



**New Sewer Service Evaluation
For The Pointe at Hills Farm Development
Shrewsbury, Massachusetts**

August 2015

Prepared For:

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Executive Summary

AECOM performed a new sewer service evaluation for St. Pierre & St. Pierre, P.C. for the proposed Pointe at Hills Farm (The Point) development located in Shrewsbury, Massachusetts. The development will consist of 300 residential units of which 45 percent are 1 bedroom units, 45 percent are 2 bedroom units and 10 percent are 3 bedroom units. The total estimated wastewater flow for the development is 42,300 gallons per day (gpd).

The wastewater from the development will discharge to the Town of Shrewsbury's (the Town) existing sewer piping and pump stations. AECOM reviewed information provided by the Town and conducted a limited field investigation to estimate the capacity of the existing collection system downstream of the development. Through this evaluation, AECOM determined that all pipe segments have sufficient capacity for the existing flow and the proposed flow from The Pointe.

In addition, AECOM reviewed pump run time records for the three pump stations located downstream of the The Pointe: Quail Hollow, Stoney Hill and Cherry Street. Drawdown and rise tests were also conducted at the three stations. The Quail Hollow Pump Station was found to be operating at its design capacity. The Stoney Hill Pump Station was found to be operating below its design capacity, but the station was functioning within industry standards with regard to pump run time and starts per hour. The Cherry Street Pump Station is operating over the rated design capacity and the number of starts per hour of this station exceeds the industry standard. Record drawings indicate the presence of a storage tank at this station. The excessive number of starts per hour has a negative impact on the overall lifespan of the pumps and use of the existing storage tank should be given consideration by the Town to reduce wear on the pump motors.

The analysis performed indicated that the flow from The Pointe will have no significant impact on the overall functionality of the system (collection system, pump stations and force mains). The pipes located downstream of The Pointe have sufficient capacity and it is anticipated that the pump stations will continue to operate in a manner similar to present operation with the flow addition from The Pointe.

1.0 Introduction

AECOM was contracted by the developers of the Pointe at Hills Farm (The Pointe) to conduct an impact assessment of the construction of The Pointe on the existing wastewater infrastructure in the Town of Shrewsbury, Massachusetts (Shrewsbury). AECOM met with the developers to discuss the proposed development plan and reviewed information provided by Shrewsbury at the developer's request. This report summarizes AECOM's findings based on available information (e.g. record drawings, pumping station data, pipe diameter, pipe slope and pipe material), field investigation (i.e. visual inspection of select manholes to verify pipe diameter and size as well as field verification of select pipe slopes; as well as draw down and rise tests at three pump stations, Cherry Street, Quail Hollow, and Stoney Hill), and proposed development plans.

2.0 Background

The Pointe is still in the development stage. As of the date of this report, it is anticipated that 280 to 300 residential units will be built. For the sake of this assessment, AECOM assumed the development will consist of 300 units. This will provide a conservative estimate, if the actual number of units is lower. In addition, it is understood from discussions with the developer that regardless of size, the complex will consist of 10 percent 3 bedroom units, 45 percent 2 bedroom units, and 45 percent 1 bedroom units. Therefore, AECOM will use that distribution of units during the analysis where applicable.

Additionally, The Pointe will consist of two separate properties both located along Route 20 (Figure 3-1). The wastewater flow from the western property will tie-in to manhole 2E-96 and flow by gravity to the Quail Hollow Pump Station (Quail Hollow) while the wastewater from the eastern property will tie-in to manhole 2E-127 and flow by gravity to the Stoney Hill Pump Station (Stoney Hill). The existing wastewater system is set up such that Quail Hollow pumps flow to Stoney Hill which in turn pumps flow to the Cherry Hill Pump Station (Cherry Hill). Shrewsbury, has noted its concerns with regard to the capacity of the wastewater pipes downstream of Cherry Hill. Shrewsbury has indicated that historically, this area has been prone to surcharges. It should be noted however, that prior to 2011, approximately 95,000 gallons per day (gpd) of average daily flow (ADF) was being pumped from the nearby landfill to Cherry Hill¹. The flow from the nearby landfill has been redirected to the Walnut Street Pump Station and therefore, no longer discharges to the sewer piping network under evaluation.

3.0 Evaluation Approach

3.1 *Estimation of Wastewater Flows*

Wastewater flows for a new development are typically estimated using Massachusetts Title 5 (Title 5) and TR-16 Guides for the Design of Wastewater Treatment Works" (TR-16). Title 5 specifies a flow of 110 gpd per bedroom for "Single Family Dwelling, Multiple", while TR-16 advises "when available, use existing wastewater flow and/or water consumption data as a basis for sewer design." For the purpose of this evaluation the flow for the proposed development will be estimated using both methods. See Section 4 of this report for further information on the estimation of wastewater flows.

¹ Information taken from the September 29, 2014 Weston and Sampson Report

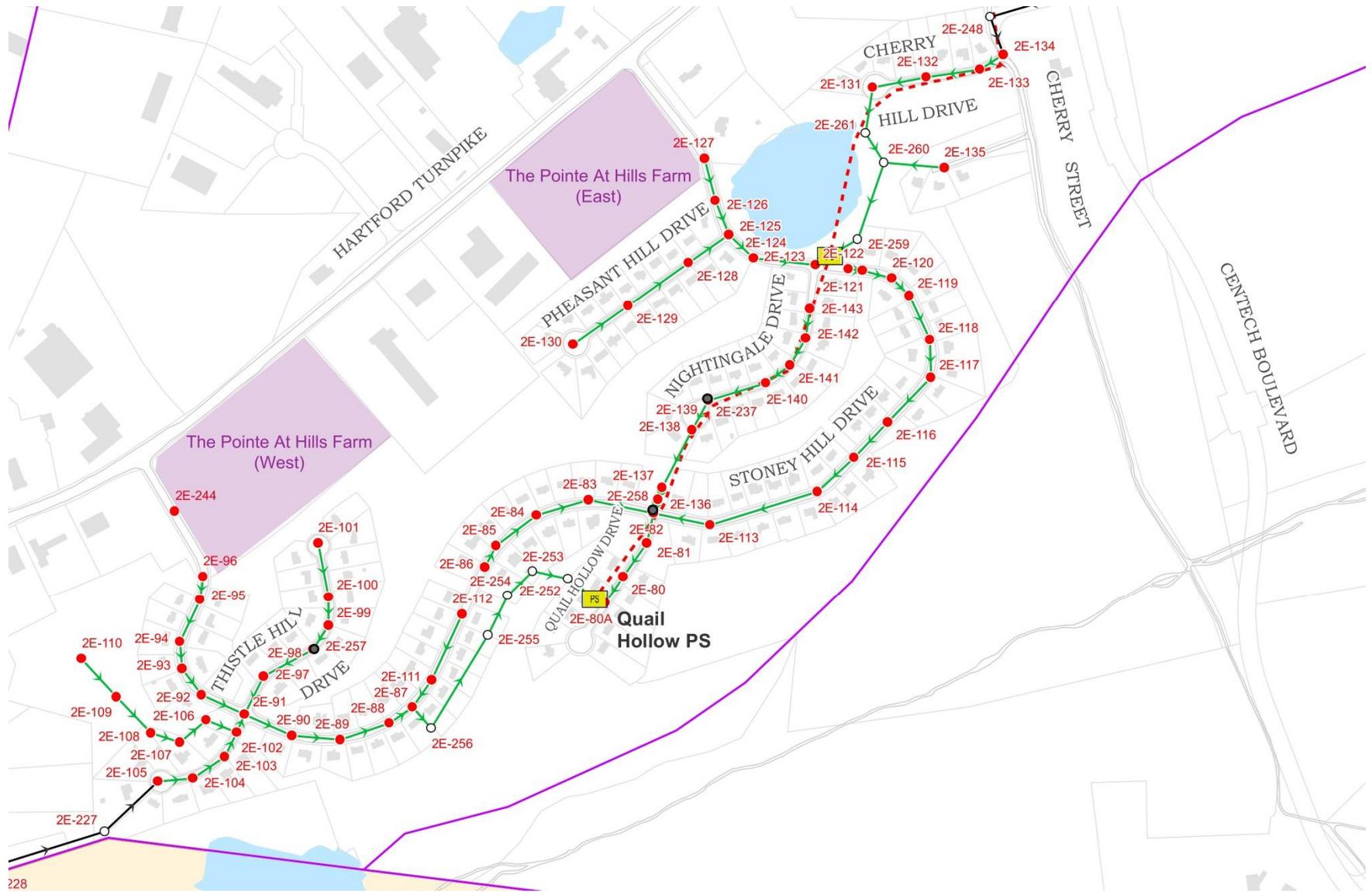


Figure 3 - 1 Map Showing The Location Of The Proposed The Pointe at Hills Farm Development

3.2 Evaluation of Existing Sewer Piping Network

AECOM's evaluation of the sewer piping network included the following:

- Review of information provided by Shrewsbury (Cherry Street Hydraulic Capacity Analysis, Year 3 Investigation Report, As-Built/Record/Construction drawings for segments of existing sewer pipe, run time data for the Cherry Street, Quail Hollow, and Stoney Hill Pump Stations, pump information and curves for the three pump stations, water usage data from Avalon and Arbor Drive, and GIS map of sewer system);
- Review of the September 29, 2014 Weston and Sampson Report (Appendix A);
- Field verification of draw down and rise tests at the three pump stations (Cherry Street, Quail Hollow and Stoney Hill);
- Calculation of theoretical pipe capacity for each segment of gravity sewer and force main between The Pointe and the former wastewater treatment plant. (See Section 7 of this report);
- Field investigation of three (3) segments of pipe to confirm diameter and slope via Survey (Appendix F); and
- Review of information provided by Thompson-Liston Associates (Appendix G).

The goal of AECOM's evaluation of the existing sewer piping network is to estimate the existing capacity of the flow path downstream of the development, identify any areas of concern where the estimated flows from the new development would cause the theoretical capacity of any pipe segment to be exceeded; and to review the pumping data of the three pumping stations and determine if there are any operational changes which could be made that will help to alleviate surcharges downstream of the stations.

4.0 Determination of Flow

The Pointe will consist of 300 units. There will be a mixture of 3-bedroom, 2-bedroom, and single bedroom units. It is anticipated that there will be 135 1-bedroom units, 135 2-bedroom units and 30 3-bedroom bedroom units.

4.1 Flow Based on Standard Title 5 Flow

310 CMR 15.00 (a.k.a. Title 5) is the Massachusetts regulation governing the design and construction of onsite sewage treatment and disposal systems. Paragraph 2.03 (2) of Title 5, identifies various types of residential establishments and lists design flows in gallons per day (gpd) for each type of establishment. The Pointe most closely resembles a "Family Dwelling, Multiple" type of establishment. Therefore, the standard flow estimation unit is 110 gpd per bedroom. Using this flow estimation method, the Pointe is predicted to generate 54,450 gallons of wastewater per day at full occupancy.

The Pointe at Hills Farm – 300 Units			
# of Bedrooms	# of Units	Flow Per Unit (GPD)	Total Flow (GPD)
1	135	110	14,850
2	135	220	29,700
3	30	330	9,900
Total	300	--	54,450

Table 4- 1 Flow Estimation Using Title 5 Methodology

4.2 Flow Based on TR-16

TR-16 “Guides for the Design of Wastewater Treatment Works” is the industry standard for design and construction of sewer systems. Paragraph 2.2.3.1 states that “When available, use existing wastewater flow and/or consumption data as a basis for sewer design. If such data are not available, consider using flow data from a similar community...,” therefore, AECOM, obtained water use data for two similar developments (Avalon and Arbor Drive) from the Town of Shrewsbury. The water use records obtained and a table summarizing the data can be found in Appendix B. The two communities reviewed both consist of a mixture of 3-bedroom, 2-bedroom, and 1 bedroom units. The total number of units per community was determined via web search of the properties. It was determine that one of the communities had an average water usage of 141 gpd per unit and the other had an average water usage of 116 gpd per unit. Therefore, the flow estimation based on TR-16 was conducted using the higher of the two (2) average daily flows, 141 gpd/unit. When estimating sewer flows from water usage data, a percentage of the flow (between 5 and 10 percent) is generally subtracted to account for the water uses that do not result in the water being returned to the sewer (cooking, lawn maintenance, etc.). For the sake of maintaining a conservative flow estimate, AECOM utilized 100 percent of the water usage indicated in the flow records when estimating the flow for The Pointe.

The Pointe at Hills Farm –300 Units		
# of Units	Average Daily Flow per Unit (Gallons)	Total Daily Flow (Gallons)
300	141	42,300

Table 4- 2 Flow Estimate Using TR-16 Methodology

4.3 Flow Estimation - Summary

As both Title 5 and TR-16 are used for flow estimation guidance throughout the industry in the design of sewers, AECOM consulted the Town of Shrewsbury’s “Rules and Regulation For The installation and Connection of Building Sewers and For the Use of Public Sewers”, updated December 10, 2012 (Rules and Regulations) for further guidance on which calculation method should be used. Paragraph 2.05 states “All sewers shall be designed in accordance with “TR-16: Guides for the Design of Wastewater Treatment Works” and DEP regulations as amended from time to time.” Accordingly, flow estimation to design sewers should be done in accordance with TR-16. Therefore, for the remainder of this analysis estimated flow from The Pointe shall be considered to be 42,300 gallons per day.

5.0 Pump Stations Impacted By The Pointe Development

There are three pumping stations that will be impacted by the addition of The Pointe development. These pump stations are the Quail Hollow Pump Station, the Stoney Hill Pump Station and the Cherry Street Pump Station.

Drawdown and rise tests were conducted for each pump at all three stations to estimate pumping rates. These three pumping stations are connected in series, with the Quail Hollow Pump Station pumping to the Stoney Hill Pump Station and the Stoney Hill Pump Station pumping to the Cherry Street Pump Station.

The rise tests at each station estimate the volume of influent flow to the station over a period of time. The rise test is conducted by calculating the volume of the wetwell per foot and then timing the rise of water level from one known elevation (Point A) to another known elevation (Point B). The difference in elevation is then multiplied by the volume per foot of the wetwell and divided by the time it took the water level to rise from Point A to Point B. This provides an approximation of the rate at which sewage is entering the wetwell. The drawdown test is conducted in a similar manner to the rise test, but in reverse. The observer in this case times the fall of water level from Point B to Point A. Once again the distance between Point A and Point B is multiplied by the volume per foot of the wetwell to determine the volume removed from the wetwell over the timed period. The rise test approximates the flow to the wetwell that is occurring during the drawdown test. This approximation is necessary because during the drawdown test, the influent into the wetwell is not blocked and will affect the volume pumped calculation. A combination of rise and drawdown tests provides the observer with a good approximation of the pumping rate of the pump. A brief description of each pumping station and the results of the drawdown and rise tests at each station follows.

5.1 Quail Hollow Pump Station

The Quail Hollow Pump Station (Quail Hollow) is located on Quail Hollow Drive in Section 2E of the Town's sewer system. The pump station has two Smith and Loveless model 6D3B pumps and a 6 foot diameter wetwell. Each pump is rated for 250 gpm of flow at 125 feet of head. The pumps are housed in a concrete building and the wetwell access is located within the building.

AECOM visited the pump station with a representative from the Shrewsbury Water and Sewer Department and conducted two drawdown and rise tests per pump on May 19, 2015. The data from the drawdown and rise tests are included in Appendix C of this report.

As indicated in Table 5-1, the drawdown and rise tests at Quail Hollow indicated that Pump No. 1 was pumping above its rated value of 250 gpm, while Pump No. 2 was pumping at its rated value of 250 gpm. Table 5-1 shows the average of the two draw down tests conducted.

Quail Hollow Pump Station	
Pump No.	Average Flow
1	332 GPM
2	252 GPM

Table 5- 1 Estimated Pumping Rates at Quail Hollow Pump Station

In general, the pumps at Quail Hollow ran for approximately 1.5 to 2.3 minutes and started approximately 5 times per hour. The drawdown and rise tests conducted at this station were done between 9:50 AM and 11 AM, which is typically considered to be "off-peak".

5.2 Stoney Hill Pump Station

The Stoney Hill Pump Station (Stoney Hill) is located on Stoney Hill Drive near the intersection of Nightingale Drive, in Section 2E of the Town's sewer system. The pump station has two Smith and Loveless model 6C3B pumps. Each pump is rated for 250 gpm at 117 feet of head. Similar to Quail Hollow, the pumps are housed in a concrete building and the wetwell access is located within the building.

On May 19, 2015, AECOM along with a representative from the Shrewsbury Water and Sewer Department conducted drawdown and rise tests at Stoney Hill. Upon arrival at the station, AECOM was informed that one of the pumps, Pump No. 2 was out of service and awaiting repair. Therefore, drawdown and rise tests for Pump No. 2 were not conducted. The data from the drawdown and rise tests conducted on Pump No. 1 is located in Appendix C of this report.

The drawdown and rise tests for Pump No. 1 at Stoney Hill indicated that the pump was pumping below its rated value of 250 gpm. Table 5-2 shows the average of the two draw down tests conducted.

Stoney Hill Pump Station	
Pump No.	Average Flow
1	158 GPM
2	N/A

Table 5- 2 Estimated Pumping Rates at Stoney Hill Pump Station

In general, the pump at Stoney Hill ran for approximately 3.2 to 4.6 minutes and started approximately 4.5 times per hour. The drawdown and rise tests conducted at this station were done between 8:50 AM and 9:10 AM, which is typically considered "peak".

Quail Hollow is located close to Stoney Hill and pumps directly to the Stoney Hill wetwell. Flow from this station was not observed during the first draw down test which resulted in a flow of approximately 186 gpm, but was observed during the second drawdown test which resulted in a flow rate of approximately 130 gpm. Flow from Quail Hollow was noted during both rise tests, and the rise times were similar, therefore it is not anticipated that the flow from this station skewed the test results for Stoney Hill.

5.3 Cherry Street Pump Station

The Cherry Street Pump Station (Cherry Street) is located on Cherry Street at the approximate midpoint between Route 9 (Boston Turnpike) and Thomas Farm Circle. The pump station has two Smith and Loveless model 4B2D pumps. Each pump is rated for 200 gpm at 93 feet of head. The pumps and wetwell access are housed in a building. Based on the review of records provided by Shrewsbury as well as Thompson-Liston Associates, the wetwell at Cherry Street was determined to be 6-feet in diameter.

On May 19, 2015, AECOM along with two representatives from the Shrewsbury Water and Sewer Department conducted drawdown and rise tests at Cherry Street. AECOM conducted

two (2) drawdown and rise tests per pump. The data from the drawdown and rise tests is located in Appendix C of this report.

The drawdown and rise tests for both pumps at Cherry Street indicated that they were pumping above their rated value of 200 gpm, as indicated in Table 5-3. Table 5-3 shows the average of the two draw down tests conducted.

Cherry Street Pump Station	
Pump No.	Average Flow
1	466 GPM
2	512 GPM

Table 5- 3 Estimated Pumping Rates at Cherry Street Pump Station

In general, the pumps at Cherry Street ran for approximately 2.4 to 3 minutes and started approximately 12 times per hour. The drawdown and rise tests conducted at this station were done at between 8:08 AM and 8:28 AM, which is typically considered “peak”.

Even though the Cherry Street Station receives flow from Stoney Hill, the stations are located relatively far apart and the discharge for Stoney Hill is located upstream of the Cherry Street wetwell and therefore, the effects of this station on the flow to Cherry Street are not as pronounced as the effects of Quail Hollow on Stoney Hill.

In addition, the As Built drawings for Cherry Street indicate the presence of a 10,000 gallon storage tank on site. Based on the drawdown and rise tests, it appears this tank is not currently being used.

The pump run time records reviewed indicate that this station has a rag issue that impacts the performance of the pumps. The As Built drawings provided for the station does not indicate the presence of a bar screen or grinder.

5.4 Summary of Observations From Drawdown and Rise Tests

Below is a summary of the observations presented in Sections 5.1 through 5.3:

1. As noted in Section 5.2, only one pump was in operation at Stoney Hill.
2. As noted in Section 5.2, the one operational pump at Stoney Hill was performing below its rated value. However, the average run time of the pump and the average number of starts per hour is within the industry standard.
3. As noted in Section 5.3, the Cherry Street Pump Station is operating at approximately 2.4 times its rated capacity of 200 gpm. This would seem to indicate that the head this station is experiencing is below the rated 93 feet.
4. As noted in Section 5.3, the pumps at Cherry Street run for 2.4 to 3 minutes which is within industry standards, but the number of starts per hour are 2 to 3 times higher than industry standard.

5. In general, Quail Hollow (Section 5.1) operates at its rated capacity and both the pump run times and starts per hour fall within industry standards.

6.0 Review of Information Provided by the Town

AECOM, through St. Pierre & St. Pierre P.C., requested information from the Town of Shrewsbury to assist in the evaluation of the existing sewer system (piping and pump stations) that will be impacted by The Pointe. Appendix D of this report contains the memorandum sent from AECOM to Roderick St. Pierre of St. Pierre & St. Pierre P.C. itemizing the information required to complete an evaluation of the sewer network.

Not all of the information requested was provided by the Town. The following items were requested, but not received:

- Drawdown test results for Cherry Street, Quail Hollow and Stoney Hill Pump Stations.
- Five years of pump run time data was requested, only 2.5 years of data was received. The data received did not include the time period prior to the removal of the Landfill Pump Station from the Cherry Street Pump Station.
- As Built/Record Plans for Stoney Hill and Quail Hollow Pump Stations.
- Information on station upgrades. The September 29, 2014 W&S report indicates that there were upgrades done on the Cherry Street Station.
- Records of surcharges in the piping network that would be affected by the construction of The Pointe.
- Current Zoning Map.

It should also be noted, that during the review of the information provided by the Town, it was noted that the GIS map provided was not the most up to date map, as it still showed the Landfill Pump Station discharging to the Cherry Street Pump Station, but the GIS map included in the W&S, September 29, 2014 report shows that the Landfill Pump Station discharge was relocated.

AECOM and St. Pierre and St. Pierre P.C. sent several other information requests to the Town in an effort to obtain all of the information necessary to complete the assessment, but as of the writing of this report, no additional information has been provided.

A review of the information provided resulted in the following observations.

1. Information regarding slope, material, and diameter of several sections of sewer were not provided.
2. None of the As Built, Record, or Construction Plans had the manhole numbering system used on the GIS system map.
3. As Built information for Cherry Street indicates that there is a storage tank located at the station that does not appear to be in operation.
4. One report indicates that pump upgrades were done at Cherry Street, but only the original As Built information was provided.
5. The pump curves provided for the pumps appear to coincide with the make, model, and capacity of the installed pumps.

6. Pump Run time data was requested for a 5 year period, only 2.5 years of data was provided. The five years of data was requested so that the current day run times could be compared with those of the pump station prior to the removal of the landfill station. None of the run time data was from the period prior to the removal of the landfill from the Cherry Street Pump Station.
7. There are sizing conflicts between some of the GIS, As Built/Record/Construction Plans, and the TV Inspection reports.
8. The Weston and Sampson Report Dated September 29, 2014 indicated that the Cherry Street Pump Station was pumping above its rated capacity.
9. Drawdown tests at the pump stations were requested, but the Town indicated no drawdown tests were completed.
10. No records of surcharges were provided. However, there is a mention of areas with known surcharge issues in the Year 3 Infiltration/Inflow report provided.
11. The Year 3 Infiltration/Inflow report indicated that the recommendations from the Years 1 and 2 reports had not been implemented at the time of the Year 3 report.
12. The year 3 Infiltration/Inflow report addressed only sections of sewer pipe in Section 2B of the Town Sewer System that will be impacted by The Pointe. Sections 2E, 2A and 4A were not included.

Based on the information provided, AECOM attempted to field verify as many sizing conflicts as possible with the assistance of the Shrewsbury Water and Sewer Department and as discussed in Section 5, AECOM conducted drawdown and rise tests at all three pump stations. Following the attempt to field verify the information AECOM approached the capacity analysis of the system as follows:

1. Information obtained from Field Verification takes precedence over all other information.
2. It is assumed the GIS plan provided by the Town is an accurate representation of the sewer system configuration as currently constituted, with the noted exception that the landfill pump station is still shown routed to the Cherry Street Pump Station.
3. Where the GIS and the As Built/Record/Construction Plans differed in pipe diameter and/or material the information on the As Built/Record/Construction Plans would take precedence.
4. It is assumed that the tank shown on the Record Plans for the Cherry Street Pump Station exists and is approximately in the same location, the same orientation, and of the same capacity indicated.
5. Where the GIS and TV Inspections differed in diameter, the information on the TV inspection reports would take precedence, unless field verification was done by AECOM, then as noted in item 1, field verification would take precedence.
6. Pump Station flow rates are assumed to be similar to the flow rates observed during the drawdown and rise tests performed on May 19, 2015.
7. Sewer flow rates to the manholes of interest are assumed to be the flow rates indicated in the September 29, 2014 Weston and Sampson report.
8. It is assumed that PM1 through PM4 on the construction plans provided, were installed to replace sewer manholes 2B-21 through 2B-18 shown on the GIS plan as they scale to be in approximately the same location.

9. Length of pipe segments does not impact capacity therefore, the length of each sewer segment was not determined, unless the length was needed to calculate the slope because a pipe slope was not provided on the plan.
10. It is assumed, based on the Cherry Street Hydraulic Capacity Analysis and Odor Management report provided by the Town and the GIS map provided by the Town that the flow from Yorkshire Terrace and Ashford Crossing do not enter the system upstream of sewer manhole 2B-23.
11. Evaluation of sewer network will be done using AECOM standards regarding theoretical capacity. See Section 7 for further explanation.

7.0 Evaluation of Existing Sewer Network

In the September 29, 2014 Weston and Sampson (W&S) report, the capacity analysis of the pipe network was done using 80 percent of the theoretical capacity. AECOM typically uses 90 percent of the theoretical capacity for 6-inch and 8-inch lines and 95 percent of the theoretical capacity for all lines larger than 8-inch. AECOM uses 95 percent for larger pipes because hydraulically, a pipe reaches its maximum flow capacity when it is flowing at approximately 95 percent full and larger pipes are generally impacted less by the build-up of grease and settlement of solids in the pipe than smaller pipes are as the pipe ages. AECOM reduces the percentage to 90 percent for small pipes to account for the potential loss in diameter over time due to the build-up of grease and solids in the piping that would reduce the wetted area of the pipe. In addition, when W&S evaluated the piping network they used a total flow from the proposed development of 60,000 gpd. As discussed in Section 4.3 of this report, AECOM determined the average daily flow for The Pointe to be 42,300 gpd. The difference between the flow used by W&S and the flow determined by AECOM is 17,700 gpd.

For this evaluation, AECOM utilized peak daily flows for each manhole calculated by Weston & Sampson and presented in the September 29, 2014 report. It is assumed these peak flows accurately represent the flow to each manhole, except where noted in this report. AECOM evaluated the existing capacity of the system based on the methodology described above and then compared the remaining capacity in the pipe with the estimated average daily flow from The Pointe to determine if sufficient capacity existed in the piping network.

AECOM reviewed 2.5 years of data for the Cherry Street Pump Station provided by the Town, reflecting the period January 2012 through July 2014. During this time, several days were noted where one pump ran significantly more hours than the other pump. This usually indicates that the pump with the longer run time has an issue that prevents it from pumping at its full capacity. Therefore, these days were excluded from the evaluation, as the data is considered unreliable.

In the September 29, 2014 W&S report, W&S indicates that the peak flow based on review of the pump run time data for Cherry Street is 462,000 gpd. While, this is consistent with the maximum day flow that occurred on June 14, 2013, the run time of 22.1 hours for this day is one of the days when an unbalanced flow occurred. On June 14, 2013, Pump 1 ran for 6.1 hours and pump 2 ran for 16.0 hours. As previously mentioned, when run times are significantly different, it usually indicates that one pump is not pumping at its capacity. Neither comments nor notes are listed in the comment section of the run time data sheets for the rest of the month,

therefore, no explanation was provided for this large discrepancy. However, given that this “peak day” flow is consistent with other peak day flows where pump issues (e.g. problems with motors or rag issues) were noted, then it is probable that there were pump issues at the station that were not noted on the run time data sheets, and therefore the data for June 14, 2013 should be excluded from the analysis of peak flow. When days with significant differences in run times between pumps are excluded from the analysis the following peak flows occur:

2012		2013		2014	
Month	Peak Flow (GPD)	Month	Peak Flow (GPD)	Month	Peak Flow (GPD)
January	392,857	January	312,000	January	171,000
February	297,000	February	480,000	February	135,000
March	231,000	March	396,000	March	402,000
April	297,000	April	171,000	April	273,000
May	354,000	May	168,000	May	195,000
June	330,000	June	495,000	June	138,000
July	345,000	July	132,000	July	117,000
August	321,000	August	120,000	August	Unavailable
September	228,000	September	132,000	September	Unavailable
October	450,000	October	141,000	October	Unavailable
November	354,000	November	147,000	November	Unavailable
December	420,000	December	180,000	December	Unavailable
Average High	334,988	Average High	239,500	Average High	204,429

Table 6- 1 Cherry Street Monthly Peak Day Flow From Run Time Tables

The information provided in Table 6-1 was determined by multiplying the Cherry Street pump run times by the flow rate determined during AECOM’s draw down test (500 gpm). Based on the information provided in Table 6-1, the Peak Day flow from January 2012 through July 2014, inclusive, is 495,000 gpd (June 2013). It should also be noted, that the peak daily flows, in general, appear to be on the decline.

For the capacity analysis, AECOM will use 495,000 gpd for the peak daily flow for Cherry Street. Given, the monthly peak flows based on pump run time data shown in Table 6-1, the average peak daily flow calculated for each year, utilization of this flow is a conservative estimate of the actual peak daily flow this station experiences. The difference between the peak flow determined by W&S (462,000 gpd) and the peak flow determined by AECOM (495,000 gpd) is 33,000 gpd. Therefore, 33,000 gpd was added to calculated existing flow provided by W&S for each manhole downstream of the Cherry Street discharge when estimating the available capacity.

Based on these flow rates and AECOM’s capacity analysis methodology described above, AECOM initially identified two (2) pipe segments that have capacity issues.

- Segment of Concern 1: MH 2B-7 to MH 2B-6
- Segment of Concern 2: MH 2B6 to MH 2B-5

Following identification of these piping segments, AECOM enlisted Waterman Design Associates, Inc. (Waterman) to conduct survey verification of the pipe diameter and to determine the slope of the pipe in these segments. The Survey Results are included in Appendix F of this report.

A discussion of the investigation into these two segments of concern and the resulting elimination of the concern is described in sections 7.1 and 7.2 below.

Additional information regarding the capacity analysis can be found in Appendix E.

7.1 Segment of Concern 1: MH 2B-7 to MH 2B-6.

This reach of pipe was noted as a segment of concern in the W&S report. This segment was footnoted in the W&S report to indicate that a minimum slope was assumed and the pipe diameter was taken from the GIS information. AECOM therefore used the minimum slope of 0.004 ft/ft as indicated by TR-16 for an 8-inch diameter pipe for the initial capacity analysis. Based on this slope and the pipe diameter shown on GIS, there is not sufficient capacity in this segment to accommodate existing flow.

AECOM attempted to field verify the pipe size and material for this segment, but AECOM and the Town were unable to remove the manhole cover for MH 2B-7 while in the field, the edges appear to have been paved over and due to the time constraints of the town personnel it was not possible to attempt to remove the cover.

Waterman made a second attempt to field verify the pipe size and slope and was able to remove the manhole cover for MH 2B-7. It was determined by Waterman that the pipe diameter for this segment was 10-inch, not the 8-inch shown on the GIS map and that the slope of this pipe was approximately 0.03 ft/ft. This slope is far greater than the original 0.004 ft/ft assumed based on the minimum slope indicated in TR-16.

Given the slope of 0.03 ft/ft and a pipe diameter of 10-inches, the segment from MH 2B-7 to MH 2B-6 has sufficient capacity to accommodate the flow from The Pointe. This segment is no longer a segment of concern.

7.2 Segment of Concern 2: MH 2B-6 to MH 2B-5

Similar to Segment of Concern 1, this reach of pipe was noted as a segment of concern in the W&S report and was footnoted to indicate that a minimum slope was assumed and the pipe diameter was taken from the GIS information. Again, AECOM initially used the minimum slope for an 8" pipe as indicated by TR-16 of 0.004 ft/ft for the capacity analysis. Based on this slope and the pipe diameter shown on GIS, there is not sufficient capacity in this segment to accommodate existing flow.

Once again, AECOM attempted to field verify the pipe diameter and slope of this segment, but was unable to do so.

Waterman made a second attempt to field verify the pipe size and slope and was able to obtain the necessary information. It was determined by Waterman that the pipe diameter was 10-inch, not the 8-inch shown on the GIS map and that the slope of this pipe was approximately 0.055 ft/ft. This slope is far greater than the original 0.004 ft/ft assumed based on the minimum slope indicated in TR-16.

Given the slope of 0.055 ft/ft and a pipe diameter of 10-inches, the segment from MH 2B-6 to MH 2B-5 has sufficient capacity to accommodate the flow from The Pointe. This segment is no longer a segment of concern.

7.3 Pipe Beneath Route 9

Another segment of concern that was cited by the W&S report that was field verified by Waterman, was the segment that runs beneath Route 9, MH 2B-23 to MH 2B-22. It is noted on the GIS map that this segment is 8-inch diameter, however, the TV Inspection report noted the pipe diameter as 18-inch. Given the large discrepancy of these two pieces of information and the fact that as built information was not provided for this section, AECOM felt it would be prudent to field verify the diameter and slope.

Survey results yielded a pipe diameter of 12-inches and a slope of approximately 0.0072 ft/ft. Given this information, the capacity analysis performed by AECOM showed that there is sufficient capacity in this pipe for the existing flow as well as the additional flow that would be contributed from The Pointe. This segment is not a segment of concern.

8.0 Results and Recommendations

AECOM performed a review of the capacity of the existing piping network from The Pointe to where the sewer system connects to the existing 18-inch interceptor. The capacity analysis consisted of sewer pipes as well as the three pumping stations impacted by the construction of The Pointe.

8.1 Pipe Network Evaluation Results

With the available information AECOM identified two segments of concern as described in Section 7 of this report. However, both of these segments were field verified and the information provided indicated that there is sufficient capacity in the segments and therefore, they are no longer considered segments of concern.

In addition, the material, slope, and diameter of the pump that runs beneath Route 9 was also field verified and it was determined that there is sufficient capacity that segment as well, therefore, it is not considered a segment of concern.

All of the piping segments analyzed, given the information available, showed sufficient capacity to accommodate the flow from The Pointe.

8.2 Pump Station Evaluation Results

The Quail Hollow Pump Station is operating at the design flow rate and appears to have capacity to accommodate the flow from The Pointe. Both of the pump run times per start are within the expected range based on industry standards as are the number of starts per hour.

The Stoney Hill Pump Station is operating below the design flow rate and had one pump out of operation at the time of the drawdown and rise tests conducted by AECOM. The fact that this station was operating below its design rate did not seem to affect the overall operation of the station based on daily flows. The pump run times were within what would be expected based on industry standards and the number of starts per hour is also within industry standards.

The Cherry Street Pump Station is operating above the design flow rate. The run times per start for each pump is below what would be expected based on industry standards and the number of starts per hour is greater than what would be expected based on industry standards. These two factors combined may result in damage to the pump motors. In addition, the pumps are pumping approximately 2.4 times their design flow rate. From all available information, there exists a 10,000 gallon holding tank at the Cherry Street Pump Station. The Town should consider utilizing this storage tank to reduce the number of starts per hour of the Cherry Street Pumps. Use of this tank may help to mitigate the excessive pump starts that appear to be caused by an undersized wetwell. Use of the holding tank in combination with the wetwell will provide additional make-up volume. Also, it should be noted based on the pump run time data provided by the Town, the Cherry Street station has a significant rag problem that often affects the operation of the pumps at the station. This is not a capacity issue, but rather a maintenance issue.

8.3 Recommendations

Given the results described in Sections 8.1 and 8.2 above, AECOM does not have any additional recommendations for the owners of The Pointe. However, during the analysis described above, it was revealed that there are several maintenance and operational items Shrewsbury may want to consider to improve the overall function of their collection system:

1. The pump that was out of operation at the Stoney Hill Station should be serviced by the Town, such that both pumps are operational.
2. The pump that was in operation at the Stoney Hill Pump Station should be serviced by the Town to determine what, if anything, was causing the pump to pump below its rated capacity.
3. Consideration should be given to conducting an inspection and evaluation of the 10,000 gallon storage tank at the Cherry Street pump station in an effort to make the tank operational. Use of the tank should result in a reduction in the number of starts per hour of the pumps at the station and increase the pump run times. Estimation of the new detention time in the pump station if the storage tank is put on line should be part of the evaluation to ensure that the odor control system located at the site is sufficient.

4. Consideration should also be given to installation of a grinder at the storage tank if it is put in to operation to help address the rag problem at the Cherry Street station. While, this item would not improve the capacity of the system, the history of rag problems at this station appears to have had an impact on the overall operation of the pumps. Engineering will be required to determine the most practicable way to install the grinder.

APPENDIX A

Weston & Sampson Report

Dated September 29, 2014

Draft Report

Smart Growth Design, LLC

Evaluation of New Sewer Service
Connection for 40B Property on Route
20 in the Town of Shrewsbury,
Massachusetts

September 29, 2014

Weston&Sampson

Weston & Sampson Engineers, Inc.
Five Centennial Drive
Peabody, MA 01960-7985
www.westonandsampson.com
Tel: 978-532-1900
Fax: 978-977-0100

Weston & Sampson Project No. 2140430.A

September 29, 2014

Mr. Francis P. Zarette, PE
Smart Growth Design, LLC
625 South Street
Shrewsbury, MA 01545

RE: Draft Report - Evaluation of New Sewer Service Connection for 40B Property on Route 20

Dear Mr. Zarette:

Weston & Sampson is pleased to provide you with our draft letter report including a hydraulic capacity evaluation for the proposed connection of the 40B Property on Route 20 to the Town of Shrewsbury's sanitary sewer system. The project area and impacted downstream sanitary sewers are shown in Figures 1 and 2.

System Description

The proposed development consists of an east and west residential property located on Route 20 in Shrewsbury between the eastern and western intersections of Stoney Hill Road and Route 20 (see attached Figure 1). The west property includes three buildings containing approximately 190 residential units and the east property includes three buildings containing approximately 110 residential units. For the purposes of this evaluation it is estimated that the development will be comprised of 45 percent one bedroom, 45 percent two bedroom and 10 percent 3 bedroom units, with an estimated total flow of 60,000 gallons per day (gpd). This flow was calculated based on the number of bedrooms per unit at the Title 5 flow of 110 gpd per bedroom. The flow was divided up into 37,800 gpd for the west property and 22,200 gpd for the east property.

The proposed sewer service connection for the west property will occur at the existing 8-inch gravity sewer (manhole 2E-96) to the Quail Hollow Pump Station which then pumps to the Stoney Hill Pump Station. The proposed sewer connection for the east property will occur at the existing 8-inch gravity sewer on Stoney Hill Drive (manhole 2E-127) and flow directly to the Stoney Hill Pump Station.

Wastewater would then be conveyed to the gravity sewer (manhole 2E-16A) on Cherry Street near Route 20 and flows by gravity to the Cherry Street Pump Station, discharging to the gravity sewer at the intersection of Route 9 and South Street (see attached Figure 2). The gravity sewer then flows to the town's interceptor and on to the Westborough Wastewater Treatment Plant.

Hydraulic Capacity Analysis

Based on Landfill Pump Station data from 2009 (which was used at the time of the Weston & Sampson's Allen Properties Hydraulic Capacity Analysis), we estimated a flow of 95,000 gpd of average daily flow from the Landfill Pump Station. We now understand that the Landfill Pump Station flow has been redirected to the Walnut Street Pump Station and no longer discharges to these sewers. Based on the proposed wastewater flow of 60,000 gpd from the development, along with estimated existing flows which were based on current pump station flows and verified with 2011 flow meter data, we performed a hydraulic capacity evaluation from sewer manhole 2E-16A to the Cherry Street Pump Station. A hydraulic capacity evaluation was also performed from sewer manhole 2B-25 to the interceptor.

The hydraulic capacity table reflects the removal of the Landfill Pump Station flow and addition of peak flows from the proposed development.

Existing Wastewater Flow Summary

	Average Daily Flow (gpd)	Peak Flow (gpd)
Quail Hollow Pump Station*	45,000	78,000
Stoney Hill Pump Station*	61,000	121,000
Cherry Street Pump Station*	135,000	462,000
Landfill Pump Station**	95,000	175,000

*Estimated based on August 7, 2014 site visit and current pump station run time records provided by Town of Shrewsbury

**2009 Flow data provided by Town of Shrewsbury

In summary, our analysis shows there are still hydraulic deficiencies in some pipe segments. Field inspection data from Weston & Sampson's Spring 2013 Year Three Infiltration Investigations and an August 7, 2014 site visit verifies this finding. In the detailed description of the hydraulic capacity evaluation below, sections of the sanitary gravity sewer and pump stations (see Figures 1 and 2 and Table 1) have been grouped for discussion purposes.

Connection of West Building to Existing Gravity Sewers on Stoney Hill Drive Tributary to the Quail Hollow Pump Station

- Sewers in this tributary area have adequate capacity to handle additional estimated peak flows generated by the proposed development.

Quail Hollow Pump Station

- The pump station currently pumps approximately 45,000 gpd of average daily flow and 78,000 gpd of peak flow (see attached table). These flows were calculated using 2012 to 2014 pump station run-time data provided by the town.
- Based on our field visit the pump station is currently operating below design rating. Actual pumping rates should be verified through a pump station evaluation.

Connection of East Building to Existing Gravity Sewers on Stoney Hill Drive Tributary to the Stoney Hill Pump Station

- Sewers in this tributary area have adequate capacity to handle additional estimated peak flows generated by the proposed development.

Stoney Hill Pump Station

- The pump station currently sees approximately 61,000 gpd of average daily flow and 121,000 gpd of peak flow. These flows were calculated using 2012 to 2014 pump station run-time data provided by the town.
- Based on a field visit the pump station is currently operating below design rating. Actual pumping rates should be verified through a pump station evaluation.

Gravity Sewers from Stoney Hill Discharge to Cherry Street Pump Station and Cherry Street Pump Station Discharge to Town Interceptor

- Sewers in this tributary area have adequate capacity to handle additional estimated peak flows generated by the proposed development.

Cherry Street Pump Station

- The pump station currently handles approximately 135,000 gpd average daily flow and 462,000 gpd peak flow. These flows were calculated using 2012 to 2014 pump station run-time data provided by the town.

- Based on our field visit the pump station appears to be currently operating at 350 gpm. This may be due to the 2004 upgrades to the pump station since its original construction in 1988. Actual pumping rates should be verified through a pump station evaluation.

Gravity Sewers from Cherry Street Pump Station Discharge to Town Interceptor

- The estimated peak flows exceed the design capacity in some sewer segments in this tributary area. The capacities are shown in the attached Table 1 and sewers are highlighted in red in the attached Figure 2. These deficiencies should be corrected prior to introducing additional wastewater flow.

Town Interceptor to former Wastewater Treatment Plant

- Minimum of 1MGD available capacity in all pipes downstream of proposed flow impact. There are no segments of concern in these sewers.

Conclusions & Recommendations

Pump Stations

- Complete pump station evaluations of Quail Hollow, Stoney Hill and Cherry Street Pump Stations should be performed (proposal attached). The evaluation will identify necessary upgrades for stations to accommodate additional flow.

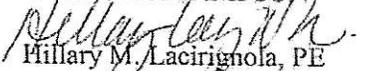
Pipelines

- Based on the information available to us, the estimated peak flows exceed the design capacity in some gravity sewers from the Cherry Street Pump Station Discharge to the Town Interceptor. The capacities are shown in the attached Table 1 and the sewers are highlighted in red in the attached Figure 2. A field survey should be performed to confirm all existing rim and invert elevations in these areas and where necessary, these deficiencies should be corrected prior to the introduction of additional wastewater flow.
- Based on our preliminary evaluation, the sewers from MH 2B-16 to 2B-10 could be lined to achieve the desired design capacity. Preliminary planning level construction costs for lining these sewers could range from \$120,000 to \$150,000. Sewer segments 2B-10 to 2B-9 and 2B-7 to 2B-5 would need to be upgraded to a 10-inch pipe. Preliminary planning level construction costs could range from \$240,000 to \$260,000. The segment under Route 9 (2B-23 to 2B-22) would need to be upgraded to a 12-inch pipe. Preliminary planning level construction costs for a trenchless replacement (pipe jacking) could range from \$100,000 to \$200,000.
- Please note that these are preliminary planning level recommendations and estimated costs. A more detailed survey/analysis, design and evaluation of permitting needs should be performed in order to develop more definitive pipe upgrades and associated costs.
- The costs presented above do not include design, permitting or construction services. Weston & Sampson is available to provide further design assistance should you desire.

This draft report represents a technical evaluation of sewers impacted by the proposed development and does not provide any assurances that the town will approve the proposed development or connection to the town's sanitary sewer system. Please feel free to contact me with any questions you may have.

Very truly yours,

WESTON & SAMPSON


Hillary M. Lacirignola, PE

Project Manager/Team Leader

cc. Robert Tozeski, Water and Sewer Superintendent
Jeffrey Howland, PE, Town Engineer
Daniel Morgado, Town Manager

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TABLE 1
SHREWSBURY, MASSACHUSETTS
HYDRAULIC CAPACITY ANALYSIS
PROPOSED 40B DEVELOPMENT ON ROUTE 20

Subarea	Location	Upstream MH	Downstream MH	Existing Design Capacity (80% of Existing Capacity)	Existing Estimated Peak Flow (Cumulative) (gpd)	Design Capacity Remaining (gpd)
2B	South Street	26	25	2,416,659	25,000	2,391,659
Cherry Street Pump Station Discharge						
2B	South Street ¹	25	24	1,706,430	480,000	1,226,430
2B	Boston Turnpike	24	23	2,748,925	499,000	2,249,925
2B	Boston Turnpike ⁵	23	22	523,083	713,000	(189,917)
2B	South Street Easement	22	PM4 ²	2,655,761	713,000	1,942,761
2B	South Street Easement	PM4 ²	PM3 ²	1,877,906	739,000	1,138,906
2B	South Street Easement	PM3 ²	PM2 ²	1,871,992	739,000	1,132,992
2B	South Street Easement	PM2 ²	PM1 ²	1,877,906	739,000	1,138,906
2B	South Street Easement	PM1 ²	18	2,640,965	739,000	1,901,965
2B	South Street Easement ³	18	16	992,626	739,000	253,626
2B	South Street Easement ^{4,5}	16	15	706,649	739,000	(32,351)
2B	South Street Easement ^{4,5}	15	14	706,649	739,000	(32,351)
2B	South Street Easement ^{4,5}	14	13	706,649	739,000	(32,351)
2B	South Street Easement ^{4,5}	13	12	706,649	739,000	(32,351)
2B	South Street Easement ^{4,5}	12	11	706,649	739,000	(32,351)
2B	South Street Easement ^{4,5}	11	10	706,649	739,000	(32,351)
2B	South Street Easement ^{4,5}	10	9	465,484	739,000	(273,516)
2B	Whippoorwill Drive	9	8	1,038,170	749,000	289,170
2B	Whippoorwill Drive	8	7	1,007,321	749,000	258,321
2B	Whippoorwill Drive ^{4,5}	7	6	568,925	749,000	(180,075)
2B	Whippoorwill Drive ^{4,5}	6	5	568,925	749,000	(180,075)
2B	Bumblebee Circle	5	4	2,939,914	873,000	2,066,914

TABLE I
SHREWSBURY, MASSACHUSETTS
HYDRAULIC CAPACITY ANALYSIS
PROPOSED 40B DEVELOPMENT ON ROUTE 20

Subarea	Location	Upstream MH	Downstream MH	Existing Design Capacity (80% of Existing Capacity)	Existing Estimated Peak Flow (Cumulative) (gpd)	Design Capacity Remaining (gpd)
2B	Bumblebee Circle	4	3	2,933,133	880,000	2,053,133
2B	Bumblebee Circle	3	2	2,933,133	880,000	2,053,133
2B	Bumblebee Circle	2	1	2,933,133	880,000	2,053,133
2B/2A	Bumblebee Circle Easement	1	7	2,930,494	880,000	2,050,494
2A	Bumblebee Circle Easement	7	6	2,316,433	1,078,000	1,238,433
2A	Bumblebee Circle Easement	6	5	2,328,102	1,078,000	1,250,102
2A	Bumblebee Circle Easement	5	4	2,307,222	1,078,000	1,229,222
2A	Bumblebee Circle Easement	4	3	2,334,253	1,078,000	1,256,253
2A	Main Boulevard Easement	3	2	2,322,523	1,122,000	1,200,523
2A	Main Boulevard Easement	2	1	3,592,339	1,122,000	2,470,339
2A-4A	Main Boulevard Easement	1	45	3,693,146	1,122,000	2,571,146

Note: Highlighted segments indicate areas of concern

1. Length for pipe segment from manhole 2B-25 to 2B-24 obtained from town GIS.
2. Pipe and manhole information for sewers in the South Street Easement from manhole PM4 through PM1 was obtained from the Bohler Utility Plan. This 12-inch diameter PVC sewer is currently being constructed and was used in the hydraulic capacity calculations for this report.
3. Information for manhole 2B-17 located in the South Street Easement was not shown on record drawings. For the purpose of this analysis, the capacity was calculated using the same slope as adjacent manhole 2B-18 to 2B-16.
4. Minimum design pipe slopes assumed. Pipe size and material obtained from GIS (no record drawings available)
5. Design capacity capacity exceeded.

O:\Shrewsbury\General\40B Evaluation Project on Route 20\Report\[Final Report Tables.xls]Table 1- Final Report

APPENDIX B

Water Use Records

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- Tier History
- Replace Hist
- Demand Inq
- Report Options

Account

Account **67008837** Customer **254036**
 Parcel **0** HOME PROPERTIES HAYNES FARM LLC
 Location **10100 ARBOR DR** Status **Active**

Service

Service **WATERA 001 WATERA** Mfr **BADG** Meter # **30147713**

◀ ▶ 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463683	A		3610300	650700	0	94	8,846.99	6,922.340
10/27/2014	452160	A		2959600	723500	0	94	9,833.43	7,696.809
07/25/2014	440760	A		2236100	657800	0	93	8,943.19	7,073.118
04/23/2014	429326	A		1578300	548700	0	84	7,464.89	6,532.143
01/29/2014	417896	A		1029600	632100	0	96	8,594.96	6,584.375
10/25/2013	406376	A		397500	397500	225000	91	8,464.88	6,840.659
08/30/2013	0	I		60557000	225000	0	28	.00	6,607.143
07/26/2013	395065	A		60332000	655000	0	94	8,905.25	6,968.085
04/23/2013	383769	A		59677000	612000	0	81	8,322.60	7,555.556
02/01/2013	372421	A		59065000	715000	0	95	9,539.50	7,526.316
10/29/2012	361081	A		58350000	642000	0	95	8,568.60	6,757.895
07/26/2012	349887	A		57708000	654000	0	92	8,728.20	7,108.696

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Account

Account **67008760** Customer **254036**
 Parcel **0** HOME PROPERTIES HAYNES FARM LLC
 Location **100 ARBOR DR** Status **Active**
-1200

Service

Service **WATERA 001 WATERA** Mfr **BADG** Meter # **30147688**

◀ ▶ 1 of 1

Consumption history

Read Date	Bill#	P R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463661	A	2642700	460400	0	94	6,268.42	4,897.872
10/27/2014	452138	A	2182300	484600	0	94	6,596.33	5,155.319
07/25/2014	440738	A	1697700	486200	0	93	6,618.01	5,227.957
04/23/2014	429304	A	1211500	434400	0	84	5,916.12	5,171.429
01/29/2014	417874	A	777100	488700	0	96	6,651.89	5,090.625
10/25/2013	406354	A	288400	288400	155000	91	6,038.07	4,872.527
08/30/2013	0	I	37244000	155000	0	28	.00	4,857.143
07/26/2013	395043	A	37089000	448000	0	94	6,100.40	4,765.957
04/23/2013	383747	A	36641000	427000	0	81	5,815.85	5,271.605
02/01/2013	372399	A	36214000	484000	0	95	6,467.20	5,094.737
10/29/2012	361059	A	35730000	492000	0	95	6,573.60	5,178.947
07/26/2012	349865	A	35238000	490000	0	92	6,547.00	5,326.087

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Account

Account **67008761** Customer **254036**
 Parcel **0** HOME PROPERTIES HAYNES FARM LLC
 Location **100 ARBOR DR** Status **Active**

-2100

Service

Service **WATERA 001 WATERA** Mfr **BADG** Meter # **30147716**

1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463662	A		1737300	291500	0	94	3,979.83	3,101.064
10/27/2014	452139	A		1445800	309000	0	94	4,216.95	3,287.234
07/25/2014	440739	A		1136800	313100	0	93	4,272.51	3,366.667
04/23/2014	429305	A		823700	286800	0	84	3,916.14	3,414.286
01/29/2014	417875	A		536900	331300	0	97	4,519.12	3,415.464
10/24/2013	406355	A		205600	205600	132000	90	4,604.48	3,751.111
08/30/2013	0	I		30691000	132000	0	28	.00	3,464.286
07/26/2013	395044	A		30559000	331000	0	94	4,515.05	3,521.277
04/23/2013	383748	A		30228000	291000	0	81	3,973.05	3,592.593
02/01/2013	372400	A		29937000	303000	0	95	4,059.90	3,189.474
10/29/2012	361060	A		29634000	434000	0	95	5,802.20	4,568.421
07/26/2012	349866	A		29200000	347000	0	92	4,645.10	3,771.739

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- Demand Inq
- Report Options

Account

Account 67008762 **Customer** 254036
Parcel 0 **HOME PROPERTIES HAYNES FARM LLC**
Location 100 ARBOR DR **Status** Active

- 3200

Service

Service WATERA 001 WATERA **Mfr** BADG **Meter #** 30147687

◀ ▶ 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463663	A		1691400	316900	0	94	4,324.00	3,371.277
10/27/2014	452140	A		1374500	294700	0	94	4,023.19	3,135.106
07/25/2014	440740	A		1079800	302000	0	93	4,122.10	3,247.312
04/23/2014	429306	A		777800	272400	0	84	3,721.02	3,242.857
01/29/2014	417876	A		505400	307000	0	96	4,189.85	3,197.917
10/25/2013	406356	A		198400	198400	100000	91	4,073.32	3,279.121
08/30/2013	0	I		30538000	100000	0	28	.00	4,357.143
07/26/2013	395045	A		30438000	331000	0	94	4,515.05	3,521.277
04/23/2013	383749	A		30107000	278000	0	81	3,796.90	3,432.099
02/01/2013	372401	A		29829000	407000	0	95	5,443.10	4,284.211
10/29/2012	361061	A		29422000	342000	0	95	4,578.60	3,600.000
07/26/2012	349867	A		29080000	332000	0	92	4,445.60	3,608.696

My File Edit Tools Help



- Tier History
- Replace Hist
- Demand Inq
- Report Options

Account

Account 67008763 Customer 254036
 Parcel 0 HOME PROPERTIES HAYNES FARM LLC
 Location 100 ARBOR DR Status Active

-4100

Service

Service WATERA 001 WATERA Mfr BADG Meter # 29948136

1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463664	A		1894700	330700	0	94	4,510.99	3,518.085
10/27/2014	452141	A		1564000	386700	0	94	5,269.79	4,113.830
07/25/2014	440741	A		1177300	371800	0	93	5,067.89	3,997.849
04/23/2014	429307	A		805500	287300	0	84	3,922.92	3,420.238
01/29/2014	417877	A		518200	327000	0	96	4,460.85	3,406.250
10/25/2013	406357	A		191200	191200	133000	91	4,422.91	3,562.637
08/30/2013	0	I		27699000	133000	0	28	.00	3,107.143
07/26/2013	395046	A		27566000	304000	0	94	4,149.20	3,234.043
04/23/2013	383750	A		27262000	256000	0	81	3,498.80	3,160.494
02/01/2013	372402	A		27006000	327000	0	95	4,379.10	3,442.105
10/29/2012	361062	A		26679000	345000	0	95	4,618.50	3,631.579
07/26/2012	349868	A		26334000	320000	0	92	4,286.00	3,478.261

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Account

Account 67008764 Customer 254036
 Parcel 0 HOME PROPERTIES HAYNES FARM LLC
 Location 100 ARBOR DR Status Active

5200

Service

Service WATERA 001 WATERA Mfr BADG Meter # 30147710

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Consumption history

Read Date	Bill#	P R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463665	A	1462700	246100	0	94	3,364.66	2,618.085
10/27/2014	452142	A	1216600	218300	0	94	2,987.97	2,322.340
07/25/2014	440742	A	827700	188700	0	93	2,586.89	2,029.032
04/23/2014	429308	A	520000	162900	0	84	2,237.30	1,939.286
01/29/2014	417878	A	357100	192700	0	97	2,641.09	1,986.598
10/24/2013	406358	A	164400	180600	0	87	2,477.13	2,075.862
08/30/2013	0	I	26154000	64200	0	28	.00	2,573.929
07/29/2013	395047	A	26089800	277550	0	97	3,790.81	2,861.340
04/23/2013	383751	A	25720600	229700	0	81	3,142.44	2,835.802
02/01/2013	372403	A	25490900	276000	0	95	3,700.80	2,905.263
10/29/2012	361063	A	25214900	238400	0	95	3,200.72	2,509.474
07/26/2012	349869	A	24777800	239160	0	92	3,210.83	2,599.565

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Account

Account 67008765 Customer 254036
 Parcel 0 HOME PROPERTIES HAYNES FARM LLC
 Location 100 ARBOR DR Status Active

6200

Service

Service WATERA 001 WATERA Mfr BADG Meter # 30147739

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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463666	A		1793900	265800	0	94	3,631.59	2,827.660
10/27/2014	452143	A		1528100	290400	0	94	3,964.92	3,089.362
07/25/2014	440743	A		1237700	292600	0	93	3,994.73	3,146.237
04/23/2014	429309	A		945100	293600	0	84	4,008.28	3,495.238
01/29/2014	417879	A		651500	360900	0	96	4,920.20	3,759.375
10/25/2013	406359	A		290600	290600	126000	91	5,674.93	4,578.022
08/30/2013	0	I		27040000	126000	0	28	.00	2,714.286
07/26/2013	395048	A		26914000	344000	0	94	4,691.20	3,659.574
04/23/2013	383752	A		26570000	335000	0	81	4,569.25	4,135.802
02/01/2013	372404	A		26235000	330000	0	95	4,419.00	3,473.684
10/29/2012	361064	A		25905000	372000	0	95	4,977.60	3,915.789
07/26/2012	349870	A		25533000	330000	0	92	4,419.00	3,586.957

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Account

Account 67008766 **Customer** 254036
Parcel 0 **HOME PROPERTIES HAYNES FARM LLC**
Location 100 ARBOR DR **Status** Active

7200

Service

Service WATERA 001 WATERA **Mfr** BADG **Meter #** 30147682

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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463667	A		3195300	483800	0	94	6,585.49	5,146.809
10/27/2014	452144	A		2711500	559600	0	94	7,612.58	5,953.191
07/25/2014	440744	A		2151900	555900	0	93	7,562.45	5,977.419
04/23/2014	429310	A		1596000	535300	0	84	7,283.32	6,372.619
01/29/2014	417880	A		1060700	657900	0	96	8,944.55	6,853.125
10/25/2013	406360	A		402800	402800	269000	91	9,132.89	7,382.418
08/30/2013	0	I		51604000	269000	0	28	.00	6,857.143
07/26/2013	395049	A		51335000	639000	0	94	8,688.45	6,797.872
04/23/2013	383753	A		50696000	526000	0	81	7,157.30	6,493.827
02/01/2013	372405	A		50170000	601000	0	95	8,023.30	6,326.316
10/29/2012	361065	A		49569000	606000	0	95	8,089.80	6,378.947
07/26/2012	349871	A		48963000	683000	0	92	9,113.90	7,423.913

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Account

Account 67008767 Customer 254036
 Parcel 0 HOME PROPERTIES HAYNES FARM LLC
 Location 100 ARBOR DR Status Active

8100

Service

Service WATERA 001 WATERA Mfr BADG Meter # 30147743

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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463668	A		1854600	268900	0	94	3,673.60	2,860.638
10/27/2014	452145	A		1585700	244100	0	94	3,337.56	2,596.809
07/25/2014	440745	A		1169600	289200	0	93	3,948.66	3,109.677
04/23/2014	429311	A		758400	231500	0	84	3,166.83	2,755.952
01/29/2014	417881	A		526900	261500	0	96	3,573.33	2,723.958
10/25/2013	406361	A		265400	126500	214000	91	4,643.78	3,741.758
08/30/2013	0	I		27253000	214000	0	28	.00	2,993.929
07/26/2013	395050	A		27039000	251000	0	94	3,431.05	2,670.213
04/23/2013	383754	A		26595000	239000	0	81	3,268.45	2,950.617
02/01/2013	372406	A		26356000	287000	0	95	3,847.10	3,021.053
10/29/2012	361066	A		26068000	250000	0	95	3,355.00	2,631.579
07/26/2012	349872	A		25636000	267000	0	92	3,581.10	2,902.174

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Account

Account 67008768 Customer 254036
 Parcel 0 HOME PROPERTIES HAYNES FARM LLC
 Location 100 ARBOR DR Status Active

9100

Service

Service WATERA 001 WATERA Mfr BADG Meter # 30147676

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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463669	A		1792500	373100	0	98	5,085.51	3,807.143
10/23/2014	452146	A		1419400	321300	0	90	4,383.62	3,570.000
07/25/2014	440746	A		1098100	341700	0	93	4,660.04	3,674.194
04/23/2014	429312	A		756400	266700	0	84	3,643.79	3,175.000
01/29/2014	417882	A		489700	315800	0	96	4,309.09	3,289.583
10/25/2013	406362	A		173900	173900	129000	91	4,134.30	3,328.571
08/30/2013	0	I		33272000	129000	0	28	.00	3,964.286
07/26/2013	395051	A		33143000	547000	0	94	7,441.85	5,819.149
04/23/2013	383755	A		32596000	483000	0	81	6,574.65	5,962.963
02/01/2013	372407	A		32113000	545000	0	95	7,278.50	5,736.842
10/29/2012	361067	A		31568000	351000	0	95	4,698.30	3,694.737
07/26/2012	349873	A		31217000	334000	0	92	4,472.20	3,630.435

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Account

Account 67010804 **Customer** 254036
Parcel 0 **HOME PROPERTIES HAYNES FARM LLC**
Location 100 ARBOR DRIVE LAWREN METR **Status** Active

Service

Service WATALN 001 WATAPTLAWN Mfr BADG **Meter #** 29011231

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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463782	A		426000	0	0	94	21.00	.000
10/27/2014	452259	A		426000	172000	0	94	1,519.00	1,829.787
07/25/2014	440858	A		254000	122000	0	93	1,019.00	1,311.828
04/23/2014	429425	A		13200	0	0	84	21.00	.000
01/29/2014	417995	A		13200	0	0	96	21.00	.000
10/25/2013	406475	A		13200	13200	125700	91	1,188.00	1,526.374
08/30/2013	0	I		2606700	125700	0	28	.00	77.500
07/26/2013	395164	A		2481000	193000	0	94	1,729.00	2,053.191
04/23/2013	383868	A		2288000	0	0	81	21.00	.000
02/01/2013	372521	A		2288000	1000	0	95	24.75	10.526
10/29/2012	361180	A		2287000	182000	0	95	1,096.00	1,915.789
07/26/2012	349985	A		2105000	285000	0	92	1,714.00	3,097.826

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Account

Account 67010803 Customer 254036
Parcel 0 HOME PROPERTIES HAYNES FARM LLC
Location 100 ARBOR DRIVE LAWN METR Status Active

Service

Service WATALN 001 WATAPTLAWN Mfr BADG Meter # 29850620

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Consumption history

Read Date	Bill#	P R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463781	A	332000	0	0	94	21.00	.000
10/27/2014	452258	A	332000	170000	0	94	1,499.00	1,808.511
07/25/2014	440857	A	162000	119000	0	93	989.00	1,279.570
04/23/2014	429424	A	43000	0	0	84	21.00	.000
01/29/2014	417994	A	43000	0	0	96	21.00	.000
10/25/2013	406474	A	43000	43000	0	88	291.90	488.636
08/30/2013	0	I	2631050	0	0	28	.00	2,043.929
07/29/2013	395163	A	2631050	91650	0	97	715.50	944.845
04/23/2013	383867	A	2539400	0	0	81	21.00	.000
02/01/2013	372520	A	2539400	0	0	95	19.00	.000
10/29/2012	361179	A	2539400	198700	0	95	1,196.20	2,091.579
07/26/2012	349984	A	2340700	330540	0	92	1,987.24	3,592.826

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Account

Account 67010802 Customer 254036
Parcel 0 HOME PROPERTIES HAYNES FARM LLC
Location 11 ARBOR DRIVE LAWII Status Active

Service

Service WATALN 001 WATAFTLAWN Mfr HRSY Meter # 19526111

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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463780	A		228000	0	0	94	21.00	.000
10/27/2014	452257	A		228000	34000	0	94	235.20	361.702
07/25/2014	440856	A		194000	39000	0	93	266.70	419.355
04/23/2014	429423	A		155000	0	0	84	21.00	.000
01/29/2014	417993	A		155000	0	0	96	21.00	.000
10/25/2013	406473	A		155000	34000	0	91	235.20	373.626
07/26/2013	395162	A		121000	26000	0	94	184.80	276.596
04/23/2013	383866	A		95000	0	0	81	21.00	.000
02/01/2013	372519	A		95000	0	0	95	19.00	.000
10/29/2012	361178	A		95000	40000	0	95	249.00	421.053
07/26/2012	349983	A		55000	54000	0	92	329.50	586.957
04/25/2012	338785	A		1000	0	0	85	19.00	.000

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Account

Account 67008769 Customer 254036
 Parcel 0 HOME PROPERTIES HAYNES FARM LLC
 Location 11 ARBOR DR Status Active

Pool

Service

Service WATERA 001 WATERA Mfr GENL Meter # 89144373

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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463670	A		2722770	0	0	94	30.00	.000
10/27/2014	452147	A		2722770	31870	0	94	461.84	339.043
07/25/2014	440747	A		2690900	38130	0	93	546.66	410.000
04/23/2014	429313	A		2652770	0	0	84	51.00	.000
01/29/2014	417883	A		2652770	0	0	96	30.00	.000
10/25/2013	406363	A		2652770	32140	0	91	465.50	353.187
07/26/2013	395052	A		2620630	25320	0	94	373.09	269.362
04/23/2013	383756	A		2595310	0	0	81	30.00	.000
02/01/2013	372408	A		2595310	0	0	95	30.00	.000
10/29/2012	361068	A		2595310	38060	0	95	536.20	400.632
07/26/2012	349874	A		2557250	52800	0	92	732.24	573.913
04/25/2012	338675	A		2504450	0	0	85	30.00	.000

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Account

Account 67008788 **Customer** 254036
Parcel 8035 **HOME PROPERTIES HAYNES FARM LLC**
Location 8 ARBOR DR- MAINT GARAGE **Status** Active

Service

Service WATERA 001 WATERA **Mfr** BADG **Meter #** 29054747

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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463674	A		10	0	0	94	30.00	.000
10/27/2014	452151	A		10	0	0	94	51.00	.000
07/25/2014	440751	A		10	0	0	93	30.00	.000
04/23/2014	429317	A		10	0	0	84	51.00	.000
01/29/2014	417887	A		10	10	0	96	30.13	.104
10/25/2013	406367	A		0	0	0	91	30.00	.000
07/26/2013	395056	A		0	0	0	94	30.00	.000
04/23/2013	383760	A		0	0	0	108	30.00	.000
01/06/2013	0	I		4350	0	0	111	.00	.000
01/05/2013	372412	A		4350	350	0	68	34.66	5.147
10/29/2012	361072	A		4000	0	0	95	30.00	.000
07/26/2012	349878	A		4000	0	0	92	30.00	.000

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Account

Account 67008770 **Customer** 254036
Parcel 0 **HOME PROPERTIES HAYNES FARM LLC**
Location 11 ARBOR DR **Status** Active

Laundry

Service

Service WATERA 001 WATERA **Mfr** GENL **Meter #** 89138440

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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
01/29/2015	463671	A		3503400	17110	0	94	261.84	182.021
10/27/2014	452148	A		3486290	18330	0	94	278.37	195.000
07/25/2014	440748	A		3467960	48960	0	93	693.41	526.452
04/23/2014	429314	A		3419000	4380	0	84	89.35	52.143
01/29/2014	417884	A		3414620	5230	0	96	100.87	54.479
10/25/2013	406364	A		3409390	28680	0	91	418.61	315.165
07/26/2013	395053	A		3380710	37670	0	94	540.43	400.745
04/23/2013	383757	A		3343040	4190	0	81	86.78	51.728
02/01/2013	372409	A		3338850	4910	0	95	95.30	51.684
10/29/2012	361069	A		3333940	16220	0	95	245.73	170.737
07/26/2012	349875	A		3317720	73380	0	92	1,005.95	797.609
04/25/2012	338676	A		3244340	27540	0	85	396.28	324.000

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Account: 68011490 Customer: 199833
 Account: AVALONBAY COMMUNITIES, INC
 Location: 1 AVALON WAY BLD 1-1000 Status: Active
 Service: WATERA 001 WATERA Mfr HRSY Meter # 22422831

- Tier History
- Replace Hist
- Demand Inq
- Report Options

Service WATERA 001 WATERA Mfr HRSY Meter # 22422831
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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455389	A		7095000	226000		90	3,092.30	2,511.111
08/26/2014	443982	A		6869000	370000		97	5,043.50	3,814.433
05/21/2014	432577	A		6499000	375000		91	5,111.25	4,120.879
02/19/2014	421148	A		6124000	306000		85	4,176.30	3,600.000
11/26/2013	409621	A		5818000	303000		92	4,135.65	3,293.478
08/26/2013	398250	A		5515000	291000		101	3,973.05	2,881.188
05/17/2013	386964	A		5224000	258000		84	3,525.90	3,071.429
02/22/2013	375671	A		4966000	266000		88	3,634.30	3,022.727
11/26/2012	364269	A		4700000	256000		96	3,434.80	2,666.667
08/22/2012	353061	A		4444000	302000		92	4,046.60	3,282.609
05/22/2012	341880	A		4142000	269000		91	3,607.70	2,956.044
02/21/2012	330696	A		3873000	239000		90	3,208.70	2,655.556





Account: 68011494 Customer: 199833
 Account: AVALONBAY COMMUNITIES, INC
 Parcel: 0
 Location: 1 AVALON WAY-BLD 3-3000
 Status: Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service: WATERA 001 WATERA Mfr HRSY Meter # 23130202
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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455391	A		3839000	105000		0	1,452.75	1,166.67
08/26/2014	443984	A		3734000	126000		0	1,737.30	1,298.969
05/21/2014	432579	A		3608000	120000		0	1,656.00	1,318.681
02/19/2014	421152	A		3488000	119000		0	1,642.45	1,400.000
11/26/2013	409623	A		3369000	120000		0	1,656.00	1,304.348
08/26/2013	398252	A		3249000	123000		0	1,696.65	1,217.822
05/17/2013	386966	A		3126000	128000		0	1,764.40	1,523.810
02/22/2013	375675	A		2998000	148000		0	2,035.40	1,681.818
11/26/2012	364271	A		2850000	142000		0	1,918.60	1,479.167
08/22/2012	353063	A		2708000	130000		0	1,759.00	1,413.043
05/22/2012	341882	A		2578000	132000		0	1,785.60	1,450.549
02/21/2012	380700	A		2446000	123000		0	1,665.90	1,366.667





Account 68011496 Customer 199833
 Account AVALONBAY COMMUNITIES, INC
 Parcel 0
 Location 1 AVALON WAY BLD4-4000
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr HRSY Meter # 22422679
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Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455392	A		4153000	7500	0	90	1,046.25	833.333
08/26/2014	443985	A		4078000	9500	0	97	1,317.25	979.381
05/21/2014	432580	A		3983000	8700	0	91	1,208.85	956.044
02/19/2014	421154	A		3896000	7900	0	85	1,100.45	929.412
11/26/2013	409624	A		3817000	10900	0	92	1,506.95	1,184.783
08/26/2013	398253	A		3708000	10400	0	101	1,439.20	1,029.703
05/17/2013	386967	A		3604000	10400	0	84	1,439.20	1,238.095
02/22/2013	375677	A		3500000	14700	0	88	2,021.85	1,670.455
11/26/2012	364272	A		3353000	17900	0	96	2,410.70	1,864.583
08/22/2012	353064	A		3174000	17900	0	92	2,410.70	1,945.652
05/22/2012	341883	A		2995000	13500	0	91	1,825.50	1,483.516
02/21/2012	330702	A		2860000	13800	0	90	1,865.40	1,533.333





Account: 68011498 Customer: 199833
 Account: 8196
 Location: 1 AVALON WAY BLD 5-5000
 Status: Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service: WATERA 001 WATERA Mfr HRSY Meter # 22422621
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455393	A		8404000	301000		0	4,108.55	3,344.444
08/26/2014	443986	A		8103000	317000		0	4,325.35	3,268.041
05/21/2014	432581	A		7786000	319000		0	4,352.45	3,505.495
02/19/2014	421156	A		7467000	269000		0	3,674.95	3,164.706
11/26/2013	409625	A		7198000	364000		0	4,962.20	3,956.522
08/26/2013	398254	A		6834000	346000		0	4,718.30	3,425.743
05/17/2013	386968	A		6488000	255000		0	3,485.25	3,035.714
02/22/2013	375679	A		6233000	262000		0	3,580.10	2,977.273
11/26/2012	364273	A		5971000	270000		0	3,621.00	2,812.500
08/22/2012	353065	A		5701000	249000		0	3,341.70	2,706.522
05/22/2012	341884	A		5452000	220000		0	2,956.00	2,417.582
02/23/2012	330704	A		5232000	249000		0	3,341.70	2,766.667





Account 68011500 Customer 199833
 Account 8196
 Location 1 AVALON WAY BLD 6-6000
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr HRSY Meter # 23130191
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455394	A		8293000	277000	0	90	3,783.35	3,077.78
08/26/2014	443987	A		8016000	270000	0	97	3,688.50	2,783.505
05/21/2014	432582	A		7746000	239000	0	91	3,268.45	2,626.374
02/19/2014	421158	A		7507000	206000	0	85	2,821.30	2,423.529
11/26/2013	409626	A		7301000	264000	0	92	3,607.20	2,869.565
08/26/2013	398255	A		7037000	286000	0	101	3,905.30	2,831.683
05/17/2013	386969	A		6751000	263000	0	84	3,593.65	3,130.952
02/22/2013	375681	A		6488000	276000	0	88	3,769.80	3,136.364
11/26/2012	364274	A		6212000	339000	0	96	4,538.70	3,531.250
08/22/2012	353066	A		5873000	251000	0	92	3,368.30	2,728.261
05/22/2012	341885	A		5622000	263000	0	91	3,527.90	2,890.110
02/21/2012	330706	A		5359000	250000	0	90	3,355.00	2,777.78



Account 68011502 Customer 199833
 Account 8196
 Location 1 AVALON WAY BLD7-7000
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr HRSY Meter # 22422639
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455395	A		6443000	243000	0	90	3,322.65	2,700.000
08/26/2014	443988	A		6200000	243000	0	97	3,322.65	2,505.155
05/21/2014	432583	A		5957000	191000	0	91	2,618.05	2,098.901
02/19/2014	421160	A		5766000	210000	0	85	2,875.50	2,470.588
11/26/2013	409627	A		5556000	235000	0	92	3,214.25	2,554.348
08/26/2013	398256	A		5321000	340000	0	101	4,637.00	3,366.337
05/17/2013	386970	A		4981000	232000	0	84	3,173.60	2,761.905
02/22/2013	375683	A		4749000	217000	0	88	2,970.35	2,465.909
11/26/2012	364275	A		4532000	291000	0	96	3,900.30	3,031.250
08/22/2012	353067	A		4241000	264000	0	92	3,541.20	2,869.565
05/22/2012	341886	A		3977000	232000	0	91	3,115.60	2,549.451
02/21/2012	330708	A		3745000	215000	0	90	2,889.50	2,388.889





Account: 68011504 Customer: 199833
 Account: AVALONBAY COMMUNITIES, INC
 Parcel: 8196
 Location: 1 AVALON WAY BLDG-8000
 Status: Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service: WATERA 001 WATERA Mfr HRSY Meter # 22148852
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455396	A		6733000	247000	0	90	3,376.85	2,744.444
08/26/2014	443989	A		6486000	241000	0	97	3,295.55	2,484.536
05/21/2014	432584	A		6245000	197000	0	91	2,699.35	2,164.835
02/19/2014	421162	A		6048000	197000	0	85	2,699.35	2,317.647
11/26/2013	409628	A		5851000	238000	0	92	3,254.90	2,586.957
08/26/2013	398257	A		5613000	314000	0	101	4,284.70	3,108.911
05/17/2013	386971	A		5299000	234000	0	84	3,200.70	2,785.714
02/22/2013	375685	A		5065000	245000	0	88	3,349.75	2,784.091
11/26/2012	364276	A		4820000	299000	0	96	4,006.70	3,114.583
08/22/2012	353068	A		4521000	248000	0	92	3,328.40	2,695.652
05/22/2012	341887	A		4273000	244000	0	91	3,275.20	2,681.319
02/21/2012	330710	A		4029000	217000	0	90	2,916.10	2,411.111

1 of 1



Account: 68011506 Customer: 199833
 Account: AVALONBAY COMMUNITIES, LLC
 Parcel: 8196
 Location: 1 AVALON WAY BLD 9-9000
 Status: Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service: WATERA 001 WATERA Mfr HRSY Meter # 23130205
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455397	A		7219000	200000		0	2,740.00	2,222.222
08/26/2014	443990	A		7019000	248000		0	3,390.40	2,556.701
05/21/2014	432585	A		6771000	237000		0	3,241.35	2,604.396
02/19/2014	421164	A		6534000	207000		0	2,834.85	2,435.294
11/26/2013	409629	A		6327000	258000		0	3,525.90	2,804.348
08/26/2013	398258	A		6069000	247000		0	3,376.85	2,445.545
05/17/2013	386972	A		5822000	233000		0	3,187.15	2,773.810
02/22/2013	375687	A		5589000	213000		0	2,916.15	2,420.455
11/26/2012	364277	A		5376000	251000		0	3,368.30	2,614.583
08/22/2012	353069	A		5125000	193000		0	2,596.90	2,097.826
05/22/2012	341888	A		4932000	241000		0	3,235.30	2,648.352
02/21/2012	330712	A		4691000	249000		0	3,341.70	2,766.667





Account 68011508 Customer 199833
 Account AVALONBAY COMMUNITIES, INC
 Location 1 AVALON WAY THRS = 1
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr HRSY Meter # 22237093
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455398	A		1002000	63000		90	883.65	700.000
08/26/2014	443991	A		939000	64000		97	897.20	659.794
05/21/2014	432586	A		875000	67000		91	937.85	736.264
02/19/2014	421166	A		808000	63000		85	883.65	741.176
11/26/2013	409630	A		745000	59000		92	829.45	641.304
08/26/2013	398259	A		686000	68000		101	951.40	673.267
05/17/2013	386973	A		618000	58000		84	815.90	690.476
02/22/2013	375689	A		560000	51000		88	721.05	579.545
11/26/2012	364278	A		509000	51000		96	708.30	531.250
08/22/2012	353070	A		458000	61000		92	841.30	663.043
05/22/2012	341889	A		397000	54000		91	748.20	593.407
02/21/2012	330714	A		343000	94000		90	1280.20	1044.444



Account 68011510 Customer 199833
 Account AVALONBAY COMMUNITIES, INC
 Parcel 0
 Location 1 AVALON WAY T1HS-2
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr BADG Meter # 30582430
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455399	A		78100	52160	0	90	736.77	579.556
08/26/2014	443992	A		25940	25940	0	70	381.49	370.571
06/18/2014	0	I		1024510	0	0	34	.00	297.059
06/17/2014	432587	A		1024510	45960	0	112	652.76	410.357
02/25/2014	421168	A		978550	40680	0	69	581.21	589.565
12/18/2013	409631	A		937870	96870	0	114	1,342.59	849.737
08/26/2013	398260	A		841000	13000	0	101	206.15	128.713
05/17/2013	386974	A		828000	43000	0	84	612.65	511.905
02/22/2013	375691	A		785000	44000	0	88	626.20	500.000
11/26/2012	364279	A		741000	35000	0	96	495.50	364.583
08/22/2012	353071	A		706000	19000	0	92	282.70	206.522
05/22/2012	341890	A		687000	24000	0	91	349.20	263.736



Account 68011512 Customer 199833
 Account AVALONBAY COMMUNITIES, INC
 Parcel 0
 Location 1 AVALON WAY THHS-#4
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr HRSY Meter # 22421871
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455400	A		3565000	181000		0	2,482.55	2,011.111
08/26/2014	443993	A		3384000	204000		0	2,794.20	2,103.093
05/21/2014	432588	A		3180000	154000		0	2,116.70	1,692.308
02/19/2014	421170	A		3026000	143000		0	1,967.65	1,682.353
11/26/2013	409632	A		2883000	106000		0	1,466.30	1,152.174
08/26/2013	398261	A		2777000	82000		0	1,141.10	811.881
05/17/2013	386975	A		2695000	66000		0	924.30	785.714
02/22/2013	375693	A		2629000	115000		0	1,588.25	1,306.818
11/26/2012	364280	A		2514000	128000		0	1,732.40	1,333.333
08/22/2012	353072	A		2386000	121000		0	1,639.30	1,315.217
05/22/2012	341891	A		2265000	112000		0	1,519.60	1,230.769
02/21/2012	330718	A		2153000	104000		0	1,413.20	1,155.556





Account: 68011514 Customer: 199833
 Account: AVALONBAY COMMUNITIES, INC
 Location: 1 AVALON WAY T11SH-5
 Status: Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service: WATERA 001 WATERA Mfr HRSY Meter # 23130788
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455401	A		262000	90000	0	90	1,249.50	1,000.000
08/26/2014	443994	A		253000	77000	0	97	1,073.35	793.814
05/21/2014	432589	A		245300	83000	0	91	1,154.65	912.088
02/19/2014	421172	A		237000	109000	0	85	1,506.95	1,282.353
11/26/2013	409633	A		226100	106000	0	92	1,466.30	1,152.174
08/26/2013	398262	A		215500	91000	0	101	1,263.05	900.990
05/17/2013	386976	A		206400	73000	0	84	1,019.15	869.048
02/22/2013	375695	A		199100	71000	0	88	992.05	806.818
11/26/2012	364281	A		192000	74000	0	96	1,014.20	770.833
08/22/2012	353073	A		184600	64000	0	92	881.20	695.652
05/22/2012	341892	A		178200	71000	0	91	974.30	780.220
02/21/2012	330720	A		171100	78000	0	90	1,067.40	866.667



Account 68011516 Customer 199833
 Account AVALONBAY COMMUNITIES, LLC
 Parcel 0
 Location 1 AVALON WAY THHS-#6
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr HRSY Meter # 22422006
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455402	A		1795000	59000	0	90	829.45	655.556
08/26/2014	443995	A		1736000	65000	0	97	910.75	670.103
05/21/2014	432590	A		1671000	64000	0	91	897.20	703.297
02/19/2014	421174	A		1607000	64000	0	85	897.20	752.941
11/26/2013	409634	A		1543000	73000	0	92	1,019.15	793.478
08/26/2013	398263	A		1470000	76000	0	101	1,059.80	752.475
05/17/2013	386977	A		1394000	58000	0	84	815.90	690.476
02/22/2013	375697	A		1336000	56000	0	88	788.80	636.364
11/26/2012	364282	A		1280000	64000	0	96	881.20	666.667
08/22/2012	353074	A		1216000	55000	0	92	761.50	597.826
05/22/2012	341893	A		1161000	61000	0	91	841.30	670.330
02/21/2012	330722	A		1100000	48000	0	90	668.40	533.333



Account 68011518 Customer 199833
 Account AVALONBAY COMMUNITIES, INC
 Parcel 0
 Location 1 AVALON WAY THHS-#7
 Status Active

- Tier History
- Replace Hist
- Demand Inq
- Report Options

Service WATERA 001 WATERA Mfr HRSY Meter # 23131087
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455403	A		2688000	104000		0	1,439.20	1,155.556
08/26/2014	443996	A		2584000	103000		0	1,423.65	1,061.856
05/21/2014	432591	A		2481000	99000		0	1,371.45	1,087.912
02/19/2014	421176	A		2382000	80000		0	1,114.00	941.176
11/26/2013	409635	A		2302000	76000		0	1,059.80	826.087
08/26/2013	398264	A		2226000	75000		0	1,046.25	742.574
05/17/2013	386978	A		2151000	74000		0	1,032.70	880.952
02/22/2013	375699	A		2077000	71000		0	992.05	806.818
11/26/2012	364283	A		2006000	70000		0	961.00	729.167
08/22/2012	353075	A		1936000	94000		0	1,280.20	1,021.739
05/22/2012	341894	A		1842000	110000		0	1,493.00	1,208.791
02/21/2012	330724	A		1732000	116000		0	1,572.80	1,288.889



Account 68011520 Customer 199833
 Account AVALONBAY COMMUNITIES, INC
 Location 1 AVALON WAY THHS-#8
 Parcel 0
 Service WATERA 001 WATERA Mfr HRSY Meter # 22422027
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr HRSY Meter # 22422027
 1 of 1

Consumption history

Read Date	Bill#	P R Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455404	A	3045000	102000	0	1412.10	1,133.333
08/26/2014	443997	A	2943000	137000	0	1886.35	1,412.371
05/21/2014	432592	A	2806000	120000	0	1656.00	1,318.681
02/19/2014	421178	A	2686000	114000	0	1,574.70	1,341.176
11/26/2013	409636	A	2572000	121000	0	1,669.55	1,315.217
08/26/2013	398265	A	2451000	148000	0	2,035.40	1,465.347
05/17/2013	386979	A	2303000	117000	0	1,615.35	1,392.857
02/22/2013	375701	A	2186000	110000	0	1,520.50	1,250.000
11/26/2012	364284	A	2076000	133000	0	1,798.90	1,385.417
08/22/2012	353076	A	1943000	107000	0	1,453.10	1,163.043
05/22/2012	341895	A	1836000	91000	0	1,240.30	1,000.000
02/21/2012	330726	A	1745000	98000	0	1,333.40	1,088.889





Account 68011487 Customer 199833
 Account Parcel 8196
 Location 1 AVALON WAY COMMI BLDG/FOOL
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr HRSY Meter # 22422833
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455387	A		782000	7000		90	124.85	77.78
08/26/2014	443980	A		775000	97000		97	1,344.35	1,000.000
05/21/2014	432575	A		678000	28000		91	409.40	307.692
02/19/2014	421145	A		650000	7000		85	124.85	82.353
11/26/2013	409619	A		643000	21000		92	314.55	228.261
08/26/2013	398248	A		622000	39000		101	558.45	386.139
05/17/2013	386962	A		583000	18000		84	273.90	214.286
02/22/2013	375668	A		565000	8000		88	138.40	90.909
11/26/2012	364267	A		557000	13000		96	202.90	135.417
08/22/2012	353059	A		544000	58000		92	801.40	630.435
05/22/2012	341878	A		486000	21000		91	309.30	230.769
02/21/2012	330693	A		465000	5000		90	96.50	55.556





Account 68011489 Customer 199833
 Account AVALONBAY COMMUNITIES, INC
 Location 1 AVALONWAY MAINTEN BLC
 Status Active

- Report Options
- Demand Inq
- Replace Hist
- Tier History

Service WATERA 001 WATERA Mfr HRSY Meter # 22524520
 1 of 1

Consumption history

Read Date	Bill#	P	R	Current	Usage	Repl Use	Use Days	Bill Amt	Avg Cons
11/24/2014	455388	A		60000	3000	0	90	70.65	33.333
08/26/2014	443981	A		57000	3000	0	97	70.65	30.928
05/21/2014	432576	A		54000	9000	0	91	151.95	98.901
02/19/2014	421147	A		45000	3000	0	85	70.65	35.294
11/26/2013	409620	A		42000	2000	0	92	57.10	21.739
08/26/2013	398249	A		40000	3000	0	101	70.65	29.703
05/17/2013	386963	A		37000	2000	0	84	57.10	23.810
02/22/2013	375670	A		35000	1000	0	88	43.55	11.364
11/26/2012	364268	A		34000	2000	0	96	56.60	20.833
08/22/2012	353060	A		32000	1000	0	92	43.30	10.870
05/22/2012	341879	A		31000	3000	0	91	69.90	32.967
02/21/2012	330695	A		28000	1000	0	90	43.30	11.111



APPENDIX C

Drawdown and Rise Test Data

PUMP STATION DRAWDOWN TESTS

Location: Cherry Street Pump Station, Shrewsbury, MA

Date: 5/19/2015

Attendance:

Jami Walsh
Dave, Sewer Department

John DeCillis, Water Department Field Inspector

Station Information:

Wetwell Diameter (ft): 6
 No. of Wetwells: 1
 Volume per Foot (gal): 211.51
 Volume per Inch (gal): 17.63

Pump Number	Drawdown				Refill				Flow (gpm)
	Wetwell Level Pump Start (inches) (time)	Wetwell Level Pump Stop (inches) (time)	Wetwell Level Drop (inches)	Length of Test (min.)	Wetwell Level Refill Start (inches) (time)	Wetwell Level Refill Stop (inches) (time)	Wetwell Level Rise (inches)	Length of Fill (min.)	
1	132 8:14:23	170 8:17:21	38	3.0	170 8:11:14	132 8:14:23	38	3.1	438.39
1	132 8:19:57	170 8:22:47	38	2.8	170 8:17:21	132 8:19:57	38	2.6	493.99
2	132 8:08:24	170 8:11:14	38	2.8	170 8:06:00	132 8:08:24	38	2.4	515.46
2	132 8:25:41	170 8:28:06	38	2.4	170 8:22:47	132 8:25:41	38	2.9	508.10
							Average		488.99

PUMP STATION DRAWDOWN TESTS

Location: Stoney Hill Pump Station, Shrewsbury, MA

Date: 5/19/2015

Attendance:

Jami Walsh
Dave, Sewer Department

P2 is not Functional

Station Information:

Wetwell Diameter (ft): 6
 No. of Wetwells: 1
 Volume per Foot (gal): 211.51
 Volume per Inch (gal): 17.63

Pump Number	Drawdown				Refill				Flow (gpm)
	Wetwell Level Pump Start (inches) (time)	Wetwell Level Pump Stop (inches) (time)	Wetwell Level Drop (inches)	Length of Test (min.)	Wetwell Level Refill Start (inches) (time)	Wetwell Level Refill Stop (inches) (time)	Wetwell Level Rise (inches)	Length of Fill (min.)	
1	135 8:49:00	161 8:52:09	26	3.2	161 8:52:09	135 9:03:28	26	11.3	185.97
1	135 9:03:28	161 9:08:04	26	4.6	161 9:08:04	135 9:23:21	26	15.3	129.61
2									
2									
					0	0	Average		157.79

PUMP STATION DRAWDOWN TESTS

Location: Quail Hollow, Shrewsbury, MA

Date: 5/19/2015

Attendance:

Jami Walsh
Dave, Sewer Department

Station Information:

Wetwell Diameter (ft): 6
 No. of Wetwells: 1
 Volume per Foot (gal): 211.51
 Volume per Inch (gal): 17.63

Pump Number	Drawdown				Refill				Flow (gpm)
	Wetwell Level Pump Start (inches) (time)	Wetwell Level Pump Stop (inches) (time)	Wetwell Level Drop (inches)	Length of Test (min.)	Wetwell Level Refill Start (inches) (time)	Wetwell Level Refill Stop (inches) (time)	Wetwell Level Rise (inches)	Length of Fill (min.)	
1	134 10:17:45	161 10:19:17	27	1.5	161 10:03:48	134 10:17:45	27	13.9	344.48
1	134 10:55:39	161 10:57:18	27	1.7	161 10:40:20	134 10:55:39	27	15.3	319.49
2	134 10:01:33	161 10:03:48	27	2.3	161 9:51:00	134 10:01:33	27	10.6	256.61
2	134 10:38:11	161 10:40:20	27	2.2	161 10:19:17	134 10:38:11	27	18.9	246.52
					0	0	Average		291.78

APPENDIX D

Information Request Memorandum

Memorandum

To	Roderick A. St. Pierre, P.C.	Page	1
CC	Jason St. Pierre, P.C. Thomas E. Parece, P.E.		
Subject	The Pointe at Hills Farm Request for Information		
From	Jami Walsh, P.E. 		
Date	March 4, 2015		

As discussion during our March 3, 2015 meeting, the following is a summary of the information/data required from the Town of Shrewsbury which is necessary in order to complete the scope of work per our Agreement.

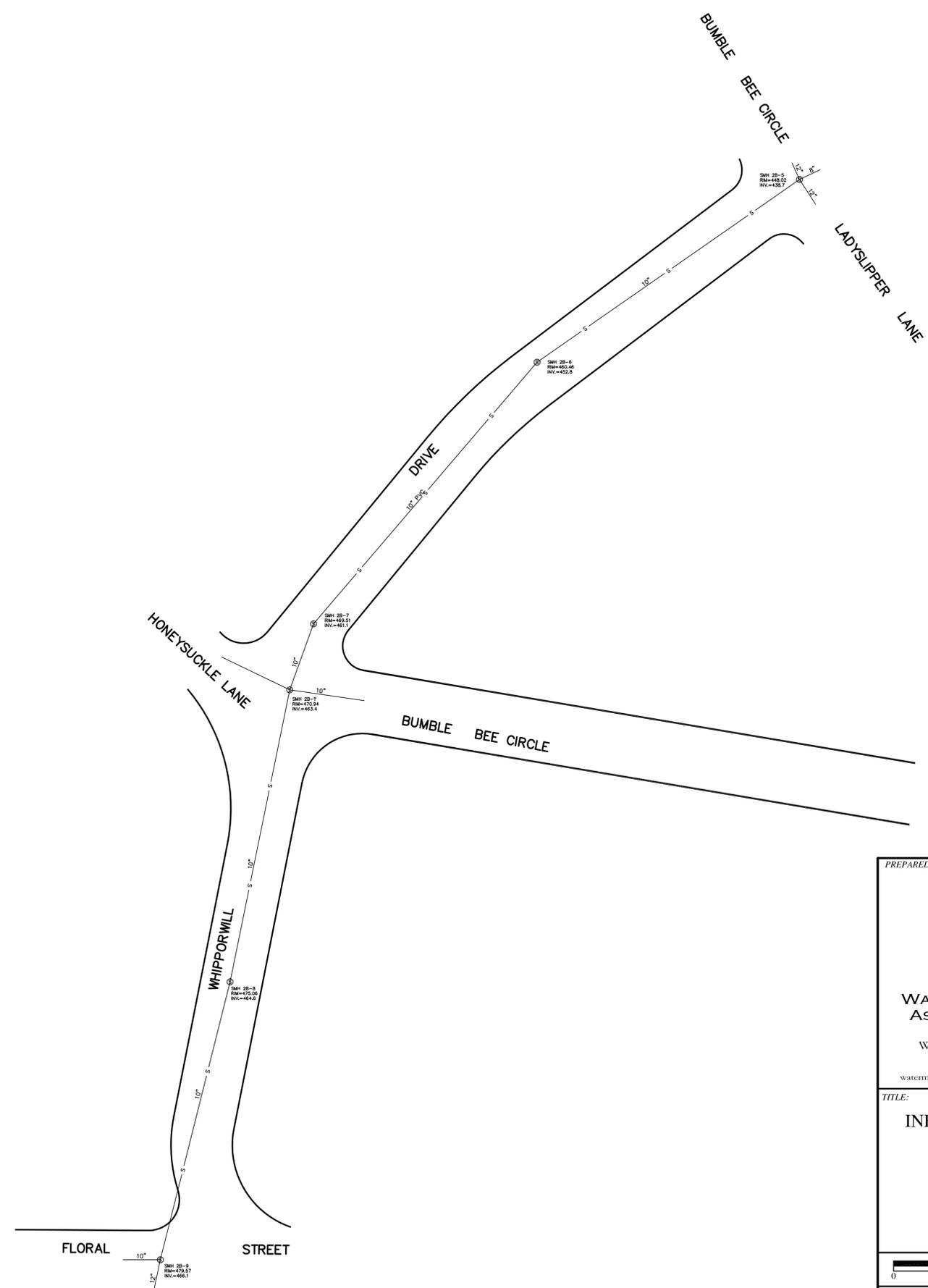
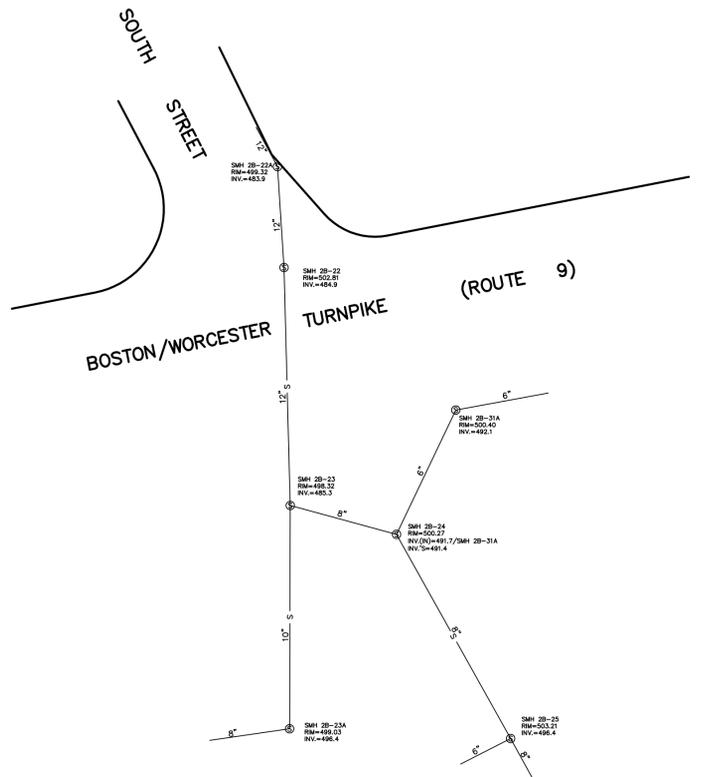
1. Current zoning map (Drawings in GIS or ACAD format) for the tributary area to the collection system (identified as "Impacted Gravity Sewer" and "Segment of Concern") as shown on Figure 1 and Figure 2 prepared by Weston & Sampson (W&S), dated August 2014.
2. Any Infiltration/Inflow information/study/analysis (Tables in Excel format and Drawings GIS or ACAD format) done on the collection system (identified as "Impacted Gravity Sewer" and "Segment of Concern") as shown on Figure 1 and Figure 2 prepared by W&S, dated August 2014.
3. Record/As Built Drawings (Drawings in PDF format) for the following:
 - a. Gravity Sewer from MH 2E-16 to the Quail Hollow Pump Station;
 - b. Quail Hollow Pump Station;
 - c. Force Main from the Quail Hollow Pump Station to the Stoney Hill Pump Station;
 - d. Gravity Sewer from MH 2E-127 to Stoney Hill Pump Station;
 - e. Stoney Hill Pump Station;
 - f. Force Main from the Stoney Hill Pump Station to MH 2E-10A;
 - g. Gravity sewer from MH 2E-10 to the Cherry Street Pump Station;
 - h. Cherry Street Pump Station;
 - i. Force Main from the Cherry Street Pump Station to MH 2B-25;
 - j. Gravity Sewer from MH 2B-25 to MH 2B-1;
 - k. Gravity Sewer from MH 2B-1 to 2A-1; and
 - l. Gravity Sewer from MH 2A-1 to MH 4A-45.
4. Summary and record of any upgrades made to any of the wastewater infrastructure system (gravity sewers, pump stations and/or force mains) which is not shown in the Record/As-Built Drawings noted in Item 3.
5. Draw down test results (Tables in Excel Format) and field notes conducted at the Cherry Street, Stoney Hill, or Quail Hollow Pump Stations in the last 5 years.

6. Pump run time data (Tables in Excel Format) for the Cherry Street, Stoney Hill, and Quail Hollow Pump Stations for the last 5 years.
7. Wastewater flow data (Tables in Excel Format) for the Cherry Street, Stoney Hill, and Quail Hollow Pump Stations for the last 5 years.
8. Water/Sewer use data (Tables in Excel format) for existing Chapter 40B developments located in Shrewsbury, Massachusetts (ie. Shrewsbury Housing Authority, Madison Place, Avalon Shrewsbury, Town Arbor, Shrewsbury Towers, etc.) for the last two years.
9. Latest maps (Drawings in GIS or ACAD format) showing the tributary area of the wastewater infrastructure system (gravity sewers, pump stations and/or force mains) as shown on Figure 1 and Figure 2 prepared by W&S, dated August 2014 (summarized in Item 3).
10. Records of known sewer surcharges (Photos, Field Reports, etc.) in the wastewater infrastructure system (gravity sewers, pump stations and/or force mains) as shown on Figure 1 and Figure 2 prepared by W&S, dated August 2014 (summarized in Item 3) in the last 5 years.
11. Flow meter data (Tables in Excel Format) and location of flow meters located within the wastewater infrastructure system (gravity sewers, pump stations and/or force mains) as shown on Figure 1 and Figure 2 prepared by W&S, dated August 2014 (summarized in Item 3) in the last 5 years.
12. Records/Reports of TV inspections of the wastewater infrastructure system (gravity sewers, pump stations and/or force mains) as shown on Figure 1 and Figure 2 prepared by W&S, dated August 2014 (summarized in Item 3) in the last 5 years.
13. Records/Reports of cleaning activities associated with the wastewater infrastructure system (gravity sewers, pump stations and/or force mains) as shown on Figure 1 and Figure 2 prepared by W&S, dated August 2014 (summarized in Item 3) in the last 5 years.
14. Final and/or Draft Reports (Text in Word format, Tables in Excel format and Graphics/Drawings in GIS or ACAD format) regarding the proposed project and evaluation of the existing wastewater infrastructure including the report titled "Evaluation of New Sewer Services Connection for 40B Property on Route 20 in the Town of Shrewsbury, Massachusetts prepared by W&S, dated September 29, 2014.

We will proceed with our analysis/evaluation as soon as the information/data has been provided.

APPENDIX E
Capacity Analysis Data

APPENDIX F
Survey Results



PREPARED BY:

WATERMAN DESIGN ASSOCIATES, INC.
 31 East Main Street
 Westborough, MA 01581
 508.366.6552
 508.366.6506 (fax)
 watermandesign.com wda@wdassoc.com

TITLE: **SEWER INFRASTRUCTURE SKETCH**

Shrewsbury, MA
 (Worcester County)

0 50 100 150	
DATE: 07/24/15	SCALE: 1" = 50'
JOB NO.: 0927.01	DWN. BY: _____
FILE NO.: 0927001	CHK'D. BY: _____
DRAWING NO.:	SHEET: _____

APPENDIX G

Information from Thompson-Liston Associates

TRANSMITTAL FORM

Thompson-Liston Associates, Inc.
Civil Engineers & Land Surveyors
P.O. Box 570 51 Main Street
Boylston, MA 01505-0570
Telephone (508) 869-6151
Fax (508) 869-6842
info@tlainc.net

DATE: August 4, 2015
TO: **Francis P. Zarette**
595 South Street
Shrewsbury, MA 01545
VIA: Hand/You pick up
FROM: Andrew B. Liston, PE, PLS, CPESC
RE: Cherry Street Sewer Pump Station, Shrewsbury, MA
Job # 271-1444 **Client #**

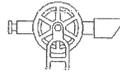
Fran: I attach the documents that I have located. The only information that we have on the tank ahead of the wet well is included.

- Roll of Plans of the Replacement of the Cherry Street Pump Station—Revised 04/22/05
- Worksheet plot of the station area and showing the tank.
- Worksheet plot of the station area and showing the tank label.
- Adams Farm Site Plan, Sheet U8—Revised 01/07/05
- McManus—Submittal Transmittal No.2—April 14, 2005
- McManus—Submittal Transmittal No.9—April 14, 2005
- DEP Final Permit—Sewer Extension—July 22, 2005
- TLA undated sketch of area sewer pump stations
- J&R fax of S&L Data Sheets—09/08/04
- J&R fax of Pump Details—12/15/04
- J&R fax of Pump Curves—12/20/04
- T&L markup of wet well measurements—Apparently from installation process.

We have found no CADD work on the Pump Station design.

I also include our invoice for research, search and copying fees.

THOMPSON-LISTON
ASSOCIATES, INC.



*Professional Engineers Professional Land Surveyors
 Erosion Control Specialists*

51 Main Street, Post Office Box 570
 Boylston, Massachusetts 01505-0570
 Telephone 508-869-6151 FAX 508-869-6842
 www.thompsonliston.com

August 4, 2015

Francis P. Zarette
 595 South Street
 Shrewsbury, MA 01545

Re: Cherry Street Sewer Pump Station, Shrewsbury, MA
 Billing through August 4, 2015

For research in our files for information regarding the design of the replacements and improvements to the Cherry Street Pump Station. For making copies of the located plans and documents. \$ 750.00

Direct Expenses:	Plan Copies	\$ 14.50	
	MA Sales Tx	<u>\$.90</u>	
		\$ 15.40	<u>\$ 15.40</u>

Total Amount Due This Invoice: \$ 765.40

5.

SMH "R"

(WATERTIGHT)

RIM=484.24

INV. IN=470.40

EXISTING SMH

RIM=484.24

EXISTING INV IN=475.6

INV OUT=475.5

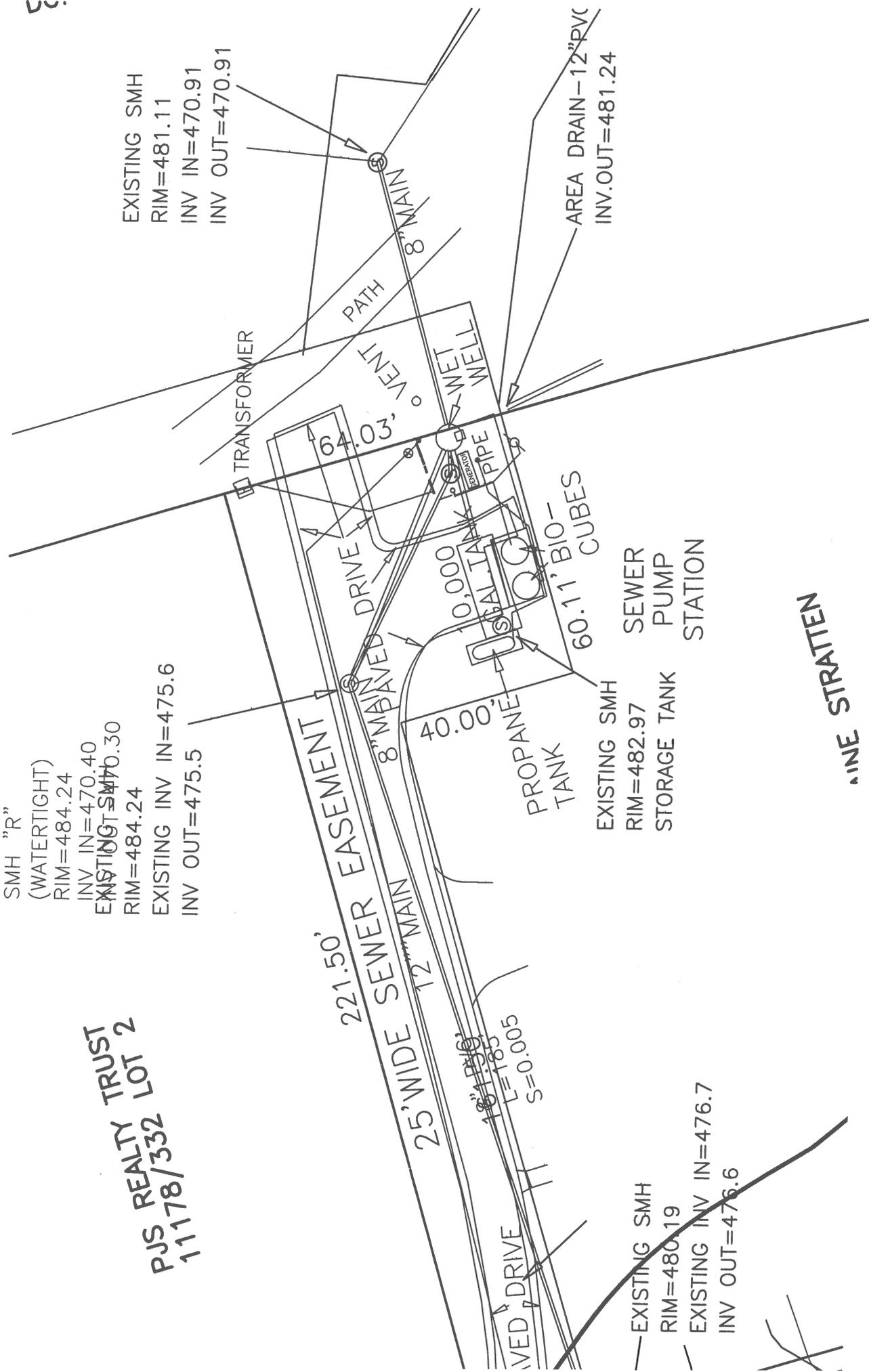
EXISTING SMH

RIM=481.11

INV IN=470.91

INV OUT=470.91

PJS REALTY TRUST
11178/332 LOT 2



EXISTING SMH
RIM=482.97

STORAGE TANK

SEWER
PUMP
STATION

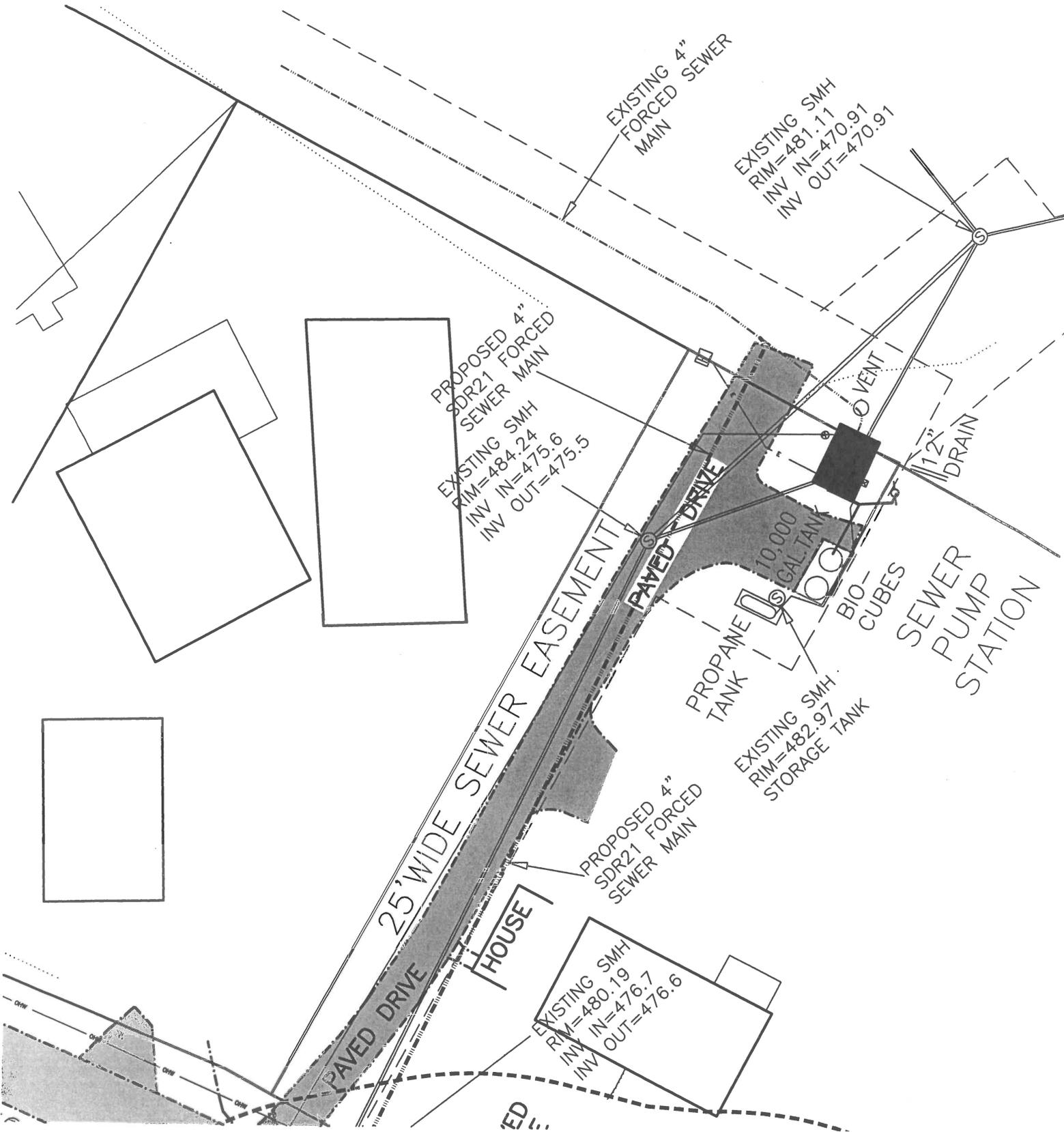
AREA DRAIN-12" PVC
INV. OUT=481.24

EXISTING SMH
RIM=480.19

EXISTING INV IN=476.7

INV OUT=476.6

PINE STRATTEN



EXISTING 4" FORCED SEWER MAIN

EXISTING SMH
RIM=481.11
INV IN=470.91
INV OUT=470.91

PROPOSED 4" SDR21 FORCED SEWER MAIN

EXISTING SMH
RIM=484.24
INV IN=475.6
INV OUT=475.5

25' WIDE SEWER EASEMENT

PROPOSED 4" SDR21 FORCED SEWER MAIN

PROANE TANK

EXISTING SMH
RIM=482.97
STORAGE TANK

BIO-CUBES

SEWER PUMP STATION

112" DRAIN

VENT

10,000 GAL. TANK

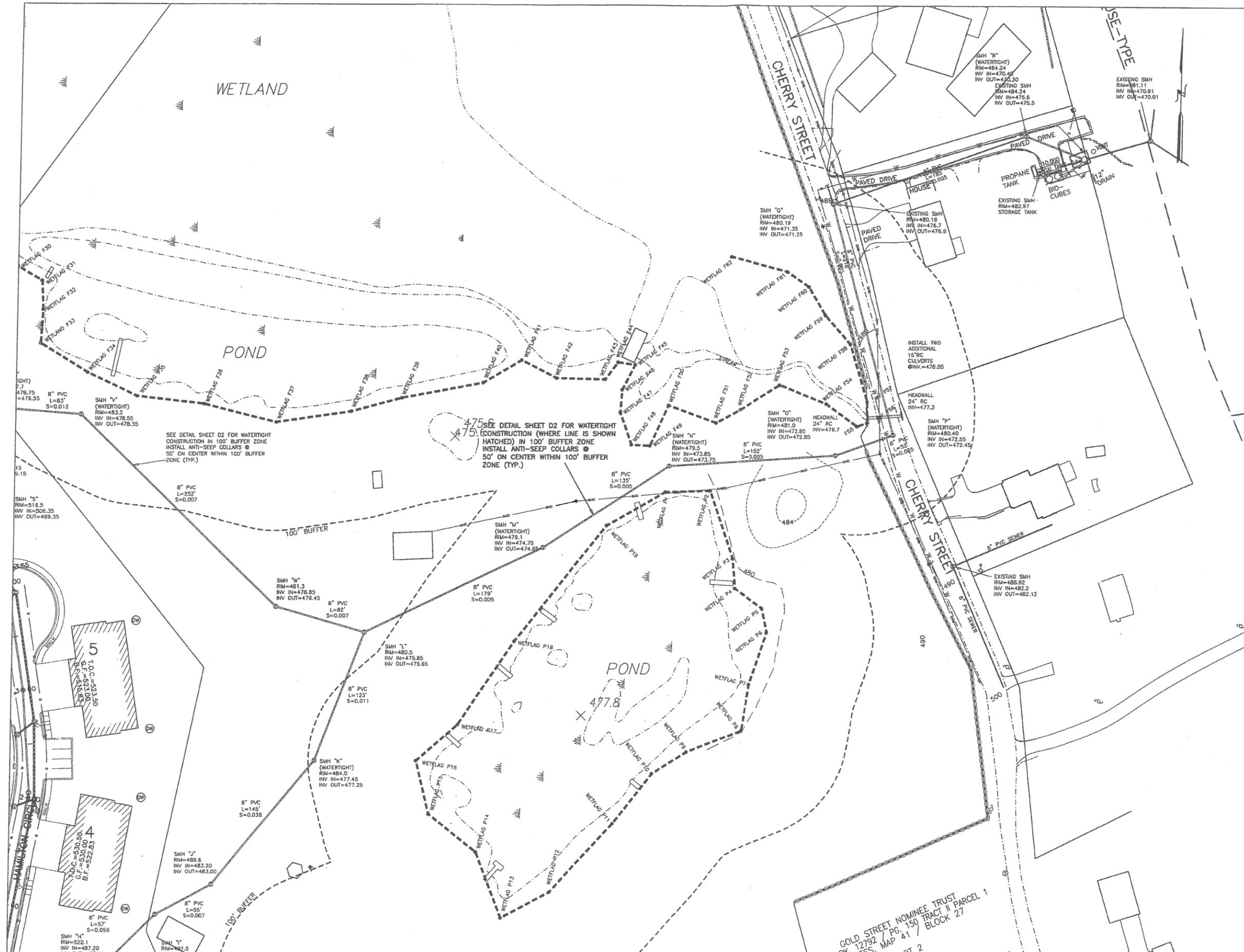
PAVED DRIVE

PAVED DRIVE

HOUSE

EXISTING SMH
RIM=480.19
INV IN=476.7
INV OUT=476.6

ED



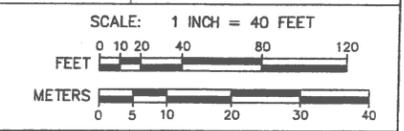
LEGEND

- WETLAND EDGE
- 100' WETLAND BUFFER ZONE EDGE
- RIVERFRONT AREA EDGE
- SEWER MANHOLE
- DRAIN MANHOLE
- CATCHBASIN
- FLARED END SECTION
- STORM DRAIN (PROPOSED)
- SANITARY SEWER (PROPOSED)
- GAS LINE (UNDERGROUND)
- ELECTRIC, TELE. & CABLE (UNDERGROUND)
- WATER LINE (UNDERGROUND)
- WATER GATE
- HYDRANT
- PAYMENT EDGE (EXISTING)
- BERM OR CURBING (PROPOSED)
- UTILITY POLE
- POLE WITH LIGHT
- OVERHEAD WIRES
- 2' CONTOUR
- 10' CONTOUR
- PROPOSED CONTOUR
- EXISTING SPOT GRADE
- PROPOSED SPOT GRADE
- CHAIN LINK FENCE
- WOOD STOCKADE FENCE
- SEDIMENTATION BARRIER
- STONE WALL
- PROPOSED DRYWELL
- PROPOSED HANDICAP RAMP
- PROPOSED GUARDRAIL
- BASEMENT FLOOR
- GARAGE FLOOR
- TOP OF CONCRETE
- INVERT
- LENGTH
- SLOPE
- PVC
- RC
- POLY VINYL CHLORIDE
- REINFORCED CONCRETE



THOMPSON-LISTON ASSOCIATES, INC.
 PROFESSIONAL ENGINEERS & LAND SURVEYORS
 51 MAIN STREET, POST OFFICE BOX 570
 BOYLSTON, MASSACHUSETTS 01505-0570
 TELEPHONE (508) 869-6151 FAX (508) 869-6842 tlainc@aol.com

CLT. NO.	1887	JOB NO.	271-1444
DATE:	SEPTEMBER 13, 2004	DWG NO.	BRENDONADAMSCURRENT.dwg
REVISIONS			
DATE:	DESCRIPTION		
09/24/04	MISCELLANEOUS CHANGES		
10/18/04	ADDRESS TOWN COMMENTS		
12/14/04	ADDRESS TOWN COMMENTS		
1/7/05	ADDRESS TOWN COMMENTS		



SITE PLAN
ADAMS FARM
 GOLD STREET & MEMORIAL DRIVE (ROUTE 140)
 SHREWSBURY, MASSACHUSETTS
 PREPARED FOR
BRENDON PROPERTIES THREE REALTY TRUST
 259 TURNPIKE ROAD, SUITE 110
 SOUTHBOROUGH, MA 01772

TRANSMITTAL FORM

Thompson-Liston Associates, Inc.
Civil Engineers & Land Surveyors
P.O. Box 570 51 Main Street
Boylston, MA 01505-0570
Telephone (508) 869-6151
Fax (508) 869-6842
info@tlainc.net

DATE: April 14, 2005
TO: David Baker, Project Manager
McManus Excavating Co., Inc.
361 West Main Street
Northborough, MA 01532
VIA: Mail
FROM: Andrew B. Liston, PE, PLS, CPESC
RE: Adams Farm, Gold Street and Memorial Drive, Shrewsbury, MA
Transmittal No. 9—Adams Farm PS and Generator
Job # 271-1444 **Client #** 1887

One (1) copy of the following submittals is being returned to you as requested. Please contact me if you have questions. Thank you.

APPROVED AS SUBMITTED

None

APPROVED WITH NOTE OR CHANGE

SGV5062L Barnes Pump, Williamson New England Electric Motor Service Corporation, 03/01/05
LS-100 Biocube, Inc., 03/01/05
KCT-ACTA-0150S Kraft Power Corp., Kohler Model 30RZGB Generator, 03/01/05

- Review and approval is limited to the description of provided performance data as compared to the pump supplier's requirements. No approval is given for the specific electrical or electronic submittal information.
- Change any references of Start Code H to Start Code K
- Change any references of 32KW/40KVA to 30KW/38KVA

RESUBMISSION REQUIRED

None

DISAPPROVED

None

NOT REVIEWED

None

PUMP SYSTEM SUBMITTAL
ADAMS FARM
SHREWSBURY, MA

CONTRACTOR: McMANUS EXCAVATING
361 WEST MAIN STREET
NORTHBORO, MA 01532
CONTACT: JOE SULLIVAN
508-393-6295

SUPPLIER/
INSTALLER: WILLIAMSON NEW ENGLAND
111 BOSTON STREET
EVERETT, MA 02149
CONTACT: JOHN PENNINI
617-394-5060

THOMPSON—LISTON ASSOCIATES, INC.	
SHOP DRAWING REVIEW	
REVIEWED AGAINST THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS ONLY FOR CONFORMANCE TO THE DESIGN REQUIREMENTS.	
<input type="checkbox"/>	APPROVED AS SUBMITTED
<input checked="" type="checkbox"/>	APPROVED SUBJECT TO THE LIMITATIONS OR CHANGES NOTED ON TRANSMITTAL AND HEREON RESUBMISSION NOT REQUIRED
<input type="checkbox"/>	RESUBMISSION REQUIRED
<input type="checkbox"/>	DISAPPROVED
DATE	02/14/05
BY	ES

TRANSMITTAL FORM

Thompson-Liston Associates, Inc.
Civil Engineers & Land Surveyors
P.O. Box 570 51 Main Street
Boylston, MA 01505-0570
Telephone (508) 869-6151
Fax (508) 869-6842
info@tlainc.net

DATE: April 14, 2005
TO: David Baker, Project Manager
McManus Excavating Co., Inc.
361 West Main Street
Northborough, MA 01532
VIA: Mail
FROM: Andrew B. Liston, PE, PLS, CPESC
RE: Adams Farm, Gold Street and Memorial Drive, Shrewsbury, MA
Transmittal No. 2—Cherry Street PS
Job # 271-1444 **Client #** 1887

One (1) copy of the following submittals is being returned to you as requested. Please contact me if you have questions. Thank you.

APPROVED AS SUBMITTED

None

APPROVED WITH NOTE OR CHANGE

16-07878-00-G Smith & Loveless, Inc., 2-Pump Above-Grade WWMPS, 03/15/05

- Priming Lock Loop Installation is not required per telephone report of Bob Greene of J&R Engineered Products

RESUBMISSION REQUIRED

None

DISAPPROVED

None

NOT REVIEWED

None

THOMPSON—LISTON ASSOCIATES, INC.	
SHOP DRAWING REVIEW	
REVIEWED AGAINST THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS ONLY FOR CONFORMANCE TO THE DESIGN REQUIREMENTS.	
<input type="checkbox"/>	APPROVED AS SUBMITTED
<input checked="" type="checkbox"/>	APPROVED SUBJECT TO THE LIMITATIONS OR CHANGES NOTED WILLIAMSON RESUBMISSION NOT REQUIRED
<input type="checkbox"/>	RESUBMISSION REQUIRED
<input type="checkbox"/>	DISAPPROVED.
DATE	04/14/05
BY	ABL

ON TRANSMITTAL

Product: 2-Pump Above-Grade WWMPs
Location: Shrewsbury, MA
Project: Cherry Street PS
Purchaser: Williamson New England Electric Motor Service
Engineer: Thompson-Liston
Serial Number: 16-07878-00-G
Date: 15-Mar-2005

To avoid any lengthy delays that resubmittals may cause, please contact Jon Greenberg at (913) 888-5201 to work out any discrepancies or questions on the submittals.

Equipment as covered by these documents will have a completion date 8 weeks after Smith & Loveless receives the approved documents and clarification of all details.

Smith & Loveless, Inc.
 14040 Santa Fe Trail Drive
 Lenexa, KS 66215-1284
 United States of America

Phone: (913) 888-5201
 Fax: (913) 888-2173
 Parts: (800) 922-9408
www.smithandloveless.com



COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Central Regional Office, 627 Main Street, Worcester, MA 01608

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

STEPHEN R. PRITCHARD
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

Kevin Giblin
Brendon Properties Three Realty Trust
259 Turnpike Road, Suite 110
Southborough, MA 01772

RE: SHREWSBURY – BRPWP13 – W059717
314 CMR 7.00 – Sewer Extension
Adams Farm Senior Housing – Final Permit

Dear Mr. Giblin:

The Department has completed its review of your sewer extension application for the proposed Adams Farm Senior Housing Project of Gold Street and Memorial Drive in Shrewsbury. The project will consist of 90 2-bedroom age restricted (over 55) condominium units within 45 buildings. The project will generate a design flow of 13,500 gpd of sanitary sewage which will be conveyed through gravity sewers to a small pump station and then pumped cross-country to the exiting municipal sewer on Cherry Street, and eventually to the Westborough Wastewater Treatment Facility. As part of the project, the applicant has agreed to upgrade the pumps within the Cherry Street pump station to 200 gpm and other minor improvements to improve capacity.

During the review there were a few items that were identified that will be included as special conditions in the permit. This include the requirement for cross-country easements, the operation and maintenance of the Adams Farm Pump Station by either Brendon Properties LLC or the Adams Farm Condominium Trust and the attachment of the Collins property to the private pump station through an easement.

No comments objecting to the issuance or terms of the permit were received by the Department during the public comment period. After due public notice, the Department hereby issues the attached final sewer extension permit W059717. In accordance with 314 CMR 2.08, the permit becomes effective upon issuance. The Town received an ENF MEPA certificate and Phase I waiver for the project on February 7, 2005.

This information is available in alternate format. Call Donald M. Gomes, ADA Coordinator at 617-556-1057.

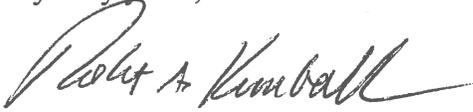
<http://www.mass.gov/dep> • Phone (508) 792-7650 • Fax (508) 792-7621 • TDD # (508) 767-2788

Printed on Recycled Paper

Parties aggrieved by the issuance of this permit are hereby advised of their right to request an Adjudicatory Hearing under the provision of Chapter 30A of the Massachusetts General laws and 314 CMR 1.00 "Rules for the Conduct of Adjudicatory Hearing Proceedings." Unless the person requesting the adjudicatory hearing requests and is granted a stay of the conditions and terms of the permit, the permit shall remain fully effective.

If you have any questions please contact Margo Webber at (508) 767-2738.

Very truly yours,



Robert A. Kimball, P.E.
Environmental Engineer V
Bureau of Resource Protection

July 22, 2005

Date

mw:w059717fp-271

enc.

cc:

Dana Samuelson, DEP-CERO
Westborough Sewer Department

Bob Tozeski
Shrewsbury Sewer Department
100 Maple Street
Shrewsbury, MA 01545

Andrew Liston
PO Box 570
Boylston, MA 01505

SPECIAL CONDITIONS FOR PERMIT #W059717

1. Cross-country easements must be established to prohibit the installation of trees, shrubs or buildings within the easement and that allow the town or other personnel access to the easement for operation and maintenance of the sewer line.
2. The Adams Farm Road pump station will be privately owned and maintained by the Adams Farm Condominium Association. The SCADA system will be connected to the Town of Shrewsbury who will respond to alarm conditions, but maintenance will be performed by Brendon Properties LLC or the Adams Farm Condominium Trust.
3. The Collins home, and up to two other private residences, will be allowed to connect to the sewer line and the private pump station through sewer easements.

**THOMPSON-LISTON
ASSOCIATES, INC.**

51 Main St. P.O. Box 570
BOYLSTON, MASSACHUSETTS 01505
(508) 869-6151 FAX (508) 869-6842

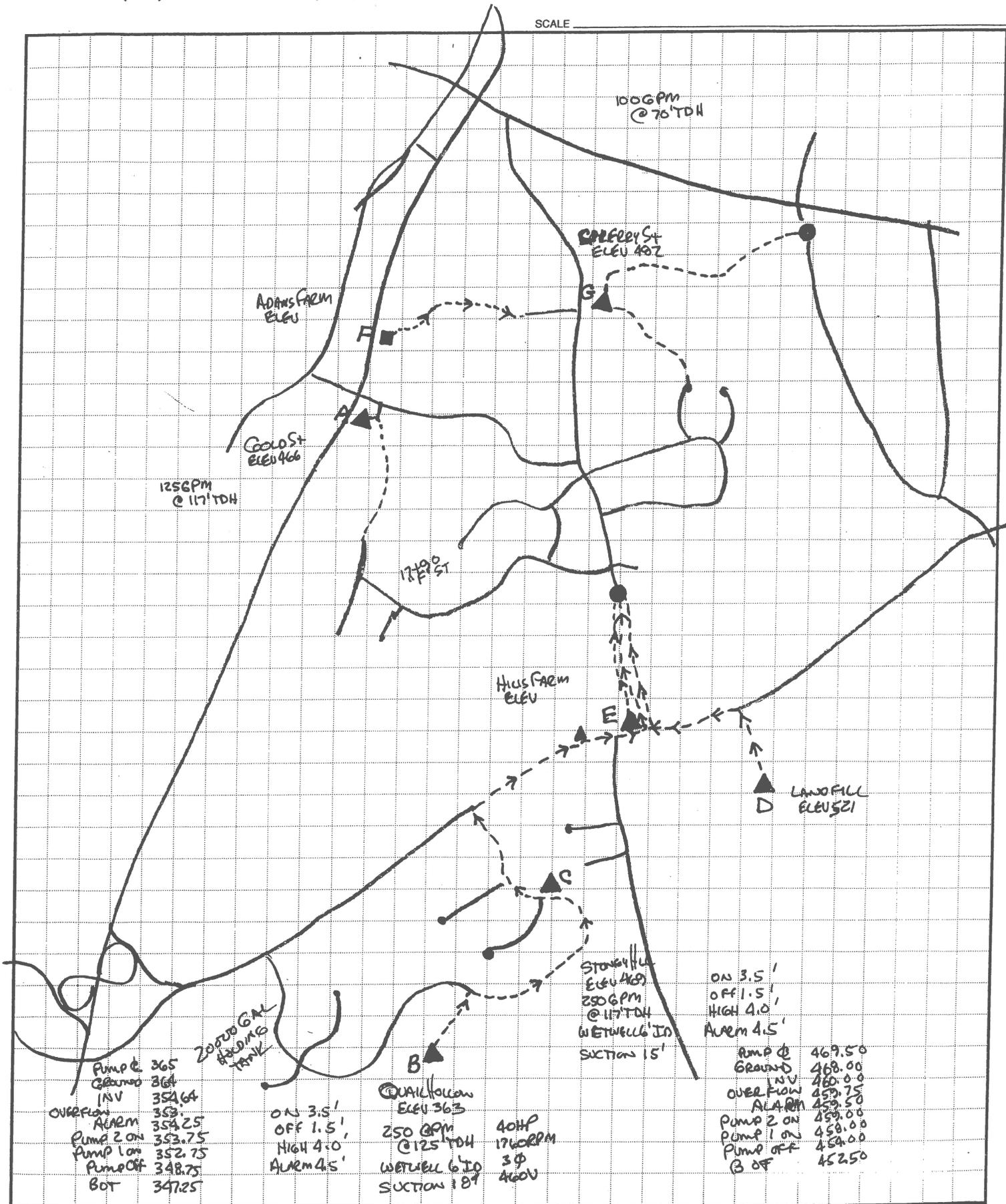
JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____



Pump @ Ground INV 365
364
354.64
OVERFLOW ALARM 353
Pump 2 on 353.25
Pump 1 on 352.75
Pump off 348.75
BOT 347.25

ZOOLOGICAL HOLDING TANK
ON 3.5'
OFF 1.5'
HIGH 4.0'
ALARM 4.5'

QUALIFLOW ELEV 363
250 GPM @ 125' TDH
40HP 1760RPM
WELL 6" ID SUCTON 1.8'

STONE HILL ELEV 469
250 GPM @ 117' TDH
WELL 6" ID SUCTON 1.5'

ON 3.5'
OFF 1.5'
HIGH 4.0'
ALARM 4.5'

Pump @ Ground INV 469.50
468.00
460.00
OVERFLOW ALARM 459.75
459.50
Pump 2 on 459.00
Pump 1 on 458.00
Pump off 454.00
BOT 452.50



J & R Engineered Products, Inc.

44 Commercial Street - Raynham, MA 02767
 Tele: 508/823-9566 Fax: 508/880-7232

Fax Cover Sheet

TO: Thompson - Liston Associates, Inc.	DATE: 12/20/04
ATTN: Andrew Liston	FAX#: 508 869 6842
FROM: Ray Sawyer	PHONE #: 508 8696151 ext 222
SUBJECT: Cherry Street, Shrewsbury, Ma. Smith & Loveless Pumping Station S/N 16-3110 Replacement	TOTAL PAGES: 2 (Including Cover)

Andrew,

In response to your request to upgrade the Cherry Street pumping station with a new Smith & Loveless station to provide 200 GPM at an estimated 92.90 Feet TDH, see the attached 4B2D pump curve. The power at the current station is 3 phase, 60 Hz, 208 VAC.

For the new conditions 15 HP motors at 1760 RPM will be required. The VFD's will be ABB. I have requested the VFD models, generator size and pump curve for both pumps running from S&L.

I hope this helps,

Ray Sawyer

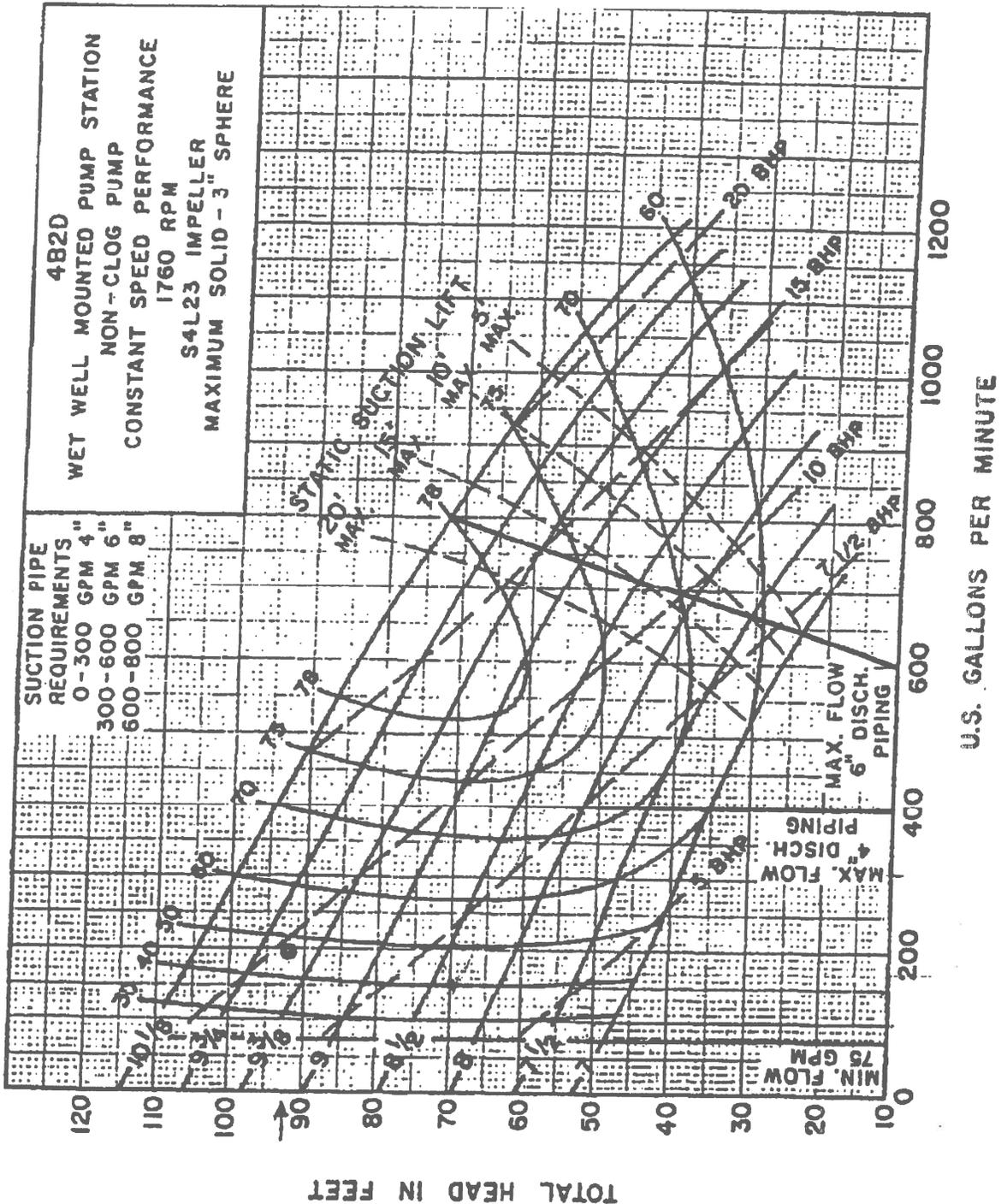
ENGINEERING DATA



Smith & Loveless, Inc.®

14040 W. Santa Fe Trail Dr.
Lenexa, Kansas 66215-1284

Vacuum Primed Pump
Performance Curves
Constant Speed
4B2D, 4C2D
Non-Clog Pump
1760 RPM





J & R Engineered Products, Inc.

44 Commercial Street - Raynham, MA 02767
Tele: 508/823-9566 Fax: 508/880-7232

Fax Cover Sheet

TO: Thompson - Liston Associates, Inc.	DATE: 12/15/04
ATTN: Andrew Liston	FAX#: 508 869 6842
FROM: Ray Sawyer	PHONE #: 508 8696151 ext 222
SUBJECT: Cherry Street, Shrewsbury, Ma. Smith & Loveless Pumping Station S/N 16-3110	TOTAL PAGES: 3 (Including Cover)

Andrew,

I just spoke with Bob Durdee at Smith & Loveless and they will email the 6" piping CAD. Although not very good copies, here is the cut sheet for 6" piping and the pump curve for the 4B2B pumps. Note with the 6" piping you will need 4" suction piping and a reducer for the discharge. Please re-run the calculations for the 6" station piping and I will provide a scope and price.

Thanks,

Ray Sawyer

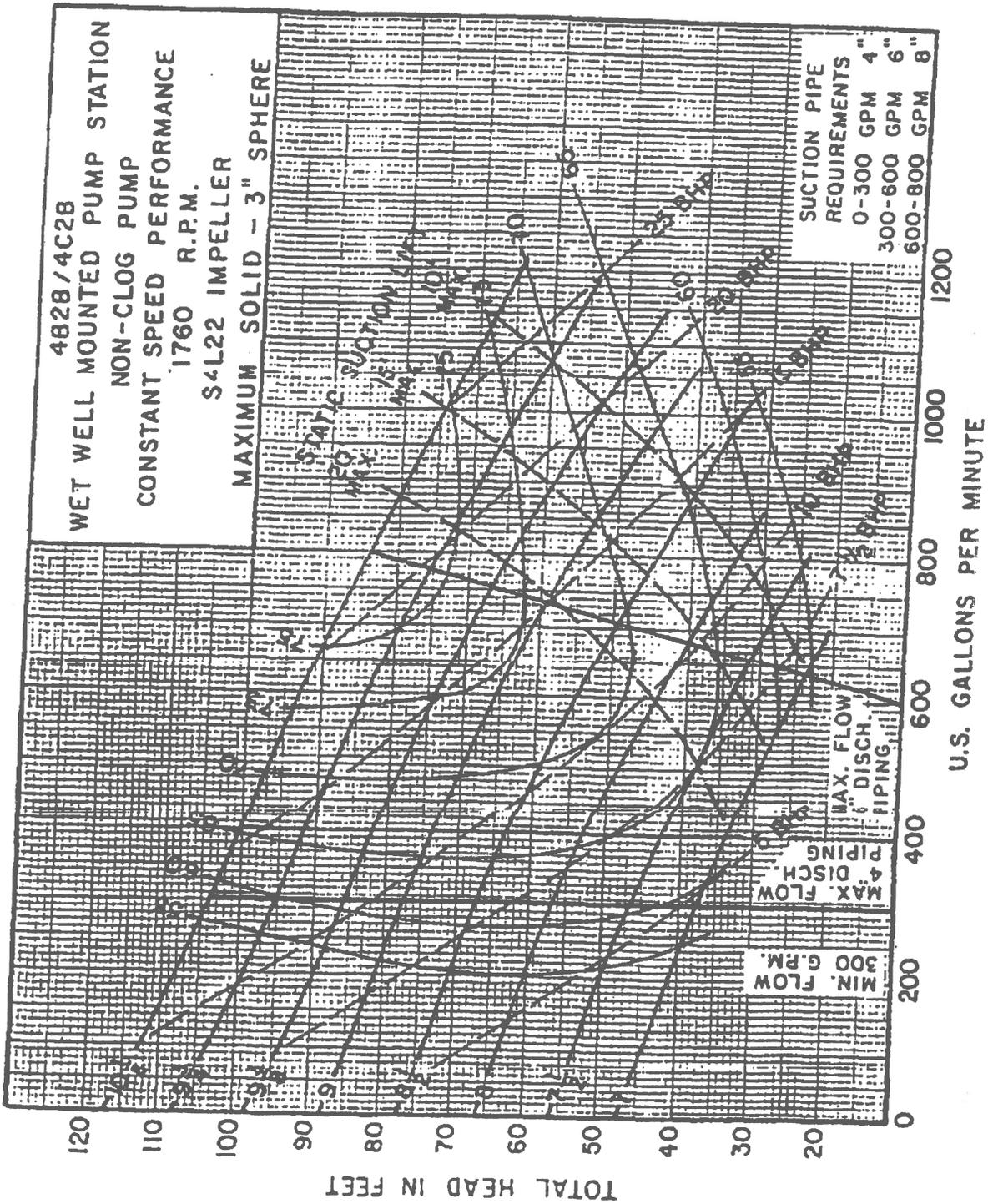
ENGINEERING DATA



Smith & Loveless, Inc.®

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BEFORE B.H. CHANGES

TO: Thompson Liston	DATE: 9-8-04
ATTN: ANDREW LISTON	FAX#: 508 869 6842
FROM: RAY SAWYER	
SUBJECT: CHERRY ST., SARENSBURY, MA.	TOTAL PAGES: (Including Cover) 3

Andrew,

Here is a copy of the S+L Data Sheets for the original station. They are not very good copies but the original S+L Station S/N 16-3110 was sized for 100 GPM @ 40' TDH with 4B2B pumps and 7 1/2 HP, 1760 RPM, 3/60/208 motors.

I just spoke with Bob Tozeski and Friday morning (9-10 AM) is OK with him to visit the station.

Bob thinks the impellers may have been increased also.

Ray

TO: RAY SAWYER
FROM: DENNIS

12/23



Smith & Loveless, Inc.

4" NEEDED - STANDARD
WEY WELL MOUNTED
PUMP STATION ENGINEERING ORDER

Form No. 34-06-79 (Rev. 8-20)

LOCATION	SHREWSBURY, MA.	STATION SERIAL NO	16-3110-4
OWNER	J. J. O'BRIEN & SONS	ENGINEER	E. J. FLYNN

OUTLINE DRAWING NO.

- 1. Station Size 6'-0" Ft. Diameter I.D. Wet Well
- 2. Suction Piping Pump 1 4" Pump 2 4" Pump Discharge Valve Pump 1 4" Pump 2 4"
- 3. Common Discharge Outlet Size 4" & Main Conduit Size 1 1/2"
- 4. Electrical Service System Data: 3 Phase 60 Cycle 208 Wire 4 Wire
- 5. 115V Single Phase Supply Available YES Wiring Diagram No. 16-3110-30
- 6. KVA Transformer Req'd. NO Volt to 115 Volt AC

PUMP & MOTOR DATA

PUMP DATA	PUMP 1	PUMP 2
Design Characteristics (GPM @ TD _h)	100 @ 40	100 @ 40
Pump Model	4B2B	4B2B
Impeller Diameter	7"	7"
Rotation (CW) (CCW)	CCW	CCW
S&L Mech. Seal-Filter Assy (Size)	1 1/8"	1 1/8"
Static Suction Lift	17'-0"	19'-0"
MOTOR DATA (INVENTORY CODE)		
Motor Power	7 1/2	7 1/2
R.P.M.	1760	1760
Phase Cycle Volts	3/60/208	3/60/208
Motor Serial No. (Code Lit.)		
NEMA 1 CONTROL PANEL EQUIPMENT	PUMP 1	PUMP 2
Circuit Breaker - Trip Rating - Amps	4L202H	4L202H
Magnetic Starter - Nema Size	4L330B	4L330B
O.L. Coil No. 10177H - 6 Quad	4L331B2	4L331B2

STANDARD EQUIPMENT

- 1. Automatic Alternator
- 2. Vacuum Pumps
- 3. NEMA 1 Enclosure - 1 Phase Discrete Receivable
- 4. S&L Dynamic Seal (Spare)
- 5. Control Circuit Breaker
- 6. Station Operating Instructions
- 7. Seals Valve Gaskets
- 8. Float Check Valve
- 9. Venting Fan with Thermostat
- 10. Header with the Instal. of 4" Access Unit
- 11. 16-3110-30

OPTIONAL EQUIPMENT

- 1. Aux. Space Heater 4L54 (Yes)
- 2. High Water Alarm Sensor (Yes)
- 3. 115 Volt Alarm Light (Yes)
- 4. 115 Volt Alarm Horn (Yes)
- 5. Running Time Meters (Yes)
- 6. 115V Transformer (Yes)
- 7. 1/2" S&S Piping (Yes)

GCG
9-11-85

16-3110

CONTROL SYSTEM SWITCH SETTINGS	LOW LEVEL ON	HIGH LEVEL ON	BOTH PUMPS OFF	HI WATER ALARM LOCAL
Switch - S&L Part No.	4L291A	4L291A	4L291A	4L291A
Cut-In (feet)	3.5	4.0		4.5
Cut-Out (feet)			1.5	

SALES ENGINEERING		Maintenance Manual Qty.	COMPANION JOB SERIAL NOS.
PREPARED BY	DATE	Rev. 1	
B. J.	8-27-85	Job File 0	
		Contractor	

*Rotation subject to change w/ Model "S" piping

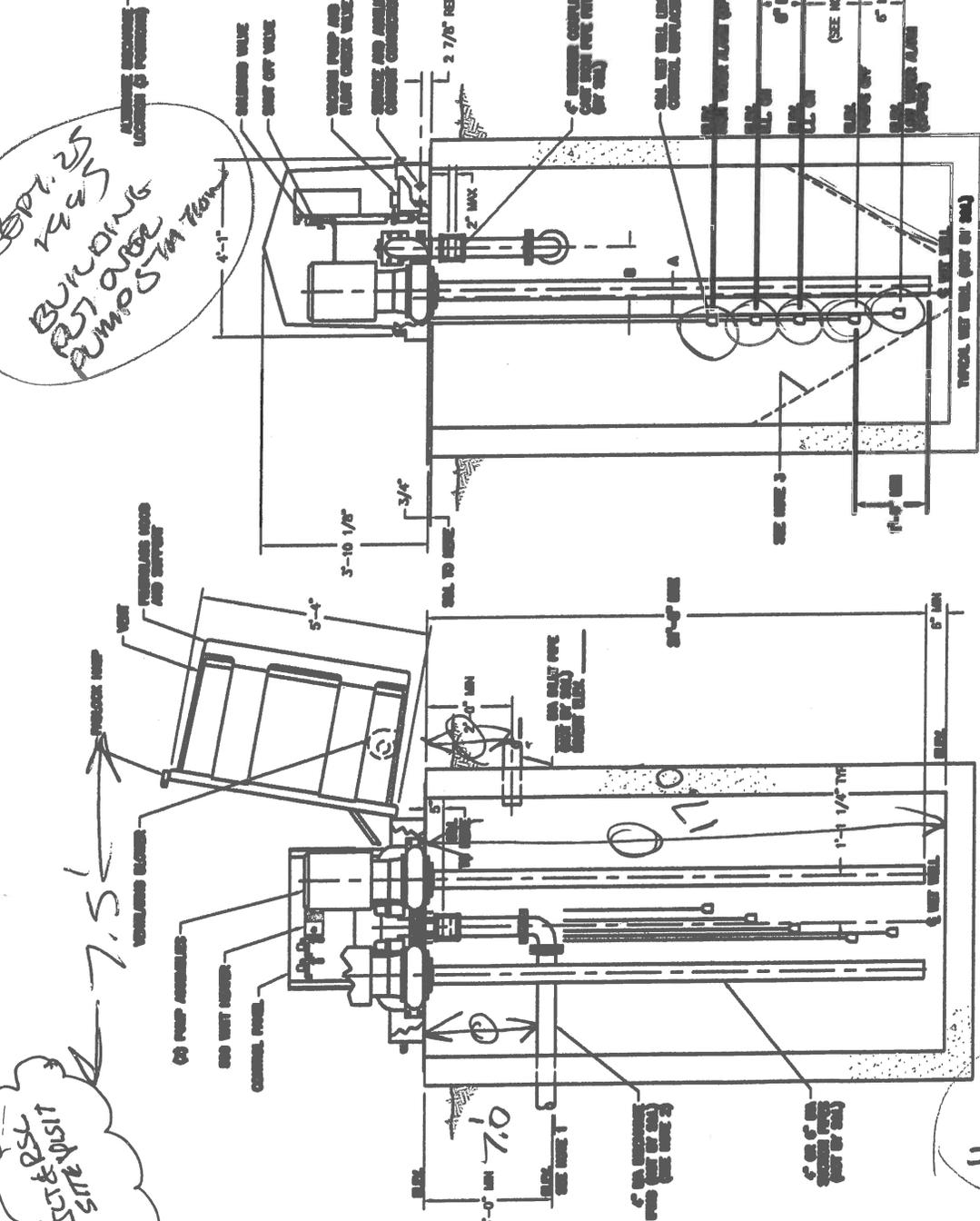
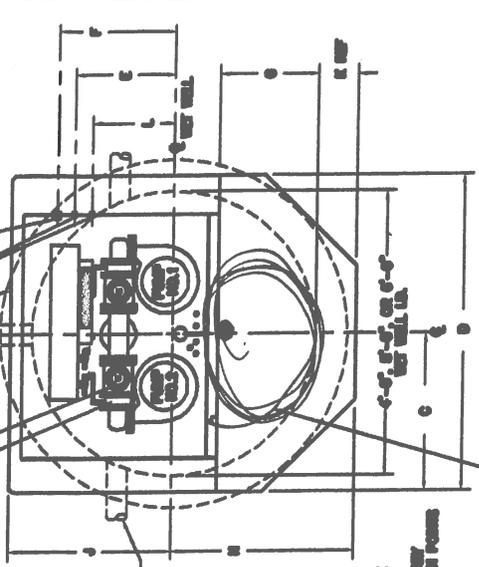
12/21/85

APPARENTLY - MEASUREMENTS DURING INSTALLATION

WELL NUMBER	WELL A	WELL B	WELL C	WELL D	WELL E	WELL F	WELL G	WELL H	WELL I	WELL J	WELL K	WELL L
1	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4
2	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4
3	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4

7.5' SITE VISIT

SEPT. 25 1993 BUILDING POST OVER PUMP STATION



-7.0' TO CROWN OF FORCE LINE OUT
 -11.6' TO INV. IN
 -12.1' TO PUMP ON
 -17.0' TO WET WELL BOTTOM

- IF END OF FORCE LINE IS OTHER END OF FORCE LINE AT POINT OF FORCE LINE, A POWER LINE LOOP MAY BE REQUIRED. CONSULT PROJECT.
- IF FORCE LINE IS LARGER THAN 200 VOLT OR LARGER, THE FORCE LINE SHALL BE POWER LINE LOOP.
- POWER OF SHAFT IS WET WELL, AS SHOWN.
- VALVE IS SHOWN BETWEEN LL AND LL OFF SHALL BE USED TO OR CHECK THAT THE PUMP IS ON.
- MINIMUM CAPACITY - 400 GPM.
- COMPONENT (S) 100, 10, 200, 40, 200, 40, 200, 40, 200, 40, 200, 40.

CROSS SECTION

12.1' TO PUMP ON

10.8' TO INV. OF 8' TO WELLS

11.6' TO INV. IN

10.84' TO CROWN

10.9' TO CROWN

FLUAT WT OF TANK = 11.1'

NO.	DESCRIPTION	QTY.	UNIT	PRICE	TOTAL
1	WET WELL MOUNTED PUMP STATION MODEL 5 4\"/>	1	STATION	1000.00	1000.00
2	1/2\"/>	1	VALVE	100.00	100.00
3	1/2\"/>	1	VALVE	100.00	100.00
4	1/2\"/>	1	VALVE	100.00	100.00
5	1/2\"/>	1	VALVE	100.00	100.00
6	1/2\"/>	1	VALVE	100.00	100.00
7	1/2\"/>	1	VALVE	100.00	100.00
8	1/2\"/>	1	VALVE	100.00	100.00
9	1/2\"/>	1	VALVE	100.00	100.00
10	1/2\"/>	1	VALVE	100.00	100.00
11	1/2\"/>	1	VALVE	100.00	100.00
12	1/2\"/>	1	VALVE	100.00	100.00
13	1/2\"/>	1	VALVE	100.00	100.00
14	1/2\"/>	1	VALVE	100.00	100.00
15	1/2\"/>	1	VALVE	100.00	100.00
16	1/2\"/>	1	VALVE	100.00	100.00
17	1/2\"/>	1	VALVE	100.00	100.00
18	1/2\"/>	1	VALVE	100.00	100.00
19	1/2\"/>	1	VALVE	100.00	100.00
20	1/2\"/>	1	VALVE	100.00	100.00
21	1/2\"/>	1	VALVE	100.00	100.00
22	1/2\"/>	1	VALVE	100.00	100.00
23	1/2\"/>	1	VALVE	100.00	100.00
24	1/2\"/>	1	VALVE	100.00	100.00
25	1/2\"/>	1	VALVE	100.00	100.00
26	1/2\"/>	1	VALVE	100.00	100.00
27	1/2\"/>	1	VALVE	100.00	100.00
28	1/2\"/>	1	VALVE	100.00	100.00
29	1/2\"/>	1	VALVE	100.00	100.00
30	1/2\"/>	1	VALVE	100.00	100.00
31	1/2\"/>	1	VALVE	100.00	100.00
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97	1/2\"/>	1	VALVE	100.00	100.00
98	1/2\"/>	1	VALVE	100.00	100.00
99	1/2\"/>	1	VALVE	100.00	100.00
100	1/2\"/>	1	VALVE	100.00	100.00

REPLACEMENT CHERRY STREET PUMP STATION

CHERRY STREET SEWER PUMP STATION

IN

SHREWSBURY, MASSACHUSETTS

APPLICANT:

BRENDON PROPERTIES THREE REALTY TRUST

259 TURNPIKE ROAD, SUITE 110

SOUTHBOROUGH, MA 01772

CLIENT NUMBER: 1881
JOB NUMBER: 271-1444
DWG. NO. REPLACEMENT CHERRY STREETPUMPSTATION.DWG

PREPARED BY

THOMPSON-LISTON ASSOCIATES, INC.

CIVIL ENGINEERS & LAND SURVEYORS

51 MAIN STREET, PO BOX 570

BOYLSTON, MASSACHUSETTS 01505

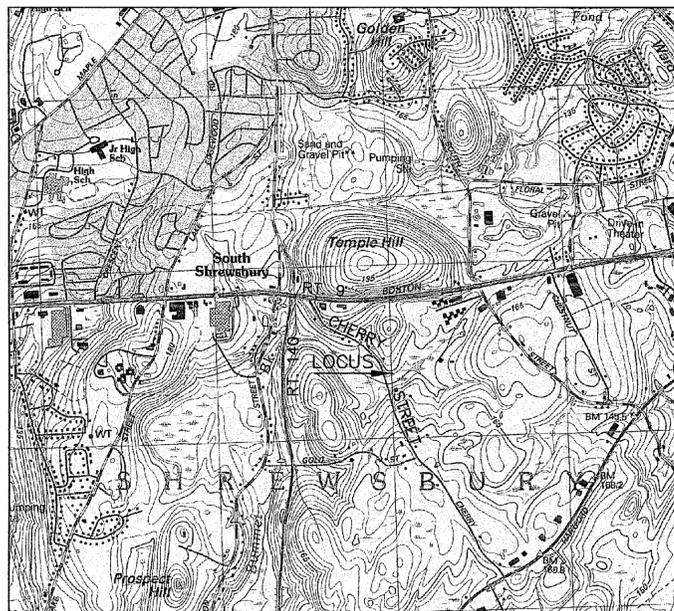
TELEPHONE (508) 869-6151

DATE:

AUGUST 20, 2004

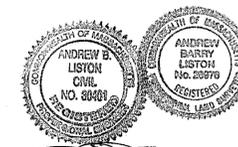
REVISED DECEMBER 3, 2004

REVISED APRIL 22, 2005

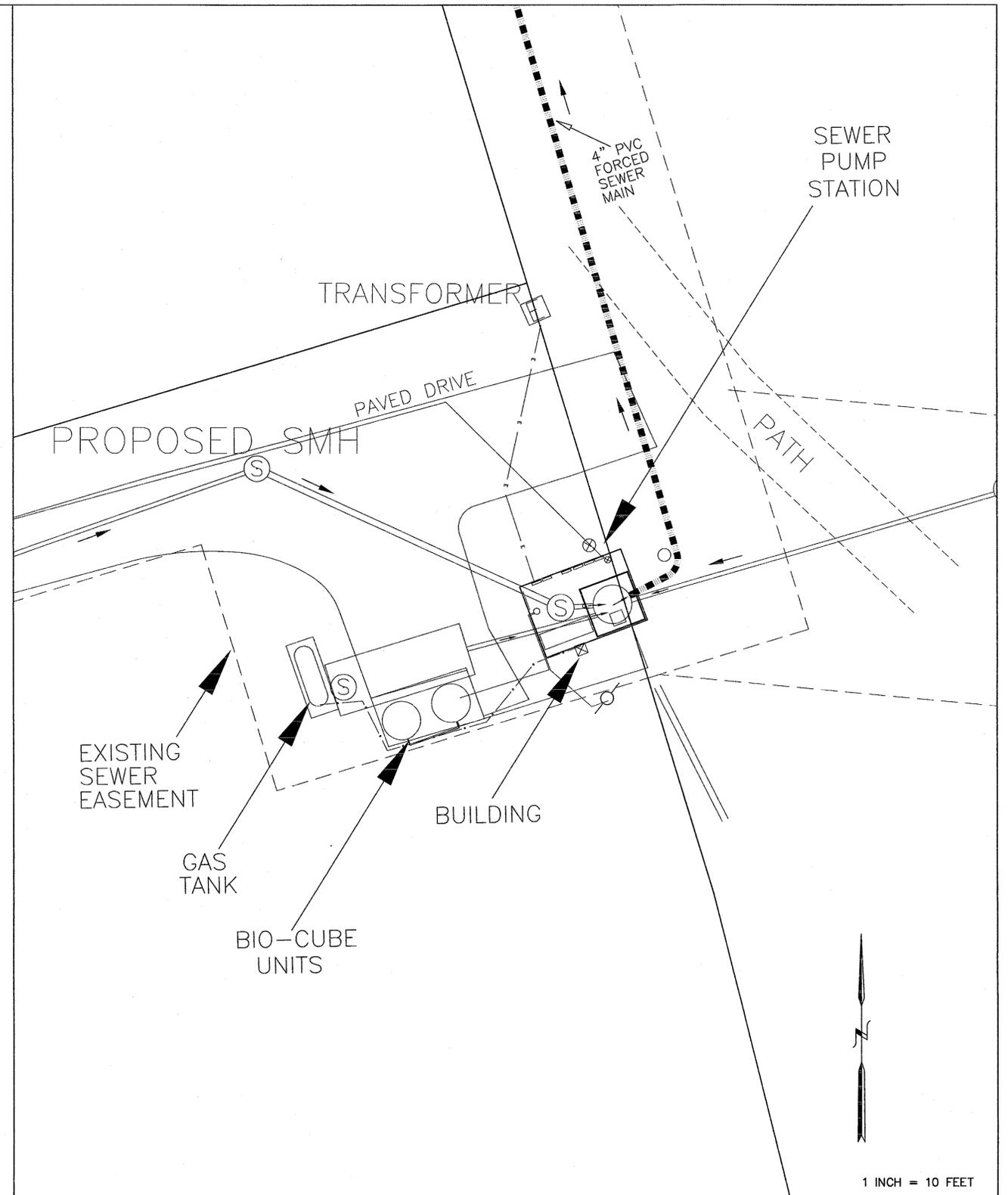
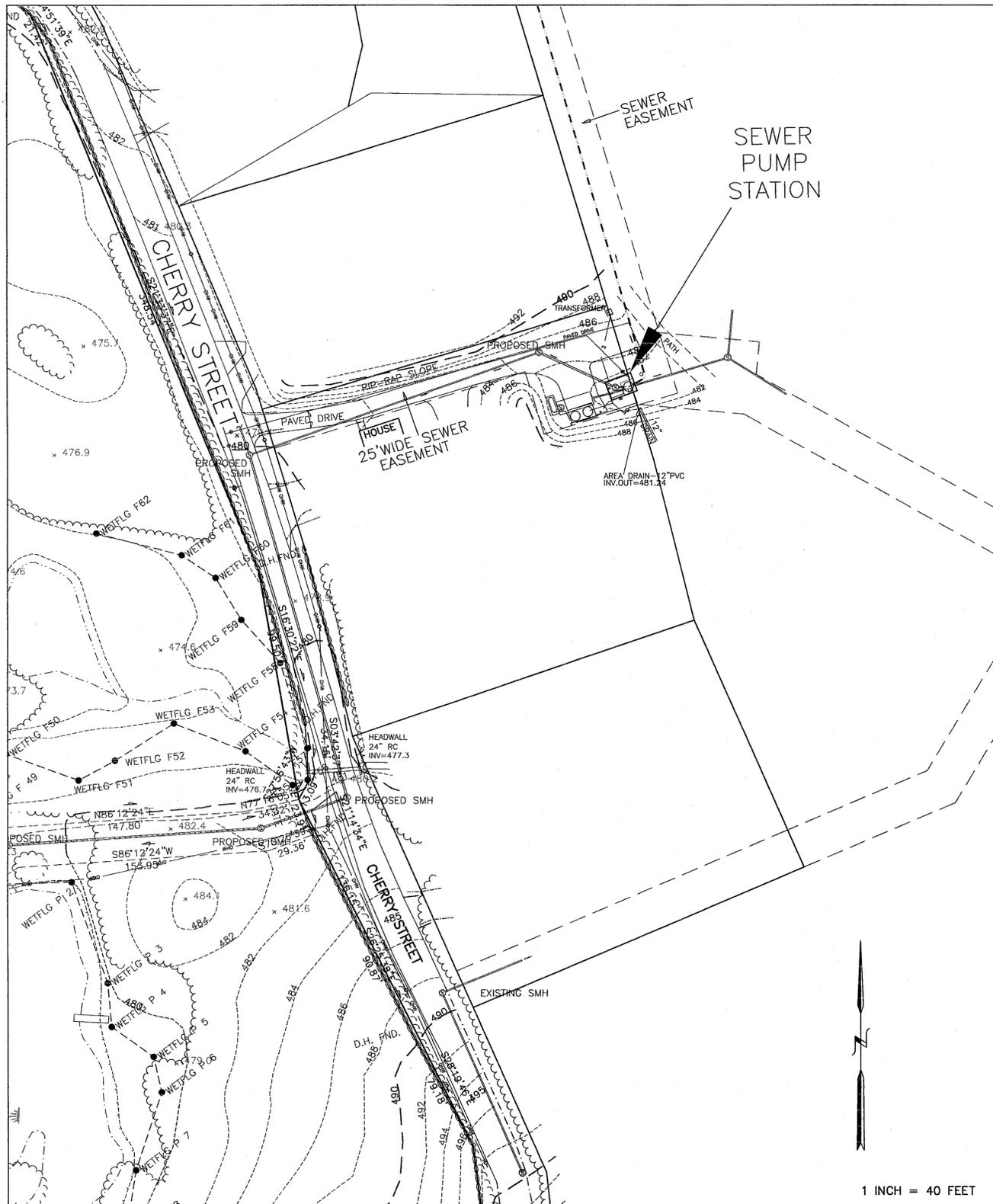


LOCUS

SCALE: 1 INCH = 1,600 FEET



Andrew E. Liston



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 EXCEPT FOR VISIBLE STRUCTURES (MANHOLES, GATES, POLES, ETC.) LOCATED BY THOMPSON-LISTON ASSOCIATES, INC., ALL UNDERGROUND UTILITIES SHOWN WERE COMPILED ACCORDING TO AVAILABLE RECORD PLANS FROM THE VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD BEFORE DESIGNING, EXCAVATING, BLASTING OR INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORATION, OR REPAIRING. ALL UTILITY COMPANIES, PUBLIC & PRIVATE, MUST BE CONTACTED, INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN. THOMPSON-LISTON ASSOCIATES, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. CALL "DIG SAFE" AT 1-888-344-7233.

- | | |
|-----|--|
| --- | WETLAND EDGE |
| --- | 100' BUFFER ZONE EDGE |
| --- | OVERHEAD WIRES |
| --- | UNDERGROUND TELEPHONE & ELECTRIC |
| --- | STREET LIGHT |
| --- | WATER LINE |
| --- | HYDRANT |
| --- | WATER GATE |
| --- | SEWER MANHOLE |
| --- | DRAIN MANHOLE |
| --- | CATCHBASIN |
| --- | CASCADE GRATE |
| --- | FLARED END SECTION |
| --- | EXISTING UNDERGROUND DRAIN OR SEWER PIPE |
| --- | PROPOSED DRAIN OR SEWER PIPE |

- KEY**
- | | |
|-----|-----------------------------|
| --- | 4" FORCED SEWER MAIN |
| --- | BIT, BERM OR GRANITE CURB |
| --- | EDGE OF PAVEMENT |
| --- | GRANITE MONUMENT TO BE SET |
| --- | CONCRETE MONUMENT TO BE SET |
| --- | EXISTING STONE WALL |
| --- | EXISTING GUARD RAIL |



ANDREW B. LISTON P.E., P.L.S.

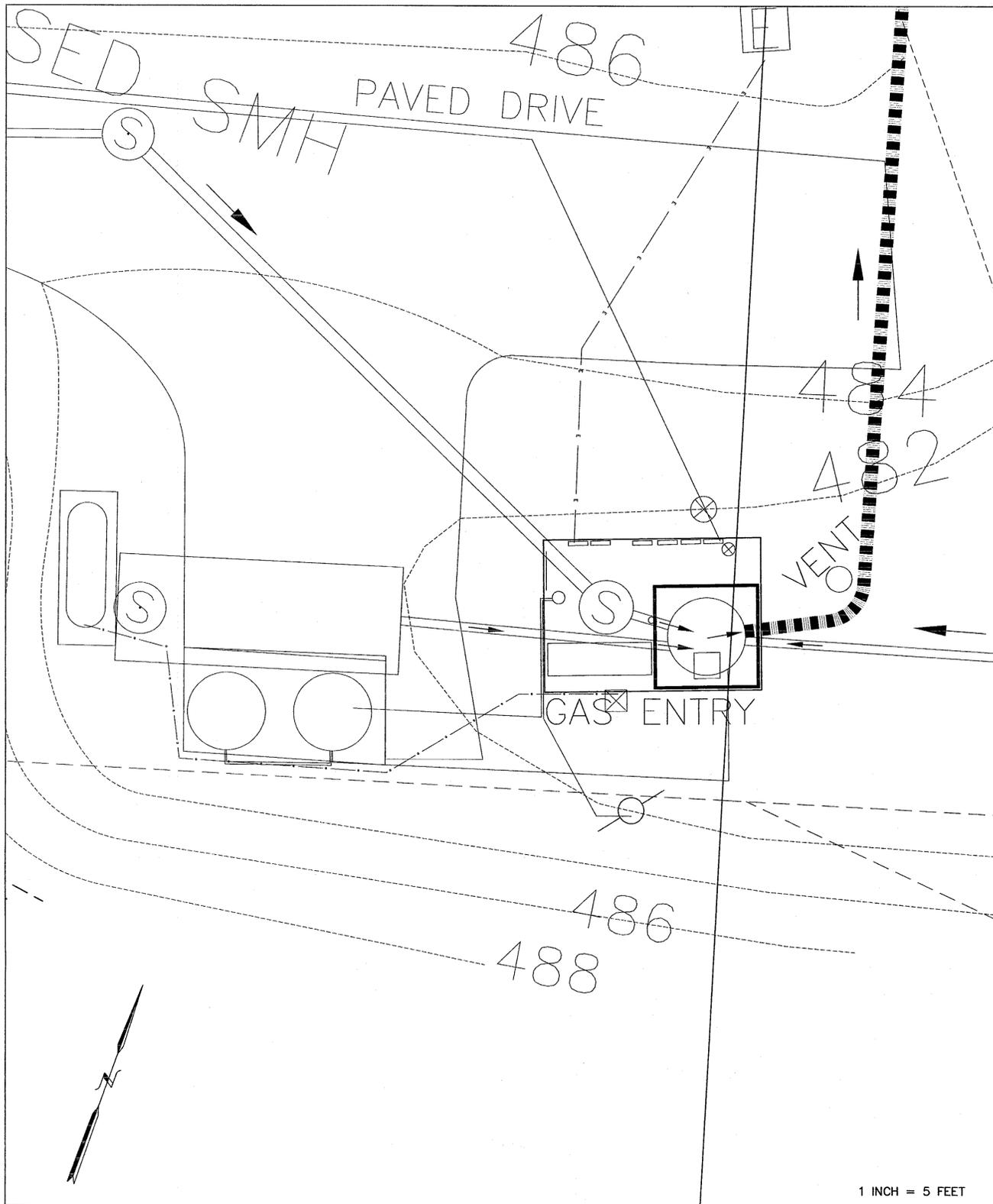
CLT. NO. 1881
 JOB NO. 271-1444
 DWG. NO. ReplacementCherrySt PumpStation.DWG
 DATE: AUG. 20, 2004
 REVISION DATES:
 DEC. 3, 2004
 APR. 22, 2005

SCALES AS NOTED

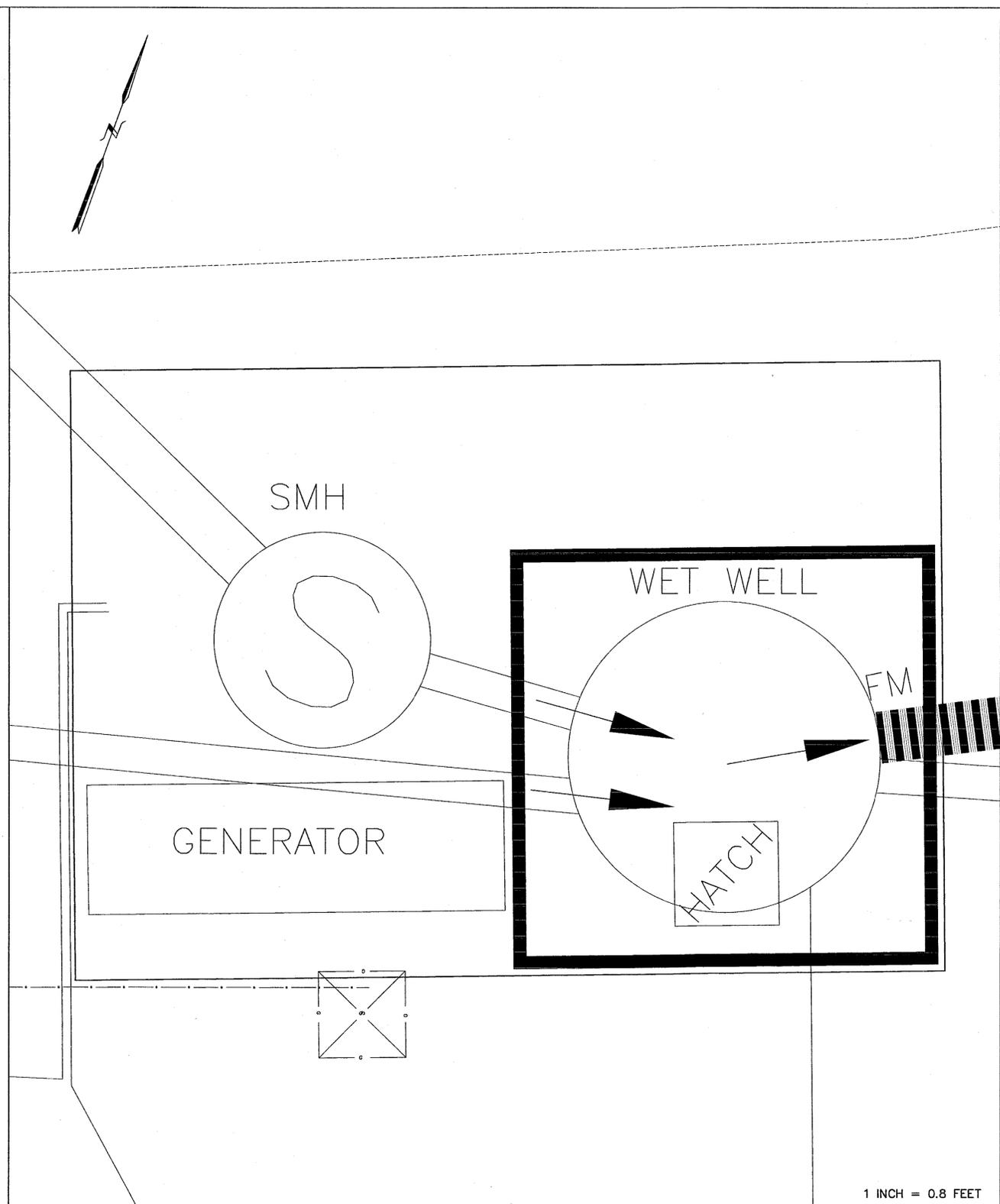
THOMPSON-LISTON ASSOCIATES, INC.
 CIVIL ENGINEERS & LAND SURVEYORS
 51 MAIN STREET, PO BOX 570
 BOYLSTON, MASS. 01505-0570
 VOICE (508) 869-6151
 FAX (508) 869-6842
 EMAIL info@tlainc.net



REPLACEMENT CHERRY STREET PUMP STATION
 SITE LAYOUT
 IN
 SHREWSBURY, MASSACHUSETTS
 PREPARED FOR
BRENDON PROPERTIES THREE REALTY TRUST
 259 TURNPIKE ROAD, SUITE 110
 SOUTHBOROUGH, MA 01772
 SHEET S1



1 INCH = 5 FEET



1 INCH = 0.8 FEET

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KEY	
	WETLAND EDGE
	100' BUFFER ZONE EDGE
	OVERHEAD WIRES
	UNDERGROUND TELEPHONE & ELECTRIC
	STREET LIGHT
	WATER LINE
	HYDRANT
	WATER GATE
	SEWER MANHOLE
	CATCH BASIN
	CASCADE GRATE
	FLARED END SECTION
	EXISTING UNDERGROUND DRAIN OR SEWER PIPE
	PROPOSED DRAIN OR SEWER PIPE
	4" FORCED SEWER MAIN
	BIT. BERM OR GRANITE CURB
	EDGE OF PAVEMENT
	GRANITE MONUMENT TO BE SET
	CONCRETE MONUMENT TO BE SET
	EXISTING STONE WALL
	EXISTING GUARD RAIL

ANDREW B. LISTON P.E., P.L.S.

CLT. NO. 1881
 JOB NO. 271-1444
 DWG. NO. ReplacementCherrySt PumpStation.DWG
 DATE: AUG. 20, 2004
 REVISION DATES:
 DEC. 3, 2004
 APR. 22, 2005

SCALE:
 SCALES AS NOTED

THOMPSON-LISTON ASSOCIATES, INC.
 CIVIL ENGINEERS & LAND SURVEYORS
 51 MAIN STREET, PO BOX 570
 BOYLSTON, MASS. 01505-0570
 VOICE (508) 869-6151
 FAX (508) 869-6842
 EMAIL info@tlainc.net



**REPLACEMENT
 CHERRY STREET PUMP STATION**
 SITE LAYOUT
 IN
SHREWSBURY, MASSACHUSETTS
 PREPARED FOR
BRENDON PROPERTIES THREE REALTY TRUST
 259 TURNPIKE ROAD, SUITE 110
 SOUTHBOROUGH, MA 01772
 SHEET S2

Cherry Street Replacement Sewer Pump Station

Pump Station Building Changes

Changes and Replacements related to the Adams Farm Senior Housing proposal involve the replacement of certain pumping and control equipment in the existing Cherry Street Pump Station.

In order to make the changes, the roof of the existing building will change in the following manner.

- A hole will be cut in the roof of the existing building to allow the removal of the existing pumps and the installation of the new pumps, and
- A new gable or shed type of roof will be constructed to replace the existing flat roof. The roof will be constructed in such a manner as to allow for a future removal or servicing of the pumps.

Within the building, new control equipment will be added for the control of the new pumps and for the intercommunication between the Shrewsbury Sewer Department and this and other sewer pump stations.

Pump Changes

The existing 2 pumps are Smith & Loveless with 4B2B, 7 1/2 H.P., 1,760 RPM, 3 Phase, 60 Hz., 208 Volt motors, rated for 100 GPM at 40 feet TDH.

The proposed 2 pumps are to be Smith & Loveless with 4B2D, 6-inch piping, 15 H.P., 1,760 RPM, 3 Phase, 60 Hz., 208 Volt motors, rated for 200 GPM at 92 feet TDH. The pumps are to include ABB Variable Frequency Drives (VFD.) The station is to be provided with 6" to 4" reduction to connect the station to the existing 4-inch forced sewer main.

The existing Control Panel shall be removed and replaced with a new, appropriately sized Smith & Loveless Control Panel.

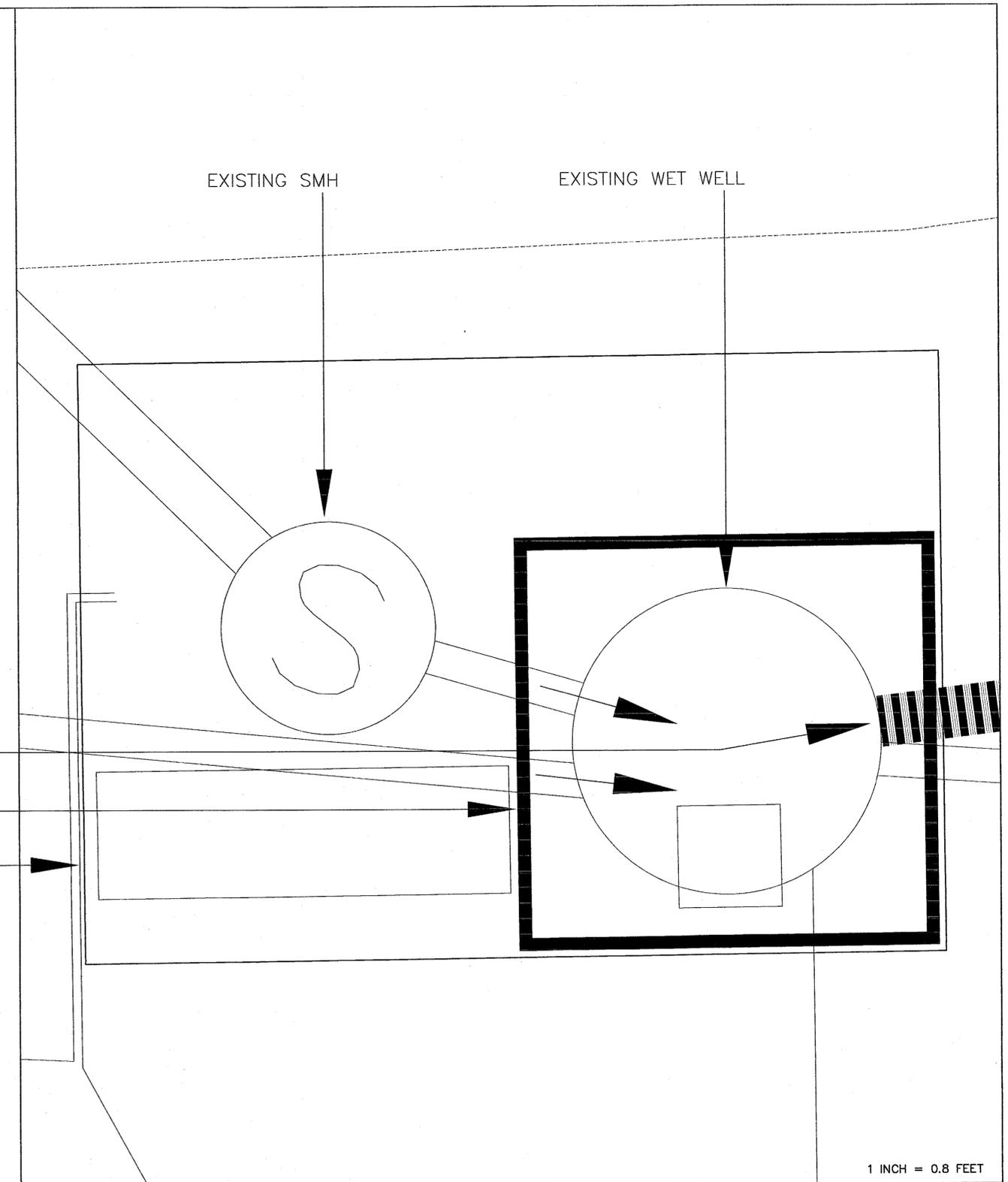
SCADA Monitoring System Changes

Make the changes and additions to the Cherry Street, Stoney Hill Road, Quail Hollow Drive, Gold Street and Landfill sewer pump station SCADA Monitoring Systems to effect the pumping delays contained in the December 31, 2004 Design Report. The changes and additions will be carried out by American Computer Technologies, Ltd., Fall River, Massachusetts

RECONNECT THE FORCED SEWER MAIN TO THE NEW PUMPS

REMOVE A SECTION OF THE ROOF TO ALLOW THE REMOVAL/INSTALLATION WORK.

EXISTING BUILDING



DIG SAFE:
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- WETLAND EDGE
- 100' BUFFER ZONE EDGE
- OVERHEAD WIRES
- UNDERGROUND TELEPHONE & ELECTRIC
- STREET LIGHT
- WATER LINE
- HYDRANT
- WATER GATE
- SEWER MANHOLE
- DRAIN MANHOLE
- CATCHBASIN
- CASCADE GRATE
- FLARED END SECTION
- EXISTING UNDERGROUND DRAIN OR SEWER PIPE
- PROPOSED DRAIN OR SEWER PIPE

- KEY**
- 4" FORCED SEWER MAIN
 - BIT. BERM OR GRANITE CURB
 - EDGE OF PAVEMENT
 - GRANITE MONUMENT TO BE SET
 - CONCRETE MONUMENT TO BE SET
 - EXISTING STONE WALL
 - EXISTING GUARD RAIL



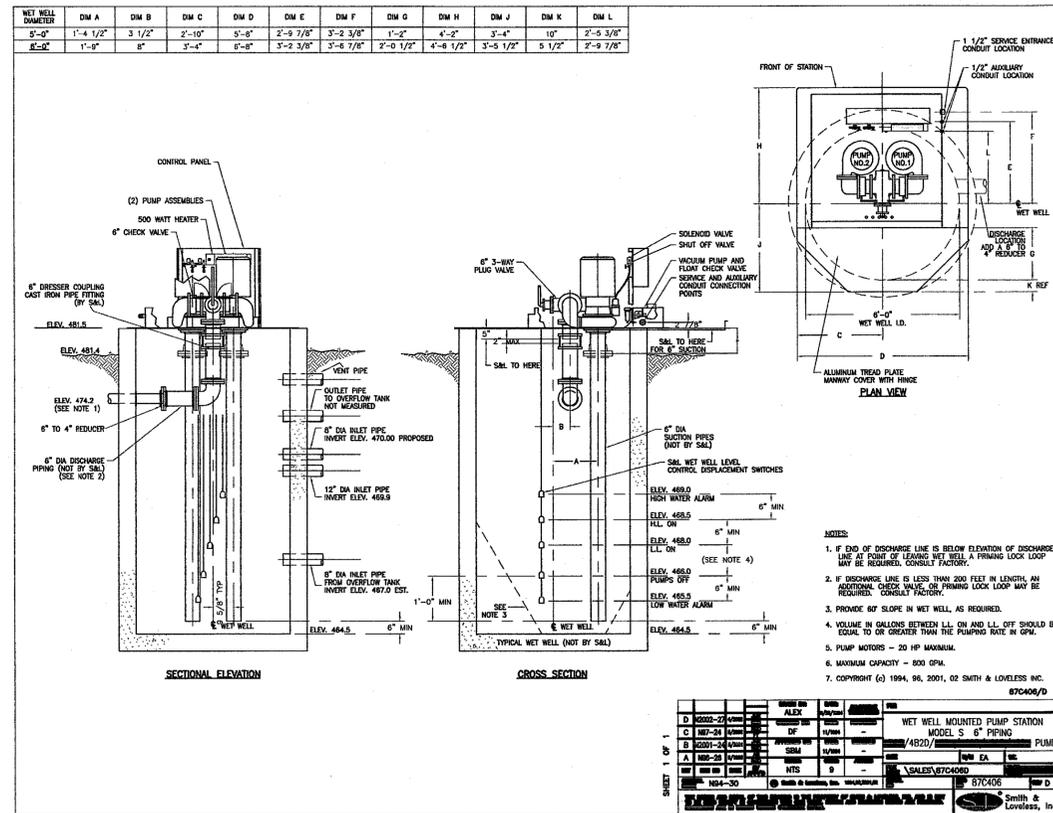
Andrew B. Liston
ANDREW B. LISTON P.E., P.L.S.

CLT. NO.	1881
JOB NO.	271-1444
DWG. NO.	ReplacementCherrySt PumpStation.DWG
DATE:	AUG. 20, 2004
REVISION DATES:	DEC. 3, 2004 APR. 22, 2005

SCALES AS NOTED

THOMPSON-LISTON ASSOCIATES, INC.
CIVIL ENGINEERS & LAND SURVEYORS
51 MAIN STREET, PO BOX 570
BOYLSTON, MASS. 01505-0570
VOICE (508) 869-6151
FAX (508) 869-6842
EMAIL info@tlainc.net

**REPLACEMENT
CHERRY STREET PUMP STATION**
SITE LAYOUT
IN
SHREWSBURY, MASSACHUSETTS
PREPARED FOR
BRENDON PROPERTIES THREE REALTY TRUST
259 TURNPIKE ROAD, SUITE 110
SOUTHBOROUGH, MA 01772
SHEET S3



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ANDREW B. LISTON
CIVIL
NO. 50401

ANDREW BARRY LISTON
CIVIL
NO. 50370

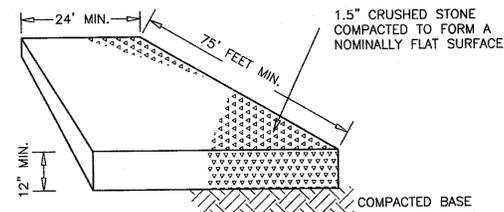
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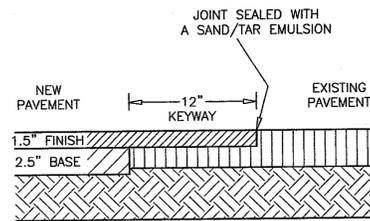
NO SCALE

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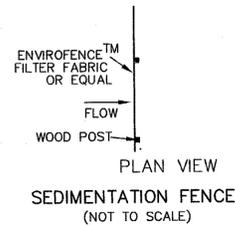
REPLACEMENT
CHERRY STREET PUMP STATION
STATION DETAILS
IN
SHREWSBURY, MASSACHUSETTS
PREPARED FOR
BRENDON PROPERTIES THREE REALTY TRUST
259 TURNPIKE ROAD, SUITE 110
SOUTHBOROUGH, MA 01772
SHEET S4



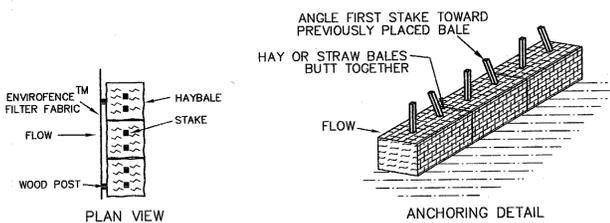
SITE ENTRANCE MAT
(NOT TO SCALE)
TOWN ROADS WILL BE SWEEP DAILY WHEN HAULING IS IN PROGRESS.
CRUSHED STONE SHALL BE REPLACED WHEN DEPOSITED SOILS ACCUMULATE TO THE EXTENT THAT THEY LESSEN THE EFFECTIVENESS OF THE MAT



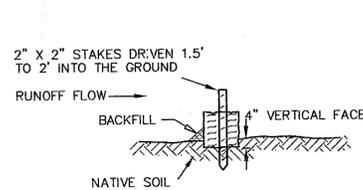
PAVEMENT BLEND DETAIL
(NOT TO SCALE)



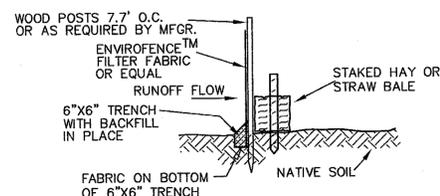
SEDIMENTATION FENCE
(NOT TO SCALE)



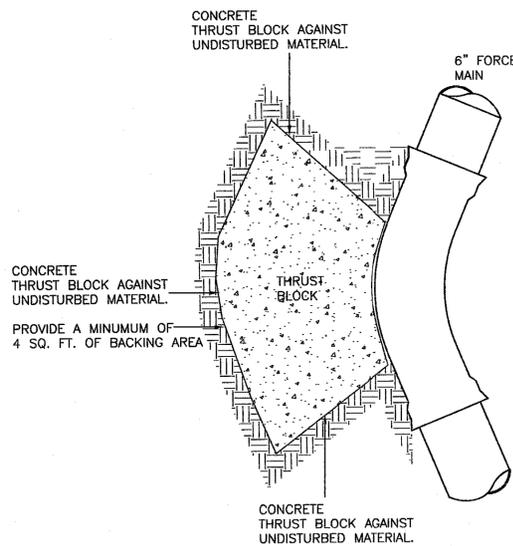
STAKED HAYBALES
(NOT TO SCALE)



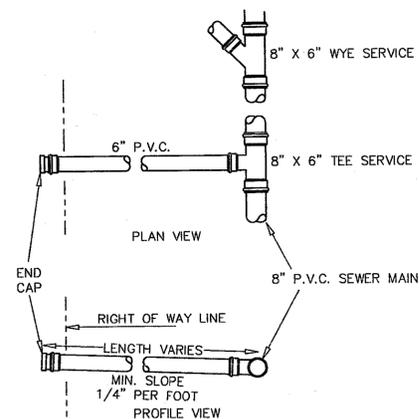
EMBEDDING DETAIL
HAY OR STRAW BALE DIKE
(NOT TO SCALE)



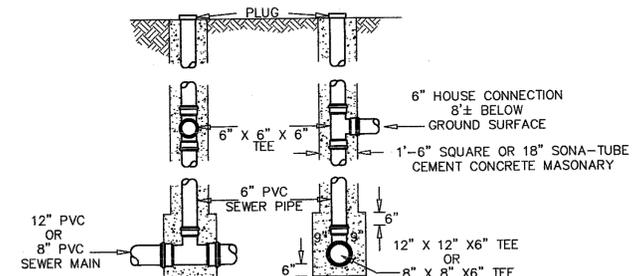
CROSS SECTION
SEDIMENTATION CONTROL BARRIER
(NOT TO SCALE)



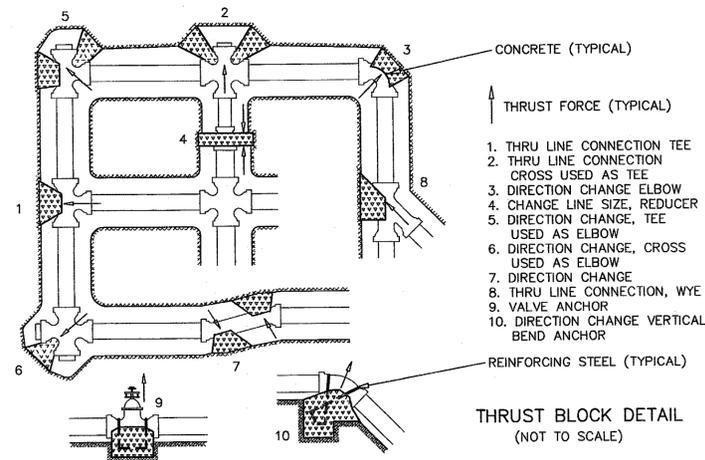
THRUST BLOCK PLAN VIEW
NO SCALE



TYPICAL SERVICE CONNECTION (SEWER)
(NOT TO SCALE)



TYPICAL CHIMNEY DETAIL
(NOT TO SCALE)



THRUST BLOCK DETAIL
(NOT TO SCALE)

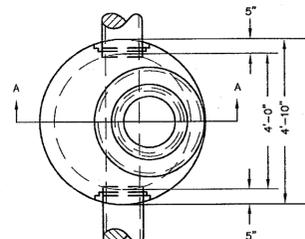
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Professional Engineer Seal for Andrew B. Liston, No. 20401, State of Massachusetts.
Professional Engineer Seal for Andrew Liston, No. 22870, State of Massachusetts.
Signature of Andrew B. Liston, P.E., dated 05/22/05.

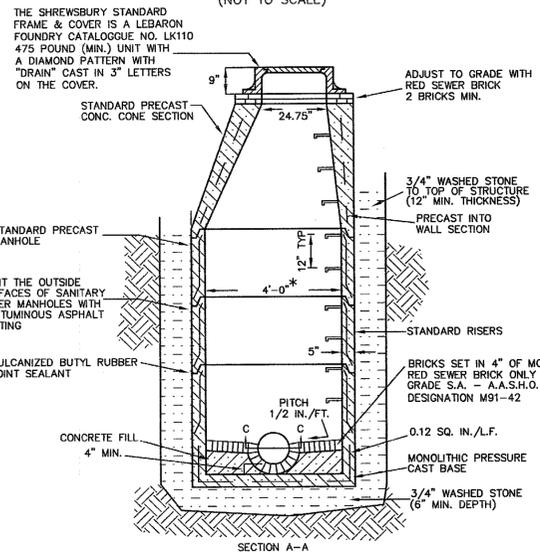
CLT. NO. 1881
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SHEET D1

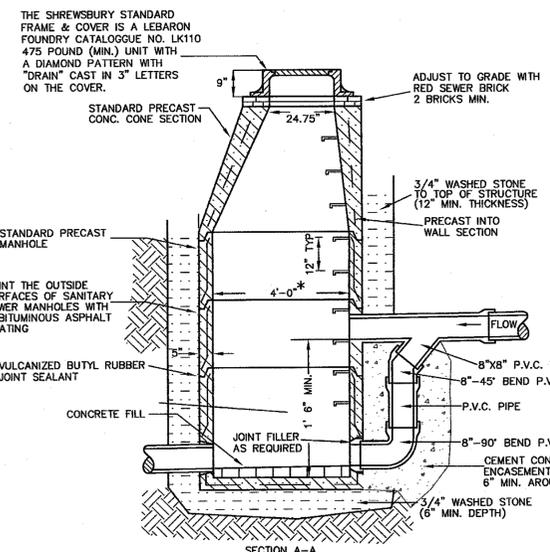


TYPICAL PRE-CAST MANHOLE
(NOT TO SCALE)



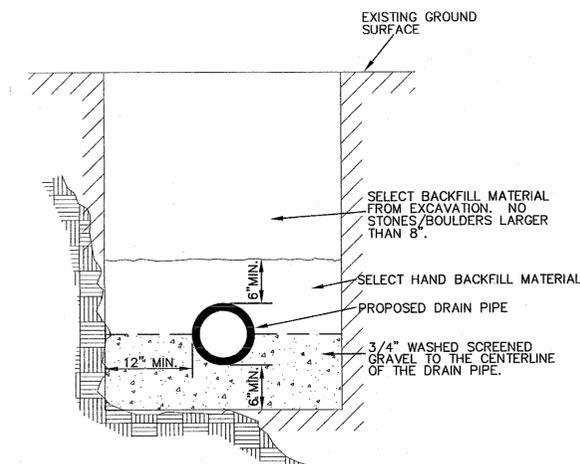
TYPICAL PRE-CAST MANHOLE
(NOT TO SCALE)

* ALL SANITARY SEWER OR DRAIN MANHOLES GREATER THAN 12 FEET DEEP SHALL HAVE A MINIMUM INSIDE DIAMETER OF FIVE FEET.

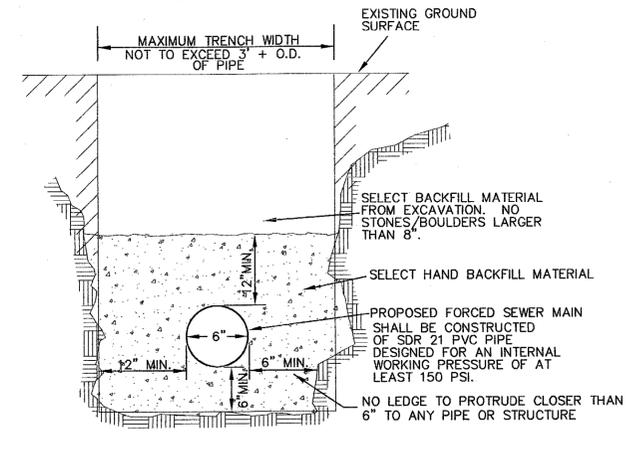


TYPICAL DROP MANHOLE
(NOT TO SCALE)

* ALL SANITARY SEWER OR DRAIN MANHOLES GREATER THAN 12 FEET DEEP SHALL HAVE A MINIMUM INSIDE DIAMETER OF FIVE FEET.

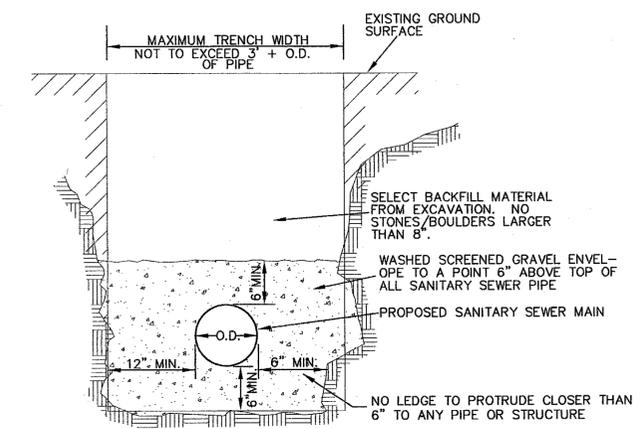


TYPICAL STORM DRAIN TRENCH SECTION
(NOT TO SCALE)



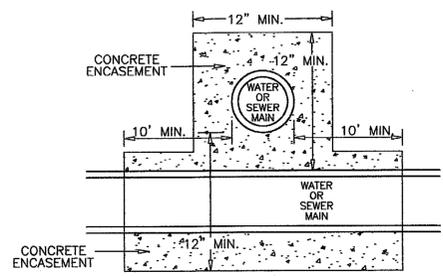
TYPICAL FORCED SEWER MAIN TRENCH SECTION
(NOT TO SCALE)

NOTE: IF SIGNIFICANT LEDGE IS ENCOUNTERED IN THE COURSE OF UTILITY CONSTRUCTION, THE TOWN WILL BE INFORMED AND A PLAN FOR SOIL TESTS OR BORINGS, AS WELL AS EXPECTED METHODS AND SCHEDULE OF REMOVAL SHALL BE SUBMITTED TO THE TOWN.



TYPICAL SANITARY SEWER TRENCH SECTION
(NOT TO SCALE)

NOTE: ALL SANITARY SEWERS MORE THAN 20 FEET DEEP SHALL BE CONSTRUCTED USING SCHEDULE 80 PVC OR SCHEDULE 40 DUCTILE IRON PIPE.



TYPICAL WATER MAIN/SEWER MAIN CROSSING
(NOT TO SCALE)

CONCRETE ENCASEMENT OF BOTH WATER AND SEWER SHALL EXTEND FOR 10 FEET FROM THE INTERSECTION OF THE MAINS AND ALONG EACH MAIN. CENTER ONE FULL PIPE LENGTH OF BOTH WATER AND SEWER OVER THE INTERSECTION.

NOTE: ALL SEWER PIPING AND/OR STRUCTURES CROSSING UNDER OR WITHIN 100 FEET OF ANY SURFACE WATERBODY, STORMWATER IMPONDMENT OR WETLAND SHALL BE BUILT USING WATERTIGHT CONSTRUCTION METHODS AND MATERIALS.

NOTE: SANITARY SEWER SHALL BE INSTALLED WITH A MINIMUM HORIZONTAL SEPARATION OF 10 FEET TO ALL WATER SUPPLY LINES. WHEN A 10 FOOT HORIZONTAL SEPARATION BETWEEN THE SEWER AND WATER CANNOT BE MAINTAINED, THE WATER MAIN SHALL BE INSTALLED IN A SEPARATE TRENCH ABOVE THE SEWER WITH AN 18 INCH VERTICAL SEPARATION BETWEEN THE CROWN OF THE SEWER AND THE INVERT OF THE WATER MAIN.

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