



Gardco OptiForm site and area luminaires are available in three sizes: small, medium and large. Featuring the latest in LED technology, OptiForm achieves up to 192 lumens per watt. Eleven optical distributions are available, suitable for a range of outdoor lighting applications. OptForm features a unique mounting system with a two-piece housing for hassle-free installation. Mounting options include a standard arm, mast arm, and wall mount bracket. Service Tag is a standard feature with every OptiForm luminaire, providing maintenance or upgrade assistance throughout the life of the product.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Lamps: _____ Qty: _____
 Notes: _____

Ordering guide

example: OPF-S-A01-840-T4M-AR1-120-BL50-L3-BZ

Luminaire	Configuration (nom. lumens)		Color Temperature	Distribution		Mounting	Voltage
OPF-S							
OPF-S OptiForm Small Area	Site and Area	Precision Plus¹⁶ (T2M, T3M, T4M, T5M only)	827' 80CRI 2700K 830 80CRI 3000K 840 80CRI 4000K 727' 70CRI 2700K 730 70CRI 3000K 740 70CRI 4000K 750 70CRI 5000K	AFR Autofront row T2M Type 2 medium T3M Type 3 medium T4M Type 4 medium T4W Type 4 wide T5N Type 5 narrow T5M Type 5 medium T5W Type 5 wide	LCL LEED corner optic left LCR LEED corner optic right BLC Back light control 2RL Type 2 rotated left 90° 2RR Type 2 rotated right 270° 3RL Type 3 rotated left 90° 3RR Type 3 rotated right 270° 4RL¹ Type 4 rotated left 90° 4RR¹ Type 4 rotated right 270°	AR1^{2,17} Arm mount (standard) MAR³ Mast arm WAL Wall mount MOS⁴ Mounting ordered separately	120 120V 208 208V 240 240V 277 277V 347 347V 480 480V UNV 120-277V HVU¹⁶ 347-480V

Dimming Controls	Sensing	Options (electrical, mechanical, etc)	Emergency	Finish
The following options include 0-10V Driver		None Surge protector 10kV/10kA standard SP2 Surge protector 20kV/10kA (option) FS1¹¹ Single fuse (120, 277, or 347VAC) FS2¹¹ Double fuse (208, 240, or 480V) PCB^{11,12} Photocontrol button connected to 0-10V driver TR5 NEMA Twist-lock 5-pin receptacle connected to 0-10V driver TR7¹³ 7-pin twist lock receptacle connected to D4i compliant driver TLP^{11,13} 7-pin twist lock receptacle connected to D4i compliant driver w/ 3-pin photocell EHS Housing machined to accept external house side shield for field install. Must be combined with OPF-S-EHS-1 accessory.	EM^{12,14,15} Emergency Battery Pack (0-40 °C) Available with precision plus optics P01-P03 only	Standard textured finish BK Black WH White BZ Bronze DG Dark Gray MG Medium Gray Customer specified OC Special optional color or RAL, consult factory SC Special color (must supply color chip, requires factory quote)
none 0-10V dimming driver				
DLEA^{5,10} Dimming leads externally accessible (controls by others)				
FAWS^{5,8,10} Field adjustable wattage selector				
BL50^{5,7,10} Bi-level with motion sensor	L2 PIR sensor, #2 lens (Required if BL50 is selected)			
The following options include SR/DALI Driver				
SRDR^{5,8,13} SR driver connected to Zhaga socket (D4i)				
OMSR^{5,8,13} Outdoor multi-sensor				
DynaDimmer: Automatic Profile Dimming				
CS50^{5,13} Security 50% dimming, 7 hours				
CM50^{5,13} Median 50% dimming, 8 hours				
CS30^{5,13} Security 30% dimming, 7 hours				
CM30^{5,13} Median 30% dimming, 8 hours				

- Extended leadtime applies. Consult factory for details.
- Mounts to a square pole with knockout for 4-5" OD round pole.
- Mounts to a horizontal 2-3/8" OD x 5" Long tenon.
- Must be ordered with mounting accessory. Photocell option (TR7) must be selected with mounting accessory. See Page 2 for options.
- Not available with other dimming control options (mutually exclusive).
- Not available with motion sensor (physical restriction).
- Must be specified with a motion sensor lens (L2).
- Not available with PCB, TR5.
- Must be specified with a motion sensor LW, LB.
- Not available with TR7, TLP.
- Must specify input voltage.
- Not available in HVU [347-480V].
- UNV [120-277V] only available for lumen packages P03-P09. HVU [347-480V] only available for lumen packages P06-P09 & A04-A07.
- UNV [120-277V] only available for lumen packages P04-P09.
- Not available with Dynadimmer, SRDR, FAWS, FS1, FS2, OMSR, DLEA, BL50 (physical restriction).
- Precision Plus Optics (P01-P09) available only with T2M, T3M, T4M, and T5M optical distributions and are non-rotatable.
- OPF-RMB accessory recommended for retrofit applications.



OPF-S OptiForm small

Site & area luminaire

Shielding Accessory Kits (order separately)

One shield kit per luminaire

- OPF-S-EHS-1*** External house side shield (field installed)
- OPF-S-HIS-1**** Internal house side shields. For Area optic types T2M, T3M, and T5N.
- OPF-S-HIS-T4-1**** Internal house side shield for Area optic types T4M and T4W, qty 1.
- OPF-S-HIS-5M/5W-1**** Internal house side shield for Area optic types T5M and T5W, qty 1

*Must select EHS option on luminaire options section

**Not available for Precision Plus (P01-P09)

Luminaire Accessories (order separately)

Pole Mount Fusing

- FP1** Pole mount single fuse (120V, 277V, or 347V)
- FP2** Pole mount double fuse (208V, 240V, or 480V)
- FP3** Pole mount double fuse canadian double pull (208V, 240V, or 480V)

Photocell Accessories

- P400S** Shorting cap

Mountings (boxed and shipped separately)

Must choose Mounting Ordered Separately (MOS) selection for mounting option of luminaire. Useful for attachment of arm to pole prior to luminaire installation.

Standard Arm

- OPF-AR1-(F)^{2,17}** Standard arm mount
- OPF-AR1-TR7-(F)^{2,13,17}** Mast arm mount with 7-pin (TR7) receptacle

Wall Mount

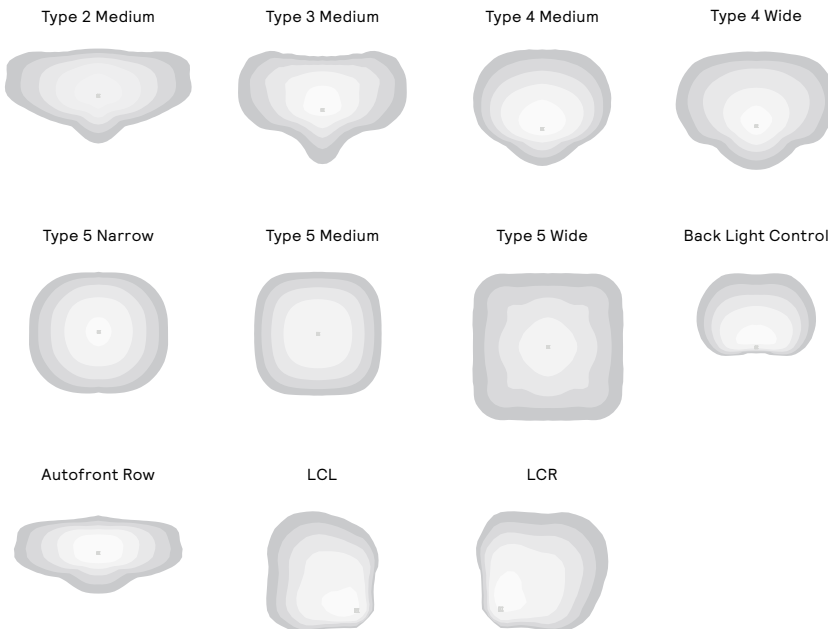
- OPF-WAL-(F)** Wall mount bracket
- OPF-WAL-TR7-(F)¹³** Wall mount with 7-pin (TR7) receptacle

Mast Arm

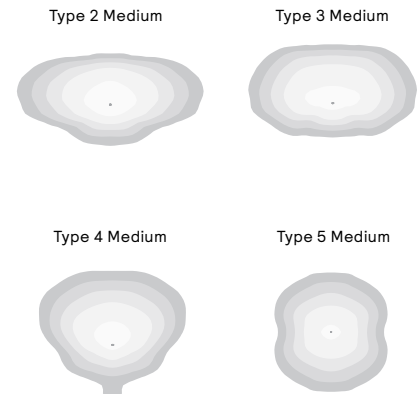
- OPF-MAR-(F)³** Mast arm mount
- OPF-MAR-TR7-(F)^{3,13}** Mast arm mount with 7-pin (TR7) receptacle

Optical Distributions

Site and Area Optics



Precision Plus Optics



Mounting Accessories

OPF-RMB Retrofit Mounting Bolster Plate for attaching OptiForm to existing poles. Recommended for retrofit applications.

OPF-RPA Round Pole Adapter. Fits to 3"- 3.9" O.D. pole. Painted black.

Pole Top Fitters

PTF2 - Pole top fitter fits 2 3/8 - 2 1/2" OD x 4" depth tenon

- PTF2-1-90-(F)** 1 luminaire at 90°
- PTF2-2-90-(F)** 2 luminaires at 90°
- PTF2-3-90-(F)** 3 luminaires at 90°
- PTF2-4-90-(F)** 4 luminaires at 90°
- PTF2-2-180-(F)** 2 luminaires at 180°
- PTF2-3-120-(F)** 3 luminaires at 120°

PTF3 - Pole top fitter fits 3-3 1/2" OD x 6" depth tenon

- PTF3-1-90-(F)** 1 luminaire at 90°
- PTF3-2-90-(F)** 2 luminaires at 90°
- PTF3-3-90-(F)** 3 luminaires at 90°
- PTF3-4-90-(F)** 4 luminaires at 90°
- PTF3-2-180-(F)** 2 luminaires at 180°
- PTF3-3-120-(F)** 3 luminaires at 120°

OPF-S OptiForm small

Site & area luminaire

OPF-S Area Optic Lumen values

Performance Package	System Watts	Distribution Type	70 CRI			70 CRI			70 CRI		
			3000K			4000K			5000K		
			Lumen Output	BUG Rating	Efficacy (LPW)	Lumen Output	BUG Rating	Efficacy (LPW)	Lumen Output	BUG Rating	Efficacy (LPW)
A01	42	T2M	6991	B2-U0-G2	167	7391	B2-U0-G2	176	7391	B2-U0-G2	176
		T3M	6935	B2-U0-G2	166	7332	B2-U0-G2	175	7332	B2-U0-G2	175
		T4M	7028	B1-U0-G2	168	7431	B1-U0-G2	177	7431	B1-U0-G2	177
		T5M	7244	B3-U0-G1	173	7659	B3-U0-G1	183	7659	B3-U0-G1	183
		AFR	7241	B2-U0-G2	173	7655	B2-U0-G2	183	7655	B2-U0-G2	183
		T4W	6692	B1-U0-G2	160	7075	B1-U0-G2	169	7075	B1-U0-G2	169
		T5N	7193	B3-U0-G1	172	7605	B3-U0-G1	182	7605	B3-U0-G1	182
		T5W	6926	B3-U0-G2	165	7322	B3-U0-G2	175	7322	B3-U0-G2	175
		LCL	3804	B1-U0-G1	91	4021	B1-U0-G1	96	4021	B1-U0-G1	96
		LCR	3804	B1-U0-G1	91	4021	B1-U0-G1	96	4021	B1-U0-G1	96
BLC	4874	B0-U0-G1	116	5153	B0-U0-G1	123	5153	B0-U0-G1	123		
A02	54	T2M	8941	B2-U0-G2	165	9452	B2-U0-G2	175	9452	B2-U0-G2	175
		T3M	8869	B2-U0-G2	164	9377	B2-U0-G2	173	9377	B2-U0-G2	173
		T4M	8989	B1-U0-G2	166	9503	B1-U0-G2	176	9503	B1-U0-G2	176
		T5M	9265	B3-U0-G2	171	9795	B3-U0-G2	181	9795	B3-U0-G2	181
		AFR	9260	B2-U0-G2	171	9790	B2-U0-G2	181	9790	B2-U0-G2	181
		T4W	8558	B2-U0-G2	158	9048	B2-U0-G2	167	9048	B2-U0-G2	167
		T5N	9200	B3-U0-G1	170	9726	B3-U0-G1	180	9726	B3-U0-G1	180
		T5W	8858	B3-U0-G2	164	9365	B3-U0-G2	173	9365	B3-U0-G2	173
		LCL	4864	B1-U0-G1	90	5143	B1-U0-G1	95	5143	B1-U0-G1	95
		LCR	4864	B1-U0-G1	90	5143	B1-U0-G1	95	5143	B1-U0-G1	95
BLC	6234	B0-U0-G2	115	6591	B0-U0-G2	122	6591	B0-U0-G2	122		
A03	54	T2M	10438	B2-U0-G2	164	11035	B2-U0-G2	174	11035	B3-U0-G3	174
		T3M	10354	B2-U0-G2	163	10947	B2-U0-G2	172	10947	B2-U0-G2	172
		T4M	10494	B2-U0-G2	165	11094	B1-U0-G2	174	11094	B2-U0-G2	174
		T5M	10816	B3-U0-G2	170	11435	B3-U0-G2	180	11435	B3-U0-G2	180
		AFR	10811	B3-U0-G3	170	11429	B2-U0-G2	180	11429	B3-U0-G3	180
		T4W	9991	B2-U0-G3	157	10563	B2-U0-G2	166	10563	B2-U0-G3	166
		T5N	10740	B3-U0-G2	169	11355	B3-U0-G1	179	11355	B3-U0-G2	179
		T5W	10341	B4-U0-G2	163	10933	B3-U0-G2	172	10933	B4-U0-G2	172
		LCL	5679	B1-U0-G1	89	6004	B1-U0-G1	94	6004	B1-U0-G1	94
		LCR	5679	B1-U0-G1	89	6004	B1-U0-G1	94	6004	B1-U0-G1	94
BLC	7278	B1-U0-G2	114	7694	B0-U0-G2	121	7694	B1-U0-G2	121		
A04	91	T2M	14465	B3-U0-G3	160	15293	B3-U0-G3	169	15293	B3-U0-G3	169
		T3M	14350	B3-U0-G3	158	15171	B3-U0-G3	167	15171	B3-U0-G3	167
		T4M	14543	B2-U0-G2	160	15375	B2-U0-G2	170	15375	B2-U0-G2	170
		T5M	14990	B4-U0-G2	165	15848	B4-U0-G2	175	15848	B4-U0-G2	175
		AFR	14982	B3-U0-G3	165	15840	B3-U0-G3	175	15840	B3-U0-G3	175
		T4W	13847	B2-U0-G3	153	14639	B2-U0-G3	161	14639	B2-U0-G3	161
		T5N	14884	B4-U0-G2	164	15736	B4-U0-G2	174	15736	B4-U0-G2	174
		T5W	14331	B4-U0-G3	158	15151	B4-U0-G3	167	15151	B4-U0-G3	167
		LCL	7870	B1-U0-G2	87	8321	B1-U0-G2	92	8321	B1-U0-G2	92
		LCR	7870	B1-U0-G2	87	8321	B1-U0-G2	92	8321	B1-U0-G2	92
BLC	10086	B1-U0-G2	111	10663	B1-U0-G2	118	10663	B1-U0-G2	118		

OPF-S OptiForm small

Site & area luminaire

OPF-S Area Optic Lumen values (cont'd)

Performance Package	System Watts	Distribution Type	70 CRI			70 CRI			70 CRI		
			3000K			4000K			5000K		
			Lumen Output	BUG Rating	Efficacy (LPW)	Lumen Output	BUG Rating	Efficacy (LPW)	Lumen Output	BUG Rating	Efficacy (LPW)
A05	104	T2M	16226	B3-U0-G3	156	17155	B3-U0-G3	164	17155	B3-U0-G3	164
		T3M	16096	B3-U0-G3	154	17018	B3-U0-G3	163	17018	B3-U0-G3	163
		T4M	16313	B2-U0-G3	156	17247	B2-U0-G3	165	17247	B2-U0-G3	165
		T5M	16814	B4-U0-G2	161	17777	B4-U0-G2	170	17777	B4-U0-G2	170
		AFR	16806	B3-U0-G3	161	17768	B3-U0-G3	170	17768	B3-U0-G3	170
		T4W	15532	B3-U0-G3	149	16421	B3-U0-G3	157	16421	B3-U0-G3	157
		T5N	16696	B4-U0-G2	160	17652	B4-U0-G2	169	17652	B4-U0-G2	169
		T5W	16075	B4-U0-G3	154	16995	B4-U0-G3	163	16995	B4-U0-G3	163
		LCL	8828	B1-U0-G2	85	9333	B1-U0-G2	89	9333	B1-U0-G2	89
		LCR	8828	B1-U0-G2	85	9333	B1-U0-G2	89	9333	B1-U0-G2	89
BLC	11314	B1-U0-G2	108	11961	B1-U0-G2	115	11961	B1-U0-G2	115		
A06	122	T2M	18441	B3-U0-G3	151	19496	B3-U0-G3	160	19496	B3-U0-G3	160
		T3M	18294	B3-U0-G3	150	19341	B3-U0-G3	158	19341	B3-U0-G3	158
		T4M	18540	B3-U0-G3	152	19601	B3-U0-G3	160	19601	B3-U0-G3	160
		T5M	19110	B4-U0-G2	156	20203	B4-U0-G2	165	20203	B4-U0-G2	165
		AFR	19100	B3-U0-G3	156	20193	B3-U0-G3	165	20193	B3-U0-G3	165
		T4W	17652	B3-U0-G3	144	18662	B3-U0-G3	153	18662	B3-U0-G3	153
		T5N	18975	B4-U0-G2	155	20061	B4-U0-G2	164	20061	B4-U0-G2	164
		T5W	18270	B5-U0-G3	150	19315	B5-U0-G3	158	19315	B5-U0-G3	158
		LCL	10033	B2-U0-G2	82	10607	B2-U0-G2	87	10607	B2-U0-G2	87
		LCR	10033	B2-U0-G2	82	10607	B2-U0-G2	87	10607	B2-U0-G2	87
BLC	12858	B1-U0-G2	105	13594	B1-U0-G2	111	13594	B1-U0-G2	111		

OPF-S Precision Plus Optic Lumen values

Performance Package	System Watts	Distribution Type	70 CRI			70 CRI			70 CRI		
			3000K			4000K			5000K		
			Lumen Output	BUG Rating	Efficacy (LPW)	Lumen Output	BUG Rating	Efficacy (LPW)	Lumen Output	BUG Rating	Efficacy (LPW)
P01	15	T2M	2691	B1-U0-G1	182	2845	B1-U0-G1	192	2845	B1-U0-G1	192
		T3M	2718	B1-U0-G1	184	2874	B1-U0-G1	194	2874	B1-U0-G1	194
		T4M	2665	B1-U0-G1	180	2817	B1-U0-G1	190	2817	B1-U0-G1	190
		T5M	2610	B2-U0-G1	176	2759	B2-U0-G1	186	2759	B2-U0-G1	186
P02	23	T2M	4022	B1-U0-G1	178	4252	B1-U0-G1	189	4252	B1-U0-G1	189
		T3M	4062	B1-U0-G1	180	4295	B1-U0-G1	191	4295	B1-U0-G1	191
		T4M	3983	B1-U0-G1	177	4211	B1-U0-G1	187	4211	B1-U0-G1	187
		T5M	3900	B2-U0-G1	173	4124	B2-U0-G1	183	4124	B2-U0-G1	183
P03	38	T2M	6465	B2-U0-G2	169	6835	B2-U0-G2	179	6835	B2-U0-G2	179
		T3M	6530	B2-U0-G2	171	6904	B2-U0-G2	181	6904	B2-U0-G2	181
		T4M	6402	B1-U0-G2	168	6768	B1-U0-G2	177	6768	B1-U0-G2	177
		T5M	6269	B3-U0-G2	164	6629	B3-U0-G2	174	6629	B3-U0-G2	174
P04	53	T2M	8759	B2-U0-G2	165	9261	B2-U0-G2	174	9261	B2-U0-G2	174
		T3M	8848	B2-U0-G2	166	9355	B2-U0-G2	176	9355	B2-U0-G2	176
		T4M	8674	B2-U0-G2	163	9171	B2-U0-G2	172	9171	B2-U0-G2	172
		T5M	8495	B3-U0-G2	160	8982	B3-U0-G2	169	8982	B3-U0-G2	169

OPF-S OptiForm small

Site & area luminaire

OPF-S Area Optic Lumen values (cont'd)

Performance Package	System Watts	Distribution Type	70 CRI			70 CRI			70 CRI		
			3000K			4000K			5000K		
			Lumen Output	BUG Rating	Efficacy (LPW)	Lumen Output	BUG Rating	Efficacy (LPW)	Lumen Output	BUG Rating	Efficacy (LPW)
P05	66	T2M	11253	B2-U0-G2	172	11898	B2-U0-G2	182	11898	B2-U0-G2	182
		T3M	11366	B3-U0-G3	173	12018	B3-U0-G3	183	12018	B3-U0-G3	183
		T4M	11143	B2-U0-G3	170	11782	B2-U0-G3	180	11782	B2-U0-G3	180
		T5M	10913	B3-U0-G2	167	11539	B3-U0-G2	176	11539	B3-U0-G2	176
P06	76	T2M	13987	B3-U0-G3	183	14788	B3-U0-G3	194	14788	B3-U0-G3	194
		T3M	14128	B3-U0-G3	185	14937	B3-U0-G3	196	14937	B3-U0-G3	196
		T4M	13850	B2-U0-G3	182	14644	B2-U0-G3	192	14644	B2-U0-G3	192
		T5M	13564	B4-U0-G3	178	14342	B4-U0-G3	188	14342	B4-U0-G3	188
P07	94	T2M	15850	B3-U0-G3	168	16758	B3-U0-G3	178	16758	B3-U0-G3	178
		T3M	16010	B3-U0-G3	170	16927	B3-U0-G3	180	16927	B3-U0-G3	180
		T4M	15696	B3-U0-G3	167	16595	B3-U0-G3	176	16595	B3-U0-G3	176
		T5M	15372	B4-U0-G3	163	16253	B4-U0-G3	172	16253	B4-U0-G3	172
P08	113	T2M	19800	B3-U0-G3	176	20934	B3-U0-G3	186	20934	B3-U0-G3	186
		T3M	19999	B3-U0-G3	178	21145	B3-U0-G3	188	21145	B3-U0-G3	188
		T4M	19607	B3-U0-G3	174	20730	B3-U0-G3	184	20730	B3-U0-G3	184
		T5M	19202	B4-U0-G3	171	20302	B4-U0-G3	180	20302	B4-U0-G3	180
P09	133	T2M	21655	B3-U0-G3	163	22896	B3-U0-G3	172	22896	B3-U0-G3	172
		T3M	21874	B3-U0-G3	164	23127	B3-U0-G3	174	23127	B3-U0-G3	174
		T4M	21444	B3-U0-G4	161	22673	B3-U0-G4	171	22673	B3-U0-G4	171
		T5M	21002	B4-U0-G3	158	22205	B4-U0-G3	167	22205	B4-U0-G3	167

LED Wattage and Lumen Values (Emergency Mode)

Ordering Code	CCT	CRI	Avg. System Wattage (W)	Type 2M		Type 3M		Type 4M	
				Lumen Output	BUG Rating	Lumen Output	BUG Rating	Lumen Output	BUG Rating
OPF-S-PXX-740-X-EM	4000	70	6	1000	B0-U0-G0	1014	B0-U0-G1	838	B0-U0-G0
OPF-S-PXX-750-X-EM	5000	70	6	960	B0-U0-G0	973	B0-U0-G1	804	B0-U0-G0
OPF-S-PXX-830-X-EM	3000	80	6	856	B0-U0-G0	868	B0-U0-G1	717	B0-U0-G0
OPF-S-PXX-840-X-EM	4000	80	6	887	B0-U0-G0	899	B0-U0-G1	743	B0-U0-G0

Predicted Lumen Depreciation Data

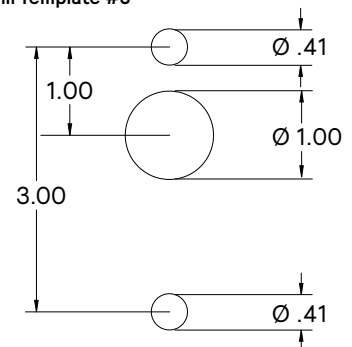
Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions. L70 is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L70 hours limited to 6 times actual LED test hours

Ambient Temp°C	Lumen Package	Calculated L70 Hours	L70 per TM-21	Lumen Maintenance % at 60,000 hrs
25°C	A06-A07	>77,000 hours	>77,000 hours	90%
25°C	All others	>100,000 hours	>100,000 hours	96%

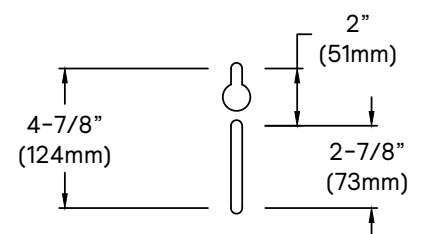
Dimensions

Standard Drill Pattern

Drill Template #5



Standard Arm Mounting Hole Pattern



OPF-S OptiForm small

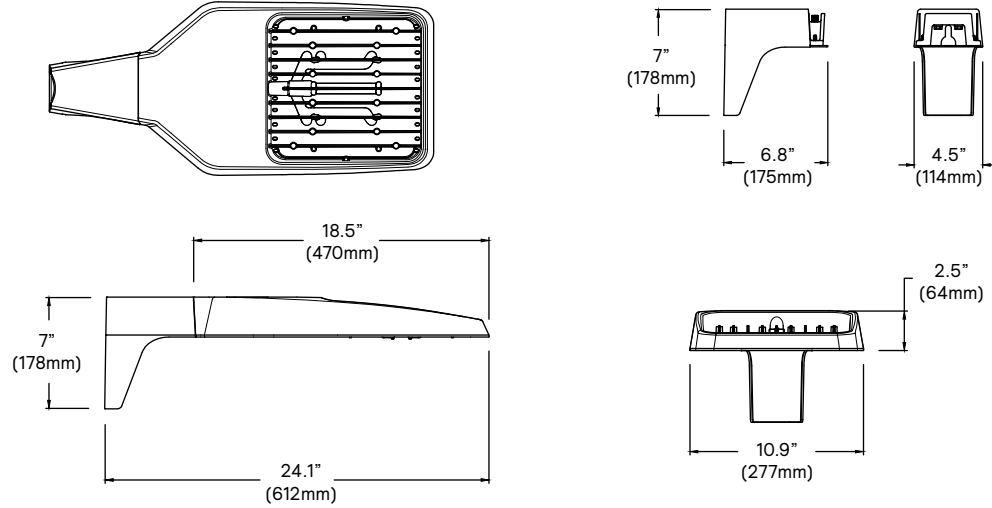
Site & area luminaire

Dimensions

OptiForm Standard Arm

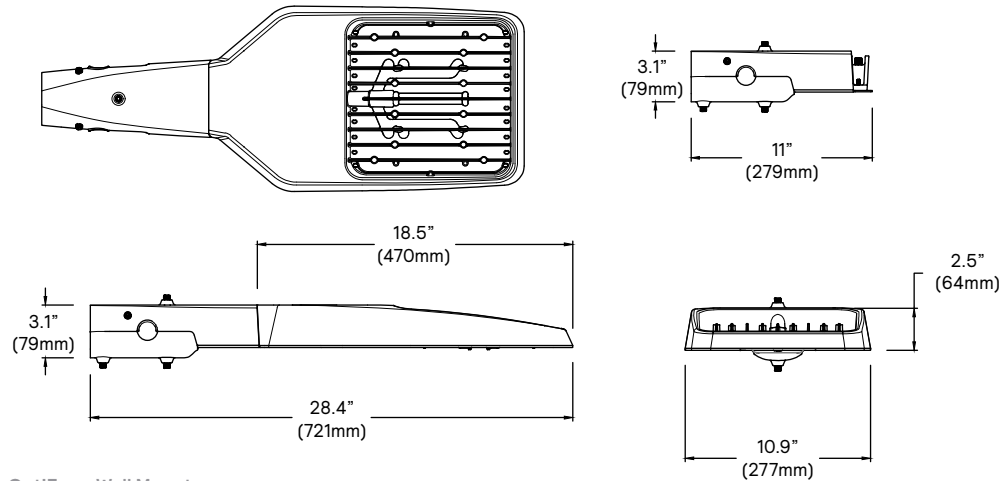
Weight: 11 lb (5.0 kg)

EPA: 0.2 ft² (0.018 m²)



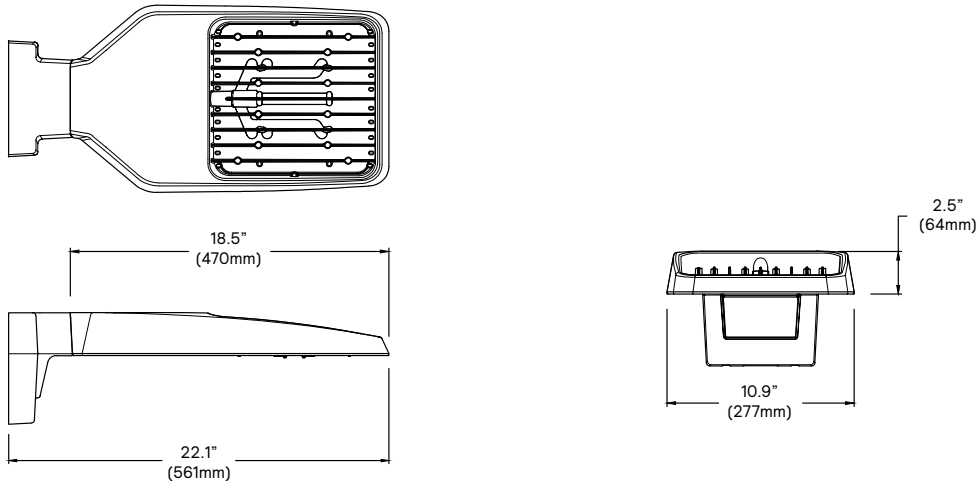
OptiForm Mast Arm

Weight: 12.6 lb (5.7 kg)



OptiForm Wall Mount

Weight: 11.5 lb (5.2 kg)



OPF-S OptiForm small

Site & area luminaire

Specifications

Housing

Housing and door constructed of low copper die cast Aluminum alloy (A360) with detachable arms for quick mounting. Heatsink is integral to the housing providing passive cooling of LEDs to maintain long LED life. Luminaire housing rated to IP65, LED Modules rated IP66 tested in accordance to Section 9 of IEC 60598-1.

Vibration resistance

OptiForm is tested and rated to standards set forth in ANSI C136.31-2018 Level 2 for Bridge and Overpass applications.

Light engine

Light engine comprises of a module of 40-LED aluminum metal clad board fully sealed with optics: Medium = 2 Modules with 80 LEDs, Large = 4 modules with 160 LEDs. Module is RoHS compliant. Color temperature as per ANSI/NEMA bin 2700 Kelvin nominal (2725 ±145K), 3000 Kelvin nominal (3045K +/- 175K) or 4000 Kelvin nominal (3985K +/- 275K), CRI 70 Min. 75 Typical. Other CCT/CRI also available, consult factory. LED light engine is rated IP66 in accordance to Section 9 of IEC 60598-1.

Energy saving benefits

System efficacy up to 182 lms/W with significant energy savings over Pulse Start Metal Halide luminaires. Optional control options provide added energy savings during unoccupied periods.

Optical systems

Site and Area optical distributions include Types 2 Medium, 3 Medium, 4 Medium, 4 Wide, 5 Narrow, 5 Medium, 5 Wide, and Auto Front Row. LEED Corner Left, LEED Corner Right, and Backlight Control distributions also available to provide excellent cutoff to meet the most stringent requirements at property lines. Optional internal shields mount to LED optics and are available with Type 2M, 3M, and 4M distributions. Types 2M and 3M can be rotated at 90° or 270° when specified, and are factory set only. Site and Area optics shall be performance tested per LM-79 and TM-15 (IESNA) certifying their photometric performance. Luminaire designed with 0% uplight (U0 per IESNA TM-15).

Precision Plus optical distributions include Types 2, 3, 4 and 5 and are designed to illuminate pedestrian scale applications by providing lower glare, while still achieving desired distribution, optimized spacing, and excellent uniformity. Optics are made of optical grade polymer refractor lenses and shall be performance tested per LM-63, LM-79 and TM-15 (IESNA) certifying their photometric performance. Luminaire designed with 0% uplight (U0 per IESNA TM-15).

Mounting

Standard luminaire arm mounts to square poles with knock-out on the arm to allow for mounting to 4" O.D. round poles. Standard arm casting can accommodate existing bolt spacing from 2" to 4-7/8". It is recommended to use the bolster plate kit OPF RMB when it's not a new installation or if the mounting holes are larger than 0.41" (10mm).

OptiForm features a Mast Arm for Mounting to 2-3/8x4" tenon as well as wall mount casting for exterior building mount applications.

Control options

Dimming Leads Externally Accessible (DLEA): Access to 0-10V dimming leads supplied through back of luminaire (for secondary dimming controls by others). Cannot be used with other control options.

Sensor Ready Zhaga Socket Connector (SRDR): Product is D4i Certified and equipped with Sensor Ready drivers connected to 4-pin Zhaga Book 18 compliant receptacle designed for sensor and other control system applications. Receptacle is rated IP66 assembly in a compact design that provides a sealed electrical interface and rated UV resistance, mounted on underside of the luminaire, protective dust cap included. When a controller not provided by Signify is used with Sensor Ready Zhaga socket connector, the controller must be certified to work with the Xitanium SR LED drivers as part of the SR certified program. SRDR can be used with NEMA 7-pin twist lock receptacle, which is mounted on top of the luminaire.

Automatic Profile Dimming (CS/CM/CE/CA): Standard dimming profiles provide flexibility towards energy savings goals while optimizing light levels during specific dark hours. Dimming profiles include two dimming settings including dim to 30% or 50% of the total lumen output. When used in combination with not programmed motion response it overrides the controller's schedule when motion is detected. After 5 minutes with no motion, it will return to the automatic dimming profile schedule. Automatic dimming profile scheduled with the following settings:

- **CS50/CS30:** Security for 7 hours night duration (Ex., 11 PM – 6 AM)
- **CM50/CM30:** Median for 8 hours night duration (Ex., 10 PM – 6 AM)

All above profiles are calculated from mid point of the night. Dimming is set for 6 hours after the mid point and 1 or 2 hours before depending of the duration of dimming. Cannot be used with other dimming control options

Field Adjustable Wattage Selector (FAWS): Luminaire equipped with the ability to manually adjust the wattage in the field to reduce total luminaire lumen output and light levels. Comes pre-set to the highest position lumen output selected. Use chart below to estimate reduction in lumen output desired. Cannot be used with other control options or motion response.

FAWS Position	Percent of Typical Lumen Output	FAWS Position	Percent of Typical Lumen Output
1	25%	6	80%
2	50%	7	85%
3	55%	8	90%
4	65%	9	95%
5	75%	10	100%

Note: Typical value accuracy +/- 5%

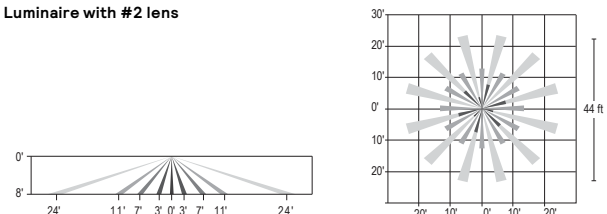
Motion response options

Bi-Level Infrared Motion Response (BL50): Motion Response module is mounted integral to luminaire factory pre-programmed to 50% dimming when not ordered with other control options. BL-IMRI is set/operates in the following fashion: The motion sensor is set to a constant 50%. When motion is detected by the PIR sensor, the luminaire returns to full power/light output. Dimming on low is factory set to 50% with 5 minutes default in "full power" prior to dimming back to low. When no motion is detected for 5 minutes, the motion response system reduces the wattage by 50%, to 50% of the normal constant wattage reducing the light level. Other dimming settings can be provided if different dimming levels are required (contact Technical Support for details).

Infrared Motion Response with Other Controls: When used in combination with other controls (Automatic Dimming Profile), motion response device will simply override controller's schedule with the added benefits of a combined dimming profile and sensor detection. In this configuration, the motion response device cannot be re-programmed with FSIR-100 Wireless Remote Programming Tool. The profile can only be re-programmed via the controller.

Infrared Motion Response Lenses (L2): Infrared Motion Response Integral module is available with two different sensor lens types to accommodate various mounting heights and occupancy detection ranges. Lens #2 is designed for mounting heights 8' to 15'. Lens #3 is designed for higher mounting heights up to 20' with a 40' diameter coverage area. See charts for approximate detection patterns:

Luminaire with #2 lens



OPF-S OptiForm small

Site & area luminaire

Specifications (cont'd)

Electrical

Twist-Lock Receptacle (TR5/TR7): Twist Lock Receptacle with 5 pins enabling dimming or with 7 pins with additional functionality (by others) can be used with a twistlock photoelectric cell or a shorting cap. Dimming Receptacle Type B (5-pin) and Type D-24 (7-pin) in accordance to ANSI C136.41. Can be used with third-party control system. Receptacle located on top of luminaire housing. When specifying receptacle with twistlock photoelectric cell, voltage must be specified. When ordering 7-pin Twist-lock receptacle (TR7), all 7 pins are wired to respective pins with the Sensor Ready (SR) driver, and photocell or shorting cap is not included. When ordering a twist-lock receptacle with a photocell (TLP), the receptacle used is a 7-pin receptacle, with pins 6 and 7 connected to SR DALI driver. 0-10V dimming leads (pins 4 and 5) are connected if not ordered with any other dimming option.

Driver: Driver efficiency (>90% standard). 120-480V available (restrictions apply). Open/short circuit protection. All drivers are 0-10V dimming to 10% power standard, except when using Sensor Ready (SR) drivers, which uses DALI protocol (options CS50/CM50/CS30/CM30, SRDR, and TR7). Drivers are RoHS and FCC Title 47 CFR Part 15 compliant.

Button Photocontrol (PCB): Button style design for internal luminaires mounting applications. The photocontrol is constructed of a high impact UV stabilized polycarbonate housing. Rated voltage of 120V or 208-277V with a load rating of 1000 VA. The photocell will turn on with 1-4Fc of ambient light.

Surge protection (SP1/SP2): Surge protection device tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line-Ground, Line-Neutral and Neutral-Ground, and in accordance with DOE MSSLC Model Specification for LED Roadway Luminaires Appendix D Electrical Immunity High test level 10kV/10kA. 20kV / 10kA surge protection device that provides extra protection beyond the SP1 10kV/10kA level.

Buy American Act of 1933 (BAA):

This product is manufactured in one of our US factories and, as of the date of this document, this product was considered a commercially available off-the-shelf (COTS) item meeting the requirements of the BAA. This BAA designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America" domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies. Prior to ordering, please visit www.signify.com/baa to view a current list of BAA-compliant products to confirm this product's current compliance.

Listings

UL/cUL wet location listed to the UL 1598 standard, suitable for use in ambient temperatures from -40° to 40°C (-40° to 104°F). All Optiform configurations are qualified under Design Lights Consortium Premium classification. Consult DLC Qualified Products list to confirm your specific luminaire selection is approved. CCTs 3000K and warmer are Dark Sky Approved.

Finish

Each standard color luminaire receives a fade and abrasion resistant, electrostatically applied, thermally cured, triglycidal isocyanurate (TGIC) textured polyester powdercoat finish. Standard colors include bronze (BZ), black (BK), white (WH), dark gray (DGY), and medium gray (MGY). Consult Factory for specs on optional, custom colors, and marine grade paint.

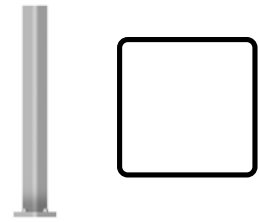
Service Tag

Each individual luminaire is uniquely identifiable, thanks to the Service tag application. With a simple scan of a QR code, placed on the inside of the mast door, you gain instant access to the luminaire configuration, making installation and maintenance operations faster and easier, no matter what stage of the luminaire's lifetime. Just download the APP and register your product right away. For more details visit: signify.com

Warranty

OptiForm luminaires feature a 5-year limited warranty
See signify.com/warranties for complete details and exclusions.





The **Gardco SSS Straight Square Steel** pole consists of a one-piece high tensile carbon steel tube welded and secured to the carbon steel base plate providing excellent strength and integrity. The poles are finished with an electrostatically applied, thermally cured polyester powdercoat. All poles include base cover, hand hole, ground lug and top cap. Anchor bolts and templates are ordered as a separate accessory.

Project: _____
 Location: _____
 Cat.No: _____
 Type: _____
 Notes: _____

Ordering guide

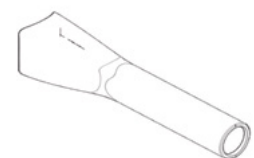
example: SSS-CB-4-11-12-D1-DT1-BK-FES

Family	Base	Pole Shaft Size (in.)	Pole Gauge/Wall Thickness	Height (ft) ⁵	Drilling/Tenon Configurations ¹	Drilling Template ²	Finish	Options ³
SSS	CB Carbon Steel Base w/ Base Cover	4	11 11 ga. / 0.120"	10	D1 1 Way D1@180 1 Way @ 180 D2 2 Way @ 180 D2@90 2 Way @ 90 D3 3 Way @ 90 D4 4 Way @ 90	DT1 Drill Template 1 DT2 Drill Template 2 DT3 Drill Template 3 DT4 Drill Template 4 DT5 Drill Template 5 DT6 Drill Template 6 [DTX-xxx] ^{6,7} Custom Template See drill template chart for details.	BK Black BZ Bronze WH White DG Dark Grey MG Medium Grey GY3 ⁸ Light Grey, Smooth SSDGY ⁸ SolarForm Dark Grey (RAL 7011) GV Galvanized (No Paint) FP/GV Finished Textured Paint over Galvanized (Specify, ex: MG/GV)	FES ⁶ Festoon Outlet VDA Vibration Dampener AHH ⁶ Additional Hand Hole DR ^{6,8} Duplex Receptacle VPA Vandalproof Screws GFI ^{6,8} DR with GFI (120V only) BAC ⁹ Buy American Compliant
				12				
				14				
				15				
				16				
				18				
		5	11 11 ga. / 0.120"	20	T2D4L 2-3/8" OD x 4" length T2D6L ⁸ 2-3/8" OD x 6" length T3D4L 3" OD x 4" length T4D6L 4" OD x 6" length	N No Drilling Template (for Tenon and Plain Top Options)	OC Optional Color Paint (ex: RAL7024) SC ⁶ Special/ Custom Color (Specify, must supply color chip)	CL1/2 ⁶ Coupling 1/2" CL3/4 ⁶ Coupling 3/4" CL1 ⁶ Coupling 1" CL1-1/4 ⁶ Coupling 1-1/4" CL1-1/2 ⁶ Coupling 1-1/2" NL1/2 ⁶ Nipple 1/2" NL3/4 ⁶ Nipple 3/4" NL1 ⁶ Nipple 1" NL1-1/4 ⁶ Nipple 1-1/4" NL1-1/2 ⁶ Nipple 1-1/2"
				25				
				30				
				20				
				25				
				30				
L/SSS	6	7 7 ga. / 0.180"	No Drilling/No Tenon		P Plain Top			
			30	35			40	

- See Drilling Configurations on Page 3.
- See Luminaire Drilling Templates on Page 3
- Not all options available with all configurations. Consult factory for more details
- Options listed with *gray text* will be shipped with the Legacy SSS design. Use the L/SSS family code whenever these options are specified.
- Pole heights can be cut to length. Specify as a whole number in ft. (ex. 11, 13) or to the inch as a decimal (ex. 15.33 = 15' 4") or as "15FT 4IN" for Legacy designs.
- Option must be specified, including install location, by the customer before order release. FES, DR, GFI, AHH options typically must be placed 12-18" away from standard hand hole (20" or 12" above base).
- Custom drill templates (DTX) require factory quote.
- Option not available with Legacy SSS designs.
- Failure to properly select the "BAC" suffix could result in you receiving product that is not BAA compliant product with no recourse for an RMA or refund. This BAC designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America" domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies.
- Consult Signify to confirm whether specific accessories are BAA-compliant.

Accessories ¹⁰

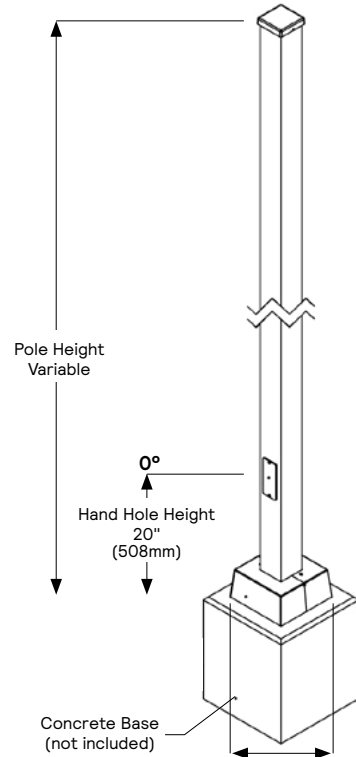
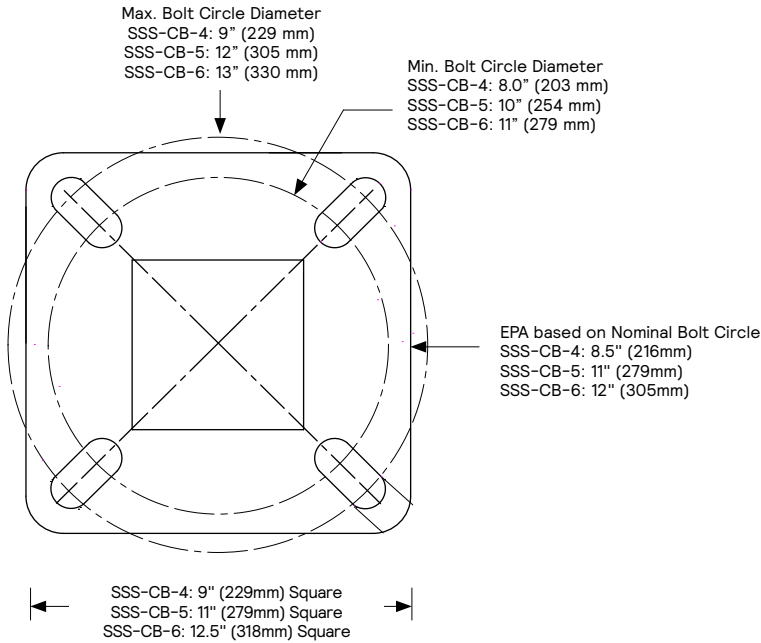
Service	Pole Size	12NC	Description (Diameter x Length x Hook)
Anchor Bolts + Templates			
For shipment with the pole (order 1 per pole)	4" Poles	912401597397	AB 3/4x24x3-G DEC w/ 8.5 BC ABT
	5" Poles	912401613107	AB 1x33x3-G DEC w/ 11 BC ABT
	6" Poles	912401597401	AB 1x33x3-G DEC w/ 12 BC ABT
For Pre-Ship service (order 1 per pole)	4" Poles	912401597405	AB 3/4x24x3-G DEC w/ 8.5 BC ABT-RS
	5" Poles	912401613106	AB 1x33x3-G DEC w/ 11 BC ABT-RS
	6" Poles	912401597408	AB 1x33x3-G DEC w/ 12 BC ABT-RS
Part No.	Description		
RLAR-1A-SQ4+ - (finish)	Cast aluminum mounting arm, 15" long with DT6 drill pattern (order 1 per luminaire). For use with Lumec Roadway and Gardco SolarForm luminaires (for SolarForm: use RLAR bracket to mount horizontally, use T2D6L tenon to mount vertically). Specify finish to match pole.		



RLAR

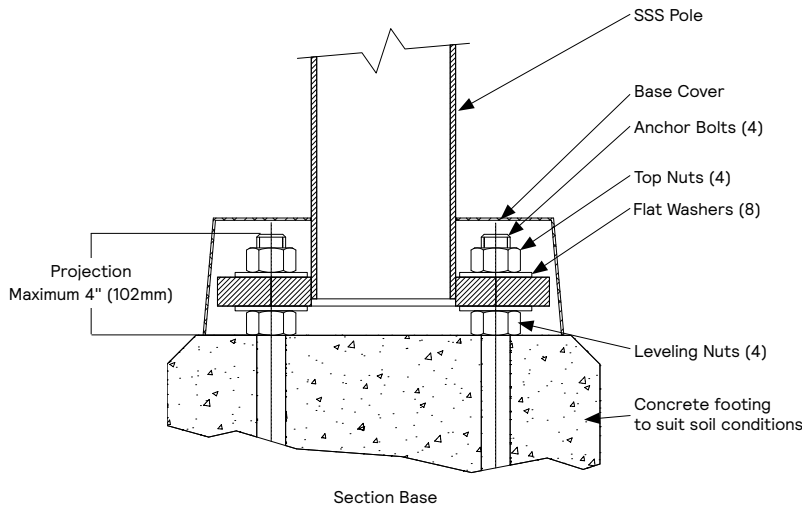
Poles Straight Square Steel

Dimensions



Base Cover Dimensions (L x W x H)
 SSS-CB-4: 9.80" x 9.80" x 4.58" (245mm x 245mm x 116mm)
 SSS-CB-5: 11.80" x 11.80" x 4.58" (300mm x 300mm x 116mm)
 SSS-CB-6: 13.30" x 13.30" x 4.58" (338mm x 338mm x 116mm)

SSS Legacy Design not shown.
Base Cover: Square
Hand Hole: 12" Above Base



* Anchor Bolt Lock Washers are not normally required and are not included in standard anchor bolt sets. They are available upon request at additional cost.

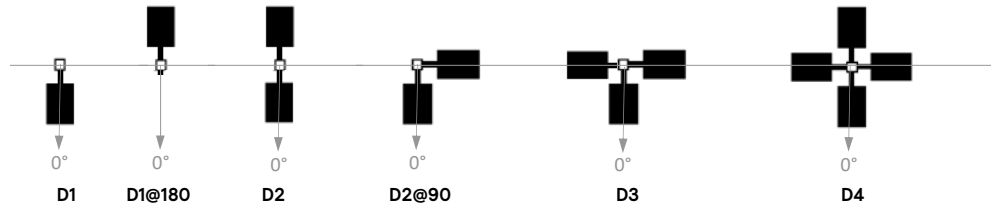
** Grouting should include a drainage slot or tube (by others) to permit water to drain from the base of the pole. Failure to provide drainage may weaken the pole base structure over time and may result in pole base failure, for which Gardco is not responsible.

NOTE: Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement from failure to use factory supplied templates.

Poles Straight Square Steel

Drilling Configuration

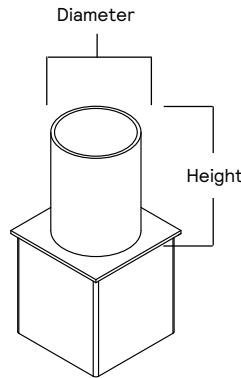
Code	Description
D1	Single luminaire
D1@180	Single luminaire @ 180
D2	Two luminaires @ 180
D2@90	Two luminaires @ 90
D3	Three luminaires @ 90
D4	Four luminaires @ 90



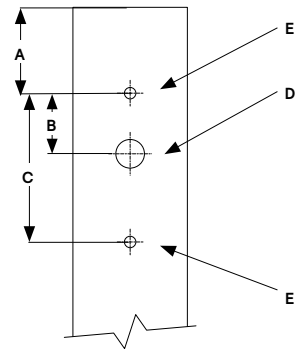
Ref. access door at 0° for all
Legacy design places access door at 180°

Tenon Dimensions

Tenon	Diameter	Height
T2D4L	2.375" (60mm)	4" (102mm)
T2D6L	2.375" (60mm)	6" (152mm)
T3D4L	3" (76mm)	4" (102mm)
T4D6L	4" (102mm)	6" (152mm)



Pole Top Drilling



Luminaire Drill Pattern

Code	Description	Luminaires	Pole Drilling				
			A To Pole Top	B	C Full Extent	D Wireway Hole	E Bolt Hole
DT1	Drill Template 1	Gardco SlenderForm Round SFRA	2.25" (57mm)	1.5" (38.1mm)	3" (76mm)	0.875" (22.2mm)	0.40" (10.2mm)
DT2	Drill Template 2	Gardco SlenderForm Square - SFA Gardco Gullwing - GL13, GL18 Gardco Form Ten - EH14L, EH19L, CAL17, CAL22, MAL17, MAL22	2.25" (57mm)	2.17" (55mm)	3.84" (98mm)	0.875" (22.2mm)	0.39" (9.9mm)
DT3	Drill Template 3	Gardco PowerForm PFAS	2.25" (57mm)	1.75" (44mm)	3.84" (98mm)	0.875" (22.2mm)	0.41" (10.4mm)
DT4	Drill Template 4	Gen1 Stonco/Keene AL150-G1, AL200-G1	2.5" (64mm)	1.7" (43mm)	3.5" (89mm)	0.875" (22.2mm)	0.41" (10.4mm)
DT5	Drill Template 5	Gardco EcoForm Gen2 - ECF-S, ECF-L Gardco PureForm Gen2 - P15, P20, P26, P34 OptiForm Small - OPF-S OptiForm Med - OPF-M OptiForm Large - OPF-L	3" (76mm)	1" (25mm)	3" (76mm)	1" (25mm)	0.41" (10.4mm)
DT6	Drill Template 6	Hole pattern drilled for the following: Gen2 Stonco/Keene AL70-G2 and AL150-G2, or to attach RLAR bracket accessory, suitable for use with: Lumec Capella CPLM, CPLS Lumec RoadStar GPLM, GPLS Lumec RoadFocus RFS, RFM, RFL Lumec RoadView RVM, RVS Lumec MiniView SVS Lumec StreetView SVM Gardco SolarForm BRP710	2.5" (64mm)	1" (25mm)	2" (50mm)	0.875" (22mm)	0.5" (12.7mm)

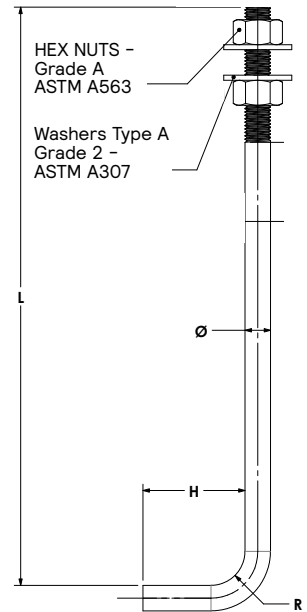
Poles Straight Square Steel

Pole Data

Product Catalog Number	Pole Specs				Anchor Bolt Data			
	Height (ft.)	Pole Diameter (in.)	Wall Thickness (in.)	Pole Weight (lbs)	Bolt Circle (in.)	Anchor Bolt Spec (in.)	Legacy Anchor Bolt Spec (in.)	Anchor Bolt Max Proj. (in.)
SSS-CB-4-11-10	10	4	0.12	63	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-4-11-12	12	4	0.12	76	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-4-11-14	14	4	0.12	88	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-4-11-15	15	4	0.12	94	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-4-11-16	16	4	0.12	101	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-4-11-18	18	4	0.12	113	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-4-11-20	20	4	0.12	126	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-4-11-25	25	4	0.12	157	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-4-7-20	20	4	0.18	185	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-4-7-25	25	4	0.18	232	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
● SSS-CB-4-7-30	30	4	0.18	278	8.5 (+/- 0.5)	3/4 x 24 x 3	3/4 x 24 x 3	4
SSS-CB-5-11-20	20	5	0.12	158	11 (+/- 1)	1 x 33 x 3	3/4 x 24 x 3	4
SSS-CB-5-11-25	25	5	0.12	197	11 (+/- 1)	1 x 33 x 3	3/4 x 24 x 3	4
● SSS-CB-5-11-30	30	5	0.12	237	11 (+/- 1)	1 x 33 x 3	3/4 x 24 x 3	4
SSS-CB-5-7-20	20	5	0.18	234	11 (+/- 1)	1 x 33 x 3	3/4 x 24 x 3	4
SSS-CB-5-7-25	25	5	0.18	292	11 (+/- 1)	1 x 33 x 3	3/4 x 24 x 3	4
● SSS-CB-5-7-30	30	5	0.18	350	11 (+/- 1)	1 x 33 x 3	3/4 x 24 x 3	4
● SSS-CB-5-7-35	35	5	0.18	409	11 (+/- 1)	1 x 33 x 3	3/4 x 24 x 3	4
● SSS-CB-6-7-30	30	6	0.18	423	12 (+/- 1)	1 x 33 x 3	1 x 33 x 3	4
● SSS-CB-6-7-35	35	6	0.18	493	12 (+/- 1)	1 x 33 x 3	1 x 33 x 3	4
● SSS-CB-6-7-40	40	6	0.18	564	12 (+/- 1)	1 x 33 x 3	1 x 33 x 3	4

● SSS Legacy Design

Standard Anchor Bolt



Pole Data (cont.)

Product Catalog Number	AASHTO 2001 - EPA ft ²								CSA - EPA ft ²							
	80 MPH	90 MPH	100 MPH	110 MPH	120 MPH	130 MPH	140 MPH	150 MPH	300 Pa 79 MPH	400 Pa 91 MPH	500 Pa 102 MPH	600 Pa 111 MPH	700 Pa 120 MPH	800 Pa 129 MPH	900 Pa 136 MPH	1000 Pa 144 MPH
SSS-CB-4-11-10	30.00	26.82	21.25	17.13	13.99	11.55	9.62	8.07	30.00	27.03	21.10	17.15	14.34	12.23	10.59	9.27
SSS-CB-4-11-12	28.31	21.72	17.04	13.55	10.88	8.83	7.19	5.88	30.00	21.74	16.76	13.44	11.08	9.30	7.92	6.82
SSS-CB-4-11-14	23.54	17.83	13.77	10.77	8.48	6.69	5.26	4.15	24.79	17.66	13.40	10.53	8.51	6.98	5.79	4.85
SSS-CB-4-11-15	21.53	16.22	12.41	9.57	7.43	5.76	4.44	3.36	22.58	15.92	11.94	9.30	7.40	5.96	4.87	3.97
SSS-CB-4-11-16	19.70	14.69	11.12	8.48	6.47	4.91	3.65	2.66	20.58	14.37	10.65	8.16	6.37	5.05	4.03	3.19
SSS-CB-4-11-18	16.19	11.82	8.72	6.43	4.67	3.30	2.21	1.33	17.07	11.59	8.31	6.12	4.56	3.38	2.47	1.74
SSS-CB-4-11-20	13.29	9.46	6.72	4.67	3.13	1.92	N/A	N/A	14.07	9.20	6.29	4.34	2.95	1.90	1.10	N/A
SSS-CB-4-11-25	7.78	4.86	2.78	1.22	N/A	N/A	N/A	N/A	7.95	4.26	2.06	N/A	N/A	N/A	N/A	N/A
SSS-CB-4-7-20	22.23	16.63	12.62	9.65	7.40	5.65	4.26	3.15	23.05	15.94	11.67	8.83	6.78	5.26	4.09	3.15
SSS-CB-4-7-25	14.87	10.59	7.54	5.28	3.56	2.23	1.16	N/A	14.83	9.42	6.17	4.01	2.46	1.31	N/A	N/A
● SSS-CB-4-7-30	9.63	6.25	3.82	2.01	N/A	N/A	N/A	N/A	8.36	4.20	1.72	N/A	N/A	N/A	N/A	N/A
SSS-CB-5-11-20	22.64	16.51	12.13	8.89	6.43	4.51	2.99	1.76	24.95	17.04	12.29	9.10	6.84	5.14	3.82	2.76
SSS-CB-5-11-25	14.32	9.62	6.25	3.79	1.90	N/A	N/A	N/A	16.16	10.00	6.29	3.83	2.06	N/A	N/A	N/A
● SSS-CB-5-11-30	8.28	4.53	1.86	N/A	N/A	N/A	N/A	N/A	9.30	4.42	1.48	N/A	N/A	N/A	N/A	N/A
SSS-CB-5-7-20	30.00	27.78	21.37	16.63	13.01	10.21	7.97	6.17	30.00	28.15	21.16	16.51	13.19	10.71	8.77	7.21
SSS-CB-5-7-25	25.42	18.54	13.62	9.97	7.19	5.05	3.34	1.98	27.74	18.68	13.23	9.61	7.02	5.08	3.56	2.37
● SSS-CB-5-7-30	17.45	11.94	8.01	5.08	2.88	1.16	N/A	N/A	18.54	11.33	7.02	4.12	2.07	N/A	N/A	N/A
● SSS-CB-5-7-35	11.37	6.84	3.62	1.22	N/A	N/A	N/A	N/A	10.73	5.08	1.70	N/A	N/A	N/A	N/A	N/A
● SSS-CB-6-7-30	27.54	19.44	13.66	9.38	6.14	3.59	1.57	N/A	30.00	20.55	13.99	9.59	6.47	4.11	2.27	N/A
● SSS-CB-6-7-35	19.06	12.39	7.60	4.05	1.36	N/A	N/A	N/A	21.06	12.23	6.96	3.42	N/A	N/A	N/A	N/A
● SSS-CB-6-7-40	12.29	6.64	2.60	N/A	N/A	N/A	N/A	N/A	12.21	5.17	N/A	N/A	N/A	N/A	N/A	N/A

- Warning:** Additional wind loading, in terms of EPA, from banners, cameras, floodlights and other accessories attached to the pole, must be added to the luminaire(s) EPA before selecting the pole with the appropriate wind load capability. Specifying BAA or BAC compliant poles may result in different EPA ratings.
- Factory supplied template must be used when setting anchor bolts. Gardco will not honor any claim for incorrect anchorage placement resulting from failure to use factory supplied templates. Exact length of anchor bolts may vary.
- EPA ratings are based on the listed, optimal midpoint of the bolt circle. The bolt circle has limited variability but the EPA rating will change.

NOTE: Above EPA (Effective Projected Area) rating is in accordance with AASHTO 2001, with a 50 pound load (22.7 kg) placed at 1 foot (305mm) above its center.

Poles Straight Square Steel

Specifications

Pole shaft

The pole shaft is fabricated from a single piece of 11 ga (0.1196") or 7 ga (0.180") high tensile carbon steel. The formed steel plate is longitudinally welded providing minimum yield strength of 50 ksi. Shaft includes factory installed copper ground lug, 10-7 copper wire, and ground lug screw.

Anchor Base

The pole anchor base is fabricated from 44W structural quality carbon steel with a minimum yield strength of 44 ksi. The base plate is circumferentially welded on both top and bottom.

Anchor Bolts

Anchor bolts are fabricated from a commercial quality hot rolled carbon steel bar that meets or exceeds a minimum guaranteed yield strength of 55 ksi. Bolts have an "L" bend on one end and threaded on the opposite end. Anchor bolts are galvanized in accordance with ASTM A-153.6 C1.C. Four (4) properly sized bolts, each furnished with two (2) regular hex nuts and two (2) flat washers, are provided per pole (priced and ordered separately), unless otherwise specified. Conforms to AASHTO M 314 90 and ASTM F1554.

Customer Specified Options

The options, DTX, FES, DR, GFI, AHH, CL*, and NL* require factory quotation. Poles with custom drilling templates (DTX) are provided as a service, however Signify holds no liability for improper installation and safety when using non-Signify luminaires or attachments on Gardco poles via drilling, tenon mounting, or coupling and nipple mounting. It is the responsibility of the customer to ensure the pole is loaded and installed in a safe manner to the limitations of the pole structure. See "Warning" paragraph for more details.

Base Cover

A two-piece painted square aluminum base cover that completely conceals the entire base plate and anchorage. Base cover is provided standard. Legacy design is provided with a composite base cover.

Hand hole

The hand hole has a nominal rectangular 2"x4.5" inside opening in the pole shaft. Included is an aluminum cover plate, EPDM gasket, and captive attachment screws. The hand hole is located 20" above the base and 0° clockwise with respect to the luminaire arm when viewed from the top of the pole for one arm. For two arms the hand hole is located directly under one arm. Legacy design includes an easy to install, self-contained Swing Latch hand hole cover assembly. U.S. Patent Swing Latch cover is fabricated from durable polycarbonate/ABS blend plastic. All pole assemblies are provided with a 2.50" x 5.00" rectangular hand hole.

Pole Top Cap

Each pole assembly is provided with a removable aluminum pole top cap painted to match the specified pole and attached with two pressure screws. Legacy design is provided with a removable plastic top push cap. Finish is Black.

Finish

Poles are available with Gardco's standard textured color finishes - Black, White, Bronze, Dark Grey, Medium Grey, and Lumec GY3 for a match with roadway luminaire finishes. Optional Galvanized finish and custom colors also available. Legacy design is provided with gloss paint on standard finishes.

Couplings and Nipples

Couplings (NPSC standard internal threads) and Nipples (NPT standard external threads) are available to mount 3rd party objects to the pole. For most applications Couplings and Nipples must be at least 4' from the base of the pole. Lengths are as follows:

Couplings < 1" dia. = 1" length
Couplings >= 1" dia. = 1.5" length
Nipples < 1" dia. = 1.5" length
Nipples >= 1" dia. = 2" length

Legacy pole designs may deviate from specifications listed here. See "Customer Specified Options" paragraph for more details.

Duplex Receptacle (DR and GFI)

DR and GFI options are placed at 2' below the pole top on the same side as the hand hole unless otherwise specified. DR or GFI options cannot be placed within 1' of the the hand hole. Options can typically be placed 32" above base for utility purposes. Maximum output of the receptacles are 15A.

General Pole Information

Design

EPA specs conform to AASHTO 2001 standard. The poles as charted are designed to withstand dead loads and predicted dynamic loads developed by variable wind pressure with an additional 2.5 gust factor under the following conditions: The charted weights include luminaire(s) and/or mounting bracket(s). Poles installed in areas of known abnormal conditions may require special consideration. For example: coastal areas, airports and areas of special winds. Poles are designed for ground mounted applications. Poles mounted on structures (such as buildings and bridges) may also necessitate special consideration requiring Gardco's recommendation. Height correction factors and drag coefficients are applied to the entire structure. An appropriate safety factor is maintained based on the minimum yield strength of the material incorporated in the pole.

Warning

This design information is intended as a general guideline only. The customer is solely responsible for proper selection of pole, luminaire, accessory and foundation under the given site conditions and intended usage. The addition of any items to the pole, in addition to the luminaire, will dramatically impact the EPA load on that pole. It is strongly recommended that a qualified professional be consulted to analyze the loads given the user's specific needs to ensure proper selection of the pole, luminaire, accessories, and foundation. Gardco assumes no responsibility for such proper analysis or product selections. Failure to ensure proper site analysis, pole selection, loads and installation can result in pole failure, leading to serious injury or property damage.

Warranty

Gardco Steel poles are covered by a 3-year structural and finish warranty. Legacy designs are covered by a 1-year warranty. For more information visit signify.com/warranties





STORM SEWER COMPUTATION SHEET

SHT
1

2 Yr Design Storm n= 0.013

Project: Light Bridge
Job No.: 2023-1033
Intensity Reference: Columbus

Date: 3/29/24
By: JTS
Checked: KSB

Revised:
Revised:

Struc.	Struc. Index	Sta.	Drainage Area				Time		Intensity in/hr	Des Q CFS	Length ft.	Dia. In	Slope%	Vel	Cap. Flowing Full	Status	In	Out	TC	Remarks	5 YEAR HYDRAULIC GRADE LINE					
			Trib	Cumul.	C	Cumul CA	Delta t Min.	Sum t Min.													5 Yr Rainfall Intensity	Discharge Q	Slope %	Minor Losses	5 Yr HGL w/o minor losses	
Ex 27		4+76.50	0.47	0.47	0.93		10.00	10.00	3.91	1.71						864.17		866.99		1.65 ft. cover 2.82 ft. depth	4.74	2.07	0.3370	-	865.40	
			0.00		0.93	0.44					161.82	12	0.44%	3.0	2.4	OK					DROP					ok
Ex 26		3+14.68	0.21	0.99	0.93		0.89	10.89	3.76	3.46						863.24	863.45	867.14	0.21	2.19 ft. cover 3.90 ft. depth	4.57	4.21	0.1594	-	864.86	
			0.31		0.93	0.92					59.36	18	0.19%	2.6	4.5	OK					DROP					ok
Ex 25		2+55.32	0.20	1.19	0.90		0.39	11.28	3.70	4.07						863.13	863.13	866.93	0.00	2.09 ft. cover 3.80 ft. depth	4.50	4.95	0.2208	-	864.76	
			0.00		0.90	1.10					76.01	18	0.26%	3.0	5.4	OK					DROP					ok
Ex 24		1+79.31	0.22	1.71	0.90		0.42	11.69	3.64	5.71						862.46	862.93	867.41	0.47	2.70 ft. cover 4.95 ft. depth	4.42	6.94	0.0935	-	864.60	
			0.30		0.90	1.57					29.21	24	0.24%	3.5	11.0	OK					DROP					ok
2		1+50.10	0.04	1.75	0.90		0.14	11.83	3.62	5.80						862.39	862.39	867.29	0.00	2.65 ft. cover 4.90 ft. depth	4.40	7.06	0.0968	-	864.57	
			0.00		0.90	1.60					89.77	24	0.24%	3.5	11.0	OK					DROP					ok
Ex 23		0+60.33	0.33	2.37	0.90		0.43	12.26	3.56	7.69						862.11	862.18	866.78	0.07	2.35 ft. cover 4.67 ft. depth	4.32	9.35	0.1700	-	864.48	
			0.29		0.90	2.16					60.33	24	0.20%	3.2	10.1	OK					DROP					ok
Ex HW3		0+00.00	0.00	2.37	0.90		0.31	12.57	3.51	7.60						861.99	861.99		0.10	-864.24 ft. cover -861.99 ft. depth	4.27	9.24	0.1660	-	864.38	
			0.00		0.90	2.16					0.01	24	0.20%	3.2	10.1	OK					DROP					problem
1		1+26.19	0.16	0.16	0.90		10.00	10.00	3.91	0.56						862.41		866.80	0.00	3.22 ft. cover 4.39 ft. depth	4.74	0.68	0.0366	-	864.46	
			0.00		0.90	0.14					62.28	12	0.45%	3.1	2.4	OK					DROP					ok
Ex 28		0+63.91	0.23	1.66	0.90		0.34	10.34	3.85	5.75						862.13	862.13	866.83	0.00	2.45 ft. cover 4.70 ft. depth	4.68	6.98	0.0948	-	864.44	
			1.27		0.90	1.49					63.91	24	0.30%	4.0	12.4	OK					DROP					ok
HW4		0+00.00	0.00	1.66	0.00		0.27	10.61	3.81	5.69						861.94	861.94		0.00	-864.19 ft. cover -861.94 ft. depth	4.62	6.91	0.0927	-	864.38	
			0.00		0.00	1.49					0.01	24	0.20%	3.2	10.1	OK					DROP					problem



Engineers, Surveyors, Planners, Scientists

MEMO

Date: March 25, 2024
To: City of Dublin
From: Matt Stechschulte, PE, CFM
Subject: Light Bridge SWMP
Copies:



This memo summarizes the stormwater management approach for the Light Bridge project located at the northwest corner of Rings Road and Frantz Road. The proposed project was analyzed under the Dublin Smart Parking Lot Stormwater Management Plan (SWMP) dated May 19, 2017. The Dublin Smart Parking Lot report accounted for the Corners project area within Subarea 03 which discharges to Wet Basin 01. Wet Basin 01 is interconnected with Wet Basin 02 before discharging east across Frantz Road. Subarea 03 was to be developed at 75% impervious cover per the Smart Parking Lot SWMP. The proposed project was calculated to be 72% impervious which is less than what was assumed. Due to the proposed project containing less impervious cover than what was assumed in the Dublin Smart Parking Lot SWMP the existing BMPs (Wet Basins 01 & 02) are able to adequately proposed quantity and quality control for the proposed development without the need for any modifications.

APPENDIX A:

Water Quality Calculations

Project Name: Dublin Smart Parking Lot

Water Quality Volume Calculation

Wet Basins 01 & 02

Area = 26.159 acres
% imp = 0.72
C = 0.51
WQv = 0.840 ac-ft

Offsite

Area = 29.343 acres
% imp = 0.73
C = 0.53
WQv = 0.965 ac-ft

75% of WQv= 1.354 ac-ft
(for wet basins)

WQv Elevation= 862.92 feet

Water quality volume calculated using the Ohio EPA formula

Ohio EPA formula

$$WQv = \frac{C \times P \times A}{12}$$

A = area (acres)

P = 0.75"

C = runoff coefficient (calculated using the ASCE method)

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Where i = fraction of post-construction impervious surface

Summary for Pond 14P: Wet Basins 01 & 02 WQ @ 862.92'

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 1.11 cfs @ 0.00 hrs, Volume= 1.283 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.11 cfs @ 0.00 hrs, Volume= 1.283 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Starting Elev= 862.92' Surf.Area= 1.564 ac Storage= 1.360 af
 Peak Elev= 862.92' @ 0.00 hrs Surf.Area= 1.564 ac Storage= 1.360 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	862.00'	5.548 af	Wet Basin 01 (Prismatic) Listed below (Recalc)
#2	862.00'	3.834 af	Wet Basin 02 (Prismatic) Listed below (Recalc)
		9.382 af	Total Available Storage

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
862.00	0.827	0.000	0.000
863.00	0.937	0.882	0.882
864.00	1.050	0.993	1.875
865.00	1.165	1.107	2.983
866.00	1.282	1.224	4.207
866.50	1.342	0.656	4.862
867.00	1.401	0.686	5.548

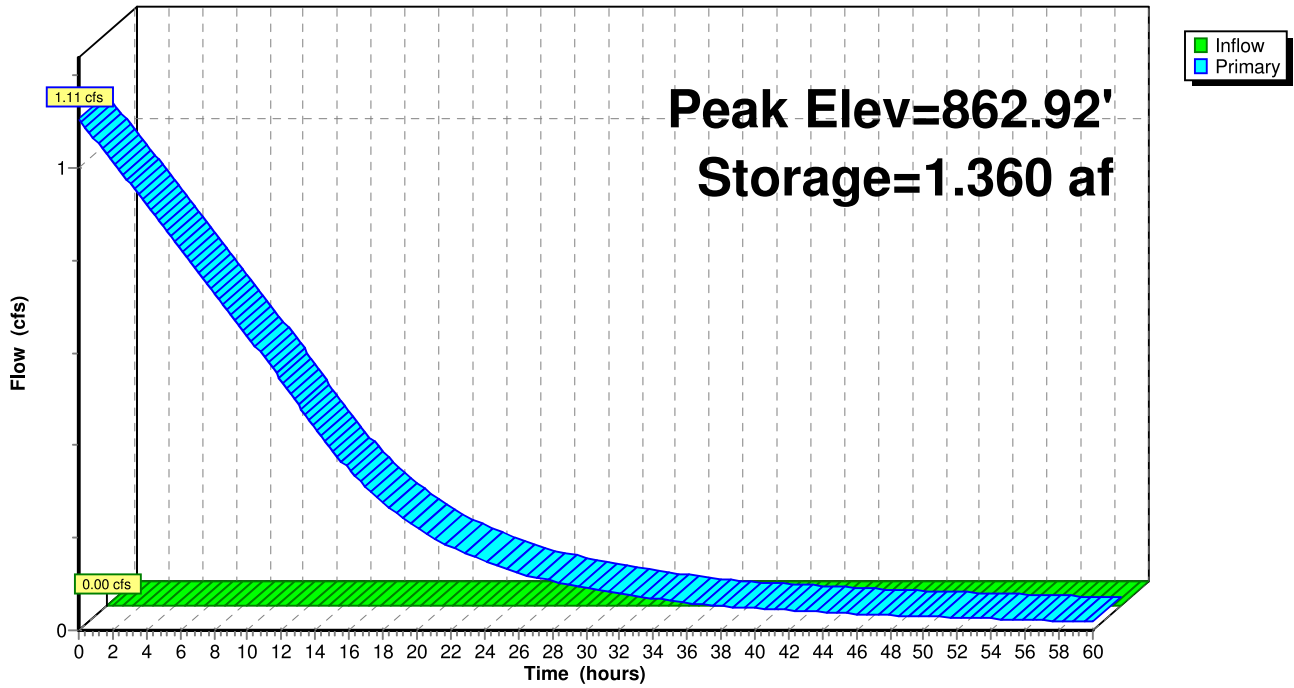
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
862.00	0.566	0.000	0.000
863.00	0.642	0.604	0.604
864.00	0.720	0.681	1.285
865.00	0.801	0.760	2.045
866.00	0.884	0.843	2.888
866.50	0.950	0.459	3.347
867.00	0.998	0.487	3.834

Device	Routing	Invert	Outlet Devices
#1	Primary	862.00'	5.0" Vert. WQ orifice X 2.00 C= 0.600

Primary OutFlow Max=1.11 cfs @ 0.00 hrs HW=862.92' (Free Discharge)
 ←1=WQ orifice (Orifice Controls 1.11 cfs @ 4.06 fps)

Pond 14P: Wet Basins 01 & 02 WQ @ 862.92'

Hydrograph



Hydrograph for Pond 14P: Wet Basins 01 & 02 WQ @ 862.92'

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	1.360	862.92	1.11
2.00	0.00	1.185	862.81	1.02
4.00	0.00	1.025	862.70	0.92
6.00	0.00	0.880	862.61	0.83
8.00	0.00	0.751	862.52	0.73
10.00	0.00	0.637	862.44	0.64
12.00	0.00	0.540	862.38	0.54
14.00	0.00	0.459	862.32	0.44
16.00	0.00	0.394	862.28	0.35
18.00	0.00	0.343	862.24	0.28
20.00	0.00	0.302	862.21	0.22
22.00	0.00	0.269	862.19	0.18
24.00	0.00	0.241	862.17	0.15
26.00	0.00	0.219	862.16	0.13
28.00	0.00	0.200	862.14	0.11
30.00	0.00	0.183	862.13	0.09
32.00	0.00	0.169	862.12	0.08
34.00	0.00	0.157	862.11	0.07
36.00	0.00	0.146	862.10	0.06
38.00	0.00	0.137	862.10	0.05
40.00	0.00	0.129	862.09	0.05
42.00	0.00	0.121	862.09	0.04
44.00	0.00	0.114	862.08	0.04
46.00	0.00	0.108	862.08	0.04
48.00	0.00	0.103	862.07	0.03
50.00	0.00	0.097	862.07	0.03
52.00	0.00	0.093	862.07	0.03
54.00	0.00	0.088	862.06	0.02
56.00	0.00	0.085	862.06	0.02
58.00	0.00	0.081	862.06	0.02
60.00	0.00	0.078	862.06	0.02

APPENDIX B:

Dublin Smart Parking Lot SWMP



A legacy of **experience**. A reputation for **excellence**.

PROJECT SUMMARY

Project Name: Dublin Smart Parking Lot
Location: City of Dublin, Franklin County, Ohio
Type: Stormwater Management Plan
Reviewing Agency: City of Dublin, Ohio EPA

HYDROLOGIC SUMMARY

Rainfall Data: City of Dublin Stormwater Management Design Manual

1-yr	2.20"
2-yr	2.63"
5-yr	3.24"
10-yr	3.74"
25-yr	4.44"
50-yr	5.02"
100-yr	5.63"

Rainfall Distribution: NRCS Type II 24 hour
Detention Policy: City of Dublin
Water Quality: City of Dublin, Ohio EPA
Hydrology Modeling Program: Autodesk Storm and Sanitary Analysis 2015

DESIGN SUMMARY

Detention: Wet Basin, Bioretention Basins, and Pervious Pavers
Water Quality: Wet Basin, Bioretention Basins, silva cells, and Pervious Pavers
Receiving Water Body: Existing storm sewer network that eventually discharges into the Scioto River



A legacy of **experience**. A reputation for **excellence**.

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- Appendix B: Storm Sewer Calculations
- Appendix C: Water Quality Calculations
- Appendix D: HydroCAD and SSA Output
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1.0 INTRODUCTION

The following report provides a detailed analysis and design of the Stormwater Management Plan for the Dublin Smart Parking Lot development in the City of Dublin, Franklin County, Ohio. The proposed site is located along Blazer Parkway, north of Rings Road and west of Frantz Road. The proposed project area involves the development of commercial lot and open space into commercial development and an innovative parking lot involving several stormwater BMPs. The Stormwater management Plan was prepared in accordance with the requirements of both the City of Dublin and the Ohio EPA. The runoff from this site will be routed through a wet basin, bioretention basins, silva cells, or pervious pavers for quantity and quality control before discharging to an existing outfall on the southeast side of the site. The outfall will enter an existing storm sewer network which eventually discharges into the Scioto River.

2.0 HYDROLOGIC ANALYSIS

Hydrologic parameters such as Runoff Curve Number (RCN) and Time of Concentration were determined using standard Natural Resources Conservation Service (NRCS) methodology. The 1-, 2-, 5-, 10-, 25-, 50-, and 100-year storm event discharge amounts were calculated using the NRCS TR-55 method. This analysis reflects the NRCS Type II distribution, 24-hr storm duration. Rainfall depths were obtained from the City of Dublin Stormwater Management Design Manual. The peak flow rates were computed using the Autodesk Storm and Sanitary Analysis 2015 computer program.

3.0 PRE-DEVELOPED ANALYSIS

The pre-developed condition, as seen on Exhibit 1 in Appendix E, consists of open space in Type “C/D” soils (Crosby silt loam, Crosby-Urban land complex, Kokomo silty clay loam, and Miamian silt loam). Pre-developed 01 consists of a commercial building, associated hardscape, and open space for future development. Pre-developed 02 consists of open space. Pre-developed 01, Pre-developed 02, and 4 offsite areas currently drain into an existing wet basin at the southeast corner of the site. The existing wet basin serves as water quantity control for the site before discharging into an existing storm sewer network. The storm sewer network then discharges into the Scioto River.

Pre-developed subarea characteristics are detailed in Table 1. Time of concentration calculations are included in the HydroCAD output in Appendix D. The time of concentration flow paths can be found on Exhibit 1. The pre-developed subareas are located within subareas 1650, 1660, 1680, 1690, 1710, 1720, 1730, and 1740 of the Southwest Unconsolidated Watershed per the City of Dublin’s Stormwater master Plan. Table 2 shows the pre-developed peak flow rates for each subarea.

Table 1 - Pre-developed Subarea Characteristics

Subarea Identifier	Tributary Area (acres)	Land Usage	Runoff Curve Number	Percent Impervious	Time of Concentration (min)
Pre-developed 01	25.21	Open space	74	0%	22.9
Pre-developed 02	8.29	Open space	74	0%	19.7



Table 2 - Pre-developed Peak Flow Rates

Storm Event (year)	Pre-developed 01 Peak Flow Rates (cfs)	Pre-developed 02 Peak Flow Rates (cfs)
1	9.40	3.43
2	15.75	5.72
5	26.02	9.42
10	35.27	12.75
25	49.15	17.72
50	61.21	22.04
100	74.30	26.72

4.0 POST-DEVELOPED ANALYSIS

The post-developed conditions, as seen on Exhibit 2 in Appendix E, consist of three subareas. Subarea 01 consists of an existing commercial building, associated parking lot, and the proposed Wet Basins. Subarea 02 consists of the Smart Parking Lot. Subarea 03 consists of open space and an assumed future development equivalent to 75% impervious. The existing wet basin at the southeast side of the site, designed under the “Duke Weeks Realty Corporation at 5100 & 5000 Rings Road Nationwide Campus” report dated September 27, 2000, will be filled in and replaced with Wet Basin 01 and Wet Basin 02 for water quality and quantity control.

Subarea 01, Subarea 03, Offsite 01, Offsite 02, Offsite 03, and Offsite 04 will utilize Wet Basin 01 and Wet Basin 02 (which are interconnected) for water quality and quantity control. Wet Basins 01 and 02 will outlet into a proposed channel, which will release into the existing storm sewer network.

Subarea 02 has been broken up further, as seen on Exhibit 3 in Appendix E, into tributary areas to each BMP. The Dublin Smart Parking lot will have a total of 4 pervious paver areas, 5 bioretention basins, and 4 silva cell systems that will all outlet into the proposed channel, which will release into the existing storm sewer network.

Post-developed subarea characteristics are detailed in Table 3. The breakdown of Subarea 02 is detailed in Table 4. SSA output is provided in Appendix D.



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Table 3 - Post-developed Subarea Characteristics

Subarea Identifier	Tributary Area (acres)	Land Usage	Runoff Curve Number	Percent Impervious	Time of Concentration (min)
Subarea 01	14.97	Commercial Development	91	70%	5.0
Subarea 02	8.29	Parking Lot	96	90%	5.0
Subarea 03	10.24	Future Commercial Development	92	75%	5.0
Offsite 01	9.91	Commercial Development	94	85%	10.0
Offsite 02	11.21	Commercial Development	93	78%	8.5
Offsite 03	2.50	Open Space	74	0%	9.0
Offsite 04	5.72	Commercial Development	94	85%	10.0

Table 4 - Dublin Smart Lot Subarea Characteristics

BMP Identifier	Tributary Area (acres)	Control Type
Bioretention Basin 01	1.39	Quality and Quantity
Bioretention Basin 02	0.52	Quality and Quantity
Bioretention Basin 03	1.35	Quality and Quantity
Bioretention Basin 04	0.81	Quality and Quantity
Bioretention Basin 05	1.44	Quality and Quantity
Pervious Pavers 01	0.28	Quality and Quantity
Pervious Pavers 02	0.63	Quality and Quantity
Pervious Pavers 03	0.28	Quality and Quantity
Pervious Pavers 04	0.65	Quality and Quantity
Wet Basin 01	0.52	Quality and Quantity
Wet Basin 02	0.43	Quality and Quantity



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The 1-year runoff volume for Subareas 01 and 03 increases to 2.882 ac-ft, an increase of 207% from the existing condition (Pre-developed 01), which results in 25-year critical storm event.

$$\% \text{ Increase} = [(2.882 - 0.940)/0.940] \times 100 = 207\%$$

25-Yr Critical Storm

The 1-year runoff volume for Subarea 02 increases to 1.222 ac-ft, an increase of 295% from the existing condition, which results in 50-year critical storm event.

$$\% \text{ Increase} = [(1.222 - 0.309)/0.309] \times 100 = 295\%$$

50-Yr Critical Storm

Table 5 shows the allowable release rates for Subareas 01 and 03 per the Dublin Master Plan. Table 6 shows the allowable release rates for Subarea 02 per the Dublin Master Plan. Table 7 shows the total allowable release rates and the proposed release rates to the proposed channel. Table 8 shows the performance summary for all of the BMPs onsite.



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Table 5 - Subareas 01 and 03 Allowable Release Rates/Acre (Dublin Master Plan)

Allowable Release Rates per Acre

*Southwest
Unconsolidated*

Sub-Basin	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1650	1.00	1.20	1.70	2.10	2.70	3.60	4.40
1660	1.50	2.10	3.20	4.00	4.80	5.80	6.60
1680	1.00	1.30	1.70	2.10	2.80	3.70	4.50
1690	0.80	1.00	1.30	1.70	2.20	3.00	3.80
1710	0.60	0.70	1.00	1.20	1.70	2.30	3.00
1720	1.70	2.20	2.80	3.40	4.20	5.20	6.00
1730	0.90	1.10	1.40	1.90	2.60	3.60	4.70
1740	1.00	1.20	1.60	2.10	2.90	4.00	5.10

**Post-Developed Area
per Sub-Basin**

Sub-Basin	Area (Acres)
1650	2.52
1660	0.32
1680	0.03
1690	0.14
1710	21.74
1720	0.11
1730	0.11
1740	0.24

Allowable Release Rates per Acre

*Southwest
Unconsolidated*

Sub-Basin	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1650	2.52	3.02	4.28	5.29	6.80	9.07	11.08
1660	0.47	0.66	1.01	1.26	1.51	1.83	2.08
1680	0.03	0.04	0.06	0.07	0.09	0.12	0.15
1690	0.11	0.14	0.19	0.24	0.31	0.43	0.54
1710	13.04	15.22	21.74	26.09	36.96	50.00	65.22
1720	0.18	0.23	0.30	0.36	0.45	0.55	0.64
1730	0.10	0.12	0.15	0.21	0.29	0.40	0.52
1740	0.24	0.29	0.39	0.51	0.70	0.97	1.23
Total	16.70	19.73	28.11	34.03	47.11	63.37	81.46



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Table 6 - Subarea 02 Allowable Release Rates/Acre (Dublin Master Plan)

Allowable Release Rates per Acre

*Southwest
Unconsolidated*

Sub-Basin	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1710	0.6	0.7	1.0	1.2	1.7	2.3	3.0

**Post-Developed Area
per Sub-Basin**

Sub-Basin	Area (Acres)
1710	8.29

Allowable Release Rates per Acre

*Southwest
Unconsolidated*

Sub-Basin	1-year	2-year	5-year	10-year	25-year	50-year	100-year
1710	4.97	5.80	8.29	9.95	14.09	19.07	24.87
Total	4.97	5.80	8.29	9.95	14.09	19.07	24.87

Table 7 - Total Allowable and Proposed Release Rates

Storm Event (yr.)	Subarea 01 and 03 Allowable Release Rates* (cfs.)	Subarea 02 Allowable Release Rates** (cfs.)	Offsite Release Rates*** (cfs.)	Total Allowable Release Rates (cfs.)	Proposed Release Rates**** (cfs.)
1	16.70	4.97	10.74	32.42	10.17
2	16.70	4.97	11.88	33.56	13.30
5	16.70	4.97	13.65	35.33	16.62
10	16.70	4.97	15.14	36.82	18.18
25	16.70	4.97	17.23	38.91	20.12
50	63.37	4.97	19.73	88.07	21.37
100	81.46	24.87	23.25	129.59	22.54

*Based on a 25-year critical storm

**Based on a 50-year critical storm

***From "Offsite 01: Lucent Site", "Offsite 02: Blazer Tech Offices", "Offsite 03: Triangle Outparcel", and "Offsite 04: Cendant Site"; "Existing 36-inch outlet pipe" node in SSA

****From "EX00_Outlet" node in SSA



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**Table 8 - BMP Performance Summary
Wet Basins 01 and 02**

Storm Event (yr.)	Wet Basins 01 and 02 Inflow Rates (cfs.)	Maximum W.S.E., T.O.B. = 867.00 (feet)	Storage Volume Utilized (ac-ft)
1	73.67	863.76	2.742
2	91.18	863.95	3.078
5	115.62	864.38	3.863
10	135.13	864.86	4.778
25	162.21	865.52	6.098
50	185.00	866.04	7.209
100	209.66	866.55	8.352

Wet Basins 01 & 02 Detention Storage Utilized: 8.352 ac-ft (100-year storm event)

Wet Basins 01 & 02 Detention Storage Provided: 9.388 ac-ft

Bioretention Basin 01

Storm Event (yr.)	Bioretention Basin 01 Inflow Rates (cfs.)	Maximum W.S.E., T.O.B. = 867.14 (feet)	Storage Volume Utilized (ac-ft)
1	3.63	866.17	0.093
2	4.45	866.26	0.103
5	5.61	866.39	0.116
10	6.56	866.47	0.126
25	7.87	866.56	0.138
50	8.95	866.71	0.154
100	10.09	866.90	0.180

Bioretention Basin 01 Detention Storage Utilized: 0.180 ac-ft (100-year storm event)

Bioretention Basin 01 Detention Storage Provided: 0.213 ac-ft

Bioretention Basin 02

Storm Event (yr.)	Bioretention Basin 02 Inflow Rates (cfs.)	Maximum W.S.E., T.O.B. = 867.17 (feet)	Storage Volume Utilized (ac-ft)
1	1.36	866.26	0.029
2	1.66	866.31	0.031
5	2.09	866.36	0.032
10	2.45	866.42	0.033
25	2.94	866.68	0.041
50	3.34	866.90	0.049
100	3.77	867.13	0.057



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Bioretention Basin 02 Detention Storage Utilized: 0.057 ac-ft (100-year storm event)
 Bioretention Basin 02 Detention Storage Provided: 0.059 ac-ft

Bioretention Basin 03

Storm Event (yr.)	Bioretention Basin 03 Inflow Rates (cfs.)	Maximum W.S.E., T.O.B. = 867.10 (feet)	Storage Volume Utilized (ac-ft)
1	3.53	866.08	0.084
2	4.33	866.18	0.093
5	5.46	866.29	0.104
10	6.38	866.37	0.111
25	7.65	866.61	0.135
50	8.71	866.82	0.158
100	9.81	867.04	0.184

Bioretention Basin 03 Detention Storage Utilized: 0.184 ac-ft (100-year storm event)
 Bioretention Basin 03 Detention Storage Provided: 0.191 ac-ft

Bioretention Basin 04

Storm Event (yr.)	Bioretention Basin 04 Inflow Rates (cfs.)	Maximum W.S.E., T.O.B. = 866.50 (feet)	Storage Volume Utilized (ac-ft)
1	2.11	865.34	0.053
2	2.59	865.52	0.067
5	3.26	865.62	0.074
10	3.81	865.70	0.079
25	4.57	865.93	0.098
50	5.20	866.18	0.121
100	5.86	866.46	0.147

Bioretention Basin 04 Detention Storage Utilized: 0.147 ac-ft (100-year storm event)
 Bioretention Basin 04 Detention Storage Provided: 0.215 ac-ft



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Bioretention Basin 05

Storm Event (yr.)	Bioretention Basin 05 Inflow Rates (cfs.)	Maximum W.S.E., T.O.B. = 867.10 (feet)	Storage Volume Utilized (ac-ft)
1	3.75	866.13	0.096
2	3.63	866.23	0.107
5	5.80	866.35	0.120
10	6.77	866.43	0.131
25	8.13	866.54	0.144
50	9.24	866.69	0.161
100	10.41	866.87	0.188

Bioretention Basin 05 Detention Storage Utilized: 0.188 ac-ft (100-year storm event)
 Bioretention Basin 05 Detention Storage Provided: 0.221 ac-ft

Pervious Pavers Basin 100-year Detention Summary

Basin	Outlet Structure Number	Total Tributary Area (Ac.)	Pervious Pavers Surface Area (ft ²)	Total 100-year Peak Inflow Rates (cfs.)	Total 100-year proposed release rates (cfs.)	Total Storage Volume Utilized (ac-ft)	Max. W.S.E. (feet)	Top of Pavement Elevation (feet)
01-02	9	0.911	10,156	6.61	1.74	0.235	866.31	867.50
03-04	13	0.924	10,009	6.74	0.41	0.282	866.86	867.50

5.0 OUTLET DESIGN

The proposed outlet structures are designed to release runoff from the post-developed site at or below the allowable release rates calculated in Tables 5 for Subareas 01 and 03, and Table 8 for Subarea 02. The proposed outlet structures described below are preliminary and subject to change upon final design. The location of these structures can be seen on Exhibit 2 in Appendix E.

Proposed Outlet Structure 1 – Wet Basin 02

- Normal Pool – 862.00 ft.
- Top of Bank – 867.00 ft.
- 100-year – 866.55 ft.
- 1st stage outlet – (2) 5-inch orifices, cut into submerged riser pipe, invert at 862.00 ft.
- 2nd stage outlet – (2) 36-inch wide by 8-inch high window, invert at 863.20 ft.
- 3rd stage outlet – Neenah R-4871 grate, top of casting at 865.00 ft.
- Tailwater Control – 36-inch outlet pipe with 2.87% slope, invert at 862.00 ft.

Proposed Outlet Structure – Wet Basin 01

- Normal Pool – 862.00 ft.
- Top of Bank – 867.00 ft.



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- 100-year – 866.55 ft.
- 1st stage outlet – Submerged 24-inch pipe with 0.00% slope, invert 859.00 ft.
- Tailwater Control – Wet Basin 02

Proposed Outlet Structure 8 – Bioretention Basin 01

- Top of Soil Media – 865.14 ft.
- Top of Bank – 867.14 ft.
- 100-year – 866.90 ft.
- 1st stage outlet – Biomedia, invert at 865.14 ft.
- 2nd stage outlet – Neenah R-4871 grate, top of casting 866.14 ft.
- Tailwater Control – 18-inch outlet pipe with 0.25% slope, invert at 862.64 ft.

Proposed Outlet Structure 5 – Bioretention Basin 02

- Top of Soil Media – 865.17 ft.
- Top of Bank – 867.17 ft.
- 100-year – 867.13 ft.
- 1st stage outlet – Biomedia, invert at 865.17 ft.
- 2nd stage outlet – Neenah R-4871 grate, top of casting 866.17 ft.
- Tailwater Control – 12-inch orifice plate on the 18-inch outlet pipe with 0.25% slope, invert at 862.67 ft.

Proposed Outlet Structure 4 – Bioretention Basin 03

- Top of Soil Media – 865.00 ft.
- Top of Bank – 867.10 ft.
- 100-year – 867.04 ft.
- 1st stage outlet – Biomedia, invert at 865.00 ft.
- 2nd stage outlet – Neenah R-4871 grate, top of casting 866.00 ft.
- Tailwater Control – 18-inch outlet pipe with 0.25% slope, invert at 862.44 ft.

Proposed Outlet Structure 3 – Bioretention Basin 04

- Top of Soil Media – 864.50 ft.
- Top of Bank – 867.00 ft.
- 100-year – 866.46 ft.
- 1st stage outlet – Biomedia, invert at 864.50 ft.
- 2nd stage outlet – Neenah R-4871 grate, top of casting 865.50 ft.
- Tailwater Control – 18-inch outlet pipe with 0.25% slope, invert at 862.00 ft.

Proposed Outlet Structure 12 – Bioretention Basin 05

- Top of Soil Media – 865.10 ft.
- Top of Bank – 867.10 ft.
- 100-year – 866.87 ft.
- 1st stage outlet – Biomedia, invert at 865.10 ft.
- 2nd stage outlet – Neenah R-4871 grate, top of casting 866.10 ft.
- Tailwater Control – 18-inch outlet pipe with 0.25% slope, invert at 862.60 ft.



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Proposed Outlet Structure 9 – Pervious Pavers 01-02

- Invert of Stone Storage – 863.79 feet
- Top of Stone Storage – 867.24 feet
- Lowest Pavement Elevation – 867.50 feet
- 1st stage outlet – (2) 1-inch orifices cut into caps of underdrains, invert 863.79 ft.
- 2nd stage outlet – 4-foot long sharp crested weir, top of weir at 865.70 ft.
- Tailwater Control – 15-inch outlet pipe with 0.37% slope, invert 863.79 ft.

Proposed Outlet Structure 13 – Pervious Pavers 03-04

- Invert of Stone Storage – 863.79 feet
- Top of Stone Storage – 867.24 feet
- Lowest Pavement Elevation – 867.50 feet
- 1st stage outlet – (2) 1-inch orifices cut into caps of underdrains, invert 863.79 ft.
- 2nd stage outlet – 4-foot long sharp crested weir, top of weir at 866.80 ft.
- Tailwater Control – 12-inch outlet pipe with 0.44% slope, invert 863.79 ft.

6.0 WATER QUALITY

The Ohio EPA requires that the water quality volume for wet basins and pervious pavers be detained for a period of 24 hours while releasing less than half of that volume in less than 8 hours. Water quality drawdown for each basin will be provided by the basin’s 1st stage outlet listed in Section 5.0. Water quality calculations are provided in Appendix C.

Table 9 - Water Quality Calculations

Basin Identifier	Tributary area (acres)	Water Quality Volume* (ac-ft)	Water Quality Elevation (feet)
Wet Basins 01 & 02	55.502	1.354	862.92
Pervious Pavers 01-02	0.911	0.042	864.25
Pervious Pavers 03-04	0.924	0.042	864.26

*75% of WQv for Wet Basins

To meet water quality requirements, the surface area required for Bioretention Basins is designed to have 1 foot of head on the biomedica. Table 10 summarizes the water quality calculations for the Bioretention Basins



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Table 10 - Bioretention Basin Summary Data

Bioretention Basin	100% Water Quality Volume (ac-ft)	Water Quality Elevation (feet)	Required Biomedia Area (sq-ft)	Provided Biomedia Area (sq-ft)
01	0.063	865.88	2726	3206
02	0.024	866.11	1019	999
03	0.062	865.83	2649	2836
04	0.037	865.11	1584	2399
05	0.066	865.85	2814	3265

7.0 SEDIMENT BASIN CALCULATIONS

The Ohio EPA requires that during construction a site must provide a means by which to control the sediment laden runoff from the construction site. For each acre of drainage area that is tributary to the sediment basin, a drawdown volume of 67 yd³ is provided above the normal pool elevation. The basin will additionally provide more than the required 37 yd³ of settling volume below the normal pool elevation for each acre of disturbed area tributary to the basin.

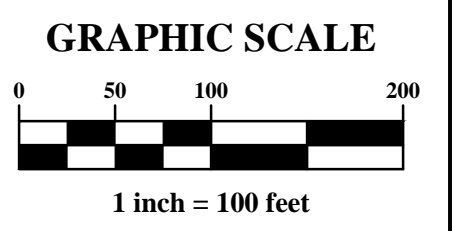
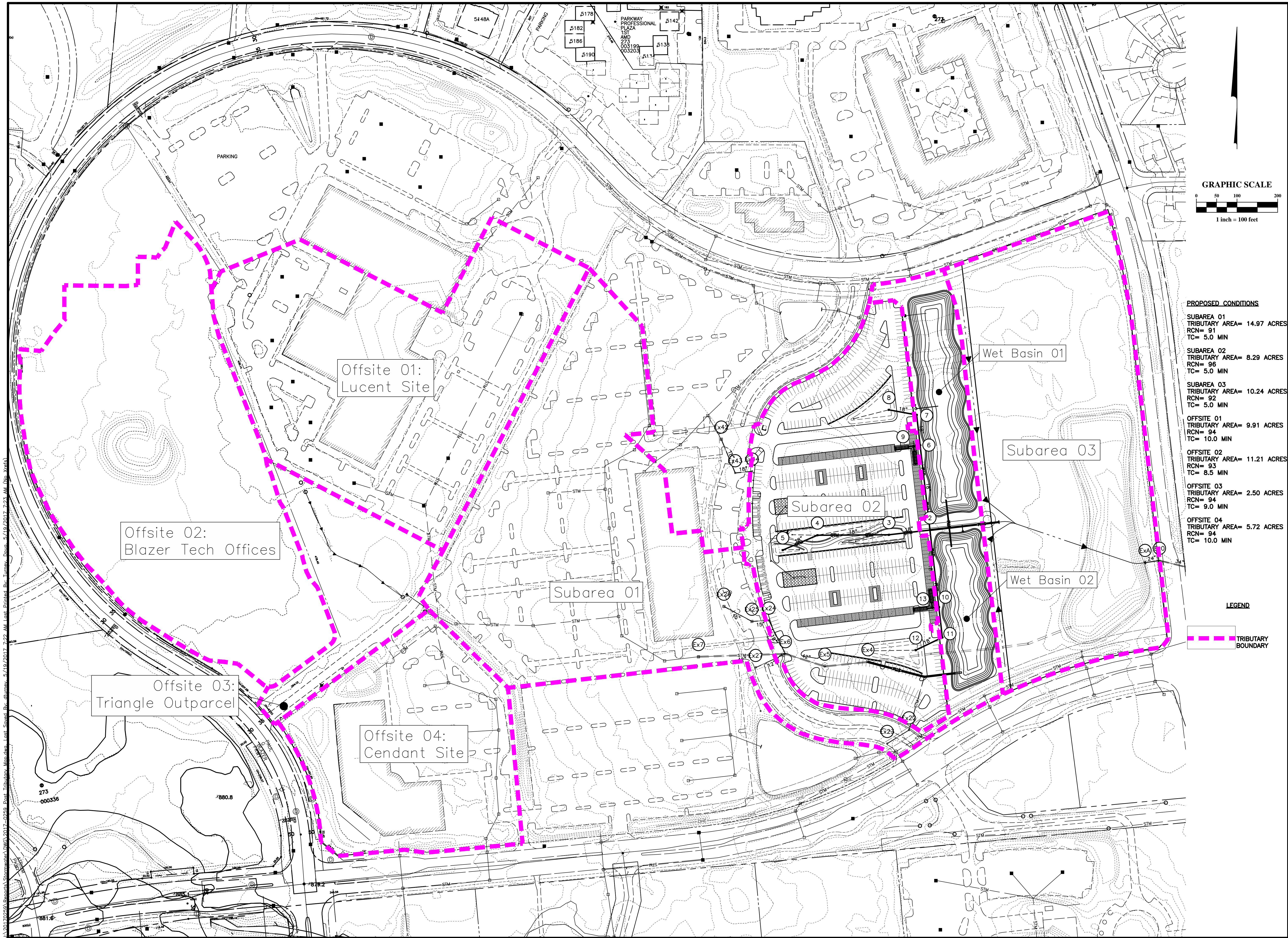
Wet Basins 01 and 02 will be used as sediment basins during construction. Sediment Basin Calculations are described in Table 11 below and provided within Appendix C.

Table 11 - Sediment Basin Calculations

Basin	Tributary area (acres)	Disturbed Area (acres)	Required Dewatering Volume (ac-ft)	Dewatering Elevation (feet)	Required Sediment Storage Volume (ac-ft)	Provided Sediment Storage Volume (ac-ft)	Orifice Size (inches)
01 & 02	63.79	34.45	2.65	863.71	0.79	2.69	6"

8.0 CONCLUSION

The proposed stormwater management plan for the Dublin Smart Parking Lot meets all requirements for detention and water quality as set forth by the City of Dublin and the Ohio EPA.



PROPOSED CONDITIONS

SUBAREA 01	TRIBUTARY AREA= 14.97 ACRES
RCN= 91	TC= 5.0 MIN
SUBAREA 02	TRIBUTARY AREA= 8.29 ACRES
RCN= 98	TC= 5.0 MIN
SUBAREA 03	TRIBUTARY AREA= 10.24 ACRES
RCN= 92	TC= 5.0 MIN
OFFSITE 01	TRIBUTARY AREA= 9.91 ACRES
RCN= 94	TC= 10.0 MIN
OFFSITE 02	TRIBUTARY AREA= 11.21 ACRES
RCN= 93	TC= 8.5 MIN
OFFSITE 03	TRIBUTARY AREA= 2.50 ACRES
RCN= 94	TC= 9.0 MIN
OFFSITE 04	TRIBUTARY AREA= 5.72 ACRES
RCN= 94	TC= 10.0 MIN

LEGEND

--- TRIBUTARY BOUNDARY

Offsite 01:
Lucent Site

Offsite 02:
Blazer Tech Offices

Offsite 03:
Triangle Outparcel

Offsite 04:
Cendant Site

Wet Basin 01

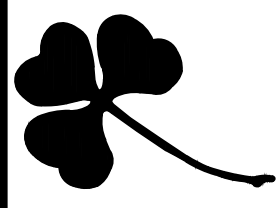
Subarea 03

Subarea 02

Wet Basin 02

Subarea 01

MARK	DATE	DESCRIPTION



CITY OF DUBLIN, FRANKLIN COUNTY, OHIO
STORMWATER MANAGEMENT PLAN
FOR
DUBLIN SMART PARKING LOT
POST-TRIBUTARY MAP

EMHT
 Evans, MacSchwartz, Humberston & Hillen, Inc.
 Engineers - Surveyors - Planners - Scientists
 10000 North State Road, Dublin, OH 43017
 Phone: 614.775.6000 Fax: 614.775.3549
 emht.com

DATE
May 16, 2017

SCALE
1" = 100'

JOB NO.
2017-0259

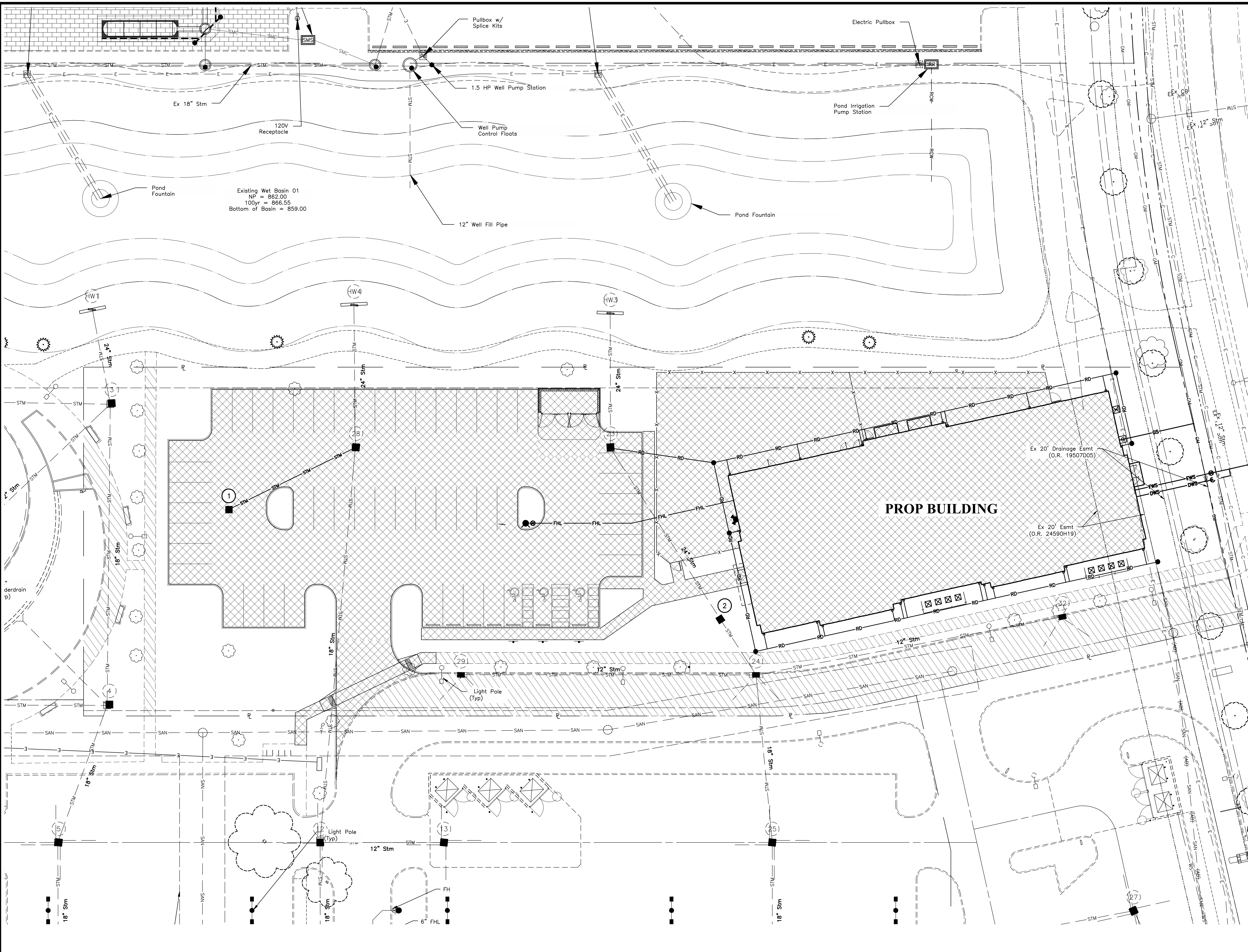
SHEET
Exhibit 2

A:\2017\0259\Present\A\Stormwater\DWG\2017-0259_Post_Tributary_Map.dwg, Last Saved: Fri, 5/19/2017 7:23 AM (No Xrefs)

APPENDIX C:

Exhibits

J:\2023\1033\DWG\4Sheets\Exhibits\Impervious Exhibit\20231033-Impervious Exhibit.dwg, Last Saved By: jseiple, 3/25/2024 9:37 AM Last Printed By: jseiple, 3/25/2024 9:37 AM (No Xref)



LEGEND

--- 1170-1171 ---	Contours
---	Curb
---	Storm Sewer
---	Sanitary Sewer
---	Water Main
---	Electric Duct Bank
---	Overhead Electric Line
---	Underground Electric Line
---	Telecomm Duct Bank
---	Gas Main
---	Lighting Conduit
▨	Existing Impervious Area
▩	Proposed Impervious Area

Site Information
 Total Site Area: 1.683 acres

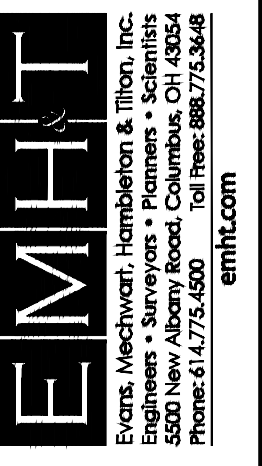
Impervious Area
 Prop Building = 12,571 sf
 Prop Parking Lot/Drive Apron = 20,415 sf
 Playground = 6,829 sf
 Prop Sidewalk = 1,615 sf
 Ex Sidewalk = 3,616 sf
 Ex Private Drive = 7,618 sf
TOTAL = 52,664 sf (1.21 acres)

Pervious Area: .474 acres
 Existing Impervious: .258 acres
 Proposed Impervious: .951 acres

REVISIONS

MARK	DATE	DESCRIPTION

CITY OF DUBLIN, FRANKLIN COUNTY, OHIO
 EXHIBIT FOR
LIGHTBRIDGE ACADEMY
 IMPERVIOUS EXHIBIT



DATE
 March 25, 2024

SCALE
 1" = 20'

JOB NO.
 2023-1033

SHEET
 1/1

