

**TOWN OF MOUNT PLEASANT
WESTCHESTER COUNTY, NEW YORK**

**COST EVALUATION FOR
ROLLING HILLS AREA WATER MAIN EXTENSION**

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COST EVALUATION FOR ROLLING HILLS AREA WATER MAIN EXTENSION

**Town of Mount Pleasant
Westchester County, New York**

1. Background

The Town of Mount Pleasant is located in the center of Westchester County, New York. The Town's water system is presently divided into several water districts; refer to drawing 1. In order to comply with the filtration avoidance compliance requirements, the Town's three (3) major districts are currently being consolidated into one service district. The new Commerce Street Pump Station and the elevated water storage tanks (total capacity-4.0 million gallons) located in the Valhalla section of the town, will act as a primary water source to the consolidated area. The proposed water main extension project is located within this consolidated area, which is located adjacent to the existing Thornwood and Valhalla Water Districts; refer to the attached location plan.

The consolidation of these water districts has already been decided upon by the Town officials and consequently, Professional Consulting, LLC. (PCI), has been involved in the consolidation of water districts and rehabilitation for the water mains in Town of Mount Pleasant. The construction phase of the consolidation work is near completion.

The new consolidated water distribution mains are interconnected with pressure reducing valves (PRV) and control devices. This arrangement will help in maintaining adequate pressures in the service areas. The distribution PRV chambers are located as such, which allows the maximum available pressures to the proposed Rolling Hills service area. Currently, the project area's domestic water demand is satisfied by the ground water source. These are individual homeowners' wells; no fire service mains are present in the area.

This report is being prepared to provide the budget cost evaluation of the Rolling Hills Area Water Main Extension work. Based on our review of the existing water distribution system, review of the available documents, and the field investigation conducted by PCI, we recommend that the proposed project area water mains be connected to the high-pressure zone of the new consolidated water district. The report conceptualizes the possible water main interconnections, the current and projected water demands, suggested layout and sizes of the proposed water mains for the optimal operation of the distribution network, and the cost break down of the project.

The project includes the following streets and one easement area for the water main extension (also refer to drawing 2):

- Rolling Hills Road
- Hilltop Lane
- Westerly Lane

- Westerly Lane South
- Aspen Way
- Grandview Lane
- Jennifer Lane
- Lillian Avenue Easement (connects to Westerly Lane)

2. Project Description

The project consists of the Water Main Extension to the Rolling Hills section of the Town. This section predominantly services the residential development comprising of single-family houses. Presently, part of area is currently within the Valhalla Water District and the majority of the remaining area is described as a non-districted water service area of the Town; refer to drawing 1. The proposed project will include construction of approximately 11,500 linear feet of 10-inch diameter water mains. These mains will be laid in the existing right-of ways, which currently provides housing for other buried and overhead utilities to the residents. These mains will provide individual service connections to all existing houses in the area, and will be connected to proposed fire hydrants. Location of hydrants and valves will comply with the requirements of the Health Department and the Recommended Standards for Water Works.

The attached conceptual water main plan shows the proposed layout of the water mains, hydrants, and valves (refer to drawing 5). These mains will be connected to the existing water distribution system via three different locations. All of the proposed interconnection mains are at maximum hydraulic gradient zone of the district, approximately 710 feet.

The proposed distribution network is tied to the existing system via an easement run off of Bellevue Avenue to Westerly Lane, which is an existing easement, as shown on drawing 3.

3. Existing Conditions

The current multiple independent but interrelated water districts are joined into one water district or distribution system as a result of Phase I construction. The Joint District is fed primarily from a single connection with the New York City's Catskill Aqueduct. The Joint District is spread out over a relatively large area, with hills and valleys ranging from 200-feet to 645-feet in elevation (refer to drawing 3).

The proposed project area is located in the hilly section of the Town. The area has apparent rock outcrops. The utilities in the service area are approximately depicted in drawing 4, which include telephone and electric lines, sanitary and storm sewer mains, catch basins, manhole, and stream crossings. Additional information requests have already been filed with the existing utility authorities, information provided is approximate and shall be verified prior to the startup of design work. However, based on site inspections, it appears that gas lines are present in Hilltop Lane adjacent to Rolling Hills Road, which extend towards High Acres Drive. The site has numerous rocks outcrops and hilly terrain.

The project area is predominantly residential, comprising of 111 single-family houses. The estimated population served in the location is approximately 450 – 500. At an estimated average demand of 125 GPCD, the approximate water demand of the proposed service area is 0.056 – 0.062 MGD (average 0.06 MGD).

Based on the existing demand pattern of the neighboring districted sections, the following is an estimated demand table for the proposed Rolling Hills service area:

Average Day Demand	42 gpm
Max. Day Demand	122 gpm
Max. Hourly Demand	218 gpm

The fire flow demand is estimated at 500gpm to 700gpm, for the proposed service area extension.

4. Proposed Improvements

The new water main arrangement is proposed to interconnect the non-districted project area with the consolidated water districts at three locations. These are located at Rolling Hills Road, Jennifer Lane, and Westerly Lane (refer to drawing 5). This is proposed to provide adequate looping to the distribution system and to assist during maintenance and repairs of the distribution system. These interconnections are presently located in the Thornwood and Valhalla water districts. The distribution mains at the interconnection points range in diameter from 8-10 inches. For the proposed distribution system, we recommend new mains to be cement lined ductile iron main with 10-inch in diameter. This should assist in controlling the head loss in the system during high demand periods. The new distribution will consist of approximately 25 hydrants and 50 control valves.

We have developed the Town hydraulic model with proposed water main extension. The purpose of the model is to simulate or mimic the system and to test and predict its responses under various domestic and fire demand conditions and emergency scenarios. This is a powerful tool to aid in the logical and economical planning for consolidation and the water main extensions.

The proposed water main extension, as shown in the attached topographic plan, varies in elevation from 400 ft to 560 ft (information obtained from existing town topographic maps). The new storage tanks in Valhalla will service these areas at the hydraulic gradient of 710 ft. The street high and low elevations are summarized below:

Street Name	Elevation (ft)	Slope (ft/ft)	Length of Slope (ft)
Aspen Way	460 – 430	0.040	750
Grandview Lane	485 – 525	0.066	600
Hilltop Lane	425 – 510 – 500	0.071 – 0.038	1,200 – 262
Rolling Hills Road	420 – 475 – 502 – 415 – 430	0.037 – 0.030 – 0.055 – 0.023	1,458 – 885 – 1,561 – 648
Jennifer Lane	425 – 405	0.066	300
Westerly Lane	501 – 550	0.025	1,900
Westerly Lane South	540 – 520	0.016	1,200

The hydraulic model confirmed pressure in the proposed extension during the average daily demand conditions to be in the range of 56 psi to 122 psi. A simulated fire demand of 500 gpm results in available pressure above the minimum 20-psi in the zone.

The old distribution system surrounding the High Hills Area maintained a lower hydraulic gradient of 592 ft (TWD) and 684 ft (VWD). The new-elevated Valhalla tanks at hydraulic gradient of 710 (VWD new) made it possible to service the proposed Rolling Hills Area at higher pressures mentioned above.

Following is the tabulated description of the proposed distribution system:

Road	Length (ft)	Proposed Water Main Size	No. of Valves	No. of Hydrants
Rolling Hills	4,500	10"	10	10
Hilltop Lane	1,700	10"	6	2
Westerly Lane	1,900	10"	8	5
Westerly Lane South	1,200	10"	4	1
Aspen Way	750	10"	4	1
Grandview Lane	600	10"	4	1
Jennifer Lane	300	10"	4	1
Lillian Avenue Easement	400	10"	4	1
Total	11,350		44	22

5. Cost Evaluation

The project cost is prepared based upon the above-described conceptual design of the water main distribution at Rolling Hills Area. All material used for the water mains and their fittings shall conform to the ANSI/NSF standards to maintain treated water quality. The minimum 10-foot horizontal and 18-inches vertical distance shall be provided between the water mains and the sewers. In exceptional cases where meeting the above requirement is not workable, and based on the plan approval from the Westchester County Department of Health (WCDOH), we propose that the water mains be encased in K-Crete. The additional cost of the encasement of water mains with K-Crete is added to the cost of the water mains. Based on the size and location of existing interconnecting water mains, and the head loss analysis through, we have designed the size of the water main to be 10-inches in diameter. Proposed water mains shall be cement lined ductile iron pipe (CLDIP).

The project area is located at an elevated rocky section of the Town. Based on our site inspection and presence of rock outcrops, we estimated approximately 50% of the trench excavation in rock. Rock quantities as presented in the table below are based on this assumption. We recommend boring and probing shall be conducted prior to the start of the design work. Estimated cost of borings and probing is added to the cost presented.

Location and distribution of hydrants and valves are shown in the attached conceptual plans (refer to drawings 5, 5A & 5B), the proposed layout satisfies the requirement of the Recommended Standards for Water Works. Due to the elevated location of the proposed water main extension, we propose installation of air relief valve chamber(s) and additional pre-cast valve chambers at stream crossings. The location and requirements for these chambers and their valve arrangements will be determined during final design work.

In order to calculate a more accurate budget cost estimate for construction and design work, we have supplemented our cost evaluation work by obtaining preliminary cost estimate from local surveying and boring/probing companies (refer to Appendix I). Also, in addition to our review of recent bid evaluations for similar work designed and administered by PCI, we have coordinated the proposed contract work cost breakdown with local qualified contractors who have previously submitted their bids for similar work in the Westchester County area.

The following construction cost is based on installation of water main within the roadway section of the Right Of Way (R.O.W.). The restoration cost as presented below is based on trench restoration only. This is approximately a 5-ft wide asphalt surface restoration. Should the Town decide to pave the entire width of the roadway, additional cost of approximately \$ 250,000 should be budgeted.

Based on the details and assumptions as described above, the following is the proposed project budget construction cost estimate:

A. Probable Construction Cost Estimate:

Item No.	Estimated Quantity	Description	Unit Price	Total Price
1.	Lump Sum	Insurance, bonds, permits & temporary construction facilities	L.S.	\$ <u>70,000</u>
2.	8,000 LF	Installation of 10" ductile iron cement lined water main encased with K-Crete	\$ <u>200</u> Per Foot	\$ <u>1,600,000</u>
3.	3,500 LF	Installation of 10" ductile iron cement lined water main	\$ <u>150</u> Per Foot	\$ <u>525,000</u>
4.	50 LF	Installation of additional 8" ductile iron cement lined water main	\$ <u>150</u> Per Foot	\$ <u>7,500</u>
5.	50 LF	Installation of additional 6" ductile iron cement lined water main	\$ <u>150</u> Per Foot	\$ <u>7,500</u>
6.	8,000 Pounds	Additional Installation of 10" ductile iron pipe fittings	\$ <u>3.0</u> Per lb.	\$ <u>24,000</u>
7.	1,000 Pounds	Additional Installation of 6" & 8" ductile iron pipe fittings	\$ <u>3.0</u> Per lb.	\$ <u>3,000</u>
8.	120	Installation of water service connections	\$ <u>2,500</u> Each	\$ <u>300,000</u>
9.	4	Installation of 6" gate valves	\$ <u>3,500</u> Each	\$ <u>14,000</u>
10.	4	Installation of 8" gate valves	\$ <u>3,500</u> Each	\$ <u>14,000</u>
11.	45	Installation of 10" gate valves	\$ <u>2,750</u> Each	\$ <u>123,750</u>
12.	25	Installation of Hydrant Assemblies	\$ <u>6,500</u> Each	\$ <u>162,500</u>
13.	Lump Sum	Demolition	L.S.	\$ <u>20,000</u>
14.	100 Tons	Additional Base Course – Type 1 (D.O.T. Item No. 403.11)	\$ <u>125</u> Per Ton	\$ <u>12,500</u>
15.	80 Tons	Additional Binder Course – Type 3 (D.O.T. Item No. 403.13)	\$ <u>125</u> Per Ton	\$ <u>10,000</u>
16.	50 Tons	Additional Wearing Course – Type 6F (D.O.T. Item No. 403.1701)	\$ <u>125</u> Per Ton	\$ <u>6,250</u>
17.	100 Cu. yds.	Additional Dense Graded Aggregate (D.O.T. Item No. 4)	\$ <u>40</u> Per Cu. Yd.	\$ <u>4,000</u>
18.	3,300 Cu. Yds.	Rock Excavation	\$ <u>250</u> Per Cu. Yd.	\$ <u>825,000</u>
19.	100 Cu. Yds.	Additional Foundation Material and Imported Granular Backfill Material	\$ <u>35</u> Per Cu. Yd.	\$ <u>3,500</u>
20.	6,000 LF/Inch Dia./VF	Reconstruction of uncharted and mismarked utilities	\$ <u>2.0</u> Per LF/Inch Dia./VF	\$ <u>12,000</u>
21.	15	Test Pits	\$ <u>1,500</u> Each	\$ <u>22,500</u>

22.	50 Cu. Yds.	Additional Concrete	\$ <u>250</u> Per Cu. Yd.	\$ <u>12,500</u>
23.	3	Furnish and Install Pre-cast Chamber	\$ <u>7,500</u> Each	\$ <u>22,500</u>
24.	250 LF	Additional Concrete Curb	\$ <u>30</u> Per LF	\$ <u>7,500</u>
25.	5000 Sq. Ft.	Additional Vegetation	\$ <u>3.0</u> Per Sq. Ft.	\$ <u>15,000</u>
26.	---	Contingencies and extra work	N/A	\$ <u>50,000</u>
Total				\$ <u>3,874,500</u>
approximately				\$ <u>3,900,000</u>

The costs presented here are based on year 2004 design and year 2005 construction schedule. These costs should be adjusted based on future CPI factors.

In addition to the above-presented cost breakdown, the individual homeowners need to make their individual house service connections independently. This cost is dependent on the length of service and the type of sub-grade conditions. We estimate this cost approximately in the range of \$ 3,500 - \$ 5,000 per service connection.

B. Design and Construction Administration Budget:

Based on the scope of work described above, we have estimated the project construction period to be approximately 8 to 10 months. We have contacted surveyors and boring contractors for their cost information for the proposed work as described herein.

Based on the scope and estimated duration of the project, we have prepared the following design/ engineering budget fee for this work:

1. Surveying	\$ 50,000
2. Borings/ Probing evaluation	\$ 25,000
3. Design & Regulatory Compliance Budget (≈ 5% - 7% of Construction Cost Estimate)	\$ 195,000 – \$ 273,000
4. Construction Administration (≈ 6% - 8% of Construction Cost Estimate)	\$ 235,000 - \$ 315,000
	\$ 663,000

approximately \$ 665,000

APPENDIX

Surveying & Boring/ Probing Estimates

REFERENCES

- Joint Water District Project and Distribution System Computer Model, Town of Mount Pleasant, Westchester County, New York, January 2001.
- Northern Water Districts Consolidation Study, Town of Mount Pleasant, Westchester County, New York, June 1995.
- Town wide Water System study, Town of Mount Pleasant, Westchester County, New York, March 1995.
- Recommended Standards for Water Works, 2003 Edition.
- Record Maps provided by Water and Sewer Department, Town of Mount Pleasant, New York.

DRAWINGS