SECTION 16520

WIRELESS STREET AND AREA LIGHTING MANAGEMENT SYSTEM

PART 1 - GENERAL

* 1. INTRODUCTION
1. The intent of this specification is to provide requirements for the ROAM system as a whole.
	1. DESCRIPTION OF WORK
2. Provide system information for photocontrols for outdoor lighting and the components necessary for communication and user control.
3. Requirements are indicated elsewhere in these specifications.
	1. QUALITY ASSURANCE
4. Individual components of the system shall undergo quality control and testing as appropriate
	1. CODES AND STANDARDS
5. ANSI C136.10
6. ANSI C136.24
	1. SUBMITTALS

Prior to fabrication manufacture shall submit the following materials for approval for each individual component:

1. Manufacturer’s published catalog data sheets for the ROAM System.
2. Shop Drawings - Submit detailed drawings and documentation of the ROAM System. As a minimum, the shop drawings shall include the following:
3. Wiring diagrams as appropriate for the various components of the ROAM System.
4. Full catalog sheets

PART 2 - PRODUCTS

* 1. SYSTEM DESCRIPTION
1. The ROAM Network shall consist of a series of ROAM photocontrols communicating with each other and ROAM Gateway controls which in turn communicate with a single Network Operations Center (NOC). The System shall also include a database of control operational data and a web interface designed to both display operational data and interface with individual units in a network of controls.
	1. RATINGS
2. Ratings shall be listed for each control individually in its specification.
	1. HARDWARE
3. The ROAM network shall consist of a series of ROAM photocontrols communicating with each other, ROAM dimming control modules interfacing with fixtures and dimming drivers, and ROAM Gateway controls which in turn communicate with a single Network Operations Center (NOC)
4. ROAM shall support three types of photocontrols designed for different fixtures
5. Standard 120-277 Volt photocontrols
6. 480 Volt photocontrols
7. Photocontrols that interface with decorative post top fixtures
8. Standard 120-277 Volt photocontrols shall include the following features:
9. Collects data from streetlight, then sends data wirelessly to Gateway
10. Wireless enabled communication
11. 2.4 GHz - 802.15.4 compatible
12. FCC Part 15 approved
13. 1000 foot clear line of sight
14. Photocontrol
15. 70 to 1000 watts; 320J MOV - 6500 amp surge protection
16. Complies with ANSI C136.10-2006
17. Voltage 100-305 VAC
18. Average power consumption of 1.6 watts
19. Maximum power consumption of 2.2 watts
20. -40 to +85°C; up to 90°C interface per ANSI; base rated at 120°C
21. ANSI standard 2.5 to 5 second turn off/on delay
22. Base rated at 120°C; Acrylic window, brass legs, neoprene gasket, polypropylene cover; Filtered silicon light sensor
23. Wirelessly interfaces with the DCM
24. Control
25. Remote on/off control
26. Grouped scheduling (energy savings)
27. 480 Volt photocontrols shall include the following features:
28. Collects data from streetlight, then sends data wirelessly to Gateway
29. Wireless enabled communication
30. 2.4 GHz - 802.15.4 compatible
31. FCC Part 15 approved
32. 1000 foot clear line of sight
33. Photocontrol
34. 70 to 1000 watts; 320J MOV - 9500 amp surge protection
35. Complies with ANSI C136.10-2006
36. Voltage 408-528 VAC
37. Average power consumption of 4.0 watts
38. Maximum power consumption of 5.4 watts
39. -40 to +85°C; up to 90°C interface per ANSI; base rated at 120°C
40. ANSI standard 2.5 to 5 second turn off/on delay
41. Base rated at 120°C; Acrylic window, brass legs, neoprene gasket, polypropylene cover; Filtered silicon light sensor
42. Optical indicator to alert line crew of malfunction
43. Larger than a standard PC
44. Wirelessly interfaces with the DCM
45. Control
46. Remote on/off control
47. Grouped scheduling (energy savings)
48. Decorative Utility Photocontrol shall include the following features:
49. Collects data from streetlight, then sends data wirelessly to Gateway
50. Wireless enabled communication
51. 2.4 GHz - 802.15.4 compatible
52. FCC Part 15 approved
53. 1000 foot clear line of sight
54. Photocontrol
55. 40 to 400 watts; 320J MOV - 9500 amp surge protection
56. Complies with ANSI C136.10-2006
57. Voltage 72-305 VAC
58. Average power consumption of 1.94 watts
59. -40 to +85°C; up to 90°C interface per ANSI; base rated at 120°C
60. ANSI standard 2.5 to 5 second turn off/on delay
61. Base rated at 120°C; brass legs, neoprene gasket, polypropylene cover; Filtered silicon light sensor
62. Optical indicator to alert line crew of malfunction
63. Wirelessly interfaces with the DCM
64. Control
65. Remote on/off control
66. Grouped scheduling (energy savings)
67. Mounting
68. Accommodates Utility Style Decorative Fixtures
69. Dimming control modules shall include the following features:
70. Dimming module provides wireless dimming control for any fixture with 0 to 10V dimming ballast/driver.
71. Remote sensor inputs
72. Wireless enabled communication
73. 2.4 GHz - 802.15.4 compatible
74. FCC Part 15 approved
75. 1000 foot clear line of sight
76. General
77. Compatible with 0-10V dimming ballasts
78. Voltage 72-305 VAC;320J MOV – 9500 amp surge protection
79. Average power consumption of 1.6 watts
80. Maximum power consumption of 2.2 watts
81. Dimming control module shall operate in -40 to +85°C ambient temperatures
82. Control
83. Remote continuous dimming control
84. Gateways shall be preconfigured to connect to the NOC and require no explicit configuration
85. Gateways shall include the following features:
86. Transmits node data back to NOC
87. Synchronizes network via NTP.
88. Wireless enabled communication
89. 2.4 GHz (new) – 802.15.4 compatible
90. Cellular network uplink – GSM, GPRS, CDMA, modem; Ethernet link for optional WAN connection via the internet
91. FCC Part 15 approved
92. 1000 foot clear line of sight
93. Supports up to 2000 nodes
94. General
95. 320J MOV - 6,500 amp surge protection
96. Voltage 100-265 VAC
97. Gateway shall operate in -40 to +85°C ambient temperatures
98. Mast arm mounting (1-3 inch) or wall mounting
99. Powered through standard locking type receptacle on fixture
100. 3 foot cable and locking type plug included
101. Average power consumption: 5.5 watts
102. Maximum power consumption: 12 watts
103. EPA: 1.62
104. Weight: 10 pounds
105. The system shall be scalable and support networks of varying size
106. All controls, dimming control modules, and gateways shall be designed to work for a minimum of eight years
107. The Network Operations Center shall consist of multiple servers used to collect, store and display the data to the user
108. A secondary NOC shall exist at a Disaster Recovery site
109. Both NOCs shall have secondary power backups in the form of batteries and diesel generators
110. All servers in the NOC shall use the NTP protocol to ensure that their clocks are in sync.
	1. SOFTWARE
111. The ROAM Network shall interface with a web portal capable of displaying data collected over the network
112. The ROAM Network shall interface with a web portal providing remote user control over elements within the network
113. The web portal shall include the following views:
114. Dashboard
115. Maps
116. Reporting
117. History
118. Grouping
119. Scheduling
120. Work Order Management
121. The Dashboard view shall summarize the status of all photocontrols, gateways, and dimming control modules within the network
122. Users shall be able to quickly determine the operational status of all fixtures within the system
123. Users shall be able to export status data
124. Users shall be able to print status data in a format conducive to presentation
125. Users shall be able to request additional information about abnormal operations within the system
126. Users shall be able to see basic information about malfunctions
127. Users shall be able to see the location of each malfunctioning device
128. Users shall be able to see a seven day history of each device
129. Users with appropriate permissions shall be able to create work orders
130. The Map view shall provide a geographical representation of system assets
131. Users shall be able to navigate around the map using standard navigational constructs
132. The Map view shall support panning
133. The Map view shall support zooming
134. The Map view shall support bookmarks
135. Users shall be able to determine which assets are operating normally and which ones are malfunctioning in some way based on the icons used to represent each fixture
136. Users shall be able to view information about each asset including any additional information about operational status by mousing over the relevant asset icon on the map
137. Users with appropriate permissions shall be able to relocate a fixture from within the Map view
138. Users with appropriate permissions shall be able to add or view notes about a fixture from within the Map view
139. Users with appropriate permissions shall be able to view or edit the attributes collected about each fixture during node activation from within the Map view
140. Users with appropriate permissions shall be able to issue the following commands to fixtures from within the Map view
141. Turn on for x time, x not to exceed one day
142. Turn off for x time, x not to exceed one day
143. Return to normal operation
144. Dim to x level for y time, x ranging from 0-100 and y not to exceed one day
145. Users with appropriate permissions shall be able to issue commands to groups as well as individual units within the system
146. Users with appropriate permissions shall be able to create work orders from within the Map view
147. All users shall have read only access to the information on the Map view regardless of permissions
148. The History view shall provide historical data for all fixtures
149. The history shall be available for either seven days or thirty days
150. The history view shall include filters that focus attention on specific assets or operational conditions
151. Users shall be able to filter by group
152. The history view shall include daily and hourly data for each fixture in the system
153. Data shall be available in both report and graphical formats
154. Users with appropriate permissions shall be able to create work orders from within the History view
155. The Reporting view shall include reports and graphs used to monitor the system and its components
156. All reports shall use a common interface
157. All reports shall be exportable in the following formats:
158. Microsoft Excel
159. PDF
160. XML
161. Users shall be able to view additional data about any unit listed on any of the reports from the Reporting view
162. Users shall be able to pinpoint any unit listed on any of the reports on a map from the Reporting view
163. Users with appropriate permissions shall be able to create work orders from within the Reporting view
164. The Grouping view shall enable users to interact with units within the network as a single group
165. Users shall be able to define a subset of units on the network as a group from within the Grouping view
166. Users shall be able to name each group from within the Grouping view
167. Users shall be able to add additional nodes to a group from within the Grouping view
168. Users shall be able to remove devices from a group from within the Grouping view
169. Users shall be able to view information about the status of all devices within a group from the Grouping view
170. Status information displayed in the Grouping view shall use the same format as the same information within the Dashboard view
171. The Scheduling view shall enable users to schedule commands
172. Users shall be able to define schedules from within the Scheduling view
173. Users shall be able to issue schedules from within the Scheduling view
174. Users shall be able to define events from within the Scheduling view
175. Users shall be able to issue events from within the Scheduling view
176. The Scheduling view shall recognize and use groups defined within the Grouping view
177. The schedule interface shall split each day into four time intervals
178. Users shall be able to choose time intervals based on sunrise and sunset if desired
179. The event interface shall split each day into eight time intervals
180. Events shall take priority over schedules if both are in place for the same units at the same time
181. The Work Order Management view enables creation of work orders
182. Users shall be able to assign work directly to crews or to crew coordinators
183. Users shall be able to define repair procedures
184. Users shall be able to record and track parts and material for billing
185. Users shall be able to track repair time
186. Users shall be able to print repair orders
187. Repair orders shall provide operating details to assist field performers in troubleshooting
188. The Work Order Management view shall provide system verification of completion of work orders
	1. NETWORKING
189. Photocontrols within the network shall be capable of remote turn off and turn on
190. Photocontrols within the network shall be capable of assignment to groups which can be controlled over the network as a single unit
191. Photocontrols within the network shall communicate with neighbor controls and gateway devices via 2.4 Gigahertz radio signals within a mesh network
192. Photocontrols within the network shall have a communications range of 1000 feet
193. Communications between controls shall require a direct line of sight view
194. Data for each control within an installation shall have a one hour collection interval resolution.
195. Data sent from individual controls via radio signals shall be encrypted
196. Data sent from the Gateway control to the NOC shall be encrypted
197. Photocontrols within the network shall provide troubleshooting information over the network in the form of alarms
198. All troubleshooting reports shall include the MAC number of the associated photocontrol
199. Fixture malfunctions shall be reported
200. Cycling fixtures shall be reported
201. Day burning fixtures shall be reported
202. Uncommunicative photocontrols shall be reported
203. Power details for fixtures shall be reported
204. Photocontrol within the network shall operate as a standard standalone photocontrol if networking fails
205. Performance of scheduled operations shall continue while in standalone mode
206. No node within an installation shall be a communications bottleneck. If any control within an installation is unavailable for communication for any reason, the signal shall be sent via different path.
207. Daily data collation shall run from midnight to midnight each night
	1. MONITORING
208. The system shall monitor the following:
209. Remote Monitoring and Diagnostics
210. Fixture Malfunction
211. Cycling
212. Day-burner
213. Unspecified Malfunction
* No Communication
* No Power
1. Low System Voltage
2. High System Voltage
3. High V Delta
4. Low Wattage
5. Excessive Power Use
6. Fixture on a Group Control
7. 120V PC on a 240V fixture
8. Reports
9. Fixture status
10. Average, Max and Min Power for each reporting interval (typically 1 hour)
11. Power measurement accuracy - 0.5% at 400 watts.
12. Energy tracking (KWH reports)
13. Burn Hour report
14. Average Line Voltage
15. Minimum Line Voltage
16. Maximum Line Voltage
17. Light sensor reading
18. Events/Alerts
19. On/Off transition alerts
20. Low voltage alert
21. High voltage alert
22. Excessive current alert (>14A)
23. Miswired fixture
	1. INSTALLATION AND ACTIVATION
24. The system system installation process shall rely on barcodes to capture data
25. The following information shall be encapsulated into a barcode associated with each fixture each unit
26. fixture type
27. lamp type
28. wattage
29. fixture manufacturer
30. pole type
31. pole material
32. system voltage
33. Fixture barcodes shall be incorporated into a custom installation booklet for use during installation
34. Installers shall be equipped with a handheld PDA capable of reading barcodes
35. Installers shall scan the barcode of each fixture at the time of installation and store the related data on the PDA
36. GPS data shall be collected and stored on the PDA for each installed unit at the time of installation
37. Installers shall scan the barcode attached to each installed photocontrol, dimming control module, or gateway at the time of installation
38. The fixture barcode information, the installed ROAM unit barcode, and the GPS location shall be grouped together on the PDA for each installed unit
39. The grouped data shall be uploaded to the NOC for incorporation into the system database
	1. PRODUCT SUPPORT AND SERVICE
40. Factory telephone support shall be available at no cost to the owner. Factory assistance shall consist of assistance insolving application issues pertaining to the control equipment.

2.9 WARRANTY

1. Manufacturer shall provide a three year (3) limited warranty on the units within a ROAM installation consisting of a one for one control replacement. The official warranty policy is the following:
2. ROAM undertakes that this product shall operate within its original operating specifications and shall be free of electrical or mechanical defects. ROAM's liability hereunder shall be limited to providing a replacement unit and shall not cover the costs of removal or installation of the unit nor any consequential damages.
3. This express warranty is in lieu of and excludes all other warranties, guaranties or representations, expressed or implied, including, but not limited to, warranties of merchantability or fitness for a specific purpose, by operation of law or otherwise

END OF SPECIFICATION