



The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.

Header 1

List View

General Information

Contact

Default Values

Discount

Document Information

Procurement Folder: 651935

SO Doc Code: CRFQ

Procurement Type: Central Purchase Order

SO Dept: 0439

Vendor ID: VS0000020535

SO Doc ID: EBA2000000014

Legal Name: HOWELL LABORATORIES INC

Published Date: 12/2/19

Alias/DBA:

Close Date: 12/10/19

Total Bid: \$58,860.00

Close Time: 13:30

Response Date: 12/09/2019

Status: Closed

Response Time: 13:04

Solicitation Description: Addendum No.02; MEDIUM POWER FM ANTENNA

Total of Header Attachments: 1

Total of All Attachments: 1



Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Solicitation Response

Proc Folder : 651935

Solicitation Description : Addendum No.02; MEDIUM POWER FM ANTENNA

Proc Type : Central Purchase Order

Date issued	Solicitation Closes	Solicitation Response	Version
	2019-12-10 13:30:00	SR 0439 ESR12091900000003460	1

VENDOR

VS0000020535

HOWELL LABORATORIES INC

Solicitation Number: CRFQ 0439 EBA2000000014

Total Bid : \$58,860.00 Response Date: 2019-12-09 Response Time: 13:04:44

Comments:

FOR INFORMATION CONTACT THE BUYER

Guy Nisbet
(304) 558-2596
guy.l.nisbet@wv.gov

Signature on File

FEIN #

DATE

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Medium POWER FM ANTENNA	1.00000	EA	\$58,860.000000	\$58,860.00

Comm Code	Manufacturer	Specification	Model #
43221703			

Extended Description :	Medium POWER UHF TV TRANSMIT ANTENNA

Comments: Complete PDF documents binder package attached

Index for
State of West Virginia
Bid offer CRFQ-0439 EBA2000000014

- 1. Bid documents**
 - a. Purchasing form**
 - b. Addendum sign off form**
 - c. Exhibit A pricing sheet**
 - d. Designated contact/certification and signature form**
- 2. Shively Introduction letter**
 - 2.1 Shively Bid responses**
- 3. 6810 antenna data sheet**
- 4. 6810 weight and Windload calculation**
- 5. Shively sample 6810-6R-EF-DA installation drawing**
- 6. Shively Pattern brochure**

Attachments:

- Shively Reference quote 66728 - attachment 3**
- Shively terms and conditions (Warranty details) attachment 4**
- Shively insurance details attachment 5**
- Shively radome data sheet - attachment 6**

REQUEST FOR QUOTATION, RFQ# EBA68287
Medium-Power UHF Television Transmit Antenna

33

Exhibit A
Pricing Page*

Item#	Description	Quan	Unit Cost	Total Item Cost
1	Medium-Power FM Broadcast Transmit Antenna as described in section 3.1.1	1	58,860.00 \$	58,860.00 \$
	Total Bid Amount			\$ 58,860.00

***Per section 4.2.3 Vendor must also provide documentation for the equipment quoted sufficient for the Agency to determine whether the quoted equipment meets specifications. Vendor should provide this documentation with their initial bid.**

Authorized Signature: _____



Dale Ladner

Date: 12/6/2019

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.:

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6 |
| <input checked="" type="checkbox"/> Addendum No. 2 | <input type="checkbox"/> Addendum No. 7 |
| <input type="checkbox"/> Addendum No. 3 | <input type="checkbox"/> Addendum No. 8 |
| <input type="checkbox"/> Addendum No. 4 | <input type="checkbox"/> Addendum No. 9 |
| <input type="checkbox"/> Addendum No. 5 | <input type="checkbox"/> Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Shively Labs, a division of Howell Laboratories

Company _____

Authorized Signature _____

12/6/2019

Date _____

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Dale Ladner Sales Mgr
 (Name, Title) Dale Ladner Sales Manager
 (Printed Name and Title)
 PO Box 389 Bridgton, Maine 04009
 (Address)
 207-647-3327 x 309 207-647-8273
 (Phone Number) / (Fax Number)
 dladner@shively.com
 (email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

Shively Labs
 (Company)
Dale Ladner Sales Mgr
 (Authorized Signature) (Representative Name, Title)
 Dale Ladner Sales Manager
 (Printed Name and Title of Authorized Representative)
 12/06/2019
 (Date)
 207-647-3327 x 309 207-647-8273
 (Phone Number) (Fax Number)

STATE OF WEST VIRGINIA
Purchasing Division
PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: Howell Laboratories, Inc / Shively Labs

Authorized Signature: [Signature] CFO Date: 12-9-2019

State of Maine

County of Cumberland, to-wit:

Taken, subscribed, and sworn to before me this 9 day of December, 2019.

My Commission expires November 13, 2026, 2026.

AFFIX SEAL HERE

NOTARY PUBLIC



CINDY E. THOMPSON

Notary Public - State of Maine
My Comm. Expires 11-13-2026

Purchasing Affidavit (Revised 01/19/2018)

**State of West Virginia RFQ
CRFQ 0439 EBA 2000000014- Bid Response**

Instructions to Vendors Submitting Bids

Bid details

Shively Response

1	Review Documents thoroughly	Comply
2	Mandatory terms	Understood
3	Prebid meeting	Understood
4	Vendor Question Deadline	Understood
5	Verbal Communications	Understood
6	Bid Submission	Comply
7	Bid Opening 12/10/19 at 1:30 pm	Understood
8	Addendum Acknowledgement	Comply, forms attached
9	Bid Formatting	Comply
10	Alternate model or brand	Understood
11	Exceptions and clarifications	Comply
12	Communication Limitations	Comply
13	Registration	Comply
14	Unit Price	Comply
15	Preference	Understood
15a	Reciprocal Preference	Understood
16	Small, women-owned or minority owned businesses	Shively Labs, a division of Howell Laboratories is considered a small business.
17	Waiver of minor irregularities	Understood
18	Electronics file access restrictions	Comply
19	Non responsible	Understood
20	Acceptance/rejection	Understood
21	Your submission is a public document	Understood
22	Interested party disclosure	Understood
23	With the bid requirements	Understood

General Terms and Conditions

1	Contractual Agreement	Understood
2	Definitions	Understood
2.1	Agency or Agencies	Understood
2.2	Bid or Proposal	Understood
2.3	Contract	Understood
2.4	Director	Understood
2.5	Purchasing division	Understood
2.6	Award Document	Understood
2.7	Solicitation	Understood
2.8	State	Understood
2.9	Vendor or vendors	Understood
3	Contract term, renewal: extension	Understood, one time purchase
4	Notice to proceed	Understood
5	Quantities	Understood, one time purchase
6	Emergency purchases	Understood

**Shively Labs 207-647-3327
dladner@shively.com**

**State of West Virginia RFQ
CRFQ 0439 EBA 2000000014- Bid Response**

General Terms and Conditions-cont

Bid details

Shively Response

7	Required Documents	Comply
8	Insurance	Comply- Attachment 5 will provide verification
9	Workers Compensation Insurance	Understood
10	Reserved	n/a
11	Liquidated Damages	Understood
12	Acceptance	Comply
13	Pricing	Comply
14	Payment in Arrears	Comply
15	Payment methods	Comply
16	Taxes	Comply
17	Additional Fees	Understood
18	Funding	Understood
19	Cancellation	Understood
20	Time	Understood
21	Applicable Law	Understood
22	Compliance with laws	Comply
23	Arbitration	Understood
24	Modifications	Understood
25	Waiver	Comply
26	Subsequent forms	Understood
27	Assignment	Understood
28	Warranty	Comply -see Attachment 4 with Shively warranty
29	State Employees	Understood
30	Privacy, security and confidentiality	Comply
31	Your submission is a public document	Understood
32	Licensing	Understood
33	Antitrust	Comply
34	Vendor certifications	Comply
35	Vendor relationship	Comply
36	Indemnification	Comply
37	Purchasing affidavit	Understood
	Additional agency and local	
38	Government Use	Understood
39	Conflict of interest	Comply
40	Reports	Understood
41	Background Check	Understood
		Comply -unless material requirements are not met
42	Preference for use of domestic steel products	domestically. Our parent company is a military supplier that requires domestic materials in nearly all
		Comply -unless material requirements are not met
43	Preference for use of domestic aluminum, glass and steel	domestically. Our parent company is a military supplier that requires domestic materials in nearly all
44	Interested party supplemental	Understood

State of West Virginia RFQ
CRFQ 0439 EBA 2000000014- Bid Response

	<u>Bid details</u>	<u>Shively Response</u>
	Specifications - Medium Power FM antenna	
1	Purpose and scope	Understood
2	Definitions	Understood
2.1	Contract item	Understood
2.2	Circular polarized	Understood
2.3	"first off" configuration	Understood
2.4	Horizontal Azimuth Pattern	Understood
2.5	Pricing Page	Understood
2.6	Radome	Understood
2.7	Solicitation	Understood
3	General Requirements	
3.1	Mandatory Contract Items	
3.1.1	Medium Power FM Broadcast Antenna	
3.1.1.1	Mechanical Specifications	
3.1.1.1.1	All structural elements shall be designed and fabricated in accordance with TIA/EIA standards RS-222G	Will comply
3.1.1.1.2	All hardware shall be constructed of non-ferrous material or be galvanized	Will comply- Shively provides stainless steel mounting and hardware with some galvanized hardware as required.
3.1.1.1.2.1	steel elements shall be hot dip galvanized per ASTM A123	Will comply
3.1.1.1.2.2	Zinc coating shall be applied with a minimum thickness of 0.022 inches	Will comply if required
3.1.1.3	Physical Attributes	
3.1.1.1.3.1	Antenna shall be affixed to a Stainless G5 tower at approximately 340 feet elevation. Vendor WIL NOT be required to attach the antenna to tower.	Understood
3.1.1.1.3.2	See Exhibit B for tower details	Understood
3.1.1.1.3.3	Radiating elements shall be protected from ice by being enclosed in a radome.	Will comply - See attachment 6 for radome data sheet
3.1.1.1.3.4	Vendor shall provide mechanical interface between tower and antenna	Will comply
3.1.1.2	Electrical specifications	
3.1.1.2.1	Antenna system (antenna,trans line and connectors) shall provide enough gain to achieve 14kW ERP with 5 kW tpo.	Will comply- final customer approved FCC pattern work will determine exact gain. Estimated power gain of 4.6 would require tpo of 3.46 kW.
3.1.1.2.1.1	Antenna being replaced is an RCA BFC-6 antenna (6 bays with radomes)	Understood
3.1.1.2.2	Polarization shall be circular	Will comply
3.1.1.2.3	The horizontal azimuth pattern shall meet the bid parameters	Will comply

State of West Virginia RFQ
CRFQ 0439 EBA 2000000014- Bid Response

Bid details

Shively Response

Specifications - Medium Power FM antenna

- | | | |
|-------------|--|--|
| 3.1.1.2.3.1 | Vendor shall provide pattern certification upon delivery to the | |
| 3.1.1.3 | Transmission line and accessories | |
| 3.1.1.3.1 | Vendor shall provide 3 1/8" 50 ohm transmission line | Will comply - 3 inch transmission line with 3 1/8" EIA connectors. Rated for 40 kW |
| 3.1.1.3.2 | Vendor will provide 450 feet of transmission line | Will comply |
| 3.1.1.3.3 | Transmission line shall be pressurized | Will comply |
| 3.1.1.3.4 | Transmission line shall have the antenna connector factory installed and delivered in a "first off" configuration | Will comply |
| 3.1.1.3.5 | Vendor shall provide all transmission line components for complete installation. Components shall include but not be limited to: Hangers, hoisting adapters, elbows, field terminated line sections and pressure windows | Exception::Will comply as required for FM project. Items in the call out such as the elbows, field terminated line sections and pressure windows are NOT utilized in FM installation. Items included in bid re listed under Attachment 3- Shively Quote 66728, line 3. |

4 Contract award

- | | | |
|-------|---|---|
| 4.1 | Contract award | Understood |
| 4.2 | Pricing Page (Exhibit A) | Will comply |
| 4.2.1 | Vendor should complete the Pricing | Will comply |
| 4.2.2 | Vendor must include additional documentation for all equipment and components to sufficiently demonstrate that all equipment and components meet specifications. Include with bid | Will comply - various attachments will be included; data sheets, formal quote, etc. |

5 Payment

- | | | |
|-----|--|-------------|
| 5.1 | Payment: Vendor shall accept payment in accordance with the payment procedures of the State of West Virginia | Will comply |
|-----|--|-------------|

6 Delivery and return

- | | | |
|-----|--|-------------|
| 6 | Shipment and delivery; Vendor shall deliver the contract lines within 120 days of being awarded this contract and receiving a purchase order or notice to proceed, | Will comply |
| 6.1 | | |
| 6.2 | Late delivery: | Will comply |
| 6.3 | Delivery Payment/Risk of loss: items to be shipped FOB destination | Will comply |
| 6.4 | Return of unacceptable items: | Will comply |

**State of West Virginia RFQ
CRFQ 0439 EBA 2000000014- Bid Response**

Bid details

Shively Response

Specifications - Medium Power FM antenna

- | | | |
|-------------------------|--|--|
| 6.5 | Return due to agency error: Items ordered in error by the Agency will be returned for credit within 30 days of receipt, FOB Vendors location. Vendor shall not charge a restocking fee if returned products are in resaleable condition, Items shall be deemed to be in a resaleable condition if they are unused and in the original packaging. Any restocking fee for items not in a resaleable condition shall be the lower of the vendor's customary restocking fee or 5% of the total invoiced value of the returned items. | EXCEPTION: The products requested in this bid are customer specific in frequency and design. Shively will not take back items ordered incorrectly as they would not be something that would be easily resold in the same configuration. There is no restocking fee that would compensate Shively Labs to rework complete antenna systems, pattern work and customer specific lengths of transmission line. |
| 7 Vendor default | | |
| 7 | The following shall be considered a vendor default under this contract | Understood |
| 7.1 | Failure to provide contract items in accordance with the requirements contained herein. | Understood |
| 7.1.1 | Failure to comply with other specifications and requirements | Understood |
| 7.1.2 | Failure to comply with any laws, rules and ordinances applicable to the contract services provided under this contract. | Understood |
| 7.1.3 | Failure to remedy deficient performances upon request | Understood |
| 7.1.4 | The following remedies shall be available to Agency upon default | |
| 7.2 | Immediate cancellation of the contract | Understood |
| 7.2.1 | Immediate cancellation of one or more release orders issued under this contract | Understood |
| 7.2.2 | Any other remedies available in law or equity | Understood |
| 7.2.3 | | |

True circular polarization

Power rating: 10 kW per Bay

Best sidemount in the industry for directionals

Will duplex over 2.2 MHz bandwidth

Shively standard features:

- Ring stub design
- Consistently predictable patterns
- Digital-ready
- Pattern studies available
- No Factory personnel needed to install
- Adjustable fine-matching transformer
- Radomes and deicers available
- Rugged corrosion-resistant mounts
- Works with regular towers; no need for special frequency-sensitive tower sections
- Pressure relief valve for easy purging of the system
- Special spacing, H/V ratios, null fill and beam tilt available



Electrical specifications:

No. of Bays	Gain		Power Rating	No. of Bays	Gain		Power Rating
	Power	dB	kW		Power	dB	kW
1	0.45	-3.43	10	7	3.93	5.94	40
2	0.99	-0.04	20	8	4.53	6.56	40
3	1.56	1.92	30	10	5.74	7.59	40
4	2.14	3.30	40	12	6.97	8.43	40
5	2.73	4.36	40	14	8.18	9.13	40
6	3.33	5.22	40	16	9.42	9.74	40

Performance specifications:

Polarization: Right circular

VSWR:

Single bay: 1.06 : 1 ± 100 kHz
1.1 : 1 ± 200 kHz

0.8 to 1.8 MHz spacing, each channel:
1.10 : 1 ± 100 kHz
1.20 : 1 ± 200 kHz

Greater than 1.8 MHz spacing: Contact the factory.

Azimuth Pattern Circularity: Horizontal component ±1.5 dB on pole.

Input Connection: Female 3-1/8 in EIA

Notes:

1. Our gain figures are derived from the computed directivity and include the losses in the antenna feed system.

Gain is provided for one polarization and is equal in circularly polarized antennas for both horizontal and vertical components. Gain will be reduced if null fill, beam tilt, special H/V ratio, or special wavelength spacing is provided. Gain will increase in a directional array by the directivity of the azimuth pattern.

Document No. ds-6810-fw (170322)

A Division of Howell Laboratories, Inc., P. O. Box 389, Bridgton, Maine 04009 USA

(207) 647-3327

1-888-SHIVELY

Fax: (207)647-8273

An Employee-Owned Company

www.shively.com

sales@shively.com

Certified to ISO-9001

Model 6810 size and weight:

No. of Bays	Vertical Tower Space						Weight					
	Antenna Radiation Aperture		Pipe Length Required		Total Tower Space Recommended		Without radomes		With radomes		With radomes & 1/2" (1.2 cm) radial ice	
	ft	m	ft	m	ft	m	lb	N	lb	N	lb	N
1	2	0.6	9	2.7	20	6.1	130	578	162	720	256	1138
2	10	3.0	19	5.8	30	9.1	200	889	264	1174	443	1970
3	20	6.1	29	8.8	40	12.2	270	1200	366	1627	630	2801
4	30	9.1	39	11.9	50	15.2	340	1512	468	2081	817	3632
5	40	12.2	49	14.9	60	18.3	410	1823	570	2534	1004	4464
6	50	15.2	59	18.0	70	21.3	480	2134	672	2988	1191	5295
7	60	18.3	69	21.0	80	24.4	550	2445	774	3441	1379	6131
8	70	21.3	73	22.2	90	27.4	636	2828	892	3966	1582	7033
10	90	27.4	93	28.3	110	33.5	776	3450	1096	4873	1956	8696
12	110	33.5	113	34.4	130	39.6	916	4072	1300	5780	2330	10359
14	130	39.6	133	40.5	150	45.7	1056	4695	1504	6687	2704	12022
16	150	45.7	153	46.6	170	51.8	1789	7954	1708	7594	3078	13684

Windload, TIA-222 Rev. G:

No. of Bays	Without radomes				With radomes				With radomes & 1/2" (1.2 cm) radial ice			
	EPA _N		EPA _T		EPA _N		EPA _T		EPA _N		EPA _T	
	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²
1	5.2	0.5	5	0.5	7.2	0.7	6.6	0.6	8.3	0.8	7.5	0.7
2	9.5	0.9	9.7	0.9	13.5	1.3	13	1.2	16.5	1.5	13.0	1.2
3	13.9	1.3	14.5	1.3	19.9	1.8	19.3	1.8	24.6	2.3	23.6	2.2
4	18.2	1.7	19.2	1.8	26.2	2.4	25.7	2.4	32.8	3.0	31.7	2.9
5	22.6	2.1	23.9	2.2	32.6	3.0	32	3.0	41.0	3.8	39.7	3.7
6	26.9	2.5	28.6	2.7	38.9	3.6	38.4	3.6	49.2	4.6	47.8	4.4
7	31.3	2.9	33.4	3.1	45.3	4.2	44.7	4.2	57.4	5.3	55.9	5.2
8	35.6	3.3	38.1	3.5	51.6	4.8	51.1	4.7	65.6	6.1	63.9	5.9
10	44.3	4.1	47.5	4.4	64.3	6.0	63.8	5.9	81.9	7.6	80.1	7.4
12	53	4.9	57	5.3	77.0	7.2	76.5	7.1	98.3	9.1	96.2	8.9
14	61.7	5.7	66.4	6.2	89.7	8.3	89.2	8.3	114.7	10.7	112.3	10.4
16	70.4	6.5	75.9	7.1	102.4	9.5	101.9	9.5	131	12.2	128.4	11.9

Notes:

- The mounting structure must not flex more than $\pm 1/2$ in (± 1.2 cm) in any 10-ft (3-meter) section. 5 feet (1.5 m) of mounting structure is required above and below the antenna bays for proper pattern formation.
- Antenna radiation aperture is the distance from the center of the top bay to the center of the bottom bay. Physical space used is from the top of the top bay to the input flange at the bottom of the array, or the bottom of the bottom bay in a center-fed array. Total tower space recommended allows ten feet (3 m) of clear tower space above and below the antenna to protect from pattern interference by other antennas. At frequencies lower than 98 MHz, each of these dimensions will increase by up to 1 ft (0.3 m) per bay.
- Seven bays or less are normally end-fed. All antennas supplied with beam tilt will be center-fed. Antennas with an odd number of bays are normally not available with center feed.
- Windload and weight tabulations are estimates and assume 98 MHz. They include the bay, interbay feedline, input connection, and a fine-matching transformer. No values have been included in these tabulations for mounts. Actual values vary with the specific installation. Contact us with details of your installation if more precise values are needed.
- Antenna areas and weights calculated in accordance with TIA-222-G.
 EPA_N - Effective projected area associated with the windward face normal to the azimuth of the antenna: $EPA_N = \sum(C_o A_R)_N$
 EPA_T - Effective projected area associated with the windward face at the side of the antenna: $EPA_T = \sum(C_o A_R)_T$
 Assumptions: Structure Class II; Exposure Category C; Topographic Category 1; Maximum basic windspeed 112 mph; with 1/2 inch design ice, 50 mph; Height about ground 200 ft.
- Deicers add approximately 1 lb (4.4 N) per bay in weight and a windload of $EPA_N = 0.7$ ft² and $EPA_T = 0.7$ ft² per bay.
- Ask for technical assistance at Shively if you are planning to mount antennas on AM towers or install them at altitudes over 3,000 ft (915 m) above mean sea level.

Antenna Windload Calculator

Model 6810-6R

December 6, 2019

Antenna Parameters

Site Parameters -

S/O or Quote # **QT66728**

Call Letters **WVBY**

Site Description **TOWER LOCATED FAYETTE COUNTY**

Bays **6**
Radomes **Y**
Deicers **N**
Frequency **91.7** Mhz
Wavelength **128.7** in
Bay Spacing **1**
Bay Distance **128.7** in
Antenna Aperture **643.6** in
Transformer **Y**
Horiz Parasitic Elem. **N**
Length in Full Scale
Vert. Parasitic Elem. **N**
Length in Full Scale

Mounts

Include ? **Y** **N** Double Mounts?
A-Dim **3.33** **14.99** in Full Scale
Face Mount **N** Pickup 2 Leg **N**
Tower Face Width in

222-F 222-G
Basic Windspeed, V (mph) **80** **110**
Windload Notes, Refer to 222-F or G
Height above ground, z (ft) **328**
Exposure Category **C** C is default
Structure Class **II** II is default
Ice Thickness, (in) **0.5** 222-F, Glaze Ice
Design Ice Thickness, ti (in) **1** 222-G, Glaze Ice
Basic Windspeed on Ice, V (mph) **30**
Topographic Category **1** 1 is default
Height of Crest above Terrain, H (ft) none is default
Structure Height, h (ft) **377**
ASR #: **1035131**
State **WV**
County: **FAYETTE**
I **1.00** Ref
Kzt **1.00** Ref
Kz **1.93** **1.63** Ref
Qz **33.90** **47.83** psf, Ref

Standard 222-C 50/33 psf

Force represents worst case wind direction

Without Ice

Force **1830** lbs
Weight **822** lbs

Comments

With Ice

Force **2149** lbs
Weight **1332** lbs

Ref 0.5 inch Radial Ice

Standard 222-F

EPAs represents worst case wind direction

Without Ice

EPA **60.7** ft²
Weight **822** lbs

Comments

With Ice

EPA **70.3** ft²
Weight **1332** lbs

Ref 0.5 inch Radial Ice

Standard 222-G

Without Ice

EPA_N **42.2** ft²
EPA_T **39.1** ft²
Weight **822** lbs

Comments

With Ice

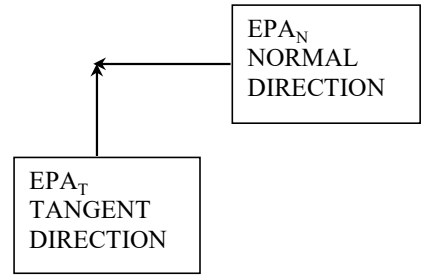
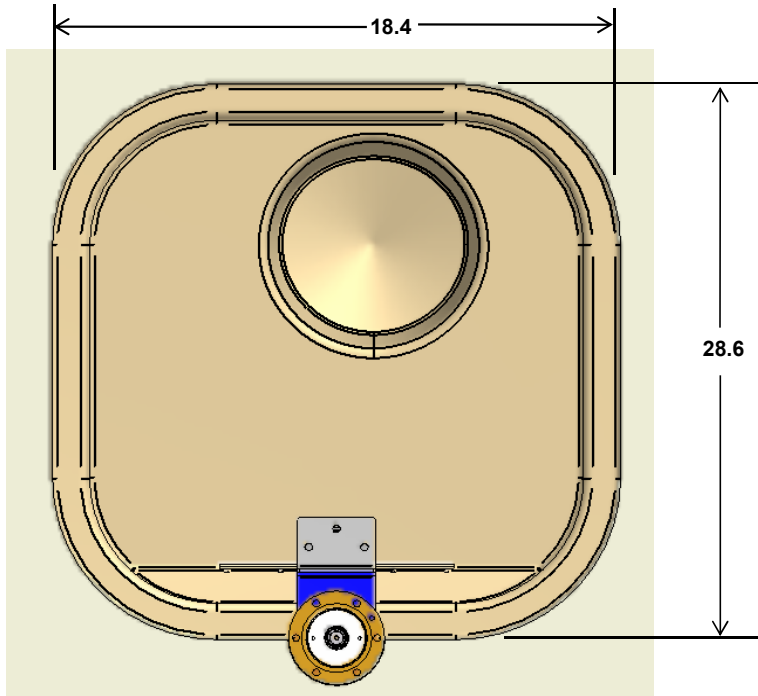
	Site Condition	Incremental			
	2.5 in	0.5	1.0	2.0	4.0 in
EPA _N	78.6 ft ²	54.2	62.1	73.0	94.8 ft ²
EPA _T	71.5 ft ²	49.6	56.7	66.4	87.0 ft ²
Weight	4201 lbs	1364	1970	3375	6958 lbs

Antenna Dimensions

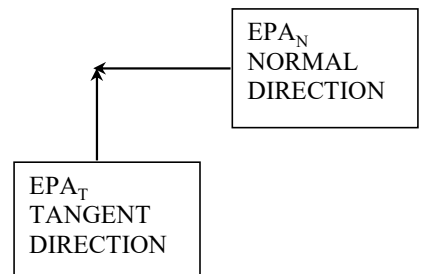
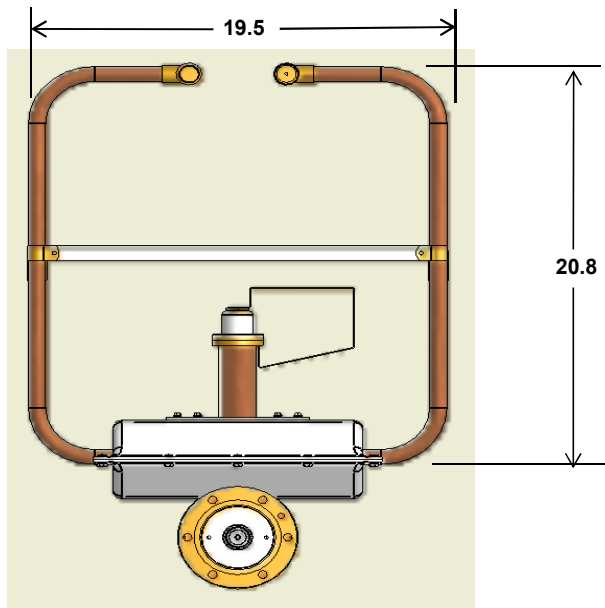
Antenna Aperture **53.6** ft
Approx Tower Space Required **62.6** ft

1. Site Specifications values used to calculate EPA values. Values may change with different Site Specifications.
2. Shively Labs does not guarantee accuracy in specifying customer's Site Specifications. Values should be used for comparison purposes only.

Wind load Orientations



6810 with Radome



6810 without Radome

1. Orientations illustrate wind directions to calculate EPA_N & EPA_T per TIA-222-G.
2. Actual orientation of load with respect to tower will depend upon mounting configuration.

Mount Strength Calculuator

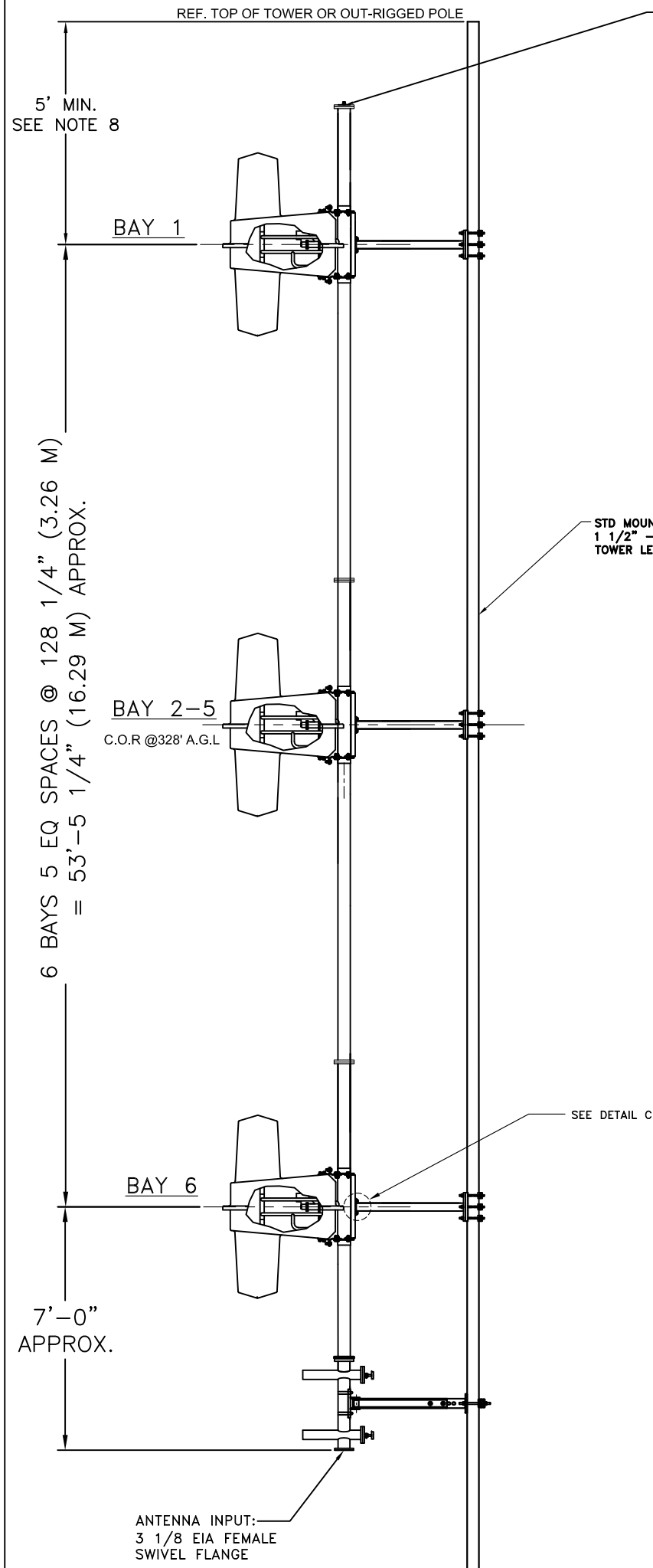
	No Ice	With Ice	
		2.52	Reference from Input Sheet
		2.53	in Radial Ice Used
S/O Number	QT66728		
Antenna Model	6810		
Radome	Yes <small>enter Yes or No</small>		
Number Mounts	6		
Area of entire antenna	42.20	78.60	ft ² <small>enter from spec sht</small>
Weight of entire antenna	822.00	4201.00	lb <small>enter from spec sht</small>
A Dim	15.00	<small>actual size</small>	
Moment Arm	27.70	<small>A + table value</small>	
Main Support Size	2x2x.25	<small>Chose std size</small>	
Weld Size	0.25	<small>equal to wall thk's</small>	
Yield Point Matl (Fy)	30500	Material	Stainless Steel
Ultimate Strength S.S (Fu)	81800		
E	2.90E+07	psi	

Enter values in RED cells
Do not change BLUE cells

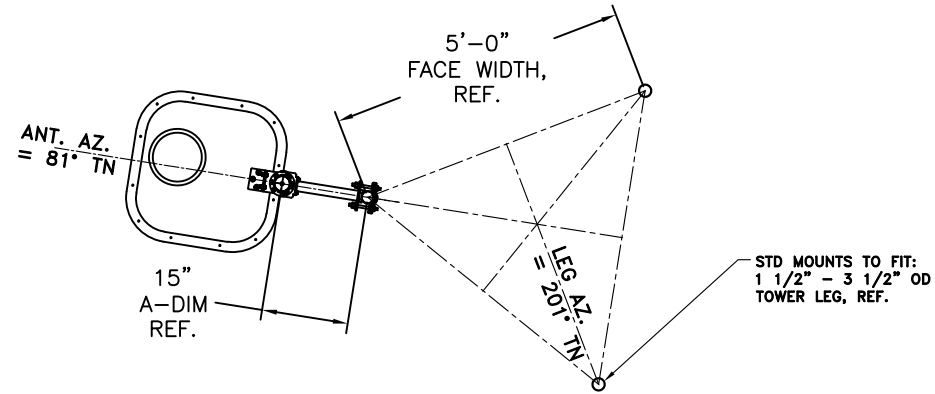
Member Characteristics		Torque Resistance		Test
				5100 in-lbs
		Force	Moment	
		Non-factored	336	9317
		Okay?	FALSE	
		Factored	538	14908
		Okay?	FALSE	
222-G	8			
LRFD	116			
h/t, λ	176			
Limiting Wall Slenderness, λ_p	46055			
Limiting Wall Slenderness, λ_r	29402			
Tensile Strength, Pn	29402			
Flexural Strength weak Axis, Mn	18300			
Flexural Strength strong Axis, Mn	1			
Shear Strength, Vn				
Torsional Strength, Tn				

Load Condition	1) No ice	D	Dg	Di	Wo	Wi	Ft	E
Load Condition 1	1) No ice	1.2	1	0	1.6	0	0	0
		164	0	0	538	0	0	0
Load Condition	2) Ice	D	Dg	Di	Wo	Wi	Ft	E
Load Condition 2	2) Ice	0.9	1	1	0	1	1	0
		630	0	25	0	47	0	0

No Ice		With Ice	
Pu	0	0.00	0
Mu	19462	0.74	19451
Vu	563	0.03	657
Tu	0	0.00	0
Design is :	GOOD	0.74	GOOD
			0.74



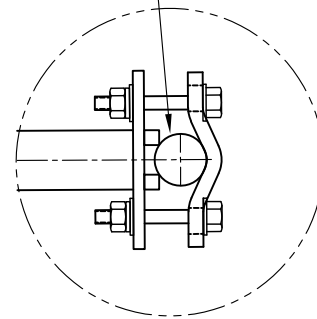
PRESSURE RELIEF VALVE
SEE MANUAL



TOP VIEW

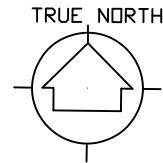
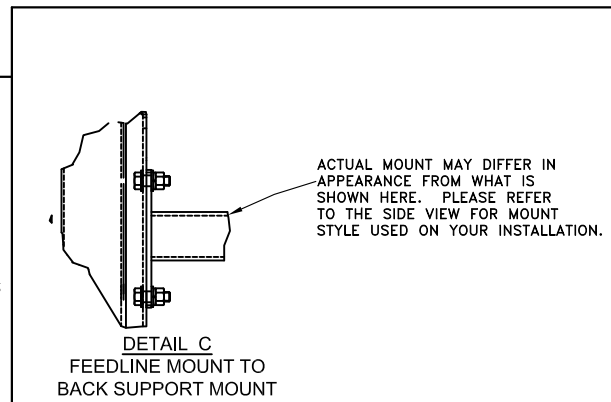
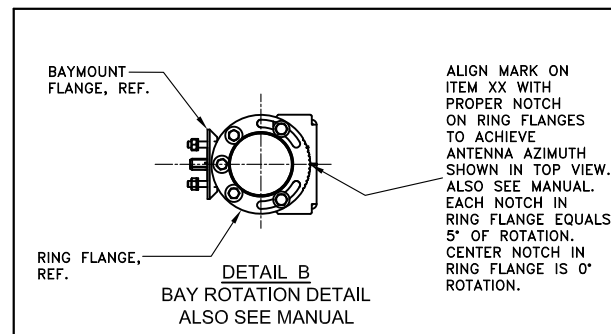
STD MOUNTS TO FIT:
1 1/2" - 3 1/2" OD
TOWER LEG, REF.

STD MOUNTS TO FIT:
1 1/2" - 3 1/2" OD
TOWER LEG, REF.



DETAIL A
MOUNT ATTACHMENT
TYPICAL 3 PLACES
EACH MOUNT

SEE DETAIL C



NOTES:

1. COAT ALL O-RINGS WITH A LIGHT FILM OF LUBRICATION PRIOR TO INSTALLATION.
2. MOUNT ANTENNA SO AS TO CLEAR ALL DIAGONALS, HORIZONTALS, & GUY WIRES THAT MIGHT INTERFERE.
3. SEE INSTALLATION INSTRUCTIONS FOR TRANSFORMER ADJUSTMENT AND ADDITIONAL INFORMATION.
4. TRANSMISSION LINE AND ANTENNA MUST BE PURGED AND PRESSURIZED WITH DRY GAS BEFORE APPLYING POWER.
5. HOSE CLAMPS HAVE FACTORY STAMPED NUMBER AS PER PARTS LIST BELOW.
EXAMPLE: B6114-250
6. THE USE OF ANTI-SEIZE ON ALL U-BOLT THREADS WILL HELP PREVENT GALLING.
7. SEAL THE JOINT WHERE THE RADOME ENCIRCLES THE BAYMOUNT FLANGE WITH RTV SILICONE SEALANT.
8. THE DISTANCE FROM THE CENTERLINE OF BAY 1 TO THE TOP OF THE TOWER IS AS SPECIFIED IN THE SIDE VIEW, IT CAN BE MORE HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO DETERMINE THE ACTUAL ELEVATION LOCATION OF THE ANTENNA ON THE TOWER/POLE TO MEET THE FCC CONSTRUCTION PERMIT CENTERLINE OF RADIATION REQUIREMENTS AND TO CLEAR TOWER/POLE MEMBER OBSTACLES.
9. ANTENNA HEADING PER CUSTOMER.
10. OUT-RIGGED POLE MUST BE THE SAME OUTSIDE DIAMETER THROUGHOUT THE ANTENNA APERTURE IN ORDER FOR THE MOUNT ASSEMBLIES TO FIT. IF THE LEG SIZE CHANGES IN ANTENNA APERTURE CONTACT THE FACTORY FOR CUSTOM MOUNTS.

		FREQ. MHZ: 91.7		SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE				
		STATION: WVBY C.O.L.: BECKLY, WV						
PREPARED JHFF		DATE 12-5-19	S/N: SAMPLE		TYPE 6810 ANTENNA INSTALLATION DRAWING			
CHECKED			S.O.: N/A					
ENGINEER			C.O.: N/A		D	CODE IDENT NO 26750	DWG. NO. QT66728	REV -
				SCALE: NTS		SHEET 1 OF 1		

Shively Labs®

PATTERN STUDY
DON'T GAMBLE WITH YOUR COVERAGE



Shively Labs®

AN EMPLOYEE OWNED COMPANY

Www.shively.com

1-888-SHIVELY

888-744-8359

March 30, 2011

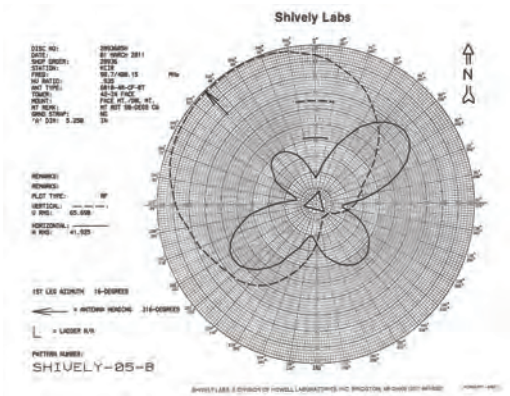
Pattern work:

At Shively Labs we have been doing both directional and omnidirectional pattern studies since 1963. We supply pattern work for our antennas that are distributed world wide. The pattern lab has a fully outfitted test facility, with thousands of patterns in our data base and over 200 model towers for testing. We are confident that our pattern work will be accurate, field verifiable and fully compliant with all regulations.



Get the best signal coverage:

Pattern work is important. Just mounting your antenna to the tower can cause serious problems. Due to following factors; the size of the tower, its bracing structure, coax, conduit, ladders, and any other metallic object in the aperture, distortion can occur. You may get nulls in the direction where you require coverage and lobes develop where coverage is not required. By performing pattern work, you can position the antenna on the tower to lessen problems or take advantage of the tower and surrounding objects.



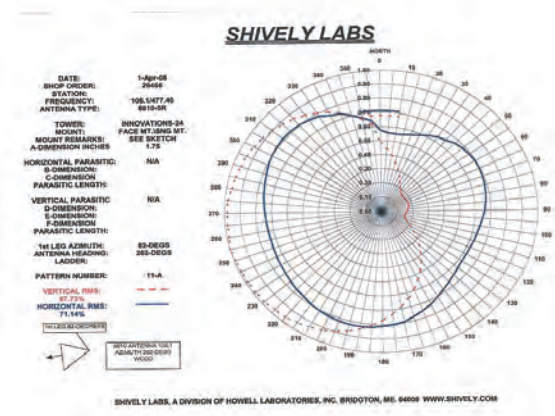
It all starts here:

Whether it's directional or omnidirectional, the customer is sent a pattern study work sheet to fill out. It is important to fill the worksheet out accurately, as all items will affect the pattern produced and final coverage. Once the information is received, an exact model is built to use in the pattern study. We use a scale model of 4.5 to 1. This allows for both accuracy, speed and economy. We are able to run many patterns in a day. Whereas full size setups, may take several days to maneuver.



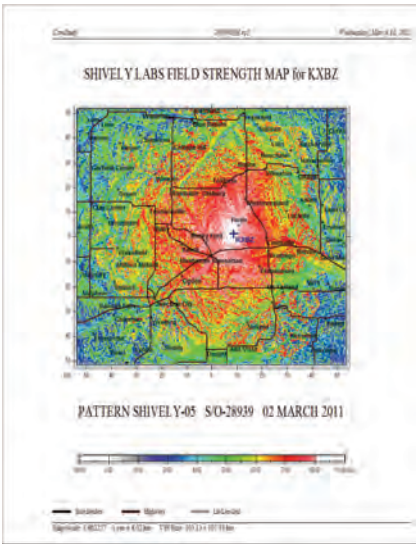
Running the Pattern:

After building a detailed model of the tower, we use mapping software to determine the actual location of the tower. Using the actual leg azimuth and customer requested area to cover, we develop the type of mounts to use. Once we begin to run patterns the position of the antenna and distance from the tower are varied to achieve the best relationship and pattern. By rotating the bays or changing the mount style allows us to meet the best coverage possible.



Reviewing the patterns:

After completing a series of patterns, the range technician and the sales department review the patterns to ensure they have met the customer requirements. Shively uses Com-Study software along with the composite of the pattern to create estimated coverage map. All the patterns and coverage map are submitted to the customer for their approval. Once approved the details are sent to design group to finalize the mount design. If the customer desires more patterns we are happy to run more.



Finalizing the mount design:

Towers vary in size and structure. So depending on the tower face width, leg size, average wind-speed, ice, and location, the mount used in the pattern study will be designed, manufactured for strength and durability. Design may also add anti-rotation or double mounts as required for manufacture.



Quote Number: 66728

Quotation and Acceptance

Page: 1 of 4

Quote To: West Virginia Educational Broadcasting Authority

For Customer:

West Virginia Educational Broadcasting Authority
600 Capitol Street
Charleston WV 25301-1223

Phone: (304)284-1450

Fax: (304)556-4980

Date: 12/5/2019

Expires: 1/31/2020

Reference:

Terms: Net 45 Days

FOB:

Sales Person: Dale Ladner

Email: dladner@shively.com

For BID CRFQ 0439 EBA2000000014 / EBA r68287
WVBY 91.7 Beckley West Virginia

Base Currency.

Line	Part	Description	Rev	Drawing	Expected Qty	Unit Price	Ext. Price
1	6810-6R-EF-DA-91.70	A			1.00 EA	40,650.00	40,650.00
	6810-6R-EF	6 bay High Power FM Antenna				30 % Discount	-12,195.00
		Frequency: WVBY					
		Call letters: 91.7					
		City of license: Beckley WV					
		Bay spacing: Full wavelength					
		Input: 3 1/8 EIA					
		System Power Handling: 40 kW					
		Polarization: Circular					
		Gain: 3.28 (5.16 dB)					

Lead Time 4-5 Weeks

Weight: 633 lbs (2823 N)

Windload: Rev "C" - 1568 lbs (6993 N) Rev "F" - 45.0 ft2 (4.2 m2)

VSWR: Single frequency: 1.06:1 ± 100 KHz, 1.1:1 ± 200 KHz

Dual frequency (up to 2.4 MHz): 1.08:1 or better, ± 100 KHz, 1.12:1 ± 200 kHz

Ice Protection: Radomes

Total recommended tower space: 70 ft (23.0 m) (includes 10 ft clear space above and below antenna). 5 feet of mounting structure is required above and below antenna bays for proper pattern formation.

System includes: antenna bay(s), adjustable matching transformer, interbay feedline and standard mounts.

Standard mounts are designed to attach to 1 1/4" to 3 1/2" OD tower leg or pole OR face mount up to 24 inch face tower with ~ 15 inch stand off.

Custom mounts are any mounts NON standard and utilized for Pattern studies and Directional antenna applications for an added fee, based on size and design of mounts..

Options available for 6810: Special wave spacing, H/V ratios, Null fill and /or Beam tilt, Deicers, Diplexing

Export Harmonized System Information

Country of Origin: United States of America

HTS Code: 8529.10

Unit of Qty: NQR

Schedule B Code: 8529.10.9000

License Number: NLR

Quote Number: 66728

Quotation and Acceptance

Page: 2 of 4

2	81500-07	-	1.00EA	11,500.00	11,500.00
	FCC Pattern Study for antenna system:			33 % Discount	-3,795.00

FOR 48 TO 120 INCH FACE, TRIANGULAR, UNTAPERED TOWERS

Used to determine the location on the tower for mounting the antenna system AND meeting the FCC envelope. Testing based on interaction between the tower structure and antenna properties. The best patterns derived from the testing will be offered to the customer for comment and approval.

Shively chooses to use scale modeling to offer the most options in recreating the relationship between the antenna and tower. It is much easier to try different mounting positions for the antenna, as well as any intentional parasitic radiators. By modeling the antenna on the test range, it is possible to determine what unwanted interactions might exist and mount the antenna in a way that avoids such problems. Shively an outdoor pattern test range to test the performance of the antennas.

INCLUDES CUSTOM MOUNTS (see notes below for additional notes)
AND PARASITICS AS REQUIRED, PROOF OF PERFORMANCE FOR
FILING AND PREDICTED COVERAGE MAP

NOTES

1. Custom mounts in a face mount or 2 leg pick up design over 48" will have \$100 per foot per mount added to project price.
2. If antennas require double mounts per engineering, order price will need to be adjusted for the additional costs incurred.
3. If leg mounted on a tower leg of 2" or less , anti rotation arms will be necessary at an additional price of \$225 per mount.

Lead Time 0 Weeks

3	FLEXLINE		1.00EA	21,050.00	21,050.00
---	----------	--	--------	-----------	-----------

RFS Flexline

Includes Transmission line, hangars, attachment to tower, grounding kits, hoisting grips, Gas Pass (first off spool) and Gas Block connectors as required, hardware and single entry panel and APD20-d dehydrator

Cable size: 3 inch

Length: 450 feet

Top Connector: 3 1/8 EIA gas pass first off spool

Bottom connector: 3 1/8 gas stop (shipped loose)

Tower attachment: standard hangers 2-3 inch round member adapters

Lead Time 0 Weeks

QUOTE - Miscellaneous Charge -

Description	Ext. Price
1.) Ship/Handle/Pack to:WV 25976	1,650.00

Quote Number: 66728

Quotation and Acceptance

Page: 3 of 4

Lines Total	57,210.00
Total Taxes	0.00
Line Miscellaneous Charges	0.00
Quote Miscellaneous Charges	1,650.00
Quote Total	58,860.00

Export shipments are ExWorks (EXW): Bridgton Maine USA, including inland delivery to first carrier.

Customer is responsible for notifying seller of all import requirements that are in effect or will be effective within 90 days before and after expected date of shipment.

Any items returned from this order with the prior agreement of Shively Labs, for reasons other than warranty replacement, shall be subject to a restocking fee of 15% for items under \$250 and 20% for all other items. Items which have been opened and used will be charged following inspection by Shively Labs.

Sales Conditions: Subject to Shively Labs standard Sales Conditions as attached.

Submitted By:

Accepted By:



Dale Ladner

Regional Sale Manager

Authorized Representative

Date: _____

Quote Number: 66728

Quotation and Acceptance

Page: 4 of 4

SALES CONDITIONS

1. DELIVERY AND EXCUSABLE DELAYS Seller will make all reasonable efforts to conform with delivery estimates but neither party shall be held in default for failure to perform or delay in performance rising out of causes beyond its reasonable control and without its fault or negligence, including, but not limited to, acts of God or of the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, lockouts, labor disputes, freight embargoes, delays in routing, fuel or energy shortages, inability to secure necessary parts and materials, and unusually severe weather. Seller will notify Buyer in writing within a reasonable time after the beginning of any delay. In the event of any delay, the date or dates for performance by Seller of this contract shall be deemed extended for a period equal to the time of delay. **IN NO EVENT SHALL SELLER BE LIABLE FOR CONSEQUENTIAL DAMAGES FOR FAILURE TO PERFORM OR FOR DELAY IN PERFORMANCE HOWEVER CAUSED.**

2. CHANGES IN DESIGN OR CONSTRUCTION. Seller reserves the right in its sole discretion to make any changes it deems desirable in the design or construction of the equipment described in this quotation, without incurring any obligation to furnish Buyer with such changes in similar items previously delivered, provided that any equipment so changed meets the performance specifications.

3. WARRANTY AND LIABILITY. Seller warrants the equipment manufactured by it to be free from defects in material and workmanship at date of shipment from Seller's factory and for a period of one year thereafter, under proper and normal use and service. As to all apparatus and accessories not manufactured by Seller which are part of the equipment furnished by Seller, Seller's only obligation shall be to obtain for Buyer such warranties or guaranties as are available from the vendors thereof. Such warranties or guaranties shall extend over the longest period of time obtainable in this instance by Seller, without payment by Seller of additional consideration therefor. Seller further warrants that the equipment will perform in accordance with the performance characteristics, if any, of such specifications as may be made a part hereof. If the specifications provide for a performance test or tests, the ability of the equipment to meet this performance warranty shall be determined by the result of such test or tests. Upon the successful completion of such test or tests, all liability of Seller under this performance warranty shall terminate. If such performance test or tests are specified but, without fault of the Seller, are not completed within 60 days after date of shipment, the equipment shall be conclusively deemed to have satisfied this performance warranty and all liability of Seller therefor shall terminate. If no performance test or tests are specified, the ability of the equipment to meet this performance warranty shall be determined by the operation of the equipment under normal operating conditions within three months from date of startup of the equipment, but not more than one year from date of shipment. If, during the applicable warranty period, the equipment or any part thereof is found to have been defective when shipped, it will be repaired at Seller's factory or replaced without charge, f.o.b. factory, provided that Buyer gives Seller immediate written notice upon discovery of such defect, whereupon Seller shall have the option of requiring the return of the defective part or parts, freight prepaid, to establish the claim. As to apparatus and accessories of other vendors, resort shall be had against such vendors only, and Seller shall use reasonable efforts to require its vendors to fulfill the obligations of their warranties or guaranties on such apparatus and accessories furnished hereunder. The replacement or repair of defective parts, as aforesaid, shall be Buyer's only remedy for breach of the warranties of Seller, except that, in case of failure of the equipment to fulfill Seller's warranty of performance, Seller shall have the option of removing and reclaiming the equipment at its own expense and of repaying to Buyer all sums received on account of the purchase price, in which event all liability of Seller shall terminate. No allowance will be made for repairs or alterations made without the written consent of Seller, in which event all Seller's warranties shall be void and of no effect. Buyer agrees to assume responsibility and pay for such defects which are attributable to it and for damages which may occur to the equipment after delivery to it.

ANY OTHER PROVISIONS OF THIS AGREEMENT TO THE CONTRARY NOTWITHSTANDING THIS WARRANTY EXCEPT AS TO TITLE IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, ARISING BY LAW, CUSTOM OR CONDUCT. THE RIGHTS AND REMEDIES PROVIDED HEREIN ARE EXCLUSIVE AND IN LIEU OF ANY OTHER RIGHTS OR REMEDIES. IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES.

4. TAXES. The price for the equipment does not include any excise, sales, privilege, or use tax or taxes which are payable by Seller because of the execution of any agreement resulting herefrom, or the sale or delivery of this equipment, and Buyer shall reimburse Seller for any such tax or taxes where applicable.

5. PATENTS. Seller agrees that it will, at its own expense, defend and hold Buyer free and harmless in any suit or proceeding insofar as the same is based on a claim that the equipment furnished hereunder constitutes an infringement of any existing U.S. patent provided Buyer gives Seller prompt notice of such suit or proceeding, permits Seller through its counsel to defend the same, and gives Seller all necessary information, assistance and authority to enable Seller so to do. In case said equipment is in such suit held to constitute infringement and the use of said equipment is enjoined, Seller shall, at its own expense and at its option, either procure from Buyer the right to continue using said equipment; or replace the same with non-infringing equipment or modify it so it becomes non-infringing; or remove said equipment and refund the purchase price. The foregoing states the entire liability of Seller for patent infringement by the equipment furnished hereunder and is not to be construed in any way as rendering Seller liable for special, indirect or consequential damages. The provisions of this paragraph shall not apply to any equipment specified by Buyer or manufactured to Buyer's design. As to such equipment, Seller assumes no liability whatsoever for patent infringement.

6. DRAWINGS. Ownership of drawings, bills of material, flow diagrams, plot plans, details, specifications and other data prepared by Seller shall remain with Seller, except in the case of drawings, manuals, etc., if any, required to be supplied to Buyer hereunder. Drawings, manuals, etc., so required to be supplied to Buyer shall be the property of Buyer, but Buyer agrees to use them solely for the purpose of facilitating or completing construction maintenance, operation, modification, and repair of the equipment, and agrees not to disclose the same to others for other purposes without the consent of the Seller.

7. ACCEPTANCE. This quotation embodies the entire agreement between the parties hereto and supersedes all prior representations, samples, technical advice and agreements between the parties in connection with the sale of the articles described herein. Unless accepted in writing by an executive officer of Seller, any terms or conditions in Buyer's acceptance of the quotation, whether in the form of a purchase order, acknowledgment, confirmation or otherwise, which purport to add to, modify, supersede or otherwise alter the terms and conditions contained in this quotation, shall not be binding on Seller nor have the effect, in construing any agreement resulting from Buyer's acceptance of this quotation, of canceling or otherwise leaving open any terms or conditions herein proposed. The commencement by Seller of any work relating to supply of the equipment described in this quotation shall not be construed as Seller's acceptance of any additions to, modifications, or alterations of, the terms and conditions set forth herein.

8. INTERPRETATION. Any agreement between Seller and Buyer resulting from acceptance of this quotation shall be governed by and construed according to the laws of the State of Maine.

SHIVELY LABS div. of HOWELL LABORATORIES, INC. BRIDGTON, ME 04009 (207) 647-3327

Sales Conditions

1. Delivery and Excusable Delays.

Seller will make all reasonable efforts to conform with delivery estimates but neither party shall be held in default for failure to perform or delay in performance rising out of causes beyond its reasonable control and without its fault or negligence, including, but not limited to, acts of God or of the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, lockouts, labor disputes, freight embargoes, delays in routing, fuel or energy shortages, inability to secure necessary parts and materials, and unusually severe weather. Unless otherwise specified, payment is due upon shipment by Seller. If shipment is delayed beyond the original agreed shipment date due to Buyer's failure to provide information necessary to complete or to ship the order, or if Buyer requests that completion or shipment of the order be delayed beyond the original agreed shipment date, then Buyer shall be invoiced on the original agreed shipment date for so much of the order as has then been completed and Buyer agrees to make timely payment of such invoice. Seller will notify Buyer in writing within a reasonable time after the beginning of any delay. In the event of any delay, the date or dates for performance by Seller of this contract shall be deemed extended for a period equal to the time of delay.

IN NO EVENT SHALL SELLER BE LIABLE FOR CONSEQUENTIAL DAMAGES FOR FAILURE TO PERFORM OR FOR DELAY IN PERFORMANCE HOWEVER CAUSED.

2. Changes in Design or Construction.

Seller reserves the right in its sole discretion to make any changes it deems desirable in the design or construction of the equipment described in this quotation, without incurring any obligation to furnish Buyer with such changes in similar items previously delivered, provided that any equipment so changed meets the performance specifications.

3. Warranty and Liability.

Seller warrants the equipment manufactured by it to be free from defects in material and workmanship at date of shipment from Seller's factory and for a period of one year thereafter, under proper and normal use and service. As to all apparatus and accessories not manufactured by Seller which are part of the equipment furnished by Seller, Seller's only obligation shall be to obtain for Buyer such warranties or guaranties as are available from the vendors thereof. Such warranties or guaranties shall extend over the longest period of time obtainable in this instance by Seller, without payment by Seller of additional consideration therefor. Seller further warrants that the equipment will perform in accordance with the performance characteristics, if any, of such specifications as may be made a part hereof. If the specifications provide for a performance test or tests, the ability of the equipment to meet this performance, warranty shall be determined by the result of such test or tests. Upon the successful completion of such test or tests, all liability of Seller under this performance warranty shall terminate. If such performance test or tests are specified but, without fault of the Seller, are not completed within 60 days after date of shipment, the equipment shall be conclusively deemed to have satisfied this performance warranty and all liability of Seller therefor shall terminate. If no performance test or tests are specified, the ability of the equipment to meet this performance warranty shall be determined by the operation of the equipment under normal operating conditions within three months from date of startup of the equipment, but not more than one year from date of shipment. If, during the applicable warranty period, the equipment or any part thereof is found to have been defective when shipped, it will be repaired at Seller's factory or replaced without charge, f.o.b. factory, provided that Buyer gives Seller immediate written notice upon discovery of such defect, whereupon Seller shall have the option of requiring the return of the defective part or parts, freight prepaid, to establish the claim. As to apparatus and accessories of other vendors, resort shall be had against such vendors only, and Seller shall use reasonable efforts to require its vendors to fulfill the obligations of their warranties or guaranties on such apparatus and accessories furnished hereunder. The replacement or repair of defective parts, as aforesaid, shall be Buyer's only remedy for breach of the warranties of Seller, except that, in case of failure of the equipment to fulfill Seller's warranty of performance, Seller shall have the option of removing and reclaiming the equipment at its own expense and of repaying to Buyer all sums received on account of the purchase price, in which event all liability of Seller shall terminate. No allowance will be made for repairs or alterations made without the written consent of Seller, in which event all Seller's warranties shall be void and of no effect. **Seller's warranties shall not extend to equipment which has not been connected, installed, used or maintained in accordance with written instructions from Seller.** Buyer agrees to assume responsibility and pay for such defects which are attributable to it and for damages which may occur to the equipment after delivery to it.

ANY OTHER PROVISIONS OF THIS AGREEMENT TO THE CONTRARY NOTWITHSTANDING THIS WARRANTY EXCEPT AS TO TITLE IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, ARISING BY LAW, CUSTOM OR CONDUCT. THE RIGHTS AND REMEDIES PROVIDED HEREIN ARE EXCLUSIVE AND IN LIEU OF ANY OTHER RIGHTS OR REMEDIES. IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES.

4. Taxes.

The price for the equipment does not include any excise, sales, privilege, or use tax or taxes which are payable by Seller because of the execution of any agreement resulting herefrom, or the sale or delivery of this equipment, and Buyer shall reimburse Seller for any such tax or taxes where applicable.

5. Patents.

Seller agrees that it will, at its own expense, defend and hold Buyer free and harmless in any suit or proceeding insofar as the same is based on a claim that the equipment furnished hereunder constitutes an infringement of any existing U.S. patent provided Buyer gives Seller prompt notice of such suit or proceeding, permits Seller through its counsel to defend the same, and gives Seller all necessary information, assistance and authority to enable Seller so to do. In case said equipment is in such suit held to constitute infringement and the use of said equipment is enjoined, Seller shall, at its own expense and at its option, either procure from Buyer the right to continue using said equipment; or replace the same with non infringing equipment or modify it so it becomes non infringing; or remove said equipment and refund the purchase price. The foregoing states the entire liability of Seller for patent infringement by the equipment furnished hereunder and is not to be construed in any way as rendering Seller liable for special, indirect or consequential damages. The provisions of this paragraph shall not apply to any equipment specified by Buyer or manufactured to Buyer's design. As to such equipment, Seller assumes no liability whatsoever for patent infringement.

6. Drawings.

Ownership of drawings, bills of material, flow diagrams, plot plans, details, specifications and other data prepared by Seller shall remain with Seller, except in the case of drawings, manuals, etc., if any, required to be supplied to Buyer hereunder. Drawings, manuals, etc., so required to be supplied to Buyer shall be the property of Buyer, but Buyer agrees to use them solely for the purpose of facilitating or completing construction maintenance, operation, modification, and repair of the equipment, and agrees not to disclose the same to others for other purposes without the consent of the Seller.

7. Acceptance.

This quotation embodies the entire agreement between the parties hereto and supersedes all prior representations, samples, technical advice and agreements between the parties in connection with the sale of the articles described herein. Unless accepted in writing by an executive officer of Seller, any terms or conditions in Buyer's acceptance of the quotation, whether in the form of a purchase order, acknowledgment, confirmation or otherwise, which purport to add to, modify, supersede or otherwise alter the terms and conditions contained in this quotation, shall not be binding on Seller nor have the effect, in construing any agreement resulting from Buyer's acceptance of this quotation, of canceling or otherwise leaving open any terms or conditions herein proposed. The commencement by Seller of any work relating to supply of the equipment described in this quotation shall not be construed as Seller's acceptance of any additions to, modifications, or alterations of, the terms and conditions set forth herein

8. Interpretation.

Any agreement between Seller and Buyer resulting from acceptance of this quotation shall be governed by and construed according to the laws of the State of Maine.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

12/6/2019

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must be endorsed. If **SUBROGATION IS WAIVED**, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Cross Insurance 491 Main Street P.O. Box 1388 Bangor ME 04401		CONTACT NAME: Judy Cardimino PHONE (A/C, No, Ext): (207) 404-5305 E-MAIL ADDRESS: jcardimino@crossagency.com FAX (A/C, No): 207-942-4678	
INSURED Howell Laboratories, Inc. Shively Labs PO Box 389 Bridgton ME 04009		INSURER(S) AFFORDING COVERAGE INSURER A: Zurich Insurance INSURER B: Zurich-American Ins Co INSURER C: Manufacturers of Maine Group Trust INSURER D: Dirigo Reinsurance INSURER E: INSURER F:	NAIC # 16535 8334098

COVERAGES

CERTIFICATE NUMBER: CL1953089134

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			CPO 0123754-03	6/1/2019	6/1/2020	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 1,000,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000
A	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> NON-OWNED AUTOS			CPO 0123754-03	6/1/2019	6/1/2020	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
A	<input checked="" type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> DED <input checked="" type="checkbox"/> RETENTION \$ 0			AUC 0123972-03	6/1/2019	6/1/2020	EACH OCCURRENCE \$ 20,000,000 AGGREGATE \$ 20,000,000 \$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N		WCMMGT2019409- ME WC0123756-04 -Out of State USL&H coverage - Included	7/1/2019 6/1/2019	7/1/2020 6/1/2020	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
D			N/A				

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Refer to policy for exclusionary endorsements and special provisions.

Certificate holder is named as addl insured as required by contract. 30 day notice of cancellation applies with exception of cancellation due to non payment of premium

CERTIFICATE HOLDER

CANCELLATION

State of West Virginia Purchasing Division 2019 Washington St East P.O. Box 50130 Charleston, WV 25305	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Judith Cardimino/JCO <i>Judith Cardimino</i>
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Radomes

Features

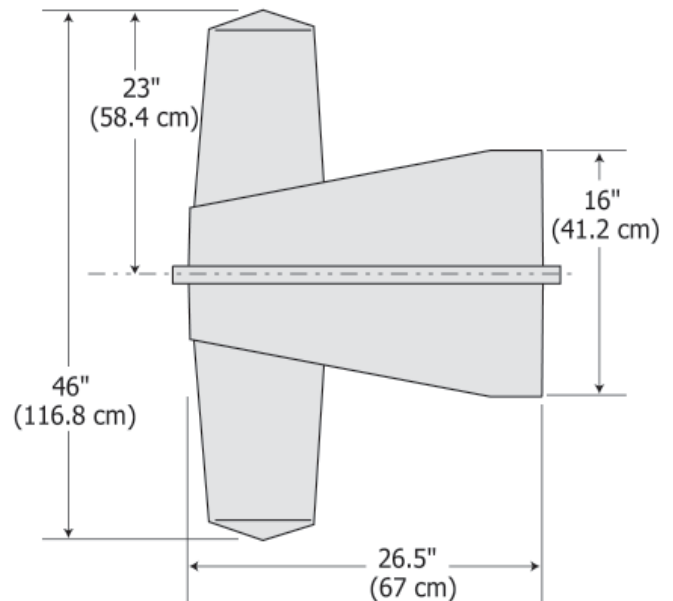
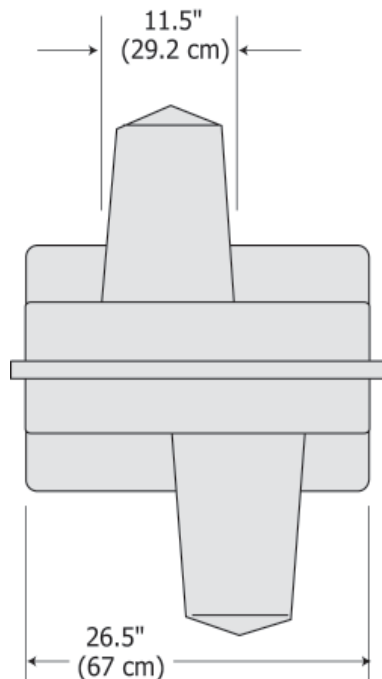
- Manufactured of high-density polyethylene no fiberglass
- Unaffected by UV radiation
- Extremely low RF loss
- Mounts directly to feedline or tower
- Specially pigmented
- Only protection against rime ice
- No wiring or electrical costs
- Three sizes available

Two colors available.



Dimensions:

Standard full radome for
Models 6600, 6810



Document No. ds-radomes (180409)

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(207) 647-3327

1-888-SHIVELY

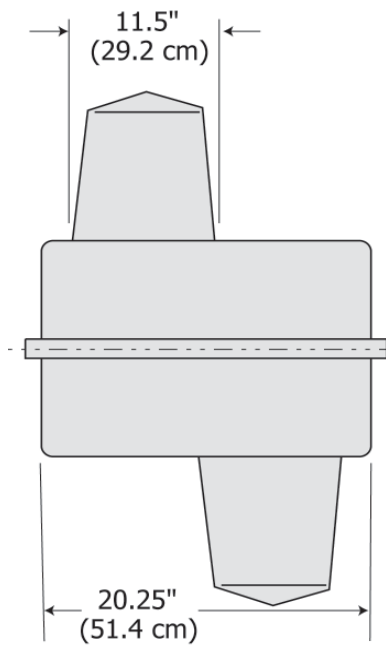
Fax: (207)647-8273

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www.shively.com

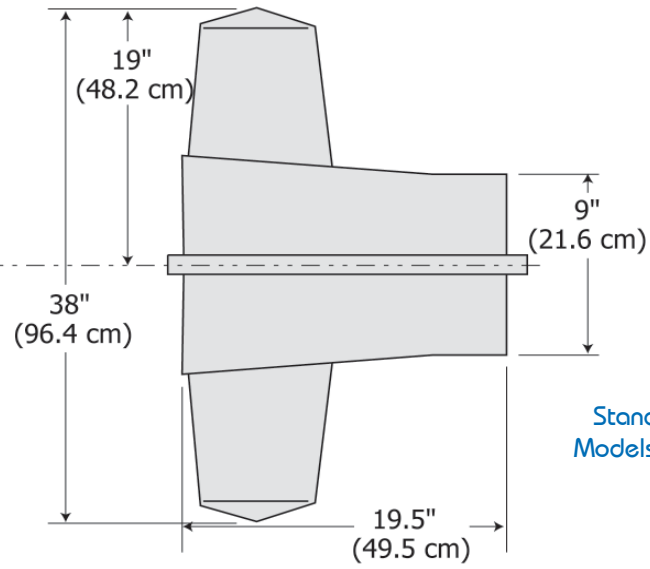
sales@shively.com

Certified to ISO-9001



Standard radome for Model 6814R

XXLR radome for Models 6600, 6810,
6813, & 6812B)



Standard full radome for
Models 6602B, 6812B and
6813

