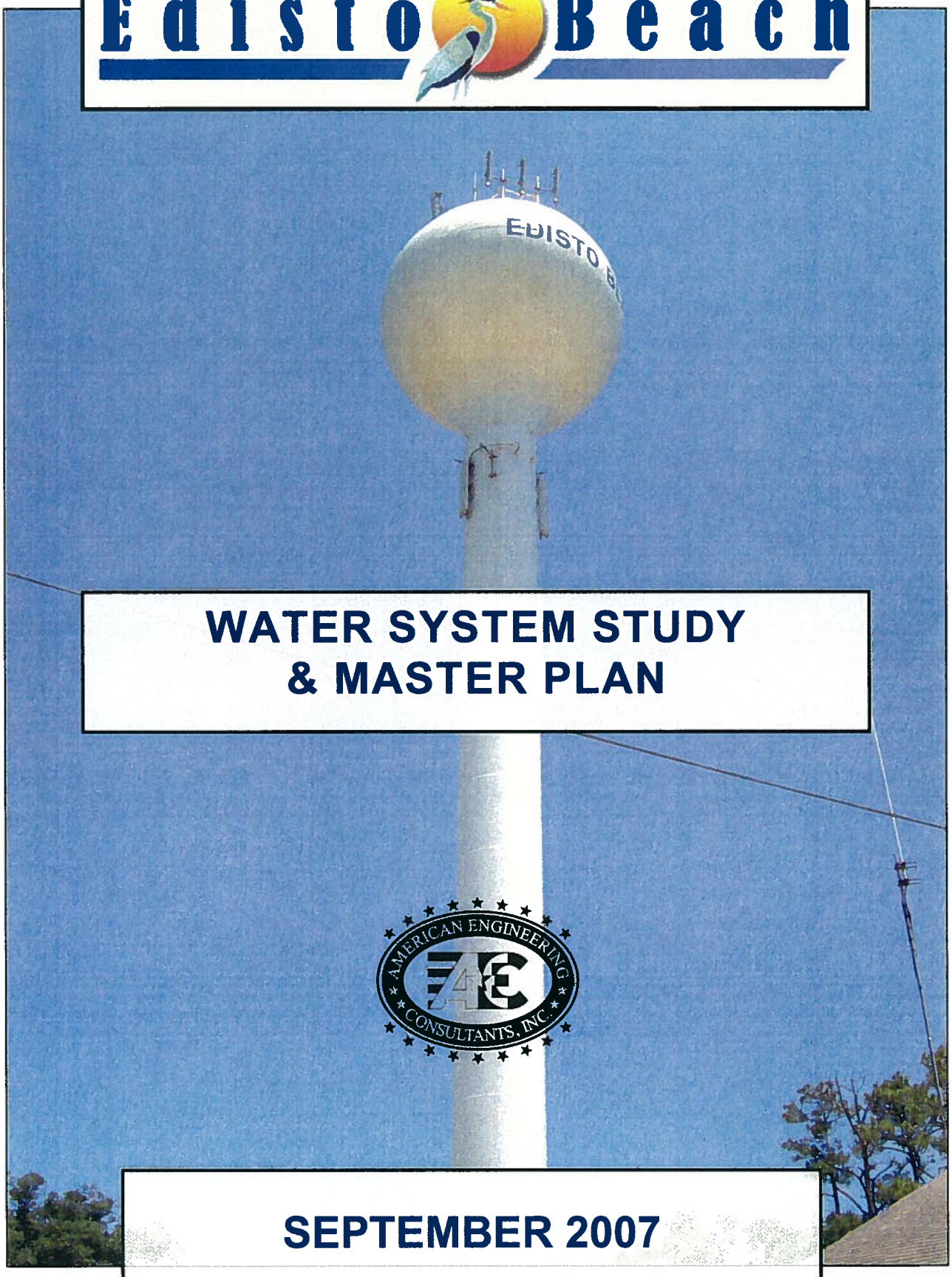
Edisto Beach



WATER SYSTEM STUDY & MASTER PLAN

AMERICAN ENGINEERING CONSULTANTS, INC.

SEPTEMBER 2007

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1.0 INTRODUCTION

The Town of Edisto Beach, located in northeast Colleton County operates a water distribution system with approximately 2,200 customers with a potential build-out of approximately 2,500 customers. These customers consist of single facility residences, condominiums, rental units and commercial business. The primary service area is located on the island with some commercial usage along US Highway 174 including the Edisto Beach State Park (Exhibit 1). The existing water distribution system consists of 2, 6, 8 and 10-inch water lines, six (6) water supply wells, two (2) water booster pumps and two (2) water storage tanks.

The overall purpose of this study is to identify potential water customers, evaluate the existing water distribution and well system, and provide recommendations for the improvements to the existing system with regard to fire protection and future demands.

2.0 EXISTING WATER SYSTEM

2.1 Distribution System

As previously discussed, the water distribution for the Town of Edisto Beach consists of a system of 2, 6, 8 and 10-inch water lines located along/within the existing roadways rights-of-way. Due to the age of portions of the distribution systems, the type of pipe material used throughout the system is not available. It is speculated that the newer portions were constructed with PVC pipe while the older sections maybe constructed of cast iron or asbestos cement pipe. During any repairs or taps into the existing lines, it would be advantageous to document the type of pipe present and establish a system map to help provide a source for evaluation of future repairs and/or replacements of the lines as part of routine maintenance.

For the purpose of the analysis of the water distribution system, the 2-inch lines were not considered because of there limited capacity and the primary focus of this analysis related to fire protection requirements. The South Carolina Department of Health and Environmental Control (SCDHEC) regulations require that all fire hydrants be located on a minimum 6-inch water line. Flow tests were conducted on fire hydrants in August 2006 to determine available flows for typical conditions within the distribution system. The flow test indicated that the average flow was approximately 1,000 gallons per minute (gpm) at a residual pressure of about 40 pounds per square inch (psi).

Exhibit 2 shows the approximate locations and alignments of the 6, 8 and 10-inch water lines. The locations of the water lines are

based on drawings (Water Distribution System for the Town of Edisto Beach - File Number C1-MAP-17) prepared by B.P. Barber & Associates, Inc. dated August 2002 and meeting/discussions with Town of Edisto Beach personnel.

2.2 Water Supply Wells

Currently the water supply well system for the Town of Edisto Beach consists of six (6) wells and are classified as open hole completed within a limestone aquifer. The wells are inspected and tested annually to evaluate operating conditions as compared to previous years and provide recommendations for replacements or adjustments of the well pumps. This testing and inspection are critical to the operation of the system since any variation in pumping performance or changes in the aquifer levels will have a direct effect on the operation of the water distribution system.

The wells range in depth from approximately 530 feet to 600 feet below ground level. Wells #1 (Dockside), #2 (Bay Point), #3 (Lion's Club) and #6 (McConkey Square) are located on the island and discharge directly into water distribution system. Wells #4 and #5 are located off Palmetto Road at the well field on the Edisto Beach State Park property. Wells #4 and #5 discharge directly to the Ground Storage Tank also located at the well field site. The water from the Ground Storage Tank is discharged into the distribution system through two (2) booster pumps located adjacent to the storage tank. The Ground Storage Tank and associated booster pumps will be discussed in a later section of this report.

Wells #1, #2 and #4 are 4-inch diameter while Wells #3, #5 and #6 are 8-inch diameter. Following is a table which outlines the line pressure and associated pumping rate for each well based on the January 2007 testing completed by Layne-Atlantic:

Well No.	Line Pressure (psi)	Pumping Rate (gpm)
1 (Dockside)	70	122
2 (Bay Point)	60	137
3 (Lion's Club)	70	86
4 (Well Field)	30	198
5 (Well Field)	60	278
6 (McConkey Sq)	60	550

Based on the results of the 2007 annual inspection and testing, it appears that the wells are currently operating within acceptable limits of design levels. The recommendations from the future inspections and testing should be addressed in a timely manner to ensure that the distribution system continues to operate as intended.

The information provided in the 2007 Annual Inspection and Testing Report prepared by Layne-Atlantic was used to establish a pump curve for each well used in the computer model of the system. A copy of the report is included in Appendix A.

2.3 Storage Tanks

Currently the Town of Edisto Beach water distribution system includes a 100,000 elevated storage tank and a 200,000 gallon ground storage tank. The elevated tank is located on the island

next to the Town Hall while the ground tank is located at the Well Field located off Palmetto Road on the Edisto Beach State Park. The elevated tank is a 30 feet diameter spherical tank on an eight foot diameter pedestal. The elevated tank has an operating range of 25 feet. However, currently only a head range of 24 feet is used because of turbulence in the tank as the water level rises to near 25 and sets off the high water alarm for the tank. The water level in the elevated storage tank is used to control the operation of the water supply well system and booster pumps. For the purpose of controlling the system, the wells and booster pumps have been separated into two categories, primary ("large") and secondary ("small"). The primary well/pumps are Well #6 and the booster pumps at the Ground Storage Tank, while the secondary wells are Wells #1, #2 and #3. For each category, the well/pumps will cycle between lead and lag so that one well/pump will not be the only one operating. Following is a breakdown of the current controls for the operation of the distribution system and filling of the elevated tank:

1) When the water level in the elevated tank drops to 21 feet, one of the primary well/pumps are turned on and one of the secondary wells is turned on - the running wells/pump are referred to as the lead and the wells/pump not running are the lag,
2) If the water level rises to 24 feet (and did not drop to 19 feet), the wells/pump (lead) will turn off and the next well/pump from each category will become the lead well/pump for the next time the water level drops below 21 feet,

3) If the water level continues to drop to 19 feet, the remaining primary well/pump and one of the remaining two secondary wells will also turn on,

4) Once the water level in the elevated tank rises to 24 feet (after dropping below 19 feet), the wells/pump (lead & lag) will be turned off and the wells/pumps alternated in the respective category - For the primary category which ever well/pump that turned on last will become the lead with the other being the lag; for the secondary category, the well that was not used will become the lead.

The ground storage tank is a steel standpipe tank, 33 feet in diameter and maximum water level of 32.6 feet. As discussed earlier, the ground tank is filled by the two wells at the Well Field (Wells #4 & #5), which alternate or operate simultaneously, as required. Following is a breakdown of the current controls for the filling of the ground storage tank:

1) When the water level drops to 28 feet, one (lead) of the two water supply wells is turned on and begins filling the tank - the second well (lag) will be on stand-by,

2) If the tank level rises to 32.6 feet, the operating well (lead) will be turned off, and the other well (lag) will be established as the lead well the next time the level drops below 28 feet,

3) If the level continues to drop to below 24 feet, the second well (lag) will be turned on to aid in filling the tank,

4) Once the water level in the tank rises to 32.6 feet, the wells (lead & lag) will be turned off, and the two wells will switch

lead and lag designation so that the wells will alternate, i.e., so one well will not be the primary and run excessively.

3.0 HYDRAULIC ANALYSIS

The hydraulic analysis of the water distribution system was performed using Bentley WaterCAD V8 XM Edition software. A link node diagram to be used as the basis in the computer model was prepared based on the sketch of the water system discussed in **2.1 Distribution System**. As noted, the sketch of the water distribution system does not provide a complete representation of the system but was prepared as general layout to address the overall recommendation to improve the system. For the purpose of this report, the general sketch/layout provides sufficient accuracy to identify area of improvement and expansion. To address particular recommendation or design individual sections/improvements outlined in the report, it may be necessary to conduct field surveys of the subject areas to obtain more precise information.

Nodal/Junction demands were established and set at various points throughout the system based on review of tax maps to determine the number of residences in a given area and thus a potential demand. Typically, a Residential Equivalent Unit (REU) of 400 gallons per day (gpd) is used for residential development. For the purpose of this analysis this REU was used for each demand unit and was adjusted to establish the necessary overall system demand to meet the particular model scenario required. It was decided that this was a reasonable method to distribute the overall demand since localized/seasonal demands are not available and would require extensive monitoring of the system to obtain. As examples, an adjusted REU of approximately 103 gpd was used to model the typical winter water demand of 260,000

gpd for the Town while a REU of approximately 437 gpd was used model the peak day demand of 1,100,000 gallons as seen during the previous 4th of July time period. Based on the review of available tax maps, it was estimated that there is approximately 2516 existing/potential customers within the service area. The biggest unknown regarding actual number of customers will be how portions of the area eventually build-out, especially along US Hwy 174. The usage and subsequent demand used in the model for the Hwy 174 area is based on historical data from the State Park, Fire Department, school and other business in the area interpolated to an average gallon per minute (gpm) value. Any significant development change in the area in the future may require a modified analysis of the system. For build-out of the system and to establish a potential worst-case scenario, a REU of 500 gpd will used which will result in a demand of approximately 1,260,000 gpd. This rate is based on the peak daily usage of 1,100,000 gallons divided by the number of current customers (2200).

In an effort to model the fluctuation in demand over the period of a day, a diurnal demand curve was used in the analysis. This diurnal demand curve is used to represent typical usage trends through out the day such as low demand during late night/early morning periods and high peak demands during late afternoon/early evening. The following table outlines the values used in the computer model to represent the typical variations in demand over a 24 hour period:

Diurnal Demand Curve

Time	Demand Factor
Midnight	0.45
1	0.43
2	0.41
3	0.42
4	0.45
5	0.53
6	0.74
7	1.02
8	1.10
9	1.09
10	1.04
11	0.98
12	0.90
13	1.02
14	1.13
15	1.27
16	1.45
17	1.70
18	1.97
19	2.10
20	1.55
21	0.97
22	0.72
23	0.54

For evaluation purposes, a fire demand of 1,000 gpm was added at various points in the system at the peak demand time (Hour 19) to establish a worst case scenario. The selection of the various points in the system for fire flow analysis was selected to provide representative location that would have potential restriction.

Examples of these locations included points in the 6-inch line along Jungle Road that did not have direct connection to the 8-inch line on Palmetto Boulevard, dead-end lines and high demand areas within the golf course community.

Since WaterCAD uses the Hazen-Williams equation to compute headloss, a typical roughness value of 130 was assumed for all pipes. As discussed in earlier sections of this report, the exact types and locations of various pipe materials is not known, therefore, for this preliminary analysis all pipes were selected to be PVC.

3.1 Model Calibration

The computer model was checked for general agreement with the existing system by comparing the recorded elevated tank water level changes for the week of January 1, 2007. Based on historical well production data, it was estimated that the demand on the water distribution system during this time period was approximately 260,000 gpd. A comparison of the recording chart and graph of the water level fluctuation from the computer model for the elevated tank show that the model compares favorably with actual data. Therefore, the system configuration and demand distribution in the computer model are considered an accepted representation of the Edisto Beach system and was used to evaluate potential scenarios for modification, upgrades and adjustment to the system.

For the purpose of evaluating the system, a demand of 1,100,000 gpd will be used to assess the system and aid in the preparation

of recommendation to improve the system. This demand was selected based on the peak demand on the system recorded during the 2006 July 4th weekend which average approximately 1,100,000 gpd during a five day period.

3.2 Analysis Of Current System

As evident from the evaluation of the water distribution system at a demand of 260,000 gpd, there is adequate storage and pressure throughout the system during the winter months in addition to providing adequate fire protection. However, as the system demand approaches 1,100,000 gpd, the ability to provide fire protection puts a significant strain on the current water distribution system for the Town. Two of the primary constraints on the system are the ability to get the water from the ground storage tank into the island system and the overall storage capacity on the island (elevated tank). With regards to the ground storage tank, there is sufficient turn-over in the tank to maintain water quality issues (approximately 10 feet or 1/3 of tank capacity is used each day). However, the volume of water that is contributed to the water distribution system is limited by the pipe sizes from the well field to the island.

With a demand of 1,100,000 gpd without a fire demand, the maximum discharge from the ground storage tank is approximately 500 gpm. If a fire demand of 1,000 gpm is added to system near the intersection of Hwy 174 and Palmetto Road, the discharge from the ground tank jumps to a peak discharge of about 920 gpm. When the fire demand is added to the system

near the intersection of Hwy 174 and Jungle Road, the peak discharge from the ground storage tank drops to approximately 700 gpm. As the fire flow demand is added to various other locations further from Hwy 174 through out the Town, the peak discharge from the ground storage tank drops to about 660 gpm. It is evident from the analysis that the ground storage tank and its current pumping and piping configuration can not provide a significant flow that would offset the draining of the elevated storage tank.

Regarding the elevated storage tank, during the analysis of the system at the 1,100,000 gpd demand without fire flow demand, the tank had a low level of approximately 14.5 feet. The level is of some concern since this provides less than 50,000 gallons of water storage in conjunction with the well output. When the fire flow demand is added to the system, the tank level drops to below six (6) feet with several scenarios calculating a tank level of only three (3) feet. This indicates that the system is operating beyond an acceptable level and the system may not be able to meet fire flow demands even with slight variations from those represented in the model.

In addition to the low levels in the elevated tank, the hours of operation of the well is beginning to reach excessive levels. Typically, a water supply well should not be operated more than 75 percent of the time (18 hours per day). Based on the analysis of the system with a demand of 1,100,000 gpd, one of the primary wells (Well #6 or Booster Pump 1) will be running between 16.5 to 17 hours per day while the other will run approximately 11.5 to

12.5 hours per day. This amount of run time is approaching excessive hours and can result in significant wear on the equipment and drawdown of the aquifer. Improvements to the water distribution system must include conditions that will reduce the amount of run time for these wells. The operation of a second booster pump, replacement of existing water supply wells or installation of additional water supply wells should reduces the pressure on the existing system components.

Another area of concern is the minimal connection of the water distribution system with the golf course development area to the overall Town of Edisto Beach system. Currently the golf course area system is connected to the remaining system through three (3) points: 1) Oristo Ridge/Holmes Street area, 2) Jennings Street and 3) Fairway Drive. These connections are indicated on Exhibit 2. With only these three connections, portions of the system around Sea Cloud Circle and Battery Park are isolated and operate as dead-end lines. Additional connection should be considered to ensure adequate flow through-out the system and reduce the potential for dead-end areas, especially during low demand periods, i.e., winter.

3.3 MODIFICATIONS TO SYSTEM

The first modification to the water distribution system that should be addressed is the additional connection of the golf course system to the primary system. At a minimum a connector line along the entrance road (King Cotton Road) from Dock Side Road (Exhibit 3). This line should be a minimum of 6-inch diameter and

connect to the water lines the runs along Dock Side Road and Sea Cloud Circle. This connection is necessary to ensure adequate flow and pressure is maintained in this area during fire flow demands. The computer model indicated that the pressures in the area of Sea Cloud Circle and Driftwood Lane would be reduced to less than 20 psi during a 1,000 gpm fire demand. With the insertion of this connector line in the model, the pressure in this area was above 50 psi even during a fire flow demand. Another area that requires a connecter water line would be the Battery Park area (Exhibit 4). Similar to the Sea Cloud area, the pressures drop below 20 psi in the immediate area during fire flow demand. The construction of this line will require the construction of a water line under a portion of the golf course and water hazard ponds. This line could be installed by directional bore to minimize the potential of impact to the golf course. The third area that would benefit with a connector pipe would be the Club Cottage area (Exhibit 5). As with the Battery Park area, this water line would need to be installed in part by directional bore to minimize impact to the golf course. The most practical alignment would be along Townsend Street and extending to Club Cottage Road.

A possible option to assist in providing some additional flow into the system and thus reducing the strain on the elevated tank would be the operation of the second booster pump. As previously discussed, the current control system operates only one of the two booster pumps. It is our understanding that the controls to allow the operation of the second booster pump in conjunction with the elevated tank level are being acquired. If the controls were installed and the second booster pump was set to

turn-on once the water level in the elevated tank dropped below 17 feet, the system would see an increase of 1.5 to 2 feet in the elevated tank level if no other changes were made to the system. Another advantage of adding the second booster pump to the distribution system would be the reduction in operating time in the other two (2) primary "wells". By cycling the operation of the Well #6 and the two booster pumps, the operational time period for each "well" should be reduced and thus lessen the wear & tear on the equipment and extend the life expectancy of each. One concern with this option would be the increase in pressure in the waterline in the vicinity of the well field. A primary objective of this evaluation was to maintain pressures around 80 psi, because of the age and material type of some of the water lines in the system. With this scenario, the pressures would be above 90 psi in the well field area. This may not represent a significant concern since this area is relatively new construction and should be able to handle the additional pressure.

To provide a more significant impact to the system with the operation of the second booster pumps, the size of the pipes connecting the booster pumps to the system will need to be increased. It is recommended that the pipes be increase to 12-inch diameter pipes; starting at the booster pumps and continuing to the intersection of Hwy 174 and Jungle Road. The new line would run parallel to the existing 8-inch line and connect at two to three locations. This upsizing of the water line would provide less head loss thus increasing the potential flow into the system. With this option, the level in the existing elevated tank will be around 10 feet even during fire flow demands. This level provides some

addition protection and water storage. While this option should not be considered a long-term solution, it will allow time to address any publics concern regarding a larger tank, focus on funding issues as well as permit/construct time for a new storage tank. Other options that could be considered in the future would be the upgrade of the two booster pumps.

With regards to storage, it is usually desirable to provide at least fifty (50) percent of the daily usage in storage with elevated tanks being the most advantageous because the water is readily available even during power outages. With the typical winter demand of around 300,000 gpd, this rule of thumb is met. However, during the summer season, the existing storage tanks (elevated and ground) provide less that a third of the overall demand of 1,100,000 gpd. Therefore, based on this ratio it is clear that the Town needs, at a minimum, an additional 200,000 to 300,000 gallons of storage.

Important to the selection of additional storage would be the impact to the system during the low demand periods. If to large a storage tank was selected, there would be the concern of inadequate turn-over of the water during the low demand periods. This limited turn-over could result in low chlorine residual in the system which would cause permit violations. Operational procedures could implemented that could reduce this concern, such as daily monitoring of the chlorine residual in the elevated tank and adding chemicals as needed to ensure compliance with regulatory limits. Another option that would allow a larger tank to be used would be the adjustment/modification of the system

controls during the various seasonal demand periods, i.e., change levels for well/pumps turn-on/off, etc.

Based on the use of a 500,000 gallon elevated storage tank (Toro Style - 64 feet in diameter and 25 feet Head Range) and implementation of the options outlined above, the low water level at the 1,100,000 gpd demand (no fire flow demand) would be approximately 19 feet. This equates to approximately 375,000 gallons available for fire demands beyond the remaining capacity of the ground storage tank. With a fire demand of 1,000 gpm for one hour, the elevated tank level drops to below 18 feet.

The primary drawback to this scenario would be the excessive time the wells/pumps will run. Based on the existing control scheme, Well #6 would turn on first and would run for approximately 14 hours before the tank level dropped to below 19 feet to trigger the second primary "well" (Booster Pumps 1) to turn on. These two "wells" would run an additional six hours to raise the level in the tank to the shut of level of 24 feet. This time period amounts to one of the "wells" running approximately 20 hours straight which is beyond acceptable limits. Based on the additional volume of water per foot of head range, the control scheme should be adjusted so that the pump on/off levels are adjusted so that pumps will cycle and a single primary "well" will not run for an excessive time period. Another option would be to put run time limits on the "wells" to ensure that proper cycling between the primary "wells" is maintained and run times are minimized.

3.4 Water Supply Well

One of the focal points for this study was the evaluation of the installation of a deeper aquifer water supply well. Based on discussions with Layne-Atlantic personnel, it has been determined that the quality of the groundwater in deeper aquifer (1000-1200 feet) is not significantly better than found in the existing aquifer that all the Town of Edisto Beach water supply wells are located within. Layne-Atlantic currently provides current water well testing services to the Town and is very knowledgeable of the aquifers of the area. The overall cost of installing a deeper well may not be justified in relationship to a new well in the existing withdrawal aquifer. Advantage of installing a new well into the deeper aquifer would be less "competition" for the available water and subsequently less concern regarding excessive drawdown.

Based on the required run time for the wells and booster pumps to maintain the elevated tank level, it may be necessary to install an additional groundwater supply well for the system. The additional well would help spread the "load" on the system so that no one component will be over taxed. This option will require extensive evaluation of the existing system to determine the effect an additional well would have on the aquifer. Critical to this option is the availability of property on the island to install a new well. To provide the most impact to the system, the well would have to be installed on the island and could be tie-in to the existing system of directly connected to the elevated storage tank. A potential location for a new well would be at or near the existing elevated tank site. A drawback to this location would be the impact of the existing wastewater treatment lagoon. This potential impact

should be a critical component of any evaluation/siting of a new well.

Another potential location for a new well would be in the northern section of the island. For evaluation purposes, a water supply well was added into the model near the Piggly Wiggly store off Jungle Road and was connected to the 6-inch line running along Jungle Road. The new well was added as a third primary well with a third trigger water level in the Elevated Tank of 17 feet. The new well will cycle with the other two primary "wells", which will result in one primary "well" at 21 feet water level, two primary "wells" at 19 feet and all three primary wells when the water level drops below 17 feet in the Elevated Tank.

Two pumping rates were used for the new well to evaluate the impact on the distribution system during fire flow demand periods. The first pumping rate for the new well was 600 gpm at 200 feet of head, which is similar to Well #6. The second rate was 1000 gpm at 220 feet of head. As with the evaluation outlined in earlier sections, a fire demand of 1000 gpm was added at various points in the system at the peak demand time (7 PM) for one hour. With the additional well added to the system at a design pumping rate of 600 gpm, the water demand on the system is met with the level of the elevated tank ranging from around 9.4 feet to 11.6 feet. These scenarios provides more than double the reserve capacity in the elevated tank during a fire demand than current operating conditions modeled (3 to 6 feet of water in the tank).

The normal demand on the system plus fire demand being easily met with the second scenario of 1000 gpm design pumping rate for the new well. With this option, the level in the elevated tank is an additional 3 feet of water over the 600 gpm scenario. A disadvantage of this scenario will be the increase in pressure in the waterlines surrounding the new well while the pump is running. The normal pressure ranges between 60 and 80 psi; however, while the pump is running the pressure can reach 100 psi. This elevated pressure may result in damage to the older components in the system in the vicinity of the new well. The actual pumping capacity for the new well will be based on the field testing.

These options show that the addition of a new high capacity well will have an immediate and beneficial impact on the system. Another advantage of this option is the significant cost saving verses the options of upsizing the line along Hwy 174 and constructing a new elevated tank. The cost for new well similar to Well #6 should around $25,000 to $300,000. While both the line upsize and new elevated tank are recommended and necessary improvements, the new well will provide a short term improvement to the system while funding, design and construction of the other options are considered.

An option to installing a new well would be to evaluate the existing wells, primarily Wells #1, #2 and #3 to determine if upsizing of the associated pumps is possible to provide additional flow. If these wells could be improved by either installing new pumps or constructing a larger well in the same location, significant saving

may be realized over the installation of a new well in a new location.

3.5 Fire Protection Lines

Another primary focus of this study was the evaluation and recommendation regarding the installation of fire protection lines to replace the existing 2-inch lines that run through-out the Town of Edisto Beach water distribution system. The analysis of the system indicates that the installation of these new 6-inch PVC lines will not have an adverse effect on the existing system and can be installed as funding becomes available. The proposed fire protection line areas are shown on Exhibits 6, 7, 8, 9, 10 and 11. The six phases were broken down as shown to represent areas and pipe lengths of similar size. A benefit of constructing these new lines in a timely manner is the additional looping of the system which provides better flow through-out the system while minimizing the concern for dead-end lines and thus areas of low chlorine residuals. The inclusion of these lines in the model provide better flow in the system and greatly aided in maintaining pressure in the existing 6-inch lines during fire flow demands. The spacing of fire hydrants along these proposed lines will be done in accordance with South Carolina Department of Health and Environmental Control regulations and recommendations from Town personnel.

4.0 RECOMMENDATIONS

To meet the requirement to improve the existing water distribution system for the Town of Edisto Beach with regard peak demands and fire protection, an analysis of the existing water distribution system with recommended options for improvements has been completed. The following recommendations are presented in order of suggested implementation with the exception of recommendation number 7 which can be completed as funding or situation require:

1) Design, permit and construct a new water supply well in the northern section of the Island similar to the current Well #6. The pumping rate for the new well should be on the order of 600 to 1000 gpm. This new well will require reconfiguration of the control system of the water distribution system. The cost for this new well should be on the order of $250,000 to $300,000 with actual cost determined based on the actual depth, pumping rate, etc.

2) Design, permit and construct a 12-inch waterline to replace the existing 8 and 10-inch lines connecting the booster pumps to the existing water distribution system at the intersection of Hwy 174 and Jungle Road. This line will consist of approximately 12000 feet of 12-inch water line and necessary appurtenances. This line will run parallel to the existing water lines and will include connection of the existing fire hydrants. A cost estimate for this recommendation is included in Appendix B.

3) Design, permit and construct a new 500,000 gallon elevated storage tank to replace the existing 100,000 gallon storage tank. It is anticipated that the new tank will be located in the vicinity of the existing tank. The construction of this tanks will included any necessary water lines to connect to the existing water distribution system and modification to the control system. A cost estimate for this recommendation is included in Appendix B.

4) Design, permit and construct a 6-inch connector line from Dock Side Road to Sea Cloud Circle to provide improved pressure and flow conditions within the Sea Cloud and Drift wood Lane area. This line will be approximately 700 feet of 6-inch PVC waterline and necessary appurtenances and will connect the existing 6-inch water lines. A cost estimate for this recommendation is included in Appendix B.

5) Design, permit and construct a 6-inch connector line from Dock Side Road to Battery Park to provide improved pressure and flow conditions within the Battery Park area. This line will be approximately 500 feet of 6-inch PVC waterline and necessary appurtenances and will connect the existing 6-inch water lines. A major portion of this line will need to be installed by the directional bore method to minimize potential disturbance to the golf course. A cost estimate for this recommendation is included in Appendix B.

6) Design, permit and construct a 6-inch connector line from Townsend Street to Club Cottage Road to provide improved pressure and flow conditions within the Club Cottage area. This line will be approximately 775 feet of 6-inch PVC waterline and necessary appurtenances and will connect the existing 6-inch water lines. A major portion of this line will need to be installed by the directional bore method to minimize potential disturbance to the golf course. A cost estimate for this recommendation is included in Appendix B.

7) Design, permit and construct fire protection lines to replace the existing 2-inch lines located through-out the Town. These fire protection lines will connect to the existing 8-inch line running along Palmetto Boulevard, the 6-inch lines running along Jungle Road and Myrtle Street and otherwise required to provide looping of the system. Because of the amount of water lines associated with this recommendation, the cost associated with the implementation of this recommendation is presented in phases starting with northern section of the Town and proceeding towards Bay Point. The cost estimate for individual phases of this recommendation is included in Appendix B.

EXHIBITS

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TOWN OF EDISTO BEACH
WATER SYSTEM STUDY
LOCATION MAP
EXHIBIT 1

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 1

DRAWING NO. 1
OF 1

LEGEND

EXISTING 6" WATERLINE
EXISTING 8" WATERLINE
EXISTING 10" WATERLINE

1200 0 1200 2400

Scale 1" = 1200 ft

NOTE:

ACTUAL ALIGNMENT OF WATER LINES MAY VARY – LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

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TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
OVERALL SYSTEM
EXHIBIT 2

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 2

DRAWING NO. 1 OF 1

NOTE:
ACTUAL ALIGNMENT OF WATER LINES MAY VARY – LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

LEGEND

PROPOSED 6" WATERLINE

PALMETTO BOUL

EDD TIDE STREET

LOUISE STREET

SUMMERWIND CIRCLE

DOCK SIDE ROAD

KING COTTON ROAD

SEA CI

BATTERY PARK

200 0 200 400

Scale 1" = 200 ft

AMERICAN ENGINEERING CONSULTANTS, INC.
1300 12th Street · P.O. Box 2299 · Cayce, SC 29171
Phone: (803) 791-1400 · Fax: (803) 791-8110
Internet: *www.aec-sc.com* · Email: *info@aec-sc.com*

TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
RECOMMENDATION NO. 1
EXHIBIT 3

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 3

DRAWING NO. 1 OF 1

NOTE:
ACTUAL ALIGNMENT OF WATER LINES MAY VARY – LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

LEGEND

PROPOSED 6" WATERLINE

KING COTTON RO

DOCK SIDE ROAD

BATTERY PARK

DRIFTWOOD LANE

GUN BLUFF ROAD

200 0 200 400

Scale 1" = 200 ft

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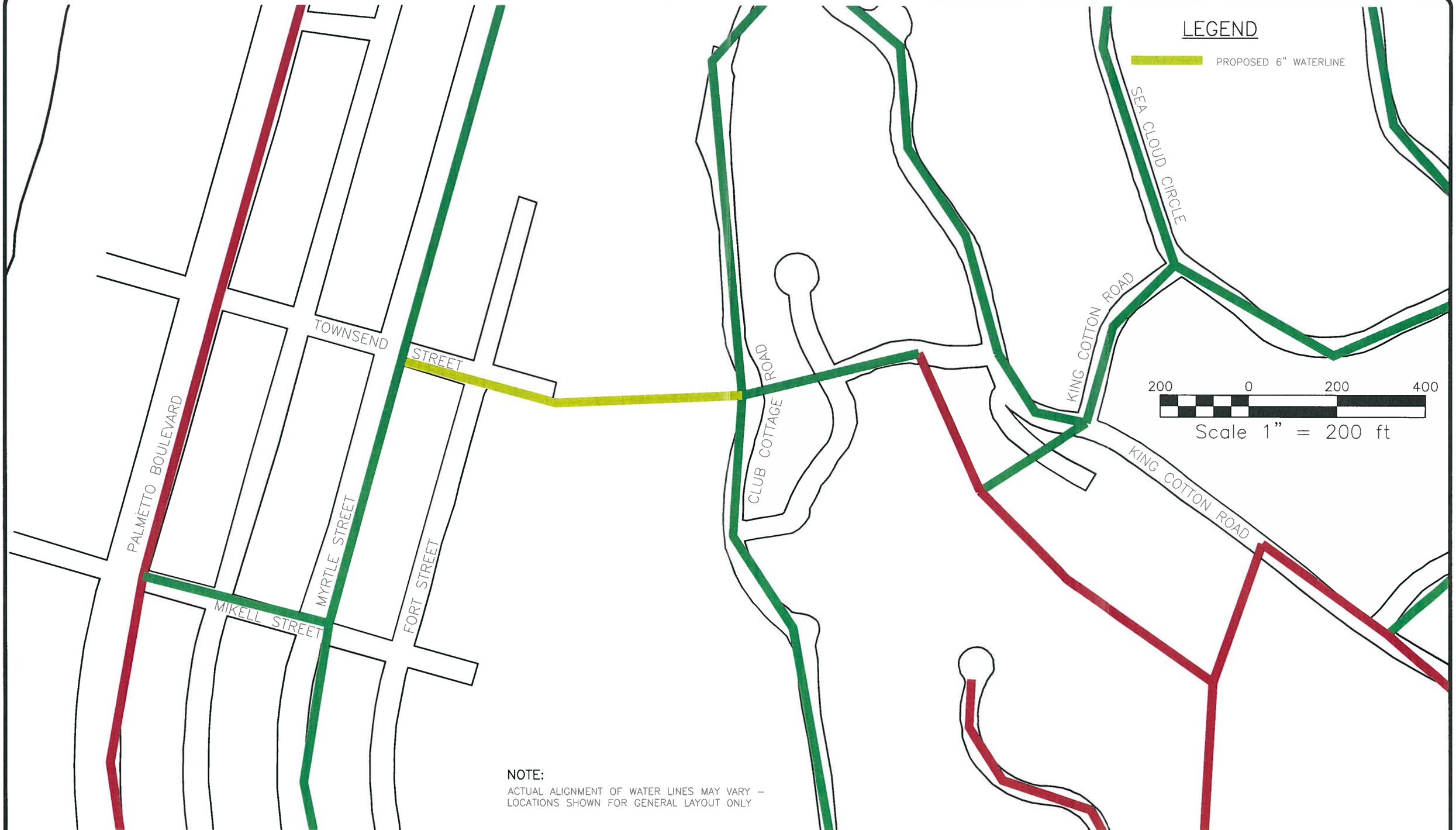
TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
RECOMMENDATION NO. 2
EXHIBIT 4

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 4

DRAWING NO. 1 OF 1



NOTE:

ACTUAL ALIGNMENT OF WATER LINES MAY VARY – LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

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TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
RECOMMENDATION NO. 3
EXHIBIT 5

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 5

DRAWING NO. 1 OF 1

NOTE:

ACTUAL ALIGNMENT OF WATER LINES MAY VARY – LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

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TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
FIRE LINES - PHASE 1
EXHIBIT 6

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 6

DRAWING NO. 1 OF 1

NOTE:

ACTUAL ALIGNMENT OF WATER LINES MAY VARY – LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

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TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
FIRE LINES - PHASE 2
EXHIBIT 7

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 7

DRAWING NO. 1 OF 1

NOTE:

ACTUAL ALIGNMENT OF WATER LINES MAY VARY - LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

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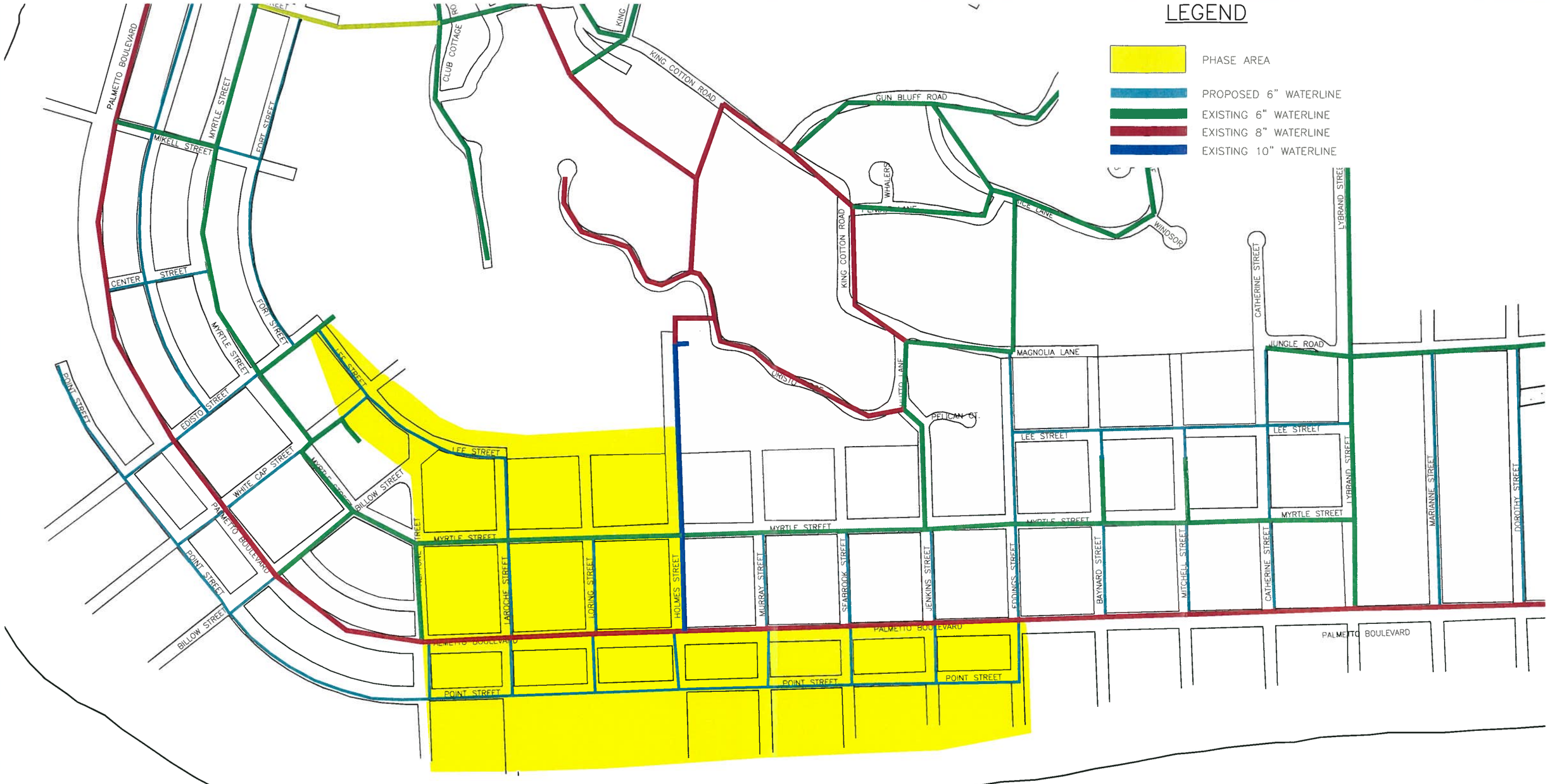
TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
FIRE LINES - PHASE 3
EXHIBIT 8

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 8

DRAWING NO. 1 OF 1



NOTE:
ACTUAL ALIGNMENT OF WATER LINES MAY VARY – LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

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TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
FIRE LINES - PHASE 4
EXHIBIT 9

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 9

DRAWING NO. 1 OF 1

NOTE:

ACTUAL ALIGNMENT OF WATER LINES MAY VARY -- LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

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TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
FIRE LINES - PHASE 5
EXHIBIT 10

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 10

DRAWING NO. 1 OF 1

LEGEND

- PHASE AREA
- PROPOSED 6" WATERLINE
- EXISTING 6" WATERLINE
- EXISTING 8" WATERLINE
- EXISTING 10" WATERLINE

NOTE:

ACTUAL ALIGNMENT OF WATER LINES MAY VARY – LOCATIONS SHOWN FOR GENERAL LAYOUT ONLY

400 0 400 800

Scale 1" = 400 ft

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TOWN OF EDISTO BEACH - WATER SYSTEM STUDY
FIRE LINES - PHASE 6
EXHIBIT 11

DATE APRIL 2007
SCALE AS SHOWN
DRAWN JHP
JOB NO. 06-053
CAD FILE EXHIBIT 11

DRAWING NO. 1 OF 1

APPENDIX A

Layne-Atlantic *a division of Layne Christensen Company*

604 West Highway 80 • Bloomingdale, GA 31302 • Phone (912) 748-9244 • (800) 332-5322 • Fax (912) 748-6208 • eMail 1078@laynechristsensen.com

January 31, 2007

Edisto Beach, Town of
Mr. Bob Doub
2414 Murray St.
Edisto Island, South Carolina 29438

RE: Annual Inspections & Testing on Wells 1-6
Layne File No. 78-6828

Dear Mr. Doub,

On January 18-19, 2007, we performed annual inspections and tests of your 6 wells. A copy of our test reports for the wells is included in this letter (which is also enclosed into your project file at our office) and a summary of the results is as follows:

Well No. 1 **Location: Dockside**

Observation
At the approximate line pressure of 70 psi, the well is producing 122 gpm which is approximately the same as 2006 inspection. The specific capacity of the well is similar to 2006 figures at around 29 gallons per foot of drawdown. Please consider, the pump has not fallen any this year but was down 10 to 20 percent from the 2004 testing. The static level was 29' (normal for the area) and pumping level maximum was 36 feet which gives you 30 feet of water coverage above the bowl. The meter readings appear to be 5 to 10 percent greater than our orifice readings. The water clarity is good and no sand was produced during testing.

Recommendation
The meter may need recalibration or replacement in the future. Planning for replacement of the pump should be considered for the future. The drop in capacity from 2004 is probably due to normal wear, but may need to be addressed in the next year or two. Otherwise, maintain your present maintenance procedures and contact us if any problems arise.

Well No. 2 **Location: Bay Point**

Observation
At the approximate line pressure of 60 psi, the well is producing 137 gpm which is less than the last inspection at 148 gpm. Pump productioon has fallen approximately 12 to 13 percent since 2004. Assuming this is a 200 gpm at 200 TDH well pump, the pump appears to be down in capacity slightly. Our e-line (water level checking device) was hanging up while trying to obtain water levels and we were not able to get those readings on the well. The water clarity is good and no sand was produced during testing. The flow meter did not work.

Recommendation
If the pump is pulled in the future, we advise installing either an airline and/or a poly guide tube to enable water level readings. We were not able to get manual water level readings. The capacity since 2004 has fallen about 12 percent and future planning for pump repairs should begin. We do recommend replacement of your meter, but otherwise maintain your present maintenance procedures and contact us if any problems arise.

Layne

Well No. 3 **Location: Lions Club**

Observation
At the approximate line pressure of 70 psi, the well is producing 86 gpm. Assuming this is a 100 gpm at 200 TDH well pump, the pump appears to be in good operating condition. At line pressure the pump is approximately the same as 2004. There was no way to get drawdown values, so we are not sure about pumping levels at this time.

Recommendation
We advise installing an airline for water level reading the next time repairs are made.
Otherwise, maintain your present maintenance procedures and contact us if any problems arise.

Well No. 4 **Location: Well Field**

Observation
At the approximate line pressure of 30 psi, the well is producing 198 gpm, which is the same as when in stalled in 2004. The specific capacity of the well has fallen from 23 g/fdd to 10 g/fdd and pumping levels are down about 10 feet greater than 2006 testing. The maximum drawdown is 64 feet, but this is still 40 feet above the pump and motor. The pump and well appear to be producing ok. The water clarity is good and no sand was produced during testing.

Recommendation
The water levels have dropped some, but are not at a critical stage, so we advise checking the levels every few months or getting me to check them when I travel through. Otherwise, maintain your present maintenance procedures and contact us if any problems arise.

Well No. 5 **Location: Well Field**

Observation
At the approximate line pressure of 60 psi, the well is producing 278 gpm, which is the same as the 2006 test. The pumping levels have drop a little with a maximum pumping level at 72 feet, which gives you a coverage of 12 feet above the bowl. If the pumping water levels continue to fall, you may need to consider lowering the pump in the next few years. The airline indicates that the pump setting is approximately 84' so you have approximately 12 feet of water above your pump bowl at 10 psi. The water clarity is good and no sand was produced during testing. The specific capacity of the well/pump average is 12 gallons per foot of drawdown, so the well giving up a little less water than last test. This is an indication of some clogging in the limestone, restricting the amount of water that can be drawn.

Recommendation
The pump appears to be producing the same as previously, but the well is showing some signs of build up which is causing a fall in well capacity. Coverage above the pump is sufficient at the moment, but may become a problem in the future. We suggest checking pumping levels periodically through the year and call if pumping levels get below 80 feet.

Layne-Atlantic *a division of Layne Christensen Company*

604 West Highway 80 • Bloomingdale, GA 31302 • Phone (912) 748-9244 • (800) 332-5322 • Fax (912) 748-6208 • eMail 1078@laynechristsensen.com

Well No. 6 **Location: Bay Creek**

Observation
At the approximate line pressure of 60 psi, the well is producing 550 gpm. The static water level is 24 feet (which is near the same as 2006) and the maximum pumping level is 45 feet. This indicates that the coverage above the bowl is 39 feet which is sufficient. The water clarity is good and no sand was produced during testing.

Recommendation
The pump and well are producing as good or better than the test in 2006. The meter appears to be running correctly with a slight difference from orifice readings at low pressures. Otherwise, maintain your present maintenance procedures and contact us if any problems arise.

Thanks for the opportunity to be of service. Please let us know if we can provide any additional assistance in helping to meet your water supply needs.

Sincerely,

Greg Luft,
Sales Representative

Layne

WELL AND PUMP INSPECTION REPORT
LAYNE ATLANTIC
BLOOMINGDALE, GA

Owner Edisto Beach Island, Town of Job 78-6828
City Edisto Beach State SC Zip 29438
Well No. Well 1 Location Dockside
DIA. 6" DEPTH 500 TYPE Openhole Limestone
DATE DRILLED Unknown
DATE INSPECTED 1-18-2007 PERSON TO CONTACT Bob Doub

4x3 LAST INSPECTION Date: 2-16-2006						4x3 PRESENT INSPECTION Date: 1-18-2007					
Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity	Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity
23"	27'	200	10	34'	29 g/ft	26.5	29'	204	9	36'	29g/ft
23"	27'	190	20	33'	32 g/ft	24"	29'	194	20	36'	28 g/ft
18"	27'	168	40	32.5'	31 g/ft	18.5"	29'	170	40	35'	28g/ft
12"	27'	137	60	31.5'	30 g/ft	13"	29'	143	60	34'	29g/ft
7"	27'	105	80	30.5'	30 g/ft	7"	29'	105	80	33'	26 g/t
4,5"	25'	95	90	27'	31 g/ft	4"	27'	88	90	30	29 g/ft
			Shut Off	105					Shut Off	105	

TEST WILL BE COMPLETE THROUGH:

AIRLINE LENGTH 63' Top of Check Meter yes ☒ Flange or ☐ Thread Size 3"
Pump Mfg Unknown Submersible Ser. No. n/a 3" Column HP 10
Rated Capacity est 122 GPM est 192.7 TDH; Operating Pressure 70
Date Installed n/a Date of Overhaul n/a

Is check valve leaking? ☐ Yes ☒ No Does Stuffing Box Have Spring? ☐ Yes ☒ No

Is stuffing box leaking? ☐ Yes ☒ No

THE FOLLOWING IS TO BE PERFORMED DURING EACH INSPECTION:

Change Motor Oil & Grease ☐ Repack Pump ☐ Grease Pump ☐
Please check mark when completed.
Pump is presently developing 125 GPM: 70 psi TDH; Shut off Head 270
Present TDH at Rated GPM n/a FT.
Electrical Data with Pump in Operation: 27-30-28 AMPS; 240 VOLTS; 3 PHASE

Remarks:

INSPECTED BY: John Clinton

DATE: 2-16-06

C:\Documents and Settings\Privette27\Local Settings\Temporary Internet Files\OLK8\J Data Dockside\2007.doc

WELL AND PUMP INSPECTION REPORT
LAYNE ATLANTIC
BLOOMINGDALE, GA

Owner Edisto Beach Island, Town of Job 78-6828
City Edisto Beach State SC Zip 29438
Well No. Well 2 Location Bay Point
DIA. 6 inch DEPTH 500 TYPE Openhole Limestone
DATE DRILLED Unknown
DATE INSPECTED 2-16-2006 PERSON TO CONTACT Bob Doub

4x2-1/2 LAST INSPECTION Date: 2-16-2006						4x3 PRESENT INSPECTION Date: 1/18/2007					
Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity	ce eading	Static	GPM	Pressure	Pumping Level	Specific Capacity
67"	21ft	203	19	77.3ft	3.6	22.5"	n/a	188	19	n/a	n/a
50"	21ft	178	40	n/a	n/a	19"	n/a	161	40	n/a	n/a
36"	21ft	148	60	56ft	4.3	12"	n/a	137	60	n/a	n/a
22"	21ft	116	80	47ft	2.5	8"	n/a	112	80	n/a	n/a
16"	21ft	105	90	40ft	2.5	5.5"	N/A	93	90	n/a	n/a
			Shut Off	120					Shut Off	118	

TEST WILL BE COMPLETE THROUGH:

AIRLINE LENGTH n/a Top of Check n/a Meter yes ☒ Flange or ☐ Thread Size 3"
Pump Mfg Unknown Submersible Ser. No. n/a has 3 inch column HP 7 1/2 ?
Rated Capacity 150 +/- GPM 200 +/- TDH; Operating Pressure 65
Date Installed n/a Date of Overhaul n/a

Is check valve leaking? ☐ Yes ☒ No Does Stuffing Box Have Spring? ☐ Yes ☒ No

Is stuffing box leaking? ☐ Yes ☒ No

THE FOLLOWING IS TO BE PERFORMED DURING EACH INSPECTION:

Change Motor Oil & Grease ☐ Repack Pump ☐ Grease Pump ☐
Please check mark when completed.
Pump is presently developing 137 GPM: n/a TDH; Shut off Head 292
Present TDH at Rated GPM n/a FT.
Electrical Data with Pump in Operation: 31-32-32 AMPS; 240 VOLTS; 3 PHASE

Remarks: Meter is not working and needs repair or replacement, Water clarity good, no vibrations

INSPECTED BY: John Clinton

DATE: 1-18-07

WELL AND PUMP INSPECTION REPORT
LAYNE ATLANTIC
BLOOMINGDALE, GA

Owner Edisto Beach Island, Town of Job 78-6828
City Edisto Beach State SC Zip 29438
Well No. Well 3 Location Lions Club
DIA. 4 inch DEPTH 500 TYPE Openhole Limestone
DATE DRILLED Unknown
DATE INSPECTED 1-18-2007 PERSON TO CONTACT Bob Doub

4x2-1/2 LAST INSPECTION Date: 2-16-2006						4x3 PRESENT INSPECTION Date: 1-18-2007					
Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity	Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity
7"	n/a	105	10	n/a	n/a	19"	n/a	108	10	n/a	n/a
6.5"	n/a	101	20	n/a	n/a	19"	n/a	108	20	n/a	n/a
5.5"	n/a	93	40	n/a	n/a	16"	n/a	99	40	n/a	n/a
4.5"	n/a	94	60	n/a	n/a	13.5"	n/a	91	60	n/a	n/a
3.5"	n/a	85	80	n/a	n/a	12"	n/a	86	80	n/a	n/a
			Shut Off	206					Shut Off	200	

TEST WILL BE COMPLETE THROUGH:

AIRLINE LENGTH None Top of Check Meter yes ☒ Flange or ☐ Thread Size 3"
Pump Mfg Unknown Submersible Ser. No. n/a 2" Column HP 7 1/2 ?
Rated Capacity 150 +/- GPM 200 +/- TDH; Operating Pressure 74
Date Installed n/a Date of Overhaul n/a

Is check valve leaking? ☐ Yes ☒ No Does Stuffing Box Have Spring? ☐ Yes ☒ No

Is stuffing box leaking? ☐ Yes ☒ No

THE FOLLOWING IS TO BE PERFORMED DURING EACH INSPECTION:

Change Motor Oil & Grease ☐ Repack Pump ☐ Grease Pump ☐
Please check mark when completed.
Pump is presently developing 86 GPM: 70 psi TDH; Shut off Head 462+
Present TDH at Rated GPM n/a FT.
Electrical Data with Pump in Operation: 28-25-24 AMPS; 240 VOLTS; 3 PHASE

Remarks: No Access port for eline

INSPECTED BY: John Clinton

DATE: 1-19-07

WELL AND PUMP INSPECTION REPORT
LAYNE ATLANTIC
BLOOMINGDALE, GA

Owner Edisto Beach Island, Town of Job 78-6828
City Edisto Beach State SC Zip 29438
Well No. Well 4 Location Well Field
DIA. 8" to120,6"to514 DEPTH 530 TYPE Openhole Limestone
DATE DRILLED 1985
DATE INSPECTED 1-19-2007 PERSON TO CONTACT Bob Doub

4"x3" LAST INSPECTION Date: 2-16-2006						4x3 PRESENT INSPECTION Date: 1-18-2007					
Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity	Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity
28"	47'	209	20	56'	23 g/ft	27"	43'	204	20	64'	10
23"	47'	190	40	53.5'	29	20.5	43'	190	40	63.5'	9
19"	47'	172	60	52'	34	19"	43'	168	60	62'	9
11"	47'	131	100	48.5'	87	10"	43'	125	100	58'	9
			Shut Off	150					Shut Off	148	

TEST WILL BE COMPLETE THROUGH:

AIRLINE LENGTH 106' Top of Check Meter ☒ Flange or ☐ Thread Size 3"
Pump Mfg Goulds Ser. No. OR190403 HP 15
Rated Capacity 150 GPM 200 TDH; Operating Pressure 30
Date Installed 4-28-2003 Date of Overhaul n/a

Is check valve leaking? ☐ Yes ☒ No Does Stuffing Box Have Spring? ☐ Yes ☒ No

Is stuffing box leaking? ☐ Yes ☒ No

THE FOLLOWING IS TO BE PERFORMED DURING EACH INSPECTION:

Change Motor Oil & Grease ☐ Repack Pump ☐ Grease Pump ☐
Please check mark when completed.
Pump is presently developing 198 GPM: 30 psi TDH; Shut off Head 148 psi
Present TDH at Rated GPM 133 FT.
Electrical Data with Pump in Operation: 42-40-40 AMPS; 240 VOLTS; 3 PHASE

Remarks: Water Clear, Looks Good.
Specific Capacity is lower.

INSPECTED BY: John Clinton

DATE: 1-31-07

WELL AND PUMP INSPECTION REPORT
LAYNE ATLANTIC
BLOOMINGDALE, GA

Owner Edisto Beach Island, Town of Job 78-6828
City Edisto Beach State SC Zip 29438
Well No. Well 5 Location Well Field
DIA. 8" DEPTH 593' TYPE Openhole Limestone, Static 18',SP=9.4
DATE DRILLED 1993
DATE INSPECTED 1-18-2007 PERSON TO CONTACT Bob Doub

6"x5" LAST INSPECTION Date: 2-16-2006						6"x5" PRESENT INSPECTION Date: 1-18-2007					
Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity	Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity
13"	38'	457	8	67'	16	12"	39'	431	10	72'	13
11"	39'	413	20	66'	15	11"	39'	413	20	71'	13
8"	39'	352	40	63'	14	8	39'	352	40	67.5'	12
5"	38'	278	60	58'	14	5"	39'	278	60	61.5'	12
			Shut Off	125					Shut Off	122	

TEST WILL BE COMPLETE THROUGH:

AIRLINE LENGTH 84' Top of Check Meter yes ☒ Flange or ☐ Thread Size 6"
Pump Mfg Submersible? Ser. No. HP 20 hp?
Rated Capacity 400? GPM 200? TDH; Operating Pressure 14
Date Installed 1993 Date of Overhaul n/a

Is check valve leaking? ☐ Yes ☒ No Does Stuffing Box Have Spring? ☐ Yes ☒ No

Is stuffing box leaking? ☐ Yes ☒ No

THE FOLLOWING IS TO BE PERFORMED DURING EACH INSPECTION:

Change Motor Oil & Grease ☐ Repack Pump ☐ Grease Pump ☐
Please check mark when completed.
Pump is presently developing 431 GPM: 10 psi TDH; Shut off Head 122
Present TDH at Rated GPM 160 FT.
Electrical Data with Pump in Operation: 62-63-57 AMPS; 240 VOLTS; 3 PHASE

Remarks: Water Clear, Looks Good.

INSPECTED BY: John Clinton

DATE: 1-31-07

WELL AND PUMP INSPECTION REPORT
LAYNE ATLANTIC
BLOOMINGDALE, GA

Owner Edisto Beach Island, Town of Job 78-6828
City Edisto Beach State SC Zip 29438
Well No. Well 6 Location Bay Creek
DIA. 8" DEPTH 580' TYPE Openhole Limestone, Static 23',SP=27
DATE DRILLED 2000
DATE INSPECTED 1-18-2007 PERSON TO CONTACT Bob Doub

6"x5" LAST INSPECTION Date: 2-16-2006						6"x5" PRESENT INSPECTION Date: 1-18-2007					
Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity	Orifice Reading	Static	GPM	Pressure	Pumping Level	Specific Capacity
28"	22'	659	11	47'	28 g/ft	27.5"	24'	653	18	45'	34
25"	22'	622	20	43'	29 g/ft	27.5"	24'	653	18	45'	34
22"	22'	584	40	40'	32 g/ft	23"	24'	597	40	42'	33
17"	22'	513	60	39'	30 g/ft	19.6"	24'	550	60	42'	33
15"	22'	482	80	37'	32 g/ft	16"	24'	458	80	39'	31
10"	22'	394	100	34'	31 g/ft	11.5"	24'	422	100	38'	30
			Shut Off	172					Shut Off	175	

TEST WILL BE COMPLETE THROUGH:

AIRLINE LENGTH 84' Top of Check Meter yes ☒ Flange or ☐ Thread Size 6"
Pump Mfg Grunfos Submersible Ser. No. HP 40 hp
Rated Capacity est 475 GPM est 200 TDH; Operating Pressure 70
Date Installed 2000 Date of Overhaul n/a

Is check valve leaking? ☐ Yes ☒ No Does Stuffing Box Have Spring? ☐ Yes ☒ No

Is stuffing box leaking? ☐ Yes ☒ No

THE FOLLOWING IS TO BE PERFORMED DURING EACH INSPECTION:

Change Motor Oil & Grease ☐ Repack Pump ☐ Grease Pump ☐
Please check mark when completed.
Pump is presently developing 521 GPM: 70 psi TDH; Shut off Head 175
Present TDH at Rated GPM 221 FT.
Electrical Data with Pump in Operation: 52-51-54 AMPS; 460 VOLTS; 3 PHASE

Remarks: Water Clear, Looks Good. Meter is with in 4 % at line pressure, ok

INSPECTED BY: John Clinton

DATE: 1-18-2007

APPENDIX B

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #2 - 12" WATERLINE FROM BOOSTER PUMPS

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
1.	Mobilization	1	LS	$15,000.00	$15,000.00
2.	Water line AWWA C900 Class 150, SDR18 (includes Restrained joint, fittings, reducers,etc. not included elsewhere)				
	a) 12" PVC Waterline, in place	12000	LF	$40.00	$480,000.00
3.	12-inch Pipe Fittings				
	a. MJ 90° Bend	5	EA	$550.00	$2,750.00
	b. MJ 12-inch x 12-inch Tee	1	EA	$750.00	$750.00
	c. MJ 12-inch x 8-inch Reducer	3	EA	$400.00	$1,200.00
	d. MJ 12-inch x 6-inch Reducer	1	EA	$350.00	$350.00
4.	8-inch x 8-inch Tapping Sleeve and Valve	3	EA	$4,000.00	$12,000.00
5.	6-inch x 6-inch Tapping Sleeve and Valve	1	EA	$3,000.00	$3,000.00
6.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	1	EA	$3,200.00	$3,200.00
7.	Fine Grading & Seeding	5	AC	$2,500.00	$12,500.00
8.	Repair Driveways	1	LS	$10,000.00	$10,000.00
				Subtotal:	**$540,750.00**
				Contingency :	**$108,250.00**
				Engineering, Surveying and Construction Oversight :	**$98,000.00**
				Total :	**$747,000.00**

Notes:

1) Cost estimate based on proposed water line installed along Palmetto Road and Hwy 174 by open cut method, including access road to State Park.
2) Quantities based on preliminary mapping, actual quantities will be determined once final alignment established and field survey conducted.

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #3 - 500,000 GALLON ELEVATED TANK

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
1.	500,000 Gallon Elevated Storage Tank complete with piping, valves, fittings, valve pit, necessary appurtenances and connection to existing water line.	1	LS	$750,000.00	$750,000.00
2.	Fine Grading & Seeding	1	LS	$5,000.00	$5,000.00

Subtotal:	**$755,000.00**
Contingency :	**$151,000.00**
Engineering, Surveying and Construction Oversight :	**$136,000.00**
Total :	**$1,042,000.00**

Notes:
1) Quantities based on preliminary mapping, actual quantities will be determined once final alignment established and field survey conducted.
2) Cost estimate is based on new elevated tank being installed in vicinity of existing elevated tanks, however, the cost does not included removal of existing elevated tank.

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #4 - DOCK SIDE ROAD & SEA CLOUD CIRCLE CONNECTOR

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
1.	Mobilization	1	LS	$5,000.00	$5,000.00
2.	Water line AWWA C900 Class 150, SDR18 (includes Restrained joint, fittings, reducers,etc. not included elsewhere) a) 6" PVC Waterline, in place	600	LF	$25.00	$15,000.00
3.	Water Line AWWA C150 & C151 with a working pressure of 150 psi and cement lining complying with AWWA C104 (includes Restrained joint, fittings, reducers, etc. not included elsewhere) a. 6-inch DIP, in steel casing	100	LF	$40.00	$4,000.00
4.	Bore & Jack 16-inch Steel Casing with all appurtances (Does not include 6-inch DIP)	70	LF	$175.00	$12,250.00
5.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	2	EA	$3,200.00	$6,400.00
6.	6-inch x 6-inch Tapping Sleeve and Valve	2	EA	$3,000.00	$6,000.00
7.	Fine Grading & Seeding	1	LS	$2,500.00	$2,500.00
8.	Repair Driveways & sidewalks	1	LS	$3,000.00	$3,000.00
				Subtotal:	**$54,150.00**
				Contingency :	**$10,850.00**
				Engineering, Surveying and Construction Oversight :	**$10,000.00**
				Total :	**$75,000.00**

Notes:
1) Cost estimate based on bore & jack required under Dock Side and Sea Cloud, and proposed water line installed along entrace road, i.e. no pavement cut/repair required.
2) Quantities based on preliminary mapping, actual quantities will be determined once final alignment established and field survey conducted.

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #5 - DOCK SIDE ROAD & BATTERY PARK CONNECTOR

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
1.	Mobilization	1	LS	$5,000.00	$5,000.00
3.	Water Line AWWA C150 & C151 with a working pressure of 150 psi and cement lining complying with AWWA C104 (includes Restrained joint, fittings, reducers, etc. not included elsewhere) a. 6-inch DIP, in steel casing	50	LF	$40.00	$2,000.00
4.	Bore & Jack 16-inch Steel Casing with all appurtances (Does not include 6-inch DIP)	35	LF	$175.00	$6,125.00
5.	Directional Bore 8" SDR 11 HPDE (Includes Fittings, RJ, Couplings, etc.)	450	LF	$110.00	$49,500.00
6.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	2	EA	$3,200.00	$6,400.00
7.	6-inch x 6-inch Tapping Sleeve and Valve	2	EA	$3,000.00	$6,000.00
8.	Fine Grading & Seeding	1	LS	$2,500.00	$2,500.00
9.	Repair Driveways & sidewalks	1	LS	$3,000.00	$3,000.00
				Subtotal:	**$80,525.00**
				Contingency :	**$16,475.00**
				Engineering, Surveying and Construction Oversight :	**$15,000.00**
				Total :	**$112,000.00**

Notes:
1) Cost estimate based on bore & jack required under Dock Side, and proposed water line installed under golf course and pond by directional bore method for entire length.
2) Quantities based on preliminary mapping, actual quantities will be determined once final alignment established and field survey conducted.

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #6 - TOWNSEND ST & CLUB COTTAGE CONNECTOR

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
1.	Mobilization	1	LS	$5,000.00	$5,000.00
2.	Water line AWWA C900 Class 150, SDR18 (includes Restrained joint, fittings, reducers,etc. not included elsewhere) a) 6" PVC Waterline, in place	360	LF	$25.00	$9,000.00
3.	Water Line AWWA C150 & C151 with a working pressure of 150 psi and cement lining complying with AWWA C104 (includes Restrained joint, fittings, reducers, etc. not included elsewhere) a. 6-inch DIP, in steel casing	50	LF	$40.00	$2,000.00
4.	Bore & Jack 16-inch Steel Casing with all appurtances (Does not include 6-inch DIP)	35	LF	$175.00	$6,125.00
5.	Directional Bore 8" SDR 11 HPDE (Includes Fittings, RJ, Couplings, etc.)	370	LF	$110.00	$40,700.00
6.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	2	EA	$3,200.00	$6,400.00
7.	6-inch x 6-inch Tapping Sleeve and Valve	2	EA	$3,000.00	$6,000.00
8.	Fine Grading & Seeding	1	LS	$2,500.00	$2,500.00
9.	Repair Driveways & sidewalks	1	LS	$3,000.00	$3,000.00
				Subtotal:	**$80,725.00**
				Contingency :	**$16,275.00**
				Engineering, Surveying and Construction Oversight :	**$14,500.00**
				Total :	**$111,500.00**

Notes:
1) Cost estimate based on bore & jack required under Club Cottage Road, and proposed water line installed along Townsend Street by open cut method and under golf course by directional bore method for entire length.
2) Quantities based on preliminary mapping, actual quantities will be determined once final alignment established and field survey conducted.

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #7 - FIRE LINES

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
PHASE 1					
1.	Mobilization	1	LS	$10,000.00	$10,000.00
2.	Water line AWWA C900 Class 150, SDR18 (includes Restrained joint, fittings, reducers,etc. not included elsewhere) a) 6-inch PVC Waterline, in place	6000	LF	$25.00	$150,000.00
3.	Water Line AWWA C150 & C151 with a working pressure of 150 psi and cement lining complying with AWWA C104 (includes Restrained joint, fittings, reducers, etc. not included elsewhere) a. 6-inch DIP, in steel casing	320	LF	$40.00	$12,800.00
4.	Bore & Jack 16-inch Steel Casing with all appurtances (Does not include 6-inch DIP)	240	LF	$175.00	$42,000.00
5.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	8	EA	$3,200.00	$25,600.00
6.	8-inch x 6-inch Tapping Sleeve and Valve	8	EA	$3,600.00	$28,800.00
7.	6-inch x 6-inch Tapping Sleeve and Valve	6	EA	$3,000.00	$18,000.00
8.	Fine Grading & Seeding	1	LS	$15,000.00	$15,000.00
9.	Repair Driveways and Sidewalks	1	LS	$25,000.00	$25,000.00
				Subtotal:	**$327,200.00**
				Contingency :	**$65,800.00**
				Engineering, Surveying and Construction Oversight :	**$59,000.00**
				Phase 1 - Total :	**$452,000.00**

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #7 - FIRE LINES

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
PHASE 2					
1.	Mobilization	1	LS	$10,000.00	$10,000.00
2.	Water line AWWA C900 Class 150, SDR18 (includes Restrained joint, fittings, reducers,etc. not included elsewhere) a) 6-inch PVC Waterline, in place	6550	LF	$25.00	$163,750.00
3.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	8	EA	$3,200.00	$25,600.00
4.	8-inch x 6-inch Tapping Sleeve and Valve	6	EA	$3,600.00	$21,600.00
5.	6-inch x 6-inch Tapping Sleeve and Valve	6	EA	$3,000.00	$18,000.00
6.	Fine Grading & Seeding	1	LS	$15,000.00	$15,000.00
7.	Repair Driveways and Sidewalks	1	LS	$25,000.00	$25,000.00
				Subtotal:	**$278,950.00**
				Contingency :	**$56,050.00**
				Engineering, Surveying and Construction Oversight :	**$50,500.00**
				Phase 2 - Total :	**$385,500.00**

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #7 - FIRE LINES

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
PHASE 3					
1.	Mobilization	1	LS	$10,000.00	$10,000.00
2.	Water line AWWA C900 Class 150, SDR18 (includes Restrained joint, fittings, reducers,etc. not included elsewhere) a) 6-inch PVC Waterline, in place	5900	LF	$25.00	$147,500.00
3.	Water Line AWWA C150 & C151 with a working pressure of 150 psi and cement lining complying with AWWA C104 (includes Restrained joint, fittings, reducers, etc. not included elsewhere) a. 6-inch DIP, in steel casing	200	LF	$40.00	$8,000.00
4.	Bore & Jack 16-inch Steel Casing with all appurtances (Does not include 6-inch DIP)	160	LF	$175.00	$28,000.00
5.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	8	EA	$3,200.00	$25,600.00
6.	8-inch x 6-inch Tapping Sleeve and Valve	7	EA	$3,600.00	$25,200.00
7.	6-inch x 6-inch Tapping Sleeve and Valve	14	EA	$3,000.00	$42,000.00
8.	Fine Grading & Seeding	1	LS	$15,000.00	$15,000.00
7.	Repair Driveways and Sidewalks	1	LS	$25,000.00	$25,000.00
				Subtotal:	**$326,300.00**
				Contingency :	**$65,700.00**
				Engineering, Surveying and Construction Oversight :	**$59,000.00**
				Phase 3 - Total :	**$451,000.00**

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #7 - FIRE LINES

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
PHASE 4					
1.	Mobilization	1	LS	$10,000.00	$10,000.00
2.	Water line AWWA C900 Class 150, SDR18 (includes Restrained joint, fittings, reducers,etc. not included elsewhere) a) 6-inch PVC Waterline, in place	5500	LF	$25.00	$137,500.00
3.	Water Line AWWA C150 & C151 with a working pressure of 150 psi and cement lining complying with AWWA C104 (includes Restrained joint, fittings, reducers, etc. not included elsewhere) a. 6-inch DIP, in steel casing	690	LF	$40.00	$27,600.00
4.	Bore & Jack 16-inch Steel Casing with all appurtances (Does not include 62-inch DIP)	520	LF	$175.00	$91,000.00
5.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	8	EA	$3,200.00	$25,600.00
6.	8-inch x 6-inch Tapping Sleeve and Valve	13	EA	$3,600.00	$46,800.00
7.	6-inch x 6-inch Tapping Sleeve and Valve	5	EA	$3,000.00	$15,000.00
8.	Fine Grading & Seeding	1	LS	$15,000.00	$15,000.00
7.	Repair Driveways and Sidewalks	1	LS	$25,000.00	$25,000.00
				Subtotal:	**$393,500.00**
				Contingency :	**$78,500.00**
				Engineering, Surveying and Construction Oversight :	**$71,000.00**
				Phase 4 - Total :	**$543,000.00**

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #7 - FIRE LINES

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
PHASE 5					
1.	Mobilization	1	LS	$10,000.00	$10,000.00
2.	Water line AWWA C900 Class 150, SDR18 (includes Restrained joint, fittings, reducers,etc. not included elsewhere) a) 6-inch PVC Waterline, in place	6100	LF	$25.00	$152,500.00
3.	Water Line AWWA C150 & C151 with a working pressure of 150 psi and cement lining complying with AWWA C104 (includes Restrained joint, fittings, reducers, etc. not included elsewhere) a. 6-inch DIP, in steel casing	440	LF	$40.00	$17,600.00
4.	Bore & Jack 16-inch Steel Casing with all appurtances (Does not include 6-inch DIP)	340	LF	$175.00	$59,500.00
5.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	8	EA	$3,200.00	$25,600.00
6.	8-inch x 6-inch Tapping Sleeve and Valve	6	EA	$3,600.00	$21,600.00
7.	6-inch x 6-inch Tapping Sleeve and Valve	5	EA	$3,000.00	$15,000.00
8.	Fine Grading & Seeding	1	LS	$15,000.00	$15,000.00
7.	Repair Driveways and Sidewalks	1	LS	$25,000.00	$25,000.00
				Subtotal:	**$341,800.00**
				Contingency :	**$68,200.00**
				Engineering, Surveying and Construction Oversight :	**$62,000.00**
				Phase 5 - Total :	**$472,000.00**

PRELIMINARY COST ESTIMATE
TOWN OF EDISTO BEACH - WATER STUDY
RECOMMENDATION #7 - FIRE LINES

The following cost estimate is based on the recommendations presented in the Water Disritibution System Study for the Town of Edisto Beach, South Carolina. Since it is impossible to control the cost of labor, materials, equipment, or the contractors methods of determining price or competitive bidding, proposals or bids can not be guaranteed and may vary from the following proposed costs.

	Item	Quantity	Unit	Price	Total
PHASE 6					
1.	Mobilization	1	LS	$10,000.00	$10,000.00
2.	Water line AWWA C900 Class 150, SDR18 (includes Restrained joint, fittings, reducers,etc. not included elsewhere) a) 6-inch PVC Waterline, in place	5100	LF	$25.00	$127,500.00
3.	Water Line AWWA C150 & C151 with a working pressure of 150 psi and cement lining complying with AWWA C104 (includes Restrained joint, fittings, reducers, etc. not included elsewhere) a. 6-inch DIP, in steel casing	100	LF	$40.00	$4,000.00
4.	Bore & Jack 16-inch Steel Casing with all appurtances (Does not include 6-inch DIP)	80	LF	$175.00	$14,000.00
5.	Fire Hydrant Assembly, including hydrant tee, 6-inch gate valve, lead pipe, valve box and concrete collar.	7	EA	$3,200.00	$22,400.00
6.	8-inch x 6-inch Tapping Sleeve and Valve	4	EA	$3,600.00	$14,400.00
7.	6-inch x 6-inch Tapping Sleeve and Valve	5	EA	$3,000.00	$15,000.00
8.	Fine Grading & Seeding	1	LS	$15,000.00	$15,000.00
7.	Repair Driveways and Sidewalks	1	LS	$25,000.00	$25,000.00
				Subtotal:	**$247,300.00**
				Contingency :	**$49,700.00**
				Engineering, Surveying and Construction Oversight :	**$44,500.00**
				Phase 6 - Total :	**$341,500.00**