

Greenhouse Supplemental Lighting Designs



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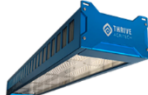
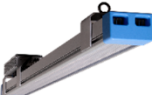
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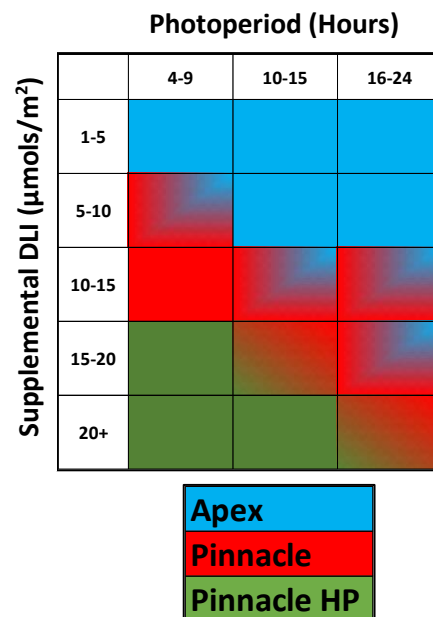
800-205-7216

Greenhouse Lighting Designs

Overview

This guide describes greenhouse lighting designs for supplementing natural sunlight using Thrive Agritech's Pinnacle HP, Pinnacle, and Apex LED lights. A summary of the designs is shown on page 2. Product specifications are shown below on the left, while the chart on the right provides recommendations for the appropriate light at a range of DLI and photoperiods.

	PINNACLE HP	PINNACLE	APEX
			
Input Power	840 Watts	610 Watts	300 Watts
Input Voltage	110-277V	110-277V or 347-480V	110-277V or 347-480V
Light Output	2,350 umols/sec	1,680 umols/sec	780 umols/sec
Efficiency	2.8 umols/joule	2.8 umols/joule	2.6 umols/joule
Driver	Internal	Internal or External	External
Dimming	Yes	Yes	Yes
IP66	Yes	Yes	Yes
UL / DLC Listed	Yes	Yes	Yes
Warranty	5 Years	5 Years	5 Years



Although greenhouses come in a variety of shapes and sizes, this guide is based on a common greenhouse construction that is 30 feet wide and 96 feet long. Contact Thrive Agritech for customized lighting designs.

Design Summary

Greenhouse Dimensions: 30' x 96'

Choosing a lighting design:

- 1) Select your crop.
- 2) Select desired supplemental DLI (daily light integral).
- 3) Review detailed lighting designs on the page numbers listed in the right-hand columns.

<i>Crop</i>	<i>Supplemental DLI ($\mu\text{mol}/\text{m}^2/\text{day}$)</i>	<i>PPFD ($\mu\text{mol}/\text{m}^2/\text{sec}$)</i>	<i>Photoperiod (hours/day)</i>	<i>Design Page #:</i>
Plugs & Cuttings (Vegetables & flowers)	3	70	12	3
	4		16	
	5		20	
Leafy Greens (Lettuce, basil, herbs)	4	100	11	4
	6		18	
	7		20	
Flowers (Potted plants)	2	50	12	5
	3		18	
Flowers (Cut Flowers)	4	100	11	6
	10	150	18	7
	14	200	20	8
Fruit & Vegetables (Cucumbers, peppers, tomatoes, strawberries)	6	100	17	9
	13	200	18	10
	18	250	20	11
Cannabis / Hemp (Vegetative)	10	150	18	12
	16	250		13
Cannabis / Hemp (Flower)	17	400	12	14
	22	500		15
	26	600		16

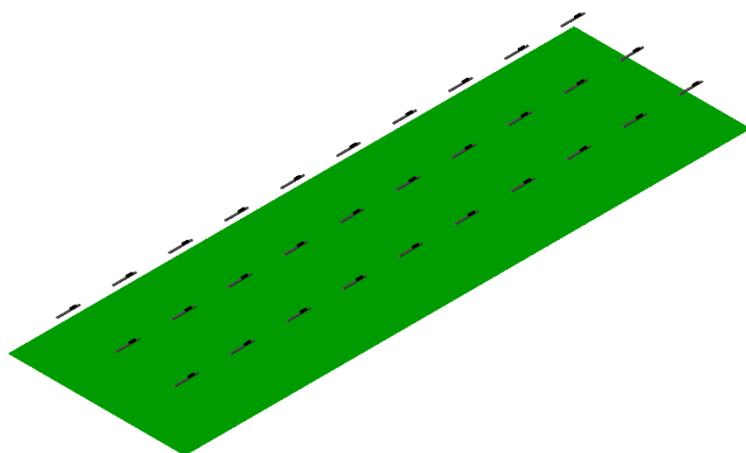
Plugs & Cuttings

30' x 96' Greenhouse, Apex Light

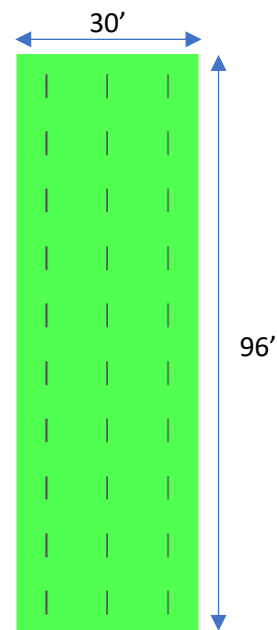
Lighting Design

- # of Apex LED lights: 30 (3 lines of 10 lights/line)
- Mounting Height: 6-feet above the canopy
- Light Bar Line Spacing: 10-feet

Isometric View



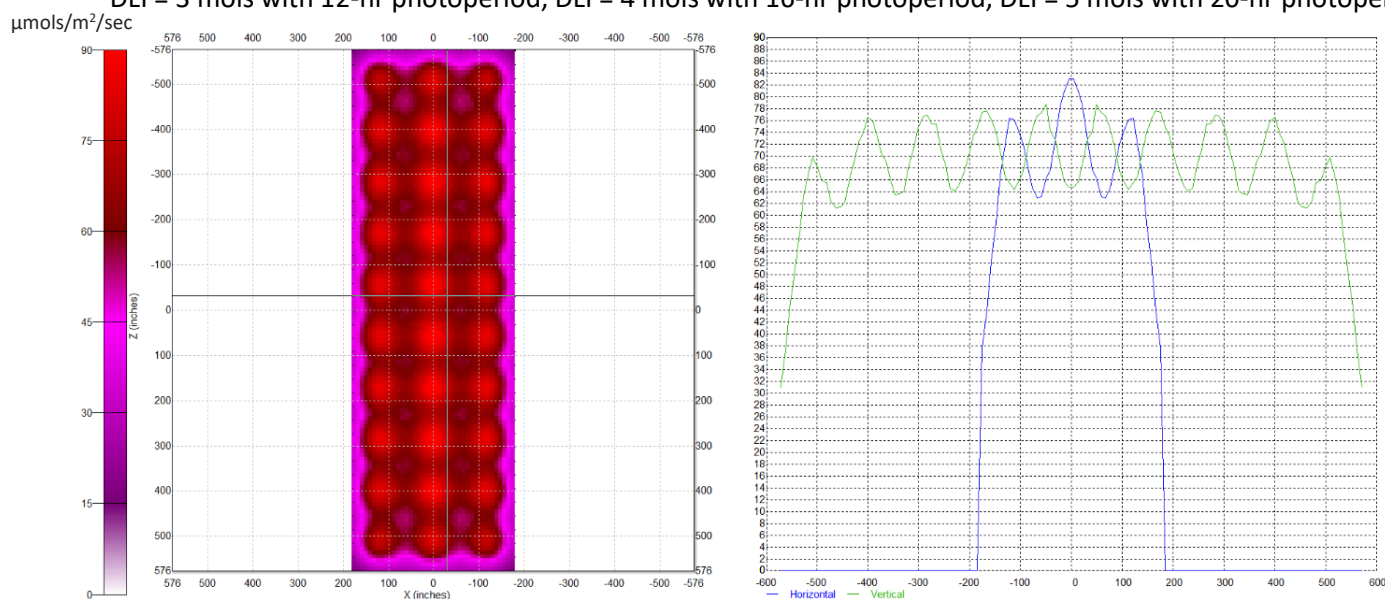
Top Down View



Light Intensity Map on 30' x 96' Canopy

PPFD = 70 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 3 mols with 12-hr photoperiod, DLI = 4 mols with 16-hr photoperiod, DLI = 5 mols with 20-hr photoperiod



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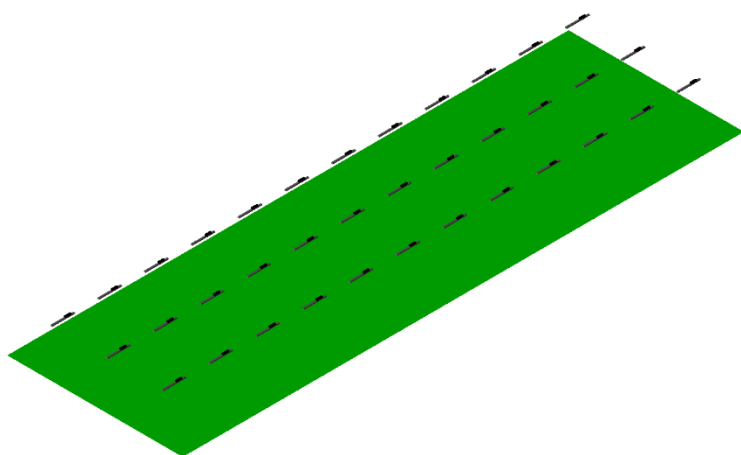
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Leafy Greens: Lettuce, Basil, Herbs 30' x 96' Greenhouse, Apex Light

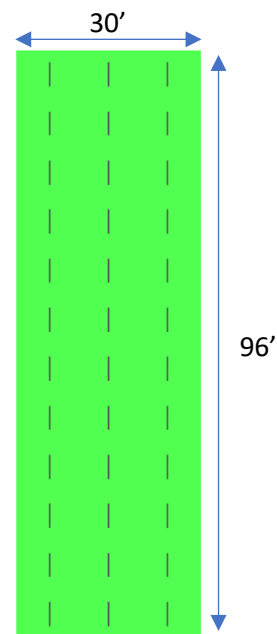
Lighting Design

- # of Apex LED lights: 36 (3 lines of 12 lights/line)
- Mounting Height: 6-feet above the canopy
- Light Bar Line Spacing: 9.5-feet

Isometric View



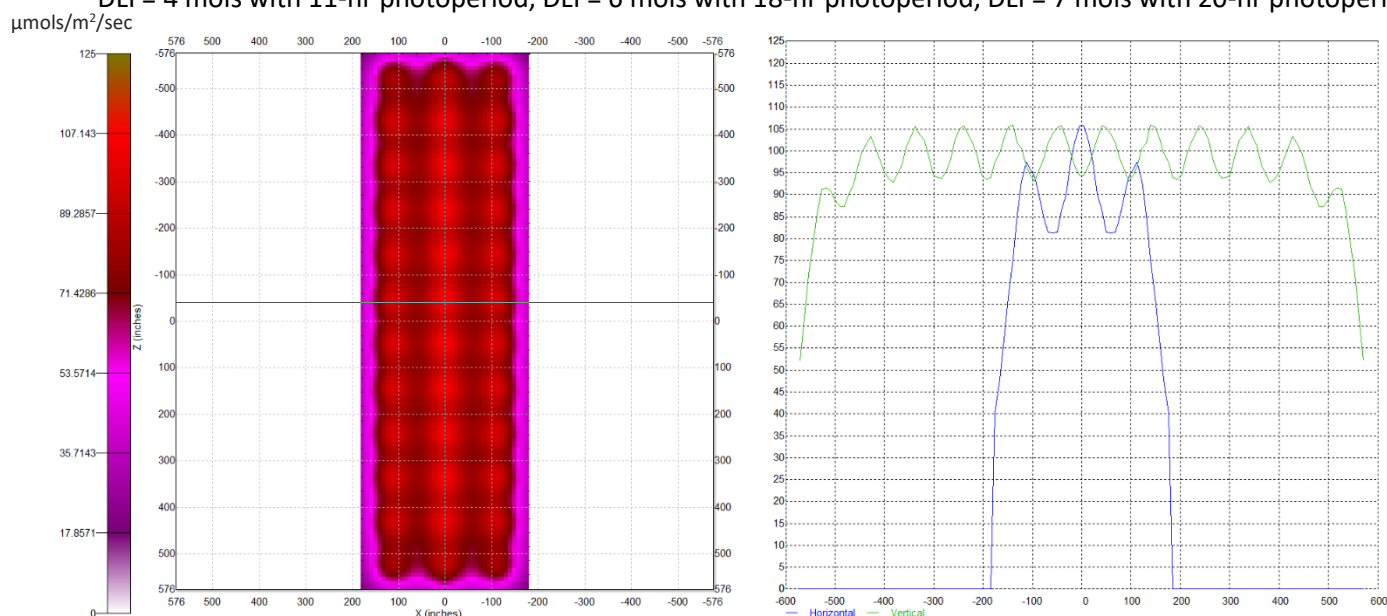
Top Down View



Light Intensity Map on 30' x 96' Canopy

PPFD = 100 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 4 mols with 11-hr photoperiod, DLI = 6 mols with 18-hr photoperiod, DLI = 7 mols with 20-hr photoperiod



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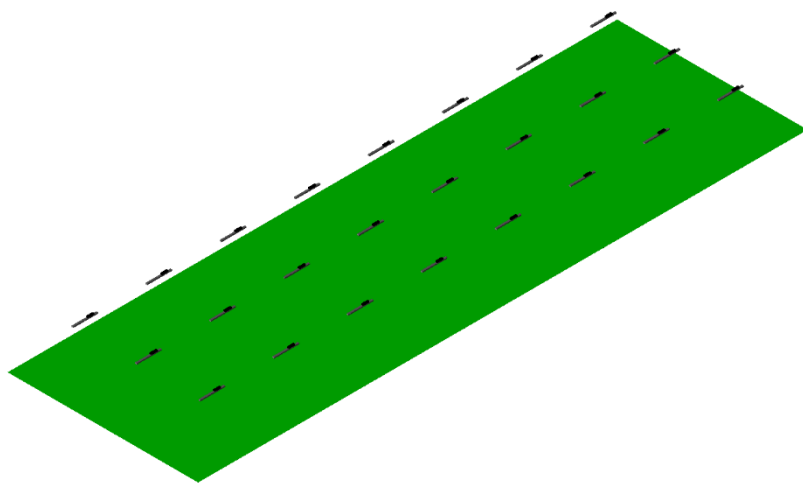
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Flowers: Potted Plants *30' x 96' Greenhouse, Apex Light*

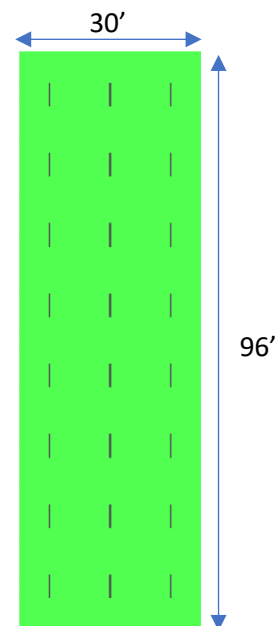
Lighting Design

- # of Apex LED lights: 24 (3 lines of 8 lights/line)
- Mounting Height: 6-feet above the canopy
- Light Bar Line Spacing: 10-feet

Isometric View



Top Down View

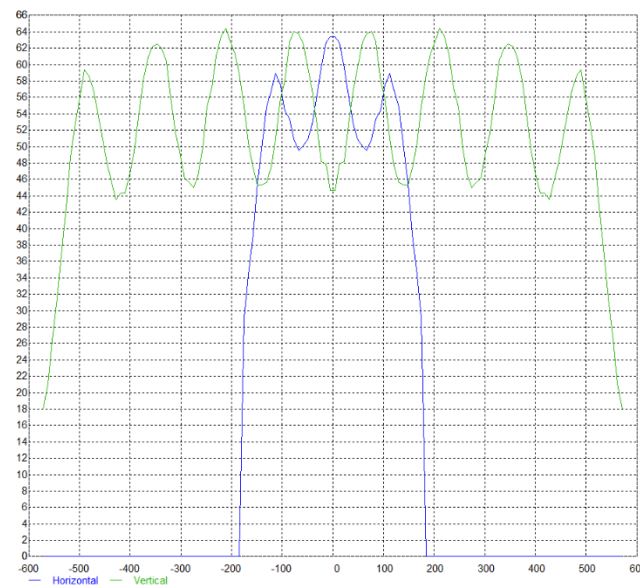
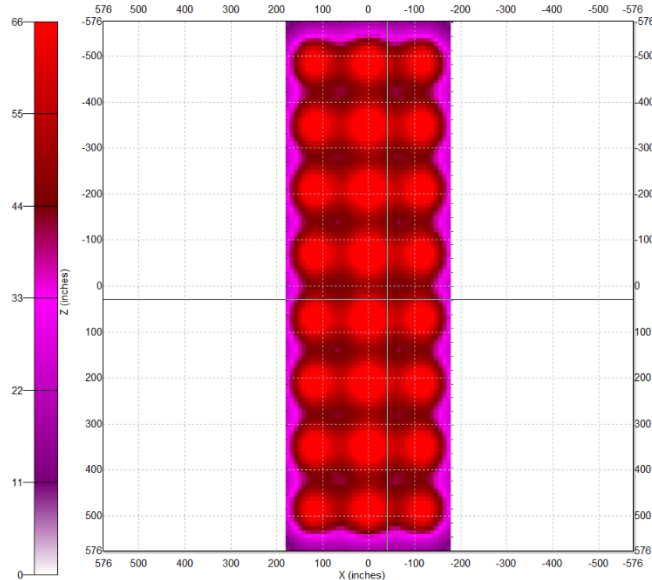


Light Intensity Map on 30' x 96' Canopy

PPFD = 50 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 2 mols with 12-hour photoperiod, DLI = 3 mols with 18-hour photoperiod

$\mu\text{mol}/\text{m}^2/\text{sec}$



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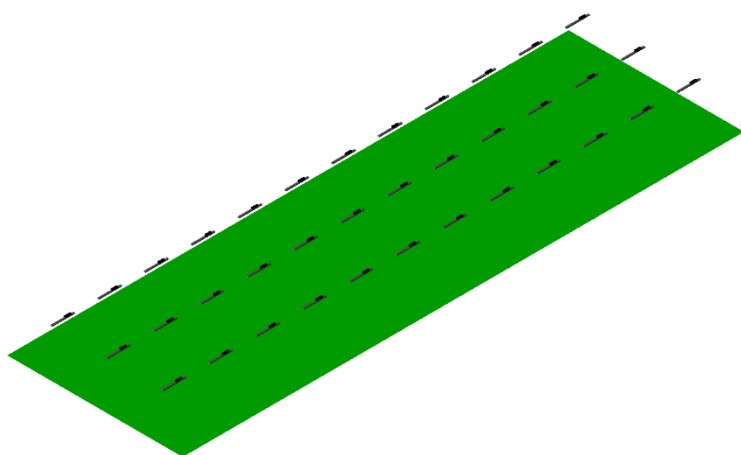
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Flowers: Cut Flowers *30' x 96' Greenhouse, Apex Light*

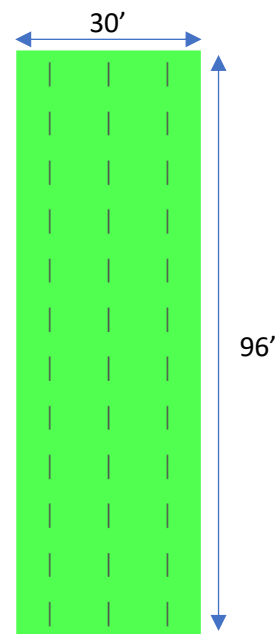
Lighting Design

- # of Apex LED lights: 36 (3 lines of 12 lights/line)
- Mounting Height: 6-feet above the canopy
- Light Bar Line Spacing: 9.5-feet

Isometric View



Top Down View

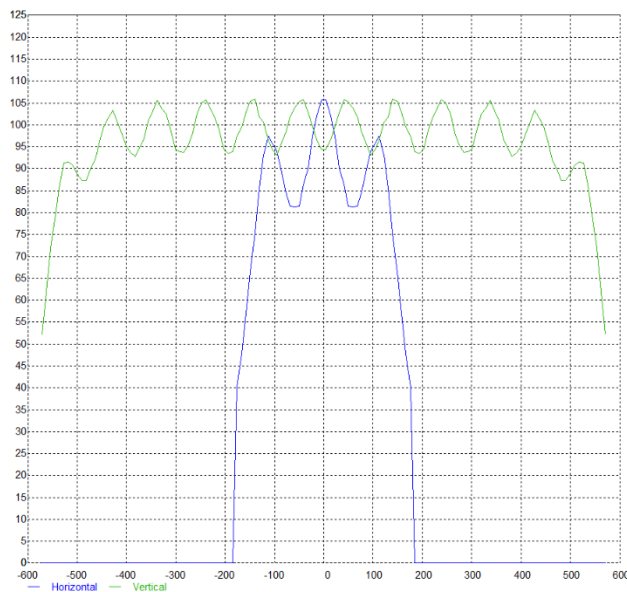
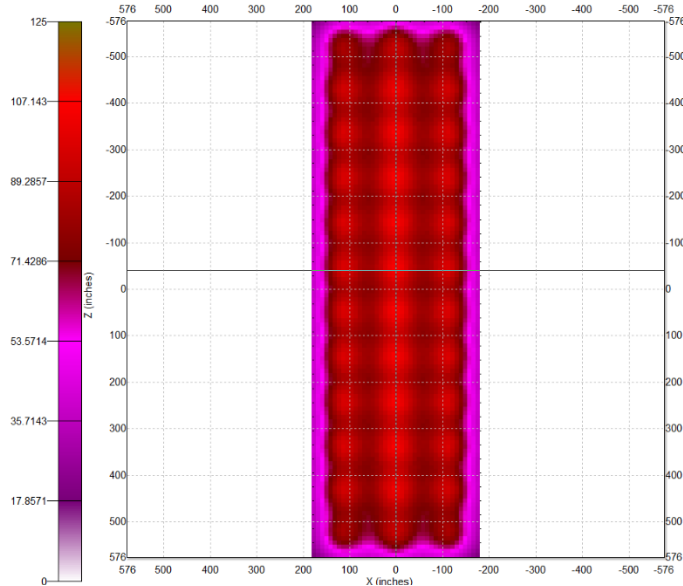


Light Intensity Map on 30' x 96' Canopy

PPFD = 100 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 4 mols with 11-hour photoperiod

$\mu\text{mol}/\text{m}^2/\text{sec}$



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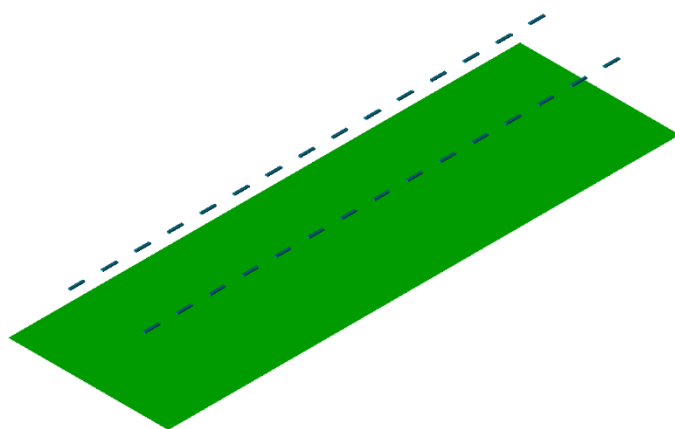
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Flowers: Cut Flowers *30' x 96' Greenhouse, Pinnacle Light*

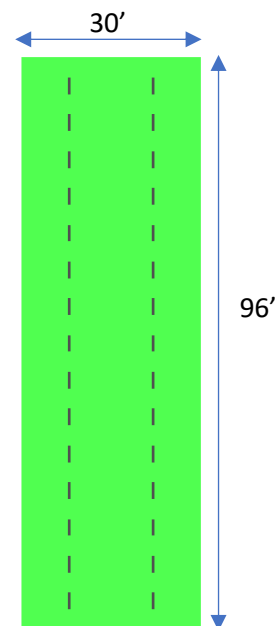
Lighting Design

- # of Pinnacle LED lights: 30 (2 lines of 15 lights/line)
- Mounting Height: 10-feet above the canopy
- Light Bar Line Spacing: 14-feet

Isometric View



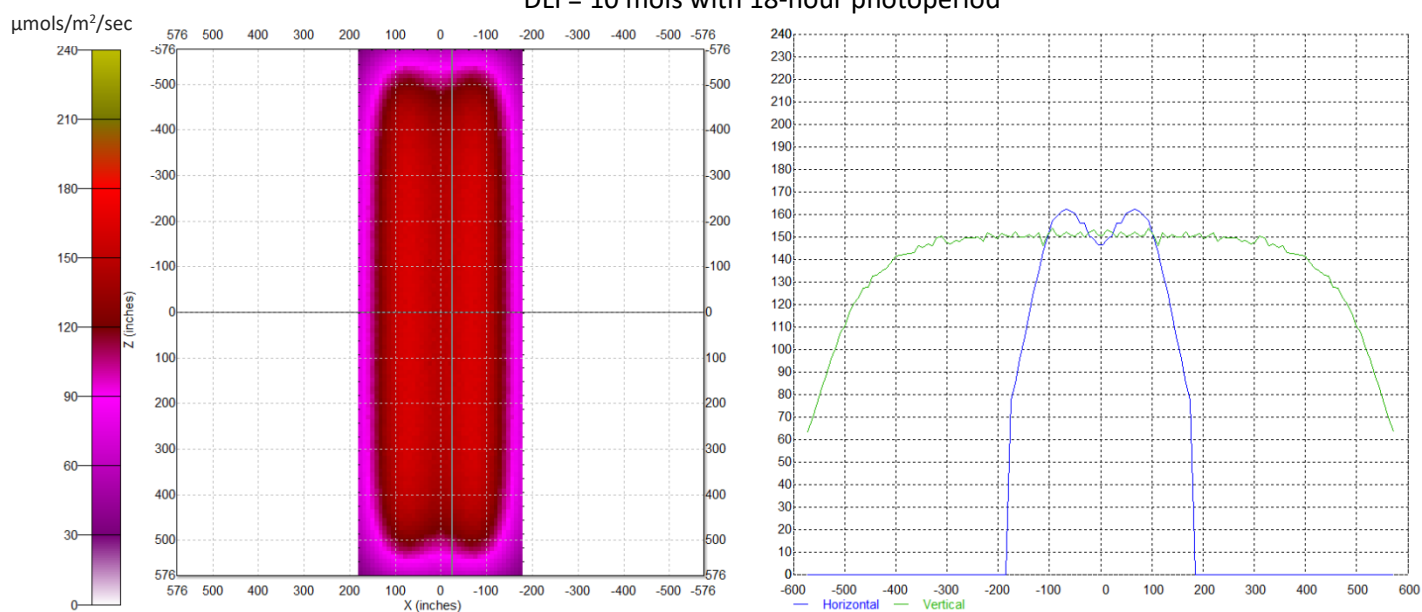
Top Down View



Light Intensity Map on 30' x 96' Canopy

PPFD = 150 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 10 mols with 18-hour photoperiod



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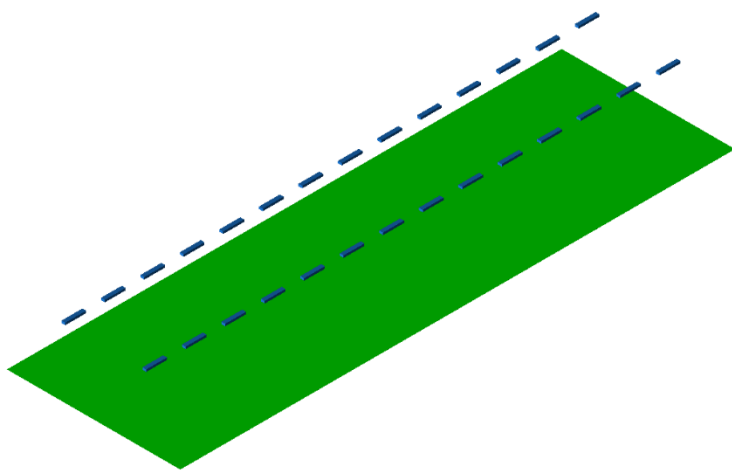
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Flowers: Cut Flowers *30' x 96' Greenhouse, Pinnacle HP Light*

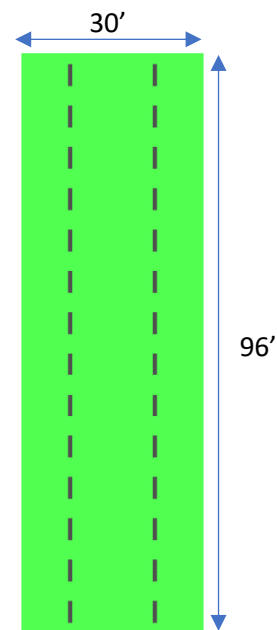
Lighting Design

- # of Pinnacle HP LED lights: 28 (2 lines of 14 lights/line)
- Mounting Height: 10-feet above the canopy
- Light Bar Line Spacing: 14-feet

Isometric View



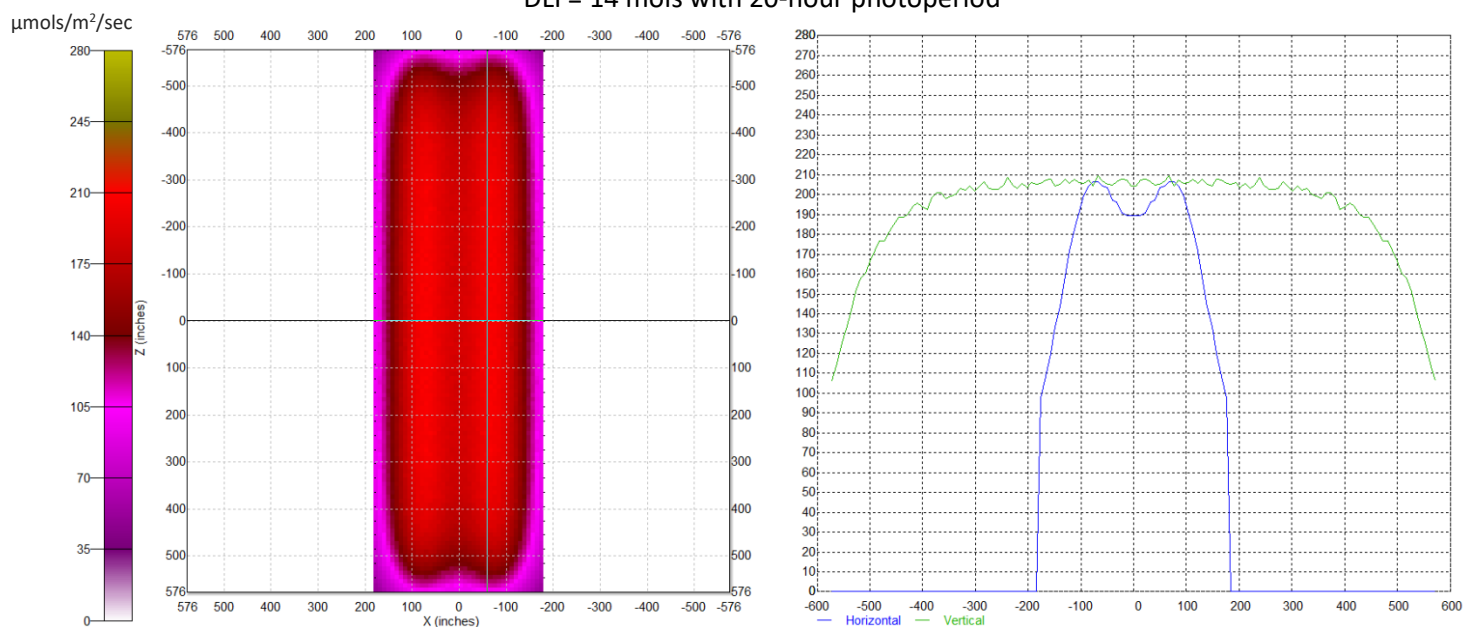
Top Down View



Light Intensity Map on 30' x 96' Canopy

PPFD = 200 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 14 mol with 20-hour photoperiod



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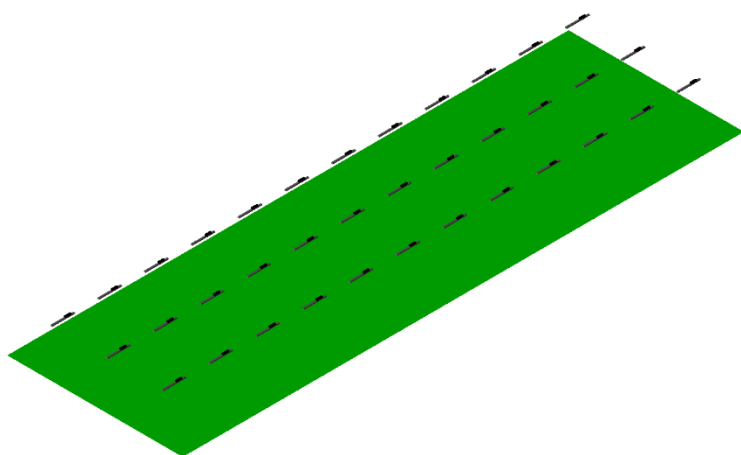
Fruit & Vegetables: Cucumbers, Peppers, Tomatoes, Strawberries

30' x 96' Greenhouse, Apex Light

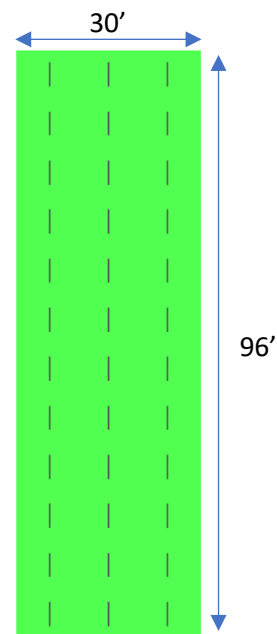
Lighting Design

- # of Apex LED lights: 36 (3 lines of 12 lights/line)
- Mounting Height: 6-feet above the canopy
- Light Bar Line Spacing: 9.5-feet

Isometric View



Top Down View

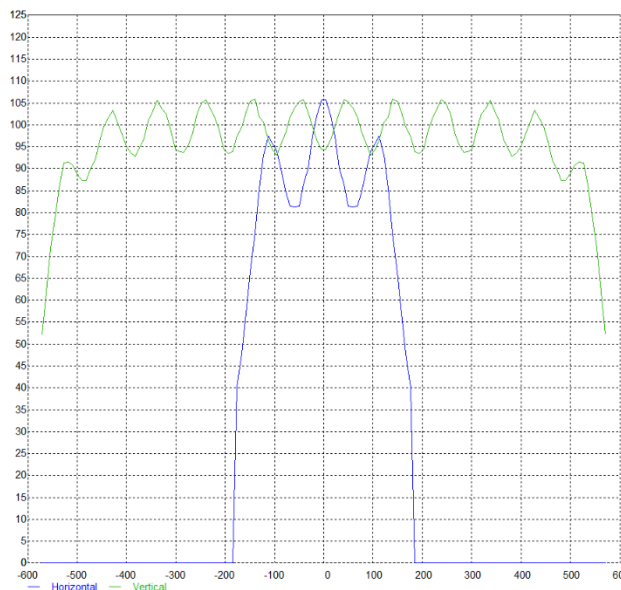
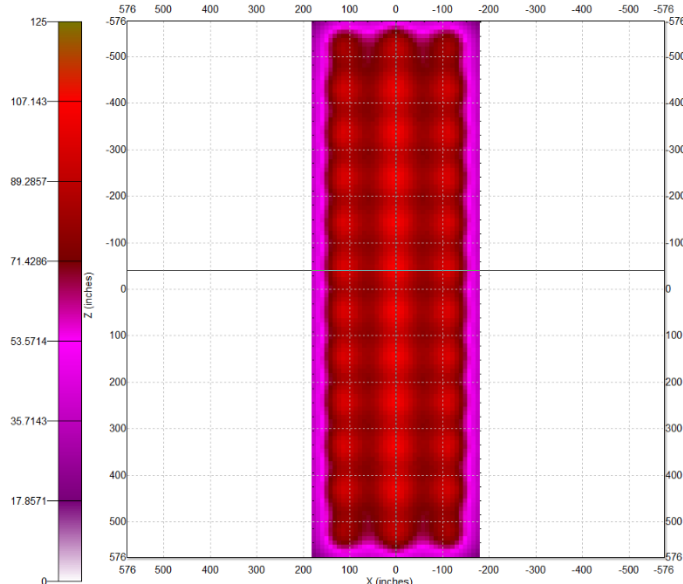


Light Intensity Map on 30' x 96' Canopy

PPFD = 100 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 6 mols with 17-hour photoperiod

$\mu\text{mol}/\text{m}^2/\text{sec}$



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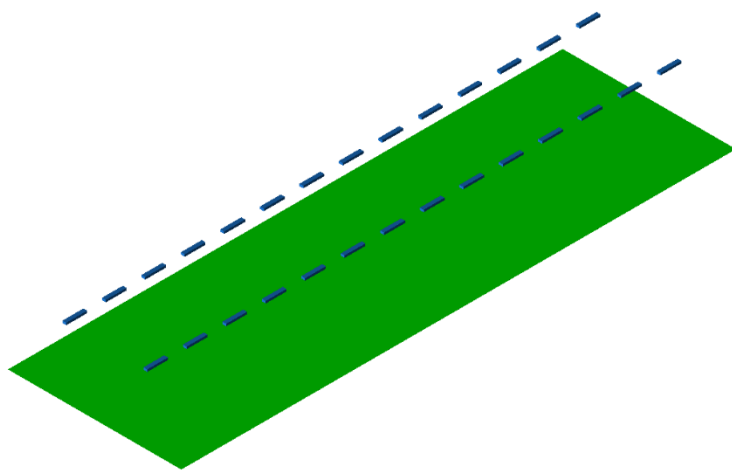
Fruit & Vegetables: Cucumbers, Peppers, Tomatoes, Strawberries

30' x 96' Greenhouse, Pinnacle HP Light

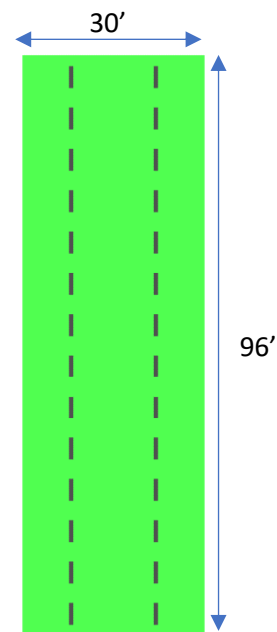
Lighting Design

- # of Pinnacle HP LED lights: 28 (2 lines of 14 lights/line)
- Mounting Height: 10-feet above the canopy
- Light Bar Line Spacing: 14-feet

Isometric View



Top Down View

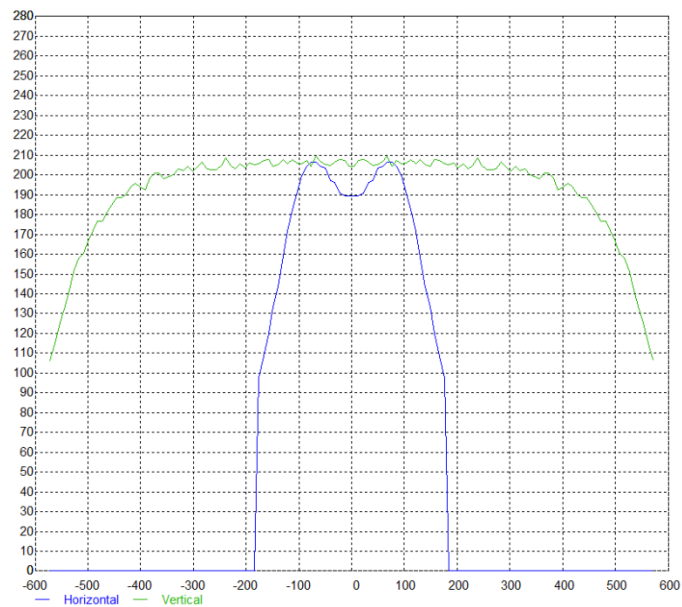
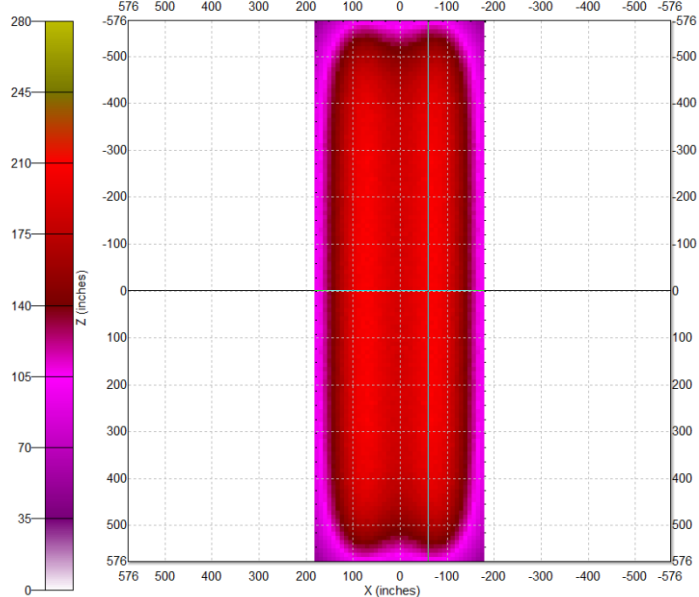


Light Intensity Map on 30' x 96' Canopy

PPFD = 200 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 13 mols with 20-hour photoperiod

$\mu\text{mol}/\text{m}^2/\text{sec}$



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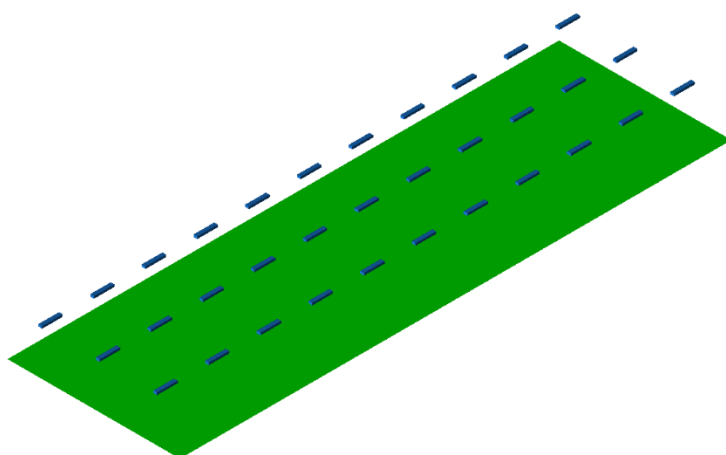
Fruit & Vegetables: Cucumbers, Peppers, Tomatoes, Strawberries

30' x 96' Greenhouse, Pinnacle HP Light

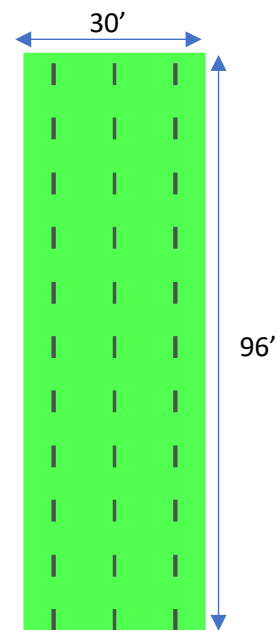
Lighting Design

- # of Pinnacle HP LED lights: 36 (3 lines of 12 lights/line)
- Mounting Height: 7-feet above the canopy
- Light Bar Line Spacing: 10-feet

Isometric View



Top Down View

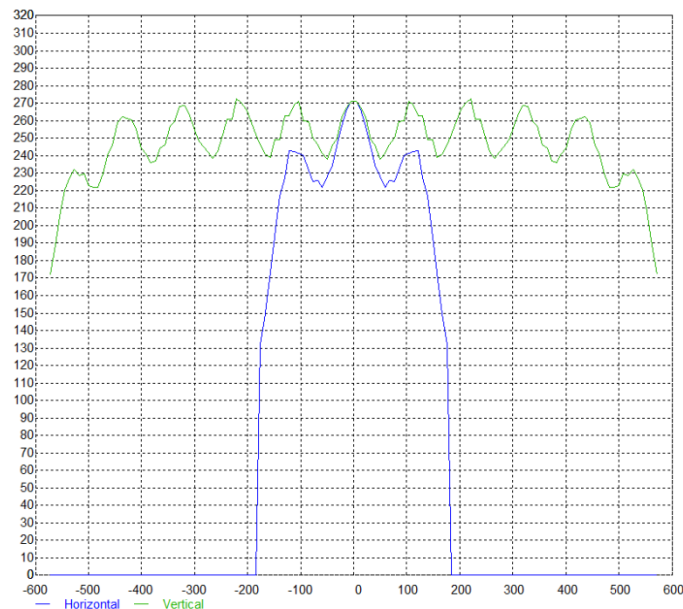
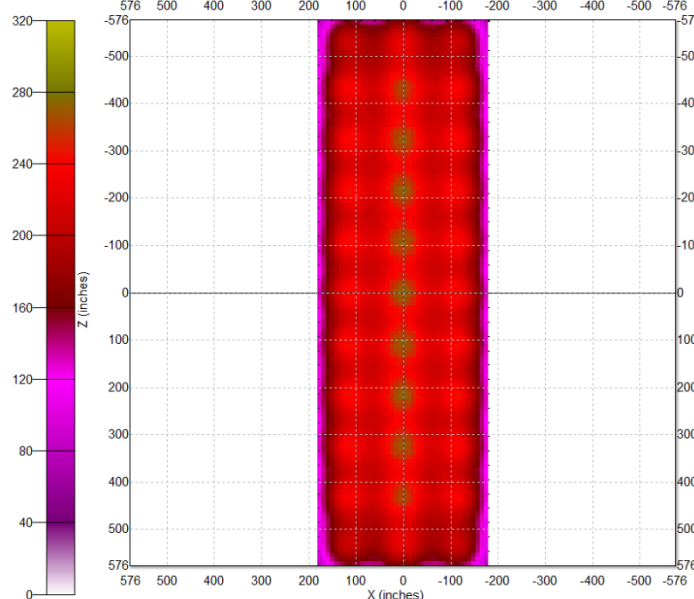


Light Intensity Map on 30' x 96' Canopy

PPFD = 250 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 18 mol with 20-hour photoperiod

$\mu\text{mol}/\text{m}^2/\text{sec}$



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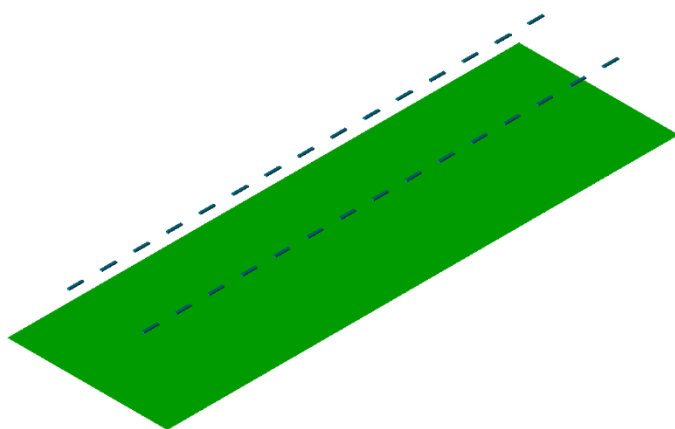
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Cannabis / Hemp: Vegetative *30' x 96' Greenhouse, Pinnacle Light*

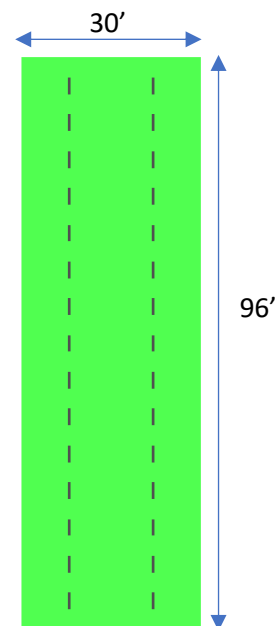
Lighting Design

- # of Pinnacle LED lights: 30 (2 lines of 15 lights/line)
- Mounting Height: 10-feet above the canopy
- Light Bar Line Spacing: 14-feet

Isometric View



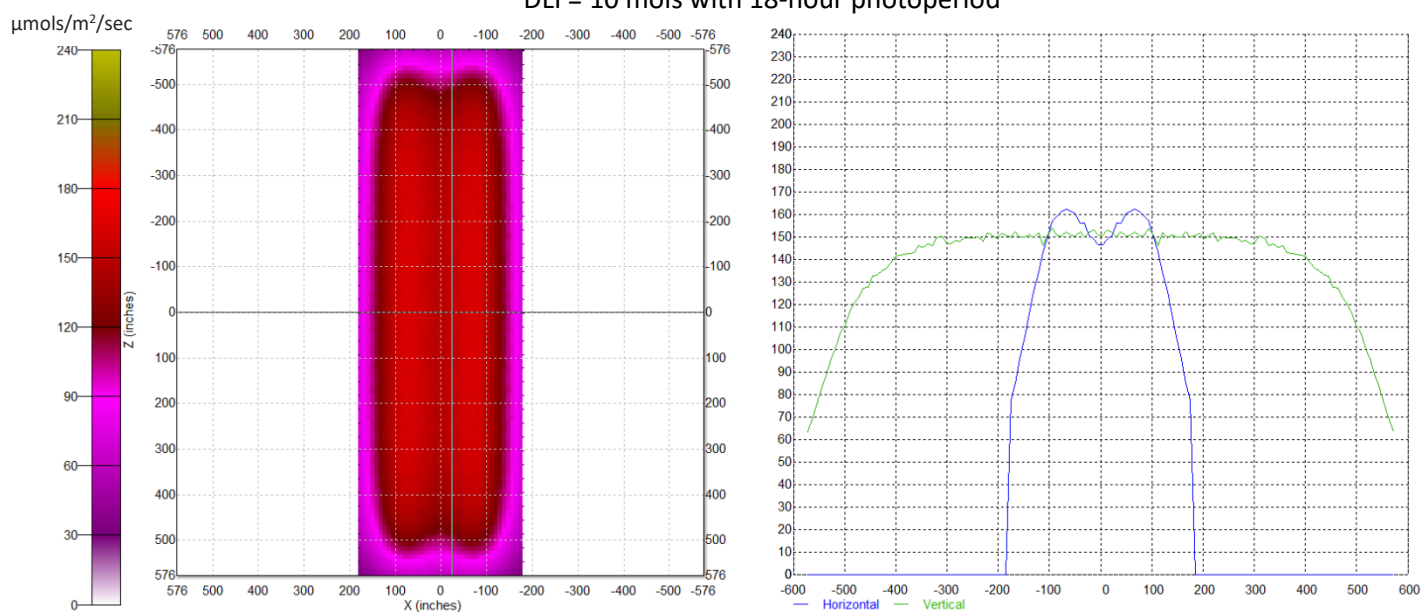
Top Down View



Light Intensity Map on 30' x 96' Canopy

PPFD = 150 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 10 mols with 18-hour photoperiod



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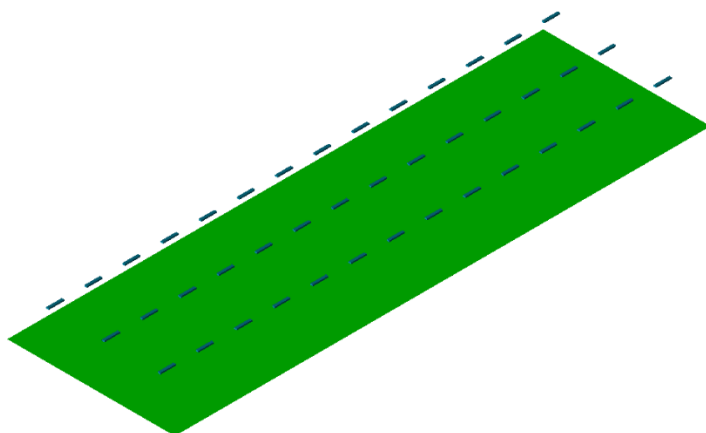
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Cannabis / Hemp: Vegetative *30' x 96' Greenhouse, Pinnacle Light*

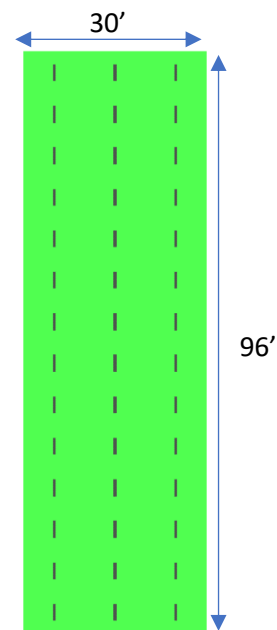
Lighting Design

- # of Pinnacle LED lights: 42 (3 lines of 14 lights/line)
- Mounting Height: 6-feet above the canopy
- Light Bar Line Spacing: 10-feet

Isometric View



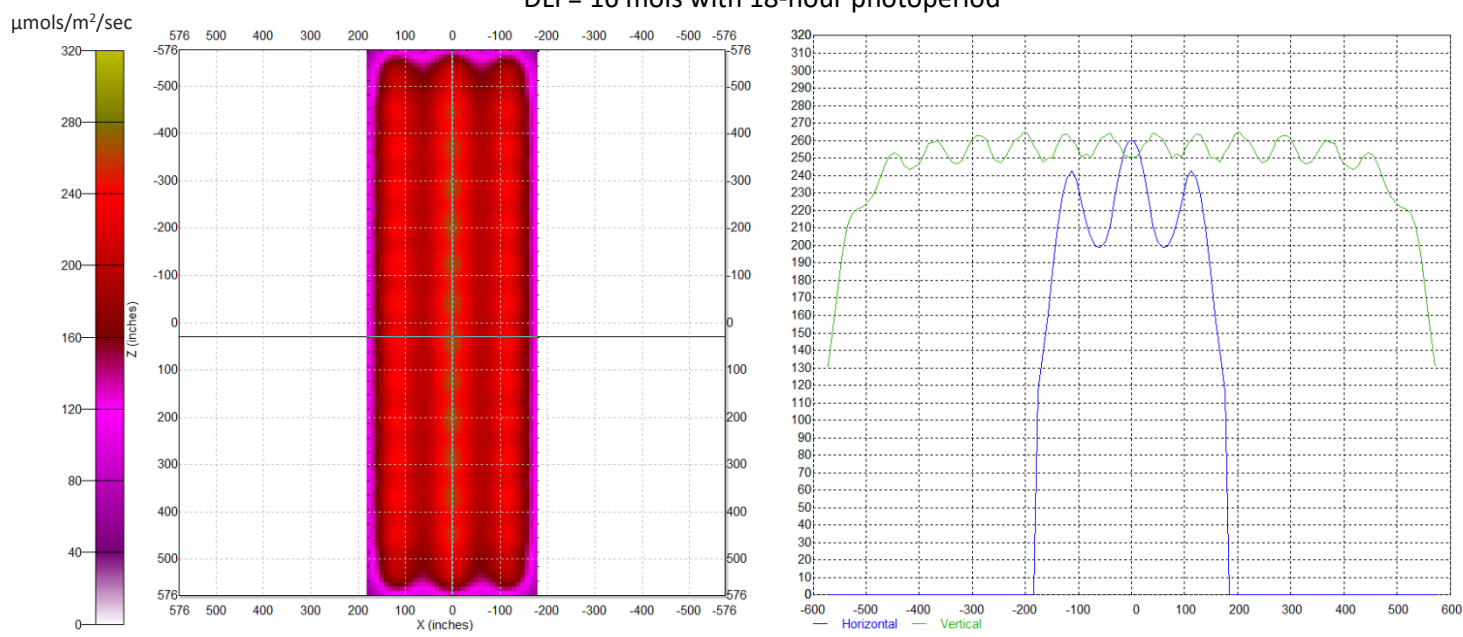
Top Down View



Light Intensity Map on 30' x 96' Canopy

PPFD = 250 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 16 mols with 18-hour photoperiod



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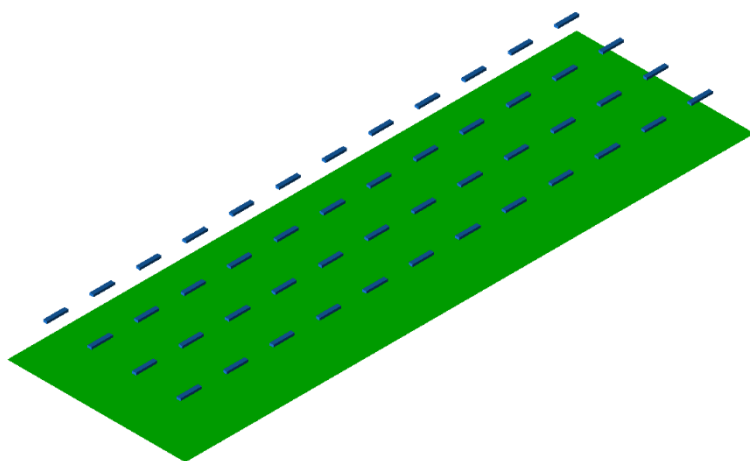
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Cannabis / Hemp: Flower 30' x 96' Greenhouse, Pinnacle HP Light

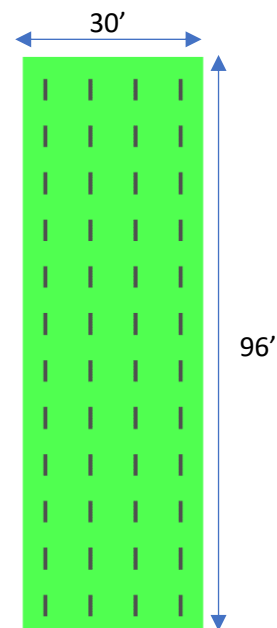
Lighting Design

- # of Pinnacle HP LED lights: 48 (4 lines of 12 lights/line)
- Mounting Height: 6-feet above the canopy
- Light Bar Line Spacing: 7.5-feet

Isometric View



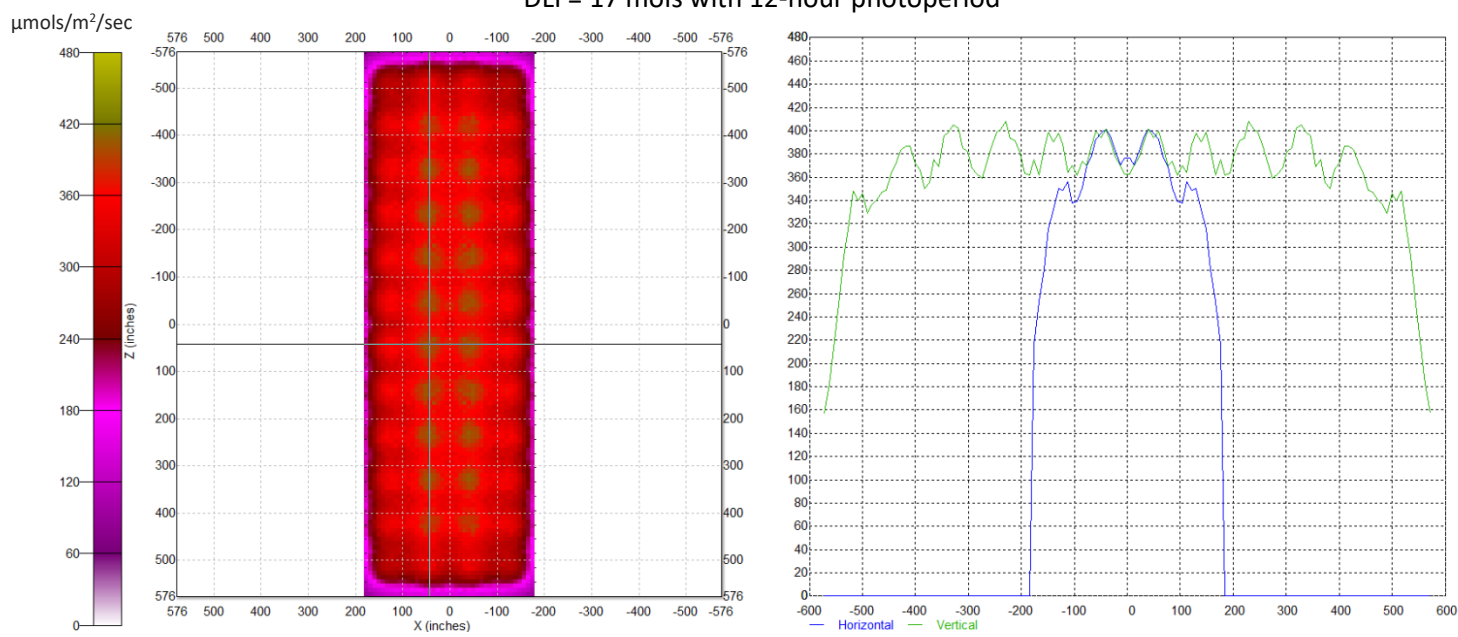
Top Down View



Light Intensity Map on 30' x 96' Canopy

PPFD = 400 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 17 mols with 12-hour photoperiod



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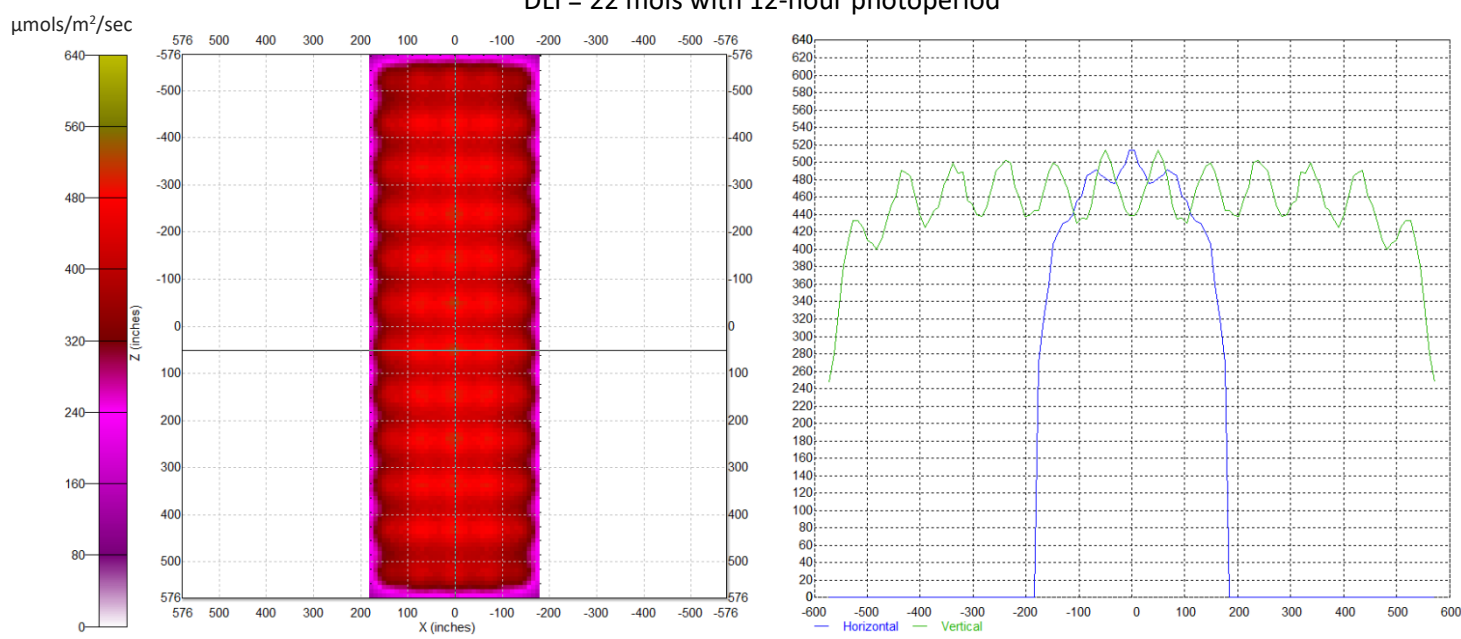
- # of Pinnacle HP LED lights: 60 (5 lines of 12 lights/line)
- Mounting Height: 5.5-feet above the canopy
- Light Bar Line Spacing: 6-feet

A 3D perspective view of a green rectangular plane. The plane is tilted upwards from the bottom-left towards the top-right. A grid of blue dashed lines is drawn on the plane, forming a coordinate system. The lines are parallel to the edges of the rectangle. The background is white.

A diagram of a rectangular field with a width of 30' and a length of 96'. The field is divided into a 6x8 grid of smaller rectangles by vertical and horizontal lines. The width is labeled 30' and the length is labeled 96'.

$$\text{PPFD} = 500 \mu\text{mols/m}^2/\text{sec}$$

DLI = 22 mols with 12-hour photoperiod

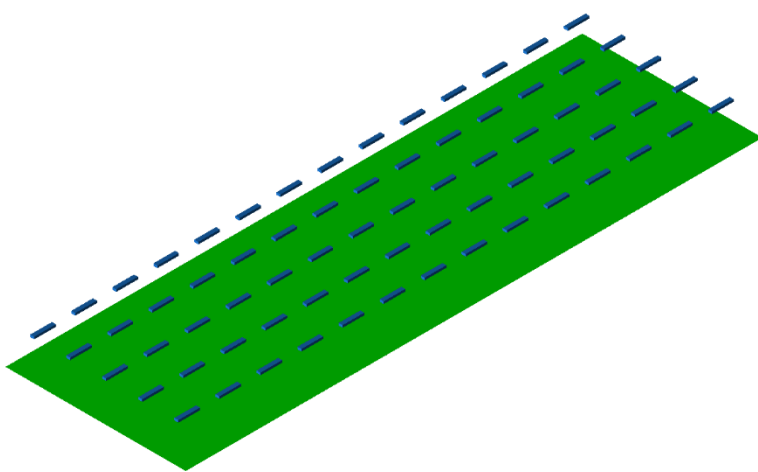


Cannabis / Hemp: Flower *30' x 96' Greenhouse, Pinnacle HP Light*

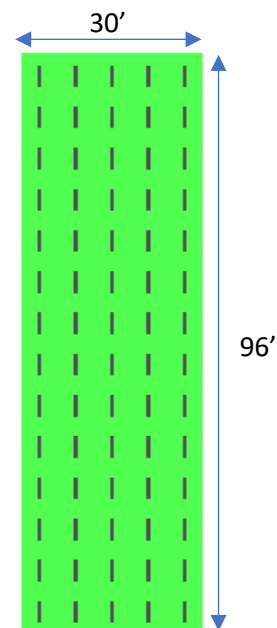
Lighting Design

- # of Pinnacle HP LED lights: 70 (5 lines of 14 lights/line)
- Mounting Height: 5-feet above the canopy
- Light Bar Line Spacing: 6-feet

Isometric View



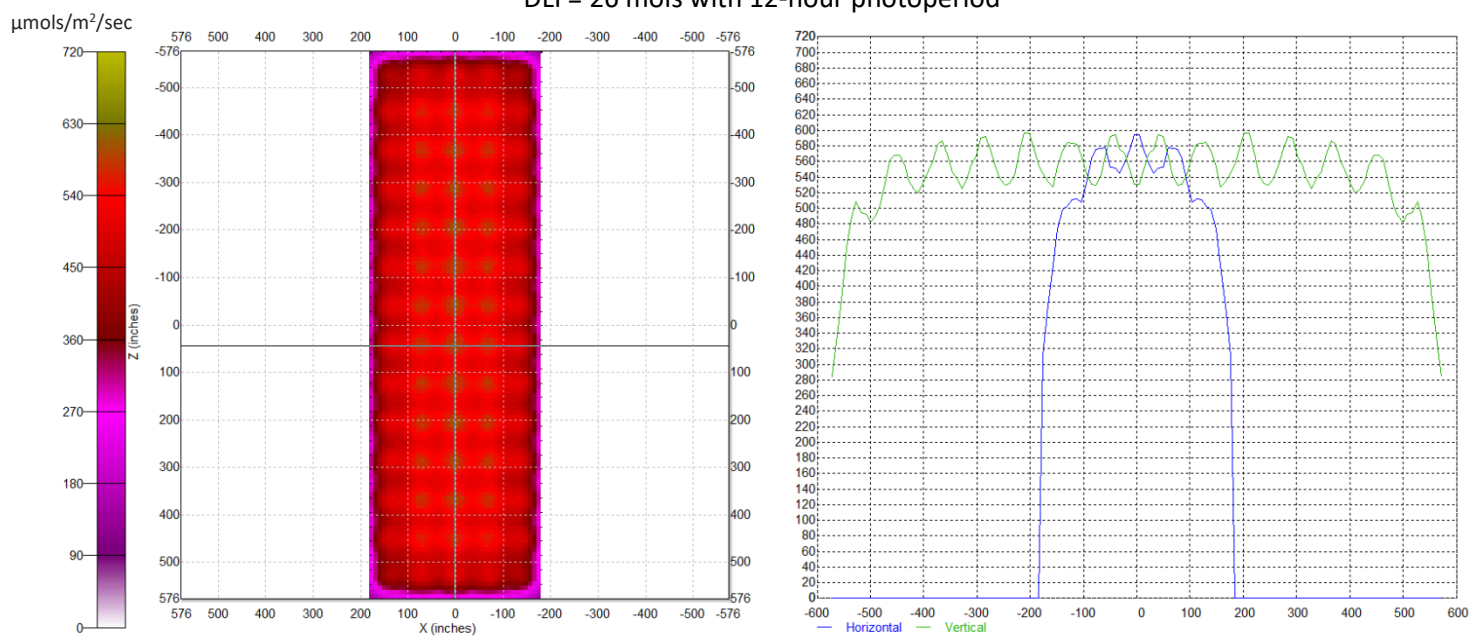
Top Down View



Light Intensity Map on 30' x 96' Canopy

PPFD = 600 $\mu\text{mol}/\text{m}^2/\text{sec}$

DLI = 26 mols with 12-hour photoperiod



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