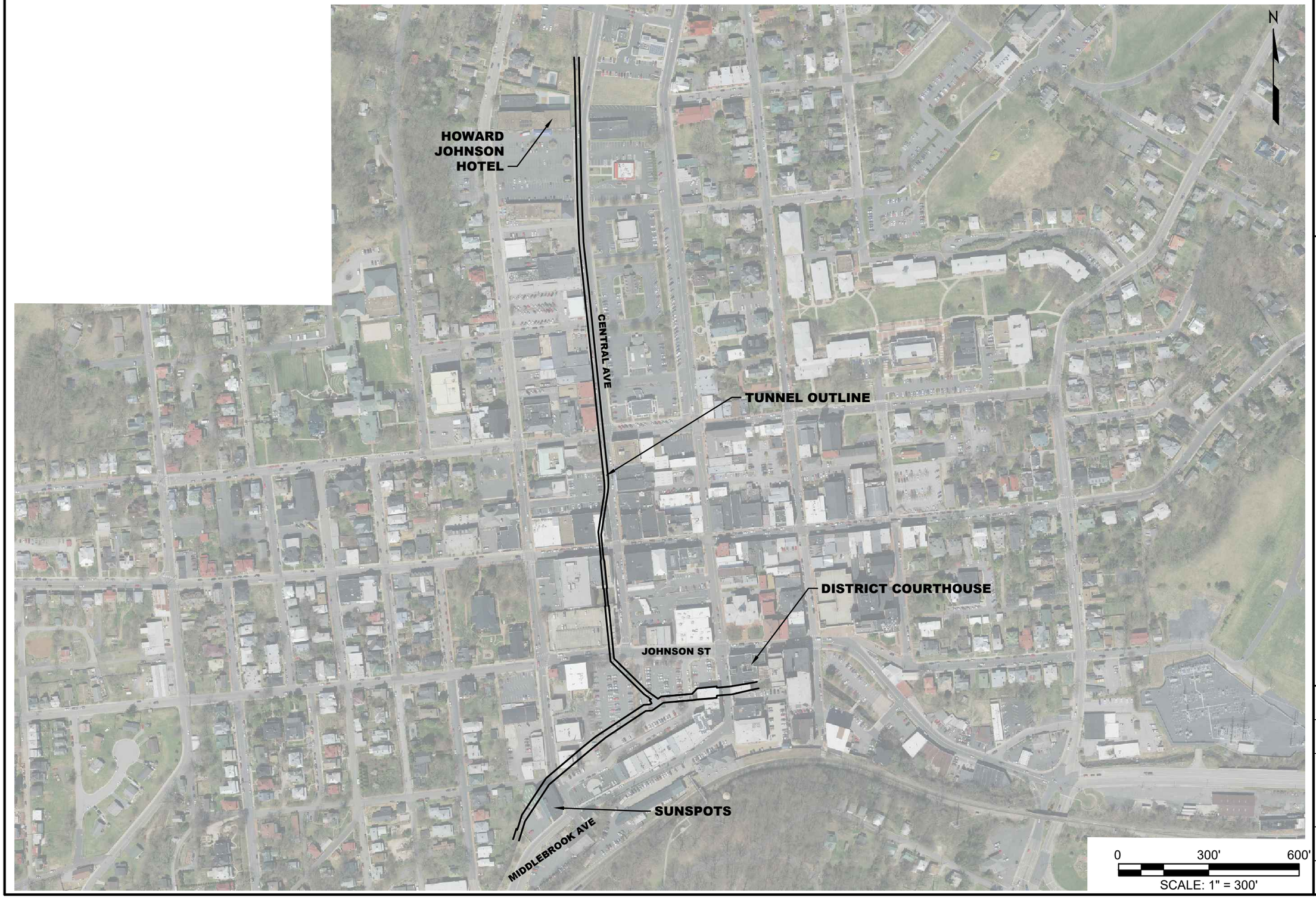
APPENDIX A

DRAINAGE AREA INFORMATION



Wiley|Wilson
Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT SCOPE

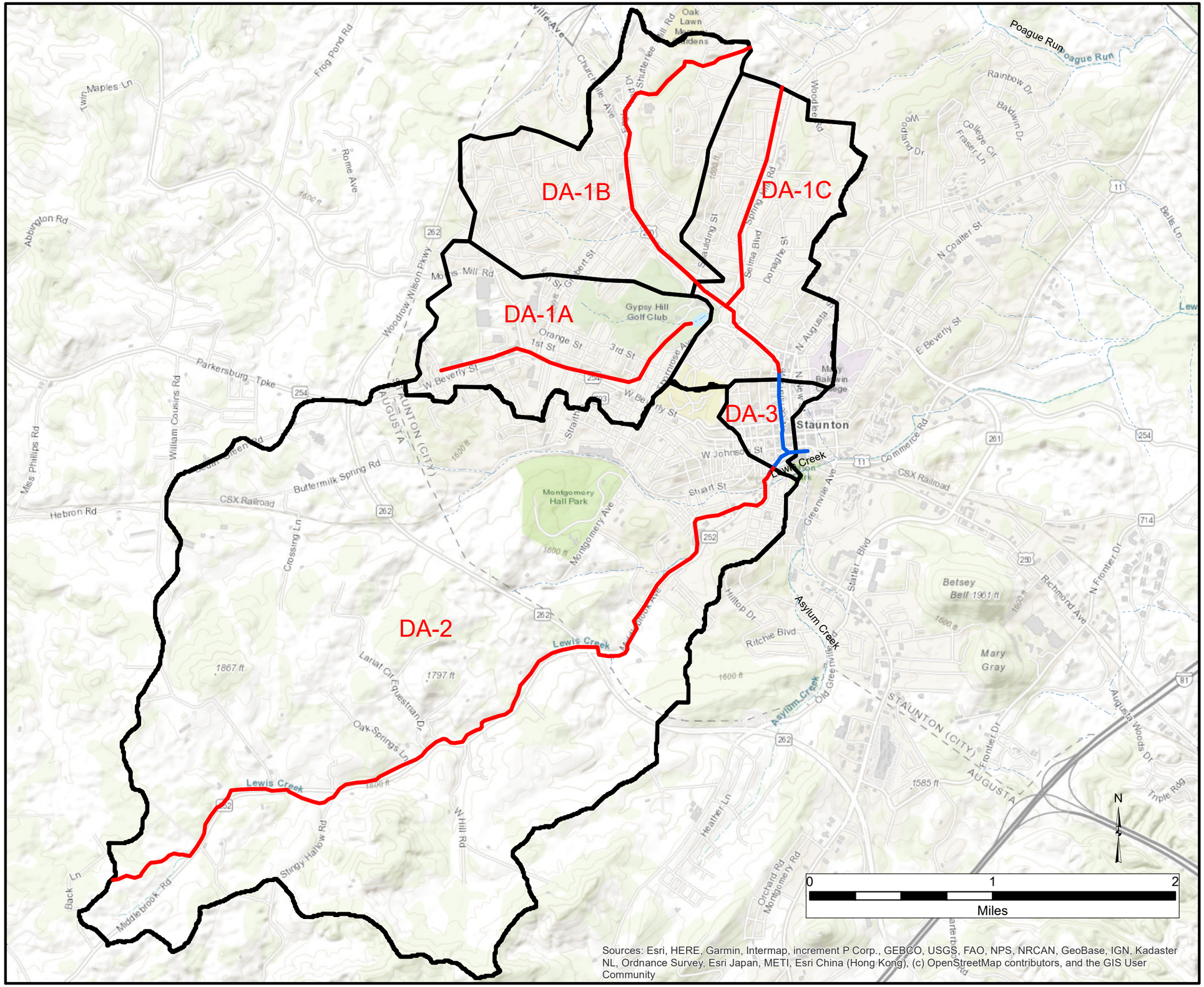
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-12

DWG. REFERENCE NO.

DATE: | REV.



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Legend

- Time of Concentration
- Tunnels
- Stream line
- Drainage Area

Name	Area (SQ MI)	CN	TC (min)
DA-1A	1.02	80	36
DA-1B	1.38	77	37.2
DA-1C	1.15	80	30
DA-2	8.08	69	95.8
DA-3	0.17	92	<Null>
Total DA	11.81	72	95.8

Notes:

1. Time of Concentration (TC) of DA-1 is 55.4 min.

Staunton Flood Study

Drainage Area Map

Page 1

Staunton, VA

Wiley|Wilson
Constant Progress

127 Nationwide Drive, Lynchburg, Virginia 24502-4272
phone 434.947.1901 | fax 434.947-1601 | web wileywilson.com

The Kirpich Method

For channel-flow component of runoff, the Kirpich equation is:

$$t_{ch} = KL^{0.770}S^{-0.385}$$

Equation 4-15.

Where:

t_{ch} = the time of concentration, in minutes

K = a units conversion coefficient, in which K = 0.0078 for traditional units and K = 0.0195 for SI units

L = the channel flow length, in feet or meters as dictated by K

S = the dimensionless main-channel slope

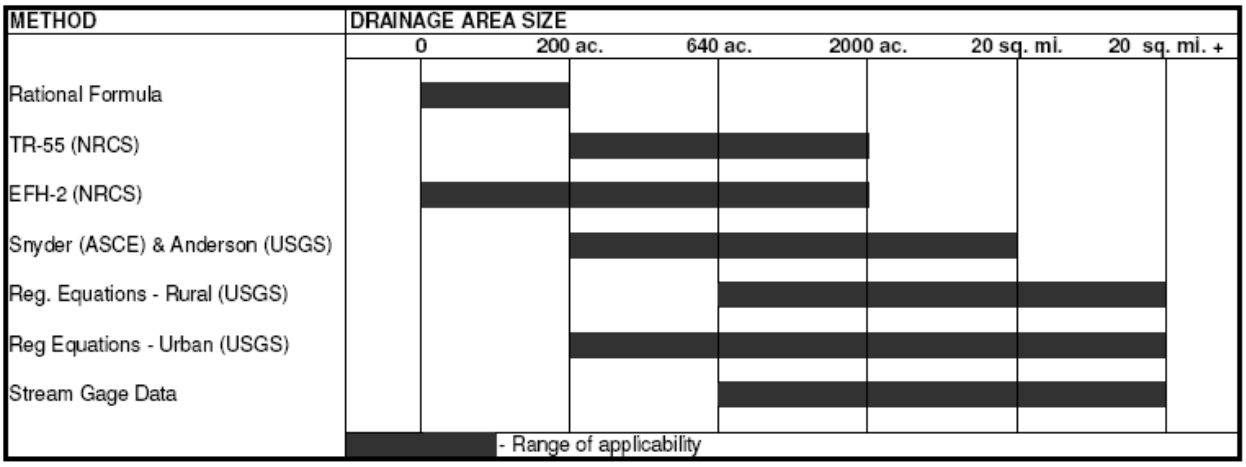
If it is determined that a low slope condition or a transitional slope condition exists, the user should consider using an adjusted slope in calculating the time of concentration.

APPENDIX B

RAINFALL INFORMATION

6.3.2 Peak Discharge Method Selection

The methods to be used are shown in Figure 6-1. For watersheds greater than 200 acres, VDOT recommends evaluating several hydrologic methods for comparison purposes.



The above does not indicate definite limits but does suggest a range in which the Particular method is "best suited".

Figure 6-1. Guidelines for Hydrologic Method Selection Based on Drainage Area

Table 3. Regression equation prediction expressions for estimating Virginia urban peak-flow discharge per square mile.

[DA, basin drainage area in square miles; AEP, annual exceedance probability; URBAN, basin urban area in percent]

Equation number	Regression equation prediction expression	R-square	Root mean square error	Observations
1	Log_{10}(0.995 AEP peak per square mile) = 1.673 + (URBAN – 43.179) × ((Log_{10}(DA) – 1.412) × –0.00637) + 0.00372 × URBAN + –0.512 × Log_{10}(DA)	0.84	0.26	69
2	Log_{10}(0.99 AEP peak per square mile) = 1.713 + (URBAN – 43.538) × ((Log_{10}(DA) – 1.400) × –0.00626) + 0.00359 × URBAN + –0.505 × Log_{10}(DA)	0.84	0.26	70
3	Log_{10}(0.95 AEP peak per square mile) = 1.764 + (URBAN – 42.993) × ((Log_{10}(DA) – 1.350) × –0.00518) + 0.00391 × URBAN + –0.448 × Log_{10}(DA)	0.84	0.23	80
4	Log_{10}(0.9 AEP peak per square mile) = 1.869 + (URBAN – 42.339) × ((Log_{10}(DA) – 1.340) × –0.00523) + 0.00323 × URBAN + –0.446 × Log_{10}(DA)	0.83	0.23	85
5	Log_{10}(0.8 AEP peak per square mile) = 1.952 + (URBAN – 42.563) × ((Log_{10}(DA) – 1.325) × –0.00459) + 0.00336 × URBAN + –0.424 × Log_{10}(DA)	0.83	0.23	89
6	Log_{10}(0.67 AEP peak per square mile) = 1.984 + (URBAN – 40.843) × ((Log_{10}(DA) – 1.272) × –0.00479) + 0.00402 × URBAN + –0.399 × Log_{10}(DA)	0.82	0.23	97
7	Log_{10}(0.5 AEP peak per square mile) = 2.027 + (URBAN – 40.290) × ((Log_{10}(DA) – 1.216) × –0.00414) + 0.00468 × URBAN + –0.366 × Log_{10}(DA)	0.81	0.23	103
8	Log_{10}(0.43 AEP peak per square mile) = 2.072 + (URBAN – 40.227) × ((Log_{10}(DA) – 1.205) × –0.00403) + 0.00465 × URBAN + –0.362 × Log_{10}(DA)	0.81	0.23	104
9	Log_{10}(0.2 AEP peak per square mile) = 2.229 + (URBAN – 39.370) × ((Log_{10}(DA) – 1.139) × –0.00346) + 0.00487 × URBAN + –0.338 × Log_{10}(DA)	0.76	0.24	110
10	Log_{10}(0.1 AEP peak per square mile) = 2.373 + (URBAN – 38.706) × ((Log_{10}(DA) – 1.103) × –0.00313) + 0.00470 × URBAN + –0.334 × Log_{10}(DA)	0.74	0.25	113
11	Log_{10}(0.04 AEP peak per square mile) = 2.557 + (URBAN – 39.168) × ((Log_{10}(DA) – 1.083) × –0.00224) + 0.00434 × URBAN + –0.332 × Log_{10}(DA)	0.69	0.28	114
12	Log_{10}(0.02 AEP peak per square mile) = 2.697 + (URBAN – 39.168) × ((Log_{10}(DA) – 1.083) × –0.00219) + 0.00390 × URBAN + –0.343 × Log_{10}(DA)	0.65	0.31	114
13	Log_{10}(0.01 AEP peak per square mile) = 2.776 + (URBAN – 38.765) × ((Log_{10}(DA) – 1.070) × –0.00242) + 0.00434 × URBAN + –0.342 × Log_{10}(DA)	0.57	0.37	110
14	Log_{10}(0.005 AEP peak per square mile) = 2.863 + (URBAN – 39.063) × ((Log_{10}(DA) – 1.057) × –0.00223) + 0.00465 × URBAN + –0.329 × Log_{10}(DA)	0.55	0.38	105
15	Log_{10}(0.002 AEP peak per square mile) = 2.961 + (URBAN – 39.287) × ((Log_{10}(DA) – 0.904) × –0.00049) + 0.00636 × URBAN + –0.317 × Log_{10}(DA)	0.44	0.46	65

NOAA Atlas 14, Volume 2, Version 3
Location name: Staunton, Virginia, USA*
Latitude: 38.15°, Longitude: -79.0727°
Elevation: 1404.49 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.288** (0.259-0.321)	**0.343** (0.309-0.382)	**0.414** (0.372-0.460)	**0.468** (0.419-0.520)	**0.533** (0.475-0.591)	**0.582** (0.514-0.645)	**0.629** (0.552-0.699)	**0.672** (0.585-0.749)	**0.725** (0.621-0.812)	**0.765** (0.649-0.863)
10-min	**0.460** (0.414-0.512)	**0.548** (0.494-0.611)	**0.662** (0.595-0.737)	**0.748** (0.670-0.832)	**0.850** (0.756-0.942)	**0.926** (0.819-1.03)	**0.999** (0.877-1.11)	**1.07** (0.927-1.19)	**1.15** (0.983-1.28)	**1.21** (1.02-1.36)
15-min	**0.575** (0.517-0.640)	**0.689** (0.621-0.769)	**0.838** (0.753-0.932)	**0.947** (0.848-1.05)	**1.08** (0.959-1.19)	**1.17** (1.04-1.30)	**1.26** (1.11-1.40)	**1.35** (1.17-1.50)	**1.44** (1.24-1.62)	**1.51** (1.28-1.71)
30-min	**0.788** (0.709-0.877)	**0.952** (0.858-1.06)	**1.19** (1.07-1.32)	**1.37** (1.23-1.53)	**1.60** (1.42-1.77)	**1.77** (1.56-1.96)	**1.93** (1.70-2.15)	**2.09** (1.82-2.33)	**2.30** (1.97-2.57)	**2.45** (2.08-2.76)
60-min	**0.983** (0.884-1.09)	**1.19** (1.08-1.33)	**1.53** (1.37-1.70)	**1.79** (1.60-1.99)	**2.13** (1.89-2.36)	**2.39** (2.12-2.66)	**2.66** (2.34-2.96)	**2.94** (2.55-3.27)	**3.29** (2.82-3.69)	**3.58** (3.03-4.03)
2-hr	**1.17** (1.06-1.30)	**1.42** (1.28-1.57)	**1.81** (1.63-2.01)	**2.13** (1.91-2.36)	**2.54** (2.27-2.81)	**2.88** (2.56-3.19)	**3.23** (2.84-3.58)	**3.58** (3.12-3.98)	**4.06** (3.48-4.55)	**4.43** (3.75-4.99)
3-hr	**1.26** (1.14-1.41)	**1.52** (1.37-1.69)	**1.92** (1.73-2.15)	**2.26** (2.03-2.52)	**2.71** (2.42-3.01)	**3.07** (2.72-3.42)	**3.45** (3.04-3.84)	**3.84** (3.34-4.29)	**4.36** (3.73-4.90)	**4.78** (4.04-5.41)
6-hr	**1.58** (1.43-1.76)	**1.89** (1.71-2.11)	**2.36** (2.13-2.64)	**2.77** (2.49-3.09)	**3.34** (2.97-3.71)	**3.81** (3.37-4.24)	**4.31** (3.77-4.80)	**4.84** (4.17-5.41)	**5.58** (4.72-6.29)	**6.18** (5.15-7.01)
12-hr	**1.95** (1.76-2.21)	**2.33** (2.09-2.63)	**2.90** (2.60-3.29)	**3.42** (3.05-3.87)	**4.15** (3.67-4.68)	**4.79** (4.18-5.41)	**5.48** (4.72-6.20)	**6.23** (5.28-7.08)	**7.32** (6.04-8.39)	**8.26** (6.68-9.53)
24-hr	**2.38** (2.18-2.61)	**2.88** (2.64-3.15)	**3.64** (3.33-3.98)	**4.26** (3.89-4.66)	**5.18** (4.69-5.63)	**5.93** (5.35-6.45)	**6.74** (6.03-7.33)	**7.60** (6.74-8.28)	**8.84** (7.72-9.65)	**9.85** (8.51-10.8)
2-day	**2.77** (2.55-3.03)	**3.34** (3.07-3.66)	**4.21** (3.86-4.60)	**4.92** (4.50-5.36)	**5.92** (5.38-6.44)	**6.74** (6.09-7.33)	**7.60** (6.83-8.26)	**8.52** (7.59-9.26)	**9.81** (8.63-10.7)	**10.8** (9.46-11.9)
3-day	**2.95** (2.72-3.22)	**3.57** (3.29-3.89)	**4.49** (4.12-4.89)	**5.23** (4.80-5.69)	**6.29** (5.73-6.83)	**7.15** (6.49-7.77)	**8.06** (7.27-8.75)	**9.02** (8.08-9.79)	**10.4** (9.18-11.3)	**11.4** (10.0-12.4)
4-day	**3.14** (2.90-3.42)	**3.79** (3.50-4.12)	**4.76** (4.38-5.17)	**5.55** (5.09-6.02)	**6.66** (6.09-7.23)	**7.57** (6.88-8.20)	**8.52** (7.71-9.24)	**9.52** (8.56-10.3)	**10.9** (9.72-11.8)	**12.0** (10.6-13.0)
7-day	**3.62** (3.35-3.91)	**4.35** (4.03-4.70)	**5.40** (4.99-5.84)	**6.24** (5.76-6.73)	**7.40** (6.80-7.99)	**8.34** (7.62-9.00)	**9.30** (8.46-10.0)	**10.3** (9.32-11.1)	**11.6** (10.5-12.6)	**12.7** (11.3-13.7)
10-day	**4.15** (3.87-4.47)	**4.98** (4.63-5.35)	**6.09** (5.66-6.54)	**6.95** (6.45-7.46)	**8.11** (7.50-8.70)	**9.02** (8.30-9.68)	**9.93** (9.11-10.7)	**10.8** (9.91-11.7)	**12.1** (10.9-13.0)	**13.0** (11.7-14.0)
20-day	**5.57** (5.23-5.94)	**6.62** (6.21-7.06)	**7.94** (7.44-8.46)	**8.97** (8.39-9.55)	**10.3** (9.65-11.0)	**11.4** (10.6-12.2)	**12.5** (11.6-13.3)	**13.6** (12.5-14.5)	**15.0** (13.7-16.0)	**16.0** (14.6-17.2)
30-day	**6.88** (6.51-7.29)	**8.14** (7.70-8.61)	**9.56** (9.03-10.1)	**10.6** (10.0-11.2)	**12.0** (11.3-12.7)	**13.1** (12.3-13.9)	**14.1** (13.2-15.0)	**15.1** (14.1-16.0)	**16.4** (15.2-17.4)	**17.3** (16.0-18.4)
45-day	**8.65** (8.21-9.13)	**10.2** (9.66-10.7)	**11.8** (11.2-12.4)	**13.0** (12.3-13.7)	**14.5** (13.7-15.3)	**15.6** (14.7-16.5)	**16.7** (15.7-17.6)	**17.7** (16.6-18.7)	**18.9** (17.7-20.0)	**19.7** (18.4-20.9)
60-day	**10.3** (9.84-10.9)	**12.1** (11.5-12.7)	**13.8** (13.1-14.5)	**15.1** (14.3-15.8)	**16.6** (15.8-17.5)	**17.8** (16.9-18.7)	**18.8** (17.8-19.8)	**19.8** (18.7-20.8)	**20.9** (19.7-22.0)	**21.7** (20.4-22.8)

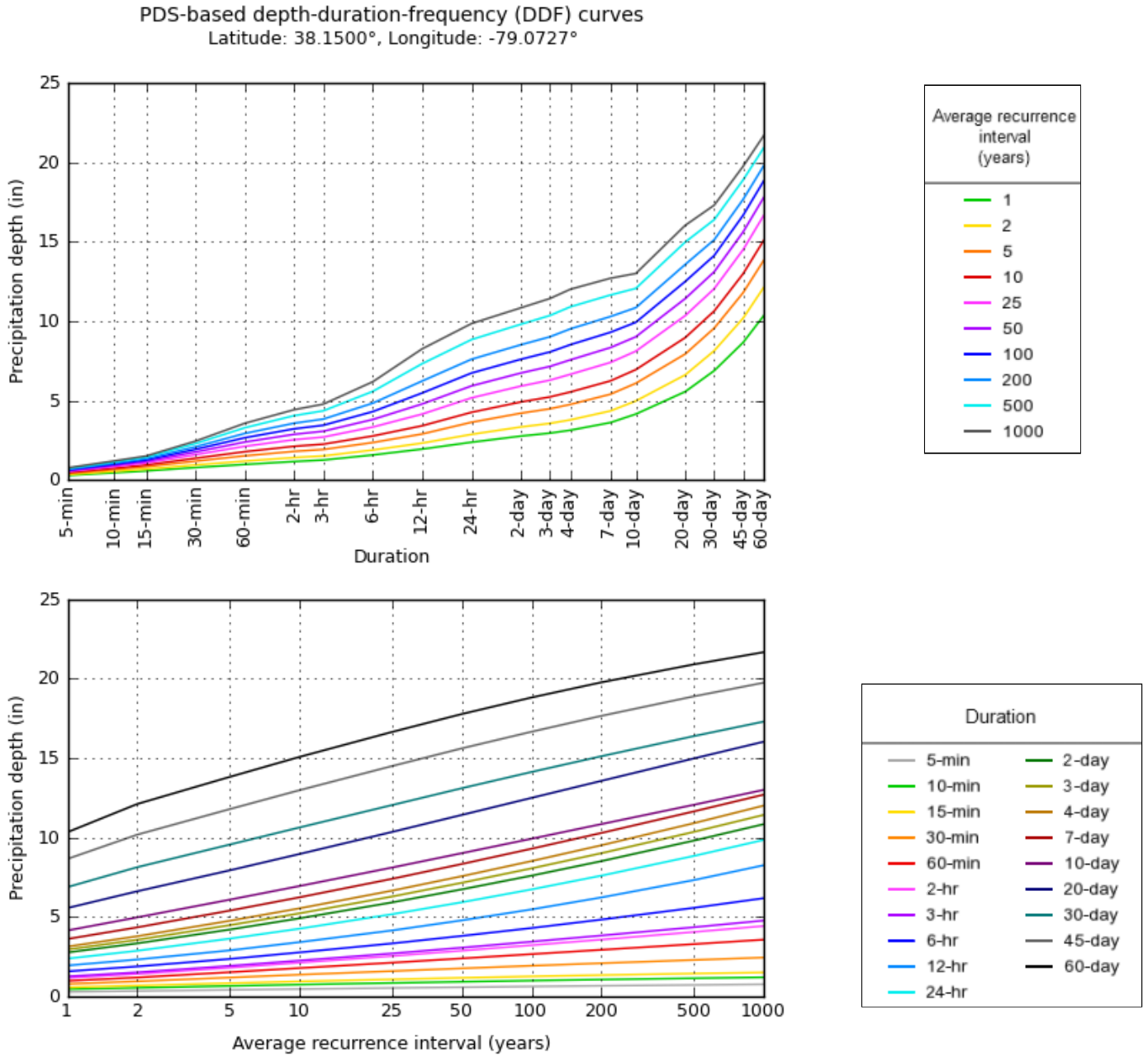
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical



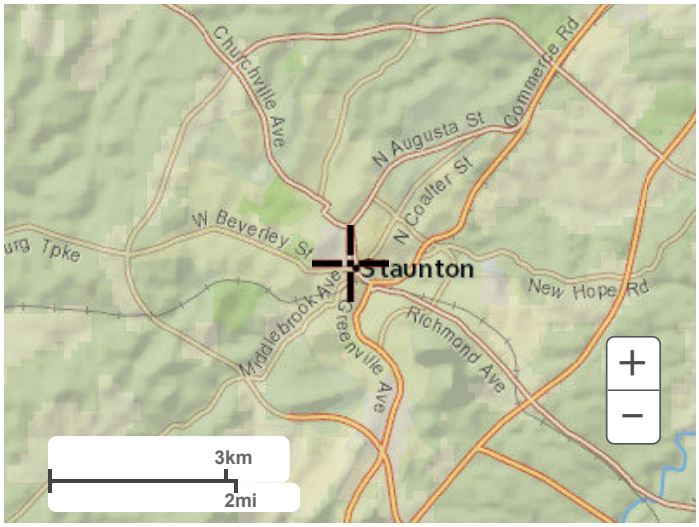
NOAA Atlas 14, Volume 2, Version 3

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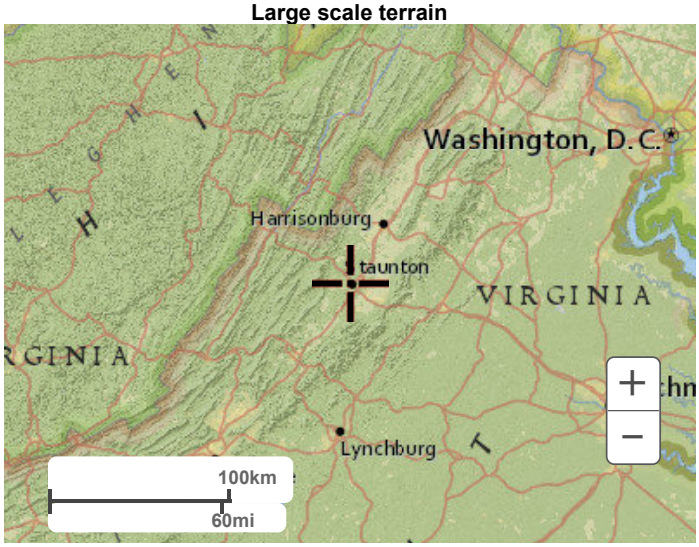
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Maps & aerials

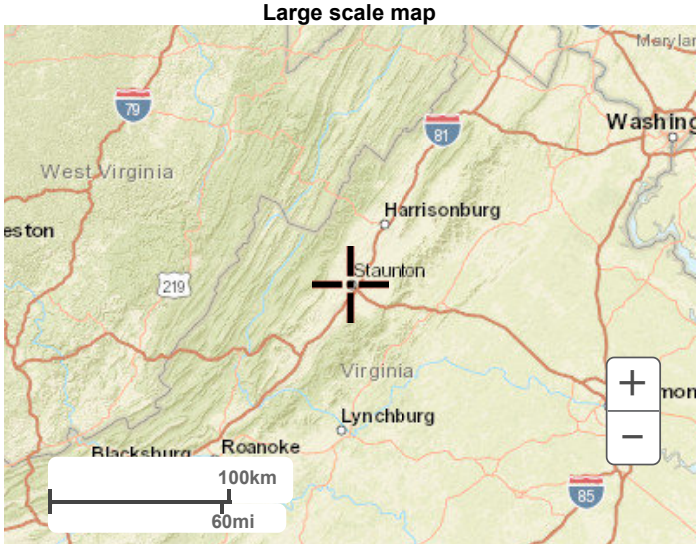
Small scale terrain



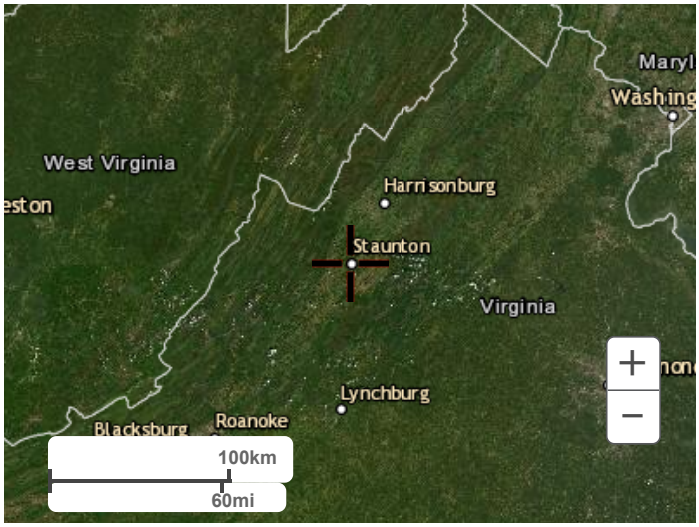
Large scale terrain



Large scale map



Large scale aerial

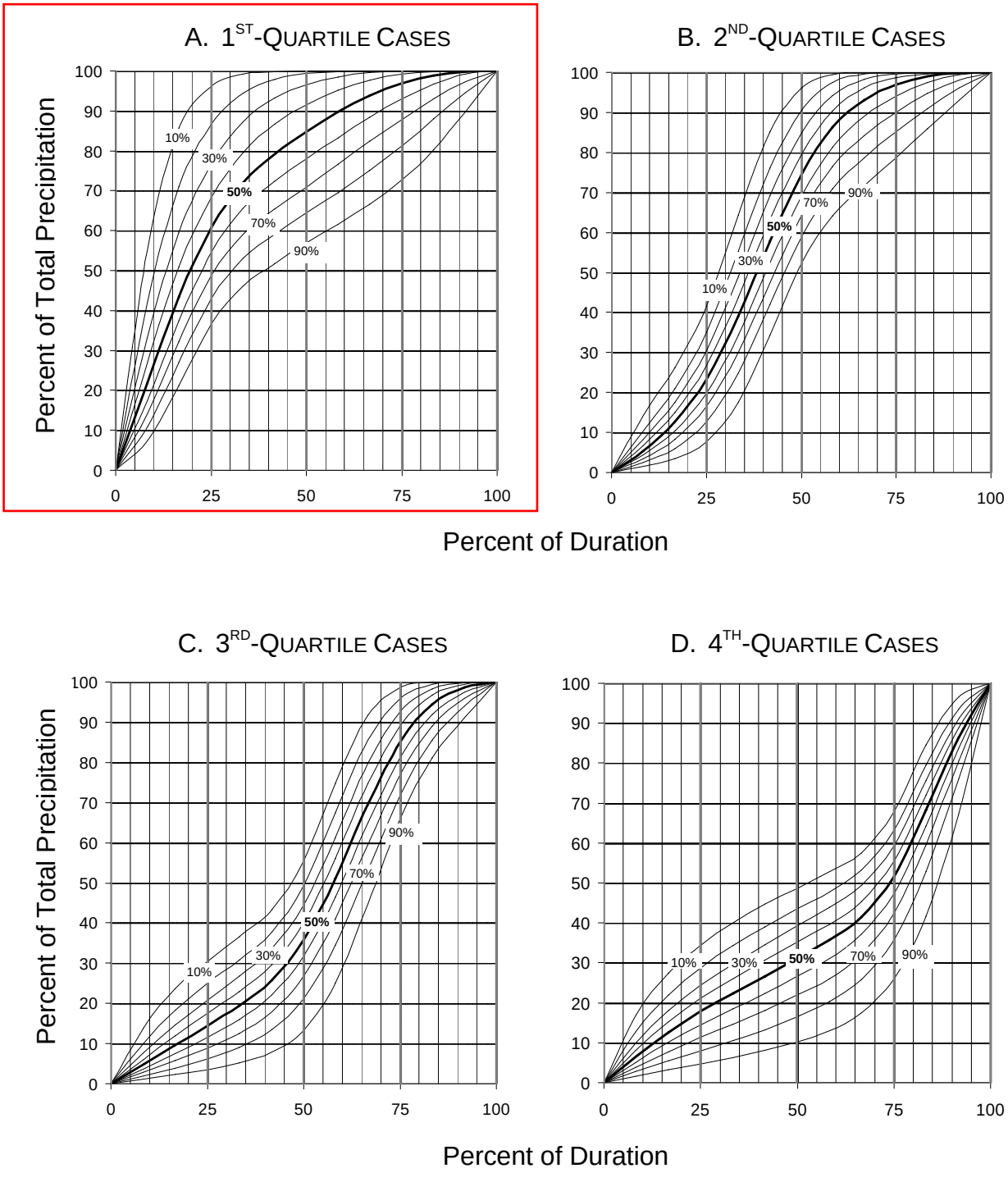


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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

FIGURE A.1.4
TEMPORAL DISTRIBUTION: 24-HOUR DURATION



Storm Data Detailed Report: NOAA Temporal 50%, 1st quartile

Element Details			
ID	261	Notes	
Label	NOAA Temporal 50%, 1st quartile		

01-yr temporal			
Label	01-yr temporal	End Time	24.000 hours
Return Event	1 years	Depth	2.4 in
Start Time	0.000 hours	Storm Event Depth Type	Cumulative
Increment	2.000 hours		

01-yr temporal

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.5	1.0	1.5	1.7
10.000	1.9	2.0	2.2	2.3	2.3
20.000	2.4	2.4	2.4	(N/A)	(N/A)

02-yr temporal			
Label	02-yr temporal	End Time	24.000 hours
Return Event	2 years	Depth	2.9 in
Start Time	0.000 hours	Storm Event Depth Type	Cumulative
Increment	2.000 hours		

02-yr temporal

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.6	1.3	1.8	2.1
10.000	2.3	2.5	2.6	2.7	2.8
20.000	2.9	2.9	2.9	(N/A)	(N/A)

05-yr temporal			
Label	05-yr temporal	End Time	24.000 hours
Return Event	5 years	Depth	3.7 in
Start Time	0.000 hours	Storm Event Depth Type	Cumulative
Increment	2.000 hours		

05-yr temporal

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.8	1.6	2.2	2.6
10.000	2.9	3.1	3.3	3.4	3.5
20.000	3.6	3.7	3.7	(N/A)	(N/A)

Storm Data Detailed Report: NOAA Temporal 50%, 1st quartile

10-yr temporal

Label	10-yr temporal	End Time	24.000 hours
Return Event	10 years	Depth	4.3 in
Start Time	0.000 hours	Storm Event Depth Type	Cumulative
Increment	2.000 hours		

10-yr temporal

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.9	1.9	2.6	3.1
10.000	3.4	3.6	3.8	4.0	4.2
20.000	4.2	4.3	4.3	(N/A)	(N/A)

25-yr temporal

Label	25-yr temporal	End Time	24.000 hours
Return Event	25 years	Depth	5.2 in
Start Time	0.000 hours	Storm Event Depth Type	Cumulative
Increment	2.000 hours		

25-yr temporal

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	1.1	2.3	3.2	3.8
10.000	4.1	4.4	4.7	4.9	5.0
20.000	5.2	5.2	5.2	(N/A)	(N/A)

50-yr temporal

Label	50-yr temporal	End Time	24.000 hours
Return Event	50 years	Depth	6.0 in
Start Time	0.000 hours	Storm Event Depth Type	Cumulative
Increment	2.000 hours		

50-yr temporal

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	1.3	2.6	3.6	4.3
10.000	4.7	5.0	5.3	5.6	5.8
20.000	5.9	5.9	6.0	(N/A)	(N/A)

100-yr temporal

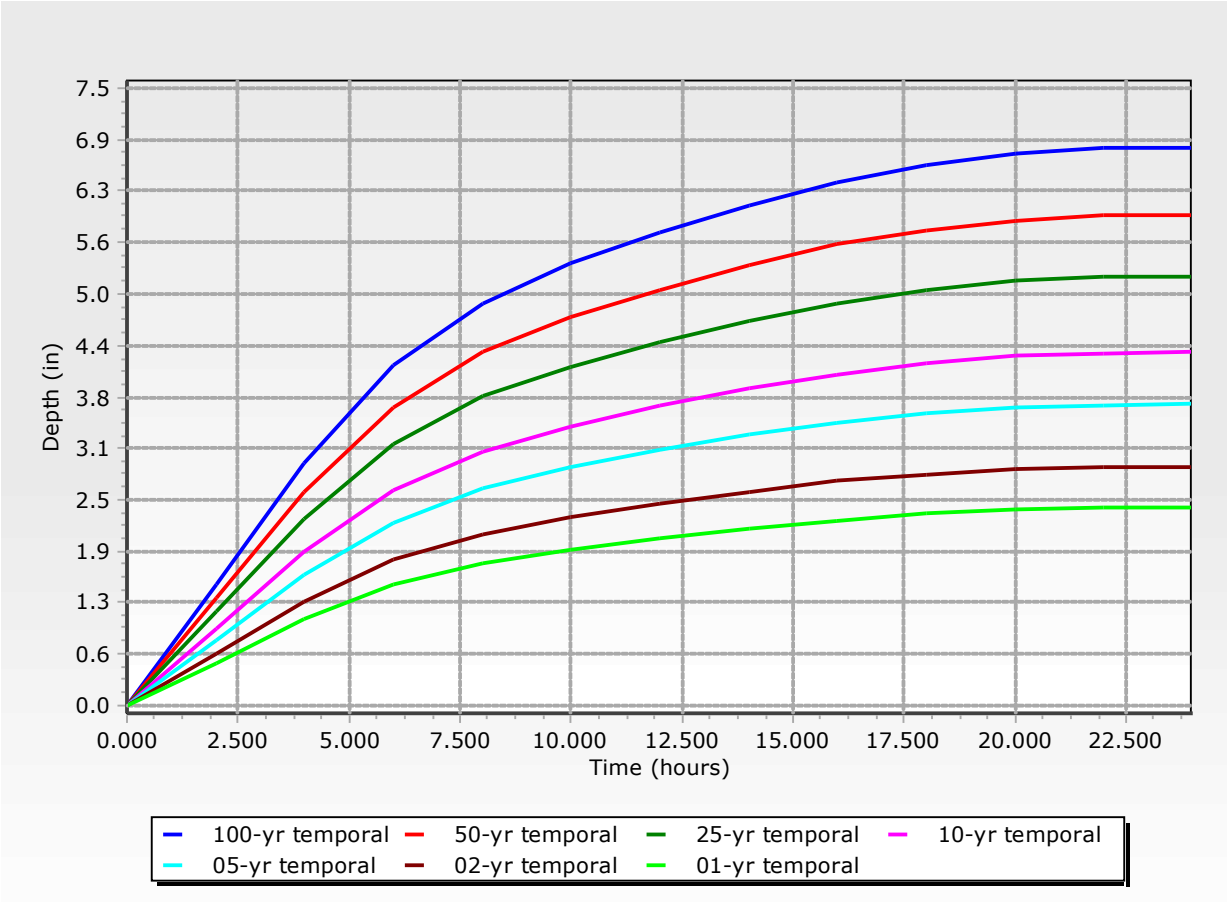
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Return Event	100 years	Depth	6.8 in
Start Time	0.000 hours	Storm Event Depth Type	Cumulative

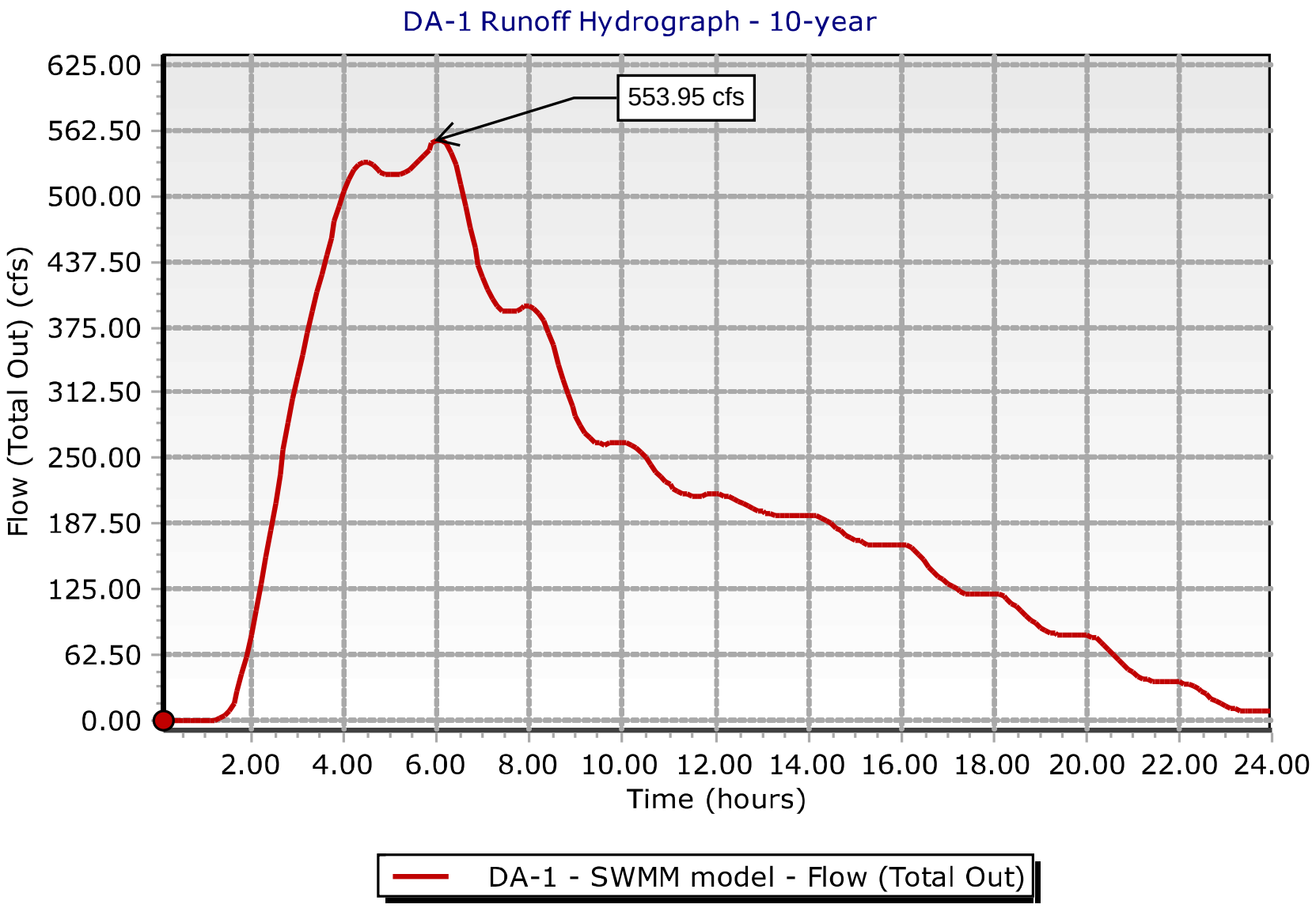
Storm Data Detailed Report: NOAA Temporal 50%, 1st quartile

100-yr temporal	
Increment	2.000 hours

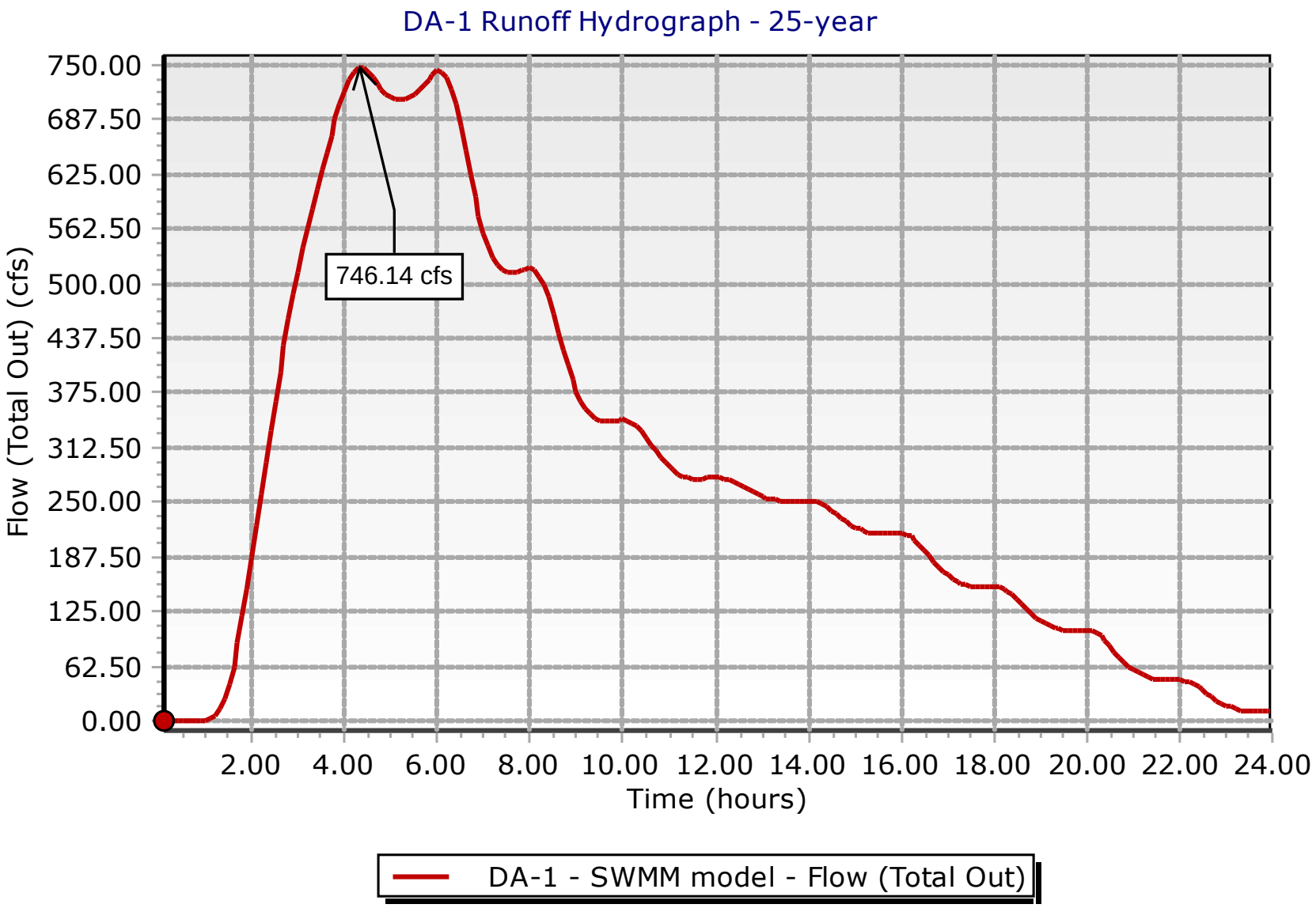
100-yr temporal

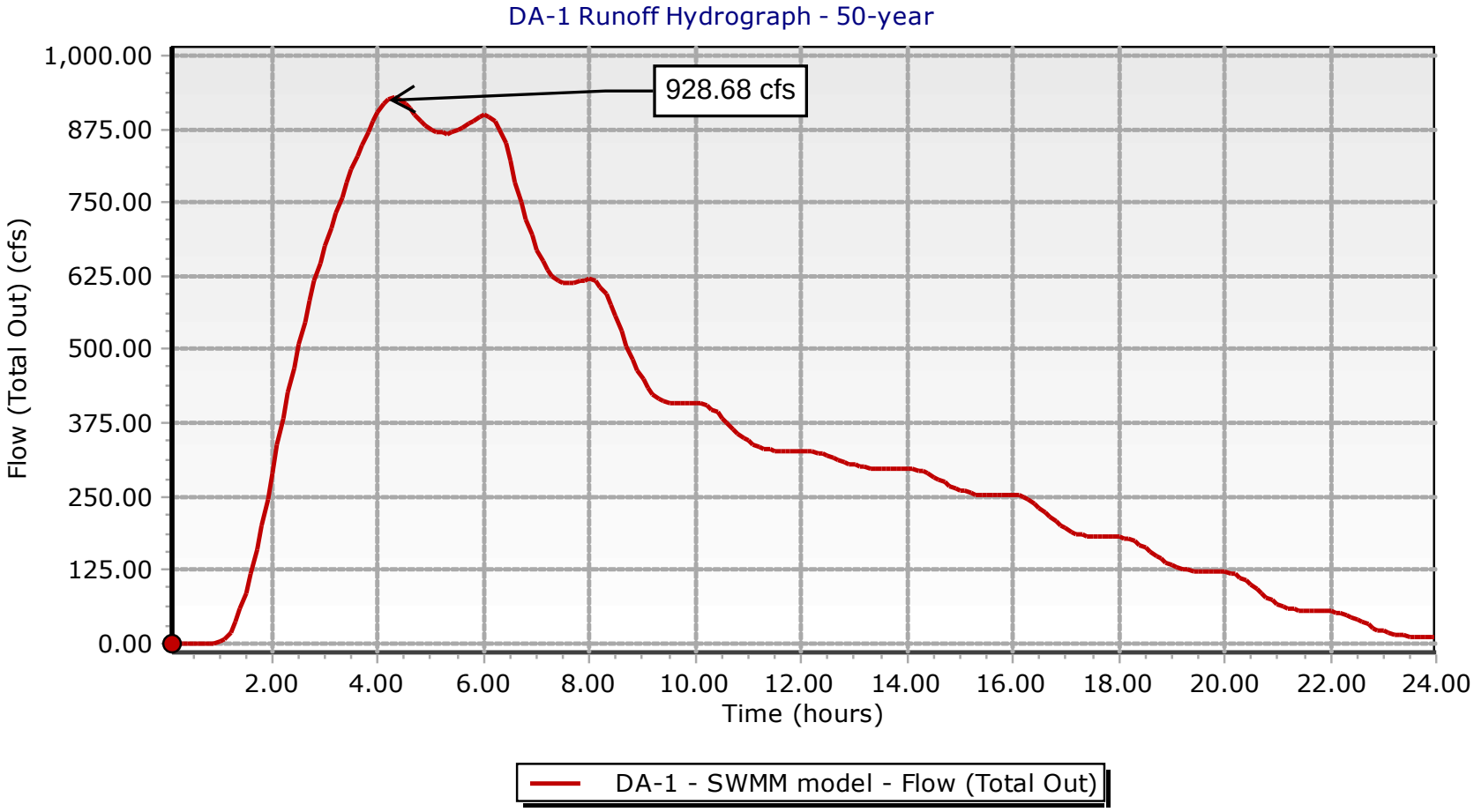
Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	1.5	2.9	4.1	4.9
10.000	5.4	5.7	6.1	6.4	6.6
20.000	6.7	6.8	6.8	(N/A)	(N/A)

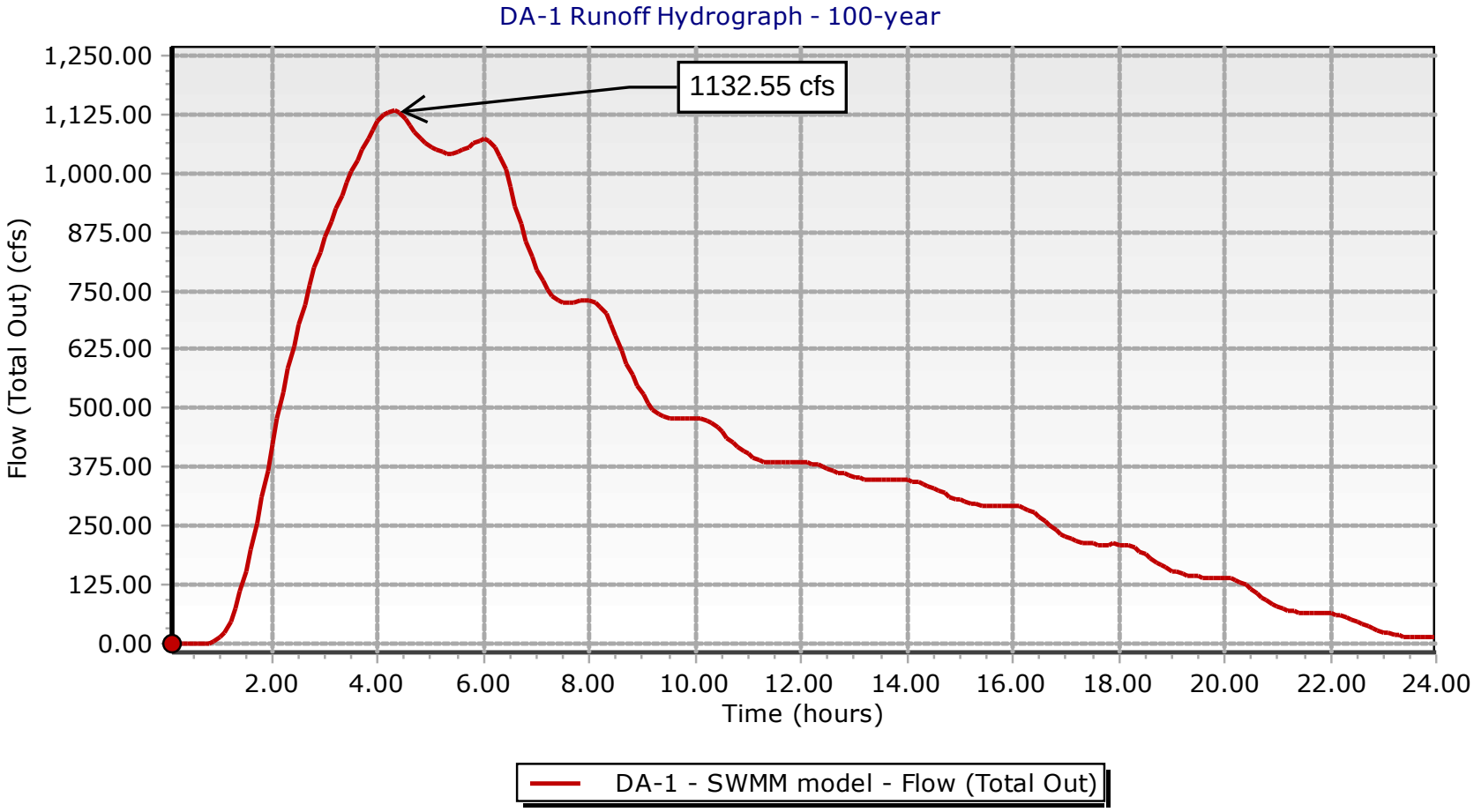


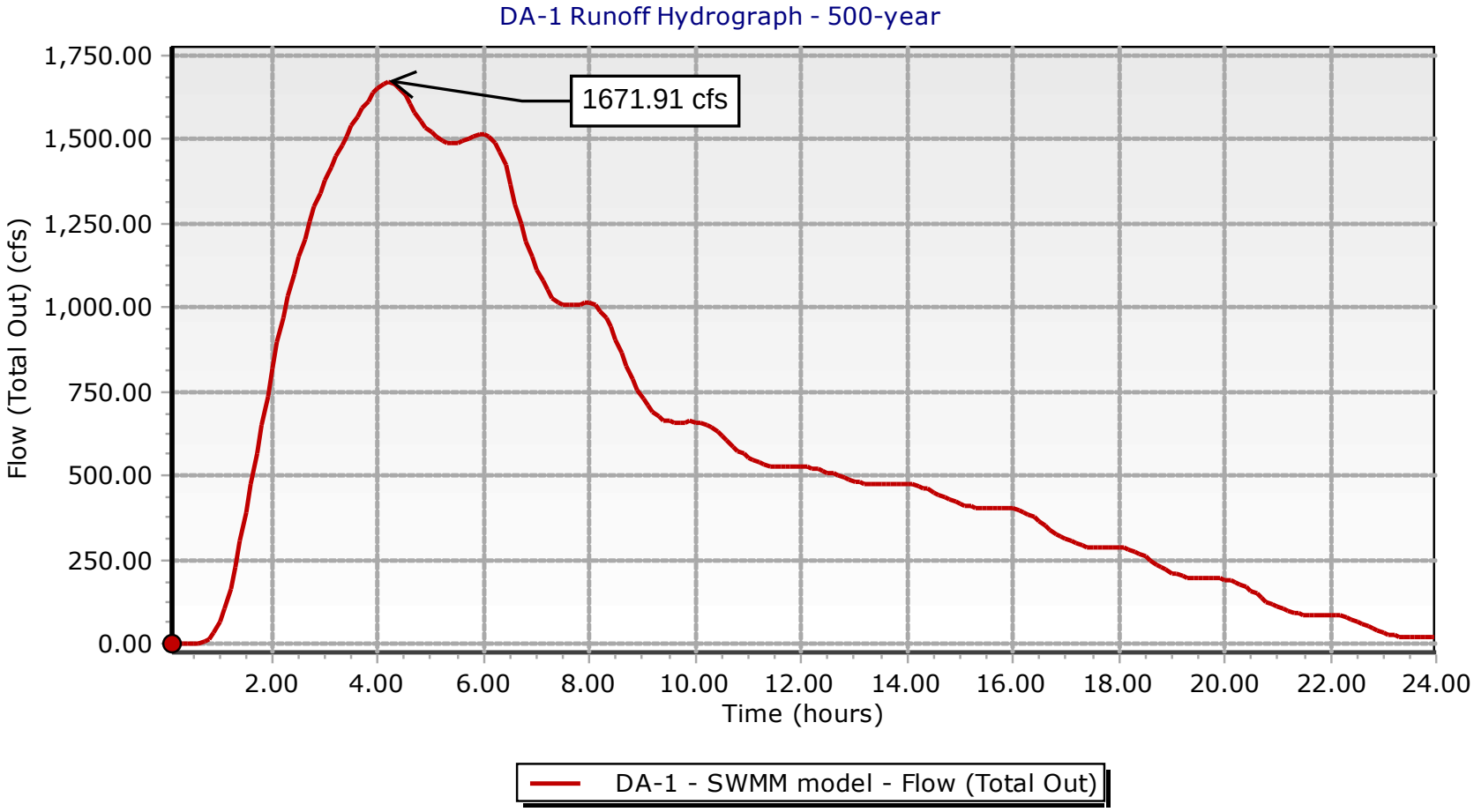


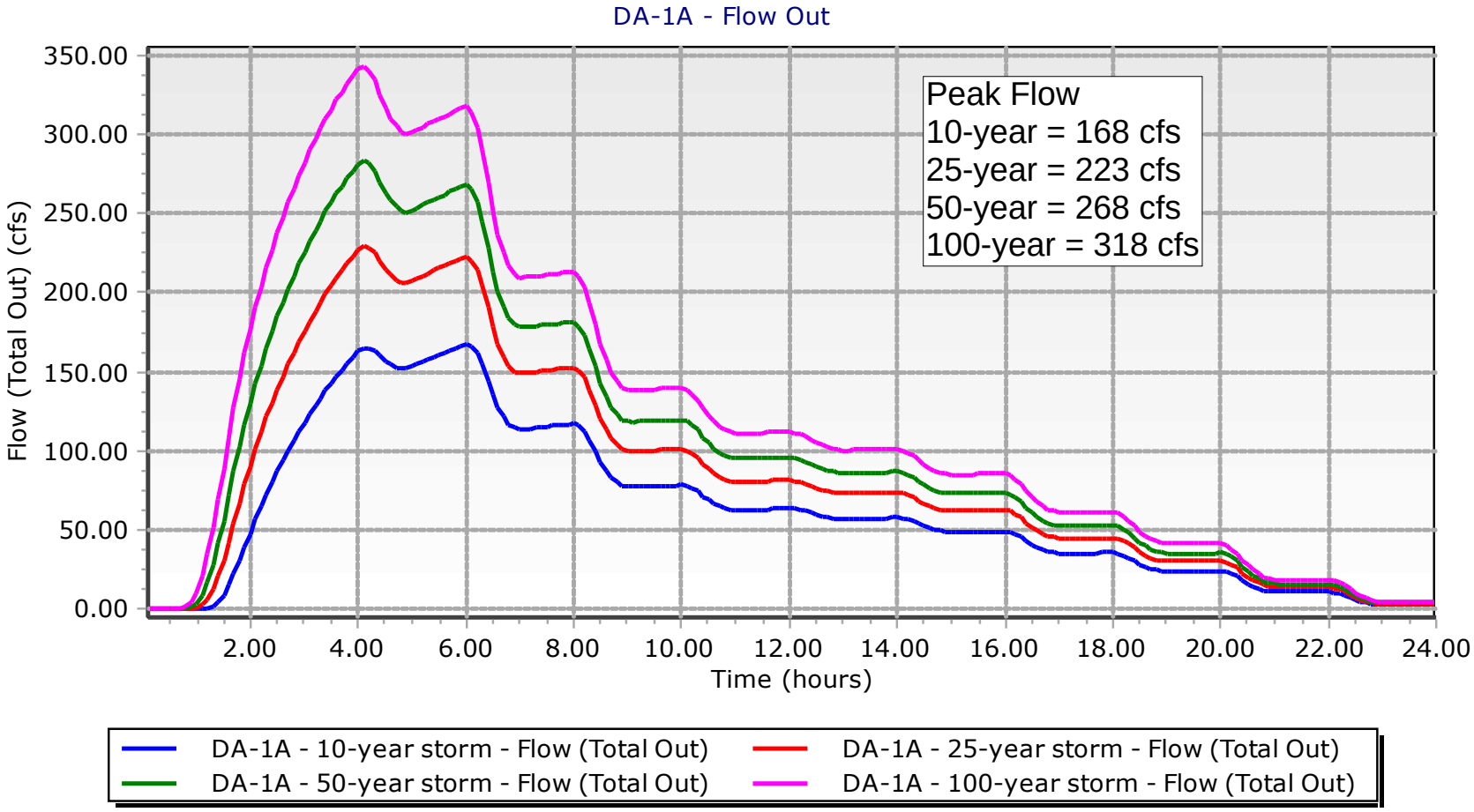
You created this PDF from an application that is not licensed to print to novaPDF printer (http://www.novapdf.com)

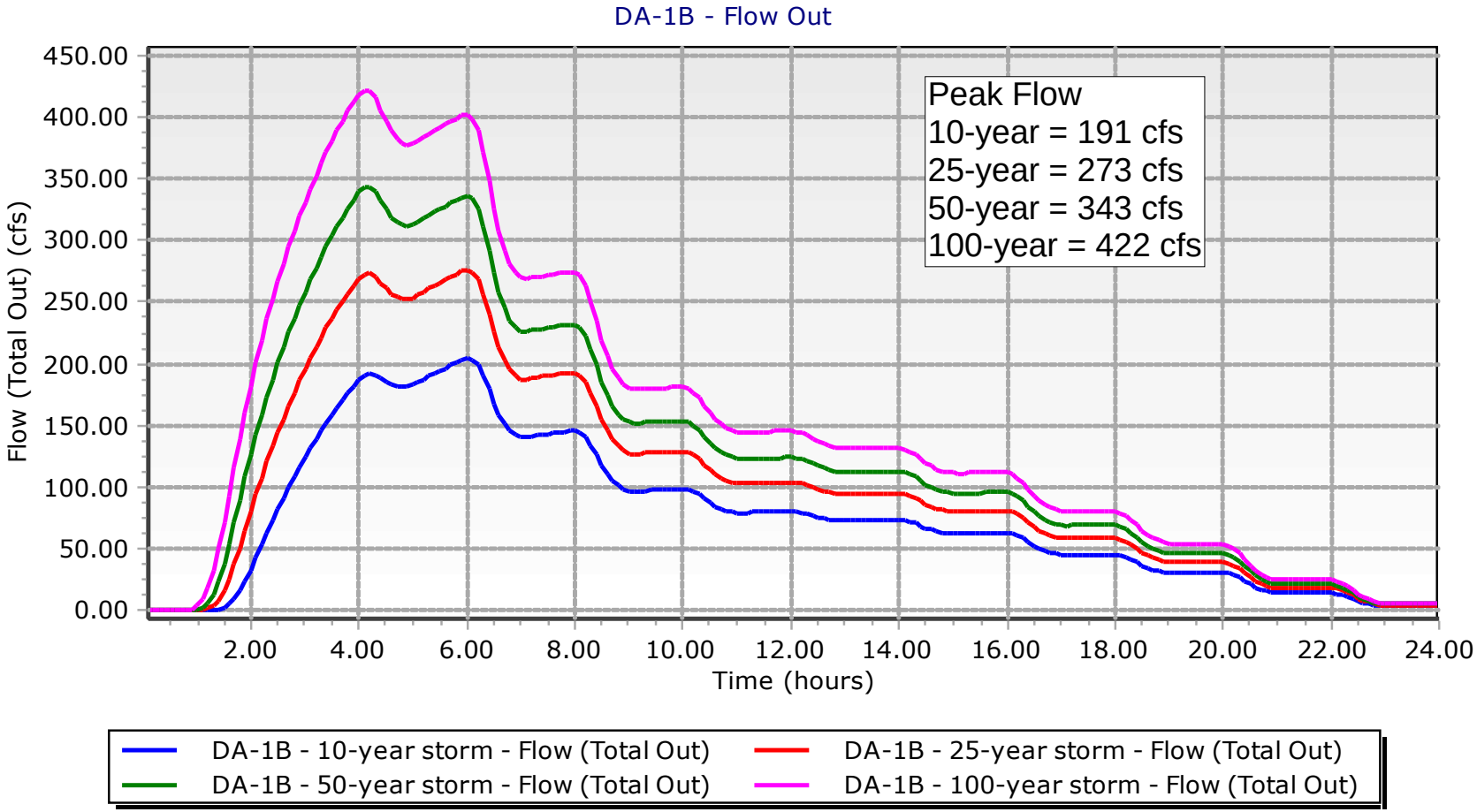

DA-1 Runoff Hydrograph - 25-year
750.00
687.50
625.00
562.50
500.00
437.50
375.00
312.50
250.00
187.50
125.00
62.50
0.00
Flow (Total Out) (cfs)
746.14 cfs
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
Time (hours)
DA-1 - SWMM model - Flow (Total Out)

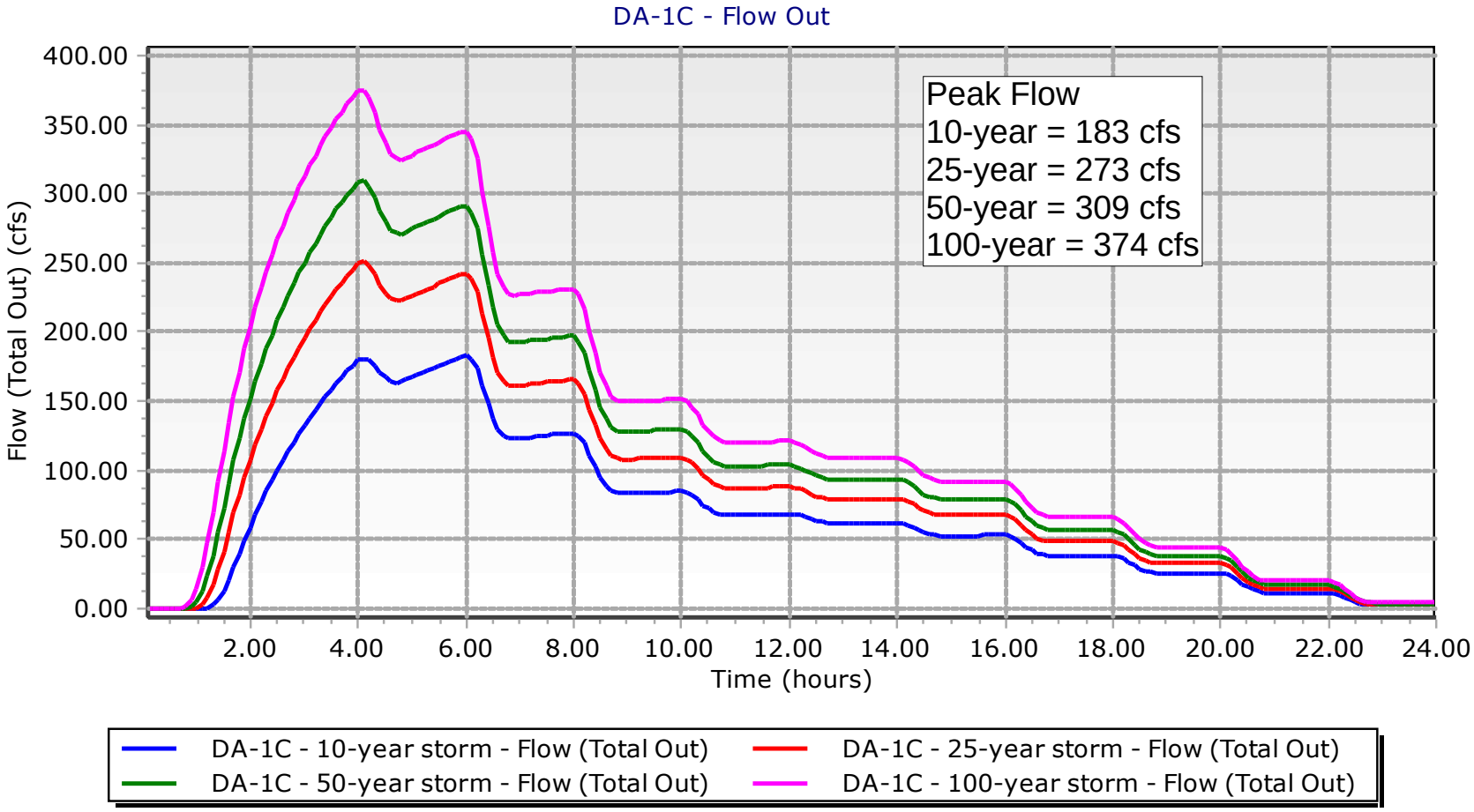

DA-1 Runoff Hydrograph - 50-year
928.68 cfs
Flow (Total Out) (cfs)
1,000.00
875.00
750.00
625.00
500.00
375.00
250.00
125.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
Time (hours)
DA-1 - SWMM model - Flow (Total Out)


DA-1 Runoff Hydrograph - 100-year
1132.55 cfs
Flow (Total Out) (cfs)
1,250.00
1,125.00
1,000.00
875.00
750.00
625.00
500.00
375.00
250.00
125.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
Time (hours)
DA-1 - SWMM model - Flow (Total Out)


DA-1 Runoff Hydrograph - 500-year
1671.91 cfs
Flow (Total Out) (cfs)
1,750.00
1,500.00
1,250.00
1,000.00
750.00
500.00
250.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
Time (hours)
DA-1 - SWMM model - Flow (Total Out)

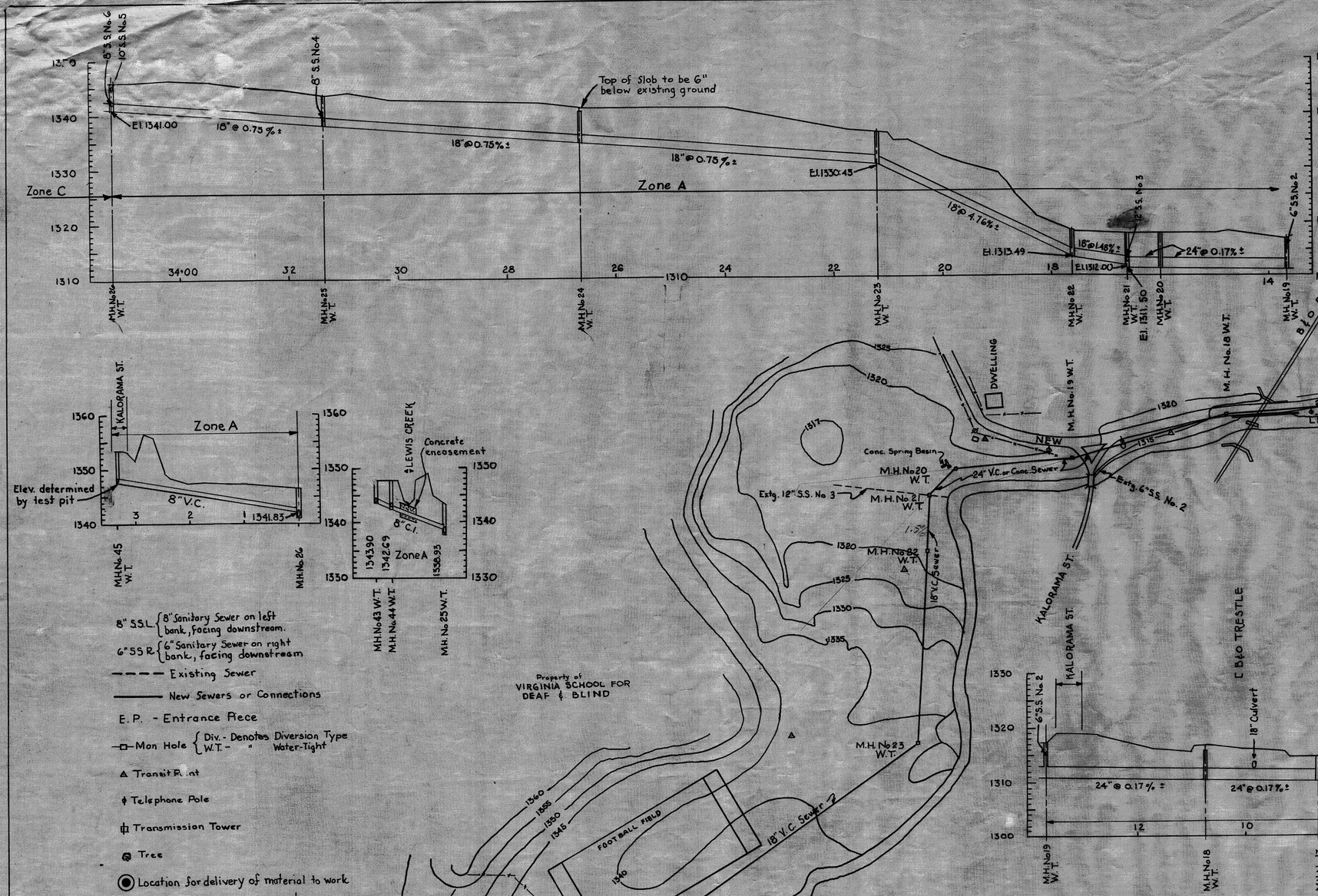

DA-1A - Flow Out
Peak Flow
10-year = 168 cfs
25-year = 223 cfs
50-year = 268 cfs
100-year = 318 cfs
Flow (Total Out) (cfs)
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
Time (hours)
DA-1A - 10-year storm - Flow (Total Out)
DA-1A - 25-year storm - Flow (Total Out)
DA-1A - 50-year storm - Flow (Total Out)
DA-1A - 100-year storm - Flow (Total Out)


DA-1B - Flow Out
Peak Flow
10-year = 191 cfs
25-year = 273 cfs
50-year = 343 cfs
100-year = 422 cfs
Flow (Total Out) (cfs)
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
Time (hours)
DA-1B - 10-year storm - Flow (Total Out)
DA-1B - 25-year storm - Flow (Total Out)
DA-1B - 50-year storm - Flow (Total Out)
DA-1B - 100-year storm - Flow (Total Out)


DA-1C - Flow Out
Peak Flow
10-year = 183 cfs
25-year = 273 cfs
50-year = 309 cfs
100-year = 374 cfs
Flow (Total Out) (cfs)
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
Time (hours)
DA-1C - 10-year storm - Flow (Total Out)
DA-1C - 25-year storm - Flow (Total Out)
DA-1C - 50-year storm - Flow (Total Out)
DA-1C - 100-year storm - Flow (Total Out)

APPENDIX C

PLANS OF STAUNTON TUNNELS



8" S.S.L. { 8" Sanitary Sewer on left bank, facing downstream.

6" S.S.R. { 6" Sanitary Sewer on right bank, facing downstream

Existing Sewer

New Sewers or Connections

E.P. - Entrance Piece

Mon Hole { Div. - Denotes Diversion Type W.T. - " Water-Tight

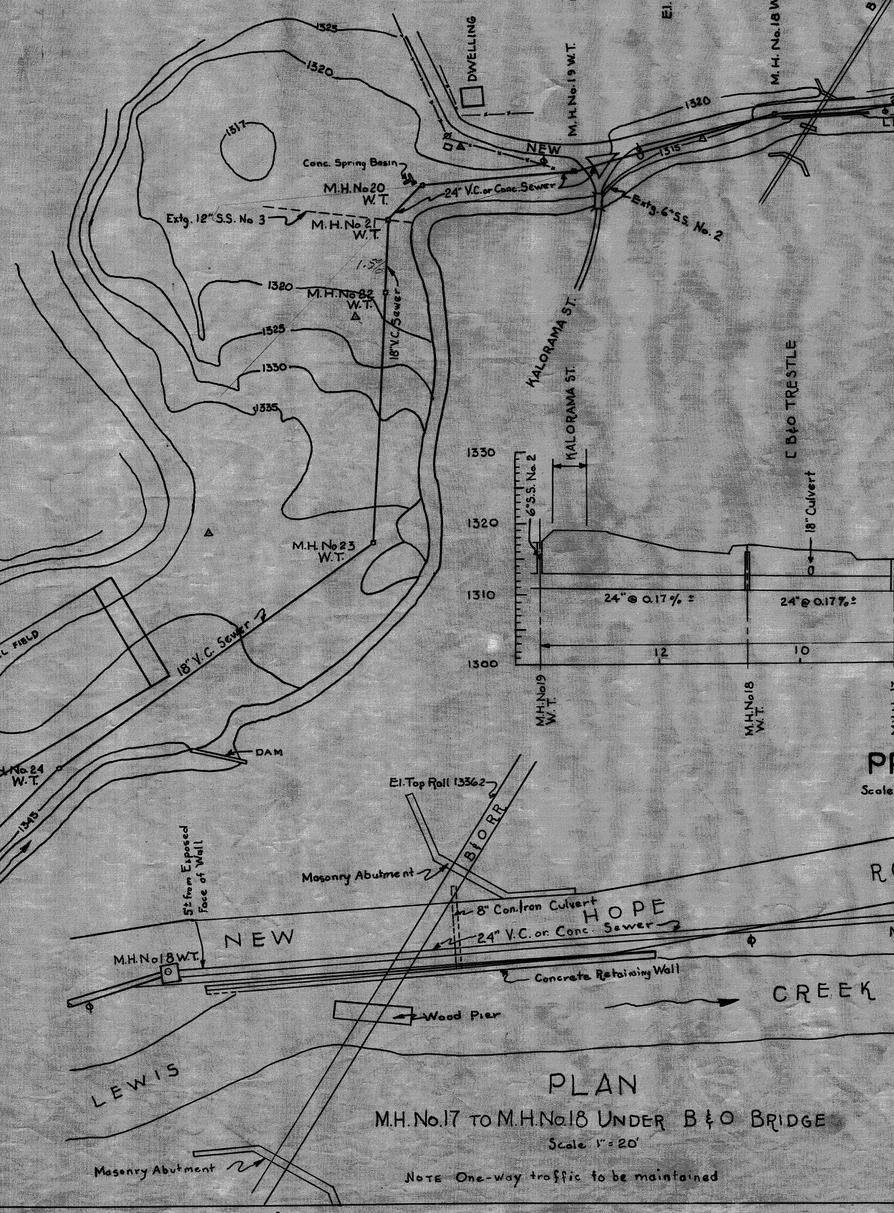
Transit Point

Telephone Pole

Transmission Tower

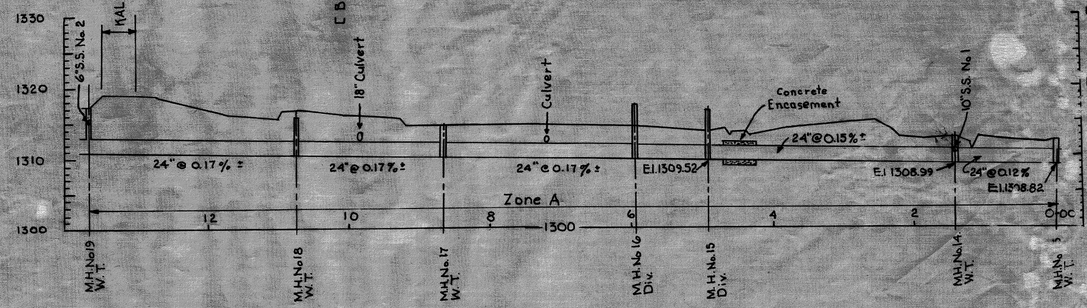
Tree

Location for delivery of material to work

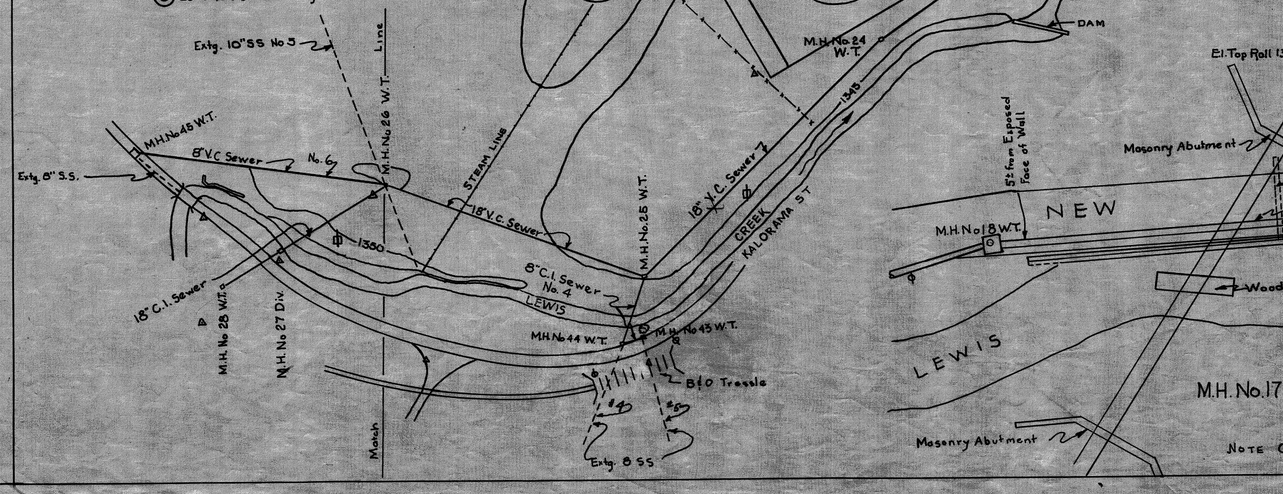


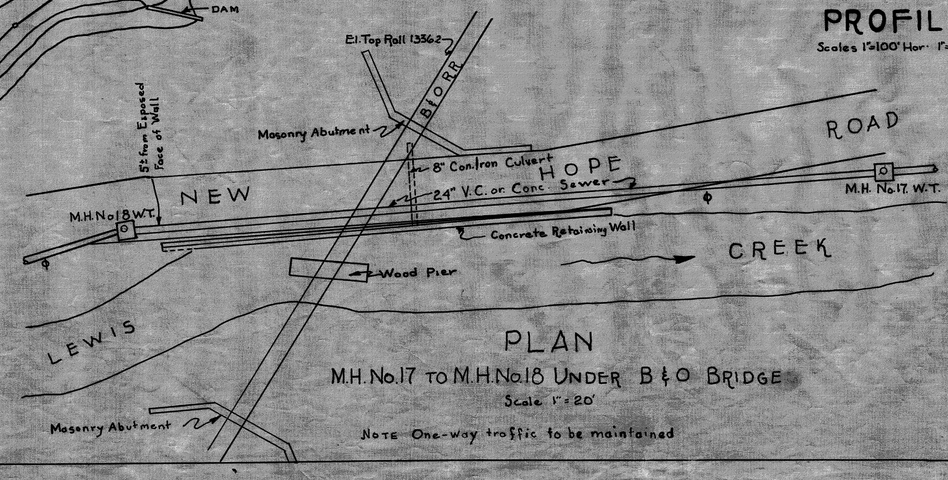
Note - Right of way through private property to be 30' wide. Sewer to be located 10' from the north or west boundary.

PLAN
Scale 1"=100'



PROFILES
Scales 1"=100' Hor. 1"=10' Vert.





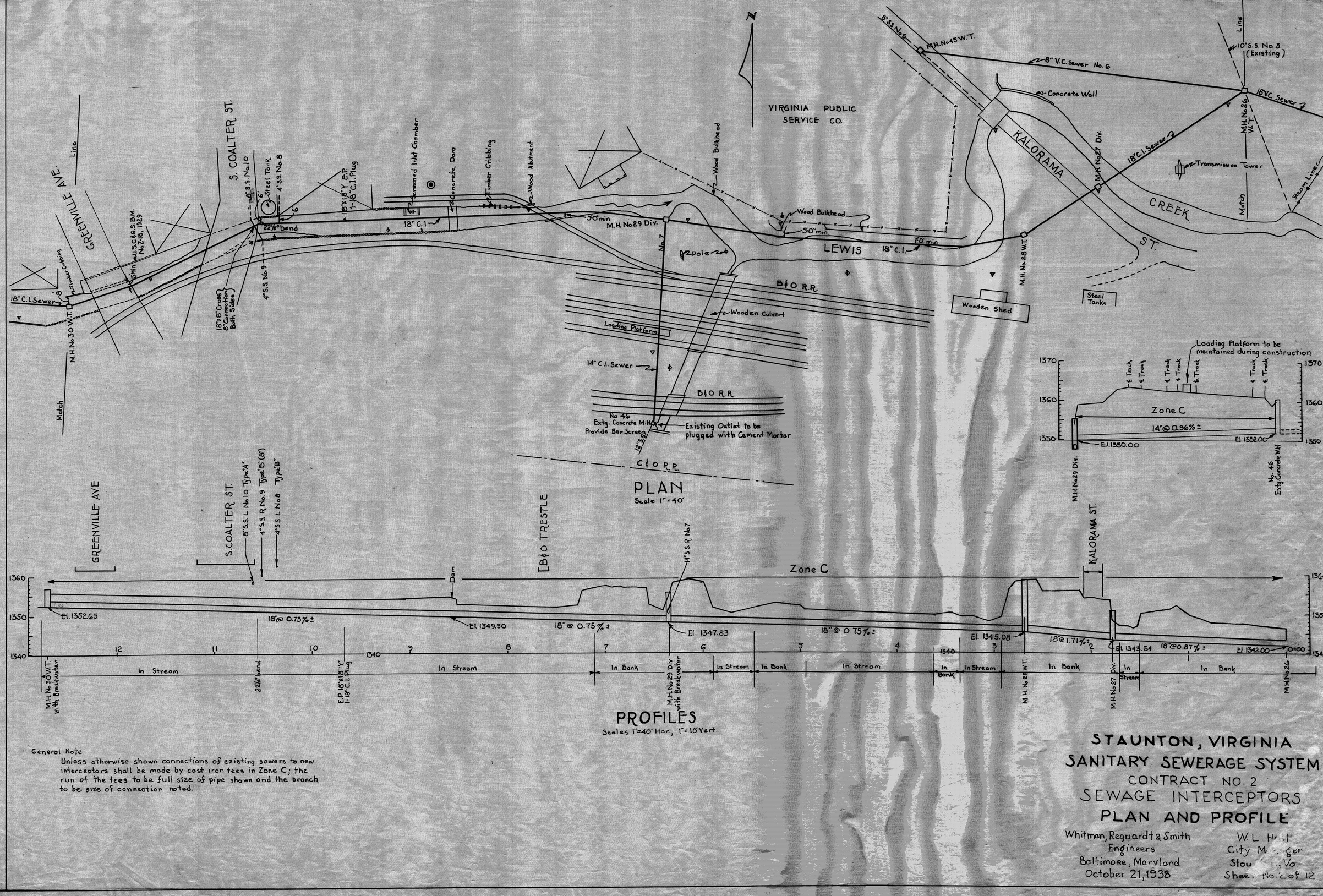
PLAN
M.H. No. 17 TO M.H. No. 18 UNDER B & O BRIDGE
Scale 1" = 20'

NOTE One-way traffic to be maintained

STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
PLAN AND PROFILE

Whitmar, Reguardt & Smith
Engineers
Baltimore, Maryland
October 21, 1938

W. L. Hall
City Manager
Staunton, Va.
Sheet No. 1 of 12



General Note

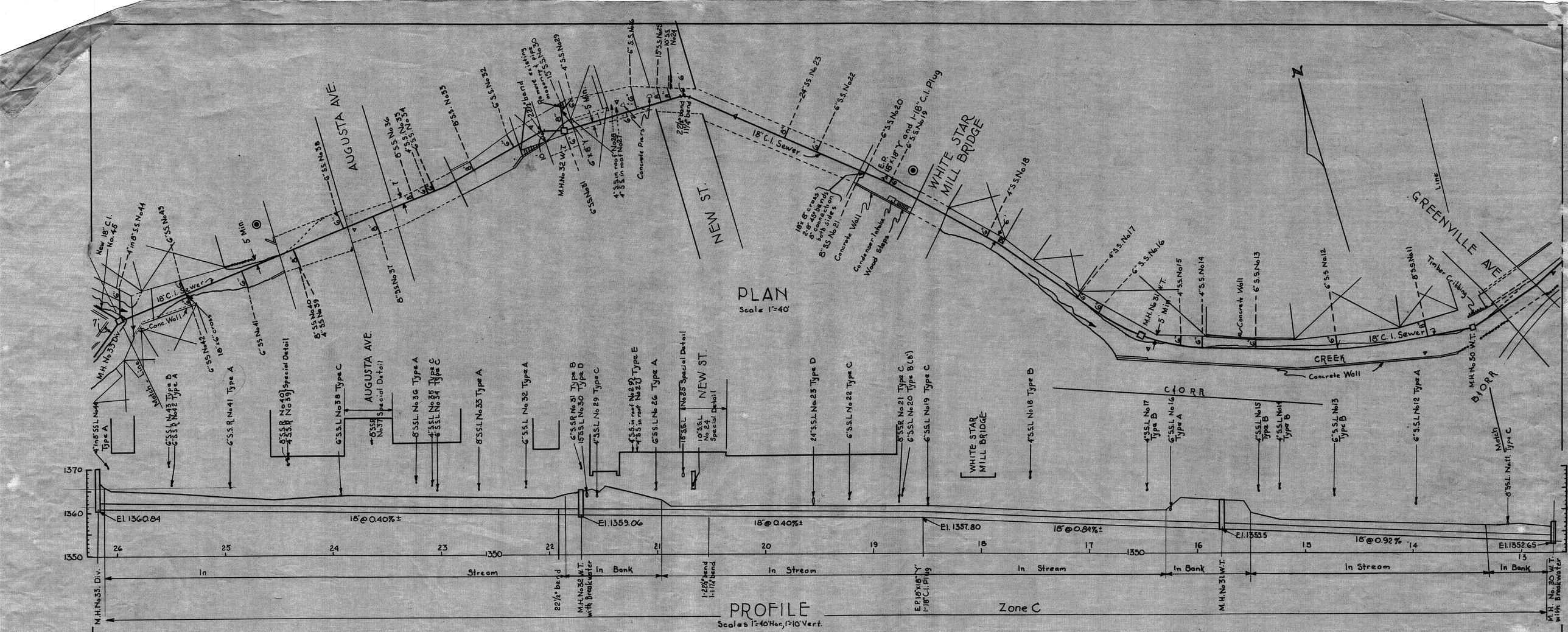
Unless otherwise shown connections of existing sewers to new interceptors shall be made by cast iron tees in Zone C; the run of the tees to be full size of pipe shown and the branch to be size of connection noted.

STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
PLAN AND PROFILE

Whitman, Requardt & Smith
Engineers
Baltimore, Maryland
October 21, 1938

W. L. H[illegible]
City M[illegible]ger
Stau[illegible] Va.

Sheet No. 2 of 12



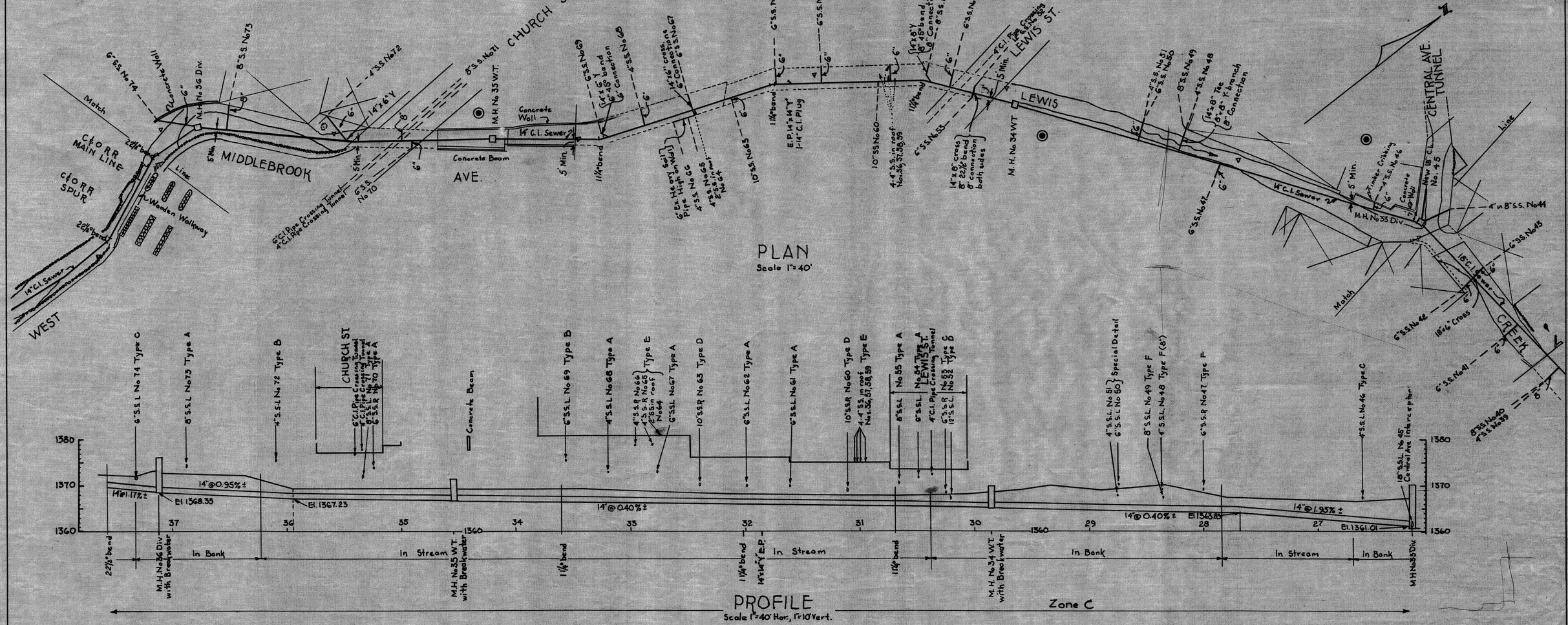
PLAN
Scale 1"=40'

PROFILE
Scales 1"=10' Hor., 1"=10' Vert.

STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
PLAN AND PROFILE

Whitman, Requardt & Smith
Engineers
Baltimore, Maryland
October 21, 1938

W. L. Holl
City Manager
Staunton, Va.
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STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
PLAN AND PROFILE

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Engineers
Baltimore, Maryland
October 21, 1938

W. L. Hall
City Manager
Staunton, Va.

Sheet No. 4 of 12

Existing 15" T.C. pipe to be removed from manhole wall. 14" C.I. pipe to be inserted in opening and annular space filled with mortar, 14" C.I. pipe to terminate with 3'-6" p.e. piece encased in concrete for a length of 18"

Tide Gate (12"x 36") to be installed in existing manhole No 40

Existing 12" SS No 87

Exist. 10" SS No 88

Existing Manhole

M.H. No 40 Div.

19' C.I. Sewer

Exist. 15" SS

LEWIS

4" SS No 86

5' Min.

6"

3" SS No 85

M.H. No 39 Div.

BRIDGE

6" SS No 84

Concrete Inlet Chamber

22½° bend

GASOLINE TANKS

WEST

4" SS No 82

14" C.I. Sewer 7

M.H. No 38 Div

5' Min

MIDDLEBROOK

3" W.I. Pipe Crossing Str. Bed

10" SS No 83

2-3" W.I. Pipes Crossing Str. Bed

22½° bend

6" SS No 81

C&O R.R. MAIN LINE

C&O R.R. SPUR

22½° bend

Wood Walkway

Conc. Encass. Class "C"

Match Line

22½° bend

5' Min

AVE.

WOOD BRIDGE

14" C.I. Sewer 2

M.H. No 37 W.T.

6" SS No 75

Wood Trestle Ben.

CREEK

6" SS No 77

5" SS No 78 CONCRETE BRIDGE CITY PLANT ENTRANCE

14"x14"Y lay flat

6"x6" Cross

6"x6" Y

6" 11¼° bend

6" SS No 79

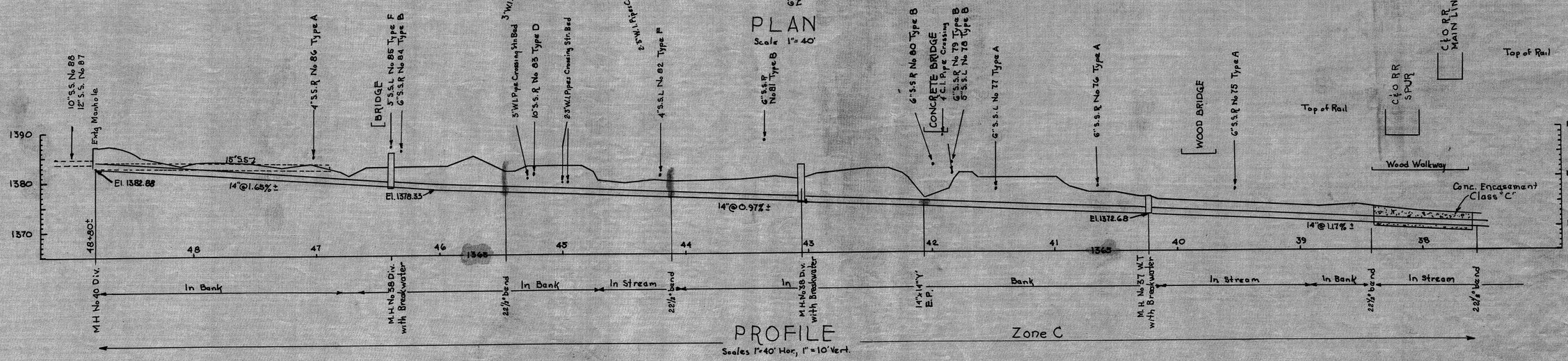
4" CI. Pipe Under Bridge

6" SS No 80

6" SS No 76

PLAN

Scale 1"= 40'



PROFILE

Scales 1"=40' Hor., 1" = 10' Vert.

Zone C

STAUNTON, VIRGINIA

SANITARY SEWERAGE SYSTEM

CONTRACT NO 2

SEWAGE INTERCEPTORS

PLAN AND PROFILE

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Baltimore, Maryland
October 21, 1938

W. L. Hall
City Manager
Staunton, Va.

Sheet No. 5 of 11

PLAN
Scale 1"=40'

PROFILES
Scales: 1"=40' Horz., 1"=10' Vert.

EAST SIDE OF TUNNEL

WEST SIDE OF TUNNEL

DETAIL OF PIPE
UNDER JOHNSON STREET
Scale 1"=10"

STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
PLAN AND PROFILE

Whitman, Requardt & Smith
Engineers
Baltimore, Maryland
October 21, 1938

W. L. Hall
City Manager
Staunton, Va.
Sheet No. 6 of 12

PLAN
Scale 1"=40'

PROFILES
Scales 1"=40' Hor; 1"=10' Vert.

JUNCTION OF 10" V.C. & 10" C.I. PIPE
See Sheet No. 6
Scale: ½"=1'-0"

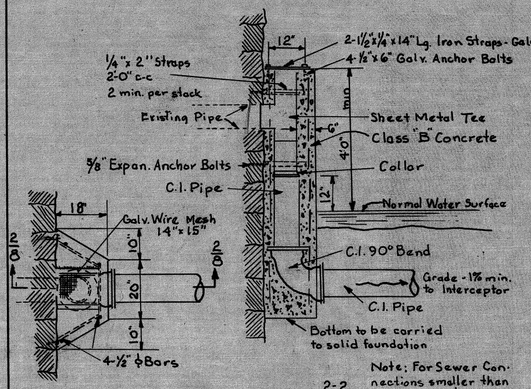
JUNCTION OF 15" V.C. & 16" C.I. PIPE - Scale ½"=1'-0"
See Sheet No. 6

SECTIONAL PLAN I-I

STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
PLAN AND PROFILE

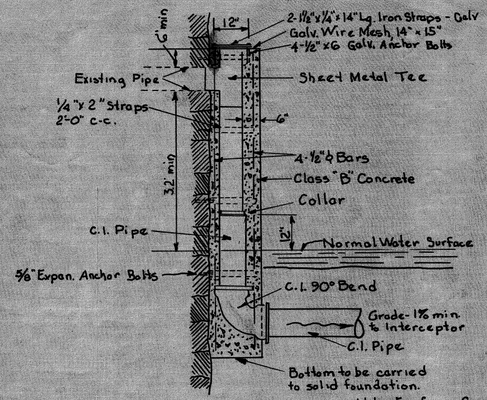
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October 21, 1938

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Staunton, Va.
Sheet No. 7 of 12



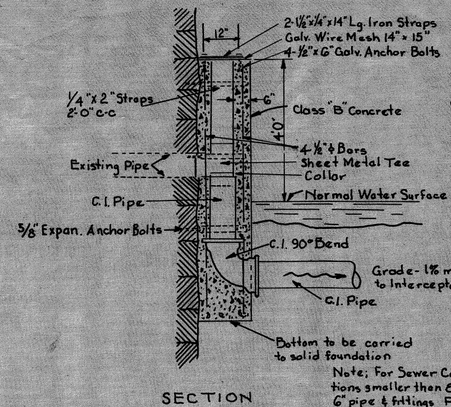
Note: For Sewer Connections smaller than 8", use 6" pipe & fittings, For 8" Sewer Connections use 8" pipe & fittings.

TYPE "A" CONNECTION
FOR EXISTING SEWERS 8" AND SMALLER



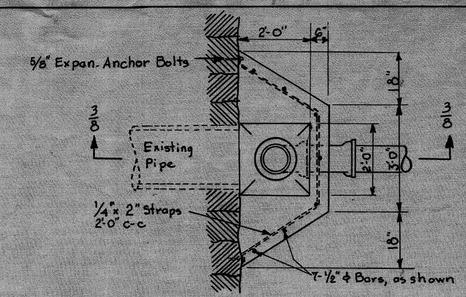
Note: For Sewer Connections smaller than 8" use 6" pipe & fittings For 8" Sewer Connections, use 8" pipe & fittings

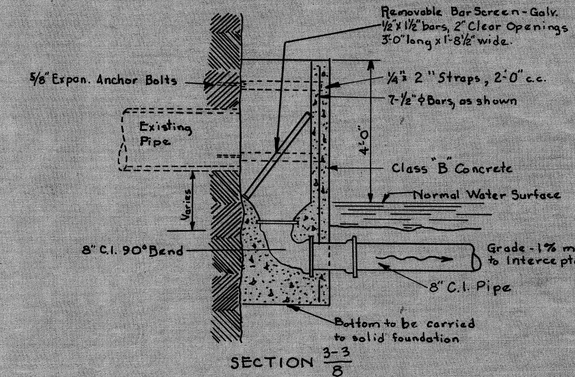
TYPE "B" CONNECTION
PLAN SAME AS TYPE "A"
FOR EXISTING SEWERS 8" AND SMALLER



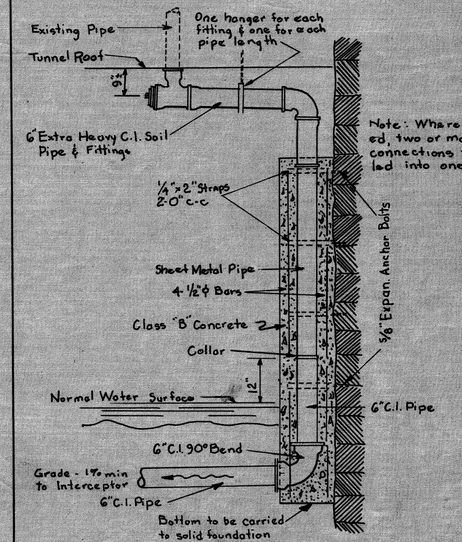
Note: This type shall be used where the invert of the existing sewer is lower than 12" above Normal Water Surface. End of C.I. Pipe to be plugged and water prevented from entering pipe until the test for infiltration in the section has been made.

TYPE "C" CONNECTION
PLAN SAME AS TYPE "A"
FOR EXISTING SEWERS 8" AND SMALLER



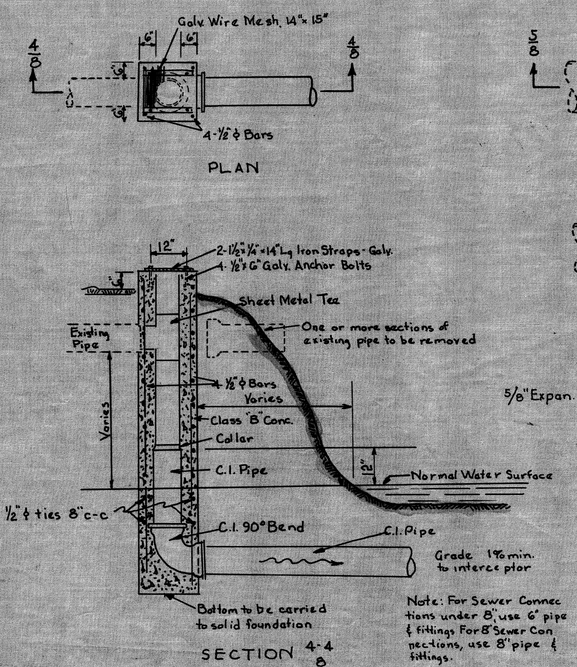


TYPE "D" CONNECTION
FOR EXISTING SEWERS 10" AND LARGER



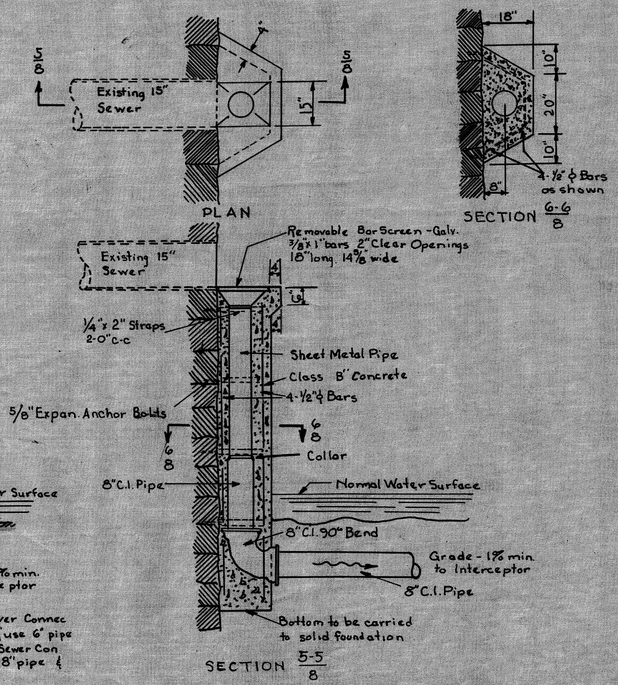
Note: Where ordered, two or more roof connections to be led into one stock

TYPE "E" CONNECTION
PLAN SAME AS TYPE "A"
FOR EXISTING SEWERS 4" & SMALLER IN TUNNEL ROOF

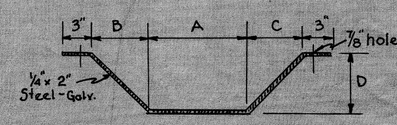


Note: For Sewer Connections under 8", use 6" pipe & fittings For 8" Sewer Connections, use 8" pipe & fittings.

TYPE "F" CONNECTION
FOR EXISTING SEWERS 8" & SMALLER



CONNECTION No 25



FOL STACK	A	B	C	D	Approximate No. Required
Type A, B, C, E #25, #37 #39 & #40	16"	8"	8"	15"	250
Type D	2'-6"	16"	16"	2'-3"	18
#24	16" 16"	8" 8"	8" 0	15" 15"	2 2
Type H & J	10"	7"	7"	10"	60
#156	2'-5" 2'-5"	17½" 11"	17½" 11"	3'-0" 2'-0"	1 1

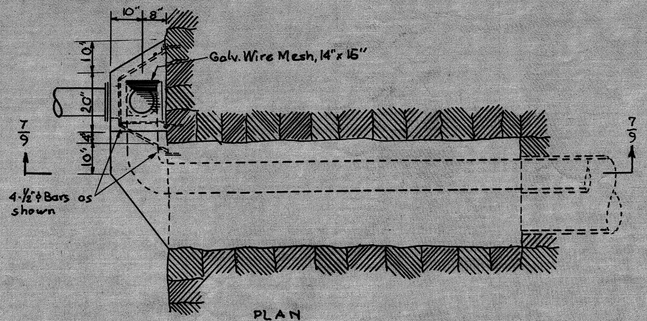
DETAILED SCHEDULE FOR STEEL STRAPS

STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
TYPICAL CONNECTIONS

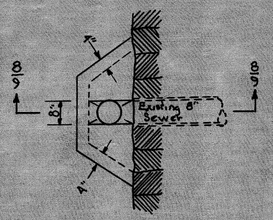
Scale: 1/2"=1'-0"

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Baltimore, Maryland
October 21, 1938

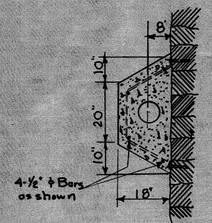
W. L. Hall
City Manager
Staunton, Va.
Sheet No. 8 of 12



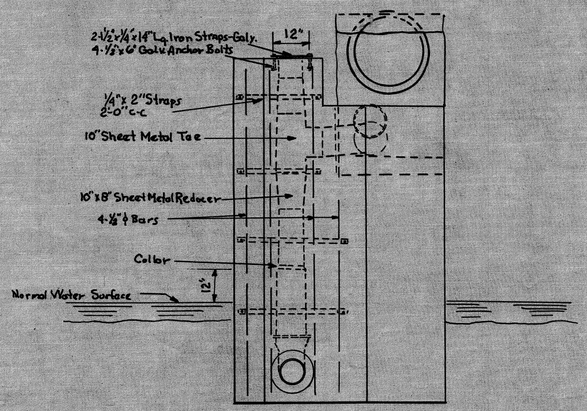
PLAN



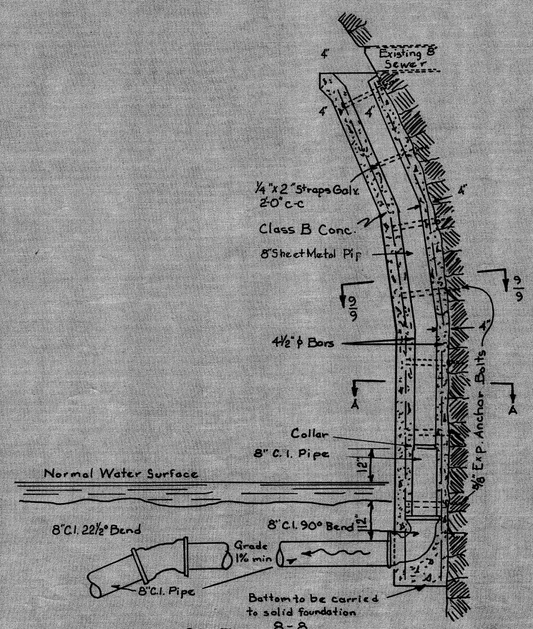
PLAN



SECTION 9-9/9



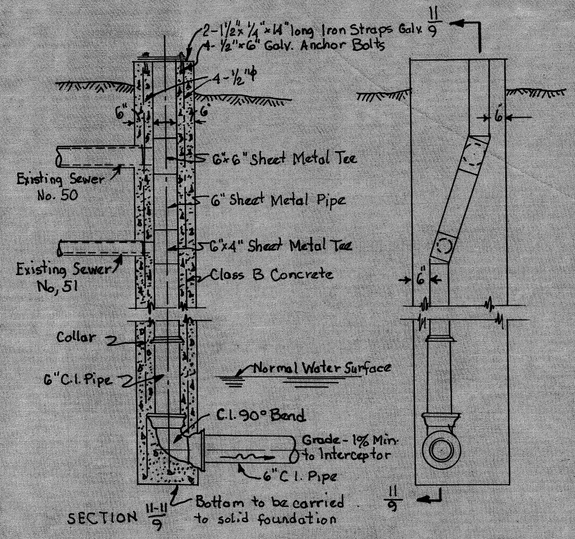
ELEVATION



SECTION 8-8/9

CONNECTION No. 37

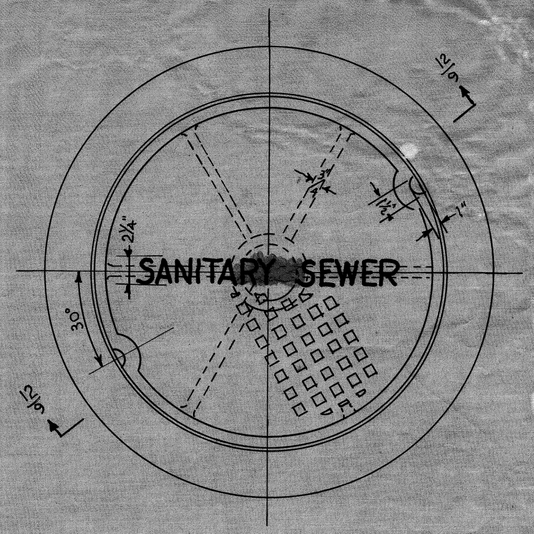
Scale ½"=1'-0"

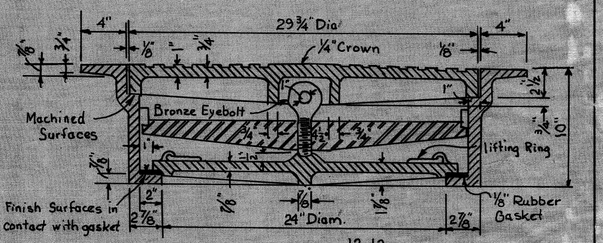


SECTION 11-11/9

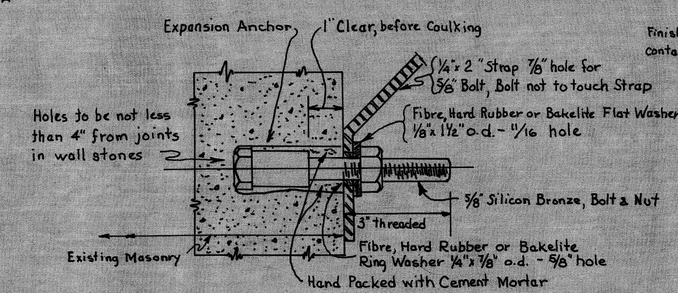
CONNECTIONS No. 50 & 51

Scale, ½"=1'-0"



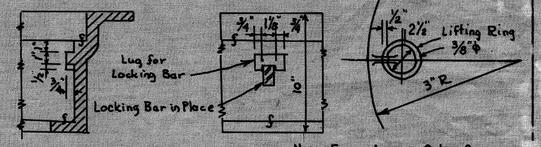


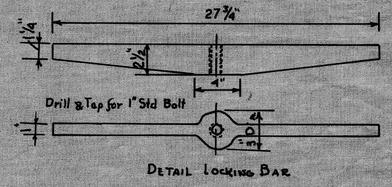
SECTION 12-12/9



DETAIL OF EXPANSION ANCHOR BOLT ASSEMBLY

Scale: 6"=1'-0" (Half Size)

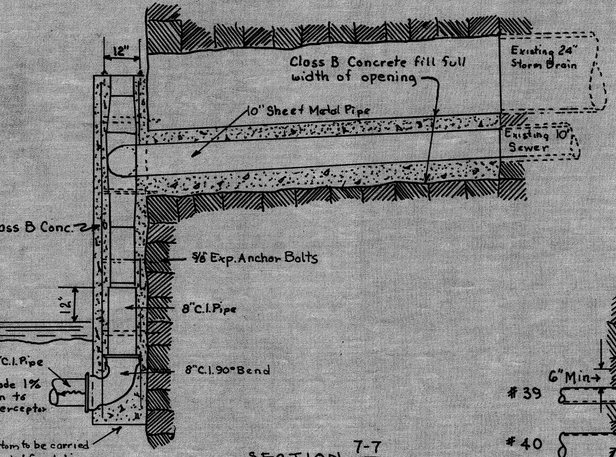




DETAIL LOCKING BAR

WATER TIGHT MANHOLE FRAMES & COVERS

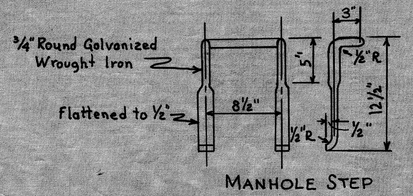
Scale 2"=1'-0"



SECTION 7-7/9

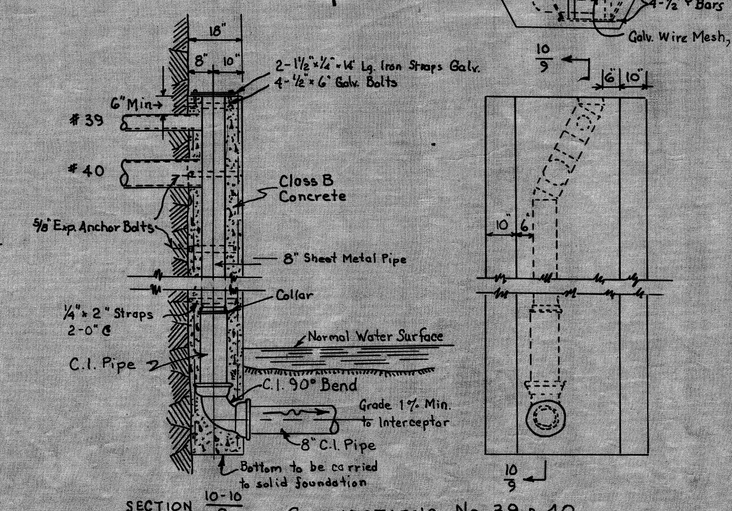
CONNECTION No. 24

Scale ½"=1'-0"



MANHOLE STEP

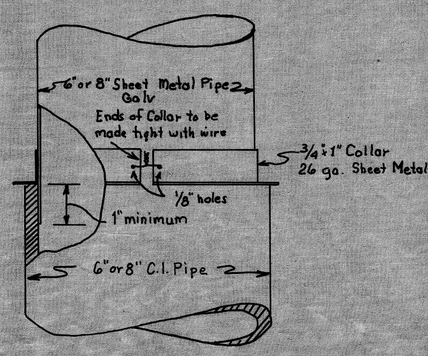
Scale: 1½"=1'-0"



SECTION 10-10/9

CONNECTIONS No. 39 & 40

Scale: ½"=1'-0"



DETAIL OF SHEET METAL COLLAR

Not to Scale

STAUNTON, VIRGINIA

SANITARY SEWERAGE SYSTEM

CONTRACT NO. 2

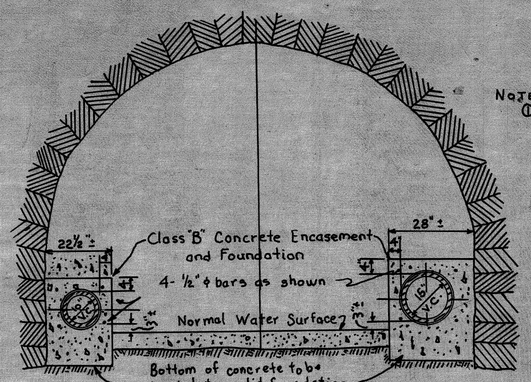
SEWAGE INTERCEPTORS

SPECIAL CONNECTIONS & DETAILS

Whitman, Requardt & Smith
Engineers
Baltimore, Maryland
October 21, 1938

W. L. Hall
City Manager
Staunton, Va.

Sheet 9 of 12

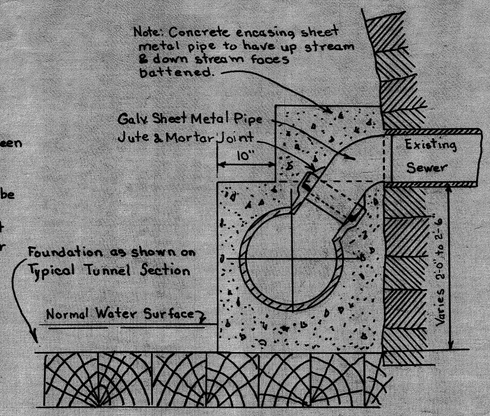


TYPICAL TUNNEL SECTION
WITH NATURAL STREAM BOTTOM
Scale ½"=1'-0"

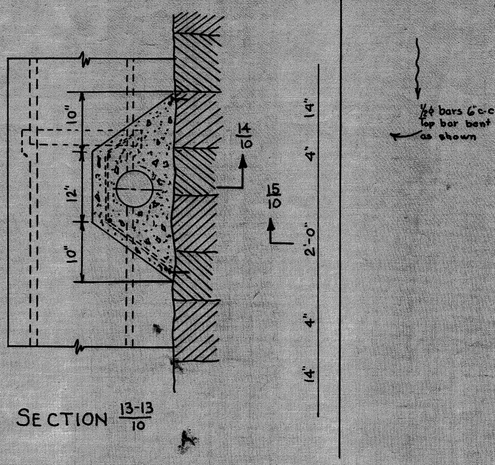
NOTES:

① Concrete foundation and encasement may be placed in two pours provided:
(a) There is 5" clear between bottom outside of pipe and top of first pour.
(b) The first pour shall be at least 9" thick.
(c) At no additional cost to the Owner the Contractor shall furnish & place ½"ϕ dowels x24" long, staggered at 24"± on both sides.

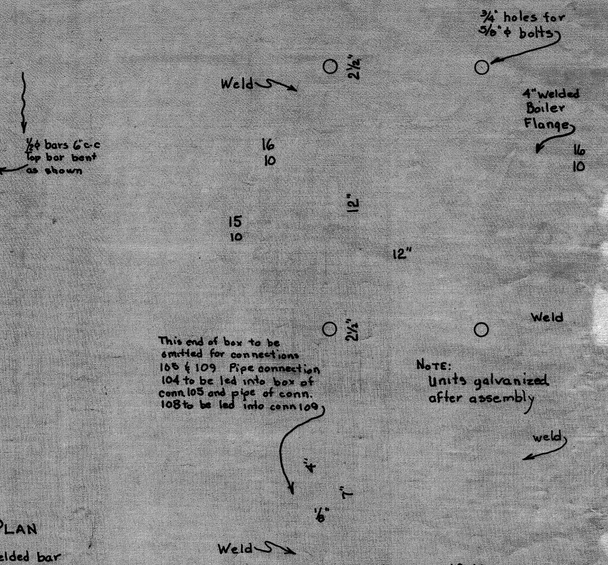
② Concrete will be paid for on a basis of outside dimensions of encasement less deductions for volume of pipe measured over the outside of the barrel



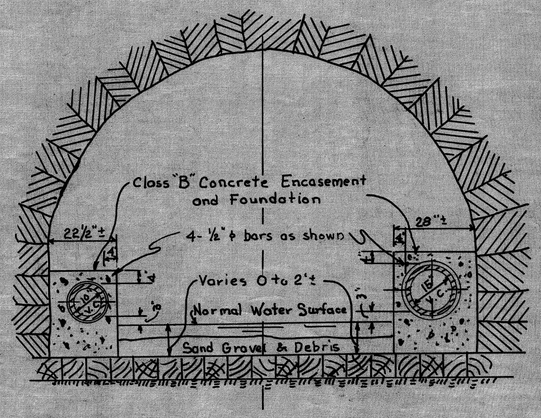
TYPE G CONNECTION FOR SEWERS 8" & SMALLER
Scale 1 in = 1 ft



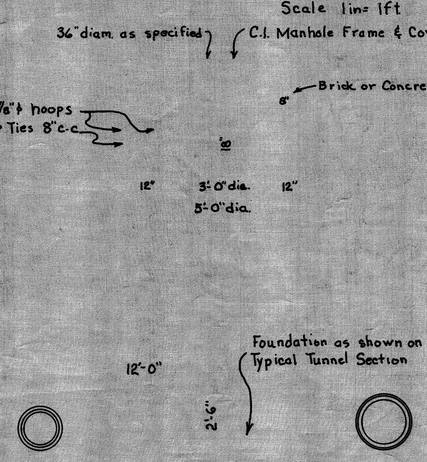
SECTION 13-13/10



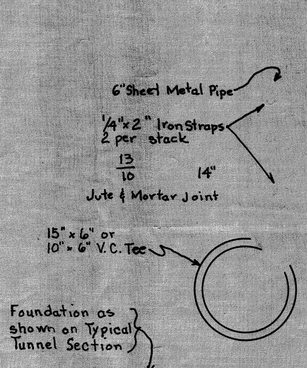
SECTION 16-16/10
DETAIL OF STEEL BOX
FOR TYPE J CONNECTION
Scale: 3"=1'-0"

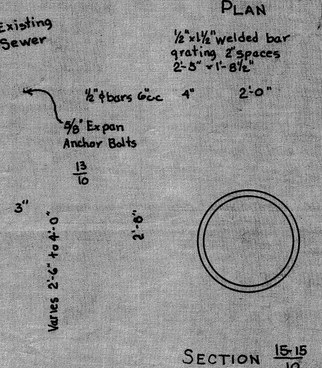


TYPICAL TUNNEL SECTION
WITH TIMBER FLOOR
Scale: ½"=1'-0"



ACCESS HOLE - CENTRAL AVE. TUNNEL
Scale: ½ in = 1 ft



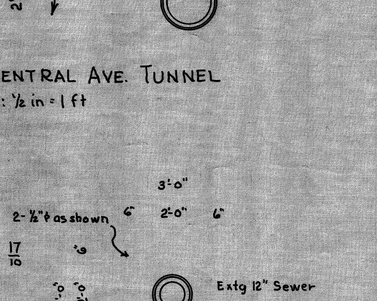


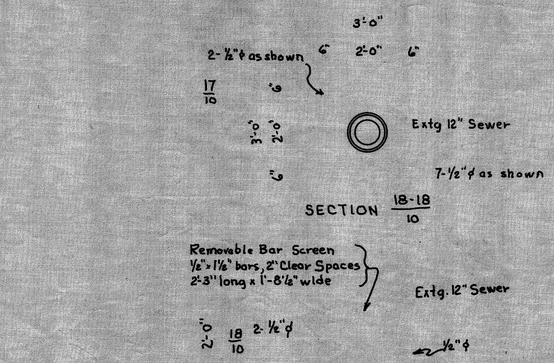
SECTION 15-15/10

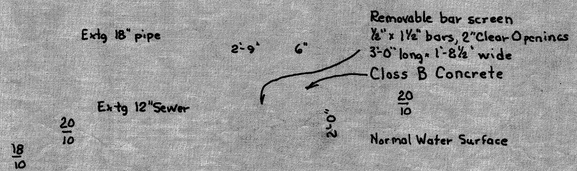
TYPE I CONNECTION OR
ACCESS OPENING
Scale ½"=1'-0"

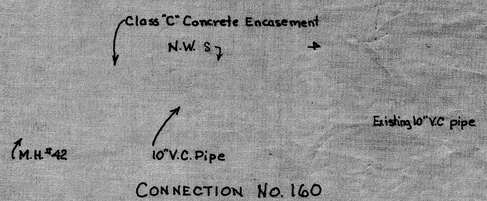
Existing Sewer

Note: Sewers entering with invert lower than ϕ of interceptor: concrete to be lowered & section tube cut from side of channel pipe.

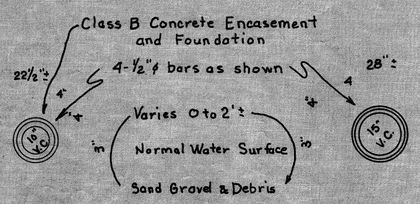






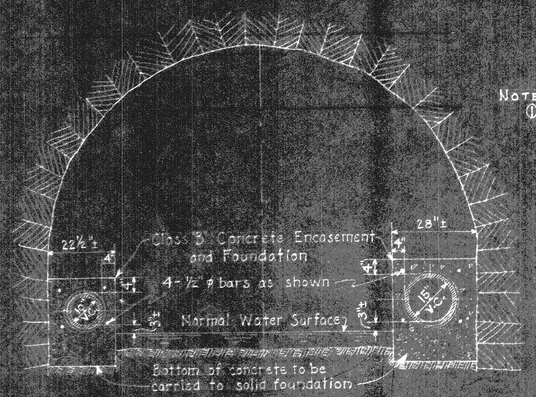


CONNECTION NO. 160
Scale: ½"=1'-0"



TYPICAL TUNNEL SECTION
WITH COBBLESTONE BOTTOM
Scale ½"=1'-0"

SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS

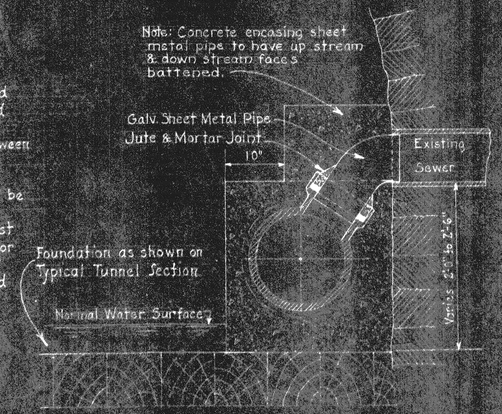


TYPICAL TUNNEL SECTION
WITH NATURAL STREAM BOTTOM
Scale: ½"=1'-0"

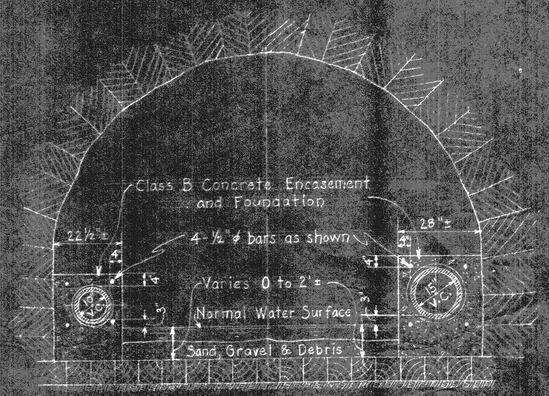
NOTES:

① Concrete foundation and encasement may be placed in two pours provided:
(a) There is 5" clear between bottom outside of pipe and top of first pour.
(b) The first pour shall be at least 9" thick.
(c) At no additional cost to the Owner the Contractor shall furnish & place ½" ϕ dowels x 24" long, staggered at 24" ℄ on both sides.

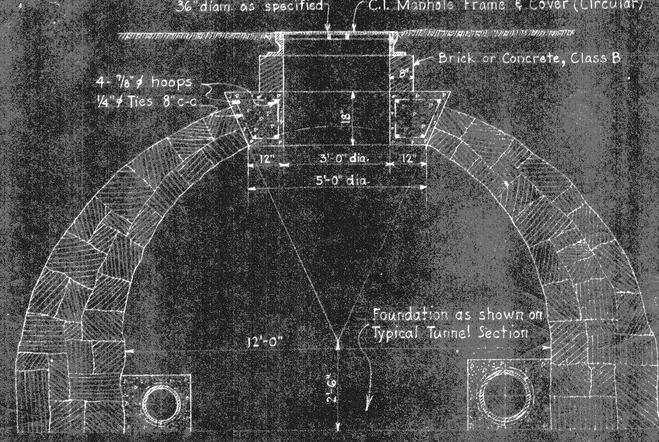
② Concrete will be paid for on a basis of outside dimensions of encasement less deductions for volume of pipe measured over the outside of the barrel



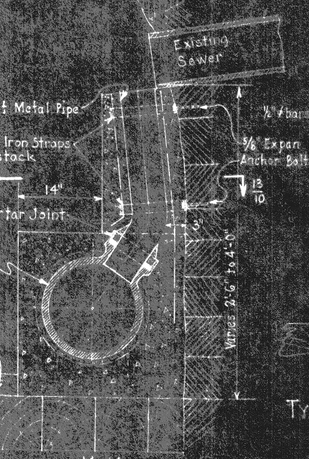
TYPE G CONNECTION FOR SEWERS 8" & SMALLER
Scale: 1 in = 1 ft.



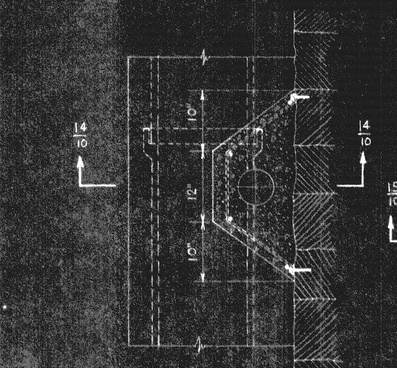
TYPICAL TUNNEL SECTION
WITH TIMBER FLOOR
Scale: ½"=1'-0"



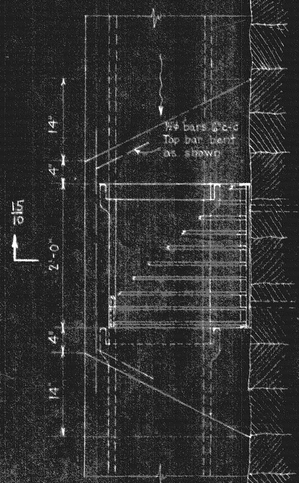
ACCESS HOLE - CENTRAL AVE. TUNNEL
Scale: ½ in = 1 ft.



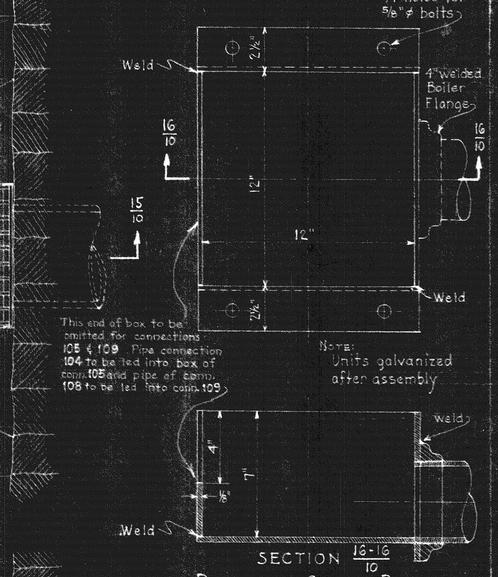
SECTION 14-14/10
TYPE "H" CONNECTION
Scale: 1"=1'-0"



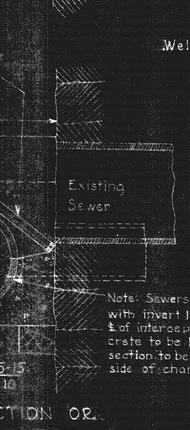
SECTION 13-13/10



PLAN



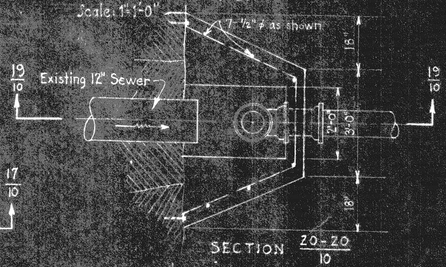
SECTION 16-16/10
DETAIL OF STEEL BOX
FOR TYPE J CONNECTION
Scale: 3"=1'-0"



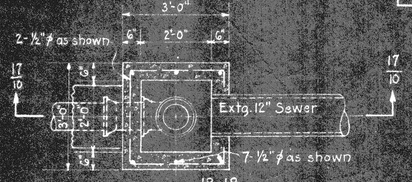
SECTION 15-15/10

Note: Sewers entering with invert lower than ℄ of interceptor, concrete to be lowered & section to be cut from side of channel pipe.

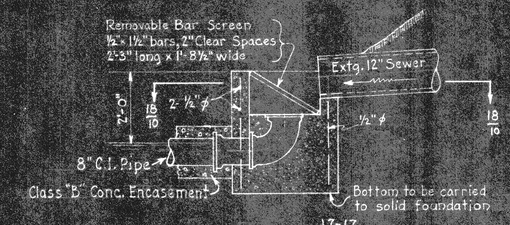
TYPE I CONNECTION OR ACCESS OPENING
Scale: 1"=1'-0"



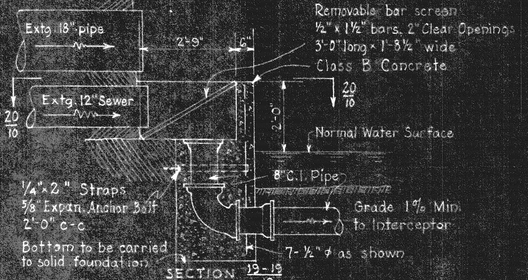
SECTION 20-20/10



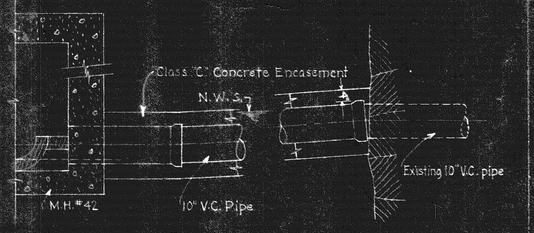
SECTION 18-18/10



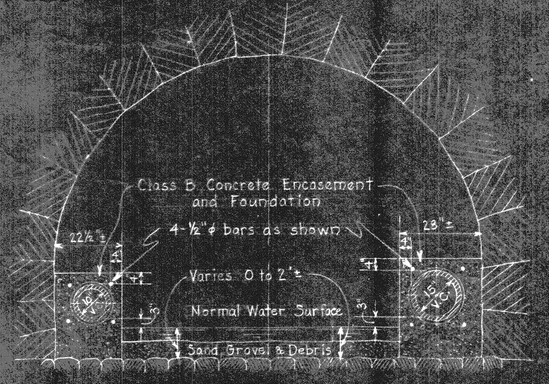
SECTION 17-17/10
CONNECTION No. 153
Scale: ½"=1'-0"



SECTION 19-19/10
CONNECTION No. 156
Scale: ½"=1'-0"



CONNECTION No. 160
Scale: ½"=1'-0"



TYPICAL TUNNEL SECTION
WITH COBBLESTONE BOTTOM
Scale: ½"=1'-0"

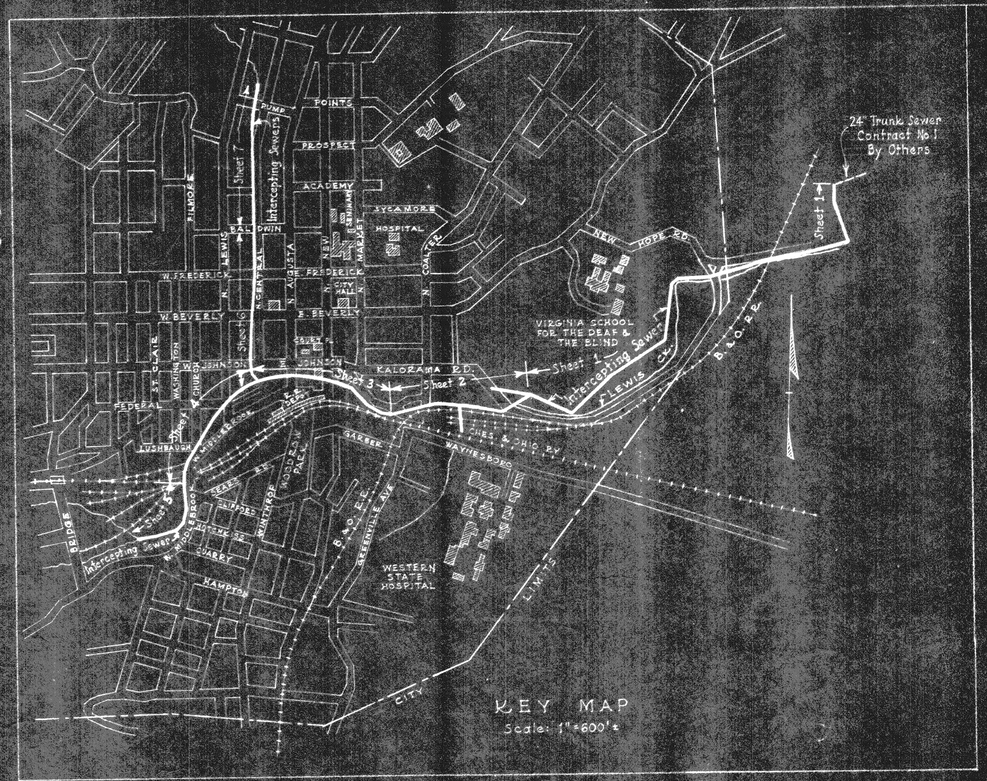
STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
TUNNEL SECTIONS & CONNECTIONS

Whitman, Requandt & Smith
Engineers
Baltimore, Maryland

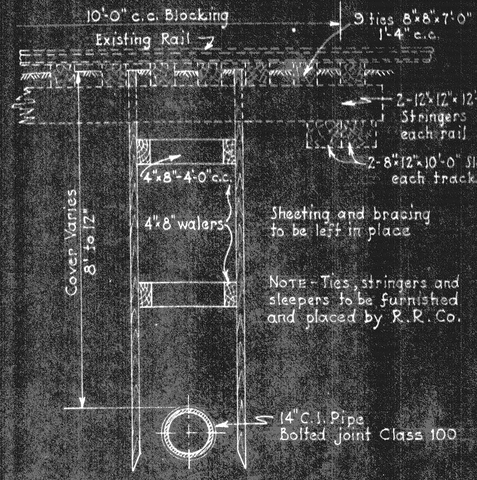
W. L. Hall
City Manager
Staunton, Va.

October 21, 1938

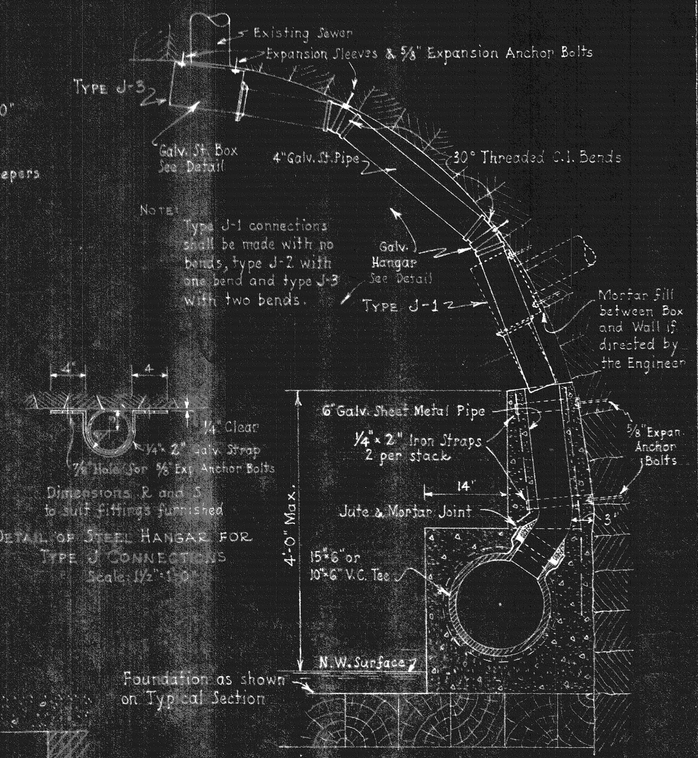
Sheet No. 10 of 12



KEY MAP
Scale: 1"=600'±



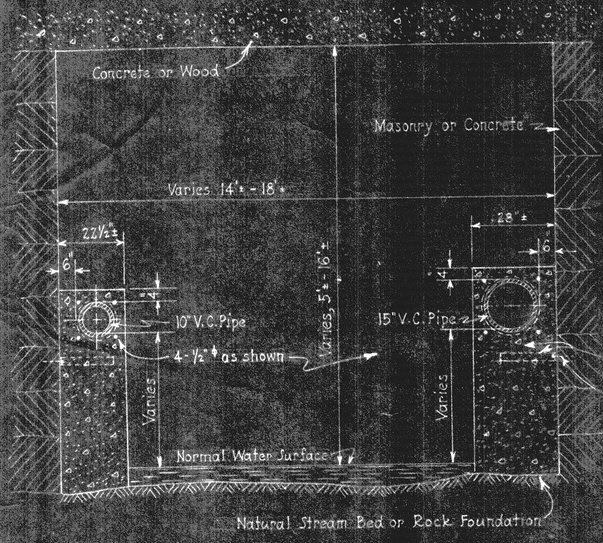
DETAIL OF TRACK SUPPORT AT B. & O. R.R. FREIGHT DEPOT
Scale: ½"=1'-0"



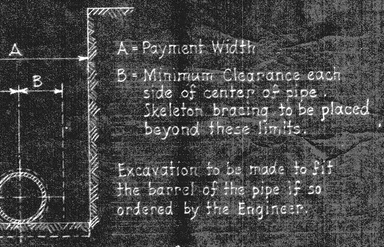
TYPE "J" CONNECTION
Scale: 1"=1'-0"

Dimensions R and S to suit fittings furnished

DETAIL OF STEEL HANGAR FOR TYPE J CONNECTIONS
Scale: 1½"=1'-0"



TYPICAL TUNNEL SECTION SOUTH OF BEVERLY ST.
Scale: ½"=1'-0"



A = Payment Width

B = Minimum Clearance each side of center of pipe. Skeleton bracing to be placed beyond these limits.

Excavation to be made to fit the barrel of the pipe if so ordered by the Engineer.

TYPICAL TRENCH SECTION WITHOUT SHEETING

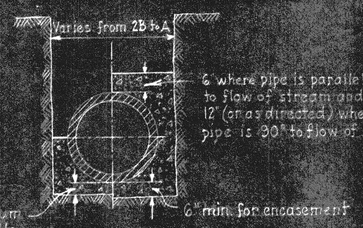
	A Feet	B Feet
8" V.C.	2.00	0.67
10" V.C.	2.20	0.75
18" V.C.	3.00	1.30
24" V.C. or Conc.	3.70	1.70
6" C.I.	2.00	0.625
8" C.I.	2.10	0.75
10" C.I.	2.30	0.83
14" C.I.	2.70	1.08
16" C.I.	2.80	1.16
18" C.I.	3.00	1.25

NOTE: In Zone B the excavation shall be made and concrete placed to the lines shown on the Tunnel Sections

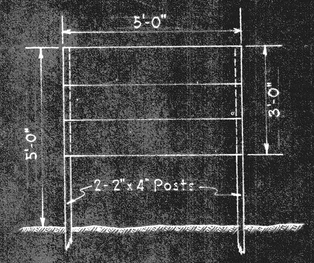
NOTE: Where sheeting and shoring is placed with the approval of or at the orders of the Engineer the clear distance between interior faces shall be the distance "A" shown above. Payment for additional excavation equivalent to the sum of the thickness of sheeting will be made under these conditions.

NOTE:

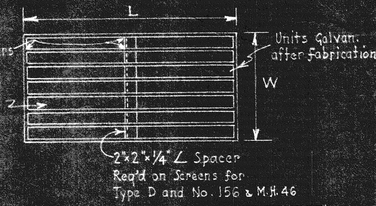
Cradles and encasements to be poured against undisturbed side of trench up to the limit of "A". Forms may be used beyond this limit. Payment width will be dimension A.



CONCRETE CRADLE AND ENCASEMENT
Not to Scale



SIGN
2 Required



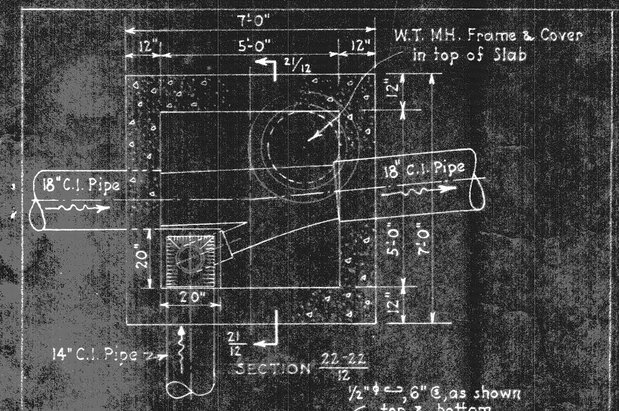
For Connection	Size Bar	L	W	Approximate No. Req'd
Type D	½"x1½"	3'-0"	1'-8½"	6
Type I	½"x1½"	2'-5"	1'-8½"	18
#25	⅜"x1"	1'-6"	1'-2⅝"	1
#156	½"x1½"	3'-0"	1'-8½"	1
#153	½"x1½"	2'-3"	1'-8½"	1
M.H.46	½"x1½"	3'-0"	2'-9"	1

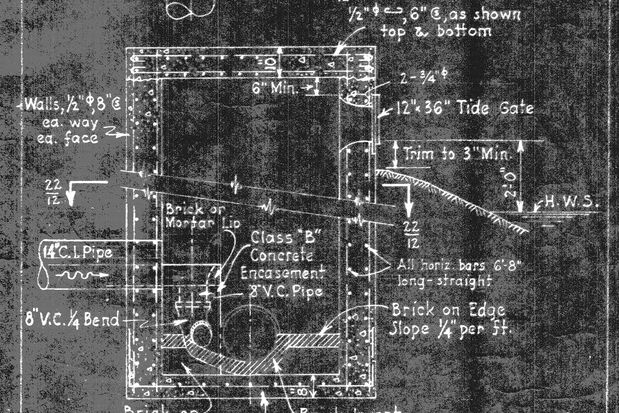
DETAILED DIMENSIONS OF BAR SCREENS

STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
MISCELLANEOUS DETAILS

Whitman, Requardt & Smith
Engineers
Baltimore, Maryland
October 21, 1938

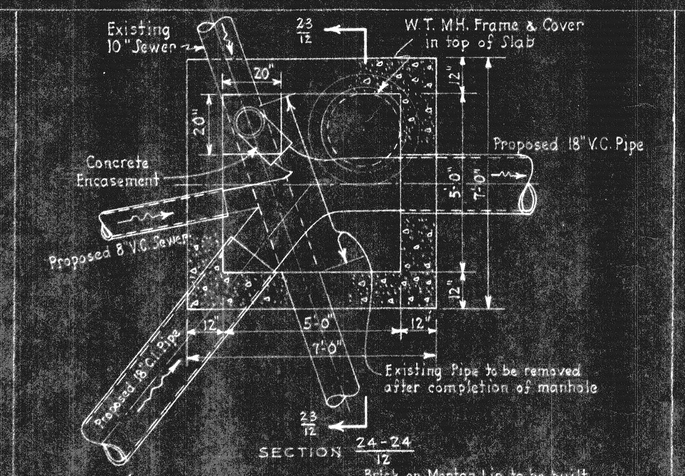
W. L. Hall
City Manager
Staunton, Va.
Sheet No. 11 of 12

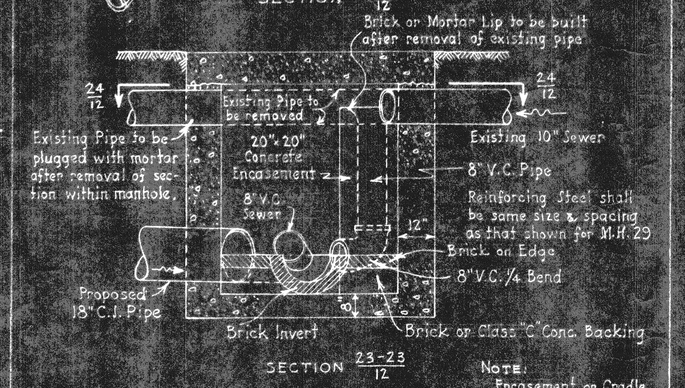




DETAIL OF MANHOLE No. 29

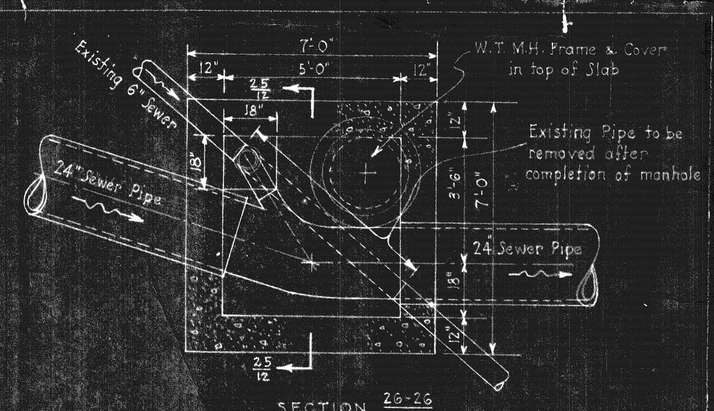
NOTE: Encasement or Cradle as shown on Typical Manholes

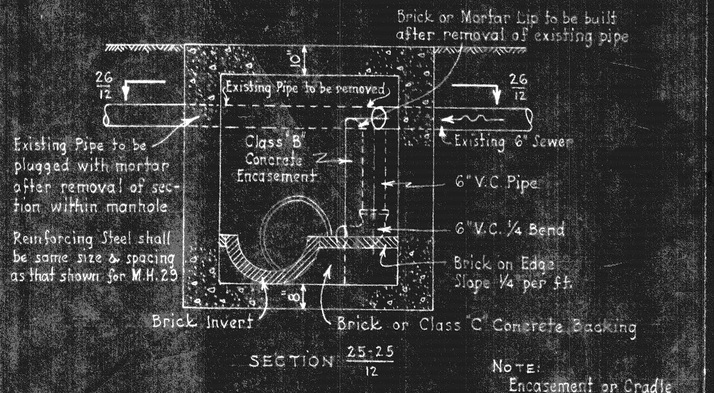




NOTE: Encasement or Cradle as shown on Typical Manhole

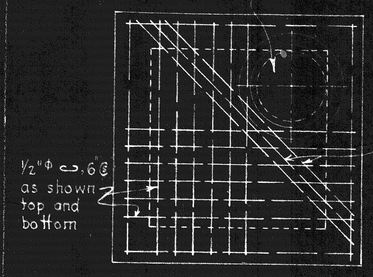
DETAIL OF MANHOLE No. 26





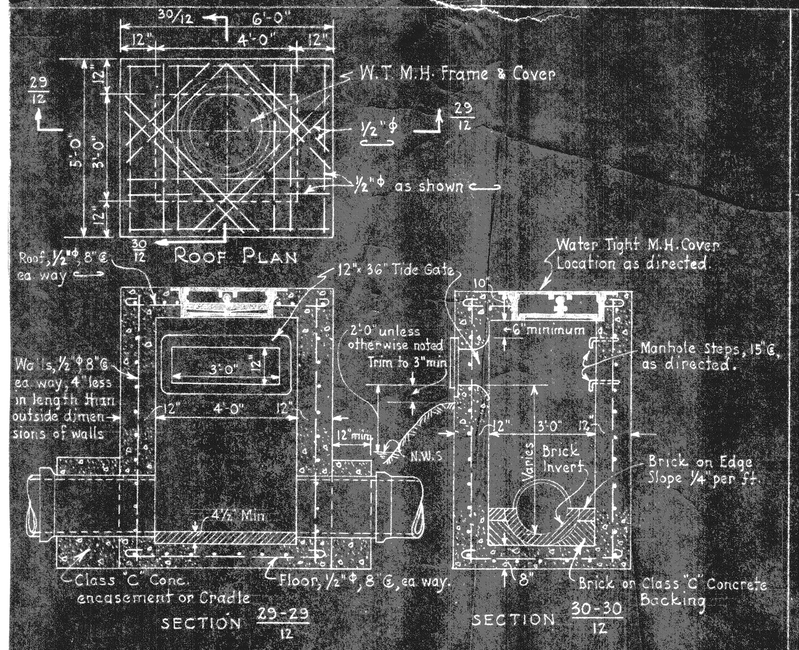
NOTE: Encasement or Cradle as shown on Typical Manhole

DETAIL OF MANHOLE No. 19

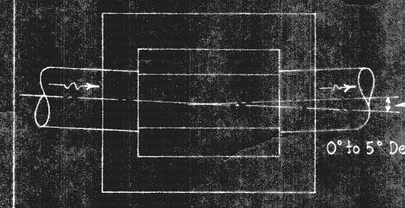


ROOF PLAN - MANHOLES 19, 26 & 29

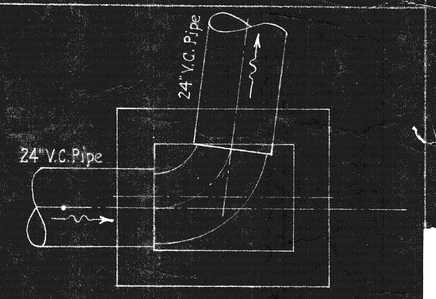
NOTE: All structural floor, walls and roofs to be Class "B" Concrete.



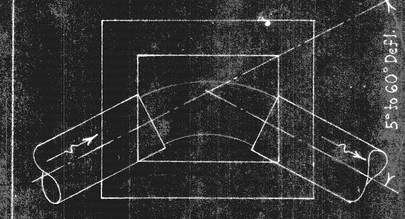
TYPICAL DIVERSION MANHOLE SHOWING TYPICAL ENCASEMENT FOR SEWER PIPE



TYPICAL BASE DETAIL 0°-5° DEFLECTION



BASE DETAIL FOR M.H. 15 Manhole 13 Similar



TYPICAL BASE DETAIL 5°-60° DEFLECTION

Scale: ½" = 1'-0", All Details

STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS
MANHOLE DETAILS

Whitman, Requardt & Smith, Engineers, Baltimore, Maryland, October 21, 1938

W. L. Hall, City Manager, Staunton, Va.

Sheet No. 12 of 12

25' ALLEY

PROPERTY LINE

50'

PROPERTY LINE

BUILDINGS ON THIS SITE TO BE REMOVED

TURNING AREA

CONCRETE WALL - MAYBE ABLE TO CUT OFF & USE FOR ABUTT

LEWIS CREEK

FACE OF ABUTMENT

MASONRY WALL - TO BE REMOVED

FACE OF ABUTMENT

25'

FACE OF ABUTMENT

MANHOLE TO BE RAISED TO TOP OF CONCRETE SLAB

CONCRETE WALL - MAYBE CUT OFF & USED FOR ABUTMENT

FACE OF ABUTMENT

25'

66°-45'

55°-25'

PROPERTY LINE

PROPERTY LINE

BUILDINGS TO BE REMOVED

CONCRETE SLAB - TO BE REMOVED

BRICK WALL - TO BE REMOVED

90°

90°

89°-02'

LINE N

LINE M

LINE L

LINE K

LINE J

LINE I

LINE H

LINE G

LINE F

LINE E

LINE D

LINE C

LINE B

LINE A

BASE LINE

SIDEWALK

+25 3+00 +75 +50 +25 2+00 +75 +50 +25 1+00 +75 +50 +25 0+00

JOHNSON ST

PLAN SHOWING

BRIDGE OVER LEWIS CREEK

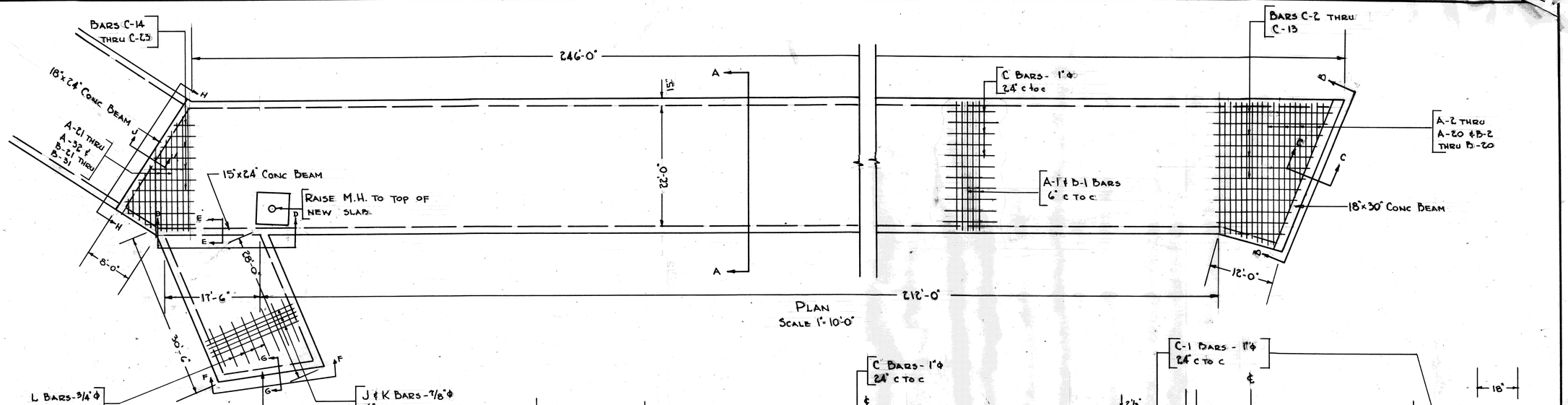
AT JOHNSON STREET PARKING LOT

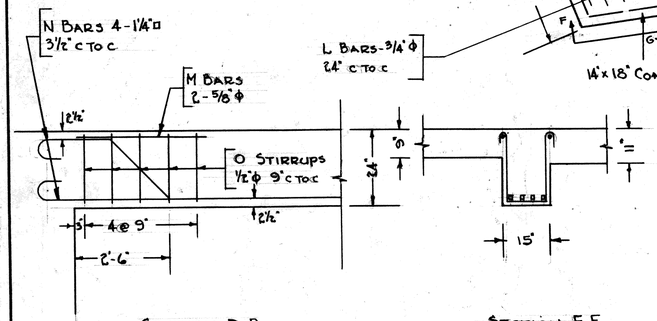
STAUNTON, VA.

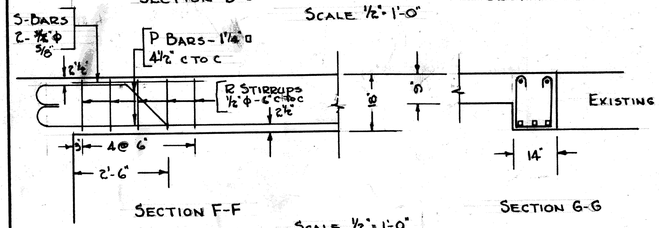
AUGUST 2, 1955 SCALE 1" = 20'

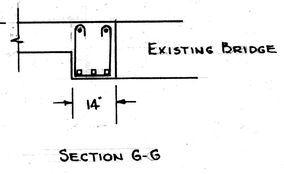
C.M. MOYER JR C.P.E.

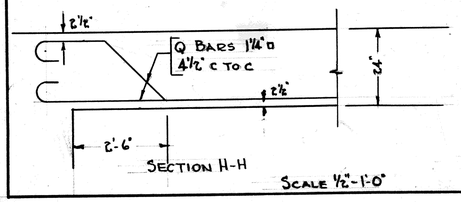
CITY ENGINEER

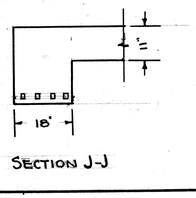


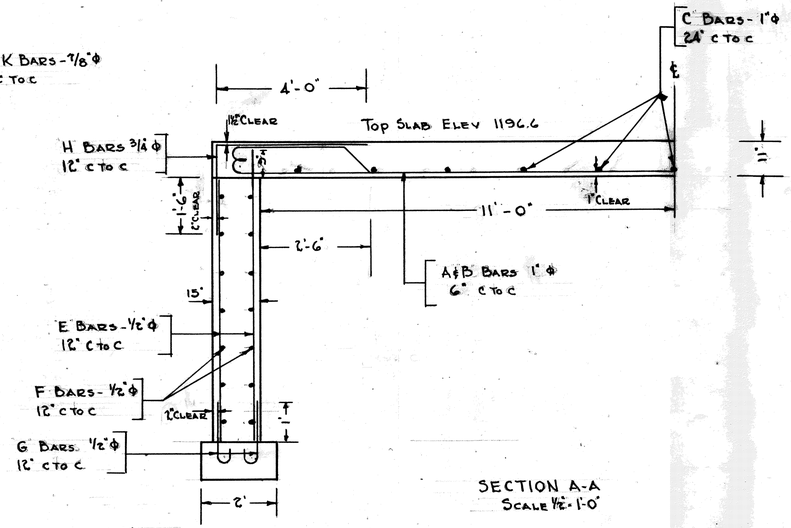




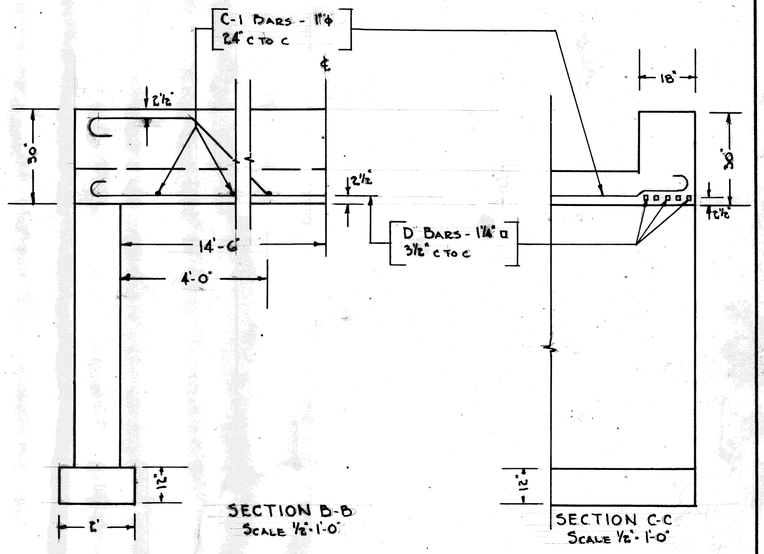








NOTE:
FOOTING DESIGN BASED ON BEARING SOIL OF 3000#/□'- IF POORER SOIL ENCOUNTERED, FOOTING TO BE SPREAD.



COMMONWEALTH OF VIRGINIA
C. M. MOYER, JR.
CIVIL ENGINEER
CERTIFICATE No.
1010
CERTIFIED PROFESSIONAL ENGINEER

CITY OF STAUNTON, VA		
OFFICE OF CITY ENGINEER		
REINFORCED CONCRETE BRIDGE OVER LEWIS CREEK		
AUGUST 23, 1955	C.M. MOYER, JR.	SHEET 2 OF 5

STEEL SCHEDULE CONT'D

11" MAIN SLAB

MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM
B-29	7/8" ϕ	1	9-4 5/16	25.0	3'-4 1/2"
B-30	7/8" ϕ	1	7-2 5/16	19.2	4'-1"
B-31	7/8" ϕ	1	5-0 5/16	13.5	2'-5"
C-1	3/4" ϕ	121	21'-7"	5,972	
C-2	3/4" ϕ	1	22'-10 15/16	61.2	2 15/16, 3 3/8, 20'-6", 1'-0"
C-3	3/4" ϕ	1	21-11 15/16	56.5	19'-9"
C-4	3/4" ϕ	1	21-4 15/16	54.8	19'-0"
C-5	3/4" ϕ	1	20-7 15/16	53.2	18'-3"
C-6	3/4" ϕ	1	19-10 15/16	51.2	17'-6"
C-7	3/4" ϕ	1	19-1 15/16	49.2	16'-9"
C-8	3/4" ϕ	1	18-4 15/16	47.2	16'-0"
C-9	3/4" ϕ	1	17-7 15/16	45.2	15'-3"
C-10	3/4" ϕ	1	16-10 15/16	43.2	14'-6"
C-11	3/4" ϕ	1	16-1 15/16	43.2	13'-9"
C-12	3/4" ϕ	1	15-4 15/16	41.3	13'-0"
C-13	3/4" ϕ	1	11-4 15/16	30.6	9'-0"
C-14	3/4" ϕ	1	5-1 15/16	13.8	8'-9"
C-15	3/4" ϕ	1	6-4 15/16	17.6	4'-0"
C-16	3/4" ϕ	1	7-7 15/16	20.3	5'-3"
C-17	3/4" ϕ	1	8-10 15/16	23.8	6'-6"
C-18	3/4" ϕ	1	10-4 15/16	28.9	8'-0"
C-19	3/4" ϕ	1	11-7 15/16	31.2	9'-3"
C-20	3/4" ϕ	1	12-10 15/16	34.6	10'-6"
C-21	3/4" ϕ	1	14'-4 15/16	38.5	12'-0"
C-22	3/4" ϕ	1	12'-7 3/8	33.8	11'-6"
C-23	3/4" ϕ	1	9'-4 3/8	25.1	8'-3"
			TOTAL	7,888#	
			TOTAL FROM SHEET 3	33,250#	
			GRAND TOTAL 11" SLAB	41,138#	

EACH BAR LAPS 8"

SAME AS C-2 - SUBSTITUTE DIMENSION IN LAST COLUMN FOR 20'-6"

9" SLAB

MARK	SIZE	NO	LENGTH	W.T.	BENDING DIAGRAM
J	7/8" ϕ	22	19-0 1/4"	85.4	3 3/8, 17'-3"
K	7/8" ϕ	21	20'-5 1/16"	87.6	10'-0", 3 3/4D
L-1	3/4" ϕ	1	28'-6 1/4"	42.8	26'-9"
L-2	3/4" ϕ	1	28'-9 1/16"	43.1	27'-0"
L-3	3/4" ϕ	1	29'-0 1/16"	43.5	27'-3"
L-4	3/4" ϕ	1	29'-3 1/16"	44.0	27'-6"
L-5	3/4" ϕ	1	29'-6 1/16"	44.3	27'-9"
L-6	3/4" ϕ	1	29'-9 1/16"	44.7	28'-0"
L-7	3/4" ϕ	1	30'-0 1/16"	45.0	28'-3"
L-8	3/4" ϕ	1	30-3 1/16"	45.4	28'-6"
J-2	7/8" ϕ	1	18'-3 1/4"	37.3	16'-6"
J-3	7/8" ϕ	1	14'-8 1/4"	29.9	12'-11"
J-4	7/8" ϕ	1	11'-1 1/4"	22.6	9'-4"
J-5	7/8" ϕ	1	7'-6 1/4"	15.3	5'-9"
J-6	7/8" ϕ	1	18'-9 1/4"	38.2	17'-0"
J-7	7/8" ϕ	1	16'-1 1/4"	32.8	14'-4"
J-8	7/8" ϕ	1	13'-5 1/4"	27.4	11'-8"
J-9	7/8" ϕ	1	9'-9 1/4"	19.9	9'-0"
J-10	7/8" ϕ	1	8'-1 1/4"	16.5	6'-4"
J-11	7/8" ϕ	1	5'-5 1/4"	11.1	3'-8"
K-2	7/8" ϕ	1	16'-11 3/16"	34.6	11'-4 1/2", 5'-11 1/2"
K-3	7/8" ϕ	1	13'-4 3/16"	27.4	7'-9 1/2"
K-4	7/8" ϕ	1	9'-9 3/16"	20.0	4'-3 1/2"
K-5	7/8" ϕ	1	19'-11 3/16"	40.6	13'-4 1/2"
K-6	7/8" ϕ	1	17'-6 3/16"	35.8	11-11 1/2"
K-7	7/8" ϕ	1	15'-1 3/16"	30.9	9'-6 1/2"
K-8	7/8" ϕ	1	12'-8 3/16	26.0	7'-1 1/2"
K-9	7/8" ϕ	1	10-3 3/16"	21.0	4'-8 1/2"
K-10	7/8" ϕ	1	7'-10 3/16"	16.1	2'-3 1/2"
			TOTAL	2,586#	

REINFORCED BEAMS

MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM
D-1	1 1/4" □	3	33'-0"	525	4 3/4, 11 3/4, 30'-3"
D-2	1 1/4" □	2	34'-8 3/8	368	2'-1", 2'-6 3/4", 2'-11 5/16", 11 3/4, 4 3/4, 21'-0"
M	5/8" ϕ	4	36'-4"	15.1	
N-1	1 1/4" □	2	21'-6"	208	18'-9"
N-2	1 1/4" □	2	22'-9 5/8	242	1'-1", 1'-7", 2'-2 5/16", 11 3/4, 4 3/4, 12'-6"
O	1/2" ϕ	10	5'-0 5/8"	33.8	8 5/16, 2", 19 7/8, 12 1/2"
P-1	1 1/4" □	2	20'-9"	221	4 3/4, 11 3/4, 18'-0"
P-2	1 1/4" □	1	21'-7 3/8	115	1'-1", 1'-1", 2-2 3/4", 1'-6 5/16", 11'-9"
Q-1	1 1/4" □	2	22'-0"	276	23'-3"
Q-2	1 1/4" □	2	27-3 3/8	290	1'-1", 1-6 1/2", 1-7", 2'-2 5/16", 17'-0"
R	1/2" ϕ	10	3'-8 5/8"	24.9	8 5/16, 2", 12 1/2", 11 1/2"
S	5/8" ϕ	4	2'-6"	10.4	
			TOTAL	2,329#	

COMMONWEALTH OF VIRGINIA
C. M. MOYER, JR.
CIVIL ENGINEER
CERTIFICATE No.
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CERTIFIED PROFESSIONAL ENGINEER

CITY OF STAUNTON, VA.

OFFICE OF CITY ENGINEER

REINFORCED CONCRETE BRIDGE OVER LEWIS CREEK

AUGUST 23, 1955 | C. M. MOYER, JR. | SHEET 4 OF 5

QUANTITIES

Location	Reinforcing Steel	Class 'B' Conc.	Class 'A' Conc.
Footing	1,577#	39.8 cu. yds	
Abutments	14,255#		175.5 cu. yds
11" Slab	41,138#		203.7
9" Slab	2,586#		13.9
Beams	2,329#		9.8
Total	61,885#	39.8 cu. yds	402.9 cu. yds

General Notes:

1. Class 'A' Concrete shall have a minimum compressive stress at 28 days of 3,000 #/□", and shall be proportioned according to the specifications of the Virginia Department of Highways.
2. Class 'B' Concrete shall be 2200 #/□"
3. Reinforcing Steel shall conform to requirements for Billet-Steel Bars for Concrete Reinforcement of A.A.S.H.O. Designation M-31.

COMMONWEALTH OF VIRGINIA
C. M. MOYER, JR.
CIVIL ENGINEER
CERTIFICATE No.
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CITY OF STAUNTON, VA

Office of City Engineer

Reinforced Concrete Bridge over Lewis Creek

August 23, 1955 | C. M. Moyer, Jr. | Sheet 5 of 5

STEEL SCHEDULE

ABUTMENTS

MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM
E-1	½"ϕ	406	7'-6"	2033#	
E-2	½"ϕ	300	6'-6"	1281#	
E-3	½"ϕ	342	5-6"	1330#	
F-1	½"ϕ	322	21-5"	4597#	
F-2	½"ϕ	16	7'-6"	80#	
H	¾"ϕ	482	6'-4"	4577#	4'-0", 2'-4"
			TOTAL	13,898#	
				357#	
				14,255#	

NOTE: ADD 12" TO HALF OF ALL E-1, E-2 & E-3 BARS

EACH BAR OVERLAPS 6"

FOOTINGS

MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM
G	½"ϕ	1068	2'-2½"	1577#	1'-0", R=1'-9"
		TOTAL		1577#	

11" MAIN SLAB

MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM.
A-1	1"ϕ	222	25'- 3¾"	14,802	25'-3"
B-1	1"ϕ	222	25'-10⅜"	15,310	12'-10½", 8", 16'-0", 5'-10½", 2⅜", 4⅜"
A-2	1"ϕ	1	25-7¼"	68.5	23'-5½"
A-3	1"ϕ	1	25-9¾"	69.0	23'-9"
A-4	1"ϕ	1	26-1¼"	69.7	24'-0½"
A-5	1"ϕ	1	26'-4¾"	70.5	24'-4"
A-6	1"ϕ	1	26'-8¼"	71.4	24'-7½"
A-7	1"ϕ	1	26-11¾"	72.0	24'-11"
A-8	1"ϕ	1	27-3¼"	72.8	25'-2½"
A-9	1"ϕ	1	27'-6¾"	73.5	25'-6"
A-10	1"ϕ	1	27'-10¼"	74.4	25'-9½"
A-11	1"ϕ	1	28'-1¾"	75.2	26'-1"
A-12	1"ϕ	1	26-5¼"	70.6	24'-4½"
A-13	1"ϕ	1	23-10¼"	63.8	21'-9½"
A-14	1"ϕ	1	21'-2¼"	56.6	19'-2½"
A-15	1"ϕ	1	18'-8¼"	50.0	16'-7½"
				31,069#	

MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM
A-16	1"ϕ	1	16-0¼"	42.7	14'-0½"
A-17	1"ϕ	1	13- 5¼	36.0	11-4½"
A-18	1"ϕ	1	10-11¼	29.2	8'-10½"
A-19	1"ϕ	1	8'-5¼	22.5	5'-2½"
A-20	1"ϕ	1	5-11¼	15.9	3'-10½"
A-21	1"ϕ	1	23-10¾	63.8	21'-10"
A-22	1"ϕ	1	22- 3¾	59.5	20'-3"
A-23	1"ϕ	1	20-10¾	55.8	18'-10"
A-24	1"ϕ	1	19-3¾	51.6	17'-5"
A-25	1"ϕ	1	17-10¾	47.8	15'-10"
A-26	1"ϕ	1	16-3¾	43.6	14'-3"
A-27	1"ϕ	1	14-10¾	39.8	12'-10"
A-28	1"ϕ	1	12-3¼	32.9	10'-3"
A-29	1"ϕ	1	10'-3¾	27.5	8'-3"
A-30	1"ϕ	1	8'-3¾	22.2	6'-3"
A-31	1"ϕ	1	5-9¾	15.5	3'-9"
A-32	1"ϕ	1	3-11¾	10.6	1-11"
				616#	

MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM
B-2	1"ϕ	1	25-11⅞	69.4	16'-1½"
B-3	1"ϕ	1	26-3⅝	70.2	16'- 5"
B-4	1"ϕ	1	26- 6⅜	71.0	16'-8½"
B-5	1"ϕ	1	26-10⅞	71.7	17- 0"
B-6	1"ϕ	1	27- 1⅜	72.5	17- 3½"
B-7	1"ϕ	1	27- 5⅝	73.3	17- 7"
B-8	1"ϕ	1	27-8⅜	74.0	17'- 10½"
B-9	1"ϕ	1	28-0⅜	74.9	18'-2"
B-10	1"ϕ	1	28-3⅞	75.5	18'-5½"
B-11	1"ϕ	1	28' 7⅜	76.4	18'-9"
B-12	1"ϕ	1	28-1⅜	75.0	18'-3"
B-13	1"ϕ	1	26'-7⅜	71.2	16'- 9"
B-14	1"ϕ	1	25'-1⅜	67.0	15'-3"
B-15	1"ϕ	1	23-7⅜	63.0	13'-9"
B-16	1"ϕ	1	18'-4 5/16	49.0	12'-4½"
B-17	1"ϕ	1	15'-3 5/16	41.2	9'- 9½"
B-18	1"ϕ	1	13'-2 5/16	35.2	7'-2½"
B-19	1"ϕ	1	10-7 5/16	28.4	4'-7½"
B-20	1"ϕ	1	8-0 5/16	21.4	2'-0½"
B-21	1"ϕ	1	23-7 5/16	63.0	17'-7½"
B-22	1"ϕ	1	22'-0 5/16	58.8	16'-0½"
B-23	1"ϕ	1	20-5 5/16	54.6	14'-5½"
B-24	1"ϕ	1	18'-10 5/16	50.4	12'-10½"
B-25	1"ϕ	1	17-3 5/16	46.2	11- 3½"
B-26	1"ϕ	1	15-8 5/16	41.9	9'-8½"
B-27	1"ϕ	1	13-8 5/16	36.5	7'-8½"
B-28	1"ϕ	1	11-6 5/16	30.8	5'-6½"
			TOTAL	32,650#	33,250#

NOTE: THESE B BARS BENT ON BOTH ENDS LIKE B-1 BARS - DIMENSION SHOWN IN LAST COLUMN IS MIDDLE DIMENSION TO REPLACE 16'-0"

DIMENSIONS IN LAST COL. SUBSTITUTE FOR 12'-4½" IN B-16 BAR.

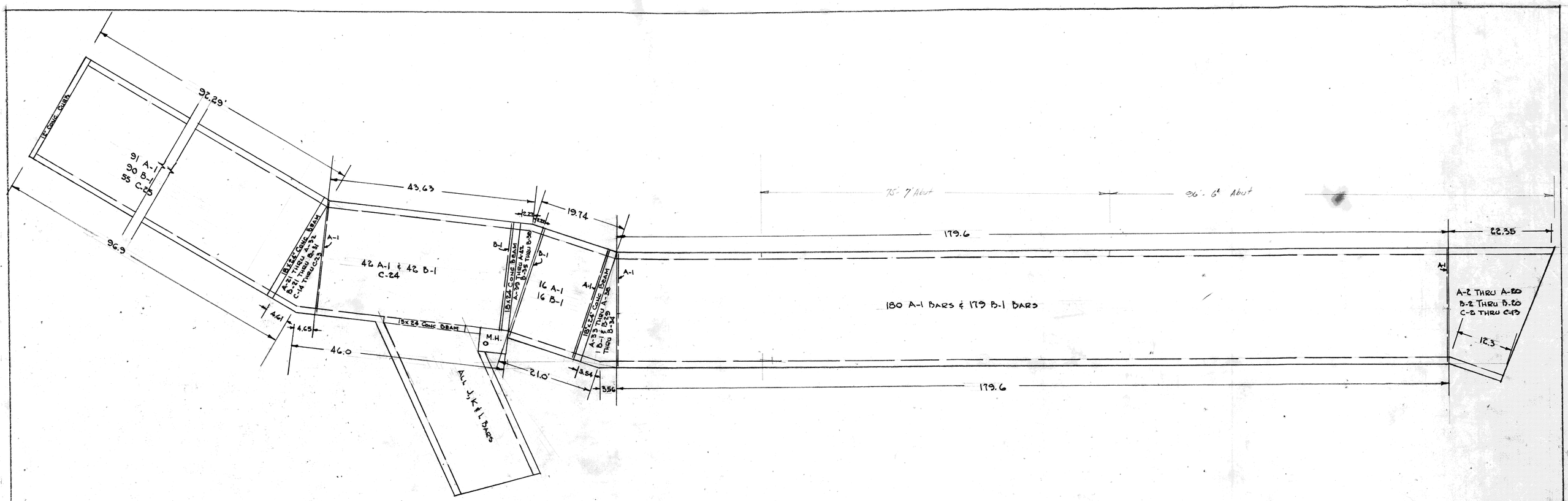
COMMONWEALTH OF VIRGINIA
C. M. MOYER, JR.
CIVIL ENGINEER
CERTIFICATE No.
1010
CERTIFIED PROFESSIONAL ENGINEER

CITY OF STAUNTON, VA.

OFFICE OF CITY ENGINEER

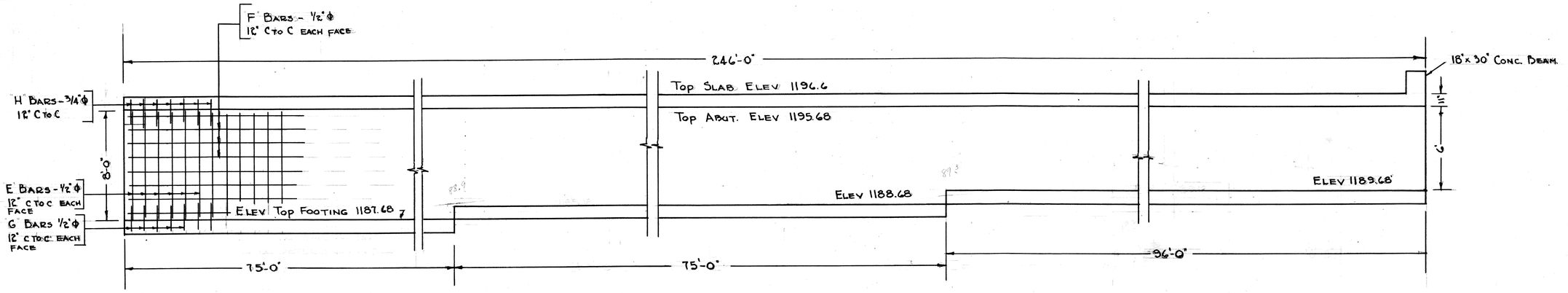
REINFORCED CONCRETE BRIDGE OVER LEWIS CREEK

AUGUST 23, 1955 | C. M. MOYER, JR. | SHEET 3 of 5

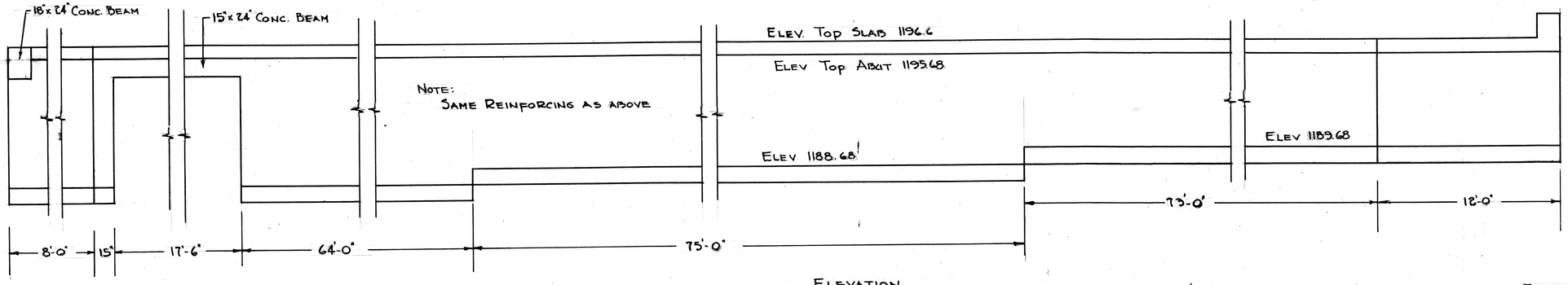


REVISED PLAN
JOHNSON STREET PARKING LOT BRIDGE
STAUNTON, VIRGINIA

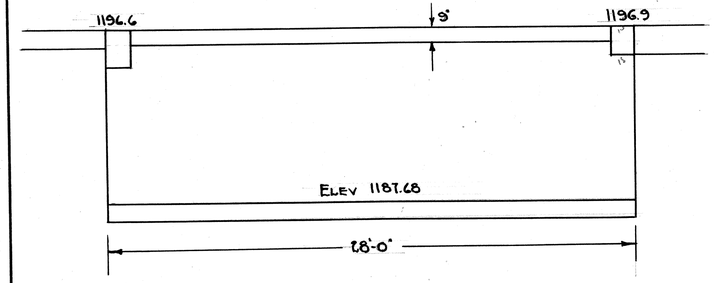
COMMONWEALTH OF VIRGINIA
C. M. MOYER, JR.
CIVIL ENGINEER
CERTIFICATE No.
4010
CERTIFIED PROFESSIONAL ENGINEER



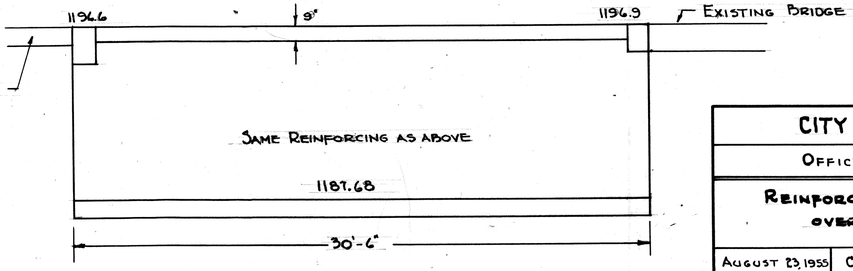
ELEVATION
SOUTH ABUTMENT
SCALE 1/4"-1'-0"



ELEVATION
NORTH ABUTMENT
SCALE 1/4"-1'-0"



ELEVATION
EAST & WEST ABUTMENTS AT
SMALL CREEK
SCALE 1/4"-1'-0"



COMMONWEALTH OF VIRGINIA
C. M. MOYER, JR.
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CITY OF STAUNTON, VA

OFFICE OF CITY ENGINEER

REINFORCED CONCRETE BRIDGE OVER LEWIS CREEK

AUGUST 23, 1955	C.M. MOYER, JR.	SHEET 1 OF 5

PLAN
SURVEYED
PLOTTED
NOTE BOOK
NO.
ALIGNMENT CHECKED
RT. OF WAY CHECKED
BY
DATE

3+51
2+42
1+96
0+38
0+00
2+42
1+68
1+40
1+12
0+84
0+56
0+28
0+00

PLAN OF
BRIDGE OVER LEWIS CREEK
SCALE 1"=10'

PROFILE
SURVEYED
PLOTTED
NOTE BOOK
NO.
GRADES CHECKED
ALIGNMENT CHECKED
STRUCTURE NOTATNS CH'KD.
BY
DATE

A-132.0'
0+00
A-133.0'
0+28
A-134.0'
0+56
A-119'
0+84
A-92.0'
1+12
A-116.0'
1+40
A-157.0'
1+96
A-120.0'
2+42

MAIN BRIDGE ~ X-SECTIONS
SCALE: HOR 1"=10'
VER 1"=10'

A-92.0'
2+49
A-209'
2+76
A-94.0'
3+01
A-166'
3+26
A-135.0'
3+51

NOTE: CARRY 135.0' FOR 10' MORE

SMALL CREEK ~ X-SECTIONS

A-150'
A-82.0'

NOTE: CARRY 82.0' FOR 21'

NOTE: TOTAL EXCAVATION 1778 CU YDS.

C.M. Mayer

PLATE 1 - PLAN - PROFILE O. P. R. & R. E. STANDARD
KEUFFEL & ESSER CO., NEW YORK.

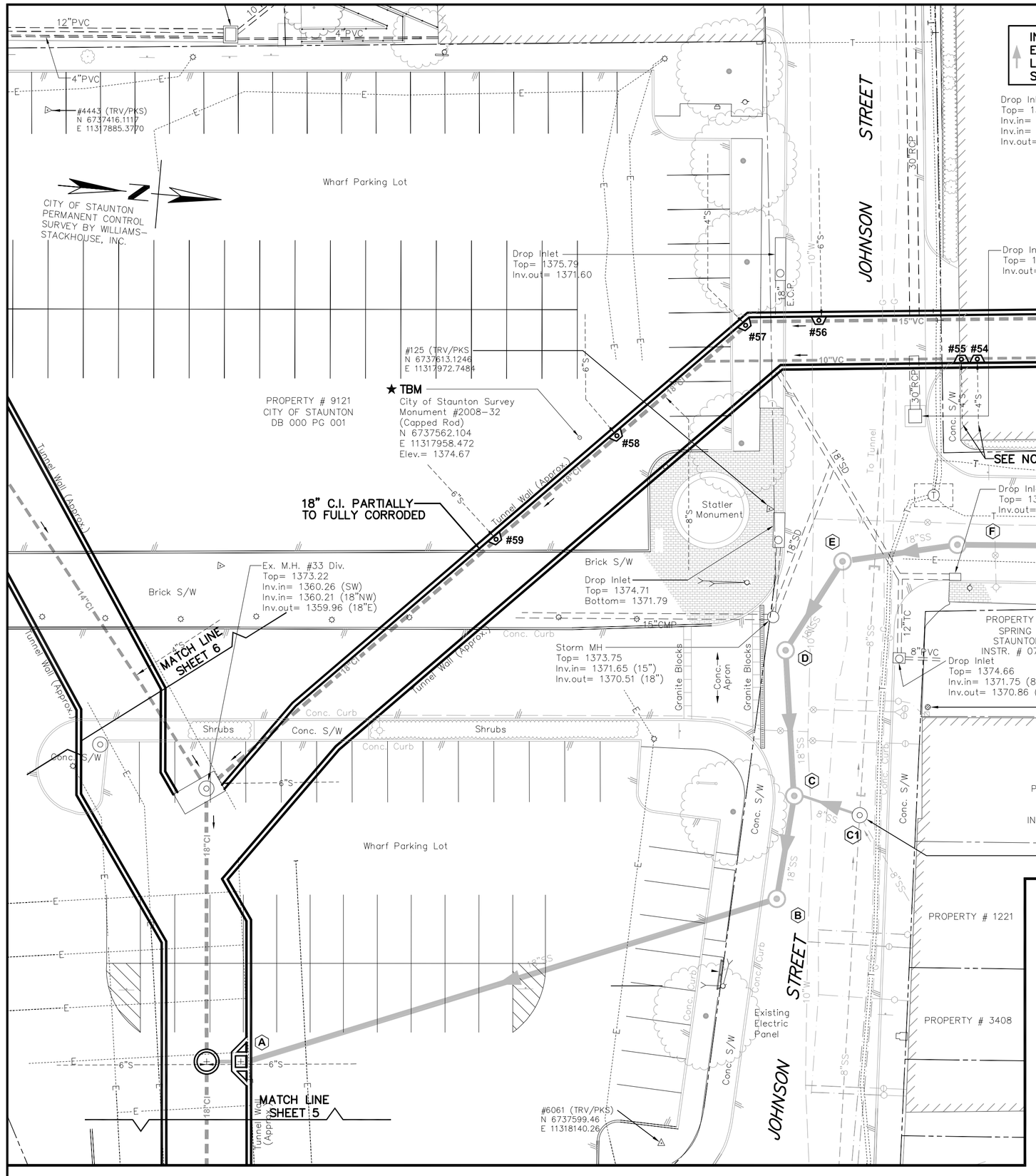
INDICATES TIE-IN OF EXISTING SEWER OR SEWER LATERAL TO 18" RELIEF SEWER IN CENTRAL AVENUE

RECONSTRUCT STRUCTURE #49 TO BE A NEW ACCESS MANHOLE WITH WATERTIGHT FRAME AND COVER

VERIFY IF #45, #46, AND #48 ARE ACTIVE; IF NOT, PROPERLY ABANDON THESE STRUCTURES

NOTE A:
LATERAL AND/OR MAINLINE BRANCH SEWERS SHOWN FROM 1939 AS-BUILT DRAWINGS AND/OR WITNESSED BY 2012 PIPELINE INSPECTIONS WITHIN TUNNEL, NOT DISCOVERED DURING THE INSTALLATION OF THE 18" RELIEF SEWER ALONG CENTRAL AVENUE.

NOTE B:
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#59



#58



#57



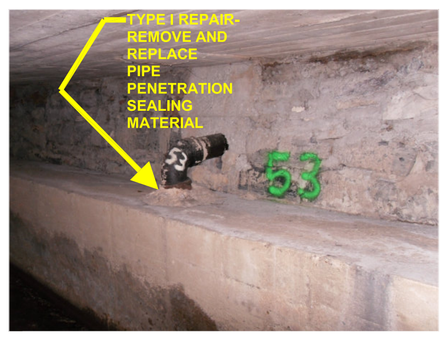
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#55



#54



#53



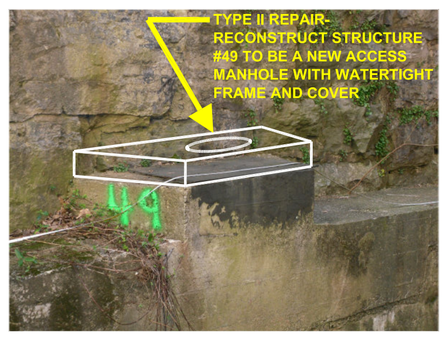
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#51



#50



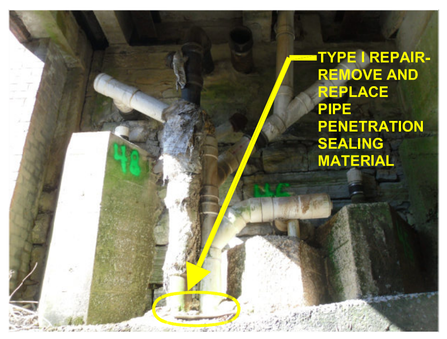
#49



#49A



#48A



#48 #46 #45



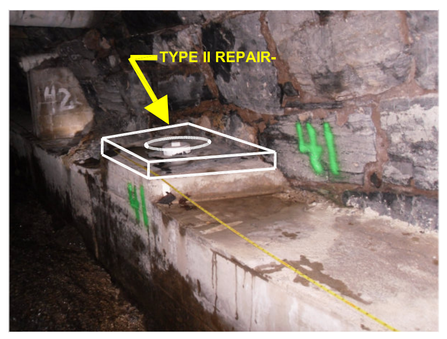
#44



#43



#42



#41

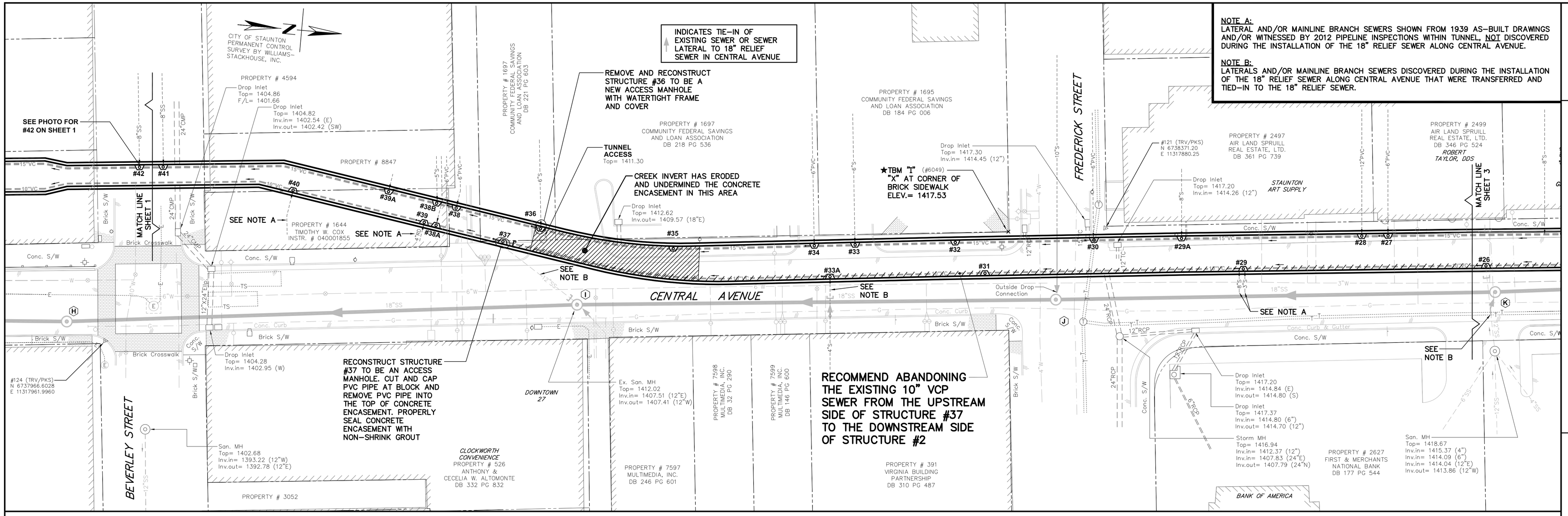
EXISTING SANITARY SEWER PLAN
CENTRAL AVENUE TUNNEL INSPECTION
CITY OF STAUNTON, VIRGINIA

Draper Aden Associates
Engineering • Surveying • Environmental Services
Blacksburg, VA
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Hampton Roads, VA
Richmond, VA
804-264-2228 Fax: 804-284-5773
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REVISIONS

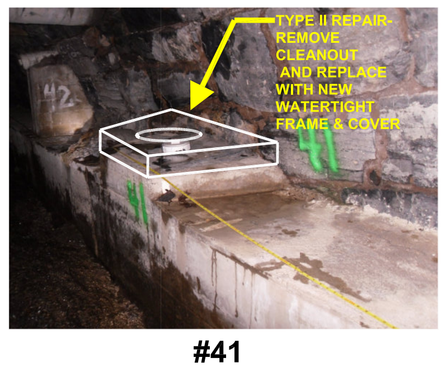
DESIGNED BY:	N/A
DRAWN BY:	HLJ
CHECKED BY:	JST
SCALE:	1"= 20'
DATE:	01/11/13
PROJECT NUMBER:	R11599R-05U

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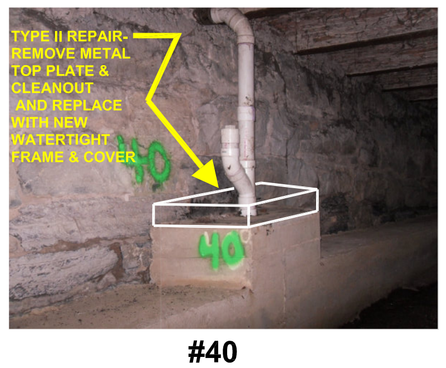


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NOTE B:
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#41



#40



#39A



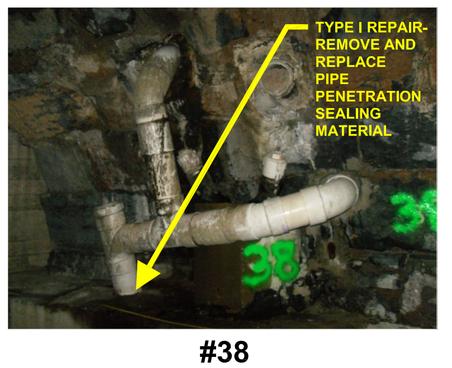
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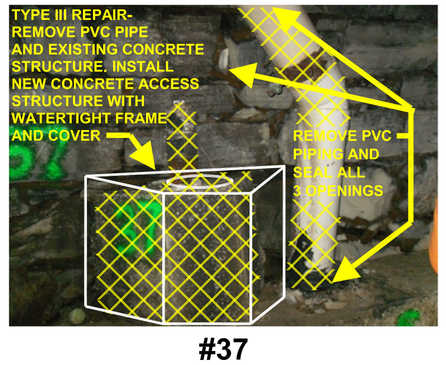
#38A



#38B

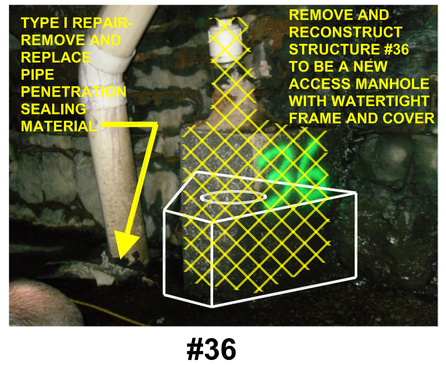


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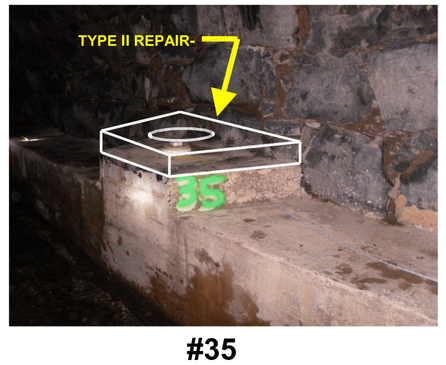


#37


TUNNEL ACCESS



#36



#35



#34



#33



#33A



#32



#31



#30



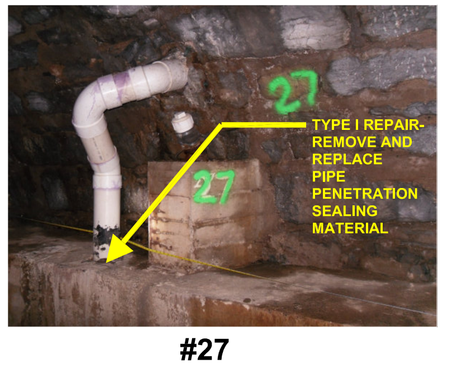
#29A



#29



#28



#27

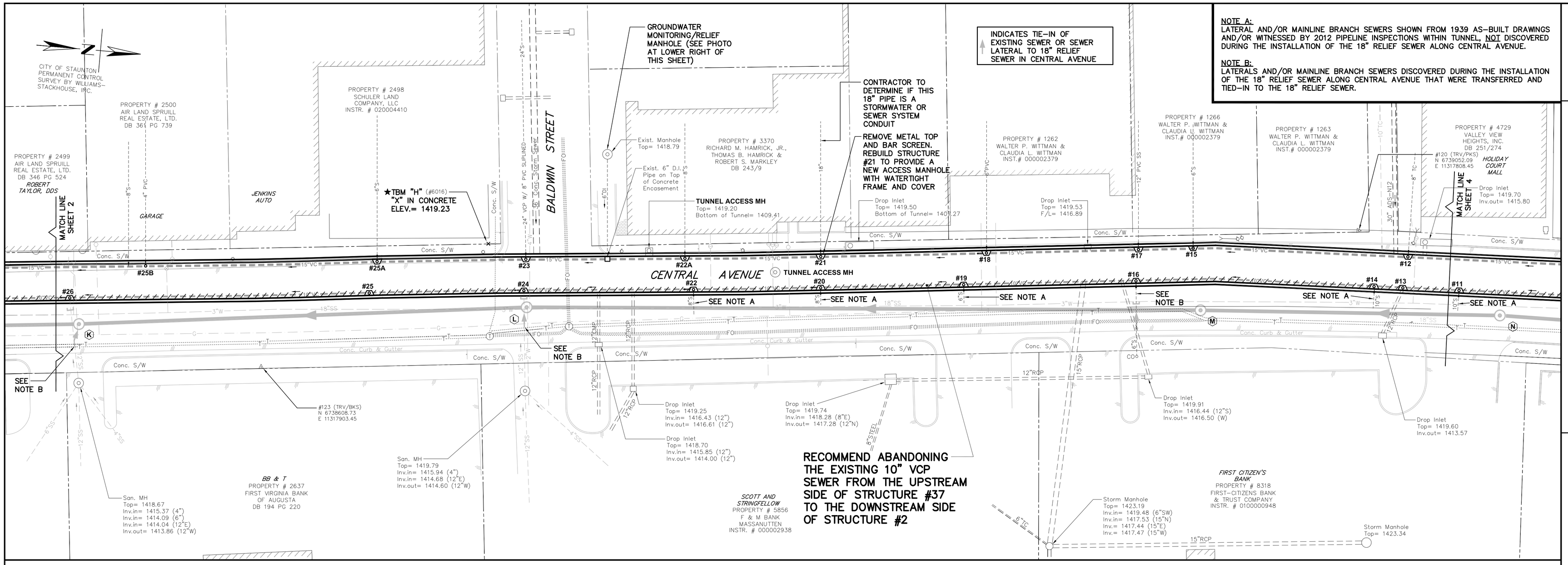
EXISTING SANITARY SEWER PLAN
CENTRAL AVENUE TUNNEL INSPECTION
CITY OF STAUNTON, VIRGINIA

REVISIONS

DESIGNED BY:	N/A
DRAWN BY:	HLJ
CHECKED BY:	JST
SCALE:	1"= 20'
DATE:	01/11/13
PROJECT NUMBER:	R11599R-05U

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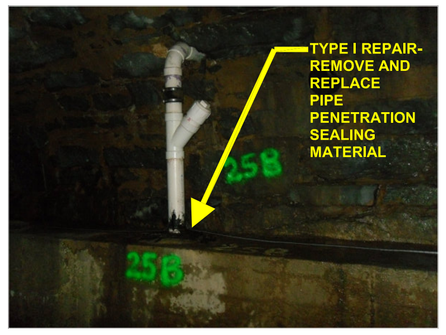


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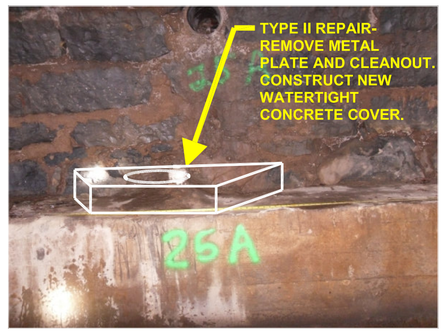
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#26



#25B



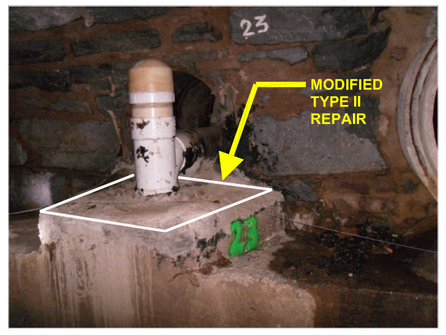
#25A



#25



#24



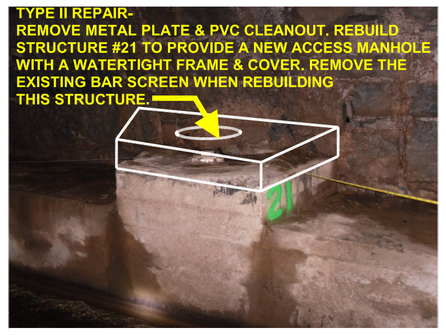
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#22A



#22



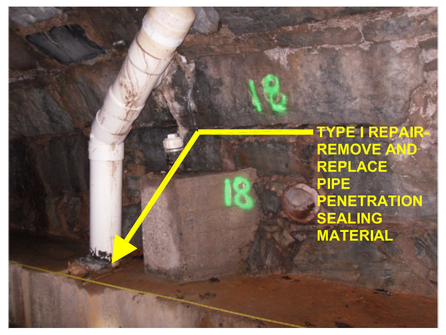
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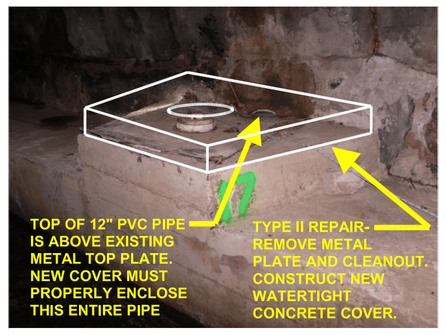
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#19



#18



#17



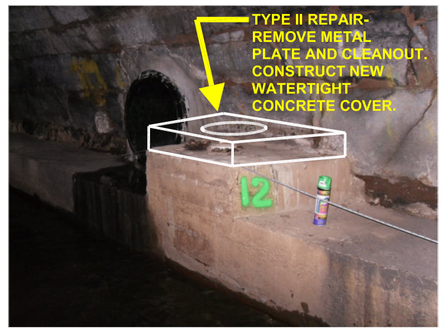
#16



#14



#13



#12



#11



#15



GROUNDWATER RELIEF OUTLET

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EXISTING SANITARY SEWER PLAN
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CITY OF STAUNTON, VIRGINIA

REVISIONS

DESIGNED BY:	N/A
DRAWN BY:	HLJ
CHECKED BY:	JST
SCALE:	1"= 20'
DATE:	01/11/13
PROJECT NUMBER:	R11599R-05U

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RECOMMEND ABANDONING THE EXISTING 10" VCP SEWER FROM THE UPSTREAM SIDE OF STRUCTURE #37 TO THE DOWNSTREAM SIDE OF STRUCTURE #2

INDICATES TIE-IN OF EXISTING SEWER OR SEWER LATERAL TO 18" RELIEF SEWER IN CENTRAL AVENUE

NO STRUCTURE HERE- 6" D.I. GOES THROUGH TUNNEL WALL AND DROPS THROUGH TOP OF ENCASEMENT

HEAVY INFILTRATION AT 15" VCP JOINT JUST DOWNSTREAM OF #3

PROPERLY ABANDON AND/OR FILL THIS 10"VC AT STRUCTURE #3 WALL FACE IF THIS LINE IS CONFIRMED TO BE INACTIVE (SEE PHOTO#3 BELOW)

CITY OF STAUNTON PERMANENT CONTROL SURVEY BY WILLIAMS-STACKHOUSE, INC.

RECOMMEND RECONSTRUCTION OF STRUCTURE #1 TO BE A NEW ACCESS MANHOLE. CUT AND CAP THE UPSTREAM 15" VCP.

RECOMMEND PARTIALLY ABANDONING THIS SEWER (APPROX. 30 L.F.)

CUT AND CAP PIPELINE JUST UPSTREAM OF #2

BYPASS MH

LATERAL ENTERS IN THE TOP OF TUNNEL

HEAVY INFILTRATION ENTERING 10" VCP SEWER UPSTREAM OF #2

VERIFY IF EXISTING 4" PVC IS ACTIVE. IF ACTIVE, TRANSFER 4" PVC TO 18" RELIEF SEWER ALONG CENTRAL AVENUE PRIOR TO ABANDONMENT OF EXISTING 10" VCP SEWER BETWEEN STRUCTURE #2 AND STRUCTUER #37.

★TBM "G" (#3060) "X" ON CORNER OF CONCRETE APRON ELEV.= 1420.43

PROPERTY # 4729 VALLEY VIEW HEIGHTS, INC. DB 251/274

#120 (TRV/PKS) N 6739052.09 E 11317808.45 HOLIDAY COURT MALL

PROPERTY # 4731 268 CENTRAL, LLC INST.# 040001007 HOWARD JOHNSON

PROPERTY # 2991 DAVID B. MORGAN & INST.# 080002517

PROPERTY # 10662 DAVID BRIAN MORGAN INST.# 080002517

PROPERTY # 616 BODDIE NOELL ENTERPRISES, INC. DB 193 PG 384 HARDEE'S

PROPERTY # 9007 B G INVESTMENTS, LLC DB 420 PG 370 VALLEY PAWNBROKERS

PROPERTY # 4660 JERRY F. LAMBERT, TRUSTEE DB 267 PG 602

PROPERTY # 6074 ROBERT S. PEELER, ETAL INSTR. # 000002861

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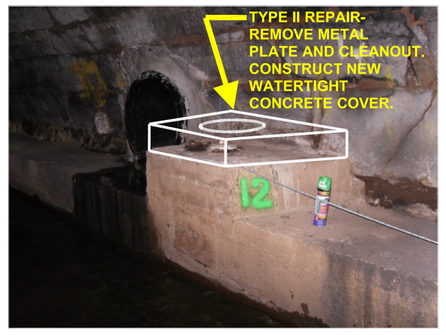
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#14



#13



#12



#11



#10A



#10



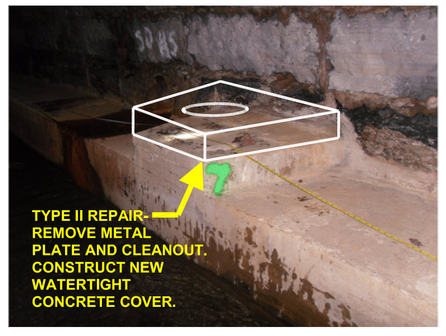
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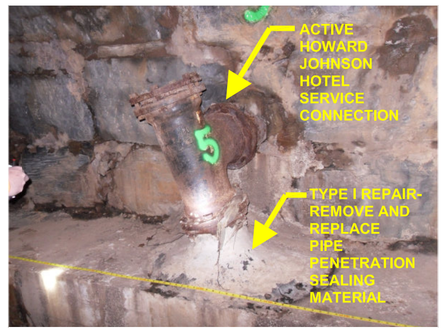
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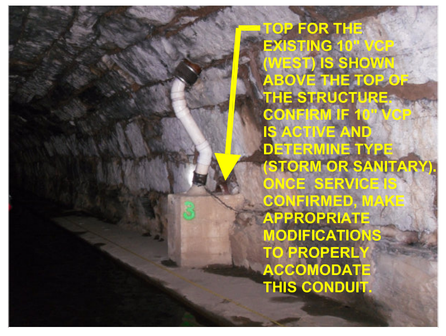
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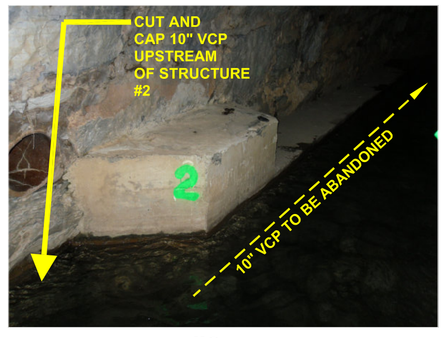
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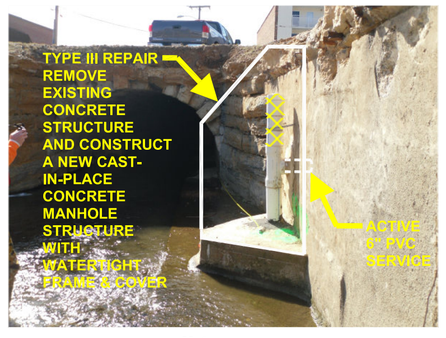
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#2



#1A



#1

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Hampton Roads, VA

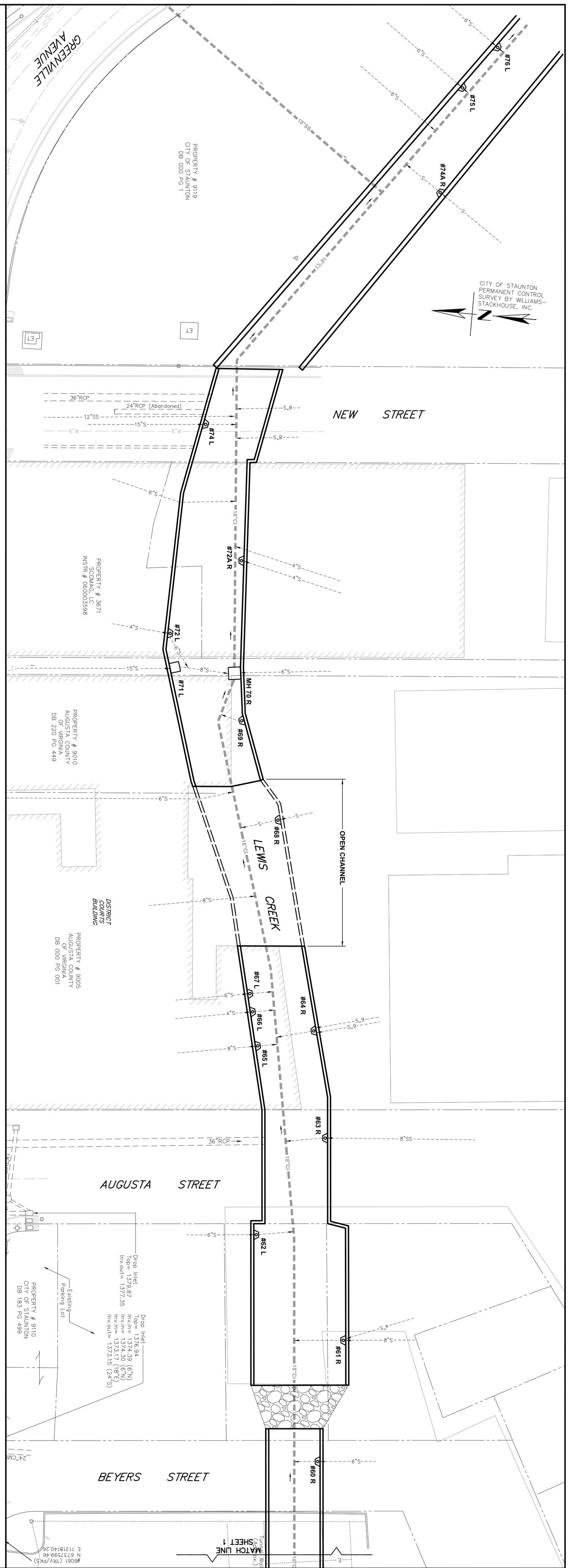
EXISTING SANITARY SEWER PLAN
CENTRAL AVENUE TUNNEL INSPECTION
CITY OF STAUNTON, VIRGINIA

REVISIONS

DESIGNED BY: N/A
DRAWN BY: HLJ
CHECKED BY: JST
SCALE: 1"= 20'
DATE: 01/11/13
PROJECT NUMBER: R11599R-05U

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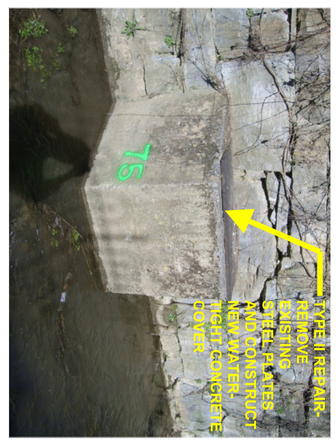
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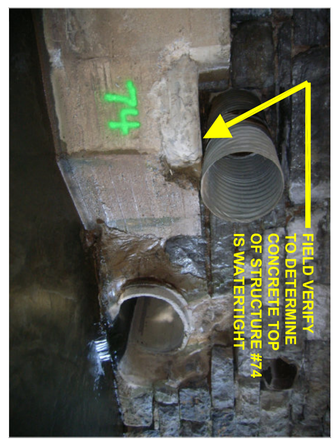
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#70 R



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#68 R



#67 L



#66 L



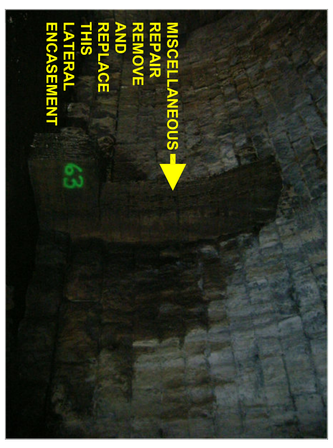
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#63 R



#62 L



#61 R



#60 R



REVISIONS

EXISTING TUNNEL PLAN

LEWIS CREEK TUNNEL INSPECTION

CITY OF STAUNTON, VIRGINIA

DESIGNED BY: N/A
DRAWN BY: HLJ
CHECKED BY: JST
SCALE: 1"= 20'
DATE: 01/11/13
PROJECT NUMBER: R11599R-05U

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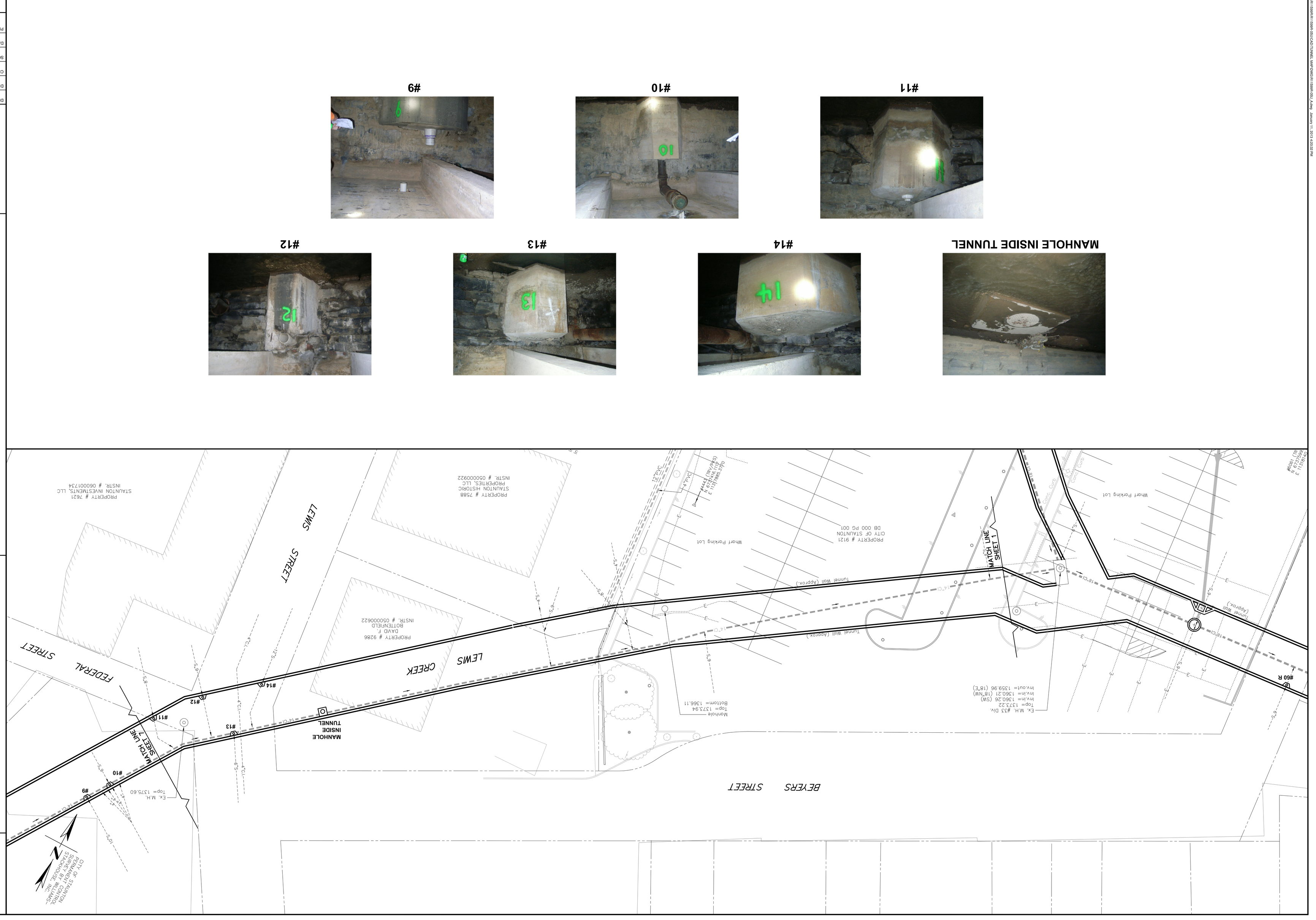
EXISTING SANITARY SEWER PLAN
LEWIS CREEK TUNNEL INSPECTION
CITY OF STAUNTON, VIRGINIA

REVISIONS

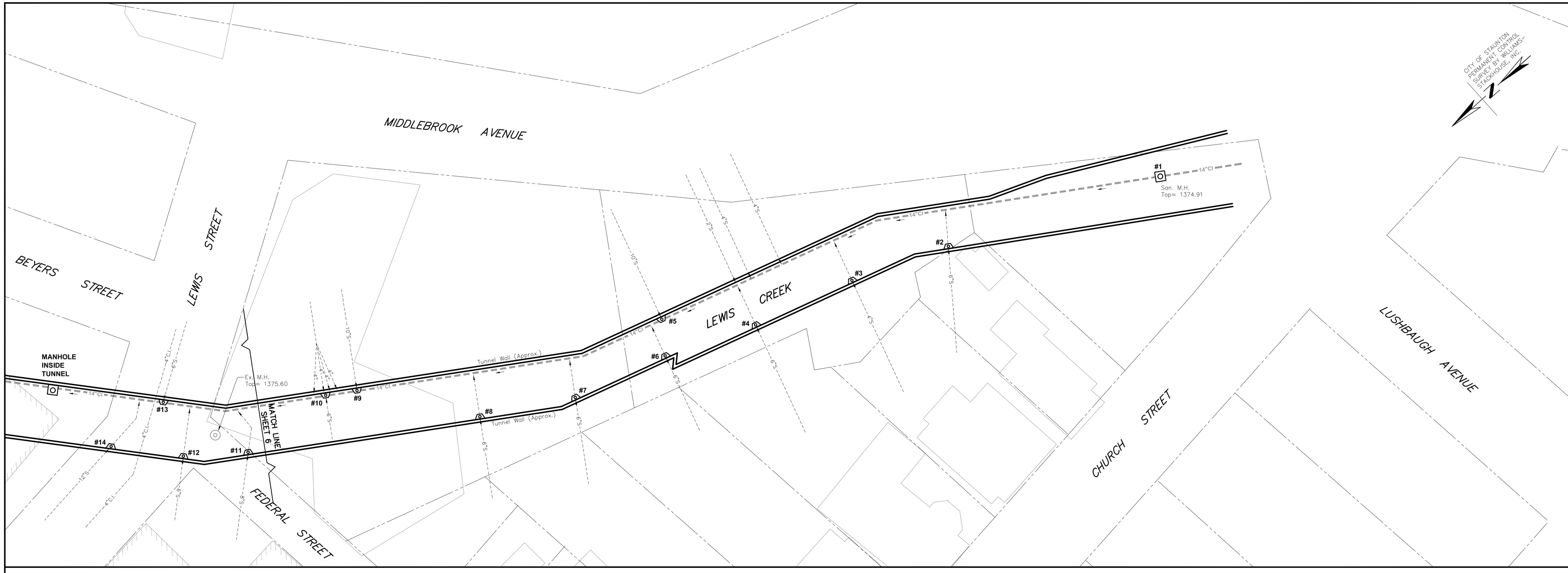
DESIGNED BY: N/A
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6 OF 7

Draper Aden Associates
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Hampton Roads, VA



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MANHOLE INSIDE TUNNEL



#14



#13



#12



#11



#10



#9



#8



#7



#6



#5



#4



#3



#2



#1



#1

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EXISTING SANITARY SEWER PLAN
LEWIS CREEK TUNNEL INSPECTION
CITY OF STAUNTON, VIRGINIA

REVISIONS

DESIGNED BY:	N/A
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APPENDIX D

EXISTING CONDITION TUNNEL GEOMETRY



Wiley|Wilson
Constant Progress

PROJECT
STAUNTON FLOOD STUDY

TITLE
TUNNEL SEGMENTS

COMM. NO.
220184

DRAWN | CHECKED

SKETCH NO.
SK-13

DWG. REFERENCE NO.

DATE: | REV.

Tunnel Geometry - Existing Conditions

Name	Dimension Source	Span	Rise	Model Dimension	Section shape	Shoulder height	Manning's n	Material
2180	WW Survey	26.6	8.7	26.6 x 8.7	Box		0.030	Natural stream, clean
	Staunton GIS	14	12					
2192	WW Survey	22.3	6.8	22.3 x 6.8	Box		0.030	Natural stream, clean
	Staunton GIS	14	12					
	Draper	21						
	Johnson	20?						
2201	WW Survey	20.6	7.5	20.6 x 7.5	Box		0.030	Natural stream, clean
	Staunton GIS	14	7					
	Draper	16						
2202	WW Survey	20.6	7.5	20.6 x 7.6	Box		0.030	Natural stream, clean
	Staunton GIS	14	7					
	Draper	20						
2203	SV 2-9		6.5	22.8 x 6.5	Box		0.030	Natural stream, clean
	Draper	22.8						
	Staunton GIS	22						
2204	Johnson	22		22 x 6.3	Box		0.030	Natural stream, clean
	SV 2-9		6.3					
2205	Johnson	22	7	22 x 6.3	Box		0.030	Natural stream, clean
	SV 2-9		6.3					
	Photos		6					
	WW Survey		8					
3000	WW Survey			cross section	irregular open channel		0.030	Natural stream, clean
3001	WW Survey	26.6	8.7	26.6 x 8.7	Box		0.030	Natural stream, clean
	Staunton GIS	14	12					
	Draper Aden			inaccurate in this area				
old		26.6	9					
3002	pictures	26.6	16		box		0.030	Natural stream, clean
	old est	26.6	17					
3003	pictures	18	16		arch		0.032	Stone Masonry
	old est	17	17					
3004		19	12		Box		0.030	Natural stream, clean
	old est	22	12					
3005		35	17.5	35 x 17.5	Rectangular		0.030	Natural stream, clean
	old est	21	17.5		open channel			
4000	WW Survey	10.3	7.3	10.3 x 7.3	Arch	2	0.032	Stone Masonry
	Draper	14.7						
	Staunton GIS	12	8.5					
	Old Sew Lines	12	8.5					
4001	Staunton GIS	12	8.5	12 x 8.5	Arch	2	0.032	Stone Masonry
	observed to be continuous with downstream section							
4002	Old Sew Lines	12	8.5	12 x 8.5	Arch	2	0.032	Stone Masonry
	Draper	14.7						

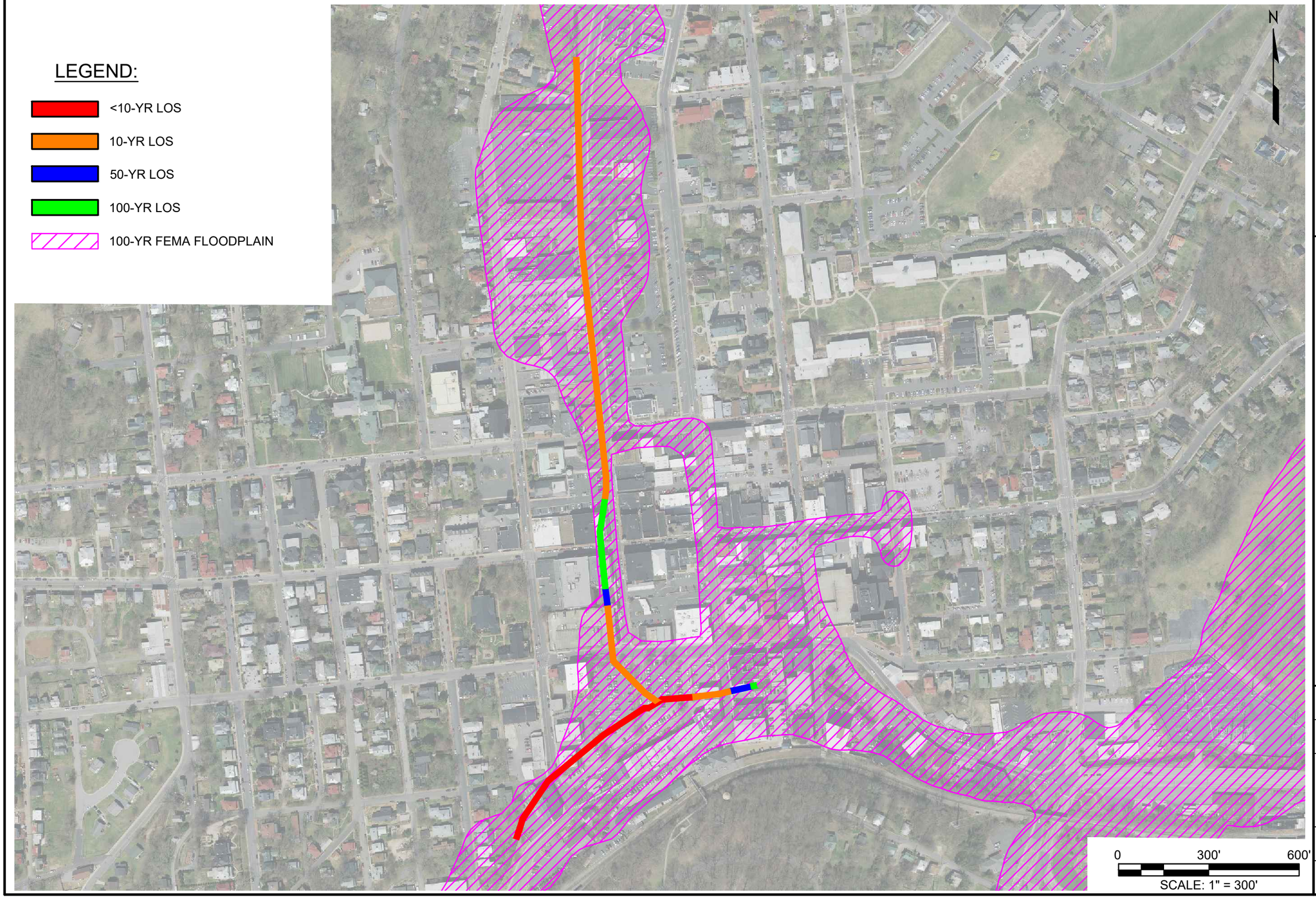
4003	Old Sew Lines	14	8.5	14 x 8.5	Box	2	0.032	Stone Masonry
	Draper	10.8						
4004	Staunton GIS	12	8.5	12 x 8.5	Arch	2	0.032	Stone Masonry
	Old Sew Lines	12	8.5					
	Draper	8.5						
4005	Staunton GIS	12	8.5	16 x 12.5	Box	6	0.032	Stone Masonry
	Photos	16	12.5					
4006	Photos	12		12 x 6	Box	NA	0.032	Stone Masonry
4007	Staunton GIS	12	8.5	16 x 8.5	Box	3	0.032	Stone Masonry
	WW Survey	16						
	Draper							
4020	Staunton GIS	12	8.5	15.5 x 7	Box	3	0.032	Stone Masonry
	WW Survey	15.5	7					
	Draper	12.6						
4031	Staunton GIS	16	6	15.8 x 6	Box		0.030	Natural stream, clean
	Old Sew Lines		6.5					
	Johnson	15.8	8.2					
	Draper	14.7						
	no photos of							

APPENDIX E

EXISTING CONDITION LEVEL OF SERVICE (LOS)

LEGEND:

- <10-YR LOS
- 10-YR LOS
- 50-YR LOS
- 100-YR LOS
- 100-YR FEMA FLOODPLAIN



Wiley|Wilson
Constant Progress

PROJECT
STAUNTON FLOOD STUDY

TITLE
EXISTING TUNNEL LEVEL OF SERVICE (LOS)

COMM. NO.
220184

DRAWN | CHECKED

SKETCH NO.
SK-11

DWG. REFERENCE NO.

DATE: | REV.

APPENDIX F

PROJECT SCENARIOS

Peyton Creek

Project Description	Individual Project Cost	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Project 3A - Replace first 600' of Tunnel along Central Ave	$4,429,000				3A		
Project 3B - Replace first 1,450' of Tunnel along Central Ave	$11,561,000					3B	
Project 4A - Flood Control Pond at Gypsy Hill Park	$13,396,000	4A		4A			
Project 4B - Flood Contol Pond at Winston Wine Stadium Parking Lot	$48,902,000		4B	4B			
Project 5 - Additional Gravity Line	$46,515,000						5
100-Year Flood Reduction at Pump Street (ft) =		0.2	0.5	0.7	1.3	5.1	5.2
Level of Service Flood Event		10-Yr	25-Yr	25-Yr	10-Yr	100-Yr	100-Yr
Total Scenario Cost =		$13,396,000	$48,902,000	$62,298,000	$4,429,000	$11,561,000	$46,515,000

Lewis Creek

Project Description	Individual Project Cost	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Project 1A - Replace Tunnel, confluence of Lewis and Peyton to Byer, Box Tunnel	$2,796,000					1A	
Project 1B - Remove Tunnel, confluence of Lewis and Peyton to Byer, Construct Open Channel	$3,605,000				1B		
Project 2A - Remove 120 S Augusta St Building, Construct Open Channel	$2,197,000			2A	2A	2A	
Project 2B - Replace Tunnel, S Augusta St, Box Tunnel	$1,168,000		2B	2B	2B	2B	2B
Project 2C - Remove 113 S Augusta St Building, Construct Open Channel	$2,319,000	2C	2C	2C	2C	2C	
Project 6 - Additonal Gravity Line	$46,288,000						
Project 7 - Stormwater Pump Station	$49,140,000						
100-Year Flood Reduction at Wharf Parking Lot (ft) =		0.2	0.6	0.6	1.7	1.6	1.2
100-Year Flood Reduction at Parking Garage (ft) =		0.5	0.6	0.7	2.3	1.9	1.3
Level of Service Flood Event		10-Yr	10-Yr	25-Yr	50-Yr	50-Yr	10-Yr
Total Scenario Cost =		$2,319,000	$3,487,000	$5,684,000	$9,289,000	$8,480,000	$1,168,000

Lewis Creek

Project Description	Individual Project Cost	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11
Project 1A - Replace Tunnel, confluence of Lewis and Peyton to Byer, Box Tunnel	$2,796,000			1A		
Project 1B - Remove Tunnel, confluence of Lewis and Peyton to Byer, Construct Open Channel	$3,605,000		1B			
Project 2A - Remove 120 S Augusta St Building, Construct Open Channel	$2,197,000	2A	2A	2A		
Project 2B - Replace Tunnel, S Augusta St, Box Tunnel	$1,168,000	2B	2B	2B		
Project 2C - Remove 113 S Augusta St Building, Construct Open Channel	$2,319,000					
Project 6 - Additonal Gravity Line	$46,288,000				6	
Project 7 - Stormwater Pump Station	$49,140,000					7
100-Year Flood Reduction at Wharf Parking Lot (ft) =		0.9	1.7	1.3	-0.1	2.0
100-Year Flood Reduction at Parking Garage (ft) =		0.9	2.0	1.5	0.0	2.1
Level of Service Flood Event		10-Yr	50-Yr	50-Yr	10-Yr	50-Yr
Total Scenario Cost =		$3,365,000	$6,970,000	$6,161,000	$46,288,000	$49,140,000

PEYTON CREEK SCENARIOS

10-Yr Storm					Scenario 1: Project 4A			Scenario 2: Project 4B	
Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1420.7	*0.2*	1417.5	-3.0	3.2	1416.47	-4.0	4.2
DT-1	1420.5	1420.7	*0.2*	1420.5	0.0	0.2	1420.5	0.0	0.2
T-31	1417.6	1413.7	*-3.9*	1412.39	-5.2	1.3	1411.94	-5.7	1.8

25-Yr Storm					Scenario 1: Project 4A			Scenario 2: Project 4B	
Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1421.5	*0.9*	1421.51	1.0	0.0	1420.59	0.1	0.9
DT-1	1420.5	1421.3	*0.8*	1421.2	0.7	-0.5	1420.8	0.3	-0.1
T-31	1417.6	1417.5	*-0.1*	1417.51	-0.1	0.0	1413.43	-4.2	4.0

50-Yr Storm					Scenario 1: Project 4A			Scenario 2: Project 4B	
Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1422.1	*1.6*	1421.97	1.5	0.1	1421.73	1.2	0.4
DT-1	1420.5	1421.6	*1.0*	1421.46	0.9	-0.8	1421.35	0.8	-0.7
T-31	1417.6	1418.1	*0.5*	1417.96	0.4	0.1	1417.73	0.1	0.4

100-Yr Storm					Scenario 1: Project 4A			Scenario 2: Project 4B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1422.3	*1.8*	1422.13	1.6	0.2	1421.78	1.3	0.5
DT-1	1420.5	1421.8	*1.3*	1421.69	1.2	0.1	1421.61	1.1	0.2
T-31	1417.6	1418.3	*0.7*	1418.13	0.5	0.2	1417.78	0.2	0.5

PEYTON CREEK SCENARIOS

10-Yr Storm					Scenario 3: Projects 4A & 4B			Scenario 4: Project 3A	
Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1420.7	*0.2*	1415.1	-5.4	5.6	1414.73	-5.8	6.0
DT-1	1420.5	1420.7	*0.2*	1420.5	0.0	0.2	1420.5	0.0	0.2
T-31	1417.6	1413.7	*-3.9*	1411.05	-6.6	2.6	1411.65	-6.0	2.0

25-Yr Storm					Scenario 3: Projects 4A & 4B			Scenario 4: Project 3A	
Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1421.5	*0.9*	1420.08	-0.4	1.4	1418.5	-2.0	3.0
DT-1	1420.5	1421.3	*0.8*	1420.5	0.0	0.2	1420.5	0.0	0.2
T-31	1417.6	1417.5	*-0.1*	1413.23	-4.4	4.2	1417.23	-0.4	0.2

50-Yr Storm					Scenario 3: Projects 4A & 4B			Scenario 4: Project 3A	
Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1422.1	*1.6*	1421.63	1.1	0.5	1420.11	-0.4	2.0
DT-1	1420.5	1421.6	*1.0*	1421.25	0.7	-0.5	1420.5	0.0	0.2
T-31	1417.6	1418.1	*0.5*	1417.63	0.0	0.5	1418.14	0.5	0.0

100-Yr Storm					Scenario 3: Projects 4A & 4B			Scenario 4: Project 3A	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1422.3	*1.8*	1421.59	1.1	0.7	1421.05	0.5	1.3
DT-1	1420.5	1421.8	*1.3*	1421.54	1.0	0.3	1420.5	0.0	1.3
T-31	1417.6	1418.3	*0.7*	1417.59	0.0	0.7	1418.11	0.5	0.2

PEYTON CREEK SCENARIOS

10-Yr Storm					Scenario 5: Project 3B			Scenario 6: Project 5	
Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1420.7	*0.2*	1414.62	-5.9	6.1	1415.08	-5.4	5.6
DT-1	1420.5	1420.7	*0.2*	1420.66	0.1	0.0	1420.5	0.0	0.2
T-31	1417.6	1413.7	*-3.9*	1409.39	-8.2	4.3	1411.03	-6.6	2.7

25-Yr Storm					Scenario 5: Project 3B			Scenario 6: Project 5	
Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1421.5	*0.9*	1415.62	-4.9	5.8	1416.12	-4.4	5.3
DT-1	1420.5	1421.3	*0.8*	1420.5	0.0	0.2	1420.5	0.0	0.2
T-31	1417.6	1417.5	*-0.1*	1410.39	-7.2	7.1	1411.95	-5.7	5.5

50-Yr Storm					Scenario 5: Project 3B			Scenario 6: Project 5	
Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1422.1	*1.6*	1416.4	-4.1	5.7	1416.49	-4.0	5.6
DT-1	1420.5	1421.6	*1.0*	1420.5	0.0	0.2	1420.5	0.0	0.2
T-31	1417.6	1418.1	*0.5*	1411.17	-6.4	6.9	1411.95	-5.7	6.1

100-Yr Storm					Scenario 5: Project 3B			Scenario 6: Project 5	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-2	1420.5	1422.3	*1.8*	1417.21	-3.3	5.1	1417.1	-3.4	5.2
DT-1	1420.5	1421.8	*1.3*	1420.5	0.0	0.2	1420.5	0.0	0.2
T-31	1417.6	1418.3	*0.7*	1411.98	-5.6	6.3	1412.26	-5.3	6.0

PEYTON CREEK SCENARIOS

10-Yr Storm

Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*
MH-2	1420.5	1420.7	*0.2*
DT-1	1420.5	1420.7	*0.2*
T-31	1417.6	1413.7	*-3.9*

25-Yr Storm

Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*
MH-2	1420.5	1421.5	*0.9*
DT-1	1420.5	1421.3	*0.8*
T-31	1417.6	1417.5	*-0.1*

50-Yr Storm

Manhole Location	Ex. Grade	HGL Elev.	*Existing HGL*
MH-2	1420.5	1422.1	*1.6*
DT-1	1420.5	1421.6	*1.0*
T-31	1417.6	1418.1	*0.5*

100-Yr Storm

Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*
MH-2	1420.5	1422.3	*1.8*
DT-1	1420.5	1421.8	*1.3*
T-31	1417.6	1418.3	*0.7*

LEWIS CREEK SCENARIOS

10-Yr Storm					Scenario 1: Project 2C			Scenario 2: Projects 2C & 2B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1372.27	*-1.6*	1372.27	-1.6	0.0	1371.38	-2.5	0.9
MH-48	1374.9	1374.58	*-0.3*	1374.58	-0.3	0.0	1373.77	-1.1	0.8
T-43	1375.0	1376.66	*1.7*	1376.66	1.7	0.0	1375.85	0.9	0.8
MH-6	1377.5	1379.9	*2.4*	1377.5	0.0	2.4	1379.1	1.6	0.8
MH-21	1382.6	1376.58	*-6.0*	1376.58	-6.0	0.0	1375.57	-7.0	1.0
T-39	1376.0	1375.55	*-0.5*	1375.55	-0.5	0.0	1374.74	-1.3	0.8

25-Yr Storm					Scenario 1: Project 2C			Scenario 2: Projects 2C & 2B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1374.77	*0.9*	1374.78	0.9	0.0	1373.15	-0.7	1.6
MH-48	1374.9	1377.11	*2.2*	1377	2.1	0.1	1376.95	2.0	0.2
T-43	1375.0	1377.45	*2.5*	1377.35	2.4	0.1	1377.23	2.2	0.2
MH-6	1377.5	1379.68	*2.2*	1379.58	2.1	0.1	1379.47	2.0	0.2
MH-21	1382.6	1380.32	*-2.3*	1380.21	-2.4	0.1	1380.16	-2.4	0.2
T-39	1376.0	1378.46	*2.5*	1378.35	2.3	0.1	1378.3	2.3	0.2

50-Yr Storm					Scenario 1: Project 2C			Scenario 2: Projects 2C & 2B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1376.57	*2.7*	1375.85	2.0	0.7	1374.93	1.0	1.6
MH-48	1374.9	1377.41	*2.5*	1377.34	2.4	0.1	1376.93	2.0	0.5
T-43	1375.0	1378.29	*3.3*	1378.22	3.2	0.1	1377.81	2.8	0.5
MH-6	1377.5	1380.71	*3.2*	1380.65	3.2	0.1	1380.25	2.8	0.5
MH-21	1382.6	1381.43	*-1.2*	1381.36	-1.3	0.1	1380.95	-1.7	0.5
T-39	1376.0	1378.55	*2.5*	1378.48	2.5	0.1	1378.07	2.1	0.5

100-Yr Storm					Scenario 1: Project 2C			Scenario 2: Projects 2C & 2B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1378.41	*4.5*	1377.89	4.0	0.5	1377.2	3.3	1.2
MH-48	1374.9	1379.25	*4.3*	1378.73	3.8	0.5	1378.69	3.8	0.6
T-43	1375.0	1379.25	*4.3*	1379.61	4.6	-0.4	1379.32	4.3	-0.1
MH-6	1377.5	1380.56	*3.1*	1382.01	4.5	-1.5	1381.73	4.2	-1.2
MH-21	1382.6	1384.88	*2.3*	1384.36	1.8	0.5	1384.32	1.7	0.6
T-39	1376.0	1380.6	*4.6*	1380.08	4.1	0.5	1380.04	4.0	0.6

LEWIS CREEK SCENARIOS

10-Yr Storm					Scenario 3: Projects 2C, 2B, & 2A			Scenario 4: Projects 2C, 2B, 2A, & 1B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1372.27	*-1.6*	1370.71	-3.2	1.6	1370.71	-3.2	1.6
MH-48	1374.9	1374.58	*-0.3*	1373.72	-1.2	0.9	1371.07	-3.8	3.5
T-43	1375.0	1376.66	*1.7*	1375.79	0.8	0.9	1372.51	-2.5	4.2
MH-6	1377.5	1379.9	*2.4*	1379.05	1.5	0.9	1375.34	-2.2	4.6
MH-21	1382.6	1376.58	*-6.0*	1375.5	-7.1	1.1	1373.76	-8.8	2.8
T-39	1376.0	1375.55	*-0.5*	1374.69	-1.3	0.9	1371.63	-4.4	3.9

25-Yr Storm					Scenario 3: Projects 2C, 2B, & 2A			Scenario 4: Projects 2C, 2B, 2A, & 1B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1374.77	*0.9*	1372.94	-0.9	1.8	1372.94	-0.9	1.8
MH-48	1374.9	1377.11	*2.2*	1376.9	2.0	0.2	1373.22	-1.7	3.9
T-43	1375.0	1377.45	*2.5*	1377.24	2.3	0.2	1374.59	-0.4	2.9
MH-6	1377.5	1379.68	*2.2*	1379.48	2.0	0.2	1377.18	-0.3	2.5
MH-21	1382.6	1380.32	*-2.3*	1380.11	-2.5	0.2	1376.43	-6.2	3.9
T-39	1376.0	1378.46	*2.5*	1378.25	2.3	0.2	1374.57	-1.4	3.9

50-Yr Storm					Scenario 3: Projects 2C, 2B, & 2A			Scenario 4: Projects 2C, 2B, 2A, & 1B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1376.57	*2.7*	1374.74	0.9	1.8	1374.74	0.9	1.8
MH-48	1374.9	1377.41	*2.5*	1376.85	1.9	0.6	1374.99	0.1	2.4
T-43	1375.0	1378.29	*3.3*	1377.73	2.7	0.6	1376.5	1.5	1.8
MH-6	1377.5	1380.71	*3.2*	1380.17	2.7	0.5	1379.76	2.3	1.0
MH-21	1382.6	1381.43	*-1.2*	1380.87	-1.7	0.6	1379.01	-3.6	2.4
T-39	1376.0	1378.55	*2.5*	1377.99	2.0	0.6	1376.13	0.1	2.4

100-Yr Storm					Scenario 3: Projects 2C, 2B, & 2A			Scenario 4: Projects 2C, 2B, 2A, & 1B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1378.41	*4.5*	1376.7	2.8	1.7	1376.7	2.8	1.7
MH-48	1374.9	1379.25	*4.3*	1378.81	3.9	0.4	1376.93	2.0	2.3
T-43	1375.0	1379.25	*4.3*	1379.48	4.5	-0.2	1378.04	3.0	1.2
MH-6	1377.5	1380.56	*3.1*	1381.48	4.0	-0.9	1380.47	3.0	0.1
MH-21	1382.6	1384.88	*2.3*	1384.44	1.8	0.4	1382.56	0.0	2.3
T-39	1376.0	1380.6	*4.6*	1380.16	4.2	0.4	1378.28	2.3	2.3

LEWIS CREEK SCENARIOS

10-Yr Storm					Scenario 5: Projects 2C, 2B, 2A, & 1A			Scenario 6: Project 2B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1372.27	*-1.6*	1370.71	-3.2	1.6	1371.85	-2.0	0.4
MH-48	1374.9	1374.58	*-0.3*	1371.07	-3.8	3.5	1374.16	-0.7	0.4
T-43	1375.0	1376.66	*1.7*	1372.51	-2.5	4.2	1376.24	1.3	0.4
MH-6	1377.5	1379.9	*2.4*	1375.34	-2.2	4.6	1379.49	2.0	0.4
MH-21	1382.6	1376.58	*-6.0*	1373.76	-8.8	2.8	1376.11	-6.5	0.5
T-39	1376.0	1375.55	*-0.5*	1371.63	-4.4	3.9	1375.13	-0.9	0.4

25-Yr Storm					Scenario 5: Projects 2C, 2B, 2A, & 1A			Scenario 6: Project 2B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1374.77	*0.9*	1372.94	-0.9	1.8	1374.48	0.6	0.3
MH-48	1374.9	1377.11	*2.2*	1374.28	-0.6	2.8	1376.82	1.9	0.3
T-43	1375.0	1377.45	*2.5*	1375.66	0.7	1.8	1377.16	2.2	0.3
MH-6	1377.5	1379.68	*2.2*	1378.03	0.5	1.7	1379.41	1.9	0.3
MH-21	1382.6	1380.32	*-2.3*	1377.49	-5.1	2.8	1380.03	-2.6	0.3
T-39	1376.0	1378.46	*2.5*	1375.63	-0.4	2.8	1378.17	2.2	0.3

50-Yr Storm					Scenario 5: Projects 2C, 2B, 2A, & 1A			Scenario 6: Project 2B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1376.57	*2.7*	1374.74	0.9	1.8	1376.66	2.8	-0.1
MH-48	1374.9	1377.41	*2.5*	1376.23	1.3	1.2	1377.5	2.6	-0.1
T-43	1375.0	1378.29	*3.3*	1377.11	2.1	1.2	1378.38	3.4	-0.1
MH-6	1377.5	1380.71	*3.2*	1379.57	2.1	1.1	1380.8	3.3	-0.1
MH-21	1382.6	1381.43	*-1.2*	1380.25	-2.4	1.2	1381.52	-1.1	-0.1
T-39	1376.0	1378.55	*2.5*	1377.37	1.4	1.2	1378.64	2.6	-0.1

100-Yr Storm					Scenario 5: Projects 2C, 2B, 2A, & 1A			Scenario 6: Project 2B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1378.41	*4.5*	1376.7	2.8	1.7	1377.08	3.2	1.3
MH-48	1374.9	1379.25	*4.3*	1377.38	2.5	1.9	1377.92	3.0	1.3
T-43	1375.0	1379.25	*4.3*	1378.06	3.1	1.2	1378.27	3.3	1.0
MH-6	1377.5	1380.56	*3.1*	1380.49	3.0	0.1	1380.69	3.2	-0.1
MH-21	1382.6	1384.88	*2.3*	1383.01	0.4	1.9	1383.55	0.9	1.3
T-39	1376.0	1380.6	*4.6*	1378.73	2.7	1.9	1379.27	3.3	1.3

LEWIS CREEK SCENARIOS

10-Yr Storm					Scenario 7: Projects 2B & 2A			Scenario 8: Projects 2B, 2A, & 1B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1372.27	*-1.6*	1371.1	-2.8	1.2	1371.08	-2.8	1.2
MH-48	1374.9	1374.58	*-0.3*	1373.7	-1.2	0.9	1371.35	-3.6	3.2
T-43	1375.0	1376.66	*1.7*	1375.8	0.8	0.9	1372.6	-2.4	4.1
MH-6	1377.5	1379.9	*2.4*	1379.1	1.5	0.9	1375.36	-2.1	4.5
MH-21	1382.6	1376.58	*-6.0*	1375.5	-7.1	1.1	1373.76	-8.8	2.8
T-39	1376.0	1375.55	*-0.5*	1374.7	-1.3	0.9	1371.93	-4.1	3.6
				-0.8					

25-Yr Storm					Scenario 7: Projects 2B & 2A			Scenario 8: Projects 2B, 2A, & 1B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1374.77	*0.9*	1373.5	-0.4	1.3	1373.5	-0.4	1.3
MH-48	1374.9	1377.11	*2.2*	1376.9	2.0	0.2	1373.71	-1.2	3.4
T-43	1375.0	1377.45	*2.5*	1377.2	2.2	0.2	1375.08	0.1	2.4
MH-6	1377.5	1379.68	*2.2*	1379.5	2.0	0.2	1377.57	0.1	2.1
MH-21	1382.6	1380.32	*-2.3*	1380.1	-2.5	0.2	1376.92	-5.7	3.4
T-39	1376.0	1378.46	*2.5*	1378.3	2.3	0.2	1375.06	-0.9	3.4
				-0.8					

50-Yr Storm					Scenario 7: Projects 2B & 2A			Scenario 8: Projects 2B, 2A, & 1B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1376.57	*2.7*	1375.6	1.7	1.0	1375.59	1.7	1.0
MH-48	1374.9	1377.41	*2.5*	1377.2	2.3	0.2	1375.77	0.9	1.6
T-43	1375.0	1378.29	*3.3*	1378.1	3.1	0.2	1376.88	1.9	1.4
MH-6	1377.5	1380.71	*3.2*	1380.5	3.0	0.2	1379.85	2.3	0.9
MH-21	1382.6	1381.43	*-1.2*	1381.2	-1.4	0.2	1379.79	-2.8	1.6
T-39	1376.0	1378.55	*2.5*	1378.3	2.3	0.2	1376.91	0.9	1.6

100-Yr Storm					Scenario 7: Projects 2B & 2A			Scenario 8: Projects 2B, 2A, & 1B	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1378.41	*4.5*	1377.06	3.2	1.4	1377.06	3.2	1.4
MH-48	1374.9	1379.25	*4.3*	1378.38	3.5	0.9	1377.27	2.4	2.0
T-43	1375.0	1379.25	*4.3*	1378.72	3.7	0.5	1377.61	2.6	1.6
MH-6	1377.5	1380.56	*3.1*	1381.14	3.6	-0.6	1380.05	2.5	0.5
MH-21	1382.6	1384.88	*2.3*	1384.01	1.4	0.9	1382.9	0.3	2.0
T-39	1376.0	1380.6	*4.6*	1379.73	3.7	0.9	1378.62	2.6	2.0

LEWIS CREEK SCENARIOS

10-Yr Storm					Scenario 9: Projects 2B, 2A, & 1A			Scenario 10: Project 6	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1372.27	*-1.6*	1371.08	-2.8	1.2	1372.27	-1.6	0.0
MH-48	1374.9	1374.58	*-0.3*	1371.35	-3.6	3.2	1374.58	-0.3	0.0
T-43	1375.0	1376.66	*1.7*	1372.6	-2.4	4.1	1375.08	0.1	1.6
MH-6	1377.5	1379.9	*2.4*	1375.36	-2.1	4.5	1375.87	-1.6	4.0
MH-21	1382.6	1376.58	*-6.0*	1373.76	-8.8	2.8	1376.58	-6.0	0.0
T-39	1376.0	1375.55	*-0.5*	1371.93	-4.1	3.6	1375.55	-0.5	0.0

25-Yr Storm					Scenario 9: Projects 2B, 2A, & 1A			Scenario 10: Project 6	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1374.77	*0.9*	1373.5	-0.4	1.3	1374.77	0.9	0.0
MH-48	1374.9	1377.11	*2.2*	1374.84	-0.1	2.3	1377.11	2.2	0.0
T-43	1375.0	1377.45	*2.5*	1376.21	1.2	1.2	1377.45	2.5	0.0
MH-6	1377.5	1379.68	*2.2*	1378.52	1.0	1.2	1379.64	2.1	0.0
MH-21	1382.6	1380.32	*-2.3*	1378.05	-4.6	2.3	1380.32	-2.3	0.0
T-39	1376.0	1378.46	*2.5*	1376.19	0.2	2.3	1378.46	2.5	0.0

50-Yr Storm					Scenario 9: Projects 2B, 2A, & 1A			Scenario 10: Project 6	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1376.57	*2.7*	1375.59	1.7	1.0	1376.57	2.7	0.0
MH-48	1374.9	1377.41	*2.5*	1376.48	1.6	0.9	1377.41	2.5	0.0
T-43	1375.0	1378.29	*3.3*	1377.36	2.4	0.9	1378.29	3.3	0.0
MH-6	1377.5	1380.71	*3.2*	1379.81	2.3	0.9	1380.14	2.6	0.6
MH-21	1382.6	1381.43	*-1.2*	1380.5	-2.1	0.9	1381.43	-1.2	0.0
T-39	1376.0	1378.55	*2.5*	1377.62	1.6	0.9	1378.55	2.5	0.0

100-Yr Storm					Scenario 9: Projects 2B, 2A, & 1A			Scenario 10: Project 6	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1378.41	*4.5*	1377.06	3.2	1.4	1378.41	4.5	0.0
MH-48	1374.9	1379.25	*4.3*	1377.75	2.8	1.5	1379.25	4.3	0.0
T-43	1375.0	1379.25	*4.3*	1378.09	3.1	1.2	1379.59	4.6	-0.3
MH-6	1377.5	1380.56	*3.1*	1380.52	3.0	0.0	1381.38	3.9	-0.8
MH-21	1382.6	1384.88	*2.3*	1383.38	0.8	1.5	1384.88	2.3	0.0
T-39	1376.0	1380.6	*4.6*	1379.1	3.1	1.5	1380.6	4.6	0.0

LEWIS CREEK SCENARIOS

10-Yr Storm					Scenario 11: Project 7	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1372.27	*-1.6*	1369.21	-4.7	3.1
MH-48	1374.9	1374.58	*-0.3*	1370.32	-4.6	4.3
T-43	1375.0	1376.66	*1.7*	1372.4	-2.6	4.3
MH-6	1377.5	1379.9	*2.4*	1375.33	-2.2	4.6
MH-21	1382.6	1376.58	*-6.0*	1373.76	-8.8	2.8
T-39	1376.0	1375.55	*-0.5*	1371.21	-4.8	4.3

25-Yr Storm					Scenario 11: Project 7	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1374.77	*0.9*	1374.3	0.4	0.5
MH-48	1374.9	1377.11	*2.2*	1376.76	1.9	0.3
T-43	1375.0	1377.45	*2.5*	1377.11	2.1	0.3
MH-6	1377.5	1379.68	*2.2*	1379.35	1.8	0.3
MH-21	1382.6	1380.32	*-2.3*	1379.97	-2.6	0.3
T-39	1376.0	1378.46	*2.5*	1378.11	2.1	0.4

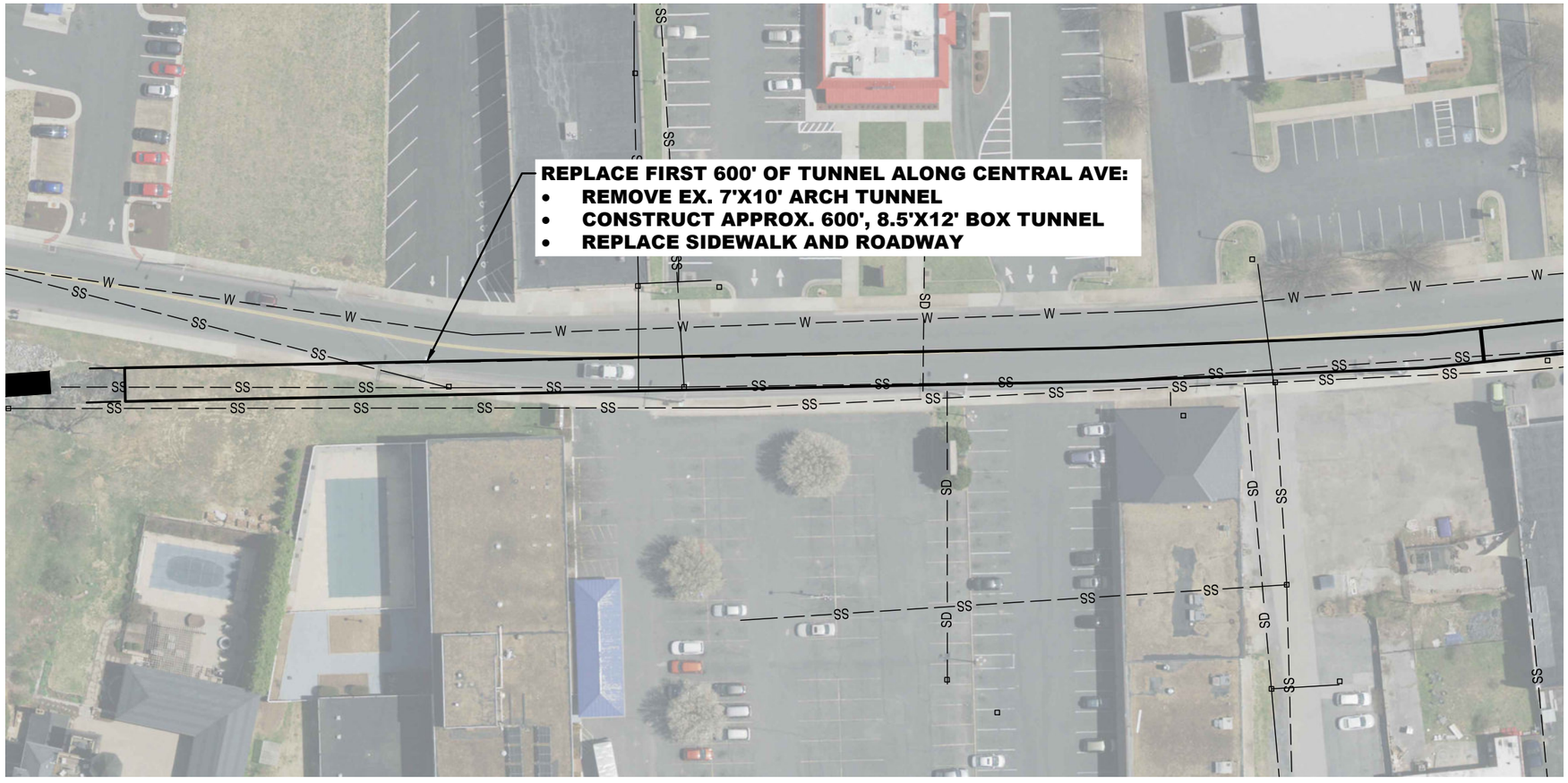
50-Yr Storm					Scenario 11: Project 7	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1376.57	*2.7*	1374.3	0.4	2.3
MH-48	1374.9	1377.41	*2.5*	1375.99	1.1	1.4
T-43	1375.0	1378.29	*3.3*	1376.87	1.9	1.4
MH-6	1377.5	1380.71	*3.2*	1379.34	1.8	1.4
MH-21	1382.6	1381.43	*-1.2*	1380.01	-2.6	1.4
T-39	1376.0	1378.55	*2.5*	1377.13	1.1	1.4

100-Yr Storm					Scenario 11: Project 7	
Manhole Location	Ex. Grade	EX HGL Elev.	*Existing HGL*	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1378.41	*4.5*	1376.32	2.4	2.1
MH-48	1374.9	1379.25	*4.3*	1377.16	2.3	2.1
T-43	1375.0	1379.25	*4.3*	1377.51	2.5	1.7
MH-6	1377.5	1380.56	*3.1*	1379.95	2.5	0.6
MH-21	1382.6	1384.88	*2.3*	1382.79	0.2	2.1
T-39	1376.0	1380.6	*4.6*	1378.51	2.5	2.1

APPENDIX G

PEYTON CREEK SCENARIO EXHIBITS

N



0 60' 120'

SCALE: 1" = 60'

Wiley|Wilson Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 3A

COMM. NO. 220184

DRAWN | CHECKED

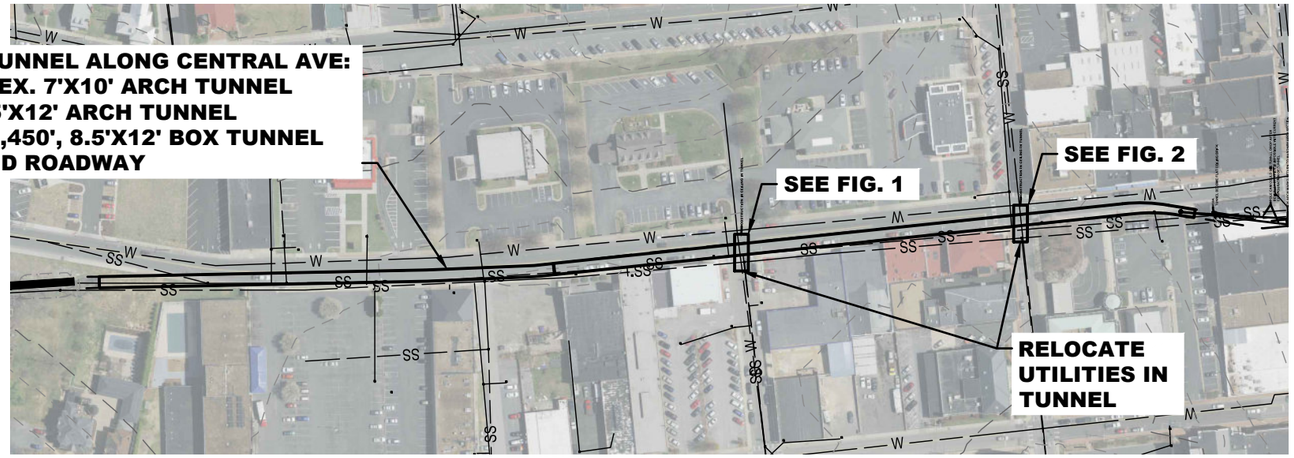
SKETCH NO. SK-03A

DWG. REFERENCE NO.

DATE: | REV.

REPLACE FIRST 1,450' OF TUNNEL ALONG CENTRAL AVE:

- **REMOVE FIRST 600' OF EX. 7'X10' ARCH TUNNEL**
- **REMOVE 850' OF EX. 8.5'X12' ARCH TUNNEL**
- **CONSTRUCT APPROX. 1,450', 8.5'X12' BOX TUNNEL**
- **REPLACE SIDEWALK AND ROADWAY**



PLAN VIEW



FIGURE 1: AT BALDWIN ST



FIGURE 2: AT FREDERICK ST

0 200' 400'

SCALE: 1" = 200'

Wiley|Wilson Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 3B

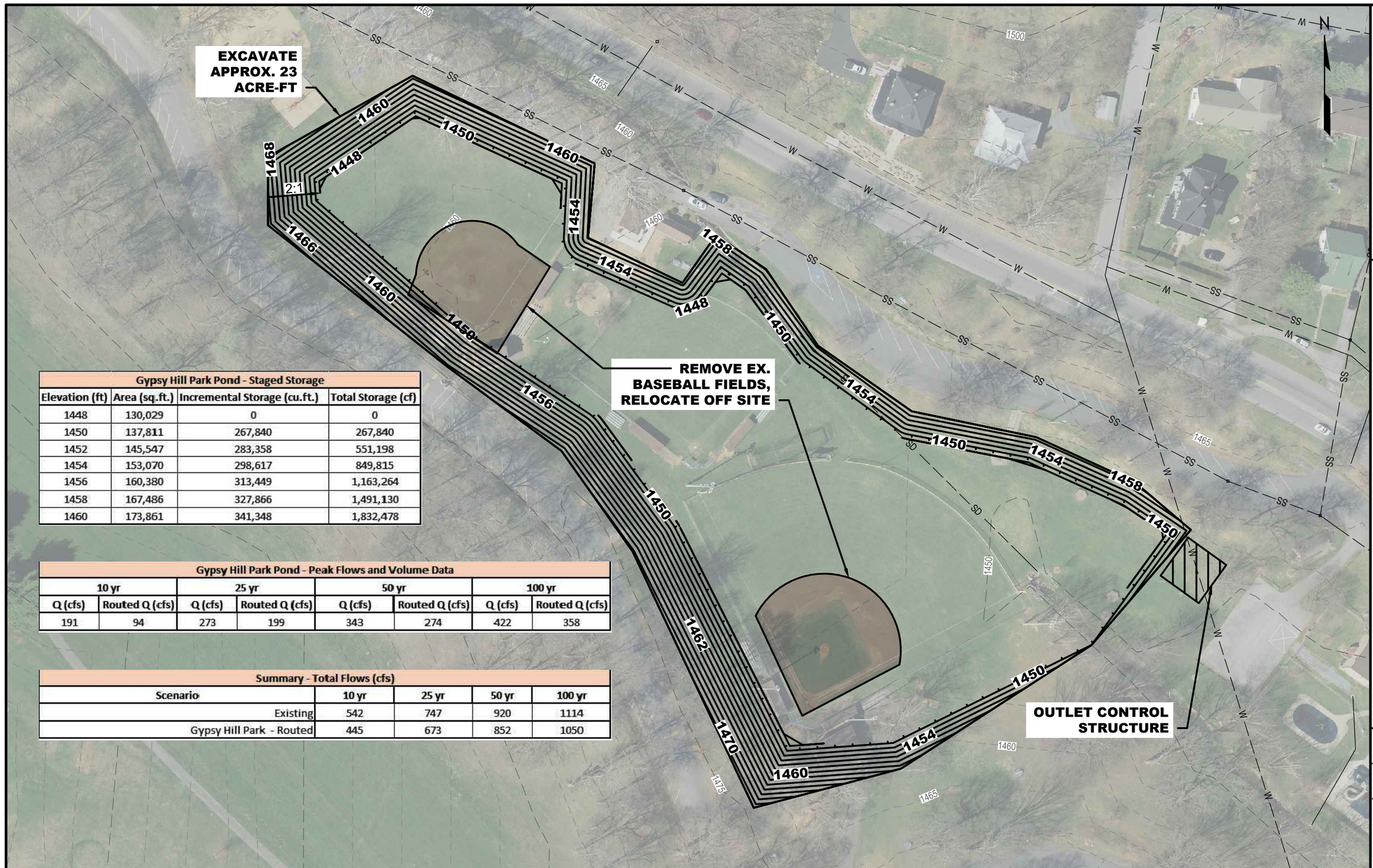
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-03B

DWG. REFERENCE NO.

DATE: | REV.



Gypsy Hill Park Pond - Staged Storage			
Elevation (ft)	Area (sq.ft.)	Incremental Storage (cu.ft.)	Total Storage (cf)
1448	130,029	0	0
1450	137,811	267,840	267,840
1452	145,547	283,358	551,198
1454	153,070	298,617	849,815
1456	160,380	313,449	1,163,264
1458	167,486	327,866	1,491,130
1460	173,861	341,348	1,832,478

Gypsy Hill Park Pond - Peak Flows and Volume Data							
10 yr		25 yr		50 yr		100 yr	
Q (cfs)	Routed Q (cfs)	Q (cfs)	Routed Q (cfs)	Q (cfs)	Routed Q (cfs)	Q (cfs)	Routed Q (cfs)
191	94	273	199	343	274	422	358

Summary - Total Flows (cfs)				
Scenario	10 yr	25 yr	50 yr	100 yr
Existing	542	747	920	1114
Gypsy Hill Park - Routed	445	673	852	1050

0 80' 160'

SCALE: 1" = 80'

Wiley|Wilson Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 4A

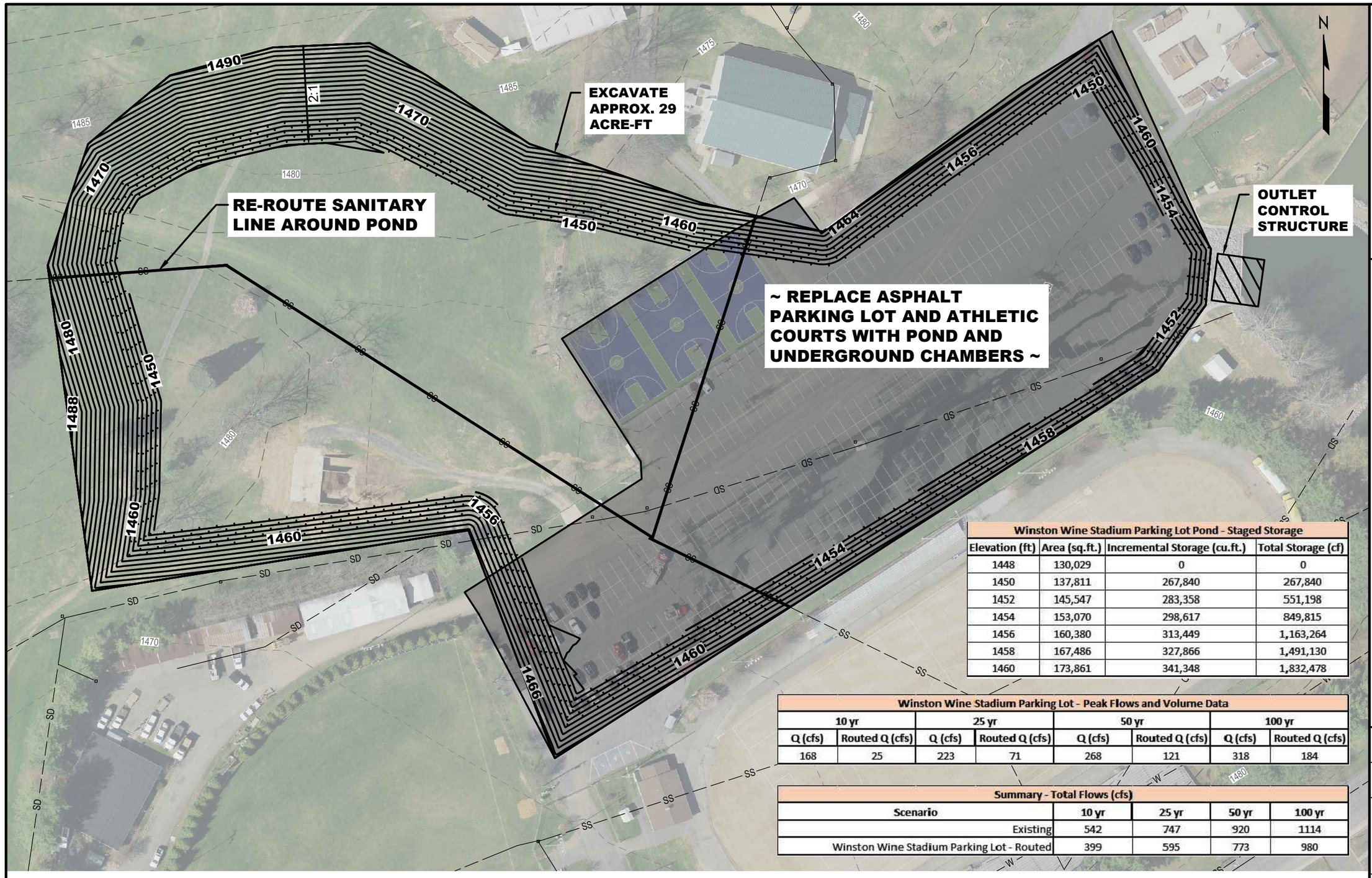
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-04A

DWG. REFERENCE NO.

DATE: | REV.



Winston Wine Stadium Parking Lot Pond - Staged Storage

Elevation (ft)	Area (sq.ft.)	Incremental Storage (cu.ft.)	Total Storage (cf)
1448	130,029	0	0
1450	137,811	267,840	267,840
1452	145,547	283,358	551,198
1454	153,070	298,617	849,815
1456	160,380	313,449	1,163,264
1458	167,486	327,866	1,491,130
1460	173,861	341,348	1,832,478

Winston Wine Stadium Parking Lot - Peak Flows and Volume Data

10 yr		25 yr		50 yr		100 yr	
Q (cfs)	Routed Q (cfs)	Q (cfs)	Routed Q (cfs)	Q (cfs)	Routed Q (cfs)	Q (cfs)	Routed Q (cfs)
168	25	223	71	268	121	318	184

Summary - Total Flows (cfs)

Scenario	10 yr	25 yr	50 yr	100 yr
Existing	542	747	920	1114
Winston Wine Stadium Parking Lot - Routed	399	595	773	980

Wiley|Wilson
Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT4B

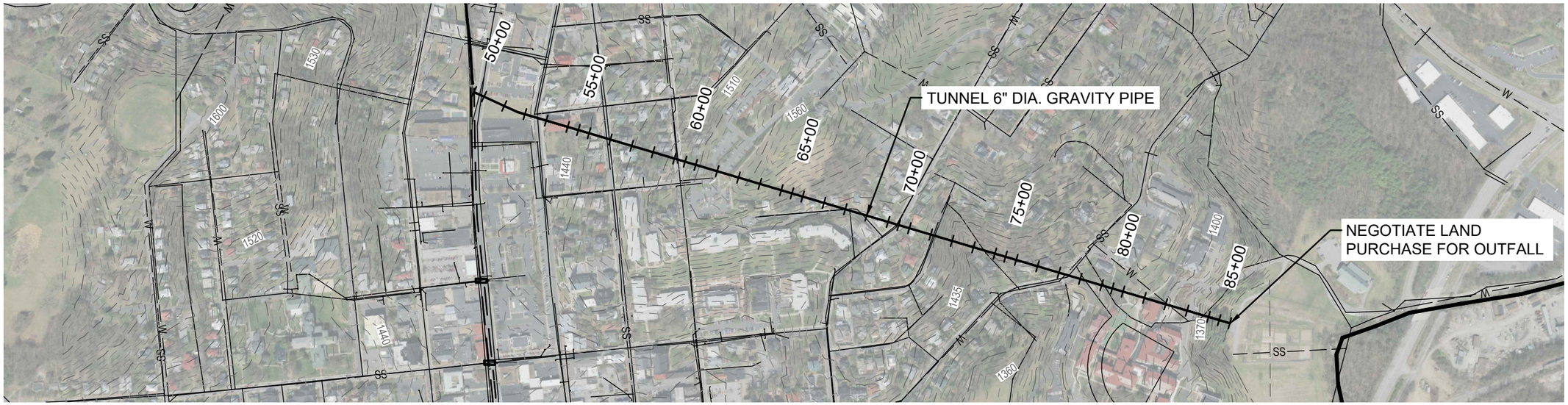
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-04B

DWG. REFERENCE NO.

DATE: | REV.



PLAN VIEW

N

0 500' 1000

SCALE: 1" = 500'

Wiley|Wilson Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 5

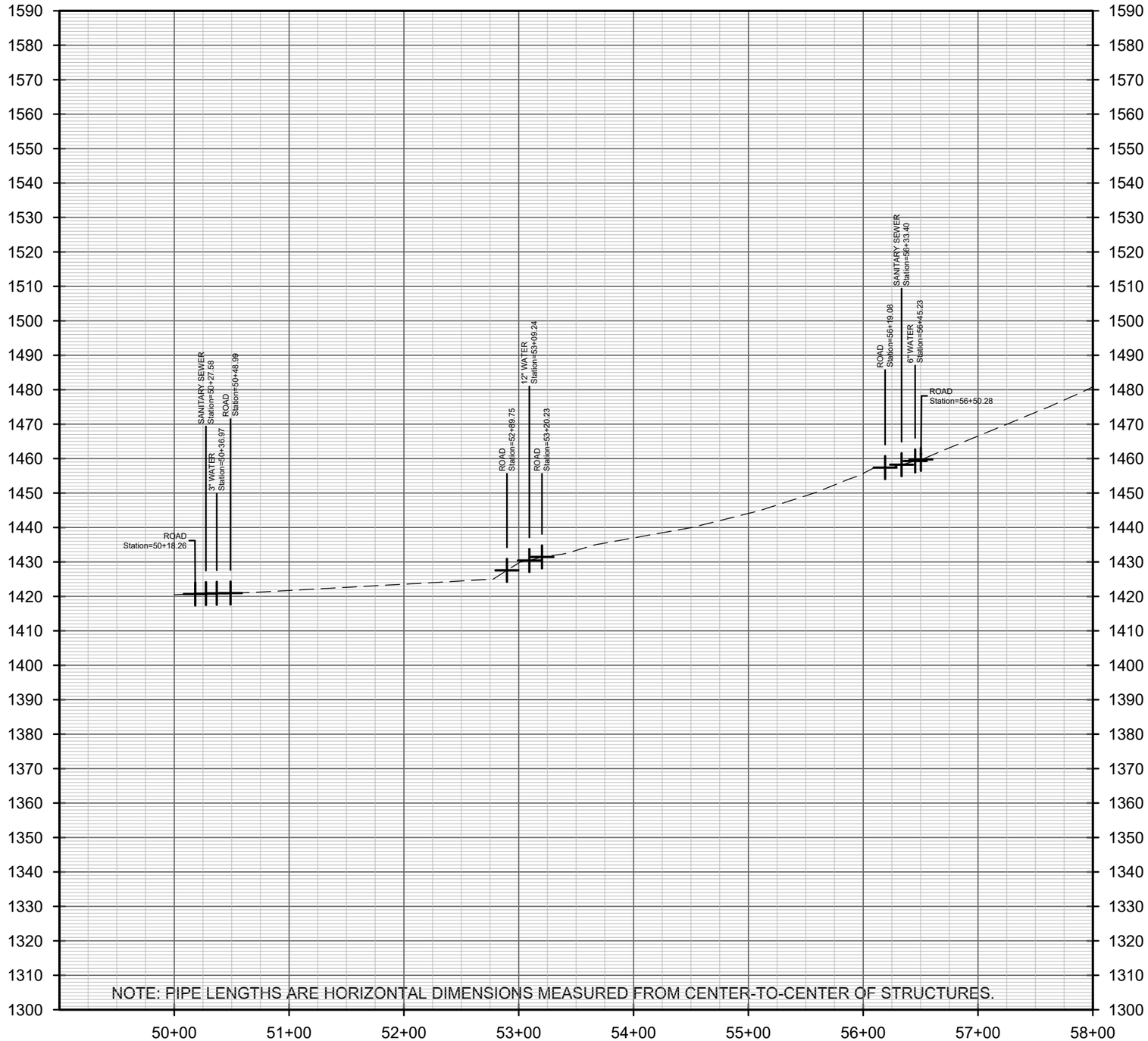
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-05A

DWG. REFERENCE NO.

DATE: | REV.



PROJ 5 - STA 49 TO STA 58

0 100' 200'

SCALE: 1" = 100'

Wiley|Wilson
Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 5

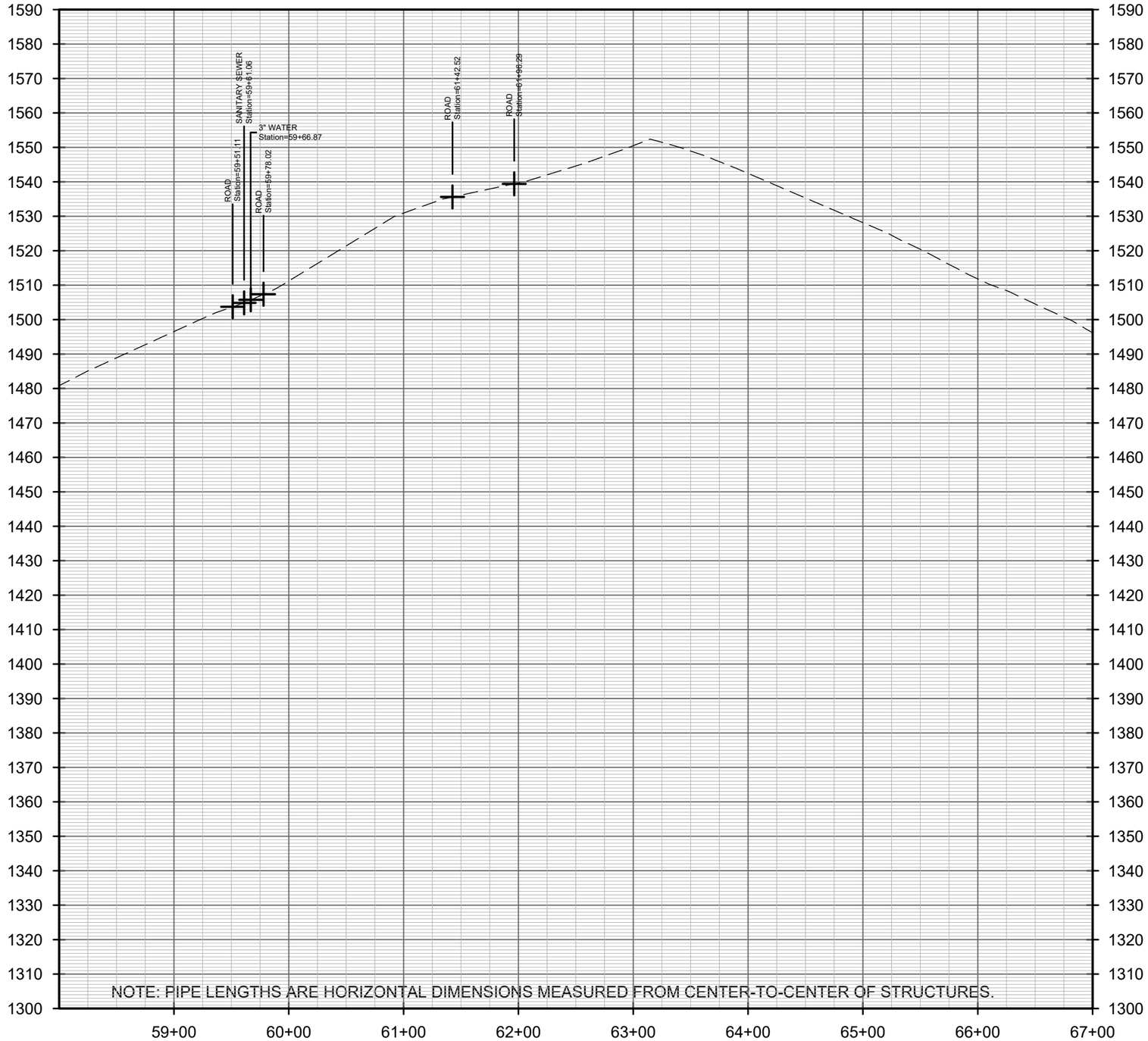
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-05B

DWG. REFERENCE NO.

DATE: | REV.



PROJ 5 - STA 58 TO STA 67

0 100' 200'

SCALE: 1" = 100'

Wiley|Wilson
Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 5

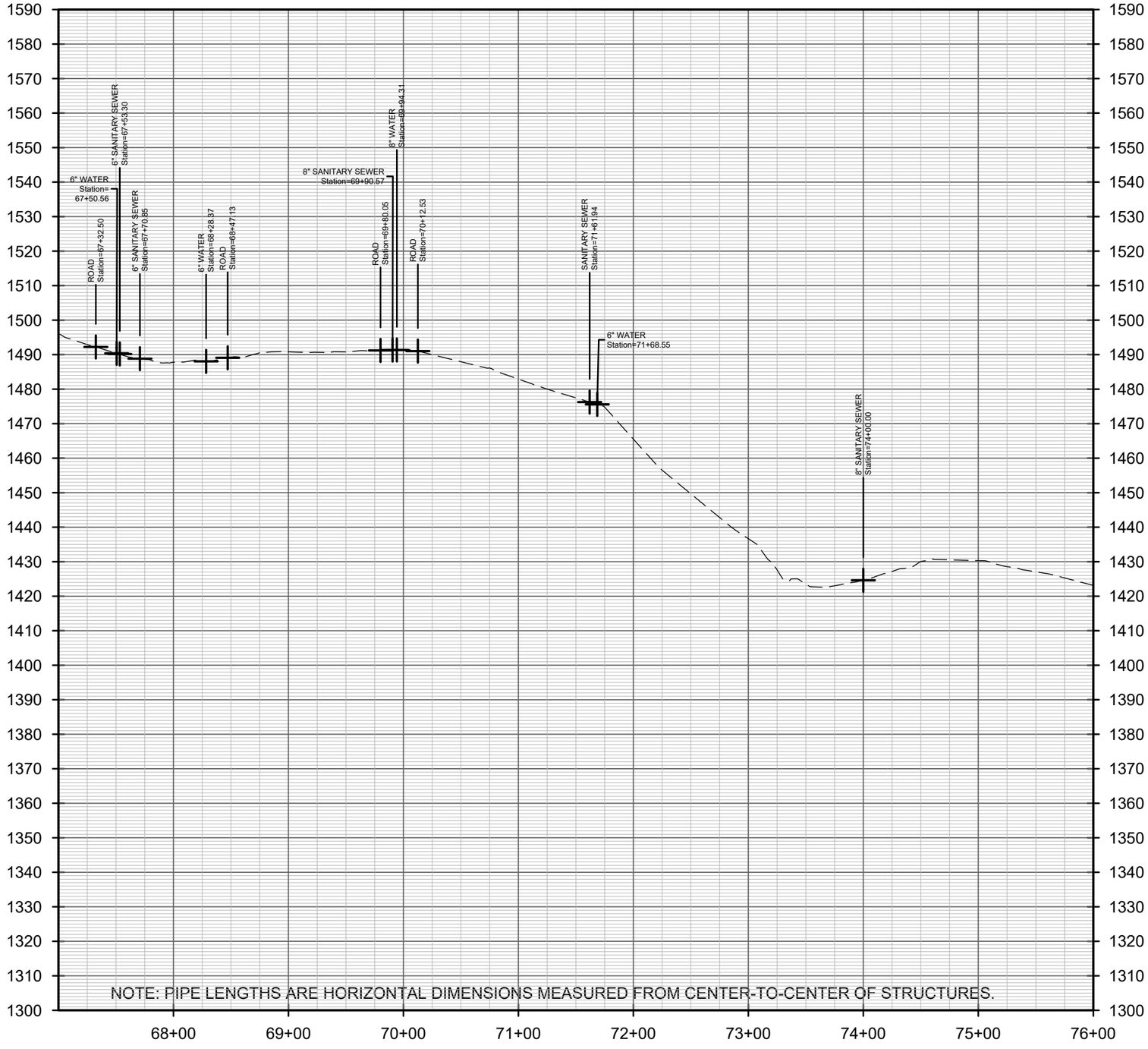
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-05C

DWG. REFERENCE NO.

DATE: | REV.



PROJ 5 - STA 67 TO STA 76

0 100' 200'

SCALE: 1" = 100'

Wiley|Wilson
Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 5

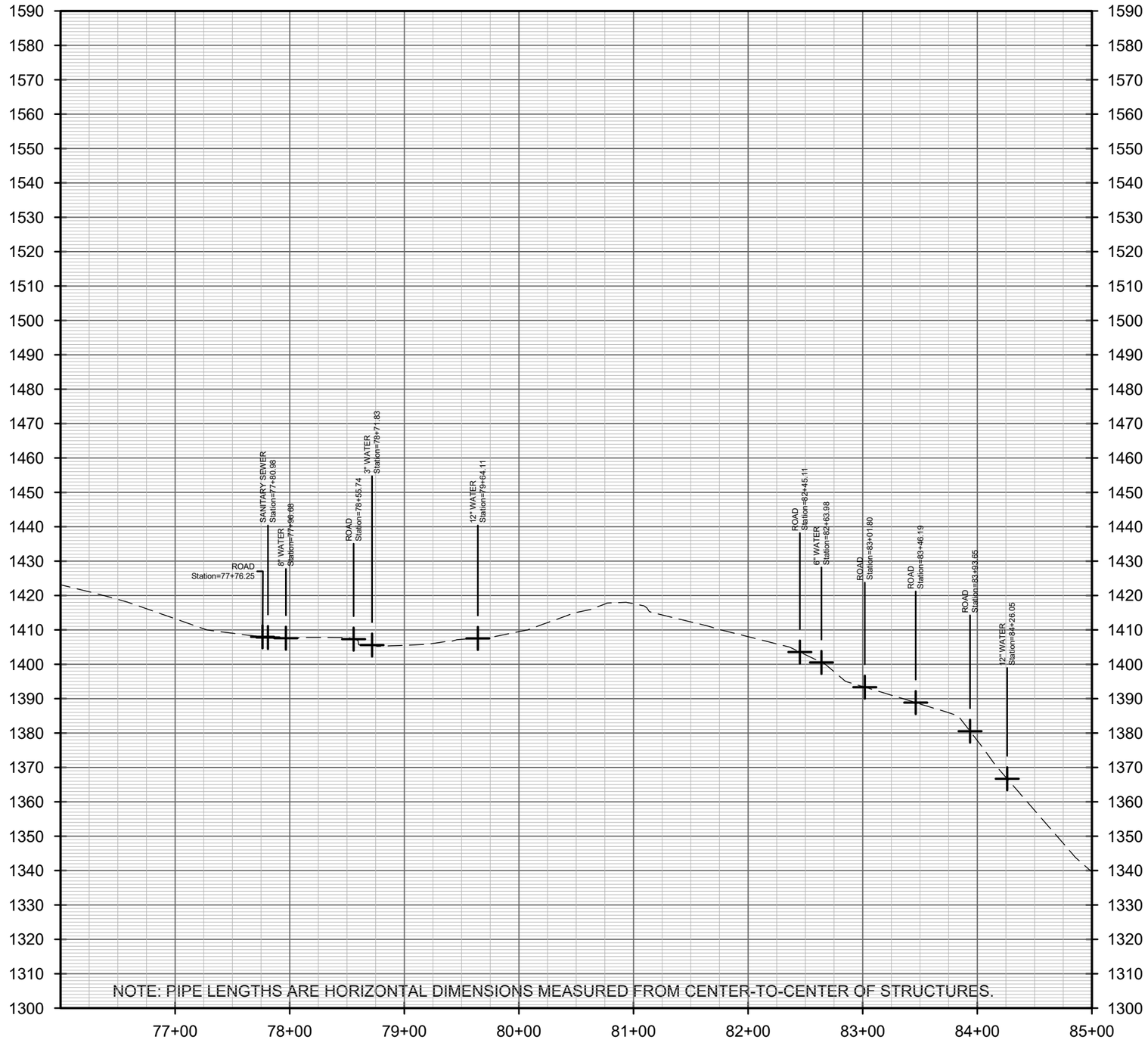
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-05D

DWG. REFERENCE NO.

DATE: | REV.



PROJ 5 - STA 76 TO STA 85

0 100' 200'

SCALE: 1" = 100'

Wiley|Wilson Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 5

COMM. NO. 220184

DRAWN | CHECKED

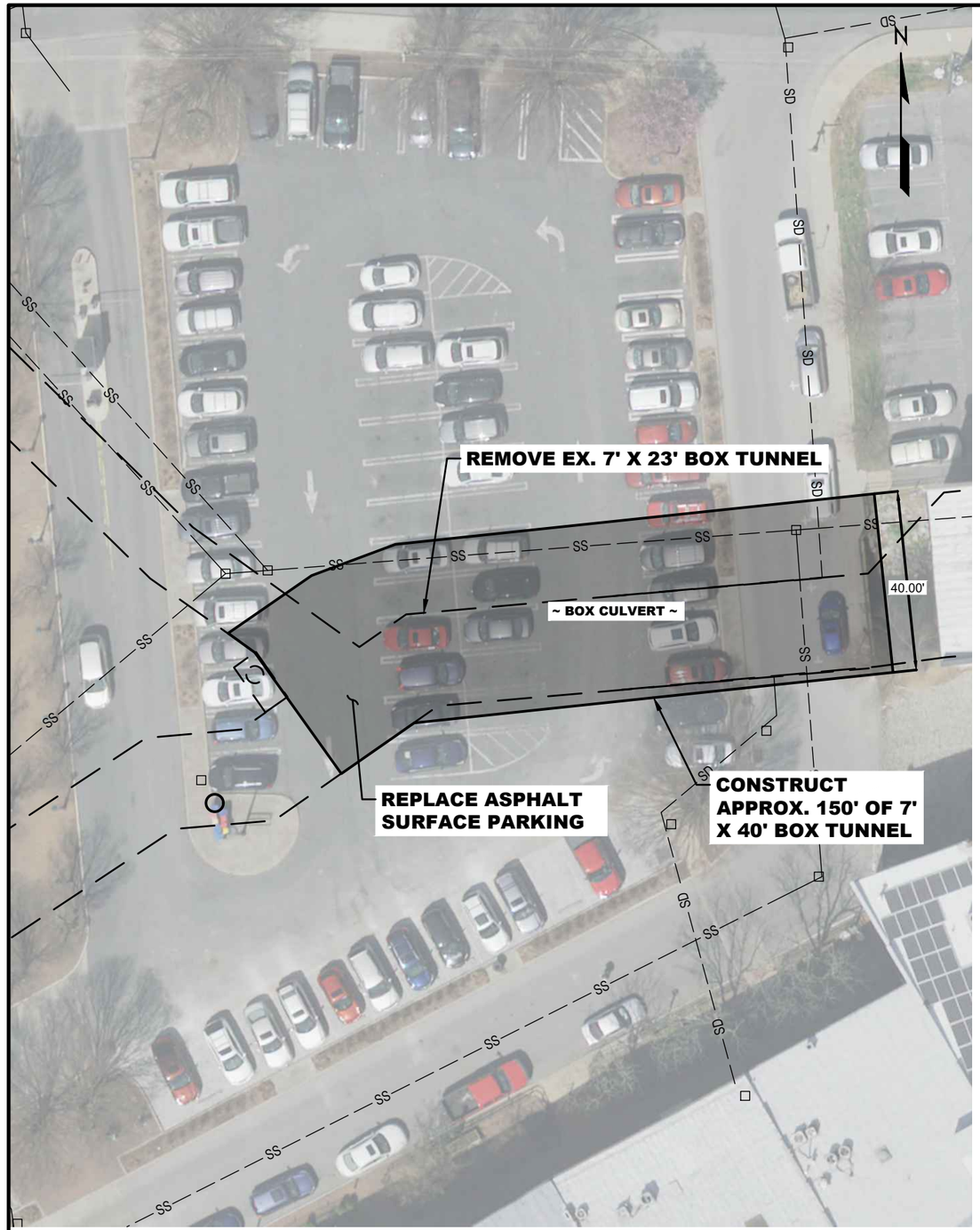
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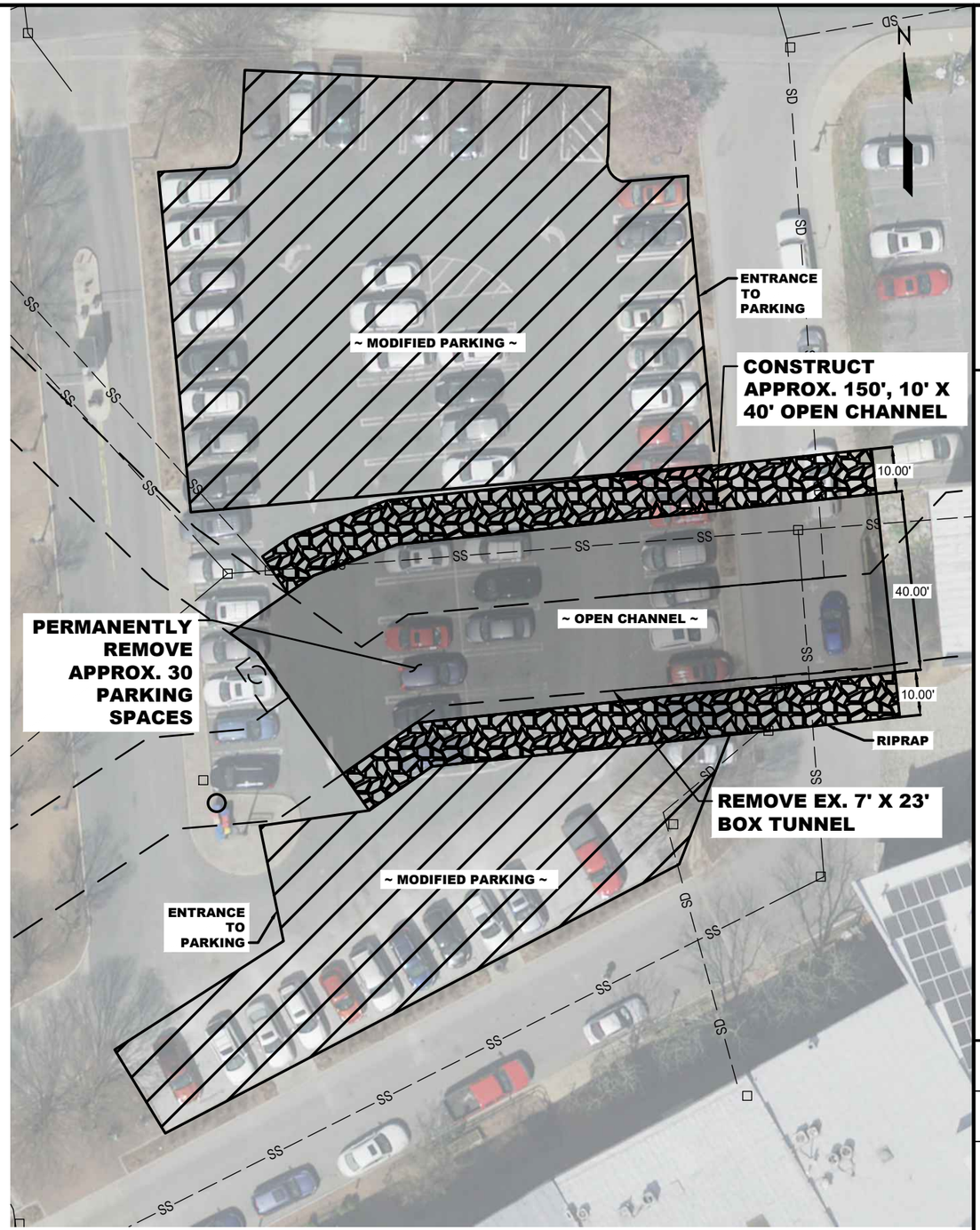
DATE: | REV.

APPENDIX H

LEWIS CREEK SCENARIO EXHIBITS



PROJECT 1A: BOX CULVERT



PROJECT 1B: OPEN CHANNEL

0 30' 60'

SCALE: 1" = 30'

Wiley|Wilson
Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 1

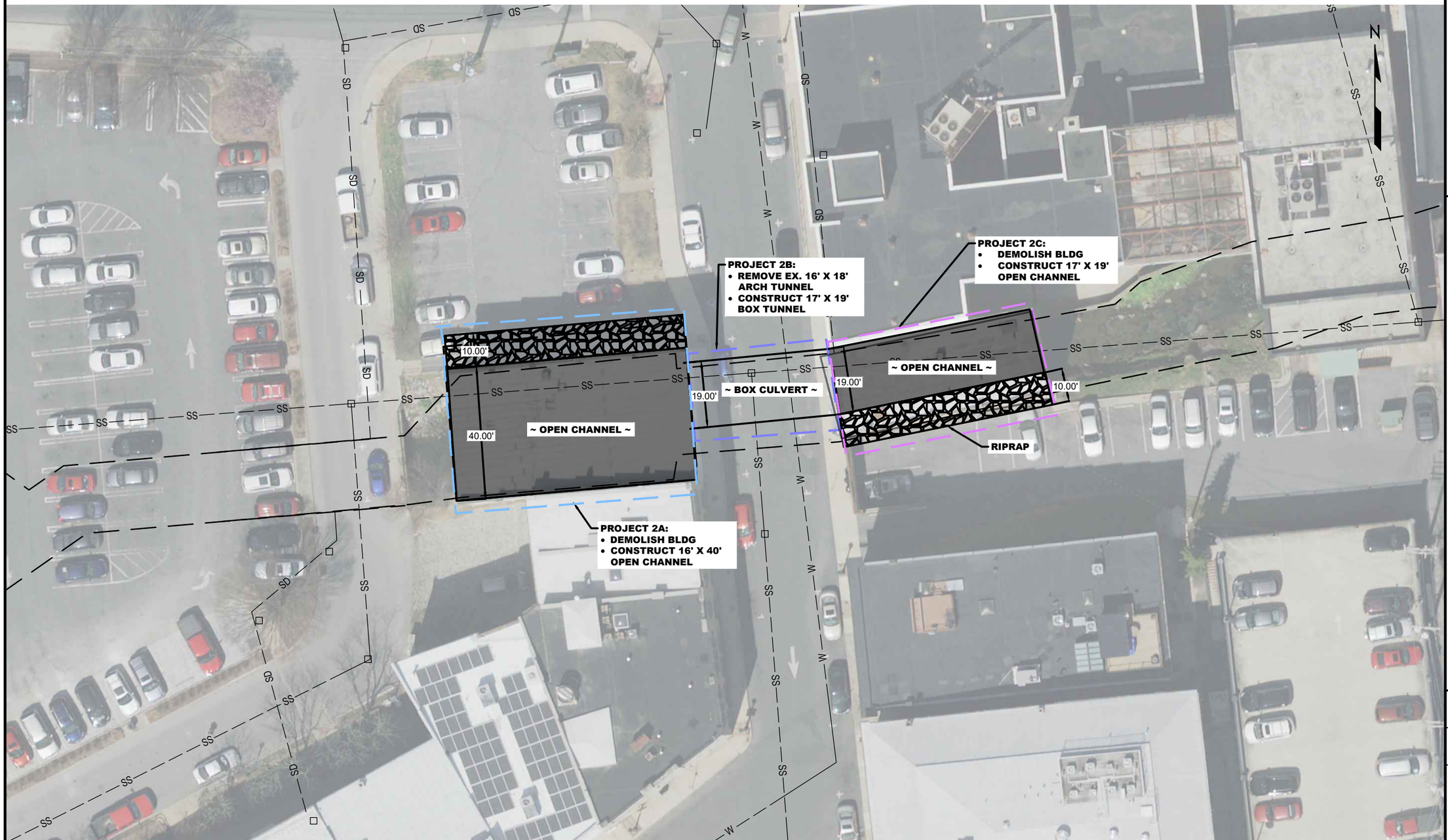
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-01

DWG. REFERENCE NO.

DATE: | REV.



Wiley|Wilson
Constant Progress

PROJECT
STAUNTON FLOOD STUDY

TITLE
PROJECT 2

COMM. NO.
220184

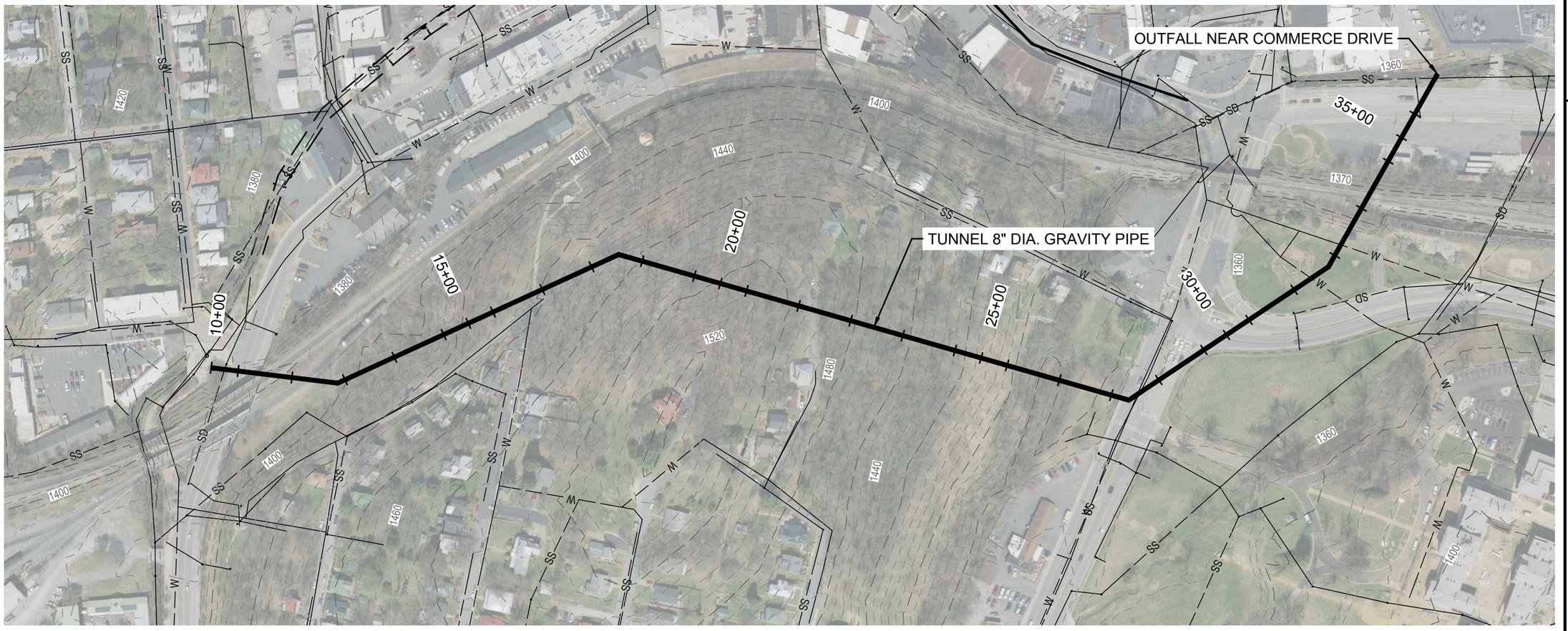
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SKETCH NO.

SK-02

DWG. REFERENCE NO.

DATE:	REV.



PLAN VIEW

Wiley|Wilson
Constant Progress

PROJECT
STAUNTON FLOOD STUDY

TITLE
PROJECT 6

COMM. NO.
220184

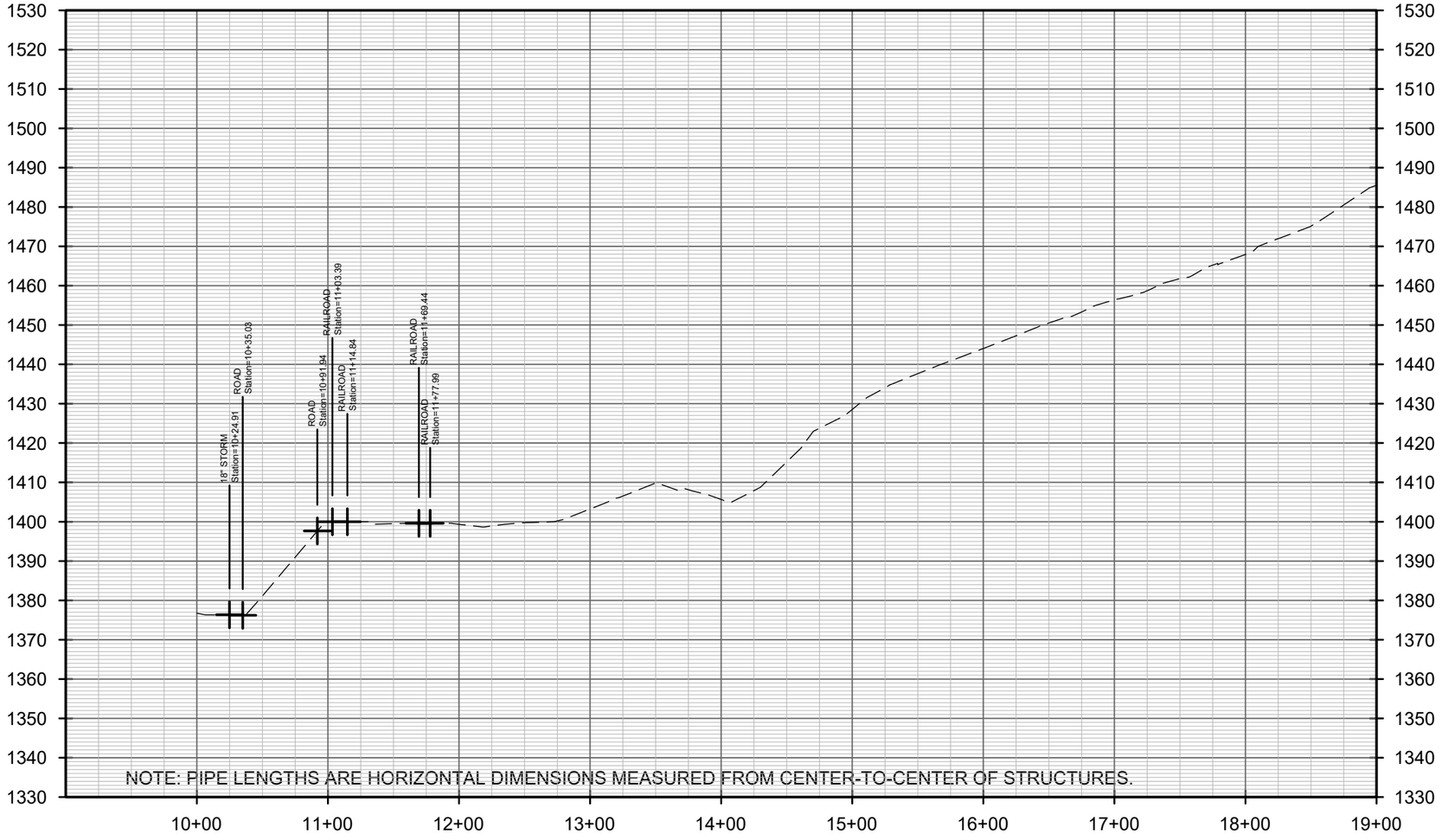
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SKETCH NO.

SK-06A

DWG. REFERENCE NO.

DATE:	REV.



PROJ 6 - STA 9 TO STA 19

0 100' 200'

SCALE: 1" = 100'

Wiley|Wilson
Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 6

COMM. NO. 220184

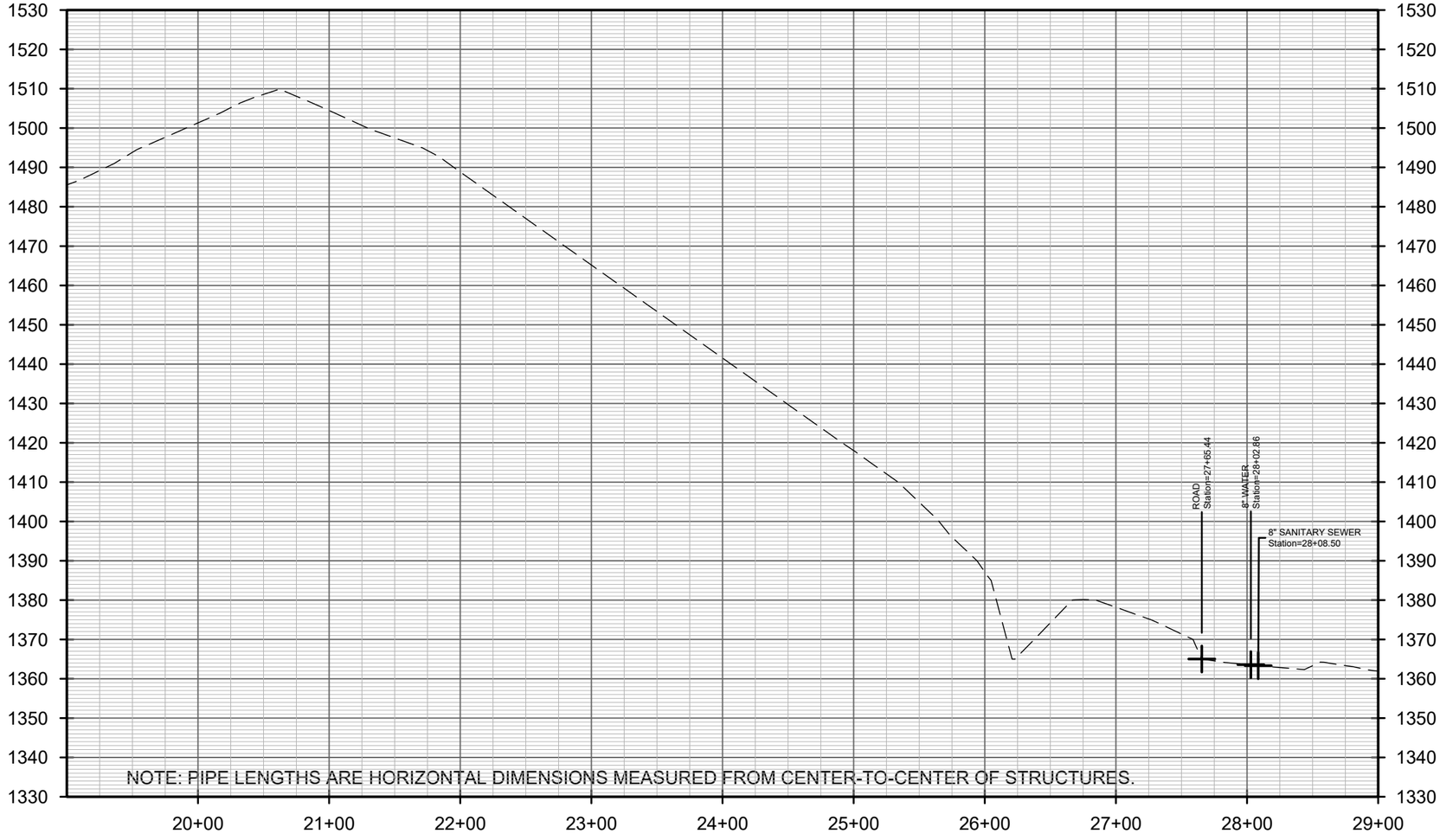
DRAWN | CHECKED

SKETCH NO.

SK-06B

DWG. REFERENCE NO.

DATE: | REV.



PROJ 6 - STA 19 TO STA 29

0 100' 200'

SCALE: 1" = 100'

Wiley|Wilson
Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 6

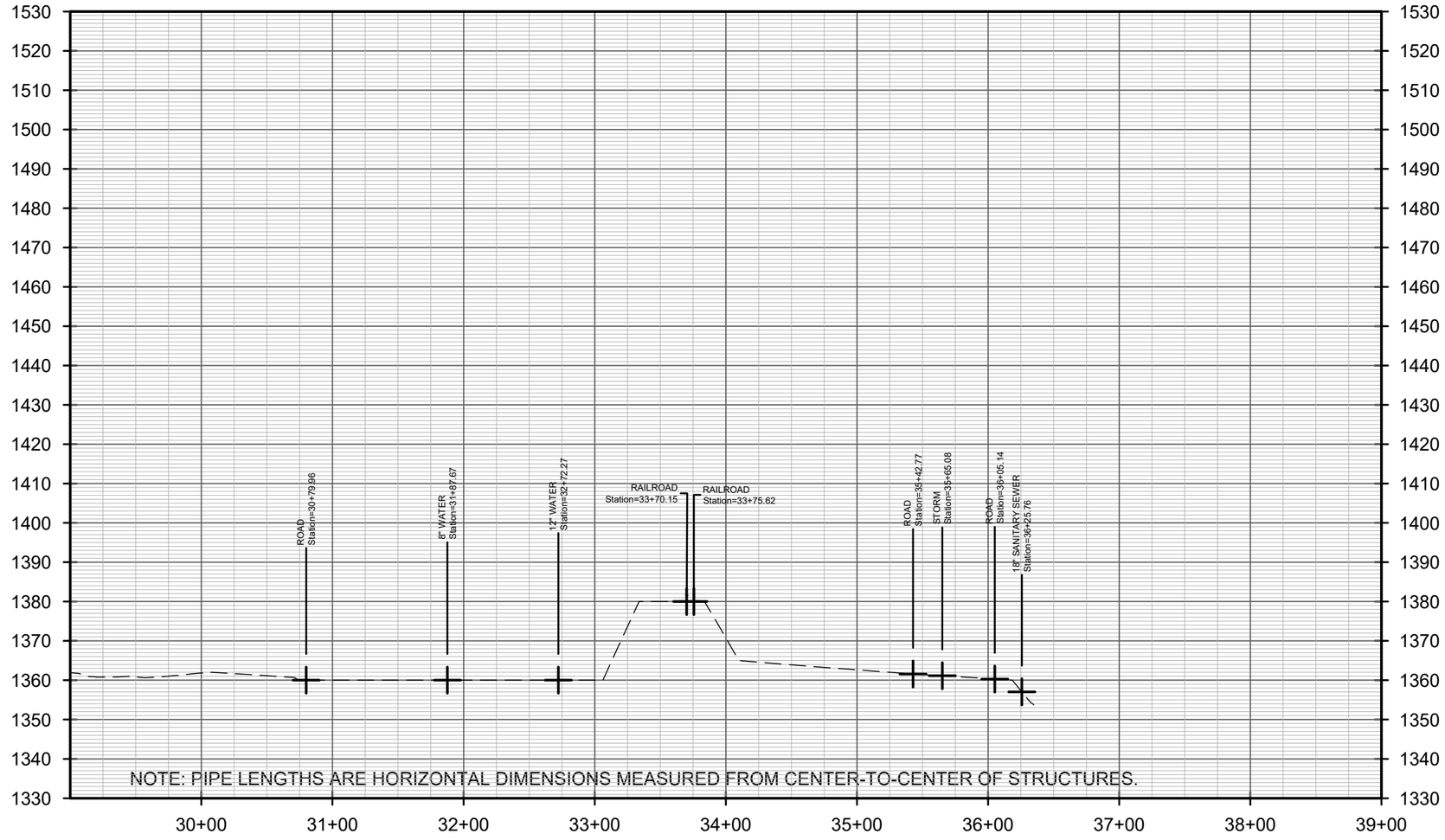
COMM. NO. 220184

DRAWN | CHECKED

SKETCH NO. SK-06C

DWG. REFERENCE NO.

DATE: | REV.



PROJ 6 - STA 29 TO STA 39

0 100' 200'

SCALE: 1" = 100'

Wiley|Wilson
Constant Progress

PROJECT: STAUNTON FLOOD STUDY

TITLE: PROJECT 6

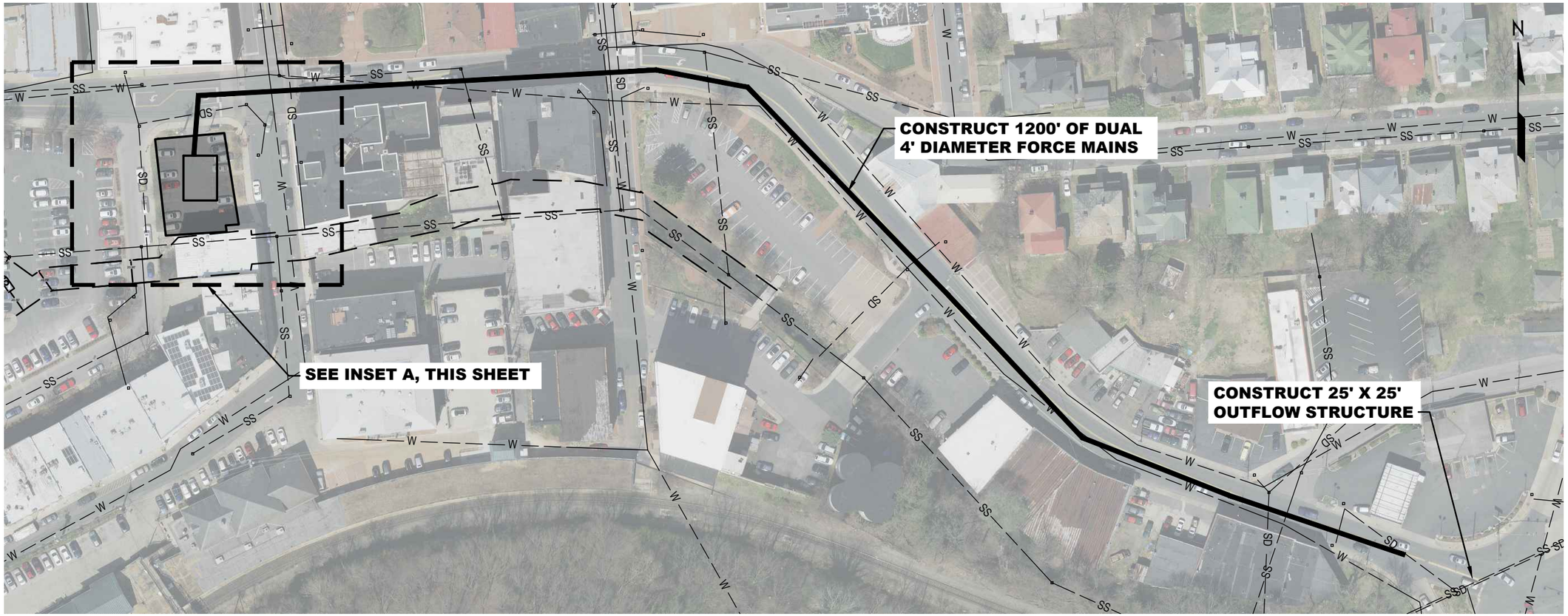
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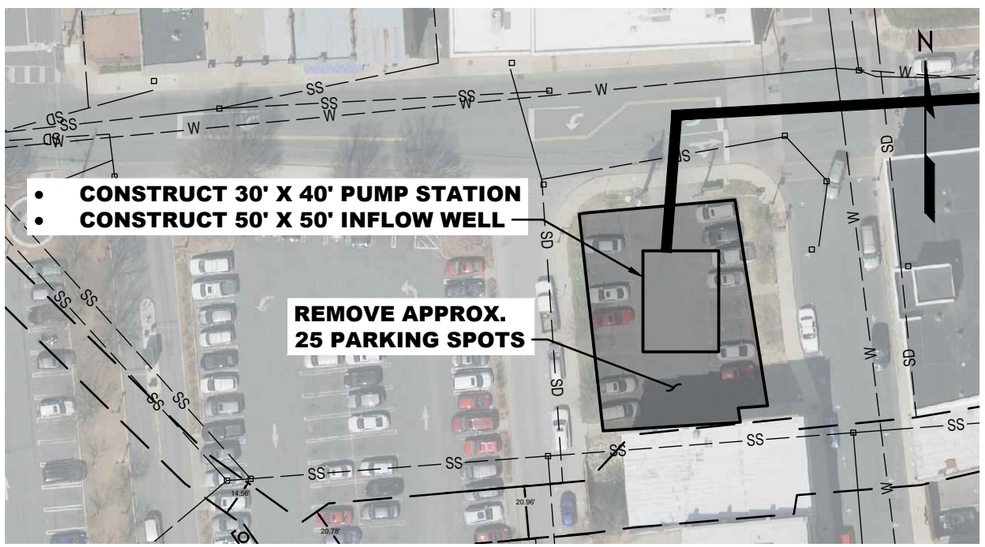
DRAWN | CHECKED

SKETCH NO. SK-06D

DWG. REFERENCE NO.

DATE: | REV.





INSET A

Wiley|Wilson
Constant Progress

PROJECT
STAUNTON FLOOD STUDY

TITLE
PROJECT 7

COMM. NO.
220184

DRAWN | CHECKED

SKETCH NO.
SK-07

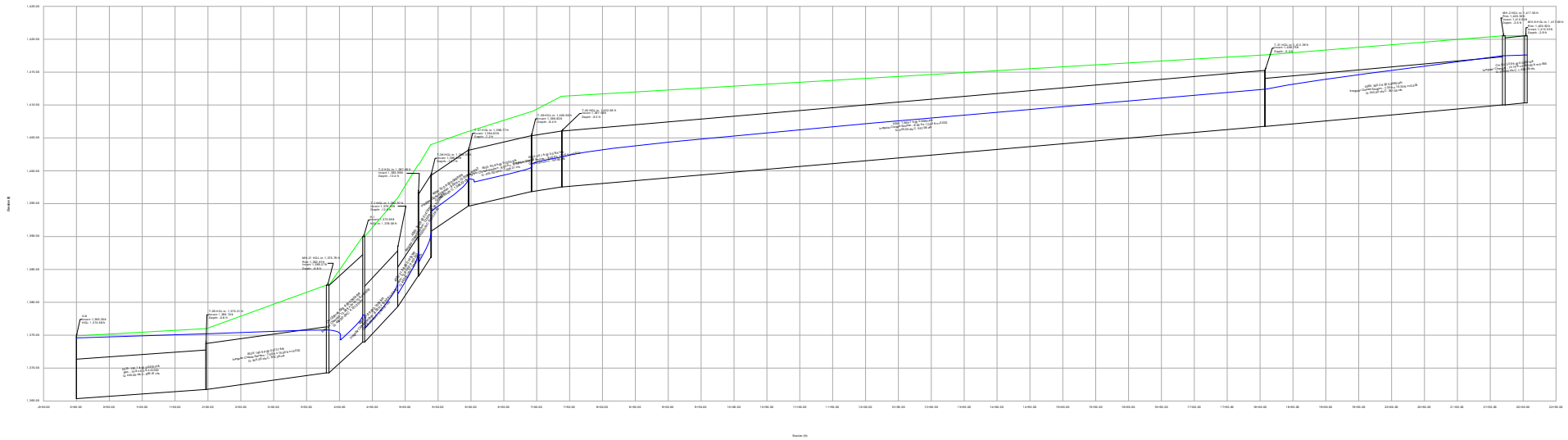
DWG. REFERENCE NO.

DATE: | REV.

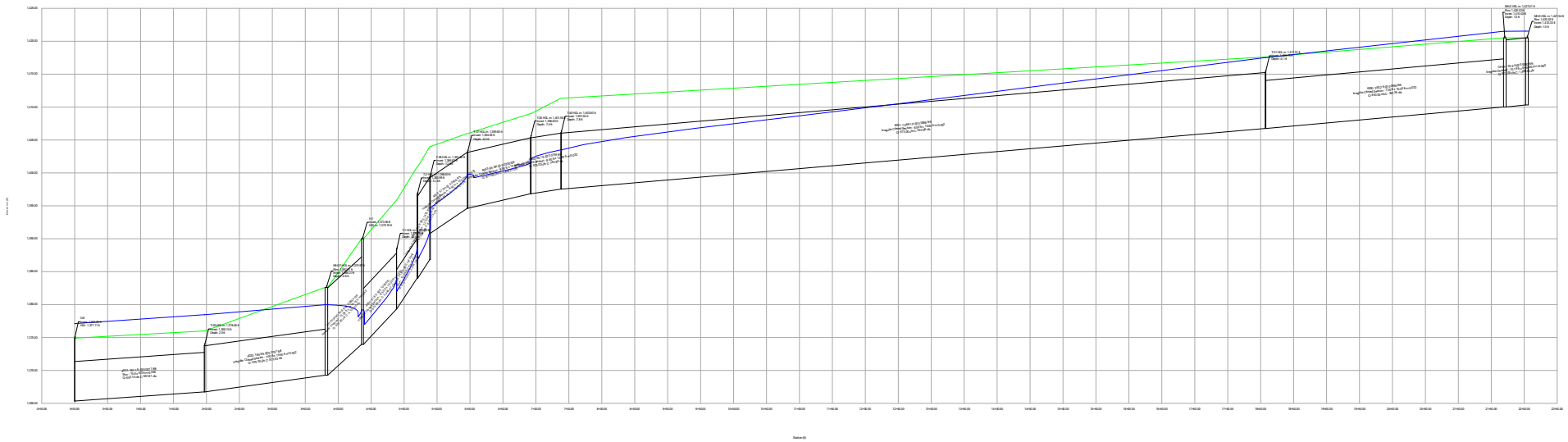
APPENDIX I

PEYTON CREEK SCENARIO PROFILES

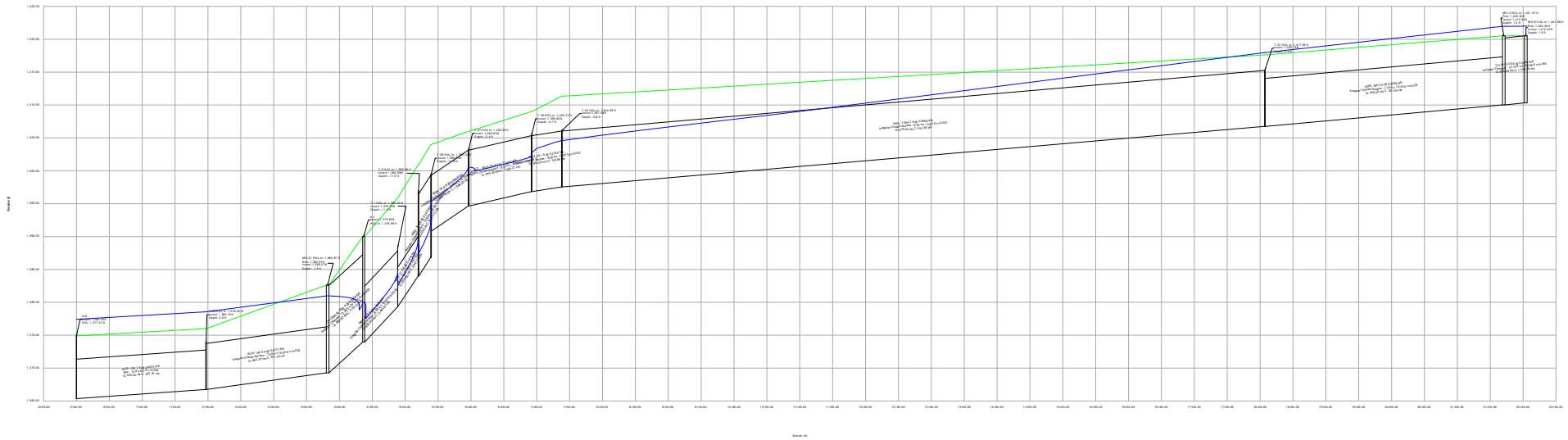
Profile Report
Engineering Profile - Project 4A - 10-yr (220184A19_Model_Design.stsw)



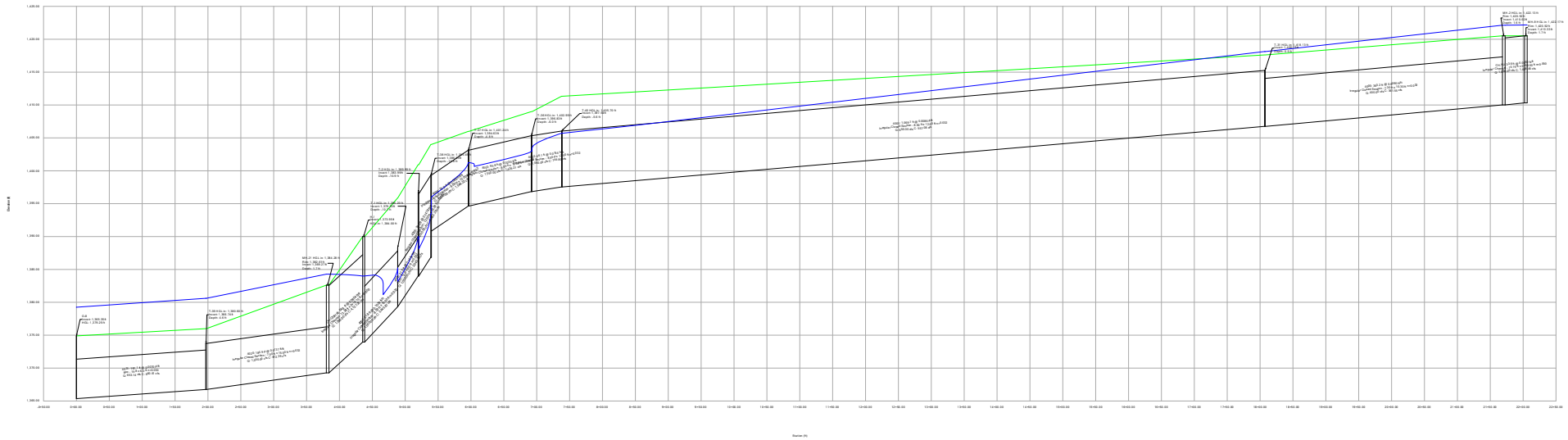
Profile Report
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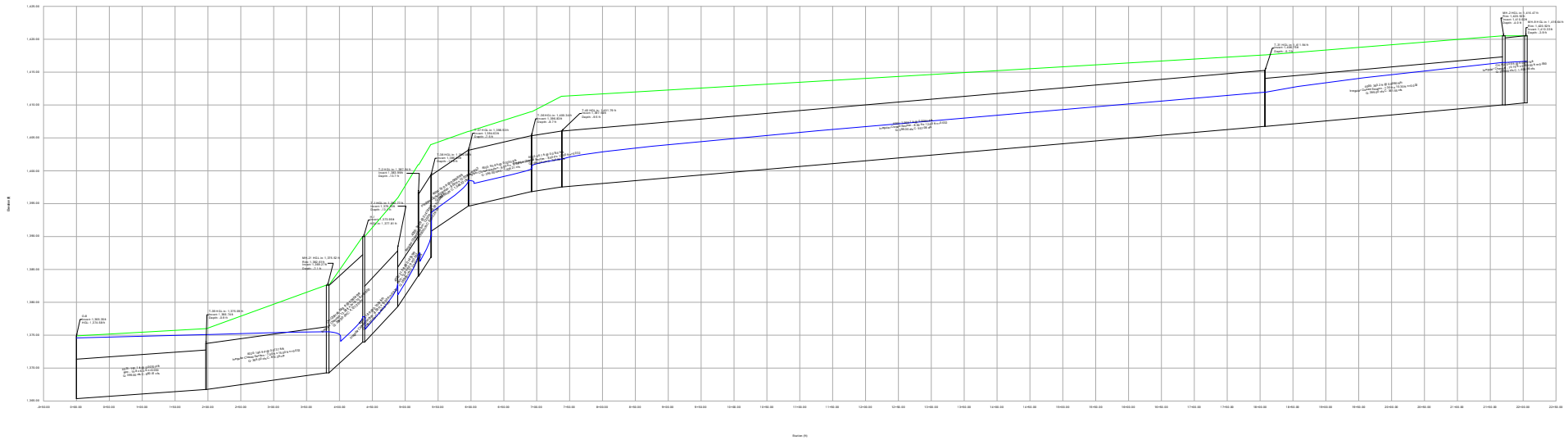
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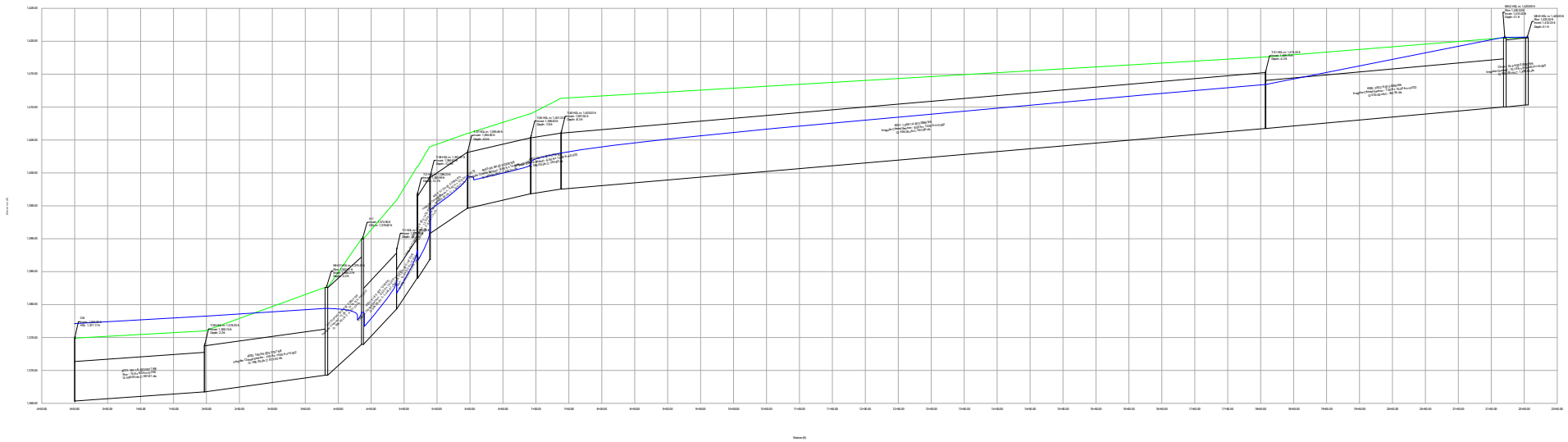
Profile Report
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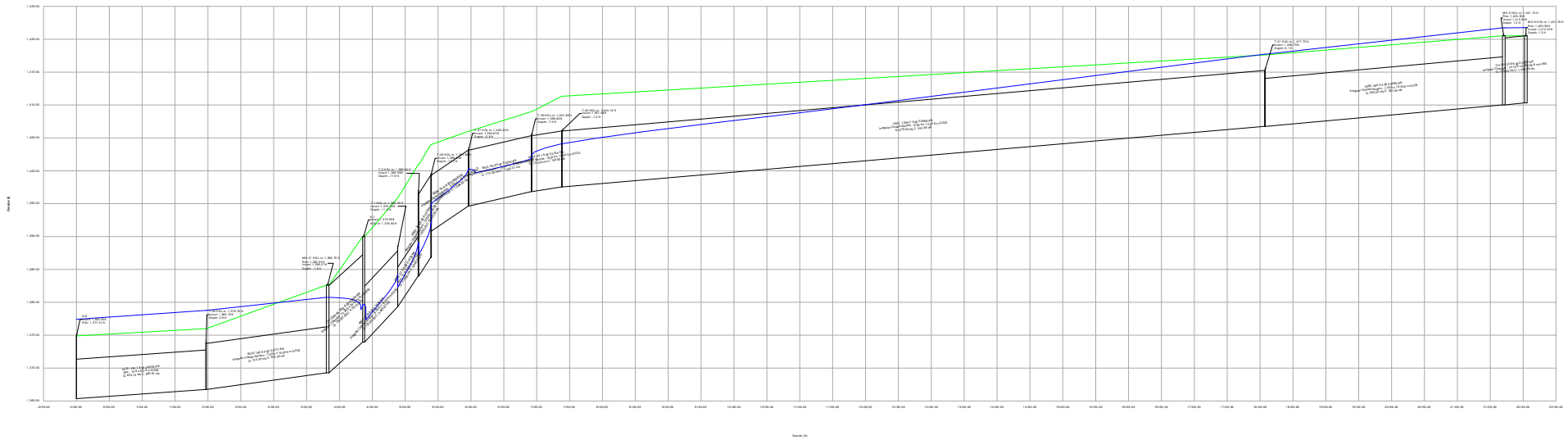
Profile Report
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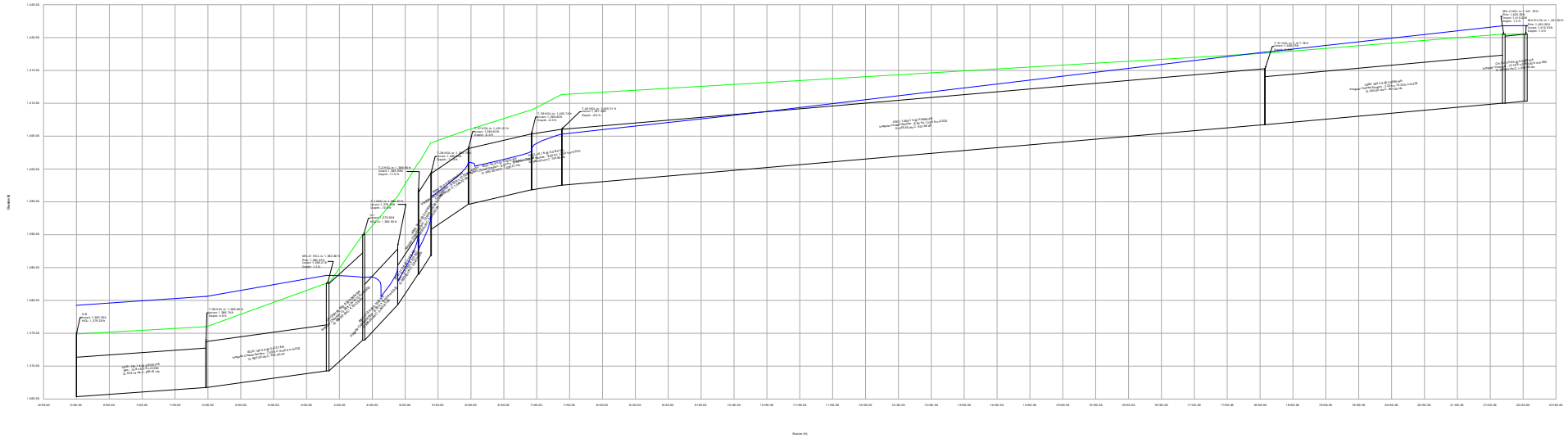
Profile Report
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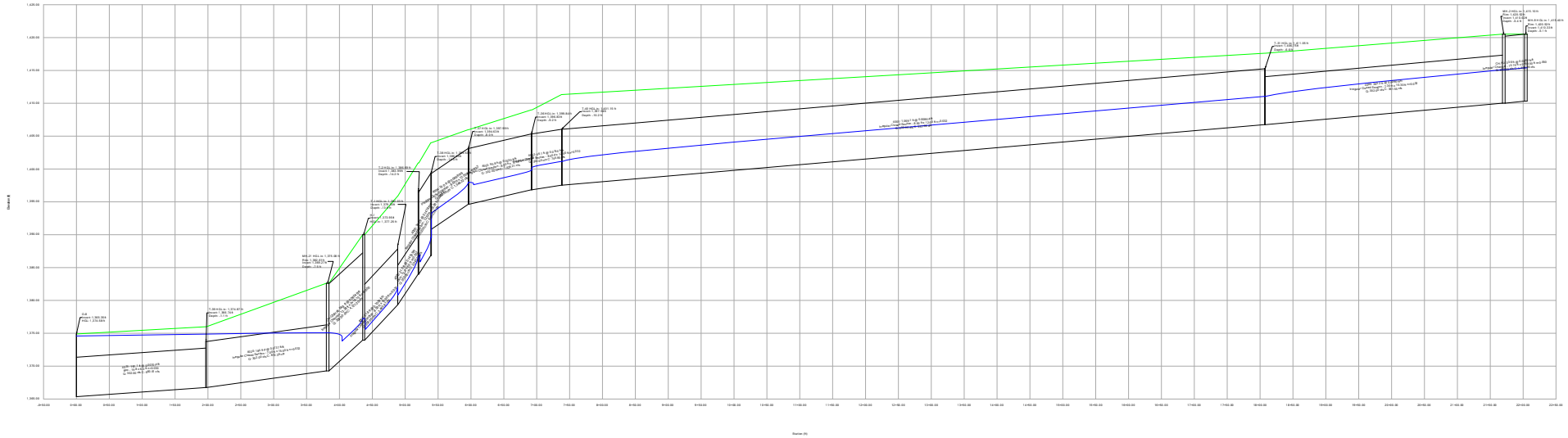
Profile Report
Engineering Profile - Project 4B - 50-yr (220184A19_Model_Design.stsw)



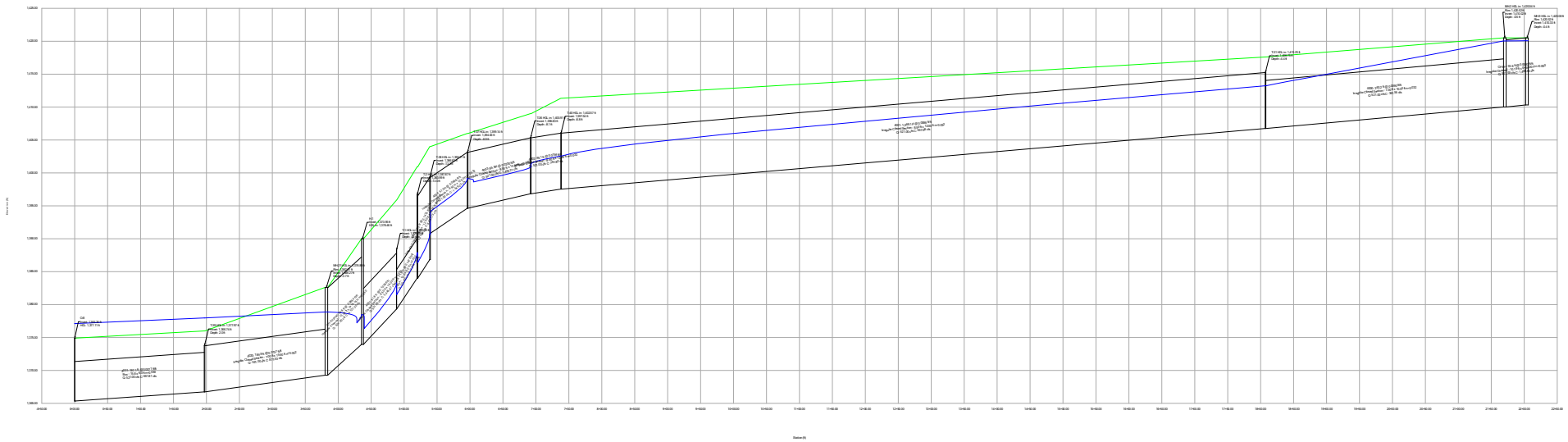
Profile Report
Engineering Profile - Project 4B - 100-yr (220184A19_Model_Design.stsw)



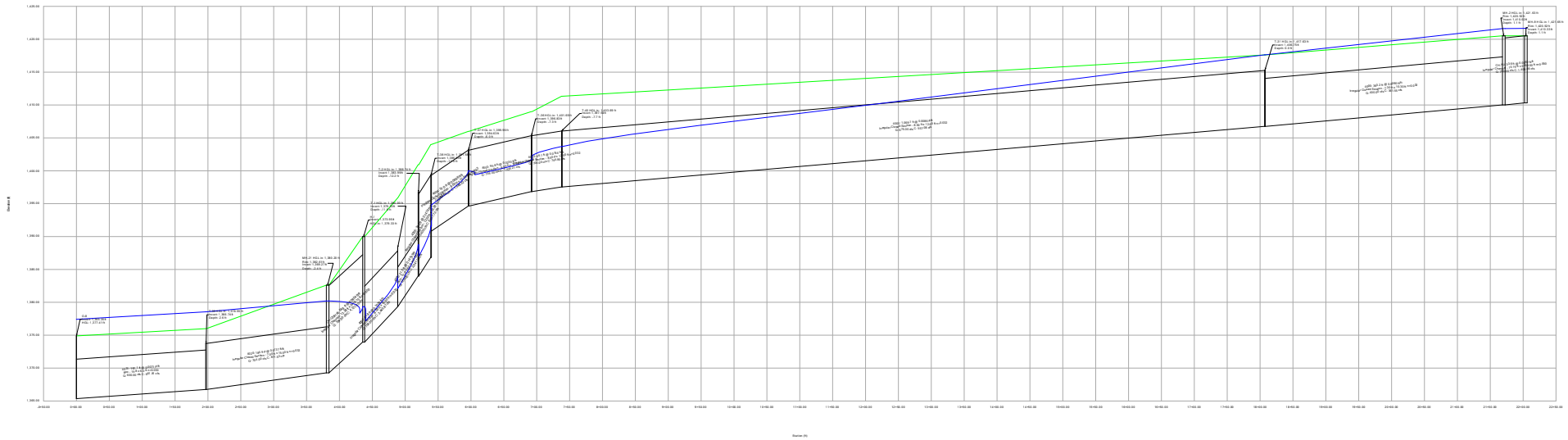
Profile Report
Engineering Profile - Project 4A+B - 10-yr (220184A19_Model_Design.stsw)



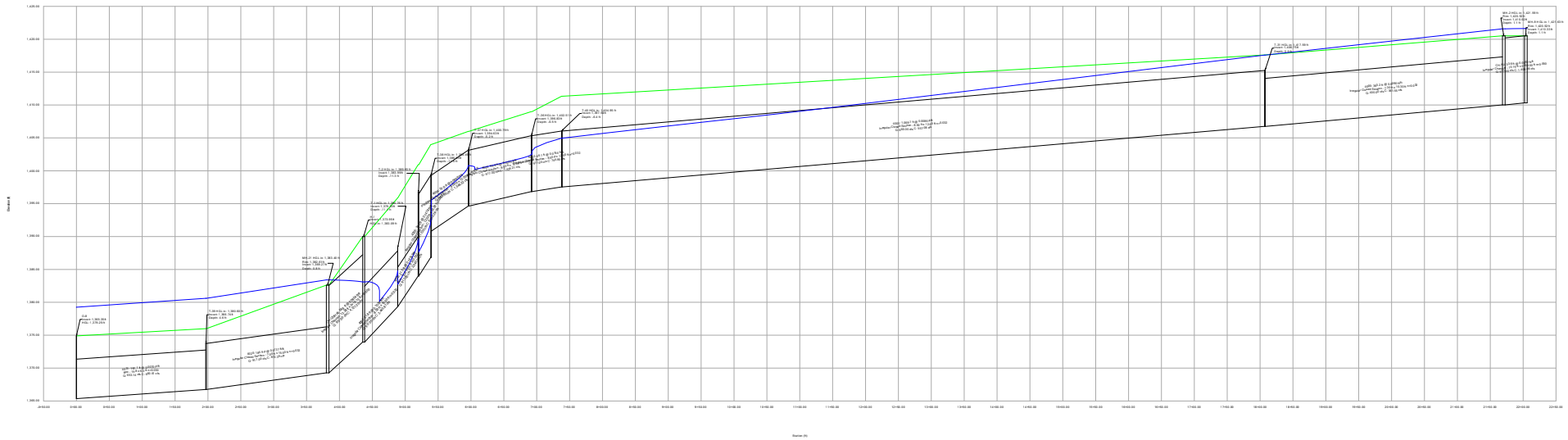
Profile Report
Engineering Profile - Project 4A+B - 25yr (220184A19_Model_Design AMB 5-12.stsw)



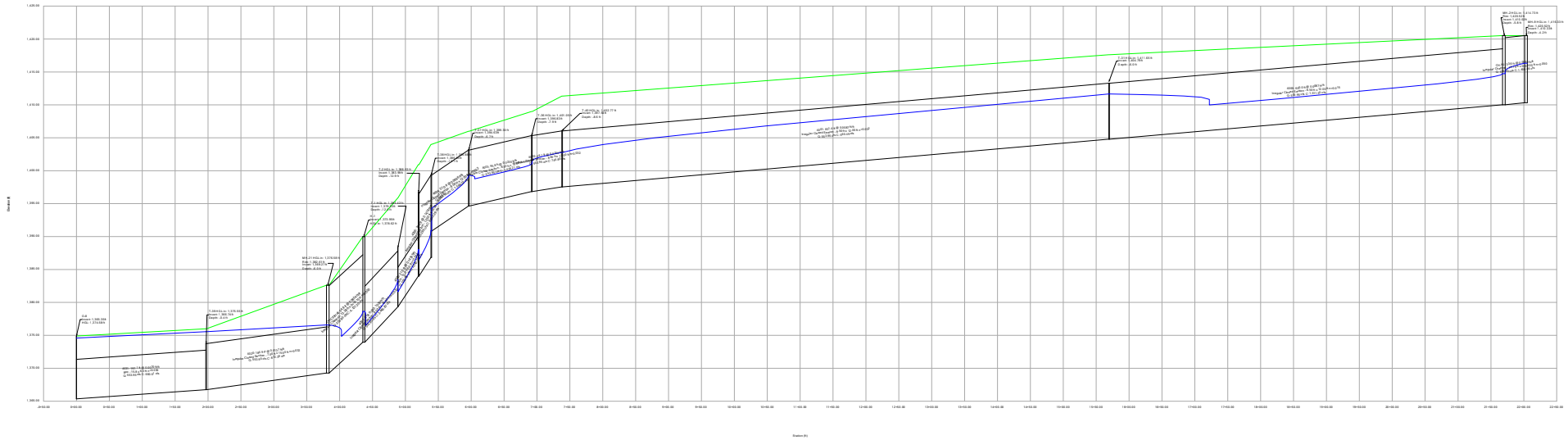
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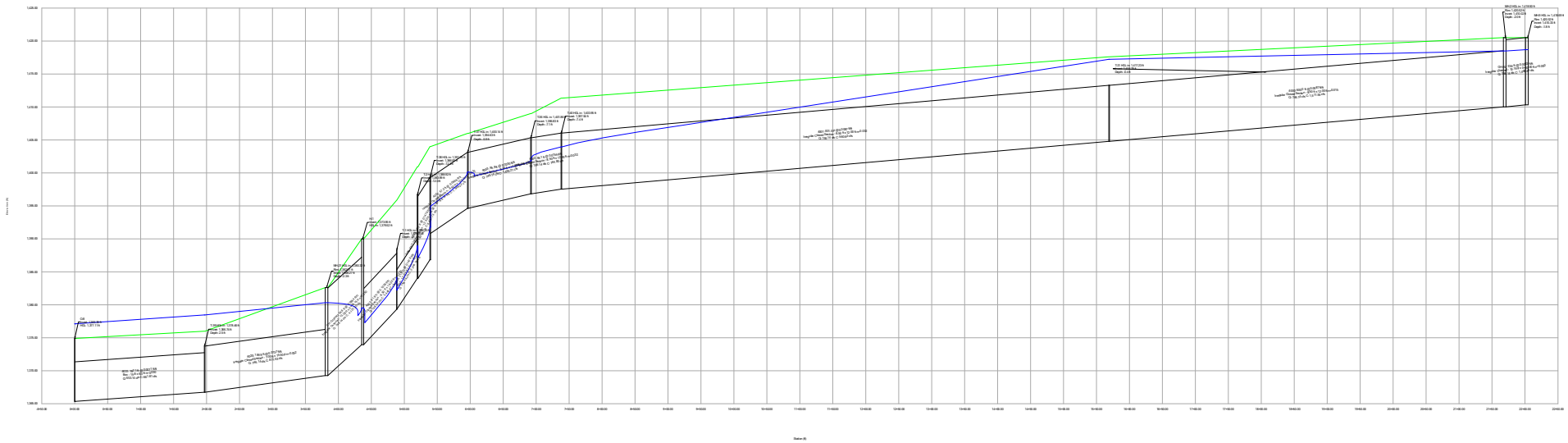
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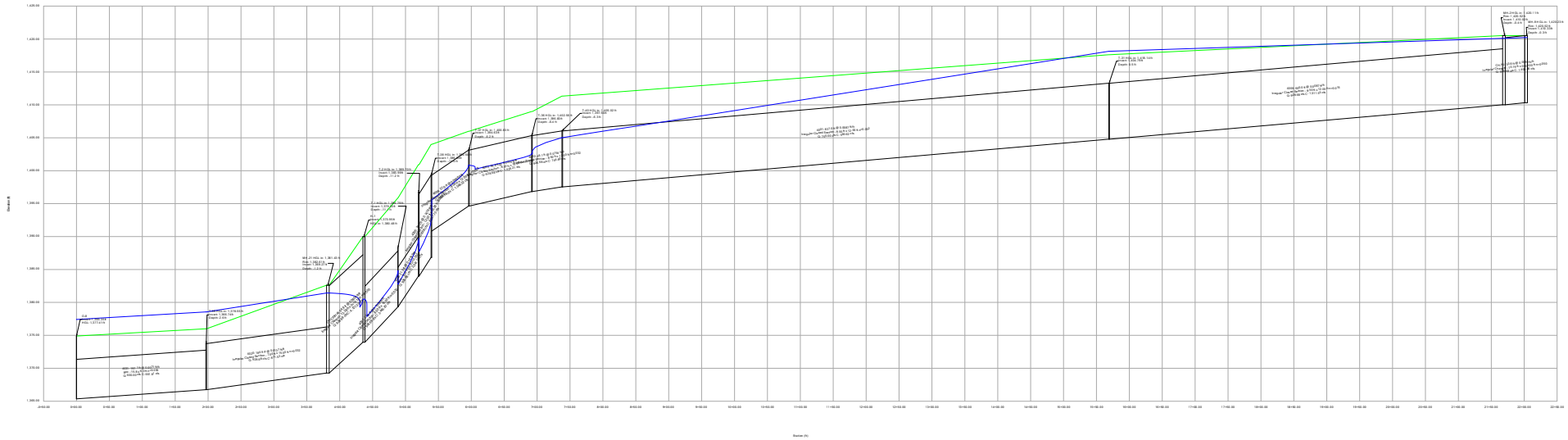
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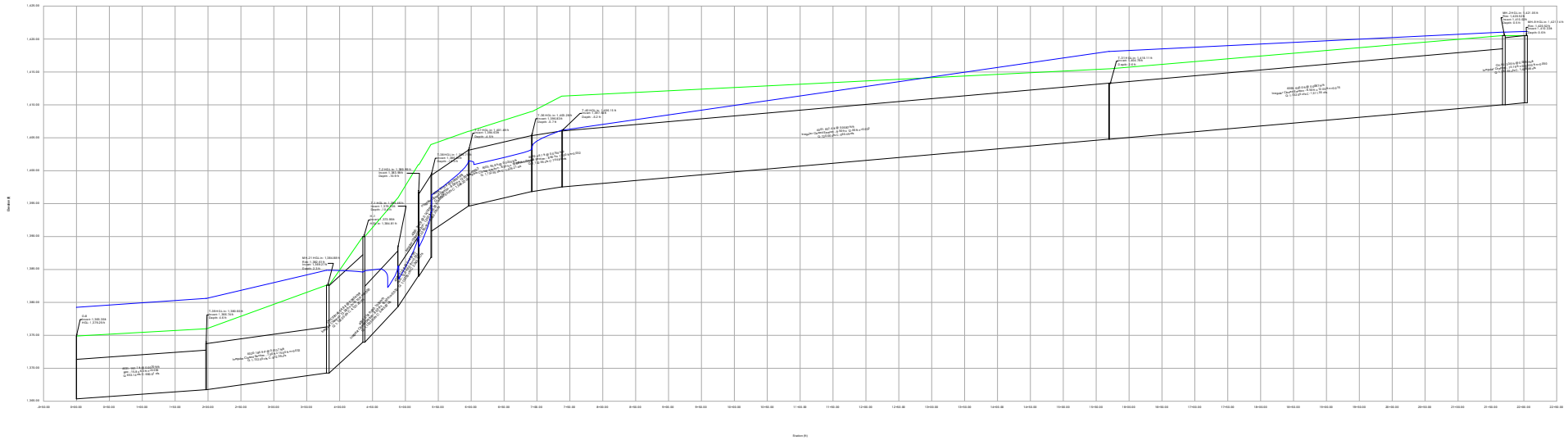
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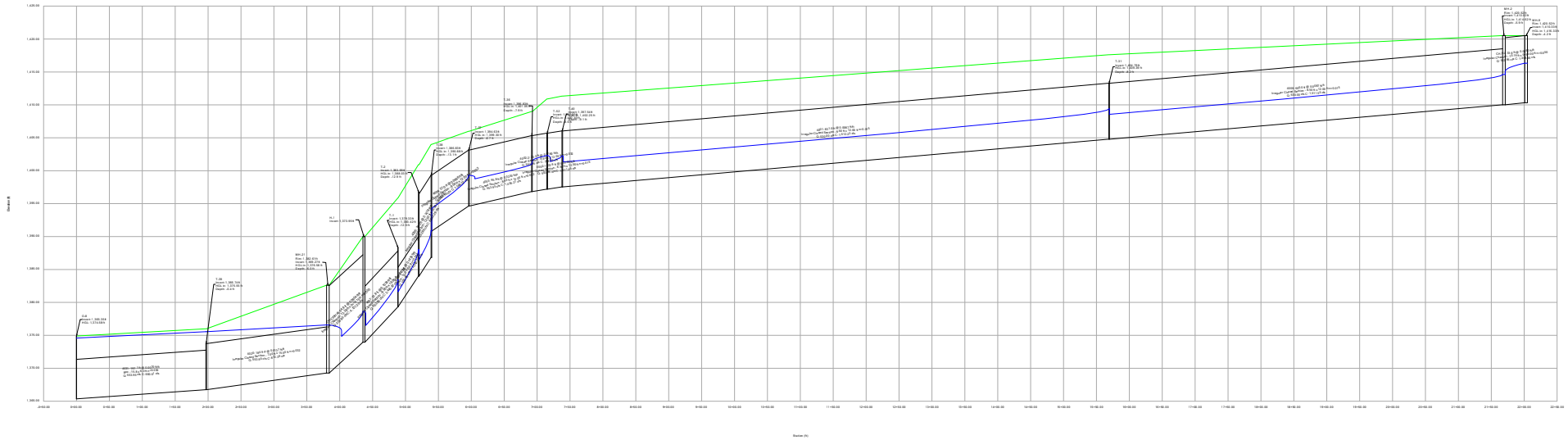
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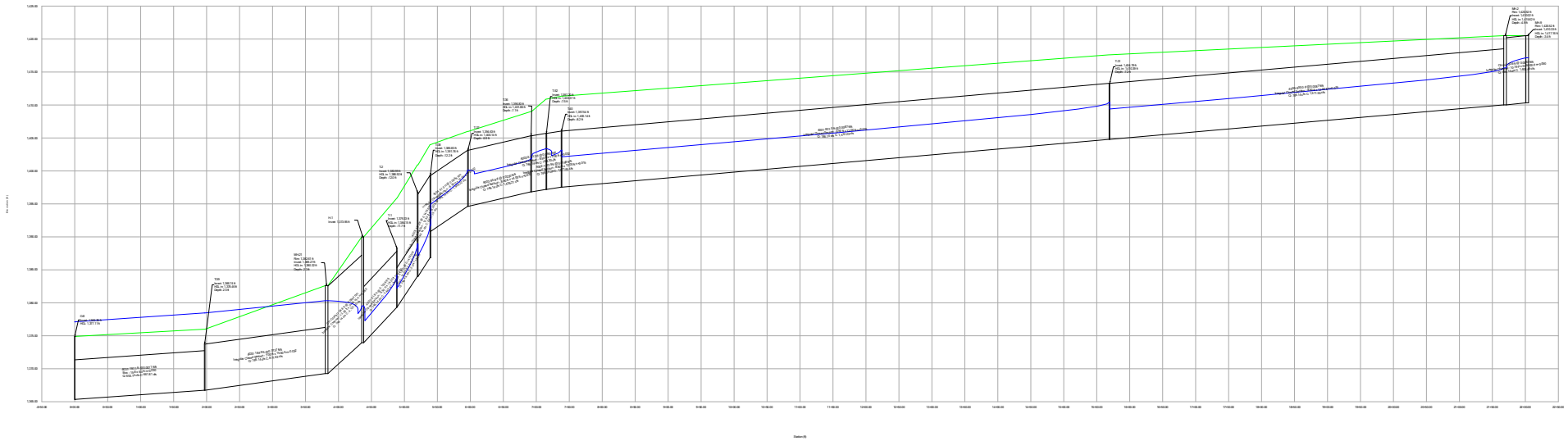
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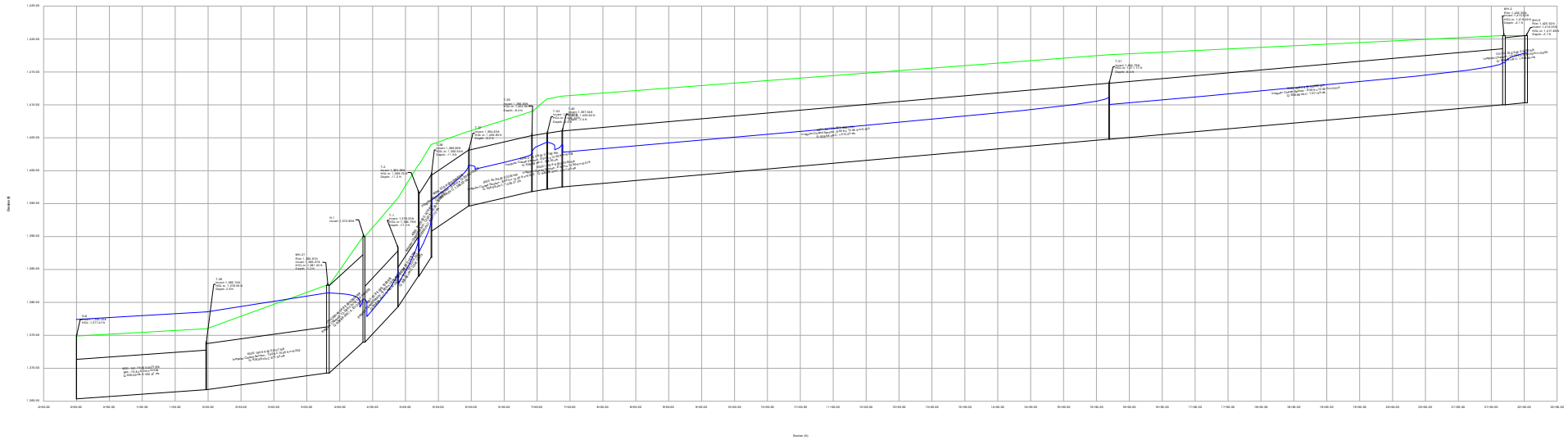
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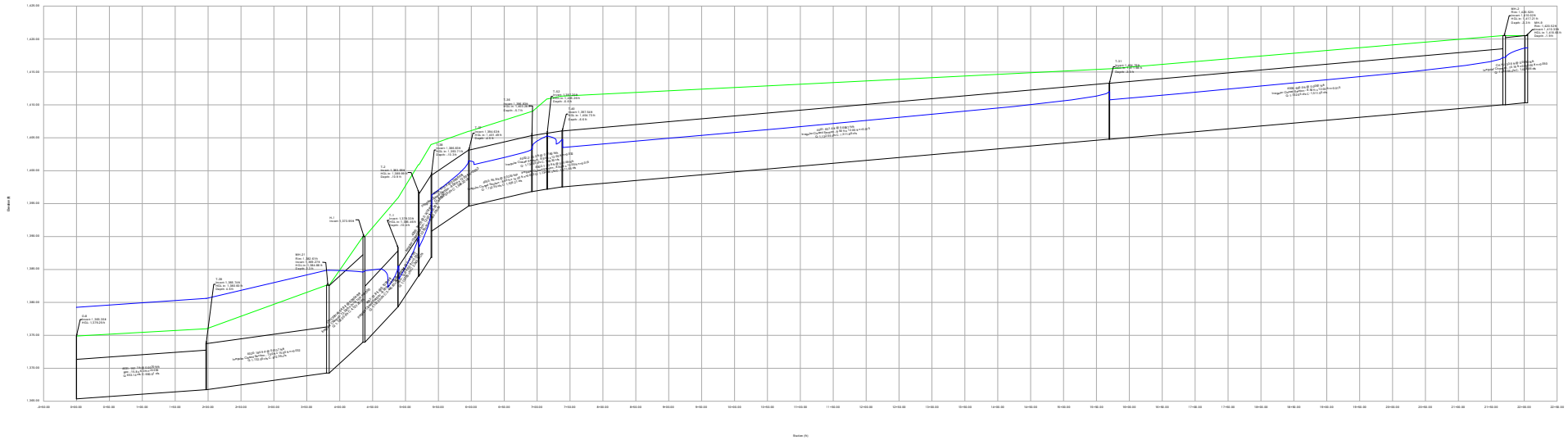
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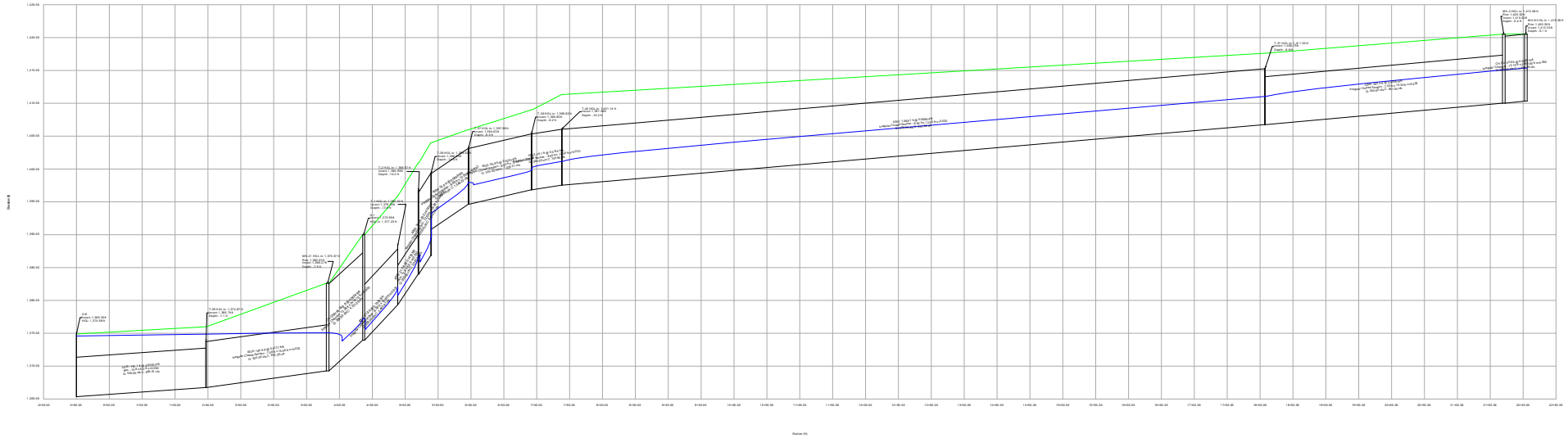
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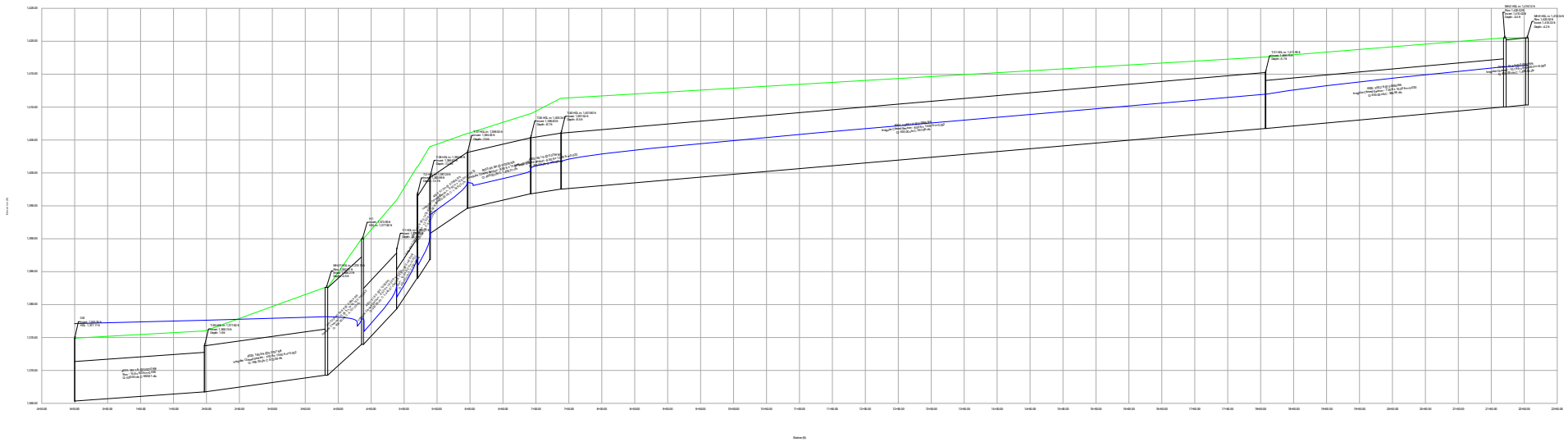
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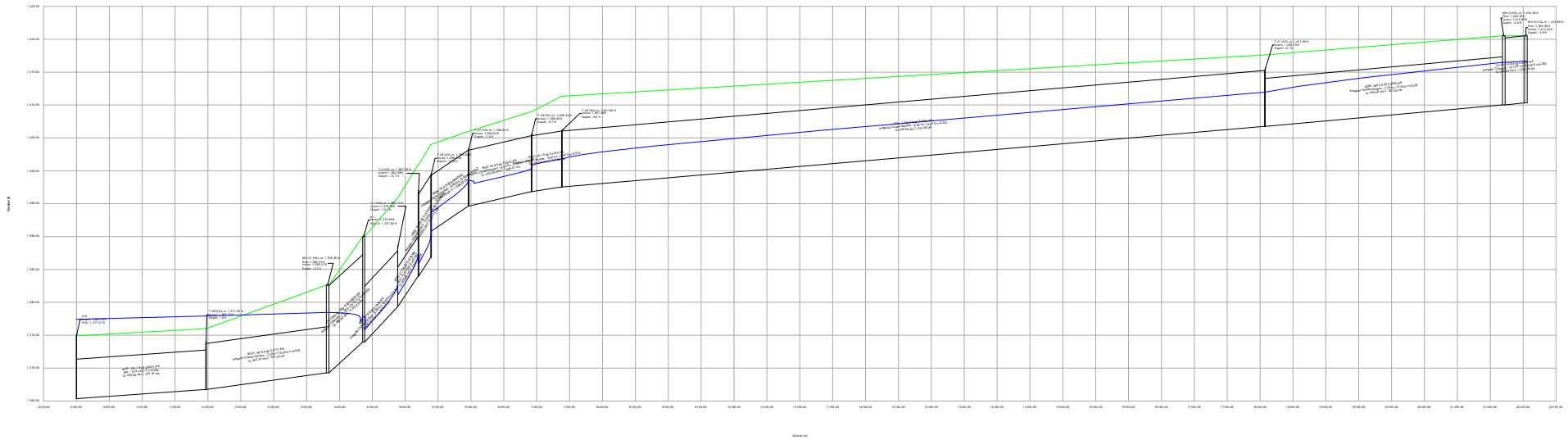
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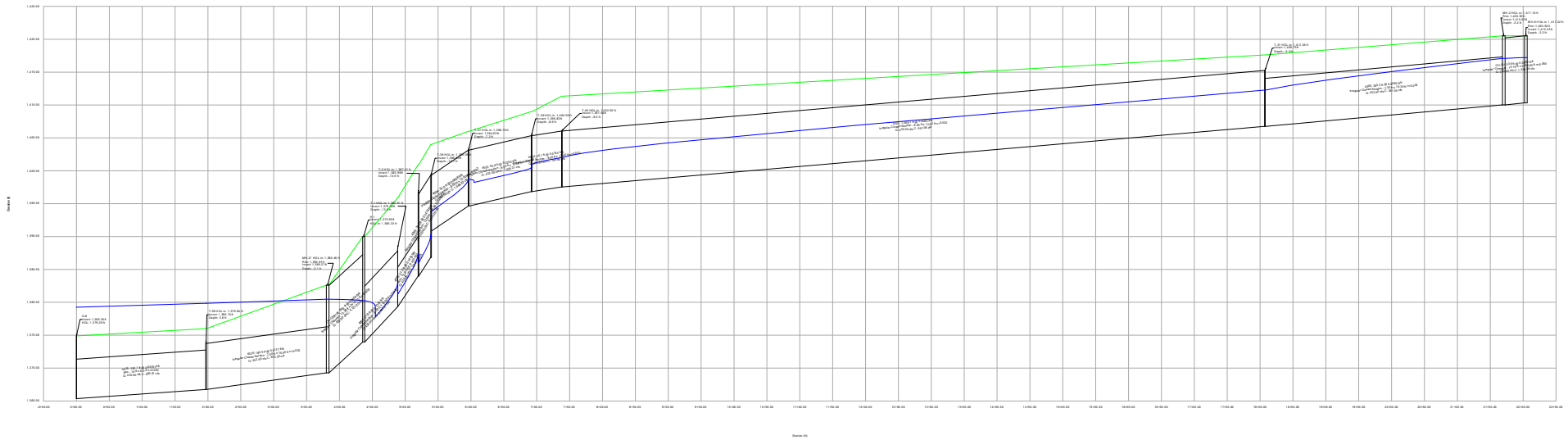
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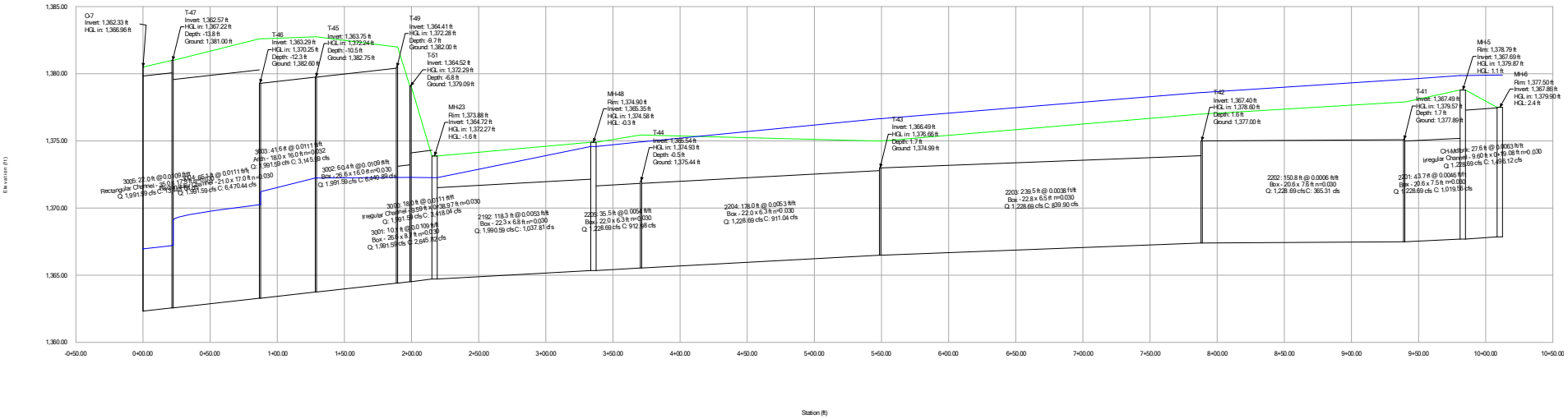
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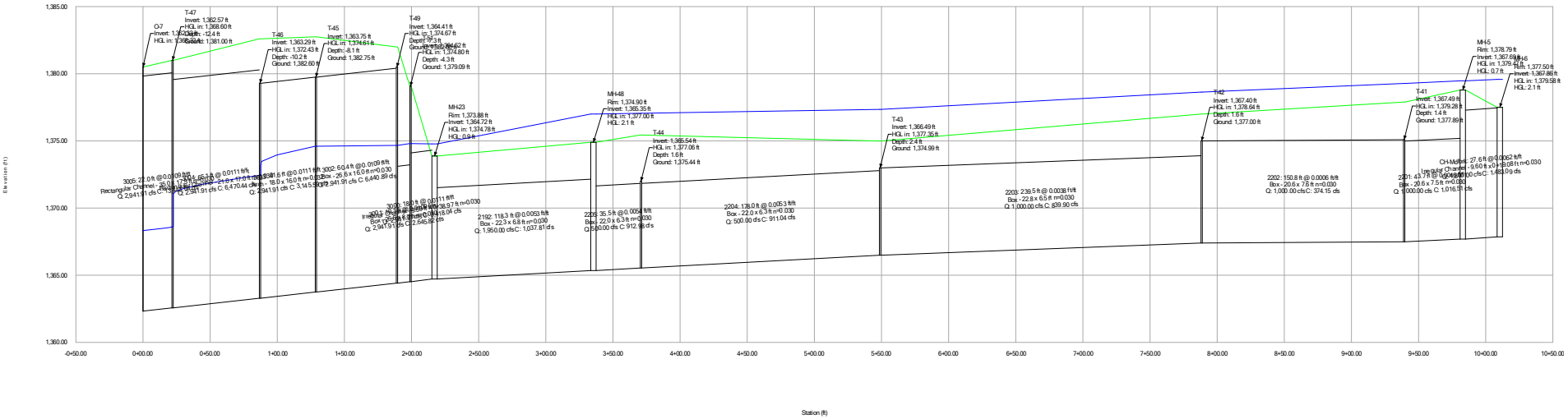
APPENDIX J

LEWIS CREEK SCENARIO PROFILES

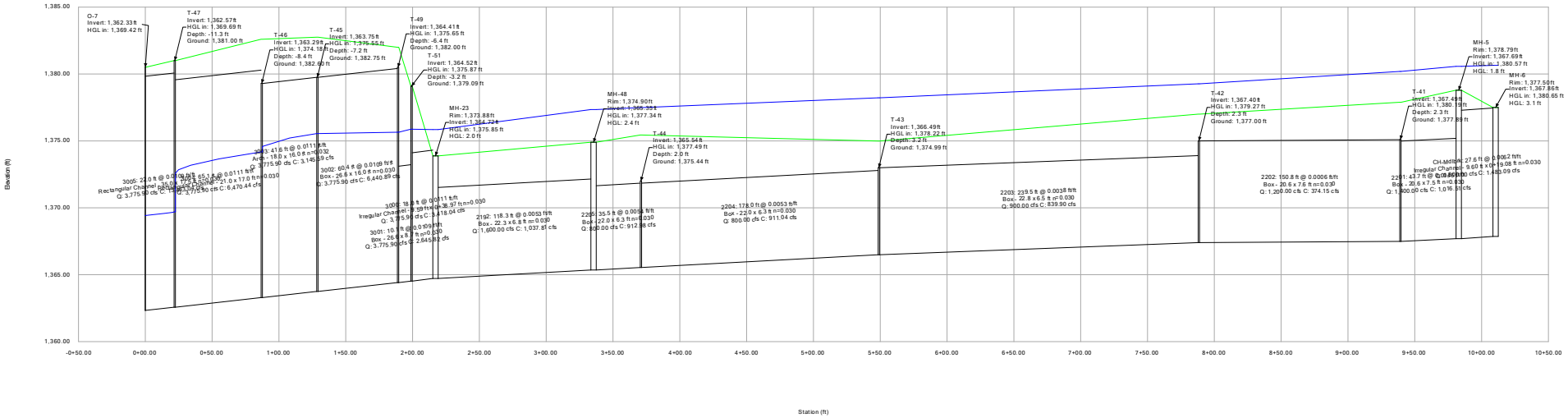
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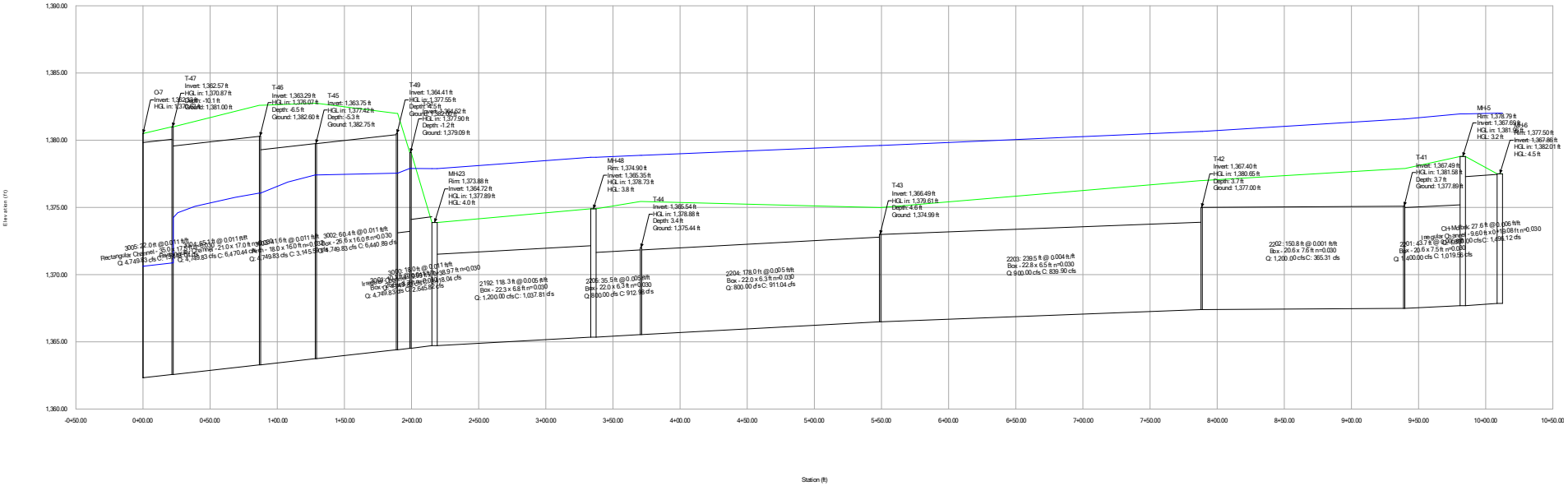
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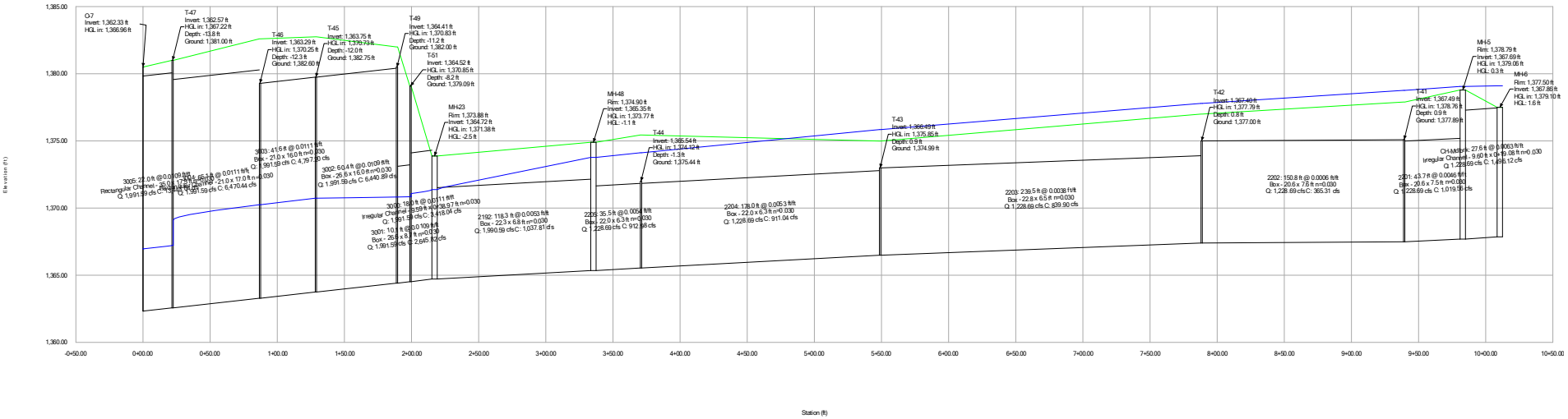
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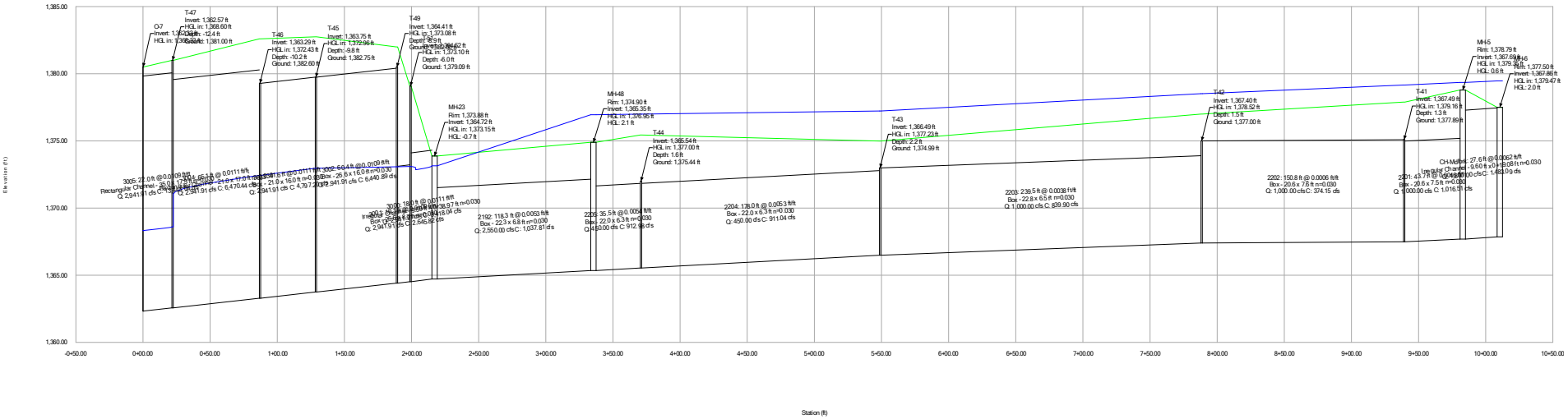
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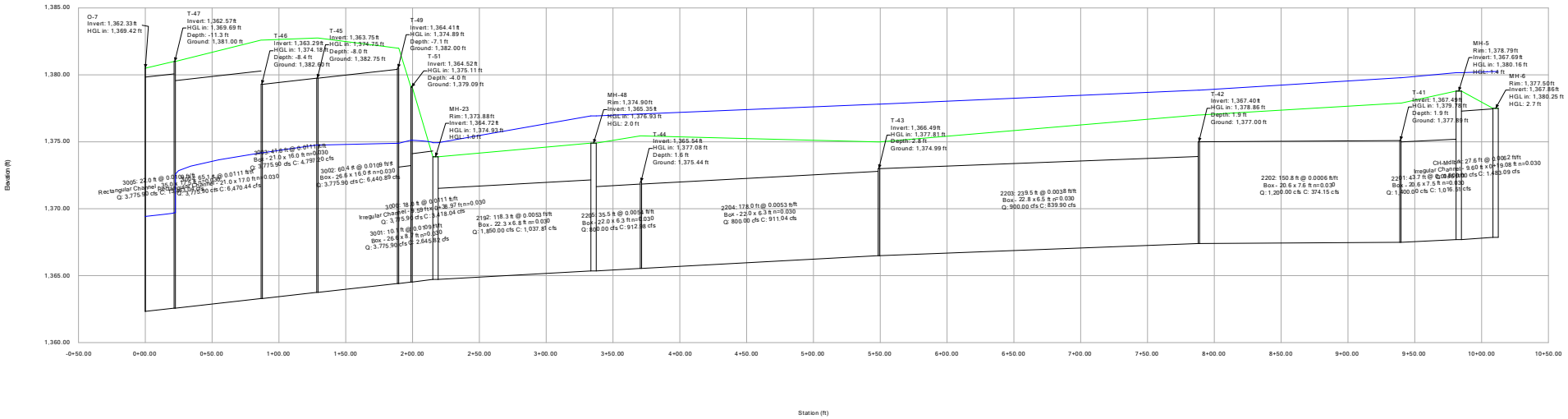
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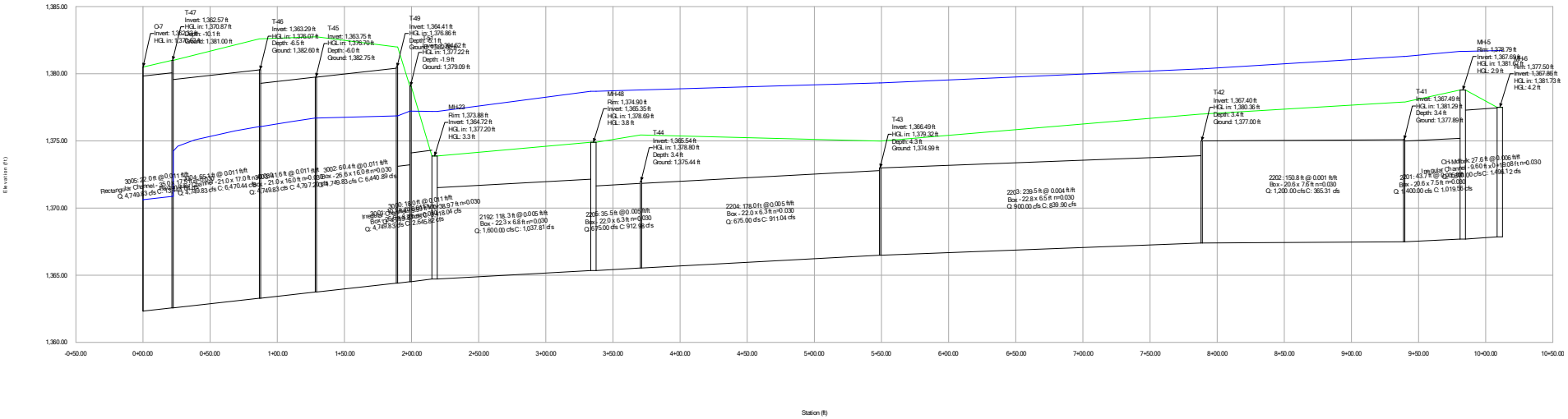
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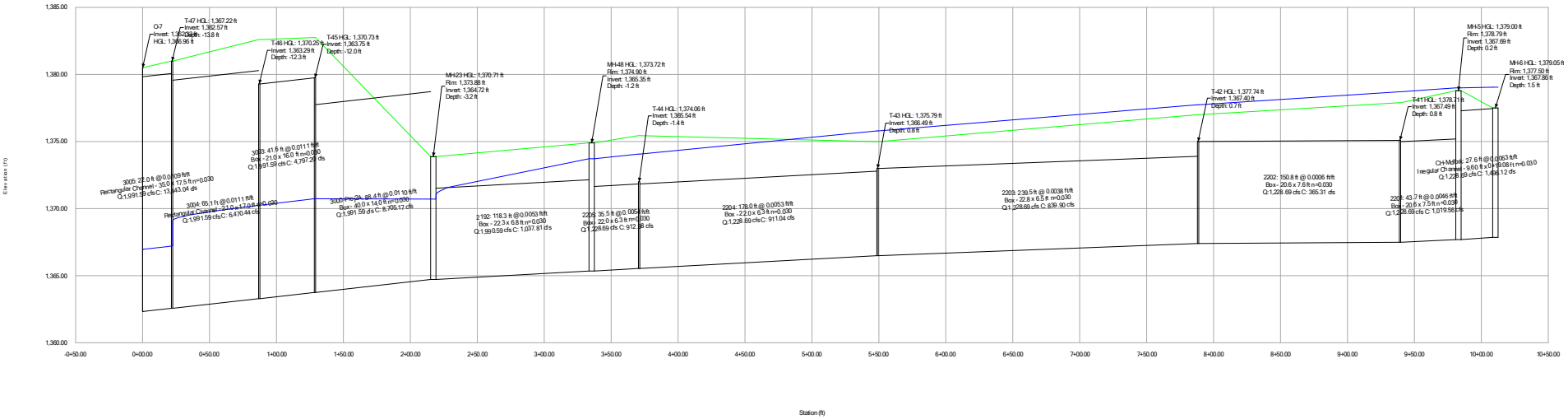
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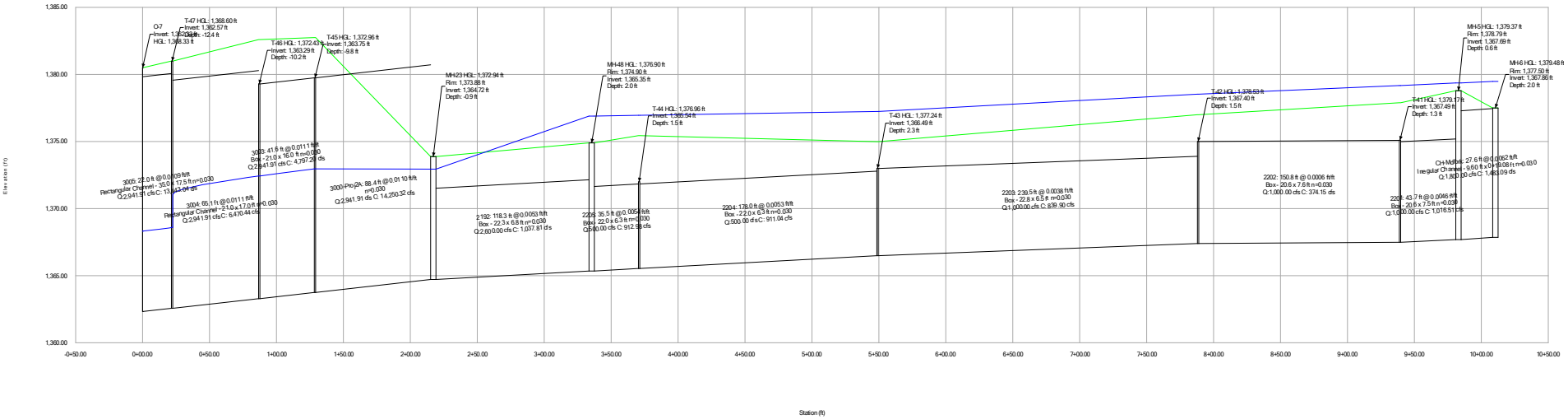
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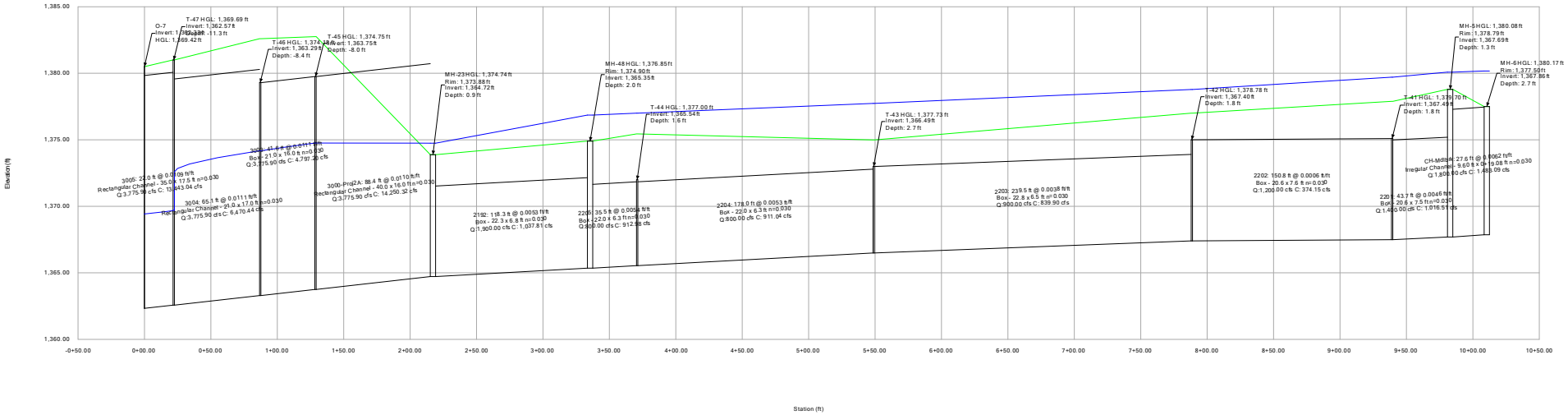
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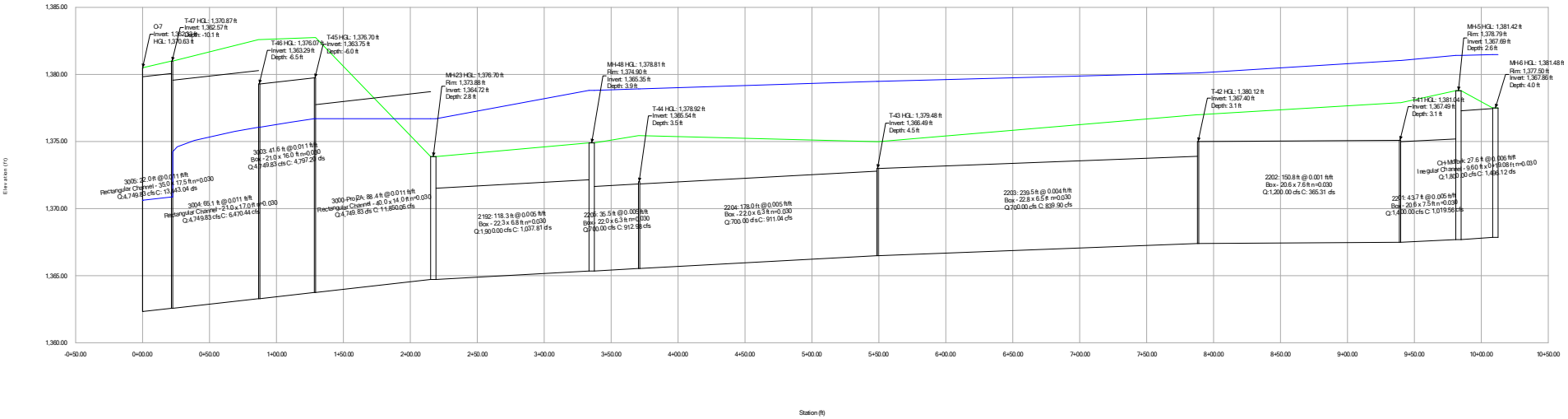
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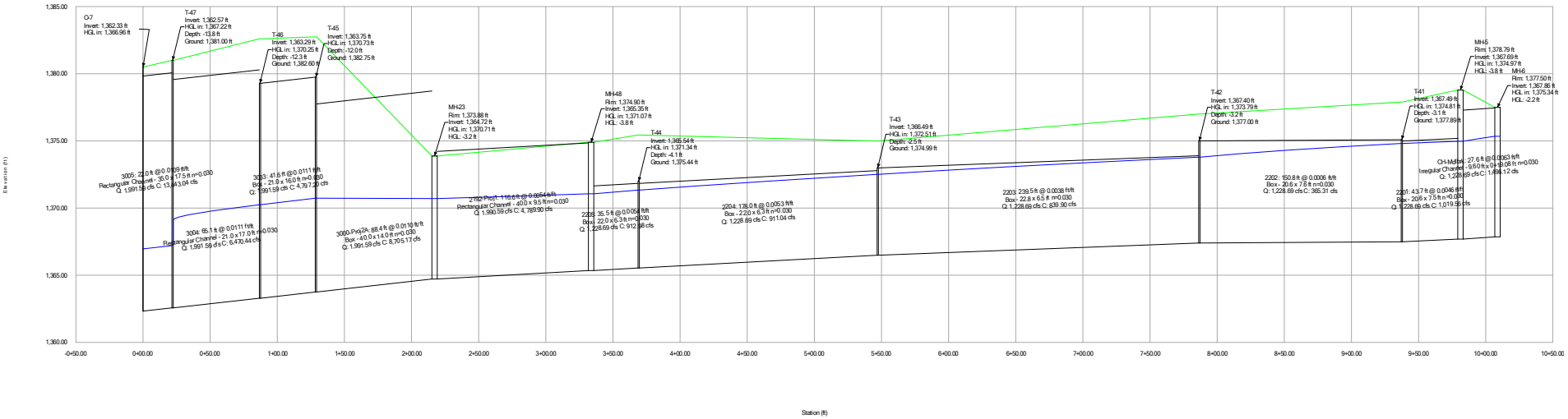
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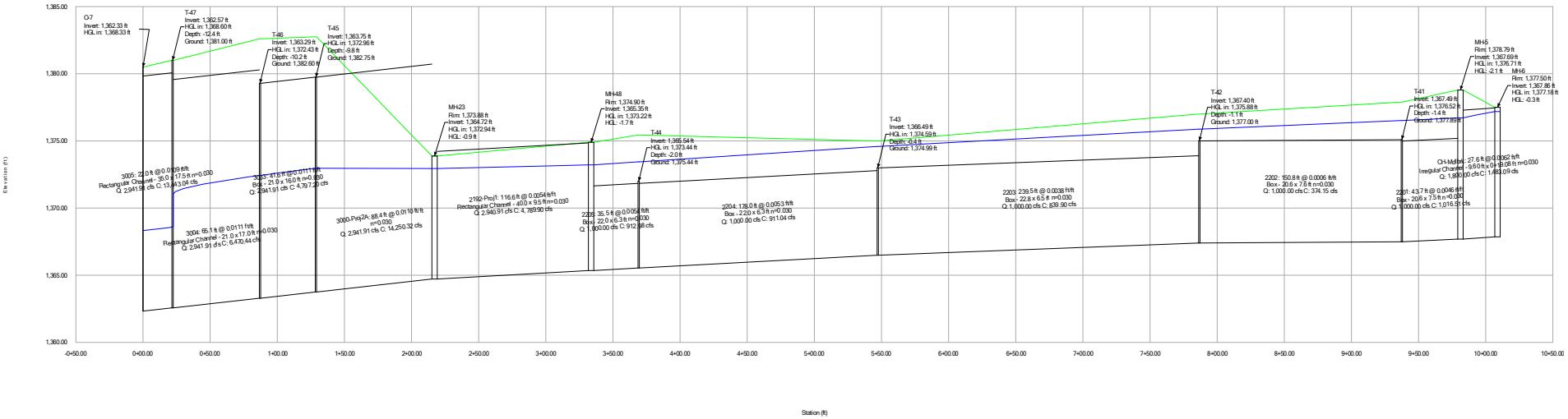
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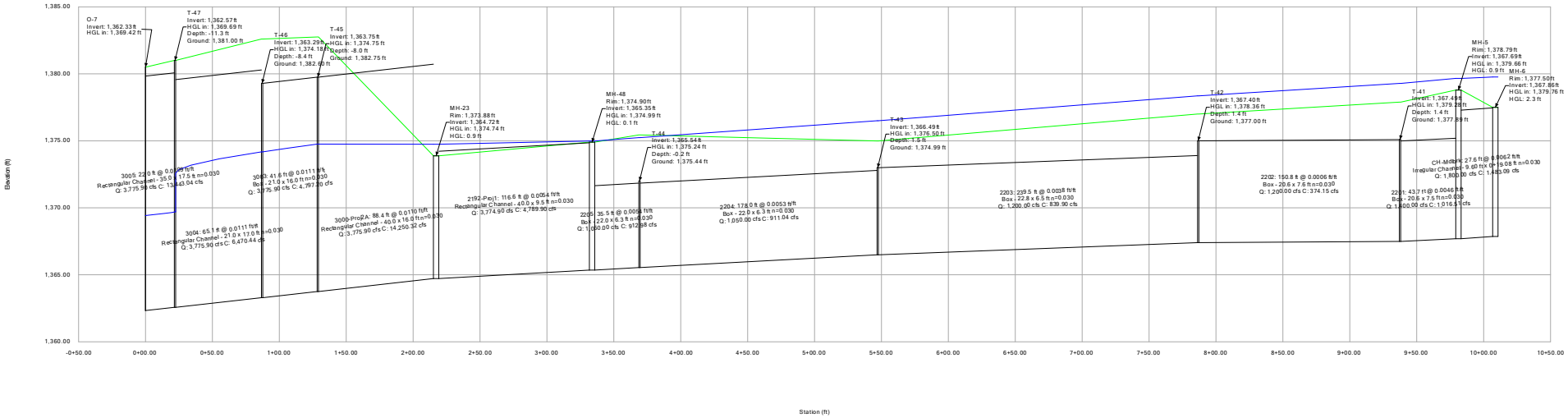
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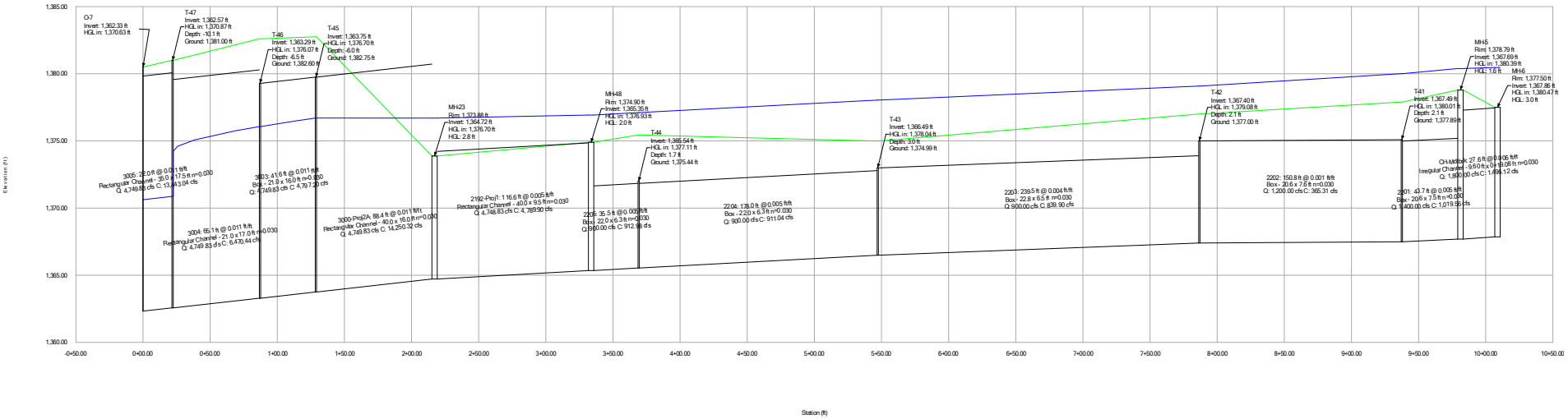
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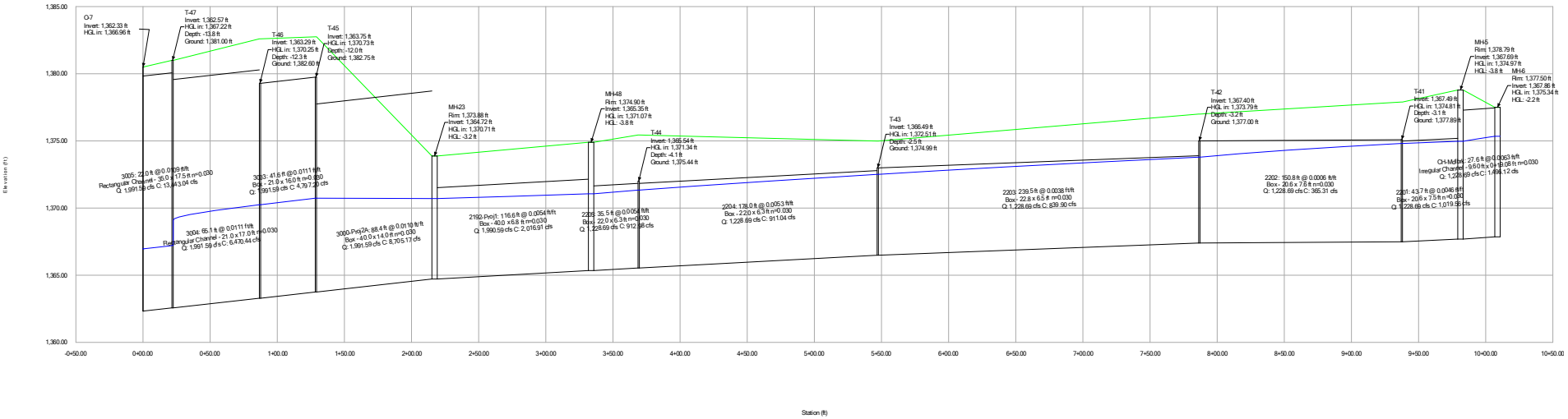
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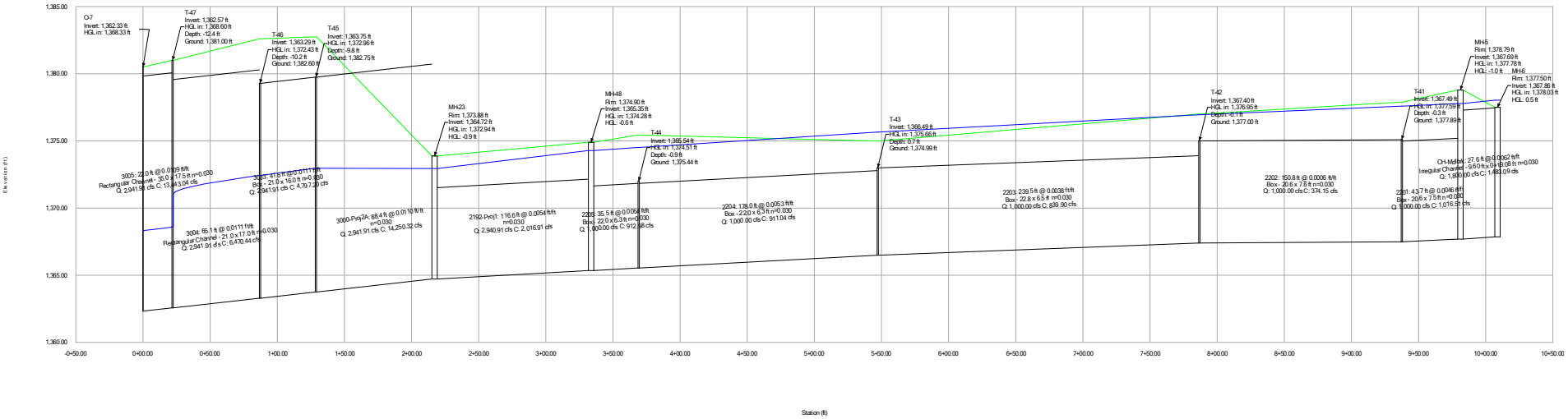
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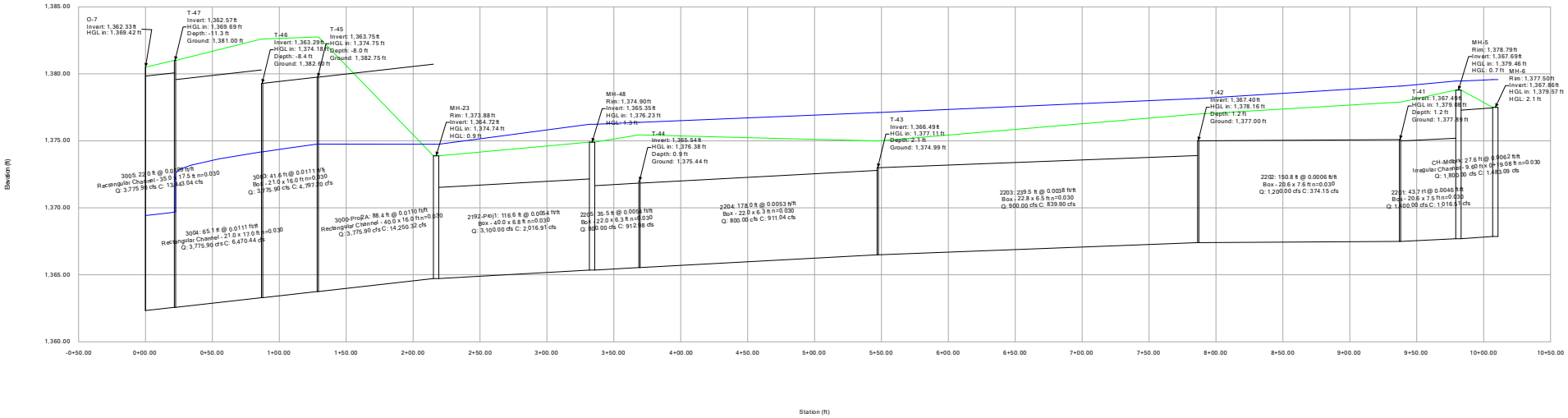
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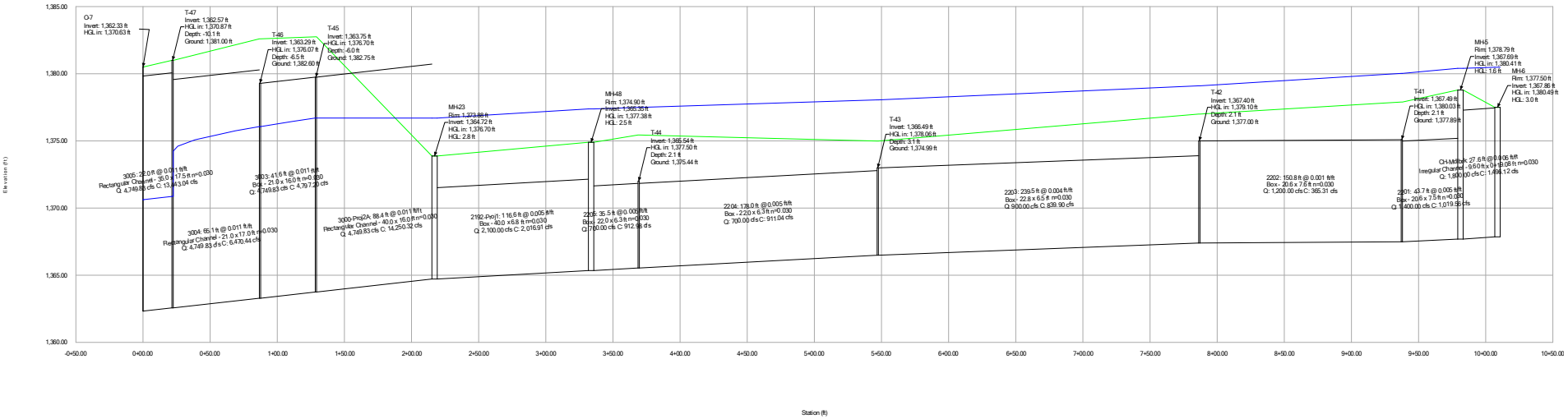
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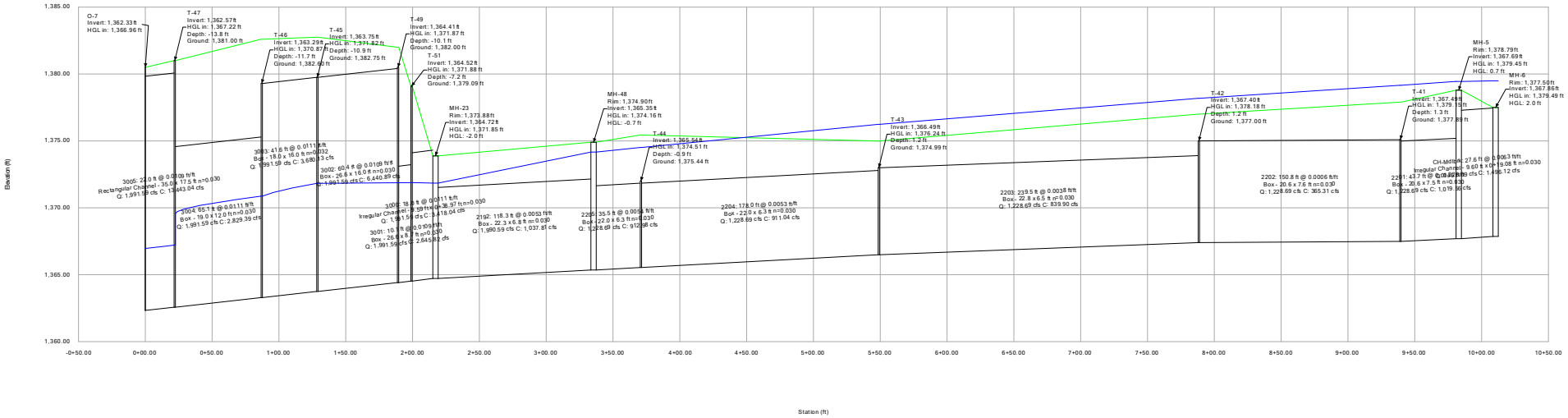
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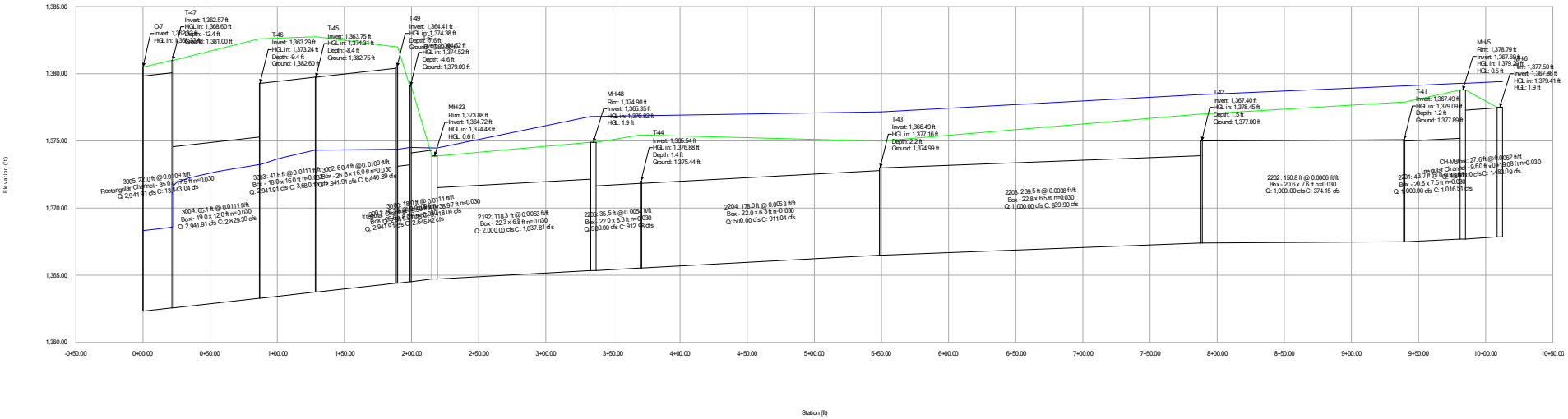
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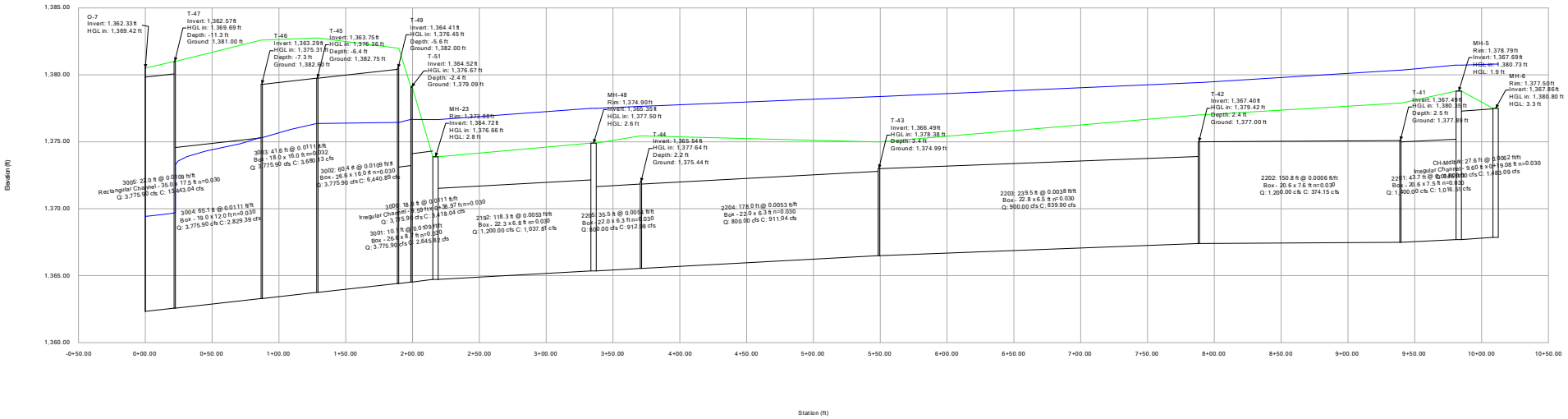
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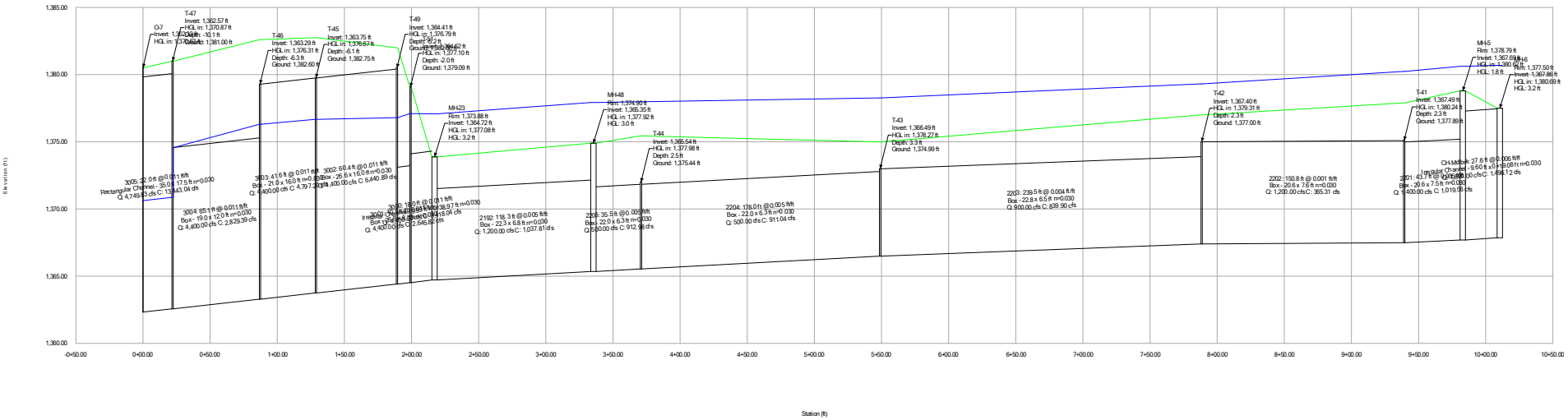
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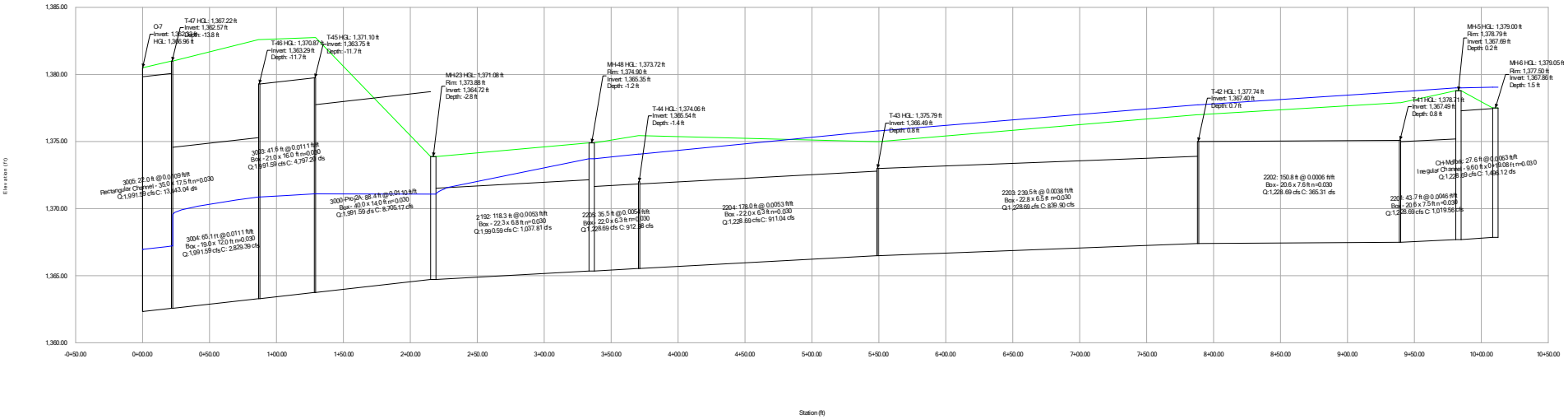
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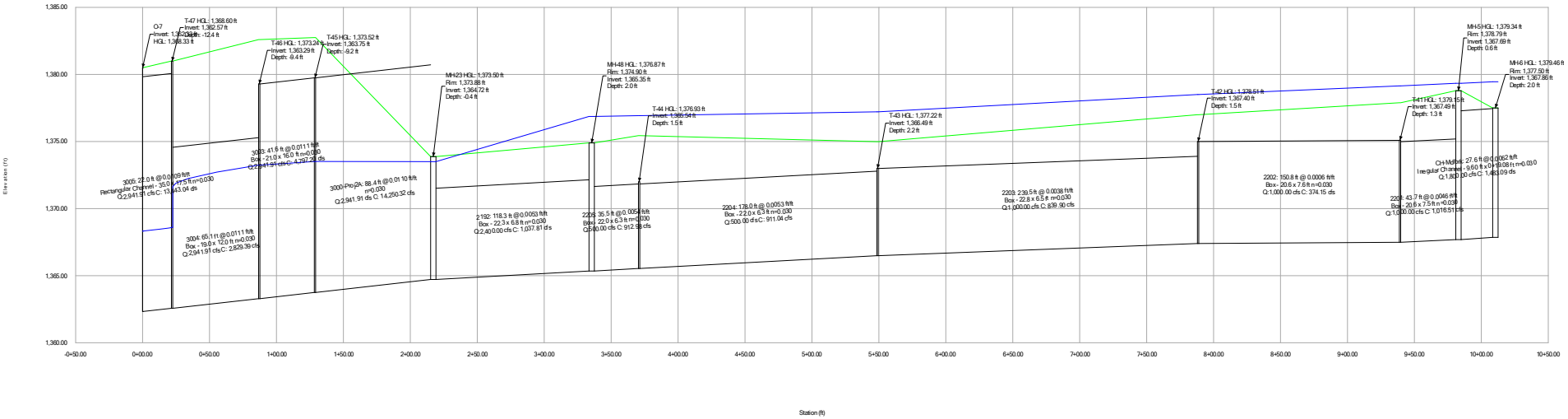
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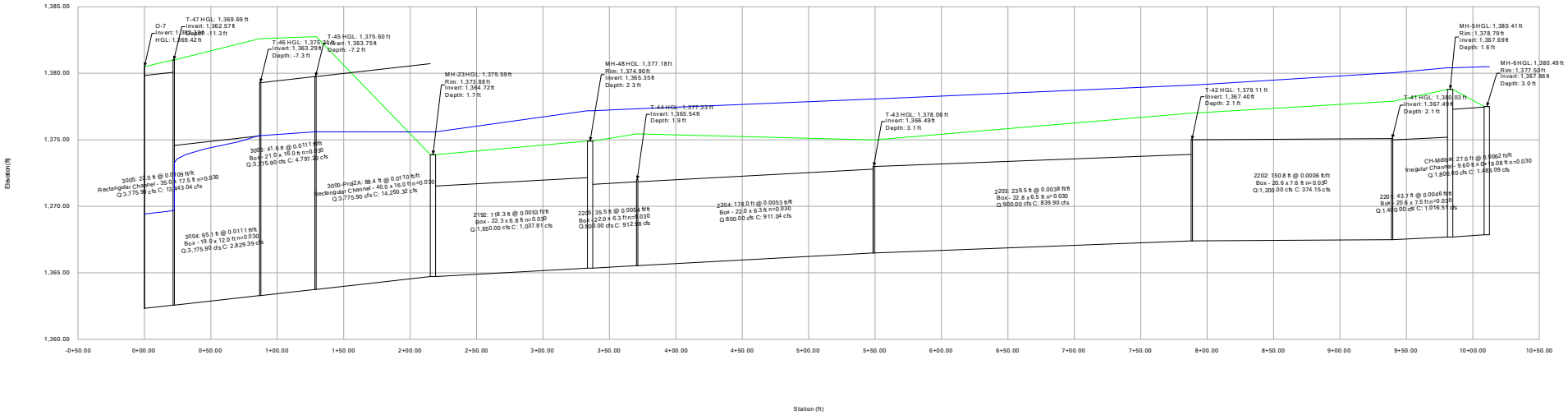
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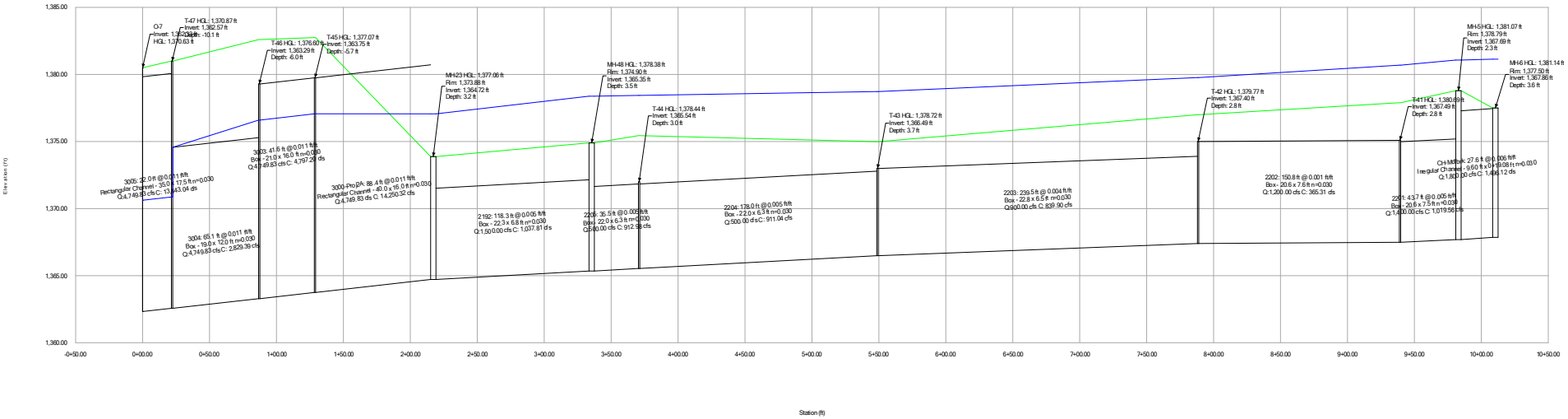
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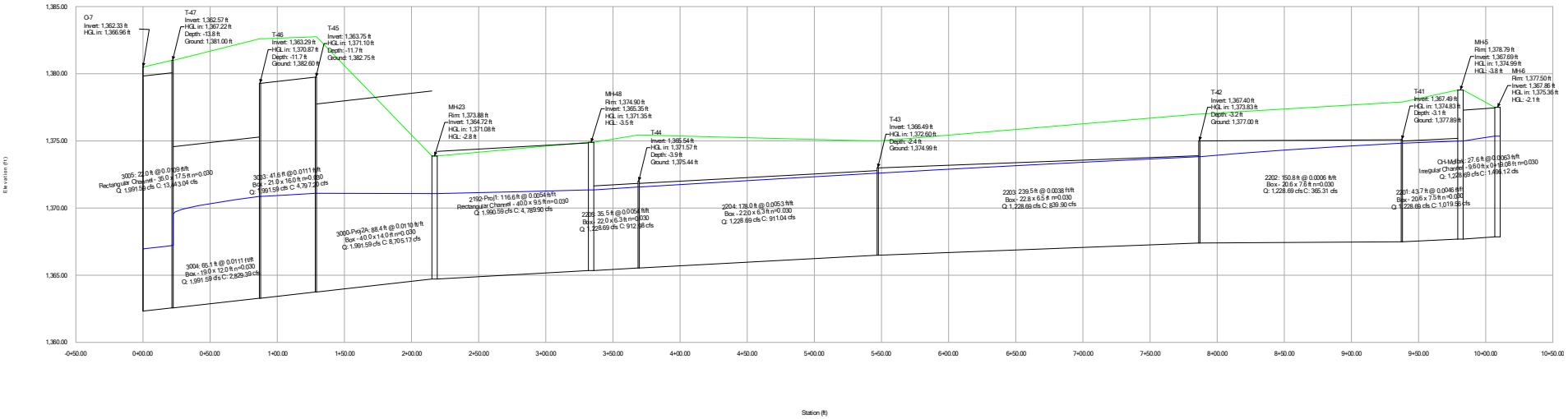
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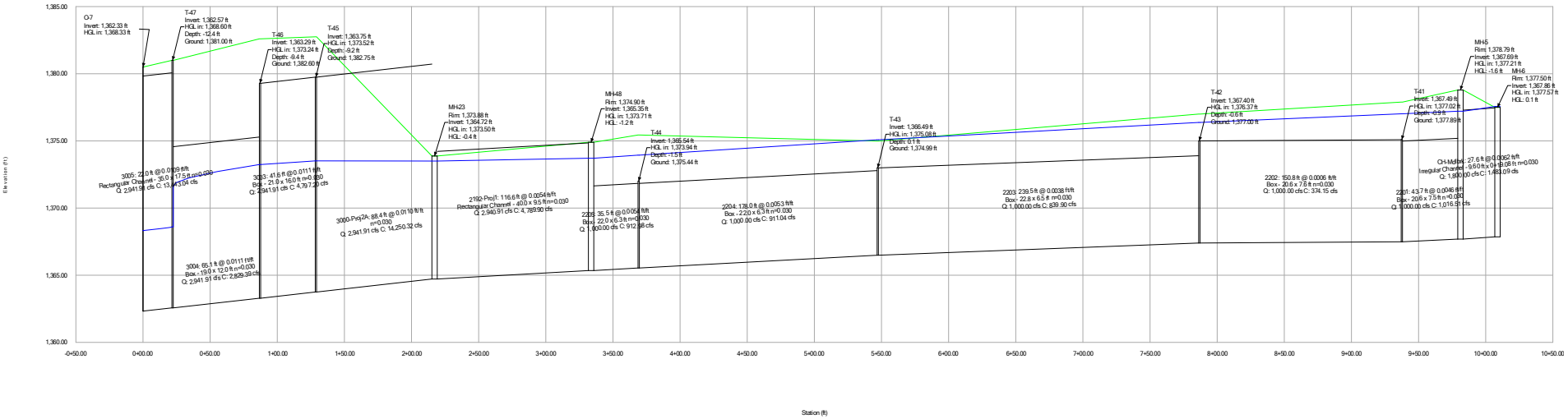
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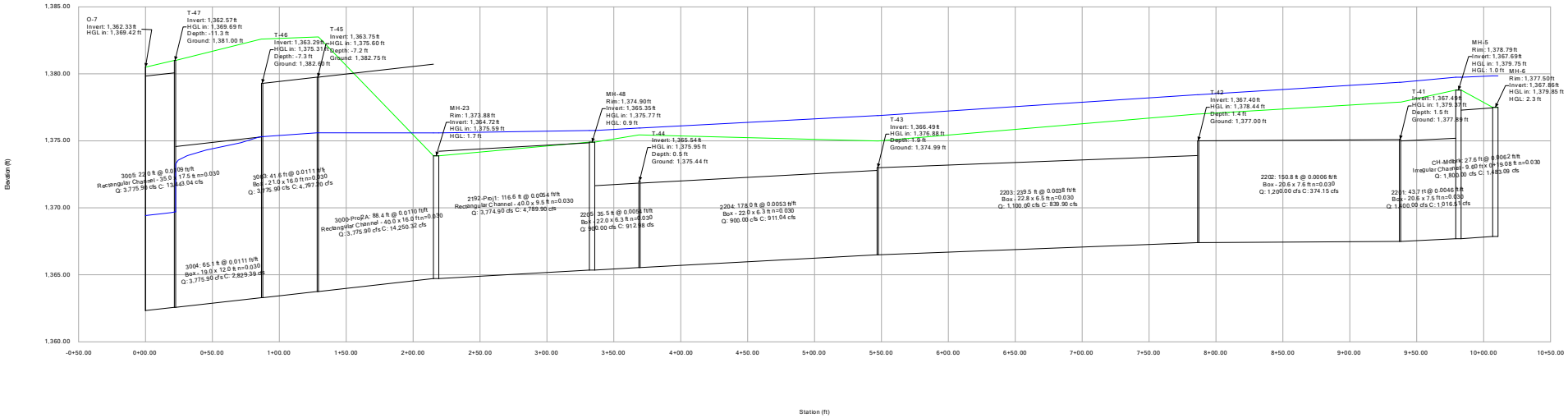
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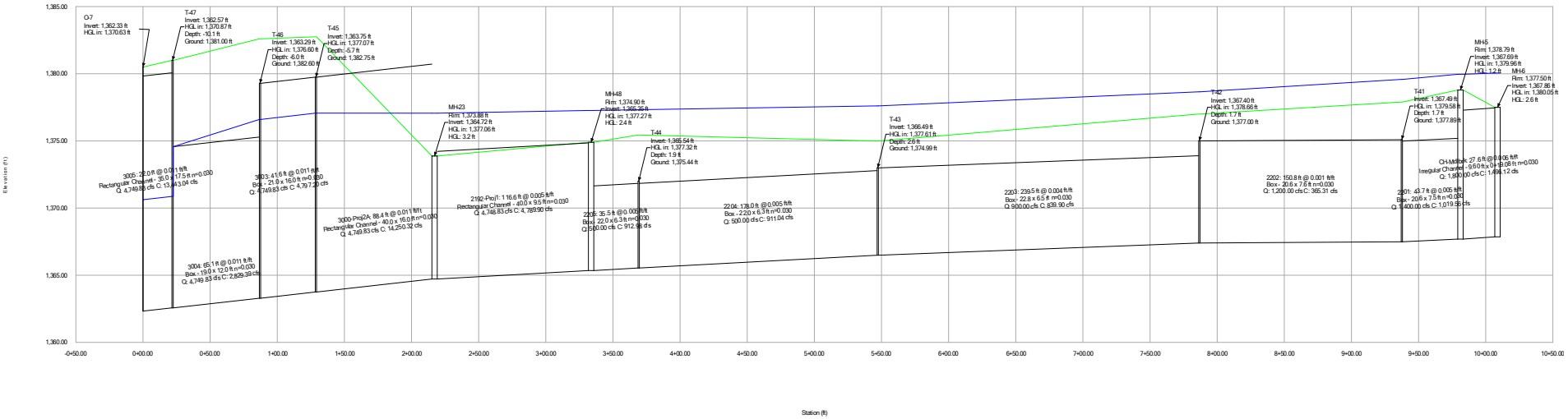
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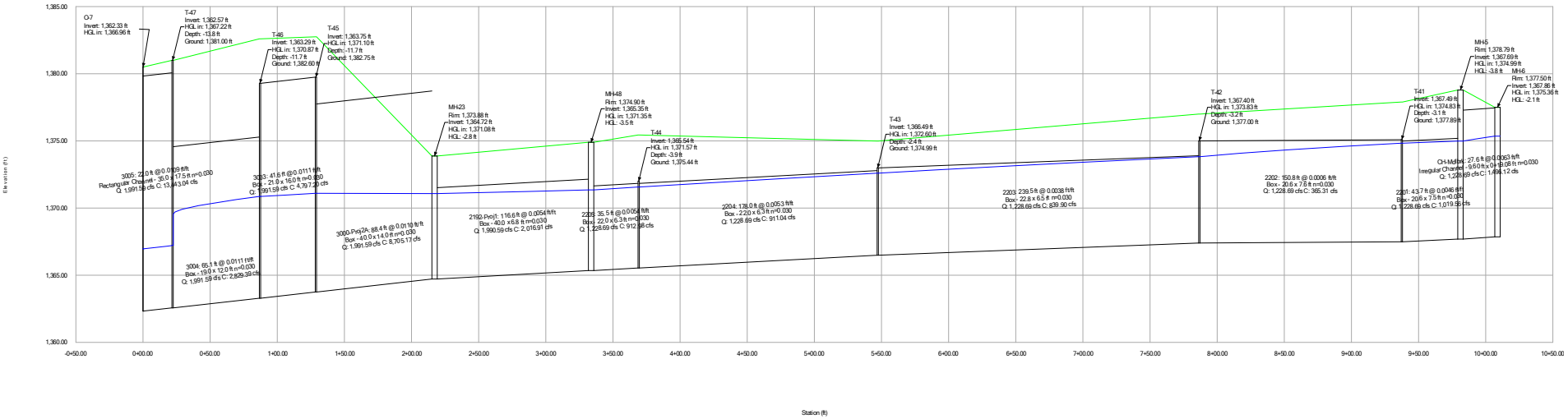
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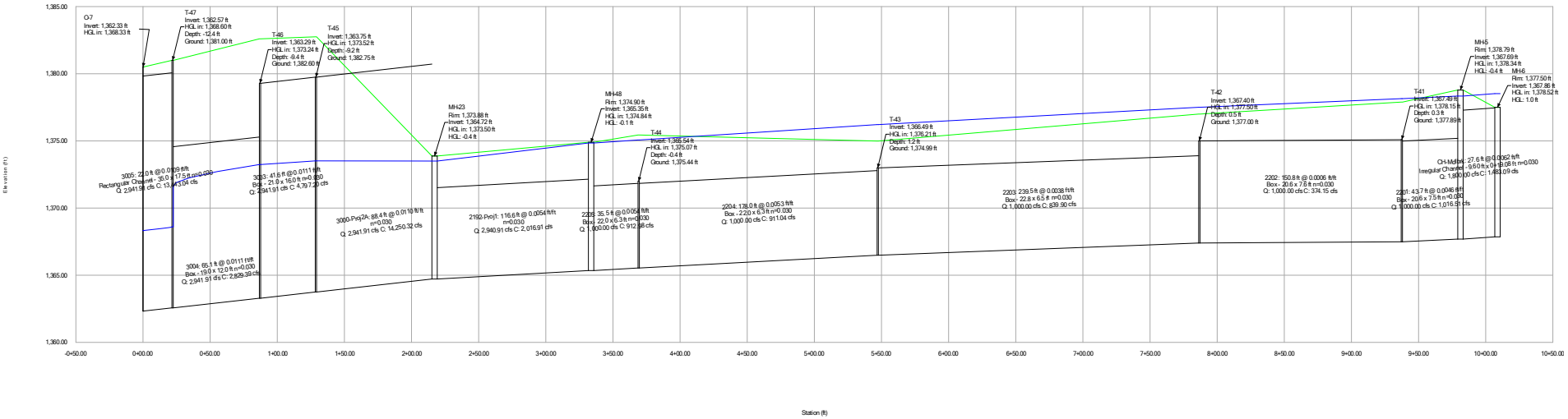
Profile Report
Engineering Profile - Project 1B+2A+B - 100-yr (220184A19_Model_Design.stsw)



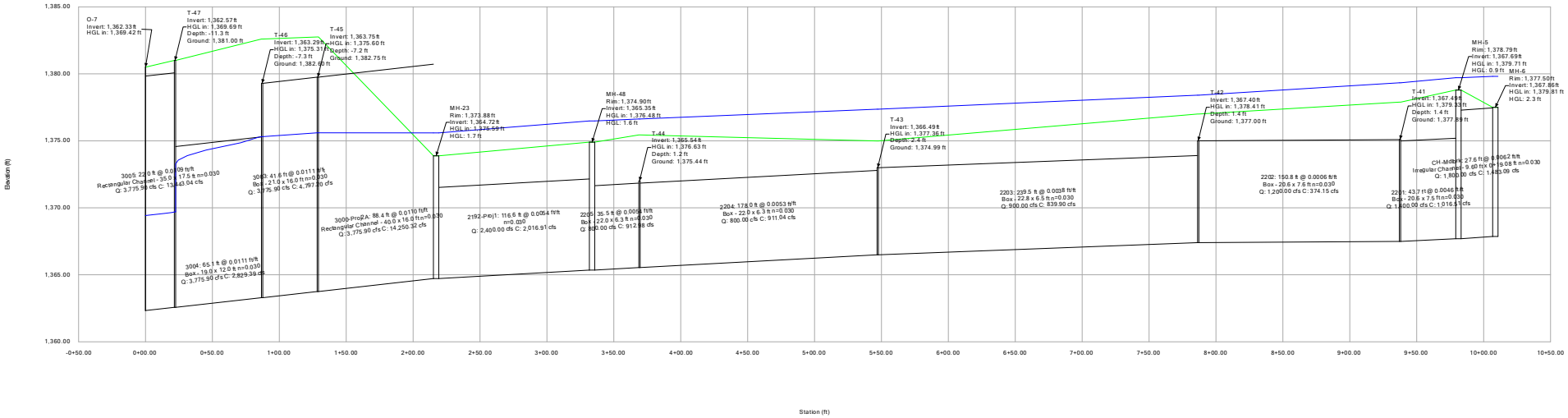
Profile Report
Engineering Profile - Project 1A+2A+B - 10-yr (220184A19_Model_Design.stsw)



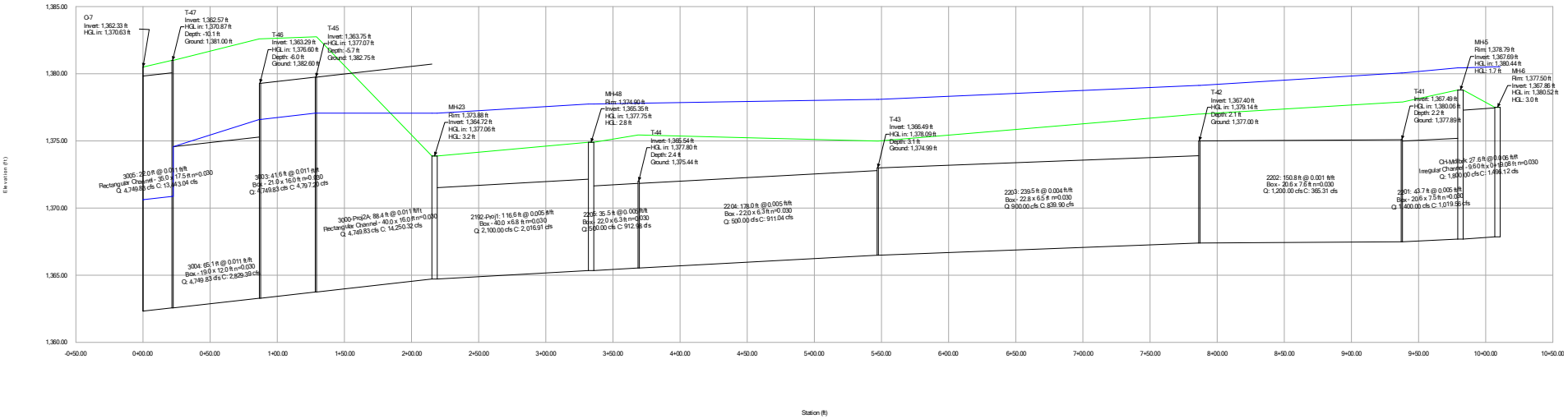
Profile Report
Engineering Profile - Project 1A+2A+B - 25-yr (220184A19_Model_Design AMB 5-12.stsw)



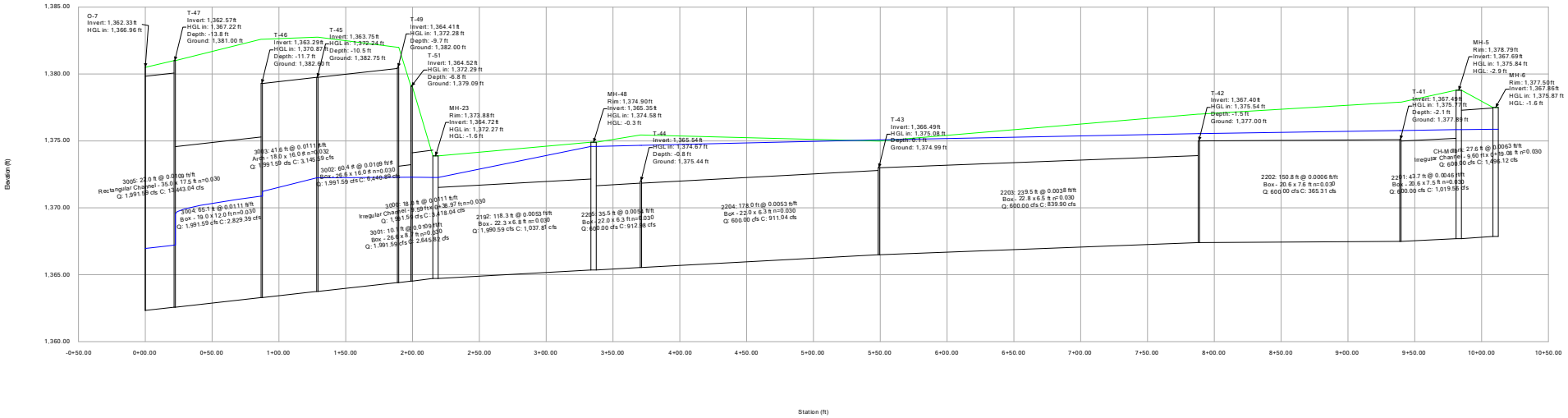
Profile Report
Engineering Profile - Project 1A+2A+B - 50-yr (220184A19_Model_Design.stsw)



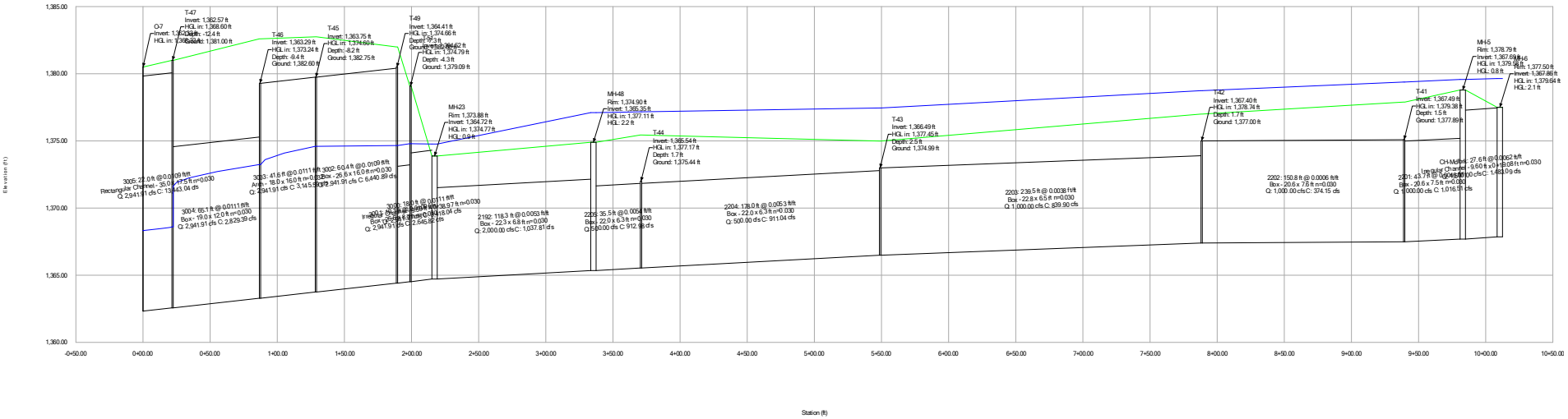
Profile Report
Engineering Profile - Project 1A+2A+B - 100-yr (220184A19_Model_Design.stsw)



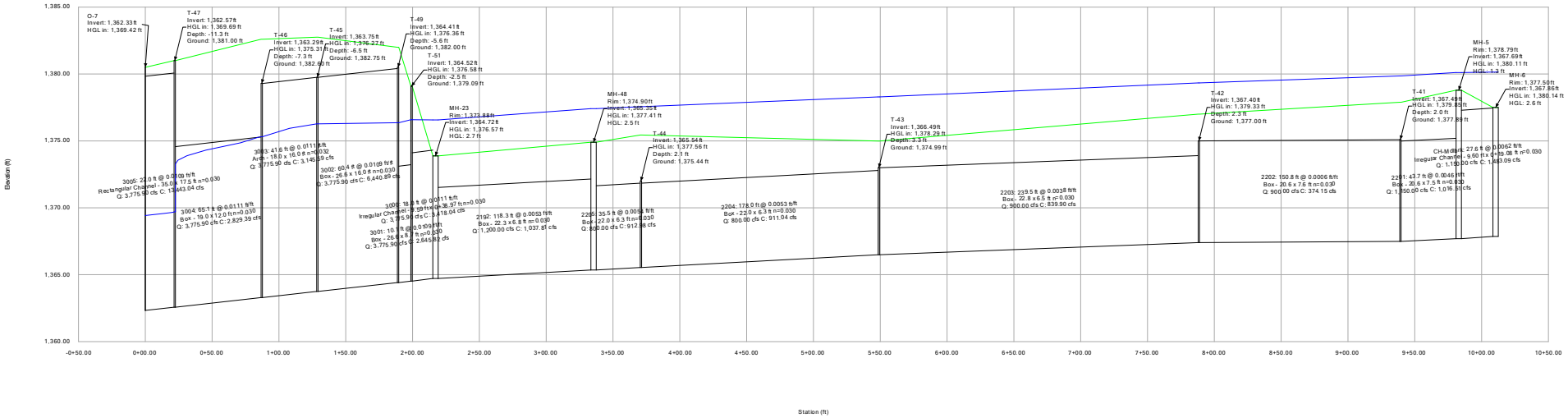
Profile Report
Engineering Profile - Project 6 - 10-yr (220184A19_Model_Design.stsw)



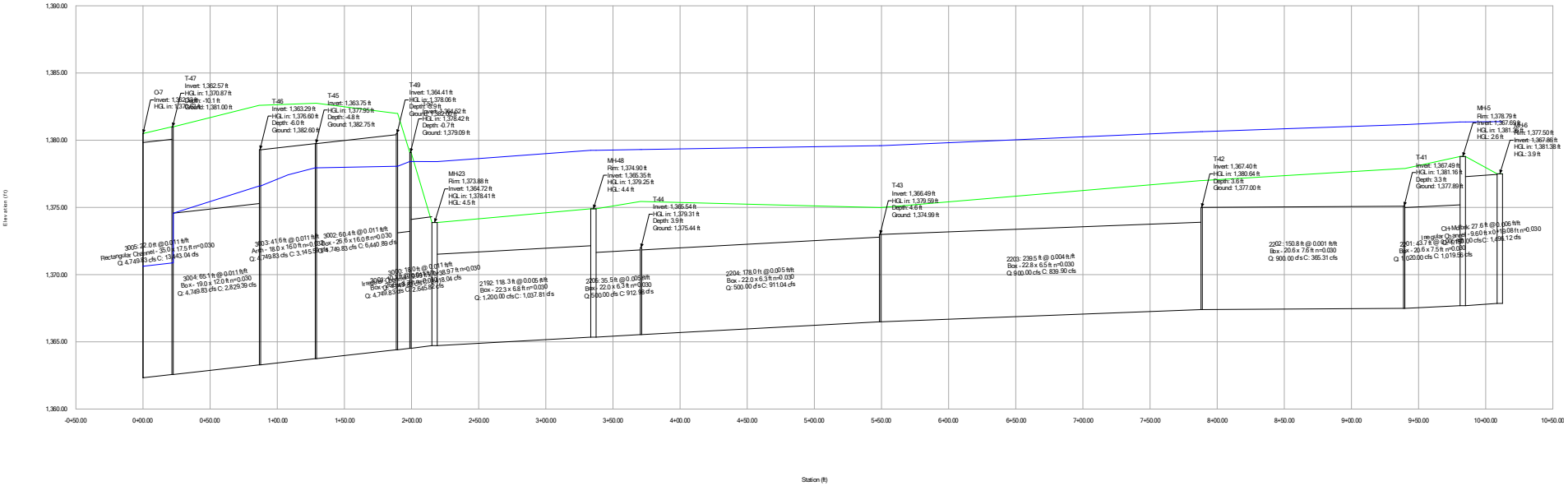
Profile Report
Engineering Profile - Project 6 - 25yr (220184A19_Model_Design AMB 5-12.stsw)



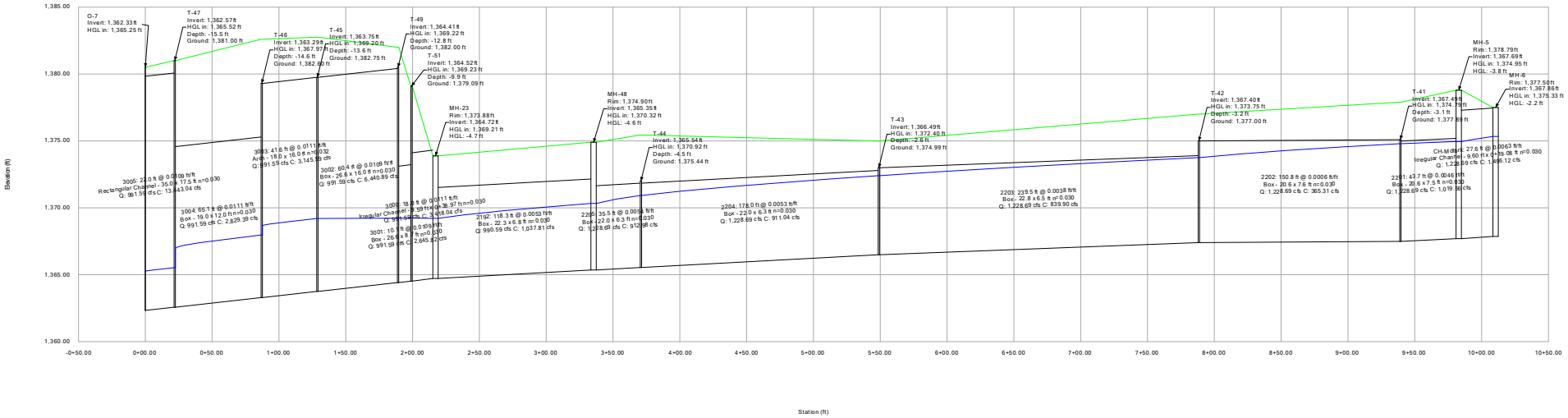
Profile Report
Engineering Profile - Project 6 - 50-yr (220184A19_Model_Design.stsw)



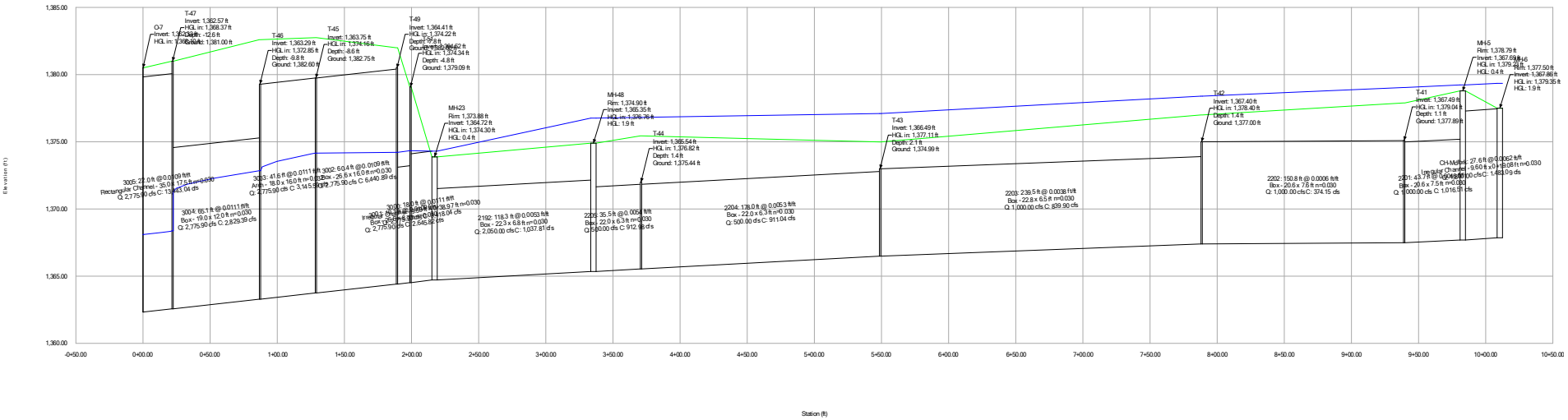
Profile Report
Engineering Profile - Project 6 - 100-yr (220184A19_Model_Design.stsw)



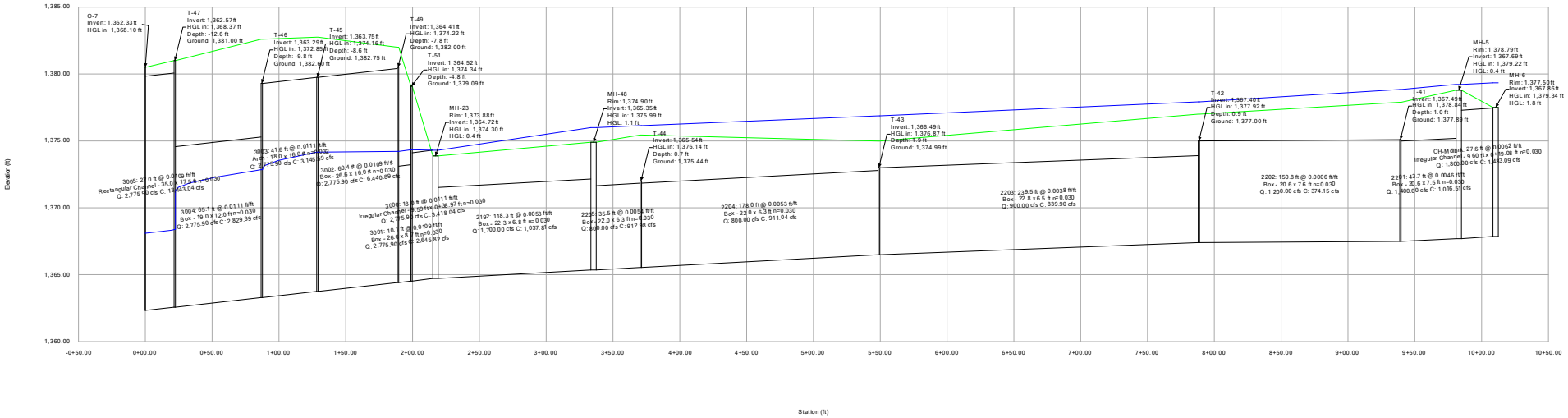
Profile Report
Engineering Profile - Project 7 - 10-yr (220184A19_Model_Design.stsw)



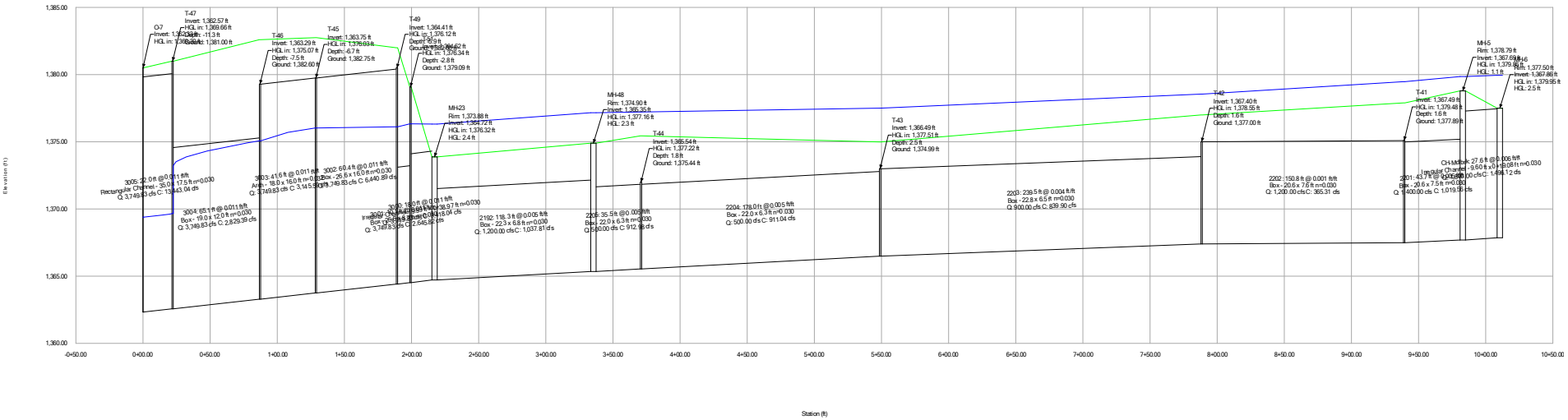
Profile Report
Engineering Profile - Project 7 - 25yr (220184A19_Model_Design AMB 5-12.stsw)



Profile Report
Engineering Profile - Project 7 - 50-yr (220184A19_Model_Design.stsw)



Profile Report
Engineering Profile - Project 7 - 100-yr (220184A19_Model_Design.stsw)



APPENDIX K

VELOCITY TABLES FOR PEYTON AND LEWIS CREEK SCENARIOS

Project 4A								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-HJ	4.28	2.61	2.96	3.54	445.00	673.00	852.00	1050.00
4000	8.44	7.22	7.22	7.22	445.00	400.00	400.00	400.00
4001	7.94	8.97	8.87	8.43	445.00	670.00	675.00	650.00
4002	9.95	11.56	12.81	14.30	445.00	673.00	852.00	1050.00
4003	10.76	12.25	13.17	14.04	445.00	673.00	852.00	1050.00
4004	14.51	16.38	17.59	18.82	445.00	673.00	852.00	1050.00
4005	15.42	17.03	18.02	18.57	445.00	673.00	852.00	1050.00
4006	16.61	18.26	19.24	20.25	445.00	673.00	852.00	1050.00
4007	15.76	16.72	17.48	12.55	445.00	673.00	852.00	1050.00
CH-CityHall	11.15	7.79	8.47	6.48	445.00	673.00	852.00	1050.00
4020	4.65	6.98	8.83	10.88	445.00	673.00	852.00	1050.00
4031	4.69	6.89	6.33	6.89	445.00	653.14	600.00	653.14

Project 4B								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-HJ	4.88	2.72	2.80	3.05	399.00	595.00	773.00	980.00
4000	8.11	9.69	7.22	7.22	399.00	535.00	400.00	400.00
4001	7.70	8.29	8.94	8.77	399.00	536.00	675.00	675.00
4002	9.59	11.03	12.24	13.73	399.00	595.00	773.00	980.00
4003	10.39	11.79	12.78	13.74	399.00	595.00	773.00	980.00
4004	14.05	15.79	17.07	18.39	399.00	595.00	773.00	980.00
4005	14.35	16.54	17.61	18.64	399.00	595.00	773.00	980.00
4006	16.18	17.77	18.83	19.88	399.00	595.00	773.00	980.00
4007	15.43	16.34	17.01	12.91	399.00	595.00	773.00	980.00
CH-CityHall	10.73	7.61	7.79	6.35	399.00	595.00	773.00	980.00
4020	4.23	6.17	8.01	10.16	399.00	595.00	773.00	980.00
4031	4.21	6.28	6.89	6.89	399.00	595.00	653.14	653.14

Project 4A+B								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-HJ	5.37	2.71	2.60	3.41	302.00	521.00	704.00	917.00
4000	7.43	9.46	7.22	7.22	302.00	521.00	400.00	400.00
4001	7.10	8.27	9.00	8.63	302.00	521.00	675.00	660.00
4002	8.73	10.51	11.77	13.26	302.00	521.00	704.00	917.00
4003	9.48	11.31	12.42	13.47	302.00	521.00	704.00	917.00
4004	12.93	15.19	16.60	18.00	302.00	521.00	704.00	917.00
4005	13.42	16.02	17.22	18.35	302.00	521.00	704.00	917.00
4006	15.16	17.24	18.45	19.57	302.00	521.00	704.00	917.00
4007	14.48	16.16	16.61	13.10	302.00	521.00	704.00	917.00
CH-CityHall	9.47	7.37	7.82	6.21	302.00	521.00	704.00	917.00
4020	3.30	5.40	7.30	9.50	302.00	521.00	704.00	917.00
4031	3.19	5.50	6.33	6.89	302.00	521.00	600.00	653.14

Project 3A								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-HJ	8.10	5.63	4.71	4.65	553.95	746.14	928.68	1132.55
4000	12.61	7.94	9.88	12.05	553.95	746.14	928.68	1132.55
4001	8.52	9.83	9.82	9.33	553.95	746.14	755.00	720.00
4002	10.74	12.06	13.35	15.07	553.95	746.14	928.68	1132.55
4003	11.53	12.64	13.52	14.37	553.95	746.14	928.68	1132.55
4004	15.47	16.89	18.07	19.31	553.95	746.14	928.68	1132.55
4005	16.26	17.46	18.40	18.67	553.95	746.14	928.68	1132.55
4006	17.48	18.68	19.63	20.45	553.95	746.14	928.68	1132.55
4007	16.34	16.85	17.68	11.72	553.95	746.14	928.68	1132.55
CH-CityHall	11.78	8.22	8.57	6.59	553.95	746.14	928.68	1132.55
4020	5.74	7.73	9.63	11.74	553.95	746.14	928.68	1132.55
4031	5.84	6.89	6.33	6.89	553.95	653.14	600.00	653.14

Project 3B								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-HJ	8.10	8.78	9.29	9.57	553.95	746.14	928.68	1132.55
4000	13.86	15.31	16.28	17.18	530.00	746.14	928.68	1132.55
4001	13.96	15.45	16.43	17.34	530.00	746.14	928.68	1132.55
4002-1	12.29	13.05	13.52	14.12	553.95	746.14	928.68	1132.55
4002-2	10.98	12.37	13.74	15.39	553.95	746.14	928.68	1132.55
4003	11.53	12.64	13.52	14.37	553.95	746.14	928.68	1132.55
4004	15.47	16.89	18.07	19.31	553.95	746.14	928.68	1132.55
4005	16.26	17.46	18.40	18.67	553.95	746.14	928.68	1132.55
4006	17.48	18.68	19.63	20.45	553.95	746.14	928.68	1132.55
4007	16.34	16.85	17.68	11.72	553.95	746.14	928.68	1132.55
CH-CityHall	11.78	8.22	8.57	6.59	553.95	746.14	928.68	1132.55
4020	5.74	7.73	9.63	11.74	553.95	746.14	928.68	1132.55
4031	5.84	6.89	6.33	6.89	553.95	653.14	600.00	653.14

Project 5								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-HJ	5.37	5.34	4.87	4.55	300.00	400.00	400.00	432.00
4000	7.41	8.36	8.12	8.33	300.00	400.00	400.00	432.00
4001	7.08	7.71	7.71	7.87	300.00	400.00	400.00	432.00
4002	8.71	9.60	9.60	9.85	300.00	400.00	400.00	432.00
4003	9.46	10.40	10.40	10.66	300.00	400.00	400.00	432.00
4004	12.91	14.06	14.06	14.38	300.00	400.00	400.00	432.00
4005	13.40	15.04	15.03	15.31	300.00	400.00	400.00	432.00
4006	15.13	16.19	16.19	16.49	300.00	400.00	400.00	432.00
4007	14.45	15.43	15.43	12.20	300.00	400.00	400.00	432.00
CH-CityHall	9.44	6.48	5.96	4.29	300.00	400.00	400.00	432.00
4020	3.28	4.15	4.15	4.48	300.00	400.00	400.00	432.00
4031	3.16	4.22	4.22	4.56	300.00	400.00	400.00	432.00

Project 2C								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	6.38	9.70	8.73	7.74	1228.69	1800.00	1800.00	1800.00
2201	7.95	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	7.85	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.29	6.75	6.07	6.07	1228.69	1000.00	900.00	900.00
2204	8.87	3.61	5.77	5.77	1228.69	500.00	800.00	800.00
2205	8.87	3.61	5.77	5.77	1228.69	500.00	800.00	800.00
2192	13.13	12.86	10.55	7.91	1990.59	1950.00	1600.00	1200.00
3000	11.29	11.40	12.60	12.54	1991.59	2941.91	3775.90	4749.83
3001	9.58	12.71	16.32	20.52	1991.59	2941.91	3775.90	4749.83
3002	9.17	10.49	12.33	13.33	1991.59	2941.91	3775.90	4749.83
3003	15.12	17.08	20.14	22.72	1991.59	2941.91	3775.90	4749.83
3004	13.80	15.61	16.88	18.15	1991.59	2941.91	3775.90	4749.83
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 2B+C								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	6.94	9.81	9.07	7.93	1,228.69	1,800.00	1,800.00	1,800.00
2201	7.95	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	7.85	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.29	6.75	6.07	6.07	1228.69	1000.00	900.00	900.00
2204	8.87	3.25	5.77	4.87	1228.69	450.00	800.00	675.00
2205	8.87	3.25	5.77	4.87	1228.69	450.00	800.00	675.00
2192	13.13	16.82	12.20	10.55	1990.59	2550.00	1850.00	1600.00
3000	13.56	14.97	14.08	13.49	1991.59	2941.91	3775.90	4749.83
3001	11.75	12.83	16.32	20.52	1991.59	2941.91	3775.90	4749.83
3002	11.19	12.38	13.22	14.06	1991.59	2941.91	3775.90	4749.83
3003	13.60	15.26	16.42	17.57	1991.59	2941.91	3775.90	4749.83
3004	13.80	15.61	16.88	18.15	1991.59	2941.91	3775.90	4749.83
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 2A+B+C								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	6.98	9.80	9.13	8.09	1228.69	1800.00	1800.00	1800.00
2201	7.95	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	7.85	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.29	6.75	6.07	4.72	1228.69	1000.00	900.00	700.00
2204	8.87	3.61	5.77	5.05	1228.69	500.00	800.00	700.00
2205	8.87	3.61	5.77	5.05	1228.69	500.00	800.00	700.00
2192	13.15	17.15	12.53	12.53	1990.59	2600.00	1900.00	1900.00
3000-Proj2A	7.70	8.45	8.99	9.54	1991.59	2941.91	3775.90	4749.83
3003	13.60	15.26	16.42	17.57	1991.59	2941.91	3775.90	4749.83
3004	13.80	15.61	16.88	18.15	1991.59	2941.91	3775.90	4749.83
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 1B+2A+B+C								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	11.50	13.10	9.52	8.87	1228.69	1800.00	1800.00	1800.00
2201	8.16	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	8.65	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.65	6.75	8.10	6.07	1228.69	1000.00	1200.00	900.00
2204	9.42	7.22	7.58	6.49	1228.69	1000.00	1050.00	900.00
2205	9.70	7.22	7.58	6.49	1228.69	1000.00	1050.00	900.00
2192-Proj1	8.51	9.14	9.60	10.08	1990.59	2940.91	3774.90	4748.83
3000-Proj2A	7.70	8.45	8.99	9.54	1991.59	2941.91	3775.90	4749.83
3003	13.60	15.26	16.42	17.57	1991.59	2941.91	3775.90	4749.83
3004	13.80	15.61	16.88	18.15	1991.59	2941.91	3775.90	4749.83
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 1A+2A+B+C								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	11.50	11.63	9.71	8.86	1228.69	1800.00	1800.00	1800.00
2201	8.16	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	8.65	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.65	6.75	6.07	6.07	1228.69	1000.00	900.00	900.00
2204	9.42	7.22	5.77	5.05	1228.69	1000.00	800.00	700.00
2205	9.70	7.22	5.77	5.05	1228.69	1000.00	800.00	700.00
2192-Proj1	8.51	10.81	11.40	7.72	1990.59	2940.91	3100.00	2100.00
3000-Proj2A	7.70	8.45	8.99	9.54	1991.59	2941.91	3775.90	4749.83
3003	13.60	15.26	16.42	17.57	1991.59	2941.91	3775.90	4749.83
3004	13.80	15.61	16.88	18.15	1991.59	2941.91	3775.90	4749.83
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 2B								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	6.66	9.88	8.6	8.69	1,228.69	1,800.00	1,800.00	1,800.00
2201	7.95	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	7.85	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.29	6.75	6.07	6.07	1228.69	1000.00	900.00	900.00
2204	8.87	3.61	5.77	3.61	1228.69	500.00	800.00	500.00
2205	8.87	3.61	5.77	3.61	1228.69	500.00	800.00	500.00
2192	13.13	13.19	7.91	7.91	1990.59	2000.00	1200.00	1200.00
3000	12.08	11.93	11.41	12.66	1991.59	2941.91	3775.90	4400.00
3001	10.10	12.71	16.32	19.01	1991.59	2941.91	3775.90	4400.00
3002	9.65	10.78	11.52	13.08	1991.59	2941.91	3775.90	4400.00
3003	14.04	15.86	16.99	16.16	1991.59	2941.91	3775.90	4400.00
3004	14.10	15.95	17.23	19.30	1991.59	2941.91	3775.90	4400.00
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 2A+B								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	6.98	9.83	8.86	8.34	1228.69	1800.00	1800.00	1800.00
2201	7.95	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	7.85	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.29	6.75	6.07	6.07	1228.69	1000.00	900.00	900.00
2204	8.87	3.61	5.77	3.61	1228.69	500.00	800.00	500.00
2205	8.87	3.61	5.77	3.61	1228.69	500.00	800.00	500.00
2192	13.15	15.83	10.88	9.89	1990.59	2400.00	1650.00	1500.00
3000-Proj2A	7.28	7.95	8.32	9.27	1991.59	2941.91	3775.90	4749.83
3003	12.71	14.21	15.07	16.99	1991.59	2941.91	3775.90	4749.83
3004	14.10	15.95	17.23	20.83	1991.59	2941.91	3775.90	4749.83
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 1B+2A+B								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	11.48	12.43	9.44	9.24	1228.69	1800.00	1800.00	1800.00
2201	8.15	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	8.62	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.57	6.75	7.42	6.07	1228.69	1000.00	1100.00	900.00
2204	9.20	7.22	6.49	3.61	1228.69	1000.00	900.00	500.00
2205	9.28	7.22	6.49	3.61	1228.69	1000.00	900.00	500.00
2192-Proj1	8.06	8.58	8.87	9.79	1990.59	2940.91	3774.90	4748.83
3000-Proj2A	7.28	7.95	8.32	9.27	1991.59	2941.91	3775.90	4749.83
3003	12.71	14.21	15.07	16.99	1991.59	2941.91	3775.90	4749.83
3004	14.10	15.95	17.23	20.83	1991.59	2941.91	3775.90	4749.83
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 1A+2A+B								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	11.48	12.26	9.47	8.83	1228.69	1800.00	1800.00	1800.00
2201	8.15	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	8.62	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.57	6.75	6.07	6.07	1228.69	1000.00	900.00	900.00
2204	9.20	3.61	5.77	3.61	1228.69	500.00	800.00	500.00
2205	9.28	3.61	5.77	3.61	1228.69	500.00	800.00	500.00
2192-Proj1	8.06	10.81	8.82	7.72	1990.59	2940.91	2400.00	2100.00
3000-Proj2A	7.28	7.95	8.32	9.27	1991.59	2941.91	3775.90	4749.83
3003	12.71	14.21	15.07	16.99	1991.59	2941.91	3775.90	4749.83
3004	14.10	15.95	17.23	20.83	1991.59	2941.91	3775.90	4749.83
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 6								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	5.06	8.01	5.84	5.21	600.00	1500.00	1150.00	1150.00
2201	3.88	6.47	7.44	6.60	600.00	1000.00	1150.00	1020.00
2202	3.83	6.39	5.75	5.75	600.00	1000.00	900.00	900.00
2203	4.05	6.75	6.07	6.07	600.00	1000.00	900.00	900.00
2204	4.33	3.61	5.77	3.61	600.00	500.00	800.00	500.00
2205	4.33	3.61	5.77	3.61	600.00	500.00	800.00	500.00
2192	13.13	13.19	7.91	7.91	1990.59	2000.00	1200.00	1200.00
3000	11.29	11.42	11.53	11.90	1991.59	2941.91	3775.90	4749.83
3001	9.58	12.71	16.32	20.52	1991.59	2941.91	3775.90	4749.83
3002	9.17	10.49	11.61	12.83	1991.59	2941.91	3775.90	4749.83
3003	15.12	17.10	19.13	22.09	1991.59	2941.91	3775.90	4749.83
3004	14.10	15.95	17.23	20.83	1991.59	2941.91	3775.90	4749.83
3005	12.28	14.01	15.20	16.36	1991.59	2941.91	3775.90	4749.83

Project 7								
Pipe Name	Velocity				Discharge			
	10-year	25-year	50-year	100-year	10-year	25-year	50-year	100-year
CH-Mdlbrk	11.53	10.06	9.95	9.34	1,228.69	1,800.00	1,800.00	1,800.00
2201	8.19	6.47	9.06	9.06	1228.69	1000.00	1400.00	1400.00
2202	8.69	6.39	7.66	7.66	1228.69	1000.00	1200.00	1200.00
2203	8.74	6.75	6.07	6.07	1228.69	1000.00	900.00	900.00
2204	9.79	3.61	5.77	3.61	1228.69	500.00	800.00	500.00
2205	10.74	3.61	5.77	3.61	1228.69	500.00	800.00	500.00
2192	9.28	13.19	11.21	7.91	990.59	2000.00	1700.00	1200.00
3000	10.29	11.58	11.58	11.80	991.59	2775.90	2775.90	3749.83
3001	7.83	12.00	12.00	16.20	991.59	2775.90	2775.90	3749.83
3002	7.28	10.33	10.33	11.76	991.59	2775.90	2775.90	3749.83
3003	11.97	16.76	16.76	19.30	991.59	2775.90	2775.90	3749.83
3004	11.29	15.66	15.66	17.22	991.59	2775.90	2775.90	3749.83
3005	9.60	13.74	13.74	15.17	991.59	2775.90	2775.90	3749.83