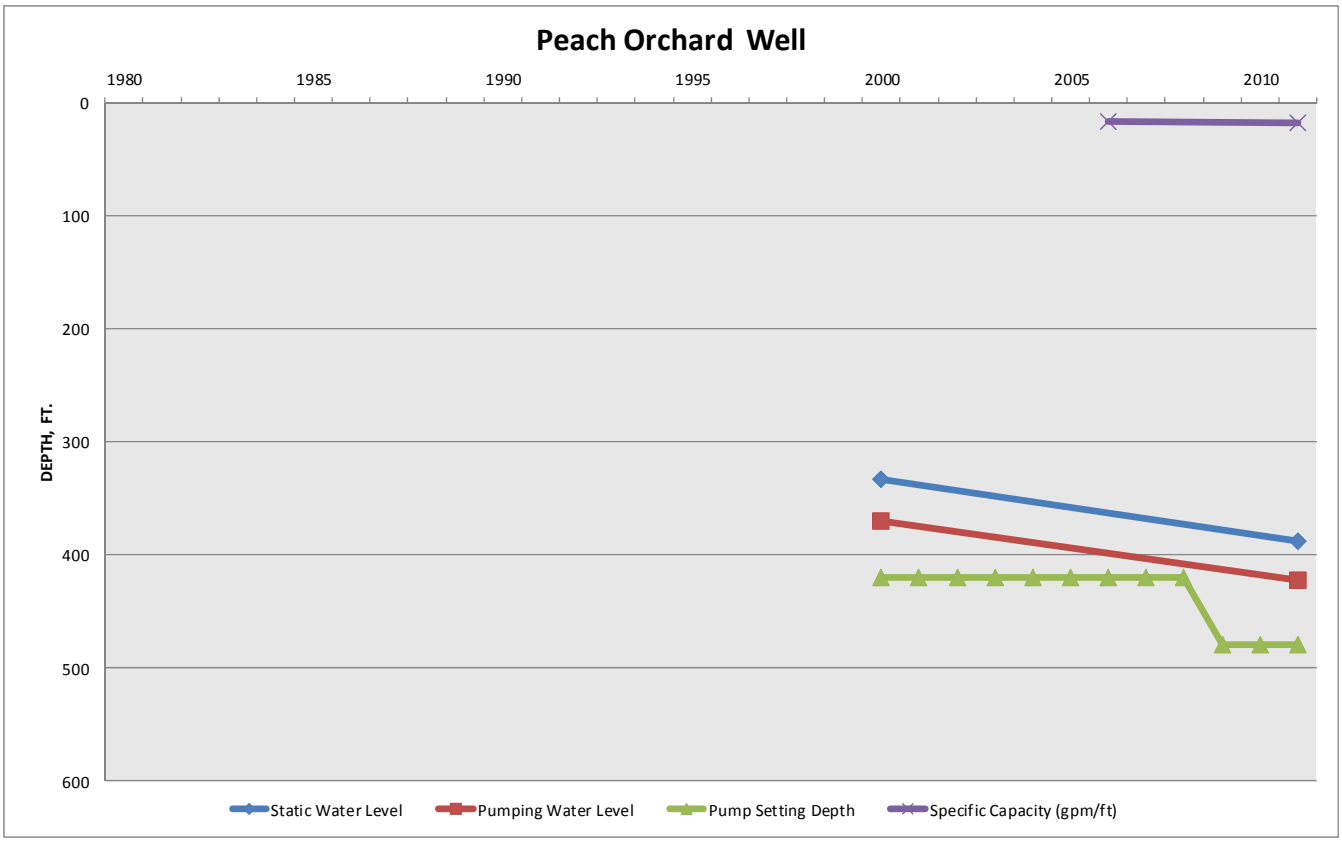
Bill

Bill Oakley, RPG
Reg. No. 0433

City of Ridgeland

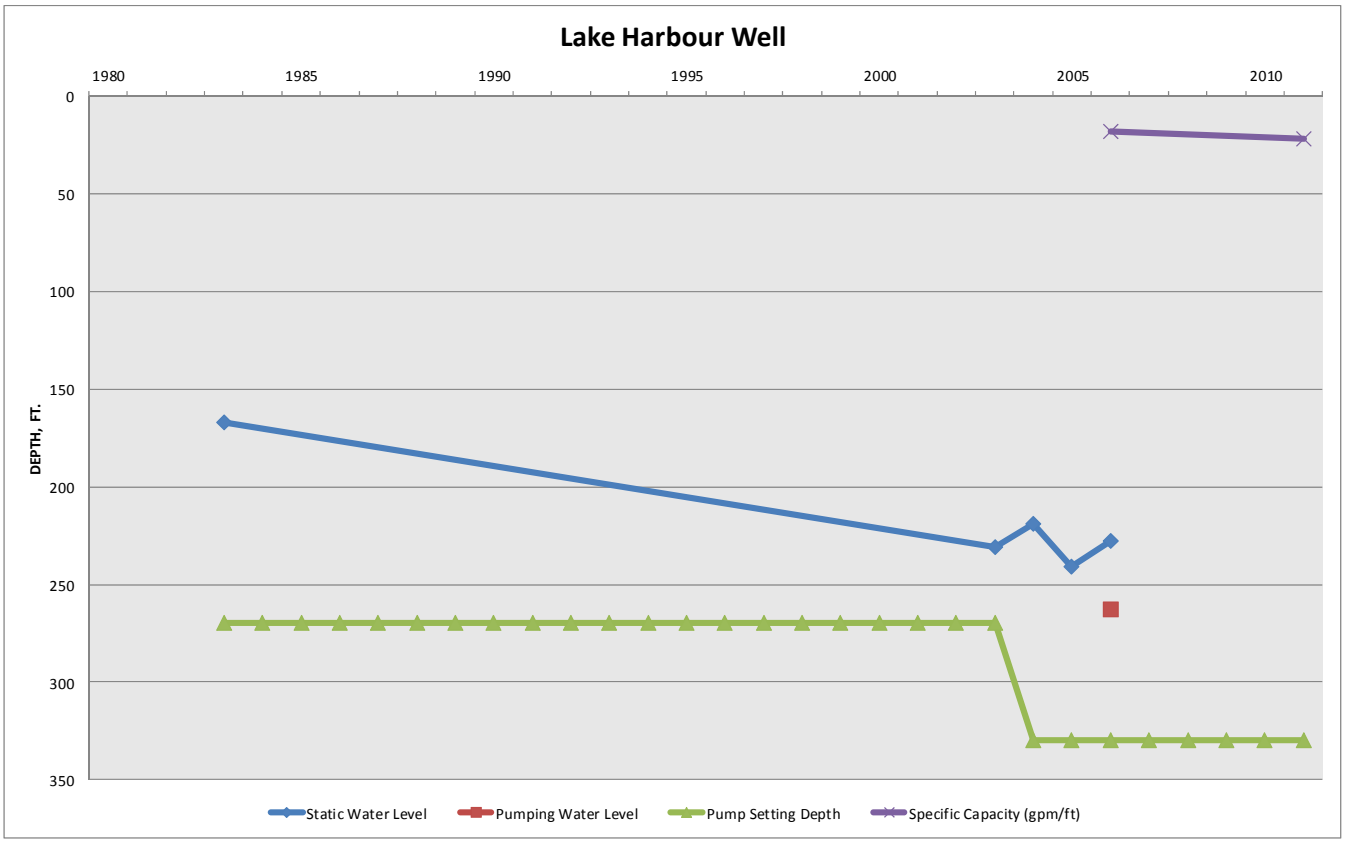
Water Well Static Water Levels

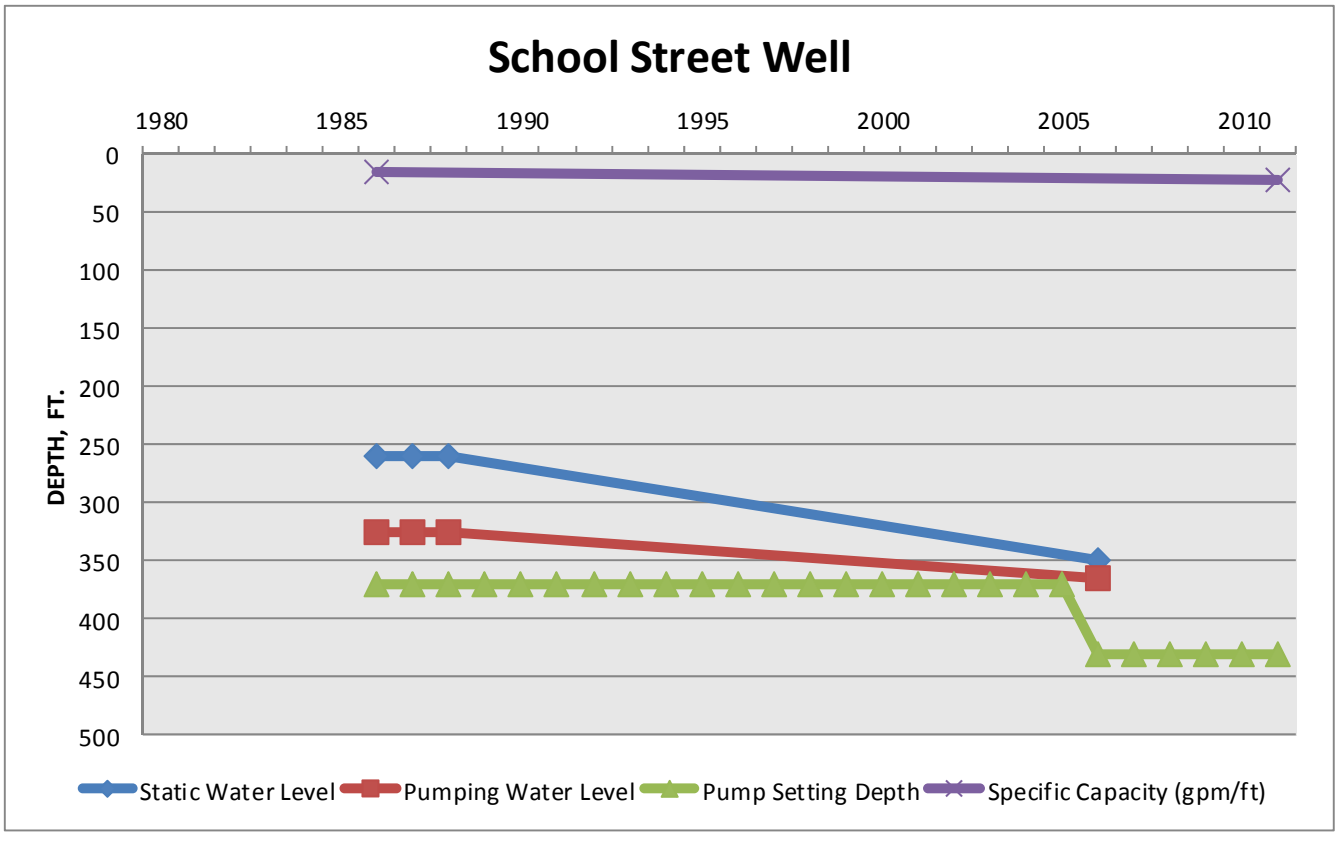




City of Ridgeland

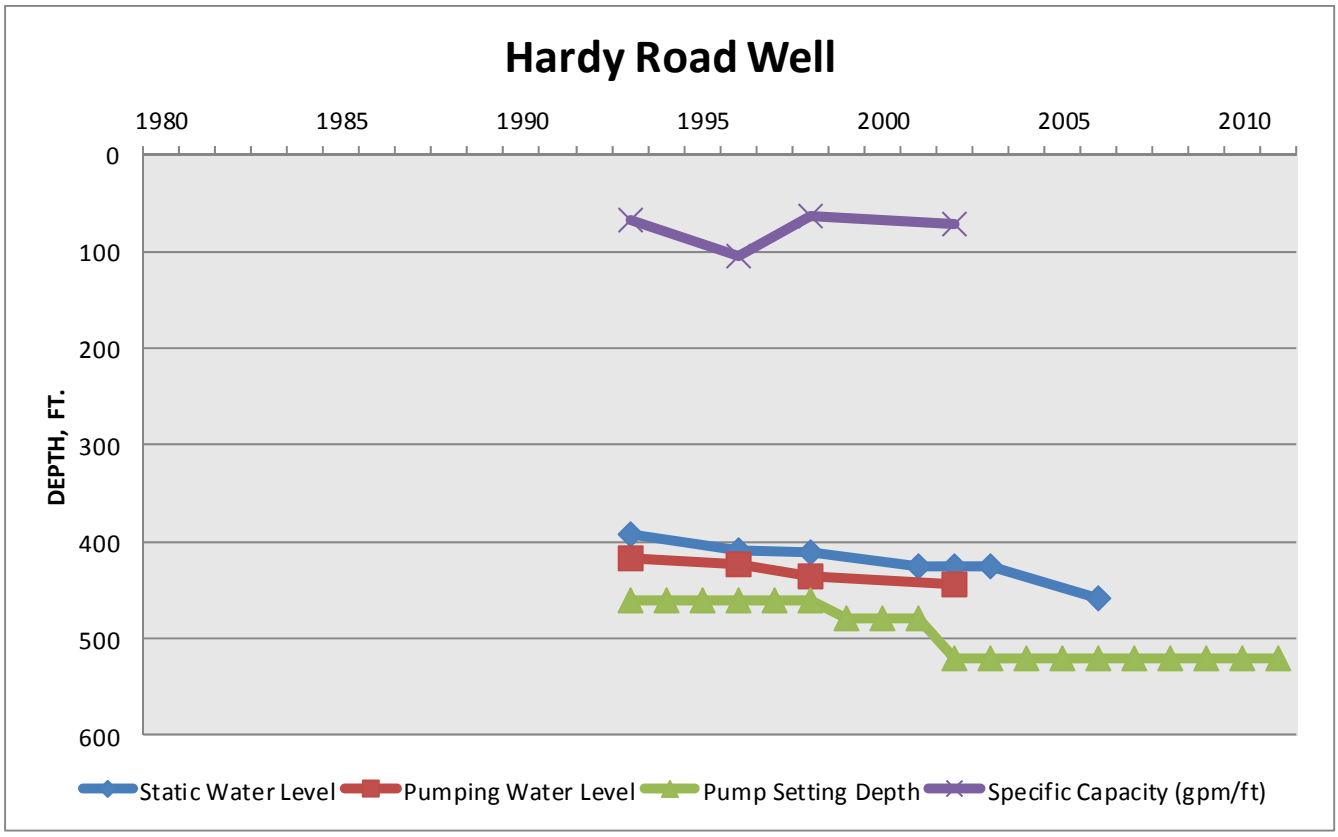
Water Well Static Water Levels

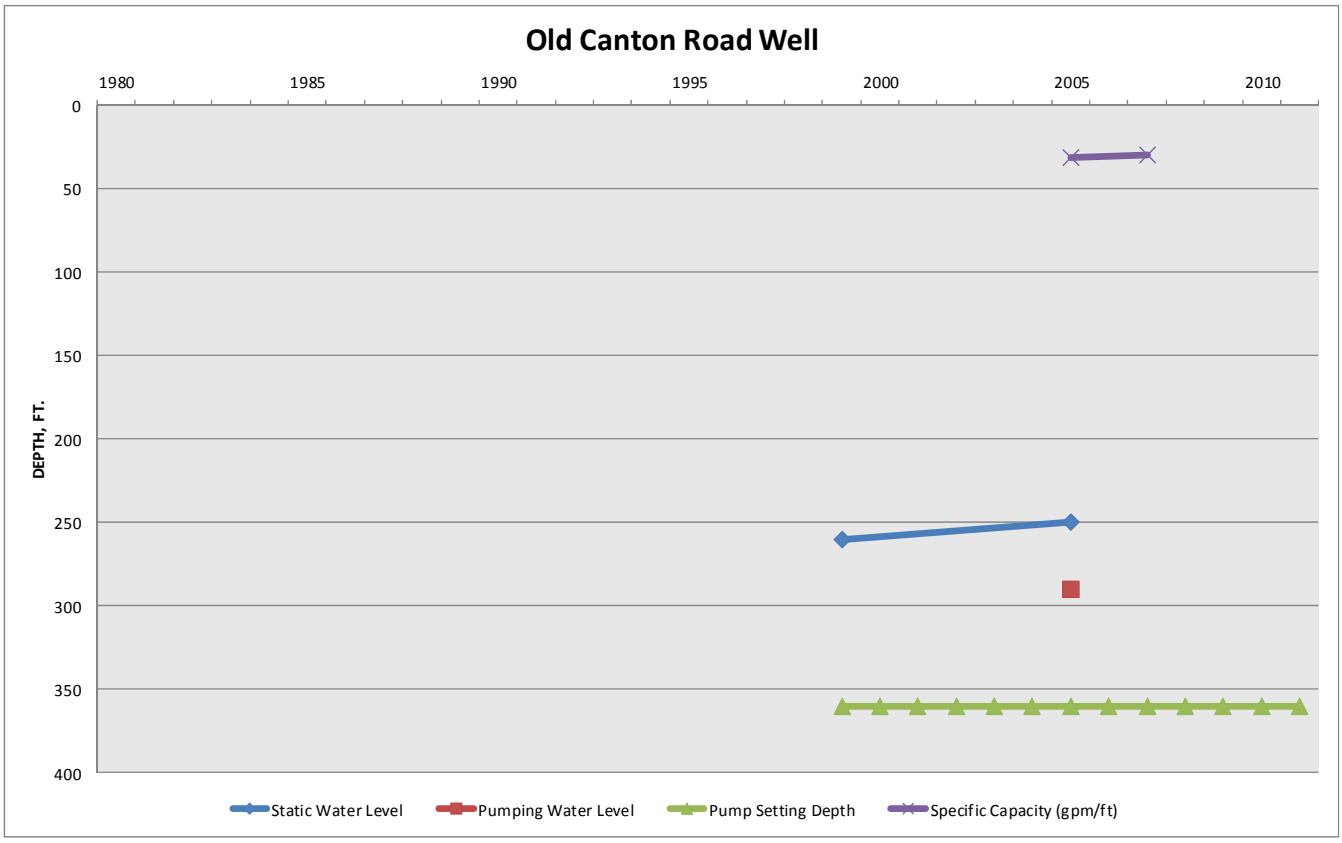




City of Ridgeland

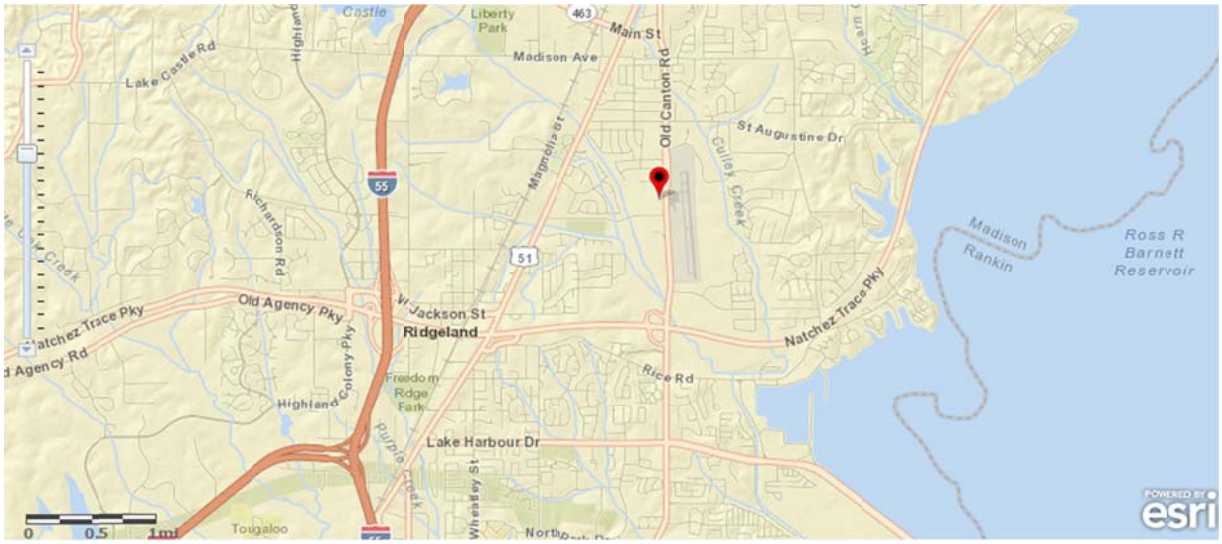
Water Well Static Water Levels

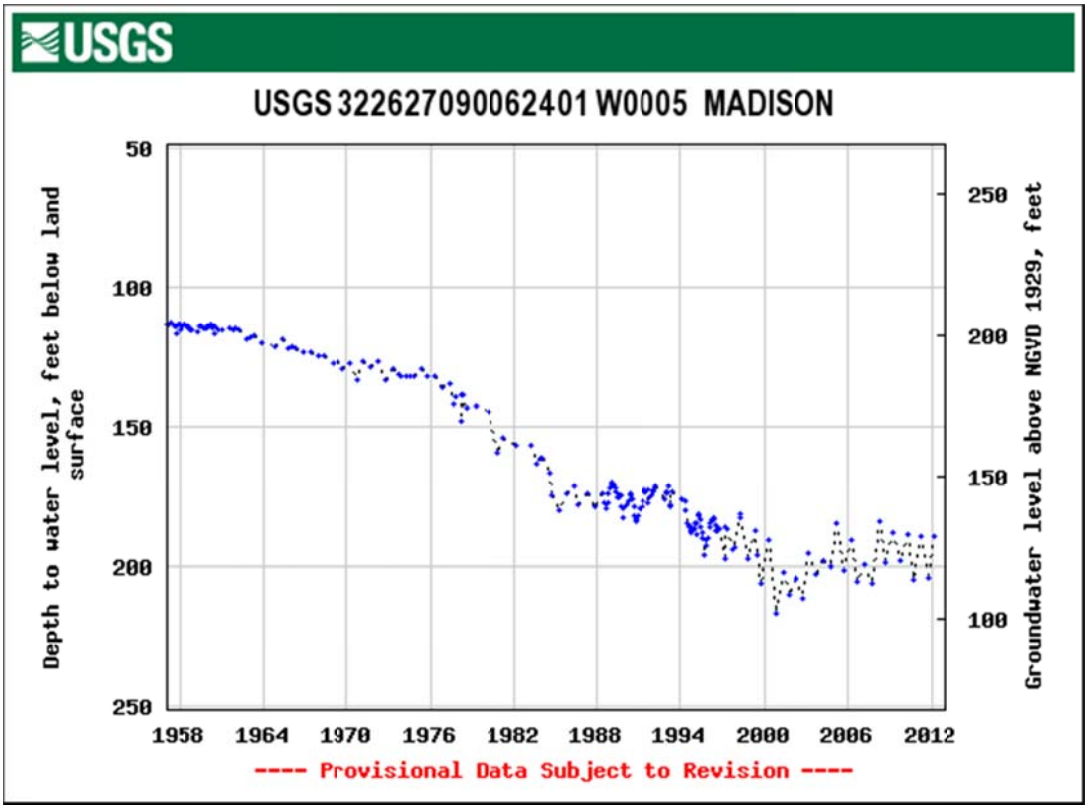




USGS 322627090062401 W0005 MADISON

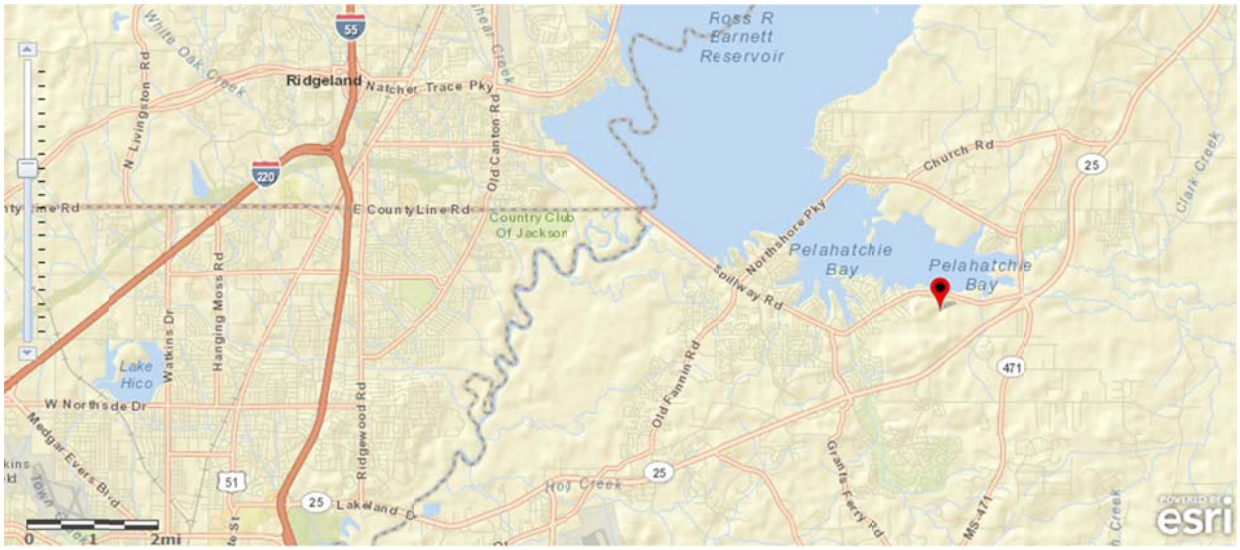
Madison County, Mississippi
Hydrologic Unit Code 03180002
Latitude 32°26'36", Longitude 90°06'25" NAD83
Land-surface elevation 318 feet above NGVD29
The depth of the well is 500 feet below land surface.
This well is completed in the **Mississippi embayment aquifer system (S100MSEMBM) national aquifer**.
This well is completed in the **Cockfield Formation of Claiborne Group (124CCKF) local aquifer**.

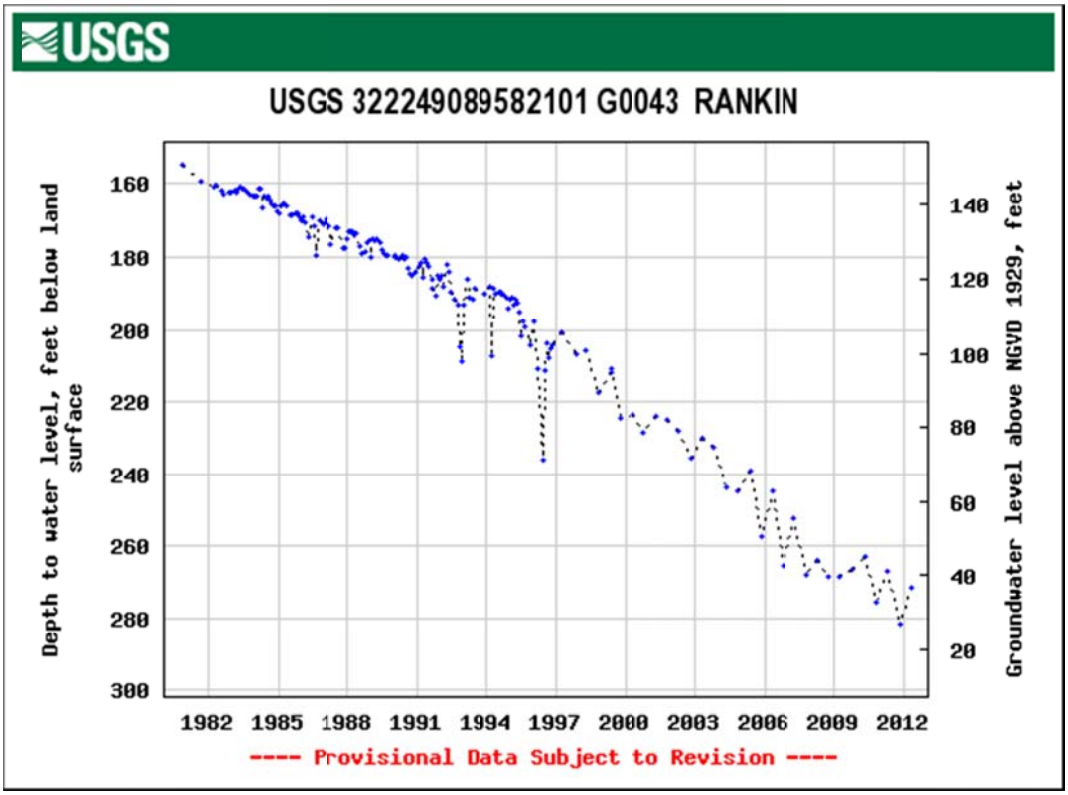




USGS 322249089582101 G0043 RANKIN

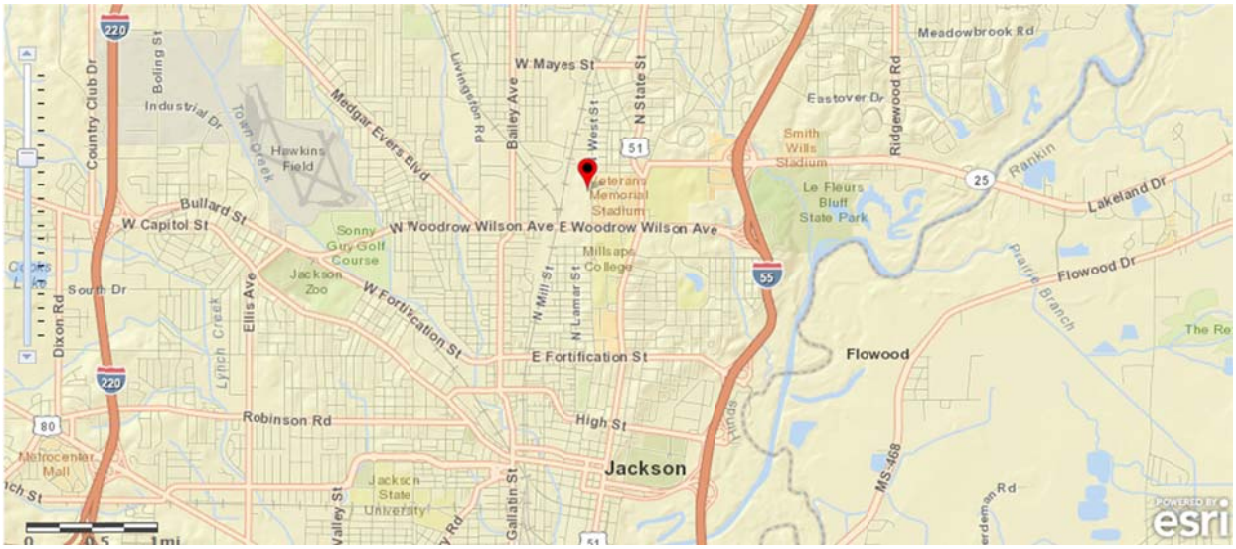
Rankin County, Mississippi
Hydrologic Unit Code 03180002
Latitude 32°22'49.63", Longitude 89°59'14.73" NAD83
Land-surface elevation 307 feet above NGVD29
The depth of the well is 1,170 feet below land surface.
The depth of the hole is 1,298 feet below land surface.
This well is completed in the **Mississippi embayment aquifer system (S100MSEMBM) national aquifer**.
This well is completed in the **Sparta Sand (124SPRT) local aquifer**.

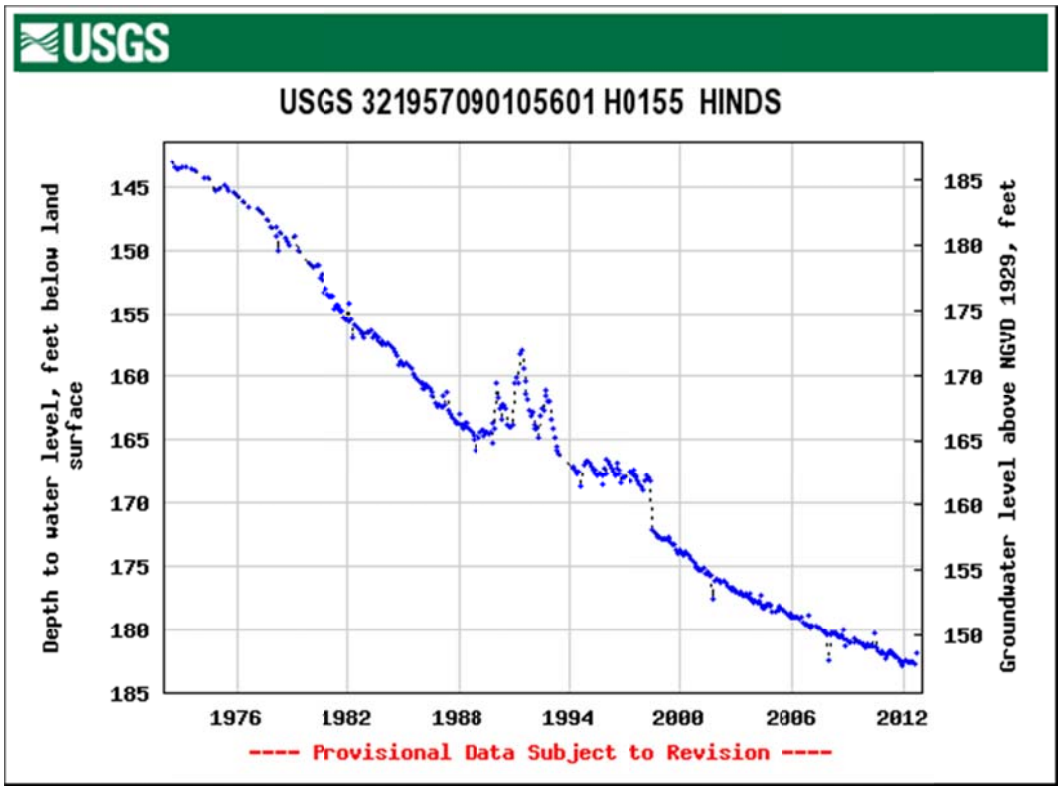




USGS 321957090105601 H0155 HINDS

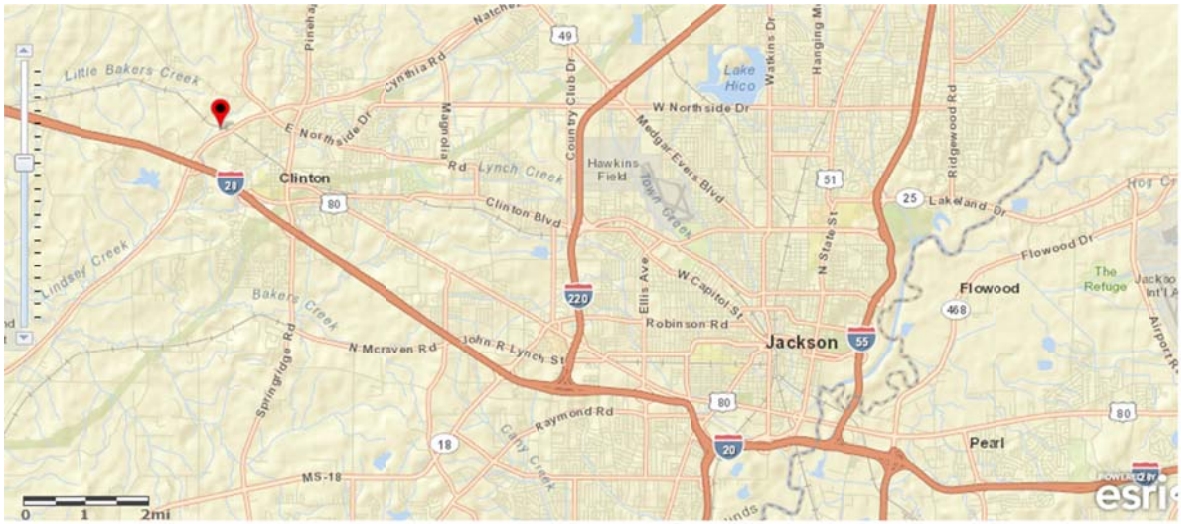
Hinds County, Mississippi
Hydrologic Unit Code 03180002
Latitude 32°19'57", Longitude 90°10'56" NAD83
Land-surface elevation 330 feet above NGVD29
The depth of the well is 200 feet below land surface.
The depth of the hole is 200 feet below land surface.
This well is completed in the **Mississippi embayment aquifer system (S100MSEMBM) national aquifer**.
This well is completed in the **Cockfield Formation of Claiborne Group (124CCKF) local aquifer**.

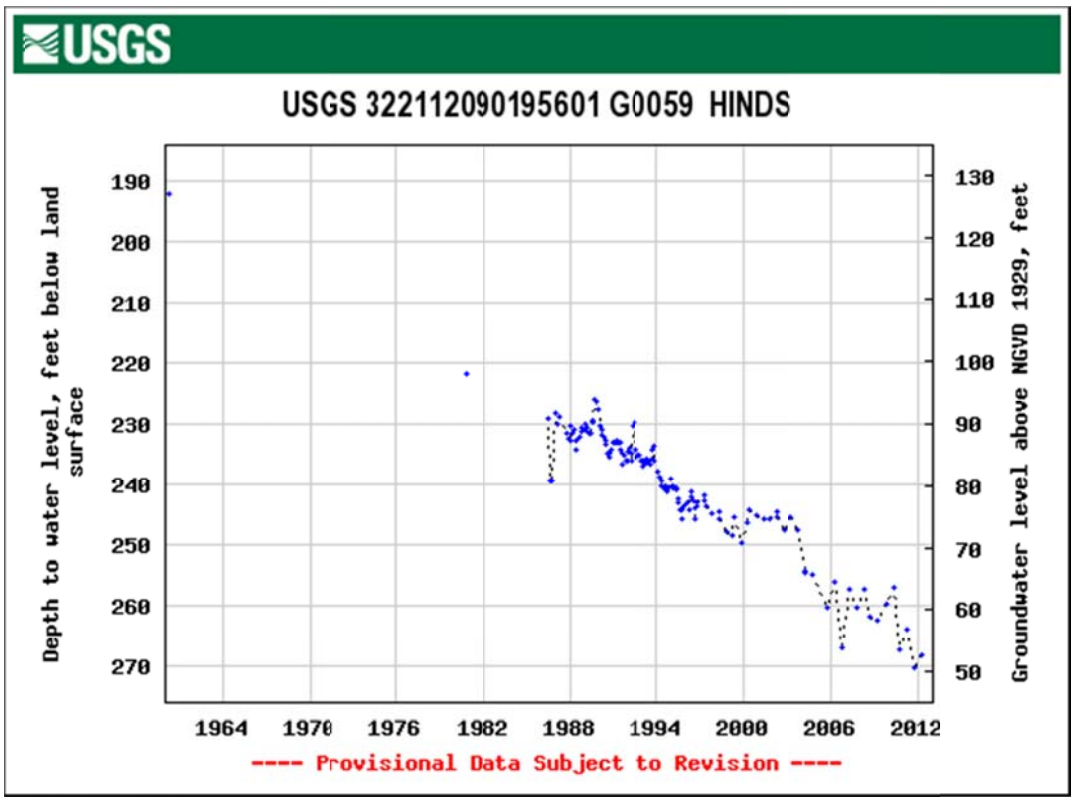




USGS 322112090195601 G0059 HINDS

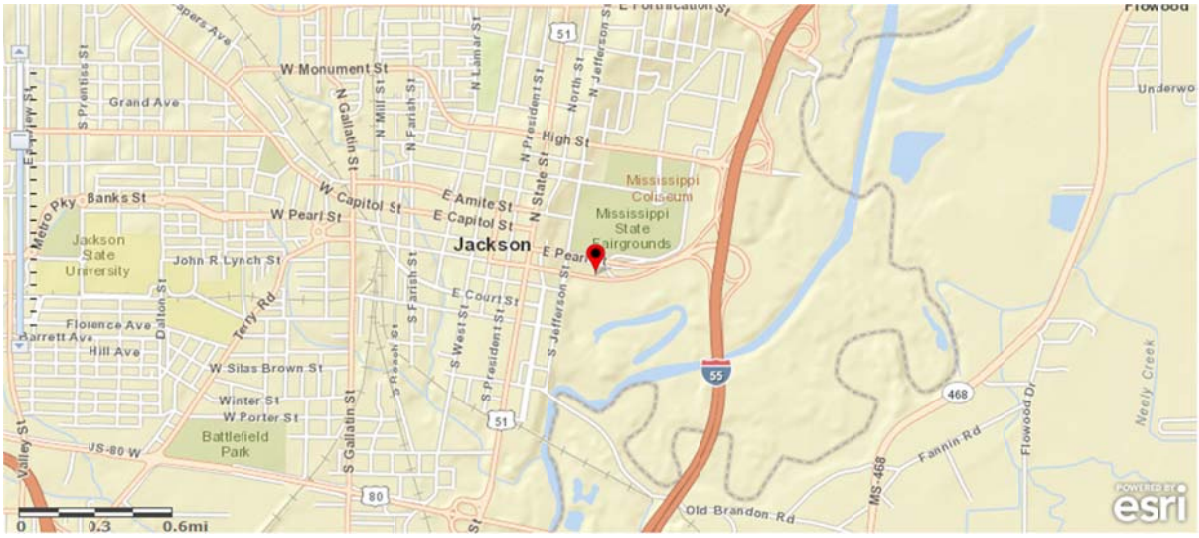
Hinds County, Mississippi
Hydrologic Unit Code 08060202
Latitude 32°21'14.59", Longitude 90°20'41.6" NAD83
Land-surface elevation 320.00 feet above NGVD29
The depth of the well is 893 feet below land surface.
This well is completed in the **Mississippi embayment aquifer system (S100MSEMBM) national aquifer.**
This well is completed in the **Cockfield Formation of Claiborne Group (124CCKF) local aquifer.**

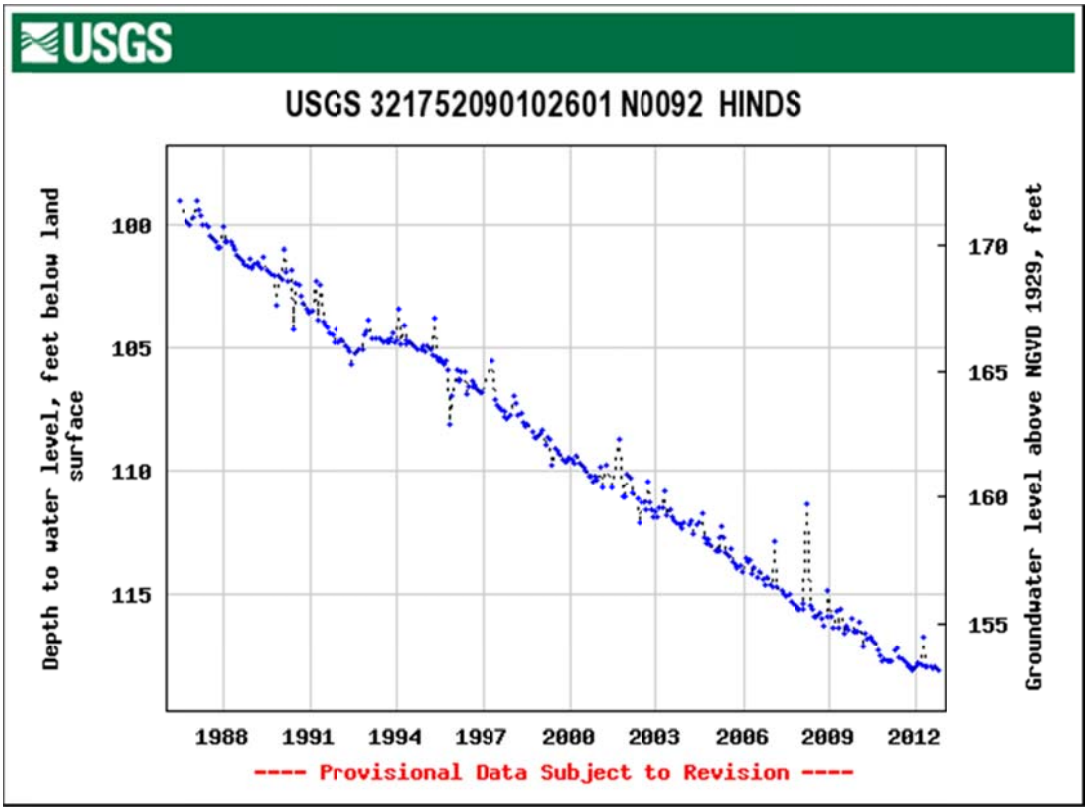




USGS 321752090102601 N0092 HINDS

Hinds County, Mississippi
Hydrologic Unit Code 03180002
Latitude 32°17'51", Longitude 90°10'33" NAD83
Land-surface elevation 271 feet above NGVD29
The depth of the well is 260 feet below land surface.
The depth of the hole is 840 feet below land surface.
This well is completed in the **Mississippi embayment aquifer system (S100MSEMBM) national aquifer**.
This well is completed in the **Cockfield Formation of Claiborne Group (124CCKF) local aquifer**.





Water Loss Calculations 2012

** Based on monthly combined information from flow meter readings at the wells and SCADA reports.*

Fiscal Year 2012

City of Ridgeland

05/21/13

CITY OF RIDGELAND SYSTEM (COR)

PWS ID #0450013

METERED WATER PUMPED, (1,000 gal.)

	Oct-11		Nov-11		Dec-11		Jan-12		Feb-12		Mar-12		Apr-12		May-12		Jun-12		Jul-12		Aug-12		Sep-12	
Well Name	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date
School Street	9,113	October 17, 2011	1,279	November 16, 2011	4,913	December 15, 2011	5,708	January 17, 2012	3,966	February 15, 2012	7,662	March 15, 2012	15,829	April 16, 2012	18,209	May 15, 2012	27,274	June 18, 2012	19,749	July 16, 2012	21,375	August 15, 2012	21,186	September 17, 2012
Peach Orchard	22,605	October 17, 2011	23,452	November 16, 2011	19,614	December 15, 2011	18,292	January 17, 2012	20,010	February 15, 2012	9,841	March 15, 2012	11,452	April 16, 2012	12,889	May 15, 2012	19,385	June 18, 2012	14,284	July 16, 2012	17,534	August 15, 2012	17,244	September 17, 2012
Lake Harbor	22,741	October 17, 2011	23,683	November 16, 2011	20,382	December 15, 2011	20,086	January 17, 2012	9,534	February 15, 2012	10,504	March 15, 2012	12,769	April 16, 2012	11,675	May 15, 2012	21,292	June 18, 2012	15,268	July 16, 2012	17,223	August 15, 2012	15,080	September 17, 2012
Charity Church	6,604	October 17, 2011	5,280	November 16, 2011	2,336	December 15, 2011	24,029	January 17, 2012	9,691	February 15, 2012	11,660	March 15, 2012	8,913	April 16, 2012	13,187	May 15, 2012	13,077	June 18, 2012	16,580	July 16, 2012	18,948	August 15, 2012	17,675	September 17, 2012
Old Canton	11,187	October 17, 2011	9,624	November 16, 2011	4,228	December 15, 2011	7,108	January 17, 2012	13,473	February 15, 2012	11,415	March 15, 2012	15,489	April 16, 2012	17,374	May 15, 2012	21,388	June 18, 2012	28,620	July 16, 2012	33,248	August 15, 2012	32,156	September 17, 2012
Hardy Road	16,246	October 17, 2011	14,838	November 16, 2011	9,587	December 15, 2011	8,903	January 17, 2012	3,909	February 15, 2012	6,172	March 15, 2012	6,253	April 16, 2012	10,105	May 15, 2012	10,016	June 18, 2012	19,389	July 16, 2012	497	August 15, 2012	0	September 17, 2012
MONTHLY TOTAL	88,496		78,156		61,060		84,126		60,583		57,254		70,705		83,439		112,432		113,890		108,825		103,341	
YEARLY TOTAL-TO-DATE	88,496		166,652		227,712		311,838		372,421		429,675		500,380		583,819		696,251		810,141		918,966		1,022,307	

METERED WATER CONSUMPTION, (1,000 gal.)

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
SPR-020-10-RESIDENTIAL	11,127	7,881	2,934	1,137	576	451	8,849	8,082	12,620	15,515	11,586	7,996
SPR-020-20-COMMERCIAL	9,282	6,209	2,703	1,189	1,302	1,041	2,406	6,848	8,515	10,584	10,215	7,653
SPR-020-99-NO CHARGE--CITY	16	22	3	1	0	0	7	19	406	141	14	386
WTR-010-10-RESIDENTIAL INSIDE	51,634	50,544	48,887	46,724	45,215	42,122	43,962	52,275	55,782	63,892	56,178	50,727
WTR-010-109-NO CHARGE--CITY SPRK	0	0	0	0	0	0	0	0	4	3	8	2
WTR-010-20-COMMERCIAL	34,901	32,392	28,073	28,064	27,818	26,080	27,002	35,099	31,281	35,231	36,895	34,080
WTR-010-30-RESIDENTIAL OUTSIDE	356	381	408	397	484	314	502	443	348	493	993	343
WTR-010-99-NO CHARGE--CITY	403	386	204	630	668	168	209	570	444	804	309	590
MONTHLY TOTAL	107,719	97,815	83,212	78,142	76,063	70,176	82,937	103,336	109,400	126,663	116,198	101,777
YEARLY TOTAL-TO-DATE	107,719	205,534	288,746	366,888	442,951	513,127	596,064	699,400	808,800	935,463	1,051,661	1,153,438

WATER LOSS, (%)

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
MONTHLY TOTAL	-21.7%	-25.2%	-36.3%	7.1%	-25.6%	-22.6%	-17.3%	-23.8%	2.7%	-11.2%	-6.8%	1.5%
YEARLY TOTAL-TO-DATE	-21.7%	-23.3%	-26.8%	-17.7%	-18.9%	-19.4%	-19.1%	-19.8%	-16.2%	-15.5%	-14.4%	-12.8%

LIVINGSTON ROAD SYSTEM (LRWA)

PWS ID #450009

METERED WATER PUMPED, (1,000 gal.)

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
Well Name	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date	Amount	Read Date
Walter Payton (Western)	27,789.0	October 17, 2011	28,365.0	November 16, 2011	26,220.0	December 15, 2011	32,774.0	January 17, 2012	32,986.0	February 15, 2012	32,038.0	March 15, 2012	35,525.0	April 16, 2012	32,429.0	May 15, 2012	39,766.0	June 18, 2012	35,038.0	July 16, 2012	36,765.0	August 15, 2012	34,840.0	September 17, 2012
Samuels Lane	35.0	October 17, 2011	59.0	November 16, 2011	0.0	December 15, 2011	0.0	January 17, 2012	0.0	February 15, 2012	0.0	March 15, 2012	0.0	April 16, 2012	0.0	May 15, 2012	0.0	June 18, 2012	0.0	July 16, 2012	0.0	August 15, 2012	0.0	September 17, 2012
MONTHLY TOTAL	27,824.0		28,424.0		26,220.0		32,774.0		32,986.0		32,038.0		35,525.0		32,429.0		39,766.0		35,038.0		36,765.0		34,840.0	
YEARLY TOTAL-TO-DATE	27,824.0		56,248.0		82,468.0		115,242.0		148,228.0		180,266.0		215,791.0		248,220.0		287,986.0		323,024.0		359,789.0		394,629.0	

METERED WATER CONSUMPTION, (1,000 gal.)

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
BOOK 11-WTR-010-10-RESIDENTIAL INSIDE	802	895	862	846	890	952	792	1,034	929	1,162	845	862
BOOK 11-WTR-010-20-COMMERCIAL	55	56	49	62	62	39	47	49	41	97	45	30
MONTHLY TOTAL	857	951	911	908	952	991	839	1,083	970	1,259	890	892
YEARLY TOTAL-TO-DATE	857	1,808	2,719	3,627	4,579	5,570	6,409	7,492	8,462	9,721	10,611	11,503

WATER LOSS, (%)

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
MONTHLY TOTAL	97%	97%	97%	97%	97%	97%	98%	97%	98%	96%	98%	97%
YEARLY TOTAL-TO-DATE	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%

BOTH SYSTEMS COMBINED

METERED WATER PUMPED, (1,000 gal.)

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
MONTHLY TOTAL	116,320.0	106,580.0	87,280.0	116,900.0	93,569.0	89,292.0	106,230.0	115,868.0	152,198.0	148,928.0	145,590.0	138,181.0
YEARLY TOTAL-TO-DATE	116,320.0	222,900.0	310,180.0	427,080.0	520,649.0	609,941.0	716,171.0	832,039.0	984,237.0	1,133,165.0	1,278,755.0	1,416,936.0

METERED WATER CONSUMPTION, (1,000 gal.)

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
MONTHLY TOTAL	108,576	98,766	84,123	79,050	77,015	71,167	83,776	104,419	110,370	127,922	117,088	102,669
YEARLY TOTAL-TO-DATE	108,576	207,342	291,465	370,515	447,530	518,697	602,473	706,892	817,262	945,184	1,062,272	1,164,941

WATER LOSS, (%)

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
MONTHLY TOTAL	7%	7%	4%	32%	18%	20%	21%	10%	27%	14%	20%	26%
YEARLY TOTAL-TO-DATE	7%	7%	6%	13%	14%	15%	16%	15%	17%	17%	17%	18%

the city of RIDGELAND

City of Ridgeland, FY 2011

Water Meter Readings

05/17/13

PWS #0450013 - RESIDENTIAL

From	To	Days	Usage (Kgal)	Daily (Kgal)
9/10/2010	10/10/2010	30	83,495	2,783
10/10/2010	11/9/2010	30	74,343	2,478
11/9/2010	12/9/2010	30	47,420	1,581
12/9/2010	1/8/2011	30	46,283	1,543
1/8/2011	2/7/2011	30	53,498	1,783
2/7/2011	3/9/2011	30	45,120	1,504
3/9/2011	4/8/2011	30	50,008	1,667
4/8/2011	5/8/2011	30	51,454	1,715
5/8/2011	6/7/2011	30	104,500	3,483
6/7/2011	7/7/2011	30	91,574	3,052
7/7/2011	8/6/2011	30	68,757	2,292
8/6/2011	9/6/2011	31		-

PWS #0450009 - RESIDENTIAL

From	To	Days	Usage (Kgal)	Daily (Kgal)
9/10/2010	10/10/2010	30	957	32
10/10/2010	11/9/2010	30	992	33
11/9/2010	12/9/2010	30	750	25
12/9/2010	1/8/2011	30	765	26
1/8/2011	2/7/2011	30	911	30
2/7/2011	3/9/2011	30	804	27
3/9/2011	4/8/2011	30	645	22
4/8/2011	5/8/2011	30	723	24
5/8/2011	6/7/2011	30	1,345	45
6/7/2011	7/7/2011	30	1,114	37
7/7/2011	8/6/2011	30	845	28
8/6/2011	9/6/2011	31		-

PWS #0450013 - COMMERCIAL

From	To	Days	Usage (Kgal)	Daily (Kgal)
9/10/2010	10/10/2010	30	50,005	1,667
10/10/2010	11/9/2010	30	52,658	1,755
11/9/2010	12/9/2010	30	30,346	1,012
12/9/2010	1/8/2011	30	26,145	872
1/8/2011	2/7/2011	30	29,338	978
2/7/2011	3/9/2011	30	27,230	908
3/9/2011	4/8/2011	30	30,760	1,025
4/8/2011	5/8/2011	30	32,081	1,069
5/8/2011	6/7/2011	30	53,738	1,791
6/7/2011	7/7/2011	30	49,600	1,653
7/7/2011	8/6/2011	30	47,200	1,573
8/6/2011	9/6/2011	31		-

PWS #0450009 - COMMERCIAL

From	To	Days	Usage (Kgal)	Daily (Kgal)
9/10/2010	10/10/2010	30	45	2
10/10/2010	11/9/2010	30	45	2
11/9/2010	12/9/2010	30	39	1
12/9/2010	1/8/2011	30	38	1
1/8/2011	2/7/2011	30	90	3
2/7/2011	3/9/2011	30	38	1
3/9/2011	4/8/2011	30	36	1
4/8/2011	5/8/2011	30	37	1
5/8/2011	6/7/2011	30	65	2
6/7/2011	7/7/2011	30	59	2
7/7/2011	8/6/2011	30	45	2
8/6/2011	9/6/2011	31		-

PWS #0450013 - NO CHARGE-CITY

From	To	Days	Usage (Kgal)	Daily (Kgal)
9/10/2010	10/10/2010	30	529	18
10/10/2010	11/9/2010	30	564	19
11/9/2010	12/9/2010	30	167	6
12/9/2010	1/8/2011	30	156	5
1/8/2011	2/7/2011	30	274	9
2/7/2011	3/9/2011	30	133	4
3/9/2011	4/8/2011	30	249	8
4/8/2011	5/8/2011	30	269	9
5/8/2011	6/7/2011	30	642	21
6/7/2011	7/7/2011	30	351	12
7/7/2011	8/6/2011	30	331	11
8/6/2011	9/6/2011	31		-

PWS #0450009 - TOTAL

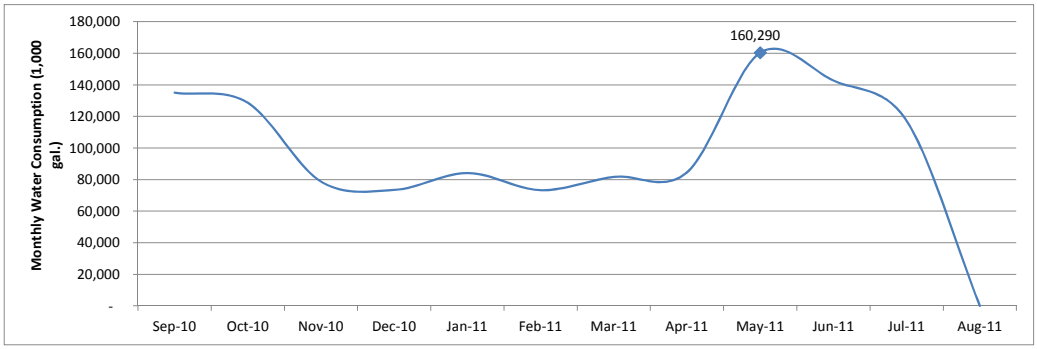
From	To	Days	Usage (Kgal)	Daily (Kgal)
9/10/2010	10/10/2010	30	1,002	33
10/10/2010	11/9/2010	30	1,037	35
11/9/2010	12/9/2010	30	789	26
12/9/2010	1/8/2011	30	803	27
1/8/2011	2/7/2011	30	1,001	33
2/7/2011	3/9/2011	30	842	28
3/9/2011	4/8/2011	30	681	23
4/8/2011	5/8/2011	30	760	25
5/8/2011	6/7/2011	30	1,410	47
6/7/2011	7/7/2011	30	1,173	39
7/7/2011	8/6/2011	30	890	30
8/6/2011	9/6/2011	31	-	-

PWS #0450013 - TOTAL

From	To	Days	Usage (Kgal)	Daily (Kgal)
9/10/2010	10/10/2010	30	134,029	4,468
10/10/2010	11/9/2010	30	127,565	4,252
11/9/2010	12/9/2010	30	77,933	2,598
12/9/2010	1/8/2011	30	72,584	2,419
1/8/2011	2/7/2011	30	83,110	2,770
2/7/2011	3/9/2011	30	72,483	2,416
3/9/2011	4/8/2011	30	81,017	2,701
4/8/2011	5/8/2011	30	83,804	2,793
5/8/2011	6/7/2011	30	158,880	5,296
6/7/2011	7/7/2011	30	141,525	4,718
7/7/2011	8/6/2011	30	116,288	3,876
8/6/2011	9/6/2011	31	-	-

COMBINED PWS #0450013 & #450009 - TOTAL

From	To	Days	Usage (Kgal)	Daily (Kgal)	% of Annual Total
9/10/2010	10/10/2010	30	135,031	4,501	12%
10/10/2010	11/9/2010	30	128,602	4,287	11%
11/9/2010	12/9/2010	30	78,722	2,624	7%
12/9/2010	1/8/2011	30	73,387	2,446	6%
1/8/2011	2/7/2011	30	84,111	2,804	7%
2/7/2011	3/9/2011	30	73,325	2,444	6%
3/9/2011	4/8/2011	30	81,698	2,723	7%
4/8/2011	5/8/2011	30	84,564	2,819	7%
5/8/2011	6/7/2011	30	160,290	5,343	14%
6/7/2011	7/7/2011	30	142,698	4,757	12%
7/7/2011	8/6/2011	30	117,178	3,906	10%
8/6/2011	9/6/2011	31	-	-	0%
Total		361	1,159,606		



MISSISSIPPI STATE DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
MASTER DATA SHEET

Name of Supply Livingston Road W/A **Owner** City of Ridgeland

County Madison **Class** D **Date of Last Inspection** 11 – 02 – 2011

Master Meter Yes **PWS ID #** MS0450009

Supply Source: **Purchase** ____ **Surface** ____ **Ground** X **Number of Wells** Two (Active)

Well Data:

Well ID No.	Location	Year Const.	Cap. (GPM)	Pres.	Casing	Screen	Depth	Controls	Auxiliary Pwr
450009-01	W. of Livingston Rd.	1968	70	65 psi	6"	4"	706'	INACT	none
450009-02	East of Well #1	1994	150		8"	4"	695'	AUTO	generator
450009-03	Walter Peyton Rd.	2010	1600	72 psi	16"	10"	1230'	AUTO	550 kw generator

Well #1 pumps sand and is inactive.
Pump test results (September 2011): Well #2 – 89 gpm @ 80 psi
Master Meter Reading: Well #2 – 681,455,000 gals; Well #3 – 326,386,000 gals & 1350 gpm

Treatment: **Iron** ____ **Softening** ____ **Corrosion** ____ **Chlorine** X **Fluoride** X

	Type	Capacity	Remarks	Location
Chlorinator	Capital Advance	50 ppd w/ switchover	Set at 7 ppd	Well #2
Chlorinator	Capital Advance (tons)	200 ppd w/ switchover	Set at 95 ppd	Well #3
Fluoridator	LMI	10 gph max	Sp/str set at 60/55	Well #3

Storage:	Location	Material	Capacity	Remarks
Pressure	Well #1	Steel	2,500 gallons	emergency only
Pressure	Well #2	Steel	6,000 gallons	60-80 psi
Elevated (2010)	Well #3	Steel	500,000 gallons	155' to OF; 37'6" HR

Mississippi State Department of Health

Division of Water Supply

LIVINGSTON ROAD WATER ASSOCIATION

FY 2012 Public Water System Capacity Assessment Form

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MISSISSIPPI STATE DEPARTMENT OF HEALTH

REPORT OF INSPECTION OF DRINKING WATER SUPPLY

PWS: 0450009 **Class:** D

An inspection of the LIVINGSTON ROAD WATER ASSN water supply in MADISON county was made on 11/02/2011. Present at the time of inspection was MARK B MCMANUS, OPERATOR; JASON JONES, CERTIFIED OPERATOR; RENEE BUCKNER, OFFICE MANAGER; WRITER. Official JOHN M MCCOLLUM Address P O BOX 217 RIDGELAND MS 39158 W.W. Operator MARK B MCMANUS Address 6002 MAPLEWOOD DR FLOWOOD MS 39232 No. Connections 179 No. Meters ___ Population Served 614 Field Chemical Analysis: pH ___ Cl2(free) 1.4 Cl2(total) ___ H2S N/A Iron ___ Fluoride ___ Point of Sampling 4-LOG VIRUS INACIVATION LOCATION Water Rates ___

COMMENTS

Technical: 5 Managerial: 5 Financial: 5

OVERALL CAPACITY RATING: 5.0 / 5.0

1. Mr. Jones reported that the system is conducting 4-log virus inactivation to comply with the Ground Water Rule. A review of the MORs showed that the chlorine residual is being properly maintained.

2. The system has installed a Hach Cl-17 continuous chlorine monitor at Well #2 and a MicroChem2 continuous chlorine monitor at Well #3.

3. Based on the system's population the first Sanitary Survey under the Ground Water Rule will be conducted in 2012.

4. Well #1 is inactive because it pumps sand. The well should either be rehabilitated or properly abandoned in accordance with recommendations from the Mississippi Department of Environmental Quality.

5. Mr. Jones reported that the SCADA shows Well #2 has not been called to run since September. The latest pump test shows the well is only pumping 89 GPM. The new well and elevated tank can handle the demand on the system, and we recommend that this well be properly abandoned if it will not be used in the future.

6. When system officials are ready to merge this system with the City of Ridgeland system (0450013), they should submit a letter to this office with that request.

GENERAL COMMENTS:

7. We recommend that steel tanks be inspected for paint coating failure, corrosion, rust, and structural integrity and be cleaned or painted (if needed) at least once every five years.

8. When repairs are made on the distribution system, all lines affected should be properly chlorinated and flushed before they are placed back in service.

9. All dead-end water lines should be flushed on a routine schedule to clear the lines of sediment and stagnant water. Full scale flushing should be carefully planned and carried out, beginning at the well or water plant and going to the outer edges of the distribution system. This flushing should be done during periods of low usage.

10. Whenever system pressure is lost, even for brief periods of time, contaminants may be introduced to the system through back-siphonage and/or back flow. When this occurs, system officials should notify all customers in the affected area to boil their drinking water vigorously for one minute. This boil water notice should remain in effect until clear bacteriological samples have been obtained.

Completed by Amy L. McLeod, E.I. on 11/08/2011.

Reviewed by Leslie Royals, P.E. on 11/22/2011.

If you have any questions, please call (601)576-7518.

pc:

JOHN M MCCOLLUM, OFFICIAL
MARK B MCMANUS, OPERATOR

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Mississippi Department of Health
Bureau of Public Water Supply

STANDARD FORM

FY 2012 Public Water System Capacity Assessment Form

NOTE: This form must be completed whenever a routine sanitary survey of a public water system is conducted by a regional engineer of the Bureau of Public Water Supply

PWS ID#: 0450009 Class: D Survey Date: 11-02-2011 County: MADISON
Public Water System: LIVINGSTON ROAD WATER ASSN Conn: 179
Certified Waterworks Operator: MARK B MCMANUS Pop: 614

CAPACITY RATING DETERMINATION

Technical (T) Capacity Rating: [5] Managerial (M) Capacity Rating [5] Financial (F) Capacity Rating [5]

Capacity Rating $= \frac{T+M+F}{3} = \frac{15}{3} = 5$

Overall Capacity Rating = 5.0

Completed by Amy L. McLeod, E.I. on 11/04/2011
Reviewed by Leslie Royals, P.E. on 11/22/2011

Comments: _____

Technical Capacity Assessment	Point Scale	Point Award
[T1] Does the water system have any significant deficiencies? [Y (N)]	N - 1pt. Y - 0pt.	1
[T2] **1)** Was the water treatment process functioning properly? [(Y) N] (i.e. Is pH, iron, free chlorine, etc. within acceptable range?) **2)** Was needed water system equipment in place and functioning properly at the time of survey? [(Y) N] (**NOTE:** Equipment deficiencies must be identified in survey report.) **3)** Were records available to the regional engineer clearly showing that all water storage tanks have been inspected and cleaned or painted (if needed) within the past 5 years? [(Y) N NA] (**NOTE:** All YESs required to receive point)	All Y - 1 pt. Else - 0 pt.	1
[T3] **1)** Was the certified waterworks operator or his/her authorized representative present for the survey? [(Y) N] **2)** Was log book up to date and properly maintained and did it show that MDH Minimum JOB Guidelines for W. W. Operators were being met? [(Y) N] **3)** Was the water system properly maintained at the time of survey? [(Y) N] **4)** Did operator satisfactorily demonstrate to the regional engineer that he/she could fully perform all water quality tests required to properly operate this water system? [(Y) N] (**NOTE:** All YESs required to receive point)	All Y - 1 pt. Else - 0 pt.	1
[T4] **1)** Does water system routinely track water loss and were acceptable water loss records available for review by the regional engineer? [(Y) N] **2)** Is water system overloaded? (i.e. serving customers in excess of MSDH approved design capacity)? [Y (N)] **3)** Was there any indication that the water system is/has been experiencing pressure problems in any part(s) of the distribution system? [Y (N)] (based on operator information, customer complaints, MSDH records, other information) **4)** Are well pumping tests performed routinely? [(Y) N NA] (**NOTE:** YES FOR #1 & YES OR N/A FOR #4 AND NOs FOR #2 & #3 required to receive point)	1)Y - pt. 2)N - pt. 3)N - pt. 4)Y - pt.	1
[T5] **1)** Does the water system have the ability to provide water during power outages? (i.e. generator, emergency tie-ins, etc.) [(Y) N] **2)** Does the water system have a usable backup source of water? [(Y) N] (**NOTE:** Must be documented on survey report)	All Y - 1 pt. Else - 0 pt.	1
TECHNICAL CAPACITY RATING = [5] (Total Points)		

Public Water System: LIVINGSTON ROAD WATER ASSN PWS ID #: 0450009

FY 2012 Public Water System Capacity Assessment Form Survey Date: 11-02-2011

Managerial Capacity Assessment	Point Scale	Point Award
[M1] Were all SDWA required records maintained in a logical and orderly manner and available for review by the regional engineer during the survey? [(Y) N]	Y - 1pt. N - 0pt.	1
[M2] 1) Have acceptable written policies and procedures for operating this water system been formally adopted and were these policies available for review during the survey? [(Y) N] **2)** Have all board members (in office more than 12 months) completed Board Member Training? [(Y) N NA] **3)** Does the Board of Directors meet monthly and were minutes of Board meetings available for review during the survey? (**NOTE:** Quarterly meetings allowed if system has an officially designated full time manager) [(Y) N NA] (**NOTE:** ALL YESs or NAs required to receive point. NA - Not Applicable)	All Y - 1 pt. Else - 0 pt.	1
[M3] Has the water system had any SDWA violations since the last Capacity Assessment? [Y (N)]	N - 1pt. Y - 0pt.	1
[M4] Has the water system developed a long range improvements plan and was this plan available for review during the survey? [(Y) N]	Y - 1pt. N - 0pt.	1
[M5] 1) Does the water system have an effective cross connection control program in compliance with MDH regulations? [(Y) N] **2)** Was a copy of the MSDH approved bacti site plan and lead/copper site plan available for review during the survey and do the bacti results clearly show that this approved plan is being followed? [(Y) N] (**NOTE:** All YESs required to receive point)	All Y - 1 pt. Else - 0 pt.	1
MANAGERIAL CAPACITY RATING = [5] (Total Points)		

Financial Capacity Assessment	Point Scale	Point Award
[F1] Has the water system raised water rates in the past 5 years? [(Y) N] (**NOTE:** Point may be awarded if the water system provides acceptable financial documentation clearly showing that a rate increase is not needed, i.e. revenue has consistently exceeded expenditures by at least 10%, etc.)	Y - 1pt. N - 0pt.	1
[F2] Does the water system have an officially adopted policy requiring that water rates be routinely reviewed and adjusted as appropriate and was this policy available for review during the survey? [(Y) N]	Y - 1pt. N - 0pt.	1
[F3] Does the water system have an officially adopted cut-off policy for customers who do not pay their water bills, was a copy of this policy available for review by the regional engineer, and do system records (cut-off lists, etc.) clearly show that the water system effectively implements this cut-off policy? [(Y) N]	Y - 1pt. N - 0pt.	1
[F4] Was a copy of the water system's officially adopted annual budget available for review by the regional engineer and does the water system's financial accounting system clearly and accurately track the expenditure and receipt of funds? [(Y) N]	Y - 1pt. N - 0pt.	1
[F5 - Municipal Systems] 1) Is the municipality current in submitting audit reports to the State Auditor's Office? [Y N] **2)** Was a copy of the latest audit report available for review at the time of the survey? [Y N] **3)** Does this audit report clearly show that water and sewer fund account(s) are maintained separately from all other municipal accounts? [Y N] (**NOTE:** Yes answer to all questions required to receive point.)	All Y - 1 pt. Else - 0 pt.	
[F5 - Rural Systems] 1) Has the rural water system filed the required financial reports with the State Auditor's Office and were these reports available for review? [(Y) N] **2)** Does the latest financial report show that receipts exceeded expenditures? [(Y) N] (**NOTE:** Yes answer to both questions required to receive point)	All Y - 1 pt. Else - 0 pt.	1
FINANCIAL CAPACITY RATING = [5] (Total Points)		

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MISSISSIPPI DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
DESIGN CAPACITY SHEET

System: **LIVINGSTON ROAD WATER ASSN**
ID: **0450009** Class: **D** County: **MADISON**

Date Completed: **11/09/2011**
Connections - Actual: **179** Equivalent: **179**
Design Capacity: **4189** Percent Design Capacity: **179/4189 = 4.3%**

Design Capacity (# connections) = well capacity (gpm) + elevated storage/200

Although Well #1 can pump water into the system, it pumps sand and should not be considered in the design capacity calculations.

Well #2 = 89 gpm @ 80 psi (September 2011 pump test)
Well #3 = 1600 gpm
Total well capacity = 1689 gpm

Elevated storage = 500,000 gallons

Design Capcaity = 1689 + (500,000/200)
Design Capacity = 4189

Connections = 179

% design capacity = (# connections/design capacity) * 100
% design capacity = (179/4189) * 100
% design capacity = 4%

GROUNDWATER RULE CALCULATIONS:
Minimum free chlorine residuals for 4-log inactivation of Viruses:

Well #2:
Actual measured groundwater temperature = 80F; CT = 1.8 mg/l min
Contact time in pressure tank = 6,000 gallons * 1/6 / 111 gpm = 9 min
C = 1.8 mg/l min / 9 min
C = 0.2 mg/l

Well #3:
Temperature = 65 + (1300/100) = 78F; CT = 1.95 mg/l min

MISSISSIPPI STATE DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
MASTER DATA SHEET

Name of Supply Livingston Road W/A **Owner** City of Ridgeland

County Madison **Class** D **Date of Last Inspection** 11 – 02 – 2011

Master Meter Yes **PWS ID #** MS0450009

Supply Source: **Purchase** ____ **Surface** ____ **Ground** X **Number of Wells** Two (Active)

Well Data:

Well ID No.	Location	Year Const.	Cap. (GPM)	Pres.	Casing	Screen	Depth	Controls	Auxiliary Pwr
450009-01	W. of Livingston Rd.	1968	70	65 psi	6"	4"	706'	INACT	none
450009-02	East of Well #1	1994	150		8"	4"	695'	AUTO	generator
450009-03	Walter Peyton Rd.	2010	1600	72 psi	16"	10"	1230'	AUTO	550 kw generator

Well #1 pumps sand and is inactive.
Pump test results (September 2011): Well #2 – 89 gpm @ 80 psi
Master Meter Reading: Well #2 – 681,455,000 gals; Well #3 – 326,386,000 gals & 1350 gpm

Treatment: **Iron** ____ **Softening** ____ **Corrosion** ____ **Chlorine** X **Fluoride** X

	Type	Capacity	Remarks	Location
Chlorinator	Capital Advance	50 ppd w/ switchover	Set at 7 ppd	Well #2
Chlorinator	Capital Advance (tons)	200 ppd w/ switchover	Set at 95 ppd	Well #3
Fluoridator	LMI	10 gph max	Sp/str set at 60/55	Well #3

Storage:	Location	Material	Capacity	Remarks
Pressure	Well #1	Steel	2,500 gallons	emergency only
Pressure	Well #2	Steel	6,000 gallons	60-80 psi
Elevated (2010)	Well #3	Steel	500,000 gallons	155' to OF; 37'6" HR

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MISSISSIPPI STATE DEPARTMENT OF HEALTH

REPORT OF INSPECTION OF DRINKING WATER SUPPLY

PWS: 0450013 **Class:** D

An inspection of the CITY OF RIDGELAND water supply in MADISON county was made on 11/02/2011. Present at the time of inspection was MARK B MCMANUS, OPERATOR; JASON JONES, CERTIFIED OPERATOR; RENEE BUCKNER, OFFICE MANAGER; WRITER. Official JOHN M MCCOLLUM Address P O BOX 217 RIDGELAND MS 39158 W.W. Operator MARK B MCMANUS Address 6002 MAPLEWOOD DR FLOWOOD MS 39232 No. Connections 13045 No. Meters ___ Population Served 20173 Field Chemical Analysis: pH ___ Cl2(free) 1.2 Cl2(total) ___ H2S N/A Iron ___ Fluoride 0.9 Point of Sampling PUBLIC WORKS SHOP Water Rates ___

COMMENTS

Technical: 5 Managerial: 5 Financial: 5

OVERALL CAPACITY RATING: 5.0 / 5.0

1. Mr. Jones reported that the system is conducting 4-log virus inactivation to comply with the Ground Water Rule. A review of the MORs showed that the chlorine residual is being properly maintained. During the inspection, all continuous chlorine monitors showed chlorine residuals at or above the minimum required to achieve 4-log virus inactivation while the wells were running.

2. System officials and operators should be commended for the hard work they do to keep this system in good working order.

3. PChem samples were collected from Wells #2-#6 at the time of inspection. These samples should be collected every five years. The field results for iron, pH, and temperature are given below:

	Well #2	Well #3	Well #4	Well #5	Well #6
Fe:	0.0 ppm	0.0 ppm	0.0 ppm	0.0 ppm	0.0 ppm
pH:	8.4	7.7	8.1	8.6	8.8
Temp:	86 F	78 F	78 F	88 F	88 F

4. When repairs are made on the distribution system, all lines affected should be properly chlorinated and flushed before they are placed back in service.

5. All dead-end water lines should be flushed on a routine schedule to clear the lines of sediment and stagnant water. Full scale flushing should be carefully planned and carried out, beginning at the well or water plant and going to the outer edges of the distribution system. This flushing should be done during periods of low usage.

6. Whenever system pressure is lost, even for brief periods of time, contaminants may be introduced to the system through back-siphonage and/or back flow. When this occurs, system officials should notify all customers in the affected area to boil their drinking water vigorously for one minute. This boil water notice should remain in effect until clear bacteriological samples have been obtained.

Completed by Amy L. McLeod, E.I. on 11/07/2011.

Reviewed by Leslie Royals, P.E. on 11/22/2011.

If you have any questions, please call (601)576-7518.

pc:

JOHN M MCCOLLUM, OFFICIAL
MARK B MCMANUS, OPERATOR

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Mississippi Department of Health
Bureau of Public Water Supply

STANDARD FORM

FY 2012 Public Water System Capacity Assessment Form

NOTE: This form must be completed whenever a routine sanitary survey of a public water system is conducted by a regional engineer of the Bureau of Public Water Supply

PWS ID#: 0450013 Class: D Survey Date: 11-02-2011 County: MADISON
Public Water System: CITY OF RIDGELAND Conn: 13045
Certified Waterworks Operator: MARK B MCMANUS Pop: 20173

CAPACITY RATING DETERMINATION

Technical (T) Capacity Rating: [5] Managerial (M) Capacity Rating [5] Financial (F) Capacity Rating [5]

Capacity Rating = $\frac{T+M+F}{3} = \frac{15}{3} = 5$

Overall Capacity Rating = 5.0

Completed by Amy L. McLeod, E.I. on 11/04/2011
Reviewed by Leslie Royals, P.E. on 11/22/2011

Comments:

Technical Capacity Assessment	Point Scale	Point Award
[T1] Does the water system have any significant deficiencies? [Y (N)]	N - 1pt. Y - 0pt.	1
[T2] 1) Was the water treatment process functioning properly? [(Y) N] (i.e. Is pH, iron, free chlorine, etc. within acceptable range?) **2)** Was needed water system equipment in place and functioning properly at the time of survey? [(Y) N] (**NOTE:** Equipment deficiencies must be identified in survey report.) **3)** Were records available to the regional engineer clearly showing that all water storage tanks have been inspected and cleaned or painted (if needed) within the past 5 years? [(Y) N NA] (**NOTE:** All YESs required to receive point)	All Y - 1 pt. Else - 0 pt.	1
[T3] 1) Was the certified waterworks operator or his/her authorized representative present for the survey? [(Y) N] **2)** Was log book up to date and properly maintained and did it show that MDH Minimum JOB Guidelines for W. W. Operators were being met? [(Y) N] **3)** Was the water system properly maintained at the time of survey? [(Y) N] **4)** Did operator satisfactorily demonstrate to the regional engineer that he/she could fully perform all water quality tests required to properly operate this water system? [(Y) N] (**NOTE:** All YESs required to receive point)	All Y - 1 pt. Else - 0 pt.	1
[T4] 1) Does water system routinely track water loss and were acceptable water loss records available for review by the regional engineer? [(Y) N] **2)** Is water system overloaded? (i.e. serving customers in excess of MSDH approved design capacity)? [Y (N)] **3)** Was there any indication that the water system is/has been experiencing pressure problems in any part(s) of the distribution system? [Y (N)] (based on operator information, customer complaints, MSDH records, other information) **4)** Are well pumping tests performed routinely? [(Y) N NA] (**NOTE:** YES FOR #1 & YES OR N/A FOR #4 AND NOs FOR #2 & #3 required to receive point)	1)Y - pt. 2)N - pt. 3)N - pt. 4)Y - pt.	1
[T5] 1) Does the water system have the ability to provide water during power outages? (i.e. generator, emergency tie-ins, etc.) [(Y) N] **2)** Does the water system have a usable backup source of water? [(Y) N] (**NOTE:** Must be documented on survey report)	All Y - 1 pt. Else - 0 pt.	1
TECHNICAL CAPACITY RATING = [5] (Total Points)		

Revision Date: 06/07/2011

Public Water System: CITY OF RIDGELAND PWS ID #: 0450013

FY 2012 Public Water System Capacity Assessment Form Survey Date: 11-02-2011

Managerial Capacity Assessment	Point Scale	Point Award
[M1] Were all SDWA required records maintained in a logical and orderly manner and available for review by the regional engineer during the survey? [(Y) N]	Y - 1pt. N - 0pt.	1
[M2] 1) Have acceptable written policies and procedures for operating this water system been formally adopted and were these policies available for review during the survey? [(Y) N] **2)** Have all board members (in office more than 12 months) completed Board Member Training? [(Y) N NA] **3)** Does the Board of Directors meet monthly and were minutes of Board meetings available for review during the survey? (**NOTE:** Quarterly meetings allowed if system has an officially designated full time manager) [(Y) N NA] (**NOTE:** ALL YESs or NAs required to receive point. NA - Not Applicable)	All Y - 1 pt. Else - 0 pt.	1
[M3] Has the water system had any SDWA violations since the last Capacity Assessment? [Y (N)]	N - 1pt. Y - 0pt.	1
[M4] Has the water system developed a long range improvements plan and was this plan available for review during the survey? [(Y) N]	Y - 1pt. N - 0pt.	1
[M5] 1) Does the water system have an effective cross connection control program in compliance with MDH regulations? [(Y) N] **2)** Was a copy of the MSDH approved bacti site plan and lead/copper site plan available for review during the survey and do the bacti results clearly show that this approved plan is being followed? [(Y) N] (**NOTE:** All YESs required to receive point)	All Y - 1 pt. Else - 0 pt.	1
MANAGERIAL CAPACITY RATING = [5] (Total Points)		

Financial Capacity Assessment	Point Scale	Point Award
[F1] Has the water system raised water rates in the past 5 years? [(Y) N] (**NOTE:** Point may be awarded if the water system provides acceptable financial documentation clearly showing that a rate increase is not needed, i.e. revenue has consistently exceeded expenditures by at least 10%, etc.)	Y - 1pt. N - 0pt.	1
[F2] Does the water system have an officially adopted policy requiring that water rates be routinely reviewed and adjusted as appropriate and was this policy available for review during the survey? [(Y) N]	Y - 1pt. N - 0pt.	1
[F3] Does the water system have an officially adopted cut-off policy for customers who do not pay their water bills, was a copy of this policy available for review by the regional engineer, and do system records (cut-off lists, etc.) clearly show that the water system effectively implements this cut-off policy? [(Y) N]	Y - 1pt. N - 0pt.	1
[F4] Was a copy of the water system's officially adopted annual budget available for review by the regional engineer and does the water system's financial accounting system clearly and accurately track the expenditure and receipt of funds? [(Y) N]	Y - 1pt. N - 0pt.	1
[F5 - Municipal Systems] 1) Is the municipality current in submitting audit reports to the State Auditor's Office? [(Y) N] **2)** Was a copy of the latest audit report available for review at the time of the survey? [(Y) N] **3)** Does this audit report clearly show that water and sewer fund account(s) are maintained separately from all other municipal accounts? [(Y) N] (**NOTE:** Yes answer to all questions required to receive point.)	All Y - 1 pt. Else - 0 pt.	1
[F5 - Rural Systems] 1) Has the rural water system filed the required financial reports with the State Auditor's Office and were these reports available for review? [Y N] **2)** Does the latest financial report show that receipts exceeded expenditures? [Y N] (**NOTE:** Yes answer to both questions required to receive point)	All Y - 1 pt. Else - 0 pt.	
FINANCIAL CAPACITY RATING = [5] (Total Points)		

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MISSISSIPPI DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
DESIGN CAPACITY SHEET

System: **CITY OF RIDGELAND**
ID: **0450013** Class: **D** County: **MADISON**

Date Completed: **11/07/2011**
Connections - Actual: **13045** Equivalent: **12877**
Design Capacity: **14127** Percent Design Capacity: **12877/14127 = 91.2%**

WELL CAPACITY:
Well #1 - abandoned
Well #2 = 630 GPM
Well #3 = 750 GPM
Well #4 = 665 GPM
Well #5 = 662 GPM
Well #6 = 1300 GPM
Well #7 = 1350 GPM
Total well capacity = 5357 GPM
September 2011 pump tests

STORAGE CAPACITY:
500,000 gallon Elevated Tank at Northpark Mall
300,000 gallon Elevated Tank North of Natchez Trace
1,000,000 gallon Elevated Tank at Well #7
1,000,000 gallon Ground Tank at Well #6

Excess storage credit can be given for the tanks at Wells #6 and #7:
1300 gpm x 6 x 60 = 468,000 gallons
1350 gpm x 6 x 60 = 486,000 gallons

Total Storage = 500,000 + 300,000 + 468,000 + 486,000
= 1,754,000 gallons

DESIGN CAPACITY:
Total Design Capacity = Total Well Capacity + Total Storage/200 minutes
= 5357 + (1,754,000/200)
= 14,127 connections

CALCULATE ADJUSTED CONNECTIONS FOR UN-METERED APARTMENTS/MOBILE HOMES:
Total number of apartment units/mobile homes = 4610 at 68 meters
Apartment Adjusted Connections = (4610 X 0.67) - 68 = 3005 connections

CALCULATE ADJUSTED CONNECTIONS FOR THE SCHOOLS:
Notes: Twice the Average Daily Usage are used in the calculations for peak usage
Schools with cafeterias = 40 gpd
Schools with cafeterias and showers = 50 gpd

Ann Smith Elementary and Highland Elementary (each has 1 meter):
Total number of students = 685 + 626 = 1311 students
Equivalent connections = (40 gpd/student x 1311 students)/400gpcd - 2 meters = 129

Olde Towne Middle and Ridgeland High (total of 6 meters):
Total number of students = 667 + 876 = 1543 students
Equivalent connections = (50 x 1543)/400 - 6 = 187

Total equivalent connections for schools = 129 + 187 = 316 equivalent connections

CALCULATE ADJUSTED CONNECTIONS FOR NURSING/RETIREMENT HOMES:
Twice the average daily usage: Nursing homes = 300 gpd/bed
There are six nursing/retirement homes on 10 meters
Total approximate number of beds = 722
Equivalent connections = (300 gpd/bed x 722 beds)/400 gpcd - 10 meters = 532 eq. conn.

MISSISSIPPI DEPARTMENT OF HEALTH
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DESIGN CAPACITY SHEET

CITY OF RIDGELAND 11/07/2011

Total Actual Connections = metered connections + unmetered = 9,024 + 4,021 = 13,045
Final Equivalent Connections = 9,024 + 3,005 + 316 + 532 = 12,877
(NOTE: All usage data obtained from City during 11/02/11 inspection)

THEREFORE THIS SYSTEM IS CURRENTLY AT 12,877/14,127 * 100% = 91% CAPACITY.

GROUNDWATER RULE CALCULATIONS:
Minimum free chlorine residual for 4-log inactivation of Viruses:

Well #2:
Based on water temperature = 87F; CT = 1.5 mg/l min
Most recent pump test (7/2010): 577 gpm
Estimated 25 ft. of 8" line from the well to the distribution tee; then 43 ft. of 8" line to the next tee, then 69 ft. of 8" to the first customer connection.
C = 1.5 mg/l min / [(2.6 gal/ft * 25 ft)/577 gpm + (2.6 * 43)/289 + (2.6 * 69)/145]
C = 0.9 mg/l @ 1st customer

Well #3:
Based on water temperature = 78F; CT = 2.0 mg/l min
Most recent pump test (10/2010): 750 gpm
Estimated 60 ft. of 8" line from the well to the first tee; then 130 ft. of 8" line at Fratesi's sign.
C = 2.0 mg/l min / [(2.6 gal/ft * 60 ft)/750 gpm + (2.6 * 130)/375]
C = 1.8 mg/l @ Fratesi's sign

Well #4:
Temperature = 78F; CT 2.0 mg/l min
Most recent pump test (10/2010): 692 gpm
Estimated 44 ft. of 8" line from the well to the tee; then 110 ft down the 12" main.
C = 2.0/[(2.6 * 44 ft)/692 gpm + (5.9 * 110 ft)/346 gpm]
C = 1.0 mg/l @ tap 110 ft down 12" main

Well #5:
Temperature = 87F; CT = 1.4 mg/l min
Most recent pump test (10/2010): 671 gpm
Estimated 324 ft. of 8" to tee at School St.; then 115 ft. of 8" to police building connection.
C = 1.4/[(2.6 * 324 ft)/671 gpm + (2.6 * 115)/336]
C = 0.7 mg/l @ police building

Well #6:
Temperature = 88F; CT = 1.4 mg/l min
Most recent pump test (10/2010): 1300 gpm
Estimated 84 ft. of 10" pipe to ground storage tank, full volume of standpipe given as contact time because there is a separate inlet and outlet and a baffling curtain inside.
C = 1.4/[(4.1 * 84 ft)/1300 gpm + (1,000,000 gal/1300 gal/min)]
C = <0.1 mg/l (below SDWA minimum of 0.2 mg/l)

Well #7:
Temperature = 78F; CT = 2.0 mg/l min
Most recent pump test (10/2010): 1300 gpm
Estimated 99 ft. of 12" pipe to tee; then 84 ft. of 16" to tank tie-in; then 54 ft. of 16" to the elevated tank.
C = 2.0/[(5.9 * 99 ft)/1300 gpm + (10.4 * 84)/650 + (10.4 * 54)/325]
C = 0.6 mg/l @ elevated tank

MISSISSIPPI STATE DEPARTMENT OF HEALTH
BUREAU OF PUBLIC WATER SUPPLY
MASTER DATA SHEET

Name of Supply City of Ridgeland **Owner** City

County Madison **Class** D **Date of Last Inspection** 11 – 02 – 2011

Master Meter Yes **PWS ID #** MS0450013

Supply Source: **Purchase** ____ **Surface** ____ **Ground** X **Number of Wells** Six (Active)

Well Data:

Well ID NO.	Location	Year Const.	Cap. (GPM)	Pres.	Casing	Screen	Depth	Controls	Aux. Power
450013-01	Concrete Plant	1965	abandoned		10"		690'	INACT	n/a
450013-02	Peach Orchard	1973	495 AT 65 psi		16"		1113'	AUTO	none
450013-03	Charity Church	1973	700 AT 80 psi		16"		720'	AUTO	rt. angle dr
450013-04	Lake Harbour	1983	700 AT 85 psi		16"		587'	AUTO	rt. angle dr.
450013-05	School St	1986	950 AT 70 psi		16"		1153'	AUTO	200 kW gen
450013-06	Hardy Street	1993	1600 at 15 psi		18"		1335'	AUTO	400 kW gen
450013-07	Old Canton Rd.	1999	800		16"	10"	710'	AUTO	rt. angle dr.

Pump test results (Sept. 2011): Well #2 – 630 GPM @ 60 psi, Well #3 – 750 GPM @ 80 psi; Well #4 – 665 GPM @ 80 psi; Well #5 – 662 GPM @ 70 psi; Well #6 – 1300 GPM @ 10 psi; Well #7 – 1350 gpm @ 65 psi

Master meter readings: Well #2 – 633 GPM & 221,695,000 gals; Well #3 – 740 GPM & 393,677,000 gals; Well #4 – 650 GPM & 161,484,000 gals; Well #5 – 900 GPM & 405,837,000 gals; Well #6 – 831,578,000 gals; Well #7 – 1300 GPM & 5,038,000 gals

System controlled by SCADA

Treatment: **Iron** ____ **Softening** ____ **Corrosion** ____ **Chlorine** X **Fluoride** X

	TYPE	CAPACITY	REMARKS	LOCATION
Chlorinator	Capital Advance	50 ppd	Set at 38 ppd	Well #2
Fluoridator	LMI 10 gph	10 gph@80 psi	Set at 40 speed/25 stroke	Well #2
Chlorinator	Capital Advance	100 ppd	Set at 65 ppd	Well #3
Fluoridator	LMI 10 gph	10 gph@80 psi	Set at 45 speed/50 stroke	Well #3
Chlorinator	Capital Advance	50 ppd	Set at 40 ppd	Well #4
Fluoridator	LMI 10 gph	10 gph@80 psi	Set at 60 speed/80 stroke	Well #4
Chlorinator	Capital Advance (ton cylinders)	100 ppd	Set at 50 ppd	Well #5
Fluoridator	LMI 10 gph	10 gph@80 psi	Set at 40 speed/45 stroke	Well #5
Chlorinator	Capital Advance (ton cylinders)	300 ppd	Set at 125 ppd	Well #6
Fluoridator	LMI 10 gph	10 gph@80 psi	Set at 50 speed/30 stroke	Well #6
Chlorinator	Capital Advance(ton cylinders)	200 ppd	Set at 120 ppd	Well #7
Fluoridator	LMI 10 gph	10 gph@80 psi	Set at 50 speed/60 stroke	Well #7

Storage:	Location	Material	Capacity	Remarks
Elevated	N. of Northpark	Steel	500,000 gallons	152' to OF
Elevated	N. of Natchez Trace	Steel	300,000 gallons	
Elevated	Old Canton Rd. at Well #7	Steel	1,000,000 gallons	114'6"
Ground	Hardy St. at Well #6	Concrete	1,000,000 gallons	

Booster Stations:

Location	Collector Tank	Pumps	Pressure Tank
Hardy St. at 1.0 MG Tank		2-100 gpm @50 psi (each)	4000 gal pressure tank
Serves approximately 20 connections			
Bridgewater S/D	100 gpm in-line booster station (MSDH approval 4/99)		