**AGENDA**
**REGULAR BOARD OF DIRECTORS MEETING**
**WEDNESDAY, DECEMBER 7, 2022 – 10:00 AM.**
GCTD ADMINISTRATIVE FACILITY
1901 AUTO CENTER DRIVE
OXNARD, CA 93036-7966
www.GoldCoastTransit.org

**The meeting will be IN PERSON / HYBRID**
**Hybrid / Remote Participation is available via ZOOM Webinar**
https://us02web.zoom.us/j/82770817518

DUE TO THE THREAT OF THE NOVEL CORONAVIRUS (COVID-19), GOVERNOR NEWSOM DECLARED A STATE EMERGENCY, AND THIS DECLARATION IS STILL IN EFFECT. IN ACCORDANCE WITH AB 361 AND AT THE RECOMMENDATION OF THE VENTURA COUNTY PUBLIC HEALTH OFFICER, THE MEETING WILL BE VIRTUAL. AB 361 ALLOWS THE DISTRICT TO HOLD BOARD MEETINGS VIA TELECONFERENCING AND ALLOWS FOR MEMBERS OF THE PUBLIC TO OBSERVE AND ADDRESS THE MEETING TELEPHONICALLY OR ELECTRONICALLY.

MEMBERS OF THE PUBLIC MAY PARTICIPATE IN THE BOARD MEETING EITHER **IN PERSON AT 1910 Auto Center Drive, Oxnard, CA, OR** EMAILING THEIR PUBLIC COMMENTS TO THE CLERK OF THE BOARD PRIOR TO 9:00 AM ON DECEMBER 7, 2022. IN ADDITION, MEMBERS MAY PARTICIPATE IN THE MEETING BY LOGGING INTO ZOOM **HERE.** ANY MEMBER OF THE PUBLIC REQUESTING ACCOMMODATION TO PARTICIPATE IN THIS MEETING VIA PHONE MAY CONTACT THE CLERK OF THE BOARD PRIOR TO 9:00 AM ON DECEMBER 7, 2022, AT 805-483-3959 X 160 OR ADELGADO@GCTD.ORG.

## CALL TO ORDER

## ROLL CALL

Chair – Bryan MacDonald, City of Oxnard
Vice Chair – Matt LaVere, County of Ventura
Director – Mike Johnson, City of Ventura
Director – Richard Rollins, City of Port Hueneme
Director – Randy Haney, City of Ojai

## CEREMONIAL CALENDAR

- **Pledge of Allegiance**
- **Employee Recognition**
  Efrain Avalos, Ops Supervisor, 15 years
  Alonzo Houston, Bus Operator, 5 years
  Manuel Contreras, Mechanic II, 5 years

## GENERAL PUBLIC COMMENT PERIOD

The GCTD Board of Directors will consider public comment for business matters that are not on the agenda. Each speaker is limited to three (3) minutes. The presiding officer shall enforce the time limit. Such matters cannot be discussed by the Board at the time of presentation but may be referred to the general manager/secretary for administrative action or public report at a later meeting or scheduled on a subsequent agenda for consideration. This rule shall not prohibit a member of the Board, at this time, from briefly responding to a public statement, or question or proposed initiative, as provided in Government Code Section 54954.2. Speakers are requested to complete a green speaker form, available from the Clerk of the Board, and file it with the Clerk before speaking.

## BOARD OF DIRECTORS' REPORTS

**AGENDA REVIEW** - Any changes to the agenda may be made at this time.

## CONSENT AGENDA

1. Consider Approval of Minutes of November 2, 2022, Board of Directors Meeting
2. Report of Contracts Awarded – Marlena Kohler, Purchasing Manager & DBE Officer
3. Consider Reconfirming Resolution 2021-09 Authorizing Virtual Board and Committee Meetings Pursuant to AB 361 - Vanessa Rauschenberger, General Manager

## GENERAL MANAGER'S REPORT

4. **General Manager's Report –** Vanessa Rauschenberger, General Manager

## FORMAL ITEMS - PUBLIC COMMENTS ON AGENDA ITEMS

The GCTD Board of Directors will consider public comment on any item appearing on the agenda at the time that agenda item has been called by the presiding officer and after the staff report has been given. Each speaker is limited to five (5) minutes comment total on all agenda items. Speakers are requested to complete a green speaker form, available from the Clerk of the Board or on the speaker's podium, and file it with the Clerk before speaking.

5. **Election of Board Officers for 2023 –** Vanessa Rauschenberger, General Manager

6. **Consider Approval of Board of Directors Meeting Schedule for Calendar Year 2023** – Vanessa Rauschenberger, General Manager

7. **Consider ReAuthorization of Public Transportation Safety Plan (PTASP)–** Alex Zaretsky, Director of Human Resources

8. **Consider Adoption of Final Zero Emissions Transition Plan –** James Beck, Director of Operations & Maintenance

## INFORMATIONAL ITEMS

9. **Receive Update and Presentation on Operations and Maintenance Departments –** James Beck, Director of Operations and Maintenance

10. **Receive Update and Presentation on Upcoming January 2023 Service Changes –** Austin Novstrup, Transit Planner II

11. **Future Agenda Items –** Vanessa Rauschenberger, General Manager

## CLOSED SESSION

- None

The next regular meeting of the GCTD Board of Directors will be held on **JANUARY 4, 2023, at 10:00 AM at 1901 Auto Center Drive, Oxnard, CA 93036.** Copies of administrative reports relating to the Board agenda are available online at www.GoldCoastTransit.org or from the Clerk of the Board, Gold Coast Transit District, 1901 Auto Center Drive, Oxnard, CA, 93036-7966.

IN COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT, IF YOU NEED SPECIAL ASSISTANCE TO PARTICIPATE IN THE MEETING, PLEASE CONTACT THE CLERK OF THE BOARD AT (805) 483-3959, Ext. 160, OR E-MAIL adelgado@gctd.org OR THROUGH THE CALIFORNIA RELAY SERVICE AT 711. NOTIFICATION 72 HOURS PRIOR TO THE MEETING WILL ENABLE GCTD TO MAKE REASONABLE ACCOMMODATIONS TO ENSURE ACCESSIBILITY TO THE MEETING.

# EMPLOYEE RECOGNITIONS

December 2022

# Manuel Contreras,

## Mechanic II

## 5 Years Service Award

Manuel Contreras was hired as a Mechanic I on December 11, 2017 and was promoted to Mechanic II on July 24, 2022. In his spare time, he likes to watch football and work on classic cars.

He is a hard-working individual and hopes to be with the District for many more years to come.

# Alonzo Houston,

## Bus Operator

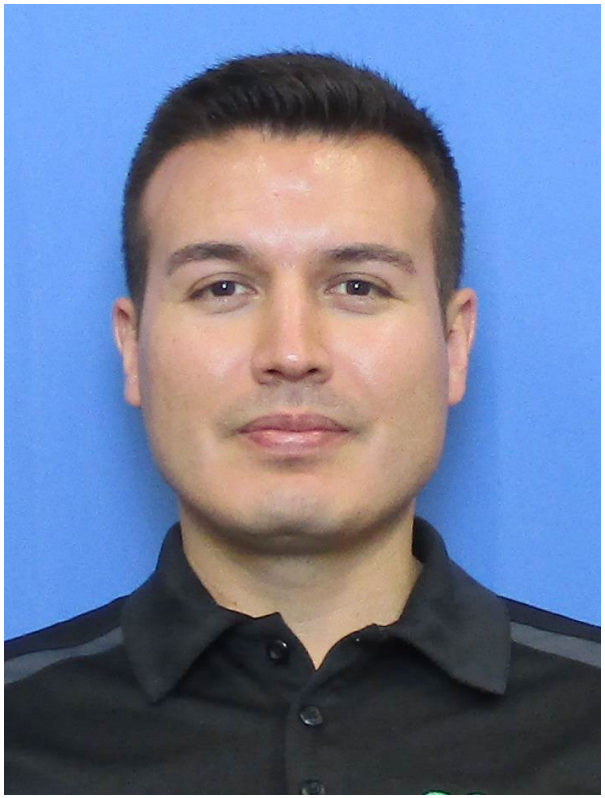
## 5 Years Service Award

Alonzo always finds joy with whatever he is doing. It could be driving a bus, helping us with a bus trade, or covering the shuttle that everybody hesitates to do. He is a fun person to be around and has plenty of love for everyone. Alonzo says he loves to work at GCTD because it's an easy job and gets to help passengers.

Thank you, Alonzo, for your service.

# Efrain Avalos,

## Operations Supervisor



## 15 Years Service Award

Efrain joined Gold Coast 15 years ago. After he was out of the extra board shift, he covered the CSC office for several months and then became a transit supervisor.

He’s one of our senior supervisors now!

Thank you, Efrain, for your service.

**Item #1**

# MINUTES OF THE REGULAR BOARD OF DIRECTORS MEETING
# WEDNESDAY, NOVEMBER 2, 2022 – 10:00 am.
# THIS MEETING WAS HELD IN PERSON & VIA ZOOM (HYBRID)

## Call to Order

Chair Bryan MacDonald called the regular meeting of the Board of Directors of Gold Coast Transit District to order at 10:05 am at the GCTD Administrative Facility, 1901 Auto Center Drive, Oxnard, California, and via Zoom. Due to COVID-19, this meeting was also made available via Zoom for the public.

## Roll Call

Chair Bryan MacDonald – City of Oxnard
Vice-Chair Matt LaVere – County of Ventura
Director Mike Johnson – City of Ventura
Director Richard Rollins – City of Port Hueneme
Director Randy Haney – City of Ojai

## Staff Present

Vanessa Rauschenberger, General Manager
Haviva Shane, General Counsel – Remote via-zoom
Angie Delgado, Clerk of the Board
Alex Zaretsky, Director of Human Resources
Ana Perez, Human Resources Generalist
Dawn Perkins, Director of Finance
James Beck, Director of Operations & Maintenance
Cynthia Torres Duque, Director of Planning & Marketing
Chiharu Endo-Lee, Operations Manager
Marlena Kohler, Purchasing Manager & DBE Officer
Robert Keys, IT Manager
Tanya Hawk, Buyer
Veronica Navarro, Accounting Analyst
Matt De La Rosa, IT Technician
Gil Piñon, Safety & Training Supervisor
Michelle Jillson, Operations Supervisor

## Ceremonial Calendar

Vice-Chair LaVere led the pledge of allegiance.

## Employee Recognition

- **Michelle Jillson, Operations Supervisor - 15 yrs.**
- **Roberto Magana, Operator - 15 yrs.**

Chair MacDonald thanked the employees for their service and stated all employees are the heart and soul of the agency. The efforts of great employees make GCTD.

**General Public Comment**

**None**

**Board of Directors Reports**

**Gil Piñon and Jed Johnson spoke during the public comment period.**

**Consent Agenda**

1. Consider Approval of Minutes of October 5, 2022, Board of Directors Meeting
2. Consider Approval of Expenditures for the Month of July
3. Consider Approval of Expenditures for the Month of August
4. Consider Approval of Expenditures for the Month of September
5. Consider Approval of Budget Income Statement for Month Ending June 2022
6. Report of Contracts Awarded – Marlena Kohler, Purchasing Manager & DBE Officer
7. Consider Reconfirming Resolution 2021-09 Authorizing Virtual Board and Committee Meetings Pursuant to AB 361 - Vanessa Rauschenberger, General Manager

Director Haney moved to approve Consent Agenda Items 1 through 7. Director Rollins seconded the motion.

**The motion passed unanimously.**

## GENERAL MANAGER'S REPORT

8. **General Manager's Report –** Vanessa Rauschenberger, General Manager

Ms. Rauschenberger shared the medals received during the corporate games in which all departments participated as a team. The medals received were a bronze medal in kickball, dodgeball, and bowling. Silver medal in cornhole. Gold medal in Sandcastle, Lazer tag, and tug-a-war. Ms. Rauschenberger stated that to see the employees come together, the effort of the teams, support, and encouragement were the winning prizes for GCTD. Ms. Rauschenberger thanked the corporate game committee and looks forward to next year's events.

Ms. Rauschenberger shared a couple of employees attending Industries Conferences. Currently, Margaret Heath-Schoep, Paratransit & Special Projects Manager, and Robert Lucio, Mobility Management Coordinator, attend California Association for Coordinated Transportation (CALACT). In addition, Ms. Rauschenberger was very pleased to announce Ms. Schoep was re-elected to the CALACT Board to serve as a representative of the South region through 2024.

Ms. Rauschenberger stated she would attend the California Transportation Association (CTA) along with James Beck, Director of Operations & Maintenance. Chiharu Endo-Lee, Operations Manager, and the two employees who won the raffle to attend, Manuel Ayala, Operator, and Lee Judy, Maintenance Material Specialist. GCTD is pleased to send staff to Industry Conferences to gain knowledge and share it with the team.

An update on Strategic Plan, a survey requested by employees, was issued based on the employee focus groups, a total of eight focus groups. In addition, insight Strategies will reach out to board members to wrap up an organizational assessment to help the strategic plan.

The bitter news is that Mr. Matt Miller will depart GCTD as he has accepted a position with Ventura County Transit Commission (VCTC). GCTD wishes Mr. Miller the best and understands the great opportunity for him with his knowledge and serving the community, which will benefit Ventura County and VCTC.

Lastly, GCTD will participate in the fifth year by providing FREE rides to U.S. military veterans on Thursday, November 11, 2021, Veterans' Day, as part of a countywide effort to honor local veterans.

## FORMAL ITEMS - PUBLIC COMMENTS ON AGENDA ITEMS

The Gold Coast Transit District Board of Directors will consider public comment on any item appearing on the agenda at the time that agenda item has been called by the presiding officer and after the staff report has been given. Each speaker is limited to three (3) minutes of comment total on all agenda items. Members of the public must submit their request by email to the Clerk of the Board prior to 9 am on the day of the Board Meeting.

**THERE WERE NO COMMENTS**

**9. Consider Award of Contract for Audit Services to Nigro & Nigro–** Marlena Kohler, Purchasing Manager & DBE Officer

Ms. Kohler stated that A competitive bid process for Audit Services began with the issuance of Request for Quote (RFQ) 23-03 on July 20, 2022. The RFQ aimed to identify and select an independent certified public accounting firm to annually review GCTD's financial records on a fiscal year basis and provide an annual report to the Board. The services are for a three (3) year base period contract with two one-year option years.

The RFQ was publicized on GCTD's and Public Purchase websites, and those on the Bidder's list for the previous RFP were also notified. Three (3) quotes were received. All quotes were considered responsive. An evaluation team independently evaluated, interviewed, and scored each quote. At the conclusion of the evaluation process, Nigro & Nigro received the highest score overall. Their quote is considered fair and reasonable based on adequate competition.

**RECOMMENDATION**
**It is recommended the Board of Directors authorize the award of a contract for Audit Services to Nigro & Nigro in an amount of $59,000 each year not-to-exceed $295,000 for the initial three-year period and the two additional one-year option periods.**

Vice Chair LaVere moved to approve Consider Award of Contract for Audit Services to Nigro & Nigro. Director Haney seconded the motion.

**The motion passed unanimously.**

**10. Consider Award of Contract for Tire Maintenance and Service to Daniels Tires–** Tanya Hawk-Buyer

Ms. Hawk stated a result of a competitive bid the staff is requesting the award of a firm-fixed contract to Daniels Tires for Tires Maintenance and Service. These services are for a one (1) year base period and four (4) one-year option periods for a total contract amount of$676,425.00.

**RECOMMENDATION**
**It Is Recommended the Board of Directors authorize the award of a contract for Tire Maintenance and Service to Daniels Tires in the amount of $135,285.00 for the initial one-year period and $541,140.00 for all four (4) option periods for a total contract amount of $676,425.00 plus an additional 10% ($67,645.00) to cover additional items and/or increases for a total approval amount of $744,070.00**

Chair Mac Donald moved to approve Consider Award of Contract for Tire Maintenance and Service to Daniels Tires. Director Johnson seconded the motion.

**The motion passed unanimously.**

**11. Receive Presentation and Provide Input on Draft Zero Emissions Transition Plan –** James Beck, Director of Operations & Maintenance, David Verbich, Senior Associate Transportation, Stantec

Mr. Beck provided the board members with a presentation. Then, Mr. Verbich, Senior Associate Transportation from Stantec, presented the information to the Board.

**The report was filed and received.**

## INFORMATIONAL ITEMS

**12. Quarterly Human Resources Update – Alex Zaretsky, Director of Human Resources**

**The report was filed and received.**

**13. Fixed Route and ACCESS Flexible Services Quarterly Update –** Cynthia Torres Duque, Director of Planning & Marketing

**The report was filed and received.**

**14. Future Agenda Items –** Vanessa Rauschenberger, General Manager

## CLOSED SESSION

CONFERENCE WITH LABOR NEGOTIATORS - Agency designated representatives: General Manager or designee Employee organization: TEAMSTERS LOCAL 186

## REGULAR SESSION

**15.** Consideration of Proposed COVID-19 Recognition & Incentive Grant (TEAMSTERS LOCAL 186

Reconvene from the Closed Session with a report on Item **#15, Consideration of Proposed COVID-19 Recognition & Incentives Grant (TEAMSTERS LOCAL 186)** The Chair asked the Board to table item #15 and authorize GCTD representatives to meet with Teamsters.

**The motion passed unanimously.**

**There being no further business, Chair MacDonald adjourned the Board of Directors meeting at 11:59 am.**

Minutes recorded by: Angie Delgado, Clerk of the Board of Directors

| | |
|---|---|
| _____ | _____ |
| Vanessa Rauschenberger | Chair Bryan MacDonald |
| Secretary of the Board of Directors | Board of Directors |

Unless otherwise determined by the Board of Directors, the next meeting of the GCTD Board of Directors will be on **December 7, 2022, at 10:00 am.** Copies of administrative reports relating to the Board agenda are available online at www.gctd.org or from the Clerk of the Board, Gold Coast Transit District, 1901 Auto Center Drive, Oxnard, CA 93036.

December 7, 2022 Item #2

**TO** GCTD Board of Directors

**FROM** Marlena Kohler, Purchasing Manager

**SUBJECT** Report of Contracts Awarded.

## SUMMARY

As requested by the Board of Directors on December 2, 2020 and in accordance with the GCTD Purchasing Resolution, staff is to provide a monthly report of all purchases issued by this agency. The attached report lists all purchase orders awarded since the November 2022 Board meeting.

## RECOMMENDATION

**It is recommended that the Board of Directors receive and file this report.**

## GENERAL MANAGER'S CONCURRENCE

Vanessa Rauschenberger
General Manager

Contracts/PO Awarded Report
December 2022

| PO# | Vendor Name | Item Description | City | State | Cost |
|---|---|---|---|---|---|
| **PROCUREMENT** | | | | | |
| P0030274 | INIT INNOVATIONS IN TRANSPORTATION, INC. | Mobile Perdis | CHESAPEAKE | VA | $21,310.00 |
| | | | | **Procurement Total** | **$21,310.00** |
| | | | | | |
| **PARTS** | | | | | |
| M0049428 | GILLIG LLC | FAN ASSEMBLY | LOS ANGELES | CA | $87.32 |
| M0049429 | MARTIN'S PLUMBING & | 2" UNION & 1 1/4 WATER LINE | OXNARD | CA | $2,100.00 |
| M0049430 | LOS ANGELES TRUCK CENTERS, LLC | FILTER, SECONDARY FUEL | PASADENA | CA | $884.14 |
| M0049431 | FRANKLIN TRUCK PARTS | E-10 BRAKE VALVE | CITY COMMERCE | CA | $235.61 |
| M0049433 | SUPERIOR SANITARY SUPPLIES | CLEANING SUPPLIES | OXNARD | CA | $729.33 |
| M0049437 | LOS ANGELES TRUCK CENTERS, LLC | VALVE, FUEL SHUTOFF | PASADENA | CA | $2,010.18 |
| M0049440 | GILLIG LLC | GLASS, ENTRANCE, UPPER | LOS ANGELES | CA | $1,057.47 |
| M0049441 | LOS ANGELES TRUCK CENTERS, LLC | Oil Drain Tube | PASADENA | CA | $1,410.13 |
| M0049442 | THE AFTERMARKET PARTS COMPANY, LLC | SHOCK ABSORBER, FRONT | MINNEAPOLIS | MN | $1,403.41 |
| M0049444 | GREG'S PETROLEUM SERVICE, INC | VALVOLINE PREMIUM BLUE 9200 15W-40 | DELANO | CA | $2,015.18 |
| M0049445 | DANIELS TIRE SERVICE | MERCHANDISE | OXNARD | CA | $697.91 |
| M0049446 | DANIELS TIRE SERVICE | MERCHANDISE | OXNARD | CA | $697.91 |
| M0049447 | PARKHOUSE TIRE, INC. | MERCHANDISE | BELL GARDENS | CA | $2,575.69 |
| M0049448 | PARKHOUSE TIRE, INC. | MERCHANDISE | BELL GARDENS | CA | $3,659.54 |
| M0049449 | PARKHOUSE TIRE, INC. | MERCHANDISE | BELL GARDENS | CA | $4,166.45 |
| M0049450 | GILLIG LLC | CABLE ASM, | LOS ANGELES | CA | $265.69 |
| M0049451 | THE AFTERMARKET PARTS COMPANY, LLC | Ball Joint, Drag Link | MINNEAPOLIS | MN | $115.57 |
| M0049453 | GILLIG LLC | BRAKE PADS | LOS ANGELES | CA | $4,379.21 |
| M0049454 | LOS ANGELES TRUCK CENTERS, LLC | Screw, Hex Flange Head Cap | PASADENA | CA | $1,349.95 |
| M0049455 | THE AFTERMARKET PARTS COMPANY, LLC | WASHER, SEALING | MINNEAPOLIS | MN | $554.03 |
| M0049456 | SUPERIOR SANITARY SUPPLIES | MISC | OXNARD | CA | $1,042.65 |
| M0049457 | GILLIG LLC | FIRE SENSOR 350 | LOS ANGELES | CA | $3,324.76 |
| M0049458 | LOS ANGELES TRUCK CENTERS, LLC | Screw, Hex Flange Head Cap | PASADENA | CA | $749.07 |
| M0049463 | PARKHOUSE TIRE, INC. | MERCHANDISE | BELL GARDENS | CA | $2,966.83 |
| M0049464 | AFFORDABLE AUTO GLASS | PARTS | VENTURA | CA | $832.05 |
| M0049465 | LOS ANGELES TRUCK CENTERS, LLC | COOLANT | PASADENA | CA | $1,179.83 |
| M0049467 | SUPERIOR SANITARY SUPPLIES | CLEANING SUPPLIES | OXNARD | CA | $1,212.15 |
| M0049468 | NATIONAL AUTO BODY&PAINT | BODY LABOR | GOLETA | CA | $5,918.68 |
| M0049470 | KIMBALL MIDWEST | MISC PARTS | COLUMBUS | OH | $581.99 |
| M0049471 | KIMBALL MIDWEST | MISC O-RINGS | COLUMBUS | OH | $564.69 |
| M0049476 | LOS ANGELES TRUCK CENTERS, LLC | Tube, Oil Gauge | PASADENA | CA | $1,301.58 |
| | | | | **Parts Total** | **$50,069.00** |
| | | | | **Grand Total** | **$71,379.00** |
| | | | | Local (Ventura County) | **$7,312.00** |

**Item #3**

**DATE** December 7, 2022

**TO** GCTD Board of Directors

**FROM** Vanessa Rauschenberger, General Manager

**SUBJECT** **Consider Reconfirming Resolution 2021-09 Authorizing Virtual Board and Committee Meetings Pursuant to AB 361**

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## SUMMARY

Since the start of the pandemic, the Board of Directors has been holding its regular board meetings virtually in accordance with Executive Orders issued by the Governor. The Governor has now rescinded those orders as they relate to the virtual meetings, and the legislature has adopted AB 361, reestablishing and amending the requirements to meet virtually.

On November 3, 2021, the Board adopted resolution 2021-09, which authorized the continuation of virtual meetings for 30 days. In order to continue meeting virtually, the Board of Directors is required to make findings reconfirming the continuation of virtual meetings every 30 days.

## BACKGROUND

When the COVID-19 pandemic began, California Governor Gavin Newsom signed an Executive Order that allowed public agencies to meet virtually. The most recent Executive Order, N-33-20, expired on September 30, 2021. On September 16, Governor Newsom signed Assembly Bill (AB) 361. AB 361 gives the option for public agencies to continue meeting virtually until January 1, 2024. This bill allows local agencies to use teleconferencing in compliance with the Ralph M. Brown Act. Pursuant to AB 361, the GCTD Board of Directors must reconsider the continuing need for virtual meetings every thirty (30) days.

Virtual meetings are permitted presently because Governor Newsom has proclaimed a state of emergency. The State of California and many local officials have recommended measures to promote social distancing. If those conditions change, the local agency can still meet virtually if it has determined that physical presence at meetings would present imminent risks to the health and safety of attendees.

## RECOMMENDATION

**It is recommended that the Board consider reconfirming GCTD Resolution 2021-09, declaring the need for continuation of virtual Board meetings, pursuant to AB 361.**

**Date:** December 7, 2022

**To:** Board of Directors

**From:** Vanessa Rauschenberger, General Manager

**Subject:** General Manager's Monthly Report

## Retirement

This month, GCTD congratulates Bob Keys, IT Manager who will be retiring from GCTD after a long career in Transit and IT. Bob joined GCTD in 2014, and lives in Ventura. We thank Bob for all his work over the years and which him the best in his retirement!

## Commendation - Staff Help to Locate Missing Person

On Nov 18th our customer service team received an email regarding a missing woman with a developmental disability who had been missing since November 12th. Due to the proactive efforts of our Customer Service Assistant Rocio Mendez in quickly sharing the information with our Operations team, Bus Operator Claudia Thorpe was able identify the woman at the Oxnard Transit Center, and Supervisor Manny Barajas stayed with her until police and family arrived to take her safely home. Kudos to the teamwork and quick action for helping to ensure a positive outcome.


## New Procurement Website Launched - OpenGov

Gold Coast Transit District has partnered with OpenGov, a web-based electronic bidding and vendor management system, to post all of GCTD's competitive bids. OpenGov lists GCTD's bids and proposals and the corresponding closing dates in an easy to use website. In order to participate in GCTD's competitive procurement process, companies must register in this system. Registration with OpenGov is free. Great job to GCTD's Procurement team Marlena Kholer and Tanya Hawk for working to implement the system and provide training to staff. OpenGov, provides a much more user-friendly layout where each department's procurements and projects are listed and streamlines our workflow.

## CHP Inspections – Passed Successfully

In November, CHP staff were on site and completed their annual inspections of our fleet. GCTD passed all aspects of the inspection. Great job to all departments and staff who worked to keep our fleet in great shape. We are proud of the excellent condition of our fleet and the superb documentation that is kept in the Maintenance, Operations and HR / Risk Management Departments.

## Collaborative Meetings & Outreach Activities

GCTD's expert staff from various departments actively coordinate and participate in multiple meetings to support GCTD's mission. Key meetings attended this last month by GCTD staff included: VCTC's TIES Operator Working Group, and several staff participated

in attending CalPalra (Human Resources), California Transit Associate (CTA) and Cal Act Conferences.

**General Manager Activities**

- Nov 3rd – Met with Central Coast Clean Air Coalition
- Nov 3rd – Met with Ventura County Disability Advocate
- Nov 7th – Participated in VCTC Regional Transportation Plan Advisory Committee
- Nov 8th – Met and Confer with Teamsters
- Nov 8th – Held Coffee with GM in Operations
- Nov 10th – Attended Joint Labor Management meeting
- Nov 15th - Held All Staff Monthly Meeting
- Nov 17th – Attended VCTC TIES Study Operator Working Group Meeting
- Dec 2nd – Ventura County Leadership Academy Site Visit

**7th Annual Holiday Bus**

On Wednesday, November 30, we officially unveiled this year's holiday bus and begin spreading holiday cheer with every trip. The bus features a Candy Cane theme "Have Yourself a Merry Little Bus Ride…." and is FREE all season long. Catch the holiday starting December 1st, through the end of the year.


**Holiday Hours**

A reminder that GCTD will have no service on the following holidays: No Bus Service on Sunday, Dec 25th Christmas Day and Sunday, Jan 1st, New Years Day, and all offices will be closed.

**Keep up with us on the GO**

"Like Us" and Follow Us on Facebook, Twitter, and Instagram, "Like Us" on Facebook @GCTransit - "Follow Us" on Twitter @GoldCoastBus - or "Follow Us" on Instagram @GoldCoastTransit. Sign up online for GCTD's monthly "News on the GO" Newsletter. ***We're on Tik Tok! @goldcoasttransitbus***

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**Item #5**

**DATE** December 7, 2022

**TO** GCTD Board of Directors

**FROM** Vanessa Rauschenberger, General Manager

**SUBJECT** Consider Election of Board Officers for 2023

## 1. Executive Summary

Annually the Board of Directors elects a Chair and Vice Chair as defined in Section 1.1(a) of the District Bylaws. The Bylaws dictate that the election is to be held at the first meeting in December of each calendar year, with the new Chair and Vice Chair taking their positions at the first meeting in January of the following year.

**It is recommended that the Board of Directors elect from its members a Chair and Vice Chair to serve as the officers of the Board for calendar year 2023.**

## 2. Background

Board officers for the past nine (10) years are listed below:

2013 – Chair John Zaragoza, County of Ventura – Vice Chair Carl Morehouse, City of Ventura
2014 – Chair Carl Morehouse, City of Ventura – Vice Chair Paul Blatz, City of Ojai
2015 – Chair Paul Blatz, City of Ojai – Vice Chair Bryan MacDonald, City of Oxnard
2016 – Chair Doug Breeze, City of Port Hueneme – Vice Chair Bryan MacDonald, City of Oxnard
2017 – Chair Bryan MacDonald, City of Oxnard – Vice Chair John Zaragoza, County of Ventura
2018 – Chair John Zaragoza, County of Ventura – Vice Chair Cheryl Heitmann, City of Ventura
2019 – Chair Cheryl Heitmann, City of Ventura – Vice Chair Will Berg, City of Port Hueneme
2020 – Chair Will Berg, City of Port Hueneme – Vice Chair Randy Haney, City of Ojai
2021 – Chair Randy Haney, City of Ojai – Vice Chair Bryan MacDonald, City of Oxnard
2022 – Chair Bryan MacDonald, City of Oxnard – Vice Chair Matt LaVere, County of Ventura

## 3. Recommendation

**It is recommended that the Board of Directors elect from its members a Chair and Vice Chair for calendar year 2023.**

**Item #6**

**DATE** December 7, 2022

**TO** GCTD Board of Directors

**FROM** Vanessa Rauschenberger, General Manager

**SUBJECT** Consider Approval of Board of Directors Meeting Schedule for 2023

## 1. Executive Summary

Regular meetings of the Gold Coast Transit District Board of Directors are held at 10:00 AM on the first Wednesday of each month. For the past year, these meetings have been held in person at GCTD's Administration Office at 1901 Auto Center Drive, in Oxnard, CA. A remote option (hybrid) meeting has also been available to both the public and the Board.

The Board meeting schedule has been amended in the past to accommodate holidays, and special events such as the California League of Cities Annual Meeting, American Public Transportation Association (APTA) conferences and other industry conferences.

- League of CA Cities Conference - September 20-22, 2023 in Sacramento - *no conflict*
- APTA TRANSform Conference - October 8-11, 2023 in Orlando, FL - *no conflict*
- California Transit Association (CTA) Annual Conference - date TBD (Typically Nov)
- Cal Act Conference - April 17-22, Lake Tahoe/Truckee - *no conflict*

Please review the dates below and let me know if any adjustments to the proposed Board of Directors Meeting Schedule for 2023 as listed below are needed.

January 4
February 1
March 1
April 5

May 3
June 7
July 5
August – *Dark*

September 6
October 4
November 1
December 6
January 3, 2024

## 2. Recommendation

**It is recommended that the Board of Directors consider, amend if necessary, and approve the proposed monthly Board meeting schedule for calendar year 2023.**

**DATE** December 7, 2022 **Item # 7**

**TO** GCTD Board of Directors

**FROM** Alex Zaretsky, Director of Human Resources *AGZ*

**SUBJECT** **Annual Recertification Gold Coast Transit District's Public Transportation Agency Safety Plan (PTASP)**

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## SUMMARY

On June 3, 2020, Gold Coast Transit District's Board of Directors certified the Federal Transit Administration (FTA) required Public Transportation Agency Safety Plan (PTASP). The plan was recertified on September 1, 2021.

In accordance with the Public Transportation Agency Plan (PTASP) the Final Rule requires all agencies that receive FTA's Urbanized Area Formula Grants to set safety performance targets in a Safety Plan that is reviewed and certified every year.

This report is a recertification request, with data, and a comparison of the safety targets for the fiscal year July 1, 2021, to June 30, 2022. This report will show the safety targets, compared to the actuals.

In addition, the Bipartisan Infrastructure Law includes new PTASP requirements effective by December 31, 2022.

1. Requirement: strategies to minimize exposure of the public, personnel, and property to prevent exposure to infectious diseases.

   GCTD has established COVID Prevention Programs and a separate Infectious Disease Outbreak Response Plan.

2. Requirement: Forming the Safety Committee, the equal number of frontline employees: The safety committee consists of five front-line represented employees (two SEIU members and three Teamsters). We meet quarterly.

3. Requirement: Risk Reduction Program, including mitigation of assaults on transit workers and deploying barriers. The District has installed barriers in the driver's cabin area and has trained drivers on assault prevention and de-escalation training. The District also adjusted the mirror placement on new bus orders starting in 2019. In addition, maintenance personnel is involved in safety training through monthly safety meetings.

4. Updated the Safety Plan Organizational Chart. Frontline Workers are part of the Agency Safety Plan and attend meetings.

Safety Targets from July 1, 2021, to June 30, 2022

The Safety Performance Measures:

1. Fatalities: total number of reportable fatalities / and rate per total vehicle revenue miles.
2. Injuries: total number of reportable injuries /and rate per total vehicle revenue miles).
3. Safety Events: total number of reportable events /and rate per total vehicle revenue miles.
4. System Reliability: mean distance between major mechanical failure

**Safety Performance Targets**

*Specify performance targets based on the safety performance measures established under the National Public Transportation Safety Plan.*

| Mode of Transit Service | Fatalities | Injuries | Safety Events | System Reliability VRM /Failures | Fatalities Rate VRM per 100,000 | Injuries Rate VRM per 100,000 | Safety Events Rate VRM per 100,000 |
|---|---|---|---|---|---|---|---|
| **Fixed Route** | 0 | 4 | 10 | 27,160 | 0 | .27 | .22 |
| **Paratransit** | 0 | 1 | 2 | 51,439 | 0 | .32 | .22 |

Actuals from July 1, 2021, to June 30, 2022

**Safety Performance Actuals**

*Specify performance targets based on the safety performance measures established under the National Public Transportation Safety Plan.*

| Mode of Transit Service | Fatalities | Injuries | Safety Events | System Reliability VRM /Failures | Fatalities Rate VRM per 100,000 | Injuries Rate VRM per 100,000 | Safety Events Rate VRM per 100,000 |
|---|---|---|---|---|---|---|---|
| **Fixed Route** | 0 | 11 | 25 | 14,690 | 0 | .53 | 1.2 |
| **Paratransit** | 0 | 0 | 0 | 62,541 | 0 | 0 | 0 |

VRM: Paratransit 562,865 / Fixed Route 2,071,200

The National Transit Database (NTD), provides specific reporting definitions:

**Fatality**: is a death due to a collision, fire, hazardous material spill, acts of god.
**Injury:** is any damage or harm to persons that require immediate medical attention away from the scene.
**Safety Events**: any accident, incident or occurrences, e.g., collisions, fires (suppressions), hazardous material spills, other safety events other than immediate transport on medical attention
**System Reliability**: Major mechanical system failures, e.g., breakdown of brakes, engine cooling.

**Safety Training & Communication**

On a monthly basis staff has a PTASP meeting to go over the reported safety events, accidents, and incidents. The group reviews each event, in most cases the bus accident video is shown and staff through dialog help determine by analysis the cause and effects of the event and the remedies that can used to prevent any future safety events that are either exact or similar in nature.

GCTD currently provides two safety training programs monthly. One is for bus operators and others holding a commercial driver's license to provide safety training. The second is provided to maintenance staff for OSHA based industrial safety training.

**Database Collection (PTASP Documentation)**

GCTD uses Track-it Manager a transit specific software database to assist in PTASP documentation. All PTASP records are in a single, easy to search cloud platform. Reports on Accident Management, Hazard and Incident Tracking are easy to complete. All pertinent information related to a report whether it is an accident, or a safety hazard is readily available. The database is populated by Transit Supervisors and the Safety and Training Supervisors and reviewed by the safety committee and the PTASP staff, and then reported to the NTD (National Transit Database).

**Plan Updates Made**

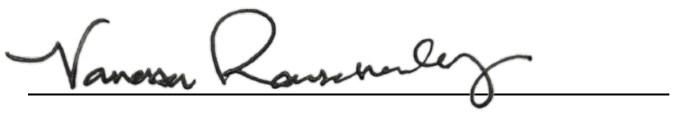
Each agency is expected to review its own program to accomplish these requirements. The Plan needed a staffing update change to the reporting structure, with the Frontline employee added to the organizational chart, and with Bipartisan Infrastructure Law requirements.

**RECOMMENDATION**

This report has the following action items for the Board of Directors.

1. Approval of GCTD's Public Transit Agency Safety Plan, update, and safety performance targets.

**GENERAL MANAGER'S CONCURRENCE**



Vanessa Rauschenberger
General Manager

**RESOLUTION No. 2022-11**
**Annual Re-Certification**
**Gold Coast Transit District**
**Public Transportation Agency Safety Plan**
**Agency Safety Plan/ Annual Re-Certification**

**WHEREAS,** Gold Coast Transit District had in effect a Resolution providing Gold Coast Transit District with a Public Transportation Agency Safety Plan on June 3, 2020, Resolution **2020-04.,** and the Annual Recertification on September 1st, 2021, Resolution **2021-06**

**WHEREAS,** on July 19, 2018, the Federal Transit Administration (FTA) published the Public Transportation Agency Safety Plan (PTASP) Final Rule, which requires certain operators of public transportation systems that receive federal funds under FTA's Urbanized Area Formula Grants to develop safety plans that include the processes and procedures to implement Safety Management Systems (SMS).

**WHEREAS**, the rule applies to all operators of public transportation systems that are recipients and sub-recipients of federal financial assistance under the Urbanized Area Formula Program (49 U.S.C. § 5307). the plan must include safety performance targets. Transit operators also must certify they have a safety plan in place meeting the requirements of the rule by December 31, 2020. The plan must be updated and certified by the transit agency annually.

**NOW, THEREFORE, BE IT RESOLVED**, on December 7th, 2022, at the Board of Directors meeting, Gold Coast Transit District's Accountable Executive Vanessa Rauschenberger along with the Board of Directors and Chair for GCTD approve for recertification the Districts Public Transportation Agency Safety Plan (PTASP), i.e., Agency Safety Plan.

PRIOR RESOLUTION No. 2020-04, on *the 3rd day of June 2020*. / Version: 1.0

RECERTIFIED RESOLUTION 2021-06 on the *1st Day of September 2021*. / Version: 2.0

APPROVED AND RECERTIFIED on the *7th Day of December 2022*. / Version: 3.0

**CHAIR OF THE BOARD OF DIRECTORS FOR GOLD COAST TRANSIT DISTRICT**

_____

Bryan MacDonald
Chair of the Board of Directors

*ATTEST: I hereby certify that the foregoing Resolution No. 2022-11 was duly approved by the Board of Directors of Gold Coast Transit District at a regular meeting thereof held on the 7th day of December 2022*.

**GENERAL MANAGER'S CONCURRENCE**

_____

Vanessa Rauschenberger
General Manager

**Gold Coast Transit District**
**1901 Auto Center Drive**
**Oxnard, California 93036**

# Public Transit Agency Safety Plan (PTASP)
# Safety Management System (SMS)
# Policy Statement

1. Adopted and Certified by the Board of Directors on June 3rd, 2020

2. Recertified by the Board of Directors on September 1st, 2021

3. Recertified by the Board of Directors on December 7th, 2022 (Safety Committee (Frontline & Management)

_____ _____

Signature of Accountable Executive Date

Vanessa Rauschenberger
General Manager

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# 1 PUBLIC TRANSPORTATION AGENCY SAFETY PLAN

The management of safety is one of our core business functions. Gold Coast Transit District (GCTD) is committed to developing, implementing, maintaining, and constantly improving processes to ensure that all our transit service delivery activities take place under a balanced allocation of organizational resources, aimed at achieving the highest level of safety performance and meeting established standards.

All levels of management and all employees are accountable for the delivery of this highest level of safety performance, starting with the General Manager.

Gold Coast Transit District commitment is to:

• **Support** the management of safety through the provision of appropriate resources, that will result in an organizational culture that fosters safe practices, encourages effective employee safety reporting and communication, and actively manages safety with the same attention to results as the attention to the results of the other management systems of the organization;

• **Integrate** the management of safety among the primary responsibilities of all managers and employees;

• **Clearly define** for all staff, managers and employees alike, their accountabilities and responsibilities for the delivery of the organization's safety performance and the performance of our safety management system;

• **Establish and operate** hazard identification and analysis, and safety risk evaluation activities, including an employee safety reporting program as a fundamental source for safety concerns and hazard identification, in order to eliminate or mitigate the safety risks of the consequences of hazards resulting from our operations or activities to a point which is consistent with our acceptable level of safety performance;

• **Ensure** that no action will be taken against any employee who discloses a safety concern through the employee safety reporting program, unless disclosure indicates, beyond any reasonable doubt, an illegal act, gross negligence, or a deliberate or willful disregard of regulations or procedures;

• **Comply** with, and wherever possible exceed, legislative and regulatory requirements and standards;

• **Ensure** that sufficient skilled and trained human resources are available to implement safety management processes;

• **Ensure** that all staff are provided with adequate and appropriate safety-related information and training, are competent in safety management matters, and are allocated only tasks commensurate with their skills;

• **Establish and measure** our safety performance against realistic and data-driven safety performance indicators and safety performance targets;

• **Continually improve** our safety performance through management processes that ensure that appropriate safety management action is taken and is effective; and

• **Ensure** externally supplied systems and services to support our operations are delivered meeting our safety performance standards.

## 2 DEFINITIONS

Accident means an Event that involves any of the following: a loss of life; a report of a serious injury to a person; a collision of public transportation vehicles; an evacuation for life safety reasons.

Accountable Executive means the single, identifiable person who has ultimate responsibility for carrying out the Public Transportation Agency Safety Plan of the Agency; responsibility for carrying out the Agency's Transit Asset Management Plan; and control or direction over the human and capital resources needed to develop and maintain both the Agency's Public Transportation Agency Safety Plan, in accordance with 49 U.S.C. § 5329(d), and the Agency's Transit Asset Management Plan in accordance with 49 U.S.C. § 5326.

Agency or Transit Agency means Gold Coast Transit District.

Board or equivalent entity means governing body of Gold Coast Transit District.

Caltrans means the California Department of Transportation.

Chief Safety Officer means the adequately trained individual who has responsibility for safety and reports directly to the Transit Agency's chief executive officer.

CFR means Code of Federal Regulations.

Event means any Accident, Incident, or Occurrence.

FTA means the Federal Transit Administration, an operating administration within the United States Department of Transportation.

Hazard means any real or potential condition that can cause injury, illness, or death, damage to or loss of the facilities, equipment, rolling stock, or infrastructure of the system, or damage to the environment.

Incident means an Event that involves any of the following: a personal injury that is not a serious injury, one or more injuries requiring medical transport, or damage to facilities, equipment, rolling stock, or infrastructure that disrupts the operations of the Transit Agency.

Investigation means the process of determining the causal and contributing factors of an accident, incident, or hazard, for the purpose of preventing recurrence and mitigating risk.

National Public Transportation Safety Plan means the plan to improve the safety of all public transportation systems that receive federal financial assistance under 49 U.S.C. Chapter 53.

Occurrence means an Event without any personal injury in which any damage to facilities, equipment, rolling stock, or infrastructure does not disrupt the operations of the Transit Agency.

Part 673 means 49 CFR (Code of Federal Regulations) Part 673.

Performance Measure means an expression based on a quantifiable indicator of performance or condition that is used to establish targets and to assess progress toward meeting the established targets.

Performance target means a quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by the Federal Transit Administration (FTA).

Risk means the composite of predicted severity and likelihood of the potential effect of a hazard.

Risk mitigation means a method or methods to eliminate or reduce the effects of hazards.

Safety Assurance means processes within the Transit Agency's Safety Management Systems that function to ensure the implementation and effectiveness of safety risk mitigation, and to ensure that the Transit Agency meets or exceeds its safety objectives through the collection, analysis, and assessment of information.

Safety Management Policy means the Transit Agency's documented commitment to safety, which defines the Transit Agency's safety objectives and the accountabilities and responsibilities of its employees in regard to safety.

Safety Management Systems (SMS) means the formal, top-down, organization-wide approach to managing safety risk and assuring the effectiveness of a Transit Agency's safety risk mitigation. SMS includes systematic procedures, practices, and policies for managing risks and hazards.

Safety Performance Target (SPT) means a Performance Target related to safety management activities.

Safety Promotion means a combination of training and communication of safety information to support SMS as applied to the Transit Agency's public transportation system.

Safety Risk Assessment (SRA) means the formal activity whereby the Transit Agency determines Safety Risk Management priorities by establishing the significance or value of its safety risks.

Safety Risk Management (SRM) means a process within the Transit Agency's Public Transportation Agency Safety Plan for identifying hazards and analyzing, assessing, and mitigating safety risk.

Serious injury means any injury which: (1) requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received, (2) results in a fracture of any bone (except simple fractures of fingers, toes, or noses), (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ, or (5) involves second or third-degree burns, or any burns affecting more than five percent of the body surface.

State of Good Repair (SGR) means the condition in which a capital asset is able to operate at a full level of performance.

Transit Asset Management Plan means the strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their life cycles, for the purpose of providing safe, cost-effective, and reliable public transportation, as required by 49 U.S.C. 5326 and 49 CFR part 625.

U.S.C. means United States Code.

# 3 TRANSIT AGENCY INFORMATION

Gold Coast Transit District is a California Governmental Transit District formed by the California legislation, which operates fixed route transit bus service in Ventura County, California. Gold Coast Transit District is a recipient of Section 5307 funds. Gold Coast Transit District utilizes a contractor (external provider) to provide paratransit transportation services and ensures compliance under Part 673. GCTD will monitor the paratransit subcontractor's Agency Safety Plan.

## 3.1 ACCOUNTABLE EXECUTIVE

Gold Coast Transit District's Accountable Executive is the General Manager. The General Manager is the single, identifiable person who has ultimate responsibility for carrying out this Agency Safety Plan and Gold Coast Transit District's Transit Asset Management (TAM)

Plan, and control or direction over the human and capital resources needed to develop and maintain both this Plan and the TAM Plan.

The General Manager is accountable for ensuring that the Agency's Safety Management Systems (SMS) is effectively implemented throughout the Agency's public transportation system. The General Manager is accountable for ensuring action is taken, as necessary, to address substandard performance in the Agency's SMS. The General Manager may delegate specific responsibilities, but the ultimate accountability for the Transit Agency's safety performance cannot be delegated and always rests with the General Manager.

### 3.2 CHIEF SAFETY OFFICER

The General Manager designates the Director of Human Resources as Gold Coast Transit District's Chief Safety Officer who has the authority and responsibility for day-to-day implementation and operation of the Agency's SMS. The Chief Safety Officer holds a direct line of reporting to the Accountable Executive,

**As shown in the organization chart in the Attachment A.** Management and has a strong working relationship with the operations and maintenance departments along with the asset management functions at Gold Coast Transit District.

## 4 PLAN DEVELOPMENT, APPROVAL, AND UPDATES

This Plan is based on the four (4) principles or pillars of the Safety Management Systems (SMS). SMS is defined as the formal, top-down, organization-wide, data-driven approach to managing safety risk and assuring the effectiveness of safety mitigations. It includes systematic policies, procedures, and practices for the management of safety risk. The four principles or pillars of SMS are: (1) Safety Management Policy; (2) Safety Risk Management; (3) Safety Assurance; and (4) Safety Promotion.

### 4.1 DRAFTING THE PLAN

GCTD drafted this Plan along with a draft from Caltrans thus meeting the requirements of 49 CFR Part 673.11(d). FTA will oversee compliance with the requirements of Part 673 through the existing Triennial Review processes.

### 4.2 SIGNATURE BY THE ACCOUNTABLE EXECUTIVE AND APPROVAL BY THE BOARD

Pursuant to 49 CFR Part 673.11 (a)(1), this Agency Safety Plan and subsequent updates must be signed by the Accountable Executive and approved by Gold Coast Transit District's Board. Documentation of Board approval is found in the Board report of June 3, 2020.

### 4.3 CERTIFICATION OF COMPLIANCE

Pursuant to 49 CFR Parts 673.13(a) and 673.13(b), Gold Coast Transit District certifies that it has established this Agency Safety Plan, meeting the requirements of 49 CFR Part 673 by July 20, 2020 and will certify its compliance with 49 CFR Part 673.

On an annual basis Gold Coast Transit District must update this Agency Safety Plan by July 20 in perpetuity. All Agency Safety Plan updates shall be signed by the Accountable Executive and approved by Gold Coast Transit District's Board.

### 4.4 PLAN REVIEW AND UPDATES

Gold Coast Transit District updates this Safety Plan when information, processes or activities change within the Agency and/or when Part 673 undergoes significant changes, or annually, whichever comes sooner. As Gold Coast Transit District collects data through its Safety Risk Management and Safety Assurance processes, and Track-it a database, and will evaluate the safety performance targets (SPTs) to determine whether they need to be changed, as well.

This Plan will be jointly reviewed and updated by the Chief Safety Officer and General Manager with the assistance of subject matter experts, each July. The Accountable Executive will approve any changes, then forward on to the Board for approval.

This Plan may need to be reviewed and updated more frequently based on the following:

- We determine our approach to mitigating safety deficiencies is ineffective;
- We make significant changes to service delivery;
- We introduce new processes or procedures that may impact safety;
- We change or re-prioritize resources available to support SMS;
- We significantly change our organizational structure.

## 5 SAFETY PERFORMANCE TARGETS (SPTs)

### 5.1 TARGET DEVELOPMENT

GCTD will create self-Safety Plan Targets SPTs in this Safety Plan. These targets are specific numerical targets set by GCTD and based on the safety Performance Measures established by yearly performance measures. GCTD will also review through FTA in the National Public Transportation Safety Plan. In the most recent version, the 2017 NSP3, FTA adopted four initial safety Performance Measures: (1) Fatalities, (2) Injuries, (3) Safety Events, and (4) System Reliability.

GCTD will develop safety performance targets that it will review and update annually. The specific safety performance targets are based on the safety performance measures established under the GCTD performance measures, and will utilize the National Public Transportation Safety Plan and the safety performance goals set through FTA based on the past three (3) Calendar years of data. The Safety Performance Targets for Gold Coast

Transit District for the first year 2020 is expected to stay within 1% +/- of previous three years data pertaining to fatalities, injuries, safety events, and system reliability.

*Note: Baseline data for each target will be analyzed by GCTD.*

Gold Coast Transit District will make safety performance targets available to aid in the planning process upon certification of this plan.

# 6 OVERVIEW OF THE AGENCY'S SAFETY MANAGEMENT SYSTEMS (SMS)

SMS is a comprehensive, collaborative approach that brings management and labor together to build on the transit industry's existing safety foundation to control risk better, detect and correct safety problems earlier, share and analyze safety data more effectively, and measure safety performance more carefully. Gold Coast Transit District's SMS focuses on applying resources to risk and is based on ensuring that the Gold Coast Transit District has the organizational infrastructure to support decision-making at all levels regarding the assignment of resources. Some key parts of Gold Coast Transit District's SMS include:

- Defined roles and responsibilities;
- Strong executive safety leadership;
- Formal safety accountabilities and communication;
- Effective policies and procedures; and
- Active employee involvement

Furthermore, Gold Coast Transit District's SMS have four distinct components, which are discussed in subsequent sections to this Safety Plan:

- Safety Policy
- Safety Risk Management
- Safety Assurance
- Safety Promotion

# 7 SAFETY MANAGEMENT POLICY

The first component of Gold Coast Transit District's SMS is the Safety Management Policy, which is the foundation of Gold Coast Transit District's safety management system. It clearly states the organization's safety objectives and sets forth the policies, procedures, and organizational structures necessary to accomplish the safety objectives. The Safety Management Policy clearly defines management and employee responsibilities for safety throughout the organization. It also ensures that management is actively engaged in the oversight of the system's safety performance by requiring regular review of the Safety Management Policy, budget and program by the designated Accountable Executive.

## 7.1 SAFETY MANAGEMENT POLICY STATEMENT

Safety is a core value at Gold Coast Transit District, and managing safety is a core business function. Gold Coast Transit District will develop, implement, maintain, and continuously improve processes to ensure the safety of our customers, employees, and the public. Gold Coast Transit District's overall safety objective is to proactively manage safety hazards and their associated safety risk, with the intent to eliminate unacceptable safety risk in our transit operations.

Gold Coast Transit District will:

- Clearly, and continuously explain to all staff that everyone working within Gold Coast Transit District must take part and be responsible and accountable for the development and operation of the Safety Management System (SMS).
- Work continuously to minimize safety risks. Work to comply with and, wherever possible, exceed legislative and regulatory requirements and standards for passengers and employees.
- Work to ensure that all employees are provided appropriate safety information and training, are competent in safety matters, and assigned tasks commensurate with duties and skills.
- Reaffirm that responsibility for making our operations safer for everyone lies with all employees – from executive management to frontline employees. Each manager is responsible for implementing the SMS in their area of responsibility and will be held accountable to ensure that all reasonable steps are taken to perform activities established through the SMS.

Gold Coast Transit District will establish safety performance targets to help measure the overall effectiveness of our processes and ensure we meet our safety objectives. Gold Coast Transit District will keep employees informed about safety performance goals and objectives to ensure continuous safety improvement.

## 7.2 SAFETY MANAGEMENT POLICY COMMUNICATION

The Safety Management Policy is communicated throughout the Agency, to all employees, managers, and executives, as well as contractors, and to the Board.

This is accomplished through various processes such as:

- Workshops/training sessions - Conducted for Senior Management, Directors, Managers, Supervisors. Once this Plan or any update to this Plan has been signed by the CEO/General Manager approved by the Board of Directors. All Union representatives will be kept informed.

- New Hire Safety Orientation – All new employees regardless of their classifications will be trained about their roles and responsibilities pertaining to PTASP and the principles of SMS.

- Safety bulletins, email safety newsletter blasts to staff, toolbox/tailgate safety meetings and/or safety committee meetings

## 7.3 EMPLOYEE SAFETY REPORTING PROGRAM

Gold Coast Transit District implemented a process that allows employees [and contracted employees] to report safety conditions to senior management, protections for employees who report safety conditions to senior management. The purpose, description and protections for employees to report unsafe conditions and hazards are described in the Employee Safety Reporting Program as below:

**Purpose:**

a) To establish a system for Gold Coast Transit District employees to identify unsafe conditions or hazards at work and report them to their department management without fear of reprisal. However, disciplinary action could result if the condition reported reveals the employee willfully participated in or conducted an illegal act, gross negligence or deliberate or willful disregard of regulations or procedures, including reporting to work under the influence of controlled substances, physical assault of a coworker or passenger, theft of agency property, unreported safety events, unreported collisions, and unreported passenger injuries or fatalities.

b) To provide guidelines for facilitating the timely correction of unsafe conditions or hazards by Gold Coast Transit District management.

**Description:**

a) This program provides a method for Gold Coast Transit District management to identify, evaluate, and correct or avoid unsafe conditions or hazards, procedural deficiencies, design inadequacies, equipment failures, or near misses that adversely affect the safety of employees.

Examples of voluntary safety reports include:

- Safety hazards in the operating environment (for example, county or city road conditions),
- Policies and procedures that are not working as intended (for example, insufficient time to complete pre-trip inspection),
- Events that senior managers might not otherwise know about (for example, near misses), and
- Information about why a safety event occurred (for example, radio communication challenges).

b) The program also involves recommending corrective actions and resolutions of identified unsafe conditions or hazards and/or near miss.

c) All employees have the obligation to report immediately any unsafe conditions or hazards and near miss to their immediate supervisor /department manager and may do so without fear of reprisal.

d) Unsafe conditions or hazards may also be identified as a result of occupational injury or illness investigations and/or by accident investigation.

e) Other means by which hazards may be identified are inspections/audits or observations made by the supervisors/management staff as referenced in agency's Safety Inspection Program.

f) Findings will be published immediately following mitigation actions. If employee identification is available, direct feedback regarding mitigation will be provided.

## 7.4 SMS AUTHORITIES, ACCOUNTABILITIES, AND RESPONSIBILITIES

This Plan has assigned specific SMS authorities, accountabilities, and responsibilities to the designated Accountable Executive; Chief Safety Officer; Agency's Leadership/Executive Management; and Key Staff/Employees as described below:

### 7.4.1 ACCOUNTABLE EXECUTIVE

Gold Coast Transit District's Accountable Executive is the General Manager. The General Manager is accountable for ensuring that the Agency's SMS is effectively implemented throughout the Agency's public transportation system. The General Manager is accountable for ensuring action is taken, as necessary, to address substandard performance in the Agency's SMS. The General Manager may delegate specific responsibilities, but the ultimate accountability for Gold Coast Transit District's safety performance cannot be delegated and always rests with the General Manager. The General Manager is accountable for ensuring that the Agency's SMS is effectively implemented, and that action is taken, as necessary, to address substandard performance in the Agency's SMS. The Accountable Executive may delegate specific responsibilities, but not accountability for Gold Coast Transit District's safety performance.

The General Manager roles include, but are not limited to:

- Decision-making about resources (e.g. people and funds) to support asset management, SMS activities, and capital investments;
- Signing SMS implementation planning documents;
- Endorsing SMS implementation team membership; and
- Ensuring safety concerns are considered and addressed in the agency's ongoing budget planning process.
- Ensuring transparency in safety priorities: for the Board of Directors and for the employees.
- Establishing guidance on the level of safety risk acceptable to the agency.
- Assuring safety policy is appropriately communicated throughout the agency.
- Other duties as assigned/necessary.

### 7.4.2 CHIEF SAFETY OFFICER

The Chief Safety Officer has the authority and responsibility for day-to-day implementation and operation of Gold Coast Transit District's SMS.

Chief Safety Officer's Roles include:

- Decision-making about resources (e.g., people and funds) to support asset management, SMS activities, and capital investments;
- Overseeing the safety risk management program by facilitating hazard identification, safety risk assessment, and the development and implementation of safety risk mitigations.
- Monitoring safety risk mitigation activities;
- Providing periodic reports on safety performance;
- Briefing the Accountable Executive and the **Board** on SMS implementation progress.
- Planning safety management training; and
- Developing and organizing annual audits/reviews of SMS processes and the Agency Safety Plan to ensure compliance with 49 CFR Part 673 requirements.
- Maintaining safety documentation.
- Other duties as assigned/necessary.

### 7.4.3 **AGENCY LEADERSHIP AND EXECUTIVE MANAGEMENT**

The department directors and or managers of each department comprise the District's Leadership/Executive Management. Some of their responsibilities include:

- Day-to-day implementation of the Agency's SMS throughout their department and the organization.
- Communicating safety accountability and responsibility from the frontline employees to the top of the organization.
- Ensuring employees are following their working rules and procedures, safety rules and regulations in performing their jobs, and their specific roles and responsibilities in the implementation of this Agency Safety Plan and the Agency's SMS.
- Ensuring that employees comply with the safety reporting program and are reporting unsafe conditions and hazards to their department management; and making sure reported unsafe conditions and hazards are addressed in a timely manner.
- Ensuring that resources are sufficient to carry out employee training/certification and re-training as required by their job classifications.

### 7.4.4 **KEY STAFF**

The agency Key Staff/Employees may include managers, supervisors, specialists, analysts, database administrators, and other key employees who are performing highly technical work and overseeing employees performing critical tasks and providing support in the implementation of this Agency Safety Plan and SMS principles in various departments throughout the agency.

Gold Coast Transit District's Key Staff/Employees responsibilities include <u>Management and Frontline Employees as a Safety Committee:</u>

- Ensuring that employees are complying with the safety reporting program.
- Ensuring supervisors are conducting their toolbox safety meetings
- Promoting safety in employee's respective area of responsibilities – That means: zero accidents; absence of any safety concerns; perfect employee

performance; and compliance with agency rules and procedures and regulatory requirements.
- Ensuring safety of passengers, employees, and the public.
- Responding to customer complaints and expectations for frequency, reliability, and convenience of service.
- Replacing and maintaining aging facilities, equipment, and infrastructure.
- Meeting increasing demands for fixed route, commuter service and paratransit service.
- Developing and maintaining programs to gather pertinent data elements to develop safety performance reports and conduct useful statistical analyses to identify trends and system performance targets.
- Establishing clear lines of safety communication and holding accountability for safety performance.
- Assisting as subject matter experts in safety risk assessment and safety risk mitigation processes.

# 8 SAFETY RISK MANAGEMENT (SRM)

The second component of Gold Coast Transit District's SMS is Safety Risk Management, which includes processes and procedures to provide an understanding of the Agency's operations and vehicle maintenance to allow individuals to identify hazards associated with those activities.

Gold Coast Transit District has implemented a Safety Risk Management process for all elements of its transportation system. The Safety Risk Management process includes the following activities: safety hazard identification, safety risk assessment, and safety risk mitigation.

## 8.1 SAFETY HAZARD IDENTIFICATION

Hazard identification is the first step in the Safety Risk Management process and a key component. It involves these fundamental safety-related activities: Identifying safety hazards and their consequences; assessing the risks associated with the consequences of the hazards; and developing mitigations to reduce the potential consequences of the identified hazards.

The following is Gold Coast Transit District's methods and processes to identify hazards. The Agency considers, as a source for hazard identification, data and information provided by an oversight authority and the FTA. Hazards are identified through a variety of sources, including:

- Employee safety reporting,
- Review of vehicle camera footage,
- Review of monthly performance data and safety performance targets,
- Observations from supervisors,
- Maintenance reports,

- Comments from customers, passengers, and third parties,
- Safety committee, driver and staff meetings,
- Results of audits and inspections of vehicles and facilities,
- Results of training assessments
- Investigations into safety events, incidents and occurrences, and
- Information from FTA and oversight authorities.

When a hazard has been identified, whatever the source, it is reported to Gold Coast Transit District's Chief Safety Officer, who enters it into the Track-It data base. The Chief Safety Officer also may enter hazards into this data base on reviews of operations and maintenance activities and procedures.

The Chief Safety Officer will investigate hazards to collect information and determine if hazards need to be entered into the safety risk assessment process. In following up on identified hazards, the Chief Safety Officer may:

- Reach out to the reporting party, if available, to gather all known information about the reported hazard,
- Conduct a walkthrough of the affected area, assessing the possible hazardous condition, generating visual documentation (photographs and/or video), and taking any measurements deemed necessary,
- Conduct interviews with employees in the area to gather potentially relevant information on the reported hazard,
- Review any documentation associated with the hazard (records, reports, procedures, inspections, technical documents, etc.),
- Contact other departments that may have association with or technical knowledge relevant to the reported hazard,
- Review any past reported hazards of a similar nature, and
- Evaluate tasks and/or processes associated with the reported hazard.

Any identified hazard that poses an immediate risk to transit operations, the health and safety of employees or the public, or equipment must immediately be brought to the attention of the Accountable Executive and placed through the Safety Risk Management process for safety risk assessment and mitigation. Otherwise, hazards will be prioritized for further Safety Risk Management activity.

## 8.2 SAFETY RISK ASSESSMENT

Safety risk assessment defines the level or degree of the safety risk by assessing the likelihood and severity of the consequences of hazards and prioritizes hazards based on the safety risk. The Chief Safety Officer, with assistance from key staff subject matter experts, is responsible for assessing identified hazards and ratings using the safety risk matrix below. Prioritizing safety risk provides the Accountable Executive with the information needed to make decisions about resource application.

The following matrix, adopted from the TSI Participation Guide – SMS Principles for Transit, facilitates the ranking of hazards based on their probability of occurrence and severity of their outcome.

| Probability Levels | | | |
|---|---|---|---|
| **Description** | **Level** | **Specific Individual Item** | **Fleet Inventory** |
| Frequent | A | Likely to occur often in the life of an item. | Continuously experienced. |
| Probable | B | Will occur several times in the life of an item. | Will occur frequently. |
| Occasional | C | Likely to occur sometime in the life of an item. | Will occur several times. |
| Remote | D | Unlikely, but possible to occur in the life of an item. | Unlikely, but can reasonably be expected to occur. |
| Improbable | E | So unlikely, it can be assumed occurrence man not be experienced in the life of an item. | Unlikely to occur, but possible. |
| Eliminated | F | Incapable of occurrence. This level is used when potential hazards are identified and later eliminated. | Incapable of occurrence. This level is used when potential hazards are identified and later eliminated. |

The measuring goes from A to F with A being frequent or likely to occur frequently and E being improbable or expected that this event will most likely never occur. The designation F is used when potential hazards are identified and later eliminated.

| Severity Levels | | |
|---|---|---|
| **Description** | **Level** | **Mishap Result Criteria** |
| Catastrophic | 1 | Could Result in one or more of the following: death, permanent total disability, irreversible significant environmental impact, or monetary loss equal to or exceeding $10M |
| Critical | 2 | Could result in one or more of the following: permanent partial disability, injuries or occupational illness that may result in hospitalization of at least three personnel, reversible significant environmental impact, or monetary loss equal to or exceeding $1M but less than $10M |
| Marginal | 3 | Could result in one or more of the following: injuries or occupational illness resulting in one or more lost work day(s), reversible moderate environmental impact, or monetary loss equal to or exceeding $100k but less than $1M |
| Negligible | 4 | Could result in one or more of the following: injuries or occupational illness not resulting in lost work day, minimum environmental impact. Or monetary loss less than $100k. |

The Safety Risk Severity Table presents a typical safety risk. It includes four categories to denote the level of severity of the occurrence of a consequence, the meaning of each category, and the assignment of a value to each category using numbers. In this table, 1 is considered catastrophic meaning possible deaths and equipment destroyed and 4 is considered negligible or of little consequence with two levels in between.

Safety Risk Probability and Safety Risk Severity are combined into the Safety Risk Index Ranking to help prioritize safety risks according to the table below.

| Safety Risk Assessment Matrix | | | | |
|---|---|---|---|---|
| Severity → / Probability ↓ | Catastrophic<br>1 | Critical<br>2 | Marginal<br>3 | Negligible<br>4 |

| | | | | |
|---|---|---|---|---|
| A-Frequent | 1A | 2A | 3A | 4A |
| B- Probable | 1B | 2B | 3B | 4B |
| C-Occasional | 1C | 2C | 3C | 4C |
| D- Remote | 1D | 2D | 3D | 4D |
| E- Improbable | 1E | 2E | 3E | 4E |
| F- Eliminated | | | | |

| Safety Risk Index Ranking | | |
|---|---|---|
| 1A, 1B, 1C, 2A, 2B | High | Unacceptable |
| 1D, 2C, 3A, 3B | Serious | Undesirable - With management decision required |
| 1E, 2D, 2E, 3C, 3D, 3E, 4A, 4B, | Medium | Acceptable - with review by management |
| 4C, 4D, 4E | Low | Acceptable - without review |

The Chief Safety Officer documents recommendations regarding hazard rating and mitigation options and reports this information to the Accountable Executive.

### 8.3 SAFETY RISK MITIGATION

*The Chief Safety Officer, assisted by Key Staff subject matter experts, reviews current safety risk mitigations and establish procedures to 1) eliminate; 2) mitigate; 3) accept specific risks. Prioritization of safety remediation measures is based on risk analysis and a course of action acceptable to Gold Coast Transit District management.*

The safety risk must be mitigated if ranked as Unacceptable (High- Red). Those safety risks that have been mitigated, even those mitigated risks shown as Acceptable status (Low - Green) undergo regular and consistent monitoring to ensure the mitigation strategy is effective.

Key strategies to minimize the types of risks that potentially exist include:

- Development and deployment of policies and procedures that address known hazards and risks,
- Discussion of other actions, strategies and procedures that might help safeguard against unknown/unforeseen risks,
- Training of drivers and other agency staff on all safety policies and procedures,
- Training of drivers and other agency staff on methodologies for handling emergencies, and
- Training of drivers and staff on proper and effective use of emergency equipment and communication technologies and protocol.

Safety risk mitigations are tracked and updated in the Hazard Log by the Chief Safety Officer.

## 9 SAFETY ASSURANCE

The third component of the Districts SMS is Safety Assurance, which ensures the performance and effectiveness of safety risk controls established under safety risk management. Safety assurance also helps ensure that the organization meets or

exceeds its safety objectives through the collection, analysis, and assessment of data regarding the organization's performance. Safety assurance includes inspection activities to support oversight and performance monitoring.

Gold Coast Transit District monitors its operations and maintenance protocols and procedures, and any safety risk mitigations to ensure that it is implementing them as planned. Furthermore, the District investigates safety events (as defined in this plan]) and any reports of non-compliance with applicable regulations, standards, and legal authority. Finally, the Districts continually monitors information reported to it through any internal safety reporting programs, including the employee safety reporting program.

Some of the key elements of Gold Coast Transit District's Safety Performance Monitoring and Measurement are shown below in subsection 9.1:

## 9.1 SAFETY PERFORMANCE MONITORING AND MEASUREMENT

As part of the Safety Assurance Process, Gold Coast Transit District:

- Monitors the system for compliance with, and sufficiency of, the Agency's procedures for operations and maintenance through:
    - Safety audits,
    - Informal inspections,
    - Regular review of on-board camera footage to assess drivers and specific incidents,
    - Safety surveys,
    - Employee safety reporting program,
    - Investigation of safety occurrences,
    - Safety review prior to the launch or modification of any facet of service,
    - Daily data gathering and monitoring of data relating to the delivery of service,
    - Regular vehicle inspections and preventative maintenance, and
    - Continuous feedback loop between leadership and all levels of the agency.
- Monitors its operations to identify any safety risk mitigations that may be ineffective, inappropriate, or were not implemented as intended through:
    - Reviewing results from accident, incident, and occurrence investigations,
    - Monitoring employee safety reporting,
    - Reviewing results of internal safety audits and inspections, and
    - Analyzing operational and safety data to identify emerging safety concerns.
- Conducts investigations of safety events to identify causal factors; and
- Monitors information reported through any internal safety reporting programs.
    - The Chief Safety Officer routinely reviews safety data captured in employee safety reports, safety meeting minutes, customer complaints, and other safety communication channels. When necessary, the Chief

Safety Officer ensures that the issues and concerns are investigated or analyzed through the safety risk assessment process.

- The Chief Safety Officer also reviews the results of internal and external reviews, including audits and assessments, with findings affecting safety performance, compliance with operations and maintenance procedures, or the effectiveness of safety risk mitigations. The Chief Safety Officer discusses relevant safety issues and concerns with the Accountable Executive and executive management and documents the results of these reviews in the Hazard Log.

In the event of a fatality, Gold Coast Transit District complies with all FTA drug and alcohol requirements.

In California, every driver involved in an accident that results in death, injury, or property damage over $1000, effective January 1, 2017, must report the accident on a Report of Traffic Accident Occurring in California (SR 1) form to DMV. The report forms are available at **www.dmv.ca.gov**, by calling 1-800-777-0133, and at CHP and DMV offices. Also, under California Vehicle Code §16002(b) the driver of a vehicle that is owned or operated by a publicly owned or operated transit system, or that is operated under contract with a publicly owned or operated transit system, and that is used to provide regularly scheduled transportation to the general public or for other official business of the system shall, within 10 days of the occurrence of the accident, report to the transit system any accident of a type otherwise required to be reported pursuant to subdivision (a) of Section 16000 . Gold Coast Transit District requires driver notification to Gold Coast Transit District immediately and maintains records of any report filed pursuant to this paragraph.

# 10 SAFETY PROMOTION

The fourth component of the Agency's SMS is Safety Promotion, which includes a combination of training and communication of safety information to employees to enhance the District's safety performance. Safety Promotion sets the tone for the SMS and helps Gold Coast Transit District to establish and maintain a robust safety culture. Safety Promotion has two-components: (1) Safety Communication; and (2) Competencies and Training.

## 10.1 SAFETY COMMUNICATION

Gold Coast Transit District communicates safety and safety performance information throughout the organization that, at a minimum, conveys information on hazards and safety risks relevant to employees' roles and responsibilities and informs employees of safety actions taken in response to reports submitted through an employee safety reporting program.

Ongoing safety communication is critical, and Gold Coast Transit District ensures communication occurs up, down, and across all levels of the organization. Any lessons learned are communicated to all concerned. Management commitment to address safety concerns and hazards is communicated on a regular basis. Management

encourages and motivates employees to communicate openly, authentically, and without concern for reprisal; ensures employees are aware of SMS principles and understand their safety-related roles and responsibilities; conveys safety critical information such as accident data, injuries, and reported safety concerns and hazards and their resolutions to employees. Gold Coast Transit District's tools to support safety communication include:

- Safety bulletins
- Safety Meetings, notices
- Posters
- CDs or online safety video access
- Newsletters
- Briefings or Toolbox talks
- Seminars and workshops
- New employee training and refresher training
- Intranet or social media
- Safety Committee Meetings

**Competencies and Training:** Executive Management ensures that all employees attend the training provided to understand their specific roles and responsibilities for the implementation of SMS. Gold Coast Transit District provides SMS training in the following areas:

**All Employees:**

- Understanding of Safety Performance Targets
- Understanding of fundamental principles of SMS
- Understanding of Safety Reporting Program – Reporting unsafe conditions and hazards/near misses
- Understanding of their individual roles and responsibilities under SMS

**Managers and Supervisors**

- Understanding of Safety Risk Management
- Understanding of Safety Assurance
- Understanding of Safety Promotion
- Understanding of their individual roles and responsibilities for SMS

**Executive Management:**

- Understanding of management commitment to and support of all SMS activities.

All employees are required to acquire the competencies and knowledge for the consistent application of their skills as they relate to safety performance objectives. Gold Coast Transit District dedicates resources to conduct effective safety-related skill training. The scope of the safety training is appropriate to each employee's individual safety-related job responsibilities and their role in SMS. Components of Gold Coast Transit District's skill-related training includes:

- Conducting training needs analyses to ensure that the right information is being taught to the right employees using the most efficient training methods.
- Communicating purpose, objectives, and outcome.

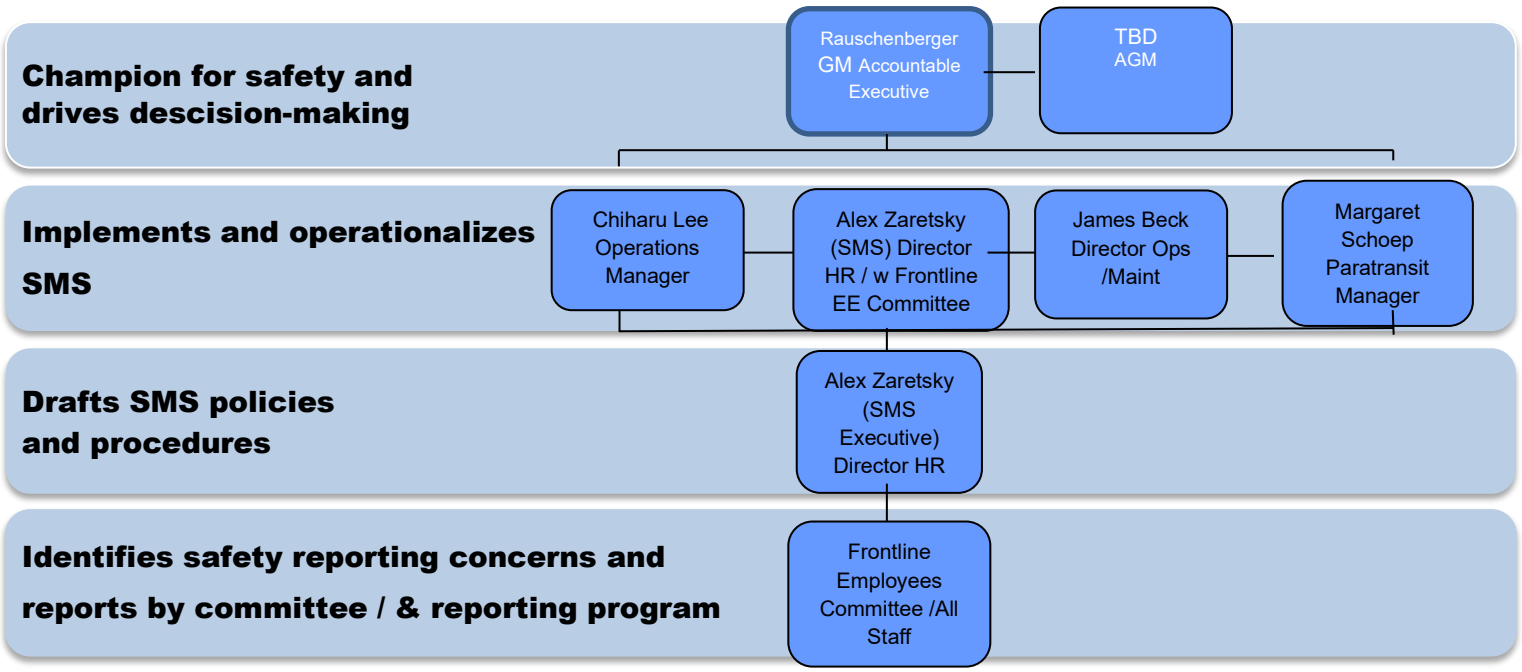
- Ensuring relevant content by directly linking training to the trainee's job experiences so trainees are more motivated to learn.
- Using active hands-on demonstrations and practice to demonstrate skills that are being taught and provide opportunities for trainees to practice skills.
- Providing regular feedback during hands-on practice and exercises.
- Reinforcing training concepts in the post-training work environment by giving employees opportunities to perform what they've learned.

Gold Coast Transit District conducts refresher safety training **e.g., monthly,** during employee safety meetings.

*Section 9 Documentation*

Pursuant to 49 CFR Part 673.31, Gold Coast Transit District maintains records related to this Safety Plan and SMS implementation for a minimum of three years. These documents include but are not limited to the results from SMS processes and activities. Gold Coast Transit District will make these documents available to FTA Region 9, and other Federal and state agencies upon request.

# ATTACHMENT A




**Roles and Responsibilities: Organizational Chart**

# Public Transportation Agency Safety Plan for Bus Transit

*Version 1, issued 07/19/18*

The Federal Transit Administration (FTA) is providing the *Public Transportation Agency Safety Plan Template for Bus Transit* and accompanying *Reference Guide* to assist with the development of a Public Transportation Agency Safety Plan (Safety Plan) for bus transit modes. Use of this template is voluntary. The template and reference guide are intended for use by States and operators of public transportation systems that are required to draft a Safety Plan in accordance with 49 C.F.R. Part 673 (Part 673). The full text of Part 673 is available at *http://www.transit.dot.gov/PTASP*.

Certain requirements in Part 673 do not apply to small public transportation providers[1]. The relevant sections in this template are noted in red to indicate where requirements differ. Transit operators that are subject to Part 673 may choose to include additional sections beyond what is required in Part 673.

Under Part 673, a transit agency is required to maintain documents that describe its Safety Plan, including those related to implementation and results from processes and activities. Also, a transit operator may have existing documentation that describes processes, procedures, and other information required in Part 673. You may reference these documents in your Safety Plan by specifying the document names and locations within the appropriate sections of the plan.

## 1. TRANSIT AGENCY INFORMATION

| | | | |
|---|---|---|---|
| **Transit Agency Name** | Gold Coast Transit District | | |
| **Transit Agency Address** | 1901 Auto Center Drive, Oxnard, California 93030 | | |
| **Name and Title of Accountable Executive** | Vanessa Rauschenberger | | |
| **Name of Chief Safety Officer or SMS Executive** | Alex Zaretsky | | |
| **Mode(s) of Service Covered by This Plan** | Fixed Route Bus Service | **List All FTA Funding Types (e.g., 5307, 5310, 5311)** | 5307 |
| **Mode(s) of Service Provided by the Transit Agency (Directly operated or contracted service)** | Directly Fixed Route Bus Serivce / and Paratransit Services Subcontracted | | |

[1] A small public transportation provider is a recipient or subrecipient of Federal financial assistance under 49 U.S.C. § 5307 that has one hundred (100) or fewer vehicles in peak revenue service and does not operate a rail fixed guideway public transportation system. 49 C.F.R. § 673.5.

| | | | | |
|---|---|---|---|---|
| **Does the agency provide transit services on behalf of another transit agency or entity?** | Yes ☐ | No ☒ | **Description of Arrangement(s)** | Not applicable |
| **Name and Address of Transit Agency(ies) or Entity(ies) for Which Service Is Provided** | Not applicable | | | |

## 2. PLAN DEVELOPMENT, APPROVAL, AND UPDATES

| | | |
|---|---|---|
| **Name of Entity That Drafted This Plan** | Gold Coast Transit District | |
| **Signature by the Accountable Executive** | **Signature of Accountable Executive** | **Date of Signature** |
| | Vanessa Rauschenberger | December 7, 2022 |
| **Approval by the Board of Directors or an Equivalent Authority** | **Name of Individual/Entity That Approved This Plan** | **Date of Approval** |
| | **Board of Directors** | June 3, 2020 |
| | **Relevant Documentation (title and location)** | |
| | Board Report / Resoultion # 2020-04 | |
| **Certification of Compliance** | **Name of Individual/Entity That Certified This Plan** | **Date of Certification** |
| | Gold Coast Transit District Board of Directors | June 3, 2020 |
| | **Relevant Documentation (title and location)** | |
| | Board Report / Resoution # 2020-04 | |

**Version Number and Updates**

*Record the complete history of successive versions of this plan.*

| Version Number | Section/Pages Affected | Reason for Change | Date Issued |
|---|---|---|---|
| 1 | all | New | June 3, 2020 |
| 2 | Org chart / Sec 7.4.4 | Updated Org Chart / Frontline Employees Committee | Dec 7, 2022 |
| | | | |
| | | | |

| **Annual Review and Update of the Public Transportation Agency Safety Plan**<br>*Describe the process and timeline for conducting an annual review and update of the Public Transportation Agency Safety Plan.* |
|---|
| Annual review and update. |

## 3. SAFETY PERFORMANCE TARGETS

**Safety Performance Targets**

*Specify performance targets based on the safety performance measures established under the National Public Transportation Safety Plan.*

| Mode of Transit Service | Fatalities | Injuries | Safety Events | System Reliability VRM /Failures | Fatalities Rate VRM per 100,000 | Injuries Rate VRM per 100,000 | Safety Events Rate VRM per 100,000 |
|---|---|---|---|---|---|---|---|
| **Fixed Route** | 0 | 6 | 5 | 27,160 | 0 | .27 | .22 |
| **Paratransit** | 0 | 1 | 2 | 51,439 | 0 | .32 | .22 |

**Safety Performance Target Coordination**

*Describe the coordination with the State and Metropolitan Planning Organization(s) (MPO) in the selection of State and MPO safety performance targets.*

**Self-made targets based on data and VRM**

| | | |
|---|---|---|
| **Targets Transmitted to the State** | **State Entity Name** | **Date Targets Transmitted** |
| | Any State or Federal Department of Transportation / FTA (TAMS System) | June 3, 2020 |
| **Targets Transmitted to the Metropolitan Planning Organization(s)** | **Metropolitan Planning Organization Name** | **Date Targets Transmitted** |
| | VCTC, Cal Trans | June 3, 2020 |
| | SCAG | June 3, 2020 |

## 4. SAFETY MANAGEMENT POLICY

**Safety Management Policy Statement**

*Include the written statement of safety management policy, incorporating safety objectives.*

Safety is a core value at GCTD, and managing safety is a core business function. We will develop, implement, maintain, and continuously improve processes to ensure the safety of our customers, employees, and the public. See attached SMS policy statement, pages 3-5 & 8.

**Safety Management Policy Communication**

*Describe how the safety management policy is communicated throughout the agency's organization. Include dates where applicable.*

The Chief Safety Officer, who leads GCTD's SMS activities, introduced our staff to SMS principles in June 2020, at an All-Staff Meeting. GCTD's Safety Management Policy Statement will be distributed to each employee in the form of a handout during All-Staff Meetings. See attached SMS policy statement, page 9.

**Authorities, Accountabilities, and Responsibilities**

*Describe the authorities, accountabilities, and responsibilities of the following individuals for the development and management of the transit agency's Safety Management System (SMS).*

| | |
|---|---|
| **Accountable Executive** | The General Manger of Gold Coast Transit District serves as the Accountable Executive with the following authorities, accountabilities, and responsibilities under this plan. See attached SMS and Agency Safety Plan ASP policy statement, page 6 & Exhibit A. |
| **Chief Safety Officer or SMS Executive** | The Accountable Executive designates the Director of Human Resources as the Chief Safety Officer. The Chief Safety Officer has the following authorities, accountabilities, and responsibilities under this plan. See attached SMS and Agency Safety Plan ASP policy statement page 6 & Exhibit A. |
| **Agency Leadership and Executive Management** | Agency Leadership and Executive Management also have authorities and responsibilities for day-to-day SMS implementation and operation of GCTD's SMS under this plan. GCTD Agency Leadership and Executive Management include, see attached SMS and Agency Safety Plan ASP policy statement and Organizational chart, page 6 & Exhibit A |
| **Key Staff** | GCTD uses the Safety Committee, as well as the monthly Drivers' Meeting and quarterly All-Staff Meetings, to support its SMS and safety programs See attached SMS and Agency Safety Plan ASP policy statement, page 6 & Exhibit A |

**Employee Safety Reporting Program**

*Describe the process and protections for employees to report safety conditions to senior management. Describe employee behaviors that may result in disciplinary action (and therefore, are excluded from protection).*

GCTD's ESRP encourages employees who identify safety concerns in their day-to-day duties to report them to senior management in good faith without fear of retribution. There are many ways employees can report safety conditions, See attached SMS and Agency Safety Plan ASP policy statement /page 9 & Exhibit B Employee Reporting System.

## 5. SAFETY RISK MANAGEMENT

**Safety Risk Management Process**

*Describe the Safety Risk Management process, including:*

- *Safety Hazard Identification: The methods or processes to identify hazards and consequences of the hazards.*

| |
|---|
| • *Safety Risk Assessment: The methods or processes to assess the safety risks associated with identified safety hazards.*<br>• *Safety Risk Mitigation: The methods or processes to identify mitigations or strategies necessary as a result of safety risk assessment.* |
| GCTD uses the SRM process as a primary method to ensure the safety of our operations, passengers, employees, vehicles, and facilities. It is a process whereby hazards and their consequences are identified, assessed for potential safety risk, and resolved in a manner acceptable to GCTD's leadership, see attached SMS and Agency Safety Plan ASP policy statement, page 13. |

## 6. SAFETY ASSURANCE

| **Safety Performance Monitoring and Measurement** |
|---|
| *Describe activities to monitor the system for compliance with procedures for operations and maintenance.* |
| Through our Safety Assurance process, GCTD evaluates our compliance with operations and maintenance procedures to determine whether our existing rules and procedures are sufficient to control our safety risk; Assesses the effectiveness of safety risk mitigations to make sure the mitigations are appropriate and are implemented as intended; Investigates safety events to identify causal factors; and Analyzes information from safety reporting, including data about safety failures, defects, or conditions. See attached SMS and Agency Safety Plan ASP policy, page 16-17. |
| *Describe activities to monitor operations to identify any safety risk mitigations that may be ineffective, inappropriate, or were not implemented as intended.* |
| GCTD monitors safety risk mitigations to determine if they have been implemented and are effective, appropriate, and working as intended. The mechanism for monitoring safety risk mitigations varies depending on the mitigation. See attached SMS and Agency Safety Plan ASP policy statement, page 16-17. |
| *Describe activities to conduct investigations of safety events to identify causal factors.* |
| GCTD maintains documented procedures for conducting safety investigations of events (accidents, incidents, and occurrences, as defined by FTA) to find causal and contributing factors and review the existing mitigations in place at the time of the event. These procedures also reflect all traffic safety reporting and investigation requirements established by Any State's Department of Motor Vehicles. See attached SMS and Agency Safety Plan ASP policy statement, page 16-17. |
| *Describe activities to monitor information reported through internal safety reporting programs.* |
| The Chief Safety Officer and Safety Committee routinely review safety data captured in employee safety reports, safety meeting minutes, customer complaints, and other safety communication channels. When necessary, the Chief Safety Officer and Safety Committee ensure that the concerns are investigated or analyzed through SRM process. See attached SMS and Agency Safety Plan ASP policy statement, page 16-17. |
| **Management of Change (Not Required for Small Public Transportation Providers)**<br>*Describe the process for identifying and assessing changes that may introduce new hazards or impact safety performance.* |
| |
| **Continuous Improvement (Not Required for Small Public Transportation Providers)**<br>*Describe the process for assessing safety performance. Describe the process for developing and carrying out plans to address identified safety deficiencies.* |

## 7. SAFETY PROMOTION

| **Competencies and Training**<br>*Describe the safety training program for all agency employees and contractors directly responsible for safety.* |
|---|
| GCTD's comprehensive safety training program applies to all employees directly responsible for safety, including: Bus vehicle operators, Dispatchers, Maintenance personnel, Managers and supervisors, Agency Leadership and Executive Management, Chief Safety Officer, and Accountable Executive. GCTD dedicates resources to conduct a comprehensive safety training program, as well as training on SMS roles and responsibilities. See attached SMS and Agency Safety Plan ASP policy statement, monthly training, page 18 and Exhibit B. |
| **Safety Communication**<br>*Describe processes and activities to communicate safety and safety performance information throughout the organization.* |
| GCTD's Chief Safety Officer and staff, and training staff coordinate GCTD's safety communication activities for the SMS, the activities focus on the three categories of communication activity established in 49 CFR Part 673 (Part 673): Communicating: Safety performance, Hazards and Reports. See attached SMS and Agency Safety Plan ASP policy statement, page 18 and Exhibit B. |

# 11 ADDITIONAL INFORMATION

| **Supporting Documentation**<br>*Include or reference documentation used to implement and carry out the Safety Plan that are not included elsewhere in this Plan.* |
|---|
| GCTD will maintain documentation related to the implementation of its SMS; the programs, policies, and procedures used to carry out this ASP; and the results from its SMS processes and activities for three years after creation. They will be available to the FTA or other Federal or oversight entity upon request. See attached SMS and Agency Safety Plan ASP policy statement and Attachments. Exhibit B. |

# 12 DEFINITIONS OF SPECIAL TERMS USED IN THE SAFETY PLAN

| Term | Definition |
|---|---|
| Pages 4-5 | See attached SMS and Agency Safety Plan ASP policy statement and Attachments. |
| Pages 4-**5** | See attached SMS and Agency Safety Plan ASP policy statement and Attachments. |

# 13 LIST OF ACRONYMS USED IN THE SAFETY PLAN

| Acronym | Word or Phrase |
|---|---|
| **Pages 4-5** | See attached SMS and Agency Safety Plan ASP policy statement and Attachments. |
| **Pages 4-5** | See attached SMS and Agency Safety Plan ASP policy statement and Attachments. |

# ATTACHMENT B

**Employee Reporting System**

It is our policy that everything possible will be done to protect employees, contractors, and visitors from accidents. Safety is a cooperative undertaking requiring participation by every employee.

To carry out this policy ALL employees shall:

1. Report immediately all unsafe conditions and equipment to their Supervisor, Manager, Department Director and/or GCTD's Human Resources Risk Manager, or the General Manager. THE EMPLOYEE IS NOT TO USE UNSAFE EQUIPMENT AND MUST REPORT IT.

2. Report immediately all accidents, injuries and illnesses to their Supervisor, Manager, Department Director, and/or GCTD's Human Resources Risk Manager, or the General Manager.

3. Anyone behaving in a manner consistent with intoxicating liquor or drugs shall not be allowed on the job while in that condition and will be subject to disciplinary actions, up to and including immediate termination.

4. Horseplay, scuffling, and other acts which tend to have an adverse influence on the safety or well-being of Gold Coast Transit District employees are prohibited.

5. Means of egress (exits) shall be kept unblocked, well lighted and unlocked during work hours.

6. In the event of fire, sound alarm and evacuate.

7. Upon hearing fire alarm, stop work and proceed to the nearest clear exit. Gather at the designated evacuation assembly areas.

8. Only trained workers may attempt to respond to a fire or other emergency.
9. Exit doors must comply with fire safety regulations during business hours.

10. Stairways should be kept clear of items that can be tripped over, and all areas under stairways that are exit routes should not be used to store combustibles.

11. Materials and equipment will not be stored against doors or exits, fire ladders, or fire extinguisher stations.

12. Aisles must be kept clear at all times.

13. Work areas should be maintained in a neat, orderly manner. Trash and refuse are to be thrown in proper waste containers.

14. All spills shall be promptly wiped up. If there is concern about the contents of the spill, the material safety data sheet (MSDS) must be reviewed.

15. Always use the proper lifting techniques. Never attempt to lift or push an object which is too heavy. Contact your supervisor or manager when help is needed to move a heavy object.

16. Never stack materials precariously on top of lockers, file cabinets or other relatively high places.

17. When carrying an object, caution should be exercised in watching for and avoiding obstructions, loose material, etc.

18. Do not stack materials in an unstable manner.

19. Report exposed wiring and cords that are frayed or have deteriorated insulation so that they can be repaired or replaced promptly.

20. Never use a metal ladder where it could come in contact with energized parts of equipment, fixtures or circuit conductors.

21. Maintain sufficient access 36 inches minimum clearance and working space around all electrical equipment to permit ready and safe operations and maintenance.

22. Do not use any portable electrical tools and equipment that are not grounded or double insulated.

23. All electrical equipment should be plugged into appropriate wall receptacles or into an extension of only one cord of similar size and capacity. Three-pronged plugs should be used to ensure continuity of ground.

24. All cords running into walk areas must be taped down or inserted through rubber protectors to preclude them from becoming tripping hazards.

25. Inspect motorized vehicles and other mechanized equipment daily or prior to use.

26. Shut off engine, set brakes and block wheels prior to loading or unloading vehicles.

27. Inspect pallets and their loads for integrity and stability before loading or moving.

28. Do not store compressed gas cylinders in areas which are exposed to heat sources, electric arcs or high temperature lines.

29. Do not use compressed air for cleaning off clothing unless the pressure is less than 10 psi.

30. Identify contents of pipelines prior to initiating any work that affects the integrity of the pipe.

31. Wear hearing protection in all areas identified as having high noise exposure.

32. Goggles or face shields must be worn when there is a risk from plastic dust or when there is a risk of splashing hazardous liquids.

33. Do not use any faulty or worn hand tools.

34. Guard floor openings by a cover, guardrail, or equivalent.

35. Do not enter into a confined space unless the space is cleared and authorized for entry and you have provided for a stand-by person.

36. Always keep flammable or toxic chemicals in closed containers when not in use.

37. Do not eat, drink or smoke in areas where hazardous chemicals are present. Smoking is not permitted in the workplace at any time, only at designated smoking areas.

38. Be aware of the potential hazards involving various chemicals stored or used in the workplace.

39. Cleaning supplies should be stored away from edible items on kitchen shelves.

40. Cleaning solvents and flammable liquids must be stored in appropriate containers.

41. Solutions that may be poisonous or not intended for consumption should be kept in well labeled containers.

42. When working with a video display terminal (VDT), have all pieces of furniture adjusted, positioned and arranged to minimize strain on all parts of the body.

43. Never leave lower desk or cabinet drawers open that present a tripping hazard. Use care when opening and closing drawers to avoid pinching fingers.

44. Do not open more than one upper drawer at a time; particularly the top two drawers on tall file cabinets.

45. Individual heaters in work areas should be kept clear of combustible materials such as drapes or waste from waste baskets. Newer heaters which are equipped with tip-over switches should be used.

46. Appliances such as coffee pots and microwaves should be kept in working order and inspected for signs of wear, heat or fraying of cords.

47. Fans used in work areas should be guarded. Guards must not allow fingers to be inserted through the mesh. Newer fans are equipped with proper guards.

## HAZARD ABATEMENT RECORD

Safety items identified during safety inspections/investigations will be submitted to the Department Director for review, and an action plan will be developed to resolve each specific safety item. Any needed policies or corrective action will be completed by those assigned responsibility. This form will be used to document identified problems, steps to be taken, and completion deadline.

## OVERALL ACTION PLAN

| MAJOR STEPS TO BE TAKEN | PRIORITY | COMPLETION DATE |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

# *ACCIDENT INVESTIGATION AND REPORTING*

## BASIC RULES FOR ACCIDENT INVESTIGATION

The purpose of an investigation is to find the cause of an accident and prevent further occurrences, not to fix blame. An unbiased approach is necessary to obtain objective findings.

Visit the accident scene as soon as possible while facts are fresh and before witnesses forget important details.

If possible, interview the injured worker at the scene of the accident and "walk" him or her through a re-enactment.

All interviews should be conducted as privately as possible. Interview witnesses one at a time. Talk with anyone who has knowledge of the accident, even if they did not actually witness it.

Consider taking signed statements in cases where facts are unclear or there is an element of controversy.

Document details graphically. Use if needed sketches, diagrams, and photos as needed, and take measurements when appropriate.

Focus on causes and hazards. Develop an analysis of what happened, how it happened and how it could have been prevented. Determine what caused the accident itself, not just the injury.

Every investigation should include an action plan. How will you prevent such accidents in the future?

Attached are copies of the reporting forms used by GCTD: (1). Safety Hazard Report (2). Unsafe condition report (3). Incident report (4). Accident investigation report (5). Employees report of an on the job injury (6). Supervisor's report on a reported employee injury. (7) Supervisors follow-up report on an accident.

**Safety Hazard Report**

## Report

Date_____ Location_____

Reported By_____ Received By_____

Date and Time Condition Reported_____

## Hazard

**Type of Concern:**

___ Unsafe Condition of area ___ Unsafe condition of equipment ___ Other

Equipment_____ Malfunction_____

Description of Hazard_____

_____

_____

## Employee Recommendation

What Changes would you recommend to correct the condition or hazard? _____

_____

_____

_____

Signature_____ Date_____

# [Form 2]

3181

## Report of Unsafe Condition or Hazard

Optional: Employees may submit this form anonymously.

Employee's Name: _____

Job Title: _____

Location of Condition Believed to Be Unsafe or Hazardous: _____

Date and Time Condition or Hazard Observed: _____

Description of Unsafe Condition or Hazard: _____

What Changes Would You Recommend to Correct the Condition or Hazard? _____

Optional:

Signature of Employee: _____ Date: _____

## Company Response:

Name of Person Investigating Report: _____

Results of Investigation (what was found? was condition unsafe or a hazard?) (attach additional sheets if necessary):

Action Taken to Correct Hazard or Unsafe Condition, If Appropriate (or, Alternatively, Information provided to Employees as to Why Condition Was Not Unsafe or Hazardous) (attach additional sheets if necessary): _____

Signature of Person Investigating Report: _____

**Gold Coast Transit**

Operators Miscellaneous Incident Report

| Operator Name | Employee # | Date | Time | Location | Route # |
|---|---|---|---|---|---|
| | | | | | |

| Coach Run | Bus # | Type of Incident |
|---|---|---|
| | | Fare/Transfer Dispute Passenger Problem Wheelchair Issue Bike Other |

Police Report Filed
Yes No

DESCRIBE INCIDENT(S)

Date: _____ Employee Signature: _____

GOLD COAST TRANSIT
Traffic Accident Report

ACCIDENT DATE: ___/___/___ TIME OF ACCIDENT: _____ am / pm FILE #_____

**EMPLOYEE INFORMATION**

Employee Name _____

Employee # _____ Drivers License # _____

Employee Classification (Check One):

Operator Supervisor Mechanic Admin

Service Worker Other _____

**ACCIDENT LOCATION INFORMATION**

Accident location:

Route # _____ Direction of Travel (circle one) N S E W

Vehicle was (check all that apply): On Route for Route On Detour

Deadheading Training Road Test At a Bus Stop

Other _____

**VEHICLE INFORMATION – GCT VEHICLE**

Vehicle # _____ License Plate #: _____ Year _____

Make _____ Vehicle Damage _____

**POLICE DEPARTMENT INFORMATION**

Police Department on Scene (Check one): Yes No REPORT # _____

Property Damage Only (Check one): Oxnard Ventura Port Hueneme CHP

Ventura County Sheriff GCU Other _____

**TRAFFIC & ROAD CONDITIONS INFORMATION**

Weather Conditions (Check all that apply): Daylight Dusk Dark Dry Roadway Wet Roadway Fog Rain Snow Other _____

Traffic Control: Light Yield Sign Stop Sign Road Type: Street State Highway Freeway Veh. Estimated Speed _____ mph

Was other driver cited by police: Yes No Was anyone involved or injured by original collision: Yes No Any vehicle towed: Yes No

**OTHER VEHICLE/PEDESTRIAN/BICYCLE #1 – INFORMATION**

Driver _____ Registered Owner (if not driver) _____

Address _____ Address _____

Phone # (___) _____ Vehicle Bicycle Pedestrian Phone # (___) _____

Vehicle Information: Make _____ Model _____ Year _____ Lic. Plate # _____ # of People in Vehicle

Insurance Company _____ Policy # _____ Policy Expiration Date ___/___/___

Direction of Travel (circle one): N S E W Estimated Speed _____ mph Vehicle Damage _____

Passengers in Other Vehicle: Give Name(s), Address(es), Phone Number(s):

_____ Claimed Injury? Yes No

_____ Claimed Injury? Yes No

**OTHER VEHICLE/PEDESTRIAN/BICYCLE #2 – INFORMATION**

Driver _____ Registered Owner (if not driver) _____

Address _____ Address _____

Phone # (___) _____ Vehicle Bicycle Pedestrian Phone # (___) _____

Vehicle Information: Make _____ Model _____ Year _____ Lic. Plate # _____ # of People in Vehicle

Insurance Company _____ Policy # _____ Policy Expiration Date ___/___/___

Direction of Travel (circle one): N S E W Estimated Speed _____ mph Vehicle Damage _____

Passengers in Other Vehicle: Give Name(s), Address(es), Phone Number(s):

_____ Claimed Injury? Yes No

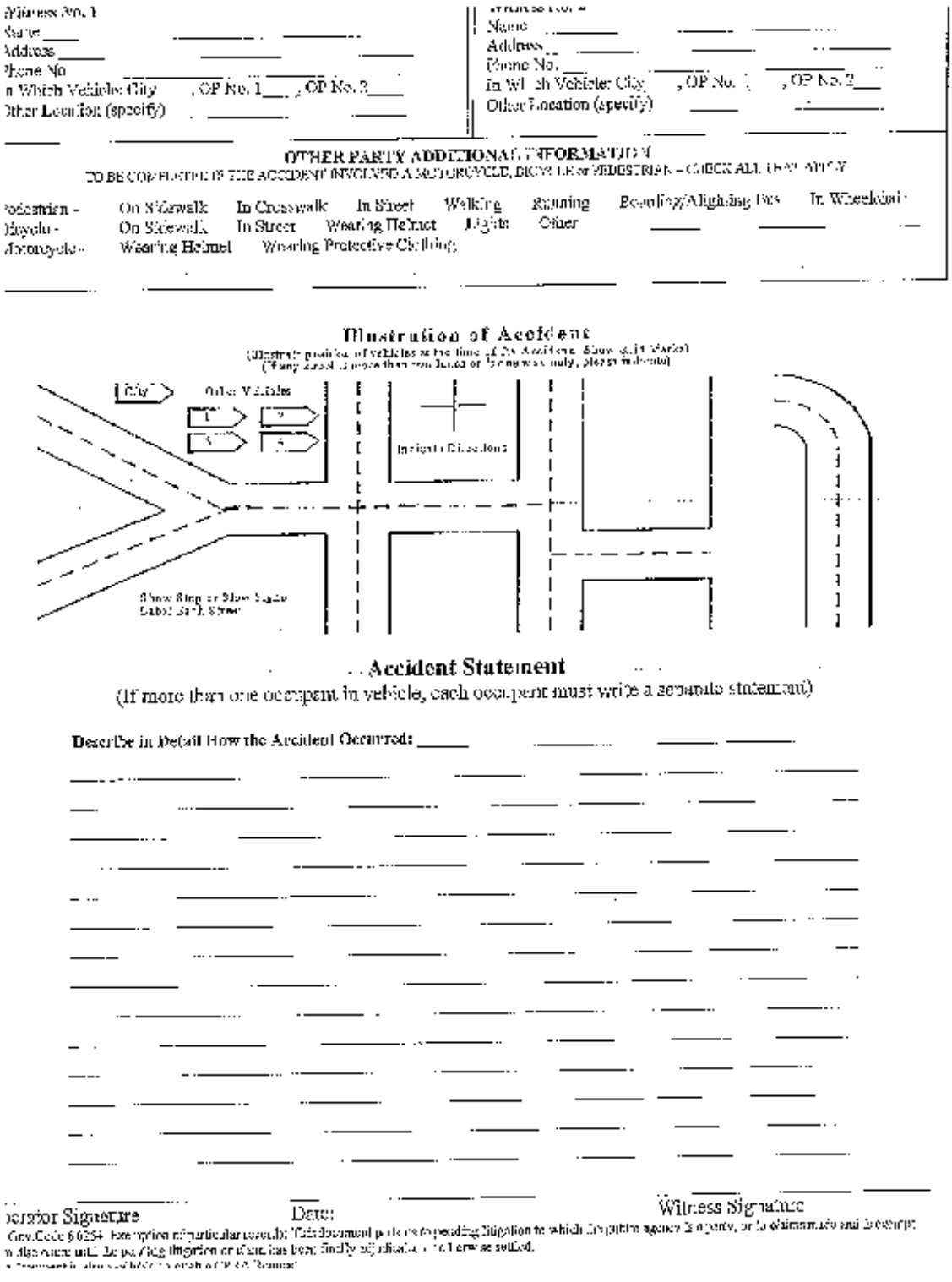
_____ Claimed Injury? Yes No

**PROPERTY DAMAGE (Other than to vehicle):** Owners Name _____ Phone # _____

Type of Property _____ Location _____ Describe Damage _____

Cal.Gov.Code § 6254, Exemption of particular records: This document pertains to pending litigation to which the public agency is a party, or to claims made and is exempt from disclosure until the pending litigation or claim has been finally adjudicated or otherwise settled.

This document is also available through a CPRA Request



Witness No. 1
Name
Address
Phone No.
In Which Vehicle: City , OP No. 1 , OP No. 2
Other Location (specify)

Name
Address
Phone No.
In Which Vehicle: City , OP No. 1 , OP No. 2
Other Location (specify)

OTHER PARTY ADDITIONAL INFORMATION

TO BE COMPLETED IF THE ACCIDENT INVOLVED A MOTORCYCLE, BICYCLE or PEDESTRIAN – CHECK ALL THAT APPLY

Pedestrian - On Sidewalk In Crosswalk In Street Walking Running Boarding/Alighting Bus In Wheelchair
Bicyclist - On Sidewalk In Street Wearing Helmet Lights Other
Motorcyclist - Wearing Helmet Wearing Protective Clothing

Illustration of Accident

(Illustrate position of vehicles at the time of the Accident. Show street names. If many streets, more than two, or driveways only, please indicate)

City
Other Vehicles
Intersection Directions
Show Ring or Show Name and Street

Accident Statement

(If more than one occupant in vehicle, each occupant must write a separate statement)

Describe in Detail How the Accident Occurred:

Operator Signature Date: Witness Signature

Gov. Code § 6254. Description of particular records: This document pertains to pending litigation to which the public agency is a party, or to claims made and is exempt from disclosure until the pending litigation or claim has been finally adjudicated or otherwise settled.

TRANSIT

# EMPLOYEE'S REPORT OF INJURY

TENTION: This form contains information relating to employee health and must be used in a manner that protects the nfidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes. e CCR Title 8 14300.29(b)(2)(H)" NOTE: Shaded boxes indicate confidential employee information as listed in CCR Title 8 14300.35 (b)(2)(E)?"

## EMPLOYEE

| EMPLOYEE NAME | EMPLOYEE ID | DATE OF BIRTH (mm/dd/yy) |
|---|---|---|
| HOME ADDRESS (Number, Street, City and Zip) | | PHONE NUMBER |
| SEX ☐ MALE ☐ FEMALE | OCCUPATION (Regular Job Title, NO initials or abbreviations) | DATE OF HIRE (mm/dd/yy) |

## INJURY OR ILLNESS

| DATE OF INJURY OR ONSET OF ILLNESS (mm/dd/yy) | TIME INJURY/ILLNESS OCCURRED: | TIME EMPLOYEE BEGAN WORK: |
|---|---|---|

SPECIFIC INJURY/ILLNESS AND PART OF BODY AFFECTED, MEDICAL DIAGNOSIS, if available (e.g., second degree burn on right arm)

LOCATION WHERE EVENT OR EXPOSURE OCCURRED (Number, Street, City)

SPECIFIC ACTIVITY THE EMPLOYEE WAS PERFORMING WHEN EVENT OR EXPOSURE OCCURRED

HOW INJURY/ILLNESS OCCURRED: DESCRIBE SEQUENCE OF EVENTS. SPECIFY OBJECT OR EXPOSURE WHICH DIRECTLY PRODUCED THE INJURY/ILLNESS, (e.g., worker stepped back to inspect work and slipped on scrap material. As he fell he brushed against hot heat wire, and burned right hand. USE SEPARATE SHEET IF NECESSARY.

**GOLD COAST TRANSIT**
**SUPERVISOR'S REPORT OF EMPLOYEE INJURY**

Name of Injured Employee: _____

Job Title: _____

Date of Accident/Incident: _____ Time: _____

Date Reported: _____

Reason for delay in reporting, if any: _____

Accident/Incident Location: _____

Nature of injury and part of body affected: _____

Name of medical facility: _____

Address: _____

Did injured leave work? _____ Date & Time: _____

Did injured return to work? _____ Date & Time: _____

Was Non-DOT Drug test conducted? Yes / No

Describe how accident occurred: _____

If another person was responsible for injury, list name: _____

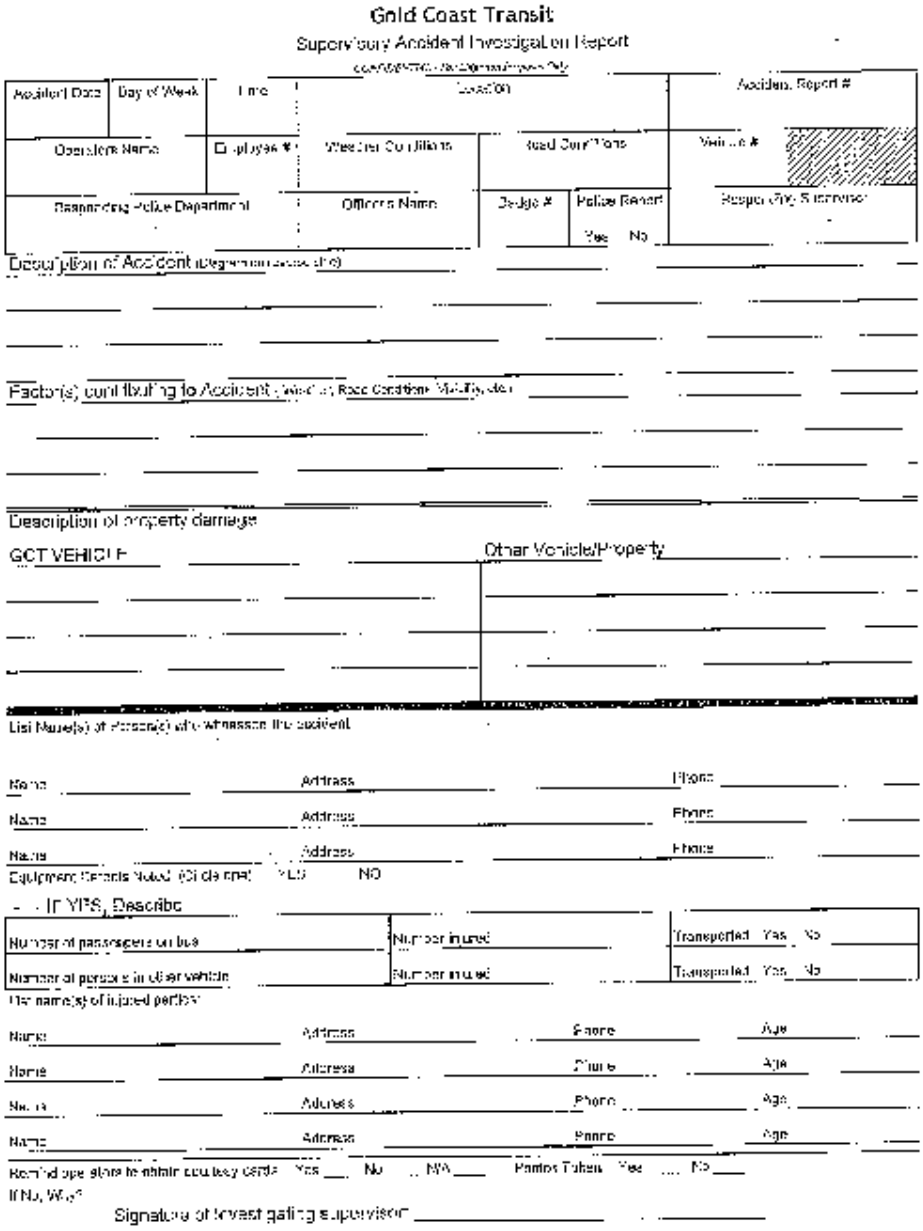
Name of witnesses: _____

What step have been taken to prevent similar accident? _____

Do you feel this is an industrial injury as reported by the employee? Yes / No

If not, please explain: _____

Filled out by: Date:



Gold Coast Transit

Supervisory Accident Investigation Report

| Accident Date | Day of Week | Time | Location | Accident Report # |
|---|---|---|---|---|
| Operator's Name | Employee # | Weather Conditions | Road Conditions | Vehicle # |
| Responding Police Department | | Officer's Name | Badge # | Police Report Yes No | Report (City, State, License) |

Description of Accident (Diagram below if necessary)

Factor(s) contributing to Accident (Weather, Road Condition, Visibility, etc.)

Description of property damage

GCT VEHICLE

Other Vehicle/Property

List Name(s) of Person(s) who Witnessed the accident

Name Address Phone

Name Address Phone

Name Address Phone

Equipment Defects Noted (Describe) YES NO

If YES, Describe

| | | |
|---|---|---|
| Number of passengers on bus | Number injured | Transported Yes No |
| Number of persons in other vehicle | Number injured | Transported Yes No |

The name(s) of injured person

Name Address Phone Age

Name Address Phone Age

Name Address Phone Age

Name Address Phone Age

Required operators to obtain courtesy cards Yes ___ No ___ N/A ___ Parties Taken Yes ___ No ___

If No, Why?

Signature of Investigating Supervisor

**Item #8**

**DATE** December 7, 2022

**TO** GCTD Board of Directors

**FROM** James Beck, Director Operations and Maintenance

**SUBJECT** Consider Approval of GCTD's ZEB Transition and Rollout Plan

## SUMMARY

Under California's Innovative Clean Transit (ICT) Regulation, all public transit providers must submit a Zero Emissions Bus (ZEB) Transition Rollout Plan to the California Air Resources Board (CARB) by June 30th, 2023 to provide a roadmap to transition bus agency fleet to 100% Zero-Emissions by the year 2040.

GCTD's submission to CARB incorporates modeling and methodology results, fleet recommendations, facility and infrastructure plans, a financial evaluation, workforce training plans as well as other considerations. The attached plan was prepared by Stantec, in conjunction with GCTD staff, and consists of a CARB-compliant plan, ready for submission in response to the Innovative Clean Transit (ICT) regulation.

## RECOMMENDATION

It is recommended that the Board of Directors approve the adoption of GCTD's ZEB Transition and Rollout Plan.

General Manager's Concurrence

Vanessa Rauschenberger


# ZEB Strategy and Rollout Plan

**Gold Coast Transit District**
**ZEB Rollout and Implementation Plan**

Final Report

October 2022

Stantec

Stantec

# ZEB Strategy and Rollout Plan

ZEB Rollout Plan and Implementation Strategy

October 5, 2022

Prepared for:

Gold Coast Transit District

Prepared by:

Stantec Consulting Services Inc.

**Acknowledgements**

We wish to thank Jim Beck,
Vanessa Rauschenberger,
Matthew Miller, Margaret Schoep,
Juan De La Rosa, and staff at GCTD.

# ZEB STRATEGY AND ROLLOUT PLAN

**Release Version**

| Rev. | Description | Date |
|---|---|---|
| 0 | Draft Report Issued to GCTD | 8/5/2022 |
| | Comments received | 8/26/2022 |
| 1 | Revised Report Issued to GCTD | 9/14/2022 |
| 2 | Final Report Issued to GCTD | 10/5/2022 |



**Project Team**

Stantec Consulting Services Inc.

801 South Figueroa Street Suite 300

Los Angeles CA 90017-3007

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# EXECUTIVE SUMMARY

Gold Coast Transit District (GCTD) is the largest public transportation operator in Ventura County, providing a variety of fixed-route and demand response services to the cities of Ojai, Oxnard, Port Hueneme, Ventura and the unincorporated areas of Ventura County.

With a service area population of 367,260[1] and a fleet of 60 active (4 contingency) standard[2] buses for fixed-route services, GCTD is classified as a small transit agency under the Innovative Clean Transit (ICT) regulation[3]. This regulation by the California Air Resources Board (CARB) mandates that all transit agencies have a goal of gradually transitioning to a zero-emission bus (ZEB) fleet by 2040. Small transit agencies are required to submit a plan to CARB by June 30, 2023 and begin ZEB purchases in 2026. While the ICT regulation is directed primarily at larger, heavy-duty transit buses[4], GCTD has chosen to transition the majority of its fixed route and demand-response service fleet to hydrogen fuel cell electric bus (FCEB) technology. This report provides a strategic transition plan for all revenue and non-revenue vehicles in GCTD's fleet.

This document also serves as the source for GCTD's rollout plan submission to CARB and provides a detailed plan of the technology, needs, and strategies that will help GCTD transition to a ZEB fleet. The previous phases of this project (summarized in this report) laid the foundation for this plan by assessing GCTD's existing conditions and modeling the power and fuel requirements needed to meet GCTD's service through a ZEB fleet. With this information, the initial ZEB fleet was refined through a collaborative optimization process that led to the preferred fleet composition of an entirely FCEB fixed-route fleet, and 90% FCE demand-response van fleet. Because there are no FCE cutaways currently available, portions of the cutaway fleet can be substituted with FCE vans.

With the preferred fleet composition established, the next steps included determining the facility upgrades and modifications—primarily the construction of a hydrogen fueling station and gas leak detection systems—required to support ZEB operations at GCTD's maintenance facility. In addition, a financial ZEB model was developed for comparative purposes against a base case (or business as usual with fossil fuel buses) and developing a phasing or implementation plan. Overall, implementing the ZEB fleet will cost $135M (cumulative capital and operating costs) compared to $105M for business-as-usual (fossil fuel technology) within a 17-year timeframe (through 2040). Stated otherwise, the transition to ZEBs adds incremental capital and operating costs of $30M to GCTD over the 17-year period. The infrastructure requirements are also captured in this plan to accommodate the phased acquisition of FCEBs while still operating and eventually phasing out fossil fuel vehicles.

Based on GCTD's existing fleet replacement schedule and the required ZEB purchase schedule outlined by CARB, this plan recommends that the ZEB procurement begins in 2023 and gradually continues

[1] NTD 2020 service profile
[2] The active fleet consists of 60 buses (40-ft and 35-ft) for revenue service and 4 buses for contingency purposes.
[3] In this document, standard refers to 35-ft and 40-ft buses.
[4] Specifically, the ICT regulation mandates the transition of vehicles with a gross vehicle weight rating (GVWR) of greater than 14,000 lbs.

through 2040 as fossil fuel vehicles reach the end of their useful lives and are retired. This phased approach allows for GCTD to implement a small number of FCEBs and learn from the process and slowly scaling up to reach a ZE revenue vehicle fleet by 2040 and adhering to ICT guidelines and goals. The full phasing and implementation plan is outlined in Table 1. With a full transition to FCEB, GCTD can reduce its fleet-related greenhouse gas emissions by approximately 49% (~5,414 tons annually) due to the residual carbon footprint of hydrogen fuel production and transportation.

Throughout this document, information is provided that corresponds to the required sections of the ICT ZEB Rollout Plan. Taken together, this plan provides a prudent and feasible approach for GCTD to implement ZEBs that meets the agency's vision of providing safe, responsive, convenient, efficient, and environmentally responsible public transportation to the community.

**Table 1: ZEB implementation phasing plan, FY2023-2040**

| Year | Construction – maintenance facility | Fixed-Route ZEB Fleet Procurements | Demand Response ZE Fleet Procurements | Training: operators, maintenance staff, technicians | Training - other | Capital expenses (2022$) | O&M expenses (2022$) | Total expenses (2022$) |
|---|---|---|---|---|---|---|---|---|
| FY2023 | Construct and install hydrogen fueling equipment for high and low pressure refueling (H35 and H70).<br>Installation of hydrogen gas detection system in maintenance bays and upgrade of ventilation system. | 0 35-ft<br>5 40-ft | 6 vans & cutaways | Tier 1 & tier 3 OEM training | Tier 1 OEM training for all other staff | $16,646,000 | $5,196,000 | $21,842,000 |
| FY2024 | | 0 35-ft<br>0 40-ft | 7 vans & cutaways | Annual refreshers | No activity | $3,448,000 | $4,808,000 | $8,256,000 |
| FY2025 | | 0 35-ft<br>0 40-ft | 2 vans & cutaways | Annual refreshers | Local fire and emergency response department introduction to new technology | $1,899,000 | $4,559,000 | $6,458,000 |
| FY2026 | | 0 35-ft<br>2 40-ft | 8 vans & cutaways | Annual refreshers | No activity | $4,821,000 | $4,236,000 | $9,057,000 |
| FY2027 | | 2 35-ft<br>0 40-ft | 0 vans & cutaways | Annual refreshers | Local fire and emergency response department introduction to new technology | $3,989,000 | $3,979,000 | $7,968,000 |
| FY2028 | | 0 35-ft<br>2 40-ft | 5 vans & cutaways | Annual refreshers | No activity | $4,824,000 | $3,707,000 | $8,531,000 |
| FY2029 | | 0 35-ft<br>5 40-ft | 0 vans & cutaways | Annual refreshers | Local fire and emergency response department introduction to new technology | $3,401,000 | $3,513,000 | $6,914,000 |
| FY2030 | | 0 35-ft<br>2 40-ft | 10 vans & cutaways | Tier 1 & tier 3 OEM training for new staff | Tier 1 OEM training for all other staff | $2,503,000 | $3,443,000 | $5,946,000 |
| FY2031 | | 0 35-ft<br>5 40-ft | 7 vans & cutaways | Annual refreshers | No activity | $3,805,000 | $3,297,000 | $7,102,000 |

| Year | Construction – maintenance facility | Fixed-Route ZEB Fleet Procurements | Demand Response ZE Fleet Procurements | Training: operators, maintenance staff, technicians | Training - other | Capital expenses (2022$) | O&M expenses (2022$) | Total expenses (2022$) |
|---|---|---|---|---|---|---|---|---|
| FY2032 | | 0 35 -ft<br>4 40-ft | 2 vans & cutaways | Tier 1 & tier 3 OEM training for new staff | Tier 1 OEM training for all other staff | $2,517,000 | $3,259,000 | $5,776,000 |
| FY2033 | | 0 35-ft<br>4 40-ft | 8 vans & cutaways | Tier 1 & tier 3 OEM training for new staff | Tier 1 OEM training for all other staff | $3,008,000 | $3,111,000 | $6,119,000 |
| FY2034 | | 0 35-ft<br>7 40-ft | 0 vans & cutaways | Annual refreshers | Local fire and emergency response department training on new technology | $3,628,000 | $2,948,000 | $6,576,000 |
| FY2035 | | 0 35-ft<br>6 40-ft | 5 vans & cutaways | Annual refreshers | No activity | $3,461,000 | $2,787,000 | $6,248,000 |
| FY2036 | | 0 35-ft<br>6 40-ft | 0 vans & cutaways | Annual refreshers | Local fire and emergency response department training on new technology | $2,794,000 | $2,626,000 | $5,420,000 |
| FY2037 | | 0 35-ft<br>6 40-ft | 10 vans & cutaways | Annual refreshers | No activity | $3,568,000 | $2,468,000 | $6,036,000 |
| FY2038 | | 0 35-ft<br>6 40-ft | 7 vans & cutaways | Tier 1 & tier 3 OEM training for new staff | Tier 1 OEM training for all other staff | $3,133,000 | $2,384,000 | $5,517,000 |
| FY2039 | | 8 35-ft<br>0 40-ft | 2 vans & cutaways | Annual refreshers | No activity | $3,123,000 | $2,252,000 | $5,375,000 |
| FY2040 | | 0 35-ft<br>8 40-ft | 8 vans & cutaways | Annual refreshers | Local fire and emergency response department training on new technology | $3,694,000 | $2,128,000 | $5,822,000 |

# Abbreviations

| | |
|---|---|
| AHJ | Authorities Having Jurisdiction |
| AHSC | Affordable Housing and Sustainable Communities Program |
| APCD | Ventura County Air Pollution Control District |
| APTA | American Public Transportation Association |
| BEB | Battery electric bus |
| BESS | Battery electric storage system |
| BEV | Business Electric Vehicle |
| BUILD | Better Utilizing Investments to Leverage Development |
| CAF | Clean Air Fund |
| CARB | California Air Resources Board |
| CCS | Carbon Capture and Storage |
| CMAQ | Congestion Mitigation and Air Quality Improvement Program |
| CTTC | California Transit Training Consortium |
| DGE | Diesel Gallon Equivalent |
| FCEB | Hydrogen fuel cell electric bus |
| FHWA | Federal Highway Administration |
| FTA | Federal Transportation Administration |
| GHG | Greenhouse gas |
| HVIP | Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program |
| ICT | Innovative Clean Transit |
| LCFS | Low Carbon Fuel Standard |
| LCTOP | Low Carbon Transit Operations Program |
| LPP | Local Partnership Program |
| MPO | Metropolitan Planning Organization |
| NFPA | National Fire Protection Association |

| | |
|---|---|
| NPV | Net Present Value |
| NREL | National Renewable Energy Laboratory |
| NTI | National Transit Institute |
| OEHHA | Office of Environmental Health Hazard Assessment |
| PPE | Personal Protective Equipment |
| PV | Photovoltaic |
| RAISE | Local and Regional Project Assistance Program |
| SAC | Stakeholder Advisory Committee |
| SCAG | Southern California Association of Governments |
| SCCAB | South Central Coast Air Basin |
| SCCP | Solutions for Congested Corridors Program |
| SCE | Southern California Edison |
| SMR | Steam Methane Reformation |
| SOC | State of Charge |
| STEP | Sustainable Transportation Equity Project |
| STIP | State Transportation Improvement Program |
| TDA | Transportation Development Act |
| TIRCP | Transit and Intercity Rail Capital Program |
| USDOT | United States Department of Transportation |
| VCTC | Ventura County Transportation Commission |
| VCREA | Ventura County Regional Energy Alliance |
| ZE | Zero emission |
| ZEB | Zero-emission bus |

# 1.0 INTRODUCTION AND BACKGROUND

Gold Coast Transit District (GCTD) provides public fixed-route and paratransit services to western Ventura County, including to the communities of Ojai, Oxnard, Port Hueneme, and Ventura. GCTD is the largest public transportation provider in Ventura County, providing over 3.6 million unlinked passenger trips in 2019[5]. GCTD operates under the mission statement "to provide safe, responsive, convenient, efficient, and environmentally responsible public transportation that serves the diverse needs of our community."

GCTD currently operates a fleet of 64 fixed route and 26 paratransit CNG-powered vehicles fueled by an onsite fueling station in Oxnard. GCTD is part of the Ventura County Air Pollution Control District (APCD), South Central Coast Air Basin (SCCAB), and Southern California Edison (SCE) electric utility territory.

With a service area population of 367,260 and a fleet of 64 fixed route vehicles (60 for revenue service and 4 contingency buses), GCTD is classified as a small transit agency under the Innovative Clean Transit (ICT) mandate and is required to submit a zero-emission bus (ZEB) rollout plan to the California Air Resources Board (CARB) by July 1, 2023[6].

This document serves as the source for GCTD's rollout plan submission to CARB and provides a detailed plan of the technology, needs, and strategies that will help GCTD transition to a ZEB fleet. To develop this rollout plan, several steps have been taken to determine the best ZEB strategy for GCTD. These steps included:

A review of existing conditions to understand characteristics and constraints for GCTD's operations and service area. This included a primer on different ZEB technologies to provide a scan of the market and technologies, including battery-electric buses (BEBs) and hydrogen fuel cell electric buses (FCEBs).

Energy and power modeling to understand performance under different ZE technology options, their viability, and suitability for GCTD's needs. A quantitative and qualitative assessment of modeling results to determine the preferred ZE fleet composition for GCTD.

This report is intended to act as a roadmap to guide GCTD through the ZEB transition to 100% ZEB deployment and implementation by 2040, as well as to fulfill the CARB guidelines as outlined in the ICT mandate. As CARB has reminded transit agencies, the ICT-regulated rollout plan is intended to be a living document that can and should be regularly revisited and updated over time as ZE technologies continue to evolve.

[5] 2019 NTD agency profile

[6] CARB ICT defined large transit agencies as operating in "an urbanized area with a population of at least 200,000 as last published by the Bureau of Census before December 31, 2017 *and* has at least 100 buses in annual maximum service." Agencies that do not meet this definition are categorized as small transit agencies.

# 2.0 APPROACH TO ZEB PLANNING

The graphic in Figure 1 provides a high-level schematic of the major steps in this project to derive a recommended fleet mix and implementation plan.

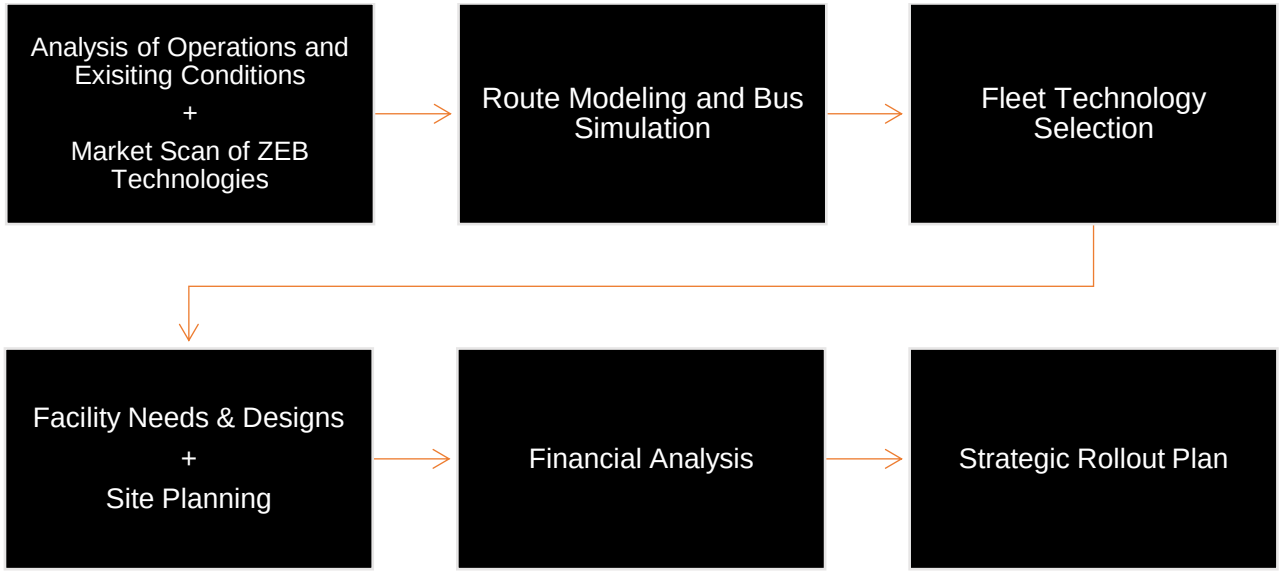



**Figure 1: Schematic representation of the steps in the ZEB planning process**

The first step involved a review of existing conditions of GCTD to provide a foundation and understanding of GCTD's operations, service, and business processes that would be impacted by a transition to a ZEB fleet. A summary of these findings is provided in Section 3.0. A site visit of the operating base and maintenance facility in Oxnard provided insights into the constraints and opportunities for implementing ZEBs, as well as the condition of the facilities, buildings, and existing service cycle. A market scan was also conducted to analyze the current ZEB technologies, their limitations, and in-development technologies that can help shape GCTD's future ZEB fleet.

Next, we modeled block-level and vehicle-level fuel economies to understand the predicted performance of different ZEB technologies under GCTD's operating parameters for both fixed-route and demand response services. Together with a multicriteria trade-off analysis and in consultation with GCTD staff, Stantec and GCTD determined that the best path forward to a ZE future is with a hydrogen fleet (Section 4.0). The fleet procurement schedule and outlook were designed to account for the ICT Regulation's requirement of annual apportionment of ZEB purchases (Section 5.0).

Stantec designed conceptual site plans (and opinion of probable costs) for the maintenance facility that demonstrates the layout of the yard, the service cycle, buses, hydrogen fueling infrastructure, and other ZEB-related equipment (Sections 6.0 and Section 7.0).

With the site plans and identification of required facility modifications and impacts on capital and operating costs, Stantec developed a financial analysis for the ZEB rollout through 2040 (Section 8.0). Operating and planning considerations (Section 9.0), workforce training (Section 10.0), and potential funding sources (Section 11.0) are also reviewed and discussed.

All steps described here provide GCTD with a ZEB rollout plan and strategy. Throughout this document, reference is made to specific sections that are found in the ICT mandated ZEB Rollout Plan document.

# 3.0 SUMMARY OF KEY EXISTING CONDITIONS

The Existing Conditions report provided a comprehensive review of GCTD's existing conditions, encompassing operations, facilities, and finances to lay the groundwork for the modeling and understand current (pre-COVID-19) operating conditions[7].

Major findings from the existing conditions report that will affect the ZEB transition include:

- GCTD operates in a relatively compact and flat service area (with the exception of the Ojai area)
- GCTD's current fleet is made up of standard buses (40-ft and 35-ft) for fixed-route services and a combination of cutaways and passenger vans for demand response services (Table 2). Cutaways and vans have fewer ZE alternatives when compared to options available for standard buses. Fixed-route buses are all CNG-powered with an average fleet age of 9.9 years. Cutaways are also CNG-powered and average 4 years old, with passenger vans an average of 4.3 years, fueled by either CNG or unleaded gasoline. All CNG vehicles are fueled onsite at GCTD's operating base and maintenance facility, and unleaded gasoline vans are fueled offsite by the contractor.

**Table 2: Current revenue fleet composition**

| In-Service Year | Quantity | Make | Seating capacity | Fuel type | GCTD retirement year | FTA minimum useful life[8] | Current age[9] | Service type | Summary |
|---|---|---|---|---|---|---|---|---|---|
| 2019 | 5 | Nor Cal Van | 4/4+2wc | Gas | 2027 | 4 years | 2 | Demand Response | 19 vans for demand response services |
| 2015 | 6 | VPG MV-1 | 3/3+1wc | CNG | 2023 | 4 years | 7 | Demand Response | |
| 2016 | 7 | VPG MV-1 | 3/3+1wc | CNG | 2024 | 4 years | 7 | Demand Response | |
| 2022 | 1 | Nor Cal Van | 4/4+2wc | Battery Electric | 2030 | 4 years | 1 | Demand Response | |
| 2017 | 8 | Starcraft | 14/4+3wc | CNG | 2025 | 4 years | 4 | Demand Response | 8 cutaways for demand response services |
| 2007 | 13 | New Flyer | 39 | CNG | 2021-2024 | 12-17 years | 15 | Fixed-Route | 60 full-size buses for fixed-route revenue service |
| 2009 | 9 | NABI | 30 | CNG | 2022 | 12 years | 13 | Fixed-Route | |
| 2010 | 8 | NABI | 30 | CNG | 2023 | 12 years | 12 | Fixed-Route | |
| 2015 | 8 | Gillig | 38 | CNG | 2027 | 12 years | 6 | Fixed-Route | |
| 2016 | 5 | Gillig | 38 | CNG | 2028 | 12 years | 5 | Fixed-Route | |

[7] Throughout this report, "current" refers to pre-COVID (2019) conditions unless otherwise stated.
[8] https://olga.drpt.virginia.gov/Documents/forms/DRPT%20Asset%20Useful%20Life%20Chart.pdf
[9] Current age determined from model year not in-service year

| In-Service Year | Quantity | Make | Seating capacity | Fuel type | GCTD retirement year | FTA minimum useful life[8] | Current age[9] | Service type | Summary |
|---|---|---|---|---|---|---|---|---|---|
| 2019 | 5 | Gillig | 38 | CNG | 2031 | 12 years | 2 | Fixed-Route | |
| 2021 | 3 | Gillig | 38 | CNG | 2033 | 12 years | 1 | Fixed-Route | |
| 2022 | 9 | Gillig | 38 | CNG | 2034 | 12 years | 0 | Fixed-Route | |

- For fixed-route services, a typical service day sees more vehicles in service during the midday period, but hourly vehicle requirements are fairly consistent throughout the day[10]. Hourly vehicle requirements peak at 3-4 pm with 47 vehicles required for service (Figure 2).

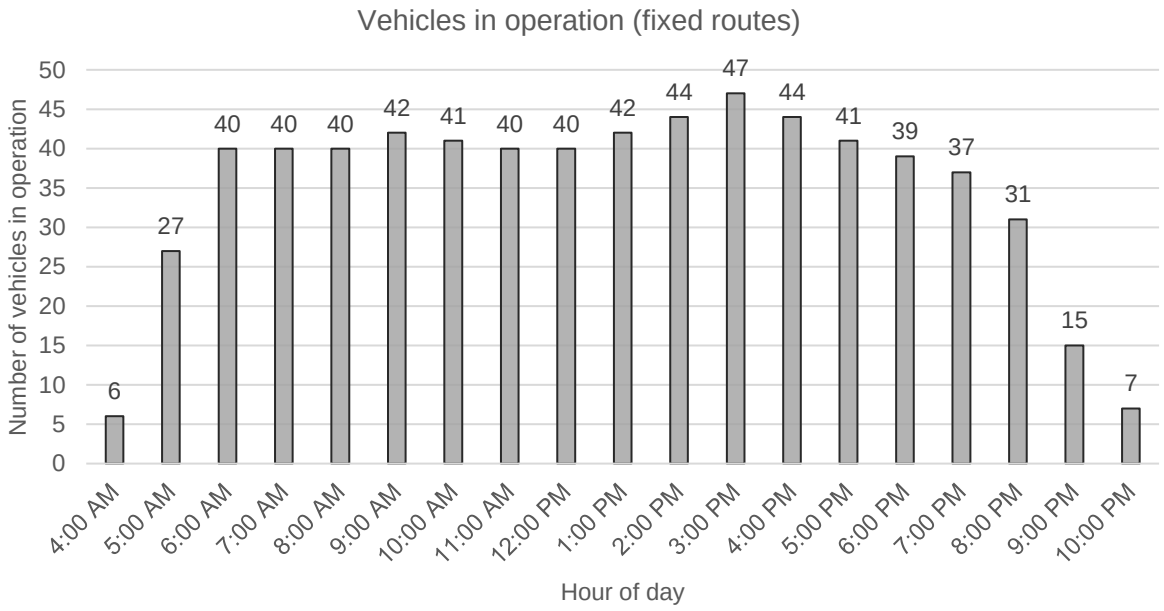



**Figure 2: Hourly vehicles in operation (fixed route)**

- The ability to analyze GCTD's scheduling and operating practices is crucial for understanding the agency's blocking practices, how long blocks are, and how blocks are assigned to vehicles. This translates to how long vehicles are out in revenue operation and, from a modeling perspective, helps us understand if current blocks can be completed with ZE equivalents. Figure 3 shows that more than half of all blocks have mileages over 100 miles, and the maximum block length is 241 miles.

[10] A representative daily service schedule for a pre-COVID-19 Monday was chosen.

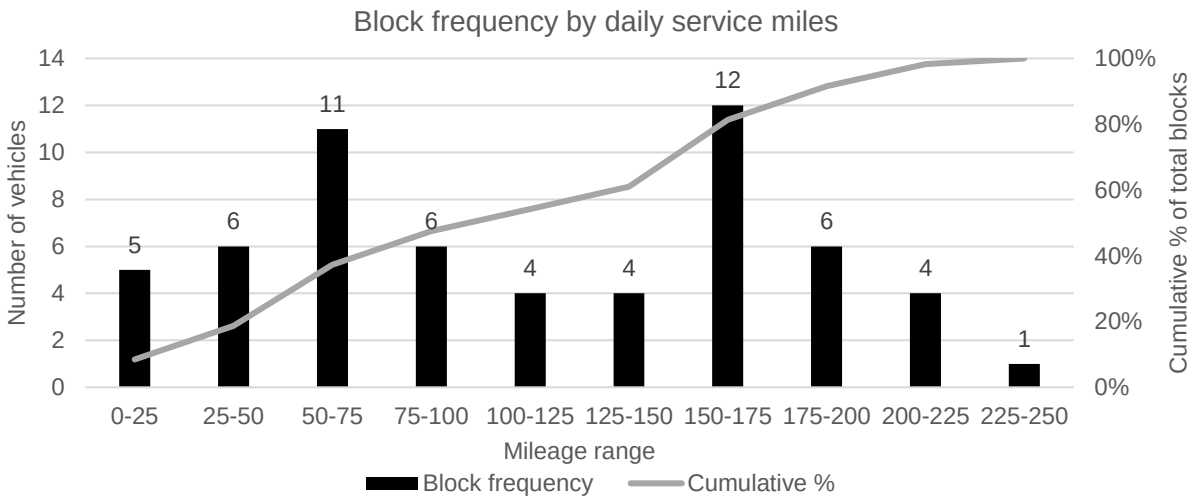



**Figure 3: Block frequency by daily service miles**

- Seven vehicles (or 13% of vehicles in operation) complete two blocks on an average day. To understand how the daily distance that vehicles are traveling changes, we combine blocks at the vehicle level (Figure 4). This shows that 50% of vehicles travel less than 150 miles in a day, which is a positive sign considering the range limitations of ZEBs.

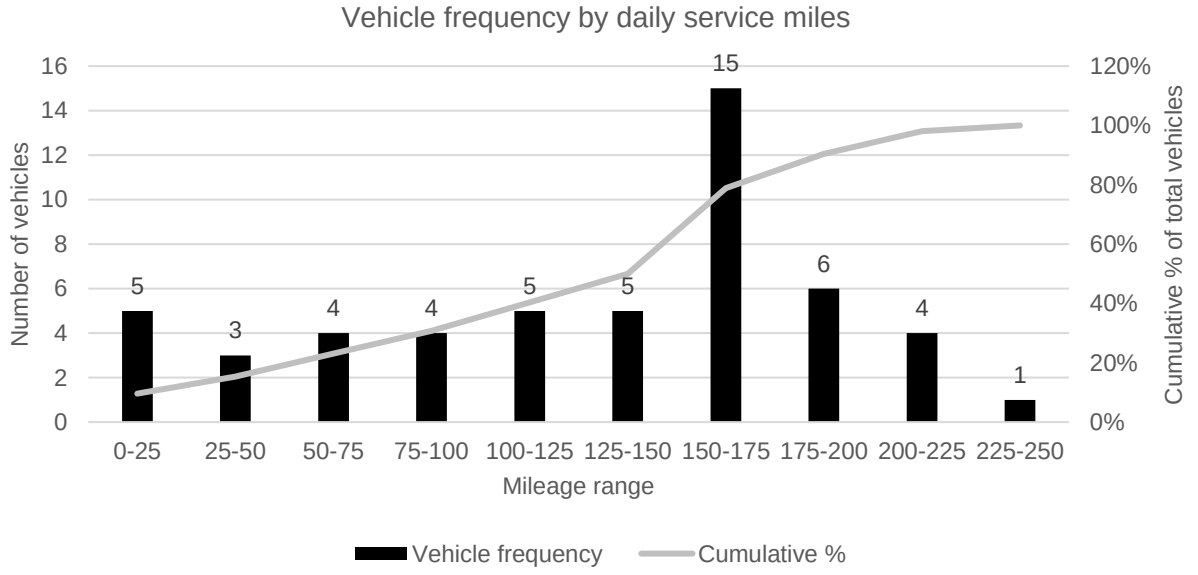



**Figure 4: Vehicle frequency by daily service miles**

- To understand the variability in daily service for demand response vehicles, an entire year (2019) of data was analyzed. Figure 5 shows that on average, vans (top) travel slightly longer distances

than cutaways (bottom), with an average daily service of 144 miles for vans compared to 130 miles for cutaways. However, both vehicles displayed examples where they traveled long distances in a day that exceed ranges of current ZE options for these vehicle types, with vans traveling a maximum of 300 miles in one day and cutaways a maximum of 250 miles.

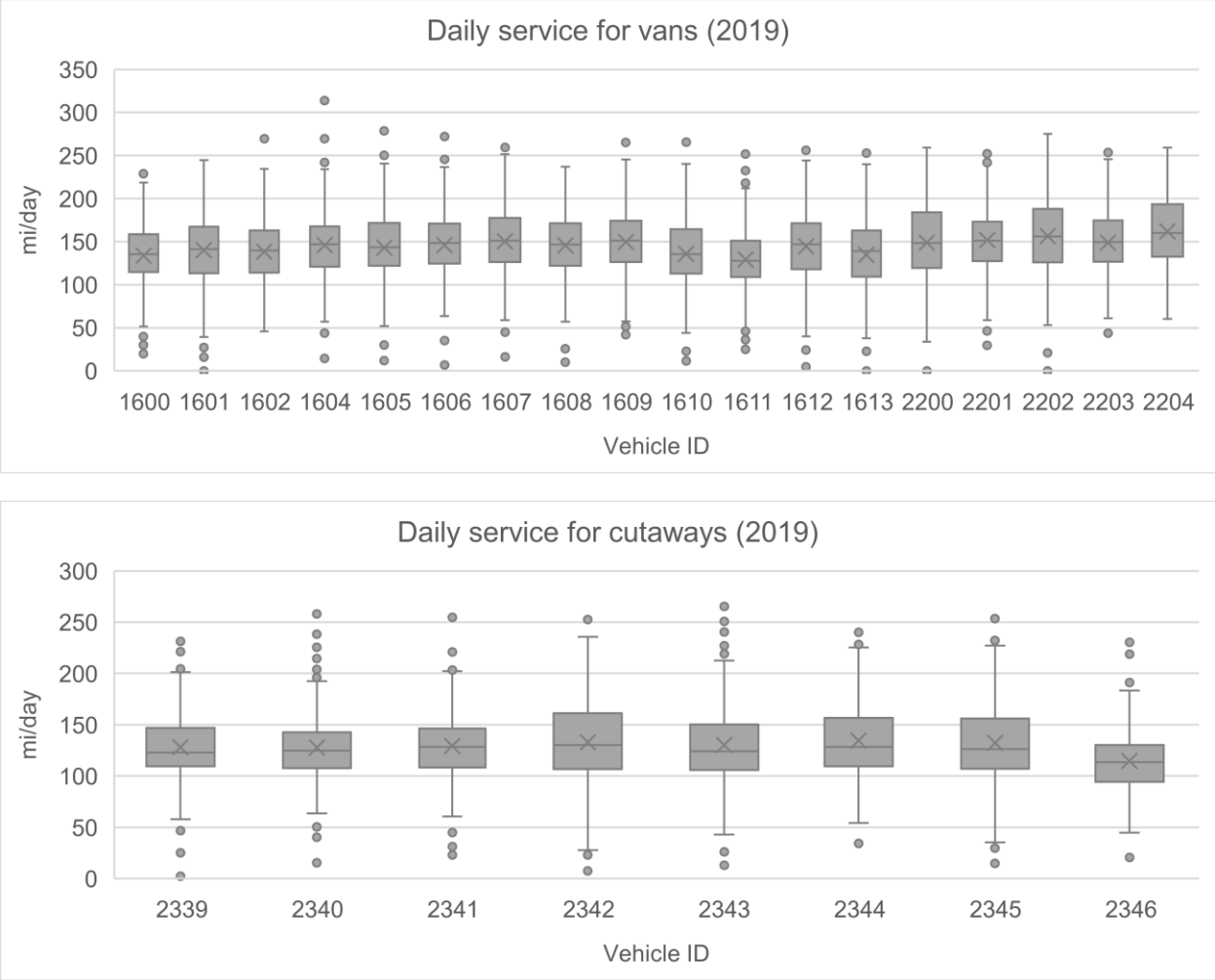



**Figure 5: Daily service for demand response vehicles (2019)**

- In the modeling, we also took into consideration the service design structure of demand response services, where vehicles can be assigned to a polygon within GCTD's service area, keeping them within a certain geographic area to improve efficiency (Figure 6). Polygon assignment criteria includes vehicle capacity and the number of ambulatory vs. wheelchair spaces available. Some vehicles are left unassigned to polygons to handle trips that cross multiple areas.

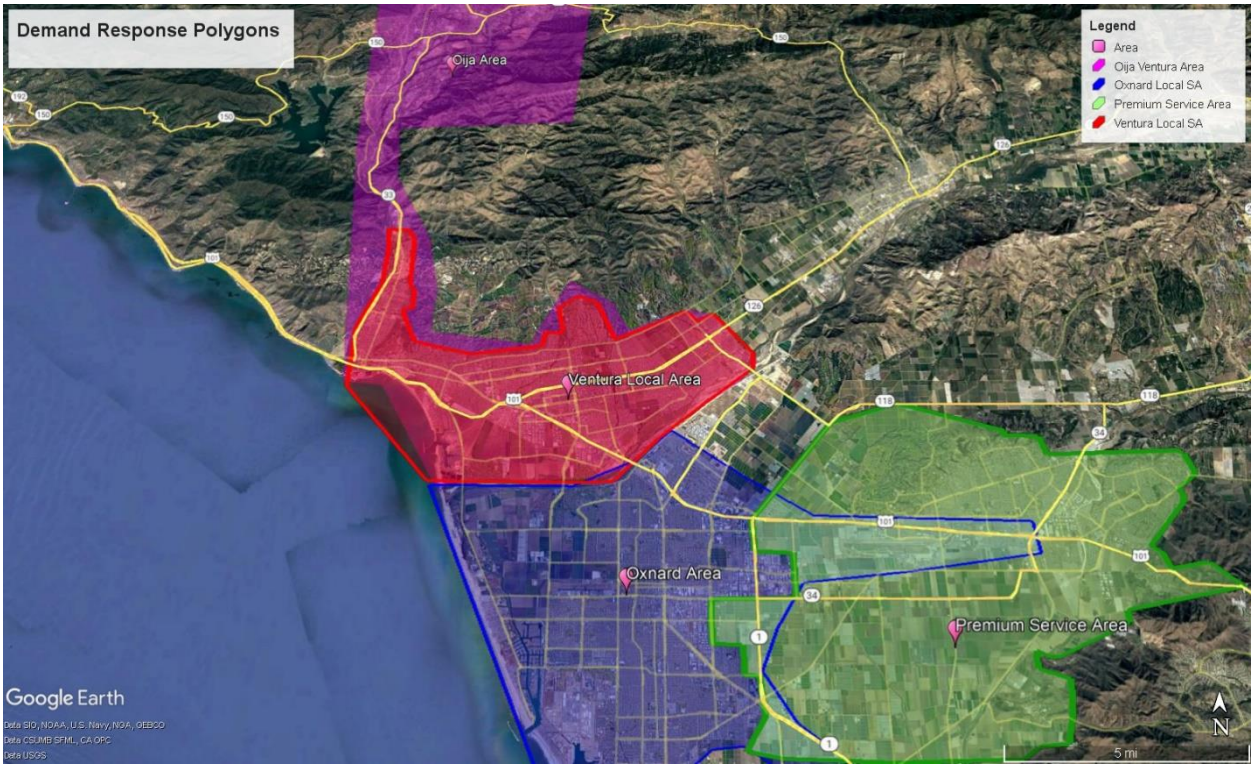



**Figure 6: Demand response polygons**

- GCTD's operating base and maintenance facility is large, new, and well-maintained with onsite CNG fueling and space for growth in fleet and infrastructure. Transition to either BEBs or FCEBs will be accommodated in the space of the facility, however either technology option will require facility modifications:
    - BEBs will require electrical upgrades and chargers, etc.
    - FCEBs will require new hydrogen storage/fueling infrastructure, gas leak detection, and potentially electrical upgrades.

Overall, GCTD's facility, operations, and service area seem well-suited to a fairly straightforward ZE transition, with factors like a relatively flat and compact service area and new facility without space constraints. Some challenges that may arise are related to how vehicles are scheduled, with many fixed-route vehicles out in operations 12+ hours a day (which could exceed range limitations of ZEBs or limit the ability for midday/opportunity charging), and a demand response fleet made up of vehicles with fewer ZE options that travel long daily distances, and the demand response model is inherently difficult to plan for because daily service miles are dictated by demand and not adherent to a fixed schedule.

# 4.0 PREFERRED/RECOMMENDED FLEET COMPOSITION

This section provides an overview of the power and energy modeling methodology and presents the results of the modeling to understand the feasibility of transitioning GCTD's operations to different ZE alternatives. Based on the modeling outcomes, we present a discussion of the different ZE fleet solutions and the pros and cons of different fleet compositions which were used to determine the preferred ZEB fleet composition for GCTD's fixed-route and demand response fleets.

## 4.1 FLEET AND POWER MODELING OVERVIEW

ZEBDecide, Stantec's fleet modeling tool, was used to determine the feasible ZEB composition for GCTD's fleet. The predictive ZEB performance modeling (schematic overview shown in Figure 7) depends on several inputs, such as passenger loads, driving cycles (or duty cycles), topography, vehicle specifications, and ambient conditions subject to the environment in which the agency operates.

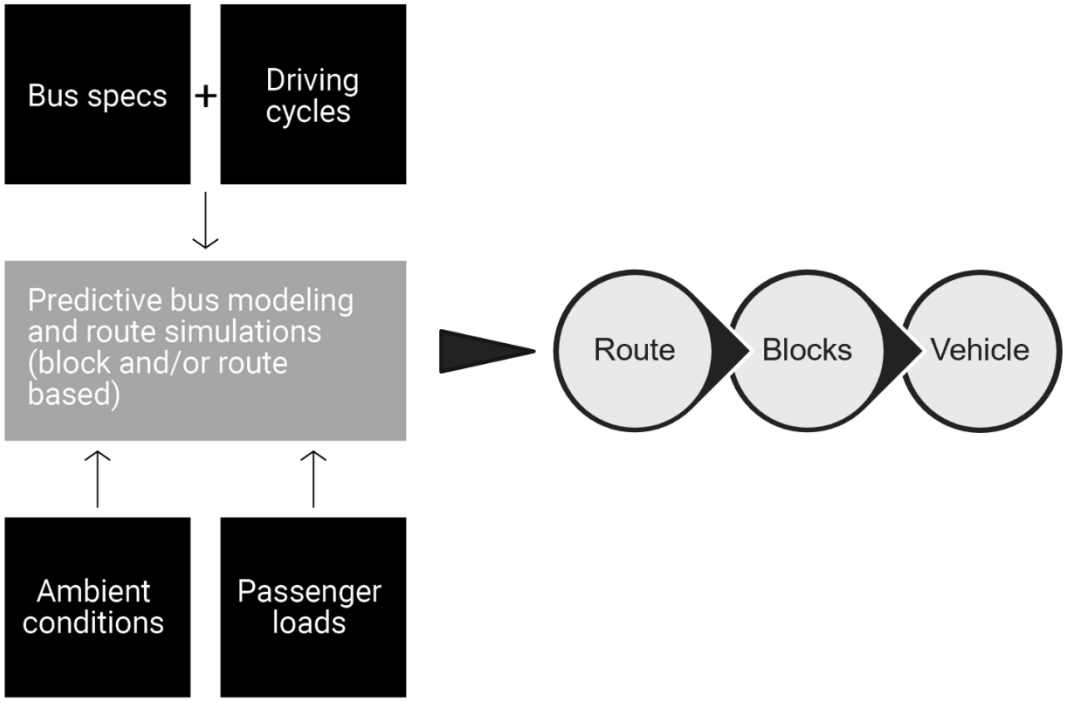



**Figure 7: ZEBDecide modeling overview**

### 4.1.1 Modeling Inputs

ZEBDecide's modeling process predicts ZEB drivetrain power requirements specific to given acceleration profiles. The following inputs are included in the model to determine feasibility of different ZEB technologies under GCTD's operating conditions:

**Bus/vehicle specifications:** the bus specification inputs used in the modeling are shown in Figure 8. For GCTD, the key bus specifications used in the modeling process for each service type are shown in Table 3. Both BEBs and FCEBs were modeled for fixed-route services. As GCTD operates 35-ft and 40-ft models, we specified the appropriate vehicle size (for each route and block) to reflect GCTD scheduling practices.

For demand response services, which are operated with both cutaways and vans, we modeled BEB options for both vehicle types. FCEB options are more limited, and a hydrogen cutaway was not modeled due to a lack of available options currently on the market and being operated by transit agencies at the time of this writing.

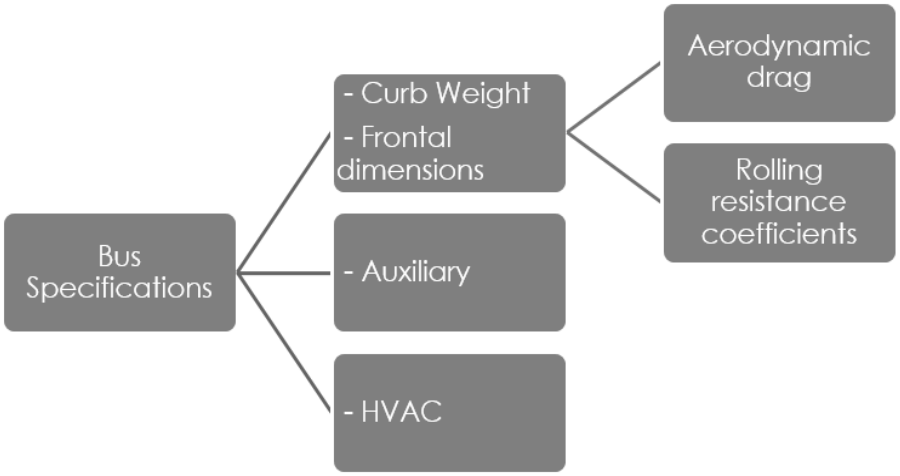



**Figure 8: Schematic of the inputs for bus specifications.**

**Table 3: Vehicle specifications for energy modeling**

| GCTD service type | Technology type | Vehicle size | Battery (kWh) or tank (kg) | Curb Weight (lbs.) |
|---|---|---|---|---|
| Fixed route | BEB | 35-ft | 450 kWh | 29,700 |
| | | 40-ft | 525 kWh[11] | 45,000 |
| | FCEB | 35-ft | 35 kg | 29,700 |
| | | 40-ft | 37.5 kg | 45,000 |
| Demand response | BEB | Cutaway | 120 kWh | 16,200 |
| | | Van (25-ft) | 118 kWh | 14,330 |
| | FCEB | Van (25-ft) | 13 kg | 10,360 |

[11] If a block modeled with a 40-ft BEB failed with a 525-kWh battery, blocks were subsequently modeled with a 40-ft BEB with a 660-kWh battery.

**Representative driving cycles:** also called acceleration profiles or duty cycles, representative driving cycles are speed versus time profiles that are used to simulate vehicle performance and energy use. Cycles were assigned to all routes based on GCTD's operations and observed driving condition and are derived from the National Renewable Energy Laboratory's (NREL) drive cycle database called DriveCAT[12]. The complete assignment of driving cycles to all routes is presented as an appendix in the energy modeling report. For demand response services, the model used the average driving speeds for each individual run instead of assigning representative driving cycles.

**Passenger loads:** to examine the weight associated impacts of passenger loads experienced by GCTD's fleet, GCTD provided data for each route detailing the passenger load for each route to be modeled. For demand response services, an average of four passengers onboard was assumed for modeling purposes.

**Ambient temperature:** Stantec developed a correlation between ambient temperature and power requirements from the HVAC system. The power requirement for modeling purposes was set based on an annual low temperature average of 46°F[13].

**Topography and elevation:** given that portions of GCTD's service area are highly impacted by elevation and topography, it is important to account for the impacts of terrain and elevation on the energy efficiency of ZEBs. Each route alignment was imported into Google Earth to create an elevation profile to understand the total elevation gains/losses seen for each route in the system (see example in Figure 9).


*Source: Google Earth*

**Figure 9: Elevation profile example (Route 6)**

The average and maximum grades for each route were similarly determined using these elevation profiles, which were used as the inputs in the topography analysis (Table 4). Modeling for demand response did not directly account for topography. Instead, the model used information about gain and loss in grade from local fixed route to correct fuel economy.

[12] NREL DriveCAT - Chassis Dynamometer Drive Cycles. (2019). National Renewable Energy Laboratory. www.nrel.gov/transportation/drive-cycle-tool
[13] US Climate Data https://www.usclimatedata.com/climate/oxnard/california/united-states/usca0819

**Table 4: Elevation analysis for fixed routes[14]**

| Route | Average slope | Max slope | Weighted average slope |
|---|---|---|---|
| 1A/B | 0.6% | 3.5% | 1.1% |
| 3 | 0.8% | 3.5% | 0.9% |
| 4A | 1.2% | 5.4% | 2.0% |
| 4B | 0.8% | 3.9% | 1.7% |
| 5 | 0.9% | 4.3% | 1.9% |
| 6 | 1.3% | 6.8% | 2.6% |
| 8 | 0.8% | 7.5% | 2.6% |
| 11 | 1.4% | 11.5% | 4.0% |
| 16 | 1.7% | 7.4% | 4.4% |
| 17 | 1.2% | 11.1% | 1.8% |
| 18A | 0.8% | 3.4% | 1.2% |
| 18C | 0.7% | 3.6% | 0.8% |
| 18E | 1.1% | 11.7% | 1.8% |
| 18F | 1.7% | 7.5% | 2.5% |
| 18G | 1.3% | 11.9% | 2.1% |
| 19 | 0.5% | 2.6% | 0.6% |
| 21 | 1.2% | 9.0% | 2.7% |

### 4.1.2 Modeling Process

Using the inputs above, predictive power and energy modeling was completed for fixed-route and demand response services. The energy modeling process for fixed-routes first aggregates results at the route level, then at the block level, and is then aggregated at the vehicle assignment level to determine total daily energy consumption per vehicle. This process is described in Figure 10 for fixed routes and Figure 11 for demand response service.

[14] Elevation analysis was not completed for routes missing in GTFS data and was approximated based on data from similar routes.

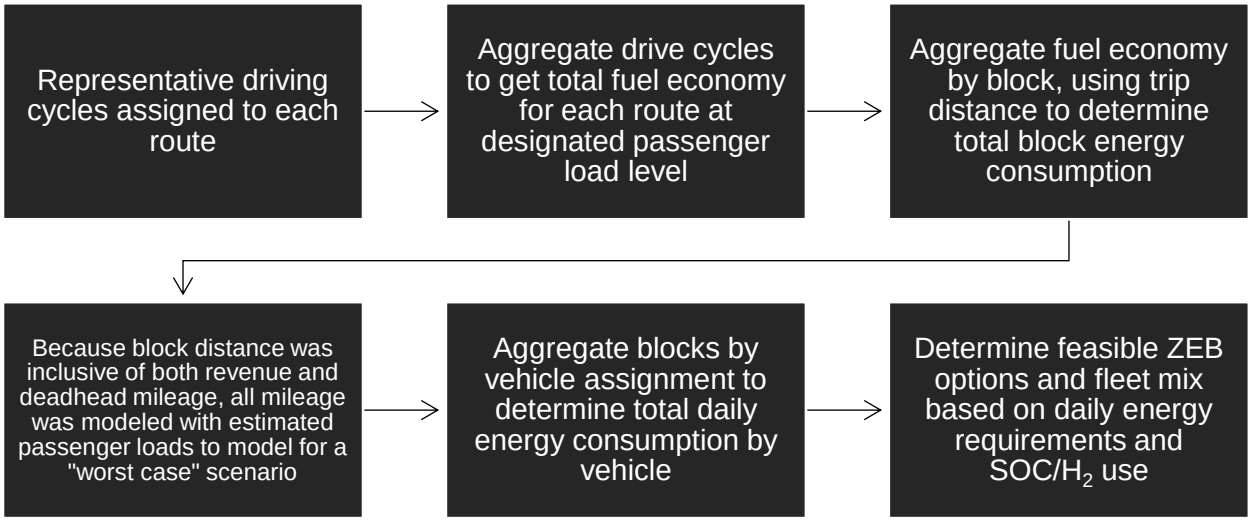



**Figure 10: ZEBDecide energy modeling process, fixed routes**

The results of the modeling provide insight into:

- Fuel economy and energy requirements
- Operating range

The feasibility of a BEB to complete its assigned service by estimating the state of charge (SOC); the vehicle assignment can be successfully completed with a BEB if it can complete its scheduled service with at least 20% battery SOC remaining.

As mentioned above, modeling for demand response services included all individual runs and vehicle assignments for 2019 and 2020 (1,230 minivan and 900 cutaway vehicle assignments accounting for over 4,800 runs). The energy requirement for each individual trip was aggregated at the vehicle level to calculate the total energy consumed by each vehicle per weekday. A statistical analysis was conducted on the entire dataset to determine the average fuel efficiency and daily energy use per vehicle to evaluate success levels. This process is shown in Figure 11.

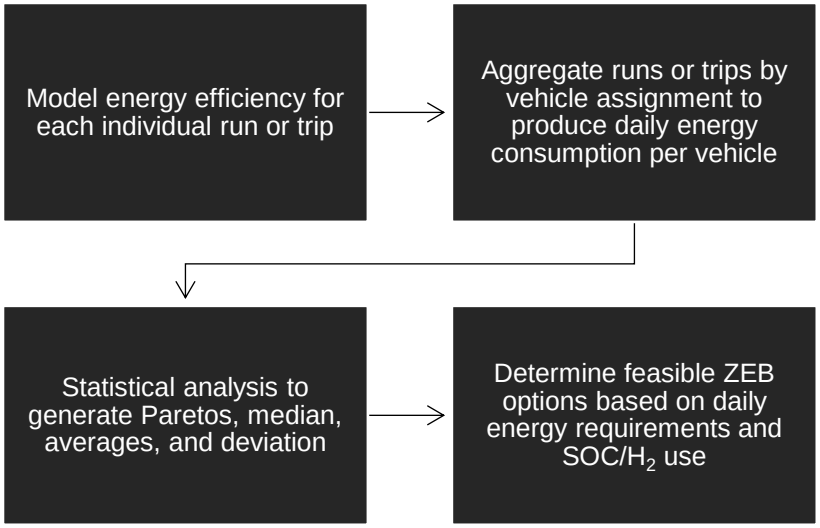



**Figure 11: ZEBDecide energy modeling process, demand response**

Similar to the fixed-route modeling, the results of the modeling for demand response service provide insights into:

- Average fuel economy
- Probability of energy requirements
- Probability of operating range

The feasibility of different ZEB technologies. For BE cutaways and vans, success is determined through SOC; the vehicle assignment can be successfully completed when BE vehicle can complete its scheduled service with at least 20% battery SOC. For hydrogen vans, if a vehicle consumes less than 95% of its tank capacity, the vehicle assignment is counted as successful.

### 4.1.3 Modeling Results

BEB Block-level and vehicle-level modeling results for fixed-route services are shown in Figure 12.

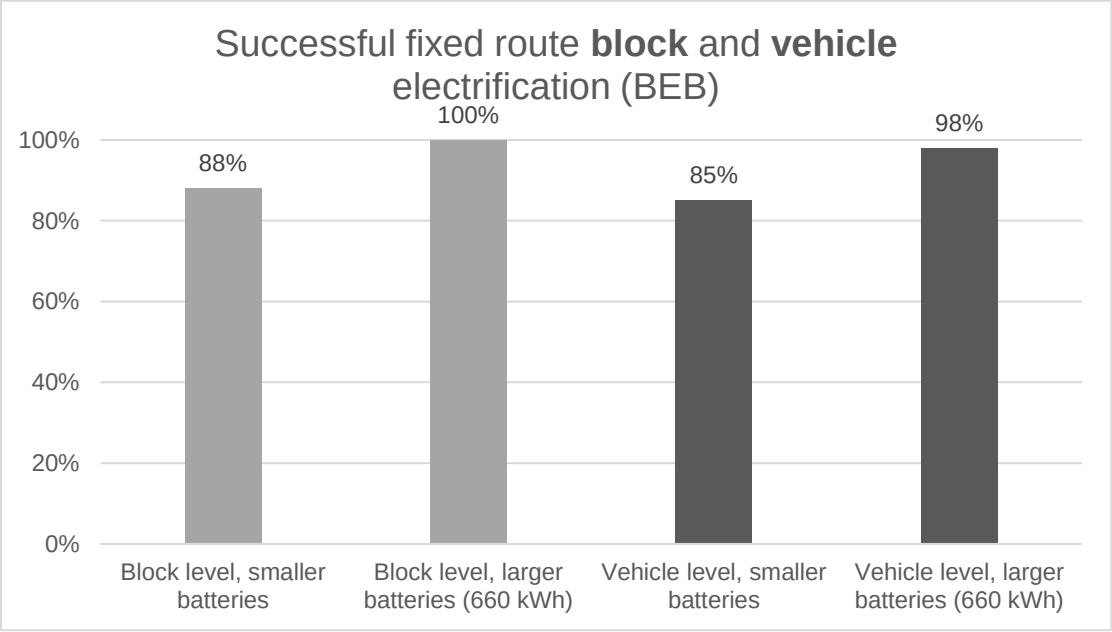



**Figure 12: Successful block and vehicle electrification (fixed routes)**

The criterion to deem if a block can be successfully served by a BEB is if the SOC of the battery is above 20% after completing all the trips in a block. A block is deemed unsuccessful if the battery SOC drops below 20% after completing the block. These results show that without increasing to a larger battery size, 88% of blocks can be successfully electrified. When unsuccessful blocks were increased to a larger battery size, 100% of blocks can be successfully electrified.

Next, blocks were aggregated at the vehicle-level. These results show that with smaller battery sizes, 85% of daily vehicle assignments can be successfully electrified. When 40-ft vehicles that failed were modeled with a larger battery size, 98% of vehicles can be successfully electrified. This is not 100% because one vehicle assignment that failed is a 35-ft vehicle which does not have an option for a larger battery size.

Table 5 summarizes the average fuel efficiency for each vehicle type.

### Table 5: Average fuel efficiency for fixed route BEB modeling results

| Vehicle type | Average fuel efficiency (kWh/mi) |
|---|---|
| **40-ft bus (both 525 and 660 kWh, as appropriate)** | 2.23 kWh/mi |
| **35-ft bus (450 kWh)** | 2.15 kWh/mi |
| **Overall** | 2.21 kWh/mi |

Next, fixed route service was modeled with FCEBs. These results are shown in Figure 13.

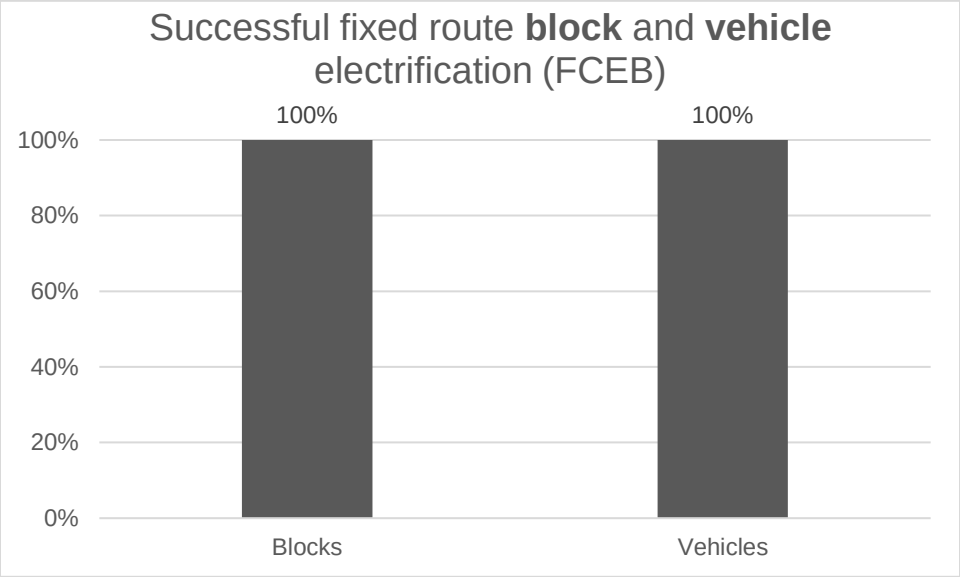



**Figure 13: Successful blocks and vehicles that can be served by FCEB equivalents (fixed route)**

Figure 13 shows that 100% of GCTD's fixed route service can be successfully completed with FCEBs. Table 6 provides the average fuel efficiency for each vehicle type modeled.

**Table 6: Average fuel efficiency for fixed route FCEB modeling results**

| Vehicle type | Average fuel efficiency (mi/kg) |
|---|---|
| **40-ft bus** | 7.20 mi/kg |
| **35-ft bus** | 7.29 mi/kg |
| **Overall** | 7.22 mi/kg |

The same procedure was completed for demand response services. Modeling was based on a sample size of 3,200 total runs, aggregated into 2,060 van assignments and 1,100 cutaway assignments. BE and hydrogen results are first presented for vans in Figure 14 and Figure 15, and BE cutaway results are shown in Figure 16.

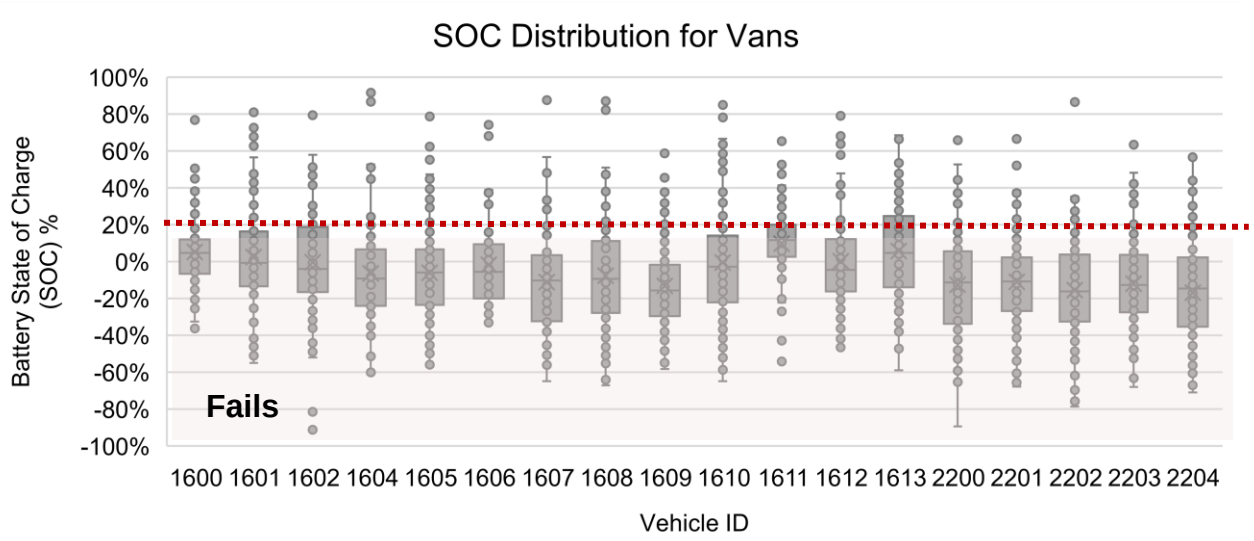



**Figure 14: SOC distribution for BE van assignments**

Figure 14 shows that when considering a full day of service for each van, 25% of daily vehicle assignments can be completed with BE vans. A sensitivity analysis suggests that with ideal weather and topography, about 60% of vehicle assignments may be successful. The daily mileage for electric vans can range between 135 and 170 mileages with an average fuel efficiency of 0.87 kWh/mi.

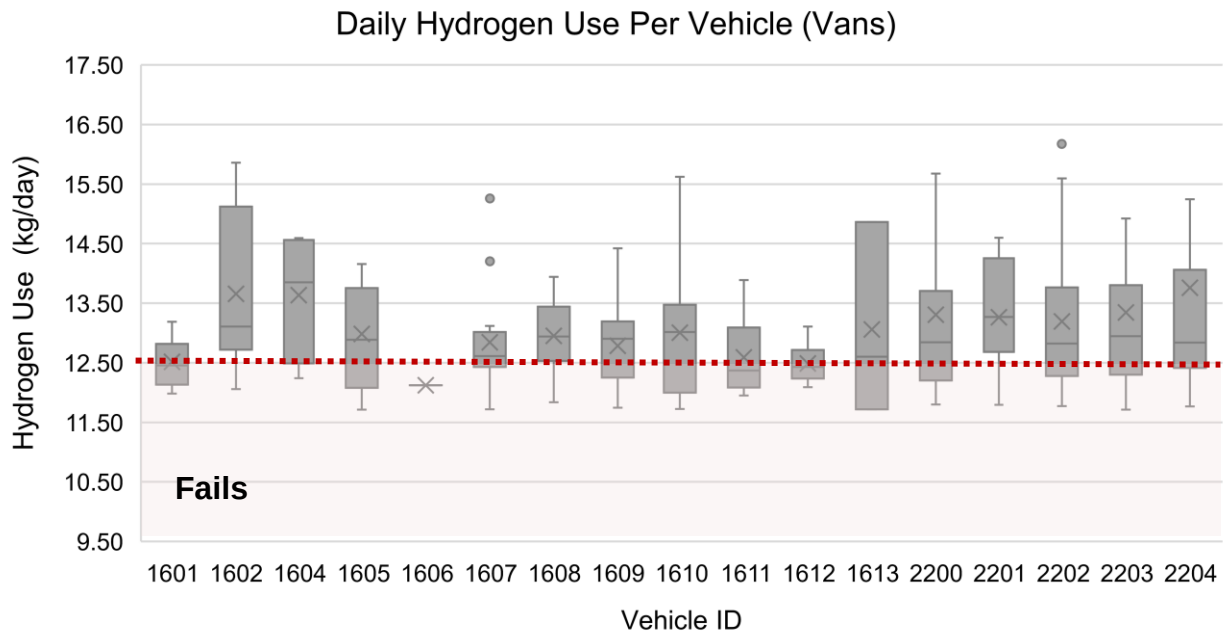



**Figure 15: Daily hydrogen use per van**

Figure 15 shows that with hydrogen vans, around 90% of daily vehicle assignments can be completed successfully. The daily mileage for hydrogen vans ranges between 210 and 250 miles with an average fuel efficiency of 17 mi/kg[15].

Finally, demand response services completed by cutaways was modeled with BE cutaways. No hydrogen FCE option was modeled due to lack of hydrogen FCE cutaway options.

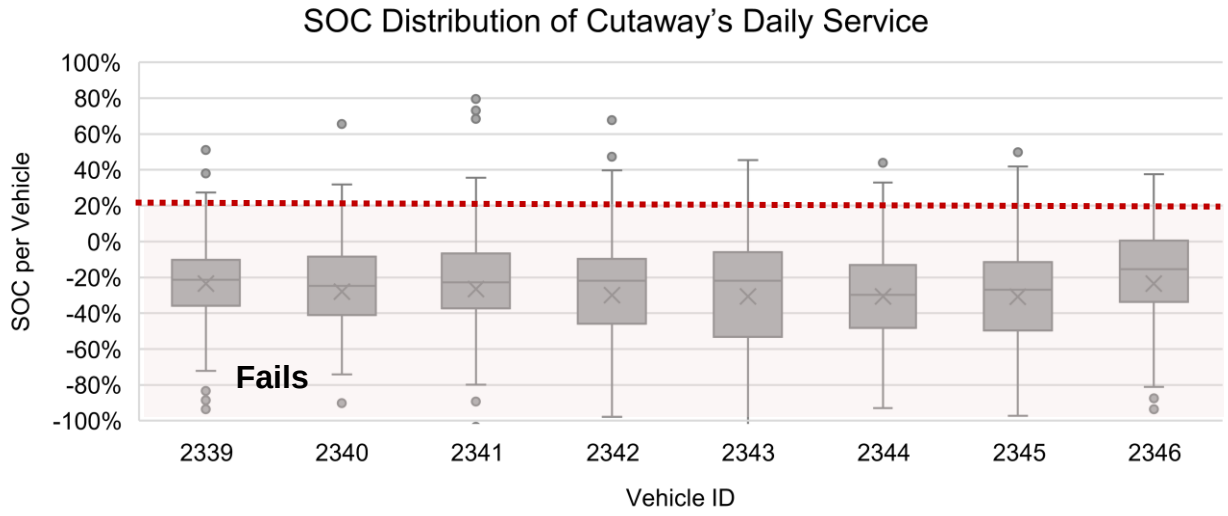



**Figure 16: SOC distribution for BE cutaways**

Figure 16 shows that only 10% of daily service schedules completed by cutaways can be successfully completed with BE equivalents. A sensitivity analysis suggests that with the ideal weather and topography, 50% of vehicle assignments may be successful. The daily mileage for an electric cutaway ranges between 105 and 135 miles, with an average fuel efficiency of 1.13 kWh/mi. Table 7 summarizes that daily mileage ranges and average fuel efficiency for all demand response modeling results.

**Table 7: Average fuel efficiency and daily mileage ranges for demand response vehicles**

| Vehicle type | Average fuel efficiency | Daily mileage range |
|---|---|---|
| **BE van** | 0.87 kWh/mi | 135-170 |
| **FCE van** | 17 mi/kg | 210-250 |
| **BE cutaway** | 1.13 kWh/mi | 105-135 |

[15] Note that Altoona testing has not been completed for hydrogen vans and not enough public data is available to validate the expected hydrogen efficiency.

## 4.2 SUMMARY AND FLEET RECOMMENDATIONS

In summary, the fixed-route service modeling results show that both BEB and FCEB options could be feasible for GCTD's operations. One hundred percent of service can be successfully transitioned to FCEBs without changing anything about GCTD's current scheduling, blocking, or operations. The majority of GCTD's fixed-route service can be successfully transitioned to BEBs, but 7 40-ft vehicles would require a larger battery (660 kWh), and one 35-ft vehicle is unsuccessful and would either require midday/opportunity charging between blocks or reblocking to be successful with BEBs.

Demand response services are less successful as ZE operations, with only 25% of daily service assignments for vans able to be successfully converted to BE vans. This jumps to about 90% for hydrogen vans, but it is important to note that no hydrogen vans have undergone Altoona testing yet.

Vehicle options are more limited for cutaways, with only BE options available. Modeling suggests that 10% of daily assigned cutaway service can be successfully completed with BE cutaways.

Following the modeling results, a variety of potential solutions were developed for each service type to weigh the pros and cons of different solutions across different areas of interest, including financial, facility, and operational considerations. Following the development of the preliminary solutions, Stantec met with GCTD staff to workshop the feasibility of the different solutions and come to a preferred fleet concept that best fits the needs of GCTD. The recommended ZE approach is summarized in Table 8.

**Table 8: Recommended fleet summary**

| Vehicle type | Tank size | Quantity | Notes |
|---|---|---|---|
| **35-ft. buses** | 35 kg | 17 | All blocks and vehicle assignments successful under the modeling conditions. |
| **40-ft buses** | 37.5 kg | 44 | All blocks and vehicle assignments were successful under the modeling conditions. |
| **Cutaways** | N/A; CARB exemption | N/A; CARB exemption | N/A; CARB exemption.<br>No hydrogen cutaway currently available. Depending on passenger capacity needs, GCTD could explore substituting a portion of the cutaway fleet with FCE vans.<br>For the purposes of the ZEB Plan, cutaways are assumed to be replaced with passenger vans. |
| **Vans** | 13 kg | 18 | Around 90% of the daily service assigned to vans can be converted to FCE.<br>Vehicles need to refuel at the main facility with the fixed-route vehicles. |

# 5.0 FLEET PROCUREMENT SCHEDULE/OUTLOOK

GCTD has specified a fleet replacement schedule for their current fleet (fixed-route and paratransit services) as summarized in Table 9. This proposed replacement schedule developed in June 2022 provides the basis for the ZEB phasing strategy[16].

**Table 9: GCTD fleet replacement schedule, March 2021 Fleet Management Plan**

| Year | Vehicle Make | Service | Useful Life | Size | No. Vehicles |
|---|---|---|---|---|---|
| 2021 | New Flyer 2006 | Fixed route | 12-yrs | 40’ | 3 |
| 2022 | New Flyer 2006 | Fixed route | 12-yrs | 40’ | 9 |
| 2023 | New Flyer NZ 2006 | Fixed route | 17-yrs | 40' | 13 |
| | MV-1 | Demand Response | 7-yrs | Van | 6 |
| 2024 | MV-1 | Demand Response | 7-yrs | Van | 7 |
| 2026 | NABI 2008 | Fixed route | 12-yrs | 35' | 9 |
| | Star Craft 2017 | Demand Response | 7-yrs | Cutaway | 8 |
| 2027 | NABI 2009 | Fixed route | 12-yrs | 35' | 8 |
| 2028 | Gillig 2015 | Fixed route | 12-yrs | 40' | 8 |
| | Ford Vans 2019 | Demand Response | 7-yrs | Van | 5 |
| 2029 | Gillig 2016 | Fixed route | 12-yrs | 40' | 5 |
| 2031 | Gillig 2019 | Fixed route | 12-yrs | 40' | 5 |
| 2033 | Planned Gillig 2021 | Fixed route | 12-yrs | 40' | 3 |

Based on the bus modeling, route simulations, and further analysis by the Stantec team, it was determined that a FCEB fleet is preferred to maintain the current fixed route service levels and a combination of zero-emission vehicles (both battery-electric [at least for a short time until hydrogen vehicles are more widely available] and hydrogen) will be used to replace the current CNG/gasoline paratransit vehicles. The phasing plan for GCTD to ZE vehicles considers the following:

- The same level of fixed-route service will be provided as pre-pandemic conditions by using hydrogen 35-ft and 40-ft buses; as the fleet expands, service levels will be increased as well.
- Seven 35-ft buses will be replaced by 7 40-ft buses, as specified by GCTD.
- The fixed-route fleet size will be expanded from 61 to a total of 69 buses in 2040, by gradually expanding the fleet starting in 2030

[16] Funding availability and changes to revenue service may require updates or changes to this proposed plan.

- The demand response fleet size will be expanded from 27 to a total of 32 vehicles in 2040, by expanding the fleet starting in 2025
- All demand response vehicle purchases starting in 2023 will prioritize available zero-emission vehicle options. Battery-electric, hydrogen fuel cell or hybrid vehicles will be acquired depending on the refueling infrastructure abilities and market availability to achieve reliable ADA / demand response service to the communities GCTD serves.
- The same spare ratio will be maintained.

Figure 17 displays a graph with the proportion of the fleet by vehicle type over time as the transition from carbon-emitting vehicles to ZEVs proceeds.

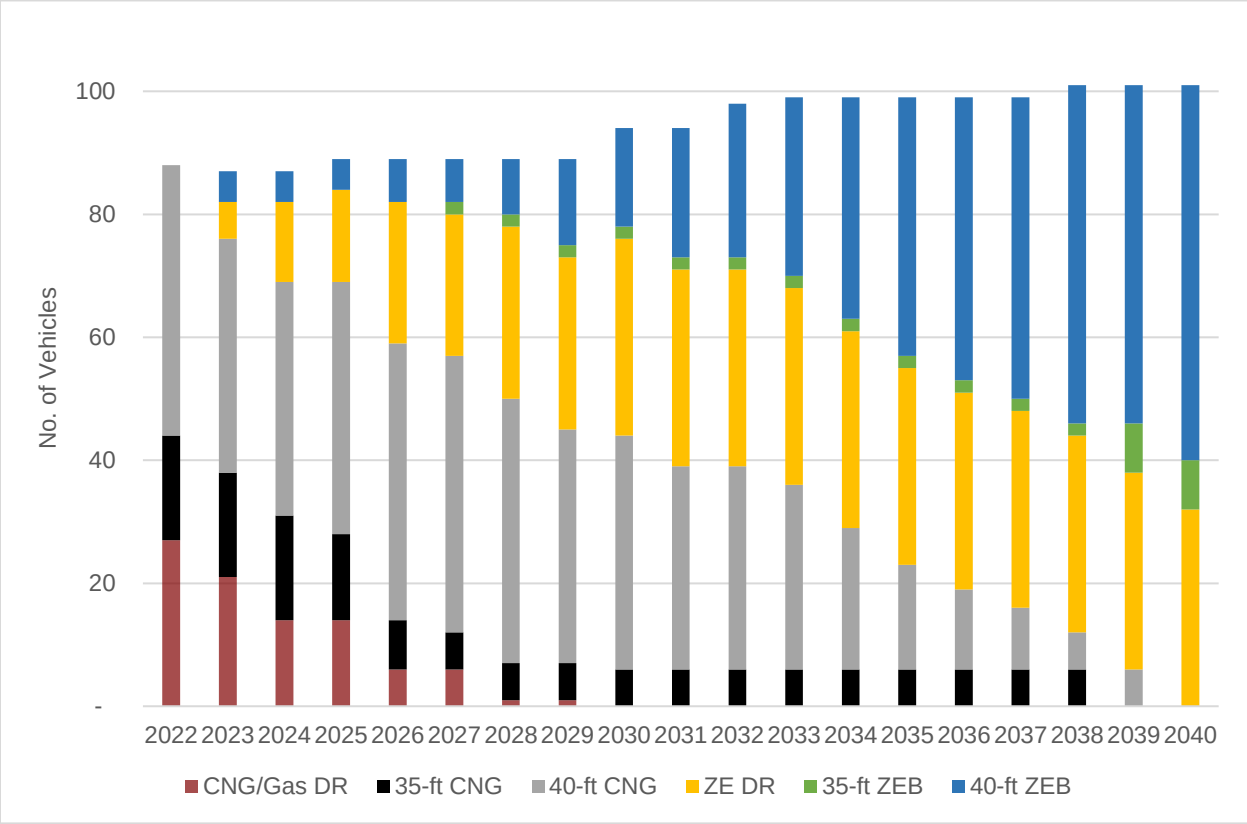



**Figure 17: GCTD fleet composition through 2040 by vehicle type and technology**

Table 10 displays the recommended fleet acquisition schedule for 35-ft and 40-ft vehicles. This plan was developed by accounting for fossil fuel vehicle retirement and the ICT purchase requirement. While the acquisition schedule assumes the first purchase for hydrogen vehicles in 2023, the purchase of these ZE vehicles can be postponed if funding for the hydrogen refueling infrastructure is not available. Table 11 provides an annual fleet plan for the demand response fleet.

**Table 10: 2023 – 2040 Fleet Forecast for 35-ft and 40-ft Vehicles**

| | | | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35-ft | CNG | Replace | | | - | - | 6 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | CNG | Expansion | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | CNG | Retire | | - | (3) | (6) | (8) | | | - | | - | - | | - | - | - | - | (6) | - |
| | **Total 35-ft CNG** | | **17** | **17** | **14** | **8** | **6** | **6** | **6** | **6** | **6** | **6** | **6** | **6** | **6** | **6** | **6** | **6** | **-** | **-** |
| | ZEB | Replace | | - | - | - | 2 | - | - | - | - | - | - | | - | - | - | - | 8 | - |
| | ZEB | Expansion | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | ZEB | Retire | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | (2) | - |
| | **Total 35-ft ZEB** | | **-** | **-** | **-** | **-** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **8** | **8** |
| 40-ft | CNG | Replace | 4 | 4 | 3 | 4 | - | 6 | - | - | - | - | - | - | - | - | - | - | - | - |
| | CNG | Expansion | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | CNG | Retire | (10) | (4) | - | - | | (8) | (5) | | (5) | | (3) | (7) | (6) | (4) | (3) | (4) | - | (6) |
| | **Total 35-ft CNG** | | **38** | **38** | **41** | **45** | **45** | **43** | **38** | **38** | **33** | **33** | **30** | **23** | **17** | **13** | **10** | **6** | **6** | **-** |
| | ZEB | Replace | 5 | - | - | 2 | - | 2 | 5 | - | 5 | - | 3 | 7 | 6 | 6 | 6 | 4 | - | 8 |
| | ZEB | Expansion | - | - | - | - | - | - | - | 2 | - | 4 | 1 | - | - | - | - | 2 | - | - |
| | ZEB | Retire | - | - | - | - | - | - | - | - | - | - | - | - | - | (2) | (3) | - | - | (2) |
| | **Total 40-ft ZEB** | | **5** | **5** | **5** | **7** | **7** | **9** | **14** | **16** | **21** | **25** | **29** | **36** | **42** | **46** | **49** | **55** | **55** | **61** |
| **Total Fleet Size** | | | **60** | **60** | **60** | **60** | **60** | **60** | **60** | **62** | **62** | **66** | **67** | **67** | **67** | **67** | **67** | **69** | **69** | **69** |

**Table 11: 2023 – 2040 Fleet Forecast for Demand Response Vehicles**

| | | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CNG/Gas | Replace | - | - | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CNG/Gas | Expansion | - | - | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CNG/Gas | Retire | (6) | (7) | | (8) | - | (5) | | (1) | | | | | - | - | - | - | - | - |
| **Total CNG/Gas Demand-Response** | | **21** | **14** | **14** | **6** | **6** | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| ZE | Replace | 6 | 7 | - | 8 | - | 5 | - | 7 | 7 | 2 | 8 | - | 5 | - | 10 | 7 | 2 | 8 |
| ZE | Expansion | - | - | 2 | | - | - | - | 3 | - | - | - | - | - | - | - | - | - | - |
| ZE | Retire | - | - | - | - | - | - | - | (6) | (7) | (2) | (8) | - | (5) | - | (10) | (7) | (2) | (8) |
| **Total ZE Demand-Response** | | **6** | **13** | **15** | **23** | **23** | **28** | **28** | **32** | **32** | **32** | **32** | **32** | **32** | **32** | **32** | **32** | **32** | **32** |
| Total Fleet Size | | 27 | 27 | 29 | 29 | 29 | 29 | 29 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 |

# 6.0 HYDROGEN FUEL DEMAND AND SUPPLY

## 6.1 HYDROGEN DEMAND

After determining a hydrogen-fueled fleet as the best fit for GCTD, the next step was to determine the estimated daily hydrogen demand to fuel the future fleet as well as the best method of supplying hydrogen to the facility. Table 12 summarizes estimated hydrogen demand needed at the facility. This includes demand from GCTD's fleet as well as the demand for the Ventura County Transportation Commission (VCTC). VCTC is a partner transit agency providing commuter services in Ventura County that could, at a future time, refuel FCEBs of its own at GCTD's shared facility.

**Table 12: Daily hydrogen demand**

| Agency | Item Description | 40-ft and 35-ft Buses | Cutaways and Vans |
|---|---|---|---|
| GCTD | Total vehicles in fleet | 64 | 27 |
| | No. of active vehicles | 60 (4 contingency) | 26 |
| | Average H2 demand per vehicles (kg/day/vehicle) | 15.5 | 8.5 |
| | H2 demand for all active vehicles (kg/day/fleet) | 885 | 180 |
| | Total GCTD Fleet Hydrogen Demand (kg/day) | 1,065 | |
| VCTC | Total VCTC Fleet Hydrogen Demand (kg/day) | 1,335 | |
| **Total Estimated Fleet Hydrogen Demand (kg/day)** | | **2,400** | |
| **Monthly Estimated Hydrogen Demand (kg/month)** | | **72,000** | |

Two possible methods for providing hydrogen to the new hydrogen facility were assessed Option 1: Trucked-in liquified hydrogen and Option 2: On-site production of gaseous hydrogen derived from water electrolysis using onsite solar PV power generation, supplemented by electricity from the grid. Option 1 is the most feasible and least costly of the two options and for the near-term implementation of FCEBs, GCTD should deploy Option 1, similar to most other transit agencies in California[17]. At a later time when GCTD's fleet is entirely hydrogen vehicles, GCTD could explore deploying the hydrolysis concept in Option 2 as a way to generate on-site hydrogen, increasing its resiliency. A deeper discussion on the two options can be found in Appendix A: Memo—Infrastructure Options for Different Hydrogen Fueling Arrangements. Note that the values in Table 12 do not include projected consumption by public-access users, which is estimated at about 60 kg per day.

[17] OCTA has recently commissioned hydrogen fueling facility based on trucked-in liquid, and other agencies including Foothill Transit, Santa Clarita Transit and Victor Valley Transit Authority are planning similar systems.

For the purposes of the rollout plan, the remainder of the analysis, recommendations, and strategies are based on the assumption that GCTD will deploy equipment necessary for on-site storage of liquid hydrogen, conversion to gaseous hydrogen, and dispensation of gaseous hydrogen. More information about the equipment required can be found in Section 7.1.

## 6.2 HYDROGEN SUPPLY

Not all hydrogen is created equal, in fact, hydrogen has several pathways to be generated and this includes different carbon intensity levels. Figure 18 provides an overview of the different hydrogen classifications based on the generation source. Gray, blue, and green hydrogen have different levels of carbon emissions, with green being the ultimate goal because it is carbon neutral.

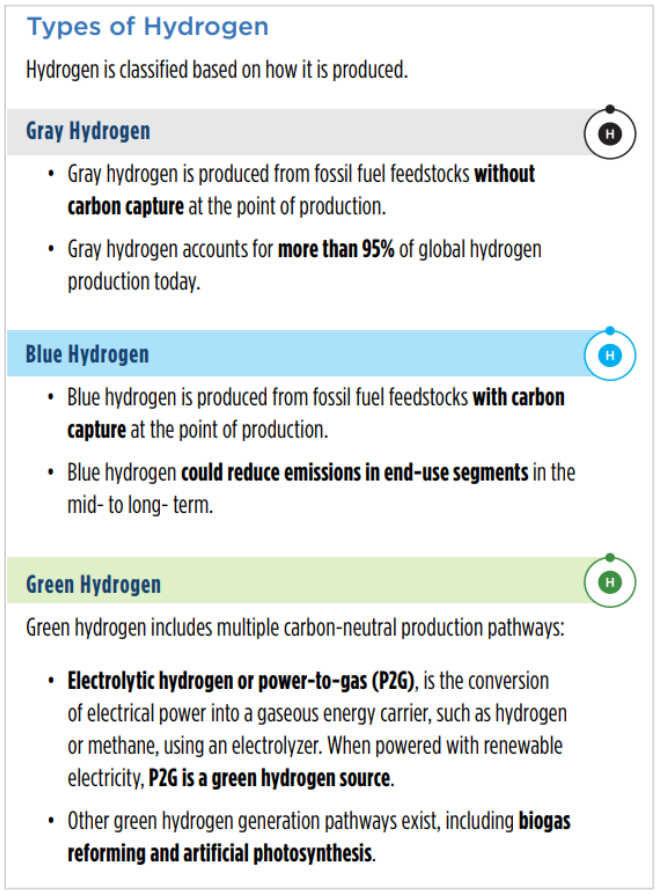



**Figure 18: Types of hydrogen based on generation source[18]**

Today, 37%-44% of hydrogen used in transportation is renewable, but 95% of all hydrogen produced in the United States is made by industrial-scale natural gas reformation (gray hydrogen). This process is called fossil fuel reforming or steam methane reforming (SMR). The process takes natural gas (NG) and

[18] https://www.energy.ca.gov/sites/default/files/2021-06/CEC_Hydrogen_Fact_Sheet_June_2021_ADA.pdf

steam to generate a product stream of carbon dioxide ($CO_2$) and hydrogen ($H_2$). Greenhouse gas emissions can be avoided completely if the $CO_2$ produced in SMR is captured and stored (blue hydrogen) in a process known as carbon capture and storage (CCS).

In the short-term, GCTD will likely receive its hydrogen from the Sacramento area that is currently produced via SMR with a mixed of biogas to account for 33% renewable green hydrogen. But as sustainable renewable energy generation advances in the United States, it is anticipated low to zero carbon hydrogen production will become more commonplace. For example, the City of Lancaster will host and co-own a green hydrogen production facility with SGH2, which will be able to produce up to 11,000 kilograms of green hydrogen per day. SGH2 anticipates breaking ground in Q1 2021, start-up and commissioning in Q4 2022, and full operations in Q1 2023[19]. Additionally, Plug Power recently announced it will build the largest green hydrogen production plant on the West Coast. The state-of-the-art production facility in Fresno County in the Central Valley of California will be powered by renewable energy. Once completed, it will produce 30 metric tons of green hydrogen daily and serve customers up and down the West Coast. The facility will use a new 300 MW zero-carbon solar farm to power 120 MW of Plug Power's state-of-the-art PEM electrolyzers, and the project includes construction of a new tertiary wastewater treatment plant in the city of Mendota that will provide recycled water for the people of Mendota and supply the full needs of the plant. The plant will break ground in early 2023 and complete commissioning in early 2024[20].

[19] https://www.sgh2energy.com/worlds-largest-green-hydrogen-project-to-launch-in-california
[20] https://www.globenewswire.com/news-release/2021/09/20/2299650/9619/en/Plug-Power-to-Build-Largest-Green-Hydrogen-Production-Facility-on-the-West-Coast.html

# 7.0 MAINTENANCE FACILITY INFRASTRUCTURE MODIFICATIONS

This section outlines the proposed facility modifications for FCEB implementation to GCTD's bus operations and maintenance facility. The final master plan has been developed proposing the addition of hydrogen fueling dispensers at the existing Fuel Building with a new hydrogen equipment yard to the northeast of the Fuel Building. Fortunately, the facility has sufficient space opportunity for the new fueling infrastructure and equipment, avoiding the reduction in parking stalls while maximizing yard flexibility by taking space from the existing storm water retention swale for the new equipment yard.

The existing service cycle can be maintained and is not required to be changed for FCEB implementation since the facility currently uses CNG fueling which is nearly identical in operation to hydrogen fueling.

The ample and spacious nature of the property will allow for simple phasing of construction with little to no impact on current operations. GCTD will need to work closely with a contractor to implement the proposed modifications to the facility but the impacts to operations will be temporary in nature and should be limited to the north of the bus parking area and the north end of the Fuel Building. Considering the facility has multiple fuel/service lanes, it should be assumed that sufficient opportunity exists to temporarily remove certain portions of the facility from GCTD's use for limited periods of time. In summary, there does not appear to be any significant constraints to the physical property that would create noteworthy cost increases to the implementation of the proposed hydrogen fueling improvements.

## 7.1 PROPOSED FUELING FACILITY MODIFICATIONS

The following summarizes the proposed improvements for the hydrogen fueling system (Figure 19):

- A new hydrogen fueling system designed to dispense 2,463 kg of hydrogen per day (90-bus capacity). This about 26.7 kg per FCEB per day and captures usage by both the GCTD and VCTC fleets (as described in Table 12). Quantities of each component are one unless noted otherwise (see Figure 20 for details).
    - 18,000 gallon liquified hydrogen tank
    - Reciprocating LH2 pump for H35 fueling (qty: 3)
    - High pressure GH2 compressor for H70 fueling
    - Hydrogen vaporizer (qty: 2)
    - Superheater vaporizer
    - GH2 priority valve panel
    - High-pressure GH2 storage vessel for H35 fuel (qty: 6)
    - High-pressure GH2 storage vessel for H70 fuel (qty: 2)
    - Pre-dispensing chiller (qty: 2)
    - GH2 H35 dispenser (qty: 2)

  - GH2 H70 dispenser with chiller
  - Air compressor system
  - Main electrical service panelboard
  - Motor starter panelboard for pumps (qty: 2)
  - System control panel
  - Electrical transformer (as required)
- New hydrogen equipment yard site improvements:
  - Perimeter security fencing to separate from other areas. Fencing to include lockable vehicle and pedestrian access gates.
  - Bollards along the vehicle traffic facing sides of the yard.
  - Equipment pads/foundations as required and pavement between all portions of the equipment yard to allow for access and maintenance activities.
  - Site retaining walls and associated foundations for equipment yard – required because of significant grading/slopes into the adjacent stormwater swale (similar to existing CNG equipment yard).
  - New site lighting and security cameras in equipment yard as required.
  - Modifications to existing storm water swale to account for capacity lost by the new equipment yard displacement. Modifications will include regrading of portions of swale and modified or new planting in those areas impacted.
- Modifications to the Fuel Building's service lanes includes the extension of service lane striping, new equipment pads for GH2 dispensers, and new bollards.
- Electrical system improvements and modifications:
  - A new transformer and panelboard to provide adequate power to the new hydrogen equipment.
  - Connection of new panelboard to existing electrical room at Fuel Building to the southwest. Power supply for hydrogen fueling equipment assumed to be backed-up by existing generator via electrical connection to the existing switchgear in the Fuel Building.
  - Associated equipment pads, fencing and bollards.
  - CMU fire barrier wall perimeter around new electrical equipment and panels.
- Pavement replacement/repair for trenching associated with electrical distribution for Area A where new electrical service and switchboard will be allocated.
- Demolition of existing north trash enclosure and replacement with a new trash enclosure to the west, outside of vehicle circulation areas and access to CNG equipment yard.
- Gas detection system modifications at Fuel Building and Maintenance Building, see narrative below.

Full site plan details can be found in Appendix B: Site Plans.

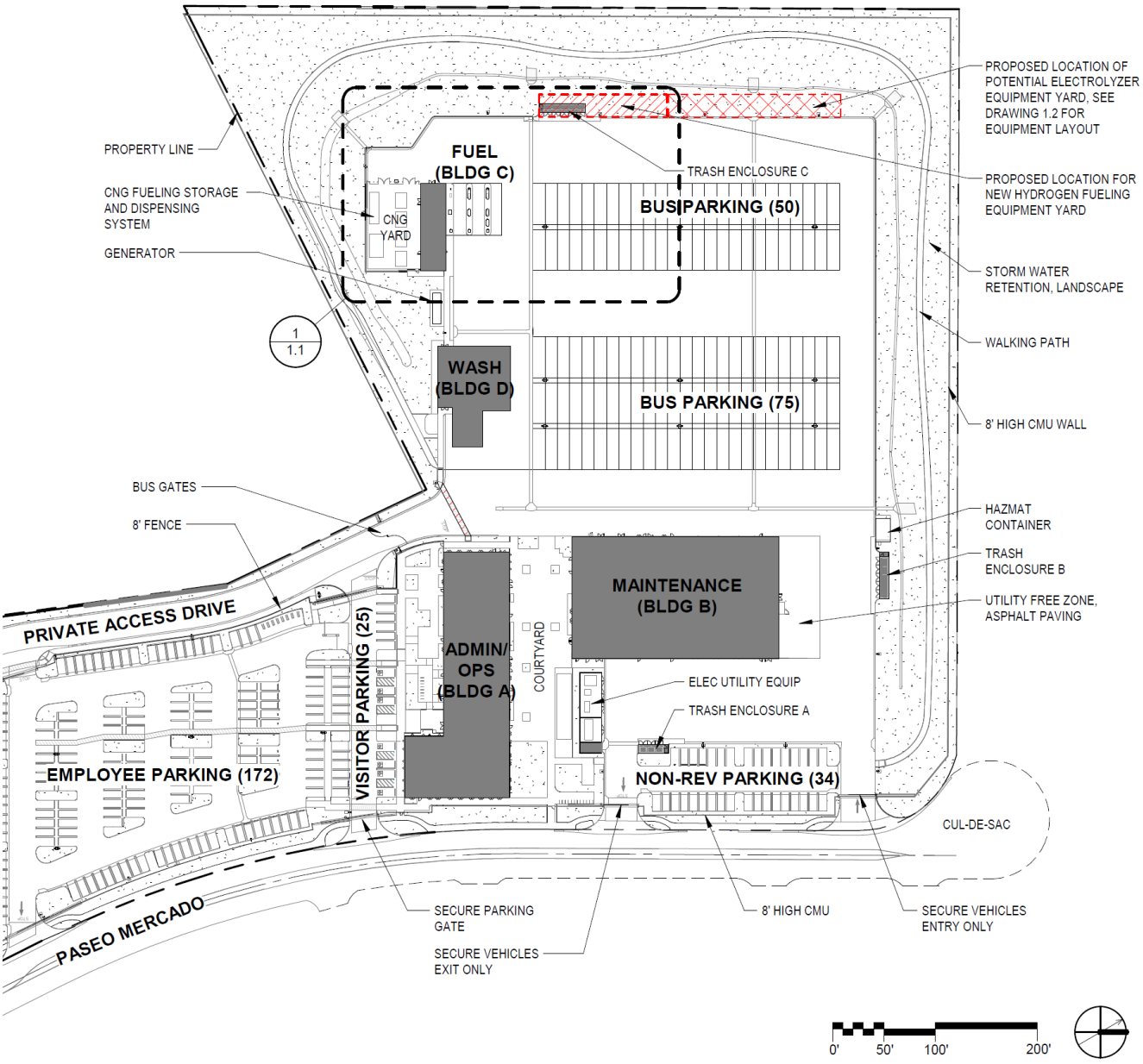



**Figure 19: GCTD Site Plan**

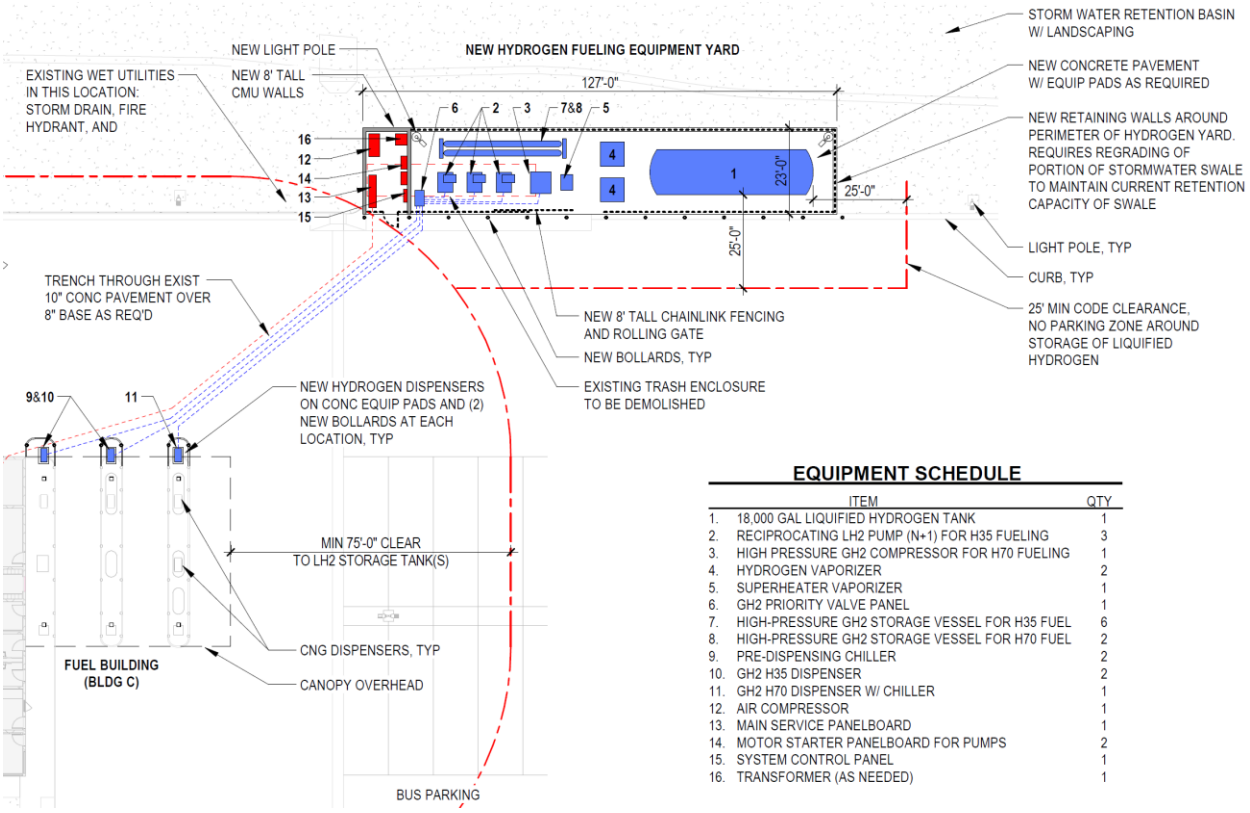



**Figure 20: GCTD ZEB Site Conceptual Master Plan**

## 7.2 FIRE PROTECTION CONSIDERATIONS

With the implementation of FCEBs, fire protection and life-safety concerns can be significant. The primary code dictating the implementation of hydrogen fueling systems in National Fire Protection Association (NFPA) 2 – Hydrogen Technologies Code. However, since the GCTD facility is relatively new and was also designed to serve CNG vehicles, many of the requirements for hydrogen fueling can already be met with little to no changes to the existing facilities.

The need for enhanced fire protection systems has not been specifically assessed as a part of this study and should be discussed with the local fire marshal and the local building officials to ensure all stakeholders in the approval process understand the proposed systems. Fire truck access to the site and hydrant access is already well defined but will need to be reviewed and approved by the pertinent AHJs prior to implementation of any facility improvements.

In summary, it is assumed that no fire protection system modifications are required for FCEB implementation, but further analysis may be required.

## 7.3 GAS DETECTION SYSTEM MODIFICATIONS

The Maintenance Building is equipped with a modern methane leak-detection system that uses infrared sensors mounted along the ceiling above the bays (methane is lighter than air), and also has carbon monoxide sensors located at personnel height (carbon monoxide is neutrally buoyant in air).

If FCEBs are deployed, new catalytic-bead sensors to detect hydrogen-gas leaks would be required, since infrared sensors cannot detect hydrogen gas. This system will need separate alarm lights that are distinct from the methane-leak alarms, as required by NFPA 72 (fire-alarm code). However, the modern site controller at the existing system can accept the new catalytic-bead sensors and can also drive the new and distinct alarms. This will allow a common control interface for all gas-leak sensing and will also reduce overall clutter and cost.

The existing ventilation system that makes the maintenance garage safe for CNG vehicles is assumed to provide at least five air-changes per hour and equipped with explosion- proof and spark-resistance fans. Accordingly, the ventilation system is adequate and compatible for hydrogen vehicles as well.

## 7.4 BACKUP PLANNING AND RESILIENCY

Planning for resiliency and redundancy is necessary not only to support operations or evacuations during emergencies or other disruptions, but also to ensure if the bus facility loses power, FCEBs can still be operated. This is particularly important given the propensity of black outs in California, especially as the adoption of EVs increases along with the demand on the electrical grid throughout the state.

Currently, GCTD's facility is equipped with a backup diesel generator for the CNG fueling infrastructure to ensure CNG compression and fueling can continue in case of a power outage. Stantec estimates that the current generator for the CNG fueling infrastructure is sufficient to support the operation of the hydrogen fueling infrastructure. As such, no additional backup generator is required, and the generator should be connected to serve the hydrogen fueling compound when it is built.

While the above is most pragmatic and direct solution for redundancy and backup, GCTD has also previously explored solar photovoltaic (PV) equipment to generate off-the-grid electricity to power the CNG equipment to reduce reliance on SCE derived electricity. The analysis by ENGIE demonstrated that by installing solar PV panels[21] above the employee and guest parking and using a stationary battery[22] (Figure 21) the project cost would be approximately $2.8 million but could result in a total net savings of $6 million over 25 years. Given the similar electrical loads for the proposed hydrogen fueling infrastructure and the CNG fueling infrastructure (Figure 22), GCTD could explore using this ENGIE solar and storage model to reduce electricity costs related to the hydrogen fueling facility, while also storing energy in case of a power outage.

[21] ENGIE analysis, estimated 514 kWdc / 890,000 kWh-yr generation.
[22] ENGIE analysis, storage system of 232 kW / 928 kWh.

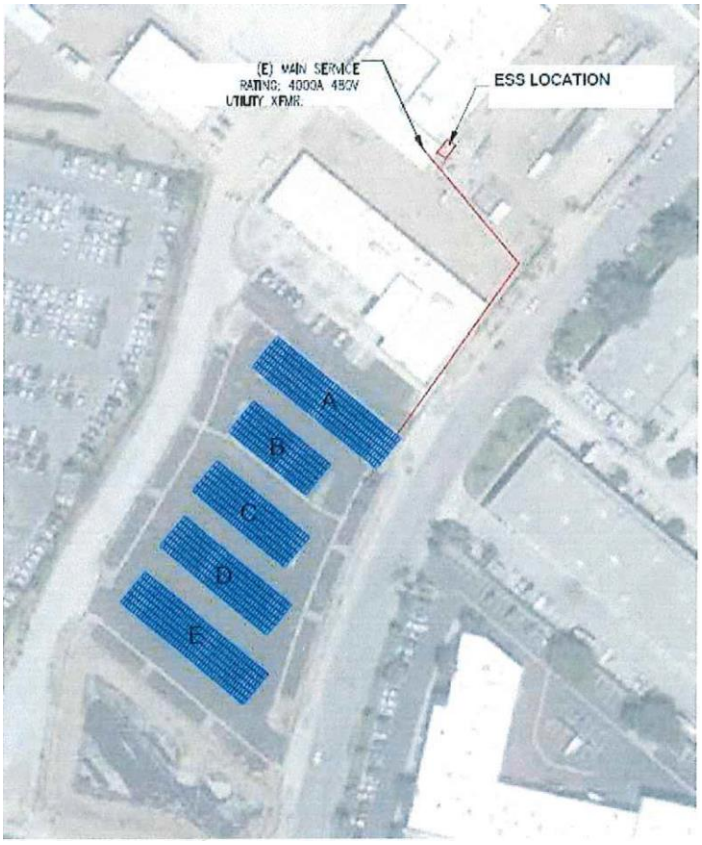



**Figure 21: Proposed Solar PV system analyzed by ENGIE over employee and guest parking (Source: ENGIE)**

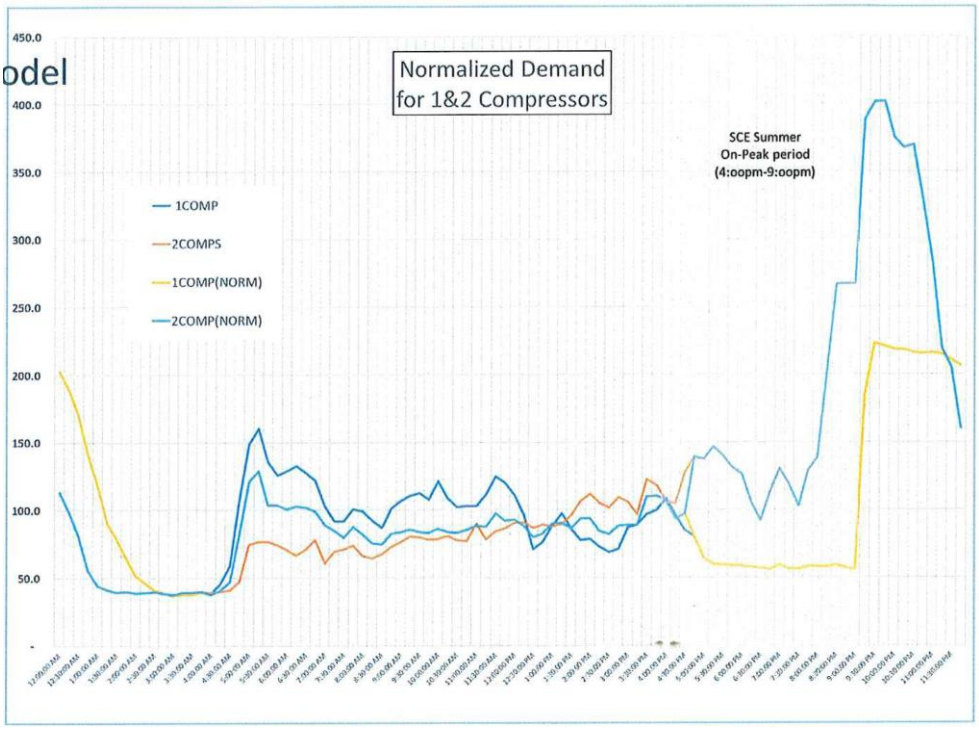



**Figure 22: Normalized Demand model to offset CNG compressors with Solar PV and a battery storage system performed by ENGIE (Source: ENGIE)**

While the power demand for compressors and other equipment to store trucked-in liquid hydrogen and dispense gaseous hydrogen is on the order of ~129 kW, Stantec's analysis of on-site production using hydrolysis revealed potentially 1.25 MW of power required just to offset 22% of the total hydrogen demand—the rest of the hydrogen would need to be delivered via a tube truck. For this scenario, it would be prudent for GCTD to further investigate the opportunities to curb grid demand by deploying solar PV assets; more information can be found in Appendix A: Memo—Infrastructure Options for Different Hydrogen Fueling Arrangements.

While the onsite generators and potential solar and battery system would be ideal solutions for on-site resiliency, GCTD also needs to consider the resiliency of its hydrogen supply. Different hydrogen suppliers will incorporate into their contract contingency plans if there is a disruption to 1) the generation site or 2) the distribution paths (e.g., the truck cannot make it to its destination). Each disruption would have different mitigation measures such as deploying a new truck to make the delivery on the same day or allow GCTD to purchase hydrogen from a different supplier at the contracted cost. Each situation would be unique and GCTD would need to incorporate mitigation strategies into their supply contract.

## 7.5 FACILITY AND INFRASTRUCTURE MODIFICATIONS CONCLUSION

Table 13 summarizes the minimum facility and infrastructure requirements for FCEB implementation at the agency's operations and maintenance facility.

### Table 13: Infrastructure modification summary

| Division Name | Address | Main Function(s) | Type(s) of Infrastructure | Service Capacity | Needs Upgrade (Yes/No) |
|---|---|---|---|---|---|
| GCTD Operations and Maintenance Facility | 1901 Auto Center Dr, Oxnard, CA 93036 | Operations, Maintenance, Training, Fueling | New FCEB fueling equipment, additional electrical improvements, | 40-60 – 40-ft buses<br>8-17 – 35 ft-buses<br>25-30 – demand response vehicles (note, these vehicles will be fueled at the 1901 Auto Center Dr, but stored at the paratransit operations center) | Yes |

Table 14 provides a breakdown by cost category for the proposed site modifications as discussed throughout Section 7.0 to transition to hydrogen as an alternative fuel. Nearly 90% of the cost—$5.42 million—is related to the hydrogen equipment, including the storage tank and related equipment, leak detection for safety, and construction hard costs to build the hydrogen fuel yard. In addition to the construction and equipment costs, soft costs related to market factors, design contingency, insurance and contractor fees bring the total estimated cost of the project to $8.97 million. The full cost estimate is found in Appendix C: Cost Estimates.

### Table 14: Cost estimate for hydrogen fueling infrastructure

| Cost Category | Total Estimated Cost ($) | Percent of Estimated Cost |
|---|---|---|
| Existing conditions (demolition, protection work etc.) | $20,143 | 0.35% |
| Hydrogen fueling equipment (tank, vaporizers, dispensers, etc.) | $4,771,010 | 81.83% |
| Electrical (power hook ups, disconnect switch, etc.) | $74,815 | 1.28% |
| Communications upgrades | $30,600 | 0.52% |
| Hydrogen leak detection system | $335,759 | 5.76% |
| Earthwork (grading) | $17,000 | 0.29% |
| Exterior improvements (CMU retaining wall, bollards, fence, etc.) | $315,703 | 5.41% |
| Utilities (yard lighting, fuel piping, ductbank, etc.) | $265,393 | 4.55% |
| Subtotal | $5,830,423 | 100% |
| General conditions/ general requirements | $728,803 | |
| Estimate/ design contingency | $1,311,845 | |
| Market factor | $393,554 | |

| Cost Category | Total Estimated Cost ($) | Percent of Estimated Cost |
|---|---|---|
| Subtotal | $8,264,625 | |
| Bonds & Insurance | $165,292 | |
| Contractor's fee | $537,201 | |
| **Grand total** | **$8,967,118** | |

# 8.0 FINANCIAL EVALUATION AND IMPACTS

The financial evaluation for GCTD's ZEB rollout plan consisted of the modeling of a Base Case (assuming continued use of CNG and gasoline vehicles or 'business-as-usual') and a ZEB Rollout scenario (assuming a transition to 100% ZEB operations and the phasing out of diesel/gasoline vehicles), and a comparison between the two scenarios to quantify the financial impacts of the transition and of ZEB operations. Stantec's cost estimator, Jacobus & Yuang, Inc., provided a detailed cost estimate of materials, soft costs, constructions, and other line items related to facility modifications for the ZEB case (more information in Section 7.5).

The main assumptions for the cost modeling are:

- Financial modeling was completed in real 2022 dollars (2022$).
- A 7% discount rate was applied for all calculations, as per USDOT guidance.
- The chief source of information regarding fleet planning is the GCTD Fleet Management Plan, dated March 2021. This document contains a fleet plan through 2031. Stantec worked with GCTD staff to revise the fleet management plan for the purposes of the ZEB rollout plan to account for fleet expansion for potential service improvements and other operational growth, as well as to extend the plan through 2040, as required by the ICT regulation; the proposed fleet plan is shown in Table 9. Furthermore, for the paratransit and demand-response fleet, the fleet management plan provides an indication of replacement and fleet size, but not of vehicle type, as more study is needed to determine the appropriate vehicle size dependent upon passenger demand. For simplicity, we assumed for the ZEB Case that paratransit and demand-response vehicles would be FCE passenger vans; future revisions to the fleet plan may be required as determined by GCTD staff and will impact the cost assumptions here.
- Annual average vehicle mileage is as follows for each vehicle type[23]:
    - 43,115 miles for 40-ft vehicles
    - 41,297 miles for 35-ft vehicles
    - 39,093 miles for CNG cutaways and ZE paratransit vehicles
    - 10,606 miles for gas vans
- Average fuel economy as follows (based on GCTD information for existing fleet and Stantec vehicle modeling for the ZE vehicles):
    - 2.82 miles per diesel gallon equivalent (DGE) for 40-ft and 35-ft vehicles

[23] Based on 2019 NTD reported statistics.

  - 6.45 miles per DGE for CNG cutaways
  - 11.95 miles per gasoline gallon for gas vans
  - 7.20 miles per kg of hydrogen for 40-ft FCEBs
  - 7.29 miles per kg of hydrogen for 35-ft FCEBs
  - 17.00 miles per kg of hydrogen for FCE paratransit vehicles
- The ZEB case included the operation of CNG and gasoline vehicles (as well as ZE vehicles) during the transition period until fossil fuel vehicles are phased out.
- The model was completed using a consistent format for both the Base Case and the ZEB Rollout to facilitate clear comparison between the two. The modeling was developed on an annual basis from 2023 through to 2040.

More details about the assumptions and inputs for both base case and ZEB case can be found in Appendix D: Financial Modeling Inputs and Assumptions.

## 8.1 BASE CASE APPROACH

Stantec developed the forecast for the Base Case (business-as-usual) scenario, assuming that the existing fleet of CNG and gasoline vehicles is maintained and renewed through to 2040. This model is inclusive of all scheduled fleet replacements required during the 2040 project horizon. It should be noted that this Base Case would be non-compliant with the ICT regulatory requirements as it deploys fossil fuel vehicles and is thus used only for illustrative purposes to determine the financial impacts of a ZEB rollout.

The Base Case fleet sees a gradual reduction in the total number of 35-ft buses and a gradual increase in 40-ft buses, thus resulting in larger vehicles for the fixed-route bus fleet over the 2040 project horizon. Moreover, for the demand response fleet, the total fleet size in the Base Case will grow but no new cutaways are assumed in this model; new demand-response vehicles are assumed to be passenger vans using gasoline. GCTD will need to conduct further analysis to right-size the paratransit fleet, as mentioned in the Fleet Management Plan.

Capital expenses modeled consist of fleet acquisition based on GCTD's Fleet Management Plan, the FY2020-22 Capital Project Plan – Funded Projects, and the FY2021-22 Budget Book for inputs related to replacement quantities and estimated purchase costs.

Vehicle maintenance costs were derived from NTD 2019 data based largely on salaries, tires and other materials; costs were developed as a cost per mile for fixed-route services and demand responses services.

Fuel costs are based on invoicing from Clean Energy from June 2022 for CNG fuel and GCTD information for gasoline fuel.

## 8.2 ZEB CASE APPROACH

The ZEB Case foresees a gradual transition to 100% ZE revenue vehicle operations by 2040 in alignment with ICT regulations. The transition follows the fleet replacement schedule presented previously in Table 9, based on GCTD's Fleet Replacement Plan but modified to account for gradual fleet growth (similar to the total fleet size as in the Base Case).

The last purchase of a CNG bus for fixed-route service would be in 2028, and the last purchase of a non-ZEB demand-response vehicle would in 2022. The assumed life cycle for the ZEB vehicles were the same as the current life cycles for non-ZEB vehicles—12 years for full size buses, and 8 years for demand-response vehicles. For demand-response vehicles, given the immaturity of the small vehicle market particularly for FCE vehicles, the modeling captured a generic 'demand response ZE' based on quotes and specifications from an OEM that has developed a FCE passenger van based on a Ford Transit Van chassis.[24] As GCTD transitions its non-fixed-route fleet to ZEBs, GCTD will likely need to revisit and refresh the assumptions in this cost model to better account for updated vehicle specifications.

Capital expenses modeled consist of fleet acquisition, extended vehicle warranties, and fuel cell replacements at a vehicle's mid-life but only for large, fixed-route vehicles (based on OEM information).

Vehicle maintenance costs for FCE vehicles were generated based on GCTD's current costs for its fossil fuel fleet based on literature from comparative FCEB and CNG operations for two California transit agencies. The findings in these reports demonstrated that on a per mile basis, vehicle maintenance costs were comparable between CNG buses and FCEBs.[25] The lack of data on maintenance costs, particularly for costs outside of any OEM warranty, makes maintenance costs difficult to forecast.

Fuel costs were based on industry reports that indicate that the price per kg of hydrogen will decrease in the future as the supply chain matures along with investments from private and public actors. The cost assumed here is the cost of the commodity as delivered liquid hydrogen.

Infrastructure costs for the ZEB case are related to facility modifications to accommodate FCEBs and hydrogen fueling infrastructure. The related infrastructure is detailed in Section 7.0.

## 8.3 COMPARISON AND OUTCOMES

The cost comparison of net present value (NPV) between the CNG/gasoline Base Case and the ZEB Case transition scenario is presented in Table 15 incorporating both capital (orange) and operating (blue) expenses. The ZEB Case has a total NPV of $134,963,000 versus $105,294,000 for the Base Case, a difference of $29,669,000 or 28% increase in NPV over the base case. The financial assessment below does not consider any rebates, grants, credits, or other alternative funding mechanisms. Therefore, there may be several opportunities to offset the difference in the price between the two scenarios.

[24] GCTD is currently exploring procuring battery-electric vans for paratransit/on-demand service as a short-term strategy to provide ZE operations in the interim while the FCE market matures for paratransit/on-demand. The modeling in this report does not consider this potential short-term fleet strategy.
[25] https://www.nrel.gov/docs/fy21osti/78078.pdf, https://www.nrel.gov/docs/fy21osti/78250.pdf

**Table 15: Cost Comparison 2023-2040**

| | Base Case | ZEB Case | Cost difference (ZEB – Base) |
|---|---|---|---|
| Fleet Acquisition | $45,200,000 | $65,425,000 | $20,225,000 |
| Fleet Refurbishment | $— | $457,000 | $457,000 |
| Infrastructure | $— | $8,380,000 | $8,380,000 |
| Fleet Maintenance | $49,098,000 | $48,829,000 | $(269,000) |
| Fuel/Hydrogen | $10,996,000 | $11,872,000 | $876,000 |
| ***Total*** | $105,294,000 | $134,963,000 | $29,669,000 |

Figure 23 displays the breakdown of total costs by category—the largest difference between the two scenarios is the capital expenses related to fleet procurement and hydrogen infrastructure deployment.

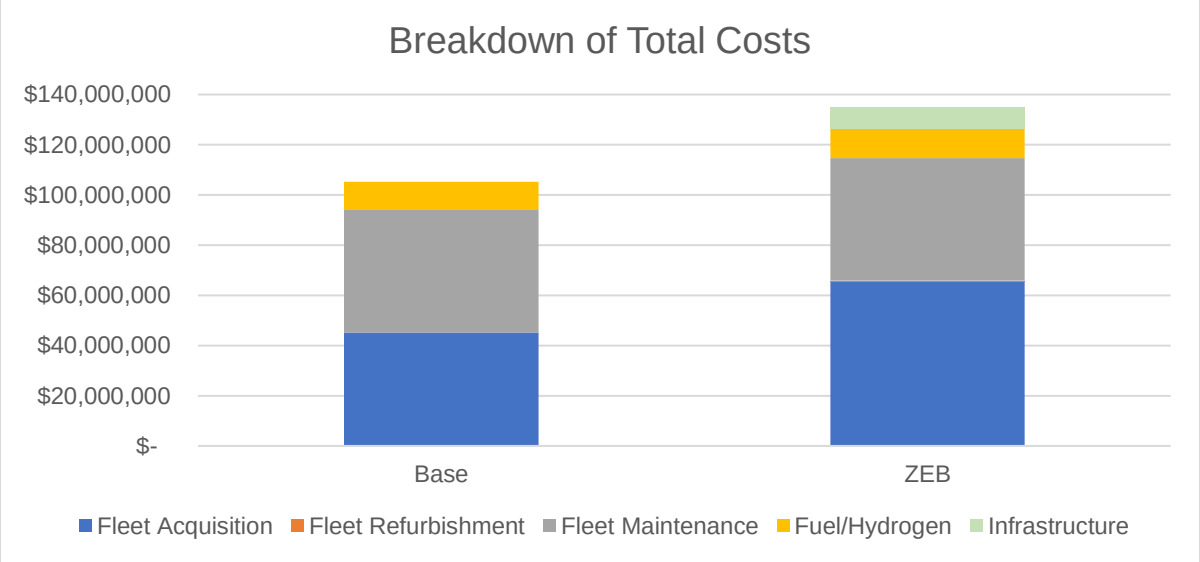



**Figure 23: Breakdown of Cost Categories for the Base Case and ZEB Case**

The procurement of ZEBs represents $20.2 million more in expenses due to the higher purchase price of FCEBs compared to fossil fuel vehicles. The conversion and upgrades to the facility to install the hydrogen fueling infrastructure and related equipment represents another added cost of over $8 million.

Capital costs associated with vehicle overhauls are related to fuel cell stack replacements or refurbishments at the midlife of a vehicle; for the Base Case, no heavy midlife refurbishments are conducted by GCTD. Notably, we assumed comparable useful life spans for both fossil fuel and ZE vehicles. Given that no agency has operated a modern FCEB in the United States continuously for over 10 years, it is unclear if an FCEB can operate longer than 12 years, but a recent report looking at the price parity of fossil fuel buses and FCEBs assumed a 14-year life span.[26] Operating the FCEBs for a

[26] https://www2.deloitte.com/content/dam/Deloitte/fr/Documents/fusions-acquisitions/fueling-the-future-of-mobility-fuel-cell.pdf

longer timespan can help spread out the steep capital costs over a longer timeframe and represents an opportunity for lower overall costs, although the impacts to fuel economy are currently unknown.

Related to operating costs, given the operating range parity of CNG vehicles and FCEBs, minimal changes to planning and scheduling is envisaged, and the servicing cycle will be similar too. Maintenance costs on a per mile basis of recent FCEBs at Sun Line and OCTA in Southern California have demonstrated relative cost parity with CNG buses. Initially, as maintenance technicians get trained to work on FCEBs, the learning curve will likely result in a greater maintenance cost for FCEBs over CNG vehicles; work under warranty can also help mitigate costs. Over time, as GCTD staff become more proficient with the FCEB technology, it is likely that maintenance costs will come down, particularly as FCEBs having fewer moving components than fossil fuel vehicles reducing the number of parts that can malfunction and that need to be periodically maintained.

Lastly, the use of hydrogen as an alternative fuel is a large cost driver compared to CNG. At the moment, even with rising fossil fuel prices due to inflation and volatility worldwide, the unit price of CNG procured by GCTD is very favorable especially compared to hydrogen fuel. The model assumed an eventual decrease of hydrogen fuel to $4 per kg based on market and industry forecasts. Even with adjustments for future fuel prices from the US Energy Information Administration, the cost of CNG fuel in the Base Case is less than for hydrogen fuel in the ZEB Case. GCTD should explore other avenues to lower the cost of hydrogen fuel, including fuel credits and potentially generating hydrogen on-site (which is described as a possible long-term strategy and detailed in Appendix A: Memo—Infrastructure Options for Different Hydrogen Fueling Arrangements).

Figure 24 shows the year-to-year comparison between the Base Case and the ZEB Case. The higher costs for the FCEB scenario occur each year, with the largest single year being the first year due to the procurement of not only FCEBs, but the large investment required for the hydrogen fueling infrastructure as well.

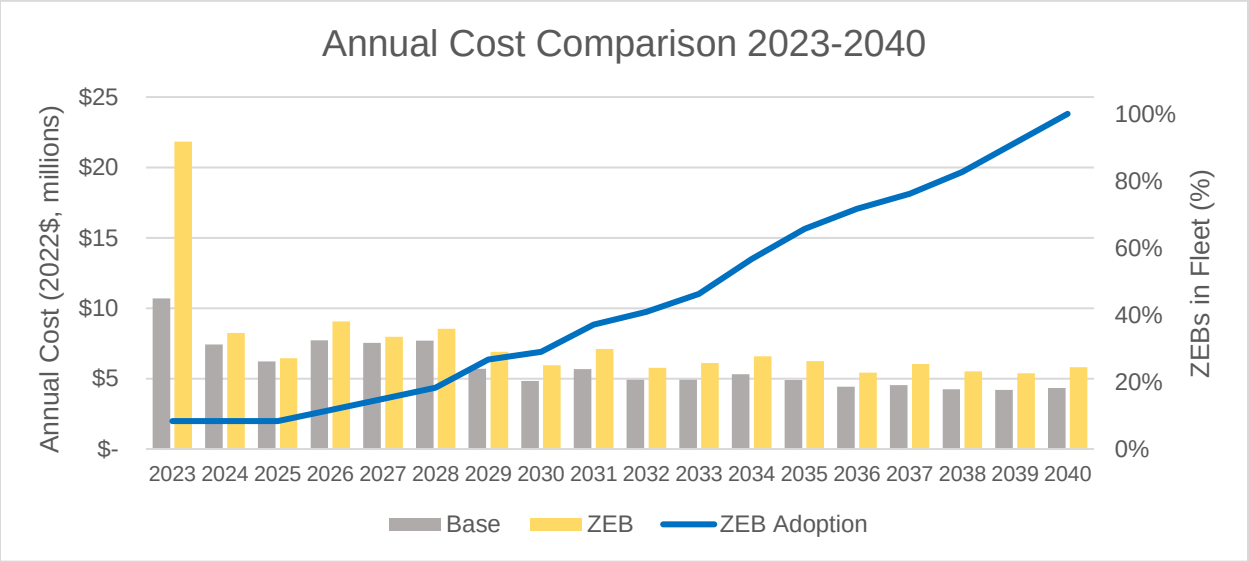



**Figure 24: Annual Total Cost Comparison**

## 8.4 SENSITIVITY ANALYSES

Notably, this financial analysis includes judgments and assumptions about future prices and assets costs. To ensure the results are robust, we conducted several sensitivity analyses to understand the potential impacts of inflation and price swings of different cost drivers for fleet and operations.

### 8.4.1 Inflation Testing

First, the impacts of three levels of inflation were considered on the cost of ownership analysis. For this analysis, year-over-year inflation was considered as follows:

- 3% for low inflation
- 5% for moderate inflation
- 7% for aggressive inflation

The summary results for the different levels of inflation tested are shown in Table 16.

**Table 16: Inflation Sensitivity analysis and impact on NPV**

| | 3% inflation | | 5% inflation | | 7% inflation | |
|---|---|---|---|---|---|---|
| | **Base Case** | **ZEB Case** | **Base Case** | **ZEB Case** | **Base Case** | **ZEB Case** |
| Fleet Acquisition | $58,688,000 | $85,765,000 | $70,546,000 | $103,730,000 | $85,429,000 | $126,338,000 |
| Fleet Refurbishment | $-- | $677,000 | $-- | $879,000 | $- | $1,140,000 |
| Infrastructure/ Facility Mods | $-- | $8,632,000 | $-- | $8,800,000 | $-- | $8,967,000 |
| Fleet Maintenance | $62,902,000 | $62,543,000 | $74,825,000 | $74,386,000 | $89,576,000 | $89,040,000 |
| Fuel | $14,335,000 | $15,654,000 | $17,238,000 | $18,985,000 | $20,852,000 | $23,165,000 |
| **Total** | **$135,925,000** | **$173,271,000** | **$162,609,000** | **$206,780,000** | **$195,857,000** | **$248,650,000** |

The graph in Figure 25 compares the NPV of both the Base Case and ZEB Case under the different inflation scenarios tested. The analysis demonstrates that the NPV of the ZEB Case can range from $173 million to $249 million depending on the rate of inflation.

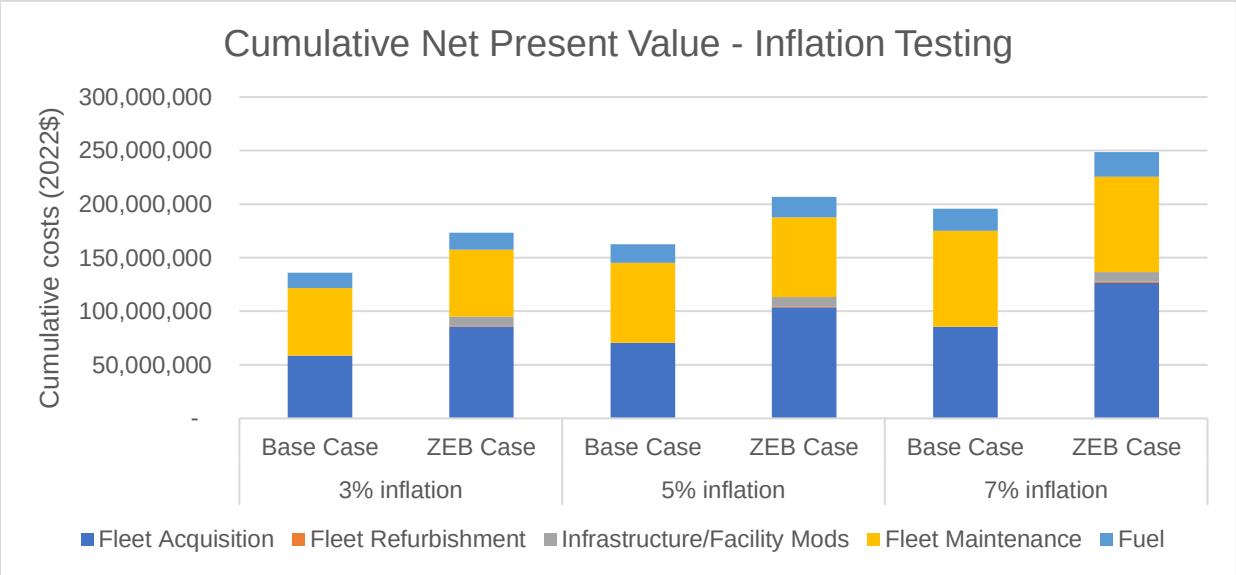



**Figure 25: Cumulative NPV at different inflation rates**

## 8.4.2 Item Sensitivity

Beyond the impacts of inflation on capital and operating expenses, we wanted to test the impacts that swings in specific cost assumptions could have on the cost of ownership for the Base Case compared to the ZEB Case. Note that the calculations below include the 7% discount rate to derive NPV, but do not include inflation for simplicity of comparison with the results in Section 8.3.

As discussed in Section 8.3, there are a range of different predictions and forecasts for ZEB capital and operating costs. The largest cost driver, other than the hydrogen fueling station, is the purchase price of an FCEB, which is currently about double the cost of a CNG equivalent. As such, we tested the impact of a much lower FCEB purchase price—ramping down from 90% of the purchase price of a CNG bus in 2026, to 50% of the purchase prices of a CNG bus in 2030 through 2040.[27] With this assumption, the total NPV of the ZEB Case is $114 million compared to $105 million for the Base Case, or about 9% more compared to the Base Case, demonstrating the significant impact that bus purchase prices will have on the total ZEB rollout budget.

Next, we tested a potential increase in the price of CNG fuel of 50%. The volatility of CNG could be a significant expense into the future and thus no longer be such a deeply discounted commodity. A 50% swing in CNG could result in a cost increase in the Base Case of $3 million; however, because CNG is a fuel in both the Base Case and the ZEB Case (while fossil fuel buses are phased out), the cost difference between the two scenarios is still about 26%, similar to the baseline analysis in Section 8.3. Thus, CNG cost swings have a minor impact in the total potential cost savings of a transition to FCEBs. Fuel-related cost savings as such would need to come from reductions in the cost of hydrogen fuel.

Another potential way to translate FCEB operations into cost savings is through maintenance cost savings due to reduced labor for maintenance work. To account for potential cost savings through reduced maintenance labor, we tested a 40% decrease in FCEBs maintenance cost per mile. A 40% decrease in maintenance labor for FCEBs decreases the NPV of the ZEB Case by $8.6 million, resulting in the ZEB Case being 20% greater than the Base Case. So, while cost savings can arise from maintenance savings, it is not as significant as the impact of cheaper FCEB purchase prices.

Table 17 summarizes the results of the sensitivity testing on the NPV of the Base Case and ZEB Case.

### Table 17: Sensitivity analysis and impact on NPV

| | Base Case | Base Case Diff | ZEB Case | ZEB Case Diff | ZEB vs. Base |
|---|---|---|---|---|---|
| Baseline | $105,294,000 | NA | $134,963,000 | NA | 28% |
| FCEB purchase price **-50%** swing | $105,294,000 | $-- | $114,323,000 | $(20,640,000) | 9% |
| CNG fuel **+50%** swing | $108,348,000 | $3,054,000 | $136,863,000 | $1,900,000 | 26% |
| FCEB maintenance **-40%** swing | $105,294,000 | $-- | $126,347,000 | $(8,616,000) | 20% |

Overall, the sensitivity analysis demonstrates that changes in capital expenses for bus purchase price has the biggest impact on NPV. If FCEB prices come down in the future, the total budget required for the transition will be significantly closer to the business-as-usual scenario. Further, GCTD will continue to use competitive and formula funding sources to reduce the expenses of capital acquisitions, such as the recent application to the federal Low-No funding program for a hydrogen fueling station.

[27] https://www2.deloitte.com/content/dam/Deloitte/fr/Documents/fusions-acquisitions/fueling-the-future-of-mobility-fuel-cell.pdf

# 9.0 OPERATIONAL AND PLANNING CONSIDERATIONS

This section provides guidance and strategies for various operational and planning requirements when implementing FCEBs.

## 9.1 OPERATOR NEEDS

As FCEBs have different components and controls than conventional buses, FCEB bus performance also differs. Operations staff should also be briefed on expected range and limitations of FCEBs (such as variability in energy consumption from HVAC under different weather conditions) as well as expected refueling times and procedures. Interaction at the depot should be similar to what is done with the CNG fleet, which is fueled as part of the service line process.

The presence of hydrogen gas and the safety issues that relate to this must be addressed as well as any differences to gauges and instrumentation. An overview of the technology should be included. An additional increment of time beyond just the vehicle layout and driving characteristics needs to be added to training sessions to address the technology and unique safety considerations. Additional training time for different start-up and shut-down procedures and proper procedures regarding what to do if there is a failure on route should be accounted for as well.

Finally, ZEBs are much quieter than conventional fuel buses. Operators should be aware of this and that pedestrians or people around the bus may not be aware of its presence or that it is approaching. CARB has also stated that due to the vehicle's lack of noise, some operators forget to turn off the bus after parking. Operator training should include a process for ensuring that this happens as well.

## 9.2 PLANNING, SCHEDULING, AND RUNCUTTING

FCEBs come closest to matching the current diesel bus range and APTA White Book Guidelines for heavy duty bus ranges (280-360 miles). GCTD can launch FCEBs first on routes/blocks with shorter daily distances to get a feel for them in terms of range and handling—placing them on routes that remain relatively close to the facility would be a pragmatic strategy at first. Non-revenue tests should be conducted to understand actual driving range and fuel economy, particularly as a function of route operating conditions, ambient temperature, passenger loads, and driver behavior.

## 9.3 MAINTENANCE NEEDS

The elimination of the internal combustion engine and powertrain will reduce operating maintenance costs in labor, material, and outsourcing. However, maintenance staff will still need to be trained on safety, scheduled maintenance, diagnostics, and repair of multiple systems that may be new to them. While a smaller high voltage battery installation is present and will require inspection and eventual changeout, the inspection and possible replacement of hydrogen fuel cell apparatus may be necessary. Tanks will have the same ruggedness as CNG products and should fulfill in excess of the heavy-duty bus 12-year service design life cycle.

According to FCEB OEMs, FCEB technicians should receive training on:

- Hydrogen systems, including fuel cell engine
- Hydrogen fuel system
- Hydrogen detection and fire suppression systems
- Hydrogen cooling system package

## 9.4 REFUELING CYCLE

Fueling a FCEB is very similar to fueling a traditional CNG bus. Attaching a dispenser nozzle to the vehicle and fueling for ~8-12 minutes will yield a full tank. The hydrogen nozzle is completely sealed to the bus while refueling due to the high-pressure delivery method (above 350 bars). The operation of the nozzle and the pump are virtually the same but specific training needs to be provided to staff for safety reasons.

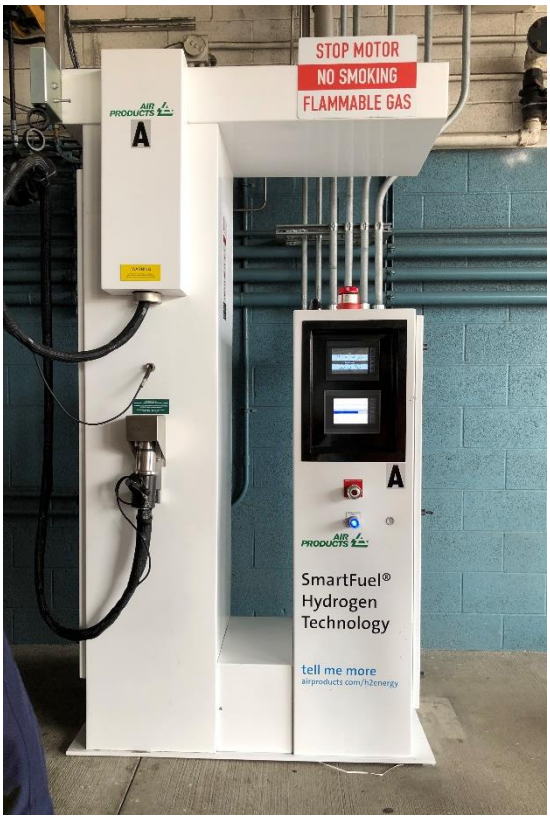



**Figure 26: Hydrogen fueling dispenser at OCTA for heavy-duty transit buses**

Overall, the concept design for the hydrogen fueling station is for two low-pressure dispensers (H35) in the current fueling lanes for 35-ft and 40-ft FCEBs to create a seamless transition to ZEBs by maintaining the current practices around servicing and fueling procedures for GCTD. Additionally, the design considers one high-pressure dispenser (H70) to refuel vans and cutaways. The pressure difference

between H35 and H70 dictates how much hydrogen can be stored in the tanks and is limited by the design specifications of each vehicle. While a van or cutaway could refuel at H35, they would only get half the tank fill capacity. However, a 35-ft or 40-ft bus is unable to fill using a H70 dispenser. Based on the design of the hydrogen infrastructure and the forecasted demand for hydrogen, we estimate that a delivery of hydrogen fuel would be required every 2-3 days to replenish the storage tank.

# 10.0 WORKFORCE TRAINING

Transitioning to zero-emission vehicles presents complexities for all areas of transit operations including scheduling, maintenance, and yard operations. GCTD has specified a fleet replacement schedule for their current fleet (fixed route and paratransit services) and aims to transition to a 100% ZEB fleet by 2040. To ensure a qualified workforce is ready to support ZEB deployment it will be essential to provide effective training and align workforce development with the fleet transition timeline. This is summarized in Figure 27 below.


**Figure 27: GCTD training timeline**

## 10.1 CURRENT PLANS

GCTD is committed to training existing employees to retain staff and develop a qualified ZEB staff and has already implemented training opportunities. For example, GCTD worked with the SEIU Mechanical

Unit to create a mentorship program that allows less experienced mechanics to learn from experienced mechanics. In addition, bus repair and electrical training is provided via the California Transit Training Consortium (CTTC), which includes high-level ZEB bus safety and operations. Mechanics also receive training on GCTD's non-revenue electric vehicles[28].

To facilitate a successful transition to a 100% ZE fleet, GCTD identified their primary training needs, which include[29]:

- Operational and safety training
- Technical training on fuel cell operations
- Technical training on battery-electric drive systems
- Tools, PPE, and equipment training
- Operational safety training on hydrogen fueling stations

Acquiring the following tools and safety materials was also identified as a top priority to ensure successful in-house ZEB maintenance and management[30]:

- Operational training module
- High voltage interface box
- Portable leak tester
- Virtual training module
- High voltage insulated tools
- Insulated PPE
- Electrical safety hooks
- Arc flash clothing

Taking these needs into consideration, GCTD developed a plan for initial training. Within one month of receiving the first vehicles, all GCTD mechanics, workers, specialists, bus operators, and office staff will attend the one-day OEM Tier 1 training. Within six weeks, facility and maintenance mechanics will receive Tier 3 training. Tier 1 and Tier 3 courses are summarized in Table 18.

### Table 18: OEM tier 1 & tier 3 training

| Tier | Course |
|---|---|
| Tier 1 | Fuel cell 101 |
| | Fuel cell system basics |
| | Hydrogen safety |
| | Servicing basics and schedule |
| | Preventative maintenance |
| Tier 3 | Introduction to system schematics |
| | Corrective maintenance |
| | Diagnostics |
| | Basic and advanced troubleshooting |

[28] GCTD FTA ZE Fleet Transition Plan, pg. 13
[29] GCTD FTA ZE Fleet Transition Plan, pg. 14-15
[30] GCTD FTA ZE Fleet Transition Plan, pg. 15

| Tier | Course |
|---|---|
| | Integration basics |
| | Remote data analysis |

GCTD also created a framework of potential training methods and strategies to bolster their workforce development and successfully transition to a 100% ZEB fleet, summarized in Table 19 below.

**Table 19: Potential training methods**

| Plan | Description |
|---|---|
| Train-the-trainer | Small numbers of staff are trained, and subsequently train colleagues. This maintains institutional knowledge while reducing the need for external training. |
| Vendor training from New Flyer and fueling vendor | OEM training provides critical, equipment-specific operations and maintenance information. Prior to implementing ZEB technology, GCTD staff will work with the OEMs to ensure all employees complete necessary training. |
| Retraining & refresher training | Entry level, intermediate, and advanced continuous learning opportunities will be offered to all GCTD staff. |
| ZEB training from other transit agencies | GCTD plans to leverage the experience of agencies who were early ZEB adopters, such as the ZEB University program offered by AC Transit. |
| National Transit Institute (NTI) training | NTI offers zero-emissions courses such as ZEB management and benchmarking and performance. |
| Local partnerships and collaborations | GCTD works with local schools to showcase potential careers in bus and facilities management to students. |
| Professional associations | Associations such as the Zero Emission Bus Resource Alliance offer opportunities for sharing and lessons learned across transit agencies. |

## 10.2 FUNDING

GCTD plans to use $764,990 of FY2022 Low-No Grant funding (if awarded) to fund the initial steps of workforce development.[31] Training and budget details are summarized in Table 20.

**Table 20: FY2022 Low-No training funding**

| Training Resource/Strategy | FY2022 Low-No Budget |
|---|---|
| Bus OEM operator, maintenance, first responder training | $84,490 |
| Operational and safety training for operators, service workers, and other staff | $50,000 |
| Technical training for mechanics on hydrogen fuel cell operations and battery systems | $100,000 |
| Regional Consortium (specific OEM training, specialized training modules for continuing education, hosting training seminars for regional providers, specialized training on hydrogen fuel station maintenance) | $480,500 |

[31] GCTD FTA ZE Fleet Transition Plan, pg. 16

| Training Resource/Strategy | FY2022 Low-No Budget |
|---|---|
| Operational and safety training for facility mechanics, building maintenance workers, and building mechanics | $50,000 |
| **Total** | **$764,990** |

## 10.3 ADDITIONAL CONSIDERATIONS

In addition to the plan outlined above, OEM recommendations from the California statewide contract procurement for ZEBs can provide general guidance for training and workforce development (Table 21).

With a focus on safety, it is highly recommended that all local fire and emergency response departments be given training as the layout, componentry, safety devices, and other features on the new technology. This should reoccur every few years. The specific frequency can be dependent on agency discretion.

First-responder training is also recommended due to the nature of the new technology, particularly fire and emergency personnel. Additionally, training for staff involved in related functions like facility maintenance, tow truck providers, and utility service works might be necessary.

Although not specifically training, dry runs on each route should be done with the ZEBs to validate range and identify opportunities for coasting and adjustment to the vehicle's acceleration profile. In turn, changes in timing points may be necessary or beneficial for all parties. This should be done with planning staff on board and schedules should be adjusted as appropriate. In tandem, based on having several vehicle types particularly during transition, dispatching training and instructions to staff on parking routines will be necessary.

**Table 21: OEM recommendations from the California ZEB contract procurement**

| Training Type | Course | Sessions | Session Hours |
|---|---|---|---|
| Operator | Drive training | 4 | 4 |
| | Overall vehicle/system orientation | 20 | 2 |
| Maintenance/Technician | Preventative maintenance | 4 | 8 |
| | Electrical/electronic | 6 | 8 |
| | Multiplex | 4 | 3x8 days |
| | HVAC | 4 | 4 |
| | Brakes | 4 | 4 |
| | Energy storage system, lithium-ion battery and energy management hardware and software training | 6 | 8 |
| | Electric drive/transmission | 6 | 8 |
| | H2 system – fuel cell engine | 6 | 8 |

| Training Type | Course | Sessions | Session Hours |
|---|---|---|---|
| | H2 fuel system | 4 | 8 |
| | H2 detection and fire suppression systems | 4 | 8 |
| | H2 cooling system package | 6 | 4 |

# 11.0 POTENTIAL FUNDING SOURCES

As a cost driver for transit agencies, funding the ZE transition will require external financial aid. Due to the long timeframe over which buses will be procured and infrastructure will be constructed, it is imperative that GCTD constantly monitors existing funding and financing opportunities and is aware of when new sources are created. Below are major current programs available for ZEB transition (Table 22).

## Table 22: Grants and potential funding options for ZEB transition

| Type | Agency | Fund/Grant/Program | Description | Applicability & Details |
|---|---|---|---|---|
| Federal | Federal Transportation Administration (FTA) | Low or No Emission Program (Low-No Program) (5339(c)) | Low-No provides competitive funding for the procurement of low or no emission vehicles, including the leasing or purchasing of vehicles and related supporting infrastructure.<br>This has been an annual program under the FAST Act since FY2016 and is a subprogram of the Section 5339 Grants for Bus and Bus Facilities.<br><br>There is a stipulation for a 20% local match. | In FY2021 the FTA awarded $180 million to 49 projects for the Low-No program.[32] In FY2021, Golden Empire Transit District received $3 million to construct a permanent hydrogen fueling station to support its electric bus operations.[33]<br>$1.1 billion has been announced for FY2022 projects.[34]<br>GCTD applied for a Low-No grant in FY2022. |
| | | Buses and Bus Facilities Program (5339(a) formula, 5339(b) competitive) | Grants applicable to rehab buses, purchase new buses, and invest and renovate related equipment and facilities for low or no emission vehicles or facilities. A 20% local match is required. | FY2021 5339 funding totaled $409 million in grants to 70 projects in 39 states. $372 million has been announced for FY2022 grants. [35] |
| | | Urbanized Area Formula Grants (5307) | 5307 grant funding makes federal resources available to urbanized areas for transit capital and operating assistance. Eligible activities include capital investments in bus and bus-related activities such as replacement, overhaul and rebuilding of buses.<br>The federal share is not to exceed 80% of the net project cost for capital expenditures. The federal share may be 90% of the cost of vehicle-related equipment attributable to compliance with the Clean Air Act. | Typically, the MPO or another lead public agency is the direct recipient of these funds and distributes these to local transit agencies based on TIP allocation. Agencies can allocate these funds for the purchase of ZEBs. |

[32] https://www.transit.dot.gov/funding/grants/fiscal-year-2021-low-or-no-emission-low-no-bus-program-projects
[33] https://www.transit.dot.gov/funding/grants/fiscal-year-2021-low-or-no-emission-low-no-bus-program-projects
[34] https://www.transit.dot.gov/lowno#:~:text=On%20March%207%2C%202022%2C%20FTA,improve%20air%20quality%20and%20combat
[35] https://www.transit.dot.gov/bus-program

| Type | Agency | Fund/Grant/Program | Description | Applicability & Details |
|---|---|---|---|---|
| | Federal Highway Administration (FHWA) | Congestion Mitigation and Air Quality Improvement Program (CMAQ) | The Congestion Mitigation and Air Quality Improvement (CMAQ) Program provides funds to states for transportation projects designed to reduce traffic congestion and improve air quality, particularly in areas of the country that do not attain national air quality standards. | Projects that reduce criteria air pollutants regulated from transportation-related sources, including ZEBs. |
| | United States Department of Transportation (USDOT) | Local and Regional Project Assistance Program (RAISE) | Previously known as BUILD and TIGER, RAISE is a discretionary grant program aimed to support investment in infrastructure.<br>RAISE funding supports planning and capital investments in roads, bridges, transit, rail, ports, and intermodal transportation.<br>A local match is required.[36] | FY2020 provided $1 billion in BUILD grants to 70 projects with a stipulation requiring 50% of funding for projects in rural areas. In FY2022, $2.28 billion in funding was announced for the RAISE Grant Program. [37] |
| State | California Air Resources Board (CARB) | Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP) | Voucher program created in 2009 aimed at reducing the purchase cost of zero-emission vehicles.<br>A transit agency would decide on a vehicle, contact the vendor directly, and then the vendor would apply for the voucher. | $430 million in funding for the FY21-22 year was announced in March 2022.[38]<br>Hydrogen fuel cell vehicles are eligible for HVIP but must not have plug-in capacity.[39] |
| | | Carl Moyer Memorial Air Quality Standards Attainment Program | The Carl Moyer Program provides funding to help procure low-emission vehicles and equipment. It is implemented as a partnership between CARB and local air districts. | Transit buses are eligible for up to $80,000 funding. |

[36] https://www.transportation.gov/RAISEgrants/about
[37] https://www.transportation.gov/sites/dot.gov/files/2022-04/RAISE_2022_NOFO_AMENDMENT_1.pdf
[38] https://californiahvip.org/funding/
[39] https://californiahvip.org/wp-content/uploads/2022/03/HVIP-FY21-22-Implementation-Manual-03.15.22.pdf

| Type | Agency | Fund/Grant/Program | Description | Applicability & Details |
|---|---|---|---|---|
| | | Volkswagen Environmental Mitigation Trust Funding | VW's settlement provides nearly $130 million for zero-emission transit, school, and shuttle bus replacements. | Transit may be eligible for up to $65 million. Applications are open for transit agencies and are processed on a first come, first serve basis. Maximum: $400,000 per FCEB and maximum of $3,250,000 total funding per agency.[40] |
| | | Sustainable Transportation Equity Project (STEP) | STEP was a pilot that took a community-based approach to overcoming barriers to clean transportation. The future of STEP is currently being determined by CARB and stakeholder groups through the FY22-23 Funding Plan and Three-Year Plan for Clean Transportation Incentives.[41] | There are two different grant types: Planning and Capacity Building Grants (up to $1.75 million for multiple grantees) and Implementation Grants (up to $17.75 million for between one and three grantees).<br>Lead applicants must be a CBO, federally-recognized tribe, or local government representing a public transit agency.<br>Award amounts ranged from $184,000 to a maximum of over $7 million.[42] |
| | California Transportation Commission (CTC) | SB1 Local Partnership Program (LPP) | The Local Partnership Program provides funding to counties, cities, districts and regional transportation agencies to improve aging infrastructure, road conditions, active transportation, transit and rail, and health and safety benefits. Funds are distributed through competitive and formulaic components.[43] | To be eligible, counties, cities, districts, and regional transportation agencies must have approved fees or taxes dedicated solely to transportation improvements. $200 million is available annually.<br>In Ventura County, a transportation sales tax measure may be placed on voter ballots for the November 2022 election. If passed, the LPP will be a potential future funding option. [44] |
| | | Solutions for Congested Corridors Program (SCCP) | The SCCP includes programs with both formula and competitive funds. Funding is available to projects that make specific performance improvements and are a part of a multimodal comprehensive corridor plan designed to reduce congestion in highly traveled corridors by providing more transportation choices for residents, commuters, and visitors. | Improvements to transit facilities are eligible projects.<br>Cycle 2 funding of $500 million covers two years (FY2022 and FY2023).<br>To submit a SCCP application, the applicant needs to know exactly what sources will be funding the project and when the funds will be used, as well as which project phase they will be used for. Total estimated funding: $500,000,000 for FY22-23[45] |

[40] http://vwbusmoney.valleyair.org/documents/FAQ.pdf
[41] https://ww2.arb.ca.gov/lcti-step
[42] https://ww2.arb.ca.gov/news/grant-awards-announced-new-195-million-pilot-funding-equitable-clean-transportation-options
[43] https://catc.ca.gov/programs/sb1/local-partnership-program
[44] https://www.vcstar.com/story/news/local/2021/10/22/group-proposing-transit-sales-tax-measure-countys-2022-ballot/5988391001/
[45] https://www.grants.ca.gov/grants/solutions-for-congested-corridors-program/

| Type | Agency | Fund/Grant/Program | Description | Applicability & Details |
|---|---|---|---|---|
| | California Department of Transportation (Caltrans) | SB1 State of Good Repair | SGR funds are formula funds eligible for transit maintenance, rehabs, and capital programs. Agencies receive yearly SB1 SGR funding through their MPO, based on population and farebox revenues. | Agencies can decide to devote its portion of SB 1 funds to ZEB transition. |
| | | Low Carbon Transit Operations Program (LCTOP) | The LCTOP provides capital assistance to transit agencies in order to reduce greenhouse gas emissions and improve mobility. 5% and 10% of the annual Cap and Trade auction proceeds fund this program. | Many agencies are already recipients of these funds and can use these funds to purchase ZEBs and related equipment. |
| | | Transit and Intercity Rail Capital Program (TIRCP) | The TIRCP was created to fund capital improvements that reduce emissions of greenhouse gases, vehicle miles traveled, and congestion through modernization of California's intercity, commuter, and rail, bus, and ferry transit systems.[46] | The five cycles of TIRCP funding have awarded $6.6 billion in funding to nearly 100 projects throughout California. In 2022, the Humboldt Transit Authority (HTA) received $38,743,000 to procure 11 hydrogen fuel cell buses, design a hydrogen fueling station, and design and construct an intermodal transit and housing center.[47] |
| | | State Transportation Improvement Program (STIP) | The STIP is a five-year plan for future allocations of certain state transportation funds including state highway, active transportation, intercity rail, and transit improvements. The STIP is updated biennially in even-numbered years. [48] | ZEB procurement could compete for STIP funding. The 2022 STIP was adopted in March 2022 and included $796 million in available funding. [49] Funding is distributed via a formula for a variety of projects. |

[46] https://calsta.ca.gov/subject-areas/transit-intercity-rail-capital-prog
[47] https://calsta.ca.gov/-/media/calsta-media/documents/tircp---program-of-projects-as-of-july-2022---cycle-5-only-a11y.pdf
[48] https://catc.ca.gov/programs/state-transportation-improvement-program
[49] https://catc.ca.gov/-/media/ctc-media/documents/programs/stip/2022-stip/2022-adopted-stip-32522.pdf

| Type | Agency | Fund/Grant/Program | Description | Applicability & Details |
|---|---|---|---|---|
| | | Transportation Development Act (Mills-Alquist-Deddeh Act (SB 325)) | The TDA law provides funding to improve existing public transportation services and encourage regional transportation coordination. There are two funding sources: the Local Transportation Fund (LTF) and the State Transit Assistance (STA) fund.[50] | Funding opportunities include transportation program activities, pedestrian and bike facilities, community transit services, public transportation, and bus and rail projects. |
| | California Energy Commission | Clean Transportation Program (Alternative and Renewable Fuel and Vehicle Technology Program) | The California Energy Commission's Clean Transportation Program provides funding to support innovation and acceleration of development and deployment of zero-emission fuel technologies.<br>A local match is often required. | The Clean Transportation Program provides up to $100 million annually for a variety of renewable and alternative fuel transportation projects throughout the state, including specific projects for heavy-duty public transit buses.<br><br>In 2021, between $4 million and $6 million were awarded to the following transit agencies to assist with zero-emission transit fleet infrastructure deployment: Anaheim Transportation Network ($5 million), LADOT ($6 million), Sunline Transit ($5 million), and North County Transit District ($4 million) |
| | Department of Housing and Community Development | Affordable Housing and Sustainable Communities Program | The AHSC Program funds land use, housing, and transportation projects to support development that reduces GHG emissions. The program provides both grants and loans that reduce GHG emissions and benefit disadvantaged communities through increasing accessibility via low-carbon transportation. $405 million in available funds was announced in 2021.[51] The maximum award amount is not to exceed $30 million per project, with a minimum award of at least $1 million.[52] | Sustainable transportation infrastructure projects, transportation-related amenities, and program costs (including transit ridership) are eligible activities. Agencies can use program funds for assistance in construction or modification of infrastructure for ZEB conversion as well as new vehicle purchases. |
| Local | Ventura County Air Pollution Control District | Clean Air Fund (CAF) | The CAF provides financial support for projects that reduce emissions of greenhouse gases and the global warming impact of carbon emissions via mitigation. [53] | Approximately $25,000 is available for project funding each year on January 1st. Projects are reviewed and recommended based on their ability to reduce air pollution in Ventura County. [54] |

[50] https://dot.ca.gov/programs/rail-and-mass-transportation/transportation-development-act
[51] https://www.hcd.ca.gov/grants-funding/active-funding/ahsc/docs/final_ahsc_nofa_round_6.pdf
[52] https://www.hcd.ca.gov/affordable-housing-and-sustainable-communities#:~:text=Communities%20Program%20(AHSC)-,Affordable%20Housing%20and%20Sustainable%20Communities%20Program%20(AHSC),(%22GHG%22)%20emissions.
[53] http://www.vcapcd.org/pubs/Incentive-Programs/What-is-the-Clean-Air-Fund-Program.pdf
[54] http://www.vcapcd.org/pubs/Incentive-Programs/What-is-the-Clean-Air-Fund-Program.pdf

| Type | Agency | Fund/Grant/Program | Description | Applicability & Details |
|---|---|---|---|---|
| | Ventura County Regional Energy Alliance (VCREA) | EV Ready Communities Challenge Grant: Ventura County EV Blueprint | VCREA and Community Environmental Council (CEC) are creating a plan for electrifying transportation in Ventura County. The second phase of funding that will go towards EV charging installations in Ventura County if approved. [55] | |
| Other | | Low Carbon Fuel Standard (LCFS credits) | LCFS credits are not necessary funding to be applied for; rather, they are offset credits that are traded (through a broker) to reduce operating costs. | Once ZEBs are acquired and operating, agencies can collect LCFS and 'sell' them to reduce operating costs of ZEBs. Both hydrogen and electricity used as fuels are eligible for LCFS credits. Credit prices range, but average credit price between 2016 and 2019 was between $65 and $200 per credit, with an average of $10,000 per vehicle. |
| | | Transportation Development Credits | Although they are not funds for projects, Transportation Development Credits, also called "Toll Credits", satisfy the federal government requirement to match federal funds.[56] | Toll credits provide a credit toward a project's local share for certain expenditures with toll revenues. FHWA oversees the toll credits within each state.[57] |

[55] https://www.vcenergy.org/electric-vehicle-blueprint/
[56] https://dot.ca.gov/-/media/dot-media/programs/rail-mass-transportation/documents/f0010121-toll-credit-fact-sheet.pdf
[57] https://dot.ca.gov/-/media/dot-media/programs/rail-mass-transportation/documents/f0009899-2-toll-credits-fact-sheet-a11y.pdf

# 12.0 SERVICE IN DISADVANTAGED COMMUNITIES

CARB defines Section F of the rollout plan as “Providing Service in Disadvantaged Communities” based on disadvantaged communities as identified by CalEnviroScreen, an online mapping tool developed by the Office of Environmental Health Hazard Assessment (OEHHA). The tool identifies (at the census tract level) the state’s most pollution-burdened and vulnerable communities based on geographic, socioeconomic, public health, and environmental hazard criteria.

ICT provisions require that transit agencies describe how they are planning to deploy ZEBs in disadvantaged communities by outlining the location of the disadvantaged community (census tract) where the ZEB will be deployed, how many ZEBs, and in what year the ZEBs will be deployed.

Figure 28 shows that there are eight census tracts that are classified as ‘disadvantaged communities’ according to CalEnviroScreen 4.0, and Table 23 details the routes that operate within or touch these census tracts.

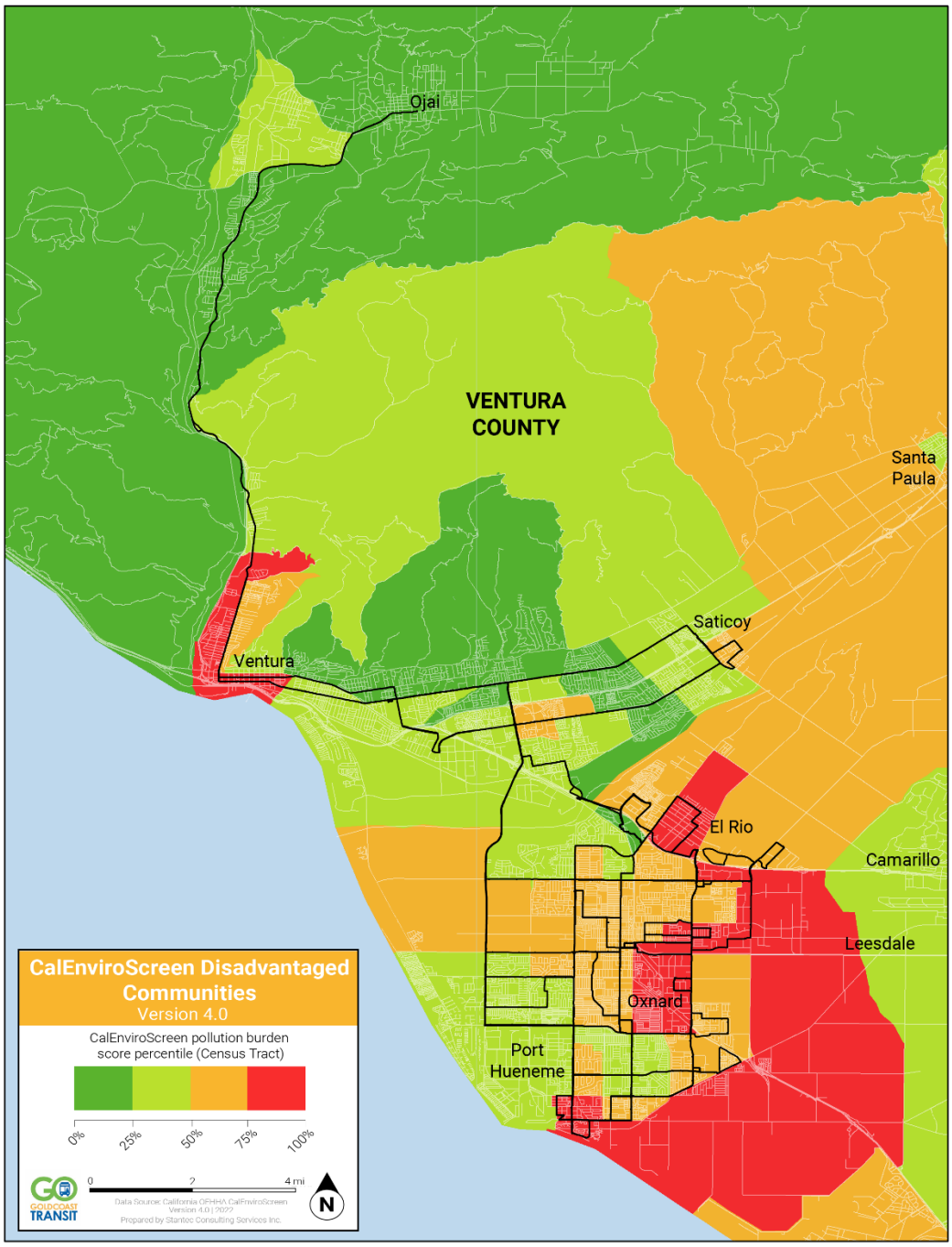



**Figure 28: CalEnviroScreen disadvantaged communities in GCTD service area**

### Table 23: Disadvantaged communities - census tracts and routes

| Census Tract ID | Community | Route(s) |
|---|---|---|
| 6111004902 | Oxnard | 2, 4A, 4B, 15, 17, 19 |
| 6111009100 | Oxnard | 2, 4A, 4B, 8, 17, 19 |
| 6111004400 | Port Hueneme | 1A, 1B, 23 |
| 6111003900 | Oxnard | 3, 7, 8 |
| 6111002300 | Ventura | 6, 16 |
| 6111002400 | Ventura | 6, 16 |
| 6111005003 | El Rio | 15, 17 |
| 6111004715 | Oxnard | 7 |

While census tracts that are considered disadvantaged are dispersed throughout the service area, there is a concentration in Oxnard (affecting routes 2, 3, 4A, 4B, 7, 8, 17, and 19). Disadvantaged communities are also seen in Ventura (affecting routes 6 and 16) and Port Hueneme (affecting routes 1A, 1B, and 23), and El Rio (affecting routes 15 and 17).

To make the biggest positive impact on disadvantaged communities in the service area, GCTD can prioritize ZEB deployment along route 17, as this route touches three different disadvantaged communities. However, GCTD can achieve this goal by deploying ZEBs first on any routes except routes 5, 10, 11, and 21, as these routes do not touch or run through any CalEnviroScreen-defined disadvantaged communities.

# 13.0 GHG IMPACTS

Based on the ZEBDecide modeling of greenhouse gas (GHG) emissions, GCTD's CNG/gasoline fleet emits ~6,300 tons of GHGs per year. Upstream GHGs related to CNG and gasoline production add another ~4,800 tons of GHGs per year for a total carbon footprint of over 11,100 tons per year (Table 24).[58]

By operating ZEBs, GCTD will be able to completely eliminate tailpipe GHGs and other harmful emissions, providing a clean, quiet ride for operators and passengers, while also eliminating emissions linked to respiratory diseases from the neighborhoods GCTD serves. Nonetheless, the current production of hydrogen does result in GHG emissions and is not a completely 'carbon-free' process. Residual GHGs resulting from the carbon-intensity of generating hydrogen through a process that is 33% green (carbon neutral) and the remainder via SMR, based on GCTD's projected hydrogen demand, can emit about 5,700 tons of GHGs per year (Table 25). Overall, however, this reduces GCTD's fleet-related GHG footprint by nearly 50% (Table 25).

**Table 24: Annual Emission in Tons of $CO_2$ per year for the GCTD fleet by service type**

| | **Zero Emissions** | | **CNG/Gasoline** | | |
|---|---|---|---|---|---|
| | **Fixed Route Fleet** | **Demand Response Fleet** | **Fixed Route Fleet** | **CNG Demand Response Fleet** | **Gasoline Demand Response Fleet** |
| Fleet tailpipe emissions (ton $CO_2$/year) | - | - | 5,627 | 394 | 284 |
| Upstream emissions (ton $CO_2$/year) | 4,960 | 732 | 3,510 | 246 | 1,044 |
| **Total Ton $CO_2$/year** | **4,960** | **732** | **9,137** | **640** | **1,329** |
| Total Ton $CO_2$/year | **5,692** | | **11,105** | | |

[58] All GHG calculations are presented in tons (not metric tons) of $CO_2$ equivalent, which is calculated using the short-term 20-year global warming potential of $CO_2$, methane, black carbon, and particulate matter.

**Table 25: Summary of Annual Emissions for the GCTD fleet**

| | **Fleet Emissions (Ton $CO_2$/year)** |
|---|---|
| FCEBs fleet | 5,692 |
| CNG/Gasoline Fleet | 11,105 |
| **Difference** | **5,414** |
| | **49%** |

As presented in Figure 29, implementing a ZEB fleet will eliminate emissions equivalent to removing 1,167 passenger vehicles per year or reducing emissions from 682 households in a year[59].

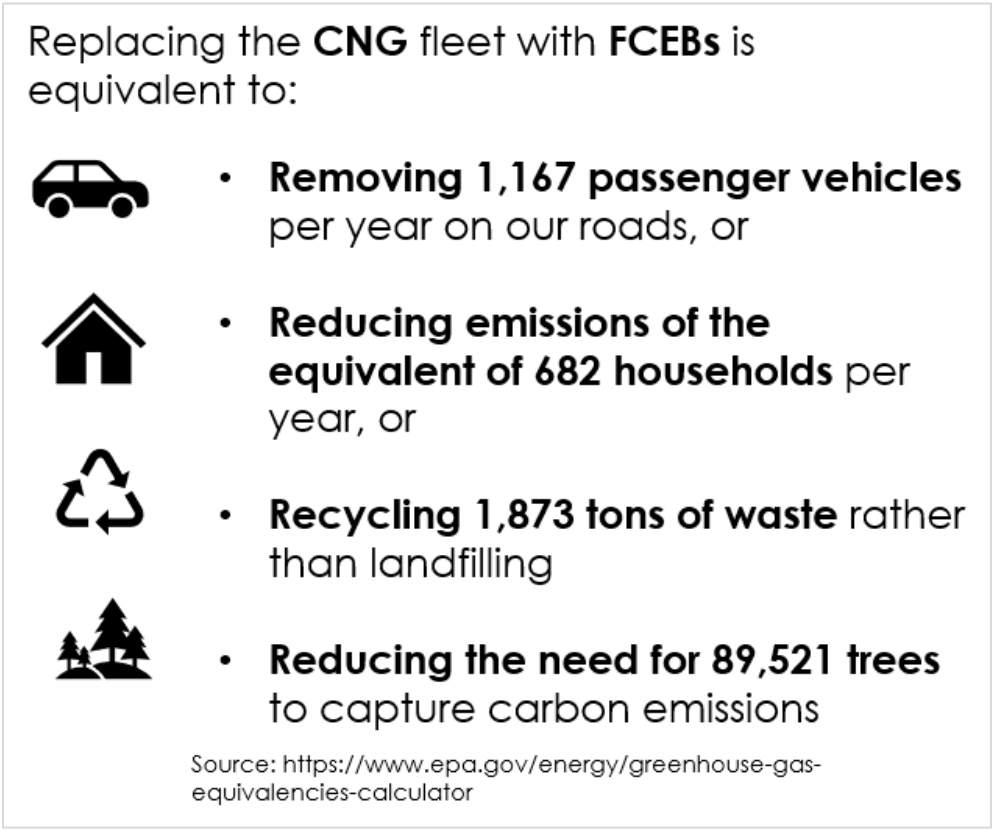



**Figure 29: Equivalent benefits of implementing a FCEB fleet at GCTD.**

[59] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

# 14.0 OTHER TRANSITION ITEMS

## 14.1 JOINT ZEB GROUP AND ASSESSMENT OF MULTI-OPERATOR VEHICLE PROCUREMENT

According to ICT regulation, transit agencies can pool resources when acquiring ZEB infrastructure if they:

- Share infrastructure
- Share the same MPO, transportation planning agency, or Air District
- Are located within the same Air Basin

The Southern California Association of Governments (SCAG) is the MPO for Ventura County and provides regional transportation funding and planning for Ventura County, Los Angeles County, Orange County, Imperial County, Riverside County, and San Bernardino County. GCTD's service area is located within the Ventura County APCD and South-Central Coast Air Basin. Table 26 lists the agencies that operate fixed route transit services within Ventura County. These agencies also are within the same air basin and air district. While GCTD could theoretically partner with any transit agency in the SCAG region, the list was limited to Ventura County due to geographic proximity and service area overlaps that could make a joint group feasible and beneficial.

**Table 26: Other bus transit agencies in Ventura County**

| Agency | Total revenue vehicles[60] | ZEB Choice | Notes |
|---|---|---|---|
| ***Gold Coast Transit District*** | ***87*** | ***Hydrogen*** | |
| Ventura County Transportation Commission[61] | 51 | TBD | ZEB plan currently underway. |
| Simi Valley Transit | 21 | BEB | 2019 SRTP notes BEBs are the likely technology option, but a full ZEB study is recommended. |
| Camarillo Area Transit | 19 | TBD | |
| Thousand Oaks Transit[62] | 38 | TBD | No ZEB plan yet, but SCAG's 2021 FTIP noted the purchase of electric vehicles by Thousand Oaks transit to replace existing buses. |
| Moorpark City Transit | 5 | TBD | |

[60] Based on NTD 2020 data.
[61] Includes both Valley Express Bus and VCTC Intercity.
[62] Also includes Kanan Shuttle and ECTA InterCity Dial-A-Ride.

| Agency | Total revenue vehicles[60] | ZEB Choice | Notes |
|---|---|---|---|
| Ojai Trolley | 6 | BEB | ZEB plan currently underway. |

While GCTD could potentially partner with any of these transit agencies to form a joint ZEB group, it would make the most sense to partner with other agencies moving forward with hydrogen as their ZEB technology choice to potentially share in the costs associated with hydrogen fueling infrastructure. As the majority of the other agencies operating in the county are small municipal agencies utilizing vehicle types with fewer hydrogen options, such as cutaways and trolleys, it might not be realistic to partner with other agencies for this reason. Nonetheless, GCTD and Ojai Trolley Service have formed a strategic partnership to collaborate with the ZEB transition in that they

Regardless of whether it makes sense to explore formation of a joint ZEB group or not, GCTD should remain in constant communication with other Ventura County agencies to understand how the agencies can work together to leverage resources and coordinate efforts on a regional level.

Another recommended strategy is developing a multi-operator vehicle procurement group. That is, GCTD could join with any of the agencies outlined above to produce common specifications for ZEBs, thus potentially driving down the purchase costs of ZEBs. Leveraging joint procurement through the CalACT/MBTA purchasing cooperative is a prudent approach, as the Cooperative offers a variety of ADA compliant vehicles like vans and cutaways; currently, ZE options are limited, however. Most judiciously, GCTD and other operators may wish to encourage OEMs to develop vehicles with longer ranges and more hydrogen options, especially vehicle types like cutaways and vans.

## 14.2 CONSIDERATIONS FOR PARTNERSHIPS

As other transit partners in the region are developing their own ZEB plans and rollout strategies, there are opportunities for partnership that can benefit all parties and help to facilitate seamless regional ZEB infrastructure. With this in mind, GCTD's hydrogen fueling station was designed to serve regional partners. For example, VCTC Intercity vehicles that travel through western Ventura County would be able to refuel at GCTD's hydrogen fueling station. VCTC is currently in the process of developing its own ZEB plan, and this opportunity will be explored in greater detail as that plan progresses. GCTD can also explore more ways to collaborate with its regional transit partners, such as exploring joint grant opportunities for ZEB vehicles and infrastructure.

## 14.3 CHANGE MANAGEMENT

Because the ZEB transition and implementation is an agencywide endeavor that also includes the need to actively consider utilities as a stakeholder and partner, an agencywide approach to the rollout is required. Additionally, the union representing the bus operators and maintenance technicians should also be included due to the large role they will play in the success of the ZEB transition and implementation. Thus, it is prudent for GCTD to form a steering committee or task force composed of staff from each major functional department and union representation to help ensure the impact of ZEBs

are considered for each. Using the rollout plan as a guide, the task force can develop action items, performance indicators, and risk assessments. The task force should also name a leader who acts as a champion for the ZEB conversion within the agency and to external stakeholders. Communication will be critical during the transition to ensure customers are made aware of potential disruptions and changes to bus operations. ZEB conversion also offers an excellent marketing opportunity for GCTD to promote its climate commitments.

# 15.0 PHASING AND IMPLEMENTATION

Table 27 provides an overview of the phasing plan for GCTD's ZEB rollout strategy. Note that expenses are in the year of cost incurred. See Table 9 for more details regarding the fleet replacement schedule.

**Table 27: ZEB implementation phasing plan, FY2023-2040**

| Year | Construction – maintenance facility | Fixed-Route ZEB Fleet Procurements | Demand Response ZE Fleet Procurements | Training: operators, maintenance staff, technicians | Training - other | Capital expenses (2022$) | O&M expenses (2022$) | Total expenses (2022$) |
|---|---|---|---|---|---|---|---|---|
| FY2023 | Construct and install hydrogen fueling equipment for high and low pressure refueling (H35 and H70).<br>Installation of hydrogen gas detection system in maintenance bays and upgrade of ventilation system. | 0 35-ft<br>5 40-ft | 6 vans & cutaways | Tier 1 & tier 3 OEM training | Tier 1 OEM training for all other staff | $16,646,000 | $5,196,000 | $21,842,000 |
| FY2024 | | 0 35-ft<br>0 40-ft | 7 vans & cutaways | Annual refreshers | No activity | $3,448,000 | $4,808,000 | $8,256,000 |
| FY2025 | | 0 35-ft<br>0 40-ft | 2 vans & cutaways | Annual refreshers | Local fire and emergency response department introduction to new technology | $1,899,000 | $4,559,000 | $6,458,000 |
| FY2026 | | 0 35-ft<br>2 40-ft | 8 vans & cutaways | Annual refreshers | No activity | $4,821,000 | $4,236,000 | $9,057,000 |
| FY2027 | | 2 35-ft<br>0 40-ft | 0 vans & cutaways | Annual refreshers | Local fire and emergency response department introduction to new technology | $3,989,000 | $3,979,000 | $7,968,000 |
| FY2028 | | 0 35-ft<br>2 40-ft | 5 vans & cutaways | Annual refreshers | No activity | $4,824,000 | $3,707,000 | $8,531,000 |
| FY2029 | | 0 35-ft<br>5 40-ft | 0 vans & cutaways | Annual refreshers | Local fire and emergency response department introduction to new technology | $3,401,000 | $3,513,000 | $6,914,000 |

| Year | Construction – maintenance facility | Fixed-Route ZEB Fleet Procurements | Demand Response ZE Fleet Procurements | Training: operators, maintenance staff, technicians | Training - other | Capital expenses (2022$) | O&M expenses (2022$) | Total expenses (2022$) |
|---|---|---|---|---|---|---|---|---|
| FY2030 | | 0 35-ft<br>2 40-ft | 10 vans & cutaways | Tier 1 & tier 3 OEM training for new staff | Tier 1 OEM training for all other staff | $2,503,000 | $3,443,000 | $5,946,000 |
| FY2031 | | 0 35-ft<br>5 40-ft | 7 vans & cutaways | Annual refreshers | No activity | $3,805,000 | $3,297,000 | $7,102,000 |
| FY2032 | | 0 35 -ft<br>4 40-ft | 2 vans & cutaways | Tier 1 & tier 3 OEM training for new staff | Tier 1 OEM training for all other staff | $2,517,000 | $3,259,000 | $5,776,000 |
| FY2033 | | 0 35-ft<br>4 40-ft | 8 vans & cutaways | Tier 1 & tier 3 OEM training for new staff | Tier 1 OEM training for all other staff | $3,008,000 | $3,111,000 | $6,119,000 |
| FY2034 | | 0 35-ft<br>7 40-ft | 0 vans & cutaways | Annual refreshers | Local fire and emergency response department training on new technology | $3,628,000 | $2,948,000 | $6,576,000 |
| FY2035 | | 0 35-ft<br>6 40-ft | 5 vans & cutaways | Annual refreshers | No activity | $3,461,000 | $2,787,000 | $6,248,000 |
| FY2036 | | 0 35-ft<br>6 40-ft | 0 vans & cutaways | Annual refreshers | Local fire and emergency response department training on new technology | $2,794,000 | $2,626,000 | $5,420,000 |
| FY2037 | | 0 35-ft<br>6 40-ft | 10 vans & cutaways | Annual refreshers | No activity | $3,568,000 | $2,468,000 | $6,036,000 |
| FY2038 | | 0 35-ft<br>6 40-ft | 7 vans & cutaways | Tier 1 & tier 3 OEM training for new staff | Tier 1 OEM training for all other staff | $3,133,000 | $2,384,000 | $5,517,000 |
| FY2039 | | 8 35-ft<br>0 40-ft | 2 vans & cutaways | Annual refreshers | No activity | $3,123,000 | $2,252,000 | $5,375,000 |
| FY2040 | | 0 35-ft<br>8 40-ft | 8 vans & cutaways | Annual refreshers | Local fire and emergency response department training on new technology | $3,694,000 | $2,128,000 | $5,822,000 |

# APPENDIX A: MEMO—INFRASTRUCTURE OPTIONS FOR DIFFERENT HYDROGEN FUELING ARRANGEMENTS

Stantec

# Memo

| | | | |
|---|---|---|---|
| To: | James Beck<br>Gold Coast Transit District | From: | Reb Guthrie<br>Faye Farahmand<br>Analy Castillo<br>David Verbich<br>Los Angeles |
| Project/File: | GCTD ZEB Rollout Plan<br>2073016250 | Date: | May 26, 2022 |

**Reference: Infrastructure options for supplying and generating hydrogen fuel to a new hydrogen bus-fueling facility at the GCTD Facility**

# 1 Background

As Gold Coast Transit District (GCTD) plans a transition from a compressed natural gas (CNG) bus fleet to a fleet of hydrogen fuel cell-electric buses (FCEBs), the appropriate mode of providing the hydrogen fuel to the GCTD facility and its full FCEB fleet needs to be established.

The approach deployed at peer agencies with similar fleet sizes is to use liquid hydrogen (LH2) that is trucked to the site and stored in an aboveground cryogenic tank, and is the approach recommended and assumed to be baseline for the purpose of this memorandum. Another possible approach to supply hydrogen for use by the FCEBs is by producing the needed hydrogen on-site using water electrolysis. However, given the greater level of complexity, space requirements, maintenance requirements, extensive utility interconnects and concerns about system reliability that are associated with on-site hydrogen production via electrolysis, a hybrid approach is considered here (i.e., trucked LH2 supplemented by a portion of onsite electrolysis) as a comparison to the baseline.

Therefore, this report will analyze two possible scenarios for providing hydrogen to GCTD's new hydrogen facility, which are summarized as follows:

1. Trucked-in liquified hydrogen (LH2 Only)
2. Trucked-in liquified hydrogen at same capacity as in scenario 1 with supplemental (25%-35%) onsite hydrogen generation via electrolysis (LH2 + Electrolysis)

The assessment of both models will be sized to accommodate GCTD's eventual full FCEB fleet of 87 FCEBs, potential fueling from buses operated by the Ventura County Transportation Commission (VCTC), as well as a small portion for future public fueling of light-duty hydrogen vehicles, since it would be in the County's interest to maximize the use of its investment in infrastructure.

The LH2 + Electrolysis scenario has the benefits of improving resiliency of hydrogen-commodity supply and partially protecting against supply interruptions, as well as possibly reducing hydrogen-commodity costs. However, since the underlying LH2-based system would be sized and configured to meet 100% of the GCTD's and VCTC's hydrogen needs, any issues related to reliability of the supplemental electrolysis system would not weaken the underlying capacity or overall ability of the core hydrogen-fueling system to meet both agencies' needs. Further, the limited nature of the onsite production capacity in relation to the total daily demand would proportionally reduce the concerns for space and utility (electrical power) that would be needed if the full (100%) facility demand were otherwise to be provided by the onsite generation system. Additionally, the high electrical power requirements for a '100%' on-site electrolysis could only be fractionally met by photovoltaic power and associated PV battery-storage system planned for the GCTD facility. Conversely, the more modest power needs of an electrolysis system that is only supplemental in nature will allow the capacity of the PV system be more proportionally matched to the electrolysis-generated power load.

Stantec conducted bus predictive modeling for the fleet of 86 vehicles and estimates the hydrogen demand for the GCTD's fleet. The hydrogen demand for the VCTC vehicles, if this fleet where transition to hydrogen vehicles, was calculated at 1,338 kg per day for VCTC commuter fleet[1]. Furthermore, a capacity of 60 kg/day was assumed for public fueling if GCTD decides to open its station to the public. A summary of the total hydrogen demand for the site is presented in the Table 1 below; the total estimated hydrogen fuel demand at GCTD's facility will be about 2,463 kg/day.

Table 1: GCTD's Hydrogen demand

| **Agency** | **Item Description** | **40-ft and 35-ft Buses** | **Cutaways and Vans** |
|---|---|---|---|
| GCTD | Total vehicles in fleet | 64 (4 contingency) | 27 |
| | No. of active vehicles | 60 | 26 |
| | Avg. H2 demand per vehicle (kg/day/vehicle) | 15.5 | 8.5 |
| | Total H2 demand for active vehicles (kg/day/fleet) | 885 | 180 |
| | Total GCTD Fleet Hydrogen Demand (kg/day/fleet) | 1,065 | |
| VCTC | Total VCTC Fleet Hydrogen Demand (kg/day/fleet) | 1,338 | |
| Public | Public Fueling (6 kg / fill x 10 fills / day) | 60 | |
| Total Facility Hydrogen Demand (kg/day/fleet) | | **2,463** | |

[1] Based on high level assumptions using VCTC mileage data.

# 2 Option 1 – Trucked-In Liquified Hydrogen

## 2.1 Summary Description

LH2 will be delivered to the facility in loads of roughly 8,000-12,000 gallons, pending sizes of delivery tankers and then will be stored in a horizontal 18,000-gallon (4,822 kg[2]) cryogenic storage tank. Assuming 90% usable tank capacity (16,200 gallons or 4,340 kg) and a facility demand of 2,463 kg per day, the tank capacity will last 1.8 days, which equates to about four hydrogen fuel deliveries per week. Note that if two 12,000-gallon tank is used instead, the usable capacity would be 21,600 gallons or 5,787 kg, which would last up to 2.5 days, which would increase the reserve days until empty to 2.5 days.

The liquid will be fed from the tank to the high-pressure reciprocating cryogenic pumps at high pressure (450+ bar). The system will have four total reciprocating pumps with any two running and one acting as a rotating spare for large vehicle refueling at lower pressure—350 bar (also known as H35)—plus the fourth pump dedicated to refueling at higher pressure—700 bar (also known as H70)—that will be used for smaller vehicles like vans, cutaways or other light-duty vehicles. The buses and dispenser nozzles will both be equipped with high-flow nozzles that will allow fill rates of up to 7.2 kg/minute (when available from buffer contribution), but the nominal or rated flow will be 3.9 kg/minute, based on LH2-pump discharge.

The pump discharge would then be routed to ambient-air vaporizers or heat exchangers, where the high-pressure liquid will be warmed to atmospheric temperature. The high-pressure gaseous hydrogen (GH2) is then routed to a priority-valve panel that will automatically direct the GH2 to either the hydrogen dispensers or to an array of high-pressure GH2 buffer-storage vessels that will accumulate pump discharge during the brief period between bus fills at the dispensers. Once there is no demand at the dispensers and the buffer vessels are full, the pumps will automatically turn off.

Two dispensers will provide ‘H35’ (350 bar or 5,076 PSI[3]) GH2 to the buses and one dispenser will provide ‘H70’ (700 bar or 10,000 PSI) to cutaways and vans. The dispensers will be located in the existing service lanes and will be connected to the existing terminals in their respective lanes.

Lastly, prior to dispensing, the hydrogen gas is chilled to compensate for the heat of compression that occurs in the onboard storage cylinders during filling. Some dispensers include a chiller function, while other configurations rely on an external pre-chiller.

[2] One gallon of liquid hydrogen equals 0.2679 kg.

[3] 1 bar is equal to 1 atmosphere of pressure at mean sea level or 14.504 PSI.

## 2.2 Equipment Requirements

An equipment compound for liquified hydrogen-based system includes the following main components:

- 18,000-gal (4,822 kg) LH2 storage tank configured horizontally (Note: Vertical tanks are available and are more space efficient, but they are more costly due to added structural bracing required. Additionally, the footers supporting the tank would need to be substantially deeper and larger, further increasing costs. Vertical tanks may be considered at a future point). Approximate dimensions: 43-ft. long x 11-ft. diameter
- (3) reciprocating LH2 pumps for H35 (any two operating with the other configured as a rotating spare)
- (1) reciprocating LH2 pump for H70
- (3) ambient-air heat-exchanger towers (also called dispensing vaporizers) for warming LH2 from pump discharge
- Warming vaporizer for generating transfer pressure at delivery truck
- (6) cylindrical high-pressure storage vessels for H35 (two stacks of three vessels)
- (2) cylindrical high-pressure storage vessels for H70 (two stacks' vessels)
- Priority valve panel
- 480V electrical power-distribution panelboard and programmable logic control (PLC) panel sized for approximately 400A (each of the running pump motors will draw about 90A, with the remaining loads being modest)
- Air compressor system
- Main service panelboard
- Motor-starter panelboard for powering four pumps
- System control panel

## 2.3 Space Requirements

The area needed to accommodate the main equipment—including the equipment listed above and accounting for a demising wall around the electrical equipment—is about 3,200-3,600 square feet. Depending on nature of other demising walls around the perimeter of the compound, setbacks of up to 40

ft. from the equipment to property lines and buildings may be required. Also, no vehicle parking is allowed within 25 ft. of the compound.

## 2.4 Utility Requirements

Given the low amount of electrical energy needed to operate the baseline LH2-only facility, it is likely that all of the power needs for the system could be met by the existing power system. Assuming a total running load of 175 HP (about 129 kW) with a nightly operating window of 8 hours, the station would have a demand of about 129 kW and a daily energy usage of about 132 kWh.

Aside from Internet connectivity—either via cellular modem or via GCTD's IP data network—no other utility connections are required.

## 2.5 Key Considerations

- Possible requirement to enter into long-term LH2-supply agreements (as preferred or required by some industrial-gas vendors). However, this may be less of a limitation in the future with an expanding network of liquid hydrogen producers and distributors including Plug Power and the emergence of Chart Industries as a new hydrogen liquefier/supplier.
- Supply resiliency, as supply disruptions as have been experienced at some light-duty hydrogen-fueling stations in California. Simply put, if the delivery truck fails to arrive on time, the supply chain and facility operation are interrupted. This is expected to improve in the near- and medium-term future as hydrogen production (including 'green' hydrogen with low carbon intensity) is expected to improve.
- The cost of LH2 commodity delivered to the site (currently estimated at $7.50-$8.50/kg) will likely be higher than if produced onsite, though LH2-commodity prices are expected to gradually fall over time (some industry projections suggest the cost could fall below $5/kg). However, this price uncertainty can be complex since an increased production is generally expected to reduce cost, demand will also rise some, so the ultimate relationship between the two forces is unclear.
- Product boiloff[4] occurs at about 0.5% to 1% of consumption. While is technically possible to capture and compress this gas, it would require a dedicated compressor that would likely cost as much to amortize and maintain as the boiloff hydrogen, and thus is not recommended.

[4] Hydrogen boiloff gas (BOG) is produced when a small percentage of the cryogenic liquid unavoidably heats up and reach its boiling point (above -420°F) after a prolonged period of time in the storage tanks, or when transported over long distances.

## 2.6 Key Benefits

- The energy required to pump and dispense is relatively low (less than 0.5 kWh/kg).
- The area required for a given flow capacity is considerably less than that of comparable systems using on-site GH2 production.
- Regional production of LH2 in California will greatly improve resiliency and should result in lower commodity costs, though the actual degree of cost reduction will be determined per market conditions.
- A reciprocating LH2 pump system requires minimal need for on-site high-pressure storage vessels. Only six total vessels configured as three banks of storage are needed, roughly similar to that of a comparable CNG-fueling system.
- The 'warm end' (connected to the drive motor and belt) of the reciprocating cryogenic pump has a long-life expectancy and the 'cold end' (cylinder and piston) part of pump is easily replaceable in about two hours. Cold-end spares can be maintained on-site or elsewhere locally.
- The ambient-heat exchangers needed to warm the cryogenic hydrogen up to above -20°F for storage are simple, solid-state devices with no moving parts. The periodic nature of bus fueling allows for the heat exchanges to defrost daily (they often accumulate a thick frost layer due to contact with ambient humidity), so redundancy is not required.
- Relatively speaking, the entire system is simple, compact and easy to maintain.
- The system is expandable with the addition of more pumps, heat exchangers and dispensers if the FCEB fleet grows and demand grows.

## 2.7 Equipment Costs

The preliminary cost estimate (in 2022$) in *Table 2* for Option 1 is based on the direct costs for primary equipment required for the system. However, the bottom line of this estimate does include additional capex costs for construction, site materials, piping, wiring, and foundations, as well as escalations and contractor markups. This amount should also include costs for dispensing equipment, which are assumed to be uniform across the two options considered in this memo and therefore are not otherwise listed in the below table.

Table 2: Equipment costs for system using trucked-in liquified hydrogen

| Item | Qty. | $ Unit ROM | $ Extended |
|---|---|---|---|
| Liquified 18,000-gal hydrogen tank | 1 | $1,100,000.00 | $1,100,000.00 |
| Reciprocating LH2 pumps for H35 | 3 | $180,000.00 | $540,000.00 |
| Reciprocating LH2 pump for H70 | 1 | $198,000.00 | $198,000.00 |
| Hydrogen vaporizers for H35 | 2 | $110,000.00 | $220,000.00 |
| Hydrogen vaporizers for H70 | 1 | $125,000.00 | $125,000.00 |
| Hydrogen vaporizer for pressure building | 1 | $90,000.00 | $90,000.00 |
| Priority valve panel | 1 | $100,000.00 | $100,000.00 |
| High pressure GH2 storage vessels | 8 | $40,000.00 | $320,000.00 |
| Air compressor system | 1 | $9,000.00 | $9,000.00 |
| Main service AC Power panelboard | 1 | $50,000.00 | $50,000.00 |
| Duplex motor starter panelboard (pumps) | 2 | $50,000.00 | $100,000.00 |
| System control panel | 1 | $60,000.00 | $60,000.00 |
| **Total (equipment only without markups)** | | | **$2,912,000.00** |
| **Total CAPEX (with markups and site construction; see appendix for backup)** | | | **$7,429,309.00** |

# 3 Option 2 – LH2 Plus Augmentation with On-site Hydrogen Production via Electrolysis

## 3.1 Summary Description

The addition of an on-site augmentation system for hydrogen production via electrolysis will have four principal elements to be added to the baseline system as follows: one electrolyzer package (with integrated DC-power inverter), one high-pressure GH2 compressor to compress the GH2 produced by the electrolyzer, a high-pressure GH2 storage array, and a large power-feeder upgrade needed to power the electrolyzer. Two secondary components will be a water supply with deionizer and a suction-buffer vessel between the discharge of the electrolyzer and the compressor inlet, as needed to even out variations of output and suction rates of the electrolyzer and compressor respectively.

The GH2-storage array and compressors are to be sized as needed to sequester GH2 output from electrolyzer during the approximately 16 hours that it will be producing GH2 but when no FCEB will be fueled. The storage array should be somewhat oversized so that it can be sure to accommodate and absorb all of the hydrogen produced by the electrolyzer, such as if the start of FCEB fueling is delayed during a given evening.

The priority-valve panel specified in the baseline system would need inlets for contribution of pre-compressed GH2 that is stored in the '16-hour' array referenced above, as well as the direct-compressor discharge coming from the electrolyzer output during the 8-hour fueling window.

## 3.2 Equipment & Area Requirements

A summary description of the added equipment needed for electrolysis-augmentation subsystem is provided below:

a. Electrolyzer package
   - Reference Nel model MC250
   - GH2 output: 531 kg / 24 hrs (hourly: 246 $m^3$, 9,353 SCF or 22.1 kg; = 156 SCFM)
   - Output pressure: 435 PSIG
   - Input electrical power: 1.25 MW
   - Input electrical energy: 50.4 kWh / kg (26,762 kWh / 24 hrs)
   - Input water: 4.25 gal / kg (2,257 gal / 24 hrs)

b. Hydrogen gas compressor skid
   - Reference PDC model 500b or similar
   - 6,000 PSI discharge pressure, sized to match electrolyzer output of ~ 156 SCFM (note that one unit is adequate to meet the functional requirement for flow; a second unit may be considered as a rotating backup)
   - Hybrid trunk-piston compressor driving multi-stage diaphragm compression units
   - Approx. 75 HP electric-motor drive

c. Storage-vessel array
   - 32 total vessels, arranged in 8 sets of 4 (stacked) vessels
   - 14,600 SCF capacity per vessel
   - Gross capacity of 467,200 SCF (assumes usable or working volume of about 33%)

d. AC power upgrade feeder for 1,600 A at 480 V circuit needed to power 1.25 MW electrolyzer and 75 HP GH2 compressor skid

e. Secondary equipment:
   - Intermediate buffer vessel—approximately 1,000-gal (water) capacity, 750 PSI MAWP
   - Water deionizer / purification system

f. Solar PV array
   - Module DC Nameplate 1,740 kW (approximately 3,222 modules assumed to be ground mounted)
   - Inverter AC Nameplate 1,460 kW
   - Annual Production of 2.612 GWh (average)
   - 1,501 kWh/kWp

## 3.3 Space Requirements

The additional area needed to accommodate the equipment listed above is about 35’ x 100’ (an additional 3,500 square feet to the 3,600 square feet for the LH2 equipment). The code offsets referenced in the description of the baseline system apply similarly to the electrolysis-augmentation subsystem as well.

The full solar PV array was assumed to be allocated in the vacant land adjacent to the GCTD facility and will approximately take a footprint of 96,000 square feet (2 acres of land).

## 3.4 Utility Requirements

As described above, the added utility requirements are about 1,600A of 480V 3-phase electrical service. While the intent is to use PV power for this system as much as possible, the station should have 100% utility power available to ensure maximum operational capability and reliability. Additionally, a domestic water-supply line of 1” will be needed and a commercial-grade water deionizer will also be required. Since electrolysis system requires deionized water, it will generate industrial waste that may require coordination with the County for disposal.

Additionally, the system requires network connection for transfer of data and communication for control and monitoring.

## 3.5 Key Considerations

- Added capital cost.
- Larger area requirement, requiring about 3,500 square feet more area vs.LH2 only.
- Expenses for the added electrical power capacity to the site to produce hydrogen via electrolysis
- Low GH2-discharge pressure (for compressor inlet) at ~ 0 PSIG for alkali systems, though PEM systems (as assumed in this analysis) have a skid-discharge pressure of just over 400 PSIG.
- Dependence on purified water and need for deionizing (or reverse osmosis) systems. The actual demand for water may be 1.5 to 2x the process water demand. The local water impurities and the local ground water (EPA) requirements will dictate the actual water cost.
- High maintenance labor and cost for compressors and electrolyzer system (due to the complex electrolyzer, GH2 compressor skid and storage vessels with many relief valves etc.).

## 3.6 Key Benefits

- The most attractive benefit of an electrolysis-based hydrogen system is the potential ability to power the system with a portion of renewably sourced electrical energy, such as from solar. However, in practice, owner-operated renewable electrical power generation currently has limitations, including space and cost effectiveness.

- Added resiliency of hydrogen-commodity supply. The 531 kg provided per day from the electrolyzer is about 22% of the 2,463 kg of total daily hydrogen demand. While far short of the full daily demand, it is a meaningful contribution and can allow deployment of at least some high-priority dispatches and otherwise provide a bridge for any delayed LH2 deliveries to the baseline station.

- The commodity cost for the hydrogen produced by the electrolyzer-based subsystem is expected to be lower than the cost of delivered LH2 (pending detailed analysis of electric power costs and determination of operating costs associated with the PV and battery-storage system).

- GCTD would likely enjoy some benefit through positive marketing and messaging from being able to advertise on-site and ‘green’ GH2 production (to the extent that on-site PV or green-purchased electricity are used).

## 3.7 Equipment Costs

The preliminary cost estimate (in 2022 dollars) in Table 3 for Option 2 is based on the direct costs for primary equipment required for the system. However, the bottom line of this estimate does include additional capex costs for construction, site materials, piping, wiring, and foundations, as well as escalations and contractor markups. This amount should also include costs for dispensing equipment, which are assumed to be uniform across the two options and therefore are not otherwise listed in the below table.

Table 3: Equipment costs LH2+ onsite electrolysis

| Item | Qty. | $ Unit ROM | $ Extended |
|---|---|---|---|
| Liquified 18,000-gal hydrogen tank | 1 | $1,100,000.00 | $1,100,000.00 |
| Reciprocating LH2 pumps for H35 | 3 | $180,000.00 | $540,000.00 |
| Reciprocating LH2 pump for H70 | 1 | $198,000.00 | $198,000.00 |
| Hydrogen vaporizers for H35 | 2 | $110,000.00 | $220,000.00 |
| Hydrogen vaporizers for H70 | 1 | $125,000.00 | $125,000.00 |
| Hydrogen vaporizer for pressure building | 1 | $90,000.00 | $90,000.00 |
| Priority valve panel | 1 | $100,000.00 | $100,000.00 |
| High pressure GH2 storage vessels | 8 | $40,000.00 | $320,000.00 |
| Air compressor system | 1 | $9,000.00 | $9,000.00 |
| Duplex motor starter panelboard (pumps) | 2 | $50,000.00 | $100,000.00 |
| System control panel | 1 | $60,000.00 | $60,000.00 |
| Electrolyzer Package | 1 | $975,000.00 | $975,000.00 |
| Hydrogen gas compressor Skid | 1 | $375,000.00 | $375,000.00 |
| Storage-vessel array (32 vessels) | 32 | $40,000.00 | $1,280,000.00 |
| AC Power upgrade feeder for 1,600A | 1 | $100,000.00 | $100,000.00 |
| Intermediate buffer vessel | 1 | $60,000.00 | $60,000.00 |
| Water service & deionizer/purification | 1 | $10,000.00 | $10,000.00 |
| PV system (KW) | 1 | $4,000,000.00 | $4,000,000.00 |
| **Total (equipment only without markups)** | | | **$9,662,000.00** |
| **Total CAPEX (with markups and site construction; see appendix for backup)** | | | **$24,650,406.02** |

# 4 Life Cycle Cost Analysis and Comparison

Data and calculations indicating the quantity of hydrogen fuel needed per day and per month are provided in Table 4 below. Notes and assumptions are: 1) Spare FCEB have no hydrogen demand. 2) The average demand may be greater if a significant number of coach buses are implemented. 3) Usage assumes no reduced consumption for weekend days.

**Reference: Infrastructure Options for Supplying and Generating Hydrogen Fuel**

Table 4: Fleet data and hydrogen demand

| Agency | Item Description | 40-ft and 35-ft Buses | Cutaways and Vans |
|---|---|---|---|
| GCTD | Total vehicles in fleet | 64 | 27 |
| | No. of active vehicles | 60 | 26 |
| | Avg. H2 demand per vehicle (kg/day/vehicle) | 15.5 | 8.5 |
| | Total H2 demand for active vehicles (kg/day/fleet) | 885 | 180 |
| | Total GCTD Fleet Hydrogen Demand (kg/day/fleet) | 1,065 | |
| VCTC | Total VCTC Fleet Hydrogen Demand (kg/day/fleet) | 1,338 | |
| Public | Public Fueling (6 kg / fill x 10 fills / day) | 60 | |
| Total Facility Hydrogen Demand (kg/day/fleet) | | **2,463** | |

Data and calculations for the quantities of input utilities and commodities on a unit basis are provided in Table 5. Notes and assumptions are: 1) SCE (Southern California Edison) tariff has multiple demand and energy rates and are approximated here as a single rate. 2) Costs are good faith estimates and may vary. 3) Costs include maintenance of associated hydrogen-gas compressors required for these systems. 4) This does not include 50¢ per gallon Federal tax credit for liquid hydrogen, which has expired but may be reinstated (https://afdc.energy.gov/laws/319).

It was assumed that all energy needed to run the electrolyzer will be provided by an on-site solar PV energy. Any surplus generation of solar PV energy was assumed to be wasted since future opportunities to sell back to the grid are becoming less and less encouraged by the utilities. Furthermore, for the basis of this analysis, the cost of PV electricity to power the electrolyzer was assumed to be only accounted by the capital investment of the PV panels.

**Reference: Infrastructure Options for Supplying and Generating Hydrogen Fuel**

Table 5: Input costs for utilities, commodities, and maintenance[5]

| Description | Cost |
|---|---|
| Water ($/Gal) | $0.005 |
| Power Demand chargers ($/kW) | $14.50 |
| Electric Energy from Gid ($/kWh) | $0.12 |
| Electric Energy from Solar PV ($/kWh) | $0.00 |
| Liquid Hydrogen Commodity ($/kg) | $7.50 |
| Liquid Hydrogen-Facility Maintenance ($/kg) | $0.50 |
| Electrolysis-Facility Maintenance ($/kg) | $2.32 |

Data and calculations indicating the quantities of input utilities and commodities as required to produce hydrogen fuel on a per-kg basis for each of the two options are provided in Table 6.

Table 6: Utility consumption per unit of hydrogen[6]

| | Consumption per kg Hydrogen (*x*/kg) | | |
|---|---|---|---|
| **Utility** | **Unit** | **Option 1 LH2** | **Option 2 LH2 + Electrolysis** |
| Water | Gal/kg | 0 | 5.24 |
| Energy from Grid (kWh) | kWh/kg | 0.32 | 0.32 |
| Energy from Solar PV (kWh) | kWh/kg | N/A | 50.4 |
| LH2 Commodity by truck | kg | 1 | 0.78 |
| Maintenance Allowance | $/kg | 0.50 | 2.32 |

Data and calculations indicating the quantities of utility commodities consumed for each of the two options on a monthly basis are provided in Table 7.

[5] Based on current hydrogen prices for transit agencies in Southern California.
[6] The energy generation of solar PV onsite would only allow for approx. 22% of onsite hydrogen generation, the rest would be procured via tub trucks of liquid hydrogen delivery (LH2).

**Reference: Infrastructure Options for Supplying and Generating Hydrogen Fuel**

Table 7: Utility consumption per month

| Utility | Monthly Utility Consumption | | |
|---|---|---|---|
| | Unit | Option 1 LH2 | Option 2 LH2 + Electrolysis |
| Water | Gal/Month | 0 | 85,213 |
| Energy from Grid (kWh) | kWh/Month | 23,911 | 18,650 |
| Energy from Solar PV (kWh) | kWh/Month | 0 | 819,292 |
| Power Demand | kW | 91 | 1,250 |

Data and calculations indicating the quantities of utility commodities consumed for each of the three options on an annual basis are provided in Table 8.

Table 8: Utility consumption per year

| Utility | Yearly Utility Consumption | | |
|---|---|---|---|
| | Unit | Option 1 LH2 | Option 2 LH2 + Electrolysis |
| Water | Gal/Year | 0 | 2,556,387 |
| Energy from Grid (kWh) | MWh/Year | 717,324 | 560 |
| Energy from Solar PV (kWh) | MWh/Year | 0 | 24,579 |
| Power Demand | kW | 91 | 1,250 |

Data and calculations indicating the operating expenses (Opex) for each of the two options are provided in Table 9. Notes and assumptions are: 1) The operating costs are assumed to extend for 12 years, as needed to match the minimum asset life of bus rolling stock per FTA requirements. 2) the 12-year costs are straight extrapolation of current-year maintenance costs and are not discounted per time value of money.

Table 9: Operating costs

| Opex Estimates | | | |
|---|---|---|---|
| **Utility or Commodity** | **Unit** | **Option 1 LH2** | **Option 2 LH2 + Electrolysis** |
| Water | $/month | $0 | $426 |
| Power Chargers (kW) | $/month | $1,320 | $18,125 |
| Energy from Grid (kWh) | $/month | $2,869 | $2,238 |
| Energy from Solar PV (kWh) | $/month | $0 | $0 |
| LH2 Commodity | $/month | $554,175 | $432,257 |
| Maintenance Allowance | $/month | $36,945 | $66,531 |
| Solar PV Maintenance Cost | $/month | $0 | $3,333 |
| **Total Unit Operating Cost** | **$/kg** | **$8** | **$7** |
| **Monthly Operating Cost** | **$/month** | **$595,309** | **$522,910** |
| **Lifetime Operating Cost** | **$/12 Yrs.** | **$85,724,467** | **$75,298,969** |

Data and calculations indicating the combined costs for equipment costs (Capex), Opex and combined life cycle cost analysis (LCA) for each of the two options are provided in Table 10. Notes and assumptions are: 1) These costs are per the totals in the body of the report respectively, 2) as indicated in Table 9, the operating costs do not reflect any discounting for the time value of money, 3) 12 years reflects the minimum operating duration for a bus purchased with FTA funding.

Table 10: Summary costs for Capex, Opex, and Lifecycle Cost Estimates

| Summary Capex, Opex and Life Cycle Cost Estimates | | | |
|---|---|---|---|
| **Item** | **Unit** | **Option 1 LH2** | **Option 2 LH2 + Electrolysis** |
| Equipment Capex | $ | $7,429,309 | $24,650,406 |
| Lifetime Operating Cost (simple) | $/12 Yrs. | $85,724,467 | $75,298,969 |
| **Lifecycle Cost** | **$** | **$93,153,776** | **$99,949,375** |

# 5 Summary and discussion

In summary, Option 2 (LH2 + on-site electrolysis) has a higher cost of $6.8 million over a 12-year lifetime when compared to using trucked-in LH2, a 7% increase. Furthermore, an additional 36,000 square foot of area is required to accommodate the electrolysis equipment that may be a challenge to implement at the current GCTD facility. Lastly, a sensitivity analysis was conducted and determined that a unit price greater than **$10.50 per kg**[7] for the hydrogen commodity to be paid at delivery would be the breaking point to make Option 2 with on-site electrolysis economically viable and preferrable over a purely trucked-in LH2 solution.

Additionally, GCTD must consider the feasibility of increasing the current power capacity at their facility in coordination with SCE since an upgrade to at least 1.5 MW would be required for electrolysis. For the purposes of this analysis, it was assumed that no cost would be passed on to GCTD for the utility upgrade to a 1.5-MW capacity. However, up to half a million dollars could be the price increase if SCE passes on the capital upgrade costs to GCTD. Additionally, the lead time for installation could be on the order to 10 to 18 months. Moreover, the large quantities of water needed (as well as the need to deionize the water) may be a significant expense and limiting factor given the trends of increasing draughts throughout Southern California.

Lastly, for the purposes of this analysis, the allocation of the solar PV system was assumed to be located in the empty lots in the vicinity of GCTD's facilities, but the cost of land or leasing fees were not considered here. The feasibility of having approximately 2 acres of land to install solar panels can prove to be a heavy constraint in the implementation of Option 2.

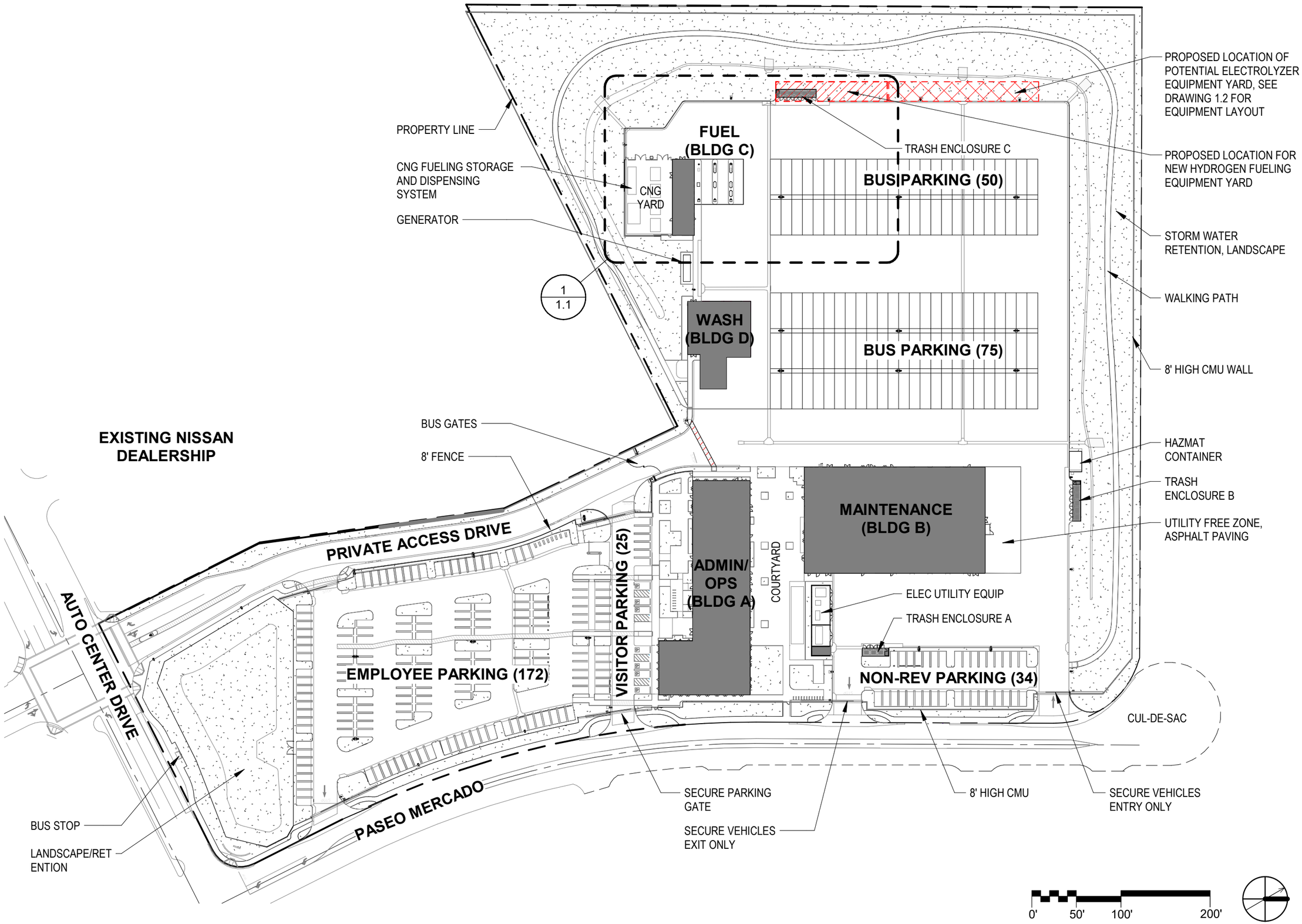
Yours sincerely,

**STANTEC CONSULTING SERVICES INC.**

[7] Assumption used for current assessment was $7.50 per kg of hydrogen based on current prices for transit agencies in Southern California.

# APPENDIX B: SITE PLANS

See attached documents for site plans, including hydrogen fueling equipment yard (drawing 1.1) and conceptual design for hydrogen electrolysis equipment (drawing 1.2).




Stantec

Stantec Proj No:
2073016250

GOLD COAST TRANSIT DISTRICT
OPERATIONS & MAINTENANCE FACILITY

ZERO-EMISSIONS BUS MASTER PLAN
EXISTING SITE PLAN

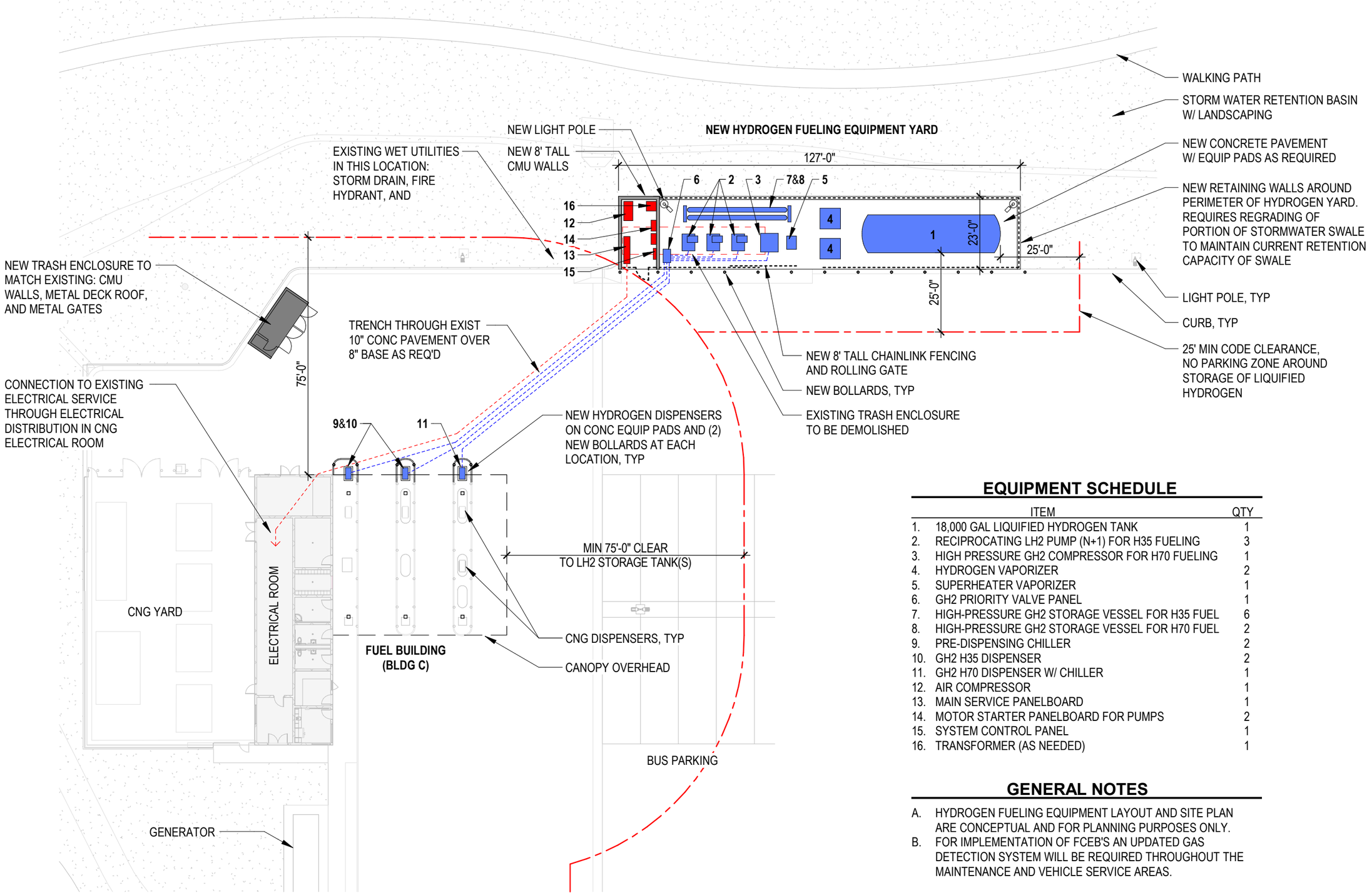
DATE:
07/21/22

DWG:

**1.0**

Stantec

Stantec Proj No:
2073016250




## EQUIPMENT SCHEDULE

| | ITEM | QTY |
|---|---|---|
| 1. | 18,000 GAL LIQUIFIED HYDROGEN TANK | 1 |
| 2. | RECIPROCATING LH2 PUMP (N+1) FOR H35 FUELING | 3 |
| 3. | HIGH PRESSURE GH2 COMPRESSOR FOR H70 FUELING | 1 |
| 4. | HYDROGEN VAPORIZER | 2 |
| 5. | SUPERHEATER VAPORIZER | 1 |
| 6. | GH2 PRIORITY VALVE PANEL | 1 |
| 7. | HIGH-PRESSURE GH2 STORAGE VESSEL FOR H35 FUEL | 6 |
| 8. | HIGH-PRESSURE GH2 STORAGE VESSEL FOR H70 FUEL | 2 |
| 9. | PRE-DISPENSING CHILLER | 2 |
| 10. | GH2 H35 DISPENSER | 2 |
| 11. | GH2 H70 DISPENSER W/ CHILLER | 1 |
| 12. | AIR COMPRESSOR | 1 |
| 13. | MAIN SERVICE PANELBOARD | 1 |
| 14. | MOTOR STARTER PANELBOARD FOR PUMPS | 2 |
| 15. | SYSTEM CONTROL PANEL | 1 |
| 16. | TRANSFORMER (AS NEEDED) | 1 |

## GENERAL NOTES

A. HYDROGEN FUELING EQUIPMENT LAYOUT AND SITE PLAN ARE CONCEPTUAL AND FOR PLANNING PURPOSES ONLY.
B. FOR IMPLEMENTATION OF FCEB'S AN UPDATED GAS DETECTION SYSTEM WILL BE REQUIRED THROUGHOUT THE MAINTENANCE AND VEHICLE SERVICE AREAS.

0' 15' 30' 60'

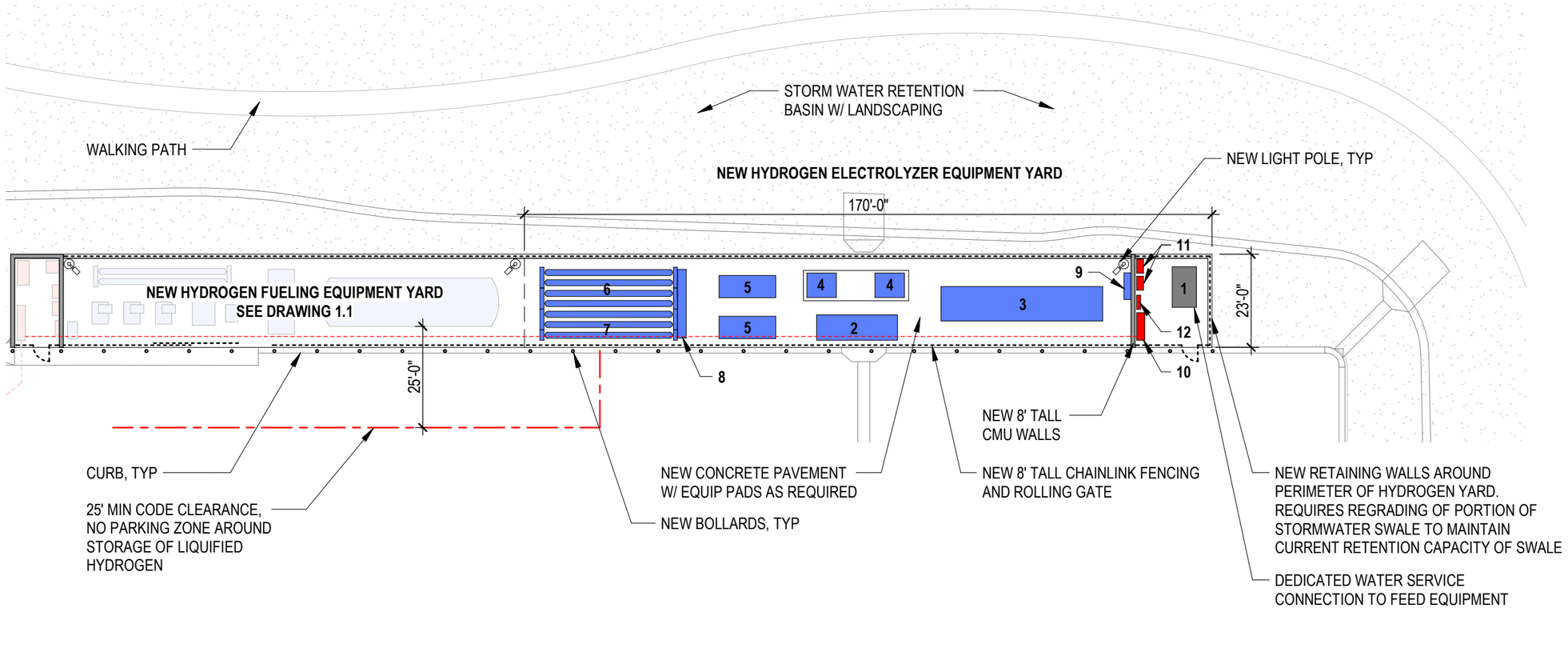
GOLD COAST TRANSIT DISTRICT
OPERATIONS & MAINTENANCE FACILITY

ZERO-EMISSIONS BUS MASTER PLAN
ENLARGED SITE PLAN

DATE:
07/21/22

DWG:

1.1




## EQUIPMENT SCHEDULE

| | ITEM | QTY |
|---|---|---|
| 1. | WATER DE-IONIZER | 1 |
| 2. | ELECTRICAL POWER SUPPLY | 1 |
| 3. | ELECTROLYZER SKID | 1 |
| 4. | HYDROGEN COMPRESSOR FOR H35 FUELING | 2 |
| 5. | HYDROGEN COMPRESSOR FOR H70 FUELING | 2 |
| 6. | BUFFER VESSEL FOR H35 FUEL (STACK OF 6) | 36 |
| 7. | BUFFER VESSEL FOR H70 FUEL (STACK OF 6) | 6 |
| 8. | PRIORITY VALVE PANEL | 1 |
| 9. | NITROGEN CYLINDERS | 1 |
| 10. | MAIN SERVICE PANELBOARD | 1 |
| 11. | MOTOR STARTER PANELBOARD FOR PUMPS | 2 |
| 12. | SYSTEM CONTROL PANEL | 1 |

## GENERAL NOTES

A. HYDROGEN FUELING EQUIPMENT LAYOUT AND SITE PLAN ARE CONCEPTUAL AND FOR PLANNING PURPOSES ONLY.
B. FOR IMPLEMENTATION OF FCEB'S AN UPDATED GAS DETECTION SYSTEM WILL BE REQUIRED THROUGHOUT THE MAINTENANCE AND VEHICLE SERVICE AREAS.


Stantec

Stantec Proj No:
2073016250

GOLD COAST TRANSIT DISTRICT
OPERATIONS & MAINTENANCE FACILITY

ZERO-EMISSIONS BUS MASTER PLAN
POTENTIAL ELECTROLYZER EQUIPMENT LAYOUT

DATE:
07/21/22

DWG:

**1.2**

# APPENDIX C: COST ESTIMATES

Please see attached cost estimates.

# GOLD COAST TRANSIT DISTRICT
# MAINTENANCE & OPERATIONS FACILITY
# ZERO EMISSIONS BUS MASTER PLAN

# ROUGH-ORDER-OF-MAGNITUDE OPINION OF PROBABLE COST

JYI #: C2616A-R2

June 16, 2022
Revised: June 24, 2022

PREPARED FOR:

**STANTEC**

BY:

**JACOBUS & YUANG, INC.**
355 North Lantana Street, #220
Camarillo, CA 93010
Tel (213) 688-1341 or (805) 339-9434

**PROJECT: GOLD COAST TRANSIT DISTRICT MAINTENANCE & OPERATIONS FACILITY - ZERO EMISSIONS BUS MASTER PLAN** — **JYI #: C2616A-R2**

**LOCATION: OXNARD, CA** — **DATE: 16-Jun-22**

**CLIENT: STANTEC** — **REVISED: 24-Jun-22**

**DESCRIPTION: R.O.M. OPINION OF PROBABLE COST - SUMMARY**

| ITEM NO. | DESCRIPTION | EST QTY | UNIT | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|
| | **SUMMARY OF ESTIMATE** | | | | **$** |
| | HYDROGEN FUELING | 3,000 | SF | 2,989.04 | 8,967,118 |
| | ADD INFLATIONARY ESCALATION | 10.7% | | | 957,567 |
| | **R.O.M. TOTAL OF OPINION OF PROBABLE CONSTRUCTION COST W/ PRORATES + ESCALATION** | **3,000** | **SF** | **3,308.23** | **9,924,684** |

**ESCALATION CALCULATION**

| | |
|---|---|
| BASE MONTH | Jun-22 |
| CONSTRUCTION START MONTH | Jun-23 |
| CONSTRUCTION DURATION (MONTHS) | 6 |
| MID POINT OF CONSTRUCTION | Sep-23 |
| % ANNUAL ESCALATION | 8.50% |
| ALLOWANCE FOR ESCALATION (TO MIDPOINT OF CONSTRUCTION) | 10.7% |

**NOTES:**

SPECIFIC INCLUSIONS

1 PREVAILING WAGE RATES IN THE AREA OF THE PROJECT
2 EQUIPMENT PADS
3 EQUIPMENT YARD
4 ALLOWANCE FOR EQUIPMENT POWER
5 ALLOWANCE FOR COMMUNICATIONS INTERPHASE WITH HYDROGEN
6 PAVEMENT REPAIR PER TRENCHWORK

SPECIFIC EXCLUSIONS

1 ASBESTOS OR HAZARDOUS MATERIAL ABATEMENT
2 PROJECT SOFT COSTS & CONSTRUCTION CONTINGENCY
3 NEW PRIMARY POWER SERVICE AND ELECTRICAL UTILITY SERVICE FEES
4 CABLINGS AND CONNECTIONS FOR PRIMARY POWER SERVICE CONDUIT
5 EMERGENCY GENERATOR UPGRADES
6 GASEOUS CLEAN AGENT EXTINGUISHING SYSTEM TO ELECTRICAL ROOM

GENERAL NOTES

1 ESTIMATE ASSUMES THAT ALL COMPONENTS WILL BE BID AS A SINGLE BID PACKAGE
2 ESTIMATE ASSUMES WORK TO BE DURING NORMAL WORKING HOURS
3 ESTIMATE ASSUMES BID COVERAGE FROM AT LEAST 4-5 RESPONSIVE BIDDERS
4 ESTIMATE IS BASED ON CONCEPTUAL DESIGN DRAWINGS PREPARED BY STANTEC, DATED 06/02/2022, RECEIVED 06/02/2022.

| | | |
|---|---|---|
| **PROJECT: GOLD COAST TRANSIT DISTRICT MAINTENANCE & OPERATIONS FACILITY - ZERO EMISSIONS BUS MASTER PLAN** | **JYI #:** | **C2616A-R2** |
| **LOCATION: OXNARD, CA** | **DATE:** | **16-Jun-22** |
| **CLIENT: STANTEC** | **REVISED:** | **24-Jun-22** |
| **DESCRIPTION: R.O.M. OPINION OF PROBABLE COST - SUMMARY** | | |

## DEFINITIONS

### OPINION OF COST

An Opinion of Cost is prepared from a survey of the quantities of work-items prepared from written or drawn information provided at the Conceptual stage of design.

Historical costs, information provided by contractors and suppliers, plus judgmental evaluation by the Estimator are used as appropriate as the basis for pricing.

Allowances as appropriate will be included for items of work which are not indicated on the design documents, provided that the Estimator is made aware of them, or which in the judgement of the Estimator are required for completion of the work.

JYI cannot, however, be responsible for inclusion of items or work of which we have not been informed.

### BID

An offer to enter a contract to perform work for a fixed sum, to be completed within a limited period of time.

### SPECIAL NOTE - MARKET CONDITIONS

In the current market conditions for construction, our experience shows the following results on competitive bids, as a differential from JYI final es

Number of bids
1.....
2-3.....
4-5.....
6-7.....
8 or more....
Accordingly, it is extremely important to ensure that a minimum of 4-5 valid bids are received

| | | | |
|---|---|---|---|
| **PROJECT: GOLD COAST TRANSIT DISTRICT MAINTENANCE & OPERATIONS** | | **JYI #:** | **C2616A-R2** |
| **FACILITY - ZERO EMISSIONS BUS MASTER PLAN** | | | |
| **LOCATION: OXNARD, CA** | | **DATE:** | **16-Jun-22** |
| **CLIENT: STANTEC** | | **REVISED:** | **24-Jun-22** |
| **DESCRIPTION: R.O.M. OPINION OF PROBABLE COST** | | **HYDROGEN YARD AREA:** | **3,000** |

| ITEM NO. | DESCRIPTION | EST QTY | UNIT | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|
| | **SUMMARY OF ESTIMATE** | | | | **$** |
| 1 | GENERAL REQUIREMENTS | | | | See Prorates |
| 2 | EXISTING CONDITIONS | 0.35% | | 6.71 | 20,143 |
| 11 | EQUIPMENT | 81.83% | | 1,590.34 | 4,771,010 |
| 26 | ELECTRICAL | 1.28% | | 24.94 | 74,815 |
| 27 | COMMUNICATIONS | 0.52% | | 10.20 | 30,600 |
| 28 | ELECTRONIC SAFETY & SECURITY | 5.76% | | 111.92 | 335,759 |
| 31 | EARTHWORK | 0.29% | | 5.67 | 17,000 |
| 32 | EXTERIOR IMPROVEMENTS | 5.41% | | 105.23 | 315,703 |
| 33 | UTILITIES | 4.55% | | 88.46 | 265,393 |
| | **SUBTOTAL** | **100.00%** | | **1,943.47** | **5,830,423** |
| | GENERAL CONDITIONS/ GENERAL REQUIREMENTS | 12.50% | | 242.93 | 728,803 |
| | ESTIMATE/ DESIGN CONTINGENCY | 20.00% | | 437.28 | 1,311,845 |
| | MARKET FACTOR | 5.00% | | 131.18 | 393,554 |
| | **SUBTOTAL** | | | **2,754.87** | **8,264,625** |
| | BONDS & INSURANCE | 2.00% | | 55.10 | 165,292 |
| | CONTRACTOR'S FEE | 6.50% | | 179.07 | 537,201 |
| | **R.O.M. OPINION OF PROBABLE COST W/OUT ESCALATION** | | | **2,989.04** | **8,967,118** |

| | | | |
|---|---|---|---|
| **PROJECT: GOLD COAST TRANSIT DISTRICT MAINTENANCE & OPERATIONS** | | **JYI #:** | **C2616A-R2** |
| **FACILITY - ZERO EMISSIONS BUS MASTER PLAN** | | | |
| **LOCATION: OXNARD, CA** | | **DATE:** | **16-Jun-22** |
| **CLIENT: STANTEC** | | **REVISED:** | **24-Jun-22** |
| **DESCRIPTION: R.O.M. OPINION OF PROBABLE COST** | | **HYDROGEN YARD AREA:** | **3,000** |

| ITEM NO. | DESCRIPTION | EST QTY | UNIT | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|
| **1** | **GENERAL REQUIREMENTS** | | | | **$** |
| | SEE PERCENTAGE ALLOWANCE | | | | |
| | **SUBTOTAL** | | | | |
| **2** | **EXISTING CONDITIONS** | | | | **$** |
| | SITE DEMOLITION (HAULING INCLUDED) | | | | |
| | DEMOLISH EX. TRASH ENCLOSURE & BUILD NEW, W/ CMU WALLS, METAL GATE - OVERALL 10'X20' | 200 | SF | 17.25 | 3,450 |
| | DEMOLISH CURB & PATCH ALONG EDGE OF EX. PAVING & NEW HYDROGEN YARD - SAY 3' WIDE | 126 | LF | 100.50 | 12,663 |
| | MISC. SITE DEMO & PROTECTION WORK | 1 | LS | 4,030.00 | 4,030 |
| | **SUBTOTAL** | | | | **20,143** |
| **11** | **EQUIPMENT** | | | | **$** |
| | HYDROGEN FUEL EQUIPMENT & RELATED | | | | |
| | 18,000 GALLON LH2 TANK | 1 | EA | 840,000 | 840,000 |
| | RECIPROCATING LIQUID-HYDROGEN PUMP (N+1) | 3 | EA | 190,000 | 570,000 |
| | HIGH PRESSURE GASEOUS-HYDROGEN COMPRESSOR | 2 | EA | 220,000 | 440,000 |
| | DISPENSER VAPORIZER | 2 | EA | 70,000 | 140,000 |
| | OFFLOAD VAPORIZER | 1 | EA | 40,000 | 40,000 |
| | PRIORITY VALVE PANEL | 1 | EA | 90,000 | 90,000 |
| | HIGH-PRESSURE GH2 STORAGE VESSEL FOR H35 FUEL | 6 | EA | 39,000 | 234,000 |
| | HIGH-PRESSURE GH2 STORAGE VESSEL FOR H70 FUEL | 2 | EA | 42,000 | 84,000 |
| | PRE-DISPENSING CHILLER | 2 | EA | 20,000 | 40,000 |
| | GH2 H35 DISPENSER | 2 | EA | 60,000 | 120,000 |
| | GH2 H70 DISPENSER W/ CHILLER1 EA | 1 | EA | 85,000 | 85,000 |
| | AIR COMPRESSOR SYSTEM | 1 | EA | 9,000 | 9,000 |
| | FLAME-DETECTION SYSTEM | 1 | EA | 60,000 | 60,000 |
| | MAIN SERVICE PANELBOARD | 1 | EA | 25,000 | 25,000 |
| | TRIPLEX MOTOR STARTER PANELBOARD | 1 | EA | 65,000 | 65,000 |
| | SYSTEM CONTROL PANEL/PLC W/ PROGRAMMING | 1 | EA | 60,000 | 60,000 |
| | TRANSFORMER (ALLOWANCE) | 1 | EA | 25,000 | 25,000 |
| | ALLOWANCE FOR FREIGHT, TAXES & INSTALLATION OF HYDROGEN FUELING EQUIPMENT | 50% | | 2,927,000 | 1,463,500 |
| | ELEC PANELS AND CONTROLS, ALLOWANCE | 1 | LS | 146,350.00 | 146,350 |
| | INTRA HYDROGEN EQUIPMENT PIPING, VALVES & SPECIALTIES - ALLOWANCE | 1 | LS | 234,160.00 | 234,160 |
| | FUEL PIPING FROM HYDROGEN YARD TO FUEL CANOPY HYDROGEN DISPENSERS - ALLOWANCE (SAME TRENCH AS ELECTRICAL FEEDERS) | | | | SEE DIV 32 |
| | CUT & PATCH EX PAVING/FLOORING FOR PIPE TRENCH | | | | SEE DIV 33 |
| | **SUBTOTAL** | | | | **4,771,010** |
| **26** | **ELECTRICAL** | | | | **$** |
| | PRIMARY POWER SERVICE | | | | |
| | ASSUME NOT REQUIRED | | | | |
| | MAIN POWER SYSTEM - NORMAL | | | | |
| | RSG POWER FEEDER FROM U/G DUCTBANK TO INTERIOR ELECTRICAL ROOM + C & P | 75 | LF | 269.00 | 20,175 |

| | | | |
|---|---|---|---|
| **PROJECT: GOLD COAST TRANSIT DISTRICT MAINTENANCE & OPERATIONS** | | **JYI #:** | **C2616A-R2** |
| **FACILITY - ZERO EMISSIONS BUS MASTER PLAN** | | | |
| **LOCATION: OXNARD, CA** | | **DATE:** | **16-Jun-22** |
| **CLIENT: STANTEC** | | **REVISED:** | **24-Jun-22** |
| **DESCRIPTION: R.O.M. OPINION OF PROBABLE COST** | | **HYDROGEN YARD AREA:** | **3,000** |

| ITEM NO. | DESCRIPTION | EST QTY | UNIT | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|
| | POWER CONNECTION TO EXISTING ELECTRICAL SERVICE IN ELECTRICAL ROOM | 1 | LS | 10,000.00 | 10,000 |
| | HYDROGEN EQUIPMENT NORMAL POWER HOOKUP, INCLUDING DISCONNECT SWITCHING | | | | |
| | RECIPROCATING LH2 PUMP (N+1) | 3 | EA | 1,115.00 | 3,345 |
| | HIGH PRESSURE GH2 COMPRESSOR | 1 | EA | 1,275.00 | 1,275 |
| | HYDROGEN VAPORIZER | 2 | EA | 1,015.00 | 2,030 |
| | SUPERHEATER VAPORIZER | 1 | EA | 1,275.00 | 1,275 |
| | GH2 PRIORITY VALVE PANEL | 1 | EA | 450.00 | 450 |
| | GH2 H35 DISPENSER | 2 | EA | 1,015.00 | 2,030 |
| | GH2 H70 DISPENSER W/ CHILLER | 1 | EA | 1,275.00 | 1,275 |
| | AIR COMPRESSOR SYSTEM | 1 | EA | 1,275.00 | 1,275 |
| | MAIN SERVICE PANELBOARD | 1 | EA | 625.00 | 625 |
| | MOTOR STARTER PANELBOARD FOR PUMPS | 2 | EA | 500.00 | 1,000 |
| | SYSTEM CONTROL PANEL | 1 | EA | 500.00 | 500 |
| | TRANSFORMER (AS NEEDED) | 1 | EA | 1,000.00 | 1,000 |
| | EMERGENCY POWER | | | | |
| | ALLOW FOR EMERGENCY GENERATOR CIRCUITRY REWORK FOR HYDROGEN EQUIPMENT | 1 | LS | 25,000.00 | 25,000 |
| | MISCELLANEOUS | | | | |
| | MISC./ TESTING/COMMISSIONING | 1 | LS | 3,560.00 | 3,560 |
| | **SUBTOTAL** | | | | **74,815** |
| **27** | **COMMUNICATIONS** | | | | **$** |
| | ALLOWANCE FOR COMMUNICATIONS UPGRADE FOR HYDROGEN INSTALLATION | 3,000 | SF | 10.20 | 30,600 |
| | **SUBTOTAL** | | | | **30,600** |
| **28** | **ELECTRONIC SAFETY & SECURITY** | | | | **$** |
| | GAS/HYDROGEN DETECTION SYSTEM INCLUDING AUDIBLE & VISIBLE ALARMS - MAINTENANCE & BUS WASH BUILDINGS | 29,925 | SF | 11.22 | 335,759 |
| | **SUBTOTAL** | | | | **335,759** |
| **31** | **EARTHWORK** | | | | **$** |
| | GRADE, LEVEL & COMPACT FOR EQ. YARD, SAY AV .3' D, 128' X 24' | 340 | CY | 50.00 | 17,000 |
| | **SUBTOTAL** | | | | **17,000** |
| **32** | **EXTERIOR IMPROVEMENTS** | | | | **$** |
| | EQUIPMENT PADS & THE LIKE | | | | |
| | FUEL ISLAND EXPANSION & CURB / EQUIPMENT PADS | 162 | SF | 50.00 | 8,100 |
| | FUEL EQUIPMENT YARD PAVING + 60% EQUIPMENT PAD THICKENING | 3,000 | SF | 22.20 | 66,600 |
| | MISC. HYDROGEN YARD PADS | 1 | LS | 3,735.00 | 3,735 |
| | EQUIPMENT ANCHORAGE | | | | |
| | EQUIPMENT ANCHORAGE - HYDROGEN COMPONENTS | 12 | EA | 750.00 | 9,000 |
| | SITE MISCELLANEOUS | | | | |
| | PIPE BOLLARDS, PAINTED, AT FUEL ISLAND EXTENSION | 6 | EA | 1,250.00 | 7,500 |
| | PIPE BOLLARDS, PAINTED, AT HYDROGEN YARD | 15 | EA | 1,250.00 | 18,750 |
| | ROLLING GATE, 20' L X 8' H, MANUAL | 1 | EA | 4,800.00 | 4,800 |
| | PEDESTRIAN GATE, 3' X 8' | 1 | EA | 840.00 | 840 |

| | | | |
|---|---|---|---|
| **PROJECT: GOLD COAST TRANSIT DISTRICT MAINTENANCE & OPERATIONS** | | **JYI #:** | **C2616A-R2** |
| **FACILITY - ZERO EMISSIONS BUS MASTER PLAN** | | | |
| **LOCATION: OXNARD, CA** | | **DATE:** | **16-Jun-22** |
| **CLIENT: STANTEC** | | **REVISED:** | **24-Jun-22** |
| **DESCRIPTION: R.O.M. OPINION OF PROBABLE COST** | | **HYDROGEN YARD AREA:** | **3,000** |

| ITEM NO. | DESCRIPTION | EST QTY | UNIT | UNIT COST | TOTAL COST |
|---|---|---|---|---|---|
| | CHAIN LINK FENCE, 8' H | 126 | LF | 68.00 | 8,568 |
| | 8" CMU RETAINING WALL, 8' H PLUS FOUNDATION | 171 | LF | 846.67 | 144,780 |
| | ALLOWANCE FOR ADDITIONAL SECURITY CAMERAS TIED TO EX. CONTROL ROOM | 4 | EA | 7,000.00 | 28,000 |
| | MISC. SITE IMPROVEMENTS ALLOWANCE | 1 | LS | 15,030.00 | 15,030 |
| | **SUBTOTAL** | | | | **315,703** |
| **33** | **UTILITIES** | | | | **$** |
| | YARD LIGHTING | | | | |
| | NEW LIGHT POLE AND FEEDERS TO EQ. YARD | 2 | EA | 4,200.00 | 8,400 |
| | CUTTING & PATCHING FOR TRENCHING | | | | |
| | 1-PIPE TRENCH, 1'-6"W INCLUDING C & P 10" CONC. SLAB | 113 | LF | 179.67 | 20,302 |
| | 3-4 PIPE TRENCH, 4'-6"W INCLUDING C & P 10" CONC. SLAB | 88 | LF | 245.67 | 21,619 |
| | FUEL PIPING | | | | |
| | FUEL PIPING FROM HYDROGEN YARD TO FUEL CANOPY HYDROGEN DISPENSERS - ALLOWANCE (SAME TRENCH AS ELECTRICAL FEEDERS) | 352 | LF | 196.875 | 69,300 |
| | POWER FEEDERS AND DUCTBANK | | | | |
| | DUCTBANK ENCASED NORMAL POWER FEEDER FROM HYDROGEN YARD TO ELECTRICAL ROOM | 176 | LF | 320.81 | 56,463 |
| | DUCTBANK ENCASED POWER FEEDER TO HYDROGEN DISPENSERS | 332 | LF | 269.00 | 89,309 |
| | **SUBTOTAL** | | | | **265,393** |

# APPENDIX D: FINANCIAL MODELING INPUTS AND ASSUMPTIONS

Table 28 presents a description as well as the sources for the cost inputs (in 2022$) of the Base Case and the ZEB Case.

**Table 28: Summary of cost inputs**

| Main Category | Item | Description | Inputs for Base Case | Inputs for ZEB Case | Sources and comments |
|---|---|---|---|---|---|
| **Capital** | | | | | |
| Fleet acquisition | Bus purchase price | Purchase price of a bus/vehicle inclusive of options and taxes and extended warranty | CNG 40-ft: $600,000<br>CNG 35-ft: $552,000<br>CNG Cutaway: $130,000<br>Gas passenger van: $77,000 | FCEB 40-ft: $1,100,000<br>FCEB 35-ft: $1,012,000<br>FCE Passenger van: $220,000 | Base Case: industry values and GCTD FY2021-22 Budget Book<br>ZEB Case: industry values CalDGS, and MBTA/CalACT<br>Values are in 2022$ and adjusted over time based on price trendlines from CARB |
| Fleet refurbishment | Mid-life rehabs | Any heavy mid-life work needed to achieve the useful life minimum benchmark | N/A; GCTD does not perform any heavy mid-life work on its CNG fleet | $30,000 per 40-ft and 35-ft FCEB at 6 years for fuel cell stack replacement | Base Case: GCTD<br>ZEB Case: OEM information; smaller vehicles with shorter lifespan are not assumed to require a fuel cell stack replacement |
| Infrastructure and Facility Modifications | Infrastructure Modification Costs | Includes equipment, installation, testing, civil and electrical work, as well as contractor's fees and escalation factors. Includes backup | N/A | $8,967,000 | Engineer's cost estimate |

| Main Category | Item | Description | Inputs for Base Case | Inputs for ZEB Case | Sources and comments |
|---|---|---|---|---|---|
| | | generator for hydrogen fueling equipment. | | | |
| **Operating and Maintenance** | | | | | |
| Operating | Vehicle fuel | Cost of fuel commodity for revenue vehicles | CNG: $0.64 per diesel gallon equivalent<br>Gasoline: $6.00 per gallon | Hydrogen: $6.00 per kg | Base Case: GCTD<br>ZEB Case: Industry reports Trendlines for projected CNG and gasoline costs were obtained from the US Energy Information Agency for the Pacific region and applied to CNG and gasoline costs through 2040.[63]<br>For hydrogen fuel costs, industry research indicates that overtime, the cost will decrease from $6.00 per kg to $4.00; the model accounted for decreases in price over time. |
| Maintenance | Vehicle maintenance costs | Maintenance costs (per mile) inclusive of labor and parts for scheduled and unscheduled maintenance | Fixed-route buses: $1.48 per mile<br>Demand response vehicles: $0.89 per mile | Fixed-route buses: $1.48 per mile<br>Demand response vehicles: $0.89 per mile | Base Case: NTD 2019 Operating Expenses Detailed sheet, adjusted to 2022$<br>ZEB Case: Based on industry research demonstrating comparative |

[63] https://www.eia.gov/outlooks/aeo/data/browser/#/?id=3-AEO2022&region=1-9&cases=ref2022&start=2020&end=2050&f=A&linechart=ref2022-d011222a.3-3-AEO2022.1-9&map=ref2022-d011222a.26-3-AEO2022.1-9&ctype=map&sid=ref2022-d011222a.26-3-AEO2022.1-9&sourcekey=0

| Main Category | Item | Description | Inputs for Base Case | Inputs for ZEB Case | Sources and comments |
|---|---|---|---|---|---|
| | | | | | maintenance costs per mile for two Southern California agencies operating CNGs and FCEBs[64] |

[64] https://www.nrel.gov/docs/fy21osti/78078.pdf, https://www.nrel.gov/docs/fy21osti/78250.pdf

**Item 9**

**DATE** December 7, 2022

**TO** GCTD Board of Directors

**FROM** James Beck, Director Operations and Maintenance

**SUBJECT** GCTD Operations and Maintenance Report

## SUMMARY

This report provides an update on GCTD's Operations and Maintenance Departments.

This report will be given monthly and will include Key Performance Indicators (KPI's), staffing updates, updates on GCTD projects and current events.

## RECOMMENDATION

It is recommended that the Board of Directors receive and file this presentation and provide any feedback to staff on the material presented.

General Manager's Concurrence

Vanessa Rauschenberger

**Item 10**

**DATE** December 7, 2022

**TO** GCTD Board of Directors

**FROM** Austin Novstrup, Transit Planner II

**SUBJECT** Update and Presentation on Upcoming January 2023 Service Changes

## SUMMARY

This report provides an update and presentation on planned changes to GCTD's fixed-route bus service scheduled to go into effect on January 8, 2023.

GCTD modifies fixed route service schedules biannually in order to maintain and improve ontime performance and implement other service improvements. Changes planned for January include minor schedule adjustments and new booster services to address overcrowding at peak times on some routes.

## RECOMMENDATION

It is recommended that the Board of Directors receive and file this presentation and provide any feedback to staff on the material presented.

General Manager's Concurrence

Vanessa Rauschenberger

**Item #11**

**DATE** December 7, 2022

**TO** GCTD Board of Directors

**FROM** Vanessa Rauschenberger, General Manager

**SUBJECT** **Discuss Future Agenda Items**

## SUMMARY

It is recommended that the Board of Directors provide input to staff on future agenda items that they would like staff to review and/or report on in a future meeting.

## FUTURE AGENDA ITEMS

Below are some of the future agenda items planned. To help staff prioritize timing of reports, staff seeks input on these items or other items that the Board is interested in discussing.

### Future Agenda Items

- Review of Bylaws, Goals & Objectives
- Budget for FY 2023-2024
- Strategic Planning
- Discuss VCTC Transit Integration and Efficiency Study (TIES)
- Redevelopment of 301 Property
- *Other Items?*

### Future Routine Items

- Monthly Financial Statements & Procurement Reports
- Monthly Operations & Maintenance Update
- Quarterly Fixed-Route & Paratransit Performance Reports
- Bi-Annual Service Plan & Outreach Updates
- Quarterly Human Resources & Staffing Updates

## CONCLUSION

It is recommended that the Board of Directors provide input to staff on future agenda items that they would like staff to review and/or report on in a future meeting.