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WORK STATEMENT

TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	Administration
2		Conduct Baseline Assessment
3	X	Project Scoping & Design
4		Structural Upgrades Engineering Services
5		Abatement & Removal of Hazardous Materials
6		Seismic Upgrades
7 5		Installation
8 6		Ongoing Monitoring & Controls
9 7	X	Post Installation Verification
10 8	X	Training & Instructional Curriculum
11 9		Public Awareness & Community Outreach

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KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	Grant Cooke	Willdan Energy Solutions	
2	Tony Fairclough & Technical Team (Carlos Urrutia, Andrew Hoffmann, Serge Adamian, Ryan Wartena)		
3	Tony Fairclough & Technical Team		
4	Tony Fairclough & Technical Team	Chevron Energy Solutions	
5	Tony Fairclough & Technical Team	Chevron Energy Solutions SunChiller	
6	Tony Fairclough & Technical Team	Chevron Energy Solutions	
7	Tony Fairclough & Technical Team	Chevron Energy Solutions, Serge Adamian and Ryan Wartena	
8 6	Tony Fairclough & Technical Team	Enterprise DX	
9 7	Tony Fairclough & Technical Team	Fat Spaniel Technologies	
10 8	Tony Fairclough & Technical Team		

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
44 <u>9</u>	Kelly Cuval, Tony Fairclough & Technical Team	Willdan Energy Solutions	

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GLOSSARY

Specific terms and acronyms used throughout this scope of work are defined as follows:

Term/ Acronym	Definition
CES	Chevron Energy Systems
CPR	Critical Project Review
FST	Fat Spaniel Technologies
LACCD	Los Angeles Community College District
LATTC	Los Angeles Trade Technical College
PIER	Public Interest Energy Research
PV	Photovoltaic
RD&D	Research, Development and Demonstration
RESCO	Renewable-Based Energy Secure Communities
SEIDO	Name of solar thermal vacuum tube heat pipe
DSA	Division of the State Architect

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Problem Statement:

~~The Campus Electrical Demand Optimization Program (CEDOP) addresses the need to reduce energy costs, a significant operating cost for a community college campus, by generating—and storing—energy by renewable means. This innovative project will reduce a key campus building’s strain on the grid at the most critical times of the year.~~

~~A prime component of the CEDOP is the installation on the F Building of a 1.1MW direct current photovoltaic array expected to generate approximately 1,500,000 kWh per annum. A key requirement of this array is to offset electrical demand during high peak periods when the utility companies are hard pressed to meet demand. Integral to the photovoltaic (PV) array is a proposed 250 kWh battery storage system which will provide a dual purpose energy source for use during periods of intermittent weather or other adverse conditions and ensure demand from the grid is minimized. An additional technology to reduce campus demand is the installation of a solar thermal array sized to offset electrical peak cooling demands of the building. Energy stored as hot water will be used to feed an absorption chiller in the summer months and provide space heating during winter months reducing both electrical demand and natural gas usage respectively. To further reduce base load demand, T8 LED lighting will replace existing florescent fixtures.~~

~~An essential component of the Los Angeles Community College District (LACCD) energy mandate is to enact educational programs to train and educate a future technical~~

workforce California will need to meet the challenges of a green economy. Los Angeles Trade Technical College (LATTC) will serve as the research model for this project with direct instructor and student interaction under the Renewable Energy Certification program, which is offered by the Construction, Design, and Manufacture Department. Classes in solar design and installation are available for students and will assist in the development of programs designed to integrate PV, solar thermal and advanced energy storage systems.

The nine-college Los Angeles Community College District (LACCD) has adopted a Campus Electrical Demand Optimization Program (CEDOP) designed to reduce its dependence on supply-side fossil fuels and eventually achieve carbon neutrality by no direct creation of greenhouse gasses. The CEDOP adopts the three underlying principles of Environmental Protection, Economic Performance and Social Equity to ensure safe, healthy, comfortable and cost-effective campuses with minimal ecological and socio-economic impact on their surroundings.

The CEDOP addresses four key components in each campus energy profile:

1. **Energy Supply Systems comprising the utility companies, solar photovoltaic (PV), solar thermal, geo-thermal, wind and biomass technologies.**
2. **Energy Delivery Systems comprising central plants, thermal energy storage, unitary systems, tri-generation (electricity, cooling and heating) systems, fuel cell electricity generators, electrical energy storage systems and legacy systems.**
3. **Energy Demand Systems comprising heating, ventilation, fire and life safety, IT and other protected loads, air conditioning, lighting and plug loads.**
4. **Energy Management Systems comprising Supervisory Control and Data Acquisition (SCADA) real-time modules to monitor, record and control the distribution, consumption and conservation of energy.**

The proposed project on Los Angeles Trade Technical College (LATTC) is designed to demonstrate the value of the four key components outlined above. The project involves the installation of:

1. **A 241 kWp (AC) photovoltaic array**
2. **A 250 kWh battery storage system to be used as an energy source during periods of intermittent weather and minimize demand from the grid.**
3. **A solar thermal array to offset 160 kilowatt equivalent of the electrical peak cooling demands of the buildings in the summer and provide space heating in the winter.**
4. **A 160-ton absorption chiller, fed by energy stored as hot water (via the solar thermal array), to provide space cooling during the summer months, thereby reducing electrical energy use.**
5. **T8 LED lighting fixtures to further reduce base load demand.**

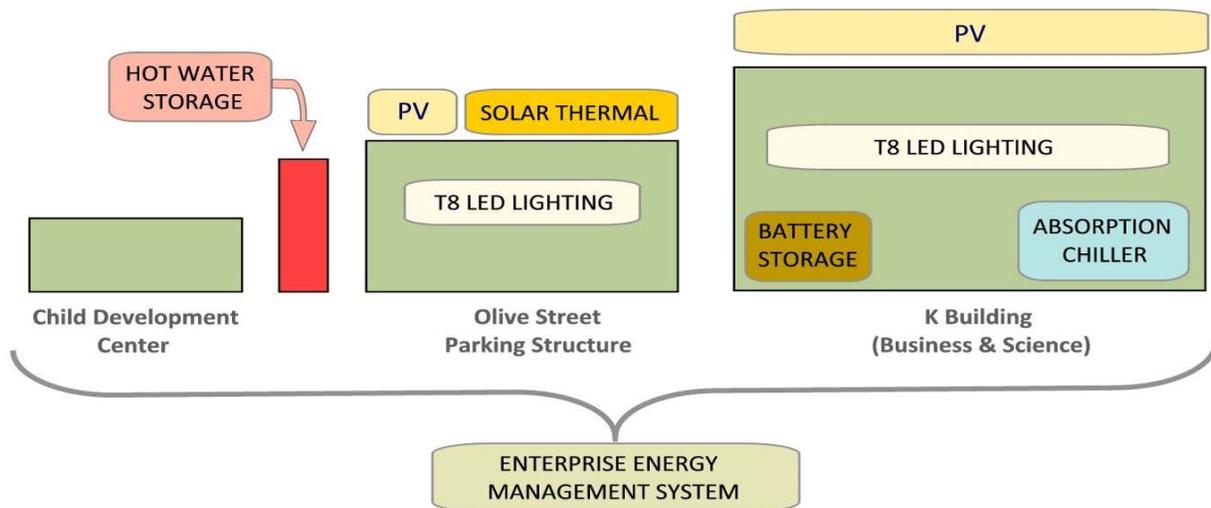
1 The buildings chosen for demonstration are the Olive Street Parking Structure
2 (OSPS), the K Building and the Child Development Center (CDC), hereafter
3 referred to as the RESCO Complex. The rationale for selecting these buildings is
4 their close proximity to each other on a campus which is severely handicapped
5 for space. The K Building, also referred to as the Business Science Building, is a
6 multi-functional building housing a bookstore, and classrooms and laboratories
7 for science, mathematics, English, business administration and Computer
8 Information Systems instruction. As such, it is a good candidate for
9 demonstrating the application of energy conservation measures.

10
11 The OSPS will provide the platform for locating a small array of solar PV, solar
12 thermal vacuum tube heat pipe (VTHP) collectors and the hot water tanks. The
13 solar PV array will supply electricity to the CDC and OSPS; the energy stored in
14 the hot water tanks will be piped across the street to the K Building. A solar PV
15 array will also be installed on Building K as well as LED lighting in classrooms
16 and offices, an absorption chiller for space cooling and a battery storage system.

17
18 The battery storage will be charged from the grid during the night when energy is
19 cheaper and will act as a load shifting device for use during the day at times of
20 peak demand. This device can also be charged by excess energy from the PV
21 array. The absorption chiller will receive its energy from the hot water storage
22 system and, in so doing, offset the energy otherwise consumed by the existing
23 electric chiller. The interaction of all these technologies will substantially reduce
24 demand on the utility company in daily peak periods from 1pm to 5pm. In
25 wintertime, the stored hot water will be used to provide space heating via the
26 building air handling units. The seamless integration and operation of these
27 systems is made possible by the Enterprise Energy Management System capable
28 of shedding load in real-time.

29
30 Hand-in-hand with the adoption of the CEDOP is establishing training and
31 educational programs to prepare the technical workforce California will need to
32 meet the challenges of a green economy. Los Angeles Trade Technical College
33 (LATTC) will serve as the research model for this project with direct instructor
34 and student interaction under the Renewable Energy Certification program, which
35 is offered by the Construction, Design, and Manufacturing Department. Classes in
36 solar design and installation are available for students and will assist in the
37 development of programs designed to integrate PV, solar thermal and advanced
38 energy storage systems.

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41 Technology Placement Diagram
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Goals of the Agreement:

The goal of this Agreement is to create a Renewable Energy Secure Community (RESCO) environment at Los Angeles Trade-Tech College (LATTC). The goals of this Agreement are to integrate the various technologies, which will provide 96% of the F Building's **76 percent of the peak energy use for the RESCO**

Complex's energy use. The Agreement will:

- Create a complete, verifiable and functional RESCO.
- Demonstrate how the technologies interact to realize the vast potential of RESCOs.
- Demonstrate the most advanced renewable and storage technologies available.
- Demonstrate some of the most advanced conceptual thinking in the sustainable field.

Objectives of the Agreement:

The objectives of this Agreement are to create a RESCO that will demonstrate the viability of the concept and technologies. In addition, our project will:

- Create a model classroom laboratory for a renewable and sustainability curriculum.
- Allow for the training of staff and faculty in how to maximize such a RESCO system and how to teach others to understand and use it.
- Enhance student learning by creating a healthy, energy efficient learning environment.
- Augment multiple instructional and certificate programs in the rapidly expanding "green" curriculum that LATTC is developing.
- Develop and train workers for the emerging "green" workforce.
- Provide an example of what other colleges and universities nationwide

1 can do to create their own RESCO.

- 2 • Provide ample opportunities for outreach and media dissemination for the
- 3 RESCO concept and Energy Commission contribution to the development
- 4 of such a valuable and beneficial process.

5 The project will help facilitate the college's mission and benefit faculty, students and the

6 community.

7

8 **Product Guidelines:**

9 For complete product guidelines, refer to Section 5 in the Terms and Conditions.

10

11 **TASK 1 ADMINISTRATION**

12

13 **Task 1.1 Attend Kick-off Meeting**

14

15 The goal of this task is to establish the lines of communication and procedures for

16 implementing this Agreement.

17

18 **The Recipient shall:**

- 19 • Attend a "Kick-Off" meeting with the Commission Project Manager, the
- 20 Grants Officer, and a representative of the Accounting Office. The
- 21 Recipient shall bring its Project Manager, Agreement Administrator,
- 22 Accounting Officer, and others designated by the Commission Project
- 23 Manager to this meeting. The administrative and technical aspects of this
- 24 Agreement will be discussed at the meeting. Prior to the kick-off meeting,
- 25 the Commission Project Manager will provide an agenda to all potential
- 26 meeting participants.

27 The administrative portion of the meeting shall include, but not be limited

28 to, the following:

- 29 ○ Discussion of the terms and conditions of the Agreement.
- 30 ○ Discussion of Critical Project Review (Task 1.2).
- 31 ○ Match fund documentation (Task 1.6).
- 32 ○ Permit documentation (Task 1.7).

33

34 The technical portion of the meeting shall include, but not be limited to, the

35 following:

- 36 ○ The Commission Project Manager's expectations for accomplishing
- 37 tasks described in the Scope of Work.
- 38 ○ An updated Schedule of Products.
- 39 ○ Discussion of Progress Reports (Task 1.4).
- 40 ○ Discussion of Technical Products (Product Guidelines located in
- 41 Section 5 of the Terms and Conditions).
- 42 ○ Discussion of the Final Report (Task 1.5).

43

44 **The Commission Project Manager shall:**

- 45 • Designate the date and location of this meeting.

46

Recipient Products:

- Updated Schedule of Products
- Updated List of Match Funds
- Updated List of Permits

Commission Project Manager Product:

- Kick-Off Meeting Agenda

Task 1.2 Critical Project Review (CPR) Meetings

The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and to identify any needed modifications to the tasks, products, schedule or budget.

CPRs provide the opportunity for frank discussions between the Energy Commission and the Recipient. CPRs generally take place at key, predetermined points in the Agreement, as determined by the Commission Project Manager and as shown in the Technical Task List above. However, the Commission Project Manager may schedule additional CPRs as necessary, and any additional costs will be borne by the Recipient.

Participants include the Commission Project Manager and the Recipient and may include the Commission Grants Officer, the Public Interest Energy Research (PIER) Program Team Lead, other Energy Commission staff and Management as well as other individuals selected by the Commission Project Manager to provide support to the Energy Commission.

The Commission Project Manager shall:

- Determine the location, date, and time of each CPR meeting with the Recipient. These meetings generally take place at the Energy Commission, but they may take place at another location.
- Send the Recipient the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not modifications are needed to the tasks, schedule, products, and/or budget for the remainder of the Agreement. Modifications to the Agreement may require a formal amendment (please see the Terms and Conditions). If the Commission Project Manager concludes that satisfactory progress is not being made, this conclusion will be referred to the Energy Commission's Research, Development and Demonstration (RD&D) Policy Committee for its concurrence.

- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more product(s) that were included in the CPR.

The Recipient shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other products identified in this scope of work. The Recipient shall submit these documents to the Commission Project Manager and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

Commission Project Manager Products:

- Agenda and a list of expected participants
- Schedule for written determination
- Written determination

Recipient Products:

- CPR Report(s)

Task 1.3 Final Meeting

The goal of this task is to closeout this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Recipient, the Commission Grants Office Officer, and the Commission Project Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Project Manager.

The technical portion of the meeting shall present an assessment of the degree to which project and task goals and objectives were achieved, findings, conclusions, recommended next steps (if any) for the Agreement, and recommendations for improvements. The Commission Project Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Commission Project Manager and the Grants Officer about the following Agreement closeout items:

- 1 ○ What to do with any equipment purchased with Energy Commission
- 2 ○ funds (Options).
- 3 ○ Energy Commission's request for specific "generated" data (not
- 4 ○ already provided in Agreement products).
- 5 ○ Need to document Recipient's disclosure of "subject inventions"
- 6 ○ developed under the Agreement.
- 7 ○ "Surviving" Agreement provisions, such as repayment provisions
- 8 ○ and confidential Products.
- 9 ○ Final invoicing and release of retention.
- 10 ○ Prepare a schedule for completing the closeout activities for this
- 11 ○ Agreement.

Products:

- 14 • Written documentation of meeting agreements
- 15 • Schedule for completing closeout activities

Task 1.4 ~~Monthly~~ Quarterly Progress Reports

18
19 The goal of this task is to periodically verify that satisfactory and continued progress is
20 made towards achieving the research objectives of this Agreement on time and within
21 budget.

22
23 The objectives of this task are to summarize activities performed during the reporting
24 period, to identify activities planned for the next reporting period, to identify issues that
25 may affect performance and expenditures, and to form the basis for determining
26 whether invoices are consistent with work performed.

The Recipient shall:

- 29 • Prepare a ~~Monthly~~ Quarterly Progress Report which summarizes all
- 30 • Agreement activities conducted by the Recipient for the reporting period,
- 31 • including an assessment of the ability to complete the Agreement within
- 32 • the current budget and any anticipated cost overruns. Each progress
- 33 • report is due to the Commission Project Manager within 10 days of the
- 34 • end of the reporting period. The recommended specifications for each
- 35 • progress report are contained in the terms and conditions of this
- 36 • Agreement.

Product:

- 39 • ~~Monthly~~ Quarterly Progress Reports

Task 1.5 Final Report

42
43 The goal of the Final Report is to assess the project's success in achieving its goals and
44 objectives, advancing science and technology, and providing energy-related and other
45 benefits to California.

46
47 The objectives of the Final Report are to clearly and completely describe the project's

1 purpose, approach, activities performed, results, and advancements in science and
2 technology; to present a public assessment of the success of the project as measured
3 by the degree to which goals and objectives were achieved; to make insightful
4 observations based on results obtained; to draw conclusions; and to make
5 recommendations for further RD&D projects and improvements to the PIER project
6 management processes.
7

8 The Final Report shall be a public document. If the Recipient has obtained confidential
9 status from the Energy Commission and will be preparing a confidential version of the
10 Final Report as well, the Recipient shall perform the following activities for both the
11 public and confidential versions of the Final Report.
12

13 **The Recipient shall:**

- 14 • Prepare an Outline of the Final Report.
- 15 • Prepare a Final Report following the approved outline and the latest
16 version of the PIER Final Report guidelines published on the Energy
17 Commission's website at
18 <http://www.energy.ca.gov/contracts/pier/contractors/index.html> at the
19 time the Recipient begins performing this task, unless otherwise instructed
20 in writing by the Commission Project Manager. Instead of the timeframe
21 listed in the Product Guidelines located in Section 5 of the Terms and
22 Conditions, the Commission Project Manager shall provide written
23 comments on the Draft Final Report within fifteen (15) working days of
24 receipt. The Final Report must be completed on or before the end of the
25 Agreement Term.
- 26 • Submit one bound copy of the Final Report with the final invoice.
27

28 **Products:**

- 29 • Draft Outline of the Final Report
- 30 • Final Outline of the Final Report
- 31 • Draft Final Report
- 32 • Final Report
33

34 **Task 1.6 Identify and Obtain Matching Funds**

35
36 The goal of this task is to ensure that the match funds planned for this Agreement are
37 obtained for and applied to this Agreement during the term of this Agreement.
38

39 The costs to obtain and document match fund commitments are not reimbursable
40 through this Agreement. Although the PIER budget for this task will be zero dollars, the
41 Recipient may utilize match funds for this task. Match funds shall be spent concurrently
42 or in advance of PIER funds for each task during the term of this Agreement. Match
43 funds must be identified in writing and the associated commitments obtained before the
44 Recipient can incur any costs for which the Recipient will request reimbursement.
45

46 **The Recipient shall:**

- 47 • Prepare a letter documenting the match funding committed to this

1 Agreement and submit it to the Commission Project Manager at least 2
 2 working days prior to the kick-off meeting. If no match funds were part of
 3 the proposal that led to the Energy Commission awarding this Agreement
 4 and none have been identified at the time this Agreement starts, then
 5 state such in the letter. If match funds were a part of the proposal that led
 6 to the Energy Commission awarding this Agreement, then provide in the
 7 letter a list of the match funds that identifies the:

- 8 ○ Amount of each cash match fund, its source, including a
 9 contact name, address and telephone number and the
 10 task(s) to which the match funds will be applied.
- 11 ○ Amount of each in-kind contribution, a description,
 12 documented market or book value, and its source, including
 13 a contact name, address and telephone number and the
 14 task(s) to which the match funds will be applied. If the in-kind
 15 contribution is equipment or other tangible or real property,
 16 the Recipient shall identify its owner and provide a contact
 17 name, address and telephone number, and the address
 18 where the property is located.
- 19 • Provide a copy of the letter of commitment from an authorized
 20 representative of each source of cash match funding or in-kind
 21 contributions that these funds or contributions have been secured.
- 22 • Discuss match funds and the implications to the Agreement if they are
 23 reduced or not obtained as committed, at the kick-off meeting. If
 24 applicable, match funds will be included as a line item in the progress
 25 reports and will be a topic at CPR meetings.
- 26 • Provide the appropriate information to the Commission Project Manager if
 27 during the course of the Agreement additional match funds are received.
- 28 • Notify the Commission Project Manager within 10 days if during the
 29 course of the Agreement existing match funds are reduced. Reduction in
 30 match funds must be approved through a formal amendment to the
 31 Agreement and may trigger an additional CPR.

32 **Products:**

- 33 • A letter regarding match funds or stating that no match funds are provided
- 34 • Copy(ies) of each match fund commitment letter(s) (if applicable)
- 35 • Letter(s) for new match funds (if applicable)
- 36 • Letter that match funds were reduced (if applicable)

37 **Task 1.7 Identify and Obtain Required Permits**

38
 39 The goal of this task is to obtain all permits required for work completed under this
 40 Agreement in advance of the date they are needed to keep the Agreement schedule on
 41 track.
 42

43
 44 Permit costs and the expenses associated with obtaining permits are not reimbursable
 45 under this Agreement. Although the PIER budget for this task will be zero dollars, the
 46 Recipient shall budget match funds for any expected expenditures associated with
 47

1 obtaining permits. Permits must be identified in writing and obtained before the
 2 Recipient can make any expenditures for which a permit is required.

3
 4 **The Recipient shall:**

- 5 • Prepare a letter documenting the permits required to conduct this
 6 Agreement and submit it to the Commission Project Manager at least 2
 7 working days prior to the kick-off meeting. If there are no permits required
 8 at the start of this Agreement, then state such in the letter. If it is known at
 9 the beginning of the Agreement that permits will be required during the
 10 course of the Agreement, provide in the letter:
 - 11 ○ A list of the permits that identifies the:
 - 12 ▪ Type of permit.
 - 13 ▪ Name, address and telephone number of the permitting
 14 jurisdictions or lead agencies.
- 15 • The schedule the Recipient will follow in applying for and obtaining these
 16 permits.
- 17 • Discuss the list of permits and the schedule for obtaining them at the kick-
 18 off meeting and develop a timetable for submitting the updated list,
 19 schedule and the copies of the permits. The implications to the Agreement
 20 if the permits are not obtained in a timely fashion or are denied will also be
 21 discussed. If applicable, permits will be included as a line item in the
 22 Progress Reports and will be a topic at CPR meetings.
- 23 • If during the course of the Agreement additional permits become
 24 necessary, provide the appropriate information on each permit and an
 25 updated schedule to the Commission Project Manager.
- 26 • As permits are obtained, send a copy of each approved permit to the
 27 Commission Project Manager.
- 28 • If during the course of the Agreement permits are not obtained on time or
 29 are denied, notify the Commission Project Manager within 5 working days.
 30 Either of these events may trigger an additional CPR.

31
 32 **Products:**

- 33 • Letter documenting the permits or stating that no permits are required
- 34 • A copy of each approved permit (if applicable)
- 35 • Updated list of permits as they change during the term of the Agreement
 36 (if applicable)
- 37 • Updated schedule for acquiring permits as changes occur during the term
 38 of the Agreement (if applicable)

39
 40 **TECHNICAL TASKS**

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 43 **TASK 2 CONDUCT BASELINE ASSESSMENT**

44
 45 ~~The goal of this task is to complete a thorough analysis of electrical and heating~~
 46 ~~demand analysis for Building F. Two electrical sub-meters will be employed to capture~~
 47 ~~the Building's demand diversity for at least three months prior to installing the renewable~~

1 technologies. This will provide a baseline for comparing Building F's overall energy use
 2 and subsequent savings. The baseline analysis will be conducted by Fairclough and the
 3 Technical Team (C. Urrutia, A. Hoffmann, S. Adamian and R. Wartena). All recording
 4 and analyses of data will conform to the International Performance Measurement &
 5 Verification Protocol adopting renewable energy components as they evolve.

6
 7 **The goal of this task is to complete a thorough electrical and heating demand**
 8 **analysis of the complete RESCO Complex (Building K, OSPS and CDC). Two**
 9 **electrical sub-meters will be employed to capture demand diversity for at least 90**
 10 **days prior to installing the renewable technologies. This will provide a baseline**
 11 **for comparing the RESCO Complex's overall energy use and subsequent savings.**
 12 **The baseline analysis will be conducted by Fairclough and the Technical Team**
 13 **(C. Urrutia, A. Hoffmann, and S. Adamian). All recording and analyses of data will**
 14 **conform to the International Performance Measurement & Verification Protocol**
 15 **adopting renewable energy components as they evolve.**

16
 17 **The Recipient shall:**

- 18 • ~~Review Building F historical utility data (for 12-18 months).~~
- 19 • ~~Install data loggers (sub-metering devices) to capture higher resolution~~
 20 ~~energy data.~~
- 21
- 22 • **Review Building K, OSPS and CDC historical utility data (for 12-18**
 23 **months).**
- 24 • **Install data loggers (sub-metering devices) to capture higher resolution**
 25 **energy data.**
- 26 • **Prepare a final baseline report.**
- 27

28 **Product:**

- 29 • ~~A baseline report~~
- 30
- 31 • **Final baseline report**
- 32

33 **TASK 3 PROJECT SCOPING AND DESIGN**

34
 35 The goal of this task is to complete scoping of the technologies and project design,
 36 making final determinations regarding equipment, equipment placement, specifications
 37 for bidding and purchasing and other considerations. Chevron Energy Solutions (CES)
 38 is the prime contractor for much of LACCD's renewable projects, particularly those
 39 employing (PV). CES will work collaboratively with and under the supervision of
 40 Fairclough and the Technical Team. Technologies involved:

- 41 • ~~PV to generate 1,500,000 kWh per annum (300 kWdc or 241 kWac of~~
 42 ~~array to be partitioned off for this project).~~
- 43 • ~~A 250 kWh li-ion battery storage system.~~
- 44 • ~~Solar thermal array comprising 150 SEDO1-16 high-performance vacuum~~
 45 ~~tube heat pipes (VHTP).~~
- 46 • ~~22,000 gallon high temperature insulated hot water storage tank.~~
- 47 • ~~160 ton single effect water-heated absorption chiller.~~

- ~~T8 LEDs to replace current fluorescent T8s.~~

The goal of this task is to complete scoping of the technologies and project design, making final determinations regarding equipment, equipment placement, specifications for bidding and purchasing and other considerations. A construction management firm and a PV Contractor will work and under the supervision of Fairclough and the Technical Team. Technologies involved:

- **PV – 241 kWp (AC).**
- **A 250 kWh battery storage system.**
- **Solar thermal array comprising 150 SEIDO 1-16 high-performance vacuum tube heat pipes (VHTP).**
- **22,000 gallon high temperature insulated hot water storage tank.**
- **160 ton single effect water-heated absorption chiller.**
- **T8 LEDs to replace current fluorescent T8s.**

The Recipient shall:

- ~~Review and approve all designs of each renewable technology, their placement and integration with the new and existing energy system for Building F. Designs will be developed by CES.~~
- ~~Complete specifications for equipment bidding and purchasing.~~
- ~~Determine schedule for installation.~~
- ~~Prepare and issue solicitations for equipment.~~
- ~~Purchase equipment.~~
- ~~Participate in CPR Meeting.~~
- ~~Prepare CPR report.~~

- **Review and approve all designs of each renewable technology, their placement and integration with the new and existing energy system for the RESCO Complex.**
- **Complete specifications for equipment bidding and purchasing.**
- **Determine schedule for installation.**
- **Prepare and issue solicitations for equipment.**
- **Purchase equipment.**

Products:

- ~~Report on scoping and planning documents~~
- ~~Report on specifications for bidding and equipment purchased~~
- ~~Copy of solicitation and bids~~
- ~~CPR Report~~
- **Final report on scoping and planning documents**
- **Final report on specifications for bidding and equipment purchased**
- **Final copy of solicitation and bids**

TASK 4 STRUCTURAL UPGRADES ENGINEERING SERVICES

The goal of this task is to complete structural upgrades to accommodate the installation of the PV arrays on Building F's rooftop. Fairclough and the Technical Team will oversee structural upgrades to Building F. Upgrades will be determined by a registered structural engineering firm and conform to federal/state/city codes and regulations. Public work activities performed on this project will be subject to the states prevailing wage requirements.

The goal of this task is to carry out the various engineering disciplines involved in realizing this project. This may include structural, mechanical, electrical and civil engineering by registered engineers whose analyses conform to federal, state and municipal codes and regulations. Engineering related to the Enterprise Management & Control system (design of the control architecture) and lighting engineering to lay out the T8 lighting design will also take place. Engineering services will be contracted out through the competitive bid process and overseen by Fairclough and the Technical Team. All engineering work shall be reviewed and approved by the California Department of the State Architect (DSA). A brief description of these activities follows:

The Recipient shall:

- ~~Submit designs to and coordinate review and approval from the designs.~~
- ~~Undertake structural work to ready Building F to support PV arrays, including repair of parking deck.~~
- **Conduct civil engineering for the overall project involving the following:**
 - a. **Surveying for trenching to place conduits and pipes beneath Grand Avenue**
 - b. **Surveying and design of a foundation and structural supports for the hot water storage tanks. Up to five stainless steel tanks with a total storage capacity of 22,000 gallons will be installed.**
 - c. **Obtaining a street easement from the City of Los Angeles Public Works Department (Bureau of Engineering) to place conduits and pipes.**
- **Conduct structural engineering relative to the designing of "mini"-columns and trusses to be placed over OSPS and Building K's existing structural columns to support solar PV and solar thermal arrays. It is expected that the weight load on OSPS and Building K will be minimal and no structural upgrades will be required.**
- **Conduct electrical engineering will be carried out relative to project components to be installed at OSPS, where the solar thermal array is sited, and Building K, where the absorption chiller is sited. These include the following:**
 - a. **PV array layout (for both OSPS and Building K rooftops)**
 - b. **Inverter sizing and selection**

- c. Interconnection design
 - d. Controls and safety
 - e. Electrical and control design for absorption chiller and solar thermal circuit
 - f. Integration of electric energy storage system
- Conduct mechanical engineering will be carried out relative to the following:
 - a. Layout of solar thermal array (OSPS roof)
 - b. Layout of insulated hot water tanks (OSPS, West side)
 - c. Layout of absorption chiller (inside Building K chiller room on the ground floor)
 - d. Design of solar thermal circuit and associated piping, pumps, valves, expansion tanks, heat exchangers, and control mechanisms (OSPS)
 - e. Design of absorption chiller piping and control system (Building K)
 - Conduct engineering and design of enterprise management and control systems including the control architecture for absorption chiller, solar thermal circuit, hot water storage tanks, and electric storage
 - Conduct engineering and design layout of lighting system

Products:

- ~~— A structural report~~
- ~~— Plans approved by OSA~~
- Final reports on civil, structural, electrical, mechanical and enterprise system
- DSA approved final plans

~~TASK 5 ABATEMENT & REMOVAL OF HAZARDOUS MATERIALS~~ INSTALLATION

~~The goal of this task is to contend with hazardous material abatement and removal. In the process of accessing and supporting Building F's structural columns, LACCD must abate and mitigate potential exposure to hazardous materials. Fairclough and the Technical Team will oversee hazardous material abatement and removal, which will conform to the various federal/state/city codes and regulations. The abatement and removal of all hazardous materials will be undertaken by a qualified hazardous waste abatement and removal firm. Public work activities performed on this project will be subject to the states prevailing wage requirements.~~

The goal of this task is to install equipment, renewable technologies and related components at the RESCO Complex and then tie the energy system into the LATTC campus grid. The design and connection of equipment and monitoring sensors shall be conducted through a competitive bid by a qualified and registered engineering firm. All equipment and renewable technologies installations will be overseen by Fairclough and the Technical Team and carried

1 out by contractors and a construction project management firm to be determined
 2 through a competitive bidding process.

3
 4 Installation of the following technologies involved:

- 5
- 6 • PV – to generate 418,000 kWh per annum.
- 7 • A 250 kWh battery storage system.
- 8 • Solar thermal array comprising 150 SEIDO 1-16 high-performance vacuum
 9 tube heat pipes.
- 10 • 22,000 gallon high temperature insulated hot water storage tank.
- 11 • 160 ton single effect water-heated absorption chiller.
- 12 • T8 LEDs to replace current fluorescent T8s.
- 13 • Enterprise DX Management & Control system.
- 14

15 ~~The Recipient shall:~~

- 16
- 17 • ~~Undertake abatement and removal of lead-based paint and asbestos.~~
- 18

19 The Recipient shall:

- 20
- 21 • Determine the sequence of equipment installation.
- 22 • Provide oversight and supervision of contractors and equipment
 23 manufacturers to complete the equipment installation.
- 24 • Ensure integration between all equipment and renewable technologies
 25 by coordinating the connections and interactions within the RESCO
 26 Complex's new and existing energy systems and to the larger LATTC
 27 campus electrical grid.
- 28 • Test and retest individual renewable technologies as they come online.
- 29 • Complete commissioning of each component and piece of equipment.
- 30 • Complete commissioning of the RESCO Complex's energy system.
- 31

32 **Product:**

- 33 • ~~Asbestos and lead-based safety report to include but not limited to:~~
- 34 ○ ~~Type of asbestos removed~~
- 35 ○ ~~Quantity removed~~
- 36 ○ ~~Method of removal~~
- 37 ○ ~~Safety Protocols~~
- 38 ○ ~~Method of Disposal~~
- 39
- 40 • Final report on the installation and testing of each piece of equipment and
 41 interconnection with the LATTC campus electrical grid
- 42
- 43

44 **TASK 6 SEISMIC UPGRADES**

45
 46 The goal of this task is to complete all required structural and seismic upgrades prior to
 47 installation of the PV arrays. Fairclough and the Technical Team will oversee seismic

1 upgrades to Building F. Seismic upgrades will be conducted by a registered engineering
 2 firm. The seismic construction retrofit work will be conducted by a qualified registered
 3 engineering firm. All retrofit work will comply with the local Uniform Building Code.
 4 Public work activities performed on this project will be subject to the states prevailing
 5 wage requirements.

6
 7 **The Recipient shall:**

- 8 • Carry out seismic retrofitting of Building F concurrent with structural
 9 upgrades. This involves placement of seismic strap assemblies at five
 10 locations on the structure to provide for steel motion resistant frame
 11 support.

12
 13 **Product:**

- 14 • A seismic report to include but not limited to:
 15 ○ Structural analysis
 16 ○ Joint X-ray tests

17
 18 **TASK 7 INSTALLATION**

19
 20 The goal of this task is to install equipment, renewable technologies and related
 21 components to complete Building F's energy system and tie the energy system it into
 22 the LATTC campus grid. All equipment and renewable technologies installations will be
 23 overseen by Fairclough and the Technical Team in collaboration with CES and carried
 24 out by contractors to be determined through a competitive bidding process. Public work
 25 activities performed on this project will be subject to the states prevailing wage
 26 requirements. Installation of the following technologies involved:

- 27
 28 • PV to generate 1,500,000 kWh per annum; 300 kWdc or 241 kWac of
 29 array to be partitioned off for this project.
- 30 • A 250 kWh li-ion battery storage system.
- 31 • Solar thermal array comprising 150 SEDO1-16 high-performance vacuum
 32 tube heat pipes.
- 33 • 22,000 gallon high temperature insulated hot water storage tank.
- 34 • 160 ton single effect water-heated absorption chiller.
- 35 • T8 LEDs to replace current fluorescent T8s.
- 36 • Enterprise DX Management & Control system.

37
 38 **The Recipient shall:**

- 39 • Determine the sequence of equipment installation.
- 40 • Provide oversight and supervision of contractors and equipment
 41 manufacturers to complete the equipment installation.
- 42 • Ensure integration between all equipment and renewable technologies by
 43 coordinating the connections and interactions within Building F's new and
 44 existing energy system and to the larger LATTC campus electrical grid.
- 45 • Test and retest individual renewable technologies as they come online.
- 46 • Complete commissioning of each component and piece of equipment.
- 47 • Complete commissioning of Building F's energy system.

Product:

- ~~Report on the installation and testing of each piece of equipment and interconnection with the LATTC campus electrical grid.~~

TASK ~~8~~ 6 ONGOING MONITORING & CONTROLS

The goal of this task is to provide ongoing monitoring and control optimization using the existing Enterprise DX recording system. A central database will correlate all data fed into the Enterprise DX. Monitoring is in real-time; power and energy behavior will be recorded at time-of-use- and constantly compared to the baseline data collected in Task 2. Exception reports will be produced when any erroneous data are detected. Items to be monitored include:

- Electricity and natural gas consumption
- Photovoltaic production
- Solar thermal production
- Battery state of charge

Such monitoring will ensure effective interaction of all system components and the existing Enterprise DX Management and Control system. The monitoring and system optimization will be conducted by Fairclough and the Technical Team. ~~The design and connection of equipment and monitoring sensors shall be conducted through a competitive bid by a qualified and registered engineering firm.~~

The Recipient shall:

- Develop a data collection process for RESCO complex's new energy system. Data will be collected for the following purposes:
 - Energy Profiling & Load Shedding.
 - Water Evaporation Rate Monitoring & Control.
 - Adoption of Renewable Energy Resources.
 - Cogeneration (Free Heat).
 - Cogeneration (Absorption Chiller Free Cooling).
 - Thermal Energy Storage (TES).
 - Water Economizer Control (Free Cooling).
 - Automated Water Treatment.
 - Lighting Control.
 - Lighting Levels.
 - Emergency Power Distribution.
 - Emergency Power Generation.
 - CO₂/ Indoor Air Quality Control.
 - VOC Monitoring.
 - Early Warning System (Code Compliance).
 - International Organization for Standardization/Compliance with ISO 14001.
 - Environmental Planning & Awareness.
 - Noise Pollution.

- 1 ○ Boiler Emissions Control.
- 2 ○ Calibration of Gauges & Instruments.
- 3 ○ Regulatory Code Compliance Agencies (OSHA, SCAQMD).
- 4 ○ Generating Management Roll-up Reports.
- 5 ○ Plant & Machinery History Records.
- 6 ○ Train staff on effective monitoring practices.

7

8 **Products:**

- 9 • **Final** check list, plans and diagrams of all monitoring and LATTC campus grid
- 10 connections
- 11 • **Final** report on monitoring processes and results

12

13

14 **TASK 9 7 POST INSTALLATION VERIFICATION**

15

16 The goal of this task is to verify energy usage and subsequent saving through a

17 comprehensive energy assessment of the ~~Building F's~~ **RESCO Complex's** energy

18 system. This process will be completed by Fat Spaniel Technologies (FST). FST

19 solutions will help optimize energy output, reduce operations and maintenance costs,

20 contain risk, and increase return on investment for renewable energy power plant

21 projects. Fairclough and the Technical Team will periodically compare current usage

22 patterns to the pre-retrofit baseline. Monitoring will be in real-time; power and energy

23 behavior will be recorded at time-of-use and constantly compared to the baseline.

24 Periodic means producing exception reports which are generated when any erroneous

25 data are detected.

26

27 **The Recipient shall:**

- 28 • Work with FST to monitor and report on ~~Building F~~ **RESCO Complex's**
- 29 performance.
- 30 • Complete a thorough comprehensive energy assessment and verification of
- 31 the ~~Building F's~~ **RESCO Complex's** energy output, system potential and all
- 32 related energy output of the system's renewable technologies.
- 33 • Generate a cost-benefit analysis, including a pre- and post-energy (all
- 34 renewable technologies) cost of electricity (levelized costs).

35

36 **Products:**

- 37 • A **final** comprehensive energy assessment database
- 38 • ~~Building F~~ **RESCO Complex** energy system verification **final** report and
- 39 related materials
- 40 • ~~Building F~~ **Final report on the RESCO Complex** case studies that clearly
- 41 explain project's inception, development and evolution, and pre- and post-
- 42 energy cost of electricity benefit analysis

1 ~~TASK 4~~ **8 TRAINING & INSTRUCTIONAL CURRICULUM**

2
3 The goal of this task is to train faculty and staff on how the renewables operate in
4 Building F and to develop curriculum and instructional materials to maximize the
5 building's use as a teaching resource. A comprehensive training process needs to be
6 developed in collaboration with product and service providers. This training will highlight
7 the benefits and extraordinary capabilities of Building F's renewable energy system.

8
9 Building F will be a valuable teaching resource, rounding out courses and certificate
10 programs in renewable energy at LA Trade Tech and perhaps other LACCD campuses.
11 Instructional materials may take the forms of PowerPoint presentations, lectures, texts,
12 articles, and teaching manuals. The Enterprise DX Management and Control system will
13 be thoroughly reviewed in this training process.

14
15 Fairclough and the Technical Team will oversee training, curriculum and instructional
16 materials development.

17
18 **The goal of this task is to train faculty and staff on how the renewables operate in**
19 **the RESCO Complex and to develop curriculum and instructional materials to**
20 **maximize the building's use as a teaching resource. A comprehensive training**
21 **process needs to be developed in collaboration with product and service**
22 **providers. This training will highlight the benefits and extraordinary capabilities**
23 **of the RESCO Complex's renewable energy system.**

24
25 **The RESCO Complex will be a valuable teaching resource, rounding out courses**
26 **and certificate programs in renewable energy at LATTC and perhaps other**
27 **LACCD campuses. Instructional materials may take the forms of PowerPoint**
28 **presentations, lectures, texts, articles, and teaching manuals. The Enterprise DX**
29 **Management and Control system will be thoroughly reviewed in this training**
30 **process. Fairclough and the Technical Team will oversee training, curriculum**
31 **and instructional materials development.**

32 33 **The Recipient shall:**

- 34 ● ~~Develop a case study for conducting the baseline assessment (Task 2) to be~~
35 ~~used as a teaching tool for classroom instruction.~~
- 36 ● ~~Document all aspects of equipment and system installation for use as~~
37 ~~instructional materials (Task 5).~~
- 38 ● ~~Produce documentation related to monitoring and controls for instructional~~
39 ~~use in classroom (Task 6).~~
- 40 ● ~~Develop verification process curriculum and instructional materials (Task 7).~~
- 41 ● ~~Work with the manufacturers' representatives, engineers and contractors to~~
42 ~~develop a comprehensive training process for faculty, staff, and~~
43 ~~administration.~~
- 44 ● ~~Develop a comprehensive training process for faculty that will enable them to~~
45 ~~use Building F and its renewable systems for instructional and certification~~
46 ~~programs.~~
- 47 ● ~~Participate in CPR meeting.~~

- 1 • ~~Prepare CPR report.~~
- 2
- 3 • **Develop a case study for conducting the baseline assessment (Task 2)**
- 4 **to be used as a teaching tool for classroom instruction.**
- 5 • **Document all aspects of equipment and system installation for use as**
- 6 **instructional materials (Task 5).**
- 7 • **Produce documentation related to monitoring and controls for**
- 8 **instructional use in classroom (Task 6).**
- 9 • **Develop verification process curriculum and instructional materials**
- 10 **(Task 8).**
- 11 • **Work with the manufacturers' representatives, engineers and**
- 12 **contractors to develop a comprehensive training process for faculty,**
- 13 **staff, and administration.**
- 14 • **Develop a comprehensive training process for faculty that will enable**
- 15 **them to use the RESCO Complex and its renewable systems for**
- 16 **instructional and certification programs.**
- 17

18 **Products:**

- 19 • ~~Baseline assessment case study~~
- 20 • ~~Instructional materials in the form of complete documentation of equipment~~
- 21 ~~and system installation~~
- 22 • ~~Staff training materials on monitoring and controls~~
- 23 • ~~Staff training materials on the verification process~~
- 24 • ~~Instructional materials on monitoring and controls~~
- 25 • ~~Instructional materials on the verification process~~
- 26 • ~~A comprehensive training manual and guide to the renewable system~~
- 27 ~~technologies for use in faculty training and student training and certification~~
- 28 ~~programs~~
- 29 • ~~CPR report~~
- 30
- 31 • **Final baseline assessment case study**
- 32 • **Final Instructional materials in the form of complete documentation of**
- 33 **equipment and system installation**
- 34 • **Final staff training materials on monitoring and controls**
- 35 • **Final staff training materials on the verification process**
- 36 • **Final instructional materials on monitoring and controls**
- 37 • **Final instructional materials on the verification process**
- 38 • **A final comprehensive training manual and guide to the renewable**
- 39 **system technologies for use in faculty training and student training and**
- 40 **certification programs**
- 41
- 42

43 **TASK 11 9 PUBLIC AWARENESS & COMMUNITY OUTREACH**

44
45 The goal of this task is to ~~develop and execute a plan to make the knowledge gained,~~
46 ~~experimental results and lessons learned available to various stakeholders and key~~

1 decision-makers at local, regional, state and even national levels. The project will also
 2 demonstrate how such a system may be integrated into the learning experience as well
 3 as providing workforce training for the emerging “green” industry.

4
 5 Willdan Energy Solutions’ S. Felix and G. Cooke will conduct the development and
 6 execution of the outreach plan with oversight by the Technical Team, led by Fairclough.

7
 8 **The goal of this task is to develop and execute a plan to make the knowledge**
 9 **gained, experimental results and lessons learned available to various**
 10 **stakeholders and key decision-makers at local, regional, state and even national**
 11 **levels. Such a multi-faceted effort begins with communicating the benefits of this**
 12 **RESCO installation to the general public and to community colleges in particular,**
 13 **within LACCD and beyond, in Los Angeles County and other counties throughout**
 14 **the state. This project will serve as an example of how a community college can**
 15 **bring together the various technologies to create an integrated energy renewable**
 16 **system. The project will also demonstrate how such a system may be integrated**
 17 **into the learning experience as well as providing workforce training for emerging**
 18 **“green” industries.**

19
 20 **Willdan Energy Solutions’ S. Felix and G. Cooke will conduct the development**
 21 **and execution of the outreach plan with oversight by the Technical Team, led by**
 22 **Fairclough.**

23
 24 **The Recipient shall:**

- 25
 26 •—Develop materials that describe the project from its inception to execution.
 27 •—Coordinate tours of the building and explain the system to community leaders.
 28 •—Arrange distribution of information about the project electronically, through
 29 LACCD’s website and e7 communication network as well as Energy
 30 Commission’s Flex Your Power network.
 31 •—Develop a presentation on the LA Trade Tech renewable energy project to
 32 present at the National Association of America Community Colleges
 33 Conference and other appropriate education, renewable energy or green
 34 jobs-related conferences and workshops on a local, statewide and national
 35 scale.
- 36
 37 • **Develop materials that describe the project from its inception to**
 38 **execution.**
 39 • **Coordinate tours of the building and explain the system to community**
 40 **leaders.**
 41 • **Arrange distribution of information about the project electronically,**
 42 **through LACCD’s website and e7 communication network as well as**
 43 **Energy Commission’s Flex Your Power network.**
 44 • **Develop a presentation on the LATTC renewable energy project to**
 45 **present at the National Association of American Community Colleges**
 46 **Conference and other appropriate education, renewable energy or green**

1 **jobs-related conferences and workshops on a local, statewide and**
2 **national scale.**
3

4 **Products:**

- 5 • ~~Case studies, Fact Sheets, Frequently Asked Questions, brochures, media~~
6 ~~releases, PowerPoint presentations and the like~~
- 7 • ~~Instructional materials to be integrated into current and future renewable~~
8 ~~energy technician training and other certificate programs~~

9
10 **Products:**

- 11 • **Final case studies, fact sheets, frequently asked questions, brochures,**
12 **media releases, PowerPoint presentations and the like**
- 13 • **Final instructional materials to be integrated into current and future**
14 **renewable energy technician training and other certificate programs**
15
16