

**GOBIERNO DE PUERTO RICO  
JUNTA REGLAMENTADORA DE SERVICIO PÚBLICO  
NEGOCIADO DE ENERGÍA DE PUERTO RICO**

NEPR

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**IN RE:** Solicitud de Aprobación de  
Ciertos Aspectos de Microred Personal

**Caso Núm.:** NEPR-CT-2020-0004

**Asunto:** Solicitud Aprobación de  
Ciertos Aspectos de Microred  
Personal

**MOCION EN CUMPLIMIENTO DE RESOLUCION DEL 1 DE SEPTIEMBRE DE 2020  
AL HONORABLE NEGOCIADO DE ENERGIA DE PUERTO RICO:**

COMPARECE Banco Popular de Puerto Rico (“BPPR”) por conducto de la representación legal que suscribe, y muy respetuosamente expone y solicita:

Mediante Resolución aprobada y notificada el 1 de septiembre de 2020 en el asunto de epígrafe (la “Resolución”), el Negociado de Energía de Puerto Rico (“NEPR”) determinó aprobar la microred propuesta en el asunto de referencia (“Microred Propuesta”) como una Microred de Tercero, condicionado a que BPPR cumpla con lo establecido en la Parte III de dicha Resolución. En cumplimiento de dicha Resolución, BPPR somete la siguiente información según listada en dicha Parte III, la cual se repite para propósitos de claridad:

*A. Información de contacto:*

(1) Nombre del Dueño de la Microred:

Banco Popular de Puerto Rico

(2) Dirección Postal:

División Legal, Banco Popular de Puerto Rico  
P.O. Box 362708, San Juan PR 00936

(3) Dirección de Correo Electrónico:

[julio.puigdorfila@popular.com](mailto:julio.puigdorfila@popular.com)  
[gisela.vazquez@popular.com](mailto:gisela.vazquez@popular.com)

(4) Número de Teléfono:

(787) 754-9111

(5) Nombre de la persona que servirá como operador de la Microred Propuesta, incluyendo información requerida en los incisos (2), (3), y (4) anteriores:

(a) Nombre de Persona: Julio de Puigdorfila Garcia

(b) Dirección Postal:  
Operations Manager  
Corporate Real Estate, Popular Inc.  
P.O. Box 362708, San Juan PR 00936

(c) Dirección de Correo Electrónico:

[julio.puigdorfila@popular.com](mailto:julio.puigdorfila@popular.com)  
[gisela.vazquez@popular.com](mailto:gisela.vazquez@popular.com)

(d) Número de Teléfono:

(787) 754-9111

*B. Demostrar que el diseño de la Microred Propuesta cumple con las disposiciones de la Sección 3.03(B) del Reglamento 9028 respecto a microredes tipo CHP y presentar la información requerida en la Sección 3.04(B)(1) del Reglamento 9028.*

Se incluyen los siguientes **Exhibits** para demostrar cumplimiento con la Sección 3.03(B) del Reglamento 9028:

**Exhibit A:** Certificación del diseñador, el ingeniero Roberto Acosta Martín (“Certificación de Diseñador”). Los Apéndices 1, 2 y 3 de este documento se incluyen como Exhibits B, C y D.

**Exhibit B:** Apéndice 1 de la Certificación del Diseñador, conteniendo las especificaciones técnicas de los cogeneradores.

**Exhibit C:** Apéndice 2 de la Certificación del Diseñador, conteniendo las especificaciones técnicas de los Chillers de Absorción.

**Exhibit D:** Apéndice 3 de la Certificación del Diseñador, conteniendo el diagrama de flujo de energía.

C. Un listado de los recursos y equipos que serán instalados, así como los cambios y modificaciones al listado originalmente presentado, de acuerdo con la Sección 5.03(F) del Reglamento 9028.

El listado de los recursos y equipos de cogeneración es el siguiente:

<b>Cantidad</b>	<b>Descripción</b>
2	Cogenerador <b>Caterpillar</b> de Gas Natural y Propano <b>CG170-12</b> de 1,198 KW (Gas Natural) o 887 KW (Propano)
2	Chiller de Absorción <b>Thermax TAC E7 E1</b> de 350 Toneladas
1	Almacenaje de Energía <b>Dynapower IPS-1500</b> de 1,500 KW con un módulo de baterías de 716 Kwh y transformador de aislamiento de 1,500 Kva, 480/480 voltios
1	Transformador <b>GE/ Prolec</b> de 3,000 Kva, 13,200/ 480 voltios
1	Medium Voltage Switchgear <b>SG2</b> de <b>Accurate Solutions</b>
1	Low Voltage Paralleling Switchboard <b>PSG2</b> de 4,000 Amperes de <b>Accurate Solutions</b>
1	Bus Duct <b>GE</b> de 4,000 Amperes
3	Torres de Enfriamiento <b>Evapco USS 312-4M54</b> de 600 Toneladas
1	Chiller Eléctrico <b>Trane CVHM0300</b> de 350 Toneladas
1	Planta de Gas Natural <b>NFEnergía</b> de 48,000 galones (3 c/u. tanques de 16,000 galones) y sus equipos relacionados

D. La información de contacto de los suplidores de los equipos que serán instalados como parte de la Microred Propuesta, incluyendo los suplidores de los equipos que sean añadidos luego de presentarse el listado original, de acuerdo con la Sección 5.03(G) del Reglamento 9028.

El Contratista de instalación de los equipos de cogeneración fue Bermúdez, Longo, Díaz-Massó, LLC., P.O. Box 191213 San Juan Puerto Rico 00919-1213; teléfono: 787-761-3030. Los equipos de la planta de gas natural fueron suplidos e instalados por NFEnergía, LLC (información de contacto se incluye en la tabla abajo). A continuación la información de cada suplidor:

Cantidad	Descripción	Suplidor
2	Cogenerador <i>Caterpillar</i>	Rimco Cat PO Box 362529 San Juan PR, 00936-2529 Teléfono: 787-253-5710 Pedro Jimenez Power System Manager
2	Chiller de Absorción <i>Thermax</i>	Accurate Solutions Corp PO Box 6014 Mayagüez PR 00681 Teléfono: 787-925-7357 Roberto Acosta Martín
1	Almacenaje de Energía <i>Dynapower</i>	Accurate Solutions Corp PO Box 6014 Mayagüez PR 00681 Teléfono: 787-925-7357

		Roberto Acosta Martín
1	Transformador <i>GE/ Prolec</i> de 3,000 Kva	Accurate Solutions Corp PO Box 6014 Mayagüez PR 00681 Teléfono: 787-925- 7357 Roberto Acosta Martín
1	Medium Voltage Switchgear SG2	Accurate Solutions Corp PO Box 6014 Mayagüez PR 00681 Teléfono: 787-925- 7357 Roberto Acosta Martín
1	Low Voltage Paralleling Switchboard PSG2	Accurate Solutions Corp PO Box 6014 Mayagüez PR 00681 Teléfono: 787-925- 7357 Roberto Acosta Martín
1	Bus Duct <i>GE</i>	Accurate Solutions Corp PO Box 6014 Mayagüez PR 00681 Teléfono: 787-925- 7357 Roberto Acosta Martín
3	Torres de Enfriamiento <i>Evapco</i>	Oldach Associates, Inc PO Box 364603

		San Juan PR, 00936-4603 Teléfono: 787-641-2420
1	Chiller Eléctrico <i>Trane</i>	Trane Puerto Rico, LLC PR#1, KM. 25.1 Barrio Quebrada Arenas San Juan Industrial Park San Juan PR, 00926-1900 Teléfono: 787-798-0999
1	Planta de Gas Natural	NFEnergía, LLC 111 W. 19th Street, 8th Floor New York, NY 10011 Teléfono: 516-268-7400

*E. Previo a la construcción de la Microred Propuesta, una certificación del diseño de la Microred, sellada y firmada por un ingeniero licenciado, de acuerdo con la Sección 5.03(H) del Reglamento 9028.*

Se incluye como **Exhibit E** el plano de diseño firmado y sellado por el diseñador y endosado por la Autoridad de Energía Eléctrica.

*F. Un modelo de cada tipo de factura que BPPR utilizará (i.e., si la factura mensual y la factura de reconciliación anual son distintas, incluir un modelo de cada una), de acuerdo con la Sección 5.03(I)(2) del Reglamento 9028. La factura debe incluir la información de contacto de la Oficina Independiente de Protección al Consumidor, de acuerdo con la Sección 5.06(B) del Reglamento 9028.*

Se incluyen los modelos de los distintos tipos de facturas, estados de cuenta y otros tipos de estados requeridos en el Acuerdo Propuesto en los siguientes **Exhibits**:

**Exhibit F:** Modelo de la factura mensual.

**Exhibit G:** Modelo del estado anual de gastos operacionales estimados y el porcentaje de gastos atribuibles a Evertec (denominado el “Advance Statement”) según la Sección 2(a) del borrador del Acuerdo Propuesto

**Exhibit H:** Modelo del estado de reconciliación anual (re-denominado “Annual Reconciliation Statement”) según la Sección 2(a) del borrador del Acuerdo Propuesto. (Este documento anteriormente denominado “End Statement” en el borrador del Acuerdo Propuesto se ha re-denominado según indicado para mayor claridad.)

**Exhibit I:** Modelo del informe para la revisión de los componentes de la fórmula para determinar la proporción de gastos operacionales del Sistema CHP atribuibles a Evertec (“Tenant’s Proportionate Share”) (dicho informe denominado “Review Statement”) según la Sección 5 del borrador del Acuerdo Propuesto.

*G. El borrador del Acuerdo Propuesto, modificado según las siguientes disposiciones:*

- (1) Se debe conceder a Evertec un término de treinta (30) días para objetar o pagar el cargo mensual por servicio de energía, de acuerdo con la Sección 5.06(A) del Reglamento 9028.*
- (2) Incluir lenguaje que permita a cualquier de las partes dar por terminada la provisión del servicio de energía, de acuerdo con la Sección 5.11(C) del Reglamento 9028.*

Se adjunta el borrador del Acuerdo Propuesto, como **Exhibit J** (anterior Exhibit L de la Moción Suplementaria), marcado para mostrar los cambios efectuados en atención a la solicitud del NEPR y aclarar aspectos relacionados. Nótese que el término “End Statement” se cambió a “Annual Reconciliation Statement” para mayor claridad.

*H. Aclarar la frase “and associated depreciation costs” contenido en el párrafo 3 del Exhibit L de la Moción Suplementaria. A esos fines, BPPR debe detallar la procedencia y naturaleza de los referidos costos, dado el argumento de que BPPR no recuperará de Evertec las inversiones de capital relacionadas con la Microred Propuesta. Debemos señalar que BPPR no mencionó dichos costos en la Petición.*

Se aclara que sí se propone cobrar los gastos de depreciación del equipo del Sistema CHP como parte de los gastos de operación del Sistema CHP que se utilizarán como base para calcular el Cargo de Electricidad del CHP a cobrarse a Evertec, según se describe en la enmienda propuesta al contrato de arrendamiento entre Evertec y BPPR (esto es, el “Eleventh Amendment to Master Lease Agreement”) incluido como Exhibit L de la Moción Suplementaria (e incluido en esta Moción como **Exhibit J**). Esta sería la única porción relacionada con la inversión de capital en el Sistema CHP que se estaría recobrando y aún con la presencia de este costo en la fórmula para determinar el Cargo de Electricidad del CHP, BPPR no va a generar ganancias del desarrollo y operación del Sistema CHP. El propósito principal del Sistema CHP continúa siendo el proveer resiliencia a las operaciones de BPPR y Evertec.

*I. Cargo de Presentación por la cantidad de \$100.*

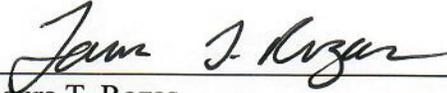
Se incluye como **Exhibit K** copia de la evidencia del pago de Cargo de Presentación.

Por todo lo cual, muy respetuosamente se solicita al NEPR que dé por cumplidos los requisitos de la Parte III de la Resolución y confirme que BPPR puede proceder con el desarrollo de la Microred Propuesta.

**RESPETUOSAMENTE SOMETIDA.**

En San Juan, Puerto Rico, hoy día 15 de septiembre de 2020

**DLA Piper (Puerto Rico) LLC  
500 Calle de la Tanca, Suite 401  
San Juan, Puerto Rico 00901-1969**



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**Engineering Specialties, PSC**

**Designers & Consultants**

12 de septiembre de 2020

Ing. Nelson Sandoval  
Baco Popular de Puerto Rico  
PO Box 362708  
San Juan, PR 00936-2708

Re: Certificación Reglamento 9028-3.03.B y 3.04.B.1

Estimado Ing. Sandoval:

El sistema de cogeneración en BPPR Cupey (CHP Cupey) es una facilidad de cogeneración eléctrica con recobro de calor ("combined heat and power", CHP). La cogeneración es un proceso que produce simultáneamente electricidad y otra fuente de energía térmica mediante el recobro del calor liberado, con el objetivo de lograr eficiencias y economías energéticas. Se reconoce su implementación como una herramienta efectiva en la lucha contra el cambio climático, donde la EPA ha emitido sinnúmero de opiniones y guías de implementación buscando una adopción rápida por el beneficio ambiental que esta representa.

La cogeneración se define como la producción y aprovechamiento conjunto de energía eléctrica y energía calorífica. El proceso contribuye al ahorro energético y disminuye los niveles de contaminación a la vez que su eficiencia se fundamenta en el aprovechamiento del calor residual en la producción de electricidad. El calor se recupera para generar energía térmica útil, entre las que se encuentran: agua caliente, vapor y hasta agua helada.

Las principales ventajas del uso de la tecnología antes mencionadas son las siguientes:

- Menor consumo de combustible y menores emisiones de contaminantes contribuyendo al desarrollo sostenible, en comparación al uso del sistema tradicional de energía eléctrica.
- Elimina las pérdidas de energía por transmisión y distribución en la red eléctrica como resultado de una generación local normalmente el punto de generación y el punto de consumo.



- Resiliencia y continuidad de negocio, dado que están dentro de las facilidades en una estructura Cat 4 (critica), el sistema está diseñado para mantener la operación critica ofrecida por esta facilidad ante eventualidades externas.
- Fortalece la industria, al reducir sus costos operacionales por energía a la vez que crea una nueva industria para el diseño, construcción, operación y mantenimiento de estos sistemas, , principalmente PYMES.
- Economías operacionales dado que el costo de producción de energía eléctrica mediante el uso de estos sistemas, en combinación con la eficiencia producida por la multiplicidad de procesos y uso máximo del combustible, es menor al costo actual de compra de energía tradicional.
- Contribución ambiental positiva, dado que reduce significativamente las emisiones, GHG y recursos de agua de PR.

Descripción:

El proyecto CHP Cupey propuesto consiste de dos (2) unidades de cogeneración de electricidad-calor mediante el uso de motores de combustión interna de uso continuo. Los generadores de combustión interna propuestos, utilizaran gas natural (LNG), aunque pueden operar con otros combustibles gaseosos como el Propano si el LNG no estuviera disponible. En LNG, cada una de las unidades de generación eléctrica tienen una capacidad mecánica esperada de 1,234KW (1,654 bhp), una capacidad eléctrica de 1,198 KW, con calor no recuperable ("surface or radiation heat") de 85KW. El calor restante se recupera mediante un "chiller" de absorción (utiliza gas de escape y lazo de agua caliente del motor) para la producción de agua helada que desplazara aproximadamente 350 Tons de refrigeración por máquina del consumo actual de la facilidad, y desplazar la energía eléctrica utilizada por los "chillers" eléctricos actuales. El calor del lazo de enfriamiento en baja temperatura se utiliza para vaporizar el combustible necesario por los generadores. Este combustible necesario para la operación de los generadores es suplido por una estación de combustible con tres (3) tanques verticales de 16,000 galones de capacidad para un total agregado de 48,000 galones.

La hora técnica de los componentes principales (generador, y chiller de absorción) se incluye como apéndice 1 y 2. También se incluye un diagrama del proceso con sus valores nominales de operación como apéndice 3. Dado que este sistema esta diseñado para operar de manera continua



desconectado de la red eléctrica de PR, se incluye un sistema de almacenamiento de energía. Este sistema consiste de un inversor de 1,500KW con un resguardo de energía en baterías de LiOn suministradas por Dynapower como un paquete. En síntesis este sistema proporciona todos los servicios auxiliares que usualmente proporciona la Red Eléctrica además de la reserva necesaria para mantener la carga si interrupciones de ocurrir un falla en alguno de los generadores. Para mas detalles favor de referirse a los planos eléctricos endosados por la AEE para el proyecto.

Cumplimiento 3.03.B:

El negociado de PR, en el reglamento 9028, hizo unos requerimientos a las Microrredes de Cogeneración CHP. Personalmente hice recomendaciones a este documento ya que encuentro que la sección 3.03.B.1 desalienta la generación eléctrica eficiente ya que requiere que la energía térmica útil sea 50% de la producción de energía total y la sección 3.03.B.2 es un requisito que NO obliga a la generación eficiente que PR aspira. Ante esto, y para demostrar el cumplimiento de este reglamento, se expone:

	Energía KWh
(1) Entrada de combustible	2,787
(2) Producción eléctrica	1,198
(3) Calor no recuperable	85
(4) Calor Recobrable <sup>1</sup>	1,504

Interpretación sección 3.03.B.1

La energía térmica útil (calor recuperable (4)), que es 100% recuperado en este proyecto es: 1,504 KWh

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<sup>1</sup> El calor recuperable es la entrada de combustible, menos la energía eléctrica producida menos el calor de radiación de superficie. Se recupera calor del “Jacket”, aceite, 1st stage intercooler, como el 2nd stage intercooler.

Producción total de energía<sup>2</sup>: 2,787KWh

Razón de energía térmica sobre energía total: 53.96%

Dado que el sistema opera a una razón de 53.96% antes indicada el sistema cumple con el parámetro 3.03.B.1

Interpretación sección 3.03.B.2

a. Entrada de combustible: 2,787KWh

b. Producción de energía térmica útil (calor recuperable): 1,504KWh

c. = a-b = 1,283KWh = 4,377,596 BTU

d. Producción del Generador: 1,198KWh

e. = c/d = "Heat Rate": 3654 BTU/kWh

Dado que el sistema opera a una razón de rechazo de calor de 3,654 BTU/KWh, el sistema CHP Cupey cumple con el parámetro 3.03.B.2<sup>3</sup>

Dado que el sistema cumple con cualquiera de los requisitos impuestos por el reglamento 9028 sección 3.03.B, se certifica el cumplimiento con este.

Certificado por,

Roberto D. Acosta, PE, MSEE  
Presidente  
Lic 13782



Fecha de Expiración: 2024-12-02

Digitally signed by Roberto D. Acosta

DN: OU=Lic 13782,  
O=Accurate Solutions,  
CN=Roberto D. Acosta,  
E=racosta@accurate.works

Date: 2020-09-12 17:25:14

<sup>2</sup> No estando definido que es producción total de energía, pudiendo interpretar que es la energía eléctrica y térmica útil y teniendo reservas de su posible interpretación; se utiliza el peor de los escenarios, la entrada de combustible. En este caso, lo que el negociado requiere es un sistema de al menos 50% ineficiente, por lo que un generador con una eficiencia eléctrica de 55% no cualificaría bajo esta sección.

<sup>3</sup> Un sistema de alta eficiencia en CHP debería recuperar al menos el 80% del calor recuperable. Este sistema opera casi a la mitad del requisito impuesto por el negociado, por lo que se presentó el comentario durante la implementación del reglamento para atemperar el reglamento a la legislación de generación altamente eficiente que persigue PR.

**Technical data**

**1198 kWel; 480 V, 60 Hz; Natural gas, MN = 80**

**Design conditions**

Inlet air temperature / rel. Humidity:	[°C] / [%]	30 / 78
Altitude:	[m]	77
Exhaust temp. after heat exchanger:	[°C]	120
NO <sub>x</sub> Emission (tolerance - 8%):	[mg/Nm <sup>3</sup> @5%O <sub>2</sub> ]	500

**Fuel gas data: <sup>2)</sup>**

Methane number:	[-]	80
Lower calorific value:	[kWh/Nm <sup>3</sup> ]	10,17
Gas density:	[kg/Nm <sup>3</sup> ]	0,79
Standard gas:	Natural gas, MN = 80	

**Genset:**

Engine:	<b>CG170-12</b>	
Speed:	[1/min]	1500
Configuration / number of cylinders:	[-]	V / 12
Bore / Stroke / Displacement:	[mm]/[mm]/[dm <sup>3</sup> ]	170 / 195 / 53
Compression ratio:	[-]	13,0
Mean piston speed:	[m/s]	9,8
Mean lube oil consumption at full load:	[g/kWh]	0,15
Engine-management-system:	[-]	TEM EVO

Generator:	<b>Marelli MJB 450 LB4 cUL</b>	
Voltage / voltage range / cos Phi:	[V] / [%] / [-]	480 / ±10 / 0,8
Speed / frequency:	[1/min] / [Hz]	1800 / 60
Gear box:	<b>Eisenbeiss GU 320</b>	
Lube oil volume of gear box:	[dm <sup>3</sup> ]	58

**Energy balance**

Load:	[%]	100	75	50
<b>Electrical power COP acc. ISO 8528-1:</b>	<b>[kW]</b>	<b>1198</b>	<b>898</b>	<b>599</b>
Engine jacket water heat:	[kW ±8%]	628	482	346
Intercooler LT heat:	[kW ±8%]	122	84	50
Lube oil heat:	[kW ±8%]			
Exhaust heat with temp. after heat exchanger:	[kW ±8%]	583	482	365
Exhaust temperature:	[°C ±25°C]	411	437	466
Exhaust mass flow, wet:	[kg/h]	6643	5026	3471
Combustion mass air flow:	[kg/h]	6426	4859	3353
Radiation heat engine / generator:	[kW ±8%]	41 / 44	40 / 35	36 / 29
<b>Fuel consumption:</b>	<b>[kW+5%]</b>	<b>2787</b>	<b>2152</b>	<b>1514</b>
Electrical / thermal efficiency:	[%]	43,0 / 43,5	41,8 / 44,8	39,6 / 47,0
Total efficiency:	[%]	86,5	86,6	86,6

**System parameters <sup>1)</sup>**

Ventilation air flow (comb. air incl.) with ΔT = 15K	[kg/h]	33000
Combustion air temperature minimum / design:	[°C]	15 / 30
Exhaust back pressure from / to:	[mbar]	30 / 50
Maximum pressure loss in front of air cleaner:	[mbar]	5
Zero-pressure gas control unit selectable from / to: <sup>2)</sup>	[mbar]	20 / 200
Pre-pressure gas control unit selectable from / to: <sup>2)</sup>	[bar]	0,5 / 10
Starter battery 24V, capacity required:	[Ah]	430
Starter motor:	[kWel.] / [VDC]	15 / 24
Lube oil content engine / base frame:	[dm <sup>3</sup> ]	205 / 510
Dry weight engine / genset:	[kg]	5080 / 12950

**Cooling system <sup>6)</sup>**

Glycol content engine jacket water / intercooler:	[% Vol.]	0 / 0
Water volume engine jacket / intercooler:	[dm <sup>3</sup> ]	111 / 14
KVS / Cv value engine jacket water / intercooler:	[m <sup>3</sup> /h]	38 / 34
Jacket water coolant temperature in / out:	[°C]	80 / 93
Intercooler coolant temperature in / out:	[°C]	40 / 43
Engine jacket water flow rate from / to:	[m <sup>3</sup> /h]	36 / 56
Water flow rate engine jacket water / intercooler:	[m <sup>3</sup> /h]	43 / 40
Water pressure loss engine jacket water / intercooler:	[bar]	1,2 / 1,4

1) See also "Layout of power plants":

2) See also Techn. Circular 0199-99-3017

6) Gear oil cooling within intercooler coolant circuit

Frequency band f [Hz]	25	31,5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	L <sub>WA</sub> [dB(A)]	S [m <sup>2</sup> ]
<b>Air-borne noise <sup>3)</sup></b>	94,0	94,7	98,0	100,5	106,1	108,9	107,6	108,5	106,0	115,3	115,0	114,8	108,6	110,2	109,5	108,8	109,2	108,2	108,1	107,6	107,0	108,5	103,5	102,3	114,1	107,0	101,4	103,8	98,1	120,7	114
L <sub>W, Terz</sub> [dB(lin)]																															
<b>Exhaust noise <sup>4)</sup></b>	114,2	116,0	124,6	115,9	120,0	129,0	125,3	134,1	125,3	130,0	128,4	128,2	126,4	125,8	125,0	119,0	117,8	116,6	117,7	117,6	116,3	115,5	114,6	113,7	114,9	113,9	113,4	112,9	111,1	132,1	15,5 <sup>5)</sup>
L <sub>W, Terz</sub> [dB(lin)]																															

3) DIN EN ISO 3746 (C<sub>37</sub>=±4 dB)

4) Measured in exhaust pipe (f ≤ 250Hz: ±5dB; f > 250Hz: ±3dB)

L<sub>W</sub>: Sound power level

S: Area of measurement surface (S<sub>r</sub>=1m<sup>2</sup>)

5) DIN 45635-11, Appendix A

## Technical data

1198 kWel; 480 V, 60 Hz; Natural gas, MN = 80

**Design conditions**

Inlet air temperature / rel. Humidity:	[°C] / [%]	30 / 78
Altitude:	[m]	77
Exhaust temp. after heat exchanger:	[°C]	120
NO <sub>x</sub> Emission (tolerance - 8%):	[mg/Nm <sup>3</sup> @5%O <sub>2</sub> ]	500

**Notes for derating<sup>7)</sup>**

	[°C]	inlet air temperature			max. inlet air temperature	
		+ 5 °C	+ 10 °C	max. w/o power derating	island mode <sup>8)</sup>	grid parallel mode <sup>9)</sup>
Inlet air temperature	[°C]	35	40	35	40	40
Load:	[%]	100	90	100	no rating	90
Electrical power COP acc. ISO 8528-1:	[kW]	1198	1078	1198	no rating	1078
Electrical / thermal efficiency:	[%]	42,9 / 43,8	42,4 / 45,1	42,9 / 43,8	no rating	42,4 / 45,1
Total efficiency:	[%]	86,7	87,5	86,7	no rating	87,5
Intercooler coolant temperature in / out:	[°C]	40 / 43	45 <sup>10)</sup> / 47	40 <sup>10)</sup> / 43	no rating	45 <sup>10)</sup> / 47

**Notes:**

- 1) See also "Layout of power plants":
- 2) See also Techn. Circular 0199-99-3017
- 3) DIN EN ISO 3746 ( $\sigma_{R0}=\pm 4$  dB)
- 4) Measured in exhaust pipe ( $f \leq 250$ Hz:  $\pm 5$ dB;  $f > 250$ Hz:  $\pm 3$ dB)
- 5) DIN 45635-11, Appendix A
- 6) 60 Hz applications only: Gear oil cooling within intercooler coolant circuit
- 7) The derate information shown does not take into account external cooling system capacity. It assumes that external cooling systems can maintain the specified cooling water temperatures at site conditions.
- 8) ISO 8528-1:2005-06, 6.3.1 a)
- 9) ISO 8528-1:2005-06, 6.3.1 b)
- 10) To maintain a constant air-fuel-mixture inlet manifold temperature, as the inlet air temperature goes up, so must the heat rejection. The listed aftercooler coolant temperatures have been increased considering a limited capacity of the heat exchange circuit to reject heat to the atmosphere. Non standard applications, e.g. use of cooling towers are hereby not considered.

## VAPOUR ABSORPTION CHILLER

<b>CLIENT</b>	:	<b>DATE</b>	: 12-03-2019
<b>PROJECT</b>	:	<b>MODEL</b>	: TAC E7 E1

	DESCRIPTION	UNITS	VALUE
	<b>Cooling Capacity (±3%)</b>	<b>TR</b>	<b>350</b>
		<b>BTU/hr</b>	<b>4200344</b>
<b>A</b>	<b>CHILLED WATER CIRCUIT:</b>		
1.	Chilled Water Inlet Temperature	°F	54.0
2.	Chilled Water Outlet Temperature	°F	44.0
3.	Chilled Water Flow Rate	GPM	836.0
4.	Passes in Evaporator	Nos.	1+1
5.	Chilled Water Circuit Friction Loss	ft WC	19.7
6.	Glycol in Chilled Water		NA
7.	Concentration of Glycol	%	0
8.	Fouling Factor	ft <sup>2</sup> hr °F/BTU	0.0001
9.	Connection Diameter (Indicative)	Inches	6.0
10.	Maximum Working Pressure	PSI g	113.8
<b>B</b>	<b>COOLING WATER CIRCUIT:</b>		
1.	Heat Rejected	MBH	8051.0
2.	Cooling Water Inlet Temperature	°F	85.0
3.	Cooling Water Outlet Temperature	°F	95.8
4.	Cooling Water Flow Rate	GPM	1500.0
5.	Cooling Water Bypass Flow	GPM	0
6.	Passes in Absorber / Condenser	Nos.	1/1+1/1
7.	Cooling Water Circuit Friction Loss	ft WC	29.9
8.	Glycol in Cooling Water		NA
9.	Concentration of Glycol	%	0
10.	Fouling Factor	ft <sup>2</sup> hr °F/BTU	0.00025
11.	Connection Diameter (Indicative)	Inches	8.0
12.	Maximum Working Pressure	PSI g	113.8
<b>C</b>	<b>EXHAUST GAS CIRCUIT:</b>		
1.	Heat Input	MBH	1841.0
2.	Engine Type		Gas engine
3.	Engines Connected	Nos.	1.0
4.	Engine Loading	%	100.0
5.	Exhaust Flow Rate @ Design Load	lbs/hr	14645
6.	Exhaust Gas Inlet Temp. @ Design Load	°F	772
7.	Exhaust Gas Outlet Temp.	°F	287.1
8.	Average Cp of Exhaust Gas	BTU/lb °F	0.267
9.	Exhaust Flow Rate @ 100% Load	lbs/hr	14645
10.	Exhaust Flow Temp @ 100% Load	°F	772

11.	Pressure Drop in Exhaust Gas Furnace	Inch WC	10.0
12.	Connection Diameter (Indicative)	Inches	18.0
<b>D LT HOT WATER CIRCUIT:</b>			
1.	Heat Input	MBH	2079.5
2.	Hot Water Inlet Temperature	°F	199.0
3.	Hot Water Outlet Temperature	°F	176.7
4.	Hot Water Flow Rate (± 3 %)	GPM	186.5
5.	Passes in Hot Water	Nos.	6.0
6.	Hot Water Circuit Friction Loss (Indicative)	ft WC	21.5
7.	Glycol in Hot Water		NA
8.	Concentration of Glycol	%	0
9.	Fouling Factor	ft <sup>2</sup> hr °F/BTU	Standard
10.	Connection Diameter (Indicative)	Inches	3.2
11.	Maximum Working Pressure	PSI g	113.8
<b>E ELECTRICAL DATA:</b>			
1.	Power Supply (3 Phase + N)	V, Hz	460 (±10%) 60 (±5%)
2.	Absorbent pump (DE)	kW(A)	3.7 (12.0)
3.	Absorbent pump-2	kW(A)	3.0 (8.0)
4.	Refrigerant pump	kW(A)	0.3 (1.4)
5.	Vacuum pump	kW(A)	0.75 (1.8)
6.	Power consumption	kVA	19.5
<b>F PHYSICAL DATA (APPROXIMATE, ±10%):</b>			
1.	Length	Inches	209.0
2.	Width	Inches	137.0
3.	Height	Inches	144.0
4.	Dry Weight	lbs	31085.7
5.	Operating Weight	lbs	41006.7
<b>G TUBE METALLURGY:</b>			
1.	Evaporator		Copper
2.	Absorber		Copper
3.	Condenser		Copper
4.	Hot Water Generator		Copper

- Note:
1. This Selection is valid for Insulated Chiller only.
  2. For Non-Insulated Chiller, the Capacity & Heat Source Consumption will vary.
  3. Plant room temperature should be from +5°C to +45°C (41°F to 113°F).
  4. Please contact Thermax representative/office for Customized Specifications.



**GENERAL NOTES:**

- THESE PLANS COINCIDE WITH THE PLANES OF RESIDING INSCRIPTION ON THE REGULATIONS AND PERMITS ADMINISTRATION (ARPE).
- THE PROJECT OWNER IS RESPONSIBLE FOR MANAGING AND OBTAIN, BEFORE THE DATE OF COMMENCEMENT OF THE WORK, ALL ENDORSEMENTS, PERMITS AND EASEMENTS REQUIRED BY GOVERNMENT ENTITIES, STATE, MUNICIPAL, FEDERAL AND PRIVATE DEVELOPMENT CONCERNING THE TYPE OF PROJECT PROPOSED.
- THE OWNER OF THIS WORK HAVE TO HIRE THE SERVICES OF A LICENSED AND REGISTERED ENGINEER TO INSPECT THE CONSTRUCTION OF ELECTRICAL WORKS IN ACCORDANCE WITH ACT. NO. 7 OF JULY 19, 1985, AS AMENDED, AND THE REGULATION CERTIFICATION OF PROJECT PLANS OF ELECTRIC CONSTRUCTION VALID OF THE AEE. THE OWNER MUST NOTIFY TO AEE THE DESIGNATION OF THIS PRIVATE INSPECTOR BEFORE THE START OF THE PROJECT.
- THE EXECUTION OF ELECTRICAL WORKS, AS OUTLINED IN THESE PLANS, SHALL OBSERVE THE BEST PRACTICE IN ELECTRICAL AND CONSTRUCTION INDUSTRY IN ACCORDANCE WITH THE RULES AND REGULATIONS ADOPTED BY THE AEE AND AGENCIES CONCERNED, AS WITH THE CODES, NEC AND NESC, AND OTHER IEEE STANDARDS, NFPA, NEMA AND ANSI ADOPTED.
- THE CONTRACTOR IS NOT AUTHORIZED TO MAKE CHANGES TO THIS DESIGN. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONSULT WITH THE DESIGNER OR INSPECTOR DESIGNATED FOR THIS WORK ANY QUESTIONS ARISING FROM THE INTERPRETATION OF THE PLANS, EXECUTION OF THE PROPOSED WORKS, TECHNICAL SPECIFICATIONS OR DISCREPANCIES BETWEEN THE CONDITIONS IN THE FIELD AND THOSE USED FOR PURPOSES DESIGN.
- THE OWNER OR ELECTRICAL CONTRACTOR SHALL NOTIFY THE AEE THE BEGINNING OF THESE WORKS, BY DELIVERING THE DOCUMENT "NOTICE OF COMMENCEMENT OF PROJECT" TO THE ENGINEERING DEPARTMENT DISTRIBUTION OF THE CORRESPONDING REGION, WITH AT LEAST (15) FIFTEEN DAYS PRIOR TO THE PROPOSAL DATE.
- THE PRIVATE INSPECTOR AND ELECTRICAL CONTRACTOR ARE RESPONSIBLE FOR ATTENDING A MEETING OF PRE-CONSTRUCTION TO COORDINATE WITH THE DEPARTMENT OF ENGINEERING DISTRIBUTION OF THE CORRESPONDING REGION.
- ALL WORK TO BE PERFORMED ON ENERGIZED LINES, INCLUDING THE CONNECTION OF THIS WORK HAS TO BE CARRIED OUT BY AEE. THE PROPONENT MUST ASSUME ALL COSTS OF EQUIPMENT, MATERIALS AND LABOR. THE PROPONENT MUST REQUEST THE AEE AN ESTIMATE FOR THESE WORKS, WHICH WILL BE VALID FOR (3) THREE MONTHS FROM ISSUE.
- PROHIBITS PERFORMING ANY WORK ON THE EDGES OF ELECTRICAL SERVITUDE WITHOUT THE WRITTEN PERMISSION OF THE AEE.
- THE AEE WILL NOT APPROVE PROJECTS WITH CONDITIONS OF SERVITUDE INVASION'S CONNECTIONS OR THAT DO NOT MEET THE REQUIRED SAFETY CLEARANCES.

**MATERIALS NOTE:**

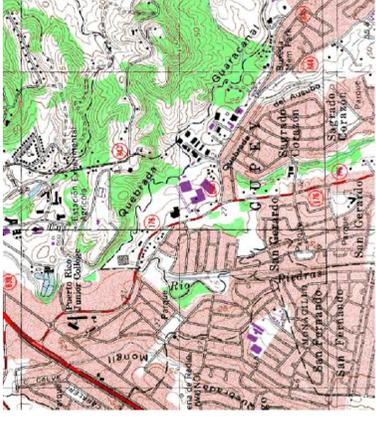
- ALL THE EQUIPMENT USED IN CONSTRUCTION MUST COMPLY WITH STANDARDS IEEE, ANSI, NEMA AND ASTM.
- THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING WITH AEE THAT ALL MATERIAL OR EQUIPMENT FOR USE IS APPROVED BY THE AEE BEFORE INSTALLATION. THE AEE RESERVES THE RIGHT TO ACCEPT ANY EQUIPMENT YOU WILL GO TRANSFER.
- EQUIPMENT AND MATERIAL INCLUDING ALL TRANSFORMERS AND CABINETS (SUB-STATIONS) TO BE INSTALLED TO A MILE OR LESS OF DISTANCE SALTWATER BODIES HAVE TO BE BUILT IN STAINLESS STEEL, EXCEPT THE BASIS OF METERS.
- IN THE UNDERGROUND SYSTEM, MUST BE USED WITH PRIMARY CABLE FINISHES FOR 15 KV DISTRIBUTION VOLTAGES 46 KV AND FOR LINES OF 38 KV.
- IN THE AIR SYSTEMS MUST BE USED POLYMER INSULATORS FOR VOLTAGES 15KV DISTRIBUTION AND 46 KV FOR 38 KV.
- THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL TRANSFORMER LABEL TO BE AEE TRANSFERRED TO PROPERTY WITH A NUMBER PROVIDED BY THE DEPARTMENT OF ENGINEERING FOR DISTRIBUTION.

**SYSTEM NOTES:**

- ALL THE CONSTRUCTION WORK SHALL BE DONE IN A THOROUGH AND WORKMANLIKE MANNER IN ACCORDANCE WITH THE SPECIFICATIONS AND CONSTRUCTION DRAWINGS.
- THE ELECTRICAL CONSTRUCTION SHALL BE PERFORMED AND CERTIFIED PRIOR TO ITS CONNECTION TO THE PREPA. ELECTRICAL SYSTEM BY AN ELECTRICAL ENGINEER.
- ALL EQUIPMENT AND ITS INSTALLATION SHALL CONFORM TO ALL APPLICABLE CODES, NATIONAL STANDARD, INCLUDING UL, ANSI, NEMA, NFPA, NEC, AND THE RULES AND REGULATIONS OF THE PUERTO RICO ELECTRICAL POWER AUTHORITY (PREPA).
- AN APPROVED INTERCONNECTION PERMIT SHALL BE PROVIDED BY PREPA TO STARTUP AND CONNECT THE COGENERATION UNIT IN GRID-TIED MODE. THE CONTRACTOR SHALL COORDINATE WITH PREPA THE FINAL INSPECTION AND INTERCONNECTION EXECUTION.
- PREPA SHALL APPROVE AND COORDINATE WITH THE DESIGNER THE INTER-TIE AND ANTI ISLANDING PROTECTIONS SCHEME AND RELAY SETTINGS FOR GRID-TIE OPERATION OR CLOSE TRANSITION MODE, INCLUDING THE 38KE LINE TO GROUND FAULT DETECTION. ALSO, A POWER QUALITY STUDY (INCLUDING HARMONIC DISTORTION AND VOLTAGE FLIKER) INDICATING THAT THE GENERATOR MEETS IEEE519, IEEE1463 AND IEEE1159 SHALL BE PROVIDED. UNDER ANY CIRCUMSTANCES THE SYSTEM SHALL EXPORT POWER TO PREPA.
- PROVIDE NEW NEMA 1 SWITCHBOARD WITH PROTECTIVE RELAYING AS INDICATED ON DRAWINGS.
- THE OWNER IS RESPONSIBLE TO REQUEST WIRE AND TERMINATION TESTS. DURING THE INSTALLATION, ALL ELECTRICAL CONDUCTORS SHALL BE KEPT DRY AND FREE OF MECHANICAL DETERIORATION. THE CONTRACTOR SHALL USED PROPER WIRING TECHNIQUES AND MUST NOT EXCEED THE CABLE PULL TENSION RECOMMENDED BY THE MANUFACTURER.
- UNDERGROUND CONDUITS SHALL BE ENCASED IN CEMENT AND AT LEAST 13 INCHES FROM OTHER UTILITIES.
- GROUNDING TERMINATIONS SHALL BE PERFORMED IN THERMO-WELD CONNECTIONS, USE COMPRESSION CONNECTORS WHEN THERMO-WELD ARE NOT POSSIBLE OR INADEQUATE.
- THE MAXIMUM GROUND RESISTANT IS 5 OHMS. CONTRACTORS SHALL IMPROVE THE GROUNDING RESISTANCE AS NECESSARY FOR A RESISTANCE BELOW 5 OHMS.
- ALL SPARE CONDUITS SHALL HAVE FISHWIRE.
- THE OWNER OR OWNER'S REPRESENTATIVE SHALL BE RESPONSIBLE TO:
  - PREPARE AND SHORT CIRCUIT AND COORDINATION STUDY WITH RELAYS SETTINGS. PREPA SHALL RECEIVE, EVALUATE AND APPROVE THE STUDY AND RELAYS SETTINGS 60 DAYS PRIOR TO ENERGIZE.
  - SUPPLY PREPA ALL TRANSFORMER IMPEDANCE AS PER MANUFACTURER TEST REPORT, 60 DAYS PRIOR TO ENERGIZE.
  - PRESENT TO PREPA THE TEST RESULTS OF THE EQUIPMENT 30 DAYS PRIOR TO ENERGIZE.
- THE SYSTEM SHALL OPERATE IN ISLAND-MODE ONLY. THE CLOSE TRANSITION LOAD TRANSFER FEATURES SHALL BE ALLOWED ONCE ALLOWED BY PREPA.

**SPECIAL NOTES:**

- THE PROJECT'S OWNER PAY TO PREPA:  
THE AMOUNT OF \$0.0 FOR ELECTRICAL IMPROVEMENTS THEREOF.  
REQUIRED IN EVALUATING THE WORKS FOR THIS PROJECT OF \_\_\_\_\_ OF \_\_\_\_\_  
THIS CONTRIBUTION IS MADE AS PROPOSED PURSUANT TO LOAD REGULATION TO DETERMINE AND COLLECT CONTRIBUTIONS OF PERSONS OR INSTITUTIONS IN DEVELOPMENT PROJECTS IN FORCE.



**LOCATION PLAN**

COORDINATES NAD-83  
X= 240113.36  
Y= 200777.26  
ADDRESS:  
Road # 176 KM 1.3  
San Juan, Puerto Rico  
(LAT: 18.386232, LONG: -66.053695)

**NEW CO-GENERATION FACILITIES COMBINED HEAT & POWER (CHP)**

SHEET TITLE

PROJECT NAME:



Digitally signed by  
Roberto D. Acosta  
DN: OU=Lic 13782,  
O=Accurate Solutions,  
CN=Roberto D. Acosta,  
E=racosta@accurate.wor  
ks

Date: 2019-12-03 23:05:03

Fecha de Emisión: 2019-12-03

**DESIGNERS CERTIFICATION**

- I CERTIFY THAT I AM A LICENSED ENGINEER OR ARCHITECT MEMBER OF THE COLLEGE OF MY PROFESSION AND AUTHORIZED BY THIS PROJECT'S OWNER TO PRESENT THESE CONSTRUCTION PLANS TO P.R.E.P.A.
- IN COMPLIANCE WITH LAW NO.7 OF JULY 19, 1985, AS AMENDED, KNOWN AS CONSTRUCTION PLANS' CERTIFICATION LAW, I CERTIFY THAT I PREPARED THE ELECTRIC DESIGN OF THIS PROJECT FOLLOWING ALL CODES, STANDARDS, NORMS AND REGULATIONS APPLICABLE TO THE PROJECT AND THE ENGINEERING BOARD AND PERMITS AND REGULATION ADMINISTRATION.



DESIGNER'S SIGNATURE AND SEAL  
LICENSE NUMBER: 13782

**PUERTO RICO ELECTRIC POWER AUTHORITY ENDORSEMENT**

PROJECT NAME: CHP\_BPPR\_CUPEY CENTER  
PROJECT NUMBER: CHP\_BPPR\_CUPEY  
LOAD (KVA): 1,198 Kw per CogGen, Island Mode  
ENDORSED BY:  
DATE:

- P.R.E.P.A. ENDORSES THE ELECTRIC DESIGN SHOWN IN THESE CONSTRUCTION PLANS BASED ON THE CERTIFICATION PRESENTED BY THE DESIGNER IN COMPLIANCE WITH LAW NO.7 OF JULY 19, 1985, AS AMENDED.
- P.R.E.P.A. DOES NOT ASSUME RESPONSIBILITY OVER THE CERTIFIED DESIGN. P.R.E.P.A.'S ENDORSEMENT DOES NOT RELIEVE THE DESIGNER FROM THE PROFESSIONAL RESPONSIBILITY ASSUMED WITH THE CERTIFICATION OF THESE PROJECT'S PLANS. THE DESIGNER SHALL BE RESPONSIBLE FOR THE DESIGN AND THE INSPECTOR FROM COMPLIANCE WITH STANDING DISPOSITIONS FROM: NATIONAL ELECTRIC CODE; NATIONAL ELECTRIC SAFETY CODE; CONSTRUCTIONS STANDARDS, NORMS AND REGULATIONS APPLICABLE TO THE PROJECT; AND THE ENGINEERING BOARD, FEDERAL, AND STATE LAWS RULING BY THE TIME CONSTRUCTION BEGINS.
- THIS ENDORSEMENT IS VALID FOR ONE YEAR. IF ELECTRICAL WORK IS NOT COMPLETED WITHIN THE ENDORSEMENT PERIOD, NOTIFICATION TO P.R.E.P.A. THE ENDORSEMENT WILL STILL BE VALID UNTIL WORK'S COMPLETION. IN CASE THERE IS NO CERTIFIED ELECTRICAL WORK DURING A TWELVE MONTH PERIOD, THIS ENDORSEMENT WILL LOSE ITS VALIDITY.

REV. #	DATE	ENDORSED BY:



**EXHIBITE**

NO.	DATE	DESCRIPTION	BY	APP.
1	12/18/2018	Issued for Bid	RA	RA
2	5/10/2019	Issued for Construction	RA	RA

**ELECTRICAL NOTES**

**BANCO POPUL**  
Cupey Center  
Road 176 KM 1.3  
San Juan, PR 00926

Yo, Ing. Roberto D. Acosta Martin, Licencia # 13982, certificado soy el profesional que diseño estos planos y las especificaciones complementarias. También, certifico que entiendo que dichos planos y especificaciones cumplen con las disposiciones aplicables de los Reglamentos y Códigos de Construcción Vigentes de las Agencias, Juntas Reglamentadoras o Corporaciones Públicas con Jurisdicción Reconocida que cualquier declaración falsa o falsificación de hechos que se haya producido por desconocimiento o por negligencia.

**Engspec**  
Engineering Specialists, PSC  
Designers & Consultants  
PO Box 6014 Mayaguez, PR 00881  
PO Box 6014 Mayaguez, PR 00881

DESIGN BY: ROBERTO D. ACOSTA MARTIN  
DRAWN BY: ROBERTO D. ACOSTA MARTIN  
CHK'D BY: N/A  
SCALE: N/A  
PROJECT NO:  
MODEL FILE: Notes  
DATE: 12/18/2018

## Sequence of Operation Narrative

### Definitions:

ESS - Energy Storage System. Comprised of a: isolation transformer, 4 quadrant inverter and energy storage. Note: The energy storage of the selected system are LiOn batteries.

LDSS - The Load Dependent Start/Stop feature is Woodward easYgen feature that will auto start/stop a generator based on the system reserve settings (were the system reserved is the aggregated capacity of operating generators minus actual load).

LS-5 - Woodward breaker controller part number 8440-2150.

easYgen: Woodward engine controller (Gas or Diesel). Notes: the easYgen model used is the 3500XT-P2, part number 8440-2088.

PQ Mode - Mode were a generator or ESS deliver a particular KW (P) and KVAR (Q) based on signal setpoints sent by the site controller.

Site Controller - High speed distributed controller doing supervisory control, sequencing, notifications and setpoint management to all equipment in the system

SOC - State of Charge of the energy storage batteries. This is a 4-20ma signal, indicating the remaining energy as percentage of the rated KW/hs (0-100% of rating).

Syn - Synchronization or Synchronized, when the voltage between 2 sources are in phase with an angle difference of less than 3 degrees.

UF Mode - Mode were a generator or ESS fit the Voltage and frequency of the system. Setpoint is fix at 13.2KV<sub>LL</sub> for the medium voltage, 480V<sub>LL</sub> for the low voltage and 60Hz for the frequency. Note: Only one equipment could be in UF Mode at a time, and a system MUST have one device operating in UF Mode. PREPA, if closed to the system, only behaves in UF Mode.

UM - Utility Main.

Variable System - equipment or group of equipment that could operate in PQ Mode. Note: For the proposed system the Gas or Diesel Engines or the ESS are considered variable.

Woodward System - Network of LS-5's and easYgens that interacts between them providing integrated and autonomous functionality to synchronize and close variable segments, load share devices, decouple segments, and other services, including protection and alarming.

### Normal Operating Mode:

ESS in UF Mode

Gas Engines operating in PQ Mode with LDSS feature adding or stopping generators based on the reserve capacity.

Diesel generators in stop, but in Auto Mode to response to any request.

UM's breakers open, both ID 33 and 34.

Site controller increasing/decreasing gas engine real power setpoint to maintain a SOC of 70% and increasing/decreasing gas engine reactive power if necessary due to ESS current rating

### Contingencies to the Normal Operating Mode

Gas engine failure or unscheduled maintenance: During weekends or at nights, the load could be supported by a single engine. If there is an unplanned maintenance or gas engine shutdown when the load is greater than a single engine rating, the normal mode is interrupted. In this scenario:

The ESS will hold the step load created by the engine shutdown and support the site with the reserve energy (KWh) stored. The energy reserve in the ESS will hold the site between 30 to several hours, depending of the load level.

The operating gas engine goes to full rated power.

If the ESS Battery SOC drops to 20% and the gas engine still not in service, a Diesel engine is started, sync and closed to the bus with a power setpoint for the SOC to reach setpoint, but not exceeding the ESS rate of charge.

When the faulted gas engine is operational, it is sync and closed to the bus, and its power setpoint is increased while the diesel engine ramps down and stops.

ESS fails: If the ESS fails, the gas engines switch in about 4ms to UF Mode and load share to keep the site running. If any stopped gas engine (by the LDSS due to low load levels) will be commanded to operate; both gas engine are commanded to run, regardless of the load level. When the ESS fault is cleared and the ESS is back in service, the engines will synchronize with the ESS, and switch to PQ Mode when the ESS breaker is closed.

ESS and one gas engines fails: In such scenario, the remaining gas engine is dedicated to the datacenter substation via the low voltage busway, and all upstream breakers opens. The datacenter power is not interrupted. If the fault occurs during normal business operations, a diesel engine is commanded to run to supply the noncritical buildings. Those non-critical buildings will see a momentary power interruption. After the site is stable, the upstream breakers close for the diesel and gas engine to load share. Once the ESS and failed gas engine are operational, the gas engine is Sync and close to the bus, ramp up while the diesel engine ramp down, and then the ESS restore procedure is initiated.

ESS and both gas engines fail: The diesel engines are started as they do to a PREPA power outage. Power is interrupted to the site momentarily. Once the ESS and gas engine are operational, the gas engines are Sync and close to the bus, ramp up while the diesel engine ramp down, and then the ESS restore procedure is initiated.

ESS and both gas engines fail, while a single diesel engine fails: The remaining diesel engines is started and close to the bus (UF Mode). Power is interrupted to the site momentarily. If the load exceeds the diesel engine rating, the noncritical load is shed and operated with the PREPA (if available and stable). If the load do not exceed the generator rating and allows a 25% reserve capacity, the non-critical building are supplied from the single diesel generator. Once the ESS and gas engine are operational, the gas engines are Sync and close to the bus, ramp up while the diesel engine ramp down, and then the ESS restore procedure is initiated.

ESS and both gas and diesel engines fail: The UMs breaker closes if PREPA available. Note that the breakers of the gas or diesel generators and energy storage opens automatically on a fault or if they are not operational. Once the ESS and Gas engines are operational, the UM breaker opens, the ESS breaker closes, the gas engines Sync and close to the bus and the normal operating mode is re-established.



Digitally signed by  
Roberto D. Acosta  
DN: OU=Lic 13782,  
O=Accurate Solutions,  
CN=Roberto D. Acosta,  
E=racosta@accurate.work  
s  
Date: 2019-12-03 23:05:39

### DESIGNERS CERTIFICATION

- I, CERTIFY THAT I AM A LICENSED ENGINEER OR ARCHITECT MEMBER OF THE COLLEGE OF MY PROFESSION AND AUTHORIZED BY THIS PROJECT'S OWNER TO PRESENT THESE CONSTRUCTION PLANS TO P.R.E.P.A.
- IN COMPLIANCE WITH LAW NO.7 OF JULY 19, 1985, AS AMENDED, KNOWN AS CONSTRUCTION PLANS' CERTIFICATION LAW, I CERTIFY THAT I HAVE PREPARED THESE ELECTRICAL DESIGN PLANS AND SPECIFICATIONS IN ACCORDANCE WITH THE REGULATIONS APPROVED BY P.A.E.P.A., PUERTO RICO PLANNING BOARD AND PERMITS AND REGULATION ADMINISTRATION.



DESIGNER'S SIGNATURE AND SEAL  
LICENSE NUMBER: 13782

### PUERTO RICO ELECTRIC POWER AUTHORITY ENDORSEMENT

PROJECT NAME: CHP BPPR CUPEY CENTER  
PROJECT NUMBER: CHP BPPR CUPEY  
LOAD (KVVA): 1,198 KV\_per Cogen, Island Mode  
ENDORSED BY: \_\_\_\_\_  
DATE: \_\_\_\_\_

- P.A.E.P.A. ENDORSES THE ELECTRIC DESIGN SHOWN IN THESE CONSTRUCTION PLANS BASED ON THE CERTIFICATION PRESENTED BY THE DESIGNER IN COMPLIANCE WITH LAW NO.7 OF JULY 15, 1985, AS AMENDED.
- P.A.E.P.A. DOES NOT ASSUME RESPONSIBILITY OVER THE CERTIFIED DESIGN. P.A.E.P.A.'S ENDORSEMENT DOES NOT RELIEVE THE DESIGNER FROM HIS PROFESSIONAL LIABILITY ASSUMED WITH THE CERTIFICATION OF THESE PROJECTS PLANS. THIS ENDORSEMENT RELIEVES NEITHER THE BUILDER NOR PRIVATE INSPECTOR FROM COMPLIANCE WITH STANDING DISPOSITIONS FROM: NATIONAL ELECTRIC CODE, NATIONAL ELECTRIC SAFETY CODE, NATIONAL ELECTRICAL SAFETY CODE, FEDERAL AND STATE LAWS RULING BY THE TIME CONSTRUCTION BEGINS.
- THIS ENDORSEMENT IS VALID FOR ONE YEAR. IF ELECTRICAL WORKS HAVE BEGUN DURING THIS YEAR, WITH PRIOR NOTIFICATION TO P.A.E.P.A., THE ENDORSEMENT WILL STILL BE VALID UNTIL WORK'S COMPLETION. IN CASE THERE IS NO NOTIFICATION, THE ENDORSEMENT WILL LOSE ITS VALIDITY. THIS ENDORSEMENT WILL LOSE ITS VALIDITY.

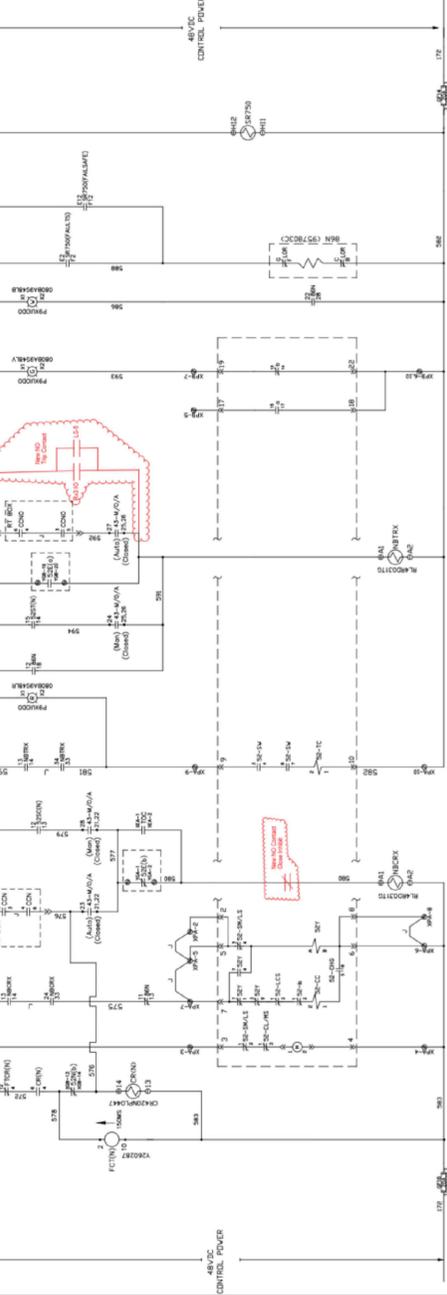
REV. #	DATE	ENDORSED BY:



Roberto Castro  
Lic. No. 13782  
Ingeniero Electricista  
Puerto Rico

### Utility Breaker Notes:

- Modifications to the existing trip and close circuit of the utility breakers are presented in the remarks below.
- The NO Contact in series with the existing close circuit prevents UM closing if segments 3 or 7 are tied to a variable system (diesel or gas engines, or ESS). The logic for this ID output energize if the breaker ID of the following logic evaluates true: NOT[(ID36 & ID38) OR (ID35 & ID37 & ID39)] & ID40 & (ID3 OR ID41 & ID4 & ID5)]. Due to extent of logic, is not hardwired and implemented via PLC ID logic at the site controller with redundant means:
  - The NO contacts in parallel with the existing trip circuit also inhibit the breaker operation through the trip circuit. There are 2 outputs, one from the site controller and one from the Woodward System via the LS-5 at the breaker. The logic are:
    - At the site controller ID, a trip occurs if the breaker ID of the following logic evaluates true: (ID36 & ID38) OR (ID35 & ID37 & ID39)] & ID40 & (ID3 OR ID41 & ID4 & ID5)
    - At the Woodward System, the trip is issues if segment 3 is tied to segment 9 or 10, or if segment 7 is tied to segment 9 or 10 as executed by the internal Woodward logic
- The reverse power trip is executed by the existing protection relay,  
2% of the nominal power, where the relay nominal system power is 4MW.
- The system transition from PREPA to local generation and from local generation to PREPA is OPEN, and supervised by above trip/close signals. There must be a 1 second delay between the PREPA breaker open and any internal generation closing, and vice versa. PREMA must close after 1 second dedbus after tripping the internal generation.



GE POWERVAC 5KV, 1200A, 350MVA VACUUM CIRCUIT BREAKER

## NEW CO-GENERATION FACILITIES COMBINED HEAT & POWER (CHP)

SHEET TITLE



Cupey Center Camaguey  
Road 176 KM 1.3  
San Juan, PR 00926

Yo, Ing. Roberto D. Acosta Martin, Licencia # 13982, certificado soy el profesional que diseño estos planos y las especificaciones complementarias. También, certifico que las disposiciones aplicables de los Reglamentos y Códigos de Construcción Vigentes de las Agencias, Juntas Reglamentadoras o Corporaciones Públicas con Jurisdicción Reconozco que cualquier declaración falsa o falsificación de hechos que se haya producido por desconocimiento o por negligencia de cualquier profesional responsable de la ejecución de estos planos.



Engspec  
Engineering Specialists, PSC  
Designers & Consultants  
P.O. Box 6014 Mayaguez, PR 00881  
P.O. Box 6014 Mayaguez, PR 00881

THE INFORMATION CONTAINED HEREIN IS THE INTELLECTUAL PROPERTY OF THE DESIGNER. IT MAY NOT BE USED OR REPRODUCED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF THE ENGINEERING SPECIALTY FIRM.  
DESIGN BY: ROBERTO  
DRAWN BY: ROBERTO  
CHK'D BY: N/A  
SCALE: N/A  
PROJECT NO:  
MODEL FILE: Notes  
DATE: 09/24/2019

E-004

**DESIGNERS CERTIFICATION**

I, THE UNDERSIGNED, BEING A LICENSED ENGINEER OR ARCHITECT MEMBER OF THE PROFESSION AND AUTHORIZED BY THE BOARD OF PROFESSIONAL ENGINEERS AND ARCHITECTS OF PUERTO RICO TO PREPARE THESE CONSTRUCTION PLANS TO THE BEST OF MY KNOWLEDGE AND BELIEF, I HEREBY CERTIFY THAT I AM A LICENSED ENGINEER OR ARCHITECT MEMBER OF THE PROFESSION AND AUTHORIZED BY THE BOARD OF PROFESSIONAL ENGINEERS AND ARCHITECTS OF PUERTO RICO TO PREPARE THESE CONSTRUCTION PLANS TO THE BEST OF MY KNOWLEDGE AND BELIEF. I HAVE PREPARED THE ELECTRIC DESIGN OF THIS PROJECT IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS, NORMS AND REGULATIONS AND I AM NOT PROVIDING ANY SERVICES OUTSIDE THE SCOPE OF MY LICENSE AND REGULATION ADMINISTRATION.



DESIGNER'S SIGNATURE AND SEAL  
E. NUMBER: 13782

**PUERTO RICO ELECTRIC POWER AUTHORITY  
ENDORSEMENT**

PROJECT NAME: CHP, BPPR, CUPEY CENTER  
 CT NUMBER: CHP, BPPR, CUPEY  
 (KV/A): 1,198 KV per. CoGen, Island Mode  
 DESIGNED BY:

P.R.E.P.A. ENDORSES THE ELECTRIC DESIGN SHOWN IN THESE CONSTRUCTION PLANS BASED ON THE CERTIFICATION OF THE ENGINEER OR ARCHITECT IN COMPLIANCE WITH LAW NO. 7 OF JULY 19, 1985, AS AMENDED.

P.R.E.P.A. DOES NOT ASSUME RESPONSIBILITY OVER THE ELECTRIC DESIGN. P.R.E.P.A.'S ENDORSEMENT DOES NOT RELIEVE THE ENGINEER OR ARCHITECT OF HIS OR HER RESPONSIBILITY OVER THE DESIGN OF THESE PROJECTS PLANS. P.R.E.P.A. ENDORSEMENT RELIEVES NEITHER THE BUILDER NOR PRIVATE CONTRACTOR FROM COMPLIANCE WITH STANDING DISPOSITIONS OF THE CONSTRUCTION STANDARDS, NORMS AND REGULATIONS OF P.R.E.P.A. AND OTHER GOVERNMENT AGENCIES AS WELL AS FEDERAL AND STATE LAWS RULING BY THE TIME CONSTRUCTION BEGINS.

ENDORSEMENT IS VALID FOR ONE YEAR. IF ELECTRICAL WORK HAS BEGUN DURING THIS YEAR, WITH PRIOR NOTIFICATION TO P.R.E.P.A., THE ENDORSEMENT WILL STILL BE VALID FOR THE REMAINDER OF THE YEAR. IF THERE IS NO ELECTRICAL WORK BEGUN DURING THE MONTH PERIOD, THE ENDORSEMENT WILL LOSE ITS VALIDITY.

DATE	ENDORSED BY:



Engineering: Ricardo Castro  
 License No. 13782  
 Empresa Eléctrica, S.L.  
 www.empresa-electrica.com  
 2019-2020 117905

Digitally signed by  
 Roberto D. Acosta  
 DN: OU=Lic 13782,  
 O=Accurate Solutions,  
 CN=Roberto D. Acosta,  
 E=racosta@accurate.wor  
 ks  
 Date: 2019-12-03 23:06:  
 05



Fecha de Expedición: 2019-12-02

NO.	DATE	DESCRIPTION	BY
1	12/18/2018	Issued for Bid	RA
2	06/24/2019	Issued for Construction	RA

PROJECT NAME: **NEW CO-GENERATION FACILITIES COMBINED HEAT & POWER (CHP)**  
 SHEET TITLE: **CHP STATIONAYOUT**

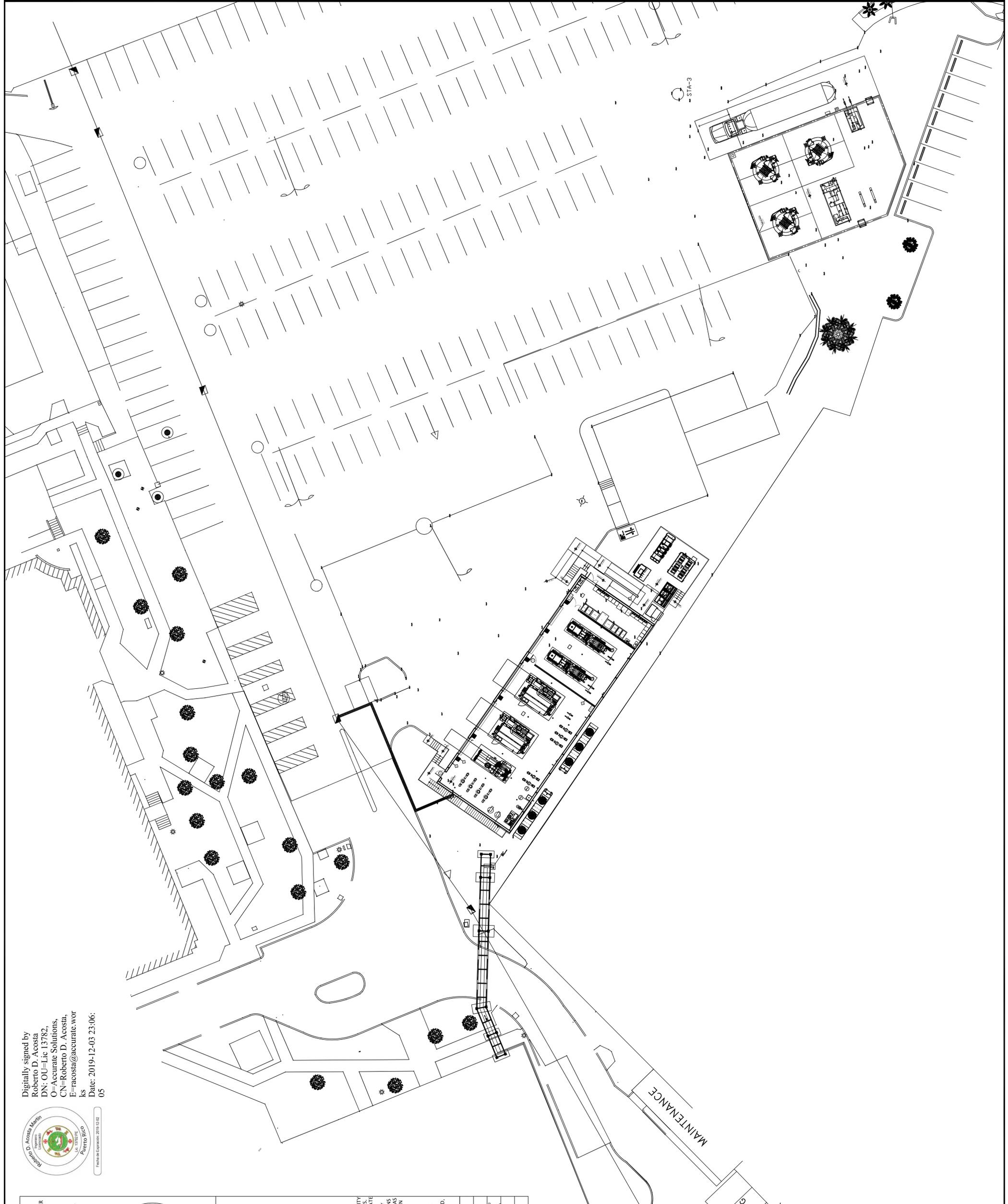
**BANCC POPULI**  
 Cupey Center, Car  
 Road 176 KM 1.3  
 San Juan, PR 00922

Yo, Ing. Roberto D. Acosta Martín, Licencia # 13982, certifico que soy el profesional que diseño estos planos y las especificaciones complementarias. También, certifico con entendido que dichos planos y especificaciones cumplen con las disposiciones aplicables de los Reglamentos y Códigos de Construcción Vigentes de las Agencias, Juntas, Reglamentadoras o Corporaciones Públicas con Jurisdicción de Reconocimiento que cualquier declaración falsa o falsificación de Reglamentos o Corporaciones Públicas con Jurisdicción de Reconocimiento que cualquier declaración falsa o falsificación de

**Engspec**  
 Engineers & Consultants, PSC  
 P.O. Box 6014 Mayagüez, PR 00681

DESIGN BY: ROBERTO  
 DRAWN BY: ROBERTO  
 CHK'D BY: N/A  
 SCALE: N/A  
 PROJECT NO:  
 MODEL FILE: Site.d  
 DATE: 12/18/2018

**E-100**



**DESIGNERS CERTIFICATION**

I CERTIFY THAT I AM A LICENSED ENGINEER OR ARCHITECT MEMBER OF THE COLLEGE OF MY PROFESSION AND AUTHORIZED BY THIS ACT AS THE OWNER TO PRESENT THESE CONSTRUCTION PLANS TO THE P.E.A.

IN COMPLIANCE WITH LAW NO. 7 OF JULY 19, 1985, AS AMENDED, AND AS PART OF THE CONSTRUCTION PLANS, I CERTIFY THAT I AM AWARE OF THE STANDARDS, ORDINANCES AND REGULATIONS GOVERNING THE DESIGN AND CONSTRUCTION OF SUCH WORKS AND REGULATIONS GOVERNED BY P.R.E.P.A., PUERTO RICO PLANNING BOARD AND ITS AND REGULATION ADMINISTRATION.



DESIGNER'S SIGNATURE AND SEAL NUMBER: 13782

**PUERTO RICO ELECTRIC POWER AUTHORITY ENDORSEMENT**

PROJECT NAME: CHP BPPR CUPEY CENTER  
 PROJECT NUMBER: 1188 KW per CogGen, Island Mode  
 ENDORSED BY:

P.R.E.P.A. ENDORSES THE ELECTRIC DESIGN SHOWN IN THESE CONSTRUCTION PLANS BASED ON THE CERTIFICATION SUBMITTED BY THE DESIGNER IN COMPLIANCE WITH LAW NO. 7 OF JULY 19, 1985, AS AMENDED.

P.R.E.P.A. DOES NOT ASSUME RESPONSIBILITY OVER THE CERTIFIED DESIGN. P.R.E.P.A.'S ENDORSEMENT DOES NOT IMPLY THAT THE DESIGNER HAS MET ALL THE REQUIREMENTS OF THE PROFESSIONAL RESPONSIBILITY ACT. THE DESIGNER IS RESPONSIBLE FOR THE DESIGN AND FOR OBTAINING THE NECESSARY ENDORSEMENT FROM THE DESIGNER. THE ENDORSEMENT RELIEVES NEITHER THE DESIGNER NOR PRIVATE ENDORSEMENT FROM COMPLIANCE WITH STANDING DISPOSITIONS OF THE P.R.E.P.A. BOARD OF PROFESSIONAL ENGINEERS AND ARCHITECTS. NATIONAL ELECTRIC CODE; NATIONAL ELECTRIC SAFETY CODE; CONSTRUCTION STANDARDS, NORMS AND REGULATIONS GOVERNED BY P.R.E.P.A., PUERTO RICO PLANNING BOARD AND ITS AND STATE LAWS RULING BY THE TIME CONSTRUCTION BEGINS.

ENDORSEMENT IS VALID FOR ONE YEAR, IF ELECTRICAL WORK BEGINS DURING THIS YEAR. WITH PRIOR APPROVAL FROM P.R.E.P.A., THE ENDORSEMENT WILL STILL BE VALID UNTIL WORK'S COMPLETION. IN CASE THERE IS NO ENDORSEMENT DURING A TWELVE MONTH PERIOD, ENDORSEMENT WILL LOSE ITS VALIDITY.

#	DATE	ENDORSED BY:

Gustavo Ricardo Castro  
 Gómez, ex-Autoridad de Energía Eléctrica, ex-  
 Director General de BPPR  
 2019.12.05 11:19:28  
 -04100

Digitally signed by Roberto D. Acosta DN: OU=Lic 13782, O=Accurate Solutions, CN=Roberto D. Acosta, E=racosta@accurate.worlds Date: 2019-12-03 23:06:30



Fecha de Expedición: 2019-12-02

**PROJECT NAME: NEW CO-GENERATION FACILITIES COMBINED HEAT & POWER (CHP)**

SHEET TITLE SHEET TITLE

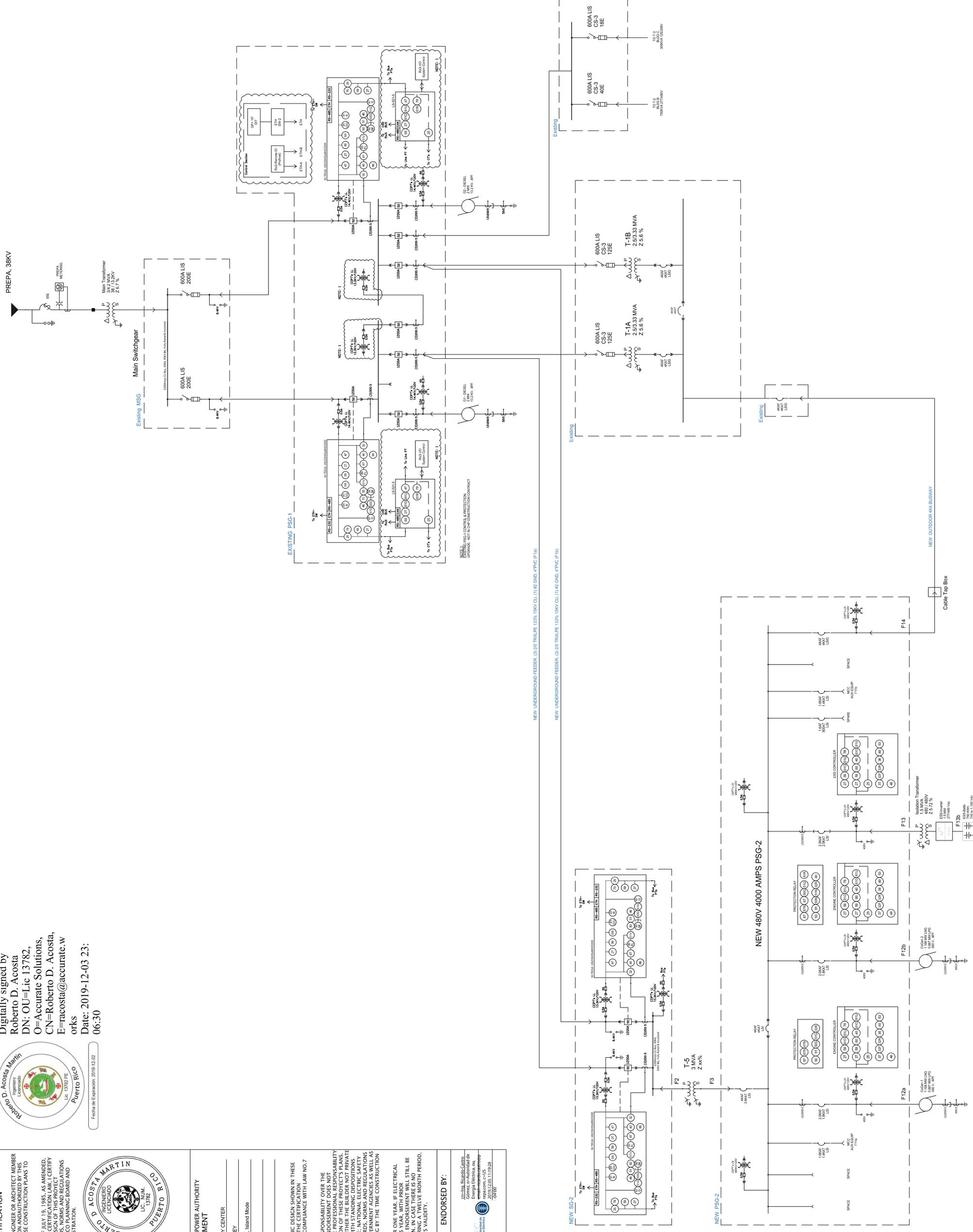
**BANCO POPULAR**  
 Cupey Center, Car...  
 Road 176 KM 1.3  
 San Juan, PR 00929

Yo, Ing. Roberto D. Acosta Martín, Licencia # 13982, certifico que soy el profesional que diseño estos planos y las especificaciones complementarias. También, certifico que entiendo que dichos planos y especificaciones cumplen con las disposiciones aplicables de los Reglamentos y Códigos de Construcción Vigentes de las Agencias, Juntas Regulatorias o Corporaciones Públicas con Jurisdicción Reconocida que cualquier declaración falsa o falsificación de Reglamentos Vigentes de las Agencias, Juntas Regulatorias o Corporaciones Públicas con Jurisdicción Reconocida que cualquier declaración falsa o falsificación de



THE INFORMATION CONTAINED HEREIN IS THE INTELLECTUAL PROPERTY OF THE DESIGNER AND IS TO BE USED ONLY IN THE MANNER AND FOR THE PURPOSES SPECIFICALLY SET FORTH IN ANY WRITTEN PERMISSIVE AGREEMENT. ENGINEERING SPECIALIST  
 DESIGN BY: ROBERTO  
 DRAWN BY: ROBERTO  
 CHK'D BY: N/A  
 SCALE: N/A  
 PROJECT NO:  
 MODEL FILE: OneL...  
 DATE: 12/18/2018

**E-600**



REVISIONS

NO.	DATE	DESCRIPTION	BY
1	12/18/2018	Issued for Bid	RA
2	04/08/2019	ESS Update	RA
3	6/24/2019	Issued for Construction	RA



**[DRAFT FOR PUERTO RICO ENERGY BUREAU APPROVAL]**

**MONTHLY INVOICE  
CHP ENERGY CHARGE  
Banco Popular de Puerto Rico**

This Monthly Invoice is issued pursuant to Section 2 (a) of the Eleventh Amendment to Master Lease Agreement by and between Banco Popular de Puerto Rico (“Landlord”) and Tenant (“Master Lease”); any capitalized terms in this statement not otherwise defined here shall have the meaning in the Eleventh Amendment and the Master Lease.

To : Evertec Group, LLC (“Tenant”)

Date of Statement : [30 days before due date for payment]

Billing Period :

Due Date : Thirty (30) days from receipt by Tenant

Current Charges : \$\_\_\_\_.00

Description : Equal to Tenant’s Proportionate Share of CHP Operating Costs Divided by 12 in accordance with Advance Statement of [Date]

Other Charges :

Credits :

Previous Balance :

Total Amount Due :

**Objections and Additional Information**

Tenant has thirty (30) days after the receipt of this Invoice to dispute its correctness, by providing in writing its objection at the address provided for notifications in the Master Lease and specifying the particular respects in which the Invoice is claimed to be incorrect. If such dispute shall not have been settled by agreement, Tenant may submit the dispute to arbitration by a recognized national accounting firm within sixty (60) days after receipt of this Invoice. If the dispute is not settled by agreement or submitted to arbitration, this Invoice shall be final and binding on both Tenant and Landlord. Notwithstanding that a dispute is pending determination by agreement or arbitration, Tenant shall continue to pay, when due, the CHP Energy Charge, such payment to be without prejudice to Tenant’s position. If the dispute shall be determined in Tenant’s favor, Landlord at its option shall either (i) pay Tenant the amount of Tenant’s overpayments resulting from compliance with Landlord’s Statement or (ii) apply as credit for past due or future CHP Energy Charges. Other terms related to dispute resolution are as provided in the Eleventh Amendment to the Master Lease.

The Independent Consumer Protection Office (“ICPO”) provides guidance, assistance and represents energy consumers in Puerto Rico. If there is any situation with your energy provider, you can contact ICPO by phone at 787-523-6962, fax at 787-523-6961, electronic mail at [info@oipc.pr.gov](mailto:info@oipc.pr.gov) or postal mail at 268 The Hato Rey Center, Suite 524, Piso 5, Ave. Ponce de León, San Juan 00918.

**[DRAFT FOR PUERTO RICO ENERGY BUREAU APPROVAL]**

**Annual Advance Statement of CHP Operating Expenses  
Banco Popular de Puerto Rico**

To : Evertec Group, LLC (“Tenant”)  
 Date of Statement : [30 days before March 31 of each year]  
 Lease Year Starting : \_\_\_\_\_ (“Lease Year”)

This Advance Statement is issued pursuant to Section 2 of the Eleventh Amendment to Master Lease Agreement by and between Banco Popular de Puerto Rico (“Landlord”) and Tenant (“Master Lease”); any capitalized terms in this statement not otherwise defined here shall have the meaning in the Eleventh Amendment and the Master Lease.

Tenant’s Proportionate Share of CHP Operating Expenses projected for the Lease Year is \_\_\_\_\_ %.

Tenant’s monthly CHP Energy Charge for the Lease Year is: \$ \_\_\_\_\_.

The CHP Energy Charge must be paid by the 1<sup>st</sup> day of each month of the Lease Year, commencing on [April 1, 20\_\_\_\_] or thirty (30) days from the date of receipt of this Advance Statement, whichever is later. See Section II below for the right to object and other information.

These amounts were calculated as described in Section I below.

**I. Basis for Monthly CHP Energy Charge**

**A. Base Information**

Building’s total leasable area : \_\_\_\_\_ square feet (“sf”).  
 Tenant’s total leasable area : \_\_\_\_\_ sf (“LAT”).  
 Landlord total leasable area : \_\_\_\_\_ sf (“LAL”).  
 Total energy consumption of Building for past Lease Year : \_\_\_\_\_ kilowatts per hour (“kWh”) per year (“yr”) (Building Total Consumption or “BTC”).

**B. Estimated CHP Operating Expenses**

The Estimated CHP Operating Expenses are based on the following breakdown of costs and expenses related to the operations and maintenance of the CHP System:

Type of Costs	Amount	Comments/Description
Fuel costs, including taxes and fees		
Costs of maintaining PREPA backup connection		
Other costs of operations and maintenance		Includes maintenance and repair of CHP System, absorption chillers and energy storage system, cost of replacement parts, depreciation costs of equipment, cost of insurance policies, and costs of

		regulatory and permitting requirements, if any.
<b>Total</b>		

**C. Landlord’s Historic Consumption Density (“HCDL”)**

The HCDL was determined based on the historic energy consumption density of Landlord for the year \_\_\_\_\_ in the following other office buildings owned and occupied by Landlord in San Juan with similar uses as those of Landlord in the Building (“Comparable Buildings”): [List buildings].

Total Landlord energy consumption in Comparable Buildings: \_\_\_\_\_ kWh/yr.

Total leasable area in Comparable Buildings: \_\_\_\_\_ sf.

HCDL =  $\frac{\text{Total Landlord energy consumption in Comparable Buildings kWh/yr}}{\text{Total Leasable area of Landlord in Comparable Buildings in sf}}$  = \_\_\_\_\_ kWh/sf/yr.

**D. Determination of Landlord’s and Tenant’s Consumption in the Building**

Landlord’s and Tenant’s total energy consumption in the Building per kWh/sf/yr has been determined to be as follows:

Landlord: HCDL x LAL= \_\_\_\_\_ kWh/sf/yr (Landlord’s Total Consumption or “LTC”).

Tenant: BTC-LTC= \_\_\_\_\_ kWh/sf/yr (Tenant’s Total Consumption or “TTC”).

**E. Determination of Tenant’s Proportionate Share and CHP Energy Charge**

$\frac{\text{TTC}}{\text{BTC}}$  = \_\_\_\_\_ % (Tenant’s Proportionate Share)

Tenant’s Proportionate Share x CHP Operating Costs = \_\_\_\_\_ (CHP Energy Charge)

**II. Objections and Additional Information**

Tenant has thirty (30) days after the receipt of this Advance Statement to dispute its correctness, by providing in writing its objection at the address provided for notifications in the Master Lease and specifying the particular respects in which the Advance Statement is claimed to be incorrect. If such dispute shall not have been settled by agreement, Tenant may submit the dispute to arbitration by a recognized national accounting firm within sixty (60) days after receipt of this Advance Statement. If the dispute is not settled by agreement or submitted to arbitration, this Advance Statement shall be final and binding on both Tenant and Landlord. Notwithstanding that a dispute is pending determination by agreement or arbitration, Tenant shall continue to pay, when due, the CHP Energy Charge, such payment to be without prejudice to Tenant’s position. If the dispute shall be determined in Tenant’s favor, Landlord at its option shall either (i) pay Tenant the amount of Tenant’s overpayments resulting from compliance with Landlord’s Statement or (ii) apply as credit for past due or future CHP Energy Charges. Landlord, for the purpose of allowing Tenant to verify the CHP Operating Expenses incurred by Landlord, and upon five (5) days prior written request by Tenant, agrees to grant Tenant reasonable access, at Landlord’s facilities and during regular hours of operation, to those books and records kept by Landlord containing said information. All costs associated with the dispute shall be paid by the non-prevailing party provided that in the case of Landlord and for these specific purposes, any Advance or Annual Reconciliation Statement shall be deemed in error only if the error in computation of CHP Operating Expenses for the Lease Year in dispute shall be in excess of five percent (5%).

The Independent Consumer Protection Office (“ICPO”) provides guidance, assistance and represents energy consumers in Puerto Rico. If there is any situation with your energy provider, you can contact ICPO by phone at 787-523-6962, fax at 787-523-6961, electronic mail at [info@oipc.pr.gov](mailto:info@oipc.pr.gov) or postal mail at 268 The Hato Rey Center, Suite 524, Piso 5, Ave. Ponce de León, San Juan 00918.

**[DRAFT FOR PUERTO RICO ENERGY BUREAU APPROVAL]**

**Annual Reconciliation Statement of CHP Operating Expenses  
Banco Popular de Puerto Rico**

To : Evertec Group, LLC (“Tenant”)  
 Date of Statement : [30 days after March 31 of each year]  
 Lease Year Ending : \_\_\_\_\_ (“Lease Year”)

This Annual Reconciliation Statement is issued pursuant to Section 2 of the Eleventh Amendment to Master Lease Agreement by and between Banco Popular de Puerto Rico (“Landlord”) and Tenant (“Master Lease”); any capitalized terms in this statement not otherwise defined here shall have the meaning in the Eleventh Amendment and the Master Lease. The purpose of this Annual Reconciliation Statement is to provide reconciliation of the CHP Energy Charges paid by Tenant during the Lease Year calculated based on the CHP Operating Expenses estimated for the Lease Year (“Estimated Operating Expenses”), as per the Lease Year’s Advance Statement, with the CHP Energy Charges that would have applied to the Lease Year based on the CHP Operating Expenses actually incurred for the Lease Year (“Incurred Operating Expenses”) (the latter CHP Energy Charge, the “Adjusted CHP Energy Charge”).

Estimated Operating Expenses : \$ \_\_\_\_\_.  
 Incurred Operating Expenses : \$ \_\_\_\_\_.  
 CHP Energy Charges paid by Tenant : \$ \_\_\_\_\_.  
 Adjusted CHP Energy Charges : \$ \_\_\_\_\_.  
 Difference : \$ \_\_\_\_\_.  
 Amount to be credited to Tenant : \$ \_\_\_\_\_.  
 Amount to be paid by Tenant : \$ \_\_\_\_\_.

Any amounts to be paid by Tenant must be paid to Landlord within thirty (30) days of receipt of this Annual Reconciliation Statement. See Section II below for the right to object and other information.

Any amounts to be credited to Tenant will be applied to: \_\_\_\_\_ [or is being paid by Landlord to Tenant with this Annual Reconciliation Statement.]

The breakdown of the Incurred Operating Expenses is provided in Section I below.

**I. Incurred Operating Expenses**

Type of Costs	Amount	Comments/Description
Fuel costs, including taxes and fees		
Costs of maintaining PREPA backup connection		
Other costs of operations and maintenance		Includes maintenance and repair of CHP System, absorption chillers and energy storage system, cost of replacement parts, depreciation costs of equipment, cost of insurance policies, and costs of

		regulatory and permitting requirements, if any.
<b>Total</b>		

**II. Objections and Additional Information**

Tenant has thirty (30) days after the receipt of this Annual Reconciliation Statement to dispute its correctness, by providing in writing its objection at the address provided for notifications in the Master Lease and specifying the particular respects in which the Annual Reconciliation Statement is claimed to be incorrect. If such dispute shall not have been settled by agreement, Tenant may submit the dispute to arbitration by a recognized national accounting firm within sixty (60) days after receipt of this Annual Reconciliation Statement. If the dispute is not settled by agreement or submitted to arbitration, this Annual Reconciliation Statement shall be final and binding on both Tenant and Landlord. Notwithstanding that a dispute is pending determination by agreement or arbitration, Tenant shall continue to pay, when due, the CHP Energy Charge, such payment to be without prejudice to Tenant’s position. If the dispute shall be determined in Tenant’s favor, Landlord at its option shall either (i) pay Tenant the amount of Tenant’s overpayments resulting from compliance with Landlord’s applicable Statement or (ii) apply as credit for past due or future CHP Energy Charges. Landlord, for the purpose of allowing Tenant to verify the CHP Operating Expenses incurred by Landlord, and upon five (5) days prior written request by Tenant, agrees to grant Tenant reasonable access, at Landlord’s facilities and during regular hours of operation, to those books and records kept by Landlord containing said information. All costs associated with the dispute shall be paid by the non-prevailing party provided that in the case of Landlord and for these specific purposes, any Advance or Annual Reconciliation Statement shall be deemed in error only if the error in computation of CHP Operating Expenses for the Lease Year in dispute shall be in excess of five percent (5%).

The Independent Consumer Protection Office (“ICPO”) provides guidance, assistance and represents energy consumers in Puerto Rico. If there is any situation with your energy provider, you can contact ICPO by phone at 787-523-6962, fax at 787-523-6961, electronic mail at [info@oipc.pr.gov](mailto:info@oipc.pr.gov) or postal mail at 268 The Hato Rey Center, Suite 524, Piso 5, Ave. Ponce de León, San Juan 00918.

**[DRAFT FOR PUERTO RICO ENERGY BUREAU APPROVAL]**

**Review Statement**

Banco Popular de Puerto Rico

To : Evertec Group, LLC (“Tenant”)

Date of Statement :

This Review Statement is issued pursuant to Section 5 of the Eleventh Amendment to Master Lease Agreement by and between Banco Popular de Puerto Rico (“Landlord”) and Tenant (“Master Lease”); any capitalized terms in this statement not otherwise defined here shall have the meaning in the Eleventh Amendment and the Master Lease. This Statement has been prepared to inform of the results of the review of components considered for determining the Tenant’s Proportionate Share of CHP Operating Expenses under the Master Lease and the related CHP Energy Charge.

Landlord has conducted an investigation of the relevant factors that could affect the formula to determine Tenant’s Proportionate Share and the results of the investigation are as follows:

[To be inserted]

As a result of the investigation, Landlord proposes to change the [HCDL] or [other component] to determine Tenant’s Proportionate Share as follows:

[To be inserted]

Tenant has thirty (30) days after the receipt of this Review Statement to dispute its correctness, by providing in writing its objection at the address provided for notifications in the Master Lease and specifying the particular respects in which the Review Statement is claimed to be incorrect. If the Parties are unable to reach agreement on the disputed issues within sixty (60) days of the issuance of the Review Statement, either Party may submit the dispute to arbitration by a recognized national accounting firm within sixty (60) days after receipt of the corresponding Statement. If neither Party reaches an agreement or submits the matter to arbitration within this time period, the findings and determinations of the Review Statement shall be final and binding on both Parties. In the event of arbitration, the determination of the accounting firm will be final and binding on both Parties. Notwithstanding that a dispute is pending determination by agreement or arbitration, Tenant shall continue to pay, when due, the CHP Electricity Charge, such payment to be without prejudice to Tenant’s position. In the event the final determination provides for a revised consumption density, the revised numbers shall apply as of the date the review process was commenced, provided that any adjustments related to over or underpayments already made shall be conducted in the End Statement as provided in Section 2(b) of the Eleventh Amendment.

The Independent Consumer Protection Office (“ICPO”) provides guidance, assistance and represents energy consumers in Puerto Rico. If there is any situation with your energy provider, you can contact ICPO by phone at 787-523-6962, fax at 787-523-6961, electronic mail at [info@oipc.pr.gov](mailto:info@oipc.pr.gov) or postal mail at 268 The Hato Rey Center, Suite 524, Piso 5, Ave. Ponce de León, San Juan 00918.

**DRAFT FOR PREB REVIEW**

**PROPOSED ELEVENTH AMENDMENT**

**MEMORANDUM OF LEASE**

This Eleventh Amendment is attached to and made an integral part of the Master Lease Agreement dated April 1, 2004, as amended by the First Amendment dated January 1, 2006, Second Amendment dated April 23, 2010, Third Amendment dated September 30, 2010, Fourth Amendment dated April 12, 2011, Fifth Amendment dated March 30, 2017, Sixth Amendment dated August 15, 2018, Seventh Amendment dated November 13, 2018, Eighth Amendment dated February 7, 2019, Ninth Amendment dated May 13, 2019, and Tenth Amendment dated May 6, 2020 (the Master Lease Agreement, as amended, the “Lease”), entered into by and between Banco Popular de Puerto Rico, hereinafter referred to as “Landlord,” and Evertec Group, LLC, hereinafter referred to as the “Tenant” (Landlord and Tenant shall be also referred to as the “Parties”). Any capitalized terms not specifically defined in this Eleventh Amendment shall have the meaning set forth in the Lease.

**WITNESSETH**

This Eleventh Amendment is made for the purpose of establishing the terms and conditions related to the establishment and operation by Landlord of a combined heat and power energy producing plant (“CHP” or “CHP System”) at the Building. Once built and operational, the CHP System will become the primary source of energy for the Building, including the Leased Premises, and the electric power from the Puerto Rico Electric Power Authority (“PREPA”) will be used for backup purposes only. The CHP System will also produce chilled water to be used in the operation of the air conditioning system of the Building. Landlord and Tenant agree that the terms of this Eleventh Amendment will govern the legal relationship of the Parties with respect to the energy to be supplied by the CHP System as per the provisions set forth below.

1. Landlord will charge Tenant for Tenant’s proportionate share (“Tenant’s CHP Proportionate Share”) of the costs to generate and supply energy from the CHP System (the “CHP Operating Expenses”) to the Building (the “CHP Energy Charge”). The CHP Energy Charge will be charged and billed in a manner similar to that for the Share of Operating Expenses under the Lease but as specified in Section 2 of this Eleventh Amendment and provided that the CHP Energy Charge will be billed separately from the Operating Expenses. The CHP Energy Charge shall constitute an Additional Rent under the Lease.
2. Similar to the process established in Sections 11(d), (e) and (f) of the Lease, the following billing process and associated terms and conditions shall apply with respect to the CHP Energy Charge:
  - a. Landlord shall, at the moment of execution of this Eleventh Amendment, and thereafter by the thirty first (31<sup>st</sup>) day of March of each subsequent Lease Year

during the term of the Lease Agreement, deliver to Tenant a written Statement of the CHP Operating Expenses projected for the coming Lease Year (“Advance Statement”) specifying Tenant’s CHP Proportionate Share thereof in accordance with the formulas to determine this amount as provided in Section 4 of this Eleventh Amendment. Tenant’s CHP Proportionate Share so notified by Landlord shall be paid by Tenant to Landlord in equal monthly installments, in advance, within 30 days of receipt of the corresponding monthly invoice from Landlord, on the first date of each month during the term of the Lease. Thereafter, at the end of each Lease Year during the Term of the corresponding Lease, Landlord shall furnish to Tenant a written detailed Statement of the actual CHP Operating Expenses (“Annual Reconciliation Statement~~End Statement~~”) actually incurred for such Lease Year and will at such time note and effect in such Statement the corresponding adjustment on the CHP Energy Charges paid by Tenant to Landlord in the preceding Lease Year as follows: (1) if the Annual Reconciliation~~End~~ Statement indicates that the projected CHP Operating Expenses in the Advance Statement were less than CHP Operating Expenses actually incurred, then Tenant shall pay Landlord such shortfall within thirty~~fifteen (30+5)~~ days from the date of receipt of the Annual Reconciliation~~End~~ Statement; (2) if the Annual Reconciliation~~End~~ Statement indicates that the CHP Operational Expenses under the Advance Statement exceeded the CHP Operational Expenses actually incurred, Landlord shall forthwith, at its option, (i) pay the amount of the excess directly to Tenant concurrently with the Annual Reconciliation~~End~~ Statement or (ii) credit to Tenant the amount of such excess against past due or subsequent payments of CHP Energy Charges under the Lease.

- b. Every Advance Statement and Annual Reconciliation ~~End~~ Statement shall be prepared by Landlord and shall be conclusive and binding upon Tenant unless within thirty~~ten (130)~~ days after the receipt of such statement Tenant ~~shall notify~~ Landlord that it disputes the correctness thereof, specifying the particular respects in which the statement is claimed to be incorrect. If such dispute shall not have been settled by agreement, Tenant may submit the dispute to arbitration by a recognized national accounting firm within sixty (60) days after receipt of the corresponding Statement. If the dispute is not settled by agreement or submitted to arbitration, the Statement in question shall be final and binding on both Parties. Notwithstanding that a dispute is pending determination by agreement or arbitration, Tenant shall continue to pay, when due, the CHP Energy Charge, such payment to be without prejudice to Tenant’s position. If the dispute shall be determined in Tenant’s favor, Landlord at its option shall either (i) pay Tenant the amount of Tenant’s overpayments resulting from compliance with Landlord’s Statement or (ii) apply as credit for past due or future CHP Energy Charges. Landlord, for the purpose of allowing Tenant to verify the CHP Operating Expenses incurred by Landlord, and upon five (5) days prior written request by Tenant, agrees to grant Tenant reasonable access, at Landlord’s facilities and during regular hours of operation, to those books and records kept by Landlord containing said information. All costs associated with the dispute shall be paid by the non-prevailing party provided that in the case of Landlord and for these specific

purposes, any Advance or ~~Annual Reconciliation-End~~ Statement shall be deemed in error only if the error in computation of CHP Operating Expenses for the Lease Year in dispute shall be in excess of five percent (5%).

- c. Payments by Tenant of CHP Energy Charges shall be made pursuant to this Section 2 notwithstanding that a Statement is furnished to Tenant after the expiration of the term of the Lease.
3. The CHP Operating Costs will be calculated based on the following components: Fuel costs, including applicable taxes or fees; costs of maintaining the backup connection with PREPA; costs of complying with regulatory and permitting requirements; costs of insurance policies necessary for the CHP System; and other costs of operation and maintenance, including maintenance and repair of the CHP System, the absorption chillers, the CHP System's energy storage system, costs of replacement parts for the all of these systems/equipment; and associated depreciation costs.
4. Given that there are no meters to separately measure the consumption of energy by Tenant in the Building, Tenant's Proportionate Share of CHP Operating Costs will be based on the following calculations. Landlord will determine the consumption density for the type of use in the Cupey Building based on the historic energy consumption density of Landlord ("HCDL") in other office buildings occupied by Landlord in San Juan with similar uses as those of Landlord in the Building and that have meters to measure that consumption. The HCDL will be specifically determined by dividing the total leasable area occupied by Landlord in those buildings in square feet ("sf") by the total energy consumption of Landlord in those areas in kWh per year ("yr") for a consumption in kWh/sf/yr. The HCDL will then be multiplied by the total leasable area in the Building occupied by Landlord ("LAL") to determine Landlord's total energy consumption in the Building per year ("LTC"). The difference between the total energy consumption of the Building for a given year ("BTC") and the LTC will be considered Tenant's total energy consumption for that given year ("TTC"). Tenant's Proportionate Share of Operating Costs would then be determined by dividing the TTC by the BTC. The formulas below reflect these calculations:

$$\text{LAL} \times \text{HCDL} = \text{LTC}$$

$$\text{BTC} - \text{LTC} = \text{TTC}$$

$$\frac{\text{TTC}}{\text{BTC}} = \text{Tenant's Proportionate Share}$$

$$\text{Tenant's Proportionate Share} \times \text{CHP Operating Costs} = \text{CHP Energy Charge}$$

5. Landlord will conduct a review of the HCDL (i) every three (3) years calculated from the effective date of this Eleventh Amendment ("Review Date") and (ii) when either Party notifies the other of a change in their then current use of ten percent (10%) or more of their occupied/leased space. Landlord will conduct a review of the other components of the

formula to determine Tenant's Proportionate Share in the following circumstances: (a) when either Party notifies the other that their total area of occupation or lease has or will change by more than five percent (5%) and such change is in accordance with the Lease; and (b) when Tenant notifies of its intention to renew the Lease in accordance with Section 7 of the Lease if Tenant raises at that time the need to revise the leased area. Within sixty days (60) days of receiving or sending one of the notifications described above, as applicable, or within sixty (60) days of the Review Date, BPPR shall conduct an investigation of the relevant factors that could reasonably affect the formula to determine Tenant's Proportionate Share and notify Tenant in writing of the results of the investigation and the proposed changes to the formula based on the results of such investigation (the "Review Statement"). If Tenant disagrees with the Review Statement and the Parties are unable to reach agreement on the disputed issues within sixty (60) days of the issuance of the Review Statement, either Party may submit the dispute to arbitration by a recognized national accounting firm within sixty (60) days after receipt of the corresponding Statement. If neither Party reaches an agreement or submits the matter to arbitration within this time period, the findings and determinations of the Review Statement shall be final and binding on both Parties. In the event of arbitration, the determination of the accounting firm will be final and binding on both Parties. Notwithstanding that a dispute is pending determination by agreement or arbitration, Tenant shall continue to pay, when due, the CHP Electricity Charge, such payment to be without prejudice to Tenant's position. In the event the final determination provides for revised consumption densities, the revised numbers shall apply as of the date the review process was commenced, provided that any adjustments related to over or underpayments already made shall be conducted in the [Annual Reconciliation ~~End~~ Statement](#) as provided in Section 2(b) of this Eleventh Amendment.

6. Similar to what is provided in Section 8(c) of the Lease with respect to Additional Rents, if any CHP Energy charge is not paid within fourteen (14) days after such payment first becomes due, Tenant shall also pay to Landlord a Late Charge at a rate of ten percent (10%) per year for the unpaid amount until such installment is fully paid. Such Late Charge shall be due and payable at the time of payment of the next monthly installment of the Basic Rent. Upon default in payment by Tenant of the Late Charge (after notice and expiration of the applicable cure period) Landlord shall have the rights and remedies provided for upon default of the Basic Rent. Any Late Charge payable by Tenant pursuant to the Lease shall be calculated from the day such expenditure is made or obligation is incurred until the date when such payment is finally and completely paid by Tenant to Landlord.
7. No deposit will be required in connection with the CHP Electricity Charge.
8. The supply of energy from the CHP System will be subject to the following provisions of the Lease regarding entrance to the Leased Premises for repairs, maintenance and similar activities, damages or losses related to the energy supply services, service interruptions and inability to perform: Sections 10(b), 14(c), 22(a) and (b), and 24 and Section 8 of Exhibit B.

9. Failure to pay the CHP Energy Charge will constitute an Event of Default as defined in Section 28(a)(i) of the Lease and subject to the default provisions in Section 28 of the Lease. Similar to the case with Landlord Furnished Services under Section 10(a) of the Lease, the supply of electricity from the CHP System to Tenant is contingent upon Tenant not being in default under the Lease. In addition, as provided in Section 28(j) of the Lease, Landlord can discontinue providing energy in the Event of Default, until Tenant cures the default.

9.10. Either Party may terminate or request the termination of the energy services from the CHP System by providing the other Party thirty (30) days' prior written notice via electronic mail or regular mail to the addresses provided in the notification section of the Lease.

10.11. In the event of any conflict between the provisions of this Eleventh Amendment and the ~~Master~~ Lease with respect to any matter related to the CHP System, the provisions of this Eleventh Amendment shall prevail.

11.12. Except as amended herein, all other terms and conditions of the ~~Master~~ Lease ~~Agreement~~ and all of its amendments remain in full force and effect.

As of this \_\_\_\_ day of [August], 2020, in San Juan, Puerto Rico.

TENANT  
EVERTEC GROUP, LLC

LANDLORD  
BANCO POPULAR DE PUERTO RICO

By: \_\_\_\_\_  
Name:  
Title:

By: \_\_\_\_\_  
Name:  
Title:

Following invoices are included in this payment. If you have any questions please call us at 787-751-9800 - 3140 or  
e-mail at accountspayablesbppr@popular.com

EXHIBIT K

Invoices Information

Invoice Number	Date	Message	Amount		
			Gross	Withheld/Discount	Net
#CASO NEPR-CT-2020-0004	09/01/2020	RESOLUCION- CASO-NEPR-CT-2020-0004	100.00	8.88	100.00

2020 SEP 15 PM 5:03

NEGOCIADO DE ENERGIA DE PUERTO RICO

TOTAL	100.00	0.00 0.00	100.00
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Incorporated herein by reference are the Equal Employment and Affirmative Action clauses at 41CFR 60 - 1.4, 41 CFR 60 - 250.0 and 41 CFR 60 - 741.4

ULAR.

ADMINISTRATIVE CHECK

101-201  
215

2708  
Puerto Rico 00936-2708

NO. **45-000067039**  
Date 09/15/2020

D\*\*\*\*\*

year.

Check Amount  
\*\*\*\*\*100.00

DE ENERGIA DE PUERTO RICO  
ENTER  
ENTER - HATO REY PR CLAVE 718

*Carly M*

Authorized Signature

*Alfonso Brando*

Authorized Signature

Reserve System and FDIC

039 1:02:50 2011: 000 000450