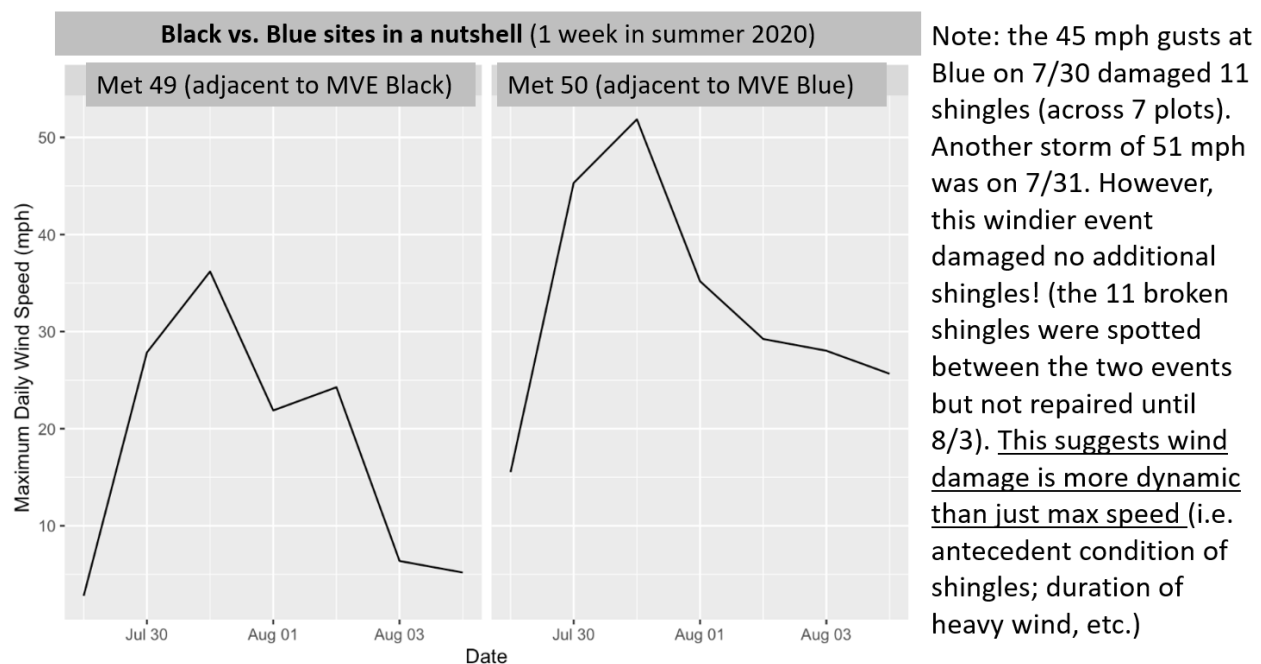


Lessons learned/time will tell

Wind abatement will be an ongoing point of concern for MVE maintenance and Sev infrastructure at large. We have gained more knowledge about what can be done to improve the situation and things we can expect going forward. First, there are some bullet points of the main takeaways from this section and some points about moving forward in the effort against wind. Finally, the last figure of this section is some examples about future strategies that may work or inspire other improvements.

- Any wind over 45 mph can damage infrastructure and unfortunately this wind is common; improvements are therefore needed
- Regular maintenance is expected throughout the year (ex: re-tying fallen gutters w/ thicker wires; replacing broken shingles; constant assessment of storms)
- We know Blue site is more vulnerable than Black/Creosote sites. Not only because of the data (see fig below) but because of damage that occurs regularly at MVE and EDGE Blue sites but not at MVE and EDGE Black sites.



- More strategies will be employed in the future if damage continues
 - o See pic below
 - o More installation of 'stabilizer lines' (see above)
 - o JB Henderson suggestions: see a pasted email from J. Rudgers on her conversations with JBH

Examples of potential future solutions for wind abatement

Pin attachment of conduit to bracket



As a strategy to make removing panels easier during treatment swaps, all paired plots at MVE Black are held to the brackets with pins on the outer posts. This may prove an effective method for combating wind since the conduit is actually bound to the bracket (which in turn is bound to the post) instead of suspended via carriage bolts. Note: guy wires still pulling posts inward to a) combat shaking and b) reduce pin stress

Wire tying conduit: some T-posts were installed incorrectly by 90 degrees forcing brackets to sit off as well. However, simply tying down the panels to the brackets with thick wire may prove to be a quick and reliable binding option (this is similar to EDGE shelter installation which is reliable)



An excerpt from an email conversation from J. Rudgers about talks with JB-H 5/20/20:

JB Henderson's suggestions for wind resistance at MVE blue

1. Add a PVC brace for "V" up shingles this would go across the middle of the side of the shelter (half way up a shingle) then wire each shingle to the PVC to stop them from twisting side to side in the wind. For "Λ" down shingles, the PVC would instead go underneath the conduit on the low end of the shelter to provide additional support for the downward attachment of the shingles hanging off the conduit (counteract gravity and the weight of the shingle pulling on the bolt). For this, we may only need to wire the PVC to the conduit at each end, rather than wiring each shingle to it. I suggest we try this on plot 7 MVE blue and one control plot that has had repeatedly broken shingles to see if that helps it.
2. When we swap treatments (this July at Blue), consider lowering the roof closer to the ground on all t-posts – we would have to shorten or remove the spacers (black vertical pipes) that are used with the sprinkler heads
3. Try shingles made from Lexan (will be more expensive, but they will get a quote for us); this is more rubbery and less likely to crack at the bolt hole.
4. For any shingles that get replaced... pre-drill the hole only on one end, then drill the second hole in the field, which will create less pressure/tension on the shingle in spots where the conduits are not exactly parallel or at the right distance from one another.

More desperate measures:

-JB Henderson is willing to pour concrete for us to stabilize t-posts more, but suggested they would try tension wires on the sides that don't have them first – this could cause more breakage since some shingles are already under pressure between the perpendicular conduit

Solutions for next install:

- JB Henderson will get us a quote for them to machine a brace for the shingles that would sit on top of the conduit. Sort of like... WWWWWWW... the shingles won't be able to shake side to side if we have something like this in place.

- Consider only drilling one hole for all of the shingles in the future.

ARMS vs. MVE

The MVE shelter and irrigation system emulates the original ARMS design but diverges in a few key ways. For this reason, it may be important to justify omissions and additions that deviate from ARMS (Gherardi et al. 2013). This will improve our methods by solving design follies and anticipating issues during the review process.

ARMS used flow meters to record water on the outlet side of the pump, ensuring that the system was working properly and achieving desired treatments based on precipitation events. This allowed them to model expected (rain measurements) vs. observed (pumped) precip. We do not have flow meters. T

Ordering material + costs

Posted here is info about buying material (what where why?). Some receipts are also pictured to help with pricing, ordering, vendor contact info, part #'s, etc. etc. Work with UNM Bio Accounting department to order things. Personal note: I have had more success ordering most items directly from vendors when possible as opposed to Amazon. Not listed below are various items that can be purchased on an as-needed basis from Home Depot or other hardware stores (i.e. insulation, electrical tape, wire tie, etc.)

Shingles

Port Plastics in Albuquerque sells Acrylic sheets (1/8" x 96" x 48") for \$74 per sheet which produces 9 shingles.

- 25% shelters: (6 shingles * 4 panels * 5 plots) = 120 shingles
- mock shelters: (9 shingles * 4 panels * 10 plots) = 360 shingles
- 50% shelters: (11 shingles * 4 panels * 10 plots) = 440 shingles
- 75% shelters: (17 shingles * 4 panels * 5 plots) = 340 shingles
- A full MVE site thus needs 1260 shingles
- Assuming damage in the field and during fabrication, extras are needed (an additional 144 is standard): **a site needs 1404 shingles**
- 1404/9 shingles in a sheet of acrylic = 156 sheets * \$74.00 = **\$11,544.00 in materials**

Shingles arrive with manufacturer's paper which takes approx. 30 seconds to tear off. Bending requires two people and averages 2 minutes per shingle. Drilling averages 30 seconds per shingle. Hence a conservative time estimate for shingle fabrication of a site is:

- (3 minutes * 1404) / 60 minutes = 71 hours labor time
- ((2 minutes * 1404 * 2 people) + (1 minute * 1404)) / 60 minutes = 117 people hours
- 117 people hours @ undergraduate labor rate \$10.50/hr = **\$1,228.50 in labor**

MVC (Oct 2020) order:



2109 CANDELARIA ROAD NE
ALBUQUERQUE NM 87107
Phone (505) 8840507 Fax (505) 8840525

QUOTE THIS IS NOT AN INVOICE

Page 1 of 1

Quote Number:	1740243 SQ
Quote Date:	10/1/20
Customer No:	94867
Branch Plant:	840

Sold To: 94867
UNIVERSITY OF NEW MEXICO
ONATE HALL 222
ALBUQUERQUE NM 87131

Ship To: 94867
UNIVERSITY OF NEW MEXICO
BIOLOGY DEPARTMENT
ALBUQUERQUE NM 87131

Customer PO		Customer Phone		Planned Carrier		Planned Freight Terms	
ANTHONY LUKETICH		505 2777169		WILL CALL CARRIER		WILL CALL	
Payment Terms				Salesperson			
CREDIT CARD				ADRIAN MARTINEZ			
Qty Req	UM	Description Cust Item Number	Item Number/ Lot	Units Req	PR UOM	Unit Price	Total
156.000	SH	ACR EXTR CLEAR FW .118 X 48 X 96 ⚠ETHYL ACRYLATE cut to 1,404 each 5" x 96" strips Lead Time 1 - 2 days	18253	156.000	SH	74.000	11,544.00

Guy-wires, Turnbuckles, and Clamps

This is the material for securing the guy wires on the shelters (3/16" cable – see MVG site to understand material). Fastenal in Abq has great prices compared to online vendors. The quote below was for MVG and enough material was ordered for the "X" installation and the "rubber bands" installation (see Wind Damage section). As of Oct 2020, not all MVG shelters have yet received rubber bands, hence there is some leftover; although they should be installed just to be safe.

Material is picked up from the store and delivered to the site; guy wires should be installed ASAP after a shelter is constructed.



Price Quotation
CONFIDENTIAL

March 6, 2020

UNIVERSITY OF NEW MEXICO
1818 CAMINO DEL SERVICIO NE
ALBUQUERQUE, NM 87131-0001
ATTN: Francis

Phone: 505-277-1327
Fax:
Contract No: 2018.000208

Account #: AQNM0661 Due Date: 03/9/2020
Quote #: 115763 Expiration Date: 04/6/2020
Job #: PO #:

<u>Part #</u>	<u>Customer Part #</u>	<u>Description</u>	<u>Quantity</u>	<u>Price/C</u>	<u>Extended Price</u>
45525		S/S Cbl 3/16 (7X19)	2,500	\$86.0000	\$2,150.00
43030		TB EYE-EYE 3/8 X 6	88	\$1,133.0000	\$997.04
43402		MALL CC 3/16	1,100	\$104.0000	\$1,144.00
USD Subtotal:					\$4,291.04
Shipping & Handling:					\$0.00

Pumps

Pumps are ordered from Seaflo, see attached quote for contact info. The quote below is from MVG order and was delivered to UNM Bio. 11 pumps were ordered to have a backup ready to go.

Seaflo Marine & RV North America
808 North Central Ave
Wood Dale, IL 60191
844-473-2356
sales@SeafloUSA.com



INVOICE

BILL TO

Anthony Luketich
University of New Mexico
1 University of New
Mexico
MSCO3 2020
Castetter Hall
Albuquerque, NM 87131

SHIP TO

Anthony Luketich
University of New
Mexico
1 University of New
Mexico
MSCO3 2020
Castetter Hall
Albuquerque, NM
87131

INVOICE # 4053

DATE 02/07/2020

DUE DATE 02/07/2020

TERMS Due on receipt

SKU	DESCRIPTION	QTY	PRICE	AMOUNT
SFDP1-030-055-42		11	47.99	527.89
Country of Origin: China		SUBTOTAL		527.89
		SHIPPING		38.86
		TOTAL		566.75
		BALANCE DUE		\$566.75

Pump batteries

After power-budgeting for combined winter heat-tape operation and intense rain events, the irrigation systems received solar panel (see next section) and battery upgrades. The batteries are picked up from Interstate batteries (aka More-Co batteries) in Abq; see quote. Note: the '24DC boxes' portion of the quote are the battery boxes, but these should not be purchased again, as future installs should probably contain a larger box (Husky storage container or Action Packer) for both battery + solar charge controller (see irrigation electrical section).

INTERSTATE BATTERIES
 1910 1ST STREET NW
 ALBUQUERQUE NM 87102
 T:(505)247-3434 F:(505)247-9199

DATE February 3, 2020

TO UNM

SALESPERSON	JOB	SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE	PAYMENT TERMS	DUE DATE
BARRY					Due on receipt	

QTY	ITEM #	DESCRIPTION	UNIT PRICE	DISCOUNT	LINE TOTAL
18.00	24DC-1	95AH MORCO DEEP CYCLE	\$ 89.95		\$ 1,619.10
20.00	24 BOX	24DC BOXES	10.95		219.00

Pump solar panels and charge controllers

For operating the pumps and keeping the batteries charged we bought SunSaver brand solar controllers and SolarLand brand solar panels. We bought these through Solarflexion.com and they were delivered to us (quote below). If better products or prices are found for panels, sticking with SolarLand is not imperative, however I urge sticking with the same charge controller (assuming we keep the same pump model).

38365 Innovation Ct., Suite 1005
Murrieta, CA 92563
(800)942-2424
www.solarflexion.com

INVOICE

Date: 03/10/2020 **Order#:** 31396

Bill To: (Customer ID#1034)

University of New Mexico
Anthony Lukechith
TBD
Albuquerque, NM 87131
United States
520-820-9971
lukechith.anthony@gmail.com

Ship To:

University of New Mexico
Anthony Lukechith
TBD
Albuquerque, NM 87131
United States
520-820-9971

Payment Method:

NONE

Shipping Method:

Custom Shipping Quote Required

Code	Description	Qty	Price	Total
SLP100-12U	SLP100-12U	20	\$187.46	\$3,749.20
SS-10L-12V	Morningstar SunSaver SS-10L-12V w/ Low Voltage Disconnect (LVD) > 10 Amp (12V) Charge Controller	10	\$76.00	\$760.00
Shipping	Shipping Services	1	\$267.77	\$267.77

Subtotal: \$4,776.97

Tax: \$0.00

Shipping & Handling: \$0.00

Grand Total: \$4,776.97

Sensor cables and splice connectors

We order our sensor cables and other products at Graybar in Abq and just pick them up from their store. Below is the quote for MVC, for the various cables and splicers that connects the sensors, muxes, dataloggers etc.



281 MENAUL BLVD NE
ALBUQUERQUE NM 87107-1523
Phone: 505-449-4500
Fax: 505-449-4533





To: UNM - COMM DATA PURCHASING
UNM BUSINESS CENTER, SUITE 2600
1 UNIVERSITY OF NEW MEXICO
ALBUQUERQUE NM 87131-0001
Attn: Anthony Luketick
Phone: 505-277-2036
Email:
Fax: 505-277-7774

Date: 08/20/2020
Project Name:
GB Quote #: 0236061159
Purchase Order Nbr:
Release Nbr:
Additional Ref#:
Revision Nbr:
Valid From: 08/20/2020
Valid To: 09/19/2020
Contact: BARBARA BARRETT
Email: barbara.barrett@graybar.com

Proposal

We appreciate your request and take pleasure in responding as follows

Notes:

Item	ItemType	Quantity	Supplier	Catalog Nbr	Description	Price	Unit	Ext.Price
100		1000	BELDEN	2C18-FPL-R-M -B-BED	5320UU 002U1000	\$164.59	1000	\$164.59
 GB Part#: 99913205 UNSPCS: 26121600 MFR SPEC SHEET Ship From: Stock DENVER, SERVICE CENTER Long Description: Red Riser electronic wire has (2) 18 AWG conductors. Wire is packaged in 1000 ft. Reel. Belden alt. mfr. number: 5320UU 002U1000								
Country:USA								
101		1000	SOUTHWIRE	F40015-1A	18/2 TWISTED SHIELDED PAIR FPLR	\$93.12	1000	\$93.12
101		1000	SOUTHWIRE	F40015-1A	18/2 TWISTED SHIELDED PAIR FPLR	\$93.12	1000	\$93.12
GB Part#: 25795156 UNSPCS: 26121604 Ship From: Stock-MULT. Shipments Scheduled Graybar would like to offer this item as an alternate for item (000100). The price for this suggested item is not factored into the total for this quote.								
Country:USA								
UPC#:03288688099								
200		1000	GENERAL CABLE	6C24FS-CMR-G Y-R-A-GCC	C0743A.41.10	\$283.03	1000	\$283.03
 GB Part#: 25043712 UNSPCS: 26121600 Ship From: Stock ZONE-FRESNO, CA Long Description: Carol® Computer Cable, No. of Conductors: 6, Conductor Size: 24 AWG, Tinned Copper, PVC								
Country:USA								
UPC#:07940739005								
300		1000	GENERAL CABLE	3C24FS-CMR-G Y-R-A-GCC	C0741A.41.10	\$169.83	1000	\$169.83
 GB Part#: 25164027 UNSPCS: 26121600 Ship From: Will Call ALBUQUERQUE, NM Long Description: Carol® Computer Cable, No. of Conductors: 3, Conductor Size: 24 AWG, Tinned Copper, PVC								
Country:USA								
UPC#:07940739004								
400		200	BELDEN	709SC	TELECOM WIRE CONNECTOR FILLED	\$46.78	100	\$93.56
 GB Part#: 22086991 UNSPCS: 39121400 Ship From: Stock DENVER, SERVICE CENTER Long Description: Pink, pair-at-a-time filled inline connector for solid 2-conductors, 26 to 22 AWG.								
Country:Mexico								
UPC#:78621097365								

Total in USD (Tax not included): \$711.01





Sensors (soil moisture and temperature)

Meter Group makes the Teros 11 sensors which is the current model used at MVG, MVC.

Dataloggers and enclosures

We are using CR1000 starting with Jsav

Campbell Scientific makes the dataloggers, multiplexers, and weather-proof enclosures we use to collect soil moisture and other data. Below is the quote for the products ordered for MVC.

						Price
1		CR6-NA-ST-SW-CC	Measurement & Control Datalogger -NA No Additional Coms -ST -40 to +70C -SW Standard 3yr Warranty -CC Campbell Calibration	1	\$1,915.20	\$1,915.20
2		AM16/32B-ST-SW	16 or 32 Channel Relay Multiplexer -ST -25 to +50C -SW Standard 1yr Warranty	3	\$576.00	\$1,728.00
3		ENC12/14-SC-MM	Weather-Resistant Enclosure, 12 x 14 inches -SC 1 Conduit for Cables -MM Tripod Mast Mounting	2	\$321.60	\$643.20
4		ENC16/18-SC-SB-MM	Weather-Resistant Enclosure, 16 x 18 inches -SC 1 Conduit for Cables -SB Standard Backplate -MM Tripod Mast Mounting	1	\$465.60	\$465.60

Sub Total: \$4,752.00
Tax: \$0.00
Freight: \$55.88
Grand Total: \$4,807.88

Quote Date: 20 Aug 2020
Valid Through: 19 Oct 2020
Quoted By: [Brittany Batt](#)
Credit Terms: [Apply now](#)
Freight Terms: PP&A
Incoterms: FOB Logan, UT

To
Anthony Luketich
University Of New Mexico
Biology Dept
MSC03 2020
Albuquerque, New Mexico 87131
United States

Ship To
University Of New Mexico
1 University of New Mexico
MSC03 2020 Ceria 315
Albuquerque, New Mexico 87131
United States

Shelter hardware

ABQ bolt and fastener is also good

Ordering hardware from True Value in Abq was far superior than ordering it from Amazon, as in-person communication with managers when placing the order (recommended) was good, and the order arrived all at once in a convenient package. Amazon orders arrive in broken boxes at different times and the vendors are mysterious cyborg creatures shrouded in conspiracy (probably). Also I have a anti-online ordering bias that stems from fear of my own laziness, fear of human workers becoming obsolete, and fear of Jeff Bezos. The receipt below is probably not everything at a site, but one should take an inventory of what is needed at a site and then take that to True Value. Some notes: 1) a lot of extra hardware exists at the FS storage e.g. lots of carriage bolts, hex bolts, etc. 2) make sure nuts and bolts truly work together (3/8" zinc nuts may not screw on easily or at all to a 3/8" galvanized bolt).



Float switches

The float switches were an item I did not mind ordering from Amazon.



Roll over image to zoom in

attwood Atwood 4202-7 Automatic Float Switch, One size

Brand: attwood

★★★★☆

115 ratings | 4 answered questions

Amazon's Choice for "attwood float switch"

List Price: ~~\$32.25~~

Price: **\$25.13** & **FREE Returns**

You Save: **\$7.12 (22%)**

[Get \\$60 off instantly: Pay \\$0.00 upon approval for the Amazon.com Store Card.](#)

Available at a lower price from [other sellers](#) that may not offer free Prime shipping.

- Converts manual bilge pump into one that is controlled fully automatically
- Compact, low-profile design that mounts on any surface from horizontal up to a 24-degree angle
- Reliable mechanical switch that actuates pump motor at 2 inches water level
- 12- and 24-volt CE rated with a 36-inch wire connection
- Maximum amp draw is 12 amps (at 12-volt DC) or 6 amps (at 24-volt DC)
- Measures 4 1/4 inches L x 3 7/8 inches W x 1 3/8 inches H

\$25.13

& **FREE Returns**

FREE delivery: Thursday, Oct 29
[Details](#)

Fastest delivery: **Tomorrow**
Order within 11 hrs and 44 mins [Details](#)

In Stock.

Qty: 1

Add to Cart

Buy Now

Secure transaction

Ships from **Amazon.com**
Sold by **Amazon.com**

Return policy: [Returnable until Jan 31, 2021](#)

☐ Yes, I want **FREE delivery, as fast as today with Prime**

Conduit

EMT conduit (3/4") comes in 10 ft lengths and has been ordered from a few different vendors. Each shelter needs 8 conduit (cut down to their 8' 2" length). Therefore, $(8 \times 30 =)$ 240 sticks of conduit are ordered per site. Avg cost has been ~6/7 dollars per stick)

T-posts

Important: Creosote bushes are tall. If the shelters at MVC need to be built taller than grassland sites, taller T-posts will be needed (and on that note beware of additional wind susceptibility).

Each shelter needs three 8' T-posts for the center of the plot and six 5.5' T-posts for the outsides. So a site needs: 90 8-foot posts and 180 5.5-foot posts. Raks and Tractor Supplies are both stores that have these in stock. Hint: picking up posts from Tractor Supplies at the Bosque Farms location and then driving them straight to the site is pretty quick.

Pump Boxes

The pump boxes are similar to the weather proof enclosures from Campbell Sci but a little cheaper (in both price and quality but they seem to do the job thus far). For MVG, we ordered from Master Electronics (see below). The boxes are Bud Industries NBB-15245. The NBX part is the back plate that fits inside the box which is good for a few reasons such as weighing down the box, and elevating the pump to help sheet away potential leaks.



(952) 960-4774

Manufacturer	Part Number	Quantity	Availability	Price	Ext.Price
Bud Industries	NBB-15245	10	10 Ships 03/09/2020	\$66.18	\$661.80
Bud Industries	NBX-10986	10	1 Ships 03/09/2020 9 Due: 05/01/2020	\$10.62	\$106.20
				Subtotal:	\$768.00
				Shipping:	\$17.98
				Order Total:	\$785.98

Rain barrels

Rain barrels are made and sold in Abq from Desert Plastics, the line of product is called Tijeras rain barrels, and the model is the Agua Fria. See order forms and quotes below.

Promised Date _____

Invoice # 0710477

Fax to Desert Plastics @ (505) 884-3932

"AF Companion" ONLY Build Sheet

05.24.16

Order Date: 3/16/2019 Quantity: 10
(Number of IDENTICAL units only!)

Distributor: UNM Biology Department

Job Name: Primary L. Salesman: Vanessa PO # 277-2712

Barrel Size: ☒ 55 Gallon Vertical ☐ 100 Gallon Vertical
☐ 200 Gallon Vertical ☐ 360 Gallon Vertical

Standard Top: The removable tops are solid with a 4" Ring & Cap inlet and secured with mechanical fasteners like the regular Agua Fria series. Cover Vent-tube holes w/ 1/2" holes

Colors:

<input type="checkbox"/> Blueberry	<input type="checkbox"/> Bright Yellow	<input type="checkbox"/> Bright Red	<input type="checkbox"/> Dark Grey	Premium Resins (extra charge)
<input type="checkbox"/> Bright Blue	<input type="checkbox"/> Light Adobe	<input type="checkbox"/> Latte	<input type="checkbox"/> Wickertone	
<input type="checkbox"/> Bright Green	<input type="checkbox"/> Medium Adobe	<input checked="" type="checkbox"/> Black	<input type="checkbox"/> Natural	
<input type="checkbox"/> Sherwood Green	<input type="checkbox"/> Dark Adobe	<input type="checkbox"/> White	<input type="checkbox"/> Turquoise	
<input checked="" type="checkbox"/> SOLID COLOR <input type="checkbox"/> SPECKLED COLOR				

☒ Plus Version: Includes Internal Overflow, Backup Overflow, and Drain Fitting plus valve.

☐ Factory DEFAULT locations are OK. These positions are "A" @ 0° / 360°, "B" @ 90° and "D" @ 270°.

☒ I want CUSTOM locations at no extra charge! Please indicate below by placing the appropriate letter in the desired position. Notice "C" is optional at additional charge.

Tell us where to install your fittings.

0°: A (3/4" 1/2 thread) 45°: _____

90°: _____ 135°: A (1/2" 1/2 thread)

180°: _____ 225°: A (1/2" 1/2 thread)

270°: _____ 315°: _____

A. Fitting for Drain Valve
3/4" NPT Fitting; Single Threaded; Natural Color; installed as close to bottom as possible.

B. Fitting for Primary Overflow
1-1/2" NPT Fitting; Double Threaded; Natural Color; installed as close to bottom as possible.
*AF 360 Remote Tank has a 2" NPT Fitting.

C. Fitting for Bucket-high Throttling Valve
3/4" NPT Fitting; Single Threaded; Natural Color; installed approx. 16" from bottom

D. Fitting for Backup Overflow / Manifold
1-1/2" NPT Fitting; Double Threaded; Natural Color; installed approx. 3" underneath lip.
*AF 360 Remote Tank has a 2" NPT Fitting.

Gutters and irrigation parts

MVE gutters are weird: From Williams Windmill in Lemitar, we order 4" x 20' pipes of schedule 40 PVC. At their shop, they cut the pipes length-wise down the entire stretch; this creates 2 "half-pipes" per pipe and each half-pipe becomes a gutter on one end of the shelters. They charge for cutting labor as well as delivery to the site. Because 20 plots get gutters, we order 20 pipes (aka 400 ft) and therefore 40 half-pipes.

2401 A Phoenix, NE
Albuquerque, New Mexico 87107



Date

3/6/2019

Quotation #

10679

FOB

Albuquerque

Name / Address

University of New Mexico
Accounts Payable
PO Box 4548
Albuquerque NM 87196

Total

\$2,275.00



Williams Windmill Inc.

P.O. Box 7 Lemitar, New Mexico 87823
Telephone (575) 835-1630 Fax (575) 838-4536
Williamswindmill@live.com

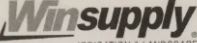
No: 143889

4-16-19

★ Unm. Biology

QUANTITY	DESCRIPTION	PRICE	AMOUNT	
200'	4" Sch 40	230	460	00
5	Hawn Shop Labor		300	00
	Delivory Fee		250	00
			1010	00
		NTIC		

As for the rest of the irrigation fittings, the easiest thing to do would be to go to MVG and write down everything you need (from the gutter fittings to the barrel to the pumps to the sprinklers etc....) After that get a quote from 2 irrigation stores in town for the material. (Quote examples below). You may have to mix and match as Sisco has some parts that WinSupply may not, but Sisco 4" elbows are insanely overpriced.



IRRIGATION & LANDSCAPE

3101 VASSAR DR NE
ALBUQUERQUE, NM 87107-1839

PHONE (505) 893-8500
FAX (505) 893-8505

Job Name

biology dept/anthony luketich

Quote No.	Date	Page
0002701	1/29/20	1
Expiration Date	2/28/20	
Revised Date	1/29/20	
Bid Due Date	1/29/20	

Quoted To Customer

UNM GROUNDS & LANDSCAPING
ENVIRONMENTAL SERVICES DIV.
MSC07 4200 1 UNIVERSITY N.M.
ALBUQUERQUE, NM 87131-0005

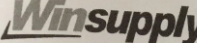
Phone (505) 277-0615
Fax (505) 277-1250

Quoted By

Derek
dsburt@winsupplyinc.com
(505) 893-8500

Customer	Payment Terms	Quoted To	Salesperson	FOB
001621	COD-CASH/CREDIT CARD	UNM GROUNDS & LANDSCAPING	LOREN DUNLAP	D

Line	Qty.	Description	Unit Price	UOM	Extended Price
1.0	20	430-005 1/2 SCH40 FXT CPLG 1/2" COUPLING (XT) SCH40 060S430005 Spec sheet: http://winsupply.com/pdfs/0011001005_LAB_1401-001_060S430005_SPEC.pdf	.3160	EA	6.32
2.0	20	PM-12-8 1/2X6 10000 NIPPLE 1/2" X 6" NIPPLE SCH80PVC 2330PM126	.3800	EA	7.60
3.0	20	PM-12-12 1/2X12 PUC80 NIPPLE 1/2" X 12" NIPPLE SCH80PVC 2330PM1212	.6268	EA	12.54
4.0	20	BPFS 3/4 MHT TO 3/4MTP/1/2FIP 3/4" MHT X MTP OR 1/2" FIP 1690BPFS	2.4500	EA	49.00
5.0	50	1413-007 3/4 PVC INSMXT 90 3/4" ELL (PM) POLY INSERT 060S1413007 Spec sheet: http://winsupply.com/pdfs/0011001007_LAB_1413-007_060S1413007_SPEC.pdf	1.2600	EA	63.00
6.0	30	1436-007 3/4 PVC INS X MIP 3/4" MALE ADAPTER (PM) POLY 060S1436007 Spec sheet: http://winsupply.com/pdfs/0011001007_LAB_1436-007_060S1436007_SPEC.pdf	.4640	EA	13.92
7.0	20	R814V 8-14 ROTAR NOZZLE 8-14 VARIABLE ROTARY NOZZLE 1920R814V	5.9471	EA	118.94
8.0	10	R-VANI7 24" ADJ ROTARY NOZZLE 17-24 VARIABLE ROTARY NOZZLE 1920R84663 Spec sheet: http://winsupply.com/pdfs/0011001007_LAB_1920R84663_SPEC.pdf	5.9375	EA	59.38
9.0	20	1407-101 3/4X1/2 INS RED 90 3/4" X 1/2" ELL (PF) FIPT P 060S1407101 Spec sheet: http://winsupply.com/pdfs/0011001001_LAB_1407-101_060S1407101_SPEC.pdf	.7636	EA	15.27
10.0	10	1407-101 3/4X1/2 INS RED 90 3/4" X 1/2" ELL (PF) FIPT P 060S1407101	.7636	EA	7.64



IRRIGATION & LANDSCAPE

Job Name

biology dept/anthony luketich

Quote No.	Date	Page
0002701	1/29/20	2
Expiration Date	2/28/20	
Revised Date	1/29/20	
Bid Due Date	1/29/20	

Line	Qty.	Description	Unit Price	UOM	Extended Price
11.0	30	Spec sheet: http://winsupply.com/pdfs/0011001005_LAB_1401-001_060S430005_SPEC.pdf HRM-100-SA-P1 HRN 100 SHRUB AD SHRUB ADAPTER 117994525	1.0227	EA	30.68
12.0	40	406-040 4 SCH40 90 ELL 4" ELL (SS) SCH40 060S406040 Spec sheet: http://winsupply.com/pdfs/0011001005_LAB_406-040_060S406040_SPEC.pdf	6.6857	EA	267.43
13.0	40	437-426 4X2 SPCKX PVC40 BUSH 4" X 2" BUSHING (SS) SCH40 060S437420 Spec sheet: http://winsupply.com/pdfs/0011001005_LAB_437-426_060S437420_SPEC.pdf	4.2714	EA	170.86
14.0	40	438-248 2X3/4 840 SPCKX BUSH 2" X 3/4" BUSHING (ST) SCH4 060S438248 Spec sheet: http://winsupply.com/pdfs/0011001005_LAB_438-248_060S438248_SPEC.pdf	1.2666	EA	50.66
15.0	150	SSC8710 9/16-1 1/16 S.S CLAMP 3/4" HOSE CLAMP 5180SSC8710	.5428	EA	81.42
16.0	2	A 940 3/4"X500' PE TUBING 3/4" POLY TUBING 500' ROLL 0657A940	66.3846	RL	132.77
17.0	10	TT520 1/2X520 TEFLON TAPE 1/2" TEFLON TAPE 5180TT520	.4666	EA	4.67
18.0	1	PVC258-030 1QT PVC-25 MED BDY 725 QUART WET-R-DRY PVC CEMENT 060SPVC258030BA	19.2333	EA	19.23
19.0	1	PRIMER68-020 1PT PRIMER-68 PRP P68 PINT PURPLE PRIMER 060SPRIM68P020	9.6000	EA	9.60

Tax Area Id

320010020

Net Sales

1,120.95

Freight

.00

Tax

.00

Quotation Total

1,120.95



OPEN ROUTE Page 1

Order No. 133057
Order Date 01/09/2020
Sales P. 0
Terms, CHARGE Rep 05

Sold To
UNIV. BIOLOGY BUILDING
BIOLOGY BUILDING
ROOM 1272
ALBUQUERQUE, NM 87131

Ship To
UNIV. BIOLOGY BUILDING
BIOLOGY BUILDING
ROOM 121
ALBUQUERQUE, NM 87131

Fax No:
Contact:

Qty	Description	Price	Total
Loc	Part Number		Sched Date
20.00 EA	COUPLING, FIP X FIP, 1/2" PVC	0.6500 EA	13.00
	PVC 430005		01/09/2020
20.00 EA	RHIPLE, 1/2" X 1/2" PVC	0.6500 EA	13.00
	PVC 882040		01/09/2020
20.00 EA	HOSE ADAPTER, 3/4" MPT X 3/4" MIP	2.3200 EA	46.40
	CLAMP 5		01/09/2020
20.00 EA	BUTVEL ADAPTER, FHT X 3/4" INS	2.3200 EA	46.40
	POLY 1435007515		01/09/2020
120.00 EA	CLAMP, 3/4" STAINLESS STEEL	0.8400 EA	100.80
	CLAMP 1E		01/09/2020
20.00 EA	CLAMP, 1 1/2" X 2" STAINLESS ST	1.0000 EA	20.00
	CLAMP 2E		01/09/2020
30.00 EA	ELL, 90, INSERT X MIP, 3/4"	2.7700 EA	83.10
	POLY 1419007		01/09/2020
30.00 EA	ADAPTER, INSERT X MIP, 3/4"	0.9700 EA	29.10
	POLY 1436007		01/09/2020
20.00 EA	ROTORV NOZZLE, FULL, 37 FT	5.4800 EA	109.60
	RS FURN4360		01/09/2020
10.00 EA	NOZZLE, ROTARY, FULL, 37 FT	5.4800 EA	54.80
	RS FURN4360		01/09/2020
30.00 EA	HOSE ADAPTER, PLASTIC	0.8000 EA	24.00
	RS P28		01/09/2020
20.00 EA	TEE, INSERT, 3/4" X 3/4" X 1/2"	0.3500 EA	7.00
	POLY 1402101		01/09/2020
10.00 EA	ELL, 90, INS X FIP, 3/4" X 1/2"	1.5600 EA	15.60
	POLY 1407101		01/09/2020
30.00 EA	RHIPLE, 1/2" X 1/2" PVC	1.0200 EA	30.60
	PVC 882120		01/09/2020
		15.7300 EA	286.40

TERMS: ALL ACCOUNTS ARE NET AND DUE ON THE 10TH OF THE MONTH FOLLOWING PURCHASE. A LATE CHARGE OF 1% PER MONTH WILL BE MADE ON OVERDUE INVOICES. Claims for shortages must be made within 7 days after receipt of goods. All merchandise returned will be subject to our acceptance, and if needed a 30% RESTOCKING CHARGE and transportation charges will be deducted from the invoice price. All merchandise is sold with the understanding that we will furnish new material for any printing defective through manufacture, but under NO circumstances shall we be liable for any labor or consequential damages involved. Purchaser agrees to pay attorney fees, court costs and all other expenses that may be involved herein, in the event the amount herein is collected from a collection agency, purchaser agrees to pay all collection costs.

PRINT NAME 01/09/2020

RETURNED TO SENDER



SISCO
SPRINKLER IRRIGATION SUPPLY CO.
4010 VALLEJO ROAD, N.E. - 87109
ALBUQUERQUE, NEW MEXICO
(505) 881-4800
FAX (505) 883-8041
1-800-445-RAIN

OPEN QUOTE

Page 2

Order No 129/ST
Order Date 01/28/2000
Cost P.O.
Terms CHARGE Rep 00

Sold To
UNIV. BIOLOGY BUILDING
BIOLOGY BUILDING
ROOM 1475
ALBUQUERQUE, NM 87131

Ship To
UNIV. BIOLOGY BUILDING
BIOLOGY BUILDING
ROOM 1475
ALBUQUERQUE, NM 87131

Fax No
Contact

Qty	Description	Price	Total
Loc	Part Number	Sched	Date
40.00 EA	BUSHING, SLIP X SLIP 1/2" X 2"	11.8000 EA	470.40
	PVC 437420		01/28/2000
20.00 EA	BUSHING, SLIP X FIP, 2" X 3/4"	3.2100 EA	64.20
	PVC 433540		01/28/2000
20.00 EA	ADAPTER, INSERT X SPIGOT, 2"	4.4500 EA	89.00
	PVC 440020		01/28/2000
600.00 FT	PIPE, POLYETHYLENE, 3/4" HDPE	0.0700 FT	42.00
	POLY 077P1FC		01/28/2000

Shipped Via	MC	Accept Back Order Y	Subtotal	685.60
FOB			Sales Tax	0.00
			Shipping	0.00
			Total	685.60

TERMS: ALL ACCOUNTS ARE NET AND DUE ON THE 10th OF THE MONTH FOLLOWING PURCHASE. A LATE CHARGE OF 1 1/2% PER MONTH WILL BE MADE ON OVERDUE INVOICES. CLIENTS FOR SHIPMENTS MUST BE MADE AFTER 7 DAYS OF RECEIPT OF GOODS. All merchandise returned will be subject to our acceptance, and if credited a 25% RESTOCKING CHARGE. The transportation charges will be deducted from the invoice price. All merchandise is sold with the understanding that we will furnish new material for any proving defective through manufacture, but under NO circumstances shall we be liable for any labor or consequential damages involved. Purchaser agrees to pay attorney fees, court costs and all other expenses that may be involved herein. In the event this amount herein is collected thru a collection agency, purchaser agrees to pay all collection costs.

PRINT NAME

AUTHORIZED SIGNATURE

Angle iron

12 gauge 'punched' angle iron is what we cut into smaller pieces to make the brackets which hold the shelters up on the T-posts. Hint: there are a different configuration of "hole-cuts" depending on the type of shelter (i.e. mock plot versus capture plot) and what you need determines how many different types need to be cut from the larger stick of angle iron. This can be ordered at Fastenal along with guy-wire to consolidate orders. The amount is ordered in 28 sticks which are all 10' long. Pick up and take to field station.

FASTENAL®

Cust. No. AQNM0661
Cust. P.O. Biology
Job No.

Sold To
UNIVERSITY OF NEW MEXICO
1818 CAMINO DEL SERVICIO NE
ALBUQUERQUE, NM 87131-0001
505-277-1105; 505-277-3561(Fax)

Fastenal Company
P.O Box 1286
WINONA, MN 55987-1286

The store serving you is
3204 Candelaria Ave.

ALBUQUERQUE, NM 87107
Phone #: (505)880-1124
Fax #: (505)880-1139

Invoice

Date	Reference	Page
6/3/19	No. NMALB241290	1
DUE DATE: 07/03/2019		

Contract No:
2018.000208
Ship To
Picked up at Fastenal Store

This Order and Document are subject to the "Terms of Purchase" posted on www.fastenal.com.

Line No.	Quantity Ordered	Quantity Shipped	Quantity Backorder	Description	Control No.	Part No.	Price / Hundred	Amount
1	28	28		0 12Gx1-1/4x10PnchAng	m052919	0952098	1,073.0000	300.44 G

Split-loom

Split loom for protecting the sensor cables from sun, trampling, rodent bites, etc has been ordered from FlexiblePVC.net. It is hard to say if this co. will be around long term as their website is ambiguous about closing. Receipt from 2019 for MVG is below.



Thank you for your order. Your order number is 19914, placed 08/22/2019 at 06:18PM.

Bill To:

University of New Mexico
Tayli Larreategui
MSC 03 2020 BIOLOGY
1 University of New Mexico
Albuquerque, NM 87131
United States
5052772742
tlam@unm.edu

Ship To:

University of New Mexico
Anthony Luketich
219 Yale Blvd. NE
Castetter Hall RM 1480
ALBUQUERQUE, NM 87131
United States
5052772742

Payment Info:

Credit Card: Visa
Tayli Larreategui
*****8846

Shipping Method:

Ground Service

Order Details:

Code	Item	Qty	Price	Grand Total
Split-Tubing-PVC-B-1x100	Flexible PVC Split Tubing - Corrugated - Black - 1.00" dia x 100 ft	10	\$69.99	\$699.90
				Subtotal: \$699.90
				Tax: \$0.00
				Shipping Cost: \$100.00
				Grand Total: \$799.90

References

Gherardi, L. A., & Sala, O. E. (2013). Automated rainfall manipulation system: a reliable and inexpensive tool for ecologists. *Ecosphere*, 4(2), 1–10. doi:10.1890/es12-00371.1

Yahdjian, L., & Sala, O. E. (2002). A rainout shelter design for intercepting different amounts of rainfall. *Oecologia*, 133(2), 95–101. doi:10.1007/s00442-002-1024-3