

FRAMINGHAM DOWNTOWN PROGRAMMATIC STUDY
TECHNICAL MEMORANDUM ON EXISTING CONDITIONS

Technical Memorandum #4
Existing Lighting Levels/Deficiencies/Operations

Prepared by: Antonio P. Franco & Associates
Prepared for: BETA Group, Inc. and
Town of Framingham

June, 2008

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INTRODUCTION

The purpose of this study is to assess and evaluate the existing lighting in the Downtown Core Area of Framingham primarily along Concord Street/Hollis Street (Rt. 126) from the intersection of Clinton Street in the northern area to the intersection of Gordon Street in the southern area, (see Figure 1) and prepare recommendations for a new continuous lighting system to provide illumination lighting levels and uniformity in compliance with IES guidelines for this type of roadway.

ASSESSMENT & EVALUATION OF EXISTING LIGHTING SYSTEM

The existing lighting system in the entire area consists of two types of poles/luminaires.

Type “A” – 400 watt high pressure sodium cobrahead on 6’ davit arm mounted on a 30’ concrete pole. Pole/luminaire is supplied from existing un-metered underground secondary system, owned and maintained by NSTAR.

Type “B” – 250 watt metal halide pendant luminaire mounted on a 20’ decorative steel pole.

Pole/luminaire is supplied from existing un-metered underground system from NSTAR. Pole/luminaire is owned and maintained by the Town of Framingham.

Notes:

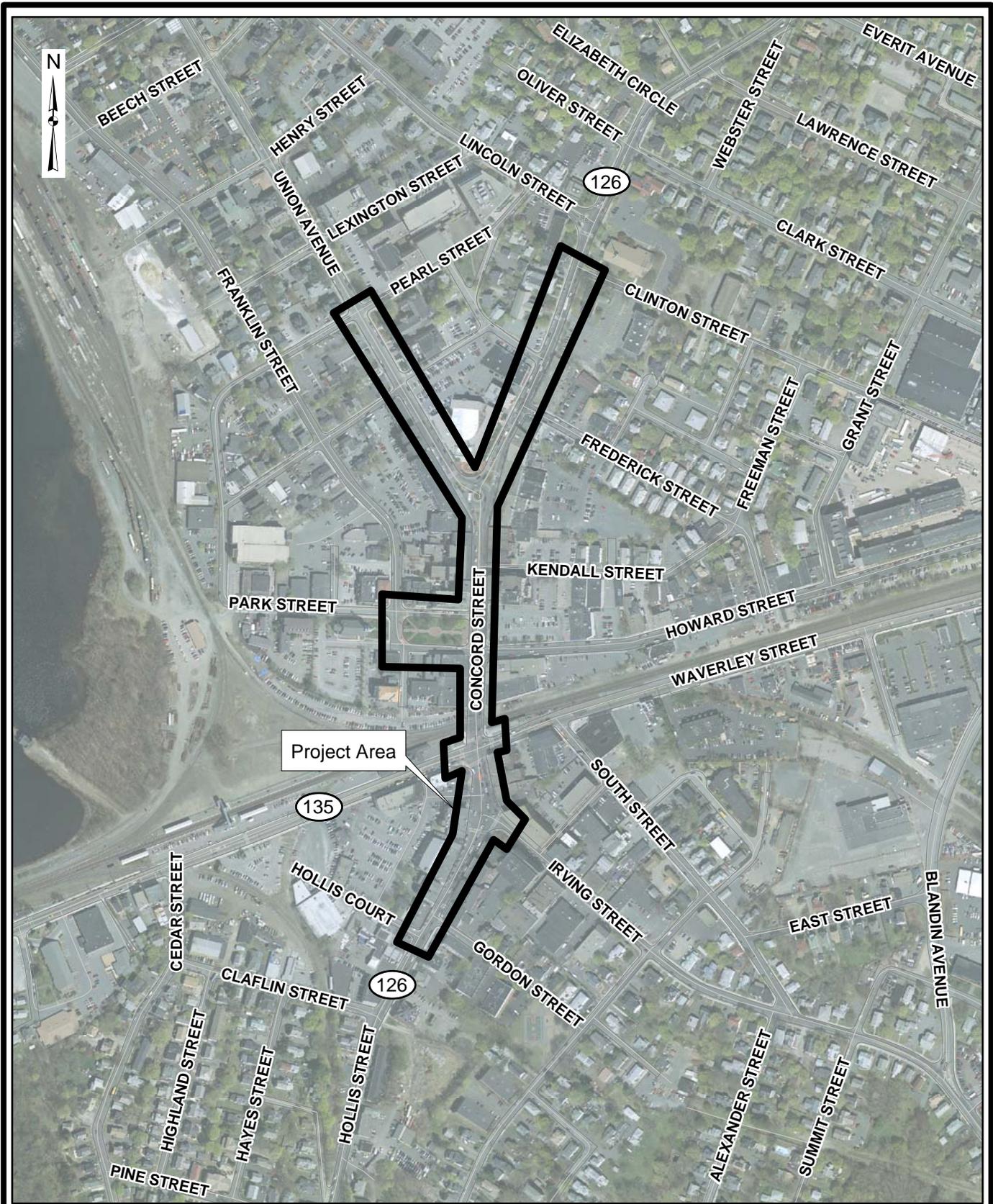
1. There are some Type “B” poles/luminaires surrounding the park at Concord Street and Park Street. It appears that these poles/luminaires are supplied from a metered service pedestal #1 within the park area. Since we have not received any prints of the existing electrical layout, we do not know to what extent this pedestal supplies the existing lighting system.
2. All Type “B” pole/luminaires are provided with an outdoor receptacle at the top of the pole to provide power for decorative lighting during holidays. Each luminaire is energized via a photocell at top of each luminaire.

In addition to the two types of lighting pole/luminaires described above, there is a 400 watt HPS floodlight mounted on an existing concrete pole and another 400 watt MH floodlight mounted on the roof parapet of the municipal building at the corner of Concord Street/Union Ave. Both of these flood lights are focused toward the rotary at this intersection.

Existing pole spacing varies from 100’ to 200’ depending on the area. It is evident that some recent installations of Type “B” pole/luminaires took place in the areas of most activity and pedestrian interference such as:

1. Rotary intersection at Concord/Union Avenue
2. Park @ Park Street area.
3. R/R crossing/Waverly Street intersection.
4. Hollis/Irving Street intersection.

Based on our field survey and walk through of the area, it was observed that the existing new Type “B” pole/luminaires were installed either near or on the locations of the old Type “A” pole/luminaires without consideration of proper spacing or closeness to existing trees. Some of these luminaires are totally obscured by tree foliage preventing these luminaires from providing adequate lighting. Refer to Appendix A – area photos for typical pole/luminaire locations.



Antonio P. Franco & Associates
 17 Susan Drive
 Cumberland, RI 02864

**Framingham Downtown
 Programmatic Plan**
 Framingham, MA

Figure 1

Site Location

FIELD LIGHTING SURVEY ANALYSIS

In addition to properly evaluate the existing lighting system, we performed a field survey of the lighting levels provided by the existing luminaires within the project area.

The project area was divided into (5) separate areas and light readings were taken at 50' intervals within each area. These areas comprised between 90% - 95% of the entire project and we felt that they were representative of what the entire lighting levels were.

Lighting results varied from area-to-area showing average foot candles ranging from 1.24 to 2.5 with uniformity ratio ranging from 3.47 to 10.54.

The recommended lighting level for this type of roadway, according to IES Guidelines should be:

- Average Foot candles – 1.5
- Average to minimum uniformity ratio 3.0 or less

Lighting levels as recommended by IES roadway lighting design guidelines RP – 8 – 00 (2005) – Table 2 (Major w/high Pedestrian Interference)

Refer to Appendix B – Sample Areas

PROPOSED NEW LIGHTING SYSTEMS

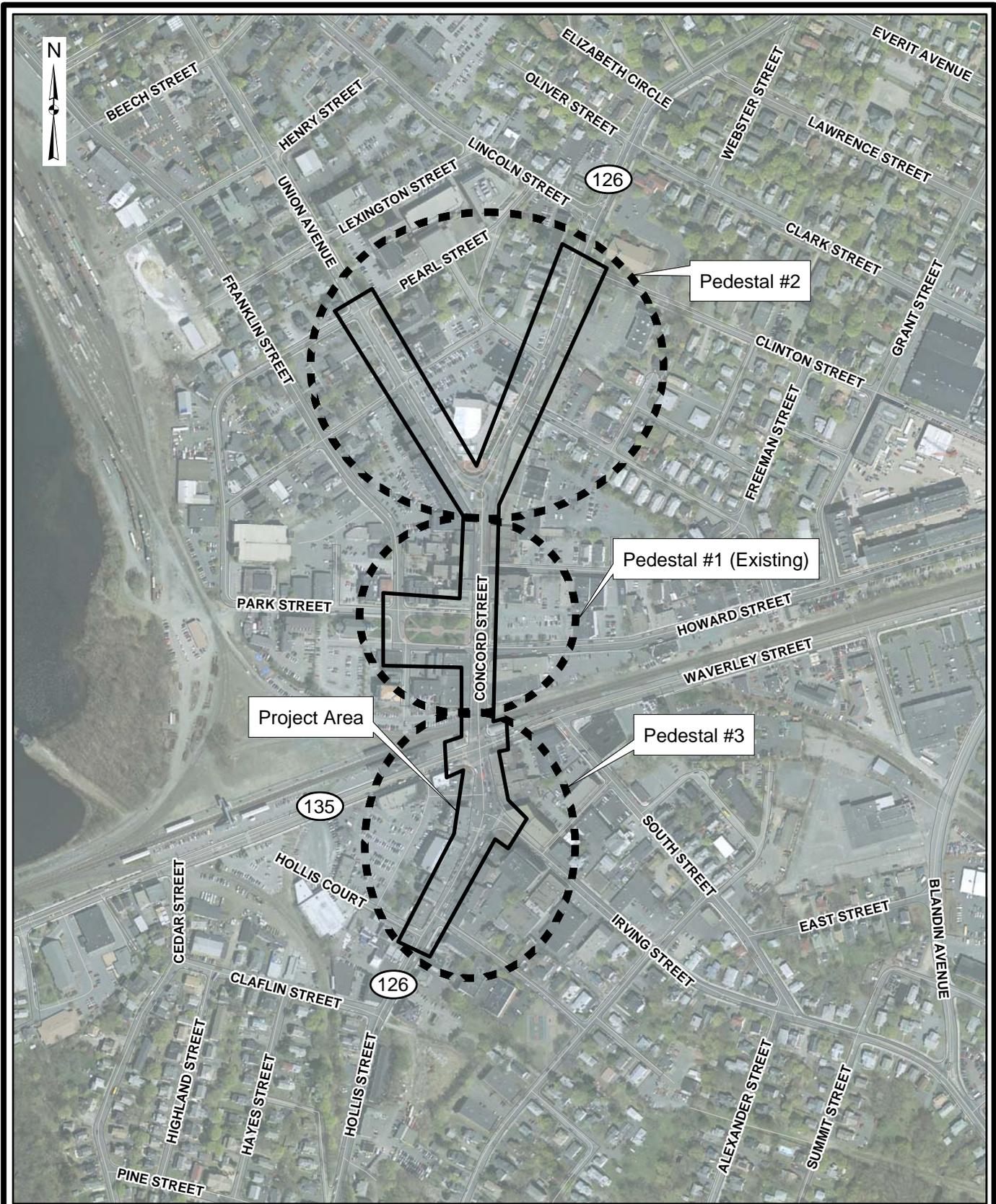
In order to meet general lighting guidelines for this type of roadway as described in the previous section and to be consistent with the new Type "B" pole/luminaires, we propose to design and install a complete new lighting system throughout the area with the proper spacing and location to avoid any conflicts with existing trees or other elements in the area.

Photometric calculations show that the lighting levels and uniformity ratio can be obtained by spacing poles at approximately 150 ft. apart on a staggered layout on both sides of the roadway. Special attention must be given to new roadway/sidewalk layout near the vicinity of the municipal buildings. In order to provide metered power to the new lighting systems we estimate that (2) new service pedestal will be needed plus using or replacing existing service pedestal #1. (see Figure 2).

In order to minimize the cost of the overall project, we recommend to salvage existing Type "B" pole/luminaires by relocating them to new foundations connected to the new conduit/handhole and service pedestals. Existing individual un-metered services can be disconnected and removed. Existing foundations can either be totally removed or removed 12" min. below existing grade.

PROPOSED CONSTRUCTION COSTS

Total estimated construction cost for a new lighting system to provide the required lighting levels is approximately \$688 k (see Table I). This cost assumes that existing Type "B" poles/luminaires can be salvaged and relocated to a new foundation. Existing photocells will be removed since the new lighting circuits will be controlled via a lighting contactor and master photocell at each service pedestal. In addition, sidewalk and roadway restoration cost are not included in our estimate.



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**Framingham Downtown
 Programmatic Plan**
 Framingham, MA

Figure 2

**Proposed Lighting
 Systems**

Table 1 - Lighting Estimate

Item #	Description	Unit Measure	Quantity	Cost/Unit	Total Cost
1	Service Pedestal	Each	3	\$12,500	\$37,500
2	Secondary Services	Each	2	\$2,500	\$5,000
3	Type "A" Handhole	Each	44	\$350	\$15,400
4	New Pole/Luminaire/Foundation/Wiring	Each	21	\$6,850	\$143,850
5	Relocated Pole/ Luminaire/Foundation/Wiring	Each	20	\$3,000	\$60,000
6	2" SCH 40 PVC Conduit (Underground)	LF	6,300	\$20	\$126,000
7	2" SCH 80 PVC Conduit (Road Crossing)	LF	300	\$40	\$12,000
8	Miscellaneous Splices	Each	38	\$85	\$3,230
9	3-#2 + 1-#6 Conductors (Circuit Feet)	CF	6,500	\$10	\$65,000
10	Testing	LS	1	\$5000	\$5,000
	Subtotal				\$472,980
	Contingency (10%)				\$47,298
	Subtotal				\$520,278
	Contractor's OH & Profit (15%)				\$78,042
	Subtotal				\$598,320
	Engineering (10%)				\$89,748
	Total				\$688,068

CONCLUSIONS

Based on our site visit, field lighting measurements, and photometric calculations, we conclude that the existing lighting system is not providing the adequate lighting as recommended by IES guidelines. We further conclude that it is not feasible to expand the existing system since the present locations of the new type “B” poles/luminaires are not spaced properly and in some cases being obstructed by the ever growing adjacent trees.

As a result of the above, we recommend that a new independent lighting system be designed and installed using the same poles/luminaires as existing Type “B” ones (minus photocells), supplied from (3) metered pad-mounted service pedestals. Pedestal #1 can either be modified or replaced with a new standard design as the other two proposed for the area. Some of the benefits associated with our recommendation, in addition to having a new system, are:

1. New metered pedestals to account for all energy usage.
2. Easier identification of system ownership between the Town of Framingham and NSTAR making easier for future maintenance issues.
3. New lighting design will meet the IES guidelines for the entire area.
4. Better location of new poles in order to minimize any interference with existing or future tree installations.
5. Improvements in the overall aesthetic appearance of the area.
6. Added benefit to merchants appealing and improvements in public safety.

Note: Once the final roadway re-alignment is completed in the rotary areas in the northern and southern boundaries of this project a preliminary lighting layout and photometric calculations will be prepared to supplement this study. Final design of the new lighting system will be prepared under a separate contract.

Appendix A

Area Photos



Figure A1 - View of a 400-watt HPS cobrahead and floodlight on a 30-foot concrete pole.



Figure A2 - View of a 400-watt HPS cobrahead on a 30-foot concrete pole being supplied via overhead secondary cable from another pole.



Figure A3 - General view of a new 250-watt metal halide luminaire on a 20-foot decorative steel pole.



Figure A4 - View of an existing 400-watt HPS cobrahead on a 30-foot concrete pole.



Figure A5 - General view of Irving Street showing existing 400-watt HPS cobraheads on 30-foot concrete poles.



Figure A6 - View of a metered service pedestal supplying new pole luminaires within and surrounding the Park Street park area.

Appendix B

Sample Areas (Lighting Field Survey)

SAMPLE 1 (6/18/08)

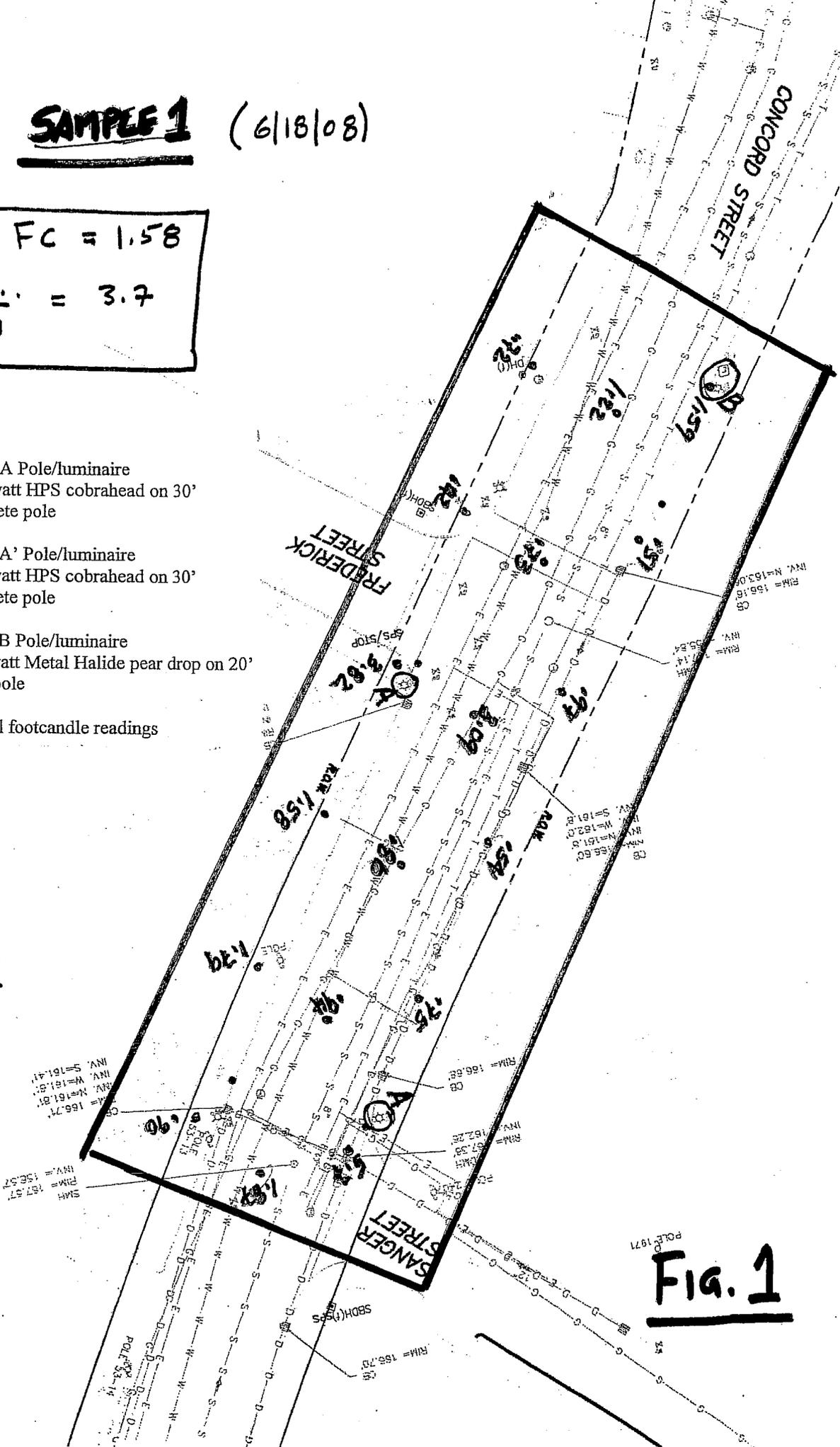
$$\text{AVE FC} = 1.58$$

$$\text{Ratio } \frac{\text{Ave.}}{\text{Min}} = 3.7$$

LEGEND

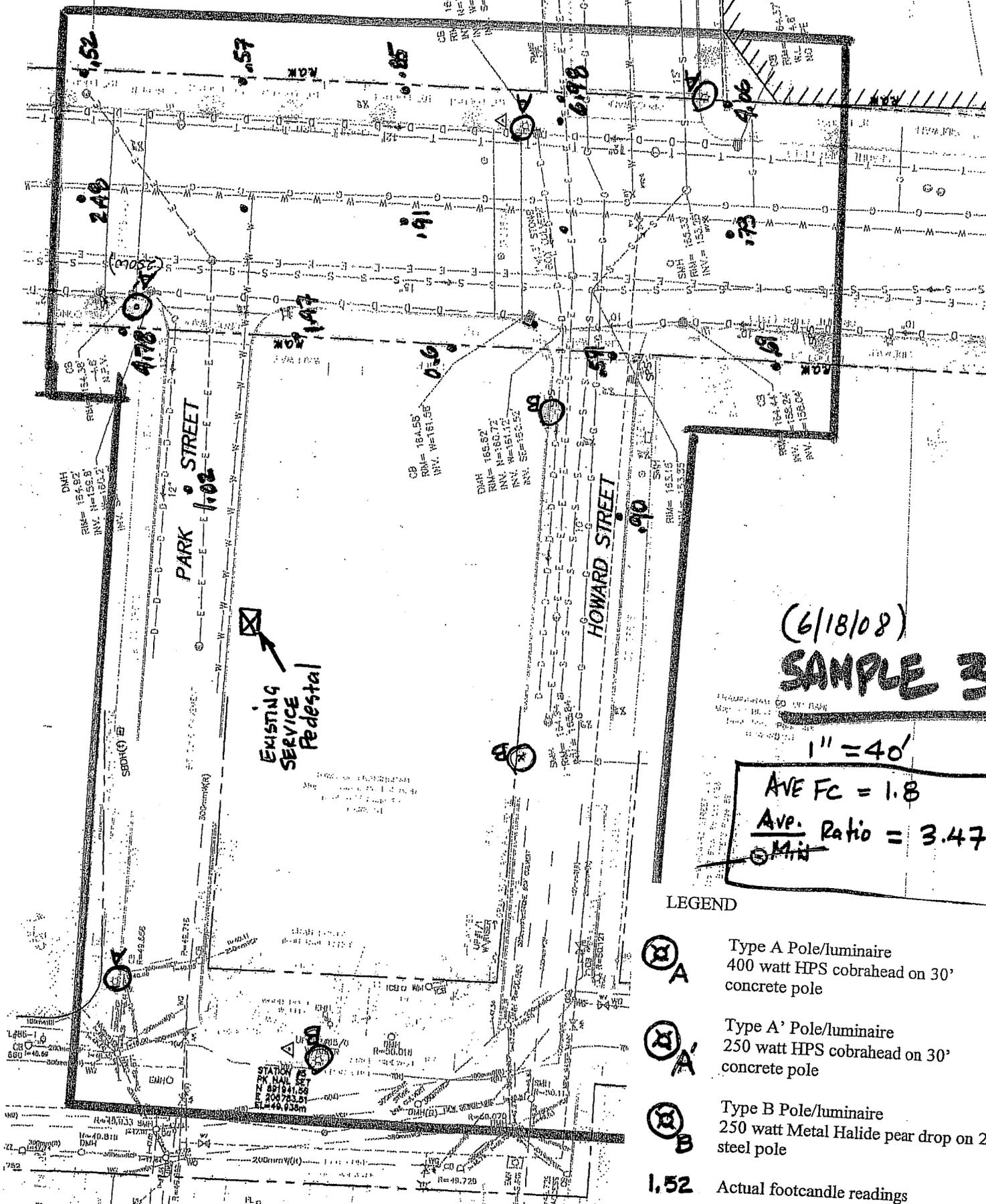
- 
 Type A Pole/luminaire
 400 watt HPS cobrahead on 30' concrete pole
- 
 Type A' Pole/luminaire
 250 watt HPS cobrahead on 30' concrete pole
- 
 Type B Pole/luminaire
 250 watt Metal Halide pear drop on 20' steel pole
- 1.52 Actual footcandle readings

N



POL.F.1971
Fig. 1

FIG. 3



LEGEND



Type A Pole/luminaire
400 watt HPS cobrahead on 30'
concrete pole



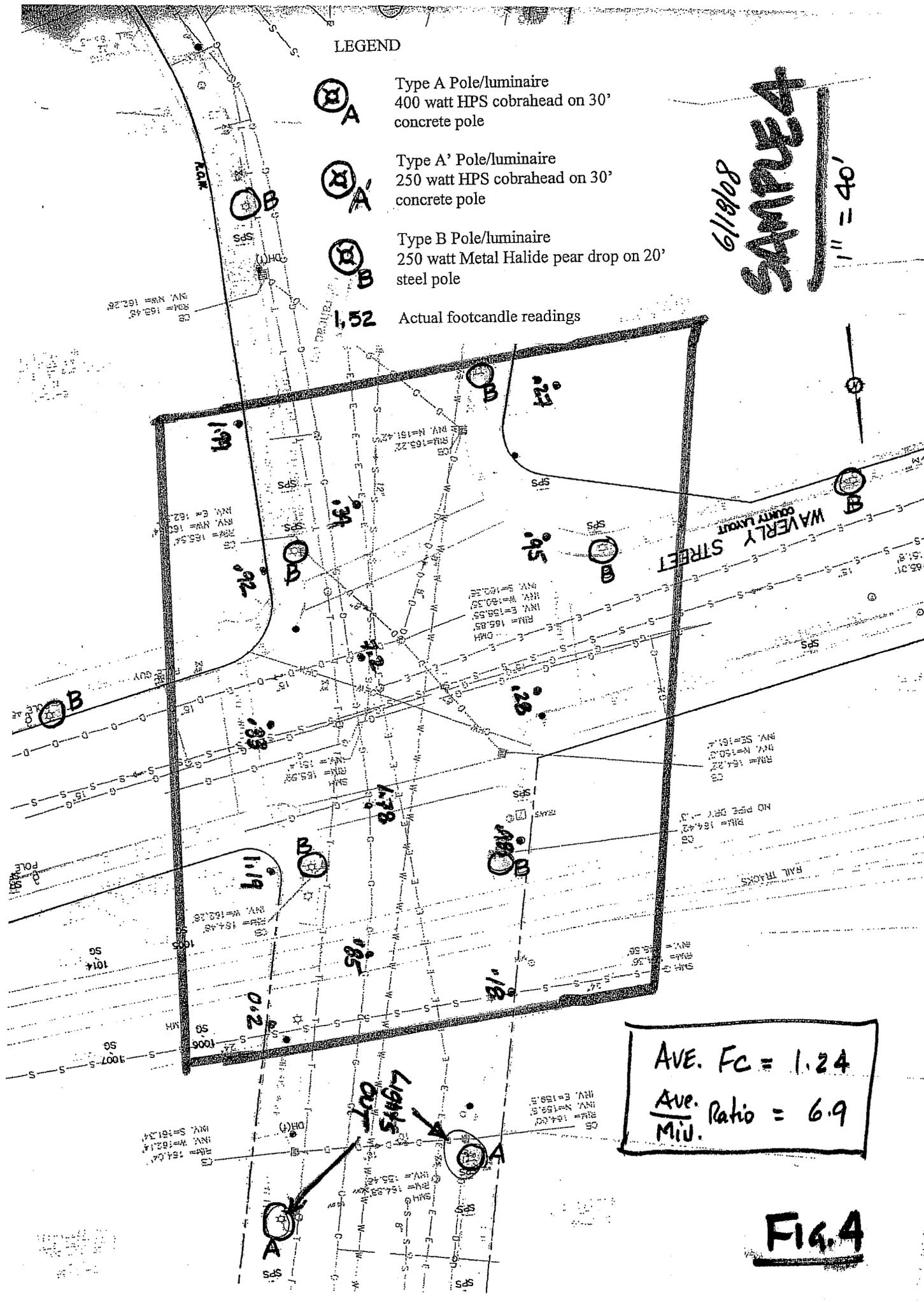
Type A' Pole/luminaire
250 watt HPS cobrahead on 30'
concrete pole



Type B Pole/luminaire
250 watt Metal Halide pear drop on 20'
steel pole

1.52 Actual footcandle readings

8/18/19
SAMPLE
1" = 40'



Ave. Fc = 1.24
Ave. Ratio = 6.9
Miu.

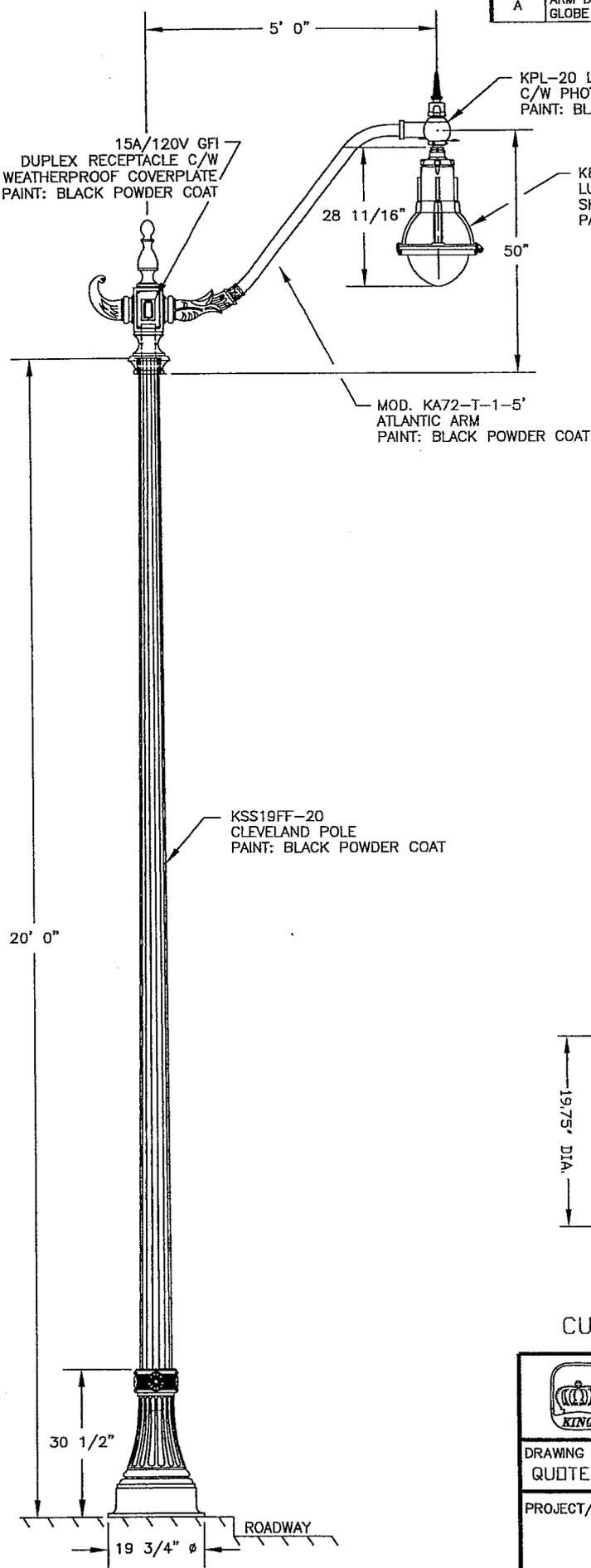
FIG. 4

Lights
OUT

Appendix C

Proposed Pole/Luminaire

REV.	ALTERATION	DATE	BY
A	ARM DIM. WERE 6' 0" LONG WITH 40° RISE; GFI ADDED; GLOBE MAT'L WAS POLYCARBONATE. BASE WAS CAST IRON;	04/22/02	M.M.



LUMINAIRE SPECIFICATIONS

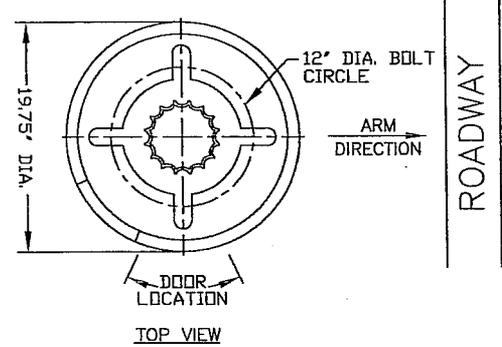
CATALOGUE NO.: K81-EGS-III-250(MDG)
-MH-120(MT)-KPL20-PE
 QUANTITY:
 GLOBE MAT'L: GLASS
 IES CLASSIFIC.: TYPE III
 WATTAGE: 250W
 LIGHT SOURCE: METAL HALIDE
 VOLTAGE: 120V (MULTI-TAP)
 PAINT: BLACK POWDER COAT
 OPTIONS: KPL-20-PE LEVELLING DEVICE

ARM SPECIFICATIONS

CATALOGUE NO.: MOD. KA72-T-1-5' C/W DR
 QUANTITY:
 MATERIAL: ALUMINUM
 PAINT: BLACK POWDER COAT

POLE SPECIFICATIONS

CATALOGUE NO.: KSS19FF-20
 QUANTITY:
 MATERIAL: STEEL TAPERED SHAFT,
DUCTILE IRON BASE
 POLE HEIGHT: 20' 0"
 PAINT: BLACK POWDER COAT
 TENDR: 1.9" O.D. x 2 3/4"L
 ANCHOR BOLTS: (4) 1" x 36" LONG
 BOLT CIRCLE: 12" ø



CUSTOMER APPROVAL: _____

 KING LUMINAIRE COMPANY INC. 840 WALKER'S LINE, P.O. BOX 7, BURLINGTON, ONTARIO, CANADA L7R 3X9 P.O. BOX 266 JEFFERSON, OHIO 1153 STATE ROUTE 46N U.S.A. 44047				
DRAWING NAME: QUOTE DWG	DWG NUMBER 02-176A-1	DATE 04/16/02	DWG BY: M.M.	REV. A
PROJECT/CUSTOMER: FRAMINGHAM DOWNTOWN COMMON				