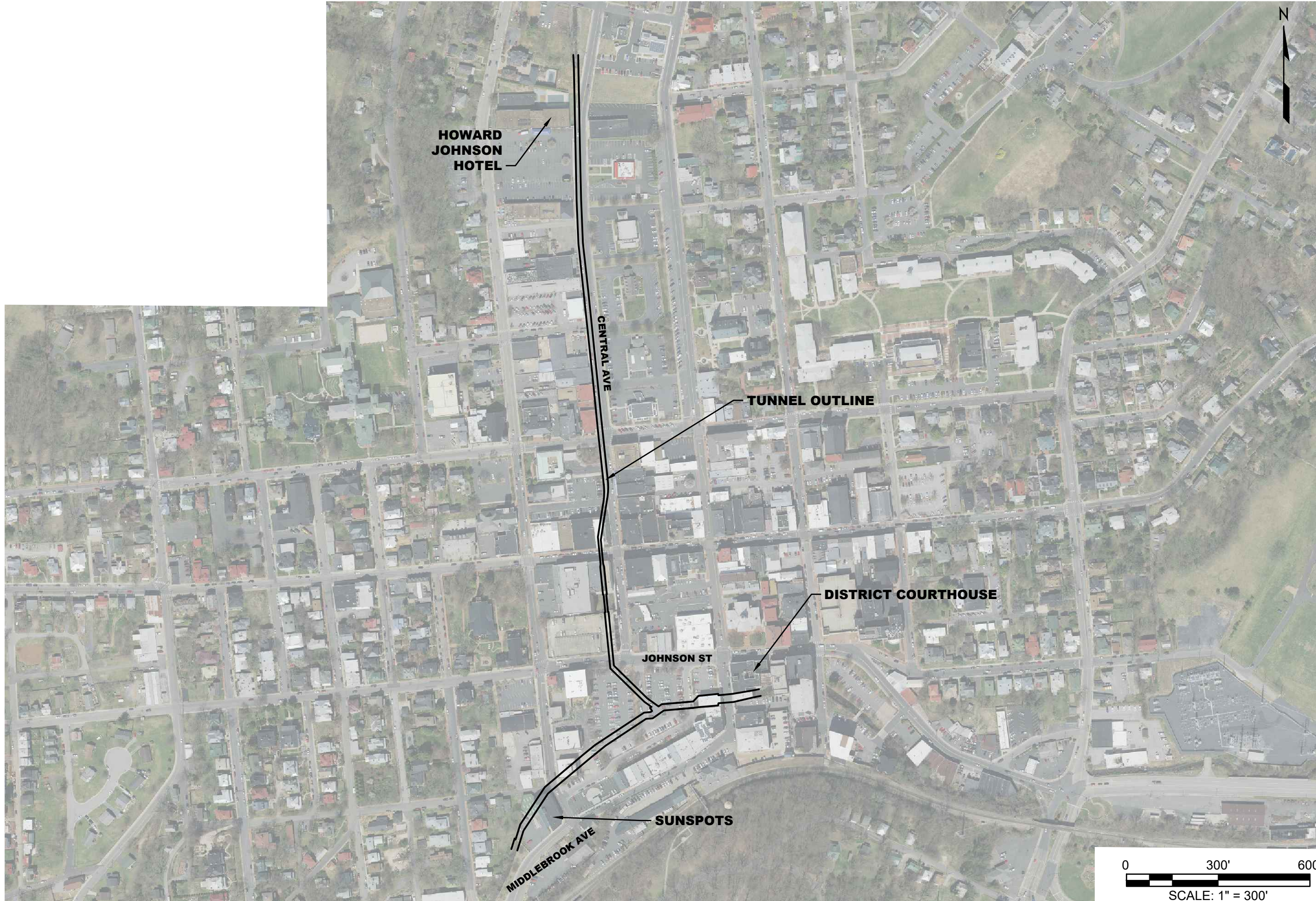
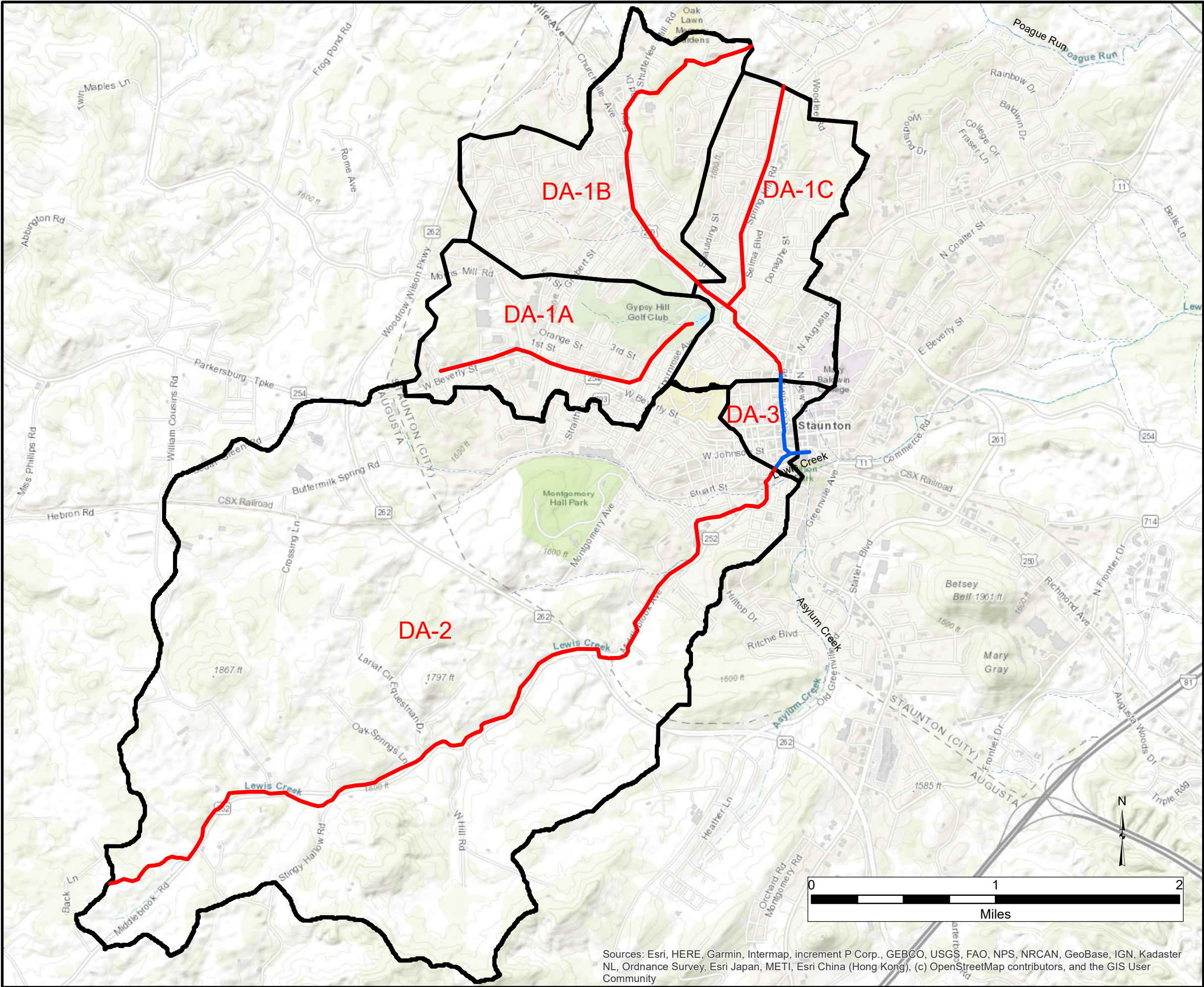


APPENDIX A

DRAINAGE AREA INFORMATION



PROJECT		TITLE	
STAUNTON FLOOD STUDY		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



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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.

METHOD	DRAINAGE AREA SIZE					
	0	200 ac.	640 ac.	2000 ac.	20 sq. mi.	20 sq. mi. +
Rational Formula						
TR-55 (NRCS)						
EFH-2 (NRCS)						
Snyder (ASCE) & Anderson (USGS)						
Reg. Equations - Rural (USGS)						
Reg Equations - Urban (USGS)						
Stream Gage Data						
	- Range of applicability					

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

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.

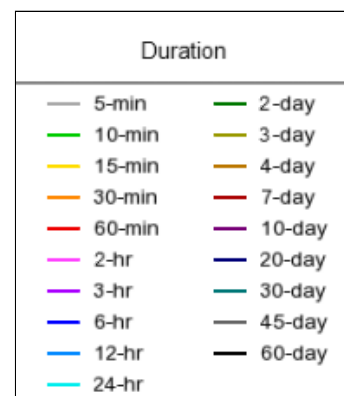
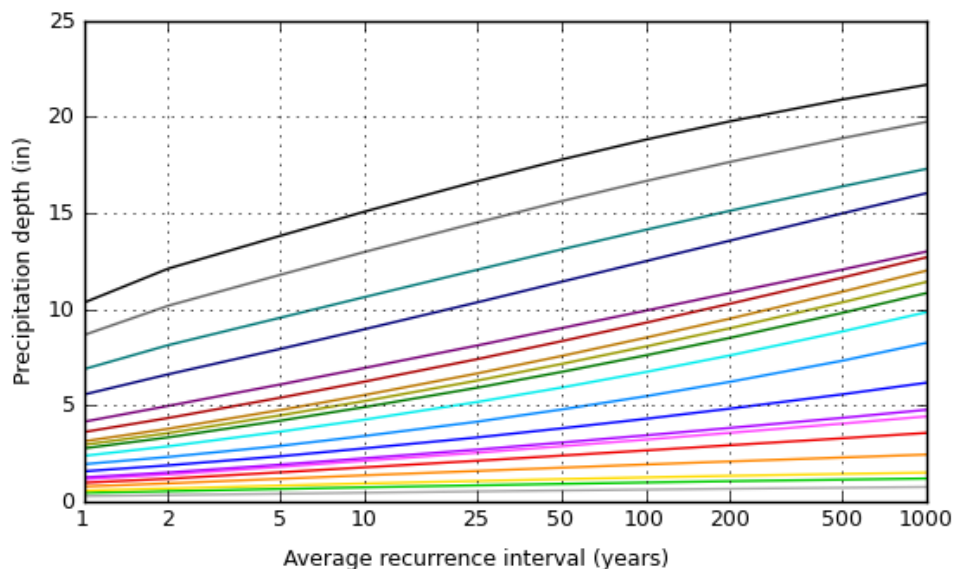
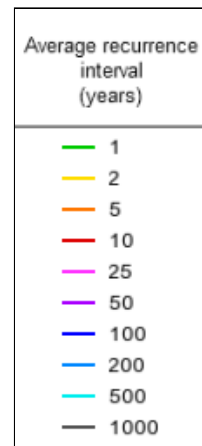
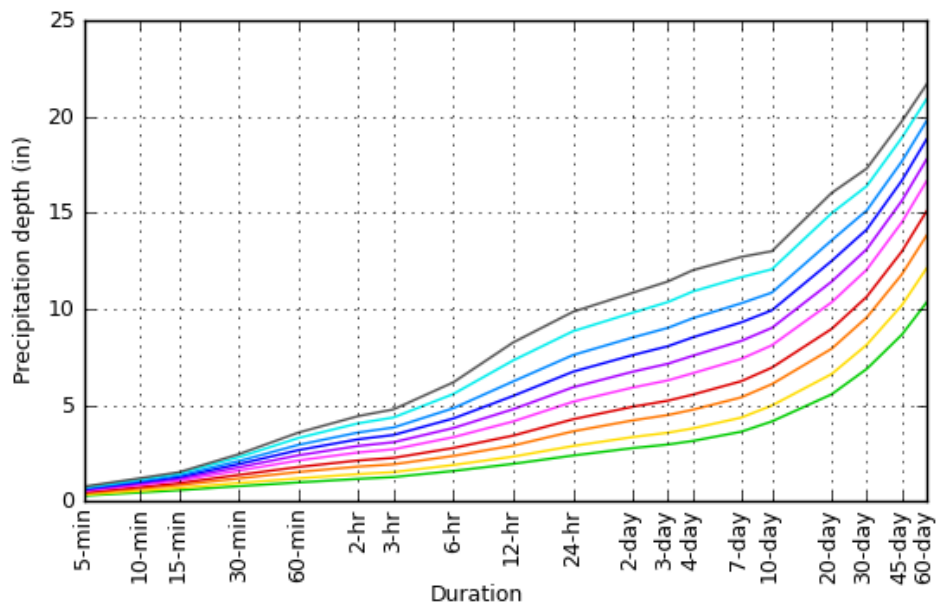
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves

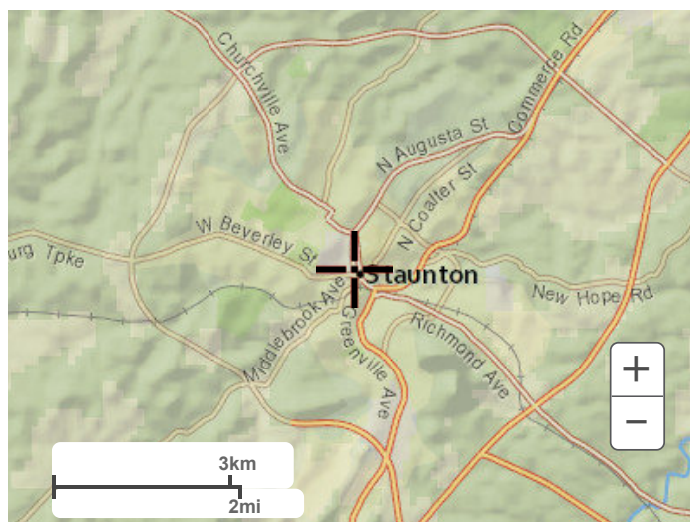
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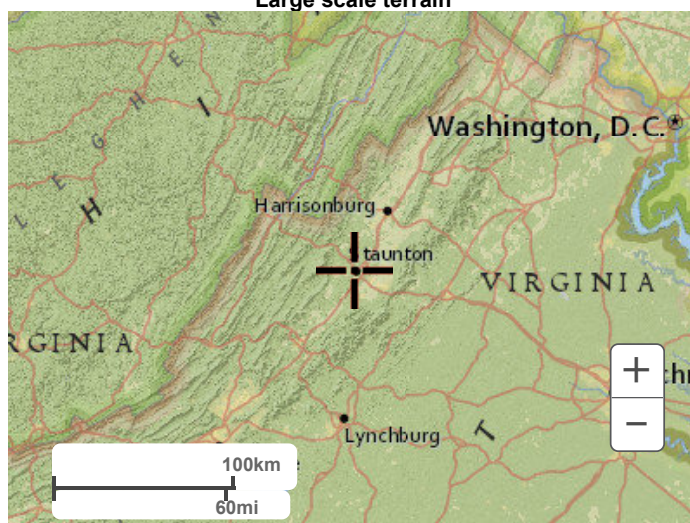
NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Fri Feb 26 12:09:39 2021

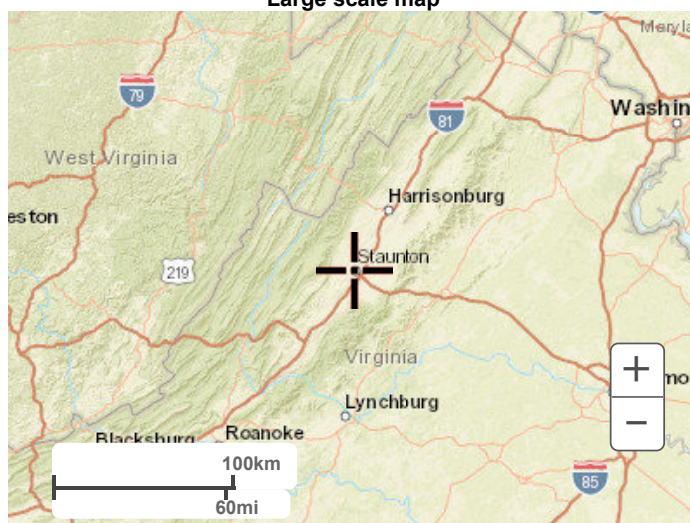
[Back to Top](#)**Maps & arials****Small scale terrain**



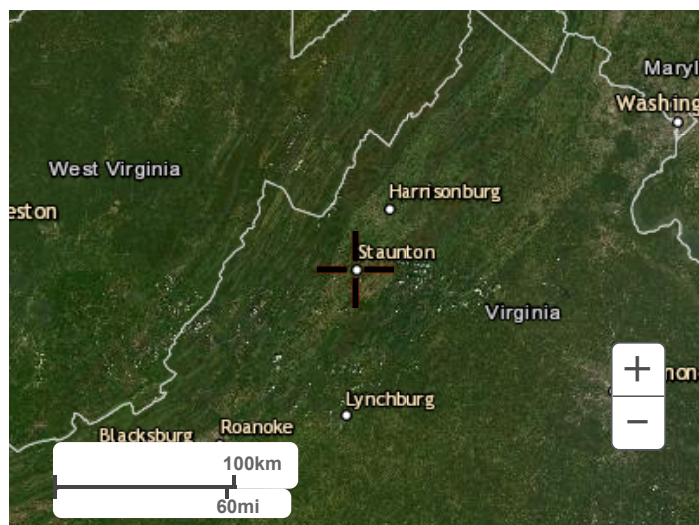
Large scale terrain



Large scale map



Large scale aerial

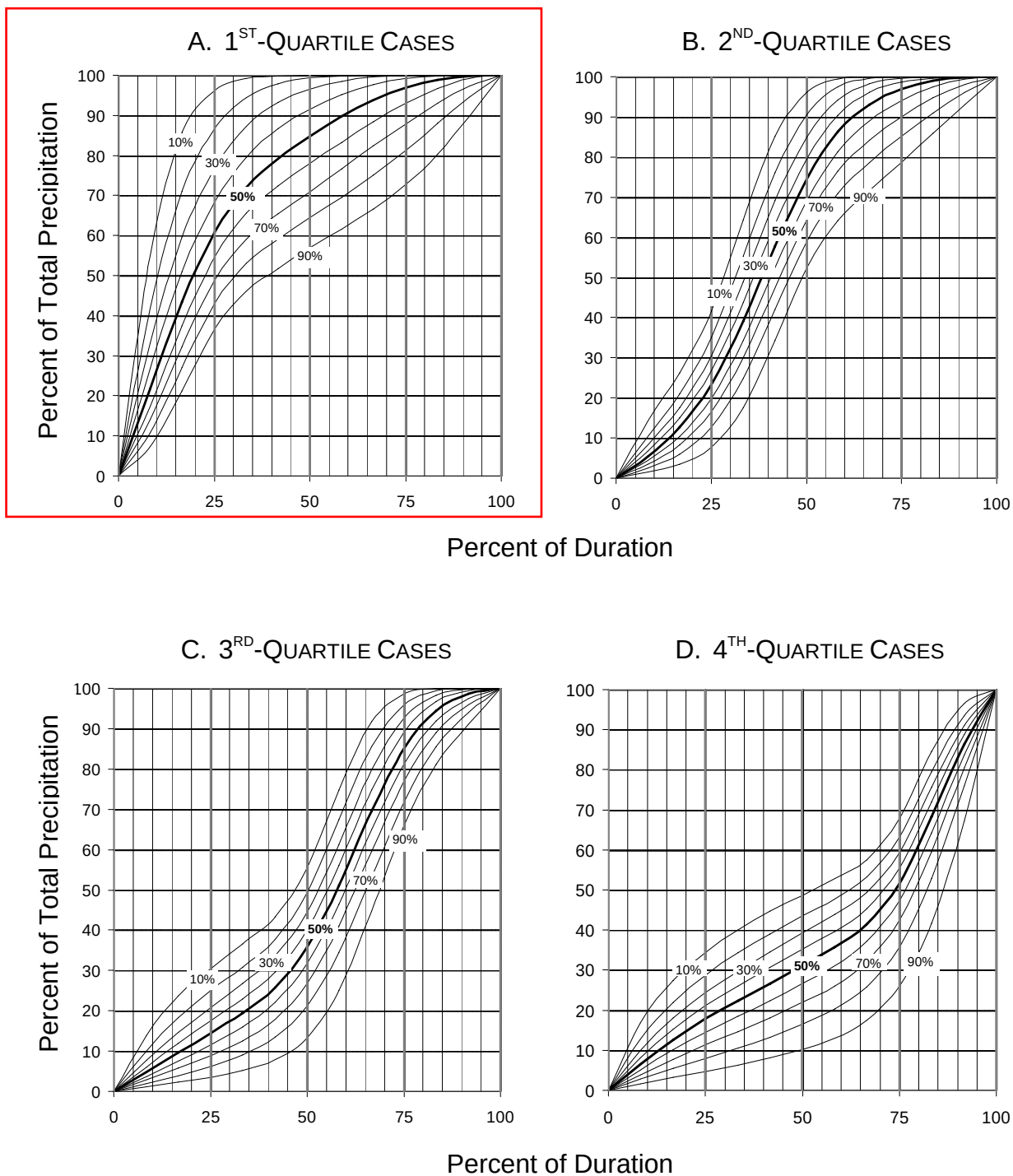


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FIGURE A.1.4
TEMPORAL DISTRIBUTION: 24-HOUR DURATION



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

Label	100-yr temporal	End Time	24.000 hours
Return Event	100 years	Depth	6.8 in
Start Time	0.000 hours	Storm Event Depth Type	Cumulative

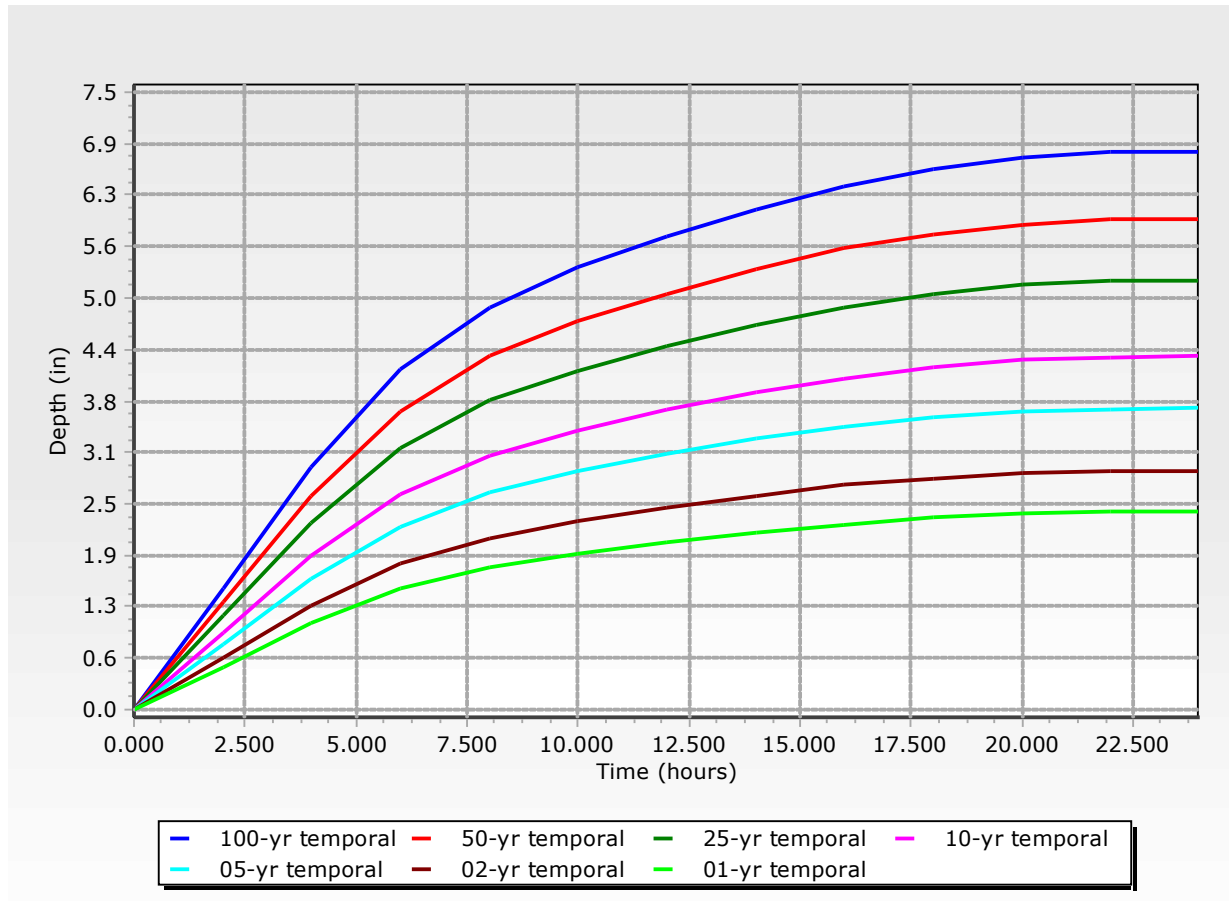
Storm Data Detailed Report: NOAA Temporal 50%, 1st quartile

100-yr temporal

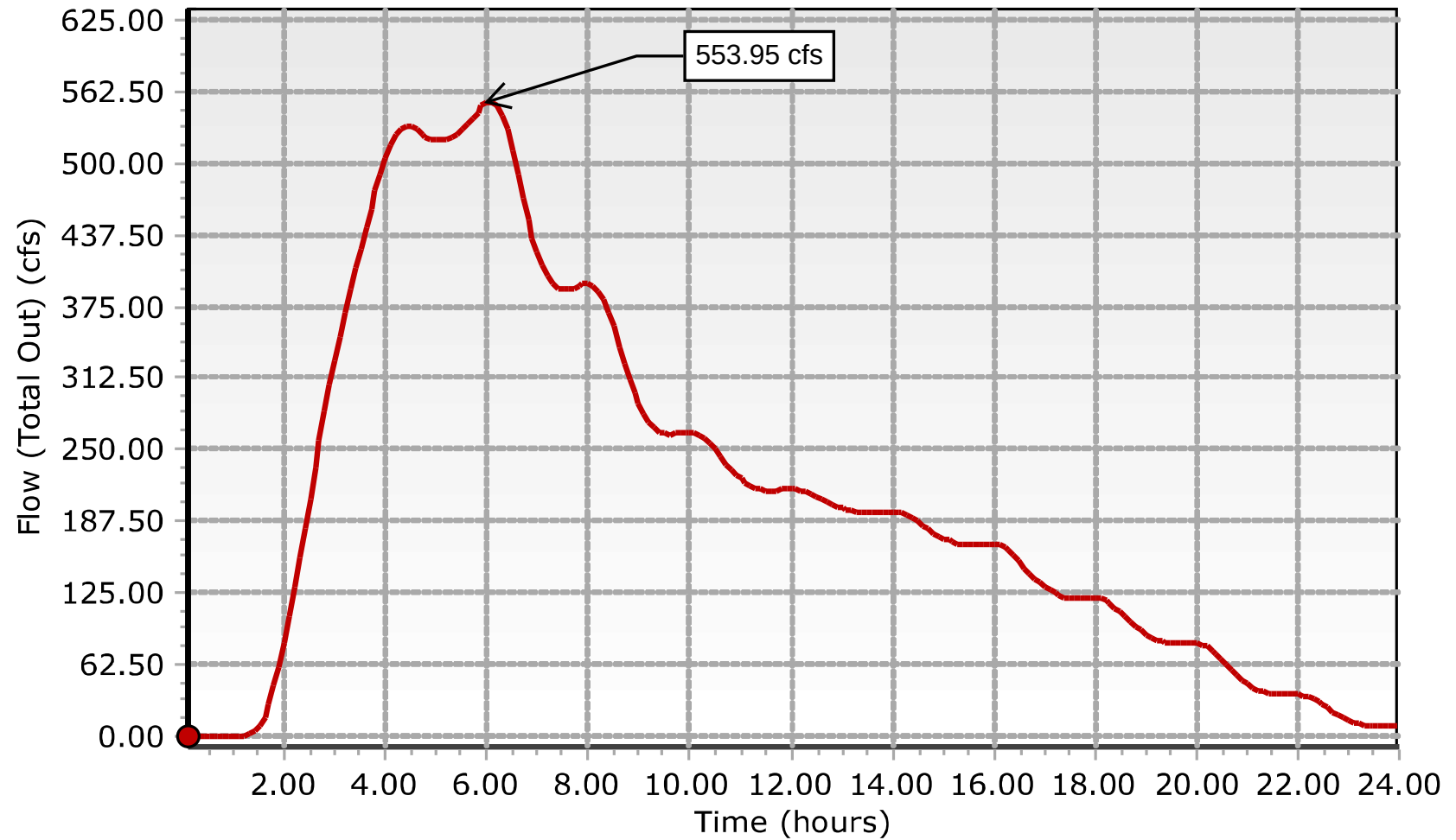
Increment 2.000 hours

100-yr temporal

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	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)	

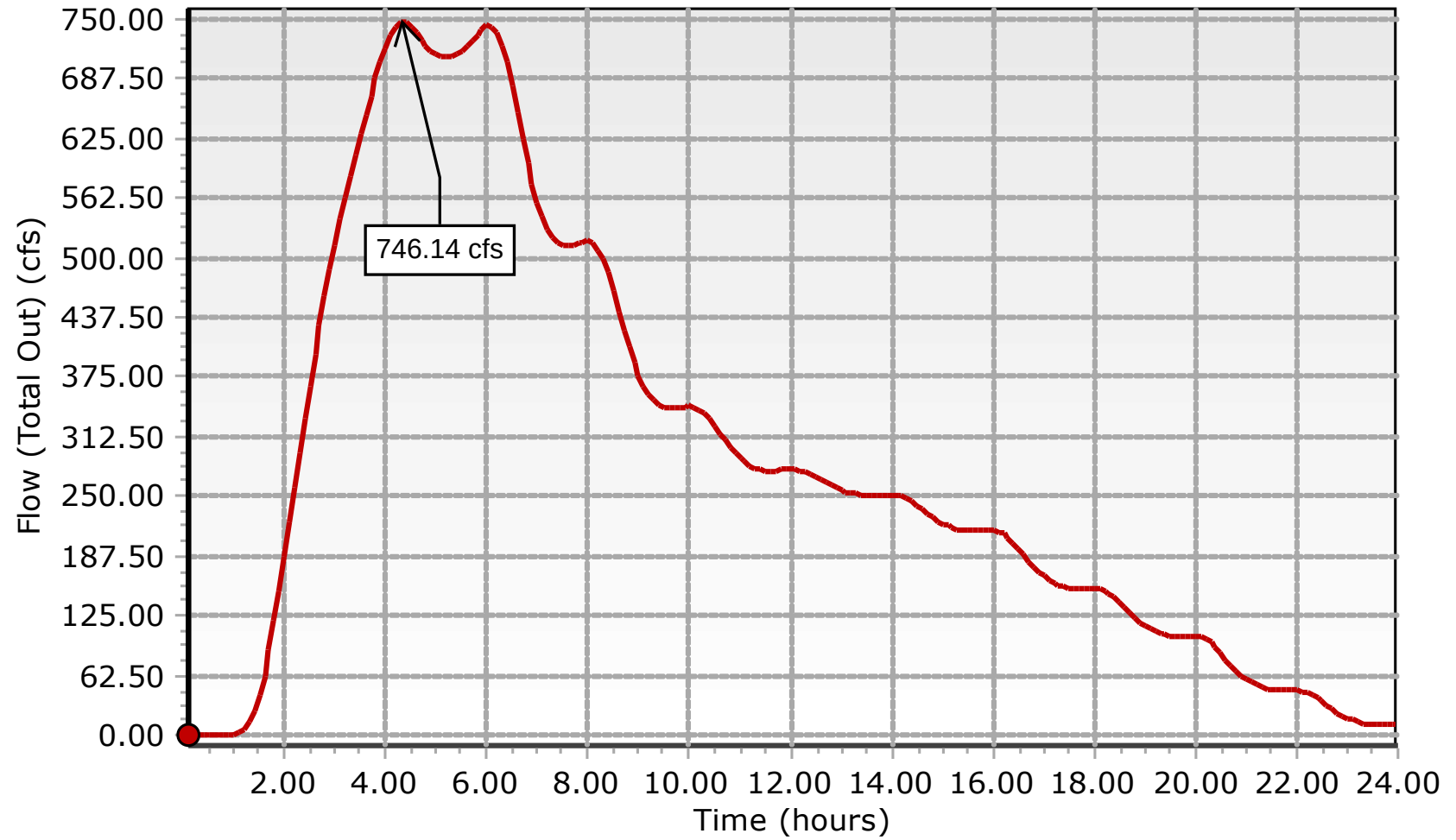


DA-1 Runoff Hydrograph - 10-year



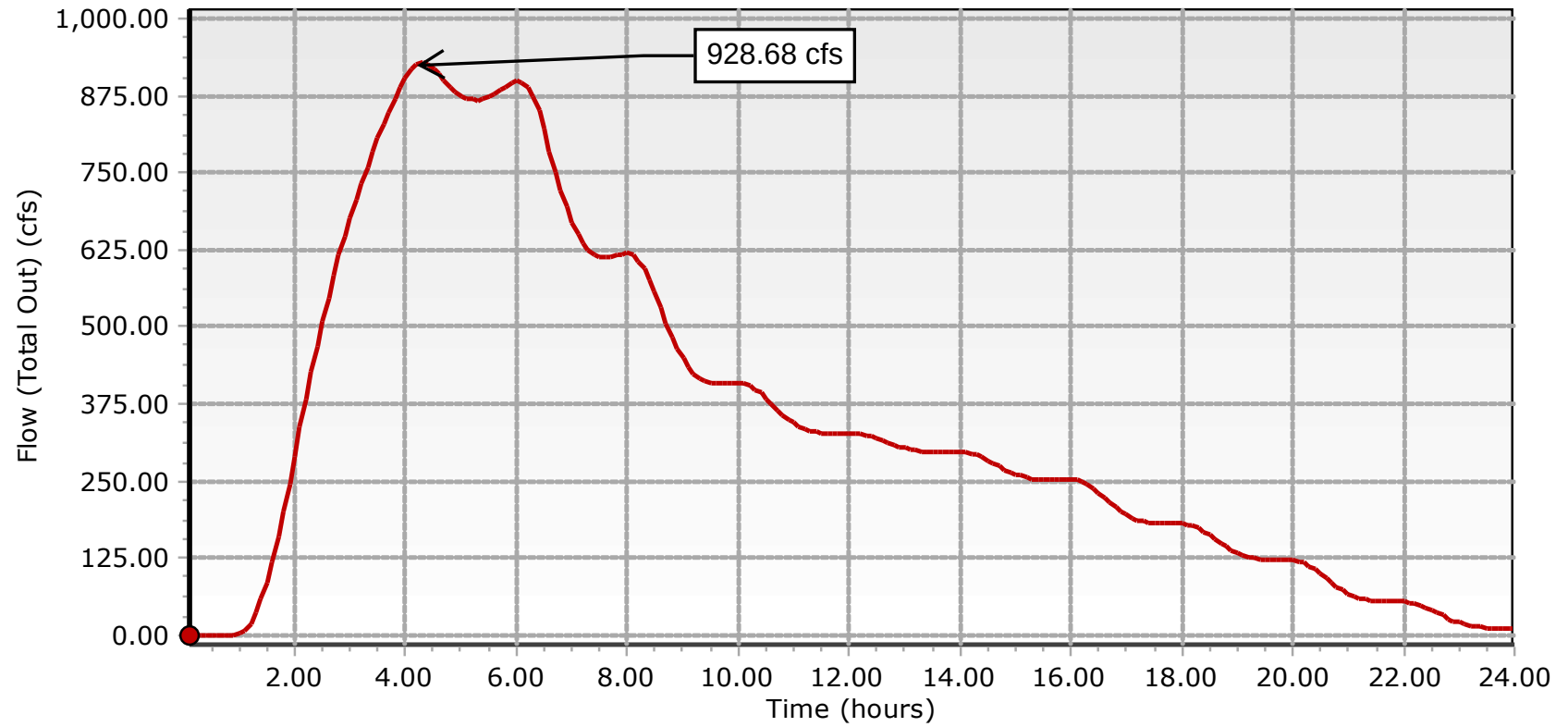
— DA-1 - SWMM model - Flow (Total Out)

DA-1 Runoff Hydrograph - 25-year



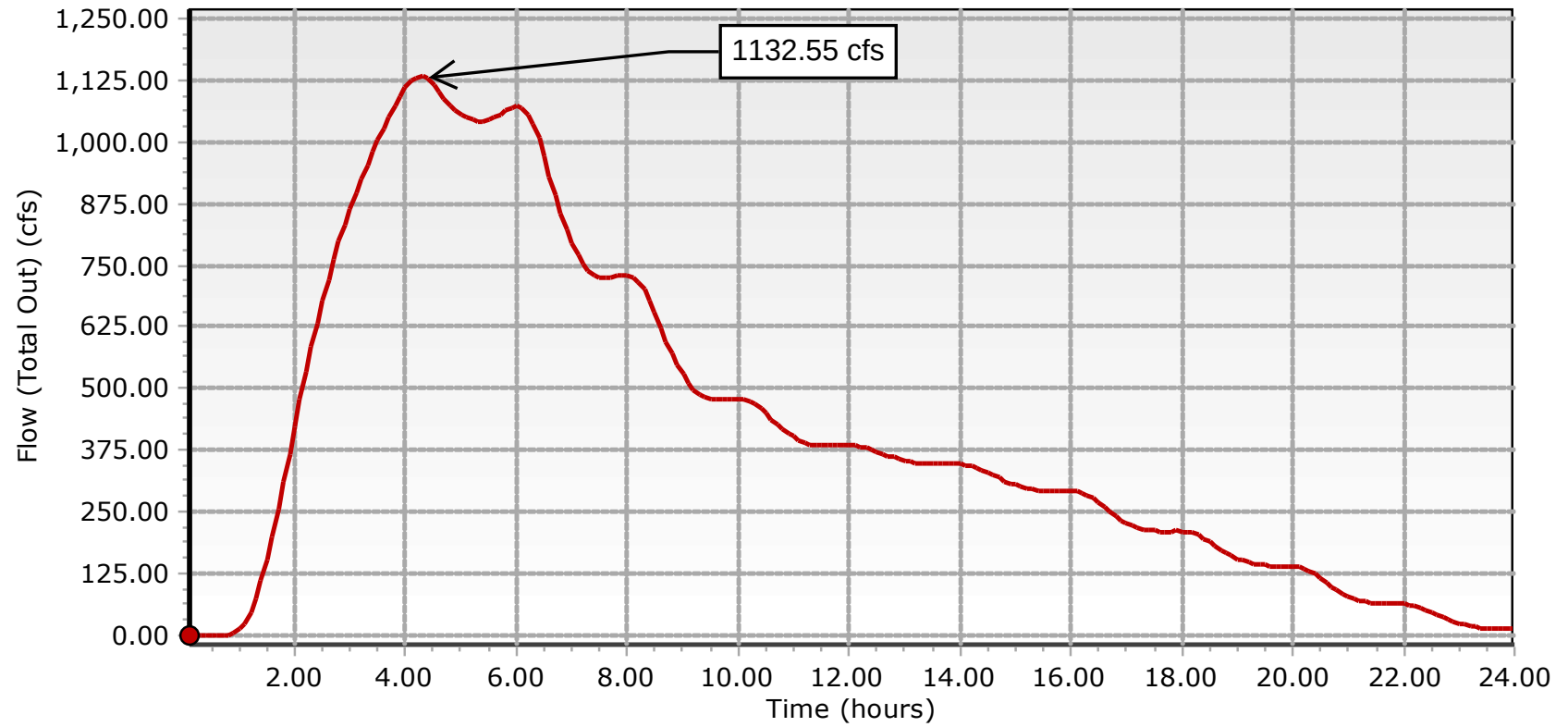
— DA-1 - SWMM model - Flow (Total Out)

DA-1 Runoff Hydrograph - 50-year



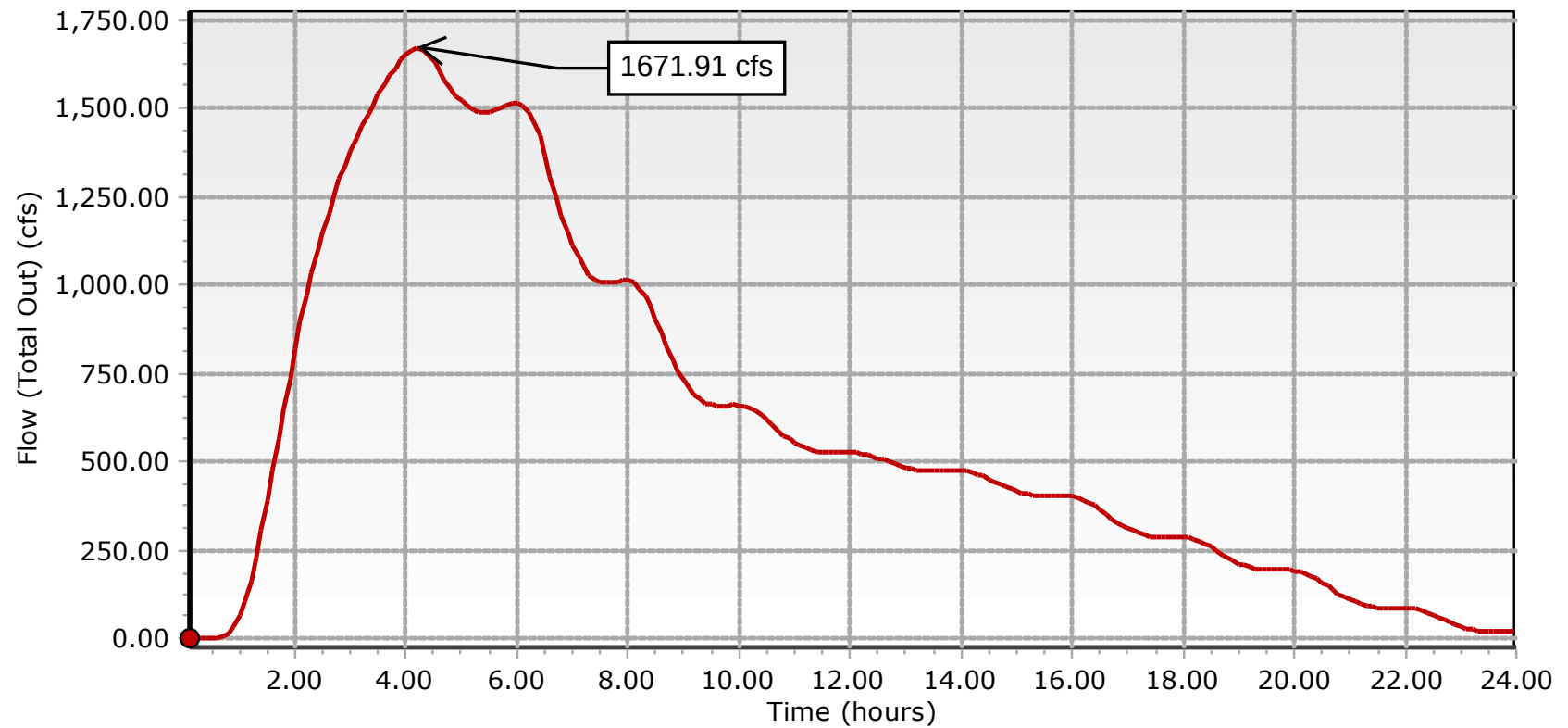
— DA-1 - SWMM model - Flow (Total Out)

DA-1 Runoff Hydrograph - 100-year



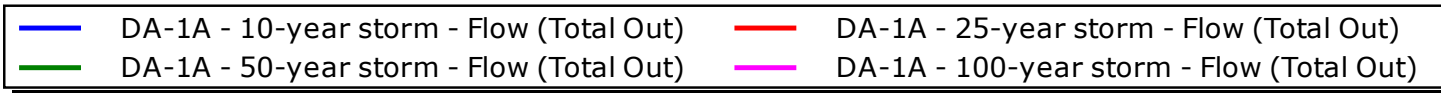
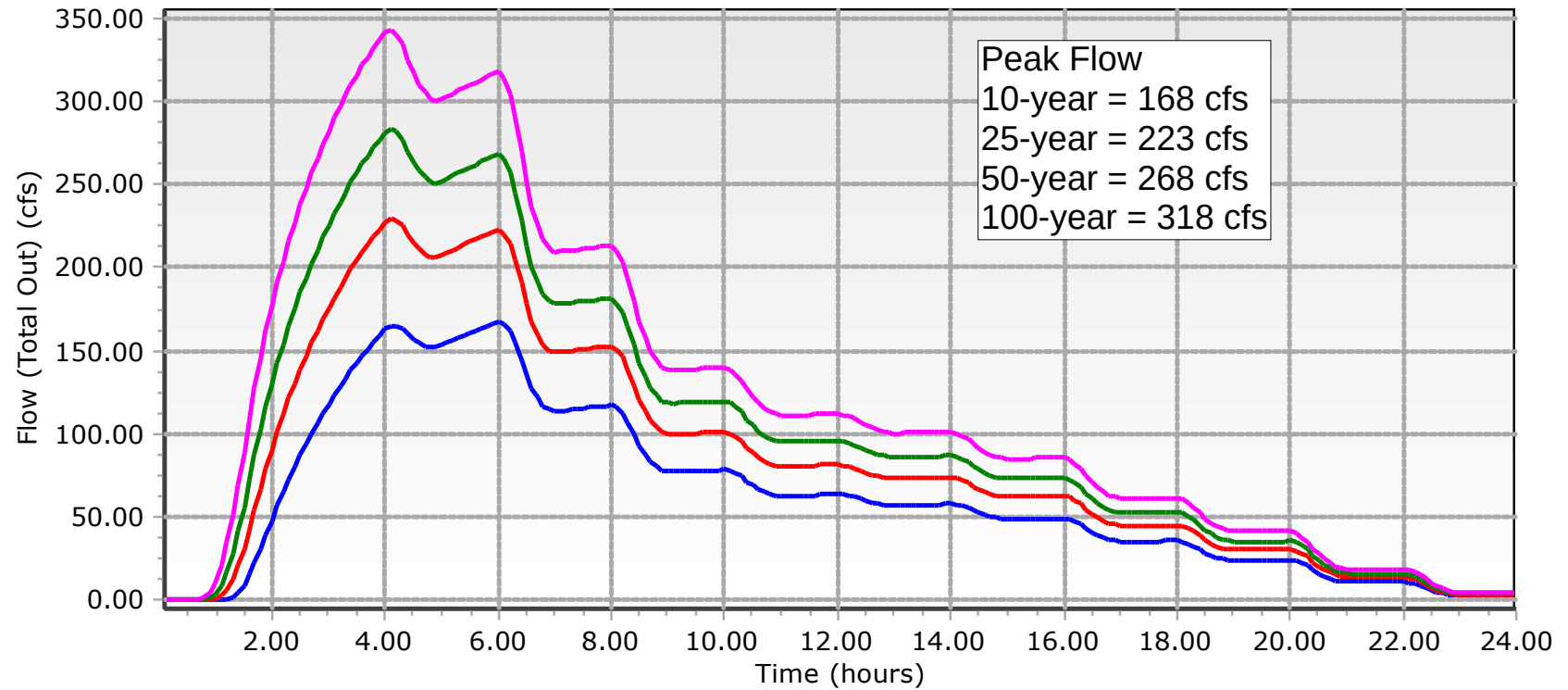
— DA-1 - SWMM model - Flow (Total Out)

DA-1 Runoff Hydrograph - 500-year

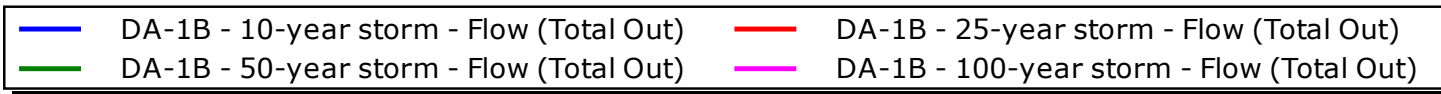
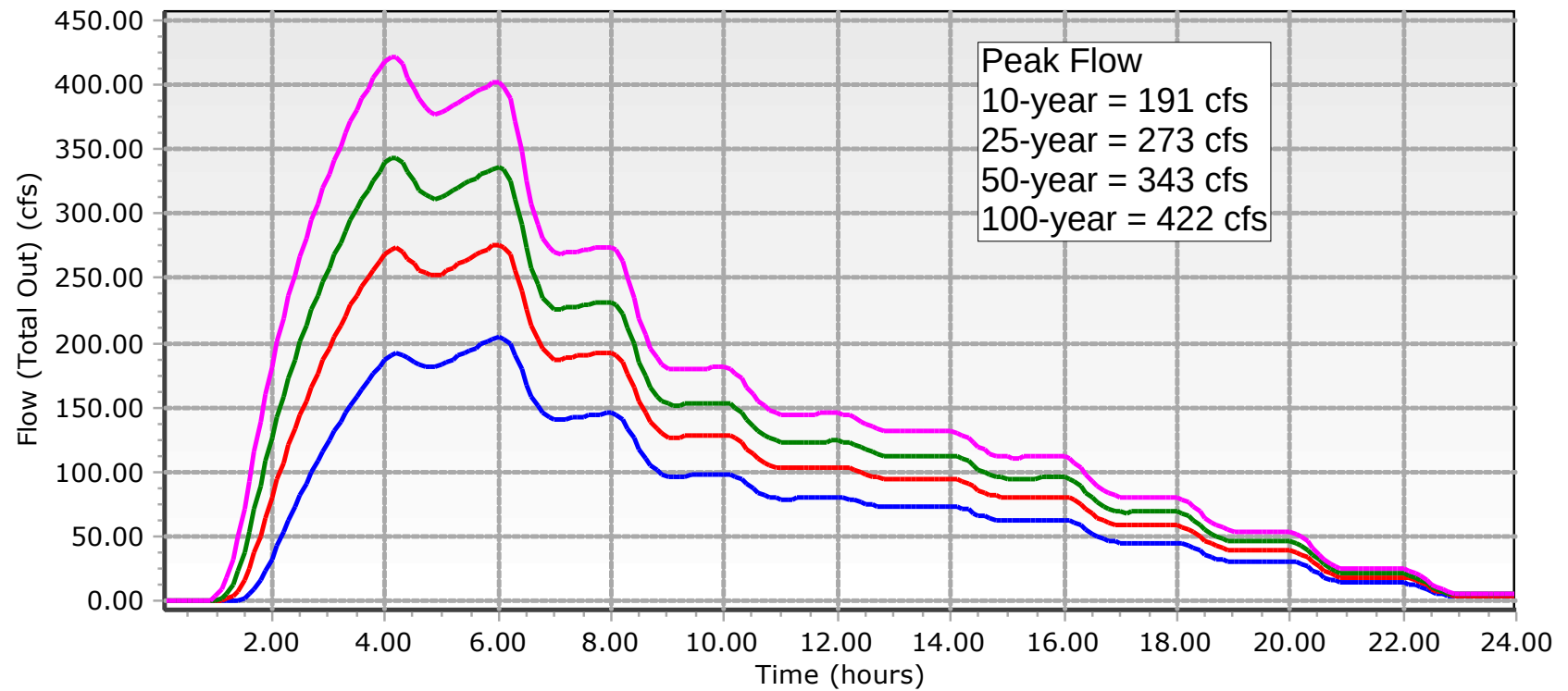


— DA-1 - SWMM model - Flow (Total Out)

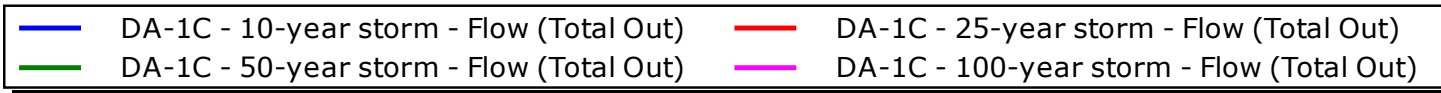
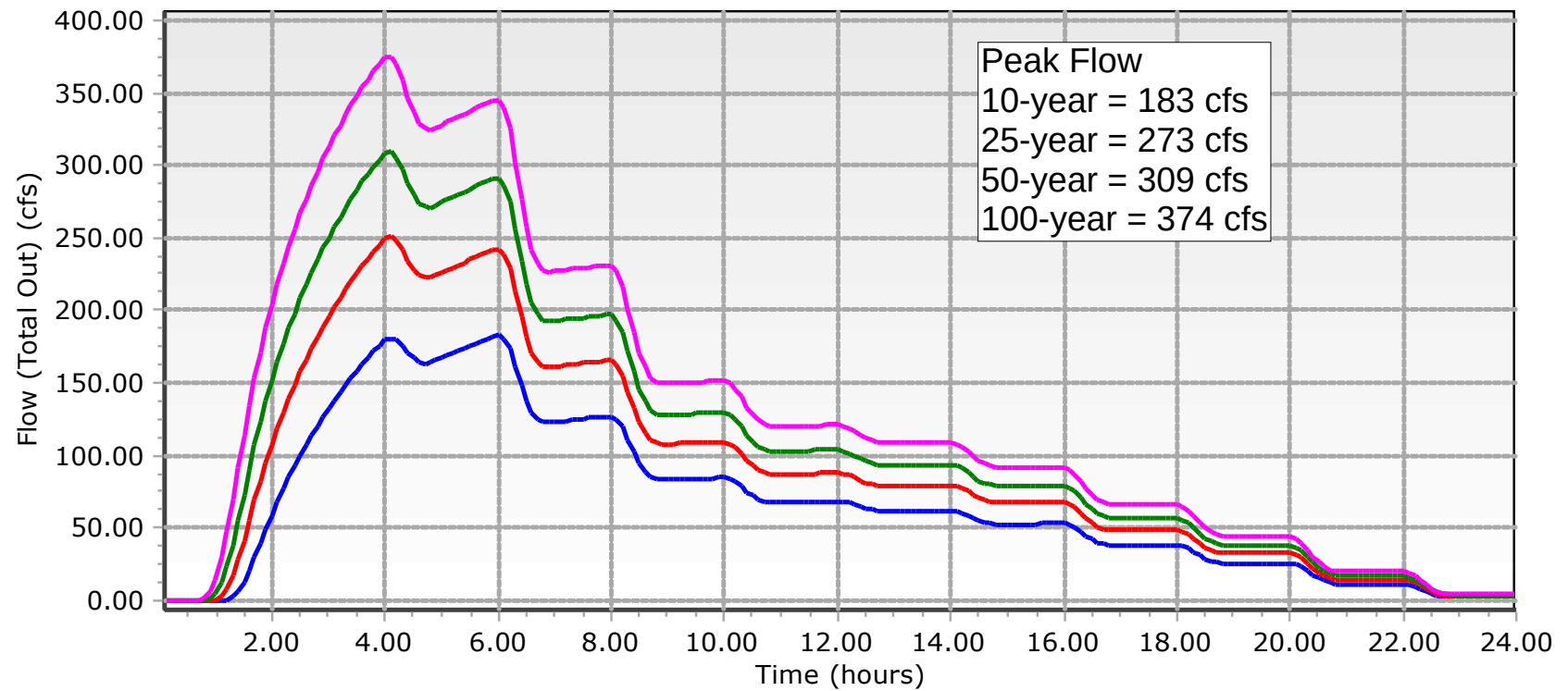
DA-1A - Flow Out



DA-1B - Flow Out

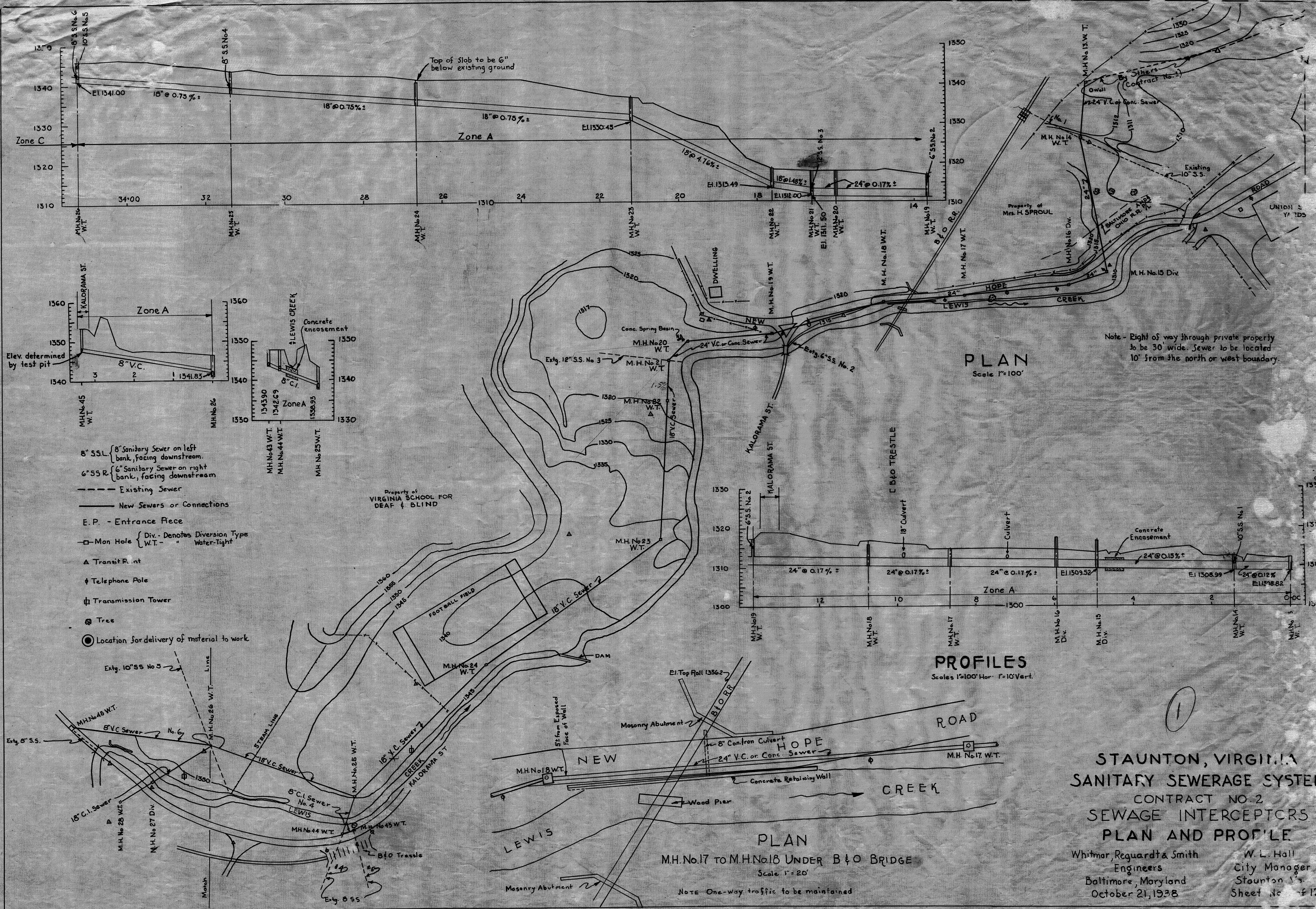


DA-1C - Flow Out



APPENDIX C

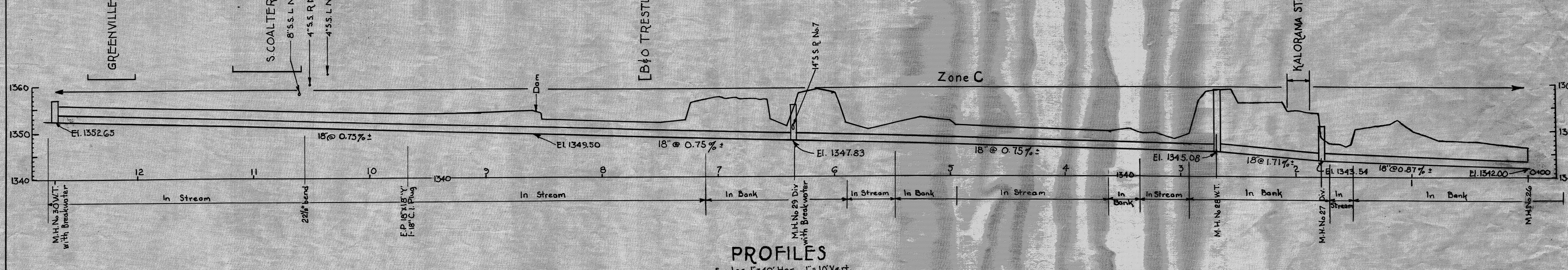
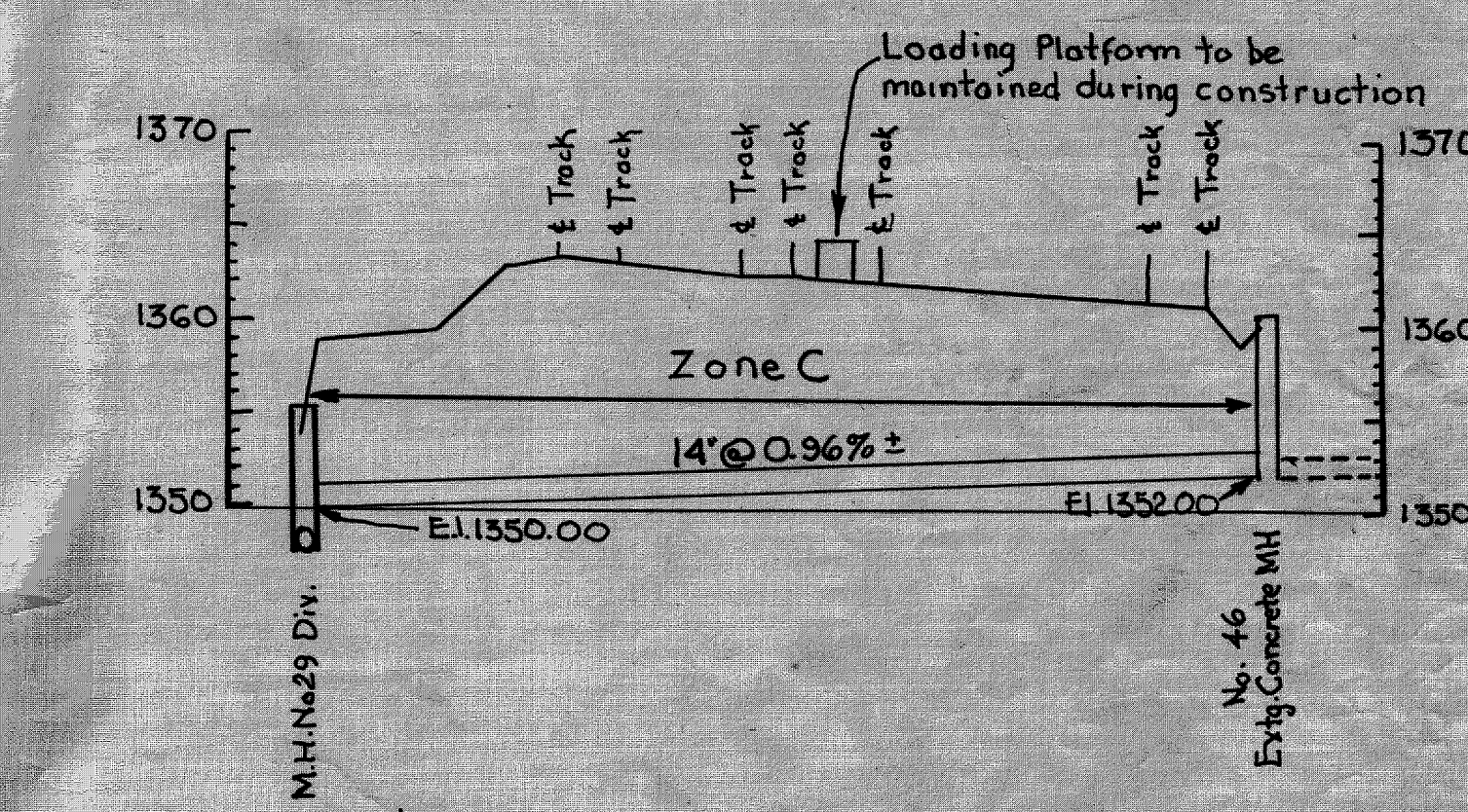
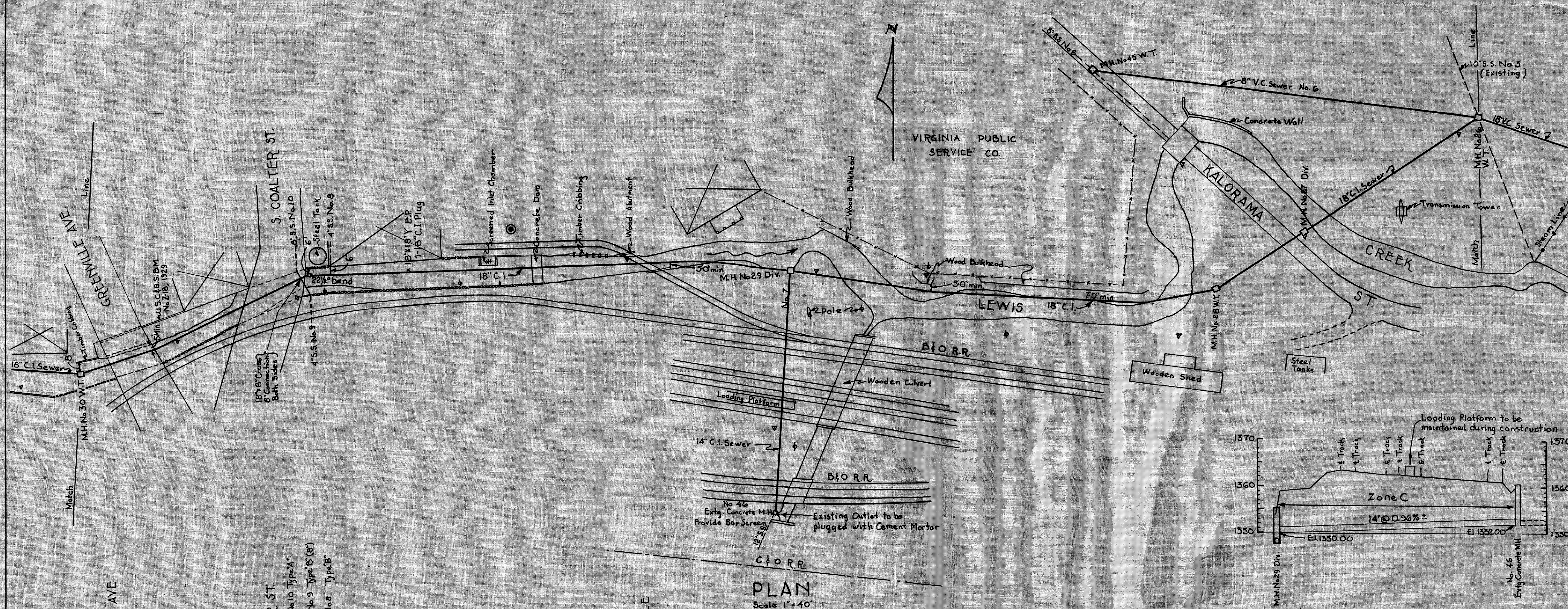
PLANS OF STAUNTON TUNNELS



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

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

W. L. Hall
City Manager
Staunton, Va.
Sheet No. 412



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.

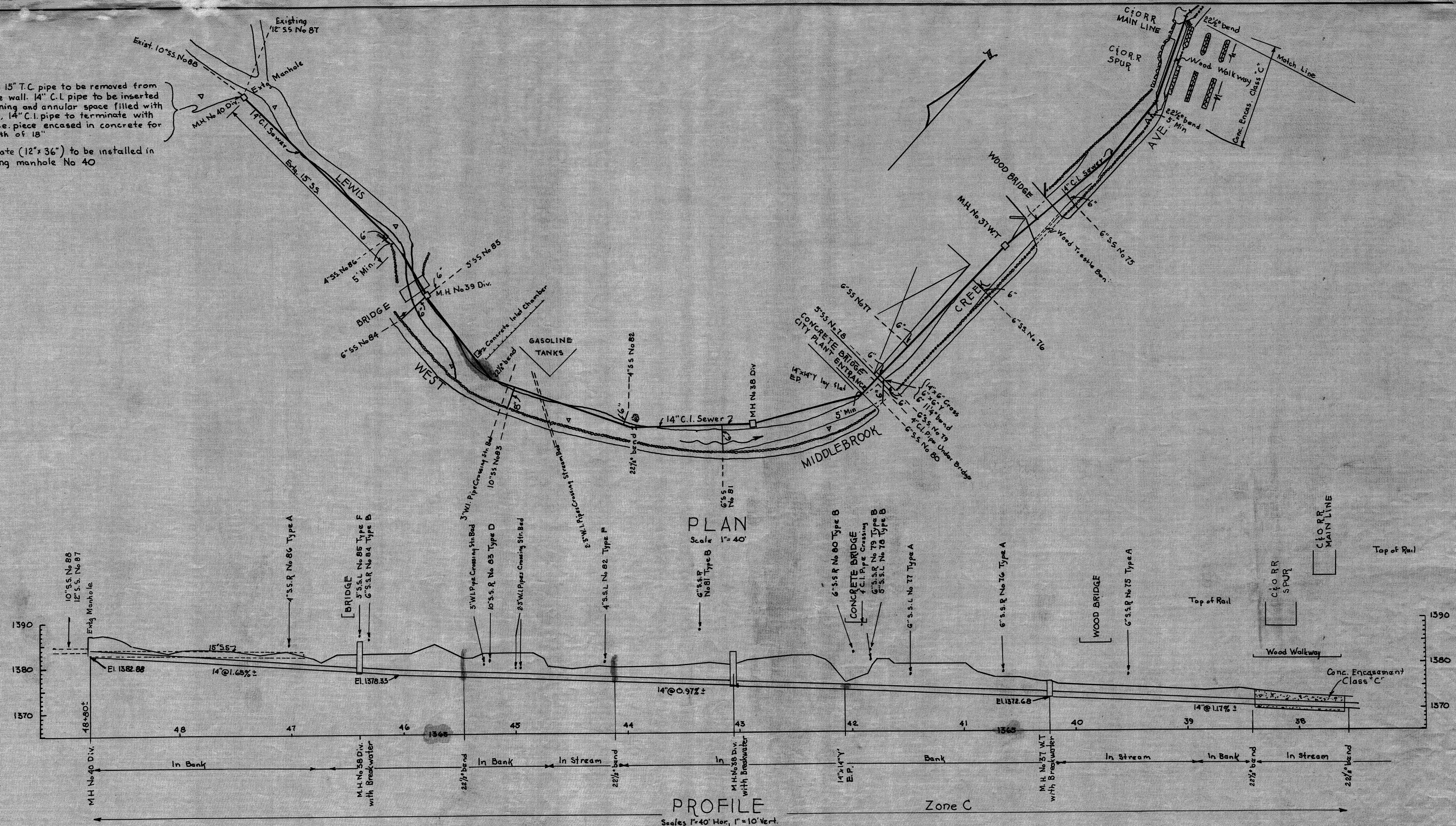
STAUNTON, VIRGINIA SANITARY SEWERAGE SYSTEM CONTRACT NO. 2 SEWAGE INTERCEPTORS PLAN AND PROFILE

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

W.L. Hall
City Engineer
Staunton, Va.
Sheet No. 2 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'

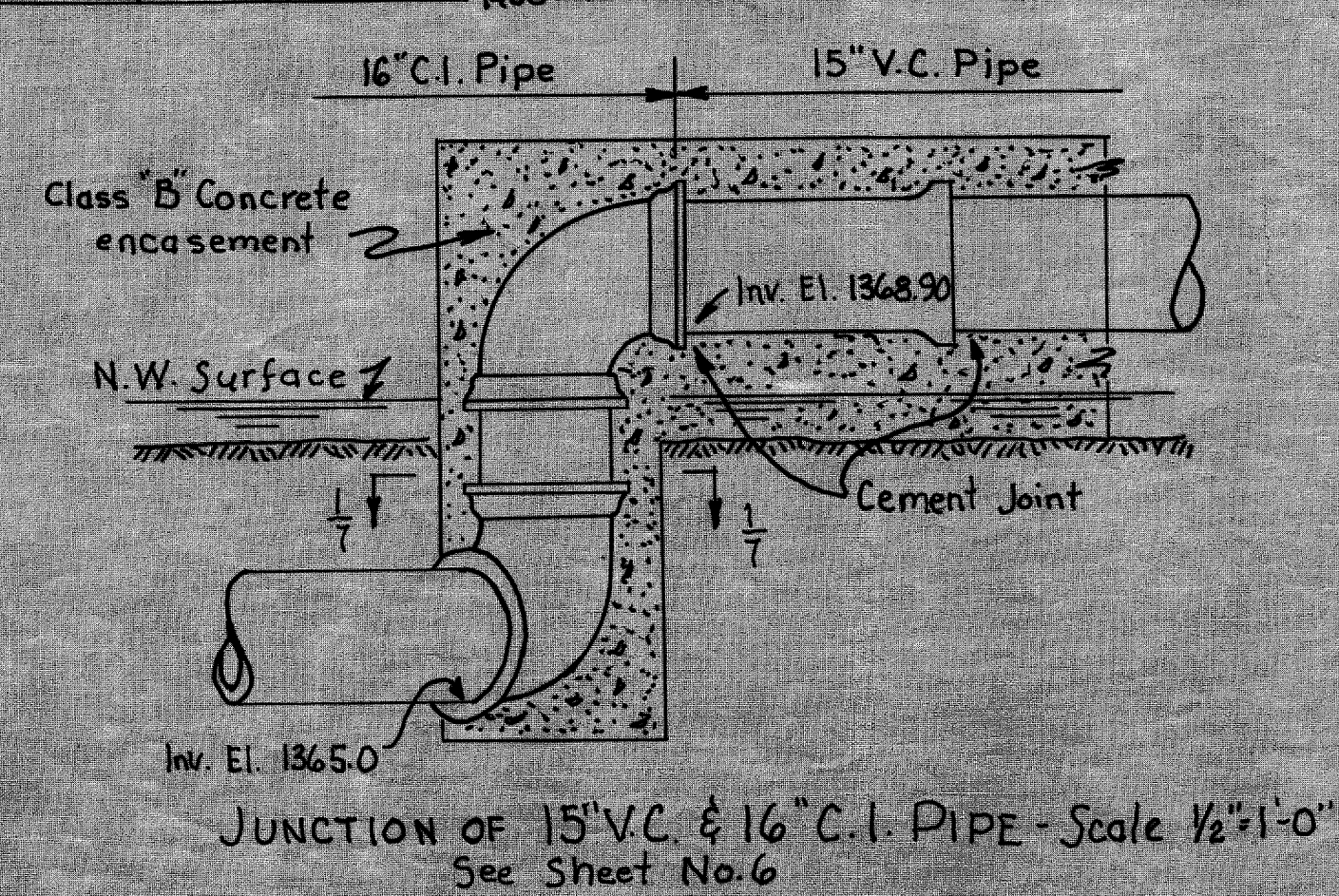
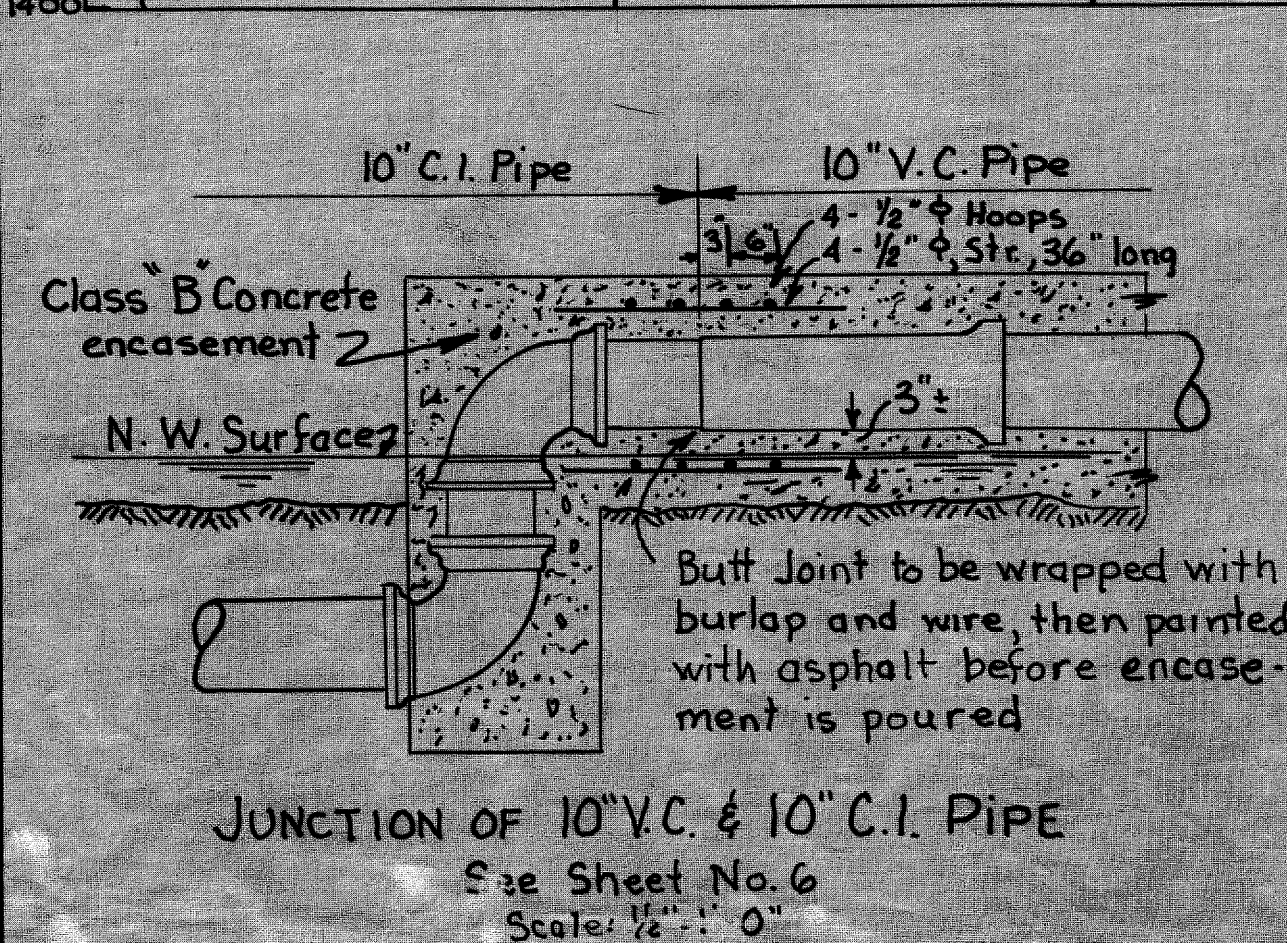
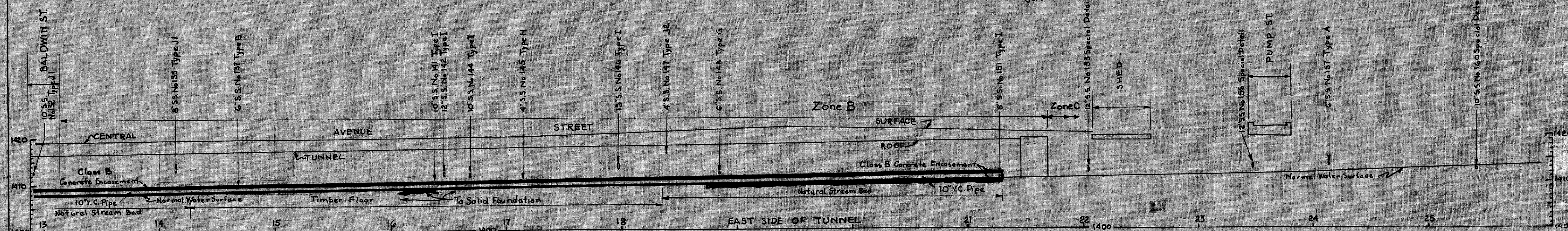
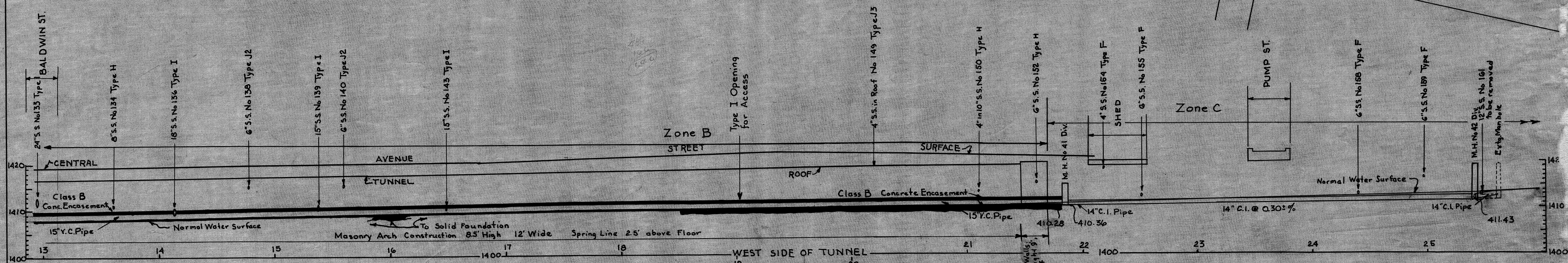
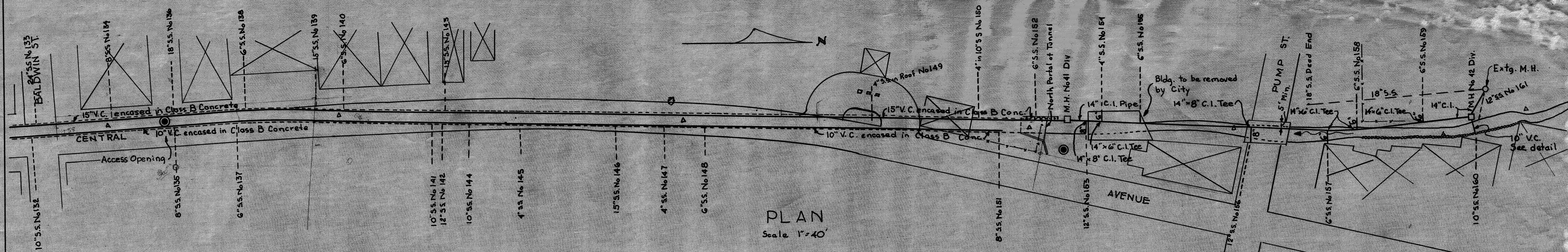
Tide Gate (12" x 36") to be installed in existing manhole No 40



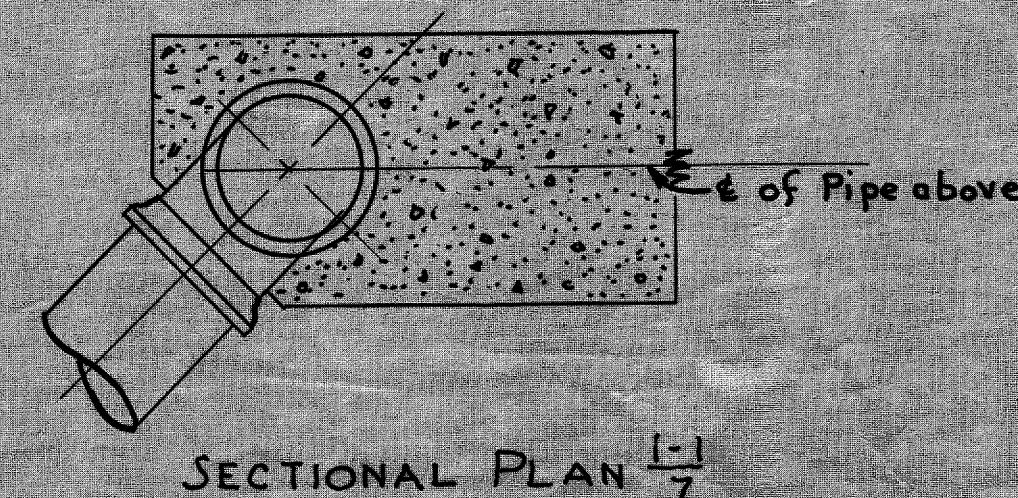
**STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO 2
SEWAGE INTERCEPTORS
PLAN AND PROFILE**

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

W. L. Hall
City Manager
Staunton, Va.
Sheet No. 5 of 1



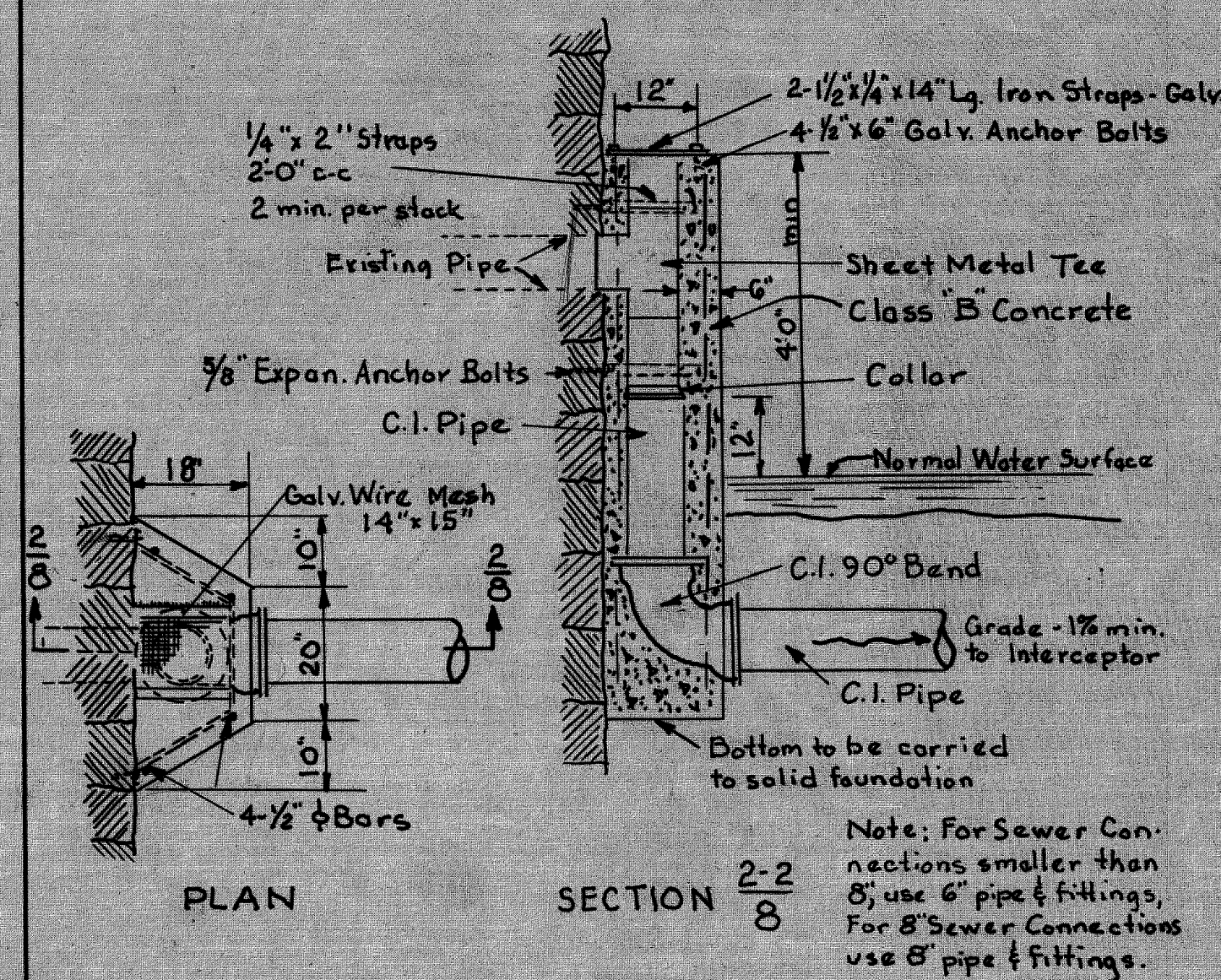
PROFILES
Scales 1"=40' Hor.; 1"=10' Vert.



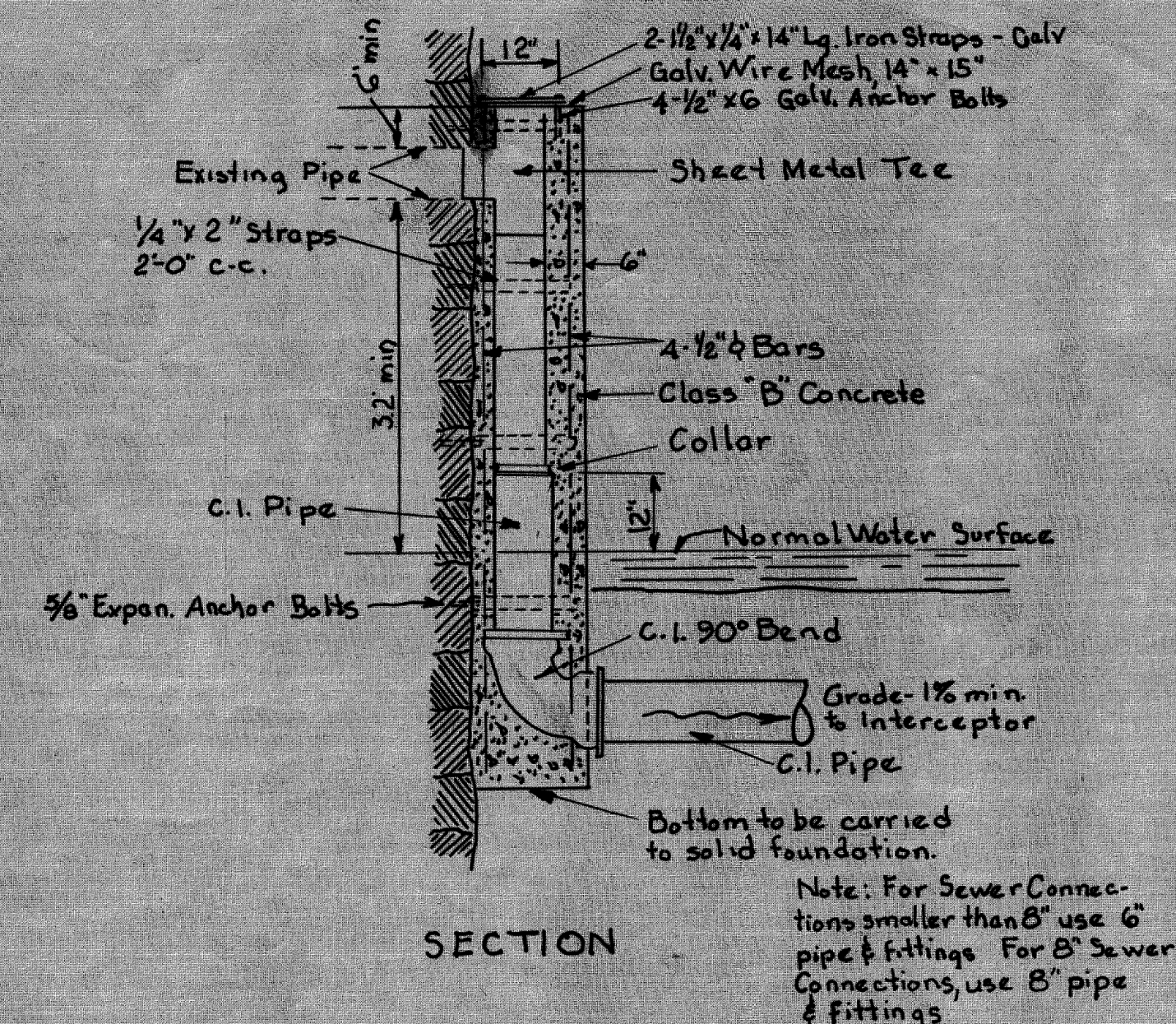
STAUNTON, VIRGINIA SANITARY SEWERAGE SYSTEM CONTRACT NO. 2 SEWAGE INTERCEPTORS PLAN AND PROFILE

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

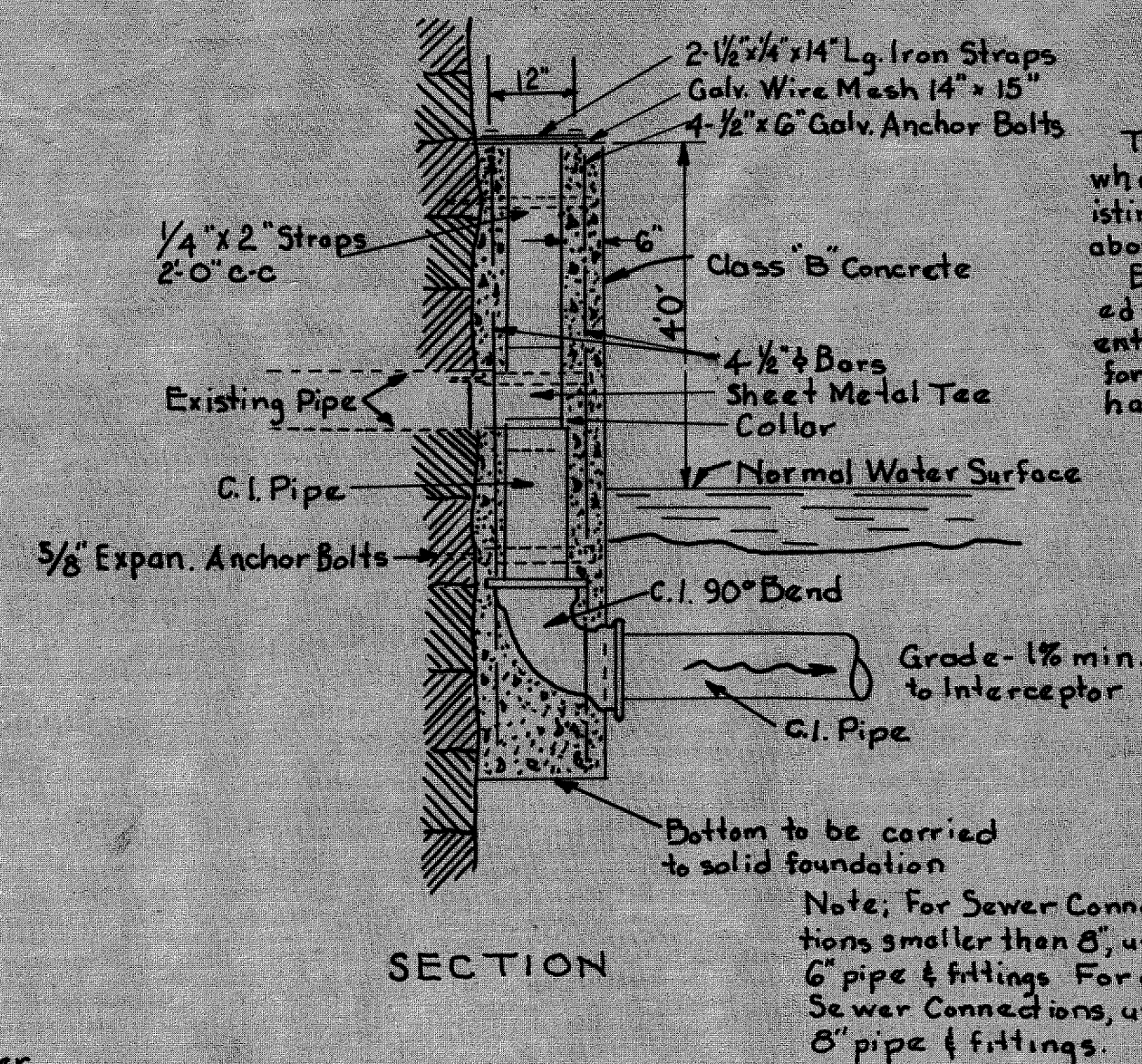
W. L. Hall
City Manager
Staunton, Va.
Sheet No. 7 of 12



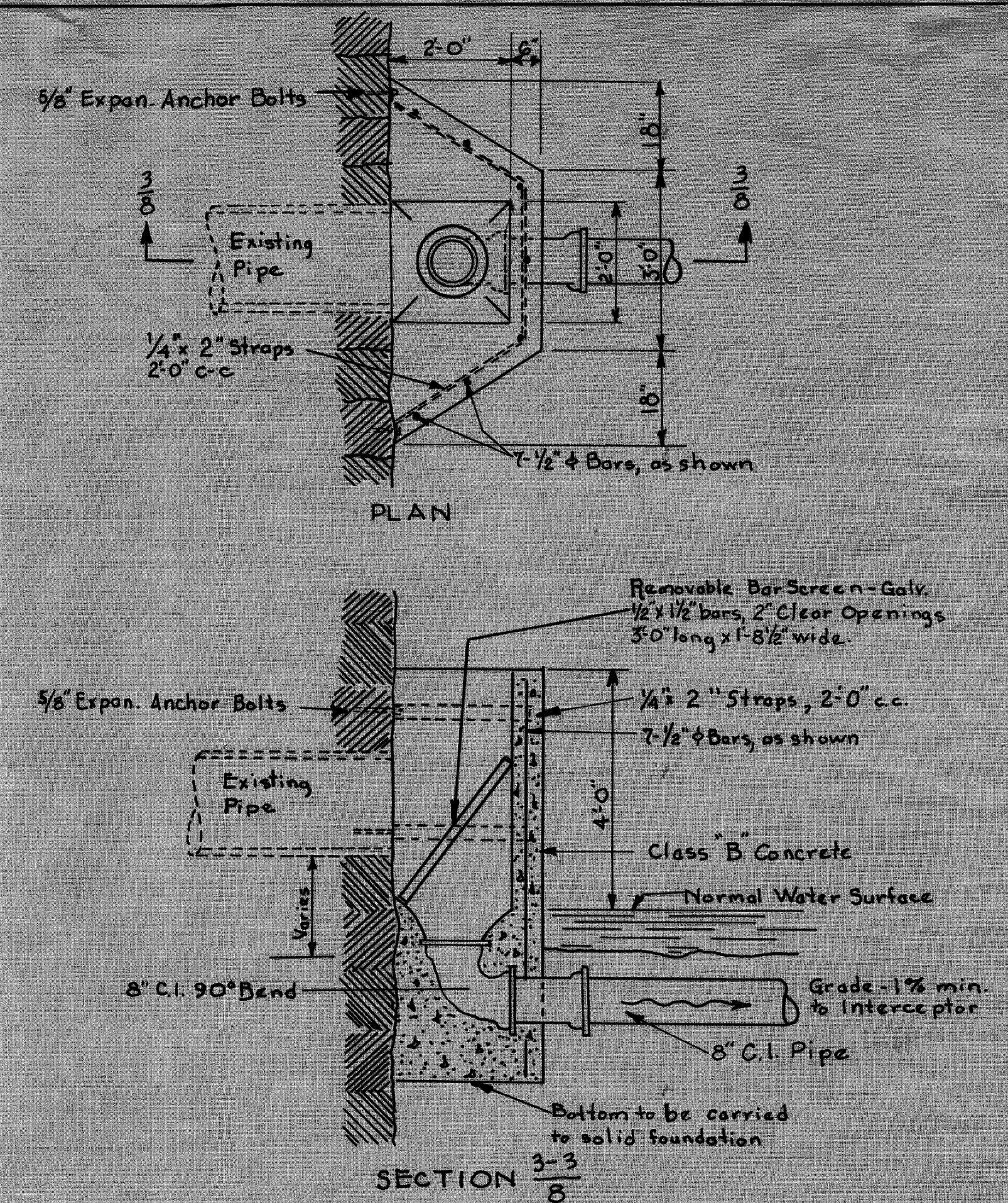
TYPE "A" CONNECTION
FOR EXISTING SEWERS 8" AND SMALLER



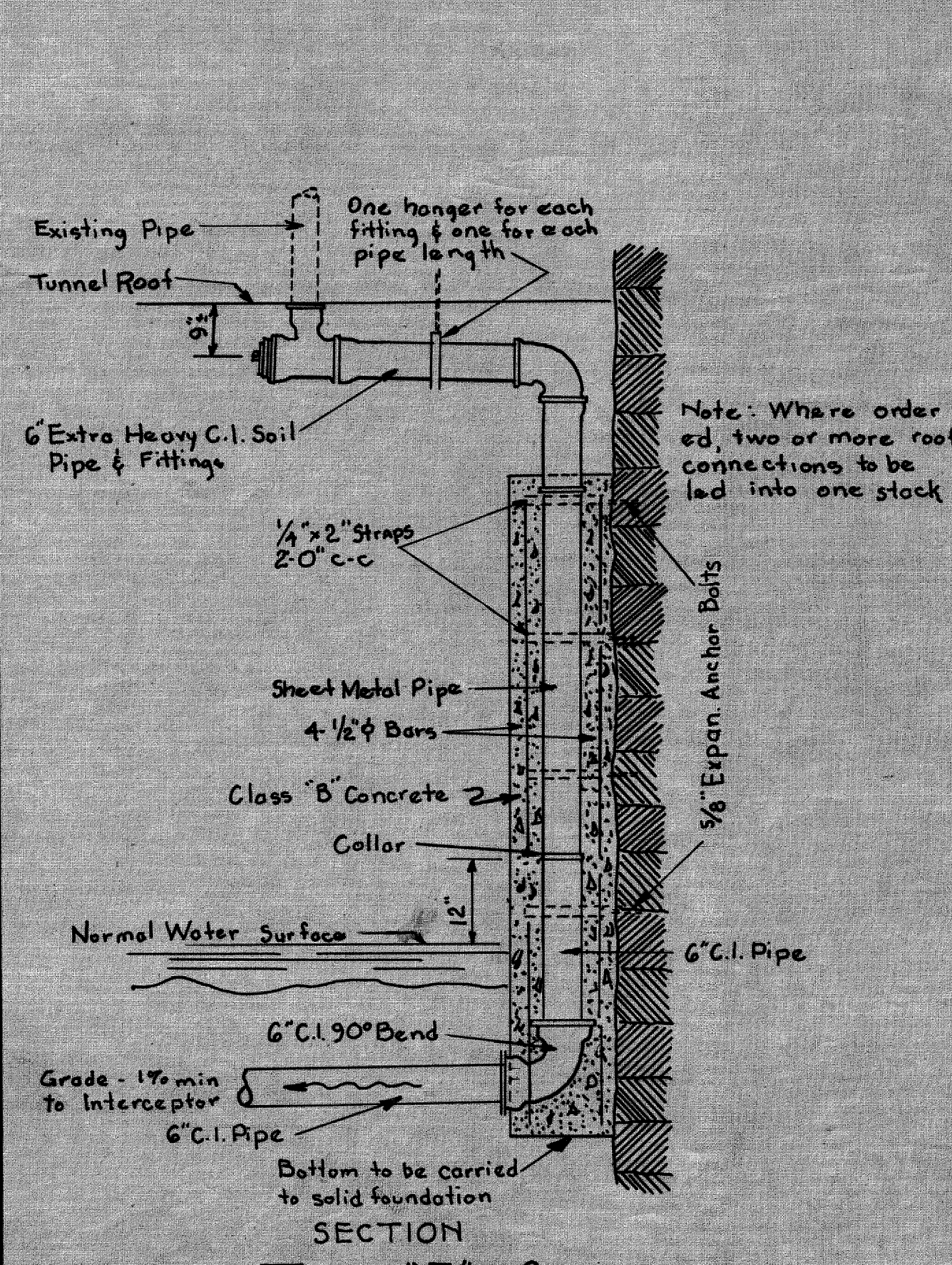
TYPE "B" CONNECTION
PLAN SAME AS TYPE "A"
FOR EXISTING SEWERS 8" AND SMALLER



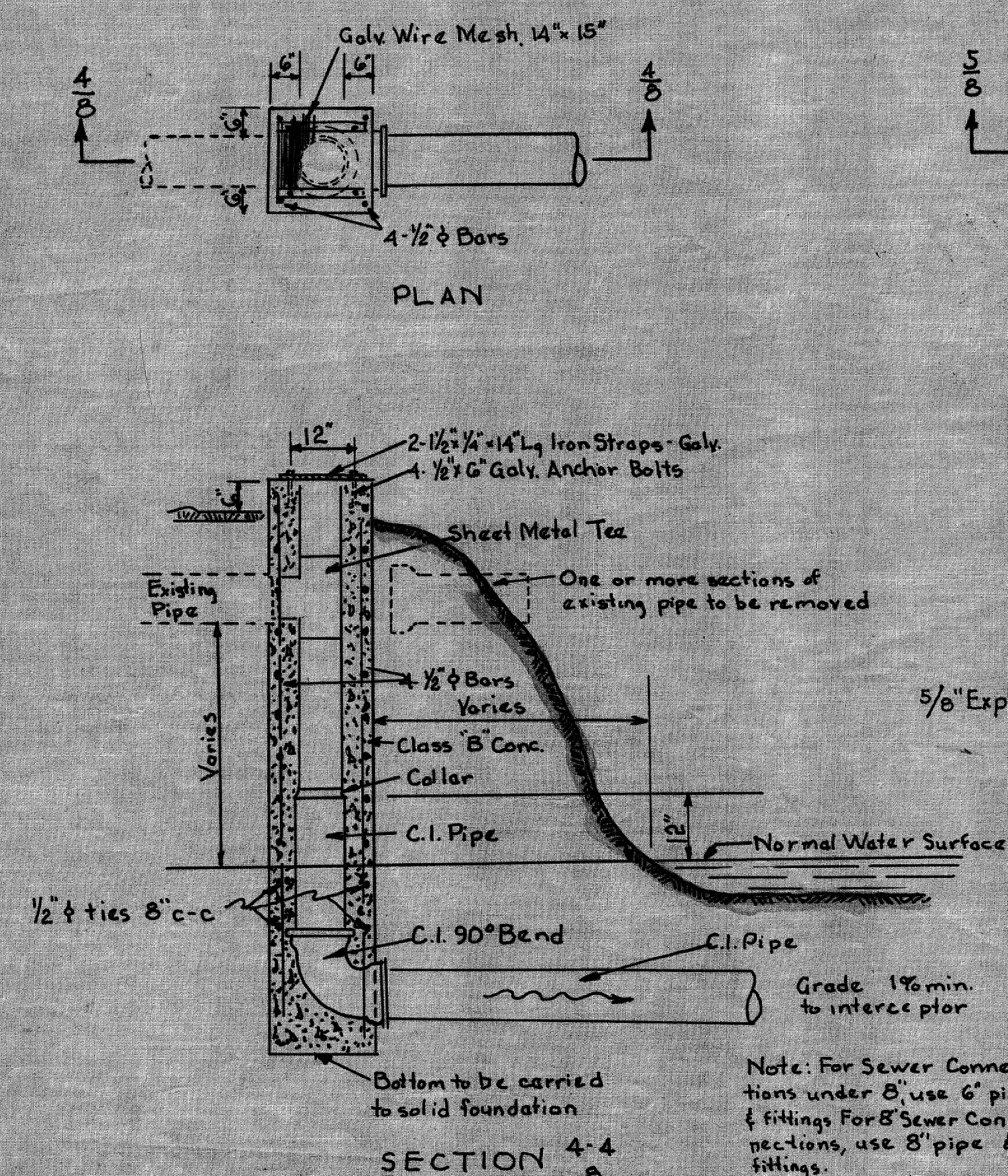
TYPE "C" CONNECTION
PLAN SAME AS TYPE "A"
FOR EXISTING SEWERS 8" AND SMALLER



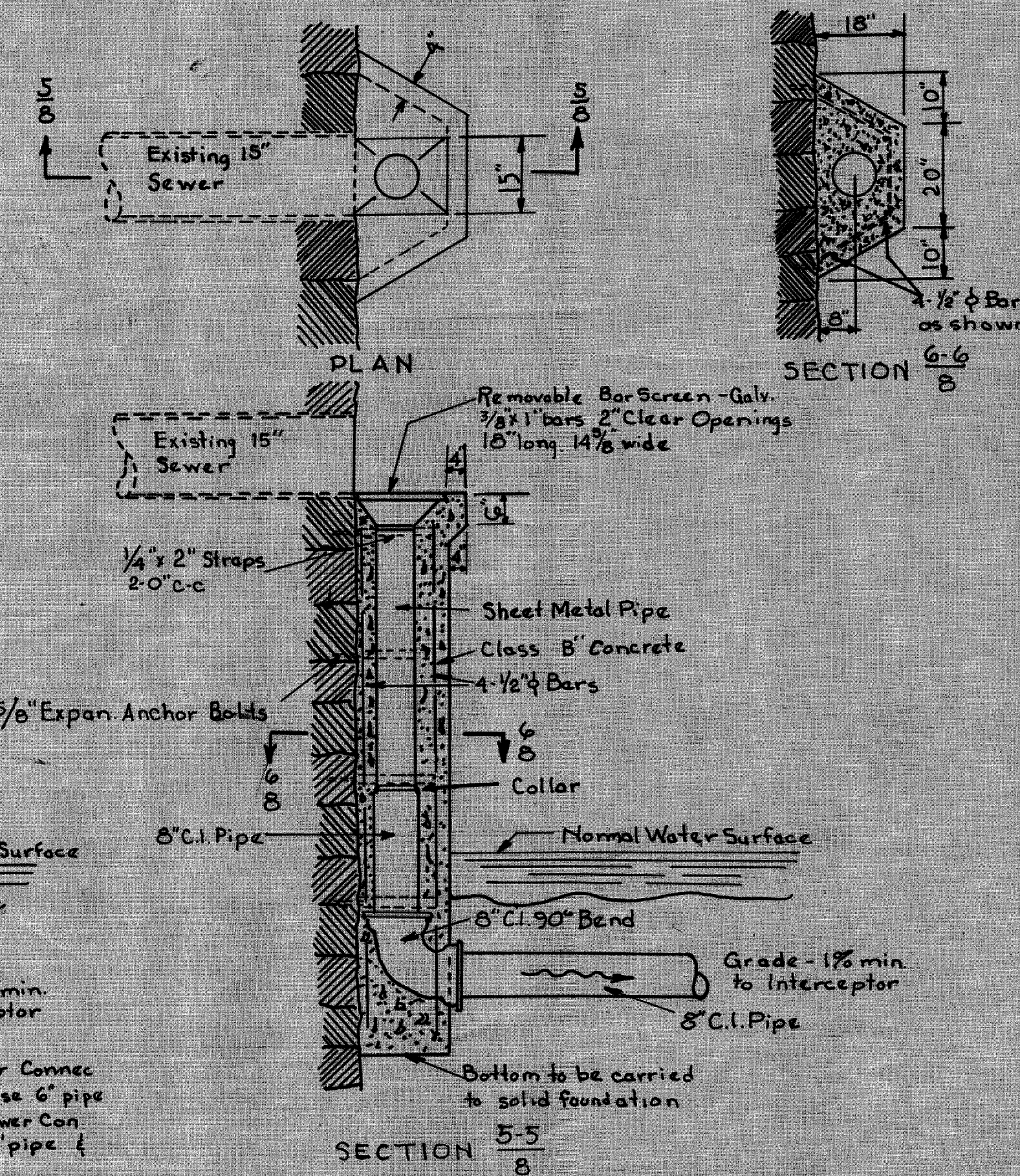
TYPE "D" CONNECTION
FOR EXISTING SEWERS 10" AND LARGER



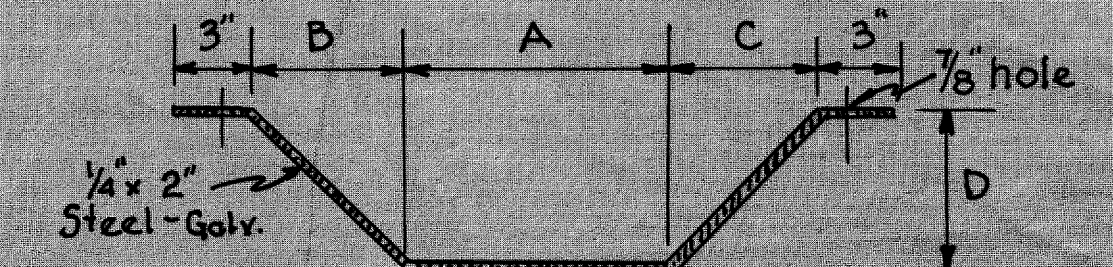
TYPE "E" CONNECTION
PLAN SAME AS TYPE "A"
FOR EXISTING SEWERS 4" & SMALLER IN TUNNEL ROOF



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



CONNECTION No 25



FOR 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"	8"	8"	15"	2
Type H & J	10"	7"	7"	10"	60
#156	2'-5"	17 1/2"	17 1/2"	3'-0"	1
	2'-5"	11"	11"	2'-0"	1

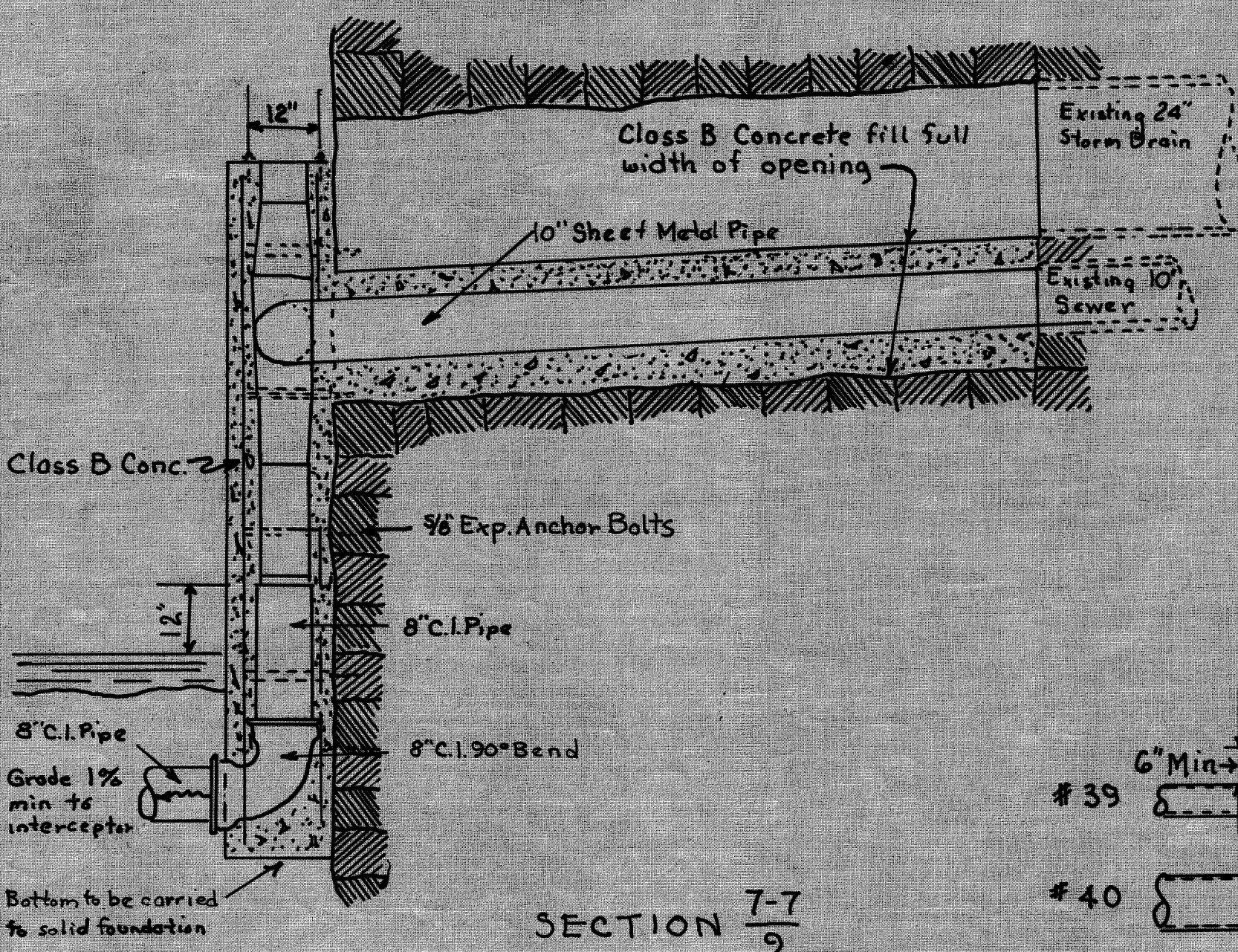
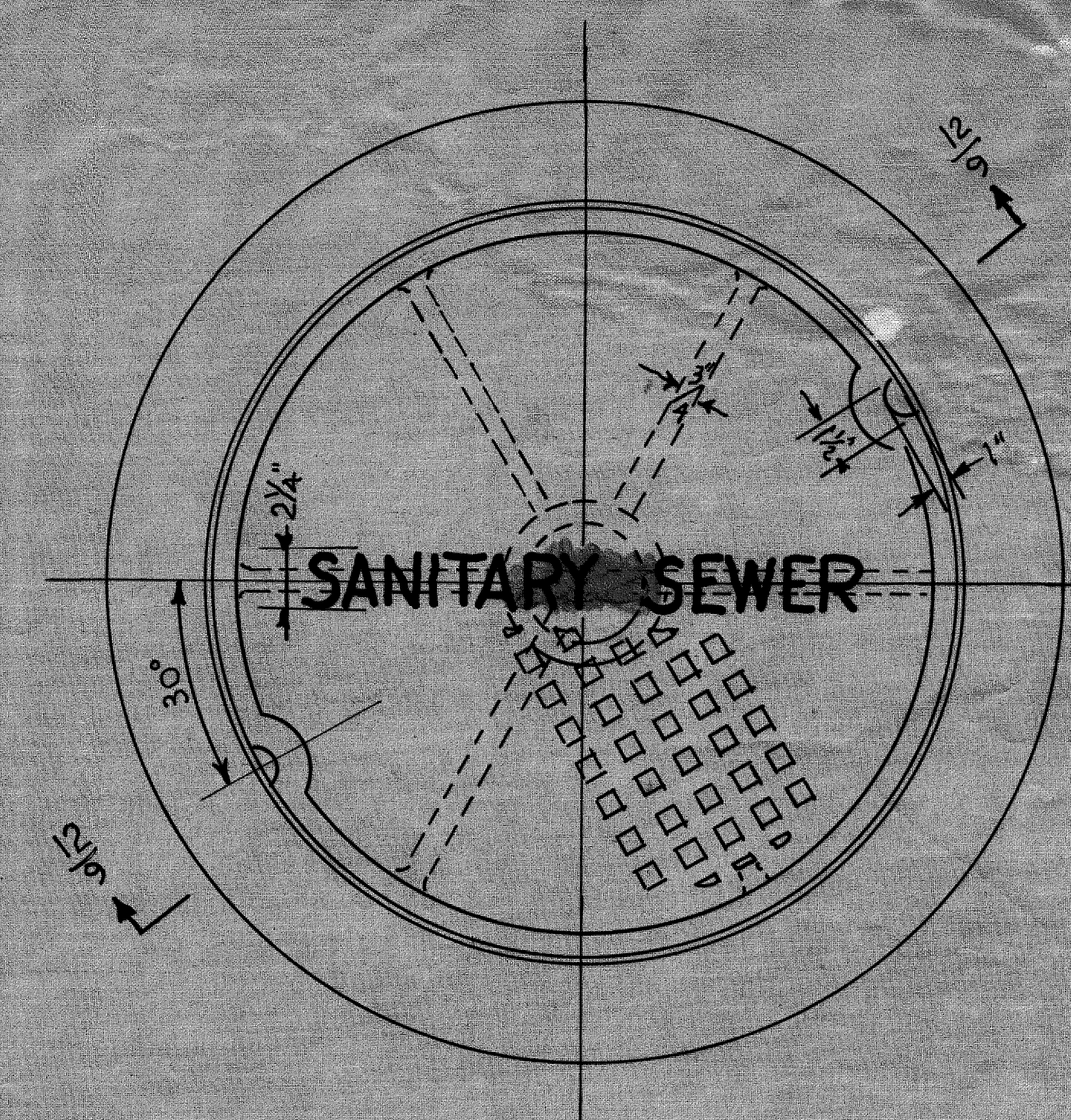
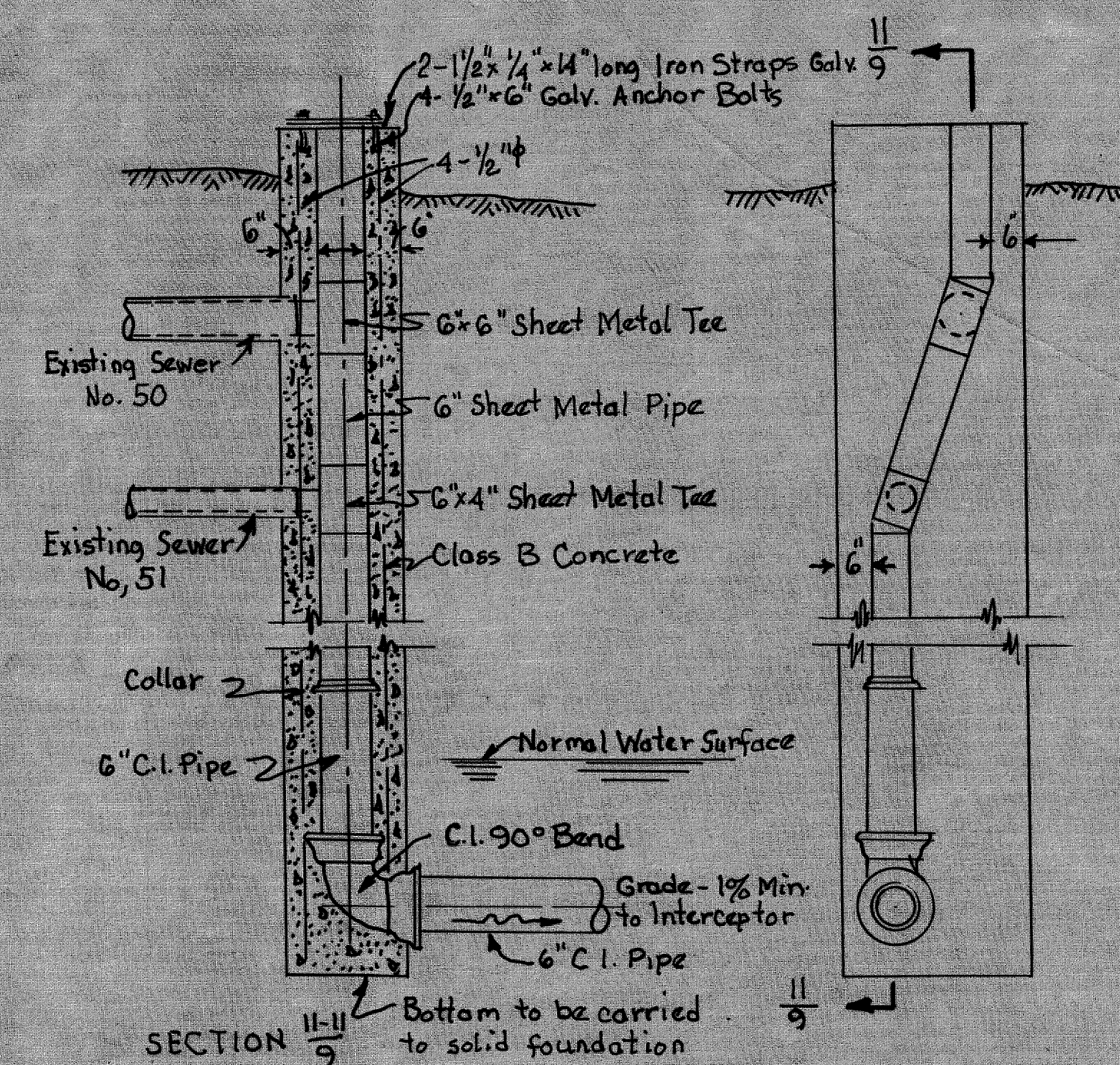
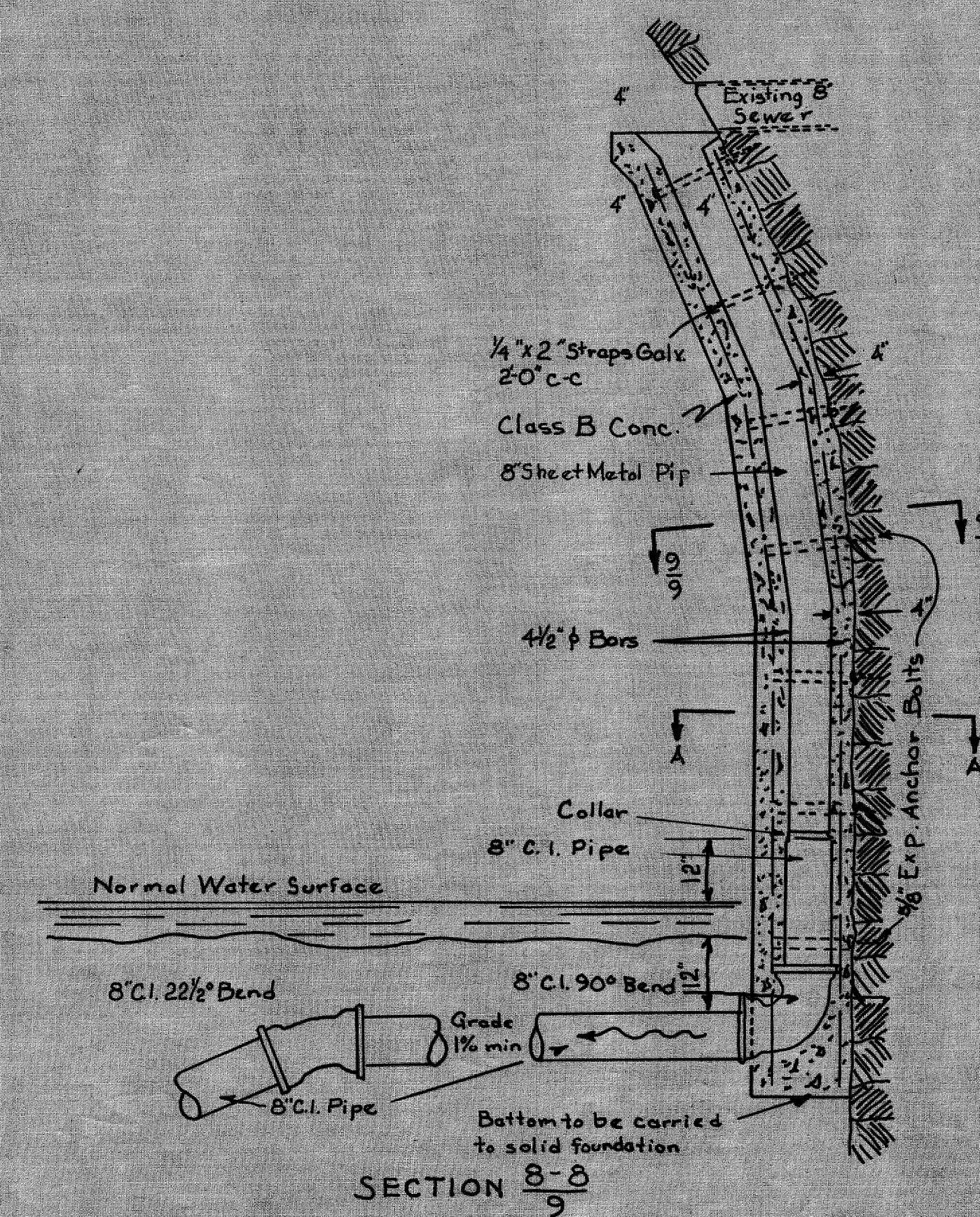
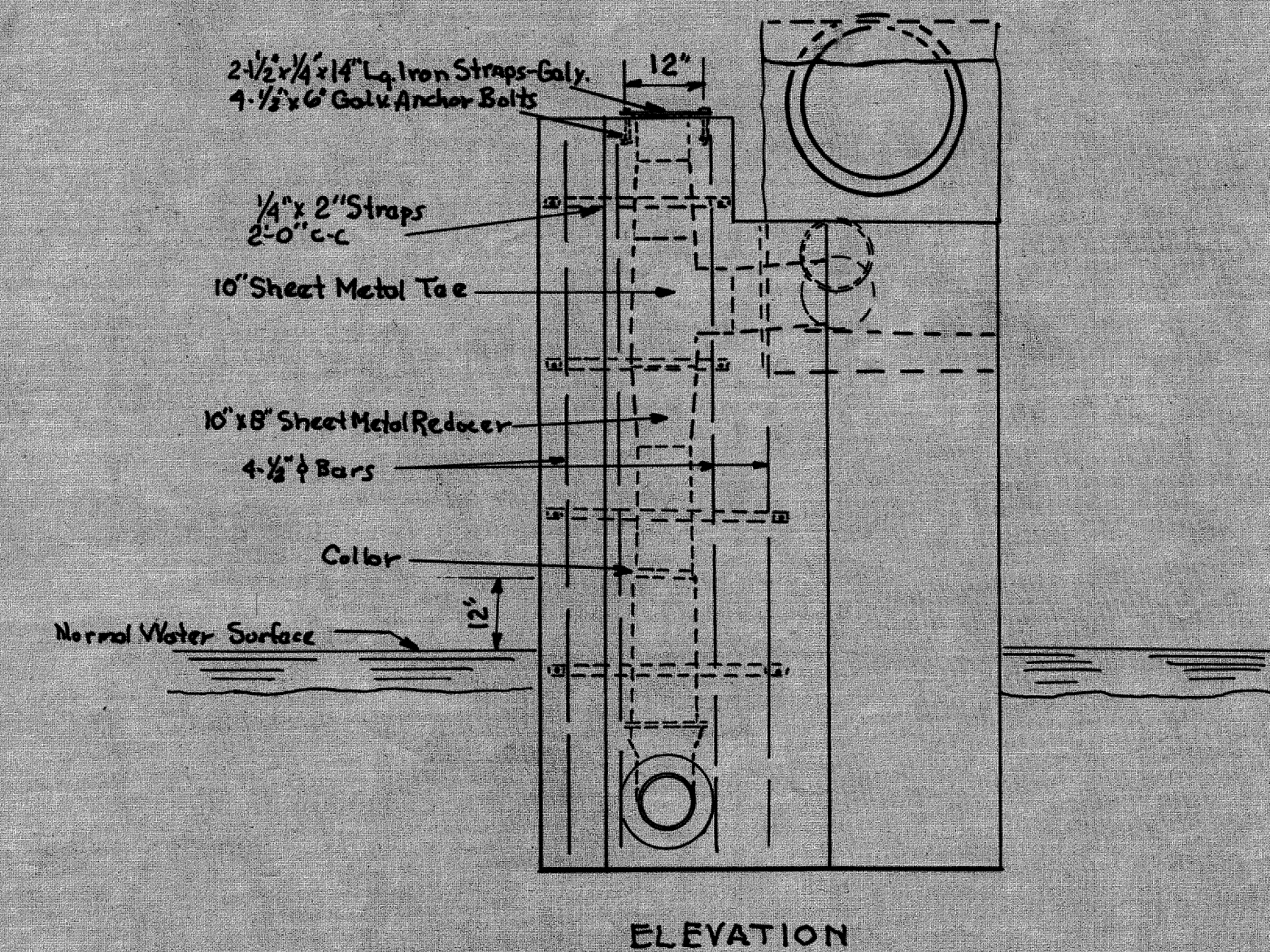
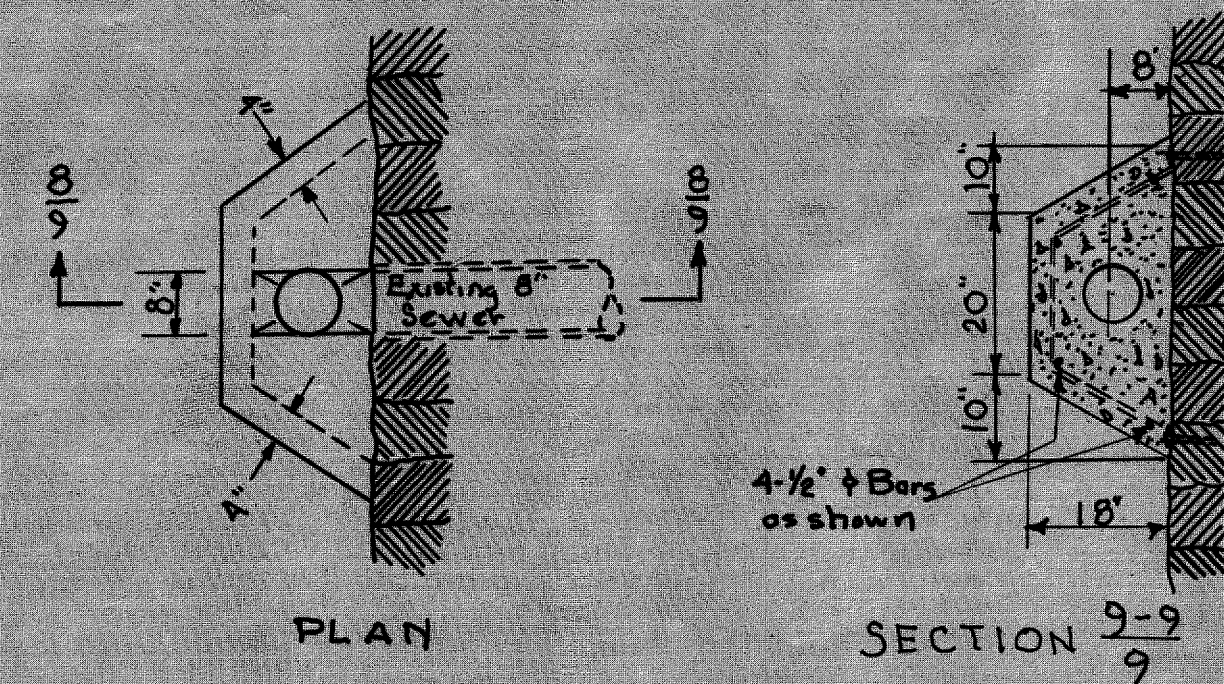
DETAILED SCHEDULE FOR STEEL STRAPS

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

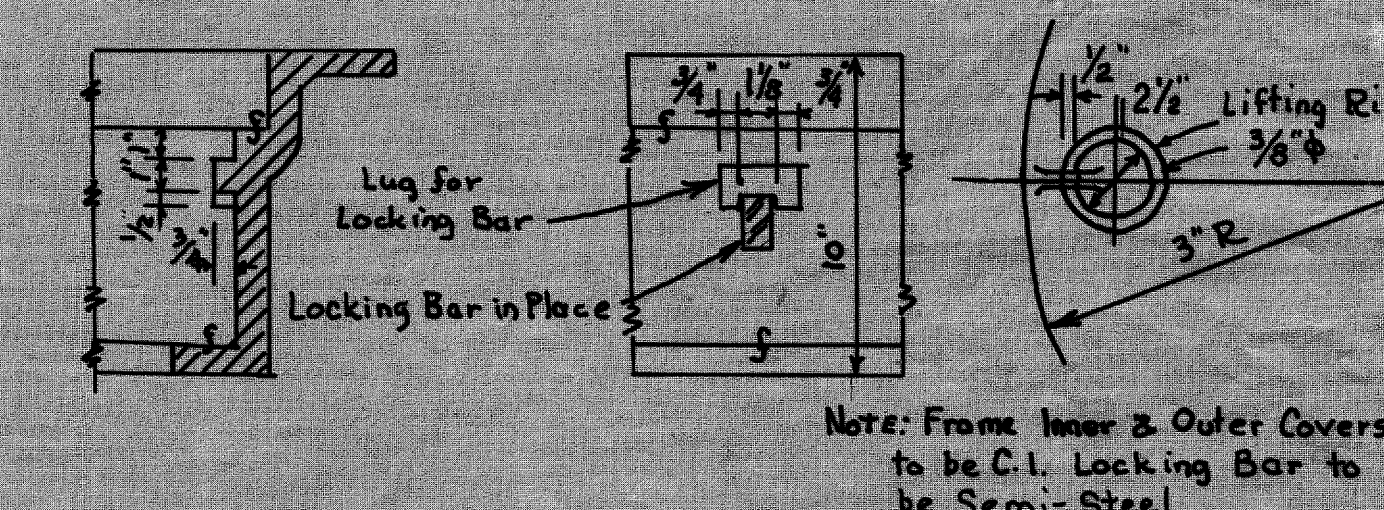
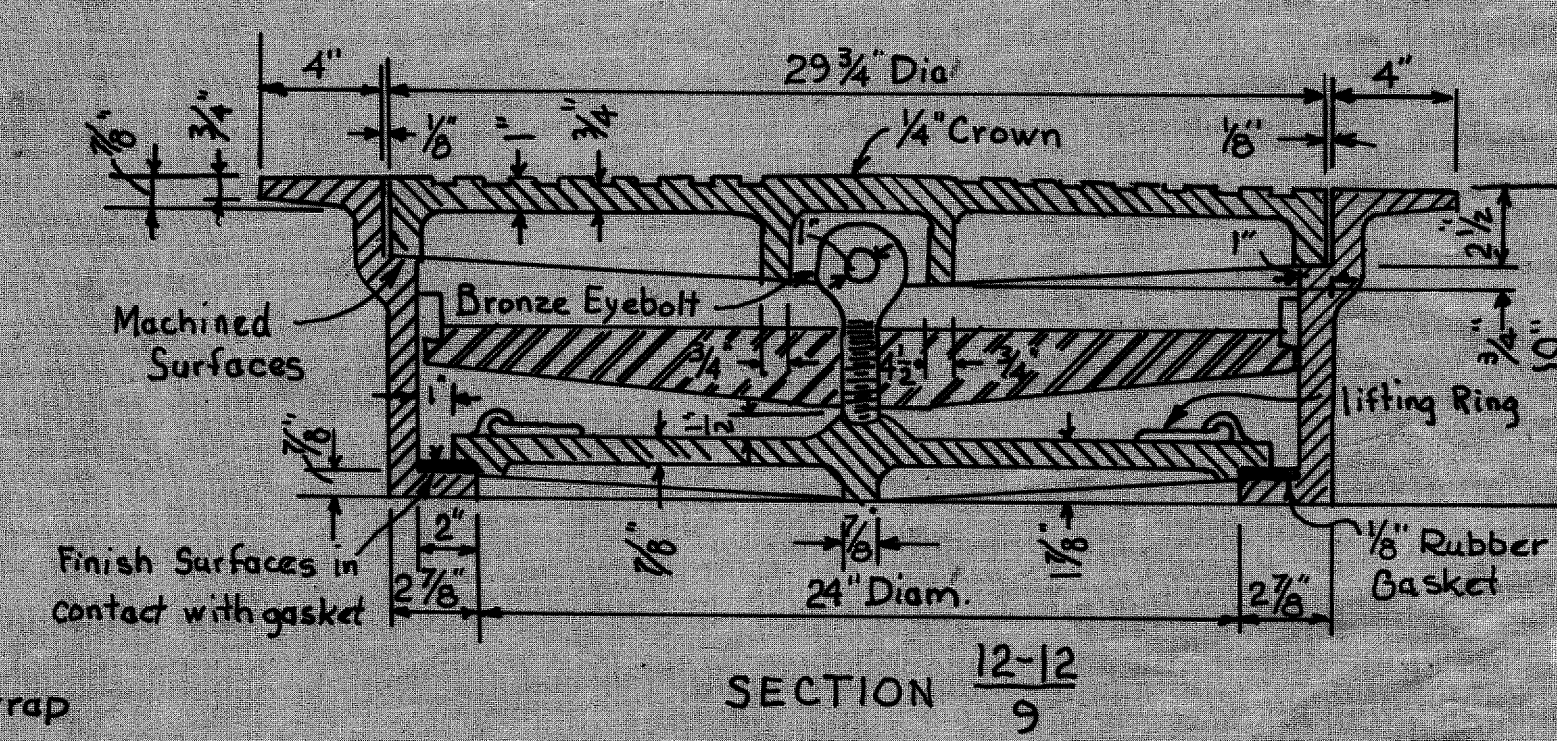
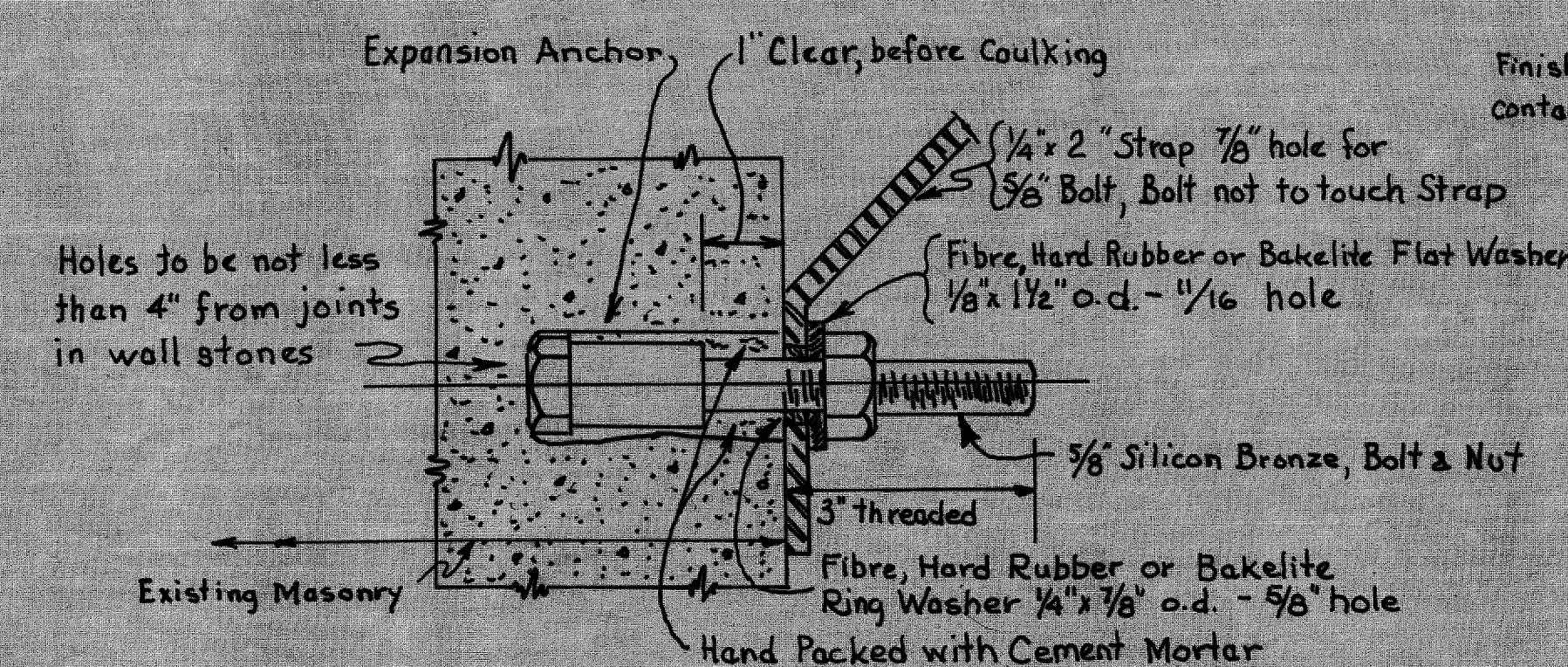
Whitman, Reardon & Smith
Engineers
Baltimore, Maryland
October 21, 1938

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

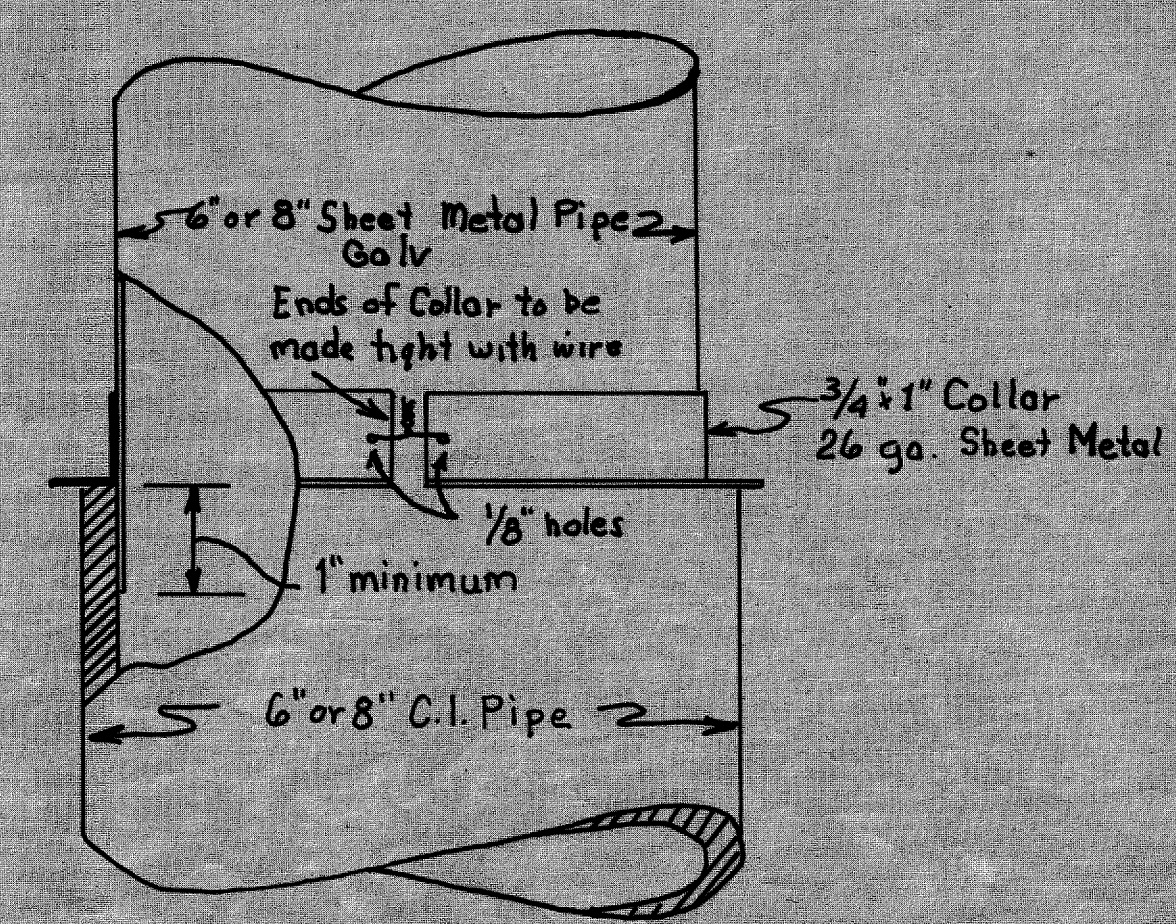
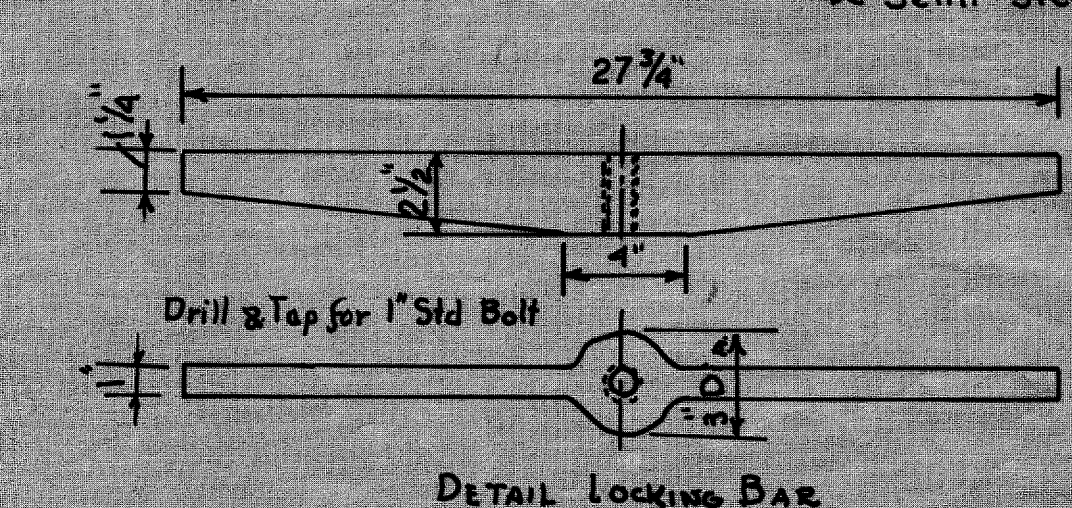
Scale: 1/2" = 1'-0"



SECTION $\frac{8-8}{9}$
CONNECTION No. 37
Scale $\frac{1}{2}" = 1'-0"$



DETAIL OF EXPANSION ANCHOR BOLT ASSEMBLY
Scale: 6" = 1'-0" (Half Size)

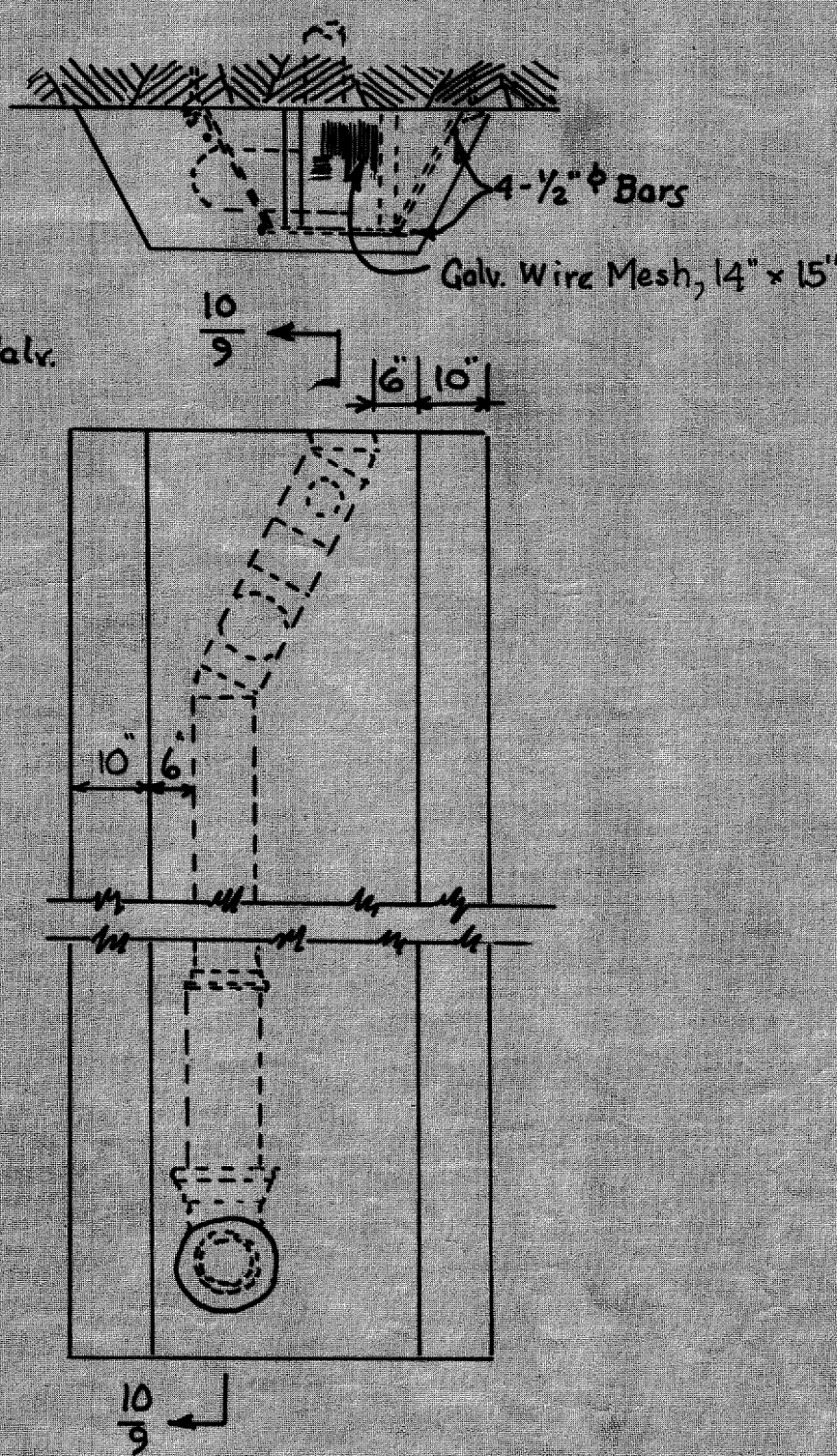
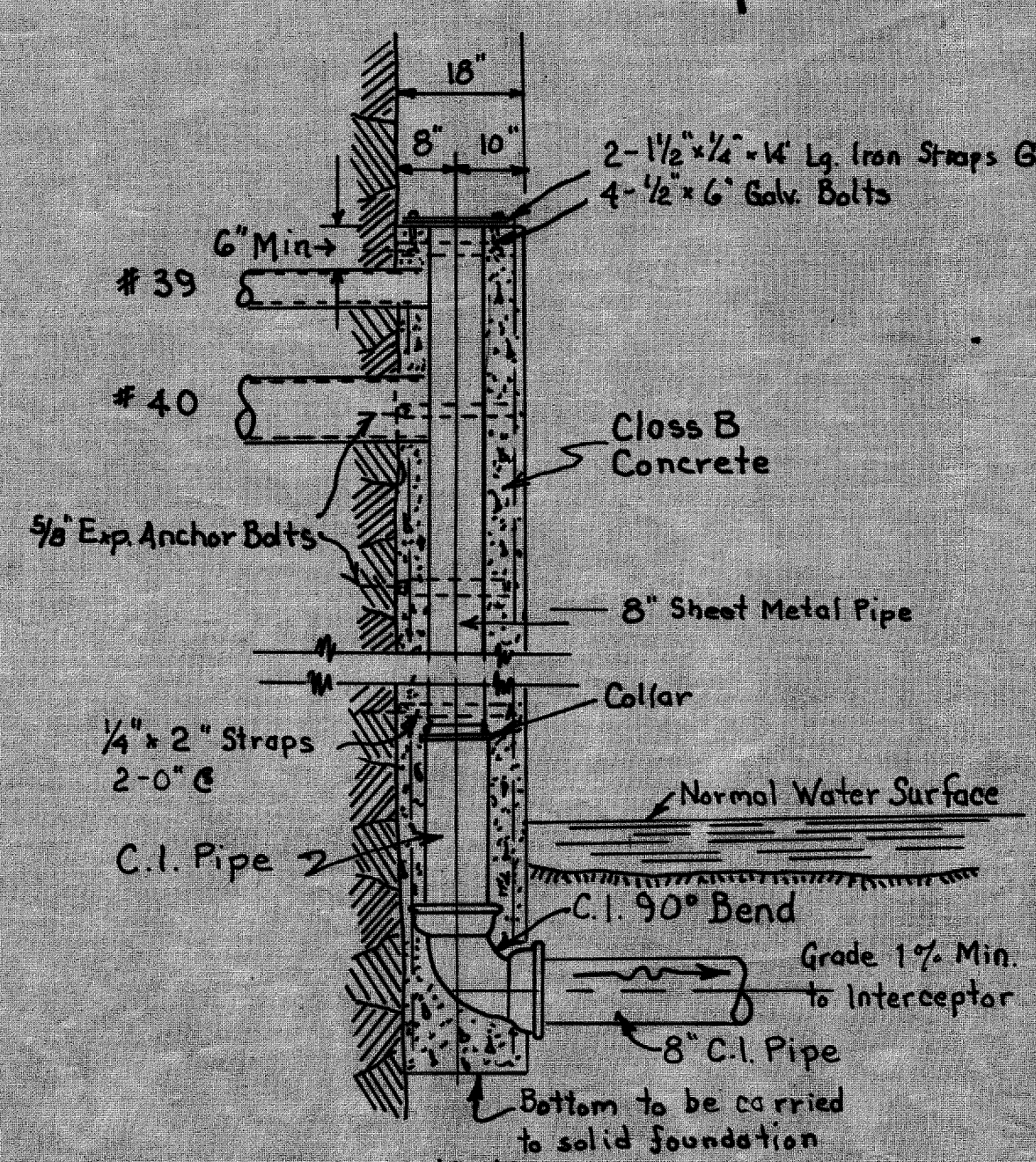
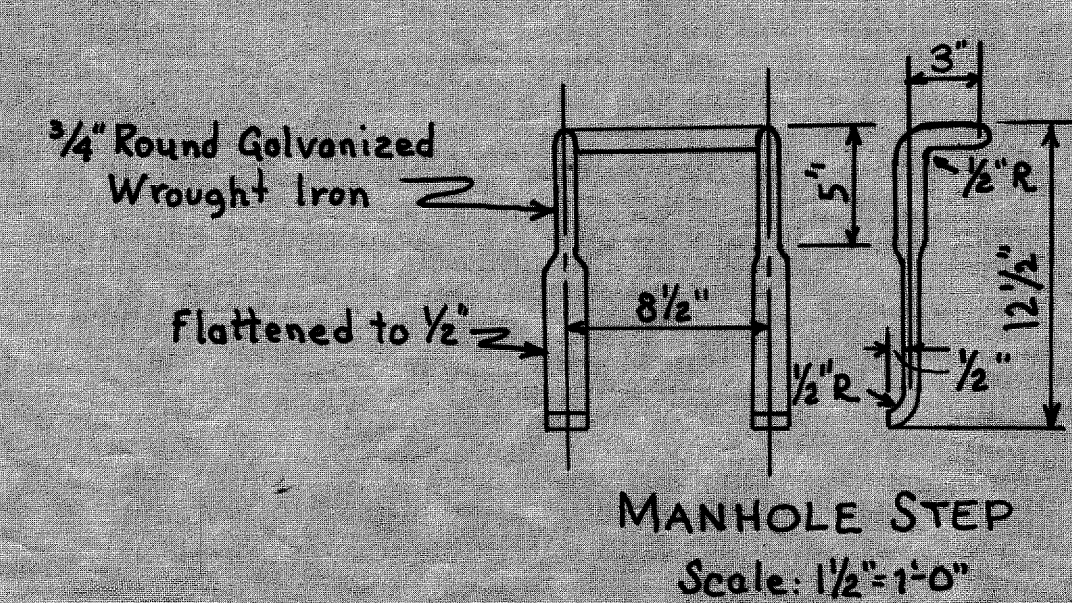


DETAIL OF SHEET METAL COLLAR
Not to Scale

SECTION $\frac{7-7}{9}$

CONNECTION No.24

Scale $\frac{1}{2}''=1'-0''$



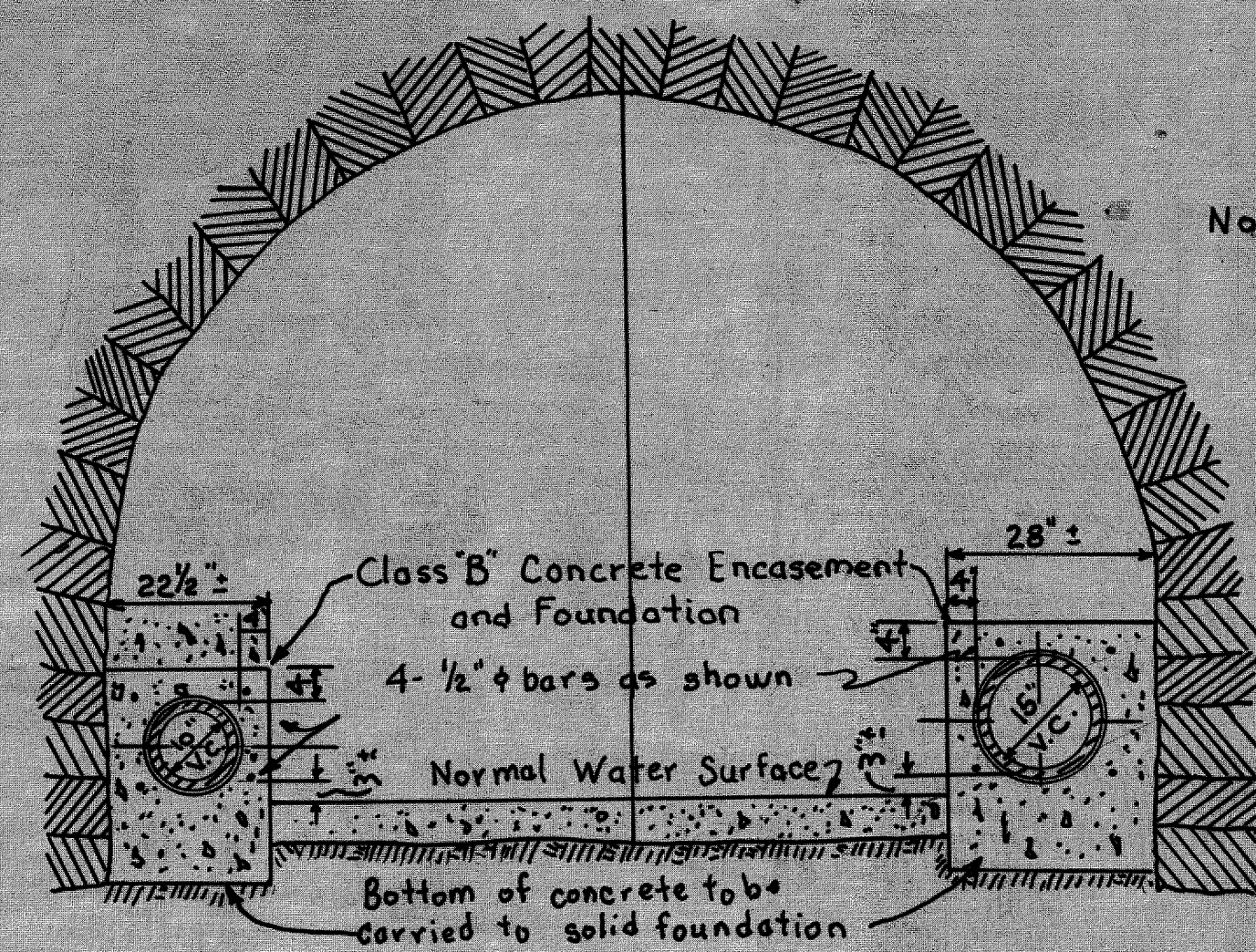
CONNECTIONS No. 39 & 40
Scale: 1/2" = 1'-0"

WATER TIGHT MANHOLE
FRAMES & COVERS
Scale 2"=1'-0"

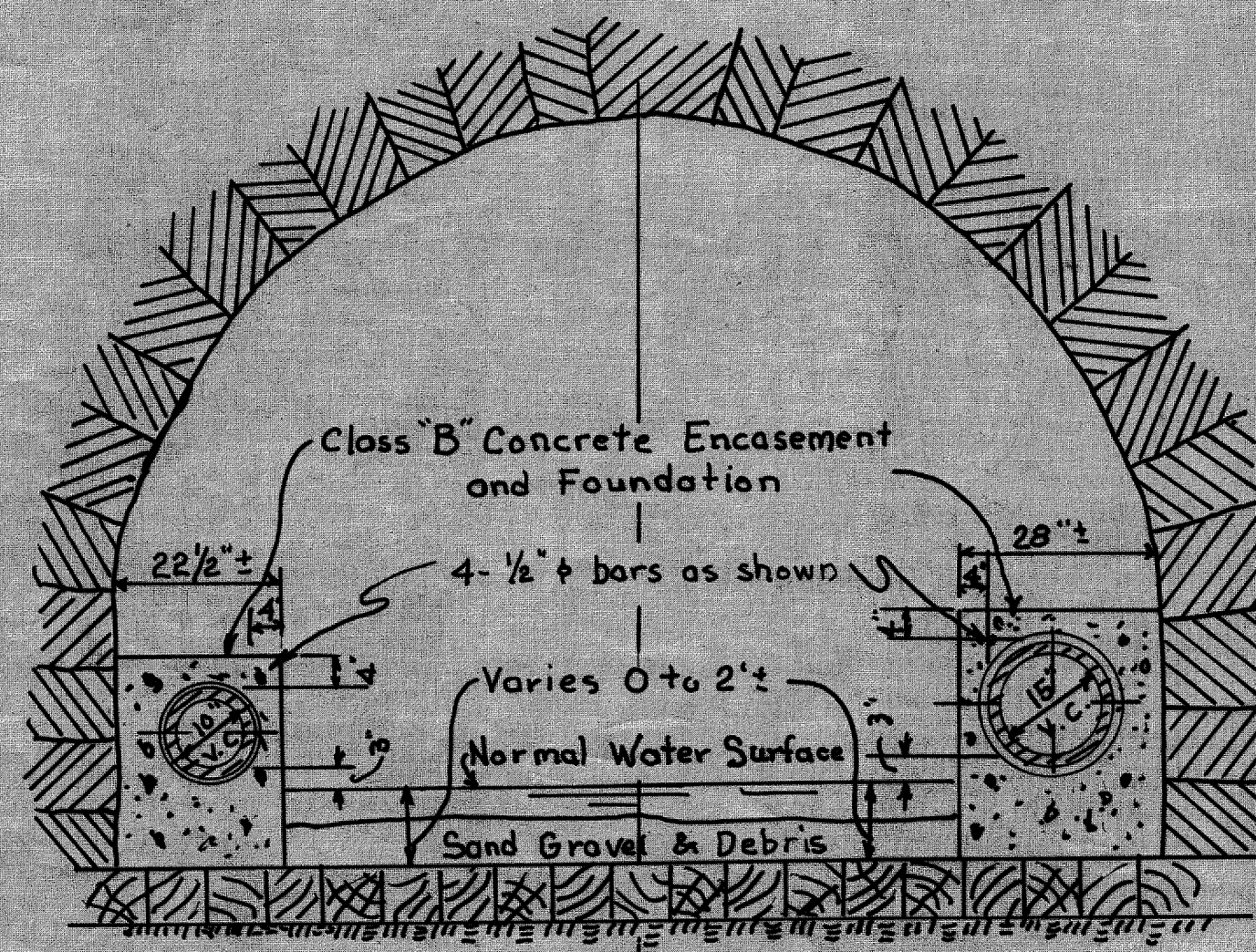
STAUNTON, VIRGINIA
SANITARY SEWERAGE SYSTEM
CONTRACT NO.2
SEWAGE INTERCEPTORS
SPECIAL CONNECTIONS & DETAILS

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

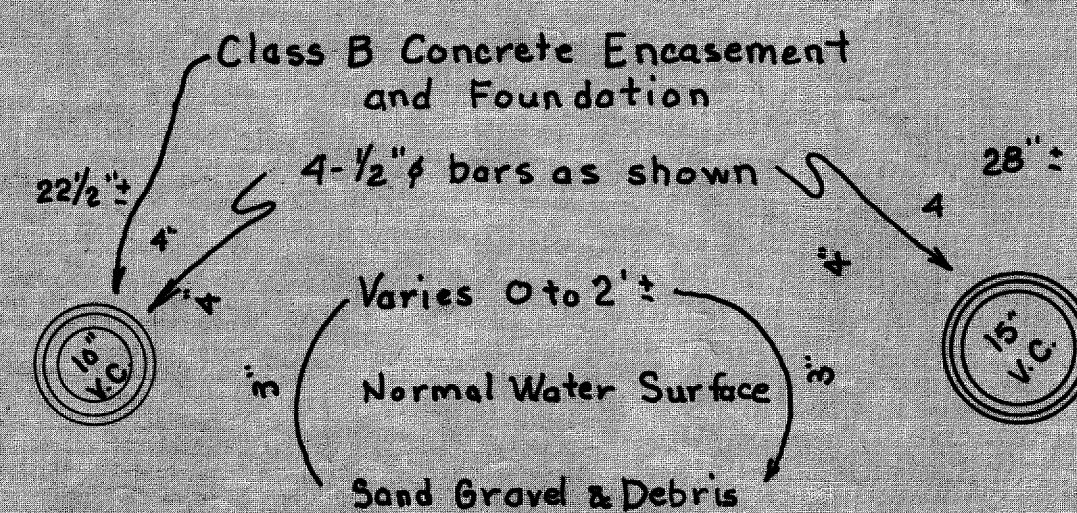
W. L. Hall
City Manager
Staunton, Va
Shee 9 of 12



Typical Tunnel Section
With Natural Stream Bottom
Scale 1/2" = 1'-0"



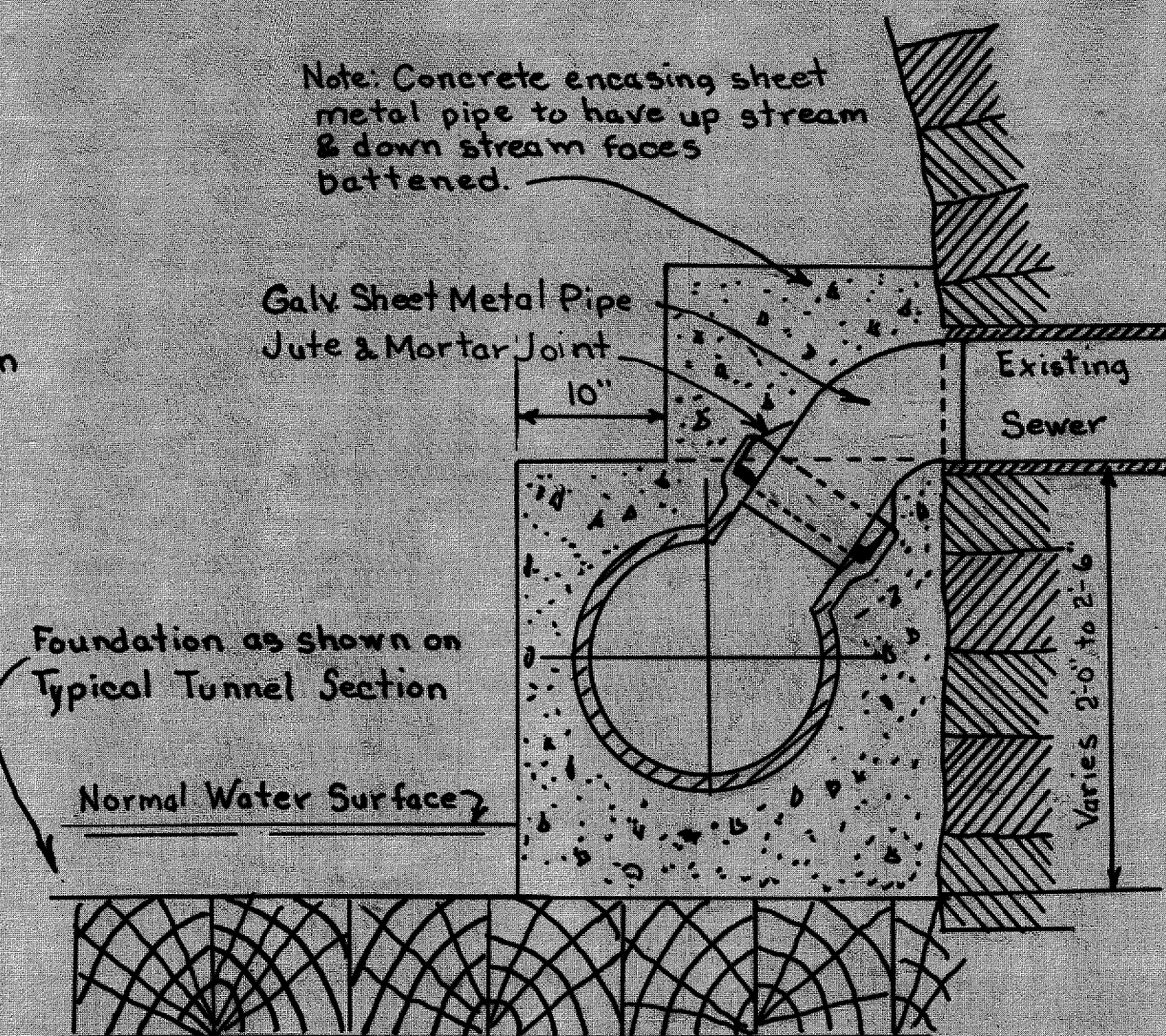
Typical Tunnel Section
With Timber Floor
Scale: 1/2" = 1'-0"



Typical Tunnel Section
With Cobblestone Bottom
Scale 1/2" = 1'-0"

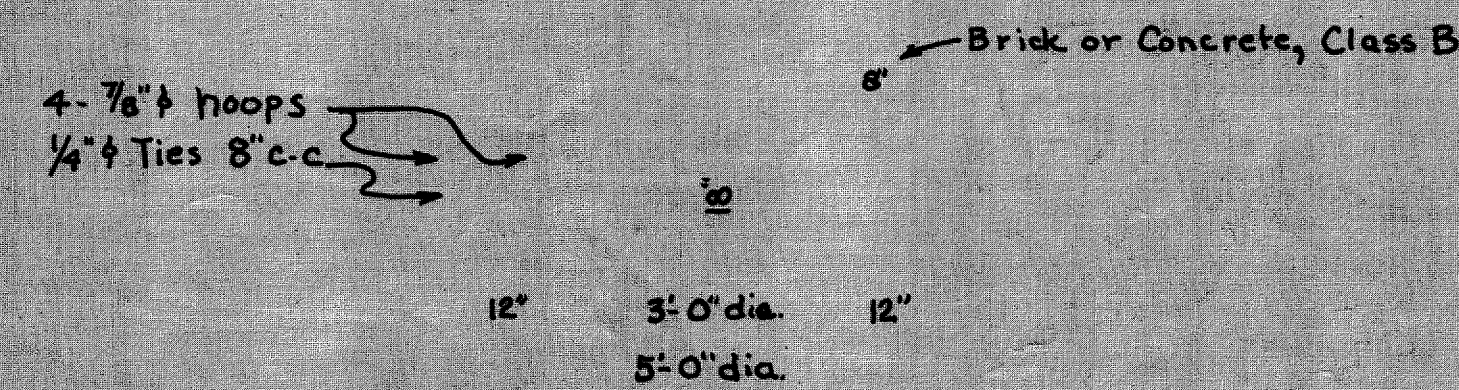
NOTES:

- 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 1/2" 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.

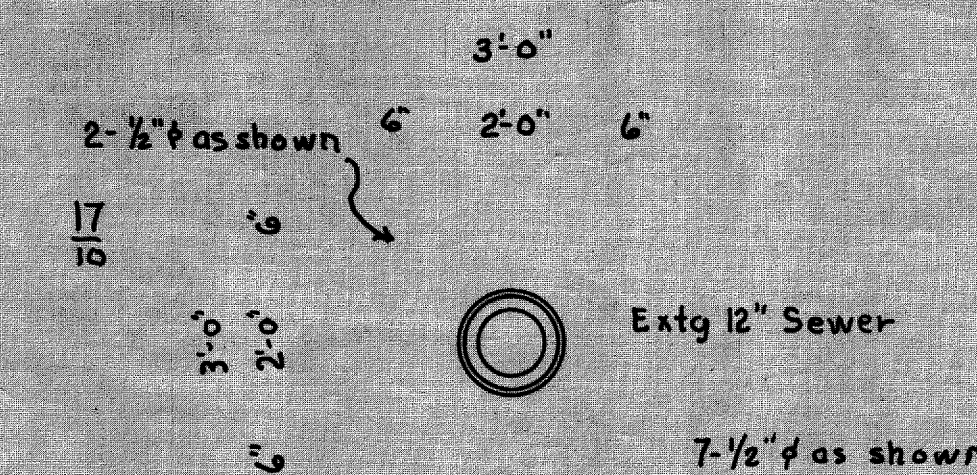


TYPE G CONNECTION FOR SEWERS 8" & SMALLER
Scale 1 in = 1 ft

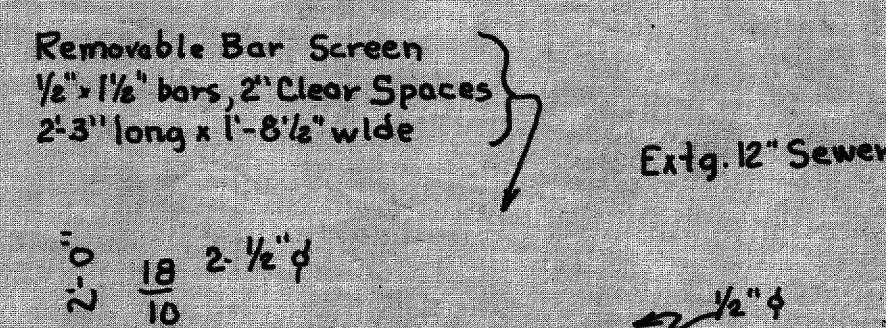
36" diam. as specified C.I. Manhole Frame & Cover (Circular)



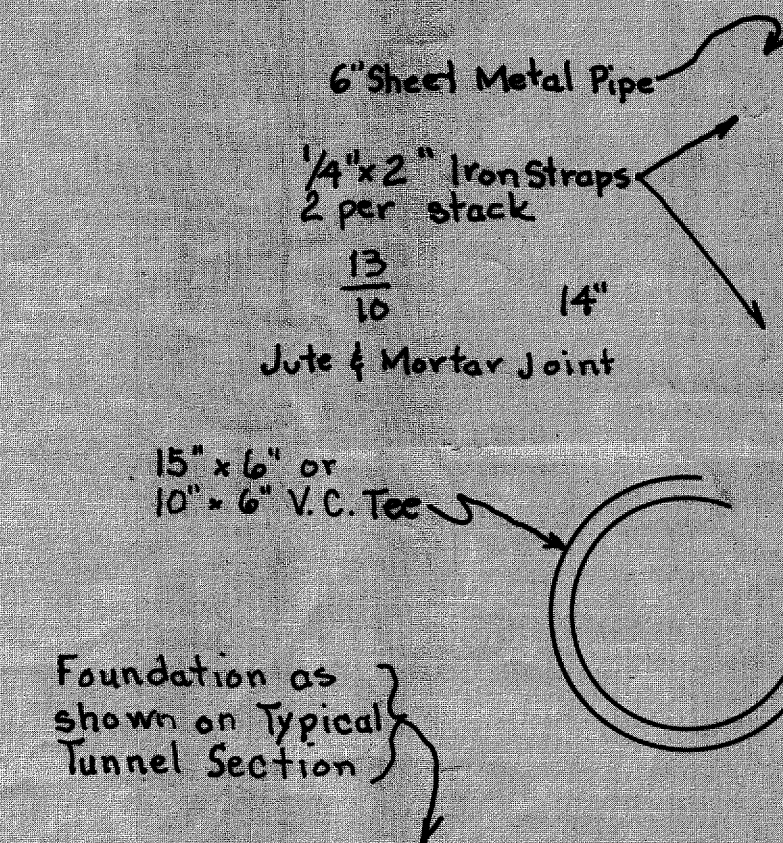
ACCESS HOLE - CENTRAL AVE. TUNNEL
Scale: 1/2 in = 1 ft



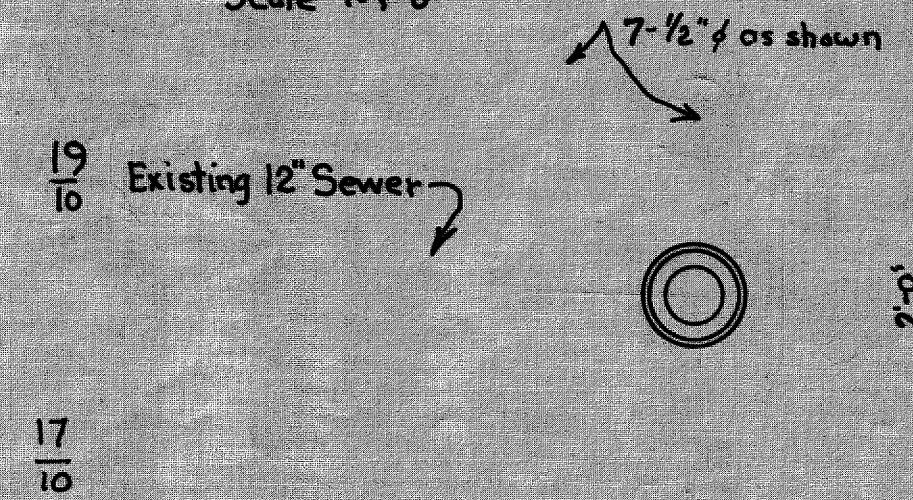
SECTION 18-18
10



SECTION 13-13
10

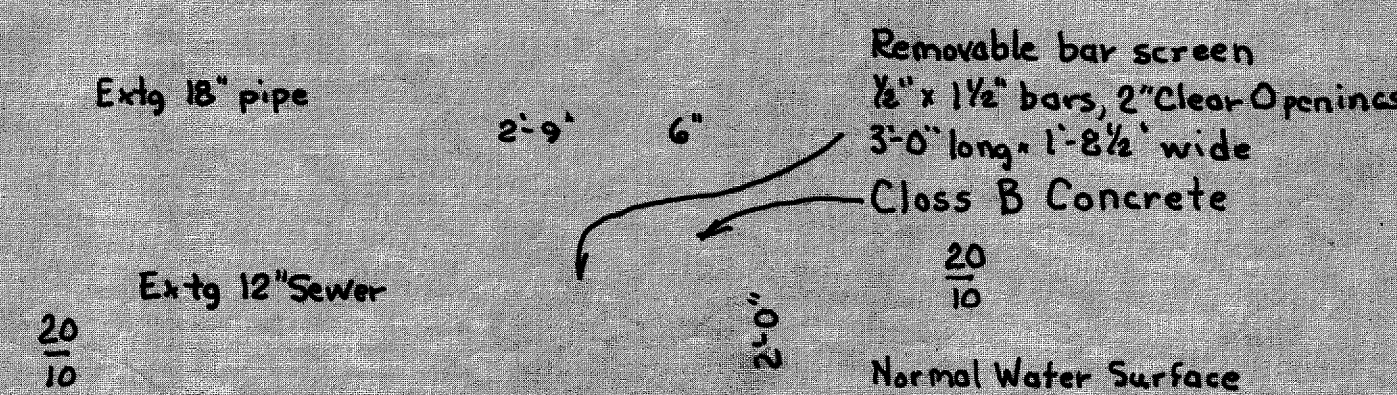


SECTION 14-14
10
TYPE 'H' CONNECTION
Scale 1'-1'-0"



SECTION 17-17
10

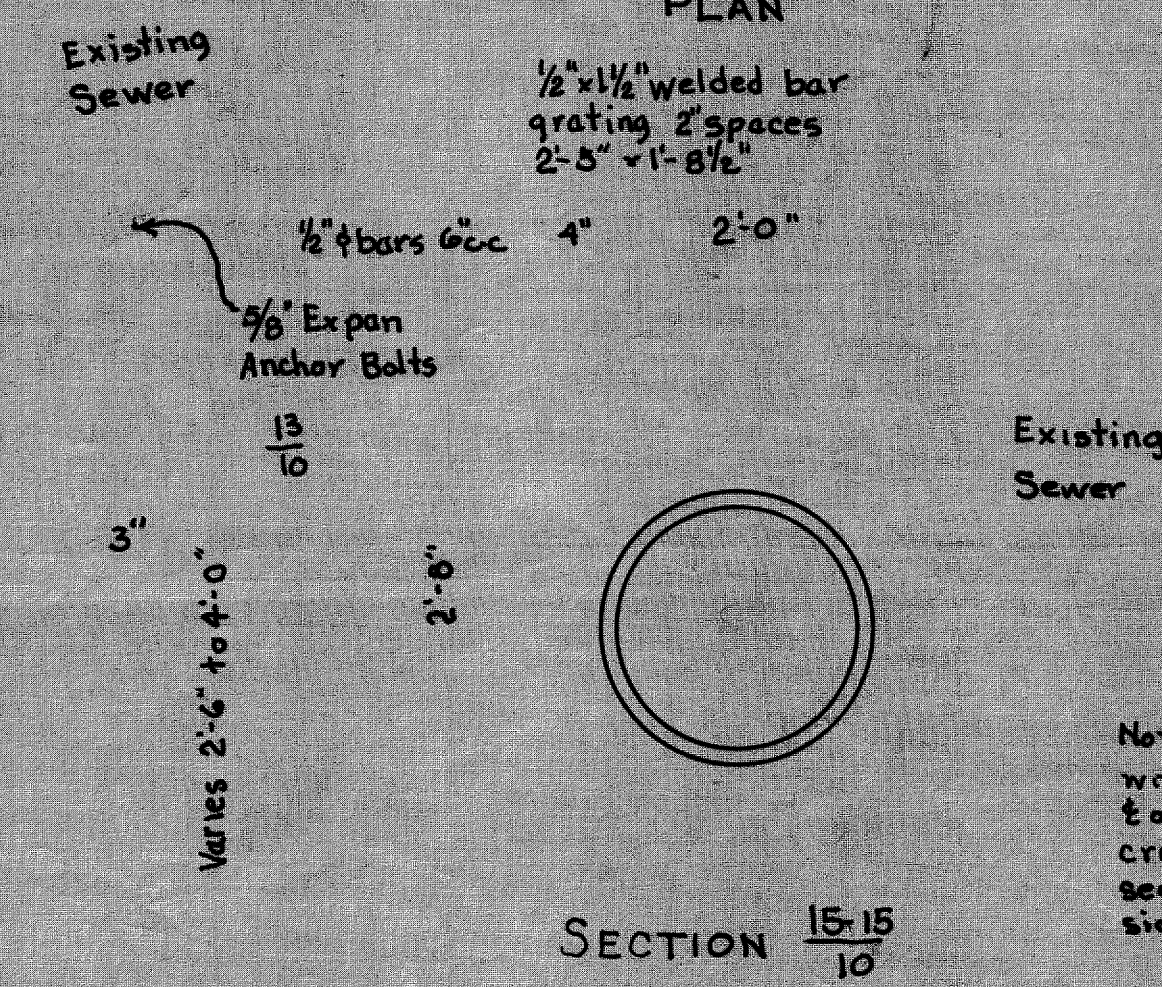
SECTION 20-20
10



SANITARY SEWERAGE SYSTEM
CONTRACT NO. 2
SEWAGE INTERCEPTORS

PLAN

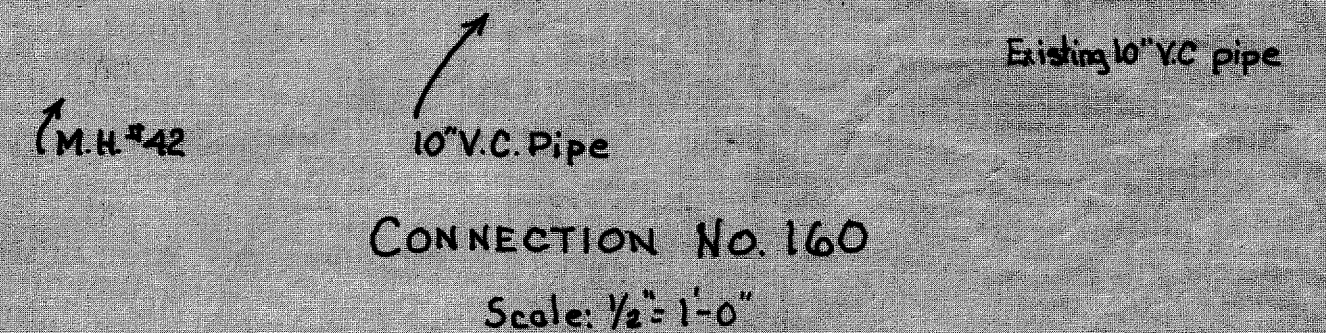
1/2" x 1/2" welded bar
grating, 2" spaces
2'-5" x 1'-8 1/2"



SECTION 15-15
10
TYPE 'I' CONNECTION OR
ACCESS OPENING
Scale 1/2" = 1'-0"

Note: Sewers entering with invert lower than 1/2" of interceptor: concrete to be lowered & section tab cut from side of channel pipe.

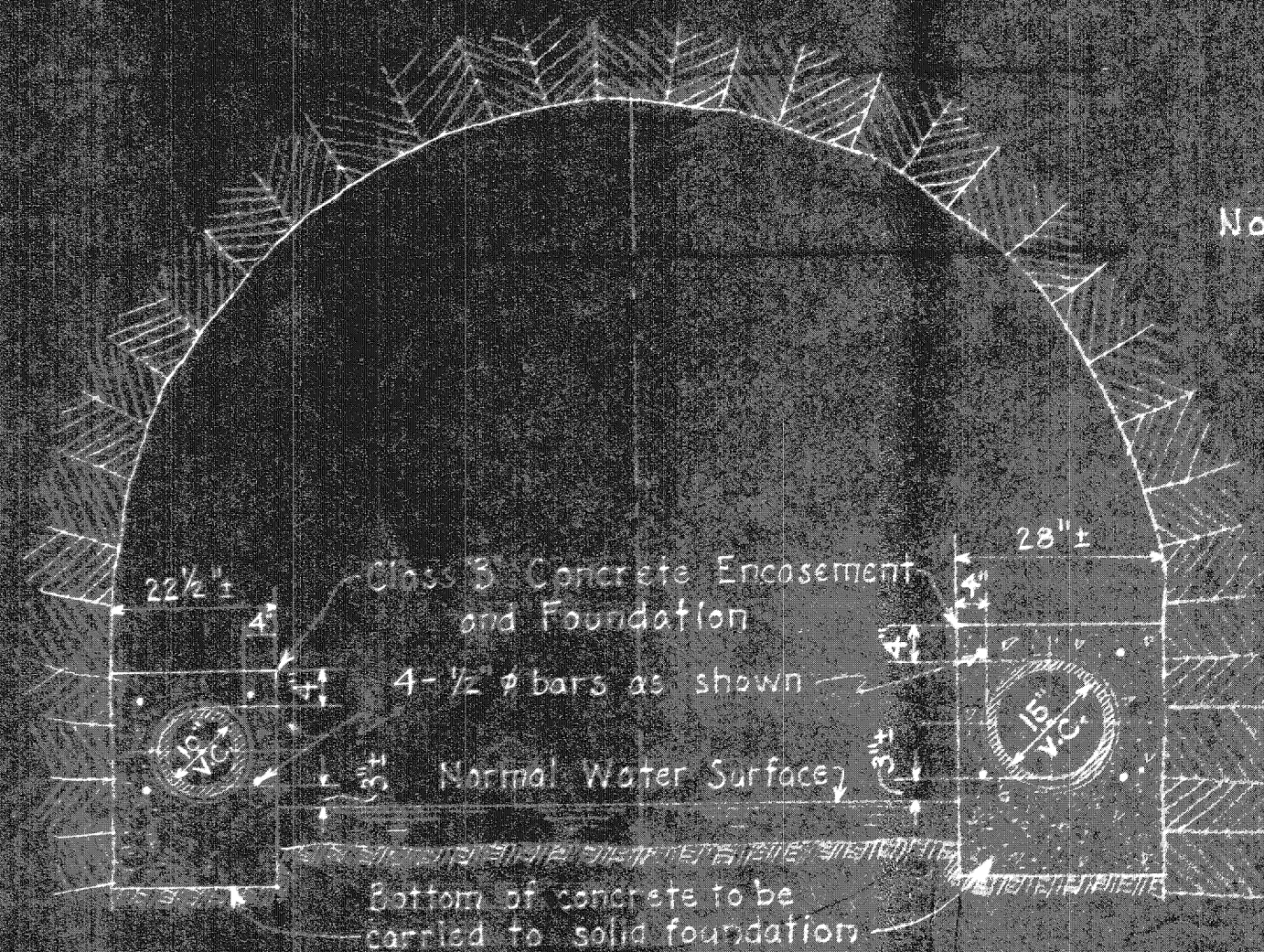
Class 'C' Concrete Encasement
N.W. S.



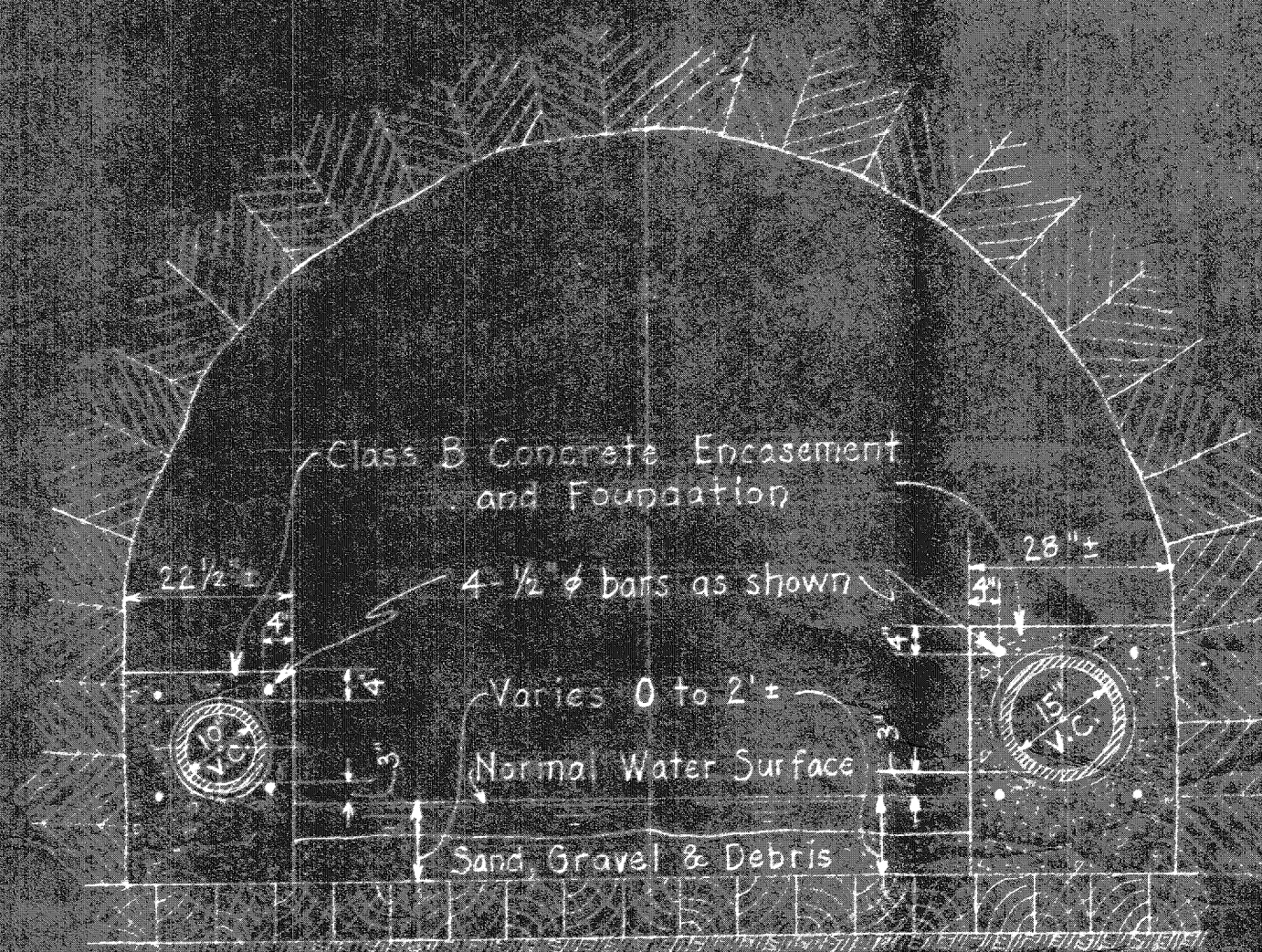
CONNECTION NO. 160
Scale: 1/2" = 1'-0"

This end of box to be omitted for connections 105 & 109. Pipe connection 104 to be led into box at conn. 105 and pipe of conn. 108 to be led into conn. 109.

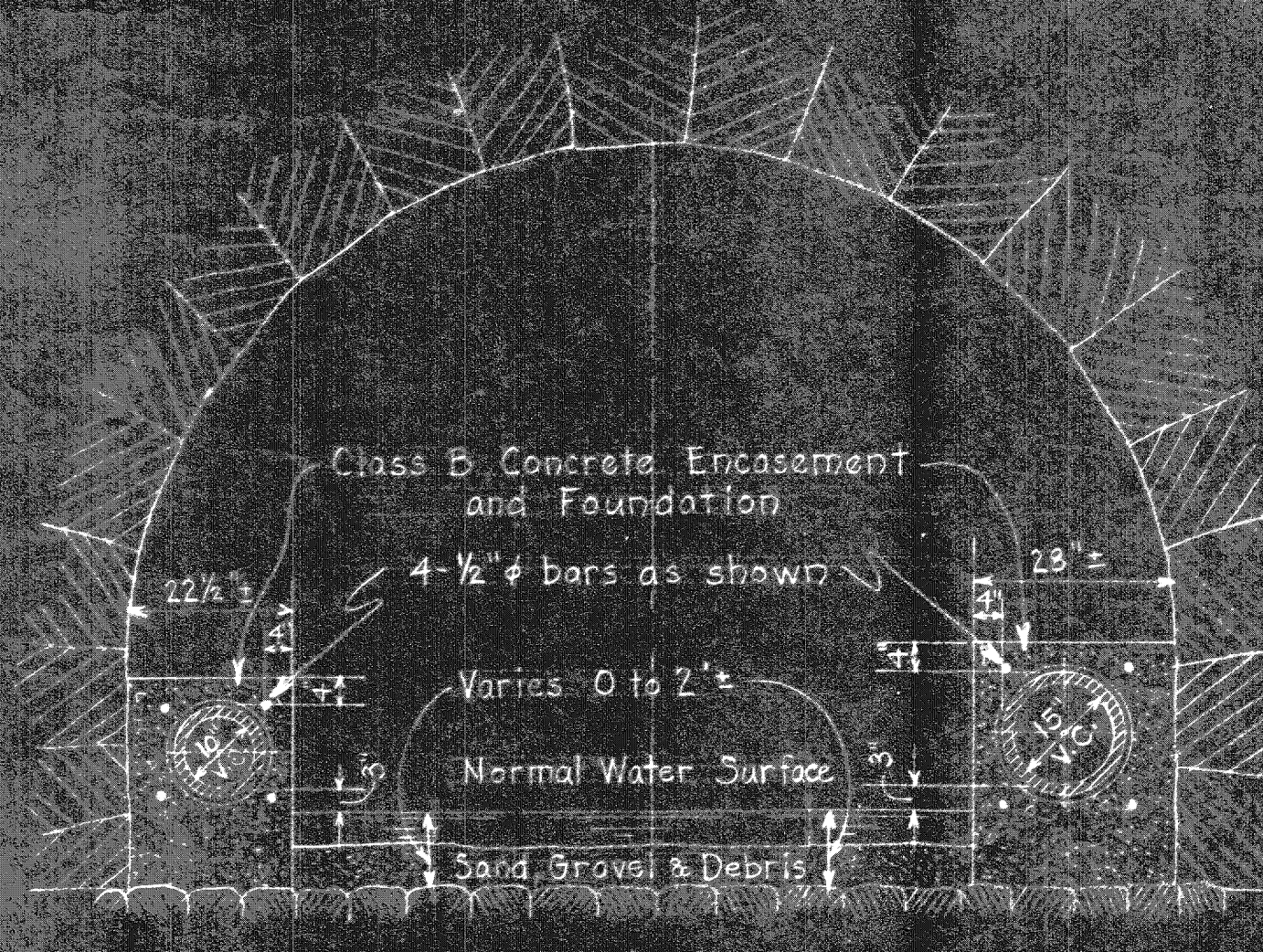
Note: Units galvanized after assembly



TYPICAL TUNNEL SECTION
WITH NATURAL STREAM BOTTOM
Scale: 1/2" = 1'-0"

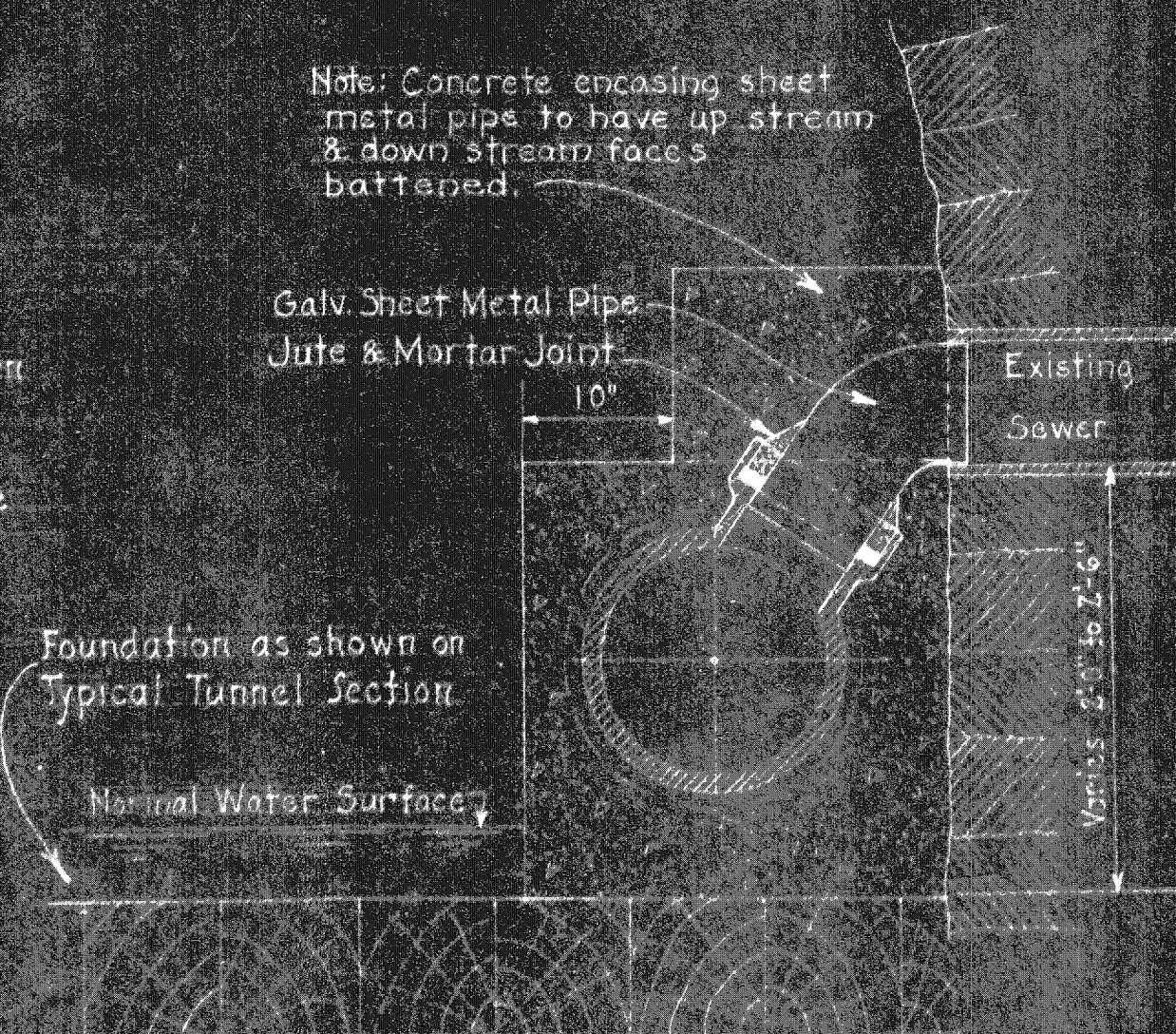


TYPICAL TUNNEL SECTION
WITH TIMBER FLOOR
Scale: 1/2" = 1'-0"

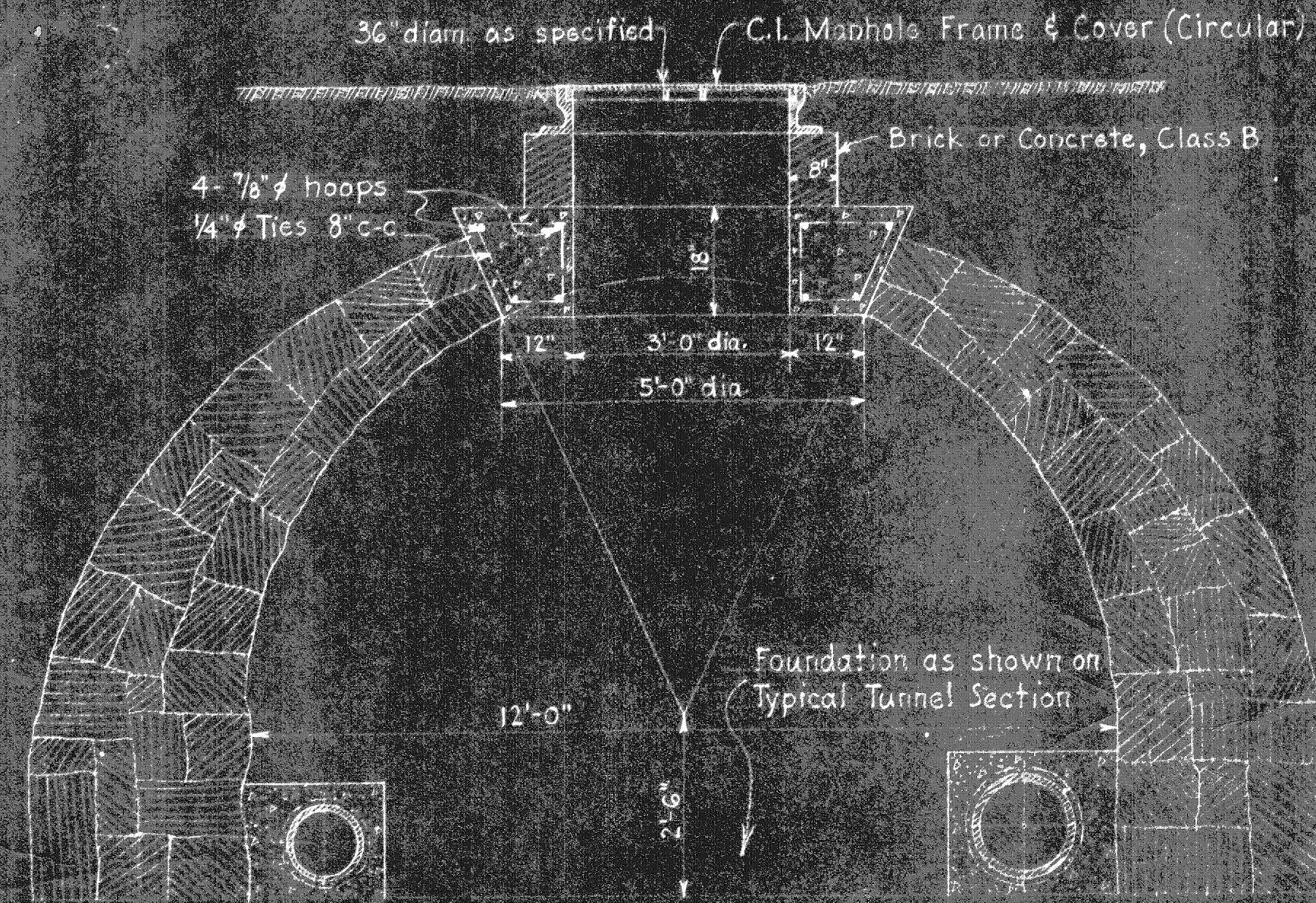


TYPICAL TUNNEL SECTION
WITH COBBLESTONE BOTTOM
Scale: 1/2" = 1'-0"

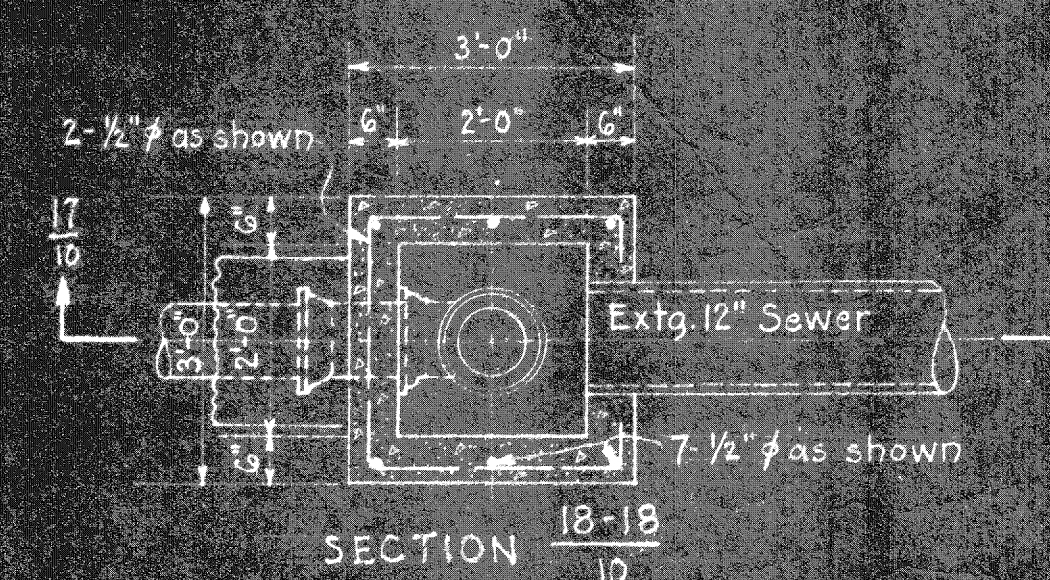
- NOTES:
- Concrete foundation and encasement may be placed in two pours provided:
 - There is 5' clear between bottom outside of pipe and top of first pour.
 - The first pour shall be at least 9" thick.
 - At no additional cost to the Owner the Contractor shall furnish & place 1/2" dowels x 24" long, staggered at 24" on both sides.
 - 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.



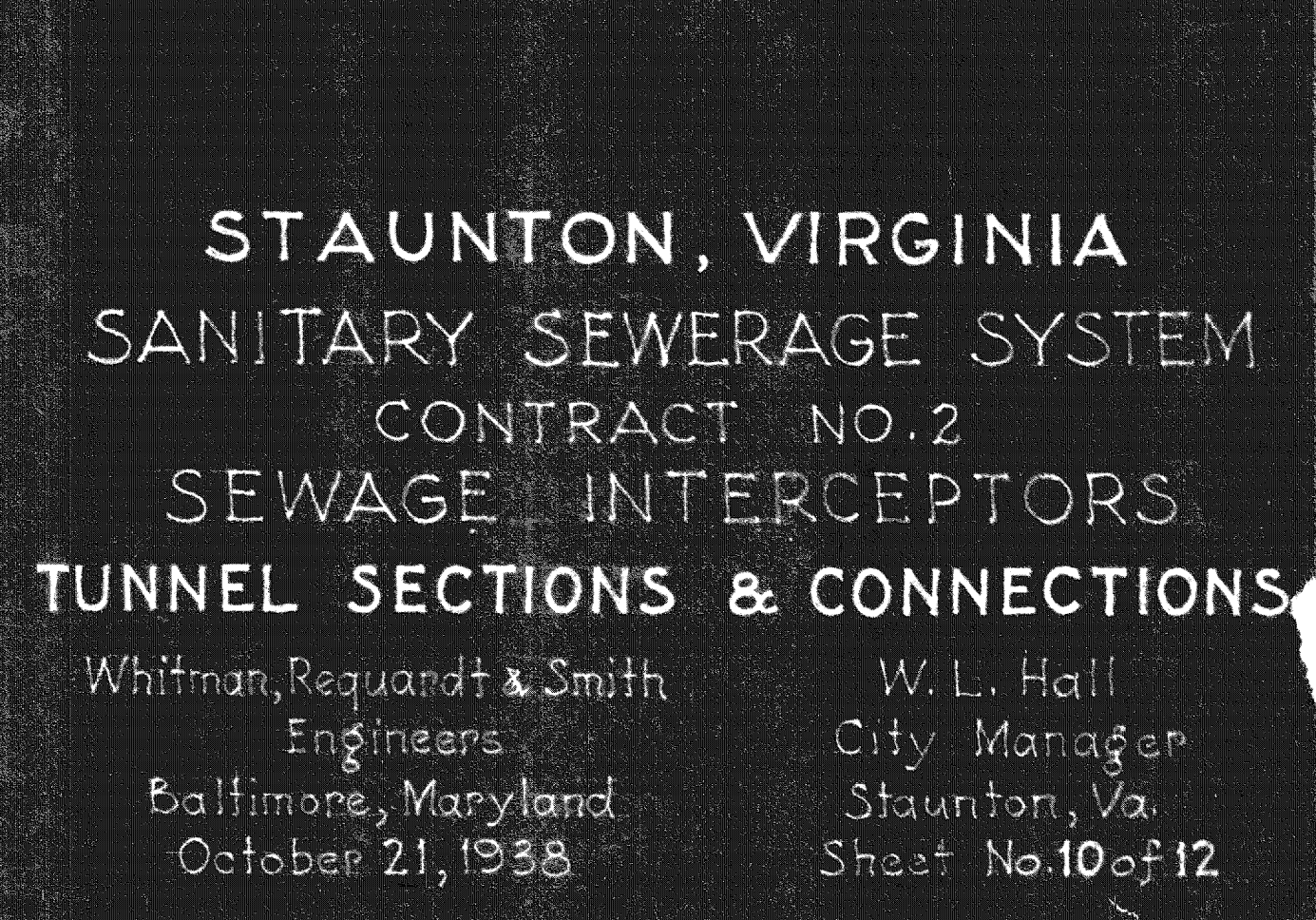
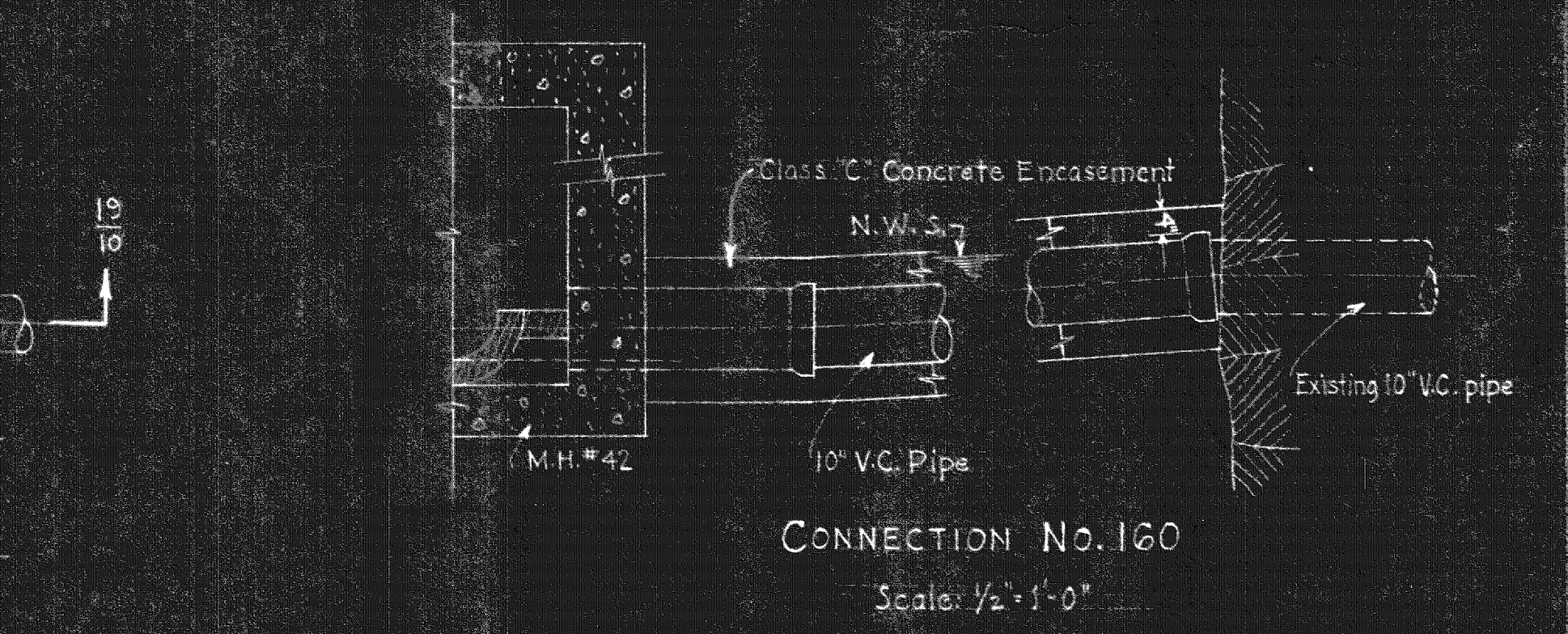
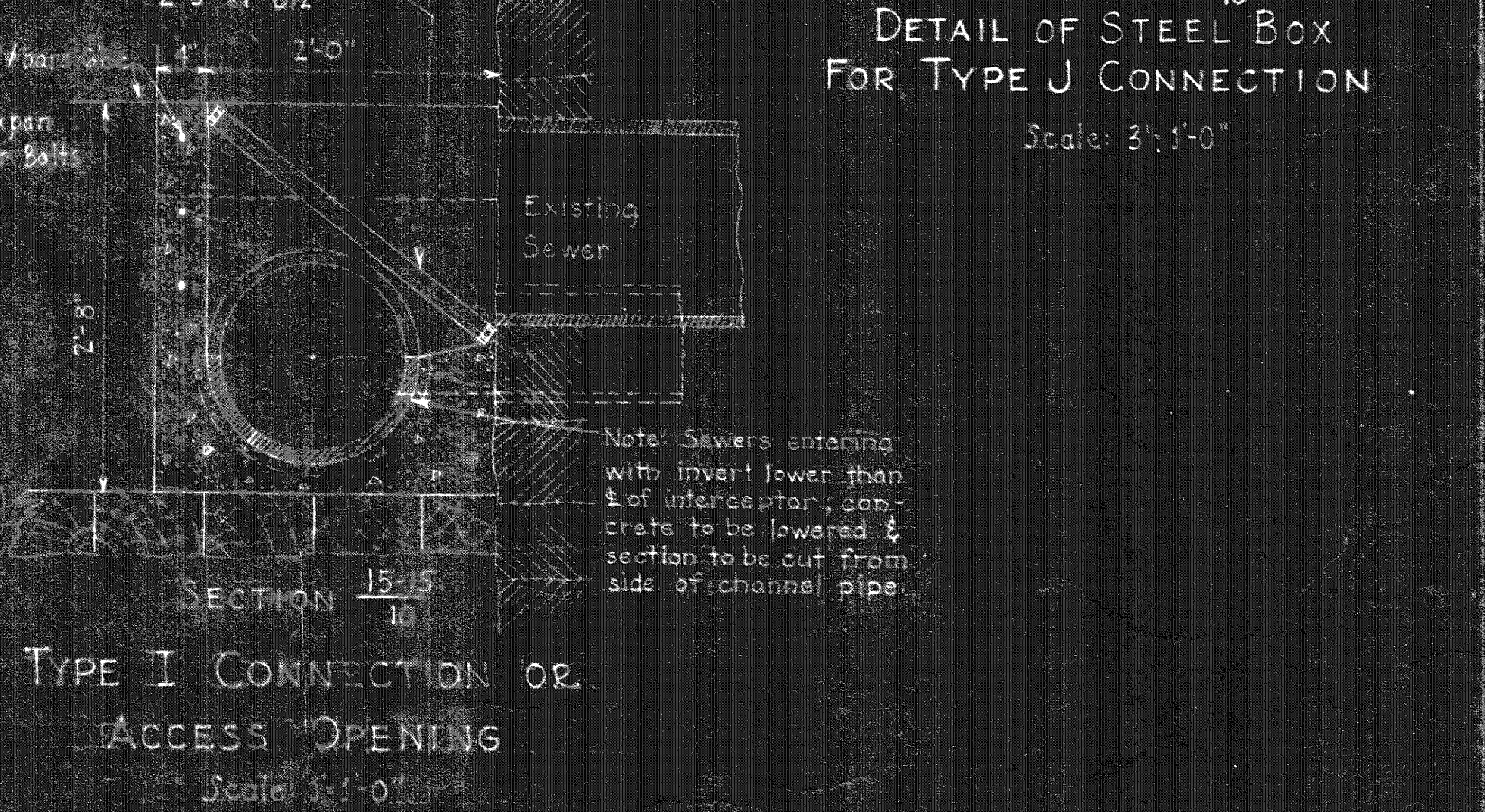
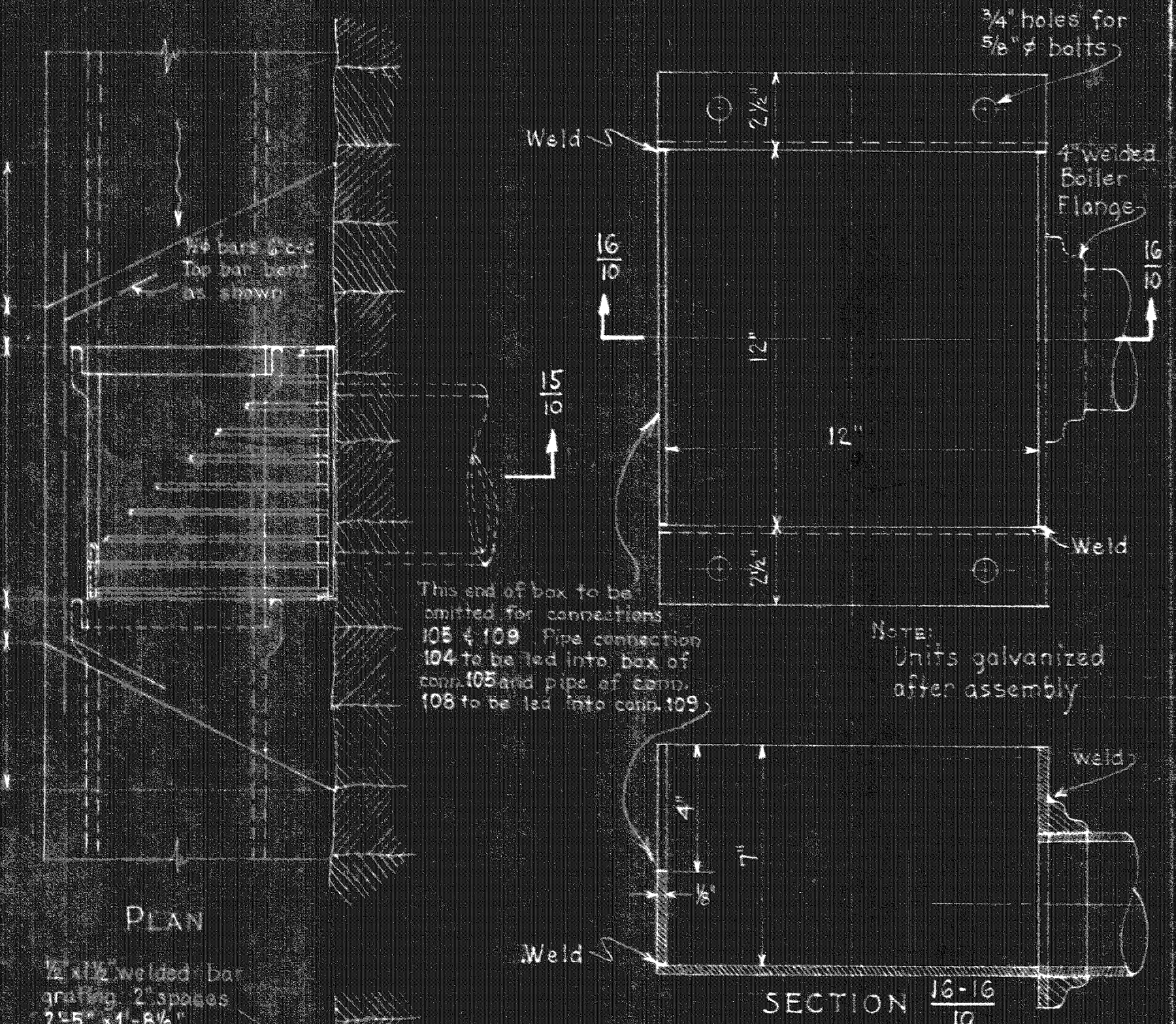
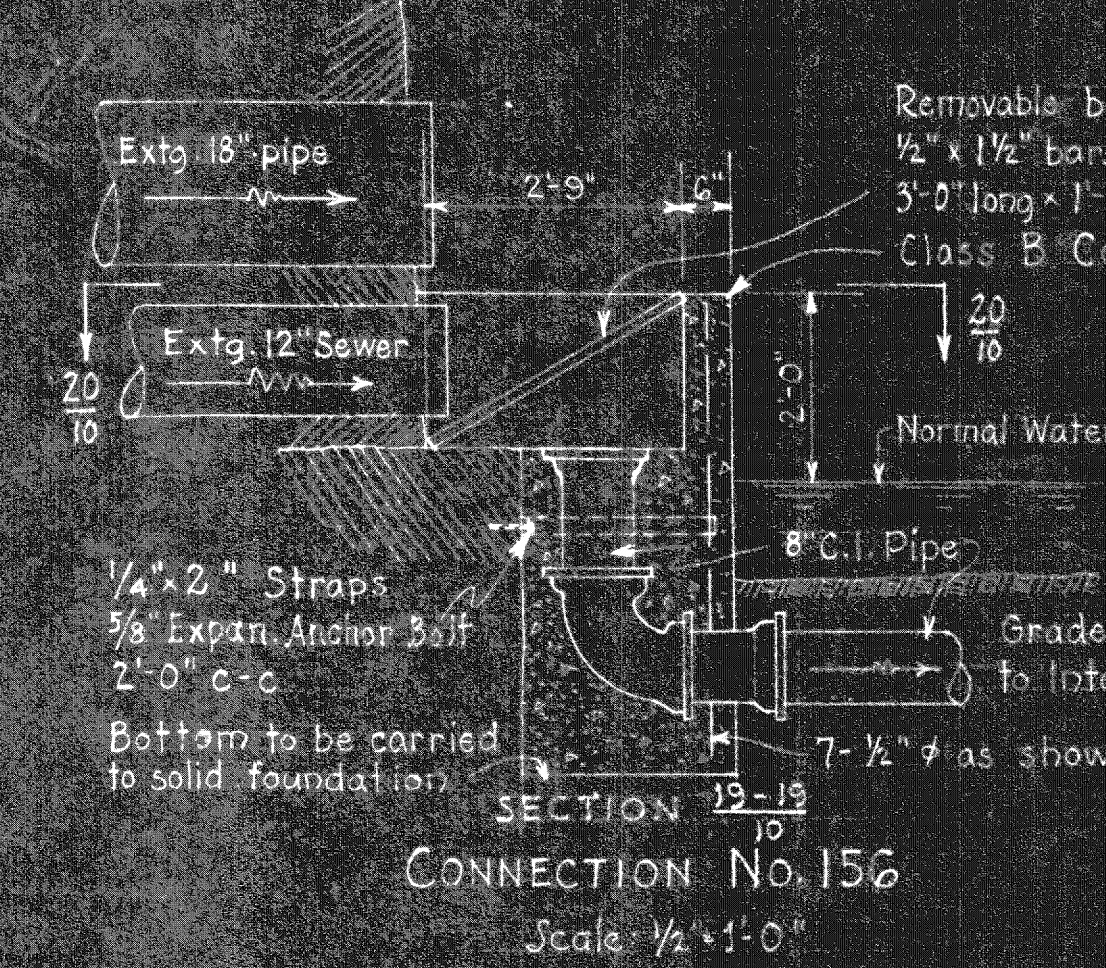
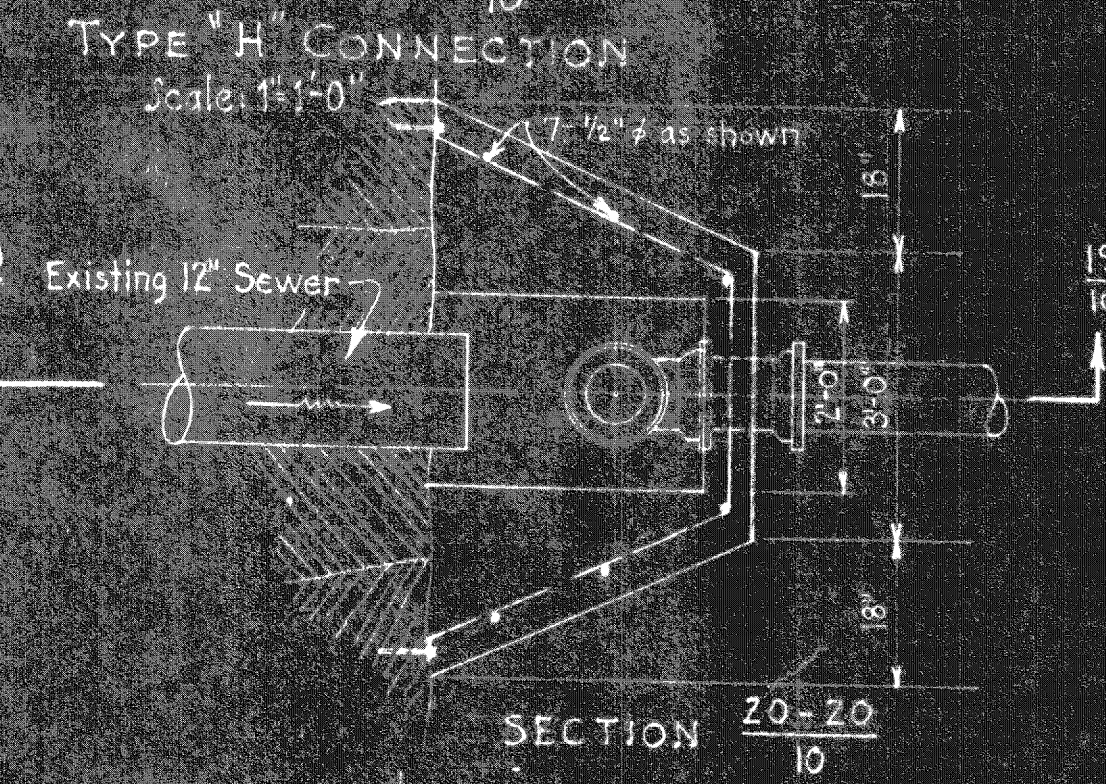
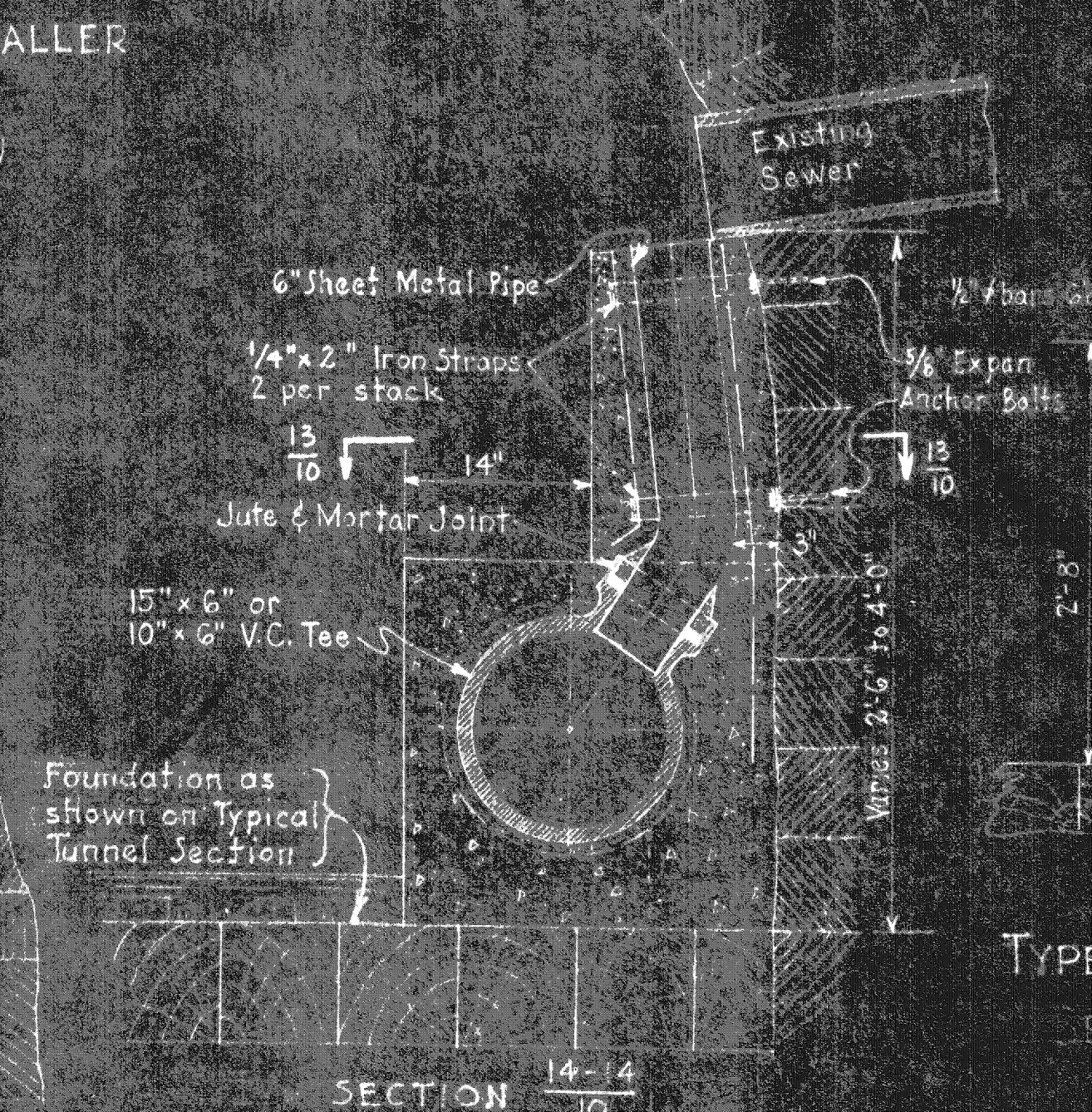
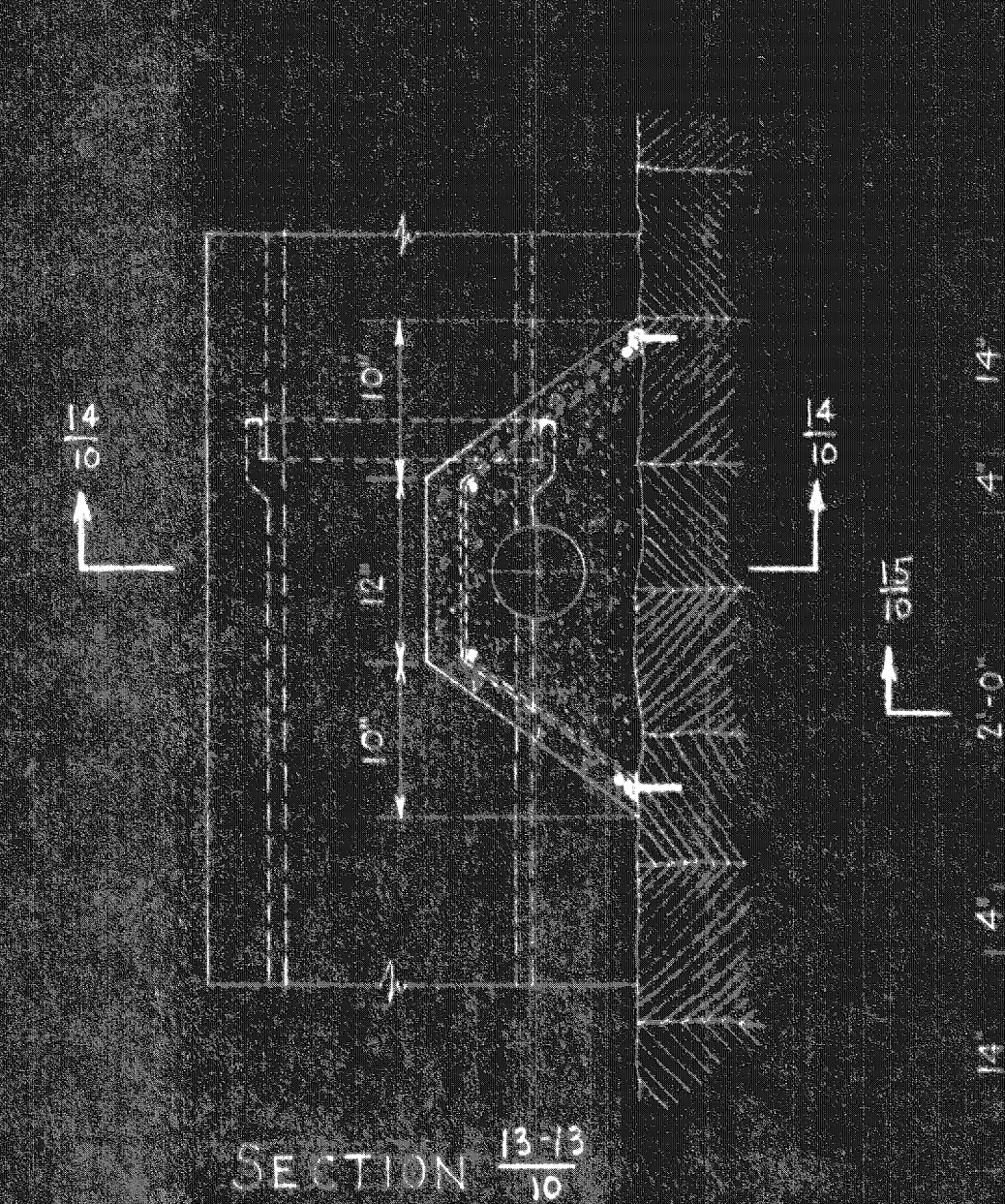
TYPE G CONNECTION FOR SEWERS 3" & SMALLER
Scale: 1 in. = 1 ft.



ACCESS HOLE - CENTRAL AVE. TUNNEL
Scale: 1/2 in. = 1 ft.



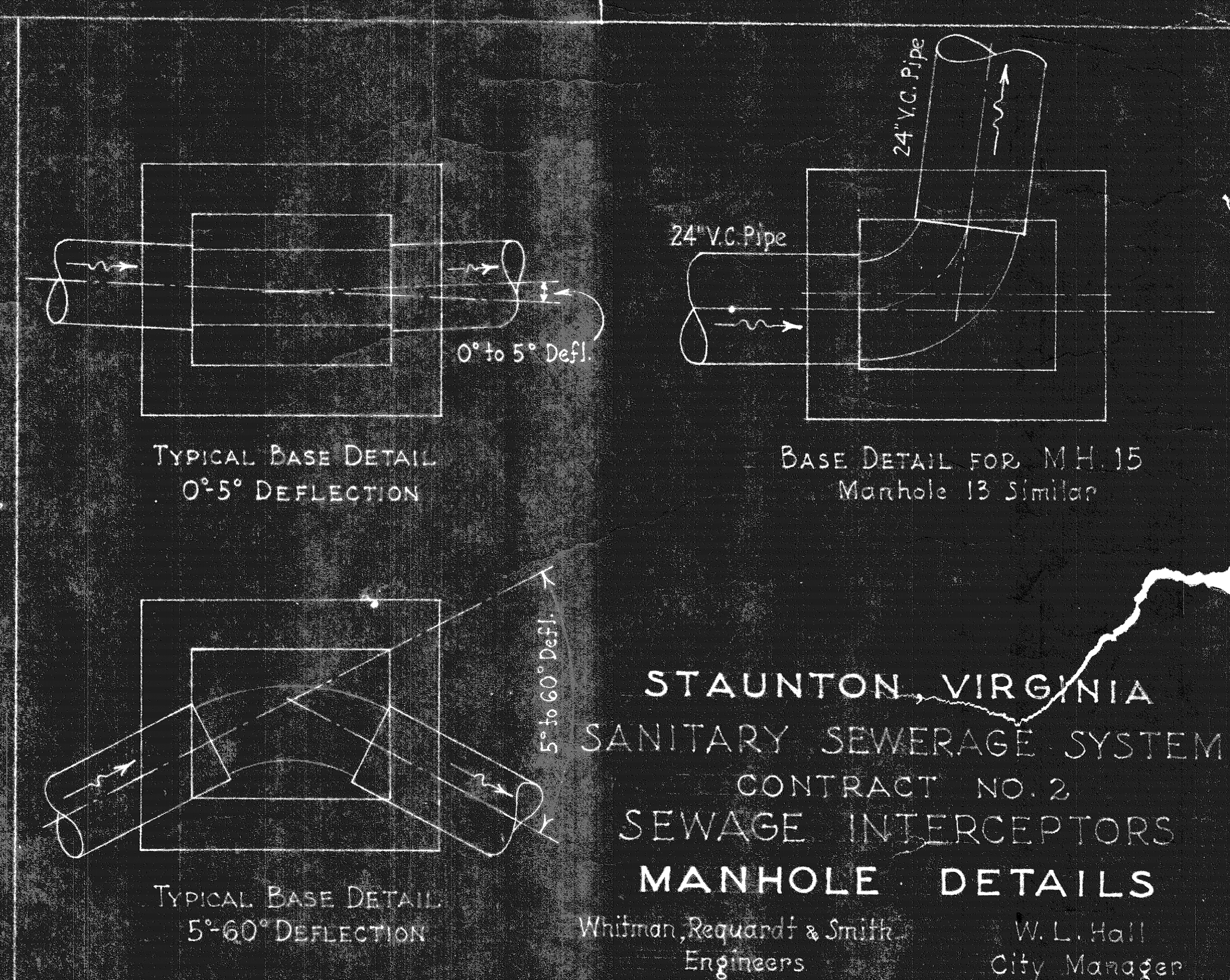
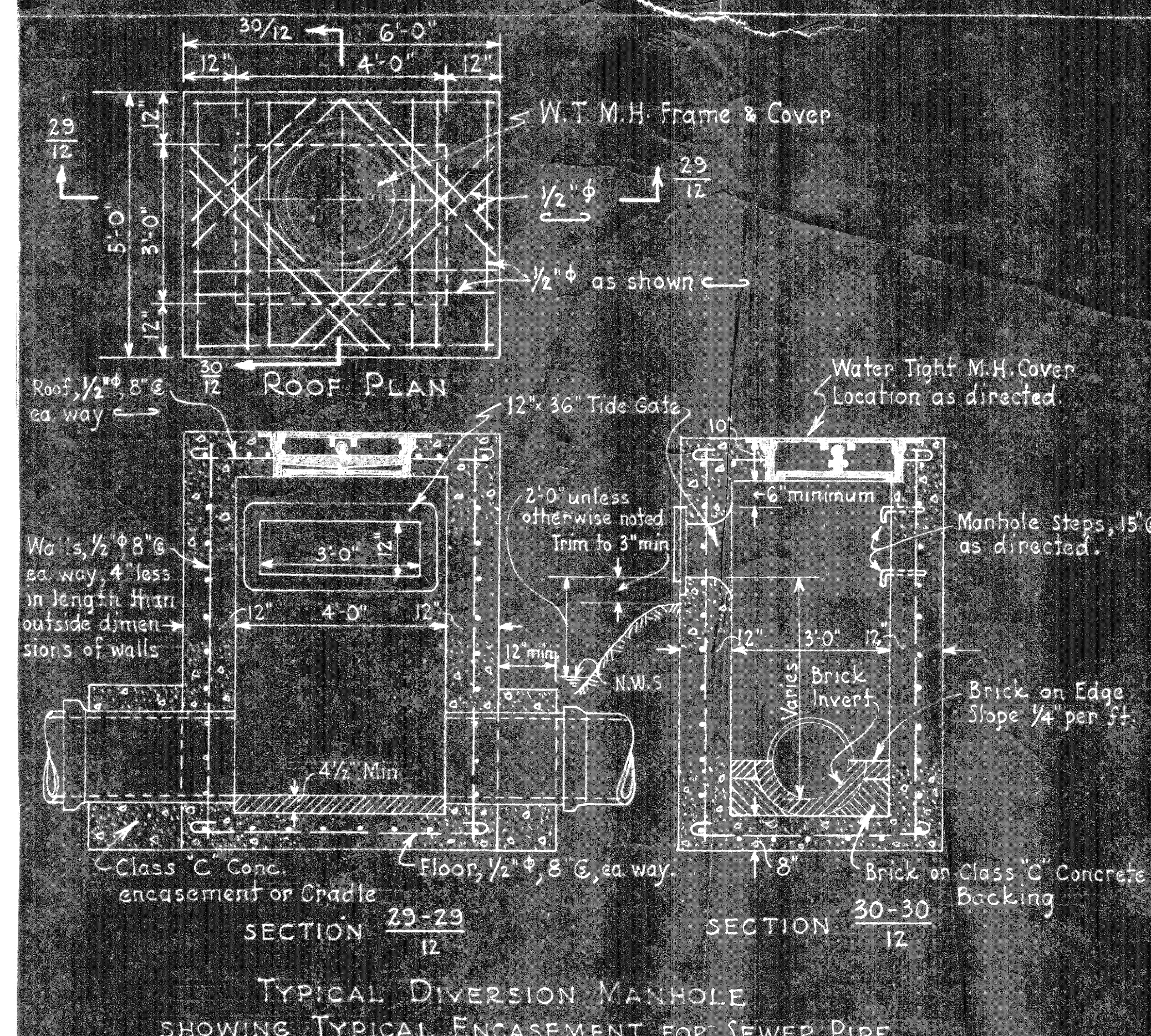
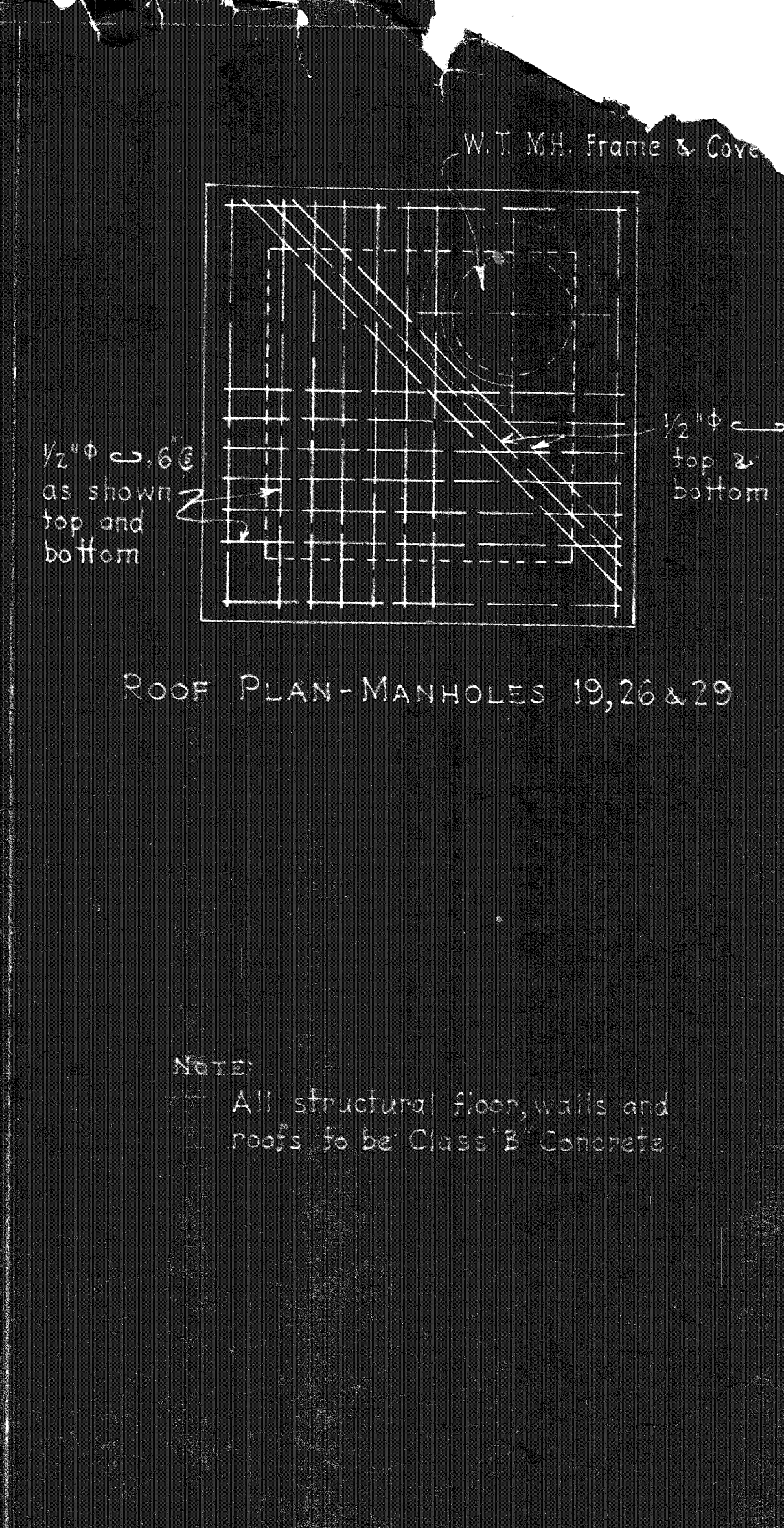
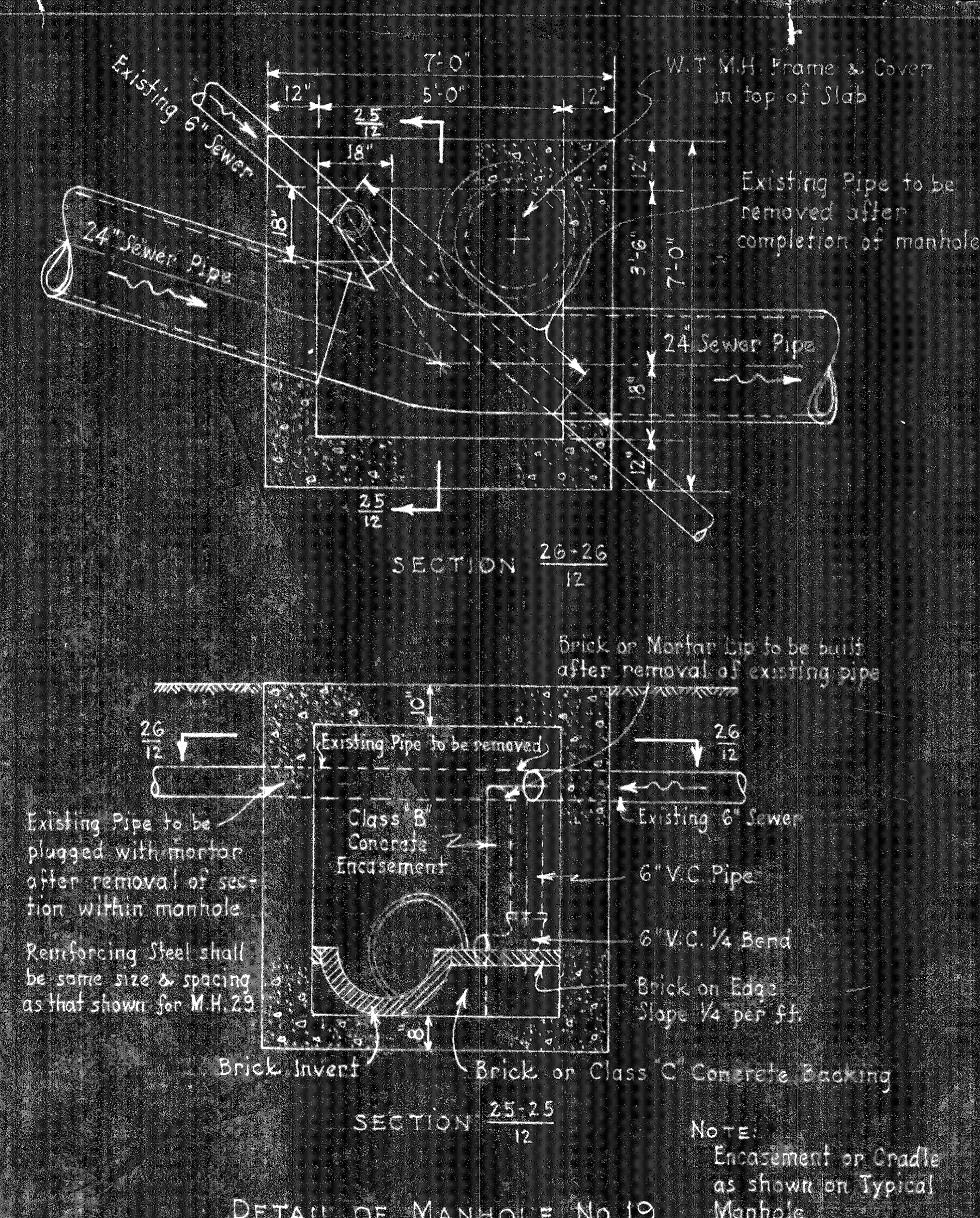
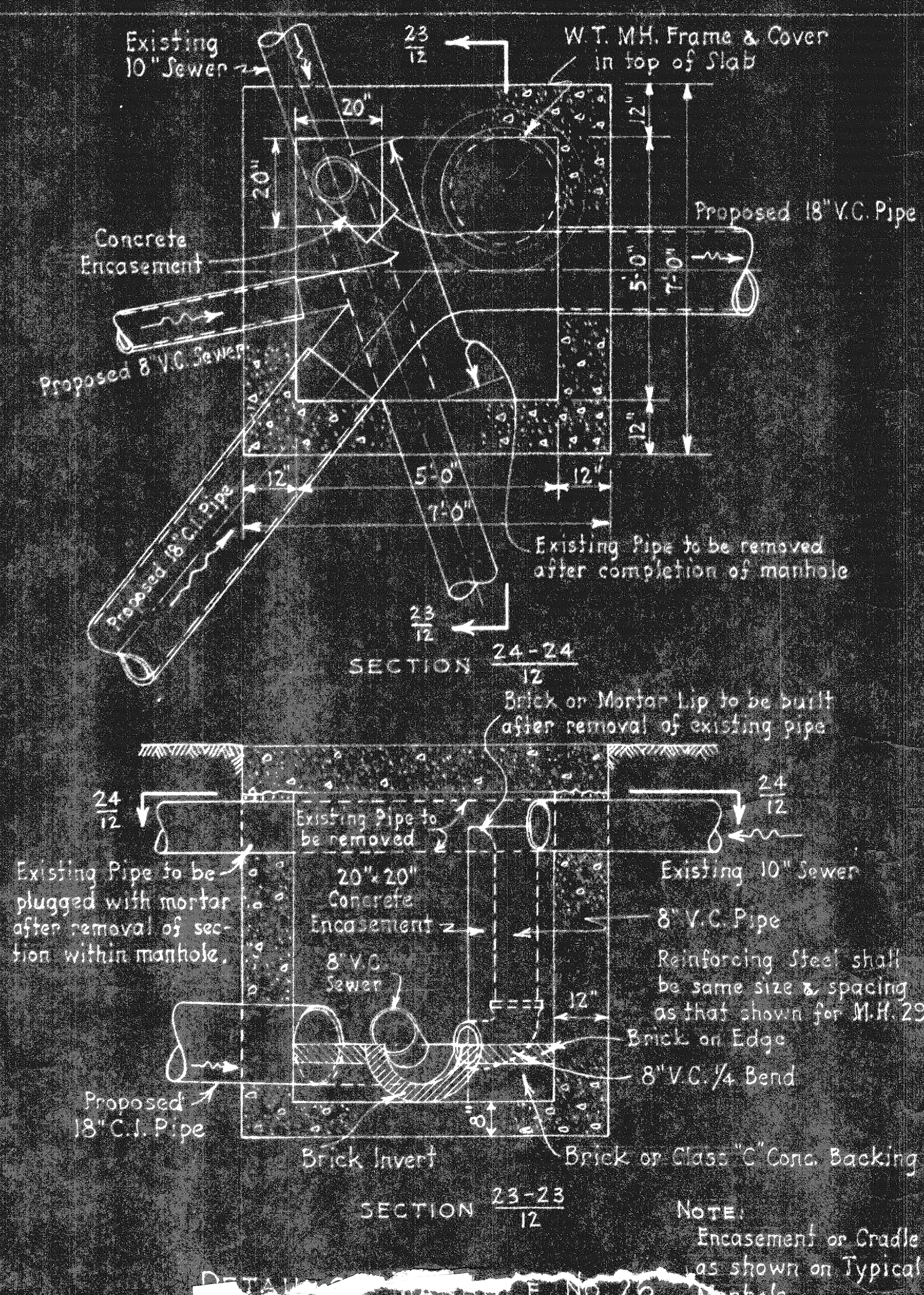
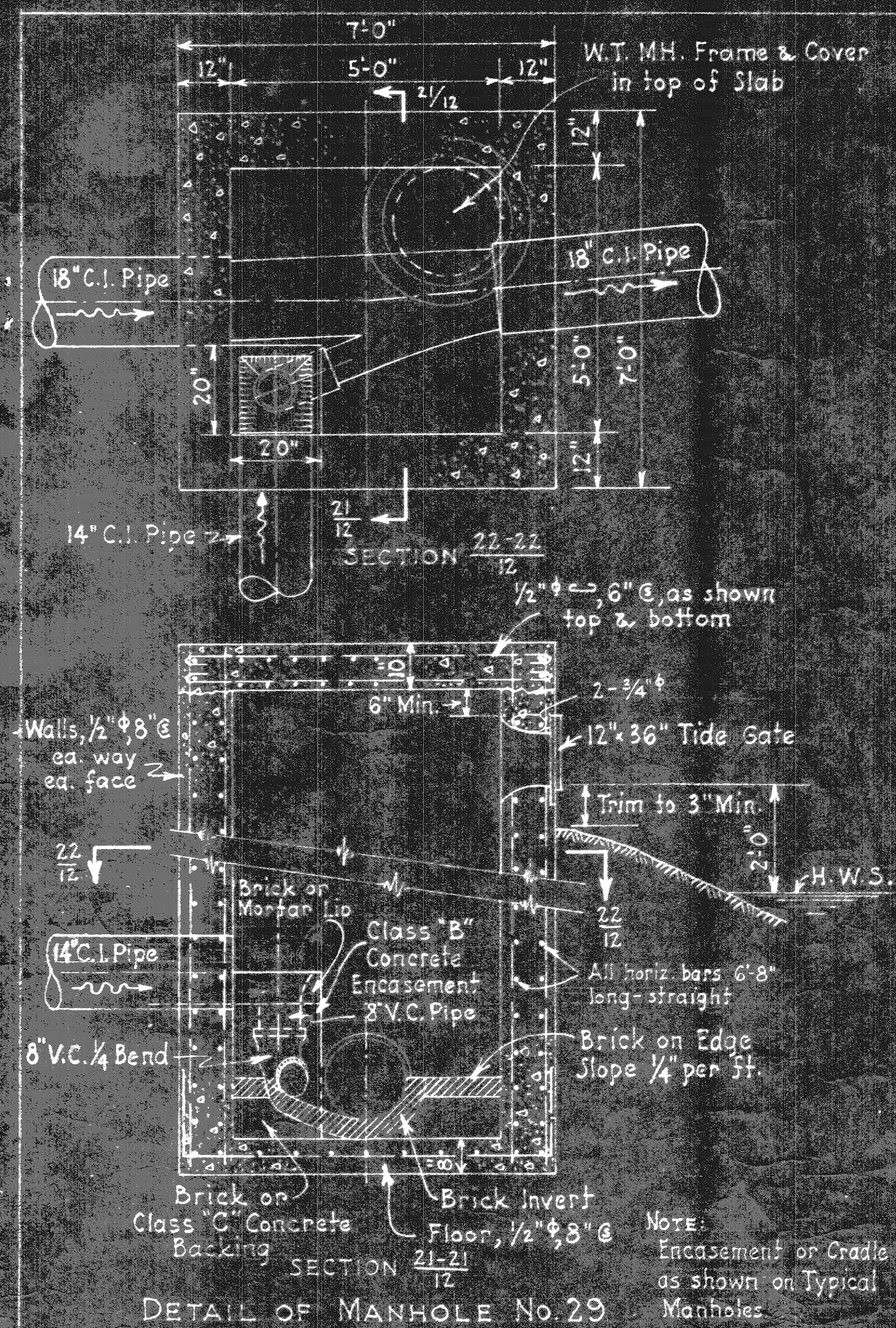
SECTION 18-18
CONNECTION No. 153
Scale: 1/2" = 1'-0"



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

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

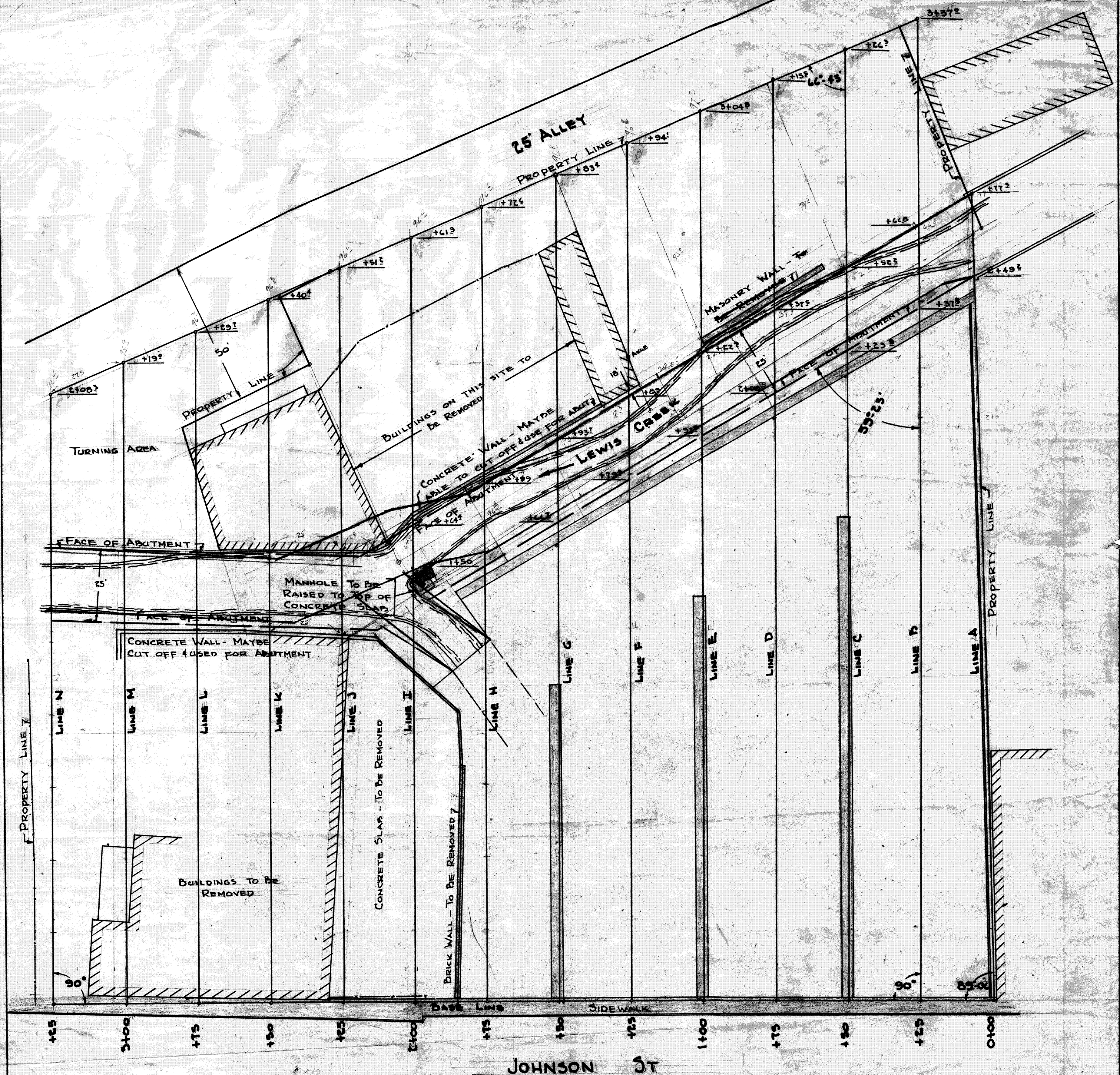
W. L. Hall
City Manager
Staunton, Va.
Sheet No. 10 of 12



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



PLAN SHOWING
BRIDGE OVER LEWIS CREEK
 AT JOHNSON STREET PARKING LOT
STAUNTON, VA.
 AUGUST 2, 1955 SCALE 1" = 20'
 C.M. MOYER JR. CPE.
 CITY ENGINEER

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	
B-31	7/8" ϕ	1	5'-0 5/16"	13.5	
C-1	3/4" ϕ	121	21'-7"	6,912	
C-2	3/4" ϕ	1	22'-10 5/16"	61.2	
C-3	3/4" ϕ	1	21'-1 5/16"	56.5	19'-9"
C-4	3/4" ϕ	1	21'-4 5/16"	57.2	19'-0"
C-5	3/4" ϕ	1	20'-7 5/16"	55.2	18'-3"
C-6	3/4" ϕ	1	19'-10 5/16"	53.2	17'-6"
C-7	3/4" ϕ	1	19'-1 5/16"	51.2	16'-9"
C-8	3/4" ϕ	1	18'-4 5/16"	49.2	16'-0"
C-9	3/4" ϕ	1	17'-7 5/16"	47.2	15'-3"
C-10	3/4" ϕ	1	16'-10 5/16"	45.2	14'-6"
C-11	3/4" ϕ	1	16'-1 5/16"	43.2	13'-9"
C-12	3/4" ϕ	1	15'-4 5/16"	41.3	13'-0"
C-13	3/4" ϕ	1	11'-4 5/16"	30.6	9'-0"
C-14	3/4" ϕ	1	5'-1 5/16"	13.8	2'-9"
C-15	3/4" ϕ	1	6'-4 5/16"	17.6	4'-0"
C-16	3/4" ϕ	1	7'-7 5/16"	20.3	5'-3"
C-17	3/4" ϕ	1	8'-10 5/16"	23.8	6'-6"
C-18	3/4" ϕ	1	10'-4 5/16"	27.9	8'-0"
C-19	3/4" ϕ	1	11'-7 5/16"	31.2	9'-3"
C-20	3/4" ϕ	1	12'-10 5/16"	34.6	10'-6"
C-21	3/4" ϕ	1	14'-4 5/16"	38.5	12'-0"
C-22	3/4" ϕ	1	12'-7 3/8"	33.8	
C-23	3/4" ϕ	1	9'-4 3/8"	25.1	

TOTAL 7,888*
TOTAL FROM SHEET 3 33,250*
GRAND TOTAL 11' SLAB 41,138*

EACH BAR LAPS 8'

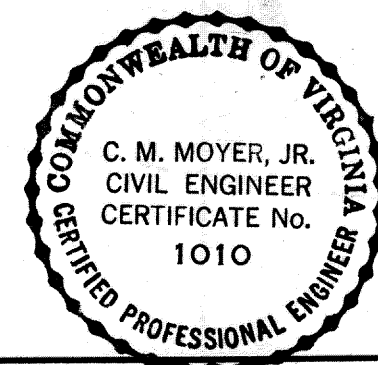
SAME AS C-2 - SUBSTITUTE DIMENSION IN LAST COLUMN FOR 20'-0"

9' SLAB					
MARK	SIZE	NO	LENGTH	WT.	BENDING DIAGRAM
J	7/8" ϕ	22	19'-0 1/4"	854	
K	7/8" ϕ	21	20'-5 1/4"	876	
L-1	3/4" ϕ	1	28'-6 1/4"	42.8	
L-2	3/4" ϕ	1	28'-9 1/4"	43.1	
L-3	3/4" ϕ	1	29'-0 1/4"	43.5	
L-4	3/4" ϕ	1	29'-3 1/4"	44.0	
L-5	3/4" ϕ	1	29'-6 1/4"	44.3	
L-6	3/4" ϕ	1	29'-9 1/4"	44.7	
L-7	3/4" ϕ	1	30'-0 1/4"	45.0	
L-8	3/4" ϕ	1	30'-3 1/4"	45.4	
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	11	16'-11 3/4"	34.6	11'-4 1/2" 3'-1 1/2"
K-3	7/8" ϕ	1	13'-4 3/4"	27.4	7'-9 1/2"
K-4	7/8" ϕ	1	9'-9 3/4"	20.0	4'-3 3/4"
K-5	7/8" ϕ	1	19'-11 3/4"	40.6	13'-4 1/2"
K-6	7/8" ϕ	1	17'-6 3/4"	35.8	11'-11 1/2"
K-7	7/8" ϕ	1	15'-1 3/4"	30.9	9'-6 1/2"
K-8	7/8" ϕ	1	12'-8 3/4"	26.0	7'-1 1/2"
K-9	7/8" ϕ	1	10'-3 3/4"	21.0	4'-8 1/2"
K-10	7/8" ϕ	1	7'-10 3/4"	16.1	2'-3 1/2"

TOTAL 2,586*

REINFORCED BEAMS					
MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM
D-1	1 1/4" $\square$	3	33'-0"	52.5	
D-2	1 1/4" $\square$	2	34'-8 3/8"	36.8	
M	3/8" ϕ	4	36'-4"	15.1	
N-1	1 1/4" $\square$	2	21'-6"	20.8	
N-2	1 1/4" $\square$	2	22'-9 3/8"	24.2	
O	1/2" ϕ	10	5'-0 3/8"	33.8	
P-1	1 1/4" $\square$	2	20'-9"	22.1	
P-2	1 1/4" $\square$	1	21'-7 3/8"	11.5	
Q-1	1 1/4" $\square$	2	26'-0"	27.6	
Q-2	1 1/4" $\square$	2	27'-3 3/8"	29.0	
R	1/2" ϕ	10	3'-8 3/8"	24.9	
S	3/8" ϕ	4	2'-6"	10.4	

TOTAL 2,329*

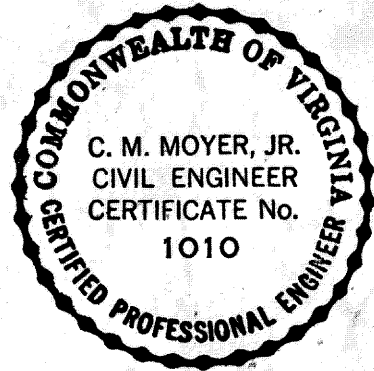


CITY OF STAUNTON, VA.		
OFFICE OF CITY ENGINEER		
REINFORCED CONCRETE BRIDGE OVER LEWIS CREEK		
AUGUST 23, 1955	C. M. MOYER, JR.	SHEET 4 of 5

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 $\frac{\text{lb}}{\text{in}^2}$, AND SHALL BE PROPORTIONED ACCORDING TO THE SPECIFICATIONS OF THE VIRGINIA DEPARTMENT OF HIGHWAYS.
2. CLASS 'B' CONCRETE SHALL BE 2,200 $\frac{\text{lb}}{\text{in}^2}$
3. REINFORCING STEEL SHALL CONFORM TO REQUIREMENTS FOR BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT OF A.A.S.H.O. DESIGNATION M-31.



CITY OF STAUNTON, VA		
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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	1/2" φ	406	7'-6"	2033*	
E-2	1/2" φ	300	6'-6"	1281*	
E-3	1/2" φ	362	5'-6"	1330*	
F-1	1/2" φ	322	21'-5"	4597*	
F-2	1/2" φ	16	7'-6"	80*	
H	3/4" φ	482	6'-4"	4577*	

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	1/2" φ	1068	2'-2 1/2"	1577*	

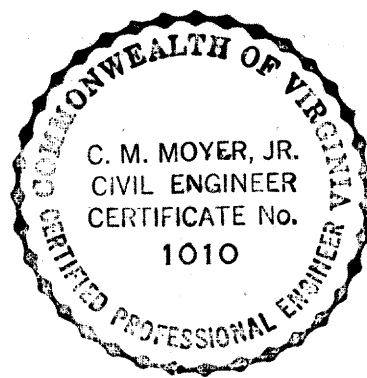
TOTAL 1577*

11" MAIN SLAB																	
MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM	MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM	MARK	SIZE	NUMBER	LENGTH	WEIGHT	BENDING DIAGRAM
A-1	1"φ	222	25'-3 3/4"	14,802		A-16	1"φ	1	16'-0 1/4"	42.7		B-2	1"φ	1	25'-11 1/8"	69.4	16'-1 1/2"
B-1	1"φ	222	25'-10 3/8"	45,310		A-17	1"φ	1	13'-5 1/4"	36.0		B-3	1"φ	1	26'-3 3/8"	70.2	16'-5"
A-2	1"φ	1	25'-7 1/4"	68.5		A-18	1"φ	1	10'-11 1/4"	29.2		B-4	1"φ	1	26'-6 1/8"	71.0	16'-8 1/2"
A-3	1"φ	1	25'-9 3/4"	69.0		A-19	1"φ	1	8'-5 1/4"	22.5		B-5	1"φ	1	26'-10 7/8"	71.7	17'-0"
A-4	1"φ	1	26'-1 1/4"	69.7		A-20	1"φ	1	5'-11 1/4"	15.9		B-6	1"φ	1	27'-1 3/8"	72.5	17'-3 1/2"
A-5	1"φ	1	26'-4 3/4"	70.5		A-21	1"φ	1	23'-10 3/4"	63.8		B-7	1"φ	1	27'-5 3/8"	73.3	17'-7"
A-6	1"φ	1	26'-8 1/4"	71.4		A-22	1"φ	1	22'-3 3/4"	59.5		B-8	1"φ	1	27'-8 3/8"	74.0	17'-10 1/2"
A-7	1"φ	1	26'-11 3/4"	72.0		A-23	1"φ	1	20'-10 3/4"	55.8		B-9	1"φ	1	28'-0 1/8"	74.9	18'-2"
A-8	1"φ	1	27'-3 1/4"	72.9		A-24	1"φ	1	19'-3 3/4"	51.6		B-10	1"φ	1	28'-3 1/8"	75.5	18'-5 1/2"
A-9	1"φ	1	27'-6 3/4"	73.5		A-25	1"φ	1	17'-10 3/4"	47.8		B-11	1"φ	1	28'-7 1/8"	76.4	18'-9"
A-10	1"φ	1	27'-10 1/4"	74.4		A-26	1"φ	1	16'-3 3/4"	43.0		B-12	1"φ	1	28'-1 3/8"	75.0	18'-3"
A-11	1"φ	1	28'-1 3/4"	75.2		A-27	1"φ	1	14'-10 3/4"	39.8		B-13	1"φ	1	28'-7 3/8"	76.2	18'-9"
A-12	1"φ	1	26'-5 1/4"	70.6		A-28	1"φ	1	12'-3 1/4"	32.9		B-14	1"φ	1	28'-1 3/8"	75.0	18'-3"
A-13	1"φ	1	23'-10 1/4"	63.6		A-29	1"φ	1	10'-3 3/4"	27.5		B-15	1"φ	1	23'-7 3/8"	63.0	13'-9"
A-14	1"φ	1	21'-2 1/4"	56.2		A-30	1"φ	1	8'-3 3/4"	22.2		B-16	1"φ	1	18'-4 5/16"	49.0	
A-15	1"φ	1	18'-8 1/4"	50.0		A-31	1"φ	1	5'-9 3/4"	15.5		B-17	1"φ	1	15'-5 5/16"	42.2	9'-9 1/2"
						A-32	1"φ	1	3'-11 3/4"	10.6		B-18	1"φ	1	13'-2 1/4"	35.2	7'-2 1/2"
												B-19	1"φ	1	10'-7 3/16"	28.4	4'-7 1/2"
												B-20	1"φ	1	8'-0 5/16"	24.4	2'-0 1/2"
												B-21	1"φ	1	23'-7 3/16"	63.0	17'-7 1/2"
												B-22	1"φ	1	22'-0 9/16"	58.8	16'-0 1/2"
												B-23	1"φ	1	20'-5 3/16"	54.6	14'-5 1/2"
												B-24	1"φ	1	18'-10 3/16"	50.4	12'-10 1/2"
												B-25	1"φ	1	17'-3 1/16"	42.2	11'-3 1/2"
												B-26	1"φ	1	15'-8 5/16"	41.3	9'-8 1/2"
												B-27	1"φ	1	13'-8 1/16"	36.5	7'-8 1/2"
												B-28	1"φ	1	11'-6 5/16"	30.8	5'-6 1/2"

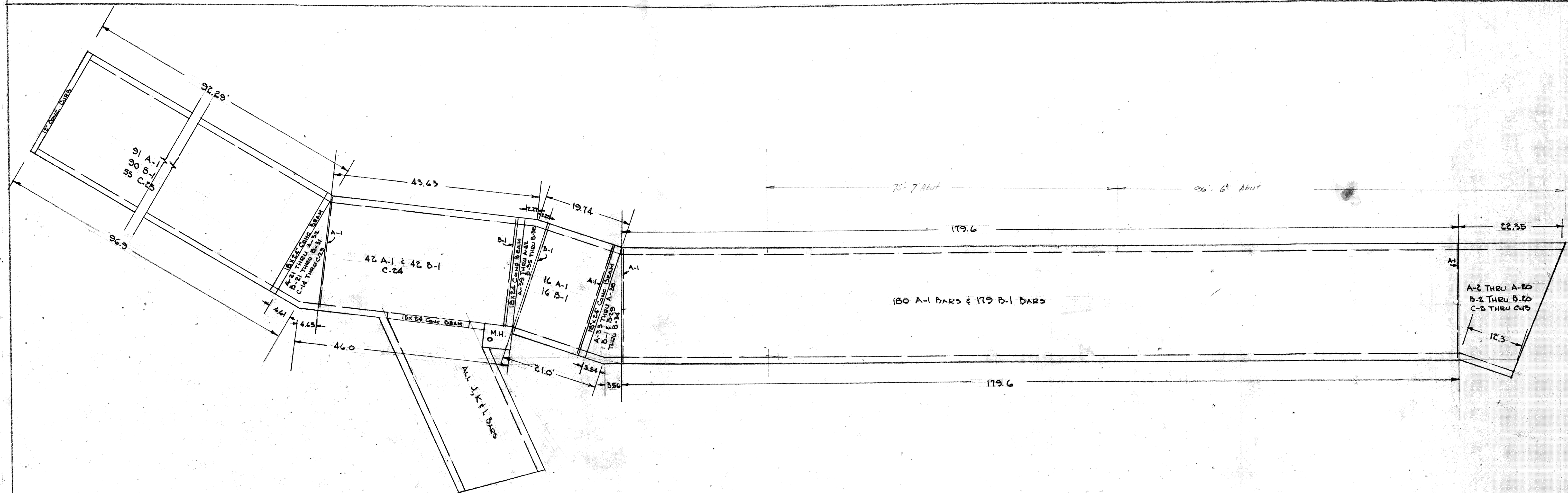
TOTAL 33,250*

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

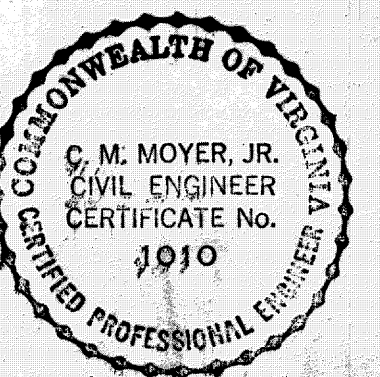
DIMENSIONS IN LAST COL. SUBSTITUTE FOR 12'-4 1/2" IN B-18 BAR.

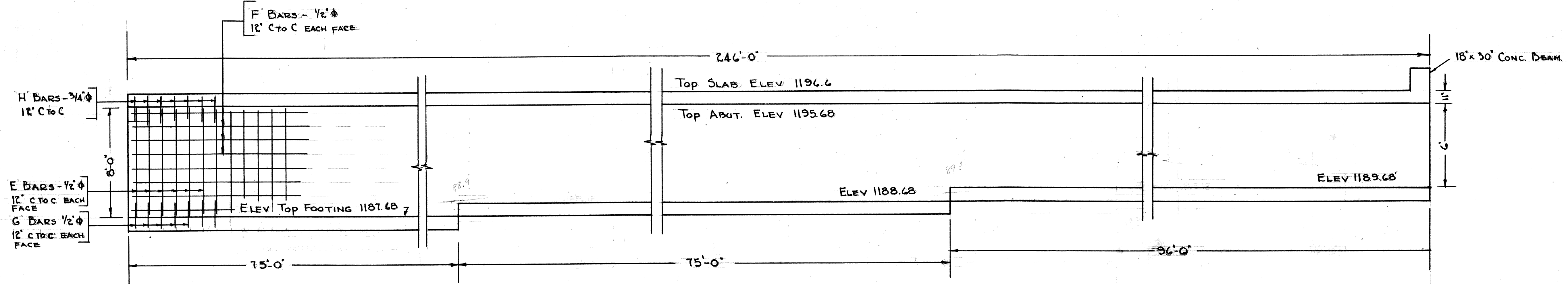


CITY OF STAUNTON, VA.		
OFFICE OF CITY ENGINEER		
REINFORCED CONCRETE BRIDGE OVER LEWIS CREEK		
AUGUST 23, 1955	C. M. MOYER, JR.	SHEET 3 OF 5

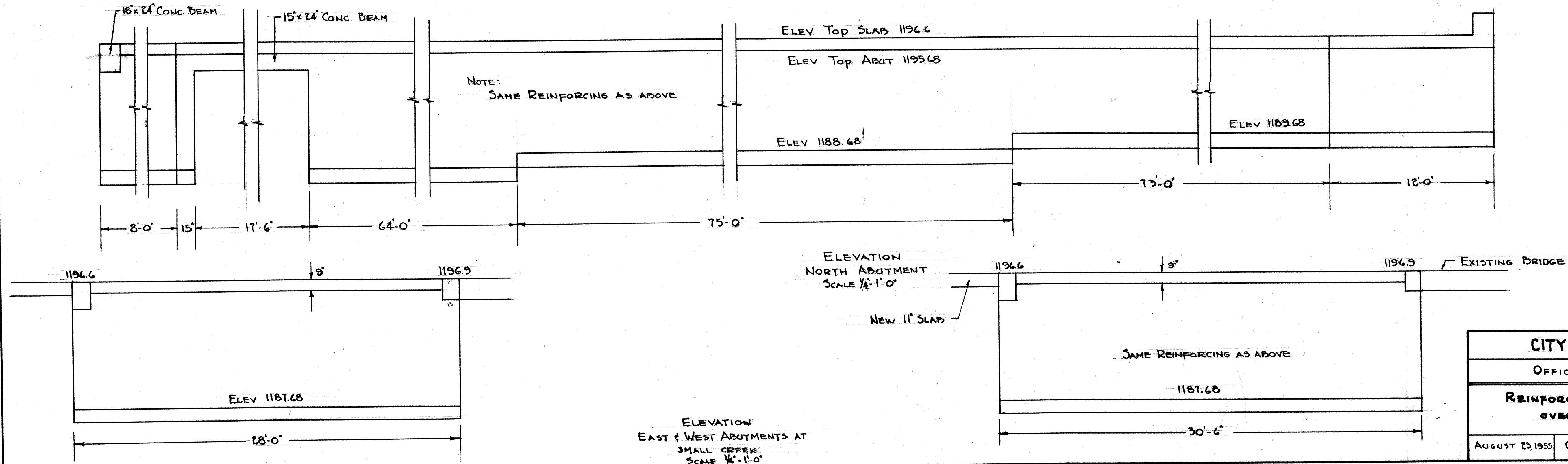


REVISED PLAN
JOHNSON STREET PARKING LOT BRIDGE
STAUNTON, VIRGINIA





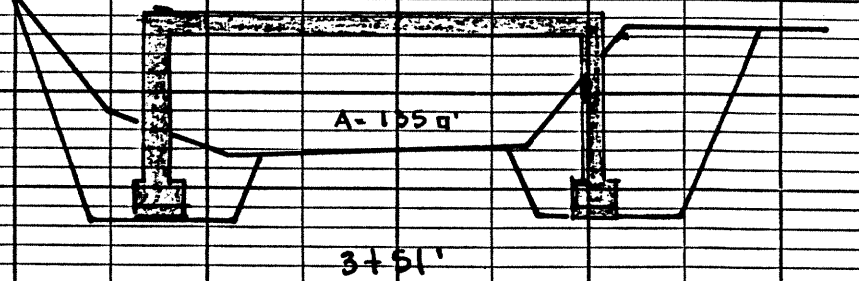
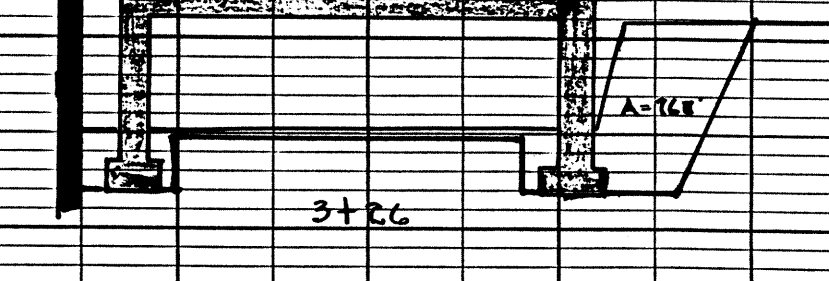
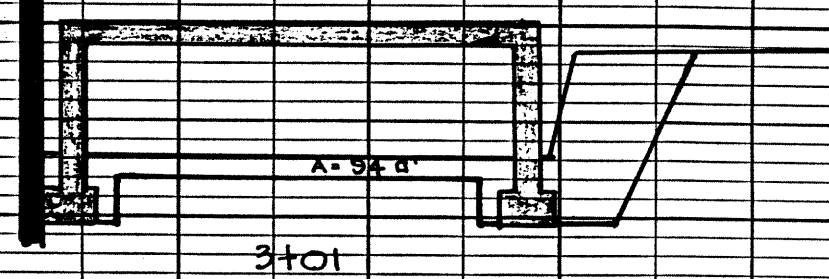
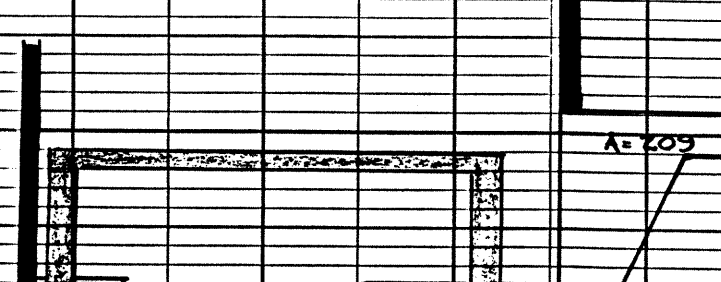
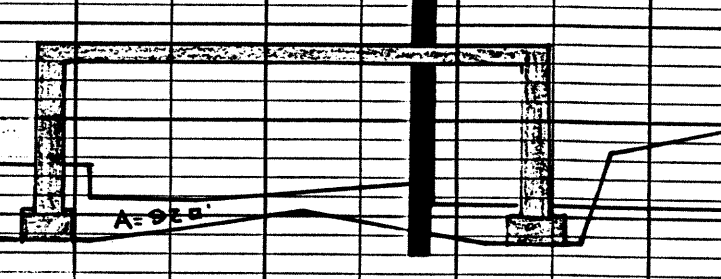
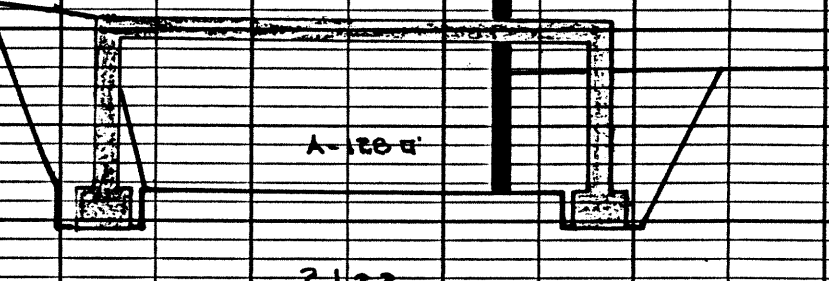
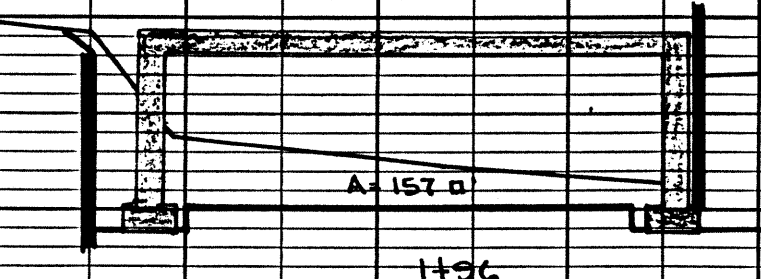
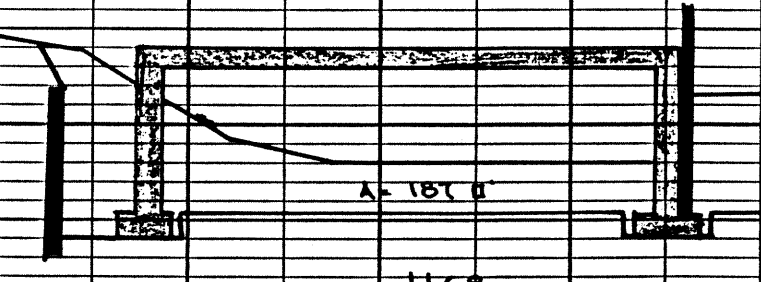
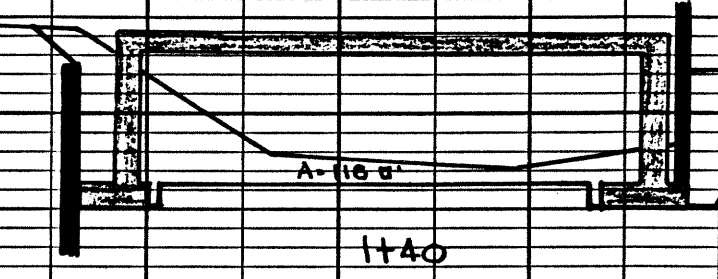
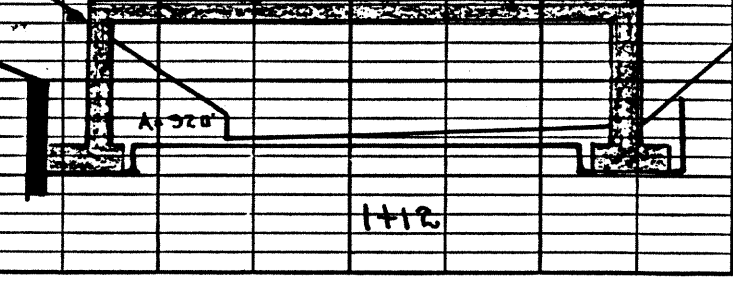
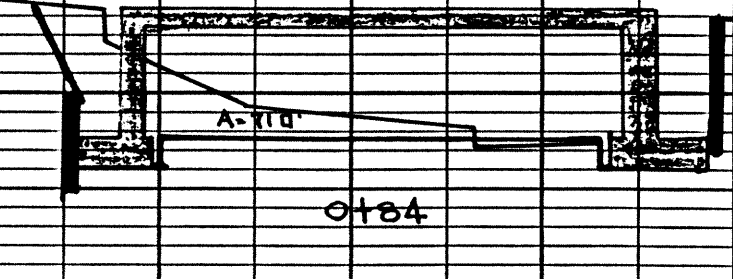
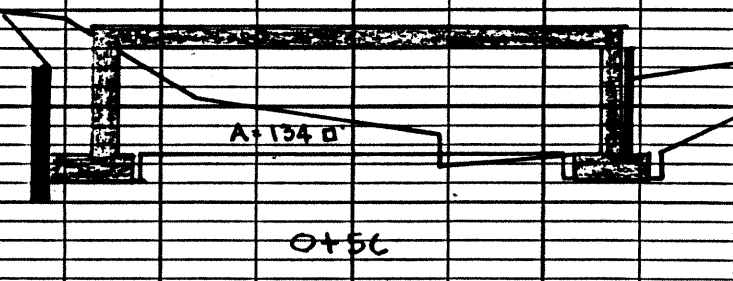
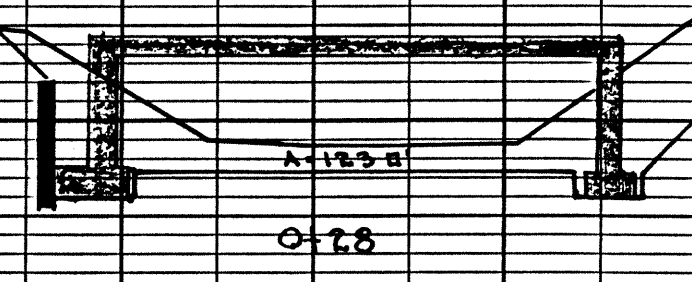
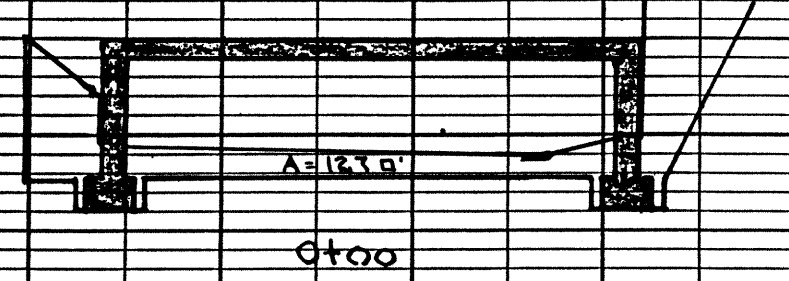
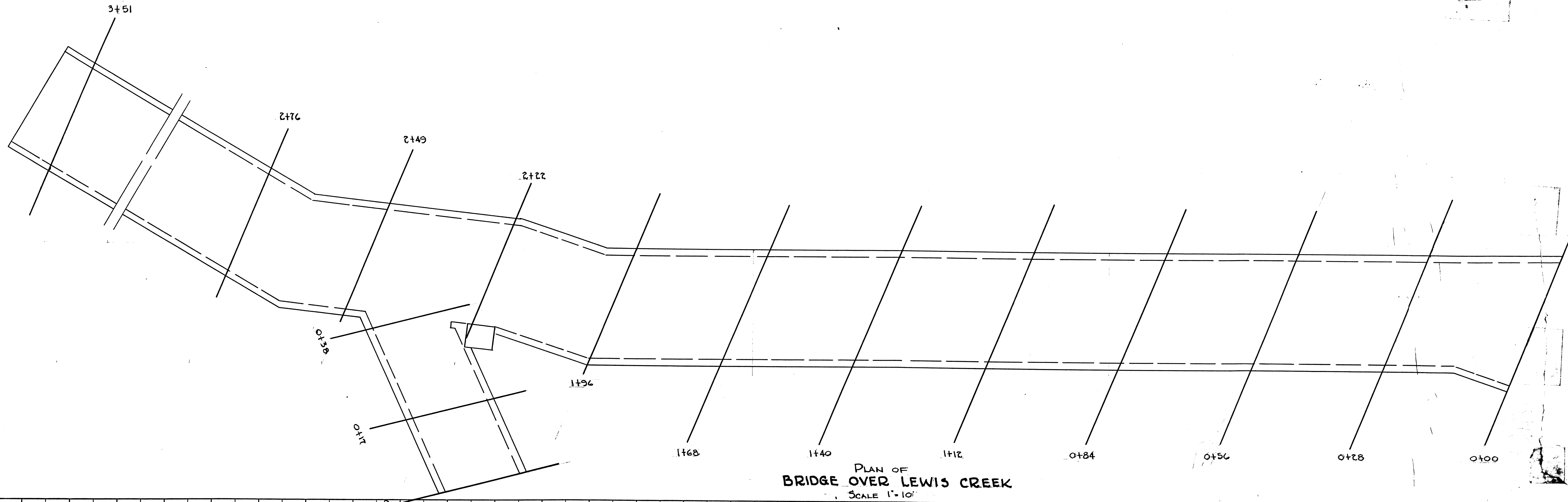
ELEVATION
 SOUTH ABUTMENT
 SCALE $\frac{1}{4}" = 1'-0"$



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

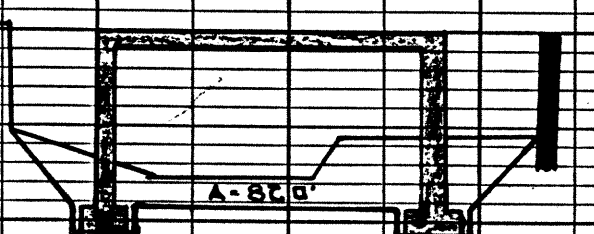
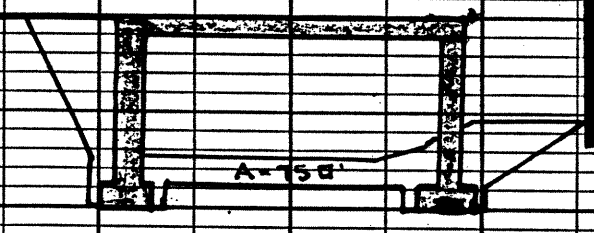
PLAN	SURVEYED	DATE
	PLOTTED	BY
	CHECKED	NO.
	NOTE BOOK	RT. OF WAY CHECKED

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



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

SMALL CREEK - X-SECTIONS



NOTE: CARRY 135' FOR 21'

NOTE: TOTAL ELEVATION 1776 cu yds.

NOTE: CARRY 135' FOR 10' MORE

C. M. May



Draper Aden Associates

Engineering • Surveying • Environmental Services

Richmond, VA 8090 Villa Park Drive Richmond, VA 23228 804-264-2228 Fax: 804-264-8773 www.daa.com	Blacksburg, VA Charlottesville, VA Hampton Roads, VA
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NOTE A: LATERAL AND/OR MAINLINE BRANCH SEWERS SHOWN FROM 1933 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: LATERALS AND/OR MAINLINE BRANCH SEWERS DISCOVERED DURING THE INSTALLATION OF THE 18" RELIEF SEWER ALONG CENTRAL AVENUE THAT WERE TRANSFERRED AND RE-DESIGNED TO THE 18" RELIEF SEWER.

#41

#49

1 OF 7

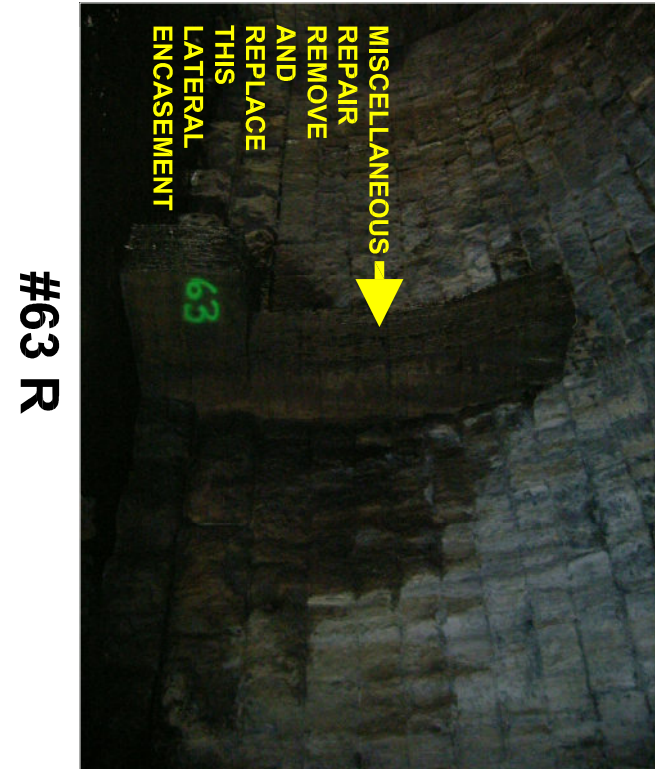
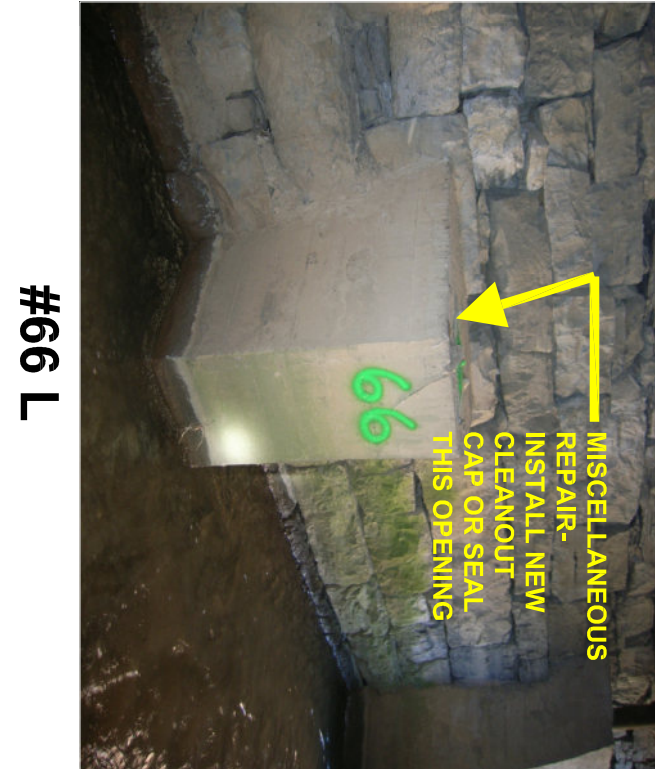


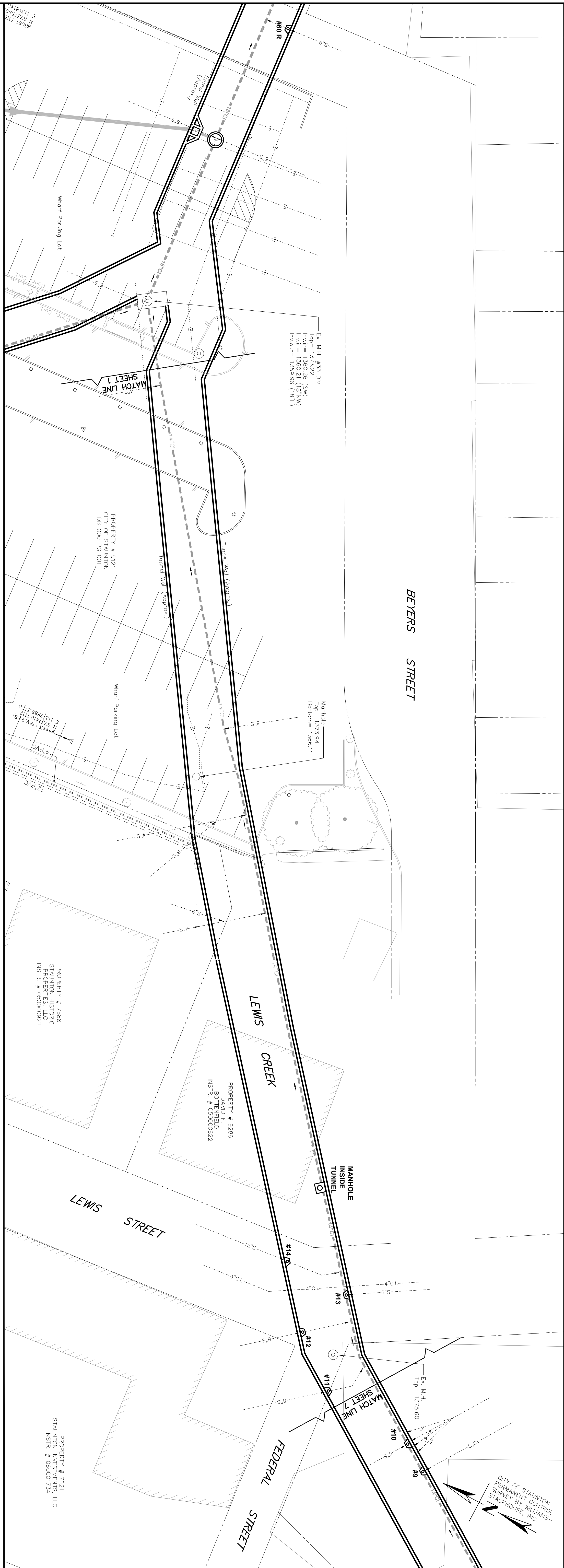
CITY OF STAUNTON, VIRGINIA

DESIGNED BY:	N/A
DRAWN BY:	HLJ
CHECKED BY:	JST

Richmond, VA
8090 Villa Park Drive
Richmond, VA 23228
804-264-2228 Fax: 804-264-8773
www.daa.com

Blacksburg, VA
Charlottesville, VA
Hampton Roads, VA





MANHOLE INSIDE TUNNEL



#14



#13



#12



#11



#10



#9



REVISIONS

EXISTING SANITARY SEWER PLAN

LEWIS CREEK TUNNEL INSPECTION

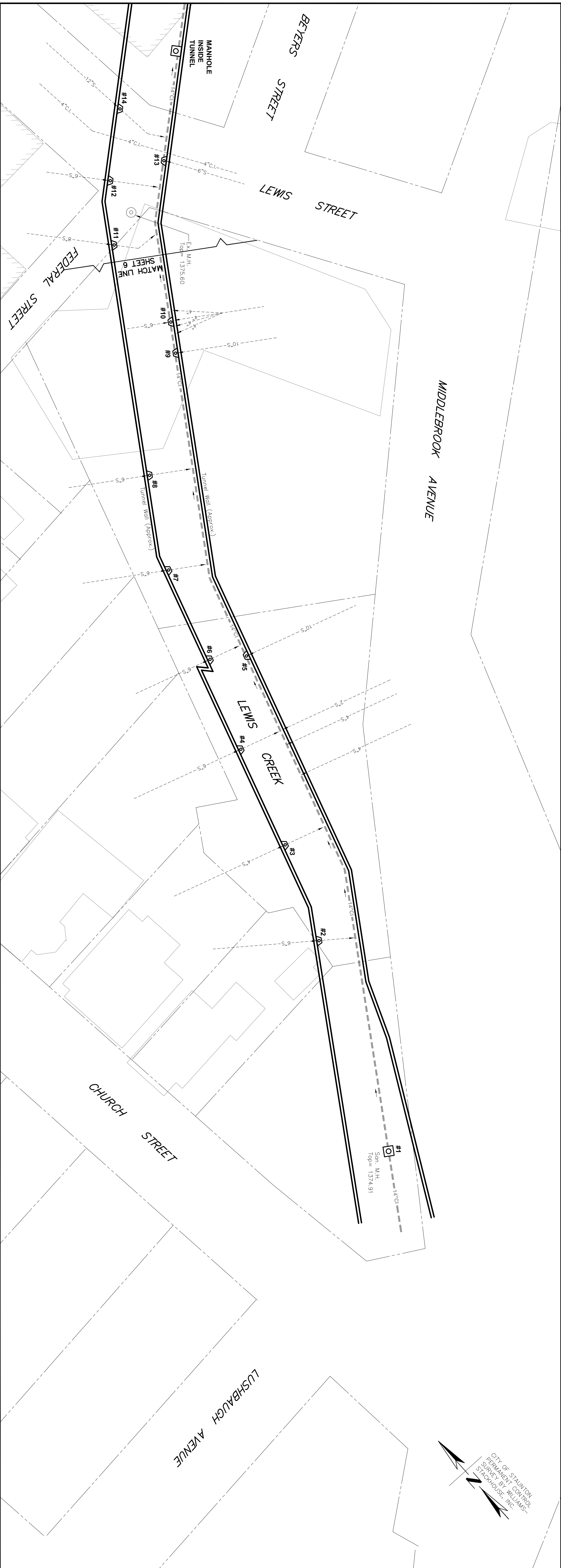
CITY OF STAUNTON, VIRGINIA



Draper Aden Associates

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8090 Villa Park Drive
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MANHOLE INSIDE TUNNEL



#10



#14



#9



#13



88



#12



#7



#11



#6



#5



#4



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#2



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

EXISTING SANITARY SEWER PLAN

LEWIS CREEK TUNNEL INSPECTION

CITY OF STAUNTON, VIRGINIA



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Hampton Roads, VA

APPENDIX D

EXISTING CONDITION TUNNEL GEOMETRY



PROJECT		TITLE	
STAUNTON FLOOD STUDY		TUNNEL SEGMENTS	
COMM. NO.		220184	
DRAWN	CHECKED		
SKETCH NO.		SK-13	
DWG. REFERENCE NO.			
DATE:		REV.	

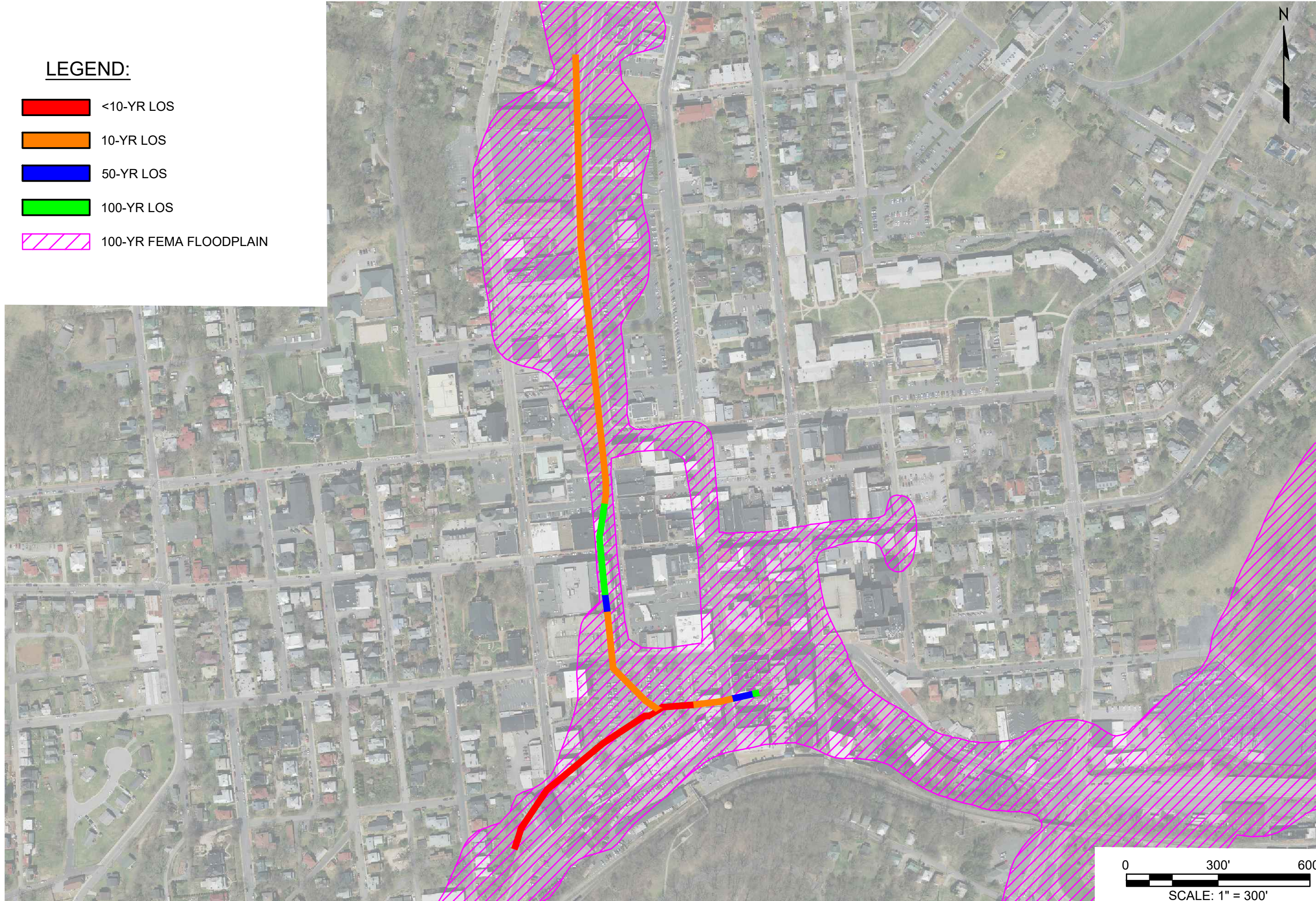
Tunnel Geometry - Existing Conditions

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

STAUNTON FLOOD STUDY

EXISTING TUNNEL LEVEL OF SERVICE (LOS)

PROJECT

TITLE

COMM. NO.
220184

DRAWN
CHECKED

SKETCH NO.

SK-11

DWG. REFERENCE NO.

DATE: REV.

0 300' 600'
SCALE: 1" = 300'

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

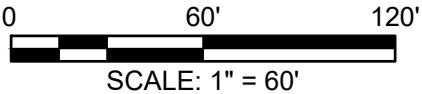
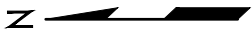
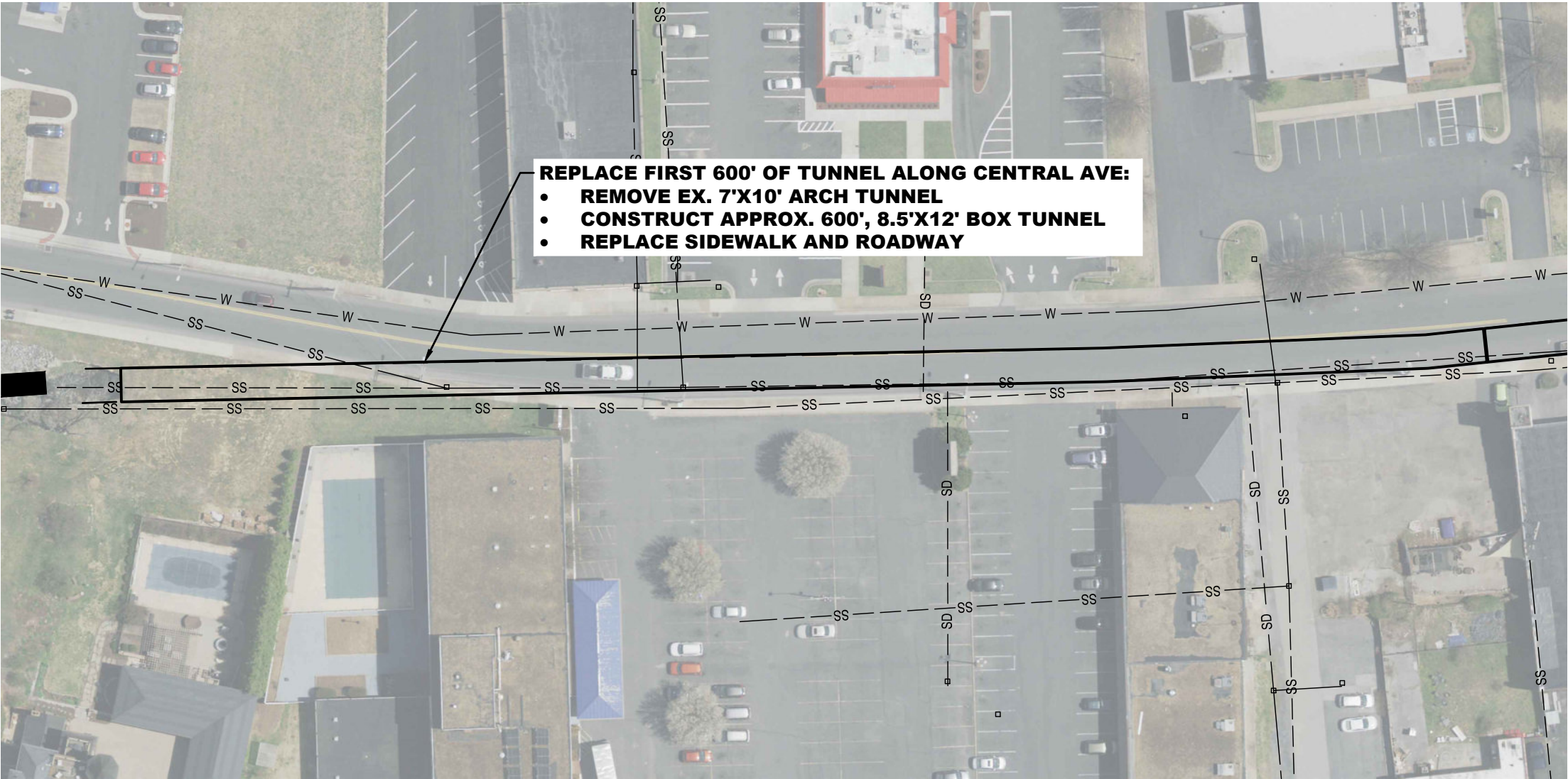
25-Yr Storm					Scenario 11: Project 7	
Manhole Location	Ex. Grade	EX HGL Elev.	Existing HGL	HGL Elev.	Proposed HGL	HGL Reduction (ft)
MH-23	1373.9	1374.77	0.9	1374.3	0.4	0.5
MH-48	1374.9	1377.11	2.2	1376.76	1.9	0.3
T-43	1375.0	1377.45	2.5	1377.11	2.1	0.3
MH-6	1377.5	1379.68	2.2	1379.35	1.8	0.3
MH-21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



PROJECT
STAUNTON FLOOD STUDY

TITLE
PROJECT 3A

COMM. NO.
220184

DRAWN
CHECKED

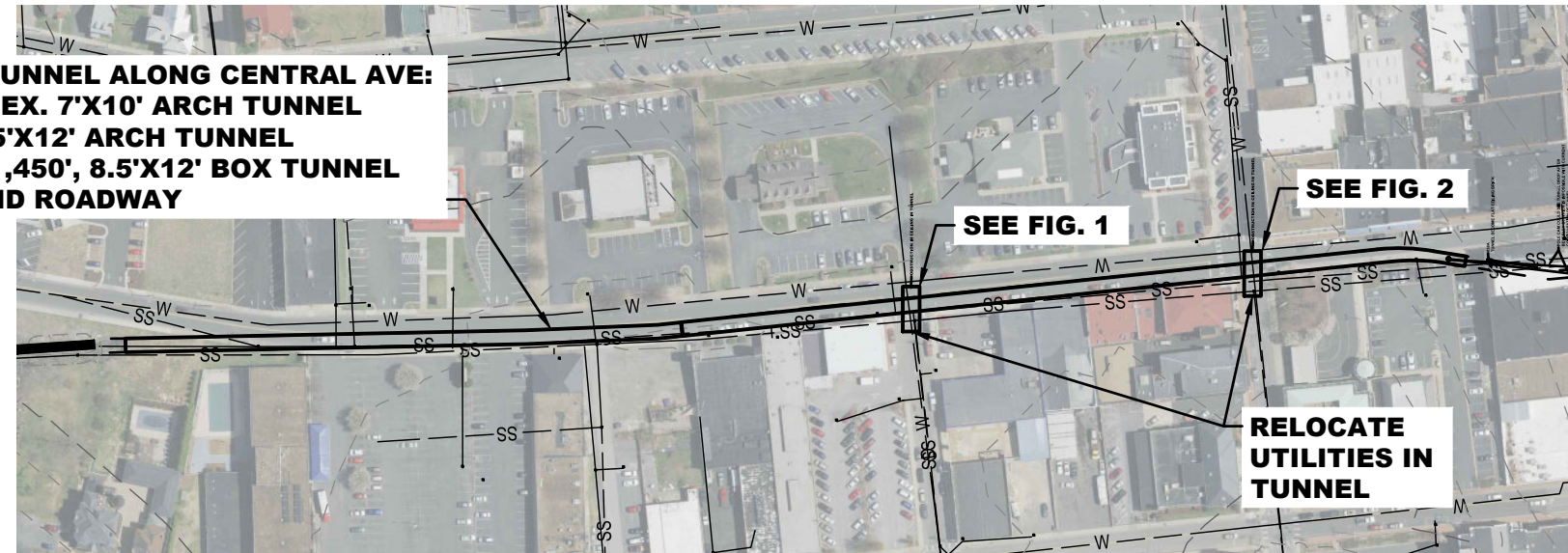
SKETCH NO.
SK-03A

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



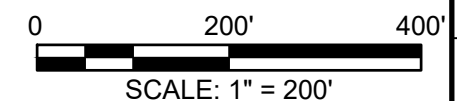
PLAN VIEW



FIGURE 1: AT BALDWIN ST



FIGURE 2: AT FREDERICK ST



PROJECT
STAUNTON FLOOD STUDY

TITLE
PROJECT 3B

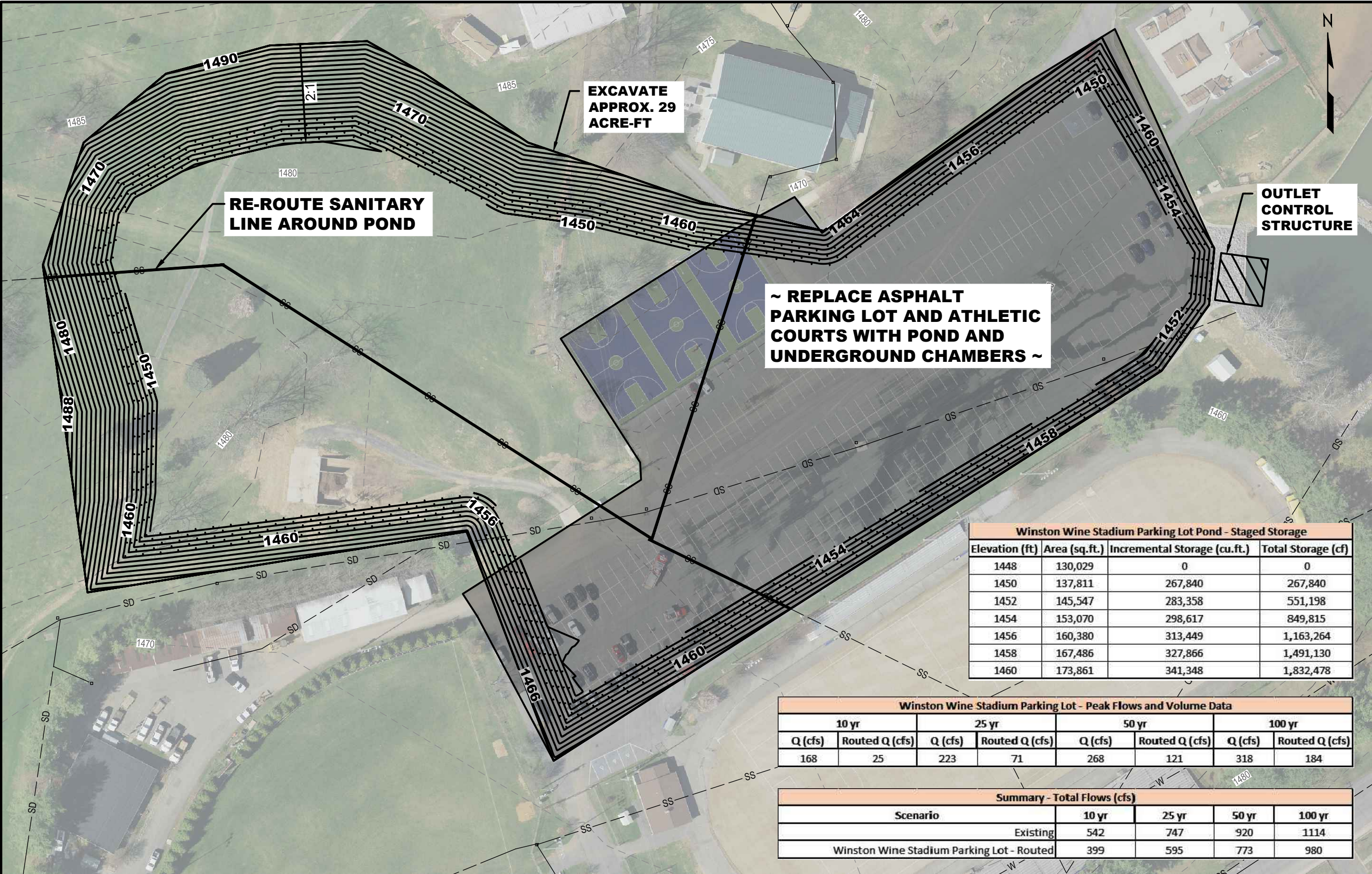
COMM. NO.
220184

DRAWN
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SKETCH NO.
SK-03B

DWG. REFERENCE NO.

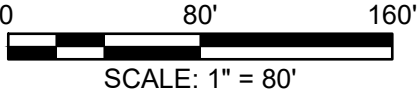
DATE:
REV.



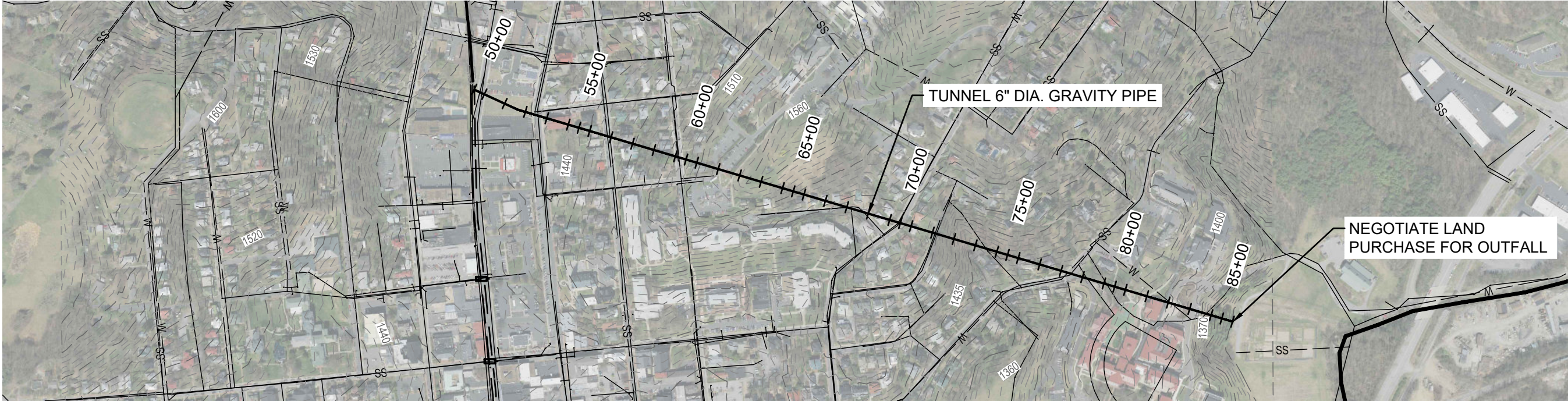
Winston Wine Stadium Parking Lot Pond - Staged Storage			
Elevation (ft)	Area (sq.ft.)	Incremental Storage (cu.ft.)	Total Storage (cf)
1448	130,029	0	0
1450	137,811	267,840	267,840
1452	145,547	283,358	551,198
1454	153,070	298,617	849,815
1456	160,380	313,449	1,163,264
1458	167,486	327,866	1,491,130
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

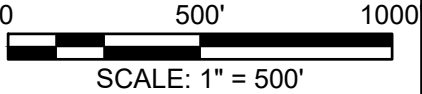
Summary - Total Flows (cfs)				
Scenario	10 yr	25 yr	50 yr	100 yr
Existing	542	747	920	1114
Winston Wine Stadium Parking Lot - Routed	399	595	773	980



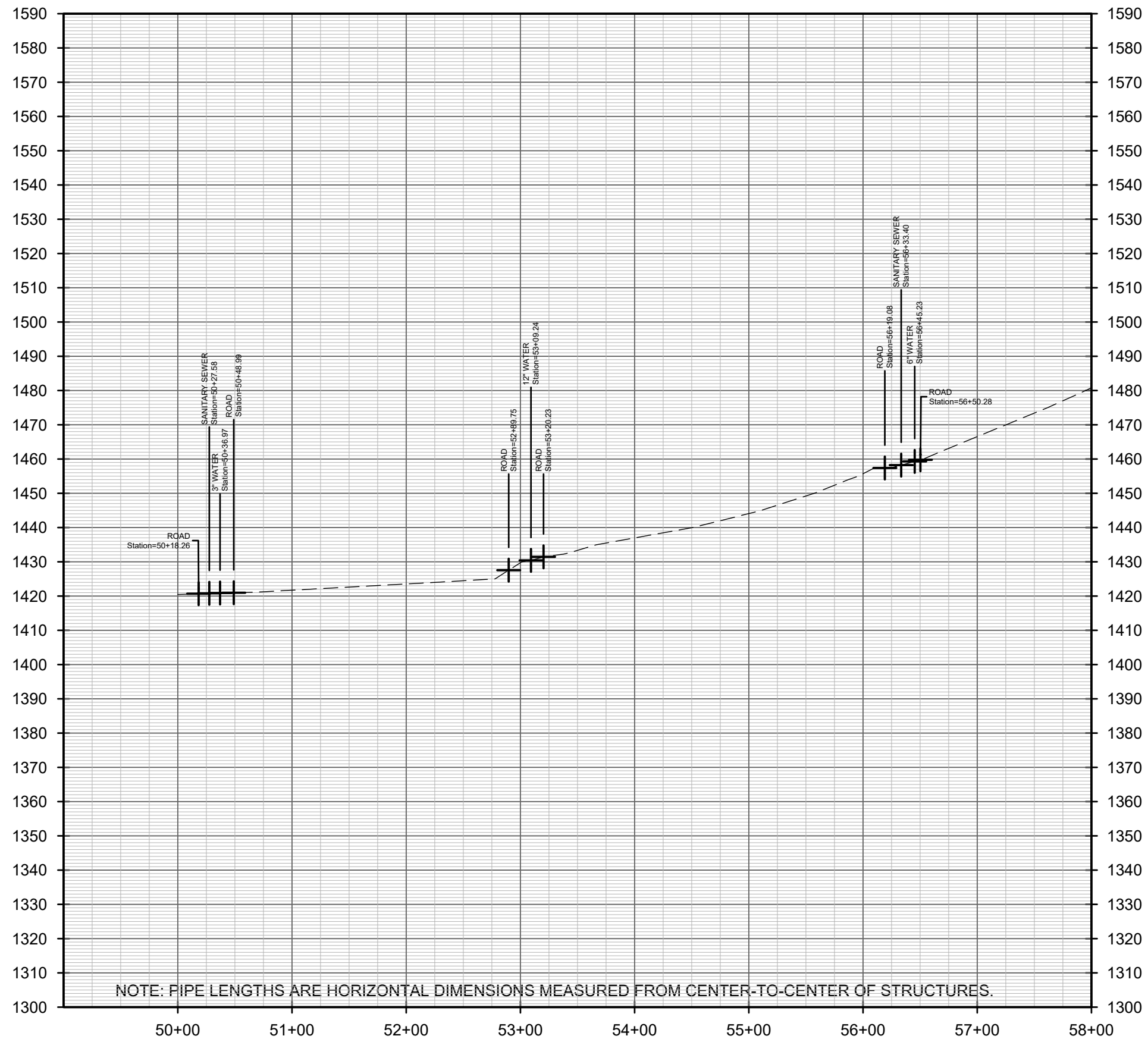
PROJECT		STAUNTON FLOOD STUDY		TITLE		PROJECT4B	
COMM. NO.				220184			
DRAWN				CHECKED			
SKETCH NO.				SK-04B			
DWG. REFERENCE NO.							
DATE:				REV.			



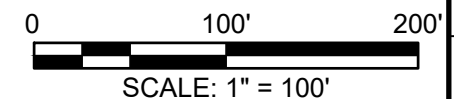
PLAN VIEW



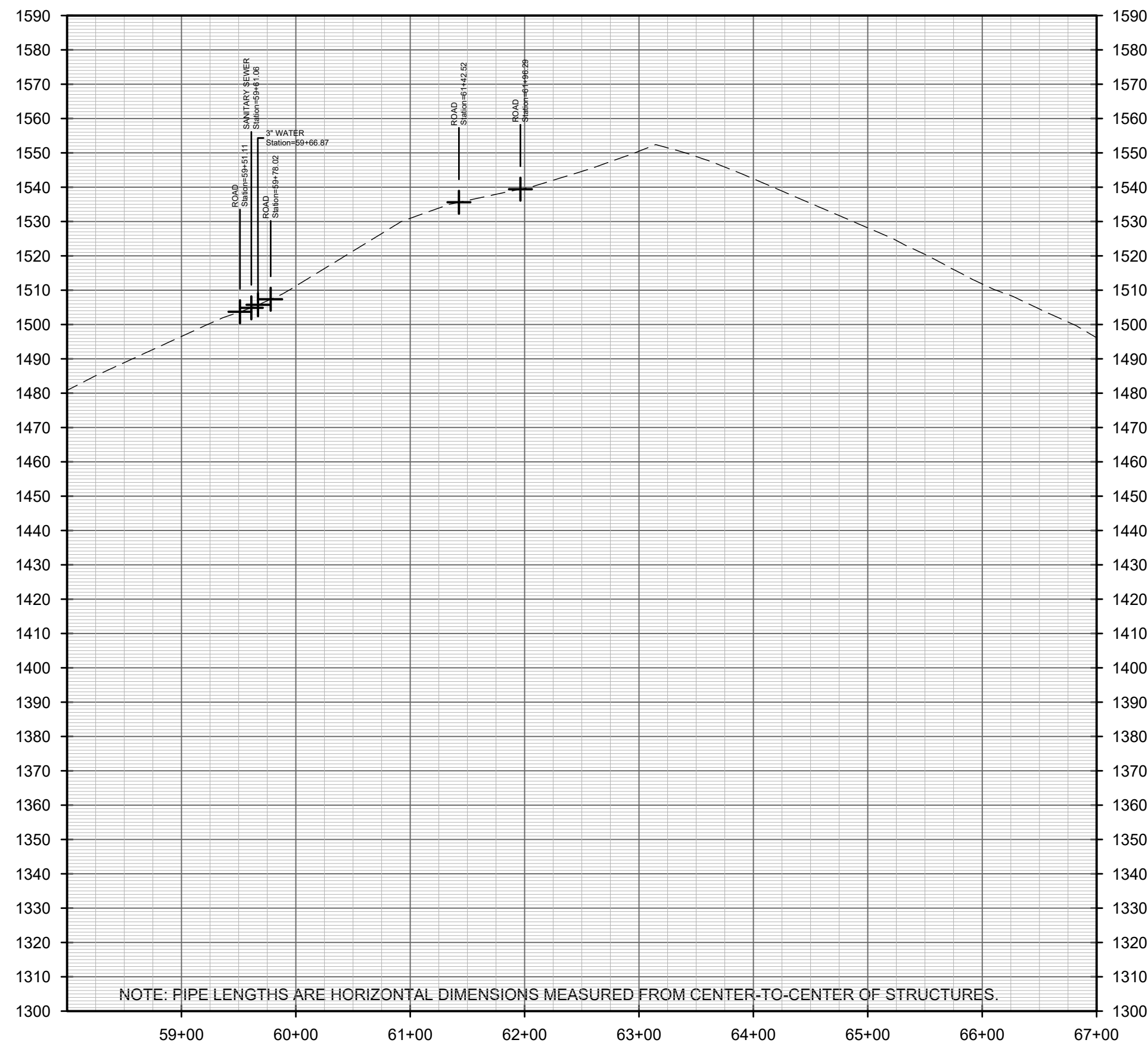
PROJECT		STAUNTON FLOOD STUDY		TITLE		PROJECT 5	
COMM. NO.				220184			
DRAWN				CHECKED			
SKETCH NO.				SK-05A			
DWG. REFERENCE NO.							
DATE:				REV.			



PROJ 5 - STA 49 TO STA 58

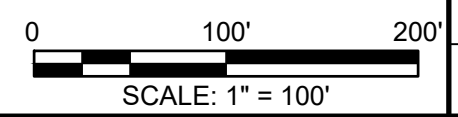


PROJECT STAUNTON FLOOD STUDY		TITLE PROJECT 5	
COMM. NO. 220184			
DRAWN		CHECKED	
SKETCH NO. SK-05B			
DWG. REFERENCE NO.			
DATE:		REV.	

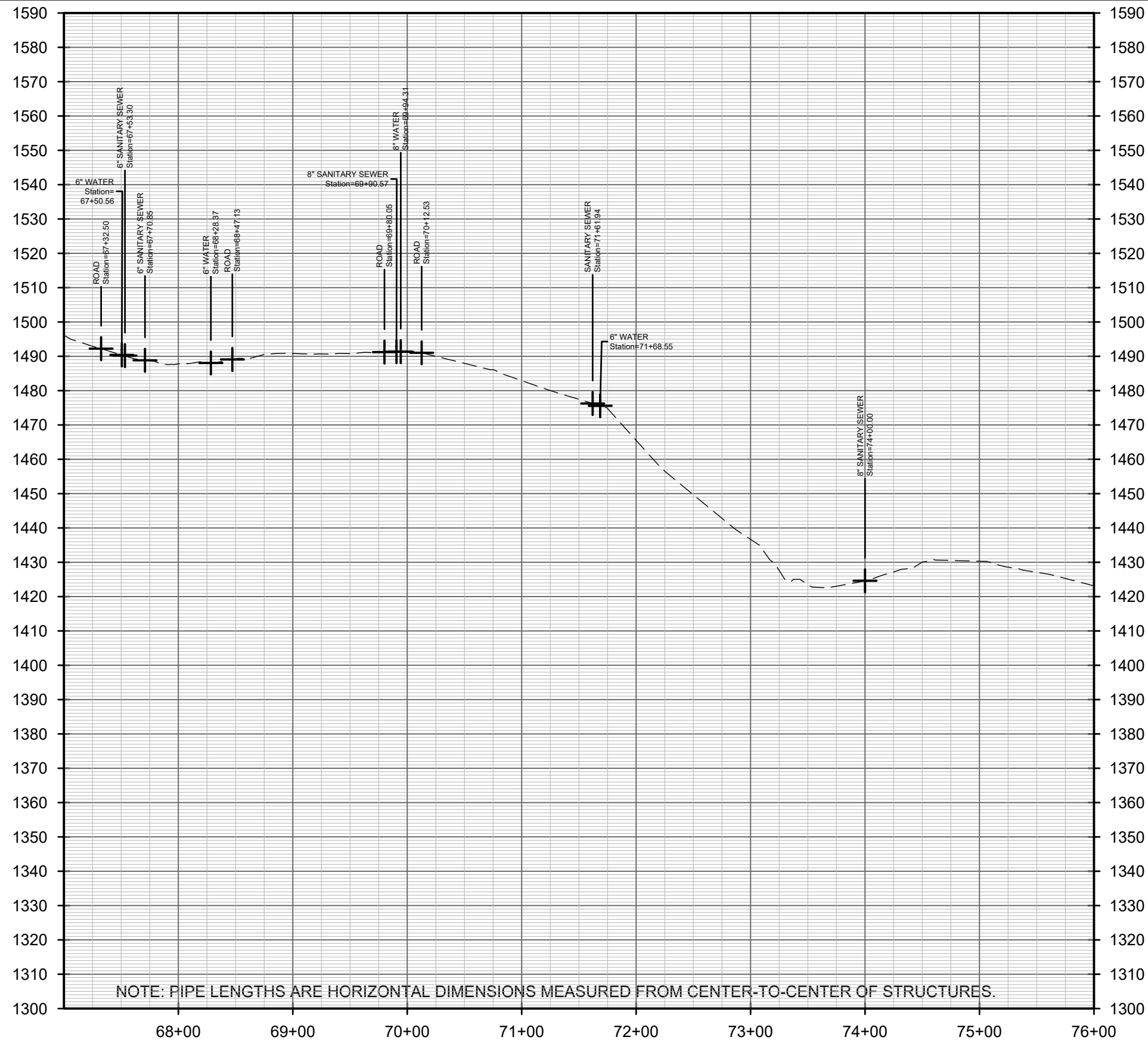


NOTE: PIPE LENGTHS ARE HORIZONTAL DIMENSIONS MEASURED FROM CENTER-TO-CENTER OF STRUCTURES.

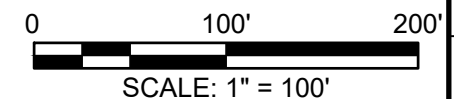
PROJ 5 - STA 58 TO STA 67



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



PROJECT
STAUNTON FLOOD STUDY

TITLE
PROJECT 5

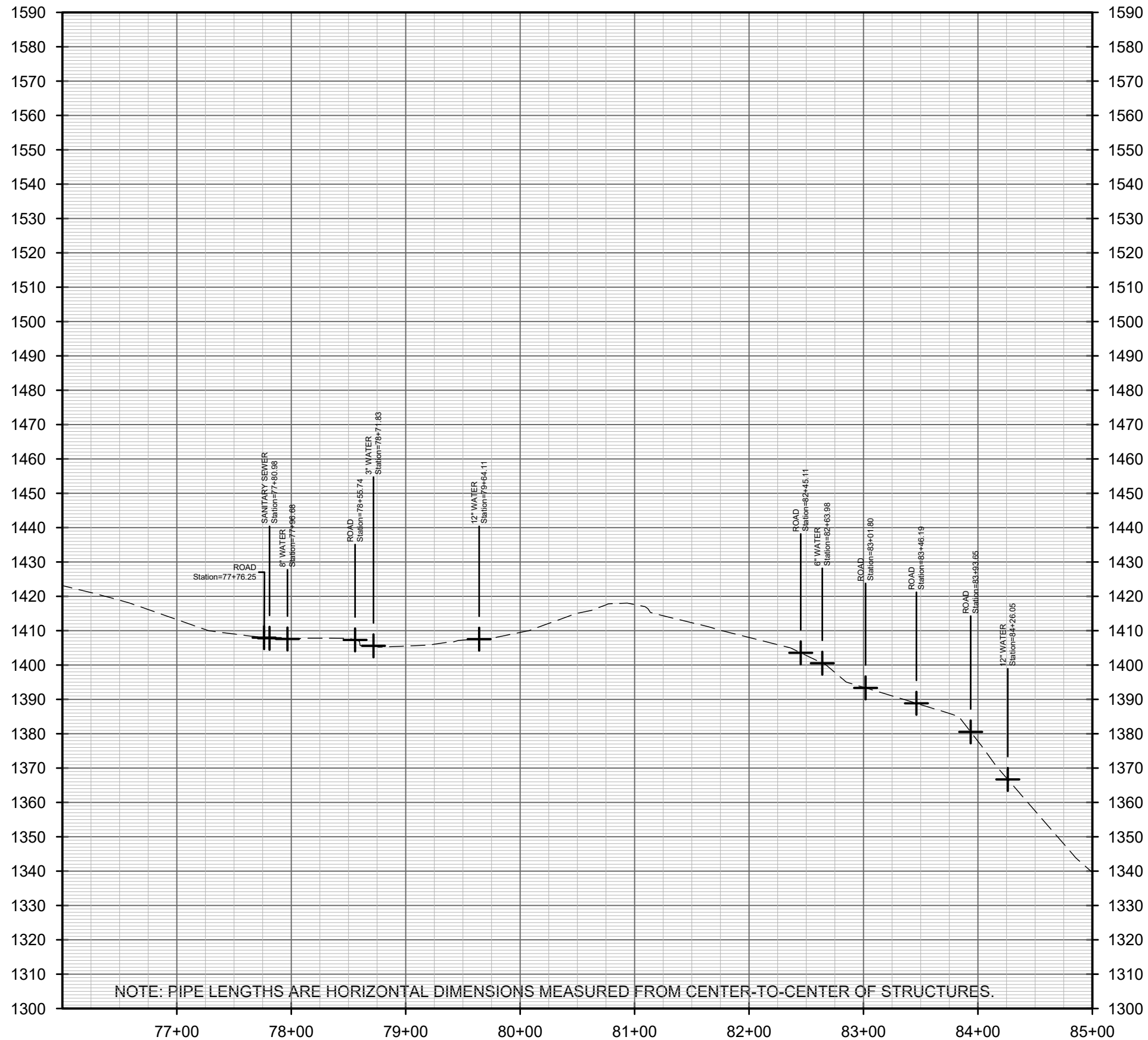
COMM. NO.
220184

DRAWN
CHECKED

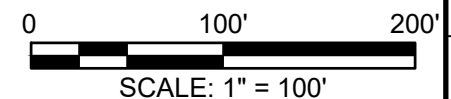
SKETCH NO.
SK-05D

DWG. REFERENCE NO.

DATE: REV.



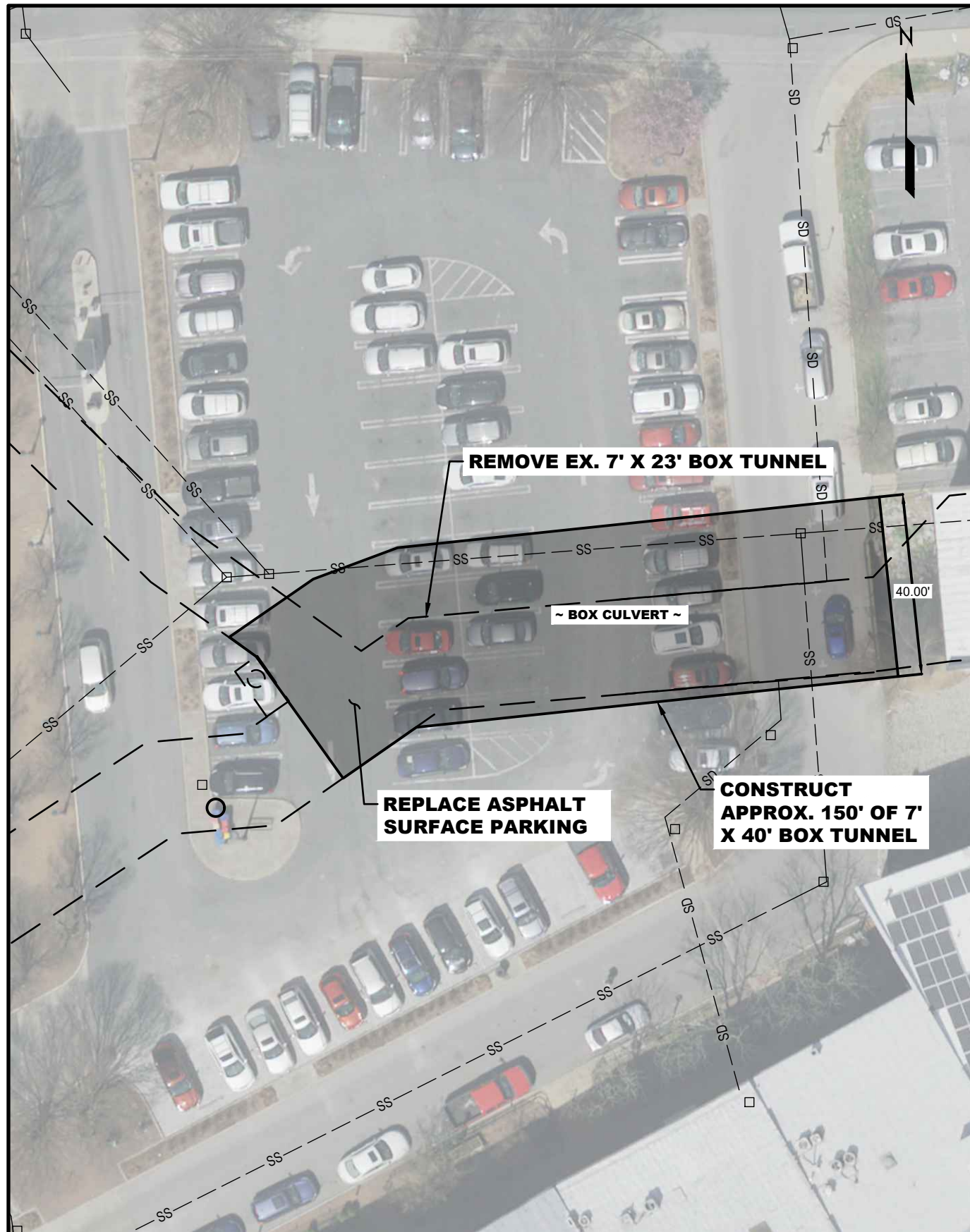
PROJ 5 - STA 76 TO STA 85



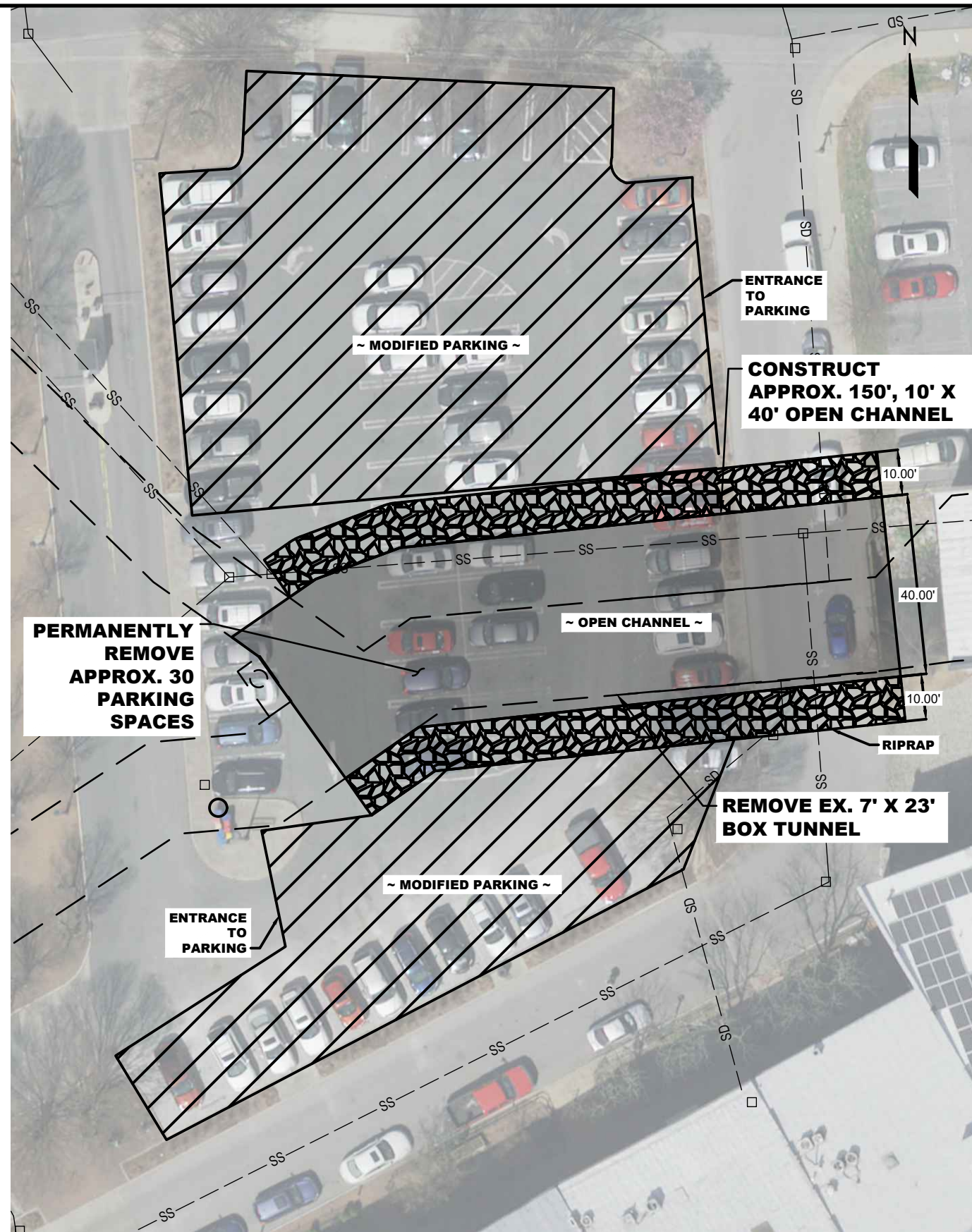
PROJECT		STAUNTON FLOOD STUDY		TITLE		PROJECT 5	
COMM. NO.				220184			
DRAWN				CHECKED			
SKETCH NO.				SK-05E			
DWG. REFERENCE NO.							
DATE:				REV.			

APPENDIX H

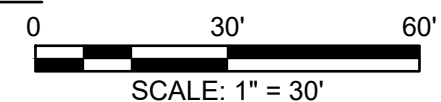
LEWIS CREEK SCENARIO EXHIBITS

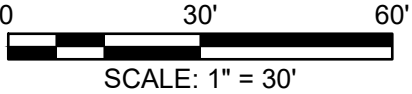
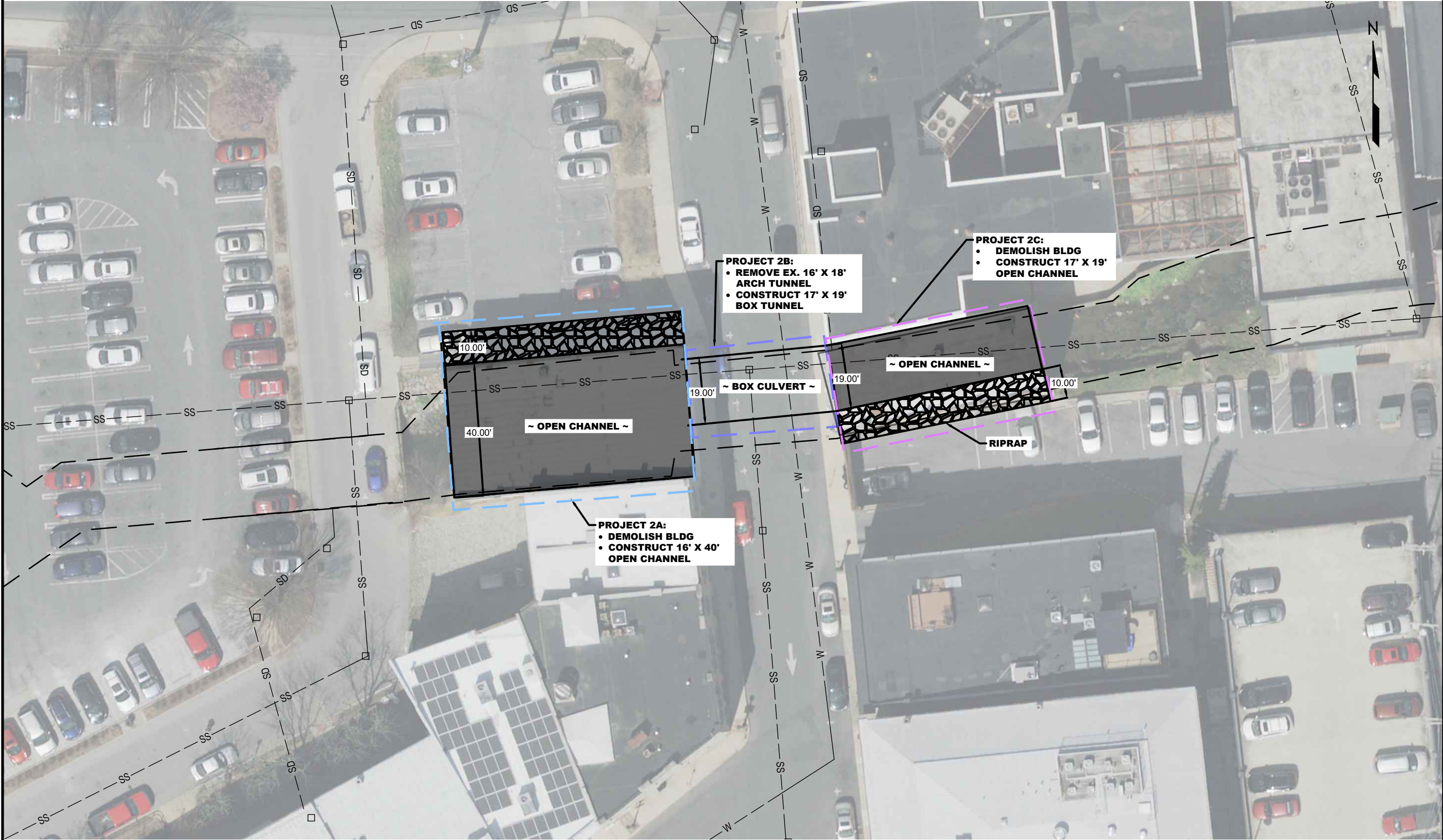


PROJECT 1A: BOX CULVERT

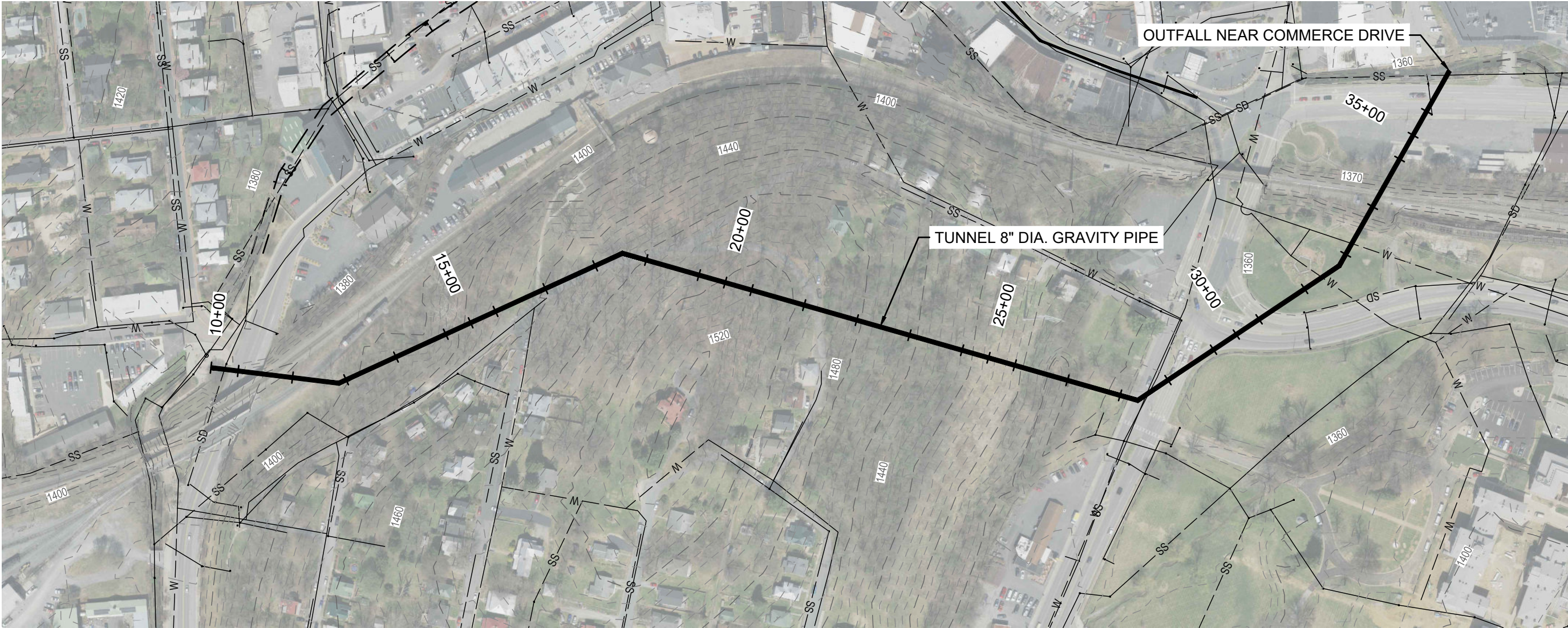


PROJECT 1B: OPEN CHANNEL

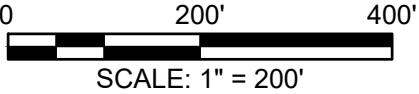




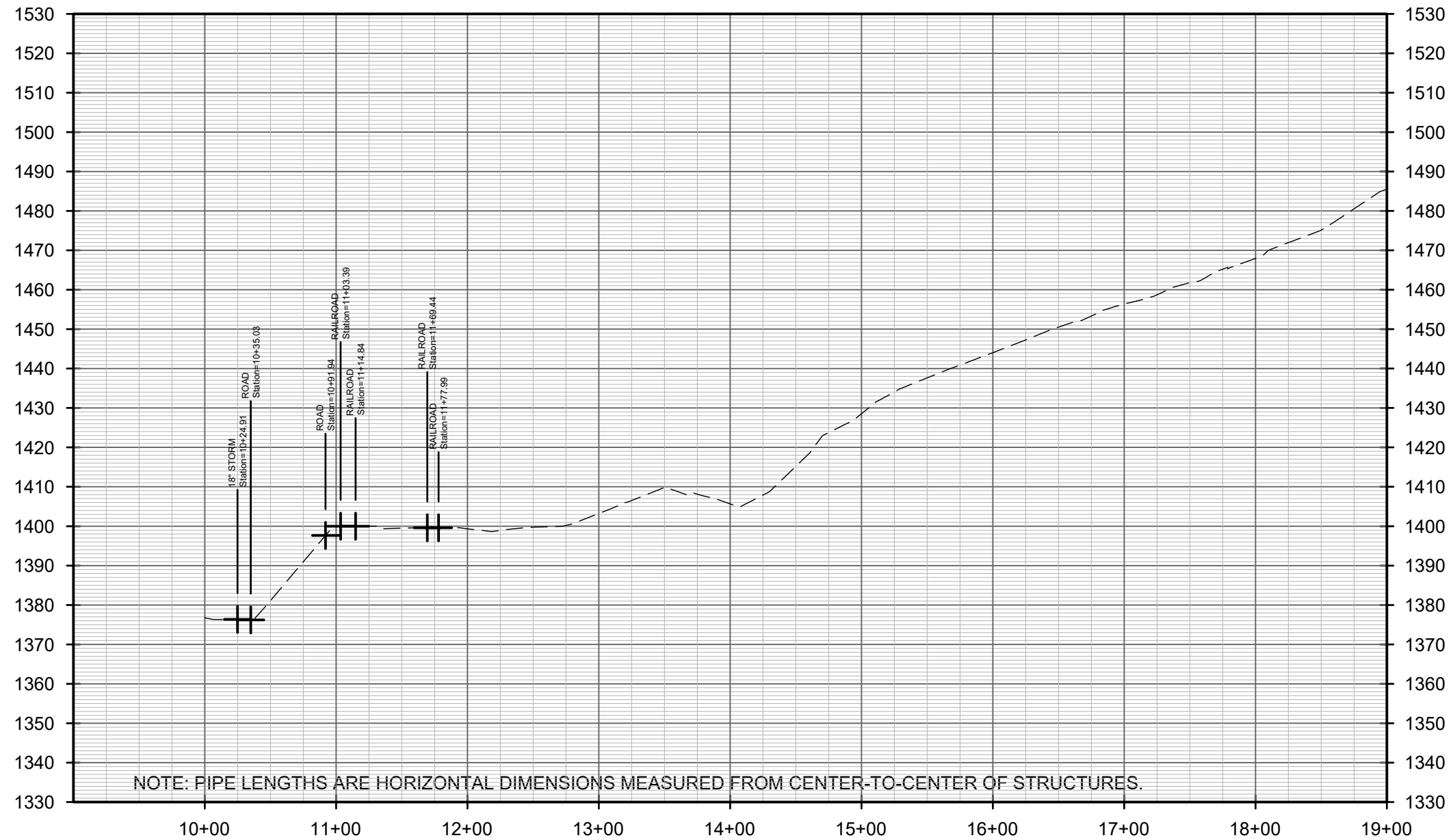
PROJECT		STAUNTON FLOOD STUDY		PROJECT 2	
TITLE					
COMM. NO.				220184	
DRAWN		CHECKED			
SKETCH NO.					
SK-02					
DWG. REFERENCE NO.					
DATE:			REV.		



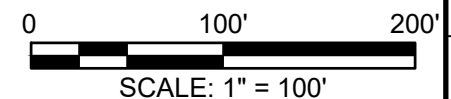
PLAN VIEW



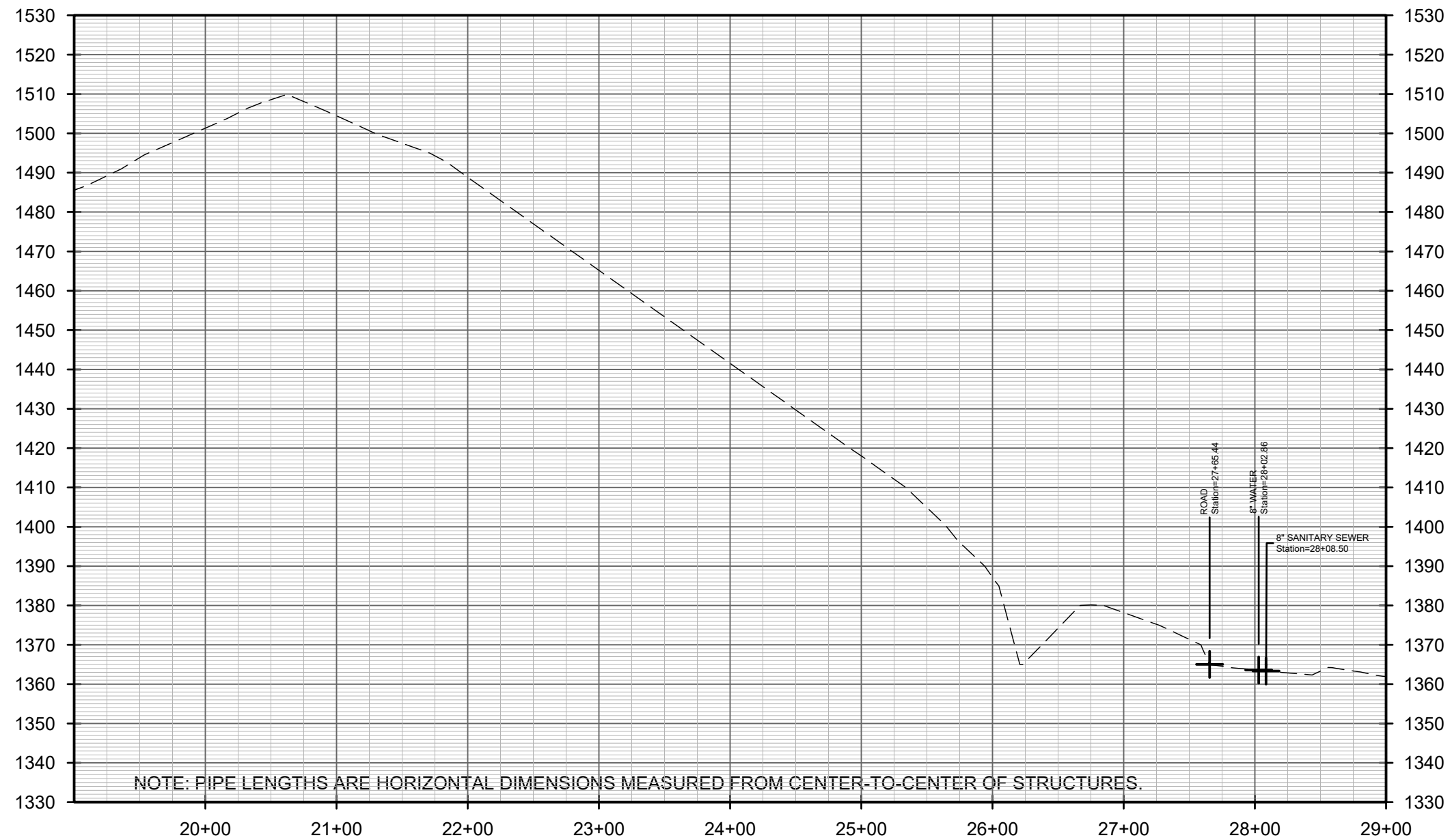
STAUNTON FLOOD STUDY	
PROJECT 6	
PROJECT	TITLE
COMM. NO. 220184	
DRAWN	CHECKED
SKETCH NO. SK-06A	
DWG. REFERENCE NO.	
DATE:	REV.



PROJ 6 - STA 9 TO STA 19

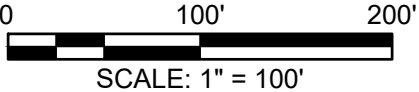


PROJECT		STAUNTON FLOOD STUDY	
TITLE		PROJECT 6	
COMM. NO.			
220184			
DRAWN		CHECKED	
SKETCH NO.			
SK-06B			
DWG. REFERENCE NO.			
DATE:		REV.	

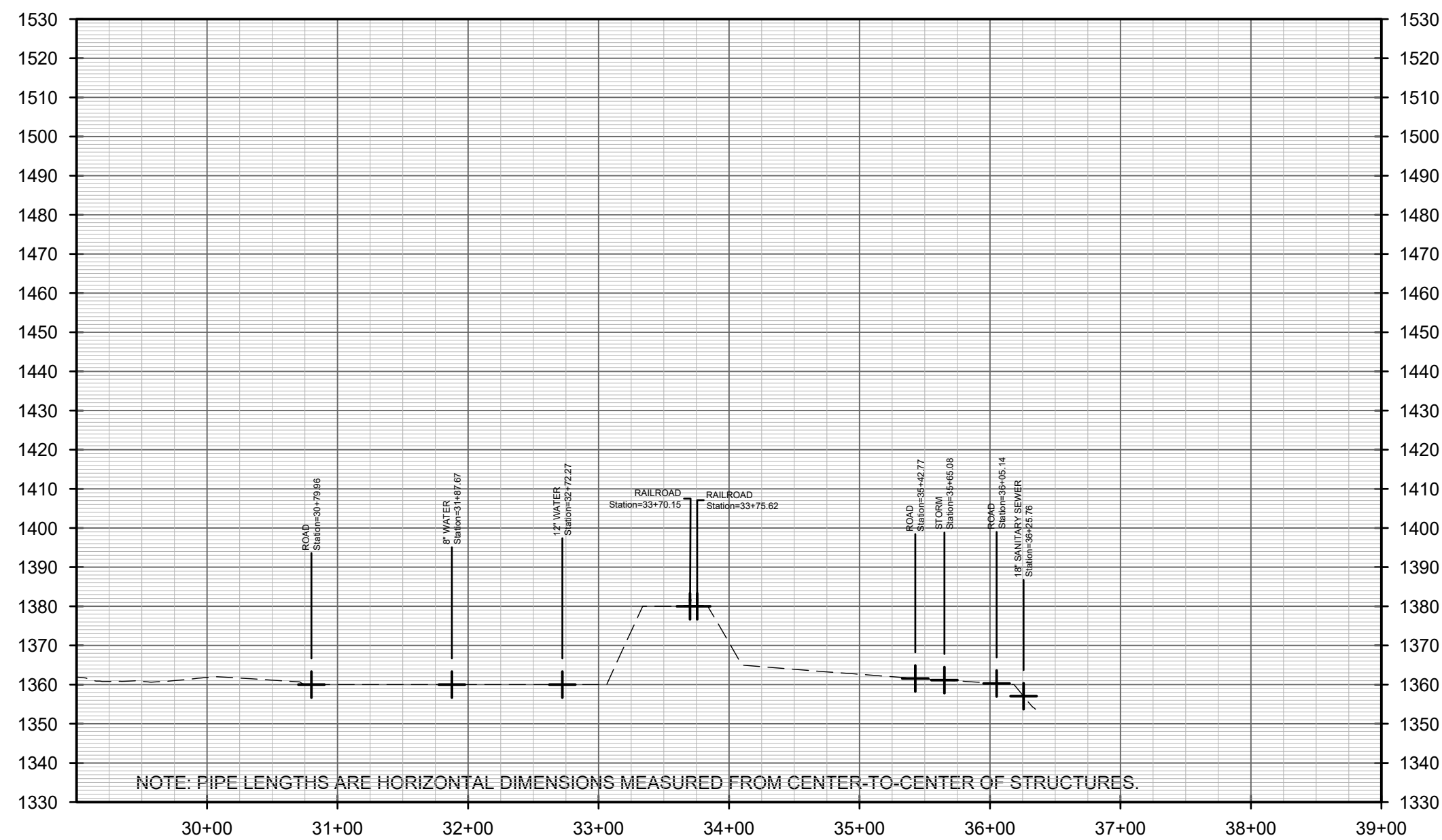


NOTE: PIPE LENGTHS ARE HORIZONTAL DIMENSIONS MEASURED FROM CENTER-TO-CENTER OF STRUCTURES.

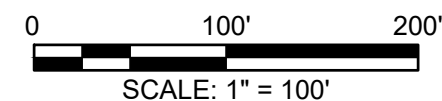
PROJ 6 - STA 19 TO STA 29



STAUNTON FLOOD STUDY	
PROJECT	TITLE
PROJECT 6	
COMM. NO. 220184	
DRAWN	CHECKED
SKETCH NO. SK-06C	
DWG. REFERENCE NO.	
DATE:	REV.



PROJ 6 - STA 29 TO STA 39



STAUNTON FLOOD STUDY

PROJECT 6

PROJECT

TITLE

COMM. NO.

220184

DRAWN

CHECKED

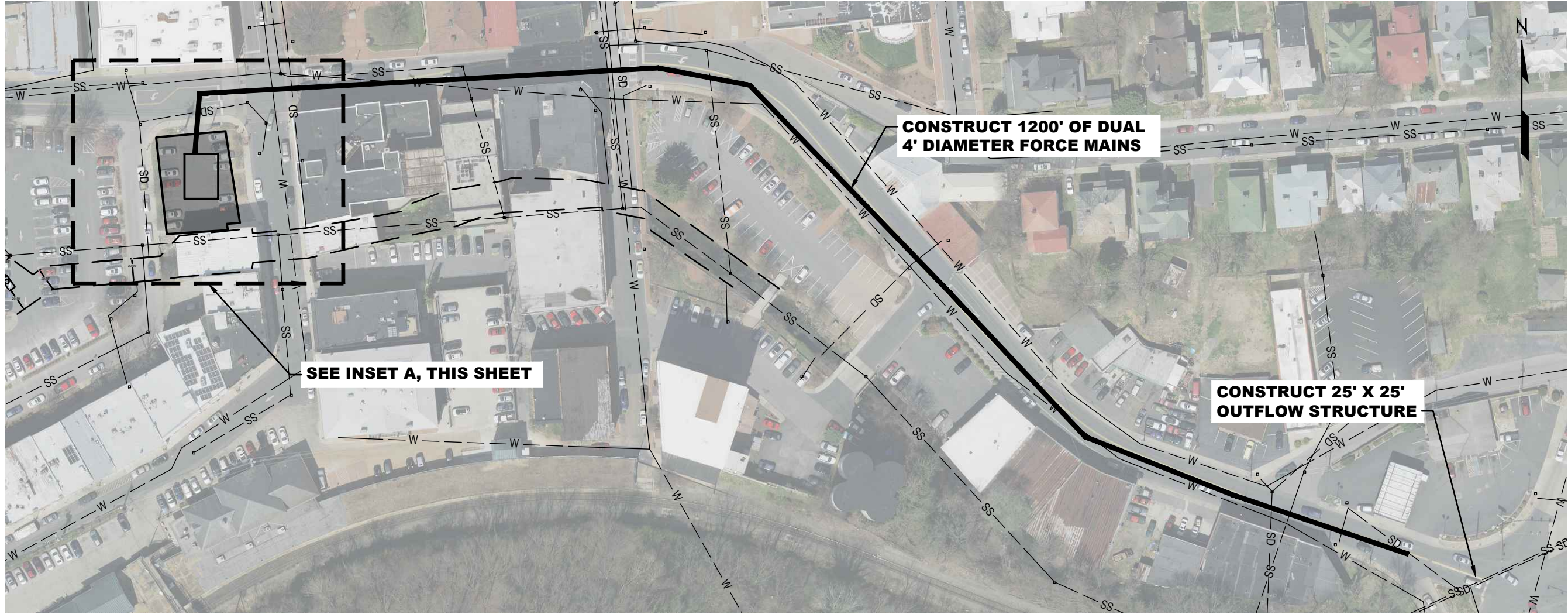
SKETCH NO.

SK-06D

DWG. REFERENCE NO.

DATE:

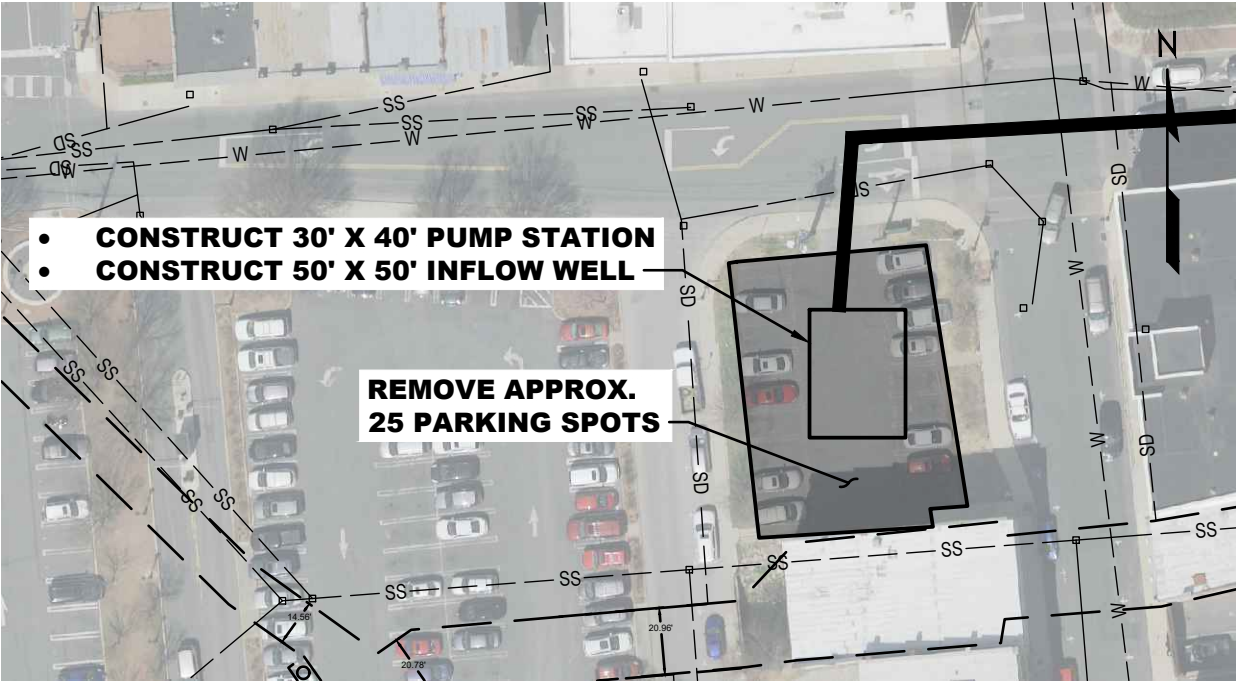
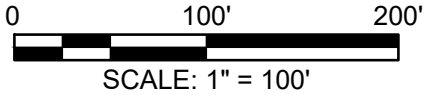
REV.



**CONSTRUCT 1200' OF DUAL
4' DIAMETER FORCE MAINS**

**CONSTRUCT 25' X 25'
OUTFLOW STRUCTURE**

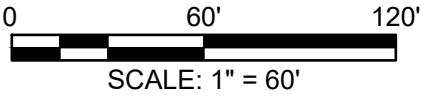
SEE INSET A, THIS SHEET



- **CONSTRUCT 30' X 40' PUMP STATION**
- **CONSTRUCT 50' X 50' INFLOW WELL**

**REMOVE APPROX.
25 PARKING SPOTS**

INSET A



STAUNTON FLOOD STUDY

PROJECT 7

PROJECT

TITLE

COMM. NO.
220184

DRAWN CHECKED

SKETCH NO.

SK-07

DWG. REFERENCE NO.

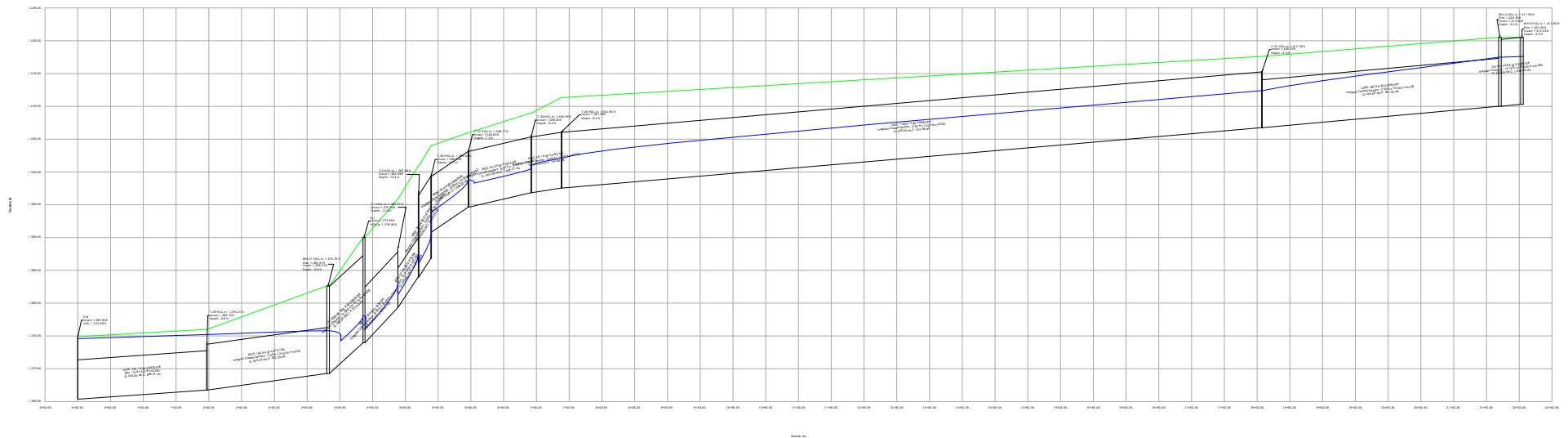
DATE: REV.

APPENDIX I

PEYTON CREEK SCENARIO PROFILES

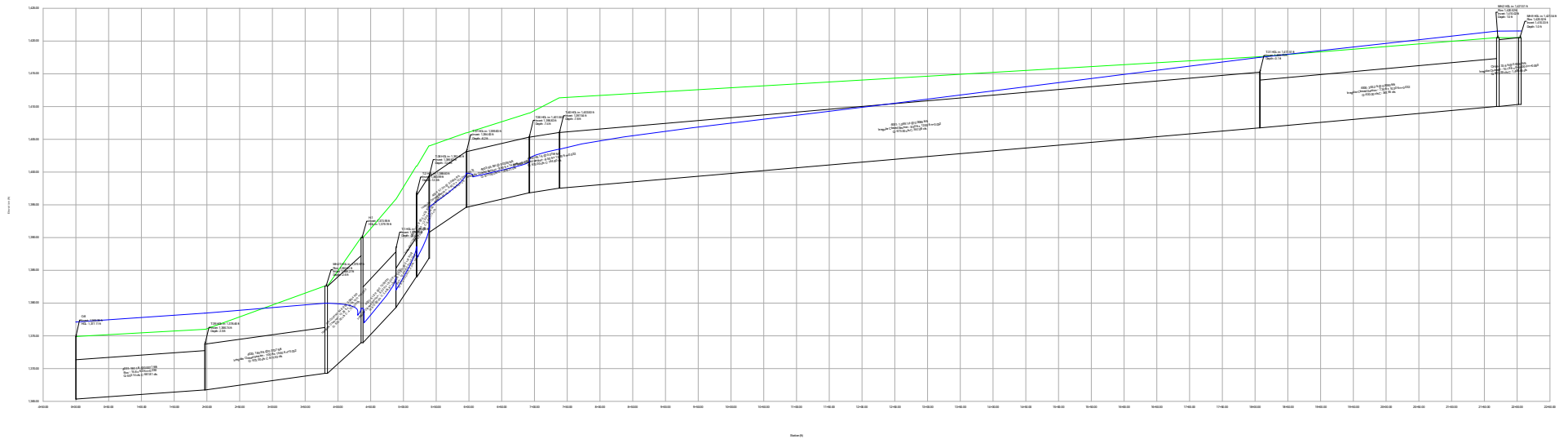
Profile Report

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



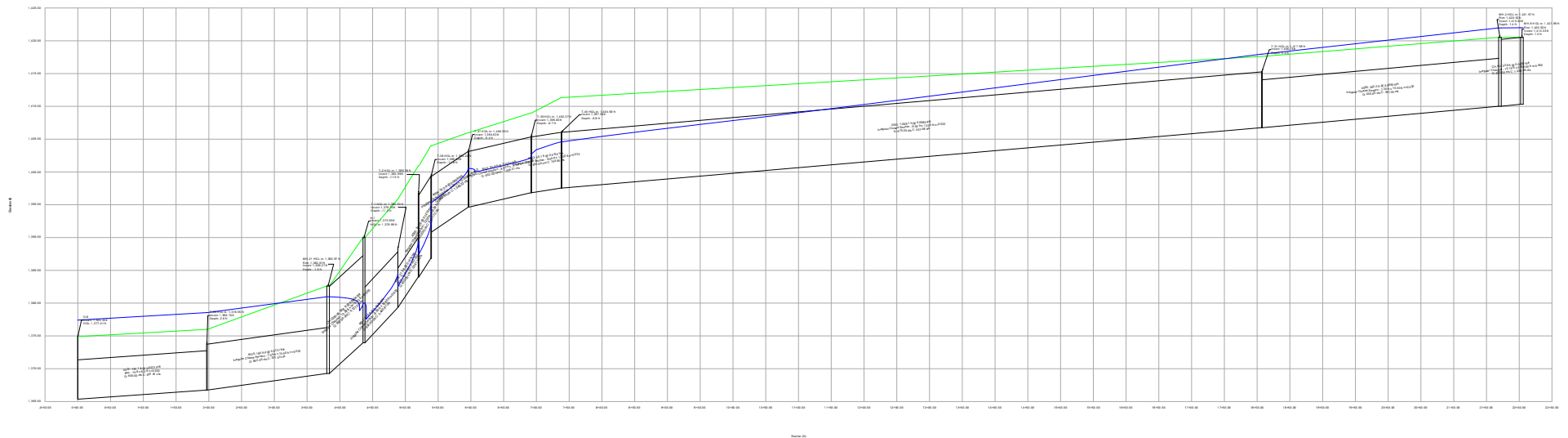
Profile Report

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



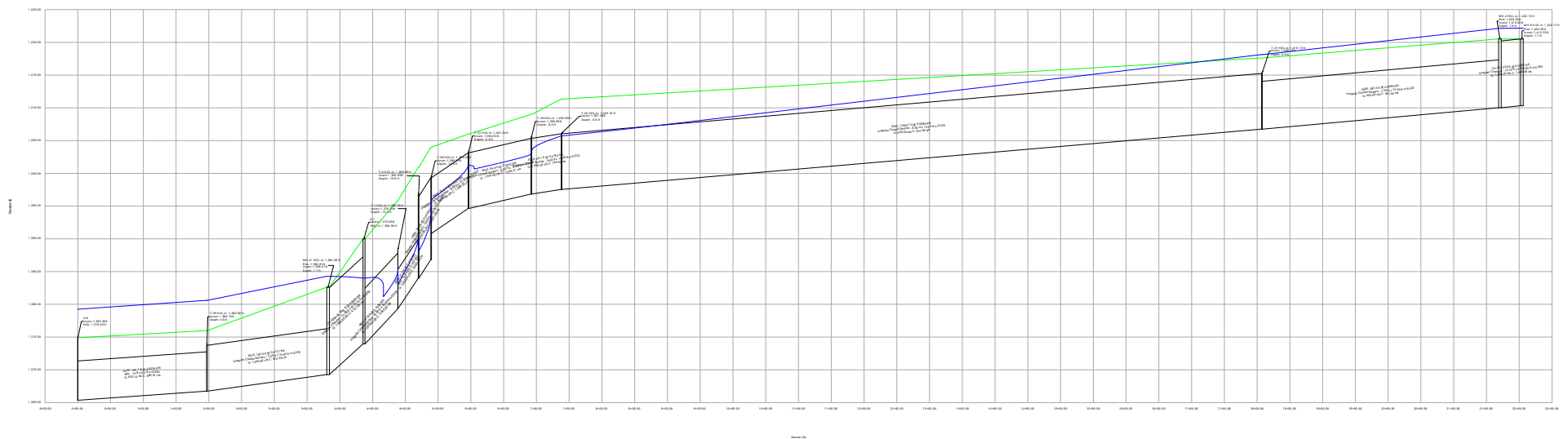
Profile Report

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



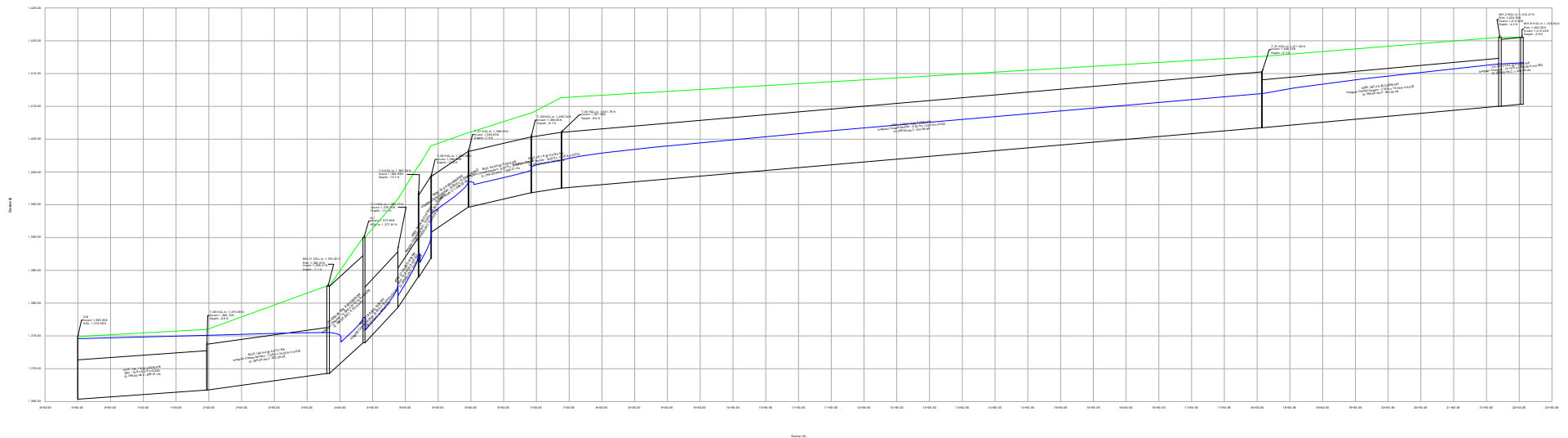
Profile Report

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



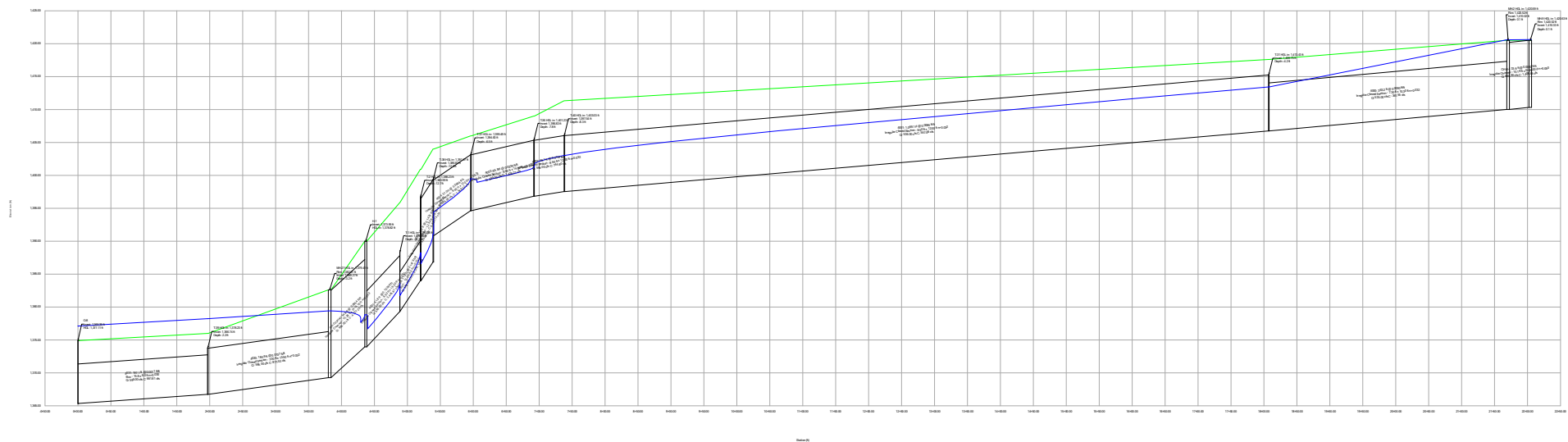
Profile Report

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



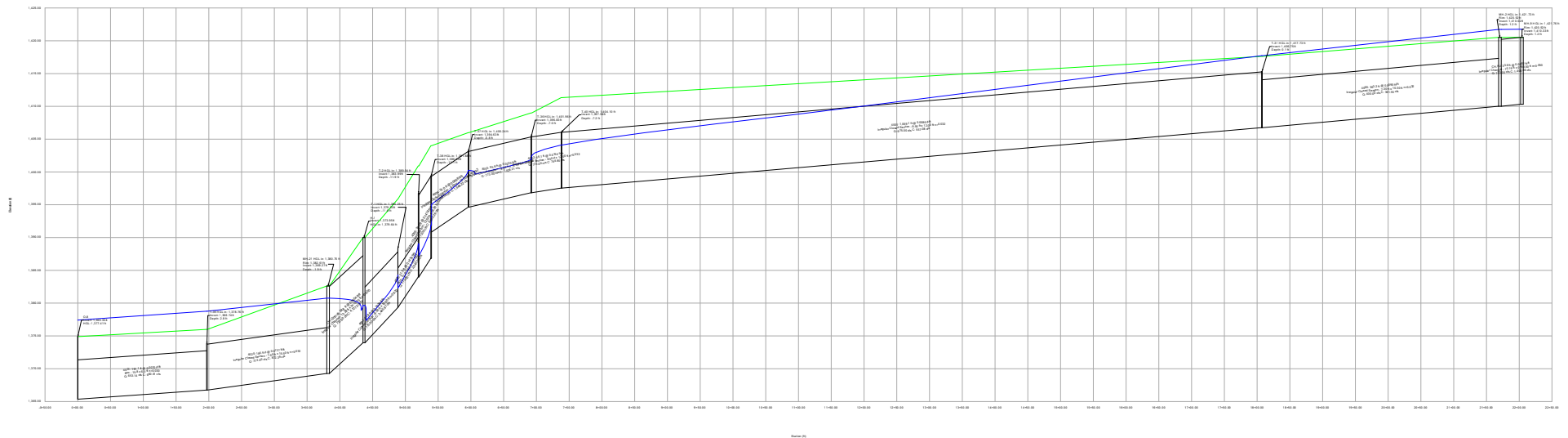
Profile Report

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



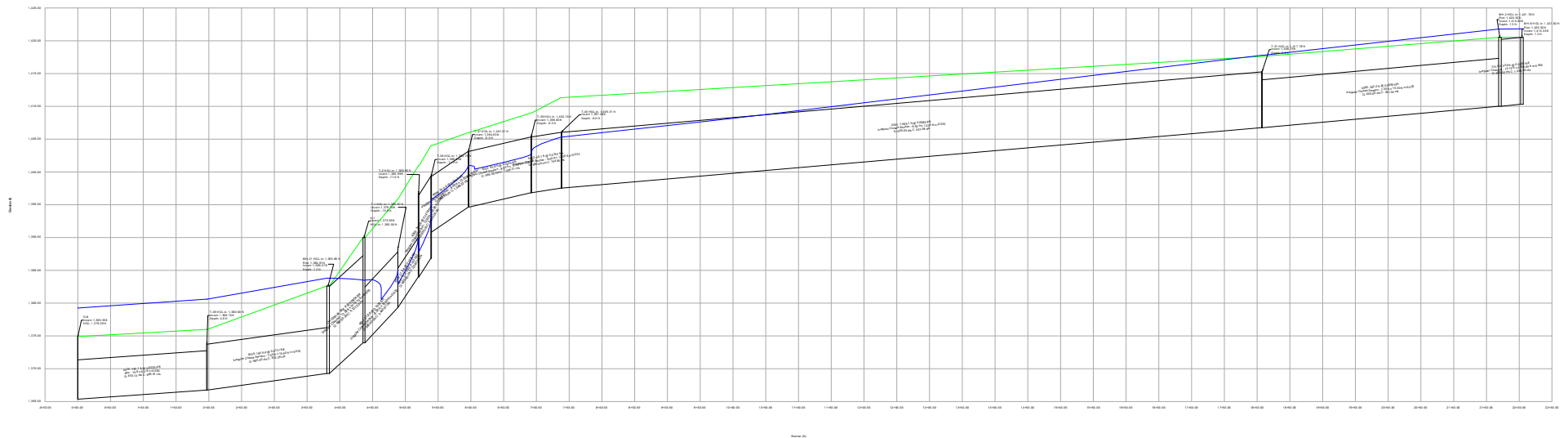
Profile Report

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



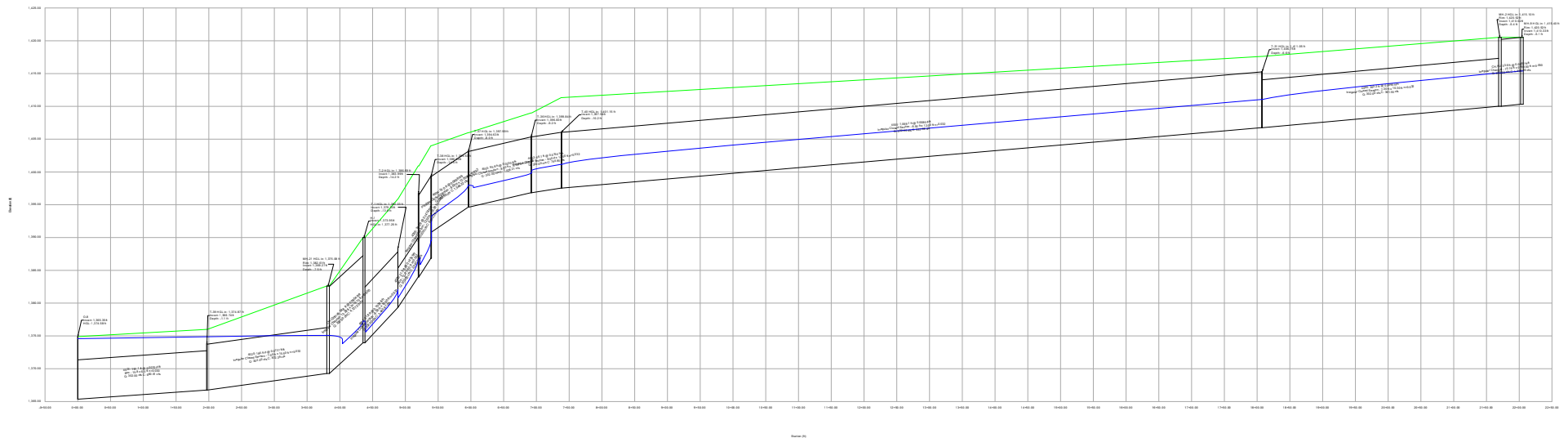
Profile Report

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



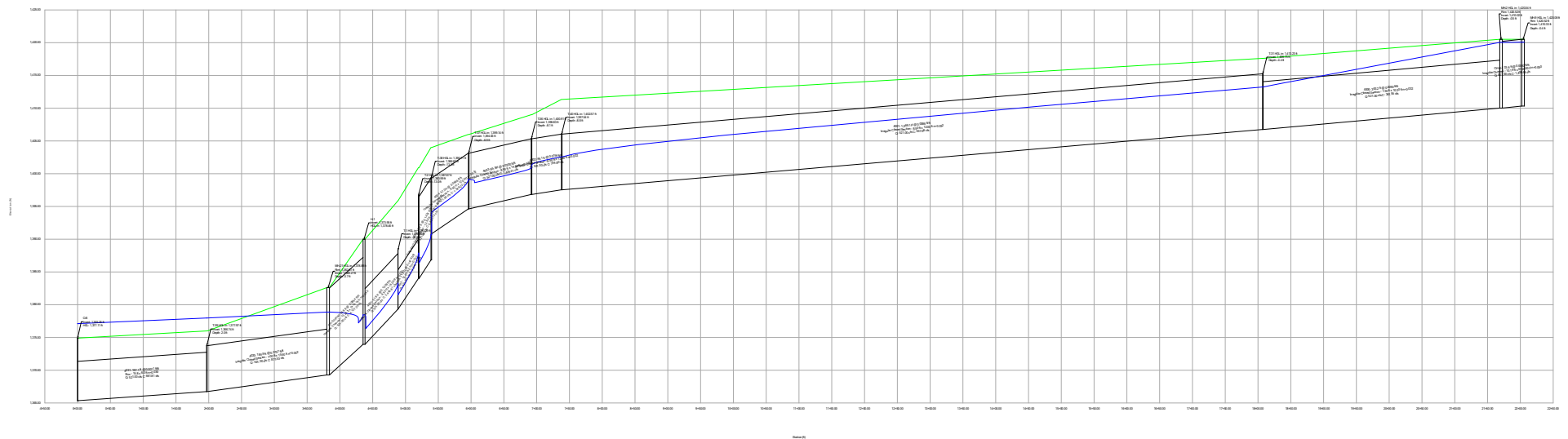
Profile Report

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



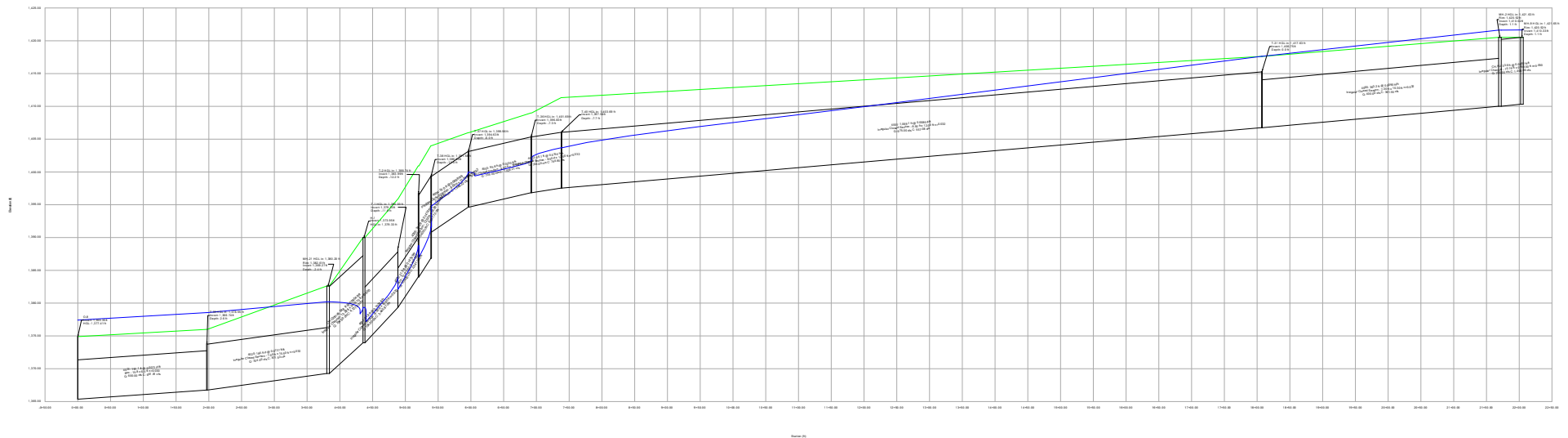
Profile Report

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



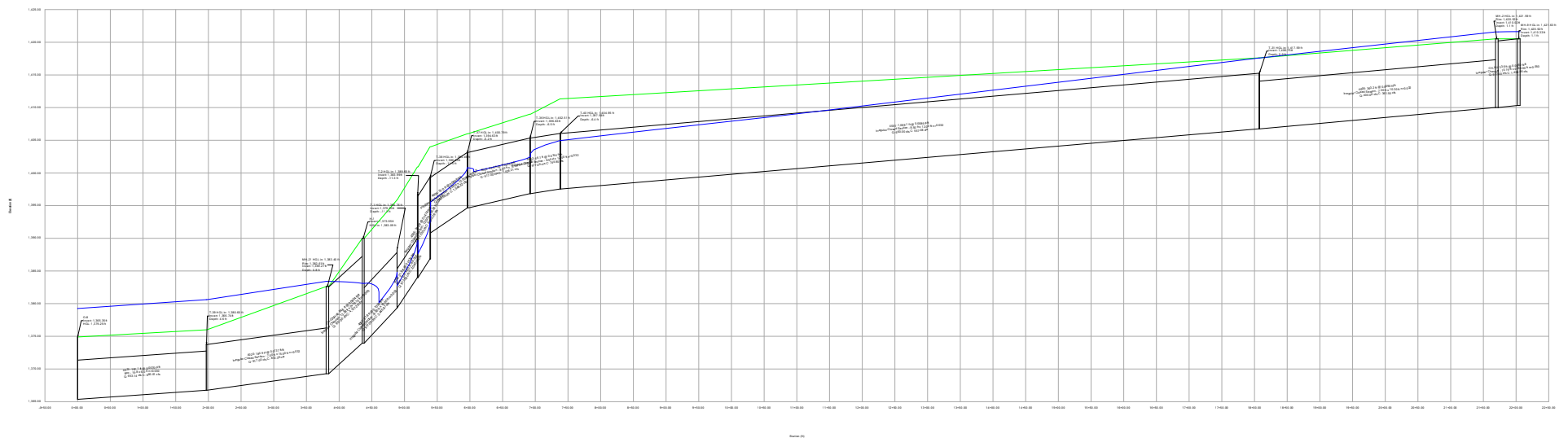
Profile Report

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



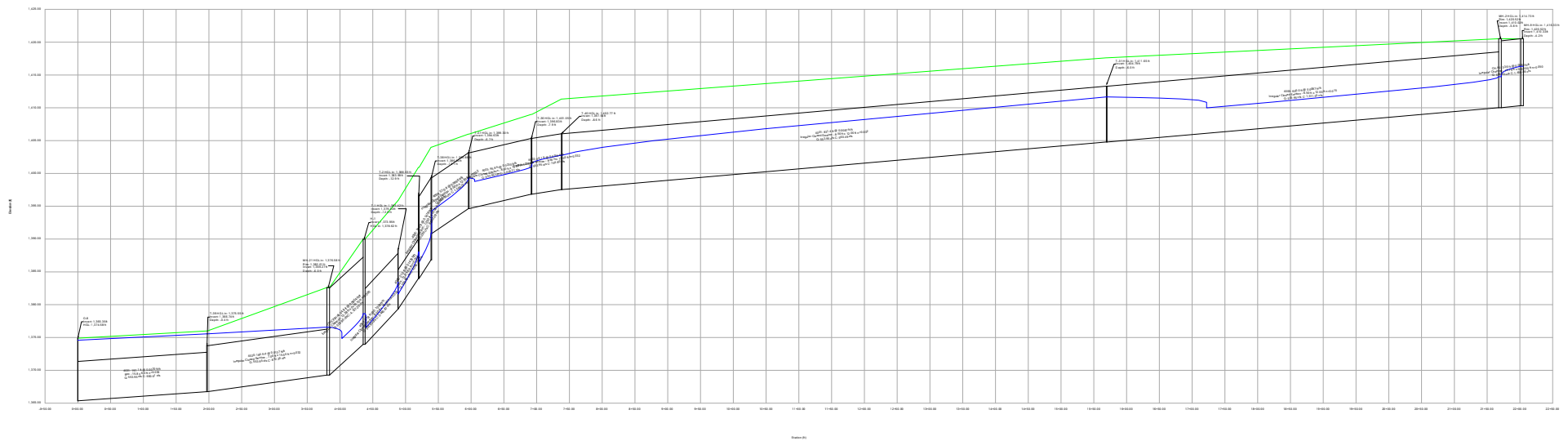
Profile Report

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



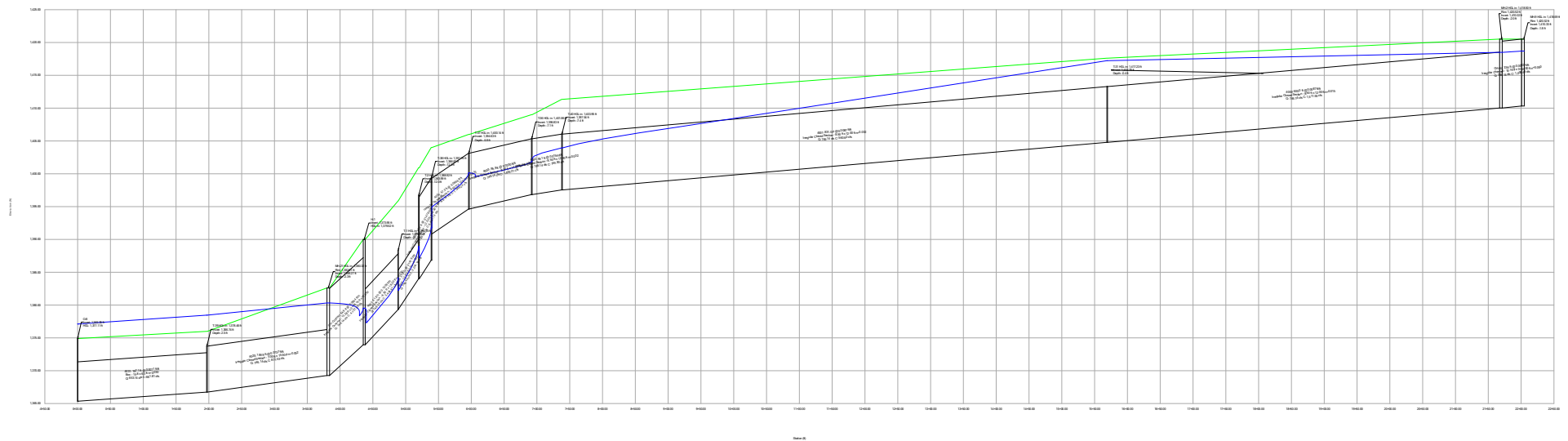
Profile Report

Engineering Profile - Project 3A - 10-yr (220184A19_Model_Design.stsw)



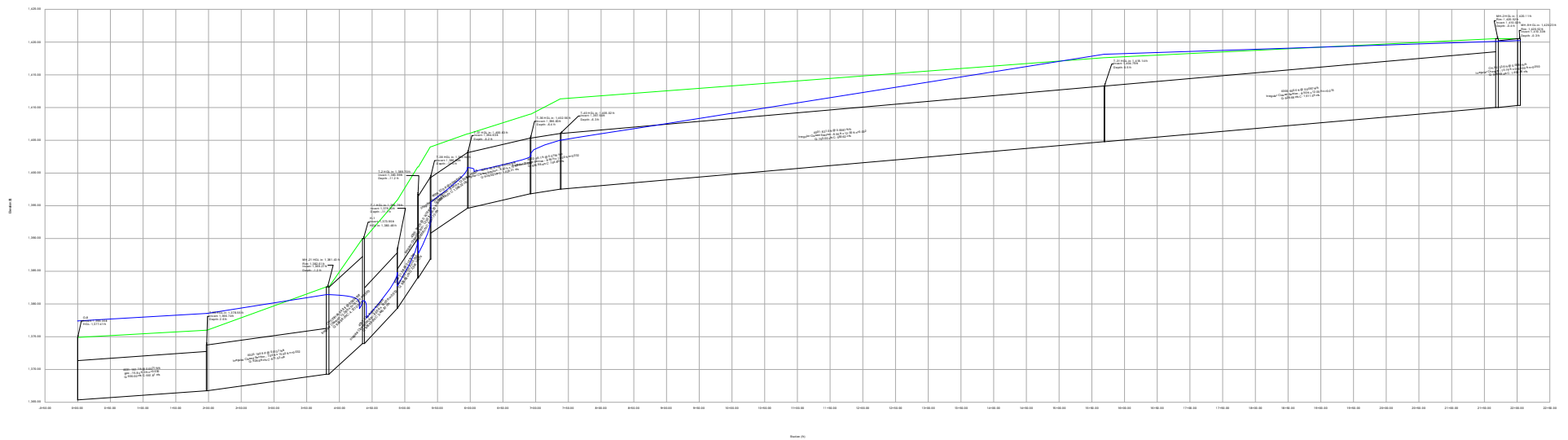
Profile Report

Engineering Profile - Project 3A - 25-yr (220184A19_Model_Design AMB 5-12.stsw)



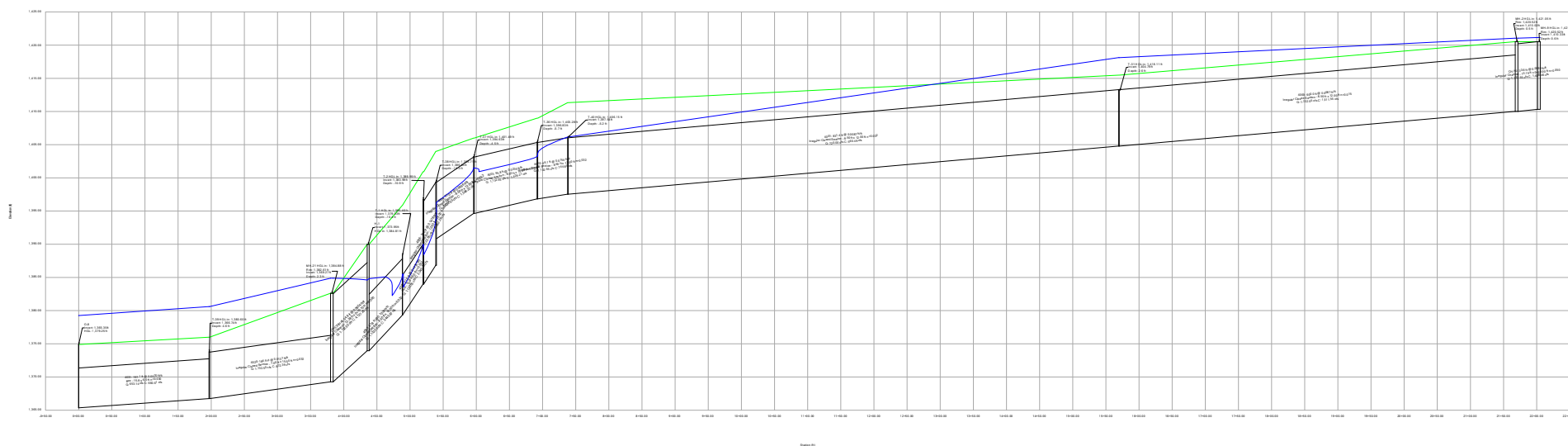
Profile Report

Engineering Profile - Project 3A - 50-yr (220184A19_Model_Design.stsw)



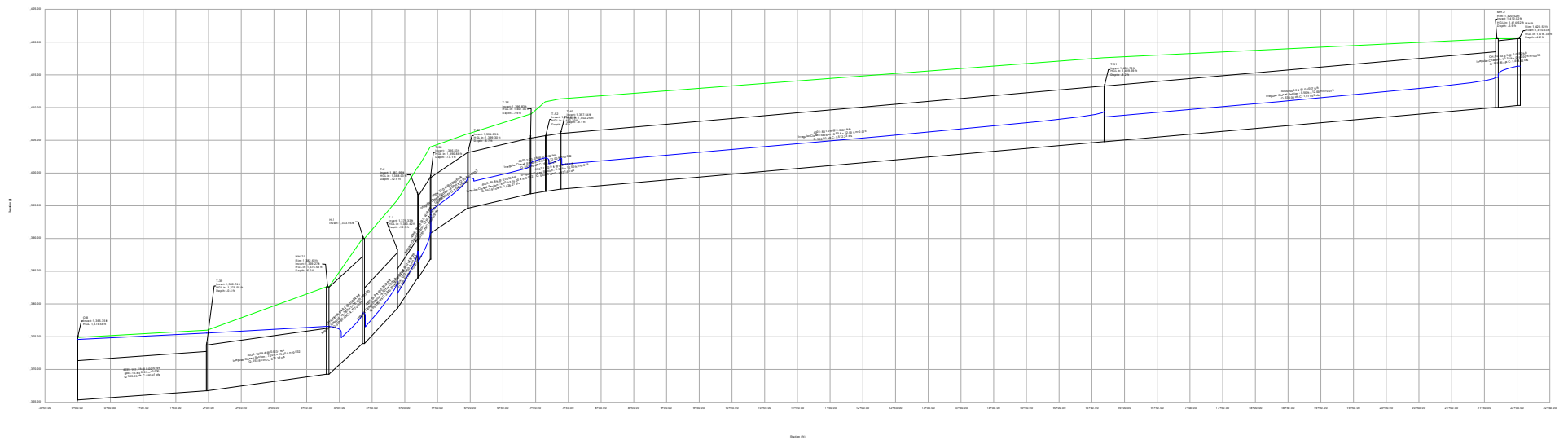
Profile Report

Engineering Profile - Project 3A - 100-yr (220184A19_Model_Design.stsw)



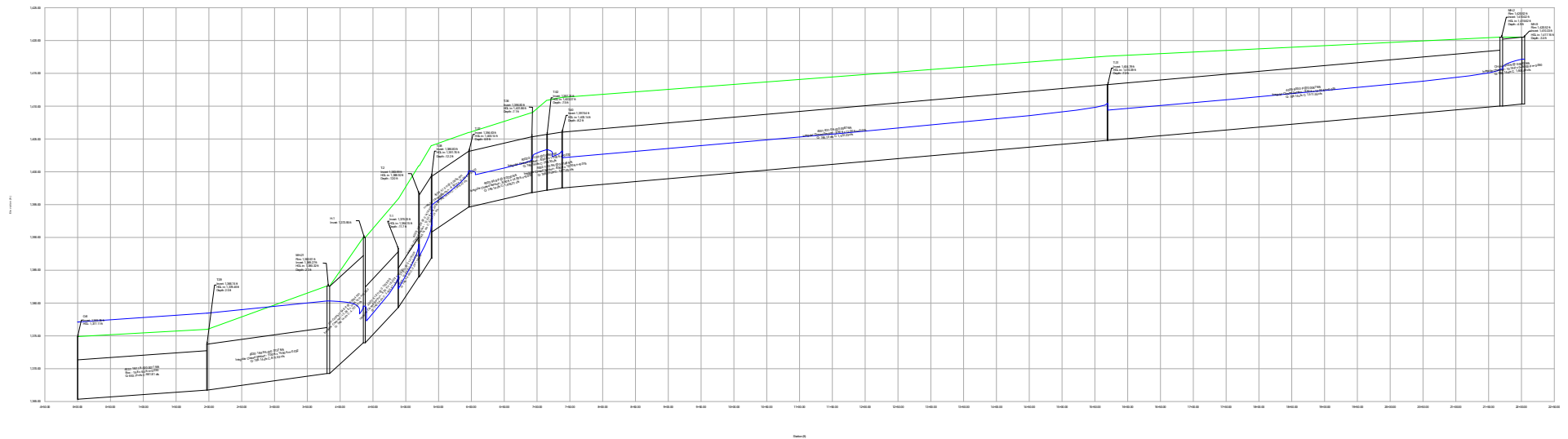
Profile Report

Engineering Profile - Project 3B - 10-yr (220184A19_Model_Design.stsw)



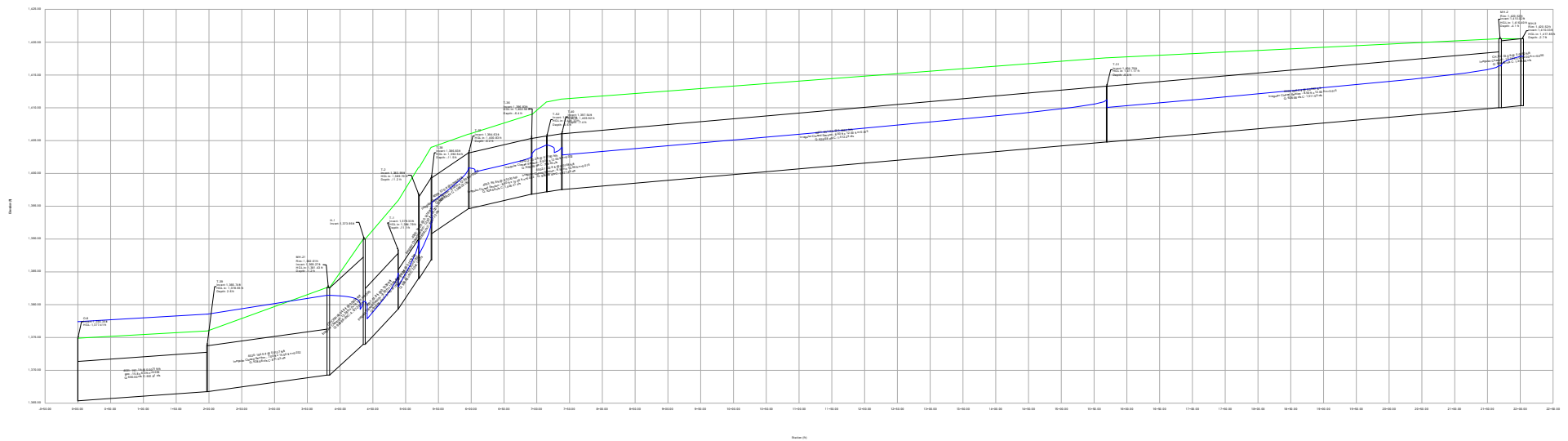
Profile Report

Engineering Profile - Project 3B - 25-yr (220184A19_Model_Design AMB 5-12.stsw)



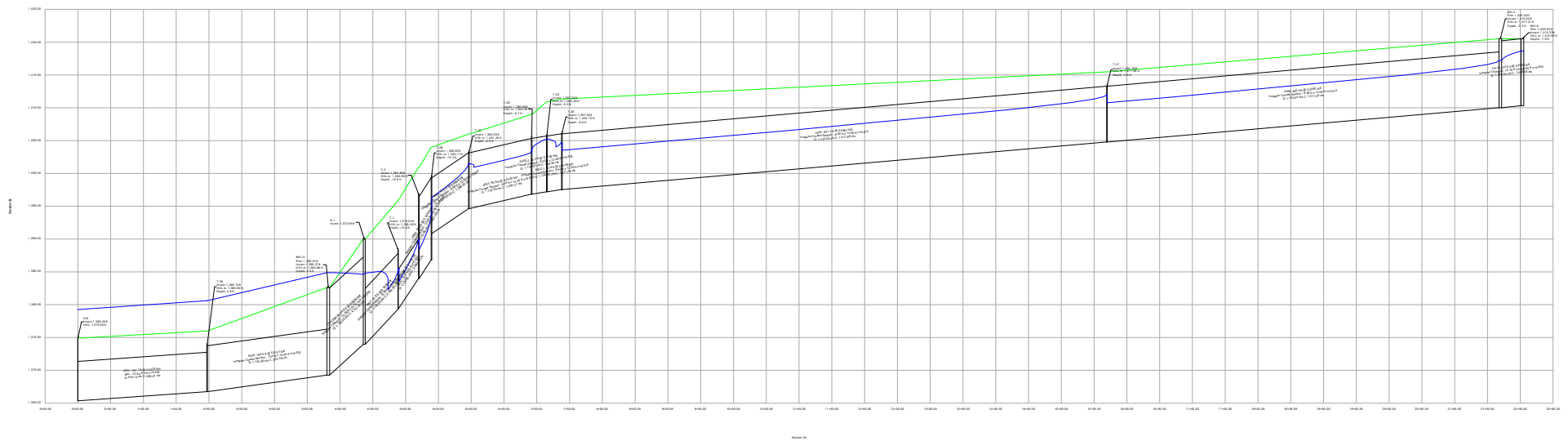
Profile Report

Engineering Profile - Project 3B - 50-yr (220184A19_Model_Design.stsw)



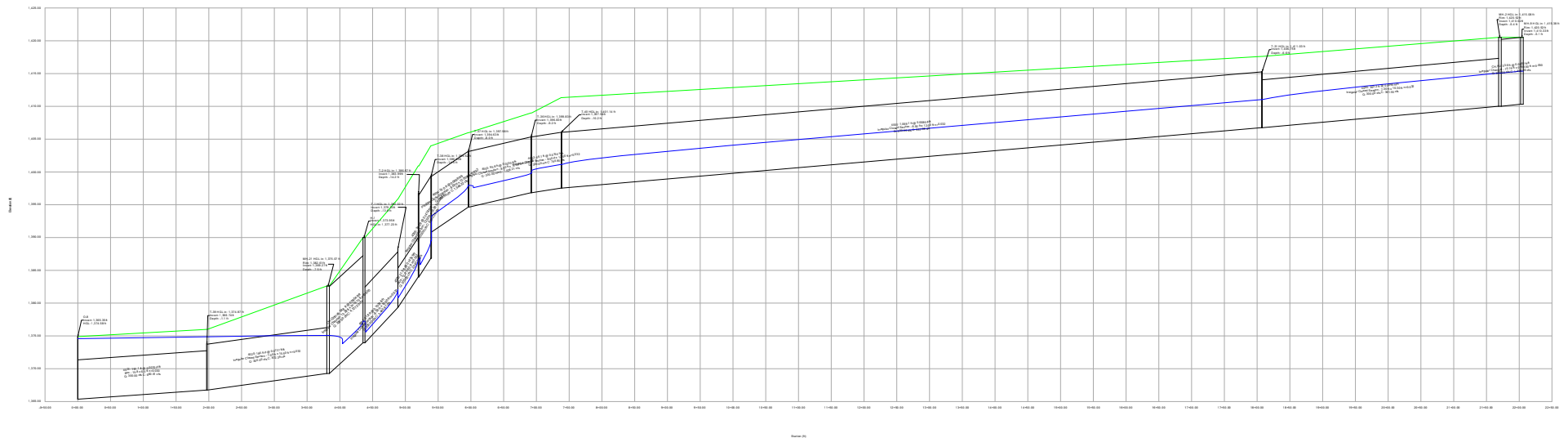
Profile Report

Engineering Profile - Project 3B - 100-yr (220184A19_Model_Design.stsw)



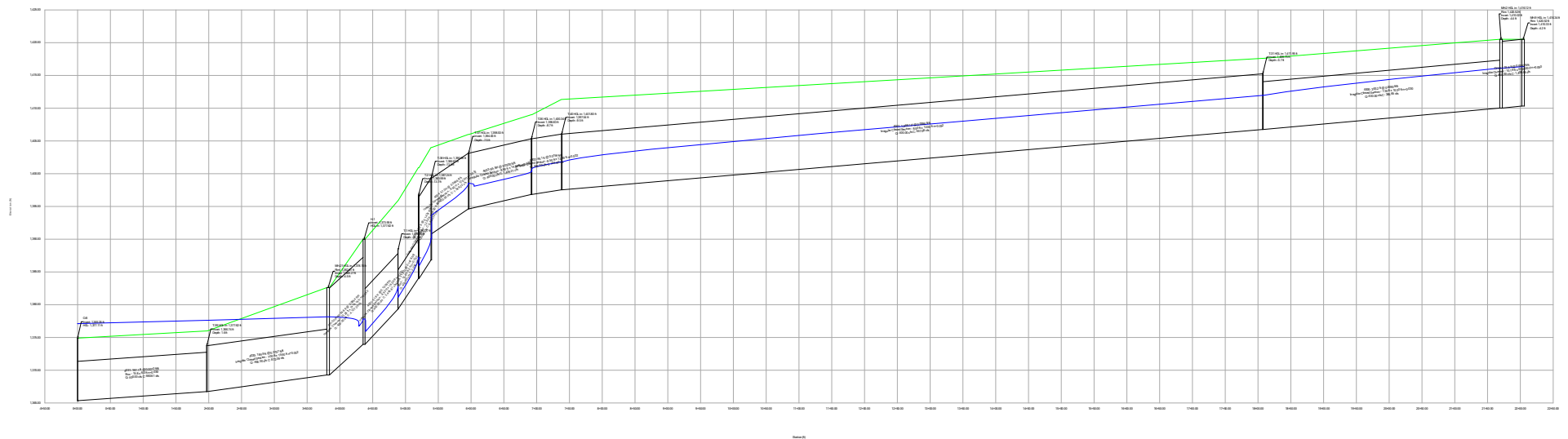
Profile Report

Engineering Profile - Project 5 - 10-yr (220184A19_Model_Design.stsw)

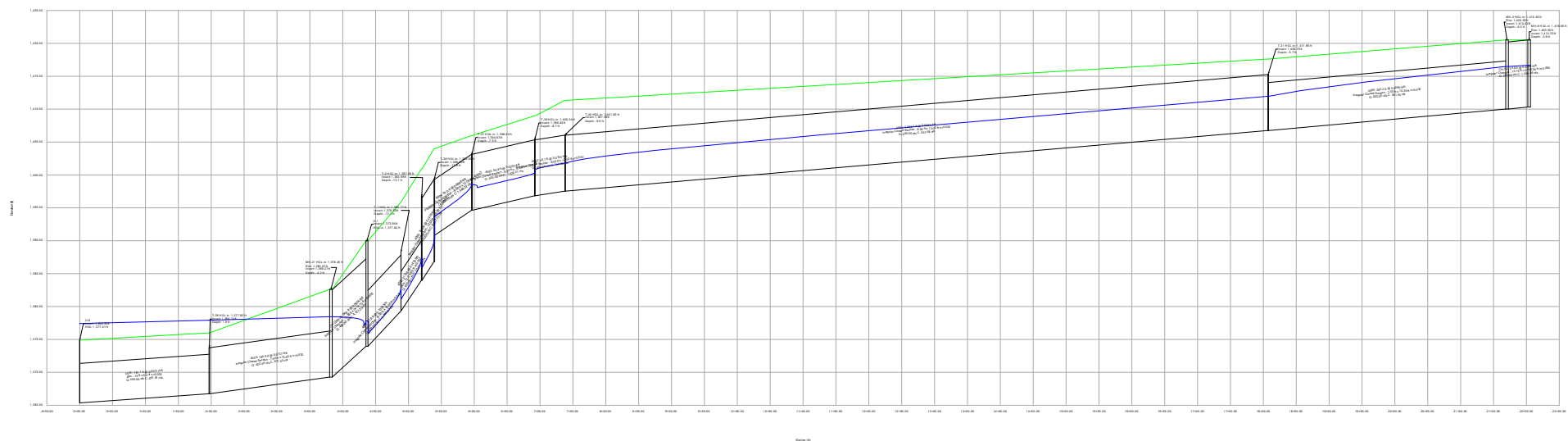


Profile Report

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

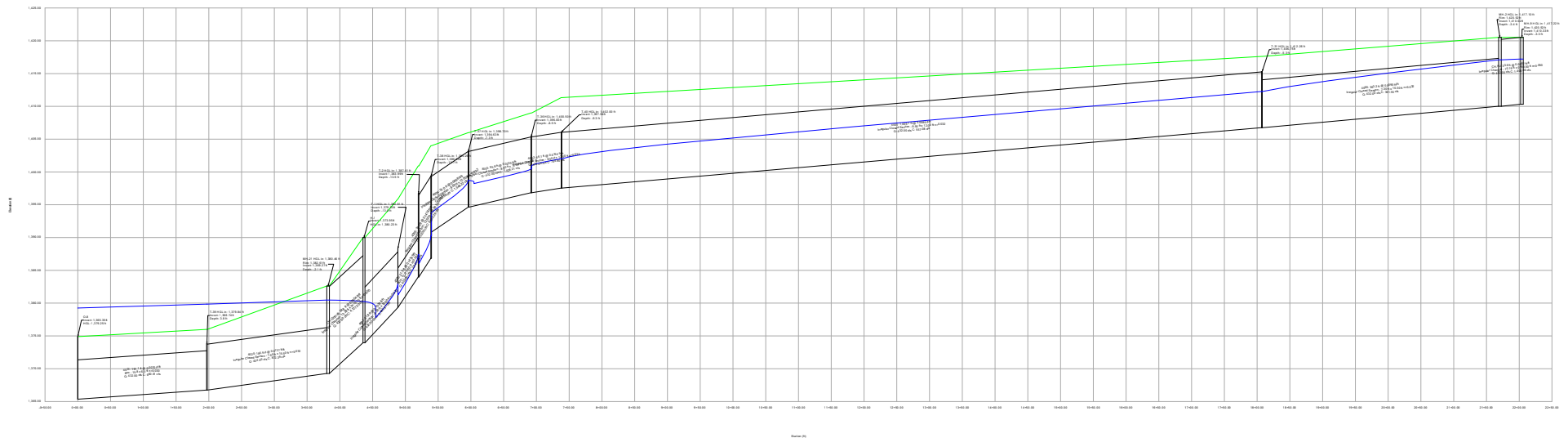


Engineering Profile - Project 5 - 50-yr (220184A19_Model_Design.stsw)



Profile Report

Engineering Profile - Project 5 - 100-yr (220184A19_Model_Design.stsw)

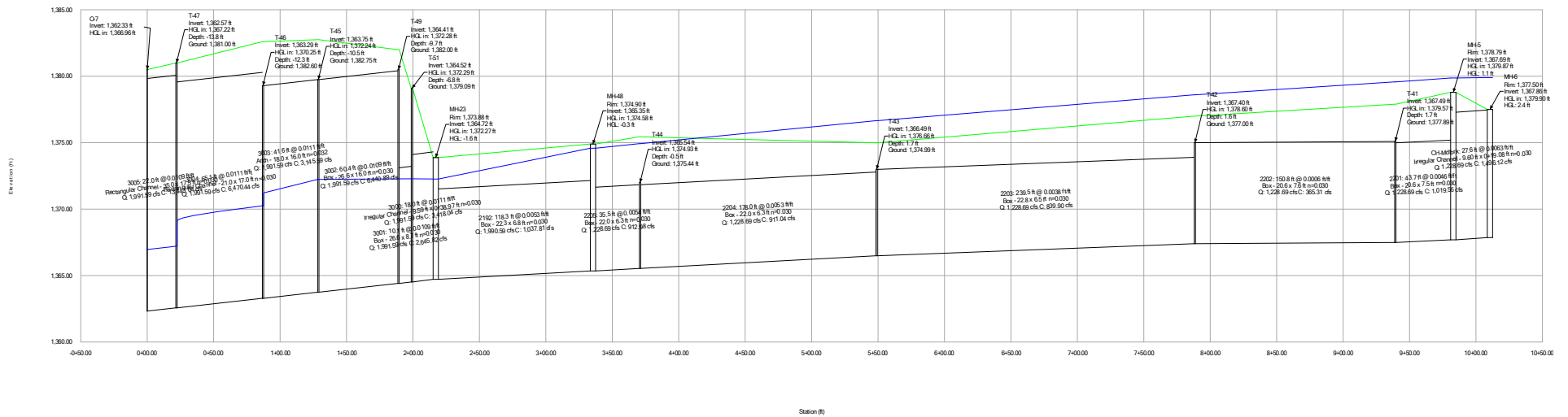


APPENDIX J

LEWIS CREEK SCENARIO PROFILES

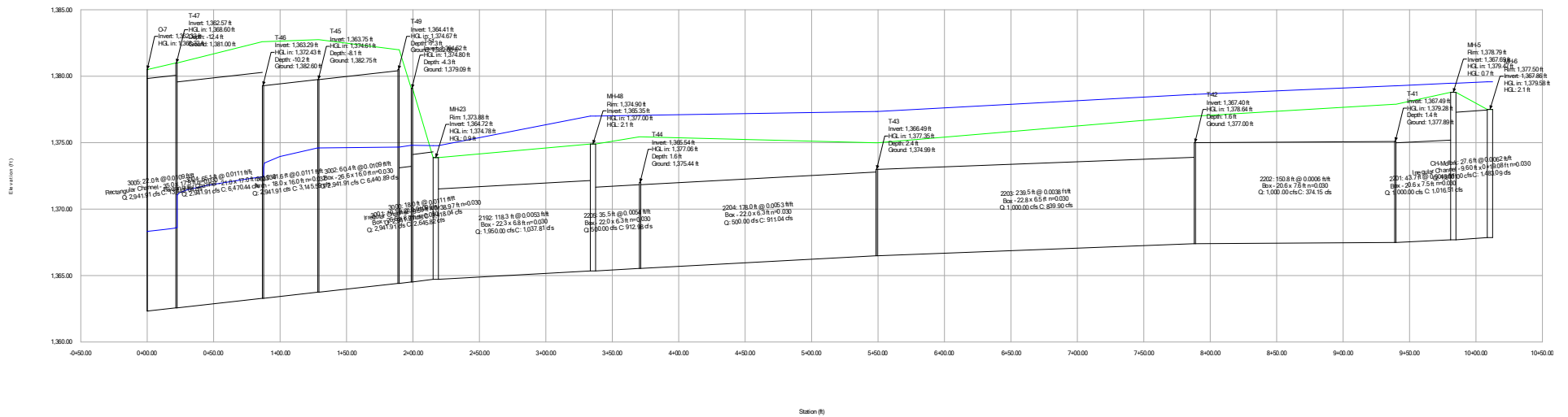
Profile Report

Engineering Profile - Project 2C - 10-yr (220184A19_Model_Design.stsw)



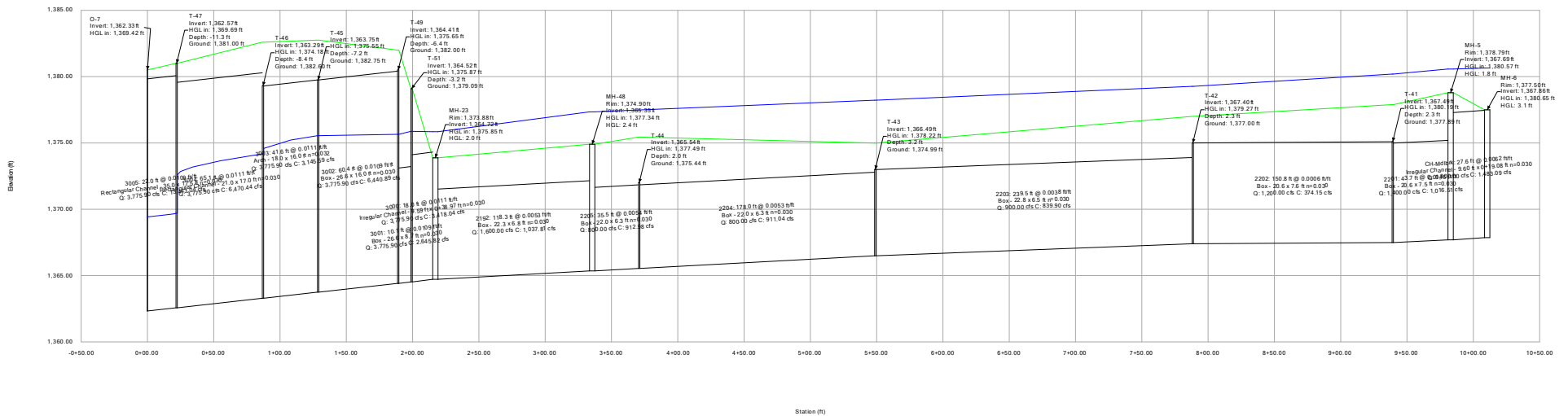
Profile Report

Engineering Profile - Project 2C - 25yr (220184A19_Model_Design AMB 5-12.stsw)



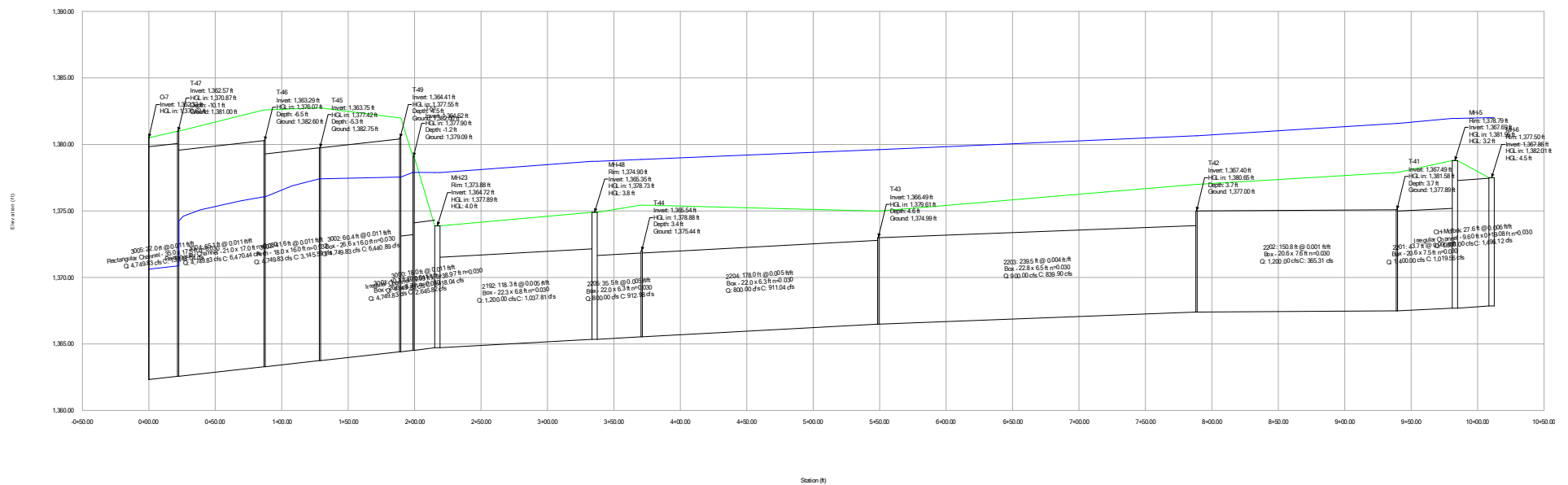
Profile Report

Engineering Profile - Project 2C - 50-yr (220184A19_Model_Design.stsw)



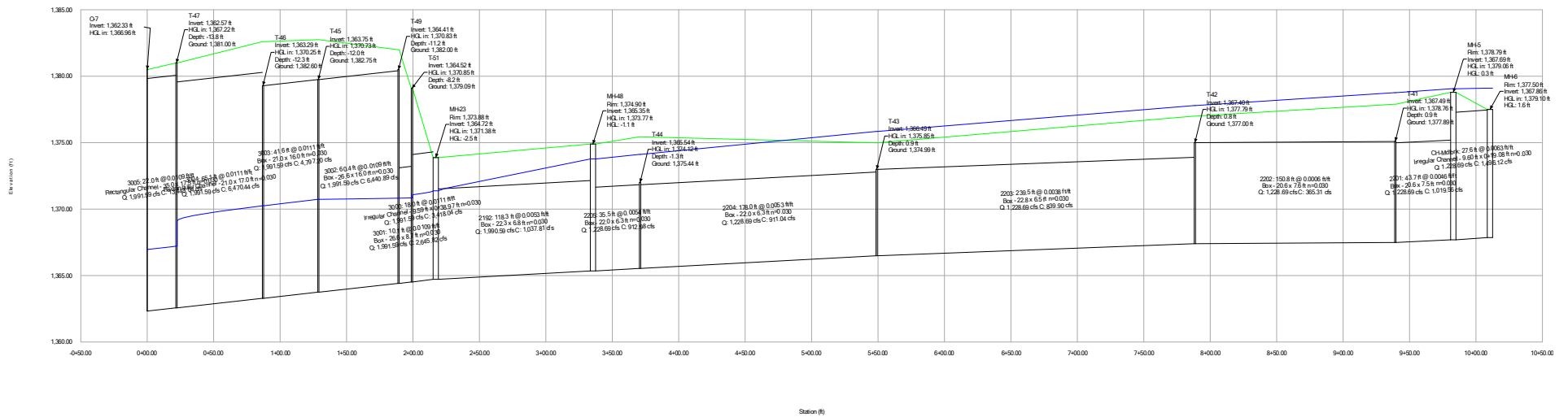
Profile Report

Engineering Profile - Project 2C - 100-yr (220184A19_Model_Design.stsw)



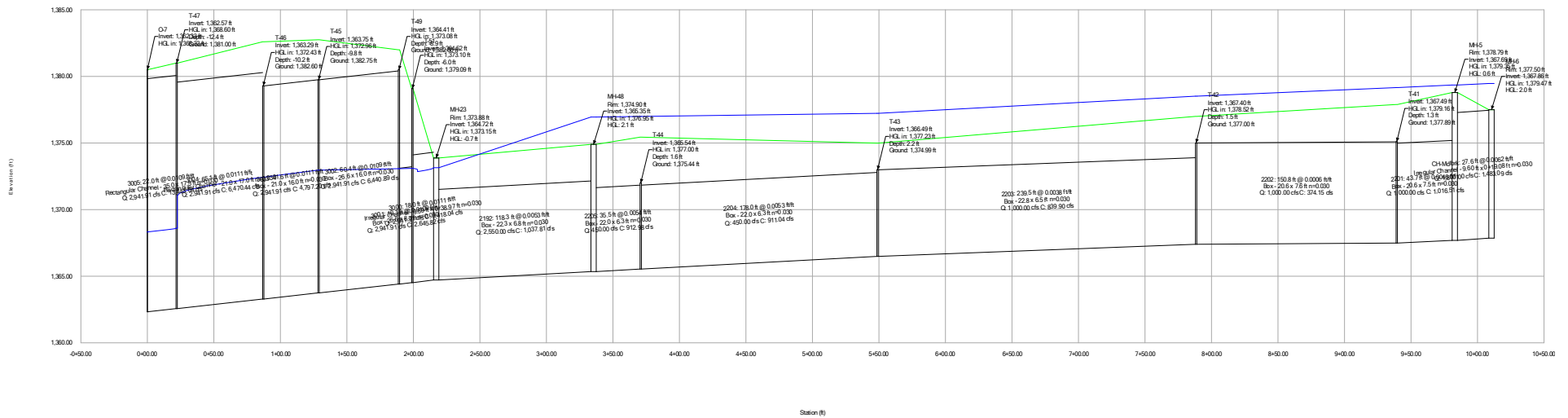
Profile Report

Engineering Profile - Project 2B+C - 10-yr (220184A19_Model_Design.stsw)



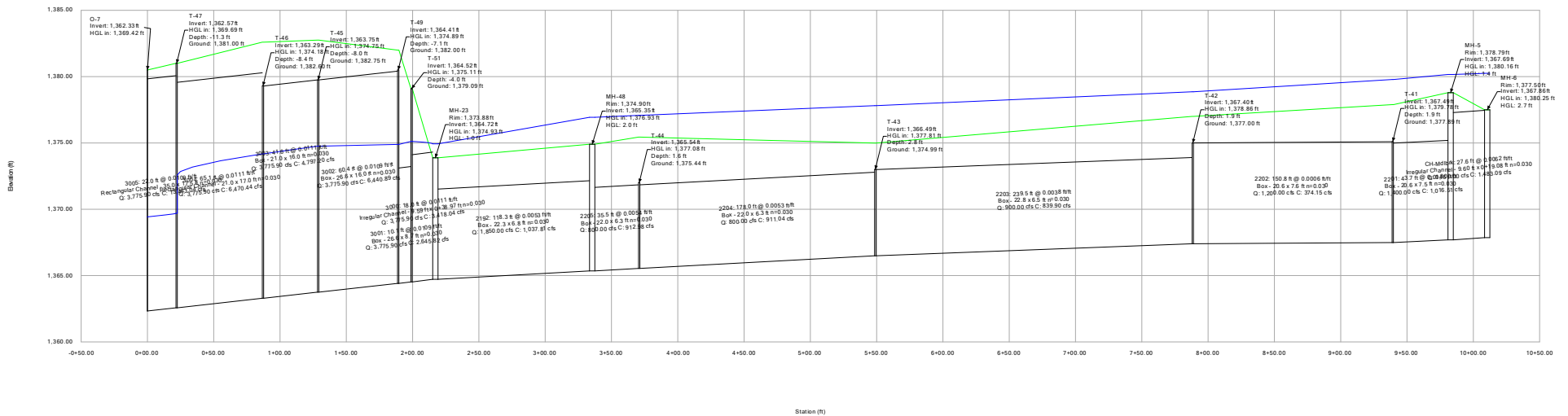
Profile Report

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



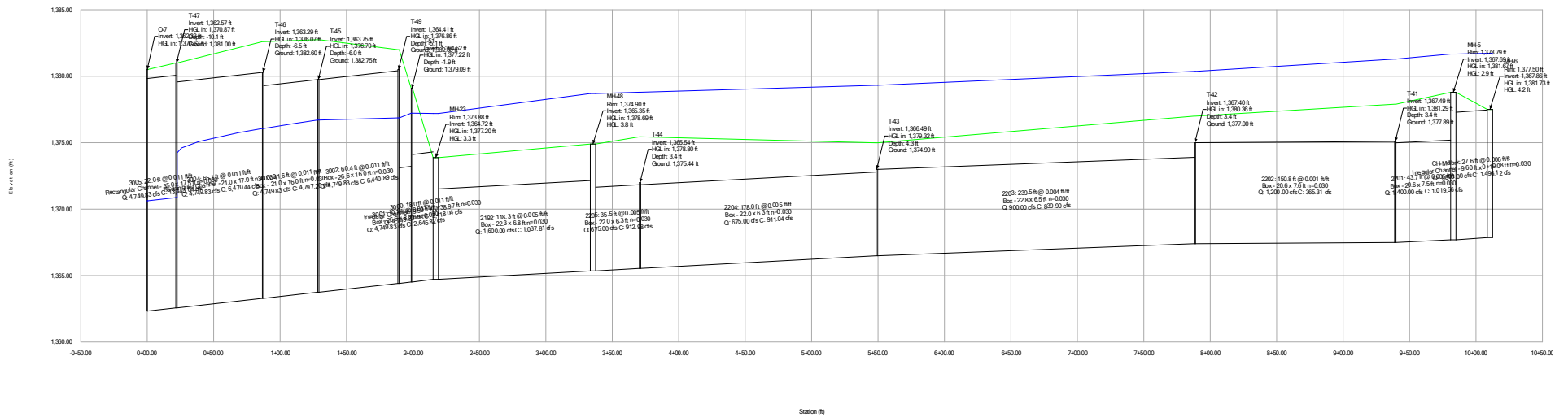
Profile Report

Engineering Profile - Project 2B+C - 50-yr (220184A19_Model_Design.stsw)



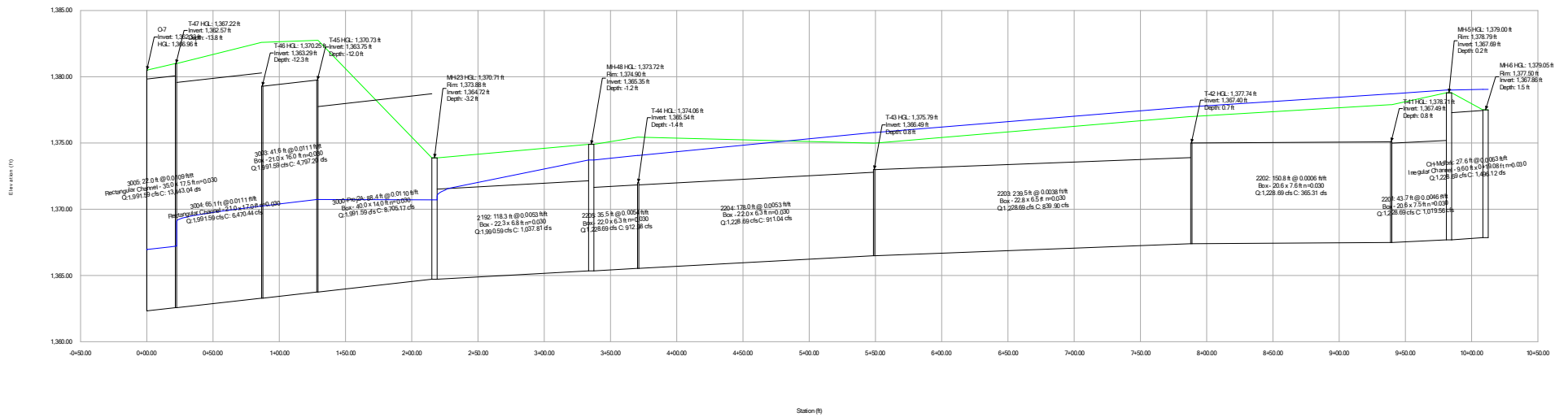
Profile Report

Engineering Profile - Project 2B + C - 100-yr (220184A19_Model_Design.stsw)



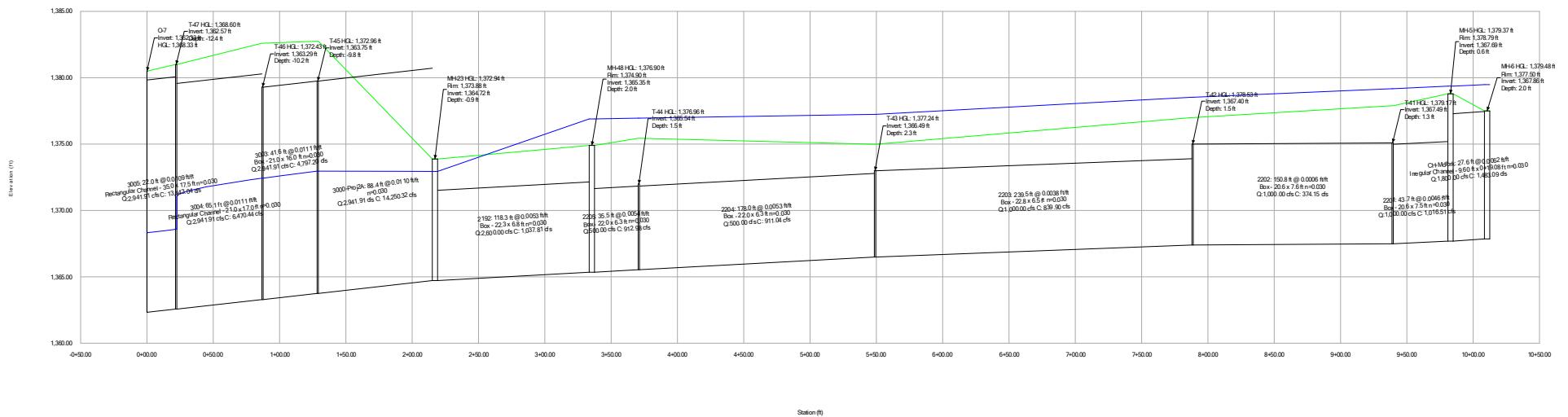
Profile Report

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



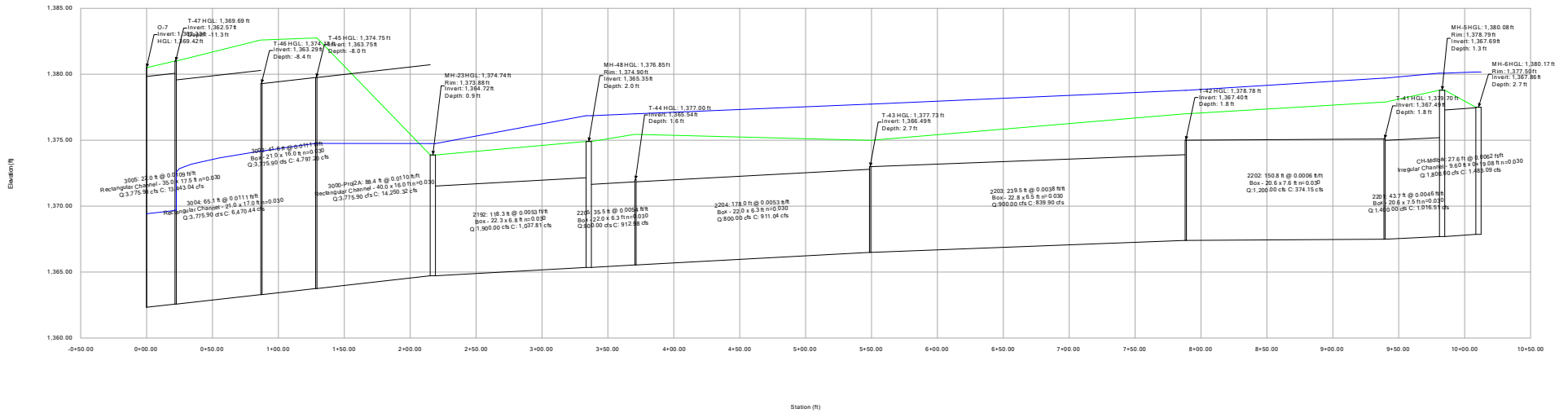
Profile Report

Engineering Profile - Project 2A+2B+2C (220184A19_Model_Design AMB 5-12.stsw)



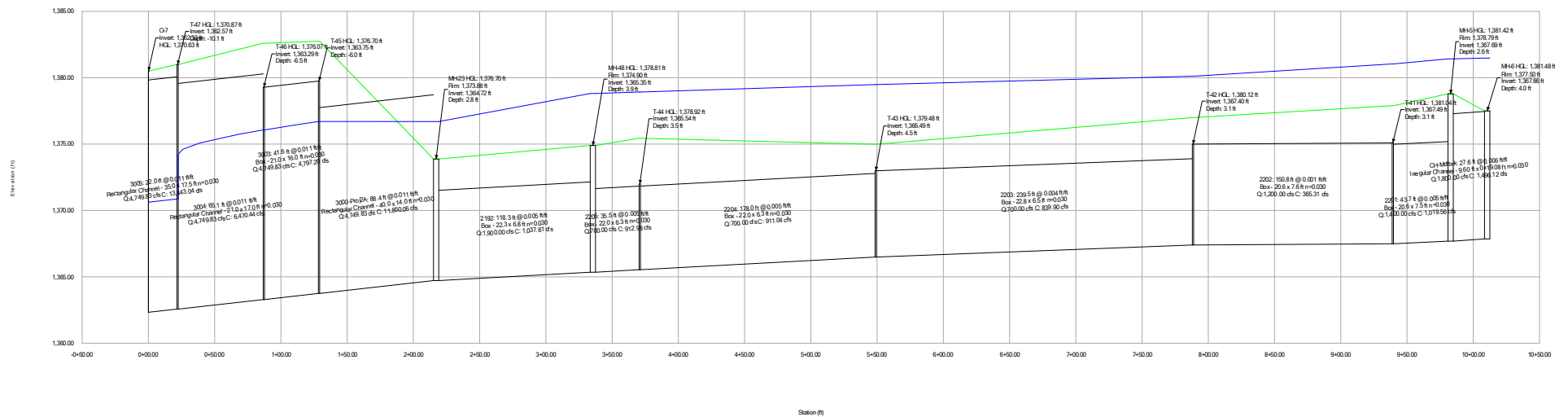
Profile Report

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



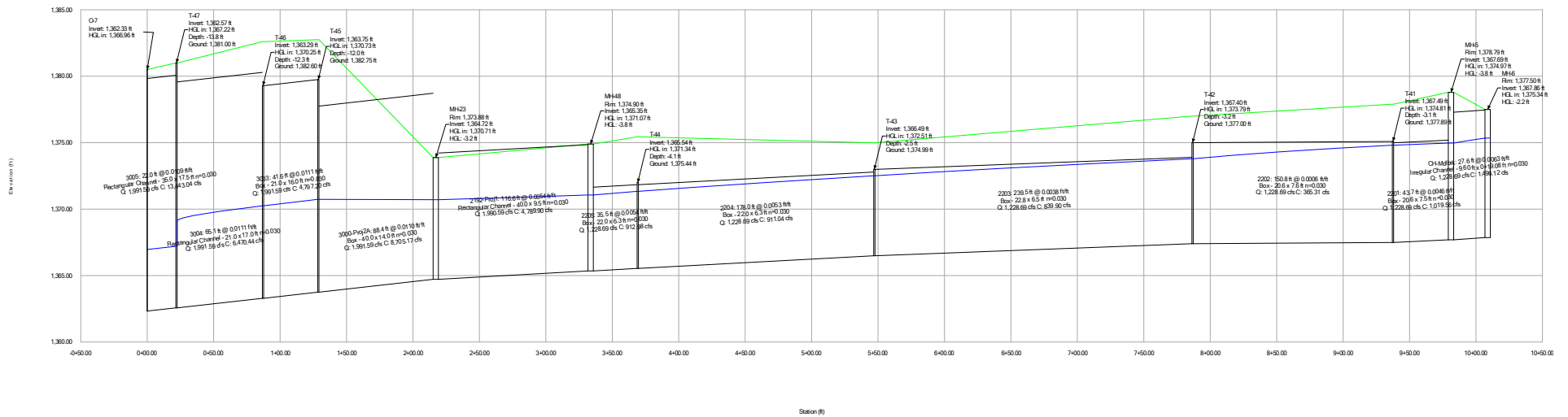
Profile Report

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



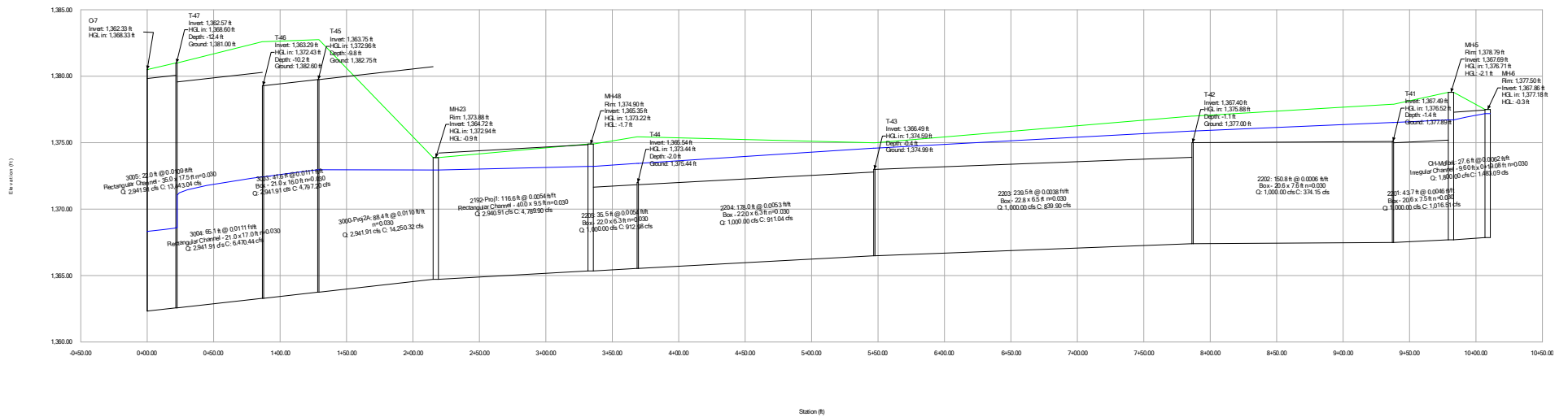
Profile Report

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



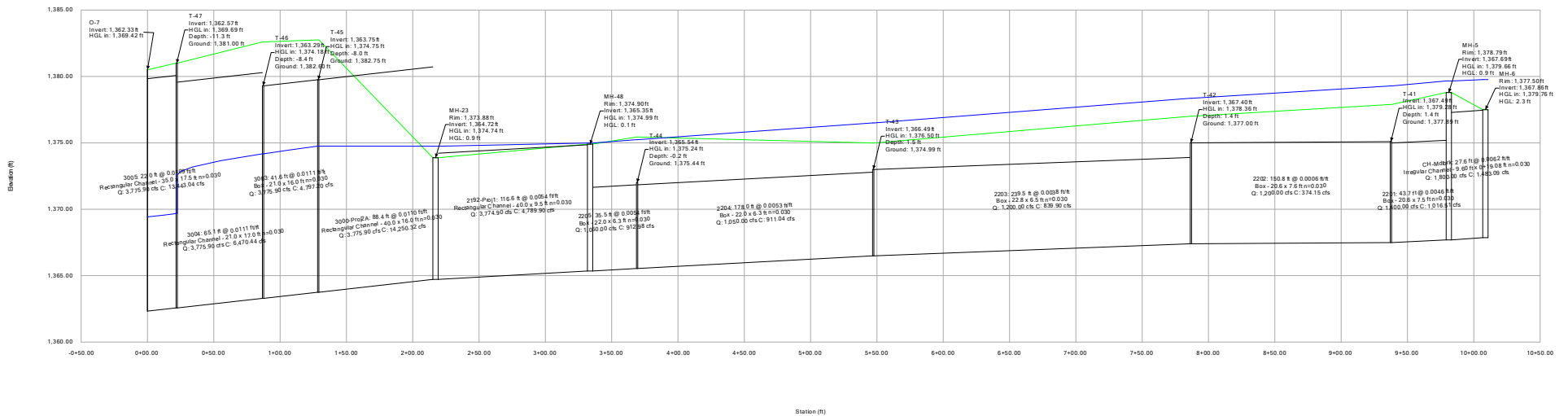
Profile Report

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



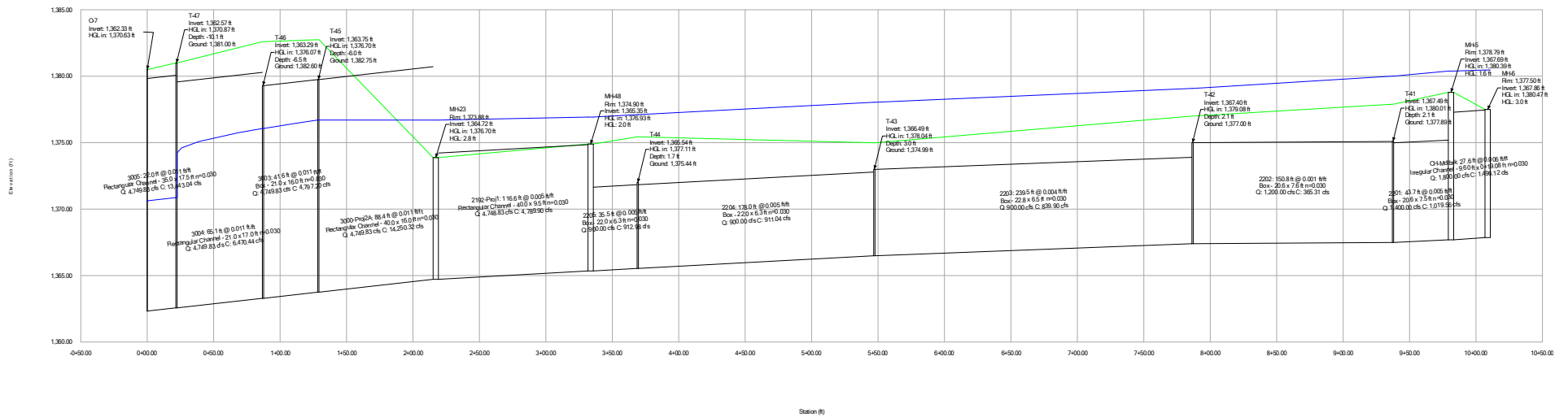
Profile Report

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



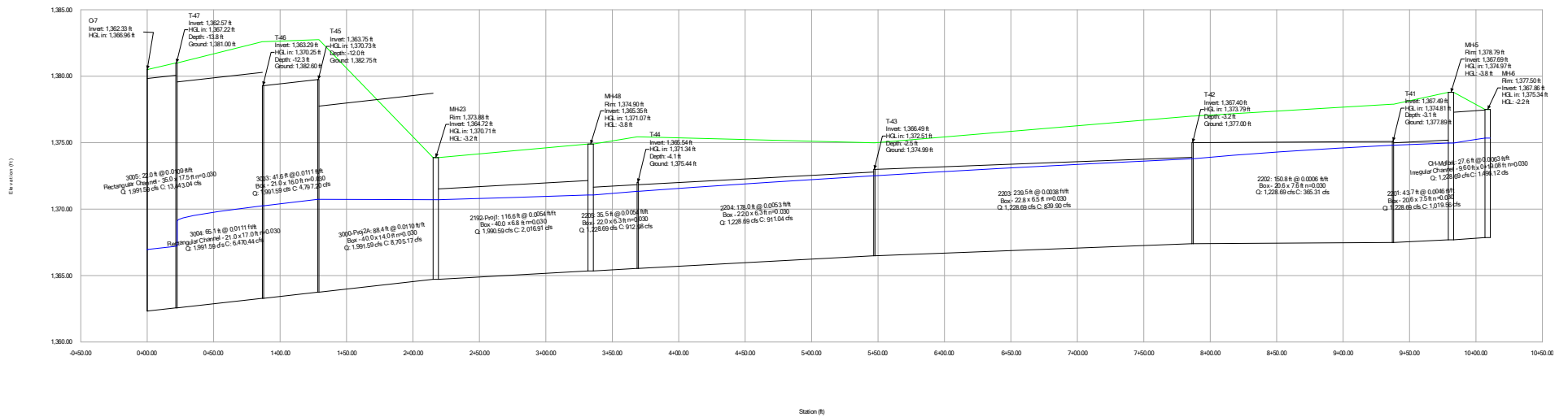
Profile Report

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



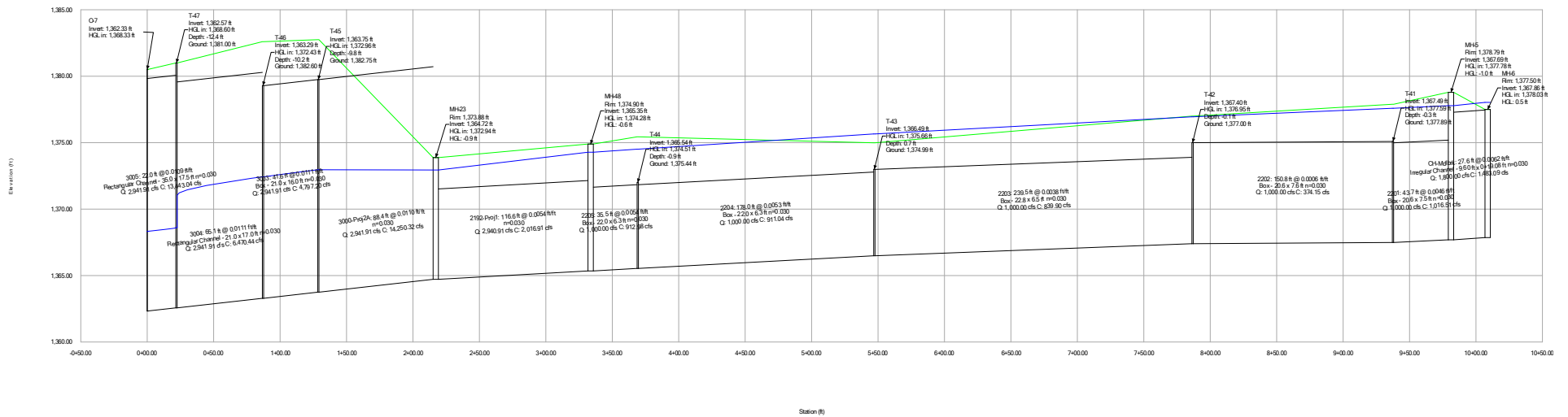
Profile Report

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



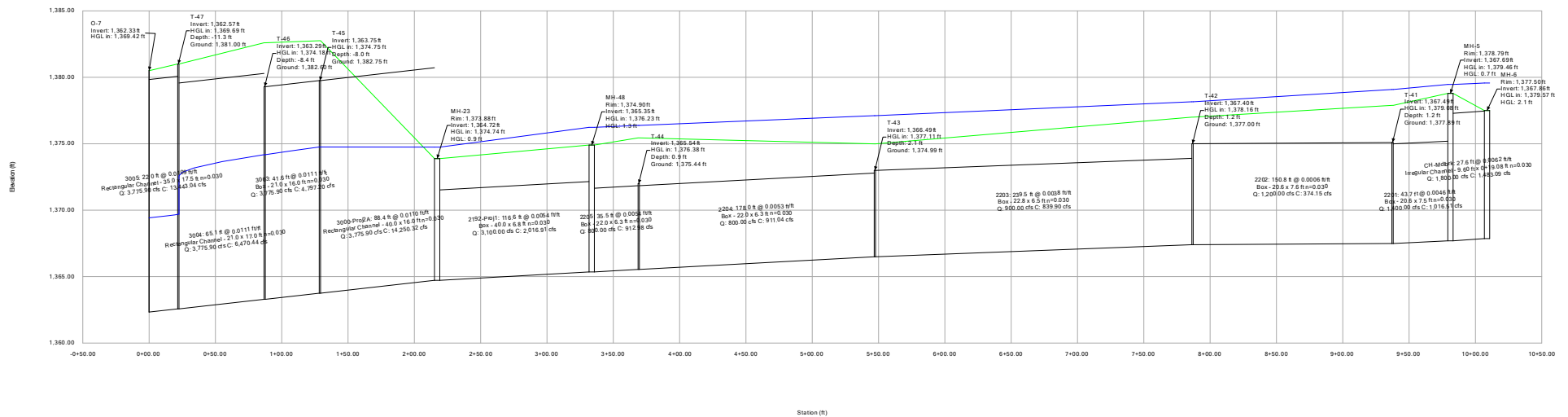
Profile Report

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



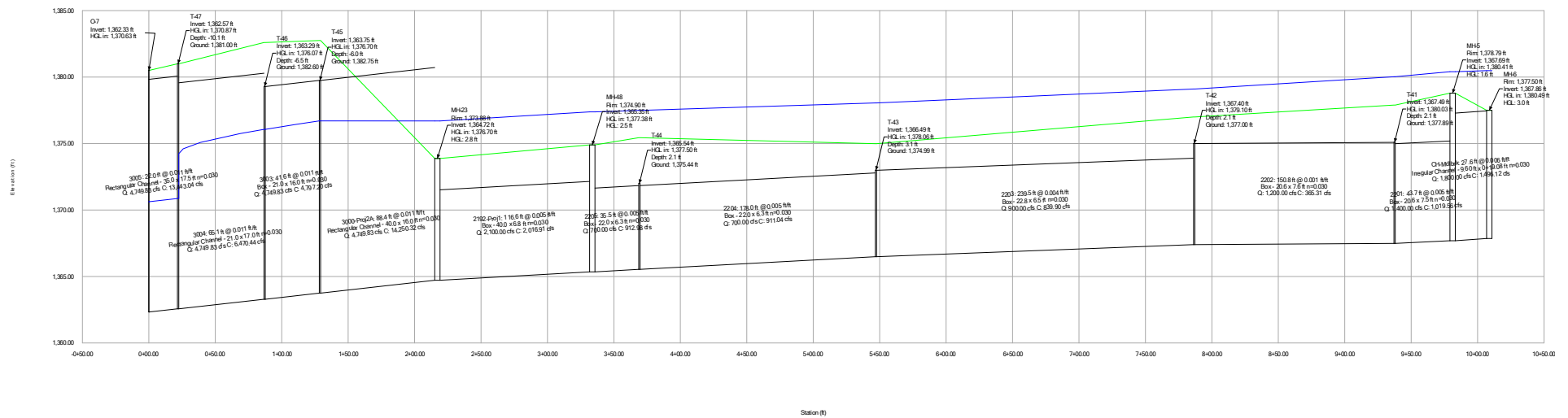
Profile Report

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

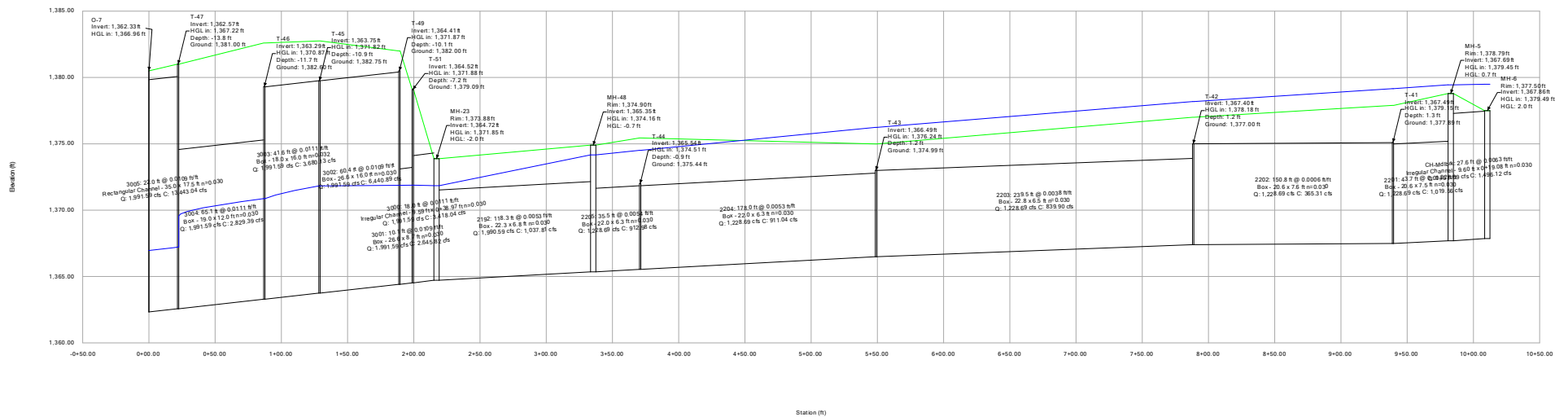


Profile Report

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

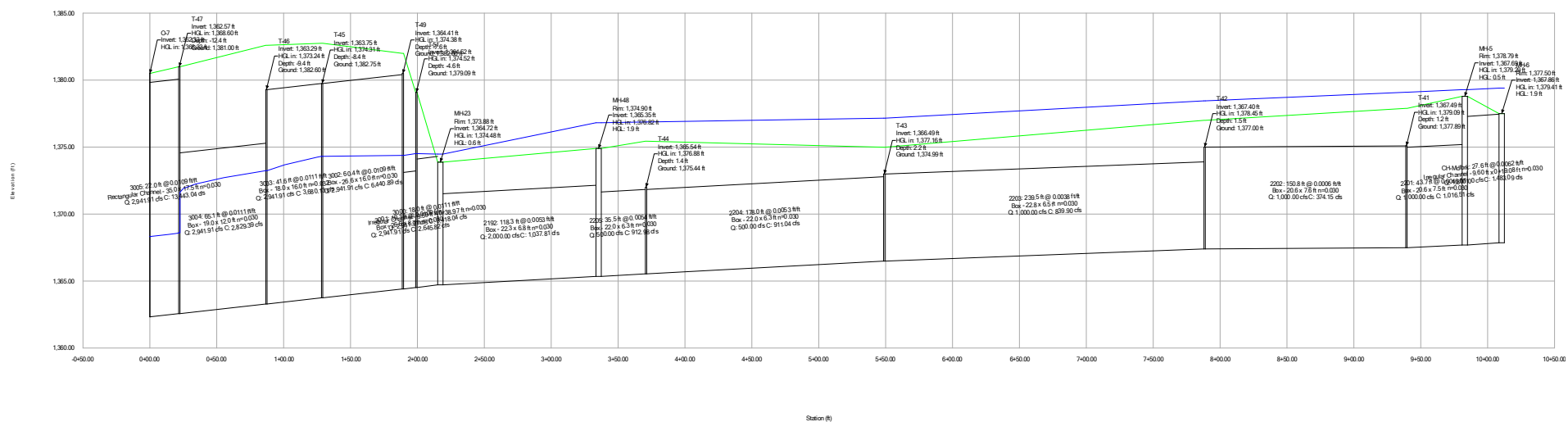


Engineering Profile - Project 2B - 10-yr (220184A19_Model_Design.stsw)



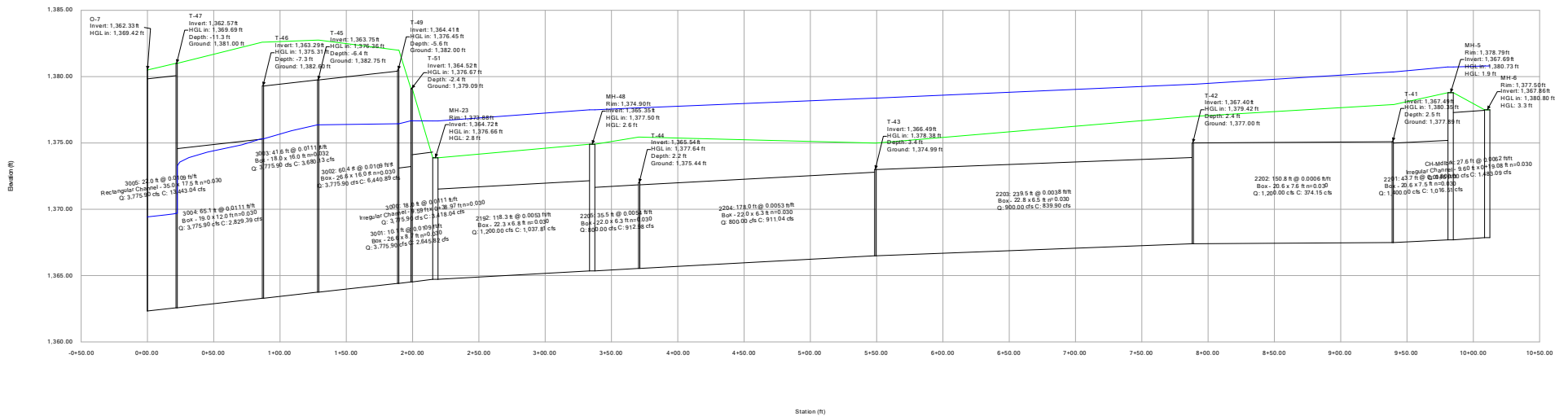
Profile Report

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



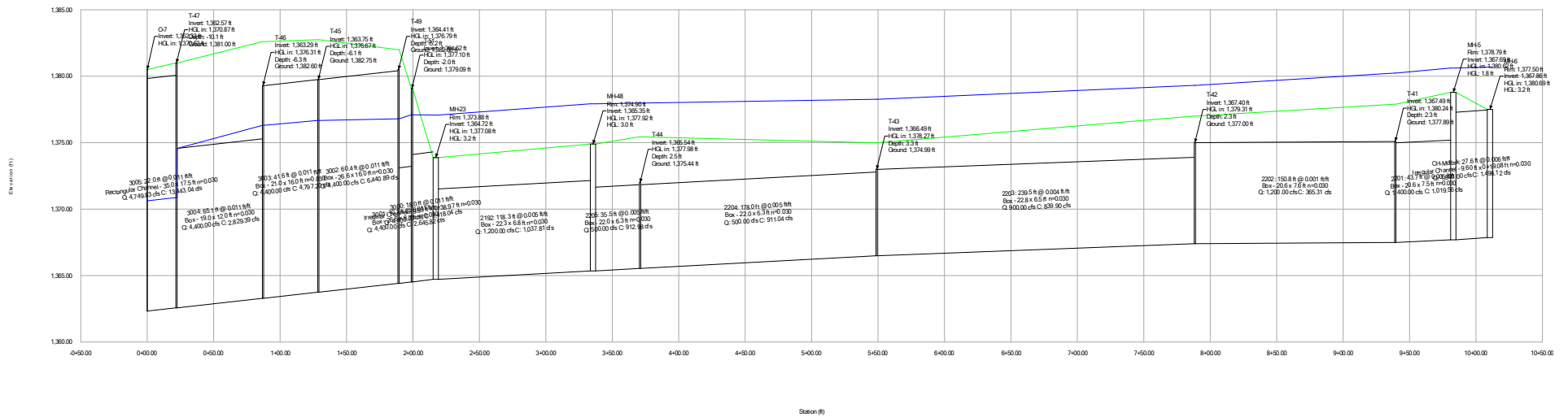
Profile Report

Engineering Profile - Project 2B - 50-yr (220184A19_Model_Design.stsw)

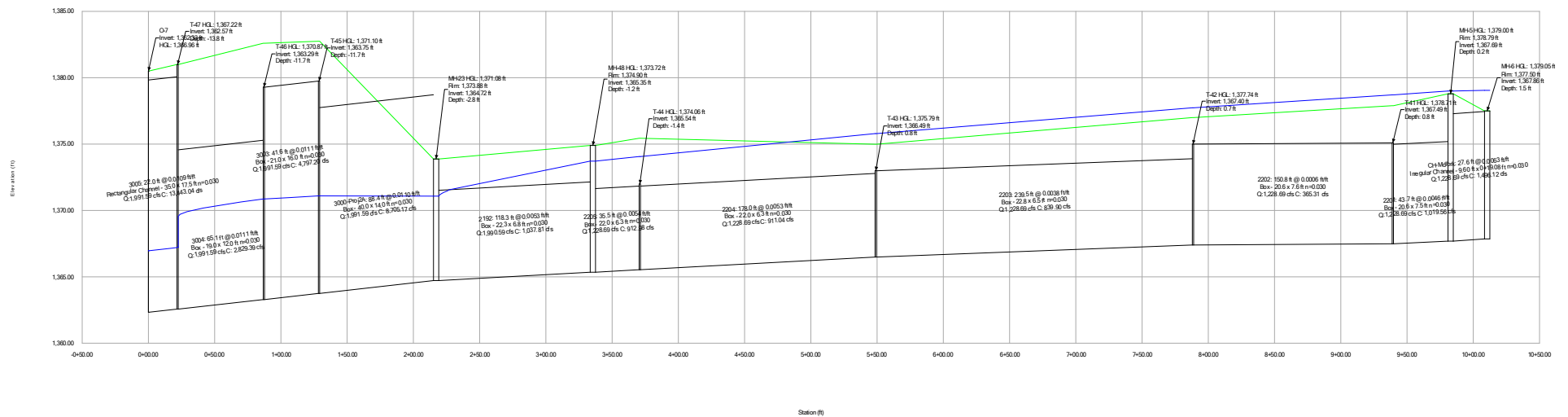


Profile Report

Engineering Profile - Project 2B - 100-yr (220184A19_Model_Design.stsw)

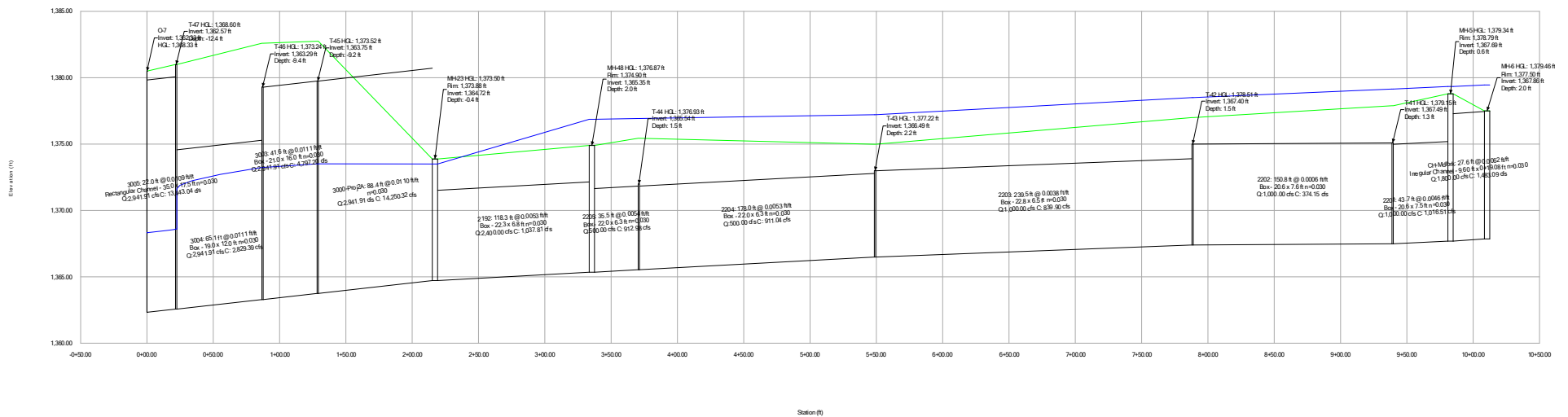


Engineering Profile - Project 2A+B - 10-yr (220184A19_Model_Design.stsw)

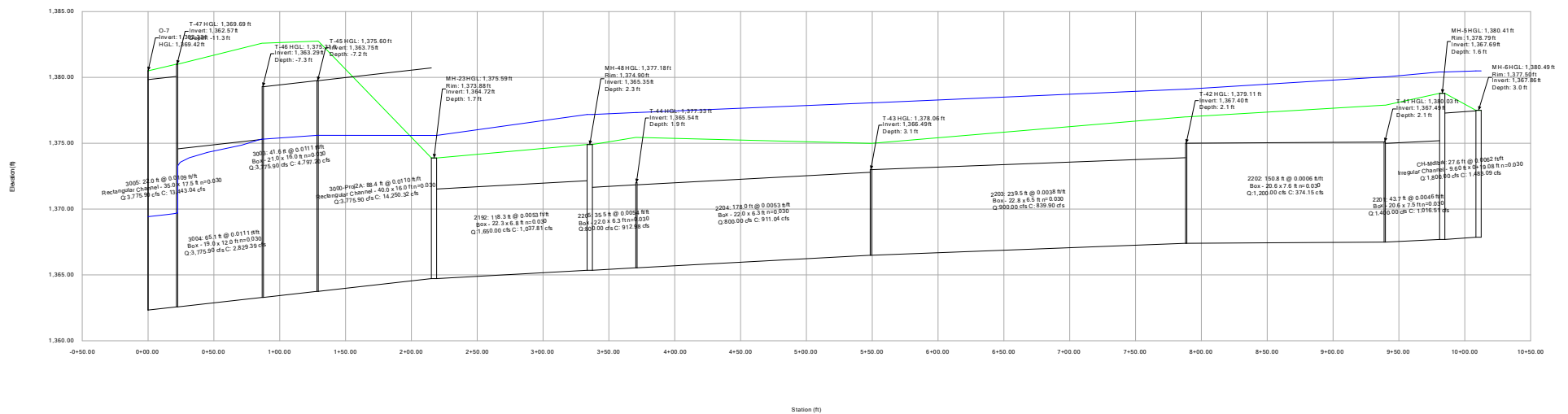


Profile Report

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

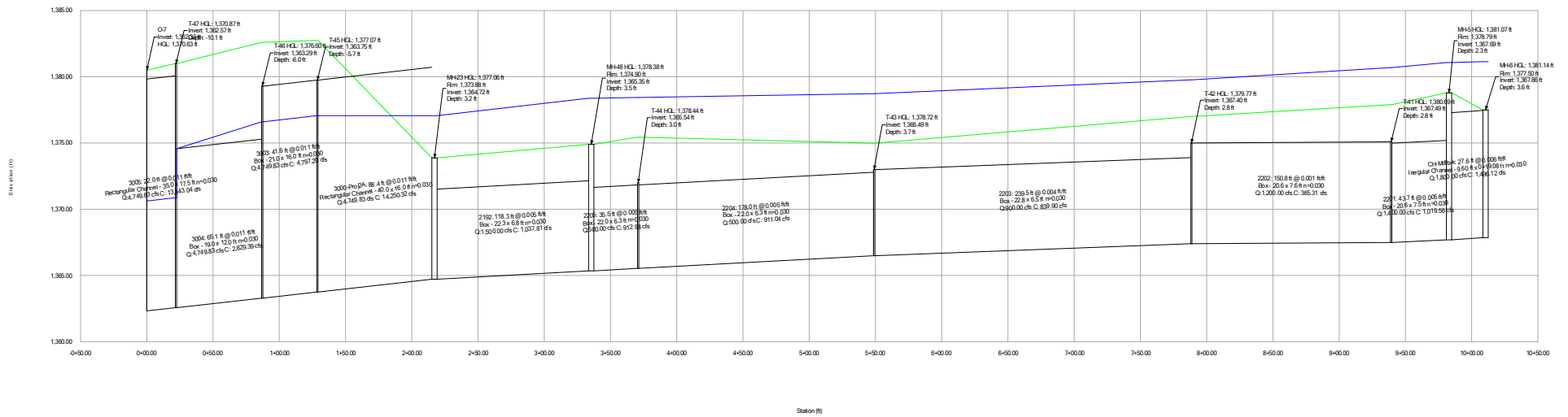


Engineering Profile - Project 2A+B - 50-yr (220184A19_Model_Design.stsw)



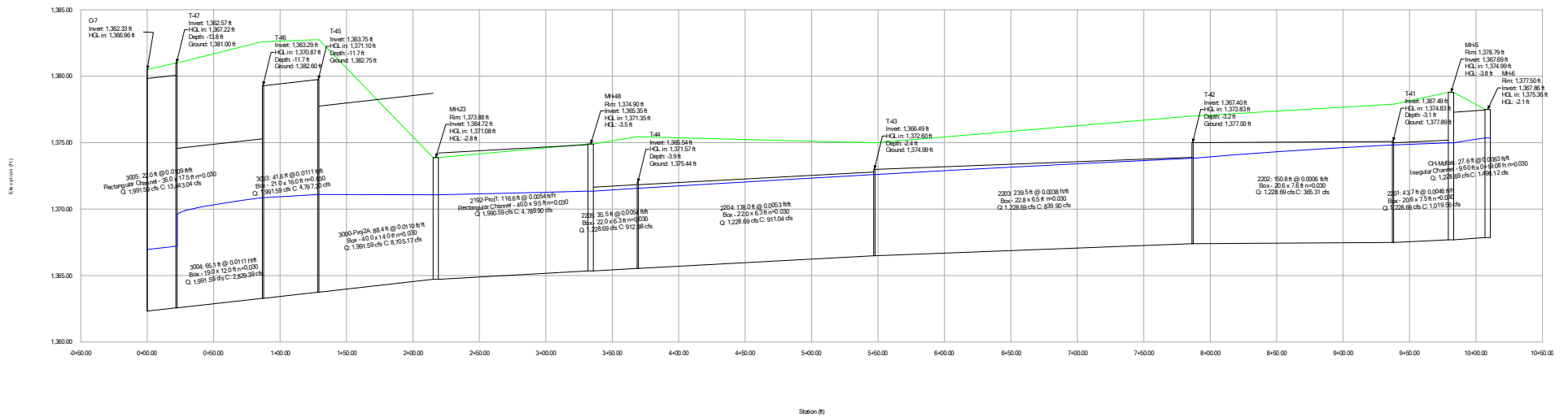
Profile Report

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



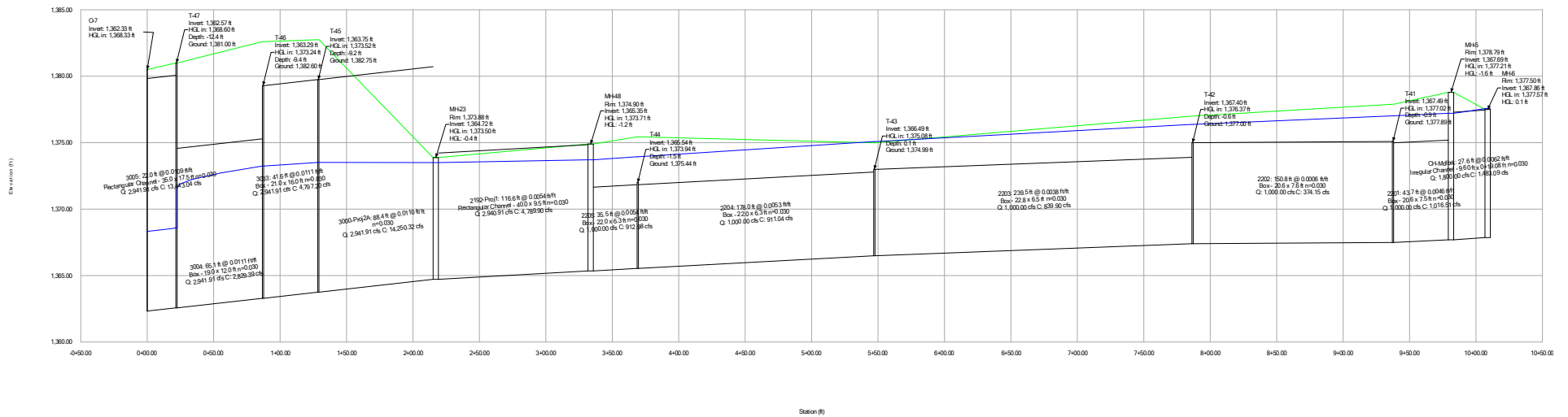
Profile Report

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



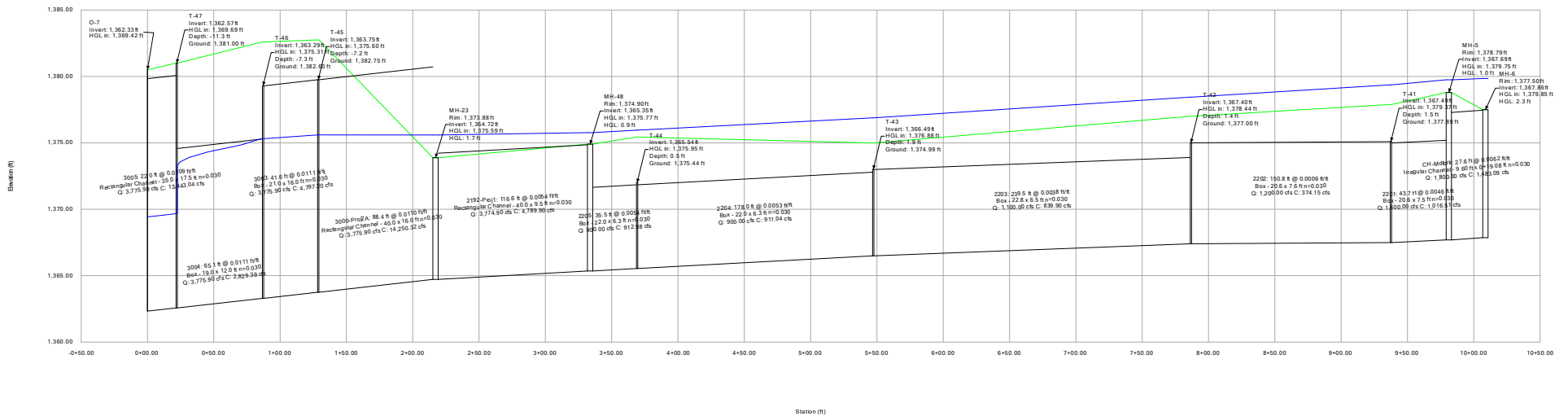
Profile Report

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



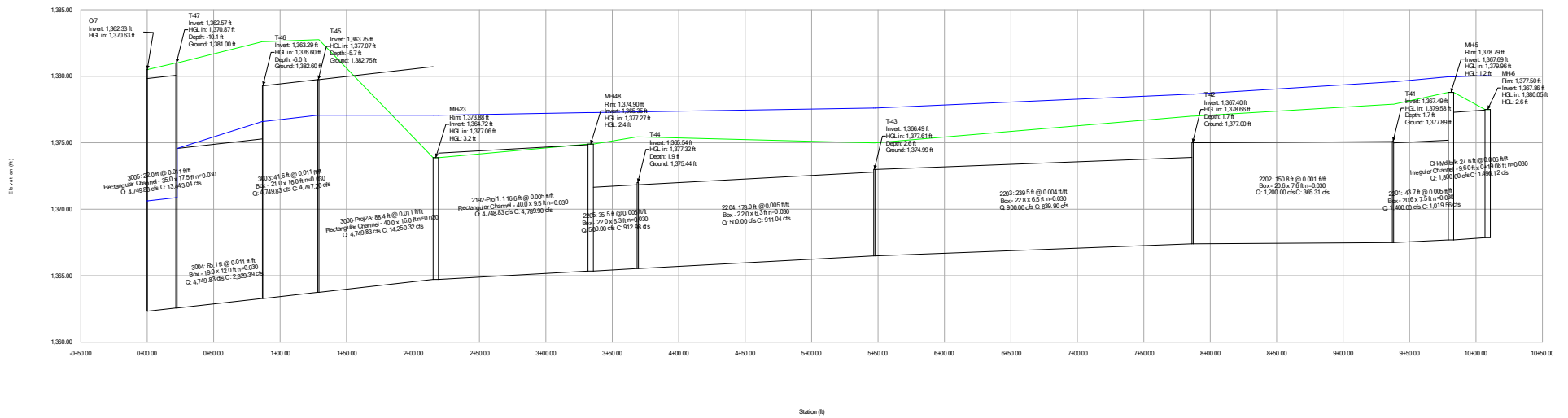
Profile Report

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



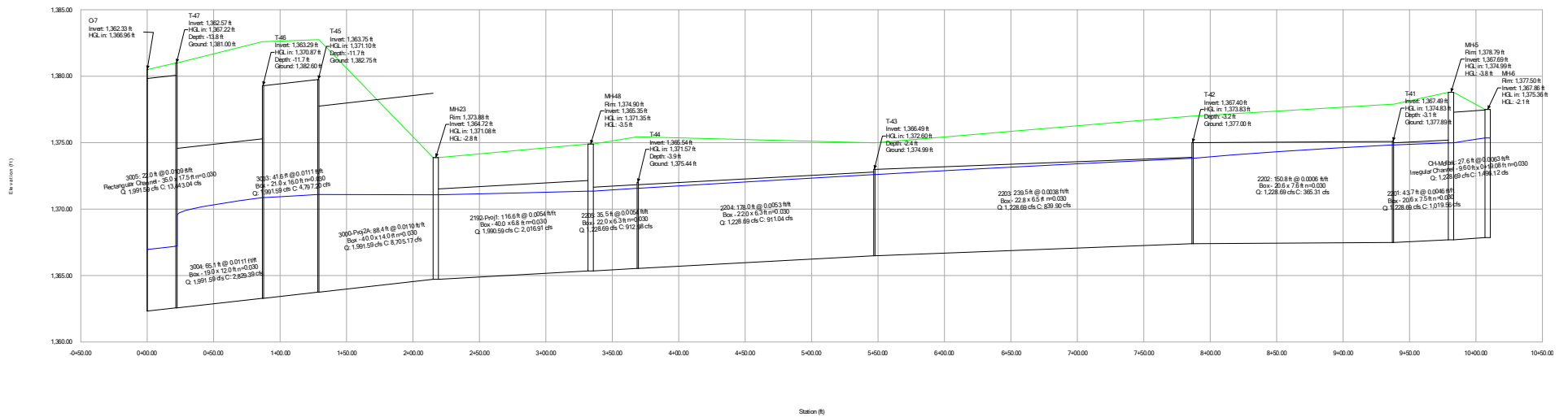
Profile Report

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



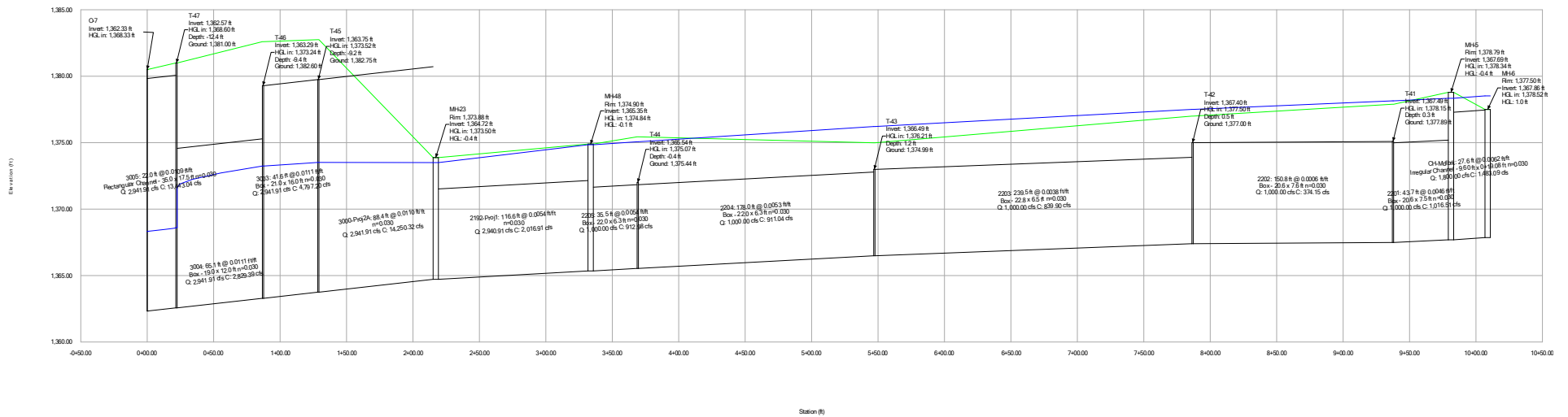
Profile Report

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



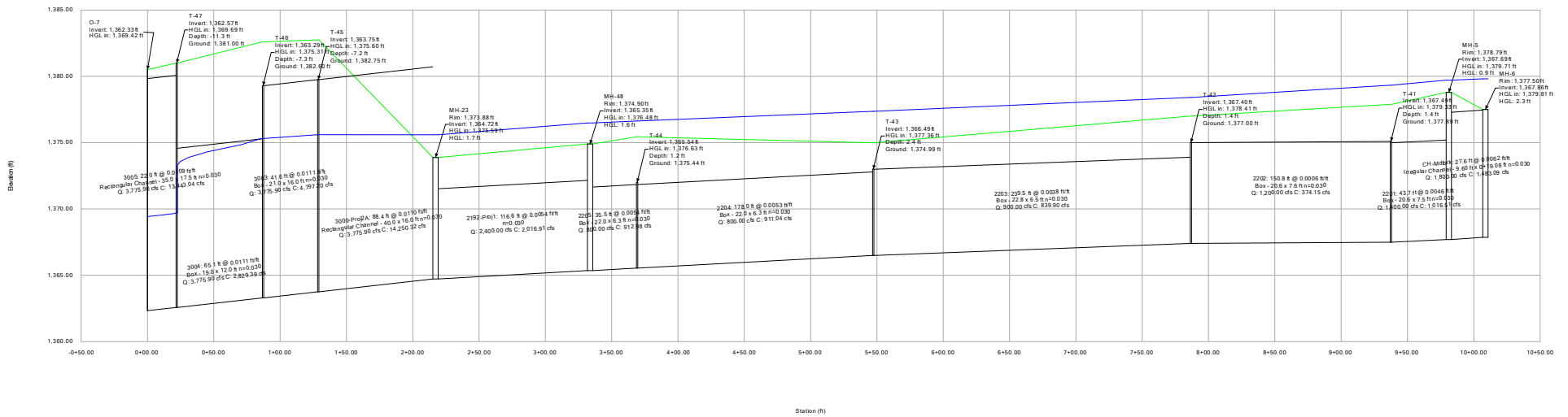
Profile Report

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



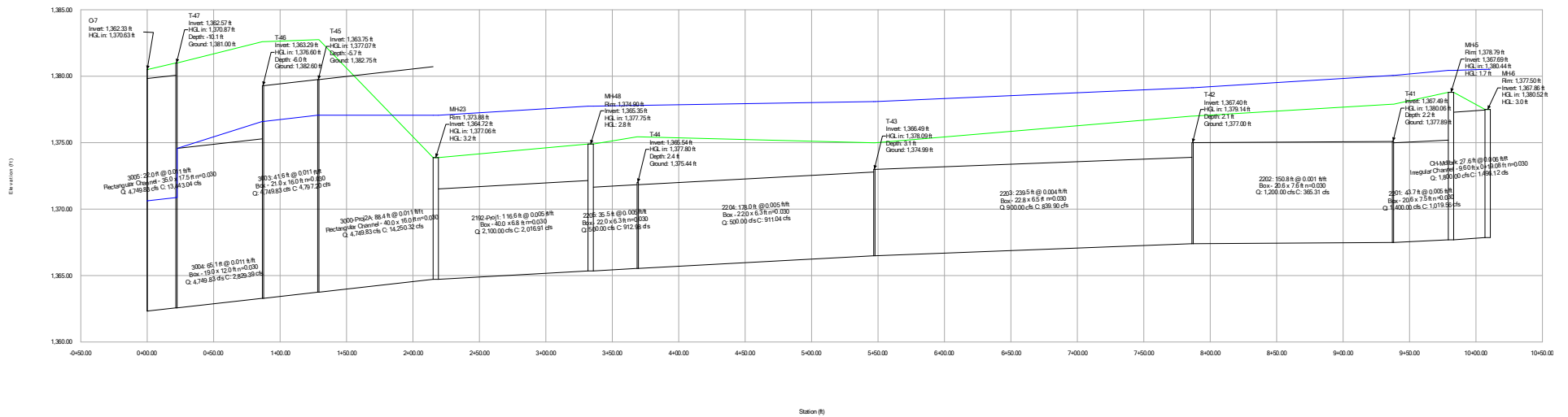
Profile Report

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



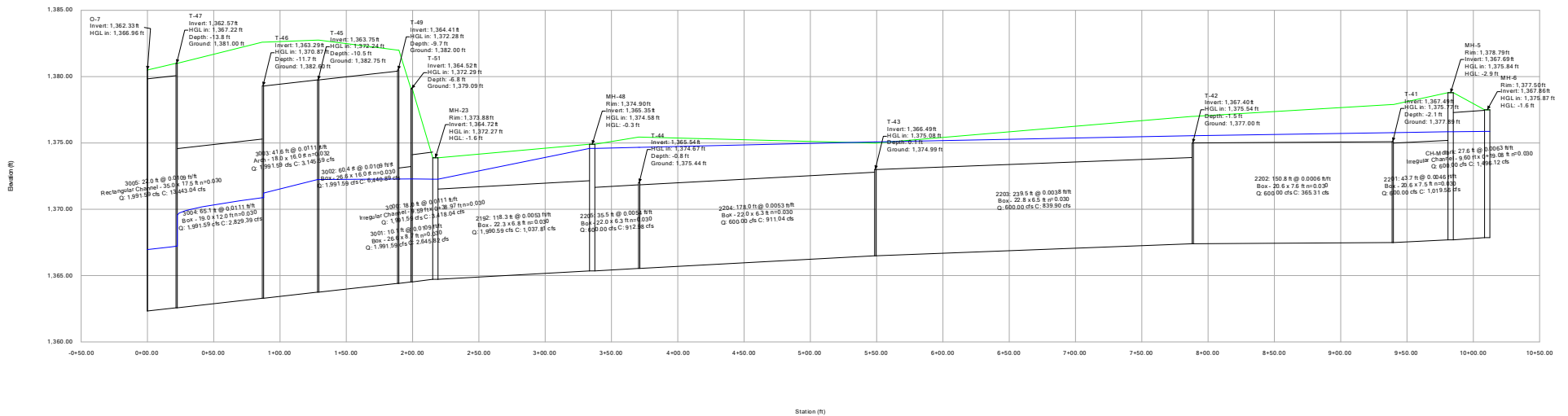
Profile Report

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



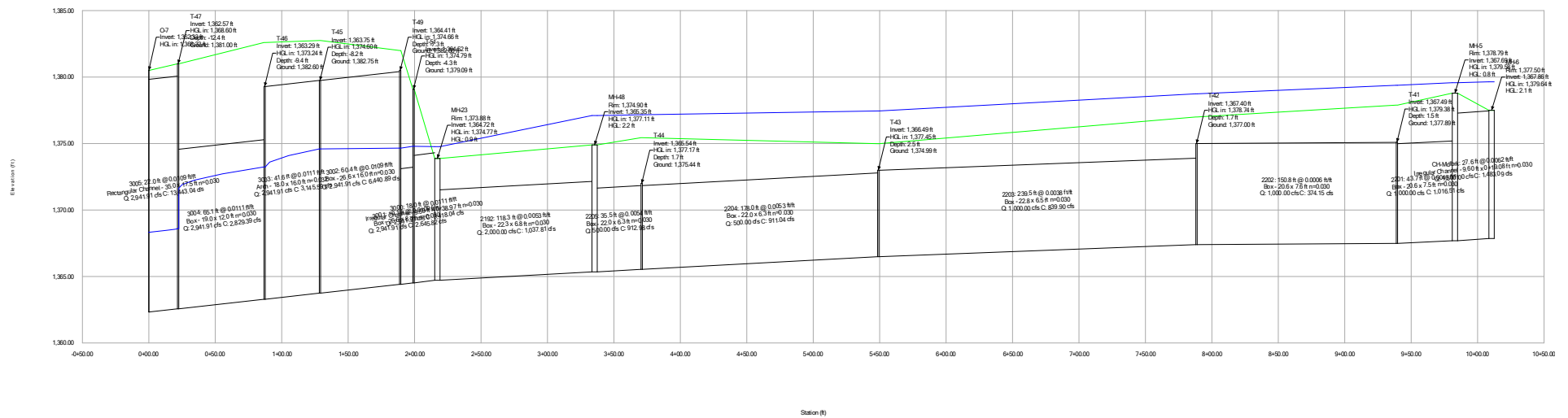
Profile Report

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

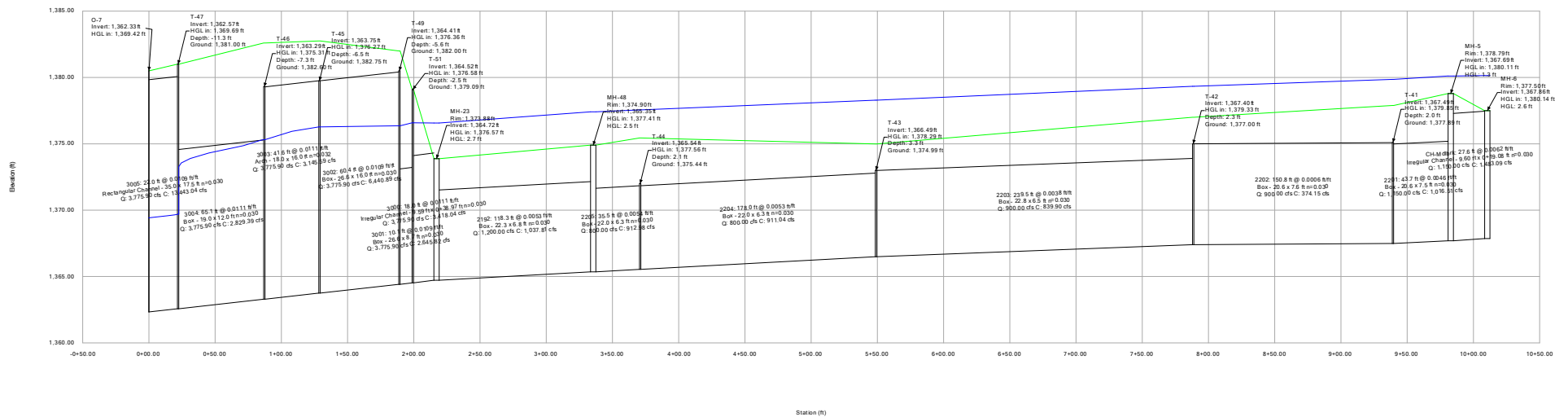


Profile Report

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

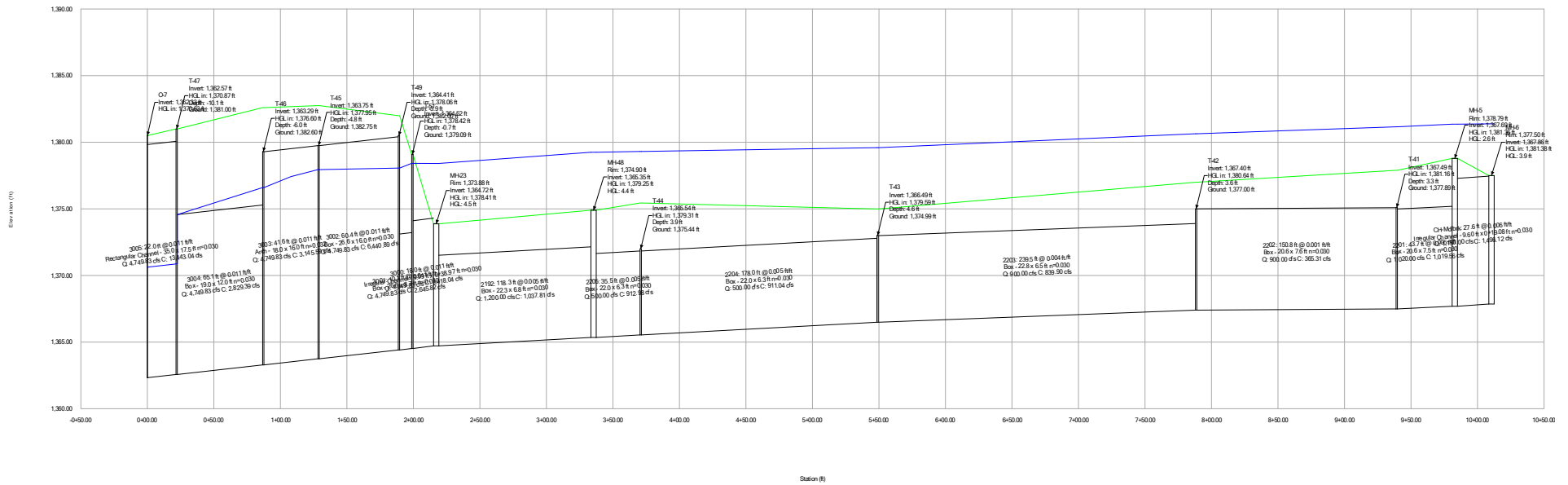


Engineering Profile - Project 6 - 50-yr (220184A19_Model_Design.stsw)



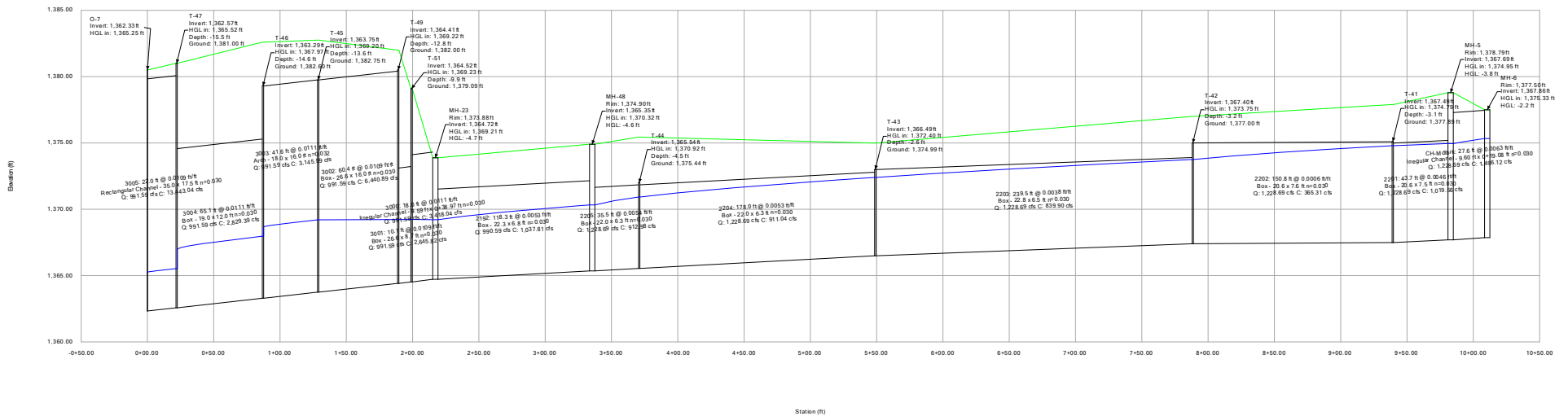
Profile Report

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



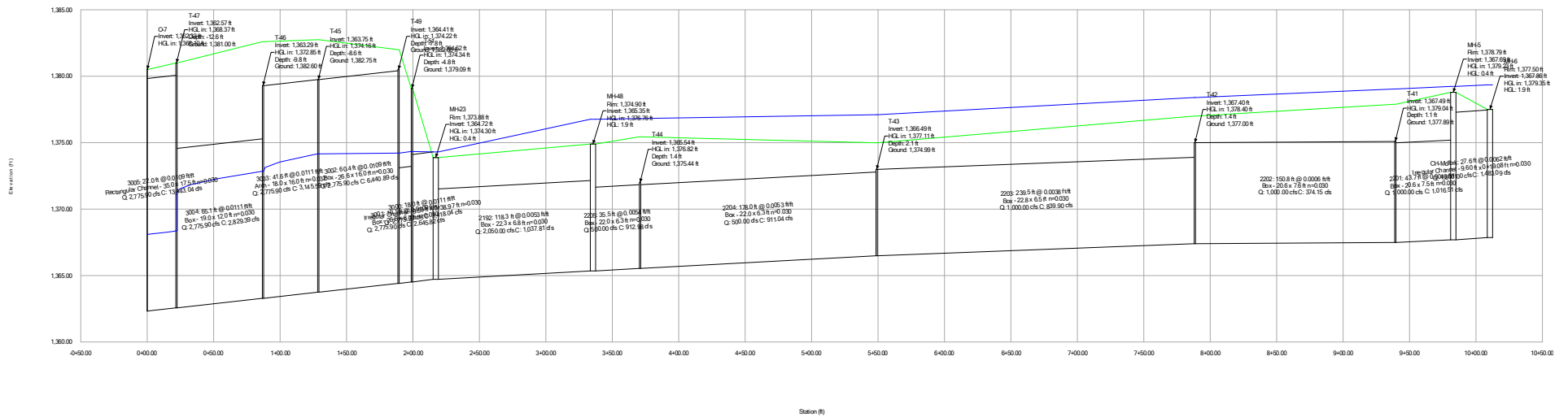
Profile Report

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



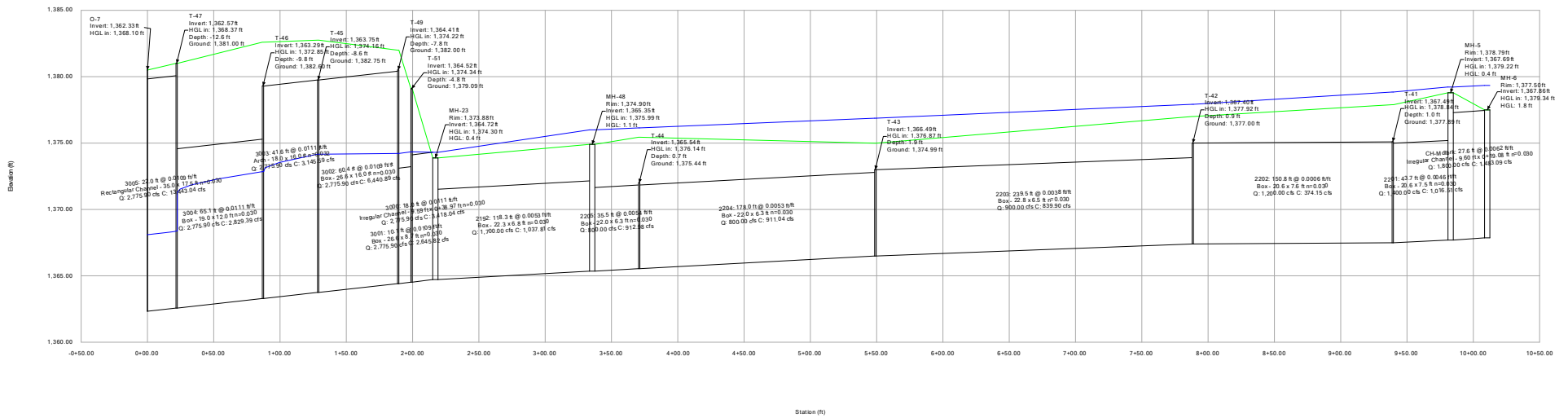
Profile Report

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



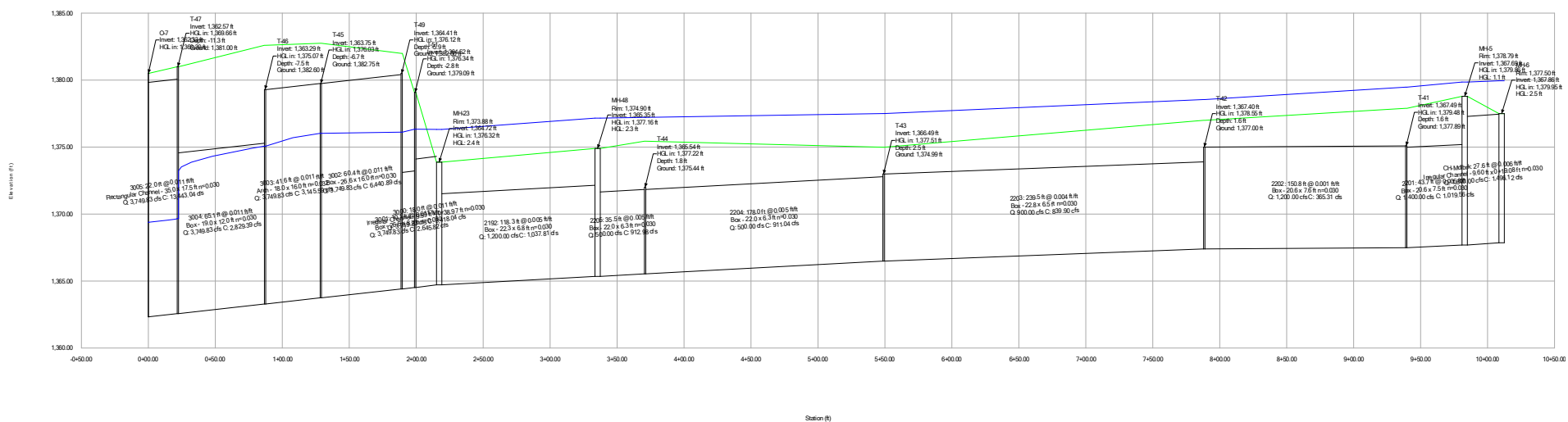
Profile Report

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