BUCK SEIFERT & JOST INC. CONSULTING ENGINEERS

JOB 400.482 - Western Reservoir

SHEET No. _____ OF _____

CALCULATED BY_____ DATE_____

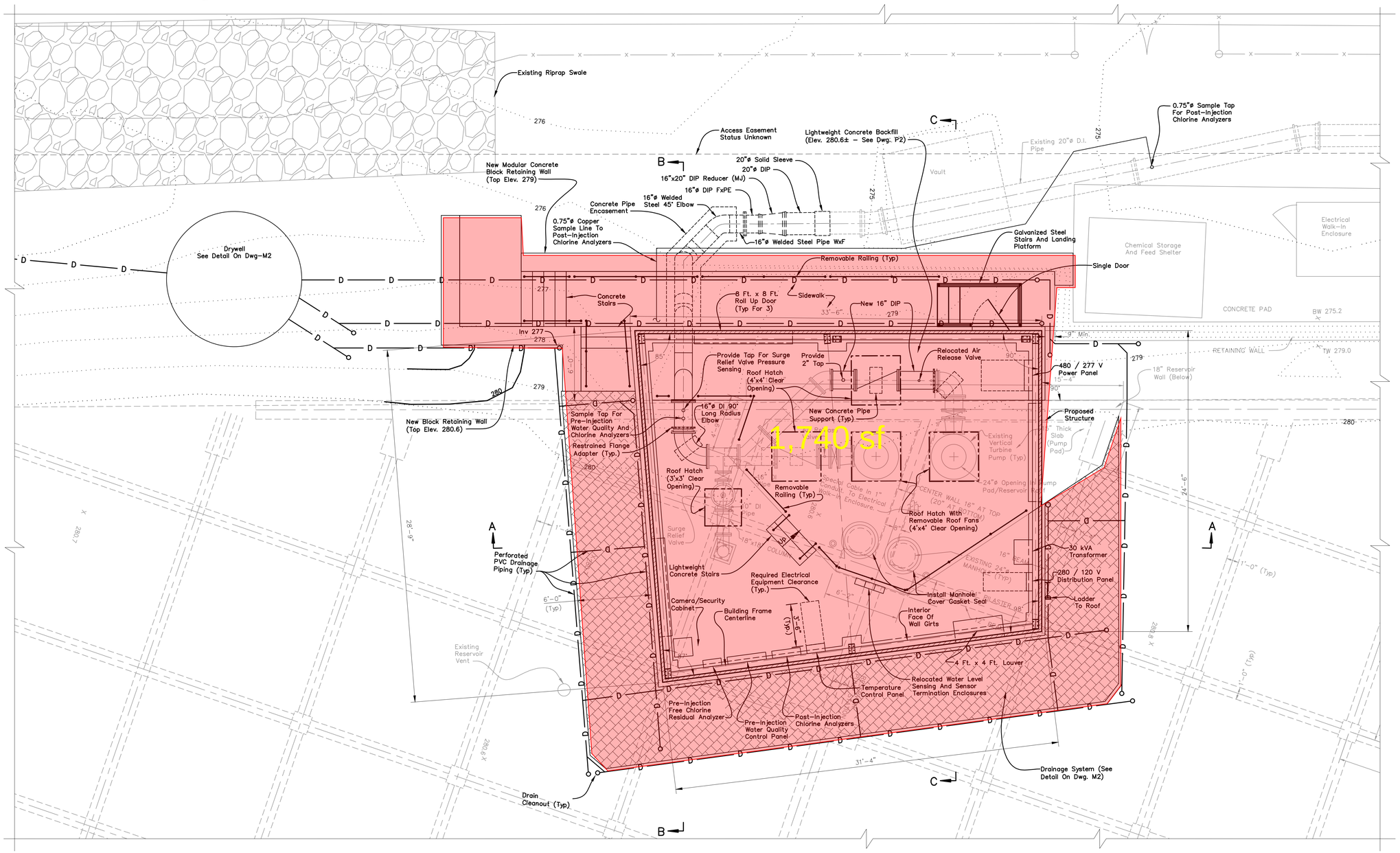
CHECKED BY_____ DATE_____

400.482 - Western Reservoir

Storm Water Drainage System and Drywell Design

August 14, 2020

Michael S. Johnson
New Jersey Professional Engineer
License No. GE44487



EQUIPMENT AND PIPING PLAN

SCALE 1/4"=1'-0"

Notes:

1. Roll Up Doors Shall Be Provided With Windows And Folding Accoridion Style Security Gates.
2. Existing Reservoir Roof Exposed Within Proposed Building To Be Skim Coated.
3. All Exposed Concrete Surfaces Shall Be Epoxy Coated.
4. Discharge From Water Quality And Chlorine Analyzers To Be Provided With An Air Gap And Tied Into Drainage System

TENTATIVE & PRELIMINARY NOT FOR CONSTRUCTION

Scale: 1/4" = 1'-0"
0 1' 2' 4' 6'

BS&J CADD DRAWING NAME: C:\Users\Robert Mathias\Desktop\Work At Home\UPDATED FILES\400.482 CAD – Original Drawings\400.482-D1_P1_P2_A1_A2_S1_S2_E2.dwg 4/28/2020 TES

Drawn By: TES
Checked By: RJM
Examined By: MSJ
Approved By: GMR

No.	DATE	DESCRIPTION	CKD.	APP'D.

REVISIONS

BS&J

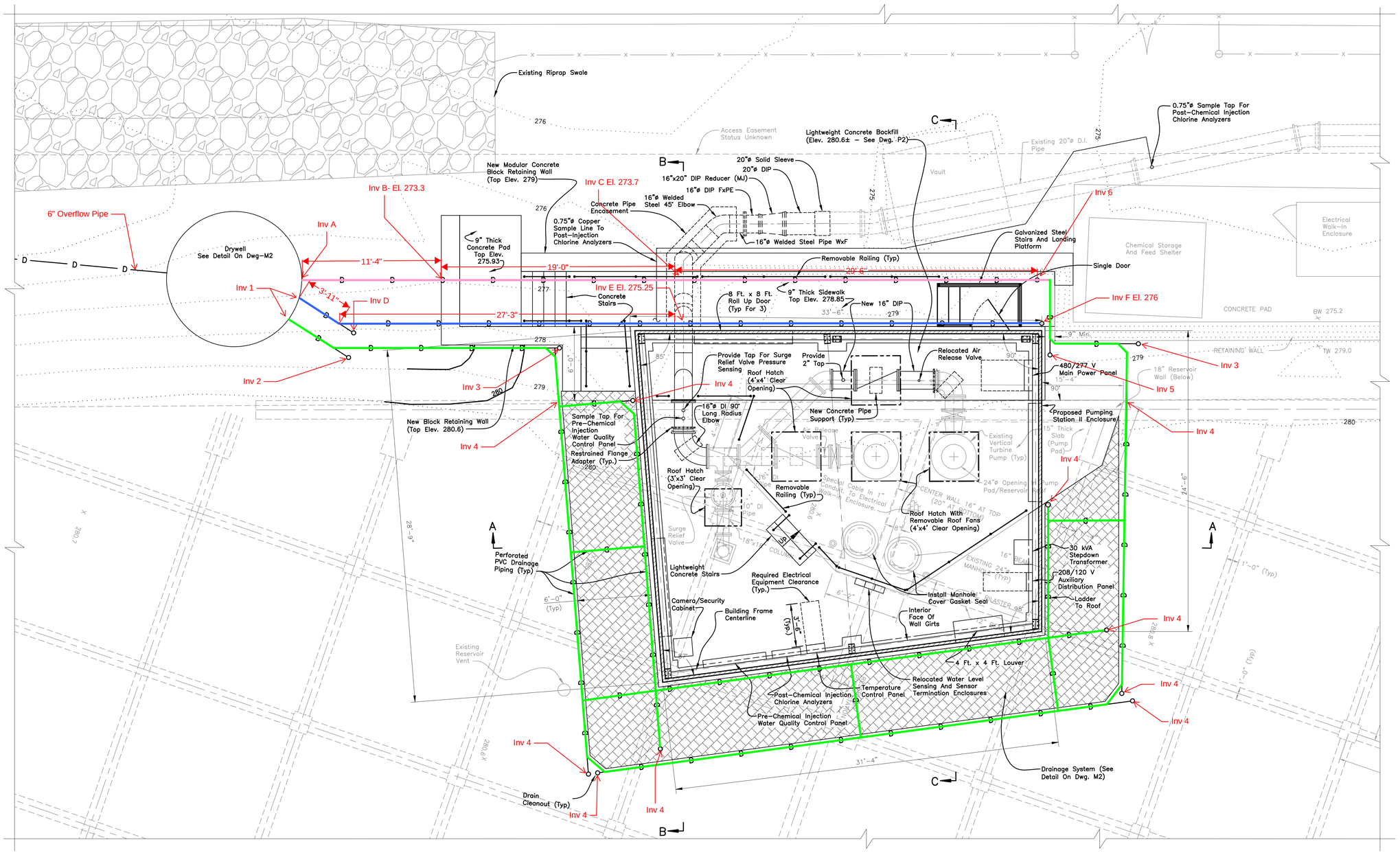
BUCK, SEIFERT & JOST, INC.
Consulting Engineers
65 Oak Street, Norwood, New Jersey 07648
CERTIFICATE OF AUTHORIZATION #24GA27996600

SUEZ Water New Jersey Inc.
461 From Road
PARAMUS, NJ 07652

WESTERN RESERVOIR
PUMPING STATION II ENCLOSURE
BOROUGH OF WOODCLIFF LAKE, BERGEN COUNTY, N.J.
EQUIPMENT AND PIPING PLAN

GLENN M. RAMETTA
New Jersey Professional Engineer
License No. 24GE04593000

DRAWING No. 400.482-P1
SHEET No. 8 OF 13
SCALE: AS SHOWN
DATE: APRIL 2020



EQUIPMENT AND PIPING PLAN

SCALE 1/4"=1'-0"

Notes:

1. Roll Up Doors Shall Be Provided With Windows And Folding Accordion Style Security Gates.
2. Existing Reservoir Roof Exposed Within Proposed Building To Be Skim Coated.
3. All Exposed Concrete Surfaces Shall Be Epoxy Coated.
4. Discharge From Water Quality And Chlorine Analyzers To Be Provided With An Air Gap And Tied Into Drainage System.
5. Gutters Shall Be 'Leaf-Free' Type.

TENTATIVE & PRELIMINARY NOT FOR CONSTRUCTION

Scale: 1/4" = 1'-0"

0 1' 2' 4' 6'

BS&J CADD DRAWING NAME: C:\Users\Robert Mathias\Desktop\Work At Home\UPDATED FILES\400.482 CAD – Original Drawings\400.482-D1_P1_P2_A1_A2_S1_S2_E2.dwg 5/1/2020 TES

Drawn By: TES
Checked By: RJM
Examined By: RvA
Approved By: GMR

No.	DATE	DESCRIPTION	CKD.	APP'D.

REVISIONS

BS&J

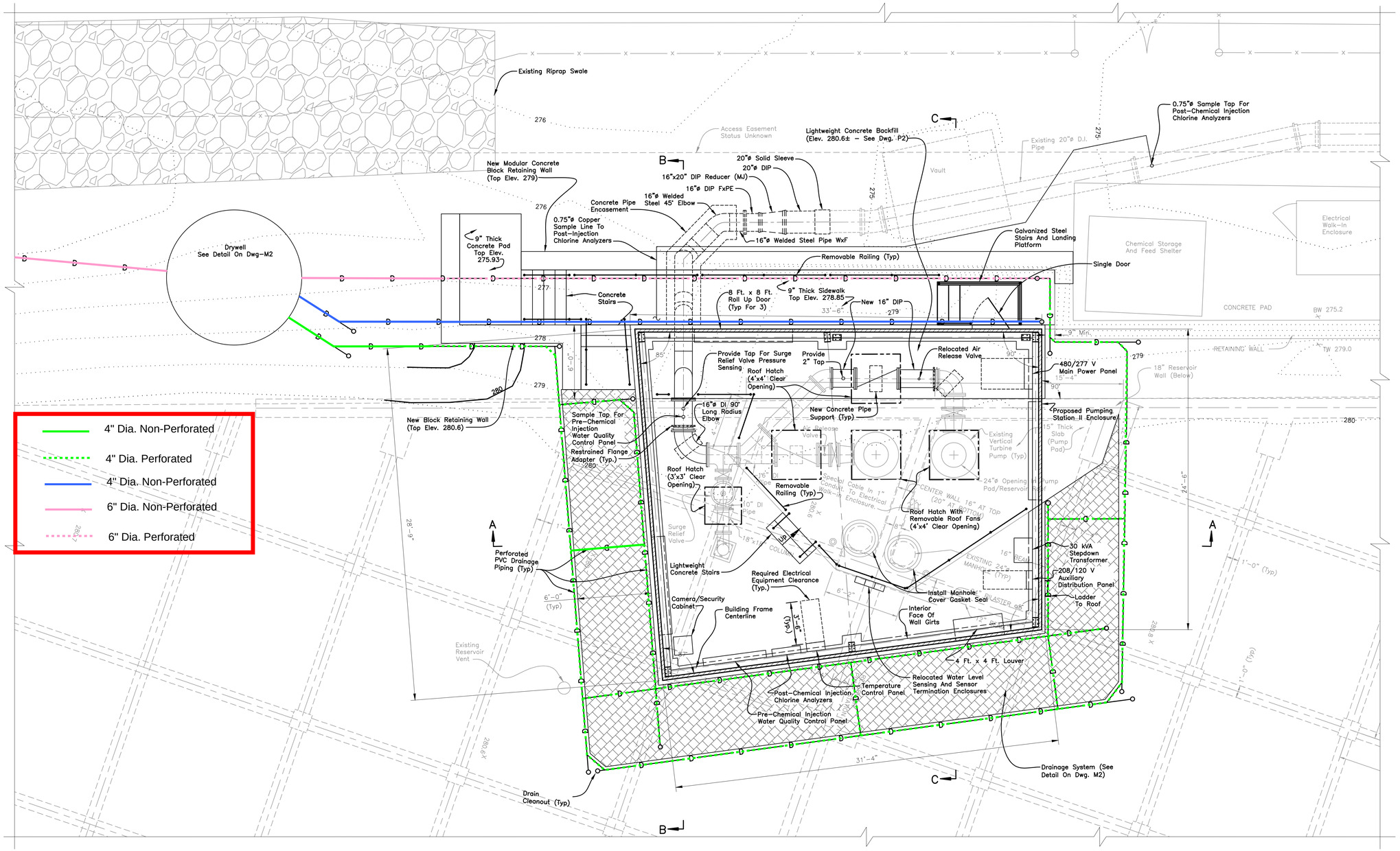
BUCK, SEIFERT & JOST, INC.
Consulting Engineers
65 Oak Street, Norwood, New Jersey 07648
CERTIFICATE OF AUTHORIZATION #24GA27996600

SUEZ Water New Jersey Inc.
461 From Road
PARAMUS, NJ 07652

WESTERN RESERVOIR PUMPING STATION II ENCLOSURE
BOROUGH OF WOODCLIFF LAKE, BERGEN COUNTY, N.J.
EQUIPMENT AND PIPING PLAN

GLENN M. RAMETTA
New Jersey Professional Engineer
License No. 24GE04593000

DRAWING No. 400.482-P1
SHEET No. 8 OF 13
SCALE: AS SHOWN
DATE: MAY 2020



EQUIPMENT AND PIPING PLAN

SCALE 1/4"=1'-0"

Notes:

1. Roll Up Doors Shall Be Provided With Windows And Folding Accordion Style Security Gates.
2. Existing Reservoir Roof Exposed Within Proposed Building To Be Skim Coated.
3. All Exposed Concrete Surfaces Shall Be Epoxy Coated.
4. Discharge From Water Quality And Chlorine Analyzers To Be Provided With An Air Gap And Tied Into Drainage System.
5. Gutters Shall Be 'Leaf-Free' Type.

TENTATIVE & PRELIMINARY NOT FOR CONSTRUCTION

Scale: 1/4" = 1'-0"
0 1' 2' 4' 6'

BS&J CADD DRAWING NAME: C:\Users\Robert Mathias\Desktop\Work At Home\UPDATED FILES\400.482 CAD – Original Drawings\400.482-D1_P1_P2_A1_A2_S1_S2_E2.dwg 5/1/2020 TES

Drawn By: TES
Checked By: RJM
Examined By: RvA
Approved By: GMR

No.	DATE	DESCRIPTION	CKD.	APP'D.

REVISIONS

BS&J

BUCK, SEIFERT & JOST, INC.
Consulting Engineers
65 Oak Street, Norwood, New Jersey 07648
CERTIFICATE OF AUTHORIZATION #24GA27996600

SUEZ Water New Jersey Inc.
461 From Road
PARAMUS, NJ 07652

WESTERN RESERVOIR PUMPING STATION II ENCLOSURE
BOROUGH OF WOODCLIFF LAKE, BERGEN COUNTY, N.J.
EQUIPMENT AND PIPING PLAN

GLENN M. RAMETTA
New Jersey Professional Engineer
License No. 24GE04593000

DRAWING No. 400.482-P1
SHEET No. 8 OF 13
SCALE: AS SHOWN
DATE: MAY 2020

Sheet 15

C. Buffer area design.

(1) Where evergreens are used as buffer materials, they shall be planted in two or more staggered planted rows. The rows shall be four feet to five feet apart, and the evergreens shall be planted four feet on center and in each row shall be staggered from the adjacent rows.

(2) Where earth and berms are utilized, they shall be maintained with a minimum height of four feet and a maximum slope ratio of one to one (1:1). The slope shall be suitably stabilized to prevent erosion.

§ 292-30. Utility improvements.

A. Gas, electric and telephone service.

(1) Gas, electric and telephone service shall be provided by the applicant with the public utility providing such service. The utility services on the site shall be provided as part of an underground system.

(2) If such utility services cannot be reasonably provided due to topographic or geological conditions of the land or due to technological circumstances, and when the applicant can adequately demonstrate the lack of feasibility for these reasons to the satisfaction of the approving authority, the approving authority may waive this requirement.

B. Water supply and sanitary sewerage disposal. Adequate provisions for water supply and sanitary sewerage disposal shall be provided. The locations of all proposed fire hydrants, standpipes or similar facilities shall be subject to the approval of the Fire Prevention Bureau, and provisions shall be made, where necessary, for fire lanes or protective areas which shall not be impeded by parking or standing vehicles or other obstructions.

C. Stormwater drainage.

(1) Provisions shall be made for safe and adequate drainage of surface runoff waters in and from the premises so that flooding and erosion of the subject property and the property of others will be prevented.

(2) Each site plan submitted to the approving authority shall be submitted to the Borough Engineer to establish requirements to prevent adverse drainage conditions both on and off the site.

(3) The drainage system shall be designed in conformance with accepted engineering standards. To facilitate review of proposed drainage facilities, design calculations prepared by the applicant's engineer shall accompany the application.

(4) Unless otherwise stipulated by law or by the Borough Engineer, drainage facilities shall be designed on the basis of a fifteen-year storm, using a one-hour intensity of two inches.

Rainfall intensity (i) = 2in/hr

D. Soil erosion and sedimentation control. Standards for soil erosion and sedimentation control shall be in accordance with the Standards For Soil Erosion and Sedimentation Control in New Jersey, dated September 9, 1974, published by the New Jersey State Soil Conservation Committee, as it may be amended, supplemented and revised from time to time.

§ 292-31. Street improvements.

A. Curbing.

(1) General.

(a) Where curbing is lacking, an applicant for site plan approval shall install curbing along the extent of all property fronting public and private streets in accordance with municipal standards and specifications.

(b) The Borough Engineer may require curbing within parking areas in order to facilitate drainage and provide separation between pedestrian and vehicular movement.

(2) Alignment and grade. Curb grading and alignment is to be determined as established in the area unless otherwise required by the Borough Engineer.

(3) Curbing and driveway openings. Where a proposed driveway is to serve any land development of 50 or more parking spaces, curbing need not be carried across the driveway opening as a depressed curb, but rather may be swept back as curb returns. Where the driveway is to serve land development of fewer than 50 parking spaces, a depressed curb driveway shall be utilized.

B. Street widening.

(1) The right-of-way width, measured from lot line to lot line, shall not be less than 50 feet in width, except when shown at a greater width in the Master Plan or Official Map or where the street constitutes an extension of an existing street with a width greater than 50 feet.

(2) For site plans that adjoin or include existing streets which do not conform to widths as shown in the Master Plan or the Official Map or are at least 50 feet in width, the applicant shall dedicate additional width along either one or both sides of the street. If the premises being developed is along one side only, 1/2 of the required difference in street width shall be dedicated.

C. Sidewalks.

(1) Each land development requiring site plan approval may be required to provide a sidewalk within the street right-of-way.

(2) Pedestrian walkways or sidewalks may also be required for any development of 50 or more parking spaces within said parking area to provide convenient and safe access for pedestrian circulation.

(3) Sidewalks shall be constructed of concrete, quarry tile or other similar material and shall be at least four feet in width unless otherwise provided in Chapter **380**, Zoning.

(4) Sidewalks between parking areas and principal structures, along aisles and driveways and wherever pedestrian traffic shall occur shall be raised six inches or more above the parking area except when crossing streets or driveways. Sidewalks, when constructed along the building, shall be located not less than three feet from the building.

D. Street furniture. Street furniture, which shall include telephone booths, benches, planting boxes, mailboxes, fountains and pools, drinking fountains, trash receptacles, bicycle racks, sculptures, paving and steps, bus shelters and similar items, when provided by the applicant, shall be subject to the approval of the approving authority as to design, location and size.

1C fm
5F
85cu fm

Buck, Seifert & Jost Inc.
Drywell Computation Spreadsheet

Calculated By: MSJ Date: 12/18/2019
Checked By: RJM Date: 6/4/2020

Job No.: 400.482
Location: Western Reservoir

Step 1: Volume To Be Retained

Data	Inputs	Notes
Area Number	3	Only For Rainfall Collection. See Figure 13-5
Contributing Area	1740	Square Feet
Design Storm	15	Year - See Table 3 for design/frequency years
Method Selection	Time Duration (td,	Select Time Duration (t_d) or Time of Concentration (t_c)
Time Duration (t_d, min)	60	Leave Blank For No Rainfall Collection
Time of Concentration (t_c, min)	N/A	Calculated - See Table 4 For Inputs
Emergency Shower	0	Quantity, Assumed 20gpm flowrate - 5mins
Emergency Eyewash	0	Quantity, Assumed 3gpm flowrate - 20mins
Chlorine Analyzer	8	Quantity. Assumed Collection For 24 hrs.
Chlorine Analyzer Flow	7	Flowrate in Gallons Per Hour (gph)
Unit Weight of Soil	0	Pounds per Cubic Foot (pcf)
Voids In Gravel	30%	Percentage (calculated)
Total Width of Gravel (W)	1.0	Feet (See Figure 2)
Other Sources		Total Quantity, Gallons

Rainfall	2.00	in/hr

Total Volume To Be Retained	3513.20	Gallons

Step 2: Size Dry Well

Volume (Gallons)						
	Depth (ft.)					
Diameter (ft.)	3	3.5	4	4.5	5	6
2	96.93	113.09	129.25	145.40	161.56	193.87
3	195.63	228.24	260.84	293.45	326.05	391.26
4	329.58	384.50	439.43	494.36	549.29	659.15
5	498.77	581.90	665.02	748.15	831.28	997.54
6	703.21	820.41	937.61	1054.82	1172.02	1406.42
7	942.90	1100.05	1257.20	1414.35	1571.50	1885.80
8	1217.84	1420.82	1623.79	1826.76	2029.74	2435.68
10	1873.47	2185.71	2497.96	2810.20	3122.44	3746.93

^--Input If Needed

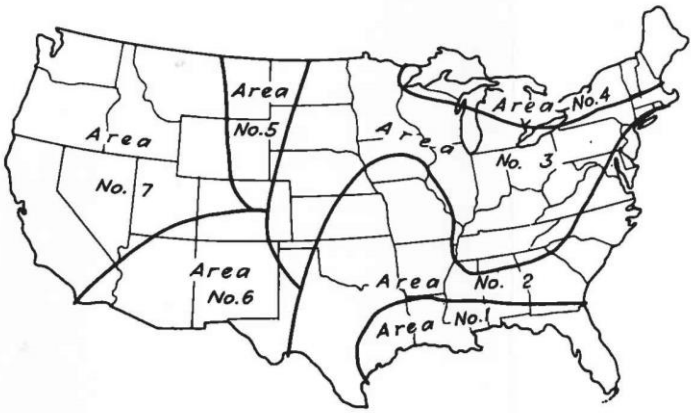


Figure 13-5 Map showing areas of approximately similar rainfall characteristics.

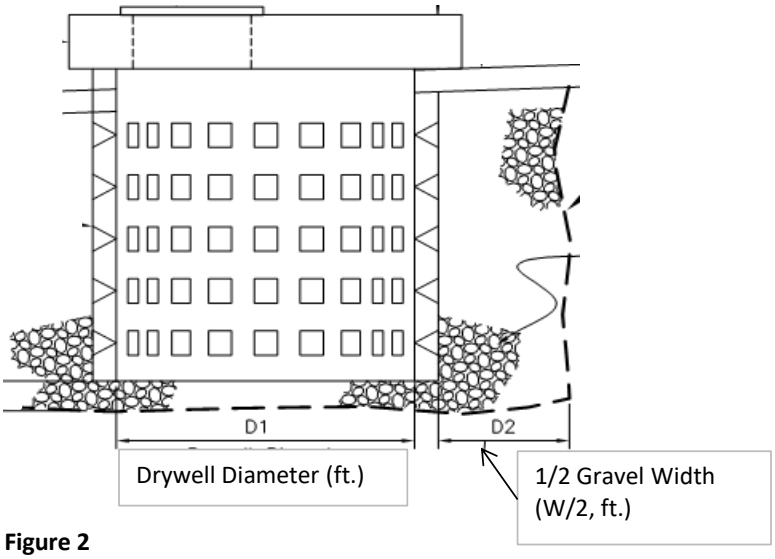


Figure 2

<--Input If Needed

Table 3

Rainfall (in./hr)							
	Area						
Frequency (yrs)	1	2	3	4	5	6	7
2							
5							
15			2.00				
25							
50							
100							

Table 4	
Data	Inputs
Runoff Coefficient, C	
Overland Flow Distance, D (ft.)	
Slope, S (%)	

Volume To Be Retained		
Input	Amount (Gallons)	Notes
Shower/Eyewash	0	Assumed As Stated For Inputs
Rainfall	2169	Gallons
Chlorine Analyzer	1344	Assumed over 24 hours
Other Sources	0	Gallons
Total	3513.20	Gallons

Buck, Seifert & Jost Inc.
Drywell Computation Spreadsheet

Calculated By: MSJ Date: 12/18/2019
Checked By: RJM Date: 6/4/2020

Job No.: 400.482
Location: Western Reservoir

Step 1: Volume To Be Retained

Data	Inputs	Notes
Area Number	3	Only For Rainfall Collection. See Figure 13-5
Contributing Area	1740	Square Feet
Design Storm	100	Year - See Table 3 for design/frequency years
Method Selection	Time Duration (td,	Select Time Duration (t_d) or Time of Concentration (t_c)
Time Duration (t_d, min)	60	Leave Blank For No Rainfall Collection
Time of Concentration (t_c, min)	N/A	Calculated - See Table 4 For Inputs
Emergency Shower	0	Quantity, Assumed 20gpm flowrate - 5mins
Emergency Eyewash	0	Quantity, Assumed 3gpm flowrate - 20mins
Chlorine Analyzer	8	Quantity. Assumed Collection For 24 hrs.
Chlorine Analyzer Flow	7	Flowrate in Gallons Per Hour (gph)
Unit Weight of Soil	0	Pounds per Cubic Foot (pcf)
Voids In Gravel	30%	Percentage (calculated)
Total Width of Gravel (W)	1.0	Feet (See Figure 2)
Other Sources		Total Quantity, Gallons

Rainfall	3.19	in/hr

Total Volume To Be Retained	4802.46	Gallons

Step 2: Size Dry Well

Volume (Gallons)						
	Depth (ft.)					
Diameter (ft.)	3	3.5	4	4.5	5	6
2	96.93	113.09	129.25	145.40	161.56	193.87
3	195.63	228.24	260.84	293.45	326.05	391.26
4	329.58	384.50	439.43	494.36	549.29	659.15
5	498.77	581.90	665.02	748.15	831.28	997.54
6	703.21	820.41	937.61	1054.82	1172.02	1406.42
7	942.90	1100.05	1257.20	1414.35	1571.50	1885.80
8	1217.84	1420.82	1623.79	1826.76	2029.74	2435.68
10	1873.47	2185.71	2497.96	2810.20	3122.44	3746.93

^--Input If Needed

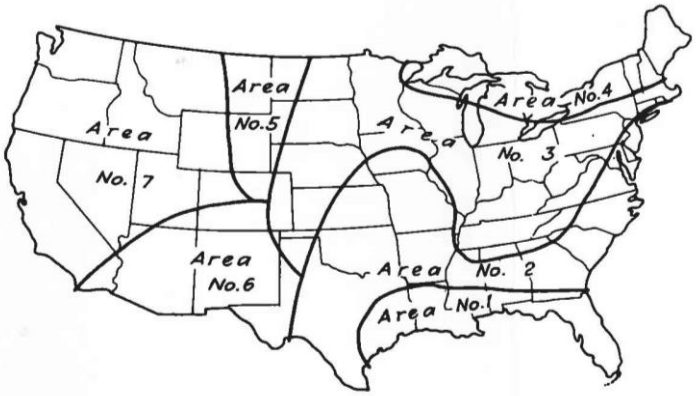


Figure 13-5 Map showing areas of approximately similar rainfall characteristics.

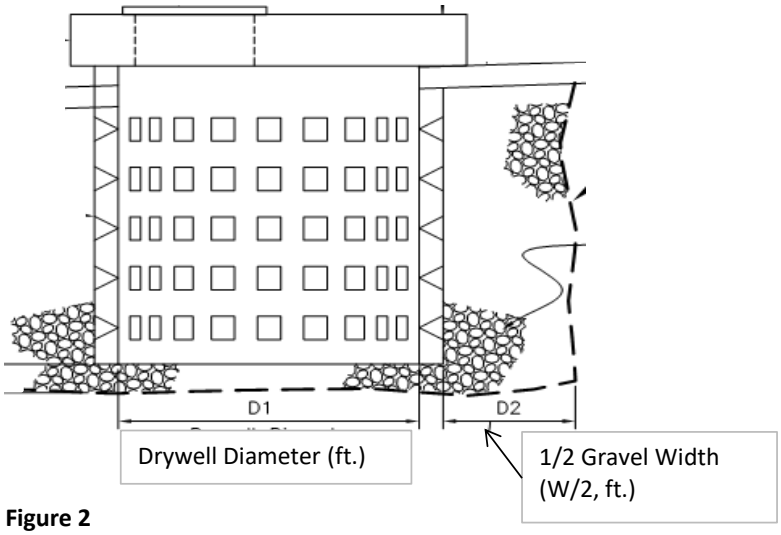


Figure 2

<--Input If Needed

Table 3

Rainfall (in./hr)							
	Area						
Frequency (yrs)	1	2	3	4	5	6	7
2	2.29	1.73	1.32	0.96	0.92	0.92	0.45
5	2.77	2.24	1.66	1.27	1.11	1.04	0.67
10	3.13	2.58	2.05	1.46	1.44	1.47	0.82
25	3.51	2.82	2.58	1.96	1.69	1.80	0.96
50	3.58	3.57	2.87	2.23	2.20	1.97	0.96
100	3.95	3.90	3.19	2.50	2.70	2.44	1.10

Table 4	
Data	Inputs
Runoff Coefficient, C	
Overland Flow Distance, D (ft.)	
Slope, S (%)	

Volume To Be Retained		
Input	Amount (Gallons)	Notes
Shower/Eyewash	0	Assumed As Stated For Inputs
Rainfall	3458	Gallons
Chlorine Analyzer	1344	Assumed over 24 hours
Other Sources	0	Gallons
Total	4802.46	Gallons

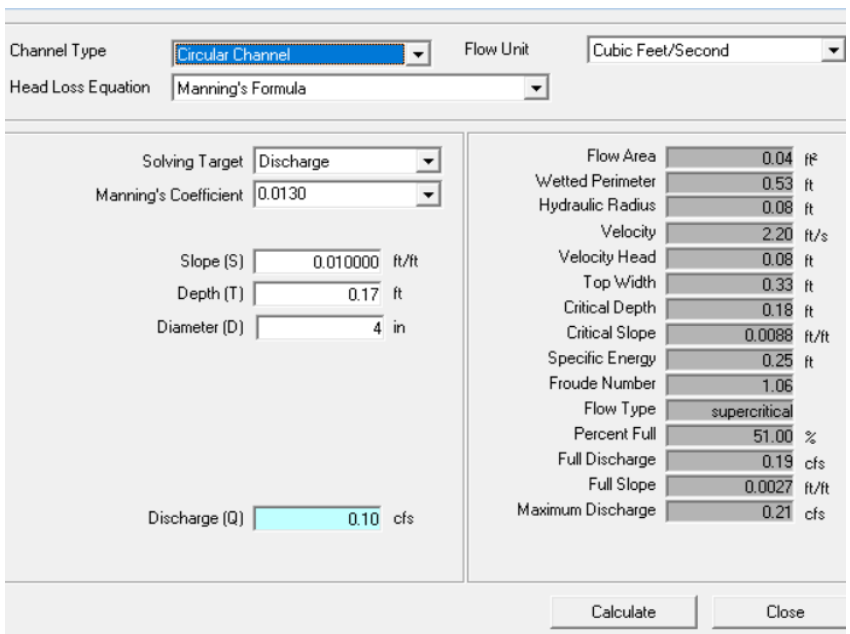
Buck, Seifert & Jost In Calculated By: MSJ Date: 4/30/2020
Drain Pipe Computati Checked By: RJM Date: 6/4/2020

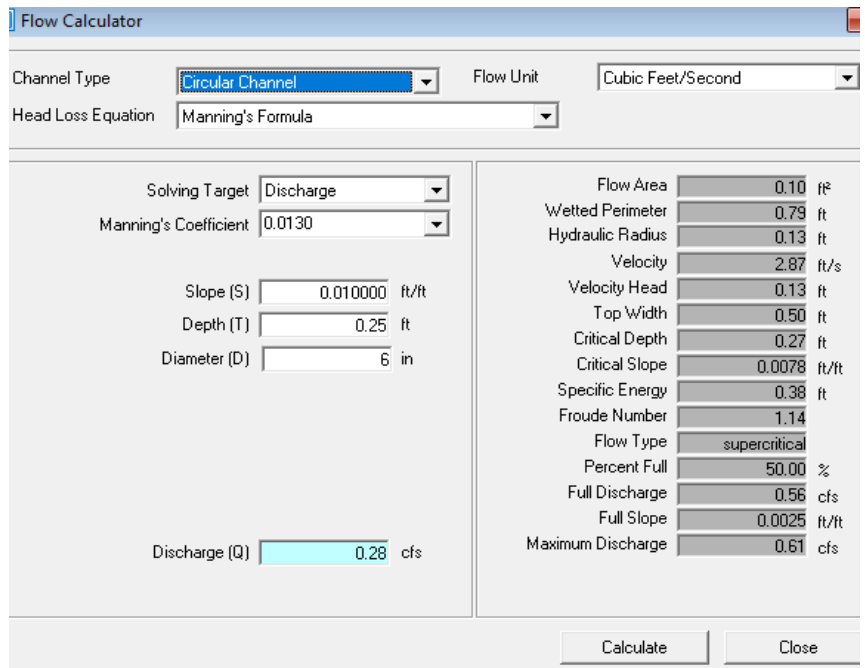
Job No.: 400.482
Location: Western Reservoir

Q=CIA

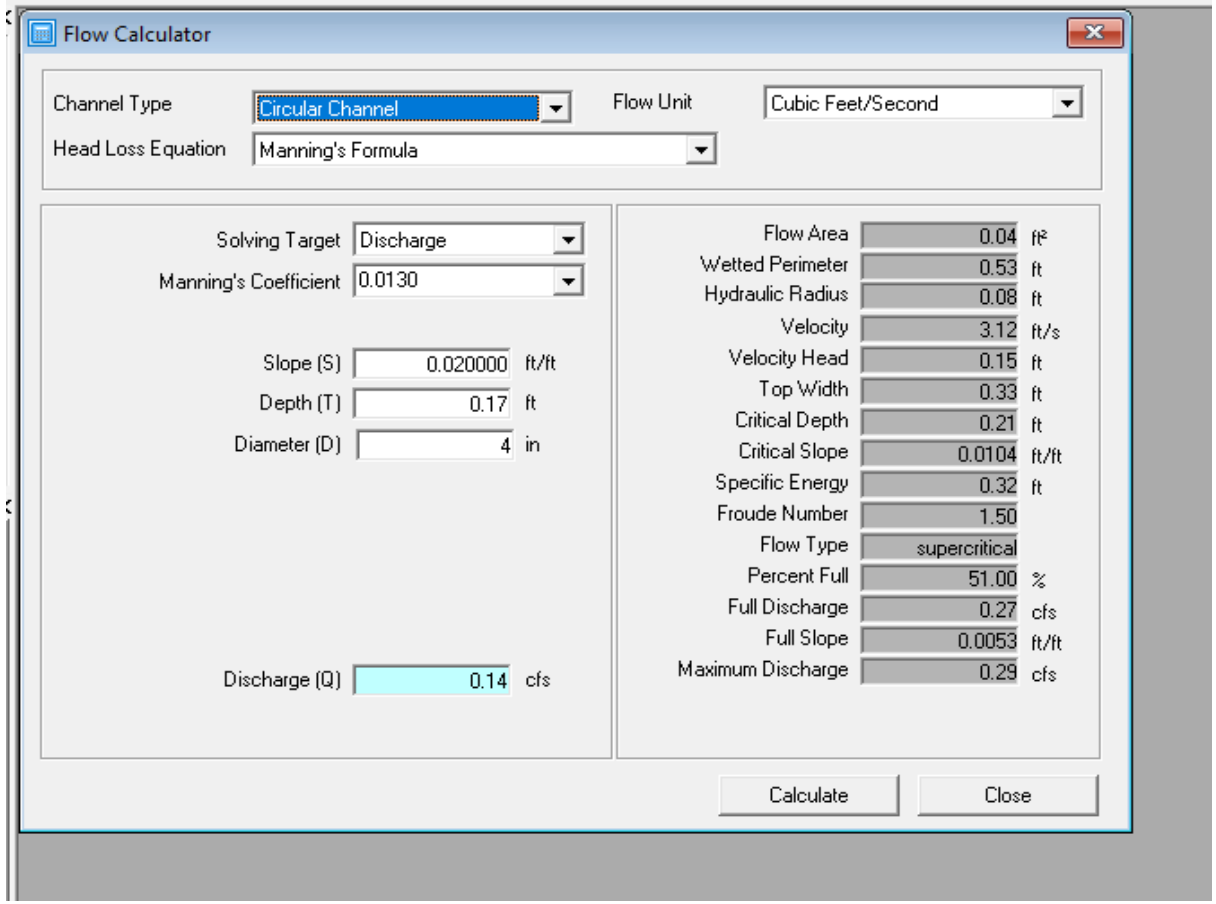
C	I, in/hr	A, acres	Q,cfs	Frequency
0.9	2.0	0.040	0.072	15-year
0.9	3.2	0.04	0.115	100-year

a) Pipe flowing half full, Slope 1%

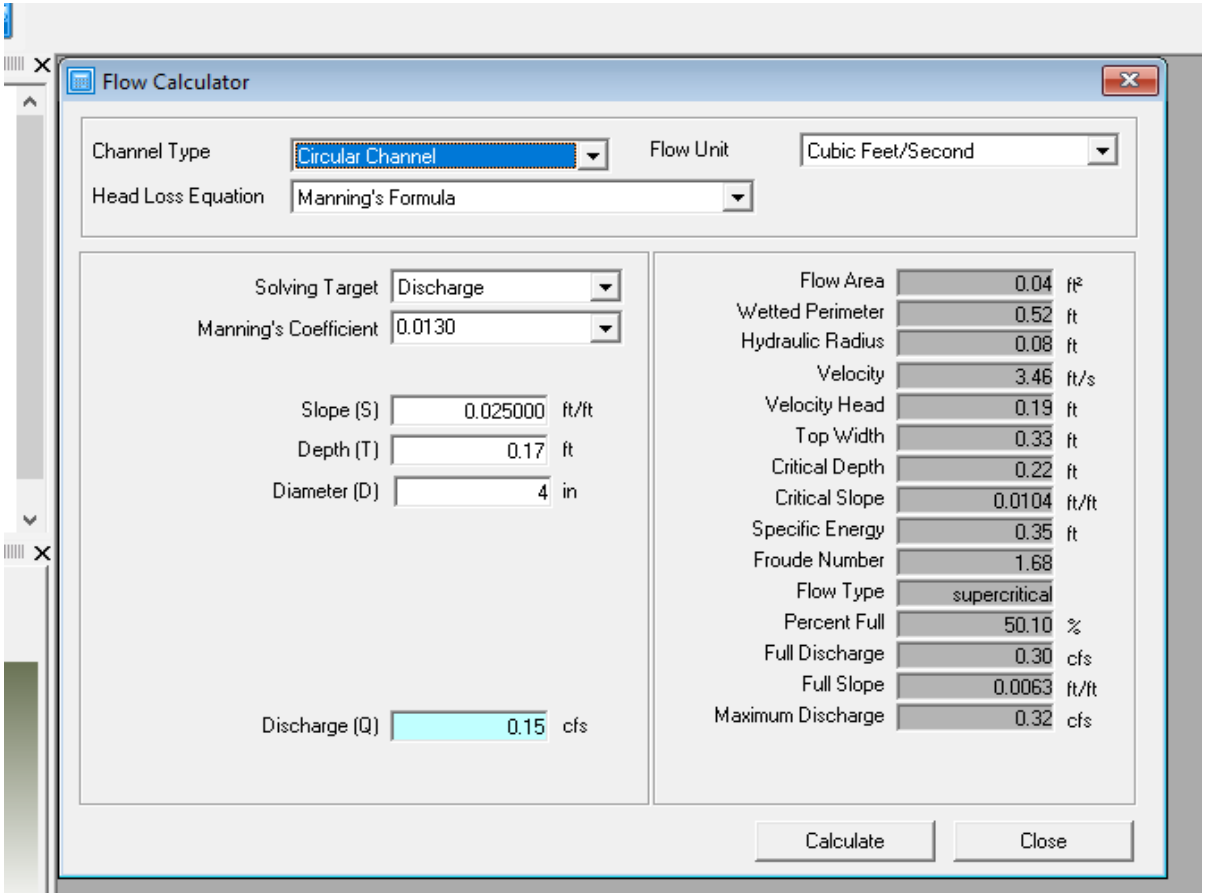




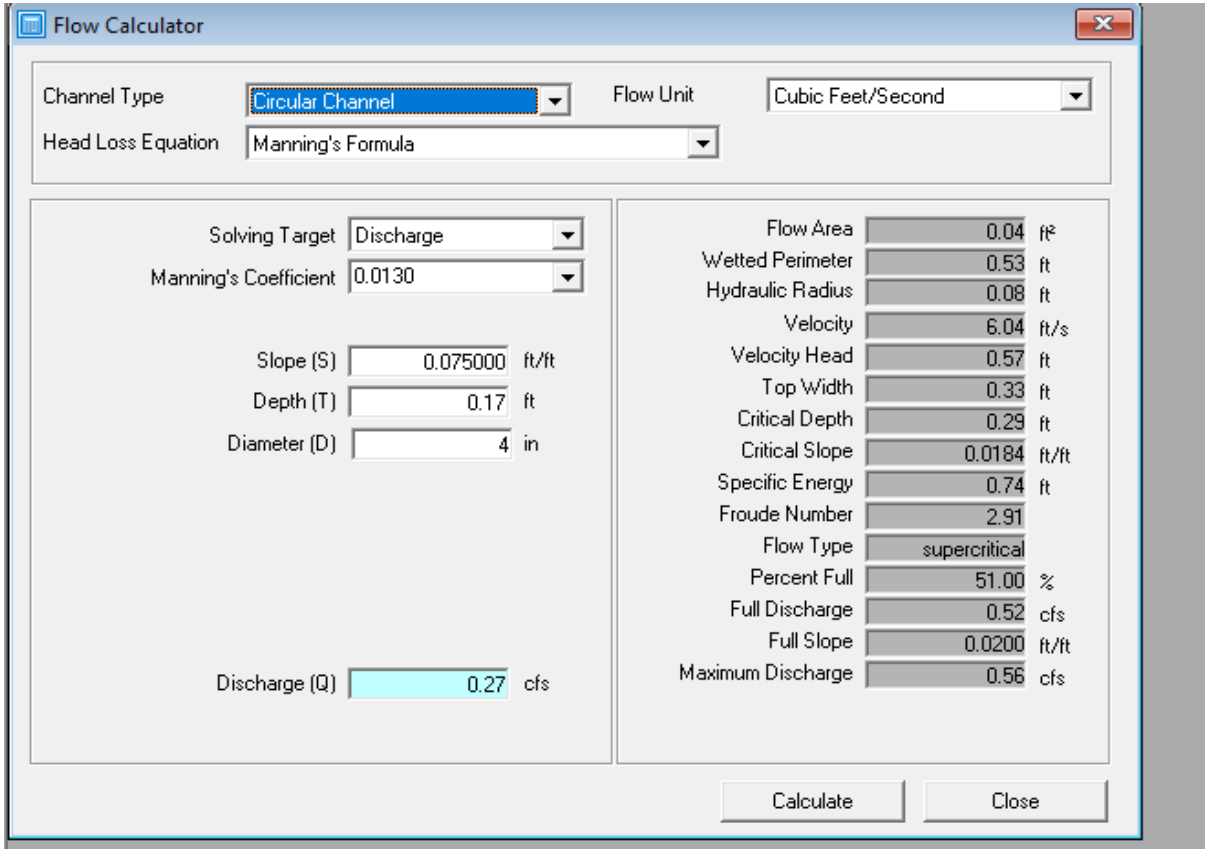
b) Pipe flowing half full, Slope 2%



c) Pipe flowing half full, Slope 2.5%



d) Pipe flowing half full, Slope 7.5%



Buck, Seifert & Jost Inc.
Drain Pipe Computation Spreadsheet

Calculated By: MSJ
Checked By: RJM

Date: 4/30/2020
Date: 6/9/2020

Job No.: 400.482
Location: Western Reservoir

1. Flow Path A		
Approx Grade At Drywell	275.0	
Cover on Drywell	0.75	ft
4" PVC	0.33	ft
Assume Drywell cover Slab thickness	0.75	ft
El. For PVC Inv In (Inv 1)	273.2	
L	6	ft
Slope	0.02	ft/ft
Inv 2 = Inv 1 + L*Slope	273.3	
Grade at Inv 3	280	
Inv 3 = Gr - 3 ft	277.0	
Inv 4 (Top of Slab)	279.1	
L	8	ft
Slope	0.03	ft/ft
Inv 5 = Inv 3 - L*Slope	276.76	
Inv 6 (set to avoid piping)	274.35	

2. Flow Path C		
Approx Grade At Drywell	275.0	
Cover on Drywell	0.75	ft
6" PVC	0.50	ft
Assume Drywell cover Slab thickness	0.75	ft
El. For PVC Inv In (Inv A)	273.0	
L	11	ft
Slope	0.025	ft/ft
Inv B	273.3	
L	19	ft
Slope	0.02	ft/ft
Inv C	273.7	
L	30	ft
Slope	0.02	ft/ft
Inv 6	274.3	

3. Flow Path B		
Approx Grade At Drywell	275.0	
Cover on Drywell	0.75	ft
4" PVC	0.33	ft
Assume Drywell cover Slab thickness	0.75	ft
El. For PVC Inv In (Inv 1)	273.2	
L	5	ft
Slope	0.02	ft/ft
Inv D	273.3	
L	27	ft
Slope	0.072	ft/ft
Inv E	275.21	
L	30	ft
Slope	0.025	ft/ft
Inv F	276.0	

4. Drywell Oveflow Pipe		
El. For PVC Inv Out	273.0	
Overflow Pipe Dia	0.50	ft
Length	60	ft
Slope	0.01	ft/ft
Inv at Discharge	272.4	