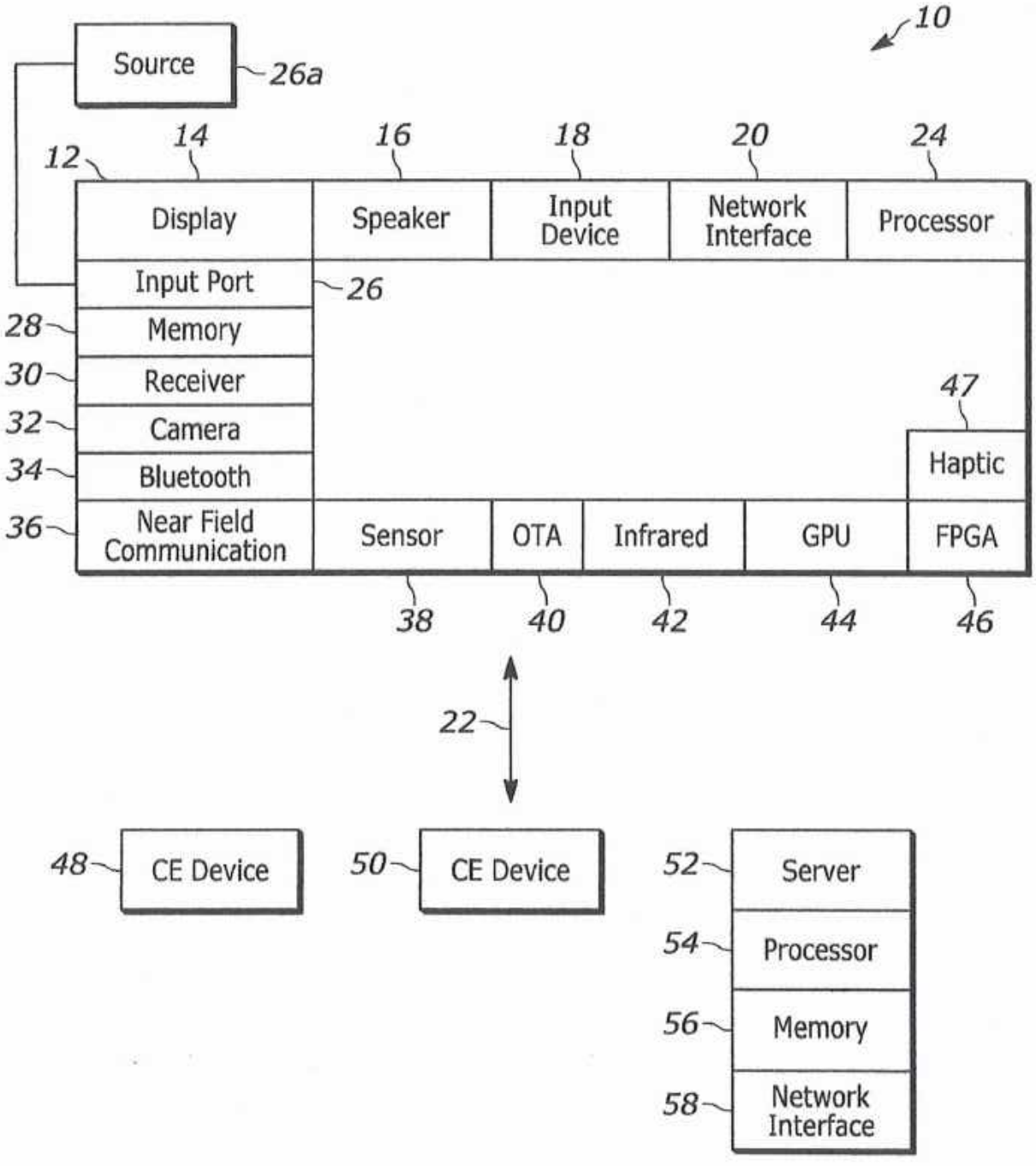

10
Source
26a
12
14
16
18
20
24
Display
Speaker
Input Device
Network Interface
Processor
Input Port
26
28
Memory
30
Receiver
32
Camera
34
Bluetooth
36
Near Field Communication
47
Haptic
Sensor
OTA
Infrared
GPU
FPGA
38
40
42
44
46
22
48
CE Device
50
CE Device
52
Server
54
Processor
56
Memory
58
Network Interface

FIG. 1

Fig. 2

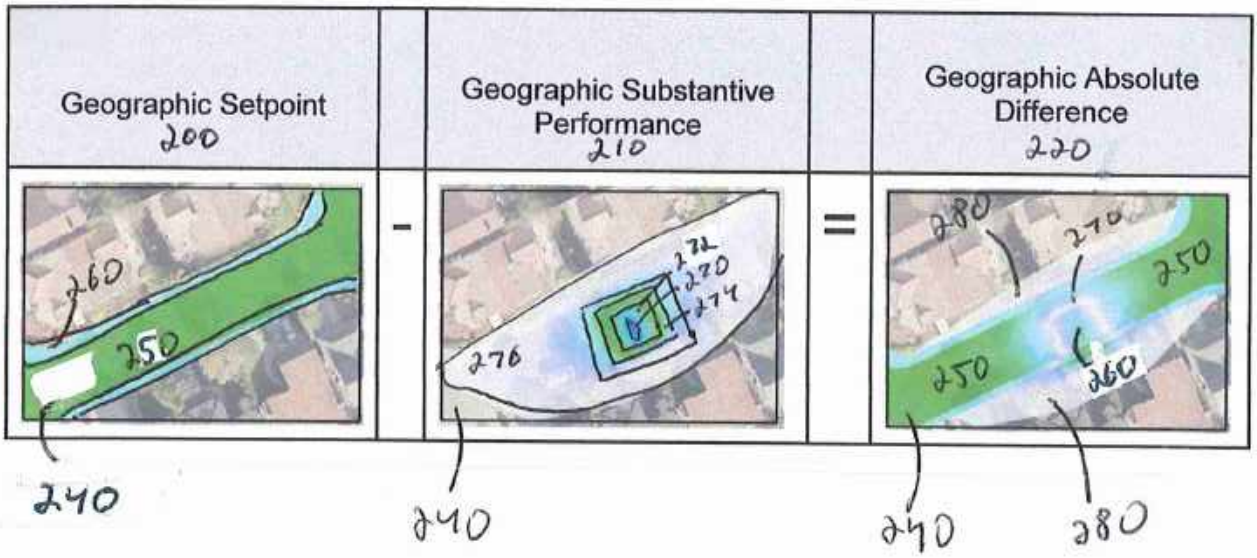

Geographic Setpoint
200
Geographic Substantive Performance
210
Geographic Absolute Difference
220
260
250
272
270
274
276
280
270
250
250
260
240
240
240
280

Fig. 3

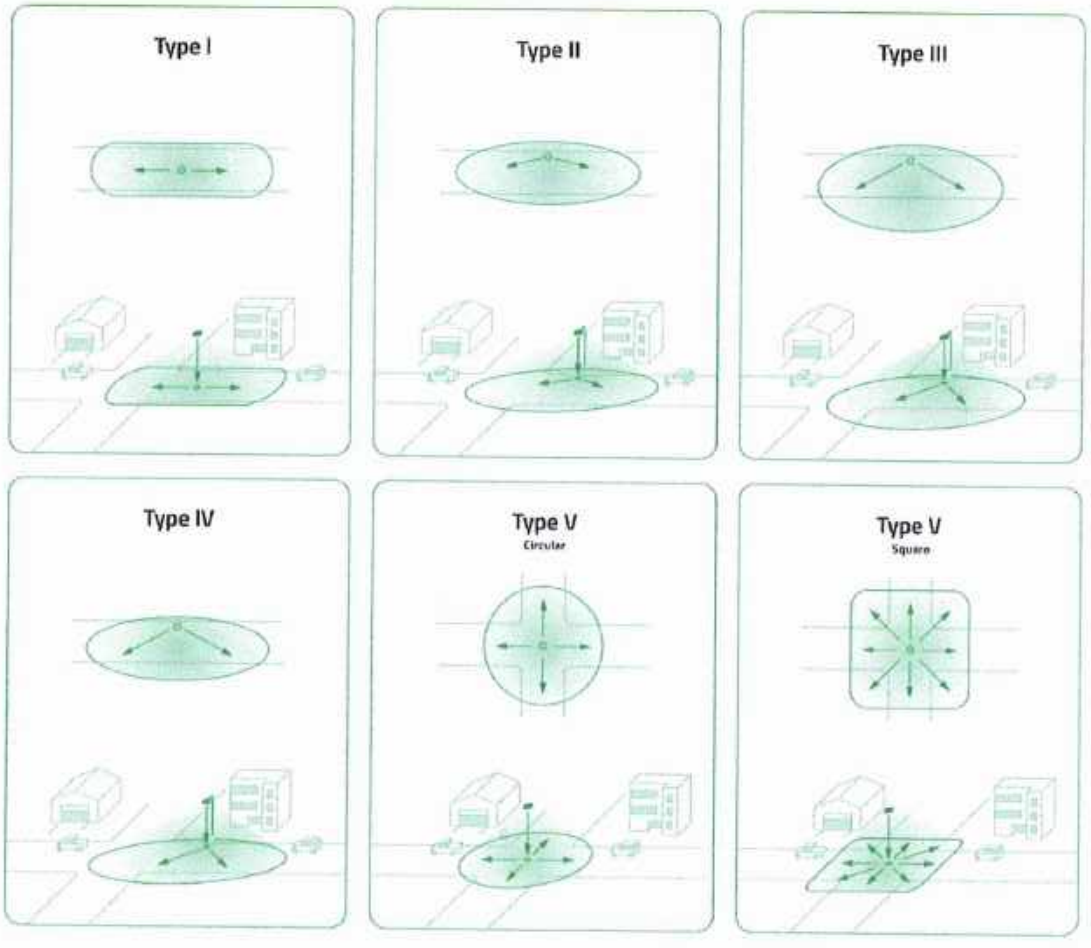

Type I
Type II
Type III
Type IV
Type V
Circular
Type V
Square

Fig. 4

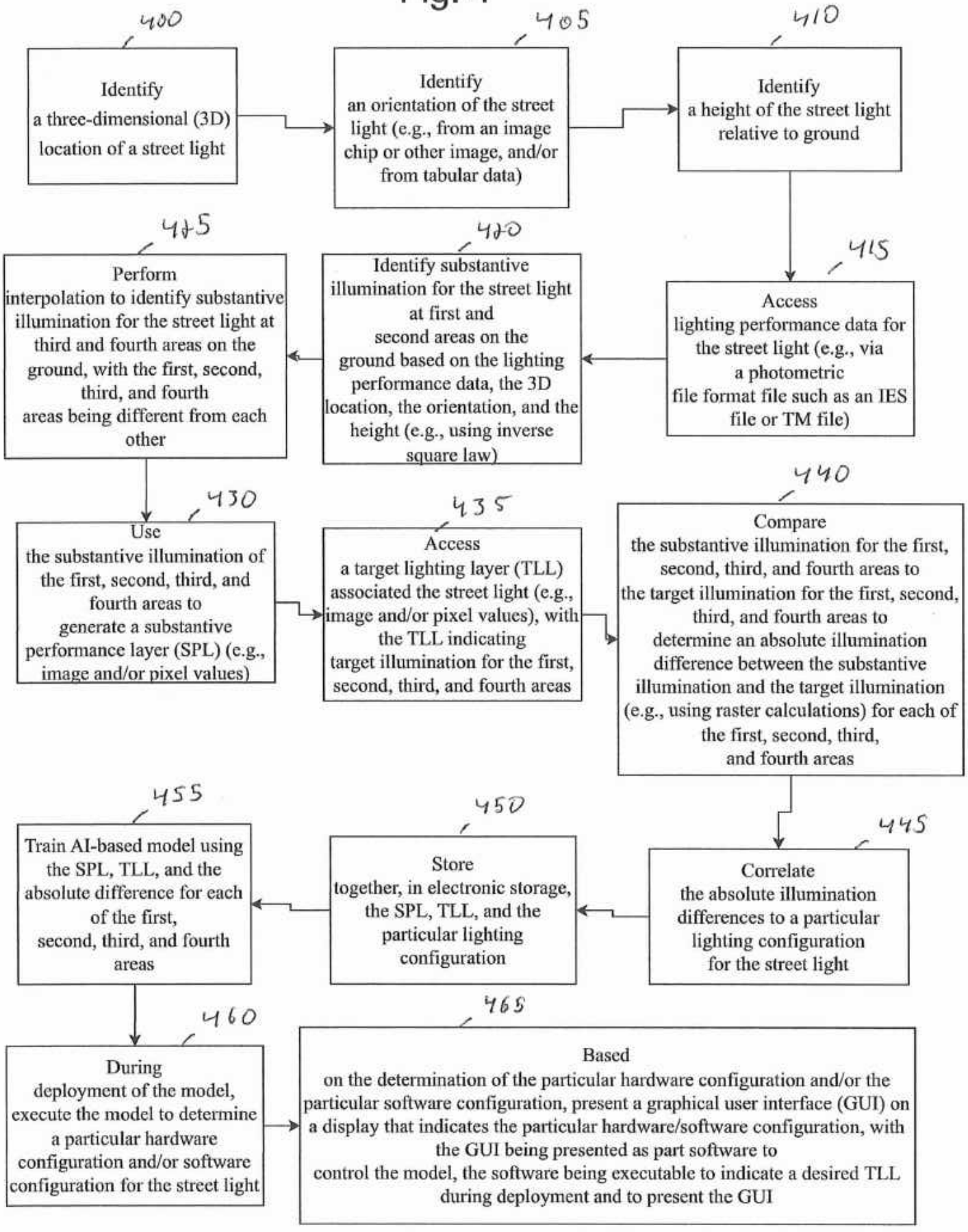

400
Identify a three-dimensional (3D) location of a street light
405
Identify an orientation of the street light (e.g., from an image chip or other image, and/or from tabular data)
410
Identify a height of the street light relative to ground
415
Access lighting performance data for the street light (e.g., via a photometric file format file such as an IES file or TM file)
420
Identify substantive illumination for the street light at first and second areas on the ground based on the lighting performance data, the 3D location, the orientation, and the height (e.g., using inverse square law)
425
Perform interpolation to identify substantive illumination for the street light at third and fourth areas on the ground, with the first, second, third, and fourth areas being different from each other
430
Use the substantive illumination of the first, second, third, and fourth areas to generate a substantive performance layer (SPL) (e.g., image and/or pixel values)
435
Access a target lighting layer (TLL) associated the street light (e.g., image and/or pixel values), with the TLL indicating target illumination for the first, second, third, and fourth areas
440
Compare the substantive illumination for the first, second, third, and fourth areas to the target illumination for the first, second, third, and fourth areas to determine an absolute illumination difference between the substantive illumination and the target illumination (e.g., using raster calculations) for each of the first, second, third, and fourth areas
445
Correlate the absolute illumination differences to a particular lighting configuration for the street light
450
Store together, in electronic storage, the SPL, TLL, and the particular lighting configuration
455
Train AI-based model using the SPL, TLL, and the absolute difference for each of the first, second, third, and fourth areas
460
During deployment of the model, execute the model to determine a particular hardware configuration and/or software configuration for the street light
465
Based on the determination of the particular hardware configuration and/or the particular software configuration, present a graphical user interface (GUI) on a display that indicates the particular hardware/software configuration, with the GUI being presented as part software to control the model, the software being executable to indicate a desired TLL during deployment and to present the GUI

Fig. 5

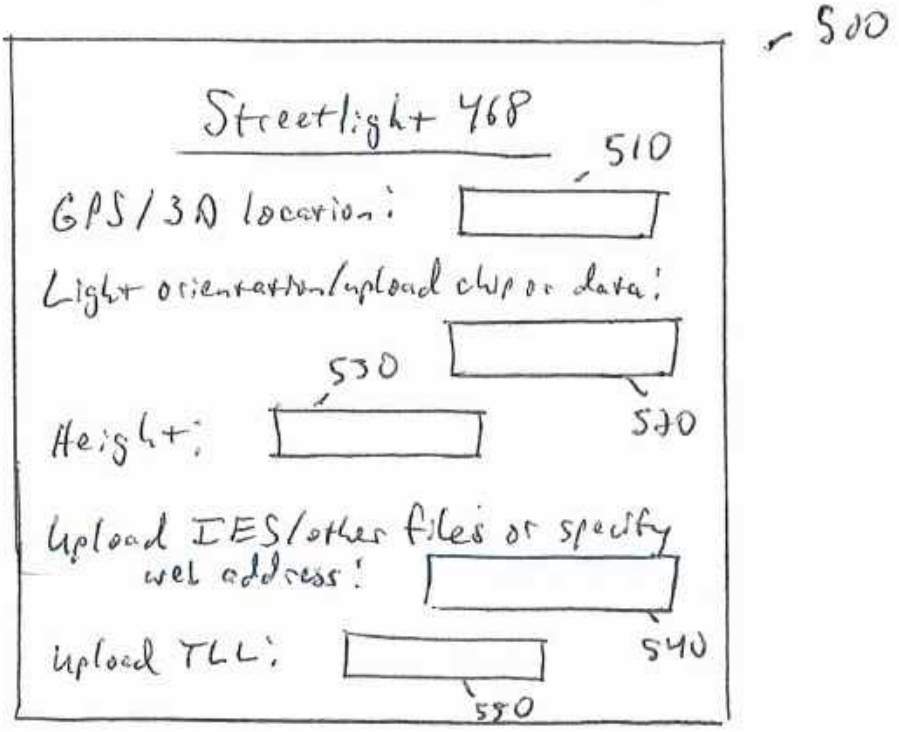

500
Streetlight 468
510
GPS/3D location:
Light orientation/upload chip or data:
530
520
Height:
Upload IES/other files or specify web address:
540
Upload TLL:
550

Fig. 6

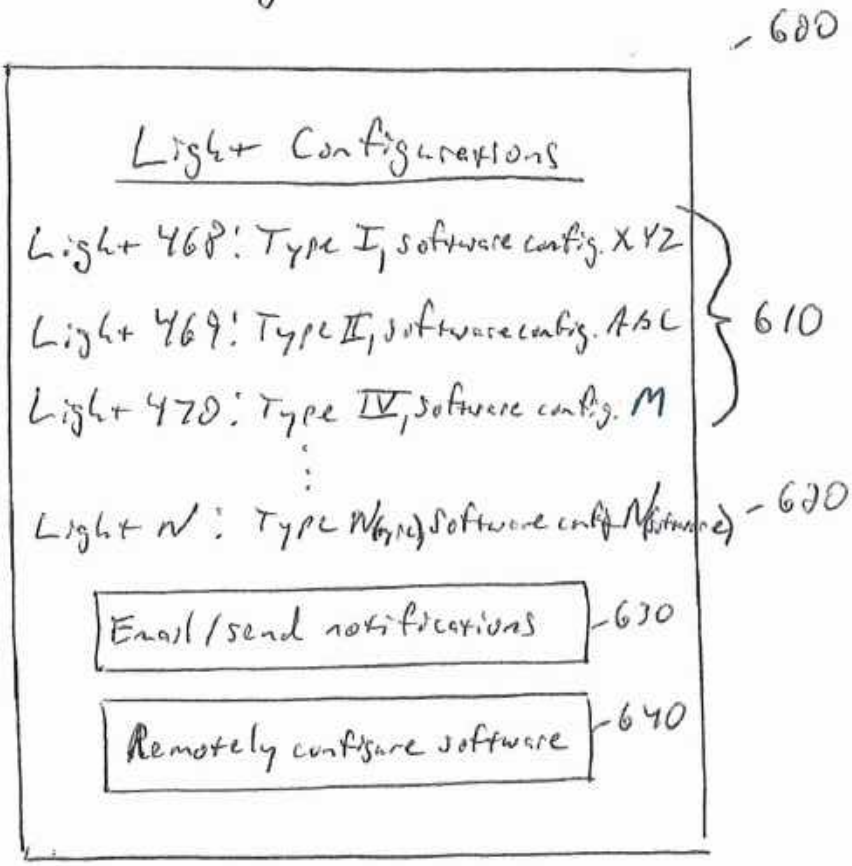

600
Light Configurations
Light 468: Type I, software config. XYZ
Light 469: Type II, software config. ABC
Light 470: Type IV, software config. M
610
Light N: Type N, software config. N
620
Email/send notifications
630
Remotely configure software
640

Fig. 7

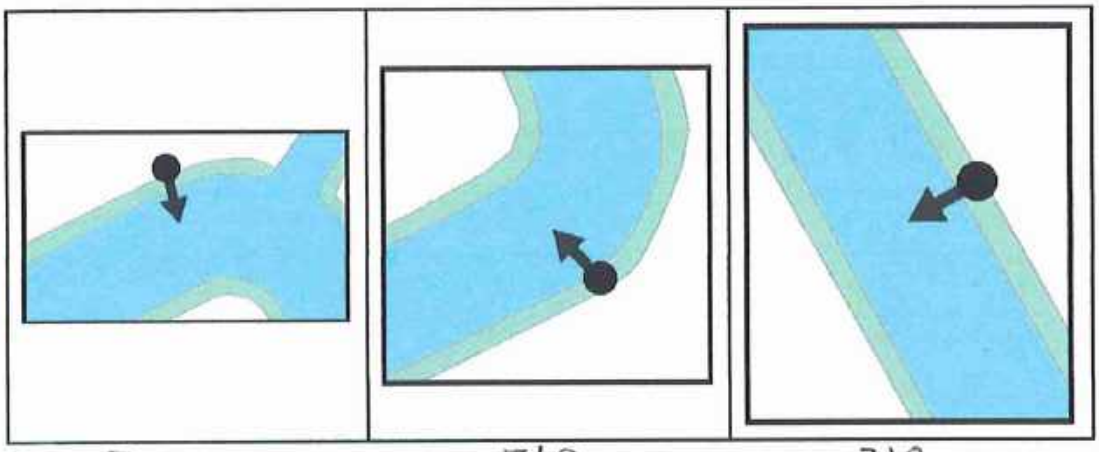


Fig. 8

800 810 820 830

Analysis 1

Target Lighting Layer		
1	4	5
5	3	2
2	5	2

-

Geographic Substantive Performance		
5	1	3
1	2	1
1	4	2

=

Difference		
-4	3	2
4	1	1
1	1	0

ABS()

Absolute Difference		
4	3	2
4	1	1
1	1	0

Total 17 - 840

Analysis 2

5	3	5
5	6	2
2	5	1

-

5	1	2
1	3	1
4	4	8

=

0	2	3
4	3	1
-2	1	-7

ABS()

0	2	3
4	3	1
2	1	7

Total 23 - 840

Fig. 9

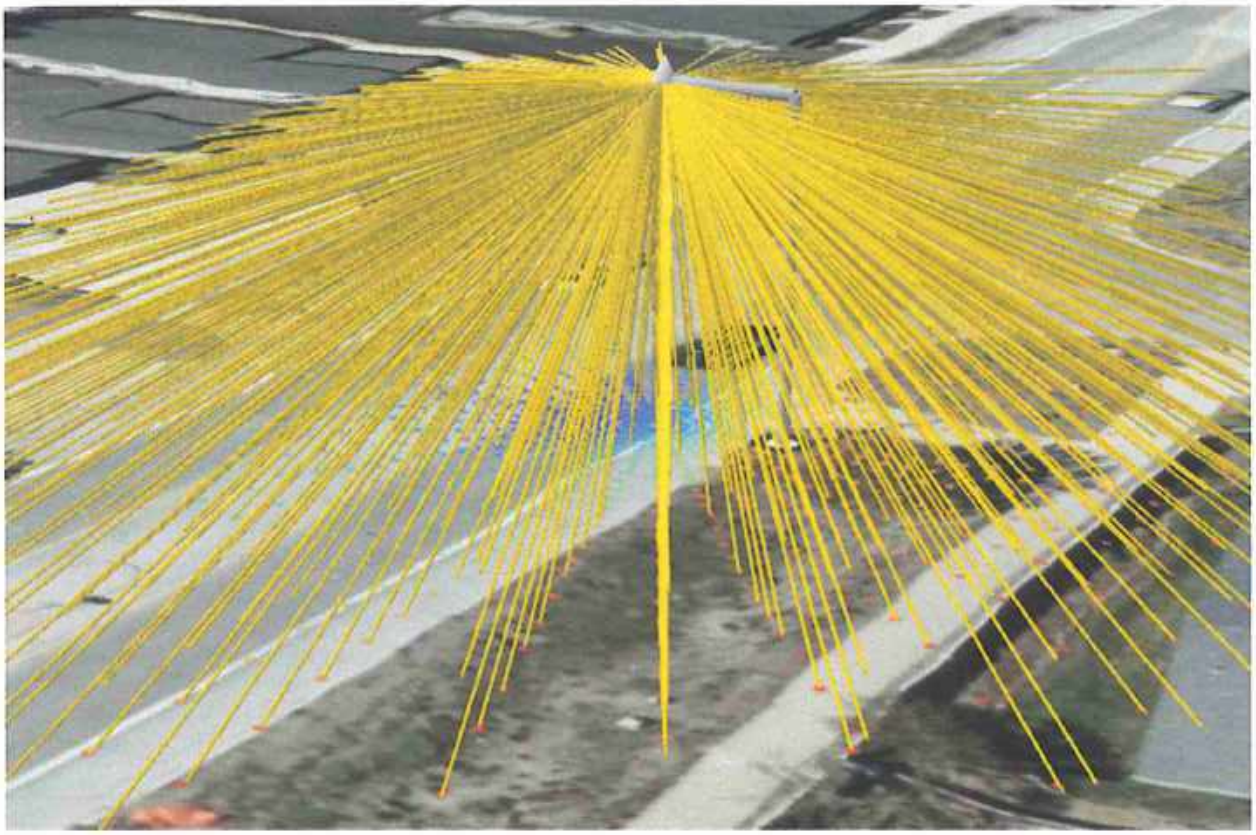


Fig. 10

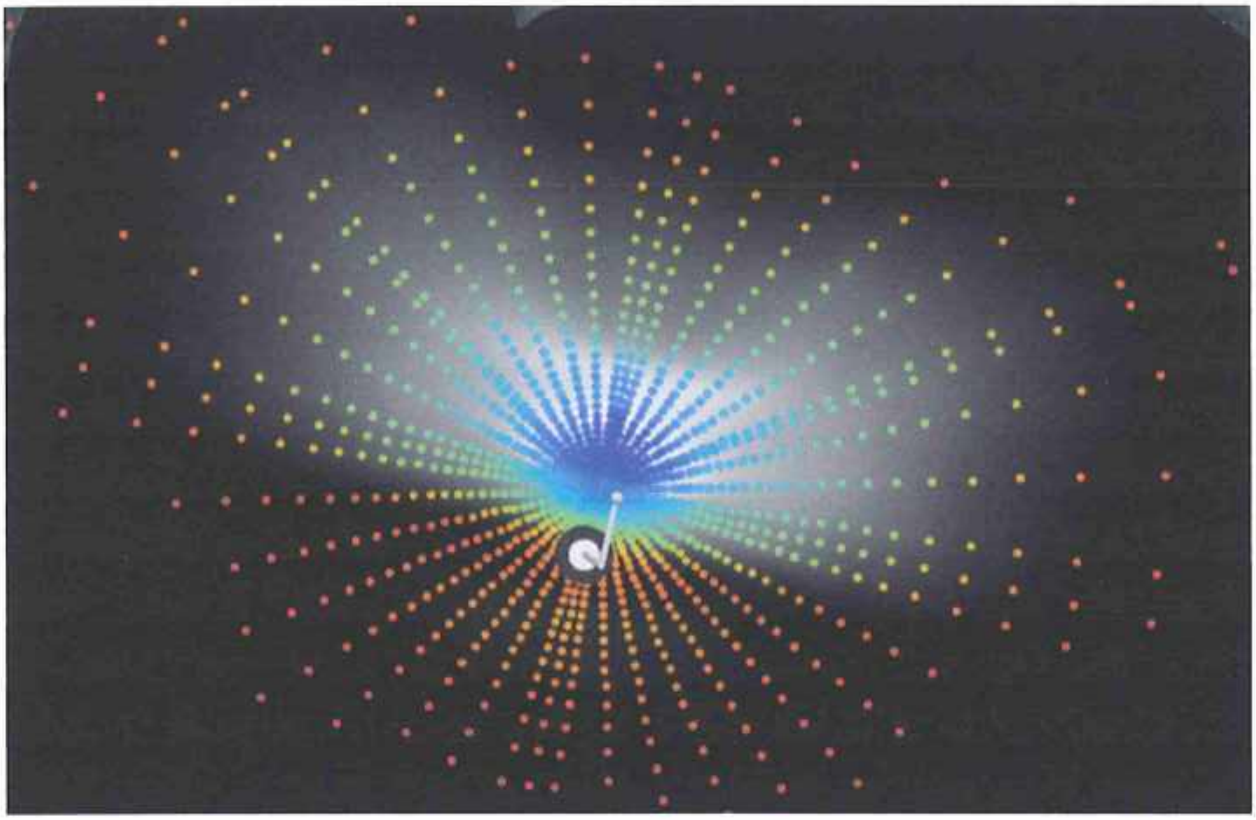
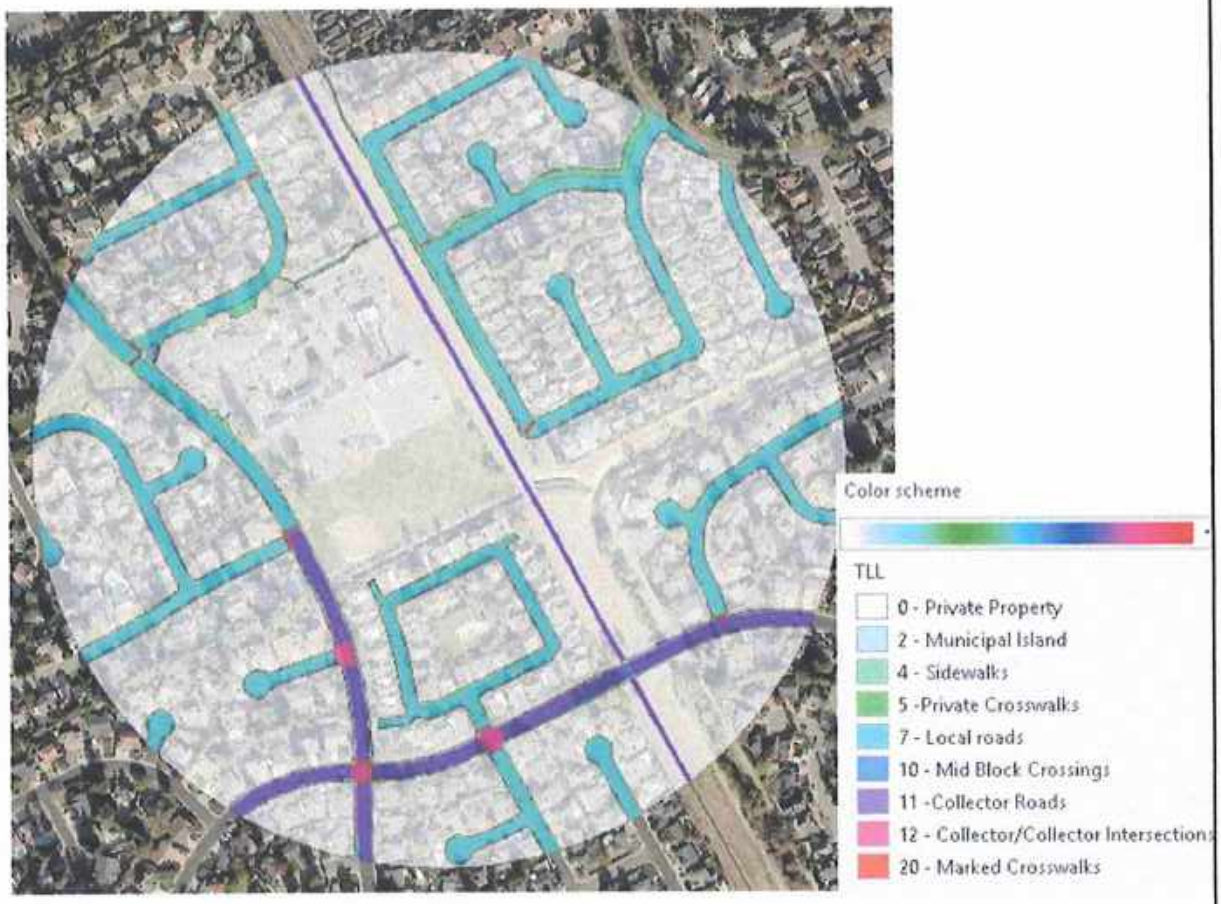


Fig. 11A

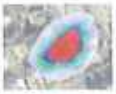
Local hardware based approach - where the Local hardware installed directs the performance of the lighting.



Multiple luminaires are chosen to be evaluated to match the TLL. Raster analysis is done on each one. For each luminiare/IES file, light falls on the ground differently at this location. The Local hardware installed is the only tactic to control the luminaire.

1	2	3	4	5	6	7	8	9	10	11
1) Nolu minaire or	ERL1_A 7C140__ ____- 120- 277V_29 W_LED.i es	AR 18- 96 N- M V- W	GC M2- 40H- MV- NW- 2S- XX-	AT BM P05 R3 XX X VR	GE45 4202. IES	RFL- 190W1 12LED 4KGS 5- IES.ies	OVX2 5SXX7 E.ies	EALS03_D5 SW750____ ____.ies	BLX- II_8_FM_ 256LC_3 _5K.ies	LX T2 - PL ED -II- FR

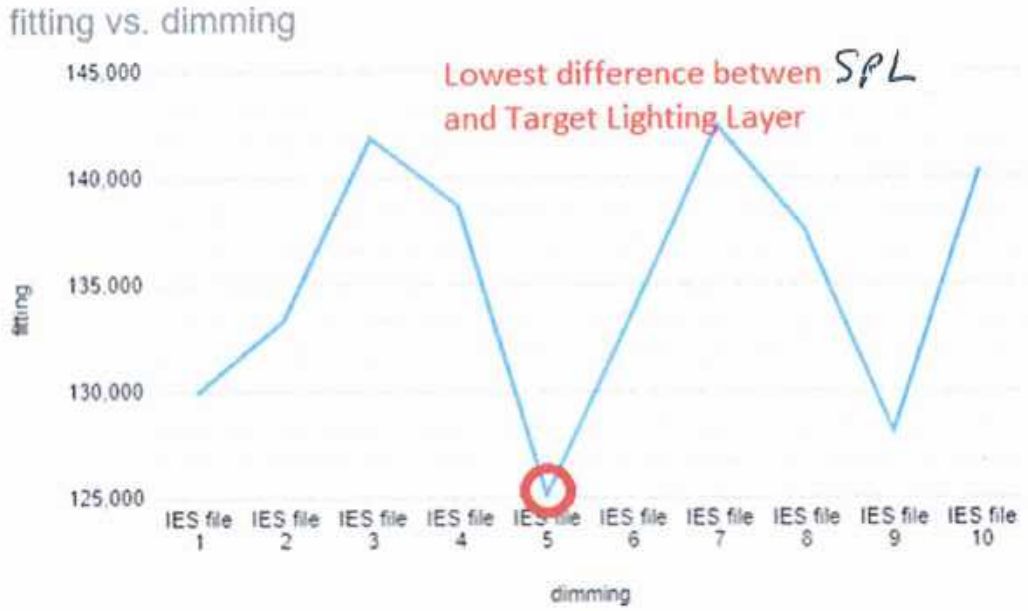
Fig. 11B

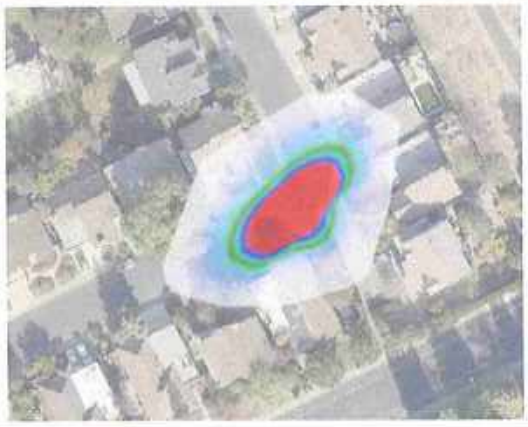
IES file		W-3-XX-210S.ies	850-HSS.IES.ies	3KXXXXX.ies						-40LED-350mA-40K.ies
										
										

The images above are different. They display the amount of light which will fall on the ground at this location at different dimming levels.

Each cell in the 1 band ABS raster has values. The optimum lighting is the one with the lowest values.

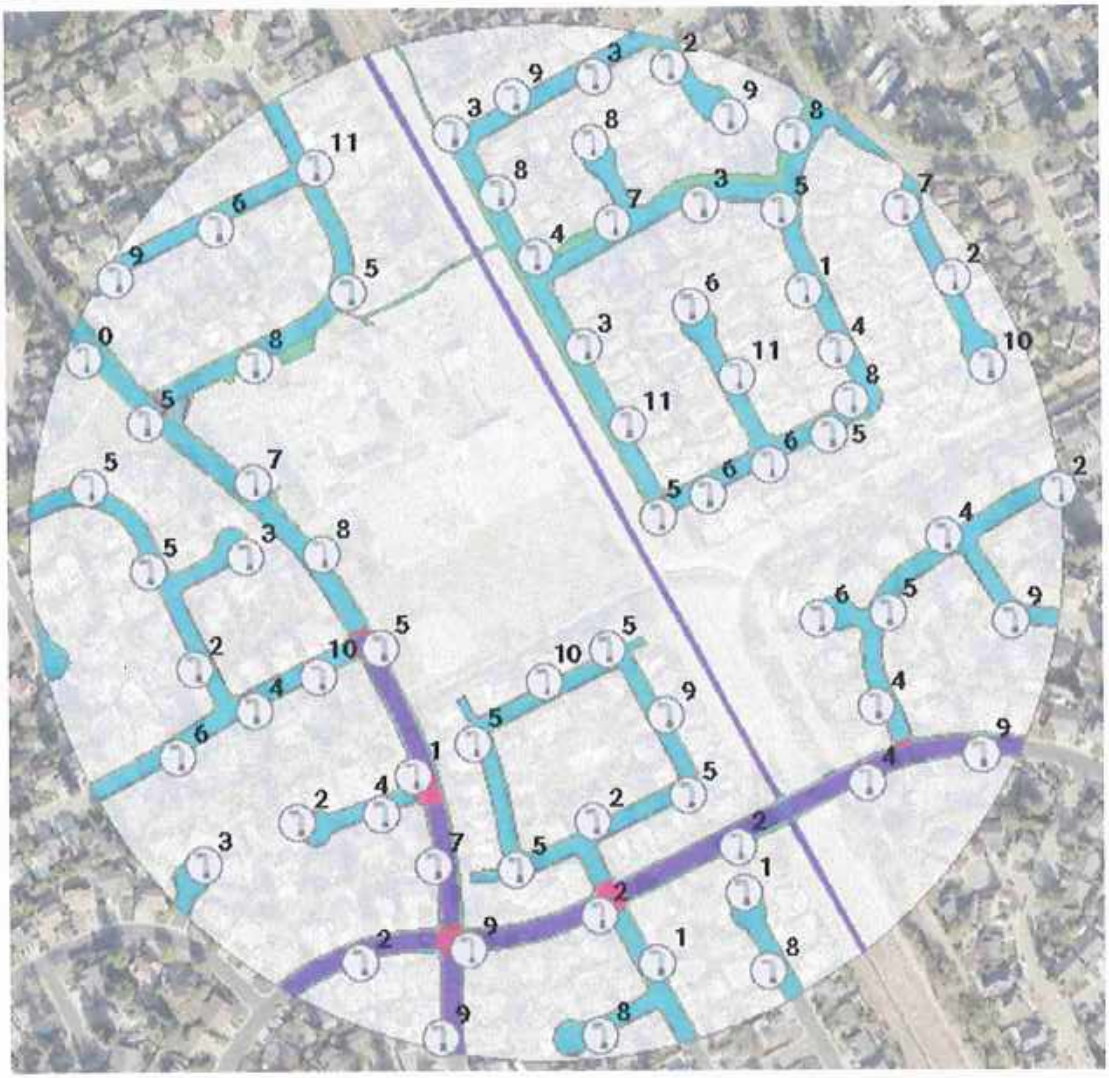
Fig. 11C



Optimum Luminaire/IES File:		
#5. ATBM P05 R3 XXX VR 3K XXXXX.ies		

The steps above show how to run this for a single light model can run this for all lights in project to determine the optimum lighting level.

Fig. 12



In the image above we used 10 IES files and 1 no fixture installed option to determine the Luminiare/IES file which most closely matches the Target Lighting Layer at each location. The numbers above match the chosen luminaire/IES files.

Fig. 13A

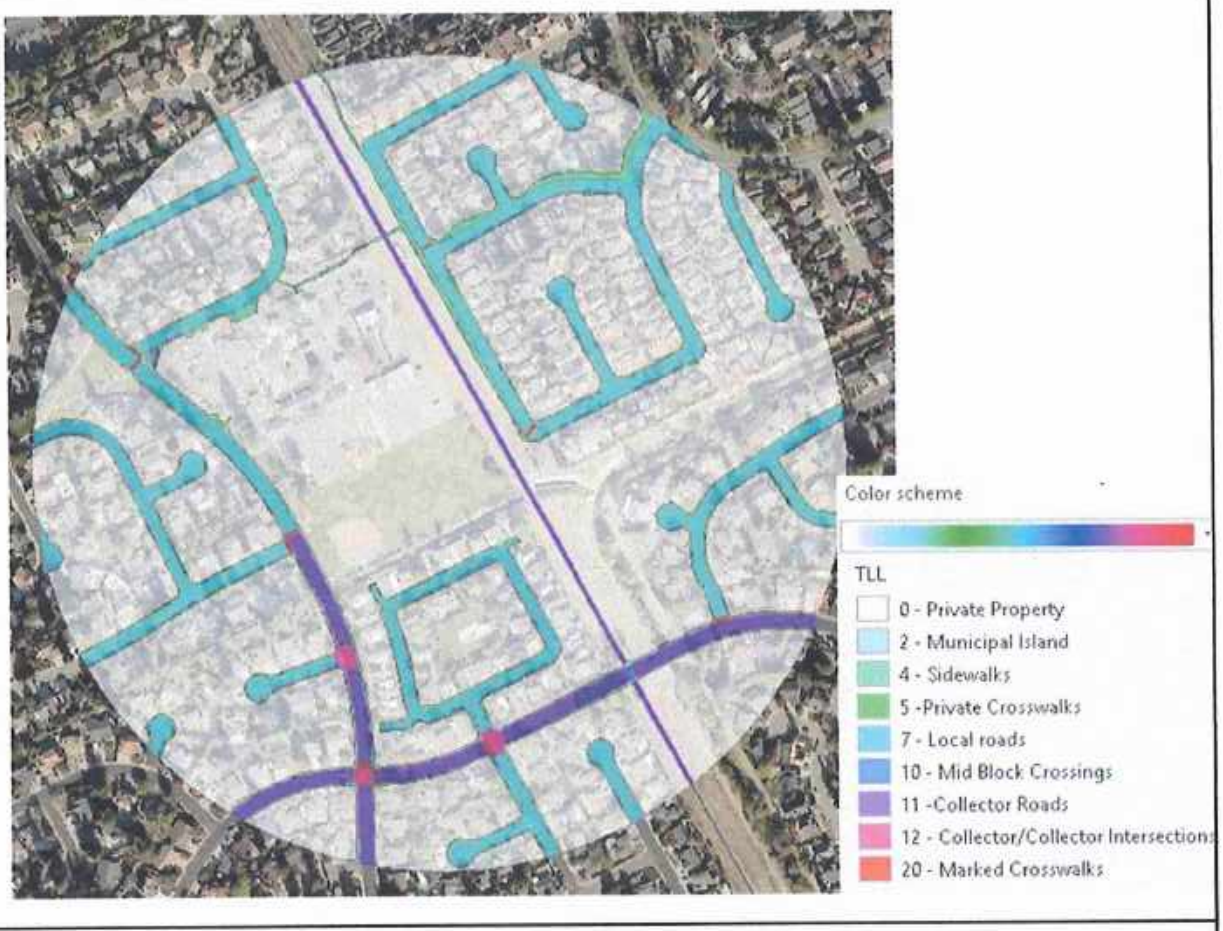
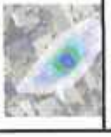
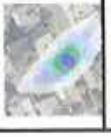
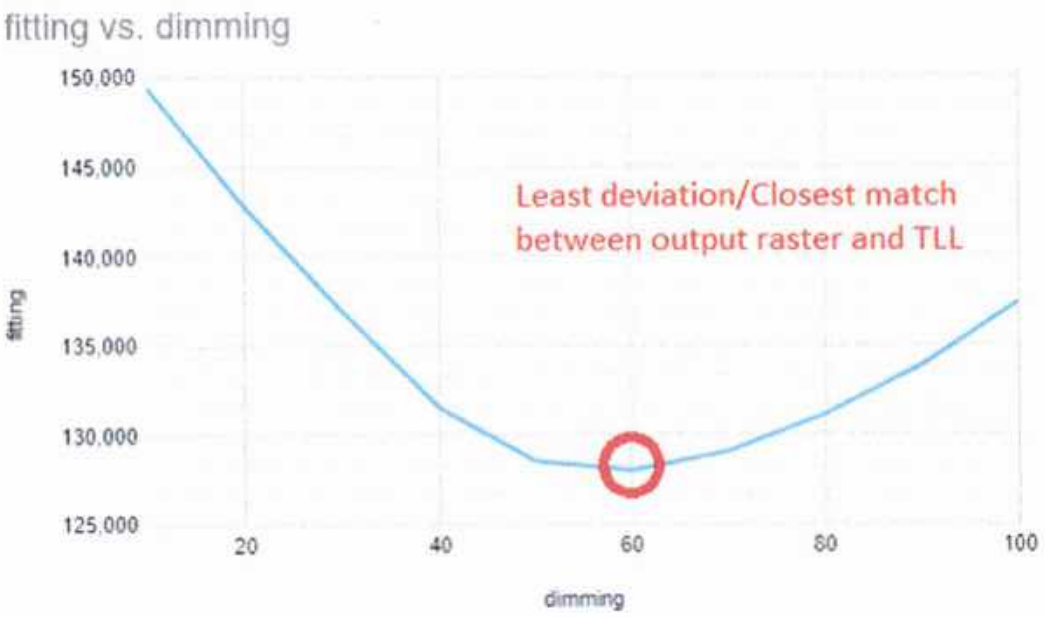

Color scheme
TLL
0 - Private Property
2 - Municipal Island
4 - Sidewalks
5 -Private Crosswalks
7 - Local roads
10 - Mid Block Crossings
11 -Collector Roads
12 - Collector/Collector Intersections
20 - Marked Crosswalks

Fig. 136

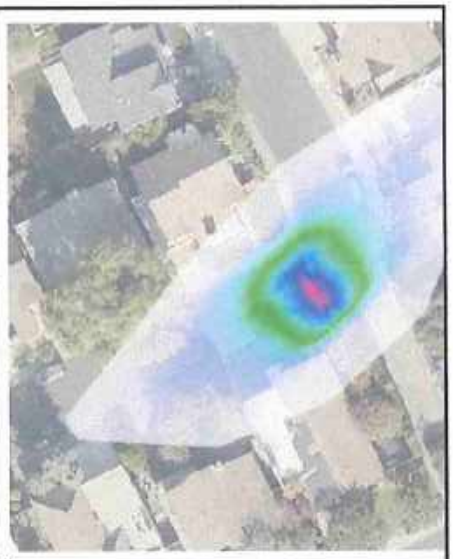
No luminaire or IES file	ERL1_A7C140_____-120-277V_29W_LED									
	Dimmed to 10% power	Dimmed to 20% power	Dimmed to 30% power	Dimmed to 40% power	Dimmed to 50% power	Dimmed to 60% power	Dimmed to 70% power	Dimmed to 80% power	Dimmed to 90% power	Not Dimmed
										
										

The images above are slightly different. They display the amount of light which will fall on the ground at this location at different dimming levels.



Optimum Luminaire/IES File: 60%

Fig. 13C

ERL1_A7C140_____-120-277V_29W_LED Dimmed to 60% power		

The steps above show how to run this for a single light. Model can run this for all lights in project to determine the optimum lighting level.

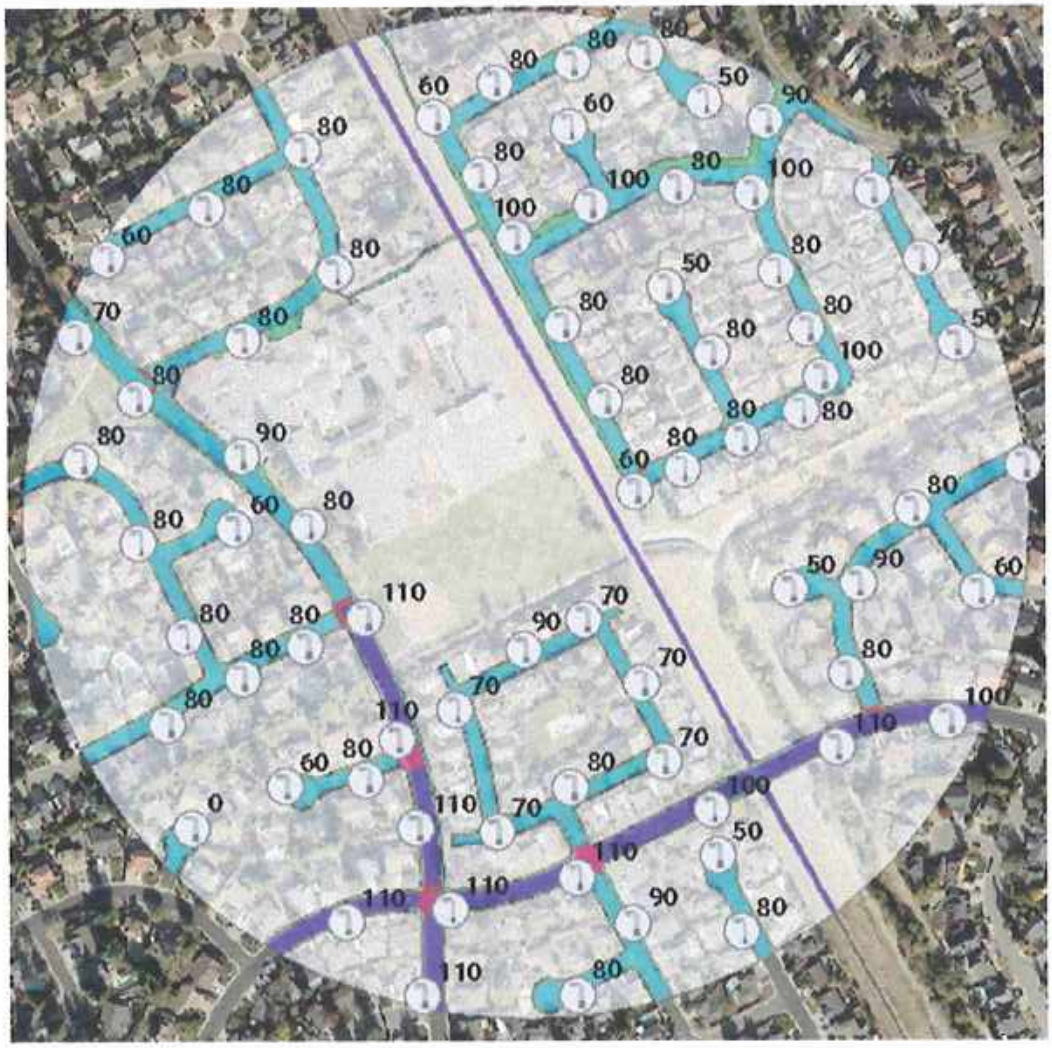


Fig. 14

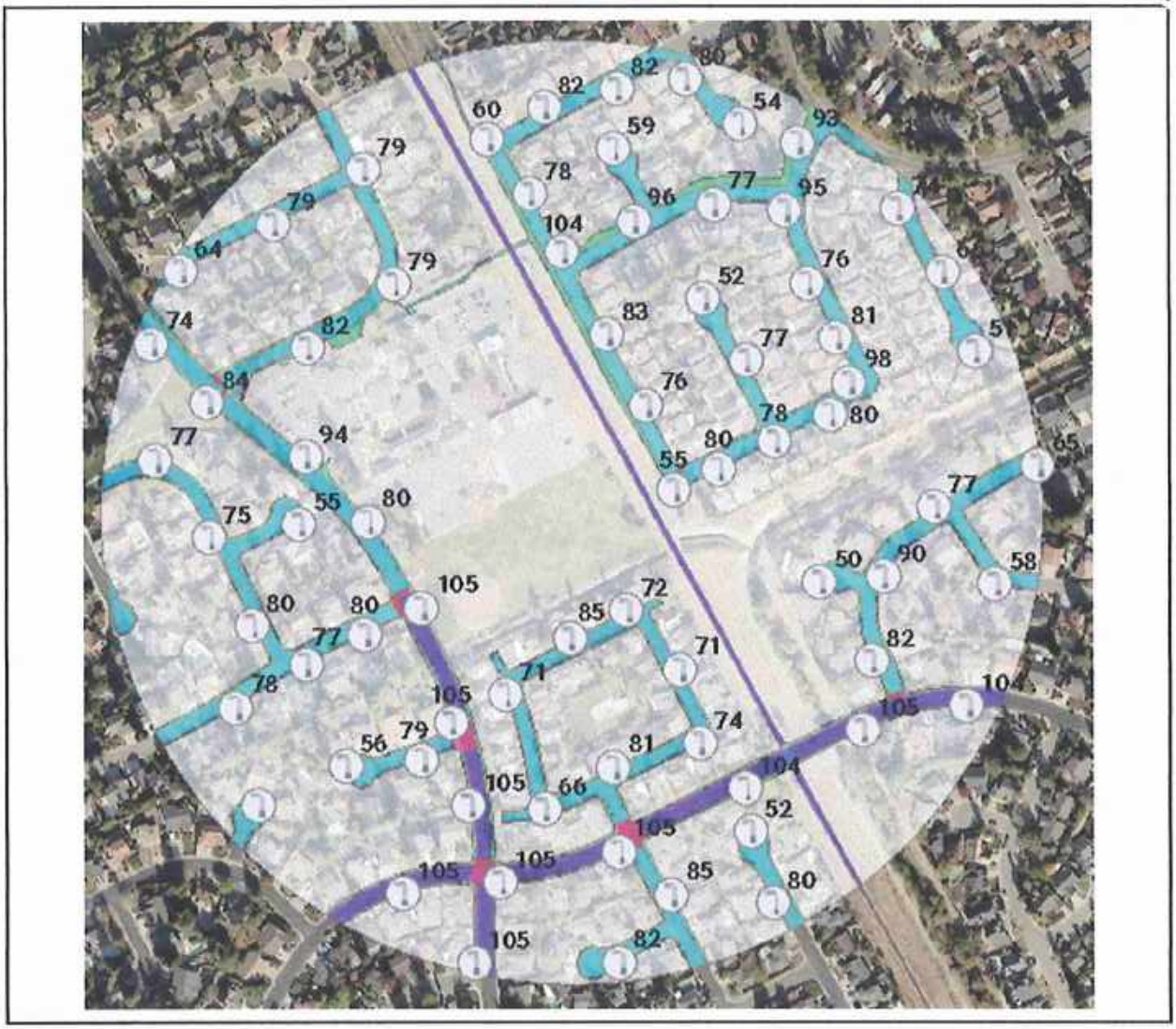

82
82
80
60
54
59
93
79
78
96
77
95
79
104
64
79
76
52
74
82
83
81
77
98
84
76
78
80
77
94
55
80
55
80
75
77
50
90
58
105
72
80
80
85
77
71
71
78
105
74
56
79
81
105
66
104
52
105
105
105
85
80
105
82

Fig. 15

Fig. 16A

6496_4 x 6497_1.tif

6496_0 x 6497_0	6496_0 x 6497_1	6496_0 x 6497_3	6496_0 x 6497_5	6496_0 x 6497_7	6496_0 x 6497_9
6496_1 x 6497_0	6496_1 x 6497_1	6496_1 x 6497_3	6496_1 x 6497_5	6496_1 x 6497_7	6496_1 x 6497_9
6496_2 x 6497_0	6496_2 x 6497_2	6496_2 x 6497_3	6496_2 x 6497_5	6496_2 x 6497_7	6496_2 x 6497_9
6496_3 x 6497_0	6496_3 x 6497_2	6496_3 x 6497_3	6496_3 x 6497_5	6496_3 x 6497_7	6496_3 x 6497_9
6496_4 x 6497_0	6496_4 x 6497_2	6496_4 x 6497_3	6496_4 x 6497_5	6496_4 x 6497_7	6496_4 x 6497_9
6496_5 x 6497_0	6496_5 x 6497_2	6496_5 x 6497_3	6496_5 x 6497_5	6496_5 x 6497_7	6496_5 x 6497_9
6496_6 x 6497_0	6496_6 x 6497_2	6496_6 x 6497_3	6496_6 x 6497_5	6496_6 x 6497_7	6496_6 x 6497_9
6496_7 x 6497_0	6496_7 x 6497_2	6496_7 x 6497_3	6496_7 x 6497_5	6496_7 x 6497_7	6496_7 x 6497_9
6496_8 x 6497_0	6496_8 x 6497_2	6496_8 x 6497_3	6496_8 x 6497_5	6496_8 x 6497_7	6496_8 x 6497_9
6496_9 x 6497_0	6496_9 x 6497_2	6496_9 x 6497_3	6496_9 x 6497_5	6496_9 x 6497_7	6496_9 x 6497_9
6496_10 x 6497_0	6496_10 x 6497_2	6496_10 x 6497_3	6496_10 x 6497_5	6496_10 x 6497_7	6496_10 x 6497_9
6496_0 x 6497_0	6496_0 x 6497_2	6496_0 x 6497_4	6496_0 x 6497_6	6496_0 x 6497_8	6496_0 x 6497_10
6496_1 x 6497_1	6496_1 x 6497_2	6496_1 x 6497_4	6496_1 x 6497_6	6496_1 x 6497_8	6496_1 x 6497_10
6496_2 x 6497_1	6496_2 x 6497_2	6496_2 x 6497_4	6496_2 x 6497_6	6496_2 x 6497_8	6496_2 x 6497_10
6496_3 x 6497_1	6496_3 x 6497_2	6496_3 x 6497_4	6496_3 x 6497_6	6496_3 x 6497_8	6496_3 x 6497_10

Fig. 16B

6496_4 x 6497_1	6496_4 x 6497_2	6496_4 x 6497_4	6496_4 x 6497_6	6496_4 x 6497_8	6496_4 x 6497_10
6496_5 x 6497_1	6496_5 x 6497_2	6496_5 x 6497_4	6496_5 x 6497_6	6496_5 x 6497_8	6496_5 x 6497_10
6496_6 x 6497_1	6496_6 x 6497_2	6496_6 x 6497_4	6496_6 x 6497_6	6496_6 x 6497_8	6496_6 x 6497_10
6496_7 x 6497_1	6496_7 x 6497_2	6496_7 x 6497_4	6496_7 x 6497_6	6496_7 x 6497_8	6496_7 x 6497_10
6496_8 x 6497_1	6496_8 x 6497_2	6496_8 x 6497_4	6496_8 x 6497_6	6496_8 x 6497_8	6496_8 x 6497_10
6496_9 x 6497_1	6496_9 x 6497_2	6496_9 x 6497_4	6496_9 x 6497_6	6496_9 x 6497_8	6496_9 x 6497_10
6496_10 x 6497_1	6496_10 x 6497_2	6496_10 x 6497_4	6496_10 x 6497_6	6496_10 x 6497_8	6496_10 x 6497_10

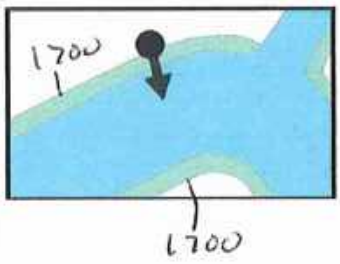
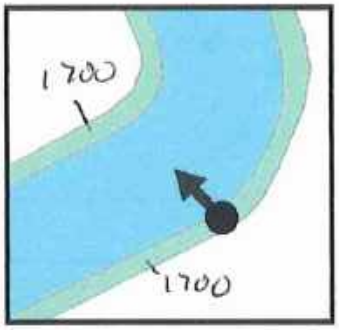
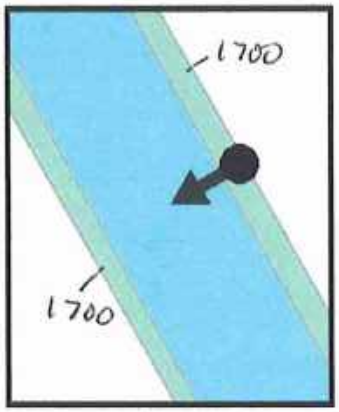
			
Local hardware	AR18-96N-MV-WW-3-XX-210 S.ies	ERL1_A7C140_____-120-277V_29W_LED	LXT2-PLED-II-FR-40LED-350mA-40K.ies
Remote software	ERL1_A7C140_____-120-277V_29W_LED Run at 72% power	ERL1_A7C140_____-120-277V_29W_LED Run at 74% power	ERL1_A7C140_____-120-277V_29W_LED Run at 71% power

Fig. 17

Fig. 18

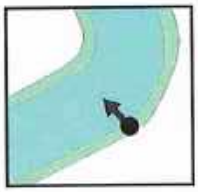
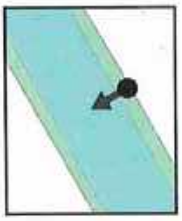
Image Chip 1800			
Label 1810	ERL1_A7C140__ ____-120-277V_2 9W_LED Run at 72% power	ERL1_A7C140__ ____-120-277V_2 9W_LED Run at 74% power	ERL1_A7C140__ ____-120-277V_2 9W_LED Run at 71% power

Fig. 19