

Consulting and Technical Services Plus (CATS+)  
Labor Rates

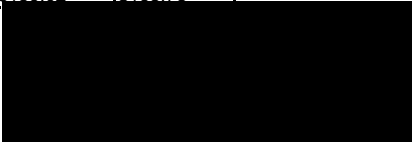
**Attachment F-A1- Labor Rate Schedule**

Record the fully loaded, all inclusive hourly labor rates chargeable during each contract year for the labor categories delineated and defined in Section 2.10 of the RFP

#	LABOR CATEGORY	HOURLY LABOR RATES CONTRACT YEAR*											
		Year 1 Offeror Price	Year 2 Offeror Price	Year 3 Offeror Price	Year 4 Offeror Price	Year 5 Offeror Price	Year 6 Offeror Price	Year 7 Offeror Price	Year 8 Offeror Price	Year 9 Offeror Price	Year 10 Offeror Price	Year 11 Offeror Price	Year 12 Offeror Price
66	Accountant, Cost (Senior)	\$185.31	\$190.85	\$196.56	\$202.44	\$208.49	\$214.72	\$221.14	\$227.76	\$234.57	\$241.58	\$248.80	\$256.24
47	Administrator, Systems	\$163.26	\$168.15	\$173.17	\$178.35	\$183.68	\$189.18	\$194.83	\$200.66	\$206.66	\$212.84	\$219.20	\$225.75
5	Analyst, Computer Software/Integration (Senior)	\$156.68	\$161.36	\$166.18	\$171.15	\$176.27	\$181.54	\$186.97	\$192.56	\$198.32	\$204.25	\$210.35	\$216.64
9	Analyst, Computer Systems (Junior)	\$148.55	\$153.00	\$157.57	\$162.28	\$167.13	\$172.13	\$177.28	\$182.58	\$188.04	\$193.66	\$199.45	\$205.41
8	Analyst, Computer Systems (Senior)	\$132.29	\$136.24	\$140.32	\$144.51	\$148.83	\$153.29	\$157.87	\$162.59	\$167.45	\$172.46	\$177.61	\$182.92
68	Analyst, Financial	\$143.59	\$147.88	\$152.30	\$156.85	\$161.54	\$166.37	\$171.35	\$176.47	\$181.75	\$187.18	\$192.78	\$198.54
67	Analyst, Financial (Senior)	\$169.47	\$174.54	\$179.76	\$185.13	\$190.67	\$196.37	\$202.24	\$208.29	\$214.52	\$220.93	\$227.54	\$234.34
54	Analyst, Research	\$107.75	\$110.97	\$114.29	\$117.71	\$121.23	\$124.85	\$128.59	\$132.43	\$136.39	\$140.47	\$144.67	\$148.99
37	Analyst, Systems (Senior)	\$168.24	\$173.27	\$178.45	\$183.79	\$189.28	\$194.94	\$200.77	\$206.78	\$212.96	\$219.33	\$225.88	\$232.64
17	Application Developer, Advanced Technology	\$135.46	\$139.51	\$143.69	\$147.98	\$152.41	\$156.96	\$161.66	\$166.49	\$171.47	\$176.60	\$181.88	\$187.31
16	Application Developer, Advanced Technology (Senior)	\$150.41	\$154.91	\$159.54	\$164.31	\$169.22	\$174.28	\$179.49	\$184.86	\$190.39	\$196.08	\$201.94	\$207.98
11	Applications Development Expert	\$182.67	\$188.13	\$193.76	\$199.55	\$205.52	\$211.66	\$217.99	\$224.51	\$231.22	\$238.14	\$245.26	\$252.59
10	Applications Programmer	\$120.79	\$124.40	\$128.12	\$131.95	\$135.89	\$139.96	\$144.14	\$148.45	\$152.89	\$157.46	\$162.17	\$167.02
92	Archeologist /Historic Preservation Specialist	\$138.58	\$142.72	\$146.99	\$151.38	\$155.91	\$160.57	\$165.37	\$170.31	\$175.41	\$180.65	\$186.05	\$191.62
40	Architect, Application (Senior)	\$166.97	\$171.96	\$177.10	\$182.40	\$187.85	\$193.47	\$199.25	\$205.21	\$211.35	\$217.67	\$224.17	\$230.88
38	Architect, Information Technology (Senior)	\$168.52	\$173.56	\$178.75	\$184.10	\$189.60	\$195.27	\$201.11	\$207.12	\$213.31	\$219.69	\$226.26	\$233.03
61	Architect, Internet/Web	\$163.45	\$168.33	\$173.37	\$178.55	\$183.89	\$189.39	\$195.05	\$200.88	\$206.89	\$213.08	\$219.45	\$226.01
63	Architect, Systems (Senior)	\$163.39	\$168.28	\$173.31	\$178.49	\$183.83	\$189.33	\$194.99	\$200.82	\$206.82	\$213.00	\$219.37	\$225.93
64	Architect, Systems Design	\$150.41	\$154.91	\$159.54	\$164.31	\$169.22	\$174.28	\$179.49	\$184.86	\$190.39	\$196.08	\$201.94	\$207.98
93	Architectural Historian	\$124.61	\$128.34	\$132.18	\$136.13	\$140.20	\$144.39	\$148.71	\$153.15	\$157.73	\$162.45	\$167.31	\$172.31
110	Audit Manager	\$239.04	\$246.18	\$253.55	\$261.13	\$268.93	\$276.98	\$285.26	\$293.79	\$302.57	\$311.62	\$320.93	\$330.53
111	Audit Supervisor	\$195.96	\$201.82	\$207.86	\$214.07	\$220.47	\$227.06	\$233.85	\$240.85	\$248.05	\$255.46	\$263.10	\$270.97
69	Auditor, IT (Senior)	\$182.68	\$188.14	\$193.76	\$199.56	\$205.52	\$211.67	\$218.00	\$224.51	\$231.23	\$238.14	\$245.26	\$252.60
112	Auditor, Lead	\$182.68	\$188.14	\$193.76	\$199.56	\$205.52	\$211.67	\$218.00	\$224.51	\$231.23	\$238.14	\$245.26	\$252.60
70	Auditor (Senior)	\$189.15	\$194.81	\$200.63	\$206.63	\$212.81	\$219.17	\$225.72	\$232.47	\$239.42	\$246.58	\$253.96	\$261.55
113	Auditor, Staff	\$137.09	\$141.19	\$145.41	\$149.76	\$154.23	\$158.84	\$163.59	\$168.49	\$173.52	\$178.71	\$184.06	\$189.56
72	Business Process Consultant (Senior)	\$243.76	\$251.05	\$258.56	\$266.29	\$274.25	\$282.45	\$290.90	\$299.59	\$308.55	\$317.78	\$327.28	\$337.06
62	Computer Graphics Illustrator	\$123.25	\$126.94	\$130.73	\$134.64	\$138.67	\$142.81	\$147.08	\$151.48	\$156.01	\$160.67	\$165.48	\$170.42
34	Computer Operations Center Specialist	\$137.09	\$141.19	\$145.41	\$149.76	\$154.23	\$158.84	\$163.59	\$168.49	\$173.52	\$178.71	\$184.06	\$189.56
35	Computer Operations Research Analyst	\$126.30	\$130.08	\$133.97	\$137.97	\$142.10	\$146.35	\$150.72	\$155.23	\$159.87	\$164.65	\$169.57	\$174.64
42	Computer Operator	\$65.71	\$67.67	\$69.70	\$71.78	\$73.93	\$76.14	\$78.41	\$80.76	\$83.17	\$85.66	\$88.22	\$90.86
41	Computer Operator (Senior)	\$79.47	\$81.84	\$84.29	\$86.81	\$89.41	\$92.08	\$94.83	\$97.67	\$100.59	\$103.60	\$106.69	\$109.88
15	Computer Programmer (Junior)	\$146.02	\$150.38	\$154.88	\$159.51	\$164.28	\$169.19	\$174.25	\$179.46	\$184.83	\$190.35	\$196.04	\$201.90
14	Computer Programmer (Senior)	\$152.01	\$156.56	\$161.24	\$166.06	\$171.02	\$176.14	\$181.40	\$186.83	\$192.41	\$198.17	\$204.09	\$210.19
7	Computer Specialist	\$134.28	\$138.29	\$142.43	\$146.68	\$151.07	\$155.59	\$160.24	\$165.03	\$169.97	\$175.05	\$180.28	\$185.67
6	Computer Specialist (Senior)	\$147.52	\$151.93	\$156.47	\$161.15	\$165.97	\$170.93	\$176.04	\$181.30	\$186.73	\$192.31	\$198.06	\$203.98
13	Computer Systems Programmer	\$132.29	\$136.24	\$140.32	\$144.51	\$148.83	\$153.29	\$157.87	\$162.59	\$167.45	\$172.46	\$177.61	\$182.92
12	Computer Systems Programmer (Senior)	\$152.01	\$156.56	\$161.24	\$166.06	\$171.02	\$176.14	\$181.40	\$186.83	\$192.41	\$198.17	\$204.09	\$210.19
23	Database Management Specialist (Junior)	\$118.44	\$121.99	\$125.63	\$129.39	\$133.26	\$137.24	\$141.35	\$145.57	\$149.92	\$154.41	\$159.02	\$163.78

COMPANY NAME:  
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Consulting and Technical Services Plus (CATS+)  
Labor Rates

**Attachment F-A1- Labor Rate Schedule**

Record the fully loaded, all inclusive hourly labor rates chargeable during each contract year for the labor categories delineated and defined in Section 2.10 of the RFP

#	LABOR CATEGORY	HOURLY LABOR RATES CONTRACT YEAR*											
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
22	Database Management Specialist (Senior)	\$146.90	\$151.29	\$155.82	\$160.48	\$165.27	\$170.22	\$175.31	\$180.55	\$185.95	\$191.51	\$197.23	\$203.13
21	Database Manager	\$166.94	\$171.93	\$177.07	\$182.36	\$187.81	\$193.43	\$199.21	\$205.17	\$211.30	\$217.62	\$224.13	\$230.83
55	Documentation Specialist	\$101.15	\$104.18	\$107.29	\$110.50	\$113.80	\$117.21	\$120.71	\$124.32	\$128.04	\$131.87	\$135.81	\$139.87
97	Electrician, Journeyman	\$76.20	\$78.48	\$80.83	\$83.25	\$85.74	\$88.30	\$90.94	\$93.66	\$96.46	\$99.34	\$102.31	\$105.37
96	Electrician, Licensed Master	\$115.51	\$118.97	\$122.52	\$126.19	\$129.96	\$133.85	\$137.85	\$141.97	\$146.21	\$150.59	\$155.09	\$159.73
99	Electricians Helper	\$84.11	\$86.63	\$89.22	\$91.89	\$94.63	\$97.46	\$100.38	\$103.38	\$106.47	\$109.65	\$112.93	\$116.31
101	Engineer, Facility Operations	\$202.15	\$208.19	\$214.42	\$220.83	\$227.43	\$234.23	\$241.24	\$248.45	\$255.88	\$263.53	\$271.41	\$279.52
19	Engineer, Information	\$156.07	\$160.74	\$165.54	\$170.49	\$175.59	\$180.84	\$186.25	\$191.82	\$197.55	\$203.46	\$209.54	\$215.81
18	Engineer, Information (Senior)	\$164.33	\$169.25	\$174.31	\$179.52	\$184.89	\$190.41	\$196.11	\$201.97	\$208.01	\$214.23	\$220.64	\$227.23
52	Engineer, Information Security	\$229.74	\$236.61	\$243.68	\$250.97	\$258.47	\$266.20	\$274.16	\$282.36	\$290.80	\$299.49	\$308.45	\$317.67
33	Engineer, Interdisciplinary	\$164.57	\$169.49	\$174.56	\$179.78	\$185.15	\$190.69	\$196.39	\$202.26	\$208.31	\$214.54	\$220.95	\$227.56
32	Engineer, Interdisciplinary (Senior)	\$175.33	\$180.57	\$185.97	\$191.53	\$197.26	\$203.15	\$209.23	\$215.48	\$221.93	\$228.56	\$235.40	\$242.43
82	Engineer, Network (Junior)	\$162.54	\$167.40	\$172.41	\$177.56	\$182.87	\$188.34	\$193.97	\$199.77	\$205.74	\$211.89	\$218.23	\$224.75
81	Engineer, Network (Senior)	\$183.79	\$189.29	\$194.95	\$200.78	\$206.78	\$212.96	\$219.33	\$225.89	\$232.64	\$239.60	\$246.76	\$254.14
86	Engineer, Network Security	\$187.05	\$192.64	\$198.40	\$204.33	\$210.44	\$216.73	\$223.21	\$229.89	\$236.76	\$243.84	\$251.13	\$258.64
95	Engineer, Radio Frequency	\$147.52	\$151.93	\$156.47	\$161.15	\$165.97	\$170.93	\$176.04	\$181.30	\$186.73	\$192.31	\$198.06	\$203.98
31	Engineer, Software	\$153.69	\$158.29	\$163.02	\$167.90	\$172.92	\$178.09	\$183.41	\$188.90	\$194.54	\$200.36	\$206.35	\$212.52
101	Engineer, Stationary	\$192.92	\$198.69	\$204.63	\$210.75	\$217.05	\$223.54	\$230.22	\$237.11	\$244.20	\$251.50	\$259.02	\$266.76
30	Engineer, Systems	\$153.69	\$158.29	\$163.02	\$167.90	\$172.92	\$178.09	\$183.41	\$188.90	\$194.54	\$200.36	\$206.35	\$212.52
29	Engineer, Systems (Senior)	\$154.87	\$159.50	\$164.27	\$169.18	\$174.24	\$179.45	\$184.82	\$190.34	\$196.03	\$201.90	\$207.93	\$214.15
65	Engineer, Systems Design	\$163.39	\$168.28	\$173.31	\$178.49	\$183.83	\$189.33	\$194.99	\$200.82	\$206.82	\$213.00	\$219.37	\$225.93
99	Facilities Engineering Manager	\$266.46	\$274.42	\$282.63	\$291.08	\$299.78	\$308.75	\$317.98	\$327.49	\$337.28	\$347.36	\$357.75	\$368.45
105	Facilities Specialist Level I	\$65.83	\$67.79	\$69.82	\$71.91	\$74.06	\$76.27	\$78.55	\$80.90	\$83.32	\$85.81	\$88.38	\$91.02
104	Facilities Specialist Level II	\$75.39	\$77.65	\$79.97	\$82.36	\$84.82	\$87.36	\$89.97	\$92.66	\$95.43	\$98.29	\$101.23	\$104.25
103	Facilities Specialist Level III	\$122.13	\$125.78	\$129.54	\$133.41	\$137.40	\$141.51	\$145.74	\$150.10	\$154.59	\$159.21	\$163.97	\$168.87
102	Facilities Specialist, Lead	\$126.27	\$130.05	\$133.94	\$137.94	\$142.07	\$146.31	\$150.69	\$155.20	\$159.84	\$164.61	\$169.54	\$174.61
106	Facility Operations Supervisor	\$174.66	\$179.88	\$185.26	\$190.80	\$196.50	\$202.38	\$208.43	\$214.66	\$221.08	\$227.69	\$234.50	\$241.51
90	Geographic Information Systems (GIS) Analyst	\$149.90	\$154.38	\$159.00	\$163.75	\$168.65	\$173.69	\$178.88	\$184.23	\$189.74	\$195.41	\$201.26	\$207.28
91	Geographic Information Systems Specialist	\$137.09	\$141.19	\$145.41	\$149.76	\$154.23	\$158.84	\$163.59	\$168.49	\$173.52	\$178.71	\$184.06	\$189.56
88	Geographic Information Systems Technician I	\$149.54	\$154.01	\$158.61	\$163.36	\$168.24	\$173.27	\$178.45	\$183.79	\$189.28	\$194.94	\$200.77	\$206.77
87	Geographic Information Systems Technician II	\$156.64	\$161.32	\$166.14	\$171.11	\$176.23	\$181.50	\$186.92	\$192.51	\$198.27	\$204.20	\$210.30	\$216.59
89	Geographic Information Systems Technician Trainee	\$127.69	\$131.51	\$135.44	\$139.49	\$143.66	\$147.95	\$152.38	\$156.93	\$161.63	\$166.46	\$171.43	\$176.56
	GeoSpatial Web Developer (Mid-level)	\$88.79	\$91.44	\$94.18	\$96.99	\$99.89	\$102.88	\$105.96	\$109.12	\$112.39	\$115.75	\$119.21	\$122.77
	GeoSpatial Web Developer (Senior)	\$102.44	\$105.50	\$108.65	\$111.90	\$115.25	\$118.70	\$122.24	\$125.90	\$129.66	\$133.54	\$137.53	\$141.65
73	Group Facilitator (Senior)	\$187.75	\$193.36	\$199.15	\$205.10	\$211.23	\$217.55	\$224.05	\$230.75	\$237.65	\$244.76	\$252.08	\$259.61
44	Help Desk Manager	\$137.09	\$141.19	\$145.41	\$149.76	\$154.23	\$158.84	\$163.59	\$168.49	\$173.52	\$178.71	\$184.06	\$189.56
46	Help Desk Specialist (Junior)	\$113.71	\$117.11	\$120.61	\$124.22	\$127.93	\$131.76	\$135.70	\$139.76	\$143.94	\$148.24	\$152.67	\$157.24
45	Help Desk Specialist (Senior)	\$122.60	\$126.27	\$130.04	\$133.93	\$137.93	\$142.06	\$146.31	\$150.68	\$155.19	\$159.83	\$164.60	\$169.53
60	Internet/Intranet Site Developer (Junior)	\$118.44	\$121.99	\$125.63	\$129.39	\$133.26	\$137.24	\$141.35	\$145.57	\$149.92	\$154.41	\$159.02	\$163.78
59	Internet/Intranet Site Developer (Senior)	\$139.65	\$143.83	\$148.13	\$152.56	\$157.12	\$161.82	\$166.66	\$171.64	\$176.77	\$182.06	\$187.50	\$193.11
20	IT Professional (Senior)	\$198.93	\$204.87	\$211.00	\$217.31	\$223.81	\$230.50	\$237.39	\$244.49	\$251.80	\$259.33	\$267.08	\$275.07

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Labor Rates

**Attachment F-A1- Labor Rate Schedule**

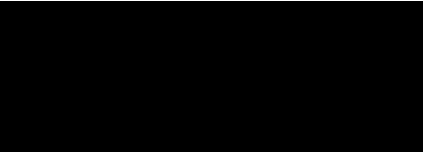
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		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
75	Market Research Consultant (Senior)	\$182.15	\$187.60	\$193.21	\$198.99	\$204.93	\$211.06	\$217.37	\$223.87	\$230.57	\$237.46	\$244.56	\$251.87
74	Marketing Consultant (Senior)	\$244.09	\$251.39	\$258.90	\$266.64	\$274.62	\$282.83	\$291.28	\$299.99	\$308.96	\$318.20	\$327.71	\$337.51
83	Network Administrator	\$118.44	\$121.99	\$125.63	\$129.39	\$133.26	\$137.24	\$141.35	\$145.57	\$149.92	\$154.41	\$159.02	\$163.78
80	Network Manager	\$207.68	\$213.89	\$220.29	\$226.88	\$233.66	\$240.65	\$247.84	\$255.25	\$262.88	\$270.74	\$278.84	\$287.18
85	Network Technician (Junior )	\$105.69	\$108.85	\$112.10	\$115.46	\$118.91	\$122.46	\$126.12	\$129.90	\$133.78	\$137.78	\$141.90	\$146.14
84	Network Technician (Senior)	\$151.46	\$155.99	\$160.65	\$165.46	\$170.40	\$175.50	\$180.74	\$186.15	\$191.72	\$197.45	\$203.35	\$209.43
43	Office Automation Specialist	\$67.54	\$69.56	\$71.64	\$73.78	\$75.99	\$78.26	\$80.60	\$83.01	\$85.50	\$88.05	\$90.68	\$93.40
36	Operations Research Analyst (Senior)	\$126.67	\$130.46	\$134.36	\$138.38	\$142.52	\$146.78	\$151.17	\$155.69	\$160.34	\$165.14	\$170.07	\$175.16
108	Operator Level I	\$80.83	\$83.24	\$85.73	\$88.30	\$90.94	\$93.66	\$96.46	\$99.34	\$102.31	\$105.37	\$108.52	\$111.76
107	Operator Level II	\$87.91	\$90.54	\$93.25	\$96.04	\$98.91	\$101.86	\$104.91	\$108.05	\$111.28	\$114.61	\$118.03	\$121.56
109	Photographer	\$133.11	\$137.09	\$141.19	\$145.41	\$149.76	\$154.24	\$158.85	\$163.60	\$168.49	\$173.53	\$178.72	\$184.06
39	Planner, Information Technology (Senior)	\$172.91	\$178.08	\$183.40	\$188.89	\$194.53	\$200.35	\$206.34	\$212.51	\$218.86	\$225.41	\$232.15	\$239.09
58	Program Administration Specialist	\$91.99	\$94.75	\$97.58	\$100.50	\$103.50	\$106.59	\$109.78	\$113.06	\$116.45	\$119.93	\$123.51	\$127.21
1	Program Manager	\$165.87	\$170.83	\$175.93	\$181.19	\$186.61	\$192.19	\$197.94	\$203.86	\$209.95	\$216.23	\$222.69	\$229.35
57	Project Control Specialist	\$89.42	\$92.10	\$94.85	\$97.69	\$100.61	\$103.62	\$106.71	\$109.91	\$113.19	\$116.58	\$120.06	\$123.65
2	Project Manager	\$116.31	\$119.78	\$123.36	\$127.05	\$130.85	\$134.76	\$138.79	\$142.94	\$147.22	\$151.62	\$156.15	\$160.82
25	Quality Assurance Consultant (Senior)	\$130.58	\$134.49	\$138.51	\$142.65	\$146.92	\$151.31	\$155.83	\$160.49	\$165.29	\$170.23	\$175.32	\$180.56
24	Quality Assurance Manager	\$140.84	\$145.05	\$149.39	\$153.86	\$158.46	\$163.20	\$168.08	\$173.10	\$178.28	\$183.61	\$189.10	\$194.75
26	Quality Assurance Specialist	\$118.44	\$121.99	\$125.63	\$129.39	\$133.26	\$137.24	\$141.35	\$145.57	\$149.92	\$154.41	\$159.02	\$163.78
71	Risk Assessment Consultant (Senior)	\$210.18	\$216.46	\$222.93	\$229.60	\$236.46	\$243.53	\$250.81	\$258.31	\$266.04	\$273.99	\$282.18	\$290.62
49	Security, Computer Systems Specialist	\$172.75	\$177.92	\$183.23	\$188.71	\$194.36	\$200.17	\$206.15	\$212.32	\$218.66	\$225.20	\$231.94	\$238.87
50	Security, Data Specialist	\$118.44	\$121.99	\$125.63	\$129.39	\$133.26	\$137.24	\$141.35	\$145.57	\$149.92	\$154.41	\$159.02	\$163.78
4	Subject Matter Expert	\$186.29	\$191.86	\$197.60	\$203.50	\$209.59	\$215.86	\$222.31	\$228.96	\$235.80	\$242.85	\$250.11	\$257.59
3	Subject Matter Expert (Senior)	\$221.28	\$227.90	\$234.71	\$241.73	\$248.96	\$256.40	\$264.07	\$271.96	\$280.09	\$288.47	\$297.09	\$305.98
94	Systems Analyst, Wireless	\$118.44	\$121.99	\$125.63	\$129.39	\$133.26	\$137.24	\$141.35	\$145.57	\$149.92	\$154.41	\$159.02	\$163.78
53	System Security Research Analyst	\$164.70	\$169.62	\$174.70	\$179.92	\$185.30	\$190.84	\$196.55	\$202.42	\$208.48	\$214.71	\$221.13	\$227.74
51	Systems Security Specialist	\$163.26	\$168.15	\$173.17	\$178.35	\$183.68	\$189.18	\$194.83	\$200.66	\$206.66	\$212.84	\$219.20	\$225.75
48	Systems Security Specialist (Senior)	\$200.42	\$206.41	\$212.58	\$218.94	\$225.48	\$232.22	\$239.17	\$246.32	\$253.68	\$261.27	\$269.08	\$277.13
78	Telecommunications Consultant (Senior)	\$265.80	\$273.75	\$281.93	\$290.36	\$299.04	\$307.98	\$317.19	\$326.68	\$336.44	\$346.50	\$356.86	\$367.53
77	Telecommunications Engineer	\$147.52	\$151.93	\$156.47	\$161.15	\$165.97	\$170.93	\$176.04	\$181.30	\$186.73	\$192.31	\$198.06	\$203.98
76	Telecommunications Engineer (Senior)	\$187.12	\$192.72	\$198.48	\$204.41	\$210.52	\$216.82	\$223.30	\$229.98	\$236.85	\$243.94	\$251.23	\$258.74
79	Telecommunications, System Analyst	\$147.52	\$151.93	\$156.47	\$161.15	\$165.97	\$170.93	\$176.04	\$181.30	\$186.73	\$192.31	\$198.06	\$203.98
27	Testing Specialist	\$115.45	\$118.90	\$122.46	\$126.12	\$129.89	\$133.78	\$137.78	\$141.89	\$146.14	\$150.51	\$155.01	\$159.64
28	Training Specialist/Instructor	\$141.03	\$145.24	\$149.59	\$154.06	\$158.66	\$163.41	\$168.29	\$173.33	\$178.51	\$183.85	\$189.34	\$195.01
56	Writer/Editor, Technical	\$109.36	\$112.63	\$116.00	\$119.47	\$123.04	\$126.72	\$130.51	\$134.41	\$138.43	\$142.57	\$146.83	\$151.22

\* Contract year one begins on the date of contract award and continues for one year, contract year two begins one year after contract award and continues one year, etc.

COMPANY NAME:  
CONTRACT POC:  
ADDRESS:

OFFICE NUMBER:  
FAX NUMBER:



AUTHORIZED SIGNATURE

Consulting and Technical Services Plus (CATS+)  
 Commision Only Pricing

	<b>Table F-A2, Commission Only Percentage for Telecommunication Audits (as defined in 2.3.9.1)</b>											
	<b>COMMISSION ONLY PERCENTAGE CONTRACT YEAR*</b>											
	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Year 10</b>	<b>Year 11</b>	<b>Year 12</b>
	Offeror Percentage	Offeror Percentage	Offeror Percentage	Offeror Percentage	Offeror Percentage	Offeror Percentage	Offeror Percentage	Offeror Percentage	Offeror Percentage	Offeror Percentage	Offeror Percentage	Offeror Percentage
<b>Commission Only Percentage</b>	<b>20%</b>	<b>20%</b>	<b>20%</b>	<b>22%</b>	<b>22%</b>	<b>24%</b>	<b>24%</b>	<b>22%</b>	<b>22%</b>	<b>20%</b>	<b>20%</b>	<b>20%</b>

\* Contract year one begins on the date of contract award and continues for one year, contract year two begins one year after contract award and continues one year, etc.

COMPANY NAME:  
 CONTRACT POC:  
 ADDRESS:

PHONE NUMBER:  
 FAX NUMBER:

[Redacted]

[Redacted]

AUTHORIZED SIGNATURE

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TITLE

**PRICE PROPOSAL FORM B  
FUNCTIONAL AREA 13**

**Example of Task Order # 1**

Tower – Self Supporting 180-ft AGL  
12 X 38 X 10-FT Equipment Shelter

**SCOPE OF SERVICES AND SPECIFICATIONS**

The Task Order Contractor (TO Contractor) shall purchase and provide all coordination, functions, labor, materials, insurance and items required to install a fully functional microwave and wireless communications site in accordance with the following specifications:

**A. Site Preparation Work**

1. Clearing and grading of one approximately 100 ft x 100 ft area to install one 12 foot x 38 foot concrete equipment shelter foundation, one tower foundation for a 180-ft self-supporting tower, and one 1,000 gallon liquid propane fuel tank foundation.
2. Purchase and installation of a 180-ft self-supporting tower foundation.
3. Purchase and install one 4 foot x 20 foot foundation for a 1,000 gallon LP propane fuel tank.
4. Purchase and installation of one 12 foot x 38 foot equipment shelter foundation as per equipment shelter manufacturer supplied specifications. The supply and installation of the equipment shelter and foundation shall include: the construction of one concrete foundation with integrated continuous stoops for the doors, designed to support one 12x38x10 foot concrete equipment shelter (height is inside dimension). The equipment shelter foundation shall be provided at the same time as the tower foundation.
5. Upon completion of tower installation, the TO Contractor shall re-grade and install storm-water management, grub the entire site, extending 2 –feet below finished grade, and two foot around the perimeter of the fence line; install filter cloth and defoliant and cover the entire site with crusher/run. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
6. The TO Contractor shall install temporary storm-water management measures during the construction. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
7. The TO Contractor shall provide and install a ten foot high-galvanized chain link fence, with a ten foot wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 60 foot long by 60 foot wide. The security gate shall be

chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.

8. The TO Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.
9. The TO Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than four inches.

#### B. Tower Specifications

1. The tower shall be a solid steel leg constructed, self-supporting, 180 foot lattice tower. The tower shall be constructed of high-strength steel. All components and hardware are to be hot-dip galvanized with a zinc coating (per EIA standards) after fabrication. A zinc coating shall be permanently fused to the steel, both inside and outside, so all surfaces are protected and no painting is required for rust protection. Upon delivery, the tower shall be subject to approval by the State Project Manager and the State Program Manager.
2. Supplied materials, including, but not limited to, equipment shelter, fuel tank and tower, shall be new, unused and shall meet the latest design and fabrication standards of the Electronics Industry Association (EIA). The tower shall have a safety climbing cable installed. All supplied materials shall be purchased, not leased.
3. The State Project Manager shall coordinate exact placement of the tower and shelter with the TO Contractor.
4. The tower shall be required to meet or **exceed** the latest EIA 222-G standards for this type of tower with the State supplied loading design. The tower and associated installation shall conform to all local, County, State and Federal equipment shelter codes. The State of Maryland shall be responsible for obtaining Federal Aviation Administration (FAA) approval and permits.
5. The bottom 20 foot (minimum) of the tower shall have K-bracing construction to allow for ingress and egress under the tower. The top 60 foot (minimum) of the tower shall contain no slope.
6. Spacing between tower legs shall not exceed 26 foot
7. Proper and thorough grounding methods shall be employed to provide maximum lightning protection.
8. The TO Contractor shall use soil borings supplied by the State for analysis to assure that the engineered tower foundation and the calculated ground loadings are acceptable. The TO Contractor shall furnish one copy of the foundation designs and the ground loading calculations certified by a Maryland registered Professional Engineer (P.E.) to the State Project Manager and one copy to Maryland Department of Information Technology (DoIT) with the response to the Task Order RFP. The TO Contractor shall

furnish a statement that the engineered tower foundations and the calculated ground loadings meet the manufacturer's recommended requirements.

9. Step bolts and safety climbs are to be provided as part of the tower.
10. All leg and leg flange PL material is ASTM A-572 grade 50 ( $F_y \geq 50$  ksi). All other material is ASTM A36 ( $F_y \geq 36$  ksi)
11. 1 1/8"  $\Phi$  ASTM A449 anchor bolts required per leg.
12. Concrete strengths to equal 3000 PSI at 28 days.
13. Non-chloride, non-corrosive concrete set accelerate may be utilized in compliance with ASTM-C-494 type C and ACI-318.
14. Water reducing admixture may be utilized in compliance with ASTM-C-494.
15. All admixtures should be dispensed into fresh concrete and sufficiently mixed. All admixtures must be added separately.
16. Minimum concrete cover of three inches on all steel.
17. Crown top of piers for drainage and chamfer all exposed concrete edges one inch.
18. Compact backfill in nine inch lifts. Remove all forms prior to backfill.

### C. Specifications for Shelter Equipped with Emergency Power

1. Shelter installations must be in conformance with manufacturer's requirements for application of warranties provided by the manufacturer.
2. The equipment shelter shall be a one-piece Concrete Communications Equipment Shelter including a 35KW generator, 200 Amp Service Panel, and ATS. The supplied equipment shelter shall be nominally sized 12 foot x 38 foot x 10 foot (Height is inside dimension) and configured with two rooms.
3. Two cable entry points complete with weatherproof caps shall be provided for antenna cable entry. One entry point will be located on the long side of the equipment shelter and the second entry point will be located on the end wall of the equipment shelter between the air conditioner units. Each port within both assemblies shall be four inches in diameter, and shall be located with the top of the assembly located directly under the cable rack, in four rows of four ports each. In addition to the cable entry points, one single four inch PVC conduit sleeve for communications conduits and one single two inch PVC conduit sleeve for installation of S. O. cables to the tower lighting system, both with temporary end caps shall be installed. The actual location of these penetrations and sleeves must be confirmed with the State Project Manager prior to the fabrication of the shelter.

4. Cable ladders (24 inches wide) shall be mounted eight feet above the floor, measured from the floor to the middle of the bottom of the cable ladder.
5. Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with 5-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter will be supplied with a 16-inch exhaust fan and hood and a 16-inch intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. Each unit shall contain a time delay startup relay, low ambient control, and a forced air resistive heat strip. The outside portions of the units will be weather/rodent and tamper proof.
6. All shelters shall be equipped with 16-inch ventilation fans with gravity operated back draft louvers and 16-inch gravity intake damper with filter and hood (bug and rodent intrusion resistant). Each fan shall be connected to a thermostatic device to allow automatic fan on-off control. The openings will be provided with shutters and weather hoods. All required exhaust piping and intake and exhaust plenums required for the manufacturer's recommended air flow shall be included as part of the installed equipment. All openings in the shelter structure for the provision of entry or exit of cables, equipment, ventilation, etc., must be sealed to prevent the invasion of the shelter interior by insects, rodents and external moisture.
7. Electric baseboard heater strips shall supply heating for all shelters, including the generator rooms of double room shelters. Thermostats mounted on a wall opposite each heater shall control these heaters. The heaters will be sufficient for the size of the equipment shelter to maintain a room temperature of 72 degrees F.
8. Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have an R-19 (minimum) rating.
9. Concrete Construction – The wall outer finish will be natural stone aggregate finish with an aesthetically pleasing earth tone.
10. Each foundation shall be comprised of concrete pad with steel reinforcement. The foundations shall level each shelter such that all foundation-to-shelter contact points have equal loads. The equipment shelter is to rest flush on the paved concrete foundation without showing any gaps between shelter and pad and to be level to within ½ degree. The shelter shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the shelter. Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.
11. The minimum floor loading design will be 300 lbs. per square foot  
The minimum roof loading design will be 100 lbs. per square foot  
The minimum wall loading design will be 34 lbs. per square foot  
The minimum wind loading design will be 50 lbs. per square foot
12. Two reinforced steel finished doors shall be located on each shelter, per the



attached drawings. The doors will be finished to match the appearance of the shelter. The doors shall be pre-hung, gasket sealed, insulated, approximately three foot by seven foot, and in a metal frame. The door will be supplied with door-closer, magnetic weather stripping, drip strip over door, doorstop, door sweep and a 42-inch door canopy. Door checks and door stops shall be provided along with a three point locking system for maximum security. The doors will have non-removable ball bearing hinges and deadbolt locks with tamper plates installed.

13. The equipment shelter floor shall be covered with 1/8 inch, 12 inches x 12 inches vinyl tile, light in color (beige, tan or white). The walls will be trimmed with a four foot high X 1/8 in. rubber base trim against the floor.
14. The walls will be covered with a minimum of white wood-grained paneling or white vinyl over 1/2 inch plywood. There will be a telephone mounting board of 3/4 inch x 4 foot X 8 foot plywood installed at one end of the equipment shelter that is painted to match the walls.
15. The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five foot intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be installed 18 inches above finished floor. Horizontal runs of conduit will be installed a minimum of 7-1/2 feet above the floor whenever possible with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall. Two weatherproof outlets will be installed on the exterior of the shelter. These outlets are to be located at both ends of the shelter. In addition, circuits supplying power to the equipment racks in shelters shall extend downward six feet from boxes mounted at 22" intervals on the ceiling. Wiring for these drops shall be housed in "Sealtite" flexible conduit and each drop shall be terminated in a quad receptacle box. Each circuit drop shall have its own dedicated 20 ampere circuit breaker. These drops shall be planned to fall immediately adjacent to the edge of the cable tray. The exact location for each drop must be confirmed with the Project Manager before the shelter is fabricated.
16. Power to the shelter shall be fed through a properly sized 120V/208V, single-phase disconnect switch mounted on the exterior wall of the shelter.
17. Shelter is to be provided with 200amp 20-position (minimum) load center, equipped with a minimum of 20 20-amp breakers. Breakers shall be "high magnetic" or high inrush current type (Square D, HM or equivalent). This box shall be installed at one end of the equipment area within five feet of the primary cable entry port. The shelter will be provided with a -200-Amp load center.
18. An interior system ground (halo) with a single #2 AWG stranded wire will be provided with proper connections to the shelter and, in turn, to the tower ground system. The halo will have a 6-inch break roughly opposite the Master Ground Bar. The halo's 6-inch break will not be bridged by any installed metal conduits. The internal ground system will be mounted on the

wall using 2-inch standoff insulators, connected to one ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar that is installed directly under the main cable entry port. The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system. These copper ground bars will be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One, 10-foot (minimum) solid copper grounding rod (provided by the shelter contractor) shall be driven into the ground soil and subsurface directly under the cable entry port of the shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system. A minimum of two 2-inch copper strapping shall be used for the exterior ground connection. All exterior connections shall be exothermically welded to ensure proper connection. Electrical ground will be bonded to the RF ground.

19. An IEEE Type 1 SAD/MOV protection device will be installed across the main utility service entry. An IEEE Type 2 MOV protection device will be installed at the main power input inside the shelter, by means of a 60-Ampere fused breaker, across the utility lugs of the transfer switch. The devices will be installed inside the equipment shelter.
20. 48-inch, two or four-tube, fluorescent fixtures shall provide sufficient lighting (minimum 50-foot candles) for the shelters. The lights shall be controlled by a wall switch internal to the shelter, and located at the entry door. See Attachment J for details concerning number and arrangement of fixtures. An exterior entry light shall be installed outside the doorways of the structure. This light shall be controlled by a photocell wired through a wall switch inside the shelter.
21. The shelter shall be pre-wired, with the following functions, to a common point in the radio compartment and terminated with a “66 Block”:
  - ◆ High Temperature Alarm – Adjustable for over-temperature alert (may be integrated with HVAC system).
  - ◆ Low Temperature Alarm – Adjustable for under-temperature alert (may be integrated with HVAC system).
  - ◆ Generator Alarm – Output when generator is running.
  - ◆ Entry/Intrusion – Output when either door is opened
  - ◆ Fire and Smoke Alarm
22. This double room shelter shall have a partition wall separating the emergency generator from the room containing the RF equipment. This partition wall shall have a one hour fire rating (from the inside out and outside in). The floor under this section shall be reinforced to handle additional loading. Two intake louvers and one exhaust fan with gravity louvers shall be installed. The powered louvers will default to a closed position in the event of a

complete power failure. All louvers and openings will be wire covered for security and prevention of entry by rodents. A separate outside door shall be installed on this room and shall be identical to the equipment room door.

23. The lighting for this room shall be controlled by a separate wall switch internal to the room and located next to the entry door.
24. The TO Contractor shall supply with each equipment shelter one 35 Kilowatt liquid propane vapor fueled, 1800-RPM generator, 44 kVA, 60 Hz, 120/240 volt, single phase with a properly sized Automatic Transfer Switch. The TO Contractor will provide a new and unused, purchased and not leased, above ground 1,000-gallon fuel tank filled to rated capacity (liquid propane only).
25. Installation shall include all materials, parts, labor, etc., to provide a fully functional generator back-up system. Included in the installed price is the transfer switch and all associated wiring. Block heaters with necessary wiring are to be included. Fuel tank hookup, fuel tank, fuel tank pad and fuel supply piping to the shelter is to be provided by the site work contractor.
26. Fuel strainers on the propane fuel systems must be installed for proper drainage to prevent moisture buildup in the line. Proper sized flex fuel lines needs to be installed on all generators and the fuel line so as to not impede the proper flow of fuel and must not be sharply bent, or crimped. Proper venting of the fuel system must be installed to ensure no buildup of pressure and safe venting will occur. Fuel lines run in conduit or sleeves must be sealed from moisture. Proper battery chargers must be installed for the appropriate system, either 12 VDC or 24 VDC, 110 VAC. Note: two 12 VDC battery chargers are not acceptable on 24-volt systems.
27. The TO Contractor must perform on-site startup of the generator under full load.
28. All alarm outputs from the generator are to be extended to the radio compartment of the shelter and terminated in a "66 block".
29. All wiring for the generator must be routed overhead. It is unacceptable to cross the floor with conduits.
30. An external ¼-inch x 4 inches x 20 inches, 27 hole copper ground bar is to be installed on the outside of the shelter directly under the main cable entry port and attached with two, solid tinned copper, two-inch ground straps, to the single ground point directly below the main cable entry port.
31. An external ground ring is to be provided around the shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches below the earth's surface with ground rods driven into the earth at intervals not to exceed twice the ground rod length. In the event 10-foot ground rods cannot be driven shorter rods are acceptable if driven at the proper intervals. The external ground ring is to be placed two feet outside the shelter footprint in order to be outside the drip line of the shelter.

32. All grounds must be bonded together. This includes the generator, the shelter, the fuel tank, the fencing, the equipment shelter grounding system and the tower. The ground test reading must not exceed five OHMS. The State shall test all grounds using a fall-of-potential method test to determine compliance. In the event five Ohms cannot be reached by reasonable means and through no fault of the vendor, the State will determine the course of action to be taken by the TO Contractor at an additional cost to the State. Grounds must test fewer than 25 OHMS for the site to be acceptable for reasons of personal safety.

D. Specifications for Installation

1. Purchase and installation of one fully functional, 180 foot above ground level, three legged, heavy duty, self-supporting, two-way microwave radio tower.
2. TO Contractor is to assume normal soil conditions.
3. Installation of the tower shall include placing a foundation which is certified signed and stamped by a Maryland registered Professional Engineer **(certification must be provided with the actual response to the bid)** that it is designed in accordance with the tower manufacturer's recommendations based upon the soil borings provided by the State, erecting the tower, supplying and mounting 24 inch cable ladders or wave guide stacker system on two faces of the tower (each must accommodate at least 15-3/4 inch snap-ins), and supplying and installing two nominal 24 inches wide by 20 foot long extruded metal, four post, no cantilever ice bridges from the tower to the equipment shelter cable entry ports. The ice bridges will be electrically insulated from the tower.
4. The tower shall be erected to a height of 180 foot (AGL) above ground in such a manner as to assure straightness and plumb. The top 60 foot (minimum) of the 180 foot tower shall contain no slope.
5. The following lightning protection devices shall be installed:
  - ◆ An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board.
  - ◆ An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch.
6. Purchase and installation of one 12 x 38 x 10 foot concrete equipment shelter (height is inside dimension) with a 35 KW standby generator. The equipment shelter is to rest flush on the poured concrete foundation without showing any gaps between equipment shelter and pad and leveled to within 1/2 degrees.
7. Purchase and installation of one new 1,000 gallon LP propane fuel tank with hookup to the generator and shall include first propane fill-up.

8. Provision and installation of a liquid cooled, 1800 RPM, 44 KVA, 60 hertz, 35 KW liquid propane vapor fueled generator complete with a 200-Amp automatic transfer switch capable of zero cross-over switching to eliminate service interruptions.
9. Generator start-up and test under load after permanent power is connected to the equipment shelter.
10. Purchase and install one nominal 20 foot, 24-inch wide, four-post, no cantilever ice bridge.
11. Purchase and installation of site grounding in accordance with Motorola R-56 standards.
12. Purchase and installation of three four-inch PVC conduits for electrical service, each approximately 60 feet long, between the electric company demarcation point and the Contractor supplied backboard and from the backboard into the equipment shelter. Contractor shall purchase and install one electric company meter face.

PRICE SHEET  
 EXAMPLE OF TASK ORDER #1  
 180-FT SELF SUPPORTING TOWER AND  
 12X38X10-FT SHELTER

PROJECT LINE ITEM

PRICE

**A: SITE**

1. Clearing and grading of one 100 ft x 100 ft area	Medium Clearing (Does not include removing large trees and stumps) \$12,500.00
2. Purchase and installation of one tower foundation	Assume Pad and Pier (approx. 46 cu yd) \$45,750.00
3. Purchase and installation of one 4 ft x 20 ft concrete foundation to install one 1,000 gallon liquid propane fuel tank	\$1,950.00
4. Purchase and installation of one 12 ft x 38 ft concrete foundation to install one 12x38x10-ft concrete equipment shelter	\$15,850.00
5. Site restoration, grading, grubbing, reseeding, installation of storm water management.	\$450.00
6. Purchase and installation of temporary storm-water management and soil erosion measures during construction	\$900.00
<b>B: INSTALLATION</b>	

7. Purchase, shipping and erection of one fully functional, 180-ft self supporting tower	Includes crane for erection \$105,000.00
8. Purchase, shipping and installation of one 12x38x10-ft concrete equipment shelter (height is inside dimension) with a 35KW standby generator	Includes Offload and setup and crane \$199,500.00
9. Purchase and installation of one new 1,000 gallon liquid propane fuel tank including first fuel fill-up	\$9,000.00
10. Generator start up test under full load	\$350.00
11. Purchase and installation of one nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridge from the equipment shelter to the tower.	\$1,750.00
12. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel	Included in Shelter Price in item 8
13. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch	Included in Shelter Price in item 8
14. Purchase and install a ten foot high-galvanized chain link fence, with a ten foot wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 foot long by 100 foot wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.	\$23,750.00

<p>15. Purchase and install grounding associated with the equipment shelter and fuel tank and connect to the existing tower/site grounding in accordance with the most recently published Motorola R-56 guidelines (98R82904Y01-O)</p>	<p style="text-align: right;">\$9,200.00</p>
<p>16. Purchase and installation of three 4-inch PVC conduits, each approximately 60 feet long, between the electric company demarcation point to a Contractor supplied backboard and from the backboard into the equipment shelter, and purchase and installation of one electric company meter face.</p>	<p>Includes 120 / 240 volt, 200 amp, single-phasesmeter pedestal &amp; hookup for electrical service by the local utility; Supply and install three gang single phase 200 Amp meter base of Ring type with no Bypass, OH/UG, 4 Terminal, No Sealing Ring on existing utility rack; H-Frame; Underground conduit and service for 60'</p> <p style="text-align: right;">\$13,500.00</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <p><b>TOTAL PRICE TASK ORDER #1 (TOTAL ITEMS 1 THROUGH 16)</b></p> </div>	<p style="text-align: right;">\$439,450.00</p>



## Example of Task Order # 2

Tower - Self Supporting 330-ft AGL  
12 X 38 X 10-FT Equipment Shelter

### SCOPE OF SERVICES AND SPECIFICATIONS

The TO Contractor shall provide all coordination, functions, labor, materials, insurance and purchase items required to install a fully functional microwave and wireless communications site in accordance with the following specifications:

#### A. Site Preparation Work

1. Clearing and grading of approximately 100 foot x 100foot area. Purchase and installation of the tower foundation.
2. Purchase and installation of one 12 foot x 38 foot equipment shelter foundation as per equipment shelter manufacturer supplied specifications. The supply and installation of the equipment shelter and foundation shall include: the construction of one concrete foundation with integrated continuous stoops for the doors, designed to support one 12x38x10 foot concrete equipment shelter (height is inside dimension). The equipment shelter foundation shall be provided at the same time as the tower foundation.
3. Purchase and install one foundation for a 1,000 gallon LP propane fuel tank.
4. Upon completion of tower installation, the TO Contractor shall re-grade and install storm-water management, grub the entire site extending two (2) foot below finished grade and two foot around the perimeter of the fence line; install filter cloth and defoliant and cover the entire site with crusher/run. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
5. The TO Contractor shall provide and install a ten foot high-galvanized chain link fence, with a ten foot wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 foot long by 100 foot wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.
6. If necessary, the TO Contractor shall install temporary storm-water management measures during the construction. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
7. The TO Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.

8. The TO Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than 4 inches.

B. Tower Specifications

1. The tower shall be a solid steel leg constructed, self-supporting, 330 foot lattice tower. The tower shall be constructed of high-strength steel. All components and hardware are to be hot-dip galvanized with a zinc coating (per EIA standards) after fabrication. A zinc coating shall be permanently fused to the steel, both inside and outside, so all surfaces are protected and no painting is required for rust protection. Upon delivery, the tower shall be subject to approval by the State Project Manager and the State Program Manager
2. Supplied materials, including, but not limited to, equipment shelter, fuel tank and tower, shall be new, unused and shall meet the latest design and fabrication standards of the Electronics Industry Association (EIA). The tower shall have a safety climbing cable installed. All supplied materials shall be purchased, not leased.
3. The TO Contractor with the State Project Manager shall coordinate exact placement of the tower and shelter.
4. The tower shall be required to meet or **exceed** the latest EIA 222-G standards for this type of tower with the State supplied loading design. The tower and associated installation shall conform to all local, County, State and Federal equipment shelter codes. The Contractor shall supply and install an FAA - A1 tower lighting system in accordance with FAA regulations. The State of Maryland shall be responsible for obtaining Federal Aviation Administration (FAA) approval and permits.
5. The bottom 20 foot (minimum) of the tower shall have K-bracing construction to allow for ingress and egress under the tower. The top 60 foot (minimum) of the tower shall contain no slope.
6. Spacing between tower legs shall not exceed 32 feet.
7. Proper and thorough grounding methods shall be employed to provide maximum lightning protection.
8. The TO Contractor shall use soil borings supplied by the State for analysis to assure that the engineered tower foundation and the calculated ground loadings are acceptable. The Contractor shall furnish one copy of the foundation designs and the ground loading calculations certified by a Maryland registered Professional Engineer (P.E.) to the State Project Manager and one copy to Maryland Department of Information Technology. The Contractor shall furnish a statement that the engineered tower foundations and the calculated ground loadings meet the manufacturer's recommended requirements.
9. Step bolts and safety climbs are to be provided as part of the tower.
10. All leg and leg flange PL material is ASTM A-572 grade 50 ( $F_y \geq 50$  ksi). All other material is ASTM A36 ( $F_y \geq 36$  ksi)

11. 1 1/8"  $\Phi$  ASTM A449 anchor bolts required per leg.
12. Concrete strengths to equal 3000 PSI at 28 days.
13. Non-chloride, non-corrosive concrete set accelerate may be utilized in compliance with ASTM-C-494 type C and ACI-318.
14. Water reducing admixture may be utilized in compliance with ASTM-C-494.
15. All admixtures should be dispensed into fresh concrete and sufficiently mixed. All admixtures must be added separately.
16. Minimum concrete cover of three inches on all steel.
17. Crown top of piers for drainage and chamfer all exposed concrete edges one inch.
18. Compact backfill in nine inch lifts. Remove all forms prior to backfill.

C. Specifications for Shelter Equipped with Emergency Power

1. Shelter installations must be in conformance with manufacturer's requirements for application of warranties provided by the manufacturer.
2. The equipment shelter shall be a one-piece Concrete Communications Equipment Shelter including a 75KW generator, 400 Amp. Service Panel, ATS with installation, included. The supplied equipment shelter shall be nominally sized 12 foot x 38 foot x 10 foot (Height is inside dimension) and configured as a two-room shelter.
3. Two cable entry points complete with weatherproof caps shall be provided for antenna cable entry. One entry point will be located on the long side of the equipment shelter and the second entry point will be located on the end wall of the equipment shelter between the air conditioner units. Each port within both assemblies shall be four inches in diameter, and shall be located with the top of the assembly located directly under the cable rack, in four rows of four ports each. In addition to the cable entry points, one single four inch PVC conduit sleeve for communications conduits and one single two inch PVC conduit sleeve for installation of S. O. cables to the tower lighting system, both with temporary end caps shall be installed. The actual location of these penetrations and sleeves must be confirmed with the State Project Manager prior to the fabrication of the shelter.
4. Cable ladders (24 inches wide) shall be mounted eight feet above the floor, measured from the floor to the middle of the bottom of the cable ladder.
5. Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with five-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter will be supplied with a 16" exhaust fan and hood and a 16" intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. Each unit shall contain a time delay startup relay, low ambient control, and a forced

air resistive heat strip. The outside portions of the units will be weather/rodent and tamper proof.

6. All shelters shall be equipped with 16-inch ventilation fans with gravity operated back draft louvers and 16-inch gravity intake damper with filter and hood (bug and rodent intrusion resistant). Each fan shall be connected to a thermostatic device to allow automatic fan on-off control. The openings will be provided with shutters and weather hoods. All required exhaust piping and intake and exhaust plenums required for the manufacturer's recommended air flow shall be included as part of the installed equipment. All openings in the shelter structure for the provision of entry or exit of cables, equipment, ventilation, etc., must be sealed to prevent the invasion of the shelter interior by insects, rodents and external moisture.
7. Electric baseboard heater strips shall supply heating for all shelters, including the generator rooms of double room shelters. Thermostats mounted on a wall opposite each heater shall control these heaters. The heaters will be sufficient for the size of the equipment shelter to maintain a room temperature of 72 degrees F.
8. Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have an R-19 (minimum) rating.
9. Concrete Construction – The wall outer finish will be natural stone aggregate finish with an aesthetically pleasing earth tone.
10. Each foundation shall be comprised of concrete pad with steel reinforcement. The foundations shall level each shelter such that all foundation-to-shelter contact points have equal loads. The equipment shelter is to rest flush on the paved concrete foundation without showing any gaps between shelter and pad and to be level to within ½ degree. The shelter shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the shelter. Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.
11. The minimum floor loading design will be 300 lbs. per square foot  
The minimum roof loading design will be 100 lbs. per square foot  
The minimum wall loading design will be 34 lbs. per square foot  
The minimum wind loading design will be 50 lbs. per square foot
12. Two reinforced steel finished doors shall be located on each shelter, per the attached drawings. The doors will be finished to match the appearance of the shelter. The doors shall be pre-hung, gasket sealed, insulated, approximately three foot by seven foot, and in a metal frame. The door shall be supplied with door-closer, magnetic weather stripping, drip strip over door, doorstop, door sweep and a 42-inch door canopy. Door checks and door stops shall be provided along with a three point locking system for maximum security. The doors will have non-removable ball bearing hinges and deadbolt locks with tamper plates installed.
13. The equipment shelter floor shall be covered with 1/8 inch, 12 inches x 12 inches vinyl tile, light in color (beige, tan or white). The walls will be trimmed with a 4 foot high X 1/8 in. rubber base trim against the floor.

14. The walls will be covered with a minimum of white wood-grained paneling or white vinyl over ½ inch plywood. There will be a telephone mounting board of ¾ inch x four foot X eight foot plywood installed at one end of the equipment shelter that is painted to match the walls.
15. The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five foot intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be installed 18 inches above finished floor. Horizontal runs of conduit will be installed a minimum of 7-1/2 feet above the floor whenever possible with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall. Two weatherproof outlets will be installed on the exterior of the shelter. These outlets are to be located at both ends of the shelter. In addition, circuits supplying power to the equipment racks in shelters shall extend downward six feet from boxes mounted at 22” intervals on the ceiling. Wiring for these drops shall be housed in “Sealtite” flexible conduit and each drop shall be terminated in a quad receptacle box. Each circuit drop shall have its own dedicated 20 ampere circuit breaker. These drops shall be planned to fall immediately adjacent to the edge of the cable tray. The exact location for each drop must be confirmed with the Project Manager before the shelter is fabricated.
16. Power to the shelter shall be fed through a properly sized 120V/208V, single-phase disconnect switch mounted on the exterior wall of the shelter.
17. Shelter is to be provided with 400-amp, 20-position (minimum) load center, equipped with a minimum of 20 20-amp breakers. Breakers shall be “high magnetic” or high inrush current type (Square D, HM or equivalent). This box shall be installed at one end of the equipment area within five feet of the primary cable entry port. The shelter will be provided with a 400-Amp load center and a 200-Amp sub feed panel shall be installed adjacent to, and fed from, the main service panel to provide electrical feed to a second shelter that will be installed in the future.
18. An interior system ground (halo) with a single #2 AWG stranded wire will be provided with proper connections to the shelter and, in turn, to the tower ground system. The halo will have a 6-inch break roughly opposite the Master Ground Bar. The halo’s 6-inch break will not be bridged by any installed metal conduits. The internal ground system will be mounted on the wall using 2-inch standoff insulators, connected to one ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar that is installed directly under the main cable entry port. The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system. These copper ground bars will be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One, 10-foot (minimum) solid copper grounding rod (provided by the shelter contractor) shall be driven into the ground soil and subsurface directly under the cable entry port of the shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system. A minimum of two 2-inch copper strapping shall be used for the exterior ground connection. All exterior connections shall be exothermically welded to ensure proper connection. Electrical ground will be bonded to the RF ground.

19. An IEEE Type 1 SAD/MOV protection device will be installed across the main utility service entry. An IEEE Type 2 MOV protection device will be installed at the main power input inside the shelter, by means of a 60-Ampere fused breaker, across the utility lugs of the transfer switch. The devices will be installed inside the equipment shelter.
20. 48-inch, two or four-tube, fluorescent fixtures shall provide sufficient lighting (minimum 50-foot candles) for the shelters. The lights shall be controlled by a wall switch internal to the shelter, and located at the entry door. See Attachment J for details concerning number and arrangement of fixtures. An exterior entry light shall be installed outside the doorways of the structure. This light shall be controlled by a photocell wired through a wall switch inside the shelter.
21. The shelter shall be pre-wired, with the following functions, to a common point in the radio compartment and terminated with a “66 Block”:
  - ◆ High Temperature Alarm – Adjustable for over-temperature alert (may be integrated with HVAC system).
  - ◆ Low Temperature Alarm – Adjustable for under-temperature alert (may be integrated with HVAC system).
  - ◆ Generator Alarm – Output when generator is running.
  - ◆ Entry/Intrusion – Output when either door is opened
  - ◆ Fire and Smoke Alarm
22. This double room shelter shall have a partition wall separating the emergency generator from the room containing the RF equipment. This partition wall shall have a one hour fire rating (from the inside out and outside in). The floor under this section shall be reinforced to handle additional loading. Two intake louvers and one exhaust fan with gravity louvers shall be installed. The powered louvers will default to a closed position in the event of a complete power failure. All louvers and openings will be wire covered for security and prevention of entry by rodents. A separate outside door shall be installed on this room and shall be identical to the equipment room door.
23. The lighting for this room shall be controlled by a separate wall switch internal to the room and located next to the entry door.
24. The TO Contractor shall supply with each equipment shelter one 75 Kilowatt liquid propane vapor fueled, 1800-RPM generator, 94 kVA, 60 Hz, 120/240 volt, single phase with a properly sized Automatic Transfer Switch. The TO Contractor will provide a new and unused, purchased and not leased, above ground 1,000-gallon fuel tank filled to rated capacity (liquid propane only).

25. Installation shall include all materials, parts, labor, etc., to provide a fully functional generator back-up system. Included in the installed price is the transfer switch and all associated wiring. Block heaters with necessary wiring are to be included. Fuel tank hookup, fuel tank, fuel tank pad and fuel supply piping to the shelter is to be provided by the site work contractor.
26. Fuel strainers on the propane fuel systems must be installed for proper drainage to prevent moisture buildup in the line. Proper sized flex fuel lines needs to be installed on all generators and the fuel line so as to not impede the proper flow of fuel and must not be sharply bent, or crimped. Proper venting of the fuel system must be installed to ensure no buildup of pressure and safe venting will occur. Fuel lines run in conduit or sleeves must be sealed from moisture. Proper battery chargers must be installed for the appropriate system, either 12 VDC or 24 VDC, 110 VAC. Note: two 12 VDC battery chargers are not acceptable on 24-volt systems.
27. The contractor must perform on-site startup of the generator under full load.
28. All alarm outputs from the generator are to be extended to the radio compartment of the shelter and terminated in a “66 block”.
29. All wiring for the generator must be routed overhead. It is unacceptable to cross the floor with conduits.
30. An external ¼-inch x 4 inches x 20 inches, 27 hole copper ground bar is to be installed on the outside of the shelter directly under the main cable entry port and attached with two, solid tinned copper, two-inch ground straps, to the single ground point directly below the main cable entry port.
31. An external ground ring is to be provided around the shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches below the earth’s surface with ground rods driven into the earth at intervals not to exceed twice the ground rod length. In the event 10-foot ground rods cannot be driven shorter rods are acceptable if driven at the proper intervals. The external ground ring is to be placed two feet outside the shelter footprint in order to be outside the drip line of the shelter.
32. All grounds must be bonded together. This includes the generator, the shelter, the fuel tank, the fencing, the equipment shelter grounding system and the tower. The ground test reading must not exceed five OHMS. The State shall test all grounds using a fall-of-potential method test to determine compliance. In the event five Ohms cannot be reached by reasonable means and through no fault of the vendor, the State will determine the course of action to be taken by the vendor at an additional cost to the State. Grounds must test fewer than 25 OHMS for the site to be acceptable for reasons of personal safety.

#### D. Specifications for Installation

1. Purchase and installation of one fully functional, 330 foot above ground level, three legged, heavy duty, self-supporting, two-way microwave radio tower.

2. TO Contractor is to assume normal soil conditions.
3. Installation of the tower shall include placing a foundation which is certified signed and stamped by a Maryland registered Professional Engineer (**certification must be provided with the response to the bid**) that it is designed in accordance with the tower manufacturer's recommendations based upon the soil borings provided by the State, erecting the tower, supplying and mounting 24 inch cable ladders or wave guide stacker system on two faces of the tower (each must accommodate at least 15-3/4 inch snap-ins), and supplying and installing two nominal 24 inches wide by 20 foot long extruded metal, four post, no cantilever ice bridges from the tower to the equipment shelter cable entry ports. The ice bridges will be electrically insulated from the tower.
4. The tower shall be erected to a height of 330 foot (AGL) above ground in such a manner as to assure straightness and plumb. The top 60 foot (minimum) of the 330 foot tower shall contain no slope.
5. The TO Contractor shall purchase and install one FAA A-1 medium intensity, dual tower lighting system.
6. The TO Contractor shall install the following lightning protection:
  - a. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board.
  - b. An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch.
7. Purchase and installation of one 12 x 38 x 10 foot concrete equipment shelter (height is inside dimension) with a 75 KW standby generator. The equipment shelter is to rest flush on the poured concrete foundation without showing any gaps between equipment shelter and pad and leveled to within 1/2 degrees.
8. Purchase and installation of one new 1,000 gallon LP propane fuel tank with hookup to the generator and shall include first propane fill-up.
9. Provision and installation of a liquid cooled, 1800 RPM, 94 kVA, 60 hertz, 75 KW liquid propane vapor fueled generator complete with a 400-Amp automatic transfer switch capable of zero cross-over switching to eliminate service interruptions.
10. Generator start-up and test under load after permanent power is connected to the equipment shelter.
11. Purchase and install one nominal 20 foot, 24-inch wide, 4-post, no cantilever ice bridge.
12. Purchase and installation of three 4-inch PVC conduits for electrical service, each approximately 60 feet long, between the electric company demarcation



point and the Contractor supplied backboard and from the backboard into the equipment shelter. Contractor shall purchase and install one electric company meter face.

**PRICE SHEET**  
**EXAMPLE OF TASK ORDER # 2**  
**330-FT SELF SUPPORTING TOWER AND**  
**12X38X10-FT SHELTER**

PROJECT LINE ITEM	PRICE
<b>A: SITE</b>	
1. Clearing and grading of one 100 ft x 100 ft area	Medium Clearing (Does not include removing large trees and stumps) \$12,500.00
2. Purchase and installation of one tower foundation for a 330-ft self supporting tower	Assume Pad and Pier (approx. 200 cu yd) \$205,500.00

3. Purchase and installation of one 4 ft x 20 ft concrete foundation to install one 1,000 gallon liquid propane fuel tank	\$1,950.00
4. Purchase and installation of one 12 ft x 38 ft concrete foundation to install one 12x38x10-ft concrete equipment shelter	\$15,850.00
5. Site restoration, grading, grubbing, reseeding, installation of storm water management.	\$450.00
6. Purchase and installation of temporary storm-water management and soil erosion measures during construction	\$900.00
<b>B: INSTALLATION</b>	
7. Purchase, shipping and erection of one fully functional, 330-ft self supporting tower	Includes Crane for erecting tower: \$240,950.00
8. Purchase and installation of one FAA - A1 tower lighting system in accordance with FAA regulations.	Included in item 7
9. Purchase, shipping and installation of one 12x38x10-ft concrete equipment shelter (height is inside dimension) with a 75KW standby generator	Includes crane and offloading: \$228,000.00
10. Purchase and installation of one new 1,000 gallon liquid propane fuel tank including first fuel fill-up	\$9000.00
11. Generator start up test under full load	\$350.00
12. Purchase and installation of one nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridge from the equipment shelter to the tower.	\$1,750.00

<p>13. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel</p>	<p>Included in item 9</p>
<p>14. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch</p>	<p>Included in item 9</p>
<p>15. Purchase and install a ten foot high-galvanized chain link fence, with a ten foot wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 foot long by 100 foot wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.</p>	<p>\$23,750.00</p>
<p>16 Purchase and installation of 3 – 4inch PVC conduits, each approximately 60 feet long, between the electric company demarcation point and a Contractor supplied backboard and from the backboard into the equipment shelter, and the purchase and installation of one electric company meter face.</p>	<p>Includes 120 / 240 volt, 400 amp, single-phasemeter pedestal &amp; hookup for electrical service by the local utility; Supply and install three gang single phase 400 Amp meter base of Ring type with no Bypass, OH/UG, 4 Terminal, No Sealing Ring on existing utility rack; H-Frame; Underground conduit and service for 60'</p> <p>\$16,500.00</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <p><b>TOTAL PRICE TASK ORDER #2 (TOTAL ITEMS 1 THROUGH 16)</b></p> </div>	<p>\$757,450.00</p>

### **Example of Task Order # 3**

Tower – Self Supporting 450-ft AGL,  
One 12 X 38 X 10-FT Two-Room and One 12 X 38 X 10-ft One-Room Equipment shelter

#### **SCOPE OF SERVICES AND SPECIFICATIONS**

The TO Contractor shall provide all coordination, functions, labor, materials, insurance and purchase items required to install a fully functional microwave and wireless communications site in accordance with the following specifications:

##### **A. Site Preparation Work**

1. Clearing and grading of one area approximately 100 foot x 100 foot
2. Purchase and installation of the tower foundation.
3. Purchase and installation of two 12 foot x 38 foot equipment shelter foundations as per equipment shelter manufacturer supplied specifications. The supply and installation of the equipment shelters and foundations shall include: the construction of two concrete foundations with integrated continuous stoops for the door(s), designed to support two 12x38x10 foot concrete equipment shelters (height is inside dimension). The equipment shelter foundations shall be installed at the same time as the tower foundation.
4. Purchase and install one 4 foot x 20 foot foundation for a 1,000 gallon LP propane fuel tank.
5. Upon completion of tower installation, the TO Contractor shall re-grade and install storm-water management, grub the entire site extending two foot below the finished grade and two foot around the perimeter of the fence line; install filter cloth and defoliant and cover the entire site with crusher/run. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
6. The TO Contractor shall provide and install a ten foot high-galvanized chain link fence, with a ten foot wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 foot long by 100 foot wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.

7. The TO Contractor shall install temporary storm-water management measures during the construction. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
8. The TO Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.
9. The TO Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than four inches.

B. Tower Specifications

1. The tower shall be a solid steel leg constructed, self-supporting, 450 foot lattice tower. The tower shall be constructed of high-strength steel. All components and hardware are to be hot-dip galvanized with a zinc coating (per EIA standards) after fabrication. A zinc coating shall be permanently fused to the steel, both inside and outside, so all surfaces are protected and no painting is required for rust protection. Upon delivery, the tower shall be subject to approval by the State Project Manager and the State Program Manager (See Section 1.3).
2. Supplied materials, including, but not limited to, equipment shelter, fuel tank and tower, shall be new, unused and shall meet the latest design and fabrication standards of the Electronics Industry Association (EIA). The tower shall have a safety climbing cable installed. All supplied materials shall be purchased, not leased.
3. The TO Contractor with the State Project Manager shall coordinate exact placement of the tower and shelter.
4. The tower shall be required to meet or **exceed** the latest EIA 222-G standards for this type of tower with the State supplied loading design. The tower and associated installation shall conform to all local, County, State and Federal equipment shelter codes. The TO Contractor shall supply and install a Medium Intensity, dual mode (day/night) tower lighting system in accordance with FAA regulations. The State of Maryland shall be responsible for obtaining Federal Aviation Administration (FAA) approval and permits.
5. The bottom 20 foot (minimum) of the tower shall have K-bracing construction to allow for ingress and egress under the tower. The top 60 foot (minimum) of the tower shall contain no slope.
6. Spacing between tower legs shall not exceed 38 foot
7. Proper and thorough grounding methods shall be employed to provide maximum lightning protection.
8. The TO Contractor shall use soil borings supplied by the State for analysis to assure that the engineered tower foundation and the calculated ground loadings are acceptable. The TO Contractor shall furnish one copy of the

foundation designs and the ground loading calculations certified by a Maryland registered Professional Engineer (P.E.) to the State Project Manager and one copy to Maryland Department of Information Technology at the address identified in paragraph 33.2 of the contract, attachment A. The TO Contractor shall furnish a statement that the engineered tower foundations and the calculated ground loadings meet the manufacturer's recommended requirements.

9. Step bolts and safety climbs are to be provided as part of the tower.
10. All leg and leg flange PL material is ASTM A-572 grade 50 ( $F_y \geq 50$  ksi). All other material is ASTM A36 ( $F_y \geq 36$  ksi)
11. 1 1/8"  $\Phi$  ASTM A449 anchor bolts required per leg.
12. Concrete strengths to equal 3000 PSI at 28 days.
13. Non-chloride, non-corrosive concrete set accelerate may be utilized in compliance with ASTM-C-494 type C and ACI-318.
14. Water reducing admixture may be utilized in compliance with ASTM-C-494.
15. All admixtures should be dispensed into fresh concrete and sufficiently mixed. All admixtures must be added separately.
16. Minimum concrete cover of three inches on all steel.
17. Crown top of piers for drainage and chamfer all exposed concrete edges 1 inch.
18. Compact backfill in nine inch lifts. Remove all forms prior to backfill.

C. Specifications for Equipment Shelters

1. Shelter installations must be in conformance with manufacturer's requirements for application of warranties provided by the manufacturer.
2. The following equipment shelters shall be supplied:
  - a. One equipment shelter, one-piece, two-room Concrete Communications Equipment Shelter with a 75KW generator, 400 Amp. Service Panel, a 200 Amp sub-feed panel and ATS (automatic transfer switch) with installation included. The supplied equipment shelter shall be nominally sized 12 foot x 38 foot x 10 foot (Height is inside dimension) and configured as a two-room shelter.
  - b. One equipment shelter, one-piece, one-room Concrete Communications Equipment Shelter without a standby generator with a 200 Amp. Service Panel, installation included. The supplied equipment shelter shall be nominally sized 12 foot x 38 foot x 10 foot (Height is inside dimension) and configured as a one- room shelter.
  - c. Both equipment shelters shall have the following general specifications:

3. Two cable entry points complete with weatherproof caps shall be provided for antenna cable entry. One entry point will be located on the long side of the equipment shelter and the second entry point will be located on the end wall of the equipment shelter between the air conditioner units. Each port within both assemblies shall be four inches in diameter, and shall be located with the top of the assembly located directly under the cable rack, in four rows of four ports each. In addition to the cable entry points, one single four inch PVC conduit sleeve for communications conduits and one single two inch PVC conduit sleeve for installation of S. O. cables to the tower lighting system, both with temporary end caps shall be installed. The actual location of these penetrations and sleeves must be confirmed with the Project Manager prior to the fabrication of the shelter.
4. Cable ladders (24 inches wide) shall be mounted eight feet above the floor, measured from the floor to the middle of the bottom of the cable ladder.
5. Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with 5-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter will be supplied with a 16" exhaust fan and hood and a 16" intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. Each unit shall contain a time delay startup relay, low ambient control, and a forced air resistive heat strip. The outside portions of the units will be weather/rodent and tamper proof.
6. The shelters shall be equipped with 16-inch ventilation fans with gravity operated back draft louvers and 16-inch gravity intake damper with filter and hood (bug and rodent intrusion resistant). Each fan shall be connected to a thermostatic device to allow automatic fan on-off control. The openings will be provided with shutters and weather hoods. All required exhaust piping and intake and exhaust plenums required for the manufacturer's recommended air flow shall be included as part of the installed equipment. All openings in the shelter structure for the provision of entry or exit of cables, equipment, ventilation, etc., must be sealed to prevent the invasion of the shelter interior by insects, rodents and external moisture.
7. Electric baseboard heater strips shall supply heating for all shelters, including the generator rooms of double room shelters. Thermostats mounted on a wall opposite each heater shall control these heaters. The heaters will be sufficient for the size of the equipment shelter to maintain a room temperature of 72 degrees F.
8. Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have an R-19 (minimum) rating.
9. Concrete Construction – The wall outer finish will be natural stone aggregate finish with an aesthetically pleasing earth tone.
10. Each foundation shall be comprised of concrete pad with steel reinforcement. The foundations shall level each shelter such that all foundation-to-shelter contact points have equal loads. The equipment shelter is to rest flush on the paved concrete foundation without showing any gaps between shelter and pad and to be level to

within ½ degree. The shelter shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the shelter. Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.

11. The minimum floor loading design will be 300 lbs. per square foot  
The minimum roof loading design will be 100 lbs. per square foot  
The minimum wall loading design will be 34 lbs. per square foot  
The minimum wind loading design will be 50 lbs. per square foot
12. Two reinforced steel finished doors shall be located on each shelter, per the attached drawings. The doors will be finished to match the appearance of the shelter. The doors shall be pre-hung, gasket sealed, insulated, approximately three foot by seven foot, and in a metal frame. Door will be supplied with door-closer, magnetic weather stripping, drip strip over door, doorstop, door sweep and a 42-inch door canopy. Door checks and door stops shall be provided along with a three point locking system for maximum security. The doors will have non-removable ball bearing hinges and deadbolt locks with tamper plates installed.
13. The equipment shelter floor shall be covered with 1/8 inch, 12 inches x 12 inches vinyl tile, light in color (beige, tan or white). The walls will be trimmed with a 4 foot high X 1/8 in. rubber base trim against the floor.
14. The walls will be covered with a minimum of white wood-grained paneling or white vinyl over ½ inch plywood. There will be a telephone mounting board of ¾ inch x 4 foot X 8 foot plywood installed at one end of the equipment shelter that is painted to match the walls.
15. The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five foot intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be installed 18 inches above finished floor. Horizontal runs of conduit will be installed a minimum of 7-1/2 feet above the floor whenever possible with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall. Two weatherproof outlets will be installed on the exterior of the shelter. These outlets are to be located at both ends of the shelter. In addition, circuits supplying power to the equipment racks in shelters shall extend downward six feet from boxes mounted at 22” intervals on the ceiling. Wiring for these drops shall be housed in “Sealtite” flexible conduit and each drop shall be terminated in a quad receptacle box. Each circuit drop shall have its own dedicated twenty ampere circuit breaker. These drops shall be planned to fall immediately adjacent to the edge of the cable tray. The exact location for each drop must be confirmed with the Project Manager before the shelter is fabricated.
16. Power to the shelter shall be fed through a properly sized 120V/208V, single-phase disconnect switch mounted on the exterior wall of the shelter.
17. The equipment shelter equipped with the 75KW standby generator is to be provided with one 400-amp, 20-position (minimum) load center, equipped with a minimum of twenty (20) 20-amp breakers. Breakers shall be “high magnetic” or high inrush current type (Square D, HM or equivalent). This box shall be installed at one end of



the equipment area within five feet of the primary cable entry port. The shelter will be provided with a 400-Amp load center, and a 200-Amp sub feed panel shall be installed adjacent to, and fed from, the main service panel to provide electrical feed to the second one-piece equipment shelter.

18. An interior system ground (halo) with a single #2 AWG stranded wire will be provided with proper connections to the shelter and, in turn, to the tower ground system. The halo will have a 6-inch break roughly opposite the Master Ground Bar. The halo's 6-inch break will not be bridged by any installed metal conduits. The internal ground system will be mounted on the wall using 2-inch standoff insulators, connected to one (-1) ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar that is installed directly under the main cable entry port. The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system. These copper ground bars will be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One 10-foot (minimum) solid copper grounding rod (provided by the shelter contractor) shall be driven into the ground soil and subsurface directly under the cable entry port of the shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system. A minimum of two 2-inch copper strapping shall be used for the exterior ground connection. All exterior connections shall be exothermically welded to ensure proper connection. Electrical ground will be bonded to the RF ground.
19. An IEEE Type 1 SAD/MOV protection device will be installed across the main utility service entry. An IEEE Type 2 MOV protection device will be installed at the main power input inside the shelter, by means of a 60-Ampere fused breaker, across the utility lugs of the transfer switch. The devices will be installed inside the equipment shelter.
20. 48-inch, two or four-tube, fluorescent fixtures shall provide sufficient lighting (minimum 50-foot candles) for the shelters. The lights shall be controlled by a wall switch internal to the shelter, and located at the entry door. See Attachment J for details concerning number and arrangement of fixtures. An exterior entry light shall be installed outside the doorways of the structure. This light shall be controlled by a photocell wired through a wall switch inside the shelter.
21. The shelters shall be pre-wired, with the following functions, to a common point in the radio compartment and terminated with a "66 Block":
  - ◆ High Temperature Alarm – Adjustable for over-temperature alert (may be integrated with HVAC system).
  - ◆ Low Temperature Alarm – Adjustable for under-temperature alert (may be integrated with HVAC system).
  - ◆ Generator Alarm – Output when generator is running.
  - ◆ Entry/Intrusion – Output when either door is opened

◆ Fire and Smoke Alarm

22. The two-room equipment shelter shall have a partition wall separating the emergency generator from the room containing the RF equipment. This partition wall shall have a one hour fire rating (from the inside out and outside in). The floor under this section shall be reinforced to handle additional loading. Two intake louvers and one exhaust fan with gravity louvers shall be installed. The powered louvers will default to a closed position in the event of a complete power failure. All louvers and openings will be wire covered for security and prevention of entry by rodents. A separate outside door shall be installed on this room and shall be identical to the equipment room door.
23. The lighting for this room shall be controlled by a separate wall switch internal to the room and located next to the entry door.
24. The standby generator supplied with the two-piece equipment shelter shall be one (1) 75 Kilowatt liquid propane vapor fueled, 1800-RPM generator, 94 kVA, 60 Hz, 120/240 volt, single phase with a properly sized Automatic Transfer Switch. The contractor will provide a new and unused, purchased and not leased, above ground 1,000-gallon fuel tank filled to rated capacity (liquid propane only).
25. Installation shall include all materials, parts, labor, etc., to provide a fully functional generator back-up system. Included in the installed price is the transfer switch and all associated wiring. Block heaters with necessary wiring are to be included. Fuel tank hookup, fuel tank, fuel tank pad and fuel supply piping to the shelter is to be provided by the site work contractor.
26. Fuel strainers on the propane fuel systems must be installed for proper drainage to prevent moisture buildup in the line. Proper sized flex fuel lines needs to be installed on all generators and the fuel line so as to not impede the proper flow of fuel and must not be sharply bent, or crimped. Proper venting of the fuel system must be installed to ensure no buildup of pressure and safe venting will occur. Fuel lines run in conduit or sleeves must be sealed from moisture. Proper battery chargers must be installed for the appropriate system, either 12 VDC or 24 VDC, 110 VAC. Note: two (2) 12 VDC battery chargers is not acceptable on 24-volt systems.
27. The TO Contractor must perform on-site startup of the generator under full load.
28. All alarm outputs from the generator are to be extended to the radio compartment of the shelter and terminated in a "66 block".
29. All wiring for the generator must be routed overhead. It is unacceptable to cross the floor with conduits.
30. An external ¼-inch x 4 inches x 20 inches, 27 hole copper ground bar is to be installed on the outside of the shelter directly under the main cable entry port and attached with two, solid tinned copper, two-inch ground straps, to the single ground point directly below the main cable entry port.
31. An external ground ring is to be provided around the shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches

below the earth's surface with ground rods driven into the earth at intervals not to exceed twice the ground rod length. In the event ten-foot ground rods cannot be driven shorter rods are acceptable if driven at the proper intervals. The external ground ring is to be placed two feet outside the shelter footprint in order to be outside the drip line of the shelter.

32. All grounds must be bonded together. This includes the generator, the shelter, the fuel tank, the fencing, the equipment shelter grounding system and the tower. The ground test reading must not exceed five OHMS. The State shall test all grounds using a fall-of-potential method test to determine compliance. In the event five Ohms cannot be reached by reasonable means and through no fault of the TO Contractor, the State will determine the course of action to be taken by the TO Contractor at an additional cost to the State. Grounds must test fewer than 25 OHMS for the site to be acceptable for reasons of personal safety.

D. Specifications for Installation

1. Purchase and installation of one fully functional, 450 foot above ground level, three legged, heavy duty, self-supporting, two-way microwave radio tower.
2. TO Contractor is to assume normal soil conditions.
3. Installation of the tower shall include placing a foundation which is certified signed and stamped by a Maryland registered Professional Engineer (**certification must be provided with the response to the bid**) that it is designed in accordance with the tower manufacturer's recommendations based upon the soil borings provided by the State, erecting the tower, supplying and mounting 24 inch cable ladders or wave guide stacker system on two faces of the tower (each must accommodate at least 15-3/4 inch snap-ins), and supplying and installing two nominal 24 inches wide by 20 foot long extruded metal, 4 post, no cantilever ice bridges from the tower to the equipment shelter cable entry ports. The ice bridges will be electrically insulated from the tower.
4. The tower shall be erected to a height of 450 foot (AGL) above ground in such a manner as to assure straightness and plumb. The top 60 foot (minimum) of the 450 foot tower shall contain no slope.
5. The TO Contractor shall purchase and install one FAA approved, medium intensity, dual tower lighting system.
6. The TO Contractor shall install the following lightning protection:
  - a. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board.
  - b. An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch.
7. Purchase and installation of two equipment shelters: one two-room 12 x 38 x 10 foot concrete equipment shelter (height is inside dimension) with a 75 KW standby generator and one one-room 12 x38 x10 ft concrete equipment shelter without a

standby generator. The equipment shelters are to rest flush on the poured concrete foundations without showing any gaps between equipment shelters and pads and leveled to within ½ degrees.

8. Purchase and installation of one new 1,000 gallon LP propane fuel tank with hookup to the generator and shall include first propane fill-up.
9. Provision and installation of a liquid cooled, 1800 RPM, 94KVA, 60 hertz, 75 KW liquid propane vapor fueled generator complete with a 400-Amp automatic transfer switch capable of zero crossover switching to eliminate service interruptions.
10. Generator start-up and test under load after permanent power is connected to the equipment shelter.
11. Purchase and install one nominal 20 foot, 24-inch wide, 4-post, no cantilever ice bridge.
12. Purchase and installation of three four-inch PVC conduits for electrical service, each approximately 60 feet long, between the electric company demarcation point and the Contractor supplied backboard and from the backboard into the equipment shelter. Contractor shall purchase and install one electric company meter face.

PRICE SHEET  
EXAMPLE TASK ORDER # 3

450-FT SELF SUPPORTING TOWER AND  
TWO 12X38X10-FT SHELTERS

PROJECT LINE ITEM

PRICE

**A: SITE**

1. Clearing and grading of one 100ft x 100ft area	Medium Clearing (Does not include removing large trees and stumps) \$12,500.00
2. Purchase and installation of one tower foundation for one 450-ft tower	Assume Pad and Pier (Approx 380 cu yd) \$395,000.00
3. Purchase and installation of one 4 ft x 20 ft concrete foundation to install one 1,000 gallon liquid propane fuel tank	\$1,950.00
4. Purchase and installation of two 12 ft x 38 ft concrete foundations to install two 12x38x10-ft concrete equipment shelters	\$31,750.00
5. Site restoration, grading, grubbing, reseeding, installation of storm water management	\$450.00
6. Purchase and installation of temporary storm-water management and soil erosion measures during construction	\$900.00

<div style="border: 2px solid black; padding: 5px; display: inline-block;"><b>B: INSTALLATION</b></div>	
7. Purchase, shipping and erection of one fully functional, 450-ft self supporting tower	Includes crane for tower erection \$460,000.00
8. Purchase and installation of one medium intensity, dual mode, FAA approved tower lighting system	Included in item 7
9. Purchase, shipping and installation of one two-room 12x38x10-ft concrete equipment shelter (height is inside dimension) with a 75KW standby generator	Includes crane for offload and setup: \$228,000.00
10. Purchase, shipping and installation of one one-room 12x38x10-ft concrete equipment shelter (height is inside dimension) without a standby generator	Includes crane for offload and setup: \$165,000.00
11. Purchase and installation of one new 1,000 gallon liquid propane fuel tank including first fuel fill-up	\$9,000.00
12. Generator start up test under full load	\$350.00
13. Purchase and installation of one nominal 20-foot, 24-inch wide, four-post, no cantilever ice bridge from the equipment shelter to the tower.	\$1,750.00
14. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel of the standby generator equipped shelter	Included in item 9 Included in item 10
15. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the standby generator equipped shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch	Included in item 9

<p>16. Purchase and install a ten foot high-galvanized chain link fence, with a ten foot wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 foot long by 100 foot wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.</p>	<p style="text-align: right;">\$ 23,750.00</p>
<p>17. Purchase and installation of three four inch PVC conduits, each approximately 60 feet long, between the electric company demarcation point and a Contractor supplied backboard and from the backboard into the equipment shelter, and the purchase and installation of one electric company meter face.</p>	<p>Includes 120 / 240 volt, 400 amp, single-phasemeter pedestal &amp; hookup for electrical service by the local utility; Supply and install three gang single phase 400 Amp meter base of Ring type with no Bypass, OH/UG, 4 Terminal, No Sealing Ring on existing utility rack; H-Frame; Underground conduit and service for 60'</p> <p style="text-align: right;">\$16,500.00</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content; margin: auto;"> <p><b>TOTAL PRICE TASK ORDER #3 (TOTAL ITEM 1 THROUGH 17)</b></p> </div>	<p style="text-align: right;">\$1,346,900.00</p>

## Example of Task Order # 4

Monopole Tower 75-ft AGL and  
12 X 28 X 10-FT Equipment Shelter

### SCOPE OF SERVICES AND SPECIFICATIONS

The TO Contractor shall provide all coordination, functions, labor, materials, insurance and purchase items required to install a fully functional microwave and wireless communications site in accordance with the following specifications:

#### A. Site preparation work

1. Clearing and grading of approximately 60 foot x 60ft. area.
2. Purchase and installation of a monopole tower foundation.
3. Purchase and installation of one one-room 12 foot x 28 foot equipment shelter foundation as per equipment shelter manufacturer supplied specifications. The supply and installation of the equipment shelter and foundation shall include: the construction of one concrete foundation with integrated continuous stoops for the doors, designed to support one 12x28x10 foot concrete equipment shelter (height is inside dimension). The equipment shelter foundation shall be provided at the same time as the tower foundation.
4. Upon completion of tower installation, the TO Contractor shall re-grade and install storm-water management, grub the entire site extending two foot below finished grade and two foot around the perimeter of the fence line; install filter cloth and defoliant and cover the entire site with crusher/run. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
5. The TO Contractor shall provide and install a ten foot high-galvanized chain link fence, with a ten (10) foot wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 60 foot long by 60 foot wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.
6. The TO Contractor shall install temporary storm-water management measures during the construction. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
7. The TO Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.
8. The TO Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than four inches.

#### B. Tower Specifications



1. The monopole tower shall be galvanized and constructed of high-strength steel. All components and hardware are to be hot-dip galvanized with a zinc coating (per EIA standards) after fabrication. A zinc coating shall be permanently fused to the steel, both inside and outside, so all surfaces are protected and no painting is required for rust protection. Upon delivery, the tower shall be subject to approval by the State Project Manager and the State Program Manager.
2. Supplied materials, including, but not limited to, equipment shelter and tower, shall be new, unused and shall meet the latest design and fabrication standards of the Electronics Industry Association (EIA). The tower shall have a safety climbing cable installed. All supplied materials shall be purchased, not leased.
3. The TO Contractor with the State Project Manager shall coordinate exact placement of the monopole tower and shelter.
4. The monopole tower shall be required to meet or **exceed** the latest EIA 222-G standards for this type of tower with the State supplied loading design. The monopole tower and associated installation shall conform to all local, County, State and Federal equipment shelter codes. The State of Maryland shall be responsible for obtaining Federal Aviation Administration (FAA) approval and permits.
5. Proper and thorough grounding methods shall be employed to provide maximum lightning protection.
6. The TO Contractor shall use soil borings supplied by the State for analysis to assure that the engineered tower foundation and the calculated ground loadings are acceptable. The TO Contractor shall furnish one copy of the foundation designs and the ground loading calculations certified by a Maryland registered Professional Engineer (P.E.) to the State Project Manager and one copy to Maryland State Department of Budget & Management at the address identified in paragraph 33.2 of the contract, attachment A. The TO Contractor shall furnish a statement that the engineered monopole tower foundation and the calculated ground loadings meet the manufacturer's recommended requirements.
7. Step bolts and safety climbs are to be provided as part of the monopole tower.
8. Concrete strengths to equal 3000 PSI at 28 days.
9. Non-chloride, non-corrosive concrete set accelerate may be utilized in compliance with ASTM-C-494 type C and ACI-318.
10. Water reducing admixture may be utilized in compliance with ASTM-C-494.
11. All admixtures should be dispensed into fresh concrete and sufficiently mixed. All admixtures must be added separately.
12. Minimum concrete cover of three inches on all steel.
13. Crown top of piers for drainage and chamfer all exposed concrete edges one inch.
14. Compact backfill in nine inch lifts. Remove all forms prior to backfill.

C. Specifications for Equipment Shelter

1. Shelter installation must be in conformance with manufacturer's requirements for application of warranties provided by the manufacturer.
2. The equipment shelter shall be a one-piece, one-room concrete communications equipment shelter supplied without a standby generator. The equipment shelter shall have a 200 Amp. Service Panel included. The supplied equipment shelter shall be nominally sized 12 foot x 28 foot x 10 foot (Height is inside dimension).
3. Two cable entry points complete with weatherproof caps shall be provided for antenna cable entry. One entry point will be located on the long side of the equipment shelter and the second entry point will be located on the end wall of the equipment shelter between the air conditioner units. Each port within both assemblies shall be four inches in diameter, and shall be located with the top of the assembly located directly under the cable rack, in four rows of four ports each. In addition to the cable entry points, one single four inch PVC conduit sleeve for communications conduits, with temporary end cap shall be installed. The actual location of this penetration and sleeve must be confirmed with the Project Manager prior to the fabrication of the shelter.
4. Cable ladders (24 inches wide) shall be mounted eight feet above the floor, measured from the floor to the middle of the bottom of the cable ladder.
5. Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with 5-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter will be supplied with a 16" exhaust fan and hood and a 16" intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. Each unit shall contain a time delay startup relay, low ambient control, and a forced air resistive heat strip. The outside portions of the units will be weather/rodent and tamper proof.
6. The shelter shall be equipped with 16-inch ventilation fans with gravity operated back draft louvers and 16-inch gravity intake damper with filter and hood (bug and rodent intrusion resistant). Each fan shall be connected to a thermostatic device to allow automatic fan on-off control. The openings will be provided with shutters and weather hoods. All required exhaust piping and intake and exhaust plenums required for the manufacturer's recommended air flow shall be included as part of the installed equipment. All openings in the shelter structure for the provision of entry or exit of cables, equipment, ventilation, etc., must be sealed to prevent the invasion of the shelter interior by insects, rodents and external moisture.
7. Electric baseboard heater strips shall supply heating for the shelter. Thermostats mounted on a wall opposite each heater shall control these heaters. The heaters will be sufficient for the size of the equipment shelter to maintain a room temperature of 72 degrees F.

8. Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have an R-19 (minimum) rating.
9. Concrete construction – The wall outer finish will be natural stone aggregate finish with an aesthetically pleasing earth tone.
10. The equipment shelter foundation shall be comprised of concrete pad with steel reinforcement. The foundation shall level the shelter such that all foundation-to-shelter contact points have equal loads. The equipment shelter is to rest flush on the paved concrete foundation without showing any gaps between shelter and pad and to be level to within ½ degree. The shelter shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the shelter. Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.
11. The minimum floor loading design will be 300 lbs. per square foot  
The minimum roof loading design will be 100 lbs. per square foot  
The minimum wall loading design will be 34 lbs. per square foot  
The minimum wind loading design will be 50 lbs. per square foot
12. The shelter shall have one reinforced steel finished door. The door will be finished to match the appearance of the shelter. The door shall be pre-hung, gasket sealed, insulated, approximately three foot by seven foot, and in a metal frame. Door shall be supplied with door-closer, magnetic weather stripping, drip strip over door, doorstop, door sweep and a 42-inch door canopy. Door checks and door stops shall be provided along with a three point locking system for maximum security. The door will have non-removable ball bearing hinges and deadbolt locks with tamper plates installed.
13. The equipment shelter floor shall be covered with 1/8 inch, 12 inches x 12 inches vinyl tile, light in color (beige, tan or white). The walls will be trimmed with a 4 foot high X 1/8 in. rubber base trim against the floor.
14. The walls will be covered with a minimum of white wood-grained paneling or white vinyl over ½ inch plywood. There will be a telephone mounting board of ¾ inch x four foot X eight foot plywood installed at one end of the equipment shelter that is painted to match the walls.
15. The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five foot intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be installed 18 inches above finished floor. Horizontal runs of conduit will be installed a minimum of 7-1/2 feet above the floor whenever possible with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall. Two weatherproof outlets will be installed on the exterior of the shelter. These outlets are to be located at both ends of the shelter. In addition, circuits supplying power to the equipment racks in shelters shall extend downward six feet from boxes mounted at 22” intervals on the ceiling. Wiring for these drops shall be housed in “Sealtite” flexible conduit and each drop shall be terminated in a quad receptacle

box. Each circuit drop shall have its own dedicated twenty ampere circuit breaker. These drops shall be planned to fall immediately adjacent to the edge of the cable tray. The exact location for each drop must be confirmed with the Project Manager before the shelter is fabricated.

16. Power to the shelter shall be fed through a properly sized 120V/208V, single-phase disconnect switch mounted on the exterior wall of the shelter.
17. Shelter is to be provided with 200-Amp, 20-position (minimum) load center, equipped with a minimum of 20 20-amp breakers. Breakers shall be “high magnetic” or high inrush current type (Square D, HM or equivalent). This box shall be installed at one end of the equipment area within five feet of the primary cable entry port. The shelter will be provided with a 200-Amp load center.
18. An interior system ground (halo) with a single #2 AWG stranded wire will be provided with proper connections to the shelter and, in turn, to the tower ground system. The halo will have a 6-inch break roughly opposite the Master Ground Bar. The halo’s 6-inch break will not be bridged by any installed metal conduits. The internal ground system will be mounted on the wall using 2-inch standoff insulators, connected to one ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar that is installed directly under the main cable entry port. The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system. These copper ground bars will be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One 10-foot (minimum) solid copper grounding rod (provided by the shelter contractor) shall be driven into the ground soil and subsurface directly under the cable entry port of the shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system. A minimum of two 2-inch copper strapping shall be used for the exterior ground connection. All exterior connections shall be exothermically welded to ensure proper connection. Electrical ground will be bonded to the RF ground.
19. An IEEE Type 1 SAD/MOV protection device will be installed across the main utility service entry. An IEEE Type 2 MOV protection device will be installed at the main power input inside the shelter, by means of a 60-Ampere fused breaker, across the utility lugs of the transfer switch. The devices will be installed inside the equipment shelter.
20. 48-inch, two or four-tube, fluorescent fixtures shall provide sufficient lighting (minimum 50-foot candles) for the shelters. The lights shall be controlled by a wall switch internal to the shelter, and located at the entry door. An exterior entry light shall be installed outside the doorways of the structure. This light shall be controlled by a photocell wired through a wall switch inside the shelter.
21. The shelter shall be pre-wired, with the following functions, to a common point in the radio compartment and terminated with a “66 Block”:
  - ◆ High Temperature Alarm – Adjustable for over-temperature alert (may be integrated with HVAC system).

- ◆ Low Temperature Alarm – Adjustable for under-temperature alert (may be integrated with HVAC system).
  - ◆ Generator Alarm – Output when generator is running.
  - ◆ Entry/Intrusion – Output when either door is opened
  - ◆ Fire and Smoke Alarm
22. An external ¼-inch x 4 inches x 20 inches, 27 hole copper ground bar is to be installed on the outside of the shelter directly under the main cable entry port and attached with two, solid tinned copper, two-inch ground straps, to the single ground point directly below the main cable entry port.
23. An external ground ring is to be provided around the shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches below the earth’s surface with ground rods driven into the earth at intervals not to exceed twice the ground rod length. In the event 10-foot ground rods cannot be driven shorter rods are acceptable if driven at the proper intervals. The external ground ring is to be placed two feet outside the shelter footprint in order to be outside the drip line of the shelter.
24. All grounds must be bonded together. This includes the shelter, the fencing, the equipment shelter grounding system and the tower. The ground test reading must not exceed five OHMS. The State shall test all grounds using a fall-of-potential method test to determine compliance. In the event five Ohms cannot be reached by reasonable means and through no fault of the vendor, the State will determine the course of action to be taken by the vendor at an additional cost to the State. Grounds must test fewer than 25 OHMS for the site to be acceptable for reasons of personal safety.

D. Specifications for Installation

1. Purchase and installation of one fully functional, 75 foot above ground level, galvanized, heavy duty, monopole tower.
2. TO Contractor is to assume normal soil conditions.
3. Installation of the tower shall include placing a foundation which is certified signed and stamped by a Maryland registered Professional Engineer (**certification must be provided with the response to the bid**) that it is designed in accordance with the tower manufacturer’s recommendations based upon the soil borings provided by the State, erecting the tower, supplying and installing one nominal 24 inches wide by 20 foot long extruded metal, 4 post, no cantilever ice bridge from the tower to the equipment shelter cable entry ports. The ice bridge will be electrically insulated from the tower.
4. The tower shall be erected to a height of 75 foot (AGL) above ground in such a manner as to assure straightness and plumb.

5. The following lightning protection devices shall be installed:
  - a. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board.
  - b. An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch.
6. Purchase and installation of one 12 x 28 x 10 foot concrete equipment shelter (height is inside dimension) without a standby generator. The equipment shelter is to rest flush on the poured concrete foundation without showing any gaps between equipment shelter and pad and leveled to within ½ degrees.
7. Purchase and install one nominal 20 foot, 24-inch wide, 4-post, no cantilever ice bridge.
8. Purchase and installation of three 4-inch PVC conduits for electrical service, each approximately 60 feet long, between the electric company demarcation point and the Contractor supplied backboard and from the backboard into the equipment shelter. Contractor shall purchase and install one electric company meter face.

<div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: 60%;">           PRICE SHEET            EXAMPLE TASK ORDER #4             75-FT MONOPOLE AND            12X28X10 SHELTER         </div>		PRICE
PROJECT LINE ITEM		
<b>A: SITE</b>		
1. Clearing and grading of one 60 ft x 60 ft area	Medium Clearing (Does not include removing large trees and stumps)	\$4,750.00
2. Purchase and installation of one tower foundation for one (1) 75-ft monopole	Assumed spreadfooter (16 cu yd)	\$17,000.00

3. Purchase and installation of one 12 ft x 28 ft concrete foundation to install one 12x28x10-ft concrete equipment shelter	\$12,000.00
4. Site restoration, grading, grubbing, reseeded, installation of storm water management	\$450.00
5. Purchase and installation of temporary storm-water management and soil erosion measures during construction	\$600.00
<b>B: INSTALLATION</b>	
6. Purchase, shipping and erection of one fully functional, 75-ft monopole tower	Includes crane for tower stacking: \$44,000.00
7. Purchase, shipping and installation of one 12x28x10-ft concrete equipment shelter (height is inside dimension) without a standby generator	Includes crane for offload and setup: \$148,900.00
8. Purchase and installation of one nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridge from the equipment shelter to the tower.	\$1,750.00
9. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel	Included in item 7
10. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch	Included in item 7

<p>11 Purchase and install a ten foot high-galvanized chain link fence, with a ten foot wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 60 foot long by 60 foot wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.</p>	<p style="text-align: right;">\$14,250.00</p>
<p>12. Purchase and installation of three four inch PVC conduits, each approximately 60 feet long, between the electric company demarcation point and a Contractor supplied backboard and from the backboard into the equipment shelter, and the purchase and installation of one electric company meter face.</p>	<p>Includes 120 / 240 volt, 200 amp, single-phasemeter pedestal &amp; hookup for electrical service by the local utility; Supply and install three gang single phase 200 Amp meter base of Ring type with no Bypass, OH/UG, 4 Terminal, No Sealing Ring on existing utility rack; H-Frame; Underground conduit and service for 60'</p> <p style="text-align: right;">\$13,500.00</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content; margin: auto;"> <p><b>TOTAL PRICE TASK ORDER #4 (TOTAL ITEM 1 THROUGH 12)</b></p> </div>	<p style="text-align: right;">\$257,200.00</p>



## Example of Task order # 5

### Purchase and Installation of four Prefabricated Equipment Shelters

#### SCOPE OF SERVICES AND SPECIFICATIONS

The TO Contractor shall provide all coordination, shipping, functions, labor, materials, insurance and purchase items required to install three fully functional Microwave/Wireless Communications equipment shelters at three different tower sites in Harford County. The equipment shelter supplied shall have the following size/configuration:

One 12 foot X 28 foot X 10 foot (height is inside dimension) – No standby generator  
One 12 foot X 38 foot X 10 foot (height is inside dimension) – No standby generator  
One 12 foot X 38 foot X 10 foot (height is inside dimension) with 75 kW standby generator, in accordance with the following specifications:

#### A. Site Preparation Work:

1. Clearing and grading of three areas, each approximately 15 ft x 41 foot
2. Purchase and installation of one four foot x 20 foot concrete fuel tank foundation.
3. Purchase and installation of one 12 foot X 28 foot and two 12 foot x 38 foot concrete equipment shelter foundations per manufacturer's specifications.
4. The supply and installation of each shelter foundation shall include construction of integrated continuous stoops for the doors.
5. Upon completion of shelter installation, the TO Contractor shall re-grade, re-grub, re-seed and install storm-water management, in order to restore each site to its original condition.
6. TO Contractor shall extend the existing fence line to include the new equipment shelter and fuel tank.
7. TO Contractor shall install temporary storm-water management and soil erosion measures during construction at each site.
8. Disposition of any spoils from each site shall be approved by the State Project Field Engineer prior to its removal.
9. TO Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.
10. TO Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than 4 inches.

B. Installation work required at each site:

1. Purchase and installation of either one 12 foot X 28 foot X 10 foot, one 12 foot X 38 foot X 10 foot without generator or one 12 foot X 38 foot X 10 foot with 75 kW standby generator.
2. TO Contractor is to assume normal soil conditions.
3. The equipment shelters are to rest flush on the poured concrete foundation without showing any gaps between equipment shelter and pad and leveled to within ½ degree;
4. Purchase and install one nominal 20-foot, 24-inch wide, four post, no cantilever ice bridge at each site;
5. The following lightning protection shall be installed at each site:
  - a. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board;
  - b. An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch;
6. Purchase and install equipment shelter grounding at each site and connect the equipment shelter grounding ring and fuel tank grounding ring to the existing tower/site grounding in accordance with the most recently published Motorola R-56 guidelines (98R82904Y01-O); the Contractor shall perform ground resistance readings prior to, and after, installation of the building grounding. Resistance readings may not increase from the initial reading after ground system work is completed.
7. The purchase and installation of three four inch Schedule 80 conduits each approximately 50-feet long to provide for electrical service from the existing backboard service meter into each shelter, and the purchase and installation of an electrical company's meter face at each of the sites.

C. Prefabricated equipment shelters general specifications:

SIZE

12 foot X 28 foot X 10 foot (height is inside dimension) – no generator  
12 foot X 38 foot X 10 foot (height is inside dimension) – no generator  
12 ft X 38 foot X 10 foot (height is inside dimension) – with 75 kW standby generator

**Note: The shelter wall thickness and strength shall comply with Motorola's R56 requirements for equipment shelters.**

12 foot X 28 foot X 10 foot – input 200A – S. Panel: 200A  
12 foot X 38 foot X 10 foot – input 400A – S. Panel: 200A – Sub-feed: 200A

12 foot X 38 foot X 10 foot – input 400A – S. Panel: 200A – Sub-feed: 200A

### CABLE ENTRY PORTS

Two-cable entry ports shall be provided, a main, located with the top of the assembly located directly under the cable rack near the Master Grounding Bar and one for future use, located between the two air conditioning units. Each port shall be four inches in diameter and have four rows of four ports each for a total of 16 ports.

### CABLE LADDERS

**Cable ladders, 24-inches wide, shall be mounted eight feet above the floor, measured from the floor to the bottom of the cable ladder, and shall be oriented as shown in the supplied equipment shelter drawing.**

### AIR CONDITIONING

Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with 5-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter shall be supplied with a 16” exhaust fan and hood and a 16” intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. The provided HVAC units shall have sufficient capacity for the equipment shelter size supplied, fully loaded with equipment. Each unit shall contain a time delay startup relay, low ambient control, and a forced air resistive heat strip. The outside portions of the units shall be weather/rodent and tamper proof.

### VENTILATION

All equipment shelters shall be equipped with an exhaust fan with gravity flow back draft louvers and screened rain hood, intake damper with screened and filtered rain hood and thermostat. All required exhaust piping and intake and exhaust plenums required for the manufacturers recommended air flow shall be included as part of the installed equipment.

### INSULATION

Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have an R-19 (minimum) rating.

### FINISH

Concrete construction. The outer finish shall be a natural stone aggregate finish with an aesthetically pleasing earth tone.

### FOUNDATIONS

Each foundation shall be comprised of a concrete pad with steel reinforcement. The foundations shall level the provided equipment shelter such that all foundation-to-equipment shelter contact points have equal loads. There shall be no twisting moment to the final, level structures. The shelter provided shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the equipment shelter.

Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.

### FLOOR LOADING

The minimum floor loading design shall be 300 lbs. per square foot (PSF).

### ENTRY DOORS

The 12 foot X 38 foot X 10 foot equipment shelters shall have two entry doors. The doors shall be 1-3/4 inch thick, made have reinforced 18-gage steel and have an approximate 3 feet x 7 feet size. The door shall be finished to match the appearance of the equipment shelter. The door shall be pre-hung in a metal frame, gasket sealed and insulated. Door shall be supplied with: Door-closer, magnetic weather stripping, drip-strip over door, doorstop, door-sweep and 42-inch door-canopy. The door shall be provided with a 3-point locking system for maximum security. The door shall have non-removable, fully mortised ball bearing hinges and a standard duty single deadbolt lock with a tamper plate installed.

### ELECTRICAL

The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five feet intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be equally spaced. Outlets shall be installed 18 inches above finished floor. Horizontal runs of conduit shall be installed a minimum of 7-1/2 feet above the floor (whenever possible) with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall.

Two weatherproof duplex outlets as shown on each equipment shelter drawing shall be installed on the exterior of the equipment shelters, located between the air conditioners on the end of the equipment shelter.

In addition, 2 circuits supplying power to the microwave equipment rack in the equipment shelter shall extend downward six feet from "Sealtite" boxes mounted at 22 inch intervals on the ceiling as shown in the supplied Attachment K (shelter layout drawing). Wiring for these circuits shall be housed in "Sealtite" flexible conduit and the drop shall be terminated in a quad-receptacle box. Each circuit drop shall have its own dedicated 20 Amp circuit breaker. This drop shall be planned to fall immediately adjacent to the edge of the cable tray.

Power to the equipment shelter shall be 200-Amp or 400-Amp, 120/240 Volt, single-phase to a fuse-protected safety switch mounted on the exterior of the equipment shelter.

A 200 Amp or 400 Amp, 40-position load center shall be provided. The equipment shelters supplied with a 400 Amp load center shall have one 200 Amp Sub-feed panel and one 150-amp breaker for UPS service installed. Breakers shall be "high magnetic" or high inrush current type. ("Square D" or equivalent). The load center shall be installed at one end of the equipment area. Commercial load center and UPS load centers shall share this space. An IEEE Type 1 SAD/MOV surge suppression device shall be installed across the main utility panel, and an IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter by means of a fused 60A breaker, across the utility lugs of the Automatic transfer switch (ATS).

## UPS

The uninterruptible power supply (UPS) electrical installation and wiring shall conform to the latest version of the National Electrical Code and Motorola R56 Standards and Guidelines for Communication Sites. A 150 Amp, 48-position UPS load center shall be provided. Breakers shall be “high magnetic” or high inrush current type. (“Square D” or equivalent). The UPS load centers shall be located in close proximity to the commercial load center. An IEEE Type 1 SAD/MOV surge suppression device shall be installed across the UPS load center. The UPS circuits shall each have its own dedicated individual 3-wire branch circuit.

The equipment shelters shall have UPS wiring dropped above the cable trays using drop down flex conduit. Refer to the Attachment K (shelter layout drawing).

The row nearest the entrance door is designated as row 1.

The adjacent rows of racks are designated as 2, 3 and 4 from left to right. The rack position for each row is designate as rack 1, closest to the wall containing the waveguide port, through rack 4, closest to the entry door.

The circuits supplying UPS power to the equipment racks in the equipment shelter shall extend downward 2 1/2 feet from boxes mounted at 22 inch intervals on the ceiling as shown in the supplied Attachment K (shelter layout drawing). Wiring for these simplex circuits shall be housed in “sealtite” flexible conduit and each drop shall be tagged showing the associated circuit. Each 3-wire simplex circuit drop shall have its own dedicated 20-amp breaker. These drops shall be planned to fall center to the cable tray, beginning 22 inches off the back wall and mounted at 22-inch intervals.

Row 1 rack 4 shall have eight dropped circuits

Row 2 rack 1 shall have eight dropped circuits

Row 2 rack 2 shall have eight dropped circuits

Row 2 rack 3 shall have eight dropped circuits

Row 2 rack 4 shall have two dropped circuits

Row 3 rack 1 shall have one dropped circuits

Row 3 rack 2 shall have one dropped circuits

Row 3 rack 3 shall have five dropped circuits

Row 3 rack 4 shall have five dropped circuits

Row 4 rack 1 shall have one dropped circuits

Row 4 rack 2 shall have one dropped circuits

Row 4 rack 3 shall have zero dropped circuits

Row 4 rack 4 shall have zero dropped circuits

## LIGHTING

Energy-efficient equivalent to seven 48-inch, 40 Watt, four-tube fluorescent fixtures shall provide lighting inside the equipment shelter; five inside the radio compartment and two inside the generator compartment. The lights shall be controlled by a wall switch internal to the equipment shelter, and located near the entry door.

Energy-efficient equivalent to a 100-watt incandescent entry light shall be installed outside each doorway of the equipment shelter. The light shall be controlled by a photocell.

## ALARMS

The equipment shelter shall be pre-wired with the following functions, to a common point in the electronic equipment and terminated with a “type 66 Block” located on a 4 x 8 foot sheet of plywood provided for wiring terminations.

- High Temperature Alarm
- Low Temperature Alarm
- Generator Alarm
- Entry/Intrusion Alarm
- Fire and Smoke Alarm
- UPS Alarms

## GENERATOR

The generator supplied with the 12 foot X 38 foot X 10 foot equipment shelter shall be a 75 kW, 94 KVA, 1800RPM, 60 hertz, liquid cooled, single phase, liquid propane vapor fueled generator with full metering and a 400 Amp automatic transfer switch installed.

## GROUNDING AND LIGHTNING PROTECTION

All grounding shall conform to Motorola R-56 Guidelines.

An interior system ground (halo) with a single bare #2 AWG stranded wire shall be provided with proper connections to the equipment shelter and, in turn, to the tower ground system. The halo shall have a 6-inch break roughly opposite a Master Ground Bar (MGB). The internal ground system shall be mounted on the wall using 2” standoff insulators, connected to one ¼” x 4” x 20”, 27 hole copper Master Ground Bus Bar installed directly under the main cable entry port. The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system. These copper ground bars shall be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One, 10 feet long (minimum) solid copper grounding rod (provided by the contractor) shall be driven into the ground soil and subsurface directly under the main cable entry port of the equipment shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system. A minimum #2 AWG solid tinned copper wire or 2-inch copper strapping shall be used for each exterior ground connection. All exterior connections shall be cad-welded to ensure proper connection. The electrical ground shall be bonded to the RF ground. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board. An IEEE Type 2 MOV protection device shall be installed, by means of a 60A breaker, across the utility lugs of the disconnect switch if the main service enters the shelter.

One external ¼”x4”x20”, 27 hole copper ground bar shall be installed on the outside of the equipment shelter directly under the main cable entry port and attached with a single solid tinned copper #2 AWG wire to the single ground point directly below the main cable entry port.

An external ground ring is to be provided around the equipment shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches below the earth’s surface with ground rods driven into the earth at intervals not to exceed twice the

ground rod length. In the event 10-foot ground rods cannot be driven, shorter rods are acceptable if driven at the proper intervals.

All grounds must be bonded together. This includes the generator, the equipment shelter, the fuel tank, the equipment shelter grounding system and the tower. The ground test reading must not exceed 5 Ohms. The State shall test all grounds using a fall-of potential method test to determine compliance. In the event 5 Ohms cannot be reached, by reasonable means and no fault of the vendor, the State shall determine the course of action to be taken by the vendor at an additional cost to the State. Grounds must test fewer than 25 Ohms for the site to be acceptable for reasons of personal safety.

#### GENERAL

All openings to the exterior of the equipment shelter shall be properly sealed; covers used to cap unused cable entry port shall fit snugly (no cable ties). All exterior shrouds, fan louvers and air conditioning units shall be properly caulked to prevent moisture intrusion into the equipment shelter

**PRICE SHEET**  
**EXAMPLE TASK ORDER #5**  
**3 –PREFABRICATED CONCRETE**  
**EQUIPMENT SHELTERS**

PROJECT LINE ITEM

**PRICE**

**A: SITE**

1. a. Clearing and grading of one approximately 15foot x 41foot areas	\$825.00
1. b. Clearing and grading of two approximately 15foot x 41 foot areas	\$1,650.00
2. Purchase and installation of one 4 ft x 20 ft concrete foundation to install one 1,000 gallon liquid propane fuel tank	\$1,950.00
3. Purchase and installation of one 12 foot X 28 foot concrete foundation to install one 12 foot X 28 foot X 10 foot concrete equipment shelter	\$12,000.00
4.a.Purchase and installation of one 12 foot X 38 foot concrete foundation to install one 12 foot X 38 foot X 10 foot concrete equipment shelters.	\$15,850
4.b. Purchase Installation of two 12 foot X 38 foot concrete foundations to install two 12 foot X 38 foot X 10foot concrete equipment shelters.	\$31,700



5. Site restoration, grading, grubbing, reseeding, installation of storm water management for three construction sites	\$1500.00
6. Extension of the existing fence line to include the new equipment shelter and fuel tank	Assume bump out area to be (53': includes 10' from existing shelters plus 5' for generator hood and egress, x 32': includes 11' between LP tank and ignition source, x 53' = total linear feet: 138')  \$8,207.50
7. Purchase and installation of temporary storm-water management and soil erosion measures during construction for three construction sites	\$2,750.00
<b>B: INSTALLATION</b>	
8. Purchase, shipping and installation of one 12 foot X 28 foot X 10 foot concrete equipment shelter	\$12,000.00
9. Purchase, shipping and installation of one 12 foot X 38 foot X 10 foot concrete equipment shelter	\$15,800.00
10. Purchase, shipping and installation of one 12 foot X 38 foot X 10 foot concrete equipment shelter complete with one (1) 75 kW standby generator	Includes crane for offload and setup:  \$228,000.00
11. Purchase and installation of one new 1,000 gallon liquid propane fuel tank, including first fuel fill-up	\$9,000.00
12. Generator start up test under full load for one site	\$350.00
13. Purchase and installation of three nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridges from the equipment shelters to the tower.	\$5,350.00

14. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel of each equipment shelter	Included in item 10
15. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch of each equipment shelter	Included in item 10
16. Purchase and install grounding associated with the equipment shelter and fuel tank and connect to the existing tower/site grounding in accordance with the most recently published Motorola R-56 guidelines (98R82904Y01-O) - three construction sites	\$27,650.00
17. Purchase and installation of three 4-inch Schedule-80 conduits, each approximately 50 feet long, from the existing backboard into the equipment shelter at three different sites, and the purchase and installation of one electric company meter face at three construction sites.	Includes 120 / 240 volt, 400 amp, single-phasemeter pedestal & hookup for electrical service by the local utility; Supply and install three gang single phase 400 Amp meter base of Ring type with no Bypass, OH/UG, 4 Terminal, No Sealing Ring on existing utility rack; H-Frame; Underground conduit and service for 60'  \$14,600.00
<b>TOTAL PRICE TASK ORDER #5 (TOTAL ITEM 1 THROUGH 17)</b>	\$389,182.50

Submitted By:

Name of Offeror:

Address of Offeror:



Date:

Signature:



**PRICE PROPOSAL FORM F-C  
FUNCTIONAL AREA 14**

**Price Proposal Form 14-A  
Category 1 - Wireless Communication Antenna & Transmission Line  
Installation, Removal & Repair**

County(ies): ALL

1. Self-Supporting Tower:

	Fully-loaded Weight Hourly Crew	Factor	Rate
A. 000-200 Ft.	<u>\$551.00</u>	X .40	= <u>\$220.40</u>
B. 201-375 Ft.	<u>\$551.00</u>	X .40	= <u>\$220.40</u>
C. 376 Ft.+	<u>\$551.00</u>	X .20	= <u>\$110.20</u>
D. Total ( Add 1A+1B+1C =1D)			<u>\$551.00</u> (1D)

2. Guyed Tower:

	Fully-loaded Weight Hourly Crew	Factor	Rate
A. 000-200Ft.	<u>\$551.00</u>	X .60	= <u>\$330.60</u>
B. 201-375Ft.	<u>\$551.00</u>	X .10	= <u>\$55.10</u>
C. 376Ft. +	<u>\$551.00</u>	X .30	= <u>\$165.30</u>
D. Total (Add 2A+2B+2C =2D)			<u>\$551.00</u> (2D)

3. Monopole:

	Fully-loaded Weight Hourly Crew	Factor	Rate
A. 000-200Ft.	<u>\$551.00</u>	X .90	= <u>\$495.90</u>
B. 201Ft. +	<u>\$551.00</u>	X .10	= <u>\$55.80</u>
C. Total (3A+3B = 3C)			<u>\$551.00</u> (3C)

**4. Total (1D+2D+3C= 4A) \$1,653.00 (4A) CATEGORY 1**

**Price Proposal Form 14B**  
**Category 2 - Medium Intensity, Dual Tower Lighting System Installation - Per FAA Advisory**  
**Circular AC70/7460K**

County(ies): ALL

1. Self-Supporting Tower:

	Fully-loaded Weight Hourly Crew	Factor	Rate
A. FAA - E1 - Tower Height 201 - 350 Ft. <u>\$413.00</u>	X	.40	= <u>\$165.20</u>
B. FAA - E2 - Tower Height 351 - 500 Ft. <u>\$551.00</u>	X	.40	= <u>\$220.40</u>
C. FAA - F2 - Tower Height 501 - 700 Ft. <u>\$551.00</u>	X	.20	= <u>\$110.20</u>
D. Total (Add 1A+1B+1C =1D)			<u>\$495.80</u> (1D)

2. Guyed Tower:

	Fully-loaded Weight Hourly Crew	Factor	Rate
A. FAA - E1 - Tower Height 201 - 350 Ft. <u>\$413.00</u>	X	.40	= <u>\$165.20</u>
B. FAA - E2 - Tower Height 351 - 500 Ft. <u>\$551.00</u>	X	.40	= <u>\$220.40</u>
C. FAA - F2 - Tower Height 501 - 700 Ft. <u>\$551.00</u>	X	.20	= <u>\$110.20</u>
D. Total (Add 2A+2B+2C =2D)			<u>\$495.80</u> (2D)

**3. Total (1D+2D= 3A) \$991.60 (3A)**

**Price Proposal Form 14C  
Category 2 - Tower Lighting System Repair**

County(ies): ALL

***SCHEDULED WORK (Self-Supporting Tower Item 1)***

**1. Self-Supporting Tower (Hours Monday - Friday 7am to 7pm)**

	Fully-loaded Weight		
	Hourly Crew	Factor	Rate
A. FAA - E1 - Tower Height - 201 - 350 Ft.	\$413.00	X .40	= \$165.20
B. FAA - E2 - Tower Height - 351 - 500 Ft.	\$413.00	X .40	= \$165.20
C. FAA - F2 - Tower Height - 501 - 700 Ft.	\$413.00	X .20	= \$82.60
D. Total (Add 1A+1B+1C =1D)			\$413.00 (1D)

***UN-SCHEDULED EMERGENCY CALL OUT (Self-Supporting Tower Items 2, 3 and 4)***

**2. Self-Supporting Tower (Hours Monday - Friday 7am to 7pm )**

	Fully-loaded Weight		
	Hourly Crew	Factor	Rate
A. FAA - E1 - Tower Height - 201 - 350 Ft.	\$530.00	X .40	= \$212.00
B. FAA - E2 - Tower Height - 351 - 500 Ft.	\$530.00	X .40	= \$212.00
C. FAA - F2 - Tower Height - 501 - 700 Ft.	\$530.00	X .20	= \$106.00
D. Total (Add 2A+2B+2C =2D)			\$530.00 (2D)

**3. Self-Supporting Tower (Hours Monday - Friday 7pm to 7am)**

	Hourly Crew	Fully-loaded Weight Factor	Rate
A. FAA - E1 - Tower Height - 201 - 350 Ft.	\$530.00	X	.40 = \$212.00
B. FAA - E2 - Tower Height - 351 - 500 Ft.	\$530.00	X	.40 = \$212.00
C. FAA - F2 - Tower Height - 501 - 700 Ft.	\$530.00	X	.20 = \$106.00
D. Total (Add 3A+3B+3C =3D)			\$530.00 (3D)

**4. Self-Supporting Tower (Holidays and Weekends):**

	Hourly Crew	Fully-loaded Weight Factor	Rate
A. FAA - E1 - Tower Height - 201 - 350 Ft.	\$648.00	X	.40 = \$259.20
B. FAA - E2 - Tower Height - 351 - 500 Ft.	\$648.00	X	.40 = \$259.20
C. FAA - F2 - Tower Height - 501 - 700 Ft.	\$648.00	X	.20 = \$129.60
D. Total (Add 4A+4B+4C =4D)			\$648.00 (4D)

**SCHEDULED WORK (Guyed Tower Item 5)**

**5. Guyed Tower (Hours Monday - Friday 7am to 7pm):**

	Hourly Crew	Fully-loaded Weight Factor	Rate
A. FAA - E1 - Tower Height - 201 - 350 Ft.	\$530.00	X	.40 = \$212.00
B. FAA - E2 - Tower Height - 351 - 500 Ft.	\$530.00	X	.40 = \$212.00
C. FAA - F2 - Tower Height - 501 - 700 Ft.	\$530.00	X	.20 = \$106.00
D. Total (Add 5A+5B+5C =5D)			\$530.00 (5D)

**UN-SCHEDULED EMERGENCY CALL OUT (Guyed Tower Items 6, 7 and 8)**

**6. Guyed Tower (Hours Monday - Friday 7am to 7pm):**

	Fully-loaded Weight			
	Hourly Crew	Factor	Rate	
A. FAA - E1 - Tower Height - 201 - 350 Ft.	\$530.00	X	.40 =	\$212.00
B. FAA - E2 - Tower Height - 351 - 500 Ft.	\$530.00	X	.40 =	\$212.00
C. FAA - F2 - Tower Height - 501 - 700 Ft.	\$530.00	X	.20 =	\$106.00
D. Total (Add 6A+6B+6C =6D)				\$530.00 (6D)

**7. Guyed Tower (Hours Monday - Friday 7pm to 7am):**

	Fully-loaded Weight			
	Hourly Crew	Factor	Rate	
A. FAA - E1 - Tower Height - 201 - 350 Ft.	\$530.00	X	.40 =	\$212.00
B. FAA - E2 - Tower Height - 351 - 500 Ft.	\$530.00	X	.40 =	\$212.00
C. FAA - F2 - Tower Height - 501 - 700 Ft.	\$530.00	X	.20 =	\$106.00
D. Total (Add 7A+7B+7C =7D)				\$530.00 (7D)

**8. Guyed Tower (Holidays and Weekends):**

	Fully-loaded Weight			
	Hourly Crew	Factor	Rate	
A. FAA - E1 - Tower Height - 201 - 350 Ft.	\$648.00	X	.40 =	\$259.20
B. FAA - E2 - Tower Height - 351 - 500 Ft.	\$648.00	X	.40 =	\$259.20
C. FAA - F2 - Tower Height - 501 - 700 Ft.	\$648.00	X	.20 =	\$129.60
D. Total (Add 8A+8B+8C =8D)				\$648.00 (8D)

**9. Total (Add 1D+2D+3D+ 4D+ 5D+ 6D+7D+8D = 9A) \$4,359.00 (9A)**

**Price Proposal Form  
Category 2 - Tower Lighting**

County(ies): ALL

**1. Total From 14B (Line 3A) \$991.60**

**2. Total From 14C (Line 9A) \$4,359.00**

**3. Add 3A+9A= C3 \$5350.60 (C3) CATEGORY 2**



**Price Proposal Form 14E  
Tower Inspection**

County:(ies) ALL

1 Self-Supporting Tower Flat Fee:

	Fully Loaded Weight Flat Fee	Factor	Rate
A. 000-200 Ft.	<u>\$5471.00</u>	<u>X</u>	.50 = <u>\$2735.50</u>
B. 201-375 Ft.	<u>\$5471.00</u>	<u>X</u>	.40 = <u>\$2188.40</u>
C. 376 Ft.+	<u>\$5471.00</u>	<u>X</u>	.10 = <u>\$547.10</u>
D. Total (Add 1A+1B+1C =1D)			<u>\$5471.00</u> (1D)

2, Guyed Tower Flat Fee:

	Fully Loaded Weight Flat Fee	Factor	Rate
A. 000-200Ft.	<u>\$5471.00</u>	<u>X</u>	.40 = <u>\$2188.40</u>
B. 201-375Ft.	<u>\$5471.00</u>	<u>X</u>	.40 = <u>\$2188.40</u>
C. 376Ft. +	<u>\$5471.00</u>	<u>X</u>	.20 = <u>\$1094.20</u>
D. Total (Add 2A+2B+2C =2D)			<u>\$5471.00</u> (2D)

4. Monopole Flat Fee:

	Fully Loaded Weight Flat Fee	Factor	Rate
A. 000-200Ft.	<u>\$5471.00</u>	<u>X</u>	.90 = <u>\$4923.90</u>
B. 201Ft.+	<u>\$5471.00</u>	<u>X</u>	.10 = <u>\$547.10</u>
C. Total (3A+3B = 3C)			<u>\$5471.00</u> (3C)

**4. Total (1D+2D+3C = 4A) \$16,413.00 (4A) CATEGORY 3**

**Price Proposal Form 14F  
GENERATOR MAINTENANCE**

County(ies): ALL

Weight    Factor    Rate

SCHEDULED WORK

A. FULLY-LOADED HOURLY CREW RATE    \$95.00    X 94% = \$89.30 (A)  
(HOURS Monday-Friday 7am to 7pm)

EMERGENCY RATES (FOR UNSCHEDULED WORK):

B. FULLY-LOADED CALL-OUT CREW RATE \$130.00 X 2% = \$2.60 (B)  
(HOURS Monday - Friday 7am to 7pm)

C. FULLY-LOADED CALL-OUT CREW RATE \$130.00 X 2% = \$2.60 (C)  
(HOURS Monday - Friday 7pm to 7am)

D. FULLY-LOADED CALL-OUT CREW RATE \$147.00 X 2% = \$2.94 (D)  
(HOURS HOLIDAYS and WEEKENDS)

**E. TOTAL ADD (A) + (B) +(C) + (D) = (E)                      \$97.44    (E) CATEGORY**

**4**

**Price Proposal Form 14F  
Tower Site Up-Keep**

County(ies): ALL

**FULLY-LOADED HOURLY RATE** \$177.00 **CATEGORY 5**  
**(HOURS: Monday-Friday 7am to 7pm)**

**Price Proposal Form 14G  
TOWER SITE AUDIT**

County(ies): ALL

**FULLY-LOADED HOURLY RATE**    \$165.00                      **CATEGORY 6**

**(HOURS: Monday-Friday 7am to 7pm)**

**SUBMITTED BY:**

[REDACTED]

**SIGNATURE**

**DATE**

**PRINTED NAME & TITLE**

[REDACTED]

**FEIN**

**NAME OF OFFEROR (COMPANY)**