



# FINAL REPORT: 2021 UNIDATA COMMUNITY EQUIPMENT GRANT

## Title: “Reimagining South Dakota Mine’s Weather and Climate Program’s Cyberinfrastructure”

UCAR SUBAWARD: SUBAWD002840

NSF Parent Award: 1901712 Unidata: Next-generation Data Services and Workflows to Advance Geoscience Research and Education

### Project Summary

In 2019, the Atmospheric Sciences degree at the South Dakota School of Mines and Technology (henceforth, SD Mines) transitioned from a specialization within the school’s Interdisciplinary Sciences degree to a separate bachelor’s degree managed entirely within the Atmospheric and Environmental Sciences. While both the old and new programs provided all of the coursework for the federal requirements to qualify as a meteorologist (i.e., the GS-1340 Requirements), the new program has more flexibility in the availability and timing of undergraduate coursework. Enrollment numbers in the new program show a higher growth rate than the previous program, increasing strain on the program’s aging cyberinfrastructure and teaching facilities.

This equipment grant requests updates to convert the Atmospheric Sciences program’s computer lab into a flexible teaching classroom for Weather and Climate coursework. This conversion is underway with a modern 4K-resolution class display, smart board, and movable chairs and desks to create a flexible learning space. This grant will complete the process by acquiring and configuring the last elements of cyberinfrastructure needed for the teaching space.

Specifically, this will include the following acquisitions and associated benefits.

- Scalable upgrades to CI combined with repurposing and redirecting existing CI to increase current student teaching and research computing capacity and better facilitate integration into current campus CI management plans.
- Integrating local data storage and delivery infrastructure into more efficient teaching and resource data services (THREDDS, LDM, and Jupyter Hub Services).
- A wireless testbed to explore alternative access to traditional LAN-lined weather analysis and research resources.
- Leveraging existing campus resources and surplus to reduce non-computing costs to this grant and reduce campus waste.

The overarching goal is to create a dynamic, high-use classroom environment with access to state-of-the-art technology and resources for student teaching and improve access to and exchange of UNIDATA and other weather and climate community resources.

## Specific Implementation Requests and Awarded Items

The final awarded grant approved the following purchases:

- Three (3) HPE ProLiant DL360 Gen10 Xeon Gold 5220 2.2GHz 2P 64G NC 8SFF Servers
- Three (3) HPE MSA 600GB SAS Hard Drives (1 per server).
- A modest supply budget of \$174.00. This component was not spent because the university's Information Technology Services (ITS) already had the requisite supplies for their subsequent infrastructure development plans.

Two other specific items, a wireless access node, and a web camera for the Weather & Climate Lab, were disallowed from the earlier grant.

For the HPE ProLiant servers and Hard Disks, there was a significant price increase in the total HPE package for a total of \$18,480.51. The change from the price increase was absorbed using the Atmospheric and Environmental Sciences Program's alumni association foundation accounts.

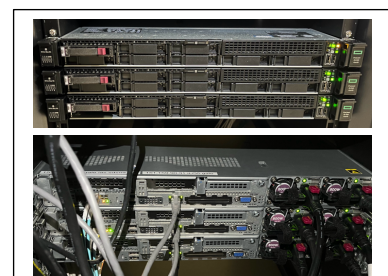
***The final expenditures from Unidata were \$16,304.57, leaving \$252.43 of the grant unspent.***

After the awarding of the grant, the Atmospheric & Environmental Sciences Program received a donation from an alum to also provide supplemental materials not applicable for the original grant, which was used to acquire a Dell C8621QT Smart Board, an in-lab web camera (excluded from the original grant's eligibility) for the student weather and climate lab. While these were not officially part of the Unidata Equipment Grant, we consider them part of the total upgrade and integral to the overall redesign of our facilities, thus completing the overall vision of updating our facilities from our original equipment grant request, which was made possible with the equipment grant's HPE ProLiant servers.

## Report on Implementation Plan

Preparations to reorganize our infrastructure to receive our new servers began in July 2021 with coordinating support from UCAR Unidata personnel (Mike Schmidt, Julian Chastang, and Jeff Weber) for configuring our expected HPC resources and redistributing the loads of our existing supporting computing resources to manage storage, and existing networking and data-sharing support (e.g., our THREDDS and RAMADDA support). Unidata also guided the development of a Jupyter Hub service by which faculty and students could directly access SD Mines HPC python resources for data analysis.

Once final vendor quotes were received, initial purchases for the equipment HPE servers were made in early August 2021 and were fulfilled, shipped, and arrived at South Dakota Mines by the close of that month. The three server units were loaded with Ubuntu 20.04.02 LTS (since then, upgraded to Ubuntu 22.04.03 LTS) and were installed into existing racks in the university Information Technology Services server room (Figure 1). Later, in January 2022, Intel One-API HPC compilers were installed on the HPE ProLiant servers, and the associated meteorological support packages (e.g., NetCDF) were updated from GCC- to Intel-built libraries.



**Figure 1:** HPE ProLiant Servers ("Gale," "Cyclone," and "Chinook") deployed in South Dakota Mines' ITS facilities.



**Figure 2:** Original Weather & Climate Lab Before & After Removal of In-Lab Computing Workstations. Left, Configuration Schematic for Academic-Year 2020-21 with COVID Distancing. Center & Right Academic Years 2021-22 and 2022-23 Photos.

Before the start of the 2022-23 Academic Year (AY), the previous lab orientation (Figure 2, left) was converted into the “desktop-less” orientation (Figure 2, center, right), and the aging desktop computer units were reassigned. This academic year also saw the relaxing of COVID-19 room capacity restrictions (6 students), and the room was permitted to operate at a higher capacity of 12-18 students with new desks provided from university surplus at no cost to the program or equipment grant. For reference, the maximum pre-COVID-19 capacity for the room was a maximum of 12, with two students having to share each of the six LAN-connected workstations.

The final components of our upgraded teaching infrastructure *not included in the Unidata Equipment Grant* were the arrival of the smart board in February 2023 and the moving from the existing 85-in flatscreen display in the classroom into a nearby hallway space to create a virtual map wall leveraging Unidata THREDDS Data Services, -South Dakota Mine’s Real-time NCAR Weather Research and Forecast Model, all rendered with Unidata’s Meteorological Python (metpy) packages.

## Infrastructure Impacts

The impact of the infrastructure grant freeing our classroom space of static LAN-connected desktop terminals was felt in several areas.

### Courses Taught

The increased capacity of the weather and climate lab (initially at a maximum [and cramped] capacity of 12) permitted the use of the facility for Atmospheric and Environmental Sciences more course delivery, such as

- Academic Year 2021-2022 (\* indicates classes with distance components)
  - Fall 2021
    - [AES 401/501 Atmospheric Physics](#)
    - [AES 773 Mesometeorology](#)
    - [AES 775 Applied Freshwater Science](#)
  - Spring 2022
    - [AES 216 Fundamentals of Weather Analysis](#)
    - [AES 421/521 Climate & Weather Resiliency in Meteorology & Engineering\\*](#)
    - [AES 430/530 Radar Meteorology](#)
    - [AES 570 The Wildfire Environment](#)
    - [AES 690 Seminar\\*](#)

- Academic Year 2022-2023
  - Fall 2022
    - [AES 419/519 High-Performance Computing in Earth Sciences](#)
    - [AES 403/503 Biogeochemistry](#)
    - [AES 450/450L Synoptic Meteorology I/Lab](#)
    - [AES 460/560 Atmospheric Dynamics](#)
    - [AES/CEE/GEOL 808 Fundamental Problems in Engineering and Science\\*](#)
  - Spring 2023
    - [AES 455/455L/555/555L Synoptic Meteorology II/Lab](#)
    - [AES 660 Atmospheric Dynamics II](#)
    - [AES 690 Seminar\\*](#)

A final Spring 2023 course, [AES 744/744L Numerical Weather & Climate Prediction/Lab\\*](#), while not using the Weather & Climate Lab Facilities due to scheduling conflicts, made extensive use of the Jupyter Hub and new HPC servers provided by the Unidata Equipment Grant.

In AY 2023-24, the Atmospheric and Environmental Science Program moved faculty offices and the Weather & Climate Lab to another on-campus building in anticipation of the university vacating their existing building to accommodate new construction. The new Weather and Climate Lab (Figure 2) again benefitted from the lack of tethering to LAN-networked consoles and improved wireless networking between the new location and the rest of the campus network. Current and projected use of the facilities are,

- Academic Year 2022-2023
  - Fall 2022
    - [AES 110 Orientation to the Atmospheric Sciences](#)
    - [AES 401/501 Atmospheric Physics](#)
    - [AES 773 Mesometeorology](#)
    - [AES 775 Applied Freshwater Science](#)
    - [AES 615 Earth Systems Modeling](#)



**Figure 3:** New Weather and Climate Lab in the Atmospheric and Environmental Sciences wing of the remodeled McClauray Building.

- Spring 2023 (Scheduled)
  - [AES 421/521 Climate & Weather Resiliency in Meteorology & Engineering](#)
  - [AES 430/530 Radar Meteorology](#)
  - [AES 570 The Wildfire Environment](#)
  - [AES 690 Seminar\\*](#)

## Real-time Forecasting and Weather Support

### WRF Real-time Forecasts

Before this equipment grant, the South Dakota Mines ran the NCAR Weather Research and Forecast Model (WRF) on a 12-hr or 24-hr cycle for 36-hr forecast periods, depending on available resources as our cyberinfrastructure aged.

The new HPC system provided an opportunity to update our real-time modeling framework to the latest version of WRF and also move away from the previous running and processing framework using the now-frozen NCAR Command Language (NCL) for graphics and Interactive Data Language (IDL) for scripting. The new framework uses Python for both the task scripting and graphics layers. Also, it uses the Intel One-API HPC compilers for faster execution over the previously-used GNU compilers. The new real-time WRF framework has four daily 36-hr runs and products available over the Northern Great Plains. The graphics products page can be accessed at the following URL:

[http://kyrill.ias.sdsmt.edu/WRF/WRF\\_Landing\\_Page.html](http://kyrill.ias.sdsmt.edu/WRF/WRF_Landing_Page.html).

The WRF model output is archived in GRIB2 and NetCDF formats and includes NetCDF time series for select stations. These WRF products are served to the larger community via our local THREDDS service. Our local Rapid City National Weather Service Office has found these products helpful, especially during cold season, due to its resolving of upslope on the east side of the Black Hills.

[http://kyrill.ias.sdsmt.edu:8080/thredds/catalog/SDSMT\\_WRF/catalog.html](http://kyrill.ias.sdsmt.edu:8080/thredds/catalog/SDSMT_WRF/catalog.html).

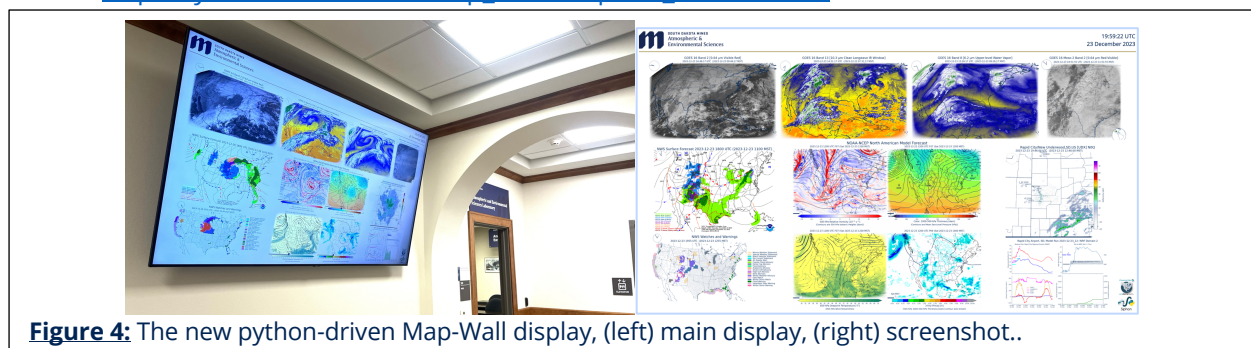
Our pre- and post-processing scripts are available at

[https://github.com/wjcapehart/SD\\_Mines\\_WRF\\_REALTIME](https://github.com/wjcapehart/SD_Mines_WRF_REALTIME)

### Real-time Weather Display / “Map Wall”

The South Dakota Mines also used the freeing of resources made possible in this equipment grant to take our previous paper “analog” Map Wall with periodic paper products to a more modern Virtual Map Wall for student use and campus outreach. The main display is shown in Figure 4 and is also accessible on any campus web-serving display via the refreshing URL

[http://kyrill.ias.sdsmt.edu/Map\\_Wall/mapwall\\_refresh.html](http://kyrill.ias.sdsmt.edu/Map_Wall/mapwall_refresh.html)



**Figure 4:** The new python-driven Map-Wall display, (left) main display, (right) screenshot..

with the Python graphics scripts available at

[https://github.com/wjcapehart/SD\\_Mines\\_Map\\_Wall](https://github.com/wjcapehart/SD_Mines_Map_Wall) .

## **Curricular Pivot to Python**

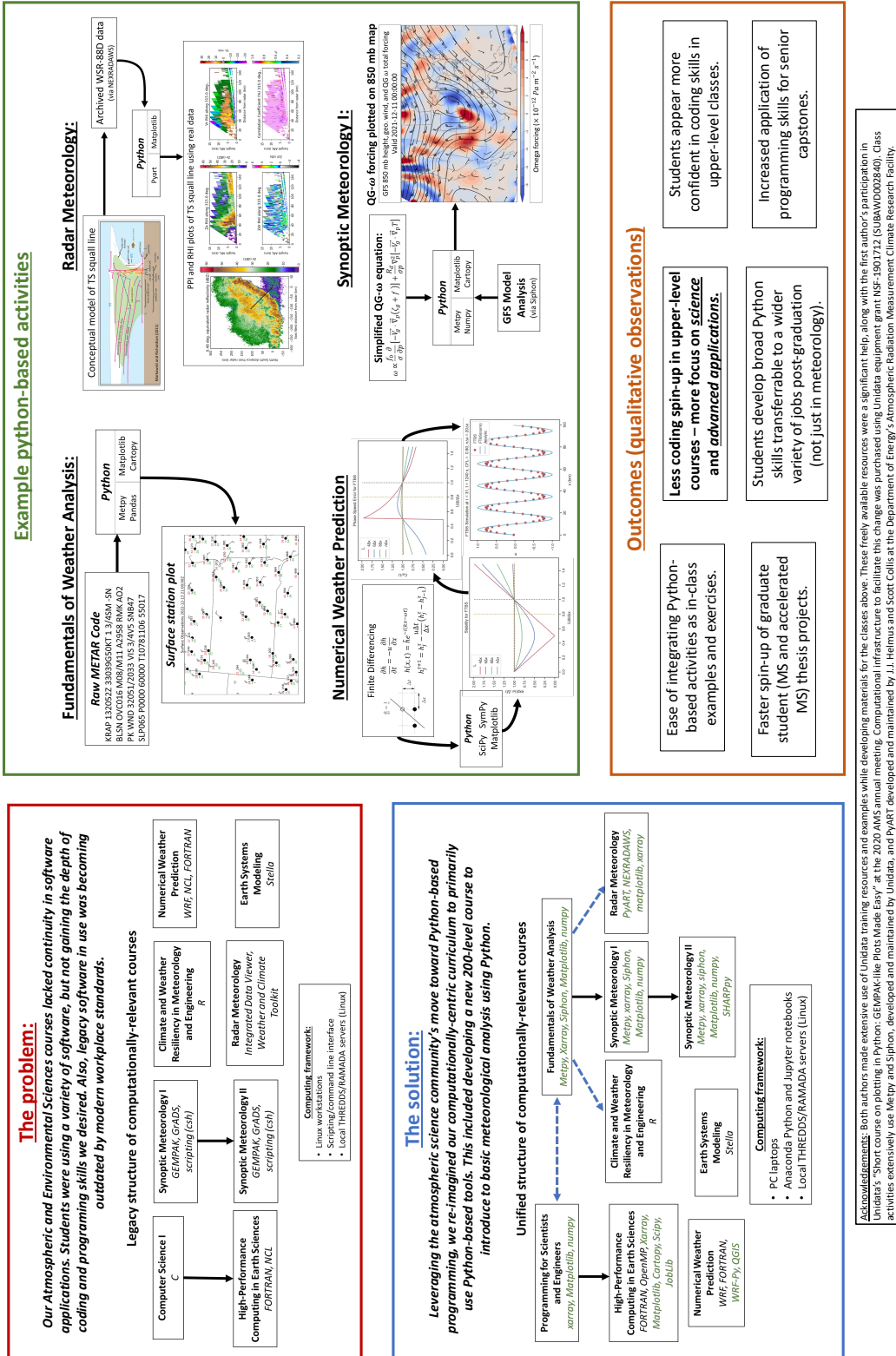
With the new infrastructure and services that support and leverage Python (e.g., new servers, more powerful student laptops, and Jupyter Hub services), our coursework in synoptics, dynamics, atmospheric physics, and numerical weather and climate prediction has substantially increased the use of Python in the curriculum. This is a significant change because the synoptic courses typically heavily leveraged GEMPAK, while NWP and scientific computing classes leveraged Fortran and NCL. While R, RStudio, and R-Shiny Services are still used for statistics-heavy problems (e.g., extreme-event analysis), Python is increasingly becoming the primary go-to language for most weather and climate data science at South Dakota Mines. This was also reported at the 103<sup>rd</sup> AMS Annual Meeting in 2003 (poster included in this report).

# Conference Poster from 103<sup>rd</sup> Annual AMS Meeting

French, A.J., and W.J. Capehart, 2023: Integrating a Unified Software Paradigm Across an Atmospheric Sciences Undergraduate Program, 32nd Conference on Education, 103<sup>rd</sup> American Meteorological Society Annual Meeting, Denver, CO, 08-12 January 2023.

## Integrating a unified software paradigm across an atmospheric sciences undergraduate program

Adam French and Bill Capehart  
 Atmospheric and Environmental Sciences Program, Department of Civil and Environmental Engineering  
 South Dakota School of Mines and Technology



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<a href="#">HPE ProLiant DL360 Gen10 - rack-mountable - Xeon Gold 5220 2.2 GHz - 64 GB</a> Mfg. Part#: P19771-B21 Contract: E&I CNR01439 Catalog SMA (CNR01439)	1	6424478	\$5,005.65	\$5,005.65
<a href="#">HPE Dual Port Enterprise - hard drive - 600 GB - SAS 12Gb/s</a> Mfg. Part#: J9F46A UNSPSC: 43201803 Contract: E&I CNR01439 Catalog SMA (CNR01439)	1	3760864	\$275.33	\$275.33
<a href="#">HPE Pointnext Tech Care Basic Service - extended service agreement - 3 year</a> Mfg. Part#: HS7V7E Electronic distribution - NO MEDIA Contract: E&I CNR01439 Catalog SMA (CNR01439)	1	6495949	\$881.00	\$881.00

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<b>Aug 6, 2021</b>	<b>P0355781</b>	<b>0</b>

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Line Item Details: **Total lines ordered 5**

Line No.	Product Description	Catalog No.	UOM / Packaging	Unit Price	Quantity	Ext. Price
1 of 5	HPE ProLiant DL360 Gen10 - rack-mountable - Xeon Gold5220 2.2 GHz - 64 GB	6424478	1/EA	5,005.65 USD	3 EA	15,016.95 USD
	Add'l Info:					
2 of 5	HPE Dual Port Enterprise - hard drive - 600 GB - SAS 12Gb/s	3760864	1/EA	275.33 USD	3 EA	825.99 USD
	Add'l Info:					
3 of 5	HPE Pointnext Tech Care Basic Service - extended serviceagreement - 3 year	6495949	1/EA	467.06 USD	1 EA	467.06 USD
	Add'l Info:					
4 of 5	HPE Pointnext Tech Care Basic Service - extended serviceagreement - 3 year	6495949	1/EA	0.00 USD	2 EA	0.00 USD
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5 of 5	NOTE: Line Items 3 & 4 balance for QTY:3 @ 881.00 totalling \$2643 is covered by attached PO CARA 22017 (\$467.06 + \$2175.94 = \$2643.00)	NA	1/EA	0.00 USD	1 EA	0.00 USD
	Add'l Info:					
<b>Total</b>						<b>16,310.0 USD</b>
						<b>0</b>



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<b>Account Number/Name</b>	23280

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QUANTITY	STOCK #	DESCRIPTION	UNIT PRICE	TOTAL AMOUNT
*	6495949	HPE Pointnext Tech Care	\$881.00	\$2,175.94
		Basic Service - extended service		\$0.00
		agreement - 3 year		\$0.00
				\$0.00
				\$0.00
		* Partial amount from QTY:3		\$0.00
		using Quote MGTR502.		\$0.00
		Balance on total being paid		\$0.00
		via separate PO from separate		\$0.00
		funding source as discussed		\$0.00
		with Don Tinimbang via email		\$0.00
		on 07/30/21		\$0.00
		<b>TOTAL =</b>		<b>\$2,175.94</b>

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*Sondra Bray*

Sondra Bray

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SUBTOTAL	SHIPPING	SALES TAX
\$820.56	\$0.00	\$0.00
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3760864	HP MSA 600GB 12G SAS 10K 2.5IN HDD Manufacturer Part Number: J9F46A Serial No: THN109E1AJ Serial No: THN109E1AL Serial No: THN109E19K	3	3	0	273.52	820.56

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J172690	08/11/21	9934860
SUBTOTAL	SHIPPING	SALES TAX
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DUE DATE		AMOUNT DUE
09/10/21		\$820.56

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ORDER DATE	SHIP VIA	PURCHASE ORDER NUMBER			CUSTOMER NUMBER	
08/06/21	DROP SHIP-GROUND	P0355781			9934860	
ITEM NUMBER	DESCRIPTION	QTY ORD	QTY SHIP	QTY B/O	UNIT PRICE	TOTAL
3760864	HP MSA 600GB 12G SAS 10K 2.5IN HDD Manufacturer Part Number: J9F46A Serial No: THN109E1AJ Serial No: THN109E1AL Serial No: THN109E19K	3	3	0	273.52	820.56
ACCOUNT MANAGER		SHIPPING ADDRESS:			SUBTOTAL	\$820.56
DON TINIMBANG 312-547-2184 dontini@cdwg.com		SCHOOL OF MINES AND TECH JOHN MASON 501 E SAINT JOSEPH ST CIVIL & ENVIRONMENTAL ENGINEERING RAPID CITY SD 57701-3995			SHIPPING	\$0.00
SALES ORDER NUMBER					SALES TAX	\$0.00
CZS4555					AMOUNT DUE	\$820.56

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DUNS Number 02-615-7235  
ISO 9001 and ISO 14001 Certified  
CDW GOVERNMENT FEIN 36-4230110

HAVE QUESTIONS ABOUT YOUR ACCOUNT?  
PLEASE EMAIL US AT [credit@cdw.com](mailto:credit@cdw.com)  
VISIT US ON THE INTERNET AT [www.cdwg.com](http://www.cdwg.com)

REMIT PAYMENT TO:



CDW Government  
 75 Remittance Drive, Suite 1515  
 Chicago, IL 60675-1515

RETURN SERVICE REQUESTED

INVOICE



ACH INFORMATION:  
 THE NORTHERN TRUST  
 50 SOUTH LASALLE STREET  
 CHICAGO, IL 60675

E-mail Remittance To: gachremittance@cdw.com  
 ROUTING NO.: 071000152  
 ACCOUNT NAME: CDW GOVERNMENT  
 ACCOUNT NO.: 91057

INVOICE NUMBER	INVOICE DATE	CUSTOMER NUMBER
J235281	08/12/21	9934860
SUBTOTAL	SHIPPING	SALES TAX
\$5,005.65	\$0.00	\$0.00
DUE DATE		AMOUNT DUE
09/11/21		\$5,005.65

SOUTH DAKOTA BOARD OF REGENTS  
 SDSU - ACCOUNTS PAYABLE CENTER  
 PO BOX 2201  
 BROOKINGS SD 57007-0001  
 USA

CDW Government  
 75 Remittance Drive  
 Suite 1515  
 Chicago, IL 60675-1515

PLEASE RETURN THIS PORTION WITH YOUR PAYMENT

INVOICE DATE	INVOICE NUMBER	PAYMENT TERMS			DUE DATE	
08/12/21	J235281	Net 30 Days			09/11/21	
ORDER DATE	SHIP VIA	PURCHASE ORDER NUMBER			CUSTOMER NUMBER	
08/06/21	DROP SHIP-GROUND	P0355781			9934860	
ITEM NUMBER	DESCRIPTION	QTY ORD	QTY SHIP	QTY B/O	UNIT PRICE	TOTAL
6424478	HPE DL360 GEN10 5220 2P 64G NC 8SFF Manufacturer Part Number: P19771-B21 Serial No: MXQ1250R91	3	1	2	5,005.65	5,005.65

**GO GREEN!**  
 CDW is happy to announce that paperless billing is now available! If you would like to start receiving your invoices as an emailed PDF, please email CDW at [paperlessbilling@cdw.com](mailto:paperlessbilling@cdw.com). Please include your Customer number or an Invoice number in your email for faster processing.  
**REDUCE PROCESSING COSTS AND ELIMINATE THE HASSLE OF PAPER CHECKS!**  
 Begin transmitting your payments electronically via ACH using CDW's bank and remittance information located at the top of the attached payment coupon. Email [credit@cdw.com](mailto:credit@cdw.com) with any questions.

ACCOUNT MANAGER	SHIPPING ADDRESS:	SUBTOTAL	
DON TINIMBANG 312-547-2184 <a href="mailto:dontini@cdwg.com">dontini@cdwg.com</a>	SCHOOL OF MINES AND TECH JOHN MASON 501 E SAINT JOSEPH ST CIVIL & ENVIRONMENTAL ENGINEERING RAPID CITY SD 57701-3995	\$5,005.65	
SALES ORDER NUMBER		SHIPPING	\$0.00
CZS4555		SALES TAX	\$0.00
		AMOUNT DUE	\$5,005.65



Cage Code Number 1KH72  
 DUNS Number 02-615-7235  
 ISO 9001 and ISO 14001 Certified  
 CDW GOVERNMENT FEIN 36-4230110

HAVE QUESTIONS ABOUT YOUR ACCOUNT?  
 PLEASE EMAIL US AT [credit@cdw.com](mailto:credit@cdw.com)  
 VISIT US ON THE INTERNET AT [www.cdwg.com](http://www.cdwg.com)

REMIT PAYMENT TO: \_\_\_\_\_

**INVOICE**

ACH INFORMATION:  
THE NORTHERN TRUST  
50 SOUTH LASALLE STREET  
CHICAGO, IL 60675

E-mail Remittance To: gachremittance@cdw.com  
ROUTING NO.: 071000152  
ACCOUNT NAME: CDW GOVERNMENT  
ACCOUNT NO.: 91057



**CDW Government**  
75 Remittance Drive, Suite 1515  
Chicago, IL 60675-1515



RETURN SERVICE REQUESTED

INVOICE NUMBER	INVOICE DATE	CUSTOMER NUMBER
J993137	08/28/21	9934860
SUBTOTAL	SHIPPING	SALES TAX
\$10,011.30	\$0.00	\$0.00
DUE DATE		AMOUNT DUE
09/27/21		\$10,011.30

SOUTH DAKOTA BOARD OF REGENTS  
SDSU - ACCOUNTS PAYABLE CENTER  
PO BOX 2201  
BROOKINGS SD 57007-0001  
USA

CDW Government  
75 Remittance Drive  
Suite 1515  
Chicago, IL 60675-1515

PLEASE RETURN THIS PORTION WITH YOUR PAYMENT

INVOICE DATE	INVOICE NUMBER	PAYMENT TERMS			DUE DATE	
08/28/21	J993137	Net 30 Days			09/27/21	
ORDER DATE	SHIP VIA	PURCHASE ORDER NUMBER			CUSTOMER NUMBER	
08/06/21	DROP SHIP-GROUND	P0355781			9934860	
ITEM NUMBER	DESCRIPTION	QTY ORD	QTY SHIP	QTY B/O	UNIT PRICE	TOTAL
6424478	HPE DL360 GEN10 5220 2P 64G NC 8SFF Manufacturer Part Number: P19771-B21 Serial No: MXQ1330J27 Serial No: MXQ1330J28	3	2	0	5,005.65	10,011.30
ACCOUNT MANAGER		SHIPPING ADDRESS:			SUBTOTAL	\$10,011.30
DON TINIMBANG 312-547-2184 dontini@cdw.com		SCHOOL OF MINES AND TECH JOHN MASON 501 E SAINT JOSEPH ST CIVIL & ENVIRONMENTAL ENGINEERING RAPID CITY SD 57701-3995			SHIPPING	\$0.00
SALES ORDER NUMBER					SALES TAX	\$0.00
CZS4555					AMOUNT DUE	\$10,011.30

**GO GREEN!**

CDW is happy to announce that paperless billing is now available! If you would like to start receiving your invoices as an emailed PDF, please email CDW at [paperlessbilling@cdw.com](mailto:paperlessbilling@cdw.com). Please include your Customer number or an Invoice number in your email for faster processing.

**REDUCE PROCESSING COSTS AND ELIMINATE THE HASSLE OF PAPER CHECKS!**

Begin transmitting your payments electronically via ACH using CDW's bank and remittance information located at the top of the attached payment coupon. Email [credit@cdw.com](mailto:credit@cdw.com) with any questions.



Cage Code Number 1KH72  
DUNS Number 02-615-7235  
ISO 9001 and ISO 14001 Certified  
CDW GOVERNMENT FEIN 36-4230110

HAVE QUESTIONS ABOUT YOUR ACCOUNT?  
PLEASE EMAIL US AT [credit@cdw.com](mailto:credit@cdw.com)  
VISIT US ON THE INTERNET AT [www.cdwg.com](http://www.cdwg.com)

9/22/21, 9:52 AM

Mail - Mason, John E. - Outlook

CDW-G Invoice #K236335 Detail

CDW <cdwsales@cdwemail.com>

Wed 9/22/2021 9:10 AM

To: Don Tinimbang <dontini@cdwg.com>

EXTERNAL EMAIL

The copy of the invoice # you requested is now available. | [View in browser](#)



CDW-G

Hardware Software Services IT Solutions Brands Research Hub

### CDW-G Invoice #K236335

John Mason,

Thank you for choosing CDW-G. The Invoice #K236335 from 09/02/2021 you requested is detailed below. The total amount of **\$2,643.00** is due by **10/02/2021**.

**Please remit payment to:**

CDW Government - 75 Remittance Drive, Suite 1515 Chicago, IL 60675-1515

Order #	Order Date	PO #	Customer #
CZS4555	08/6/2021	P0355781	9934860

Due Date	Amount Due
10/2/2021	\$2,643.00

**Order Details**

Item	Order Qty	Ship Qty	Open Qty	Unit Price	Ext. Price
<b>HPE 3YR TC BAS DL360 GEN10 SVC</b>	3	3	0	\$881.00	\$2,643.00
Mfg. Part#: HS7V7E CDW #: 6495949 Electronic distribution - NO MEDIA					
Serial Numbers: MXQ1250R91, MXQ1330J27, MXQ1330J28					

*paying assist  
line 3  
Qty 1 @ 412.06  
see attached  
email*

<b>Subtotal</b>	\$2,643.00
<b>Sales Tax</b>	\$0.00
<b>AMOUNT DUE</b>	<b>\$2,643.00</b>

Purchaser Billing Info	Deliver To
<b>Billing Address:</b> SOUTH DAKOTA BOARD OF REGENTS SDSU - ACCOUNTS PAYABLE CENTER PO BOX 2201	<b>Shipping Address:</b> SCHOOL OF MINES AND TECH ATTN: ,JOHN MASON 501 E SAINT JOSEPH ST



9/22/21, 9:52 AM

Mail - Mason, John E. - Outlook

BROOKINGS, SD 57007-0001  
**Payment Terms:** NET 30-VERBAL

CIVIL & ENVIRONMENTAL ENGINEERING  
RAPID CITY, SD 57701-3995  
**Shipping Method:** DROP SHIP-GROUND

**2 ways to GO GREEN with CDW-G! Paperless billing and electronic payment transmission**

- TRANSMIT PAYMENTS ELECTRONICALLY** — Eliminate the hassle of paper checks by utilizing ACH for electronic bill pay.  
**EMAIL REMITTANCE TO:** [achremittance@cdw.com](mailto:achremittance@cdw.com)  
**ACH INFORMATION:** The Northern Trust, 50 South LaSalle St., Chicago, IL 60675  
**ROUTING NO.:** 071000152 | **ACCOUNT NAME:** CDW Government | **ACCOUNT NO.:** 91057
- PAPERLESS BILLING NOW AVAILABLE** — If you would like to start receiving your invoices as an emailed PDF, please contact us at [paperlessbilling@cdw.com](mailto:paperlessbilling@cdw.com). Please include your customer number or an invoice number in your request for faster processing.

**Sales Contact Info**

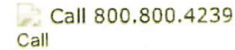
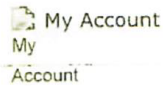
**Don Tinimbang** | (312) 547-2184 | [dontini@cdwg.com](mailto:dontini@cdwg.com)

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Achieve Your Technology Goals Securely, at Speed and at Scale.  
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This email was sent to dontini@cdwg.com. Please add cdwsales@cdwemail.com to your address book.

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AS-I:001 | iSeries 004 | Customer#: 9934860 | 9A26700B-95AC1A6F-84580004-AC1D9492

**From:** [Den Otter, Brenda](#)  
**To:** [Mason, John E.](#)  
**Cc:** [SDSU Apssinv](#)  
**Subject:** RE: [EXT] RE: Invoices  
**Date:** Thursday, September 23, 2021 12:06:27 PM

---

Thanks John....If that works for you Laura please proceed.

Brenda

---

**From:** Mason, John E. <John.Mason@sdsmt.edu>  
**Sent:** Thursday, September 23, 2021 10:38 AM  
**To:** Den Otter, Brenda <Brenda.DenOtter@sdsmt.edu>  
**Cc:** SDSU Apssinv <sdsu.apssinv@sdstate.edu>  
**Subject:** Re: [EXT] RE: Invoices

I'm very sorry for all the confusion. Hopefully this clears things up:

This purchase was being made with 2 separate funding sources and the sales rep informed me they would adjust their invoices accordingly and it wouldn't be a problem. That didn't happen and is causing confusion.

In order to ensure P0355781 (and our responsibility) had a *correct dollar amount*, I adjusted the "per unit" price of line 3 to a lower amount than the vendor's per unit cost. What is listed on line item 3 is the amount we intended to pay from account 442154. *53% of a single unit rather than an entire unit.*

I was unaware that the additional notations I made to explain were not entirely visible.

The invoice is QTY:3 @ 881.00 totaling \$2643 - paid in part by PO CARA 22017 which was supplied to the vendor along with P0355781.

\$467.06 (from P0355781)  
+ \$2175.94 (from CARA 22017)  
= \$2643.00 (total cost)

Please *only* pay \$467.06 toward this invoice. CARA is paying the remaining balance.

**John Mason**  
Civil & Environmental Engineering  
South Dakota Mines  
501 E. Saint Joseph St., Rapid City, SD 57701

605.394.2439 | [John.Mason@sdsmt.edu](mailto:John.Mason@sdsmt.edu)



---

**From:** Den Otter, Brenda <[Brenda.DenOtter@sdsmt.edu](mailto:Brenda.DenOtter@sdsmt.edu)>  
**Sent:** Thursday, September 23, 2021 9:05 AM  
**To:** Mason, John E. <[John.Mason@sdsmt.edu](mailto:John.Mason@sdsmt.edu)>  
**Cc:** SDSU Apssinv <[sdsu.apssinv@sdstate.edu](mailto:sdsu.apssinv@sdstate.edu)>  
**Subject:** FW: [EXT] RE: Invoices

Hi John.....We need to do a change order for payment, please call me on this.

Thanks,  
Brenda

---

**From:** SDSU Apssinv <[sdsu.apssinv@sdstate.edu](mailto:sdsu.apssinv@sdstate.edu)>  
**Sent:** Thursday, September 23, 2021 8:41 AM  
**To:** Den Otter, Brenda <[brenda.denotter@sdsmt.edu](mailto:brenda.denotter@sdsmt.edu)>  
**Subject:** RE: [EXT] RE: Invoices

\*\*\* This email is from an EXTERNAL sender. Use CAUTION before opening attachments or clicking links. \*\*\*

Hi Brenda,

With some of the invoices already been paid, you will not be able to cancel the PO. Do you want me to go ahead and process the 1<sup>st</sup> attached invoice? If so, could you do a change order for **the 1<sup>st</sup> attached invoice to match line 3?**

Please advise how you would like to proceed.

*Laura Hall*  
South Dakota Board of Regents  
Accounts Payable Shared Services

---

**From:** Den Otter, Brenda <[Brenda.DenOtter@sdsmt.edu](mailto:Brenda.DenOtter@sdsmt.edu)>  
**Sent:** Wednesday, September 22, 2021 3:36 PM  
**To:** Mason, John E. <[john.mason@sdsmt.edu](mailto:john.mason@sdsmt.edu)>; SDSU Apssinv <[sdsu.apssinv@sdstate.edu](mailto:sdsu.apssinv@sdstate.edu)>  
**Subject:** RE: [EXT] RE: Invoices

Thanks John for the explanation.....Laura will this work or do we need to cancel PO and pay as a direct bill?

---

**From:** Mason, John E. <[John.Mason@sdsmt.edu](mailto:John.Mason@sdsmt.edu)>  
**Sent:** Wednesday, September 22, 2021 2:10 PM  
**To:** Den Otter, Brenda <[Brenda.DenOtter@sdsmt.edu](mailto:Brenda.DenOtter@sdsmt.edu)>; SDSU Apssinv <[sdsu.apssinv@sdstate.edu](mailto:sdsu.apssinv@sdstate.edu)>  
**Subject:** Re: [EXT] RE: Invoices

Hello!

Please note Line 5 on the PO. This invoice is partially paid by CARA (*there is no way to split cost among funding organizations in the purchasing system*). Apologies for not pointing that out again when submitting these invoices, I know it's been a while since the PO went through. The agreement with the sales rep was they were supposed to split the invoices for us but that aspect must have been forgotten between July and now.

Please advise on the best course of action.

NOTE: Line Items 3 & 4 balance for QTY:3 @ 881.00 totaling \$2643 is covered by attached PO CARA 22017 (\$467.06 + \$2175.94 = \$2643.00)

Thank you & have a great day!

**John Mason**

Civil & Environmental Engineering  
South Dakota Mines  
501 E. Saint Joseph St., Rapid City, SD 57701  
605.394.2439 | [John.Mason@sdsmt.edu](mailto:John.Mason@sdsmt.edu)

\_\_\_\_\_

\_\_\_\_\_

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**From:** Den Otter, Brenda <[Brenda.DenOtter@sdsmt.edu](mailto:Brenda.DenOtter@sdsmt.edu)>  
**Sent:** Wednesday, September 22, 2021 1:39 PM  
**To:** SDSU Apssinv <[sdsu.apssinv@sdstate.edu](mailto:sdsu.apssinv@sdstate.edu)>  
**Cc:** Mason, John E. <[John.Mason@sdsmt.edu](mailto:John.Mason@sdsmt.edu)>  
**Subject:** RE: [EXT] RE: Invoices

Laura.....Sorry about that....John always make sure the invoices you forward to Brookings are ready for payment. Apparently the first invoice has discrepancies. Send me a request to do a change order or contact the vendor if it isn't correct for either a credit memo or a revised invoice.

Thanks,  
Brenda

---

**From:** SDSU Apssinv <[sdsu.apssinv@sdstate.edu](mailto:sdsu.apssinv@sdstate.edu)>  
**Sent:** Wednesday, September 22, 2021 12:55 PM  
**To:** Den Otter, Brenda <[brenda.denotter@sdsmt.edu](mailto:brenda.denotter@sdsmt.edu)>  
**Cc:** Mason, John E. <[john.mason@sdsmt.edu](mailto:john.mason@sdsmt.edu)>  
**Subject:** [EXT] RE: Invoices

\*\*\* This email is from an EXTERNAL sender. Use CAUTION before opening attachments or clicking links.\*\*\*

Hi Brenda,

I was able to process the 2<sup>nd</sup> invoice attached under I2026843.

The 1<sup>st</sup> attached invoice looks like it matches line 3 on the PO however, the quantity on the invoice is 3 @ \$881.00 each totaling \$2,643.00 whereas there is a quantity of 1 @ \$467.06 totaling \$467.06 on the PO. If the invoice is correct, there will need to be a change order done to match the invoice.

Thanks.

*Laura Hall*  
South Dakota Board of Regents  
Accounts Payable Shared Services

---

**From:** Den Otter, Brenda <[Brenda.DenOtter@sdsmt.edu](mailto:Brenda.DenOtter@sdsmt.edu)>  
**Sent:** Wednesday, September 22, 2021 12:58 PM  
**To:** SDSU Apssinv <[sdsu.apssinv@sdstate.edu](mailto:sdsu.apssinv@sdstate.edu)>; Hall, Laura <[laura.hall@sdstate.edu](mailto:laura.hall@sdstate.edu)>  
**Cc:** Mason, John E. <[john.mason@sdsmt.edu](mailto:john.mason@sdsmt.edu)>  
**Subject:** FW: Invoices

Hi Laura.....Please process payment to the attached invoices the 2<sup>nd</sup> one is due by the 27<sup>th</sup>.

Thanks,  
Brenda

---

**From:** Mason, John E. <[John.Mason@sdsmt.edu](mailto:John.Mason@sdsmt.edu)>  
**Sent:** Wednesday, September 22, 2021 10:13 AM  
**To:** Den Otter, Brenda <[Brenda.DenOtter@sdsmt.edu](mailto:Brenda.DenOtter@sdsmt.edu)>  
**Subject:** Invoices

Hi, Brenda!

I've secured a couple invoices from CDW which don't appear on Banner. I know they're a little behind, but one is due on the 27th and the other on the 2nd. I don't know if they have these and just haven't entered them or if they haven't gotten them.

There's also something going on with a budget forecast for the account they are trying to sort out by the end of the month (I don't know anything about that other than there's a bee in their bonnet).

Thanks & have a great day!

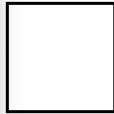
**John Mason**

Civil & Environmental Engineering  
South Dakota Mines  
501 E. Saint Joseph St., Rapid City, SD 57701  
605.394.2439 | [John.Mason@sdsmt.edu](mailto:John.Mason@sdsmt.edu)

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## End-of-Award Period Budget Reports



South Dakota School of Mines & Technology  
Office of Research Affairs

### CONTRACT / GRANT MONTHLY FINANCIAL REVIEW

Report Date: 7/6/22 for the Month of: June

<b>Grant ID:</b>	MA2200003	<b>Grant Name:</b>	Capehart UCAR NSF SDMINES Climate		
<b>PI / Manager:</b>	William J. Capehart	<b>Start Date:</b>	06/30/2021	<b>End Date:</b>	04/30/2022
<b>Department / Center:</b>	Civil & Environmental Engineering	<b>Agency:</b>	University Corporation For Atmospheric Research		
<b>Grant Total Budget:</b>	\$16,557.00	<b>Total Expenses:</b>	\$16,304.57	<b>Remaining:</b>	\$252.43

Fund	Trans Category	Account Desc	Current Budget	Current Expenses	Expenditures To Date	Commitments	Available
442154	SUPPLIES	Supplies - BUDGET ONLY	\$174.00	\$0.00	\$0.00	\$0.00	
<b>SUPPLIES - Total</b>			<b>\$174.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$174.00</b>
442154	CAPITAL OUTLAY/EQUIPMENT	Capital Outlay - BUDGET ONLY	\$16,310.00	\$0.00	\$0.00	\$0.00	
442154	CAPITAL OUTLAY/EQUIPMENT	Computer Hardware CAP	\$0.00	\$0.00	\$16,304.57	\$0.00	
<b>CAPITAL OUTLAY/EQUIPMENT - Total</b>			<b>\$16,310.00</b>	<b>\$0.00</b>	<b>\$16,304.57</b>	<b>\$0.00</b>	<b>\$5.43</b>
442154	F&A	Indirect Cost Charges	\$73.00	\$0.00	\$0.00	\$0.00	
<b>F&amp;A - Total</b>			<b>\$73.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$73.00</b>
<b>442154 - Total</b>			<b>\$16,557.00</b>	<b>\$0.00</b>	<b>\$16,304.57</b>	<b>\$0.00</b>	<b>\$252.43</b>

#### Banner Account Report

'COA'	'Fund'	'Organizati'	'Account'	'Program'		'Transaction Date'	'Field'	'Amount'
S	442154	440703			2			
'Account'	'Activity Date'	'Type'	'Document'	'Description'		'Transaction Date'	'Field'	'Amount'
750000	7/19/2021 10:18	ZD02	BG002111	Original budget		7/19/2021 10:17	ABD	\$ 174.00
770000	7/19/2021 10:18	ZD02	BG002111	Original budget		7/19/2021 10:17	ABD	\$ 16,310.00
777907	5/6/2022 15:58	POCL	*0040442	Close PO P0355781		5/6/2022 15:51	ENC	\$ -
777907	5/6/2022 15:58	POCL	*0040442	Close PO P0355781		5/6/2022 15:51	ENC	\$ -
777907	9/24/2021 9:42	INEI	I2027145	CDW Government Inc		9/23/2021 13:18	ENC	\$ (467.06)
777907	9/24/2021 9:42	INEI	I2027145	CDW Government Inc		9/23/2021 13:18	YTD	\$ 467.06
777907	9/23/2021 12:31	INEI	I2026843	CDW Government Inc		9/22/2021 13:49	ENC	\$ (10,011.30)
777907	9/23/2021 12:31	INEI	I2026843	CDW Government Inc		9/22/2021 13:49	YTD	\$ 10,011.30
777907	9/1/2021 9:44	INEI	I2020470	CDW Government Inc		9/1/2021 0:00	ENC	\$ (5,005.65)
777907	9/1/2021 9:44	INEI	I2020470	CDW Government Inc		9/1/2021 0:00	YTD	\$ 5,005.65
777907	8/31/2021 9:08	INEI	I2019863	CDW Government Inc		8/30/2021 13:30	ENC	\$ (825.99)
777907	8/31/2021 9:08	INEI	I2019863	CDW Government Inc		8/30/2021 13:30	YTD	\$ 820.56
777907	8/6/2021 16:04	PORD	P0355781	CDW Government Inc		8/6/2021 15:58	ENC	\$ -
777907	8/6/2021 16:04	PORD	P0355781	CDW Government Inc		8/6/2021 15:58	ENC	\$ -
777907	8/6/2021 16:04	PORD	P0355781	CDW Government Inc		8/6/2021 15:58	ENC	\$ 467.06
777907	8/6/2021 16:04	PORD	P0355781	CDW Government Inc		8/6/2021 15:58	ENC	\$ 825.99
777907	8/6/2021 16:04	PORD	P0355781	CDW Government Inc		8/6/2021 15:58	ENC	\$ 15,016.95
780001	7/19/2021 10:18	ZD02	BG002111	Original budget		7/19/2021 10:17	ABD	\$ 73.00

Item	Final Unit Cost	Unidata Grant		CARA 23280	
		Quantity	Cost	Quantity	Cost
HPE ProLiant DL360 Gen10 Xeon Gold 5220 2.2 GHz - 64 GB	\$5,005.65	3	\$15,016.95	0	\$ -
HPE Dual Port Enterprise - hard drive - 600 GB - SAS 12Gb/s	\$273.52	3	\$820.56	0	\$ -
HPE Pointnext Tech Care Basic Service – 3-yr ext. service agmt	\$881.00	0.53	\$467.06	2.47	\$2,175.94
Total Costs from Funding Pool			\$18,480.51		\$16,304.57
			\$16,304.57		\$2,175.94