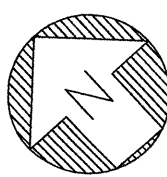
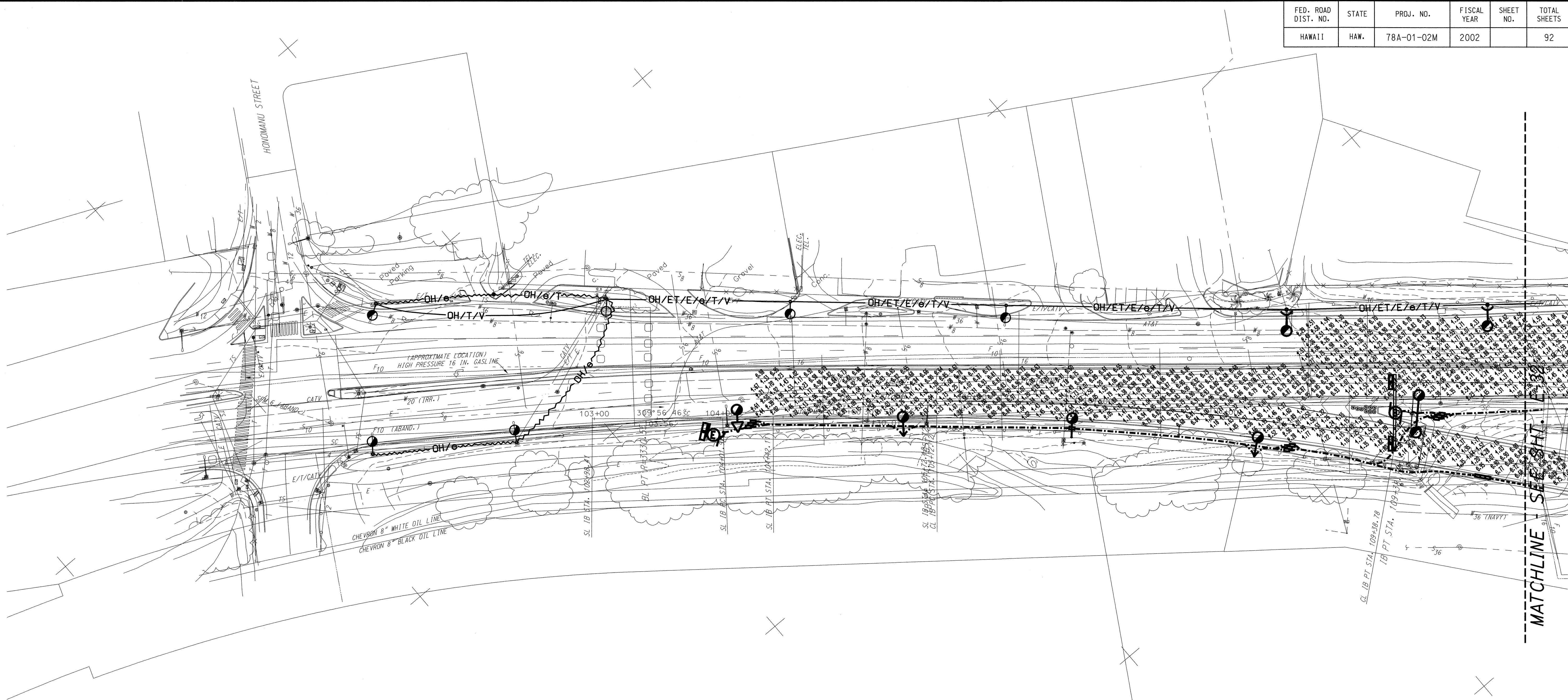
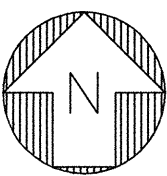
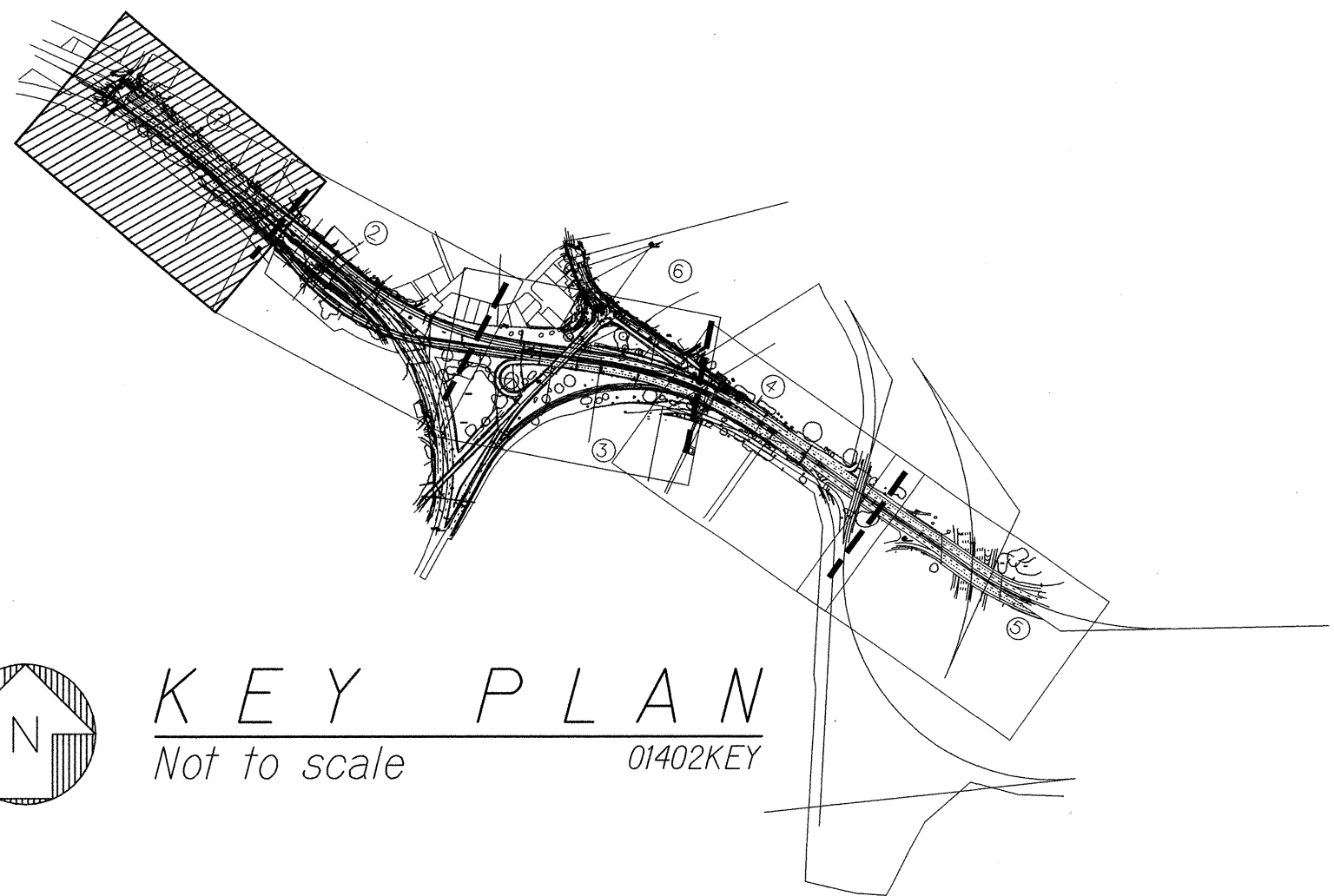


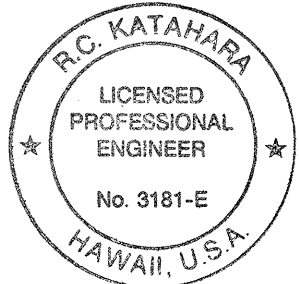
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	78A-01-02M	2002		92



LIGHTING CALCULATION PLAN "A"
Scale: 1" = 40'-0"
01402-S0



KEY PLAN
Not to scale
01402-KEY



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R. KATHARA 5/2/02
MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/04

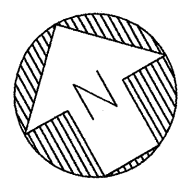
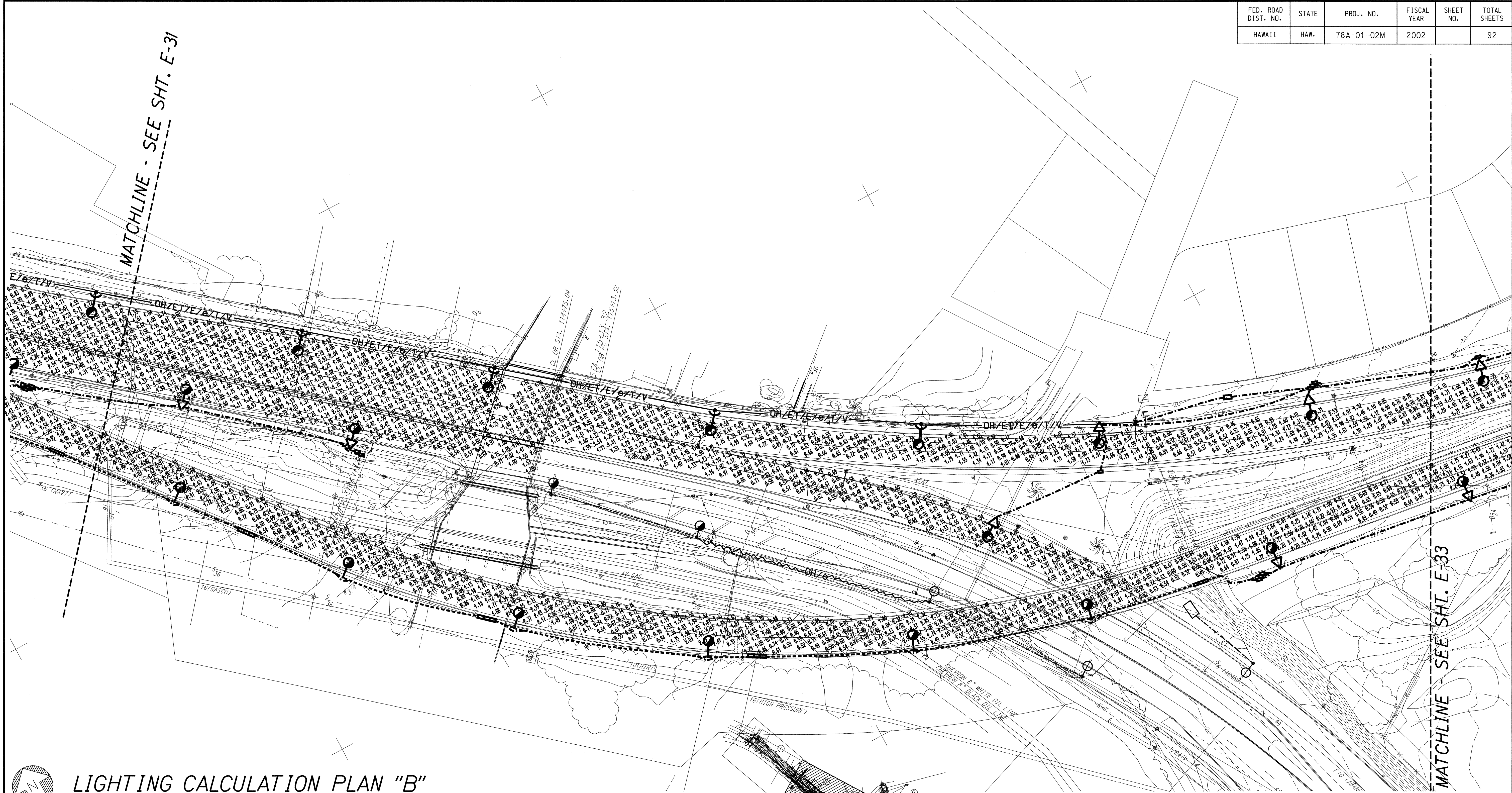
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

LIGHTING CALCULATION PLAN "A"
MOANALUA FREEWAY LIGHTING IMPROVEMENTS
Kamehameha Highway to H1 Halawa Interchange
Proj. No. 78A-01-02M
Oahu, Hawaii

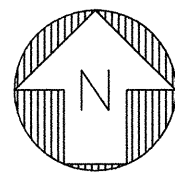
Scale: As Noted Date: May 2002
SHEET No. E-38 OF 92 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
NOTE BOOK	TRACED BY	
	DESIGNED BY	
No.	CHECKED BY	

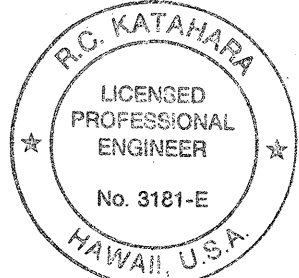
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	78A-01-02M	2002		92



LIGHTING CALCULATION PLAN "B"
Scale: 1" = 40'-0" 01402-SP



KEY PLAN
Not to scale 01402KEY



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MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/04

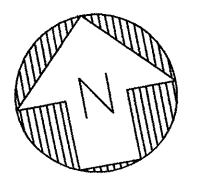
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

LIGHTING CALCULATION PLAN "B"
MOANALUA FREEWAY LIGHTING IMPROVEMENTS
Kamehameha Highway to H1 Halawa Interchange
Proj. No. 78A-01-02M
Oahu, Hawaii

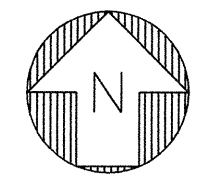
Scale: As Noted Date: May 2002
SHEET No. E-39 OF 92 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
No.	DESIGNED BY	
	CHECKED BY	

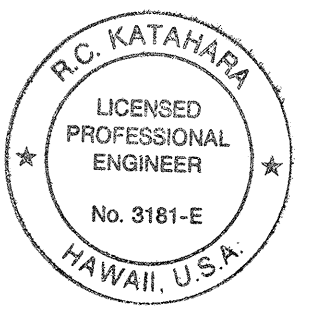
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	78A-01-02M	2002		92



LIGHTING CALCULATION PLAN "C"
Scale: 1" = 40'-0"
01402-SQ



KEY PLAN
Not to scale
01402-KEY



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MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE 4/30/04

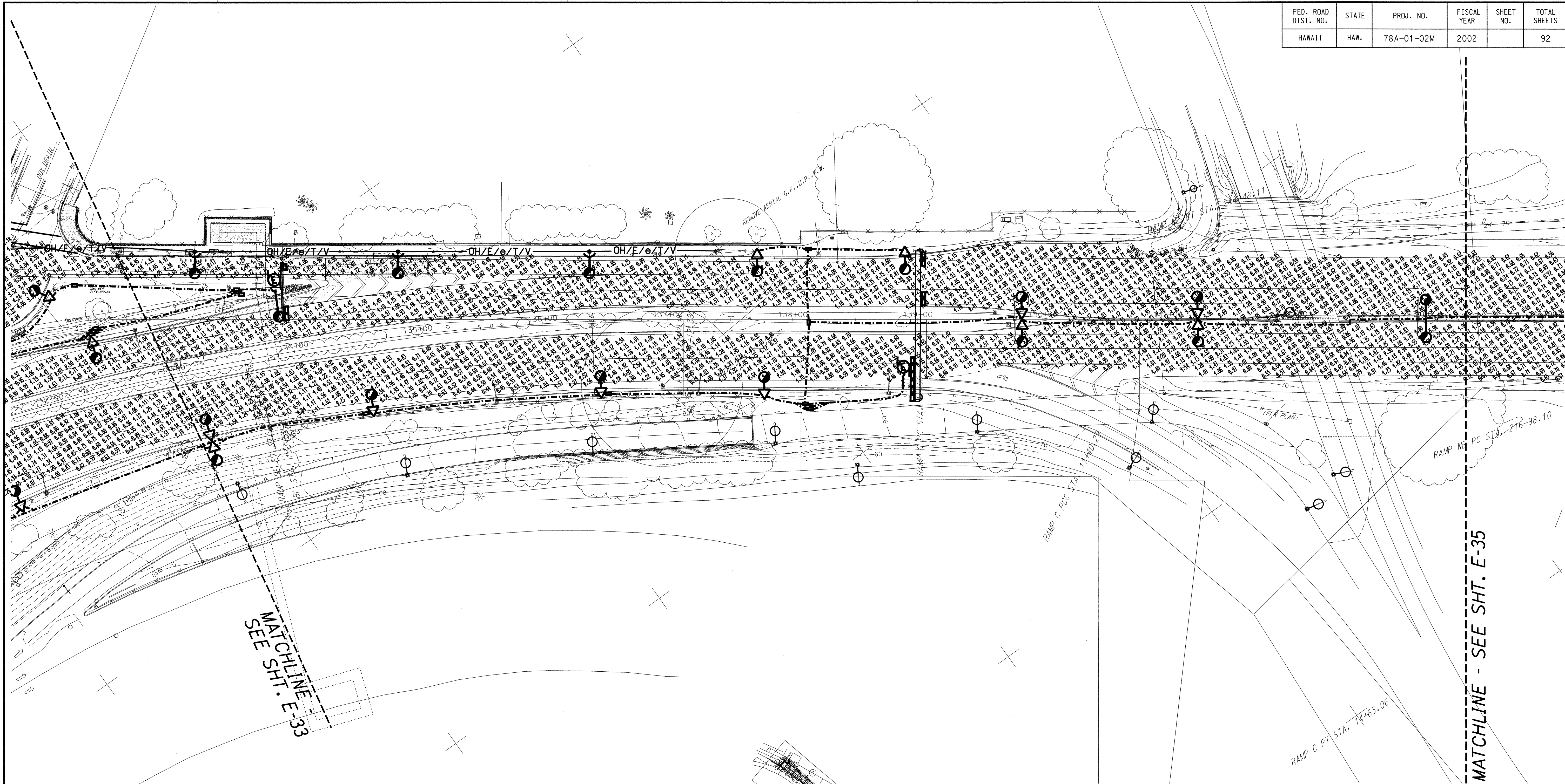
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

LIGHTING CALCULATION PLAN "C"
MOANALUA FREEWAY LIGHTING IMPROVEMENTS
Kamehameha Highway to H1 Halawa Interchange
Proj. No. 78A-01-02M
Oahu, Hawaii

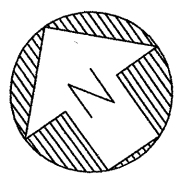
Scale: As Noted Date: May 2002
SHEET No. E-40 OF 92 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
	DESIGNED BY	
NOTE BOOK	CHECKED BY	
	No.	

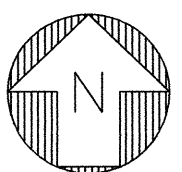
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	78A-01-02M	2002		92



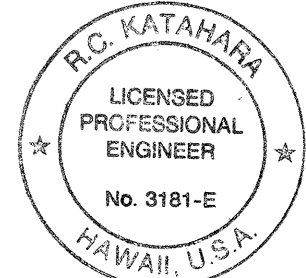
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
	DESIGNED BY	
NOTE BOOK	CHECKED BY	
	No.	



LIGHTING CALCULATION PLAN "D"
Scale: 1" = 40'-0"
01402-SR



KEY PLAN
Not to scale
01402-KEY



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McKenna Stiles
MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/04

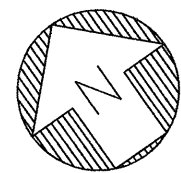
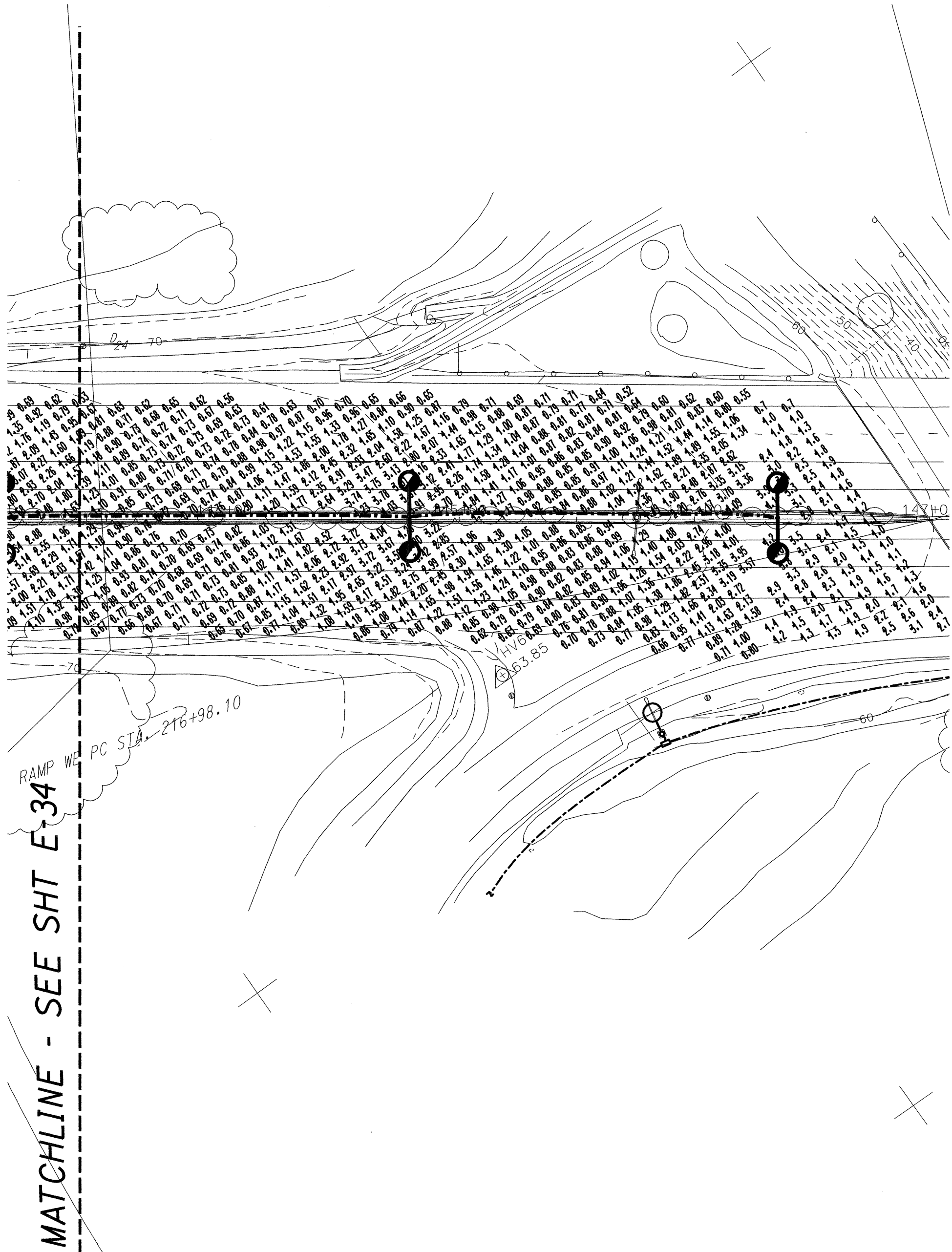
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

LIGHTING CALCULATION PLAN "D"
MOANALUA FREEWAY LIGHTING IMPROVEMENTS
Kamehameha Highway to H1 Halawa Interchange
Proj. No. 78A-01-02M
Oahu, Hawaii

Scale: As Noted
Date: May 2002

SHEET No. E-41 OF 92 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	78A-01-02M	2002		92

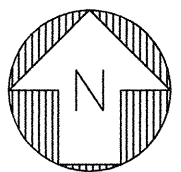
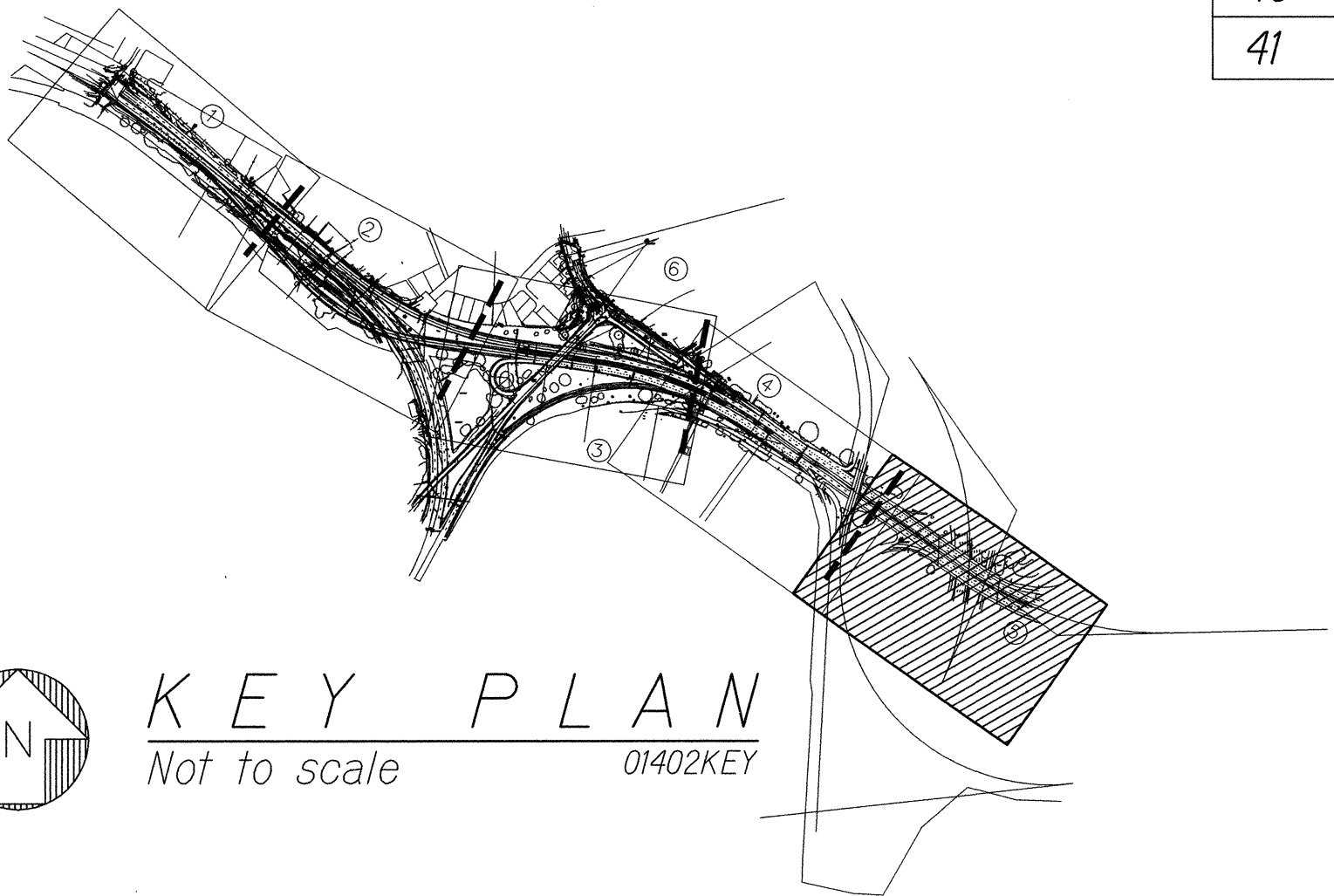


LIGHTING CALCULATION PLAN "E"
Scale: 1" = 40'-0" 01402-SS

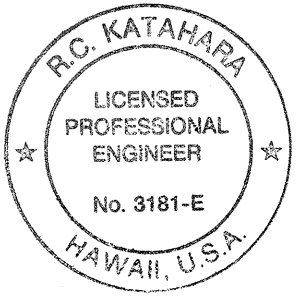
Numeric Summary - Basic							
Project: All Projects							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
SECTION 1	Illuminance	Fc	1.50	3.98	0.54	2.78	7.37
section 2	Illuminance	Fc	1.35	3.08	0.45	3.00	6.84
Section 3	Illuminance	Fc	1.32	3.22	0.44	3.00	7.32
section 4	Illuminance	Fc	2.12	4.24	0.72	2.94	5.89
section 5	Illuminance	Fc	1.55	4.34	0.52	2.98	8.35
SECTION 6	Illuminance	Fc	2.10	4.2	0.7	3.00	6.00

Luminaire Location Summary						
Project: All Projects						
SeqNo	Label	X	Y	Z	Orient	Tilt
42	GE MC2 10 foot arm	523454.6	76755.50	35	57.653	0
43	GE MC2 10 foot arm	523291.7	76977.55	35	243.431	0
44	GE MC2 10 foot arm	523389.9	76945.90	35	235.011	0
45	GE MC2 10 foot arm	523514.2	76857.45	35	240.523	0
46	GE MC2 10 foot arm	523257.3	77040.40	35	231.951	0
47	GE MC2 10 foot arm	523622.7	76778.78	35	241.187	0
49	GE MC2 10 foot arm	523720.0	76710.81	35	237.999	0
50	GE MC2 10 foot arm	523766.5	76614.45	35	58.395	0
51	GE MC2 10 foot arm	523766.5	76614.45	35	237.267	0
52	GE MC2 10 foot arm	523881.1	76532.05	35	59.421	0
53	GE MC2 10 foot arm	523881.1	76532.05	35	241.557	0
54	GE MC2 10 foot arm	524029.1	76425.91	35	55.841	0
55	GE MC2 10 foot arm	524029.1	76425.91	35	236.977	0
56	GE MC2 10 foot arm	524170.1	76327.22	35	56.31	0
57	GE MC2 10 foot arm	524170.1	76327.22	35	239.038	0
58	GE MC2 10 foot arm	524297.2	76235.51	35	55.619	0
59	GE MC2 10 foot arm	524297.2	76235.51	35	239.423	0
60	GE MC2 10 foot arm	522818.6	77352.85	35	233.88	0
61	GE MC2 10 foot arm	522915.4	77283.82	35	235.785	0
62	GE MC2 10 foot arm	523022.2	77207.43	35	232.884	0
63	GE MC2 10 foot arm	523104.6	77149.26	35	236.506	0
64	GE MC2 10 foot arm	523142.0	77077.98	30	120.176	0
65	GE MC2 10 foot arm	522930.7	77182.82	30	56.852	0
66	GE MC2 10 foot arm	522824.3	77260.48	30	57.908	0
67	GE MC2 10 foot arm	521455.4	77508.80	35	47.813	0
68	GE MC2 10 foot arm	521544.4	77419.59	35	40.237	0
69	GE150hps	521686.6	77279.36	35	38.114	0
18	GE MC2 8 foot arm	521604.2	77501.27	35	234.163	0
20	GE MC2 8 foot arm	521749.4	77411.42	35	238.673	0
21	GE MC2 8 foot arm	521879.3	77340.66	35	245.227	0
27	GE MC2 8 foot arm	522043.2	77278.28	35	254.361	0
28	GE MC2 8 foot arm	522181.9	77237.78	35	259.112	0
29	GE MC2 8 foot arm	522369.5	77202.40	35	263.161	0

31	GE MC2 8 foot arm	522505.9	77182.85	35	261.573	0
70	GE MC2 10 foot arm	523567.3	76678.99	35	52.254	0
73	GE MC2 10 foot arm	524328.5	76131.58	30	59.037	0
74	GE MC2 10 foot arm	522662.5	77159.73	35	261.603	0
75	GE MC2 8 foot arm	521172.7	77645.70	35	38.991	0
76	GE MC2 8 foot arm	521656.0	77249.93	35	65.095	0
77	GE MC2 8 foot arm	521799.6	77204.27	35	83.883	0
2	GE MC2 10 foot arm	520679.2	78139.27	35	53.128	0
3	GE MC2 10 foot arm	520775.5	78049.43	35	52.123	0
4	GE MC2 10 foot arm	520878.9	77964.70	35	50.064	0
5	GE MC2 10 foot arm	521072.5	77928.86	35	229.4	0
6	GE MC2 10 foot arm	520978.0	77856.93	35	45	0
7	GE MC2 10 foot arm	521197.3	77829.00	35	230.44	0
8	GE MC2 10 foot arm	521332.8	77720.53	35	234.865	0
9	GE MC2 10 foot arm	521098.6	77798.74	35	47.489	0
10	GE MC2 10 foot arm	521098.6	77798.74	35	228.576	0
11	GE MC2 10 foot arm	521215.0	77712.15	35	48.576	0
12	GE MC2 10 foot arm	521324.4	77618.58	35	47.121	0
13	GE MC2 10 foot arm	521458.9	77619.05	35	229.186	0
15	GE MC2 8 foot arm	521267.6	77525.48	35	38.418	0
16	GE MC2 8 foot arm	521373.3	77421.67	35	48.576	0
17	GE MC2 8 foot arm	521503.6	77325.30	35	58.784	0
19	GE MC2 10 foot arm	521769.0	77314.13	35	221.424	0
24	GE MC2 8 foot arm	521962.2	77177.26	35	82.648	0
25	GE MC2 8 foot arm	522126.0	77145.14	35	79.696	0
26	GE MC2 8 foot arm	522277.8	77128.85	35	86.73	0
30	GE MC2 10 foot arm	522427.2	77093.00	35	81.636	0
32	GE MC2 10 foot arm	522572.9	77072.99	35	82.503	0
34	GE MC2 10 foot arm	522727.5	77050.18	35	79.511	0
35	GE MC2 10 foot arm	522841.1	77126.52	35	258.69	0
36	GE MC2 10 foot arm	522871.3	77019.92	35	77.905	0
37	GE MC2 10 foot arm	522993.3	77088.35	35	254.356	0
38	GE MC2 10 foot arm	523026.8	76955.67	35	75.966	0
39	GE MC2 10 foot arm	523148.8	77030.16	35	249.442	0
40	GE MC2 10 foot arm	523182.3	76913.31	35	72.348	0
41	GE MC2 10 foot arm	523298.2	76849.07	35	62.745	0



KEY PLAN
Not to scale 01402KEY



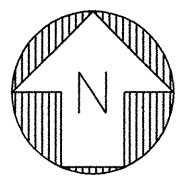
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P. K. K. K.
MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

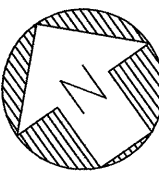
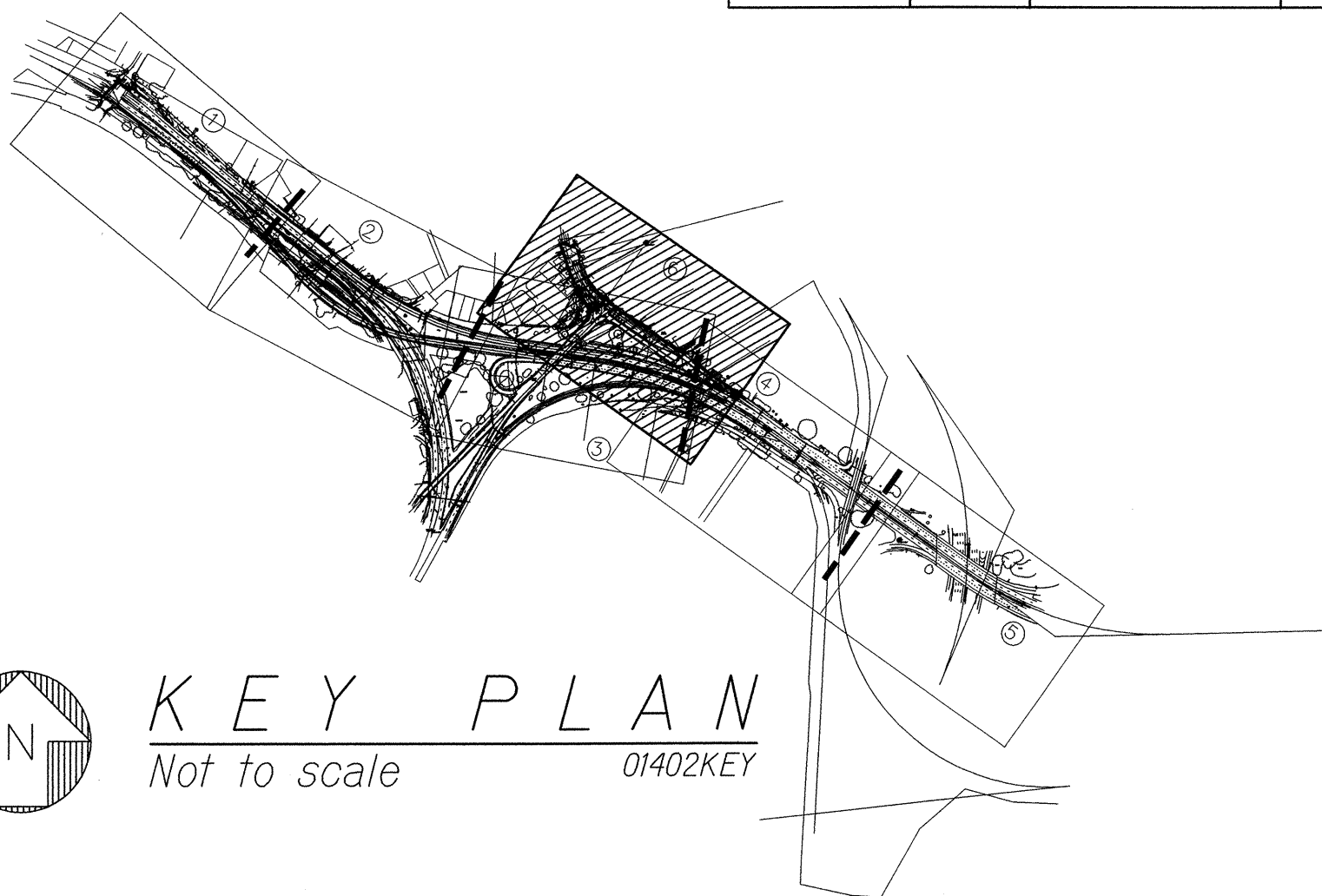
LIGHTING CALCULATION PLAN "E"
MOANALUA FREEWAY LIGHTING IMPROVEMENTS
Kamehameha Highway to H1 Halawa Interchange
Proj. No. 78A-01-02M
Oahu, Hawaii

Scale: As Noted Date: May 2002
SHEET No. E-42 OF 92 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	78A-01-02M	2002		92

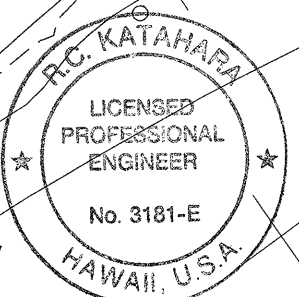
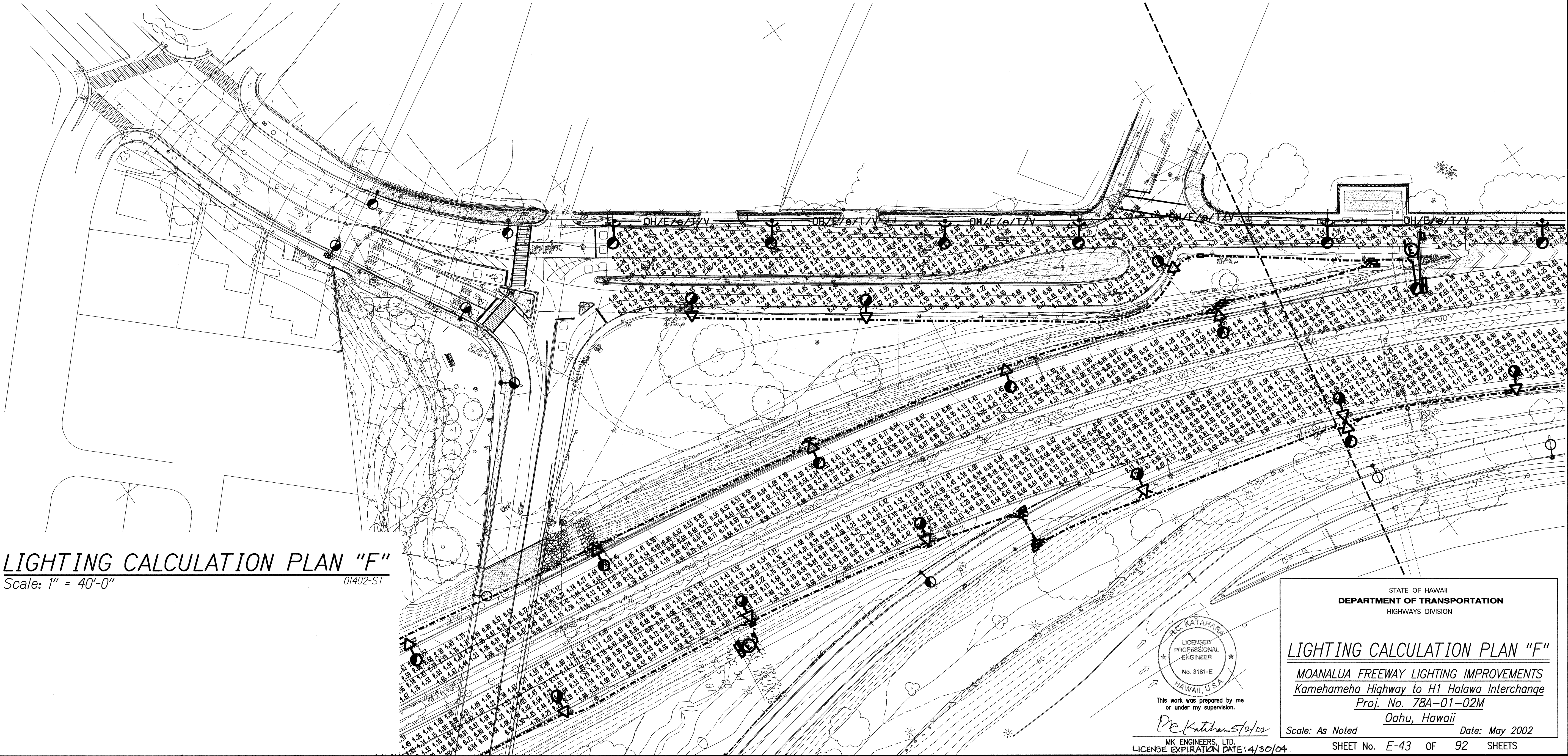


KEY PLAN
Not to scale
01402KEY



LIGHTING CALCULATION PLAN "F"
Scale: 1" = 40'-0"
01402-ST

ORIGINAL PLAN NOTE BOOK No.	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	DESIGNED BY	
	CHECKED BY	



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R.C. KATAHARA
MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

LIGHTING CALCULATION PLAN "F"
MOANALUA FREEWAY LIGHTING IMPROVEMENTS
Kamehameha Highway to H1 Halawa Interchange
Proj. No. 78A-01-02M
Oahu, Hawaii

Scale: As Noted Date: May 2002
SHEET No. E-43 OF 92 SHEETS