Town of Harwich
Brooks Park & Whitehouse Field

Harwich, Massachusetts

Sports Lighting Study

September 21, 2020

Prepared By:

Thompson engineering company inc.
FOUNDED 1935
CONSULTING ENGINEERS

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FOUNDED 1935
CONSULTING ENGINEERS

September 21, 2020

Mr. Griffin Ryder
Town Engineer
Town of Harwich
732 Main Street
Harwich, Massachusetts 02645

Dear Mr. Ryder:

Attached please find the *"Brooks Park and Whitehouse Field - Assessment of Existing Sports Lighting Systems"*

This assessment addresses the existing sports lighting including electrical system conditions, cost estimate and recommendations.

We apologies for the tardiness of this report. The current situation we all living with has greatly slowed down portions of this Study.

We at Thompson Engineering Company, Inc. appreciate the opportunity to serve the Town in anyway and look forward to working with you on any future projects.

Very truly yours,

Kevin W. Murphy
Kevin W. Murphy

89 Newbury Street, Suite 103 Danvers, MA 01923 (617) 886-9066

TOWN OF HARWICH
BROOKS PARK
WHITEHOUSE FIELD

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SECTION

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TOWN OF HARWICH
BROOKS PARK
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1.0 INTRODUCTION

A. Thompson Engineering Company, Inc. has been engaged by the Town of Harwich to survey, analyze, and assess the existing sports lighting at Brooks Park and Whitehouse Field.

B. The Brooks Park is located off Oak Street and consists of the following recreational elements:

a. 90’ Baseball diamond
b. Playground
c. Tennis courts
d. Pickleball courts
e. Basketball courts
f. Parking
g. Shed structure
h. Restroom building

C. Whitehouse Field is a 90’ baseball diamond that is home to the Cape Cod Baseball League (CCBL) Harwich Mariners. Opened in 1969, the Field has been a part of the rich history of the CCBL for the past 50 plus seasons. The scoreboard was installed in 1998, funded by the former commissioner of Major league baseball, Fay Vincent, Jr.in memory of his father. The current sports field lighting system was installed in 2008 with the assistance of a grant from the Yawkey Foundation. The field consists of the following features:

1. 90’ baseball diamond
2. Scoreboard in right field.
3. Sports lighting system
4. Bleachers
5. Dugouts
6. Concession building
7. Restroom building
8. Storage buildings
9. Pressbox building.

D. The main focus of this assessment is predicated upon the following sub-issues:

1. Existing Conditions of Electrical Systems

2. Recommendations

3. Cost Estimate

E. This report is based on visual inspections of the site and electrical systems.

F. This report does not include as assessment of asbestos or other hazardous materials, which may or may not be present at the site.

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TOWN OF HARWICH
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2.0 PHYSICAL ASSESSMENT

BROOKS PARK

A. The Sports Lighting System consists of the following:

1. Utility Pole with transformer
2. Pedestal mounted enclosure with panel and time clock
3. Utility meter
4. Eight wood poles with two flood lighting fixtures which serves tennis courts #1-4.
5. Two wood poles with three flood lighting fixtures which serves tennis courts #5-6/pickle ball courts.
6. Two wood poles with three flood lighting fixtures which serves one basketball court.

B. The half basketball court, and playground do not currently have sports lighting systems.

C. The existing sports lighting systems is not a traditional sports lighting system. It consists of a wood utility pole with two or three flood lighting fixtures mounted two the wood poles with U brackets and bolts.

D. Each flood lighting fixture uses a 250W MH lamp, has a wire guard, but no optics systems. The lighting fixtures do not focus the light towards the playing surfaces, but rather "blasts" light out creating glare and light spill. TEC did not observe the lighting system in operation but it is staff to say that the lighting quality is substandard with glare and uneven lighting over the playing surface.

E. The wood utility poles are 30'-0" used utility poles. Proper recreational level tennis court poles should be at least 50'-0".

F. There is significant ballast "hum" being created by several fixtures. This indicates that the ballast is failing and will stop functioning at some point. The sound can be very annoying to nearby individuals. More importantly, the ongoing ballast failures also damaging the lamp and causing the lamp to produce lower light levels and ultimately reduces lamp life.

G. The sports lighting is served from a single-phase aerial 5 KV utility electric service and utility transformer mounted on the utility pole adjacent to the electrical equipment cabinet. The cabinet is mounted on a wood pedestal frame with the utility meter. The cabinet houses two electrical panels, relays and a time clock. Lighting fixtures are turned on/off by a relay system and timeclock. The timeclock allows a user to turn on the lighting by the relay during a set period of time.

H. All conduit underground and exposed installed in PVC schedule 40 conduit. All wiring between the poles and the cabinet are installed underground. There is a Musco ballast cabinet mounted on each utility pole approximately 10'-0" above grade. All ballast for the two or three fixtures on each respective pole is mounted in this cabinet.

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PHOTOS


Control panel interior


Control panel and meter location

Damaged exposed PVC conduit


Ballast cabinet on pole

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TOWN OF HARWICH
BROOKS PARK
WHITEHOUSE FIELD


Utility poles with two and three flood lights

BB Court with very limited lighting

BB Court with lighting

WHITEHOUSE FIELD

A. The existing sports lighting system was installed in 2008 and consists of the following:

- Utility Pole with transformer
- Panel, controls, and time clock located in a wood storage building.
- Two 90'-0" standards with 18 sports fixtures with 1500W MH lamps
- Two 90'-0" standards with 32 sports fixtures with 1500W MH lamps
- Two 105'-0" standards with 18 sports fixtures with 1500W MH lamps

B. The existing scoreboard was installed in 1998 and consists of the following:

- Scoreboard
- Steel mounting structure
- Electric panel

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- Utility meter

C. Staff stated that lighting ballasts and the fixture harness wiring are failing. Staff stated that is difficult to find firms capable of replacing the lamps on the 90'-0" and especially the 105'-0" poles

D. The fixtures do not have external or internal glare shields or reflectors.

E. TEC observed multiple lamps that did not illuminate during the test. See list below. In addition, several other lamps did not strike to full brilliance after 30 minutes from a cold start. In the photos below, lamps with a blue hue did not fully strike. The cold start lamp strike period should be less than 10 minutes for properly functioning metal halide lamps and ballasts.

Lamps out

- Pole B1 – 9 out of 18 were out.
- Pole B2 – 2 out of 32 were out.
- Pole B3 – 3 out of 18 were out.
- Pole B4 – 2 out of 18 were out.
- Pole B5 – 5 out of 32 were out.
- Pole B6 – 4 out of 18 were out.

Lamps that did not fully strike

- Pole B1 – 3 out of 18 did not fully strike.
- Pole B2 – 12 out of 32 did not fully strike.
- Pole B3 – 3 out of 18 did not fully strike.
- Pole B4 – 0 out of 18 did not fully strike.
- Pole B5 – 1 out of 32 did not fully strike.
- Pole B6 – 0 out of 18 did not fully strike.

44 of the 136 lamps – 32% failure rate. The 19 lamps that did not fully strike indicate failing ballasts that need to be replaced. The 25 lamps out could simply be from lamps failing at end of life or could also indicate ballast failure.

F. Lighting fixtures are currently turned on off by panel circuit breakers in the storage building.

G. Service main breaker appears to be older than the rest of the panels. Difficult to inspect because room is filled with storage. Per MA Electrical Code Article 110-26, storage cannot be located within the panel working space.

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TOWN OF HARWICH
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WHITEHOUSE FIELD

Photos

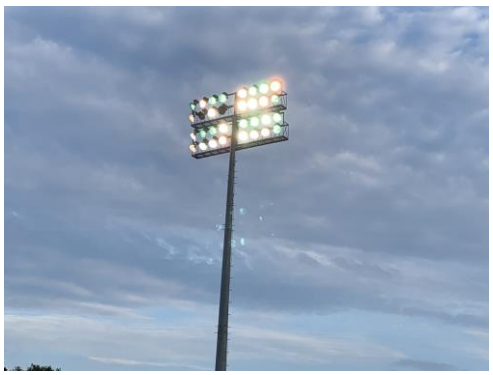
Utility three phase service

Shed Building containing electrical panels

Main electric service panels

Panel serving field lighting

Pole B1



Pole B2

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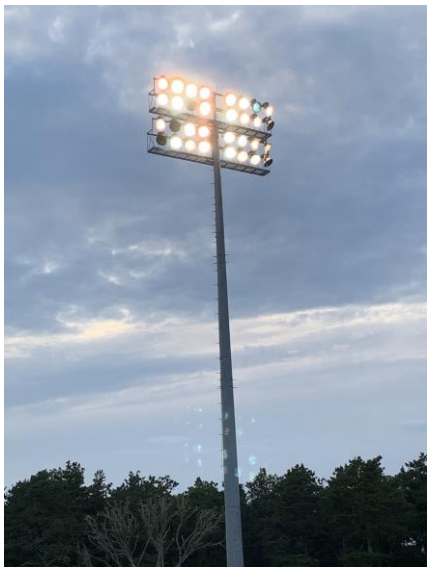
Pole B3


Pole B4


Pole B5


Pole B6


Photos indicating lighting standards are in the grass area close to the field

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Scoreboard in right field


Scoreboard utility meter


Scoreboard panel


Scoreboard feeder handhole

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3.0 RECOMMENDATIONS

BROOKS PARK

1. The existing sports lighting system was a make shift installation installed by the Town. Overall, it has served the town well but the electrical installation is old and failing. The quality of lighting is poor and many users complain about the uneven light and glare.

2. During our inspection, we noticed loud humming from many fixtures, indicating ballast failure. In addition, we noted broken conduits and wiring with insulation starting to crack.

3. Therefore, we recommend complete removal of the existing system and installation of a new LED sports lighting system. Project goals:

   - Recommended recreational lighting levels.
   - Use 50'-0" poles to minimize glare in participants' eyes.
   - Use LED fixtures with 80,000 L90 hours rating (90% lumen output)
   - Photometric plans - Tennis courts 1-4 30 FC average, Tennis courts 5-6 30 FC average, Basketball courts 30 FC average.
   - Illuminate paved parking lot.
   - Illuminate playground area.
   - Provide controller that provide flexible control – remote and wireless
   - Provide receptacles at selected locations. Refer to site plans

4. Scope of work: Working with Musco Lighting, TEC recommends the following scope of work. Note: There are multiple other manufacturers are capable of providing the required sports lighting system, this is not a proprietary system.

   - Remove existing utility poles, lighting fixtures and wiring.
   - Provide new control cabinet with lighting panel and Musco or approved equal controller.
   - Provide new utility meter and new pedestal.
   - Install four 50'-0" poles and three 40'-0" pole.
   - Install twenty-nine (29) LED fixtures – combination of 400W, 600W, and 900W fixtures illuminate tennis courts, pickleball, basketball, playground and parking lot. The sports lighting fixture have full cutoff and minimize spill lighting.

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- Provide receptacles at selected locations.
- Provide a new Musco or approved equal controller in cabinet. Controller to provide wireless controls.
- No work shall be performed from the courts. Grass and walkways to be protected and repaired/replaced as required.

WHITHOUSE FIELD

TEC recommends the following for Whitehouse Field:

1. Remove all non-electrical materials and trash from the work space in front of the panels in the shed building. This is a fire hazard and a safety hazard. Per MA Electrical Code Article 110-26, the work space is the area 3'-6" from the panels.

2. Replace the electric service main circuit breaker. The circuit breaker appears to be much older than the rest of the equipment and is probably 50 years old. We were unable to determine panel size. This is not included in the cost estimate for this Study but we estimate this cost to be $10,000 to $15,000.

3. The electrical installation is approximately 12 years old so therefore we would recommend maintaining and reusing the electrical panels and the underground feeders to each of the six poles. Also, same for the poles.

4. Ballast typically last approximately 15 years. It appears that the ballasts and wiring harness have been prematurely failing at Whitehouse Field. With 32% of lamps and/or ballasts failed or in the process of failing is a significant failure rate for one year. Clearly with 32% failure rate, the quality of lighting does not meet the requirements for a Cape Cod League game.

5. TEC recommends replacing all 136 fixtures with 1500 MH lamps with new LED sports lighting fixtures. Working with Musco Lighting, TEC recommends the following scope of work. Note: There are multiple other manufacturers are capable of providing the required sports lighting system, this is not a proprietary system.

    - Recommended college lighting levels.
    - Use LED fixtures with 80,000 L90 hours rating (90% lumen output)
    - Photometric plans indicate 100 FC average for the infield and 70 FC average for the outfield.
    - Remove existing fixtures, ballasts and mounting platform
    - Install eighty (80) 1500W LED lighting fixtures with internal glare shield.
        - Pole B1 – 10 fixtures.

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- Pole B2 – 18 fixtures.
- Pole B3 – 12 fixtures.
- Pole B4 – 12 fixtures.
- Pole B5 – 18 fixtures.
- Pole B6 – 10 fixtures.

- Install sixteen (16) 575W LED ball tracker fixtures to illuminate the high canopy to provide better illumination for flyballs. The proposed sports lighting fixture have full cutoff and do not have spill lighting similar to the existing fixtures. These "ball tracker" lights are required to fill in the lighting lost by the full cutoff fixtures.

- Fixture cluster to be connected to a mounting platform. The platform will be either bolted to the standard or to the top of the standard.

- Reuse underground wiring.

- Provide new wiring in the pole from the pole base to the fixtures.

- Provide six new breakers in the panel for the reduced loads

- Provide a new Musco or approved equal controller in the shed building. Controller to provide wireless controls.

- Work to be performed on lifts.

- No work shall be performed from the field. Grass to be protected and repaired/replaced as required.

- Work should take approximately two to three weeks once material is on site.

6. The scoreboard is 22 years old. It is at or past its life expectancy. In addition, the scoreboard uses incandescent automotive lamps which requires constant maintenance and lamp replacement. The Town provide a sketch for a Nevco scoreboard. We contacted Daktronics and Fairplay and both manufacturers are capable of provide a similar custom scoreboard. This is not a proprietary scoreboard. TEC recommends the following scope of work.

   - Nevco or approved equal 1603-ETN scoreboard with
     - Custom decorative truss arch
     - Mariners logo
     - Whitehouse Field sign
     - Pitch speed display and gun package
     - All LED baseball/softball scoreboard
     - Wireless controller

   - Remove existing scoreboard and structure and base.

   - Provide new structure and bases

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- Remove existing feeder.
- Install new feeder from scoreboard panelboard.
- Provide control circuit in existing conduit from scoreboard to press box.

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BROOKS PARK
WHITEHOUSE FIELD

4.0 COST ESTIMATE

Originally, the Study included a high-level cost estimate prepared by TEC. During our site meeting it was discussed that a more thorough conceptual cost estimate. As requested, TEC engaged the services of AM Fogarty & Associates to prepare a cost estimate. To assist the cost estimate, TEC prepared site plans. Refer to attachments.

Cost estimate assumptions:

- Spring 2021 construction start
- Sports lighting cost provided by Musco Lighting
- Scoreboard cost provided by Nevco

BROOKS PARK **$439,863**

Cost considerations

- $6,390 to remove existing underground wiring. Cost savings - Abandoned in place?
- Civil and Landscaping – Patching pavement and repair grass. Cost savings - Could DPW perform this work?

WHITEHOUSE FIELD **$588,996**

Cost considerations – The new scoreboard installation could be a separate stand-alone project

- Scoreboard installation - $64,175.
    - Potential savings – reuse existing structure supports. This was not studied.

- Athletic Field Lighting - $524,821

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TOWN OF HARWICH
BROOKS PARK
WHITEHOUSE FIELD

SCHEDULE

ELEMENTS

○ Design Phase	4-6 weeks
○ Bid Phase	3 weeks
○ Contract agreement	3 weeks
○ Shop drawing approval	4 weeks
○ Sport lighting fabrication	6 weeks
○ Scoreboard fabrication	12 weeks
○ Brooks Park installation	8-10 weeks
○ Whitehouse Field lighting installation	2-3 Weeks
○ Whitehouse Field scoreboard installation	1 Week
○ Whitehouse Field construction in May	
○ Brooks Park Construction could start in April	
○ Town may need to pre-purchase scoreboard	

DESIGN AND CONSTRUCTION SCHEDULE

○ Design Phase	Oct. 19th to Nov.13th 2020
○ Bid Phase	Nov 16th to Dec 8th 2020
○ Contract agreement	Dec. 9th to 30th 2020
○ Contractor to start	Jan 4, 2021
○ Shop drawing approval	Jan 4th to Feb 5th 2021
○ Sport lighting on site	April 1, 2021
○ Brooks Park construction begins	April 5, 2021
○ Scoreboard on site	May 3, 2021
○ Whitehouse Field construction begins	May 3, 2021
○ Whitehouse Field construction complete	May 21, 2021 – 3 weeks
○ Brooks Park construction complete	June 16, 2021 – 10 weeks

END OF SECTION

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ATTACHMENTS

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TOWN OF HARWICH
BROOKS PARK
WHITEHOUSE FIELD

SITE PLANS

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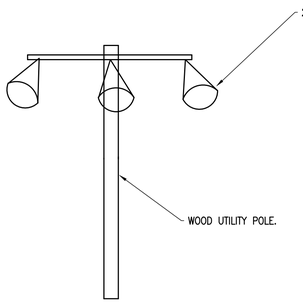
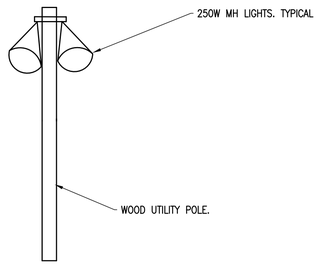


EXISTING POLE A2 DETAIL



EXISTING POLE A1 DETAIL

PRICING SCOPE OF WORK

1 – DISCONNECT, REMOVE AND DISPOSE OF THE ELECTRICAL ENCLOSURE AND ALL EQUIPMENT LOCATED INSIDE. EQUIPMENT LOCATED INSIDE – PANEL, TIMECLOCK, RELAYS. DISCONNECT, REMOVE AND DISPOSE OF THE FEEDER AND CONDUIT FROM THE TRANSFORMER ABOVE.

2 – DISCONNECT, REMOVE AND DISPOSE OF ALL OF THE WOOD UTILITY POLES, SPORTS FLOOD LIGHTING AND ASSOCIATED CONDUIT AND WIRING. DISCONNECT, REMOVE AND DISPOSE OF THE UNDERGROUND WIRING BETWEEN THE PANEL AND ALL UTILITY POLE MOUNTED LIGHTING FIXTURES. ALL UNDERGROUND CONDUIT SHALL BE ABANDONED IN PLACE.

Project Name:

TOWN OF HARWICH
BROOKS PARK
WHITEHOUSE FIELD
LIGHTING STUDY

Prepared By:

Thompson engineering company, inc.
CONSULTING ENGINEERS
89 NEWBURY STREET · DANVERS · MASSACHUSETTS 01923

Rev:	Date:	Description:

Stamp:

PRICING SET

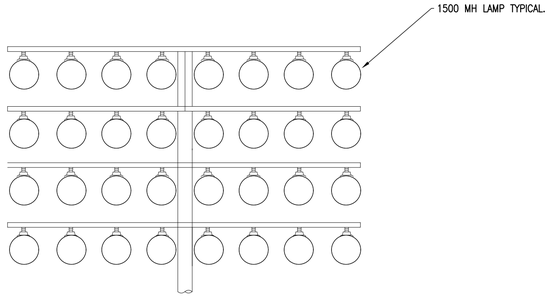
Date:	08/26/20
Project No:	20021
Drawn:	JM / CM
Checked:	EG / KM
Scale:	1'=60'-0"

Dwg Name:

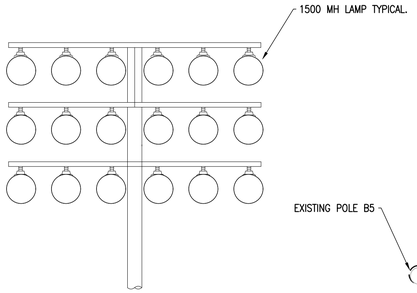
Brooks Park
Existing Site
Lighting Plan

Dwg No:

E-1



B2,B5
POLE FIXTURE DETAIL
N.T.S.



B1,B3,B4,B6
POLE FIXTURE DETAIL
N.T.S.

POLE HEIGHTS	
POLE	HEIGHTS
B1	105 FT
B2	90 FT
B3	90 FT
B4	90 FT
B5	90 FT
B6	105 FT

PRICING SCOPE OF WORK

1 – DISCONNECT, REMOVE AND DISPOSE OF THE 18 SPORTS FIELD LIGHTING FIXTURES AND ASSOCIATED MOUNTING BRACKETS, BALLASTS AND WIRING. REFER TO THE DETAIL ON THIS DRAWING. EXISTING LIGHTING STANDARD AND BASE TO REMAIN. TYPICAL FOR FOUR STANDARDS.

2 – DISCONNECT, REMOVE AND DISPOSE OF THE 32 SPORTS FIELD LIGHTING FIXTURES AND ASSOCIATED MOUNTING BRACKETS, BALLASTS AND WIRING. REFER TO THE DETAIL ON THIS DRAWING. EXISTING LIGHTING STANDARD AND BASE TO REMAIN. TYPICAL FOR TWO STANDARDS.

3 – DISCONNECT, REMOVE AND DISPOSE OF THE EXISTING SCOREBOARD AND ASSOCIATED MOUNTING BRACKETS, THREE POLES/BASES, AND FEEDER. UNDERGROUND FEEDER LENGTH IS APPROXIMATLY 50'–0'.

4 – FURNISH AND INSTALL NEW NEVCO 850–005 CUSTOM BASEBALL SCOREBOARD WITH CUSTOM LOGOS, DECORATIVE DETAILS, SPEED GUN AND CONTROLLER. REFER TO PDF SCOREBORD QUOTE FROM NEVCO. PROVIDE NEW UNDERGROUND 50A–3P FEEDER FROM EXISTING PANEL. LENGTH OF UNDERGROUD FEEDER 50'–0'. PROVIDE 50A–3P BREAKER IN PANEL.

5 – THE INTENT IS TO INSTALL A STEEL MOUNTING ARM WITH 18 LED SPORTS LIGHTING FIXTURES ON TOP OF THE STANDARD. PROVIDE NEW WIRING FROM THE JUNCTION AT THE CONCRETE BASE TO THE FIXTURES VIA THE LED DRIVERS. TYPICAL FOR FOUR STANDARDS.

6 – THE INTENT IS TO INSTALL A STEEL MOUNTING ARM WITH 32 LED SPORTS LIGHTING FIXTURES ON TOP OF THE STANDARD. PROVIDE NEW WIRING FROM THE JUNCTION AT THE CONCRETE BASE TO THE FIXTURES VIA THE LED DRIVERS. TYPICAL FOR TWO STANDARDS.

7 – IN THE SHED, DISCONECT, REMOVE AND DISPOSE OF THE EXISTING USL LIGHTING CONTROLLER INCLUDING CIRCUITS FROM THE POWER PANEL

8 – PROVIDE A NEW MUSCO LIGHTING CONTROLLER IN THE SHED BUILDING.

9 – PROVIDE SIX 50A–3P BREAKERS IN THE EXISTING PANEL. PROVIDE SIX BRANCH CIRCUITS FROM PANEL TO THE MUSCO CONTROLLER. CONNECT THE SIX EXISTING FEEDERS FROM THE SPORTS LIGHTING TO THE NEW MUSCO CONTROLLER.

10 – ALL EXISTING UNDERGROUND CONDUIT AND WIRING FROM SHED TO EACH IS EXISTING TO REMAIN AND WILL BE REUSED.

11 – PROVIDE ALL REQUIRED LIFTS TO ACCESS THE SPORTS LIGHTING AT TOP OF THE 90'–0' AND 105'–0' STANDARDS.

12 – ALL SIX SPORTS LIGHTING STANDARDS AND SCOREBOARD ARE LOCATED IN GRASS AREA. PROVIDE THE REQUIRED PROTECTION TO PROTECT THE GRASS. ALL DAMAGE GRASS TO BE REPLACED WITH SOD. ASSUME 200 SF FOR PRICING

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Rev:	Date:	Description:

Stamp:

PRICING SET

Date:	08/26/20
Project No:	20021
Drawn:	JM / CM
Checked:	EG / KM
Scale:	1'=60'-0"

Dwg Name:

Whitehouse Field Site Lighting Plan

Dwg No:

E-2

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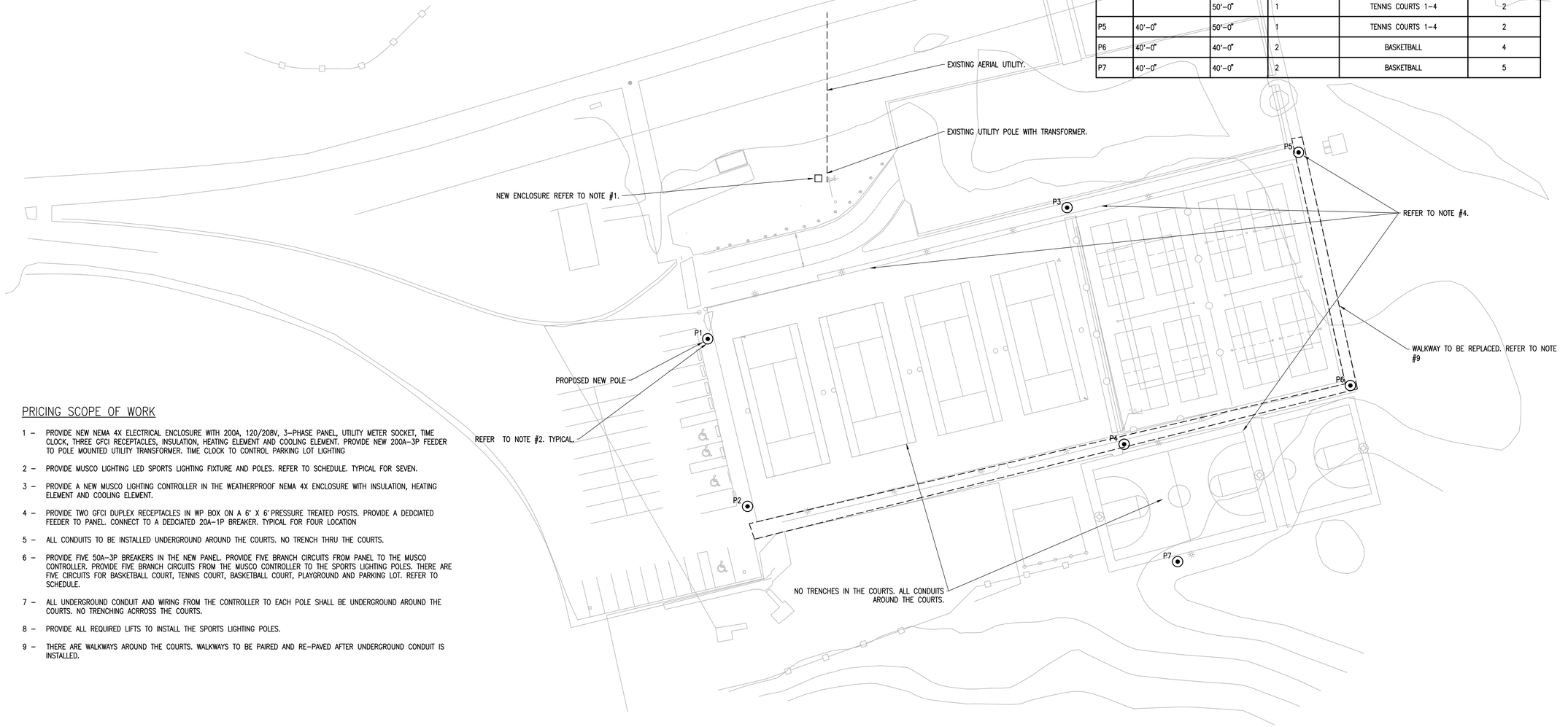
LIGHTING SYSTEM AND CIRCUIT SUMMARY					
POLE ID	POLE HEIGHT	MTG HEIGHT	FIXTURE QUANTITY	SERVES	CIRCUIT #
P1	50'-0"	50'-0"	1	PARKING	1
		50'-0"	2	TENNIS COURTS 1-4	2
		50'-0"	1	TENNIS COURTS 1-4	2
P2	50'-0"	50'-0"	1	PARKING	1
		50'-0"	2	PLAYGROUND	3
		50'-0"	2	TENNIS COURTS 1-4	2
		50'-0"	1	TENNIS COURTS 1-4	2
P3	50'-0"	50'-0"	2	PARKING	1
		50'-0"	2	TENNIS COURTS 5-6, PICKLEBALL 1-8	4
		50'-0"	2	TENNIS COURTS 1-4	2
		50'-0"	1	TENNIS COURTS 1-4	2
P4	50'-0"	50'-0"	2	TENNIS COURTS 5-6, PICKLEBALL 1-8	4
		50'-0"	2	TENNIS COURTS 1-4	2
		50'-0"	1	TENNIS COURTS 1-4	2
P5	40'-0"	50'-0"	1	TENNIS COURTS 1-4	2
P6	40'-0"	40'-0"	2	BASKETBALL	4
P7	40'-0"	40'-0"	2	BASKETBALL	5



PRICING SCOPE OF WORK

1 – PROVIDE NEW NEMA 4X ELECTRICAL ENCLOSURE WITH 200A, 120/208V, 3-PHASE PANEL, UTILITY METER SOCKET, TIME CLOCK, THREE GFCI RECEPTACLES, INSULATION, HEATING ELEMENT AND COOLING ELEMENT. PROVIDE NEW 200A-3P FEEDER TO POLE MOUNTED UTILITY TRANSFORMER. TIME CLOCK TO CONTROL PARKING LOT LIGHTING

2 – PROVIDE MUSCO LIGHTING LED SPORTS LIGHTING FIXTURE AND POLES. REFER TO SCHEDULE. TYPICAL FOR SEVEN.

3 – PROVIDE A NEW MUSCO LIGHTING CONTROLLER IN THE WEATHERPROOF NEMA 4X ENCLOSURE WITH INSULATION, HEATING ELEMENT AND COOLING ELEMENT.

4 – PROVIDE TWO GFCI DUPLEX RECEPTACLES IN WP BOX ON A 6' X 6' PRESSURE TREATED POSTS. PROVIDE A DEDCIATED FEEDER TO PANEL. CONNECT TO A DEDCIATED 20A-1P BREAKER. TYPICAL FOR FOUR LOCATION

5 – ALL CONDUITS TO BE INSTALLED UNDERGROUND AROUND THE COURTS. NO TRENCH THRU THE COURTS.

6 – PROVIDE FIVE 50A-3P BREAKERS IN THE NEW PANEL. PROVIDE FIVE BRANCH CIRCUITS FROM PANEL TO THE MUSCO CONTROLLER. PROVIDE FIVE BRANCH CIRCUITS FROM THE MUSCO CONTROLLER TO THE SPORTS LIGHTING POLES. THERE ARE FIVE CIRCUITS FOR BASKETBALL COURT, TENNIS COURT, BASKETBALL COURT, PLAYGROUND AND PARKING LOT. REFER TO SCHEDULE.

7 – ALL UNDERGROUND CONDUIT AND WIRING FROM THE CONTROLLER TO EACH POLE SHALL BE UNDERGROUND AROUND THE COURTS. NO TRENCHING ACRROSS THE COURTS.

8 – PROVIDE ALL REQUIRED LIFTS TO INSTALL THE SPORTS LIGHTING POLES.

9 – THERE ARE WALKWAYS AROUND THE COURTS. WALKWAYS TO BE PAIRED AND RE-PAVED AFTER UNDERGROUND CONDUIT IS INSTALLED.

Project Name:

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Rev:	Date:	Description:

Stamp:

PRICING SET

Date:	08/26/20
Project No:	20021
Drawn:	JM / CM
Checked:	EG / KM
Scale:	1'=60'-0"

Dwg Name:

Brooks Park
Proposed Site
Lighting Plan

Dwg No:

E-3

TOWN OF HARWICH
BROOKS PARK
WHITEHOUSE FIELD

PHOTOMETRICS

89 Newbury Street, Suite 103 Danvers, MA 01923 (617) 886-9066

Whitehouse Baseball Field LED Relight

Harwich, MA

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
A1-A2	105'	105'	10	TLC-LED-1500	14.30 kW	A
		16'	2	TLC-BT-575	1.15 kW	A
B1-B2	90'	90'	18	TLC-LED-1500	25.74 kW	A
		16'	3	TLC-BT-575	1.73 kW	A
C1	90'	90'	12	TLC-LED-1500	17.16 kW	A
		16'	3	TLC-BT-575	1.73 kW	A
C2	90'	90'	12	TLC-LED-1500	17.16 kW	A
		30'	3	TLC-BT-575	1.73 kW	A
6			***96***		***123.60 kW***	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Baseball	123.6 kW	96

Fixture Type Summary

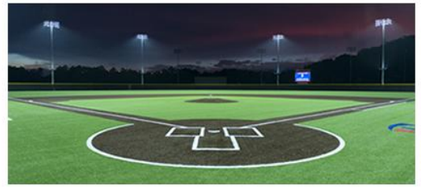
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-LED-1500	LED 5700K - 75 CRI	1430W	160,000	>120,000	>120,000	>120,000	80
TLC-BT-575	LED 5700K - 75 CRI	575W	52,000	>120,000	>120,000	>120,000	16

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
Baseball Center	Center Outfielder Player view	5.39	0	28	30461.85		A	96
Baseball Center	Left Outfielder Player view	16.7	4	62	15.35	4.16	A	96
Baseball Center	Min Playability	23.7	3	106	33.39	7.91	A	96
Baseball Center	Right Outfielder Player view	16.3	4	64	16.31	4.07	A	96
Baseball Left Center	Center Outfielder Player view	4.72	1	22	26.78	4.72	A	96
Baseball Left Center	Left Outfielder Player view	24.1	4	80	20.14	6.04	A	96
Baseball Right Center	Center Outfielder Player view	5.05	2	22	14.37	2.53	A	96
Baseball Right Center	Right Outfielder Player view	22.5	4	85	24.03	5.64	A	96
Baseball mid field	Center Outfielder Player view	8.83	2	41	22.26	4.42	A	96
Baseball mid field	Left Outfielder Player view	14.8	1	69	115.14	14.84	A	96
Baseball mid field	Min Playability	25.7	4	75	18.64	6.42	A	96
Baseball mid field	Right Outfielder Player view	13.5	1	65	120.12	13.46	A	96
Baseball through 2nd	Center Outfielder Player view	3.29	1	6	9.10	3.29	A	96
Baseball through 2nd	Left Outfielder Player view	17.3	2	80	43.32	8.64	A	96
Baseball through 2nd	Min Playability	17	3	63	18.49	5.68	A	96
Baseball through 2nd	Right Outfielder Player view	16.8	1	76	53.41	16.84	A	96
Baseball (Infield)	Horizontal Illuminance	100	86	112	1.31	1.17	A	96
Baseball (Outfield)	Horizontal Illuminance	70.3	60	95	1.60	1.17	A	96
Bleachers	Horizontal	35.7	15	57	3.77	2.38	A	96
Spill at 150'	Horizontal Illuminance	0.57	0.09	2.10	22.74	6.28	A	96
Spill at 150'	Max Candela Metric	27326	7823	54866	7.01	3.49	A	96
Spill at 150'	Max Vertical Illuminance Metric	1.16	0.28	3.86	13.97	4.16	A	96

From Hometown to Professional



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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	105'	-	15.5'	TLC-BT-575	2	2	0
				105'	TLC-LED-1500	10	10	0
2	B1-B2	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	18	18	0
1	C1	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
1	C2	90'	-	30'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
6	TOTALS					96	96	0

SCALE IN FEET 1 : 60

0' 60' 120'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #194150B • 29-Jul-20

Whitehouse Baseball Field LED Relight

Harwich, MA

GRID SUMMARY

Name:	**Baseball**
Size:	Irregular 330' / 399' / 328'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Infield	Outfield
Guaranteed Average:	**100**	**70**
Scan Average:	100.37	70.28
Maximum:	112	95
Minimum:	86	60
Avg / Min:	1.17	1.18
Guaranteed Max / Min:	**1.5**	**2**
Max / Min:	1.31	1.60
UG (adjacent pts):	1.16	1.26
CU:	0.69	
No. of Points:	25	111

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	160,000 / 52,000 lumens
No. of Luminaires:	**96**
Total Load:	123.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1500	>120,000	>120,000	>120,000
TLC-BT-575	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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.

We Make It Happen.

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	105'	-	15.5'	TLC-BT-575	2	2	0
				105'	TLC-LED-1500	10	10	0
2	B1-B2	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	18	18	0
1	C1	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
1	C2	90'	-	30'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
6	TOTALS					96	96	0

SCALE IN FEET 1 : 30

0' 30' 60'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #194150B • 29-Jul-20

Whitehouse Baseball Field LED Relight

Harwich, MA

GRID SUMMARY

Name:	**Bleachers**
Size:	Irregular 330' / 399' / 328'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**35.73**
Maximum:	57
Minimum:	15
Avg / Min:	2.36
Max / Min:	**3.77**
UG (adjacent pts):	1.46
CU:	0.02
No. of Points:	60

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	160,000 / 52,000 lumens
No. of Luminaires:	**96**
Total Load:	123.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1500	>120,000	>120,000	>120,000
TLC-BT-575	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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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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	105'	-	15.5'	TLC-BT-575	2	2	0
				105'	TLC-LED-1500	10	10	0
2	B1-B2	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	18	18	0
1	C1	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
1	C2	90'	-	30'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
6	TOTALS					96	96	0

SCALE IN FEET 1 : 100

0' 100' 200'

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

Whitehouse Baseball Field LED Relight
Harwich, MA

GRID SUMMARY

Name:	**Spill at 150'**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.5654**
Maximum:	2.10
Minimum:	0.09
No. of Points:	74

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	160,000 / 52,000 lumens
No. of Luminaires:	**96**
Total Load:	123.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1500	>120,000	>120,000	>120,000
TLC-BT-575	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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.

MUSCO Lighting®
We Make It Happen®

ENGINEERED DESIGN By: Tanner Lanphier • File #194150B • 29-Jul-20

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	105'	-	15.5'	TLC-BT-575	2	2	0
				105'	TLC-LED-1500	10	10	0
2	B1-B2	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	18	18	0
1	C1	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
1	C2	90'	-	30'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
6	TOTALS					96	96	0

SCALE IN FEET 1 : 100

0' 100' 200'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #194150B • 29-Jul-20

Whitehouse Baseball Field LED Relight
Harwich, MA

GRID SUMMARY

Name:	**Spill at 150'**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**1.1637**
Maximum:	3.86
Minimum:	0.28
No. of Points:	74

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	160,000 / 52,000 lumens
No. of Luminaires:	**96**
Total Load:	123.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1500	>120,000	>120,000	>120,000
TLC-BT-575	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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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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	105'	-	15.5'	TLC-BT-575	2	2	0
				105'	TLC-LED-1500	10	10	0
2	B1-B2	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	18	18	0
1	C1	90'	-	15.5'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
1	C2	90'	-	30'	TLC-BT-575	3	3	0
				90'	TLC-LED-1500	12	12	0
6	TOTALS					96	96	0

SCALE IN FEET 1 : 100

0' 100' 200'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #194150B • 29-Jul-20

Whitehouse Baseball Field LED Relight
Harwich, MA

GRID SUMMARY

Name:	**Spill at 150'**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**27326.1465**
Maximum:	54866.16
Minimum:	7822.92
No. of Points:	74

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	160,000 / 52,000 lumens
No. of Luminaires:	**96**
Total Load:	123.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1500	>120,000	>120,000	>120,000
TLC-BT-575	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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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SCALE IN FEET 1 : 80

0' 80' 160'

ENGINEERED DESIGN By: Tanner Lanphier • File #194150B • 29-Jul-20

Whitehouse Baseball Field LED Relight
Harwich, MA

EQUIPMENT LAYOUT

INCLUDES:
· Baseball

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
2	A1-A2	105'	-	15.5' 105'	TLC-BT-575 TLC-LED-1500	2 10
2	B1-B2	90'	-	15.5' 90'	TLC-BT-575 TLC-LED-1500	3 18
1	C1	90'	-	15.5' 90'	TLC-BT-575 TLC-LED-1500	3 12
1	C2	90'	-	30' 90'	TLC-BT-575 TLC-LED-1500	3 12
6	TOTALS					96

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
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

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

We Make It Happen®

Brooks Park Tennis Basketball Ice Rink

Harwich,MA

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
T1	50'	50'	1	TLC-LED-400	0.40 kW	D
		50'	2	TLC-LED-600	1.16 kW	A
		50'	1	TLC-LED-900	0.89 kW	A
T2	50'	50'	1	TLC-LED-400	0.40 kW	D
		50'	2	TLC-LED-400	0.80 kW	E
		50'	2	TLC-LED-600	1.16 kW	A
		50'	1	TLC-LED-900	0.89 kW	A
T3	50'	50'	2	TLC-LED-400	0.80 kW	D
		50'	2	TLC-LED-600	1.16 kW	B
		50'	2	TLC-LED-600	1.16 kW	A
		50'	1	TLC-LED-900	0.89 kW	A
T4	50'	50'	2	TLC-LED-600	1.16 kW	B
		50'	2	TLC-LED-600	1.16 kW	A
		50'	1	TLC-LED-900	0.89 kW	A
		50'	1	TLC-LED-900	0.89 kW	C
T5-T6	40'	40'	2	TLC-LED-600	1.16 kW	B
T7	40'	40'	2	TLC-LED-600	1.16 kW	C
7			***29***		***17.29 kW***	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	TN 1-4	8.2 kW	12
B	PB 1-8 / TN 5-6	4.64 kW	8
C	BA	2.05 kW	3
D	Parking	1.6 kW	4
E	Playground	0.8 kW	2

Fixture Type Summary

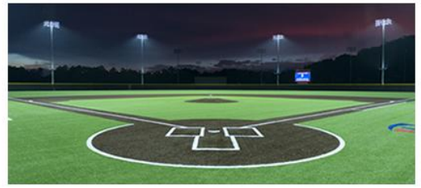
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-LED-600	LED 5700K - 75 CRI	580W	65,600	>120,000	>120,000	>120,000	18
TLC-LED-900	LED 5700K - 75 CRI	890W	89,600	>120,000	>120,000	>120,000	5
TLC-LED-400	LED 5700K - 75 CRI	400W	46,500	>120,000	>120,000	>120,000	6

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
Basketball	Horizontal Illuminance	31.4	18	44	2.51	1.74	C	3
Parking Lot	Horizontal	3.33	0	11	34767.40		D	4
Pickleball 1-8	Horizontal Illuminance	32.6	26	41	1.56	1.25	B	8
Playground	Horizontal	5.38	1	15	26.47	5.38	E	2
Tennis 1-4	Horizontal Illuminance	32.4	22	45	2.05	1.47	A	12
Tennis 5-6	Horizontal Illuminance	32.1	26	38	1.44	1.24	B	8

From Hometown to Professional



ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

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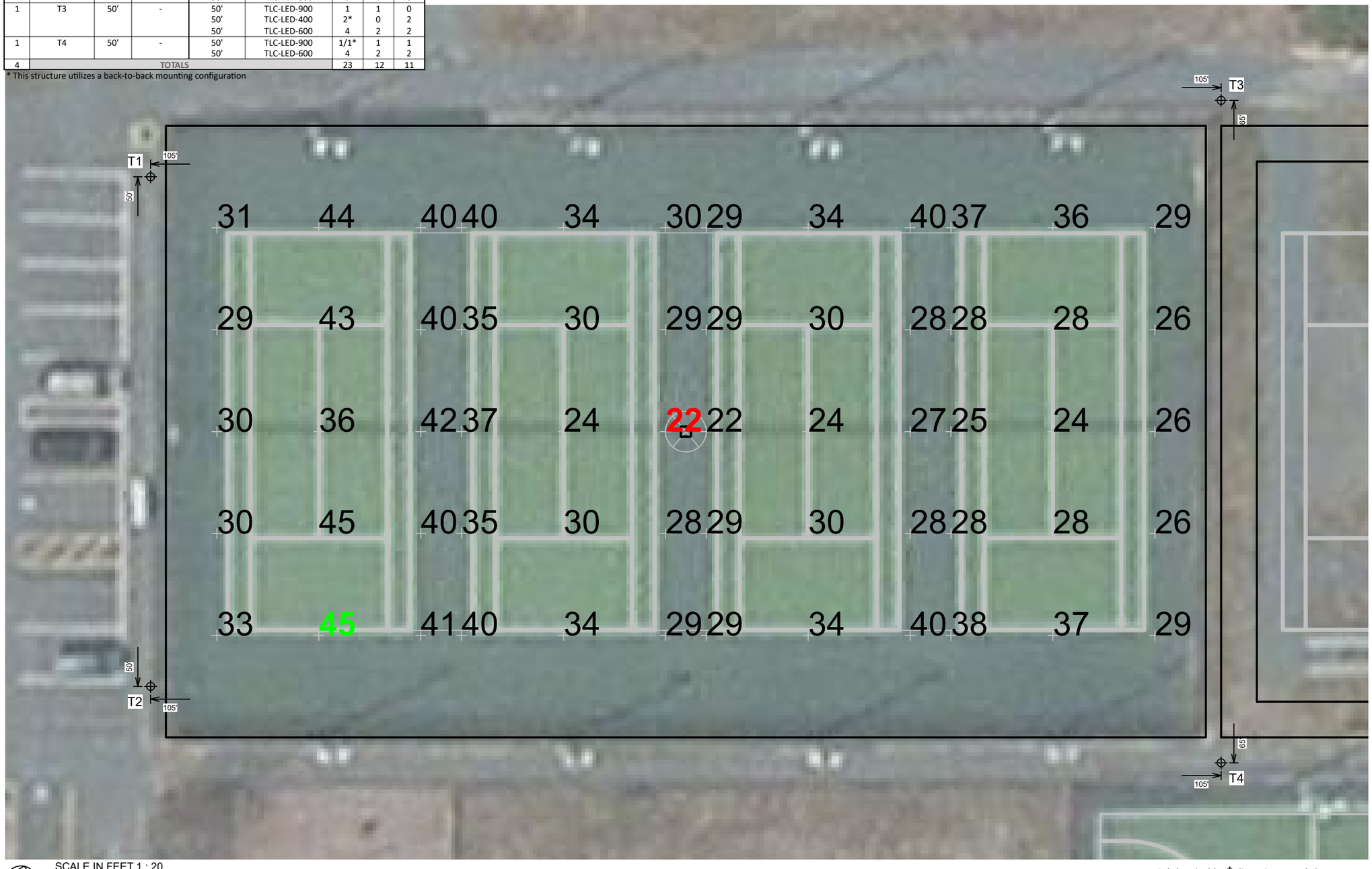
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	T1	50'	-	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	1	0	1
				50'	TLC-LED-600	2	2	0
1	T2	50'	-	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	1/2*	0	3
				50'	TLC-LED-600	2	2	0
1	T3	50'	-	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	2*	0	2
				50'	TLC-LED-600	4	2	2
1	T4	50'	-	50'	TLC-LED-900	1/1*	1	1
				50'	TLC-LED-600	4	2	2
4	TOTALS					23	12	11

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



SCALE IN FEET 1 : 20

0' 20' 40'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

GRID SUMMARY

Name:	**Tennis 1-4**
Size:	4 Court - 12' Spacing
Spacing:	20.0' x 20.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**30**
Scan Average:	32.35
Maximum:	45
Minimum:	22
Avg / Min:	1.46
Guaranteed Max / Min:	**2.5**
Max / Min:	2.05
UG (adjacent pts):	0.00
CU:	0.84
No. of Points:	60

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 / 89,600 lumens
No. of Luminaires:	**12**
Total Load:	8.2 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>120,000	>120,000	>120,000
TLC-LED-900	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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.

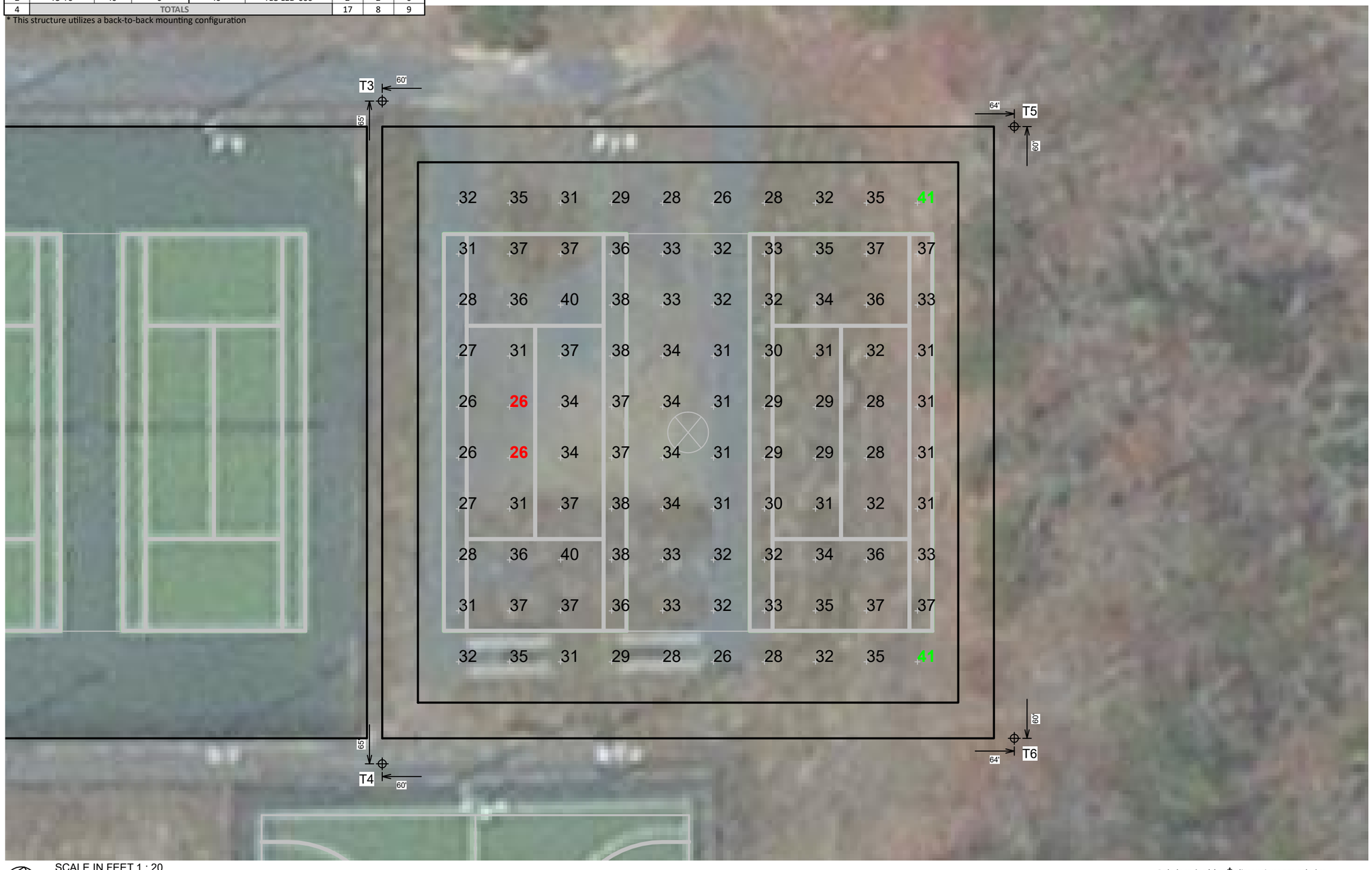
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	T3	50'	0'	50'	TLC-LED-900	1	0	1
				50'	TLC-LED-400	2*	0	2
				50'	TLC-LED-600	4	2	2
1	T4	50'	0'	50'	TLC-LED-900	1/1*	0	2
				50'	TLC-LED-600	4	2	2
2	T5-T6	40'	0'	40'	TLC-LED-600	2	2	0
4	TOTALS					17	8	9

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



SCALE IN FEET 1 : 20

0' 20' 40'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

GRID SUMMARY

Name:	**Pickleball 1-8**
Size:	106' x 106'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**30**
Scan Average:	32.62
Maximum:	41
Minimum:	26
Avg / Min:	1.25
Guaranteed Max / Min:	**3**
Max / Min:	1.56
UG (adjacent pts):	1.29
CU:	0.63
No. of Points:	100

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**8**
Total Load:	4.64 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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.

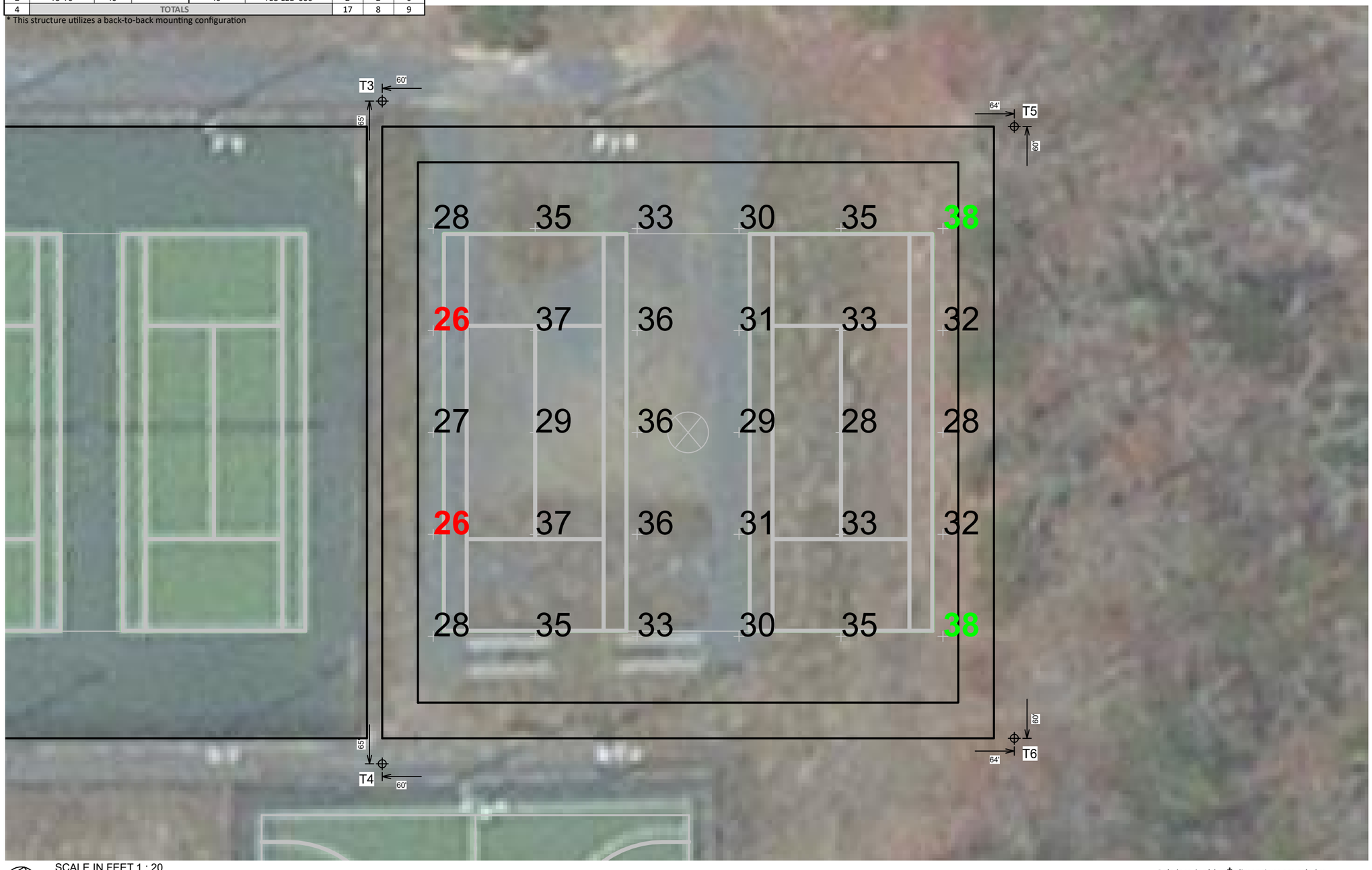
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	T3	50'	0'	50'	TLC-LED-900	1	0	1
				50'	TLC-LED-400	2*	0	2
				50'	TLC-LED-600	4	2	2
1	T4	50'	0'	50'	TLC-LED-900	1/1*	0	2
				50'	TLC-LED-600	4	2	2
2	T5-T6	40'	-	40'	TLC-LED-600	2	2	0
4	TOTALS					17	8	9

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



SCALE IN FEET 1 : 20

0' 20' 40'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

GRID SUMMARY

Name:	**Tennis 5-6**
Size:	2 Court - 24' Spacing
Spacing:	20.0' x 20.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**30**
Scan Average:	32.14
Maximum:	38
Minimum:	26
Avg / Min:	1.23
Guaranteed Max / Min:	**2.5**
Max / Min:	1.44
UG (adjacent pts):	0.00
CU:	0.74
No. of Points:	30

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**8**
Total Load:	4.64 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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.

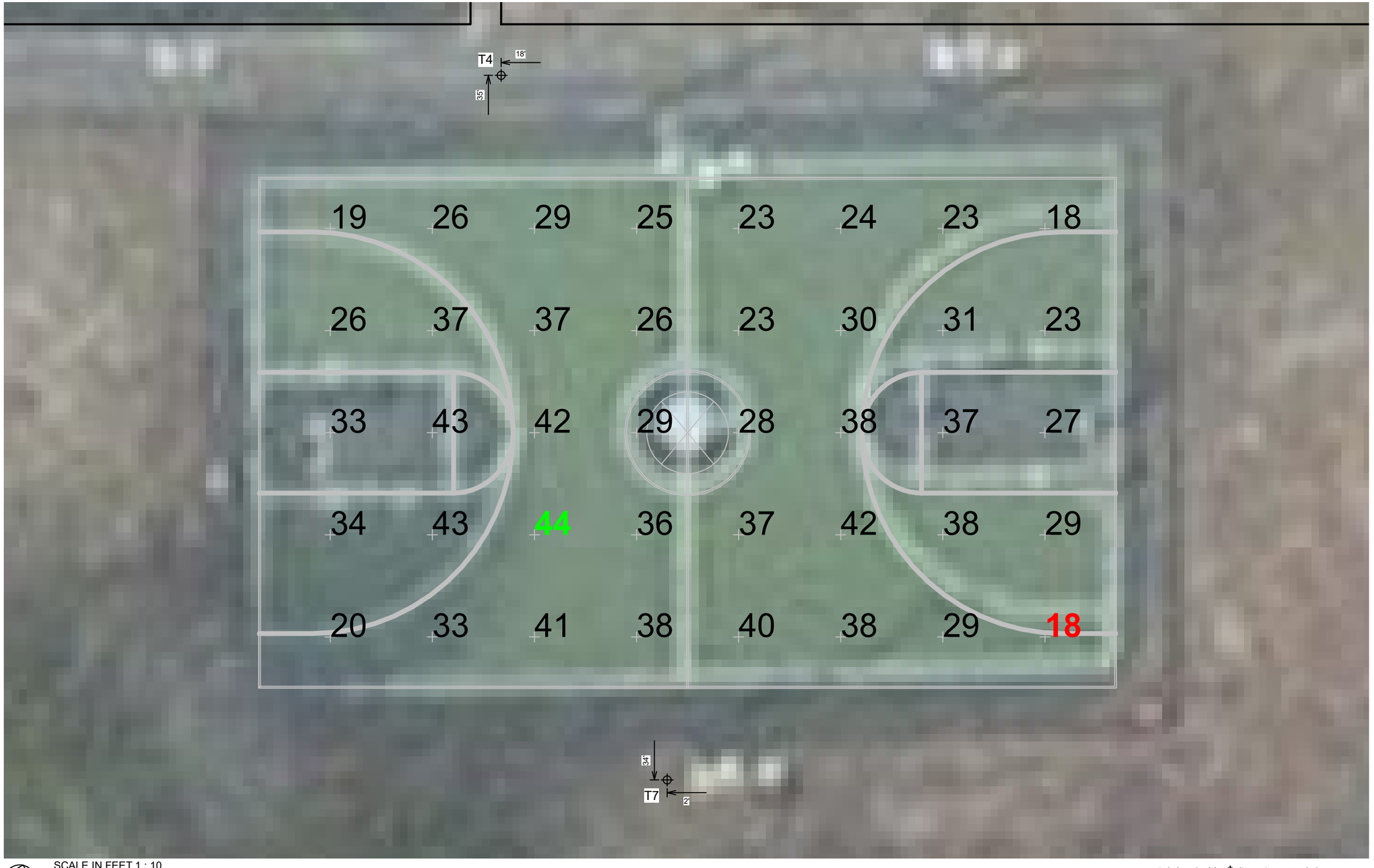
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	T4	50'	0'	50'	TLC-LED-900	1/1*	1	1
				50'	TLC-LED-600	4	0	4
1	T7	40'	-	40'	TLC-LED-600	2	2	0
2	TOTALS					8	3	5

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



SCALE IN FEET 1 : 10

0' 20' 40'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

GRID SUMMARY

Name:	**Basketball**
Size:	84' x 50'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**30**
Scan Average:	31.38
Maximum:	44
Minimum:	18
Avg / Min:	1.79
Guaranteed Max / Min:	**3**
Max / Min:	2.51
UG (adjacent pts):	1.69
CU:	0.60
No. of Points:	40

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 / 89,600 lumens
No. of Luminaires:	**3**
Total Load:	2.05 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>120,000	>120,000	>120,000
TLC-LED-900	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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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EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	T1	50'	0'	50'	TLC-LED-900	1	0	1
				50'	TLC-LED-400	1	1	0
				50'	TLC-LED-600	2	0	2
1	T2	50'	0'	50'	TLC-LED-900	1	0	1
				50'	TLC-LED-400	1/2*	1	2
				50'	TLC-LED-600	2	0	2
1	T3	50'	0'	50'	TLC-LED-900	1	0	1
				50'	TLC-LED-400	2*	2	0
				50'	TLC-LED-600	4	0	4
3	TOTALS					17	4	13

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

SCALE IN FEET 1 : 40

0' 40' 80'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

GRID SUMMARY

Name:	**Parking Lot**
Size:	2' x 2'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**3.33**
Maximum:	11
Minimum:	0
Avg / Min:	10125.25
Max / Min:	**34767.40**
UG (adjacent pts):	213.56
CU:	0.82
No. of Points:	416

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	46,500 lumens
No. of Luminaires:	**4**
Total Load:	1.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-400	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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.

musco Lighting
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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
1	T2	50'	0'	50'	TLC-LED-900	1	0	1
				50'	TLC-LED-400	1/2*	2	1
				50'	TLC-LED-600	2	0	2
1	TOTALS					6	2	4

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

SCALE IN FEET 1 : 20

0' 20' 40'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

GRID SUMMARY

Name:	**Playground**
Size:	2' x 2'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**5.38**
Maximum:	15
Minimum:	1
Avg / Min:	9.57
Max / Min:	**26.47**
UG (adjacent pts):	2.73
CU:	0.61
No. of Points:	102

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	46,500 lumens
No. of Luminaires:	**2**
Total Load:	0.8 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-400	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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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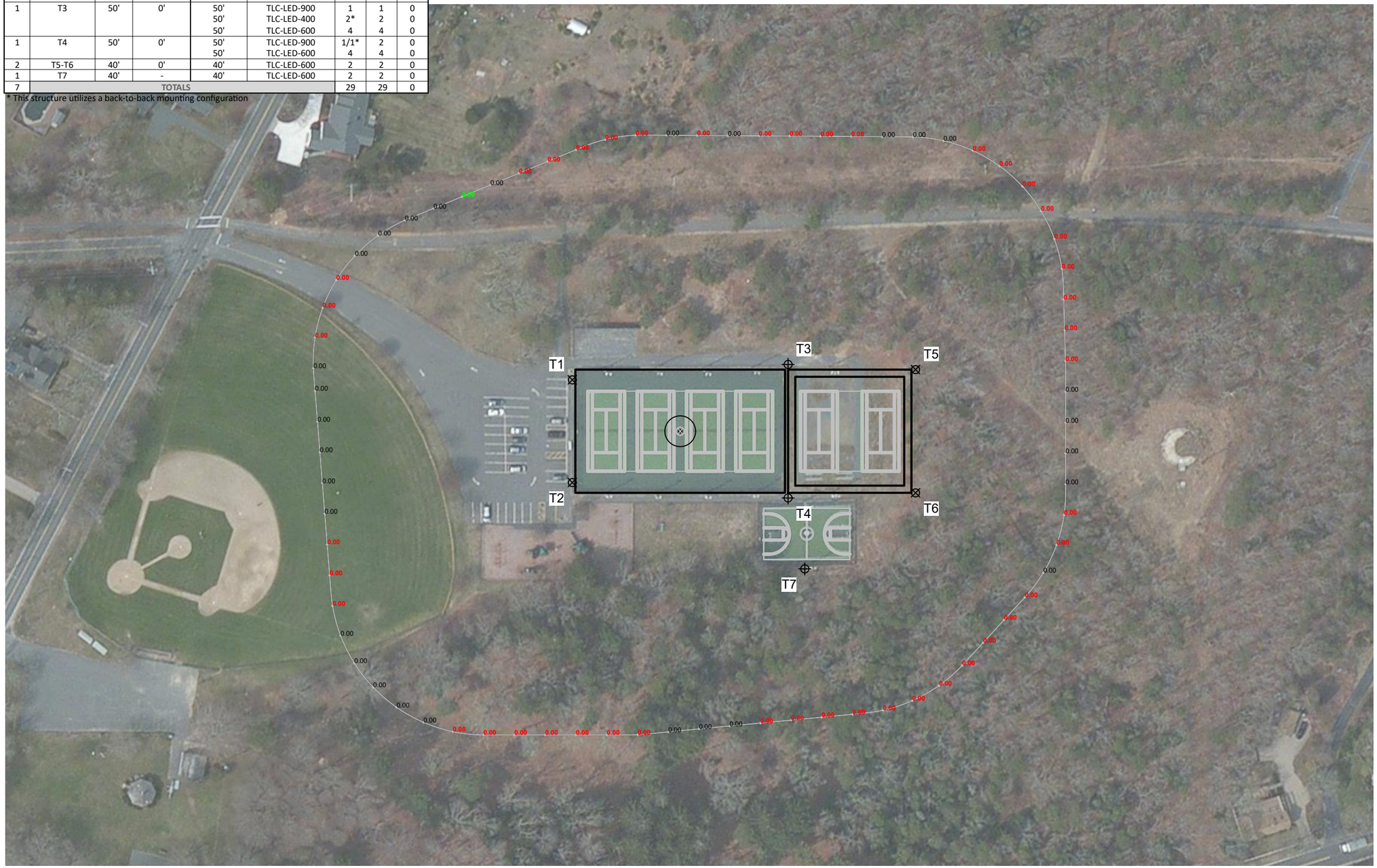
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	T1	50'	0'	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	1	1	0
				50'	TLC-LED-600	2	2	0
1	T2	50'	0'	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	1/2*	3	0
				50'	TLC-LED-600	2	2	0
1	T3	50'	0'	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	2*	2	0
				50'	TLC-LED-600	4	4	0
1	T4	50'	0'	50'	TLC-LED-900	1/1*	2	0
				50'	TLC-LED-600	4	4	0
2	T5-T6	40'	0'	40'	TLC-LED-600	2	2	0
1	T7	40'	-	40'	TLC-LED-600	2	2	0
7	TOTALS					29	29	0

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



SCALE IN FEET 1 : 100

0' 100' 200'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

GRID SUMMARY

Name:	**150' Spill**
Spacing:	30.0'
Height:	6.0' above grade

ILLUMINATION SUMMARY

HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0000**
Maximum:	0.00
Minimum:	0.00
No. of Points:	75

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 / 89,600 / 46,500 lumens
No. of Luminaires:	**29**
Total Load:	17.29 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>120,000	>120,000	>120,000
TLC-LED-900	>120,000	>120,000	>120,000
TLC-LED-400	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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.

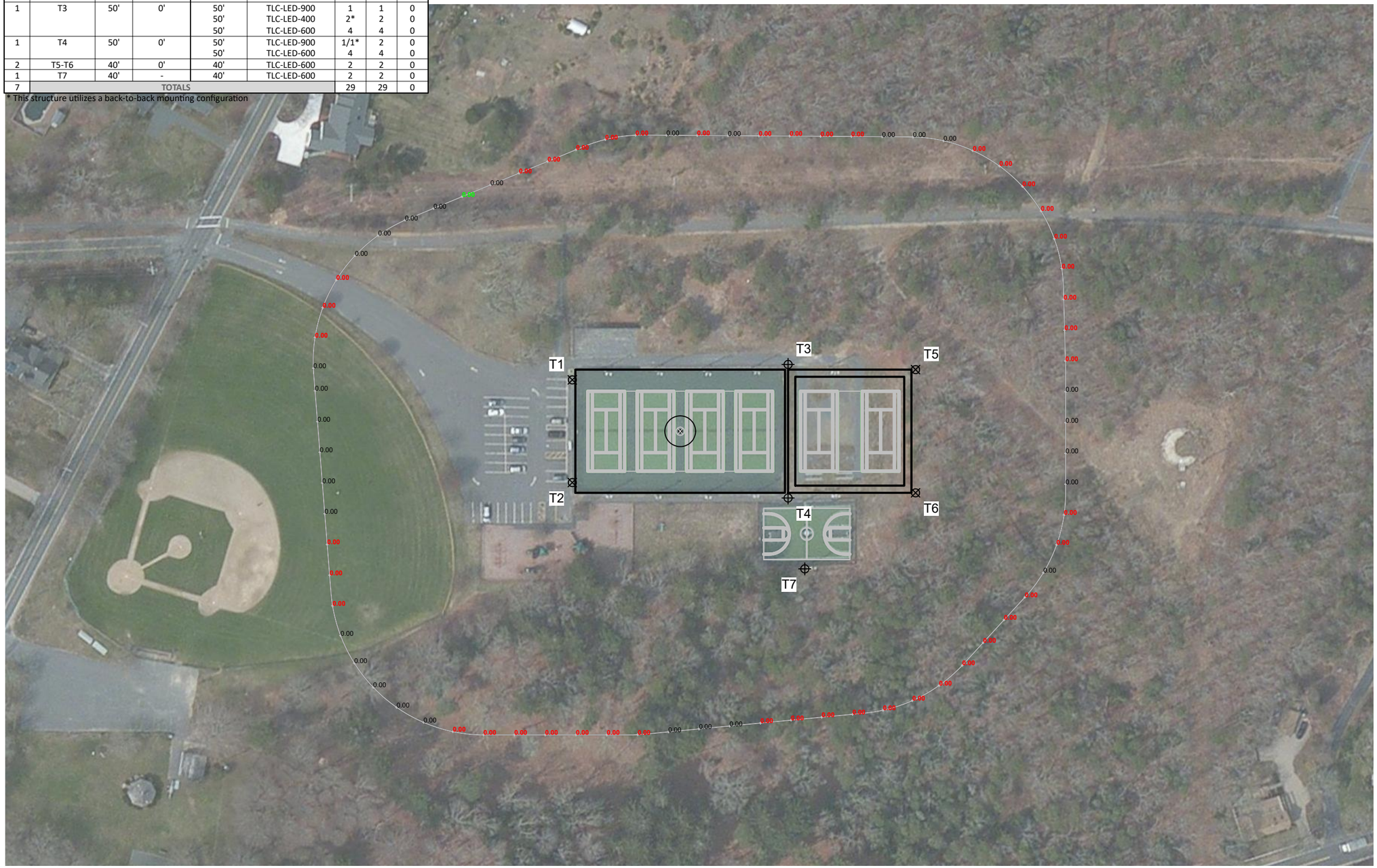
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	T1	50'	0'	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	1	1	0
				50'	TLC-LED-600	2	2	0
1	T2	50'	0'	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	1/2*	3	0
				50'	TLC-LED-600	2	2	0
1	T3	50'	0'	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	2*	2	0
				50'	TLC-LED-600	4	4	0
1	T4	50'	0'	50'	TLC-LED-900	1/1*	2	0
				50'	TLC-LED-600	4	4	0
2	T5-T6	40'	0'	40'	TLC-LED-600	2	2	0
1	T7	40'	-	40'	TLC-LED-600	2	2	0
7	TOTALS					29	29	0

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



SCALE IN FEET 1 : 100

0' 100' 200'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

GRID SUMMARY

Name:	**150' Spill**
Spacing:	30.0'
Height:	6.0' above grade

ILLUMINATION SUMMARY

MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0000**
Maximum:	0.00
Minimum:	0.00
No. of Points:	75

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 / 89,600 / 46,500 lumens
No. of Luminaires:	**29**
Total Load:	17.29 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>120,000	>120,000	>120,000
TLC-LED-900	>120,000	>120,000	>120,000
TLC-LED-400	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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.

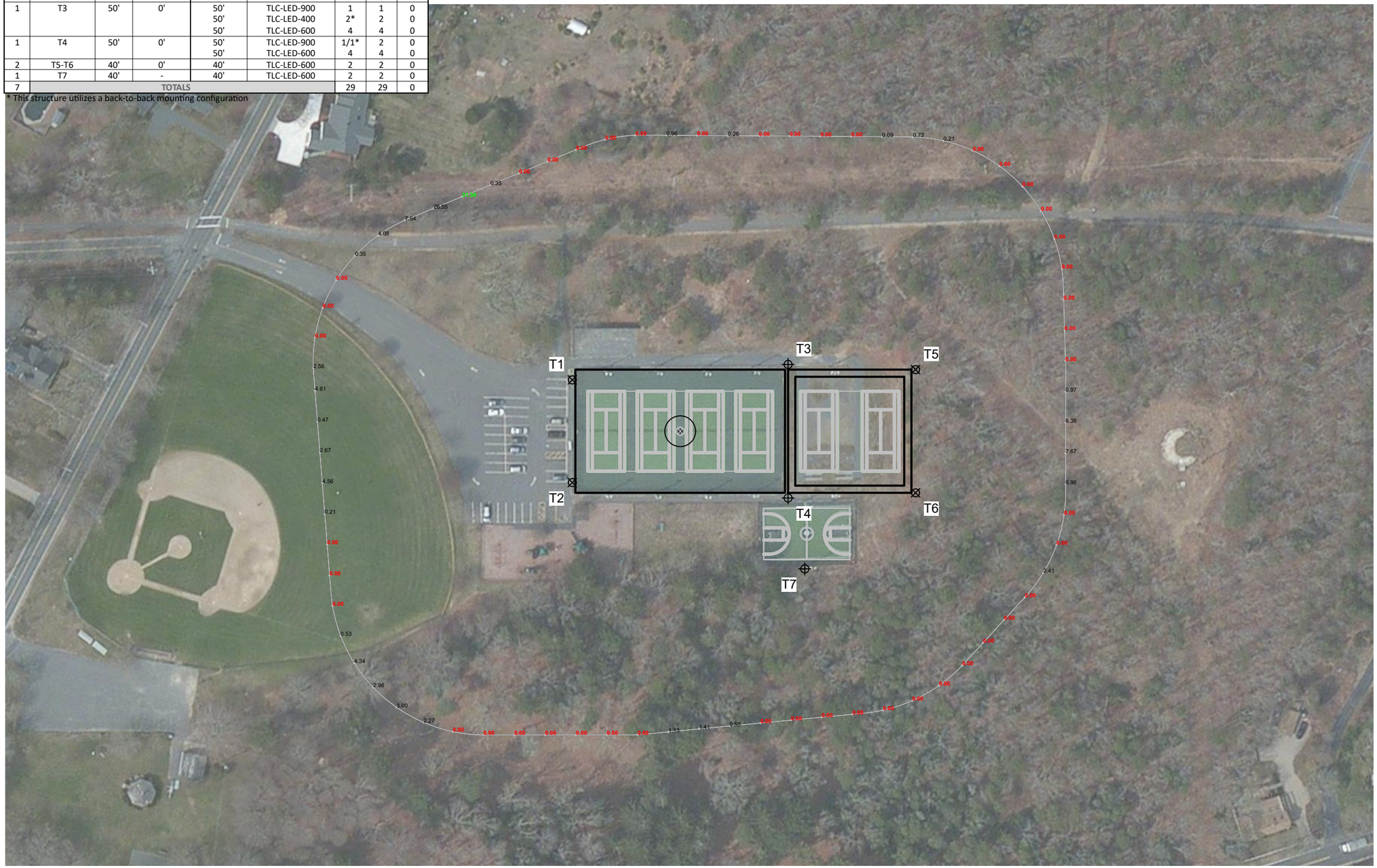
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	T1	50'	0'	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	1	1	0
				50'	TLC-LED-600	2	2	0
1	T2	50'	0'	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	1/2*	3	0
				50'	TLC-LED-600	2	2	0
1	T3	50'	0'	50'	TLC-LED-900	1	1	0
				50'	TLC-LED-400	2*	2	0
				50'	TLC-LED-600	4	4	0
1	T4	50'	0'	50'	TLC-LED-900	1/1*	2	0
				50'	TLC-LED-600	4	4	0
2	T5-T6	40'	0'	40'	TLC-LED-600	2	2	0
1	T7	40'	-	40'	TLC-LED-600	2	2	0
7	TOTALS					29	29	0

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



SCALE IN FEET 1 : 100

0' 100' 200'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

GRID SUMMARY

Name:	**150' Spill**
Spacing:	30.0'
Height:	6.0' above grade

ILLUMINATION SUMMARY

CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**1.6538**
Maximum:	31.30
Minimum:	0.00
No. of Points:	75

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 / 89,600 / 46,500 lumens
No. of Luminaires:	**29**
Total Load:	17.29 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>120,000	>120,000	>120,000
TLC-LED-900	>120,000	>120,000	>120,000
TLC-LED-400	>120,000	>120,000	>120,000

Reported per TM-21-11. See luminaire datasheet for details.

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.

We Make It Happen.

Brooks Park Tennis Basketball Ice Rink
Harwich,MA

EQUIPMENT LAYOUT

INCLUDES:
· Basketball
· Parking Lot
· Pickleball 1-8
· Playground
· Tennis 1-4
· Tennis 5-6

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
1	T1	50'	-	50'	TLC-LED-900	1
				50'	TLC-LED-400	1
				50'	TLC-LED-600	2
1	T2	50'	-	50'	TLC-LED-900	1
				50'	TLC-LED-400	1/2*
				50'	TLC-LED-600	2
1	T3	50'	-	50'	TLC-LED-900	1
				50'	TLC-LED-400	2*
				50'	TLC-LED-600	4
1	T4	50'	-	50'	TLC-LED-900	1/1*
				50'	TLC-LED-600	4
3	T5-T7	40'	-	40'	TLC-LED-600	2
7	TOTALS					29

* 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)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-600	3.4	3.2	3.0	2.6	2.0	1.9	1.5
TLC-LED-900	5.3	5.0	4.6	4.0	3.2	2.9	2.3
TLC-LED-400	2.3	2.2	2.0	1.7	1.4	1.3	1.0

SCALE IN FEET 1 : 40
0' 40' 80'

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

ENGINEERED DESIGN By: Tanner Lanphier • File #165020C • 23-Jul-20

We Make It Happen.

TOWN OF HARWICH
BROOKS PARK
WHITEHOUSE FIELD

COST ESTIMATE

89 Newbury Street, Suite 103 Danvers, MA 01923 (617) 886-9066

A.M. Fogarty
& Assoc., Inc.

175 Derby St., Suite 5, Hingham, MA 02043
TEL: (781) 749-7272 • FAX: (781) 740-2652
ptim@amfogarty.com

"Construction Cost Consultants"

Brooks and Whitehouse Field
Harwich, MA

October 7, 2020

GRAND SUMMARY

BROOKS PARK	$439,863
WHITE HOUSE FIELD	$588,996

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
BROOKS PARK				
Electrical:				
D&R Electrical enclosure w/all time clocks and contactors	1	EA	1,250.00	1,250
D&R relays & panel	1	EA	750.00	750
D&R feeder & conduit	1	EA	500.00	500
D&R pole A1 w/250w	8	EA	1,000.00	8,000
D&R pole A2 w/250w	4	EA	1,000.00	4,000
D&R all U/G wiring between panel & poles - abandon conduit (14500 SF)	1	LS	6,390.00	6,390
Nema 4X enclosure w/components	1	EA	2,950.00	2,950
Musco Fixtures - includes following:	1	LS	180,000.00	180,000
Lighting Install:	1	LS	67,000.00	67,000
P1, P2, P3 & P4 - 50'	4		inc.	
P5, P6 & P7 - 40'	3		inc.	
F&I 50A-3P c/b @ panel	5	EA	585.00	2,925
GFI WP	2	EA	50.00	100
6x6 Post	2	EA	75.00	150
PVC-1"C-2#10 & 1#12	600	LF	4.00	2,400
PVC-1 1/4"C-3#6 & 1#8	1,500	LF	7.00	10,500
Direct Job Expense	1	LS	10,000.00	10,000
Civil and Landscaping				
Dispose of site pole	12	EA	350.00	4,200
Trench lighting loop	1,500	LF	9.50	14,250
Patch Perm Walkway	750	LF	32.00	24,000
Repair lawn	750	LF	3.00	2,250
Reapir at New Court Light Pole	7	EA	1,000.00	7,000
SUBTOTAL				348,615
GENERAL CONDITIONS		10 %		34,862
SUBTOTAL				383,477
P&P BOND & INSURANCE		2 %		7,670
SUBTOTAL				391,146
FEE		5 %		19,557

ALTERNATES 10/7/2020

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				410,703
DESIGN CONTINGENCY		5 %		20,535
SUBTOTAL				431,238
ESCALATION (spring 2021)		2 %		8,625
TOTAL				439,863

WHITE HOUSE FIELD

Electrical:				
Disc. existing scoreboard	1	EA	318.00	318
Disc. existing feeder	50	EA	2.52	126
30/20A/2P/3R	1	EA	268.00	268
Furnish Nevco scoreboard	1	EA	37,710.00	37,710
PVC-1"C-2#8 & 1#10	60	LF	4.70	282
F&I 30A c/b in pnl	1	EA	147.00	147
At shed D&R USL controller	1	EA	432.00	432
D&R all 5 ckts from panel to the existing controller	1	EA	241.00	241
F& I new Musco ltg control	1	EA	1,152.00	1,152
F&I new Musco sports clusters	6	EA	65,833.00	394,998
F&I 50A/3P c/b in exist. Pnl	6	EA	269.00	1,614
F&I 1 1/4"C-w/3#6 & 1#10 ckt	6	EA	254.40	1,526
Revamp exist. Pnl to accommodate 18 new poles	1	EA	1,170.00	1,170
Reconnect exist. Pole ckts to new Musco control - assumes reusing all existing U/G ltg ckts from 6 poles to shed	1	EA	826.00	826
Direct Job Expense	1	LS	10,000.00	10,000
Dispose of Score Board	1	LS	6,000.00	6,000
New Scoreboard footings	1	LS	10,000.00	10,000
SUBTOTAL				466,810
GENERAL CONDITIONS		10 %		46,681
SUBTOTAL				513,491
P&P BOND & INSURANCE		2 %		10,270
SUBTOTAL				523,761
FEE		5 %		26,188
SUBTOTAL				549,949

ALTERNATES 10/7/2020

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
DESIGN CONTINGENCY		5 %		27,497
SUBTOTAL				577,447
ESCALATION (spring 2021)		2 %		11,549
TOTAL				588,996

QUOTATION

Account Name	Harwich Mariners	Created Date	8/12/2020
Quote Number	00111654	Expiration Date	9/16/2019
Contact Name	Kevin Murphy	Prepared By	Scott Butler
Title	xx	Title	Regional Sales Manager
Phone	(617) 886-9066	Email Address	sbutler@nevco.com
Email Address	kmurphy@thompson-engineering.com		

Quantity	Model/Part #	Product Description	Line Item Description	Color	Dimensions L x H x W/D
1.00	850-0005	Aluminum Decorative Truss Arch 4' Tall x 36' Wide			36'X4'
1.00	4x4 Truss Logo	Logo for Decorative Truss	4'x4' Mariners "H" Logo on Truss		4'x4'
1.00	ADO 36-3	Non-illuminated Outdoor Sign	36'x3' WHITEHOUSE FIELD sign		36'x3'
1.00	1603-ETN	Baseball/Softball LED Scoreboard	Red LED Digits	#74 Forest Green	36'x9'x8"
2.00		16'x4' MARINERS and SHARKS signs			
1.00	PSDA	Baseball/Softball Pitch Speed LED Display			4'x4'x8"
1.00	Radar Gun Pkg Pro	Stalker Pro 2 Radar Gun Package			
1.00	MPCW-7	Controller MPCW-7 (Wired or Wireless)			0.9'x0.8'x4"
1.00	MPC(W) Case	MPC/ MPCW Control Carrying Case			1.7'x1.1'x8"
1.00	MPCW-7 Outdoor Rec	Receiver MPCW-7 (Wireless) for outdoor scoreboards			

Ttl Shipping Wt (lbs)	3,820	Subtotal	USD 37,710.36
		Freight	USD 4,000.00
		Total	USD 41,710.36

Additional Notes

- QUOTE IS FOR EQUIPMENT ONLY - INSTALLATION QUOTED SEPARATELY
- FIVE YEAR SCOREBOARD PARTS WARRANTY
- TWO YEAR WIRELESS EQUIPMENT WARRANTY

Quote Terms and Conditions

The above pricing is for equipment only and does not include installation (unless specified) or taxes (if applicable). Unless shown specifically in the quote, shipping is an additional cost and is not included. Credit terms determined upon receipt of purchase order. Shipping terms are F.O.B. Greenville, IL USA.

All Scoreboards and Message Centers are UL Listed and most come with our free 5-year guarantee (Exception: Special promotion/packages may have shorter warranty and are noted in product descriptions). Wireless components, UltraScore Portable Scoreboard and Solar Power Kit carry a 2-year guarantee. Hand-held controls and switches carry a 1-year guarantee.

QUOTATION

Scoreboards are available in 15 standard colors at no extra charge. Please contact your consultant for production/shipping lead times.

Purchase Order Address	Nevco, Sports, LLC 301 East Harris Ave Greenville, IL 62246-2151	Remit To Address	Nevco Sports, LLC P.O. Box 74758 Chicago, IL 60694-4758 800.851.4040 / 618.664.0360

Billing/Shipping Information

Bill To Name	Thompson Engineering Company	Ship To Name	Harwich Mariners
Bill To	89 Newbury Street Danvers, MA 01923	Ship To	75 Oak Street Harwich, MA 02646

Quote Acceptance

Signature _____ Title _____

Name _____ Date _____

TOWN OF HARWICH
BROOKS PARK
WHITEHOUSE FIELD

SPEC SHEETS

89 Newbury Street, Suite 103 Danvers, MA 01923 (617) 886-9066

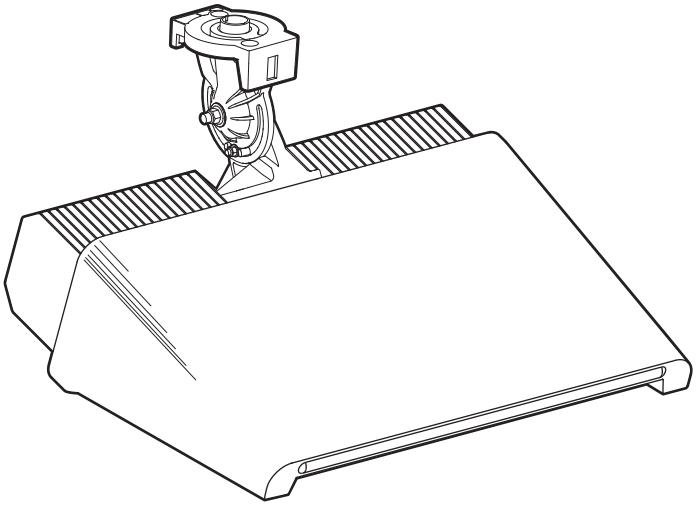
Harwich Mariners, Harwich, MA

PROOF #39398A

PROOF INCLUDES:

- **Model 1603-ETN Baseball/Softball LED Scoreboard**
  36'W x 9'H x 8"
  Digit Color: Amber
  Scoreboard Color: #74 Forest Green
  Electronic Team Name Color: Amber
- **Decorative Arch Truss**
  36'W x 4'H
  Truss Logo: 4x4
- **Non-Illuminated Sign**
  36'W x 3'H
- **Non-Illuminated Sign**
  (2) 16'W x 4'H
- **PSDA Baseball/Softball Pitch Speed LED Display**
  4'W x 4'H

NEVCO
INTEGRATED DISPLAY AND SCORING SOLUTIONS
WWW.NEVCO.COM



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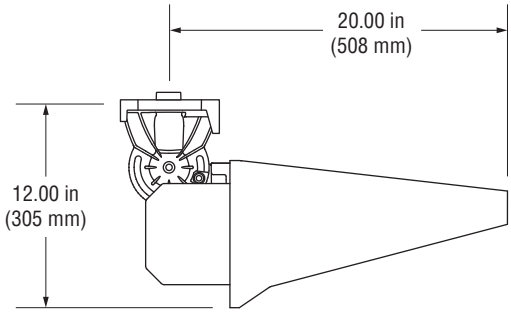

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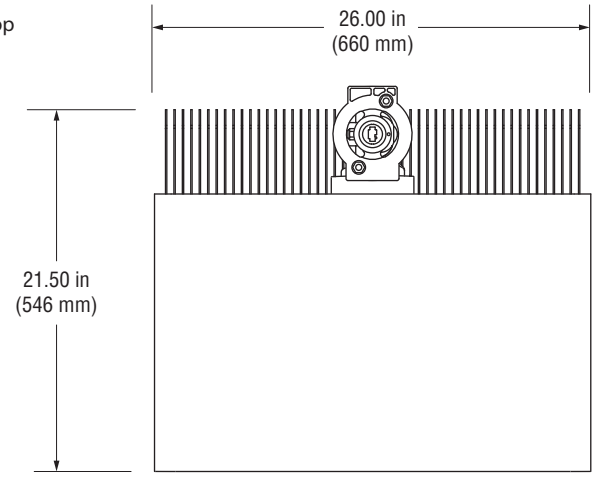


Luminaire Data

Weight (luminaire)	40 lb (18 kg)
UL listing number	E338094
UL listed for USA / Canada	UL1598 CSA-C22.2 No.250.0
Ingress protection, luminaire	IP65
Material and finish	Aluminum, powder-coat painted
Wind speed rating (aiming only)	150 mi/h (67 m/s)
UL ambient temperature rating, luminaire	50°C (122°F)

Photometric Characteristics

Projected lumen maintenance per IES TM-21-11	
L90 (13.5k)	>81,000 h
L80 (13.5k)	>81,000 h
L70 (13.5k)	>81,000 h
CIE correlated color temperature	5700 K
Color rendering index (CRI)	75 typ, 70 min
Lumens[1]	65,600

Footnotes:

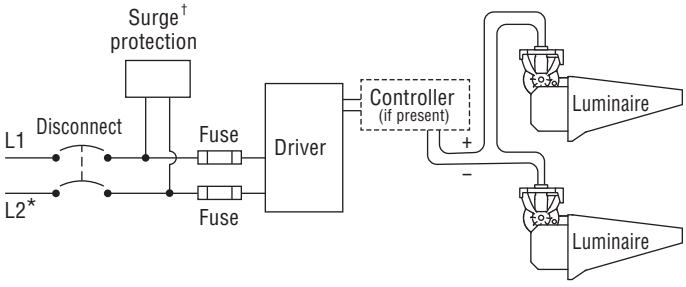
1) Incorporates appropriate dirt depreciation factor for life of luminaire.

Driver Data

Electrical Data

Rated wattage[1]	
Per driver	1160 W
Per luminaire	580 W
Number of luminaires per driver	2
Starting (inrush) current	<40 A, 256 µs
Fuse rating	15 A
UL, IEC ambient temperature rating, electrical components enclosure	50°C (122°F)
Ingress protection, electrical components enclosure	IP54
Efficiency	95%
Dimming mode	optional
Range, energy consumption	20 – 100%
Range, light output	25 – 100%

Typical Wiring



* If L2 (com) is neutral then not switched or fused.
† Not present if indoor installation.

	200 Vac 50/60 Hz	208 Vac 60 Hz	220 Vac 50/60 Hz	230 Vac 50 Hz	240 Vac 50/60 Hz	277 Vac 60 Hz	347 Vac 60 Hz	380 Vac 50/60 Hz	400 Vac 50 Hz	415 Vac 50 Hz	480 Vac 60 Hz
Max operating current per luminaire[2]	3.54 A	3.40 A	3.22 A	3.08 A	2.95 A	2.56 A	2.04 A	1.86 A	1.77 A	1.71 A	1.48 A

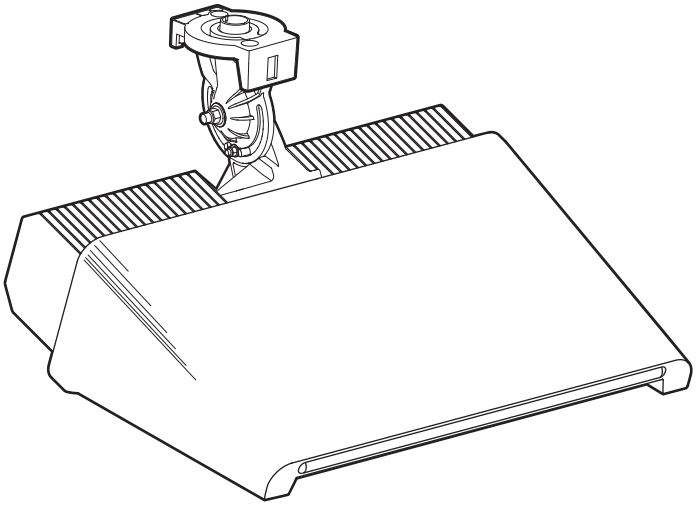
Footnotes:

1) Rated wattage is the power consumption, including driver efficiency losses, at stabilized operation in 25°C ambient temperature environment.

2) Operating current includes allowance for 0.90 minimum power factor, operating temperature, and LED light source manufacturing tolerances.

Notes

1. Use thermal magnetic HID-rated or D-curve circuit breakers.
2. See *Musco Control System Summary* for circuit information.



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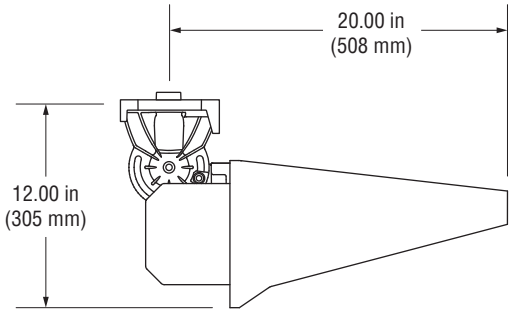

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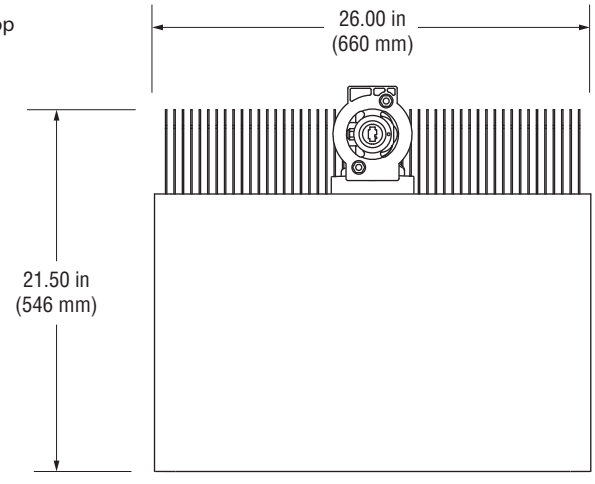

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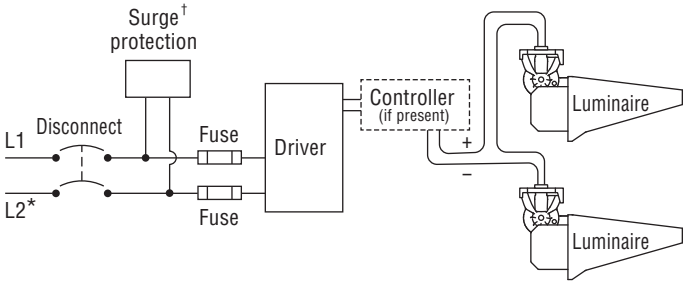

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