



Capital Systems, Inc.  
7063-C Commerce Circle  
Pleasanton, CA 94588  
(925) 416-8527 • (925) 468-0797 fax  
CA License #C10-70011

SIGNATURE: \_\_\_\_\_

Jefferson At Bay Meadows  
Apartments  
1075 Park Place  
San Mateo, CA

Drawn By: A. EBY  
Date: 8/07/00  
Scale: NONE  
Job No: 20001

REVISIONS

REV. DESCRIPTION DATE  
- Device Locations 8/11/00  
- Submittal To City 9/22/00

System Calculations  
Building 2  
FIRE SPRINKLER MONITORING SYSTEM  
Sheet Number

FA-5.1

Jefferson At Bay Meadows

| BATTERY CALCULATION                     |  |                      |                 |               |               |         |         |         |        |
|---|--|----------------------|-----------------|---------------|---------------|---------|---------|---------|--------|
| PROJECT: Bay Meadows                    |  | San Mateo CA         |                 |               |               |         |         |         |        |
| PANEL: MS-9200 Fire Alarm Control Panel |  | Buildings 1, 2, 3, 4 |                 |               |               |         |         |         |        |
| LOCATION: Building 2 Garage             |  |                      |                 |               |               |         |         |         |        |
| Quantity                                | Panel Devices                                      | STANDBY (in Amps)    | ALARM (in Amps) | Total Current | Total Current | Current | Current | Current | Total  |
| 1                                       | Main Circuit Board                                 | 0.0000               | 0.060           | 0.060         | 0.168         | 0.0000  | 0.000   | 0.168   | 0.168  |
| 0                                       | KTR-8F Relay Transmitter Module                    | 0.0000               | 0.000           | 0.000         | 0.146         | 0.0000  | 0.000   | 0.146   | 0.146  |
| 0                                       | ZDM-16F Annunciator Module                         | 0.0000               | 0.000           | 0.000         | 0.080         | 0.0000  | 0.000   | 0.080   | 0.080  |
| 1                                       | UDACT-F Digital Communicator                       | 0.0400               | 0.040           | 0.100         | 0.100         | 0.0000  | 0.040   | 0.100   | 0.100  |
| Remote Annunciators                     |  |                      |                 |               |               |         |         |         |        |
| 0                                       | AFM-18ATX LED Annunciator                          | 0.0400               | 0.000           | 0.056         | 0.000         | 0.0000  | 0.000   | 0.056   | 0.056  |
| 0                                       | AFM-32AX LED Annunciator                           | 0.0400               | 0.000           | 0.056         | 0.000         | 0.0000  | 0.000   | 0.056   | 0.056  |
| 0                                       | AEM-16ATX LED Annunciator Expander                 | 0.0000               | 0.000           | 0.016         | 0.000         | 0.0000  | 0.000   | 0.016   | 0.016  |
| 0                                       | AEM-32AF LED Annunciator Expander                  | 0.0000               | 0.000           | 0.016         | 0.000         | 0.0000  | 0.000   | 0.016   | 0.016  |
| 0                                       | AFM-16AF LED Annunciator                           | 0.0250               | 0.000           | 0.035         | 0.000         | 0.0000  | 0.000   | 0.035   | 0.035  |
| 0                                       | LDM-32F Graphic (Name 20% of devices in alarm)     | 0.0000               | 0.000           | 0.056         | 0.000         | 0.0000  | 0.000   | 0.056   | 0.056  |
| 0                                       | LDM-E-32F Graphic                                  | 0.0000               | 0.000           | 0.018         | 0.000         | 0.0000  | 0.000   | 0.018   | 0.018  |
| 4                                       | External Devices                                   | 0.0540               | 0.216           | 0.054         | 0.216         | 0.0000  | 0.216   | 0.054   | 0.216  |
| 4 Wire Smoke Detector                   |  |                      |                 |               |               |         |         |         |        |
| 0                                       | Power Supervision Relay                            | 0.0250               | 0.000           | 0.035         | 0.000         | 0.0000  | 0.000   | 0.035   | 0.035  |
| 0                                       | CP500 Ionization Smoke Detector                    | 0.0015               | 0.000           | 0.0015        | 0.000         | 0.0000  | 0.000   | 0.0015  | 0.0015 |
| 68                                      | SD300 Photoelectric Smoke Detector                 | 0.0015               | 0.000           | 0.0015        | 0.000         | 0.0000  | 0.000   | 0.0015  | 0.0015 |
| 0                                       | M300 Monitor Module                                | 0.0000               | 0.000           | 0.000         | 0.000         | 0.0000  | 0.000   | 0.000   | 0.000  |
| 32                                      | M301 Mini-Monitor Module                           | 0.0000               | 0.000           | 0.000         | 0.000         | 0.0000  | 0.000   | 0.000   | 0.000  |
| 0                                       | M302 2-wire Smoke Monitor Module                   | 0.0000               | 0.000           | 0.000         | 0.000         | 0.0000  | 0.000   | 0.000   | 0.000  |
| 28                                      | C301 Control Module                                | 0.0000               | 0.000           | 0.000         | 0.000         | 0.0000  | 0.000   | 0.000   | 0.000  |
| 0                                       | I201 Isolation Module                              | 0.0000               | 0.000           | 0.000         | 0.000         | 0.0000  | 0.000   | 0.000   | 0.000  |
| 0                                       | RW-LINE-P Air Systems Duct Detector                | 0.0200               | 0.000           | 0.050         | 0.000         | 0.0000  | 0.000   | 0.050   | 0.050  |
| Initiating Totals                       |  |                      |                 |               |               |         |         |         |        |
|   |  | 0.358                | 0.000           | 0.358         | 0.684         | 0.0000  | 0.684   | 0.358   | 0.684  |
| Notification Appliances                 |  |                      |                 |               |               |         |         |         |        |
|   |  | STANDBY (in Amps)    | ALARM (in Amps) | Total Current | Total Current | Current | Current | Current | Total  |
| Horns, 90 dBA                           |  | 0.000                | 0.000           | 0.000         | 0.000         | 0.0000  | 0.000   | 0.000   | 0.000  |
| 0                                       | NH-24-R/W  | 0.000                | 0.000           | 0.021         | 0.000         | 0.0000  | 0.000   | 0.021   | 0.021  |
| Horn Strobes, 95 dBA                    |  |                      |                 |               |               |         |         |         |        |
| 0                                       | NS-2415W-FR/FW, 15 candela                         | 0.000                | 0.000           | 0.072         | 0.000         | 0.0000  | 0.000   | 0.072   | 0.072  |
| 0                                       | NS-2415W-FR/FW, 15/75 candela                      | 0.000                | 0.000           | 0.086         | 0.000         | 0.0000  | 0.000   | 0.086   | 0.086  |
| 0                                       | NS-2430W-FR/FW, 30 candela                         | 0.000                | 0.000           | 0.097         | 0.000         | 0.0000  | 0.000   | 0.097   | 0.097  |
| 0                                       | NS-2475W-FR/FW, 75 candela                         | 0.000                | 0.000           | 0.155         | 0.000         | 0.0000  | 0.000   | 0.155   | 0.155  |
| 2                                       | NS-24110W-FR/FW, 110 candela                       | 0.000                | 0.000           | 0.185         | 0.000         | 0.0000  | 0.000   | 0.185   | 0.185  |
| Strobes, wall mount                     |  |                      |                 |               |               |         |         |         |        |
| 0                                       | RSS-2415W-FR/FW, 15 candela                        | 0.000                | 0.000           | 0.060         | 0.000         | 0.0000  | 0.000   | 0.060   | 0.060  |
| 0                                       | RSS-2415W-FR/FW, 15/75 candela                     | 0.000                | 0.000           | 0.066         | 0.000         | 0.0000  | 0.000   | 0.066   | 0.066  |
| 1                                       | RSS-2430W-FR/FW, 30 candela                        | 0.000                | 0.000           | 0.072         | 0.000         | 0.0000  | 0.000   | 0.072   | 0.072  |
| 2                                       | RSS-2475W-FR/FW, 75 candela                        | 0.000                | 0.000           | 0.133         | 0.000         | 0.0000  | 0.000   | 0.133   | 0.133  |
| 2                                       | RSS-24110W-FR/FW, 110 candela                      | 0.000                | 0.000           | 0.161         | 0.000         | 0.0000  | 0.000   | 0.161   | 0.161  |
| Strobes, ceiling mount                  |  |                      |                 |               |               |         |         |         |        |
| 0                                       | RSS-2415C-FW, 15 candela                           | 0.000                | 0.000           | 0.067         | 0.000         | 0.0000  | 0.000   | 0.067   | 0.067  |
| 0                                       | RSS-2430C-FW, 30 candela                           | 0.000                | 0.000           | 0.102         | 0.000         | 0.0000  | 0.000   | 0.102   | 0.102  |
| 0                                       | RSS-2475C-FW, 75 candela                           | 0.000                | 0.000           | 0.204         | 0.000         | 0.0000  | 0.000   | 0.204   | 0.204  |
| 0                                       | RSS-24100C-FW, 100 candela                         | 0.000                | 0.000           | 0.238         | 0.000         | 0.0000  | 0.000   | 0.238   | 0.238  |
| Sync Modules                            |  |                      |                 |               |               |         |         |         |        |
| 0                                       | SM-1224-R  | 0.000                | 0.000           | 0.025         | 0.000         | 0.0000  | 0.000   | 0.025   | 0.025  |
| 1                                       | DSM-1224-R   | 0.000                | 0.000           | 0.038         | 0.000         | 0.0000  | 0.000   | 0.038   | 0.038  |
| Other                                   |  |                      |                 |               |               |         |         |         |        |
| 0                                       | Remote Power Supply Connection (polarity reversal) | 0.000                | 0.000           | 0.005         | 0.000         | 0.0000  | 0.000   | 0.005   | 0.005  |
| TOTALS                                  |  | 0.358                | 0.000           | 0.358         | 0.684         | 0.0000  | 0.684   | 0.358   | 0.684  |
| Standby                                 |  |                      |                 |               |               |         |         |         |        |
| Standby Load Current per Hour (Amps)    |  | 0.048                |                 |               |               |         |         |         |        |
| X # of hours                            |  | 24                   |                 |               |               |         |         |         |        |
| Total Standby Load                      |  | 1.152                |                 |               |               |         |         |         |        |
| Alarm                                   |  |                      |                 |               |               |         |         |         |        |
| Alarm Load Current (Amps)               |  | 3.517                |                 |               |               |         |         |         |        |
| For 5 min. alarm (Signal Alarm x 0.83)  |  | 2.922                |                 |               |               |         |         |         |        |
| Total Alarm Load                        |  | 2.922                |                 |               |               |         |         |         |        |
| Total Standby + Total Alarm             |  | 4.074                |                 |               |               |         |         |         |        |
| Safety Margin +20%                      |  | 4.889                |                 |               |               |         |         |         |        |
| Total Amp. Hrs. Required                |  | 1.73                 |                 |               |               |         |         |         |        |
| Battery Size                            |  | 4 A.H.               |                 |               |               |         |         |         |        |

| VOLTAGE DROP CALCULATION   |             |                              |          |       |       |           |               |                 |              |
|--|-------------|------------------------------|----------|-------|-------|-----------|---------------|-----------------|--------------|
| PROJECT: Bay Meadows   |             | San Mateo CA                 |          |       |       |           |               |                 |              |
| PANEL: MS-9200 Fire Alarm Control Panel                            |             | Building 2, southeast        |          |       |       |           |               |                 |              |
| SIGNAL CIRCUIT: 2.3  |             | LOCATION: Garage, Building 2 |          |       |       |           |               |                 |              |
| Device Description   | From Device | To Device                    | Distance | Load  | VDC   | Wire Size | Circular Mils | Cumulative Load | Voltage Lost |
| Sync Module DSM  | FCPS        | DSM                          | 0.038    | 10    | 24.00 | 14        | 4110          | 1.068           | 0.0681       |
| Strobe, 15 candela   | DSM         | 1                            | 0.050    | 55    | 23.94 | 14        | 4110          | 1.030           | 0.2977       |
| Strobe, 30 candela   | 1           | 2                            | 0.061    | 110   | 23.85 | 14        | 4110          | 0.980           | 0.5665       |
| Horn Strobe, 30 candela  | 2           | 3                            | 0.097    | 45    | 23.74 | 14        | 4110          | 0.899           | 0.7126       |
| Strobe, 15 candela   | 3           | 4                            | 0.050    | 35    | 22.67 | 14        | 4110          | 0.802           | 0.8145       |
| Strobe, 15 candela   | 4           | 5                            | 0.133    | 30    | 22.52 | 14        | 4110          | 0.752           | 0.9186       |
| Strobe, 15 candela   | 5           | 6                            | 0.050    | 30    | 22.47 | 14        | 4110          | 0.619           | 0.9776       |
| Strobe, 30 candela   | 6           | 7                            | 0.061    | 60    | 22.36 | 14        | 4110          | 0.569           | 0.9897       |
| Horn Strobe, 15 candela  | 7           | 8                            | 0.072    | 75    | 22.21 | 14        | 4110          | 0.488           | 0.9924       |
| Horn Strobe, 15 candela  | 8           | 9                            | 0.072    | 45    | 22.14 | 14        | 4110          | 0.416           | 0.9984       |
| Strobe, 15 candela   | 9           | 10                           | 0.133    | 105   | 22.02 | 14        | 4110          | 0.344           | 0.9889       |
| Strobe, 15 candela   | 10          | 11                           | 0.050    | 30    | 21.93 | 14        | 4110          | 0.211           | 0.9533       |
| Strobe, 110 candela  | 11          | 12                           | 0.161    | 65    | 21.80 | 14        | 4110          | 0.161           | 0.6550       |
| TOTALS   |             | 1.068                        | 665      | 21.84 |       |           |               | 2.1552          |              |
| (Voltage Drop = 21.6 x Distance x Cumulative Load / Circular Mils) |             |                              |          |       |       |           |               |                 |              |
| Total Voltage Drop (Amps) 2.1552                                   |             |                              |          |       |       |           |               |                 |              |
| (Percent Voltage Drop = Total Voltage Drop / 24Volts x 100)        |             |                              |          |       |       |           |               |                 |              |
| Percent Voltage Drop 8.980%  |             |                              |          |       |       |           |               |                 |              |

| VOLTAGE DROP CALCULATION   |             |                              |          |       |       |           |               |                 |              |
|--|-------------|------------------------------|----------|-------|-------|-----------|---------------|-----------------|--------------|
| PROJECT: Bay Meadows   |             | San Mateo CA                 |          |       |       |           |               |                 |              |
| PANEL: MS-9200 Fire Alarm Control Panel                            |             | Building 2, west             |          |       |       |           |               |                 |              |
| SIGNAL CIRCUIT: 2.2  |             | LOCATION: Garage, Building 2 |          |       |       |           |               |                 |              |
| Device Description   | From Device | To Device                    | Distance | Load  | VDC   | Wire Size | Circular Mils | Cumulative Load | Voltage Lost |
| Strobe, 110 candela  | FCPS        | 1                            | 0.161    | 95    | 24.00 | 14        | 4110          | 0.886           | 0.4424       |
| Strobe, 110 candela  | 1           | 2                            | 0.161    | 10    | 23.56 | 14        | 4110          | 0.725           | 0.0381       |
| Strobe, 110 candela  | 2           | 3                            | 0.161    | 35    | 23.32 | 14        | 4110          | 0.644           | 0.0022       |
| Strobe, 30 candela   | 3           | 4                            | 0.081    | 30    | 23.12 | 14        | 4110          | 0.403           | 0.0635       |
| Strobe, 110 candela  | 4           | 5                            | 0.161    | 65    | 23.06 | 14        | 4110          | 0.322           | 0.1130       |
| Strobe, 110 candela  | 5           | 6                            | 0.161    | 100   | 22.95 | 14        | 4110          | 0.161           | 0.1546       |
| TOTALS   |             | 0.886                        | 435      | 22.86 |       |           |               | 1.3388          |              |
| (Voltage Drop = 21.6 x Distance x Cumulative Load / Circular Mils) |             |                              |          |       |       |           |               |                 |              |
| Total Voltage Drop (Amps) 1.3388                                   |             |                              |          |       |       |           |               |                 |              |
| (Percent Voltage Drop = Total Voltage Drop / 24Volts x 100)        |             |                              |          |       |       |           |               |                 |              |
| Percent Voltage Drop 4.745%  |             |                              |          |       |       |           |               |                 |              |

| VOLTAGE DROP CALCULATION   |             |                                 |          |      |       |           |               |                 |              |
|--|-------------|---------------------------------|----------|------|-------|-----------|---------------|-----------------|--------------|
| PROJECT: Bay Meadows   |             | San Mateo CA                    |          |      |       |           |               |                 |              |
| PANEL: MS-9200 Fire Alarm Control Panel                            |             | Building 2, southwest           |          |      |       |           |               |                 |              |
| SIGNAL CIRCUIT: 2.5  |             | LOCATION: Building 2, southwest |          |      |       |           |               |                 |              |
| Device Description   | From Device | To Device                       | Distance | Load | VDC   | Wire Size | Circular Mils | Cumulative Load | Voltage Lost |
| Sync Module DSM  | FCPS        | DSM                             | 0.038    | 10   | 24.00 | 14        | 4110          | 0.823           | 0.0453       |
| Strobe, 15 candela   | DSM         | 1                               | 0.050    | 60   | 23.96 | 14        | 4110          | 0.785           | 0.2475       |
| Strobe, 15 candela   | 1           | 2                               | 0.050    | 15   | 23.71 | 14        | 4110          | 0.735           | 0.0679       |
| Strobe, 15 candela   | 2           | 3                               | 0.050    | 15   | 23.42 | 14        | 4110          | 0.685           | 0.0540       |
| Strobe, 15 candela   | 3           | 4                               | 0.050    | 15   | 23.60 | 14        | 4110          | 0.635           | 0.0501       |
| Horn   | 4           | 5                               | 0.021    | 35   | 23.45 | 14        | 4110          | 0.585           | 0.1076       |
| Horn   | 5           | 6                               | 0.021    | 15   | 23.44 | 14        | 4110          | 0.564           | 0.0445       |
| Horn Strobe, 30 candela  | 6           | 7                               | 0.097    | 25   | 23.40 | 14        | 4110          | 0.543           | 0.0713       |
| Horn Strobe, 15 candela  | 7           | 8                               | 0.072    | 50   | 23.32 | 14        | 4110          | 0.446           | 0.1172       |
| Horn Strobe, 75 candela  | 8           | 9                               | 0.155    | 65   | 23.21 | 14        | 4110          | 0.374           | 0.1278       |
| Horn Strobe, 30 candela  | 9           | 10                              | 0.097    | 40   | 23.08 | 14        | 4110          | 0.219           | 0.0460       |
| Strobe, 15 candela   | 10          | 11                              | 0.050    | 55   | 23.03 | 14        | 4110          | 0.122           | 0.0553       |
| Horn Strobe, 15 candela  | 11          | TOTALS                          | 0.823    | 450  | 22.98 | 14        | 4110          | 0.072           | 0.0189       |
| (Voltage Drop = 21.6 x Distance x Cumulative Load / Circular Mils) |             |                                 |          |      |       |           |               |                 |              |
| Total Voltage Drop (Amps) 1.0214                                   |             |                                 |          |      |       |           |               |                 |              |
| (Percent Voltage Drop = Total Voltage Drop / 24Volts x 100)        |             |                                 |          |      |       |           |               |                 |              |
| Percent Voltage Drop 4.256%  |             |                                 |          |      |       |           |               |                 |              |

| VOLTAGE DROP CALCULATION                 |             |                                 |          |      |       |           |               |                 |              |
|--|-------------|---------------------------------|----------|------|-------|-----------|---------------|-----------------|--------------|
| PROJECT: Bay Meadows                     |             | San Mateo CA                    |          |      |       |           |               |                 |              |
| PANEL: FCPS-24F Remote Power Supply #2.1 |             | Building 2, southwest           |          |      |       |           |               |                 |              |
| SIGNAL CIRCUIT: 2.6                      |             | LOCATION: Building 2, southwest |          |      |       |           |               |                 |              |
| Device Description                       | From Device | To Device                       | Distance | Load | VDC   | Wire Size | Circular Mils | Cumulative Load | Voltage Lost |
| Strobe, 15 candela                       | FCPS        | 1                               | 0.050    | 120  | 24.00 | 14        | 4110          | 0.827           | 0.5216       |
| Strobe, 15 candela                       | 1           | 2                               | 0.050    | 15   | 23.48 | 14        | 4110          | 0.777           | 0.0613       |
| Strobe, 15 candela                       | 2           | 3                               | 0.050    | 15   | 23.42 | 14        | 4110          | 0.727           | 0.0773       |
| Strobe, 15 candela                       | 3           | 4                               | 0.050    | 15   | 23.36 | 14        | 4110          | 0.677           | 0.0534       |
| Horn                                     | 4           | 5                               | 0.021    | 45   | 23.11 | 14        | 4110          | 0.627           | 0.1483       |
| Horn Strobe, 110 candela                 | 5           | 6                               | 0.161    | 15   | 23.10 | 14        | 4110          | 0.666           | 0.0478       |
| Strobe, 110 candela                      | 6           | 7                               | 0.161    | 20   | 23.11 | 14        | 4110          | 0.421           | 0.0443       |
| Strobe, 15 candela                       |             |                                 |          |      |       |           |               |                 |              |