Rensselaer Riverfront Development
DGEIS Wastewater Study

City of Rensselaer, New York

CHA Project Number: 17083.1009.1102

Prepared for:

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1.0 INTRODUCTION

1.1 BACKGROUND

The Rensselaer Waterfront Development project, located in the City of Rensselaer (City), is a proposed mixed use development including multi story residential units, retail, office space, a hotel with banquet facility, parking garages and small boat marina. It is anticipated wastewater collection and treatment will be provided to the development through a new piping system that discharges to an 18-inch stub at the north easterly corner of the proposed development site.

1.2 PURPOSE AND SCOPE

Marx Properties, Inc. has authorized Clough Harbour & Associates LLP (CHA) to complete a wastewater study for the preparation of a Draft Generic Environmental Impact Statement (DGEIS) to evaluate wastewater collection options for the proposed development. The purpose of this study is to review the City's existing wastewater system and identify the sewer infrastructure needed to serve the proposed development. This study includes the following:

- Wastewater Demand Evaluation
- Wastewater System Improvements
- Cost Summary and Conclusions

2.0 EXISTING WASTEWATER FACILTIIES

2.1 MAPPING AND RECORD DRAWINGS

An existing sewer system map is included as Figure 1. City Sewer information was interpolated from the Plan of Existing Sewerage System prepared by J. Kenneth Fraser & Associates dated 1978 and revised December 1979. As Built drawings of Interceptor and Trunk Sewers Contract 13 prepared by Malcolm Pirnie, dated 1977, for the County's gravity interceptor sewer were also used in the development of the existing sewer system mapping.

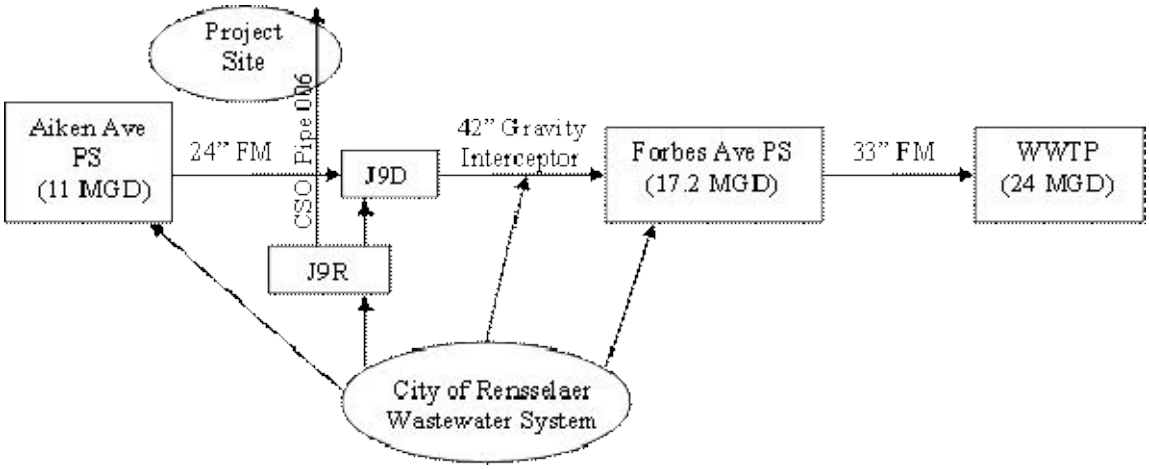
2.2 CITY OF RENSSELAER INFRASTRUCTURE AND FACILTIES

The City's existing sewer system infrastructure is comprised of primarily cast iron, vitrified clay (tile) and reinforced concrete pipe (RCP) mains ranging in size from 8 to 24-inch diameter and includes gravity piping and manholes located within City streets. Generally, the City's sanitary sewer system flows gravity, from east to west; towards the Hudson River where the project site is located. The gravity network of sewer pipes discharges to the County's main trunk lines at a number of different points in the city.

2.3 RENSSELAER COUNTY INFRASTRUCTURE AND FACILITIES

Rensselaer County owns, operates and maintains pumping stations, force mains and mainline gravity sewers. Some of these facilities run adjacent to and within the boundaries of the proposed site. In the City of Rensselaer, the County system includes two existing pump stations with

associated large diameter (33 inch and 24 inch) force mains, and a 42-inch RCP gravity sewer. The following schematic depicts the county facilities located adjacent to the project location.



The Aiken Ave Pump Station is located in the upper reaches of the city. This pumping station is rated for 11 Million Gallons per Day (MGD) per Malcolm Pirnie, March 1970. The terminus for the 24-inch force main is manhole structure J9D located on the eastern property line of the site. J9D is also where the County's 42-inch gravity interceptor sewer originates. The Forbes Avenue Pumping Station is located downstream of the project site. This pumping station is rated for 17.2 MGD and connects to the WWTP via a 33-inch force main.

The County's main trunk and interceptor sewer system runs parallel to the Hudson River. During dry periods, all sanitary waste is directed to the Rensselaer County Wastewater Treatment Plant (WWTP), located north of the project at the foot of Water Street (south of the Menands Bridge- Route 378) site in the City of Troy. During some wet weather events, existing combined sewers' capacities are exceeded. In this event, the combined sewers that are connected to regulating chambers activate combined sewer overflows and allow some discharge to the Hudson.

2.4 COMBINED SEWER OVERFLOW

Currently there is a Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) being developed for communities on both sides of the Hudson River. The LTCP will likely address CSO related issues and present alternatives for minimizing CSO events and volumes of CSO that discharges to the River. It is not in the scope of this project to mitigate CSO issues off site.

The County's Structure J9R as show in Figure 1 is a regulating chamber designed to allow the existing combined sewer system to discharge to the Hudson River during extreme wet weather events through CSO 006. Dry Weather flows, along with a portion of the wet weather flows pass though this regulator structure, J9R to manhole J9D, and on to the 42-inch Interceptor sewer. The sanitary waste stream from this project will discharge to the 18-inch RCP stub on manhole J9D.

The proposed development is in close proximity to the existing CSO 006, and the county's regulator structure J9R. The proposed development will pipe all new sanitary wastes separately from storm water runoff and discharge sanitary waste downstream of regulator J9D and CSO 006.

3.0 WASTEWATER DEMAND EVALUATION

3.1 WASTEWATER LOADING PROJECTIONS

The facilities proposed for this site are generally residential and commercial. The characteristics of the sewage should be consistent with similar residential and commercial buildings. There are no industrial or medical facilities proposed which could release constituents that require treatment at the source. Should the character of the wastewater flow vary for a particular user of the project's wastewater collection system, pretreatment equipment or systems would be required to meet the requirements of the Rensselaer County Sewer District, New York State Department of Environmental Conservation and Department of Health.

In addition, any changes to the County's WWTP permit may require additional pretreatment on site or at the source (such as a business with special wastes/effluent characteristics not typical). Any local municipal plumbing codes would also be applicable.

3.2 PROJECTED WASTEWATER FLOWS

3.2.1 Projected Average Daily Flow

The anticipated wastewater flows for the proposed development was calculated based on the mixed use development program as outlined in the Final Scoping Document for the DGEIS proposed by Marx Properties, Inc. The proposed development is comprised of a combination of residential, retail, hotel, and office space. In some cases, CHA made assumptions to allow for number of employees and food service operations. Factors such as anticipated operation hours for offices, retail and banquet facilities were also considered.

CHA has estimated the design flows in accordance with New York State Department of Environmental Conversation Standards. For new developments the NYSDEC requires the use of DEC standard design flows published in the DEC Design Standards for Wastewater Treatment Works (1998) book. CHA has taken the 20% reduction on those flows for the residences as allowed for new installations.

Marx Properties, Inc. has indicated that the proposed development's components may increase or decrease by 30% depending on market demand. The worst case scenario for wastewater flows is represented by an increase of residential units by 30% in conjunction with a decrease in retail properties by 30%. Table 1 summarizes the daily average flows generated by each component of the project for the base scenario as outlined by Marx. Table 2 shows the worst case scenario for the projected flows from this development. As shown in these tables, this proposed development will generate between 0.25 MGD and 0.30 MGD.

3.2.2 Projected Peak Flows

The "Recommended Standards for Wastewater Facilities", or "Ten State Standards", published by the Great Lakes Upper Mississippi Board of State Public Health and Environmental Managers require peaking factors to be based on the population for the system. Peaking factors were used to determine the Peak Hourly Flow that would discharge to the interceptor to ensure that the existing infrastructure would be able to convey the flow. Peak flow rates from the base scenario and the worst case scenario are included in the calculations in Tables 1 and 2.

Marx Properties Inc. expects a population between 4,000 and 4,500 for this development when it is fully occupied. Using the peaking factors as calculated, the peak flow from this site is expected to be between 580-700 gallons per minute (0.85 – 1.0 MGD).

4.0 EXISTING INFARSTRUCTURE EVALUATION

4.1 RESERVE CAPACITY

The idea that there is reserve capacity in the Rensselaer County System has been discussed with the city and county officials. A number of commercial and industrial users located upstream of J9D have been moved out of the area, freeing up capacity in the pumping stations and gravity interceptor. At present, both pump stations are running below their capacity due to the loss of some significant industrial users in the City.

The proposed site is on the site of the former Rensselaer High School. Flow data from the school was not available for this report, however, CHA estimates that when the school was fully occupied up to 1,500 students and faculty were present. Assuming gyms, cafeteria and showers, the equivalent hydraulic sewer loading would be 30-35 GPD/Person, or approximately 50,000 GPD. Additionally, large industrial and commercial outfits have either closed down or moved from the area. This includes Sterling Winthrop and BASF. According to the County, wastewater loads from these facilities amounted to over 700,000 GPD. The elimination of these wastewater loads, as well as the high school provides excess capacity in the City's system.

4.2 EXISTING DRY WEATHER FLOWS

As part of an ongoing CSO study in a number of adjacent Communities, discrete flow monitoring and interceptor modeling has been completed. CDM has been tasked with the development of the interceptor model for Rensselaer County. The model developed and calibrated by CDM shows a peak from in the interceptor of 4.8cfs (3.10 MGD). This peak flow is taken at a time when the groundwater, and therefore base flow, is the highest during the year.

4.3 EXISTING INFRASTRUCTURE CAPACITIY

The County's 42-inch RCP gravity interceptor sewer runs from manhole structure J9D northerly to the Forbes Avenue Pumping Station. CHA has reviewed the 1977 as built drawings prepared by Malcolm Pirnie and provided detailed flow calculations in Table 3. The 42-inch RCP interceptor sewer can convey 16.26 MGD to the WWTP. The existing flows in the interceptor as

detailed by CDM and summarized in the previous section are 3.10 MGD. This leaves an excess capacity of 13.16 MGD in the existing interceptor.

As detailed in Section 3.2, the average wastewater demand for the development is approximately 0.25 to 0.30 Million Gallons per Day (MGD), with a peak flow of 0.85 MGD to 1 MGD. The 42-inch interceptor sewer has about 13.16 MGD of excess capacity during dry weather, and it can therefore accommodate this new development.

The existing capacity of the Rensselaer County WWTP is 24 MGD according to Rensselaer County Sewer District Personnel. This plant generally sees between 14-17 MGD during dry periods. During wet weather events, however, flow rates are much higher due to storm water runoff entering the system. During these events, the plant may see flow rates in excess of 30 MGD. The projected wastewater flows from this project represent 1% of the total capacity and can be collected and treated by the plant without impacting the existing facilities.

5.0 PROPOSED WASTEWATER SYSTEM IMPROVEMENTS

5.1 EXISTING ON-SITE WASTEWATER COLLECTION SYSTEM

A site plan of the original school building and utilities indicates that the school building had multiple sanitary sewer laterals leaving the building. A single 10 inch clay sanitary collector sewer runs easterly and discharges to the city's 15-inch clay pipe located just outside the site boundary as shown on Figure 1.

It is not anticipated that any of the existing clay pipes serving the school would be reused. There is some site preparation work already completed, including demolition of school building, but it is not clear what, if any, demolition of underground utilities has been completed,. The existing piping on site will either need to be removed, or it may be necessary to plug and seal the pipes to be abandoned.

5.2 PROPOSED ON-SITE WASTEWATER COLLECTION SYSTEM

The anticipated preliminary wastewater system layout is shown in Figure 2. The proposed on-site wastewater system will be comprised of 8-inch to 18-inch PVC SDR 35, RCP and/or cast iron sewer pipe, manholes, and associated fittings to supply sewer to the proposed development. The development's separated sanitary sewer system will discharge to the existing 18-inch stub into manhole J9D as shown in the Figure 2. The City and County personnel have agreed that this is the preferred connection point to the existing system.

The floor finish elevations as set out in the scoping document are at or above 23.5 ft. It is anticipated that proposed sewer laterals from the buildings could connect to existing sanitary sewers at manholes or other structures by gravity due to the elevation of the proposed buildings. Buildings with plumbing fixtures below grade may require small sewage ejector pumps to connect to the existing infrastructure.

All storm water discharged from roof leaders and impervious areas such as roads and parking will be kept separate from the sanitary sewer collection system.

Grease traps will be required for larger kitchen wastewater loads such as banquet hall or restaurants in the retail area. For the purpose of preparing an opinion of probable construction cost, we provided an allowance for two large concrete grease traps; one for banquet hall kitchen and one for restaurant in retail space.

6.0 COST SUMMARY

The opinion of probable construction cost is based on the on-site wastewater system components only. Items required inside the various buildings, such as ejector pumps should be budgeted in the programming cost for each building. Based on the type and location of the proposed facilities, these costs may be significant.

The opinion of probable construction cost for the proposed wastewater collection system improvements, as described herein, is approximately $715,000 as shown in Table 4. This assumes use of PVC SDR 35 pipe throughout the project for gravity sewer. In addition, if a central pump station is required due to alternate building layouts and sewer laterals below assumed invert elevations, an additional capital cost of approximately $155,000 would be incurred

CHA also completed cost analyses if iron pipe or reinforced concrete pipe were installed for the new sanitary sewer system. These costs are detailed in Tables 5 and 6, respectively. The cost increases by about 40% to about $1,000,000when cast iron and ductile iron pipe are installed, instead of the PVC. A less dramatic increase to $740,000 (less than 5%) is seen when installing RCP rather than PVC.

Costs are subject to change with verification of connection points, preparation of design plans, building and road layout and distribution of wastewater loads for each individual building. Lump sum allowances were made for items that require detailed design and therefore the overall costs includes some design contingencies and assumptions.

7.0 CONCLUSIONS

The existing sewer collection system operated by Rensselaer County appears able to provide adequate wastewater service for the proposed development. The average and peak projected flow rates and final connection points may be refined during the preparation of construction drawings.

The calculated projected wastewater flows are based on the information provided in the Final Scoping document for the DGEIS and should be considered preliminary. These calculations are based on a number of assumptions including population and number of users for the different building types. These assumptions should be revisited as the project progresses to confirm the actual wastewater flow and loading demand.

It does not appear necessary to provide for additional wastewater conveyance or treatment systems on site. It should be noted, however, that the interior plumbing system for each building may require the use of sewage ejector pumps to provide sanitary waste disposal for areas below grade that can not connect by gravity. It should also be noted that this study was based on the

development program outlined in the Final Scoping document for the DGEIS and any changes to the program may impact the demand estimates and associated recommendations.

Should the development program schedule change, the recommended wastewater system improvements should be re-evaluated. It should also be noted that the findings of this study were based on information provided by municipal public officials and the sewer plans available. Any changes to the City system may also impact the recommended wastewater system improvements.

HUDSON RIVER

006

INTERSTATE 787

54" CMP STORM
(CSO 006)

48" CMP
STORM

PROPOSED DEVELOPMENT
SITE

42" Interceptor Sewer

42" Interceptor Sewer

TO FORBES AVE.
PUMP STATION

12" CLAY

18" STUB
J9R

J9D
INV.=3.80

15" CLAY

30"

BROADWAY

WASHINGTON ST.

24" FM

10"

24" FORCE MAIN
FROM AIKEN ST.
PUMP STATION

005

EAST ST.

21"

21"

18"

12"

12"

18"

10"

10"

18"

10"

FIRST ST.

SECOND ST.

THIRD ST.

ELM ST.

LAWRENCE ST.

WILLOW ST.

WILSON ST.

PARTITION ST.

HARRISON AVE.

JOHN ST.

GLEN ST.

PINE ST.

CATHERINE ST.

WASTEWATER LEGEND

- EXISTING SEWER PIPE
- EXISTING FORCE MAIN
- EXISTING GRAVITY INTERCEPTOR
- EXISTING COMBINED SEWER OVERFLOW
- EXISTING MANHOLE
- 005 – CSO NPDES PERMIT No.

SCALE: 1"=300'

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EXISTING CITY SEWER SYSTEM MAP

MARX PROPERTIES, INC.
RENSSELAER WATERFRONT DEVELOPMENT PROJECT
CITY OF RENSSELAER, NY

PROJECT NO.
17083.1009.1102

DATE: 4/09

FIGURE 1

006

54" CMP STORM
(CSO 006)

48" CMP STORM

INV. ~10.5

8" SAN.

8" SAN.

8" SAN.

INV. ~6.5

INV. ~6.0

8" SAN.

8" SAN.

INV. ~9.0

8" SAN.

INV. ~9.0

12" SAN.

12" SAN.

12" SAN.

12" SAN.

INV. ~6.5

15" SAN.

18" SAN.

42" Interceptor Sewer

CONNECT TO
EXISTING 18" STUB
FROM J9D
AT APPROX EL. 5.5'

J9D

J9R

15" CLAY

24" FM

WASTEWATER LEGEND

- SAN — PROPOSED SANITARY SEWER
- PROPOSED MANHOLE
- EXISTING MANHOLE
- EXISTING GRAVITY SEWER
- EXISTING CSO PIPE
- EXISTING GRAVITY INTERCEPTOR SEWER
- EXISTING FORCE MAIN

SCALE: 1"=150'

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PROPOSED ON-SITE SEWER SYSTEM

MARX PROPERTIES, INC.
RENSSELAER WATERFRONT DEVELOPMENT PROJECT
CITY OF RENSSELAER, NY

PROJECT NO.
17083.1009.1102

DATE: 4/09

FIGURE 2

Table 1 - Projected Wastewater Flows - Base Scenerio

Completed By:	KF	**Job No**	17083
Checked By	C Motyl	**Page**	1 **of** 1
Project Name:	Rensselaer	**Date:**	Apr-09

Subject: Estimate of Wastewater Flow Rates - Base Scenerio

Determination of Average Daily Wastewater Flow Rates

Category	Unit	Quantity	Flow Per Unit	Average Flow	
				gpd	gpm
Residential	unit	515	330	169,950	118
Office Space	ft^2	250,000	0.1	25,000	17
Hotel	rooms	300	120	36,000	25
Banquet facility	ppl	200	20	4,000	3
Retail Space	ft^2	165,000	0.1	16,500	11
Total				251,450 gpd	175 gpm

Determination of Peak Wastewater Flow Rates

$$\frac{Q_{\text{peak hourly}}}{Q_{ave}} = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$$

Assume population 4,000 people

Where: Q_{ave} = Average Daily Wastewater Flow Rate

Q peak hourly = Maximum Wastewater Flow Rate (Peak Hourly Flow)

P = Population in thousands = 4.00

Peak Wastewater Info

	DEC
Peaking Factor	3.33
Peak Hourly Flow (gpm)	582
Peak Hourly Flow (MGD)	0.84

Notes:

1. Development components based on preliminary site plan and Final Scoping document for DGEIS.
2. Facility demands are based on the NYSDEC Design Standards for Wastewater Treatment Works.
3. Assume each residential unit has 3 bedrooms and utilizes low flow plumbing fixtures at 110 gallons/bedroom.
4. Banquet facility assumed to be part of the hotel with a capacity of 200 guests.
5. Peak hourly flow rate was calculated from Ten State Standards

Table 2 - Projected Wastewater Flows - Worst Case Scenerio

Completed By:	KF	**Job No**	17083
Checked By	C Motyl	**Page**	1 **of** 1
Project Name:	Rensselaer	**Date:**	Apr-09

Subject: Estimate of Wastewater Flow Rates - Worst Case Scenerio

Determination of Average Daily Wastewater Flow Rates

Category	Unit	Quantity	Flow Per Unit	Average Flow	
				gpd	gpm
Residential	unit	700	330	231,000	160
Office Space	ft^2	250,000	0.1	25,000	17
Hotel	rooms	300	120	36,000	25
Banquet facility	ppl	200	20	4,000	3
Retail Space	ft^2	115,000	0.1	11,500	8
Total				307,500 gpd	214 gpm

Determination of Peak Wastewater Flow Rates

$$\frac{Q_{\text{peak hourly}}}{Q_{ave}} = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$$

Assume population 4,500 people

Where: Q_{ave} = Average Daily Wastewater Flow Rate

Q peak hourly = Maximum Wastewater Flow Rate (Peak Hourly Flow)

P = Population in thousands = 4.50

Peak Wastewater Info

	DEC
Peaking Factor	3.29
Peak Hourly Flow (gpm)	702
Peak Hourly Flow (MGD)	1.01

Notes:

1. Development components based on preliminary site plan and Final Scoping document for DGEIS.
2. Facility demands are based on the NYSDEC Design Standards for Wastewater Treatment Works.
3. Assume each residential unit has 3 bedrooms and utilizes low flow plumbing fixtures at 110 gallons/bedroom.
4. Banquet facility assumed to be part of the hotel with a capacity of 200 guests.
5. Peak hourly flow rate was calculated from Ten State Standards

Table 3 - Capacity Calculations

Completed By:	KF	**Job No**	17083
Checked By	C Motyl	**Page**	1 **of** 1
Project Name:	Rensselaer	**Date:**	Apr-09

Subject: **Check capacity of existing Sewer Infrastructure**

Find Capacity of exsisting 42" resselaer county Interceptor. Use lengths and inverts from 1977 MP As built dwgs

Size:
Diameter 42 inches = 3.5 feet Radius 1.75 ft

Length:
D/S Station 0 U/S Station 3755 Length 3,755 ft

Slope:
Downstream Invert 0.75 Elevation Change 3.11
Upstream Invert 3.86 Slope 0.0008

Find Full Capacity of the 42" Rensselaer County Interceptor:

$$Q = (1.49/n)(A)\ (R_h)^{2/3}(S)^{1/2}$$

Hydraulic Radius = R_h = area/wetted perimeter
Perimeter = 11.00 ft^2
R_h = 0.88

Area = 9.62 ft^2
$(R_h)^{2/3}$ = 0.91
$S^{1/2}$ = 0.03
n (assume old RCP) = 0.015

Peak Flow = 25.16 cfs 16.26 MGD
11,293.22 gpm

Existing Peak DWF in interceptor(1)	4.80 cfs	3.10 MGD
Full Flow Capacity of 42" Interceptor	25.16 cfs	16.26 MGD
Spare Capacity in 42-inch interceptor	**20.36 cfs**	**13.16 MGD**

Notes:
(1) The peak Dry Weather Flow in the 42" Interceptor was provided by CDM from Rensselaer model.

Table 4 - Opinion of Probable Comnstruction Costs - Option 1 PVC Pipe

Completed By:	KF	**Job No:**	17083
Checked By	C Motyl	**Page:**	1 of 1
Project Name:	Rensselaer Riverfront	**Date:**	Apr-09

Subject: **Opinion of Probable Cost- Preferred Material - PVC**

	Units	QTY	Materials	Labor	Equipt	Bare Cost	15% OH&P	UNIT COST	TOTAL COST
PVC SDR 35 Sewer Pipe									
8" pipe	LF	1,675	$7.05	$2.53		$9.58	$1.44	$11.02	$18,453.48
12" pipe	LF	1,205	$12.70	$3.18	$0.40	$16.28	$2.44	$18.72	$22,560.01
15" pipe	LF	270	$12.10	$4.24	$0.54	$16.88	$2.53	$19.41	$5,241.24
18" pipe	LF	170	$14.95	$5.10	$0.65	$20.70	$3.11	$23.81	$4,046.85
Trenching and Backfill (assume 4' wide trench) [1]									
6' deep	LF	250		$15.25	$5.75	$21.00	$3.15	$24.15	$6,037.50
8' deep	LF	250		$22.50	$11.05	$33.55	$5.03	$38.58	$9,645.63
10' deep	LF	250		$31.50	$15.40	$46.90	$7.04	$53.94	$13,483.75
12' deep	LF	550		$42.50	$19.75	$62.25	$9.34	$71.59	$39,373.13
15' deep	LF	2,020		$45.50	$22.00	$67.50	$10.13	$77.63	$156,802.50
Pipe Bedding [1]									
8" pipe (2' wide)	LF	1,675	$2.70	$2.00		$4.70	$0.71	$5.41	$9,053.38
12" pipe (2' wide)	LF	1,205	$3.13	$2.32		$5.45	$0.82	$6.27	$7,552.34
15" pipe (3' wide)	LF	270	$4.61	$3.41		$8.02	$1.20	$9.22	$2,490.21
18" pipe (3' wide)	LF	170	$5.00	$3.70		$8.70	$1.31	$10.01	$1,700.85
4' Diameter Sewer Manholes									
6' deep	EA	1	$1,827.00	$783.00	$143.00	$2,753.00	$412.95	$3,165.95	$3,165.95
8' deep	EA	1	$2,052.00	$963.00	$175.50	$3,190.50	$478.58	$3,669.08	$3,669.08
10' deep	EA	1	$2,414.00	$1,101.00	$199.70	$3,714.70	$557.21	$4,271.91	$4,271.91
12' deep	EA	3	$2,776.00	$1,239.00	$223.90	$4,238.90	$635.84	$4,874.74	$14,624.21
14' deep	EA	5	$3,138.00	$1,377.00	$248.10	$4,763.10	$714.47	$5,477.57	$27,387.83
16' deep	EA	3	$3,138.00	$1,515.00	$272.30	$4,925.30	$738.80	$5,664.10	$16,992.29
5' Diameter Sewer Manholes									
12' deep	EA	1	$2,572.00	$1,190.00	$365.00	$4,127.00	$619.05	$4,746.05	$4,746.05
14' deep	EA	1	$2,882.00	$1,321.00	$413.00	$4,616.00	$692.40	$5,308.40	$5,308.40
16' deep	EA	1	$3,192.00	$1,452.00	$461.00	$5,105.00	$765.75	$5,870.75	$5,870.75
Manhole Excavation, Subbase & Backfill									
Footing Excavation	CY			$5.25	$6.00	$11.25	$1.69	$12.94	$0.00
For Tamping Backfilled Trenches, Vibra	CY		$0.00	$4.12	$0.21	$4.33	$0.65	$4.98	$0.00
Backfill Trench	CY		$0.00	$2.20	$1.13	$3.33	$0.50	$3.83	$0.00
Pipe Zone Bedding Crushed/Screened	CY	740	$29.50	$5.25	$1.90	$36.65	$5.50	$42.15	$31,189.15
Miscellaneous Items and Allowances									
2,500 Gal Grease Trap	EA	2						$8,000.00	$16,000.00
Reroute existing City Sewer on-site	LS	1						$25,000.00	$25,000.00
Modify exist. structure J9D	LS	1						$30,000.00	$30,000.00
						Subtotal			**$541,654.00**
10% General Conditions		1						$54,200.00	$54,200.00
20% Design Contingency		1						$119,200.00	$119,200.00
						Option of Probable Cost -PVC Option			**$715,054.00**
If a central pump station is required Add these items [2] *:*									
Packaged Pump Station Unit (incl pumps)		1						$110,000.00	$110,000
6" PVC SDR21 San. Force Main	LF	1000						$45.60	$45,600
						Total			$155,600

Notes:

1. Trenching & bedding costs assume preliminary design layout and is subject to change.
2. Pump Station may be required depending on bldg. sewer laterals and invert elevations. The cost for pump station assumes preliminary design variables; gravity sewer cost will be reduced depending on design.
3. Material, Labor and Equipment Costs from 2009 RS Means