

APPENDIX B

Lighting Study



Lowe's Parking Lot Lighting Study
City of Manteca, CA
Prepared by Auerbach Glasow

Executive Summary

- Average maintained light levels exceed recommended practice by about 300%.
- The revised layout effectively integrates the lighting and landscape.
- Indirect glare from wall mounted fixtures is caused by high light output towards the wall.
- Wall fixtures are lamped at a much higher wattage than necessary
- The northeast corner of the site is significantly underlit

Summary of Recommendations

- Reduce lamp wattages on all pole fixtures 400W to 250W.
- Reduce lamp wattages on all wall mounted fixtures to 150W.
- Include glare shield with all type WL and WL-250 fixtures to reduce back splash.
- Add one to two fixtures at the northeast corner of the site to improve light levels.

Process

Lighting levels, light trespass, and high-angle glare were assessed for the parking lot and adjacent areas of Lowe's shopping center in Manteca, CA. Calculations were prepared by Auerbach Glasow, using AGI32 v1.92, by Lighting Analysts, using a calculation file provided by Page Interworks as a template. Site layout, landscaping, fixture layouts, and photometric files were based on the materials provided by Page Interworks. Calculations were run to assess horizontal and vertical light levels, glare, and light trespass. Calculation results were compared to value recommendations in Auerbach's Revised Draft Report and values from the previous original layout.

Results were analyzed based on lighting recommendations published by the International Engineering Society of North America (IESNA), California Energy Commission (CEC), the International Dark-Sky Association (IDA), and discussions with Kitchell Development Company, EDAW, and the city of Manteca.



Lighting Code Recommendations for Parking Lots

Table 1 summarizes the lighting recommendations from Section 22 of the IESNA Handbook, 9th Edition.

Table 1 - Recommended maintained illuminance for parking lots

| | |
|--|--------|
| Recommended Average Horizontal Illuminance at pavement | 1.0 fc |
| Minimum Horizontal Illuminance at pavement | 0.2 fc |
| Horizontal Uniformity Ratio, Maximum-to-Minimum | 20:1 |
| Minimum Vertical Illuminance at 5' above pavement | 0.1 fc |

The maximum allowed lighting power densities prescribed by the CEC in Title 24 are based upon the Lighting Zone the site is located in. According to the CEC, those areas not designated as a park, recreation area, or wildlife preserve, or otherwise redefined by a local jurisdiction, shall be considered in Lighting Zone 2 if the property is located in a rural census tract, and Lighting Zone 3 if the area is located in an urban census tract, per the U.S. 2000 Census map. The Lowe's site is in an urban tract [Appendix A], and is therefore in Lighting Zone 3. Title 24 allows a maximum of 0.15 watts per square foot for site lighting in this Lighting Zone. The current layout complies with Title 24.

Calculated Site Lighting Values

The calculation model includes mature trees and planting, arranged according to the most recent landscape plans provided to Page Interworks. A lamp lumen depreciation value of 0.65 and a luminaire dirt depreciation value of 0.89 were assumed, yielding a light loss factor of 0.58. All values discussed reflect this 0.58 light loss factor. Initial footcandle values will be about twice what is shown. The results of this calculation set are summarized and compared to the recommended criteria in Table 2. Values that fail to meet the criteria are shown in red. In general, light levels far exceed requirements, except where light is directly occluded by foliage. There is one exception to this statement. At the northeast corner of the site, light levels fall to 0.0fc [Appendix B-2]. One or more fixtures should be added at this location. The highest light levels are found directly below the type A fixtures mounted to the building at the west end of the site. Light levels are as high as 9.2fc at this location. Light levels are also more than twice the site average where the type WL fixtures are located.



Table 2 – Comparison of recommended versus calculated lighting values.

| Criteria | Recommended Value | Original layout | Revised layout |
|--|-------------------|------------------------|----------------|
| Recommended Average Horizontal Illuminance at pavement | 1.0 fc | 3.1 fc | 2.9 fc |
| Minimum Horizontal Illuminance at pavement | 0.2 fc | 0.0 fc | 0.1 fc |
| Horizontal Uniformity Ratio, Maximum-to-Minimum | 20:1 | ∞:1¹ | 92:1 |
| Minimum Vertical Illuminance at 5' above pavement | 0.1 fc | 0.1 fc | 0.3 fc |
| Lighting Power Density | 0.15 W/sqft | 0.145 W/sqft | 0.122 W/sqft |

¹Minimum horizontal light levels for this calculation condition were 0.0 fc.

Glare and Light Trespass

To assess light trespass, light levels were calculated at the site boundary and across the street from the site. In the previous calc, light levels at the neighboring properties averaged 0.15 fc, with a maximum of 0.5 fc [Table 3]. Light levels at the site boundary were much higher [Table 4], ranging as high as 2.67 fc, average and 7.2 fc maximum. Based on Auerbach’s recommendations, fixtures were fitted with house-side shields and oriented away from the site boundary. In general, light trespass is significantly reduced from the previous layout. The only location where light levels increased is at Site 4. However, since light levels at Neighbor 3 - located directly beyond Site 2 - decreased, no further action needs to be taken in regards to this discrepancy. Based on the roadway light levels provided by the city of Manteca [Appendix C], the amount of light trespass from the Lowe’s site is reasonable, given the adjacent lighting conditions.

Table 3 – Summary of light levels at boundary of neighboring properties

| Neighboring Boundary | Original | | Revised | |
|----------------------|----------|------|---------|------|
| | Avg. | Max. | Avg. | Max. |
| Neighbor 1 | 0.15 | 0.3 | 0.05 | 0.2 |
| Neighbor 2 | 0.08 | 0.2 | 0.03 | 0.1 |
| Neighbor 3 | 0.17 | 0.5 | 0.13 | 0.2 |

* Refer to Appendix D for calculation plan locations.

Table 4 – Summary of light levels at site boundary

| Site Boundary * | Original | | Revised | |
|-----------------|----------|------|-------------|------------|
| | Avg. | Max. | Avg. | Max. |
| Site 1 | 1.07 | 7.2 | 0.29 | 2.5 |
| Site 2 | 1.17 | 3.8 | 0.00 | 0.1 |
| Site 3 | 0.24 | 1.5 | 0.13 | 0.4 |
| Site 4 | 0.59 | 1.7 | 0.65 | 2.4 |
| Site 5 | 1.37 | 4.1 | 1.15 | 2.9 |

* Refer to Appendix D for calculation plan locations.



Indirect glare was analyzed at walls where type WL and WL-250 fixtures [Appendix E-1] are located. Calculations were taken at the wall plane, and analyzed based on the IDA recommendations for glare; that the maximum intensity in one's field of view shall not exceed 10 times that of the average lighting level. Maximum to average ratios at the wall were found to be 35:1 on average, far exceeding IDA recommendations [Table 5].

Table 5 – Evaluation of glare at wall surfaces.

| Building Surface | Maximum (fc) | Average (fc) | Max. to Min. Ratio |
|------------------|--------------|--------------|--------------------|
| Wall 1 | 69.8 | 4.50 | 15.5 |
| Wall 2 | 241 | 6.28 | 38.4 |
| Wall 3 | 270 | 8.28 | 32.6 |
| Wall 4 | 168 | 4.34 | 38.7 |
| Wall 5 | 108 | 2.11 | 51.2 |

Refer to Appendix D for calculation plan locations.

Summary and Discussion

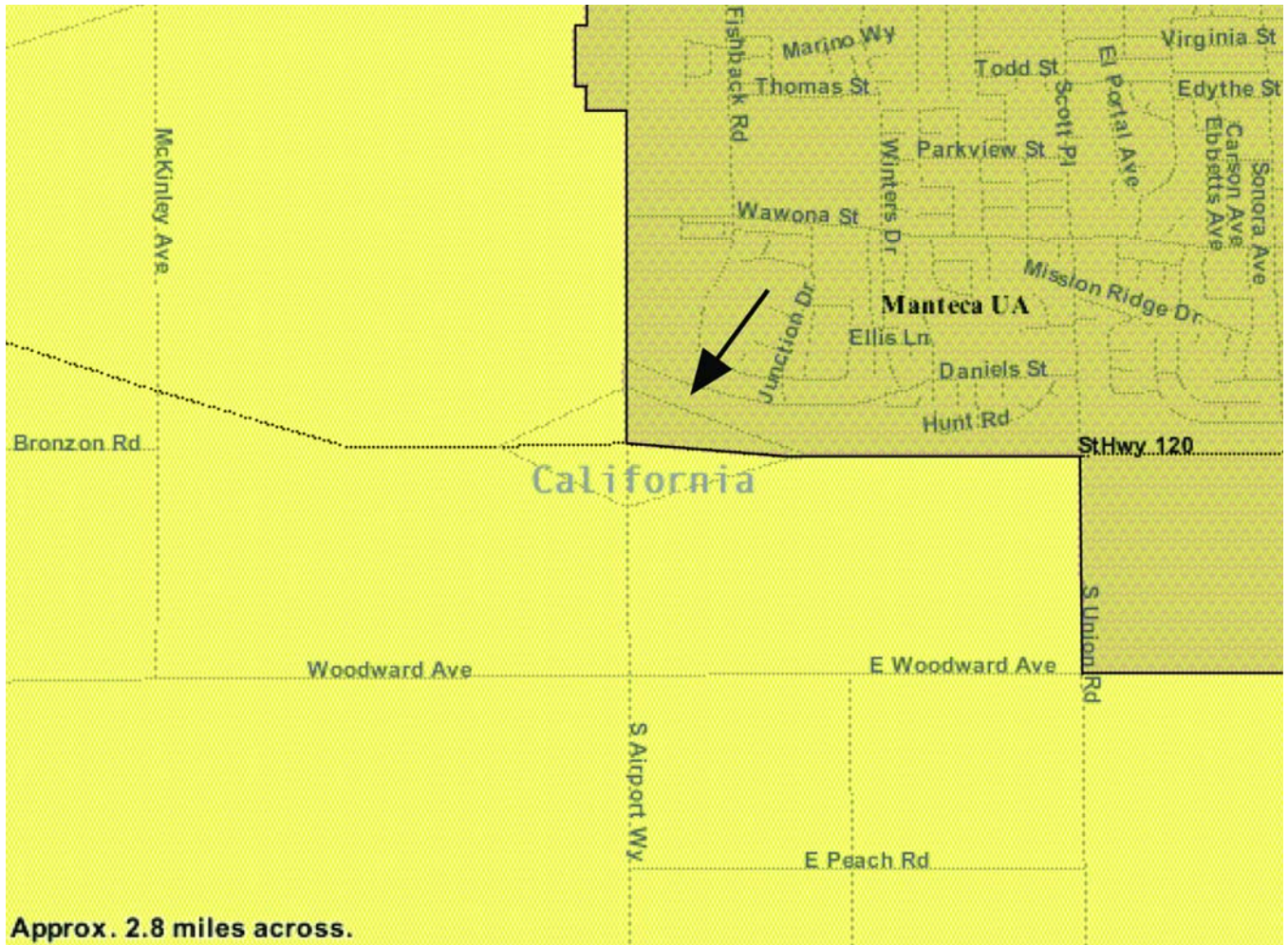
The revisions made to the landscaping and lighting layout greatly improve the lit uniformity of the parking lot. Previous reports from AG recommended reducing the lighting level to one half to one third of levels shown. Lamp wattages were reduced for most fixtures, but fixture quantity was significantly increased. AG recommends further reductions to lamp wattage. All fixtures currently lamped at 400W could be reduced to 250W without compromising the safety or security. Light levels will be reduced by approximately 25% and energy consumption by approximately 35%. All wall mounted fixtures (types, A, WL, and WL-250) should be reduced to 150W.

There is minimal light reaching neighboring sites, and this is further reduced by the presence of trees along the site perimeter. By orienting fixtures away from the site boundary, light trespass has been significantly reduced. However, glare from fixture type WL and WL-250 is still a concern. Auerbach Glasow recommends the addition of a glare shield for all wall mounted fixtures [Appendix E-2] on the Lowe's project. A sample calculation suggests that this adjustment will reduce the max-to-average ratio at the walls by about half, greatly improving the uniformity of the lighting at the wall without significantly reducing the overall light level at the pavement. In general, all wall mounted fixtures can be lamped down to 150W while still maintaining appropriate light levels.



Appendix A – U.S. 2000 Census map for Site

From: <http://factfinder.census.gov>

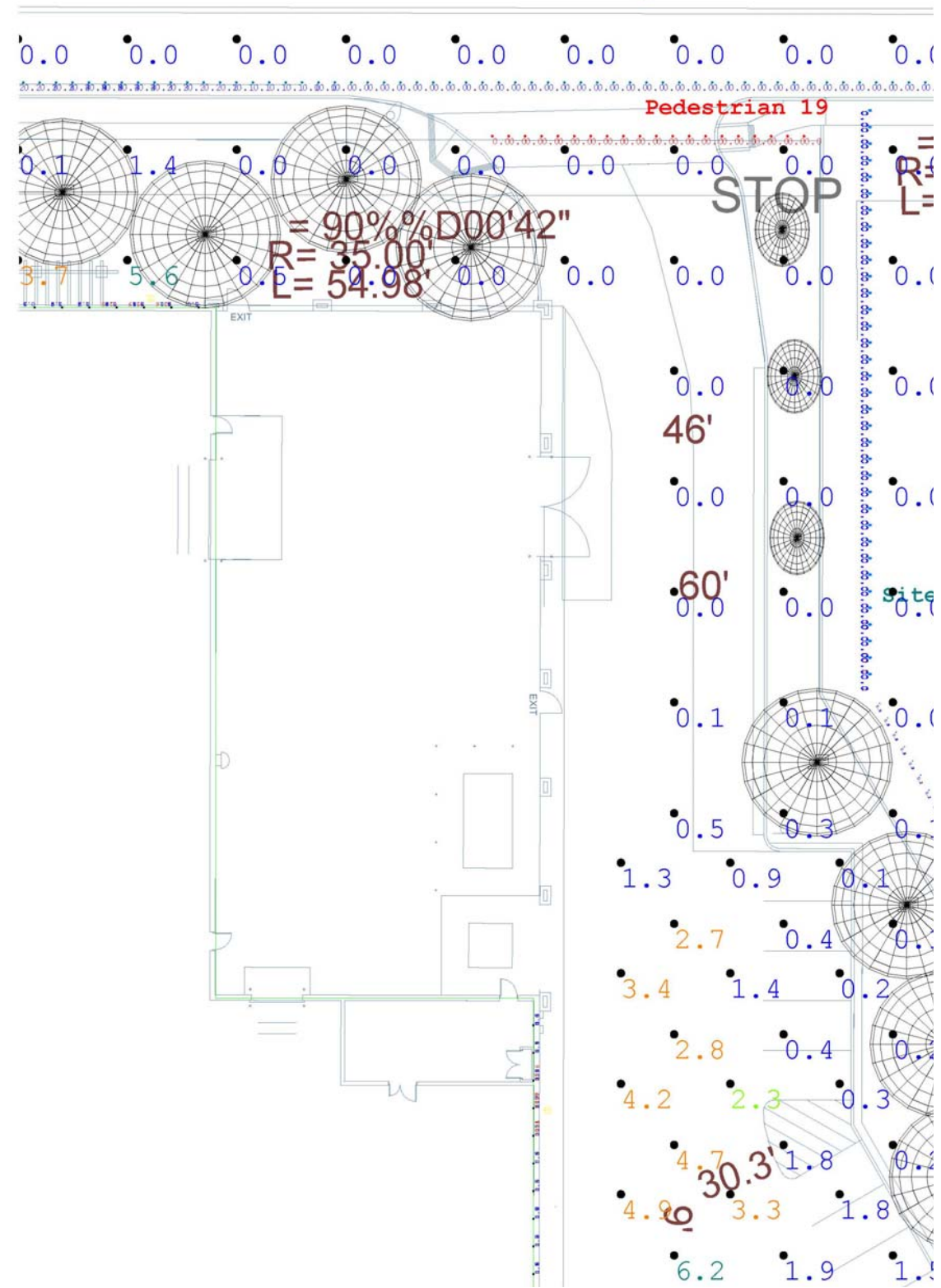
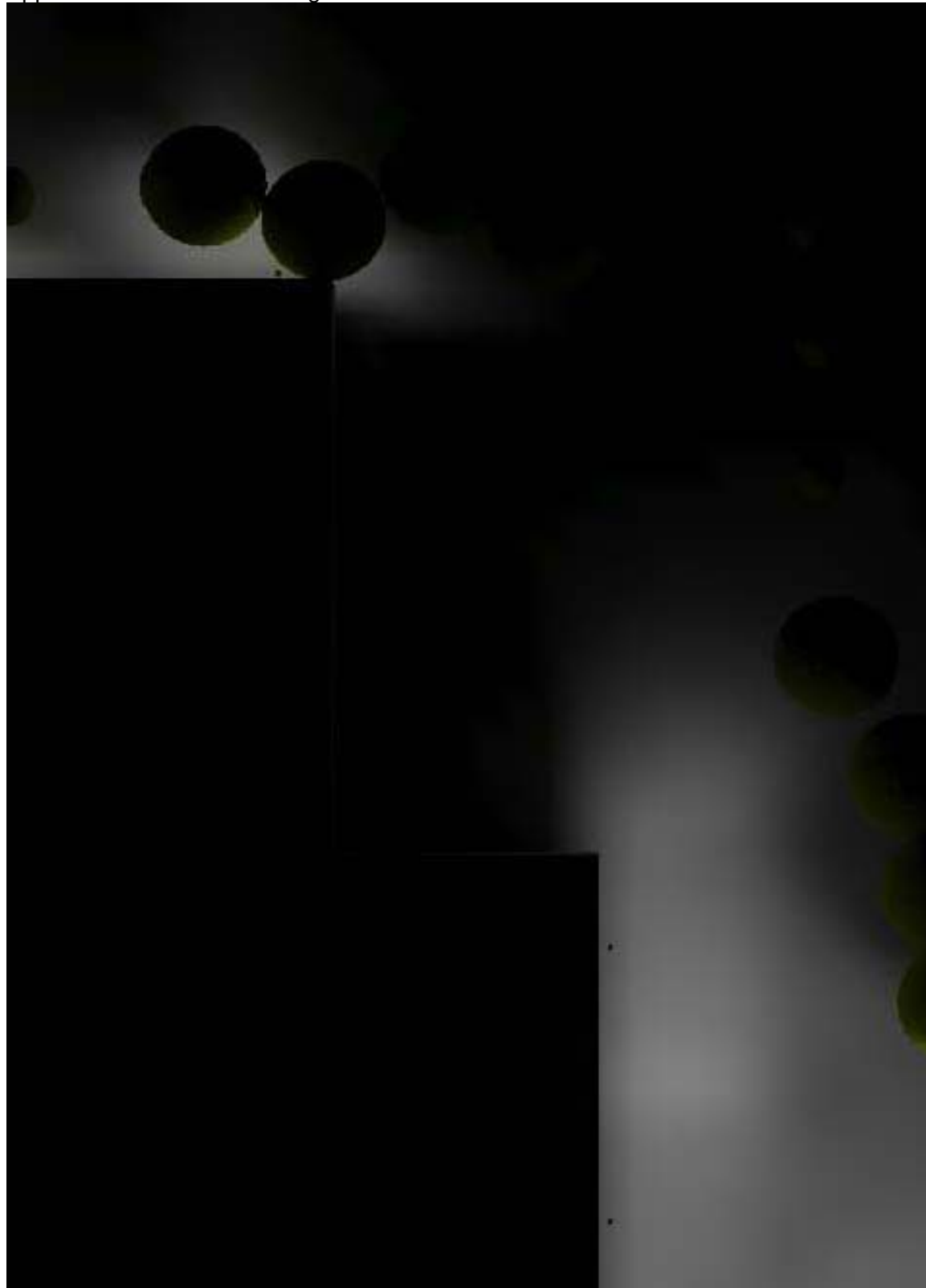




Appendix B-1 – Site rendering – Plan View

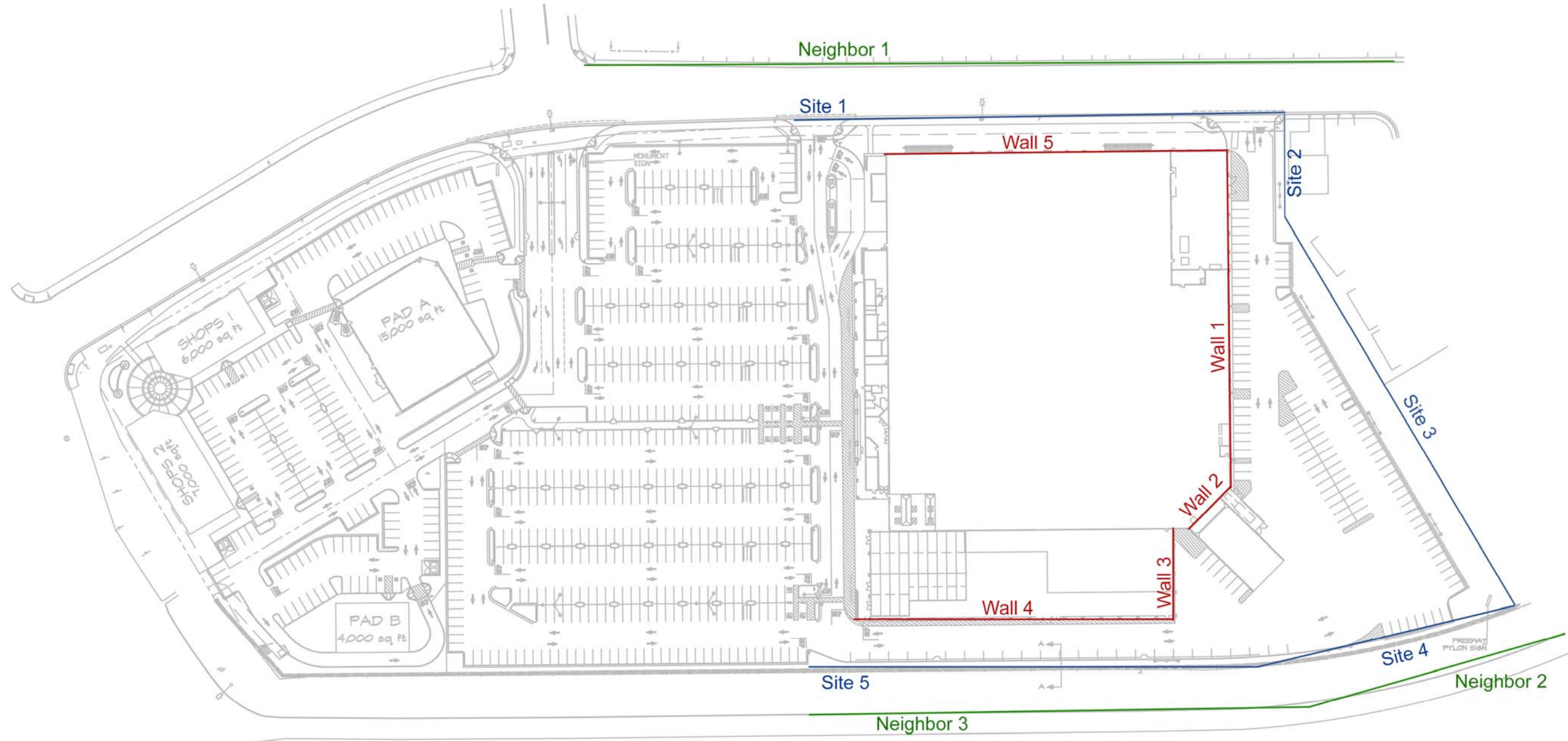


Appendix B-2 – Site rendering and calculation – Plan View at Northeast Corner





Appendix D – Site location of calculation planes





Appendix E-1 – Photometric reports for specified fixtures

Fixture types WL, WL-250, and H23FG

Photometric Report (Type C)

Filename: hp08644.ies
[TEST] HP-08644
[ISSUEDATE] 3- 1-2001
[MANUFAC] Hubbell Lighting, Inc., Christiansburg, VA 24073-2500
[LUMCAT] MSVA0400H-FPx-x
[LUMINAIRE] MAGNUSQUARE - MSV SERIES - ARCHITECTURAL REFL_ SPECULAR ALUMINUM ENCL_ CLEAR, FLAT G
[LAMPCAT] MH400 U
[LAMP] 400W MET_ HAL_ ED 37, CLEAR

Maximum Candela = 21584 at 55 H 65 V

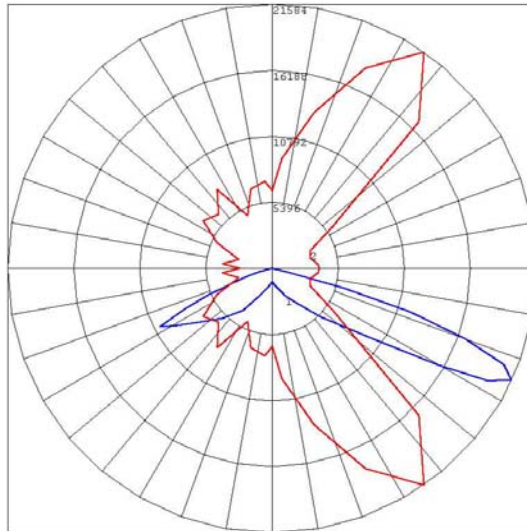
Classification:

Road Classification: Type III, Short, Full Cutoff
Indoor Classification: Direct

Polar Candela Curves:

Vertical Plane Through:
1) 55 - 235 Horizontal

Horizontal Cone Through:
2) 65 Vertical





Appendix E-2 – Photometric reports for specified fixtures

Fixture types Q27FG and H127FG
Recommended distribution for types WL and WL-250

Photometric Report (Type C)

Filename: HP08643.IES
 [TEST] HP-08643
 [ISSUEDATE] 2-28-2001
 [MANUFAC] Hubbell Lighting, Inc., Christiansburg, VA 24073-2500
 [LUMCAT] MSVA0400HFPx3-GS
 [LUMINAIRE] MAGNUSQUARE - MSV SERIES - ARCHITECTURAL REFL_ SPECULAR ALUMINUM ENCL_ CLEAR, FLAT G
 [LAMPCAT] MH400 U
 [LAMP] 400W MET_ HAL_ ED 37, CLEAR

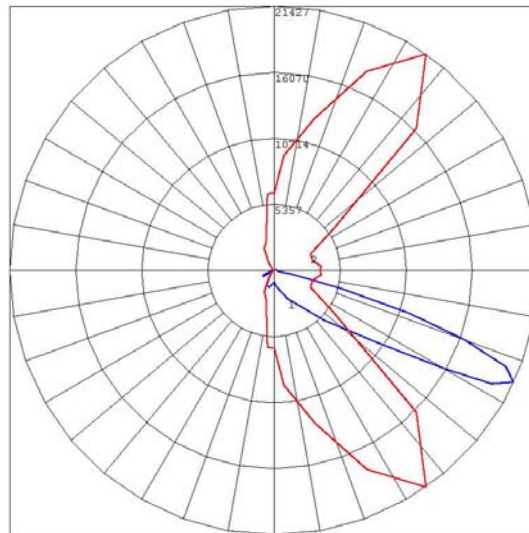
Maximum Candela = 21427 at 55 H 65 V

Classification:

Road Classification: Type III, Short, Cutoff
 Indoor Classification: Direct

Polar Candela Curves:

Vertical Plane Through:
 1) 55 - 235 Horizontal
 Horizontal Cone Through:
 2) 65 Vertical



AGI32/Photometric Report Generator - Copyright 1999-2006 by Lighting Analysts, Inc.



Appendix E-3 – Photometric reports for specified fixtures

Fixture types G27FG, L27FG, B27FG, and Z27FG

Photometric Report (Type C)

Filename: HP08645.IES
 [TEST] HP-08645
 [ISSUEDATE] 3- 1-2001
 [MANUFAC] Hubbell Lighting, Inc., Christiansburg, VA 24073-2500
 [LUMCAT] MSVA0400H-FWx-x
 [LUMINAIRE] MAGNUSQUARE - MSV SERIES - ARCHITECTURAL REFL_ SPECULAR ALUMINUM ENCL_ CLEAR, FLAT G
 [LAMPCAT] MH400 U
 [LAMP] 400W MET_ HAL_ ED 37, CLEAR

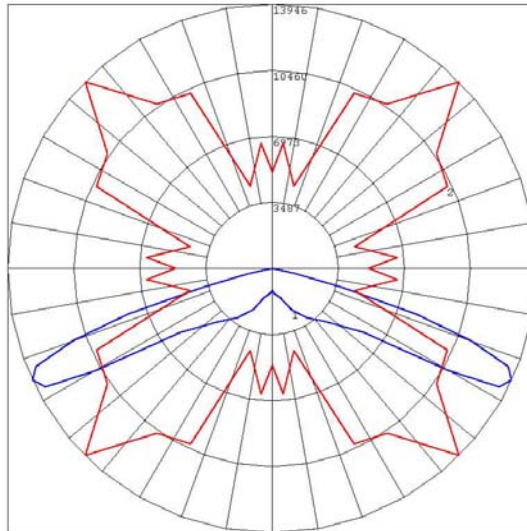
Maximum Candela = 13946 at 45 H 65 V

Classification:

Road Classification: Type V, Short, Full Cutoff
 Indoor Classification: Direct

Polar Candela Curves:

Vertical Plane Through:
 1) 45 - 225 Horizontal
 Horizontal Cone Through:
 2) 65 Vertical



AGI32/Photometric Report Generator - Copyright 1999-2006 by Lighting Analysts, Inc.



Appendix E-4 – Photometric reports for specified fixtures

Fixture type A

Photometric Report (Type C)

Filename: Lt18509.IES
[TEST] LTL8509
[MANUFAC] LITHONIA LIGHTING
[LUMCAT] KSF2 400M R4W
[LUMINAIRE] ARM MOUNTED PREMIUM CUTOFF W_R4W REFL, CLEAR GLASS FLAT LENS_
[LAMPCAT] MH400 U_ED28
[LAMP] ONE 400-WATT CLEAR ED-28 METAL HALIDE, HORIZONTAL POSITION_

Maximum Candela = 16613 at 40 H 67.5 V

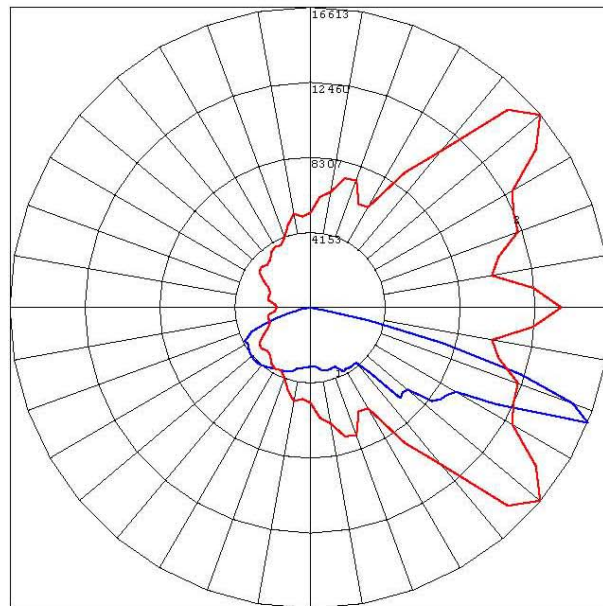
Classification:

Road Classification: Type IV, Short, Full Cutoff
Indoor Classification: Direct

Polar Candela Curves:

Vertical Plane Through:
1) 40 - 220 Horizontal

Horizontal Cone Through:
2) 67.5 Vertical



AGI32/Photometric Report Generator - Copyright 1999-2006 by Lighting Analysts, Inc.

March 2007 Lighting Study



Lowe's Parking Lot Lighting Study
City of Manteca, CA
Prepared by Auerbach Glasow

Executive Summary

- Initially, minimum light levels exceed recommendations by 350-400% and higher, with average light levels exceeding recommendations by about 600%.
- Once landscaping grows to full maturity, minimum light levels and uniformity ratios will not be met in some areas.
- Pole fixture locations have a high maximum candela angle, posing a glare problem when oriented towards the site boundary.
- Indirect glare from wall mounted fixtures is caused by high light output towards the wall.
- Task 2 will be necessary for project to meet IESNA recommended practice.

Summary of Recommendations

- Reduce lamp wattages from 400-1000W to 150-400W.
- Pursue alternate fixtures for type WL to reduce back splash and high angle light.
- Redesign pole layout to coordinate with landscaping.
 - Redesign may include changes to pole height and arm length.
- Orient pole fixtures away from site boundary to reduce light trespass.
- Run computer calculations to confirm the effectiveness of the above revisions.

Process

Lighting levels, light trespass, and high-angle glare were assessed for the parking lot and adjacent areas of Lowe's shopping center in Manteca, CA. Calculations were prepared by Auerbach Glasow, using AGI32 v1.90, by Lighting Analysts. Site layout, landscaping, fixture layouts, and photometric files were based on the materials provided by EDAW, Inc., and confirmed against calculations originally prepared by Page Interworks. Calculations were run to assess horizontal and vertical light levels, glare, and light trespass. Two calculation sets were analyzed, to account for different tree conditions across the lifetime of the project.

Results were analyzed based on lighting recommendations published by the International Engineering Society of North America (IESNA), California Energy Commission (CEC), the International Dark-Sky Association (IDA), and the Design Guidelines established by Kitchell Development Company.



Lighting Code Recommendations for Parking Lots

Table 1 summarizes the lighting recommendations from Section 22 of the IESNA Handbook, 9th Edition.

Table 1 - Recommended maintained illuminance for parking lots

| | |
|--|--------|
| Recommended Average Horizontal Illuminance at pavement | 1.0 fc |
| Minimum Horizontal Illuminance at pavement | 0.2 fc |
| Horizontal Uniformity Ratio, Maximum-to-Minimum | 20:1 |
| Minimum Vertical Illuminance at 5' above pavement | 0.1 fc |

The maximum allowed lighting power densities prescribed by the CEC in Title 24 are based upon the Lighting Zone the site is located in. According to the CEC, those areas not designated as a park, recreation area, or wildlife preserve, or otherwise redefined by a local jurisdiction, shall be considered in Lighting Zone 2 if the property is located in a rural census tract, and Lighting Zone 3 if the area is located in an urban census tract, per the U.S. 2000 Census map. The Lowe's site is in an urban tract [Appendix A], and is therefore in Lighting Zone 3. Title 24 allows a maximum of 0.15 watts per square foot for site lighting in this Lighting Zone.

Calculated Site Lighting Values

Two calculation sets were performed for the site. The first set was run without landscaping, as an assumption of winter conditions and newly planted trees [Appendix B-1]. The second set [Appendix B-2] contains tree models [Appendix C], to assess the effectiveness of the lighting system with trees grown to full size. The results of these calculation sets are summarized and compared to the recommended criteria in Table 2. Values that fail to meet the criteria are shown in red. In general, light levels far exceed requirements, except where light is directly occluded by foliage.

Table 2 – Comparison of recommended versus calculated lighting values.

| Criteria | Recommended Value | Actual Value, without trees | Actual Value, with trees |
|--|-------------------|-----------------------------|--------------------------|
| Recommended Average Horizontal Illuminance at pavement | 1.0 fc | 5.7 fc | 3.1 fc |
| Minimum Horizontal Illuminance at pavement | 0.2 fc | 0.7 fc | 0.1 fc |
| Horizontal Uniformity Ratio, Maximum-to-Minimum | 20:1 | 15:1 | ∞:1¹ |
| Minimum Vertical Illuminance at 5' above pavement | 0.1 fc | 0.4 fc | 0.1 fc |
| Lighting Power Density | 0.15 W/sqft | 0.145 W/sqft | 0.145 W/sqft |

¹Minimum horizontal light levels for this calculation condition were 0.0 fc.



Glare and Light Trespass

To assess light trespass, light levels were calculated at the site boundary and across the street from the site. As measured from across the street and without trees the light levels averaged 0.3 fc, with a maximum value of 0.8 fc. With trees, light levels averaged 0.15 fc, with a maximum of 0.5 fc [Table 3] at the neighboring boundary.

Table 3 – Summary of light levels at boundary of neighboring properties

| Neighboring Boundary | No trees | | Trees | |
|----------------------|----------|------|-------|------|
| | Avg. | Max. | Avg. | Max. |
| Neighbor 1 | 0.28 | 0.4 | 0.15 | 0.3 |
| Neighbor 2 | 0.32 | 0.8 | 0.08 | 0.2 |
| Neighbor 3 | 0.15 | 0.2 | 0.17 | 0.5 |

Refer to Appendix D for calculation plan locations.

Light levels at the site boundary were much higher [Table 4], ranging as high as 2.67 fc, average. Maximum values, as high as 7.8 fc, were not significantly reduced by the addition of landscaping.

Table 4 – Summary of light levels at site boundary

| Site Boundary | No trees | | Trees | |
|---------------|----------|------|-------|------|
| | Avg. | Max. | Avg. | Max. |
| Site 1 | 2.67 | 7.8 | 1.07 | 7.2 |
| Site 2 | 1.33 | 3.1 | 1.17 | 3.8 |
| Site 3 | 0.64 | 1.1 | 0.24 | 1.5 |
| Site 4 | 0.66 | 1.7 | 0.59 | 1.7 |
| Site 5 | 2.05 | 6.3 | 1.37 | 4.1 |

Refer to Appendix D for calculation plan locations.

Lighting fixture photometric files [Appendix E-1, E-2, & E-3] were assessed for direct high-angle glare. The Design Guidelines by Kitchell Development specify “luminaires so hooded or shielded that the maximum angle of the cone of direct illumination shall not be sixty degrees if the luminaire is not less than six feet above ground” (p. 10). The intent and language of this code is unclear. Based on discussions with the City of Manteca, fixtures used on this project will not meet these code requirements, but must conform to a standard of recommended practice, as determined by Auerbach Glasow.

Indirect glare was analyzed at walls where type WL fixtures were located. Calculations were taken at the wall plane, and analyzed based on the IDA recommendations for glare; that the maximum intensity in one’s field of view shall not exceed ten times that of the average lighting level. Maximum to average ratios at the wall were found to range from 20:1 to 42:1, far exceeding IDA recommendations [Table 5].



Table 5 – Evaluation of glare at wall surfaces.

| Building Surface | Maximum (fc) | Average (fc) | Max. to Min. Ratio |
|------------------|--------------|--------------|--------------------|
| Wall 1 | 119 | 4.04 | 29 |
| Wall 2 | 153 | 7.26 | 21 |
| Wall 3 | 207 | 4.98 | 42 |
| Wall 4 | 99.2 | 4.90 | 20 |
| Wall 5 | 136 | 3.75 | 36 |

* Refer to Appendix D for calculation plan locations.

Summary and Discussion

Calculations show that lighting levels for the space far exceed the criteria, initially, for recommended light levels but will not meet these recommendations once the site landscaping is allowed to grow to full maturity. We recommend the lighting and/or landscaping be evaluated for alternate layouts or specific maintenance schemes to ensure desired lighting levels will be preserved over the lifespan of the project. It is important to coordinate the lighting and landscape layouts so that trees do not grow to significantly block pole fixtures. Furthermore, AG recommends the fixture layout and lamp wattage selection be reviewed for opportunities where total light output may be reduced while still meeting the criteria of the design, as the current design exceeds the criterion minimums by a magnitude of 350-400% (and more in some areas) and exceeds recommended averages by about 600%. While the current lighting power density is below the maximum watts per square foot allowance prescribed in Title 24, there may be opportunity for further reductions in energy consumption.

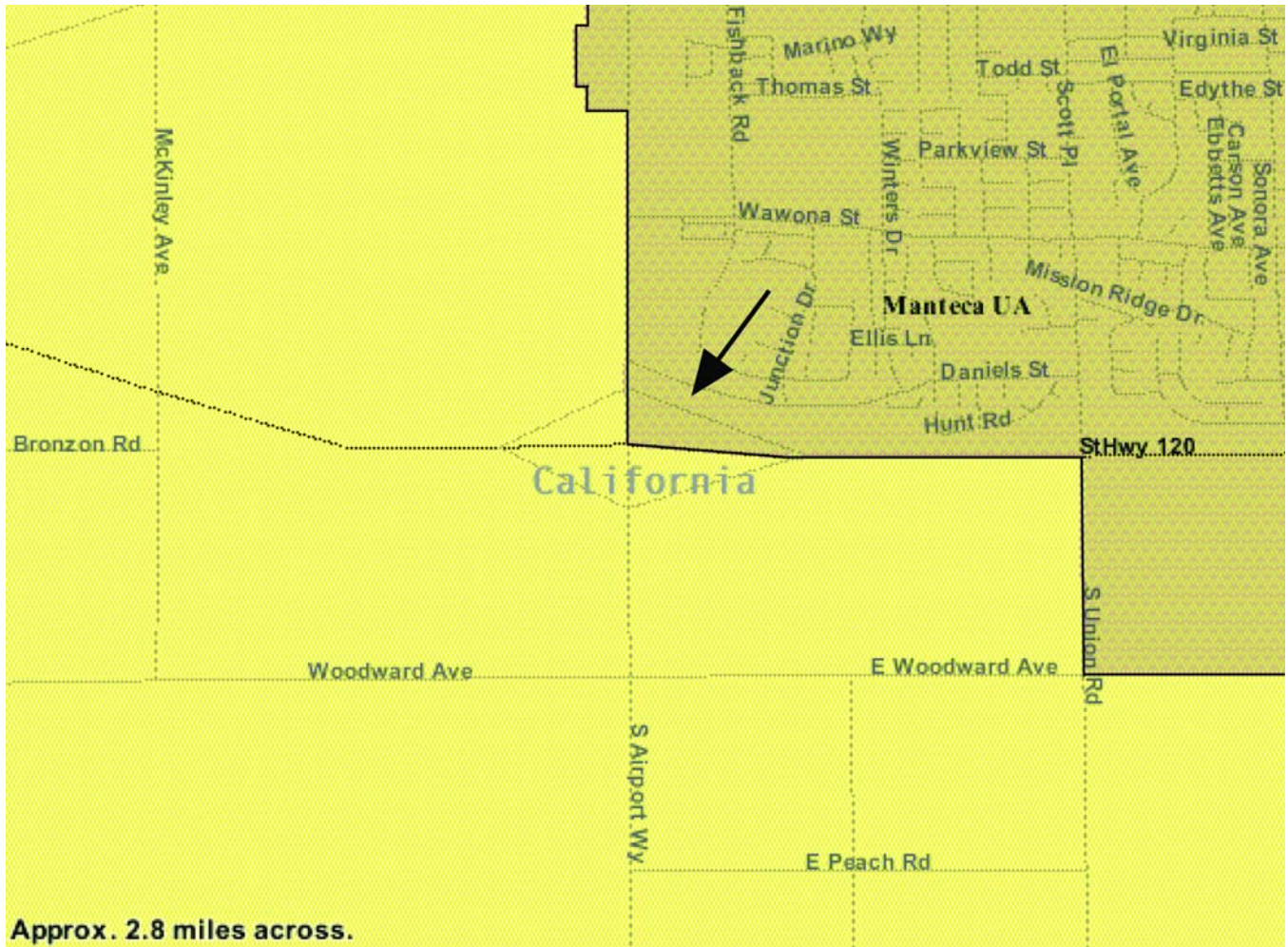
There is minimal light reaching neighboring sites, and this is further reduced by the presence of trees along the site perimeter. Indirect glare from fixture type WL, however, is still a concern. Light levels at the site boundary are high, and may be a concern for motorists on adjacent roadways. In general, due to their high forward throw maximum candela angle, fixtures should be oriented away from the site boundary to reduce light trespass and glare into adjacent sites and roadways. Since fixture type WL is oriented towards the site boundary and produces high levels of indirect glare, AG recommends these fixtures be substituted or modified to reduce backsplash against the wall and high-angle light aimed towards the boundary.

The exact meaning and intent of the fixture requirements laid out in the Kitchell Design Guidelines is unclear. However, the current fixture characteristics meet the standards of recommended practice outlined by IESNA and IDA. The lighting layout requires additional revisions to meet IESNA, IDA, and Title 24 lighting criteria discussed above. Based on feedback from EDAW and Lowe's, AG will provide a revised lighting layout and supporting calculations for the Lowe's Manteca parking lot.



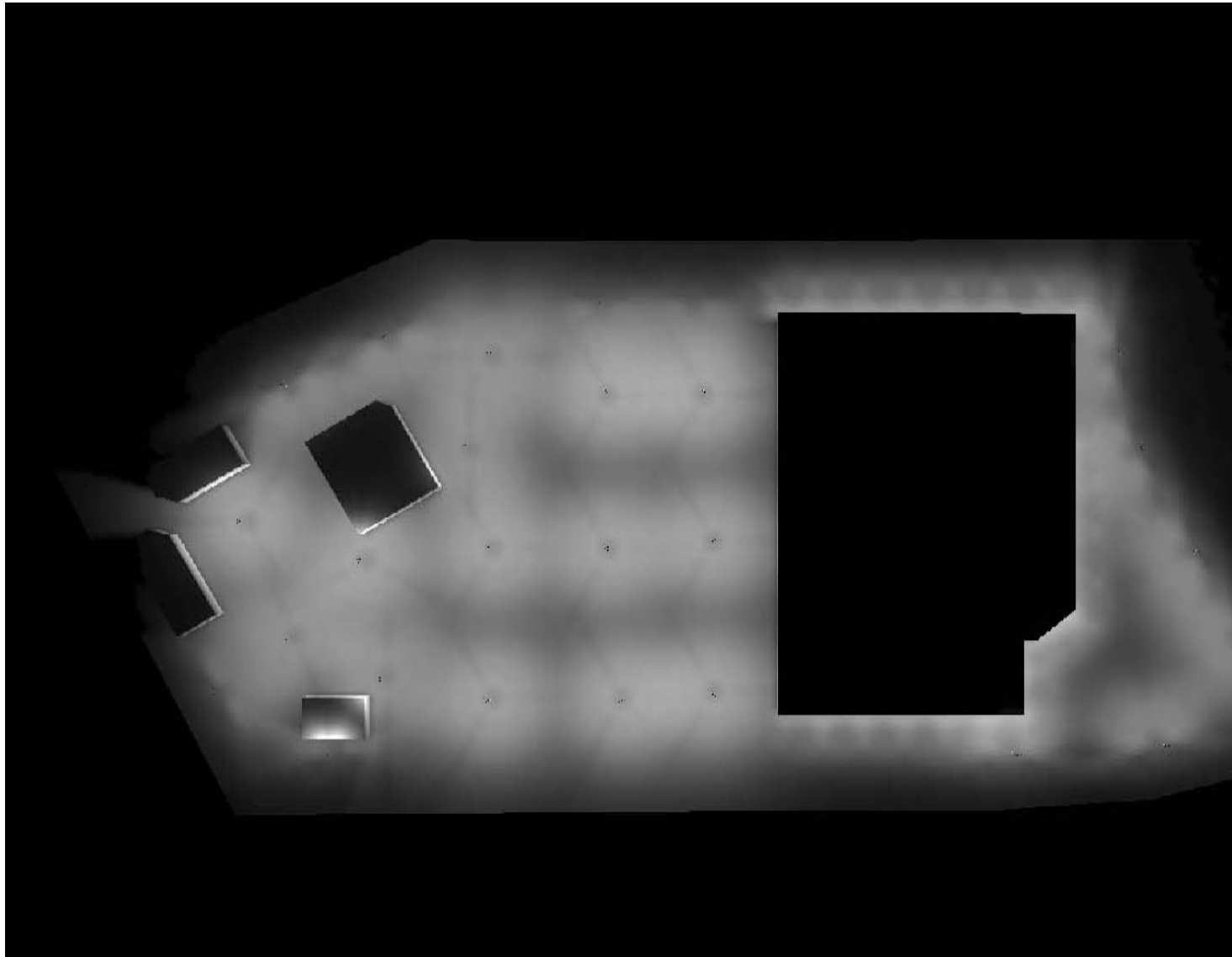
Appendix A – U.S. 2000 Census map for Site

From: <http://factfinder.census.gov>



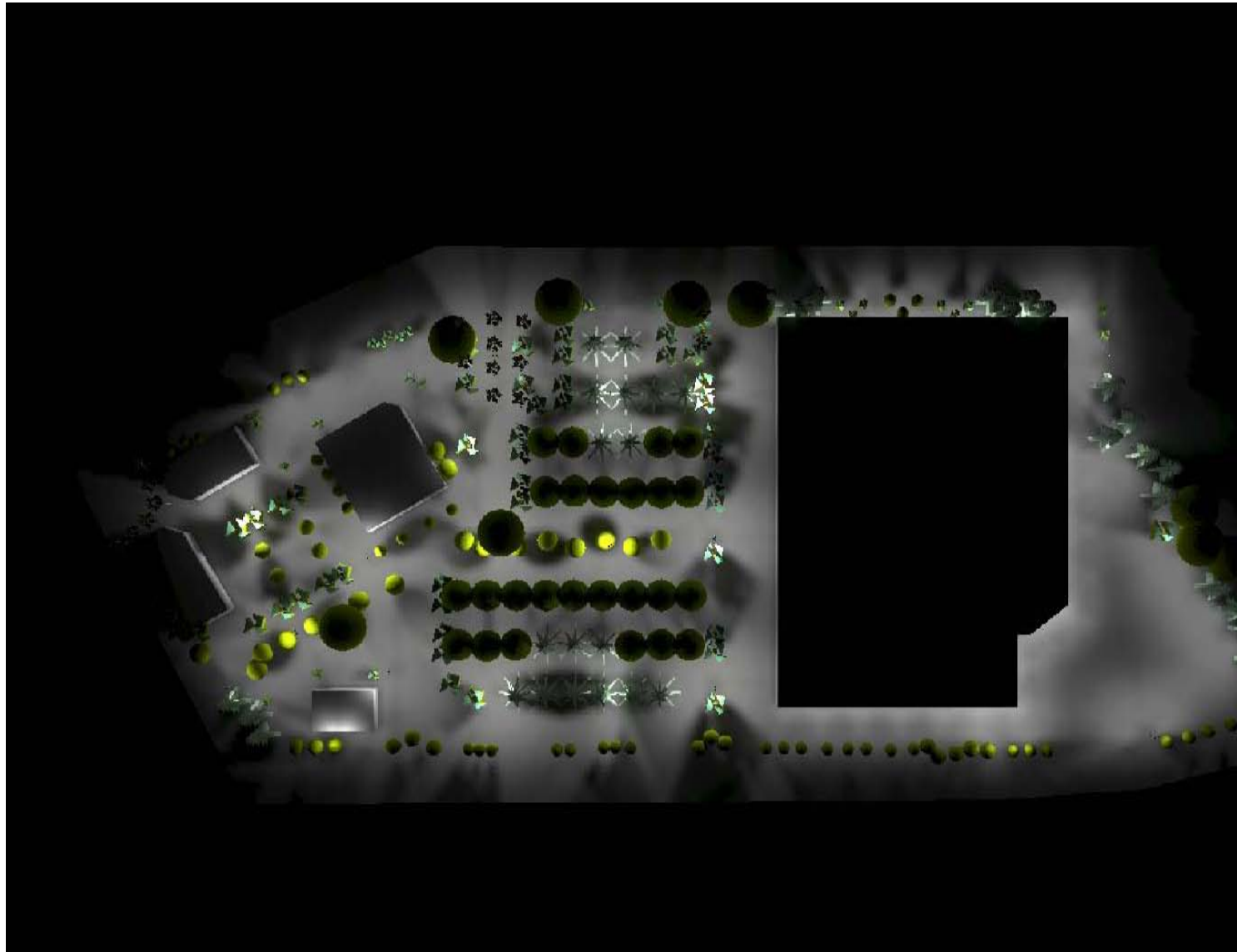


Appendix B-1 – Site rendering without trees – Plan View

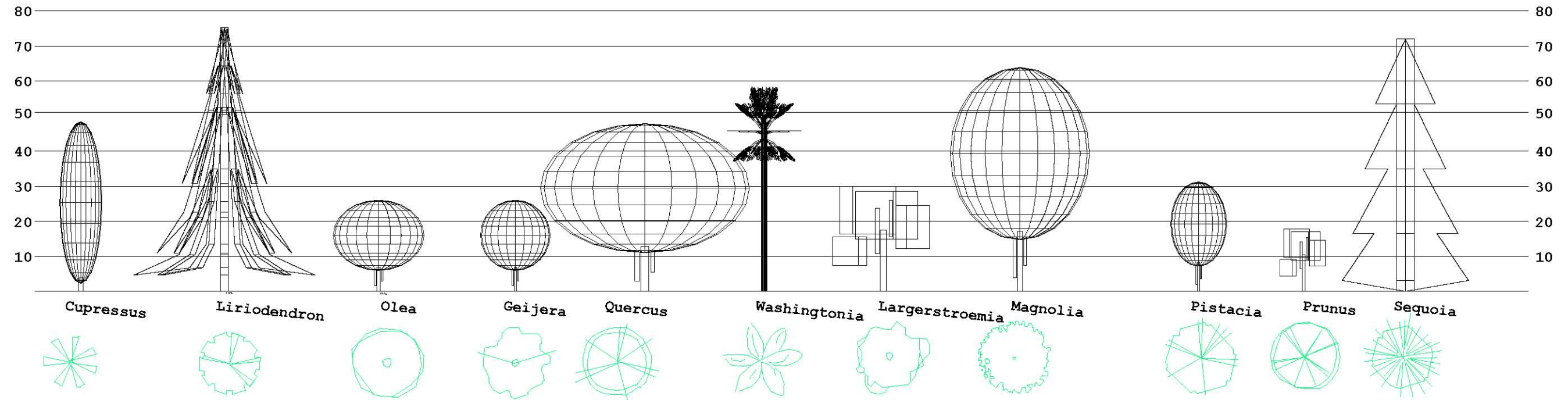




Appendix B-2 – Site rendering with trees – Plan View

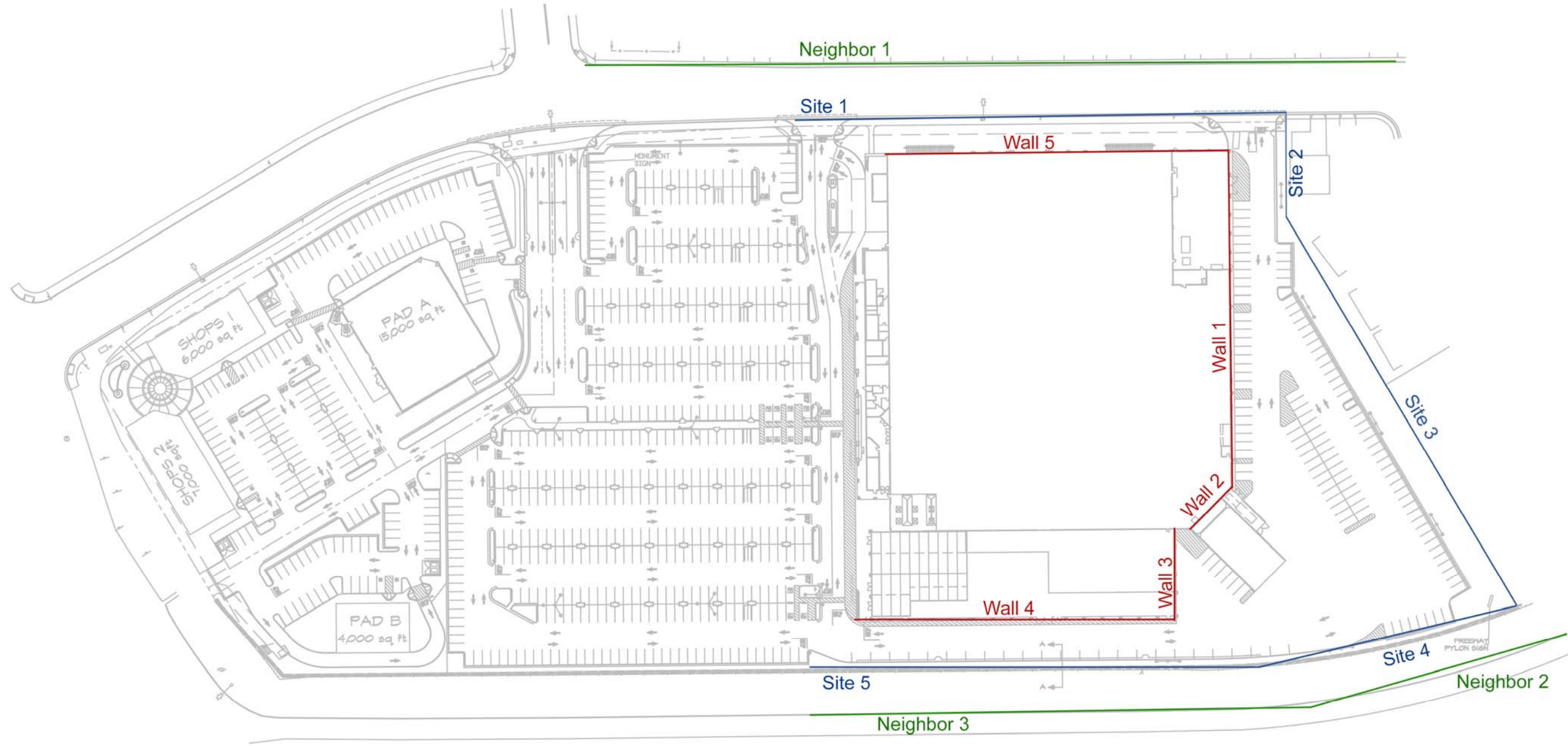


Appendix C – Sample tree models



-Tree shapes and dimensions were taken from the *Western Garden Book*, by Sunset Publishing (1988), and from internet references, as necessary.
 -Tree models are simplified forms to accommodate the limitations of the calculation software.

Appendix D – Site location of calculation planes





Appendix E-1 – Photometric reports for specified fixtures

Fixture type WL



Photometric Report (Type C)

Filename: Lt111262.IES
 [TEST] LTL11262
 [MANUFAC] LITHONIA LIGHTING
 [LUMCAT] KVF 400M SR4WFL
 [LUMINAIRE] SQUARE AREA LIGHT, SR4W DISTRIBUTION, FLAT LENS_
 [LAMPCAT] MH400 U ED28
 [LAMP] ONE 400-WATT CLEAR ED-28 METAL HALIDE, HORIZONTAL POSITION_

Maximum Candela = 16613 at 40 H 67.5 V

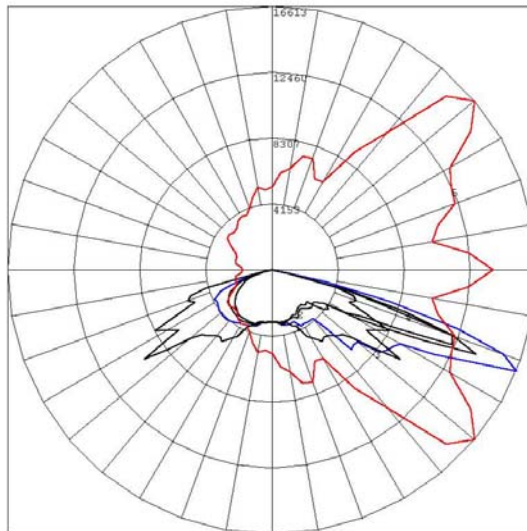
Classification:

Road Classification: Type IV, Short, Full Cutoff
 Indoor Classification: Direct

Polar Candela Curves:

Vertical Plane Through:
 1) 40 - 220 Horizontal
 2) 0 - 180 Horizontal
 3) 90 - 270 Horizontal
 4) 20 - 200 Horizontal

Horizontal Cone Through:
 5) 67.5 Vertical



AGI32/Photometric Report Generator - Copyright 1999-2006 by Lighting Analysts, Inc.



Appendix E-2 – Photometric reports for specified fixtures

Fixture types Q35FG and H135FG



Photometric Report (Type C)

Filename: LTL11574.IES
 [TEST] LTL11574
 [ISSUEDATE] 24-Apr-03
 [MANUFAC] LITHONIA LIGHTING
 [LUMCAT] KVF 1000M ASYFL EHS
 [LUMINAIRE] SQUARE AREA LIGHT, ASYMMETRIC DISTRIBUTION, FLAT LENS, HOUSE SIDE SHIELD_
 [LAMPCAT] M1000 U_BT37
 [LAMP] ONE 1000-WATT CLEAR BT-37 METAL HALIDE, VERTICAL BASE-UP POSITION_

Maximum Candela = 26392 at 45 H 65 V

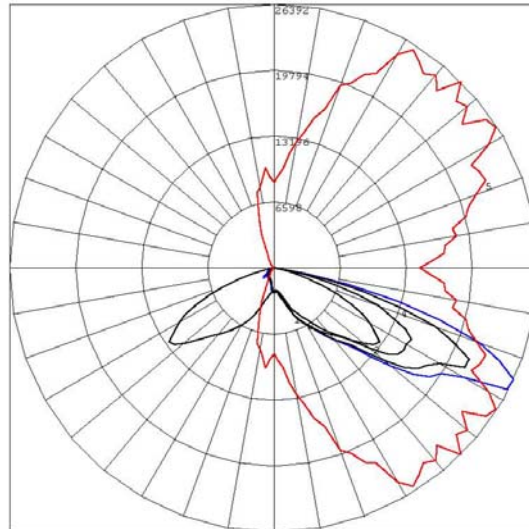
Classification:

Road Classification: Type IV, Short, Cutoff
 Indoor Classification: Direct

Polar Candela Curves:

Vertical Plane Through:
 1) 45 - 225 Horizontal
 2) 0 - 180 Horizontal
 3) 90 - 270 Horizontal
 4) 20 - 200 Horizontal

Horizontal Cone Through:
 5) 65 Vertical



AGI32/Photometric Report Generator - Copyright 1999-2006 by Lighting Analysts, Inc.



Appendix E-3 – Photometric reports for specified fixtures

Fixture types G35FG and B35FG



Photometric Report (Type C)

Filename: LTL11378.IES
 [TEST] LTL11378
 [MANUFAC] LITHONIA LIGHTING
 [LUMCAT] KVF 1000M SYMFL
 [LUMINAIRE] SQUARE AREA LIGHT, SYMMETRIC DISTRIBUTION, FLAT LENS_
 [LAMPCAT] M1000 U BT37
 [LAMP] ONE 1000-WATT CLEAR BT-37 METAL HALIDE, VERTICAL BASE-UP POSITION_

Maximum Candela = 28173 at 45 H 65 V

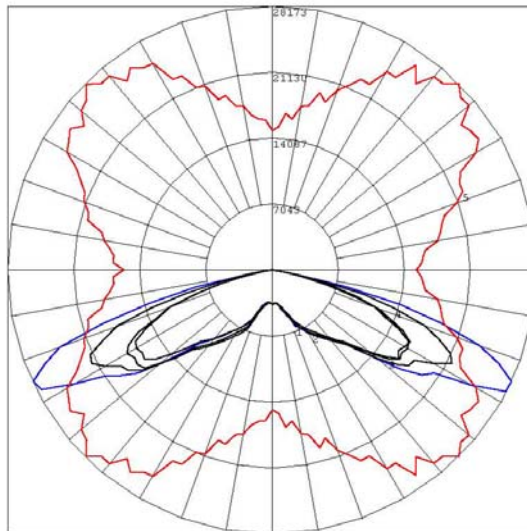
Classification:

Road Classification: Type IV, Short, Full Cutoff
 Indoor Classification: Direct

Polar Candela Curves:

Vertical Plane Through:
 1) 45 - 225 Horizontal
 2) 0 - 180 Horizontal
 3) 90 - 270 Horizontal
 4) 20 - 200 Horizontal

Horizontal Cone Through:
 5) 65 Vertical



AGI32/Photometric Report Generator - Copyright 1999-2006 by Lighting Analysts, Inc.