MEMORANDUM

CSO 029 Approach Analysis

PREPARED FOR:	Tom Rhoads, Adam Woodburn, Nick Capozza/OCDWEP
PREPARED BY:	CH2M
DATE:	December 16, 2016
REVISION NO.:	3

Background

The CSO 029 sewershed is primarily within the Armory Square district in the City of Syracuse, and is 98% impervious (Figure 1, red boundary). Walton Street, and portions of Franklin, and Clinton Streets are within the CSO boundary and numerous subsurface utilities are present. Furthermore, all but four of the buildings within the CSO basin have separated storm and sanitary laterals, either within or outside the building (Attachment A). The County's Stormwater Management Model (SWMM) indicates that CSO 029 activates at rainfall intensities as low as 0.1 in/hr.

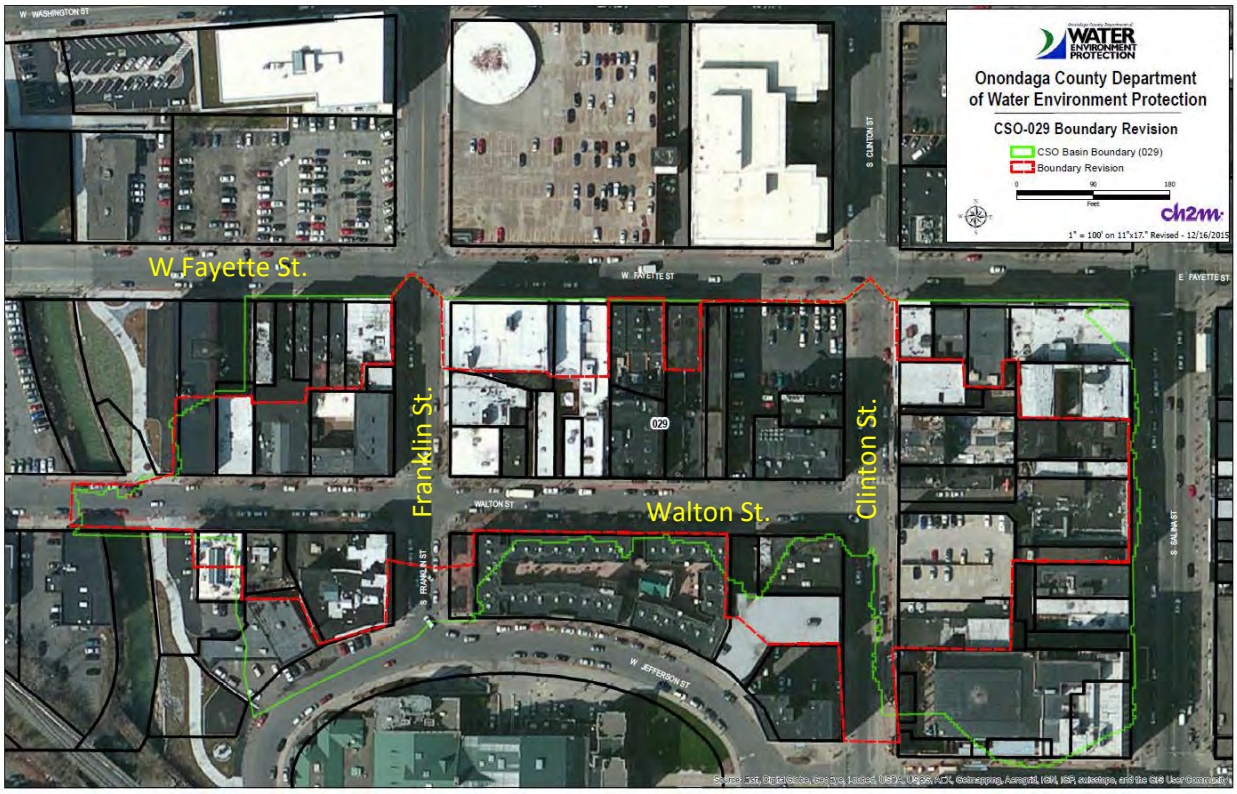


Figure 1: CSO 029 Boundary Map (green represents the previous boundary, red represents the current one based on newer information regarding building and street drainage)

Due to the makeup of this area of the city and complexities with existing utilities and vaults (known and unknown), traditional green infrastructure approaches are unlikely to be sufficient for this CSO.

Existing Utilities

CH2M utilized Fisher Associates to obtain a field survey of existing utilities within CSO 029. Fisher and CH2M contacted the respective utility owners for record plans, and also used field UFPO mark outs to complete the survey. CH2M exported the CAD of the survey file into the GIS basemap in Attachment B. Note that the storm, sanitary, and combined sewer lateral locations are approximate; the exact locations of these were not able to be identified in this preliminary analysis.

Alternatives

Two sewer separation alternatives and one alternative conveying combined storm and sanitary flow to the Clinton Storage Facility (CSF) were considered in this analysis. The drainage area for each alternative is shown on the maps in Attachment C. Both sewer separation alternatives (A and B) include separating all of Walton Street, Franklin Street, and Clinton Street within CSO 029 and all of the buildings within CSO 029 that have separate storm laterals (inside or outside buildings). The combined sewer approach (alternative C) includes replacing portions of the combined sewer to redirect the CSO 029 overflow from Onondaga Creek to the CSF. The ultimate outfall from the proposed separate storm sewer varies in each alternative as follows.

- Alternative A: Utilize the existing CSO 029 outfall to Onondaga Creek for the new separate storm sewer.
- Alternative B: Extend the separate storm sewer around western half of Jefferson Street Circle and utilize the existing 48-inch casing beneath the railroad tracks to tie the outfall from the storm sewer into one of the chambers of the Clinton Storage Facility.

Utilizing the survey locations of known utilities, CH2M prepared a concept map for each alternative (Attachment D). The new storm sewer for the sewer separation alternatives (A and B) is proposed to be located on the south side of Walton Street between the existing combined sewer and the water main. This locates the storm sewer away from the potentially large electrical duct bank on the north side of the street. Similarly, the storm sewers on Franklin and Clinton Streets are proposed to be located between the combined sewers and adjacent electrical duct banks. Additional information on the size of these duct banks is required to confirm the exact location of the storm sewers. It was assumed that each of the separate storm laterals could be connected to the proposed storm sewer; however, this assumption will need to be confirmed as part of subsequent work.

Alternative C includes a new combined sewer on the west block of Walton Street to convey flow towards the MIS instead of towards Onondaga Creek (current conditions). A new regulator is proposed in the Franklin/Walton intersection to connect the existing combined sewers on the east block of Walton Street, north block of Franklin Street, and Clinton Street to the new combined sewer on the west block of Walton Street and the MIS. The regulator would also direct overflows to the CSF via a new 40-inch combined sewer on Jefferson Circle and include a backflow preventer to prevent the MIS from relieving itself during high flow periods.

Sewer Improvements

The following sewer improvements are proposed in each alternative. These improvements are shown in the concept maps in Attachment D. The sizes of the pipes below are based on preliminary calculations – these will need to be refined/confirmed during design.

1) New 30-inch combined sewer with direct connection to the MIS for 028 flows and elimination of 028/029 interconnection (All alternatives)

    a) Previously, 028 flows combined with 029 flows on the east side of the Walton Street, Onondaga Creek Bridge in a 12-inch pipe that then connected to the MIS. Due to the elevations of these

connections, flows from 028 discharged out the 029 outfall during times of high flow, and the MIS utilized the 028/029 combined sewer and 029 outfall as a high flow relief point. Consequently, this interconnection provided a hydraulic restriction that prevented flow from 029 from reaching the MIS, thus increasing volume and frequency of overflows. The new combined sewer will improve these sewer hydraulics substantially.

2) Direct connection to MIS for 029 combined sewer east of Franklin Street (All alternatives)

   a) Presently, the 029 combined sewer on the east block of Walton Street (28 x 42-inch rectilinear), which also receives the combined flow from Clinton Street and the north block of Franklin Street, crosses over the MIS and continues westward before making a 180-degree turn and combining with the 028 sewer. The combined sewer is proposed to remain in place on the east block of Walton Street to manage sanitary flow and flow from the remaining combined buildings; however, to improve the sewer hydraulics, a direct connection is proposed to the MIS at the former crossover point with a new manhole.

3) New 12-inch sanitary sewer for west block of Walton Street and removal of return sewer (Alternatives A and B only)

   a) Currently, there is a combined sewer and return sewer on the west block of Walton Street to manage both combined and storm flow. The proposed storm sewer will manage all of the catch basin and building laterals on this block and, with the sewer improvements listed in Items 1 and 2 above, both the combined sewer and return sewer are no longer necessary. To manage sanitary flow from each of the buildings, a new sanitary sewer and direct connection to the MIS is proposed.

Partial Sewer Separation Options

In the event of funding restrictions or other constraints, CH2M developed partial sewer separation options for alternatives A and B above, as follows. Drainage area maps for these options are included in Attachment E and concept maps are included in Attachment F.

- Option 1:
  - Separation of the west block of Walton Street and north block of Franklin Street with a new storm sewer that would capture runoff from street catch basins and separate storm laterals from buildings. In both alternatives, a new outfall from the proposed separate storm sewer to Onondaga Creek would be required as the 029 outfall would remain in service.
  - Elimination of the 028/029 interconnection and addition of a 30-inch combined sewer with direct connection to the MIS for 028 flows in the same manner as described in sewer improvement item 1 above.
  - Direct connection of the 029 combined sewer on the east block of Walton Street as described in sewer improvement item 2 above with the addition of an overflow weir and overflow connection to the existing 029 outfall.
  - A new sanitary sewer for the west block of Walton Street with direct connection to the MIS as described in sewer improvement item 3 above.
- Option 2:
  - Same as Option 1, however, the separate storm sewer drainage area would be increased to include all of Walton Street and the north block of Franklin Street, but exclude all of Clinton Street.

Potential Additional Utility Work

The east block Walton Street combined sewer which would remain was built in 1855. Potentially lining, parging, or replacement of the sewer during the course of this work may be considered. The exact age of the remaining Franklin and Clinton Street combined sewers is unknown, but they date to the early 1900's and may also be considered for lining or replacement.

The water mains on Walton, Franklin, and Clinton Streets also date to the early 1900's and have been subject to multiple breaks in recent years. Replacement of these water mains in conjunction with the sewer separation work would limit repeated disturbance and inconvenience to business owners in this area.

The gas mains in this area are plastic inserted inside early 1900's cast iron mains. National Grid has no current plans for any work in this area, but if relocations of mains are required for the proposed sewer separation, they would be willing to relocate as necessary.

SWMM Model Results

CH2M input each alternative and partial sewer separation option into the County's combined sewer system SWMM model (draft 2016 conditions) and ran the model for the 1991 typical year. Results for CSO Discharge Volume for the CSOs impacted by the proposed separation are provided in Table 1. The number of CSO discharge events under each scenario is provided in Table 2. CSOs not impacted by the proposed separation alternatives are not listed. The alternative letters and partial separation numbers correspond to the descriptions above. Note that the base conditions draft 2016 model is a work in-progress that will be updated with 2016 green and gray projects, boundary changes, calibration, etc. Inputs, parameters, and other SWMM information from this model input are included in Attachment G.

Table 1: Total CSO Discharge Volume (MG, 1991 Typical Year)

CSO Outfall Number	**Base Conditions**	**Alternatives**			**Partial Separation Options**			
	Draft 2016 Model	A	B	C	A1	B1	A2	B2
020	23.2	23.3	23.3	23.3	23.3	23.3	23.3	23.3
021	45.0	45.8	45.9	46.0	45.5	45.6	45.5	45.6
027	17.7	18.0	18.0	18.0	17.9	17.9	17.9	17.9
028	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
029	9.0	0.0	0.0	0.0	3.3	3.4	2.7	2.8
CSF#	53.6	54.4	56.7	54.9	54.6	54.7	54.5	55.2
073A	2.4	2.5	2.5	2.4	2.5	2.5	2.5	2.5
080	1.2	1.4	1.4	1.4	1.3	1.3	1.3	1.3
Total – All CSOs	**227.2**	**220.3**	**222.6**	**221.0**	**223.3**	**223.6**	**222.6**	**223.5**
Total CSO Reduction Compared to 2016 Base Conditions	**N/A**	**6.9**	**4.6**	**6.2**	**3.9**	**3.7**	**4.6**	**3.7**

[#] CSF = Clinton Storage Facility

Table 2: CSO Discharge Events (1991 Typical Year)

CSO Outfall Number	Base Conditions	Alternatives			Partial Separation Options			
	Draft 2016 Model	A	B	C	A1	B1	A2	B2
020	22	22	22	22	22	22	22	22
021	37	37	37	37	37	37	37	37
027	28	28	28	28	28	28	28	28
028	8	6	6	6	6	6	6	6
029	42	0	0	0	28	28	28	28
CSF[#]	11	11	11	11	11	11	11	11
073A	8	8	7	7	8	7	8	8
080	4	4	4	4	4	4	4	4

[#] CSF = Clinton Storage Facility

The following conclusions can be drawn from Tables 1 and 2:

- The alternatives and partial separation options for 029 provide significant CSO discharge reductions, which are seen primarily in CSOs 029 and 028 as well as reduced total CSO volumes in aggregate.
- Conveying the proposed Walton Street separate storm sewer to Onondaga Creek (Alternative A) provides greater CSO benefit than conveying it to the CSF (Alternative B). There are increases in total CSO discharge volume from the Clinton Storage Facility in alternative B while not providing increased capacity in the MIS for downstream CSOs. This is not surprising as only a small additional drainage area would be ultimately removed from the MIS under alternative B. However, despite the increase in CSO discharge volume, the number of discharge events from the CSF does not change.
- Conveying the combined storm and sanitary overflow from Walton Street to the CSF (Alternative C) increases its total discharge volume slightly more than in Alternative A, but does not increase the number of discharge events from the CSF. While the aggregate CSO reduction for Alternative C is approximately 10% less than Alternative B, the cost should be significantly less as it does not require the storm to be separated and does not require a detailed, long-term investigation by WEP to confirm the possibility of any cross connections.
- The hydraulic improvements of the new dedicated combined sewer and direct connection to the MIS for CSO 028 alone provide 300,000 gallons (0.3 MG) of CSO reduction benefit and a reduction in number of events from 8 to 6 for CSO 028.
- By improving the existing 028/029 connection to the MIS and removing the unintended high flow relief point for the MIS, the hydraulic grade line of the MIS is increased. This in turn causes slightly increased CSO discharge volumes for the downstream CSOs connecting to the MIS (020, 021, 027, 073A, 080) and the Clinton Storage Facility upstream of the connection point. The slight increases in volume do not, however, result in a greater frequency of discharge events from these CSOs.
- The partial separation options for CSO 029 provide a CSO discharge volume reduction, however CSO discharge remains at a significant frequency (42 annual events down to 28). Additional CSO abatement practices would be necessary to decrease the number of discharge events to 4 or less if partial separation were to occur.

Cost Estimates

CH2M completed a Class 5 Association for the Advancement of Cost Engineering International (AACEI) estimate for each alternative. The estimated cost and low (-20%) and high (+50%) ranges are provided in Table 3. Costs for water main replacement and repair of the sewer on the east block of Walton Street are included as separate line items from the main project cost. Detailed breakdowns of each estimate are available in the basis of estimate included in Attachment H.

Table 3: Cost Estimates for Each Alternative

Alternative	Low Range (-20%)	Estimated Cost	High Range (+50%)
A – Main Project	$4,282,400	**$5,353,000**	$8,029,500
A – Water Main Replacement	$733,600	**$917,000**	$1,375,500
A – Sewer Repair	$681,600	**$852,000**	$1,278,000
B – Main Project	$4,823,000	**$6,029,000**	$9,043,500
B – Water Main Replacement	$822,400	**$1,028,000**	$1,542,000
B – Sewer Repair	$681,600	**$852,000**	$1,278,000
C – Main Project	$2,714,400	**$3,393,000**	$5,089,500
C – Water Main Replacement	$473,600	**$592,000**	$888,000
C – Sewer Repair	$681,600	**$852,000**	$1,278,000

Recommendations

CH2M recommends proceeding with Alternative C for conveying combined overflow from CSO 029 to the CSF. Although the discharge volumes from the CSF increase compared to Alternative A (discharging separate storm flow to Onondaga Creek), the total number of discharge events does not change under this scenario. The cost estimate for Alternative C is also approximately $2 million less than A. Additionally, if Alternative A were selected, as a sewer separation project, the NYSDEC would require WEP to conduct a two year monitoring period to confirm no sanitary cross connections exist. This would be an additional substantial cost and effort in addition to the capital cost for the project.

Next Steps

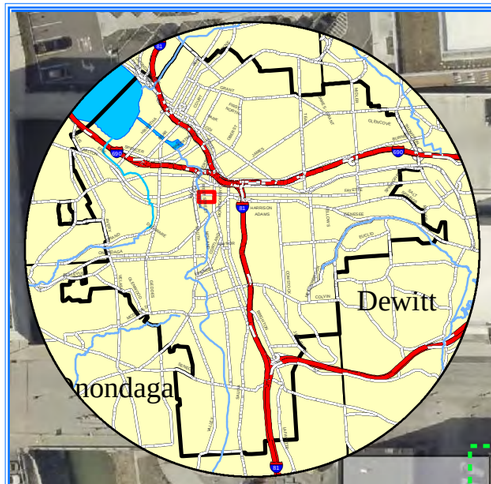
CH2M recommends the following approach moving forward:

- Discuss the potential additional work with the City and determine if the City is interested in partnering with the County for addressing any of these items.
- Investigate grant funding options for the project.
- Work with property owners, OCDWEP, and the City to identify exact locations and depths of building storm and sanitary laterals as required to construct the project.
- Utilizing obtained information proceed to 30% design with CAD drawings.

Attachment A – CSO 029 Building Laterals

DRAFT

Onondaga County Wastewater Infrastructure
Combined Sewage Overflow 029 Area



329 FAYETTE ST W TO WALTON ST
216 WALTON
321 FAYETTE
storm
san
317 FAYETTE
313 FAYETTE
311 FAYETTE
301-07 FAYETTE & FRANKLIN
308-10 FRANKLIN
212-14 WALTON TO FAYETTE
200 WALTON ST & FRANKLIN ST S
storm
san
247-59 FAYETTE ST W & FRANKLIN S
storm
239-45 FAYETTE TO WALTON
229-37 FAYETTE ST W
219-25 FAYETTE TO WALTON
215 FAYETTE TO WALTON
201-13 FAYETTE ST W & CLINTON ST
309-15 FRANKLIN ST S
134 1/2 WALTON
134 WALTON
317-21 FRANKLIN WALTON
136 WALTON
130 WALTON
120-24 WALTON ST
316 CLINTON
318-22 CLINTON & WALTON
121-29 FAYETTE & CLINTON
302-10 SALINA ST S & FAYETTE ST
307-13 CLINTON ST S
313 1/2 CLINTON
315-19 CLINTON ST S
320-24 SALINA ST S
326 SALINA ST S
321-25 CLINTON ST S
351 CLINTON ST S
332 SALINA ST S
401 CLINTON ST S
San
407 CLINTON REAR
338-46 SALINA
348-52 SALINA
358 SALINA
415-17 CLINTON ST S
362-64 SALINA ST S TO JEFFERSON
Storm
215 WALTON
Storm
402 FRANKLIN ST S & JEFFERSON
308-10 JEFFERSON ST W
298 JEFFERSON & FRANKLIN
400 CLINTON & WALTON
410-14 CLINTON TO WALTON
SOCPA

Sanitary Sewer
Combined Sewer
County Trunk Sewer
Force Main
Combined
Sep. Inside Bldg.
Sep. Outside Bldg.

0 0.0075 0.015 0.03 Miles

Onondaga County Water Environment Protection
7120 Henry Clay Boulevard, Liverpool NY 13088
P. 315-435-5402

S:\GIS WEP (Flow Control)\1.0 MXDs\6.0 MS4\CSO029_11_17_landscape.mxd

THIS MAP INTENDED FOR GENERAL PLANNING PURPOSES ONLY

Created : 8/17/2015 by : dsmhenn

Attachment B – CSO 029 Existing Utility Map

Onondaga County Department of WATER ENVIRONMENT PROTECTION

Onondaga County Department of Water Environment Protection CSO 029 Existing Utilities

- Electrical Manhole
- Sewer Manhole
- Existing Catch Basin
- Possible Vaults
- Combined Sewer
- Sanitary Sewer
- Storm Sewer
- Trunk Sewer
- Underground Electric
- Secondary Underground Electric
- Gas Main
- Water Main
- Fire Hydrant
- Electrical Vault
- CSO Sewersheds

N W E S

150 Feet

Note: Building lateral locations are approximate.

ch2m

Revised 11/14/2016

027
028
029
030
031
W FAYETTE ST
WALTON ST
W JEFFERSON ST
S CLINTON ST
S FRANKLIN ST
18-in Trunk
36-in Trunk
66-in Trunk
12-in Storm
10-in Sanitary
66-in Trunk
12-in Combined
8-in Combined
6-in Trunk
8-in Trunk
12-in Trunk
36-in Combined
12-in Combined
8-in Storm
28-in Combined
66-in Trunk
12-in Storm
8-in Storm
10-in Storm
12-in Storm
12-in Combined
12-in Storm
8-in Storm
18-in Combined
24-in Trunk
8-in Trunk
6-in Trunk
18-in Sanitary
24-in Combined
64-in Trunk
58-in Trunk

Attachment C – Alternative Drainage Area Maps

Onondaga County Department of
WATER ENVIRONMENT PROTECTION

Onondaga County Department of Water Environment Protection Walton Street Sewer Separation Alternative A Drainage Area

CSO Sewershed

Drainage Area

ch2m

Revised 11/14/2016

N
W E
S

150
Feet

027

028

029

030

031

W FAYETTE ST

S CLINTON ST

WALTON ST

S FRANKLIN ST

W JEFFERSON ST

Onondaga County Department of
WATER ENVIRONMENT PROTECTION

Onondaga County Department of Water Environment Protection Walton Street Sewer Separation Alternative B Drainage Area

CSO Sewershed

Drainage Area

ch2m:

Revised 11/14/2016

N
W E
S

150
Feet

027

028

029

030

031

W FAYETTE ST

S FRANKLIN ST

WALTON ST

W JEFFERSON ST

S CLINTON ST

Onondaga County Department of
Water Environment Protection
Walton Street Sewer Separation
Alternative C Drainage Area

CSO Sewershed
Drainage Area

Revised 11/21/2016

N
W E
S
150
Feet

027
028
029
030
031

W FAYETTE ST
S FRANKLIN ST
WALTON ST
W JEFFERSON ST
S CLINTON ST

Attachment D – Alternative Concept Maps

Onondaga County Department of Water Environment Protection Walton Street Sewer Separation Alternative A with Existing Utilities

Onondaga County Department of WATER ENVIRONMENT PROTECTION

- Sewer Manhole
- Existing Catch Basin

Sewer Type

- Combined
- Private
- Sanitary
- Existing Storm
- Trunk
- Proposed Separate Storm Sewer
- Possible Vaults
- Gas Main
- Water Main
- Fire Hydrant
- Electrical Vault
- CSO Sewershed

N W E S

150 Feet

NOTE: GAS AND ELECTRIC UTILITIES NOT SHOWN FOR CLARITY.

ch2m:

Revised 11/14/2016

PROPOSED STORM SEWER; UTILIZE EXISTING CSO 029 OUTFALL

NEW DEDICATED 30" PIPE FOR CSO 028 COMBINED SEWER CONNECTION TO MIS

028 OUTFALL

029 OUTFALL

028 COMBINED SEWER

NEW 12" SANITARY SEWER WITH DIRECT CONNECTION TO MIS FOR WEST BLOCK OF WALTON STREET

DIRECT CONNECTION TO MIS OF EXISTING COMBINED SEWER FOR EAST BLOCK OF WALTON, CLINTON, AND FRANKLIN

68-in Trunk
12-in Storm
10-in Sanitary
18-in Trunk
36-in Trunk
68-in Trunk
S FRANKLIN ST
027
10-in Sanitary
12-in Storm
W FAYETTE ST
S CLINTON ST
12-in Combined
30-in Combined
12-in Sanitary
28-in Combined
WALTON ST
12-in Combined
028
029
036-in Trunk
W JEFFERSON ST
18-in Combined
030
24-in Trunk
64-in Trunk
031
8-in Trunk
6-in Trunk
58-in Trunk

Onondaga County Department of Water Environment Protection Walton Street Sewer Separation Alternative B with Existing Utilities

Onondaga County Department of WATER ENVIRONMENT PROTECTION

- Sewer Manhole
- Existing Catch Basin

SEWER_TYPE

- Combined
- Private
- Sanitary
- Storm
- Trunk
- Proposed Separate Storm Sewer Alternate B
- Possible Vaults
- Gas Main
- Water Main
- Fire Hydrant
- Electrical Vault
- CSO Sewershed

N W E S

150 Feet

NOTE: GAS AND ELECTRIC UTILITIES NOT SHOWN FOR CLARITY.

ch2m:

Revised 11/14/2016

027

W FAYETTE ST

S FRANKLIN ST

S CLINTON ST

WALTON ST

W JEFFERSON ST

029

028

030

031

NEW DEDICATED 30" PIPE FOR CSO 028 COMBINED SEWER CONNECTION TO MIS

028 OUTFALL

028 COMBINED SEWER

NEW 12" SANITARY SEWER WITH DIRECT CONNECTION TO MIS FOR WEST BLOCK OF WALTON STREET

DIRECT CONNECTION TO MIS OF EXISTING COMBINED SEWER FOR EAST BLOCK OF WALTON, CLINTON, AND FRANKLIN

NEW STORM SEWER, UTILIZE EXISTING 48" CASING UNDER RAILROAD AND TIE INTO CLINTON STORAGE FACILITY STORAGE CHAMBERS

Onondaga County Department of WATER ENVIRONMENT PROTECTION

Onondaga County Department of Water Environment Protection Walton Street Sewer Separation Alternative C with Existing Utilities

- Sewer Manhole
- Existing Catch Basin
- Proposed Combined Sewer

SEWER_TYPE

- Combined
- Private
- Sanitary
- Storm
- Trunk
- Possible Vaults
- Gas Main
- Water Main
- Fire Hydrant
- Electrical Vault

N W E S

150 Feet

NOTE: GAS AND ELECTRIC UTILITIES NOT SHOWN FOR CLARITY.

ch2m:

Revised 11/21/2016

NEW DEDICATED 30" PIPE FOR CSO 028 COMBINED SEWER CONNECTION TO MIS

CLOSE CSO 029 OUTFALL

NEW REGULATOR AT 029/MIS CONNECTION. OVERFLOW ROUTED TO CLINTON STORAGE FACILITY AS SHOWN

028 OUTFALL

028 COMBINED SEWER

NEW COMBINED SEWER FOR WEST BLOCK OF WALTON ST TO FLOW EASTWARD

NEW 40" COMBINED OUTFALL TO CLINTON STORAGE FACILITY

W FAYETTE ST

WALTON ST

S FRANKLIN ST

W JEFFERSON ST

S CLINTON ST

W JEFFERSON ST

Attachment E – Partial Separation Drainage Area Maps

Onondaga County Department of
WATER ENVIRONMENT PROTECTION

Onondaga County Department of Water Environment Protection
Walton Street Sewer Separation
Partial Sewer Separation
Option A1 Drainage Area

CSO Sewershed

Drainage Area

ch2m

Revised 11/14/2016

N
W E
S

150
Feet

027

028

029

030

031

W FAYETTE ST

S CLINTON ST

WALTON ST

W JEFFERSON ST

S FRANKLIN ST

Onondaga County Department of Water Environment Protection

Onondaga County Department of Water Environment Protection
Walton Street Sewer Separation
Partial Sewer Separation
Option A2 Drainage Area

CSO Sewershed

Drainage Area

ch2m:

Revised 11/14/2016

N

W E

S

150

Feet

027

028

029

030

031

W FAYETTE ST

S CLINTON ST

WALTON ST

S FRANKLIN ST

W JEFFERSON ST

Onondaga County Department of
WATER ENVIRONMENT PROTECTION

Onondaga County Department of Water Environment Protection
Walton Street Sewer Separation
Partial Sewer Separation
Option B1 Drainage Area

CSO Sewershed

Drainage Area

ch2m:

Revised 11/14/2016

N
W E
S

150
Feet

027

028

029

030

031

W FAYETTE ST

S FRANKLIN ST

S CLINTON ST

WALTON ST

W JEFFERSON ST

Onondaga County Department of Water Environment Protection

Onondaga County Department of Water Environment Protection
Walton Street Sewer Separation
Partial Sewer Separation
Option B2 Drainage Area

CSO Sewershed

Drainage Area

ch2m:

Revised 11/14/2016

N W E S

150 Feet

027

028

029

030

031

W FAYETTE ST

S FRANKLIN ST

S CLINTON ST

WALTON ST

W JEFFERSON ST

Attachment F –Partial Separation Concept Maps

Onondaga County Department of Water Environment Protection

Onondaga County Department of Water Environment Protection
Walton Street Sewer Separation
Partial Sewer Separation
Option A1 with Existing Utilities

- Sewer Manhole
- Existing Catch Basin
- Proposed Storm Sewer Outfall

SEWER_TYPE

- Combined
- Private
- Sanitary
- Storm
- Trunk
- Proposed Separate Storm Sewer
- Possible Vaults
- Gas Main
- Water Main
- Fire Hydrant
- Electrical Vault

N W E S

NOTE: GAS AND ELECTRIC UTILITIES NOT SHOWN FOR CLARITY.

150
Feet

ch2m:

Revised 11/14/2016

PROPOSED STORM SEWER; UTILIZE NEW SEPARATE STORM SEWER OUTFALL

NEW DEDICATED 30" PIPE FOR CSO 028 COMBINED SEWER CONNECTION TO MIS

029 OUTFALL

NEW SEPARATE STORM SEWER OUTFALL

028 OUTFALL

028 COMBINED SEWER

NEW 12" SANITARY SEWER WITH DIRECT CONNECTION TO MIS FOR WEST BLOCK OF WALTON STREET

DIRECT CONNECTION TO MIS OF EXISTING COMBINED SEWER FOR EAST BLOCK OF WALTON, CLINTON, AND FRANKLIN WITH WITH OVERFLOW WEIR CONVEYING OVERFLOW TO THE 029 OUTFALL

S FRANKLIN ST

W FAYETTE ST

S CLINTON ST

WALTON ST

W JEFFERSON ST

Onondaga County Department of Water Environment Protection Walton Street Sewer Separation Partial Sewer Separation Option A2 with Existing Utilities

Onondaga County Department of WATER ENVIRONMENT PROTECTION

- Sewer Manhole
- Existing Catch Basin
- Proposed Storm Sewer Outfall

SEWER_TYPE

- Combined
- Private
- Sanitary
- Storm
- Trunk
- Proposed Separate Storm Sewer
- Possible Vaults
- Gas Main
- Water Main
- Fire Hydrant
- Electrical Vault

N W E S

150 Feet

NOTE: GAS AND ELECTRIC UTILITIES NOT SHOWN FOR CLARITY.

ch2m

Revised 11/14/2016

PROPOSED STORM SEWER; UTILIZE NEW SEPARATE STORM OUTFALL

NEW DEDICATED 30" PIPE FOR CSO 028 COMBINED SEWER CONNECTION TO MIS

029 OUTFALL

NEW SEPARATE STORM SEWER OUTFALL

028 OUTFALL

028 COMBINED SEWER

NEW 12" SANITARY SEWER WITH DIRECT CONNECTION TO MIS FOR WEST BLOCK OF WALTON STREET

DIRECT CONNECTION TO MIS OF EXISTING COMBINED SEWER FOR EAST BLOCK OF WALTON, CLINTON, AND FRANKLIN WITH WITH OVERFLOW WEIR CONVEYING OVERFLOW TO THE 029 OUTFALL

S FRANKLIN ST

W FAYETTE ST

S CLINTON ST

WALTON ST

W JEFFERSON ST

W JEFFERSON ST

Onondaga County Department of WATER ENVIRONMENT PROTECTION

Onondaga County Department of Water Environment Protection
Walton Street Sewer Separation
Partial Sewer Separation
Option B1 with Existing Utilities

- Sewer Manhole
- Existing Catch Basin
- Proposed Storm Sewer Outfall

N
W E
S

150
Feet

SEWER_TYPE
- Combined
- Private
- Sanitary
- Storm
- Trunk
- Proposed Separate Storm Sewer
- Possible Vaults
- Gas Main
- Water Main
- Fire Hydrant
- Electrical Vault

NOTE: GAS AND ELECTRIC UTILITIES NOT SHOWN FOR CLARITY.

ch2m:

Revised 11/14/2016

PROPOSED STORM SEWER

NEW DEDICATED 30" PIPE FOR CSO 028 COMBINED SEWER CONNECTION TO MIS

029 OUTFALL

NEW SEPARATE STORM SEWER OUTFALL

028 OUTFALL

028 COMBINED SEWER

NEW 12" SANITARY SEWER WITH DIRECT CONNECTION TO MIS FOR WEST BLOCK OF WALTON STREET

DIRECT CONNECTION TO MIS OF EXISTING COMBINED SEWER FOR EAST BLOCK OF WALTON, CLINTON, AND FRANKLIN WITH WITH OVERFLOW WEIR CONVEYING OVERFLOW TO THE 029 OUTFALL

OUTFALL TO CLINTON STORAGE FACILITY

S FRANKLIN ST

W FAYETTE ST

S CLINTON ST

WALTON ST

W JEFFERSON ST

Onondaga County Department of Water Environment Protection

Onondaga County Department of Water Environment Protection

Walton Street Sewer Separation Option B2 with Existing Utilities

- Sewer Manhole
- Existing Catch Basin
- Proposed Storm Sewer Outfall

SEWER_TYPE

- Combined
- Private
- Sanitary
- Storm
- Trunk
- Proposed Separate Storm Sewer
- Possible Vaults
- Gas Main
- Water Main
- Fire Hydrant
- Electrical Vault

N W E S

150 Feet

NOTE: GAS AND ELECTRIC UTILITIES NOT SHOWN FOR CLARITY.

ch2m:

Revised 11/14/2016

PROPOSED STORM SEWER

NEW DEDICATED 30" PIPE FOR CSO 028 COMBINED SEWER CONNECTION TO MIS

029 OUTFALL

NEW SEPARATE STORM SEWER OUTFALL

028 OUTFALL

028 COMBINED SEWER

NEW 12" SANITARY SEWER WITH DIRECT CONNECTION TO MIS FOR WEST BLOCK OF WALTON STREET

DIRECT CONNECTION TO MIS OF EXISTING COMBINED SEWER FOR EAST BLOCK OF WALTON, CLINTON, AND FRANKLIN WITH WITH OVERFLOW WEIR CONVEYING OVERFLOW TO THE 029 OUTFALL

OUTFALL TO CLINTON STORAGE FACILITY

S FRANKLIN ST

S CLINTON ST

W FAYETTE ST

WALTON ST

W JEFFERSON ST

Attachment G – SWMM Model Inputs

CSO 029 Approach Analysis
SWMM Weir Inputs

Existing Conditions													
Name	**Inlet Node**	**Outlet Node**	**Tag**	**Type**	**Height (ft)**	**Length (ft)**	**Side Slope (ft/ft)**	**Inlet Offset (ft)**	**Discharge Coeff. (CFS)**	**Flap Gate**	**End Contractions**	**End Coeff. (CFS)**	**Can Surcharge**
028_weir	28	OnCrk_031	GateAdded	TRANSVERSE	10	2.83	0	1.63	3.3	YES	0	0	YES
029_Weir	29	165		TRANSVERSE	10	3	0	1.66	3.3	NO	0	0	YES
030_weir	30	167		TRANSVERSE	10	5.5	0	4.83	3.3	NO	0	0	YES
CSF_Overflow	Clinton_West	OnCrk_035		SIDEFLOW	2	36	0	28	3.3	YES	0	0	YES

Alternative A													
Name	**Inlet Node**	**Outlet Node**	**Tag**	**Type**	**Height (ft)**	**Length (ft)**	**Side Slope (ft/ft)**	**Inlet Offset (ft)**	**Discharge Coeff. (CFS)**	**Flap Gate**	**End Contractions**	**End Coeff. (CFS)**	**Can Surcharge**
028_weir	28	OnCrk_031	GateAdded	TRANSVERSE	10	2.83	0	1.63	3.3	YES	0	0	YES
030_weir	30	167		TRANSVERSE	10	5.5	0	4.83	3.3	NO	0	0	YES
CSF_Overflow	Clinton_West	OnCrk_035		SIDEFLOW	2	36	0	28	3.3	YES	0	0	YES

Alternative B													
Name	**Inlet Node**	**Outlet Node**	**Tag**	**Type**	**Height (ft)**	**Length (ft)**	**Side Slope (ft/ft)**	**Inlet Offset (ft)**	**Discharge Coeff. (CFS)**	**Flap Gate**	**End Contractions**	**End Coeff. (CFS)**	**Can Surcharge**
028_weir	28	OnCrk_031	GateAdded	TRANSVERSE	10	2.83	0	1.63	3.3	YES	0	0	YES
030_weir	30	167		TRANSVERSE	10	5.5	0	4.83	3.3	NO	0	0	YES
CSF_Overflow	Clinton_West	OnCrk_035		SIDEFLOW	2	36	0	28	3.3	YES	0	0	YES

Alternative C													
Name	**Inlet Node**	**Outlet Node**	**Tag**	**Type**	**Height (ft)**	**Length (ft)**	**Side Slope (ft/ft)**	**Inlet Offset (ft)**	**Discharge Coeff. (CFS)**	**Flap Gate**	**End Contractions**	**End Coeff. (CFS)**	**Can Surcharge**
028_weir	28	OnCrk_031	GateAdded	TRANSVERSE	10	2.83	0	1.63	3.3	YES	0	0	YES
030_weir	30	167		TRANSVERSE	10	5.5	0	4.83	3.3	NO	0	0	YES
CSF_Overflow	Clinton_West	OnCrk_035		SIDEFLOW	2	36	0	28	3.3	YES	0	0	YES

Partial Separation Option A1													
Name	**Inlet Node**	**Outlet Node**	**Tag**	**Type**	**Height (ft)**	**Length (ft)**	**Side Slope (ft/ft)**	**Inlet Offset (ft)**	**Discharge Coeff. (CFS)**	**Flap Gate**	**End Contractions**	**End Coeff. (CFS)**	**Can Surcharge**
028_weir	28	OnCrk_031	GateAdded	TRANSVERSE	10	2.83	0	1.63	3.3	YES	0	0	YES
029_Weir	29	165		TRANSVERSE	10	3	0	1.66	3.3	NO	0	0	YES
030_weir	30	167		TRANSVERSE	10	5.5	0	4.83	3.3	NO	0	0	YES
CSF_Overflow	Clinton_West	OnCrk_035		SIDEFLOW	2	36	0	28	3.3	YES	0	0	YES

Partial Separation Option B1													
Name	**Inlet Node**	**Outlet Node**	**Tag**	**Type**	**Height (ft)**	**Length (ft)**	**Side Slope (ft/ft)**	**Inlet Offset (ft)**	**Discharge Coeff. (CFS)**	**Flap Gate**	**End Contractions**	**End Coeff. (CFS)**	**Can Surcharge**
028_weir	28	OnCrk_031	GateAdded	TRANSVERSE	10	2.83	0	1.63	3.3	YES	0	0	YES
029_Weir	29	165		TRANSVERSE	10	3	0	1.66	3.3	NO	0	0	YES
030_weir	30	167		TRANSVERSE	10	5.5	0	4.83	3.3	NO	0	0	YES
CSF_Overflow	Clinton_West	OnCrk_035		SIDEFLOW	2	36	0	28	3.3	YES	0	0	YES

Partial Separation Option A2													
Name	**Inlet Node**	**Outlet Node**	**Tag**	**Type**	**Height (ft)**	**Length (ft)**	**Side Slope (ft/ft)**	**Inlet Offset (ft)**	**Discharge Coeff. (CFS)**	**Flap Gate**	**End Contractions**	**End Coeff. (CFS)**	**Can Surcharge**
028_weir	28	OnCrk_031	GateAdded	TRANSVERSE	10	2.83	0	1.63	3.3	YES	0	0	YES
029_Weir	29	165		TRANSVERSE	10	3	0	1.66	3.3	NO	0	0	YES
030_weir	30	167		TRANSVERSE	10	5.5	0	4.83	3.3	NO	0	0	YES
CSF_Overflow	Clinton_West	OnCrk_035		SIDEFLOW	2	36	0	28	3.3	YES	0	0	YES

Partial Separation Option B2													
Name	**Inlet Node**	**Outlet Node**	**Tag**	**Type**	**Height (ft)**	**Length (ft)**	**Side Slope (ft/ft)**	**Inlet Offset (ft)**	**Discharge Coeff. (CFS)**	**Flap Gate**	**End Contractions**	**End Coeff. (CFS)**	**Can Surcharge**
028_weir	28	OnCrk_031	GateAdded	TRANSVERSE	10	2.83	0	1.63	3.3	YES	0	0	YES
029_Weir	29	165		TRANSVERSE	10	3	0	1.66	3.3	NO	0	0	YES
030_weir	30	167		TRANSVERSE	10	5.5	0	4.83	3.3	NO	0	0	YES
CSF_Overflow	Clinton_West	OnCrk_035		SIDEFLOW	2	36	0	28	3.3	YES	0	0	YES

CSO 029 Approach Analysis
SWMM Conduit Inputs

Existing Conditions										
Name	**Inlet Node**	**Outlet Node**	**Length (ft)**	**Roughness**	**Inlet Offset (ft)**	**Outlet Offset (ft)**	**Flap Gate**	**Cross-Section**	**Geom1 (ft)**	**Geom2 (ft)**
10718	4796	29	342.565	0.015	0	0.6	NO	HORSESHOE	3	0
114	41	4778	92.675	0.015	0	0.4	NO	CIRCULAR	2.5	0
115	29	4778	50	0.015	0	0.46	NO	CIRCULAR	0.833	0
249	4778	4780	306.54	0.015	0	2.04	NO	CIRCULAR	1	0
2970	4798	4796	482.437	0.015	0	0	NO	HORSESHOE	2.333	0
496	28	41	50	0.015	0	0	NO	CIRCULAR	1	0
552	CSF_W6	28	306.419	0.015	0	0	NO	CIRCULAR	2	0
6300	165	OnCrk_031	50	0.015	0	6.5	YES	CIRCULAR	3	0

Alternative A										
Name	**Inlet Node**	**Outlet Node**	**Length (ft)**	**Roughness**	**Inlet Offset (ft)**	**Outlet Offset (ft)**	**Flap Gate**	**Cross-Section**	**Geom1 (ft)**	**Geom2 (ft)**
028NewToMIS	4778	4780	306.54	0.015	0	2.04	NO	CIRCULAR	2.5	0
029E_comb	4798	4796	482.437	0.015	0	0	NO	HORSESHOE	2.333	0
029EtoMIS	4796	4780	50	0.013	0	1.5	NO	CIRCULAR	2.333	0
029W_DWF	029W_DWF	029WtoMIS	228.45	0.013	0	0	NO	CIRCULAR	1	0
029WtoMIS	029WtoMIS	4780	50	0.013	0	1.5	NO	CIRCULAR	1	0
114	41	4778	92.675	0.015	0	0.4	NO	CIRCULAR	2.5	0
496	28	41	50	0.015	0	0	NO	CIRCULAR	1	0
552	CSF_W6	28	306.419	0.015	0	0	NO	CIRCULAR	2	0

Alternative B										
Name	**Inlet Node**	**Outlet Node**	**Length (ft)**	**Roughness**	**Inlet Offset (ft)**	**Outlet Offset (ft)**	**Flap Gate**	**Cross-Section**	**Geom1 (ft)**	**Geom2 (ft)**
028NewToMIS	4778	4780	306.54	0.015	0	2.04	NO	CIRCULAR	2.5	0
029E_comb	4798	4796	482.437	0.015	0	0	NO	HORSESHOE	2.333	0
029EtoMIS	4796	4780	50	0.013	0	1.5	NO	CIRCULAR	2.333	0
029SepDummyToCSF	029Sep_Load	Clinton_West	1232.92	0.013	0	34	NO	CIRCULAR	1.5	0
029W_DWF	029W_DWF	029WtoMIS	228.45	0.013	0	0	NO	CIRCULAR	1	0
029WtoMIS	029WtoMIS	4780	50	0.013	0	1.5	NO	CIRCULAR	1	0
114	41	4778	92.675	0.015	0	0.4	NO	CIRCULAR	2.5	0
496	28	41	50	0.015	0	0	NO	CIRCULAR	1	0
552	CSF_W6	28	306.419	0.015	0	0	NO	CIRCULAR	2	0

Alternative C										
Name	**Inlet Node**	**Outlet Node**	**Length (ft)**	**Roughness**	**Inlet Offset (ft)**	**Outlet Offset (ft)**	**Flap Gate**	**Cross-Section**	**Geom1 (ft)**	**Geom2 (ft)**
028NewToMIS	028newToMIS	4780	309.79	0.015	0	2.04	NO	CIRCULAR	2.5	0
029EtoMIS	029RegToCSF	4780	50	0.013	0	2	YES	CIRCULAR	2.5	0
029-FranklinDummy	029-Franklin_dummy	029RegToCSF	122.57	0.013	0	0	NO	CIRCULAR	2.5	0
029SepDummyToCSF_1	029RegToCSF	JeffCirToCSF	124.84	0.013	2.5	0	NO	CIRCULAR	3.33	0
029SepDummyToCSF_2	JeffCirToCSF	Clinton_West	691.55	0.013	0	16	NO	CIRCULAR	3.33	0
029WaltonW_dummy	029WaltonW_dummy	029RegToCSF	191.82	0.013	0	0	NO	CIRCULAR	2.5	0
1	4796	029RegToCSF	50	0.013	0	0	NO	HORSESHOE	2.33	0
114	41	028newToMIS	90.29	0.015	0	0.4	NO	CIRCULAR	2.5	0
2970	4798	4796	482.437	0.015	0	0	NO	HORSESHOE	2.333	0
496	28	41	50	0.015	0	0	NO	CIRCULAR	1	0
552	CSF_W6	28	306.419	0.015	0	0	NO	CIRCULAR	2	0

CSO 029 Approach Analysis
SWMM Conduit Inputs

Partial Separation Option A1										
Name	**Inlet Node**	**Outlet Node**	**Length (ft)**	**Roughness**	**Inlet Offset (ft)**	**Outlet Offset (ft)**	**Flap Gate**	**Cross-Section**	**Geom1 (ft)**	**Geom2 (ft)**
028NewToMIS	028newToMIS	4780	309.79	0.015	0	2.04	NO	CIRCULAR	2.5	0
114	41	028newToMIS	90.29	0.015	0	0.4	NO	CIRCULAR	2.5	0
2970	4798	4796	482.437	0.015	0	0	NO	HORSESHOE	2.333	0
496	28	41	50	0.015	0	0	NO	CIRCULAR	1	0
552	CSF_W6	28	306.419	0.015	0	0	NO	CIRCULAR	2	0
029EtoMIS	4796	4780	50	0.013	0	1.5	NO	CIRCULAR	2.333	0
029W_DWF	029W_DWF	029WtoMIS	228.45	0.013	0	0	NO	CIRCULAR	1	0
029WtoMIS	029WtoMIS	4780	50	0.013	0	1.5	NO	CIRCULAR	1	0

Partial Separation Option B1										
Name	**Inlet Node**	**Outlet Node**	**Length (ft)**	**Roughness**	**Inlet Offset (ft)**	**Outlet Offset (ft)**	**Flap Gate**	**Cross-Section**	**Geom1 (ft)**	**Geom2 (ft)**
028NewToMIS	028newToMIS	4780	309.79	0.015	0	2.04	NO	CIRCULAR	2.5	0
029SepDummyToCSF	029Sep_Load	Clinton_West	926.34	0.013	0	34	NO	CIRCULAR	1.5	0
114	41	028newToMIS	90.29	0.015	0	0.4	NO	CIRCULAR	2.5	0
2970	4798	4796	482.437	0.015	0	0	NO	HORSESHOE	2.333	0
496	28	41	50	0.015	0	0	NO	CIRCULAR	1	0
552	CSF_W6	28	306.419	0.015	0	0	NO	CIRCULAR	2	0
029EtoMIS	4796	4780	50	0.013	0	1.5	NO	CIRCULAR	2.333	0
029W_DWF	029W_DWF	029WtoMIS	228.45	0.013	0	0	NO	CIRCULAR	1	0
029WtoMIS	029WtoMIS	4780	50	0.013	0	1.5	NO	CIRCULAR	1	0

Partial Separation Option A2										
Name	**Inlet Node**	**Outlet Node**	**Length (ft)**	**Roughness**	**Inlet Offset (ft)**	**Outlet Offset (ft)**	**Flap Gate**	**Cross-Section**	**Geom1 (ft)**	**Geom2 (ft)**
028NewToMIS	028newToMIS	4780	309.79	0.015	0	2.04	NO	CIRCULAR	2.5	0
114	41	028newToMIS	90.29	0.015	0	0.4	NO	CIRCULAR	2.5	0
2970	4798	4796	482.437	0.015	0	0	NO	HORSESHOE	2.333	0
496	28	41	50	0.015	0	0	NO	CIRCULAR	1	0
552	CSF_W6	28	306.419	0.015	0	0	NO	CIRCULAR	2	0
029EtoMIS	4796	4780	50	0.013	0	1.5	NO	CIRCULAR	2.333	0
029W_DWF	029W_DWF	029WtoMIS	228.45	0.013	0	0	NO	CIRCULAR	1	0
029WtoMIS	029WtoMIS	4780	50	0.013	0	1.5	NO	CIRCULAR	1	0

Partial Separation Option B2										
Name	**Inlet Node**	**Outlet Node**	**Length (ft)**	**Roughness**	**Inlet Offset (ft)**	**Outlet Offset (ft)**	**Flap Gate**	**Cross-Section**	**Geom1 (ft)**	**Geom2 (ft)**
028NewToMIS	028newToMIS	4780	309.79	0.015	0	2.04	NO	CIRCULAR	2.5	0
029SepDummyToCSF	029Sep_Load	Clinton_West	926.34	0.013	0	34	NO	CIRCULAR	1.5	0
114	41	028newToMIS	90.29	0.015	0	0.4	NO	CIRCULAR	2.5	0
2970	4798	4796	482.437	0.015	0	0	NO	HORSESHOE	2.333	0
496	28	41	50	0.015	0	0	NO	CIRCULAR	1	0
552	CSF_W6	28	306.419	0.015	0	0	NO	CIRCULAR	2	0
029EtoMIS	4796	4780	50	0.013	0	1.5	NO	CIRCULAR	2.333	0
029W_DWF	029W_DWF	029WtoMIS	228.45	0.013	0	0	NO	CIRCULAR	1	0
029WtoMIS	029WtoMIS	4780	50	0.013	0	1.5	NO	CIRCULAR	1	0

CSO 029 Approach Analysis
SWMM Junction Inputs

Existing Conditions				
Name	**Tag**	**Invert Elev. (ft)**	**Rim Elev. (ft)**	**Depth (ft)**
28	Regulator	376.6	390.1	13.5
29	Regulator	372.21	389.66	17.45
165		373.59	389.571	15.981
41		374.28	390.58	16.3
4778		371.93	389.822	17.892
4780		368.7	388.371	19.671
4796		376.49	388.133	11.643
4798		380	389.665	9.665
CSF_W6		376.7	391.3	14.6
OnCrk_031	OnCrk	360.57	380.57	20

Alternative A				
Name	**Tag**	**Invert Elev. (ft)**	**Rim Elev. (ft)**	**Depth (ft)**
28	Regulator	376.6	390.1	13.5
029W_DWF	029Sep	378.001	385.002	7.001
029WtoMIS	029Sep	377.001	384.002	7.001
41		374.28	390.58	16.3
4778		371.93	389.822	17.892
4780		368.7	388.371	19.671
4796		376.49	388.133	11.643
4798		380	389.665	9.665
CSF_W6		376.7	391.3	14.6
OnCrk_031	OnCrk	360.57	380.57	20

Alternative B				
Name	**Tag**	**Invert Elev. (ft)**	**Rim Elev. (ft)**	**Depth (ft)**
28	Regulator	376.6	390.1	13.5
029Sep_Load		390	410	20
029W_DWF	029Sep	378.001	385.002	7.001
029WtoMIS	029Sep	377.001	384.002	7.001
41		374.28	390.58	16.3
4778		371.93	389.822	17.892
4780		368.7	388.371	19.671
4796		376.49	388.133	11.643
4798		380	389.665	9.665
CSF_W6		376.7	391.3	14.6
OnCrk_031	OnCrk	360.57	380.57	20

CSO 029 Approach Analysis
SWMM Junction Inputs

Alternative C				
Name	**Tag**	**Invert Elev. (ft)**	**Rim Elev. (ft)**	**Depth (ft)**
28	Regulator	376.6	390.1	13.5
028newToMIS		371.93	389.822	17.892
029-Franklin_dummy		377	397	20
029RegToCSF		372	387	15
029WaltonW_dummy		373	393	20
41		374.28	390.58	16.3
4780		368.7	388.371	19.671
4796		376.49	388.133	11.643
4798		380	389.665	9.665
CSF_W6		376.7	391.3	14.6
JeffCirToCSF		371	386	15
OnCrk_031	OnCrk	360.57	380.57	20

Partial Separation Option A1				
Name	**Tag**	**Invert Elev. (ft)**	**Rim Elev. (ft)**	**Depth (ft)**
28	Regulator	376.6	390.1	13.5
028newToMIS		371.93	389.822	17.892
29		372.21	389.66	17.45
165		373.59	389.571	15.981
41		374.28	390.58	16.3
4780		368.7	388.371	19.671
4796		376.49	388.133	11.643
4798		380	389.665	9.665
CSF_W6		376.7	391.3	14.6
OnCrk_031	OnCrk	360.57	380.57	20
029W_DWF	029Sep	378.001	385.002	7.001
029WtoMIS	029Sep	377.001	384.002	7.001

Partial Separation Option B1				
Name	**Tag**	**Invert Elev. (ft)**	**Rim Elev. (ft)**	**Depth (ft)**
28	Regulator	376.6	390.1	13.5
028newToMIS		371.93	389.822	17.892
29		372.21	389.66	17.45
029Sep_Load		390	410	20
165		373.59	389.571	15.981
41		374.28	390.58	16.3
4780		368.7	388.371	19.671
4796		376.49	388.133	11.643
4798		380	389.665	9.665
CSF_W6		376.7	391.3	14.6
OnCrk_031	OnCrk	360.57	380.57	20
029W_DWF	029Sep	378.001	385.002	7.001
029WtoMIS	029Sep	377.001	384.002	7.001

CSO 029 Approach Analysis
SWMM Junction Inputs

Partial Separation Option A2				
Name	**Tag**	**Invert Elev. (ft)**	**Rim Elev. (ft)**	**Depth (ft)**
28	Regulator	376.6	390.1	13.5
028newToMIS		371.93	389.822	17.892
29		372.21	389.66	17.45
165		373.59	389.571	15.981
41		374.28	390.58	16.3
4780		368.7	388.371	19.671
4796		376.49	388.133	11.643
4798		380	389.665	9.665
CSF_W6		376.7	391.3	14.6
OnCrk_031	OnCrk	360.57	380.57	20
029W_DWF	029Sep	378.001	385.002	7.001
029WtoMIS	029Sep	377.001	384.002	7.001

Partial Separation Option B2				
Name	**Tag**	**Invert Elev. (ft)**	**Rim Elev. (ft)**	**Depth (ft)**
28	Regulator	376.6	390.1	13.5
028newToMIS		371.93	389.822	17.892
29		372.21	389.66	17.45
029Sep_Load		390	410	20
165		373.59	389.571	15.981
41		374.28	390.58	16.3
4780		368.7	388.371	19.671
4796		376.49	388.133	11.643
4798		380	389.665	9.665
CSF_W6		376.7	391.3	14.6
OnCrk_031	OnCrk	360.57	380.57	20
029W_DWF	029Sep	378.001	385.002	7.001
029WtoMIS	029Sep	377.001	384.002	7.001

CSO 029 Approach Analysis
SWMM Subcatchments

Existing Conditions														
Name	Tag	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Lengt	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)	Subarea Routing	Percent Routed (%)
029-01		Metro	4798	9.863	369.8	1161.796	92.99	0.017	0.15	0.016	0.1	25	PERVIOUS	6.949
030-01		Savin	4994	7.63849	650.899	511.189	63.4	0.017	0.15	0.018	0.1	25	PERVIOUS	8.52

Alternative A														
Name	Tag	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Lengt	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)	Subarea Routing	Percent Routed (%)
029-Sep	SEPARATED	Metro	4798	0.3227	369.8	38.012	98	0.017	0.15	0.016	0.1	25	OUTLET	100
030-01		Savin	4994	7.63849	650.899	511.189	63.4	0.017	0.15	0.018	0.1	25	PERVIOUS	8.52

Alternative B														
Name	Tag	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Lengt	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)	Subarea Routing	Percent Routed (%)
029-Sep	SEPARATED	Metro	4798	0.3227	369.8	38.012	98	0.017	0.15	0.016	0.1	25	OUTLET	100
029-SepJeff	SPLIT_AltB	Savin	029Sep_Load	0.3261	650.899	21.824	100	0.017	0.15	0.018	0.1	25	OUTLET	100
029-Stormwater	SepToCSF	Metro	029Sep_Load	6.918	1000	301.348	100	0.017	0.15	0.016	0.1	25	OUTLET	100
030-01_ParSep	SPLIT_AltB	Savin	4994	6.4869	650.899	434.122	63.4	0.017	0.15	0.018	0.1	25	PERVIOUS	8.52
030-SepJeff	SPLIT_AltB	Savin	029Sep_Load	0.6679	650.899	44.698	100	0.017	0.15	0.018	0.1	25	OUTLET	100

Alternative C														
Name	Tag	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Lengt	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)	Subarea Routing	Percent Routed (%)
029-Clinton		Metro	4798	2.6697	369.799	314.474	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-Franklin		Metro	029-Franklin_dummy	0.5521	369.799	65.034	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-SepJeff	SPLIT_AltB	Savin	JeffCirToCSF	0.3261	650.899	21.824	100	0.017	0.15	0.018	0.1	25	OUTLET	100
029-WaltonE		Metro	4796	2.0534	369.799	241.878	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-WaltonW		Metro	029WaltonW_dummy	1.6429	369.799	193.523	100	0.017	0.15	0.016	0.1	25	OUTLET	100
030-01_ParSep	SPLIT_AltB	Savin	4994	6.4869	650.899	434.122	63.4	0.017	0.15	0.018	0.1	25	PERVIOUS	8.52
030-SepJeff	SPLIT_AltB	Savin	JeffCirToCSF	0.6679	650.899	44.698	100	0.017	0.15	0.018	0.1	25	OUTLET	100

Partial Separation Option A1														
Name	Tag	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Lengt	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)	Subarea Routing	Percent Routed (%)
029-Clinton		Metro	4798	2.697	369.799	317.69	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-Franklin		Metro	OnCrk_030	0.5244	369.799	61.771	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-WaltonE		Metro	4796	2.0969	369.799	247.002	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-WaltonW		Metro	OnCrk_030	1.5948	369.799	187.857	100	0.017	0.15	0.016	0.1	25	OUTLET	100
030-01		Savin	4994	7.63849	650.899	511.189	63.4	0.017	0.15	0.018	0.1	25	PERVIOUS	8.52

Partial Separation Option B1														
Name	Tag	Rain Gage	Outlet	Area (ac)	Width (ft)	Flow Lengt	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)	Subarea Routing	Percent Routed (%)
029-Clinton		Metro	4798	2.6697	369.799	314.474	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-Franklin		Metro	029Sep_Load	0.5521	369.799	65.034	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-SepJeff	SPLIT_AltB	Savin	029Sep_Load	0.3261	650.899	21.824	100	0.017	0.15	0.018	0.1	25	OUTLET	100
029-WaltonE		Metro	4796	2.0534	369.799	241.878	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-WaltonW		Metro	029Sep_Load	1.6429	369.799	193.523	100	0.017	0.15	0.016	0.1	25	OUTLET	100
030-01_ParSep	SPLIT_AltB	Savin	4994	6.4869	650.899	434.122	63.4	0.017	0.15	0.018	0.1	25	PERVIOUS	8.52
030-SepJeff	SPLIT_AltB	Savin	029Sep_Load	0.6679	650.899	44.698	100	0.017	0.15	0.018	0.1	25	OUTLET	100

CSO 029 Approach Analysis
SWMM Subcatchments

Partial Separation Option A2														
Name	**Tag**	**Rain Gage**	**Outlet**	**Area (ac)**	**Width (ft)**	**Flow Lengt**	**Imperv. (%)**	**N Imperv**	**N Perv**	**Dstore Imperv (in)**	**Dstore Perv (in)**	**Zero Imperv (%)**	**Subarea Routing**	**Percent Routed (%)**
029-Clinton		Metro	4798	2.697	369.799	317.69	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-Franklin		Metro	OnCrk_030	0.5244	369.799	61.771	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-WaltonE		Metro	OnCrk_030	2.0969	369.799	247.002	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-WaltonW		Metro	OnCrk_030	1.5948	369.799	187.857	100	0.017	0.15	0.016	0.1	25	OUTLET	100
030-01		Savin	4994	7.63849	650.899	511.189	63.4	0.017	0.15	0.018	0.1	25	PERVIOUS	8.52

Partial Separation Option B2														
Name	**Tag**	**Rain Gage**	**Outlet**	**Area (ac)**	**Width (ft)**	**Flow Lengt**	**Imperv. (%)**	**N Imperv**	**N Perv**	**Dstore Imperv (in)**	**Dstore Perv (in)**	**Zero Imperv (%)**	**Subarea Routing**	**Percent Routed (%)**
029-Clinton		Metro	4798	2.6697	369.799	314.474	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-Franklin		Metro	029Sep_Load	0.5521	369.799	65.034	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-SepJeff	SPLIT_AltB	Savin	029Sep_Load	0.3261	650.899	21.824	100	0.017	0.15	0.018	0.1	25	OUTLET	100
029-WaltonE		Metro	029Sep_Load	2.0534	369.799	241.878	100	0.017	0.15	0.016	0.1	25	OUTLET	100
029-WaltonW		Metro	029Sep_Load	1.6429	369.799	193.523	100	0.017	0.15	0.016	0.1	25	OUTLET	100
030-01_ParSep	SPLIT_AltB	Savin	4994	6.4869	650.899	434.122	63.4	0.017	0.15	0.018	0.1	25	PERVIOUS	8.52
030-SepJeff	SPLIT_AltB	Savin	029Sep_Load	0.6679	650.899	44.698	100	0.017	0.15	0.018	0.1	25	OUTLET	100

Attachment H – Basis of Cost Estimate

Basis of Estimate

Onondaga County CSO 029

Approach Analysis

Prepared for

Onondaga County Department of Water Environment Protection

December 16, 2016

Contents

Appendices

CSO 029 Approach Analysis
Basis of Estimate

TABLE 0.1
Estimate Information
CSO 029 Approach Analysis

Estimate Classification	Class 5
Requested By	Zachary Monge/SYR
Estimated By	John DeWolf/FSN
Estimator Phone	559.621.1604
Estimate Date	December 13, 2016

1. Purpose of Estimate

The purpose of this Estimate of Construction Cost is to establish an Engineer's opinion of probable construction cost at the 10% level of design development.

2. General Project Description

This analysis includes three alternates to deal with storm and sewer flows.

1. Alternative A: Install a new storm sewer to collect runoff from separated building and street catch basins on Walton Street, North Franklin Street, and North Clinton Street and utilize the existing CSO 029 outfall to discharge Onondaga Creek.
2. Alternative B: Same as Alternative A with the exception of utilizing the existing 48" casing beneath the railroad to outfall the separate storm sewer to the Clinton Storage Facility. Close the CSO 029 outfall.
3. Alternative C: Reconstruct the combined sewer on the west block of Walton Street within CSO 029 and install a new regulator structure at the MIS. Route overflows to the Clinton Storage Facility utilizing the existing 48" casing beneath the railroad bridge. Close the CSO 029 outfall.

3. Overall Cost

The following is a summary breakdown of the costs for each Alternative. Water main replacement and sewer repair costs for the east block of Walton Street are kept separate from the overall project estimate.

Table 3.1

Alternate A

Overall Costs

Low Range (-20%)	Estimated Costs[a]	High Range (+50%)
$4,282,400	**$5,353,000**	$8,029,500

Water Main Replacement

Low Range (-20%)	Estimated Costs[a]	High Range (+50%)
$733,600	**$917,000**	$1,375,500

East Block Walton St. Sewer Repair

Low Range (-20%)	Estimated Costs[a]	High Range (+50%)
$681,600	**$852,000**	$1,278,000

Table 3.2

Alternate B

Overall Costs

Low Range (-20%)	Estimated Costs[a]	High Range (+50%)
$4,823,200	**$6,029,000**	$9,043,500

Water Main Replacement

Low Range (-20%)	Estimated Costs[a]	High Range (+50%)
$822,400	**$1,028,000**	$1,542,000

East Block Walton St. Sewer Repair

Low Range (-20%)	Estimated Costs[a]	High Range (+50%)
$681,600	**$852,000**	$1,278,000

Table 3.3

Alternate C

Onondaga Wastewater Infrastructure

Low Range (-20%)	Estimated Costs[a]	High Range (+50%)
$2,714,400	**$3,393,000**	$5,089,500

Water Main Replacement

Low Range (-20%)	Estimated Costs[a]	High Range (+50%)
$473,600	**$592,000**	$888,000

East Block Walton St. Sewer Repair

Low Range (-20%)	Estimated Costs[a]	High Range (+50%)
$681,600	**$852,000**	$1,278,000

[a] See Appendix for cost estimate detail breakdown

This cost estimate has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors. As a result, the final project costs will vary from the estimate presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

4. Scope of Work

For the 3 alternatives, please refer to the attached estimate breakdowns for the scope and quantities for each.

5. Markups

These markups are based upon general assumptions about how the project will be contracted. Actual markup percentages may vary from those shown here, and are the responsibility of the bidding contractor.

TABLE 5.1
General Contractor Markups
Onondaga Co. Wastewater Infrastructure

Contractor General Conditions	7.00%
Sales Tax on Material	0.00%
Contractor Overhead	8.00%
Contractor Profit	10.00%
Bonds and Insurance	2.16%
Estimate Contingency	25.00%
Escalation Rate	0.00%

6. Escalation Rate

This estimate does not include Escalation.

7. Estimate Classification

This cost estimate prepared is considered a Budget or Class 5 estimate as defined by the Association for the Advancement of Cost Engineering International (AACEI). It is considered accurate to +50% to -20%, based on a 10% design deliverable.

8. Estimate Methodology

This cost estimate is considered a bottom rolled up type estimate with cost items and breakdown of Labor, Materials and Equipment. Some quotations were obtained for various items. The estimate may include allowance cost and dollars per SF cost for certain components of the estimate.

9. Cost Resources

The following is a list of the various cost resources used in the development of the cost estimate:

- R.S. Means
- CH2M HILL Historical Data
- Vendor Quotes on Equipment and Materials where appropriate
- Estimator Judgment
- Available Local Cost Data

10. Labor Costs

The estimate has been adjusted for local area labor rates, based upon 2016 national rates.

Labor unit prices reflect a burdened rate, including: workers compensation, unemployment taxes, Fringe Benefits, and medical insurance.

11. Taxes

No sales tax was added to the project as Onondaga County is tax exempt.

12. Major Assumptions

The estimate is based on the assumption the work will be done on a competitive bid basis and the contractor will have a reasonable amount of time to complete the work. All contractors are equal, with a reasonable project schedule, no overtime, constructed as under a single contract, no liquidated damages.

This estimate should be evaluated for market changes after 90 days of the issue date. It is assumed that much of the fabricated equipment will be shipped from the mainland USA.

- All underground lines are figure with an average of 5 foot of coverage.
- Manholes are figure at a 7 foot average depth. They are also figured at each angle point in the various lines.
- Catch basins are figure at 6 foot average depth.
- All sewer and storm laterals are figure to property line and each includes a cleanout.
- Sidewalks are figured to be 15 feet wide of which the 5 feet adjacent to the curb are brick pavers.
- The casing ate the railroad is an existing 48 inch empty conduit.
- Groundwater is not expected nor have any cost other than nuisance water for passing rainfall is expected to be encountered.
- Paving section is 3 inches of asphalt concrete over 8 inches of concrete roadbase over 6 inches of aggregate
- The patching of the existing historical sewer line is based on it being safe and practical to have this done manually form the interior.
- All dimensions were taken from PDF drawings and to the best of the estimator's ability were verified via Google Earth.

13. Allowances

The estimate includes allowances for known work that is not sufficiently detailed at this time:

- An allowance for the Tideflex check valve is included for backflow prevention.
- An allowance for the Terrestorm Water Quality Unit is included for Alternative A for floatables control.
- An allowance for a regulator structure for Alternative C.

14. Excluded Costs

The cost estimate excludes the following costs:

- Plans, Permits and Fees
- Dewatering Cost.
- Any rock excavation
- Non-construction or soft costs for design, services during construction, land, legal and owner administration costs
- Material Adjustment allowances above and beyond what is included at the time of the cost estimate

15. Reference Documents

This cost estimate is based upon CH2M's CSO 029 Approach Analysis Technical Memorandum dated 11/28/16 and email clarifications received from Zachary Monge.

Appendix A – Alternative A Overall Cost Estimate Breakdown

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
01A			**24" Storm Drain**			
			Utilities			
			Utilities General			
	33.00.07.0001		**24" PVC Storm Drain**			
		33.00.07.24	**Buried Pipe, PVC, 24"**			
			Pipeline LF per day	***150.00 lf***		***/lf***
			Traffic Control, Labor per Day	10.00 day	21,867	2,186.72 /day
			Trench Box, 8' x 24' x 10'	0.50 mo	3,132	6,264.26 /mo
			Dedicated Fire / Safety Monitor	40.00 hr	5,034	125.85 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	1,772.84 CY	55,083	31.07 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	603.78 cy	22,921	37.96 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	1,049.68 cy	10,870	10.36 /cy
			Pipe zone material	603.78 cy	46,045	76.26 /cy
			Pipe bedding material	134.48 cy	10,256	76.26 /cy
			Imported backfill material	1,049.68 cy	34,307	32.68 /cy
			Haul spoils, offsite, up to 10 miles	738.26 cy	20,107	27.24 /cy
			24" pipe, PVC, SDR 35, B & S, excav/bkfill not included	1,518.00 LF	184,311	121.42 /LF
			24" PVC, SDR 35, B & S, reducing wye	45.00 ea	181,709	4,037.99 /ea
			Pipe Marking, Detection Tape	1,518.00 lf	3,577	2.36 /lf
			Pipe Marking, Copper Wire	1,518.00 lf	3,949	2.60 /lf
			33.00.07.24 Buried Pipe, PVC, 24"	**1,518.00 LF**	**603,170**	**397.35 /LF**
			33.00.07.0001 24" PVC Storm Drain	**1,518.00 LF**	**603,170**	**397.35 /LF**
			Utilities General	**1.00 LS**	**603,170**	**603,169.84 /LS**
			Utilities	**1,518.00 LF**	**603,170**	**397.35 /LF**
			01A 24" Storm Drain	**1,518.00 LF**	**603,170**	**397.35 /LF**
02A			**24" Check Valve and Structure**			
			Utilities			
			Utilities General			
	33.20.07.0020		**24" Check Valve**			
		33.20.07.24	**Buried Valves, Check 24"**			

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.20.07.24	Buried Valves, Check 24"			
			Check valve, Tideflex, 24" and Structure Allowance	1.00 ea	39,901	39,900.70 /ea
			33.20.07.24 Buried Valves, Check 24"	1.00 EA	39,901	39,900.70 /EA
			33.20.07.0020 24" Check Valve	1.00 EA	39,901	39,900.70 /EA
			Utilities General	1.00 LS	39,901	39,900.70 /LS
			Utilities	1.00 LF	39,901	39,900.70 /LF
			02A 24" Check Valve and Structure	**1.00 EA**	**39,901**	**39,900.70 /EA**
03A			**30" Storm Drain**			
			Existing Conditions			
			Demolition			
	02.01.01.0024		Remove Sewer Line			
		02.01.01.00	Remove Sewer Lines			
			Storm Sewer Pipe Demolition and Loading, 10' Deep	306.00 lf	25,826	84.40 /lf
			02.01.01.00 Remove Sewer Lines	306.00 LS	25,826	84.40 /LS
			02.01.01.0024 Remove Sewer Line	306.00 LF	25,826	84.40 /LF
			Demolition	1.00 LS	25,826	25,825.93 /LS
			Existing Conditions	1.00 LS	25,826	25,825.93 /LS
			Utilities			
			Utilities General			
	33.00.07.0002		30" Storm Drain			
		33.00.07.30	Buried Pipe, PVC, 30"			
			Pipeline LF per day	***150.00 lf***		***/lf***
			Traffic Control, Labor per Day	2.00 day	4,373	2,186.72 /day
			Trench Box, 8' x 24' x 10'	0.25 mo	1,566	6,264.32 /mo
			Dedicated Fire / Safety Monitor	8.00 hr	1,007	125.85 /hr
			Excav. pipe trench, w/ trench box, for > 30" pipe	426.73 CY	15,906	37.27 /CY
			Backfill / Compact @ pipe zone, for 30" & larger pipe	148.60 cy	7,173	48.27 /cy
			Backfill / Compact above pipe zone, for 30" & larger pipe	237.02 cy	2,672	11.27 /cy
			Pipe zone material	148.60 cy	11,332	76.26 /cy
			Pipe bedding material	30.37 cy	2,316	76.26 /cy

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.30	Buried Pipe, PVC, 30"			
			Imported backfill material	237.02 cy	7,747	32.68 /cy
			Haul spoils, offsite, up to 10 miles	178.97 cy	4,874	27.24 /cy
			FURNISH PVC water distribution pipe, C-905, class 165, DR 25, 30"	306.00 LF	87,793	286.90 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 30"	306.00 LF	30,171	98.60 /LF
			Pipe Marking, ID Tape	306.00 lf	721	2.36 /lf
			Pipe Marking, Copper Wire	306.00 lf	796	2.60 /lf
			33.00.07.30 Buried Pipe, PVC, 30"	306.00 LF	178,447	583.16 /LF
			33.00.07.0002 30" Storm Drain	306.00 LF	178,447	583.16 /LF
			Utilities General	1.00 LS	178,447	178,446.51 /LS
			Utilities	306.00 LF	178,447	583.16 /LF
			03A 30" Storm Drain	306.00 LF	204,272	667.56 /LF
04A			30" Check Valve and Structure			
			Utilities			
			Utilities General			
	33.20.07.0019		30" Check Valve			
		33.20.07.30	Buried Valves, Check 30"			
			Check valve, Tideflex 30" and Structure Allowance	1.00 ea	39,901	39,900.69 /ea
			33.20.07.30 Buried Valves, Check 30"	1.00 EA	39,901	39,900.69 /EA
			33.20.07.0019 30" Check Valve	1.00 EA	39,901	39,900.69 /EA
			Utilities General	1.00 LS	39,901	39,900.69 /LS
			Utilities	1.00 LF	39,901	39,900.69 /LF
			04A 30" Check Valve and Structure	1.00 EA	39,901	39,900.69 /EA
05A			Water Quality Structure			
			Utilities			
			Utilities General			
	33.15.03.0024		Water Quaility Structure			
		33.15.03.04	Buried Structures, Vaults,			
			Water Quality Structure Allowance	1.00 ea	46,437	46,437.33 /ea

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Duration:
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			33.15.03.04 Buried Structures, Vaults,	1.00 EA	46,437	46,437.33 /EA
			33.15.03.0024 Water Quaility Structure	1.00 EA	46,437	46,437.33 /EA
			Utilities General	1.00 LS	46,437	46,437.33 /LS
			Utilities	1.00 LF	46,437	46,437.33 /LF
			05A Water Quality Structure	**1.00 EA**	**46,437**	**46,437.33 /EA**
06A			**Tie into Existing**			
			Utilities			
			Utilities General			
	33.10.01.0021		Tie into Existing			
		33.10.01.15	Buried Pipe Specials, Tie-Ins			
			Add for tie-in to existing (Adjust productivity)	6.00 ea	58,960	9,826.65 /ea
			33.10.01.15 Buried Pipe Specials, Tie-Ins	6.00 EA	58,960	9,826.65 /EA
			33.10.01.0021 Tie into Existing	6.00 EA	58,960	9,826.65 /EA
			Utilities General	1.00 LS	58,960	58,959.91 /LS
			Utilities	1.00 LF	58,960	58,959.91 /LF
			06A Tie into Existing	**6.00 EA**	**58,960**	**9,826.65 /EA**
07A			**Manholes**			
			Utilities			
			Utilities General			
	33.15.01.0004		Manholes			
		33.15.01.05	Buried Structures, Manholes, 60" Dia			
			Manholes, precast, 5' inside dia, 8' deep	12.00 ea	75,645	6,303.75 /ea
			Cast-in-Place Base, 5'	12.00 ea	36,025	3,002.07 /ea
			Slab Top, 5'	12.00 ea	19,728	1,644.03 /ea
			Reducer, 5'	12.00 ea	16,460	1,371.67 /ea
			Grade Ring, 5'	12.00 ea	4,709	392.42 /ea
			Bituminous Coating, 5'	84.00 vf	4,347	51.75 /vf
			Frame & Cover, 5'	12.00 ea	15,138	1,261.47 /ea
			Grout Invert, 5'	12.00 ea	8,764	730.37 /ea

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			33.15.01.05 Buried Structures, Manholes, 60" Dia	12.00 EA	180,816	15,068.02 /EA
			33.15.01.0004 Manholes	12.00 EA	180,816	15,068.02 /EA
			Utilities General	1.00 LS	180,816	180,816.23 /LS
			Utilities	1.00 LF	180,816	180,816.23 /LF
			07A Manholes	**12.00 EA**	**180,816**	**15,068.02 /EA**
08A			**Replace Catch Basins**			
			Utilities			
			Utilities General			
	33.15.02.0023		Replace Catch Basin			
		33.15.02.99	Buried Structures, Catch Basin, Frames, Covers and Inverts			
			Catch Basin Allowance	16.00 ea	206,993	12,937.09 /ea
			33.15.02.99 Buried Structures, Catch Basin, Frames, Covers and Inverts	16.00 EA	206,993	12,937.09 /EA
			33.15.02.0023 Replace Catch Basin	16.00 EA	206,993	12,937.09 /EA
			Utilities General	1.00 LS	206,993	206,993.40 /LS
			Utilities	1.00 LF	206,993	206,993.40 /LF
			08A Replace Catch Basins	**16.00 EA**	**206,993**	**12,937.09 /EA**
09A			**Storm Laterals**			
			Utilities			
			Utilities General			
	33.00.07.0006		Rain Ledders			
		33.00.07.06	Buried Pipe, PVC, 6"			
			Pipeline LF per day	***135.00 lf***		***/lf***
			Traffic Control, Labor per Day	11.00 day	24,054	2,186.72 /day
			Dedicated Fire / Safety Monitor	44.00 hr	5,537	125.85 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	674.11 CY	20,945	31.07 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	241.40 cy	9,164	37.96 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	417.72 cy	4,326	10.36 /cy
			Pipe zone material	241.40 cy	18,409	76.26 /cy

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.06	**Buried Pipe, PVC, 6"**			
			Pipe bedding material	84.63 cy	6,454	76.26 /cy
			Imported backfill material	417.72 cy	13,652	32.68 /cy
			Haul spoils, offsite, up to 10 miles	326.03 cy	8,880	27.24 /cy
			6" pipe, PVC, SDR 35, B & S, excav/bkfill not included	1,494.00 LF	49,998	33.47 /LF
			6" PVC, SDR 35, B & S, Ell, 45	135.00 ea	64,329	476.51 /ea
			6" PVC, SDR 35, B & S, reducing wye	45.00 ea	32,870	730.44 /ea
			Pipe Marking, Detection Tape	1,494.00 lf	3,521	2.36 /lf
			Pipe Marking, Copper Wire	1,494.00 lf	3,887	2.60 /lf
			CI Valve Box & Cover, w/ Concrete Collar included	45.00 ea	62,169	1,381.54 /ea
			33.00.07.06 Buried Pipe, PVC, 6"	**1,494.00 LF**	**328,195**	**219.68 /LF**
			33.00.07.0006 Rain Ledders	**45.00 EA**	**328,195**	**7,293.23 /EA**
			Utilities General	**1.00 LS**	**328,195**	**328,195.28 /LS**
			Utilities	**1,494.00 LF**	**328,195**	**219.68 /LF**
			09A Storm Laterals	**45.00 EA**	**328,195**	**7,293.23 /EA**
10A			**Demolition**			
			Existing Conditions			
			Demolition			
	02.01.01.0017		**Demolition**			
		02.01.01.00	**Remove Sewer Lines**			
			Saw Cutting, Ashpalt, 6" Depth	400.00 lf	2,179	5.45 /lf
			Asphalt Demolition and Loading	2,600.00 cy	26,513	10.20 /cy
			Concrete Curb Demolition and Loading	3,179.00 lf	50,651	15.93 /lf
			Concrete Sidewalk Demolition and Loading	600.00 cy	6,118	10.20 /cy
			Haul Site Demolition Spoils, 12 yd capacity, 10 miles RT, priced per cy	4,500.00 cy	83,551	18.57 /cy
			Dump Charges for Site Demolition Spoils, 12 yd tandem, priced per cy	4,500.00 cy	153,202	34.04 /cy
			02.01.01.00 Remove Sewer Lines	**1.00 LS**	**322,214**	**322,213.61 /LS**
			02.01.01.0017 Demolition	**1.00 LS**	**322,214**	**322,213.61 /LS**
			Demolition	**1.00 LS**	**322,214**	**322,213.61 /LS**

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			Existing Conditions	1.00 LS	322,214	322,213.61 /LS
			10A Demolition	**1.00 LS**	**322,214**	**322,213.61 /LS**
11A			**Curb and Gutter**			
			Concrete Work			
			Cast-In-Place Concrete Work			
	03.00.99.0015		**Curb and Gutter**			
		03.00.99.00	Concrete, Other			
			Granite Curb Allowance	3,179.00 lf	199,141	62.64 /lf
			03.00.99.00 Concrete, Other	1.00 LS	199,141	199,141.26 /LS
			03.00.99.0015 Curb and Gutter	**3,179.00 LF**	**199,141**	**62.64 /LF**
			Cast-In-Place Concrete Work	1.00 LS	199,141	199,141.26 /LS
			Concrete Work	1.00 LS	199,141	199,141.26 /LS
			11A Curb and Gutter	**3,179.00 LF**	**199,141**	**62.64 /LF**
12A			**Sidewalk**			
			Concrete Work			
			Cast-In-Place Concrete Work			
	03.00.99.0016		**Sidewalk**			
		03.00.99.00	Concrete, Other			
			Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	5,465.00 sy	22,911	4.19 /sy
			Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 4500 psi, 4" thick, excludes base	47,685.00 sf	1,006,269	21.10 /sf
			Sidewalks, driveways, and patios, sidewalks, concrete, excludes base, for 4" thick bank run gravel base, add	47,685.00 sf	127,476	2.67 /sf
			Bituminous-stabilized base courses, for roadways and large paved areas, macadam penetration crushed stone, 4 gallons per S.Y., 8" thick	166.67 sy	8,474	50.85 /sy
			Concrete paving surface treatment, 4500 psi, fixed form, unreinforced, 12' pass, 8" thick, includes joints, finishing, and curing	166.67 sy	15,913	95.48 /sy

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			03.00.99.00 Concrete, Other	1.00 LS	1,181,044	1,181,044.10 /LS
			03.00.99.0016 Sidewalk	47,685.00 SF	1,181,044	24.77 /SF
			Cast-In-Place Concrete Work	1.00 LS	1,181,044	1,181,044.10 /LS
			Concrete Work	1.00 LS	1,181,044	1,181,044.10 /LS
			12A Sidewalk	**47,685.00 SF**	**1,181,044**	**24.77 /SF**
13A			**Brick Pavers**			
			Exterior Improvements			
			Site, Improvements			
	32.40.07.0016		Brick Pavers			
		32.40.07.00	Site Improvements, Brick and Stone Pavers			
			Brick paving, without joints, grouted, (3.9 brick/S.F.), 4" x 8" x 2-1/4", 3/8" joint	15,895.00 sf	514,436	32.36 /sf
			32.40.07.00 Site Improvements, Brick and Stone Pavers	15,895.00 SF	514,436	32.36 /SF
			32.40.07.0016 Brick Pavers	15,895.00 SF	514,436	32.36 /SF
			Site, Improvements	1.00 LS	514,436	514,436.28 /LS
			Exterior Improvements	1.00 LS	514,436	514,436.28 /LS
			13A Brick Pavers	**15,895.00 SF**	**514,436**	**32.36 /SF**
14A			**Asphalt Paving**			
			Concrete Work			
			Cast-In-Place Concrete Work			
	03.10.05.08.0018		Road Base Slab			
		03.10.05.08	Cast-In-Place Concrete, Slabs on Grade, 8" thick			
			Fine grade, for slab on grade, by hand	59,400.00 sf	60,681	1.02 /sf
			Slab on grade edge forms, 7" to 12"	2,333.33 sf	78,346	33.58 /sf
			Concrete, ready mix, 4500 psi	1,466.67 CY	463,375	315.94 /CY
			Add for concrete waste, 4500 psi	73.33 cy	23,169	315.94 /cy
			Add amount for Fuel Surcharges - per concrete truck load	154.00 load	6,292	40.85 /load
			Add amount for Environmental Fee - per concrete truck load	154.00 load	2,517	16.34 /load

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		03.10.05.08	Cast-In-Place Concrete, Slabs on Grade, 8" thick			
			Placing concrete, direct chute	1,466.67 cy	98,461	67.13 /cy
			03.10.05.08 Cast-In-Place Concrete, Slabs on Grade, 8" thick	1,467.00 CY	732,840	499.55 /CY
			03.10.05.08.0018 Road Base Slab	59,400.00	732,840	12.34
			Cast-In-Place Concrete Work	1.00 LS	732,840	732,839.51 /LS
			Concrete Work	1.00 LS	732,840	732,839.51 /LS
			Exterior Improvements			
			Paving			
	32.40.01.0017		Asphalt Paving			
		32.40.01.00	Site Improvements, Paving, Asphaltic Concrete			
			Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	6,600.78 sy	15,243	2.31 /sy
			Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,6"deep	6,600.78 sy	137,921	20.89 /sy
			Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	6,600.78 sy	15,495	2.35 /sy
			Bituminous-stabilized base courses, for roadways and large paved areas, liquid application to gravel base, asphalt emulsion	1,320.16 gal	17,384	13.17 /gal
			Plant-mix asphalt paving, for highways and large paved areas, binder course, 3" thick, no hauling included	6,600.78 sy	228,570	34.63 /sy
			Plant-mix asphalt paving, for highways and large paved areas, wearing course, 1-1/2" thick, no hauling included	6,600.78 sy	131,110	19.86 /sy
			Painted pavement markings, thermoplastic, white or yellow, 4" wide, less than 6000 L.F.	6,400.00 lf	10,035	1.57 /lf
			32.40.01.00 Site Improvements, Paving, Asphaltic Concrete	6,600.00 SY	555,759	84.21 /SY
			32.40.01.0017 Asphalt Paving	6,600.00 SY	555,759	84.21 /SY
			Paving	6,600.00 SY	555,759	84.21 /SY
			Exterior Improvements	1.00 LS	555,759	555,758.84 /LS
			14A Asphalt Paving	**59,400.00 SF**	**1,288,598**	**21.69 /SF**
15A			**Tree Protection**			

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			General Requirements			
			Construction Operations			
	01.01.01.0022		Tree Protection			
		01.01.06.02	GC Temporary Facilities & Services			
			Tree Protection	38.00 ea	11,736	308.83 /ea
			01.01.06.02 GC Temporary Facilities & Services	1.00 LS	11,736	11,735.61 /LS
			01.01.01.0022 Tree Protection	38.00 EA	11,736	308.83 /EA
			Construction Operations	1.00 LS	11,736	11,735.61 /LS
			General Requirements	1.00 LS	11,736	11,735.61 /LS
			15A Tree Protection	**38.00 EA**	**11,736**	**308.83 /EA**
16A			**12" Sewer**			
			Existing Conditions			
			Demolition			
	02.01.01.0024		Remove Sewer Line			
		02.01.01.00	Remove Sewer Lines			
			Storm Sewer Pipe Demolition and Loading, 10' Deep	242.00 lf	20,424	84.40 /lf
			02.01.01.00 Remove Sewer Lines	1.00 LS	20,424	20,424.44 /LS
			02.01.01.0024 Remove Sewer Line	242.00 LF	20,424	84.40 /LF
			Demolition	1.00 LS	20,424	20,424.44 /LS
			Existing Conditions	1.00 LS	20,424	20,424.44 /LS
			Utilities			
			Utilities General			
	33.00.07.0003		12" Sewer PVC			
		33.00.07.12	Buried Pipe, PVC, 12"			
			Pipeline LF per day	***150.00 lf***		***/lf***
			Traffic Control, Labor per Day	2.00 day	4,373	2,186.72 /day
			Trench Box, 8' x 24' x 10'	0.25 mo	1,566	6,264.32 /mo
			Dedicated Fire / Safety Monitor	8.00 hr	1,007	125.85 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	186.37 CY	5,791	31.07 /CY

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.12	**Buried Pipe, PVC, 12"**			
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	57.05 cy	2,166	37.96 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	127.12 cy	1,316	10.36 /cy
			Pipe zone material	57.05 cy	4,351	76.26 /cy
			Pipe bedding material	16.28 cy	1,242	76.26 /cy
			Imported backfill material	127.12 cy	4,155	32.68 /cy
			Haul spoils, offsite, up to 10 miles	73.33 cy	1,997	27.24 /cy
			12" pipe, PVC, SDR 35, B & S, excav/bkfill not included	242.00 LF	14,686	60.69 /LF
			12" PVC, SDR 35, B & S, reducing wye	8.00 ea	12,247	1,530.88 /ea
			Pipe Marking, Detection Tape	242.00 lf	570	2.36 /lf
			Pipe Marking, Copper Wire	242.00 lf	630	2.60 /lf
			33.00.07.12 Buried Pipe, PVC, 12"	**242.00 LF**	**56,096**	**231.80 /LF**
			33.00.07.0003 12" Sewer PVC	**242.00 LF**	**56,096**	**231.80 /LF**
			Utilities General	**1.00 LS**	**56,096**	**56,096.19 /LS**
			Utilities	**242.00 LF**	**56,096**	**231.80 /LF**
			16A 12" Sewer	**242.00 LF**	**76,521**	**316.20 /LF**
17A			**Sewer Laterals**			
			Utilities			
			Utilities General			
	33.00.07.0005		**Sewer Laterals**			
		33.00.07.06	**Buried Pipe, PVC, 6"**			
			Pipeline LF per day	***135.00 lf***		***/lf***
			Traffic Control, Labor per Day	2.00 day	4,373	2,186.72 /day
			Dedicated Fire / Safety Monitor	8.00 hr	1,007	125.85 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	122.73 CY	3,813	31.07 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	43.95 cy	1,668	37.96 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	76.05 cy	788	10.36 /cy
			Pipe zone material	43.95 cy	3,352	76.26 /cy
			Pipe bedding material	15.41 cy	1,175	76.26 /cy
			Imported backfill material	76.05 cy	2,486	32.68 /cy
			Haul spoils, offsite, up to 10 miles	59.36 cy	1,617	27.24 /cy

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Duration:
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.06	**Buried Pipe, PVC, 6"**			
			6" pipe, PVC, SDR 35, B & S, excav/bkfill not included	272.00 LF	9,103	33.47 /LF
			6" PVC, SDR 35, B & S, Ell, 45	3.00 ea	1,430	476.51 /ea
			6" PVC, SDR 35, B & S, wye	8.00 ea	6,027	753.43 /ea
			6" PVC, SDR 35, B & S, plug	8.00 ea	1,825	228.13 /ea
			Pipe Marking, Detection Tape	272.00 lf	641	2.36 /lf
			Pipe Marking, Copper Wire	272.00 lf	708	2.60 /lf
			CI Valve Box & Cover, w/ Concrete Collar included	8.00 ea	11,052	1,381.54 /ea
			33.00.07.06 Buried Pipe, PVC, 6"	**272.00 LF**	**51,064**	**187.74 /LF**
			33.00.07.0005 Sewer Laterals	**8.00 EA**	**51,064**	**6,383.05 /EA**
			Utilities General	**1.00 LS**	**51,064**	**51,064.37 /LS**
			Utilities	**272.00 LF**	**51,064**	**187.74 /LF**
			17A Sewer Laterals	**8.00 EA**	**51,064**	**6,383.05 /EA**

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	2,130,424		13,537.215 hrs		39.80%
Material	2,284,002				42.66%
Subcontract	39,654				0.74%
Equipment	481,450		3,128.965 hrs		8.99%
Other	417,870				7.81%
Construction Total	**5,353,400**	**5,353,400**			**100.00**

Cost Estimate Breakdown - Alternative A

Project: 381098 Onondaga Co
Estimator: John DeWolf

Job Size: 7,230 LF
Project No.: 381098
Revision / Date: Rev1 12/13/16

Duration:
Design Stage: 10%
Estimate Class: 5

Facility	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
01A	24" Storm Drain	1,518.00 LF	603,170	397.35 /LF
02A	24" Check Valve and Structure	1.00 EA	39,901	39,900.70 /EA
03A	30" Storm Drain	306.00 LF	204,272	667.56 /LF
04A	30" Check Valve and Structure	1.00 EA	39,901	39,900.69 /EA
05A	Water Quality Structure	1.00 EA	46,437	46,437.33 /EA
06A	Tie into Existing	6.00 EA	58,960	9,826.65 /EA
07A	Manholes	12.00 EA	180,816	15,068.02 /EA
08A	Replace Catch Basins	16.00 EA	206,993	12,937.09 /EA
09A	Storm Laterals	45.00 EA	328,195	7,293.23 /EA
10A	Demolition	1.00 LS	322,214	322,213.61 /LS
11A	Curb and Gutter	3,179.00 LF	199,141	62.64 /LF
12A	Sidewalk	47,685.00 SF	1,181,044	24.77 /SF
13A	Brick Pavers	15,895.00 SF	514,436	32.36 /SF
14A	Asphalt Paving	59,400.00 SF	1,288,598	21.69 /SF
15A	Tree Protection	38.00 EA	11,736	308.83 /EA
16A	12" Sewer	242.00 LF	76,521	316.20 /LF
17A	Sewer Laterals	8.00 EA	51,064	6,383.05 /EA

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	2,130,424		13,537.215 hrs		39.80%
Material	2,284,002				42.66%

Cost Estimate Breakdown - Alternative A

Project:381098 Onondaga Co
Job Size: 7,230 LF
Project No.: 381098
Duration:
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: Rev1 12/13/16
Estimate Class: 5

Estimate Totals

Subcontract	39,654			0.74%
Equipment	481,450		3,128.965 hrs	8.99%
Other	417,870			7.81%
Construction Total	**5,353,400**	**5,353,400**		**100.00**

Appendix B – Alternative A Water Main Replacement and Sewer Repair Estimate Breakdowns

Cost Estimate Breakdown - Alternative A Sewer Repair

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/15/16
Estimate Class: 5

Job Size: 7,230 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
18A			**Parge Existing Sewer**			
			Masonry			
			Masonry			
	04.00.00.0007		**Patch Existing Sewer**			
		04.00.00.99	**Masonry, Other**			
			Bypass Pumping	***1.00 ls***		***/ls***
			Bypass Pumping, Pumps and Piping, Mob	2.00 ea	13,687	6,843.71 /ea
			Bypass Pumping, Set-up Pumps	2.00 ea	11,318	5,659.06 /ea
			Bypass Pumping, Install Suction Piping	2.00 ea	5,097	2,548.30 /ea
			Bypass Pumping, Install Discharge Piping	2.00 ea	15,571	7,785.55 /ea
			Bypass Pumping, System Operation	5.00 week	146,813	29,362.63 /week
			Patching conc, wall, incl. chipping, cleaning and epoxy grout, 3/4" deep	6,400.00 sf	614,126	95.96 /sf
			High pressure wash	6,400.00 sf	44,994	7.03 /sf
			04.00.00.99 Masonry, Other	**6,400.00 SF**	**851,607**	**133.06 /SF**
			04.00.00.0007 Patch Existing Sewer	**546.00 LF**	**851,607**	**1,559.72 /LF**
			Masonry	**6,400.00 SF**	**851,607**	**133.06 /SF**
			Masonry	**6,400.00 SF**	**851,607**	**133.06 /SF**
			18A Parge Existing Sewer	**546.00 LF**	**851,607**	**1,559.72 /LF**

Estimate Totals

Construction Total	**851,607**	**851,607**		**100.00**

Cost Estimate Breakdown - Alternative A Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/13/16
Estimate Class: 5

Job Size: 7,230 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
19A			**16" Waterline Replacement**			
			Existing Conditions			
			Demolition			
	02.01.01.0017		**Demolition**			
		02.01.01.00	**Remove Sewer Lines**			
			Water Main Pipe Demolition and Loading, 4' Deep	1,116.00 lf	81,042	72.62 /lf
			02.01.01.00 Remove Sewer Lines	**1.00 LS**	**81,042**	**81,042.48 /LS**
			02.01.01.0017 Demolition	**1.00 LS**	**81,042**	**81,042.48 /LS**
			Demolition	**1.00 LS**	**81,042**	**81,042.48 /LS**
			Existing Conditions	**1.00 LS**	**81,042**	**81,042.48 /LS**
			Utilities			
			Utilities General			
	33.00.07.0008		**16" Waterline**			
		33.00.07.16	**Buried Pipe, PVC, 16"**			
			Pipeline LF per day	***200.00 lf***		***/lf***
			Traffic Control, Labor per Day	6.00 day	13,547	2,257.82 /day
			Dedicated Fire / Safety Monitor	24.00 hr	3,119	129.94 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	805.70 CY	25,848	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	321.08 cy	12,585	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	436.25 cy	4,665	10.69 /cy
			Pipe zone material	321.08 cy	25,282	78.74 /cy
			Pipe bedding material	83.03 cy	6,538	78.74 /cy
			Imported backfill material	436.25 cy	14,722	33.75 /cy
			Haul spoils, offsite, up to 10 miles	404.11 cy	11,364	28.12 /cy
			16" DI, MJ, Ell, 90	4.00 ea	23,355	5,838.77 /ea
			16" DI, MJ, tee	3.00 ea	26,343	8,780.85 /ea
			Solid Sleeve, DI, MJ, 16"	2.00 ea	6,840	3,419.84 /ea
			FURNISH PVC water distribution pipe, C-905, class 235, DR 18, 16"	1,116.00 LF	118,787	106.44 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 16"	1,116.00 LF	68,765	61.62 /LF
			Pipe Marking, ID Tape	1,116.00 lf	2,715	2.43 /lf
			Pipe Marking, Copper Wire	1,116.00 lf	2,998	2.69 /lf

Cost Estimate Breakdown - Alternative A Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/13/16
Estimate Class: 5

Job Size: 7,230 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			33.00.07.16 Buried Pipe, PVC, 16"	1,116.00 LF	367,471	329.27 /LF
			33.00.07.0008 16" Waterline	**1,116.00 LF**	**367,471**	**329.27 /LF**
	33.00.07.0009		**Temp Waterline**			
		33.00.09.16	Buried Pipe, HDPE, 16"			
			25 tn Rough Terrain	0.25 mo	18,125	72,501.92 /mo
			16" HDPE shop fabricated pipe - FURNISH	1,120.00 LF	76,976	68.73 /LF
			16" HDPE, shop fabricated, Ell, 90	6.00 ea	7,177	1,196.09 /ea
			16" HDPE, shop fabricated, tee	4.00 ea	5,499	1,374.83 /ea
			16" HDPE - Install shop fabricated pipe spools	1,120.00 LF	34,461	30.77 /LF
			Field weld fusion joints, Subcontracted (S), 16"	65.00 ea	9,139	140.61 /ea
			33.00.09.16 Buried Pipe, HDPE, 16"	1,120.00 LF	151,378	135.16 /LF
			33.00.07.0009 Temp Waterline	**1,120.00 LF**	**151,378**	**135.16 /LF**
			Utilities General	1.00 LS	518,849	518,848.56 /LS
			Utilities	1,116.00 LF	518,849	464.92 /LF
			19A 16" Waterline Replacement	**1,116.00 LF**	**599,891**	**537.54 /LF**
20A			**12" Waterline Replacement**			
			Existing Conditions			
			Demolition			
	02.01.01.0017		**Demolition**			
		02.01.01.00	Remove Sewer Lines			
			Water Main Pipe Demolition and Loading, 4' Deep	171.00 lf	12,418	72.62 /lf
			02.01.01.00 Remove Sewer Lines	1.00 LS	12,418	12,417.80 /LS
			02.01.01.0017 Demolition	**1.00 LS**	**12,418**	**12,417.80 /LS**
			Demolition	1.00 LS	12,418	12,417.80 /LS
			Existing Conditions	1.00 LS	12,418	12,417.80 /LS
			Utilities			
			Utilities General			
	33.00.07.0010		**12" Waterline**			
		33.00.07.12	Buried Pipe, PVC, 12"			

Cost Estimate Breakdown - Alternative A Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/13/16
Estimate Class: 5

Job Size: 7,230 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.12	**Buried Pipe, PVC, 12"**			
			Pipeline LF per day	***171.00 lf***		***/lf***
			Traffic Control, Labor per Day	1.00 day	2,258	2,257.81 /day
			Dedicated Fire / Safety Monitor	4.00 hr	520	129.94 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	111.67 CY	3,582	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	40.31 cy	1,580	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	67.80 cy	725	10.69 /cy
			Pipe zone material	40.31 cy	3,174	78.74 /cy
			Pipe bedding material	11.51 cy	906	78.74 /cy
			Imported backfill material	67.80 cy	2,288	33.75 /cy
			Haul spoils, offsite, up to 10 miles	51.82 cy	1,457	28.12 /cy
			12" DI, MJ, Ell, 90	2.00 ea	6,652	3,326.00 /ea
			12" DI, MJ, tee	2.00 ea	10,973	5,486.74 /ea
			Solid Sleeve, DI, MJ, 12"	2.00 ea	4,165	2,082.57 /ea
			FURNISH PVC water distribution pipe, C-900, class 150, DR 18, 12"	171.00 LF	10,320	60.35 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 12"	171.00 LF	9,620	56.26 /LF
			Pipe Marking, ID Tape	171.00 lf	416	2.43 /lf
			Pipe Marking, Copper Wire	171.00 lf	459	2.69 /lf
			33.00.07.12 Buried Pipe, PVC, 12"	**171.00 LF**	**59,097**	**345.59 /LF**
			33.00.07.0010 12" Waterline	**171.00 LF**	**59,097**	**345.59 /LF**
	33.00.09.0011		**Temp Waterline**			
		33.00.09.12	**Buried Pipe, HDPE, 12"**			
			25 tn Rough Terrain	0.10 mo	7,250	72,501.90 /mo
			12" HDPE shop fabricated pipe - FURNISH	175.00 LF	7,667	43.81 /LF
			12" HDPE, shop fabricated, Ell, 90	4.00 ea	2,250	562.43 /ea
			12" HDPE, shop fabricated, tee	2.00 ea	1,650	824.90 /ea
			12" HDPE - Install shop fabricated pipe spools	175.00 LF	4,308	24.61 /LF
			Field weld fusion joints, Self Perform (L), 12"	10.00 ea	1,406	140.61 /ea
			33.00.09.12 Buried Pipe, HDPE, 12"	**175.00 LF**	**24,531**	**140.18 /LF**
			33.00.09.0011 Temp Waterline	**175.00 LF**	**24,531**	**140.18 /LF**

Cost Estimate Breakdown - Alternative A Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/13/16
Estimate Class: 5

Job Size: 7,230 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			Utilities General	1.00 LS	83,627	83,627.20 /LS
			Utilities	171.00 LF	83,627	489.05 /LF
			20A 12" Waterline Replacement	**171.00 LF**	**96,045**	**561.67 /LF**
21A			**8" Waterline Replacement**			
			Existing Conditions			
			Demolition			
	02.01.01.0017		**Demolition**			
		02.01.01.00	Remove Sewer Lines			
			Water Main Pipe Demolition and Loading, 4' Deep	356.00 lf	25,852	72.62 /lf
			02.01.01.00 Remove Sewer Lines	1.00 LS	25,852	25,852.26 /LS
			02.01.01.0017 Demolition	**1.00 LS**	**25,852**	**25,852.26 /LS**
			Demolition	1.00 LS	25,852	25,852.26 /LS
			Existing Conditions	1.00 LS	25,852	25,852.26 /LS
			Utilities			
			Utilities General			
	33.00.07.0012		**8" Watermain**			
		33.00.07.08	Buried Pipe, PVC, 8"			
			Pipeline LF per day	***175.00 lf***		***/lf***
			Traffic Control, Labor per Day	2.00 day	4,516	2,257.82 /day
			Dedicated Fire / Safety Monitor	8.00 hr	1,040	129.94 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	207.97 CY	6,672	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	66.14 cy	2,593	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	139.93 cy	1,496	10.69 /cy
			Pipe zone material	66.14 cy	5,208	78.74 /cy
			Pipe bedding material	21.44 cy	1,688	78.74 /cy
			Imported backfill material	139.93 cy	4,722	33.75 /cy
			Haul spoils, offsite, up to 10 miles	87.58 cy	2,463	28.12 /cy
			8" DI, MJ, Ell, 90	4.00 ea	7,885	1,971.31 /ea
			8" DI, MJ, tee	2.00 ea	5,825	2,912.46 /ea
			Solid Sleeve, DI, MJ, 8"	2.00 ea	3,062	1,531.05 /ea

Cost Estimate Breakdown - Alternative A Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/13/16
Estimate Class: 5

Job Size: 7,230 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.08	Buried Pipe, PVC, 8"			
			FURNISH PVC water distribution pipe, C-900, class 150, DR 18, 8"	356.00 LF	10,141	28.49 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 8"	356.00 LF	15,260	42.86 /LF
			Pipe Marking, ID Tape	356.00 lf	866	2.43 /lf
			Pipe Marking, Copper Wire	356.00 lf	956	2.69 /lf
			33.00.07.08 Buried Pipe, PVC, 8"	356.00 LF	74,393	208.97 /LF
			33.00.07.0012 8" Watermain	**356.00 LF**	**74,393**	**208.97 /LF**
	33.00.09.0013		**Temp Waterline**			
		33.00.09.08	Buried Pipe, HDPE, 8"			
			25 tn Rough Terrain	0.25 mo	18,125	72,501.72 /mo
			8" HDPE shop fabricated pipe - FURNISH	360.00 LF	7,117	19.77 /LF
			8" HDPE, shop fabricated, Ell, 90	4.00 ea	1,245	311.22 /ea
			8" HDPE, shop fabricated, tee	4.00 ea	1,785	446.21 /ea
			8" HDPE - Install shop fabricated pipe spools	360.00 LF	7,384	20.51 /LF
			Field weld fusion joints, Self Perform (L), 8"	18.00 ea	2,531	140.61 /ea
			33.00.09.08 Buried Pipe, HDPE, 8"	360.00 LF	38,188	106.08 /LF
			33.00.09.0013 Temp Waterline	**360.00 LF**	**38,188**	**106.08 /LF**
			Utilities General	1.00 LS	112,580	112,580.02 /LS
			Utilities	356.00 LF	112,580	316.24 /LF
			21A 8" Waterline Replacement	**356.00 LF**	**138,432**	**388.85 /LF**
22A			**Fire Hydrant Replacement**			
			Utilities			
			Utilities General			
	33.00.07.0014		**Fire Hydrant Runs**			
		33.00.07.06	Buried Pipe, PVC, 6"			
			Pipeline LF per day	***100.00 lf***		***/lf***
			Traffic Control, Labor per Day	1.00 day	2,258	2,257.80 /day
			Dedicated Fire / Safety Monitor	8.00 hr	1,040	129.95 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	54.97 CY	1,763	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	16.16 cy	633	39.20 /cy

Cost Estimate Breakdown - Alternative A Water Main Replacement

		Project:	381098 Onondaga Co	Estimator:	John DeWolf
Job Size:	7,230 LF	Project No.:	381098	Revision / Date:	12/13/16
Duration:		Design Stage:	10%	Estimate Class:	5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.06	**Buried Pipe, PVC, 6"**			
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	38.79 cy	415	10.69 /cy
			Pipe zone material	16.16 cy	1,272	78.74 /cy
			Pipe bedding material	5.67 cy	446	78.74 /cy
			Imported backfill material	38.79 cy	1,309	33.75 /cy
			Haul spoils, offsite, up to 10 miles	21.83 cy	614	28.12 /cy
			6" DI, MJ, tee	4.00 ea	9,253	2,313.21 /ea
			Solid Sleeve, DI, MJ, 6"	4.00 ea	4,836	1,209.12 /ea
			FURNISH PVC water distribution pipe, C-900, class 150, DR 18, 6"	100.00 LF	1,651	16.51 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 6"	100.00 LF	4,019	40.19 /LF
			Pipe Marking, ID Tape	100.00 lf	243	2.43 /lf
			Pipe Marking, Copper Wire	100.00 lf	269	2.69 /lf
			Fire hydrant assembly (includes everything from valve thru hydrant)	4.00 ea	51,833	12,958.28 /ea
			33.00.07.06 Buried Pipe, PVC, 6"	**100.00 LF**	**81,854**	**818.54 /LF**
			33.00.07.0014 Fire Hydrant Runs	**4.00 EA**	**81,854**	**20,463.61 /EA**
			Utilities General	**1.00 LS**	**81,854**	**81,854.45 /LS**
			Utilities	**100.00 LF**	**81,854**	**818.54 /LF**
			22A Fire Hydrant Replacement	**4.00 EA**	**81,854**	**20,463.61 /EA**

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	305,178		1,637.519 hrs		33.31%
Material	406,434				44.36%
Subcontract	26,444				2.89%
Equipment	178,168		1,009.359 hrs		19.45%
Other					

Cost Estimate Breakdown - Alternative A Water Main Replacement

	Project: 381098 Onondaga Co	Estimator:	John DeWolf
Job Size: 7,230 LF	Project No.: 381098	Revision / Date:	12/13/16
Duration:	Design Stage: 10%	Estimate Class:	5

Estimate Totals

Construction Total	**916,224**	**916,224**	**100.00**

Appendix C – Alternative B Overall Cost Estimate Breakdown

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12-13-16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
01A			**24" Storm Drain PVC**			
			Utilities			
			Utilities General			
	33.00.07.0001		**24" PVC Storm Drain**			
		33.00.07.24	**Buried Pipe, PVC, 24"**			
			Pipeline LF per day	***150.00 lf***		***/lf***
			Traffic Control, Labor per Day	10.00 day	22,574	2,257.45 /day
			Trench Box, 8' x 24' x 10'	0.50 mo	3,233	6,466.90 /mo
			Dedicated Fire / Safety Monitor	40.00 hr	5,197	129.92 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	2,478.24 CY	79,491	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	844.02 cy	33,078	39.19 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	1,467.33 cy	15,687	10.69 /cy
			Pipe zone material	844.02 cy	66,447	78.73 /cy
			Pipe bedding material	187.99 cy	14,800	78.73 /cy
			Imported backfill material	1,467.33 cy	49,508	33.74 /cy
			Haul spoils, offsite, up to 10 miles	1,032.01 cy	29,017	28.12 /cy
			24" pipe, PVC, SDR 35, B & S, excav/bkfill not included	2,112.00 LF	264,727	125.34 /LF
			24" PVC, SDR 35, B & S, reducing wye	45.00 ea	187,586	4,168.58 /ea
			Pipe Marking, Detection Tape	2,112.00 lf	5,138	2.43 /lf
			Pipe Marking, Copper Wire	2,112.00 lf	5,673	2.69 /lf
			33.00.07.24 Buried Pipe, PVC, 24"	**2,112.00 LF**	**782,156**	**370.34 /LF**
			33.00.07.0001 24" PVC Storm Drain	**2,112.00 LF**	**782,156**	**370.34 /LF**
			Utilities General	**1.00 LS**	**782,156**	**782,156.03 /LS**
			Utilities	**2,112.00 LF**	**782,156**	**370.34 /LF**
			01A 24" Storm Drain PVC	**2,112.00 LF**	**782,156**	**370.34 /LF**
02A			**24" Check Valve Backflow Preventer**			
			Utilities			
			Utilities General			
	33.20.07.0020		**24" Check Valve**			
		33.20.07.24	**Buried Valves, Check 24"**			

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12-13-16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.20.07.24	Buried Valves, Check 24"			
			Check valve, Tideflex, 24" and Structure Allowance	1.00 ea	42,710	42,709.50 /ea
			33.20.07.24 Buried Valves, Check 24"	1.00 EA	42,710	42,709.50 /EA
			33.20.07.0020 24" Check Valve	1.00 EA	42,710	42,709.50 /EA
			Utilities General	1.00 LS	42,710	42,709.50 /LS
			Utilities	1.00 LF	42,710	42,709.50 /LF
			02A 24" Check Valve Backflow Preventer	1.00 EA	42,710	42,709.50 /EA
03A			30" Storm Drain			
			Existing Conditions			
			Demolition			
	02.01.01.0024		Remove Sewer Line			
		02.01.01.00	General Site Demolition			
			Storm Sewer Pipe Demolition and Loading, 10' Deep	306.00 lf	26,661	87.13 /lf
			02.01.01.00 General Site Demolition	1.00 LS	26,661	26,661.21 /LS
			02.01.01.0024 Remove Sewer Line	306.00 LF	26,661	87.13 /LF
			Demolition	1.00 LS	26,661	26,661.21 /LS
			Existing Conditions	1.00 LS	26,661	26,661.21 /LS
			Utilities			
			Utilities General			
	33.00.07.0002		30" Storm Drain			
		33.00.07.30	Buried Pipe, PVC, 30"			
			Pipeline LF per day	*150.00 lf*		*/lf*
			Traffic Control, Labor per Day	2.00 day	4,515	2,257.45 /day
			Trench Box, 8' x 24' x 10'	0.25 mo	1,617	6,466.84 /mo
			Dedicated Fire / Safety Monitor	8.00 hr	1,039	129.92 /hr
			Excav. pipe trench, w/ trench box, for > 30" pipe	426.73 CY	12,315	28.86 /CY
			Backfill / Compact @ pipe zone, for 30" & larger pipe	148.60 cy	7,405	49.83 /cy
			Backfill / Compact above pipe zone, for 30" & larger pipe	237.02 cy	2,759	11.64 /cy
			Pipe zone material	148.60 cy	11,699	78.73 /cy
			Pipe bedding material	30.37 cy	2,391	78.73 /cy

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12-13-16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.30	**Buried Pipe, PVC, 30"**			
			Imported backfill material	237.02 cy	7,997	33.74 /cy
			Haul spoils, offsite, up to 10 miles	178.97 cy	5,032	28.12 /cy
			FURNISH PVC water distribution pipe, C-905, class 165, DR 25, 30"	306.00 LF	90,632	296.18 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 30"	306.00 LF	31,146	101.79 /LF
			Pipe Marking, ID Tape	306.00 lf	744	2.43 /lf
			Pipe Marking, Copper Wire	306.00 lf	822	2.69 /lf
			33.00.07.30 Buried Pipe, PVC, 30"	**306.00 LF**	**180,113**	**588.60 /LF**
			33.00.07.0002 30" Storm Drain	**306.00 LF**	**180,113**	**588.60 /LF**
			Utilities General	**1.00 LS**	**180,113**	**180,112.90 /LS**
			Utilities	**306.00 LF**	**180,113**	**588.60 /LF**
			03A 30" Storm Drain	**306.00 LF**	**206,774**	**675.73 /LF**
04A			**30" Check Valve and Structure**			
			Utilities			
			Utilities General			
	33.20.07.0019		**30" Check Valve**			
		33.20.07.30	**Buried Valves, Check 30"**			
			Check valve, Tideflex, 30" and Structure Allowance	1.00 ea	42,710	42,709.51 /ea
			33.20.07.30 Buried Valves, Check 30"	**1.00 EA**	**42,710**	**42,709.51 /EA**
			33.20.07.0019 30" Check Valve	**1.00 EA**	**42,710**	**42,709.51 /EA**
			Utilities General	**1.00 LS**	**42,710**	**42,709.51 /LS**
			Utilities	**1.00 LF**	**42,710**	**42,709.51 /LF**
			04A 30" Check Valve and Structure	**1.00 EA**	**42,710**	**42,709.51 /EA**
05A			**Water Quality Structure**			
			Utilities			
			Utilities General			
	33.15.03.0024		**Water Quaility Structure**			
		33.15.03.04	**Buried Structures, Vaults,**			
			Water Quality Structure Allowance	1.00 ea	49,907	49,907.41 /ea

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12-13-16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			33.15.03.04 Buried Structures, Vaults,	1.00 EA	49,907	49,907.41 /EA
			33.15.03.0024 Water Quaility Structure	1.00 EA	49,907	49,907.41 /EA
			Utilities General	1.00 LS	49,907	49,907.41 /LS
			Utilities	1.00 LF	49,907	49,907.41 /LF
			05A Water Quality Structure	**1.00 EA**	**49,907**	**49,907.41 /EA**
06A			**Tie into Existing**			
			Utilities			
			Utilities General			
	33.10.01.0021		Tie into Existing			
		33.10.01.15	Buried Pipe Specials, Tie-Ins			
			Add for tie-in to existing (Adjust productivity)	6.00 ea	60,867	10,144.47 /ea
			33.10.01.15 Buried Pipe Specials, Tie-Ins	6.00 EA	60,867	10,144.47 /EA
			33.10.01.0021 Tie into Existing	6.00 EA	60,867	10,144.47 /EA
			Utilities General	1.00 LS	60,867	60,866.82 /LS
			Utilities	1.00 LF	60,867	60,866.82 /LF
			06A Tie into Existing	**6.00 EA**	**60,867**	**10,144.47 /EA**
07A			**Manholes**			
			Utilities			
			Utilities General			
	33.15.01.0004		Manholes			
		33.15.01.05	Buried Structures, Manholes, 60" Dia			
			Manholes, precast, 5' inside dia, 8' deep	19.00 ea	123,645	6,507.62 /ea
			Cast-in-Place Base, 5'	19.00 ea	58,884	3,099.17 /ea
			Slab Top, 5'	19.00 ea	32,247	1,697.20 /ea
			Reducer, 5'	19.00 ea	26,905	1,416.03 /ea
			Grade Ring, 5'	19.00 ea	7,697	405.11 /ea
			Bituminous Coating, 5'	133.00 vf	7,105	53.42 /vf
			Frame & Cover, 5'	19.00 ea	24,743	1,302.27 /ea
			Grout Invert, 5'	19.00 ea	14,326	753.99 /ea

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12-13-16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			33.15.01.05 Buried Structures, Manholes, 60" Dia	19.00 EA	295,552	15,555.35 /EA
			33.15.01.0004 Manholes	19.00 EA	295,552	15,555.35 /EA
			Utilities General	1.00 LS	295,552	295,551.66 /LS
			Utilities	133.00 LF	295,552	2,222.19 /LF
			07A Manholes	**19.00 EA**	**295,552**	**15,555.35 /EA**
08A			**Replace Catch Basins**			
			Utilities			
			Utilities General			
	33.15.02.0023		Replace Catch Basin			
		33.15.02.99	Buried Structures, Catch Basin, Frames, Covers and Inverts			
			Catch Basin Allowance	16.00 ea	213,688	13,355.51 /ea
			33.15.02.99 Buried Structures, Catch Basin, Frames, Covers and Inverts	16.00 EA	213,688	13,355.51 /EA
			33.15.02.0023 Replace Catch Basin	16.00 EA	213,688	13,355.51 /EA
			Utilities General	1.00 LS	213,688	213,688.09 /LS
			Utilities	96.00 LF	213,688	2,225.92 /LF
			08A Replace Catch Basins	**16.00 EA**	**213,688**	**13,355.51 /EA**
09A			**Storm Laterals**			
			Utilities			
			Utilities General			
	33.00.07.0006		Rain Ledders			
		33.00.07.06	Buried Pipe, PVC, 6"			
			Pipeline LF per day	***135.00 lf***		***/lf***
			Traffic Control, Labor per Day	11.00 day	24,832	2,257.45 /day
			Dedicated Fire / Safety Monitor	44.00 hr	5,717	129.92 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	674.11 CY	21,622	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	241.40 cy	9,461	39.19 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	417.72 cy	4,466	10.69 /cy
			Pipe zone material	241.40 cy	19,005	78.73 /cy

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12-13-16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.06	Buried Pipe, PVC, 6"			
			Pipe bedding material	84.63 cy	6,663	78.73 /cy
			Imported backfill material	417.72 cy	14,094	33.74 /cy
			Haul spoils, offsite, up to 10 miles	326.03 cy	9,167	28.12 /cy
			6" pipe, PVC, SDR 35, B & S, excav/bkfill not included	1,494.00 LF	51,615	34.55 /LF
			6" PVC, SDR 35, B & S, Ell, 45	135.00 ea	66,409	491.92 /ea
			6" PVC, SDR 35, B & S, reducing wye	45.00 ea	33,933	754.07 /ea
			Pipe Marking, Detection Tape	1,494.00 lf	3,635	2.43 /lf
			Pipe Marking, Copper Wire	1,494.00 lf	4,013	2.69 /lf
			CI Valve Box & Cover, w/ Concrete Collar included	45.00 ea	64,180	1,426.22 /ea
			33.00.07.06 Buried Pipe, PVC, 6"	1,494.00 LF	338,810	226.78 /LF
			33.00.07.0006 Rain Ledders	45.00 EA	338,810	7,529.11 /EA
			Utilities General	1.00 LS	338,810	338,809.93 /LS
			Utilities	1,494.00 LF	338,810	226.78 /LF
			09A Storm Laterals	45.00 EA	338,810	7,529.11 /EA
10A			Demolition			
			Existing Conditions			
			Demolition			
	02.01.01.0017		Demolition			
		02.01.01.00	General Site Demolition			
			Saw Cutting, Ashpalt, 6" Depth	400.00 lf	2,249	5.62 /lf
			Asphalt Demolition and Loading	3,500.00 cy	36,844	10.53 /cy
			Concrete Curb Demolition and Loading	3,771.00 lf	62,027	16.45 /lf
			Concrete Sidewalk Demolition and Loading	700.00 cy	7,369	10.53 /cy
			Haul Site Demolition Spoils, 12 yd capacity, 10 miles RT, priced per cy	5,500.00 cy	105,420	19.17 /cy
			Dump Charges for Site Demolition Spoils, 12 yd tandem, priced per cy	5,500.00 cy	193,303	35.15 /cy
			02.01.01.00 General Site Demolition	1.00 LS	407,213	407,212.53 /LS
			02.01.01.0017 Demolition	1.00 LS	407,213	407,212.53 /LS
			Demolition	1.00 LS	407,213	407,212.53 /LS

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12-13-16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			Existing Conditions	1.00 LS	407,213	407,212.53 /LS
			10A Demolition	**1.00 LS**	**407,213**	**407,212.53 /LS**
11A			**Curb and Gutter**			
			Concrete Work			
			Cast-In-Place Concrete Work			
	03.00.99.0015		**Curb and Gutter**			
		03.00.99.00	Concrete, Other			
			Granite Curb Allowance	3,771.00 lf	243,866	64.67 /lf
			03.00.99.00 Concrete, Other	1.00 LS	243,866	243,865.90 /LS
			03.00.99.0015 Curb and Gutter	**3,771.00 LF**	**243,866**	**64.67 /LF**
			Cast-In-Place Concrete Work	1.00 LS	243,866	243,865.90 /LS
			Concrete Work	1.00 LS	243,866	243,865.90 /LS
			11A Curb and Gutter	**3,771.00 LF**	**243,866**	**64.67 /LF**
12A			**Sidewalk**			
			Concrete Work			
			Cast-In-Place Concrete Work			
	03.00.99.0016		**Sidewalk**			
		03.00.99.00	Concrete, Other			
			Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	6,673.89 sy	15,910	2.38 /sy
			Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	56,565.00 sf	650,359	11.50 /sf
			Sidewalks, driveways, and patios, sidewalks, concrete, excludes base, for 4" thick bank run gravel base, add	56,565.00 sf	156,106	2.76 /sf
			Bituminous-stabilized base courses, for roadways and large paved areas, macadam penetration crushed stone, 4 gallons per S.Y., 8" thick	388.89 sy	20,413	52.49 /sy
			Concrete paving surface treatment, 4500 psi, fixed form, unreinforced, 12' pass, 8" thick, includes joints, finishing, and curing	388.89 sy	38,332	98.57 /sy

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Estimator: John DeWolf
Job Size: 8,057 LF
Project No.: 381098
Revision / Date: REV 1 12-13-16
Duration:
Design Stage: 10%
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			03.00.99.00 Concrete, Other	1.00 LS	881,119	881,118.97 /LS
			03.00.99.0016 Sidewalk	56,565.00 SF	881,119	15.58 /SF
			Cast-In-Place Concrete Work	1.00 LS	881,119	881,118.97 /LS
			Concrete Work	1.00 LS	881,119	881,118.97 /LS
			12A Sidewalk	**56,565.00 SF**	**881,119**	**15.58 /SF**
13A			**Brick Pavers**			
			Exterior Improvements			
			Site, Improvements			
	32.40.07.0016		Brick Pavers			
		32.40.07.00	Site Improvements, Brick and Stone Pavers			
			Brick paving, without joints, grouted, (3.9 brick/S.F.), 4" x 8" x 2-1/4", 3/8" joint	18,855.00 sf	629,972	33.41 /sf
			32.40.07.00 Site Improvements, Brick and Stone Pavers	18,855.00 SF	629,972	33.41 /SF
			32.40.07.0016 Brick Pavers	18,855.00 SF	629,972	33.41 /SF
			Site, Improvements	1.00 LS	629,972	629,972.23 /LS
			Exterior Improvements	1.00 LS	629,972	629,972.23 /LS
			13A Brick Pavers	**18,855.00 SF**	**629,972**	**33.41 /SF**
14A			**Aspalt Paving**			
			Concrete Work			
			Cast-In-Place Concrete Work			
	03.10.04.0018		Concrete Base Slab			
		03.10.04.08	Cast-In-Place Concrete, Composite Slab, 8" thick			
			Fine grade, for slab on grade, by hand	72,396.00 sf	76,349	1.05 /sf
			Slab on grade edge forms, 7" to 12"	2,666.67 sf	92,434	34.66 /sf
			Concrete, ready mix, 4500 psi	1,787.56 CY	583,021	326.16 /CY
			Add for concrete waste, 4500 psi	89.38 cy	29,151	326.16 /cy
			Add amount for Fuel Surcharges - per concrete truck load	188.00 load	7,929	42.18 /load
			Add amount for Environmental Fee - per concrete truck load	188.00 load	3,172	16.87 /load
			Placing concrete, crane & bucket	1,787.56 cy	198,215	110.89 /cy

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Estimator: John DeWolf
Job Size: 8,057 LF
Project No.: 381098
Revision / Date: REV 1 12-13-16
Duration:
Design Stage: 10%
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			03.10.04.08 Cast-In-Place Concrete, Composite Slab, 8" thick	1,788.00 CY	990,271	553.84 /CY
			03.10.04.0018 Concrete Base Slab	**72,396.00 SF**	**990,271**	**13.68 /SF**
			Cast-In-Place Concrete Work	1.00 LS	990,271	990,271.29 /LS
			Concrete Work	1.00 LS	990,271	990,271.29 /LS
			Exterior Improvements			
			Paving			
	32.40.01.0017		**Asphalt Paving**			
		32.40.01.00	Site Improvements, Paving, Asphaltic Concrete			
			Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	8,044.78 sy	19,178	2.38 /sy
			Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,6"deep	8,044.78 sy	173,530	21.57 /sy
			Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	8,044.78 sy	19,495	2.42 /sy
			Bituminous-stabilized base courses, for roadways and large paved areas, liquid application to gravel base, asphalt emulsion	1,608.96 gal	21,873	13.59 /gal
			Plant-mix asphalt paving, for highways and large paved areas, binder course, 3" thick, no hauling included	8,044.78 sy	287,582	35.75 /sy
			Plant-mix asphalt paving, for highways and large paved areas, wearing course, 1-1/2" thick, no hauling included	8,044.78 sy	164,960	20.51 /sy
			Painted pavement markings, thermoplastic, white or yellow, 4" wide, less than 6000 L.F.	8,000.00 lf	12,950	1.62 /lf
			32.40.01.00 Site Improvements, Paving, Asphaltic Concrete	8,044.00 SY	699,568	86.97 /SY
			32.40.01.0017 Asphalt Paving	**8,044.00 SY**	**699,568**	**86.97 /SY**
			Paving	8,044.00 SY	699,568	86.97 /SY
			Exterior Improvements	1.00 LS	699,568	699,568.23 /LS
			14A Aspalt Paving	**72,396.00 SF**	**1,689,840**	**23.34 /SF**
15A			**Tree Protection**			
			General Requirements			

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Estimator: John DeWolf
Job Size: 8,057 LF
Project No.: 381098
Revision / Date: REV 1 12-13-16
Duration:
Design Stage: 10%
Estimate Class: 5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			Construction Operations			
	01.01.01.0022		Tree Protection			
		01.01.06.02	GC Temporary Facilities & Services			
			Tree Protection	38.00 ea	12,137	319.40 /ea
			01.01.06.02 GC Temporary Facilities & Services	1.00 LS	12,137	12,137.30 /LS
			01.01.01.0022 Tree Protection	38.00 EA	12,137	319.40 /EA
			Construction Operations	1.00 LS	12,137	12,137.30 /LS
			General Requirements	1.00 LS	12,137	12,137.30 /LS
			15A Tree Protection	**38.00 EA**	**12,137**	**319.40 /EA**
16A			**12" Sewer**			
			Existing Conditions			
			Demolition			
	02.01.01.0024		Remove Sewer Line			
		02.01.01.00	General Site Demolition			
			Storm Sewer Pipe Demolition and Loading, 10' Deep	242.00 lf	21,085	87.13 /lf
			02.01.01.00 General Site Demolition	1.00 LS	21,085	21,085.00 /LS
			02.01.01.0024 Remove Sewer Line	1,242.00 LF	21,085	16.98 /LF
			Demolition	1.00 LS	21,085	21,085.00 /LS
			Existing Conditions	1.00 LS	21,085	21,085.00 /LS
			Utilities			
			Utilities General			
	33.00.07.0003		12" Sewer PVC			
		33.00.07.12	Buried Pipe, PVC, 12"			
			Pipeline LF per day	***150.00 lf***		***/lf***
			Traffic Control, Labor per Day	2.00 day	4,515	2,257.46 /day
			Trench Box, 8' x 24' x 10'	0.25 mo	1,617	6,466.84 /mo
			Dedicated Fire / Safety Monitor	8.00 hr	1,039	129.92 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	186.37 CY	5,978	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	57.05 cy	2,236	39.19 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	127.12 cy	1,359	10.69 /cy

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12-13-16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.12	Buried Pipe, PVC, 12"			
			Pipe zone material	57.05 cy	4,491	78.73 /cy
			Pipe bedding material	16.28 cy	1,282	78.73 /cy
			Imported backfill material	127.12 cy	4,289	33.74 /cy
			Haul spoils, offsite, up to 10 miles	73.33 cy	2,062	28.12 /cy
			12" pipe, PVC, SDR 35, B & S, excav/bkfill not included	242.00 LF	15,161	62.65 /LF
			12" PVC, SDR 35, B & S, reducing wye	8.00 ea	12,643	1,580.39 /ea
			Pipe Marking, Detection Tape	242.00 lf	589	2.43 /lf
			Pipe Marking, Copper Wire	242.00 lf	650	2.69 /lf
			33.00.07.12 Buried Pipe, PVC, 12"	242.00 LF	57,910	239.30 /LF
			33.00.07.0003 12" Sewer PVC	**242.00 LF**	**57,910**	**239.30 /LF**
			Utilities General	1.00 LS	57,910	57,910.48 /LS
			Utilities	242.00 LF	57,910	239.30 /LF
			16A 12" Sewer	**242.00 LF**	**78,995**	**326.43 /LF**
17A			**Sewer Laterals**			
			Utilities			
			Utilities General			
	33.00.07.0005		**Sewer Laterals**			
		33.00.07.06	Buried Pipe, PVC, 6"			
			Pipeline LF per day	***135.00 lf***		***/lf***
			Traffic Control, Labor per Day	2.00 day	4,515	2,257.45 /day
			Dedicated Fire / Safety Monitor	8.00 hr	1,039	129.92 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	122.73 CY	3,937	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	43.95 cy	1,722	39.19 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	76.05 cy	813	10.69 /cy
			Pipe zone material	43.95 cy	3,460	78.73 /cy
			Pipe bedding material	15.41 cy	1,213	78.73 /cy
			Imported backfill material	76.05 cy	2,566	33.74 /cy
			Haul spoils, offsite, up to 10 miles	59.36 cy	1,669	28.12 /cy
			6" pipe, PVC, SDR 35, B & S, excav/bkfill not included	272.00 LF	9,397	34.55 /LF
			6" PVC, SDR 35, B & S, Ell, 45	3.00 ea	1,476	491.92 /ea

Cost Estimate Breakdown - Alternative B

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12-13-16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.06	**Buried Pipe, PVC, 6"**			
			6" PVC, SDR 35, B & S, wye	8.00 ea	6,222	777.80 /ea
			6" PVC, SDR 35, B & S, plug	8.00 ea	1,884	235.50 /ea
			Pipe Marking, Detection Tape	272.00 lf	662	2.43 /lf
			Pipe Marking, Copper Wire	272.00 lf	731	2.69 /lf
			CI Valve Box & Cover, w/ Concrete Collar included	8.00 ea	11,410	1,426.22 /ea
			33.00.07.06 Buried Pipe, PVC, 6"	**272.00 LF**	**52,716**	**193.81 /LF**
			33.00.07.0005 Sewer Laterals	**8.00 EA**	**52,716**	**6,589.49 /EA**
			Utilities General	**1.00 LS**	**52,716**	**52,715.93 /LS**
			Utilities	**272.00 LF**	**52,716**	**193.81 /LF**
			17A Sewer Laterals	**8.00 EA**	**52,716**	**6,589.49 /EA**

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	2,104,228		13,021.136 hrs		34.90%
Material	2,686,667				44.56%
Subcontract	49,196				0.82%
Equipment	583,922		3,656.116 hrs		9.69%
Other	605,018				10.04%
Construction Total	**6,029,031**	**6,029,031**			**100.00**

Cost Estimate Breakdown - Alternative B

		Project:	381098 Onondaga Co	Estimator:	John DeWolf
Job Size:	8,057 LF	Project No.:	381098	Revision / Date:	REV 1 12-13-16
Duration:		Design Stage:	10%	Estimate Class:	5

Facility	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
01A	24" Storm Drain PVC	2,112.00 LF	782,156	370.34 /LF
02A	24" Check Valve Backflow Preventer	1.00 EA	42,710	42,709.50 /EA
03A	30" Storm Drain	306.00 LF	206,774	675.73 /LF
04A	30" Check Valve and Structure	1.00 EA	42,710	42,709.51 /EA
05A	Water Quality Structure	1.00 EA	49,907	49,907.41 /EA
06A	Tie into Existing	6.00 EA	60,867	10,144.47 /EA
07A	Manholes	19.00 EA	295,552	15,555.35 /EA
08A	Replace Catch Basins	16.00 EA	213,688	13,355.51 /EA
09A	Storm Laterals	45.00 EA	338,810	7,529.11 /EA
10A	Demolition	1.00 LS	407,213	407,212.53 /LS
11A	Curb and Gutter	3,771.00 LF	243,866	64.67 /LF
12A	Sidewalk	56,565.00 SF	881,119	15.58 /SF
13A	Brick Pavers	18,855.00 SF	629,972	33.41 /SF
14A	Aspalt Paving	72,396.00 SF	1,689,840	23.34 /SF
15A	Tree Protection	38.00 EA	12,137	319.40 /EA
16A	12" Sewer	242.00 LF	78,995	326.43 /LF
17A	Sewer Laterals	8.00 EA	52,716	6,589.49 /EA

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	2,104,228		13,021.136 hrs		34.90%
Material	2,686,667				44.56%

Cost Estimate Breakdown - Alternative B

		Project:	381098 Onondaga Co	Estimator:	John DeWolf
Job Size:	8,057 LF	Project No.:	381098	Revision / Date:	REV 1 12-13-16
Duration:		Design Stage:	10%	Estimate Class:	5

Estimate Totals

Subcontract	49,196			0.82%
Equipment	583,922		3,656.116 hrs	9.69%
Other	605,018			10.04%
Construction Total	**6,029,031**	**6,029,031**		**100.00**

Appendix D – Alternative B Water Main Replacement and Sewer Repair Estimate Breakdowns

Cost Estimate Breakdown - Alternative B Sewer Repair

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/15/16
Estimate Class: 5
Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
18A			**Parge Existing Sewer**			
			Masonry			
			Masonry			
	04.00.00.0007		**Patch Existing Sewer**			
		04.00.00.99	**Masonry, Other**			
			Bypass Pumping	***1.00 ls***		***/ls***
			Bypass Pumping, Pumps and Piping, Mob	2.00 ea	13,687	6,843.71 /ea
			Bypass Pumping, Set-up Pumps	2.00 ea	11,318	5,659.06 /ea
			Bypass Pumping, Install Suction Piping	2.00 ea	5,097	2,548.30 /ea
			Bypass Pumping, Install Discharge Piping	2.00 ea	15,571	7,785.55 /ea
			Bypass Pumping, System Operation	5.00 week	146,813	29,362.63 /week
			Patching conc, wall, incl. chipping, cleaning and epoxy grout, 3/4" deep	6,400.00 sf	614,126	95.96 /sf
			High pressure wash	6,400.00 sf	44,994	7.03 /sf
			04.00.00.99 Masonry, Other	**6,400.00 SF**	**851,607**	**133.06 /SF**
			04.00.00.0007 Patch Existing Sewer	**546.00 LF**	**851,607**	**1,559.72 /LF**
			Masonry	**6,400.00 SF**	**851,607**	**133.06 /SF**
			Masonry	**6,400.00 SF**	**851,607**	**133.06 /SF**
			18A Parge Existing Sewer	**546.00 LF**	**851,607**	**1,559.72 /LF**

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	252,229		1,492.000 hrs		29.62%
Material	467,660				54.91%
Subcontract	53,431				6.27%
Equipment	78,287		264.000 hrs		9.19%
Other					

Cost Estimate Breakdown - Alternative B Sewer Repair

	Project:	381098 Onondaga Co	Estimator: John DeWolf
Job Size: 8,057 LF	Project No.:	381098	Revision / Date: 12/15/16
Duration:	Design Stage:	10%	Estimate Class: 5

Estimate Totals

Construction Total	**851,607**	**851,607**		**100.00**

Cost Estimate Breakdown - Alternative B Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/15/16
Estimate Class: 5
Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
19A			**16" Waterline**			
			Existing Conditions			
			Demolition			
	02.01.01.0017		**Demolition**			
		02.01.01.00	**General Site Demolition**			
			Water Main Pipe Demolition and Loading, 4' Deep	1,116.00 lf	81,042	72.62 /lf
			02.01.01.00 General Site Demolition	**1.00 LS**	**81,042**	**81,042.47 /LS**
			02.01.01.0017 Demolition	**1.00 LS**	**81,042**	**81,042.47 /LS**
			Demolition	**1.00 LS**	**81,042**	**81,042.47 /LS**
			Existing Conditions	**1.00 LS**	**81,042**	**81,042.47 /LS**
			Utilities			
			Utilities General			
	33.00.07.0008		**16" Waterline**			
		33.00.07.16	**Buried Pipe, PVC, 16"**			
			Pipeline LF per day	***200.00 lf***		***/lf***
			Traffic Control, Labor per Day	6.00 day	13,547	2,257.82 /day
			Dedicated Fire / Safety Monitor	24.00 hr	3,119	129.94 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	805.70 CY	25,848	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	321.08 cy	12,585	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	436.25 cy	4,665	10.69 /cy
			Pipe zone material	321.08 cy	25,282	78.74 /cy
			Pipe bedding material	83.03 cy	6,538	78.74 /cy
			Imported backfill material	436.25 cy	14,722	33.75 /cy
			Haul spoils, offsite, up to 10 miles	404.11 cy	11,364	28.12 /cy
			16" DI, MJ, Ell, 90	4.00 ea	23,355	5,838.77 /ea
			16" DI, MJ, tee	3.00 ea	26,343	8,780.85 /ea
			Solid Sleeve, DI, MJ, 16"	2.00 ea	6,840	3,419.84 /ea
			FURNISH PVC water distribution pipe, C-905, class 235, DR 18, 16"	1,116.00 LF	118,787	106.44 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 16"	1,116.00 LF	68,765	61.62 /LF
			Pipe Marking, ID Tape	1,116.00 lf	2,715	2.43 /lf
			Pipe Marking, Copper Wire	1,116.00 lf	2,998	2.69 /lf

Cost Estimate Breakdown - Alternative B Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/15/16
Estimate Class: 5
Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			33.00.07.16 Buried Pipe, PVC, 16"	1,116.00 LF	367,471	329.27 /LF
			33.00.07.0008 16" Waterline	**1,116.00 LF**	**367,471**	**329.27 /LF**
	33.00.07.0009		**Temp Waterline**			
		33.00.09.16	Buried Pipe, HDPE, 16"			
			25 tn Rough Terrain	0.25 mo	18,125	72,501.88 /mo
			16" HDPE shop fabricated pipe - FURNISH	1,120.00 LF	76,976	68.73 /LF
			16" HDPE, shop fabricated, Ell, 90	6.00 ea	7,177	1,196.09 /ea
			16" HDPE, shop fabricated, tee	4.00 ea	5,499	1,374.83 /ea
			16" HDPE - Install shop fabricated pipe spools	1,120.00 LF	34,461	30.77 /LF
			Field weld fusion joints, Subcontracted (S), 16"	65.00 ea	9,139	140.61 /ea
			33.00.09.16 Buried Pipe, HDPE, 16"	1,120.00 LF	151,378	135.16 /LF
			33.00.07.0009 Temp Waterline	**1,120.00 LF**	**151,378**	**135.16 /LF**
			Utilities General	1.00 LS	518,849	518,848.58 /LS
			Utilities	1,116.00 LF	518,849	464.92 /LF
			19A 16" Waterline	**1,116.00 LF**	**599,891**	**537.54 /LF**
20A			**12" Waterline**			
			Existing Conditions			
			Demolition			
	02.01.01.0017		**Demolition**			
		02.01.01.00	General Site Demolition			
			Water Main Pipe Demolition and Loading, 4' Deep	171.00 lf	12,418	72.62 /lf
			02.01.01.00 General Site Demolition	1.00 LS	12,418	12,417.79 /LS
			02.01.01.0017 Demolition	**1.00 LS**	**12,418**	**12,417.79 /LS**
			Demolition	1.00 LS	12,418	12,417.79 /LS
			Existing Conditions	1.00 LS	12,418	12,417.79 /LS
			Utilities			
			Utilities General			
	33.00.07.0010		**12" Waterline**			
		33.00.07.12	Buried Pipe, PVC, 12"			

Cost Estimate Breakdown - Alternative B Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/15/16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.12	**Buried Pipe, PVC, 12"**			
			Pipeline LF per day	***171.00 lf***		***/lf***
			Traffic Control, Labor per Day	1.00 day	2,258	2,257.81 /day
			Dedicated Fire / Safety Monitor	4.00 hr	520	129.94 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	111.67 CY	3,582	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	40.31 cy	1,580	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	67.80 cy	725	10.69 /cy
			Pipe zone material	40.31 cy	3,174	78.74 /cy
			Pipe bedding material	11.51 cy	906	78.74 /cy
			Imported backfill material	67.80 cy	2,288	33.75 /cy
			Haul spoils, offsite, up to 10 miles	51.82 cy	1,457	28.12 /cy
			12" DI, MJ, Ell, 90	2.00 ea	6,652	3,326.00 /ea
			12" DI, MJ, tee	2.00 ea	10,973	5,486.74 /ea
			Solid Sleeve, DI, MJ, 12"	2.00 ea	4,165	2,082.57 /ea
			FURNISH PVC water distribution pipe, C-900, class 150, DR 18, 12"	171.00 LF	10,320	60.35 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 12"	171.00 LF	9,620	56.26 /LF
			Pipe Marking, ID Tape	171.00 lf	416	2.43 /lf
			Pipe Marking, Copper Wire	171.00 lf	459	2.69 /lf
			33.00.07.12 Buried Pipe, PVC, 12"	**171.00 LF**	**59,097**	**345.59 /LF**
			33.00.07.0010 12" Waterline	**171.00 LF**	**59,097**	**345.59 /LF**
	33.00.09.0011		**Temp Waterline**			
		33.00.09.12	**Buried Pipe, HDPE, 12"**			
			25 tn Rough Terrain	0.10 mo	7,250	72,502.00 /mo
			12" HDPE shop fabricated pipe - FURNISH	175.00 LF	7,667	43.81 /LF
			12" HDPE, shop fabricated, Ell, 90	4.00 ea	2,250	562.43 /ea
			12" HDPE, shop fabricated, tee	2.00 ea	1,650	824.89 /ea
			12" HDPE - Install shop fabricated pipe spools	175.00 LF	4,308	24.61 /LF
			Field weld fusion joints, Self Perform (L), 12"	10.00 ea	1,406	140.61 /ea
			33.00.09.12 Buried Pipe, HDPE, 12"		**24,531**	**/LF**
			33.00.09.0011 Temp Waterline		**24,531**	**/LF**

Cost Estimate Breakdown - Alternative B Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/15/16
Estimate Class: 5
Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			Utilities General	1.00 LS	83,627	83,627.21 /LS
			Utilities	171.00 LF	83,627	489.05 /LF
			20A 12" Waterline	**171.00 LF**	**96,045**	**561.67 /LF**
21A			**8" Watermain**			
			Existing Conditions			
			Demolition			
	02.01.01.0017		**Demolition**			
		02.01.01.00	General Site Demolition			
			Water Main Pipe Demolition and Loading, 4' Deep	729.00 lf	52,939	72.62 /lf
			02.01.01.00 General Site Demolition	1.00 LS	52,939	52,939.05 /LS
			02.01.01.0017 Demolition	**1.00 LS**	**52,939**	**52,939.05 /LS**
			Demolition	1.00 LS	52,939	52,939.05 /LS
			Existing Conditions	1.00 LS	52,939	52,939.05 /LS
			Utilities			
			Utilities General			
	33.00.07.0012		**8" Watermain**			
		33.00.07.08	Buried Pipe, PVC, 8"			
			Pipeline LF per day	***175.00 lf***		***/lf***
			Traffic Control, Labor per Day	2.00 day	4,516	2,257.82 /day
			Dedicated Fire / Safety Monitor	8.00 hr	1,040	129.94 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	425.87 CY	13,662	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	135.44 cy	5,309	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	286.56 cy	3,064	10.69 /cy
			Pipe zone material	135.44 cy	10,665	78.74 /cy
			Pipe bedding material	43.88 cy	3,455	78.74 /cy
			Imported backfill material	286.56 cy	9,670	33.75 /cy
			Haul spoils, offsite, up to 10 miles	179.32 cy	5,043	28.12 /cy
			8" DI, MJ, Ell, 90	4.00 ea	7,885	1,971.31 /ea
			8" DI, MJ, Ell, 45	2.00 ea	3,661	1,830.56 /ea
			8" DI, MJ, Ell, 22 1/2	4.00 ea	8,485	2,121.34 /ea

Cost Estimate Breakdown - Alternative B Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/15/16
Estimate Class: 5

Job Size: 8,057 LF
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.08	Buried Pipe, PVC, 8"			
			8" DI, MJ, tee	2.00 ea	5,825	2,912.45 /ea
			Solid Sleeve, DI, MJ, 8"	2.00 ea	3,062	1,531.05 /ea
			FURNISH PVC water distribution pipe, C-900, class 150, DR 18, 8"	729.00 LF	20,767	28.49 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 8"	729.00 LF	31,248	42.86 /LF
			Pipe Marking, ID Tape	729.00 lf	1,774	2.43 /lf
			Pipe Marking, Copper Wire	729.00 lf	1,958	2.69 /lf
			33.00.07.08 Buried Pipe, PVC, 8"	729.00 LF	141,089	193.54 /LF
			33.00.07.0012 8" Watermain	**729.00 LF**	**141,089**	**193.54 /LF**
	33.00.09.0013		**Temp Waterline**			
		33.00.09.08	Buried Pipe, HDPE, 8"			
			25 tn Rough Terrain	0.25 mo	18,125	72,501.80 /mo
			8" HDPE shop fabricated pipe - FURNISH	740.00 LF	14,629	19.77 /LF
			8" HDPE, shop fabricated, Ell, 90	4.00 ea	1,245	311.22 /ea
			8" HDPE, shop fabricated, tee	4.00 ea	1,785	446.20 /ea
			8" HDPE - Install shop fabricated pipe spools	740.00 LF	15,179	20.51 /LF
			Field weld fusion joints, Self Perform (L), 8"	37.00 ea	5,202	140.61 /ea
			33.00.09.08 Buried Pipe, HDPE, 8"	740.00 LF	56,166	75.90 /LF
			33.00.09.0013 Temp Waterline	**740.00 LF**	**56,166**	**75.90 /LF**
			Utilities General	1.00 LS	197,255	197,254.89 /LS
			Utilities	729.00 LF	197,255	270.58 /LF
			21A 8" Watermain	**729.00 LF**	**250,194**	**343.20 /LF**
22A			**Fire Hydrant Runs**			
			Utilities			
			Utilities General			
	33.00.07.0014		**Fire Hydrant Runs**			
		33.00.07.06	Buried Pipe, PVC, 6"			
			Pipeline LF per day	***100.00 lf***		***/lf***
			Traffic Control, Labor per Day	1.00 day	2,258	2,257.80 /day
			Dedicated Fire / Safety Monitor	8.00 hr	1,040	129.95 /hr

Cost Estimate Breakdown - Alternative B Water Main Replacement

		Project:	381098 Onondaga Co	Estimator:	John DeWolf
Job Size:	8,057 LF	Project No.:	381098	Revision / Date:	12/15/16
Duration:		Design Stage:	10%	Estimate Class:	5

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.06	**Buried Pipe, PVC, 6"**			
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	54.97 CY	1,763	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	16.16 cy	633	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	38.79 cy	415	10.69 /cy
			Pipe zone material	16.16 cy	1,272	78.74 /cy
			Pipe bedding material	5.67 cy	446	78.74 /cy
			Imported backfill material	38.79 cy	1,309	33.75 /cy
			Haul spoils, offsite, up to 10 miles	21.83 cy	614	28.12 /cy
			6" DI, MJ, tee	4.00 ea	9,253	2,313.21 /ea
			Solid Sleeve, DI, MJ, 6"	4.00 ea	4,836	1,209.12 /ea
			FURNISH PVC water distribution pipe, C-900, class 150, DR 18, 6"	100.00 LF	1,651	16.51 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 6"	100.00 LF	4,019	40.19 /LF
			Pipe Marking, ID Tape	100.00 lf	243	2.43 /lf
			Pipe Marking, Copper Wire	100.00 lf	269	2.69 /lf
			Fire hydrant assembly (includes everything from valve thru hydrant)	4.00 ea	51,833	12,958.28 /ea
			33.00.07.06 Buried Pipe, PVC, 6"	**100.00 LF**	**81,854**	**818.54 /LF**
			33.00.07.0014 Fire Hydrant Runs	**4.00 EA**	**81,854**	**20,463.61 /EA**
			Utilities General	**1.00 LS**	**81,854**	**81,854.45 /LS**
			Utilities	**100.00 LF**	**81,854**	**818.54 /LF**
			22A Fire Hydrant Runs	**4.00 EA**	**81,854**	**20,463.61 /EA**

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	349,119		1,865.568 hrs		33.96%
Material	443,229				43.12%
Subcontract	29,024				2.82%
Equipment	206,612		1,154.648 hrs		20.10%

Cost Estimate Breakdown - Alternative B Water Main Replacement

	Project:	381098 Onondaga Co	Estimator: John DeWolf
Job Size: 8,057 LF	Project No.:	381098	Revision / Date: 12/15/16
Duration:	Design Stage:	10%	Estimate Class: 5

Estimate Totals

	Other		
Construction Total	**1,027,984**	**1,027,984**	**100.00**

Appendix E – Alternative C Overall Cost Estimate Breakdown

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5
Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
01A			**30" Sewer**			
			Existing Conditions			
			Demolition			
	02.01.01.0024		**Remove Sewer Line**			
		02.01.01.00	**General Site Demolition**			
			Storm Sewer Pipe Demolition and Loading, 10' Deep	306.00 lf	26,658	87.12 /lf
			02.01.01.00 General Site Demolition	**1.00 LS**	**26,658**	**26,657.81 /LS**
			02.01.01.0024 Remove Sewer Line	**306.00 LF**	**26,658**	**87.12 /LF**
			Demolition	**1.00 LS**	**26,658**	**26,657.81 /LS**
			Existing Conditions	**1.00 LS**	**26,658**	**26,657.81 /LS**
			Utilities			
			Utilities General			
	33.00.07.0001		**30" Sewer**			
		33.00.07.30	**Buried Pipe, PVC, 30"**			
			Pipeline LF per Day	***150.00 lf***		***/lf***
			Traffic Control, Labor per Day	2.00 day	4,514	2,257.16 /day
			Trench Box, 8' x 24' x 10'	0.25 mo	1,617	6,466.08 /mo
			Dedicated Fire / Safety Monitor	8.00 hr	1,039	129.90 /hr
			Excav. pipe trench, w/ trench box, for > 30" pipe	426.73 CY	12,313	28.86 /CY
			Backfill / Compact @ pipe zone, for 30" & larger pipe	148.60 cy	7,404	49.82 /cy
			Backfill / Compact above pipe zone, for 30" & larger pipe	237.02 cy	2,758	11.64 /cy
			Pipe zone material	148.60 cy	11,697	78.72 /cy
			Pipe bedding material	30.37 cy	2,391	78.72 /cy
			Imported backfill material	237.02 cy	7,996	33.74 /cy
			Haul spoils, offsite, up to 10 miles	178.97 cy	5,031	28.11 /cy
			FURNISH PVC water distribution pipe, C-905, class 165, DR 25, 30"	306.00 LF	90,620	296.15 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 30"	306.00 LF	31,142	101.77 /LF
			Pipe Marking, ID Tape	306.00 lf	744	2.43 /lf
			Pipe Marking, Copper Wire	306.00 lf	822	2.69 /lf
			33.00.07.30 Buried Pipe, PVC, 30"	**306.00 LF**	**180,090**	**588.53 /LF**

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5
Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			33.00.07.0001 30" Sewer	**306.00 LF**	**180,090**	**588.53 /LF**
			Utilities General	**1.00 LS**	**180,090**	**180,089.97 /LS**
			Utilities	**306.00 LF**	**180,090**	**588.53 /LF**
			01A 30" Sewer	**306.00 LF**	**206,748**	**675.65 /LF**
02A			**40" Combined Sewer/Storm**			
			Existing Conditions			
			Demolition			
	02.01.01.0024		**Remove Sewer Line**			
		02.01.01.00	**General Site Demolition**			
			Storm Sewer Pipe Demolition and Loading, 10' Deep	306.00 lf	26,658	87.12 /lf
			02.01.01.00 General Site Demolition	**1.00 LS**	**26,658**	**26,657.84 /LS**
			02.01.01.0024 Remove Sewer Line	**920.00 LF**	**26,658**	**28.98 /LF**
			Demolition	**1.00 LS**	**26,658**	**26,657.84 /LS**
			Existing Conditions	**1.00 LS**	**26,658**	**26,657.84 /LS**
			Utilities			
			Utilities General			
	33.00.07.0002		**40" Combined Strom/Sewer**			
		33.00.07.40	**Buried Pipe, PVC, 40"**			
			Pipeline LF per Day	***150.00 ea***		***/ea***
			Traffic Control, Labor per Day	5.00 day	11,286	2,257.16 /day
			Trench Box, 8' x 24' x 10'	0.25 mo	1,617	6,466.04 /mo
			Dedicated Fire / Safety Monitor	20.00 hr	2,598	129.91 /hr
			Excav. pipe trench, w/ trench box, for > 30" pipe	1,751.16 CY	50,530	28.86 /CY
			Backfill / Compact @ pipe zone, for 30" & larger pipe	621.04 cy	30,942	49.82 /cy
			Backfill / Compact above pipe zone, for 30" & larger pipe	865.55 cy	10,073	11.64 /cy
			Pipe zone material	621.04 cy	48,887	78.72 /cy
			Pipe bedding material	110.89 cy	8,729	78.72 /cy
			Imported backfill material	865.55 cy	29,200	33.74 /cy
			Haul spoils, offsite, up to 10 miles	731.93 cy	20,577	28.11 /cy
			42" DI, MJ, Ell, 90	1.00 ea	39,094	39,093.71 /ea

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5
Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.40	Buried Pipe, PVC, 40"			
			42" DI, MJ, Ell, 45	3.00 ea	105,671	35,223.68 /ea
			42" DI, MJ, Ell, 22 1/2	4.00 ea	143,260	35,814.90 /ea
			42" DI, MJ, cap or plug	1.00 ea	15,103	15,102.87 /ea
			Solid Sleeve, DI, MJ, 42"	2.00 ea	37,592	18,795.83 /ea
			FURNISH PVC water distribution pipe, C-905, class 165, DR 25, 42"	920.00 LF	591,851	643.32 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 42"	920.00 LF	120,734	131.23 /LF
			Pipe Marking, ID Tape	920.00 lf	2,238	2.43 /lf
			Pipe Marking, Copper Wire	920.00 lf	2,471	2.69 /lf
			33.00.07.40 Buried Pipe, PVC, 40"	920.00 LF	1,272,451	1,383.10 /LF
			33.00.07.0002 40" Combined Strom/Sewer	920.00 LF	1,272,451	1,383.10 /LF
			Utilities General	1.00 LS	1,272,451	1,272,450.62 /LS
			Utilities	920.00 LF	1,272,451	1,383.10 /LF
			02A 40" Combined Sewer/Storm	920.00 LF	1,299,108	1,412.07 /LF
03A			30" Check Valve, and Structure			
			Utilities			
			Utilities General			
	33.20.07.0019		30" Check Valve			
		33.20.07.30	Buried Valves, Check 30"			
			Check valve, Tideflex, 30" and Structure	1.00 ea	42,662	42,661.88 /ea
			33.20.07.30 Buried Valves, Check 30"	1.00 EA	42,662	42,661.88 /EA
			33.20.07.0019 30" Check Valve	1.00 EA	42,662	42,661.88 /EA
			Utilities General	1.00 LS	42,662	42,661.88 /LS
			Utilities	1.00 LF	42,662	42,661.88 /LF
			03A 30" Check Valve, and Structure	1.00 EA	42,662	42,661.88 /EA
04A			Tie into Existing			
			Utilities			
			Utilities General			
	33.10.01.0021		Tie into Existing			

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5

Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.10.01.15	Buried Pipe Specials, Tie-Ins			
			Allowance for Tie-ins	6.00 ea	42,662	7,110.32 /ea
			33.10.01.15 Buried Pipe Specials, Tie-Ins	6.00 EA	42,662	7,110.32 /EA
			33.10.01.0021 Tie into Existing	6.00 EA	42,662	7,110.32 /EA
			Utilities General	1.00 LS	42,662	42,661.90 /LS
			Utilities	1.00 LF	42,662	42,661.90 /LF
			04A Tie into Existing	6.00 EA	42,662	7,110.32 /EA
05A			Manholes			
			Utilities			
			Utilities General			
	33.15.01.0004		Manholes			
		33.15.01.05	Buried Structures, Manholes, 60" Dia			
			Manholes, precast, 5' inside dia, 8' deep	12.00 ea	78,082	6,506.79 /ea
			Cast-in-Place Base, 5'	12.00 ea	37,185	3,098.78 /ea
			Slab Top, 5'	12.00 ea	20,364	1,696.98 /ea
			Reducer, 5'	12.00 ea	16,990	1,415.85 /ea
			Grade Ring, 5'	12.00 ea	4,861	405.06 /ea
			Bituminous Coating, 5'	96.00 vf	5,128	53.42 /vf
			Frame & Cover, 5'	12.00 ea	15,625	1,302.10 /ea
			Grout Invert, 5'	12.00 ea	9,047	753.90 /ea
			33.15.01.05 Buried Structures, Manholes, 60" Dia	12.00 EA	187,281	15,606.79 /EA
			33.15.01.0004 Manholes	12.00 EA	187,281	15,606.79 /EA
			Utilities General	1.00 LS	187,281	187,281.47 /LS
			Utilities	96.00 LF	187,281	1,950.85 /LF
			05A Manholes	12.00 EA	187,281	15,606.79 /EA
06A			Replace Catch Basins			
			Utilities			
			Utilities General			
	33.15.02.0023		Replace Catch Basin			

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5

Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.15.02.99	Buried Structures, Catch Basin, Frames, Covers and Inverts			
			Catch Basin Allowance	6.00 ea	64,098	10,683.05 /ea
			33.15.02.99 Buried Structures, Catch Basin, Frames, Covers and Inverts	6.00 EA	64,098	10,683.05 /EA
			33.15.02.0023 Replace Catch Basin	6.00 EA	64,098	10,683.05 /EA
			Utilities General	1.00 LS	64,098	64,098.27 /LS
			Utilities	36.00 LF	64,098	1,780.51 /LF
			06A Replace Catch Basins	**6.00 EA**	**64,098**	**10,683.05 /EA**
07A			**Storm and Sewer Laterals**			
			Utilities			
			Utilities General			
	33.00.07.0006		Rain Ledders and Sewer Connections			
		33.00.07.06	Buried Pipe, PVC, 6"			
			Pipeline LF per Day	***130.00 lf***		***/lf***
			Traffic Control, Labor per Day	5.00 day	11,286	2,257.16 /day
			Dedicated Fire / Safety Monitor	20.00 hr	2,598	129.91 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	349.63 CY	11,213	32.07 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	102.77 cy	4,027	39.19 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	246.75 cy	2,638	10.69 /cy
			Pipe zone material	102.77 cy	8,090	78.72 /cy
			Pipe bedding material	36.03 cy	2,836	78.72 /cy
			Imported backfill material	246.75 cy	8,324	33.74 /cy
			Haul spoils, offsite, up to 10 miles	138.80 cy	3,902	28.11 /cy
			6" pipe, PVC, SDR 35, B & S, excav/bkfill not included	636.00 LF	21,970	34.54 /LF
			6" PVC, SDR 35, B & S, Ell, 45	66.00 ea	32,463	491.86 /ea
			6" PVC, SDR 35, B & S, wye	22.00 ea	17,109	777.70 /ea
			6" PVC, SDR 35, B & S, plug	22.00 ea	5,180	235.47 /ea
			Pipe Marking, Detection Tape	636.00 lf	1,547	2.43 /lf
			Pipe Marking, Copper Wire	636.00 lf	1,708	2.69 /lf
			CI Valve Box & Cover, w/ Concrete Collar included	22.00 ea	31,373	1,426.03 /ea

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5

Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			33.00.07.06 Buried Pipe, PVC, 6"	636.00 LF	166,264	261.42 /LF
			33.00.07.0006 Rain Ledders and Sewer Connections	22.00 EA	166,264	7,557.46 /EA
			Utilities General	1.00 LS	166,264	166,264.18 /LS
			Utilities	636.00 LF	166,264	261.42 /LF
			07A Storm and Sewer Laterals	22.00 EA	166,264	7,557.46 /EA
08A			Demolition			
			Existing Conditions			
			Demolition			
	02.01.01.0011		Demolition			
		02.01.01.00	General Site Demolition			
			Saw Cutting, Ashpalt, 6" Depth	400.00 lf	2,249	5.62 /lf
			Asphalt Demolition and Loading	1,400.00 cy	14,736	10.53 /cy
			Concrete Curb Demolition and Loading	1,327.00 lf	21,824	16.45 /lf
			Concrete Sidewalk Demolition and Loading	300.00 cy	3,158	10.53 /cy
			Haul Site Demolition Spoils, 12 yd capacity, 10 miles RT, priced per cy	3,000.00 cy	57,495	19.16 /cy
			Dump Charges for Site Demolition Spoils, 12 yd tandem, priced per cy	3,000.00 cy	105,425	35.14 /cy
			02.01.01.00 General Site Demolition	1.00 LS	204,886	204,886.03 /LS
			02.01.01.0011 Demolition	1.00 LS	204,886	204,886.03 /LS
			Demolition	1.00 LS	204,886	204,886.03 /LS
			Existing Conditions	1.00 LS	204,886	204,886.03 /LS
			08A Demolition	1.00 LS	204,886	204,886.03 /LS
09A			Curb and Gutter			
			Exterior Improvements			
			Site, Improvements			
	32.40.05.0007		Curb and Gutters			
		32.40.05.00	Site Improvements, Curbs and Gutters			
			Granit Curb Allowance	1,327.00 lf	85,805	64.66 /lf
			32.40.05.00 Site Improvements, Curbs and Gutters	1,327.00 LF	85,805	64.66 /LF

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5
Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			32.40.05.0007 Curb and Gutters	**1,327.00 LF**	**85,805**	**64.66 /LF**
			Site, Improvements	**1.00 LS**	**85,805**	**85,804.52 /LS**
			Exterior Improvements	**1.00 LS**	**85,805**	**85,804.52 /LS**
			09A Curb and Gutter	**1,327.00 LF**	**85,805**	**64.66 /LF**
10A			**Sidewalk**			
			Exterior Improvements			
			Site, Improvements			
	32.40.06.0008		**Sidewalk**			
		32.40.06.00	**Site Improvements, Flatwork, Sidewalk**			
			Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	2,489.44 sy	5,934	2.38 /sy
			Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	19,905.00 sf	228,829	11.50 /sf
			Sidewalks, driveways, and patios, sidewalks, concrete, excludes base, for 4" thick bank run gravel base, add	19,905.00 sf	54,926	2.76 /sf
			Bituminous-stabilized base courses, for roadways and large paved areas, macadam penetration crushed stone, 4 gallons per S.Y., 8" thick	277.78 sy	14,579	52.48 /sy
			Concrete paving surface treatment, 4500 psi, fixed form, unreinforced, 12' pass, 8" thick, includes joints, finishing, and curing	277.78 sy	27,376	98.55 /sy
			32.40.06.00 Site Improvements, Flatwork, Sidewalk	**19,905.00 SF**	**331,644**	**16.66 /SF**
			32.40.06.0008 Sidewalk	**19,905.00 SF**	**331,644**	**16.66 /SF**
			Site, Improvements	**1.00 LS**	**331,644**	**331,644.45 /LS**
			Exterior Improvements	**1.00 LS**	**331,644**	**331,644.45 /LS**
			10A Sidewalk	**19,905.00 SF**	**331,644**	**16.66 /SF**
11A			**Asphalt Paving**			
			Concrete Work			
			Cast-In-Place Concrete Work			
	03.10.04.0018		**Concrete Base Slab**			
		03.10.04.08	**Cast-In-Place Concrete, Composite Slab, 8" thick**			

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5

Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		03.10.04.08	Cast-In-Place Concrete, Composite Slab, 8" thick			
			Fine grade, for slab on grade, by hand	31,698.00 sf	33,425	1.05 /sf
			Slab on grade edge forms, 7" to 12"	1,000.00 sf	34,658	34.66 /sf
			Concrete, ready mix, 4500 psi	782.67 CY	255,239	326.11 /CY
			Add for concrete waste, 4500 psi	39.13 cy	12,762	326.11 /cy
			Add amount for Fuel Surcharges - per concrete truck load	83.00 load	3,500	42.17 /load
			Add amount for Environmental Fee - per concrete truck load	83.00 load	1,400	16.87 /load
			Placing concrete, direct chute	782.67 cy	54,235	69.30 /cy
			03.10.04.08 Cast-In-Place Concrete, Composite Slab, 8" thick	783.00 CY	395,218	504.75 /CY
			03.10.04.0018 Concrete Base Slab	31,698.00 SF	395,218	12.47 /SF
			Cast-In-Place Concrete Work	783.00 CY	395,218	504.75 /CY
			Concrete Work	783.00 CY	395,218	504.75 /CY
			Exterior Improvements			
			Site, Improvements			
	32.40.01.0009		Asphalt Paving			
		32.40.01.00	Site Improvements, Paving, Asphaltic Concrete			
			Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,6"deep	3,522.22 sy	75,966	21.57 /sy
			Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	3,522.22 sy	8,534	2.42 /sy
			Bituminous-stabilized base courses, for roadways and large paved areas, liquid application to gravel base, asphalt emulsion	704.44 gal	9,575	13.59 /gal
			Plant-mix asphalt paving, for highways and large paved areas, binder course, 3" thick, no hauling included	3,522.22 sy	125,895	35.74 /sy
			Plant-mix asphalt paving, for highways and large paved areas, wearing course, 1-1/2" thick, no hauling included	3,522.22 sy	72,215	20.50 /sy
			Painted pavement markings, thermoplastic, white or yellow, 6" wide, less than 6000 L.F.	2,700.00 lf	5,793	2.15 /lf
			32.40.01.00 Site Improvements, Paving, Asphaltic Concrete	3,522.00 SY	297,979	84.61 /SY

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5

Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			32.40.01.0009 Asphalt Paving	3,522.00 SY	297,979	84.61 /SY
			Site, Improvements	1.00 LS	297,979	297,979.38 /LS
			Exterior Improvements	1.00 LS	297,979	297,979.38 /LS
			11A Asphalt Paving	31,698.00 SF	693,198	21.87 /SF
12A			Tree Protection			
			General Requirements			
			Construction Operations			
	01.01.01.0022		Tree Protection			
		01.01.06.02	GC Temporary Facilities & Services			
			Tree Protection	38.00 ea	12,136	319.36 /ea
			01.01.06.02 GC Temporary Facilities & Services	1.00 LS	12,136	12,135.65 /LS
			01.01.01.0022 Tree Protection	38.00 EA	12,136	319.36 /EA
			Construction Operations	1.00 LS	12,136	12,135.65 /LS
			General Requirements	1.00 LS	12,136	12,135.65 /LS
			12A Tree Protection	38.00 EA	12,136	319.36 /EA
13A			Regulator Allowance			
			Utilities			
			Utilities General			
	33.10.99.0024		Regulator Allowance			
		33.10.99.01	Buried Pipe Specials, Regulator Allowance			
			Regulator Allowance	1.00 ls	56,227	56,226.54 /ls
			33.10.99.01 Buried Pipe Specials, Regulator Allowance	1.00 LS	56,227	56,226.54 /LS
			33.10.99.0024 Regulator Allowance	1.00 LS	56,227	56,226.54 /LS
			Utilities General	1.00 LS	56,227	56,226.54 /LS
			Utilities	539.00 LF	56,227	104.32 /LF
			13A Regulator Allowance	539.00 LF	56,227	104.32 /LF

Estimate Totals

Cost Estimate Breakdown - Alternative C

	Project:	381098 Onondaga Co	Estimator: John DeWolf
Job Size:	Project No.:	381098	Revision / Date: REV 1 12/13/16
Duration:	Design Stage:	10%	Estimate Class: 5

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	676,771		4,040.559 hrs		19.95%
Material	2,047,382				60.35%
Subcontract	31,760				0.94%
Equipment	333,218		1,882.318 hrs		9.82%
Other	303,589				8.95%
Construction Total	**3,392,720**	**3,392,720**			**100.00**

Cost Estimate Breakdown - Alternative C

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: REV 1 12/13/16
Estimate Class: 5
Job Size:
Duration:

Facility	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
01A	30" Sewer	306.00 LF	206,748	675.65 /LF
02A	40" Combined Sewer/Storm	920.00 LF	1,299,108	1,412.07 /LF
03A	30" Check Valve, and Structure	1.00 EA	42,662	42,661.88 /EA
04A	Tie into Existing	6.00 EA	42,662	7,110.32 /EA
05A	Manholes	12.00 EA	187,281	15,606.79 /EA
06A	Replace Catch Basins	6.00 EA	64,098	10,683.05 /EA
07A	Storm and Sewer Laterals	22.00 EA	166,264	7,557.46 /EA
08A	Demolition	1.00 LS	204,886	204,886.03 /LS
09A	Curb and Gutter	1,327.00 LF	85,805	64.66 /LF
10A	Sidewalk	19,905.00 SF	331,644	16.66 /SF
11A	Asphalt Paving	31,698.00 SF	693,198	21.87 /SF
12A	Tree Protection	38.00 EA	12,136	319.36 /EA
13A	Regulator Allowance	539.00 LF	56,227	104.32 /LF

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	676,771		4,040.559 hrs		19.95%
Material	2,047,382				60.35%
Subcontract	31,760				0.94%
Equipment	333,218		1,882.318 hrs		9.82%
Other	303,589				8.95%
Construction Total	**3,392,720**	**3,392,720**			**100.00**

Appendix F – Alternative C Water Main Replacement and Sewer Repair Estimate Breakdowns

Cost Estimate Breakdown - Alternative C Sewer Repair

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/15/16
Estimate Class: 5
Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
18A			**Parge Existing Sewer**			
			Masonry			
			Masonry			
	04.00.00.0007		**Patch Existing Sewer**			
		04.00.00.99	**Masonry, Other**			
			Bypass Pumping	***1.00 ls***		***/ls***
			Bypass Pumping, Pumps and Piping, Mob	2.00 ea	13,687	6,843.71 /ea
			Bypass Pumping, Set-up Pumps	2.00 ea	11,318	5,659.06 /ea
			Bypass Pumping, Install Suction Piping	2.00 ea	5,097	2,548.30 /ea
			Bypass Pumping, Install Discharge Piping	2.00 ea	15,571	7,785.55 /ea
			Bypass Pumping, System Operation	5.00 week	146,813	29,362.63 /week
			Patching conc, wall, incl. chipping, cleaning and epoxy grout, 3/4" deep	6,400.00 sf	614,126	95.96 /sf
			High pressure wash	6,400.00 sf	44,994	7.03 /sf
			04.00.00.99 Masonry, Other	**6,400.00 SF**	**851,607**	**133.06 /SF**
			04.00.00.0007 Patch Existing Sewer	**546.00 LF**	**851,607**	**1,559.72 /LF**
			Masonry	**6,400.00 SF**	**851,607**	**133.06 /SF**
			Masonry	**6,400.00 SF**	**851,607**	**133.06 /SF**
			18A Parge Existing Sewer	**546.00 LF**	**851,607**	**1,559.72 /LF**

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	252,229		1,492.000 hrs		29.62%
Material	467,660				54.91%
Subcontract	53,431				6.27%
Equipment	78,287		264.000 hrs		9.19%
Other					

Cost Estimate Breakdown - Alternative C Sewer Repair

	Project: 381098 Onondaga Co	Estimator:	John DeWolf
Job Size:	Project No.: 381098	Revision / Date:	12/15/16
Duration:	Design Stage: 10%	Estimate Class:	5

Estimate Totals

Construction Total	**851,607**	**851,607**	**100.00**

Cost Estimate Breakdown - Alternative C Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/13/16
Estimate Class: 5
Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
13A			**16" Water**			
			Existing Conditions			
			Demolition			
	02.01.01.0011		**Demolition**			
		02.01.01.00	**General Site Demolition**			
			Water Main Pipe Demolition and Loading, 4' Deep	539.00 lf	39,142	72.62 /lf
			02.01.01.00 General Site Demolition	**1.00 LS**	**39,142**	**39,141.50 /LS**
			02.01.01.0011 Demolition	**1.00 LS**	**39,142**	**39,141.50 /LS**
			Demolition	**1.00 LS**	**39,142**	**39,141.50 /LS**
			Existing Conditions	**1.00 LS**	**39,142**	**39,141.50 /LS**
			Utilities			
			Utilities General			
	33.00.07.0008		**16" Waterline**			
		33.00.07.16	**Buried Pipe, PVC, 16"**			
			Pipeline LF per Day	***200.00 lf***		***/lf***
			Traffic Control, Labor per Day	3.00 day	6,773	2,257.82 /day
			Dedicated Fire / Safety Monitor	24.00 hr	3,119	129.94 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	389.13 CY	12,484	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	155.07 cy	6,078	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	210.70 cy	2,253	10.69 /cy
			Pipe zone material	155.07 cy	12,210	78.74 /cy
			Pipe bedding material	40.10 cy	3,157	78.74 /cy
			Imported backfill material	210.70 cy	7,110	33.75 /cy
			Haul spoils, offsite, up to 10 miles	195.17 cy	5,488	28.12 /cy
			16" DI, MJ, Ell, 90	4.00 ea	23,355	5,838.77 /ea
			16" DI, MJ, tee	3.00 ea	26,343	8,780.84 /ea
			Solid Sleeve, DI, MJ, 16"	2.00 ea	6,840	3,419.84 /ea
			FURNISH PVC water distribution pipe, C-905, class 235, DR 18, 16"	539.00 LF	57,371	106.44 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 16"	539.00 LF	33,212	61.62 /LF
			Pipe Marking, ID Tape	539.00 lf	1,312	2.43 /lf
			Pipe Marking, Copper Wire	539.00 lf	1,448	2.69 /lf

Cost Estimate Breakdown - Alternative C Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/13/16
Estimate Class: 5
Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			33.00.07.16 Buried Pipe, PVC, 16"	**539.00 LF**	**208,553**	**386.93 /LF**
		33.00.09.16	**Buried Pipe, HDPE, 16"**			
			25 tn Rough Terrain	0.25 mo	18,125	72,501.80 /mo
			16" HDPE shop fabricated pipe - FURNISH	539.00 LF	37,045	68.73 /LF
			16" HDPE, shop fabricated, Ell, 90	6.00 ea	7,177	1,196.09 /ea
			16" HDPE, shop fabricated, tee	4.00 ea	5,499	1,374.83 /ea
			16" HDPE - Install shop fabricated pipe spools	539.00 LF	16,584	30.77 /LF
			Field weld fusion joints, Subcontracted (S), 16"	27.00 ea	3,796	140.61 /ea
			33.00.09.16 Buried Pipe, HDPE, 16"	**539.00 LF**	**88,227**	**163.69 /LF**
			33.00.07.0008 16" Waterline	**539.00 LF**	**296,780**	**550.61 /LF**
			Utilities General	**1.00 LS**	**296,780**	**296,779.52 /LS**
			Utilities	**539.00 LF**	**296,780**	**550.61 /LF**
			13A 16" Water	**539.00 LF**	**335,921**	**623.23 /LF**
14A			**8" Water**			
			Existing Conditions			
			Demolition			
	02.01.01.0011		**Demolition**			
		02.01.01.00	**General Site Demolition**			
			Water Main Pipe Demolition and Loading, 4' Deep	486.00 lf	35,293	72.62 /lf
			02.01.01.00 General Site Demolition	**1.00 LS**	**35,293**	**35,292.69 /LS**
			02.01.01.0011 Demolition	**1.00 LS**	**35,293**	**35,292.69 /LS**
			Demolition	**1.00 LS**	**35,293**	**35,292.69 /LS**
			Existing Conditions	**1.00 LS**	**35,293**	**35,292.69 /LS**
			Utilities			
			Utilities General			
	33.00.07.0003		**8" Water**			
		33.00.07.08	**Buried Pipe, PVC, 8"**			
			Pipeline LF per Day	***171.00 lf***		***/lf***
			Traffic Control, Labor per Day	1.00 day	2,258	2,257.82 /day
			Dedicated Fire / Safety Monitor	4.00 hr	520	129.94 /hr

Cost Estimate Breakdown - Alternative C Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/13/16
Estimate Class: 5

Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
		33.00.07.08	**Buried Pipe, PVC, 8"**			
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	317.39 CY	10,182	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	114.57 cy	4,491	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	192.71 cy	2,061	10.69 /cy
			Pipe zone material	114.57 cy	9,021	78.74 /cy
			Pipe bedding material	32.71 cy	2,576	78.74 /cy
			Imported backfill material	192.71 cy	6,503	33.75 /cy
			Haul spoils, offsite, up to 10 miles	147.28 cy	4,142	28.12 /cy
			8" DI, MJ, Ell, 90	2.00 ea	3,943	1,971.29 /ea
			8" DI, MJ, Ell, 45	3.00 ea	5,492	1,830.56 /ea
			8" DI, MJ, Ell, 22 1/2	4.00 ea	8,485	2,121.33 /ea
			8" DI, MJ, tee	2.00 ea	5,825	2,912.46 /ea
			Solid Sleeve, DI, MJ, 8"	2.00 ea	3,062	1,531.05 /ea
			FURNISH PVC water distribution pipe, C-900, class 150, DR 18, 8"	486.00 LF	13,845	28.49 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 8"	486.00 LF	20,832	42.86 /LF
			Pipe Marking, ID Tape	486.00 lf	1,183	2.43 /lf
			Pipe Marking, Copper Wire	486.00 lf	1,306	2.69 /lf
			33.00.07.08 Buried Pipe, PVC, 8"	**486.00 LF**	**105,724**	**217.54 /LF**
		33.00.09.08	**Buried Pipe, HDPE, 8"**			
			25 tn Rough Terrain	0.10 mo	7,250	72,501.80 /mo
			8" HDPE shop fabricated pipe - FURNISH	486.00 LF	9,608	19.77 /LF
			8" HDPE, shop fabricated, Ell, 90	4.00 ea	1,245	311.22 /ea
			8" HDPE, shop fabricated, tee	2.00 ea	892	446.20 /ea
			8" HDPE - Install shop fabricated pipe spools	486.00 LF	9,969	20.51 /LF
			Field weld fusion joints, Self Perform (L), 8"	25.00 ea	3,375	134.98 /ea
			33.00.09.08 Buried Pipe, HDPE, 8"	**486.00 LF**	**32,339**	**66.54 /LF**
			33.00.07.0003 8" Water	**486.00 LF**	**138,063**	**284.08 /LF**
			Utilities General	**1.00 LS**	**138,063**	**138,063.15 /LS**
			Utilities	**486.00 LF**	**138,063**	**284.08 /LF**
			14A 8" Water	**486.00 LF**	**173,356**	**356.70 /LF**
16A			**Fire Hydrant**			

Cost Estimate Breakdown - Alternative C Water Main Replacement

Project: 381098 Onondaga Co
Project No.: 381098
Design Stage: 10%
Estimator: John DeWolf
Revision / Date: 12/13/16
Estimate Class: 5

Job Size:
Duration:

Facility	WorkActiv	Unit Price	Description	Takeoff Quantity	Grand Total w/Markups	Grand Total Unit Price
			Utilities			
			Utilities General			
	33.00.07.0010		**Fire Hydrants**			
		33.00.07.06	**Buried Pipe, PVC, 6"**			
			Pipeline LF per day	***100.00 lf***		***/lf***
			Traffic Control, Labor per Day	1.00 day	2,258	2,257.80 /day
			Dedicated Fire / Safety Monitor	8.00 hr	1,040	129.95 /hr
			Excav. pipe trench, w/ trench box, for 4" - 24" pipe	54.97 CY	1,763	32.08 /CY
			Backfill / Compact @ pipe zone, for 4" thru 24" pipe	16.16 cy	633	39.20 /cy
			Backfill / Compact above pipe zone, for 4" thru 24" pipe	38.79 cy	415	10.69 /cy
			Pipe zone material	16.16 cy	1,272	78.74 /cy
			Pipe bedding material	5.67 cy	446	78.74 /cy
			Imported backfill material	38.79 cy	1,309	33.75 /cy
			Haul spoils, offsite, up to 10 miles	21.83 cy	614	28.12 /cy
			6" DI, MJ, tee	4.00 ea	9,253	2,313.21 /ea
			Solid Sleeve, DI, MJ, 6"	4.00 ea	4,836	1,209.12 /ea
			FURNISH PVC water distribution pipe, C-900, class 150, DR 18, 6"	100.00 LF	1,651	16.51 /LF
			Install PVC water distribution pipe, excav/bkfill NOT included, 6"	100.00 LF	4,019	40.19 /LF
			Pipe Marking, ID Tape	100.00 lf	243	2.43 /lf
			Pipe Marking, Copper Wire	100.00 lf	269	2.69 /lf
			Fire hydrant assembly (includes everything from valve thru hydrant)	4.00 ea	51,833	12,958.28 /ea
			33.00.07.06 Buried Pipe, PVC, 6"	**100.00 LF**	**81,854**	**818.54 /LF**
			33.00.07.0010 Fire Hydrants	**4.00 EA**	**81,854**	**20,463.61 /EA**
			Utilities General	**1.00 LS**	**81,854**	**81,854.45 /LS**
			Utilities	**100.00 LF**	**81,854**	**818.54 /LF**
			16A Fire Hydrant	**4.00 EA**	**81,854**	**20,463.61 /EA**

Estimate Totals

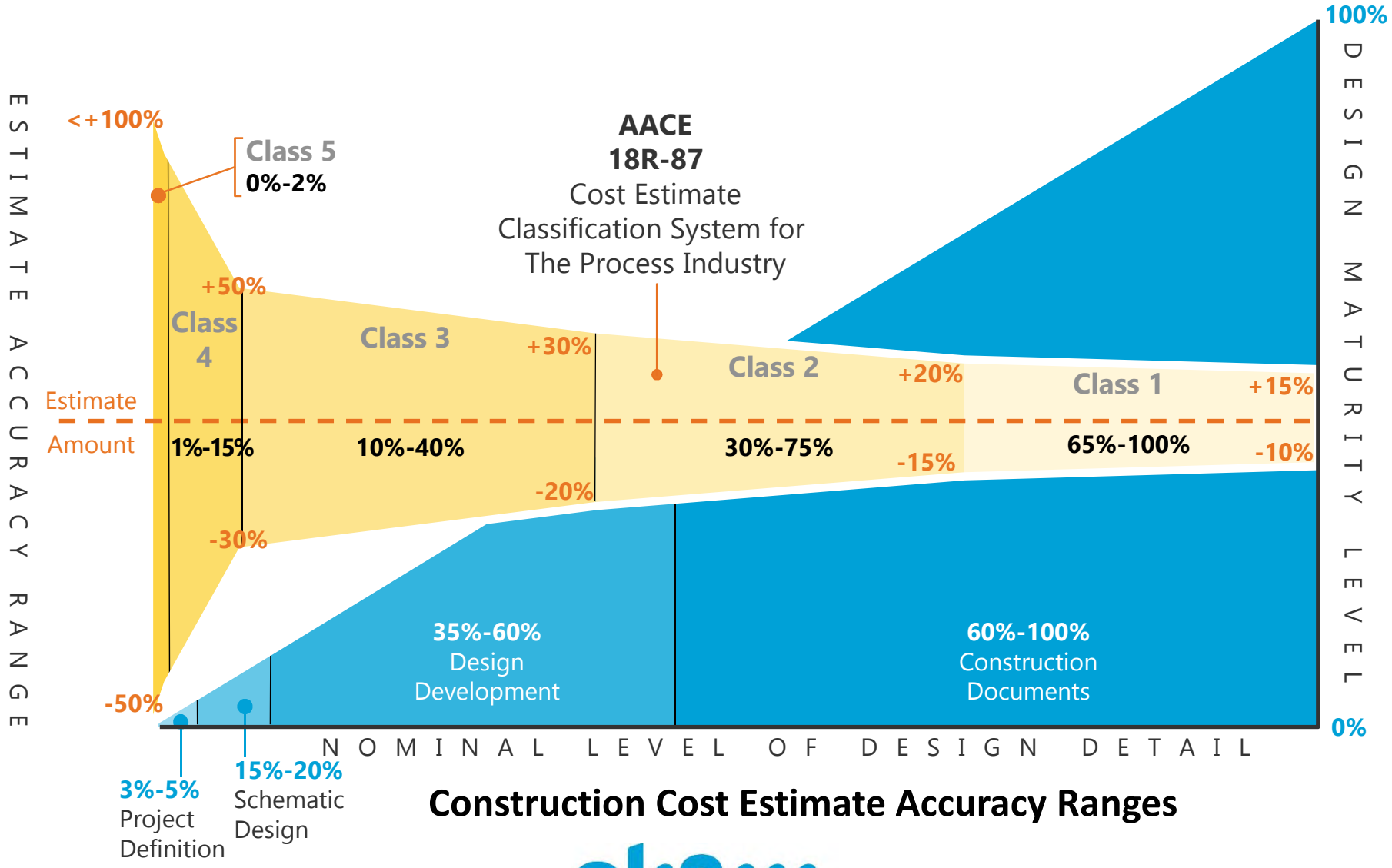
Cost Estimate Breakdown - Alternative C Water Main Replacement

	Project:	381098 Onondaga Co	Estimator: John DeWolf
Job Size:	Project No.:	381098	Revision / Date: 12/13/16
Duration:	Design Stage:	10%	Estimate Class: 5

Estimate Totals

Construction Costs	Amount	Totals	Hours	Rate	% of Total
Labor	199,338		1,064.193 hrs		33.72%
Material	256,287				43.36%
Subcontract	17,415				2.95%
Equipment	118,092		693.743 hrs		19.98%
Other					
Construction Total	**591,132**	**591,132**			**100.00**

Appendix G – Cost Estimate Accuracy Ranges



Construction Cost Estimate Accuracy Ranges

ch2m.SM

Estimate Class	Class 5	Class 4	Class 3	Class 2	Class 1
LEVEL OF PROJECT DEFINITION Expressed as a % of complete definition	0% to 2%	1% to 15%	10% to 40%	30% to 70%	50% to 100%
END USAGE Typical Purpose of Estimate	Concept Screening	Study or Feasibility	Budget Authorization, or Control	Control or Bid / Tender	Check Estimate or Bid / Tender
METHODOLOGY Typical estimating method	Capacity Factored, Parametric Models, Judgment, or Analogy	Equipment Factored or Parametric Models	Semi-Detailed Unit Costs with Assembly Level Line Items	Detailed Unit Cost with Forced Detailed Take-Off	Detailed Unit Cost with Detailed Take-Off
EXPECTED ACCURACY RANGE Typical variation in low and high ranges [a]	L: -20% to -50% / H: +30% to +100%	L: -15% to -30% / H: +20% to +50%	L: -10% to -20% / H: +10% to +30%	L: -5% to -15% / H: +5% to +20%	L: -3% to -10% / H: +3% to +15%
PREPARATION EFFORT Typical degree of effort relative to least cost index of 1 [b]	1	2 to 4	3 to 10	4 to 20	5 to 100
REFINED CLASS DEFINITION	Class 5 estimates are generally prepared based on very limited information, and subsequently have very wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systematic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with very little effort expended - sometimes requiring less than 1 hour to prepare. Often, little more than proposed plant type, location, and capacity are known at the time of estimate preparation.	Class 4 estimates are generally prepared based on very limited information, and subsequently have very wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 5% complete, and would comprise at a minimum the following: plant capacity, block schematics, indicated layout, process flow diagrams (PFDs) for main process systems and preliminary engineered process and utility equipment lists. Level of Project Definition Required: 1% to 15% of full project definition.	Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering is from 10% to 40% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, preliminary piping and instrument diagrams, utility flow diagrams, preliminary piping and instrument diagrams, plot plan, developed layout drawings, and essentially complete engineering process and utility equipment lists. Level Of Project Definition Required: 10% to 40% of full project definition.	Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value. Typically, engineering is from 30% to 70% complete, and would comprise at a minimum the following: Process flow diagrams, utility flow diagrams, piping and instrument flow diagrams, heat and material balances, final plot plan, final layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc.	Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids, or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to comprise a fair price estimate or bid check estimate to compare against a contractor's bid estimate, or to evaluate/dispute claims. Typically, engineering is from 50% to 100% complete, and would comprise virtually all engineering and design documentation of the project, and complete project execution and commissioning plans. Level for Project Definition Required: 50% to 100% of full project definition.
END USAGE DEFINED	Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.	Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to next stage.	Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase "control estimate" against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate may be the last estimate required and could well form the only basis for cost/schedule control.	Class 2 estimates are typically prepared as the detailed control baseline against which all actual costs an resources will now be monitored for variation to the budget, and form a part of the change/variation control program.	Class 1 estimates are typically prepared to form a current control estimate to be used as the final control baseline against which all actual coasts and resources will now be monitored for variations to the budget, and form a part of the change/variation control program. They may be used to evaluate bid checking, to support vendor/contractor negotiations, or for claim evaluations and dispute resolution.
ESTIMATING METHODS USED	Class 5 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, and other parametric and modeling techniques.	Class 4 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, the Miller method, gross unit costs/ratios, and other parametric and modeling techniques.	Class 3 estimates usually involve more deterministic estimating methods that stochastic methods. They usually involve a high degree of unit cost line items, although these may be at an assembly level of detail rather than individual components. Factoring and other stochastic methods may be used to estimate less-significant areas of the project.	Class 2 estimates always involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detailed takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods.	Class 1 estimates involve the highest degree of deterministic estimating methods, and require a great amount of effort. Class 1 estimates are prepared in great detail, and thus are usually performed on only the most important or critical areas of the project. All items in the estimate are usually unit cost line items based on actual design quantities.
EXPECTED ACCURACY RANGE	Typical accuracy ranges for Class 5 estimates are -20% to -50% on the low side, and +30% to +100% on the high side, depending on the technological complexity of the project, appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 3 estimates are -10% to -20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 2 estimates are -5% to -15% on the low side, and +5% to +20% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 1 estimates are -3% to -10% on the low side, and +3% to +15% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.
EFFORT TO PREPARE (for US$20MM project):	As little as 1 hour or less to prepare to perhaps more than 200 hours, depending on the project and the estimating methodology used.	Typically, as little as 20 hours or less to perhaps more than 300 hours, depending on the project and the estimating methodology used.	Typically, as little as 150 hours or less to perhaps more than 1500 hours, depending on the project and the estimating methodology used.	Typically, as little as 300 hours or less to perhaps more than 3000 hours, depending on the project and the estimating methodology used. Bid Estimates typically require more effort than estimates used for funding or control purposes	Class 1 estimates require the most effort to create, and as such are generally developed for only selected areas of the project, or for bidding purposes. A complete Class 1 estimate may involve as little as 600 hours or less, to perhaps more than 6,000 hours, depending on the project and the estimating methodology used. Bid estimate typically require more effort than estimates used for funding or control purposes.
ANSI Standard Reference Z94.2-1989 name; Alternate Estimate Names, Terms, Expressions, Synonyms:	Order of Magnitude Estimate; Ratio, ballpark, blue sky, seat-of-pants, ROM, idea study, prospect estimate, concession license estimate, guesstimate, rule-of thumb.	Budget Estimate; Screening, top-down, feasibility, authorization, factored, pre-design, pre-study.	Budget Estimate; Budget, scope, sanction, semi-detailed, authorization, preliminary control, concept study, development, basic engineering phase estimate, target estimate.	Definitive Estimate; Detailed Control, forced detail, execution phase, master control, engineering, bid, tender, change order estimate.	Definitive Estimate; Full detail, release, fall-out, tender, firm price, bottoms-up, final, detailed control, forced detail, execution phase, master control, fair price, definitive, change order estimate.

Estimate Class	Class 5	Class 4	Class 3	Class 2	Class 1
Estimate Input Checklist and Maturity Index	Class 5	Class 4	Class 3	Class 2	Class 1
GENERAL PROJECT DATA					
Project Scope Description	General	Preliminary	Defined	Defined	Defined
Plant Production / Facility Capacity	Assumed	Preliminary	Defined	Defined	Defined
Plant Location	General	Approximate	Specific	Specific	Specific
Soils & Hydrology	None	Preliminary	Defined	Defined	Defined
Integrated Project Plan	None	Preliminary	Defined	Defined	Defined
Project Master Schedule	None	Preliminary	Defined	Defined	Defined
Escalation Strategy	None	Preliminary	Defined	Defined	Defined
Work Breakdown Structure	None	Preliminary	Defined	Defined	Defined
Project Code of Accounts	None	Preliminary	Defined	Defined	Defined
Contracting Strategy	Assumed	Assumed	Preliminary	Defined	Defined
ENGINEERING DELIVERABLES:	**Class 5**	**Class 4**	**Class 3**	**Class 2**	**Class 1**
Block Flow Diagrams	Started / Preliminary	Preliminary / Complete	Complete	Complete	Complete
Plot Plans		Started	Preliminary / Complete	Complete	Complete
Process Flow Diagrams (PFDs)		Started / Preliminary	Preliminary / Complete	Complete	Complete
Utility Flow Diagrams (UFDs)		Started / Preliminary	Preliminary / Complete	Complete	Complete
Piping & Instrument Diagrams (P&IDS)		Started	Preliminary / Complete	Complete	Complete
Heat and Material Balances		Started	Preliminary / Complete	Complete	Complete
Process Equipment List		Started / Preliminary	Preliminary / Complete	Complete	Complete
Utility Equipment List		Started / Preliminary	Preliminary / Complete	Complete	Complete
Electrical One Line Drawings		Started / Preliminary	Preliminary / Complete	Complete	Complete
Specifications and Datasheets		Started	Preliminary / Complete	Complete	Complete
General Equipment Arrangement Drawings		Started	Preliminary / Complete	Complete	Complete
Spare Parts Lists			Started / Preliminary	Preliminary	Complete
Architectural Details / Schedules		Started	Preliminary / Complete	Complete	Complete
Structural Details		Started	Preliminary / Complete	Complete	Complete
Mechanical Discipline Drawings			Started	Preliminary	Preliminary / Complete
Electrical Discipline Drawings			Started	Preliminary	Preliminary / Complete
System Discipline Drawings			Started	Preliminary	Preliminary / Complete
Civil/Site Discipline Drawings			Started	Preliminary	Preliminary / Complete
Demolition Details		Started	Preliminary / Complete	Complete	Complete