

THESIS

A SURVEY OF LIGHTING CONDITIONS IN LANSING

E. R. MORROW H. A. FELLOWS

1921

Copy 1

Electric lighting

THESIS

cop. 1

XX

119

052

Electrical engineering

A Survey of Lighting Conditions.

In Lansing.

A Report Submitted to

The Faculty of

MICHIGAN AGRICULTURAL COLLEGE.

By

Carl Raymond
E. R. Morrow

Harold
H. A. Fellows.

Candidates for the Degree of

Bachelor of Science.

June 1921

THESIS

2011

TABLE OF CONTENTS.

Introduction	1
Arbaugh's Department Store	2
Hoover - Bond, Furniture	10
Mifflin's Ladies and Gent's Furnishings.....	14
O'Connor's Men's Furnishings	16
Wolverine Restaurant	18
Boston Cafe	20
Kresge's 5 and 10 cent store	22
Mill's Dry Goods	24
State Journal Office	29
Woolworth's 5 and 10 cent store.....	31
City Library	33
Residences	35
Conclusion	37

INTRODUCTION.

The fundamental basis on which a large number of business decisions are formed, is the comparison between a merchant's own practice and that of competitors engaged in the same, or similar lines of business. Lighting engineers have long been aware that this principle is an important factor in securing increased intensities in store lighting. This fact has formed the basis for a careful comparison of foot-candle intensities in several of the larger cities such as New York and Boston..

That a survey of this kind is of practical value is shown by the action of the managers in requesting information for obtaining better lighting conditions.

In this report we have attempted to analyze the installation of some of the typical stores of Lansing and, at the same time, suggest changes which will bring the intensities to the values which common practice dictates. The readings were taken on the counter or table level, thus giving values with which the user is concerned.

For the readings contained in this report we are much indebted to the managers of the stores below given for their co-operation with us:

F. N. Arbaugh Company
Hoover-Bond Company
Elgin Wifflin Furnishings.
James O'Connor, Clothier
Wolverine Lunch.

The Boston Cafe.
S.S. Kresge Company.
Wills Dry Goods Company .
The State Journal
Woolworth 5 and 10 Cent Store

The apparent lack of interest on the part of the residence owners made it impossible to make a complete investigation of this phase of illumination practice in the city, but at the three residences where conditions were examined, the people were very much interested and helped in our work.

We also owe much gratitude to Mr. Monger of the Barker-Fowler Electric Company for his assistance and advice in the compilation of the data and for the use of his foot-candle meter in making the measurements.

Arbaugh's Department Store.

Basement.

GENERAL DATA:

Room size 100 x 60 feet.

Room area 6000 square feet.

Ceiling height, 10 feet.

Number of units 21.

Type of units, Direct.

Lamps per fixture one, 100 or 200 watt "C".

Wattage consumed .48 watts per square foot.

Units on ceiling.

Maximum intensity, 7.00 foot-candles.

Minimum intensity 1.00 " "

Average " 2.75 " "

GENERAL NOTES:

The ceiling is a medium grey and the walls, a dark grey. The ceiling is covered by a network of pipes and conveyers and the units must be so mounted as to be below them.

The distribution is a negligible factor with the present installation and, especially in the grocery and shoe departments, there are places where it is difficult to see the goods on display.

The above data applies to half of the basement.

Suggested corrections:

The excessive use of local lights in the basement shows

the need of a fixture with a better distribution. Denzar number 400 with a 150 watt "C" lamp would tend to cut down the shadows which are especially troublesome on this floor and will give a much better distribution than is now obtained.

First Floor.

GENERAL DATA:

Size of room 125 x 75 feet.
Floor area 9375 square feet.
Ceiling height 22 feet.
Number of units 30.
Type of units Direct.
Lamps per fixture one 200 watt "C"
Wattage consumed .64 watts per square foot.
Units suspended 4 feet from ceiling.
Maximum intensity 3.50 foot candles.
Minimum intensity 1.50 foot candles.
Average intensity 2.25 foot candles.

GENERAL NOTES:

The wall color is a light grey and the ceiling a slightly darker grey. These colors are not suitable for indirect lighting units.

The distribution is fairly uniform due to the large number of fixtures and the high mounting, but the intensity is only about one third of that recommended for department stores.

SUGGESTED CORRECTIONS:

Using the same spacing, but installing a Denzar pendant type unit with ornamental bowl number 601 1/2 with 300 watt "C" lamp, will give an intensity of 6 foot candles, and at the same time improve the appearance of the store. This unit is entirely closed and the up keep will be less than with a more open type. This unit, while simple in appearance embodies all the requirements of the most up-to-date illuminating engineering principles.

Merchants who have installed Denzars in their stores are enthusiastic over the greatly improved illumination and the results which they have brought.

In the shoe department, where the ceiling is only eight feet high a ceiling type Denzar, number 501 with a 200 watt "C" lamp would produce an excellent general distribution.

The ribbon department, under the office, should have "CQ2" lamps in the fixtures which should be the same as in the shoe department.

On the mid-floor, where there is a trunk display, number 700 Denzar, with a 100 watt "C" lamp would give the required intensity.

The arrangement of the desks in the office is so irregular, that the present local lighting could not readily be improved. The flexible ceiling type as was used in the trunk room with a 100 watt "C" lamp, number 701, might be used in the center of each separate office to an advantage and the local lighting done away with, but the improvement would probably not be great, due to the reason just stated.

Second Floor.**GENERAL DATA:**

Size of room - 85 x 60 feet.

Floor Area - 5100 square feet.

Height of ceiling - 10 feet.

Number of units - 17

Type of units - direct.

Lamps per unit - One - 200 watt "C"

Wattage consumed - .67 watts per square foot.

Fixtures suspended - 2 feet from the ceiling.

Maximum intensity 6.00 foot candles.

Minimum intensity .70 foot candles.

Average intensity 2.25 foot candles.

GENERAL NOTES:

The ceiling is a cream and the walls, an ivory tan color.

The distribution is extremely poor, due to the type of fixture used, which is the Nitro-lite of the Horter Manufacturing Company of Chicago.

SUGGESTED CORRECTIONS:

This is the ladies' cloak department and, as such, should be lighted by a more artistic fixture. A direct unit, such as the Phoenix Glass Company's number 231 with a two foot chain suspension, would be suitable. With the same size bulb as is now used, the distribution would be better and an average intensity of 2.5 foot candles would be obtained. The dark places between the fixtures would be eliminated by general appearance.

The north side of this floor contains a new installation of lighting fixtures which are very artistic in appearance and which also give a good distribution. There seems to be no change necessary.

Third Floor.

GENERAL DATA:

Size of room 85 x 60 feet.

Floor area 5100 square feet.

Ceiling height 10 feet.

Number of units 18

Type of units direct.

Lamps per fixture One 150 watt "C"

Wattage consumed .35 watts per square foot.

Units suspended 2 foot from ceiling.

Maximum intensity 2.5 foot candles.

Minimum intensity .5 foot candles.

Average intensity 1.23 foot candles.

GENERAL NOTES:

The walls and ceiling are the same as in the lower floor.

The distribution is very poor, in spite of the fact that there are colors to examine and tapestries to match.

SUGGESTED CORRECTIONS:

A unit suitable for a rug department is the Denmar with a "C-2" lamp. To obtain proper intensity, number 200 type with a 150 watt "C-2" lamp should be used. This size will give an average intensity of about 2.25 foot candles and the shadows will be eliminated, making it very easy to examine the stock.

The north half of this floor contains curtains, art lamps, and phonographs. The use of "Daylight Lamps" is not necessary, as there are no colors to be matched. Other than this, the units to be used should be the same as in the other part of this floor.

Fourth Floor.

GENERAL DATA:

Size of room 85 x 60 feet.

Floor 5100 Square feet.

Ceiling light 10 feet.

Number of units 18.

Type of units Direct.

Lamps per fixture - one 150 or 200 watt, "C"

Wattage consumed .60 units per square foot.

Units suspended 2. feet from ceiling.

Maximum intensity 2.25 foot candles.

Minimum intensity .50 foot candles.

Average intensity 1.25 foot candles.

GENERAL NOTES:

The walls are a light grey color and also the ceiling.

The floor is very nearly the same as the floor below and scarcely requires special treatment.

SUGGESTED CORRECTIONS:

Uniformity of fixtures on the upper floors is a desirable feature from the standpoint of maintenance. This suggests the installation of number 200 Densar units with 150 watt "C" lamps., giving an average intensity of 2.25 foot candles.

The north side of this floor is used for the same purpose as the room just treated, . The same type and size of units would apply.



Basement - North Side



Basement - South Side.



Main Floor.



Second Floor - North Side



Second Floor - South Side



Third Floor



Fourth Floor.

Hoover-Bond. Furniture.

First Floor.

GENERAL DATA:

Size of room - 40 x 125 feet.

Floor area - 50000 square feet.

Height of ceiling - 18 feet.

Number of fixtures - 12.

Lamps per fixture - 1. 200 watt. (C)

Type of fixture - Direct.

Wattage consumed - .48 watts per square foot.

Fixtures suspended - 4 feet from the ceiling.

Maximum intensity 4.00 foot candles. (4.00)

Minimum intensity 1.75 foot candles.

Average intensity 2.75 foot candles.

GENERAL NOTES:

The ceiling is a cream color and the walls are an ivory tan, thus direct units are preferable. The furniture on this floor is dark and of a somewhat mixed variety. A bright light is necessary to suitably display this and is not furnished by the present installation. The distribution is not bad, but the goods would show up to a greater advantage under a brighter and softer light and a modern fixture would give the store a more pleasing appearance.

SUGGESTED CORRECTIONS:

A unit which will fill the requirements outlined above is the Denzar # 2 Catalog #D-6. of the Beardslee Chandelier Mfg. Co., Chicago. At the same time it has the advantage of being a dust proof unit and the up keep would be lower than with a unit which must be cleaned more often.

Hoover-Bond. Furniture.

Second Floor.

GENERAL DATA:

Size of room - 60 x 60 feet.

Floor area - 3600 square feet.

Height of ceiling - 9 feet.

Number of units - 10

Type of units - Direct.

Lamps per unit - one 200 watt.

Wattage consumed - .555 watts per square foot.

Fixtures - on ceiling.

Maximum intensity 10.0 foot candles.

Minimum intensity 1.5 foot candles.

Average intensity 3.6 foot candles.

GENERAL NOTES:

The ceiling and wall are a cream stone color. The furnishings consist of dining tables and other dining fixtures. The west side of the room is mostly window area. Thus, artificial lighting is not ordinarily required during the day, unless it is dark.

The spacing is uniform, but the flat metal shades used do not give an even distribution. There is also a troublesome glare due to the low ceiling and the bare lamps.

SUGGESTED CORRECTIONS:

A replacement of the present units by Brascolite type AF Catalog #8., with a 200 watt, type C lamp will give an average intensity of 4 foot candles. This is an added intensity without an added wattage consumption and the distribution is more uniform. There will be an absence of glare and at the same time, a sufficient intensity to exhibit the stock.

Hoover-Bond. Furniture.

Third Floor.

GENERAL DATA:

Size of room - 75 x 175 feet.

Floor area - 13100 square feet.

Height of ceiling - 9 feet.

Number of units - 33

Type of units - direct.

Lamps per unit - one 150 watt.

Wattage consumed - .385 watts per square foot.

Fixtures on ceiling.

Maximum intensity 7.00 foot candles.

Minimum intensity .70 foot candles.

Average intensity 3.04 foot candles.

GENERAL NOTES:

The ceiling color is an ivory tan and the walls, a light grey. The furnishings consist of tapestry, bedroom furniture, and easy chairs, which are all dark.

There is no uniformity in the distribution.

The glare is very bad due to the low mounting height of the unit and to the fact that the room is large, this causes many units to be in the field of vision and the unshaded lamps are really painful to the eyes.

SUGGESTED CORRECTIONS:

To obtain a more uniform distribution and to eliminate the glare which is worse on this floor than on the second, the use of

a unit similar to that suggested for the second floor would be desirable a 200 watt lamp would give an average of 3 foot candles, the same as is obtained at present at an added consumption of 50 watts per unit. There is no particular reason for increasing the intensity as it compares favorably with modern standards. The necessity is reducing the glare to a minimum and obtaining better distribution and this is done by the suggested units.



First Floor



Second Floor



Third Floor

Mifflin's Ladies and Gent's Furnishings.

GENERAL DATA:

Size of room 25 x 90 feet.

Floor area 2250 square feet.

Height of ceiling 14 feet.

Number of units 4

Type of units total indirect, non-luminous bowls.

Lamps per unit one 400 watt (C)

Wattage consumed .70 watts per square foot.

Units suspended 4 feet.

Maximum intensity 3.50 foot candles.

Minimum intensity 1.50 foot candles

Average intensity 2.50 foot candles.

GENERAL NOTES:

The ceiling is a medium gray, the walls a dark gray, and the furnishings are also a dark color. Therefore this combination causes a very poor efficiency with such an installation. The distribution is fairly uniform.

SUGGESTED CORRECTIONS:

The first correction should be in the wall and ceiling decoration. A suggestion in this line would be to use a much lighter shade of the same color.

If the non-luminous bowl is desired, its efficiency could be greatly increased by the installation of an X-Ray reflector in the bowl.

With these corrections an average of 4.50 foot candles could

be obtained with the same size lamp, and with a 500 watt lamp an average intensity of 6.00 foot candles would result. This is accordance with standard practice.



O'Connors Mens Furnishings.

GENERAL DATA:

Size of room - 50 x 80 feet.

Floor area 4000 square feet.

Ceiling height 18 feet.

Number of units 7.

Type of units direct (glass shade.)

Lamps per fixture one 200 watt.

Watts consumed 2.85 watts per square foot.

Units suspended 4.00 feet from ceiling.

Maximum intensity 5.00 foot candles.

Minimum intensity 2.00 foot candles.

Average intensity 3.50 foot candles.

General Notes:

Ceiling dark grey, and the walls are a dark tan color. Shelves containing dark materials and boxes extend around the wall to a height of about fourteen feet. Due to the store's location on a northeast corner artificial illumination is seldom required during the daytime. However this does not eliminate the gloom which seems to prevail at all times.

SUGGESTED CORRECTIONS:

An indirect lighting system would be suitable for this type of store, but owing to the dark color of the walls and ceiling such an installation would be impractical. Therefore it is necessary to use a type of unit which is more nearly independent of reflection from the walls and ceiling. The units are not congruent. The class of goods sold by this store warrant

the use of a more artistic type of unit. The Brascolite type AH (catalog 8) would be in accordance with the above suggestions. This would necessitate the use of a 500 watt (C) lamp, producing an intensity of eight foot candles, which is recommended for men's furnishings stores.

The mid-floor in the back part of the store makes it necessary to use a ceiling unit for the part under-neath. Brascolite AF with 75 watt "FC" lamps would be in harmony with the main lights and the intensity would average 6 foot candles.

Type AH Brascolite with a 200 watt "C" lamp would give an intensity of 5 foot candles on the mid floor.



Wolverine Restaurant.

GENERAL DATA:

Size of room 25 x 75'

Floor area 1875 sq. ft.

Height of ceiling 18'

Number of units 11 semi-indirect, and 80 direct.

Type of units, light opal semi-indirect; bare lamps on ceiling.

Lamps per fixture One 300 watt (C) are lamps 40 watt (B)

Wattage consumed: 3.47 watts per square foot.

Units suspended three feet from ceiling.

Maximum intensity 10.25 ft. c.

Minimum intensity 6.00 ft. c.

Average intensity 8.50 ft. c.

GENERAL NOTES:

Ceiling light buff, and walls white enamel. The fixtures are of white marble with nickel trimmings. A three foot band of mirrors extending along the two sides of the room.

During the day all the lights are burned to combat the effect of sunlight, giving the intensities shown above, but at night only the direct units are used resulting in an intensity of 4.50 foot candles. This latter value compares favorably with standard practice. The high intensity during the day is considered necessary to provide sufficient brilliancy to combat nearby competition.

SUGGESTED CORRECTIONS:

A reduction of the bulbs in the semi-indirect bowls from 300

watt to 200 watt would give an average intensity of 4.00 foot candles, which could then be used at night in place of the direct units with a lower wattage consumption and a more pleasing effect. This change would not materially alter the daytime effect because the glare from the direct units is needed in addition to the added intensity.



Boston Cafe.

GENERAL DATA:

Size of room 24 x 70 feet.

Floor area 1750 square feet.

Ceiling height 12 feet.

Number of lighting units. five general direct cluster units,
and twenty-one bracket lights.

Type of units direct.

Lamps per unit 6, 40 watt "B".

Wattage consumed

Units suspended (Main) five feet.

Maximum intensity 3.50 foot candles.

Minimum intensity 1.50 foot candles.

Average intensity 2.75 foot candles.

GENERAL NOTES:

The ceiling is a light gray, while the walls are a sage green color. A band of mirrors three feet wide extends along the wall on three sides of the room at a height of four feet from the floor. The furnishings are of a white color, consisting of table linens and marble counter tops.

The distribution is poor but owing to the fact that light is needed only on the tables and counters this does not enter into the problem.

SUGGESTED CORRECTIONS:

The color of the ceiling and walls is not a very great item in this store as special units furnish light for each table. For this

reason, the general lighting is not of very great importance and the artistic effect is more to be considered.

The low intensity of general illumination presents a pleasing appearance and the local light is sufficient for the requirements.



Kresge's 5 and 10 cent Store.

GENERAL DATA:

Size of room 50 x 125 feet.

Floor area 6250 square feet.

Height of ceiling 15 feet.

Number of units 38.

Type of units direct, total inclosed.

Lamps per unit one 75 watt (C)

Wattage consumed .464 per square foot.

Units suspended 3.5 feet.

Maximum intensity 4.00 foot candles.

Minimum intensity 2.50 foot candles.

Average intensity 3.35 foot candles.

GENERAL NOTES:

The ceiling is a light gray, and the walls are largely covered with pictures, music, etc. They all blend together to make a pleasing light appearance.

While the average intensity is low, there seems to be a sufficiency intensity on the working plane. This is probably due to the light color of all fixtures. The fixtures create a delightful atmosphere, and there is a noticeable absence of glare.

Not long ago 100 watt lamps were used, but have been mostly replaced with 75 watt lamps. Measurements taken under the few remaining former size units showed a slight increase in intensity over those in present use, but the increase was not sufficient to warrant the greater wattage consumption.

SUGGESTED CORRECTION:

Since consideration has been given to the decoration and the type of lighting unit, and the result is satisfactory, there is no need to suggest further correction, even though the intensity is low according to common practice.



Mill's Dry Goods.

GENERAL DATA:

Size of room - 125 x 50 feet.
 Floor area - 6250 square feet.
 Height of ceiling - 18 feet.
 Number of fixtures - 12.
 Lamps per fixture - 1 - 200 and 300. watt C.
 Type of fixture - Direct.
 Wattage consumed - .48 watts per square foot.
 Fixtures suspended - 4 feet from ceiling.
 Maximum intensity 5.00 foot candles.
 Minimum intensity 2.00 foot candles.
 Average intensity 2.75 foot candles.

GENERAL NOTES:

The ceiling is a dark tan and the wall is a light yellow but two-thirds of the wall is covered by dark shelves and other display.

Artificial light is required continuously, due to the dark decoration and furnishings and the small percentage of window area.

SUGGESTED CORRECTIONS:

Unless the room is redecorated, indirect, or semi-indirect units would not be advisable., because the ceiling in its present condition should be kept out of sight as much as possible. The intensity is low as compared with common practice in stores of this nature, Six foot candles average is a minimum and eight would be more desirable.

The type of units now installed in this store is not in keeping

with a first class store. A more congruous fixture should be used, such as Brascolite, type W catalog #8. .500 W Type C lamp per unit will give an intensity of 5 foot candles.

For use under the mid floor and on the mid floor, the same type of unit would be required as on the main floor, except that it would be of the ceiling type VD. For the part under the mid-floor a 100 watt lamp would give an intensity of 4.5 foot candle when 14 units are used. This would require a slight change in the wiring of the floor, but the change is in six outlets only.

The mid-floor is used for an office. Using two units in the back part of the office and one near the manager's desk, 200 w. units would give an intensity of 5 foot candles which would be sufficient intensity. The same type of unit used as in the previous case. For the Cashier's and telephone operator's desk, a 150 watt unit would bring the intensity up to 5 foot candles. The same size of unit in front of the stairs would even up the distribution on this floor and present a pleasing appearance.

This system would require a change in the wiring of the floor. The expense incident to this alteration is fully justified on account of the improvement in light distribution and general appearance.

Second Floor.

GENERAL DATA:

Size of room - 50 x 125 feet.

Floor area - 6250 square feet.

Height of ceiling - 14 feet.

Number of fixtures - 28.

Lamps per fixture - 1. 75 - 300 watts.

Type of fixture - Direct, Same as first floor.

Wattage consumed - .675 watts per square foot.

Fixtures suspended - 3 feet from ceiling.

Maximum intensity 8.00 foot candles.

Minimum intensity 2.00 foot candles.

Average intensity 4.50 foot candles.

GENERAL NOTES:

The ceiling and walls are the same as the first floor. The furnishings are largely dark, consisting of millinery and ladies cloaks. In general, this floor is lighter than the first, and the window area is greater.

The units are uniformly spaced in four rows running the length of the store. The size, however, varies from 75 watts to 300 w., and the distribution is very irregular. The intensity at the front of the store is higher than necessary, but, in the back part, where millinery is displayed, the intensity is correspondingly low.

SUGGESTED CORRECTIONS:

This being a floor exclusively for ladies, the lighting should be so planned as to cater to the taste of ladies. The lighting unit should be such that it would create a pleasing atmosphere, in keeping with the rest room and tea room at the back of this floor.

A unit of the type of "Decora #3774 E 162" Catalog #81 of the Macbeth - Evans Company, would be suitable for use here. The light is soft and a 200 watt lamp would give 3.5 foot candles on the working plane, which is standard for this type of room.

Third Floor.

GENERAL DATA:

Size of room - 125 x 50 feet.

Floor area - 6250 square feet.

Height of ceiling - 14 feet.

Number of units - 10.

Type of units - Direct.

Lamps per unit - one. 200 watt. (C)

Wattage consumed - .32 watts per square foot.

Fixtures suspended - 3 feet.

Maximum intensity - 11.0 foot candles.

Minimum intensity - 2.00 foot candles.

Average intensity - 5.00 foot candles.

GENERAL NOTES:

The ceiling is light grey and the walls, a tan and sky blue. The floor was used for children's clothing, toys, notions, and ladies underwear.

The electric units were supplemented by gas units of the same candle power as the electric. There were six of these units, so the effect was the same as 16 units. The spacing being very irregular, the distribution was the same, altho the units used resemble the brascolite type and have a good curve. The uneven distribution does not have a detrimental effect on the looks of the room and the entire atmosphere is pleasing.

SUGGESTED CORRECTIONS:

There seem to be no direct changes which might be made in this installation which would make it much better, and as the present installation is satisfactory, no changes will be suggested.

MILLS DRY GOODS



First Floor



Third Floor



Second Floor.

1. 041 100

1. 041 100

1. 041 100

State Journal Office.

GENERAL DATA:

Size of room - 60 x 90 feet.
 Floor area - 5400 square feet.
 Height of ceiling - 12 feet.
 Number of fixtures 8
 Lamp per fixture - 1-300 watt (C)
 Type of fixture Semi-indirect.
 Wattage consumed p .444 watts per square foot.
 Maximum intensity 10.0 foot candles.
 Fixtures suspended 3 feet.
 Minimum intensity 1.25 foot candles.
 Average intensity 3.4 foot candles.

GENERAL DATA:

The ceiling is an ivory tan and the walls are a light grey.
 The furnishings are dark.

The general illumination is low, but is sufficient because local lights which give an intensity as high as 15 foot candles are used on every desk. 75 watt C-2 lamps are used in all desk lamps.

As the office hours end at five P.M., there is seldom a need for the use of the entire number of units, the local units being sufficient.

SUGGESTED CORRECTIONS:

The lighting unit used is very inefficient, due to the great absorption of the glass. The use of an indirect unit for this installation would be very desirable. By using EC-14 X-Ray reflector in conjunction with the bowl now in use, the same intensity could be obtained with a 200

watt lamp type C. This reflector would convert the present semi-indirect unit into a luminous bowl indirect unit and a more uniform distribution would result with a saving of one third of the wattage consumption.

The 75 watt "CA2" lamps used in the desk units are far in excess of the requirements. 25 watt "B" lamps would be sufficient and there would be less strain on the eyes of those at the desks.



Woolworth's 10 cent Store.

GENERAL DATA:

Size of room - 50X125 feet.

Floor area - 6250 square feet.

Height of ceiling - 16 feet.

Number of units - 21.

Type of units - Nitro-Light (Hortor, Chi.)

Lamps per fixture - 1 300 watt. (6)

Wattage consumed - 1.05 watts per Square foot.

Units suspended 6 feet from ceiling.

Maximum intensity 10 ft. c.

Minimum intensity 4.5 ft. c.

Average intensity 6 ft. c.

GENERAL NOTES:

The ceiling is a light gray and the walls, to about five feet from the ceiling, is an ivory color. The remainder of the wall is covered with miscellaneous articles on display such as music, etc.

The foot candle meter readings indicated an uneven distribution of light, because of the poor curve of unit used. The average, however, is correct as compared with present lighting practice.

SUGGESTED CORRECTIONS:

The ceiling and walls would be suitable for the use of indirect units but, owing to the nature of the goods, a more brilliant light is required. The type of unit answering these requirements is

the Denzar #1 (Manufactured by the Beardsley Chandelier Co.). This unit, gives an even distribution with a minimum of glare and shadows. With this unit, it would be possible to reduce the size of the lamp to 200 watts and still maintain the average of intensity of 6 ft. c., thereby the wattage consumption would be reduced to .68 watts per square foot.



City Library.

GENERAL DATA:

Size of room 50 x 100 feet.
 Floor area 5,000 square feet.
 Ceiling height 12 feet.
 Number of units 5.
 Type of units Direct.
 Lamps per fixture one.
 Wattage consumed .20 watts per square foot.
 Units on ceiling.
 Maximum intensity 3.00 foot candles.
 Minimum intensity - foot candles.
 Average intensity - foot candles.

GENERAL NOTES:

The wall color is a dark brown and the ceiling is a dirty white.

The distribution is poor, there being almost no light on the book shelves and not sufficient anywhere without the aid of the desk lamps, which should not be necessary. The desk lamps now in use cause glare and are harmful to the eyes.

SUGGESTED CORRECTIONS:

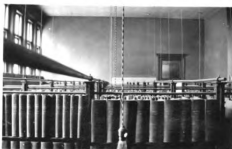
The following design is based on the decoration as suggested for the place can not be made attractive when the walls and ceiling are in bad shape.

The first thing which must be done to get good lighting in this place is to redecorate. Ivory white is a desirable color for the ceiling and an ivory tan for the walls.

An ideal installation would consist of four symmetrically located #1074 fixtures with three 75 watt "C" lamps, each lamp in its individual X-Ray indirect lighting reflector, in each of the two large reading rooms and two in the smaller reading room, and one placed above the center of the Librarian's desk. This would give an average intensity of four and a half foot candles in the reading rooms and a slightly higher value at the librarian's desk.

In the adjoining room, containing the book stacks, the same correction as to decoration applies.

A practical method of lighting the book stacks is by the use of a cylindrical housing mounted on top of the book stack and containing an X-Ray reflector unit, EC-15, with a hundred watt "C" lamp. Four of these uniformly spaced on alternate stacks would entirely eliminate hanging fixtures and would illuminate the books on the lower shelves as well as those on the upper.



Residences.

The conditions found at the residences examined show the following intensities:

	No. 1 Foot-candles	No. 2. Foot-candles	No. 3 Foot-candles.
Parlor	2.15	2.30	2.10
Dining Room	2.00	3.35	1.20
Library	2.40	- - -	- - -
Hall	1.60	.60	.70
Kitchen	2.65	1.85	1.50
Bed Room	2.65	1.30	2.65
Bath	2.50	2.50	1.80
Sun Parlor	2.45	3.00	- - -
Sewing Room	4.00	1.40	- - -

The standards of illumination as set by common practice at the present time are:

Parlor	1.50	Kitchen	2.00
Dining Room	1.50	Bedroom	2.00
Library	2.00	Bath	2.00
Hall	.60	Sun Parlor	1.50
Sewing Room	2.50		

The lighting installations examined are all of modern type. The owners each consider that they have about the best. The tendency seems to be toward too great an intensity.

In residence number 1, the fixtures on the first floor are richly conservative. In the parlor, or living room, no ceiling fixtures are used. Candlestick brackets of the type number 23401 of the Horn and Brannen Manufacturing Company are used. Art floor lamps are used in conjunction with these for reading lights. The remainder of the fixtures of this floor are of the type of number 16355 of the same company.

In second floor units consist mostly of a type similar to the Macbeth-Evans number 1500 S 139 Thebian, either of one, two or three lights per fixture.

Residence number two contained, on the first floor, candlestick fixtures almost exclusively. The second floor units are semi-indirect with Thebrian number 4404 S III type of glassware.

Residence number three contains similar fixtures on the first floor to those in number two, with the exception that round, frosted bulbs are used in place of the candlesticks. The second floor units are of the type of Decora number 1504 E 151 of the Macbeth Evans Glass Company.

The kitchen fixtures are all a single unit in the center of the room. No provision is made for special light on the stove, sink, or work table. This small change would make work in the kitchen much easier by removing the discomfort of working in one's own shadow.

Our findings would indicate that the intensities used in Lansing are below those in other cities where surveys have been made. A comparison of the department store intensities of this city with averages taken from reports of the other cities will show this.

Floor	Lansing Stores	Averages of compared stores.
	Foot-candles	Foot-candles.
1st	2.50	5.00
2nd	3.35	3.50
3rd	3.25	3.50
4th	1.25	3.00
Basement	3.30	3.00

The comparison was made with the intensities as they were at the time of the surveys in the East. Complete data as to the present values are not obtainable, but, from the changes which are recorded, it would appear that these present values are in excess of those recorded in the above table. Intensities recommended for department stores are 6 to 10 foot-candles for the first floor, and 4 to 8 for the other floors.

Higher intensities permit a more rapid examination of the goods and thus speed up the operation of selling. An improvement in the personal appearance of the employees is noticeable in stores having higher intensities.

The problem of maintenance is one which is lightly considered in most of the stores. Replacement of lamps at the end of their useful life and, more especially, a systematic cleaning of the fixtures would do much toward bettering the lighting conditions. Where stores persist in burning lamps ^{longer than the recommended life} removal of such lamps to the floors above the second, serves to maintain the illumination of the lower floors at a desirable intensity.

In general, the above applies to the stores other than the department stores. For them no comparative data is available more than that given in the discussions following each individual installation. As the different stores handle various goods it is difficult to generalize, and standard practice along will rule.

ROOM USE ONLY

ROOM USE ONLY

MICHIGAN STATE UNIVERSITY LIBRARIES



3 1293 03142 9289