

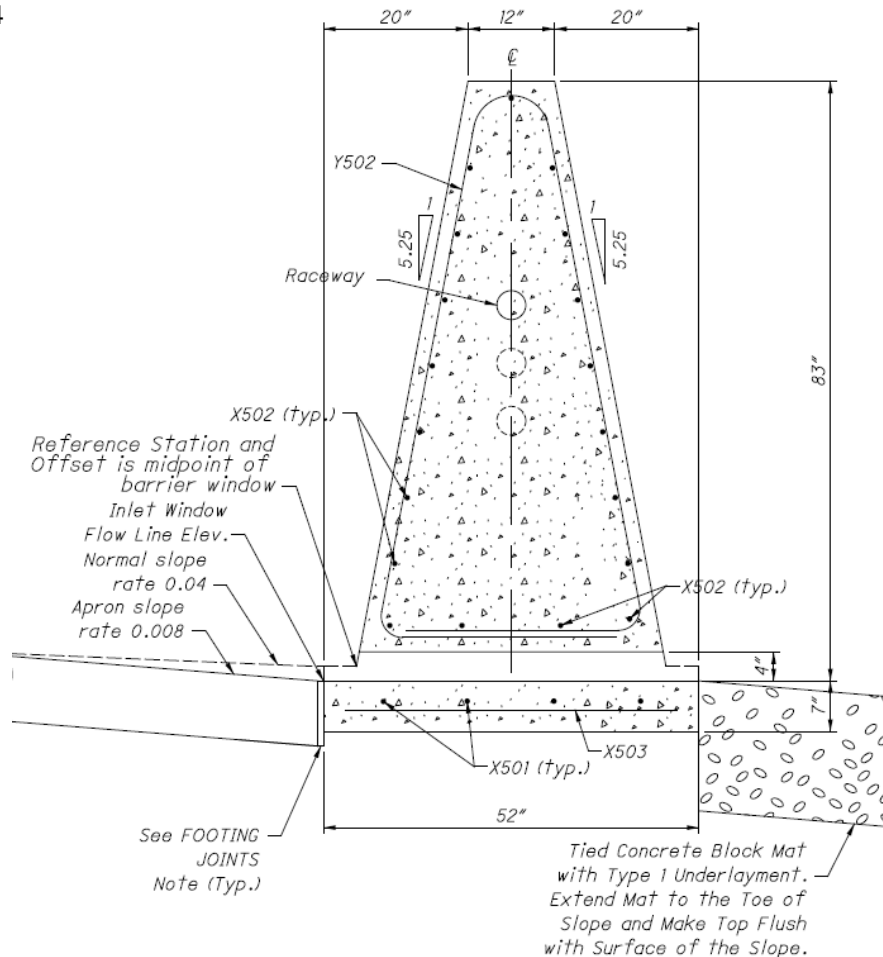
Ohio Department of Transportation

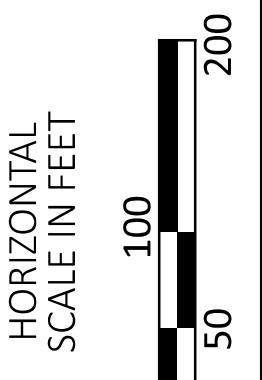
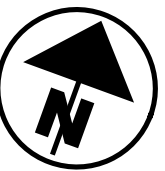
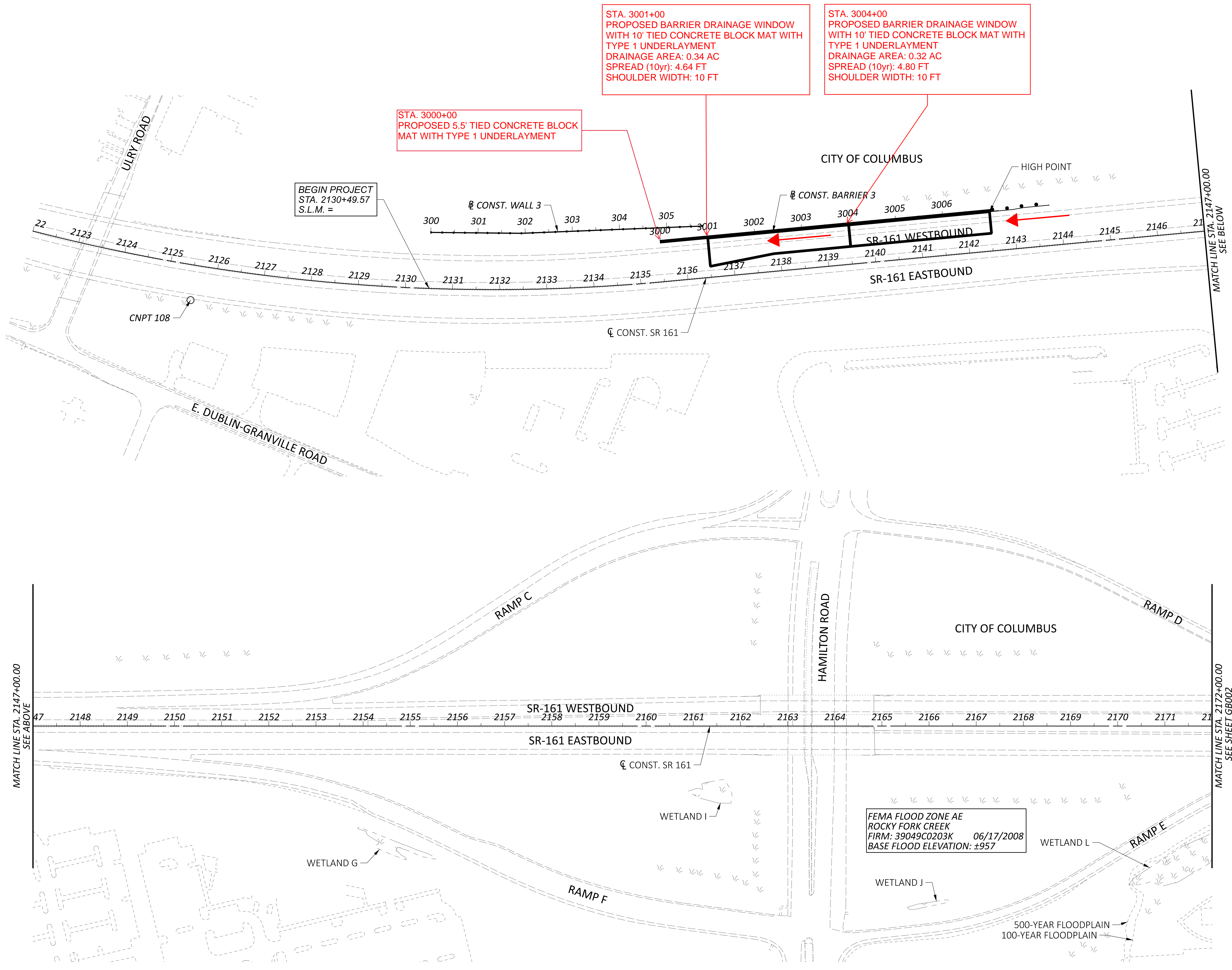
# FRA-161-15.80 Noise Walls – 81” Barrier Drainage Opening Spread Analysis

PID 117607

DOSD/Storm&Sanitary		THE CITY OF COLUMBUS ANDREW J. DANIEL, Mayor DEPARTMENT OF PUBLIC UTILITIES
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COMMENTS	COMMENTS (COMPLIANCE REVIEW ELIGIBLE)	NO COMMENTS
tlstewart		
SUBMITTAL# Stage 2		02/23/2024

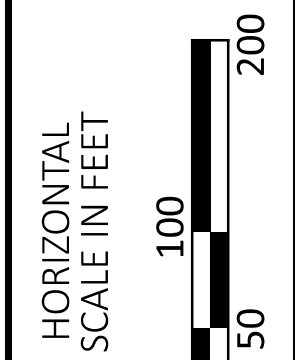
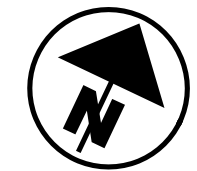
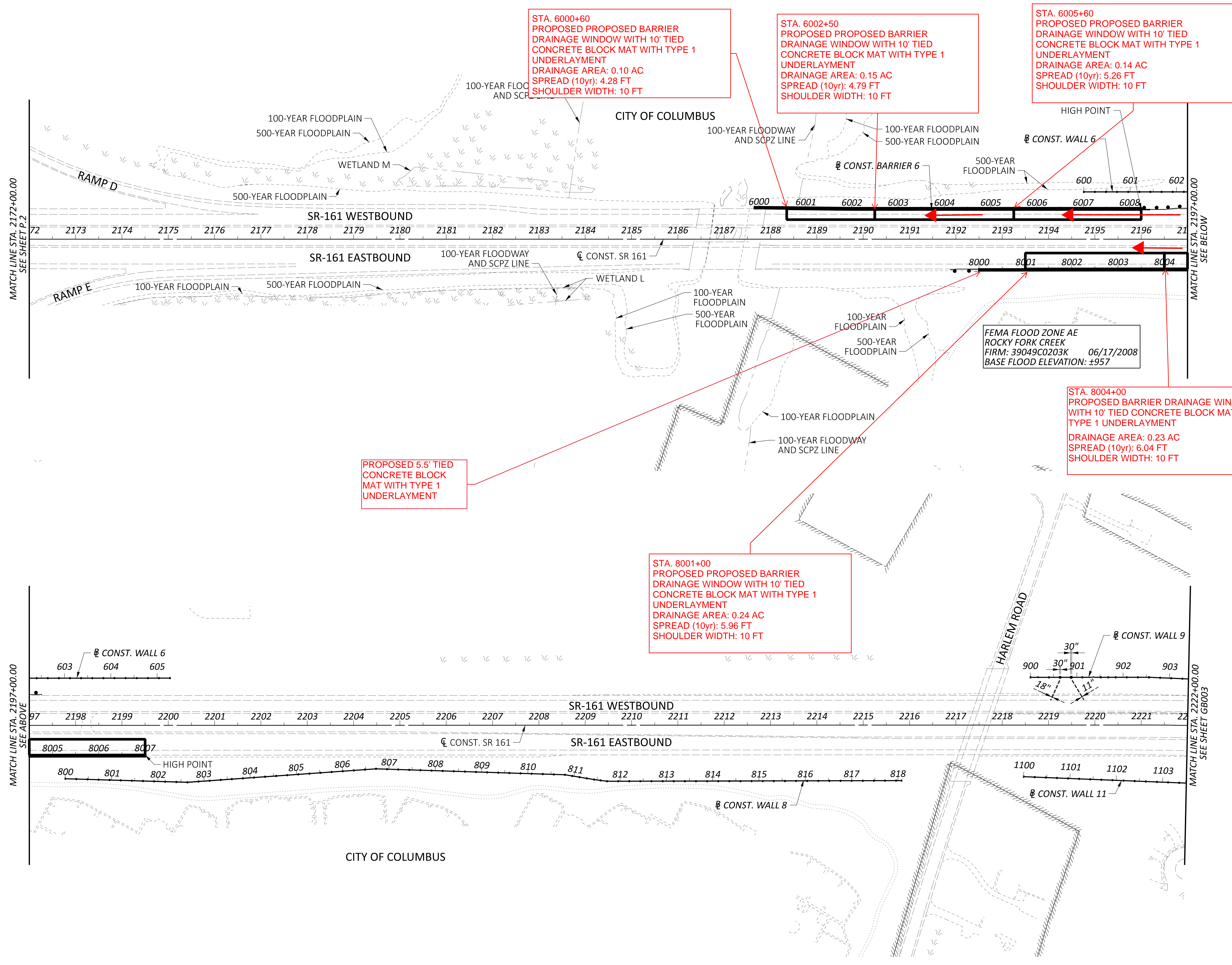
January 22, 2024





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

DESIGN AGENCY	
8101 NORTHERN BUCKLE CIRCLE, 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	
801 NORTHCHURCH ST 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

STA. 1001+00  
 PROPOSED BARRIER DRAINAGE WINDOW  
 WITH 10' TIED CONCRETE BLOCK MAT WITH  
 TYPE 1 UNDERLAYMENT DRAINAGE AREA:  
 0.07 AC  
 SPREAD (10yr): 2.90 FT  
 SHOULDER WIDTH: 10 FT

STA. 1004+00  
 PROPOSED BARRIER DRAINAGE WINDOW  
 WITH 10' TIED CONCRETE BLOCK MAT WITH  
 TYPE 1 UNDERLAYMENT DRAINAGE AREA: 0.07 AC  
 SPREAD (10yr): 2.85 FT  
 SHOULDER WIDTH: 10 FT

STA. 1007+00  
 PROPOSED PROPOSED BARRIER  
 DRAINAGE WINDOW WITH 10' TIED  
 CONCRETE BLOCK MAT WITH TYPE 1  
 UNDERLAYMENT  
 DRAINAGE AREA: 0.08 AC  
 SPREAD (10yr): 3.38 FT  
 SHOULDER WIDTH: 10 FT

STA. 1011+60  
 PROPOSED PROPOSED BARRIER DRAINAGE WINDOW  
 WITH 10' TIED CONCRETE BLOCK MAT WITH TYPE 1  
 UNDERLAYMENT  
 DRAINAGE AREA (STA 1010+60 TO STA 1011+60): 0.03 AC  
 DRAINAGE AREA (STA 1014+40 TO STA 1011+60): 0.25 AC  
 SPREAD (50yr): 5.57 FT  
 PONDED SPREAD (50yr): 1.87 FT  
 SHOULDER WIDTH: 10 FT

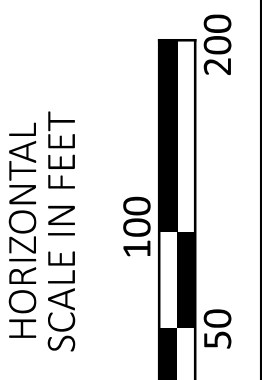
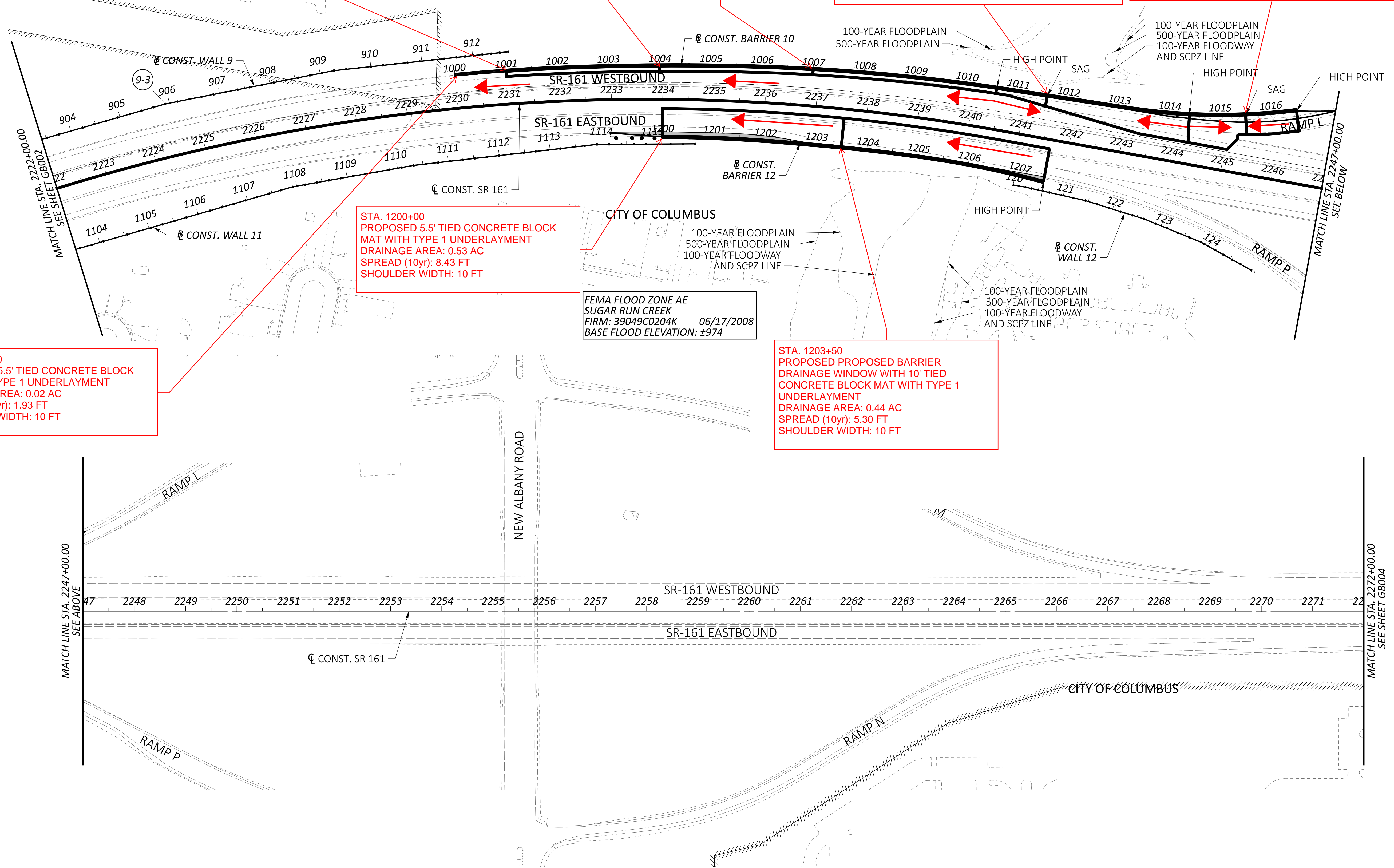
STA. 1015+50  
 PROPOSED PROPOSED BARRIER DRAINAGE WINDOW  
 WITH 10' TIED CONCRETE BLOCK MAT WITH TYPE 1  
 UNDERLAYMENT  
 DRAINAGE AREA (STA 1014+40 TO STA 1015+50): 0.14 AC  
 DRAINAGE AREA (STA 1016+50 TO STA 1015+50): 0.09 AC  
 SPREAD (50yr): 4.20 FT  
 PONDED SPREAD (50yr): 1.81 FT  
 SHOULDER WIDTH: 10 FT

STA. 1000+00  
 PROPOSED 5.5' TIED CONCRETE BLOCK  
 MAT WITH TYPE 1 UNDERLAYMENT  
 DRAINAGE AREA: 0.02 AC  
 SPREAD (10yr): 1.93 FT  
 SHOULDER WIDTH: 10 FT

STA. 1200+00  
 PROPOSED 5.5' TIED CONCRETE BLOCK  
 MAT WITH TYPE 1 UNDERLAYMENT  
 DRAINAGE AREA: 0.53 AC  
 SPREAD (10yr): 8.43 FT  
 SHOULDER WIDTH: 10 FT

STA. 1203+50  
 PROPOSED PROPOSED BARRIER  
 DRAINAGE WINDOW WITH 10' TIED  
 CONCRETE BLOCK MAT WITH TYPE 1  
 UNDERLAYMENT  
 DRAINAGE AREA: 0.44 AC  
 SPREAD (10yr): 5.30 FT  
 SHOULDER WIDTH: 10 FT

FEMA FLOOD ZONE AE  
 SUGAR RUN CREEK  
 FIRM: 39049C0204K 06/17/2008  
 BASE FLOOD ELEVATION: ±974



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

DESIGN AGENCY	
<b>ARCADIS</b>	8101 NORTH HICKORY SUITE 100 COLUMBUS, OH 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



# 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



# INLET SPACING DESIGN

What happens with a cogged inlet window?

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

Arcadis Response\_3-27-2024: Please note that since Stage 2 ODOT has directed Arcadis to add 3 additional inlets which will provide contingency against blockage. The inlets were added in the sag locations as flanking inlets which will provide contingency against blockage. If further discussion is desired please advise and we will set up a call with ODOT D6 PM Katie Montoya and ODOT D6 Drainage Engineer Jon Adams. Response written by Jeff Hackenbracht (Arcadis) Cell # 614-563-9786.





# 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	
<b>Wall 3</b>				
3004+00	0.50	0.203	6.33	✓
3001+00	0.50	0.198	6.18	✓
<b>Wall 6</b>				
6005+60	0.50	0.223	6.96	✓
6002+50	0.50	0.203	6.33	✓
6000+60	0.50	0.181	5.65	✓
<b>Wall 8</b>				
8004+00	0.50	0.256	7.99	✓
8001+00	0.50	0.252	7.86	✓
<b>Wall 10</b>				
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	✓
<b>Wall 12</b>				
1203+50	0.50	0.357	11.14	✓
1200+00	0.50	0.224	6.99	✓

