Valley View Storage Tank Replacement

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Following are various concerns, ideas, and topics that were discussed and raised during presentations of the Valley View Tank Replacement Project. The subject, while seemingly simple in nature (tanks are not complex features within the water system), there are numerous issues that factor into the need, sizing, location, and design of a storage tank.

Tank Size - Concern has been expressed about the proposed size of the tank.

Numerous factors come into play with the size, which is based on the volume of water to be stored and this in turn is based on the system demand. Demand in the area that the tank serves is an average of 3.6 million gallons per day* (see explanation in next section). Three tanks serve this area: Valley View #1, Valley View #2, and Lafayette.

Lafayette Tank holds 2.25 million gallons. To reach 3.6 million gallons, the new tank at Valley View will have to hold 1.35 million gallons.

The height of the present tanks at Valley View is 30'. Since the top elevation is a given (the balance of the water system is designed and constructed around this elevation), the proposed tank will have to be a minimum of 30' high. This leaves the diameter of the structure as the final variable.

A volume of 1 cubic foot holds 7.48 gallons.

1,350,000 gallons / 7.48 gallons/Cubic Foot = 180,481 cubic feet of required volume

180,481 cf / 30' high = 6016 square feet of area that the tank will have to occupy

Based on the area of a circle, which equals pi times the square of the radius:

$6016 \text{ sf} = 3.14159 \times r^2$ $\quad r = 43.76$ feet

Thus, the diameter of the tank would have to be 87.5' to hold 1,350,000 gallons.

By dropping the base of the tank 5' into the ground, the depth of the tank can increase to 35' (the height above grade is still the critical 30'). This allows the diameter of the tank to drop to 81'.

*Demand - Detailed discussion of water system population and demand toward the use of 3.6 million gallon parameter.

In 1997, Ridgewood Water completed a system planning study that reviewed the issue of demand,

both present and future. Working off results from another recent study that investigated and documented the placement of demands regionally around the system based on actual metered usage patterns, the 1997 Study reviewed the anticipated long-term impact on the then present day demands. Analysis of future potentials of population, employment, and development were reviewed and coordinated with historical understandings of water usage to develop an understanding of future demands. The following table is the result of the average daily demand, by pressure zone.

Pressure Zone	1990 (MGD)	2010 - Ultimate (MGD)
Low	3.8	4.0
Intermediate	2.3	2.6
High	0.7	1.0
Booster	0.4	0.5
Total	7.2	8.1

MGD = million of gallons per day

The results of the 1997 Study showed several issues. The Ridgewood Water System is essentially built out. Not much future demand potential exists. Much of that which does exist is located in the Intermediate, High, and Booster Zones. This minor additional demand might occur within a decade or over several decades. Planning should take into account the quantity of the demand today and not focus in on when it will occur. Again, the magnitude of this change is minimal.

Through the past 10 years, much of the demand potential has occurred. Average daily demand is presently 8 MGD. However, basically none of it has occurred in the Low Zone as predicted. An additional note of issue is that we are starting to see a very slight trend toward "consolidation" (purchase of perhaps two parcels, removal of the two houses, and reconstruction of a single structure).

Given these numbers, there is direct thought toward sizing for 3.8 to 4.0 MGD of average daily demand. The targeted volume of 3.6 MG is a compromise between these numbers, actual development that has occurred since the 1997 study, the site conditions at Valley View, long-term storage potentials, and system operating parameters.

Peak summertime demands are not the design standard for the proposed tank. Average daily demands are the standard. Peak demands are a supplemental storage requirement, not the base requirement that has sized the tank volume at 1.35 million gallons. The original proposal to place 1.75 million gallons on the Valley View Site included 0.4 million gallons of supplemental storage and was based on the thought that the site could house a 100' diameter tank in reasonable fashion. Upon hearing over-riding concerns about the size of the tank, the supplemental volume was removed.

Peak demands are a concern within the system, but they are not significantly associated with the size of the Valley View Tank. Similarly, unless there is a societal shift in the way that the public uses water or in the development or population of the area it serves, then the sizing of the Valley View Tank should be a viable solution for many decades into the future.

Growth - Several questions were raised about future growth as it might relate to the storage tank.

Population growth has not markedly changed in the last 30 - 40 years. The minor amount of growth that has occurred in the last two decades can be characterized as in-filling (e.g. one house is torn down and two or three are built in its place). There is little room for development of any significance throughout the entire system that will have any impact on typical daily demands.

Height

The 30' height that is discussed herein is the distance from the ground level to the top of the side wall of the tank. The concrete tank has a dome that will rise about 8' higher than the top of the side wall. Seen from the ground level on Valley View Avenue, this dome peeks above the outside perimeter of the tank sidewall. Its shape (a shallow arch) and coloration (planned to be a blueish grey) help to transition between the darker wall of the tank (to help blend into the foliage of the landscaping) and the sky. The visual impact of the dome is negligible.

Depth - Can the base of the tank be deeper than 5' to maximize the volume below ground and minimize the diameter further?

Theoretically we can go deeper into the ground with the base of the tank. Preliminary investigations have not shown rock to be within 10' of the surface. Not that rock would be a theoretical limitation. But from a practical standpoint, rock and several other factors are limiting. Digging a hole on the site brings up the situation of the earth that will be generated. It will have to be removed from the site, stored during the tank construction, and then brought back to the site to fill the hole and assist with the final grading around the new tank. The bigger the hole, the more volume to be dealt with.

The deeper the excavation, the more shoring the sides of that excavation becomes an issue. Access to and from the bottom of the excavation for personnel and equipment becomes a greater task and safety concern.

The lower the base of the tank, the more difficult it is to access in the future for necessary repairs or inspection. Since the water main that feeds the tank has to enter at the base of the tank, it will also be that much deeper, both near the tank and out into the public roadway. This becomes a maintenance issue for our in-house personnel should there be a main leak or break that requires repair.

Preliminary investigations are showing that 5' seems to be about the practical limit for the configurations of the site. Ridgewood Water will be exploring the ability to maximize the depth of the tank during the detailed design effort.

Location - Thoughts have been expressed about moving the tank from the Valley View Site to another location.

Many issues go toward locating a storage tank, including - available land, elevation, locations of supply and demand, etc. Elevation can be overcome by putting a tank up in the air, an elevated tank. Such tanks are likewise difficult to site. In the case of Valley View, such a tank would likely be placed eastward from the escarpment that the present tank site occupies. At over 230' tall, this would likely cause widespread concern and opposition. Such a tank would not only impact the view from the crest, but would also be visible from a significant distance around the relatively flat area of eastern Ridgewood.

Keeping the tank on the ground restricts the available land to a narrow range of elevations around

300'. Most areas of Ridgewood already have development and most of that development is residential. One possible new site along the 300' contour is at the corner of W. Glen Ave. and N. Monroe St., a small park area next to the Fire House and Tennis Courts. Using similar parameters to the Valley View Site and keeping the present storage volume on that site, a new tank at Monroe and Glen would be about 60+' diameter and 20' high, with 5 more feet buried into the ground. This alternative would:

still require replacement of the Valley View Tanks, likely with one tank of 61+/-' diameter,

landscaping on both sites, and

over 2500' of water main from the Valley View Site to the new site.

Questions would likely be asked if spending the additional monies for two sites/structures and the additional water mains is justifiable versus constructing a single tank on an existing site. This alternative will cost on the order of $1,800,000 more than the proposed Valley View Tank.

Alternately, constructing a single tank (at the Monroe/Glen Site) would require it to be 96' in diameter, based on a 25' depth (5' bury). The site is approximately 135' (Glen to Tennis Court) x 250' (Monroe to Fire House). This leaves on the order of 20' of area around the structure for any screening, less than the Valley View Site. Cost to complete this work, about $500,000 to $750,000 more than the proposed Valley View Tank. Again, justification of why additional monies are being spent to construct the tank on another site would be asked.

Although additional land area is available on the existing Lafayette Tank Site, 2 factors limit its viability - distance and elevation. The length of water main required to get the water back to the northern part of the Low Service Area is in excess of two miles. At a budgetary price of $200 per foot, this is in excess of 2 million dollars and would entail significant traffic and regional disruptions. The back part of the Lafayette Site is at elevation of about 335'. This would require the tank to be buried about 15+', just to its top.

The existing Valley View Site is clearly the most practical location where additional gravity fed storage could be located without elevating the tank structure.

Placement on the Site - Where should the new tank be placed on the site?

Several people have expressed concern about placing the tank toward the center of the site. Further back is thought to be better from the standpoint of the view from the front and sides of the site. This obviously is not the sentiment of the residents that live behind the tank site, they have the existing tanks within about 10' of their property lines. Increasing the distance from the road reduces the distance to the neighbors in the back and thus, the amount of screening that can be introduced on this side of the tank.

The landscape architect that is working on the project has thoughts about placing the tank slightly off-center on the site to maximize the benefits of the slight rise in elevation to the northeast. This allows maximum screening of the tank from all angles/sides. This siting provides benefits to all the properties surrounding the site and does not favor any one side greater than another.

Landscaping

Will Ridgewood Water put the proposed landscaping in place and if so, will it be maintained? Will the project run out of money and the landscaping be cut in the end? The landscaping will be included in the lump sum bid for the tank project. Extra attention will be put toward helping the plants to become established by utilizing some irrigation for the first couple of growing seasons. The design for the site is to provide significant screening with native species that do not require tremendous amounts of water or care. Once established there should be little ongoing maintenance of the plants themselves. They will provide for both screening and a natural setting.

Aesthetics

The present site has primarily mature oak trees, whose leaves/canopy are well above the height of the present tanks. Although they are very nice mature trees, they provide no screening of the existing structures and inhibit lower growth. The proposed landscaping plan leaves some of these trees on the site to provide some vertical depth perception for the site.

Several people have expressed the understanding that the proposed landscaping will be a marked improvement to the site. Even from the road, the existing structures are plainly evident. Several of the neighboring properties (particularly those to the rear of the site) have invested significant efforts to mask the close proximity of the tanks to their yards.

Visual Impact

The 40' and 50' diameters of the present tanks equals 90' of tank "wall" on the site. Most viewpoints of the present tanks provide this result. By constructing a single tank of 81' diameter, the visual impact of the size of storage on the site is actually less. There are some angles where less tank wall is visible and the proposed tank will increase the visual impact.

Neighborhood Setting - There is some discussion that the Valley View Tank should not be located in a residential area.

The Valley View Tank Site was established in 1900, perhaps before most of the houses were constructed. Like this site, most of our other tank sites are located in close proximity to residential properties. These situations are typical to the present situation at Valley View. Tanks located very close to the neighboring property, very little screening, and scant amounts of landscaping buffer. We try to make improvements at these locations as time, energies, and willingness of the neighbors to work with us permits. Most times it takes significant replacement/reconstruction type work on the structure to obtain any ability to improve the screening buffer on a site and we have found obtaining consensus with the neighbors to be imperative to a successful project.

Virtually the entire 4 town service area of the water system is developed. Most properties that do not house a structure are vacant for a particular reason (e.g. the parcel is wetlands, floodplain, or a park or recreation area). A very high percentage of the area is populated by single family residential homes. There are only limited areas where commercial development exists and as such, these areas are encircled in close proximity by residential properties.

Very few options exist for constructing a storage tank within the service area. Still fewer exist to meet the criteria of providing gravity based storage (e.g. elevation, proximity to supply/demand). As

with many of our sites, development grew up around the facility in a space restrictive market.

Property Values - Some of the neighbors have expressed concern about the impact on their property values.

Ridgewood Water has over 70 facility locations, 10 of these are storage tank sites. We have numerous conversations and discussions with the neighboring property owners at these sites and get a wide variety of opinions and ideas about our facilities. Some are rather satisfied to have us as their neighbor. They tell us we are a quiet private alternative and would not want to see anything else on our property.

Improvements, including modifications, expansions, reconstructions, and new installations, have been made to quite a number of our facilities in recent years and in various degrees we have addressed the issue of property values and impacts thereon. Many neighboring property owners perceive an impact from our facilities when we are making and improvement. They are used to the existing situation and concerned about change.

However, both through our projects and projects of other water utilities that have been reviewed there is a common thread of understanding - property values are not impacted by the types of facilities that we are constructing.

Water tanks and the sites that they occupy are generally innocuous, generating a minimal amount of disturbance or disruption beyond the construction period. The facility is different than the norm (a neighboring house), but causes no detriment. The sites typically raise questions and comments, but not much if any issue beyond the initial inquiry.

Professional Appraisers have looked at several of our sites and their opinion is consistent:

> The proposed facility will have minimal if any impact on the value of neighboring properties. Some evidence periodically exists where the value of a neighboring property is increased, as some people perceive the benefit of having a silent private neighbor. Devaluation of property is the perception of the existing owners because they have emotional attachment to the present situation of the neighborhood.

Their opinions are derived from a wide range of studies, of both our facilities and those of water facilities in other similar settings. During the Glen Avenue Tank Project, the property next to the tank site was for sale. The prospective owners came to several planning meetings that we had for the project. They ultimately purchased the property. Note: because of the size of the site and the requirements of that tank, there is no room for any type of buffer or landscaping on the site, except the small berm along the roadway.

Public Concern and Outreach

Several residents have contacted us about the project with marked concerns about what we are going to be constructing. It becomes evident after listening to the description of their concerns that they have been led to believe that the project is significantly different than the one being proposed. Brief review of the actual project, answering some further questions, and sometimes showing some of the visual graphics of the proposed project significantly change their fears to understanding and acceptance.

Ridgewood Water has notified homeowners of the project and invited them in to 2 meetings to discuss aspects of the site, the project, and the water system and to hear their concerns and suggestions. Concern was broadcast that we had only included most properties within 500' of the Valley View Site and had excluded about 15 properties that have no practical view of the site and have just a small portion of their property that is barley inside the 500' radius.

Since the standard of the Zoning and Planning Boards is to notify properties within 200' of a site, the voluntary notice of properties within 500' (and those properties outside of 500' that have a line of sight toward the tank site - some as far away as 800+') seems unworthy of concern and criticism.

Experience and Opinion

Much of what is discussed and presented is opinion, even the standards that must be adhered to are based upon professional opinion. These opinions are borne out of extensive experience and knowledge.

In-house staff capabilities include Licenced Professional Engineers and Licenced Water System Operators. Personnel serve on a variety of local and national waterworks committees, including one dedicated to developing and progressing standards for water storage tank design, construction, and operations. The accumulation of design, study, and operating knowledge represents decades of experience. Even with this, Ridgewood Water hires Professional Engineering firms to perform many of its studies and designs.

The firm of Gannett Fleming has been hired to conduct the detailed design improvements at the Valley View Site. Their staff includes engineers and planners that will assist and present opinions to Ridgewood Water Staff about the design, construction and operation of the improvements. Additional professional staff includes such specialists as landscape architects to be able to detail and specify the important features of screening between the proposed structure and the neighboring properties and roadway.

Project personnel will also draw off relationships with tank manufacturers and professionals. Such previous relationships have led to very innovative design aspects in certain projects.

The knowledge and experience of the accumulated staff provide the ability to develop a beneficial water storage facility while accounting for the localized setting of the facility.

Reasonableness

Several thoughts have been posed about the proposed project associated with issues of cost, location, etc. Some of these thoughts suggest that Ridgewood Water ought to just move the tank to an alternate location or not use economic factors in any of its judgement processes.

The project is for regional public good. True, the project more directly services a particular area, but that area houses numerous properties that service the general public good - Ridgewood High School, GW Middle School, Village Hall, the downtown area, Valley Hospital, etc. As such, and for several other reasons, Ridgewood Water has to consider all aspects and approaches to the project. Reasonableness and economics must be factored in the decision making process for the same reasons that we should not design and construct the project in a Spartan manner.

Reasonable strides are being taken in the layout and design of the improvements to reduce and

screen the appearance of the proposed structure. Using our professional experience and judgement and that of our consultants, the project will progress with the best of intentions to afford the neighbors of the project site assurances that we understand their concerns and will develop a project that limits impacts to their properties.

Assurance should be felt on the part of the residents by virtue of the fact that we have met on several occasions with them to present the project and hear their concerns and ideas. We feel that through a dialogue with some understanding and compromise, a final project should be designed that can reasonably meet the various expectations.

Ridgewood Water Storage Locations

Below is a listing of Ridgewood Water Storage Tank Sites. Please do not enter any of the sites without an escort from Ridgewood Water (contact Wm. Mowell to coordinate entry/access).

Vance Tank offers the closest comparison to proposed Valley View Site with 1960 era landscape treatment, that is a minimal amount around the immediate perimeter of the tank. Eastside and Southside Tanks offer a berm that is closest to the proposed berm/backfill. The view from Lafayette Ave. will offer similarities to the Valley View site, minus landscaping. The Aqueduct Site can offer understanding of the effects of berm and screening versus without, but you would have to access neighbors property to do so.

Ames Tank - Behind 533/535 Carlton Road, Wyckoff, NJ
1 tank 40' high 48' dia. 525,000 gallons Steel

Aqueduct Storage Tank Site* - End of Aqueduct Avenue, Midland Park NJ
2 tanks, each 30' high 60' dia. 634,500 gallons Steel

Cedar Hill Tank - Off Christian Health Care Center Driveway, off Mountain Ave., Wyckoff, NJ
1 tank 20' high 130' dia. 2,000,000 gallons Conc.
Backfilled about 17'

Eastside Tank* - East Saddle River Road, just north of Rt. 17, Ridgewood, NJ
1 tank 20' high 130' dia. 2,000,000 gallons Conc.
Backfilled about 12'

Glen Avenue Tank(s) - Top of Glen Avenue Hill, Midland Park, NJ
2 tanks (one atop other) 90' high 50' dia. 500,000 gallons (each) Steel
Lower tank is pumped storage*

Lafayette Tank - Behind 451 Lafayette Avenue, Wyckoff, NJ
1 tank 15' high 160' dia. 2,250,000 gallons Conc.
Backfilled about 12'

Southside Tank* - Off DeBoer Drive exit of Rt. 208, northbound past Nabisco Plant, Glen Rock, NJ
1 tank 20' high 130' dia. 2,000,000 gallons Conc.
Backfilled about 12'

Vance Tank - At corner of Vance Avenue and Evergreen Drive, Wyckoff, NJ
1 tank 35' high 100' dia. 2,000,000 gallons Conc.
Backfilled about 27'

Wortendyke Tank* - Off Witte Drive, Midland Park, NJ (off Godwin, look left after Jacobsen's)

1 tank	24' high	30' dia.	125,000 gallons	Steel

* Pumped Storage - Requires pumping to lift water back to system gradient/elevation. Gravity storage allows flow back to system by gravity.