MAINTENANCE OF TRAFFIC SUBSUMMARY

SHEET NO.	LOCATION	STATION TO STATION				614 WORK ZONE IMPACT ATTENUATOR, 24" WIDE HAZARDS, (UNIDIRECTIONAL) EACH	614 WORK ZONE IMPACT ATTENUATOR, 24" WIDE HAZARDS, (UNIDIRECTIONAL), AS PER PLAN EACH	614 BARRIER REFLECTOR, TYPE 1 EACH	614 OBJECT MARKER, ONE WAY EACH	614 OBJECT MARKER, TWO WAY EACH	614 WORK ZONE RAISED PAVEMENT MARKER, AS PER PLAN EACH	614 WORK ZONE EDGE LINE, CLASS 1, 6", 807 PAINT, WHITE FT/MI	614 WORK ZONE EDGE LINE, CLASS 1, 6", 807 PAINT, YELLOW FT/MI	614 WORK ZONE LANE LINE, CLASS 1, 6", 807 PAINT FT/MI	614 WORK ZONE CHANNELIZING LINE, CLASS 1, 12", 807 PAINT FT	614 WORK ZONE DOTTED LINE, CLASS 1, 6", 807 PAINT FT	614 WORK ZONE TRANSVERSE/DIAGONAL LINE, CLASS 1, 740.06, TYPE 1 FT	614 WORK ZONE ARROW, CLASS 1, 740.06, TYPE 1 EACH	614 WORK ZONE PAVEMENT MARKING, MISC.: SHARROW EACH	614 WORK ZONE PAVEMENT MARKING, MISC.:PAVEMENT TATTOO EACH	614 WORK ZONE PAVEMENT MARKING, MISC.: LANE LINE, 5" FT/MI	614 WORK ZONE PAVEMENT MARKING, MISC.:EDGE LINE, 5" (WHITE) FT/MI	614 WORK ZONE PAVEMENT MARKING, MISC.:CENTER LINE, DOUBLE SOLID, 5" FT/MI	614 WORK ZONE PAVEMENT MARKING, MISC.: CHANNELIZING LINE, 10" FT	614 WORK ZONE PAVEMENT MARKING, MISC.: STOP LINE, 20" FT	614 WORK ZONE PAVEMENT MARKING, MISC.: DOTTED LINE, 5" FT	615 PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A SY	615 PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A, AS PER PLAN SY	622 PORTABLE BARRIER, UNANCHORED FT	622 PORTABLE BARRIER, UNANCHORED, AS PER PLAN FT	622 PORTABLE BARRIER, ANCHORED FT	630 SIGN, TEMPORARY OVERLAY SF	630 REMOVAL OF TEMPORARY OVERLAY SIGN AND DISPOSAL EACH
PHASE 1B CONT. (ODOT)																																		
150		546+50	LT		557+47	LT					19			2194																				
		546+76	LT		549+27	LT										251																		
		549+27	LT		549+64	LT					1				37																			
		549+27	LT		550+86	LT					4				159																			
		550+86	LT		554+47	LT						361																						
PHASE 1C - STEP 1 (ODOT)																																		
152	I-71 SB	209+54	LT		215+50	RT			36	12																								
		36+33	L/R		215+50	L/R																								1375		596			
153		215+50	RT		225+50	RT			60	20																				3416	1000				
		218+89	RT		225+50	RT					23	661		661	661																			
154		225+50	LT		11+45	L/R																								2882					
		225+50	RT		10+27	RT	1		63	21																					1020				
		225+50	RT		9+75	CL						1072																							
		225+50	RT		226+05	RT					2				55																				
		225+50	RT		228+27	RT					3			277																					
	TR-1	13+82	LT		17+76	LT					10				394																				
PHASE 1C - STEP 2 (ODOT)																																		
155	TR-1	45+57	LT		205+00	RT					4	458		458																				
156		205+00	RT		40+75	CL						24																							
		205+00	RT		215+50	LT					9			1050																				
		40+75	CL		38+12	RT					14				263		101																	
		39+15	LT		35+99	LT					16				316																			
		38+12	CL		35+99	CL										213																		
		37+95	RT		30+48	LT						747																						
		36+84	RT		30+48	LT			39	13																					636				
		35+99	LT		30+48	LT			36	12	15		551																		551				
		35+98	RT																														57	1
	I-71 SB	206+61	RT		215+50	RT			54	18																					889				
157		215+50	RT		216+28	RT			6	2																					78				
	TR-1	30+48	L/R		20+49	L/R			120	40	9	1000	1000	1000																	2000				
158		20+49	RT		11+31	RT	1		57	19																					918				
		20+49	CL		7+91	CL						1258																							
		20+49	LT		15+96	LT					4			453																					
		20+49	LT		14+76	LT							573																						
		20+49	LT		15+06	LT			33	11																					543				
		15+96	LT		13+23	LT					7				273																				
		15+28	LT		11+55	LT	1		24	8																					373				
		13+23	LT		7+91	LT							532																						
	TR-2	110+16	L/R		114+12	L/R																								838					
	I-71 SB	230+81	LT		238+72	LT					40	791																							
		231+40	LT		238+72	LT					37		732																						
		232+94	LT		236+09	LT	1		21	7																					315				
PHASE 1D (CITY)																																		
162	MOUND ST	14+07	RT	TO	18+22	RT																		415											
		18+22	RT																																
	10	18+58	RT		22+08	RT	1		18	6													645				12			265	271				
		23+08	RT																								20								
		23+08	RT		23+50	RT																	10		42									
		23+28	RT															1											10						
163		23+50	RT		25+63	RT																			213									
		24+28	RT															1																	
		25+28	RT															1																	
		25+63	RT		25+93	RT																													
		25+93	RT		12+10	L/R																													
		12+10	LT		14+46	LT																													
		12+90	LT															1																	
		13+90	LT				9		9									1				9	10		9			9		10		9	10		
TOTALS CARRIED TO SHEET 77							5		567	189	217	6372	3388	6093	2158	464	101	5			30	645	415	491	32	220	265	8511	9190		57	1		

NO.	DESCRIPTION	REV. BY	DATE
9	REVISED QTY'S	KWR	12-09-2021
10	REVISED QTY'S	KWR	12-14-2021

CALCULATED KWR
CHECKED JML

FRA-71-14.36

73
1228

SHEET NO.	LOCATION	STATION TO STATION	614 WORK ZONE IMPACT ATTENUATOR, 24" WIDE HAZARDS, (UNIDIRECTIONAL) EACH	614 WORK ZONE IMPACT ATTENUATOR, 24" WIDE HAZARDS, (UNIDIRECTIONAL), AS PER PLAN EACH	614 BARRIER REFLECTOR, TYPE 1 EACH	614 OBJECT MARKER, ONE WAY EACH	614 OBJECT MARKER, TWO WAY EACH	614 WORK ZONE RAISED PAVEMENT MARKER, AS PER PLAN EACH	614 WORK ZONE EDGE LINE, CLASS I, 6", 807 PAINT, WHITE FT/MI	614 WORK ZONE EDGE LINE, CLASS I, 6", 807 PAINT, YELLOW FT/MI	614 WORK ZONE LANE LINE, CLASS I, 6", 807 PAINT FT/MI	614 WORK ZONE CHANNELIZING LINE, CLASS I, 12", 807 PAINT FT	614 WORK ZONE DOTTED LINE, CLASS I, 6", 807 PAINT FT	614 WORK ZONE TRANSVERSE/DIAGONAL LINE, CLASS I, 740.06, TYPE I FT	614 WORK ZONE ARROW, CLASS I, 740.06, TYPE I EACH	614 WORK ZONE PAVEMENT MARKING, MISC.: SHARROW EACH	614 WORK ZONE PAVEMENT MARKING, MISC.:PAVEMENT TATTOO EACH	614 WORK ZONE PAVEMENT MARKING, MISC.: LANE LINE, 5" FT/MI	614 WORK ZONE PAVEMENT MARKING, MISC.:EDGE LINE, 5" (WHITE) FT/MI	614 WORK ZONE PAVEMENT MARKING, MISC.:CENTER LINE, DOUBLE SOLID, 5" FT/MI	614 WORK ZONE PAVEMENT MARKING, MISC.: CHANNELIZING LINE, 10" FT	614 WORK ZONE PAVEMENT MARKING, MISC.: STOP LINE, 20" FT	614 WORK ZONE PAVEMENT MARKING, MISC.: DOTTED LINE, 5" FT	615 PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A SY	615 PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A, AS PER PLAN SY	622 PORTABLE BARRIER, UNANCHORED FT	622 PORTABLE BARRIER, UNANCHORED, AS PER PLAN FT	622 PORTABLE BARRIER, ANCHORED FT	630 SIGN, TEMPORARY OVERLAY SF	630 REMOVAL OF TEMPORARY OVERLAY SIGN AND DISPOSAL EACH
		PHASE 3D (ODOT)																												
260	I-71 SB	686+27 LT TO 205+24 RT							482																					
		686+27 LT 206+00 RT						28				1116																		
		205+24 LT 206+00 LT						2	76			76																		
		205+24 RT 206+00 RT						2				76																		
261		206+00 L/R 207+69 L/R						9				338																		
		206+00 RT 209+45 RT						9				345																		
		206+00 RT 212+45 RT						17				645																		
		206+00 LT 216+00 RT							1000																					
		212+45 RT 216+00 RT						3			355																			
262		216+00 RT 226+50 RT							1050																					
		216+00 RT 225+58 RT						8			958																			
		225+58 RT 226+50 RT						5				184																		
263	RAMP C3	226+50 RT 3009+00 CL							1074																					
		226+50 RT 230+85 LT						11				435																		
		3015+37 LT 3009+00 LT						8		637																				
		3015+30 LT 3012+11 RT	1		21	7																				319				
	I-71 SB	226+50 RT 230+90 RT						11				440																		
264	RAMP C3	3004+39 LT 3009+00 LT						6	461	461																				
TOTALS THIS SHEET			1		21	7		119	4143	1098	1313	3655														319				
TOTALS CARRIED FROM SHEET 72			16		240	76	4	726	7285	3980	3788	6603	251													3537				
TOTALS CARRIED FROM SHEET 73			5		567	189		217	6372	3388	6093	2158	464	101	5			30	645	415	491	32	220	265	8511	9190			57	1
TOTALS CARRIED FROM SHEET 74			6		321	107		668	3604	3493	1318	11060	2410	50	5					639	151	48	110	30		4248		829		
TOTALS CARRIED FROM SHEET 75			1	1	327	109		845	9694	14191	1988	10446	1643	64	5	4	3	484	122	109	583		435			4391	963		45	1
TOTALS CARRIED FROM SHEET 76			3		78	28		282	6221	4035		3857	631	134			3									1196	23		358	7
TOTAL FEET									37319	30185	14500							514	767	1163										
TOTAL MILES									7.07	5.72	2.75							0.10	0.15	0.22										
TOTALS CARRIED TO GENERAL SUMMARY			32	1	1554	514	4	2857	7.07	5.72	2.75	37779	5399	349	15	4	6	0.10	0.15	0.22	1225	80	765	295	8511	22881	986	829	460	9

NO.	DESCRIPTION	REV. BY	DATE
9	REVISED QTY'S	KWR	12-09-2021
10	REVISED QTY'S	KWR	12-14-2021

CALCULATED KWR
CHECKED JML

MAINTENANCE OF TRAFFIC SUBSUMMARY

FRA-71-14.36

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Ohio DOT Workspace
70\71 West Interchange 6R

1" 0 0.5"

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By: kryan

34" x 22"

PHASE 1 SEQUENCE OF CONSTRUCTION

PHASE 1A (SHEETS 137 - 143)

1) PLACE PORTABLE BARRIER AND SHIFT TRAFFIC AS NECESSARY FOR CONSTRUCTION OF PIERS 1-22 WHILE MAINTAINING AT LEAST ONE LANE OF TRAFFIC ON THE EXISTING ROADWAYS. PIER LOCATIONS PIER 1, PIER 2, PIER 3, PIER 5, PIER 6, PIER 7, PIER 8, AND PIER 19 MUST HAVE TRAFFIC SHIFTED OR LANES NARROWED PRIOR TO BEGINNING CONSTRUCTION.

2) DIVERT THE BIKE TRAIL TRAFFIC TO THE BIKE TRAIL DETOUR CONSTRUCTED IN PART 1 TO CONSTRUCT THE FOOTER FOR PIER 15.

3) CONSTRUCT THE WIDENED MEDIAN BARRIER FOR THE NEW SIGN TRUSS FOUNDATION ALONG I-70 BETWEEN HIGH ST. AND 3RD ST.

PHASE 1B (SHEETS 144 - 150)

1) THE CONTRACTOR MAY BEGIN CONSTRUCTION OFFLINE OF I-71 SB AS SHOWN IN THE PLANS: FROM PIER 1 TO PIER 22 WHILE MAINTAINING AT LEAST 1 LANE OF TRAFFIC IN ALL DIRECTIONS DURING CONSTRUCTION AND AS NOTED IN THE ROAD CLOSURES (FOR HANGING GIRDERS) AND LANE RESTRICTIONS.

PHASE 1C

STEP 1 (SHEETS 151 - 154)

1) CONSTRUCT TEMPORARY ROAD 1 (TR-1) FOR I-70 EB TO I-71 SB ALONG RAMP C3 AND I-71 SB WHILE MAINTAINING ALL LANES OF TRAFFIC ON THE EXISTING ROADWAYS.

STEP 2 (SHEETS 155 - 158)

1) MOVE I-70 EB TO I-71 SB TRAFFIC TO THE NEWLY CONSTRUCTED TR-1.

2) NARROW AND SHIFT THE RAMP FROM I-70 WB TO I-71 SB AND CONSTRUCT TEMPORARY ROAD 2 (TR-2) WHICH WILL BE USED AS A CONNECTION TO TR-1 IN THE NEXT PHASE.

PHASE 1D (SHEETS 159 - 165)

NOTE: THIS PHASE MAY BEGIN EARLIER IN PHASE 1.

1) PRIOIR TO BEGINNING CONSTRUCTION OF THIS PART ALL UNDERGROUND UTILITIES SHALL BE INSTALLED, INCLUDING BUT NOT LIMITED TO: STORM AND SANITARY SEWERS, WATER LINES, UNDERGROUND ELECTRIC CONDUIT AND CONDUITS FOR LIGHTING AND TRAFFIC SIGNALS. THE CONTRACTOR SHALL UTILIZE ONE LANE, TWO-WAY OPERATIONS BY USE OF FLAGGERS/LEO OR TRAFFIC SHALL BE MAINTAINED ON DETOUR ROUTES DURING WORKING HOURS. DURING NON-WORKING HOURS, ALL TRENCHES AND EXCAVATIONS SHALL BE ADEQUATELY PROTECTED OR BACKFILLED AND ALL ROADWAYS REOPENED TO THE EXISTING TRAFFIC PATTERN.

2. INSTALL THE TEMPORARY SIGNAL AT THE INTERSECTION OF 2ND STREET AND MOUND STREET. INSTALL TEMPORARY INTERCONNECT TO THE TEMPORARY SIGNAL CABINET.

PHASE 1D CONT. (SHEETS 159 - 165)

3) CONSTRUCT CIVIC CENTER DRIVE PRIOR TO BEGINNING ROADWAY WORK ON MOUND STREET SO THAT CIVIC CENTER DRIVE CAN REMAIN OPEN WHEN MOUND STREET IS CONVERTED TO ONE-WAY WESTBOUND BETWEEN CIVIC CENTER DRIVE AND FRONT STREET.

4) INSTALL TEMPORARY PAVEMENT ON THE SOUTH SIDE OF MOUND STREET BETWEEN CIVIC CENTER DRIVE AND SECOND ST. UTILIZING ONE LANE, TWO-WAY OPERATIONS BY USE OF FLAGGERS/LEO IF NECESSARY. (10)

5) INSTALL TEMPORARY MARKINGS AND PORTABLE BARRIER TO CONVERT MOUND STREET TO A TWO LANE, ONE-WAY WESTBOUND TRAFFIC PATTERN FROM SECOND STREET TO FRONT STREET AND A ONE LANE, ONE-WAY WESTBOUND TRAFFIC PATTERN FROM CIVIC CENTER DRIVE TO SECOND STREET. BEGIN CONSTRUCTION OF THE NORTH SIDE OF MOUND STREET FROM MIRINOVA PLACE TO FRONT STREET. THE INTERSECTION OF MOUND STREET & MIRANOVA PLACE WILL BE COMPLETED IN PART WIDTHS (ONE HALF AT A TIME) IN TWO STEPS, UTILIZING FLAGGERS. THE INTERSECTION OF MOUND STREET & JEWETT STREET IS PERMITTED TO BE CLOSED FOR THE ENTIRE PHASE ONCE MOUND STREET IS CONVERTED TO ONE-WAY WESTBOUND. THE INTERSECTIONS OF MOUND STREET & 2ND STREET, AND MOUND STREET & LUDLOW STREET ARE PERMITTED TO BE CLOSED TO COMPLETE THE INTERSECTION CONSTRUCTION; HOWEVER THE CONTRACTOR IS ONLY PERMITTED TO CLOSE OR HAVE LANE RESTRICTIONS AT ONE INTERSECTION AT A TIME. DURING CONSTRUCTION OF AN INTERSECTION, ALL OTHER INTERSECTIONS SHALL BE FULLY OPEN TO TRAFFIC EXCEPT AT JEWETT STREET. (9)

6) CONSTRUCT THE FOOTER AND A PORTION OF WALL E5 ALONG THE NEW RAMP D7 UP TO ABOUT THE FINISHED GRADE OF MOUND STREET. THE REST OF THE WALL WILL BE COMPLETED IN A LATER PHASE.

7) WORK ON PARCEL 44 (MARATHON GAS STATION) SHALL BE COMPLETED WITHIN 1 YEAR OF TEMPORARY TAKE.

CALCULATED | CHECKED

PHASE 1 - SEQUENCE OF CONSTRUCTION

FRA-71-14.36

134
1228

NO.	DESCRIPTION	REV. BY	DATE
9	REVISED SEQUENCE FOR WALL E5 CONST.	KWR	12-9-2021
10	ADDED TEMP. PAVEMENT TO SEQUENCE	KWR	12-14-2021

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NO.	DESCRIPTION	REV. BY	DATE
9	MOUND ST 1-WAY WB	KWR	12-09-2021
10	SHIFT MOUND ST SOUTH	KWR	12-14-2021

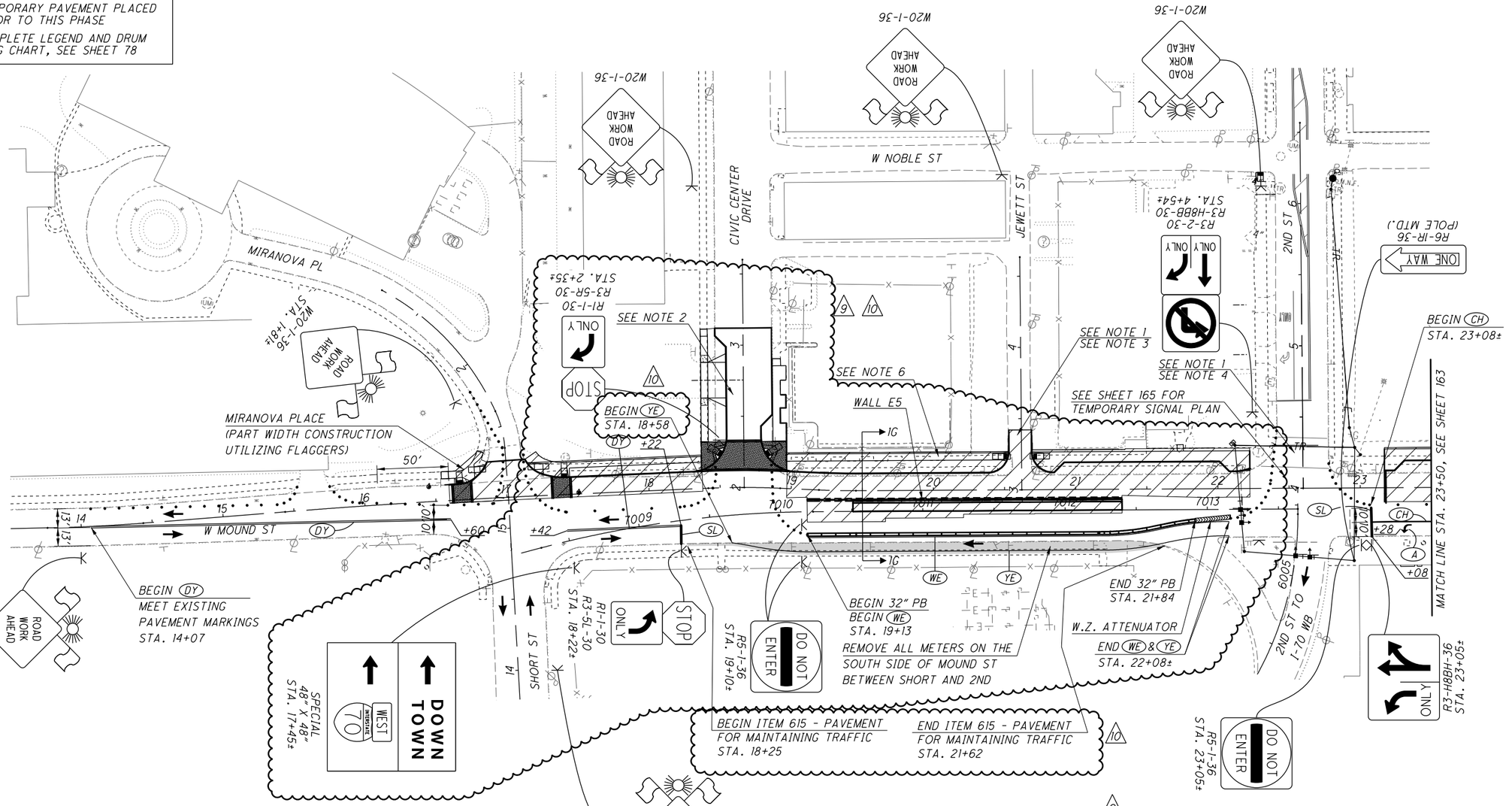
SHEET LEGEND

WORK AREA

TEMPORARY PAVEMENT PLACED DURING THIS PHASE

TEMPORARY PAVEMENT PLACED PRIOR TO THIS PHASE

FOR COMPLETE LEGEND AND DRUM SPACING CHART, SEE SHEET 78



NOTES:

1. CLOSE AND DETOUR ONE SIDE STREET (2ND STREET OR LUDLOW STREET) AT A TIME TO CONSTRUCT INTERSECTIONS.

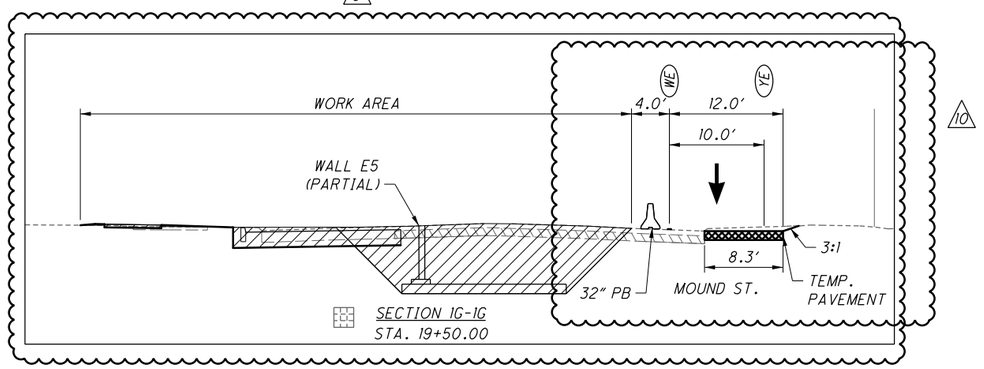
2. CIVIC CENTER DRIVE SHALL BE CONSTRUCTED PRIOR TO THE MOUND STREET CONSTRUCTION SO THAT IT CAN BE OPEN WHEN TRAFFIC IS ONE WAY WESTBOUND BETWEEN 2ND STREET AND CIVIC CENTER DRIVE. CLOSE AND DETOUR CIVIC CENTER DRIVE TO CONSTRUCT IT. FOR CIVIC CENTER DRIVE DETOUR DETAILS, SEE SHEET 160.

3. BLOCK ACCESS TO/FROM JEWETT ST. USING TYPE 3 BARRICADES FOR THE ENTIRE PHASE.

4. FOR 2ND STREET CLOSURE DETAILS, SEE SHEET 164.

5. ALL PAVEMENT MARKINGS ARE EXISTING TO REMAIN OR PLACED IN A PREVIOUS PHASE UNLESS OTHERWISE NOTED.

6. FOR DETAILS ON MAINTAINING PEDESTRIAN TRAFFIC, SEE SHEETS 79-80.



N

0 20 40 80
HORIZONTAL SCALE IN FEET

CALCULATED | CHECKED

MAINTENANCE OF TRAFFIC - PHASE 1D
W. MOUND ST. - STA. 13+50 TO STA. 23+50

FRA-71-14.36

162
1228

Ohio DOT Workspace
70\71 West Interchange 6R
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DCF: 60-06634_6R_Columbus

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View: FENCE_VIEW1
By: kryan

34" x 22"

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SHEET NUM.									PART.			ITEM	ITEM EXT	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
287	295	297	298						08/NHS/P V	08/NHS/P V.	08/NHS/P V.						
																WATER WORK	
			48								48	511	71100	48	CY	CONCRETE, MISC.: CONCRETE BLOCKING, CLASS C, INCREASE OR DECREASE (COL. 801)	641
6									3	3		638	10801	6	EACH	VALVE BOX ADJUSTED TO GRADE, AS PER PLAN	45
		1									1	638	98000	1	EACH	WATER WORK, MISC.: 3/4" WATER SERVICE TAP, TRANSFERRED (COL. 805)	641
		1									1	638	98000	1	EACH	WATER WORK, MISC.: 8"X6" TAPPING SLEEVE AND VALVE (COL. 803)	45, 641
		131									131	638	98600	131	FT	WATER WORK, MISC.: 12" DUCTILE IRON WATER PIPE AND FITTINGS (COL. 801)	641
		1,354									1,354	638	98600	1,354	FT	WATER WORK, MISC.: 36" WATER PIPE AND FITTINGS (COL. 801)	641
		379									379	638	98600	379	FT	WATER WORK, MISC.: 6" DUCTILE IRON WATER PIPE AND FITTINGS (COL. 801)	641
		1									1	SPECIAL	69098000	1	EACH	1 1/2" CURB STOP, RELOCATED (COL 805)	641
		2									2	SPECIAL	69098000	2	EACH	36" BUTTERFLY VALVE AND APPURTENANCES (COL 802)	45, 641
		5									5	SPECIAL	69098000	5	EACH	6" GATE VALVE AND APPURTENANCES (COL 802)	45, 641
		1									1	SPECIAL	69098000	1	EACH	12" GATE VALVE AND APPURTENANCES (COL 802)	45, 641
		2									2	SPECIAL	69098000	2	EACH	FIRE HYDRANT, ABANDONED (COL 809)	641
		4									4	SPECIAL	69098000	4	EACH	FIRE HYDRANT, RELOCATED (COL 809)	45, 641
		1									1	SPECIAL	69098000	1	EACH	FIRE HYDRANT, TYPE A (COL. 809)	45, 641
		1									1	SPECIAL	69098000	1	EACH	FIRE HYDRANT, TYPE A MODIFIED (COL 809)	641
	4 2	2									2	SPECIAL	69098000	2	EACH	8" WATER MAIN ABANDONDED	641
	2	128									128	SPECIAL	69098100	128	FT	54" CASING PIPE, 3/4" THICKNESS (COL 806)	641
	4	971									971	SPECIAL	69098100	971	FT	PIPE REMOVED (COL 202)	643
	3																
			LUMP								LUMP	SPECIAL	69098400	LS		CONTINUITY TESTING	641
			LUMP								LUMP	SPECIAL	69098400	LS		CORROSION PROTECTION	641
			LUMP								LUMP	SPECIAL	69098400	LS		FLANGE ISOLATION KITS FOR DUCTILE IRON PIPES	641
			LUMP								LUMP	SPECIAL	69098400	LS		SURVEY COORDINATES	641
			3,200								3,200	SPECIAL	69099400	3,200	LB	FITTINGS, INCREASE OR DECREASE (COL. 801)	641
																SANITARY SEWER	
	1										1	SPECIAL	69098000	1	EACH	AIR RELEASE MANHOLE AND APPURTENANCES, COMPLETE	640
	1										1	SPECIAL	69098000	1	EACH	MANHOLE RECONSTRUCTED TO GRADE	45, 640
	3										3	SPECIAL	69098000	3	EACH	MANHOLE TYPE C, W/ OUTSIDE DROP (COL 901)	45, 640
	4 2										2	SPECIAL	69098000	2	EACH	SEWER ABANDONED(COL 202)	640
	1										1	SPECIAL	69098000	1	EACH	STRUCTURE REMOVED - AIR RELEASE MANHOLE VAULT (COL 202)	640
	1										1	SPECIAL	69098000	1	EACH	STRUCTURE REMOVED - SANITARY VAULT (COL 202)	640
	1										1	SPECIAL	69098000	1	EACH	STRUCTURE AT STATION 0+47, COMPLETE (COL 904)	640
	10 4 251										251	SPECIAL	69098100	251	FT	SEWER ABANDONED AND SEALED 24" AND UNDER (USACE SOP)	
	126										126	SPECIAL	69098100	126	FT	SEWER ABANDONED AND SEALED OVER 24" (USACE SOP)	
	495										495	SPECIAL	69098100	495	FT	16" PVC C900 PIPE, WITH TYPE 1 BEDDING WITH 912 COMPACTED GRANULAR BACKFILL (COL 901)	640
	38										38	SPECIAL	69098100	38	FT	42" PIPE, WITH TYPE 1 BEDDING WITH 912 COMPACTED GRANULAR BACKFILL (COL 901)	640
	174										174	SPECIAL	69098100	174	FT	10" DIP FORCEMAIN W/ BEDDING AND BACKFILL PER COL 801	640
	120										120	SPECIAL	69098100	120	FT	18" DIP FORCEMAIN W/ BEDDING AND BACKFILL PER COL 801	640
	169										169	SPECIAL	69098100	169	FT	36" DIP OR PCCP FORCEMAIN W/ BEDDING AND BACKFILL PER COL 801	640
	40										40	SPECIAL	69098100	40	FT	24" CASING PIPE (COL 806)	640
	40										40	SPECIAL	69098100	40	FT	30" CASING PIPE (COL 806)	640
	40										40	SPECIAL	69098100	40	FT	54" CASING PIPE (COL 806)	640
	LUMP										LUMP	SPECIAL	69098400	LS		BYPASS PUMPING, COS	640
	18										18	SPECIAL	69098700	18	CY	INCREASED OR DECREASED EARTH EXCAVATION	640

NO.	DESCRIPTION	REV. BY	DATE
2	ADD QTY. FOR PIPE (TBR)	TAZ	11-12-2021
3	Items Deleted	ADB	11-22-2021
4	Water Quantities Revised	TAZ	11-24-2021
4	Update Funding Splits	TAZ	11-24-2021
4	Add/Rev. Sewer Quantities	TAZ	11-29-2021
10	Rev. Item No. 680E98100	TAZ	12-14-2021

CALCULATED HRB
CHECKED TAZ

GENERAL SUMMARY

FRA-71-14.36

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1228

SHEET NUM.									PART.				ITEM 4	ITEM EXT	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
59	65	66	67	68	69	71	77	944	08/NHS/P V	08/NHS/P V	09/NHS/B R	09/NHS/B R						
																	STRUCTURE (FRA-71-1503L) (CONT.)	
								93			47	46	524	95100	93	EACH	DRILLED SHAFTS, MISC.: THERMAL INTEGRITY PROFILER (T.I.P.) WIRE CABLE TESTING OF DRILLED SHAFTS	
								LUMP			LUMP	LUMP	524	95200	LS		DRILLED SHAFTS, MISC. SHAFT INSPECTION DEVICE	
								392			196	196	526	30010	392	SY	REINFORCED CONCRETE APPROACH SLABS WITH QC/QA (T=17")	
								116			58	58	526	90030	116	FT	TYPE C INSTALLATION	
								LUMP			LUMP	LUMP	SPECIAL	53000200	LS		STRUCTURES SOLDIER PILE RETAINING WALL	942
								465			233	232	607	39901	465	FT	VANDAL PROTECTION FENCE, 6' STRAIGHT, COATED FABRIC, AS PER PLAN	942
								570			285	285	SPECIAL	69098100	570	FT	COVERED WALKWAY SYSTEM	136 & 941
								148			74	74	869	00100	148	EACH	HIGH LOAD MULTI-ROTATIONAL (HLMR) BEARINGS	
																	MAINTENANCE OF TRAFFIC	
			2,208						1,104	1,104			614	11110	2,208	HOUR	LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE	
100									50	50			614	11111	100	HOUR	LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE, AS PER PLAN	59
							9 32		16	16			614	12380	32	EACH	WORK ZONE IMPACT ATTENUATOR, 24" WIDE HAZARDS, (UNIDIRECTIONAL)	
							1		1				614	12381	1	EACH	WORK ZONE IMPACT ATTENUATOR, 24" WIDE HAZARDS, (UNIDIRECTIONAL), AS PER PLAN	69
		LUMP							LUMP	LUMP			614	12420	LS		DETOUR SIGNING	
		7							4	3			614	12484	7	EACH	WORK ZONE INCREASED PENALTIES SIGN	
	20								10	10			614	12500	20	EACH	REPLACEMENT SIGN	
	50								25	25			614	12600	50	EACH	REPLACEMENT DRUM	
								2,857	1,429	1,428			614	12801	2,857	EACH	WORK ZONE RAISED PAVEMENT MARKER, AS PER PLAN	68
							9 1,554		777	777			614	13310	1,554	EACH	BARRIER REFLECTOR, TYPE 1, ONE WAY	
	15								8	7			614	13312	15	EACH	BARRIER REFLECTOR, TYPE 2, ONE WAY	
	15						9 514		265	264			614	13350	529	EACH	OBJECT MARKER, ONE WAY	
							4		2	2			614	13360	4	EACH	OBJECT MARKER, TWO WAY	
100									50	50			614	18020	100	HOUR	MAINTAINING TRAFFIC, MISC.: LAW ENFORCEMENT OFFICER (LEO) WITHOUT PATROL CAR	59
					1,400				700	700			614	18030	1,400	FT	MAINTAINING TRAFFIC, MISC.: PORTABLE WATER FILLED BARRIER PROTECTED PEDESTRIAN WALKWAY	69
			53						27	26			614	18601	53	SNMT	PORTABLE CHANGEABLE MESSAGE SIGN, AS PER PLAN	67
							2.75		1.38	1.37			614	20056	2.75	MILE	WORK ZONE LANE LINE, CLASS I, 6", 807 PAINT	
				1.38					0.69	0.69			614	20366	1.38	MILE	WORK ZONE LANE LINE, CLASS I, 6", 648	
				4.76					2.38	2.38			614	20410	4.76	MILE	WORK ZONE LANE LINE, CLASS II, 6"	
							9 7.07		3.54	3.53			614	22056	7.07	MILE	WORK ZONE EDGE LINE, CLASS I, 6", 807 PAINT (WHITE)	
							5.72		2.86	2.86			614	22056	5.72	MILE	WORK ZONE EDGE LINE, CLASS I, 6", 807 PAINT (YELLOW)	
				6.25					3.13	3.12			614	22336	6.25	MILE	WORK ZONE EDGE LINE, CLASS I, 6", 648	
							37,779		18,890	18,889			614	23110	37,779	FT	WORK ZONE CHANNELIZING LINE, CLASS I, 12", 807 PAINT	
				18,906					9,453	9,453			614	23150	18,906	FT	WORK ZONE CHANNELIZING LINE, CLASS I, 12", 648	
							9 5,399		2,700	2,699			614	24102	5,399	FT	WORK ZONE DOTTED LINE, CLASS I, 6", 807 PAINT	
							349		175	174			614	25400	349	FT	WORK ZONE TRANSVERSE/DIAGONAL LINE, CLASS I, 740.06, TYPE I	
							15		8	7			614	30400	15	EACH	WORK ZONE ARROW, CLASS I, 740.06, TYPE I	
							9 0.22		0.11	0.11			614	98000	0.22	MILE	WORK ZONE PAVEMENT MARKING, MISC.: CENTER LINE, DOUBLE SOLID, 5"	68
							10 0.15		0.08	0.07			614	98000	0.15	MILE	WORK ZONE PAVEMENT MARKING, MISC.: EDGE LINE, 5" (WHITE)	68
							0.1		0.05	0.05			614	98000	0.1	MILE	WORK ZONE PAVEMENT MARKING, MISC.: LANE LINE, 5"	68
							1,225		613	612			614	98100	1,225	FT	WORK ZONE PAVEMENT MARKING, MISC.: CHANNELIZING LINE, 10"	68
							765		383	382			614	98100	765	FT	WORK ZONE PAVEMENT MARKING, MISC.: DOTTED LINE, 5"	68
							9 80		40	40			614	98100	80	FT	WORK ZONE PAVEMENT MARKING, MISC.: STOP LINE, 20"	68
							6		3	3			614	98200	6	EACH	WORK ZONE PAVEMENT MARKING, MISC.: PAVEMENT TATOO	68
							4		2	2			614	98200	4	EACH	WORK ZONE PAVEMENT MARKING, MISC.: SHARROW	68
							10 295		148	147			615	20000	295	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A	
							8,511		4,256	4,255			615	20001	8,511	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A, AS PER PLAN	3 71
				6					3	3			615	20001	6	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A, AS PER PLAN, "A"	68
						100			50	50			615	25001	100	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS B, AS PER PLAN, TYPE 1	71
						50			25	25			615	25001	50	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS B, AS PER PLAN, TYPE 2	71
						20			10	10			615	25001	20	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS B, AS PER PLAN, TYPE 3	71
					666				333	333			616	10000	666	MGAL	WATER	
							10 9 22,881		11,441	11,440			622	41100	22,881	FT	PORTABLE BARRIER, UNANCHORED	
							986		493	493			622	41101	986	FT	PORTABLE BARRIER, UNANCHORED, AS PER PLAN	69
							829		415	414			622	41110	829	FT	PORTABLE BARRIER, ANCHORED	
							460		230	230			630	80300	460	SF	SIGN, TEMPORARY OVERLAY	
							9		5	4			630	89894	9	EACH	REMOVAL OF TEMPORARY OVERLAY SIGN AND DISPOSAL	
		168							84	84			808	18700	168	SNMT	DIGITAL SPEED LIMIT (DSL) SIGN ASSEMBLY	

NO.	DESCRIPTION	REV. BY	DATE
3	Revise See Sheet No.	TAZ	11-18-2021
4	Update Funding Splits	TAZ	11-24-2021
9	Revise MOT QTYS	TAZ	12-10-2021
10	Revise MOT QTYS	TAZ	12-14-2021

CALCULATED HRB CHECKED TAZ

GENERAL SUMMARY

FRA-71-14.36

275H 1228

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ITEM 203 - ROADWAY, MISC.: COLUMN SUPPORTED WALLS (WALL E4, W5)

PART 1 DESCRIPTION AND OBJECTIVES

1.1 PERFORMANCE CRITERIA

A. PROJECT DESCRIPTION: THE WORK SHALL CONSIST OF DESIGNING AND CONSTRUCTING COLUMN-SUPPORTED WALLS (CSW) IN THE INSTALLATION AREAS NOTED ON THE PLANS. THE CSW DESIGNER MUST DEMONSTRATE BY CALCULATIONS THAT THE CSW SYSTEMS SATISFY THE FOLLOWING REQUIREMENTS:

1. CSW MUST SATISFY THE FACTORED BEARING RESISTANCE REQUIREMENTS OF THE PLANNED EMBANKMENTS AND WALLS AT THE DESIGNATED BEARING LEVELS.

A. THE DESIGNATED BEARLING LEVEL FOR MSE WALLS IS THE TOP OF THE LEVELING PAD/BASE OF THE SGB.

B. THE DESIGNATED BEARING LEVEL FOR THE EMBANKMENTS IS EXISTING GRADE.

2. GLOBAL AND LOCAL STABILITY OF CSW SYSTEMS SUPPORTING EMBANKMENTS AND WALLS MUST EXCEED 1.3 FOR BOTH SHORT-TERM AND LONG-TERM CONDITIONS.

3. GLOBAL AND LOCAL STABILITY OF CSW SYSTEMS SUPPORTING BRIDGES MUST EXCEED 1.5 FOR BOTH SHORT-TERM AND LONG-TERM CONDITIONS.

4. LATERAL SQUEEZE CALCULATIONS MUST DEMONSTRATE A MINIMUM FACTOR OF SAFETY OF 2.0

5. A LOAD TRANSFER PLATFORM SHALL BE PROVIDED, AS NECESSARY, TO LIMIT PENETRATION (PUNCHING) OF GROUND IMPROVEMENT ELEMENTS AND DIFFERENTIAL SETTLEMENT OF MSE WALLS AND EMBANKMENTS BETWEEN CSW ELEMENTS. IF A LOAD TRANSFER PLATFORM IS NOT REQUIRED, PROVIDE A 1-FOOT LAYER OF ODOT CMS ITEM 703.16.C.3 COMPACTED PER ITEM 203 TO SUPPORT MSE LEVELING PADS AND SELECT GRANULAR EMBANKMENT MATERIALS.

6. TOTAL SETTLEMENT OF CSW SYSTEM IS TO BE LIMITED TO 3 INCHES OR LESS OCCURING WITHIN 30 DAYS AFTER THE SUPPORTED WALL REACHES FULL DESIGN HEIGHT (LESS COPING).

A. AN ADDITIONAL 0.5" OF SETTLEMENT AFTER THE 30 DAY WAITING PERIOD IS ACCEPTABLE. IN ADDITION, THE CONTRACTOR SHALL TAKE SURVEY SHOTS ALONG THE CENTERLINE OF CONSTRUCTION AT 50' INTERVALS ON THE EMBANKMENTS SUPPORTED BY CSW. THESE SHOTS SHALL BE TAKEN AT THE END OF THE 30 DAY WAITING PERIOD AND AGAIN 1 WEEK PRIOR TO BEGINNING PLACEMENT OF AGGREGATE BASE. THE SURVEY SHOTS SHALL BE PROVIDED TO THE DEPARTMENT AND WILL BE CONSIDERED INCIDENTAL TO THE CSW PAY ITEMS. THE SURVEY DATA WILL BE USED TO CALCULATE ANY ADDITIONAL EMBANKMENT OR AGGREGATE BASE NEEDED TO ACCOUNT FOR 0.5" OR LESS OF SETTLEMENT. PAYMENT FOR EMBANKMENT AND/OR AGGREGATE BASE NEEDED FOR SETTLEMENTS EXCEEDING 0.5" AT THE TIME OF PAVEMENT CONSTRUCTION WILL NOT BE MADE. THE CONTRACTOR WILL BE REQUIRED TO CONTINUE MONITORING THE SETTLEMENT UNTIL PROJECT CLOSE-OUT TO VERIFY THE MAXIMUM PERMISSIBLE SETTLEMENT IS NOT EXCEEDED. PAYMENT FOR CORRECTIVE REPAIRS NEEDED RESULTING FROM SETTLEMENT EXCEEDING 0.5" AFTER THE 30 DAY WAITING PERIOD WILL ALSO NOT BE MADE.

B. WICK DRAINS MAY BE UTILIZED TO ACCELERATE THE TIME RATE OF SETTLEMENT.

7. MAXIMUM DIFFERENTIAL SETTLEMENT FOR CSW'S IN THE LONGITUDINAL DIRECTION (ALONG THE WALL FACING) IS 0.5% FOR CONVENTIONAL MSE FACING PANELS AND 1.0% FOR SLIP-JOINTED PANELS. MAXIMUM DIFFERENTIAL SETTLEMENT FOR CSW'S IN THE TRANSVERSE DIRECTION (PERPENDICULAR TO THE WALL FACING) IS 1%.

8. AT A MINIMUM, THE CONTRACTOR SHALL PROVIDE TWO SURVEY POINTS FOR EVERY 50 FEET ALONG THE EMBANKMENT ALIGNEMENT, WITH ONE SURVEY POINT LOCATED ABOVE A COLUMN AND ONE SURVEY POINT LOCATED AT THE CENTROID OF A UNIT CELL FORMED BY THE CENTERS OF ADJACENT COLUMNS. DIFFERENTIAL SETTLEMENT BETWEEN UNIT CELL CONTROIDS AND ADJACENT CSW COLUMNS SHOULD NOT EXCEED *INCH.

9. THE CSW SYSTEM AND CONSTRUCTION PROCESSES SHALL NOT CAUSE ANY ADDITIONAL LOADING, DETRIMENTAL SETTLEMENT, OR DAMGE TO ADJACENT FACILITIES, UTILITIES, OR EMBANKMENTS.

B. THE DESIGN CONCEPT OF THE CSW INVOLVES CONSTRUCTING A PATTERN OF COLUMNS USING AN ACCEPTED SOIL IMPROVEMENT TECHNIQUE OF TRADITIONAL DEEP FOUNDATION ELEMENTS. DESIGN THE CSW SYSTEM TO EFFICIENTLY DISTRIBUTE EMBANKMENT AND WALL LOADS PLUS SURCHARGE LIVE AND DEAD LOADS. THE TYPE, NUMBER OF COLUMNS, SPACING, DIAMETER AND DEPTH SHALL BE DETERMINED BY THE CSW CONTRACTOR AND CSW DESIGNER. COLUMNS SHALL NOT BE LOCATED AT PROPOSED STRUCTURE PILE LOCATIONS.

1. THE CSW SYSTEM SHALL BE DESIGNED IN ACCORDANCE WITH FHWA RECOMMENDATIONS. THE FOLLOWING VARIABLES ARE USED IN THE CRITERIA BELOW:

S = COLUMN CENTER-TO-CENTER SPACING,
A = COLUMN WIDTH,
H = EMBANKMENT HEIGHT,
A(S) = AREA REPLACEMENT RATIO (COLUMN AREA DIVIDED BY COLUMN TRIBUTARY AREA),
T = COMPETENT LAYER THICKNESS.

NOTE THAT A COMPETENT LAYER IS DEFINED AS N ==10 BLOWS/FT FOR SANDS AND AN UNDRAINED SHEAR STRENGTH, SU ==500 PSF FOR CLAYS. A CONSERVATIVE, LOW AVERAGE, OF THE COMPETENT SOIL THICKNESS, T, SHOULD BE USED IN THE CRITERIA BELOW:

AT A MINIMUM, THE FOLLOWING CRITERIA SHALL BE SATISFIED:

A. THE MAXIMUM CENTER-TO-CENTER COLUMN SPACING, S, IS GIVEN BY THE RELATIONSHIP BELOW:

S =< MINIMUM OF (0.67H + α + 0.5) OR (1.23H - 1.20 α)

B. THE MINIMUM THICKNESS OF SELECT FILL FOR THE BRIDGING LAYER (LOAD TRANSFER PLATFORM) SHALL BE THE LARGER OF 2 FT OR 0.5(S - A).

C. THE CSW DESIGN CONCEPT SHALL INCLUDE THE DESIGN OF LOAD TRANSFER PLATFORMS, INCLUDING SELECT FILL AND GENERAL EMBANKMENT FILL MATERIALS, NUMBER OF REINFORCMENT LAYERS, TYPE OF REINFORCEMENT, AND PROPERTIES OF THE GEOSYNTHETIC REINFORCEMENT.

D. PRIOR TO SUBMITTING THE BID, THE CONTRACTOR AND CSW DESIGNER SHALL REVIEW THE AVAILABLE SUBSURFACE INFORMATION AND VISIT THE SITE TO ASSESS SITE GEOMETRY, CSW INSTALLATION METHOD VIABILITY, EQUIPMENT ACCESS CONDITIONS, AND LOCATION OF EXISTING STRUCTURES AND ABOVE GROUND UTLITIES AND FACILITIES.

1.2 GEOTECHNICAL ENGNIEER'S DESIGN CRITERIA FOR CSW

THE PURPOSE OF THE SUBGRADE IMPROVEMENT IS TO PROVIDE SUPPORT FOR MSE WALL E2 & E4 AND SUPPORT EMBANKMENTS. IT IS ANTICIPATED THAT THE CSW COLUMNS WILL EXTEND THROUGH THE VARIABLE FILL AND ALLUVIAL SOILS AND BEAR IN THE UNDERLYING GLACIAL TILL LAYERS.

SEE SHEET 843 FOR DESIGN CRITERIA TABLE.

1.3 CSW COLUMN TYPES AND MATERIALS

A. CSW COLUMN TYPES MAY INCLUDE, BUT ARE NOT LIMITED TO:

1. STEEL H PILES
2. STEEL PIPE PILES
3. PRE-CAST CONCRETE PILES
4. CONTINUOUS FLIGHT AUGER PILES (A.K.A. AUGERCAST PILES)
5. AGGREGATE COLUMNS (A.K.A. STONE COLUMNS)
6. RIGID INCLUSIONS
7. VIBRO-CONCRETE COLUMNS (VCC)
8. CONTROLLED MODULUS COLUMNS (CMC)

PART 2 MINIMUM CONTRACTOR QUALIFCATIONS

2.1 THE CONTRACTOR CONSTRUCTING THE CSW SYSTEM SHALL HAVE A MINIMUM 5+ YEARS EXPERIENCE INSTALLING GEOSYNTHETIC REINFORCEMENT AND THE COLUMN TYPE SUBMITTED IN THE CONTRACTOR'S BID PROPOSAL.

2.2 THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR THREE RECENT, SUCCESSFUL PROJECTS COMPLETED WITH SIMILAR SITE CONDITIONS AND IMPROVEMENT CRITERIA. THE CONTRACTOR SHALL PROVIDE NAMES AND CONTACT INFORMATION OF INDIVIDUALS WHO CAN ATTEST TO THE ADEQUACY OF THE WORK PERFORMED. THIS INFORMATION SHALL BE SUBMITTED IN THE CONTRACTOR'S BID PROPOSAL.

2.3 THE CONTRACTOR MUST A ASSIGN MANAGER WHO HAS BEEN RESPONSIBLE FOR THE CSW WORK ON AT LEAST THREE (3) PROJECTS. THE PROJECT MANAGER SHALL HAVE BEEN IN FULL-TIME EMPLOYMENT OF THE CONTRACTOR FOR AT LEAST TWO OF THOSE PROJECTS (PROVIDE A LIST OF PROJECTS AND DATES IN BID PROPOSAL). A DESIGNER THAT IS A CONSULTANT ON THIS PROJECT CANNOT BE THE PROJECT MANAGER.

2.4 THE CSW SYSTEM SHALL BE DESIGNED BY THE DESIGNER, A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF OHIO WITH EXPERIENCE IN THE DESIGN OF AT LEAST THREE SUCCESSFULLY COMPLETED CSW PROJECTS OVER THE PAST FIVE YEARS. THE DESIGNER MAY BE EITHER AN EMPLOYEE OF THE CONTRACTOR OR A SEPARATE CONSULTANT DESIGN ENGINEER MEETING THE STATED EXPERIENCE REQUIREMENTS.

2.5 THE CONTRACTOR MUST ASSIGN A FULL-TIME PROJECT SUPERINTENDENT WITH AT LEAST THREE (3) YEARS EXPERIENCE IN CSW CONSTRUCTION AND WHO HAS BEEN RESPONSIBLE FOR A MINIMUM OF THREE (3) CSW PROJECTS (PROVIDE A LIST OF PROJECTS AND DATES IN BID PROPOSAL).

2.6 WRITTEN REQUESTS FOR SUBSTITUTION OF THESE KEY PERSONNEL MUST BE SUBMITTED PRIOR TO PERSONNEL CHANGES. DOCUMENTATION MUST BE SUBMITTED TO THE ENGINEER THAT DEMONSTRATES THAT THE SUBSTITUTE MEETS THE REQUIREMENTS LISTED ABOVE.

REFERENCES:

A. AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020, AND CONSTRUCTION SPECIFICATIONS, 4TH EDITION, 2017, WITH 2020 INTERIMS.

B. FHWA NHI-16-027 AND 028, FHWA GEC 013 GROUND IMPROVEMENT METHODS: REFERENCE MANUAL VOLUMES I & II, APRIL 2017.

C. FHWA-NHI-16-009, FHWA GEC 012: DESIGN AND CONSTRUCTION OF DRIVEN PILE FOUNDATIONS VOLUMES I & II, 2016.

D. FHWA-RD-83-026 DESIGN AND CONSTRUCTION OF STONE COLUMNS, VOL. 1.

E. FHWA NHI-06-089 SOILS AND FOUNDATIONS REFERENCE MANUAL VOLUMES I & II, 2006.

F. FHWA GEC NO. 8 DESIGN AND CONSTRUCTION OF CONTINUOUS FLIGHT AUGER PILES, 2007.

G. ASTM D 6637 STANDARD TEST METHOD FOR DETERMINING TENSILE PROPERTIES OF GEOGRIDS BY THE SINGLE OR MULTI-RIB TENSILE METHOD.

H. ASTM D 4595 STANDARD TEXT METHOD FOR TENSILE PROPERTIES OF GEOTEXTILES BY THE WIDE-WIDTH STRIP METHOD

I. ASTM 5262 STANDARD TEST METHOD FOR EVALUATNG THE UNCONFINED TENSION CREEP AND RUPTURE BEHAVIOR OF GEOSYNTHETICS

NO.	DESCRIPTION	REV. BY	DATE
1	UPDATED CONTROLLED MODULUS COLUMNS NOTES TO COLUMN SUPPORTED WALLS	MMS	11/5/21
1	UPDATED SHEET TITLE	MMS	11/5/21
10	UPDATED NOTES	MMS	12/14/21

RESOURCE INTERNATIONAL INC.
6350 PRESIDENTIAL GATEWAY
COLUMBUS, OHIO 43231
(614) 823-4949

DESIGNED	DRAWN	REVIEWED	DATE
MMS	MMS	NCK	6/23/2021
CHECKED	REVISED		STRUCTURE FILE NUMBER
JGM			

RETAINING WALL NOTES 5 OF 9

RETAINING WALLS

I-70/I-71 WEST INTERCHANGE PROJECT

FRA-71-14.36

PID No. 105588

5 / 9

842
1228

ITEM 203 - ROADWAY, MISC.: COLUMN SUPPORTED WALLS (WALL E4, W5)

PART 3 - EQUIPMENT

3.1 THE EQUIPMENT REQUIRED FOR COLUMN INSTALLATION WILL VARY DEPENDING ON THE COLUMN TYPE. EQUIPMENT FOR COLUMN INSTALLATION SHOULD MEET FHWA CRITERIA FOR THE TYPE OF COLUMN SELECTED.

3.2 EQUIPMENT FOR FILL AND GEOSYNTHETIC PLACEMENT SHALL NOT CAUSE EXCESSIVE LOADS OR SETTLEMENT TO THE SOFT GROUND BETWEEN COLUMNS.

PART 4 - LOAD TRANSFER PLATFORM (LTP) MATERIALS

4.1 LTP SELECT FILL SHALL MEET THE FOLLOWING GRADATION REQUIREMENTS:

SIZE	% PASSING
4-INCH	100
NO. 4	15 - 70
NO. 40	10 - 60
NO. 200	5 - 15

4.2 THE SELECT FILL SHALL ALSO HAVE:

$$CC = \frac{D(30)^2}{D(60) \times D(10)} = 1 \text{ TO } 3$$

$$CU = \frac{D(60)}{D(10)} > 4$$

WHERE: CC = COEFFICIENT OF CURVATURE
CU = COEFFICIENT OF UNIFORMITY
D(10) = DIAMETER SIZE AT 10% PASSING
D(30) = DIAMETER SIZE AT 30% PASSING
AND, D(60) = DIAMETER SIZE AT 60% PASSING

4.3 SELECT FILL PASSING THE NO. 40 SIEVE SHALL HAVE A LIQUID LIMIT LESS THAN 40 AND A PLASTICITY INDEX LESS THAN 20.

4.4 THE ALLOWABLE STRENGTH OF THE GEOSYNTHETIC T(A) MUST BE EQUAL OF GREATER THAN THE REQUIRED STRENGHT T(G). ALLOWABLE TENSILE STRENGTH T(A) OF THE GEOSYNTHETICSHALL BE DETERMINED USING A REDUCTION FACTOR APPROACH TO ACCOUND FOR CREEP RUPTURE STRENGHT AND DEGRADATION MECHANISMS OF THE REINFORCEMENT. THE ALLOWABLE LONG-TERM GEOSYNTHETIC DESIGN TENSILE STRENGTH T(A) IS:

$$T(G) <= T(A) = \frac{T(ULT)}{RF(D)XRD(ID)XRF(CR)XFS(UNC)}$$

WHERE:

T(G) = REQUIRED STRENGTH OF GEOSYNTHETIC,
T(A) = ALLOWABLE TENSILE STRENGTH OF GEOSYNTHETIC,
T(ULT) = ULTIMATE TENSILE STRENGTH FROM SINGLE OR MULTI-RIB TENSILE STRENGTH TESTS (ASTM D6637) FOR GEOGRIDS OR WIDE WIDTH TENSILE STRENGTH TESTS (ASTM D4595) FOR GEOTEXTILES,
RD(D) = DURABILITY REDUCTION FACTOR IS DEPENDENT ON THE SUSCEPIBILITY OF THE GEOSYNTHETIC TO ATTACK BY MIRCOORGANISMS, CHEMICALS, THERMAL OXIDATION, HYDROLYSIS AND STRESS CRACKING. THE TYPICAL RANGE IS FROM 1.1 TO 2.0.
RF (ID) = INSTALLATION DAMAGE REDUCTION FACTOR CAN RANGE FROM 1.05 TO 3.0, DEPENDING ON BACKFILL GRADATION AND PRODUCT MASS PER UNIT WEIGHT.
RF(CR) = CREEP REDUCTION FACTOR IS THE RATION OF THE ULTIMATE STRENGTH T(ULT) TO THE CREEP LIMITED STRENGTH OBTAINED FROM LABORATORY CREEP TESTS FOR EACH PRODUCT, AND CAN VARY TYPICALLY FROM 1.65 TO 5.0.
FS(UNC) = OVERALL FACTOR OF SAFETY OR LOAD FACTOR REDUCTION TO ACCOUNT FOR UNCERTANTIES IN THE GEOMETRY OF THE STRUCTURE, FILL PROPERTIES, REINFORCEMENT PROPERTIES, AND EXTERNALLY APPLIED LOADS. FOR LOAD TRANSFER PLATFORMS, A MINIMUM OVERALL FACTOR OF SAFETY OF 1.5 IS TYPICAL.

THE SPECIFIC VALUES FOR THE REDUCTION FACTORS (RDF, RFID, RFCR) USED IN DESIGN SHALL BE THOSE ESTABLISHED BY THE NATIONAL TRANSPORTATION PRODUCT EVALUATION PROGRAM (NTPEP) AND CAN BE FOUND ONLINE AT:

HTTP://NTPEP.ORG/CONTENTMANAGEMENT/PAGEBOY.ASP?PAGE_ID=26

IF NTPEP REDUCTION FACTORS ARE NOT AVAILABLE FOR THE MANUFACTURER AND TYPE OF GEOSYNTHETIC PROPOSED BY THE DESIGNER, THEN THE VALUES USED SHALL BE THOSE RECOMMENDED BY THE GEOSYNTHETIC MANUFACTURER, SUPPORTED BY LABORATORY TESTING AND AS APPROVED BY THE ENGINEER.

4.5 IN ADDITION TO THE LONG TERM ALLOWABLE STRENGTH REQUIREMENT, THERE IS A SERVICEABILITY REQUIREMENT. FOR SERVICEABILITY, THE GEOSYNTHETIC MUST HAVE A CREEP LIMITED STRENGTH AT A STRAIN OF 5% ACCORDING TO ASTM D 5262 THAT IS EQUAL TO OR GREATER THAN THE REQUIRED STRENGTH T(G).

PART 5 - SUBMITALS

5.1 FOLLOWING AWARD OF THE CONTRACT AND PRIOR TO THE STARTOF CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT DESIGNER-APPROVED DETAILS, SPECIF/CATIONS, DRAWINGS, CONSTRUCTION SEQUENCES, DESIGN CALCULATIONS, QUALITY CONTROL PLAN, MONITORING PLAN, AND ANY OTHER REQUIRED INFORMATION FOR THE COLUMN-SUPPORTED EMBANKMENT SYSTEM. THE ENGINEER SHALL REVIEW THE SUBMITTAL ITEMS FOR INFORMANCE WITH THE PERFORMANCE SPECIFICATION. THE CONTRACTOR SHALL ALLOW A MINIMUM OF 14 DAYS FOR THE REVIEW OF THE INITIAL SUBMISSION AND SHALL ALSO ACCOUNT FOR THE SUBSEQUENT REVIEW AND ACCEPTANCE PROCESS WHICH WILL DEPEND ON THE ACCURACY AND QUALITY OF THE SUBMISSION DOCUMENTS.

5.2 THE FOLLOWING SHALL BE SUBMITTED TO THE ENGINEER AT LEAST 30 DAYS PRIOR TO BEGINNING WORK:

A. PROPOSED CSE CONSTRUCTION SEQUENCE AND SCHEDULE.

B. WORKING DRAWINGS AND DESIGN TO THE ENGINEER FOR REVIEW PRIOR TO STARTING THE WORK IND/CATING THE EMBANKMENT DETAILS (MATERIAL TYPES, ELEVATIONS, GEOSYNTHETIC REINFORCEMENT, ETC.), COLUMN TYPE, COLUMN LAYOUT, COLUMN SIZE, SPACING OF COLUMNS, COLUMN TOP ELEVATIONS, AND THE DEPTH OF COLUMNS AS PROPOSED TO ACHIEVE THE CRITERIA OUTLINED IN THIS SPECIFICATION AND THE CONTRACT PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL LINES AND GRADES FOR COLUMNS, INCLUDING LOCATIONS OF ALL UTILITIES AND SURVEY MARKERS.

C. A CSE/CSW DEMONSTRATION COLUMN/LOAD TESTING PROGRAM TO DEMONSTRATE INSTALLATION TECHNIQUES AND COMPLIANCE WITH THE PERFORMANCE CRITERIA. THE LOAD TEST PROGRAM SHALL INCLUDE THE INSTALLATION OF ONE OR MORE TYPICAL COLUMNS OF THE SIZE, TYPE AND SPACING SPECIFIED BY THE CSE/CSW DESIGNER IN EACH STABILIZED ZONE IDENTIFIED IN SECTION 1.2. THE CSE/CSW DESIGNER SHALL PRESCRIBE A LOAD TEST PROCEDURE FOR MEASURING THE PERFORMANCE OF THE CSE ELEMENTS (I.E. ASTM D/143 PROCEDURES FOR PILE ELEMENTS), SUBJECT TO ACCEPTANCE BY THE ENGINEER. THE TEST PROGRAM SHALL INCLUDE AT A MINIMUM:

1. MEASURMENT OF VERTICAL SURFACE DEFLECTIONS BOTH OVER THE TEST COLUMN BY A SUITABLE METHOD.

2. COLUMNS SHALL HAVE SUFFICIENT STRENGTH AND STIFFNESS TO SATISFY BEARING CAPACITY AT 150 PERCENT OF THE DESIGN STRESS AND TO SATISFY SETTLEMENT CRITERIA IN SECTION 1.1 (PERFORMANCE CRITERIA) AT 100 PERCENT OF THE DESIGN STRESS.

A. IN THE EVENT THAT TEST COLUMNS FAIL TO COMPLY WITH THE DESIGN REQUIREMENTS, CONTRACTOR SHALL INSTALL ADDITIONAL TEST COLUMNS AND CONDUCT ADDITIONAL TESTS AT NO COST TO THE DEPARTMENT.

3. ANY PLANNED DEVIATIONS FROM THE ABOVE DESCRIBED LOAD TEST PROCEDURE MUST BE DESCRIBED IN THE CONTRACTOR'S DESIGN SUBMITTAL, APPROVED BY THE DESIGNER, AND ACCEPTED BY THE ENGINEER.

4. CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS FOR THE LOAD TEST REACTION ELEMENTS INCLUDING DIAMETER, TYPE, REINFORCEMENT, DEPTH AS WELL AS THE REACTION FRAME AND BEAMS FOR REVIEW BY THE ENGINEER. THE CONTRACTOR SHALL DESIGN THE REACTION PILES AND FRAME FOR MINIMUM ONE AND HALF TIMES THE MAXIMUM TEST LOAD. ALL SHOP DRAWINGS AND SUPPORTING SHOP DRAWINGS CALCULATIONS SHALL BE SIGNED AND SEALED BY PROFESSIONAL ENGINEER.

5. SUBMIT CALIBATION RECORDS FOR LOAD CELLS, HYDRAULIC JACKS, PUMPS AND PRESSURE GAUGES AT LEAST 7 DAYS PRIOR TO PERFORMING THE LOAD TESTS.

6. SUBMIT THE FOLLOWING TO THE ENGINEER AFTER THE LOAD TESTS ARE COMPLETED:

A. A REPORT DOCUMENTING THE OBSERVATIONS AND RESULTS OF ALL TESTS. THE REPORT WILL CERTIFY THAT THE REQUIRED BEARING RESISTANCE HAS BEEN ACHIEVED WITHIN THE SETTLEMENT TOLERANCES AS DETAILED IN SECTION 1.1 (PERFORMANCE CRITERIA).

B. AS-BUILT DRAWINGS INDICATING THE LOCATION, DIAMETER, TOP AND BOTTOM ELEVATIONS, AND IDENTIFICATION NUMBER FOR EACH CSW COLUMN.

7. CSW COLUMN PRODUCTION SHALL ONLY START UPON COMPLETION OF TWO LOAD TESTS AND AFTER THE ENGINEER ACCEPTS THE CSW DESIGNER'S FINAL TIP ELEVATION, INSTALLATION CRITERIA, AND SPACING OF COLUMNS.

D. LOAD TRANSFER PLATFORM SUBMITTALS

1. GRADATION, ATTERBERG LIMITS, AND THE RESULTING ODOT/AASHTO CLASSIFICATION FOR ALL FILL MATERIALS USED.

2. THE CONTRACTOR SHALL SUBMIT A CERTIFCATE STATING THAT THE GEOSYNTHETIC REINFORCEMENT MEETS THE DESIGN REQUIREMENTS FOR ULTIMATE STRENGTH, CREEP, DURABILITY, INSTALLATION DAMAGE, AND COEFFIENT OF INTERACTION FOR SLIDING IN ACCORDANCE WITH THE DESIGN SUBMITTAL.

E. A DETAILED WRITTEN PROCEDURE OF PLANS TO PROTECT ADJACENT FACILITIES AND EMBANKMENTS FROM DAMAGE, INCLUDING DESIGN CALCULATIONS. ADJACENT EXISTING STRUCTURES AND PAVEMENT MUST REMAIN IN SERVICE AT ALL TIMES, EXCEPT WHEN CLOSED PER MOT REQUIREMENTS.

NO.	DESCRIPTION	REV. BY	DATE
1	UPDATED CONTROLLED MODULUS COLUMNS NOTES TO COLUMN SUPPORTED WALLS	MMS	11/5/21
1	UPDATED SHEET TITLE	MMS	11/5/21
10	UPDATED NOTES	MMS	12/14/21

5.3 ACCEPTANCE OF THE PROPOSED DESIGN AND CONSTRUCTION METHODOLOGIES SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR THE SAFETY OF THE METHOD OR EQUIPMENT USED OR THE RESPONSIBILITY OF CARRYING OUT THE WORK IN FULL ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

5.4 THE CONTRACTOR SHALL SUBMIT AS-BUILT DRAWINGS TO THE ENGINEER NO-LATER-THAN 30 DAYS FOLLOWING COMPLETION OF CONSTRUCTION.

PART 6 SPOIL HANDLING REQUIREMENTS

6.1 THE CONTRACTOR SHALL FURNISH ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO PROPERLY HANDLE, STORE, TRANSPORT AND DISPOSE OF REGULATED MATERIALS INCLUDING ANY REQUIRED PERMITS, APPROVALS OR FEES WITHIN THE PROJECT LIMITS. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.

6.2 MAINTAIN RECORDS (SUCH AS MANIFESTS, LANDFILL TICKETS, DAILY LOGS, ETC.) TO DOCUMENT THE SOURCE, MOVEMENT AND DESTINATION OF EACH TRUCKLOAD OF SOLID WASTE OR REQULATED MATERIAL. ALL TRANSPORT VEHICLES USED FOR THE MOVEMENT OF REGULATED MATERIALS SHALL MEET ALL APPLICABLE LOCAL, STATE AND FEDERAL REQUIREMENTS. ONE COPY OF EACH RECORD SHALL BE SUBMITTED TO THE ENGINEER.

PART 7 CSW CONSTRUCTION AND QC / QA REQUIREMENTS

7.1 PRE-CONSTRUCTION MEETING: A PRE-CONSTRUCTION MEETING SHALL BE HELD AMONG THE ENGINEER, CONTRACTOR, AND DESIGNER PRIOR TO MOBILIZING EQUIPMENT TO THE PROJECT SITE. AT THE MEETING, THE COLUMN INSTALLATION MEANS/METHODS, OBSERVATION, ACCEPTANCE/REJECTION PROCEDURES, TESTING AND CSW CONSTRUCTION PROCEDURES SHALL BE DISCUSSED AND FORMALIZED.

7.2 WORKING DRAWINGS

A. THE CONTRACTOR SHALL PROVIDE WORKING DRAWINGS WHICH SHALL SHOW THE LOCATION OF EACH COLUMN, AS WELL AS THE TOP AND BOTTOM ELEVATIONS. EACH COLUMN SHALL BE IDENTIFIED WITH A REFERENCE NUMBER.

B. THE WORKING DRAWINGS SHALL ALSO PROVIDE DETAIL ON THE SELECT FILL, GEOSYNTHETIC REINFORCEMENT, AND GENERAL EMBANKMENT FILL. A DESIGNER-APPROVED SET OF WORKING DRAWINGS AND CONTRACT SPECIFICATIONS SHALL BE ON-SITE AT ALL TIMES DURING CONSTRUCTION OF THE LOAD TRANSFER PLATFORM.

7.3 SITE PREPARATION

A. THE CONTRACTOR SHALL ENSURE A FIRM WORKING PLATFORM ON WHICH HEAVY EQUIPMENT CAN BE OPERATED SAFELY UNDER ITS OWN POWER. THE WORK PLATFORM MUST COMPLY WITH ITEM 203.

B. THE CONTRACTOR SHALL ACCURATELY LOCATE THE LIMITS OF COLUMN INSTALLATION AND EMBANKMENT EXTENTS IN ACCORDANCE WITH THE CONTRACT PLANS.

C. THE CONTRACTOR SHALL EXERCISE CAUTION TO AVOID SETTLEMENT OR DAMAGE TO EXISTING FACILITIES AND SETTLEMENT, UNDERMINING, OR INSTABILITY TO EXISTING EMBANKMENTS.

D. STABILITY OF ALL THE TEMPORARY SHEETING AND/OR TEMPORARY SLOPES, IF USED TO FACILITATE INSTALLATION OF THE COLUMNS IS THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE CAUSED BY HIS ACTIVITIES AT NO ADDITIONAL COST TO THE DEPARTMENT.

E. THE CONTRACTOR SHALL EXERCISE CAUTION AND ACCOUNT FOR THE TEMPORARY INSTABILITY THAT MAY BE CAUSED BY GROUND IMPROVEMENT (IF USED) UNTIL THE GROUND IMPROVEMENT FEATURES GAIN STRENGTH WITH TIME.

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DESIGNED MMS | DRAWN MMS | REVIEWED NCK 6/23/2021 | DATE
CHECKED JGM | REVISED | STRUCTURE FILE NUMBER

SHEET 6 OF 9 SHEETS

RETAINING WALL NOTES
RETAINING WALLS
I-70/I-71 WEST INTERCHANGE PROJECT

FRA-71-14.36
PID No. 105588

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ITEM 203 - ROADWAY, MISC.: COLUMN SUPPORTED WALLS (WALL E4, W5)

7.4 CSW COLUMN TOLERANCES

A. THE CSW DESIGNER SHALL SPECIFY IN THE CONTRACTOR'S SUBMITTAL THE ALLOWABLE TOLERANCES FOR:

1. COLUMN VERTICALITY
2. HORIZONTAL TOLERANCE FROM PLAN LOCATION.
3. VERTICAL TOLERANCE FROM COLUMN TOP.
4. ACCEPTABLE CONDITION OF COLUMN TOPS PRIOR TO INSTALLATION OF LOAD TRANSFER PLATFORM.
5. MINIMUM COLUMN DIMENSIONS.
6. COLUMN OVERLAP REQUIREMENTS, IF APPLICABLE.
7. MINIMUM STRENGTH REQUIREMENTS OF COLUMN MATERIALS.
8. MATERIAL PROPERTIES, AS INCORPORATED INTO THE COLUMNS.
9. OTHER ITEMS, AS REQUIRED PER ODOT CMS.

B. BEFORE BEGINNING INSTALLATION, THE CONTRACTOR SHOULD ACCURATELY STAKE THE LOCATION OF THE CSW COLUMNS USING A LICENSED SURVEYOR. THE CONTRACTOR SHOULD PROVIDE AN ADEQUATE METHOD FOR LOCATING ELEMENTS TO ALLOW THE ENGINEER TO VERIFY THE AS-BUILT LOCATION OF THE ELEMENTS DURING CONSTRUCTION. THE CONTRACTOR WILL NOT BE COMPENSATED FOR ELEMENTS THAT ARE LOCATED OUTSIDE OF THE SPECIFIED TOLERANCES. IF THE ENGINEER DETERMINES THAT MISALIGNED ELEMENTS WILL INTERFERE WITH CONSTRUCTION, A METHOD OF CORRECTION SHOULD BE PREPARED BY THE CSW DESIGNER AND SUBMITTED BY THE CONTRACTOR TO THE ENGINEER FOR REVIEW AND ACCEPTANCE.

C. COLUMN ELEMENTS INSTALLED BEYOND THE MAXIMUM ALLOWABLE TOLERANCES SHALL BE ABANDONED AND REPLACED WITH NEW COLUMNS, UNLESS THE DESIGNER APPROVES THE CONDITION OR PRESCRIBES OTHER REMEDIAL MEASURES TO BE COMPLETED BY CONTRACTOR AND CSW DESIGNER. ALL MATERIAL AND LABOR REQUIRED TO REPLACE OR REMEDY REJECTED COLUMNS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE DEPARTMENT. REMEDIAL MEASURES MUST BE SUBMITTED TO THE ENGINEER FOR REVIEW AND ACCEPTANCE.

7.5 AS-BUILT COLUMN INSTALLATION RECORDS: THE CONTRACTOR MUST SUBMIT AS-BUILT FIELD MEASUREMENT DATA INDICATING SURVEYED AS-BUILT PLAN LOCATIONS OF EACH CSW ELEMENT, INCLUDING THE ELEMENT CENTER (PER SITE SPECIFIC COORDINATES), THE ELEMENT DIMENSION, THE COLUMN VERTICALITY, AND THE TOP AND BOTTOM ELEVATIONS OF EACH ELEMENT TO THE ACCURACY REQUIRED BY THE PROJECT SPECIFICATIONS. THE AS-BUILT DOCUMENTATION MUST BE APPROVED BY THE DESIGNER AND SUBMITTED TO THE ENGINEER NO LATER THAN 90 DAYS AFTER THE COMPLETION OF EACH CSW-STABILIZED ZONE. A DISINCETIVE OF $300.00 PER DAY WILL BE ASSESSED FOR EACH DAY BEYOND 90 DAYS THAT THE COMPLETED AS-BUILT DRAWINGS ARE NOT SUBMITTED TO THE ENGINEER.

7.6 SELECT FILL PLACEMENT AND QA/QC REQUIREMENTS (LOAD TRANSFER PLATFORMS)

A. NO GEOSYNTHETIC REINFORCEMENT OR FILL MATERIALS SHALL BE PLACED PRIOR TO SATISFYING THE COLUMN PERFORMANCE CRITERIA, UNLESS THE FILL MATERIAL IS REQUIRED AS A WORKING PLATFORM FOR COLUMN INSTALLATION.

B. INSTRUMENTATION FOR PERFORMANCE MEASUREMENTS AND INSTRUMENTATON FOR MONITORING OF EXISTING STRUCTURES AND EMBANKMENTS SHALL BE INSTALLED PRIOR TO PLACEMENT OF ANY SELECT FILL OR GEOSYNTHETIC REINFORCEMENT.

C. PRIOR TO CONSTRUCTION OF THE LOAD TRANSFER PLATFORM, THE CONTRACTOR SHALL PREPARE SUBGRADE, AND REMOVE ANY DELETERIOUS MATERIALS SUCH AS TREE ROOTS. THE FOUNDATION SOIL SHALL BE OBSERVED AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT OF SELECT REINFORCED FILL.

D. IF CEMENTITIOUS GROUND IMPROVEMENT METHODS ARE USED, PLACEMENT OF FILL MATERIAL SHALL NOT START UNTIL THE COLUMNS HAVE GAINED ADEQUATE STRENGTH TO SUPPORT THE FILL MATERIALS AND FILL INSTALLATION AND CONSTRUCTION EQUIPMENT.

E. SELECT REINFORCED FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT EXCEEDING 10 IN. IN UNCOMPACTED THICKNESS FOR HEAVY COMPACTION EQUIPMENT. FOR ZONES WHERE COMPACTION IS ACCOMPLISHED WITH HAND-OPERATED COMPACTION EQUIPMENT, FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT EXCEEDING 6 IN. IN UNCOMPACTED THICKNESS.

F. SELECT REINFORCED FILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH ITEM 203. THIS MAY NOT BE ACHIEVABLE FOR THE FIRST LIFT OF FILL BECAUSE OF THE WEAK SUBGRADE BETWEEN COLUMNS, HOWEVER, SUBSEQUENT LIFTS SHOULD MEET THE MINIMUM REQUIREMENTS.

G. TEST METHODS AND FREQUENCY, AND VERIFICATION OF MATERIAL SPECIFICATIONS AND COMPACTION, SHALL BE THE RESPONSIBILITY OF THE STATE.

7.7 GEOSYNTHETIC REINFORCEMENT PLACEMENT AND QA/QC REQUIREMENTS

A. PLACE REINFORCEMENT AT THE LOCATIONS AND ELEVATION SHOWN ON THE CONTRACTORS WORKING DRAWINGS. NO CHANGES TO THE GEOSYNTHETIC REINFORCEMENT LAYOUT, INCLUDING, BUT NOT LIMITED TO LENGTH, REINFORCEMENT TYPE (I.E., STRENGTH), DIRECTION OF REINFORCEMENT, OR ELEVATION SHALL BE MADE WITHOUT THE EXPLICIT WRITTEN APPROVAL OF THE DESIGNER. CONTRACTOR SHALL SUBMIT THE CHANGES TO THE ENGINEER FOR ACCEPTANCE.

B. CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON THE GEOSYNTHETIC REINFORCEMENT. A MINIMUM FILL THICKNESS OF 150 MM (6 IN.) IS REQUIRED FOR OPERATION OF VEHICLES OVER THE REINFORCEMENT. TURNING OF VEHICLES SHOULD BE KEPT TO A MINIMUM TO PREVENT TRACKS OR TIRES FROM DISPLACING THE FILL AND/OR GEOSYNTHETIC REINFORCEMENT.

C. MINIMUM OVERLAP OF ADJACENT ROLLS OF REINFORCEMENT SHALL BE AS INDICATED BY THE DESIGNER OF THE CONTRACTOR'S WORKING DRAWINGS.

D. EACH ROLE OF GEOSYNTHETIC REINFORCEMENT SHOULD BE INSPECTED BY THE CONTRACTOR TO ENSURE THAT IT IS UNDAMAGED PRIOR TO COVERING WITH FILL MATERIAL.

E. CARE SHALL BE TAKEN TO PREVENT EXCESSIVE MUD, WET CONCRETE, EPOXY, OR OTHER DELETERIOUS MATERIALS FROM COMING IN CONTACT WITH AND AFFIXING TO THE GEOGRID MATERIALS.

F. GEOSYNTHETIC REINFORCEMENT SHALL BE STORED AT TEMPERATURES ABOVE -20 DEGREES F (- 29 DEGREES C).

G. GEOSYNTHETIC REINFORCEMENT SHALL NOT BE LEFT DIRECTLY EXPOSED TO SUNLIGHT FOR A PERIOD LONGER THAN RECOMMENED BY THE MANUFACTURER OR ONE MONTH WHICHEVER IS SHORTER.

H. ANY ROLL OR PORTION OF A ROLL OF GEOSYNTHETIC DAMAGED BEFORE, DURING, AND/OR AFTER INSTALLATION SHALL BE REPLACED BY THE CONTRACTOR.

I. LARGE PILES OF FILL MATERIAL SHALL NOT BE PLACED ON THE GEOSYNTHETIC REINFORCEMENT.

J. IF GEOTEXTILE SEAMS ARE SPECIFIED, THE SEAMS SHOULD BE PLACED UP AND EVERY STITCH SHOULD BE INSPECTED.

K. THE CONTRACTOR SHALL REMOVE SLACK AND WRINKLES FROM THE GEOSYNTHETIC PRIOR TO PLACING FILL.

L. THE CONTRACTOR SHALL SUBMIT THE LOT NUMBERS AND ROLL NUMBERS ALONG WITH THEIR LOCATIONS WITHIN THE EMBANKMENT FOR ALL GEOSYNTHETIC REINFORCEMENT.

PART 8 POST-INSTALLATION PERFORMANCE MONITORING INSTRUMENTATION

8.1 POST-INSTALLATION PERFORMANCE MONITORING INSTRUMENTATION: TEN (10) SETS OF CSW PERFORMANCE MONITORING INSRUMENTATION SHALL BE INSTALLED. THIS INSTRUMENTATION WILL BE PLACED TO MONITOR THE PERFORMANCE OF THE CSW SYSTEM AFTER IT HAS BEEN SUCCESSFULLY CONSTRUCTED AND IS SUBJECTED TO THE CONSTRUCTION LOADING AND SUBSEQUENT SERVICE LOADING. THE INSTALLATION MAY BE PERFORMED BY THE PRIME CONTRACTOR, THE CONTRACTOR, OR AN INSTRUMENTATION SUBCONTRACTOR OR CONSULTANT (OR IN WHOLE OF IN PART BY COMBINATIONS THEREOF). IMPORTANT NOT: IN THE EVENT THAT THIS QA MONITORING WORK IS NOT TO BE COORDINATED OR PERFORMED BY THE CSW CONTRACTOR, THE CSW CONTRACTOR SHALL BE REQUIRED TO SPECIFICALLY COORDINATE THIS WORK AND SUBMIT A WORK PLAN TO THE ENGINEER PRIOR TO INITIATING THE CSW WORK.

A. THE INSTRUMENT SHALL BE INSTALLED AS DESCRIBED IN THE FOLLOWING SUBSECTIONS, IN AREAS TOP BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER SUCH THAT CONSTRUCTION INTERFERENCE AND THE POTENTIAL FOR DAMAGE IS MINIMIZED. THE INSTALLATIONS SHALL ALSO BE PLACED SUCH THAT DATA MAY CONTINUE TO BE ACQUIRED ONCE THE FACILITY HAS BEEN PLACED IN SERVICE. DETAILS OF THE EXACT INSTALLATION LOCATIONS WILL BE DETERMINED AT THE PRE-CONSTRUCTION MEETING.

B. MINIMUM INSTRUMENTATION PROVIDED BY THE CONTRACTOR IS TO CONSIST OF:

1. SLOPE INCLINOMETERS CASINGS INSTALLED OUTSIDE OF AND IMMEDIATELY ADJACENT TO THE CSW STABILIZATION ZONE. THE INCLINOMETERS ARE INTENDED TO MONITOR POTENTIAL GROUND MOVEMENTS WITH THE ROUGE MATERIALS ADJACENT TO THE STABILIZED ZONE. CONTRACTOR WILL ALSO SELF-PERFORM OR RETAIN A CONSULTANT TO OBTAIN INCLINOMETER READINGS DURING THE REQUIRED MONITORING PERIOD.
2. SETTLEMENT PLATES, TO BE INSTALLED ON TOP OF THE LOAD/TRANSFER PLATFORM.
3. PIEZOMETERS TO MONITOR PORE PRESSURES BENEATH THE MSE WALLS AND EMBANKMENTS IN THE STABILIZED ZONE.

C. CONTRACTOR SHALL INSTRUMENTATION DATA FROM THE TIME OF INSTALLATION (END OF CSW CONSTRUCTION) UNTIL 30 DAYS AFTER THE WALLS REACH THEIR FINAL PLAN ELEVATION (LESS COPING AND PAVEMENTS). READINGS SHALL BE TAKEN TWICE WEEKLY DURING WALL AND EMBANKMENT FILL PLACEMENT AND AT INTERVALS NOT TO EXCEED 15 CALENDAR DAYS AT OTHER TIMES. DATA FROM ALL SENSORS SHALL BE READ IN A UNIFORM MANNER, SUCH THAT ALL DATA IS TAKEN WITHIN A 2-DAY PERIOD AT THE 15 (OR 30) DAY INTERVALS TO AID IN THE EVALUATION OF THE DATA AND SUBSEQUENT PRESENTATION OF RESULTS.

D. IF THE WALLS SUPPORTED OVER THE CSW ELEMENTS HAVE COMPLETED SETTLEMENT IN ACCORDANCE WITH THE PERFORMANCE CRITERIA WITHIN 30 DAYS OF SUBSTANTIAL WALL COMPLETION AS DEFINED IN 7.1.C ABOVE, THE CONTRACTOR MAY TURN OVER FURTHER MONITORING OF THE DATA TO THE DEPARTMENT. IF THE WALLS HAVE NOT COMPLETED SETTLEMENT IN ACCORDANCE WITH THE DESIGN CRITERIA, THE CONTRACTOR SHALL CONTINUE MONITORING EFFORTS (AT NO ADDITIONAL COST TO THE DEPARTMENT) AS DIRECTED BY THE ENGINEER.

E. INSTRUMENTATION SHALL BE INSTALLED AFTER THE CONSTRUCTION OF THE CSW ELEMENTS WITHIN THE IN-SITU SOILS AND PRIOR TO MSE WALL CONSTRUCTION OR EMBANKMENT FILL PLACEMENT. A MINIMUM OF 2 SETS OF BASELINE READINGS SHALL BE TAKEN AND CONFIRMED PRIOR TO THE CONSTRUCTION OF ELEMENTS ABOVE THE INSTALLED CSW CONSTRUCTION.

F. INSTRUMENTATION SHALL BE ELECTRONIC AND SELF-RECORDING, WHERE PRACTICAL. READINGS FROM SENSORS SHALL BE TAKEN WITH AUTOMATED DATA COLLECTION SYSTEMS. ANY PARTICULAR INSTRUMENT TYPE SHALL BE OBTAINED FROM THE SAME MANUFACTURER TO MINIMIZE POTENTIAL INCOMPATIBILITIES AND ERRORS. DATA ACQUISITION DEVISES (DATA LOGGERS) SHALL BE OF A TYPE COMPATIBLE WITH EACH TYPE OF INSTRUMENTATION AND RECOMMENDED BY THE MANUFACTURER.

G. INSTRUMENT SHALL BE PROVIDED WITH CALIBRATION CERTIFICATES FROM THE MANUFACTURER, AS APPROPRIATE.

H. ALL INSTRUMENTATION AND ASSOCIATED MONITORING AND DATA COLLECTION DEVICES (PROBES, CABLES, DATA COLLECTORS, ETC.) BECOME THE PROPERTY OF THE DEPARTMENT AT THE END OF THE MONITORING PERIOD. ELECTRONIC FILES AND ALL DATA REPORTS SHALL BE PROVIDED TO THE DEPARTMENT AT THE END OF THE MONITORING PERIOD.

I. THE DEPARTMENT RESERVES THE RIGHT TO PUBLISH THE INFORMATION FROM THE MONITORING INVESTIGATION IN INTERNAL AND EXTERNAL TECHNICAL PUBLICATIONS.

J. THE PERFORMANCE MONITORING INSTRUMENTATION AND ASSOCIATED DATA COLLECTION AND ANALYSIS SHALL NEITHER BE USED AS A BASIS OF PAYMENT NOR AS A PERFORMANCE CRITERIA FOR THE DETERMINATION OF SUCCESSFUL INSTALLATION OF THE CSW APPLICATION.

K. INSTRUMENTS SHALL MEET ACCEPTED INDUSTRY STANDARDS AND HAVE AN ACCURACY OF +/- 0.5% WITH A MINIMUM PRECISION OF +/- 0.5% OF FULL SCALL (SPAN).

L. INSTRUMENTS SHALL HAVE APPROPRIATE RUGGEDNESS TO SURVIVE INSTALLATION AND CONSTRUCTION PROCESSES SUCH THAT THEY READ WITH THE MINIMUM PRECISION AND ACCURACY OVER THE DURATION OF CONSTRUCTION AND A MINIMUM OF EIGHTEEN (18) MONTHS OF SERVICE FOLLOWING CONSTRUCTION.

M. INSTRUMENTATION SHALL HAVE AN OPERATING TEMPERATURE RANGE AS APPROPRIATE FOR CONDITIONS ANTICIPATED WHERE INSTALLED (I.E. WITHIN OR ABOVE A CSW ELEMENT).

N. CABLING TO EACH SENSOR (REQUIRING CABLING) SHALL BE INCLUDED SUCH THAT DATA MAY BE OBTAINED AT ALL PHASES OF CONSTRUCTION AND WHEN THE NEW CONSTRUCTION IS IN SERVICE. THE DISTANCE FROM THE DATA ACQUISITION SYSTEM TO ANY GIVEN SENSOR SHALL BE A MINIMUM HORIZONTAL DISTANCE FROM THE SENSOR TO THE OUTSIDE OF THE NEAREST RETAINING WALL OR ABUTMENT FACE, PLUS A MINIMUM CABLING AMOUNT TO PROVIDE FOR ANY NECESSARY VERTICAL TRAVEL TO THE GROUND SURFACE, PLUS 6 FT.

O. THE INSTRUMENTATION INSTALLATIONS SHALL BE ADEQUATELY PROTECTED FROM CONSTRUCTION IMPACTS, DURING CONSTRUCTION, AS WELL AS WEATHER EFFECTS, AND VANDALISM. APPROPRIATE LOCKED CASINGS AND/OR REMOVABLE CABLING AND PLASTIC CONNECTOR CAPS AND RELATED PROTECTIVE DEVICES SHALL BE PROVIDED TO ENSURE THE INTEGRITY OF THE INSTRUMENTATION OVER THE PROPOSED MONITORING DURATION.

P. THE PLAN FOR INSTALLATION OF INSTRUMENTATION SHALL BE APPROVED BY THE DESIGNER AND SUBMITTED TO THE ENGINEER FOR ACCEPTANCE PRIOR TO PLACEMENT.

PART 9 ACCEPTANCE CRITERIA

9.1 ACCEPTANCE CRITERIA: THE COLUMN-SUPPORTED EMBANKMENT IS CONSIDERED ACCEPTABLE WHEN THE EMBANKMENT CONSTRUCTION AND QC/QA REQUIREMENTS ARE COMPLETED IN ACCORDANCE WITH SECTION 6, COMPLIANCE WITH THE PERFORMANCE CRITERIA FROM PARAGRAPH 1.1 IS DEMONSTRATED, AND NO DAMAGE TO ADJACENET FACILITIES IS FOUND OR COMPENSATION IS MADE FOR DAMAGED CAUSED OR DAMAGE IS REPAIRED AT CONTRACTOR'S EXPENSE.

PART 10 CSW PAYMENT

10.1 ALL COST IN CONNECTION WITH MOBILIZATION AND DEMOBILIZATION OF MATERIALS, EQUIPMENT AND LABOR FOR THE CONSTRUCTION OF COLUMN-SUPPORTED WALLS (CSW) AS REQUIRED IN THIS SPECIFICATION, SHALL BE IN PAID FOR UNDER ITEM 203 - ROADWAY MISC; COLUMN SUPPORTED WALLS.

10.2 ALL COST IN CONNECTION WITH DESIGN, EQUIPMENT, MATERIAL, AND LABOR FOR THE INSTALLATION OF COLUMN-SUPPORTED WALLS (CSW), INCLUDING COLUMN MATERIALS AND CONSTRUCTION, QC MONITORING, INSTRUMENTATION, WORKING AND LOAD TRANSFER PLATFORM MATERIALS, WICK DRAINS IF NECESSARY TO MEET SETTLEMENT REQUIREMENTS, AND THE GEOSYNTHETIC REINFORCEMENTS AS REQUIRED IN THIS SPECIFICATION, SHALL BE INCIDENTAL TO ITEM-203. SEPARATE PAYMENT WILL NOT BE MADE FOR SITE PREPARATION, DEWATERING, TEMPORARY WORKS TO FACILITATE CONSTRUCTION, ETC. INCLUDE ALL THE ANTICIPATED COSTS IN PRICE BID FOR ITEM 203 - ROADWAY, MISC.: COLUMN SUPPORTED WALLS. GROUND IMPROVEMENT AREAS HAVE BEEN DEFINED IN THE PLANS FOR BIDDING PURPOSES. ADDITIONAL COLUMN SUPPORTS SHALL BE PROVIDED AS NECESSARY BEYOND THE DEFINED AREAS TO SATISFY GLOBAL STABILITY AND SHALL BE INCIDENTAL TO THIS ITEM.

10.3 ALL COSTS ASSOCIATED WITH THE INSTALLATION OF TEST COLUMNS, REACTION FRAMES, INSTRUMENTATION, PERFORMANCE, ANALYSIS, AND REPORTING OF TEST RESULTS TO ENGINEER SHALL BE INCLUDED IN UNIT BID FOR ITEM - 203, ROADWAY, MISC.: COLUMN SUPPOPRTED WALLS.

10.4 THE TERMS CSW AND COLUMN SUPPORTED WALLS SHALL BE USED INTERCHANGEABLY THROUGHOUT THE PLANS.

NO.	DESCRIPTION	REV. BY	DATE
1	UPDATED CONTROLLED MODULUS COLUMNS NOTES TO COLUMN SUPPORTED WALLS	MMS	11/5/21
1	UPDATED SHEET TITLE	MMS	11/5/21
10	UPDATED NOTES	MMS	12/14/21

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DESIGNED MMS | DRAWN MMS | REVIEWED NCK 6/23/202 | DATE
CHECKED JGM | REVISED | STRUCTURE FILE NUMBER

RETAINING WALL NOTES 7 OF 9
RETAINING WALLS
I-70/I-71 WEST INTERCHANGE PROJECT

FRA-71-14.36
PID No. 105588

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