Santa Rosa City Schools

REGULAR BOARD MEETING
10/11/2023 06:00 PM
Hybrid: Zoom / Santa Rosa City Hall Council Chambers (100 Santa Rosa Ave, Santa Rosa, CA 95404)
4:00 p.m. Closed Session | 6:00 p.m. Open Session

MEETING MINUTES

The Santa Rosa City Schools Board Meeting of October 11, 2023, starting at 6:00 pm, is in a hybrid format. The public can attend and **comment in person** by presenting a blue card to the Executive Assistant at the Santa Rosa City Hall Council Chambers (100 Santa Rosa Ave, Santa Rosa, CA 95404) or view/listen to the meeting in a virtual format via Zoom. **No public comments will be taken via the virtual format.** For more information on viewing/listening to the meeting virtually via Zoom or by phone, please click HERE.

La reunión de la mesa directiva del distrito escolar Santa Rosa City Schools del 11 de octubre de 2023, a partir de las 6:00 p. m., se llevará a cabo en un formato híbrido. El público puede asistir y **hacer comentarios en persona** presentando una tarjeta azul a la Asistente Ejecutiva en la Cámara del Ayuntamiento de Santa Rosa (100 Santa Rosa Ave, Santa Rosa, CA 95404) o ver/escuchar la reunión en formato virtual a través de Zoom. **No se aceptarán comentarios públicos a través del formato virtual.** Para obtener más información sobre cómo ver/escuchar la reunión virtualmente a través de Zoom o por teléfono, haga clic AQUÍ.

Individual speakers shall be allowed up to three minutes to address the Board on each agenda or non-agenda item. The Board may limit the total time for public input on each item to 20 minutes. With Board consent, the presiding officer may increase or decrease the time allowed for public presentation, depending on the topic and the number of persons wishing to be heard. The presiding officer may take a poll of speakers for or against a particular issue and may ask that additional persons speak only if they have something new to add (BP 9323).

Se les permitirán a los oradores hablar de manera individual por tres minutos ante la mesa directiva sobre cada tema incluido o no en la agenda. La mesa directiva puede limitar el tiempo total para la participación del público a 20 minutos por cada tema. Con el consentimiento de la mesa directiva, la presidenta puede incrementar o disminuir el tiempo asignado para los comentarios del público, dependiendo del tema y la cantidad de personas que deseen ser escuchadas. La presidenta puede llevar a cabo una encuesta para determinar cuántos oradores están a favor o en contra de un tema en particular, y puede pedir que otras personas hablen solo si tienen algo nuevo que agregar (BP 9323).

For questions or comments, please contact the Superintendent's Office at (707) 890-3800 ext. 80101 or mmartin@srcs.k12.ca.us.

To view future board meeting dates, click HERE.

To view agendas and minutes from July 2016 - August 12, 2020, click HERE.
To view agendas and minutes prior to July 27, 2016, please contact the Superintendent's Office at (707) 890-3800 ext. 80201, mmartin@srcs.k12.ca.us.
To view recordings of past board meetings, click HERE.

MISSION: SRCS ensures equitable access to a transformative educational experience grounded in the assets of our students, staff, and community. We nurture the whole student in an engaging, challenging, and safe environment. We recognize and value each student's individuality and our community's cultural wealth.

VISION: SRCS will send students into the world empowered to find purpose, think critically, embrace diversity, work together, and adapt to our changing planet, and live healthy and fulfilling lives.

Attendees

Voting Members
Alegria De La Cruz, Board of Education Director
Ever Flores, Board of Education Clerk
Stephanie Manieri, Board of Education President
Omar Medina, Board of Education Vice President
Ed Sheffield, Board of Education Director
Roxanne McNally, Board of Education Director
Jeremy De La Torre, Board of Education Director

A. CALL TO ORDER (4:00 p.m.)

The meeting was called to order at 4:00 pm by President Manieri.

1. Public Comment on Closed Session Agenda

There was no public comment on the Closes Session Agenda.

B. RECESS TO CLOSED SESSION

The meeting recessed to Closed Session.
President Manieri stated that the following items will be discussed:

- Public Employee Performance Evaluation (Title of employee being reviewed: Superintendent, Associate Superintendent, Assistant Superintendent, Principals, Vice Principals, Assistant Principals, Directors, Coordinators) [Gov. Code § 54957]
- Conference With Legal Counsel - Anticipated Litigation (Number of potential cases: 2) [Gov. Code § 54956.9]
- Student Expulsions (Case Nos: 2023/24-02, 2023/24-04, 2023/24-06) [Ed. Code § 48918]

1. Public Employee Performance Evaluation (Title of employee being reviewed: Superintendent, Associate Superintendent, Assistant Superintendent,

Principals, Vice Principals, Assistant Principals, Directors, Coordinators) [Gov. Code § 54957]

2. **Conference With Legal Counsel - Anticipated Litigation (Number of potential cases: 2) [Gov. Code § 54956.9]**

3. **Student Expulsions (Case Nos: 2023/24-02, 2023/24-04, 2023/24-06) [Ed. Code § 48918]**

C. RECONVENE TO OPEN SESSION (6:00 p.m.)

The meeting reconvened to Open Session at 6:02 p.m.

Director Rauh was present.

1. Pledge of Allegiance

President Manieri led the Pledge of Allegiance.

2. Territorial Land Acknowledgment

Principal Allegra Buschman led the Territorial Land Acknowledgment.

3. Report of Actions Taken in Closed Session

There was no report of action taken in Closed Session.

4. Items Considered In Closed Session for Action In Open Session

Motion Passed: Case No. 2023/24-02
Motion Made by: Omar Medina
Motion Seconded by: Alegria De La Cruz
Voting:
Ever Flores - Yes
Omar Medina - Yes
Ed Sheffield - Yes
Jeremy De La Torre - Yes
Alegria De La Cruz - Yes
Stephanie Manieri - Yes
Roxanne McNally - Yes

Motion Passed: Case No. 2023/24-04
Motion Made by: Ed Sheffield
Motion Seconded by: Ever Flores
Voting:
Ever Flores - Yes
Omar Medina - Yes
Ed Sheffield - Yes
Jeremy De La Torre - Yes
Alegria De La Cruz - Yes
Stephanie Manieri - Yes
Roxanne McNally - Yes

Motion Passed: Case No. 2023/24-06
Motion Made by: Ever Flores
Motion Seconded by: Alegria De La Cruz
Voting:
Ever Flores - Yes
Omar Medina - Yes
Ed Sheffield - Yes
Jeremy De La Torre - Yes
Alegria De La Cruz - Yes
Stephanie Manieri - Yes
Roxanne McNally - Yes

5. Statements of Abstention

There were no statements of abstention.

6. Adjustments to Agenda

There were no adjustments to the agenda.

7. Special Presentations for Student of the Month and Certificated/Classified Employees of the Month (Santa Rosa French American Charter School)

The following individuals were presented with their awards from the Santa Rosa French American Charter School:

- Pepper Budlong, Student of the Month
- Benat Habtom, Classified Employee of the Month
- Berengere Demailly, Certificated Employee of the Month

8. School Site Parent Organization Updates (Santa Rosa French American Charter School)

The following individuals gave a report for their School Site Parent Organizations:

- Evelyn Gonzalez, ELAC Representative
- Angelica Ramon Zurita, ELAC Representative
- Beatriz Oviedo Guillermo, ELAC Representative
- Ben Wolf, Parent Association Foundation (PAF) President

D. REPORTS

1. California School Employee Association (CSEA) Santa Rosa 75 Report

There was no CSEA Santa Rosa 75 report.

2. Santa Rosa Teachers Association (SRTA) Report

President Howell gave a Santa Rosa Teachers Association (SRTA) report.

3. Superintendent Report

Superintendent Trunnell gave a report.

4. Board President Report

President Manieri gave a report.

5. Board Member Reports

The following Board members gave a report:

- Director De La Cruz
- Director Flores
- Director De La Torre
- Director Medina

6. Indian Education Report

The following individuals presented the Indian Education report to the Board:

- Elizabeth Billy, Native American Community Worker
- Dr. Patricia Law, Coordinator of State and Federal Programs
- MaDonna Feather-Cruz, Indian Education President
- Donna Fernandez, Indian Education Teacher Representative

7. Safety Report

The following individuals presented the safety report to the Board:

- Superintendent Trunnell
- Director Rauh
- Erica Vogel, Chief Executive Officer, Community Matters

Superintendent Trunnell provided follow-up information regarding the additional positions being hired as a result of the Safety Advisory Round Table and LCAP work:

- In 22-23: 15 Campus Supervisors
- In 23-24: 27 Campus Supervisors (10 of these still need to be filled)
- In 22-23: 25.4 Family Engagement Facilitators
- In 23-24: 26 Family Engagement Facilitators (6 still need to be filled)
- In 22-23: 16 Restorative Specialists
- In 23-24: 26 Restorative Specialists (8 positions still need to be filled)
- In 22-23: 23 School Based Therapists
- In 23-24: 24.75 School Based Therapists (keep in mind that some SBT;s are .875 not 1.0)

8. Schools Plus Report

There was no Schools Plus report, this presentation will be rescheduled to a future meeting.

9. CSBA Report

There was no CSBA report.

E. PUBLIC COMMENT ON NON-AGENDA ITEMS

The following individuals addressed the Board during public comment:

- Matt Hillestad - Campus Safety
- Nicole Rosaschi - Campus Safety
- Mike Martini - School Resource Officer (SRO) on campus
- Natalie Goodrich - SROs on campus
- Serina DeBaca - SROs on campus
- Julia Stewart - SROs on campus
- Teresa Jepson - Safety
- Scott Kincaid - SRO Program
- Aimee Werle - SROs on campus
- Tara Hackett - Safety
- Olive Blain - Safety
- Jim LaFrance - Safety

F. DISCUSSION / ACTION ITEMS

1. (Action) Approval of Resolution Recognizing the Week of the School Administrator October 8 through 14, 2023

Assistant Superintendent Dr. Castro presented the Approval of Resolution Recognizing the Week of the School Administrator October 8 through 14, 2023 to the Board.
Superintendent Trunnell assisted with recognizing all Santa Rosa City Schools Administrators for their dedication and hard work.

The duration of the Board's comments lasted 1 minute.

Motion Passed: Approval of Resolution Recognizing the Week of the School Administrator October 8 through 14, 2023
Director Rauh preferential vote: Aye

Motion made by: Ed Sheffield
Motion seconded by: Jeremy De La Torre
Voting:
Alegria De La Cruz - Yes
Ever Flores - Yes
Stephanie Manieri - Yes
Omar Medina - Yes
Ed Sheffield - Yes
Roxanne McNally - Yes
Jeremy De La Torre - Yes

2. (Action) Approval of Resolution Proclaiming October as LGBTQIA+ History Month

Trustee De La Torre presented the Approval of Resolution Proclaiming October as LGBTQIA+ History Month to the Board.

The duration of the Board's comments lasted 1 minute.

Motion Passed: Approval of Resolution Proclaiming October as LGBTQIA+ History Month
Director Rauh preferential vote: Aye

Motion made by: Jeremy De La Torre
Motion seconded by: Alegria De La Cruz
Voting:
Alegria De La Cruz - Yes
Ever Flores - Yes
Stephanie Manieri - Yes
Omar Medina - Yes
Ed Sheffield - Yes
Roxanne McNally - Yes
Jeremy De La Torre - Yes

3. (Action) Approval of Resolution Proclaiming October as Filipino American History Month

Superintendent Trunnell presented the Approval of the Resolution Proclaiming October as Filipino American History Month to the Board.

The duration of the Board's comments lasted 1 minute.

Motion Passed with Friendly Amendment to add the name of Phillip De La Cruz to the Resolution: Approval of the Resolution Proclaiming October as Filipino American History Month
Director Rauh preferential vote: Aye

Motion made by: Ever Flores
Motion seconded by: Omar Medina
Voting:
Alegria De La Cruz - Yes
Ever Flores - Yes
Stephanie Manieri - Yes
Omar Medina - Yes
Ed Sheffield - Yes
Roxanne McNally - Yes
Jeremy De La Torre - Yes

4. (Action) Approval of First Read, and Potential Waive of Second Read for Board Policy 6174 - Education for English Learners

Assistant Superintendent Dr. Castro and Director of Multilingual Services, Eduwiges Llamas, presented the Approval of First Read, and Potential Waive of Second Read for Board Policy 6174 - Education for English Learners to the Board.

The duration of the Board's questions lasted 2 minutes.

Director Medina asked that the history of the Board Policy be posted on the Districts Board Policy Manual and updated each time the policies come to the Board for approval.

Motion Passed: Approval of First Read, and Potential Waive of Second Read for Board Policy 6174 - Education for English Learners
Director Rauh preferential vote: Aye

Motion made by: Alegria De La Cruz
Motion seconded by: Ed Sheffield
Voting:
Alegria De La Cruz - Yes
Ever Flores - Yes
Stephanie Manieri - Yes
Omar Medina - Yes
Ed Sheffield - Yes
Roxanne McNally - Yes
Jeremy De La Torre - Yes

5. (Discussion) Facilities Master Plan Updates

The following individuals presented the Facilities Master Plan (FMP) to the Board with the latest updates:

- Lisa August, Associate Superintendent
- Erik Oden, Executive Director
- Aaron Jobson, Quattrocchi Kwok Architects (QKA)

The following individual addressed the Board during public comment:

- Lacinda Moore

The duration of the Board's questions and comments lasted 14 minutes.

6. (Discussion) West County Transportation Agency Update

The following individuals presented the West County Transportation Agency Update:

- Lisa August, Associate Superintendent
- Erik Oden, Executive Director
- Chad Barksdale, Executive Director, West County Transportation Agency

At 9:42 p.m., Director Medina made a motion to extend the meeting to 10:30 p.m. Director Flores seconded the motion. All were in favor, there were no oppositions and no abstentions.

The WCTA presentation and EV Study are provided with the minutes as

supporting documents.

The duration of the Board's questions lasted 12 minutes.

The following individuals addressed the Board during public comment:

- Kathryn Howell
- Lacinda Moore

G. CONSENT ITEMS

Motion Passed: Consent Items G.2 and G.4-G.14
Director Rauh preferential vote: Aye

Motion made by: Omar Medina
Motion seconded by: Alegria De La Cruz
Voting:
Alegria De La Cruz - Yes
Ever Flores - Yes
Stephanie Manieri - Yes
Omar Medina - Yes
Ed Sheffield - Yes
Roxanne McNally - Yes
Jeremy De La Torre - Yes

1. **Approval of Absent Board Members**
2. **Approval of Personnel Transactions**
3. **Approval of Vendor Warrants**

   Motion Passed: Approval of Vendor Warrants
   Director Rauh preferential vote: Aye

   Motion made by: Ed Sheffield
   Motion seconded by: Omar Medina
   Voting:
   Alegria De La Cruz - Abstain
   Ever Flores - Yes
   Stephanie Manieri - Yes
   Omar Medina - Yes
   Ed Sheffield - Yes
   Roxanne McNally - Yes
   Jeremy De La Torre - Yes

4. **Approval of Donations and Gifts**
5. **Approval of Contracts**
6. **Approval of the 2023-24 Consolidated Application for Funding**
7. **Adjustments to the already approved 2022-23 Unaudited Actuals Fiscal Report**

8. **Approval of LLB Contracts for Preconstruction Services for Rincon Valley Middle School Roofing/HVAC**

9. **Approval of LLB Contract for Preconstruction Services for Luther Burbank Elementary School Roofing/HVAC**

10. **Approval of LLB Contracts for Pre-construction Services for Helen Lehman Elementary School Roofing/HVAC**

11. **Approval of Trope Group Cubicle Extenders**

12. **Proposal from TLCD for Pilot Classroom Furniture Budget**

13. **Proposal from T&R to move the Fiber Cables at 211 Ridgway**

14. **Proposal for Architectural Services for Removal of the Portable Buildings at 211 Ridgway Ave.**

H. APPROVAL OF MINUTES

1. **Approval of Minutes of the Regular Board Meeting Held On September 27, 2023**

Motion Passed: Approval of Minutes of the Regular Board Meeting Held on September 27, 2023
Director Rauh preferential vote: Aye

Motion made by: Ed Sheffield
Motion seconded by: Alegria De La Cruz
Voting:
Alegria De La Cruz - Yes
Ever Flores - Yes
Stephanie Manieri - Yes
Omar Medina - Yes
Ed Sheffield - Yes
Roxanne McNally - Yes
Jeremy De La Torre - Yes

2. **Approval of Minutes of the Special Board Meeting Held On October 2, 2023**

Motion Passed with Amendment to add the Board Member's Attendance to the Meeting Minutes: Approval of Minutes of the Special Board Meeting Held On October 2, 2023
Director Rauh preferential vote: Aye

Motion made by: Alegria De La Cruz
Motion seconded by: Ed Sheffield
Voting:
Alegria De La Cruz - Yes
Ever Flores - Yes
Stephanie Manieri - Yes
Omar Medina - Abstain
Ed Sheffield - Yes

Roxanne McNally - Yes
Jeremy De La Torre - Yes

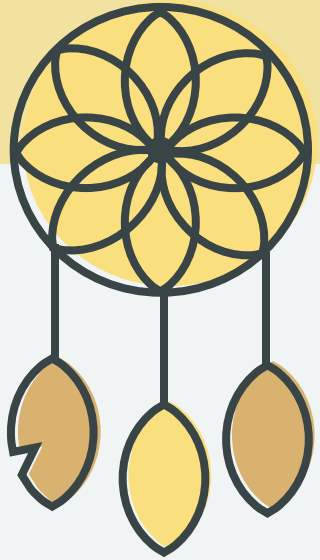
I. BOARD MEMBER REQUESTS FOR INFORMATION

J. INFORMATION ITEMS

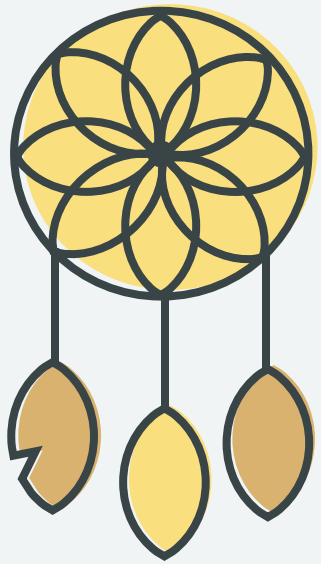
1. **Future Board Discussion Items**
2. **Board Conduct and Code of Ethics**
3. **Educational Acronyms and Abbreviations**
4. **School Site Reports**
    a. **Santa Rosa French-American Charter School**
5. **Fund 25 Capital Facilities Fund**
6. **Fund 73 Scholarships**
7. **2018/19 Unaudited Actuals vs Estimated Actuals**
8. **Sonoma County Office of Education (SCOE) Call for Nomination for Representatives to the Sonoma County Committee on School District Organization**

K. ADJOURNMENT

The meeting adjourned at 9:59 p.m.



Indian Education Program 2023/2024 SRCS Fall Board Meeting



The Team

Elizabeth Billy

Indian Education Community Worker

Dr. Patricia Law

Coordinator, State & Federal Programs

MaDonna Feather-Cruz

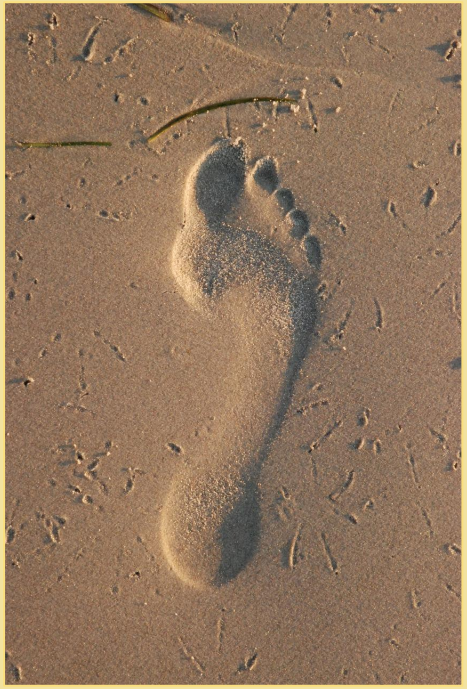
Indian Education President

Donna Fernandez

Indian Education Teacher Representative

Step 1

It begins here ...



506 FORM

If you don't have the tribal number, that is okay ... we are here to help!

OMB Control No. 1810-0021 (Exp. 01/31/2024)

ED 506 Form
Indian Student Eligibility Certification Form for Title VI Indian Education Formula Grant Program

Parent/Guardian: This form serves as the official record of the eligibility determination for each individual child included in the student count for the Title VI Indian Education Formula Grant Program. If you choose to submit a form, your child could be counted for funding under the program. The grantee receives the grant funds based on the number of eligible forms counted during the established count period. You are not required to complete or submit this form unless you wish for your child(ren) to be included in the Indian student count. This form should be kept on file with the grant applicant and will not need to be completed every year. Where applicable, the information contained in this form may be released with your prior written consent or the prior written consent of an eligible student (aged 18 or over), or if otherwise authorized by law, if doing so would be permissible under the Family Educational Rights and Privacy Act, 20 U.S.C. § 1232g, and any applicable state or local confidentiality requirements.

Student Information

Name of the Child _____ Date of Birth _____ Grade level _____

Name of School _____ School District _____

Tribal Membership

The individual with Tribal membership is the (select only one): ◯ child ◯ child's parent ◯ child's grandparent

If the individual with Tribal membership is **not** the child listed above, name the individual (parent/grandparent) with tribal membership: _____

Name and address of Tribe or Band that maintains updated and accurate membership data for the individual listed above:

Name _____ Address _____

City _____ State _____ Zip Code _____

The Tribe or Band is (select only one):

- ☐ Federally Recognized Tribe
- ☐ State Recognized Tribe
- ☐ Terminated Tribe
- ☐ Alaska Native
- ☐ Member of an organized Indian group that received a grant under the Indian Education Act of 1988 as it was in effect October 19, 1994.

Proof of membership in Tribe or Band listed above, as defined by Tribe or Band is:

- ☐ Membership or enrollment number establishing membership (if readily available) or
- ☐ Other evidence establishing membership in the Tribe listed above (describe and attach)

Membership or enrollment number establishing membership (if readily available) or other evidence establishing membership in the Tribe listed above (describe and attach). _____

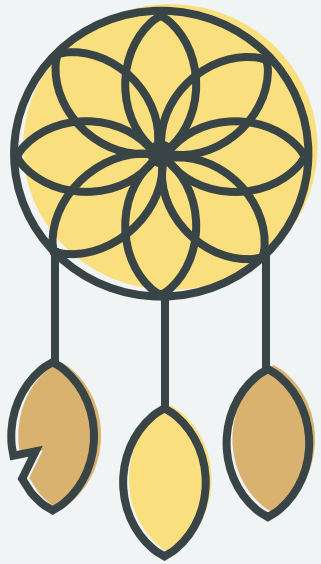
Attestation Statement

I verify that the information provided above is true and correct to the best of my knowledge and belief.

Printed Name of Parent/Guardian _____ Signature_____

Address _____ City _____ State _____ Zip Code _____

Phone Number _____ Email _____ Date _____



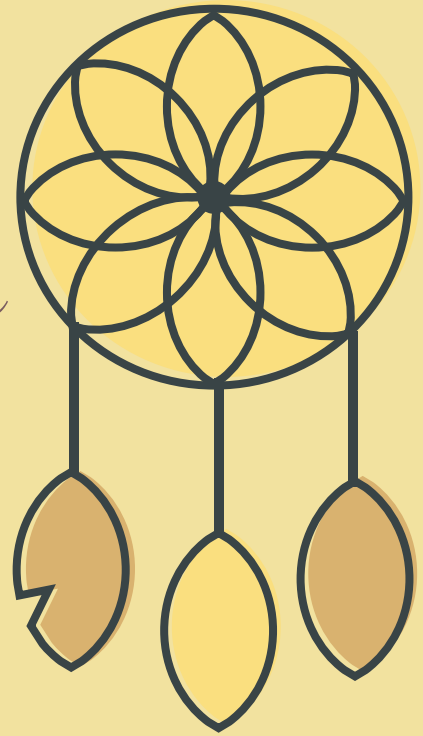
Program Overview

- School Site Visits
- Student Visits (accountability partner, support, buddy, mentor)
- Participate in IEPs, SST Meetings, Counseling meetings
- Native Talking Circle @ Comstock Middle, SR Middle
- Native Group/Clubs on High School Campuses
- Community Outreach
- Parent Committee Meetings, Parent Workshops, Family Nights
- Home Visits
- Promote Higher Education (Summer Bridge), SRJC classes

OBJECTIVES OF INDIAN EDUCATION GRANT

- Increase Academic Achievement
- Providing Academic Support
- Culturally-responsive academic support
- College and career preparation
- Parent & Community Involvement

- *PK-12 Grant*
- *Continuing multi-year application*
- *Includes Parent Committee Approval*
- *In coordination with Title I. grant or $52,481 supports staff and program supplies*

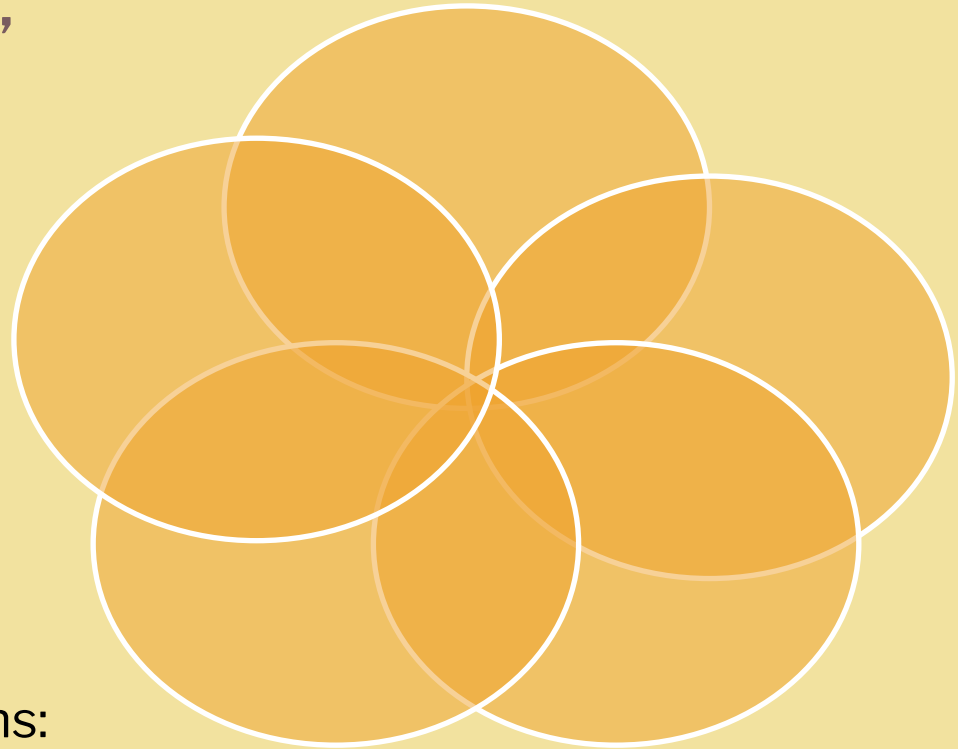


Office of Indian Education (OIE) Title VI Program

HOW WE MEET GOALS

Family Connections :
Family Fun Nights, Parent & Family Workshops

Community Outreach:
Traditional dance, CIMCC workshops



School Connections:
Native Clubs

Materials and Resources:
School Supplies, Tutoring, Food Distribution

Student Needs Assessment: Santa Rosa City Schools Title VI Native American Indian Education Program 2023-24 / Evaluación de Necesidades Estudiantiles: Distrito Escolar Santa Rosa City Schools - Título VI - Programa de Educación para Amerindios del año escolar 2023-2024

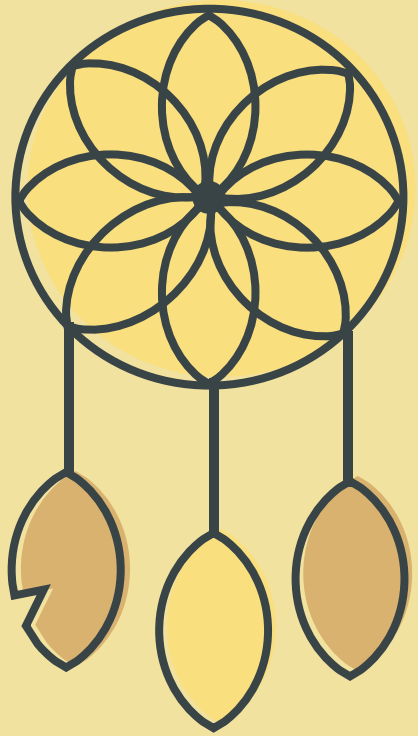
Santa Rosa City Schools needs your valuable input to best support you and further develop our Native American Indian Education program for the 2023/24 school year. Through state and federal funding allocated for Native American Indians, we support the unique academic and cultural needs of American Indian students to meet academic standards, to reduce educational barriers to academic achievement, and to promote transition into education and/or employment after high school.

Santa Rosa City Schools necesita sus valiosos aportes para brindarle el mejor apoyo y desarrollar aún más nuestro programa de educación para amerindios para el año escolar 2023/24. A través de fondos estatales y federales asignados a los amerindios, apoyamos las necesidades académicas y culturales únicas de los estudiantes amerindios para cumplir con los estándares académicos, reducir las barreras educativas que afectan el rendimiento académico y promover la transición a la educación y/o al empleo después de la escuela preparatoria.

Your Email (so we can include you in future events and updates; we promise not to spam you) * / Su dirección de correo electrónico (para que podamos incluirlo en futuros eventos y actualizaciones; prometemos no enviarle spam):

Short answer text

Student Needs Assessment



- Online
- Student-Friendly
- Open-ended
- Distributed widely via email and at events and activities

How we Partner with School Sites

SANTA ROSA CITY SCHOOLS
Excellence is our Common Ground

State & Federal Programs
Indian Education

Dear School Site Personnel, September 2023

My name is *Elizabeth Billy*, and I am the Community Worker for Indian Education in the State & Federal Programs District Office. I am a Pomo Indian member of the Dry Creek Rancheria. My goal as a Community Worker is to assist Native American students with meeting the academic standards expected of all students as well as address their social-emotional needs. As a Native American Indian Community worker, I can access tutorial resources or provide guidance to Native students and their families. This is done by establishing and maintaining a cooperative relationship with students, parents, school staff and community organizations to achieve this goal.

The Indian Education/Title VI, Part A program is currently updating our student enrollment. When a student has been identified as American Indian or Alaska Native, a 506 form is required. This program's funding helps Native American children sharpen their academic skills and provides an opportunity for them to participate in support programs that might not otherwise be available.

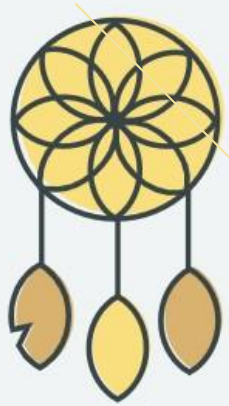
The goal of the Indian Education program is to provide culturally-responsive education to meet the academic needs of American Indian /Alaska Native students. For more information, including an overview and confidential student lists of currently identified students, please visit this resource. My goal is to assist you and your student in achieving this goal through collaboratively working with you, the community, and the schools to provide resources needed to graduate college and career ready students. We want to start this process at an age as early as preschool.

In order to have a child participate in this program completing a **506 Student Eligibility Certification Form** is necessary. This form is the funding source for our program. Without this form for your student/s, we cannot provide services. **Some parents have already completed this form. However, for those who have not done so, it is important for you to know that each student is required to have a form.** Therefore, if you have multiple students in the school district, please fill out a separate form for each student. I have attached a form for your convenience. Please complete and return a copy of this form to the office secretary at your child's school. An email copy of the form to me at ebilly@srcs.k12.ca.us is also acceptable. Regarding the tribal enrollment section of the form, write the enrollment number establishing the membership of the child or other evidence of membership. If the child is not a member of the tribe and the child's eligibility is through a parent or grandparent, aunt, or uncle, write their enrollment number or provide other proof of membership. Some examples of other proof of membership may include: affidavit from tribe, CDIB card or birth certificate. *If you do not have this information, please fill in what you know, sign and return.*

I look forward to working with you and your family. For additional information or questions please feel free to call or email me.

Respectfully,

Elizabeth Billy



SRCS Indian Education Program
An Overview

Program Overview	What is Indian Ed and How does it Support Students? Click here to learn more.
Student Lists	Confidential Student Lists (school-specific tabs at bottom)
Book List	Native Ways of Knowing Books and Authors
Contact Information	Elizabeth Billy, Community Liaison 890-3800 x8042 / ebilly@srcs.k12.ca.us SRCS Indian Education Website

September 28, 2023

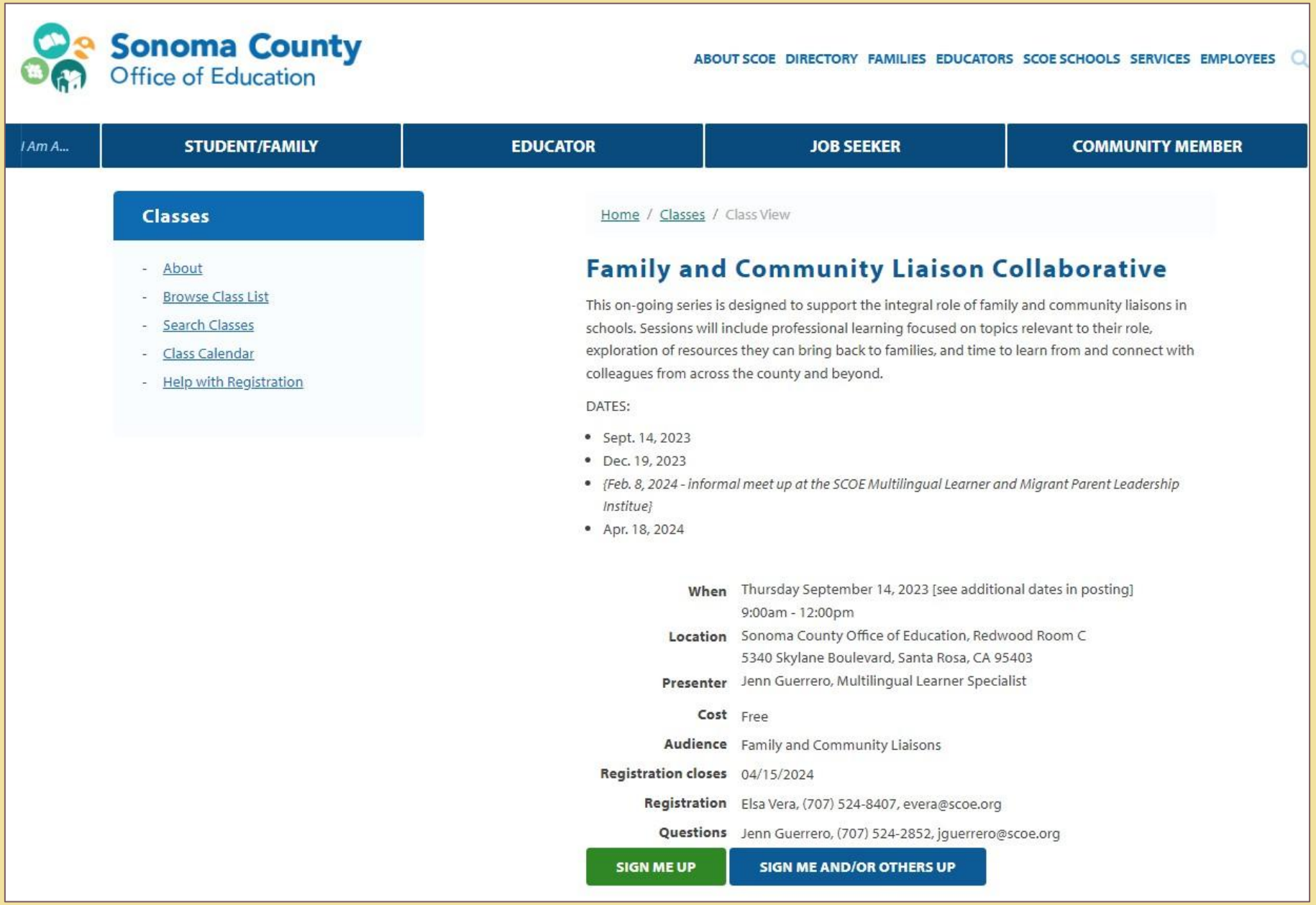
Information Items

Dr. Patricia Law, Coordinator, State and Federal Programs
O: (707) 890-3800 X 80420 | C: (707) 859-2764 | plaw@srcs.k12.ca.us

All Schools:

Help Us Help Your Students! The goal of the Indian Education program is to provide culturally-responsive education to meet the academic needs of American Indian /Alaska Native students. For more information, including an overview and confidential student lists of currently identified students, view this letter from Elizabeth Billy, Indian Education Community Worker, and visit this resource. Please share and/or forward this information to your assistant principals, counselors, registrars, advisors, office managers, secretaries, etc., as appropriate to your site.

How we Partner as a County



How we Partner with Families

Cultural Promotion is Prevention

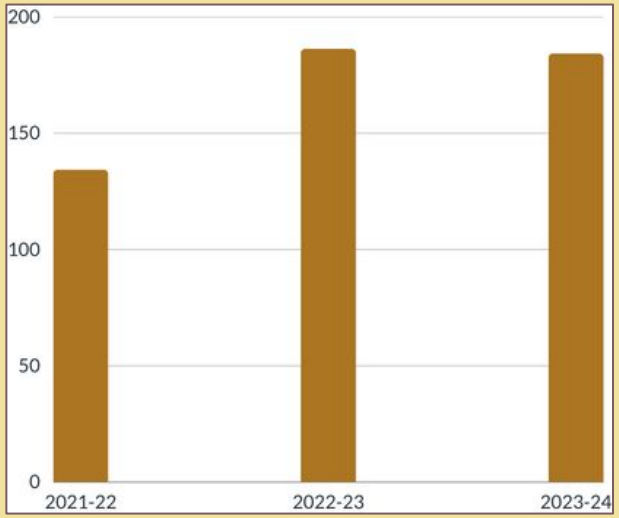
Our Impact: Stories & Successes

Identified Native Students PK-12

2021-22 = 134

2022-23 = 186

2023-24 = 184

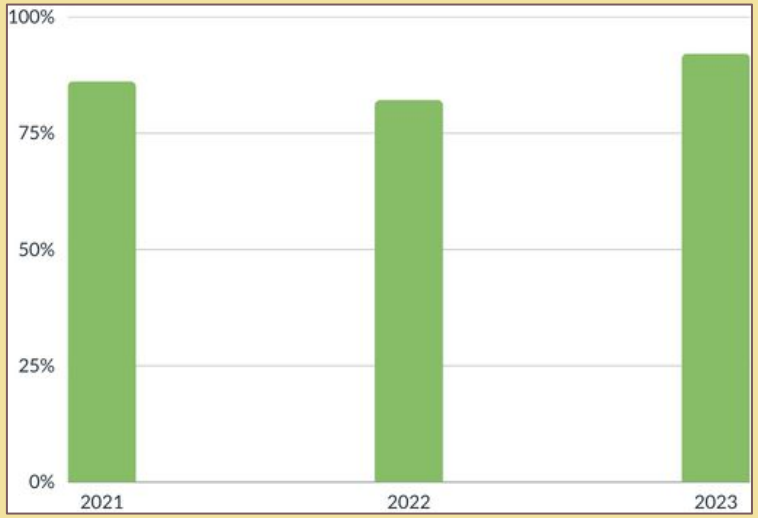


Graduation Rate

2021: 86%

2022: 82%

2023: 92%



EDFacts Graduation SY 2021-22 Data	
Graduation Rate for Indian Students	Graduation Rate for ALL STUDENTS
65%	84%

State Graduation Rates

8th Grade Data

Proficient and Above

STATE MATH - ALL

2020-21

20%

SRCS MATH - IE

2020-21

0%

Only 4 Ss tested

STATE READING - ALL

2020-21

32%

SRCS READING - IE

2020-21

50%

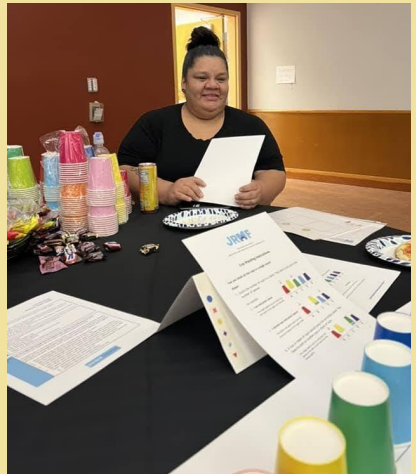
A Focus on Equity:
Increasing Knowledge through Ethnic Studies

- Indian Ed Staff partnering with Secondary Curriculum Team
- Curriculum Development teaching truth and history of our Native people with a focus on:
  California Native Americans
  Gold Rush
  Our Land
  Genocide
  Boarding School Historical Trauma
  Traditions and Culture

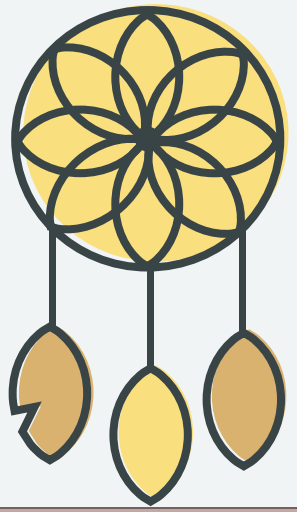
Culture – Outreach – Connection = Intervention

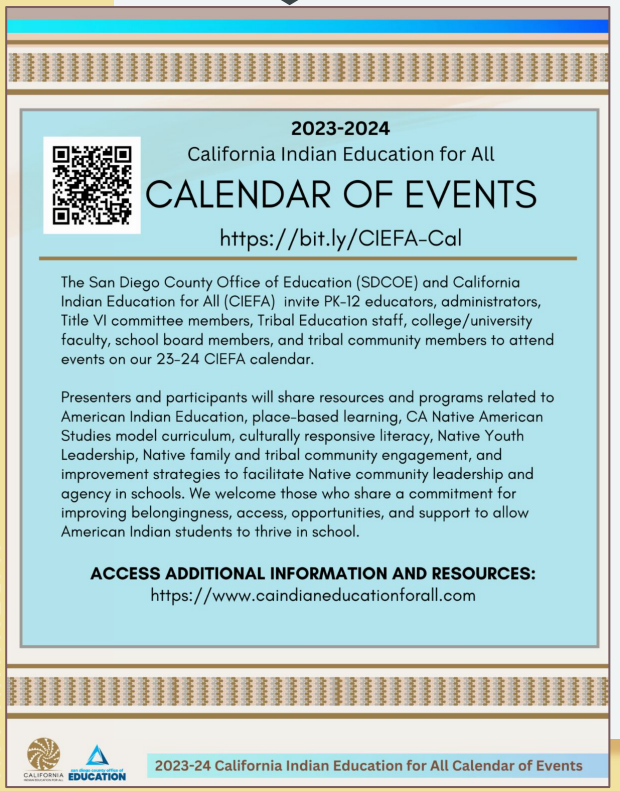
Involvement in community, home visits, student visits, attend students extra circular, attend school meetings, refer as needed.

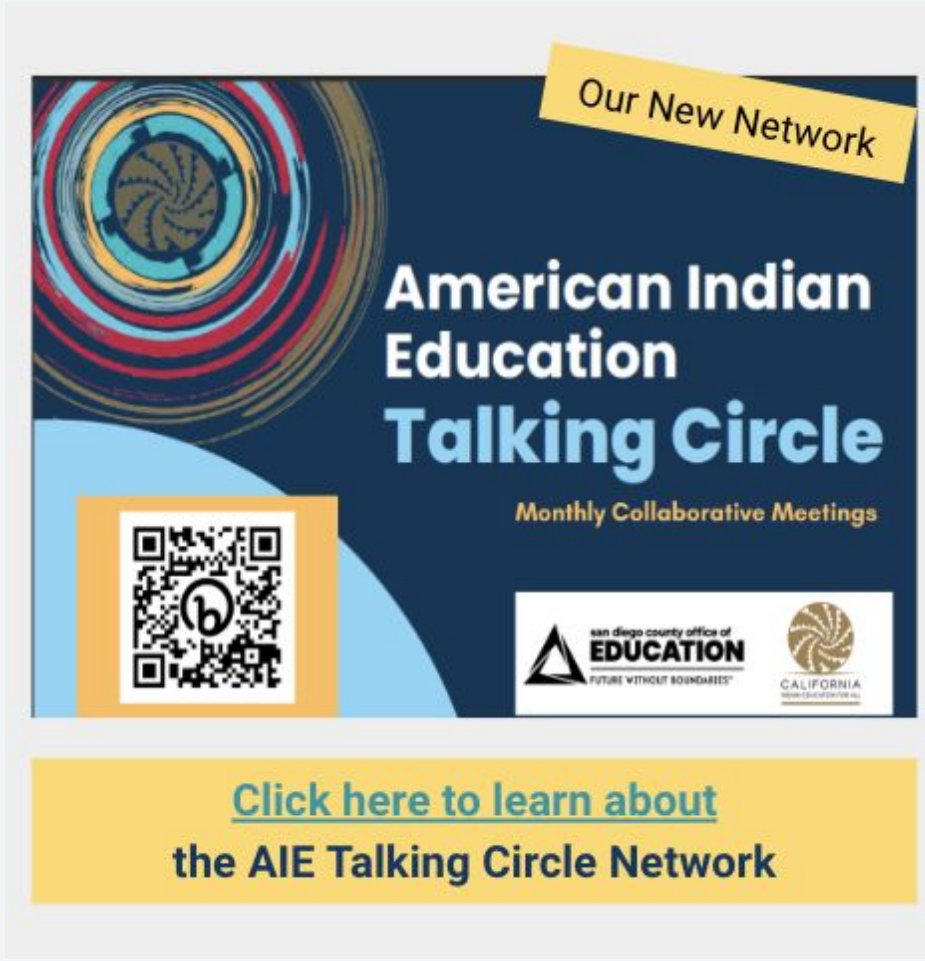
This is HOW we do Intervention: Meet students and families where they are and support, provide scaffolding, give resources to help them get to where they need and want to be.



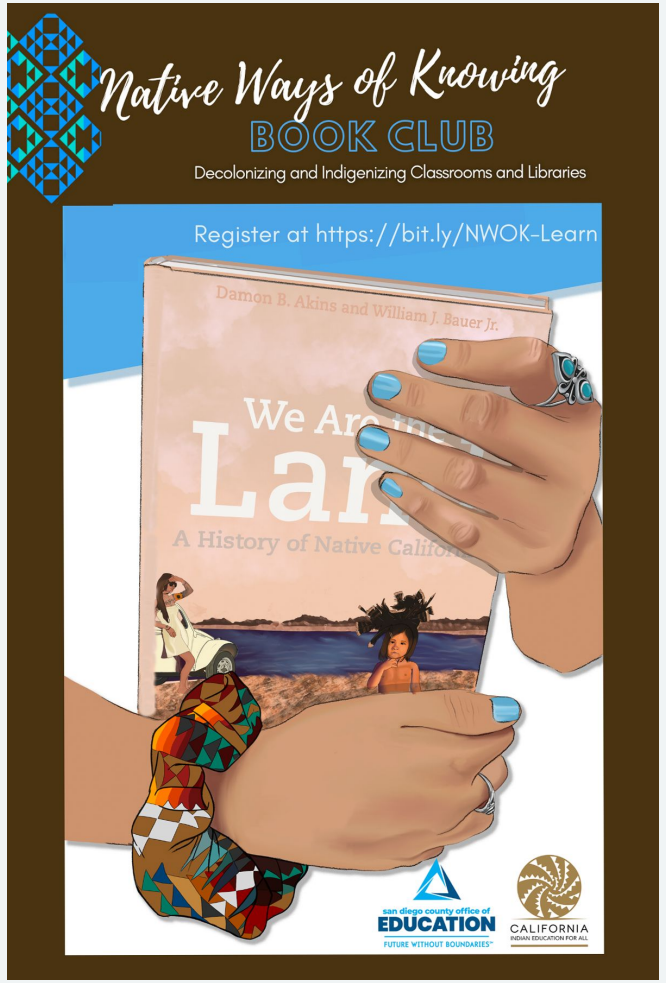
BUILDING COMMUNITY







2023-2024
California Indian Education for All
CALENDAR OF EVENTS
https://bit.ly/CIEFA-Cal



Native Ways of Knowing Webinars
Wednesdays / 3:30 - 5 pm
K-12 Educators & Administrators

COMMUNITY OUTREACH

Indian Education – Parent Committee

Without the assistance and dedication to our program and students, we would not be seeing growth and success. We appreciate our parents and volunteers who make this job easier. It truly takes a village and our Tribal leaders have supported us on this journey to educate not only our Native students, but the community they are among.

Santa Rosa City Schools Title VII Native American Indian Education
Needs Assessment

Santa Rosa City Schools needs your valuable input to further develop our Native American Indian Education program plan for the school year 2022/2023.
Per Title VII-Native American Indian, Native Hawaiian and Alaskan Native Education, of the Every Student Succeeds Act (ESSA), funds go directly to local programs to meet the unique academic and cultural needs of American Indian students. Part A, Subpart 1, of Title VII provides for Indian Education formula grant awards to assist school districts, Indian tribes, and other eligible agencies.

Funds may be used to:
- Identify Native American Indian students most at-risk in meeting the requirements of state standards
- Assess the needs of students and their families.
- Support research based, comprehensive educational programs to help reduce the educational barriers that result from different cultural and linguistic needs.
- Help Native American Indian students achieve the same standards as developed for other students.
- Design programs to facilitate students' successful transitions to post-secondary education and employment.

Distrito Escolar Santa Rosa City Schools Programa de Título VII para Educación Amerindia
Evaluación de Necesidades Educación Amerindia para el año escolar 2022/2023.

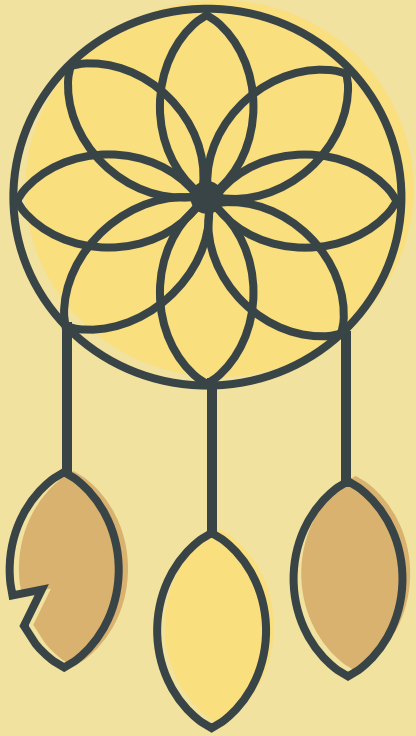
El distrito escolar Santa Rosa City Schools necesita recibir sus valiosos aportes para desarrollar nuestro programa de Educación Amerindia para el año escolar 2022/2023.

Según el programa Título VII para la Educación de amerindios, awaianos y nativos de Alaska, de la Ley Every Student Succeeds Act (ESSA), los fondos se gastan directamente en los programas locales para satisfacer las necesidades académicas y culturales únicas de los estudiantes amerindios. La Parte A, Subparte 1, del Título VII establece la fórmula de subvenciones para la Educación Indígena para ayudar a los distritos escolares, las tribus indígenas y otras agencias elegibles.

Los fondos se pueden utilizar para:
- Identificar a los estudiantes amerindios que corren mayor riesgo de no cumplir con los requisitos de los estándares estatales
- Evaluar las necesidades de los estudiantes y sus familias
- Apoyar programas educativos integrales basados en investigaciones para ayudar a reducir las barreras educativas que resultan de diferentes necesidades culturales y lingüísticas
- Ayudar a los estudiantes amerindios a lograr los mismos estándares implementados para otros estudiantes
- Diseñar programas para facilitar la transición exitosa de los estudiantes a la educación postsecundaria y empleo

En la medida de lo posible, tómese unos minutos para responder las siguientes preguntas.

2022/23 Parent Needs Assessment



Priorities

- Cultural Identity and Awareness
- Social Emotional Needs
  Necesidades socialemocionales
- Native American Indian Studies into Curriculum
- Career Readiness / Habilidades de preparacion para las carreras profesionales

Needs

- Mentoring / Programas de mentores
- Culturally-related Activities / Actividades culturales
- Tutoring / Tutorias
- Field Trips / Viajes de Estudios

Student Native Clubs

Family Fun Night

ACTIVITIES

Native American Clubs

Currently have 7 Native Clubs at

- *Piner High (12 students)*
- *Santa Rosa High (8 students)*
- *Elsie Allen High (10 students)*
- *Ridgway High (7 students)*
- *Montgomery High*
- *Santa Rosa Middle School*
  - *Partnering with Bree-Restorative*
- *Comstock Middle (8 students)*

In Process of developing Club at

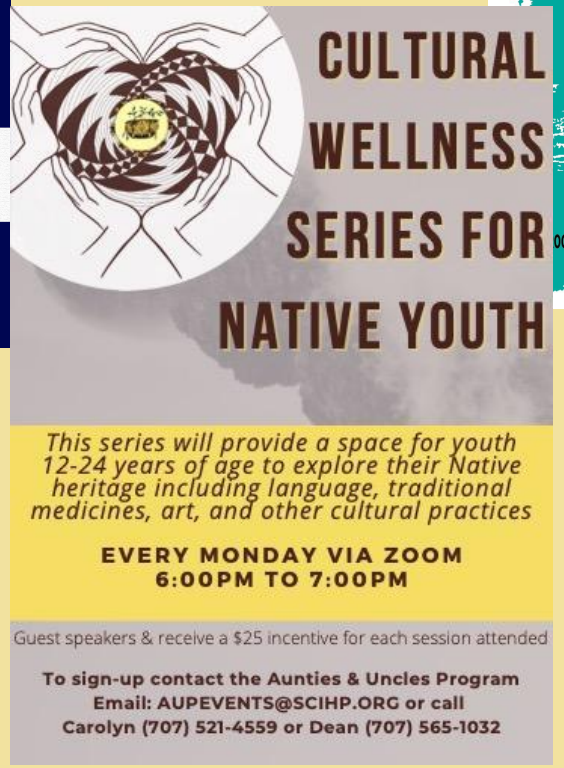
- *Maria Carrillo High*








Resources & Community Events



THANK *you*

SANTA ROSA CITY SCHOOLS

EMBRACE • ENGAGE • EMPOWER

Resolution No. 2023/24-17
Date: October 11, 2023

Resolution Recognizing the Week of the School Administrator October 8 through 14, 2023

WHEREAS, leadership matters for California's public education system and the students it serves; and

WHEREAS, the title "school administrator" is a broad term used to define many educational leadership posts, including principals, assistant/vice principals, special education, curriculum, school business officials, classified administrators, directors, coordinators, superintendents and associate/assistant superintendents, and other classified and certificated administrators; and

WHEREAS, school administrators are passionate, lifelong learners, many of whom began their careers as teachers, and who believe in the value of quality public education; and

WHEREAS, providing quality service for all students is paramount for the profession; and

WHEREAS, research shows that public school administrators in California have become increasingly effective in the improvement of student achievement; and

WHEREAS, school administrators ensure that effective and innovative classroom instruction and social emotional supports are provided for the students of California; and

WHEREAS, the future of California's public education system depends upon the quality of its leadership; and

WHEREAS, administrators at the school site and district level have served and will continue to serve in multiple capacities during the 2023/2024 school year, including but not limited to teaching in the classroom, supporting the front office, supervising at breaks and lunch, and proctoring State assessments; and

WHEREAS, the State of California has declared the second full week of October as the "Week of the School Administrator" in Education Code 44015.1; and

NOW THEREFORE, BE IT RESOLVED, that Santa Rosa City Schools recognizes administrators in the Santa Rosa City Schools District and commends their support of and contributions to a quality education.

PASSED AND ADOPTED this 11th day of October, 2023.

Ever Flores

Ever Flores, Clerk of the Board

October 11, 2023

Date

SANTA ROSA CITY SCHOOLS

EMBRACE • ENGAGE • EMPOWER

Resolution No. 2023/24-18
Date:October 11, 2023

Resolution Proclaiming October As LGBTQIA+ History Month

WHEREAS, Lesbian, Gay, Bisexual, Transgender, Queer/Questioning, Intersex, Asexual, plus all other identities not encompassed in the acronym (LGBTQIA+) History Month, founded in 1994 by Missouri high-school history teacher Rodney Wilson, is an annual month-long observance of lesbian, gay, bisexual and transgender history, and the history of the gay rights and related civil rights movements; and

WHEREAS, the month of October was selected to coincide with National Coming Out Day, October 11, which celebrates the anniversary of the first march on Washington for gay and lesbian rights in 1979; and

WHEREAS, the LGBTQIA+ History Month is meant to highlight and celebrate the history and achievements of lesbian, gay, bisexual and transgender people; and

WHEREAS, according to Gay & Lesbian Alliance Against Defamation ("GLAAD"), "during the early years, the celebration was largely marked by a call to action and commemoration ... but since then, LGBT History Month has blossomed into a national coordinated effort to highlight exemplary role models from the LGBT(QIA+) community"; and

WHEREAS, LGBTQIA+ History Month commemorates the impact that the LGBTQIA+ community has had on local, national, and international history; honors members of the LGBTQIA+ community who have been lost to hate crimes and HIV/AIDS; and

WHEREAS, LGBTQIA+ students experience high rates of bullying, victimization, and harassment at school on the basis of their actual or perceived sexual orientation or gender identity, or that of their associates; and

WHEREAS, this bullying, victimization, and harassment has led to negative educational outcomes for LGBTQIA+ students, including higher rates of dropping out, higher rates of absenteeism, and lower postsecondary school aspirations; and

WHEREAS, LGBTQIA+ students also report higher rates of anxiety and depression; and

WHEREAS, school-age years are a critical time for LGBTQIA+ youth as they often “come out” or disclose their LGBTQIA+ identities to others during that time; and

WHEREAS, creating a welcoming and safe school environment for our LGBTQIA+ students, staff, families, and caregivers makes our school community more welcoming and safe to all; and

WHEREAS, the District supports education that celebrates our different identities; integrity in how we treat others; and courage to do what's right by listening to, learning from, and respecting diverse viewpoints; and

WHEREAS, there are many reasons why LGBTQIA+ History Month is important, including the following reasons: to remember those across the world who live without rights; to learn about historic LGBTQIA+ figures and events; to remember how far we have come in the fight for equality; to teach LGBTQIA+ youth about the generosity and resiliency of the LGBTQIA+ community, as well as the ability to stand up and achieve what they believe in; and

WHEREAS, during the last decade, our country has made tremendous strides in the LGBTQIA+ equality movement, including legalizing gay marriage nationwide, electing LGBTQIA+ elected officials on local, state, and federal levels; and

WHEREAS, celebrating LGBTQIA+ History Month is particularly important now as the LGBTQIA+ community is once again being targeted by a slew of homophobic and transphobic bills introduced and adopted across the country; and

WHEREAS, this year we must reflect not only on the progress that has been made in the national and global effort to advance human rights, but also on the specific challenges that remain for members of LGBTQIA+ communities in the U.S. and around the world; and

WHEREAS, Santa Rosa City Schools is committed to recognizing and honoring the LGBTQIA+ community, including supporting and encouraging a dialogue that promotes equality, dignity, and human rights for all; and

NOW THEREFORE, BE IT RESOLVED, the Governing Board of the Santa Rosa City Schools District hereby designates the month of October 2023, as LGBTQIA+ History Month.

PASSED AND ADOPTED by the Governing Board of the Santa Rosa City Schools District on the 11th day of October, 2023.

Ever Flores

Ever Flores, Clerk

October 11, 2023

Date

SANTA ROSA CITY SCHOOLS

EMBRACE • ENGAGE • EMPOWER

Resolution 2023/24-22
Date: October 11, 2023

Resolution Recognizing October 2023 as Filipino American History Month

WHEREAS, Santa Rosa City Schools supports diversity and inclusion in education for K-12 public schools; and

WHEREAS, it is necessary to instill in our youth the importance of education, history, and self-determination in creating eminent role models, in establishing a proud cultural identity, and producing exceptional citizens of this nation; and

WHEREAS, today, the Filipino American community is the second largest Asian American group in the United States, with an estimated population of 4,200,000 people, third largest Asian American group in California with the earliest documented evidence of Filipinos in the continental United States; and

WHEREAS, Filipino American History Month began in 1992, done in recognition of the contribution, culture and heritage that Filipino Americans brought to the United States from the Philippines when they arrived in October of 1587; and

WHEREAS, every October, many communities throughout the United States and its territories have celebrated this occasion, not only to commemorate the anniversary of the presence of the first Filipinos on US soil and to observe its heritage, but also to recognize the social, intellectual, and economic contributions of Filipinos and Filipino Americans in this country; and

WHEREAS, Filipino Americans, including the leadership of Larry Itliong (born October 25, 1913), who co-established the United Farm Workers (UFW), and Philip Vera Cruz (born December 25, 1905), who served as the second vice-president of the UFW, and were both active participants in the Delano Farmworkers Grape Strike and boycott in 1965, advocated for social justice in California and nationally in partnership with Hispanic/Latinx, Black/African American, Arab, and other Asian Americans; and

WHEREAS, efforts must continue to promote the study of Filipino American history and culture, so mandated in the mission statement of the Filipino American National Historical Society, because the role of Filipino Americans and those of other people of color have been overlooked in the writings, teachings and learning of United States history; and

WHEREAS, it is imperative for Filipino American youths to have positive role models and to instill in them the importance of education, complemented with the richness of their ethnicity and the values of their legacy; and

WHEREAS, California is home to over half of the Filipino population in the USA and the location of historic Filipino communities such as in Los Angeles, San Francisco, Stockton, Vallejo, Delano, San Diego

and Salinas among others; and

NOW THEREFORE, BE IT RESOLVED that Santa Rosa City Schools recognize October 2023 as Filipino American History Month.

PASSED AND ADOPTED by the following vote of the Governing Board of Santa Rosa City Schools, County of Sonoma, State of California on October 11, 2023.

Ever Flores

October 11, 2023

Ever Flores, Clerk of the Board

Date

Policy 6174: Education For English Learners

Status: PENDING

Original Adopted Date: 11/13/2019 | Last Revised Date: 10/6/2023

The Governing Board intends to provide English learners with challenging curriculum and instruction that maximize the attainment of high levels of proficiency in English, advance multilingual capabilities, and facilitate student achievement in the district's regular course of study.

English learners shall be provided differentiated English language development instruction which is targeted to their English proficiency level. Such instruction shall be based on sound instructional theory, be aligned with state content standards, emphasize inquiry-based learning and critical thinking skills, and be integrated across all subject areas.

No middle or high school student who is an English learner shall be denied enrollment in any of the following: (Education Code 60811.8)

1. Courses in the core curriculum areas of reading/language arts, mathematics, science, and history/social science, courses required to meet state and local high school graduation requirements, or courses required for middle school grade promotion

   However, an English learner who has been enrolled in a school in the United States for less than 12 months or is enrolled in a program designed to develop the basic English skills of newly arrived immigrant students may be denied participation in any such course, if the course of study provided to the student is designed to remedy academic deficits incurred during participation and reasonably calculated to enable the student to attain parity of participation in the standard instructional program within a reasonable length of time after the student enters the school system.

2. A full course load of courses specified in Item #1 above

3. Other courses that meet the "A-G" course requirements for college admission or are advanced courses such as honors or Advanced Placement courses, on the sole basis of the student's classification as an English learner

The district shall identify in its local control and accountability plan (LCAP) goals and specific actions and services to enhance student engagement, academic achievement, and other outcomes for English learners.

The Superintendent or designee shall encourage parent/guardian and community involvement in the development and evaluation of programs for English learners. The Superintendent or designee may also provide an English development literacy training program for parents/guardians and community members so that they may better support students' English language development.

Staff Qualifications and Training

The Superintendent or designee shall ensure that all staff employed to teach English learners possess the appropriate authorization from the Commission on Teacher Credentialing.

The district shall provide effective professional development to teachers (including teachers in classroom settings that are not the settings of language instruction educational programs), administrators, and other school or community-based organization personnel to improve the instruction and assessment of English learners and enhance staff's ability to understand and use curricula, assessment, and instructional strategies for English learners. Such professional

development shall be of sufficient intensity and duration to produce a positive and lasting impact on teachers' performance in the classroom. (20 USC 6825)

Staff development shall also address the sociocultural needs of English learners and provide opportunities for teachers to engage in supportive, collaborative learning communities.

Identification and Assessment

The Superintendent or designee shall maintain procedures for the early identification of English learners and an assessment of their proficiency using the English Language Proficiency Assessments for California (ELPAC). To oversee test administration, the Superintendent or designee shall annually designate a district ELPAC coordinator and a site coordinator for each test site in accordance with 5 CCR 11518.40-11518.45.

Once identified as an English learner, a student shall be annually assessed for language proficiency until the student is reclassified based on criteria specified in the accompanying administrative regulation.

In addition, English learners' academic achievement in English language arts, mathematics, science, and any additional subject required by law shall be assessed using the California Assessment of Student Performance and Progress. As necessary, the test shall be administered with testing variations in accordance with 5 CCR 853. English learners who are in their first 12 months of attending a school in the United States shall be exempted from taking the English language arts assessment to the extent allowed by federal law. (Education Code 60603, 60640; 5 CCR 853)

Formative assessments may be utilized to analyze student performance and appropriately adapt teaching methodologies and instructions.

Language Acquisition Programs

The district shall offer research-based language acquisition programs that are designed to ensure English acquisition as rapidly and as effectively as possible and that provide instruction to students on the state-adopted academic content standards, including the English language development standards. (Education Code 306; 5 CCR 11300)

At a minimum, the district shall offer a structured English immersion program which includes designated and integrated English language development. In the structured English immersion program, nearly all of the classroom instruction shall be provided in English, but with the curriculum and presentation designed for students who are learning English. (Education Code 305-306; 5 CCR 11309)

For the purpose of determining the amount of instruction to be conducted in English in the structured English immersion program, "nearly all" means that all classroom instruction shall be conducted in English except for clarification, explanation, and support as needed.

In addition, language acquisition programs offered by the district may include, but are not limited to, the following: (Education Code 305-306)

1. A dual-language immersion program that provides integrated language learning and academic instruction for native speakers of English and native speakers of another language, with the goals of high academic achievement, first and second language proficiency, and cross-cultural understanding

2. A transitional or developmental program for English learners that provides literacy and academic instruction in English and a student's native language and that enables an English learner to achieve English proficiency and academic mastery of subject matter content and

higher order thinking skills, including critical thinking, in order to meet state academic content standards

The district's language acquisition programs for grades K-3 shall comply with class size requirements specified in Education Code 42238.02. (Education Code 310)

In establishing the district's language acquisition programs, the Superintendent or designee shall consult with parents/guardians and the community during the LCAP development process. The Superintendent or designee shall also consult with administrators, teachers, and other personnel with appropriate authorizations and experience in establishing a language acquisition program. (Education Code 305)

At the beginning of each school year or upon a student's enrollment, parents/guardians shall be provided information on the types of language acquisition programs available to students enrolled in the district, including, but not limited to, a description of each program, the process to be followed in making a program selection, identification of any language to be taught in addition to English when the program includes instruction in another language, and the process to request establishment of a language acquisition program. (Education Code 310; 5 CCR 11310)

Whenever a student is identified as an English learner based on the results of the ELPAC, the student's parents/guardians may choose a language acquisition program that best suits their child. To the extent possible, any language acquisition program requested by the parents/guardians of 30 or more students at the school or by the parents/guardians of 20 or more students at any grade level shall be offered by the school. (Education Code 310; 5 CCR 11311)

Until July 1, 2029, the Superintendent or designee may, with Board approval, and as specified in BP 5117 - Interdistrict Attendance, enter into an instruction collaboration agreement (ICA) with another school district, county office of education, or charter school to offer the same or similar courses and coursework to students who have been impacted by teacher shortages, disruptions, or cancellations, or teacher shortages to dual language immersion programs. (Education Code 48345)

Reclassification

When an English learner is determined based on state and district reclassification criteria to have acquired a reasonable level of English proficiency pursuant to Education Code 313 and 52164.6, or upon request by the student's parent/guardian, the student shall be transferred from a language acquisition program into an English language mainstream classroom.

Program Evaluation

To evaluate the effectiveness of the district's educational program for English learners, the Superintendent or designee shall report to the Board, at least annually, regarding:

1. Progress of English learners towards proficiency in English

2. The number and percentage of English learners reclassified as fluent English proficient

3. The number and percentage of English learners who are or are at risk of being classified as long-term English learners in accordance with Education Code 313.1

4. The achievement of English learners on standards-based tests in core curricular areas

5. For any language acquisition program that includes instruction in a language other than English, student achievement in the non-English language in accordance with 5 CCR 11309

6. Progress toward any other goals for English learners identified in the district's LCAP

7. A comparison of current data with data from at least the previous year in regard to Items #1-6 above

8. A comparison of data between the different language acquisition programs offered by the district

The Superintendent or designee shall also provide the Board with regular reports from any district or schoolwide English learner advisory committees.

Policy Reference Disclaimer:
These references are not intended to be part of the policy itself, nor do they indicate the basis or authority for the board to enact this policy. Instead, they are provided as additional resources for those interested in the subject matter of the policy.

State	Description
5 CCR 11300-11316	English learner education
5 CCR 11510-11517.5	California English Language Development Test
5 CCR 11517.6-11519.5	English Language Proficiency Assessments for California
5 CCR 853	Administration of CAASPP
5 CCR 854.9	CAASPP and unlisted resources for students with disabilities
Ed. Code 200	Prohibition of discrimination
Ed. Code 300-340	English language education for immigrant children
Ed. Code 310	Language acquisition programs
Ed. Code 313-313.5	Assessment of English proficiency
Ed. Code 33050	Nonwaivable provisions
Ed. Code 42238.02	Local Control Funding Formula
Ed. Code 430-446	English Learner and Immigrant Pupil Federal Conformity Act
Ed. Code 44253.1-44253.11	Qualifications of teachers of English learners
Ed. Code 48345	Interdistrict instruction collaboration agreements
Ed. Code 48980	Parent/Guardian notifications
Ed. Code 48985	Notices to parents in language other than English
Ed. Code 52052	Accountability; numerically significant student subgroups
Ed. Code 52060-52077	Local control and accountability plan
Ed. Code 52160-52178	Bilingual Bicultural Act of 1976
Ed. Code 56305	CDE manual on English learners with disabilities
Ed. Code 60603	Definition; recently arrived English learner
Ed. Code 60640	California Assessment of Student Performance and Progress
Ed. Code 62002.5	Continuation of advisory committee after program sunsets

Federal	Description
20 USC 1412	State eligibility
20 USC 1701-1721	Equal Educational Opportunities Act
20 USC 6311	State plan
20 USC 6312	Local educational agency plan
20 USC 6801-7014	Limited English proficient and immigrant students
20 USC 7801	Definition of English learner

34 CFR 100.3	Prohibition of discrimination on basis of race, color or national origin
Management Resources	**Description**
Attorney General Opinion	83 Ops.Cal.Atty.Gen. 40 (2000)
California Department of Education Publication	Summative English Language Proficiency Assessments for California, Assessment Fact Sheet, July 2023
California Department of Education Publication	Englisher Learner, Federal Program Monitoring Instrument
California Department of Education Publication	Monitoring Reclassified Students, December 2019
California Department of Education Publication	California Practitioners' Guide for Educating English Learners with Disabilities, 2019
California Department of Education Publication	English Language Proficiency Assessments for California Information Guide, July 2023
California Department of Education Publication	California Digital Learning Integration and Standards Guidance, May 2021
California Department of Education Publication	Reclassification Guidance for 2020-21 and Statewide Testing Window Extension, CDE Correspondence, June 14, 2021
California Department of Education Publication	Integrating the CA ELD Standards into K-12 Mathematics and Science Teaching and Learning, December 2015
California Department of Education Publication	Accessibility Resources Matrix, 2022
California Department of Education Publication	Next Generation Science Standards for California Public Schools, Kindergarten through Grade Twelve, rev. March 2015
California Department of Education Publication	English Language Development Standards for California Public Schools: Kindergarten Through Grade Twelve, 2012
California Department of Education Publication	California English Learner Roadmap: Strengthening Comprehensive Educational Policies, Programs and Practices for English Learners, 2017
California Department of Education Publication	Common Core State Standards for Mathematics, 2013
California Department of Education Publication	English Language Arts/English Language Development Framework for California Public Schools: Kindergarten through Grade Twelve, 2014
Commission on Teacher Credentialing Publication	Bilingual Authorization Educator Preparation Preconditions, Program Standards, and Bilingual Teaching Performance Expectations, December 2021
Court Decision	Valeria O. v. Davis (2002) 307 F.3d 1036
Court Decision	California Teachers Association v. State Board of Education et al. (9th Circuit, 2001) 271 F.3d 1141
Court Decision	McLaughlin v. State Board of Education (1999) 75 Cal.App.4th 196
Court Decision	Teresa P. et al v. Berkeley Unified School District et al (1989) 724 F.Supp. 698
CSBA Publication	English Learners in Focus, Issue 3: Ensuring High-Quality Staff for English Learners, Governance Brief, July 2016

CSBA Publication	English Learners in Focus, Issue 4: Expanding Bilingual Education in California after Proposition 58, Governance Brief, March 2017
CSBA Publication	English Learners in Focus: The English Learner Roadmap: Providing Direction for English Learner Success, Governance Brief, February 2018
CSBA Publication	English Learners in Focus, Issue 1: Updated Demographic and Achievement Profile of California's English Learners, Governance Brief, September 2016
CSBA Publication	English Learners in Focus, Issue 2: The Promise of Two-Way Immersion Programs, Governance Brief, September 2014
The Education Trust- West Publication	Unlocking Learning: Science as a Lever for English Learner Equity, January 2017
The Education Trust- West Publication	Unlocking Learning II: Math as a Lever for English Learner Equity, March 2018
U.S. Department of Education Publication	English Learners and Title III of the Elementary and Secondary Education Act (ESEA), as Amended by the Every Student Succeeds Act (ESSA), September 2016
U.S. Department of Education Publication	English Learner Tool Kit for State and Local Educational Agencies (SEAs and LEAs), rev. November 2016
U.S. Department of Education Publication	Innovative Solutions for Including Recently Arrived English Learners in State Accountability Systems: A Guide for States, January 2017
U.S. Department of Education Publication	Dear Colleague Letter: English Learner Students and Limited English Proficient Parents, January 7, 2015
Website	California Department of Education, English Language Proficiency Assessments for California (ELPAC)
Website	California Digital Learning Integration and Standards Guidance
Website	CSBA District and County Office of Education Legal Services
Website	National Clearinghouse for English Language Acquisition
Website	The Education Trust-West
Website	California Department of Education, English Learners
Website	California Association for Bilingual Education
Website	CSBA
Website	U.S. Department of Education

Cross References

Code	Description
0200	Goals For The School District
0415	Equity
0420	School Plans/Site Councils
0420	School Plans/Site Councils
0460	Local Control And Accountability Plan
0460	Local Control And Accountability Plan
0470	COVID-19 Mitigation Plan
1220	Citizen Advisory Committees
1220	Citizen Advisory Committees
3100	Budget

3100	Budget
4112.22	Staff Teaching English Learners
4131	Staff Development
4231	Staff Development
4331	Staff Development
5020	Parent Rights And Responsibilities
5020	Parent Rights And Responsibilities
5126	Awards For Achievement
5126	Awards For Achievement
5148	Child Care And Development
5148	Child Care And Development
5148.3	Preschool/Early Childhood Education
5148.3	Preschool/Early Childhood Education
6000	Concepts And Roles
6011	Academic Standards
6020	Parent Involvement
6020	Parent Involvement
6120	Response To Instruction And Intervention
6141	Curriculum Development And Evaluation
6141	Curriculum Development And Evaluation
6142.1	Sexual Health And HIV/AIDS Prevention Instruction
6142.1	Sexual Health And HIV/AIDS Prevention Instruction
6142.2	World Language Instruction
6142.2	World Language Instruction
6142.91	Reading/Language Arts Instruction
6151	Class Size
6152.1	Placement In Mathematics Courses
6152.1	Placement In Mathematics Courses
6159	Individualized Education Program
6159	Individualized Education Program
6161.1	Selection And Evaluation Of Instructional Materials
6161.1	Selection And Evaluation Of Instructional Materials
6161.1-E(1)	Selection And Evaluation Of Instructional Materials
6161.11	Supplementary Instructional Materials
6162.5	Student Assessment
6162.51	State Academic Achievement Tests
6162.51	State Academic Achievement Tests
6164.5	Student Success Teams
6164.5	Student Success Teams
6164.6	Identification And Education Under Section 504
6164.6	Identification And Education Under Section 504
6170.1	Transitional Kindergarten
6171	Title I Programs
6171	Title I Programs
6172	Gifted And Talented Student Program
6172	Gifted And Talented Student Program
6173	Education For Homeless Children
6173	Education For Homeless Children
6173-E(1)	Education For Homeless Children
6173-E(2)	Education For Homeless Children
6173.1	Education For Foster Youth

6173.1	Education For Foster Youth
6173.2	Education Of Children Of Military Families
6173.2	Education Of Children Of Military Families
6175	Migrant Education Program
6175	Migrant Education Program
6190	Evaluation Of The Instructional Program

Facilities Master Plan Update

October 11, 2023

QUATTROCCHI KWOK
ARCHITECTS

FACILITIES MASTER PLAN SCHEDULE

SPRING 2023	
Information gathering	Site Committee Input on Needs Update Educational Facilities Guidelines Capacity Analysis
SUMMER 2023	
Planning and Design	Analyze input and information Develop Draft Site Master Plans Develop preliminary Project Lists
FALL 2023	
Review and Finalize	Site Committe input on Draft Plan, Projects and Prioritzation Board of Education Review and Input Community Forum Presentations Development of Final FMP Documents
COMPLETION: NOVEMBER 2023	

Tasks Completed

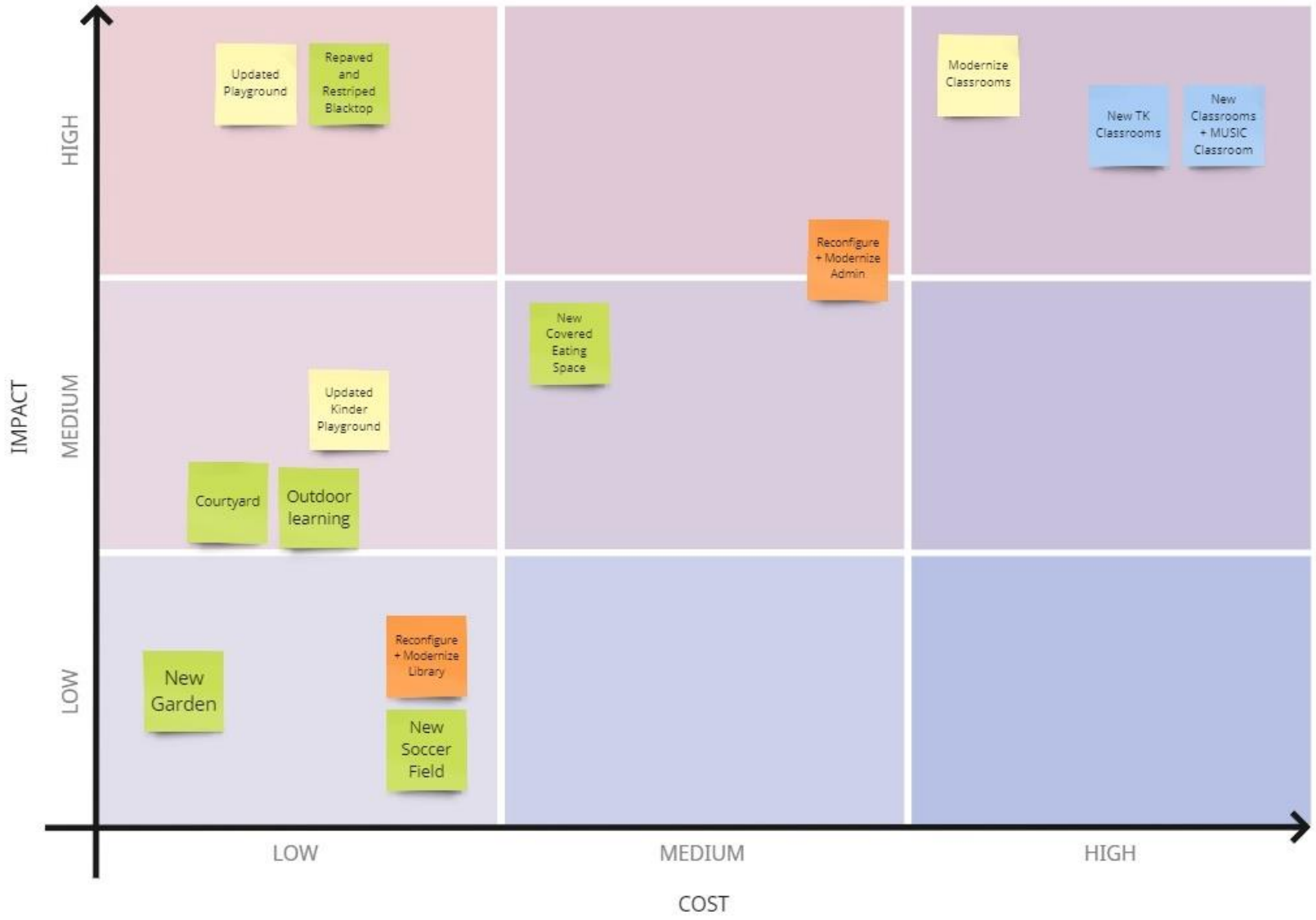
- Completed Site Committee Meetings #2 at every school site
- Security and Threat Assessment Completed for all school sites by Guidepost Solutions
- School Site Capacity Analysis updated and finalized

Work Currently Underway

- Finalizing school site Master Plans based on input from Fall Site Committee Meetings
- Developing project lists and descriptions for each site
- Cost Estimating of proposed projects
- Updating of Indicators of Quality rubric and scoring each project
- Preparing for Community Meetings

Site Committee Priorities

- Completed project prioritization exercise with each Site Committee
- Assessed each major project on its impact on education for students and staff



Site Committee Priorities Elementary Schools

- Security Fencing and access control
- Modernize existing permanent buildings
- Expand Administration to provide space for support staff
- New TK and Kinder Classrooms
- Replace portable classrooms
- Renovate Playgrounds and fields
- Provide covered eating areas for students

Site Committee Priorities Middle Schools

- Security Fencing and access control
- Modernize existing permanent buildings
- Expand Administration to provide space for support staff
- Remove portable classrooms
- Provide covered eating areas for students

Site Committee Priorities High Schools

- Security Fencing and access control
- Modernize existing permanent buildings
- Expand Administration to provide space for support staff
- Remove portable classrooms
- Provide covered eating areas and improved quad/courtyards for students
- Renovate existing spaces to support CTE and other specialized programs

Indicators of Quality

- Process to assess the impact of each proposed project on education
- Rubric applied equitably to all projects across the District
- Scoring developed to reflect priorities heard from all stakeholders

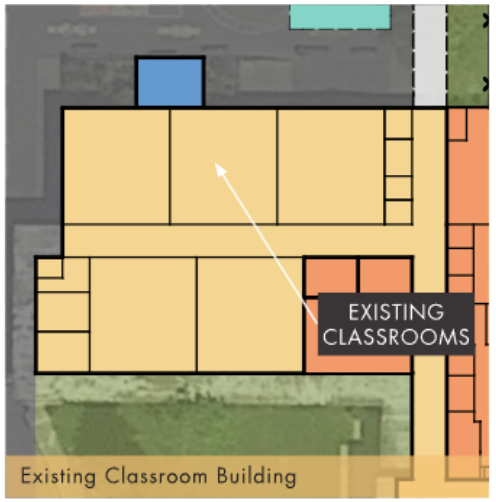
JAMES MONROE ELEMENTARY SCHOOL

MODERNIZATION OF EXISTING CLASSROOMS $10,031,055

INDICATORS OF QUALITY	
Ed. Programs	14
Community	2
Learning Env.	14
Maintenance	27
Safety and Security	6
Code Comp.	4
Total	67/120

Modernize existing classroom buildings including existing restrooms. Modernization of each space may include:

- Repair or replace existing wall, floor and hardware finishes
- Flexible furniture including movable worktables
- Storage cabinetry for projects and materials
- 1 sink with a drinking fountain bubbler
- Replace damaged acoustical ceiling tiles and casework
- Replace HVAC systems
- Repair or replace roofing and plumbing systems as necessary
- Modernize existing restrooms



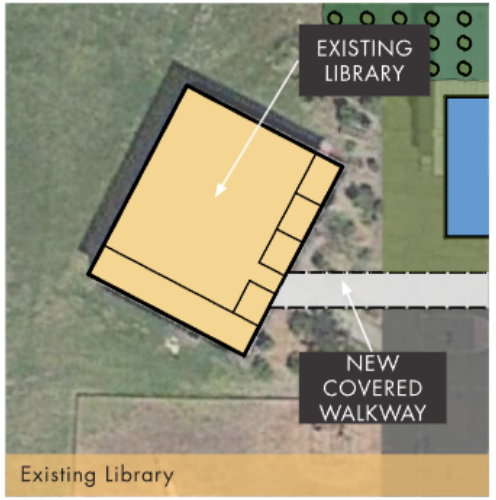
Existing Classroom Building

MODERNIZATION OF EXISTING LIBRARY $1,366,916

INDICATORS OF QUALITY	
Ed. Programs	12
Community	2
Learning Env.	14
Maintenance	12
Safety and Security	3
Code Comp.	5
Total	48/120

Modernize existing library. Modernization of the library may include:

- Repurpose and reconfigure existing Computer Lab area
- Repair or replace existing wall, floor and hardware finishes
- Flexible furniture including movable worktables
- Efficient storage stacks for books
- Security locks
- Replace damaged acoustical ceiling tiles and casework
- Replace HVAC systems
- Repair or replace roofing and plumbing systems as necessary
- Provide new covered walkway



Existing Library

SANTA ROSA CITY SCHOOLS FACILITIES MASTER PLAN JMES - 10

Indicators of Quality

- Updated rubric to reflect 2023 Priorities
  - Increased weight to Learning Environment Quality
  - Decreased weight to Maintenance and Operations
- Will be applied to all projects to help guide decisions on project prioritization

	IoQ 1	IoQ 2	IoQ 3	IoQ 4	IoQ 5	IoQ 6	
	Educational Programs	Community Benefit	Learning Environment Quality	Maintenance and Operations	Safety and Security	Code Compliance	Total
Max Score	10	10	10	10	10	10	
Weight	2	1	3	2	3	1	
Total	20	10	20	30	30	10	120

FMP Next Steps

- Complete Cost Estimating and Indicators of Quality scoring for all projects
- Hold 5 Community Meetings across the District
- Compile information and feedback into Draft FMP Document
- Present Draft FMP to Board at November 8th Meeting
- Develop Measure C and G Implementation Plan
- Present Final FMP and Measure C and G Implementation Plan to Board for Approval at December 13th Board Meeting
- Begin work on Measure C and G projects!

Community Meetings

Agenda

- Overview of FMP Process
- Next Steps for FMP and Measure C and G Projects
- Overview of FMP for selected Schools

Features

- Open to all
- Live digital polling to collect feedback
- Spanish translation
- Child Care and snacks

Community Meetings

Maria Carillo HS	Santa Rosa HS	Montgomery HS	Piner HS	Elsie Allen HS
Maria Carillo HS	Santa Rosa HS	Montgomery HS	Piner HS	Elsie Allen HS
Rincon Valley MS	Santa Rosa MS	Herbert Slater MS	Hillard Comstock MS	Cesar Chavez Language Academy
SR Accelerated Charter	Luther Burbank ES	Brook Hill ES	James Monroe ES	Abraham Lincoln ES
Hidden Valley ES	SR Charter for the Arts	SR French American Charter	Helen Lehman ES	
Proctor Terrace ES	Ridgway HS		Albert Biella ES	
	Steele Lane ES			
	Lewis Early Learning Academy			

Oct. 30 – Nov. 9

Specific dates for each site to be confirmed

Thank you!

Quattrocchi Kwok Architects | (707) 576-0829 | (Email)

QUATTROCCHI KWOK
ARCHITECTS

West County Transportation Agency Update

By: Chad Barksdale

October 11, 2023

For: Santa Rosa City Schools

Summer School/ESY Routes 2023

- 78 Routes, (57 SPED, 16 Gen Ed, 5 Field Trips)
- 625 SPED students for 2023 ESY, (record high SPED student count)
- 2022 ESY was 511 students and 78 bus routes.

Special thanks Michael Reimer for his efforts in making the ESY programming successful and gratitude to SRCS Staff for their support, communication, and flexibility.

Routes and Staffing

	2023 - 2024		2022 - 2023	
RT Type	**# Routes**	**Uncovered**	**# Routes**	**Uncovered**
SPED Ambulatory	47	10	46	12
SPED W/C	12	4	13	2
SPED Van	20	0	18	0
Gen Ed	33	2	33	5
Total RT	*112*	*16*	*110*	*19*
Standby Driver	*20*	*3*	*20*	*7*
Total Et al.	*132*	*19*	*130*	*26*

	# Routes	**Uncovered**
Net Change From 2022-23	2	-7

Staffing Continued

- 11 Driver Trainees
  - 2 Bus Aides Upgrading to Bus Driver
  - 5 Bus Driver Trainees (Driving Vans/White Buses)
  - 4 Bus Driver Trainees in original classroom training
    - Will be driving Vans/White Buses at completion of classroom training
- 2 Retiree Bus Driver Substitutes

Recruitment

We continue to pursue recruitment of bus drivers through all of the normal activities, but we have seen positive gains above the retirements and natural attrition of employees.

- Increased monetary hiring incentives
- Developed creative “paid” training options
- Year-round training classes
- Offer 10, 11, and 12 month positions
- Modified and improved salary schedule

Actions to Mitigate Driver Shortages

- Uncovered routes will be driven by our standby drivers, subs, and licensed staff members from our Operation Offices
- Reduced time window of availability for field/activity trips
    - Decreases options to schools needing field/activity trips during normal route times
- Contract services for Transition Students
- Transport capable students in 10 passenger vans
- Continued recommendation of bell time changes within the JPA membership
    - Reduce Routes & Offset Driver Shortages
    - Cost Savings
    - Retention
    - Improve Service

Special needs routes change frequently at the start of the year and will likely result in more efficiencies and help reduce ride times for most students as changes occur.

Requests for Assistance and/or Membership Due To Lack of Drivers

- Alexander Valley USD
- St. Helena & Calistoga USD
- Cloverdale USD
- Monte Rio Union
- Napa County Office of Education
- Rincon Valley USD
- Sonoma Academy
- Old Adobe
- Horicon
- Fort Ross

Ridership

- Special Needs
  - 764 School Year 2021-22 and 75 Routes (Post Pandemic, started year at 650)
    - 454 SRCS (started year at 420)
  - 926 – School Year 2022-23 and 77 Routes (started year at 835 students)
    - 535 SRCS (started year at 485)
  - 881 – School Year 2023-24 and 79 Routes (likely to increase 100+ students)
    - 502 SRCS (likely to increase by approximately 50 by end-of-year)
- General Education
  - Currently 739 student have been issued bus passes
  - 2021 – 2022 ridership count was 1,100 students at all schools (post Pandemic)
    - 665 issued bus passes

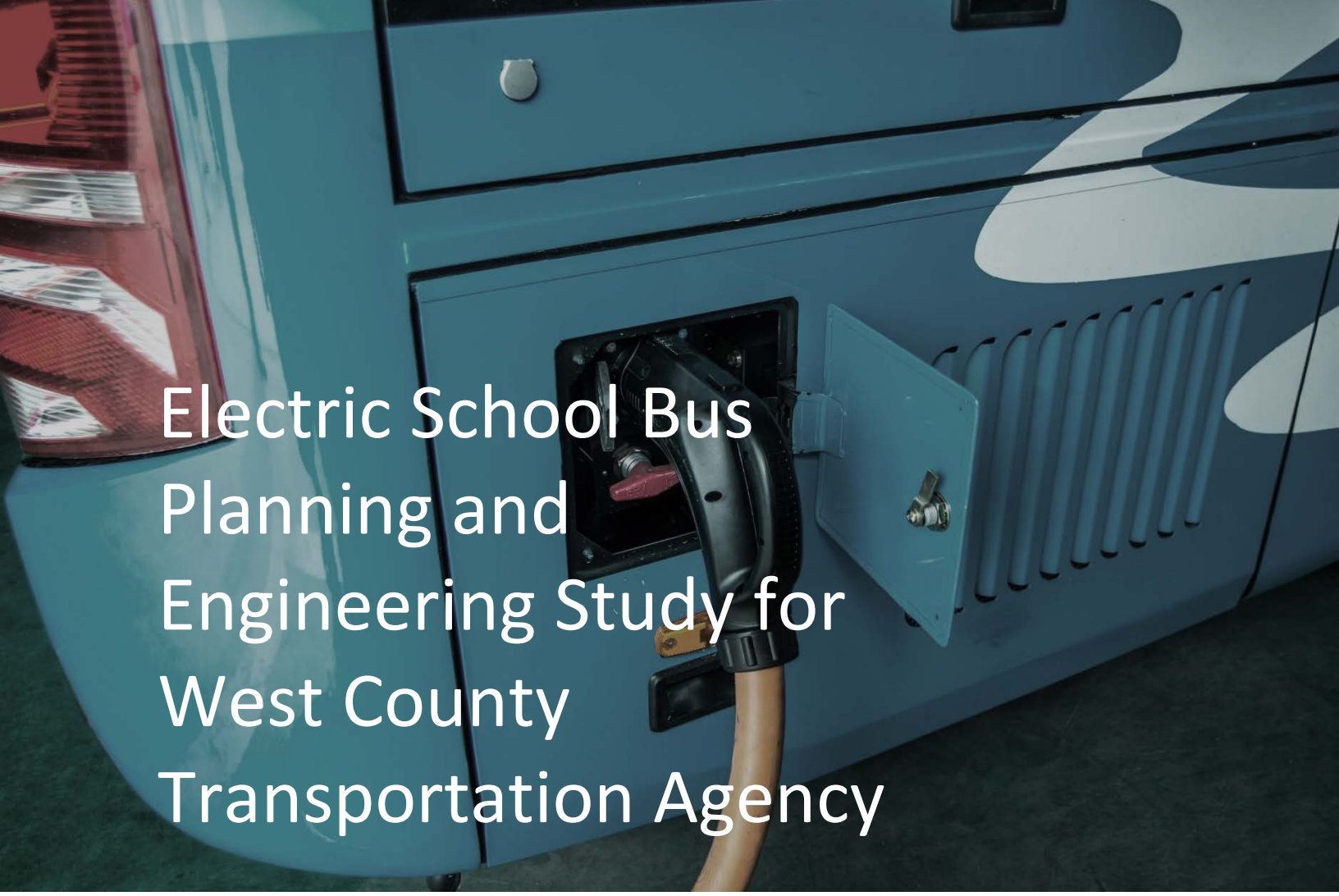
Routing Challenges

- Overwhelming number of schools that start at the same time, or near the same time
  - AM Bell Time
    - 18 schools starting between 8:00 – 8:10
    - 52 schools starting between 8:15 – 8:30
    - 14 schools starting between 8:35 – 9:00
  - PM Bell Time
    - 9 school ending between 2:00 – 2:15
    - 50 schools ending between 2:20-2:30
    - 17 schools ending between 3:10 – 3:40
- Changes to the secondary level bell times last year and this year due to legal requirements
  - Increased routes
- No changes to the elementary bell schedules
  - Increased routes

The changes or lack of changes in bells times reduced our ability to obtain multiple tiered runs (more buses to transport fewer students) and caused an increase routes in 2022-2023.

www.schoolbusing.org

Questions?



Electric School Bus Planning and Engineering Study for West County Transportation Agency

SPONSORED BY SONOMA CLEAN POWER

November 18, 2020

Prepared for:

West County Transportation Agency

367 W. Robles Ave

Santa Rosa, CA 95407

Prepared by:

The Cadmus Group

Table of Contents

Tables

Figures

Acronyms and Abbreviations

Acronym	Definition
AB	Assembly Bill
BEB	Battery electric school bus
BEV rate	Business electric vehicle rate
BUILD	Better Utilizing Investments to Leverage Development Discretionary Grant program
CARB	California Air Resources Board
CEC	California Energy Commission
CNG	Compressed natural gas
DER	Distributed energy resource
US EPA	United States Environmental Protection Agency
EV	Electric vehicle
EVSE	Electric vehicle supply equipment
HVIP	Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project program
LCFS	Low Carbon Fuel Standard
NEM	Net Metering program
OCPP	Open Charge Point Protocol
OpenADR	Open Automated Demand Response
PACE	Property Assessed Clean Energy program
PG&E	Pacific Gas and Electric Company
PV	Photovoltaic
SCE	Southern California Edison
SCP	Sonoma Clean Power
SDG&E	San Diego Gas & Electric
SGIP	Self-Generation Incentive program
STEP	Sustainable Transportation Equity Project
TOU	Time-of-use
USDOT	United States Department of Transportation
WCTA	West County Transportation Agency

Executive Summary

Background

Sonoma Clean Power (SCP) sponsored this school bus electrification study for the West County Transit Agency (WCTA), which serves 17 school districts in SCP territory. To conduct the study, SCP selected the Cadmus Group, LLC (Cadmus), an energy and environmental consulting firm with extensive transportation electrification experience. The scope involved assessment of site suitability for electric vehicle (EV) charging, solar photovoltaic (PV) potential, and current bus and route suitability for electrification. The site suitability assessment included site visits, reviews of electrical grid and customer-side infrastructure capacity, and reviews of the physical layout of the sites for operational considerations around bus electrification. The assessment of the buses included an overview of fleet characteristics, duty cycles, and operating environments. In addition, the Cadmus team reviewed existing and soon to be available chargers and bus models that may suit WCTA's requirements.

This study recommends short-term fleet electrification plans that identify immediately implementable, fiscally viable infrastructure upgrades and bus procurements to shift a few vehicles to all-electric models and high-level, long-term plans that would be needed to electrify a significant component of the fleet. The short-term plans include analysis of funding opportunities and cost estimates, opportunities for solar integration, and operational policies for charging that will minimize costs under current electric tariffs and the Pacific Gas and Electric Company (PG&E) Business Electric Vehicle (BEV) rate without operational impacts.

This report serves as a resource to help WCTA map out a transition pathway to battery electric school buses (BEBs). This executive summary presents high-level findings of the ***Existing Conditions and Assets*** analysis, the ***Fleet Electrification Analysis***, ***Funding and Financing Options*** research, the ***Available Technologies*** research, and the ***Recommendations and Next Steps***.

Existing Conditions and Assets

The first chapter introduces WCTA's ***Existing Conditions and Assets***. To determine these, Cadmus asked WCTA about its interests and constraints, visited sites to assess existing infrastructure, reviewed utility distribution system capacity, and conducted an in-depth analysis of combinations of solar and bus electrification. Cadmus identified the following key findings from these data collection activities:

- The majority (55%) of WCTA's current fleet are Type A buses.
- Cadmus estimates WCTA's annual diesel cost for all six routes analyzed in this study is $40,000, or $555 per month per route.
- The West Robles Avenue new parking area is the priority charging location in the near term for the WCTA fleet. The layout of the new transformer pad and switchgear should be such that these facilities could grow to accommodate the full buildout of future BEB charging infrastructure.
- **The current plans for the West Robles Avenue new parking area appear to include capacity for at least five (5) 19.2 kW chargers.**

- **The existing electric grid infrastructure for the West Robles Avenue main bus yard may already be able to support over (80) 19.2 kW chargers.**
    - This existing capacity may satisfy WCTA's long-term fleet electrification plans, but customer-side infrastructure upgrades may be necessary.
- According to the PG&E integration capacity map load hosting capacity, the West Robles Avenue main bus yard is using a fraction of the available electrical grid capacity (less than 10%).
- The Analy High School bus yard may face a power limitation in the near term due to thermal limitations of the nearest line sections.
    - However, PG&E's EV Fleet program may cover most of the to-the-meter infrastructure costs to increase capacity for electric vehicle supply equipment (EVSE).

Fleet Electrification Analysis

Fleet electrification will require WCTA to make notable shifts in its physical assets and operational practices. The second chapter of this report (***Fleet Electrification Analysis***) provides fleet electrification recommendations. Cadmus analyzed route energy requirements and suggested bus models, EVSE, electrical infrastructure upgrades, charging patterns and policies, and ways to optimize for solar PV energy resources. Cadmus identified the following key findings from this analysis:

Battery Electric Bus and Route Selection

- **There is at least one commercially available Type A BEB model currently on the market that can meet WCTA's energy needs for four of the six Type A bus routes selected for analysis: the eLion Lion A high range BEB.**
- The battery capacity and range of the Blue Bird Micro Bird G5 and Motive Collins EPIC E-450 BEBs cannot support the route energy requirements for a majority of the selected routes without the modeled lowest state of charge going below the manufacturer's recommended 20% minimum.
- The two bus routes that cannot be served by Type A BEBs currently on the market operate over 140 miles per day.
    - However, the BEB market is constantly evolving and WCTA should discuss their route requirements and interest in higher range Type A BEBs with manufacturers. A current survey of 18 leading available models is provided in ***Appendix F***.
- To achieve flexibility of vehicle dispatch across routes and address changes due to the COVID-19 pandemic (such as using buses to deliver learning supplies to families in the school district), Cadmus suggests WCTA select the following to reduce operational concerns:
    - High battery capacity BEB model, since the price differential is not significant between the low and high capacity models
    - Routes with maximum total daily mileage of 100 miles
    - Routes with at least four hours at the yard between morning and afternoon shifts for recharging
- Cadmus recommends evaluating the "worst case" route attributes (i.e. number of stops, passengers, length, and elevation gain) and selecting a bus that will meet those needs for all routes, in order to maximize flexibility of vehicle dispatch.

- Buses that drive longer routes work best with a bigger battery or well-managed recharging cycles to serve higher energy requirements. Weather, terrain, and bus driver training are also important factors.
- Ambient air conditions do not have a significant impact on interior space conditioning energy use, but it is important to note the high battery thermal management system energy use during extreme cold and hot periods.
- BEB batteries may lose the ability to accept full charger input power with age, outside air conditions, or other factors. WCTA should plan for longer charging windows during extreme cold or hot periods and as the batteries age.
- WCTA should ensure training materials and in-person sessions are provided by the selected BEB vendor as part of vehicle purchase.
  - Most BEB vendors offer driver training, which ensures that users understand recommended driver guidelines and how to use regenerative breaking technology to maximize the battery life and performance of their BEB products.
- WCTA's long-term fleet plans for 50% of their Type A fleet to be electrified (approximately 60 BEBs) would require approximately 9.6 MWh per day *(usage)* and would an average of 1.15 MW of power *(demand)* if each BEB has a dedicated 19.2 kW charger.

EVSE and Charge Management

After selecting routes for electrification and confirming the total energy and power needed for BEB operation, WCTA will need to select a suitable BEB charging system by determining its charger-to-bus ratio and considering operational constraints such as availability of maintenance or other staff to manually move charger nozzles between buses during the day or night. WCTA must weigh the tradeoffs between up-front cost, system redundancy, and ongoing operational impacts of the infrastructure. Cadmus identified the following key EVSE and charge management findings for the four currently feasible Type A bus routes analyzed as part of this study:

- The daily site energy usage requirements to operate four Type A BEBs range from 437 kWh to 557 kWh and the peak demand requirements range from 56 kW to 86 kW based on the modeled BEBs.
- To serve short-term electrification needs of four (4) Type A bus routes, Cadmus recommends that WCTA install four (4) 19.2 kW chargers.
  - While WCTA could technically meet its energy needs for four BEBs with as few as two (2) 19.2 kW chargers, such an approach would require charging more than one BEB per charger overnight and involve either a staff member being on the site to switch out the plugs or a multi-head charger with charge management software to automatically switch power from one head to the other.
  - Having only two 19.2 kW chargers would be risky because with a lower EVSE to BEB ratio, situations when a charger needed maintenance or was otherwise out of service could have a more substantial impact on operations.

  - Due to a lack of overnight staffing and the fleet's needs for reliability, Cadmus recommends planning for a one-to-one bus to charger ratio.
- Cadmus evaluated bus yard charging solutions with the expectation that WCTA BEBs will be charged during the day between school shifts and overnight at the main bus yard. The leading EVSE options are summarized in ***Appendix B*** and ***Appendix C***.
- To manage charging capabilities, WCTA can use features like remote monitoring of bus battery status, prioritizing which buses get charged between the morning and afternoon shifts, and regulating the amount of power each bus receives at any point in time to reduce or mitigate demand charges or subscription fees. These capabilities can either be provided by the EVSE product manufacturer or a third party such as an EV network service provider who specializes in offering charge management systems (summarized in ***Appendix D***).

Solar PV

- Cadmus estimates that this West Robles Avenue new parking area could support between 170 kW and 210 kW of solar PV power depending on the panel wattage and site barriers.
  - An additional 150 kW of potential solar PV capacity may be available across the main bus yard.
  - **This total solar PV capacity could offset the annual energy consumption of nine (9) BEBs.**
- The solar PV interconnection potential at West Robles Avenue ranges from 280 kW to 360 kW depending on the node site meaning there is capacity for an additional solar energy system.
- Existing office and maintenance rooftops in the West Robles Avenue main bus yard, which are served by a line section estimated to have a PV hosting capacity of 360 kW-DC, could support the additional 150 kW-DC of PV arrays noted previously.
- The Analy High School could support an additional 28 kW-DC to 34 kW-DC rooftop PV array and the bus parking area could support an additional 39 kW-DC to 48 kW-DC solar canopy.
- Existing electric grid infrastructure at the Analy High School could support an additional PV array (950 kW to 2,920 kW) depending on the interconnection site, indicating that the additional rooftop PV should be able to interconnect.
- Despite their challenging economics, in the long term, on-site solar energy generation and battery storage are appealing for their reliability and resiliency characteristics, particularly since Santa Rosa is increasingly subject to Public Safety Power Shutoffs. To be capable of limited operation during an outage, WCTA likely needs a backup generator and associated supporting infrastructure, including an inverter, in addition to any solar and storage.

Business Electric Vehicle Rate

- The most economical way to meet the fleet's short-term energy needs is to select PG&E's BEV rate, which could provide substantial savings and cost reliability for WCTA but will require a dedicated meter for BEB charging.
  - It is important to note that SCP supports the BEV rate and enrollment in PG&E's rate will automatically trigger enrollment in SCP's rate.

- Based on the projected power requirements for four 19.2 kW chargers in the West Robles Avenue new parking area (less than the 100 kW threshold), WCTA will likely select the BEV rate tailored to small customers (BEV 1).
- While adding a BEB to WCTA's fleet would increase the average monthly electricity bill by approximately $343 per vehicle (assuming WCTA is on the BEV 1 rate), WCTA could save approximately $212 per route per month in net fuel costs.
- The BEV rate provides a strong incentive to charge buses midday, when possible. Optimal charging patterns on the BEV rate will take full advantage of daytime charging during the super-off-peak rate to the extent feasible. If the vehicles are charged outside the 4 p.m. to 9 p.m. peak time, WCTA can avoid the costliest energy prices. For vehicles charging overnight, WCTA can select a lower demand level for the bill subscription of electric fleets that can accommodate longer charging windows.

Funding and Financing Options

The third chapter of this report (***Funding and Financing Options***) summarizes grant funding sources for EVs and EVSE and additional financing considerations, including a discussion on barriers and tradeoffs associated with funding opportunities. A wide range of funding opportunities are available and described in ***Appendix E***. Cadmus identified the following key findings from this research:

- LCFS credits associated with short-term BEB procurement of four Type A BEBs could provide an additional value of $23,585 (over the BEB lifetime, in cumulative present value terms). This relies on optimistic assumptions about credit prices.
- LCFS credits associated with the solar generation capacity that is planned to be installed in the West Robles Avenue new parking area, WCTA could earn an average of $33,055 to $82,937 per year, or up to $746,434 in LCFS credits in the next 10 years.
- A notable opportunity is presented by PG&E's EV Fleet program, through which PG&E offers design and construction services, cost offsets, and EVSE rebates for eligible equipment (***Appendix B*** lists chargers that are currently eligible).
- ***Appendix A*** provides a comprehensive solar financing matrix overview of the renewable energy financing market.

Available Technologies

The fourth chapter of this report (***Available Technologies***) delves into technology surveys of BEBs, EVSE, and data management systems. These overviews cover the breadth of available solutions.

Recommendations and Next Steps

The final chapter, ***Recommendations and Next Steps****,* summarizes report findings and recommends action WCTA can take to facilitate its BEB transition. These recommendations include the following:

- Consider a higher range BEB model for greater flexibility and reduced operational concerns.

- Consider slight modifications to route assignments to be more compatible with selected BEB model capabilities.
- Select routes for short-term electrification with maximum total daily mileage of 100 miles and at least four hours at the yard between morning and afternoon shifts for recharging.
- Explore innovative financing solutions and should consider collaboration with SCP, PG&E, or other authorities.
- Ensure the electrical infrastructure is in place and operational when a BEB is delivered, and vice versa.
- Collaborate with PG&E to ensure that future BEB plans will enable it to seamlessly enroll in the BEV rate.
- After charger installation, subscribe to the BEV rate then ensure that all EVSE is metered separately from other site loads.
- Contract with an experienced partner for the engineering, design, and construction stages of the BEB transition.
- Pursue driver training around the efficient operation of BEBs to ensure the highest possible range.
- Consider assigning specific staff and BEBs to specific routes for consistency, rather than using a lottery system.
- Hold a few diesel buses out of retirement to operate as spares to complete routes if a BEB or charger is down for maintenance.

SCP is committed to facilitating WCTA's BEB transition. In addition to providing this report to WCTA, SCP can serve as a resource to provide avenues of communication with the Bay Area Air Quality Management District or letters of support for grant applications. As described in the report, WCTA can also benefit from collaboration via cooperative purchasing, selection of interoperable BEB technologies, and creative approaches to meeting resilience needs.

Existing Conditions and Assets

This chapter explains WCTA's current school bus fleet characteristics, its stated goals and requirements, and the existing site and electrical infrastructure conditions, and identifies potential issues related to setting up battery electric bus (BEB) charging infrastructure to service select school bus routes.

This report is focused on the two main bus yards in WCTA's service area:

- Primary bus yard at 367 West Robles Avenue in Santa Rosa, California (shown in Figure 1, the majority of existing fleet is housed here)
- Secondary yard at the Analy High School at 6950 Analy Avenue in Sebastopol, California (shown in Figure 2, approximately 40 vehicles are housed here)

Figure 1. West Robles Avenue Primary Bus Yard and Planned Expansion

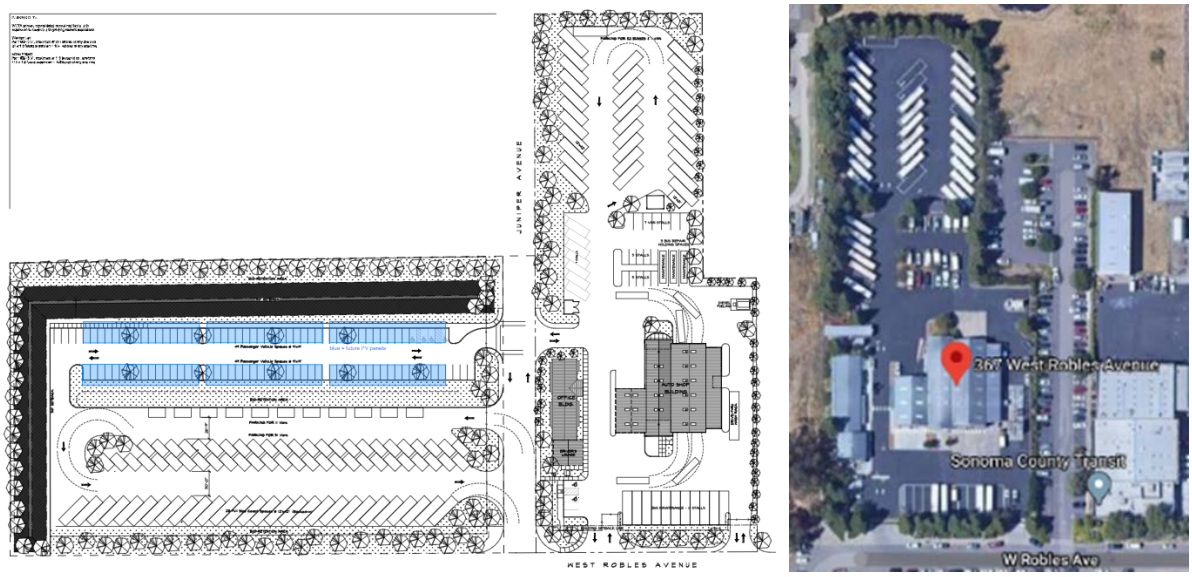


Figure 2. Analy High School Secondary Bus Yard

Operator Background and Study Goals

The site and operations descriptions in this report are based on discussions with WCTA personnel, data provided by WCTA staff, and site visits conducted in June 2020. Cadmus conducted a scoping intake interview with the WCTA site contact in May 2020 to discuss site operations, existing infrastructure, and BEB procurement plans and goals. The WCTA site contact set the priorities for evaluating the facilities and existing infrastructure.

WCTA manages approximately 120 routes during the school year, typically operating from 6 a.m. to 9 a.m. and noon to 5:00 p.m. During the summer it operates 80 to 90 routes for special needs and extended school classes and summer camps. WCTA makes bus and route driver assignments using a lottery system, so there is the potential for different buses to be used by different drivers on different routes throughout the year. Due to the COVID-19 pandemic, WCTA is not currently using its bus fleet. WCTA is using a few passenger vans to deliver learning supplies to students' homes.

WCTA is currently working with engineers to finalize plans for a six-acre parking expansion area at the primary yard on West Robles Avenue, which may include solar PV canopies. Most of the fleet is already housed at this facility and more of the fleet will be reassigned there once construction is complete; therefore, Cadmus focused this study on charging infrastructure and solar integration at this primary yard to serve a subset of WCTA's Type A bus fleet. We evaluated the sufficiency of the current parking area expansion plans and futureproofing opportunities as part of this study.

Table 1 summarizes parameters provided by WCTA for six Type A vehicle routes including total daily length, elevation gain, number of stops, number of students, and morning and afternoon start and end times. These six routes were selected by WCTA as being potential candidates for electrification.

Table 1. WCTA School Bus Route Summary Parameters

Start Location [a]	Route	Bus	Length (miles)	Elevation Gain (feet)	Stops	Students	Morning		Afternoon	
							Start	End	Start	End
Analy High School	524	358	142	885	29	8	6:45 a.m.	9:00 a.m.	11:30 p.m.	4:45 p.m.
	508	357	161	10,888	26	8	6:15 a.m.	9:15 a.m.	12:30 p.m.	4:45 p.m.
Roseland Yard	541	372	87	2,603	23	8	6:45 a.m.	9:15 a.m.	2:00 p.m.	4:30 p.m.
	504	389	107	2,836	33	8	6:00 a.m.	8:30 a.m.	12:45 p.m.	5:00 p.m.
	536	353	92	1,451	24	8	6:15 a.m.	9:15 a.m.	12:30 p.m.	4:15 p.m.
	527	338	79	886	23	8	6:15 a.m.	8:45 a.m.	12:45 p.m.	4:00 p.m.

[a] If WCTA selects to pursue fleet electrification, it plans to relocate these bus routes to start at the new West Robles Avenue bus yard when construction is complete. The West Robles Avenue bus yard is approximately three miles from the Roseland bus yard and eight miles from the Analy High School bus yard.

During the intake interview, WCTA identified a range of considerations and priorities that will influence future electrification plans:

- While WCTA has experienced operational and financial challenges due to the COVID-19 pandemic, it requested that this study assume normal operations post-COVID.
- Staffing shortages have been a challenge and WCTA is performing a bell-time study to investigate whether a two-tier system, which would reduce the number of routes by approximately 18, would ease the shortage.
- BEB range is a high concern and WCTA would like to electrify its diesel-fueled Type A bus fleet first.
- School buses need to operate onboard auxiliary electronics, such as cameras, to maintain security while parked at schools. WCTA will need to power these loads using BEBs.

Table 2 summarizes the status of electrical infrastructure at WCTA's two main sites and WCTA's primary needs and areas of focus for this study, while Table 3 summarizes WCTA's procurement planning status as of June 2020. WCTA has not yet determined the number and type of buses it is likely to procure over the next five to 10 years but expect that a few buses will be electrified depending on available funding.

Table 2. WCTA Electrical Infrastructure, June 2020

Existing BEB Charging Ports	Current BEB Infrastructure Plans	Electrical Infrastructure Upgrades for Consideration	Priority Focus for Study
None	No immediate plans, WCTA needs to secure grant funding first	• Upgrade service and add a transformer • Integrate charging and potential solar PV canopy • Investigate future-proofing parking expansion at West Robles Avenue	• Potential for California Energy Commission (CEC) or other grant funding • Applicability of funding programs to specific upgrade needs • Type A bus electrification

Table 3. WCTA Battery Electric School Bus Procurement Planning, June 2020

Number and Types of New Electric Buses			Original Equipment Manufacturers of Interest	Routes BEB(s) Will Serve
In Fleet	On Order	Anticipated		
None	None	Type A buses, number depends on funding and route feasibility	Thomas Built (WCTA recently evaluated Thomas buses, which had superior performance); Blue Bird; open to considering Lion buses	First to electrify Type A buses; long distance routes are not of interest in the short-term

Current School Bus Fleet Characteristics

WCTA's bus fleet characteristics are summarized by age and fuel type in Table 4 and by vehicle and fuel type in Table 5. Almost one-quarter (23%) of the fleet is powered by compressed natural gas (CNG). WCTA has CNG fueling infrastructure at the West Robles Avenue yard and were recently awarded funding to replace its CNG compressor systems, add seven time-fill posts, and put in a fast-fill post for emergencies and quick turnarounds. WCTA also recently received a Carl Moyer grant for up to 14 new CNG, Thomas Built buses.

Since CNG infrastructure is limited in California, WCTA still needs to maintain diesel-fueled buses to satisfy routes with long range requirements. Nevertheless, it is open to electrifying a portion of its Type A bus fleet. Most of the school bus fleet are Type A and Type D Chevy Blue Bird and Girardin models.

Table 4. WCTA School Bus Fleet – Summary by Age and Fuel Type, June 2020[a]

Age (years)	Quantity	Fuel Type		
		CNG	Diesel	Gas
0 to 5	103	15%	68%	17%
6 to 10	24	21%	62%	17%
11 to 15	40	3%	95%	3%
16 to 20	36	33%	58%	8%
21 to 25	23	78%	17%	4%
26 +	1	0%	100%	0%
Total	**227**	**51**	**149**	**27**

[a] Rows may not sum to 100% due to rounding.

Table 5. WCTA School Bus Fleet – Summary by Vehicle and Fuel Type, June 2020

Class of Vehicle	Total Quantity	Fuel Type		
		CNG	Diesel	Gas
Type A	124	0	123	1
Type C	4	0	4	0
Type D	71	50	21	0
Other	28	1	1	26
Total	**227**	**51**	**149**	**27**

Using actual total miles reported from WCTA from July 1, 2018 through June 30, 2019, Cadmus calculated typical diesel fuel consumption and cost estimates for the current diesel fleet and the fuel consumption of the six Type A routes selected for analysis (Table 6). The annual fuel consumption for the existing diesel fleet is approximately 170,000 gallons and the six routes evaluated for this study utilize over 11,000 gallons per year.

Table 6. Estimated Annual WCTA Diesel Consumption and Costs

Source	Total Miles per Year	Diesel Fueled Percent of Miles [a]	Total Annual Diesel Fuel Consumption (Gallons) [b]	Estimated Annual Diesel Fuel Cost ($) [c]
As Reported by WCTA [d]	1,904,848	66%	169,892	$611,950
Cadmus Estimate of Six Analyzed Type A Bus Routes [e]	82,244	100%	11,114	$40,033

[a] Rough estimate based on percent of total diesel fleet in Table 4.

[b] Cadmus calculated this value based on a fuel consumption rate of 7.4 miles per gallon for diesel (see: Argonne National Laboratory. "AFLEET Tool." Average Fuel Efficiency for School Buses. https://greet.es.anl.gov/afleet_tool).

[c] Cadmus calculated this value based on an average fuel cost of $3.60 per gallon of diesel (see: U.S. Energy Information Administration. "2019 Retail Gasoline and Diesel Prices." https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_a.htm).

[d] WCTA's reported mileage includes 213 buses.

[e] Cadmus used the total daily route lengths multiplied by an assumed 195 operational days per year for all six routes.

Data Collection and Site Visits

Cadmus requested most of the supporting site data ahead of the site visit, including electric utility data, construction drawings for the West Robles Avenue new parking area, existing bus fleet data, and electrical drawings. We conducted in-person site visits to both locations on June 30, 2020, with WCTA's operations manager, to supplement the previously collected data.

Prior to undertaking site visits, Cadmus prepared internal site visit memos to facilitate key facility data collection, augmented by thorough photographic documentation of the facility. We also performed a high-level review of the available space to install PV as part of the in-person evaluation.

During the site visits, Cadmus confirmed the location and capacity of the existing electrical service at the West Robles Avenue and Analy High School bus yards, recorded spare circuit breaker capacity, photographed potential EVSE locations, and discussed the West Robles Avenue construction plans. Figure 3 shows the existing West Robles Avenue facility's primary electrical service and Figure 4 shows the Analy High School bus yard's maintenance building service.

Figure 3. WCTA West Robles Avenue Primary Electrical Service

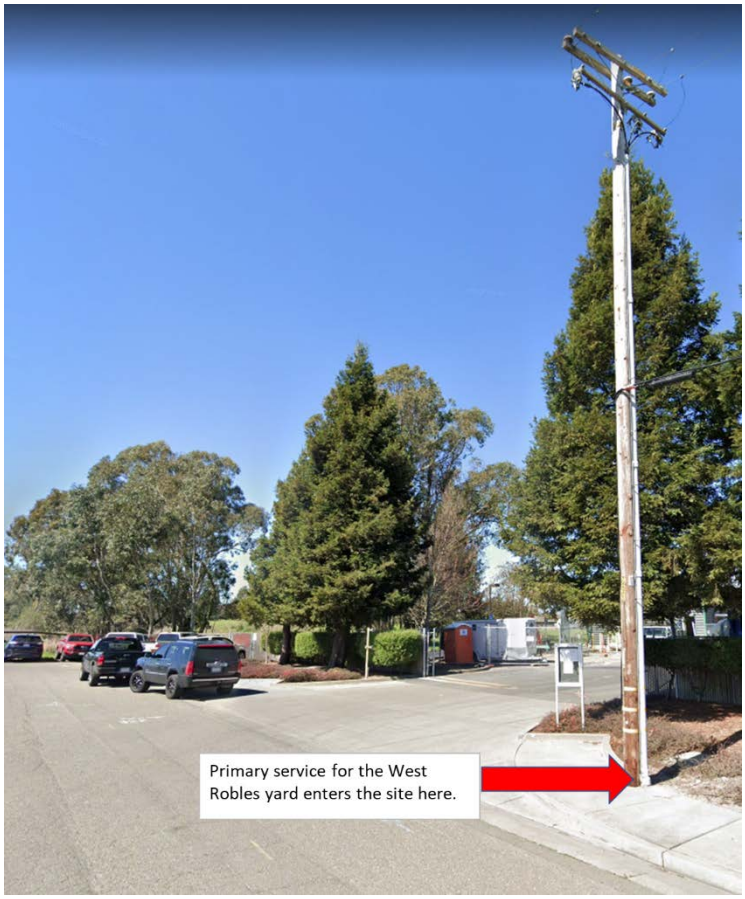
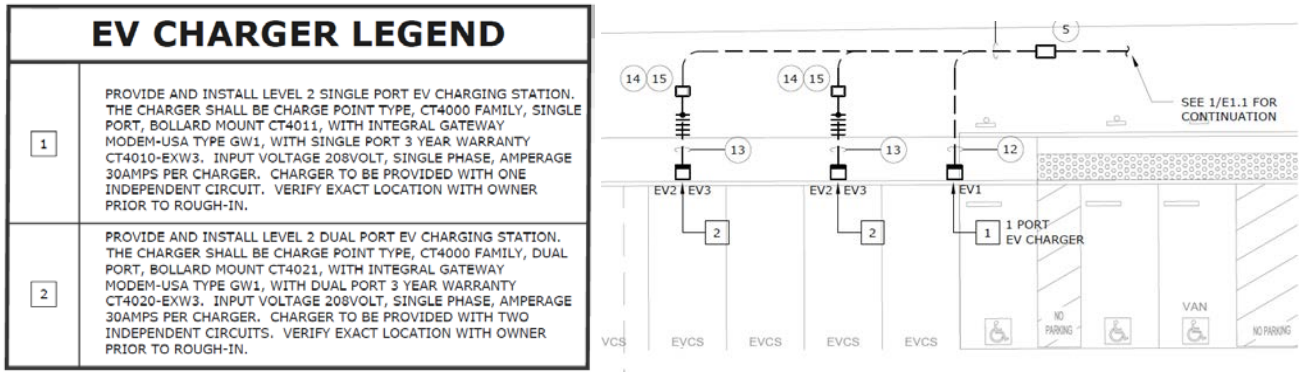


Figure 4. WCTA Analy High School Maintenance Building Primary Electrical Service

The West Robles new parking area construction plans call for a 600 ampere, 208 Volt, three-phase power distribution system and includes plans for five 30 ampere passenger EV chargers (Figure 5) and approximately 220 amperes for other expected loads (lighting, gate motors, receptacles). However, the electrical one-line diagram (E5.1) includes a note that states, "5. Provide space for up to (4) 100-amp frame, three pole circuit breakers within distribution section." Therefore, the site electrical plans may be able to support an additional 400 amperes for BEB EVSE, or approximately five 19.2 kW chargers.

Figure 5. WCTA West Robles Avenue New Parking Area Passenger EVSE Plans (E1.1)



EV CHARGER LEGEND

1	PROVIDE AND INSTALL LEVEL 2 SINGLE PORT EV CHARGING STATION. THE CHARGER SHALL BE CHARGE POINT TYPE, CT4000 FAMILY, SINGLE PORT, BOLLARD MOUNT CT4011, WITH INTEGRAL GATEWAY MODEM-USA TYPE GW1, WITH SINGLE PORT 3 YEAR WARRANTY CT4010-EXW3. INPUT VOLTAGE 208VOLT, SINGLE PHASE, AMPERAGE 30AMPS PER CHARGER. CHARGER TO BE PROVIDED WITH ONE INDEPENDENT CIRCUIT. VERIFY EXACT LOCATION WITH OWNER PRIOR TO ROUGH-IN.
2	PROVIDE AND INSTALL LEVEL 2 DUAL PORT EV CHARGING STATION. THE CHARGER SHALL BE CHARGE POINT TYPE, CT4000 FAMILY, DUAL PORT, BOLLARD MOUNT CT4021, WITH INTEGRAL GATEWAY MODEM-USA TYPE GW1, WITH DUAL PORT 3 YEAR WARRANTY CT4020-EXW3. INPUT VOLTAGE 208VOLT, SINGLE PHASE, AMPERAGE 30AMPS PER CHARGER. CHARGER TO BE PROVIDED WITH TWO INDEPENDENT CIRCUITS. VERIFY EXACT LOCATION WITH OWNER PRIOR TO ROUGH-IN.

Electrical Distribution System Capacity

To augment the information collected during site visits, Cadmus obtained details on the capacity of the grid to serve new BEB load and potential solar PV energy generation using the PG&E integration capacity analysis map, which is designed to help contractors and developers find information on potential project

sites for distributed energy resources (DERs). [1] The map details available load hosting capacity and generation hosting capacity on the distribution feeders and line sections serving a site. This analysis is the first step for transit agencies and DER project developers to determine whether their sites are appropriate for the introduction of BEB load or DERs without the need for significant upgrades to the local electrical infrastructure.

It is important to note that the model provides the most conservative estimate of these values since utilities manage the electric grid based on the maximum demand periods. For example, it often produces an estimate of zero capacity at a site when it in fact only finds a few hours during the entire year when the threshold hits a zero value. Despite providing a conservative estimate, the map's values are the best available estimates of what the grid can handle at given locations. Even in these cases, the tool provides valuable details about whether the limiting factor is a thermal, voltage, or protection violation. The PG&E 2019 "Distribution-Resource Planning Data Portal" provides additional caveats about the information provided.[2]

Many factors affect interconnection capability and costs, and the maps do not guarantee that generators can interconnect. The interconnection capacity analysis map's values are updated monthly when there are significant changes to the feeder. Cadmus recommends that WCTA involve PG&E as early as possible in the development process to identify interconnection potential, should WCTA choose to procure BEBs.

The interconnection process can be the most onerous, lengthy, and costly aspect of DER project development. This is especially true for smaller-scale projects that can be made uneconomic due to unpredictable interconnection costs and timelines. [3] The insights provided from the integration capacity analysis map will facilitate WCTA's conversations with the distribution grid operator when it initiates full engineering designs for infrastructure needed to support BEB charging loads and new on-site DERs.

West Robles Avenue Main Bus Yard

WCTA's main bus yard on West Robles Avenue houses the administrative offices, driver training facility, bus repair garages, and parking for 50 school buses. This area appears to be the long-term location for the fleet and is where WCTA would likely install charging infrastructure for its future BEB fleet.

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1 Pacific Gas and Electric Company. Last updated 2019. "Distribution-Resource Planning Data Portal." https://www.pge.com/en_US/for-our-business-partners/distribution-resource-planning/distribution-resource-planning-data-portal.page?ctx=large-business

2 This information is illustrative and is likely to change or be modified over time for reasons such as circuit upgrades, new loads, new DERs, new circuits, and seasonal switching.

3 Solar Builder. January 14, 2019. "After Some Drama, California's Major Utilities have Published Updated Interconnection Capacity Analysis Maps." https://solarbuildermag.com/news/californias-major-utilities-have-published-updated-interconnection-capacity-analysis-maps/

WCTA is planning a significant construction project at its main bus yard to expand the bus parking area and to install seven new CNG fast-fill stations. WCTA is also considering solar PV and infrastructure upgrades as part of the site improvements.

As shown in Figure 6, the PG&E circuit maps for this area indicate that the site can support enough additional capacity on the existing line section closest to the new parking area to accommodate at least five 19.2 kW chargers without requiring additional infrastructure upgrades. However, WCTA could likely install up to (80) 20 kW chargers on the nearby line section with the greatest available load hosting capacity (#3242944; see Table 7) without triggering electric grid infrastructure upgrades. Table 7 also demonstrates the solar PV interconnection potential at West Robles Avenue ranges from 280 kW to 360 kW depending on the node site.

Figure 6. 367 West Robles Avenue Line Section Map

Line sections are denoted by areas filled in blue.

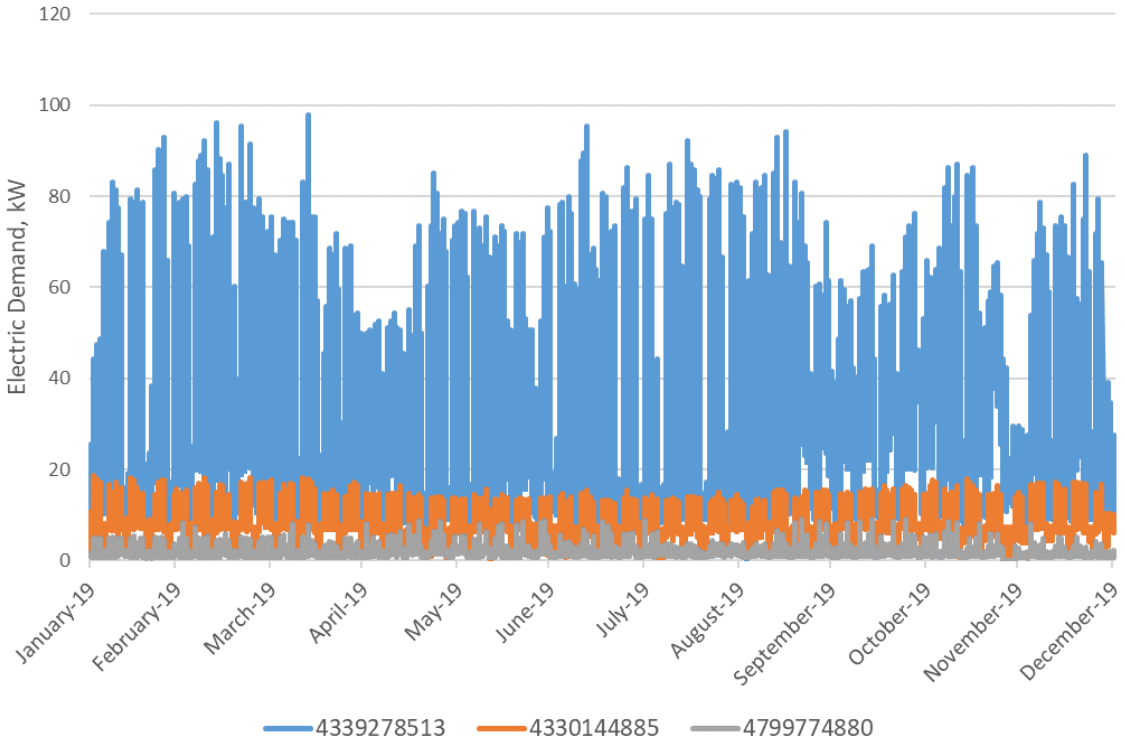
Table 7. 367 West Robles Avenue Integration Capacity Analysis Results

Feeder Name	Feeder #	Line Section	Load Hosting Capacity (kW)	PV Generation Hosting Capacity (kW)	19.2-kW Chargers
Bellevue 1102	43181102	3069966	190	360	9
Bellevue 1102	43181102	3070471	110	280	5
Bellevue 1102	43181102	3242944	1620	360	80

Cadmus also reviewed advanced metering infrastructure data (i.e. utility usage data) for all three existing accounts at West Robles Avenue to determine the historical peak demand of the existing electrical service and the available capacity to add BEB charging infrastructure (see Figure 7). The peak demand for the primary account at West Robles Avenue from January 1, 2019 to December 31, 2019 was approximately 100 kW. Considering the load hosting capacity of this site (according to the PG&E integration capacity analysis map, Table 7), the site is using a fraction of the available electrical grid capacity (less than 10%).

To move forward with infrastructure assessment and planning, WCTA will need to engage with PG&E to conduct definitive studies assessing current grid capacities.

Figure 7. WCTA West Robles Avenue Advanced Metering Infrastructure Interval Electric Utility Data



Analy High School Secondary Site

Figure 8 shows the line section map around the Analy High School. None of the line sections appear to have any load hosting capacity due to thermal and voltage limitations, which limits the opportunity for hosting EVSE without infrastructure upgrades. However, it could support an additional PV array (950 kW to 2,920 kW) depending on the interconnection site. Given the capacity limitations created by preexisting on-site load, a non-grid interconnected solar PV system with battery storage dedicated to EV charging could be another, albeit costly, solution.

Figure 8. Analy High School Line Section Map

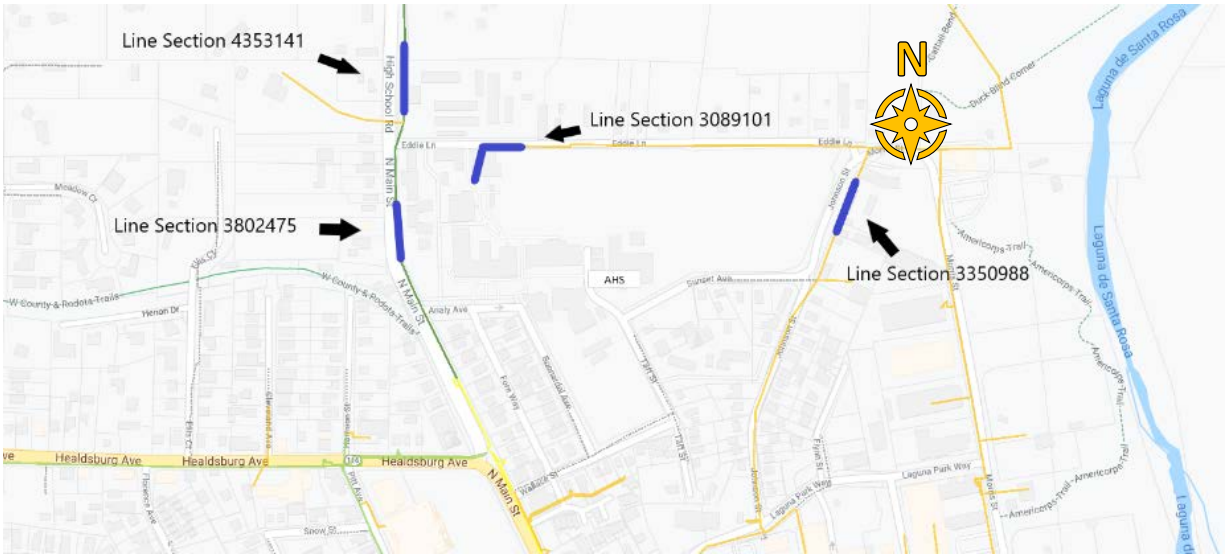


Table 8. Analy High School Bus Yard Integration Capacity Analysis Results

Feeder Name	Feeder #	Line Section	Load Hosting Capacity [a]	PV Generation Hosting Capacity (kW)
Molino 1104	42571104	3089101	Thermal and Voltage Limited	950
Molino 1104	42571104	3802475	Thermal and Voltage Limited	2,920
Molino 1104	42571104	4353141	Thermal and Voltage Limited	2,920
Molino 1104	42571104	3350988	Thermal and Voltage Limited	950

[a] Load hosting capacity values were zero for all line sections at this site, which Cadmus determined was caused by both the thermal and voltage condition of the line sections.

Fleet Electrification Analysis

Fleet electrification plans will require WCTA to make notable shifts in its physical assets and operational practices. Key determinants of the scale and nature of these adjustments include the amount of energy required to operate each fleet's electrified buses and the anticipated electricity rates. This chapter integrates modeling and analysis across these variables to inform WCTA's plans. It includes recommendations designed to meet short-term needs while preserving flexibility and alignment with long-term BEB deployment plans.

Route Energy Requirements

Cadmus analyzed the energy requirements of six Type A school bus routes. We quantitatively evaluated BEB model and route suitability and highlighted barriers by analyzing several extremes of each route's parameters:

- Routh length in miles
- Number of stops
- Number of passengers
- Route elevation gain
- Seasonal HVAC load
- Time at bus yard between morning and afternoon shifts for recharging

Model: Cadmus modeled bus and route suitability using an Excel-based, 24-hour model with 15-minute increments with weather data for the coldest winter day and warmest summer day in Santa Rosa using actual 2019 meteorological weather data.

Cadmus incorporated bus model and charger parameters—including bus weight, battery capacity, maximum charger power rating, HVAC system ratings, and bus performance (in electric energy consumption per mile)—collected from original equipment manufacturers and published specification sheets. We collected data from an ongoing National Renewable Energy Lab study on electric school buses in Utah to support our assumptions for auxiliary (such as battery thermal management systems, cameras, lights, and fans), air compressor, power steering, and HVAC system loads. We assumed charger power delivery losses of 10% on average (a 19.2 kW charge may only deliver 17.3 kW) and built in a 20% safety factor to the battery capacity (a battery with rated capacity of 160 kWh may only charge to 128 kWh).

Results: Figure 9 shows a comparison of the daily bus battery state of charge for one of the modeled Type A BEBs during the coldest winter and warmest summer day on route 541 (bus #372), which currently operates from the Roseland bus yard. **The BEB state of charge stays above the recommended minimum of 20%.** In addition to the two winter and summer plots (in blue and orange, respectively) which assume a 19.2 kW charger with 10% efficiency losses, we included a conservative plot showing the rate of charge with 40% charger losses (in yellow). High charger losses could occur if the bus battery is limited in the rate of charge it can accept due to ambient heat, age, or other reasons.

Figure 9. Illustrative Example of Route Model Results

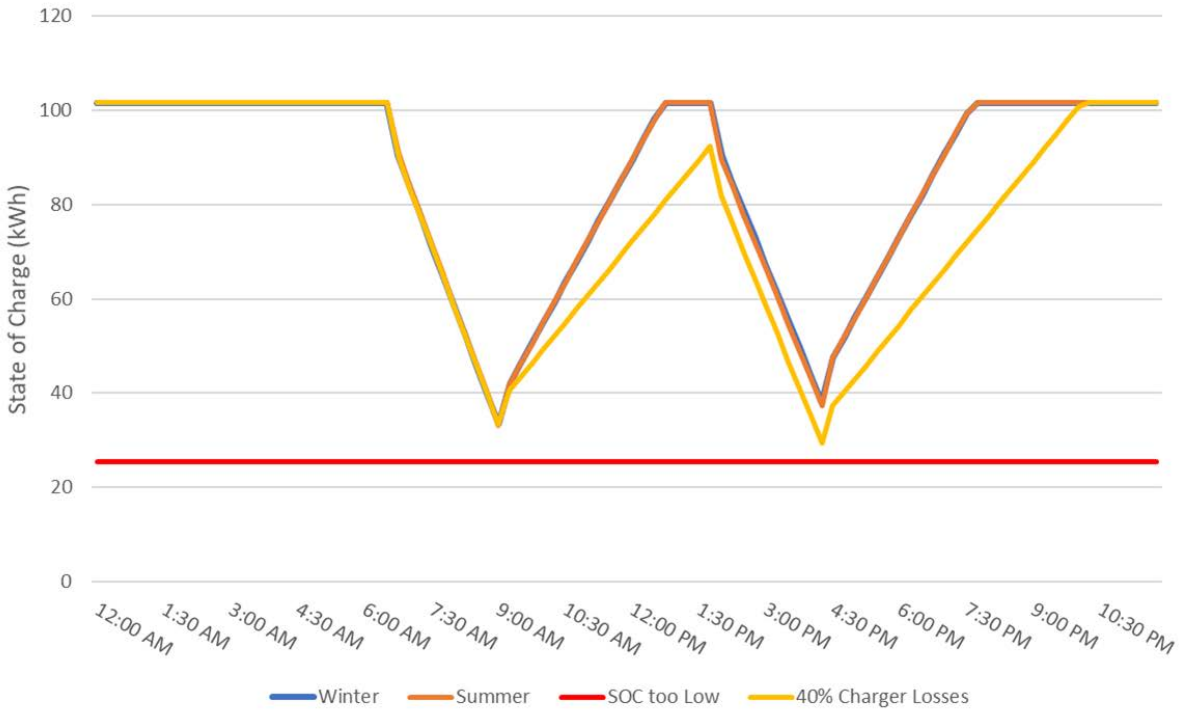


Figure 10 illustrates the breakdown of total daily energy consumption by end-use for one of the modeled BEBs. Propulsion includes the expected propulsion energy consumption if the route was flat and starting and stopping energy use was minimal. While regenerative braking can capture some of the excess energy required to travel on a hilly route with multiple start and stop cycles, some of this energy is still lost, as shown by the categories for elevation gain and stopping/acceleration.

Figure 10. Illustrative Example of Modeled Energy Consumption by Subsystem

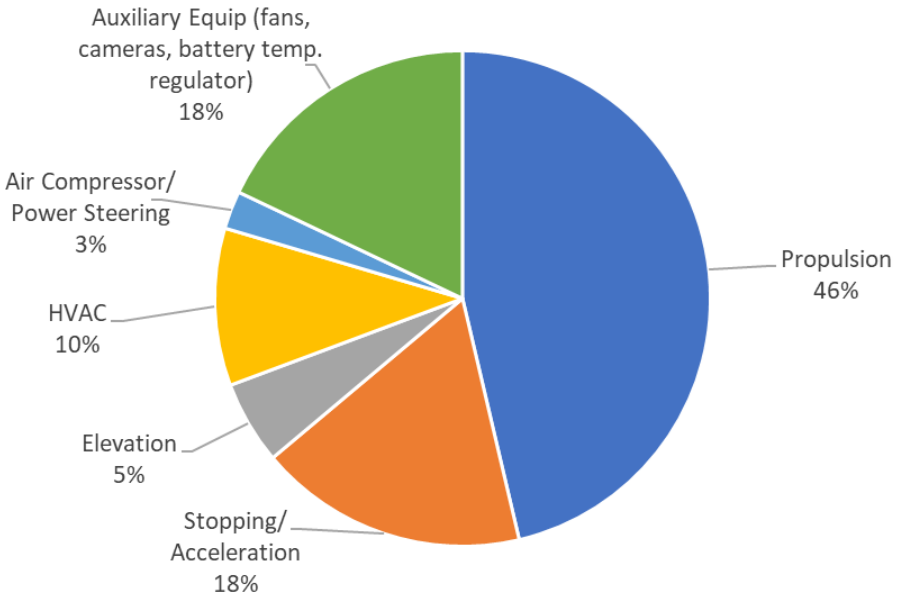


Table 9 summarizes the modeled route energy requirements, average performance, and minimum state of charge for three Type A BEB options on the six routes WCTA selected for analysis. The table compares the average performance and minimum state of charge with and without driver training, assuming a 20% impact to BEB performance.

As a best practice to support battery longevity, most major bus manufacturers recommend ensuring that the battery state of charge does not go below 20% to 30% of the battery's full energy capacity. As modeled, the battery capacity and range of the Blue Bird Micro Bird G5 and Motive Collins EPIC E-450 BEBs cannot support the route energy requirements for a majority of the selected routes and the lowest state of charge modeled goes below the manufacturer's recommended 20% minimum, as shown in Table 9. However, the eLion Lion A high range BEB **can** support the daily energy requirements of four of the six routes.

Table 9. WCTA Modeled Battery Electric School Bus Route Energy Requirements

BEB	Battery Capacity (kWh)	Range (miles)	Charger Rating (kW)	Route	Daily Energy Requirement (kWh) [a]	Average Performance (kWh/mi)		Lowest State of Charge Modeled	
						With Training	No Training	With Training	No Training
eLion Lion A (High Range)	160	150	19.2	524	164	1.18	1.42	6%	0% [b]
				508	197	1.22	1.50	0% [b]	0% [b]
				541	106	1.22	1.44	57%	50%
				504	127	1.20	1.42	34%	21%
				536	109	1.19	1.41	47%	37%
				527	95	1.20	1.42	62%	55%
Blue Bird Micro Bird G5	88	100	19.2	524	215	1.52	1.85	0% [b]	0% [b]
				508	261	1.59	1.95	0% [b]	0% [b]
				541	133	1.52	1.80	3%	0% [b]
				504	160	1.51	1.79	0% [b]	0% [b]
				536	138	1.50	1.79	0% [b]	0% [b]
				527	121	1.52	1.80	13%	0% [b]
Motiv Collins EPIC E-450	127	120	15	524	224	1.57	1.90	0% [b]	0% [b]
				508	274	1.65	2.01	0% [b]	0% [b]
				541	133	1.52	1.95	33%	14%
				504	160	1.51	1.80	0% [b]	0% [b]
				536	142	1.53	1.90	12%	0% [b]
				527	123	1.54	1.96	39%	17%

[a] These values assume efficient driving patterns that result from driver training.

[b] Battery is fully depleted without completing the route.

The results of the BEB route modeling reveal several key insights that can inform WCTA's BEB selection and prioritization of vehicle characteristics for bus procurements:

- WCTA should consider selecting a high range BEB. Our modeling shows that the eLion Lion A high range Type A BEB in Table 9 can satisfy the four remaining route requirements (541, 504, 536, and 527). These routes do not exceed approximately 110 miles per day and have at least three hours at the yard for charging between the morning and afternoon shifts.
- Routes 524 and 508 are not suitable for the battery capacities and ranges of Type A BEBs available on the market today. These routes are longer than 140 miles per day and have limited

time available to charge between shifts. WCTA should consider shorter routes with longer midday charging durations for its near-term fleet electrification plans.

- There is limited real-world BEB performance data available from manufacturers at this time. WCTA should take a conservative approach to selecting a BEB model, understanding that the manufacturer's stated performance may be theoretical.
- Proper driver training will impact realized BEB performance. WCTA should consider adding on-site training to future BEB contracts.
- Ambient air conditions do not have a significant impact on interior space conditioning energy use, but WCTA should be aware of high battery thermal management system energy use during extreme cold and hot periods.
- BEB batteries may lose the ability to accept full charger input power with age, outside air conditions, or other factors. WCTA should plan for longer charging windows during extreme cold or hot periods and as the batteries age.

Battery Electric Bus Procurements

The BEB route model results presented here suggest that electrification of part of WCTA's Type A bus fleet is feasible with existing BEB models on the current market but suggest that WCTA will need to be thoughtful in selecting BEB models and routes for electrification in the near-term. The model results indicate that shorter routes (less than 100 miles per day) with longer durations between shifts (at least three hours) are prime for electrification with current BEB models. Among the characteristics covered in this study's BEB technology survey, which is provided in ***Appendix F***, battery capacity is likely to be WCTA's principal concern. WCTA will also want to consider eligibility for the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP),[4] which can increase cost-effectiveness; luckily, nearly all the bus models surveyed for this study are eligible for that grant.

In addition to battery capacity, several operational factors can support improved BEB performance. One such factor is driver training for the efficient operation of BEBs, which can yield energy savings that enable a bus to cover a longer block or more challenging route on a given level of charge. WCTA could also consider holding a couple of diesel buses out of retirement, then using these spares for unusual routes (such as sporting events) or to complete routes when a BEB or charger is down for maintenance. WCTA may find that optimizing these operational factors for the unique features of BEBs will enhance its ability to fully integrate the new technology into regular service.

Electric Vehicle Supply Equipment Procurements

As discussed in ***Selecting a Suitable Charging System***, the suitability of a given charging technology will depend on WCTA's available charging window and the number of chargers procured. In Table 10, charging windows indicate the hours each day that vehicles are available to charge (regardless of specific charging pattern or profile). Charging windows are paired with different numbers of chargers to

[4] California HVIP. "Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project." https://www.californiahvip.org/how-to-participate/#Eligible-Vehicle-Catalog

illustrate how various combinations of these factors would affect the minimum charger rating that could meet WCTA needs for Type A BEBs to serve the four feasible routes modeled in Table 9.

Table 10. Calculated Minimum Charger Ratings for Four Type A BEBs

Maximum Daily Energy Needs	Number of Chargers	6.5-Hour Charge Window	7-Hour Charge Window	8-Hour Charge Window
eLion A 160 kWh battery		**Minimum Charger Rating** (kW)		
437 kWh across four buses	2	34	32	28
	3	23	21	19
	4	17	16	14
Blue Bird G5 88 kWh battery		**Minimum Charger Rating** (kW)		
551 kWh across four buses	2	43	40	35
	3	29	27	23
	4	22	20	18
Motiv EPIC F-450 127 kWh battery		**Minimum Charger Rating** (kW)		
557 kWh across four buses	2	43	40	35
	3	29	27	24
	4	22	20	18

WCTA has two bus charging windows: in between routes and before or after routes. While WCTA could technically meet its short-term energy needs for four Type A BEBs with as few as two high-powered chargers, this approach would be risky because operations would be constrained if one charger needed maintenance or was otherwise out of service.

If WCTA decides to pursue a charging solution comprised of less than a one-to-one charger-to-bus ratio, the system's charge management capabilities are of increased importance. WCTA will need to consider tradeoffs between automated and manual systems. An automated system that complies with the Open Charge Point Protocol (OCPP) standard and is capable of managing power loads across multiple charging stations and heads will cost more up front than a simpler manual system, while a manual system will likely require increased staff involvement and introduce greater risk of human error.

WCTA should prioritize two characteristics in EVSE procurements:

- OCPP v1.6 enabled
- Chargers that have a sufficient power rating to meet vehicle energy needs for a given combination of charging window and bus-to-charger ratio (as was shown above in Table 10)

The PG&E EV Fleet program offers rebates for eligible EVSE, which cover the lesser of 50% of charger costs or $15,000 per charger for chargers 50 kW or less. For chargers between 50.1 kW and 150 kW, the rebate covers the lesser of 50% of charger costs or $25,000 per charger.

Infrastructure Upgrades

This section covers recommended electrical infrastructure upgrades to support WCTA's short-term electric school bus fleet transition and potential charging station locations.

Electrical Infrastructure Requirements

Infrastructure must be appropriately sized on both the utility and customer sides of the meter to accommodate WCTA's specific power requirements, which are based on anticipated charging patterns and equipment selection.

The daily site energy requirements to operate four Type A BEBs range from 437 kWh to 557 kWh and the peak demand requirements range from 56 kW to 86 kW based on the modeled BEBs, as shown in Table 10. Under shorter charging protocols, the site's power needs are higher than when these are spread across a longer charging window.

The existing electrical infrastructure at the West Robles Avenue main bus yard may already be able to support over 80 19.2 kW chargers and the planned electrical infrastructure for the new parking area may be able to support up to five 19.2 kW chargers. Given the thermal limitations on the nearest line sections at the Analy High School bus yard, this secondary site may face a power limitation in the near term. Table 11 provides a summary of likely infrastructure upgrades necessary at the Analy High School bus yard to integrate EVSE, should WCTA choose to use it as a backup charging location. It's possible that PG&E's EV Fleet program may cover most of the infrastructure costs.

An important point for WCTA to consider during infrastructure planning for both sites is that EVSE must be separately metered from other loads in order to qualify for PG&E's BEV rate, which could provide substantial savings and cost reliability for WCTA.

Table 11. Potential Analy High School Bus Yard Infrastructure Upgrades

Upgrade	Covered by PG&E EV Fleet Program?
New 12 kV line (primary overhead to underground service)	Yes
To-the-meter infrastructure (design, switchboard, meter, concrete pad, other)	Yes
New transformer	Yes
Customer-side infrastructure (design, permitting, bollards, pavement, other)	No
EV Fleet program infrastructure incentive ($4,000 per vehicle)[5]	Yes

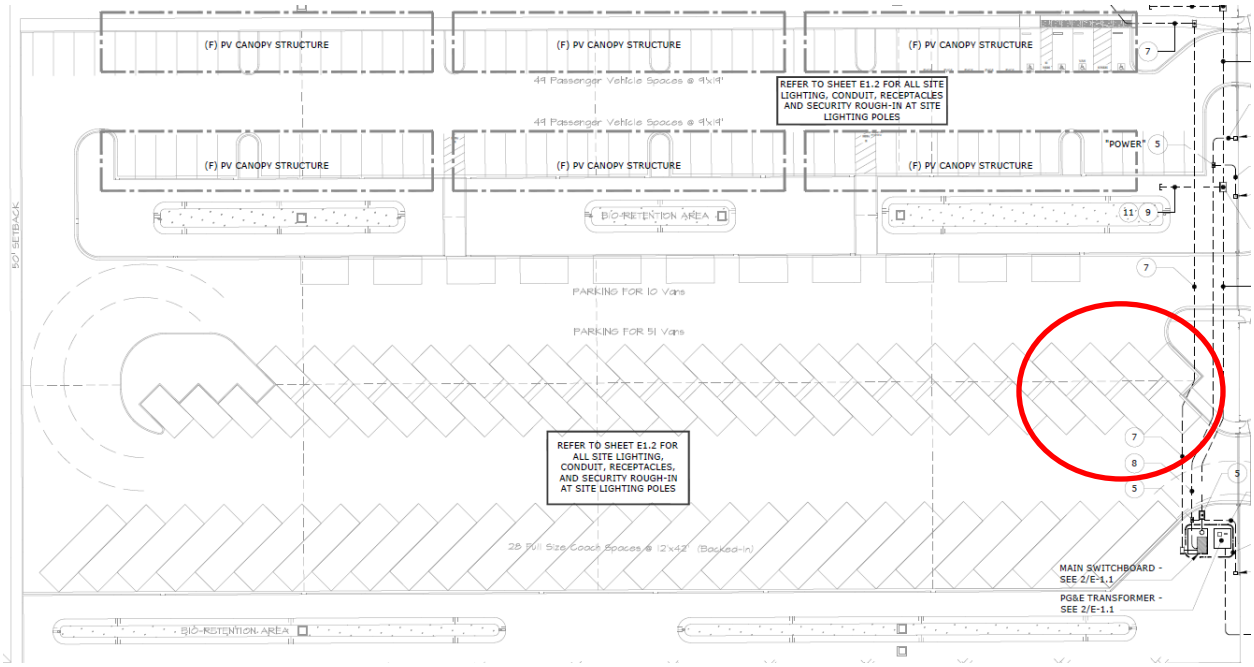
Location of Potential Charging Stations

The West Robles Avenue new parking area is the priority charging location in the near term for the WCTA fleet. The layout of the new transformer pad and switchgear should be such that these facilities could grow to accommodate the full buildout of future BEB charging infrastructure. The current plans for the new parking area will accommodate 61 Type A buses and 28 Type C and D buses. If one or two of these spaces were used for electrical infrastructure, the remaining spaces may be enough for the needs of WCTA. Based on the construction plans and locations for the Type A bus parking, Cadmus

[5] PG&E's EV Fleet program may cover the lesser of $4,000 per vehicle or 80% of construction costs (e.g., construction costs of $20,000 for five vehicles would equate to a $16,000 rebate). https://www.pge.com/en_US/large-business/solar-and-vehicles/clean-vehicles/ev-fleet-program/ev-fleet-program.page

recommends installing the BEB EVSE in the circled area in Figure 11 (east side of new property), which is closest to the existing and planned electrical infrastructure.

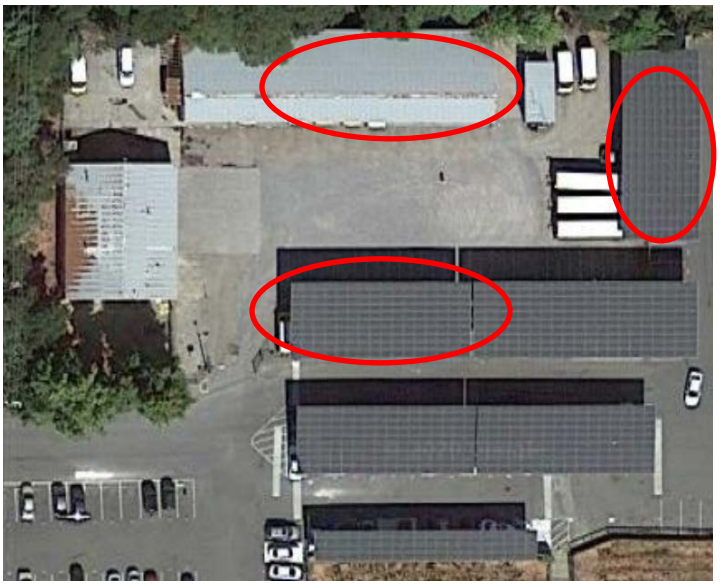
Figure 11. West Robles Avenue Potential Battery Electric School Bus Charging Location



Source: WCTA West Robles Avenue construction plans (Plans – Combined Set On-site & Off-site (Submitted date 7-29-20), Page E1.1)

There are several places in and around the Analy High School where backup EVSE for the WCTA fleet could be located (as shown in Figure 12).

Figure 12. Analy High School Potential Charger Locations



Source: Amended Google Earth image.

Charging Patterns and Rates

SCP provided Cadmus with two years of advanced metering infrastructure data (i.e. utility usage data) for West Robles Avenue accounts. We used this data to establish an electric consumption and demand baseline and to assess seasonal variation. Since the priority charging location for WCTA is the West Robles Avenue new parking area currently under construction, we estimated the PG&E rate this new account will fall under based on the projected site loads.

Current Electricity Baseline

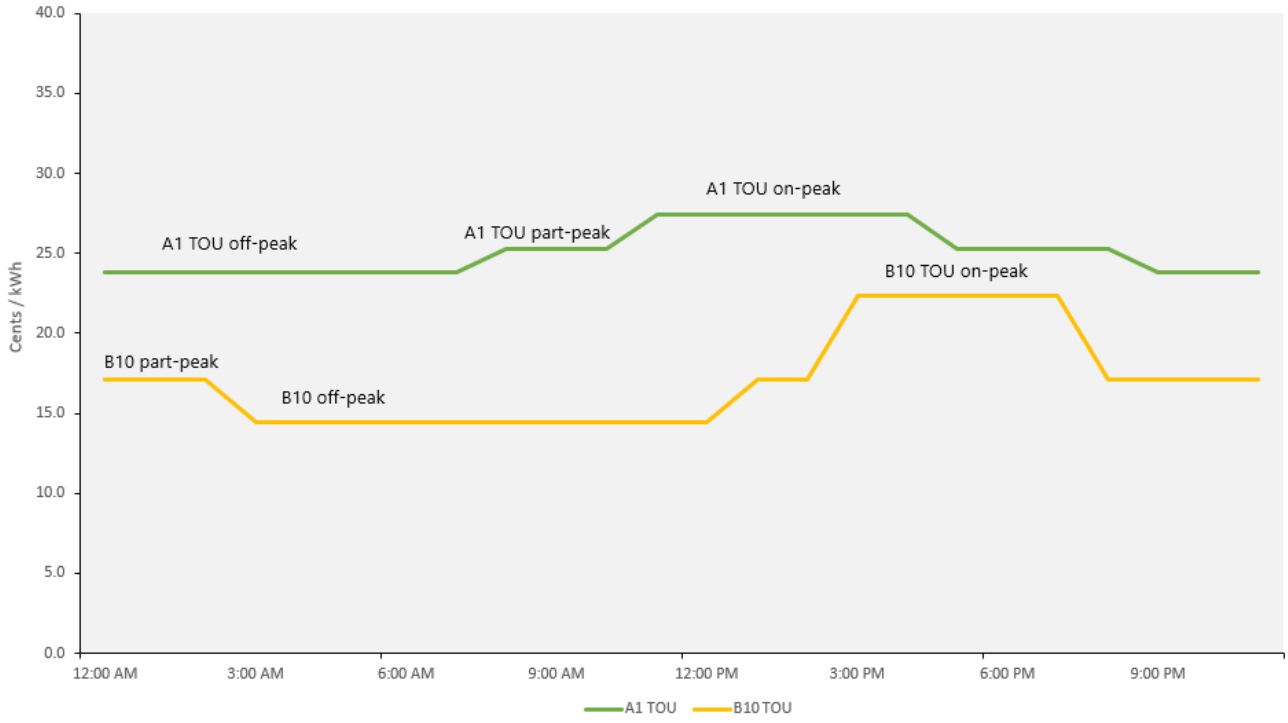
If WCTA pursues EVSE at the new parking area, it could select a traditional PG&E time-of-use (TOU) rate, as described in this section, or a BEV rate, described in ***Business Electric Vehicle Rate***. PG&E's traditional TOU rates feature fluctuating electricity prices ($/kWh) depending on the time of day of the electricity usage. Each day is split into two or three periods consisting of peak, off-peak, part-peak, and super-off-peak periods. The TOU rates are consistent across weekdays within the two seasonal periods, winter and summer. The rates favor consumption during off-peak periods, which vary by rate and season. Table 12 describes two standard rates that WCTA might fall under. The rate schedules in Table 12 have different times associated with each TOU period. However, both on-peak rates include the late afternoon hours of 4 p.m. to 6 p.m. The seasonal component of the rates contributes to higher electricity costs in the summer and lower costs in the winter. All TOU rates have peak hours in the summer, but only some TOU rates have winter peak periods.

Table 12. Conventional PG&E Rate Comparison

TOU Period	A1 TOU		B10 TOU	
	Period	Rate ($/kWh)	Period	Rate ($/kWh)
Demand Charge	None		$13.65 per kilowatt	
Summer				
On-Peak	12 p.m. to 6 p.m.	$0.2965	4 p.m. to 9 p.m.	$0.2744
Part-Peak	8:30 a.m. to 12 p.m.; 6 p.m. to 9:30 p.m.	$0.2729	2 p.m. to 4 p.m.; 9 p.m. to 11 p.m.	$0.2127
Off-Peak	9:30 p.m. to 8:30 a.m.	$0.2455	11 p.m. to 2 p.m.	$0.1801
Winter				
On-Peak	N/A	N/A	4 p.m. to 9 p.m.	$0.1981
Part-Peak	8:30 a.m. to 9:30 p.m.	$0.2523	N/A	N/A
Off-Peak	9:30 p.m. to 8:30 a.m.	$0.2314	2 p.m. to 4 p.m.; 9 p.m. to 11 p.m.	$0.1626
Super Off-Peak	N/A	N/A	9 a.m. to 2 p.m.	$0.1263

Figure 13 displays the fluctuating prices of the two TOU rates featured in Table 12. To simplify the graph, the lines represent seasonal weighted averages.

Figure 13. Conventional PG&E Rate Comparison



Business Electric Vehicle Rate

The BEV rate operates differently than PG&E's typical TOU rates. There are two components to the rate: the subscription fee, in lieu of demand charges, and the energy charge. The subscription fee is determined based on a customer's projected maximum demand per month and is sold in blocks of 10 kW for small customers and 50 kW for large customers. [6] Based on the projected power requirements for four 19.2 kW chargers in the West Robles Avenue new parking area (less than the 100 kW threshold), WCTA will likely select the BEV rate tailored to small customers (BEV 1).

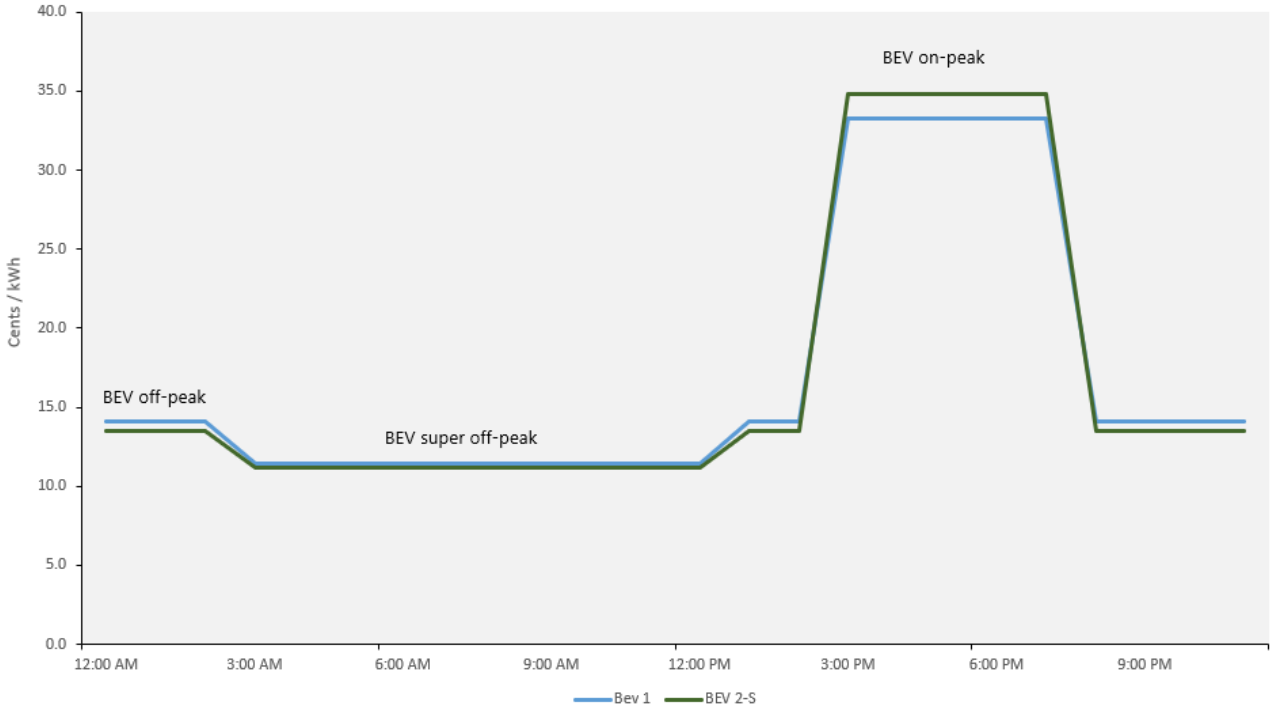
For the second component of the new rate schedule, a TOU energy charge, the peak period is from 4 p.m. and 9 p.m., while off-peak is from 2 p.m. to 4 p.m. and 9 p.m. and 9 a.m. and super-off-peak is from 9 a.m. to 2 p.m. (Table 13). This charge structure incentivizes consumption during off-peak and super-off-peak hours. It also shifts the bulk of the bill away from demand charges and toward energy charges. The BEV rate provides greater certainty of costs, particularly for fleet charging during super-off-peak hours and provides an opportunity for WCTA to manage its electricity expenses by shifting charging to non-peak period hours. Figure 14 displays the fluctuating prices of the two BEV rates featured in Table 13.

[6] Customers with a peak demand of less than 100 kW are considered small; those with peak demand greater than 100 kW are considered large.

Table 13. BEV Rate Schedule Comparison

Charge Type	Time of Use	BEV 1	BEV 2-S
		Rate per Kilowatt-Hour (except where noted)	
Subscription Demand Charge	N/A	$12.41 per 10 kW block	$95.56 per 50 kW block
Peak Energy Charge	4 p.m. to 9 p.m.	$0.333	$0.348
Off-Peak Energy Charge	2 p.m. to 4 p.m.; 9 p.m. to 4 a.m.	$0.141	$0.135
Super-Off-Peak Energy Charge	4 a.m. to 2 p.m.	$0.114	$0.112

Figure 14. BEV Rate Comparison



To analyze the advantages of the new BEV rate, Cadmus estimated WCTA's estimated annual electric bill for the highest energy consuming BEB across all three charging scenarios using a 19.2 kW charger. Table 14 summarizes the results of these hypothetical scenarios when charged on the BEV 1 rate and on the A1 TOU rate, which, based on the estimated electric load of the West Robles Avenue new parking area, the new account would likely be enrolled under should WCTA electrify four routes and choose a non-BEV rate. The BEV 1 rate will be more economical for WCTA in all scenarios, primarily because the off-peak charging rates are significantly lower than the A1 TOU rates.

- **Scenario A** assumes the BEB is plugged in after the afternoon shift and will charge from 6 p.m. to 2:30 a.m. during peak and off-peak hours. This scenario assumes no charge management system is in place.
- **Scenario B** assumes the BEB is plugged in after the morning shift and will charge for four hours during off-peak hours until the afternoon shift. The BEB is then plugged in at 6 p.m. after the afternoon shift and charges until full at 10:30 p.m. during peak and off-peak hours. This scenario assumes no charge management system is in place.

- **Scenario C** assumes the BEB is plugged in after the afternoon shift, but a charge management system is used to delay charging until 9:30 p.m. The BEB will charge during off-peak and super-off-peak periods from 9:30 p.m. until 6 a.m.
- **Scenario D** assumes the BEB is plugged in after the morning shift and will charge for four hours a day during off-peak hours until the afternoon shift. The BEB is then plugged in after the afternoon shift but a charge management system is used to delay charging until 1:30 a.m. The BEB will complete charging during off-peak hours.

Table 14. Hypothetical Annual Bills for Charging One BEB

Charging Scenario	A – 6 p.m. to 2:30 a.m.	B – 8:45 a.m. to 12:45 p.m., 6 p.m. to 10:30 p.m.	C – 9:30 p.m. to 6 a.m.	D – 8:45 a.m. to 12:45 p.m., 1:30 a.m. to 6 a.m.
Charge Management [a]	No	No	Yes	Yes
Rate Schedule				
BEV 1 Rate	$6,823	$6,652	$4,509	$4,117
A1 TOU Rate [b]	$7,637	$7,729	$7,452	$7,723

Note: These charging scenarios are hypothetical and meant to demonstrate the potential impact of different rates and charging schedules on the total annual bill. Actual bills may be slightly lower or higher than the estimates shown in the table, which were modeled based on PG&E's bundled rates for simplicity; SCP's bill component is for generation.

[a] This involves establishing a charge management protocol that delays charging to occur during the PG&E BEV off-peak periods.

[b] Since the A1 TOU rate periods do not coincide with the BEV rate periods, Cadmus calculated blended averages of the A1 TOU for comparison purposes.

Table 15 compares the estimated monthly electric bill for WCTA across multiple rates for the operation of one BEB. WCTA's electricity bills will increase with an electrified fleet regardless of which rate it chooses, but in all scenarios the BEV rate significantly reduces costs relative to the A1 TOU rate. Scenario D features the charging schedule which would yield the lowest maximum annual bill, but WCTA must consider charger power and electrical infrastructure upgrades that will influence charging patterns.

Table 15 Monthly Bill Comparison for Charging Scenario D Under Different PG&E Rates

	One BEB		
Rate	A1 TOU	B10 TOU	BEV 1
Average Monthly Bill	$644	$766	$343

Net Savings Relative to Diesel

While adding a BEB to WCTA's fleet would increase the average monthly electricity bill by approximately $343 per vehicle (assuming WCTA is on the BEV 1 Rate and implements scenario D described above), WCTA could save approximately $212 per month in net fuel costs. As previously shown in Table 6, Cadmus estimates WCTA's annual diesel cost for all six routes analyzed to be $40,000, or $555 per month per route.

The estimated fuel savings do not include ongoing network and charge management fees or maintenance cost differences between BEBs and diesel-fueled buses.

Long-Term Fleet Energy Needs

While the focus of this study is the short term, school bus fleets operate under very long-term planning horizons. Bus yard locations, site infrastructure, and vehicle lifetimes decisions are made now but will have enduring effects on WCTA for decades into the future. Pinpointing the long-term energy needs for WCTA is an inexact science; this effort provides valuable order-of-magnitude guidance that can inform current investment and upgrade decisions.

WCTA expressed interest in having 50% of their Type A fleet electrified over the next ten years, or approximately 60 BEBs. Cadmus calculated energy needs for this long-term fleet electrification plan under the assumption that Type A fleet routes are relatively consistent and will not change substantially. Our calculations show that 60 Type A BEBs traveling 100 miles per day on average with actual performance of 1.5 kWh/mile to 1.6 kWh/mile would consume approximately 9.6 MWh per day and would require an average of 1.15 MW of power if each BEB has a dedicated 19.2 kW charger. This power would come from the grid or a combination of grid and behind-the-meter resources.

As shown in Table 7, the existing electric grid infrastructure at the West Robles Avenue has the capacity to support this long-term additional EVSE load, but customer-side infrastructure upgrades will be necessary.

Solar Potential

BEB planning also includes considering solar PV systems that might augment the grid electricity supply to the proposed BEBs at each facility. The rate structures used for these BEB charging facilities will greatly impact the cost-effectiveness of the behind-the-meter resources. While cost is a key factor for integrating PV and energy storage with BEB charging, many fleets are also interested in enhancing resilience in the case of power disruptions. The following sections discuss the potential for PV at both facilities from the perspective of physical constraints.

Table 16 summarizes WCTA's considered charging approaches and current solar interest.

Table 16. Status of WCTA Interest in Site Analyses, June 2020

Charging Approaches under Consideration	Interest in Solar	Interest in Storage	What "Resilience" Means for WCTA
Main yard charging in the near and mid-term; considering how to integrate on-site solar with charging	Considering solar canopy as part of parking expansion at West Robles Avenue; also interested in possibility of solar rooftop bus panels to support auxiliary electronics	Interested in storage for resilience, supporting green initiatives, and back-up power	• No service disruptions from PG&E Public Safety Power Shutoff [a] events • Capability to power at least 48-hours of service during an outage

[a] Public Safety Power Shutoffs are Californian utilities' attempt to preemptively avoid wildfires ignited by transmission and distribution systems. These shutoffs can last for varying amounts of time.

Potential Solar Installation Technical Analysis

This subsection details both the physical design and pertinent technical details of potential solar PV installations at the two WCTA sites. This includes estimated capacity, production, and performance, all based on publicly available satellite images and information provided by WCTA staff. The estimated

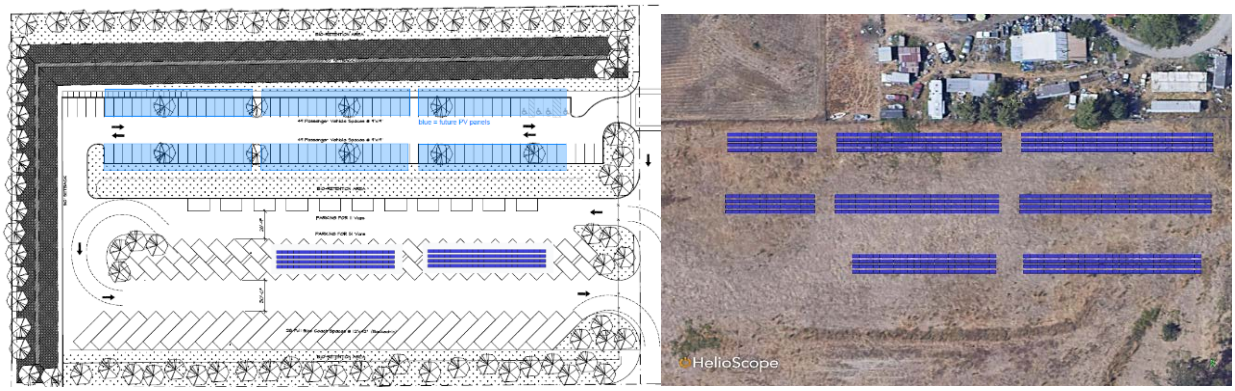
annual production offered in this analysis can be used to estimate annual energy savings for the potential solar PV arrays. Site-specific energy savings are expected to continue over a 25-year timeline with minimal performance degradation (approximately 0.5% per year).

Cadmus conducted the solar potential analysis using Helioscope, a web-based PV design software, to generate a conceptual PV system design. [7] We assumed industry-standard 370-watt PV panels and selected an inverter based on the solar PV system size. The designs do not maximize the total number of panels at each site, but instead aims to maximize efficiency and effectiveness. The designs also do not account for compliance with local zoning rules, such as roof setbacks, or for unique utility interconnection requirements—they are provided to indicate the likely technical potential for solar PV at each site.

West Robles Avenue Main Bus Yard

The solar PV canopies currently planned for the West Robles Avenue new parking area depicted with light blue rectangles in the left image of Figure 15 (from WCTA construction plans) could host up to 520 modules. A PV installation of this size would have a total power output of 170 kW-DC to 210 kW-DC depending on the wattage of the selected panels. Considering the site's PV generation hosting capacity from the integration capacity analysis (Table 7), an additional PV array of 61 to 76 kW-DC could be added, which would increase the West Robles Avenue new parking area total PV capacity to 280 kW-DC. This additional solar may be feasible without requiring electrical infrastructure upgrades. The 61 kW-DC to 76 kW-DC solar PV capacity is represented by dark blue rectangles in the left image of Figure 15 and by the third row of panels in the right image.

Figure 15. Mapped WCTA New Construction Parking Area [a, b]



[a] Cadmus added bus canopy PV to the construction plans on the left, which Cadmus estimates could support 61 – 76 kW-DC.
[b] The Helioscope image on the right shows the same area as the construction plans on the left but estimates the total PV capacity for the area. Based on the Helioscope results, the total new parking area could support 231 kW-DC to 286 kW-DC.

[7] Helioscope is a cloud-based solar PV design modeling software that integrates system design and performance modeling to develop preliminary layouts and energy yield calculations for measuring solar PV feasibility (https://www.helioscope.com/).

Cadmus also explored adding solar to the existing office and maintenance rooftops in the West Robles Avenue main bus yard, which is closer to line section 3069966 and estimated the PV hosting capacity to be 360 kW-DC, see Table 7. While the roof directions are all east-west facing, which is not optimal for solar, these potential solar additions could complement the planned south-facing canopy in Figure 15. East-facing arrays produce relatively more energy in the morning while west-facing arrays would produce relatively more energy in the later afternoon.

Accounting for the fact that this line section's PV generation hosting capacity will be impacted by the currently planned carport arrays, this line should allow for at least 150 kW-DC of additional solar PV capacity. Should WCTA not pursue the additional 61 kW-DC to 76 kW-DC bus solar PV canopy in Figure 15, the remaining 150 kW-DC could be scattered across existing rooftops, as shown in Figure 16.

Figure 16. 367 West Robles Avenue Rooftop Solar Technical Feasibility

Analy High School

Solar PV panels are currently installed at the Analy High School bus yard, but Cadmus scoped an additional area denoted as school bus parking for potential solar PV. As modeled, this area may host up to 75 kW over two rooftops. This additional area's solar generation potential in Figure 17 falls well below the maximum allowable PV hosting capacity (see Table 8).

Figure 17. Analy High School Additional Solar Technical Feasibility

Cadmus summarized the WCTA solar PV project feasibility analysis and estimated costs in Table 17. The Helioscope estimates of annual solar generation vary by the PV system size and key characteristics (azimuth, orientation, and shading). The annual solar energy will generally decrease by less than 1% per year as equipment degrades.[8]

Table 17. Summary of Potential WCTA Solar PV Projects

Site	Solar PV Project	Capacity (kW-DC)	Annual Solar Generation (MWh)	Estimated Cost per Watt	Estimated Total Cost [b]
West Robles Avenue [a]	Planned Carport PV	170 - 210	286 - 352	$2.19 - $3.39	$372,000 - $712,000
	Bus Canopy	61 - 76	103 - 127	$3.50 - $5.11	$213,000 - $388,000
	Rooftop Solar	114 - 141	140 - 174	$1.80 - $3.31	$205,000 - $466,000
Analy High School	Bus canopy	39 - 48	63 – 77	$3.50 - $5.11	$136,000 - $245,000
	Rooftop	28 - 34	45 - 55	$2.22 - $3.82	$62,000 - $130,000

[a] WCTA will likely need to perform electrical infrastructure upgrades for PV installations exceeding 280 kW at West Robles Avenue.

[b] Note that the Estimated Total Cost is based on the Estimated Cost per Watt and the Capacity for each project, which include all equipment costs and labor, but do not account for permitting fees.

Cadmus obtained cost assumptions for the solar PV projects by collecting data from private research and governmental data resources and databases such as Energy Sage, Lawrence Berkeley National

[8] Sandia National Laboratories (Stein, Robinson, King) National Renewable Energy Laboratory (Deline, Rummel, Sekulic). "PV Lifetime Project: Measuring PV Module Performance Degradation: 2018 Indoor Flash Testing Results." 2018. https://www.nrel.gov/pv/lifetime.html

Laboratory's Tracking the Sun 2019 annual report, [9] California DG Stats, Massachusetts Clean Energy Center's Production Tracking System, reports from the National Renewable Energy Laboratory, and the Rhode Island Renewable Energy Growth program. We combined the insight from these reports and resources with our own expertise in energy markets and trends to build these estimates.

Solar Opportunity in Context

To provide a sense of scale for this solar opportunity, consider that a BEB with a 160-kWh battery that recharges to 100% from a 20% state of charge, approximately 195 school days per year, would consume just over 31 MWh annually. This suggests that annual on-site generation at the West Robles Avenue main yard could offset the energy required to fuel at least nine BEBs.

Note that these order of magnitude calculations are exclusive of losses due to battery inefficiencies, any potential consumption for cooling or heating while the bus battery is connected to the grid, and other uncertainties. Furthermore, an economic analysis is necessary to illustrate how TOU electricity rates and projected generation and consumption profiles might interplay with net energy metering policy to determine the actual benefit of installing on-site PV generation to offset BEB energy needs.

[9] Lawrence Berkeley National Laboratory (Barbose, Galen, and Naim Darghouth). October 2019. "Tracking the Sun: Pricing and Design Trends for Distributed Photovoltaic Systems in the United States." https://emp.lbl.gov/sites/default/files/tracking_the_sun_2019_report.pdf

Funding and Financing Options

WCTA's highest priority in electrifying its fleet is securing grant funding. This chapter provides information about available programs, resources, and monetization options available to support the procurement of EVs, charging equipment, and site infrastructure upgrades. Cadmus researched tradeoffs between financing options, determined barriers to implement, and recommended pathways to navigate around these obstacles. We built on our infrastructure analysis and experience with CEC and other funding programs to provide recommendations to WCTA.

Grant Funding Sources for Electric Vehicle Supply Equipment

There are several EVSE funding opportunities available to WCTA at the local, state, and federal levels; a full list can be found in ***Appendix E***. The most prevalent form of funding for EVSE comes from grants. The California Air Resources Board (CARB), the Bay Area Air Quality Management District, and the CEC have become local and statewide leaders in EV and EVSE grants. WCTA should consider applying to one or more of the following funding opportunities:

- CEC School Bus Replacement program
- Carl Moyer program (CARB and BAAQMD)
- Better Utilizing Investments to Leverage Development (BUILD) Discretionary Grant program (USDOT)
- Diesel Emissions Reduction Act School Bus Rebate program (US EPA)
- Lower-Emission School Bus program (CARB)
- Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) program (CARB and CALSTART)

When applying to grants, it is critical that WCTA understands the eligibility requirements and terms and conditions of the potential contract, as some opportunities have very specific objectives and eligibility criteria. Several grants show preference for identified disadvantaged communities and low-income areas, of which the West Robles Avenue site is located in, which may give WCTA an advantage in applications. It is also important to remember that grant funding, especially on the state and federal level, is very competitive. As solicitations are posted to federal and state grant pages continually throughout the year, WCTA should regularly check these sites to identify new opportunities and should also continue to search for additional opportunities outside of grants to help offset EV infrastructure costs.

Additional Funding and Financing Considerations

In addition to grant funds, there are several other pathways to secure EV and EVSE infrastructure funding and financial assistance. There are cooperative purchasing opportunities that can help reduce the up-front costs of EVSE. Although the California Department of General Services does not currently have an electric school bus co-op program, there are other relevant co-op purchasing contracts available. Sourcewell, a Minnesota service cooperative, has several national contracts with EV and

infrastructure vendors, including Lion Electric Buses, Thomas Built Buses, and Blue Bird Bus.[10] Additional co-op purchasing contracts may be available or become available in the future (and WCTA should monitor the market for these opportunities). If existing co-op agreements are not satisfactory to WCTA's needs, WCTA may benefit from coordinating EVSE procurements with other agencies that want to electrify their vehicle fleets.

A few of the programs included in ***Appendix E*** are not currently feasible for WCTA's purposes due to eligibility criteria on this year's grant offerings, cost effectiveness requirements, current ownership status, deadlines, or other provisions. Despite WCTA's current ineligibility, the funding mechanisms of these opportunities may change over time and can become viable opportunities for WCTA's electric fleet development. For example, medium- and heavy-duty trucks are increasingly considered for electrification; while these vehicles are not the same as school buses, the charging infrastructure can be similar. Another option to closely track in coming years is on-bill financing provided through WCTA's utility. On-bill financing is an increasingly popular method for utility customers to obtain clean energy upgrades; the utility takes on the costs of the upgrade and then the customer repays their investment as a monthly charge on their utility bill. On-bill financing for EVSE is not presently available through PG&E, which currently has programs primarily focused on energy efficiency efforts. SCP has indicated a willingness to work with partner agencies to expand their on-bill financing program for electric buses. If EV infrastructure eventually becomes eligible for on-bill financing, the financing arrangement will need to carefully specify that the savings accrued from the program will be able to compensate for infrastructure costs.

A common challenge for fleets that are transitioning to EVs is justifying the upfront costs by anticipating ongoing savings.[11] The annual operational costs of electric fleets are typically much lower than required for a comparable diesel or propane fleet. However, the up-front cost of EVs, including the purchase and installation of charging infrastructure in addition to the vehicle, can significantly exceed those of fossil fuel models, especially if those fossil fueled vehicles are refueled offsite. This results in misalignment with traditional budgeting processes and a need for cultural shift within fleets during the transition. Whereas internal combustion engine buses require higher operational budgets, electric buses require a higher share of funding for capital expenditures.

It's important to note that WCTA is currently installing new refueling infrastructure to support its CNG fleet and should consider the cost differential between EVSE and CNG infrastructure. Including the fuel tank, air compressors, equipment maintenance, and fuel, the cost differential to electrify a portion of the fleet and install EVSE may be minimal.

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[10] Sourcewell. "Cooperative Purchasing." https://www.sourcewell-mn.gov/cooperative-purchasing?utm_campaign=Cooperative+Purchasing&utm_source=google&utm_medium=ppc&utm_term=%2Bcooperative%20%2Bpurchasing&utm_content=2733316xCjwKCAiA4o79BRBvEiwAjteoYGdyr6uwUDXuWXJfx6B2KYuI79vNZIRp-jiDoqtH_5y0uftltyN8PxoCASwQAvD_BwE

[11] Corpin, Tony. 2014. "Buy, Lease or Finance Your School Buses?" *School Transportation News*, October 19. https://stnonline.com/blogs/buy-lease-or-finance-your-school-buses/

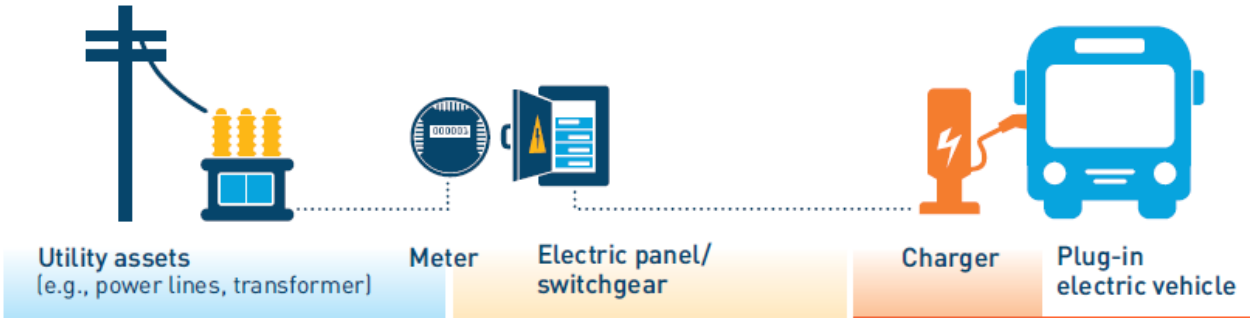
In addition to grant programs, WCTA should also consider traditional financing options, including lease purchases, municipal leases, terminal rental adjustment clause leases, and loans. Manufacturers of EVs and EVSE typically have financial partners develop customized financial products for school districts and commercial school bus contractors. The option to lease or use financing to acquire BEBs can ameliorate the effect of this budgetary misalignment.

Leases and financing spread these higher up-front costs for electric buses over the lifetime of the vehicles, more closely mirroring typical cash flows for fleet managers. This also allows fleets to implement a nimbler procurement strategy—WCTA may choose to lease a vehicle today, while the technologies continue to develop, and purchase in the future, once the industry is more mature. The costs of buying EVSE outright includes installation, hardware, software, and maintenance plans, whereas leasing will include those costs in periodic payments over a specified term. If leasing the required infrastructure, WCTA will still be responsible for the large amount of up-front installation costs. Note that leasing infrastructure may limit WCTA's ability to benefit from grant programs, which it may depend on for BEB procurement.

PG&E EV Fleet Program

PG&E created its EV Fleet program, outlined in Figure 18, to support state efforts to eliminate tailpipe emissions and increase EV operations. Through this program, PG&E offers dedicated electrical infrastructure design and construction services, significant cost offsets for electrical infrastructure work, and additional EV charger rebates for eligible medium- and heavy-duty equipment.

Figure 18. PG&E EV Fleet Program Overview



Source: Pacific Gas and Electric Company. 2019. "Boost Sales with PG&E's EV Fleet Program." https://pgemarketing.app.box.com/s/7yc6xh96fs0wbzlbm7088eqhnlscamnm

For "to-the-meter" infrastructure, PG&E coordinates the engineering, procurement, and construction, and owns and maintains infrastructure up to meter panel. For behind-the-meter infrastructure, the customer pays for, constructs, owns, and maintains infrastructure downstream of the meter. PG&E currently offers (1) a customer-side, make-ready infrastructure incentive that is capped at the lesser of $4,000 per EV school bus or 80% of customer construction costs and (2) a charger rebate, for school and transit buses, of 50% of the cost of EV charger (with upper limits based on the charger's power output). WCTA would be eligible for this program even as an SCP customer. Per the program rules, WCTA needs to have the authority to install charging infrastructure on their site, meaning they either own or rent the

property. Additionally, WCTA would need to show commitment by obtaining at least two EVs over the span of the program. The infrastructure can be designed to accommodate future procurement plans over the five-year program. Applicants must agree to provide PG&E with their charger usage data for at least five years after the chargers are installed and must make a 10-year commitment to use the chargers after installation.

When applying to PG&E's EV Fleet program, WCTA needs to provide several pieces of information:

- ***Proof of EVs:*** a paid invoice, grant approval, or letter from a board member or owner on future procurement schedule
- ***Site location:*** to verify that the charger locations examined are sufficient
- ***Site plan:*** to aid in charging infrastructure design and configuration
- ***Charging infrastructure type:*** to select the charger company, model, and size (kilowatts) to immediately begin the design and electrical planning

WCTA must use a qualified, network-connected smart charger to qualify for the EV Fleet program rebate; this allows the charger to be programmed to charge when cheaper energy is available. The exact charger details can be adjusted as the planning and design process proceeds. Finally, the BEV rate requires that EVSE be metered separately from other loads to accurately assess ESVE usage. The EVSE recommendations provided in this report include consideration of PG&E's approved vendor list and should be sufficient to initiate the application process with PG&E.

Funding Sources for Solar

This report focuses on BEB deployment and does not include an in-depth analysis of how to fund or finance solar. It is still worthwhile to continue to monitor for programs and opportunities that would make solar installation worthwhile. There are several good resources that provide a primer on various procurement approaches (such as from SolSmart and the U.S. Environmental Protection Agency).[12] It is important to note that there may be opportunities to obtain funding in surprising ways, such as the Low or No Emissions Vehicle program that supports not only vehicle and infrastructure procurement, but also clean energy deployment like solar PV. ***Appendix A*** has a comprehensive list of local, state, and federal incentives. WCTA should also monitor for the availability of emerging grant or incentive programs over time.

Low Carbon Fuel Standard Credits

Credits under the Low Carbon Fuel Standard (LCFS) are available to electric bus fleets. The LCFS could provide WCTA with a lucrative additional value stream through 2030, when its authorization will expire.

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[12] SolSmart. 2019. "Best Practices for Solar & Electric Bus Charging at Transit Agencies." Webinar. https://solsmart.org/resources/solsmart-webinar-best-practices-for-solar-electric-bus-charging-at-transit-agencies/
U.S. Environmental Protection Agency. 2016. *Guide to Purchasing Green Power: Renewable Electricity, Renewable Energy Certificates, and On-Site Renewable Generation.* https://www.epa.gov/sites/production/files/2016-01/documents/purchasing_guide_for_web.pdf

Credits are allocated based on the carbon intensity of the electricity used to power the bus and are available to the fleet regardless of whether behind-the-meter resources are installed.

Cadmus estimated the LCFS credit values WCTA could receive under an assumed carbon intensity of 16 gCO2e/MJ (grams of carbon dioxide equivalent per megajoule), which is representative of the SCP generation mix and a gradual decline of available credits through 2030. We assumed WCTA would generate credits from 2022 through 2030, at market price points of $80, $120, and $200, and we assumed market volatility over the next decade. Table 18 summarizes the potential credits for four Type A BEBs and Table 19 summarizes potential credits for 60 Type A BEBs. Under these two scenario assumptions, WTCA could earn $23,585 to $59,129 for from participating in LCFS from 2022 through 2030, based on the level of BEB procurements.

Table 18. Potential Revenue from LCFS Credits for WCTA – Four Type A BEBs

Year	Energy Consumed by WCTA Buses (kWh)	Revenue at Each Market Price Point		
		$80	$120	$200
2022	25,626	$3,331	$4,869	$7,944
2023	25,626	$3,075	$4,869	$7,944
2024	25,626	$3,075	$4,613	$7,688
2025	25,626	$3,075	$4,613	$7,688
2026	25,626	$3,075	$4,613	$7,688
2027	25,626	$3,075	$4,356	$7,432
2028	25,626	$2,819	$4,356	$7,432
2029	25,626	$2,819	$4,356	$7,175
2030	25,626	$2,819	$4,356	$7,175
Total		**$27,164**	**$41,002**	**$68,166**
Net Present Value (assuming 3% discount rate)		**$23,585**	**$35,584**	**$59,129**

Table 19. Potential Revenue from LCFS Credits for WCTA – 60 Type A BEBs

Year	Energy Consumed by WCTA Buses (kWh)	Revenue at Each Market Price Point		
		$80	$120	$200
2022	384,396	$49,971	$73,035	$119,163
2023	384,396	$46,128	$73,035	$119,163
2024	384,396	$46,128	$69,191	$115,319
2025	384,396	$46,128	$69,191	$115,319
2026	384,396	$46,128	$69,191	$115,319
2027	384,396	$46,128	$65,347	$111,475
2028	384,396	$42,284	$65,347	$111,475
2029	384,396	$42,284	$65,347	$107,631
2030	384,396	$42,284	$65,347	$107,631
Total		**$407,460**	**$615,034**	**$1,022,493**
Net Present Value (assuming 3% discount rate)		**$353,780**	**$533,761**	**$886,934**

If WCTA were to install on-site solar PV generation to power its fleet, the site could earn even more LCFS credits. Because solar generation has a carbon intensity of 0 gCO2e/MJ, whereas the carbon intensity of the energy supplied by SCP is just 16 gCO2e/MJ, the delta between the value of an LCFS credit from SCP electricity relative to that from solar electricity is about $0.01 per kilowatt-hour.

As illustrated in Table 20, based on the solar generation capacity that is planned to be installed in the West Robles Avenue new parking area noted under the ***Solar Potential*** section above, WCTA could earn an average of $33,055 to $82,937 per year. These numbers assume the minimum estimated capacity to provide a conservative estimate of potential earning, and that the PV arrays will be online by 2022. These estimates accounts for the gradually decreasing solar production associated with the industry's accepted panel degradation rate. If WCTA were to move forward with the scoped solar project, WCTA could potentially earn up to $746,434 in LCFS credits in the next 10 years.

Table 20. Potential Revenue from LCFS Credits for WCTA – Planned Solar Canopy Scenario

Year	Solar Energy Produced and Consumed by WCTA (kWh)	Market Price Point		
		$80	$120	$200
2022	286,144	$37,199	$54,367	$88,705
2023	284,713	$34,166	$54,095	$88,261
2024	283,290	$33,995	$50,992	$84,987
2025	281,873	$33,825	$50,737	$84,562
2026	280,464	$33,656	$50,484	$84,139
2027	279,062	$33,487	$47,441	$80,928
2028	277,666	$30,543	$47,203	$80,523
2029	276,278	$30,391	$46,967	$77,358
2030	274,897	$30,239	$46,732	$76,971
Total		**$297,499**	**$449,019**	**$746,434**
Net Present Value (assuming 3% discount rate)		**$258,560**	**$390,070**	**$648,110**

Available Technologies

School bus electrification presents opportunities to integrate many other technologies and services to achieve sustainable, resilient systems. This chapter outlines a snapshot of commercially available technologies to guide bus fleets as they navigate planning and procurement decisions.

Battery Electric Buses

Cadmus reviewed several vendors that offer BEB solutions that would be applicable to WCTA. A summary of key decision factors is presented here, while a complete survey of potential vehicle models is provided in ***Appendix F***.

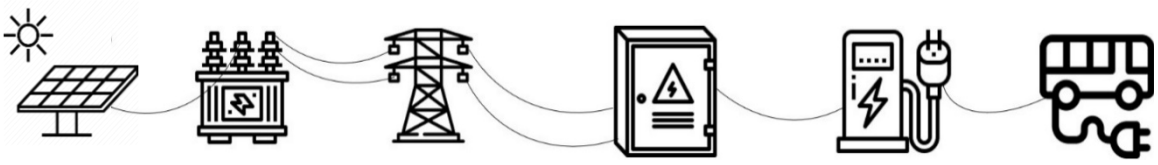
With a multitude of BEBs on the market, the bus selection for each fleet should be based on the expected overall bus performance on each route. The battery weight will affect bus performance and should also be considered. Although some routes have lower daily mileage and energy requirements, there are many benefits to standardizing BEB procurement decisions; for instance, increased flexibility to deploy any WCTA bus on any route, interoperability of charging solutions, and simplified maintenance and customer service.

Electric Vehicle Supply Equipment

The physical EVSE serves as an on-the-ground interface for the power system. It typically will have a screen interface that can be used to input instructions and a large electrical cord that can be inserted into the bus charging port. The connector plug that is inserted into the BEB can be one of several types. ***Appendix C*** reviews products built by a variety of EVSE manufacturers, such as ABB, Broadband Telcom Power, Inc. (BTCPower), ClipperCreek Inc., and SemaConnect.

Figure 19 depicts the power delivery from the power plant and distribution substations to the power lines that transmit power from the grid, then to the stepdown transformer at the bus yard. This transformer will power the EVSE that charges the BEB.

Figure 19. Basic Design of Charging Equipment



Electricity generated by SCP and delivered by PG&E will enter the bus yard, where a stepdown transformer will lower the voltage and connect to a main switchboard that contains the utility meter and main circuit breaker. EVSE connects to the switchboard and can be individually metered and placed on a separate circuit. Most BEB batteries accept the combined charging standard that uses EVSE with AC power.

Charge Management Solutions

A charge management system is an optional component to charging infrastructure design. It allows the fleet manager to track buses' charging, command the EVSE to increase or decrease power levels, prioritize certain buses for charging, and conduct other functions. These features are commonly called smart charging capabilities, and services can come with a wide variety of options.

Smart charging is often treated as a separate service from the physical hardware of an electrical cabinet and EVSE. However, with larger, more complex, or infrastructure-limited electrified fleets, smart charging can become a crucial element for efficient operations. These charge management solutions include features like remote monitoring of bus battery status, prioritizing which buses get charged, and regulating the amount of power each bus receives at any point in time to reduce or mitigate demand charges or subscription fees. These features can be useful tools for managing the power level, time of day, and coincidence of a fleet's charging profile.

Sometimes the EVSE product manufacturer (such as ABB or Proterra) will offer their own charge management service. There are also EV service providers, also known as network providers, who specialize in offering charge management systems as detailed in ***Appendix D***.

Smart Charging Features

The most basic software solution will allow WCTA to remotely monitor the bus battery status (state of charge) while charging. This usually comes in the form of a web portal or application that the fleet manager can access at any time. Basic analysis, such as which buses use the most energy, can be regularly reported to the manager.

More advanced solutions allow the charger to communicate with the utility grid. The data could be passed through in several ways, including aggregated at a network provider's cloud service or individually sent to SCP via the Open Automated Demand Response (OpenADR) 2.0b protocol or using the OpenADR with Open Charge Point Protocol (OCPP). Several charging manufacturers support the OCPP standards, which allows the end user to manage various chargers with one compatible software management system. If fleets procure more than one type of charger, then having the OCPP feature enables interoperability because all the chargers can be managed by a single centralized system.

Fleet managers can use smart charging software to dynamically regulate electricity demand in response to signals from the grid, which will help mitigate demand charges or subscription fees. For example, the Torrance Unified School District is currently working with charge management hardware and software provider Nuvve to demonstrate cost savings from demand management, TOU optimizations, and bi-directional vehicle-to-grid (V2G) load shifting.[13] Decisions about what to do under certain circumstances or the use of specific TOU rates can be made ahead of time, with smart charging software allowing a fleet manager to seamlessly apply those decisions to all EVSEs. Some buses can be prioritized for

[13] Nuvve. 2020. Torrance Electric School Buses. https://nuvve.com/projects/torrance-electric-school-buses/

charging regardless of the utility signal, while others can be reduced or entirely curtailed during a specified event.

The most advanced charge management solutions can even account for on-site energy storage and solar generation. Smart charging software can intelligently integrate energy from on-site generation resources and the grid to meet a specific price threshold. These capabilities can be extremely helpful if WCTA pursues net energy metering or participates in other electricity market programs.

Selecting a Suitable Charging System

To select a suitable charging system, WCTA must consider existing infrastructure capacity, bus battery size, EVSE, and charge management solutions and must weigh four key concepts in the selection processes:

- The system must meet the fleet's energy needs in terms of **total kilowatt-hours needed for daily operation**. This threshold is determined by the number of BEBs, the initial state of charge when charging begins, and the final state of charge after charging is complete.
- The **power demand** is a function of the total kilowatt-hours spread over the amount of time available to charge. It is optimal to allocate energy supply over the available charging window to move as much as possible of the energy consumption to off-peak periods. Lower, slower power charging systems are generally cheaper than faster, higher power charging systems and have less impact on a site's demand charge. It is also often cheaper and easier for the local utility to upgrade the grid connection to the bus yard when the average power demand is lower.
- Another key aspect is the **charger-to-bus ratio**. Because chargers can have a different number of nozzles and varying power levels, certain chargers lend themselves to certain charger-to-bus ratios. While there are lower up-front capital and installation costs for a lower charger-to-bus ratio (such as one-to-three compared to one-to-one), these up-front savings may be accompanied by higher staff costs if sequencing of bus charging is accomplished manually. In this case power demand might also be slightly higher due to losing some of the available charging time when an operator moves one bus off the charger and connects the next bus.
- **Operational constraints** may also be a factor. These include details like the availability of maintenance staff to manually move charger nozzles between buses after one bus is done charging. Another factor might be the ability of the bus battery to accept a given level of power from the EVSE. Some of these issues can be mitigated with smart charging software.

Recommendations and Next Steps

There are several actions WCTA should take to facilitate integration of BEBs into its fleet during the project planning, execution, and implementation phases.

Planning

- ***BEB selection:*** WCTA should consider the tradeoffs in purchasing a higher-range model; the cost increase may be outweighed by the flexibility to serve multiple routes or field trips and sporting events. If WCTA has budget and flexibility in the grant application, pursue a higher range model.
- ***Route design and selection:*** Depending on BEB selection, WCTA should consider slight modifications to route assignments to be more compatible with selected model capabilities. For short-term fleet electrification, WCTA should also consider selecting routes with maximum total daily mileage of 100 miles and at least four hours at the yard between morning and afternoon shifts for recharging.
- ***Develop a plan for funding or financing the investment:*** A principal challenge for WCTA will be securing the up-front capital to cover the incremental cost of a BEB over a diesel (hybrid) bus. WCTA should explore innovative financing solutions and should consider collaboration with SCP, PG&E, or other authorities.
- ***Consider timeline alignment:*** The various procurement timelines for BEBs, EVSE, and electrical infrastructure will be lengthy. WCTA should plan to ensure the electrical infrastructure is in place and operational when a BEB is delivered, and vice versa.

Execution

- ***Collaborate with PG&E:*** WCTA could benefit from engaging with PG&E to ensure that future BEB plans will enable it to seamlessly enroll in the BEV rate. Additionally, WCTA should continue to engage with PG&E to determine what is feasible and to ensure that the utility considers how WCTA's long-term ambitions might inform short-term plans.
- ***Site engineering and design:*** WCTA should contract with an experienced partner for the engineering, design, and construction stages of the BEB transition. The site energy needs, distribution system capacity, and potential electrical infrastructure upgrades discussed in this report are a starting point for more technical and actionable site work. While it is typically easier to upgrade equipment during a new construction project, permitting and regulation challenges may influence WCTA's decisions.

Ongoing Operations

- ***Anticipate and plan for operational challenges with BEB deployment:*** WCTA should pursue driver training around the efficient operation of BEBs to ensure the highest possible range. WCTA should also consider assigning specific staff and BEBs to specific routes for consistency, rather than using a lottery system. WCTA can also hold a few diesel buses out of retirement to operate as spares to complete routes if a BEB or charger is down for maintenance.

Appendices. Research Tables and Background Details

The following appendices outline technology options and funding sources available to electrify fleet vehicles and install behind-the-meter resources to support these efforts.

Appendix A. PV Funding/Finance Options

Cadmus created the financing table below based on desk research, a literature review, and interviews. The table is focused on local and state resources and programs, as well as any opportunities provided through PG&E and SCP. Some of the options listed may not be viable directly for WCTA, such as tax incentives or Property Assessed Clean Energy program (PACE) financing, but are included to provide a holistic depiction of the funding available for energy storage and behind-the-meter resources.

Category	Administrator	Incentive	Equipment	Description	Contact	More Details
The Low or No Emissions Grant						
Federal	Federal Transit Administration	Grant	EV; EVSE; PV	The Low or No Emission competitive program provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses as well as for the acquisition, construction, and leasing of required supporting facilities. Under the FAST Act, $55 million per year was available until fiscal year 2020.	Phone: 202-366-2053 Fax: 202-366-7951	https://cms7.fta.dot.gov/funding/grants/lowno
The Grants for Buses and Bus Facilities Program (49 U.S.C. 5339)						
Federal	Federal Transit Administration	Grant	EV; PV	The Grants for Buses and Bus Facilities program (49 U.S.C. 5339) provides federal resources to states and direct recipients to replace, rehabilitate, and purchase buses and related equipment and to construct bus-related facilities including technological changes or innovations to modify low- or no-emission vehicles or facilities. Funding is provided through formula allocations and competitive grants.	Phone: 202-366-2053	https://www.transit.dot.gov/bus-program

Category	Administrator	Incentive	Equipment	Description	Contact	More Details
California Net Metering Program Aggregation						
State	California Public Utilities Commission (through local utilities)	Financial Credit	PV	Customers who install small solar, wind, biogas, and fuel cell generation facilities to serve all or a portion of on-site electricity needs are eligible for the state's net metering program (NEM). This allows customers to generate energy to serve their own energy needs directly on the site and to receive a financial credit on their electric bills for any surplus energy fed back to their utility. Participation in NEM does not limit customer eligibility for any other rebate, incentive, or credit provided by an electric utility.	Email for general NEM inquiries: Kerry.Fleisher@cpuc.ca.gov Email for NEM revisit inquiries: Brian.Korpics@cpuc.ca.gov	https://www.cpuc.ca.gov/general.aspx?id=3800
Electric Program Investment Charge Program						
State	CEC, PG&E, SDG&E, SCE	Ratepayer Benefits	EV; EVSE; PV	The Electric Program Investment Charge program provides hundreds of millions of dollars annually for the development, deployment, and commercialization of **next generation** clean energy technologies through various grant solicitations regularly posted throughout the year. A competitive program submission will likely require a compelling narrative about the innovation that the project will accomplish, and it is likely not suited for a straightforward/basic PV or charger installation.	Email: ERDD@energy.ca.gov	https://www.energy.ca.gov/programs-and-topics/programs/electric-program-investment-charge-epic-program
Sales and Use Tax Exemption for Electrical Power Generation and Storage Equipment (Assembly Bill 398)						
State	California Department of Tax and Fee Administration	Sales Tax Incentive	PV	On July 25, 2017, California Governor Jerry Brown signed Assembly Bill (AB) 398.1. While the centerpiece of the legislation was to extend California's cap-and-trade emissions control program through 2030, it also expanded California's partial sales and use tax exemption (unchanged at 3.9375%, resulting in taxation at a rate of 3.3125% plus applicable district taxes) for manufacturing and research and development to include, with some limitations, electric power generation and agricultural businesses, effective January 1, 2018 (https://www2.deloitte.com/us/en/pages/tax/articles/ab-398-expands-californias-partial-sales-and-use-tax-exemption.html).	Phone: 800-400-7115	https://www.cdtfa.ca.gov/lawguides/vol1/sutl/6377-1.html

Category	Administrator	Incentive	Equipment	Description	Contact	More Details
Self-Generation Incentive Program						
State	California Public Utilities Commission (through local utilities)	Rebate	Energy Storage	The Self Generation Incentive program (SGIP) is one of the longest-running and most successful distributed generation incentive programs in the country. The SGIP was initially conceived of as a peak-load reduction program in response to the energy crisis of 2001. AB 970 designed the program as a complement to the CEC's Emerging Renewables program, which focused on smaller systems than the SGIP. Since 2001, the SGIP has evolved significantly: it no longer supports solar PV technologies, which were moved under the purview of the California Solar Initiative after its launch in 2006; and it was modified to include energy storage technologies, to support larger projects, and to provide an additional 20% bonus for California-supplied products.	Email: selfgen@pge.com Phone: 877-743-4112, ext. 4, then ext. 3	https://www.cpuc.ca.gov/General.aspx?id=11430
Sonoma County Energy Independence Program						
Local	Sonoma Energy and Sustainability Division	On-Bill Loan and Tariff	PV	The Sonoma County Energy Independence program offers PACE financing for permanent energy, water, wildfire safety, and seismic strengthening improvements through the property tax system. Financing is available for residential, commercial, industrial, agricultural, multifamily, and certain non-profit projects.	Email: SCEIP@sonoma-county.org Phone: 707-565-6470	https://sonomacountyenergy.force.com/financing/s/

Appendix B. Electric Vehicle Supply Equipment Survey

Cadmus created the EVSE survey table below based on desk research of ENERGY STAR® Certified Electric Vehicle Chargers.[14] The table is focused on commercial Level 2 EVSE with higher power output than typical residential EVSE and is intended to provide a high-level overview of the EVSE available on the market. We also cross-checked this list against the PG&E EV Fleet Program Approved Vendor List, highlighting which vendor's products may be eligible for additional incentives at the time of purchase.

Brand	Model	Charging Level	Max Output Current (Amperes)	Input (Volts)	Max Output Demand (kW)	Outputs	Connected Functionality Capable?	Network Protocol with Wake Capability	Approved for PG&E EV Fleet Program? [a]
ChargePoint	CPH25	Level 2	32	240	12	1	Yes	Wi-Fi or Gigabit Ethernet	Yes
	CPF25	Level 2	32	240	12	1	Yes	Wi-Fi or Gigabit Ethernet	Yes
	CT4000	Level 2	32	240	12	1	Yes	Wi-Fi or Gigabit Ethernet, Cellular	Yes
	CT4000	Level 2	32	240	12	2	Yes	Wi-Fi or Gigabit Ethernet, Cellular	Yes
	CPH50	Level 2	50	240	19	1	Yes	Wi-Fi or Gigabit Ethernet	Yes
	CPH12	Level 2	16	240	6	1	Yes	Wi-Fi or Gigabit Ethernet	Yes
Lite-On Technology Corp	IC3-32A-H	Level 2	32	240	12	1	No	Wi-Fi or Gigabit Ethernet, Cellular	No
Loop Inc	EVS-32A-L2-001	Level 2	32	240	12	1	No	Wi-Fi or Gigabit Ethernet, Cellular	No
Nuvve PowerPort	PowerPort	Level 1/ Level 2 Dual Input	80	240	30	1	No	Wi-Fi or Gigabit Ethernet	Yes
SemaConnect	SemaConnect	Level 2	30	240	11	1	No	Cellular	Yes
SolarEdge	DCD-1PH-US-V2H	Level 2	40	240	15	1	No	None	No
	SE-EV-SA-US-40 [a]	Level 2	40	240	15	1	Yes	Wi-Fi or Gigabit Ethernet	No
TELLUS	Dual Pedestal and Wall Mount EVSE	Level 2	30	240	11	1	No	Wi-Fi or Gigabit Ethernet	No
Webasto Charging Systems, Inc.	EVSE-DXyy32	Level 2	32	240	12	1	Yes	None	No
	EVSE-TC3834	Level 2	12	120	2	1	No	None	No
ClipperCreek, Inc.	HCS-80	Level 2	64	240	24	1	No	None	No

[14] ENERGY STAR. n.d. "ENERGY STAR Certified Electric Vehicle Chargers." https://www.energystar.gov/productfinder/product/certified-evse/results?formId=1732-0-43-06-968348114&scrollTo=2180&search_text=&product_type_filter=Level+2&brand_name_isopen=0&max_nameplate_output_current_a_isopen=0&markets_filter=United+States&zip_code_filter=&product_types=Select+a+Product+Category&sort_by=partial_on_mode_input_power_w&sort_direction=asc&page_number=0&lastpage=1

Brand	Model	Charging Level	Max Output Current (Amperes)	Input (Volts)	Max Output Demand (kW)	Outputs	Connected Functionality Capable?	Network Protocol with Wake Capability	Approved for PG&E EV Fleet Program? [a]
	HCS-D50	Level 2	40	240	15	2	No	None	No
Electric Motor Werks Inc	JuiceBox Pro 40	Level 2	40	240	15	1	No	Wi-Fi or Gigabit Ethernet	No
Enel X North America, Inc	2JBO401RNA-PJWX-200	Level 2	40	240	15	1	Yes	Wi-Fi or Gigabit Ethernet	No
	2JBO481RNA-HBWX-200	Level 2	48	240	18	1	Yes	Wi-Fi or Gigabit Ethernet	No
EV-Box North America Inc	EVSE	Level 2	32	120	6	1	No	Cellular	Yes
LiquidSky Technologies, Inc.	QuadZilla	Level 2	80	240	30	4	No	None	No
	WattZilla Series Uno	Level 2	80	240	30	1	No	None	No
	WattZilla Duo	Level 2	80	240	30	2	No	None	No
FLO	FLO CoRe+	Level 2	30	240	11	1	Yes	Other Local Area Network	No
Addenergie Technologies Inc	FH-1-STA-G5	Level 2	30	240	11	1	No	Other Local Area Network	No
	FH-1-STA-X5	Level 2	32	240	12	1	No	Other Local Area Network	No
Blink	Blink IQ 200 Smart	Level 2	80	240	30	1	No	Wi-Fi or Gigabit Ethernet, Other Local Area Network	No
	Blink IQ 200 Advanced	Level 2	80	240	30	1	No	Wi-Fi or Gigabit Ethernet, Other Local Area Network, Cellular	No
BTCPower	30 amp, dual-port, L2 EVSE	Level 2	30	240	11	2	Yes	Wi-Fi or Gigabit Ethernet	Yes
	40 amp, dual-port, L2 EVSE	Level 2	40	240	15	2	Yes	Wi-Fi or Gigabit Ethernet	Yes
	70 amp, single-port, L2 EVSE	Level 2	70	240	26	2	Yes	Wi-Fi or Gigabit Ethernet	Yes
	30 amp, single-port, L2 EVSE	Level 2	30	240	11	1	Yes	Wi-Fi or Gigabit Ethernet	Yes
	30 amp, single-port, L2 EVSE	Level 2	40	240	15	1	Yes	Wi-Fi or Gigabit Ethernet	Yes

[a] Accessed October 28, 2020. "PG&E EV Fleet Program Approved Vendor List." https://www.pge.com/pge_global/common/pdfs/solar-and-vehicles/your-options/clean-vehicles/charging-stations/ev-fleet-program/EV-Fleet-Program-Approved-Vendors.pdf

Appendix C. Electric Vehicle Supply Equipment Product Review

This appendix provides additional details on four of the EV Fleet–qualifying EVSE models shown in *Appendix B*. The models are commercial Level 2 EVSE ranging from 11 kW to 19 kW of electrical output. The critical attributes of each charger model—including power output, connectors, output voltage, and status of approval for PG&E's EV Fleet program—were provided in *Appendix B*. **It is important to note that this list is not an endorsement of these makes and models by Cadmus or SCP** and it is included to provide the reader with additional background on specific EVSE features, operations, and costs.

SemaConnect
11 kW Level 2 Charger
EV Fleet Program Approved Vendor

Started in 2012, SemaConnect[15] is primarily focused on the commercial and multifamily markets. SemaConnect offers multiple product lines, including the easy-to-configure system shown to the left, designed for custom fleet programs. This 11 kW Level 2 charger enables the system administrator to track the departure and return times and energy delivered to each vehicle, and to monitor charging fees for any public chargers. This system is also capable of scheduling both the start and stop of charging sessions to take advantage of off-peak and partial peak electricity rates. Additionally, the system administrator can receive alerts to notify exceptions in return times, energy delivered, and departure times to maximize the daily success of the entire fleet, with all data generated into a robust set of reports and analytics. The single pedestal product cost roughly $3,600, while the dual head offerings cost roughly $7,200. Commissioning for chargers is free and the first year of management is free, with a $20 per month per charger fee after year one.

Enel X North America, Inc.
18 kW Level 2 Charger, 2JBO481RNA-HBWX-200

Recently branching into the U.S. market, Enel X[16] has facilitated multiple residential pilot programs with utilities. The Enel X product line offers demand response and TOU functionality with easily updatable setpoints. Additionally, Enel X uses customer's needs so that all chargers are not set to begin immediately when TOU off-rate begins. Enel X's commercial wall mount product costs between $1,000 and $1,500, while the commercial pedestal pictured to the left costs between $1,500 and $3,200. The Enel X DC fast charging product will cost between $26,000 and $30,000. Commercial customers are charged $30 per year to provide data to the utilities. Enterprises must pay an additional $120 per port per year (or $499 per year for up to 18 chargers) to access real-time data.

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15 SemaConnect. "Smart EV Charging Stations for Fleet Applications." https://semaconnect.com/products/series7/

16 Enel X. "JuicePedestal." https://evcharging.enelx.com/juicepedestal-ev-charging-station

ChargePoint
19 kW Level 2 Charger, CPH50
EV Fleet Program Approved Vendor

ChargePoint[17] has significant experience across all channels. ChargePoint products are designed to be compatible with demand response, TOU functionality with updatable setpoints, and load shed with 15-minute intervals. The Level 2 CPF50 charging station pictured to the left is designed for use in fleet and multifamily applications. For fleets, CPF50 stations are ideally suited for depot charging. Available as a single- or dual-port station, in pedestal or wall mount and with 18- or 23-foot cable length, the CPF50 can be configured for any electric fueling needs. The CPF50 includes energy management, which lowers both installation and electricity costs with advanced energy management tools such as panel sharing and scheduled charging. The CPF50 stations are also equipped with access control, allowing the system administrator to assign RFID cards to vehicles or drivers and allow only those approved vehicles or drivers to charge at designated stations. No cost data was available at the time of this report writing.

BTCPower
15 kW Level 2 Charger, 40 amp dual port
EV Fleet Program Approved Vendor

BTCPower,[18] based in Santa Ana, California, has a large array of Level 2 AC charging station products for home, workplace, multi-dwellings, and commercial applications. In addition, BTCPower has an extensive line of DC fast chargers to service metro, commercial, workplace, and highway locations to re-charge both electric passenger vehicles and heavy-duty EVs such as electric school buses, shuttle buses, and transit buses. All BTCPower Level 2 chargers are equipped with access control methods such as RFID readers and are supported by all BTCPower charging stations. OCPP is supported by all BTCPower charging stations, which makes them easily integrated with most existing charger network software. No cost data was available at the time of this report writing.

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[17] ChargePoint. "CPF50 Fleet Charging Station." https://www.chargepoint.com/products/commercial/cpf50/

[18] BTCPower (Broadband TelCom Power, Inc.). https://www.btcpower.com/index.php#

Appendix D. Summary of Network Providers

As mentioned in the *Charge Management Solutions* section, data management is typically a separate service from the physical hardware of the EVSE and electrical cabinets. Companies that specialize in this space are called EV service providers or network providers. However, unlike with EVSEs, there are only a small handful of companies that focus on medium- and heavy-duty charging for BEBs. This appendix includes details on a sample of the companies operating in this space.

It is important to note that this list is not an endorsement of these EV service providers or network providers by Cadmus or SCP. It is included to provide the reader with additional background.

The Mobility House offers a software solution to optimize charging infrastructure operation for school bus fleets. Its charging solution helps operators gain control over their fleet by ensuring charging requirements are met, performing automated load balancing for lowest cost operation, allowing operators to monitor and control charging events in its customer portal, and offering other add-ons, including solar power integration or billing services.

I/O Control Corporations offers a basic solution that includes remote monitoring and analytics and provides the ability to prioritize charging on specific buses. The Antelope Valley Transit Authority in Lancaster, California is currently using the I/O Control Corporations Health Alert Management System, an onboard telemetry system that interfaces all the electrical subsystems, for its electric buses. This system monitors and provides data on bus aspects throughout its route, such as regenerative braking operations, average fuel economy, inter-lock system, HVAC system operations, and state of charge.

Viriciti is well-known for its telematic monitoring system for buses on the road and it offers a solution for managing chargers. Its data management solution can track EVSE performance and enable smart charging capabilities.

Greenlots (Shell Group) is another well-known network provider and is currently working with Foothill Transit on electric buses. Acquired by Shell Group in June 2019, it offers similar services to Viriciti and can assist with any troubleshooting EVSE hardware.

Electriphi is known for its products and technology in electric fleet management. It designs tools for fleet managers, energy utilities, and planning teams to provide a variety of analyses unique to each fleet. Based on algorithms, Electriphi's tools could create a variety of "what if" scenarios to analyze WCTA's fleet and give insight into the energy costs, infrastructure, and the environmental impact of its vehicles.

Nuvve is a leader in vehicle-to-grid (V2G) technology for electric school bus fleets. V2G technology allows the battery in a parked, inactive EV to be used as an energy storage device. Nuvve's V2G solution can be used to earn revenue with grid services, reduce electricity bills through demand charge management, and provide emergency back-up power for school bus fleets. Nuvve is currently working with the Torrance Unified School District's Blue Bird Fleet in Los Angeles County and the Rialto Unified School District's Blue Bird BEB fleet in San Bernardino County.

Appendix E. Electric Vehicle Infrastructure Funding/Finance Options

Cadmus created the financing table below based on desk research, a literature review, and interviews. The table is focused on local and state resources and programs, as well as any opportunities provided through PG&E and SCP. Some of the options listed may not be viable directly for WCTA, such as tax incentives or PACE financing, but are included to provide a holistic depiction of the funding available for energy storage and behind-the-meter resources.

Category	Administrator	Incentive	Equipment	Description	Contact	More Details
Carl Moyer Memorial Air Quality Standards Attainment Program						
State	CARB	Grant	EV	The Carl Moyer Memorial Air Quality Standards Attainment program provides incentive grants for cleaner-than-required engines, equipment, and other sources of pollution providing early or extra emission reductions. Each category listed in the website is linked to information pertaining to project and applicant eligibility.	Email: 8666DIESEL@arb.ca.gov Phone: 866-634-3735	https://ww2.arb.ca.gov/our-work/programs/road-heavy-duty-voucher-incentive-program
CEC School Bus Replacement Program						
State	CEC	Grant	EV; EVSE	More than $94 million is available through the School Bus Replacement program for public school districts, county offices of education, and joint power authorities, most of which will support replacing old diesel school buses with pollution-free EVs.	Email: Schoolbusprogram@energy.ca.gov Phone: 855-279-6381	https://www.energy.ca.gov/transportation/schoolbus/
Diesel Emissions Reduction Act School Bus Rebate Program						
Federal	U.S. Environmental Protection Agency	Rebate	EV	The U.S. Environmental Protection Agency offers rebates in addition to grants to reduce harmful emissions from older, dirtier diesel vehicles. The rebate program has funded vehicle replacements or retrofits for almost 2,000 vehicles. Typically, the rebate application period opens in the fall and projects are completed in less than one year.	Email: CleanDieselRebate@epa.gov	https://www.epa.gov/dera/rebates
EV Fleet Program						
Private	PG&E	Rebate, Funding	EV; EVSE	Through the EV Fleet program, PG&E constructs, owns, and maintains all electrical infrastructure from the transformer to the customer meter. In select instances, PG&E also covers behind-the-meter infrastructure. Fleet operators design, build, own, operate, and maintain the electrical infrastructure from the customer meter to the EV charger.	Statement of Interest Submission: https://energyinsight.secure.force.com/EVCustomerInterestFormPage?_ga=2.37500835.2017909394.1595870956-911605784.1595621481	https://www.pge.com/en_US/large-business/solar-and-vehicles/clean-vehicles/ev-fleet-program/ev-fleet-program.page

Category	Administrator	Incentive	Equipment	Description	Contact	More Details
Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project						
State	CARB, CALSTART	Voucher	EV	CARB, in partnership with CALSTART, launched HVIP to accelerate the adoption of cleaner, more efficient trucks and buses. HVIP partners work directly with dealers to apply the voucher incentive at the time of purchase.	Email: stella.lingtaylor@arb.ca.gov Phone: 916-322-6369	https://www.californiahvip.org/
Low Carbon Fuel Standard						
State	CARB	Credit	EV; EVSE	The LCFS is designed to decrease the carbon intensity of California's transportation fuel pool and provide an increasing range of low-carbon and renewable alternatives, which reduce petroleum dependency and achieve air quality benefits.	Phone: 800-242-4450	https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard
Pay As You Save for Clean Transport						
Private	Energy Efficiency Institute	On-Bill Loan and Tariff	EV	Pay As You Save for Clean Transport reduces the up-front cost of EVs, starting with transit buses, by harnessing a utility's capacity to invest in on-board batteries and recover its cost as a service charge.	Contact: Harlan Lachman Email: harlan@eevit.com Phone: 802-879-8895	https://www.cleanenergyworks.org/clean-transit/ https://nylcv.org/news/pays-a-financing-model-for-school-bus-electrification/
The Low or No Emissions Grant						
Federal	Federal Transit Administration	Grant	EV; EVSE; PV	The Low or No Emission competitive program provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities. Under the FAST Act, $55 million per year was available until fiscal year 2020.	Phone: 202-366-2053 Fax: 202-366-7951	https://cms7.fta.dot.gov/funding/grants/lowno
Lower-Emission School Bus Program						
State	CARB	Grant	EV	The Lower-Emission School Bus program provides funds to purchase new buses to replace old, high-emitting public school buses, and to equip in-use diesel school buses with retrofit devices that significantly reduce toxic particulate matter emissions.	Email: 8666DIESEL@arb.ca.gov Phone: 866-634-3735	https://ww2.arb.ca.gov/our-work/programs/lower-emission-school-bus-program/about

Category	Administrator	Incentive	Equipment	Description	Contact	More Details
BUILD Discretionary Grant Program						
Federal	U.S. Department of Transportation	Grant	EV; EVSE	In 2018, the Federal Transit Administration replaced the Transportation Investment Generating Economic Recovery grant program with the BUILD grant program. Despite the name change, both programs are similar, providing competitive grants to local governments to update their transportation systems.	Email: BUILDgrants@dot.gov Phone: 202-366-0301	https://www.transportation.gov/BUILDgrants
California Electric Vehicle Infrastructure Project						
State	California Electric Vehicle Infrastructure Project	Grant	EVSE	The incentives provided through the California Electric Vehicle Infrastructure Project simplify the funding process and accelerate charger deployment compared to the previously used grant solicitations. Each project provides incentives for infrastructure in specific regions throughout the state, with funding targeted at regions that have low rates of infrastructure installation or that lack adequate incentives from utilities and other sources.	Email: calevip@energycenter.org Phone: 858-429-5205	https://energycenter.org/program/california-electric-vehicle-infrastructure-project
Community Health Protection Fund						
Local	Bay Area Air Quality Management District	Grant	EV; EVSE	Community Air Protection is part of California Climate Investments, a statewide program that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment—particularly in disadvantaged communities.	Email: grants@baaqmd.gov Phone: 415-749-4994	https://www.baaqmd.gov/community-health/community-health-protection-program/grant-program
Congestion Mitigation and Air Quality Improvement and State of Good Repair						
Federal	U.S. Department of Transportation	Grant	EV; EVSE	The FAST Act continued the Congestion Mitigation and Air Quality program to provide a flexible funding source to state and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas).	Contact: Ms. Cecilia Ho, Office of Natural Environment Phone: 202-366-9862 Alternative Contact: Ms. Diane Mobley, Office of the Chief Counsel Phone: 202-366-1366	https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm

Category	Administrator	Incentive	Equipment	Description	Contact	More Details
Sustainable Transportation Equity Project						
State	CARB	Grant	EV; EVSE	The Sustainable Transportation Equity Project (STEP) aims to address community residents' transportation needs, increase residents' access to key destinations (such as schools, grocery stores, workplaces, daycare facilities, community centers, and medical facilities), and reduce greenhouse gas emissions. STEP funds projects that are priorities for historically underserved and overburdened residents by requiring that projects center the knowledge and expertise of residents through all phases of project design, implementation, and evaluation. STEP can fund many different types of projects to ensure that STEP funds can help meet the needs of each community within that community's context.	Contact: Bree Swenson Email: step@arb.ca.gov Phone: 916-440-8284	https://ww2.arb.ca.gov/our-work/programs/low-carbon-transportation-investments-and-air-quality-improvement-program/low
Urbanized Area Formula Funding Program						
Federal	U.S. Department of Transportation	Grant	EV; EVSE	The Urbanized Area Formula Funding program (49 U.S.C. 5307) makes federal resources available to urbanized areas and to governors for transit capital and operating assistance in urbanized areas and for transportation-related planning. An urbanized area is incorporated and is designated as having a population of 50,000 or more by the U.S. Department of Commerce, Bureau of the Census.	Phone: 202-366-2053	https://www.transit.dot.gov/funding/grants/urbanized-area-formula-grants-5307
Clean Transportation Program						
State	CEC	Grant	EV; EVSE	The CEC's Clean Transportation program (also known as the Alternative and Renewable Fuel and Vehicle Technology program) provides funding to support innovation and accelerate the development and deployment of advanced transportation and fuel technologies.	Email: FTD@energy.ca.gov	https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program
The Grants for Buses and Bus Facilities Program (49 U.S.C. 5339)						
Federal	Federal Transit Administration	Grant	EV; PV	The Grants for Buses and Bus Facilities program (49 U.S.C. 5339) makes federal resources available to states and direct recipients to replace, rehabilitate, and purchase buses and related equipment and to construct bus-related facilities including technological changes or innovations to modify low- or no-emission vehicles or facilities. Funding is provided through formula allocations and competitive grants.	Phone: 202-366-2053	https://www.transit.dot.gov/bus-program

Category	Administrator	Incentive	Equipment	Description	Contact	More Details
Electric Program Investment Charge Program						
State	CEC, PG&E, SDG&E, SCE	Ratepayer Benefits	EV; EVSE; PV	The Electric Program Investment Charge program provides hundreds of millions annually for the development, deployment, and commercialization of next generation clean energy technologies through various grant solicitations regularly posted throughout the year.	Email: ERDD@energy.ca.gov	https://www.energy.ca.gov/programs-and-topics/programs/electric-program-investment-charge-epic-program
Volkswagen Environmental Mitigation Trust						
State	CARB	Grant	EV	The Volkswagen Environmental Mitigation Trust provides about $423 million for California to mitigate the excess nitrogen oxide emissions caused by Volkswagen's use of illegal emissions testing defeat devices in certain Volkswagen diesel vehicles. The Trust provides funding opportunities for specified eligible actions that are focused mostly on "scrap and replace" projects for the heavy-duty sector, including on-road freight trucks, transit and shuttle buses, school buses, forklifts and port cargo handling equipment, commercial marine vessels, and freight switcher locomotives. The first installment of funding is currently underway.	Email: vwmititrust@arb.ca.gov Phone: 916-324-7582	https://ww2.arb.ca.gov/our-work/programs/volkswagen-environmental-mitigation-trust-california/about

Appendix F. Battery Electric School Bus Technology Survey

Bus Size Class	Bus Original Equipment Manufacturer	Model	Battery Capacity (kWh)	Original Equipment Manufacturer-Rated Range (miles)	Performance (kWh/mi) [a]	Passenger Capacity (seating)	Charger Power Acceptance	Cost	Website
A	Blue Bird	Micro Bird G5 Electric	88	100	N/A	30	19.2	N/A	Link
	Lion	Lion A, Low Range	80	75	1.1	26	19.2	$260,000	Link
	Lion	Lion A, High Range	160	150	1.1	26	19.2	$330,000	Link
	Motiv	Collins EPIC E-450	127	120	N/A	20	15	N/A	Link
	Motiv	Trans Tech EPIC F-450	127	120	N/A	20	15	N/A	Link
C	Blue Bird	Vision Electric	155	120	N/A	77	19.2	N/A	Link
	Lion	Lion C, Low Range	88	100	1.26	72	19.2	$305,000	Link
	Lion	Lion C, High Range	220	155	1.26	72	19.2	$365,000	Link
	Thomas Built/Proterra	Saf-T-Liner eC2/Jouley	220	149	1.474	81	24	$400,000	Link
	Thomas Built/Proterra	Saf-T-Liner eC2/Jouley	220	149	1.474	81	60	$400,000	Link
	IC Bus	Charge E [b]	105 to 315	100 to 200	N/A	-	Level 1 or 19.2	N/A	Link
	Motiv	Starcraft Epic F-59	127	120	N/A	47	15	N/A	Link
D	Blue Bird	All-American RE Electric	155	120	N/A	84	19.2	N/A	Link
	Lion	Lion D, Low Range	88	100	1.26	84	19.2	$306,000	Link
	Lion	Lion D, High Range	220	155	1.26	84	24	$366,000	Link
	Lion	Lion D, High Range	220	155	1.26	84	60	$366,000	Link
	GreenPower	Synapse 72, Low Range	100	100	N/A	72	19.2	N/A	Link
	GreenPower	Synapse 72, High Range	200	150	N/A	72	19.2	N/A	Link

[a] For modeling purposes, Cadmus assumed BEBs with unpublished or unavailable performance data have a theoretical performance of 1.4 kWh/mi.

[b] The data made available by the developer does not provide model-specific breakdowns.