


APPENDIX

A ELEMENT QUANTITIES

A decorative white diagonal bar with a pointed end, extending from the bottom left towards the center of the page.

Lytle Tunnel Overall Element Summary

Element Number	Element Name	Unit	Total Quantity	Condition State 1	Condition State 2	Condition State 3	Condition State 4
10001	Cast-in-Place Concrete Tunnel Liner	SF	149538	149143	390	5	0
	Delamination / Spall / Patched Area	SF	5	0	0	5	0
	Exposed Rebar	SF	5	0	5	0	0
	Efflorescence / Rust Staining	SF	0	0	0	0	0
	Cracking (Liners)	SF	295	0	295	0	0
	Leakage	SF	90	0	90	0	0
10020	Steel Column / Pile	EACH	18	18	0	0	0
	Corrosion	EACH	0	0	0	0	0
	Connection	EACH	0	0	0	0	0
	Cracking	EACH	0	0	0	0	0
	Distortions	EACH	0	0	0	0	0
10021	Concrete Column / Pile	EACH	5	5	0	0	0
	Delamination / Spall / Patched Area	EACH	0	0	0	0	0
	Exposed Rebar	EACH	0	0	0	0	0
	Efflorescence / Rust Staining	EACH	0	0	0	0	0
	Cracking (Liners)	EACH	0	0	0	0	0
10031	Concrete Cross Passageway	FT	14	14	0	0	0
	Delamination / Spall / Patched Area	FT	0	0	0	0	0
	Exposed Rebar	FT	0	0	0	0	0
	Efflorescence / Rust Staining	FT	0	0	0	0	0
	Cracking (Liners)	FT	0	0	0	0	0
	Distortion	FT	0	0	0	0	0
10041	Concrete Interior Walls	SF	24733	24645	78	10	0
	Delamination / Spall / Patched Area	SF	10	0	0	10	0
	Exposed Rebar	SF	10	0	10	0	0
	Efflorescence / Rust Staining	SF	0	0	0	0	0
	Cracking (Liners)	SF	68	0	68	0	0
10051	Concrete Portal	SF	3483	3417	64	2	0
	Delamination / Spall / Patched Area	SF	59	0	57	2	0
	Exposed Rebar	SF	0	0	0	0	0
	Efflorescence / Rust Staining	SF	0	0	0	0	0
	Cracking (Liners)	SF	7	0	7	0	0
10061	Concrete Ceiling Slab	SF	7680	7680	0	0	0
	Delamination / Spall / Patched Area	SF	0	0	0	0	0
	Exposed Rebar	SF	0	0	0	0	0
	Efflorescence / Rust Staining	SF	0	0	0	0	0
	Cracking (Liners)	SF	0	0	0	0	0
10080	Steel Hangers and Anchorages	EACH	47	47	0	0	0
	Corrosion	EACH	0	0	0	0	0
	Cracking	EACH	0	0	0	0	0
	Connection	EACH	0	0	0	0	0
	Bowing and Elongation	EACH	0	0	0	0	0
	Creep	EACH	0	0	0	0	0
	Anchorage Area	EACH	0	0	0	0	0
10111	Concrete Slab on Grade	SF	115711	115711	0	0	0
	Delamination / Spall / Patched Area	SF	0	0	0	0	0
	Exposed Rebar	SF	0	0	0	0	0
	Efflorescence / Rust Staining	SF	0	0	0	0	0
	Cracking (Liners)	SF	0	0	0	0	0

Lytle Tunnel Overall Element Summary

Element Number	Element Name	Unit	Total Quantity	Condition State 1	Condition State 2	Condition State 3	Condition State 4
10132	Compression Joint Seal	FT	1708	1289	2	417	0
	Leakage	FT	0	0	0	0	0
	Seal Adhesion	FT	0	0	0	0	0
	Seal Damage	FT	0	0	0	0	0
	Seal Cracking	FT	416	0	0	416	0
	Debris Impaction	FT	0	0	0	0	0
	Adjacent Deck Header	FT	3	0	2	1	0
10140	Gasket	FT	3055	3055	0	0	0
	Leakage	FT	0	0	0	0	0
	Seal Adhesion	FT	0	0	0	0	0
	Seal Damage	FT	0	0	0	0	0
	Seal Cracking	FT	0	0	0	0	0
	Debris Impaction	FT	0	0	0	0	0
	Adjacent Deck Header	FT	0	0	0	0	0
	Metal Deterioration or Damage	FT	0	0	0	0	0
10158	Asphalt Wearing Surface	SF	93721	93644	77	0	0
	General Condition	SF	50	0	50	0	0
	Effectiveness	SF	27	0	27	0	0
10161	Concrete Traffic Barrier	FT	4854	4848	6	0	0
	Delamination / Spall / Patched Area	FT	6	0	6	0	0
	Exposed Rebar	FT	0	0	0	0	0
	Efflorescence / Rust Staining	FT	0	0	0	0	0
	Cracking	FT	0	0	0	0	0
10200	Ventilation System	EACH	1	0	0	0	1
	System Condition	EACH	1	0	0	0	1
10201	Fans	EACH	3	3	0	0	0
	Fan Operation	EACH	3	3	0	0	0
	Fan Condition	EACH	3	3	0	0	0
10300	Drainage and Pumping Systems	EACH	1	1	0	0	0
	System Condition	EACH	1	1	0	0	0
10500	Electrical Distribution System	EACH	1	0	1	0	0
	System Condition	EACH	1	0	1	0	0
10550	Emergency Electrical Distribution System	EACH	1	0	1	0	0
	System Condition	EACH	1	0	1	0	0
10600	Tunnel Lighting System	EACH	3	0	3	0	0
	System Condition	EACH	3	0	3	0	0
10601	Tunnel Lighting Fixture	EACH	1301	1301	0	0	0
	Component Supports	EACH	0	0	0	0	0
	Corrosion	EACH	0	0	0	0	0
	Component Housing or Enclosure	EACH	0	0	0	0	0
10620	Emergency Lighting System	EACH	3	3	0	0	0
	System Condition	EACH	3	3	0	0	0
10650	Fire Detection System	EACH	1	1	0	0	0
	System Condition	EACH	1	1	0	0	0
10700	Fire Protection System	EACH	2	0	1	0	1
	Standpipe System	EACH	1	0	1	0	0
	Fire Extinguishers	EACH	1	0	0	0	1
	System Condition	EACH	2	0	1	0	1
10750	Emergency Communication System	EACH	1	1	0	0	0
	System Condition	EACH	1	1	0	0	0
10800	Tunnel Operations and Security System	EACH	1	0	0	1	0
	System Condition	EACH	1	0	0	1	0

Lytle Tunnel Overall Element Summary

Element Number	Element Name	Unit	Total Quantity	Condition State 1	Condition State 2	Condition State 3	Condition State 4
10952	Fire Protective Coating	SF	35309	0	35297	6	6
	Effectiveness	SF	35309	0	35297	6	6

Element 10001 - Cast-in-Place Concrete Tunnel Liner

Cracking Element Quantities

Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Exp Rebar?	Condition State	Field Notes
1	SB	125+45	5	0.001	1	-	-	CS2	HL crack in tile 5' L (Roof)
1	SB	125+80	10	0.001	1	-	-	CS2	HL crack in tile 10' L (West wall)
2	SB	125+90	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
2	SB	126+25	10	0.001	1	-	-	CS2	HL crack in tile 10' L (West wall)
3	SB	126+50	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
5	SB	127+24	6	0.002	1	-	-	CS2	2 x HL x 3' L (West wall/Roof)
5	SB	127+60	5	2	10	-	-	CS2	HL cracks in tile popagting from between lights, cracks up to 5' L, 2' W (Roof)
5	SB	127+62	5	0.001	1	-	-	CS2	HL crack in tile 5' L (East wall)
6	SB	127+80	9	0.001	1	-	-	CS2	HL crack in tile 9' L (Roof)
6	SB	127+85	7	0.001	1	-	-	CS2	HL crack in tile 7' L (Roof)
6	SB	127+90	10	2	20	-	-	CS2	HL cracks in tile up to 2'L, 20 SF Area (Roof)
7	SB	128+30	4	0.001	1	-	-	CS2	HL crack in tile 4' L (West wall)
7	SB	128+48	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
7	SB	128+50	5	0.001	1	-	-	CS2	HL crack in tile 5' L (East wall)
7	SB	128+52	6	0.001	1	-	-	CS2	HL crack in tile 6' L (Roof)
7	SB	128+55	4	2	8	-	-	CS2	HL cracks to 4'L x 2'W area (Roof)
8	SB	128+70	10	0.002	1	-	-	CS2	HL crack in tile 2 x 5'L (Liner of West wall/Roof)
8	SB	128+75	6	0.001	1	-	-	CS2	HL crack in tile 6' L (West wall)
9	SB	129+08	4	0.001	1	-	-	CS2	HL crack in tile 4' L (Roof)
9	SB	129+15	6	0.001	1	-	-	CS2	HL crack in tile 6' L (Roof)
9	SB	129+20	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
9	SB	129+25	3	0.001	1	-	-	CS2	HL crack in tile 3' L (West wall)
9	SB	129+30	5	4	20	-	-	CS2	HL cracks up to 2' L 10'x10' area (Roof)
9	SB	129+45	5	0.001	1	-	-	CS2	HL crack in tile 5' L (East wall)
19	SB	129+65	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
19	SB	129+85	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
22	SB	130+95	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
23	SB	131+65	5	0.001	1	-	-	CS2	HL crack in tile 5' L (West wall)
24	SB	133+80	4	0.001	1	-	-	CS2	HL crack in tile 4' L (West wall)
24	SB	133+90	5	0.001	1	-	-	CS2	HL crack in tile 5' L (West wall)
24	SB	134+00	6	0.001	1	-	-	CS2	HL crack in tile 6' L (West wall)
25	SB	134+50	6	0.001	1	-	-	CS2	HL crack in tile 6' L (West wall)
26	SB	135+00	5	0.001	1	-	-	CS2	HL crack in tile 5' L (West wall)
26	SB	135+10	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
26	SB	135+15	6	0.001	1	-	-	CS2	HL crack in tile 6' L (West wall)
10	NB	127+15	3	1	3	-	-	CS2	HL cracks in tile 1' L x 3'W area (Roof)
10	NB	127+18	3	0.001	1	-	-	CS2	HL crack in tile 3' L (Roof)
10	NB	127+20	9	0.001	1	-	-	CS2	HL crack in tile 9' L (Roof)
10	NB	127+25	20	0.001	1	-	-	CS2	HL crack in tile 20' L with broken tiles (Roof)
10	NB	127+35	1	0.001	1	-	-	CS2	HL crack in tile 1' L (Roof)
10	NB	127+35	8	0.001	1	-	-	CS2	HL crack in tile ? L (East wall)
10	NB	127+40	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
10	NB	127+40	12	0.001	1	-	-	CS2	HL crack in tile 12' L (Roof)
10	NB	127+45	5	4	20	-	-	CS2	HL cracks up to approx. 2' L 20 SF area (Roof)
11	NB	127+60	14	0.001	1	-	-	CS2	HL crack in tile 14' L (Roof)
11	NB	127+60	5	4	20	-	-	CS2	HL cracks up to approx. 2' L 20 SF area (Roof)
11	NB	127+75	2	0.001	1	-	-	CS2	HL crack 2' L with missing tiles (Roof)
11	NB	127+75	5	4	20	-	-	CS2	HL cracks up to approx. 2' L 20 SF area (Roof)
13	NB	128+65	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
13	NB	128+70	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
13	NB	128+70	5	0.001	1	-	-	CS2	HL crack in tile 5' L (Roof)
13	NB	128+75	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
13	NB	128+90	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
15	NB	129+55	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
15	NB	129+60	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
15	NB	129+63	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
15	NB	129+65	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
15	NB	129+68	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
15	NB	129+70	2	0.001	1	-	-	CS2	HL crack in tile 2' L (Roof)
15	NB	129+83	8	3	24	-	-	CS2	HL cracks 8' L over 3' width (Roof)
16	NB	130+10	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East Wall)
16	NB	130+20	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East Wall)
16	NB	130+30	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East Wall)
20	NB	131+98	10	2	20	-	-	CS2	HL crack in tile up to 2' L 20 SF area (Roof)
20	NB	132+25	6	0.001	1	-	-	CS2	HL crack in tile 6' L (Roof)
20	NB	132+30	4	0.001	1	-	-	CS2	HL crack in tile 4' L, crack visible in liner (Roof)
23	NB	133+35	5	0.001	1	-	-	CS2	HL crack in tile 5' L extending from exposed concrete into tiles (Roof)
23	NB	133+35	3	3	9	-	-	CS2	HL cracks 1' L over 3'x3' area (Roof)
24	NB	133+95	5	0.001	1	-	-	CS2	HL crack in tile 5' L (East wall)
24	NB	134+00	3	0.001	1	-	-	CS2	HL cracks in tile up to 3' L (Roof)
26	NB	134+80	8	0.001	1	-	-	CS2	HL crack in tile 8' L right a box (East wall)
26	NB	134+85	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	NB	134+87	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	NB	134+89	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	NB	134+90	8	5	40	-	-	CS2	HL crack in tile up to 2' L 40 SF area (Roof)
26	NB	134+91	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	NB	134+93	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	NB	135+45	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	NB	135+55	4	0.001	1	-	-	CS2	HL crack in tile 4' L (East wall)
26	NB	135+65	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	NB	135+73	3	0.001	1	-	-	CS2	HL crack in tile 3' L (East wall)
10	SB Ramp	127+20	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
10	SB Ramp	127+22	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
10	SB Ramp	127+24	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
10	SB Ramp	127+26	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
10	SB Ramp	127+28	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
10	SB Ramp	127+30	4	0.001	1	-	-	CS2	HL crack in tile 4' L (West wall)
11	SB Ramp	127+82	3	0.001	1	-	-	CS2	HL crack in tile 3' L (West wall)
12	SB Ramp	128+20	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
12	SB Ramp	128+30	6	0.001	1	-	-	CS2	HL crack in tile 6' L (West wall)

Element 10001 - Cast-in-Place Concrete Tunnel Liner									
Cracking Element Quantities									
Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Exp Rebar?	Condition State	Field Notes
12	SB Ramp	128+35	6	0.001	1	-	-	CS2	HL crack in tile 6' L (West wall)
13	SB Ramp	133+26	18	0.001	1	-	-	CS2	HL crack in tile 20' L (Roof)
23	SB Ramp	135+35	12	0.001	1	-	-	CS2	HL crack in tile 20' L (Roof)

Total Cracking (Liner) Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Cracking (Liners)	SF	295	0	295	0	0

Element 10001 - Cast-in-Place Concrete Tunnel Liner									
Delamination / Spall / Patch Element Quantities									
Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Exp Rebar?	Condition State	Field Notes
4	SB	127+24	1	1.17	2	0.75	Yes	CS3	Spall on S. edge of joint 14" W x 4.5" L x 0.75" D, exposed reinforcing
9	SB	129+54	0.42	2.00	1	-	No	CS3	Delamination on S. edge of joint 24" W x 5" L
11	NB	128+06	0.13	1.33	1	2.00	No	CS3	Spall on S. edge of joint 16" W x 1.5" L x 2" D
17	NB	131+88	3	0.33	1	1.00	No	CS3	Failed patch 4" L x 36" W x 1" D (Roof)

Total Delamination / Spall / Patch Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Delamination / Spall / Patch	SF	5	0	0	5	0

Element 10001 - Cast-in-Place Concrete Tunnel Liner									
Leakage Element Quantities									
Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Condition State	Field Notes		
16	NB	129+35	6	8	48	CS2	8' W x 6' L -area of signs of leakage (Roof)		
23	NB	133+36	6	5	30	CS2	5' W x 6' L -area of signs of leakage (Roof)		
26	SB	135+80	2	6	12	CS2	6' W x 2' L -area of signs of leakage (Roof)		

Total Leakage Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Leakage	SF	90	0	90	0	0

Element 10001 - Cast-in-Place Concrete Tunnel Liner									
Exposed Rebar Element Quantities									
Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Exp Rebar?	Condition State	Field Notes
4	SB	127+24	1	1.17	2	0.75	Yes	CS2	Spall on S. edge of joint 14" W x 4.5" L x 0.75" D, exposed reinforcing
15	NB	129+60	1	0.33	1	0.25	Yes	CS2	Shallow spall with exposed reinforcing due to lack of cover (Roof)
24	NB	133+86	2	1	2	0.25	Yes	CS2	Shallow spall with exposed reinforcing due to lack of cover (Roof)

Total Exposed Rebar Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Exposed Rebar	SF	5	0	5	0	0

Element 10041 - Concrete Interior walls

Cracking Element Quantities

Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Exp Rebar?	Condition State	Field Notes
19	SB	129+70	15	0.001	1	-	-	CS2	HL crack in cross passageway wall 15' L (East wall)
20	SB	130+30	10	0.001	1	-	-	CS2	HL crack in wedge room wall 10' L (East wall)
21	SB	130+55	16	0.001	1	-	-	CS2	HL crack in wedge room wall 16' L (East wall)
21	SB	130+65	16	0.001	1	-	-	CS2	HL crack in wedge room wall 16' L (East wall)
21	SB	130+85	16	0.001	1	-	-	CS2	HL crack in wedge room wall 16' L (East wall)
22	SB	131+00	16	0.001	1	-	-	CS2	HL crack in wedge room wall 16' L (East wall)
22	SB	131+08	16	0.001	1	-	-	CS2	HL crack in wedge room wall 16' L (East wall)
22	SB	131+15	16	0.001	1	-	-	CS2	HL crack in wedge room wall 16' L (East wall)
22	SB	131+20	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
24	SB	133+90	5	0.001	1	-	-	CS2	HL crack in tile 5' L (East wall)
25	SB	134+55	6	0.001	1	-	-	CS2	HL crack in tile 6' L (East wall)
26	SB	135+00	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	SB	135+10	6	0.001	1	-	-	CS2	HL crack in tile 6' L (East wall)
10	NB	127+25	7	0.001	1	-	-	CS2	HL diagonal crack in tile 7' L (West wall)
10	NB	127+26	6	0.001	1	-	-	CS2	HL crack 5' L with HL diagonal crack 1' L adjacent (West wall)
11	NB	127+78	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
11	NB	127+90	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
16	NB	129+35	10	0.001	1	-	-	CS2	HL crack in tile 10' L (West wall)
20	NB	132+10	3	0.001	1	-	-	CS2	HL crack in tile 3' L (West wall)
20	NB	132+20	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
24	NB	133+85	5	0.001	1	-	-	CS2	HL crack in tile 5' L (West wall)
24	NB	133+90	5	0.001	1	-	-	CS2	HL crack in tile 5' L (West wall)
26	NB	134+85	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
26	NB	134+90	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
26	NB	135+25	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
26	NB	135+45	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
10	SB Ramp	127+15	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
10	SB Ramp	127+20	6	0.001	1	-	-	CS2	HL crack in tile 6' L N256-7 (East wall)
10	SB Ramp	127+30	6	0.001	1	-	-	CS2	HL crack in tile 6' L (East wall)
11	SB Ramp	127+85	13	0.001	1	-	-	CS2	HL crack in tile 13' L (East wall)
13	SB Ramp	128+90	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
19	SB Ramp	131+50	6	0.001	1	-	-	CS2	HL crack in cross passageway wall 6' L (West wall)
19	SB Ramp	131+60	8	0.001	1	-	-	CS2	HL crack in cross passageway wall 8' L (West wall)
19	SB Ramp	131+70	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
19	SB Ramp	131+75	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
20	SB Ramp	132+18	16	0.005	1	-	-	CS2	HL crack in wedge room wall 16' L (West wall)
20	SB Ramp	132+23	16	0.005	1	-	-	CS2	HL crack in wedge room wall 16' L (West wall)
20	SB Ramp	132+33	5	0.001	1	-	-	CS2	HL crack in wedge room wall 5' L (West wall)
21	SB Ramp	132+54	16	0.005	1	-	-	CS2	1/16" crack in wedge room wall 16' L (West wall)
21	SB Ramp	132+59	25	0.001	1	-	-	CS2	HL crack in wedge room wall 25' L (West wall)
21	SB Ramp	132+59	16	0.001	1	-	-	CS2	HL crack in wedge room wall 16' L (West wall)
21	SB Ramp	132+64	17	0.005	1	-	-	CS2	1/16" crack in wedge room wall 17' L (West wall)
21	SB Ramp	132+69	8	0.001	1	-	-	CS2	HL crack in wedge room wall 18' L (West wall)
22	SB Ramp	132+90	17	0.001	1	-	-	CS2	HL crack in wedge room wall 17' L (West wall)
22	SB Ramp	132+95	6	0.001	1	-	-	CS2	HL crack in wedge room wall 6' L (West wall)
22	SB Ramp	133+00	17	0.001	1	-	-	CS2	HL crack in wedge room wall 17' L (West wall)
22	SB Ramp	133+20	17	0.001	1	-	-	CS2	HL crack in wedge room wall 17' L (West wall)
23	SB Ramp	133+56	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
23	SB Ramp	133+60	4	0.001	1	-	-	CS2	HL crack in tile 4' L (West wall)
24	SB Ramp	133+62	4	0.001	1	-	-	CS2	HL crack in tile 4' L (West wall)
25	SB Ramp	133+64	4	0.001	1	-	-	CS2	HL crack in tile 4' L (West wall)
26	SB Ramp	133+68	4	0.001	1	-	-	CS2	HL crack in tile 4' L (West wall)
24	SB Ramp	133+80	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
24	SB Ramp	133+85	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
24	SB Ramp	133+87	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
24	SB Ramp	134+20	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
24	SB Ramp	134+20	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
25	SB Ramp	134+30	5	0.001	1	-	-	CS2	HL crack in tile 5' L (West wall)
25	SB Ramp	134+50	5	0.001	1	-	-	CS2	HL crack in tile 5' L (East wall)
25	SB Ramp	134+52	2	0.001	1	-	-	CS2	HL crack in tile 2' L (West wall)
25	SB Ramp	134+55	5	0.001	1	-	-	CS2	HL crack in tile 5' L (East wall)
26	SB Ramp	134+95	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	SB Ramp	134+95	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
26	SB Ramp	135+12	5	0.001	1	-	-	CS2	HL crack in tile 5' L (East wall)
26	SB Ramp	135+12	5	0.001	1	-	-	CS2	HL crack in tile 5' L (West wall)
26	SB Ramp	135+35	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)
26	SB Ramp	135+35	8	0.001	1	-	-	CS2	HL crack in tile 8' L (West wall)
26	SB Ramp	135+45	8	0.001	1	-	-	CS2	HL crack in tile 8' L (East wall)

Total Cracking (Liner) Element Quantities

Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Cracking (Liners)	SF	68	0	68	0	0

Element 10041 - Concrete Interior walls

Delamination / Spall / Patch Element Quantities

Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Exp Rebar?	Condition State	Field Notes
19	SB	129+60	10	1	10	0.5	Yes	CS3	Spalls w/ exposed reinforcing 12"H x 4" W x 1/2" D over 10' L in cross passageway beneath stairs

Total Delamination / Spall / Patch Element Quantities

Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Delamination / Spall / Patch	SF	10	0	0	10	0

Element 10041 - Concrete Interior walls

Exposed Rebar Element Quantities

Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Exp Rebar?	Condition State	Field Notes
19	SB	129+60	10	1	10	0.5	Yes	CS3	Spalls w/ exposed reinforcing 12"H x 4" W x 1/2" D over 10' L in cross passageway beneath stairs

Exposed Rebar Element Quantities

Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Exposed Rebar	SF	10	0	10	0	0

Element 10051 - Concrete Portal								
Cracking Element Quantities								
Location	Roadway	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Exp Rebar?	Condition State	Field Notes
South Portal	SB	1.75	0.001	1	-	-	CS2	HL cracking on façade 21" L
South Portal	SB Ramp	0.79	0.001	1	-	-	CS2	HL crack 9.5" L crack in SE column façade
North Portal	SB	0.83	0.001	1	-	-	CS2	HL crack 10" L in façade
North Portal	SB	0.50	0.001	1	-	-	CS2	HL crack 6" L in façade
North Portal	SB	1.08	0.001	1	-	-	CS2	HL crack 13" L in façade
North Portal	SB	1.17	0.001	1	-	-	CS2	HL crack 14" L in façade
North Portal	SB	1.00	0.001	1	-	-	CS2	HL crack 12" L in façade

Total Cracking (Liner) Element Quantities							
Deficiency	Unit	Total	CS1	CS2	CS3	CS4	
Cracking (Liners)	SF	7	0	7	0	0	

Element 10051 - Concrete Portal								
Delamination / Spall / Patch Element Quantities								
South Portal	SB	4.50	1.50	7	-	-	CS2	FRP Wrap along bottom of portal face patched area 18" x 54"
South Portal	SB	0.50	0.79	1	-	-	CS3	9.5" W x 6" T delaminated concrete on top portal concrete with HL cracking
South Portal	SB	0.75	5.42	5	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 65"
South Portal	SB	0.75	9.83	8	-	-	CS2	FRP Wrap along bottom of portal face patched area 118" x 9"
South Portal	SB	0.75	3.50	3	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 42"
South Portal	SB	1.67	0.83	2	-	-	CS2	FRP Wrap along bottom of portal face patched area 10" x 20"
South Portal	NB	0.75	12.00	9	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 144"
South Portal	NB	0.50	5.50	3	-	-	CS2	FRP Wrap along bottom of portal face patched area 6" x 66"
South Portal	NB	10.00	0.50	5	-	-	CS2	FRP Wrap along bottom of portal face patched area 6" x 120"
South Portal	NB	2.00	0.50	1	-	-	CS3	6" W x 24" T delamination on west column
North Portal	SB	2.00	0.75	2	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 24"
North Portal	NB	0.75	1.50	2	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 18"
North Portal	NB	0.75	1.83	2	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 22"
North Portal	NB	0.75	4.00	3	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 48"
North Portal	NB	0.75	1.00	1	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 12"
North Portal	NB	0.75	5.00	4	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 60"
North Portal	NB	0.75	1.00	1	-	-	CS2	FRP Wrap along bottom of portal face patched area 9" x 12"

Delamination / Spall / Patch Element Quantities							
Deficiency	Unit	Total	CS1	CS2	CS3	CS4	
Delamination / Spall / Patch	SF	59	0	57	2	0	

Element 10132 - Compression Seal Joint								
Seal Cracking Element Quantities								
Between Unit #	Location	Station	Length (ft)	Width (ft)	Depth (in)	Exp Rebar?	Condition State	Field Notes
3, 4	SB	126+78	0.08	47.00	-	-	CS3	Joint sealant cracking along roof, FW
9, 19	SB	129+54	0.08	47.00	-	-	CS3	Joint sealant cracking along roof, FW
22, 23	SB	131+26	0.08	47.00	-	-	CS3	Joint sealant cracking along roof, FW
24, 25	SB	134+26	0.08	47.00	-	-	CS3	Joint sealant cracking along roof, FW
12, 13	NB	128+54	0.08	49.00	-	-	CS3	Joint sealant cracking along roof, FW
15, 16	NB	129+98	0.08	49.00	-	-	CS3	Joint sealant cracking along roof, FW
24, 25	NB	134+26	0.08	49.00	-	-	CS3	Joint sealant cracking along roof, FW
12, 13	SB Ramp	128+54	0.08	27.00	-	-	CS3	Joint sealant cracking along roof, FW
15, 16	SB Ramp	129+98	0.08	27.00	-	-	CS3	Joint sealant cracking along roof, FW
24, 25	SB Ramp	134+26	0.08	27.00	-	-	CS3	Joint sealant cracking along roof, FW

Total Seal Cracking Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Seal Cracking	FT	416	0	0	416	0

Element 10132 - Compression Seal Joint								
Adjacent Deck or Header Element Quantities								
Between Unit #	Location	Station	Length (ft)	Width (ft)	Depth (in)	Exp Rebar?	Condition State	Field Notes
9, 19	SB	129+54	0.25	1.00	-	-	CS3	Spall 12" T x 8" W x 3" D, exposed drain pipe
15, 16	SB Ramp	129+98	0.33	2.00	0.75	No	CS2	Spall 13" W x 4" L x 3/4" D on north header

Adjacent Deck or Header Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Adjacent Deck or Header	FT	3	0	2	1	0

Element 10158 - Asphalt Wearing Surface								
General Condition Element Quantities								
Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Condition State	Field Notes
1	SB	125+40	43.25	0.02	1	-	CS2	FW transverse pavement crack at tunnel joint between walls at end portal up to 1/4" W
4	SB	126+78	43.25	0.02	1	-	CS2	FW transverse pavement crack at tunnel joint between walls up to 1/4" W
7	SB	128+16	43.25	0.04	2	-	CS2	FW transverse pavement crack at tunnel joint between walls up to 1/2" W
19	SB	129+54	43.25	0.02	1	-	CS2	FW transverse pavement crack at tunnel joint between walls minor spalling up to 1/8" W
23	SB	133+26	43.25	0.02	1	-	CS2	FW transverse pavement crack at tunnel joint between walls minor spalling up to 1/8" W
25	SB	134+26	43.25	0.04	2	-	CS2	FW transverse pavement crack at tunnel joint between walls up to 1/2" W with minor spalling
26	SB	135+20	20.50	0.01	1	-	CS2	20.5' L Transverse pavement crack along end portal between edge lines up to 1/8" W
10	NB	127+10	45.33	0.02	1	-	CS2	FW transverse crack across width of pavement at end portal up to 1/4" W
11	NB	127+58	24	0.50	12	-	CS2	Minor scrapes in pavement from vehicle impact in right lane, approx. 6" wide
12	NB	128+06	24	0.50	12	-	CS2	Minor scrapes in pavement from vehicle impact in right lane, approx. 6" wide
13	NB	128+60	1.50	0.92	2	0.75	CS2	Series of 3 gouges in pavement up to 18" long with 11" total width up to 3/4" deep at lane line
18	NB	131+00	0.08	0.08	1	-	CS2	FW transverse crack across width of pavement at tunnel joint up to 1" W
18	NB	131+38	0.17	0.92	1	0.25	CS2	2" x 11" x 0.25" gouge center lane
19	NB	131+45	0.17	0.83	1	0.25	CS2	2" x 10" x 0.25" gouge center lane
19	NB	131+65	0.10	0.42	1	-	CS2	1.25" x 5" gouge in pavement
19	NB	131+70	0.10	0.71	1	0.25	CS2	1.25" x 8.5" gouge both up to 0.25" deep
20	NB	131+88	45.33	0.02	1	-	CS2	FW transverse crack across pavement width up to 1/4" W
23	NB	133+26	45.33	0.02	1	-	CS2	FW transverse crack across pavement width up to 1/4" W
25	NB	134+26	45.33	0.02	1	-	CS2	FW transverse pavement crack at tunnel joint up to 1 1/2" W
26	NB	135+20	0.75	2.00	2	-	CS2	24" wide, 9" long map cracking
10	SB Ramp	127+10	23.42	0.02	1	-	CS2	FW transverse pavement crack between lane edge lines at tunnel joint, up to 1/4" wide
13	SB Ramp	128+54	23.42	0.02	1	-	CS2	FW transverse pavement crack between lane edge lines at tunnel joint, up to 1/4" wide
23	SB Ramp	133+26	23.42	0.02	1	-	CS2	FW transverse pavement crack between lane edge lines at tunnel joint, up to 1/4" wide
25	SB Ramp	134+26	23.42	0.02	1	-	CS2	FW transverse pavement crack between lane edge lines at tunnel joint, up to 1/4" wide

Total General Condition Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
General Condition	SF	50	0	50	0	0

Element 10158 - Asphalt Wearing Surface								
General Condition Element Quantities								
Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Condition State	Field Notes
20	NB	131+88	2.50	4.25	11.00	-	CS2	51" W x 30" L asphalt patch

Total Effectiveness Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Effectiveness	SF	27	0	27	0	0

Element 10161 - Concrete Traffic Barrier

Delamination / Spall / Patched Area Element Quantities

Within Unit #	Location	Station	Length (ft)	Width (ft)	Depth (in)	Exp Rebar?	Condition State	Field Notes
11	NB	127+60	5.00	0.33	0.25	No	CS2	54" long, 4" wide gouge from vehicle impact on parapet up to 1/4" deep
16	SB Ramp	130+40	1.00	1.75	-	-	CS2	21" high, 8" wide scaling at bottom of barrier JT142

Total Delamination / Spall / Patch Element Quantities

Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Delamination / Spall / Patch	FT	6	0	6	0	0

Element 10952 - Fire Protective Coating							
Effectiveness Element Quantities							
Within Unit #	Location	Station	Length (ft)	Width (ft)	Area (sf)	Condition State	Field Notes
17	NB	130+46	0.58	0.17	1	CS4	Spall at edge of joint 7" W x 2" L x 2" D (Roof)
17	NB	130+50	2.67	1.25	4	CS3	Delaminated area of wall 15" W x 32" T (West wall)
17	NB	130+50	1.00	1.00	1	CS4	1 square foot delaminated are (Roof)
17	NB	130+50	4.00	0.50	2	CS3	Delaminated area on wall 48" long by 24" tall extends 6" on to roof (East wall/Roof)
18	NB	131+35	5.00	2.00	10	CS2	5' L x 2' W loss of coating on fire protection (West wall)
18	NB	131+42	8.00	0.17	2	CS4	Spall at edge of joint 8' W x 2" D x 2" L with exposed wire mesh
16	SB Ramp	130+46	4.00	0.16667	1	CS4	Spall 4' L x 2" T x 1/2" D with exposed wire mesh at top of wall (East wall)
17	SB Ramp	131+14	15.00	2.00000	30	CS2	15' L x 2' W area of 1/8" D gouges due to oscillating tool
22	SB Ramp	133+26	0.50	0.08	1	CS4	Spall at edge of joint 6" L x 1" W 1" D (Roof/East wall)

* Remainder of Fire Protection in CS2 due to extensive map cracking

Total Effectiveness Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Effectiveness	FT	35309	0	35297	6	6

Retaining Walls						
Cracking (Liners) Element Quantities						
Wall Number	Length (ft)	Height (ft)	Depth (in)	Exp Rebar?	Condition State	Field Notes
9	1.00	1.58	-	-	CS2	19" T x 1/4" W crack in façade
9	1.00	2.33	-	-	CS2	HL crack 28" T in façade
9	1.00	3.00	-	-	CS2	HL crack 3' T in façade
9	148.00	1.00	-	-	CS3	Heavy cracking throughout top concrete cap
10	1.00	2.00	-	-	CS2	HL crack 2' T in façade
11	1.00	1.00	-	-	CS2	HL crack 12" T in façade

Total Cracking (Liner) Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Cracking (Liners)	SF	153	0	5	148	0

Retaining Walls						
Delamination / Spall / Patch Element Quantities						
Wall Number	Length (ft)	Height (ft)	Depth (in)	Exp Rebar?	Condition State	Field Notes
6	2.00	0.50	-	-	CS2	21" W x 6" H area of painted over scaling
7	4.00	0.25	3.50	-	CS2	47" L x 3" T x 3.5" D spall in stone façade
10	3.00	0.50	-	-	CS3	Delaminated area 34" W x 6" H
10	3.00	0.50	-	-	CS2	Patched area 36" L x 6" T
11	1.00	0.42	1.50	-	CS2	11" L x 5" T x 1.5" D spall in façade
11	1.00	0.33	0.75	-	CS2	8.5" L x 4" T x 0.75" D spall in top concrete cap

Total Delamination / Spall / Patch Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Delamination / Spall / Patch	SF	14	0	11	3	0

Retaining Walls						
Settlement Element Quantities						
Wall Number	Length (ft)	Height (ft)	Depth (in)	Exp Rebar?	Condition State	Field Notes
11	28.00	-	-	-	CS2	Façade leaning up to 4" from concrete cap, has been tied back and retrofit U-brackets installed as catch

Total Settlement Element Quantities						
Deficiency	Unit	Total	CS1	CS2	CS3	CS4
Settlement	SF	28	0	28	0	0

Approach Roadways							
General Condition Element Quantities							
Approach	Roadway	Length (ft)	Width (ft)	Area (sf)	Depth (in)	Condition State	Field Notes
South Approach	NB	1	0.50	1	-	CS2	12" L x 6" W x 1" D gouge in pavement at roadway centerline

Total General Condition Element Quantities							
Deficiency	Unit	Total	CS1	CS2	CS3	CS4	
General Condition	SF	1	0	1	0	0	

APPENDIX

B

ODOT
TUNNEL
INSPECTION
PLAN

Procedure Description	Frequency											Recommended (Rec.) or Required (Req.) Tunnel Closure Required?	Responsible Party			Comments	Fall 2021 Inspection					
	Weekly	Monthly	Bi-Monthly	Quarterly	Semi-Annually	Annually	Bi-Annually	Tri-Annually	Quinquennial	Req.	Y		Even Year	Odd Year	ODOT		Consultant	3rd Party (Mechanic, Electrician, etc.)	Date Completed	Inspection Comments / Notes	Recommended Repairs / Maintenance	
Portals																						
1 Stone/Veneer Facing Inspection						X								Req.	Y	Even Year	Odd Year		Inspect for cracked, separated/leaning veneer, etc on portals and wingwalls with each structural inspection.	9/11/2021	Isolated locations of masonry veneer cracked or spalled and isolated locations of mortar failure between the edges of the masonry veneer and the concrete portal with up 1/4" wide gaps between mortar and concrete. Retaining wingwalls with isolated missing stones on masonry veneer. Fourth panel from north portal on Wall 11, masonry veneer leaning up to 4" on north side. Saddle catch plates installed.	Monitor leaning masonry veneer.
2 Lintel- Concrete area directly over portal.						X								Req.	Y	Even Year	Odd Year		Inspect for cracks, spalls, loose concrete over traffic. Remove any loose concrete areas over traffic or near traffic during inspection.	9/11/2021	Multiple areas of fiberwrapped patches. On North Portal over right edge line of Northbound Mainline roadway, linear heat detection wire support not reinstalled after fiberwrap installation. Wire sagging into vehicular envelope.	Reinstall linear heat detection wire support.
3 Fence						X								Req.	N	Even Year	Odd Year		Inspect for loose connections, deterioration, sturdiness, etc.	9/11/2021	No deficiencies noted.	None.
4 Capstone						X								Req.	Y	Even Year	Odd Year		Inspect for cracks, spalls, loose concrete over traffic. Remove any loose concrete areas over traffic or near traffic during inspection.	9/11/2021	South Portal over centerline of Southbound Mainline roadway, 9-1/2" wide delaminated area 6" tall on vertical face and extending 10" onto top horizontal face.	Patch delaminated area on South Portal over Southbound Mainline roadway.
Within Vehicular Tunnels																						
1 Tiles					X									Req.	Y	Even Year	Odd Year		Inspect all tiles visually. Using a rubber mallet, Sound tiles near all cracks, joints, or other missing tiles. Remove all unsound tiles with a steel headed hammer and/chisel. Consultant to do this during the one structural inspection. ODOT to do this all other occasions.	9/11/2021	Areas of unsound tiles removed throughout all three tunnel roadways, specifically at expansion joint locations. Delaminated, cracked, or missing tiles are common along joint headers and at isolated locations between joints.	Monitor tiles adjacent to missing tile locations.
2 Fireproofing						X								Req.	Y	Even Year	Odd Year		Inspect fireproofing (white, untiled areas of wall walls). Sound all areas with cracks. Randomly sound other areas. Only remove if displacement is showing or at the direction of the ODOT Project Manager	9/11/2021	Heavy hairline map cracking spaced at 3" to 6" on roof and at 6" to 12" on walls. Isolated locations of delaminated and spalled fireproofing with exposed wire mesh reinforcing.	Monitor fireproofing deterioration.
3 Barrier						X								Req.	N	Even Year	Odd Year		Inspect for accident damage, spalls, snag points, etc.	9/11/2021	Full height hairline cracks spaced at 4'. 54" long by 4" wide by 1/4" deep gouge from impact on east barrier in Northbound Mainline roadway at Station 127+60. Isolated collision scrapes and gouges throughout all barriers. Reflectors mounted to the parapets typically broken or missing.	None.
4 Wearing Surface						X								Req.	N	Even Year	Odd Year		Visually inspect for cracking, spalling, etc. Notify maintenance staff immediately of any potholes that need patched.	9/11/2021	Full width transverse cracks up to 1-1/2" (1/4" typical) at tunnel section expansion joint locations. Isolated gouges up to 3/4" deep.	None.
5 Joints						X								Req.	Y	Even Year	Odd Year		Inspect joints for signs of recent moisture (wetness, staining, etc.), separation or displacement.	9/11/2021	Crack sealer in roof joints at expansion joint locations beginning to crack and is missing at isolated locations. Vertical displacement up to 5/8" noted at joint locations.	Monitor crack sealer in roof joints.
6 Overall Structure						X								Req.	N	Even Year	Odd Year		Much of the structural components/concrete are covered by tile, veneer, etc. Inspection overall structure for signs of structural distress or deterioration such as displacement, contiguous cracking, settlement, spalling, moisture, sinkholes, etc.	9/11/2021	The tunnel liners and interior walls exhibit hairline cracks in the tiles and isolated spalls with exposed reinforcing and delaminated areas, typically adjacent to construction and expansion joint locations. Full height vertical cracks up to 1/16" wide were noted in the interior walls between the Southbound Ramp and Southbound Mainline (wedge room area).	Epoxy inject cracks, patch spalled areas, and monitor areas of water leakage.
7 Miscellaneous overhead items						X								Req.	N	Even Year	Odd Year		Inspect the heat detection wire, conduits, damper doors, and abandoned lane reminder lights to ensure nothing is loose or corroded that could fall onto traffic.	9/11/2021	Linear heat detection wire supports at two locations missing/pulled out. Cracked lense on abandoned lane reminder light removed at one location. Abandoned lane reminder light locations checked for connection.	Reinstall linear heat detection wire supports.
Mechanical / Electrical / Fan / Plenum areas																						
1 Mechanical / Fan Rooms						X								Rec.	N	Even Year	Odd Year		Inspection overall structure for signs of structural distress or deterioration such as cracking, displacement, settlement, spalling, moisture, mold, etc.	9/11/2021	Isolated full height hairline cracks in walls. Standing water noted in access room between fan room and mechanical room.	Monitor water.
2 Electrical Rooms						X								Rec.	N	Even Year	Odd Year		Inspection overall structure for signs of structural distress or deterioration such as cracking, displacement, settlement, spalling, moisture, mold, etc. Check for cracking in area immediately around floor hangers (round columns) over tunnel area.	9/11/2021	Isolated full height cracks up to 1/16" wide in walls. Crack gauge installed on wall between plenum space and electrical room.	Monitor cracks.
3 Plenum Space						X								Rec.	N	Even Year	Odd Year		Inspection overall structure for signs of structural distress or deterioration such as cracking, displacement, settlement, spalling, moisture, mold, etc. Check for cracking in area immediately around floor hangers (round columns) over tunnel area.	9/11/2021	Isolated full height cracks up to 1/16" wide in walls. Crack gauge installed on wall between plenum space and electrical room. No distress noted in roof slab surrounding hangers. Hanger shell pipes have minor surface corrosion at base.	Monitor cracks.
4 Hallways, stairs, passageways.						X								Rec.	N	Even Year	Odd Year		Inspection overall structure for signs of structural distress or deterioration such as cracking, displacement, settlement, spalling, moisture, mold, etc.	9/11/2021	Full height spall (17" wide by 1" deep) with active leakage in north wall at west end of hallway from main access stairs. Hallway between fan room and plenum space with heavy mold/mildew smell. Standing water in southeast stairway to plenum space along east wall. Isolated full height cracks up to 1/16" wide in walls.	Epoxy inject/patch spall with leakage. Monitor cracks areas of standing water.

Procedure Description	Frequency							Recommended (Rec.) Interval (Days)	Recommended (Rec.) Interval (Months)	Recommended (Rec.) Interval (Years)	Responsible Party	Scope/Requirements	Fall 2021 Inspection							
	Weekly	Monthly	Bi-Monthly	Quarterly	Semi-Annually	Annually	Tri-Annually						Biennially	Quinquennial	Recommended (Rec.) Interval (Days)	Recommended (Rec.) Interval (Months)	Recommended (Rec.) Interval (Years)	Date Completed	Inspection Comments / Notes	Recommended Repairs / Maintenance
1.1 Tunnel Closed Notification/Closed Circuit TV																				
1) Clean, align, and focus all cameras after tunnel washing					X					Rec.	Y	0				Manufacturers O&M Manual for CCTV - Not Provided. Recommended maintenance intervals by FHWA.				
2) Test tunnel closed notification system					X					Rec.	Y	0				Recommended maintenance intervals by ODOT.				
1.2 Emergency Lighting - Buildings																				
1) Operate test buttons on emergency light fixtures	X			X						Req.	N	0				Per NFPA 101, section 7.9.3.1) functional testing to be conducted every 3 to 5 weeks (beyond 30 days to be approved by AHJ) OR 2) self-testing/self diagnostic battery-operated automatic test once every 30 days for 30 seconds. A visual inspection at intervals not exceeding 30 days OR 3) Computer-based, self-testing/self-diagnostic battery-operated, automatic test not less than every 30 days for a minimum of 30 seconds.				
2) Operate battery pack for emergency lighting for 90 minutes					X					Req.	N					Per NFPA 101, section 7.9.3.1) If the emergency lighting system is self-testing/self-diagnostic, then the equipment shall be fully operation for the duration of the 90 minutes test OR 2) if the system if computer-based, then the 90 minutes test shall be performed automatically.				
1.3 Electrical Switchboard and Switchgear																				
Manufacturers O&M Manual recommendations: On the circuit breaker molded case there should not be: 1) no traces of grime (grease), excessive dust or condensation which all reduce insulation. 2) no signs of burns or cracks which could weaken the case and thus its capacity to withstand short-circuits. Preventative maintenance recommendation for molded case : 1) A visual inspection of its condition and cleaning with a dry cloth or a Q14vacuum cleaner. All cleaning products with solvents Q14are strictly forbidden. 2) Measuring the insulation every five years and following trips due to a short-circuit. Replace the circuit breaker if there are signs of burns or cracks. The arc chutes must be regularly checked. The fins of the arc chutes may be blackened (due to the gases produced at in) but must not be significantly damaged. What is more, the filters must not be blocked to avoid internal overpressures. Use a vacuum cleaner rather than a cloth to remove dust from the outside of the arc chutes. Regular operation is required to maintain the normal performance level of each part involved in the opening and closing cycles. In installations where power circuit breakers are used in source changeover systems, it is advised to periodically operate the circuit breaker for the alternate source. Preventative maintenance for MX and XF shunt releases and MN undervoltage release consists of periodically checking operation at minimum values. Auxiliary wiring must be regularly checked and replaced as needed, particularly if there are vibrations, high ambient temperatures or corrosive atmospheres. Periodic checks on the spring charging motor operation and the charging time are required to ensure the device function. To ensure correct operation of electronic trip unit , it is necessary to periodically check: • the chain of action resulting in a trip • the response time as a function of the level of the fault current. Periodic checks on the orders (read, write, commands) transmitted by the communication bus are required to maintain a high degree of reliability and confidence in the communication system. If fixed circuit breaker connections are not made with Schneider Electric recommendations (tightening torque, hardware, and contact washer), then regularly check the temperature-rise points. If there is a change in color of copper or tinning: • dismantle the connections • clean and scrape the contact surfaces • then reassemble the connections using new hardware. Check the terminals. Drawout circuit breakers connections require periodic cleaning. Always inspect the switchboard after a fault. General switchboard inspection and cleaning: 1. Vacuum the switchboard interior to remove any dirt or dust deposits. Wipe all bus bars, insulators, cables, etc., with a clean, dry, lint-free cloth. 2. Check the switchboard interior carefully for moisture, condensation build-up, or signs of any previous wetness. Inspect all conduit entrances and cracks between the enclosure panels for dripping leaks. Take the necessary steps to eliminate the moisture and seal off all leaks. 3. Inspect the switchboard for any signs of overheating. Discoloration and flaking of insulation or metal parts are indications of overheating. 4. Check for signs of rodent nesting in the switchboard. 5. Carefully inspect all devices for any visibly worn-out, cracked, or missing parts. 6. Manually open and close switches and circuit breakers several times to verify they are working properly. 7. Verify that all key interlocks and door interlocking provisions are working properly. Bus Bar Joints, Lug Terminations, and Insulating Materials 1. Bus bar joints are maintenance-free. Do not retighten them after the pre-energizing checkout procedure is complete. 2. Check all bus bar joints and terminal lugs for any pitting, corrosion, or discoloration resulting from high temperatures or subject to high fault conditions. If any damage has occurred, replace the bus bars or lugs. If cleaning is required, use Lectra-Clean®, made by CRC. 3. Inspect all insulating materials. Before re-energizing the switchboard, replace insulators with any visible damage (such as cracks). Bolt-Loose switch maintenance: 1. Exercise the operating mechanism at least once a year to ensure proper operation. 2. The Bolt-Loose switch is shipped from the factory properly lubricated. Periodic cleaning and lubrication of the switch is required. The maintenance interval between lubrications depends on factors such as usage and ambient conditions. The maximum recommended maintenance interval is one year for current-carrying parts and five years for operating mechanisms. Exercise circuit breakers at least once a year to ensure proper operation. For general maintenance: 1. Trip the circuit breaker by pushing the Push-To-Trip or "Open" button located on the face of the circuit breaker. Refer to the appropriate circuit breaker manual for the specific location of this button. 2. Manually open and close the circuit breaker two to three times. QMB/QM/QMG81 Fusible Switches 1. Periodically exercise the switch to ensure proper operation. This period should not exceed one year. 2. Check the cover interlock with the switch in the ON position. The cover should not open using normal hand force. 3. Inspect the switch interior for any damaged or cracked parts, and replace as necessary. 4. For fusible switch units, check the fuse mounting clips or bolted contact area for corrosion or discoloration (indicating overheating). Replace them if necessary. 5. For additional maintenance instructions, see the label on the inside of the door. After the equipment in switchgear has been lubricated, perform the following steps: 1) Inspect all components for cracks, loose parts, and weather or chemical damage. 2) If cracks or strain damage are suspected, remove the unit from service. If cracked components are detected, replace them before returning unit to use. 3) Periodically check for distortion of the travelling lifter. If distortion is found: - Verify that the rails and sections are aligned. - Verify that the carriage and winch mechanism have been installed correctly. - Verify that the cable has been fastened securely to the winch drum. - Verify that the gears are well lubricated. NOTE: For normal operation, use a heavy gear lubricant. In very dirty or gritty conditions, it is advisable to use a dry lubricant such as dry grease to lubricate the gears. Never allow the gears to run dry. 4) If applicable, remove handling means and any obstructions from the top of the unit that could inhibit operation of the																				
1) Inspect switchgear bus and connections by infrared scanning				X						Rec.	N									
2) Perform ultrasonic inspection of medium voltage switchgear bus supports, insulators, and barriers				X						Rec.	N									
3) Visually inspect all equipment for unusual conditions				X						Rec.	N									
4) Check tightness of all connections				X						Rec.	N									
5) Review results of last visual, infrared, and ultrasonic inspection				X						Rec.	N									
6) After power shutdown, clean entire switchgear interior				X						Rec.	N									
7) Clean all bus insulators and check for cracks and chips				X						Rec.	N									
8) Clean, lubricate (if applicable), and verify operation of all control switches, auxiliary relays, and devices				X						Rec.	N									
9) Clean, lubricate, adjust, and add anti-oxidant grease to contacts of all disconnect switches				X						Rec.	N									
10) Clean and perform insulation resistance testing on all lighting arrestors				X						Rec.	N									
11) Perform insulation resistance testing on any bus bars				X						Rec.	N									
12) Perform calibration test and verify proper operation of all meters				X						Rec.	N									
Low Voltage Air Circuit Breakers																				
13) Remove covers and thoroughly clean each breaker and contact surfaces				X						Rec.	N									
14) Apply anti-oxidant grease to breaker's main contacts				X						Rec.	N									
15) Lubricate and verify operation of all mechanisms				X						Rec.	N									
16) Apply current equal to 90 to 110 percent of the breaker trip coil setting to verify proper pick-up of tripping mechanism				X						Rec.	N									
17) Record trip times for long-time, short-time instantaneous, and ground fault breakers when passing loads equal to multiples of their listed ratings through each phase of the breaker				X						Rec.	N									
18) Measure contact resistance and adjust where possible				X						Rec.	N									
19) Perform and record results of insulation resistance test from each pole to other two poles and to ground				X						Rec.	N									
20) Clean and lubricate breaker carriage and racking mechanism on any draw out breakers				X						Rec.	N									
Molded Case Circuit Breakers																				
21) Inspect breaker for proper installation				X						Rec.	N									
22) Remove cover (if possible) and fully clean interior and exterior				X						Rec.	N									
23) Inspect for burning, overheating, wear, and proper alignment				X						Rec.	N									
24) Perform contact resistance and insulation resistance measurements and test element				X						Rec.	N									
25) Apply current equal to 300 percent of breaker rating to test the long-time element				X						Rec.	N									
26) Test and compare any breakers with instantaneous trip units to manufacturer's characteristic curve				X						Rec.	N									
Automatic Transfer Switch (600 Volt Class)																				
27) After total outage is obtained, clean all contact surfaces, apply anti-oxidant contact grease, measure and record contact resistance, and make any adjustments if necessary				X						Rec.	N									
28) Lubricate bearings, links, pins, and cams				X						Rec.	N									
29) Perform insulation resistance test				X						Rec.	N									
30) Test all settings of voltage, frequency sensing, and timing relays				X						Rec.	N									
Low Voltage Insulated Cable (Less Than 600 Volts)																				
31) Check all cable terminations for tightness				X						Rec.	N									
32) Perform and record results of insulation resistance test from each phase to the other two and to ground for one minute using a test voltage of 1,000 volts				X						Rec.	N									
33) Direct Current (DC). Compare results with previous test.				X						Rec.	N									

Procedure Description	Frequency							Recommended (Rec.) Not Recommended (Nec.) Not Done (NCD) Required?	Responsible Party	Scope/Requirements	Fall 2021 Inspection		
	Weekly	Monthly	Bi-Monthly	Quarterly	Semi-Annually	Annually	Tri-Annually				Biennially	Quinquennial	Date Completed
1.4 Masterpanel NT and NW Circuit Breakers													
Case													
1] Measure insulation resistance						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Device													
Check the general condition of the device (accessory cover, trip unit, case, cradle, connections)						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Mechanism													
3] Open/close device manually and electrically						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
4] Charge device electrically						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
5] Check complete closing of device's poles						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
6] Check number of device operating cycles						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
7] Check spring charging motor charging time at 0.85 of rated voltage						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
8] Check general condition of mechanism						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
9] Check tripping forces (trapezoid shaped part)						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Breaking Unit (Arc Chutes + Contacts)													
10] Check the filters cleanliness and the attachment of the arc-chute						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
11] Check condition of breaking unit						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
12] Measure resistance of input/output contact						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Control Accessories													
13] Check auxiliary wiring and insulation						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
14] Check operation of indication contacts (OF / PF / MCH)						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
15] Check closing operation of control auxiliary XF						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
16] Check opening operation of control auxiliary MX at 0.70 of rated voltage						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Check operation of control auxiliary MN/MNR between 0.35 and 0.7 of rated voltage						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
17] voltage						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
18] Check delay of MNR devices at 0.35 and 0.7 of rated voltage						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
19] Check MX tripping time						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
20] Check the service life of the accessories XF, MX, MN						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
21] Preventative replacement of control accessories						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Trip Unit													
22] Trip trip unit using test tool and check operation of contacts SDE and SDE2						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
23] Check ground fault protection function (Micrologic 6.0)						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Check tripping curves using test tool, signaling LED (tripped, overload). Save results on PC						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
24] results on PC						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
25] Check continuity of the tripping chain by primary injection for each phase						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Device Locking													
26] Open and close keylocks installed on device						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
27] Open and close padlock system installed on device						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Cradle (For Drawout Circuit Breakers)													
28] Remove device from cradle and put it back						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
29] Check operation of position contacts (CE, CT, CD, EF)						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
30] Check operation of safety shutters						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
31] Remove dirt and any foreign material, then regrease cradle						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Regrease disconnecting contact clusters (specific case of corrosive atmosphere)						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
32] atmosphere						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
33] Check connection/disconnection torque						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
34] Clean and regrease racking screw						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Cradle Locking													
35] Open and close keylocks installed on cradle						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
36] Operate padlocking system						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
Power connections													
37] Check and tighten loose connections						X			Rec. N	Elec	Manufacturers O&M Manual recommended maintenance intervals.		
1.5 Electrical Transformer 480/208V													
Dry-Type (All transformers)													
1] Inspect transformer connections by infrared scanning						X			Rec. N	Elec	FHWA Recommended maintenance intervals.		
Perform ultrasonic inspection of medium voltage bus supports, insulators, and barriers						X			Rec. N	Elec	FHWA Recommended maintenance intervals.		
2] Visually inspect all equipment for unusual conditions						X			Rec. N	Elec	FHWA Recommended maintenance intervals.		
3] Test transformer and circuit breaker insulating oil						X			Rec. N	Elec	FHWA Recommended maintenance intervals.		
4] Test transformer and circuit breaker insulating oil						X			Rec. N	Elec	FHWA Recommended maintenance intervals.		
Remove cover and visually inspect all cable/bus connections for evidence of overheating or burning, check for tightness and clean windings						X			Rec. N	Elec	O&M Manual recommendation for dry location 1. Perform routine inspections, maintenance, and testing after any severe electrical short circuit, ground fault, or environmental event (e.g., flooding) to determine the operational status of the transformer. 2. Perform the inspections, maintenance and testing if the transformer has been out of service for an extended period of time. Place strip heaters to maintain the transformer temperature above ambient to prevent condensation from forming in the transformer during extended down time.		

Procedure Description	Frequency							Recommended (Rec.) to Tunnel (Close) Required?	Responsible Party	Scope/Requirements	Fall 2021 Inspection									
	Weekly	Monthly	Bi-Monthly	Quarterly	Semi-Annually	Annually	Tri-Annually				Biennially	Quinquennial	Rec.	N	O	C	Elec	Date Completed	Inspection Comments / Notes	Recommended Repairs / Maintenance
1.6 Fire Alarm System																				
1. Open primary power supply to fire alarm panel and note sounding of trouble alarm and light	X					X			Rec.	N	O			Elec			FHWA recommendation			
2. Perform fire drill by user of drill switch on fire alarm panels, and check that all visual and audible signal emit a sound and tunnel SCADA system (if any) receives alarm	X					X			Rec.	N	O			Elec			FHWA recommendation			
3. Clean all smoke and heat detector housings and check battery voltage under load						X			Rec.	Y				Elec			FHWA recommendation			
4. Verify that proper alarm devices operate for the appropriate initiating device circuit						X			Rec.	N				Elec			FHWA recommendation			
5. Check all lamps, alarm devices, and printers for proper operation				X		X			Rec.	N	O			Elec			FHWA recommendation			
6. Visually inspect control panels						X			Req.	N				Elec			Per NFPA 72, table 14.3.1			
7. Visually inspect fire alarm control batteries	X					X			Req.	N	O			Elec			Per NFPA 72, table 14.3.1			
8. Visually inspect fiber optic connections						X			Req.	N				Elec			Per NFPA 72, table 14.3.1			
9. Visually inspect remote annunciators						X			Req.	N				Elec			Per NFPA 72, table 14.3.1			
10. Visually inspect duct detectors						X			Req.	N				Elec			Per NFPA 72, table 14.3.1			
11. Visually inspect HVAC control dampers						X			Rec.	N				Elec			Manufacturer O&M Manual recommendation			
12. Visually inspect tunnel linear heat detectors						X			Req.	Y				Elec			Per NFPA 72, table 14.3.1			
13. Visually inspect waterflow and tampers				X		X			Rec.	Y	O			Elec			Manufacturer O&M Manual recommendation			
14. Visually inspect alarm notification appliances						X			Req.	N				Elec			Per NFPA 72, table 14.3.1			
15. Visually inspect dialers to remote control center						X			Rec.	N				Elec			Manufacturer O&M Manual recommendation			
16. Visually inspect manual fire alarm boxes						X			Req.	N				Elec			Per NFPA 72, table 14.3.1			
17. Visually inspect carbon monoxide detectors/systems						X			Req.	Y				Elec			Per NFPA 72, table 14.3.1			
18. Test control panels						X			Req.	N				Elec			Per NFPA 72, table 14.3.2			
19. Test secondary (standby) power supply						X			Req.	N				Elec			Per NFPA 72, table 14.3.2			
20. Test UPS (if dedicated to the system used)						X			Req.	N				Elec			Per NFPA 72, table 14.3.2			
21. Test manual fire alarm boxes						X			Req.	N				Elec			Per NFPA 72, table 14.3.2			
22. Test tunnel carbon monoxide detectors/systems						X			Req.	Y				Elec			Per NFPA 72, table 14.3.2			
23. Test fire alarm control panel batteries						X			Rec.	N				Elec	9/11/2021	FACP Batteries: The two FACP batteries that were found to be	Replace the two dead FACP batteries.			
24. Test fiber optic connections						X			Rec.	N				Elec			Manufacturer O&M Manual recommendation			
25. Test duct detectors						X			Rec.	N				Elec			Manufacturer O&M Manual recommendation			
26. Test HVAC control dampers						X			Rec.	N				Elec			Manufacturer O&M Manual recommendation			
27. Test tunnel linear heat detectors						X			Req.	Y				Elec			Per NFPA 72, table 14.3.2			
28. Test waterflow and tampers						X			Rec.	N				Elec			Manufacturer O&M Manual recommendation			
29. Test dialers to remote control center						X			Rec.	N				Elec			Manufacturer O&M Manual recommendation			
1.7 Tunnel Lights																				
1. Verify proper operation of the lighting fixtures in the tunnel areas	X					X			Rec.	Y	O						Recommended maintenance intervals by FHWA.			
	X					X			Rec.	Y	O	C					1. At the time of inspection, each fixture was found to be operational. A single fixture was found to have a protective film over it. 2. The luminance meter was not operational nor communicating with the lighting contactor panel, with the meter reading "0 CD/m	1. Remove protective film from the 61st fixture from the south end in the bottom row along west wall of the Southbound mainline. 2. Investigate luminance meters not communicating with lighting contactor panels and repair.		
2. Count and record number of lights out on night lighting and day lighting						X			Rec.	Y	O				9/11/2021					
3. Replace any inoperable components	X					X			Rec.	Y	O			Elec			Recommended maintenance intervals by FHWA.			
4. Pressure wash clean the exterior of lenses on all lighting fixtures in the tunnel.						X			Rec.	Y	O			Elec			Recommended maintenance intervals by FHWA.			
5. If required clean interior of lenses						X			Rec.	Y	O			Elec			Recommended maintenance intervals by FHWA.			
6. Perform group replacement for any luminaires that have failed						X			Rec.	Y				Elec			Recommended maintenance intervals by FHWA.			
7. Replace real time clock battery for the controller						X			Rec.	Y				Elec			Manufacturer O&M Manual recommendation			
1.8 SCADA																				
1. Visually inspect equipment and verify functionality						X			Rec.	N			C		9/11/2021	Check signals from by PLC/SCADA are received for fan operation, CO detection. Confirm that detection is properly relayed through the SCADA system to the Cincinnati Fire Department and ODOT's TMC.	Re-establish PLC/SCADA for fan operation, CO detection. Confirm detection is properly relayed through the SCADA system to the Cincinnati Fire Department and ODOT's TMC.			
1.9 Soft Starters																				
1. Visually inspect equipment and verify functionality						X			Rec.	N		C			9/11/2021	Soft starter #3 pilot light is broken	Replace pilot light			
1.10 Panelboards																				
1. Visually inspect equipment and verify functionality						X			Rec.	N		C			9/11/2021	Panelboard S-EM has tape covering exposed bus instead of proper space covers	Replace the taped used on Panelboard S-EM with manufacturer specific filler plates.			
1.11 UPS																				
1. Visually inspect equipment and verify functionality						X			Rec.	Y		C			9/11/2021	The 30 KVA UPS system and associated battery racks appear	None.			

Procedure Description	Frequency						Recommended (Rec.) or Required (Req.)	Tunnel Closure Required?	Responsible Party			Comments	Fall 2021 Inspection				
	Weekly	Monthly	Bi-Monthly	Quarterly	Semi-Annually	Annually			Tri-Annually	Quinquennial	ODOT		Consultant	3rd Party (Mechanic, Electrician, etc.)	Date Completed	Inspection Comments / Notes	Recommended Repairs / Maintenance
	2.1 TVS Axial Fans																
<i>Axial Fans</i>																	
1 Operate fans and motor-operated dampers and listen for unusual noises				X				Rec.	N	O	C		9/11/2021	No unusual noises noted during operations.	None.		
2 Check for undue vibration.				X				Rec.	N	O	C		9/11/2021	No undue vibration noted during operations.	None.		
3 Operate fans and motor-operated dampers in all configurations.						X		Rec.	N		C	Mech.	9/11/2021	A full SCADA check should be performed.			
4 Fans should be inspected to ensure that there is no build-up of dirt or other matter that would cause overheating of the motor or obstruct the impeller track.						X		Rec.	N		C		9/11/2021	Cleaning can be done with air or, preferably with a soft brush and vacuum. All connections and fastenings – bolts, clamps etc should be checked to ensure nothing is loose.	No build-up of dirt or debris noted.	None.	
5 Check all bolts for tightness.						X		Rec.	N		C	Mech.		The bolts to be checked include, canvas connector, fan housing split, duct transition split, duct transition to actuator, fan vibration isolators. Also included are checking the locking collar bolts between the rotor hub and the shaft: verify to a torque rating of 105 lbs. Impeller blades hub cap bolts: verify to a torque rating of 220 ft-lb. Decoder that is attached to the shaft with a locking collar should be verified to be between 25 and 35 in-lbs torque.			
6 Inspect inside and outside of housing and impeller for wear, deterioration, or build-up of material.						X		Rec.	N		C		9/11/2021	Minor surface corrosion on impeller hardware observed	None.		
7 Verify damper interlocks and operates properly through all positions.				X				Rec.	N	O	C		9/11/2021	Qualified ODOT or consultant staff may perform this function.	The dampers were found to be in good	Inspect damper 4 and actuator on TV-2;	
8 The locking collar between the rotor hub and the shaft has locking screws that should be verified to a torque rating of 105 ft/lb.						X		Rec.	N		C	Mech.					
9 The impeller blades are held in place to the hub by cap bolts that should be verified to a torque rating of 220 ft/lb.						X		Rec.	N		C	Mech.					
10 The decoder is attached to the shaft with a locking collar that should be verified to be between 25-35 inches/lb.						X		Rec.	N		C	Mech.					
11 Check steel strength and visually inspect grating for ventilation opening in Lytle Park.							X	Rec.	N		C	Mech.					
12 Check air flow measurements in each of the tunnels.							X	Rec.	Y		C		9/11/2021	Air flow in tunnel bores sufficient.	None.		

Procedure Description	Frequency							Recommended (Rec.) or Required (Req.)	Tunnel Closure Required?	Responsible Party			Comments	Fall 2021 Inspection		
	Weekly	Monthly	Bi-Monthly	Quarterly	Bi-Annually	Tri-Annually	Quinquennial			ODOT	Consultant	3rd Party (Mechanic, Electrician, etc.)		Date Completed	Inspection Comments / Notes	Recommended Repairs / Maintenance
<i>Fan Motor</i>																
13 Check and record bearing and winding temperatures.				X				Rec.	N	O	C		If elevated temperature readings are found, investigate equipment condition and/or lubricant condition and level. Qualified ODOT or consultant staff may perform this function.	9/11/2021	Temperatures normal, no elevated temperatures noted.	None.
14 Clean up of fan motor.					X			Rec.	N		C		Clear away the dust and dirt on outside surface of enclosure and measure insulation resistance.	9/11/2021	Grease leakage from the back motor bearing on TV-1 and Tv-3 was observed.	Monitor grease leakage.
15 Check connecting terminals.						X		Rec.	N			Mech.	Check the connecting bolts (nuts) in terminal box to see whether connecting bolts (nuts) are loose or not. Replace them when necessary. Check the connecting terminals in the terminal box. The connecting terminals in the terminal box should not only be checked for correct tightness but a thermal scan can be taken and printed to verify all crimped terminal ends are correct. The thermal scan will be performed at the end of the day following run testing.			
16 Check the bolts (nuts).						X		Rec.	N			Mech.	Check earthing bolts (nuts), fastening bolts on end shield and internal and external bearing covers, connection of ground lead and setting. External bearing cover bolts can be checked on the external and (decoder end), internal (fan shaft end) are obstructed by the fan hub and axial blades (2,000 lbs.) cannot be easily checked.			
17 Check bearing.							X	Rec.	N			Mech.	Dismounting bearing cap, check whether the grease in bearings has been dirty and dried up or not. It should be replenished as required if there is short of grease. Replace the bearings when necessary. High temperature grease must be adopted according to the motor data sheet. The motor bearing cap is attached to the motor casing. The internal (fan shaft end) is obstructed by the fan hub and axial blades (2,000 lbs.) and cannot be easily removed. The external (RPM decoder end) is less difficult but the bearing is pressed into the motor end housing and very little can be accomplished by just inspecting the outer surface. We suggest that the grease be renewed biannually by removal of the bearing relief plug on the bottom of the bearing housing on the motor. Then flush new grease through the bearing until fresh grease is witnessed at the relief port in the capture vessel. This will be performed at a bi-annual frequency.			
18 Check the appearance of motors to see whether it has been damaged. Clear away dust and dirt and repair damaged sections.					X			Rec.	N			Mech.	Yearly maintenance or overhaul consists of quarterly maintenance or routine repair.			
19 Check windings.						X		Rec.	N			Elec.	a) Measure insulation resistance on all live parts with a megger and the insulation resistance value should be larger than 1MΩ.			
20 Bearing purge and grease renewed.						X		Rec.	N			Mech.	a) High temperature grease must be adopted according to the motor data sheet. b) The motors are supplied with loose leads. Where a terminal box is fitted, all cable terminations should be tightly secured.			
21 Motor internal space heater: The amp draw should be verified on the 110V circuit. Record and review record for consistency.							X	Rec.	N			Mech.				
22 Vibration transmitters on fans: test and record amplitude. Review records for consistency and any aberrations.							X	Rec.	N			Mech.				

Procedure Description	Frequency							Recommended (Rec.) or Required (Req.)	Tunnel Closure Required?	Responsible Party			Comments	Fall 2021 Inspection			
	Weekly	Monthly	Bi-Monthly	Quarterly	Annually	Bi-Annually	Tri-Annually			Quinquennial	ODOT	Consultant		3rd Party (Mechanic, Electrician, etc.)	Date Completed	Inspection Comments / Notes	Recommended Repairs / Maintenance
2.2 Isolation Dampers																	
<i>Fan Isolation Dampers</i>																	
1 Operate motor-operated dampers and listen for unusual noises and vibrations				X						Rec.	N	O	C	Perform operational checkout (including cycle testing – opening and closing the damper a few times under electrical power) and verify position status with the main control panel – This can be waived if dampers are cycled on a daily basis during normal use. Qualified ODOT or consultant staff may perform this function. Mechanical contractor to adjust as required.	9/11/2021	The dampers were found to be in good condition only exhibiting areas of superficial corrosion or deterioration. Fan damper 4 on TV-2 did not open when activated.	Inspect damper 4 and actuator on TV-2; determine the root cause of failure. Replace necessary parts
2 Check bearings for wear and dampers for debris.				X						Rec.	N	O	C	Visual inspection only. Qualified ODOT or consultant staff may perform this function.	9/11/2021	No deficiencies noted.	None.
3 Clean damper blades and linkages.					X					Rec.	N			Mech. Clean dirt and debris from the damper and actuators.			
4 Visually inspect dampers and actuators for the build up of dirt, debris, wear and corrosion.					X					Rec.	N		C	In general, the dampers must be kept clean and free from foreign matter that may impede normal movement and/or seating of the blades and seals. Therefore, dampers should be cleaned and inspected for general physical and mechanical condition. This inspection should include checking the mechanical tightness of bolted connections, visual inspection for the buildup of dirt or debris that may prevent damper closure and a general inspection for any obvious maintenance.	9/11/2021	No deficiencies noted.	None.
5 Inspect jamb and blade seals for damage and proper sealing.				X						Rec.	N		C		9/11/2021	No deficiencies noted.	None.
6 Inspect the dampers for premature corrosion.				X						Rec.	N		C		9/11/2021	No deficiencies noted.	None.
7 Check tightness of mechanical connections					X					Rec.	N			Mech. Manually check all the fasteners to ensure they are still tight. This can be done by checking with hands only. Generally if a fastener is loose, this will be a noticeable check. Tighten all fasteners as necessary.			
8 Test internal actuator heater						X				Rec.	N			Mech. Each actuator has an internal heater supplied by a separate 110 volt circuit. These will be tested and amp draw recorded annually to assure proper operation.			
<i>Southbound Tunnel Dampers</i>																	
9 Operate motor-operated dampers and listen for unusual noises and vibrations.				X						Rec.	N	O	C	Perform operational checkout (including cycle testing – opening and closing the damper a few times under electrical power) and verify position status with the main control panel – This can be waived if dampers are cycled on a daily basis during normal use. Qualified ODOT or consultant staff may perform this function. Mechanical contractor to adjust as needed.	9/11/2021	No deficiencies noted.	None.
10 Check bearings for wear and dampers for debris.				X						Rec.	N	O	C	Qualified ODOT or consultant staff may perform this function.	9/11/2021	No deficiencies noted.	None.
11 Clean damper blades and linkages.					X					Rec.	N			Mech. Clean dirt and debris from the damper and actuators.			
12 Visually inspect dampers and actuators for the build up of dirt, debris, wear and corrosion					X					Rec.	N		C	In general, the dampers must be kept clean and free from foreign matter that may impede normal movement and/or seating of the blades and seals. Therefore, dampers should be cleaned and inspected for general physical and mechanical condition. This inspection should include checking the mechanical tightness of bolted connections, visual inspection for the buildup of dirt or debris that may prevent damper closure and a general inspection for any obvious maintenance.	9/11/2021	No deficiencies noted.	None.
13 Inspect jamb and blade seals for damage and proper sealing.				X						Rec.	N		C		9/11/2021	No deficiencies noted.	None.
14 Inspect the dampers for premature corrosion.				X						Rec.	N		C		9/11/2021	No deficiencies noted.	None.
15 Check tightness of mechanical connections					X					Rec.	N			Mech. Manually check all the fasteners to ensure they are still tight. This can be done by checking with hands only. Generally if a fastener is loose, this will be a noticeable check. Tighten all fasteners as necessary.			
16 Test internal actuator heater						X				Rec.	N			Mech. Each actuator has an internal heater supplied by a separate 110 volt circuit. These will be tested and amp draw recorded annually to assure proper operation.			
<i>Coffin Dampers (Damper Doors)</i>																	
17 Operate motor-operated dampers and listen for unusual noises and vibrations.				X						Rec.	N	O	C	Perform operational checkout (including cycle testing – opening and closing the damper a few times under electrical power) and verify position status with the main control panel. Qualified ODOT or consultant staff may perform this function.	9/11/2021	No unusual noises noted during operations.	None.
18 Grease bearings using a lithium or lithium complex grease for bearing lubrication.						X				Rec.	N	O	C	Qualified ODOT or consultant staff may perform this function. Flush grease annually and replace.			
19 Chains are to be lubricated with SAE 10W 40 oil.				X			X			Rec.	N	O		Mech. Qualified ODOT or consultant staff may perform this function. Check lubrication quarterly regrease bi-annually.			
20 Visually inspect diversion walls and blades within opening of 3rd street tunnel.				X						Rec.	N	O	C	Qualified ODOT or consultant staff may perform this function.	9/11/2021	No deficiencies noted.	None.
21 Strength testing of steel blades in the 3rd street ramp ventilation opening.								X		Rec.	Y			Mech. Qualified ODOT or consultant staff may perform this function.			
22 Check actuator performance.				X						Rec.	N	O	C	Covers should not be removed during routine maintenance. Qualified ODOT or consultant staff may perform this function.	9/11/2021	No deficiencies noted.	None.
23 Actuator battery replacement.								X		Rec.	N			Mech. Refer to ROTORK maintenance manual for procedures. Initial replacement to occur in Spring 2018 as existing life of battery is unknown.			

Procedure Description	Frequency						Recommended (Rec.) or Required (Req.)	Tunnel Closure Required?	Responsible Party			Comments	Fall 2021 Inspection					
	Weekly	Monthly	Bi-Monthly	Quarterly	Semi-Annually	Annually			Bi-Annually	Tri-Annually	Quinquennial		ODOT	Consultant	3rd Party (Mechanic, Electrician, etc.)	Date Completed	Inspection Comments / Notes	Recommended Repairs / Maintenance
2.3 Carbon Monoxide Detection System																		
1 Visual inspection				X					Rec.	Y	O	C		9/11/2021	The two north bore air quality monitors were found to have an error message displayed. The air quality monitors in the south bore and south ramp, appeared to be working properly and displayed 0ppm.	The error on the two north bore monitors should be investigated and cleared by a qualified technician. Repairs should be made if determined necessary by the technician.		
2 Zero Calibration.				X					Rec.	Y		Mech.			Calibration and maintenance is carried out using a Magnetic Wand, this allows a single user to undertake routine maintenance without needing to access internal components.			
3 Span Calibration				X					Rec.	Y		Mech.						
4 Check signal read by PLC/SCADA.				X					Rec.	Y		C		9/11/2021	Readings showed up accurately at the tunnel SCADA terminal.	None.		
2.4 Standpipe																		
1 Fire Department Connections Capped and Clear				X					Req.	N		C		9/11/2021	FDC capped and clear during inspection.	None.		
2 Confirm threads are undamaged and caps in place.				X					Req.	Y		C		9/11/2021	No deficiencies noted.	None.		
3 Confirm top nut and caps are tight but not over-torqued.				X					Req.	Y		Mech.						
4 Operate all control valves by closing and opening low point drains.				X					Req.	Y		Mech.						
5 Drain all low point drains.				X					Req.	Y		Mech.						
6 Inspect piping, hose connections and couplings.									Req.	Y		C		9/11/2021	During the inspection the standpipe system underwent a hydrostatic test per NFPA 25. The system held pressure at 200psi for 2hrs. The most common standpipe defects observed are listed below. -Corrosion on Fire Hose Valve (FHV) wheel -Missing FHV caps -Unattached FHV cap chains -Corrosion on pipe threads at FHV -Corrosion on 2.5" galvanized branch pipe to FHV -Significant corrosion on standpipe risers, including widespread surface rust and pitting on piping, valves, pipe hangers and couplings. -Pipe labels not long affixed to riser pipes.	1. Replace all standpipe pipe labels 2. Replace all fire hose valve wheels 3. Replace missing fire hose valve caps 4. Reattach all fire hose valve cap chains		
7 Test flow hydrant.				X					Req.	N		Other			This element is the responsibility of the City.			
8 Hydrostatic testing of the system.							X		Req.	Y		Mech.			Cincinnati Fire Department should be invited to witness this test.			
2.5 Soundproofing																		
Fan Sound Attenuation																		
1 Visually inspect fan sound attenuators for the build up of dirt, debris, wear and corrosion.				X					Rec.	N		C		9/11/2021	No deficiencies noted.	None.		
Soundproofing Boards																		
1 Visually inspect fan soundproofing boards for the build up of dirt, debris, wear and corrosion.				X					Rec.	N		C		9/11/2021	No deficiencies noted.	None.		
2.6 HVAC																		
Commercial Electric Unit Heater																		
1 Check the tightness of all visible bolts and nuts, in particular the support structure bolts and nuts. Similarly check the motor mounting bolts located in the top and back of the heater case.				X					Rec.	N		Mech.			Potentially lethal voltages are present. Be sure to lock the branch circuit disconnect switch in the OFF position and tag the circuit "Out for Maintenance" before working on this equipment.			
2 Check the motor, fan, discharge openings, intake openings, heating elements and control compartment for cleanliness.				X					Rec.	N		Mech.			If necessary, clean by using a vacuum or compressed air. Be careful not to bend the fan blade propeller.			
3 Check that the electric motors are permanently lubricated and thermally protected.				X					Rec.	N		Mech.						
4 Inspect all terminal connections, contactor and conductor insulation for damage, looseness, fraying, etc., as applicable. Tighten any loose terminals and replace or repair wire with damaged or deteriorated insulation.				X					Rec.	N		Mech.			Badly pitted, welded together, or burned shall be replaced.			
Fans																		
5 All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.				X					Rec.	N		Mech.						
6 Motor maintenance is generally limited to cleaning and lubrication (where applicable).				X					Rec.	N		Mech.						
7 Motors supplied with grease fittings should be greased in accordance with manufacturer's recommendations.				X					Rec.	N		Mech.			Where motor temperatures do not exceed 104°F (40°C), the grease should be replaced after 2000 hours of running time as a general rule. All bearings on standard Model BSQ fans are factory lubricated and require no further lubrication under normal use (between -20°F and 180°F in a relatively clean environment).			
8 Belts should be checked periodically for wear and tightness.				X					Rec.	N		Mech.			For belt replacement, loosen the tensioning device far enough to allow removal of the belt by hand. Do not force belts on or off. This may cause cords to break, leading to premature belt failure. Once installed, adjust belts as shown in "Pre-Starting Checks." Replace belts			

Procedure Description	Frequency							Recommended (Rec.) or Required (Req.)	Tunnel Closure Required?	Responsible Party			Comments	Fall 2021 Inspection			
	Weekly	Monthly	Bi-Monthly	Quarterly	Semi-Annually	Annually	Tri-Annually			Quinquennial	ODOT	Consultant		3rd Party (Mechanic, Electrician, etc.)	Date Completed	Inspection Comments / Notes	Recommended Repairs / Maintenance
Dampers																	
9 Operate motor-operated dampers and listen for unusual noises and vibrations				X					Rec.	N			Mech.				
10 Check bearings for wear and dampers for debris.				X					Rec.	N			Mech.				
11 Visually inspect dampers and actuators for the build up of dirt, debris, wear and corrosion.				X					Rec.	N			Mech.	a) If cleaning is necessary, use mild detergents or solvents. Clean with a non-oil based solvent. b) If lubrication is desired for components such as axle bearings, jackshaft bearings and jamb seals, do not use oil-based lubricants or any other lubricants that attract			
12 Test smoke dampers.				X					Rec.	N			Mech.	They will be cycle tested by voltage drop to assure proper function. They will not be tested through the fire alarm system.			
Split-System																	
13 Check vertical centrifugal pump.				X					Rec.	N			Mech.	Ensure pump is automatically starting and stopping and performing as designed.			
14 Pull outdoor unit access door and clean bottom of the unit of dirt or debris.				X					Rec.	N			Mech.				
15 Check outdoor coil for cleanliness and clean if needed				X					Rec.	N			Mech.				
16 Check indoor filters, clean and/or change as needed				X					Rec.	N			Mech.				
17 Inspect indoor coil and indoor blower for cleanliness				X					Rec.	N			Mech.				
18 Tighten all electrical connections				X					Rec.	N			Mech.				
19 Check condenser fan blades for tightness				X					Rec.	N			Mech.				
20 Inspect contactor contacts				X					Rec.	N			Mech.				
21 Check and record temperature drop across evaporator coil				X					Rec.	N			Mech.				
22 Inspect overall operation of unit				X					Rec.	N			Mech.				
23 Visual inspection for refrigerant leaks				X					Rec.	N			Mech.				
24 Check "error history" and execute delete error history				X					Rec.	N			Mech.				
25 Select "self check" and confirm no errors existing				X					Rec.	N			Mech.				
26 Execute "test run" and inspect outdoor unit for proper operation				X					Rec.	N			Mech.				
27 Make recommendations of any required repairs				X					Rec.	N			Mech.				
28 Carry out a malfunction-diagnosis using the remote controller.				X					Rec.	N			Mech.	When a malfunction occurs to air conditioner, both indoor unit and outdoor unit will stop and operation lamp blinks to inform unusual stop.			

APPENDIX

C

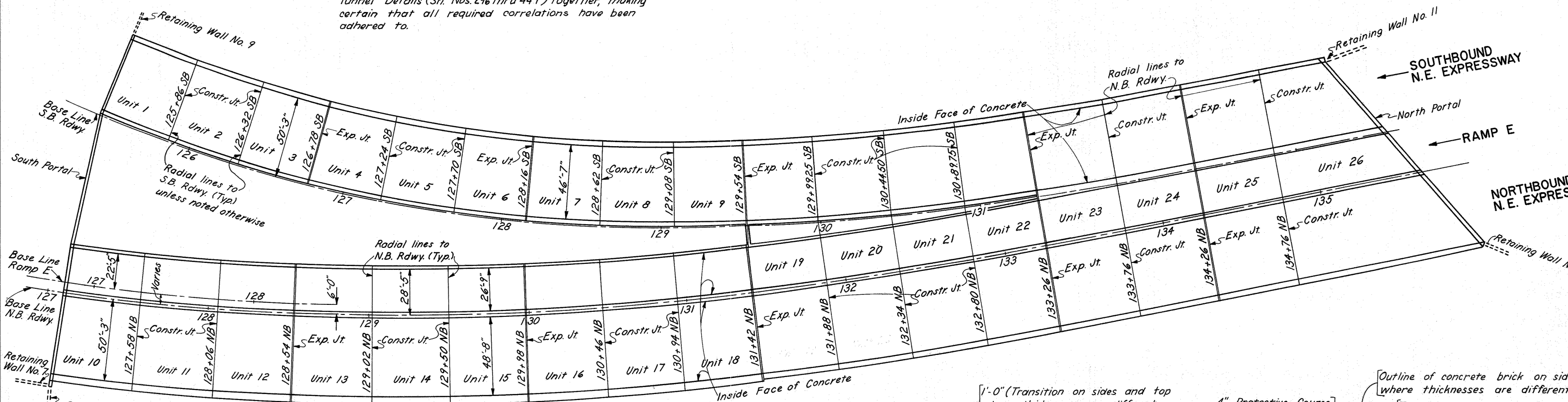
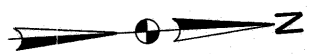
RELEVANT
TUNNEL PLAN
LAYOUT
SHEETS

MICROFILMED
MAR 15 1993

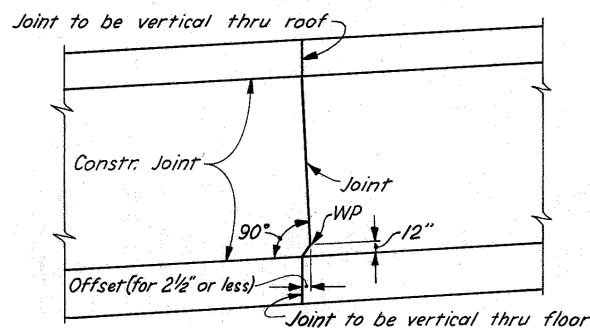
Note:
The Contractor shall work the Electrical Details (Sh. Nos. 518 thru 571), Mechanical Details (Sh. Nos. 509 thru 517), and Structural Equipment Room Details (Sh. Nos. 448 thru 491) with the Structural Tunnel Details (Sh. Nos. 296 thru 447) making certain that all the required items are set prior to placing concrete.
Also, the Contractor shall work all the Structural Tunnel Details (Sh. Nos. 296 thru 447) together, making certain that all required correlations have been adhered to.

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
2	OHIO		

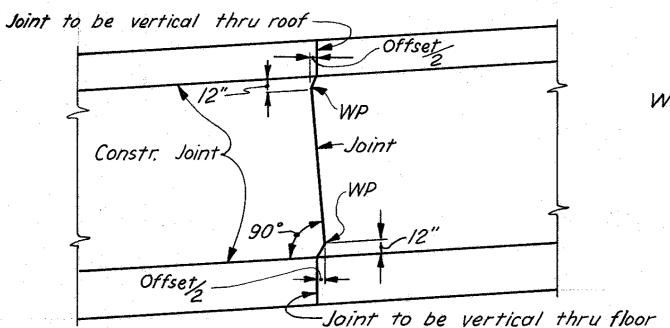
HAMILTON COUNTY
HAM-71-0.93



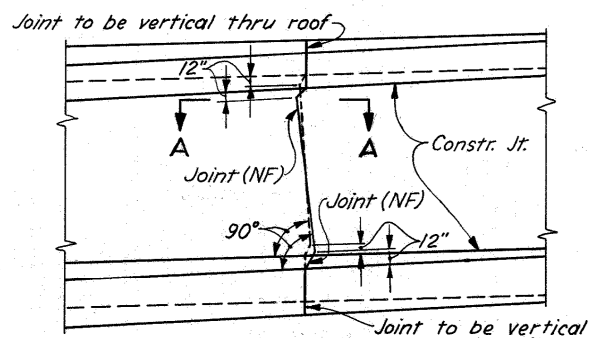
KEY PLAN



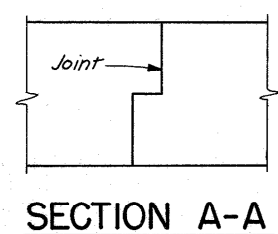
TREATMENT OF WALL JOINTS
(Tile on one side & WP at bottom)



TREATMENT OF WALL JOINTS
(Used where total offset is greater than 2 1/2")

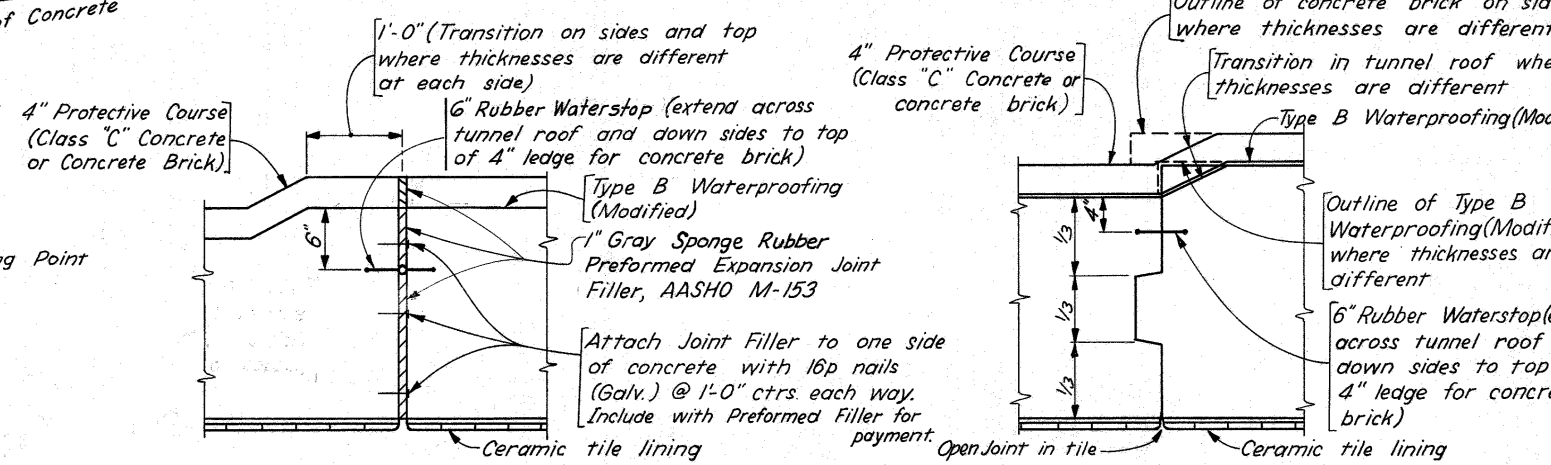


TREATMENT OF WALL JOINTS
(Common wall with tile on both sides)



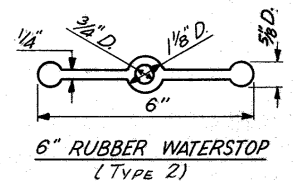
SECTION A-A

WP denotes Working Point

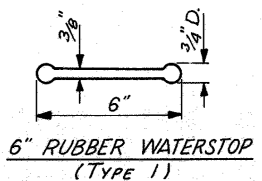


TRANSVERSE EXPANSION JOINT

TRANSVERSE CONSTRUCTION JOINT



RUBBER WATERSTOPS



H & E Sheet No 4-13

HAZELET & ERDAL CONSULTING ENGINEERS CINCINNATI, OHIO				
KEY PLAN AND TYPICAL DETAILS				
STRUCTURE NO. HAM-71-0				
TUNNEL UNDER LYTLE PA				
H & E STRUCTURE NO. 4				
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE
RAH			FN	JHQ 2-13-67

P:\PR57787\HAM\110259\Design\Structures\Walls\Sheets\50001.dgn Sheet 3/25/2020 1:38:46 PM gorsier



PLAN

LEGEND

 DENOTES LIMITS OF LYTLE PARK

HAM-71-1.34 PID No. 110259	GENERAL PLAN BRIDGE NO. HAM-71-0134 I-71 LYTLE TUNNEL UNDER LYTLE PARK		DESIGNED JDG	CHECKED XAC	DRAWN JDG	REVISED	REVIEWED JSB	DATE 12/19/2019	DESIGN AGENCY BURGESS & NIPLE 525 VINE ST. CINCINNATI, OH
	1 / 13	13 / 25	STRUCTURE FILE NUMBER 3106578						

APPENDIX

D

CRITICAL FINDING
DOCUMENTATION



MEMO

TO: Jeffery Meyer, PE
FROM: Wesley Weir, PE
SUBJECT: CRITICAL FINDING – Emergency Ventilation | Lytle Tunnel (HAM-71-01.34) 2021 Fall NTIS
DATE: September 12, 2021

During the 2021 Fall NTIS inspection of the Lytle Tunnel (HAM-71-01.34) in Cincinnati Ohio, owned and operated by the Ohio Department of Transportation. WSP observed that the tunnel emergency ventilation system is not operational under the normal mode (Auto) of the SCADA system. The tunnel emergency ventilation system is a key fire life safety system, that is designed to operate during a fire event to evacuate smoke and heat from the tunnel in order to facilitate the timely egress of passengers and to facilitate fire department firefighting operations.

Due to the key role this system plays in the safety of passengers and first responders, WSP is presenting this to the Ohio Department of Transportation as a CRITICAL FINDING.

During the inspection, WSP staff attempted to run the tunnel ventilation system through all emergency ventilation modes via the main tunnel SCADA terminal located in the Lytle Tunnel ventilation room. During this test WSP observed that the system did not operate when any of the emergency ventilation modes were initiated at the SCADA terminal. Following this test through the SCADA terminal, WSP attempted initial the emergency ventilation operation by triggering a linear heat detection alarm at the Facility Fire Alarm Control Panel (FACP). This test also failed to initialize operation of the emergency ventilation system. It should be noted that all alarms were seen correctly at the tunnel FACP but were not seen at the tunnel SCADA terminal.

Following these tests, WSP attempted to troubleshoot these issues repeatedly in an attempt to get the ventilation system to operate in all emergency ventilation modes but were unable to do so.

WSP does not believe this to be a ventilation equipment issue, as all fans and dampers were able to be operated manually at their respective local controllers, in all speeds. WSP believes this is a SCADA system issue and that repair/reprogramming/debugging of this system is required to return the emergency ventilation system back to working order.

Please feel free to contact WSP with any questions you have regarding this critical finding.



Wesley Weir, PE
Senior Director, Structural Engineer
Vice President



Photo 1

Sag over right lane line in linear heat detection wire at North Portal of I-71 Southbound Mainline tunnel due to detached eyebolt support, looking north.
Note right lane of roadway currently closed.



Photo 2

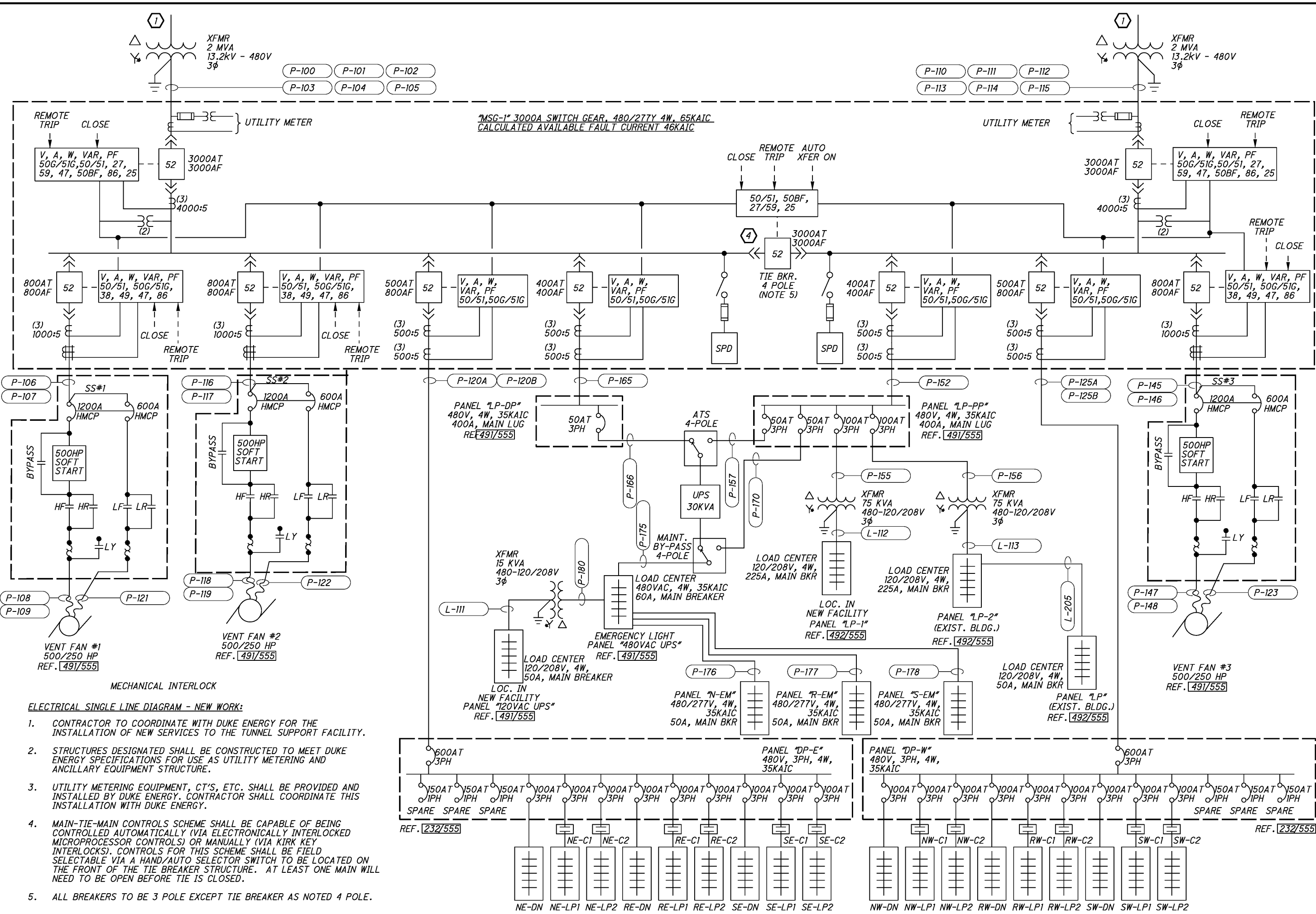
16 1/2" sag in linear heat detection wire at North Portal of I-71 Southbound Mainline tunnel due to detached eyebolt support, looking north.

APPENDIX

E

ELECTRICAL
ONE-LINE
DIAGRAM

c:\pwworking\hmm\external\pre47802\dms72703\071_0134CES009.dgn 2/20/2015 2:51:03 PM PRE47802



- ELECTRICAL SINGLE LINE DIAGRAM - NEW WORK:**
- CONTRACTOR TO COORDINATE WITH DUKE ENERGY FOR THE INSTALLATION OF NEW SERVICES TO THE TUNNEL SUPPORT FACILITY.
 - STRUCTURES DESIGNATED SHALL BE CONSTRUCTED TO MEET DUKE ENERGY SPECIFICATIONS FOR USE AS UTILITY METERING AND ANCILLARY EQUIPMENT STRUCTURE.
 - UTILITY METERING EQUIPMENT, CT'S, ETC. SHALL BE PROVIDED AND INSTALLED BY DUKE ENERGY. CONTRACTOR SHALL COORDINATE THIS INSTALLATION WITH DUKE ENERGY.
 - MAIN-TIE-MAIN CONTROLS SCHEME SHALL BE CAPABLE OF BEING CONTROLLED AUTOMATICALLY (VIA ELECTRONICALLY INTERLOCKED MICROPROCESSOR CONTROLS) OR MANUALLY (VIA KIRK KEY INTERLOCKS). CONTROLS FOR THIS SCHEME SHALL BE FIELD SELECTABLE VIA A HAND/AUTO SELECTOR SWITCH TO BE LOCATED ON THE FRONT OF THE TIE BREAKER STRUCTURE. AT LEAST ONE MAIN WILL NEED TO BE OPEN BEFORE TIE IS CLOSED.
 - ALL BREAKERS TO BE 3 POLE EXCEPT TIE BREAKER AS NOTED 4 POLE.

DESIGN AGENCY: HATCH MOTT MACDONALD, 1803 CLEVELAND PKWY., SUITE 200, CLEVELAND, OH 44135

DATE: 08/11/14

REVIEWED BY: RF

STRUCTURE FILE NUMBER: 3106578

DESIGNED BY: PAP

CHECKED BY: LL

ELECTRICAL DETAILS - ONE LINE DIAGRAM

BRIDGE NO. HAM-71-0134

I-71 LYTLE TUNNEL UNDER LYTLE PARK

HAM-71-01.34

PID No. 87268

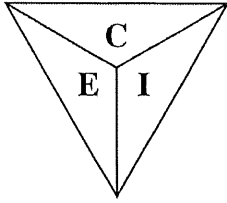
211/296

469/555

APPENDIX

F

ELECTRICAL
TESTING
DOCUMENTS



Electrical Certification Incorporated

*P.O. Box 53368 * Cincinnati, Ohio 45253
Office: (513) 662-7500 * Fax: (513) 662-6610
Cell: (513) 604-2431 * Email: ECInc@cinci.rr.com*

Report Summary 2021-814

Date: September 9, 2021

Heath Weddle
Glenwood Electric

Re: Lytle Tunnel – Cincinnati, Ohio
Subject: 2021 Preventative Maintenance

Mr. Weddle,

Electrical Certification Incorporated performed inspection, calibration, cleaning, and testing on the switchgears and associated equipment. Inspection, calibration, and testing was performed in accordance with specified requirements, the Manufacturers maintenance guide lines, and NFPA 70B Electrical Equipment Maintenance where applicable. The following is a list of the equipment included in this project.

Equipment List

Left Service Switchgear

(4) 480V Draw-Out Circuit Breakers

Right Service Switchgear

(4) 480V Draw-Out Circuit Breakers

(3) 480V Dry-Type Transformers

All inspection and test data was recorded on numbered test sheets identified as items 21-814-01 thru 21-814-14 and are enclosed for your review and records. All the equipment tested was found to be within the manufacturers acceptable tolerances.

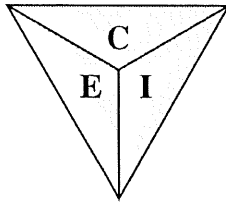
Summary

Except as noted in this report all the other equipment tested was found or left in good working condition and suitable for use as intended.

Electrical Certification Incorporated appreciates the opportunity to perform this project. If you have any questions concerning this report, or require additional assistance please call any time for prompt professional service.

Sincerely,

Jeffrey Jones
General Manager

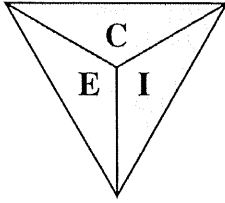


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Low Voltage Circuit Breaker

Customer	Glenwood Electric						Job #	2021-814		
Location	Lytle Tunnel						Date	09/08/2021		
Identification	Main 1 (Left Bus)									
Mfg	Square D	Type	Masterpact	Style	NW 32H1	Voltage	480	ASYM	65	
Serial	085325377502		Frame	3000	OC	ML 6.0P	Coil	3000	Plug	3000
<u>Settings</u>										
			<u>Available</u>			<u>As Found</u>			<u>As Left</u>	<u>As Tested</u>
Long Time Pick-up						1				
Long Time Delay						2				
Short Time Pick-up						6	6			4
Short Time Delay						0.4 I ² T Off				
Ground Fault Pick-up						J				
Ground Fault Delay						0.4 I ² T Off				
Instantaneous						6				
<u>Circuit Breaker Test</u>										
	<u>Test</u>	<u>% Settings</u>	<u>A Phase</u>		<u>B Phase</u>		<u>C Phase</u>			
	<u>Amps</u>									
Long Time	9000		7.362							
Short Time	15000		0.414							
Ground Fault	2400		0.403							
Instantaneous	22500	90% - 75%	0.036							
Instantaneous		110%-125%								
Insulation Resistance @ 1KVDC					A-Gr		B-Gr		C-Gr	
Across Open Pole					A-B		B-C		A-C	
P-Trip Unit					A		B		C	
Contact Resistance (μΩ)					12		12		13	
Comments										
- All functions passed										
Technician										
Joe Noeth										

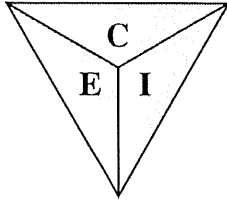


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Low Voltage Circuit Breaker

Customer	Glenwood Electric							Job #	2021-814	
Location	Lytle Tunnel							Date	09/08/2021	
Identification	Panel DP-E									
Mfg	Square D	Type	Masterpact	Style	NW 08H1	Voltage	480	ASYM	65	
Serial	085325378002		Frame	800	OC	ML 6.0P	Coil	800	Plug	600
<u>Settings</u>		<u>Available</u>		<u>As Found</u>		<u>As Left</u>		<u>As Tested</u>		
Long Time Pick-up				0.83						
Long Time Delay				12						
Short Time Pick-up				6		6		6		
Short Time Delay				0 I ² T Off						
Ground Fault Pick-up				J						
Ground Fault Delay				0.2 I ² T Off						
Instantaneous				8						
<u>Circuit Breaker Test</u>		<u>Test Amps</u>	<u>% Settings</u>	<u>A Phase</u>		<u>B Phase</u>		<u>C Phase</u>		
Long Time		2167		20.179						
Short Time		3900		0.045						
Ground Fault		1200		0.159						
Instantaneous		6000	90% - 75%	0.043						
Instantaneous			110%-125%							
Insulation Resistance @ 1KVDC				A-Gr		B-Gr		C-Gr		
Across Open Pole				A-B		B-C		A-C		
P-Trip Unit				A		B		C		
Contact Resistance (μΩ)				14		13		14		
Comments										
- All functions passed										
Technician	Joe Noeth									



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Low Voltage Circuit Breaker

Customer	Glenwood Electric	Job #	2021-814
Location	Lytle Tunnel	Date	09/08/2021
Identification	Vent Fan #1		

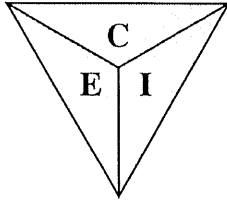
Mfg	Square D	Type	Masterpact	Style	NW 08H1	Voltage	480	ASYM	65
Serial	085325377103	Frame	800	OC	ML 6.0P	Coil	800	Plug	800

<u>Settings</u>	<u>Available</u>	<u>As Found</u>	<u>As Left</u>	<u>As Tested</u>
Long Time Pick-up		1		
Long Time Delay		12		
Short Time Pick-up		10	10	6
Short Time Delay		0.4 I ² T Off		
Ground Fault Pick-up		J		
Ground Fault Delay		0.2 I ² T Off		
Instantaneous		10		

<u>Circuit Breaker Test</u>	<u>Test Amps</u>	<u>% Settings</u>	<u>A Phase</u>	<u>B Phase</u>	<u>C Phase</u>
Long Time	5600		7.489		
Short Time	6400		0.419		
Ground Fault	1600		0.158		
Instantaneous	10000	90% - 75%	0.035		
Instantaneous		110%-125%			
Insulation Resistance @ 1KVDC			A-Gr	B-Gr	C-Gr
Across Open Pole			A-B	B-C	A-C
P-Trip Unit			A	B	C
Contact Resistance (μΩ)					

Comments	
	- All functions passed

Technician	Joe Noeth
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Low Voltage Circuit Breaker

Customer	Glenwood Electric	Job #	2021-814
Location	Lytle Tunnel	Date	09/08/2021
Identification	Vent Fan #2		

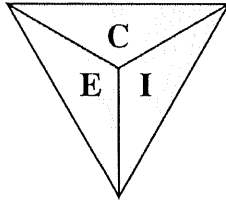
Mfg	Square D	Type	Masterpact	Style	NW 08H1	Voltage	480	ASYM	65
Serial	085325377101	Frame	800	OC	ML 6.0P	Coil	800	Plug	800

<u>Settings</u>	<u>Available</u>	<u>As Found</u>	<u>As Left</u>	<u>As Tested</u>
Long Time Pick-up		1		
Long Time Delay		12		
Short Time Pick-up		10	10	6
Short Time Delay		0.4 I ² T Off		
Ground Fault Pick-up		J		
Ground Fault Delay		0.3 I ² T Off		
Instantaneous		10		

<u>Circuit Breaker Test</u>	<u>Test Amps</u>	<u>% Settings</u>	<u>A Phase</u>	<u>B Phase</u>	<u>C Phase</u>
Long Time	3467		20.082		
Short Time	6400		0.411		
Ground Fault	1600		0.263		
Instantaneous	10000	90% - 75%	0.035		
Instantaneous		110%-125%			
Insulation Resistance @ 1KVDC			A-Gr	B-Gr	C-Gr
Across Open Pole			A-B	B-C	A-C
P-Trip Unit			A	B	C
Contact Resistance (μΩ)					

Comments	
	- All functions passed

Technician	Joe Noeth
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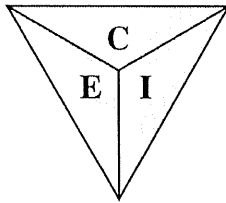


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Low Voltage Circuit Breaker

Customer	Glenwood Electric						Job #	2021-814	
Location	Lytle Tunnel						Date	09/08/2021	
Identification	Panel LP-DP								
Mfg	Square D	Type	Masterpact	Style	NW 08H1	Voltage	480	ASYM	65
Serial	085327017701	Frame	800	OC	ML 6.0P	Coil	800	Plug	400
<u>Settings</u>		<u>Available</u>		<u>As Found</u>		<u>As Left</u>		<u>As Tested</u>	
Long Time Pick-up				1					
Long Time Delay				2					
Short Time Pick-up				6		6		4	
Short Time Delay				0 I ² T Off					
Ground Fault Pick-up				J					
Ground Fault Delay				0.3 I ² T Off					
Instantaneous				6					
<u>Circuit Breaker Test</u>		<u>Test Amps</u>	<u>% Settings</u>	<u>A Phase</u>		<u>B Phase</u>		<u>C Phase</u>	
Long Time		1200		7.027					
Short Time		2000		0.047					
Ground Fault		800		0.262					
Instantaneous		3000	90% - 75%	0.044					
Instantaneous			110%-125%						
Insulation Resistance @ 1KVDC Across Open Pole P-Trip Unit				A-Gr		B-Gr		C-Gr	
				A-B		B-C		A-C	
				A		B		C	
Contact Resistance (μΩ)				18		18		14	
Comments									
- All functions passed									
Technician	Joe Noeth								

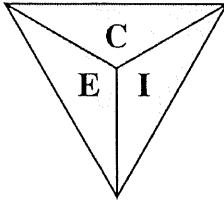


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Low Voltage Circuit Breaker

Customer	Glenwood Electric						Job #	2021-814		
Location	Lytle Tunnel						Date	09/08/2021		
Identification	Tie									
Mfg	Square D	Type	Masterpact	Style	NW 32H1	Voltage	480	ASYM	65	
Serial	085325377701		Frame	3200	OC	ML 6.0P	Coil	--	Plug	3000
<u>Settings</u>		<u>Available</u>		<u>As Found</u>		<u>As Left</u>		<u>As Tested</u>		
Long Time Pick-up				1						
Long Time Delay				2						
Short Time Pick-up				6		6		4		
Short Time Delay				0.4 I ² T Off						
Ground Fault Pick-up				J						
Ground Fault Delay				0.4 I ² T Off						
Instantaneous				6						
<u>Circuit Breaker Test</u>		<u>Test Amps</u>	<u>% Settings</u>	<u>A Phase</u>		<u>B Phase</u>		<u>C Phase</u>		
Long Time		9000		7.212						
Short Time		15000		0.414						
Ground Fault		2400		0.403						
Instantaneous		22500	90% - 75%	0.035						
Instantaneous			110%-125%							
Insulation Resistance @ 1KVDC Across Open Pole				A-Gr		B-Gr		C-Gr		
				A-B		B-C		A-C		
				A		B		C		
Contact Resistance (μΩ)				14		16		15		
Comments										
- - All functions passed										
Technician		Joe Noeth								

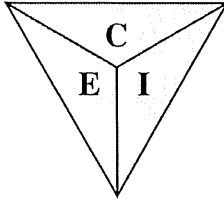


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Low Voltage Circuit Breaker

Customer	Glenwood Electric						Job #	2021-814	
Location	Lytle Tunnel						Date	09/08/2021	
Identification	Main 2 (Right Bus)								
Mfg	Square D	Type	Masterpact	Style	NW 32H1	Voltage	480	ASYM	65
Serial	085325377501	Frame	3200	OC	ML 6.0P	Coil	3000	Plug	3000
<u>Settings</u>		<u>Available</u>		<u>As Found</u>		<u>As Left</u>		<u>As Tested</u>	
Long Time Pick-up				1					
Long Time Delay				2					
Short Time Pick-up				6		6		4	
Short Time Delay				0.1 I ² T Off					
Ground Fault Pick-up				J					
Ground Fault Delay				0.4 I ² T Off					
Instantaneous				6					
<u>Circuit Breaker Test</u>		<u>Test Amps</u>	<u>% Settings</u>	<u>A Phase</u>		<u>B Phase</u>		<u>C Phase</u>	
Long Time		9000		7.329					
Short Time		15000		0.111					
Ground Fault		2400		0.403					
Instantaneous		22500	90% - 75%	0.036					
Instantaneous			110%-125%						
Insulation Resistance @ 1KVDC				A-Gr		B-Gr		C-Gr	
Across Open Pole				A-B		B-C		A-C	
P-Trip Unit				A		B		C	
Contact Resistance (μΩ)				13		13		15	
Comments									
- All functions passed									
Technician		Joe Noeth							

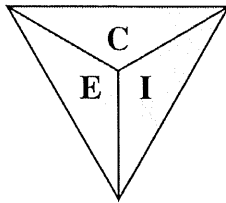


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Low Voltage Circuit Breaker

Customer	Glenwood Electric						Job #	2021-814		
Location	Lytle Tunnel						Date	09/08/2021		
Identification	Vent Fan #3									
Mfg	Square D	Type	Masterpact	Style	NW 08H1	Voltage	480	ASYM	65	
Serial	085325377102		Frame	800	OC	ML 6.0P	Coil	--	Plug	800
<u>Settings</u>		<u>Available</u>		<u>As Found</u>		<u>As Left</u>		<u>As Tested</u>		
Long Time Pick-up				1						
Long Time Delay				12						
Short Time Pick-up				10		10		6		
Short Time Delay				0.4 I ² T Off						
Ground Fault Pick-up				J						
Ground Fault Delay				0.2 I ² T Off						
Instantaneous				10						
<u>Circuit Breaker Test</u>		<u>Test Amps</u>	<u>% Settings</u>	<u>A Phase</u>		<u>B Phase</u>		<u>C Phase</u>		
Long Time		3467		19.995						
Short Time		6400		0.412						
Ground Fault		1600		0.160						
Instantaneous		10000	90% - 75%	0.035						
Instantaneous			110%-125%							
Insulation Resistance @ 1KVDC				A-Gr		B-Gr		C-Gr		
Across Open Pole				A-B		B-C		A-C		
P-Trip Unit				A		B		C		
Contact Resistance (μΩ)				19		18		19		
Comments										
- All functions passed										
Technician		Joe Noeth								

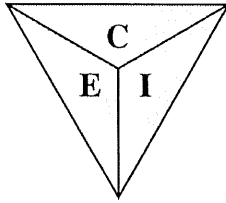


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Low Voltage Circuit Breaker

Customer	Glenwood Electric							Job #	2021-814	
Location	Lytle Tunnel							Date	09/08/2021	
Identification	Panel DP-W									
Mfg	Square D	Type	Masterpact	Style	NW 08H1	Voltage	480	ASYM	65	
Serial	085325378001		Frame	800	OC	ML 6.0P	Coil	--	Plug	600
<u>Settings</u>		<u>Available</u>		<u>As Found</u>		<u>As Left</u>		<u>As Tested</u>		
Long Time Pick-up				0.83						
Long Time Delay				12						
Short Time Pick-up				6						
Short Time Delay				0 I ² T Off						
Ground Fault Pick-up				J						
Ground Fault Delay				0.2 I ² T Off						
Instantaneous				8						
<u>Circuit Breaker Test</u>		<u>Test Amps</u>	<u>% Settings</u>	<u>A Phase</u>		<u>B Phase</u>		<u>C Phase</u>		
Long Time		2167		20.063						
Short Time		3900		0.053						
Ground Fault		1200		0.159						
Instantaneous		6000	90% - 75%	0.045						
Instantaneous			110%-125%							
Insulation Resistance @ 1KVDC				A-Gr		B-Gr		C-Gr		
Across Open Pole				A-B		B-C		A-C		
P-Trip Unit				A		B		C		
Contact Resistance (μΩ)				17		19		18		
Comments										
- All functions passed										
Technician		Joe Noeth								

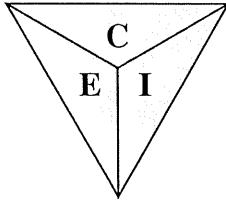


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Low Voltage Circuit Breaker

Customer	Glenwood Electric						Job #	2021-814		
Location	Lytle Tunnel						Date	09/08/2021		
Identification	Panel LP-PP									
Mfg	Square D	Type	Masterpact	Style	NW 08H1	Voltage	480	ASYM	65	
Serial	085325378101		Frame	800	OC	ML 6.0P	Coil	--	Plug	400
Settings										
	<u>Settings</u>		<u>Available</u>		<u>As Found</u>		<u>As Left</u>		<u>As Tested</u>	
	Long Time Pick-up				1					
	Long Time Delay				8					
	Short Time Pick-up				8		8		4	
	Short Time Delay				0 I ² T Off					
	Ground Fault Pick-up				J					
	Ground Fault Delay				0.3 I ² T Off					
	Instantaneous				8					
Circuit Breaker Test										
	<u>Circuit Breaker Test</u>	<u>Test Amps</u>	<u>% Settings</u>	<u>A Phase</u>		<u>B Phase</u>		<u>C Phase</u>		
	Long Time	1200		28.712						
	Short Time	2400		0.044						
	Ground Fault	800		0.264						
	Instantaneous	4000	90% - 75%	0.043						
	Instantaneous		110%-125%							
	Insulation Resistance @ 1KVDC			A-Gr		B-Gr		C-Gr		
	Across Open Pole			A-B		B-C		A-C		
	P-Trip Unit			A		B		C		
	Contact Resistance (μΩ)			20		19		22		
Comments										
- All functions passed										
Technician	Joe Noeth									

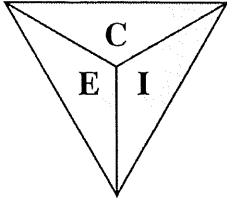


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Transformer Inspection

Customer	Glenwood Electric										Job #	2021-814		
Location	Lytle Tunnel										Date	09/08/2021		
Identification	Transformer – LP 1													
Mfg	Square D			KVA	75			Phase	3		Hertz	60		
SN	006500165319		Type	SO		Form			Class	AA		Rise	150 <input type="checkbox"/>	
Pri Volt	480		Δ	γ	Amps	90.2		%Z	5.2		Bushing			
Sec Volt	208/120		Δ	γ	Amps	208.2		%Z			Bushing			
Coolant	Dry		Gallons			EPA Label			PCB Clt			Weight	626	
No Load Tap Volts	1	503	2	491	3	480	4	469	5	458	6	443	7	431
Field Inspection														
Oil Level	<input type="checkbox"/>		Pressure			Regulator			LTC Counter			Ground	<input checked="" type="checkbox"/>	
Oil Temp	°C		Max Oil Temp	<input type="checkbox"/>		Winding Temp	<input type="checkbox"/>		Max Winding Temp	<input type="checkbox"/>		Reset All		
Fan Control			Oil Leaks			Leak Explanation								
Comments														
Technician	Joe Noeth													

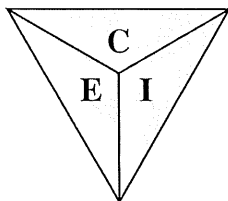


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Insulation Resistance

Customer	Glenwood Electric		Job #	2021-814
Location	Lytle Tunnel		Date	09/08/2021
Identification	Transformer – LP 1			
<i>Values listed are in MΩ</i>				
	Primary – Ground	Primary – Secondary	Secondary - Ground	
Test Volt Time in Min	1,000 VDC	1,000 VDC	VDC	
0.50	15,000	20,000		
1.00	30,000	40,000		
2.00				
3.00				
4.00				
5.00				
6.00				
7.00				
8.00				
9.00				
10.00				
PI 10 / 1 =				
PI 1 / .50 =	2	2		
Comments				
Technician	Joe Noeth			

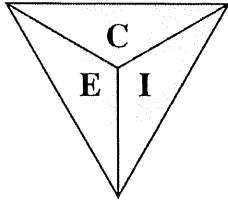


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Transformer Inspection

Customer	Glenwood Electric						Job #	2021-814														
Location	Lytle Tunnel						Date	09/08/2021														
Identification	Transformer – LP 2																					
Mfg	Square D			KVA	75		Phase	3		Hertz	60											
SN	006500165318		Type	SO		Form			Class	AA		Rise	150 <input type="checkbox"/>									
Pri Volt	480		Δ	γ	Amps	90.2		%Z	5.2		Bushing											
Sec Volt	208/120		Δ	γ	Amps	208.2		%Z			Bushing											
Coolant	Dry		Gallons			EPA Label			PCB Clt			Weight	626									
No Load Tap Volts	1	503		2	491		3	480		4	469		5	458		6	443		7	431		
Field Inspection																						
Oil Level	<input type="checkbox"/>		Pressure			Regulator			LTC Counter			Ground	<input checked="" type="checkbox"/>									
Oil Temp	°C		Max Oil Temp	<input type="checkbox"/>		Winding Temp	<input type="checkbox"/>		Max Winding Temp	<input type="checkbox"/>		Reset All										
Fan Control			Oil Leaks			Leak Explanation																
Comments																						
Technician	Joe Noeth																					

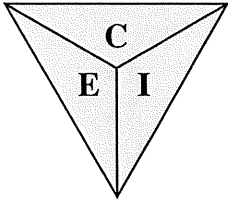


Electrical Certification Incorporated

P.O. Box 53368 * Cincinnati, Ohio 45253
 Office: (513) 662-7500 * Fax: (513) 662-6610
 Cell: (513) 604-2431 * Email: ECInc@cinci.rr.com

Insulation Resistance

Customer	Glenwood Electric		Job #	2021-814
Location	Lytle Tunnel		Date	09/08/2021
Identification	Transformer – LP 2			
<i>Values listed are in MΩ</i>				
	Primary – Ground	Primary – Secondary	Secondary - Ground	
Test Volt Time in Min	1,000 VDC	1,000 VDC	VDC	
0.50	7,000	9,000		
1.00	14,000	18,000		
2.00				
3.00				
4.00				
5.00				
6.00				
7.00				
8.00				
9.00				
10.00				
PI 10 / 1 =				
PI 1 / .50 =	2	2		
Comments				
Technician	Joe Noeth			



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Job # 2021-814 – Report Summary
Date: September 9, 2021

Heath Weddle
Glenwood Electric

Re: Lytle Tunnel
Subject: Infrared Inspection

Mr. Weddle,

I have enclosed the results of the infrared inspection conducted at the Lytle Tunnel, Cincinnati, OH. Great care was taken to provide you a report with problems and recommendations that are well defined and logically explained and easy to locate. Priority codes are included for common equipment, to help you to determine if you wish to repair or replace existing parts. Thermal graphic images are provided for each problem area found. Thermal graphic images are not provided for those items viewed, operating within normal temperatures.

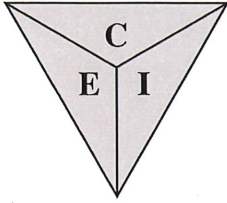
If for any reason the results are unclear, uncertain or simply not adequately explained for your determination of what corrective actions are necessary, please call at (513) 662-7500. If the results can't be completely clarified by phone, we will return at your request (at no charge) to provide additional information necessary to ensure that the information was derived correctly, logically and was adequately explained to include re-inspection of the item in question. We can't guarantee that a clerical or inspection error will never be made, but we can guarantee our diligence in providing you complete satisfaction.

Please refer to the provided CRITERIA FORMS to demonstrate why the priority code (highlighted temperature blocks on your report) have been chosen. These have been provided in an attempt to further quantify the identified problems and assist your determination of corrective action. Also included is a section on CORRECTIVE ACTION that has been found to be helpful to better describe some of the more common corrective actions and their unique requirements.

Electrical Certification Incorporated appreciates the opportunity to provide our services to you. If we can be of any assistance to you in correcting any of the reported problems, please call any time for prompt professional service.

Sincerely,

Jeffrey Jones
General Manager



Electrical Certification Incorporated

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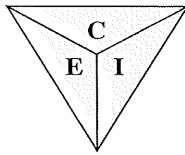
Severity Code Descriptions

The images and temperatures depicted in this report determine the severity of each anomaly found during the inspection. The temperature rise determines the severity of each hot spot.

Severity:

- Level 0 Corrective action required at next scheduled outage.
- Temperature Rise = 1°C to 7°C
 - Will not be highlighted, but noted in the Severity column
- Level 1 Corrective action required as soon as possible.
- Temperature Rise = 8°C to 15°C
 - Will be noted in the Severity column, and highlighted in **YELLOW**.
- Level 2 Corrective action required IMMEDIATELY.
- Temperature Rise = 16°C + (and higher)
 - Will be noted in the Severity column, and highlighted in **RED**.

The intention of this report is to assist your company in reducing the possibility of loss to property by bringing to your attention hazards and lack of protection. It is not intended to imply that all other hazards and conditions are under control at time of inspection. No liability is assumed by reason of this report or the inspection upon which it is based as it is only advisory in nature and you must make the final decision.



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Customer: Glenwood Electric		Location: Lytle Tunnel - Cincinnati, OH	
		Job # 2021-814	
<u>Image #</u>	<u>Location</u>	<u>Equipment Inspected</u>	<u>Severity</u>
	Lytle Tunnel	Main 1A	No Issues
	Lytle Tunnel	Panel DP-E	No Issues
	Lytle Tunnel	Vent Fan #2	No Issues
	Lytle Tunnel	Vent Fan #1	No Issues
	Lytle Tunnel	Panel LP-DP	No Issues
	Lytle Tunnel	TIE	No Issues
	Lytle Tunnel	Vent Fan #3	No Issues
	Lytle Tunnel	Panel DP-W	No Issues
	Lytle Tunnel	Panel LP-PP	No Issues
	Lytle Tunnel	Main 2B	No Issues
	Lytle Tunnel	120 VAC UPS	No Issues
	Lytle Tunnel	LP-1	No Issues
	Lytle Tunnel	LP-PP	No Issues
	Lytle Tunnel	480 VAC UPS	No Issues
	Lytle Tunnel	LP1 Transformer	No Issues
	Lytle Tunnel	SW-LP2	No Issues
	Lytle Tunnel	SW-LP1	No Issues
	Lytle Tunnel	SW-DN	No Issues
	Lytle Tunnel	RW-LP2	No Issues
	Lytle Tunnel	RW-LP1	No Issues
	Lytle Tunnel	RW-DN	No Issues
	Lytle Tunnel	NW-LP2	No Issues
	Lytle Tunnel	NW-LP1	No Issues
	Lytle Tunnel	NW-DN	No Issues
	Lytle Tunnel	DP-W	No Issues
	Lytle Tunnel	Contactactor NW-C1	No Issues
	Lytle Tunnel	Contactactor NW-C2	No Issues
	Lytle Tunnel	Contactactor RW-C1	No Issues
	Lytle Tunnel	Contactactor RW-C2	No Issues
	Lytle Tunnel	Contactactor SW-C1	No Issues
	Lytle Tunnel	Contactactor SW-C2	No Issues
	Lytle Tunnel	LP-2	No Issues
	Lytle Tunnel	LP-2 Transformer	No Issues
	Lytle Tunnel	LP	No Issues
	Lytle Tunnel	Contactactor SE-C2	No Issues
	Lytle Tunnel	Contactactor SE-C1	No Issues
	Lytle Tunnel	Contactactor RE-C2	No Issues
	Lytle Tunnel	Contactactor RE-C1	No Issues
	Lytle Tunnel	Contactactor NE-C2	No Issues
	Lytle Tunnel	Contactactor NE-C1	No Issues

APPENDIX

G

FIRE

DETECTION

TESTING

DOCUMENTS



510 West Benson Street
 Cincinnati OH 45215
 (513) 948-1030

- Acceptance
- Quarterly
- Semi-Annual
- Annual

Date: 09-01-2021
 Customer P.O. #
 Technician: DAVID BAUMGARDNER
 ST Job#: 22710336
 Date Needed: 09-30-2021

Ship To:
 Lytle Tunnel
 Interstate 71 Under Lytle Place
 Cincinnati OH 45202
 Primary Contact Info: Nick Fisco
 (740) 709-9006

Special Instructions:
 Annual Alarm Inspection

Fire Alarm Test & Inspection Conducted in Accordance with NFPA 72

1. MONITORING INFORMATION

Monitoring Organization: Tyco Phone: 8887467539
 Account number: _____ Phone line 1: _____ Phone line 2: _____
 Means of transmission: _____
 Entity to which alarms are retransmitted: _____ Phone: _____

2. DOCUMENTATION

Onsite location of the required record documents and site-specific software:
 Yes: No: Location: On top of panel

3. DESCRIPTION OF SYSTEM OR SERVICE

3.1 Control Unit

Manufacturer: Simplex Model number: 4100ES
 Control unit type: _____
 Loop/Zone quantity: _____

3.2 Software Firmware

Firmware revision number: _____

3.3 System Power

3.3.1 Primary (Main) Power

Nominal voltage: 120 B-Lock: _____ Location: _____
 Overcurrent protection type: Circuit breaker Amps: _____

Battery Location	Battery Size V/AH	Test Volts	Test Amps	Install Date
FACP	12 / 50	13.51 / 13.51	6.4 / 6.4	4/1/17 / 4/1/17
Altronix	12 / 10	12.75 / 12.75	7.6 / 7.6	4/1/17 / 4/1/17

4. DESCRIPTION OF SYSTEM OR SERVICE (continued)

4.3.2 Secondary Power

Battery type (if applicable): _____
 Calculated capacity of batteries to drive the system: In
 standby mode (hours): 24 In alarm mode (minutes): 5

SYSTEM RECORD OF INSPECTION AND TESTING (continued)

6. REMOTE ANNUNCIATORS

Brand/Model	Location

7. INITIATING DEVICES (Refer to device list)

Partial Inspection:

Full Inspection:

Type	Quantity	Addressable	Conventional	Alarm or Supervisory	Sensing Technology
Manual Pull Stations	7	Yes		Alarm	Contact
Smoke Detectors	30	Yes		Alarm	Contact
Beam Detectors					
Duct Smoke Detectors	5	Yes		Super	Contact
Heat Detectors	40	6	34	Alarm	Contact
Gas Detectors					
Waterflow Switches					
Tamper Switches	1		Yes	Super	Contact
Building Temp Site					
Water Temp Site					
Water Level Fire					
Pump Power Fire					
Pump Running					
Fire Pump Auto Position					
Fire Pump Trouble					
Fire Pump Running Generator					
Controller Trouble Transfer					
Generator Engine Running					

8. NOTIFICATION APPLIANCES (Refer to device list)

Partial Inspection:

Full Inspection:

Type	Quantity	Description
Horn		
Strobe		
Speaker		
Horn/Strobe	30	
Speaker/Strobe		
Bell		
Other		

SYSTEM RECORD OF INSPECTION AND TESTING (continued)

In-Building Fire Emergency Voice Alarm Communication System

Voice System Not Installed at Location

Manufacturer: _____ Model number: _____

Number of single voice alarm channels: _____ Number of multiple voice alarm channels: _____

Number of speakers: _____ Number of speaker circuits: _____

Location of amplification and sound processing equipment: _____

Location of paging microphone stations:

Location 1: _____

Location 2: _____

Location 3: _____

9. SYSTEM CONTROL FUNCTIONS

Type	Tested			Quantity
	Yes	No	N/A	
Hold-Open Door Releasing Devices	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	
HVAC Shutdown	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>	
Fire/Smoke Dampers	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>	
Door Unlocking	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	
Elevator Recall	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	
Elevator Shunt Trip	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	
Pre-Action System	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	

10. SYSTEM RESTORED TO NORMAL OPERATION

Date: 9/12/21

Time: 00:02

11. NOTES

FACP reported to evacuate fan system, fan system did not turn on fans.

Sales Information:

Customer wants quote on deficiency: **Yes:** **No:** Technician: David Baumgardner License/Permit: 54.89.5205 Date: 9/12/21

Customer E-mail: _____

Fire Department: _____ Customer Printed Name: _____ Date: _____

On _____ the above system was tested and inspected (with the above exceptions noted) in accordance to the Manufacturer's Published guidelines and was found to function to those guidelines. No further warranties or guarantees are either expressed or implied. Instruction of the operation sequence of this system has been performed.

MOD.	DESCRIPTION	TYPE	PASS
M1-1	WEST LIGHTING CONTROL ROOM WEST	SMOKE	PASS
M1-2	WEST LIGHTING CONTROL ROOM EAST	SMOKE	PASS
M1-6	EXHAUST ROOM 3RD ST DAMPER NORTH	SMOKE	PASS
M1-7	EXHAUST ROOM 3RD ST DAMPER CENTER	SMOKE	PASS
M1-10	EXHAUST ROOM 3RD ST DAMPER SOUTH	SMOKE	PASS
M1-12	EXHAUST ROOM 3RD ST RAMP SOUTHEAST	HEAT	PASS 23
M1-13	TUNNEL TO LYTTLE ST EXIT	SMOKE	PASS
M1-14	TUNNEL TO LYTTLE ST EXIT AT STAIRS	SMOKE	PASS
M1-15	SOUTH TUNNEL TO LOWER EXHAUST ROOM	SMOKE	PASS
M1-16	SOUTH TUNNEL TO LOWER EXHAUST ROOM	SMOKE	PASS
M1-18	EXHAUST RM STAIRWELL TO MEZZ	SMOKE	PASS
M1-24	EXHAUST ROOM MEZZ SOUTH	SMOKE	PASS
M1-25	EXHAUST ROOM MEZZ CENTER	SMOKE	PASS
M1-26	EXHAUST ROOM MEZZ NORTH	SMOKE	PASS
M1-30	LIGHTING CONTROL ROOM SOUTHWEST	HEAT	PASS
M1-31	LIGHTING CONTROL ROOM SOUTHCENTER	HEAT	PASS
M1-32	LIGHTING CONTROL ROOM SOUTHEAST	HEAT	PASS
M1-33	LIGHTING CONTROL ROOM NORTHEAST	HEAT	PASS
M1-34	LIGHTING CONTROL ROOM NORTHCENTER	HEAT	PASS
M1-35	LIGHTING CONTROL ROOM NORTHWEST	HEAT	PASS
M1-37	LIGHTING CONTROL ROOM EAST DUCT	DSD	PASS
M1-38	STAIRWELL TO LIGHTING CONTROL ROOM	SMOKE	PASS
M1-39	STAIRWELL AT ELECTRIC ROOM DUCT SOUTH	DSD	PASS
M1-40	STAIRWELL AT ELECTRIC ROOM	SMOKE	PASS
M1-41	STAIRWELL AT ELECTRIC ROOM DUCT NORTH	DSD	PASS
M1-42	ELECTRIC ROOM AT WEST EXIT	PULL	PASS
M1-43	ELECTRIC ROOM AT WEST EXIT	SMOKE	PASS
M1-44	ELECTRIC ROOM SOUTHWEST	SMOKE	PASS
M1-45	ELECTRIC ROOM NORTHWEST	SMOKE	PASS
M1-46	ELECTRIC ROOM NORTHEAST AT DOORS	SMOKE	PASS
M1-47	ELECTRIC ROOM EAST AT DOORS DUCT	DSD	PASS
M1-48	ELECTRIC ROOM SOUTHEAST AT DOORS	SMOKE	PASS
M1-49	INTAKE ROOM NORTHWEST AT DOORS	SMOKE	PASS
M1-50	INTAKE ROOM NORTH LADDER EXIT	PULL	PASS
M1-51	INTAKE ROOM NORTHEAST AT DOORS	SMOKE	PASS
M1-56	INTAKE ROOM SOUTH LADDER EXIT	PULL	PASS
M1-61	INTAKE ROOM INTAKE FAN #1	HEAT	PASS 11
M1-63	INTAKE ROOM WEST EXIT CENTER FAN #2	PULL	PASS
M1-64	SOUTHBOUND TUNNEL STAIRWELL EXIT	PULL	PASS
M1-66	FAN ROOM EAST AT FAN #1	SMOKE	PASS
M1-67	FAN ROOM WEST AT FAN #1	SMOKE	PASS
M1-68	FAN ROOM NORTH EXIT AT FAN #2	PULL	PASS
M1-69	FAN ROOM EAST AT FAN #2	SMOKE	PASS
M1-70	FAN ROOM WEST AT FAN #2	SMOKE	PASS
M1-71	FAN ROOM EAST AT FAN #3	SMOKE	PASS
M1-72	FAN ROOM WEST AT FAN #3	SMOKE	PASS

M1-73	FAN ROOM SOUTH EXIT AT FAN #3	PULL	PASS
M1-81	EXHAUST ROOM NORTH EXIT	PULL	PASS
M1-82	SOUTHBOUND TUNNEL STAIRWELL SOUTH	SMOKE	PASS
M1-83	SOUTHBOUND TUNNEL STAIRWELL NORTH	SMOKE	PASS
M1-85	LIGHTING CONTROL ROOM DUCT	DSD	PASS
M1-101	UNUSED RELAY	RELAY	
M1-102	SOUTHBOUND LINEAR HEAT RELAY	RELAY	
M1-103	SOUTHBOUND LINEAR HEAT TROUBLE	TROUBLE	PASS
M1-104	SOUTHBOUND LINEAR HEAT LANE 1	HEAT	PASS
M1-105	SOUTHBOUND LINEAR HEAT LANE 2	HEAT	PASS
M1-106	UNUSED RELAY	RELAY	
M1-107	3RD ST RAMP LINEAR HEAT RELAY	RELAY	
M1-108	3RD ST RAMP LINEAR HEAT TROUBLE	TROUBLE	PASS
M1-109	3RD ST RAMP LINEAR HEAT LANE 1	HEAT	PASS
M1-110	3RD ST RAMP LINEAR HEAT LANE 2	HEAT	PASS
M1-111	NORTHBOUND LINEAR HEAT RELAY	RELAY	
M1-112	UNUSED RELAY	RELAY	
M1-113	NORTHBOUND LINEAR HEAT TROUBLE	TROUBLE	PASS
M1-114	NORTHBOUND LINEAR HEAT LANE 1	HEAT	PASS
M1-115	NORTHBOUND LINEAR HEAT LANE 2	HEAT	PASS
M1-116	TUNNEL LIGHT CONTROL RM ALTRONIX PS	SUPER	PASS
M1-120	CONTROL RM SPRINKLER VALVE TAMPER	TAMPER	PASS

WORK ACKNOWLEDGEMENT



Your Technician:
DAVID BAUMGARDNER
 On site 9/12/2021 at 12:40pm

From | **Protegis Fire & Safety**
 510 West Benson Street
 Cincinnati, OH 45215
 (513) 948-1030
<https://www.protegis.com/>
 Visit our website to sign up for customer portal access.
 We do it right. We make it easy.

Job No. | 22710336
Type | Inspection
PO No. |

Job For | **Lytle Tunnel**
 Interstate 71 Under Lytle Place
 Cincinnati, OH 45202

Completed Services

Alarm System - Alarm System
 Annual Alarm Inspection

Parts, labor and items used		QTY
Inspection	Alarm Inspection - Alarm Annual	1
Inspection	Alarm Inspection - Detector	70
Inspection	Alarm Inspection - Pull Station	7
Inspection	Alarm Inspection - Duct Detector With Alarm	5
Fee	Alarm Fee - Compliance	1

Files and Photos

Deficiency Location	Deficiency Description	Deficiency Status	Deficiency Date	Deficiency Time	Deficiency User
100	100	100	100	100	100
100	100	100	100	100	100
100	100	100	100	100	100
100	100	100	100	100	100

Deficiencies

NEW
Suggested
DISCOVERED
09/12/2021
12:39 PM

Alarm System

Description:

Protectowire at both ends of Southbound wire have been painted. Wire at north end missing an anchor point.



NEW
Deficient
DISCOVERED
09/12/2021
1:02 PM

Alarm System

Description:

2 12/50 batteries in FACP failed. Need to replace

Comments

No Comments

Signature

09/12/2021 01:03pm EDT

NO ONE ON SITE

Accepted By: No one Onsite

APPENDIX

H

FIRE

PROTECTION

TESTING

DOCUMENTS

Contractor's Material and Test Certificate for Aboveground Piping

PROCEDURE

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property name Lytle Tunnel Date 9-10-21

Property address _____

Plans	Accepted by approving authorities (names)	
	Address	
	Installation conforms to accepted plans	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Equipment used is approved	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	If no, explain deviations	

Instructions	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? If no, explain	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Have copies of the following been left on the premises? 1. System components instructions 2. Care and maintenance instructions 3. NFPA 25	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Location of system: Supplies buildings hose valves for tunnels

Sprinklers	Make	Model	Year of manufacture	Orifice size	Quantity	Temperature rating
	<u>none</u>					

Pipe and fittings: Type of pipe Stand Pipe
Type of fittings hose valves

Alarm valve or flow indicator	Alarm device			Maximum time to operate through test connection	
	Type	Make	Model	Minutes	Seconds

Dry pipe operating test	Dry valve			Q. O. D.					
	Make	Model	Serial no.	Make	Model	Serial no.			
	Time to trip through test connection ^{1,2}		Water pressure	Air pressure	Trip point air pressure	Time water reached test outlet ^{1,2}	Alarm operated properly		
	Minutes	Seconds	psi	psi	psi	Minutes	Seconds	Yes	No
Without Q.O.D.									
With Q.O.D.									
	If no, explain								

¹ Measured from time inspector's test connection is opened
² NFPA 13 only requires the 60-second limitation in specific sections

Deluge and preaction valves	Operation <input type="checkbox"/> Pneumatic <input type="checkbox"/> Electric <input type="checkbox"/> Hydraulics							
	Piping supervised: <input type="checkbox"/> Yes <input type="checkbox"/> No			Detecting media supervised <input type="checkbox"/> Yes <input type="checkbox"/> No				
	Does valve operate from the manual trip, remote, or both control stations? <input type="checkbox"/> Yes <input type="checkbox"/> No							
	Is there an accessible facility in each circuit for testing? <input type="checkbox"/> Yes <input type="checkbox"/> No				If no, explain			
	Make	Model	Does each circuit operate supervision loss alarm?		Does each circuit operate valve release?		Maximum time to operate release	
		Yes	No	Yes	No	Minutes Seconds		
Pressure reducing valve test	Location and floor	Make and model	Setting	Static pressure		Residual pressure (flowing)		Flow rate
				Inlet (psi)	Outlet (psi)	Inlet (psi)	Outlet (psi)	Flow (gpm)
Test description	<p>Hydrostatic: Hydrostatic tests shall be made at not less than 200 psi (13.6 bar) for 2 hours or 50 psi (3.4 bar) above static pressure in excess of 150 psi (10.2 bar) for 2 hours. Differential dry-pipe valve clappers shall be left open during the test to prevent damage. All aboveground piping leakage shall be stopped.</p> <p>Pneumatic: Establish 40 psi (2.7 bar) air pressure and measure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours. Test pressure tanks at normal water level and air pressure and measure air pressure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours.</p>							
	<p>All piping hydrostatically tested at <u>200</u> psi (<u> </u> bar) for <u>2</u> hours If no, state reason</p> <p>Dry piping pneumatically tested <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Equipment operates properly <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Do you certify as the sprinkler contractor that additives and corrosive chemicals, sodium silicate or derivatives of sodium silicate, brine, or other corrosive chemicals were not used for testing systems or stopping leaks? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Drain test Reading of gauge located near water supply test connection: <u> </u> psi (<u> </u> bar) Residual pressure with valve in test connection open wide: <u> </u> psi (<u> </u> bar)</p> <p>Underground mains and lead-in connections to system risers flushed before connection made to sprinkler piping</p> <p>Verified by copy of the Contractor's Material and Test Certificate for Underground Piping <input type="checkbox"/> Yes <input type="checkbox"/> No Other Explain</p> <p>Flushed by installer of underground sprinkler piping <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If powder-driven fasteners are used in concrete, has representative 'sample' testing been satisfactorily completed? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain</p>							
Blank testing gaskets	Number used		Locations			Number removed		
Welding	Welding piping <input type="checkbox"/> Yes <input type="checkbox"/> No							
	If yes...							
	Do you certify as the sprinkler contractor that welding procedures comply with the requirements of at least AWS B2.1?						<input type="checkbox"/> Yes <input type="checkbox"/> No	
Do you certify that the welding was performed by welders qualified in compliance with the requirements of at least AWS B2.1?						<input type="checkbox"/> Yes <input type="checkbox"/> No		
Do you certify that the welding was carried out in compliance with a documented quality control procedure to ensure that all discs are retrieved, that openings in piping are smooth, that slag and other welding residue are removed, and that the internal diameters of piping are not penetrated?						<input type="checkbox"/> Yes <input type="checkbox"/> No		
Cutouts (discs)	Do you certify that you have a control feature to ensure that all cutouts (discs) are retrieved?						<input type="checkbox"/> Yes <input type="checkbox"/> No	
Hydraulic data nameplate	Nameplate provided <input type="checkbox"/> Yes <input type="checkbox"/> No				If no, explain			
Remarks	Date left in service with all control valves open							
Signatures	Name of sprinkler contractor <u>Protegis Fire</u>							
	Tests witnessed by							
	For property owner (signed)		Title		Date			
For sprinkler contractor (signed)		Title		Date				
Additional explanations and notes								
<p>Testing of stand pipe system</p> <p><u>Edna G. Zyl</u> Fire Specialist 9/11/2021</p>								

Contractor's Material and Test Certificate for Aboveground Piping

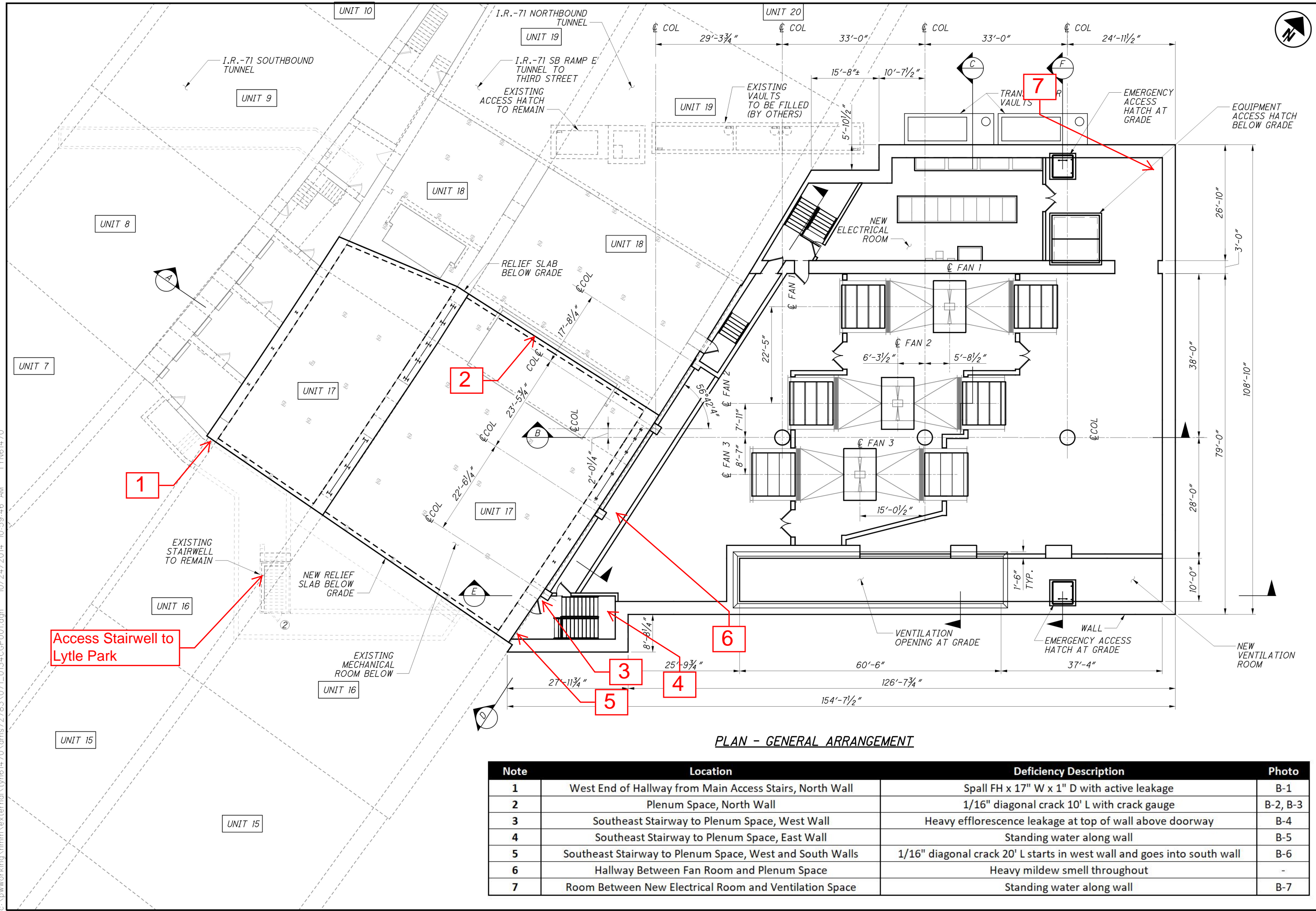
APPENDIX



BUILDING DEFICIENCIES



c:\pwworking\hmm\external\tyn61470\dms72783\071_0134\CP001.dgn 10/24/2014 10:59:46 AM TYN61470



PLAN - GENERAL ARRANGEMENT

Note	Location	Deficiency Description	Photo
1	West End of Hallway from Main Access Stairs, North Wall	Spall FH x 17" W x 1" D with active leakage	B-1
2	Plenum Space, North Wall	1/16" diagonal crack 10' L with crack gauge	B-2, B-3
3	Southeast Stairway to Plenum Space, West Wall	Heavy efflorescence leakage at top of wall above doorway	B-4
4	Southeast Stairway to Plenum Space, East Wall	Standing water along wall	B-5
5	Southeast Stairway to Plenum Space, West and South Walls	1/16" diagonal crack 20' L starts in west wall and goes into south wall	B-6
6	Hallway Between Fan Room and Plenum Space	Heavy mildew smell throughout	-
7	Room Between New Electrical Room and Ventilation Space	Standing water along wall	B-7


 DESIGN AGENCY
 HATCH MOTT MACDONALD
 1803 CLEVELAND PKWY.
 SUITE 200
 CLEVELAND, OH 44135

REVIEWED DATE 10/20/14
 MAR 10/20/14
 STRUCTURE FILE NUMBER 3106578

DRAWN JMS
 CHECKED KTO
 DESIGNED BTJ

STRUCTURAL GENERAL ARRANGEMENT PLAN
 BRIDGE NO. HAM-71-0134
 I-71 LYTLE TUNNEL UNDER LYTLE PARK

HAM-71-01.34
 PID No. 87268

26 / 296
 284 / 555

APPENDIX B



Photo B-1: Spall in north wall at west end of hallway from main access stairs with active leakage, looking northeast

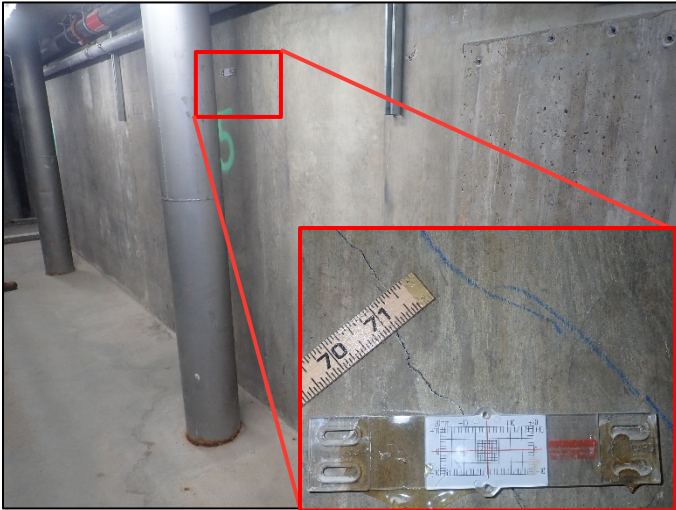


Photo B-2: 1/16" wide crack in north wall between plenum space and control room with installed crack gauge, north (control room) side shown, looking southeast

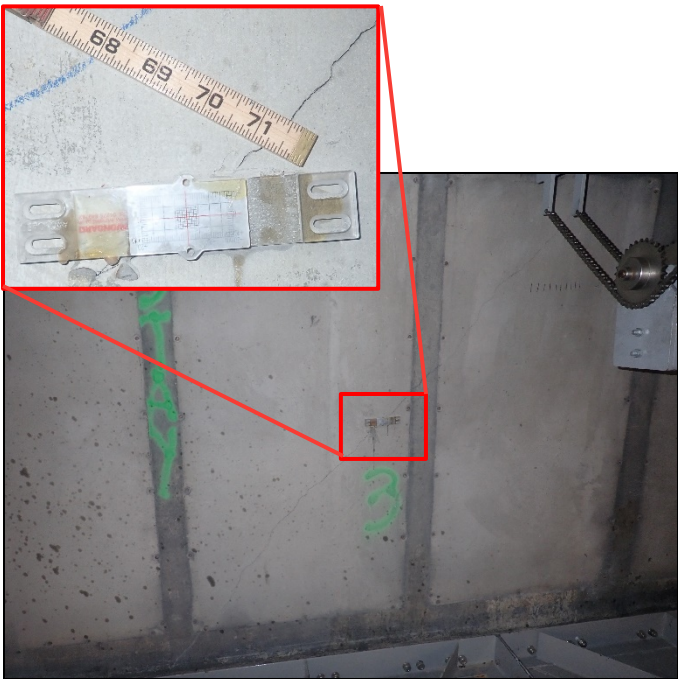


Photo B-3: 1/16" wide crack in north wall between plenum space and control room with installed crack gauge, south (plenum space) side shown, looking north



Photo B-4: Heavy efflorescence on top of west wall above door in southeast stairway to plenum space, looking west

APPENDIX B



Photo B-5: Standing water in southeast corner of southeast stairway to plenum space, looking southeast



Photo B-6: 1/16" wide crack (highlighted in yellow) in south and west walls of southeast stairway to plenum space, looking west



Photo B-7: Standing water along east wall in room between new electrical room and ventilation space, looking northeast

APPENDIX

J

**MECHANICAL
INSPECTION
DOCUMENTS**



Axial Fan Inspection Checklist

Vent Structure Name:

Condition State Definitions:

Good Condition (1) – No notable distress.

Fair Condition (2) – Isolated breakdowns or deterioration.

Poor Condition (3) – Widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.

Severe Condition (4) – The fan warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

Fan Tag Number: TV - F1

Date: 09/08/2021

Fan Inspection Checklist & Sequence

Coordinate with HOC to take fan off line

LOCK OUT AND TAG OUT AT LOCAL FAN DISCONNECT SWITCH

Photograph and Record fan nameplate information

Fan Type: Supply Exhaust **REVERSIBLE**

Fan Manufacturer:

Fan CFM:

Fan SP:

Fan BHP:

Fan RPM:

Fan Drive Arrangement: Direct Belt

Fan Arrangement: Horizontal Vertical

Duct Sound Attenuators: Yes No

Monitoring Devices

Vibration Sensors – Inspect for broken parts, working condition, etc.

Motor Winding RTDs – Inspect for broken parts/wires, working condition, etc.

Flow Sensor – Inspect for broken parts, working condition, etc.

Fan Housing Inspection

Housing Exterior - Inspect for corrosion, deterioration, paint condition, missing hardware, etc.

S/E

1 Fan Duct Flanges - Inspect for corrosion, leaks, deterioration, paint condition, missing hardware, etc.	S/E
1 Inlet Screens - Inspect for corrosion, deterioration, missing hardware, etc	S/E
1 Access Doors- Inspect for missing hardware, tight seal, corrosion, etc	S/E
1 Housing Interior - Inspect for corrosion, deterioration, paint condition, missing hardware, blocked drain, etc. SMALL GREASE STAINS ON HOUSING INTERIOR	S/E
1 Fan Housing Anchorages - Inspect for loose anchors, missing hardware, condition of shims, etc.	
1 Vibration Isolation - Inspect for loose anchors, missing hardware, general condition, any short circuit conditions, check isolators for uniform loading & level, etc.	
1 Foundation - Inspect for cracks, spalled concrete, and general condition	
1 Fan Mounting Feet/Rails - Inspect for corrosion, deterioration, paint condition, missing hardware, etc.	
Flexible Connector Inspection	
1 Fabric - Inspect for holes and general condition, deterioration, paint condition, missing hardware, etc.	S/E
1 Frames – Inspect for corrosion, deterioration, paint condition, missing hardware, etc.	S/E
Transition Duct Inspection	
1 Exterior - Inspect for corrosion, deterioration, paint condition, missing hardware, etc.	S/E
1 Interior - Inspect for corrosion, deterioration, paint condition, etc.	S/E
1 Duct Flanges - Inspect for corrosion, leaks, deterioration, paint condition, missing hardware, etc.	S/E
Fan Dampers	
1 Actuators - Inspect for broken hardware, damaged materials etc.	S/E
1 Bearings - Inspect for leakage, corrosion, grinding etc.	S/E
1 Linkages - Inspect for corrosion, damaged materials, etc.	S/E
1 End Switches – Inspect for corrosion, broken or frayed wires, etc.	S/E
1 Damper Operation – Inspect for damper operation, if it operates smoothly, doesn't work, makes loud sounds, etc. DAMPER OPEN AND CLOSED SMOOTHLY.	
1 Visual Inspection – Inspect for general corrosion, broken pieces, etc.	S/E

Fan Bearings and Pedestals (if Belt Driven)

IF ENTERING FAN HOUSING THE IMPELLER MUST BE CHOCKED TO PREVENT ROTATION PRIOR TO ENTERING FAN HOUSING

Fan Shaft Bearings - Inspect for leakage, loose/missing hardware, corrosion, etc.

Note bearing accessories such as vibration sensors and temp sensors. Note condition of accessories

Bearing Pedestals - Inspect for corrosion, deterioration, missing hardware, etc.

Bearing Pedestal Anchorages - Inspect for loose anchors, missing hardware, condition of shims corrosion, deterioration, missing hardware, etc.

Shaft – Inspect for corrosion, deterioration, paint condition, etc.

Fan Belts & Sheaves Inspection

Inspect belts for wear, frayed conditions, etc.

Inspect sheaves for excessive wear, etc.

Fan Impeller Inspection

Impeller Blades - Inspect for material buildup, corrosion, deterioration, paint condition, obvious cracks, missing hardware, etc.

Impeller Hub - Inspect for material buildup, corrosion, deterioration, paint condition, wear, missing hardware, etc.

REMOVE WHEEL CHOCK

Motor Inspection Checklist & Sequence

Photograph and Record fan nameplate information

Motor Manufacturer:

NEMA Type: TEFC TENV

Motor HP:

Motor RPM:

Volts/Phase/Hz:

Motor Housing - Inspect for grease leaks, stains, corrosion, deterioration, paint condition, etc.

Shaft – Inspect shaft for corrosion, deterioration, paint condition, etc.

DIRECT DRIVE FAN SHAFT NOT VISIBLE DURING INSPECTION

Motor Anchorages - Inspect for loose anchors, missing hardware, condition of shims, etc.

Electrical

Inspect all conduits, flex conduits, etc. for corrosion, proper fasteners, etc.

Inspect all conduit boxes and enclosures for corrosion, proper fasteners, general condition, etc.

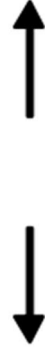
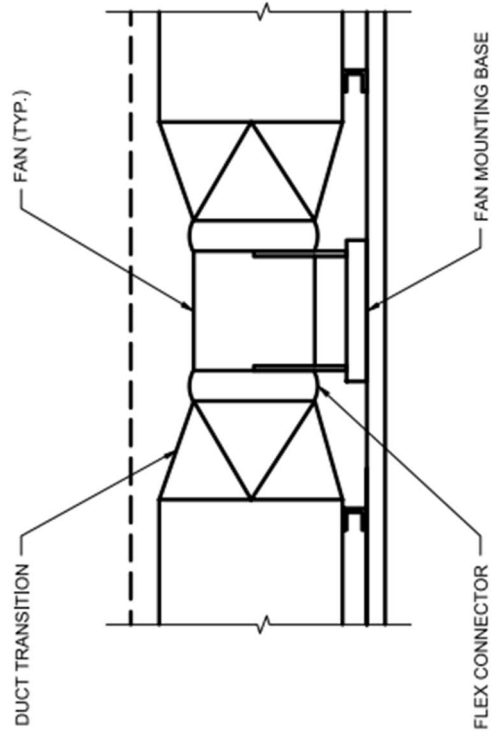
Fan Operation

1 Inspect for sounds during startup and operation such as screeching, bangs, time to start etc.

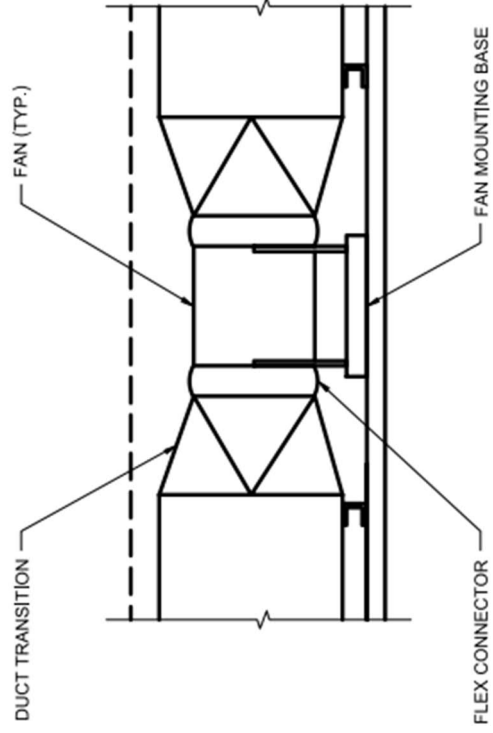
1 Inspect for sounds during startup and operation such as screeching, bangs, time to start etc. (Reversible)

FAN OPERATES SMOOTHLY IN FORWARD AND REVERSE ON BOTH HIGH AND LOW SPEED.

FAN IS NOT CONTROLLABLE VIA THE SCADA SYSTEM.



DIRECTION OF AIRFLOW
(CIRCLE ONE)



DIRECTION OF AIRFLOW
(CIRCLE ONE)



Axial Fan Inspection Checklist

Vent Structure Name:

Condition State Definitions:

Good Condition (1) – No notable distress.

Fair Condition (2) – Isolated breakdowns or deterioration.

Poor Condition (3) – Widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.

Severe Condition (4) – The fan warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

Fan Tag Number: TV - F2

Date: 09/08/2021

Fan Inspection Checklist & Sequence

Coordinate with HOC to take fan off line

LOCK OUT AND TAG OUT AT LOCAL FAN DISCONNECT SWITCH

Photograph and Record fan nameplate information

Fan Type: Supply Exhaust REVERSIBLE

Fan Manufacturer:

Fan CFM: 266,000

Fan SP: 7.4"

Fan BHP: 500

Fan RPM: 5312

Fan Drive Arrangement: Direct Belt

Fan Arrangement: Horizontal Vertical

Duct Sound Attenuators: Yes No

Monitoring Devices

Vibration Sensors – Inspect for broken parts, working condition, etc.

Motor Winding RTDs – Inspect for broken parts/wires, working condition, etc.

Flow Sensor – Inspect for broken parts, working condition, etc.

Fan Housing Inspection

Housing Exterior - Inspect for corrosion, deterioration, paint condition, missing hardware, etc.

S/E

<input checked="" type="checkbox"/> Fan Duct Flanges - Inspect for corrosion, leaks, deterioration, paint condition, missing hardware, etc.	S/E
<input checked="" type="checkbox"/> Inlet Screens - Inspect for corrosion, deterioration, missing hardware, etc	S/E
<input checked="" type="checkbox"/> Access Doors- Inspect for missing hardware, tight seal, corrosion, etc	S/E
<input checked="" type="checkbox"/> Housing Interior - Inspect for corrosion, deterioration, paint condition, missing hardware, blocked drain, etc.	S/E
<input checked="" type="checkbox"/> Fan Housing Anchorages - Inspect for loose anchors, missing hardware, condition of shims, etc.	
<input checked="" type="checkbox"/> Vibration Isolation - Inspect for loose anchors, missing hardware, general condition, any short circuit conditions, check isolators for uniform loading & level, etc.	
<input checked="" type="checkbox"/> Foundation - Inspect for cracks, spalled concrete, and general condition	
<input checked="" type="checkbox"/> Fan Mounting Feet/Rails - Inspect for corrosion, deterioration, paint condition, missing hardware, etc.	
Flexible Connector Inspection	
<input checked="" type="checkbox"/> Fabric - Inspect for holes and general condition, deterioration, paint condition, missing hardware, etc.	S/E
<input checked="" type="checkbox"/> Frames – Inspect for corrosion, deterioration, paint condition, missing hardware, etc.	S/E
Transition Duct Inspection	
<input checked="" type="checkbox"/> Exterior - Inspect for corrosion, deterioration, paint condition, missing hardware, etc.	S/E
<input checked="" type="checkbox"/> Interior - Inspect for corrosion, deterioration, paint condition, etc.	S/E
<input checked="" type="checkbox"/> Duct Flanges - Inspect for corrosion, leaks, deterioration, paint condition, missing hardware, etc.	S/E
Fan Dampers	
<input type="checkbox"/> Actuators - Inspect for broken hardware, damaged materials etc. 1&4 - Damper #4 does not operate - (CS:4) Dampers#1-3 - (CS:1)	S/E
<input checked="" type="checkbox"/> Bearings - Inspect for leakage, corrosion, grinding etc.	S/E
<input checked="" type="checkbox"/> Linkages - Inspect for corrosion, damaged materials, etc.	S/E
<input checked="" type="checkbox"/> End Switches – Inspect for corrosion, broken or frayed wires, etc.	S/E
<input checked="" type="checkbox"/> Damper Operation – Inspect for damper operation, if it operates smoothly, doesn't work, makes loud sounds, etc. Damper 1-3: all operate smoothly. Damper 4: does not open	
<input checked="" type="checkbox"/> Visual Inspection – Inspect for general corrosion, broken pieces, etc.	S/E

Fan Bearings and Pedestals (if Belt Driven)		
<input type="checkbox"/> IF ENTERING FAN HOUSING THE IMPELLER MUST BE CHOCKED TO PREVENT ROTATION PRIOR TO ENTERING FAN HOUSING		
<input type="checkbox"/> Fan Shaft Bearings - Inspect for leakage, loose/missing hardware, corrosion, etc.		
<input type="checkbox"/> Note bearing accessories such as vibration sensors and temp sensors. Note condition of accessories		
<input type="checkbox"/> Bearing Pedestals - Inspect for corrosion, deterioration, missing hardware, etc.		
<input type="checkbox"/> Bearing Pedestal Anchorages - Inspect for loose anchors, missing hardware, condition of shims corrosion, deterioration, missing hardware, etc.		
<input type="checkbox"/> Shaft – Inspect for corrosion, deterioration, paint condition, etc.		
Fan Belts & Sheaves Inspection		
<input type="checkbox"/> Inspect belts for wear, frayed conditions, etc.		
<input type="checkbox"/> Inspect sheaves for excessive wear, etc.		
Fan Impeller Inspection		
<input checked="" type="checkbox"/> Impeller Blades - Inspect for material buildup, corrosion, deterioration, paint condition, obvious cracks, missing hardware, etc.		
<input checked="" type="checkbox"/> Impeller Hub - Inspect for material buildup, corrosion, deterioration, paint condition, wear, missing hardware, etc.		
<input type="checkbox"/> REMOVE WHEEL CHOCK		
Motor Inspection Checklist & Sequence		
<input type="checkbox"/> Photograph and Record fan nameplate information		
Motor Manufacturer: woolong electrical		NEMA Type: <input type="checkbox"/> TEFC <input checked="" type="checkbox"/> TENV <input type="checkbox"/>
Motor HP: 500	Motor RPM:	Volts/Phase/Hz:
<input checked="" type="checkbox"/> Motor Housing - Inspect for grease leaks, stains, corrosion, deterioration, paint condition, etc.		
<input type="checkbox"/> Shaft – Inspect shaft for corrosion, deterioration, paint condition, etc. DIRECT DRIVE FAN SHAFT NOT VISIBLE DURING INSPECTION		
<input checked="" type="checkbox"/> Motor Anchorages - Inspect for loose anchors, missing hardware, condition of shims, etc.		
Electrical		
<input checked="" type="checkbox"/> Inspect all conduits, flex conduits, etc. for corrosion, proper fasteners, etc.		
<input checked="" type="checkbox"/> Inspect all conduit boxes and enclosures for corrosion, proper fasteners, general condition, etc.		

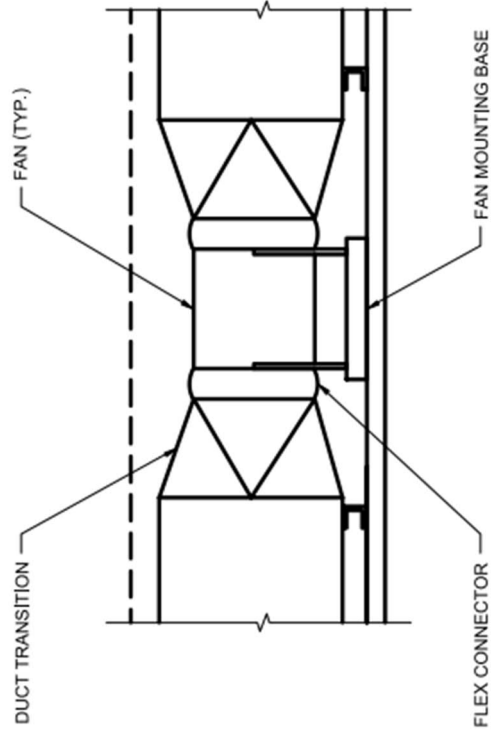
Fan Operation

1 Inspect for sounds during startup and operation such as screeching, bangs, time to start etc.

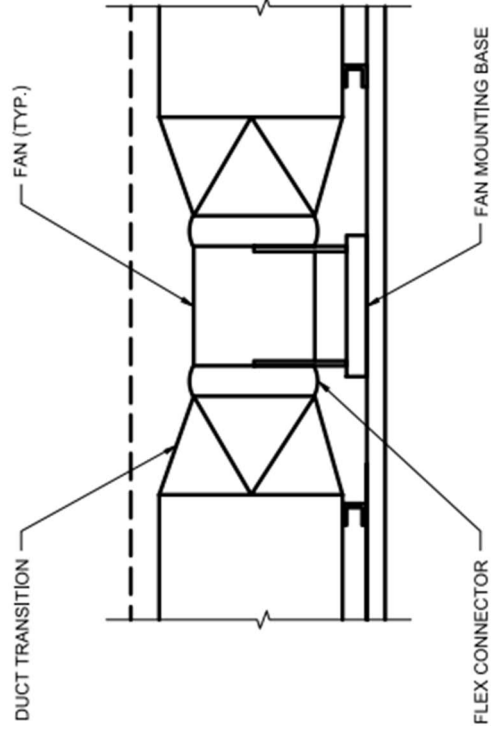
1 Inspect for sounds during startup and operation such as screeching, bangs, time to start etc. (Reversible)

FAN OPERATES SMOOTHLY IN FORWARD AND REVERSE ON BOTH HIGH AND LOW SPEED.

FAN IS NOT CONTROLLABLE VIA THE SCADA SYSTEM.



DIRECTION OF AIRFLOW
(CIRCLE ONE)



DIRECTION OF AIRFLOW
(CIRCLE ONE)



Axial Fan Inspection Checklist

Vent Structure Name:

Condition State Definitions:

Good Condition (1) – No notable distress.

Fair Condition (2) – Isolated breakdowns or deterioration.

Poor Condition (3) – Widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.

Severe Condition (4) – The fan warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

Fan Tag Number: TV - F3

Date: 09/08/2021

Fan Inspection Checklist & Sequence

Coordinate with HOC to take fan off line

LOCK OUT AND TAG OUT AT LOCAL FAN DISCONNECT SWITCH

Photograph and Record fan nameplate information

Fan Type: Supply Exhaust REVERSIBLE

Fan Manufacturer:

Fan CFM: 266,000

Fan SP: 7.4"

Fan BHP: 500

Fan RPM: 5312

Fan Drive Arrangement: Direct Belt

Fan Arrangement: Horizontal Vertical

Duct Sound Attenuators: Yes No

Monitoring Devices

Vibration Sensors – Inspect for broken parts, working condition, etc.

Motor Winding RTDs – Inspect for broken parts/wires, working condition, etc.

Flow Sensor – Inspect for broken parts, working condition, etc.

Fan Housing Inspection

Housing Exterior - Inspect for corrosion, deterioration, paint condition, missing hardware, etc.

S/E

1 Fan Duct Flanges - Inspect for corrosion, leaks, deterioration, paint condition, missing hardware, etc.	S/E
1 Inlet Screens - Inspect for corrosion, deterioration, missing hardware, etc	S/E
1 Access Doors- Inspect for missing hardware, tight seal, corrosion, etc	S/E
1 Housing Interior - Inspect for corrosion, deterioration, paint condition, missing hardware, blocked drain, etc.	S/E
1 Fan Housing Anchorages - Inspect for loose anchors, missing hardware, condition of shims, etc.	
1 Vibration Isolation - Inspect for loose anchors, missing hardware, general condition, any short circuit conditions, check isolators for uniform loading & level, etc.	
1 Foundation - Inspect for cracks, spalled concrete, and general condition	
1 Fan Mounting Feet/Rails - Inspect for corrosion, deterioration, paint condition, missing hardware, etc.	
Flexible Connector Inspection	
1 Fabric - Inspect for holes and general condition, deterioration, paint condition, missing hardware, etc.	S/E
1 Frames – Inspect for corrosion, deterioration, paint condition, missing hardware, etc.	S/E
Transition Duct Inspection	
1 Exterior - Inspect for corrosion, deterioration, paint condition, missing hardware, etc.	S/E
1 Interior - Inspect for corrosion, deterioration, paint condition, etc.	S/E
1 Duct Flanges - Inspect for corrosion, leaks, deterioration, paint condition, missing hardware, etc.	S/E
Fan Dampers	
1 Actuators - Inspect for broken hardware, damaged materials etc.	S/E
1 Bearings - Inspect for leakage, corrosion, grinding etc.	S/E
1 Linkages - Inspect for corrosion, damaged materials, etc.	S/E
1 End Switches – Inspect for corrosion, broken or frayed wires, etc.	S/E
1 Damper Operation – Inspect for damper operation, if it operates smoothly, doesn't work, makes loud sounds, etc.	
1 Visual Inspection – Inspect for general corrosion, broken pieces, etc.	S/E

Fan Bearings and Pedestals (if Belt Driven)		
<input type="checkbox"/> IF ENTERING FAN HOUSING THE IMPELLER MUST BE CHOCKED TO PREVENT ROTATION PRIOR TO ENTERING FAN HOUSING		
<input type="checkbox"/> Fan Shaft Bearings - Inspect for leakage, loose/missing hardware, corrosion, etc.		
<input type="checkbox"/> Note bearing accessories such as vibration sensors and temp sensors. Note condition of accessories		
<input type="checkbox"/> Bearing Pedestals - Inspect for corrosion, deterioration, missing hardware, etc.		
<input type="checkbox"/> Bearing Pedestal Anchorages - Inspect for loose anchors, missing hardware, condition of shims corrosion, deterioration, missing hardware, etc.		
<input type="checkbox"/> Shaft – Inspect for corrosion, deterioration, paint condition, etc.		
Fan Belts & Sheaves Inspection		
<input type="checkbox"/> Inspect belts for wear, frayed conditions, etc.		
<input type="checkbox"/> Inspect sheaves for excessive wear, etc.		
Fan Impeller Inspection		
<input checked="" type="checkbox"/> 2 Impeller Blades - Inspect for material buildup, corrosion, deterioration, paint condition, obvious cracks, missing hardware, etc. CORROSION ON HARDWARE		
<input checked="" type="checkbox"/> 1 Impeller Hub - Inspect for material buildup, corrosion, deterioration, paint condition, wear, missing hardware, etc.		
<input type="checkbox"/> REMOVE WHEEL CHOCK		
Motor Inspection Checklist & Sequence		
<input type="checkbox"/> Photograph and Record fan nameplate information		
Motor Manufacturer: woolong electrical		NEMA Type: <input type="checkbox"/> TEFC <input checked="" type="checkbox"/> TENV <input type="checkbox"/>
Motor HP: 500	Motor RPM:	Volts/Phase/Hz:
<input checked="" type="checkbox"/> 2 Motor Housing - Inspect for grease leaks, stains, corrosion, deterioration, paint condition, etc. GREASE LEAKING FROM BEARINGS		
<input type="checkbox"/> Shaft – Inspect shaft for corrosion, deterioration, paint condition, etc. DIRECT DRIVE FAN SHAFT NOT VISIBLE DURING INSPECTION		
<input checked="" type="checkbox"/> 1 Motor Anchorages - Inspect for loose anchors, missing hardware, condition of shims, etc.		
Electrical		
<input checked="" type="checkbox"/> 1 Inspect all conduits, flex conduits, etc. for corrosion, proper fasteners, etc.		
<input checked="" type="checkbox"/> 1 Inspect all conduit boxes and enclosures for corrosion, proper fasteners, general condition, etc.		

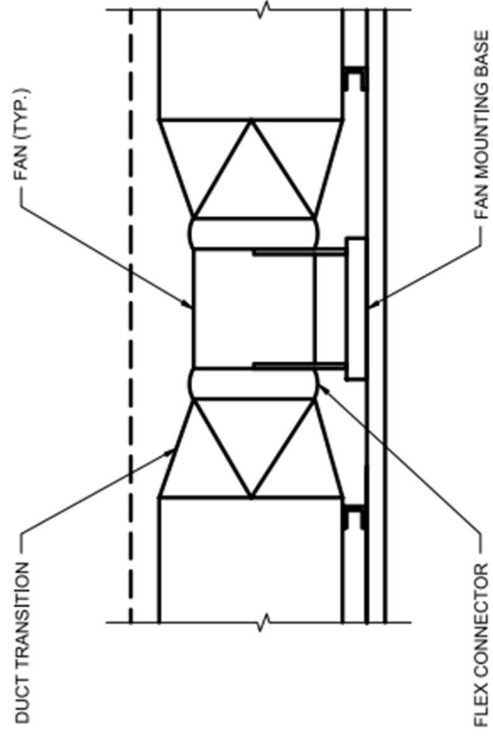
Fan Operation

1 Inspect for sounds during startup and operation such as screeching, bangs, time to start etc.

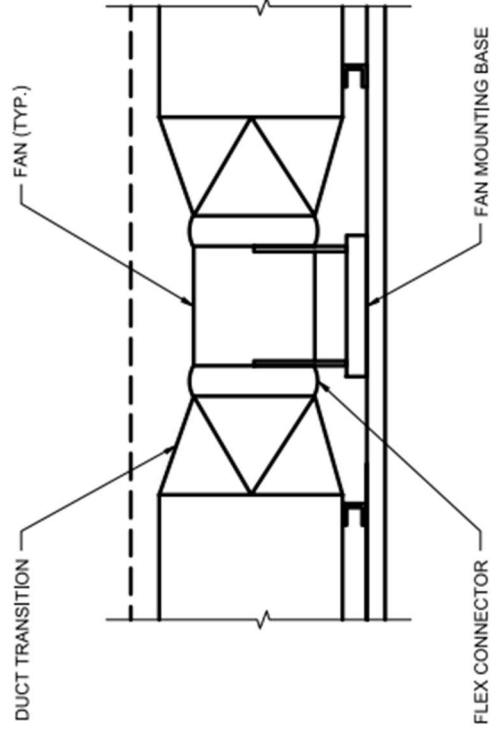
1 Inspect for sounds during startup and operation such as screeching, bangs, time to start etc. (Reversible)

FAN OPERATES SMOOTHLY IN FORWARD AND REVERSE ON BOTH HIGH AND LOW SPEED.

FAN IS NOT CONTROLLABLE VIA THE SCADA SYSTEM.



DIRECTION OF AIRFLOW
(CIRCLE ONE)



DIRECTION OF AIRFLOW
(CIRCLE ONE)

REMOVE EXISTING AND INSTALL NEW FDC#1
(CONNECT TO EXISTING FEEDING PIPE)

FIRE HOSE VALVE (FHV):
MINOR CORROSION ON
THREADS. MINOR PITTING/
CORROSION ON PIPING.
CORROSION ON HANDLE.

NEW BOLLARDS
FOR LOCATION, SEE NOTE 3
FOR DETAIL, SEE ODOT SCD RM-5.1

6" MID TUNNEL RISER: MINOR
CORROSION ON PIPE.
SEVERE CORROSION ON PIPE
HANGERS INCLUDING
PITTING. SIGN NOT
ATTACHED TO PIPE.

FIRE HOSE VALVE (FHV):
MINOR CORROSION ON
THREADS. MINOR PITTING/
CORROSION ON PIPING.
CORROSION ON HANDLE.

FIRE HOSE VALVE (FHV):
MINOR CORROSION ON
THREADS. MINOR PITTING/
CORROSION ON PIPING.
CORROSION ON HANDLE.

6" MID TUNNEL RISER: MINOR
CORROSION ON PIPE.
SEVERE CORROSION ON PIPE
HANGERS INCLUDING
PITTING. SIGN NOT
ATTACHED TO PIPE.

NOTES:

1. FOR SYMBOLS AND ABBREVIATIONS LEGENDS, SEE SHEET 116.
2. ALL STATIONING APPROXIMATE.
3. BOLLARDS SHALL BE LOCATED ON THE CONCRETE WALK AND SHALL FULLY PROTECT THE FIRE DEPARTMENT CONNECTION FROM ERRANT VEHICLES. BOLLARD PLACEMENT SHALL ALLOW UNIMPEDED CONNECTION OF HOSES TO THE FIRE DEPARTMENT CONNECTION. BOLLARDS SHALL NOT BE PLACED IN THE CURB, CURB CUT, OR STREET.
4. FOR NEW CONNECTIONS TO GROUNDING GRID, SEE ELECTRICAL DRAWINGS.
5. REMOVE AND REPLACE EXISTING FDC#1 WITH SAME KIND AND CONNECT TO EXISTING FEEDING PIPE.
6. REMOVE AND REPLACE EXISTING FDC#2 WITH SAME KIND AND REMOVE AND REPLACE EXISTING FEEDING PIPE.

FIRE HOSE VALVE (FHV):
MINOR CORROSION ON
THREADS. MINOR PITTING/
CORROSION ON PIPING.
CORROSION ON HANDLE.

6" MID TUNNEL RISER: MINOR
CORROSION ON PIPE.
SEVERE CORROSION ON
PIPE HANGERS INCLUDING
PITTING. SIGN NOT
ATTACHED TO PIPE.

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6" STANDPIPE RISER: MINOR
CORROSION ON PIPING,
FITTINGS AND CHECK VALVE

FIRE HOSE VALVE (FHV): CAP
CHAIN NOT ATACHED. PAINT
PEELING ON VALVE WHEEL.
PITTING ON WHEEL UNDER
PEELED PAINT.

FIRE HOSE VALVE (FHV): IN
GOOD CONDITION. MINOR
SURFACE CORROSION ON
THREADS AT CONNECTION
TO FHV.

FIRE HOSE VALVE (FHV):
PAINT PEELING ON VALVE
WHEEL. PITTING ON WHEEL
UNDER PEELED PAINT.
CORROSION ON THREADS AT
FHV. AREAS OF PITTING ON
2.5" GALVY PIPE.

FIRE HOSE VALVE (FHV):
PAINT PEELING ON VALVE
WHEEL. PITTING ON WHEEL
UNDER PEELED PAINT.
CORROSION ON THREADS AT
FHV. AREAS OF PITTING ON
2.5" GALVY PIPE.

FIRE HOSE VALVE (FHV):
VALVE APPEARS NEWER.
CORROSION ON VALVE
WHEEL, CORROSION ON
THREADS AT FHV

NEW WORK PLAN - STA. 126+00 N.B. TO STA 131+50 N.B.

SCALE: 1" = 20'

WATER WORK - DRY STANDPIPE - PLAN
STA. 126+00 TO STA. 131+50 - I.R.-71

HAM-71-1.34

124
555

CALCULATED: EEB

CHECKED: NAH




NOTES:

1. FOR SYMBOLS AND ABBREVIATIONS LEGENDS, SEE SHEET 116 .
2. ALL STATIONING APPROXIMATE.
3. FOR NEW CONNECTIONS TO GROUNDING GRID, SEE ELECTRICAL DRAWINGS.
4. FOR FDC#3 RELOCATION, SEE SHEETS 127, 136 AND 137.

CALCULATED
E.E.B.
CHECKED
NAH

0 10 20 40
HORIZONTAL
SCALE IN FEET

FIRE HOSE VALVE (FHV):
MINOR CORROSION ON
THREADS. MINOR PITTING/
CORROSION ON PIPING.
CORROSION ON HANDLE.

FIRE HOSE VALVE (FHV):
MINOR CORROSION ON
WHEEL. MINOR CORROSION
ON THREADS.

FIRE HOSE VALVE (FHV):
MISSING CAP. CORRODED
HANDLE. CORROSION ON
THREADS. PITTING.

FIRE HOSE VALVE (FHV):
MISSING CAP. MINOR
CORROSION ON THREADS.
MAYBE MINOR PITTING ON
COUPLING.

**6" STANDPIPE RISER: SEVERE
CORROSION ON PIPING,
FITTINGS, VALVES AND PIPE
CLAMPS. PITTING ON PIPING,
COUPLINGS AND CHECK
VALVE.**

FIRE HOSE VALVE (FHV):
VALVE APPEARS NEWER.
CORROSION ON VALVE
WHEEL, CORROSION ON
THREADS AT FHV.

FIRE HOSE VALVE (FHV):
PAINT PEELING ON VALVE
WHEEL, PITTING ON VALVE
WHEEL, CORROSION ON
THREADS AT FHV. MINOR
PITTING ON 2.5" GALVANIZED
PIPE.

FIRE HOSE VALVE (FHV):
VALVE APPEARS NEWER.
CORROSION ON VALVE
WHEEL. CORROSION ON
THREADS AT FHV. MINOR
PITTING ON 2.5" GALVY PIPE.

FIRE HOSE VALVE (FHV):
VALVE APPEARS NEWER.
CORROSION ON VALVE
WHEEL, CORROSION ON
THREADS AT FHV. MINOR
PITTING ON 2.5" GALVY PIPE.

6" STANDPIPE RISER:
SEVERE CORROSION
INCLUDING SIGNIFIGANT
PITTING ON PIPING,
FITTINGS, HANGERS AND
VALVES.



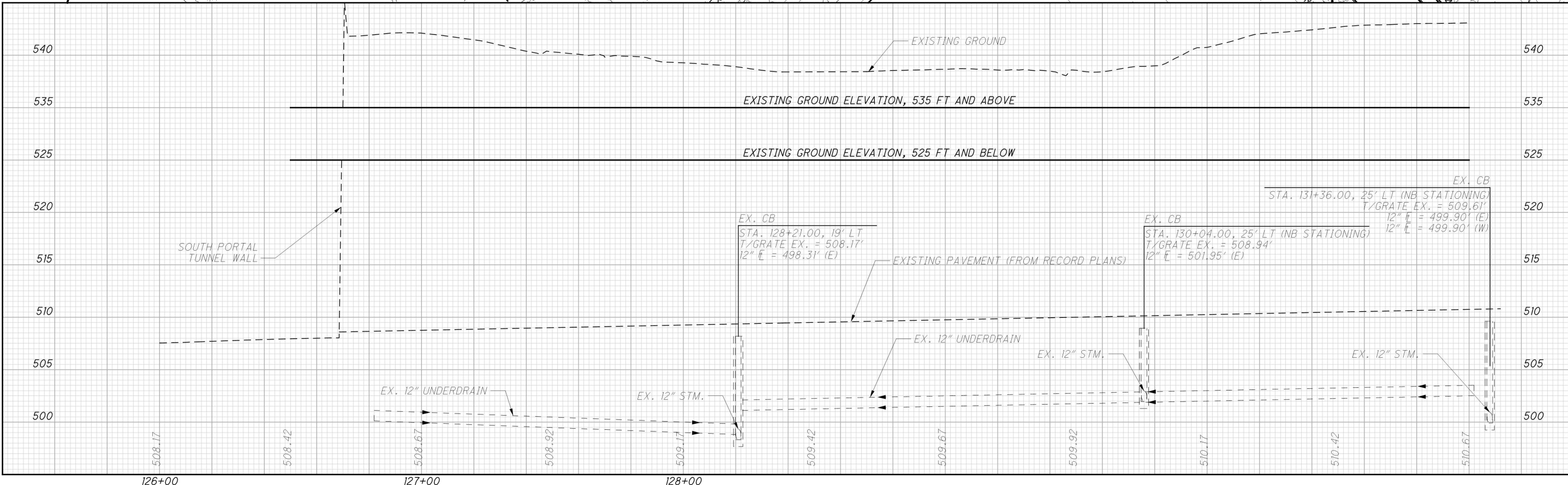
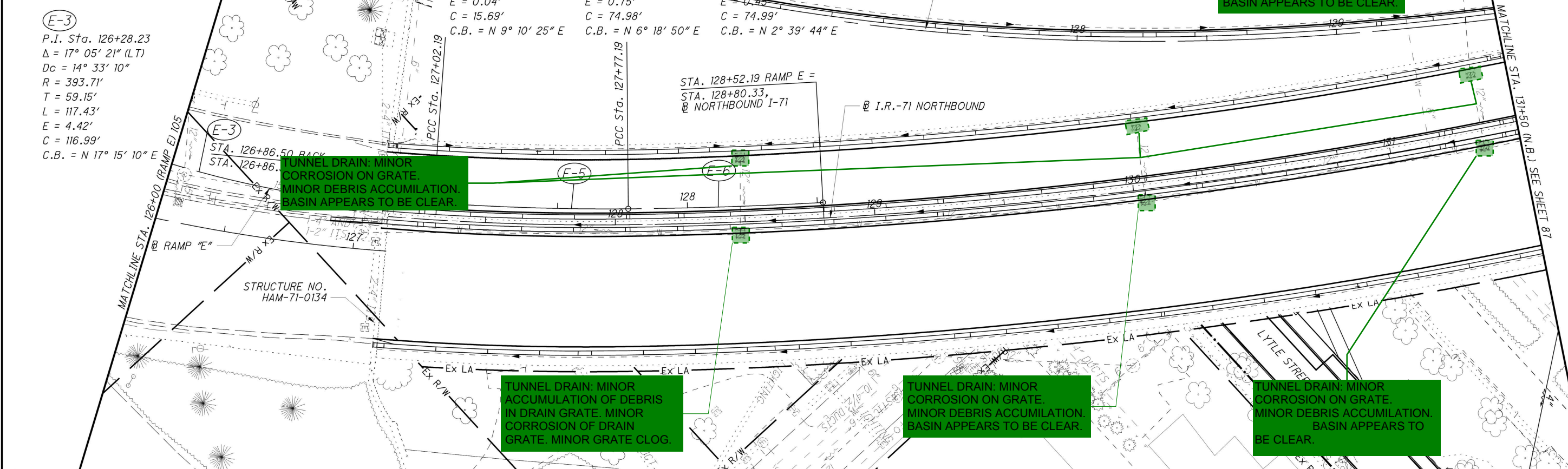
NEW WORK PLAN - STA. 131+50 N.B. TO STA. 136+50 N.B.
SCALE: 1" = 20'

WATER WORK - DRY STANDPIPE - PLAN
STA. 131+50 TO STA. 136+50 - I.R.-71

HAM-71-1.34

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CROSS REFERENCES	
SHEET NO.	DESCRIPTION
2-3	BENCHMARK AND REFERENCE POINTS
59-80	ESTIMATED QUANTITIES
168-171	TRAFFIC CONTROL PLANS
179-180	ITS PLANS
204-206	LIGHTING PLANS
124-125	WATER WORK PLANS
259-554	STRUCTURE PLANS



PLAN AND PROFILE
STA. 126+00 TO STA. 131+50 - I.R.-71 RAMP "E"

HAM-71-1.34

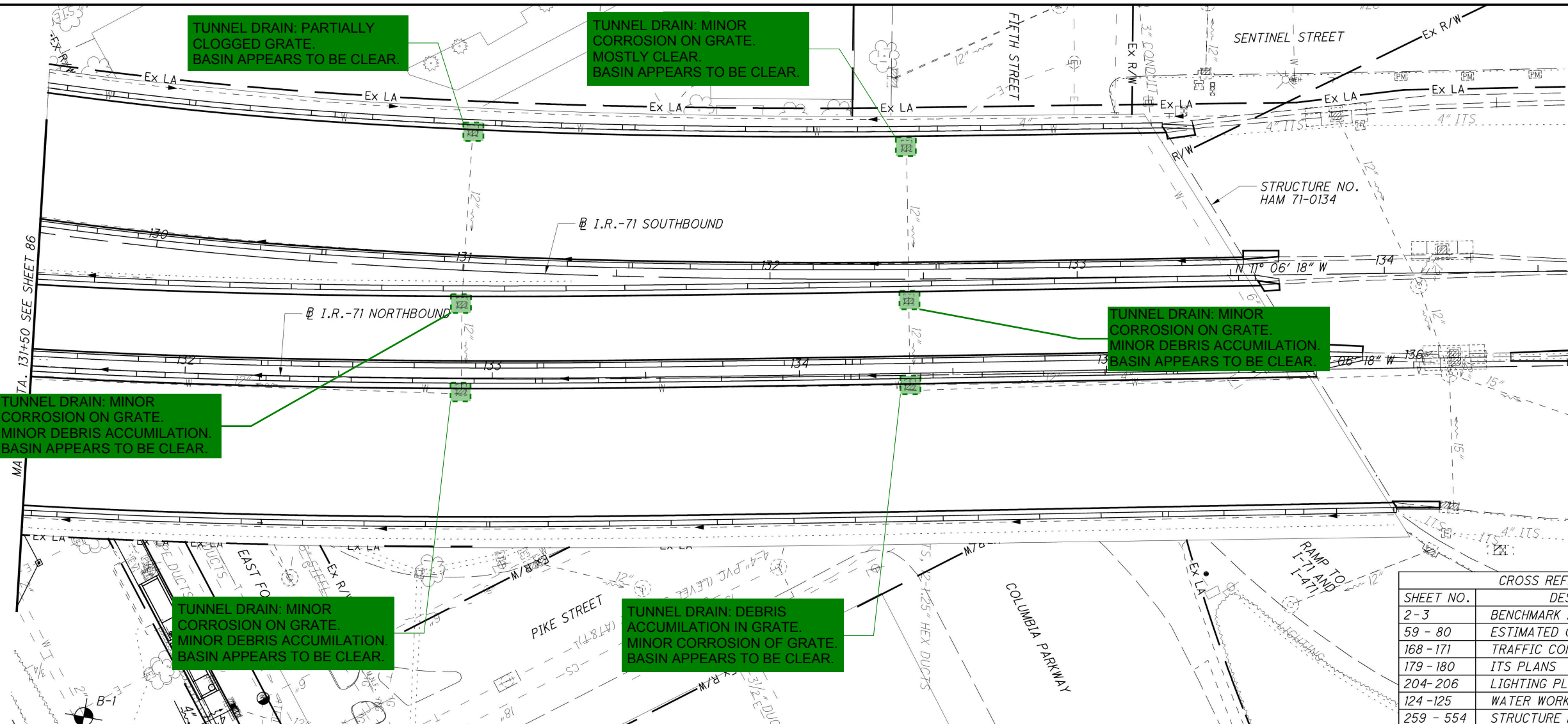
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555

CALCULATED: RLD
CHECKED: CWP

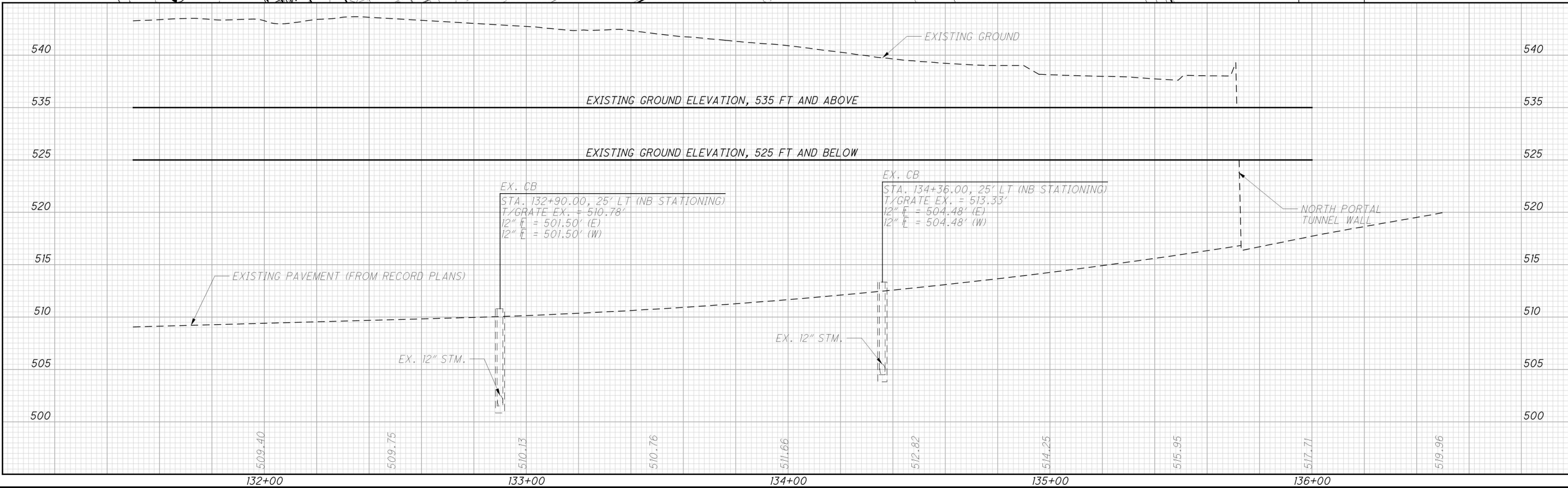
HORIZONTAL SCALE IN FEET
1" = 20'

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CROSS REFERENCES	
SHEET NO.	DESCRIPTION
2-3	BENCHMARK AND REFERENCE POINTS
59 - 80	ESTIMATED QUANTITIES
168 - 171	TRAFFIC CONTROL PLANS
179 - 180	ITS PLANS
204 - 206	LIGHTING PLANS
124 - 125	WATER WORK PLANS
259 - 554	STRUCTURE PLANS



PLAN AND PROFILE

STA. 131+50 TO STA. 136+50 - I.R.-71 RAMP "E"

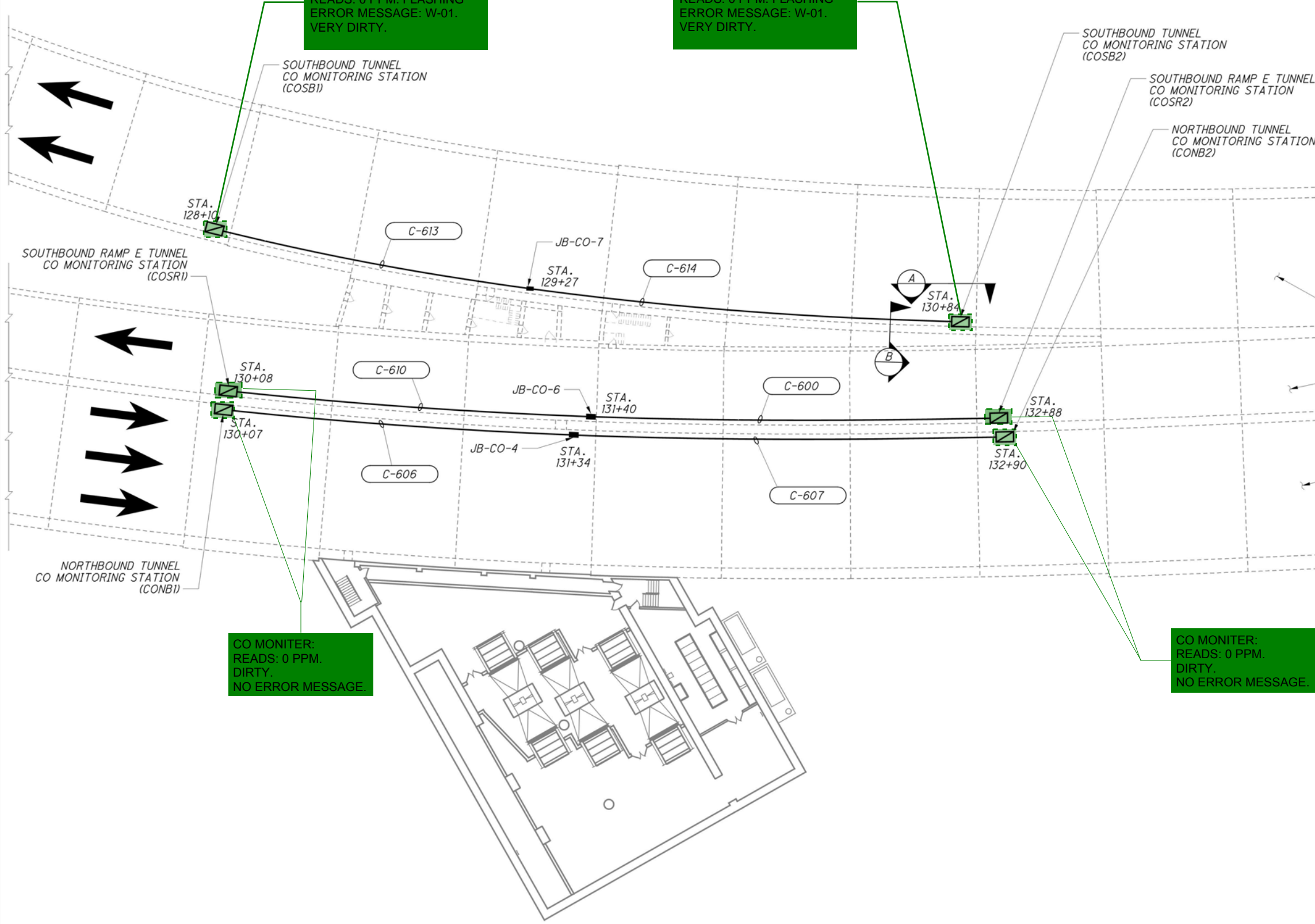
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555

CALCULATED: []
R/LD: []
CHECKED: []
CWP: []

0 20 40
HORIZONTAL SCALE IN FEET

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- NOTES:**
1. ALL DISTANCES SHALL BE FIELD VERIFIED BY THE CONTRACTOR
 2. SEE SHEET [218/296] FOR CONDUIT SIZES
 3. SEE SHEET [162/296] FOR ELEVATION A-A
 4. SEE SHEET [162/296] FOR SECTION B-B

- LEGEND:**
- ☐ - CARBON MONOXIDE DETECTION SENSOR
 - - PROPOSED JUNCTION BOX (JB)
 - RGS - RIGID GALVANIZED STEEL
 - ➔ - TRAFFIC DIRECTION
- C.O.S.B.I.**
- UNIQUE IDENTIFIER
 - SOUTHBOUND TUNNEL
 - CARBON MONOXIDE DETECTOR
- CO** - CARBON MONOXIDE
NB - NORTHBOUND TUNNEL
PLC - PROGRAMMABLE LOGIC CONTROLLER
SB - SOUTHBOUND TUNNEL
SR - SOUTHBOUND RAMP E TUNNEL TO THIRD STREET

- I.R.-71 SOUTHBOUND TUNNEL
- I.R.-71 SB RAMP E TUNNEL TO THIRD STREET
- I.R.-71 NORTHBOUND TUNNEL

CARBON MONOXIDE DETECTION SYSTEM - ROADWAY PLAN

SCALE: 1" = 20'
0 20' 40'

DESIGN AGENCY
HATCH MOTT MACDONALD
1803 CLEVELAND PKWY.
SUITE 200
CLEVELAND, OH 44135

DATE	08/07/14
REVIEWED	DGN
DESIGNED	KSK
DRAWN	JMS
CHECKED	NAH
REVISIONS	KSK
STRUCTURE FILE NUMBER	3106578

CARBON MONOXIDE DETECTION SYSTEM - ROADWAY PLAN
 BRIDGE NO. HAM-71-0134
 I-71 LYTLE TUNNEL UNDER LYTLE PARK

HAM-71-01.34
PID No. 87268
 161/296
 419
 555

APPENDIX

K

INSPECTOR
CERTIFICATIONS



U.S. Department
of Transportation
**Federal Highway
Administration**

National Highway Institute



Certificate of Training

Wesley Weir

has participated in

FHWA-NHI-130110 ~ Tunnel Safety Inspection

hosted by

Caltrans - Structure Maintenance & Investigations

Date: *January 9 – 13, 2017*

Hours of Instruction: *32 hours*

Location: *Sacramento, California*

Paul McGuinness

Instructor *Paul McGuinness, P.E.*
Michael Baker International

Anthony Traina

Local Coordinator *Anthony Traina, CT-SM&I*

Matthew McGuire

Instructor *Matthew McGuire, P.E.*
HDR

Valerie Briggs

Valerie Briggs, Director
National Highway Institute



U.S. Department
of Transportation
**Federal Highway
Administration**

National Highway Institute



Certificate of Training

Nicholas Fisco

has participated in

Tunnel Safety Inspection

hosted by

Ohio Department of Transportation

July 12 – 16, 2021

32

Date:

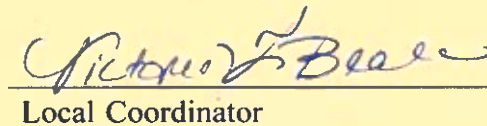
Cincinnati, OH

Hours of Instruction:

Location:



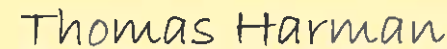
Instructor



Local Coordinator



Instructor



Thomas Harman, Director
National Highway Institute



U.S. Department
of Transportation
**Federal Highway
Administration**

National Highway Institute



Certificate of Training

Joshua Thomas

has participated in

Tunnel Safety Inspection

hosted by

Ohio Department of Transportation

July 12 – 16, 2021

32

Date:

Hours of Instruction:

Location:

Cincinnati, OH

Thomas H. Ryan

Instructor

Thomas Harman

Local Coordinator

Brian J. Laska

Instructor

Thomas Harman

Thomas Harman, Director
National Highway Institute



U.S. Department
of Transportation
**Federal Highway
Administration**

National Highway Institute
Certificate of Training



Joseph Flocco

has participated in

FHWA-NHI-130110 Tunnel Safety Inspection

hosted by

National Highway Institute

Date: Sep. 12-16, 2016

Hours of Instruction: 32

Location: Arlington, VA

Instructor

Local Coordinator

Instructor

**Valerie Briggs, Director
National Highway Institute**



U.S. Department
of Transportation
**Federal Highway
Administration**

National Highway Institute



Certificate of Training

Joseph Flocco

has participated in

130125 Tunnel Safety Inspection Refresher ILT

hosted by

BSCES

Date: May 18-20, 2021

Hours of Instruction: 17

Location: Online Delivery, MA

Instructor

Instructor

Richard Keenan

Local Coordinator

Thomas Harman

Thomas Harman, Director
National Highway Institute



U.S. Department
of Transportation
**Federal Highway
Administration**

National Highway Institute



Certificate of Training

Timothy Begin

has participated in

FHWA-NHI-130110 Tunnel Safety Inspection

hosted by

National Highway Institute

Date: Sep. 12-16, 2016

Hours of Instruction: 32

Location: Arlington, VA

/s/ Michael Baker

/s/ Barbara Szostek

Instructor

Local Coordinator

/s/ Tom Ryan

Valerie Briggs

Instructor

**Valerie Briggs, Director
National Highway Institute**



U.S. Department
of Transportation
**Federal Highway
Administration**

National Highway Institute



Certificate of Training

Timothy Begin

has participated in

130125 Tunnel Safety Inspection Refresher ILT

hosted by

BSCES

Date: March 30 - April 1, 2021

Hours of Instruction: 17

Location: Online Delivery, MA

Instructor

Instructor

Richard Keenan

Local Coordinator

Thomas Harman, Director

National Highway Institute



U.S. Department
of Transportation
**Federal Highway
Administration**

National Highway Institute



Certificate of Training

Tony Federico

has participated in

FHWA-NHI-130110 Tunnel Safety Inspection

hosted by

WSP | Parsons Brinkerhoff

Date: August 29-September 2, 2016

Hours of Instruction: 30

Location: Ephrata, PA



Instructor



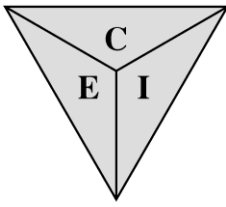
Local Coordinator



Instructor



Valerie Briggs, Director
National Highway Institute



Electrical Certification Incorporated

*P.O. Box 53368 * Cincinnati, Ohio 45253*

*Office: (513) 662-7500 * Fax: (513) 662-6610*

*Cell: (513) 604-2431 * Email: ECIInc@cinci.rr.com*

To Whom It May Concern:

Thank you for your inquiry into the capabilities of Electrical Certification Incorporated, and the possibility of future Co-operative projects. With our reputation and location in the Cincinnati market we feel that there are many areas where we can offer excellent service and also reduce your overall costs.

Electrical Certification Incorporated specializes in Electrical Product Evaluation, and Inspection, Testing, and Maintenance of electrical power distribution equipment. Our services are available 24 hours a day 7 days a week to cover any normal and/or emergency condition.

Maintenance and testing of electrical equipment has been proven to increase electrical equipment safety, reliability and longevity. Test data and evaluation can be useful in establishing bench marks for future maintenance frequency and or phased in replacement.

ECI uses recommended maintenance and testing guidelines established by many sources including; the Original Manufacturers maintenance procedures, NFPA 70 NATIONAL ELECTRICAL CODE, NFPA 70B ELECTRICAL EQUIPMENT MAINTENANCE, ANSI AMERICAN NATIONAL STANDARDS INSTITUTE, NEMA NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION, AND NETA THE INTERNATIONAL ELECTRICAL TESTING ASSOCIATION. Our equipment is calibrated regularly, and is traceable to the National Institute of Standards and Technology.

ECI employs, Electricians, Engineers, and Technicians that have at least 10 years experience in the electrical maintenance industry. Our technicians possess the skills and knowledge to safely test, evaluate, service, and recondition electrical apparatus. ECI employees are Drug Free and have OSHA safety and health training.

Electrical Certification Incorporated is committed to providing excellence in Inspection, Testing, and Maintenance services, while reducing overall electrical maintenance cost.

We appreciate the opportunity to present our case for Choosing Electrical Certification Incorporated to be your Electrical Testing and Maintenance Service Company, and are looking forward to discussing any mutually beneficial projects.

Sincerely,

Jeffrey Jones
General Manager

Jeffrey Jones - 4605 Boomer Rd. - Cincinnati, OH 45247 - (513)604-2431

EXPERIENCE

11/02 to Present (founded) ELECTRICAL CERTIFICATION INCORPORATED – Cincinnati, OH
Director of Technical Resources / General Manager

- Electrical product evaluations
- Technical consulting
- Electrical safety training
- Site specific electrical maintenance training
- Testing and Maintenance of power distribution systems
- Field Labeling Services

11/02 to 06/07 Field Apparatus Service & Testing, Division of CE Power Solutions, LLC – Cincinnati, OH
(FAST Corporation was acquired by CE Power Solutions, LLC)

General Manager

- Oversee all operations of FAST / Service division – including A/R & A/P operations
- Provide technical consulting to client base
- Perform marketing and direct sales
- Design and implement custom control systems
- Multiple project management
- Supervise field service and testing operations
- Training director
- Augment the field service department as needed
- Field Labeling Services

1995 to 11/2002 (founded) FIELD APPARATUS SERVICE & TESTING CORPORATION

A specialized Electrical Testing, Maintenance, and Engineering services company serving large Industrial, Commercial, and Institutional customers.

Field Service / Operations Manager

- Oversee all operation of FAST
- Provide technical consulting to client base
- Perform marketing and direct sales
- Design and implement custom control systems
- Supervise field service and testing operations
- Training director (Safety & new technicians)
- Augment the field service department as needed
- Field Labeling Services

1982 to 1995 HIGH VOLTAGE MAINTENANCE CORPORATION

A specialized Electrical Testing, Maintenance, and Engineering services company.

Field Service Supervisor / Certified Test Technician / Certified Test Technologist

- Special projects supervisor
- Schedule and supervise day to day field operations
- Instruct and verify new hire training
- Design and implement custom control systems
- 50% of time spent directly in field service
- Implement, manage and perform Field Labeling Services

Jeffrey Jones - 4605 Boomer Rd. - Cincinnati, OH 45247 - (513)604-2431

- 1974 to 1982 INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS
A union electrical construction organization.
FOREMAN / ELECTRICIAN
- Supervised and worked in industrial applications.
 - Medium voltage distribution.
 - Motor control and Fire Alarm systems.
 - Experienced in pole line construction and repair.
- 1983 to Present NFPA - 70 NATIONAL ELECTRICAL CODE
Yearly National Electric Code update classes
Electrical license renewal

LICENSE

- Licensed Master Electrician
- Licensed Electrical Contractor

RECOGNIZED TRAINER

- OSHA / NFPA 70E Arc Flash Trainer
- Medium Voltage Cable Splice and Terminating Trainer
- Testing Materials and Procedures Trainer
- Preventive Maintenance Trainer
- Controls & Troubleshooting

EDUCATION

- 1971 to 1974 ROGER BACON HIGH SCHOOL - Cincinnati, Ohio
Catholic College Prep School
- 1974 to 1978 CINCINNATI TECHNICAL COLLEGE - Cincinnati, Ohio
National Joint Apprenticeship Training Course
- Journeyman Wireman
- 1982 to 1985 NATIONAL ELECTRICAL TESTING ASSOCIATION - Morrison, CO
NETA Test Technician Course.
- NETA Certified Test Technician
- 1986 THE AUTOMATIC SWITCH COMPANY - Florham Park, NJ
Automatic Transfer Switch maintenance and repair
- Certified Switch Maintenance

Jeffrey Jones - 4605 Boomer Rd. - Cincinnati, OH 45247 - (513)604-2431

- 1986 RAYCHEM
 - Certified Terminations & Splice 5KV thru 69KV
- 1987 THE AUTOMATIC SWITCH COMPANY - Florham Park, NJ
 - Synchro Power System Start Up and Maintenance
 - Certified Synchro Power Systems
- 1988 MULTI AMP INSTITUTE - Dallas, TX
 - Advance Protective Relay Maintenance
 - Certified Relay Technician
- 1990 NATIONAL ELECTRICAL TESTING ASSOCIATION - Morrison, CO
 - NETA Test Technologist Qualification
 - NETA Certified Test Technologist
- 1991 THE CINCINNATI GAS AND ELECTRIC COMPANY
 - Power System Harmonics: Sources, Effects, and Solutions.
 - Continuing Education
- 1992 NATIONAL JOURNEYMAN AND APPRENTICE TRAINING COMMITTEE
 - Programmable controllers and Process Instrumentation
 - Continuing Education
- 1994 ABB POWER T&D COMPANY INC. - Greensburg, PA
 - SF6 Power Circuit Breaker Maintenance seminar (Continuing Education)
- 1998 COOPER POWER SYSTEMS
- 2001 BASLER DISTRIBUTED GENERATION
- 2002 SEL UNIVERSITY - Family of Electronic Relaying
- 1986 to Present JATC Medium Voltage Cable Trainer
- 2007 NJATC NFPA 70E Trainer
- 2008 NJATC NFPA 70E Trainer Recertification
- 2011 NJATC NFPA 70E Trainer Recertification
- 2015 NJATC NFPA 70E Trainer Recertification
- 2018 NJATC NFPA 70E Trainer Recertification

APPENDIX

L

VERTICAL
CLEARANCE
MEASUREMENTS

Southbound Mainline Vertical Clearance Measurements*		
Unit	South End	North End
1	15'-8 1/4"	15'-8 7/16"
2	15'-8 1/2"	15'-8 3/16"
3	15'-9"	15'-8 3/16"
4	15'-8 7/16"	15'-8 5/8"
5	15'-8 11/16"	15'-8 7/16"
6	15'-8 5/8"	15'-7 5/8"
7	15'-8 7/16"	15'-7 5/8"
8	15'-7 11/16"	15'-7 13/16"
9	15'-6 3/16"	15'-5 3/4"
19	15'-5 1/4"	15'-6 3/16"
20	15'-5 1/16"	15'-3 7/8"
21	15'-4 1/8"	15'-3"
22	15'-3 3/4"	15'-3 3/8"
23	15'-4 1/8"	15'-3 5/16"
24	15'-3 7/16"	15'-3 11/16"
25	15'-3 9/16"	15'-3 7/16"
26	15'-3"	15'-3 1/4"

* All vertical clearance measurements taken along east lane line (elevated side of superelevated roadway) using laser measuring device

<-- Minimum Clearance

Northbound Mainline Vertical Clearance Measurements*		
Unit	South End	North End
18	-	14'-11 11/16"

* Vertical clearance measurement was taken along east lane line (elevated side of superelevated roadway) using laser measuring device. Was only taken at one location in tunnel.

Southbound Third Street Ramp Vertical Clearance Measurements*		
Unit	South End	North End
10	25'-2 1/4"	20'-1 13/16"
11	20'-0 7/8"	16'-5"
12	16'-4 5/8"	15'-2 3/4"
13	15'-3 5/8"	15'-2 1/2"
14	15'-2 3/4"	15'-2 3/16"
15	15'-2 1/16"	15'-2 7/8"
16	15'-2 7/8"	15'-2 7/16"
17	15'-1 9/16"	15'-1 1/8"
18	15'-2"	15'-2 5/8"
19	15'-1 3/8"	15'-1 1/4"
20	15'-0 1/2"	15'-1 1/16"
21	15'-1 5/16"	15'-1"
22	15'-0 5/8"	14'-11 9/16"
23	15'-1 1/2"	15'-0 7/8"
24	15'-0 15/16"	15'-3 9/16"
25	15'-3 1/8"	15'-0 9/16"
26	15'-0 1/8"	15'-6 5/8"

* All vertical clearance measurements taken along east lane line (elevated side of superelevated roadway) using laser measuring device

<-- Minimum Clearance