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Some Common Faults in Exterior Illumination

S. Everett Doane

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SOME COMMON FAULTS IN EXTERIOR ILLUMINATION.

BY S. EVERETT DOANE.

General illumination may conveniently be considered from two points of view:

First—The actual distribution of light to the object illuminated.

Second—The value of this illumination to the observer.

We can accurately express the value of the first, but can speak only in general terms of the second. Much has been said about the first and but little about the second, yet the second is the practical end for which all illumination is designed. Whether or not the source of light is in range of the observer's vision largely influences the second value.

The contrast between the source of light and its environment is all important. A farmer's barn lantern will completely blind one to the road beyond when the night is black, and the vicinity not otherwise illuminated, whereas an arc lamp backed by a white building may be a fairly satisfactory source of light.

I had occasion during many of the evenings last summer to ride over the country roads near my home, and I had plenty of opportunity to notice their illumination. It was my observation that the best lighted towns in my vicinity used kerosene lamps situated at the side of the roads among the tree trunks.

Many and many a time when riding toward an arc lamp have I kept my place on a highway by guiding myself by the shining rail of the street railway track, absolutely unable to tell from the roadbed of shadows what was before me. Actual observations of this character make it clear that the amount of light actually delivered to a roadbed is only a part of what we must consider.

If the source of light must from its character be so placed that the observer is blinded to the road, it avails little as to the candle-power of that source. An arc lamp usually must be so placed that its light may shine in one's face in order that the light may shine along the road.

Light delivered from a lamp near at hand is much to be preferred to light delivered from a lamp so far away that the rays of light reach the ground at a small angle. Such light magnifies every hummock and equally shadows insignificant hollows and gulleys deep enough to be dangerous. It would be better to have half the illumination and be able to see the bottoms of the hollow spots. One of the recent papers on arc lamps spoke of their value in illuminating the houses and trees, and presumably the landscape, where there are no houses and trees.

The interest in this observation lies in the thought that the greater the candle power, and the more infrequent the lamps, the smaller is the portion of the total light shed upon the ground which actually reaches the roadway.

The Massachusetts State roads are uniformly 20 ft. wide. The country roads rarely exceed 30 ft. in width. City roads of Massachusetts are required to be 40 ft.

Arc lamps, located respectively 200 ft.,300 ft. and 400 ft. apart, are evidently intended to illuminate plane areas about 31,500, 70,000 and 125,000 square ft. in extent.

A 20 ft. road crossing this area will receive about 12.7 per cent., 8.6 per cent. and 6.4 per cent. respectively of the light delivered to the ground.

A 40 ft. road will receive twice this percentage, of course, but as the 20 ft. width is all the average rider ever notices, the illustration will answer. From this it is very apparent why it is wise that lamps of reduced candle power be placed closely together.

From this same illumination it will be seen that lamps placed 200 ft. apart, consuming one-half the energy, may be of one-half the efficiency and still give equally efficient illumination and, what is more to the point, will deliver their light from a more advantageous direction.

One of the best illustrations of suburban street lighting by arc lamps which comes to my mind is on the Boulevard from Boston to Auburndale. The Boulevard is really two separate roads with a continuous narrow park between, and the arc lamps are in the middle of this park, so that they may be said to be in a field

adjoining the roads. Why, with all these draw-backs, are arc lights used almost universally and incandescent lamps to so limited an extent?

I think there will be no discussion as to the reason. Incandescent lamps for street lighting have always been difficult to make, and less satisfactory than any other type of incandescent lamp.

The ordinary 100-volt to 125-volt 16 c.p. 3 l.w.p.c. incandescent lamp gives more candle hours for a given input than any other incandescent lamp. If this lamp could be used for street lighting the cost of street lighting by incandescent lamps could be materially reduced and the service rendered be much more satisfactory to the user of the highway.

There are many streets in which low voltage mains run the length of the streets and where these lamps could be used in multiple with no inconvenience. There are many other streets where ten or twenty could be used in series, each on a cut-out box, no more complicated than the Nernst lamp, which you will possibly be called upon to consider. These cut-out boxes would not be so complicated as the arc lamps, which operate with practically no attention. I do not understand why this has not been done.

Times have changed. The arc lamp lines are no longer the only wires on the poles. Probably one-half of the electric lighting poles carry alternating current mains also. Incandescent lamps are now universally fastened to their bases by a waterproof cement, and waterproof sockets are in stock everywhere. Is it not time that we broke away from tradition?

The arc lamp has its use in street lighting. There are places where it is wisest to use it. The public think they are getting more for their money with the brilliant arc lamp, but I believe that as the users of the highways come to appreciate how much safer and more satisfactory well-placed illumination is than that to which I have referred, we will learn to light our streets as we do our homes. The lesson learned in show-window lighting and in theatre stage lighting should not be lost upon us. It is not the light, after all, that interests us; it is what we see by means of the light.

We must add to this that for a given expenditure of energy more light can actually be delivered to a highway by incandescent lamps than by arc lamps and it can be better distributed.

Arc lamps are at their best in densely settled districts. The reflected light from buildings helps to economize the distribution, and the great quantity of light from store windows also assists so

to brighten the surroundings that the brilliant arc lamp is less blinding. Arc lamps are also more closely spaced in these localities, which is to their advantage.

Incandescent lamps are, in my opinion, much to be preferred for residential streets, side streets and outside the more congested portions of a town or city.