Cost Analysis

As a State Agency, PREPA is required to follow its own procurement policies and procedures. On September 17, 2017, the Governor of Puerto Rico issued an Executive Order to enable State agencies to activate the special "emergency procurement" procedures to purchase any materials and services that may be essential to respond to the emergency. The Executive Order allowed PREPA to directly procure services for labor and equipment to repair the electricity grid. Cobra Acquisitions LLC is one of the companies PREPA contracted with to perform work. PREPA and Cobra signed a time and materials (T&M) contract on October 19, 2017, for $200 million. FEMA reviewed the Cobra contract rates for reasonableness and issued a Determination Memo on December 22, 2017, concluding that the proposed prices were reasonable.

On December 27, 2018, the Department of Homeland Security (DHS) Office of Inspector General (OIG) began an audit to determine whether FEMA's PA grants to PREPA and PREPA's contracts with Whitefish Energy Holdings LLC and Cobra Acquisitions LLC (Cobra) comply with Federal laws and regulations and PA program guidelines.

FEMA requested an independent review performed by the Homeland Security Operational Analysis Center (HSOAC) of the proposed contract rates for reasonableness. On March 28, 2019, HSOAC delivered a report, which was provided to OIG, that independently concluded that Cobra's rates fell within a representative range that is reasonable for emergency work.

OIG issued an interim report on July 3, 2019 (OIG-19-052), recommending that FEMA conduct a comprehensive analysis of Cobra contract costs in accordance with Public Assistance grant guidelines and disallow any costs that are not reasonable. FEMA concurred with this recommendation to conduct a comprehensive analysis and also agreed to ensuring an independent analysis was also performed.

In order to address the OIG recommendation in the report, FEMA analyzed PREPA's final, actual costs claimed for reasonableness and asked the USACE to conduct the independent analysis. FEMA's analysis consisted of three major efforts:

1) Evaluated Cobra's overall level of effort and work productivity based on the SOW developed by FEMA;

2) Compared Cobra's actual costs to those of other electrical contractors that performed similar work when the data existed. FEMA reviewed Cobra's cost of work performed per transmission line (TL) and distribution line (DL), Cobra's overall, actual average daily rate, and the daily per diem to cover lodging and living expenses; and

3) Reviewed USACE's report and considered its recommendations prior to making a conclusion on cost reasonableness.

FEMA worked with PREPA to ensure receipt of its final claim and supporting documentation for the SOW funded under PW 251. Working with this documentation, FEMA developed a detailed DDD and SOW for the project (emergency repairs to the electric transmission and distribution system conducted from October 19, 2017 to July 20, 2018).

Data Summary and Analysis

Throughout the time period of the project, Cobra submitted invoices to PREPA and PREPA submitted those invoices to FEMA for review. FEMA entered the data from the invoices into a spreadsheet.[1] This spreadsheet contains two worksheets in which data was entered independently. The worksheet labeled "Invoices," is a chronological listing of each invoice submitted. It tracks: Invoice Number, Invoice Date, Item Number, Line/Project Number, PREPA Release Number, Dates Work Occurred, and Invoice Amount. Separate line items were used to enter the total billings for work performed on an invoice and the estimated tax gross up based on that invoice.

The second worksheet, labeled "Invoices Detail Date" included: Invoice number, Invoice date, Item number, Line/Project, Date Worked, Lineman Invoiced, Linemen Blended Rate, Daily Billing, and Work Performed. The format of the second worksheet allowed for detailed data entry for the scope of work performed on each day for each specific line. The data entry allowed FEMA to confirm the total number of linemen working on different transmission and distribution lines on any given day. Since the overall average daily rate changed, due to the change in the calculation for the man-camp and supporting services, the overall total number of linemen needed verification to ensure proper billing.

FEMA transferred data from the Invoices Master Table to a new spreadsheet for analysis purposes. Data was segmented by transmission line and distribution line.

Transmission Lines Data and Analysis

FEMA's initial data analysis was based on information received from PREPA as well as calculations FEMA performed in an effort to identify all options for analysis of the work performed FEMA reviewed the results of the calculations and information to identify any trends or patterns in the cost associated with performing the work.[2] For example, FEMA totaled the billings for work spent gaining access to a site and clearing debris because it was not directly related to electric repair work.

FEMA eliminated some data that were found to be unreliable or inaccurate. For example, the estimated amount of conductor replaced was not used because FEMA found the source documentation, such as Cobra's daily reports, to be unreliable and not accurate. The per unit costs were not used because the daily reports did not distinguish the type of repair performed. In addition to the actual structure work, the stringing of conductor is often part of the repair to a tower, and the cost associated with stringing conductor cannot be isolated to individual towers. Since the data pertaining to the mileage of the lines did not account for the actual length of conductor and the sag between towers, and FEMA could not acquire this information, FEMA also eliminated this approach to evaluating the cost due to its unreliability.

[1] See "Cobra Invoices Master Table 1.26.2021 (WDR)"

[2] See "PW 251 TL DL Analysis Spreadsheet Full Glossary" and "PW 251 TL DL Analysis March 2021 with Taxes_WDR" (specifically, the TL Analysis ALL Details Worksheet)

For the purpose of the cost analysis, FEMA developed a detailed scope to describe, validate and categorize the work performed on each line[3] using several source documents, most of which were included in the "Closeout Package," the final submission from PREPA supporting its claim for reimbursement. It includes an applicant-developed project worksheet, including proposed DDD and SOW and photo pages, PREPA's damage assessment, an invoice listing and all Cobra invoices associated with the line, and the PREPA Engineer's inspection report. The Engineer's Report includes the damages observed per tower along with periodic updates on repair progress as noted by a PREPA engineer. Cobra's invoices included Daily reports from the field. The Daily reports sometimes included narrative description of the work performed, but FEMA found summary data of work performed to be unreliable. FEMA also cross-checked this information against PREPA's daily "Restablishment Spreadsheet," which tracked the work assignments across all lines and companies working on the repair.

Ultimately, FEMA narrowed the number and types of data to use for its analysis of the costs. The data FEMA used for its analysis is summarized in the TLs Final Analysis worksheet.[4] An edited version of the glossary is also included.[5] The data includes voltage, total towers, line length, total towers affected, fallen structures, damaged structures, towers worked on, total linemen that worked on the line, date work started, date work ended, and total worked days.

The total repair cost was broken out into several components including the tax added, reimbursables, logistics/security/man-camp, in order to identify the actual cost for the linemen labor. Due to the inclusion of the estimated taxes added as a single line-item to the invoices, FEMA apportioned the value of the tax line item to the overall cost of the logistics, security and lodging compared to the overall costs of the linework. The TLs Final Analysis spreadsheet also includes a section to categorize the type of terrain, be it mountainous, hilly or flat. Finally, FEMA added a calculations section to this spreadsheet to make determinations about the data.

Overall, FEMA used this information to assess the productivity of the work for each line, considering the actual scope of work performed, number of personnel assigned to the line, the amount of time spent working on the line, the location of the line on the island and its significance to the operation of the electrical grid, the difficulty accessing the lines based on type of terrain where the line was located, the availability of materials, and the type of work necessary to repair or replace towers.

To analyze productivity and cost of the work performed by the staff from Cobra, for each Transmission Line, FEMA categorized the descriptions in the scope of work by approximating the allocation of work to the following categories based on the description in the invoices. Some days included multiple crews doing different tasks on the same line, so FEMA's calculation distributes the work effort across the types of work to ensure total number of days worked is not overcounted. The work categories are as follows:

- Cleaning:
    - Two types of site cleaning took place:

[3] See "TL Scope Classification"
[4] See "PW 251 TL DL Analysis March 2021 with Taxes_WDR"
[5] See "Glossary for Final Analysis"

        - Pre-Refers to vegetation removal, road work and other clearing of the work area. Once access to the site is created, the electrical debris must be removed, including damaged and destroyed structures, conductors and associated system components.
        - Post-Refers to general clean-up of the site after all repair work has been completed. This includes fixing roads that had been built to gain access to the area, which were often washed out by rain and damaged by mud slides.
- Damage Assessment: Refers to time spent surveying the site, assessing damage, determining how to access towers, etc.
- Rebuilding: Refers to repair work that took place at or near the structure's initial site. In general, towers categorized as damaged on PREPA's reports were rebuilt.
- Replacing: Refers to repair work that required the complete removal of a tower, the performance of repair work often at a laydown yard, and a rebuilt or new structure would be put in place on the line. In general, towers categorized as fallen on PREPA's reports were replaced.
- Conductor: Refers to the installation, replacement, or re-sagging of conductor through towers.
- Reworks: Refers to work that was re-done due to errors and other problems.

Using this information, FEMA used several methods to calculate the costs for each line and to identify patterns and trends in how the work was performed and billed.

FEMA calculated on a per day basis the cost and the percent of time spent performing "cleaning" type work compared to the amount of time spent performing actual repair work to the line. Most lines with significant cleaning time were in the hilly or mountainous regions which were more difficult to access.

After separating the cleaning cost and the damage assessment from the actual linework performed, FEMA calculated the per tower cost based on the linework cost. FEMA reviewed this information (total number of poles, rebuilt vs. repair, conductor work) to determine if there were patterns or commonalities among the lines. Since FEMA relied on the type of work performed based on Cobra's daily reports, no particular patterns could be identified related to these specific categories. Therefore, FEMA chose to use the total number of poles affected (fallen and damaged) and compared the overall cost for the replacing, rebuilding and conductor work, to calculate a per pole cost. The per pole cost calculation allowed FEMA to compare the time and effort for work performed on various lines located in different parts of the island. FEMA sought to identify if the cost of repairs across different lines were similar, and if not, FEMA reviewed the information in further detail to determine if the scope provided details that could explain any key differences in the cost.

Based on this information, FEMA reviewed the transmission line work in three distinct categories, which is described in detail in the Scope of Work (SOW):

- The Electric Chair

Electric Chair Transmission Lines
COBRA PW 251
FEMA DR-4339PR

LINE ID	50700	51000	40200	40300
Date work started	11/7/2017	1/12/2018	1/30/2018	2/25/2018
Date work ended	7/20/2018	7/20/2018	7/12/2018	7/7/2018
Per tower cost	$623,025.58	$649,691.92	$516,478.27	$366,802.48

Cobra worked on four transmission lines that are part of the Electric Chair. The per tower cost ranged from $366,802.48 to $649,691.92.

- General Transmission Lines
  Cobra worked on eight lines that FEMA categorized as general. Two of the lines (TL 37500 and TL 36100) included higher than average costs per tower, due to complex logistics.

General Transmission Lines - Special Condition Lines
COBRA PW 251
FEMA DR-4339PR

LINE ID	Base calculation		Adjusted calculation[1]	
	37500	36100	37500	36100
Date work started	2/2/2018	2/2/2018	2/2/2018	2/2/2018
Date work ended	4/6/2018	4/2/2018	4/6/2018	4/2/2018
Per tower cost	$859,063.17	$443,955.81	$528,822.96	$259,725.79

[1] Costs for holding the tower off the buildings have been removen from calculation.

  - TL 37500—The per tower cost of this line was $859,063.17. The towers impacted on this line were in a residential neighborhood and crews needed to hold towers off structures and build temporary supports for the towers. According to the invoices, a total of $1,320,960.85 (excluding tax markup) was billed for 17 days (2/2/18 to 2/18/18) for this work.
  - TL 36100—The per tower cost of this line was $443,955.81. The towers impacted on this line were also in a residential neighborhood and crews needed to hold towers off of structures and build temporary supports for the towers. According to the invoices, a total of $921,150.06 (excluding tax markup) was billed for 17 days (2/2/18 to 2/18/18) for this work.

According to the engineer's report, these two lines share three structures that could have impacted other buildings. FEMA calculated the per tower cost of these two lines after removing the cost for holding the towers, and it resulted in a per tower cost as follows:

TL 37500— $528,822.96
TL 36100— $259,725.79

General Transmission Lines
COBRA PW 251
FEMA DR-4339PR

LINE ID	36300	50800	37800	41400	39000	37400
Date work started	12/27/2017	11/20/2017	11/15/2017	1/1/2018	6/6/2018	2/24/2018
Date work ended	7/20/2018	2/18/2018	1/22/2018	2/28/2018	6/15/2018	3/22/2018
Per tower cost	$394,382.04	$ 91,492.85	$186,082.50	$ 80,235.79	$356,114.28	$220,586.19

The per tower cost of the remaining six ranged from $80,235.79 to $394,382.04. While the cost per tower for TL 37500 and TL 36100 is high when compared to these six lines, there is no indication that Cobra over-resourced the line or that the level of effort was unreasonable when considering the logistical challenges.

- Outlier Transmission Lines

Outlier Transmission Lines
COBRA PW 251
FEMA DR-4339PR

LINE ID	38200	50200	36200	37900	50500
Date work started	3/14/2018	2/20/2018	5/29/2018	2/21/2019	7/18/2018
Date work ended	6/19/2018	2/21/2018	7/20/2018	6/7/2018	7/18/2018
Per tower cost	$ 58,475.25	$ 40,932.68	N/A	N/A	N/A

Cobra worked on five lines that FEMA categorized as outliers. Two of these lines included minimal work on towers and the per tower cost is below $59,000. Three of the lines included only cleaning work, therefore, no per tower cost could be calculated for them.

Distribution and Sub-Distribution Line Data and Analysis

FEMA used the data summarized for the Transmission Line analysis and added data specific to Distribution Line work, such as: Poles (Installed and Removed), Conductor (Installed, miles and Removed miles), Transformers (Installed and Removed), Anchors (Installed and Removed), Cross Arms (Installed and Removed), Insulators (Installed and Removed), and Services (Installed/Repaired), which is the customer service connection.

FEMA reviewed several source documents to develop the full scope of repairs on each line. This included a summary chart of work completed by Cobra crews that was submitted in PREPA's closeout packages.

Work Validation: Cobra worked on a total of 58 Distribution Lines, grouped based on 26 associated Substations, and 6 Sub-Transmission Lines. FEMA validated the cost and scope of work for a sample of the 58 Distribution Lines and 6 Sub-Transmission Lines (in accordance with the Public Assistance: Reasonable Cost Evaluation Job Aid dated October 13, 2018 (Job Aid) Appendix A).[6] In order to identify lines to include in the sample FEMA grouped the

[6] "Pub Assistance Reasonable Cst Eval Job Aid"

Distribution Lines based on its associated Substation and then sorted them in total cost order. FEMA did the same for the Sub-Distribution Lines. FEMA selected 8 substation groupings, which accounts for 20 lines, and one line from the Sub-Distribution Line. This accounts for five of the 10 most expensive groupings and four additional groupings selected for validation.[7] The total cost validated accounted for 37% of the DL claim. FEMA validated the counts and tabulated preliminary per pole costs prior to the addition of the 9% in estimated taxes and prior to segmenting the cleaning work from the linework. The per pole costs contained in the validation spreadsheet are not accurate for overall analysis purposes, only for counts of poles.

To perform the validation, FEMA developed a detailed scope for the 21 lines based on the narrative descriptions in the daily work logs provided with the Cobra invoices. FEMA read through the narrative and created a chart to count every time an element of work was performed or mentioned. FEMA summarized this information and then developed a worksheet that compared the PREPA presented data with the FEMA validated count. In general, FEMA's count was the same or higher than the count reported by Cobra and PREPA, thereby making the productivity of the line more efficient than reported by PREPA. In only 2 of the 21 lines did the PREPA count exceed the FEMA count. Based on these results, FEMA used the PREPA-reported numbers to conduct its full analysis.

Analysis: In order to assess productivity, FEMA reviewed all the DLs' cost based on the average cost per installed pole and the average cost per repaired service on each line. The pole is the critical element from which all other work items emanate. For example, anchors, cross-arms and insulators are attached to the pole. Repair or replacement of an entire pole is less expensive than repair or replacement of any one of the elements that is attached to the pole. FEMA did not find any correlation with the cost per repaired service, so the focus remained on the per pole cost.

Of the 58 distribution lines, FEMA identified 9 with either no repairs to poles (only repairs to other elements such as installing conductor, cross-arms or anchors) or a low per pole cost (low outliers), so FEMA reviewed these lines in further detail.

- Low Outliers

DL	Workdays	Cost	Contract Release #	Amount	Initial Validation by FEMA	PREPA Master Tracker	Follow up Validation
2601-02	1	$111,409.23	13 76	$300,000 $300,000	Yes	Yes	Work performed includes 6 cross arms installed, 7 poles removed.
2602-01	4	$462,396.03	14 75	$400,000 $4,900,000	No	Yes	Minimal work performed includes installation of 12 cross arms, 3 insulators.
2801-03	1	$77,041.07	66	$1,898,000	Yes	Assigned to USACE	FEMA's original validation resulted in a count of no poles installed versus 31 according to Cobra. The scope included with the invoice indicated difficulties obtaining materials.

[7] See "Cobra DLs selected for validation"

							It is possible Cobra assisted USACE on this day and was later assigned the work by PREPA. Work also performed on PW 466.
2803-01	9	$454,674.40	86	$500,697	No	Assigned to USACE	FEMA reviewed the work on this line and identified the installation of 16 poles. FEMA also noted that this line is more heavily weighted with cleaning days vs. repair work; however, on the cleaning days only 4 linemen worked. Adjusting for this, the per pole cost ranges from 14,000—19,000 per pole. It is possible that Cobra assisted USACE on these days and it was not properly reported.
3205-07	1	$66,529.33	69	$18,200,000	No	Yes	Installation of 25 insulators. Work also performed on PW 466.
4001-01	1	$94,599.29	21	See note.	No	Assigned to PREPA	Only cleaning work performed on this day. Work also performed on PW 466.
4002-03	2	$304,454.66	21	See note.	No	Yes	Crews picked up damaged materials and returned them to lay-down yard.
4003-03	5	$519,148.68	21	See note.	No	Yes	Invoice scope shows 14 poles, which would result in $16,695.31 pole Work also performed on PW 466.
4301-04	10	$2,888,722.98	27	$1,954,543.05	No	Yes	Crews picked up damaged materials and returned them to lay-down yard.

Note: Contract Release 21 grouped together a number of lines (4001-01, 03, 04; 4002-02, -03; 4003-01, -03) which totaled approximately $31 million in claimed costs.

Most of the lines in the low-outlier category were worked on for a minimal number of days with little work performed. FEMA compared the claimed cost on the line with the amount approved on the PREPA contract release. FEMA also checked the PREPA master distribution tracker, which was updated daily with real-time data, to determine if Cobra had been assigned to the line by the Unified Command Group (UCG). Finally, FEMA reviewed the scope provided in the Cobra invoices and the PREPA closeout package submission to assess whether the work was actually completed. Based on its review of the supporting documentation (PREPA's master distribution tracker and contract releases), FEMA does not have concerns with the work performed and the cost for these outliers.

FEMA also identified 4 outliers high in cost, more than $100,000 per pole, so FEMA reviewed these lines in further detail.

- High Outliers

DL	Workdays	Cost	Contract Release #	Amount	Initial Validation by FEMA	PREPA Master Tracker	Follow up Validation
4101-01	66	$17,954,664.18	19	$40,720,331	Yes	Yes	FEMA pole count 205 vs. 51 Cobra.
2603-08	23	$ 1,654,781.70	8 47	400,000 $1,000,000	Yes	Yes	4 poles; high number of insulators and services; 3/2/18 CR
2604-02	26	$ 2,266,841.09	61	$2,657,000	No	Yes	9 poles
4002-01	2	$ 469,969.60	28	$500,000	No	Yes	1 pole; 47 services

DL 4101-01's contract release covers three other lines (4101-02, -03, -04), with claimed costs of $22,579,035.89. FEMA's original validation of the daily reports identified 205 poles installed on this line versus the Cobra-reported number of 51 ($223,638.82 per pole); however, it is possible that Cobra crew reported work on the same poles on numerous days. A recalculation of this work based on the maximum of 205 poles would bring the per pole cost to approximately $56,000, which is in line with the majority of the other DLs. In addition to the damage to poles, a significant amount of conductor, cross-arms, insulators and transformers were installed, and more than 600 services were repaired, which adds to the time and cost.

For the remaining three: 2603-08 ($324,304.39) and 2604-02 ($193,730.47) both have a high count of insulators and crossarms installed but a low count of poles replaced. Neither of those components were used in FEMA's analysis. DL 4002-01 ($529,076.63) has a high count of services repaired (47) and only one pole replaced.

- Remaining DLs

For the remaining 45 lines, the per pole cost ranged from a low of $22,683.67 to a high of $101,099.06.

Sub-Transmission Lines

Cobra also worked on 6 sub-transmission lines. The per pole cost ranged from $114,223.77 to $211,220.07 for five of the lines. One of the lines (5400) cost $1,101,030.66 per pole, however this line (5400) serves the islands of Vieques and Culebra, which sustained major damages and was in the direct path of the hurricane. FEMA validated the work on this line and identified 36 poles installed rather than 3, which reduces the per pole cost to approximately $92,000.

Cost Reasonability Analysis

In order to analyze Cobra's performance and productivity for work completed, FEMA reviewed the scope and cost information submitted by PREPA as discussed above and reviewed the costs in accordance with the Public Assistance: Reasonable Cost Evaluation Job Aid dated October 13, 2018 (Job Aid). The Job Aid provides guidance to "any assessment of cost reasonableness undertaken by FEMA for relevant work completed under a PA grant or subaward."

The job aid provides a number of potential methodologies to be considered when determining reasonable costs. FEMA first reviewed the documentation provided supporting the scope of work and costs for eligibility under the Public Assistance program. FEMA then evaluated the costs for the approved scope of work to determine if they were comparable to relevant current market prices for similar goods or services using the best information available. The Job Aid provides six potential resources for this process:

1. Validation of Recipient or Subrecipient's Cost or Price Analysis
2. Historical Costs and Average Weighted Unit Prices
3. Published Unit Costs: Industry Standard Information Resources
4. Comparable Costs of Other Applicants
5. FEMA Cost Codes
6. Use of Least-Cost Alternative, or Low Bid

Based on the unique circumstances surrounding this event, FEMA used method 4 to review the actual costs claimed. FEMA also performed a partial review of the information based on method 3. The other methods weren't considered applicable in this case because:

- Method 1-- Validation of Recipient or Subrecipient's Cost or Price Analysis
  In December 2017, PREPA provided FEMA a review of Cobra's rates in comparison to other contractors proposing to perform work. As previously stated, FEMA reviewed this information and issued a determination memo.

  FEMA also requested HSOAC/Rand perform its own assessment of the contract rates. In their assessment, they determined that the overall average daily rate per lineman was $6,252 was reasonable. In its report, HSOAC/Rand developed upper and lower limits for a blended rate for linemen with support staff, which ranged from $2,000 per day to more than $10,000 per day. Since Cobra's rate fell in the middle of the range, HSOAC/Rand considered it reasonable.

  FEMA is not aware of a price analysis conducted by PREPA to evaluate the actual costs claimed; therefore Method 1 was not an option to validate the actual costs.

- Method 2--Historical Costs and Average Weighted Unit Prices
  FEMA did not use this methodology due to the historic and catastrophic damage to the electricity grid. There is no historical cost that comes close to the work needed to repair the electricity grid.

- Method 5—FEMA Cost Codes
  FEMA did not use this methodology because it is based on national unit price listing, which was likely not applicable to the conditions on Puerto Rico.

- Method 6—Use of Least-Cost Alternative, or Low Bid
  FEMA did not use this methodology because of the unique procurement circumstances faced by PREPA following the hurricane.

Method 4--Comparable Costs of Other Applicants

While PREPA is the only Applicant to perform electricity grid repairs, they used multiple contractors to complete work. FEMA compared Cobra's costs with other contractors who performed work in three ways: 1) overall average daily rate, 2) cost per pole repaired, and 3) cost per person for food and lodging.

- Whitefish: On September 26, 2017, PREPA entered into a contract with Whitefish to begin work to the electricity grid. Whitefish performed work on six transmission lines and four distribution lines in October and November. PREPA terminated the contract and all work by Whitefish was completed by November 30, 2017.

- MOUs: Cobra entered into mutual aid agreements with 22 companies from the mainland U.S. to perform work on distribution lines, which predominantly took place in the first few months of 2018. The agreement is documented in a Memorandum of Understanding (MOU) signed by officials from the Requesting and Providing entities. PREPA agreed to pay each company rates that are consistent with historical rates and with no added markup (at cost).

  PREPA submitted an analysis of the estimated cost for the MOUs as part of its reasonable price analysis for its Whitefish claim. This analysis used estimated costs based on the proposed number of fieldworkers and extent of the deployment, exclusive of mobilization and demobilization expenses. FEMA selected five of the companies and recalculated the average daily rate using actual costs.

- USACE Mission Assignments: FEMA mission-assigned direct grid repair work to USACE in mid-October. USACE entered into contracts with two companies in the mainland US to perform work. These contracts are not overseen by FEMA's Public Assistance Division, and complete data regarding scope and cost was not available at the time of this analysis. Summary information, using data from information in the U.S. Department of Defense Inspector General report on the USACE contracts and line assignment data from PREPA/UCG trackers, briefly illustrate the work performed. USACE entered into one contract with Powersecure for $523 million and two contracts with Fluor, one for $505.8 million and another for $276.4 million, totaling nearly $1.3 billion. The actual value of the mission assignments from FEMA is higher, due to the administrative costs incurred by USACE. The USACE contractors worked from approximately mid-October 2017 through March 2018.

  According to PREPA's reports tracking work assignments, which updated information daily as it was reported, USACE's contractors were assigned to work on distribution and transmission lines. For example, the March 10, 2018 report on distribution lines shows that USACE contractors were assigned to 194 lines while Cobra was assigned to 52. The January 12, 2018 transmission line report indicates that USACE contractors were assigned to work on 23 segments compared to Cobra's assignment to 7 segments by that date. Without final data on work performed by USACE's contractors, FEMA only has this type of summary information to assess how much work was completed by USACE

for $1.3 billion over the course of five months versus how much work Cobra completed for $945 million over the course of nine months.

- EMAC-NYPA: Puerto Rico activated their Emergency Management Assistance Compact (EMAC) and submitted a request for assistance to the state of New York for EMAC A-team Missions. The mission associated with repair work of distribution and transmission line work, including personnel and equipment, was estimated by the New York Power Authority (NYPA) at $261 million from. NYPA brought in a number of different companies to perform the work including Central Hudson, Con Edison, Avengrid, National Grid and PSEG. Each company submitted invoices to NYPA which were then submitted to PREMA (the applicant for EMAC) and then to FEMA. At this time of this analysis, the documentation was incomplete and could not be used to assess work performance in the field. According to PREPA's tracking sheets, NYPA personnel were assigned to three transmission lines and had completed work on 226 distribution lines.

Overall average daily rate

For comparative purposes, FEMA compared Cobra's daily average rate with similar information for other contractors, including Whitefish and the MOUs. Cobra's rates changed in January 2018, so FEMA used the two time periods, as well as an average, for its comparison. FEMA compared this information with the overall average daily rates for Whitefish and the MOUs, as summarized below:

Lineman Loaded Daily Rate Comparison
DR-4339-PR

Contractor	Period of Performance		Rate Type	Low	High	Average
COBRA [1]	10/25/2017	12/31/2017	Base Contract	$ 5,246.94	$ 6,252.00	$ 5,583.02
COBRA [1]	1/1/2018	7/20/2018	Amended Contract	$ 4,531.63	$ 4,895.46	$ 4,683.73
COBRA [1]	10/25/2017	7/20/2018	Overall	$ -	$ -	$ 4,912.76
Whitefish [2]	9/26/2017	11/30/2017	Transmission	$ 5,516.24	$ 8,117.31	$ 6,600.83
Whitefish [2]	9/26/2017	11/30/2017	Distribution	$ 6,847.73	$ 7,796.76	$ 6,990.27
Whitefish [2]	9/26/2017	11/30/2017	Overall	$ -	$ -	$ 6,694.11

MOU	Period of Performance		PREPA Estimated Average	Actual Cost Average
DTE	1/22/2018	3/31/2018	$ 6,962.78	$ 5,288.68
Exelon	2/26/2018	4/4/2018	$ 7,632.02	$ 7,208.28
Duke	1/14/2018	3/8/2018	$ 3,865.67	$ 5,491.77
LGE	1/25/2018	4/6/2018	$ 4,526.13	$ 5,371.36
SMUD	1/21/2018	3/12/2018	$ 8,119.80	$ 5,603.66

[1] COBRA rate calculations does not include the 9% estimated Tax Gross Up.
[2] Whitefish rate calculation includes 8.5% local PR taxes embedded in the hourly rates.

Per pole cost

FEMA compared the per pole cost of the transmission and distribution work of Whitefish and Cobra only since similar data for other contractors was not available at the time of this analysis. Cobra and Whitefish are summarized below:

Per Pole Cost Comparison
DR-4339-PR

Company	Period of Performance		Cost Type	Low	High	Average
COBRA	10/25/2017	7/20/2018	Transmission	$ 40,932.68	$ 859,063.17	$ 408,069.46
Whitefish	9/26/2017	11/30/2017	Transmission	$ 29,505.42	$ 1,469,221.89	$ 302,264.81
COBRA	10/25/2017	7/20/2018	Distribution*	$ 1,980.61	$ 529,076.63	$ 51,861.43
Whitefish	9/26/2017	11/30/2017	Distribution	$ 52,179.40	$ 207,104.28	$ 65,858.22

*COBRA Distribution Lines Per Pole cost does not include DL5400 costs.
Whitefish rate calculation includes 8.5% local PR taxes embedded in the hourly rates.
COBRA rate calculation includes Tax Gross Up.

Lodging/Meals cost

Whitefish, Cobra and the MOUs all handled the costs associated with food and lodging differently.

Lodging and Per Diem Costs
DR-4339-PR

Company	Period of Performance		Rate Type	Average Lodging and Per Diem Costs per Person per Day
COBRA [1]	10/25/2017	12/31/2017	Base Contract	$ 281.82
COBRA [2]	1/1/2018	7/20/2018	Amended Contract	$ 259.27
COBRA [3]	10/25/2017	7/20/2018	Overall	$ 265.01
Whitefish	9/26/2017	11/30/2017	Base Contract	$ 412.23
DTE	1/22/2018	3/31/2018	Base Contract	$ 502.04
Exelon	2/26/2018	4/4/2018	Base Contract	$ 11.33
Duke	1/14/2018	3/8/2018	Base Contract	$ 511.43
LGE	1/25/2018	4/6/2018	Base Contract	$ 119.44
SMUD	1/21/2018	3/12/2018	Base Contract	$ 453.07

Notes:
[1] Calculation based on the total cost of $155,000.00 for a 550 people man camp as stated in the base contract and does not include the estimated 9% Tax Gross Up.
[2] Calculation based on the total cost of $142,600.00 for a 550 people man camp as stated in contract amendment and does not include the estimated 9% Tax Gross Up.
[3] Calculation based on 68 days using the base contract cost for man camp and 199 days using the amended cost and does not include the estimated 9% Tax Gross Up.
Whitefish Per Diem and Lodging were extracted from the received invoices.
DTE's rate includes supporting personnel such as mechanics, supervisors and managers.
Exelon's Per Diem costs were not clearly labeled on the documentation received.
Duke's rate includes about 23 supporting staff that traveled to the island to help with logistics.
LGE's information only included Lodging costs, no Per Diem costs were clearly identified.
SMUD's rate is based solely on the lineman that traveled to the island.

In summary:

- Cobra's overall average rate is lower than all other contractors reviewed. If the average 9% tax markup is added, the rates fall in line with the MOUs and are still lower than Whitefish rates.
- Cobra's highest TL per pole cost is lower than Whitefish's highest per pole cost. The overall average per pole cost is within $100,000 of Whitefish's. Cobra's DL per pole cost range spans $500,000 and the highest per pole cost is more than double the highest

per pole cost for Whitefish; however, on average, Cobra's cost is less than Whitefish's. Cobra worked on 64 distribution lines compared to Whitefish's four. In summary, Cobra's per pole cost is lower than Whitefish's.

- Cobra's man-camp rate resulted in a lower daily rate per person compared to all other contractors reviewed.

Given the condition and circumstances on the island, the evaluation of all date available to assess the level of effort for the work performed, and the comparison to other contract costs, FEMA found that Cobra's costs per tower for both transmission and distribution lines for the work captured on this project appear reasonable.

Method 3--Published Unit Costs: Industry Standard Information Resources

FEMA considered using published unit cost information or other industry standards information. For example:

MISO—A cost estimating guide by Midcontinent Independent System Operator (MISO) for transmission costs includes information about expected costs in four categories: land and right-of-way; structures and foundations; conductor, OPGW, and shield wire; and professional services and overhead in its Transmission Cost Estimating Guide; however, the data is based on new construction and not emergency repairs and restoration. This cost calculator is focused on identifying essential transmission projects studied and designed to increase reliability and efficiency in a given Region and based on a presented business case from the utility to include evaluating alternatives. This is not the case with the restoration and repairs in Puerto Rico as the Stafford Act designates the repairs and replacements to be directed at the infrastructure as it existed pre-storm or better known as "like for like' repairs. Although MISO accounts for "all inclusive" costs for projects, those additions are not based in Emergency Restoration scopes of work, timelines and logistics which precludes FEMA from using MISO outside of its designed application.

B&V—FEMA also reviewed the capital costs for transmission planning developed by Black and Veatch, which prepared a report for the Western Electricity Coordinating Council, including the cost per mile for new transmission lines. This method uses a similar approach to MISO and is also not designed for use or estimating in Emergency Restoration scenarios where infrastructure and equipment is in need of replacement or repairs due to damages forcing the implementation of unplanned projects and scopes of work. The B & V calculator is centered around implementing planned and designed projects with executable Capital funding at the utility scale along with their cost controls through Regional forecasting and system planning methodologies for long term reliability projects. The B & V calculator and methods are also primarily focused at system voltages of 230kV and above and subsequently is not tailored specifically for accurate implementation to the Puerto Rico power grid and the lower transmission voltages that make up a bulk of the PREPA system and its damages.

USDA/RUS—For Transmission, Distribution and Substations, the RUS has cost estimating and validating tools, but they are specifically tailored for execution in conjunction with USDA/RUS loan programs. Although PREPA has adopted the RUS Industry Standards as their baseline standards for the permanent reconstruction projects, the standards approved for use in the Energy

and Communications projects are focused on new construction and implementing supplemental funding for reliability and efficiency projects for the Utility much as the MISO and B&V calculators are designed to be used. The RUS does provide guidance and requirements for Emergency restoration, but its main focus is on planning, logistics and execution to include keeping in line with the latest National Response requirements and offers little in terms of estimating or validating the costs of those activities. The RUS also provides guidance on structuring and estimating costs within its loan programs, specifically in its Transmission, Distribution and Substation planning and development guides, but those guides are not applicable to the scope of work associated with Emergency restoration projects or aligned directly with applicable Stafford Act policies and requirements.

RS Means—FEMA reviewed RS Means Work Crews and units of work and determined they were not well-suited to post-disaster electrical repair work. It generally accounts for new construction of transmission and distribution line work. RS Means accounts for a number of different crew types to perform electricity construction work. FEMA did not have access to detailed information from Cobra about the makeup of their crews and the specific equipment used to allow for a reliable comparison. FEMA determined that building a new cost estimate for all the work performed on the transmission and distribution lines, and then making a number of assumptions to account for the unique circumstances on the island and the potential reasons work could be delayed, including, hurricane damage and debris, weather, and lack of materials, would not result in a reliable comparison.

Independent Analysis Conducted by USACE

Following the July 3, 2019, release of OIG-19-52, which included the recommendation that FEMA "conduct a comprehensive analysis of Cobra contract costs in accordance with PA grant guidelines and disallow any costs that are not reasonable," FEMA entered into an agreement with USACE to conduct an independent analysis of the Cobra project, separate from the one FEMA was performing. On November 17, 2020, USACE delivered the final version of its report[8] on the cost reasonableness of PW 251.

USACE's analysis focused on the cost reasonableness of the work performed and the contract adequacy for administering this work. The key findings include:

- USACE estimated the effort for electrical work (work directly related to repairing or replacing towers, poles, conductors, transformers, anchors, cross arms, insulators, and house services) should be 44,008 man-days for transmission lines and 72,446 man-days for distribution lines, totaling 116,958 man-days. Cobra Energy Services invoiced for 40,198 man-days for transmission lines and 78,601 man-days for distribution lines, totaling 118,799 man-days for electrical work. The calculations were made using standard RS Means labor and equipment crews. Cobra's duration of work for electrical work appears to be reasonable.
- USACE observed a number of poor contract management practices
- USACE recommends that the certified payrolls of both the prime Contractor and subcontractors be reviewed and compared against the contract billings to make a final

[8] See "USACE Cost Review for FEMA - Cobra Audit Final Draft – 20201117"

determination of cost reasonableness. Additionally, any internal Contractor reports, schedules and tracking documents that can be obtained may also provide further information as to the work plan and actual inefficiencies encountered.

- USACE identified a contract violation that resulted in Cobra billing above the maximum number of personnel on 43 days, resulting in overbilling $27.8 million.
- USACE questioned the inclusion of personnel such as Assessors and Tree Trimming Personnel within the "skilled linemen" rate for work on Distribution Lines. It appears Cobra charged the lineman rate for these workers. Considering the 13,809 man-days of tree trimming, a potential overpayment of $22 million to $45 million could have been made.

Commonalities with FEMA's review

- FEMA analyzed the work production for the TL and DL by calculating a per tower cost and compared those costs against all the lines as well as compared to the cost for other contractors, including Whitefish, who performed work under similar conditions and a similar timeframe.
- Although there are several examples of lines that appear to be more expensive than others, considering the conditions on the island, weather delays, material delays, difficult access in rugged conditions, FEMA is unable to clearly identify that the range in cost per tower is specific to any issues related to poor resource management or other similar concerns with the contractor. FEMA determined that the cost of the work performed appears reasonable.

Discrepancies with FEMA's review

- USACE did not make a determination on the costs claimed for mobilization. FEMA's review of mobilization costs identified $26 million in claims for personnel prior to their mobilization and performance of work.
- While FEMA agrees the contract oversight could have been better, FEMA does not believe it would have impacted the overall work productivity, given the circumstances on the island at the time.
- USACE stated that it did not appear that the equipment quantities could effectively support the demands of the larger manpower count that ultimately worked under the contract. USACE focused on the equipment listed in the contract, which was the commitment per the 250 linemen, but did not analyze the totality of equipment brought to Puerto Rico. FEMA reviewed the mobilization submission and analyzed the transport of equipment by Cobra and outside vendors. By the end of November 2017, Cobra mobilized 483 linemen and 305 pieces of equipment. In December Cobra took on personnel and equipment from subcontractors who had been working with Whitefish, so it is possible that as Cobra's lineman count increased, so did its equipment count. Therefore, FEMA does not consider Cobra to be under-resourced in equipment to be a significant factor affecting the productivity level.
- USACE questioned the inclusion of personnel such as Assessors and Tree Trimming Personnel within the "skilled linemen" rate for work on Distribution Lines and calculated a potential overpayment but did not highlight a similar issue for Transmission Lines. FEMA considered the blended rate for linemen to include an average for all skill levels of workers in a crew, not just the skilled electrical personnel. In FEMA's analysis, the work

performed was categorized and segmented to account for the significant time attributed to alternate duties such as tree trimming, traffic control, assessments, clean up, etc. Given the conditions on the island, FEMA considers the contractors work as an "all hands on deck" situation. Personnel of all skill levels needed to contribute to some activities, such as clearing access to the site, in order to move quickly. It would have been less efficient to have skilled linemen waiting for lesser skilled workers to clear access to the site. While FEMA did not find this an issue of concern for the work performed under PW 251, it may be an issue with the work performed on subsequent Cobra emergency work projects for work completed after July 20, 2018.

- USACE identified inconsistencies with the daily headcount, but FEMA did not.

Ineligible Work/Costs

Excess Man Count

Amendment #5, signed on February 27, 2018, added a provision under paragraph 11, which states "The Contractor will neither increase nor decrease its total staffing resources more than 10 percent from the level agreed to in Exhibit 1-B Contractors' Rate Schedule of 882 personnel without the written consent of PREPA." Based on this information, the lowest allowable count is 794 and the highest allowable count is 970.

FEMA identified 43 days when Cobra exceeded the highest allowable count. No documentation of written approval from PREPA for this increase in staff was submitted. The excess count of staff violates the contract provision and is not eligible. FEMA calculated the total value of the extra personnel in the attached spreadsheet[9] and will deduct the $24,439,810.49 for personnel above the contract's allowable personnel ceiling from the project. This calculation does not include the associated estimated tax markup, which will need to be recalculated at closeout.

Mobilization

Cobra submitted 14 invoices for $34,258,880.78 in costs associated with the mobilization of equipment and personnel from the US mainland to Puerto Rico.

According to the contract, reimbursement of mobilization expenses was on a cost reimbursement basis (i.e. based on actual costs). The specific mentions of mobilization in the contract are: Article 4, Article 51, Exhibit B, and Exhibit C. FEMA reviewed invoices that included the transportation for some personnel, transportation for some equipment, miscellaneous items associated with mobilization, and the average daily rate for personnel. FEMA also reviewed documentation demonstrating the transport of personnel and equipment through a third-party vendor, XGL, which is claimed on PW 358.

Transport of Personnel

Cobra personnel mobilized to Puerto Rico on five flights operated by XGL, a third-party vendor, which PREPA paid directly and claimed reimbursement from FEMA through PW 358. FEMA reviewed Cobra and XGL documentation and identified 593 personnel traveling to Puerto Rico from the mainland and 151 personnel who were already on island. By November 30, 2017,

[9] See "PW251 excess count over 970"

Cobra's billings for staff accounted for a total of 757 staff compared to 744 via XGL logs and 761 through Cobra reports.

	Billings	XGL	Cobra Daily Mobilization Report
Travel to PR	N/A	593	610
On-Island	N/A	151	not accounted for, but assumed 151
Total	**757**	**744**	**761**

Average Daily Rate for Personnel

Cobra billed its average daily rate of $1.5 million, which represents the blended daily rate for 250 linemen as well as management, security, and logistics staff, starting October 25, 2017 through November 11, 2017. Cobra began the billing for the daily minimum amount due of $1,563,000, based on 250 linemen, starting on October 25, 2017; however, Cobra did not reach the required minimum number of linemen on island until November 12, 2017.

From October 25 through November 6, Cobra billed $1,563,000 per day. Starting on November 7 through 11, Cobra billed a hybrid based on some line workers performing work in the field and the remaining for meeting the daily minimum of 250 linemen.

During the mobilization period, Cobra provided daily reports which indicated that an advance team mobilized on October 24, 2017 (via commercial flights). The reports document the schedule for the movement of personnel and equipment to Puerto Rico.

According to the contract, the minimum number of linemen is 250, however, it does not specify if this commitment is to ensure that Cobra mobilizes the minimum, or if the intent was to begin billing for that minimum. Cobra billed for the minimum of 250 linemen prior to actually reaching the minimum on island. Cobra also billed for a number of linemen listed on its "roster" but based on the actual movement of personnel, that number of linemen had not yet mobilized to the island.

The proposed blended rate for Cobra's linemen was quoted based on performing actual work, therefore, billing at this rate prior to the arrival of linemen to Puerto Rico and starting work is not supported by the terms of the contract. Since some Cobra personnel were on island from October 25-November 11, 2017, FEMA calculated the costs for the personnel who did do work, along with a pro-rated portion of the man camp[10]. Of the $26,594,217.96 Cobra claimed prior to 250 linemen reaching the island, FEMA determined $5,142,945.45 is eligible. This calculation does not include the associated estimated tax markup, which will need to be calculated at closeout. See Determination Memo for further details.

Transport of Equipment

Equipment was mobilized to Puerto Rico via barges contracted by Cobra directly as well as through the third-party vendor, XGL.

According to Cobra's daily reports in October and November, XGL transported equipment on five flights in late October and November. FEMA validated this information with the

[10] See revised calculation in the attached file "COBRA Nov 11 mobilization staff recalculation"

documentation supplied for the XGL PW and found documentation that supported 26 pieces of Cobra equipment on five XGL flights, though the flight dates did not match. An additional 51 pieces of equipment are probably Cobra equipment, though it could not be confirmed with the information provided.

Cobra's invoices for equipment shipped on 4 barges in November (Invoices 6 and 8) account for 228 pieces of equipment. In total, Cobra moved 305 pieces of equipment to Puerto Rico by the end of November 2017, which is above the amount identified in the contract. Overall, FEMA confirmed that by November 30, 2017, Cobra had mobilized 305 pieces of equipment and 483 linemen, meeting the terms of its contract.

Other Mobilization Expenses

Invoice 4 includes a miscellaneous group of receipts. Several items pertain to the monthly rental of apartments, totaling $133,800, which are not eligible.[11] Cobra's lodging costs were covered via the man-camp as detailed in the contract.

Of the $7,592,213.78 Cobra claimed for the movement of equipment and other mobilization expenses, FEMA determined $7,458,413.78 is eligible.

In total, of the $34,258,880.78 claimed in mobilization, $12,601,359.23 is eligible and $21,585,072.51 is ineligible.

Conclusion

FEMA's review of the actual costs claimed by PREPA for the emergency work performed on the electricity grid by Cobra included a detailed review of work productivity based on the SOW, comparison of actual costs to other electrical contractors based on work performed by TL and DL, the overall average daily rate and the daily per diem, and a review of USACE's report.

FEMA found that:

- Cobra's overall average rate is lower than all other contractors reviewed. If the average 9% tax markup is added, the rates fall in line with the MOUs and are still lower than Whitefish rates.
- Cobra's highest TL per pole cost is lower than Whitefish's highest per pole cost. The overall average per pole cost is within $100,000 of Whitefish's. Cobra's DL per pole cost range spans $500,000 and the highest per pole cost is more than double the highest per pole cost for Whitefish; however, on average, Cobra's cost is less than Whitefish's. Cobra worked on 64 distribution lines compared to Whitefish's four. In summary, Cobra's per pole cost is lower than Whitefish's.
- Cobra's man-camp rate resulted in a lower daily rate per person compared to all other contractors reviewed.

Given the condition and circumstances on the island, the evaluation of all data available to assess the level of effort for the work performed, and the comparison to other contract costs, FEMA

[11] See "Mobilization Invoice Tracker Final February 2021"

found that Cobra's costs per tower for both transmission and distribution lines for the work captured on this project appear reasonable.

The independent analysis performed by USACE also found that the duration of work for the electrical repairs performed by Cobra appears to be reasonable.

Based on the results of the FEMA and USACE analyses, FEMA has no reason to believe that the cost of the work performed by Cobra is not reasonable. FEMA's review did identify two contract compliance issues which will result in a deobligation of funds.