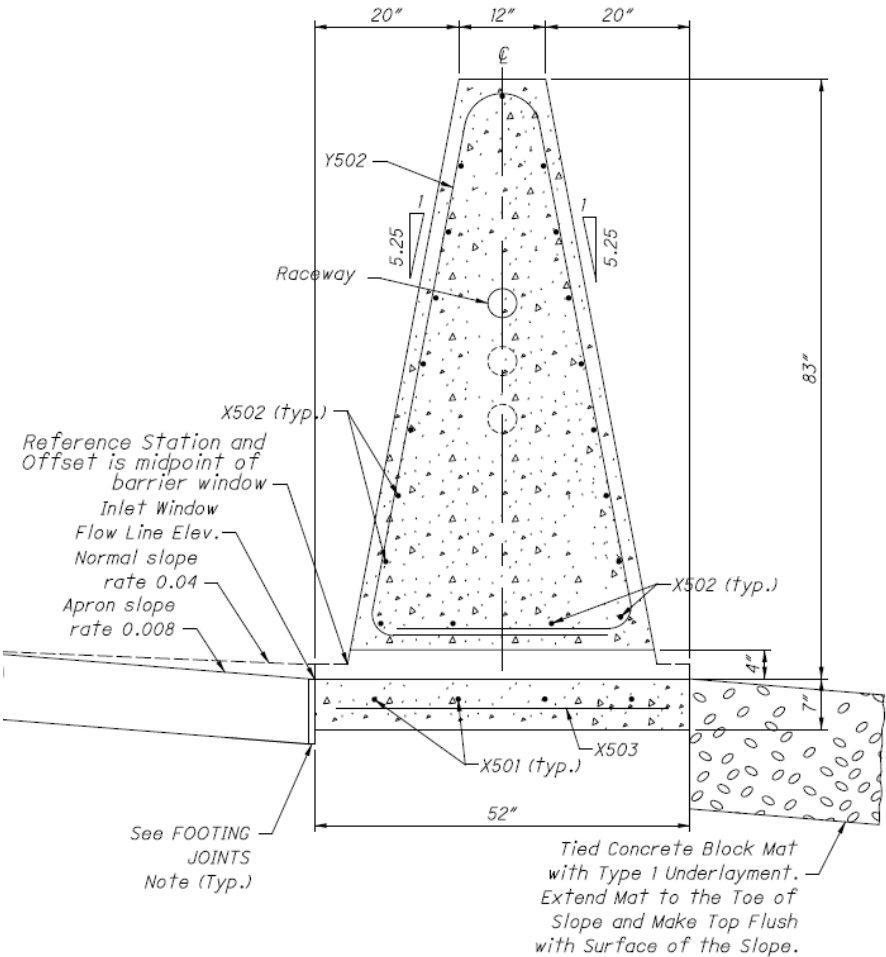


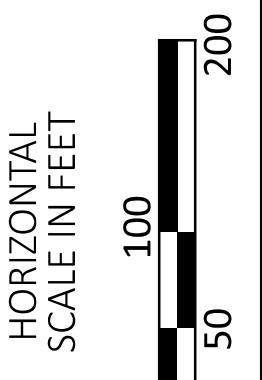
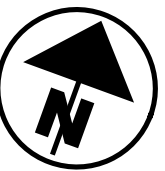
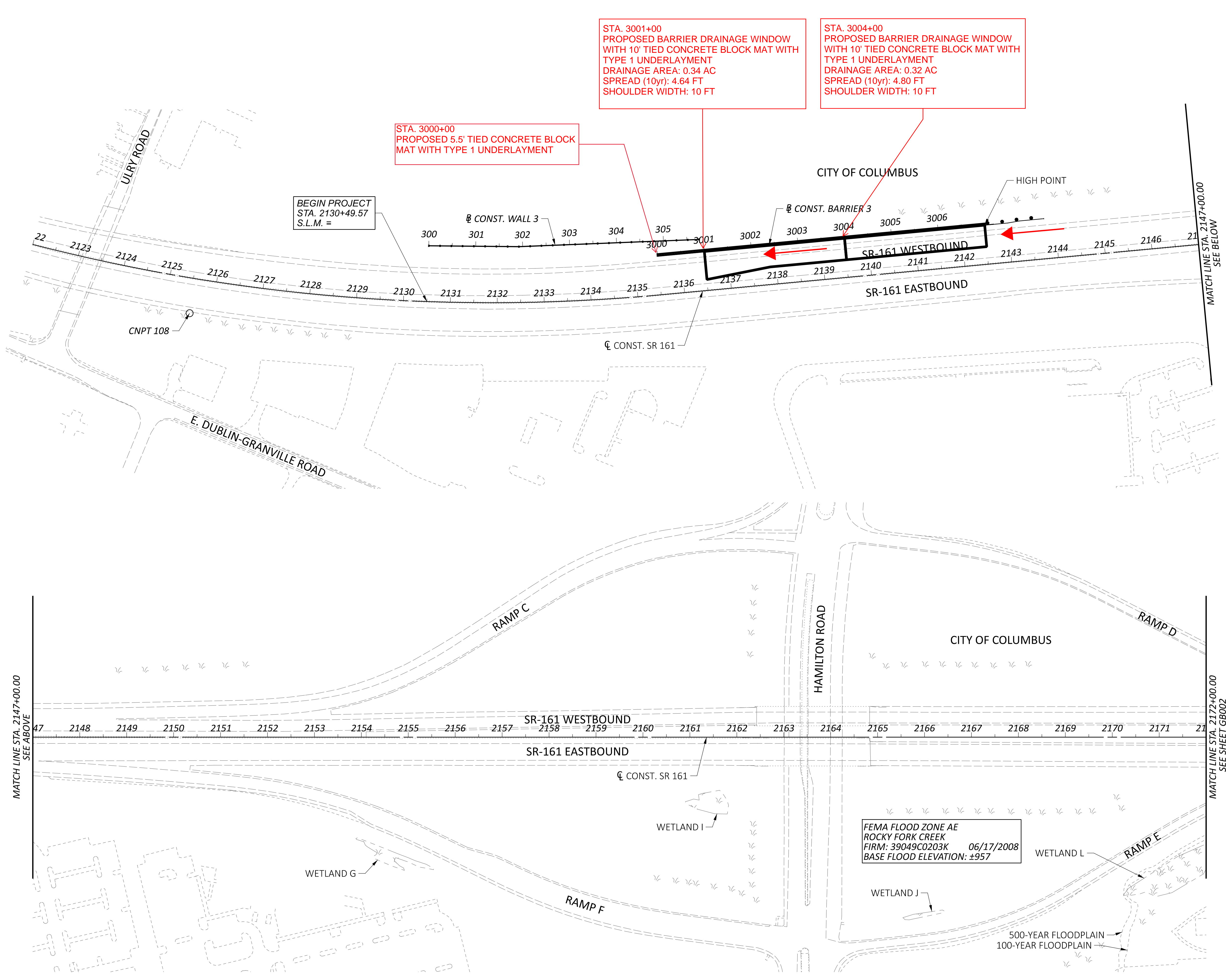
Ohio Department of Transportation

FRA-161-15.80 Noise Walls – 81” Barrier Drainage Opening Spread Analysis

PID 117607

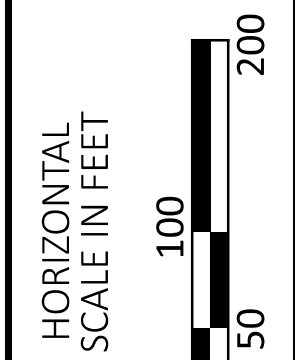
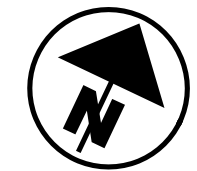
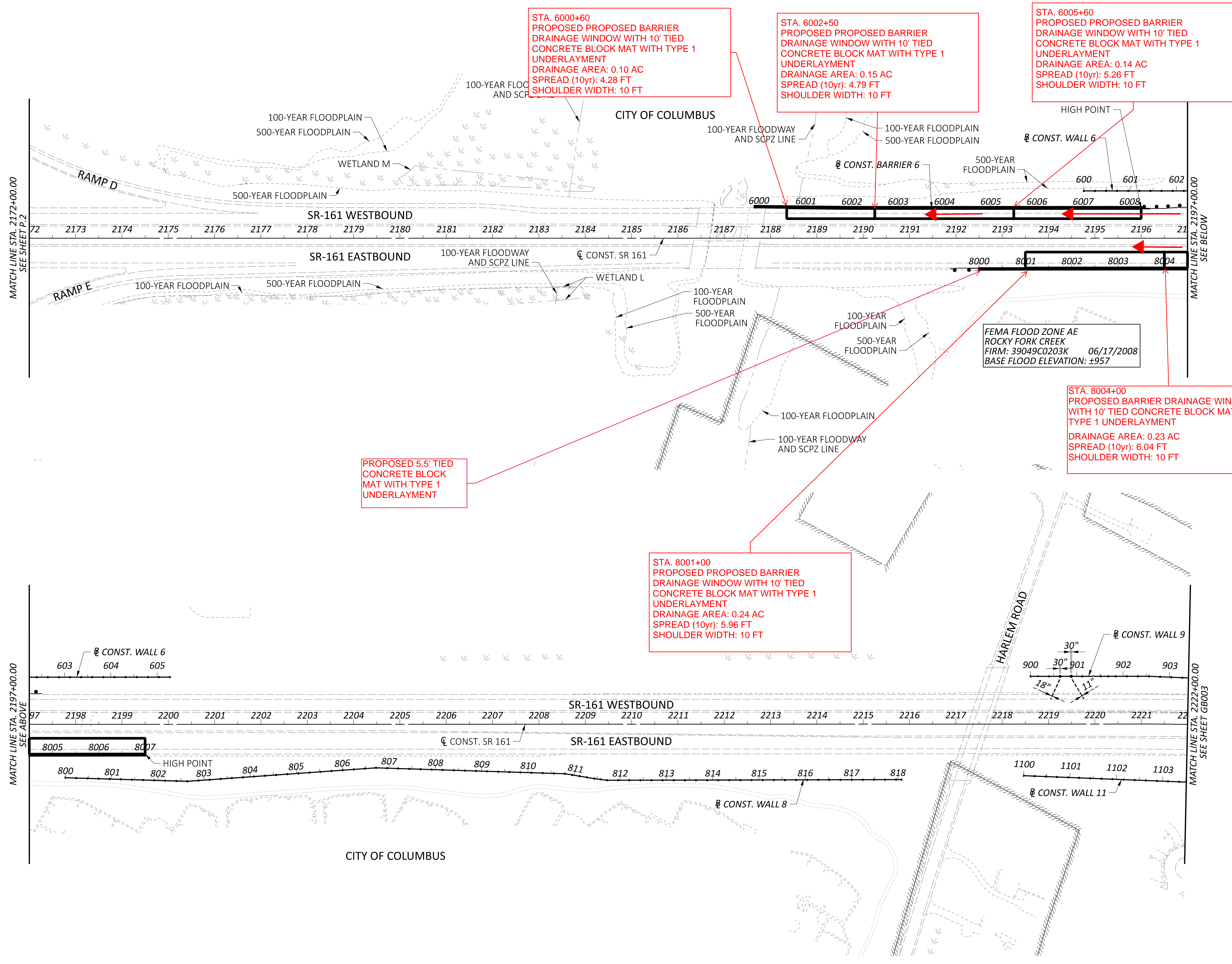
January 22, 2024





SCHEMATIC PLAN WITH 81" BARRIER DRAINAGE AREAS AND SPREAD CALC SUMMARIES
 STA. 2122+00.00 TO STA. 2172+00.00

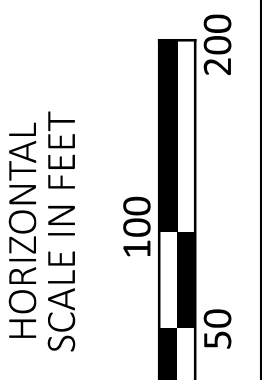
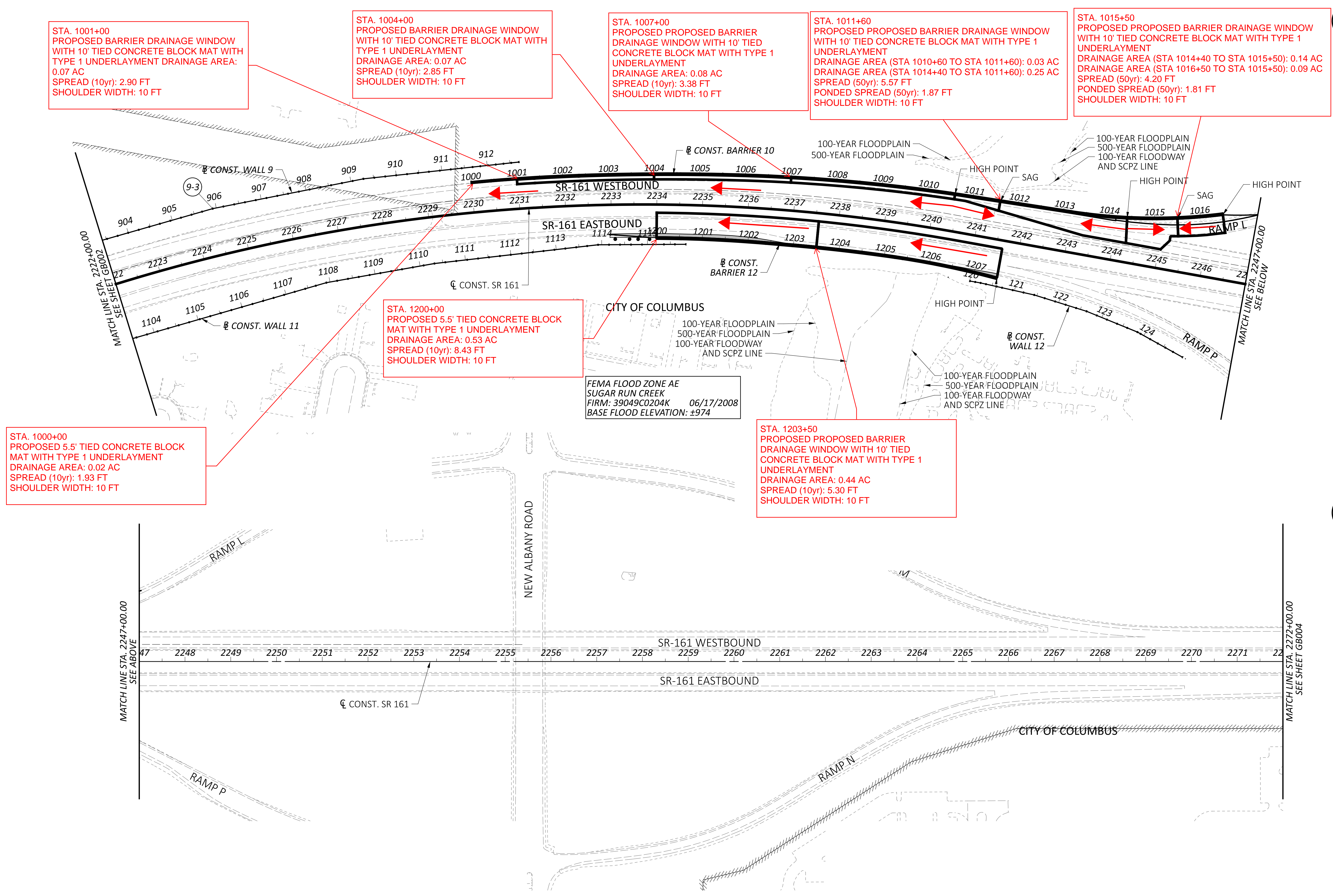
DESIGN AGENCY	
ARCADIS	
8101 NORTH HUGHES BLVD, SUITE 100 COLUMBUS, OHIO 43235 (614) 818-4900 www.arcadis.com	
DESIGNER	
MDB	
REVIEWER	
JDH 1-22-2024	
PROJECT ID	
117607	
SHEET	TOTAL
1	3



SCHEMATIC PLAN WITH 81" BARRIER DRAINAGE AREAS AND SPREAD CALC SUMMARIES
 STA. 2172+00.00 TO STA. 2222+00.00



DESIGN AGENCY	
800 ARCHULETA BLVD SUITE 100 COLUMBUS, OHIO 43260 (614) 818-4900 www.arcadis.com	
DESIGNER	
MDB	
REVIEWER	
JDH 1-22-2024	
PROJECT ID	
117607	
SHEET	TOTAL
2	3



SCHEMATIC PLAN WITH 81" BARRIER DRAINAGE AREAS AND SPREAD CALC SUMMARIES
 STA. 2222+00.00 TO STA. 2272+00.00

DESIGN AGENCY	
ARCADIS	8101 NORTH HICKORY SUITE 100 COLUMBUS OHIO 43235 (614) 818-4900 www.arcadis.com
DESIGNER	
MDB	
REVIEWER	
JDH 1-22-2024	
PROJECT ID	
117607	
SHEET	TOTAL
3	3



INLET SPACING DESIGN

PID : 117607 **Date :** 1-22-2024 **Project :** FRA-161-15.80

Location : Franklin County

Description : Wall 3 - 3007+00 to 3001+00

Designer : MDB

Rainfall Area: C

Storm Frequency (yr.) : 10

Total Allow. Spread (ft.) : 10.00

Allowable Depth (ft.) 0.33

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
3007+00	Begin																	
3004+00	I-2-10	300.00	0.90	0.32	5.00	2.10	10.00	0.0143	0.0416	0.0156	10.00	0.1700	5.32	1.45	0.09	1.53	0.203	4.89
3001+00	I-2-10	300.00	0.90	0.34	5.00	1.77	10.00	0.0208	0.0416	0.0156	10.00	0.1700	5.32	1.49	0.23	1.71	0.198	4.75



INLET SPACING DESIGN

PID : 117607 Date : 1-22-2024 Project : FRA-161-15.80

Location : Franklin County

Description : Wall 6 - 6008+25 to 6000+60

Designer : MDB

Rainfall Area: C

Storm Frequency (yr.) : 10

Total Allow. Spread (ft.) : 10.00

Allowable Depth (ft.) 0.33

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
6008+25	Begin																	
6005+60	I-2-10	265.00	0.90	0.14	5.00	5.32	10.32	0.0016	0.0416	0.0156	10.00	0.1700	5.26	0.66	0.00	0.66	0.223	5.36
6002+50	I-2-10	310.00	0.90	0.15	5.00	4.74	10.00	0.0032	0.0416	0.0156	10.00	0.1700	5.32	0.72	0.00	0.72	0.203	4.88
6000+60	I-2-10	190.00	0.90	0.10	5.00	3.50	10.00	0.0025	0.0416	0.0156	10.00	0.0000	5.32	0.47	0.00	0.47	0.181	4.36

This is concerning since 0.3% is minimum

ARCADIS RESPONSE: A DRAINAGE REVIEW CALL WAS HELD WITH ODOT DRAINAGE ENGINEER JON ADAMS. ALTHOUGH THE SPREAD IS ACCEPTABLE, IT WAS DECIDED TO ADD ADDITIONAL DRAINAGE OPENINGS/INLET AT THE FOLLOWING LOCATIONS TO MITIGATE THE VERY FLAT SLOPES: BARRIER 6 (6001+25), BARRIER 8 (7999+00) AND BARRIER 10 (1012+25).



INLET SPACING DESIGN

PID : 117607 Date : 1-22-2024 Project : FRA-161-15.80

Location : Franklin County

Description : Wall 8 - 8007+00 to 8001+00

Designer : MDB

Rainfall Area: C

Storm Frequency (yr.) : 10

Total Allow. Spread (ft.) : 10.00

Allowable Depth (ft.) 0.33

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
8007+00	Begin																	
8004+00	I-2-10	300.00	0.90	0.23	5.00	4.75	10.00	0.0022	0.0416	0.0156	10.00	0.1700	5.32	1.10	0.00	1.10	0.256	6.15
8001+00	I-2-10	300.00	0.90	0.24	5.00	4.42	10.00	0.0025	0.0416	0.0156	10.00	0.1700	5.32	1.15	0.00	1.15	0.252	6.07

This is concerning since 0.3% is minimum

ARCADIS RESPONSE: A DRAINAGE REVIEW CALL WAS HELD WITH ODOT DRAINAGE ENGINEER JON ADAMS. ALTHOUGH THE SPREAD IS ACCEPTABLE, IT WAS DECIDED TO ADD ADDITIONAL DRAINAGE OPENINGS/INLET AT THE FOLLOWING LOCATIONS TO MITIGATE THE VERY FLAT SLOPES: BARRIER 6 (6001+25), BARRIER 8 (7999+00) AND BARRIER 10 (1012+25).



INLET SPACING DESIGN

PID : 116707 **Date :** 1-22-2024 **Project :** FRA-161-15.80

Location : Franklin County

Description : Wall 10 - 1010+60 to 1014+40

Designer : MDB

Rainfall Area: C

Storm Frequency (yr.) : 50

Total Allow. Spread (ft.) : 10.00

Allowable Depth (ft.) : 0.33

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
1010+60	Begin																	
1011+60	I-2-10	100.00	0.90	0.03	5.00	2.04	10.00	0.0034	0.0416	0.0156	10.00	0.1700	6.50	*****	*****	0.18	0.120	2.89 Sag
1014+40	Begin																	
1011+60	I-2-10	280.00	0.90	0.25	10.00	3.84	13.84	0.0029	0.0416	0.0156	10.00	0.1700	5.73	*****	*****	1.28	0.256	6.15 End

SUMP DATA

Total Flow (cfs) : 1.46

Ponded Depth (ft.) : 0.131

Spread on Pavement (ft.) : 2.23

This is concerning since 0.3% is minimum

ARCADIS RESPONSE: A DRAINAGE REVIEW CALL WAS HELD WITH ODOT DRAINAGE ENGINEER JON ADAMS. ALTHOUGH THE SPREAD IS ACCEPTABLE, IT WAS DECIDED TO ADD ADDITIONAL DRAINAGE OPENINGS/INLET AT THE FOLLOWING LOCATIONS TO MITIGATE THE VERY FLAT SLOPES: BARRIER 6 (6001+25), BARRIER 8 (7999+00) AND BARRIER 10 (1012+25).



INLET SPACING DESIGN

PID : 116707 **Date :** 1-22-2024 **Project :** FRA-161-15.80

Location : Franklin County

Description : Wall 10 - 1014+40 to 1016+50

Designer : MDB

Rainfall Area: C

Storm Frequency (yr.) : 50

Total Allow. Spread (ft.) : 10.00

Allowable Depth (ft.) : 0.33

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)	
1014+40	Begin																		
1015+50	I-2-10	110.00	0.90	0.14	5.00	1.23	10.00	0.0059	0.0416	0.0156	10.00	0.1700	6.50	*****	*****	0.84	0.192	4.61	Sag
1016+50	Begin																		
1015+50	I-2-10	100.00	0.90	0.09	10.00	1.05	11.05	0.0107	0.0416	0.0156	10.00	0.1700	6.26	*****	*****	0.52	0.143	3.44	End

SUMP DATA

Total Flow (cfs) : 1.36

Ponded Depth (ft.) : 0.125

Spread on Pavement (ft.) : 2.13



INLET SPACING DESIGN

PID : 117607 **Date :** 1-22-2024 **Project :** FRA-161-15.80

Location : Franklin County

Description : Wall 10 - 1010+60 to 1000+00

Designer : MDB

Rainfall Area: C

Storm Frequency (yr.) : 10

Total Allow. Spread (ft.) : 10.00

Allowable Depth (ft.) 0.33

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
1010+60	Begin																	
1007+00	I-2-10	360.00	0.90	0.08	5.00	5.19	10.19	0.0056	0.0416	0.0156	10.00	0.1700	5.28	0.39	0.00	0.39	0.146	3.51
1004+00	I-2-10	300.00	0.90	0.07	5.00	3.51	10.00	0.0104	0.0416	0.0156	10.00	0.1700	5.32	0.33	0.00	0.33	0.121	2.92
1001+00	I-2-10	300.00	0.90	0.07	5.00	3.58	10.00	0.0100	0.0416	0.0156	10.00	0.0000	5.32	0.32	0.00	0.33	0.122	2.92



INLET SPACING DESIGN

PID : 117607 **Date :** 1-22-2024 **Project :** FRA-161-15.80

Location : Franklin County

Description : Wall 12 - 1207+51 to 1200+00

Designer : MDB

Rainfall Area: C

Storm Frequency (yr.) : 10

Total Allow. Spread (ft.) : 10.00

Allowable Depth (ft.) 0.33

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
1207+51	Begin																	
1203+50	I-2-10	401.00	0.90	0.53	5.00	5.48	10.48	0.0019	0.0416	0.0156	10.00	0.1700	5.23	2.49	0.00	2.49	0.357	8.59
1200+00	I-2-6	350.00	0.90	0.44	5.00	2.17	10.00	0.0159	0.0416	0.0156	10.00	0.1700	5.32	1.22	0.89	2.11	0.224	5.39

Date: 01/22/2024
 Calculated By: MDB
 Checked By: JDH



MAH-680 Barrier Window - Flume Shear Stress

Inlet Station	Embankment Slope	D = Water Surface Depth (per CDSS spread calculations)	Shear Stress (L&D 1102.3.2)	Tied Concrete Block Mat Acceptable (<12 lbs/ft^2)
	ft/ft	ft	tac = 62.4DS	
Wall 3				
3004+00	0.50	0.203	6.33	✓
3001+00	0.50	0.198	6.18	✓
Wall 6				
6005+60	0.50	0.223	6.96	✓
6002+50	0.50	0.203	6.33	✓
6000+60	0.50	0.181	5.65	✓
Wall 8				
8004+00	0.50	0.256	7.99	✓
8001+00	0.50	0.252	7.86	✓
Wall 10				
1015+50	0.50	0.192	5.99	✓
1011+60	0.50	0.256	7.99	✓
1007+00	0.50	0.146	4.56	✓
1004+00	0.50	0.121	3.78	✓
1001+00	0.50	0.122	3.81	✓
Wall 12				
1203+50	0.50	0.357	11.14	✓
1200+00	0.50	0.224	6.99	✓

