

Appendices

Appendix A Lighting Plans

Appendices

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Bolsa Grande High School Athletic Fields

Garden Grove, CA

Lighting System

Pole / Fixture Summary						
Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
A1-A2	70'	70'	4	TLC-LED-1200	4.68 kW	A
		16'	1	TLC-BT-575	0.58 kW	A
A3-A4	60'	60'	2	TLC-LED-1200	2.34 kW	B
		60'	1	TLC-LED-900	0.89 kW	B
		16'	1	TLC-BT-575	0.58 kW	B
B1	80'	80'	6	TLC-LED-1500	8.58 kW	A
		16'	1	TLC-BT-575	0.58 kW	A
B2	80'	80'	4	TLC-LED-1500	5.72 kW	A
		80'	2	TLC-LED-900	1.78 kW	A
		16'	1	TLC-BT-575	0.58 kW	A
B4	70'	70'	3	TLC-LED-1200	3.51 kW	B
		70'	1	TLC-LED-900	0.89 kW	B
		16'	1	TLC-BT-575	0.58 kW	B
C1	80'	80'	6	TLC-LED-1500	8.58 kW	A
		80'	5	TLC-LED-900	4.45 kW	C
		16'	2	TLC-BT-575	1.15 kW	A
C2	80'	80'	2	TLC-LED-1500	2.86 kW	A
		80'	5	TLC-LED-900	4.45 kW	A
		16'	2	TLC-BT-575	1.15 kW	A
C3	70'	70'	4	TLC-LED-1200	4.68 kW	B
		16'	1	TLC-BT-575	0.58 kW	B
S1-S2	50'	50'	2	TLC-LED-1200	2.34 kW	C
		50'	3	TLC-LED-900	2.67 kW	C
S4	100'	100'	5	TLC-LED-900	4.45 kW	C
T1-T4	70'	70'	4	TLC-LED-1200	4.68 kW	D
17			95		101.41 kW	

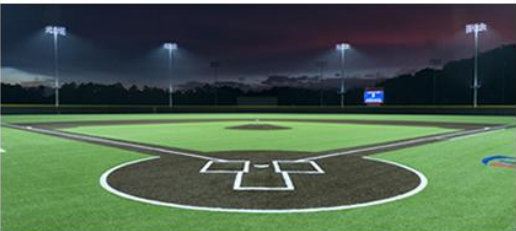
Circuit Summary			
Circuit	Description	Load	Fixture Qty
A	Baseball	45.93 kW	41
B	Softball	17.84 kW	18
C	Soccer	18.92 kW	20
D	Tennis East	18.72 kW	16

Fixture Type Summary							
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-LED-1200	LED 5700K - 75 CRI	1170W	136,000	>120,000	>120,000	>120,000	39
TLC-LED-900	LED 5700K - 75 CRI	890W	89,600	>120,000	>120,000	>120,000	26
TLC-LED-1500	LED 5700K - 75 CRI	1430W	160,000	>120,000	>120,000	>120,000	18
TLC-BT-575	LED 5700K - 75 CRI	575W	52,000	>120,000	>120,000	>120,000	12

Light Level Summary

Calculation Grid Summary								
Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
Baseball (Infield)	Horizontal Illuminance	51	37	64	1.75	1.38	A	41
Baseball (Outfield)	Horizontal Illuminance	31.2	18	43	2.43	1.74	A	41
Property Line Spill	Horizontal	0.08	0	0.38	0.00		A,B,C,D,E	95
Property Line Spill	Max Candela (by Fixture)	1837	0	6948	0.00		A,B,C,D,E	95
Property Line Spill	Max Vertical Illuminance Metric	0.12	0	0.49	0.00		A,B,C,D,E	95
Soccer	Horizontal Illuminance	31	20	48	2.42	1.55	C	20
Softball (Infield)	Horizontal Illuminance	51.5	37	63	1.72	1.39	B	18
Softball (Outfield)	Horizontal Illuminance	30.8	18	45	2.44	1.71	B	18
Tennis East	Horizontal Illuminance	51.3	42	62	1.48	1.22	D	16

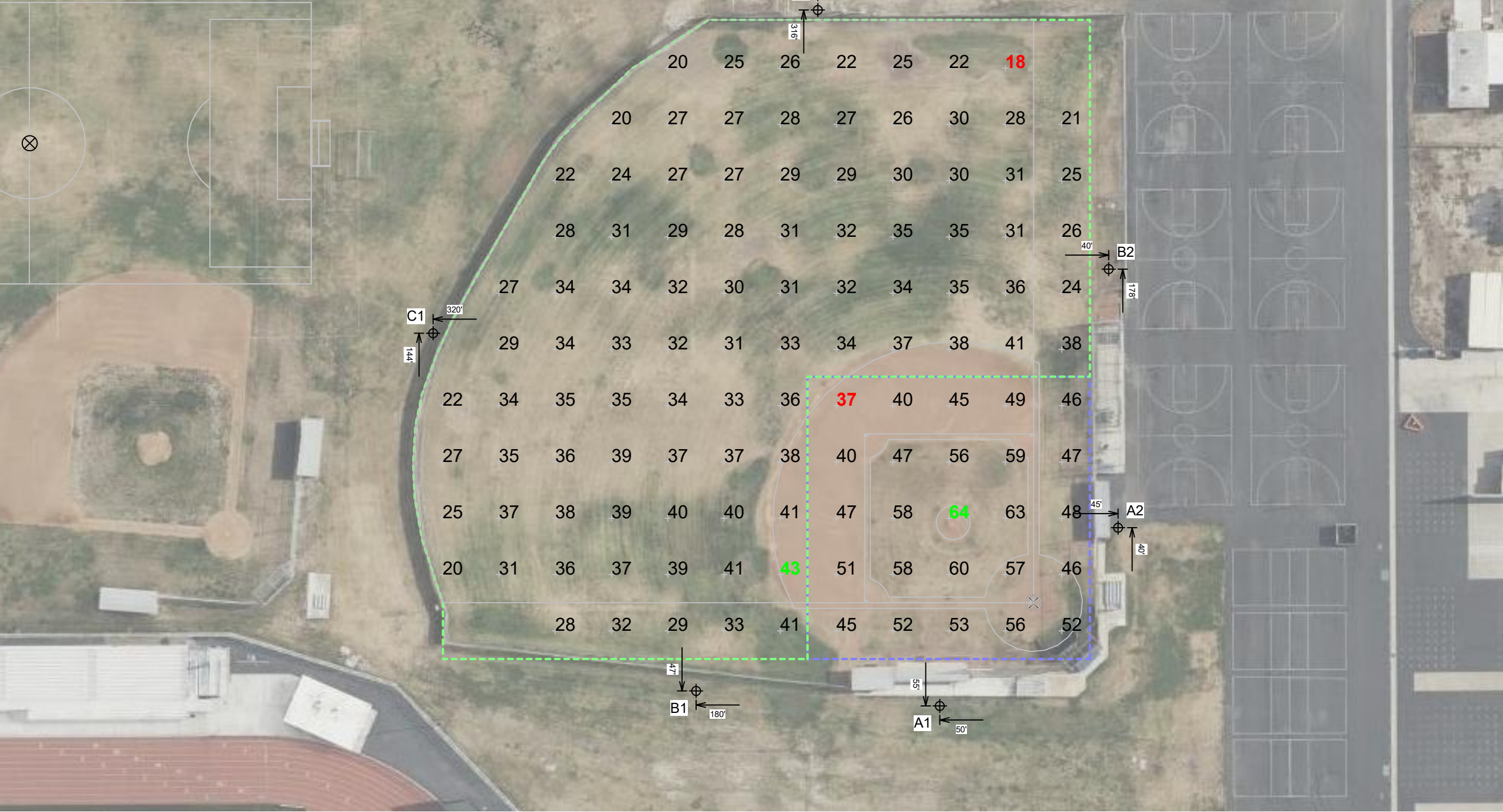
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EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	A1-A2	70'	-	15.5'	TLC-BT-575	1	1	0
				70'	TLC-LED-1200	4	4	0
1	B1	80'	-	15.5'	TLC-BT-575	1	1	0
				80'	TLC-LED-1500	6	6	0
1	B2	80'	-	80'	TLC-LED-900	2	2	0
				15.5'	TLC-BT-575	1	1	0
				80'	TLC-LED-1500	4	4	0
1	C1	80'	-	80'	TLC-LED-900	5*	0	5
				15.5'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	6	6	0
1	C2	80'	-	80'	TLC-LED-900	5	5	0
				15.5'	TLC-BT-575	2	2	0
				80'	TLC-LED-1500	2	2	0
				80'	TLC-LED-1500	2	2	0
6	TOTALS					46	41	5

* This structure utilizes a back-to-back mounting configuration



Bolsa Grande High School Athletic Fields
Garden Grove, CA

GRID SUMMARY	
Name:	Baseball
Size:	Irregular 315' / 353' / 311'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY		
MAINTAINED HORIZONTAL FOOTCANDLES		
	Infield	Outfield
Guaranteed Average:	50	30
Scan Average:	51.04	31.23
Maximum:	64	43
Minimum:	37	18
Avg / Min:	1.39	1.77
Guaranteed Max / Min:	2	2.5
Max / Min:	1.75	2.43
UG (adjacent pts):	1.32	1.60
CU:	0.74	
No. of Points:	25	91
LUMINAIRE INFORMATION		
Applied Circuits:	A	
No. of Luminaires:	41	
Total Load:	45.93 kW	

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

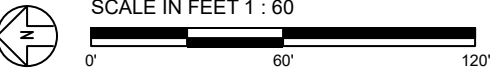
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



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ILLUMINATION SUMMARY



Pole location(s) ⚓ dimensions are relative to 0,0 reference point(s) ⊗

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	A3-A4	60'	-	60'	TLC-LED-900	1	1	0
				15.5'	TLC-BT-575	1	1	0
				60'	TLC-LED-1200	2	2	0
1	B4	70'	-	70'	TLC-LED-1200	3	3	0
				15.5'	TLC-BT-575	1	1	0
				70'	TLC-LED-900	1	1	0
1	C3	70'	-	15.5'	TLC-BT-575	1	1	0
				70'	TLC-LED-1200	4	4	0
4	TOTALS					18	18	0

Bolsa Grande High School Athletic Fields
Garden Grove, CA

GRID SUMMARY	
Name:	Softball
Size:	Irregular 200' / 176' / 194'
Spacing:	20.0' x 20.0'
Height:	3.0' above grade

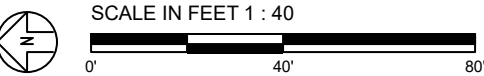
ILLUMINATION SUMMARY		
MAINTAINED HORIZONTAL FOOTCANDLES		
	Infield	Outfield
Guaranteed Average:	50	30
Scan Average:	51.53	30.83
Maximum:	63	45
Minimum:	37	18
Avg / Min:	1.41	1.68
Guaranteed Max / Min:	2	2.5
Max / Min:	1.72	2.44
UG (adjacent pts):	1.30	1.60
CU:	0.67	
No. of Points:	25	64
LUMINAIRE INFORMATION		
Applied Circuits:	B	
No. of Luminaires:	18	
Total Load:	17.84 kW	

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



Pole location(s) ⚡ dimensions are relative to 0,0 reference point(s) ⊗



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ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	C1	80'	-	80'	TLC-LED-900	5*	5	0
				15.5'	TLC-BT-575	2	0	2
				80'	TLC-LED-1500	6	0	6
2	S1-S2	50'	-	50'	TLC-LED-900	3	3	0
				50'	TLC-LED-1200	2	2	0
				100'	TLC-LED-900	5	5	0
1	S4	100'	-	100'	TLC-LED-900	5	5	0
4	TOTALS					28	20	8

* This structure utilizes a back-to-back mounting configuration



Bolsa Grande High School Athletic Fields
Garden Grove, CA

GRID SUMMARY	
Name:	Soccer
Size:	300' x 150'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY	
MAINTAINED HORIZONTAL FOOTCANDLES	
Entire Grid	
Guaranteed Average:	30
Scan Average:	31.02
Maximum:	48
Minimum:	20
Avg / Min:	1.56
Guaranteed Max / Min:	2.5
Max / Min:	2.42
UG (adjacent pts):	1.61
CU:	0.67
No. of Points:	50
LUMINAIRE INFORMATION	
Applied Circuits:	C
No. of Luminaires:	20
Total Load:	18.92 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



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ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	T1-T4	70'	-	70'	TLC-LED-1200	4	4	0
4	TOTALS					16	16	0

Bolsa Grande High School Athletic Fields
Garden Grove, CA

GRID SUMMARY	
Name:	Tennis East
Size:	4 Court - 24' Spacing
Spacing:	20.0' x 20.0'
Height:	3.0' above grade

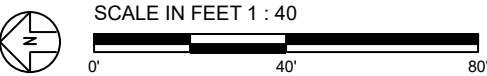
ILLUMINATION SUMMARY	
MAINTAINED HORIZONTAL FOOTCANDLES	
	Entire Grid
Guaranteed Average:	50
Scan Average:	51.33
Maximum:	62
Minimum:	42
Avg / Min:	1.22
Guaranteed Max / Min:	2
Max / Min:	1.48
UG (adjacent pts):	0.00
CU:	0.58
No. of Points:	60
LUMINAIRE INFORMATION	
Applied Circuits:	D
No. of Luminaires:	16
Total Load:	18.72 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



Pole location(s) ⚡ dimensions are relative to 0,0 reference point(s) ⊗



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ILLUMINATION SUMMARY



Bolsa Grande High School Athletic Fields
Garden Grove, CA

GRID SUMMARY	
Name:	Property Line Spill
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY	
HORIZONTAL FOOTCANDLES	
Scan Average:	Entire Grid 0.0811
Maximum:	0.38
Minimum:	0.00
No. of Points:	87
LUMINAIRE INFORMATION	
Applied Circuits:	A, B, C, D, E
No. of Luminaires:	95
Total Load:	101.41 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



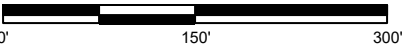
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ILLUMINATION SUMMARY



SCALE IN FEET 1 : 150



Pole location(s) ⚡ dimensions are relative to 0,0 reference point(s) ⊗



Bolsa Grande High School Athletic Fields
Garden Grove, CA

GRID SUMMARY	
Name:	Property Line Spill
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY	
MAX VERTICAL FOOTCANDLES	
Scan Average:	Entire Grid 0.1188
Maximum:	0.49
Minimum:	0.00
No. of Points:	87
LUMINAIRE INFORMATION	
Applied Circuits:	A, B, C, D, E
No. of Luminaires:	95
Total Load:	101.41 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

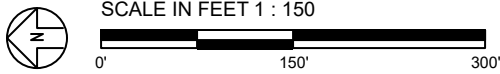
Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume $\pm 3\%$ nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



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ILLUMINATION SUMMARY



Pole location(s) ⚡ dimensions are relative to 0,0 reference point(s) ⊗

EQUIPMENT LAYOUT

INCLUDES:

- Baseball
- Soccer
- Softball
- Tennis East

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires		
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE
3	A1-A2, C3	70'	-	15.5'	TLC-BT-575	1
				70'	TLC-LED-1200	4
2	A3-A4	60'	-	60'	TLC-LED-900	1
				15.5'	TLC-BT-575	1
1	B1	80'	-	60'	TLC-LED-1200	2
				15.5'	TLC-BT-575	1
1	B2	80'	-	80'	TLC-LED-1500	6
				80'	TLC-LED-900	2
1	B4	70'	-	15.5'	TLC-BT-575	1
				80'	TLC-LED-1500	4
1	C1	80'	-	70'	TLC-LED-1200	3
				15.5'	TLC-BT-575	1
1	C2	80'	-	80'	TLC-LED-900	5*
				15.5'	TLC-BT-575	2
2	S1-S2	50'	-	80'	TLC-LED-1500	2
				50'	TLC-LED-900	3
1	S4	100'	-	50'	TLC-LED-1200	2
				100'	TLC-LED-900	5
4	T1-T4	70'	-	70'	TLC-LED-1200	4
17	TOTALS					95

* This structure utilizes a back-to-back mounting configuration

SINGLE LUMINAIRE AMPERAGE DRAW CHART

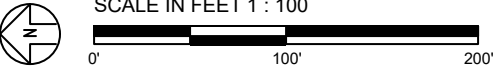
Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-1200	7.0	6.6	6.1	5.2	4.2	4.0	3.0
TLC-LED-900	5.3	5.0	4.6	4.0	3.2	2.9	2.3
TLC-LED-1500	8.5	8.1	7.4	6.4	5.1	4.7	3.7
TLC-BT-575	3.4	3.2	2.9	2.5	2.0	1.8	1.5



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EQUIPMENT LAYOUT



Pole location(s) ⚓ dimensions are relative to 0,0 reference point(s) ⊗