



# Board of Directors Agenda

Click link to access the meeting:

<https://us02web.zoom.us/j/98288032362>

Zoom Meeting ID

## Ways to Join



**Computer:** Click the link above. You will be prompted to run the Zoom browser or Zoom application. Once signed on to the meeting, you will have the option to join using your computer audio system or phone.

### Webinar Features:

	▶	Use the <b>raise hand</b> feature every time you wish to make a public comment.
	▶	Participants can enable <b>closed captioning</b> by clicking the CC icon. You may also view the full transcript and change the font size by clicking 'subtitle settings'. These features are not available via phone.
	▶	This symbol shows you are <b>muted</b> , click this icon to unmute your microphone.
	▶	This symbol shows you are currently <b>unmuted</b> , click this button to mute your microphone.
	▶	The chat feature should be used by panelists and attendees solely for "housekeeping" matters as comments made through this feature will not be retained as part of the meeting record. See the <b>Live Verbal Public Comment</b> for instructions on how to make a public comment.



**Smartphone or Tablet:** Download the Zoom app and join the meeting by clicking the link or using the webinar ID (found in the link).



### Phone:

1. If you are joining the meeting audio by phone and viewing the meeting on a device, dial the number provided in the 'join audio' phone call tab of the initial pop-up, and enter the Meeting ID (found in the link).
2. If you are joining by phone only, dial: **+1-669-900-9128** or **+1-253-215-8782** and type the meeting ID found in the link, press #. You will have access to the meeting audio, **but will NOT be able to view the PowerPoint presentations.**



### Live Verbal Public Comments:

Use the 'Raise Hand' icon every time you wish to make a public comment on an item. Raise your hand once the agenda item you wish to comment on has been called. In person public comments will be taken first, virtual attendees will be taken in the order in which they raise their hand. Requests to speak will not be taken after the public comment period ends, unless under the Chair's discretion. General Public Comment, at the beginning of the Board of Directors meeting only, will be limited to five speakers. Additional speakers with general public comments will be heard at the end of the meeting. Two-minutes of time is allotted per speaker, unless otherwise directed by the Chair.

### Public Comments Made Via Zoom

1. Click the link found at the top of this instruction page
2. Click the raise hand icon located in the bottom center of the platform
3. The Clerk will announce your name when it is your turn to speak
4. Unmute yourself to speak

### Public Comments Made by Phone Only

1. Dial **+1-669-900-9128**
2. Type in the zoom meeting ID found in the link and press #
3. Dial \*9 to raise your hand via phone
4. The Clerk will call out the last 4 digits of your phone number to announce you are next to speak
5. Dial \*6 to unmute yourself



**Written Public Comments (before the meeting):** Written public comments will be recorded in the public record and will be provided to MTS Board Members in advance of the meeting. Comments must be emailed or mailed to the Clerk of the Board\* by 4:00pm the day prior to the meeting.

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**Translation Services:** Requests for translation services can be made by contacting the Clerk of the Board\* at least four working days in advance of the meeting.

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**In-Person Participation:** In-person public comments will be heard first. Following in-person public comments, virtual attendees will be heard in the order in which they raise their hand via the Zoom platform. Speaking time will be limited to two minutes per person, unless specified by the Chairperson. Requests to speak will not be taken after the public comment period ends, unless under the Chair's discretion.

**Instructions for providing in-person public comments:**

1. Fill out a speaker slip located at the entrance of the Board Room;
2. Submit speaker slip to MTS staff seated at the entrance of the Board Room;
3. When your name is announced, please approach the podium located on the right side of the dais to make your public comments.

Members of the public are permitted to make general public comment at the beginning of the agenda or specific comments referencing items on the agenda during the public comment period. General Public Comment, at the beginning of the Board of Directors meeting only, will be limited to five speakers. Additional speakers with general public comments will be heard at the end of the meeting.

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**Assistive Listening Devices (ALDs):** ALDs are available from the Clerk of the Board\* prior to the meeting and are to be returned at the end of the meeting.

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**Reasonable Accommodations:** As required by the Americans with Disabilities Act (ADA), requests for agenda information in an alternative format or to request reasonable accommodations to facilitate meeting participation, please contact the Clerk of the Board\* at least two working days prior to the meeting.

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**\*Contact Information:** Contact the Clerk of the Board via email at [ClerkoftheBoard@sdmts.com](mailto:ClerkoftheBoard@sdmts.com), phone at (619) 398-9681 or by mail at **1255 Imperial Ave. Suite 1000, San Diego CA 92101.**



# Agenda de la Junta de Directores

Haga clic en el enlace para acceder a la reunión:

<https://us02web.zoom.us/j/98288032362>






ID de la reunión  
en Zoom

## Formas de Participar



**Computadora:** Haga clic en el enlace más arriba. Recibirá instrucciones para operar el navegador de Zoom o la aplicación de Zoom. Una vez que haya iniciado sesión en la reunión, tendrá la opción de participar usando el sistema de audio de su computadora o teléfono.

### Funciones del Seminario En Línea:

 Levantar la mano	▶	Use la herramienta de <b>levantar la mano</b> cada vez que desee hacer un comentario público.
	▶	Los participantes pueden habilitar el <b>subtitulado</b> haciendo clic en el ícono CC. También puede ver la transcripción completa y cambiar el tamaño de letra haciendo clic en “configuración de subtítulos”. Estas herramientas no están disponibles por teléfono.
	▶	Este símbolo indica que usted se encuentra en <b>silencio</b> , haga clic en este ícono para quitar el silenciador de su micrófono.
	▶	Este símbolo indica que su micrófono se encuentra <b>encendido</b> . Haga clic en este símbolo para silenciar su micrófono.
	▶	La herramienta de chat deben usarla los panelistas y asistentes únicamente para asuntos “pertinentes a la reunión”, ya que comentarios realizados a través de esta herramienta no se conservarán como parte del registro de la reunión. Consulte el <b>Comentario público verbal</b> en vivo para obtener instrucciones sobre cómo hacer un comentario público.



**Teléfono Inteligente o Tableta:** Descargue la aplicación de Zoom y participe en la reunión haciendo clic en el enlace o usando el ID del seminario web (que se encuentra en el enlace).



### Teléfono:

1. Si está participando en la reunión mediante audio de su teléfono y viendo la reunión en un dispositivo, marque el número indicado en la pestaña de llamada telefónica “unirse por audio” en la ventana emergente inicial e ingrese el ID de la reunión (que se encuentra en el enlace).
2. Si está participando solo por teléfono, marque: **+1-669-900-9128** o **+1-253-215-8782** e ingrese el ID de la reunión que se encuentra en el enlace, pulse #. Tendrá acceso al audio de la reunión, **pero NO podrá ver las presentaciones en PowerPoint.**



**Comentarios Públicos Verbales en Vivo:** Use la herramienta “levantar la mano” cada vez que desee hacer un comentario público sobre alguno de los artículos. Levante la mano una vez que el artículo de la agenda sobre el que desea comentar haya sido convocado. Los comentarios públicos en persona se escucharán primero, se escuchará a los asistentes virtuales en el orden en el que levanten la mano. No se aceptarán solicitudes para hablar después de que termine el periodo para hacer comentarios públicos, a menos de que el presidente determine de otra forma a su discreción. Comentarios públicos generales, únicamente al inicio de la reunión de la Junta de Directores, se limitarán a cinco personas que deseen hablar. Las personas adicionales que deseen aportar comentarios públicos generales podrán hacerlo al final de la reunión. Se otorga dos minutos de tiempo por persona que desee hablar, a menos de que el presidente instruya de otra forma. (Consulte la página 2 para obtener instrucciones sobre cómo hacer un comentario público.)

## Comentarios Públicos a Través de Zoom

1. Haga clic en el enlace que se encuentra en la parte superior de esta página de instrucciones
2. Haga clic en el ícono de levantar la mano en el centro inferior de la plataforma
3. El secretario anunciará su nombre cuando sea su turno de hablar
4. Desactive el silenciador para que pueda hablar

## Comentarios Públicos Realizados Únicamente por Teléfono

1. Marque el **+1-669-900-9128**
2. Ingrese el ID de la reunión en Zoom que se encuentra en el enlace y pulse #
3. Marque \*9 para levantar la mano por teléfono
4. El secretario indicará los últimos 4 dígitos de su número de teléfono para anunciar que usted será el siguiente en hablar
5. Marque \*6 para desactivar el silenciador



**Comentarios Públicos por Escrito (Antes de la Reunión):** Los comentarios públicos por escrito se registrarán en el registro público y se entregarán a los miembros de la Junta de MTS antes de la reunión. Los comentarios deben enviarse por correo electrónico o postal al secretario de la Junta\* antes de las 4:00 p.m. el día anterior a la reunión.



**Servicios de Traducción:** Pueden solicitarse servicios de traducción comunicándose con el secretario de la Junta\* por lo menos cuatro días hábiles antes de la reunión.



**Participación en Persona:** Los comentarios públicos en persona se escucharán primero. Después de los comentarios públicos en persona, se escuchará a los asistentes virtuales en el orden en el que levanten la mano a través de la plataforma de Zoom. El tiempo para hablar se limitará a dos minutos por persona, a menos de que el presidente especifique de otra forma. No se recibirán solicitudes para hablar después de que termine el periodo para hacer comentarios públicos, a menos de que el presidente determine de otra forma a su discreción.

### Instrucciones para brindar comentarios públicos en persona:

1. Llene la boleta para personas que desean hablar que se encuentran en la entrada de la Sala de la Junta.
2. Entregue la boleta para personas que desean hablar al personal de MTS que se encuentra sentado en la entrada de la Sala de la Junta.
3. Cuando anuncien su nombre, por favor, acérquese al podio ubicado en el lado derecho de la tarima para hacer sus comentarios públicos.

Los miembros del público pueden hacer comentarios públicos generales al inicio de la agenda o comentarios específicos que hagan referencia a los puntos de la agenda durante el periodo de comentarios públicos. Los comentarios públicos generales únicamente al inicio de la reunión de la Junta de Directores, se limitarán a cinco personas que deseen hablar. Las personas adicionales que deseen aportar comentarios públicos generales podrán hacerlo al final de la reunión.



**Dispositivos de Asistencia Auditiva (ALD, por sus siglas en inglés):** Los ALD están disponibles con el secretario de la Junta\* antes de la reunión y estos deberán ser devueltos al final de la reunión.



**Facilidades Razonables:** Según lo requerido por la Ley de Estadounidenses con Discapacidades (ADA, por sus siglas en inglés), para presentar solicitudes de información de la agenda en un formato alternativo o solicitar facilidades razonables para facilitar su participación en la reunión, por favor, comuníquese con el secretario de la Junta\* por lo menos dos días hábiles antes de la reunión.



**\*Información de Contacto:** Comuníquese con el secretario de la Junta por correo electrónico en [ClerkoftheBoard@sdmts.com](mailto:ClerkoftheBoard@sdmts.com), por teléfono al **(619) 398-9681** o por correo postal en **1255 Imperial Ave. Suite 1000, San Diego CA 92101.**





**Metropolitan  
Transit  
System**

## **Board of Directors Agenda**

January 18, 2024 at 9:00 a.m.

**In-Person Participation:** James R. Mills Building, 1255 Imperial Avenue, 10th Floor Board Room, San Diego CA 92101

**Teleconference Participation:** (669) 444-9171; Webinar ID: 982 8803 2362, <https://zoom.us/j/98288032362>

<b>NO.</b>	<b>ITEM SUBJECT AND DESCRIPTION</b>	<b>ACTION</b>
<b>1.</b>	<b>Roll Call</b>	
<b>2.</b>	<b>Public Comments</b> This item is limited to five speakers with two minutes per speaker. Others will be heard after Board Discussion items. If you have a report to present, please give your copies to the Clerk of the Board.	
<b>SPECIAL ITEMS</b>		
<b>3.</b>	<b>Elect Chair Pro Tem and Committee Appointments (Sharon Cooney)</b> Action would 1) Elect a Chair Pro Tem for 2024; and 2) Consider the nominating slate (Attachment A) proposed by the Ad Hoc Nominating Committee for the appointment of representatives to MTS committees for 2024 and vote to appoint representatives to those committees.	Approve
<b>CONSENT ITEMS</b>		
<b>4.</b>	<b>Approval of Minutes</b> Action would approve the December 14, 2023 Board of Directors meeting minutes.	Approve
<b>5.</b>	<b>Traction Power Substations (TPSS) Design - Work Order</b> Action would authorize the Chief Executive Officer (CEO) to execute Work Order WOA357-AE-31, under MTS Doc No. PWL357.0-22, with CR Associates (CRA), a Disadvantaged Business Enterprise (DBE), in the amount of \$2,047,425.49 for design services to replace existing TPSS with new Siemens TPSS.	Approve



6. **Regional Communications System (RCS) Radios Purchase and Installation – Sole Source Contract Award** Approve  
Action would authorize the Chief Executive Officer (CEO) to execute MTS Doc. No. G2846.0-24, with Motorola Solutions, Inc in the amount of \$266,395.10 for a period of four (4) base years.
7. **Operations Budget Status Report for November 2023** Informational
8. **Network Equipment and Services – Contract Award** Approve  
Action would authorize the Chief Executive Officer (CEO) to execute MTS Doc. No. G2796.0-24 (in substantially the same format as Attachment A), with Axelliant LLC (Axelliant), a Minority Business Enterprise (MBE), for the purchase of network equipment, services and related license subscriptions, in the amount of \$871,391.03.
9. **Trash Receptacles – Contract Award** Approve  
Action would authorize the Chief Executive Officer (CEO) to: 1) Execute MTS Doc. No. L1653.0-24, with Big Belly Solar, LLC (“Big Belly”), for the provision of seventy-eight (78) Big Belly trash receptacles at a cost of \$300,097.18 (inclusive of shipping and taxes) plus an option to purchase an additional ninety-six (96) Big Belly trash receptacles in 2024-2025 at a cost of \$478,883.78 (inclusive of shipping and taxes), for an overall estimate contract total of \$778,980.96 (inclusive of shipping and taxes); and 2) Exercise the option purchase at the CEO’s discretion.
10. **Washington Street Wall Modification – Work Order Agreement** Approve  
Action would authorize the Chief Executive Officer (CEO) to execute Work Order No. MTSJOC348-09 (in substantially the same format as Attachment A), under MTS Doc. No. PWG348.0-22, with Veterans Engineering Inc. (Veterans), for the modification of the existing wall between the Washington Street Trolley Station and the North County Transit District (NCTD) tracks along the Green Line right-of-way in the amount of \$610,819.97.
11. **MTS Board Policy No. 21: MTS Revenue-Generating Display Advertising, Concessions, and Merchandise – Revision Status Report** Informational
12. **Addition of Full Time Equivalent Position: Grants Analyst** Approve  
Action would authorize the Chief Executive Officer (CEO) to add one (1) Grants Analyst to the position tables previously approved in the Fiscal Year 2024 budget.

DISCUSSION AND REPORT ITEMS

13. **PRONTO Online Reduced Fare Application Update (Leanne Powell and Stacie Bishop)** Informational

OTHER ITEMS

- 14. Chair, Board Member and Chief Executive Officer’s (CEO’s) Communications and [CEO Report](#)** Informational
- 15. Remainder of Public Comments Not on The Agenda**  
This item is a continuation of item No. 2 (Public Comment), in the event all speakers who request to comment on item No. 2 are not called. If all Public Comment is accepted during item No. 2, no additional public comment will be accepted under this item.

CLOSED SESSION

- 16. CONFERENCE WITH LEGAL COUNSEL—ANTICIPATED LITIGATION** Possible Action  
Significant exposure to litigation pursuant to Government Code Section 54956.9(d)(2) and (e)(5): (1 Potential Case)
- 17. CLOSED SESSION – CONFERENCE WITH LEGAL COUNSEL** Possible Action  
Existing Litigation Pursuant to California Government Code Section 54956.9(d)(1)  
Grecia Figueroa v Nathan Fletcher, San Diego Metropolitan Transit System, et al.  
San Diego Superior Court Case No. 37-2023-00012828-CU-OE-CTL

ADJOURNMENT

- 18. Next Meeting Date**  
The next Board of Director’s meeting is scheduled for February 8, 2024 at 9:00am.
- 19. Adjournment**

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**From:** Alex Wong <alex@ridesd.org>  
**Sent:** Sunday, January 14, 2024 7:50 AM  
**To:** ClerkoftheBoard  
**Subject:** Non-Agenda Comment for 1/18 Board Meeting

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Dear Clerk of the Board,

Please attach the following as a written Non-Agenda Comment for this Thursday's Board Meeting. Thank You!

*To the MTS Board of Directors:*

*As data researcher for RideSD, I believe SANDAG's South Leg Automated People Mover (APM) proposal will benefit MTS more than the Trolley to Airport alternative would.*

*First, the people mover would be driverless. This would result in lower per-passenger operating costs than with a Trolley, allowing MTS to run the people mover far more frequently, at every 2 minutes, vs. every 15 minutes for an Airport Trolley.*

*Secondly, the people mover would not share tracks with existing Trolley Lines. This would free up track space between Santa Fe and Little Italy that can then be used to increase Green Line frequency to 7.5 minutes. By contrast, an Airport Trolley would share tracks with the Green Line between Little Italy and 12th/Imperial. In particular, the Airport Trolley would merge onto the existing Blue/Green Line tracks at Hawthorn, meaning between Little Italy and Santa Fe Depot, the Blue, Green, and Airport Trolley lines would share a single pair of tracks. This would create a bottleneck that would severely constrain Trolley throughput and likely irreversibly limit the Green Line to 15-minute frequencies.*

*Mission Valley needs 7.5 minute frequencies or better. It is projected to add up to 50,000 new residents. Already, Mission Valley is building two of America's largest transit-oriented megaprojects--SDSU Mission Valley and Riverwalk.*

*For further information on airport rail connection proposals, please refer to my presentation. If you have further questions, please email me at alex@ridesd.org. I'd also be willing to give presentations in-person or over Zoom to any board member.*

Sincerely,

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Alex Wong  
RideSD Data Researcher

*"Frequency is Freedom, but [every] 15 minutes isn't frequency" - Alon Levy*

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**From:** Lenora Porcella <lenoraporcella@gmail.com>  
**Sent:** Thursday, January 18, 2024 3:12 AM  
**To:** john.mccann@sdmts.com; steve.goble@sdmts.com; caylin.frank@sdmts.com; patricia.dillard@sdmts.com; george.gastil@sdmts.com; marcus.bush@sdmts.com; sean.elo-rivera@sdmts.com; todd.gloria@sdmts.com; Matthew.leyba-gonzalez@sdmts.com; alonzo.gonzalez@sdmts.com; mike.donovan@sdmts.com; monica.steppe@sdmts.com; vivian.moreno@sdmts.com; stephen.whitburn@sdmts.com; Ronn.hall@sdmts.com; Beverly Neff; ClerkoftheBoard  
**Subject:** Rapid Route #227 in Imperial Beach

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Dear Board Members, Clerk, and Ms. Neff:

Please accept my late comments to today's meeting. I've been out of town until yesterday, for the Christmas holidays.

I very happy to know that the Board and the City of Imperial Beach have agreed to move the bus #227 off of 3rd Street in Imperial Beach. It has been very disruptive and the neighborhood anxiously awaits news as to when the bus will be gone.

As a reminder, our rights were violated, we were given no notice, no meeting, no outreach we feel that a just resolution would be to quickly move the bus or eliminate the unneeded, unwanted route since the buses are empty anyway. The thought of 6-9 months more of the empty buses in the neighborhood is angering residents and creating distrust between residents, MTS and the City.

I ask that whatever needs to be done, to restore our rights quickly, be done and the buses be moved. I also ask that the neighborhood be notified quickly as to when the move will happen.

I remind you too, that the Christmas holidays and Covid/flu season is stressful for everyone. We come out of that, to prepare for more stress, deadlines, and tax season. A bit of good news after the stress we've suffered since October and the beginning of the #227 route would be very welcome.

Thank you,

Lenora Porcella





**Metropolitan  
Transit  
System**

## **Agenda Item No. 3**

MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS

January 18, 2024

**SUBJECT:**

Elect Chair Pro Tem and Committee Appointments (Sharon Cooney)

**RECOMMENDATION:**

That the San Diego Metropolitan Transit System (MTS) Board of Directors:

- 1) Elect a Chair Pro Tem for 2024; and
- 2) Consider the nominating slate (Attachment A) proposed by the Ad Hoc Nominating Committee for the appointment of representatives to MTS committees for 2024 and vote to appoint representatives to those committees.

**Budget Impact**

None with this action.

**DISCUSSION:**

Policies and Procedures No. 22, "Rules of Procedure" (Attachment B), provides for the election of a Chair Pro Tem to serve in the absence of the Chair and Vice Chair. In 2023, Board Member Monica Montgomery Steppe served as Chair Pro Tem.

In addition, each year the Board makes appointments to the following committees:

- [Accessible Services Advisory Committee \(ASAC\)](#)
- [Airport Authority Advisory Committee](#)
- [Audit Oversight Committee](#)
- [Budget Development Committee](#)
- [Executive Committee](#)
- [Los Angeles-San Diego-San Luis Obispo Rail Corridor Agency \(LOSSAN\)](#)
- [Public Security Committee](#)
- [San Diego Association of Governments \(SANDAG\) Board](#)
- [SANDAG Regional Planning Committee](#)
- [SANDAG Transportation Committee](#)



- [San Diego Regional Building Authority](#)
- [Taxicab Advisory Committee](#)

Membership of the Executive Committee is dictated by Board Policy 22. Similarly, membership on the Audit Oversight Committee is dictated by Board Policy 22, which designates all members of the Executive Committee as members of the Audit Oversight Committee, but allows the appointment of other Board members to that Committee at the Board's discretion. A simple majority of the Board present may waive any aspect of Board Policy 22 not required by state law.

The Chair Pro Tem nomination and election procedures are pursuant to Robert's Rules of Order as follows:

1. The Chair of the Board opens the agenda item.
2. The Chair requests nominations from the floor. Nominations do not require a second.
3. The Chair closes the nominations.
4. The Chair invites the candidate(s) to address the Board for 3 minutes.
5. The Chair asks for any Board discussion.
6. The Chair calls for the vote on each motion for each candidate.
7. The vote is taken on the motion(s) for each candidate based upon the order in which they were nominated. The vote continues until a candidate is elected.

/S/ Sharon Cooney

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Sharon Cooney  
Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)

Attachments: A. Proposed MTS Nominating Slate for 2024  
B. Board Policy No. 22  
C. Internal and External Meeting Schedules for 2024

**SLATE OF MTS COMMITTEES AND OUTSIDE AGENCY APPOINTMENTS**

Chair Vice Chair Chair Pro Tem	Stephen Whitburn – Chair (Term Expires (12/31/25)) Steve Goble – Vice Chair (Term Expires (12/31/25)) Monica Montgomery Steppe – Chair Pro Tem
MTS Accessible Services Advisory Committee (ASAC)	George Gastil – Chair
Airport Authority Advisory Committee	Mike Donovan – Committee Representative Ronn Hall – Alternate
MTS Audit Oversight Committee	Stephen Whitburn – Chair Steve Goble – Vice Chair Plus, Executive Committee (listed below)
MTS Budget Development Committee	Vivian Moreno – Chair Stephen Whitburn – Committee Representative Monica Montgomery Steppe – Committee Representative Steve Goble – Committee Representative John McCann – Committee Representative
MTS Executive Committee	Stephen Whitburn – Chair Monica Montgomery Steppe - County Representative ( <i>County Alternate: Nora Vargas</i> ) Steve Goble – Vice Chair Sean Elo-Rivera – City of San Diego Representative ( <i>Alternate: Joe LaCava</i> ) Caylin Frank – East County Representative ( <i>Alternate: Steve Goble</i> ) Marcus Bush – South Bay Representative ( <i>Alternate: Matthew Leyba-Gonzalez</i> ) Vivian Moreno – SANDAG Transportation Committee Representative ( <i>Alternate: Marcus Bush</i> )
Los Angeles - San Diego Rail Corridor Agency (LOSSAN) Board	Caylin Frank – Board Representative Vivian Moreno – Alternate
MTS Public Security Committee	Monica Montgomery Steppe – Chair Jose Rodriguez– Committee Representative Patricia Dillard – Committee Representative Carolina Chavez – Committee Representative Mike Donovan – Committee Representative Ronn Hall – Committee Representative
SANDAG Board	Matthew Leyba-Gonzalez – Board Representative Carolina Chavez – Alternate Patricia Dillard – 2 <sup>nd</sup> Alternate
SANDAG Regional Planning Committee	George Gastil – Committee Representative Patricia Dillard – Alternate
SANDAG Transportation Committee	Vivian Moreno – Committee Representative Marcus Bush – Alternate
San Diego Regional Building Authority	John McCann – Committee Representative
MTS Taxicab Advisory Committee	Sean Elo-Rivera – Chair



1255 Imperial Avenue, Suite 1000  
San Diego, CA 92101-7490  
(619) 231-1466 • FAX (619) 234-3407

## Policies and Procedures

No. 22

Board Approval: 6/13/19

**SUBJECT:**

RULES OF PROCEDURE FOR THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM (MTS) BOARD OF DIRECTORS

**PURPOSE:**

To define and clarify Board Rules of Procedure and incorporate them in Board Policy.

**BACKGROUND:**

In 1977, the Board adopted Rules of Procedure by resolution and from time to time amendments have been adopted. The Rules shall be contained in Board Policy for ease of reference and periodic updating. The Board is established and governed by the Mills-Deddeh Transit Development Act, set forth in the Sections 120000 through 120702 of the California Public Utilities Code (“MTS Enabling Legislation”). Section 120101 requires to the Board to “establish rules for its proceedings.” In the event the rules of procedure set forth herein conflict with the MTS Enabling Legislation, or other applicable law, the applicable law shall supersede these rules.

**22.1 Membership and Organization**

22.1.1 Membership in this Board is established by Sections 120050 through 120051.6 of the MTS Enabling Legislation.

22.1.2 The Board consists of 15 members selected as follows:

- a. One member of the County of San Diego Board of Supervisors appointed by the Board of Supervisors.
- b. Four members of the City Council of the City of San Diego, one of whom shall be the mayor, appointed by the City Council.
- c. One member of each city council appointed individually by the City Councils of the Cities of Coronado, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Poway, and Santee.



- d. Two members of the City Council of the City of Chula Vista, one of whom shall be the mayor, appointed by the City Council.
- e. The chairperson of the board shall be selected from the board membership by a two-thirds vote of the board, a quorum being present. The chairperson shall serve for a term of two years, except that he or she is subject to removal at any time by a two-thirds vote of the board, a quorum being present.

22.1.3 [RESERVED]

22.1.4 Alternate members of the Board shall be appointed as follows:

- a. The County of San Diego Board of Supervisors shall appoint as its alternate member a county supervisor not already appointed as the primary board member under Section 22.1.2(a), who represents one of the two supervisorial districts within MTS's jurisdiction with the greatest percentage of its area within the incorporated area of the County of San Diego.
- b. The City Councils of the Cities of Chula Vista, Coronado, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Poway, San Diego and Santee shall each individually appoint a member of their respective city councils not already appointed as a primary board member to serve as an alternate member for each member of the city on the board.
- c. At its discretion, a city council or the county board of supervisors may appoint a second alternate member to serve on the board in the event that neither a member nor the alternate member is able to attend a meeting of the board.

22.1.5 This Board shall exercise all powers authorized by the laws of the State of California.

22.1.6 Only the duly selected official representative, or in his or her absence his or her duly selected alternate, shall be entitled to represent a member agency in the deliberations of the Board.

22.1.7 Names of the official representatives and alternates shall be communicated in writing to the Board by each participating member agency and shall thereafter be annually communicated or reaffirmed prior to the February meeting of the Board and at such other times as changes in representation are made by member agencies.

- 22.1.8 The Board shall have the authority to appoint committees or subcommittees and may provide for the appointment of alternates to these committees or subcommittees.
- 22.1.9 Standing committees shall be appointed by the Board as may be required to carry out general and continuing functions and shall be abolished only upon specific action by the Board.
- 22.1.10 Ad hoc specialized subcommittees may be appointed by the Board as the need arises to accomplish specific tasks. Upon completion of its assignment, each ad hoc subcommittee shall disband.
- 22.1.11 Board members serving on such subcommittees shall be compensated as provided by Board ordinance. The Chief Executive Officer is authorized to enter into agreements to compensate individuals who were Board members at the time of their appointments to such subcommittees and who continue to serve on such subcommittees after their terms of office as Board members, subject to the same limitations as exist for compensation of Board members, and subject to replacement by the Board.

22.2 Meetings

- 22.2.1 On or before the first regular meeting of the Board in December of each year, the Board shall adopt a schedule of its meetings by date, time, and location for the coming year. The schedule of the meetings shall be published in the local newspaper of general circulation prior to the next regular meeting. The schedule of meetings shall also be published on the MTS website and posted at the MTS Executive Offices.
- 22.2.2 The Board may, when necessary, change the time and place of regular meetings. Notice of such change shall be posted pursuant to the Ralph M. Brown Act.
- 22.2.3 The Clerk of the Board shall forward written notice of the annual schedule of regular meetings and any changes thereto stating the dates, times, and locations to each member's agency and to the respective members and alternates of the Board and the standing committees.
- 22.2.4 Special meetings may be called and noticed under the provisions of the Ralph M. Brown Act as applicable and, specifically, Section 54956 of the California Government Code. The call and notice shall be posted in an area accessible to the public at least 24 hours prior to the meeting.

Special meetings normally shall be called by a majority of the Board or Executive Committee only upon a finding that



extraordinary circumstances require Board action prior to the next scheduled Board meeting, such as to discuss a work stoppage or significant litigation, or that a special meeting is necessary to hold a workshop, a joint meeting with another agency, or for other special purposes at a future date beyond the next Board meeting. The Chair may call such meetings only when such extraordinary circumstances arise after the last Board or Executive Committee meeting and Board action is required prior to the next regularly scheduled Board or Executive Committee meeting.

- 22.2.5 A majority of the members of the Board shall constitute a quorum for the transaction of business, and all official acts of the Board shall require the affirmative vote of a majority of the members of the Board present.
- a. After a vote of the members is taken, a weighted vote may be called by the members of any two jurisdictions in accordance with Section 120102.5 of the MTS Enabling Legislation and MTS Board Policy No. 27 (Weighted Vote).
- 22.2.6 Parliamentary procedure at all meetings shall be governed by Robert's Rules of Order Newly Revised except as otherwise modified herein.
- 22.2.7 Prior to each regular meeting, the Clerk of the Board shall forward a copy of the agenda to each member in accordance with the schedule adopted by the Board. The agendas shall also be mailed to each person or entity previously requesting such in writing. The Clerk shall post the agenda in an area accessible to the public at least 72 hours before the meeting in accordance with the Ralph M. Brown Act. Agenda materials shall be available as public record in accordance with the Ralph M. Brown Act and, specifically, Section 54957.5 of the California Government Code.
- 22.2.8 The Board may take action on items of business not appearing on the posted agenda in accordance with the Ralph M. Brown Act.
- 22.2.9 Requests for Board action may be initiated by any member of the Board or any staff officer.
- 22.2.10 Communication requests may be initiated by an individual and submitted to the Clerk by letter or on forms provided by the Clerk and must state the subject matter and the action which the writer wishes the Board to take. The Clerk shall review all communication requests so received and shall list them on the Board's docket under those items which the Clerk deems to be proper areas of discussion or action by the Board. When a Communications item is listed on the docket, it is not debatable and must be referred to an appropriate committee, other public agency, or to staff to prepare a report or response.

22.2.11 Any permanent rule of the Board as set forth herein and unless otherwise established by law may be suspended temporarily by a two-thirds vote of the members present.

22.3 Amendments

22.3.1 The Board shall be responsible for making all amendments to these rules.

22.3.2 Proposed amendments may be originated by the Board, or any member of such, or by the Chief Executive Officer.

22.3.3 Each proposed amendment shall be considered by the Board and a copy thereof forwarded by the Clerk of the Board to the official representative of each member agency.

22.4 Ordinances

22.4.1 Every ordinance shall be signed by the Chairperson of the Board and attested by the Clerk of the Board.

22.4.2 On the passage of all ordinances, the votes of the several members of the Board shall be entered on the minutes.

22.4.3 Ordinances shall not be passed at other than a regular meeting or at an adjourned regular meeting. However, an urgency ordinance may be passed at a special meeting. Except when, after reading the title, further reading is waived by regular motion adopted by unanimous vote of the Board members present, all ordinances shall be read in full either at the time of introduction or passage. When ordinances, other than urgency ordinances, are altered after introduction, they shall be passed only at a regular or at an adjourned regular meeting held at least five days after alteration. Corrections of typographical or clerical errors are not alterations within the meaning of this section.

22.4.4 Consistent with Section 120109 of the MTS Enabling Legislation, the Clerk of the Board shall cause a proposed ordinance or proposed amendment to an ordinance, and any ordinance adopted by the Board, to be published at least once, in a newspaper of general circulation published and circulated in the Board's area of jurisdiction.

22.4.5 The publication of an ordinance, as required by subdivision 22.4.4, may be satisfied by either of the following actions:

- a. The Board may publish a summary of a proposed ordinance or proposed amendment to an ordinance. The summary shall be prepared by the Clerk of the Board and General Counsel. The summary shall be published and a certified copy of the full text of the proposed ordinance or proposed amendment shall be posted in the office of the

Clerk of the Board at least five (5) days prior to the Board meeting at which the proposed ordinance or amendment is to be adopted. Within 15 days after adoption of the ordinance or amendment, the Board shall publish a summary of the ordinance or amendment with the names of those Board members voting for and against the ordinance or amendment, and the Clerk of the Board shall post in the office of the clerk a certified copy of the full text of the adopted ordinance or amendment along with the names of those Board members voting for and against the ordinance or amendment.

- b. If the person designated by the Board determines that it is not feasible to prepare a fair and adequate summary of the proposed ordinance or amendment, and if the Board so orders, a display advertisement of at least one-quarter of a page in a newspaper of general circulation in the Board's area of jurisdiction shall be published at least five (5) days prior to the Board meeting at which the proposed ordinance or amendment is to be adopted. Within 15 days after adoption of the ordinance or amendment, a display advertisement of at least one-quarter of a page shall be published. The advertisement shall indicate the general nature of, and provide information regarding, the adopted ordinance or amendment, including information sufficient to enable the public to obtain copy of the complete text of the ordinance or amendment and the name of those Board members voting for and against the ordinance amendment.

22.4.6 Ordinances shall take effect thirty days after their final passage. An ordinance takes effect immediately, if it is an ordinance for the immediate preservation of the public peace, health, or safety, containing a declaration of the facts constituting the urgency and is passed by a four-fifths vote of the Board.

## 22.5 Public Comment

22.5.1 At a public hearing of the Board, persons wishing to provide comment and testimony shall be permitted to address the Board after submitting a written request to speak to the Clerk identifying the person and the subject agenda item. The Chairperson may limit the time for each presentation and may permit additional time to speakers representing a group of individuals or organizations to avoid duplicative testimony. Ordinarily, each speaker will be allowed no more than three minutes.

22.5.2 Persons wishing to comment on agenda items other than a public hearing must submit a written request to speak in advance to the Clerk identifying the person and the subject agenda item. Comments must be limited to issues relevant to the particular agenda item. The Chairperson may limit the time for each presentation and may permit additional time to speakers

representing a group of individuals or organizations to avoid duplicative testimony. Ordinarily, each speaker will be allowed no more than three minutes.

22.5.3 Public comment on matters not on the agenda will be permitted on items of interest to the public that are within the subject matter jurisdiction of the Board. Persons wishing to comment must submit a written request in advance to the Clerk identifying the person and subject matter. The Chairperson may limit the time for each speaker. Ordinarily, each speaker will be allowed no more than three minutes.

## 22.6 Chairperson

Prior to the expiration of a Chairperson's term, the Executive Committee shall make a recommendation to the Board on whether to reelect the current Chairperson. In the event that the Board does not reelect a chairperson, or in the event of a vacancy in the position of Chairperson, the Executive Committee shall create an ad hoc nominating committee that shall, by whatever means it deems appropriate, recommend to the Board a candidate or candidates for the position of Chairperson. The Board shall then vote to elect a Chairperson in accordance with Section 22.1.2(e).

## 22.7 Election of Board Officers and Appointments to Committees

22.7.1 On or before the Board's first meeting in November, the Board shall appoint less than a quorum of members to an Ad Hoc Nominating Committee. The Ad Hoc Nominating Committee shall review the list of MTS committees and make recommendations to the Board with respect to the appointment of members of the Board or former Board members to serve on each MTS committee.

22.7.2 The Ad Hoc Nominating Committee shall also review the list of outside boards and/or committees and make recommendations to the Board with respect to the appointment of members of the Board to represent MTS on each outside board or committee.

22.7.3 The Ad Hoc Nominating Committee shall also make a recommendation to the Board with respect to the appointment of the Vice Chairperson and the Chair Pro Tem and any other board officers.

22.7.4 The Ad Hoc Nominating Committee shall forward its recommendations for appointments of officers and committee members on or before the first Board meeting in January.

22.7.5 At its first meeting in January, the Board shall elect a Vice Chairperson and a Chair Pro Tem from amongst its members. The Vice Chairperson shall preside in the absence of the Chairperson. In the event of the absence or inability to act by the Chairperson and Vice Chairperson, the Chair Pro Tem shall preside.

22.7.6 The Board shall then vote on the recommendations made by the Ad Hoc Nominating Committee with respect to all other committee appointments.

22.7.7 In the event that a Board member vacates his or her position on the Board, at the next meeting, the Chairperson shall take nominations from the floor to fill any opening in any Committee positions vacated by that Board member.

22.8 Executive Committee

22.8.1 The Executive Committee of the Board shall consist of the Chairperson, the Vice Chairperson (if he or she is not already a voting member), a member from the County of San Diego, a member from the City of San Diego, the Transportation Committee Representative (if he or she is not already a voting member), one member who represents the cities of Chula Vista, National City, Coronado, and Imperial Beach (the “South Bay Cities’ representative”), and one member who represents the cities of Lemon Grove, La Mesa, El Cajon, Poway, and Santee (the “East County Cities’ representative”). The South Bay Cities’ representative and the East County Cities’ representative shall serve as members of the Executive Committee for a term of two years each. The terms of these two members shall be staggered so as to avoid replacement of both members at the same time.

22.8.2 The East County and South Bay representatives shall serve in the following order:

East County: El Cajon, La Mesa, Lemon Grove, Santee, Poway—each serving a two-year term.

South Bay: Chula Vista, Coronado, Imperial Beach, National City—each serving a two-year term.

After each member has served as either the East County or South Bay representative, the rotation schedule shall repeat.

22.8.3 The alternates to the Executive Committee members shall be as follows:

22.8.3.1 The alternate for the County of San Diego shall be the alternate appointed by the County of San Diego to serve as the alternate for the Board.

2.8.3.2 The alternate for the City of San Diego shall be selected by the City of San Diego from amongst the three remaining City of San Diego Board members.

- 2.8.3.3 The alternates for the East County Cities' and the South Bay Cities' representatives shall be the representative from the city that is next in the rotation order set forth in section 22.8.2 above (for example, if the City of El Cajon is currently the primary Executive Committee member, then the City of La Mesa member shall be the alternate Executive Committee member). Alternates shall be appointed for a term of two years or such lesser term as necessary to coincide with the term of the member for whom the alternate is appointed.
- 22.8.4 The Vice Chairperson shall attend each Executive Committee meeting as a voting member. The Vice Chairperson shall serve as the alternate to the Chairperson in his or her absence and as a second alternate at large for any of the Executive Committee representatives and shall be a voting member when serving in this capacity.
- 22.8.5 At its first meeting in January, the Board shall vote on the Ad Hoc Nominating Committee's recommendation for the representative and alternate to the San Diego Association of Governments (SANDAG) Transportation Committee to serve for a term of one year. In the event that the Board votes to appoint a member of the Board who does not serve on the Executive Committee, then the appointed SANDAG Transportation Committee representative, or the alternate in his or her absence, shall attend the Executive Committee meetings as a voting member.
- 22.8.6 The primary purpose of the Executive Committee shall be to review and recommend consent items for the agenda of the next MTS Board of Directors meeting; add or delete items as appropriate; and provide input and direction on emerging policies, plans, and issues, in advance, for Board consideration. The Executive Committee shall have the authority to create ad hoc subcommittees for purposes of carrying out its duties and responsibilities.
- 22.8.7 Three members shall constitute a quorum of the Executive Committee, and a majority vote of the members present shall be required to approve any item. In the absence of a quorum, the Chairperson may review and recommend consent items for the agenda, establish the order of items, and add or delete items.
- 22.8.8 The Executive Committee shall adopt operating procedures as are necessary for the conduct of its business.
- 22.9 Audit Oversight Committee
- 22.9.1 The Audit Oversight Committee shall be comprised of the same members that make up the Executive Committee and such other



individuals as the Board may appoint at the first MTS Board meeting each calendar year. The Board may also appoint individuals who are not members of the Board to serve as non-voting advisory members to the Audit Oversight Committee

22.9.2 No additional compensation shall be paid to the members of the Audit Oversight Committee unless a meeting takes place on a day other than a regularly scheduled MTS Board meeting or MTS Executive Committee meeting. Compensation shall be paid to any additional voting members who are appointed to serve on the Audit Oversight Committee. No compensation shall be paid to any non-voting advisory member appointed by the MTS Board.

22.9.3 The primary duties and responsibilities of the Audit Oversight Committee shall be to ensure that management is maintaining a comprehensive framework of internal control, to ensure that management's financial reporting practices are assessed objectively, and to determine to its own satisfaction that the financial statements are properly audited and that any problems uncovered in the course of the audit are properly reported and resolved.

22.9.4 The Audit Oversight Committee shall:

- a. Review the scope of the annual financial statement audit and any other audits the committee feels are appropriate. The financial statement or CAFR audit should be conducted by an external, independent, public accounting firm experienced in municipal financial audits (external auditor).
- b. Review the purpose and scope of any nonaudit services to be performed by the external auditor.
- c. Oversee the procurement of the external auditor and any related advisory services with final approval by the Board.
- d. Oversee the preparation of annual financial statements, the annual financial reporting process, internal controls, and the external auditor using an appropriate degree of professional skepticism.
- e. Assess the performance of the external auditor.
- f. Provide a forum for internal auditor(s) to report findings during committee meetings. Internal auditor(s) are MTS employee(s) who report to management and primarily perform operational and compliance audits. In unusual circumstances involving significant fraud, waste, or abuse, the internal auditors must contact the Chairperson of the Audit Oversight Committee.

- g. Establish a procedure for receipt, retention, and treatment of complaints regarding accounting, internal controls, or auditing matters.

22.9.5

The Audit Oversight Committee shall perform the following tasks each year and, to the extent possible, adhere to this timetable:

- a. Prior to the fiscal year end, review the independent audit engagement letter.
- b. Prior to the fiscal year end establish a plan for review of the audits with external auditor.
- c. In October or November, review a draft of the Comprehensive Annual Financial Report
- d. Prior to the fiscal year end, review the management letter and management's response to the letter from the previous year.

22.9.6

At a minimum, and no later than the MTS Board meeting for the CAFR final adoption, the Audit Oversight Committee shall publically ask the following questions of MTS management and/or the external auditors:

- a. What is the name of the audit firm performing the audit, and how long has such firm been under contract to perform such audits?
- b. Was the audit performed in accordance with generally accepted auditing standards and generally accepted government auditing standards? If not, why?
- c. Has the external auditor prepared an unqualified opinion regarding the financial statements? If not, what type of opinion was issued and why?
- d. Did the external auditor issue a management letter?
- e. Did the external auditor find any nonmaterial weaknesses or reportable conditions?
- f. How did the external audit firm maintain its independence during the course of the audit?
- g. Describe, in general, the audit procedures performed.
- h. Were any new accounting principles adopted? If so, what was their effect?

- i. Does the external auditor recommend any changes in the accounting policies used or their application? Did management apply the best accounting principles or merely permitted ones?
- j. Describe any significant accounting adjustments affecting the financial statements (prior year as well as current year).
- k. Did the external auditor encounter any difficulties in dealing with management in performing the audit?
- l. Were there any disagreements with management regarding any accruals, estimates, reserves, or accounting principles?
- m. Did the external auditor have the full cooperation of MTS management and staff?
- n. Assess the quality of the accounting, internal controls, and the competency of staff.
- o. Were there any accounting issues on which the audit firm sought the advice of other audit firms or regulatory bodies?
- p. Are there new pronouncements and/or risks affecting future financial statements which the Audit Oversight Committee should be aware of?

22.9.8 A majority of the members of the Audit Oversight Committee shall constitute a quorum, and a majority vote of the members present shall be required to approve any item.

22.9.9 The Audit Oversight Committee shall adopt operating procedures as are necessary for the conduct of its business.

22.10 Board Member Standards of Conduct

22.10.1 The purpose of this policy is to emphasize that each Board member occupies a position of public trust that demands the highest moral and ethical standard of conduct.

22.10.2 This policy shall be supplemental and in addition to the Conflict of Interest Code of the Board and any applicable laws or regulations (including, but not limited to, the Brown Act, Government Code section 1090 and the Political Reform Act) and is not intended to supersede any provisions thereof.

22.10.3 Board members shall not engage in any business or transaction or have a financial or other personal interest, actual, potential, or

apparent, which is incompatible with the proper discharge of his or her official duties or would tend to impair his or her independence of judgment or action in the performance of such duties. Such business, transaction, or interest shall constitute a conflict of interest.

22.10.4

No Board member shall engage in any enterprise or activity that shall result in any of the following:

- a. Using the prestige or influence of the Board office for private gain or advantage of the member or another person.
- b. Using time, facilities, equipment, or supplies of the Board for the private gain or advantage of the member or another person.
- c. Using official information not available to the general public for private gain or advantage of the member or another person.
- d. Receiving or accepting money or other consideration from anyone other than the Board for the performance of acts done in the regular course of duty.
- e. Receiving or accepting, directly or indirectly, any gift or favor from any one doing business with the Board under circumstances from which it could reasonably be inferred that such was intended to influence such person in such person's duties or as a reward for official action.
- f. Soliciting any gift or favor in such person's official capacity, either directly or indirectly, when such solicitation might reasonably be inferred as to have a potential effect on such person's duties or decision, or when the individual's position as a Board member would in any way influence the decision of the person being solicited.
- g. Engaging in or accepting private employment or rendering services for private interest, direct or indirect, which may conflict with such person's responsibility or duty, or which, because of that person's position, may influence a decision to the benefit of the organization in which such person has an interest.

22.10.5

If a Board member has an actual, potential, or apparent conflict of interest in the subject of an agenda item, and the Board will make a decision regarding this agenda item during an open session meeting, the Board member must recuse himself or herself or, in the case of uncertainty, request a binding determination from the Board's General Counsel. If the Board member has a conflict, he

or she may observe, but not participate, in the decision-making process.

- 22.10.6 If a Board member has an actual, potential, or apparent conflict of interest in the subject of an agenda item to be discussed during a closed session meeting, the Board member shall be disqualified and not present during such discussion so as not to make, participate in making, or in any way attempt to use his or her official position to influence the discussion or decision. In such case, the Board member must recuse himself or herself or, in the case of uncertainty, request a binding determination from the Board's General Counsel. In accordance with the Brown Act, the Board member would be entitled to any information that is publicly reported. The Board member would not, however, be privy to any confidential or privileged information or communications pertaining to the closed session agenda item.
- 22.10.7 No Board member shall disclose to any person, other than members of the Board and other Board staff designated to handle such confidential matters, the content or substance of any information presented or discussed during a closed session meeting unless the Board authorizes such disclosure by the affirmative vote by a majority of the Board.
- 22.10.8 No Board member may disclose confidential or privileged information or communications to any person other than a Board member, General Counsel to the Board, or other Board staff designated to handle such matters, unless disclosure is mandated by law or the Board authorizes such disclosure by the affirmative vote of a majority of the Board.
- 22.10.9 A Board member shall not be privy to confidential or privileged information or communications concerning threatened, anticipated, or actual litigation affecting the Board where the Board member has an actual, potential, or apparent conflict of interest. In the case of uncertainty as to whether a conflict of interest exists, the Board's General Counsel shall issue a binding determination.
- 22.10.10 No Board member shall represent a position on an issue to be the Board's unless the Board has formally adopted such position at a public meeting.
- 22.10.11 Any violation of this policy shall constitute official misconduct if determined by an affirmative vote of the majority of the Board in an open and public meeting. The Board may elect to censure the Board member and the violation may be subject to criminal and/or civil penalties as provided for by applicable law.

Original Policy approved on 4/5/84.  
Policy revised on 1/12/84.

Policy revised on 7/11/85.  
Policy revised on 1/8/87.  
Policy revised on 1/11/90.  
Policy revised on 8/23/90.  
Policy revised on 1/10/91.  
Policy revised on 3/24/94.  
Policy revised on 1/14/99.  
Policy revised on 6/14/01.  
Policy revised on 1/10/02.  
Policy revised on 1/24/02.  
Policy revised on 5/8/03.  
Policy revised 2/26/04.  
Policy revised 1/12/06.  
Policy revised 3/9/06.  
Policy revised 3/23/06.  
Policy revised 6/14/07.  
Policy revised 7/19/07.  
Policy revised 2/21/08.  
Policy revised 12/11/08.  
Policy revised 2/12/15.  
Policy revised 11/10/16.  
Policy revised 11/9/2017, changes effective 1/1/2018.  
Policy revised 6/13/2019.





**Metropolitan  
Transit  
System**

**2024**

**BOARD OF DIRECTORS AND EXECUTIVE COMMITTEE MEETING SCHEDULE**

In-Person Participation: James R. Mills Building, 1255 Imperial Avenue, 10th Floor, San Diego CA 92101

Virtual Participation: 1(669) 444-9171; **EC** Webinar ID: 945 6218 8418; **Board** Webinar ID: 982 8803 2362

<b>Executive Committee Meetings Thursdays at 9:00 a.m.</b>	<b>Board Meetings Thursdays at 9:00 a.m.</b>
January 11	January 18
February 1	February 8
March 7	March 14 (Finance Workshop)
April 11	April 25 (Finance Workshop)
May 9	May 16 (Public Hearing)
June 13	June 20
July 11	July 18
<b>August NO MEETING</b>	<b>August NO MEETING</b>
September 5	September 12
October 10	October 17
November 7	November 14
December 12	December 19

**1255 Imperial Avenue, Suite 1000, San Diego, CA 92101-7490 • (619) 231-1466 • [sdmts.com](http://sdmts.com)**

San Diego Metropolitan Transit System (MTS) is a California public agency comprised of San Diego Transit Corp., San Diego Trolley, Inc. and San Diego and Arizona Eastern Railway Company (nonprofit public benefit corporations). MTS member agencies include the cities of Chula Vista, Coronado, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Poway, San Diego, Santee, and the County of San Diego. MTS is also the For-Hire Vehicle administrator for nine cities.



# 2024 LOSSAN EXECUTIVE AND BOARD MEETINGS CALENDAR



Oct. C, Al 3, 01/18/23

JANUARY						
SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
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FEBRUARY						
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MARCH						
SUN	MON	TUE	WED	THU	FRI	SAT
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31						

APRIL						
SUN	MON	TUE	WED	THU	FRI	SAT
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MAY						
SUN	MON	TUE	WED	THU	FRI	SAT
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JUNE						
SUN	MON	TUE	WED	THU	FRI	SAT
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30						

\*Gold Coast Transit (201 E. 4th St., Oxnard) at 1:15 p.m.

JULY						
SUN	MON	TUE	WED	THU	FRI	SAT
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AUGUST						
SUN	MON	TUE	WED	THU	FRI	SAT
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SEPTEMBER						
SUN	MON	TUE	WED	THU	FRI	SAT
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29	30					

\*LA Metro (1 Gateway Plaza, Los Angeles) at 12:15 pm

OCTOBER						
SUN	MON	TUE	WED	THU	FRI	SAT
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27	28	29	30	31		

NOVEMBER						
SUN	MON	TUE	WED	THU	FRI	SAT
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DECEMBER						
SUN	MON	TUE	WED	THU	FRI	SAT
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29	30	31				

\*North County Transit District (810 Mission Ave., Oceanside) at 1 p.m.

**LOSSAN Executive meeting**  
9:00 a.m.: Meetings will take place at the OCTA headquarters

**LOSSAN Board of Directors regular meeting**  
1:15 p.m.: Meetings will take place at the OCTA headquarters unless otherwise noted

**Holidays**

**2024 Legislative Calendar of Meetings of the SANDAG Board of Directors and Policy Advisory Committees**

<b>Audit Committee</b> 9 a.m.	<b>Regional Planning Committee</b> 1 p.m.	<b>Executive Committee</b> 9 a.m.	<b>Board of Directors</b> 10 a.m.	<b>Transportation Committee</b> 9 a.m.	<b>Public Safety Committee</b> 1 p.m.	<b>Board of Directors</b> 9 a.m.	<b>Borders Committee</b> 1 p.m.
January 5, 2024	January 5, 2024	January 12, 2024	January 12, 2024	January 19, 2024	-----	January 26, 2024	January 26, 2024
February 2, 2024	-----	February 9, 2024	February 9, 2024	February 16, 2024	February 16, 2024	February 23, 2024	February 23, 2024
March 1, 2024	March 1, 2024	March 8, 2024	March 8, 2024	March 15, 2024	-----	March 22, 2024	March 22, 2024
April 5, 2024	-----	April 12, 2024	April 12, 2024	April 19, 2024	April 19, 2024	April 26, 2024	April 26, 2024
May 3, 2024	May 3, 2024	May 10, 2024	May 10, 2024	May 17, 2024	-----	May 24, 2024	May 24, 2024
June 7, 2024	-----	June 14, 2024	June 14, 2024	June 21, 2024	June 21, 2024	June 28, 2024	June 28, 2024
July 5, 2024	July 5, 2024	July 12, 2024	July 12, 2024	July 19, 2024	-----	July 26, 2024	July 26, 2024
NO SCHEDULED MEETINGS IN AUGUST							
September 6, 2024	September 6, 2024	September 13, 2024	September 13, 2024	September 20, 2024	-----	September 27, 2024	September 27, 2024
October 4, 2024	-----	October 11, 2024	October 11, 2024	October 18, 2024	October 18, 2024	October 25, 2024	October 25, 2024
November 1, 2024	November 1, 2024	November 8, 2024	November 8, 2024	November 15, 2024	-----	November 22, 2024	November 22, 2024
December 6, 2024 <b>at 1 p.m.</b>	-----	December 6, 2024	December 6, 2024	December 13, 2024	December 13, 2024	December 20, 2024	December 20, 2024

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# San Diego Regional Building Authority (SDRBA)

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<p style="text-align: center;"><b>2024 MEETING SCHEDULE</b></p>
<p>In-person and teleconference participation will be posted on the agenda of each respective meeting.</p>
<p style="text-align: center;">Thursday, May 16, 2024 at 3:00pm</p>

In the event a quorum cannot be reached on the above date, the Clerk of the Authority shall have the right to identify and publicly notice an alternate meeting date in May 2024, so long as such actions comply with the Brown Act

MINUTES  
MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS

December 14, 2023

[Clerk's note: Except where noted, public, staff and board member comments are paraphrased. The full comment can be heard by reviewing the recording at the [MTS website](#).]

**1. Roll Call**

Chair Whitburn called the Board meeting to order at 9:03 a.m. A roll call sheet listing Board member attendance is attached.

**2. Public Comment**

Chair Whitburn announced that, due to the number of items on the agenda and limited time available, public comment would be reduced to one minute for all public commenting periods.

Henry Agnew – Provided a written and verbal statement to the Board both during and prior to the meeting. The written comment is provided in the December 14, 2023 Final Meeting Packet. Henry asked that SANDAG and MTS prioritize the Trolley to the airport connection and referenced a potential route idea.

Louis Pruitt – Provided a verbal statement to the Board during the meeting. Louis asked the Board to incorporate a 901 Express with Monday through Friday service, from 7:00 a.m. to 5:00 p.m.

Valerie Hightower – Provided a verbal statement to the Board during the meeting. Valerie believed that drivers were disrespectful, asked for additional security and restrooms.

Alex Wong – Provided a verbal statement to the Board during the meeting. Alex supported the Automated People Mover to the airport due to frequency benefits.

Truth – Provided a verbal statement to the Board during the meeting. Truth stated an anecdotal account of security concerns.

The Original DRA – Provided a verbal statement to the Board during the meeting. The Original DRA expressed dissatisfaction with the one-minute public comment time allocation, lack of bathrooms and security.

**CONSENT ITEMS:**

**3. Approval of Minutes**

Action would approve the November 9, 2023 Board of Directors meeting minutes.

**4. San Diego and Arizona Eastern (SD&AE) Railway Company Board of Directors Meeting on October 17, 2023 – Report Update**

Action would receive the reports to the SD&AE Board of Directors at its meeting on October 17, 2023 for the San Diego and Imperial Valley Railroad (SD&IV), Pacific Southwest Railway Museum Association (Museum), and Desert Line activities for information.

**5. PRONTO Extend Pilot Program – Pilot Extension**

Action would approve a six-month extension of the PRONTO Extend Pilot Program, extending the pilot until June 30, 2024.

- 6. Approve the Fiscal Year (FY) 2023-24 State Transit Assistance (STA) Claim and STA Interest Claim**  
Action would adopt Resolution No. 23-12 approving the FY 2023-24 STA claim.
- 7. Clean California Local Grant Program (Cycle 2) Beyer Blvd Pathway Beautification – Grant Project Funding Determination Project is Exempt from Environmental Review under the California Environmental Quality Act and approval of Project**  
Action would approve Resolution No. 23-13 in order to: 1) Authorize the use of FY 2023-24 Clean California grant funding in the amount of, \$1,604,000 for the Beyer Blvd Pathway Beautification Project; and 2) Authorize \$535,000 in local match funding for the Beyer Blvd Pathway Beautification Project and 3) Determine that Project is exempt from environmental review under the California Environmental Quality Act; and 4) Approve the Project.
- 8. Clean California Local Grant Program (District Transit Partnership Program) South Bay Transit Beautification – Grant Project Funding**  
Action would approve Resolution No. 23-14 in order to authorize the use of FY 2023-24 Clean California grant funding in the amount of \$1,001,000 for the South Bay Transit Beautification Project.
- 9. SD100 Light Rail Vehicle (LRV) Replacement Project – Funds Transfer**  
Action would 1) Approve the transfer of Federal Transit Administration (FTA) Section 5337 funding in the amount of \$2,640,000 from the Downtown Parallel Cable Project to the SD100 LRV Replacement Project; and 2) Approve the transfer of FTA Section 5337 funding in the amount of \$851,766 from the A-Yard Catenary Replacement Project to the SD100 LRV Replacement Project to continue the 47 Siemens SD10 LRV vehicle replacement.
- 10. Amendments to County and MTS Sublease (Mills Building)**  
Action would authorize the Chief Executive Officer (CEO) to execute an Amendment to Sublease between MTS and the County of San Diego (County) related to the Mills Building located at 1255 Imperial Avenue in San Diego.
- 11. Addition of Six (6) Full Time Equivalent Positions: Capital Projects, Procurement and Human Resources Departments – Additional Staffing**  
Action would authorize the Chief Executive Officer (CEO) to add two (2) Project Managers, two (2) Procurement Specialists and two (2) Talent Acquisition Specialists to the position tables previously approved in the Fiscal Year 2024 budget.
- 12. Addition of One (1) Full Time Equivalent Position: Information Technology (IT) Department – Additional Staffing**  
Action would authorize the Chief Executive Officer (CEO) to add one (1) ETL Developer to the position tables for the IT Department previously approved in the Fiscal Year 2024 budget.
- 13. Addition of Four (4) Full Time Equivalent Positions and Conversion of Five (5) Part Time Positions to Full Time Status: San Diego Trolley Inc. (MTS Rail Division) – Additional Staffing**  
Action would approve the creation of Four (4) Roadway Worker Supervisor positions and Conversion of Five (5) Part-Time Train Operator positions to Full-Time in the Rail Division position tables previously approved in the Fiscal Year 2024 budget.

- 14. Wheel Truing Machine – Sole Source Contract Award**  
Action would authorize the Chief Executive Officer (CEO) to execute MTS PWL369.0-23, with NSH USA Corporation (NSH) for the purchase and installation of a Hegenscheidt U2000-150 Under-Floor Wheel-Truing Machine in the amount of \$2,152,578.00.
- 15. SD8 Power Axles Overhaul - Sole Source Contract Award**  
Action would authorize the Chief Executive Officer (CEO) to: 1) Execute MTS Doc. No. L1647.0-23 with Siemens Mobility, Inc. at \$15,477,856.50 (including sales tax), to overhaul two-hundred and sixty-nine (269) power axles on the entire fleet of SD8 vehicles, over the next seven (7) years; and 2) Approve a 20% Contingency of up to \$3,095,571.30 for any out of scope repair needs that are discovered during the overhaul process.
- 16. MTS Collateral Distribution Services – Contract Award**  
Action would authorize the Chief Executive Officer (CEO) to: 1) Execute MTS Doc. G2840.0-24, with Certified Folder Display Service, Inc. (Certified Folder), for Collateral Distribution Services for a four (4) year base period with two (2) 1-year options for a total cost of \$182,360.16; and 2) Exercise the option years at the CEO's discretion.
- 17. Non-Revenue Vehicles - Body Shop Repairs – Contract Award**  
Action would authorize the Chief Executive Officer (CEO) to execute MTS Doc No. G2758.0-23, with Carlos Guzman, Inc. (Guzman), a Disadvantage Business Enterprise (DBE), for the provision of non-revenue vehicles body shop repairs services for five (5) years, for a total of \$623,765.24.
- 18. A-Yard Asphalt Resurfacing and Repairs – Work Order Agreement**  
Action would authorize the Chief Executive Officer (CEO) to execute Work Order MTSJOC347-27 under Job Order Contract (JOC) to MTS Doc. No. PWG347.0-22, with ABC General Contractor, Inc. (ABC GC), in the amount of \$578,092.38 for the resurfacing and repair of the asphalt at the San Diego Trolley Inc. (SDTI) Facilities Maintenance A-Yard (A-Yard).
- 19. Blue Line Right of Way Retaining Wall – Work Order Amendment**  
Action would authorize the Chief Executive Officer (CEO) to execute Change Order (CCO) 2 to Work Order No. MTSJOC348-01.02 under Job Order Contract (JOC) MTS Doc. No. PWG348.0-22 with Veterans Engineering Inc. (Veterans) in the amount of \$865,530.74 for the additional sheet pile depth and thickness required for the installation of 550 linear feet of a new sheet pile retaining wall near Switch 85 along the Blue Line Right of way.
- 20. Closed Circuit Television (CCTV) Maintenance Services – Contract Amendment**  
Action would 1) Ratify Amendment 2 to MTS Doc. No. PWG335.0-21 with Electro Specialty Systems (ESS), a Small Business (SB), in the amount of \$125,000.00; and 2) Authorize the Chief Executive Officer (CEO) to execute Amendment 3 to MTS Doc. No. PWG335.0-21 with ESS, in the amount of \$1,526,933.47, for a total of \$1,651,933.47.

- 21. Regional Transit Management System (RTMS) Mt. Soledad Radio Tower – Site Lease Amendment**  
Action would authorize the Chief Executive Officer (CEO) to execute MTS Doc. No. B0513.7-09, with the Department of the Navy, in the amount of \$537,793.13, to exercise the final 5-year option of the Mt. Soledad Signal Station radio tower lease.
- 22. Janitorial Services Supplies – Contract Award**  
**Action would** authorize the Chief Executive Officer (CEO) to: 1) Execute MTS Doc. No. G2835.0-24 with Interboro Packaging Corporation (Interboro) to furnish janitorial supplies for five (5) years in the amount of \$17,305.15; 2) Execute MTS Doc. No. G2836.0-24 with Pacific Star Corporation (Pacific Star) to furnish janitorial supplies for five (5) years in the amount of \$61,020.06; 3) Execute MTS Doc. No. G2837.0-24 with Supply Solutions to furnish janitorial supplies for five (5) years in the amount of \$570,710.89; 4) Execute MTS Doc. No. G2838.0-24 with Waxie Sanitary Supply (Waxie) to furnish janitorial supplies for five (5) years in the amount of \$1,873,707.02; for a grand total of \$2,718,255.71.
- 23. Disadvantaged Business Enterprise (DBE) Awards and Payments – Semiannual Uniform Report**
- 24. Fixed-Route and Paratransit Bus Services – Transdev Contract Amendments**  
Action would authorize the Chief Executive Officer (CEO) to: 1) Execute Amendment No. 5 to MTS Doc, No. B0708.0-20 with Transdev Services, Inc., (Transdev) for fixed-route bus services to authorize \$439,946 to be allocated to additional wages and benefits provided to the East County division bus operators and South Bay division road supervisors and dispatchers represented by ATU 1309; and 2) Execute Amendment No. 11 to MTS Doc. B0703.0-19 with Transdev (as successor-in-interest to First Transit, Inc.) for fixed-route minibus and ADA paratransit bus services, to authorize \$750,000 to be allocated to additional wages and benefits provided to the Copley Park division bus and paratransit operators represented by Teamsters Local 542.
- 25. Approve the Fiscal Year (FY) 2022-23 State Transit Assistance (STA) Claim Amendment**  
Action would adopt Resolution No. 23-13 approving the FY 2022-23 STA claim amendment.
- 26. Open County of San Diego Investment Account**  
Action would adopt Resolution No. 23-16 (Attachment A) and authorize the Chief Executive Officer (CEO) to add an MTS-owned County of San Diego investment account which will support Senate Bill (SB) 125 specific funded projects.
- 27. Project Labor Agreement (PLA) and Monitoring Support Services**  
Action would authorize the Chief Executive Officer (CEO) to: 1) Execute the negotiated PLA between MTS and the San Diego County Building and Construction Trades Council (Building Trades); 2) Authorize the CEO to award and execute MTS Doc. G2540.0-22 with TSG Enterprises, Inc. dba The Solis Group (TSG), a Disadvantaged Business Enterprise (DBE), for PLA Monitoring Support Services for a three (3) year-base period with two (2) optional 1-year extensions in the amount of \$1,593,484.02; and 3) At the CEO's discretion, exercise the option years in MTS Doc. No. G2540.0-22.



**28. 2024 Legislative Program**

Action would approve the 2024 Legislative Program.

**Public Comment for item 24**

Jose Puga – Representing Teamsters 683 made a verbal statement to the Board during the meeting. Jose noted Transdev’s contract extension tendencies with other agencies throughout the nation.

Ayanna Mayfield – A Bus Operator made a verbal statement to the Board during the meeting. Ayanna expressed difficulty with restroom availability on 13<sup>th</sup> and Broadway, Old Town, and Iris Ave stations. Ayanna discussed some issues including encampments near the facilities and poor restroom cleanliness.

**Public Comment for item 27**

Associated Contractors of America – Provided a written statement to the Board prior to the meeting. The written comment is provided in the December 14, 2023, Final Meeting Packet.

Carol Kim – Representing the San Diego County Building and Construction Trades Council made a verbal statement to the Board during the meeting. Carol supported the item and looked forward to the partnership the PLA contract would create with MTS.

Dustin Steiner – Representing Associated General Contractors of San Diego made a verbal statement to the Board during the meeting. Dustin opposed the item and referenced a PLA project that SANDAG awarded.

Cori Shumacher – Representing IBEW 569 made a verbal statement to the Board during the meeting. Cori supported the item for the financial and physical safety that is fostered in local communities.

Kelvin Barrios – Representing Local 89 made a verbal statement to the Board during the meeting. Kelvin supported the item and believed that the contract was beneficial for the local workforce.

**Public Comment for Other Consent Items**

Truth – Provided a verbal statement to the Board during the meeting. Truth commented on items 5, 6, 25, 11, 12, 13, 23, 27, 28 and expressed dissatisfaction with (5) youth receiving free transit rather than seniors, (6 and 25) transit funding allocation, (11-13) additional MTS staff, (18) the cost of a retaining wall, (22) cleanliness of the station, (23) concern about artificial intelligence taking jobs, (24) cost of inflation adjustment increases, (27) PLA contract costs and TSG Enterprise consultant cost, (28) the agency’s lack of fare box recovery and personal identifiable information.

The Original DRA – Provided a verbal statement to the Board during the meeting. The Original DRA expressed frustration with the one-minute public comment time allocation and believed that legislative priorities should focus on restroom access for the public and employees.

Jarrold Caswell – A resident of Imperial Beach made a verbal statement to the Board during the meeting. Jarrold expressed dissatisfaction with Route 227’s Imperial Beach service area and asked staff to consider an alternative route.

### **Board Comment**

Board Member Elo-Rivera expressed appreciation for the PRONTO Extend and Youth Opportunity Pass Program.

### **Action on Recommended consent item 27**

Board Member Dillard moved to approve Consent Agenda Item No. 27. Board Member Elo-Rivera seconded the motion, and the vote passed with 7 in favor (Board Member Chavez, Board Member Montgomery Steppe, Board Member Dillard, Board Member Mendoza, Board Member Bush, Board Member Elo-Rivera and Chair Whitburn), 3 opposed (Board Member Frank, Board Member Hall, Board Member Donovan), 1 recusal from Board Member Leyba-Gonzalez, and Board Member Gonzalez, Vice Chair Goble, Board Member Moreno and Board Member Gloria absent.

### **Action on Recommended Consent Items, Excluding Consent Item 27**

Board Member Dillard moved to approve Consent Agenda Item Nos. 3 to 28, excluding item 27. Board Member Elo-Rivera seconded the motion, and the vote was 10 to 0 in favor, with Board Member Gonzalez, Vice Chair Goble, Board Member Moreno, Board Member Leyba-Gonzalez, and Board Member Gloria absent.

## **DISCUSSION ITEMS AND REPORT ITEMS (ITEMS TAKEN OUT OF ORDER):**

### **29. Senate Bill (SB) 125 Allocation Package (Denis Desmond)**

Denis Desmond, MTS Director of Planning, presented on the SB 125 Allocation Package. He outlined: the state budget, legislative intent, social equity details, Zero Emission Transit Capital Program (ZETCP) proposed projects, Transit and Intercity Rail Capital Program (TIRCP) proposed projects, and staff's recommendation.

#### **Public Comment**

Billingsley Alfreda – Provided a verbal statement to the Board prior to the meeting. The written comment is provided in the December 14, 2023, Final Meeting Packet.

Dave Nearing – Provided a verbal statement to the Board prior to the meeting. The written comment is provided in the December 14, 2023, Final Meeting Packet.

Adian Chowdhury - Provided a verbal statement to the Board prior to the meeting. The written comment is provided in the December 14, 2023, Final Meeting Packet.

Katrine Field - Provided a verbal statement to the Board prior to the meeting. The written comment is provided in the December 14, 2023, Final Meeting Packet.

Rosa Sanchez – A resident of City Heights made a verbal statement to the Board during the meeting. Rosa expressed support for the implementation of the Border to Downtown bus by FY 2025.

Fany Esquivel – A resident of City Heights made a verbal statement to the Board during the meeting. Fany requested additional service on Route 235 by FY 2025.

Mayra Valadez – A resident of City Heights made a verbal statement to the Board during the meeting. Mayra requested additional frequency and equal weekend service on Route 10 by FY 2025.

Carolina Martinez – Representing Environmental Health Coalition made a verbal statement to the Board during the meeting. Carolina supported the proposed frequency improvements and advocated that the Border to Downtown route be implemented by FY 2025.

Vanessa Lopez – A resident of City Heights made a verbal statement to the Board during the meeting. Vanessa advocated for 24-hour service for the Blue Line within FY 25.

Truth – Provided a verbal statement to the Board during the meeting. Truth expressed support for higher service frequency and dissatisfaction with operation costs, security, and cleanliness on the system.

The Original DRA – Provided a verbal statement to the Board during the meeting. The Original DRA expressed health and safety concerns with lithium battery powered buses.

### **Board Comments**

Board Member Moreno expressed concern with the agency's ability to provide additional overnight downtown to the Border service due to the ongoing driver shortage. Sharon Cooney, MTS Chief Executive Officer, replied that while the agency continues to have a driver shortage, it is feasible to support the service. Mr. Desmond added that with strategic planning and the necessary board approvals, the agency can plan to prioritize the route, once funding resources are available. Board Member Moreno asked for an item to be brought to the Board at the beginning of 2024 to discuss the bus driver shortage, explaining the cause and proposed strategies. She hoped that by solving the driver shortage, the agency could accelerate the implementation of the Border to Downtown bus route to FY 25.

Board Member Bush made an amendment to the motion to accelerate bus frequencies and implementation of the Border to Downtown bus route to FY 25. He noted that if there continued to be impending driver shortages, that staff can adjust accordingly and believed the new route was important. Board Member Moreno asked staff to clarify if this acceleration request was feasible. Mr. Desmond confirmed that it was feasible. He stated that the agency aims to do service restoration and additional service improvements and noted that there was some prioritization flexibility. Board Member Moreno accepted the amendment. Ms. Cooney asked if the motion would be to prioritize the Border to Downtown route over other route improvements. He clarified that his intent was not to prioritize over other projects but would like advancements to bus frequencies and the Border to Downtown bus route to FY 25. Ms. Cooney noted that the prioritization would be based on driver retention and hiring. Ms. Cooney added that while this could be done, prioritizing the proposed amendment would delay the restoration of other routes. Board Member Moreno noted that because staff stated that the prioritization was possible, she would support the amendment to advocate for the service to be implemented. Karen Landers, MTS General Counsel, noted two issues at hand, 1) a plan document that was pending submittal to the state for funding consideration, and 2) project acceleration of the two proposed projects. She asked Mr. Desmond to clarify if any of the direction from the Board to accelerate projects require changes to the Allocation Package application. Staff confirmed that changes would need to be made to the Allocation Package to reflect the motion. Mr. Desmond clarified that it is also possible to amend the plan once it has been submitted to include the timeline changes proposed by Board Member Bush. Ms. Landers provided a proposed solution for the

Board to consider in which the plan could be approved as is today, and the Board could create a separate direction for staff to accelerate the implementation of bus frequencies and implementation of the Border to Downtown bus route to FY 25 and bring back any applicable Allocation Package changes at a future date. Board Member Hall commented that the application submission should be prioritized, and agreed that project prioritization could be amended at a later date. Ms. Cooney suggested that the Board make two motions, one to approve the staff recommendation and one to direct staff to return with a plan to expedite the requested services. Chair Whitburn noted that because there was not a second to Board Member Bush's original motion, the Board would move forward with acting on the original staff recommendation and then make a separate motion directing on future service adjustments.

Board Member Chavez supported the package being submitted as soon as possible. She reiterated the importance of frequency enhancements for the benefit of the community. She also supported 24-hour service or, at a minimum, extending hours to support riders.

Board Member Montgomery Steppe supported fleet electrification, and increasing trolley frequencies, particularly the Orange Line. She noted her continued advocacy for East County trolley frequency proposed in the current plan. She also advocated for more reliability for Route 961 and encouraged the ideas and projects generated by Elevate SD to be incorporated in the SB 125 discussions.

Board Member Bush made a substitute motion to approve the staff recommendation and include the change to advance the 24-hour Border to Downtown route to FY 25 and advance bus service frequencies to FY 25. Board Member Montgomery Steppe expressed concerns about the impacts that may have on the frequencies for the Orange Line. Board Member Bush stated that his expectation with the substitute motion is for staff to return to the Board should there be any project displacement concerns. Ms. Cooney noted that if the substitute motion was approved, staff would have to change the allocation package, delaying its submission to the state. Board Member Bush acknowledged the submittal delay and retracted his substitute motion.

### **Actions Taken**

Board Member Moreno moved to approve the SB 125 Allocation Package. Board Member Hall seconded the motion, and the vote was 12 to 0 in favor with Board Member Gonzalez, Board Member Goble and Board Member Gloria absent.

Board Member Bush moved to direct staff to come back to the Board with a plan or proposal to accelerate bus service enhancements and the overnight Border to Downtown services by FY 25. Board Member Elo-Rivera seconded the motion, and the vote was 12 to 0 in favor with Board Member Gonzalez, Board Member Goble and Board Member Gloria absent.

### **CLOSED SESSION (ITEMS TAKEN OUT OF ORDER):**

The Board convened to Closed Session at 10:21 a.m.

### **33. Closed Session – Conference with Real Property Negotiators Pursuant to California Government Code Section 54956.8**

5801 and 5805 Fairmount Ave, San Diego, CA (APNs 461-320-20 and 461-320-21)  
Agency Negotiators: Sharon Cooney, Chief Executive Officer; Karen Landers, General Counsel; Heather Furey, Director of Capital Projects; Sean Myott, Manager of Real Estate Assets;

Negotiating Parties: Four D Properties, Inc.  
Under Negotiation: Price and Terms of Payment

**34. Closed Session – Conference with Real Property Negotiators Pursuant to California Government Code Section 54956.8**

Northwest Corner Federal Boulevard and 47th Street, San Diego, CA (APN 541-611-27)  
Agency Negotiators: Sharon Cooney, Chief Executive Officer; Karen Landers, General Counsel; Heather Furey, Director of Capital Projects; Sean Myott, Manager of Real Estate Assets; Chip Willett, Bender Rosenthal, Inc.; David Skinner, Meyers Nave  
Negotiating Parties: Lone Oak – San Diego III, LLC  
Under Negotiation: Price and Terms of Payment

**35. Conference with Legal Counsel—Anticipated Litigation**

Significant exposure to litigation pursuant to Government Code Section 54956.9(d)(2) and (e)(5): (1 Potential Case)

**36. Closed Session – Conference with Legal Counsel – Existing Litigation Pursuant to California Government Code Section 54956.9(d)(1)**

Grecia Figueroa v Nathan Fletcher, San Diego Metropolitan Transit System, et al.  
San Diego Superior Court Case No. 37-2023-00012828-CU-OE-CTL  
The Board reconvened to Open Session at 12:32 p.m.

**Public Comment**

Truth - Provided a verbal statement to the Board during the meeting. Truth speculated about the discussion during closed session and opposed potential additional electric bus charging infrastructure.

The Original DRA - Provided a verbal statement to the Board during the meeting. The Original DRA expressed dissatisfaction with closed session conversations away from public participation.

**Closed Session Reconvening**

Karen Landers, General Counsel, reported the following oral report of final actions taken in Closed Session:

- 33. There was no reportable action.
- 34. There was no reportable action.
- 35. There was no reportable action.
- 36. There was no reportable action.

**30. Palm Avenue Trolley Station Transit Oriented Development (TOD)– Palm City Transit Village (Karen Landers & Sean Myott)**

Ms. Landers and Sean Myott, MTS Manager of Real Estate Assets, presented on Palm City Transit Village TOD. They provided details on: the site's background, Oct 2021 Disposition and Development (DDA) site plan, proposed site plan, transit operations and amenities, transit patron restroom operation discussion, CEQA compliance and staff's recommendation.

John Seymour, with National CORE, expressed reluctance to operate a restroom facility at the affordable housing site and noted additional developer concerns on operational cost expectations. He stated that a pro forma for the operational costs would exceed \$2 million over a 55-year public lender payback period, reduce the agency's ground lease payment by over \$200,000, and was unsure if the amenity would be covered through the IRS code. He also noted that the projected \$2 million would not be recirculated through the Housing Commission to be loaned to future affordable projects. He also noted mortgage debt would impact the developers by over \$300,000 and may impact already awarded public subsidies. He suggested that a coalition composed of other developers strategize through sustainable operational strategies.

### **Public Comment**

Truth - Provided a verbal statement to the Board during the meeting. Truth expressed opposition for the staff recommendation and believed that MTS should fund restroom operations.

The Original DRA - Provided a verbal statement to the Board during the meeting. The Original DRA expressed opposition for the staff recommendation and believed that MTS should pay for restroom operations through partnerships.

### **Board Comments**

Board Member Elo-Rivera asked if the development was a mixed used space. Ms. Landers clarified that there was a convenience store that would be built on the site. He asked if there were restrictions for customers to use the restrooms in commercial properties. Ms. Landers confirmed that there were no restrictions. Board Member Elo-Rivera asked staff to work with the developers on potential terms and solutions to make sure the restroom obligation is reasonable. He restated the Board's priority to provide additional restrooms on the system and expressed confidence that reasonable terms related to the developer's responsibilities for the restroom operations could be identified during the implementation process.

Board Member Moreno supported staff's recommendation and acknowledged the developer's operational concerns. She was comfortable asking MTS to absorb the maintenance cost of the restroom. She believed that the bathroom maintenance costs were small enough to find a funding solution.

Board Member Bush supported MTS's funding of public restrooms on the system. He suggested private financing, legislation, or a use fee as part of potential solutions.

### **Action Taken**

Board Member Elo-Rivera moved to authorize the Chief Executive Officer to: 1) Amend the approved project scope and material terms of the ground lease for the Disposition and Development Agreement with National Community Renaissance of California, a California nonprofit public benefit corporation (National CORE) for the proposed affordable housing portions of Palm City Village Transit Oriented Development Project (National CORE DDA); and 2) Amend the approved project scope and material terms of the ground lease for the Disposition and Development Agreement with Malick Infill Corp, a California corporation (Malick Infill) for the moderate income housing portions of the Palm City Village Transit Oriented Development Project (Malick Infill DDA) and; 3) Determine that the modified Palm City Village Transit Oriented Development Project is exempt from environmental review under the California

Environmental Quality Act pursuant to Title 14 of the California Code of Regulations, sections 15268, 15378, and 15332. Board Member Moreno seconded the motion, and the vote was 8 to 0 in favor with Board Member Gonzalez, Board Member Donovan, Vice Chair Goble, Board Member Leyba-Gonzalez , Board Member Frank and Board Member Gloria and Board Member Hall absent.

OTHER ITEMS:

**31. Chair, Board Member and Chief Executive Officer’s (CEO’s) Communications and CEO Report**

The Board waived the staff report for this item.

**32. Remainder of Public Comments Not on The Agenda**

There were no additional public comments.

ADJOURNMENT

**33. Next Meeting Date**

The next regularly scheduled Board meeting is January 18, 2024 at 9:00 a.m.

**34. Adjournment**

The meeting was adjourned at 12:53 p.m.

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Chairperson  
San Diego Metropolitan Transit System

Filed by:

Approved as to form:

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Clerk of the Board  
San Diego Metropolitan Transit System

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General Counsel  
San Diego Metropolitan Transit System

Attachment: Roll Call Sheet

SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS  
ROLL CALL

MEETING OF (DATE): December 14, 2023 CALL TO ORDER (TIME): 9:03 a.m.  
 RECESS: \_\_\_\_\_ RECONVENE: \_\_\_\_\_  
 CLOSED SESSION: 10:21 a.m. RECONVENE: 12:32 p.m.  
 PUBLIC HEARING: \_\_\_\_\_ RECONVENE: \_\_\_\_\_  
 ORDINANCES ADOPTED: \_\_\_\_\_ ADJOURN: 12:53 p.m.

JURISDICTION	BOARD MEMBER		ALTERNATE		PRESENT (TIME ARRIVED)	ABSENT (TIME LEFT)
City of Chula Vista	Gonzalez	<input type="checkbox"/>	Chavez	<input type="checkbox"/>	ABSENT	ABSENT
City of Chula Vista	McCann	<input type="checkbox"/>	Chavez	<input checked="" type="checkbox"/>	9:06 a.m.	12:53 p.m.
City of Coronado	Donovan	<input checked="" type="checkbox"/>	Duncan	<input type="checkbox"/>	9:03 a.m.	12:32 p.m.
County of San Diego	Montgomery Steppe	<input checked="" type="checkbox"/>	Vargas	<input type="checkbox"/>	9:03 a.m.	12:53 p.m.
City of El Cajon	Goble (Vice-Chair)	<input type="checkbox"/>	Ortiz	<input type="checkbox"/>	ABSENT	ABSENT
City of Imperial Beach	Leyba-Gonzalez	<input checked="" type="checkbox"/>	Aguirre	<input type="checkbox"/>	9:03 a.m.	12:32 p.m.
City of La Mesa	Dillard	<input checked="" type="checkbox"/>	Arapostathis	<input type="checkbox"/>	9:03 a.m.	12:53 p.m.
City of Lemon Grove	Gastil	<input type="checkbox"/>	Mendoza	<input checked="" type="checkbox"/>	9:03 a.m.	12:53 p.m.
City of National City	Bush	<input checked="" type="checkbox"/>	Rodriguez	<input type="checkbox"/>	9:03 a.m.	12:53 p.m.
City of Poway	Frank	<input checked="" type="checkbox"/>	Pepin	<input type="checkbox"/>	9:03 a.m.	12:32 p.m.
City of San Diego	Moreno	<input checked="" type="checkbox"/>	Campbell	<input type="checkbox"/>	9:34 a.m.	12:53 p.m.
City of San Diego	Elo-Rivera	<input checked="" type="checkbox"/>	LaCava	<input type="checkbox"/>	9:18 a.m.	12:53 p.m.
City of San Diego	Gloria	<input type="checkbox"/>	Campillo	<input type="checkbox"/>	ABSENT	ABSENT
City of San Diego	Whitburn (Chair)	<input checked="" type="checkbox"/>	Lee	<input type="checkbox"/>	9:03 a.m.	12:53 p.m.
City of Santee	Hall	<input checked="" type="checkbox"/>	Koval	<input type="checkbox"/>	9:03 a.m.	12:32 p.m.
			Minto	<input type="checkbox"/>		

SIGNED BY THE CLERK OF THE BOARD: /S/ Dalia Gonzalez





**Metropolitan  
Transit  
System**

## **Agenda Item No. 5**

**MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS**

January 18, 2024

**SUBJECT:**

Traction Power Substations (TPSS) Design - Work Order

**RECOMMENDATION:**

That the San Diego Metropolitan Transit System (MTS) Board of Directors authorize the Chief Executive Officer (CEO) to execute Work Order WOA357-AE-31, under MTS Doc No. PWL357.0-22 (in substantially the same format as Attachment A), with CR Associates (CRA), a Disadvantaged Business Enterprise (DBE), in the amount of \$2,047,425.49 for design services to replace existing TPSS with new Siemens TPSS.

Budget Impact

The total contract cost for this contact is estimated to be \$2,047,425.49. The project will be funded by Capital Improvement Program (CIP) account 2005118601 – Substation Replacement.

**DISCUSSION:**

TPSS provide power to operate the electric-powered trolley system. TPSS are installed along the railroad right-of-way, generally at one-mile intervals. Trolleys receive power from the TPSS along the route through the overhead catenary system.

In several phases, MTS has been working towards replacing and/or decommissioning various TPSS. These have been in place for more than thirty years. As these substations are surpassing their life expectancy, they require constant maintenance. The replacement parts for the substations are difficult to procure, as they have become either obsolete, hard to find, or are very expensive to reverse engineer. Also, the substation flooring is warping, and the structures are deteriorating, causing safety hazards for MTS employees during maintenance calls. TPSS are identified for decommissioning and replacement according to their condition and age. Eighteen (18) substations have been identified for decommissioning.

In this phase, MTS seeks to decommission and remove five (5) TPSS and to install five (5) new substations at or in close proximity to the decommissioned TPSS. The new substations will be built and energized before the old substations are decommissioned and removed. The locations of the five (5) substations to be replaced are located at:



- Yard 1 TPSS at 13<sup>th</sup> Street in San Diego;
- Yard 2 TPSS at 13<sup>th</sup> Street in San Diego;
- DairyMart TPSS at 3415 Beyer Blvd in San Diego;
- Fletcher TPSS at 1151 Fesler Street in El Cajon; and
- Sweetwater TPSS at 410 W. 33rd Street in National City.

The design team’s scope of work is to design the ground mat, utility connections, and other civil improvements which will be required to install the five (5) substations and decommission the existing substations described above.

MTS intends to purchase the substations through a separate, standalone procurement.

Architectural and Engineering (A&E) Consultant Selection Process

On September 15, 2021, MTS issued a solicitation for On-Call A&E Design Services by Requesting Statements of Qualifications (RFSQ) from firms with expertise in a variety of A&E design and related consulting services separated into the following three (3) categories:

- Category A: Comprehensive/Full Service - Five (5) prime contracts
- Category B: Small Business (SB) Set Aside- Three (3) prime contracts awarded to a certified SB or a Disadvantaged Business Enterprise (DBE) certified firm, (which is also considered to be a SB)
- Category C: Specialty Prime – Up to Five (5) specialty service contracts

As a result of the RFSQ, seven (7) firms were selected to perform various A&E services. For projects requiring A&E Services, work orders will be issued to these firms.

On July 21, 2023, MTS issued a Request for Proposal (RFP) to the A&E qualified firms to provide design services for TPSS Design Phase I.

On August 29, 2023, MTS received a proposal from each of the following firms:

Firm Name	Classification
CRA	DBE, SB
Dokken Engineering	N/A
HDR Engineering, Inc	N/A
Mott MacDonald	N/A
Pacific Railway Enterprises, Inc	DBE

On October 4, 2023, a selection committee consisting of MTS staff evaluated the proposals received using the following criteria:

Criteria	Points
Project Team	25
Project Team’s Capabilities	25
Project Understanding and Approach	25
Schedule	25

<b>Total Possible Score</b>	<b>100</b>
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During the initial evaluation, the committee scored and ranked the firms as follows:

Rank	Firm Name	Total Score
1.	CRA	93.33
2.	Mott MacDonald	71.67
3.	HDR Engineering, Inc.	65.00
4.	Pacific Railway Enterprises, Inc.	63.33
5.	Dokken Engineering	56.67

As a result of the evaluations, CRA was deemed to be the most qualified firm to perform the services. The committee then reviewed CRA’s initial cost proposal of \$2,400,912.26, and through negotiations was able to reduce the fee by \$353,486.77, which is a cost savings to MTS. Based on the proposed level effort and classifications, CRA’s revised proposed amount of \$2,047,425.49 was determined to be fair and reasonable.

For these services, CRA will be utilizing the following subconsultants:

Subconsultant Name	Certifications	Subconsultants Amount
STV Incorporated	None	\$1,343,884.79
NV5	None	\$160,818.00
Aguirre & Associates	DBE, SB	\$54,993.56
Leighton Group	None	\$146,555.95

Therefore, staff recommends that the MTS Board of Directors authorize the CEO to execute Work Order WOA357-AE-31, under MTS Doc No. PWL357.0-22 (in substantially the same format as Attachment A), with CRA, a DBE, in the amount of \$2,047,425.49 for design services to replace the existing TPSS with new Siemens TPSS.

/S/ Sharon Cooney  
 Sharon Cooney  
 Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)

Attachment: A. Draft Work Order, MTS Doc No. WOA357-AE-31



# Metropolitan Transit System

January 18, 2024

MTS Doc. No. PWL357.0-22  
WOA357-AE-31

Mr. Ross Duenas, PE  
Executive Vice President/Principal  
CR Associates  
3900 Fifth Avenue, Suite 310  
San Diego, CA 92103

Dear Mr. Duenas:

Subject: WORK ORDER WOA357-AE-31, TO MTS DOC. NO. PWL357.0-22, DESIGN SERVICES FOR TRACTION POWER SUBSTATIONS (TPSS) DESIGN

This letter shall serve as Work Order WOA357-AE-31, under the General Engineering Consultant Agreement, MTS Doc. No. PWL357.0-22, as further described below.

## SCOPE OF SERVICES

This Work Order shall provide tenant relocation services for the TPSS Design project (Attachment A and A1).

## SCHEDULE

The Scope of Services, as described above, shall be for a period of six (6) months from the date of the Notice to Proceed.

## PAYMENT

Payment shall be based on actual costs in the amount not to exceed \$2,047,425.49 without prior authorization of MTS (Attachment B).



Please sign below, and return the document to the Contracts Specialist at MTS. All other terms and conditions shall remain the same and in effect.

Sincerely,

Accepted:

Sharon Cooney  
Chief Executive Officer

\_\_\_\_\_  
Ross Duenas, PE  
Executive Vice President/Principal

Date: \_\_\_\_\_

Attachments: Attachment A, Scope of Services  
Attachment A1, Consultant's Proposal  
Attachment B, Negotiated Fee Proposal

DRAFT

**ATTACHMENT A  
SCOPE OF SERVICES**

DRAFT

**TITLE:** TRACTION POWER SUBSTATIONS (TPSS) **WOA #:** WOAXXX-AE-31  
DESIGN PHASE I

## I. PROJECT DESCRIPTION

MTS staff seeks a consultant to perform site survey and design services related to plans, specifications and estimates (PS&E) for the replacement of existing TPSS with new Siemens TPSS.

MTS has six (6) Control Power Corporation (CPC), eleven (11) Ohio Brass on the Orange Line and one (1) Impulse downtown substations have been in service more than thirty years. As these substations are surpassing their life expectancy, they require constant maintenance. The replacement parts for the substations are difficult to procure, as they have become either obsolete, hard to find, or are very expensive to perform the reverse engineering. Also, the substation flooring is warping, and the structures are deteriorating, causing safety hazards for MTS employees during maintenance calls.

The priority list of TPSS are as follows:

1. Yard 2 TPSS – 13<sup>th</sup> Street, San Diego
  - a. 2MW TPSS with 6 feeder breakers
  - b. Need a new location approximately 100 feet from 3 and 4 on map. Location 3 will be decommissioned and removed (Exhibit C)
2. Yard 1 TPSS – 13<sup>th</sup> Street, San Diego
  - a. 2MW TPSS with 6 feeder breakers
  - b. Need a new location Approximately 325 feet from 2 on map (Exhibit C)
3. Dairymart TPSS – 3415 Beyer Blvd, San Diego
  - a. 1.5MW TPSS with 4 feeder breakers
  - b. New Location Approximately 800 feet from Existing (Exhibit D)
4. Fletcher -1151 Fesler St El Cajon
  - a. 1.5MW TPSS with 4 feeder breakers
  - b. New Location Approximately 40 feet to the south (Exhibit E)
5. Sweetwater 410 W 33<sup>rd</sup> St National City
  - a. 1.5MW TPSS with 4 feeder breakers
  - b. New Location Approximately 370 feet from existing (Exhibit F, which includes Boundary Layout)

## II. EXPECTED RESULTS

Consultant shall prepare a) site concepts for verification, b) design submittals (35%, 65% & 100%), c) contract bid documents (PS&E), and d) conformed documents for the installation of TPSS at five (5) sites. All of the sites have existing TPSS with SDG&E connections. SDG&E connections may have to change, especially with circuit 123 that feeds all yard. These substations will be built and energized then the old ones will be removed after cutover.

## III. SCOPE OF WORK

The Scope of Work is based on the planned installation of two (2) 2.0 MW minimum and three (3) 1.5MW 12kV AC, 650V DC substations and the decommissioning and removal of five (5) existing

substations. Design criteria is per the MTS General Design Criteria (Exhibit A). The scope of work shall include:

### **TASK 1: Project Management**

This work includes project management services, including the requirements for progress report(s), invoicing, and work order setup and administration in addition to the services listed below.

**1.1 Document Control and File Sharing:** Consultant shall manage the project's paper and electronic files, transmittal forms, submittals, letters, correspondence, and other documents. Consultant will use ProjectWise for managing and storing files internally, including CAD drawings.

**1.2 Submittals:** Design submittals will include one formal submittal including both paper and electronic files. The Consultant shall transmit to MTS a "pdf" file format, and CADD files (100% design only), and distribute them to MTS staff a minimum of a week prior to a review meeting.

Consultant shall make recommendations for site concepts, to be reviewed for verification at an MTS team meeting, and applicable third parties. The formal design development submittals will be provided as follows:

- Concept Verification
- 35% Submittal
- 65% Submittal
- 100% Submittal
- Conformed Submittal

**1.3 Schedules:** Consultant shall maintain and revise the project schedule periodically or as appropriate while the design continues, and shall complete a draft schedule for the design package.

### **TASK 2: Meetings**

**Kick-Off Meeting:** Immediately following the NTP, Consultant shall schedule a kick-off meeting which shall include the following: 1) clarification of project roles and responsibilities, 2) administrative requirements, 3) understanding program requirements and goals, and 4) discussion of MTS objectives and approach at each substation location. This information will be used to confirm design criteria, scope of work at each location, and data requirements.

**Project Development Team Meetings:** Consultant shall conduct up to five (5) MTS team meetings as deemed necessary to discuss the project requirements. This may include participation in project development team meetings, as well as other meetings convened for specific data or project needs. Consultant attendees shall include Work Order Manager, Design Manager, OCS designers, and up to two (2) technical leads.

### **Assumptions**

- Meetings assumed to be two hours duration.



**Design Team Meetings:** Consultant shall conduct up to five (5) project team meetings throughout the design phases of the project to communicate and coordinate between members of the design team. Prepare and distribute minutes with an on-going listing of all required action items. Provide technical coordination of the project between the design disciplines. Attendees shall include Work Manager, Design Manager, and up to four (4) technical leads.

### **Assumptions**

Meetings assumed to be one-hour duration.

### **TASK 3: Scope of Work Development and Data Collection**

**Review Record Documents and As-Built Drawings:** Consultant shall collect available as-built drawings for any affected existing facilities and existing utility and drainage information for the substation locations and review the scope of work required at each location. As applicable, Consultant shall review the as-built and design drawings in each engineering discipline, including traction power and overhead contact systems, electrical, civil and structural engineering. Consultant shall then develop a plan for a focused site investigation. This plan shall include a preliminary strategy for installing and cutting-over new equipment and associated building modifications. Consultant shall prepare necessary documentation for each discipline to make certain that all necessary site information is obtained during a single visit.

**Site Investigation:** Consultant shall perform a site visit at each substation location to confirm the preliminary plan, assumptions, design criteria and recommendations for implementing the project scope objectives.

Consultant shall anticipate that MTS staff will be available to provide insight into MTS operating experiences so as to best tailor each substation design to address previous operating difficulties. The intent of this is to accurately record any issues or preferences about the substations that affect the replacement order or new substation requirements.

The extent of the services required shall be appropriately tailored to each location. Site specific requirements may include topographical survey, geotechnical subsurface investigations, ground resistance tests, right-of-way (R/W), and drainage capacity assessments.

Specific activities include:

- Examination and documentation of the proposed site for new installation locations,
- Condition of equipment affected by the work at existing locations,
- Photographic records of existing conditions and access.

### **Assumptions**

- Municipalities do not have jurisdiction except where drainage is of concern and work occurs outside of right-of-way.
- MTS assumes one (1) site visit per day per location. For Yard 1 and 2, MTS assumes the site visits will take place on the same day.

### **TASK 4: Design Development**

Consultant shall prepare site concepts for five (5) TPSS Sites. Site concepts may include substation screening. Consultant shall review the TPSS procurement design documents and prepare design plans based on MTS furnished substations(Exhibit B). Consultant shall utilize the substation layout information provided by the substation manufacturer to design TPSS site improvements.

MTS will make a determination on the concept acceptability.

Design development shall include drawings, technical specifications, and cost estimates. At the 35% design stage, the design documents shall include the drawings as identified herein, as well as long lead items.

The Consultant will hold monthly internal project reviews consisting of the Project Manager and Work Manager to review scope, schedule, budget, and MTS expectations under this Work Order.

MTS will review deliverables concurrently.

**4.1 Cost Estimate:** The cost estimate for the construction work shall be developed. Measurement and Payment sections shall be developed with items provided on a unit basis.

**4.1.1 Concept Cost Estimate:** The concept estimate shall be developed at a high level to be used as a tool for obtaining funding approval. Consultant shall recommend an appropriate contingency to apply at the concept phase. Concept cost estimate will be reviewed at the MTS team meeting when the concept sites are discussed.

**4.1.2 65% & 100%Cost Estimate:** The concept cost estimate shall continue to be developed and delivered at the 65% and 100% phases.

**4.2 Specifications:** Specifications for this work shall be developed accordingly to MTS design criteria.

**4.2.1 100% Specifications:** Specifications will be provided by MTS. Consultant shall provide edits to these specifications deleting items that are known to not be relevant having completed the concept site verification, and providing a bulleted outline for items that need to be added.

### **Assumptions**

- Phasing and construction schedule will be described in the specifications and provided by MTS.
- MTS will allow taking two substations offline during construction to allow a new substation to be placed in the same approximate area. However, if we build adjacent there will be no need to take any offline.
- MTS believes there will be only be two, to three identical designs needed for this task for the project.

**4.3 TPSS Installation/Connection:** Consultant shall develop 35%, 65% and 100% plans for TPSS installation plans for five (5) sites. Prepare the plans as listed in herein including:

- Typical ground mat layout,
- Typical grounding details,

- Typical Positive feeder and disconnect assembly details,
- Typical negative return connection details,
- Typical red concrete encased duct bank details,
- Typical traction power vault details (similar to SDG&E 3314),
- Typical site single line diagrams that show feeder arrangements to the line (including disconnects cabling and connections to substations).
- Develop traction power sectionalizing diagrams that show all new substations and existing substations along the same line.
- OCS Sectionalizing 3 Switch Assembly and Details
- OCS Surge Arrestor Assembly and Details
- OCS Feeder Cable Assembly and Details
- OCS Hanger, Jumper, and Grounding Assemblies
- OCS Foundation Detail
- OCS Pole Detail
- OCS Site layout and allocation plan
- OCS Site feeder routing and switching diagram
- OCS Site Demolition Plan
- Develop fiber optic splicing specifications to connect the substation into the existing Fiber Optic Network. (The MTS project manager will provide additional information on splicing, site cabling, and conduit raceway requirements).
- Coordinate with SDG&E regarding service to substation.

### **Assumptions**

- New TPSS supplied by others will be equipped to be compatible to existing Supervisory Control and Data Acquisition SCADA and emergency trip systems. SCADA and emergency trip system connection information will be supplied by MTS and will not be included on Consultant supplied drawings.
- MTS will provide complete, up to date, standard OCS assembly and hardware detail sheets and standard OCS arrangements in CADD format. Consultant is not required to update standard OCS arrangement, detail and assembly drawings.

**4.4 Environmental:** Consultant assumes that all site locations will fit within existing R/W. The proposed improvements along the Blue Line trolley corridors would be preempted from the California Environmental Quality Act (CEQA), as well as other state and local environmental laws and regulations, based on the Interstate Commerce Commission Termination Act (ICCTA; 49 U.S.C. §10101, et seq.) and related Surface Transportation Board (STB) rulings. Environmental clearance will be provided by MTS. Consultant shall provide a copy of the 35% plans to MTS for use in completing any documentation in support of environmental clearance or permitting as needed.

### **Assumptions**

- MTS will provide and submit necessary documentation for environmental clearance.
- All construction work will be completed within the existing right-of-way.

## 4.5 Survey

**4.5.1 Topographic Survey and Control:** Consultant shall provide survey and mapping services for existing TPSS site locations.

These extents are expected to accommodate grading tie-ins and location of existing features should site location need to be shifted slightly to avoid conflicts or impacts with existing features. Minor additional survey data acquisition may be identified following a review of existing data and the field visit. Two control points will be set with durable markers for future construction activities at the site.

- The digital terrain model (DTM) and topography will be based upon a ground survey and will be developed at a 1" = 20' and a 1-foot contour interval. Consultant shall prepare a site exhibit with the topography, control stations, datums, basis of bearings and coordinates utilized on it as a CADD deliverable. This survey scope and services will include proof of internal Quality Control and Quality Assurance for the CADD deliverable.

### **Assumptions/Exclusions/Clarifications:**

- This survey scope of services has specifically excluded any R/W or property line determination and/or the plotting of easements.
- Consultant is not required to provide a Required On-Site (ROS.)
- This survey scope of services will not be acquiring new aerial topographic mapping.
- This survey scope of services will utilize the NAD-83, Zone 6 CCS coordinate system on the properly identified epoch.
- This survey scope of services will utilize the NAVD-88 vertical datum unless otherwise agreed upon.

**4.5.2 R/W/property line survey:** Consultant shall provide R/W and property line services for the above-described site as defined more specifically below.

Consultant shall research, recover and measure a sufficient number of survey monuments to allow for the accurate plotting of the adjacent railroad R/W and the property description of the existing sub-station site.

### **Assumptions/Exclusions/Clarifications:**

- This survey scope of services does not include a full and complete boundary survey and/or title review of any particular property.
- The plotting of easements is not included in this scope of services.
- Consultant presumes that a railroad R/W survey has been prepared and recorded for the adjacent trolley and freight line R/W's. If a railroad R/W survey is needed to complete this optional service work, it is not included herein and will require a separate scope and fee.
- Consultant is not required to provide an ROS.
- Consultant assumes the surveyor will have reasonable access or that it can be arranged by other in order to survey boundary corner monuments.

**4.6 Street Designs:** Consultant assumes that minimal traffic control may be needed at some sites due to access and construction traffic. Consultant shall include language in the specifications for the contractor to provide traffic control and obtain required permits.

#### **Assumptions**

- Temporary truck and crane turning templates for each site will be provided by others.

**4.7 Site Preparation and Demolition:** Develop 35%, 65% & 100% site preparation and demolition plans. Site preparation and demolition plans shall include demolition and clearing and grubbing for the sites including the six (6) substations to be decommissioned.

#### **Assumptions**

- Coordination with third party for utility location and protection will be led by MTS with design support from Consultant.

**4.8 Site Plans:** Site plans shall show fencing, pad location, duct banks, grading and drainage, utilities, retaining walls, and access.

**4.8.1 Site Concepts:** The site concepts shall show fencing, pad location, duct banks, rough grading, and retaining wall locations and will be used as the basis of the concept cost estimate that will be used to support the construction funding request.

#### **Assumptions**

- Work within city R/W is not required.
- All entities of the TPSS will remain within one unit.
- Temporary Construction Easements (TCEs) are not required.
- No improvements to major drainage basins or channels are included in the work.
- Sites will not require City of San Diego approval or post-construction As-Builts.
- Site concepts to be verified at MTS team meetings and documented in the meeting minutes.
- All new TPSS will be placed near existing TPSS sites and possibly use existing electrical service points. New or upgraded access roads and other new project SDG&E standards will apply to the project design. Should any special SDG&E design requirements be identified, additional improvements may be added as a construction change order for the contractor.

#### **4.9 Grading and Drainage**

**4.9.1 Grading:** Existing drainage patterns at each site will be maintained to the extent possible, ideally with each site graded to drain, e.g., sheet flow. A six-inch layer of crushed rock surrounding the substation within the fenced area shall be used to facilitate on site absorption of rain and improve electrical isolation. In some instances, retaining walls may be needed to avoid impacts to existing features or where there is a grade differential across the site.

Each site may require visual aesthetic considerations that will be incorporated into the design.

Standard Fences will be required for Sweetwater Fletcher and DairyMart locations.

**4.9.2 Drainage:** Drainage patterns and land cover will not be significantly different from existing; therefore, flow to existing drainage systems is not changed.

### Assumptions

- Drainage areas affected are less than one square mile. Sites are located outside of streams and floodways.
- This Work consists of construction of underground/overhead utilities, so is an exempt project and will not require a SWPPP or Water Pollution Control Plan (WPCP).

**4.10 Erosion and Sediment Controls:** Appropriate best management practices (BMPs) will be evaluated and applied per the CGP. One erosion control sheet, only blue line in this design will be provided referencing best management practices during construction. Disturbed area calculations will be performed. Permanent BMPs will be addressed.

### Assumptions

- SWPPP is not required.

**4.11 Utilities:** Existing utilities including both wet and dry utilities will be shown on the site plan based on record information and physical surface features shown in the topographic surveys. The new TPSS will occupy a larger footprint than the existing TPSS, but will be placed generally in the same location or close by location. Relocation of existing utilities are anticipated for this project. Relocation and reconnection of the SDG&E service conduits and fiber optic lines will be defined in the project specifications.

Consultant shall submit the site location maps for the request for dry utility information. The Utility Coordinator will contact the utility companies and obtain facility information from the various dry utility companies. Limited coordination with franchise utilities regarding potential relocations may be required.

Consultant shall update MTS with status of received as-builts or record drawings and re-request to obtain missing as-built information for all wet utilities from the various agencies with wet utilities located within the project limits.

### Assumptions

- Dry utility companies will prepare relocation plans for their utilities if needed.
- MTS will lead coordination with SDG&E for service to substations.

**4.12 Structures Design for Substation Foundations:** Consultant shall develop typical foundation details and foundation footprints for the five (5) substation foundations. The details will show typical cross sections of the footing and anchorage details for the substation equipment.

If we end up with three classifications of subs (i.e. 1.5MW, 2MW and 3MW), we would want three typical foundation details, one per "size"

For the 65% design effort, two sheets will be created. The first sheet will show typical footing details and will provide a typical foundation plan. The second sheet will provide tabular details for the bid set foundation. Design and detailing will be consistent with 65% plans.

For 100% design efforts, the two typical foundations will be shown with two foundation plan sheets and two detail sheets.

### **Assumptions**

- Existing track plans will be referenced to locate the substation foundations and catenary riser poles.
- Foundations are assumed to be shallow foundations on grade and detailed per geotechnical recommendations.
- Consultant shall provide sub base detailing (and improvements if necessary) for the shallow foundation on grade.
- Substation loads to the foundation shall be based on similar 1.5/2 substations procured for the MTS system.
- Final design of anchorage will be verified via review of shop drawing anchorage calculations provided by substation Subcontractor.

**4.12.1 Geotechnical:** The Geotechnical scope of work includes the following:

**4.12.1.1 Preliminary Geotechnical Report:** Consultant shall review available data on the existing conditions at the selected locations including data and reports resulting from previous projects and conduct a site visit to supplement the review of the as-built plans and existing soils information. Preliminary geotechnical reports based on previous reports, as-built review and geologic reconnaissance will be prepared in support of the 35% submittals.

**4.12.1.2 Geotechnical Design Reports:** In support of the proposed design development, geotechnical reports will be developed for the 100% design submittals. The scope of the study will be based on the findings of the Geotechnical Technical Memos and 35% design plans.

- Coordinate access, attend rail safety training (when necessary), prepare exploration plan, and obtain County boring waiver/permit as applicable.
- Subsurface exploration may consist of borings, penetration testing, test pits, geophysical testing and/or field resistivity testing.
- Laboratory testing to include moisture density, grain size distribution, plasticity, shear strength consolidation tests, and corrosion potential.
- Geologic hazard evaluation
- Preparation of geologic cross-sections at proposed TPSS locations.
- Slope stability analysis.
- Preparation of a final geotechnical design report for each of the TPSS sites that summarizes the investigation activities, results of our analysis, and recommendations related to the geotechnical design and construction of the proposed TPSS pads, walls, and culverts (as needed) utilizing the applicable design criteria from the MTS General Design Criteria.

### **Assumptions**

- Five (5) sites will require five (5) days of drilling.
- Consultant shall attend up to one (1) meeting at the MTS or Consultant's office in downtown San Diego.
- Infiltration/permeability testing for storm water management will not be required
- No log of test boring sheets will be required. Boring logs within the reports will be sufficient.
- Due to the small size and low man hour occupancy, the TPSS Structures are exempt from requirements to investigate for the presence of active faulting.

- No draft versions of the preliminary or final geotechnical reports are included in the scope. Any requested revisions to the reports or supplemental memos will be provided as additions to the scope and fee.

#### IV. DELIVERABLES

In addition to the deliverables listed in Section V and described above, deliverables include:

- Monthly invoice and progress report;
- Meeting agendas;
- Progress meetings and/or written updates including monthly updates;
- Technical specifications, estimate, single line diagram and layout plans for one type of new two TPSS (2.0 MW) and three (3) TPSS (1.5 MW). Interim and drafts including site concepts, progress submittals (35%, 65%, & 100%) stamped contract ready documents, and the stamped conformed set shall be provided to MTS in hard and electronic copy as described in Section 1.2 above. A maximum of two (2) hard copies of reports and half scale drawings are included in each submittal.

#### V. SCHEDULE OF SERVICES/MILESTONES/DELIVERABLES

##### A. Milestones/Deliverables Schedule

<u>Milestone/Deliverable</u>	<u>Due Dates</u>
<b>Schedule</b>	NTP + 2 Wks
<b>Informational Requests</b>	
-Submit Request for dry utility information and project site plan to MTS Utility Coordinator	NTP + 4 Wks
-Re-request for missing as-built information for all wet utilities (water, sewer, storm drains)	NTP + 6 Wks
<b>Reports</b>	
Preliminary Geotechnical Report	NTP + 8 Wks
Final Geotechnical Report	NTP + 20 Wks
<b>Cost Estimate</b>	<b>NTP + 24 Wks</b>
Concept Cost Estimate	NTP + 9 Wks
65% Cost Estimate	NTP + 24 Wks
<b>Specifications</b>	NTP + 24 Wks
<b>Site Concepts</b>	NTP + 8 Wks
<b>65% Drawings</b>	<b>NTP + 12 Wks</b>
<b>100% Drawings</b>	<b>NTP + 24 Wks</b>

#### VI. MATERIALS TO BE PROVIDED BY MTS AND/OR THE OTHER AGENCY

**Right of Entry (ROE) Permits:** Consultant shall be responsible for obtaining ROE permits. The ROE shall cover non-intrusive work for most of the Consultant's team, and intrusive work for the geotechnical drillers.



### **Assumptions**

- ROE permits and insurance assumed to be in place three weeks following NTP.
- No fee for ROE.
- MTS will manage and coordinate this work order.

All existing project documentation and background reports will be provided by MTS.

Drawings will be provided in AutoCAD format.

### **VII. SPECIAL CONDITIONS**

Any condition listed below applies solely to this Work Order and does not otherwise alter the Agreement or other Work Orders.

Bidding and Construction Support Services are not included in this Work Order.

### **VIII. MTS ACCEPTANCE OF SERVICES:**

Contractor shall not be compensated at any time for unauthorized work outside of this Work Order. Contractor shall provide notice to MTS' Project Manager upon 100% completion of this Work Order. Within five (5) business days from receipt of notice of Work Order completion, MTS' Project Manager shall review, for acceptance, the 100% completion notice. If Contractor provides final service(s) or final work product(s) which are found to be unacceptable due to Contractors and/or Contractors subcontractors negligence and thus not 100% complete by MTS' Project Manager, Contractor shall be required to make revisions to said service(s) and/or work product(s) within the Not to Exceed (NTE) Budget. MTS reserves the right to withhold payment associated with this Work Order until the Project Manager provides written acceptance for the 100% final completion notice. Moreover, 100% acceptance and final completion will be based on resolution of comments received to the draft documents and delivery of final documentation which shall incorporate all MTS revisions and comments.

Monthly progress payments shall be based on hours performed for each person/classification identified in the attached Fee Schedule and shall at no time exceed the NTE. Contractor shall only be compensated for actual performance of services and at no time shall be compensated for services for which MTS does not have an accepted deliverable or written proof and MTS acceptance of services performed.

### **IX. DEFICIENT WORK PRODUCT**

Throughout the construction management and/or implementation phases associated with the services rendered by the Contractor, if MTS finds any work product provided by Contractor to be deficient and the deficiently delays any portion of the project, Contractor shall bear the full burden of their deficient work and shall be responsible for taking all corrective actions to remedy their deficient work product including but not limited to the following:

- Revising provided documents,

At no time will MTS be required to correct any portion of the Contractors deficient work product and shall bear no costs or burden associated with Contractors deficient performance and/or work product.

### **X. DELIVERABLE REQUIREMENTS**

Contractor will be required to submit any and all documentation required by the Scope of Work. The deliverables furnished shall be of a quality acceptable to MTS. The criteria for acceptance

shall be a product of neat appearance, well-organized, and procedurally, technically and grammatically correct. MTS reserves the right to request a change in the format if it doesn't satisfy MTS's needs. All work products will become the property of MTS. MTS reserves the right to disclose any reports or material provided by the Contractor to any third party.

Contractor shall provide with each task, a work plan showing the deliverables schedule as well as other relevant date needed for Contractor's work control, when and as requested by MTS.

Contractor's computer data processing and work processing capabilities and data storage should be compatible with Windows compatible PC's, text files readable in Microsoft Word, and standard and customary electronic storage. Contractor shall maintain backup copies of all data conveyed to MTS.

Contractor shall provide MTS with hard copy or electronic versions of reports and/or other material as requested by MTS.

**XI. PRICING**

Except where otherwise noted herein, pricing shall be firm and fixed for the duration of the Work Order and any subsequent Change Orders/Amendments to the Work Order. There shall be no escalation of rates or fees allowed.

**XII. ADDITIONAL INFORMATION**

List additional information as applicable to the specific Work Order scope of services.

**XIII. PREVAILING WAGE**

Prevailing wage rates apply to certain personnel for these services?  Yes  No

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**EXHIBIT A  
MTS GENERAL DESIGN CRITERIA**

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**SANDAG**

**General Design  
Criteria**

San Diego Trolley  
**September 2014**





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## **Design Criteria Manual Draft Rev 0 September 2014**

*Prepared by:*  
The San Diego Association of Governments (SANDAG)



This Manual is published as a set of general guidelines for the planning and design of bus and light rail transit extensions and improvements. While this Manual is comprehensive, it is not meant to replace the standard design process. Project design is still the responsibility of the designer.

The intent of the Manual is to establish general criteria for project design. However, deviations are anticipated from time to time. The Director of Rail must approve any such changes or deviations.

  
\_\_\_\_\_  
John Haggerty  
Director of Rail

  
\_\_\_\_\_  
Date

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**REVISION RECORD  
GENERAL DESIGN CRITERIA MANUAL**

REV. NO	REV. DATE	SECTION (S) AFFECTED	COMMENTS
0	09/2014	All	Initial Issue

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## Terms and Abbreviations

The following acronyms, initialisms, and short forms are used in this report.

Acronyms	List of Terms
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphaltic Concrete
ACE	Advanced Conceptual Engineering
ADA	Americans with Disabilities Act
AREMA	American Railway Engineering and Maintenance-of-Way Association
BDS	Bridge Design Specifications (Caltrans)
BMP	Best Management Practices
CAB	Crushed Aggregate Base
Caltrans	State of California Department of Transportation
CBC	California Building Code
CCTV	Closed Circuit Television
CEQA	California Environmental Quality Act
CEQA	California Environmental Quality Act
CFC	California Fire Code
CFR	Code of Federal Regulations
CPTED	Crime Prevention Through Environmental Design
CPUC	California Public Utilities Commission
CWR	Continuous Welded Rail
EA	Environmental Assessment
EC	Erosion Control
EN	European Standards
F	Fahrenheit
FEMA	Federal Emergency Management Agency
FRA	Federal Railroad Administration
ft/s	Feet per Second
FTA	Federal Transit Administration
IDS	Intrusion Detection System
LAN	Local Area Network
LRFD	Load and Resistance Factor



Acronyms	List of Terms
LRT	Light Rail Transit
LRV	Light Rail Vehicle
MM&PI	SANDAG Director of Mobility Management and Project Implementation
mph	Miles per Hour
MTS	San Diego Metropolitan Transit System
NACE	National Association of Corrosion Engineers
NCTD	Metro Link – North County Transit District
NEPA	National Environmental Policy Act
NF	Nosing Forces
NFPA	National Fire Protection Association
NPDES	National Pollutant Discharge Elimination System
OCS	Overhead Contact System
PE	Professional Engineer
ppm	Person per Minute
PRC	Public Resources Code
R	Radius
R	Resistance Value for Soil
ROW	Right-of-Way
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SWPPP	Storm Water Pollution Prevention Plan
USC	United States Code
VSS	Video Surveillance System
WPC	Water Pollution Control





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## 1.0 INTRODUCTION

These criteria establish requirements for the design of both bus and rail facilities for the San Diego Metropolitan Transit System (MTS). Design shall be consistent with applicable regulations and laws, and the San Diego Association of Governments (SANDAG) policies and procurement requirements.

In general, the criteria herein are the standards to be used in all designs. Deviations and additional criteria for a specific project will only be considered based upon a written request with a description of the deviation or addition, explanation of benefits and costs (see Request to Deviate from Baseline Design Criteria or Standard, Appendix A). Request for deviations shall be reviewed by the affected service operators and other agencies as deemed appropriate by the SANDAG project manager (Project Manager). To be approved as project criteria, all deviation must be approved by the SANDAG Director of Mobility Management and Project Implementation. At the direction of the Director, significant changes or deviations will require the approval of the SANDAG Executive Director and MTS.

All references made to other agency regulations, guidelines, manuals, or criteria, as supplemental to the criteria herein, were current and accurate at the time of publication for this document. Users of this Design Criteria shall confirm accuracy of references as agencies, titles, or sections may have changed over time.

### 1.1 Transit System Overview

MTS and the North County Transit District operate light rail and commuter rail over infrastructure owned and maintained by each agency; operate local, express, and commuter bus service on public streets and highways, and own and operate maintenance and support facilities. SANDAG has the legal responsibility to design and construct capital infrastructure improvements for the operating agencies, maintain as-built records, and manage the configuration of safety critical elements.

### 1.2 Stakeholders

SANDAG is the lead agency for implementing transit and rail improvement projects in the region for its transit operating partners. Other rail entities also operate in the region for which SANDAG is not responsible, such as Amtrak and the Burlington Northern Santa Fe Railway. The following list identifies the transit operating partners and other rail entities:

- MTS
- San Diego and Arizona Eastern Railroad
- North County Transit District
- Los Angeles–San Diego–San Luis Obispo Rail Corridor Agency
- Metrolink
- Amtrak
- Burlington Northern Santa Fe Railway



### 1.3 Purpose and Scope

These criteria establish requirements for design of bus transit and electrified light rail transit systems.

### 1.4 Governing Regulations and Laws

SANDAG projects shall be designed in conformance with the requirements of funding agencies; federal, state, and local regulatory agencies; and applicable standards and codes, except where exceeded by requirements in these criteria.

Funding and regulatory agencies include, but are not limited to, the following:

- Federal Transit Administration
- Federal Highway Administration
- Federal Rail Administration
- National Highway Traffic Safety Administration
- Occupational Safety and Health Administration
- U.S. Department of Transportation
- California Department of Transportation
- California Public Utilities Commission (CPUC)
- Environmental Protection Agency

#### 1.4.1 Bus Standards and Codes

- Federal Motor Carrier Safety Regulations
- Federal Mass Vehicle Safety Standards
- Americans with Disabilities Act (ADA)
- State regulations (e.g., California Highway Patrol and California Air Resources Board)
- Compressed Natural Gas Regulations by U.S. Department of Transportation and American National Standards Institute and Natural Gas Vehicles Requirements
- American Society of Heating, Refrigeration, and Air Conditioning Engineers
- Environmental Protection Agency
- Society of American Engineers

#### 1.4.2 Electrified Light Rail Transit

- American Railway Engineering and Maintenance-of-Way Association

Trackwork and signaling design shall follow the requirements of the American Railway Engineering and Maintenance-of-Way Association design manuals, standard plans, and design guidance.



- Federal

The Code of Federal Regulations, Title 49, “Transportation,” shall apply to design of light rail trolley operations as follows:

- Part 37 – Transportation services for individuals with disabilities (ADA)
- Part 38 – (ADA) accessibilities specifications for transportation vehicles
- Part 213 – Track safety standards
- Part 236 – Rules, standards, and instructions, governing the installation, inspection, maintenance, and repair of signal and train control

Where light rail projects are designed on tracks shared with freight rail or commuter rail operations and the jurisdiction of the Federal Railway Administration applies, railroad design shall comply with Federal Railway Administration standards and requirements.

- State of California

- CPUC: The General Orders of the CPUC shall apply as follows:
  - a) General Order No. 26-D - Clearances on Railroads and Street Railroads as to Side and Overhead Structures, Parallel Tracks, and Crossings
  - b) General Order No. 33-B - Construction, Reconstruction, Maintenance, and Operation of Interlocking Plants of Railroads
  - c) General Order No. 52 - Construction and Operation of Power and Communication Lines for the Prevention or Mitigation of Inductive Interference
  - d) General Order No. 72-B - Standard Types of Pavement Construction at Railroad Grade Crossings
  - e) General Order No. 75-D - Regulations Governing Standards for Warning Devices for At-Grade Highway-Rail Crossing
  - f) General Order No. 88-B - Rules for Altering Public Highway-Rail Crossings
  - g) General Order No. 95 - Overhead Electric Line Construction
  - h) General Order No. 108 - Filing of Railroad Operating Department Rules
  - i) General Order No. 110 - Radio Communications in Railroad Operations
  - j) General Order No. 118 - Construction, Reconstruction, and Maintenance of Walkways and Control of Vegetation Adjacent to Railroad Tracks
  - k) General Order No. 128 - Construction of Underground Electric Supply and Communication Systems
  - l) General Order No. 131-D - Planning and Construction of Facilities for the Generation of Electricity and Certain Electric Transmission Facilities
  - m) General Order No. 135 - The Occupancy of Public Grade Crossings by Railroads



- n) General Order No. 143-B - Design, Construction, and Operation of Light Rail Transit Systems
- o) General Order No. 164-D - Rules and Regulations Governing State Safety Oversight of Rail Fixed Guideway Systems
- Division of Industrial Safety
  - The electrical orders in Title 8 of the Division of Industrial Safety, as applicable to Trolley facilities (Chapter 4, Subchapter 5), shall be implemented.
- California Department of Transportation
  - a) Standard Specifications (latest edition)
  - b) Standard Plans (latest edition)
  - c) Bridge Planning and Design Manual (latest updates)
- State of California, Energy Commission, Title 24, Part 6
- California Building Code, Title 24, Part 2

## 1.5 Acronyms and Abbreviations

See "Table and Abbreviations" table at the beginning of this document.

## 1.6 Energy Resource and Management

### 1.6.1 Green Transportation Concepts

Designers shall evaluate "green" construction materials and technologies that limit greenhouse gas emissions, utilize recycled and/or environmentally friendly materials, conserve energy, conserve water, and allow storm water to penetrate into soils or pass through biological filters before entering drains or watercourses. Evaluation shall consider effectiveness of a material or technology with respect to cost, availability, maintainability, and constructability. Designs including green materials and technology shall be approved by the SANDAG project manager except where required by law or applicable regulation.



## 2.0 Compliance with Environmental Laws

### 2.1 California Environmental Quality Act (CEQA)

The designer shall consult with the San Diego Association of Governments (SANDAG) Environmental Manager to verify the applicable environmental requirements for the project under CEQA (California Public Resources Code [PRC] §21000 et seq. and the State CEQA Guidelines [14 California Code of Regulations §15000 et seq.]) and determine whether those requirements have been completed. The SANDAG Principal Planner of the Environmental/ Public Facilities Section of the Land Use and Transportation Planning Department is responsible for determining whether the project requires any additional CEQA documentation and, if so, the appropriate type of CEQA document that may be required. If required, CEQA documentation may be prepared by SANDAG or tasked to a consultant and would consist of one of the following: Notice of Exemption; Negative Declaration; Mitigated Negative Declaration; Environmental Impact Report; or a supplement or addendum to a previously approved CEQA document. CEQA documentation shall be supported by technical studies, as appropriate.

The SANDAG Environmental Manager shall provide the completed and approved CEQA document to the designer to integrate the environmental requirements into the project design. Ongoing coordination between the designer, the SANDAG Project Manager (Project Manager), and the SANDAG Environmental Manager will be required to ensure the project maintains consistency with the approved environmental document. The designer shall notify the Project Manager and SANDAG Environmental Manager of any project condition that may create unanticipated or unmitigated environmental impacts requiring additional environmental review or that may preclude the implementation of identified environmental requirements.

### 2.2 National Environmental Policy Act (NEPA)

The designer shall consult with the Project Manager and the SANDAG Environmental Manager to evaluate applicability of NEPA (42 United States Code [USC] §4321 et seq.) to the project. The SANDAG Principal Planner of the Environmental/ Public Facilities Section of the Land Use and Transportation Planning Department is responsible for determining whether the project requires any additional NEPA documentation and, if so, the appropriate type of document that may be required in compliance with NEPA. SANDAG projects that involve a federal agency, either through direct participation funding or authorization of a discretionary permit (such as a Clean Water Act §404 permit), may be subject to a NEPA evaluation. SANDAG shall determine and notify the designer if a project is exempt from NEPA. If required, NEPA documentation may be prepared by SANDAG or tasked to a consultant.

The SANDAG Environmental Manager shall provide the completed and approved NEPA document to the designer to integrate the environmental requirements into the project design. Ongoing coordination between the designer, the Project Manager, and the SANDAG Environmental Manager will be required to ensure the project maintains consistency with the approved environmental document. The designer shall notify the Project Manager and SANDAG Environmental Manager of any project condition that may create unanticipated or unmitigated environmental impacts requiring additional



environmental review or that may preclude the implementation of identified environmental requirements.

The environmental documentation process for both Federal Transit Administration (FTA) funded projects and Federal Railroad Administration (FRA) funded projects is outlined below, as these are the primary federal funding agencies for SANDAG projects. For projects that require NEPA documentation as a result of other federal agency participation (e.g., U.S. Army Corps of Engineers due to issuance of a Clean Water Act §404 permit), the SANDAG Environmental Manager will identify the applicable NEPA implementing regulations for the agency/agencies involved to guide preparation of the NEPA documents.

For FTA funded projects, the designer shall refer to FTA guidelines titled “Environmental Impact and Related Procedures” to verify if the project may qualify as a Categorical Exclusion (CE). As directed by the Project Manager in consultation with the SANDAG Environmental Manager, documentation will be prepared that explains why the proposed project meets the criteria for a CE recommendation that the SANDAG Environmental/Public Facilities Section will provide to the federal lead agency. The documented CE recommendation shall be submitted to the SANDAG Project Manager and the Environmental Project Manager. In cases where an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) may be required, at the direction of the Principal Planner of the SANDAG Environmental/Public Facilities Section, the designer or another consultant may be directed to provide support for the preparation of these documents.

For FRA projects, as directed by the Environmental Project Manager, the designer shall complete the FRA Categorical Exclusion Worksheet and SANDAG will submit the document to the FRA. Should the FRA determine that a CE is not appropriate, an EA or EIS may be required in accordance with the FRA guidelines titled “Procedures for Considering Environmental Impacts.” In cases where an EA or an EIS may be required, at the direction of the Principal Planner of the SANDAG Environmental/Public Facilities Section, the designer or another consultant may be directed to provide support for the preparation of these documents.

## 2.3 Other Environmental Laws

The designer, with assistance from the SANDAG Environmental Manager, shall determine if there is a reasonable possibility that the project or element of the project is subject to any of the following environmental laws:

- 15 USC 2601-2671: Toxic Substances Control Act
- 16 USC 1451–1464: Coastal Zone Management Act
- 16 USC 1531 et seq.: Endangered Species Act
- 16 USC 431-433: American Antiquities Act
- 16 USC 461-467: National Natural Landmarks Program
- 16 USC 470f: National Historic Preservation Act, Section 106





- 16 USC 6301: Paleontological Resources Preservation Act
- 16 USC 661–666: Fish and Wildlife Coordination Act
- 16 USC 703–712: Migratory Bird Treaty Act
- 23 Code of Federal Regulations (CFR) Part 774: U.S. Department of Transportation Act of 1966, Section 4(f)
- 33 USC 1251 et seq.: Clean Water Act
- 33 USC 4401 et seq.: Rivers and Harbors Act, Sections 9 and 10
- 33 USC 525 et seq.: General Bridge Act of 1946
- 40 CFR 131.12: Federal Antidegradation Policy
- 40 CFR 131.28: National Toxics Rule
- 40 CFR Part 131: Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California (California Toxics Rule)
- 42 USC 2000d et seq.: Civil Rights Act of 1964, Title VI
- 42 USC 300f et seq.: Safe Drinking Water Act of 1974
- 42 USC 6901 et seq. (1976): Resource Conservation and Recovery Act
- 42 USC 7401 et seq.: Clean Air Act
- 42 USC 9601 et seq. (1980): Comprehensive Environmental Response, Compensation, and Liability Act
- 49 USC 5301(e), 5323(b), and 5324(b): Federal Transit Law
- 49 USC Chapter 53: Public Transportation
- Executive Order 11988: Floodplain Management
- Executive Order 11990: Protection of Wetlands
- Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks
- Executive Order 13112: Invasive Species
- Executive Order 13514: Federal Leadership in Environmental, Energy, and Economic Performance
- Public Law 111-011, Title VI Subtitle D: Omnibus Public Land Management Act of 2009
- Public Law 92-574: Noise Control Act of 1972
- Public Law 94-265 (as amended): Magnuson-Stevens Fishery Conservation and Management Act





- California Assembly Bill 32: Global Warming Solutions Act of 2006
- California Fish and Game Code, Section 1600 et seq.: Fish and Wildlife Protection and Conservation
- California Fish and Game Code, Section 2050 et seq.: California Endangered Species Act
- California Fish and Game Code, Section 3503 regarding protection of birds' nests
- California Fish and Game Code, Sections 1900–1913: Native Plant Protection Act
- California PRC Section 30000 et seq.: California Coastal Act of 1976
- California PRC Section 5097.5 regarding historic, prehistoric, archaeological, and paleontological resources on public lands
- California Water Code, Section 13000–16104: Porter-Cologne Water Quality Control Act
- Office of the Governor Executive Order S-3-05 establishing greenhouse gas reduction targets
- Office of the Governor Executive Order S-13-08: Sea Level Rise
- Office of the Governor Executive Order W-59-93: Wetland – No Net Loss Policy
- State Water Resources Control Board Resolution No. 68-16: State Antidegradation Policy

If the project may be subject to one or more of these regulations, the designer shall notify the Project Manager and SANDAG Environmental Manager, who will then consult the Principal Planner of the SANDAG Environmental/Public Facilities to ensure compliance with all applicable regulatory requirements.



## 3.0 DESIGN GOALS

The design goal for all projects implemented under these criteria is development of construction-ready documents that meet the project's functional and aesthetic requirements while minimizing the initial capital cost. Functional and aesthetic goals of the project shall meet the safety, transit operation, maintainability, accessibility, and urban and art design requirements included in the project description and the approved environmental and preliminary engineering documents. Design shall primarily use service-proven techniques and off-the-shelf equipment and materials. Compatibility with existing facilities shall be a primary consideration in the selection of material and equipment. By state law, the San Diego Association of Governments (SANDAG) must provide for competitive bidding to the maximum extent possible; therefore, proprietary materials, systems, or equipment may not be specified without the approval of the project manager and a sole-source justification.

### 3.1 Proven Hardware

The design of projects shall incorporate proven subsystems, hardware, and design concepts. All of the major subsystems shall be specified from established manufacturers, have a documented operating history of previous and current usage, and be available off the shelf, to the greatest extent possible. The same requirements shall apply to spare parts. Waiver of these requirements will be considered only where the alternative material offers substantial technical and cost advantages, is in an advanced state of development, and has accumulated substantial test data under near-revenue conditions and as approved by SANDAG.

### 3.2 Design Life

The transit system's fixed facilities shall be designed for continued operation over a minimum period of 50 years before complete refurbishment and renovations are necessary due to wear and tear and obsolescence. The 50-year service life shall be used unless stated otherwise for particular pieces of equipment or systems in other sections. Major system equipment shall be designed for continued operation over a minimum period of 30 years before complete replacement becomes necessary.

### 3.3 Service Integration

All aspects of design must be considered when evaluating service integration and shall be reviewed and analyzed during preliminary engineering efforts. Where service integration is in conflict with existing systems, the designer shall inform SANDAG and assist in determining a resolution.



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## 4.0 DESIGN AND CONSTRUCTION STANDARDS

### 4.1 Drafting/Plan Criteria

All contract drawings shall be prepared using the supported version of AutoCAD or MicroStation in accordance with best engineering practices and the following project requirements:

- a) San Diego Association of Governments (SANDAG) contract plans shall be printable to 22 inches by 34 inches, with an outside border dimension of 21 inches by 32.75 inches to allow for half-size reduction onto 11 inches by 17 inches sheets. Plan sheets shall utilize standard SANDAG title blocks.
- b) In general, the typical scale for all plan and profile drawings will be 1 inch = 40 feet for horizontal measurements. The vertical scale shall typically be five (5) times that of the horizontal scale; however, variances are allowed based on project-specific topographic relief. Additional variances for scale are allowed to maintain legibility of details and lettering when half-sized reductions of the sheets are produced.
- c) Typically, text height for general notes and plan sheet annotations shall be 0.14 inch.
- d) Projects shall be designed in U.S. Customary Units.
- e) Project plans shall be prepared in electronic format. Final plans shall be submitted on full-sized printed bond paper and in CAD and PDF format on a portable external storage media. CADD standards followed shall be those of the California Department of Transportation (Caltrans) as much as possible. Any CADD standard differences from Caltrans shall be submitted by the designer in a project-specific CADD manual at the beginning of the project.
- f) Where applicable, details shall be prepared in accordance with or by reference made to the most current versions of Standard Plans from Caltrans and the San Diego Regional Standard Drawings and Standard Plans for Public Works Construction (Greenbook).
- g) A typical project plan set shall generally include the following plans:
  - Cover sheet (per SANDAG standards)
  - Project location/drawings index/abbreviations sheet
  - General notes/legend sheet
  - Key map and survey controls
  - Horizontal control/alignment
  - Typical sections
  - Demolition
  - Plan and profile
  - Signing and striping
  - Traffic handling



- Construction details
  - Construction staging
  - Drainage and grading
  - Utility relocation
  - Temporary Water Pollution Control/Erosion Control Plans
  - Architectural drawings
  - Electrical and mechanical
  - Landscape
  - Structural
  - Trackwork
  - Systems
  - Right-of-way
  - Standard plans
- h) All standard elements for drawings, such as borders, cover sheet layout, general notes, etc., shall be obtained from SANDAG.

## 4.2 Specifications

- a) The project-specific design Specifications shall be Contract Special Provisions numbered Sections 10 and beyond. The Special Provisions shall be prepared by the designer based on project-specific requirements, and these sections shall correlate with SANDAG's Special Provisions, Sections 1 through 9. The designer shall ensure that Sections 10 and beyond do not conflict with Sections 1 through 9.
- b) The SANDAG Project Manager and the designer will be required to fill out a SANDAG-provided form (Electronic Info [EI] Form) that tells the SANDAG Contracts Analyst project details so Sections 1 through 9 can be individualized for the project. Details to be provided will include scope, number of working days, liquidated damages, cost estimate, etc.
- c) Where applicable, specifications shall be in accordance with or reference made to other agency standard specifications, including but not limited to, the most current versions of Caltrans Standard Specifications or Standard Specifications for Public Works Construction. The designer shall utilize local supplements to standard specifications, as appropriate. Note that if another agency's standard specifications have received a recent update, those updates may not have yet been reviewed and accepted by SANDAG. The designer shall verify with the SANDAG Project Manager the local supplements to use for the project.
- d) Format for specifications shall follow Caltrans outlining configuration and be prepared using a supported version of Microsoft Word. Additional formatting requirements shall be as follows:



Font type:	Arial
Font size:	11 point
Top margin:	1 inch
Bottom margin:	1 inch
Side margins:	0.75 inch
Headers and footers:	0.5 inch

### 4.3 Submittals

#### a) General

Unless otherwise indicated in this design criterion, all aspects of design submittals shall follow the schedule as defined below. Submittal packages shall be complete with drawings and specifications. Cost estimates shall be included in the submittal package starting at the 35% submittal schedule.

Each submittal package shall be accompanied with a transmittal letter and progress status report. Each subsequent submittal following the 35% submittal shall also include an updated design schedule and comment review log.

The schedule of submittals shall be as listed below, except where an alternate schedule of submittals has been approved by SANDAG and the designer on a project-specific basis and defined in the scope of work for the design contract, task order, or amendment.

- Draft: 35%, 65%, 100%
- Final

#### b) Submittal Format

- Submittal packages shall be in both hardcopy and electronic format in the sizes and quantities as required by the contract or task order for each drawing submittal level.
- Drawings
  - 35% drawings shall include: cover sheet; vicinity maps; drawing index listing all sheets proposed at the 100% submittal with the sheets included in the 35% submittal in bold type; and section, plan, and detail sheets sufficient to confirm the overall project design configuration and elements. The 35% shall include plans for all the project design disciplines.
  - 65% drawings shall include: cover sheet; vicinity maps; drawing index listing all sheets proposed at the 100% submittal with the sheets included in the 65% submittal in bold type; and section, plan, and detail sheets sufficient to review the project design in detail. The 65% plans shall include detail-level plans for all the project design disciplines and include, as needed, construction phasing, traffic control, construction storm-water control, utility service and relocation plans, and shall show right-of-way lines.



- 100% drawings shall include: cover sheet; vicinity maps; drawing index listing all sheets; and section, plan, and detail sheets of the complete project design. The 100% plans shall include complete detailed plans for all the project design disciplines and include, as needed, complete construction phasing, traffic control, construction storm-water control, utility service and relocation designs, and shall show accurate right-of-way line lines.
- Final shall include one full-sized plan set with wet signature on each drawing. Final plans shall be the 100% submittal with changes incorporated from the 100% submittal review comments. Where 100% review comments are not included, an explanations shall be included in the final comment and review documents and brought to the Project Manager's attention.
- Specifications
 

Hard and electronic copies of the technical special provisions "Specifications" shall be submitted with the submittals as indicated below in the form, format, and quantity required by the Project Manager.

  - 65% – Specifications shall include language providing qualitative and quantitative information on materials, products, and processes to be provided by the construction contractor for at least all the work shown in the 65% drawings. Specification language shall include a description of the measurement and payment for the bid item work included in the 65% drawings.
  - 100% – Specifications shall include language providing qualitative and quantitative information on materials, products, and processes to be provided by the construction contractor for all the work shown in the 100% drawings. Specification language shall include a description of the measurement and payment for each bid item of work included in the 100% drawings. In addition, the 100% Specifications submittal shall include proposed language for contract boilerplate Sections 5, 6, and 8 describing the Contractor's working limitations and contract working days.
  - Final – Specifications shall include one wet signature page for the responsible engineer for each discipline included in the project specifications. Final Specifications shall be the 100% submittal with changes incorporated from the 100% submittal review comments. Where 100% review comments are not included, an explanations shall be included in the final comment and review documents and brought to the Project Manager's attention.

c) Estimates

- 35% – At the discretion and direction of the Project Manager, a project construction estimate shall be submitted with the 35% submittal. The estimate shall, to the extent possible, use quantities developed in design extended by unit costs. The estimate may use rough estimates of quantity and unit cost or be based on projects of similar work and scale. The estimate shall be logically developed on a spreadsheet with an item description, quantity, and unit cost. Other factors, such as contingencies, third-party costs, vehicles, or other items, will be included at the direction of the Project Manager.



- 65% – A detailed project construction estimate shall be submitted with the 65% submittal. The estimate shall use quantities developed in the 65% design extended by unit costs. The estimate shall be logically developed on a spreadsheet with an item description, quantity, and unit cost. Quantity take-off data used to develop the estimate shall be included with the 65% estimate submittal. Other factors, such as contingencies, third-party costs, vehicles, or other items, will be included at the direction of the Project Manager
- 100% – A complete project construction estimate shall be submitted with the 100% submittal. The estimate shall use quantities developed in the 100% design extended by unit costs. The estimate shall be on a spreadsheet with the complete item descriptions, quantities, and unit costs. Quantity take-off data used to develop the estimate shall be included with the 100% estimate submittal. Other factors, such as contingencies, third-party costs, vehicles, or other items, will be included at the direction of the Project Manager.
- Final – The final estimate shall be the 100% submittal with changes incorporated from the 100% submittal review comments. Where 100% review comments are not addressed in the estimate, an explanation shall be included in the final comment and review documents and brought to the Project Manager's attention.

d) Comment and Review Documentation

The designer shall maintain a comment and review tracking log or other comment tracking system throughout the design submittal process. Comment tracking documentation shall number comments in a logical manner, include descriptions of the comment, identify the commenter, and describe the comment disposition.

- 35% – Initiate comment-tracking documentation.
- 65% – Provide updated comment tracking documentation with current comment disposition.
- 100% – Provide complete updated comment tracking documentation with the proposed final comment disposition.
- Final – Provide complete updated comment tracking documentation with the final comment disposition. Final review comments in which changes differed significantly from the commenter's intention shall be brought to the Project Manager's attention.

e) Design Calculations, Reports, and Tests

The designer shall submit hardcopy and electronic documents for other items pertinent to the project in the form, format, and in the quantity directed by the Project Manager. Soils and geotechnical reports, structural calculations, and hazardous materials analysis shall be submitted in draft at the 65% submittal and signed and complete with the Final submittal. Other reports, tests, and design documentation shall be submitted as required by this criterion, contract, or the Project Manager.





#### 4.4 As-Builts/Record Drawings

Where a design modifies or expands an existing facility, the designer shall obtain relevant as-built documentation of the existing facility for review prior to start of design. If a previously constructed project was a SANDAG project, as-builts may be obtained through SANDAG. The designer shall develop as-built drawings after the completion of the project. The designer is responsible to verify the actual as-built conditions of a facility, system, or control function during design and, as needed, perform field measurements, tests, or operating functions to validate its design.

#### 4.5 Stamps and Signatures

All drawings and specifications shall contain a stamp of an authorizing Professional Engineer (PE) currently registered in the State of California showing the name, registration number, and registration expiration date of the authorizing PE. An authorizing PE shall be specifically qualified for the engineering discipline related to a particular drawing or subset of drawings the PE is signing for. The stamp and the PE qualification shall be in accordance with the California Department of Consumer Affairs. All drawings submitted as Final shall contain the signature of the appropriate authorizing PE. SANDAG requires a half-sized and full-sized PDF set. If required by the SANDAG project manager, a full-sized set of reproducible drawings shall also be submitted with a wet signature on each drawing.

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## 5.0 CIVIL WORK

This chapter provides general design guidelines for multiple disciplines specific to civil works and shall be applied to all San Diego Association of Governments (SANDAG) projects. The designer shall note that some additional civil works design criteria related specifically to light rail transit (LRT) facilities or bus transit facilities may apply and therefore should reference the appropriate sections within Volumes 2 and 3 of this manual.

### 5.1 Survey Control

#### 5.1.1 Project Alignment

Project alignment control shall be established on the California State Plane Coordinate system, NAD 83, Zone 6, by ties to monuments with values published by the U.S. Geological Survey, San Diego County, or the California Department of Transportation (Caltrans) – second order – second class minimum order of accuracy.

Coordinates shown on maps, plans, and other related documents shall be CCS83 coordinates. The reference network for CCS83 coordinates shall be the CA-HPGN.

Project alignment control shall be established to a minimum accuracy of 1:20,000 (Caltrans modified second order – second class).

The monuments set for project alignment control shall be of a permanent nature in accordance with the San Diego Regional Standards and as approved by the SANDAG project manager.

Record of survey for project monuments shall be provided as directed by the SANDAG project manager. A systematic numbering system shall be established and approved by the SANDAG project manager for all alignment control monuments.

Where the project mapping ties to existing SANDAG monuments or controlled mapping, any corrections or adjustment to existing monuments or plans to conform to NAD 83 shall be made by the designer and identified in the survey notes and on the plans.

Copies of all field notes and calculations shall be supplied to the SANDAG project manager with the 100 percent design submittal.

#### 5.1.2 Vertical Alignment Control

Vertical control shall be based on the North American Vertical Datum of 1988, second order accuracy or higher. Where design involves previous work that used the National Geodetic Vertical Datum of 1929, all data shall be checked and converted as necessary to North American Vertical Datum of 1988.

Project alignment control surveys greater than 1 mile in length shall be tied to a minimum of two benchmarks unless a second benchmark has not been established within 3,000 feet of the alignment. Additional benchmarks shall be tied at a maximum



interval of 5 miles along the alignment unless no benchmark has been established within 1 mile of the alignment.

#### 5.1.3 Survey Procedures

Field survey procedures shall be per the most current Caltrans Survey Manual.

#### 5.1.4 Aerial Photography

Aerial photography shall be provided as needed to complete an engineering project or as required by the scope of work. The designer shall supply aerial photography and photogrammetric products in accordance with the best practice and standards.

Contact prints on resin-coated paper shall be furnished to SANDAG in the number required by the contract or the project manager. Digitized photo-files of photographs compatible with and viewable through AutoCAD and Micro Station shall be furnished as required on electronic media specified by the Project Manager.

#### 5.1.5 Map Compilation

In accordance with the design scope of work, the designer shall develop or accept, verify, and, if needed, adjust existing base mapping for a project. Base mapping shall be defined as scaled mapping showing the physical features and elevations of the project site at the start of design. The mapping limits shall adequately cover the project, as required, to complete the project study or design. The mapping limits, stereo model layout and coverage, and photo control layout shall be submitted to the SANDAG Project Manager for approval prior to the beginning of field work or aerial photography.

Contour intervals appropriate to the project design requirements shall be selected by the designer and approved by the Project Manager prior to compilation of mapping.

Map contents, symbols, grid system, and editing style shall conform to the standards adopted by Caltrans.

#### 5.1.6 Map Accuracy

The designer shall be responsible for verifying the accuracy of all mapping provided or developed for a project.

The position of all grid ticks and all monuments shall not vary more than 0.01 inch from their coordinate position.

At least 90 percent of all well-defined planimetric features shall be within 0.025 inch of their true position.

All contours shall be within one-half contour interval of true elevation.

Contours shall reflect the crown or cross slope of all paved areas, including paved ditches.



In areas not obscured by grass, weeds, or brush, all spot elevations shall be within one-fourth contour interval of true elevation.

#### 5.1.7 Field Survey Checks of Mapping

Field surveys shall be conducted to confirm mapping accuracy.

#### 5.1.8 References

- *Caltrans CADD Users Manual*
- *Caltrans Plans Preparation Manual*

#### 5.1.9 Format

Base mapping for projects shall be provided on A3-size Mylar sheets and electronic format or as specified by the contract or project manager. Digitized data files shall be ASCII files written either in the Drawing Interchange File format readable into a drawing file format by Autodesk's "AutoCAD" program or in a format that can be imported into Bentley MicroStation InRoads in the version currently in use by SANDAG.

#### 5.1.10 Coordinate Grids

Mapping shall include coordinate grid markings and grid ticks. The size of the grid tick symbol shall be 0.6 inch by 0.6 inch at final plotted scale. Grid ticks shall be rotated orthogonal with the project coordinate system and shall be spaced as follows:

<u>Imperial</u>	<u>Grid Spacing (Drawing Units)</u>
1 inch = 10 feet	75 feet
1 inch = 20 feet	150 feet
1 inch = 50 feet	325 feet
1 inch = 100 feet	650 feet
1 inch = 200 feet	1650 feet
1 inch = 400 feet	3275 feet

#### 5.1.11 Symbols

The symbols shall be generally from the library developed for the Caltrans Divisions of Design CADD system as shown in the *Caltrans CADD Users Manual*, Appendix A1.

## 5.2 Permits, Reviews, and Approvals

Designer shall determine applicable permit requirements and prepare submittal packages for permit applications. Permit packages shall be submitted to appropriate agencies for review. Designer shall attend review meetings and incorporate comments into the package as necessary.



### 5.2.1 Environmental Regulatory Agencies

- United States Army Corps of Engineers
- United States Coast Guard
- United States Fish and Wildlife Service
- California Department of Fish and Wildlife (formerly Fish and Game)
- California Environmental Protection Agency
- San Diego County Department of Environmental Health
- San Diego Regional Water Quality Control Board
- State Water Resource Control Board
- California Coastal Commission
- San Diego Air Pollution Control District

### 5.2.2 Traffic Regulatory Agencies

- Caltrans
- City having jurisdiction in which project encroaches

### 5.2.3 Utilities and Other Agencies

Other agencies shall be consulted as needed during the design process for potential review and permit requirements, include, but are not limited to, the following:

- a) Utilities
  - San Diego Gas & Electric
  - Local and regional water supply districts
  - Cox and Time Warner Cable
  - AT&T, Sprint, Verizon, and T-Mobile communications
- b) San Diego Historical Society
- c) San Diego Port Authority
- d) California Public Utilities Commission (CPUC)
- e) Metropolitan Transit System (MTS)/North County Transit District (NCTD)

## 5.3 Street Designs

### 5.3.1 General

Unless otherwise specified, all road and street design shall be in accordance with the current standard plans, specifications, and design guidelines of the local jurisdictions. For those cases where the local jurisdictions have no design guidelines, the Caltrans Design Standards shall be used.



Street and road design within the jurisdiction of a local agency shall have a title block for that agency, be designed to the agency's standards, and approved/signed by the agency.

### 5.3.2 Paving

#### a) Codes and Standards

All pavements in public streets shall be in conformance with the current specifications and practices of the local jurisdictions or Caltrans standards for state highways and right-of-ways. In a case where the local jurisdictions have no codes or standards, the Caltrans standards shall be followed.

#### b) Restored Pavement

Restored pavement shall conform to widths prevailing prior to transit construction. No street, sidewalk, or alley widening shall be included unless required in the project description or environmental document. Pavement shall be restored with similar materials existing prior to the transit project to current local agency or Caltrans specifications and standards.

#### c) New Pavement

New pavements shall be of materials conforming to the latest standards of the agency having jurisdiction and maintenance responsibility. See also Section 5.8 "Structures," for requirements concerning pavement recommendations.

### 5.3.2.1 Traffic Signals

#### a) Codes and Standards

All relocations, temporary or permanent, and restoration of traffic signal facilities shall be in accordance with the practices of the local jurisdictions. In the case where the local jurisdictions have no standards, the *California Manual of Uniform Traffic Control Devices*, and Caltrans standard plans and specifications shall be followed.

Traffic signal plans need to include a title block and approval signature by the agency in charge of operating and maintaining the signal.

#### b) New and Existing Signal Installations

New traffic signal installations shall provide for all required auto, bicycle, and pedestrian movements in addition to signal priority or pre-emption that may be required for rail or bus movements. All existing signals shall be modified to accommodate any revisions to auto, bicycle, and pedestrian movements and signal priority or pre-emption for railway vehicles or buses where required. All traffic signal installations and modifications shall be compatible with the local jurisdiction's traffic signal control program and standards or Caltrans traffic signal program and standards for State Highways or Right-of-Way.

## 5.4 Hydrology/Hydraulics

### 5.4.1 General

Project features such as track, transit stations, bridges, depressed section structures, street improvements, and support facilities (e.g., substations and transit station parking)



shall be designed to minimize and avoid potential water resources impacts (direct and indirect; short-term and long-term) as a result of a project.

Unless otherwise specified, all water resources design shall be in accordance with the current standard plans, specifications, and design guidelines of the local jurisdictions. This includes relocation or modification of existing drainage facilities and systems. For work within MTS and/or NCTD right-of-way, or where a jurisdiction has not established a code or standard, the most current version of the county/city guidelines shall be used, unless where otherwise noted below.

#### 5.4.2 Drainage (On-Site and Off-Site)

Existing drainage systems shall be identified. Existing drainage facilities that conflict with the proposed alignment infrastructure should be evaluated for relocation and/or removal. In general, SANDAG will be responsible for mitigating impacts directly caused by its projects and will not improve or replace existing inadequate drainage systems not affected by the project.

To the extent practical, services to adjoining properties shall be maintained by “protecting-in-place”; where not achievable, the designer shall evaluate alternative facilities or diverting to other points. Replacement and new drainage structures shall be reinforced concrete. Corrugated metal pipe is not permitted for new construction. Use of polyvinyl chloride and/or high-density polyethylene is not allowed under track segments. Culverts and storm drains passing beneath track segments or maintenance roadways shall be reinforced concrete pipe rated at 4000D for the entire length of the buried pipe. All materials must satisfy the durability design life of the project. Reinforced concrete pipes shall be of at least 18 inches in diameter, unless otherwise approved by SANDAG.

Any potential for drainage run-on shall be intercepted and prevented from entering the right-of-way. The designer shall determine the best means of interception in accordance with local jurisdictional guidelines. Interception of run-on shall in no way cause flooding, erosion, or interruption of necessary drainage functions to adjacent properties or up/downstream facilities.

Where an on-site drainage facility is designed to handle both off-site and on-site flows, such as concrete-lined ditches, the design will be coordinated with the jurisdiction involved. Effort should be made to maintain current flow paths and drainage patterns for surface runoff and other drainage to the maximum extent possible.

##### 5.4.2.1 Design Storm Frequency

In general, projects shall be designed to convey the following design storm frequencies:

- Track section drainage: Track drainage facilities (e.g., swales, storm drains/culverts) adjacent to or crossing the track shall be designed for the 100-year design storm flow.
- Storm drains/culverts: Storm drains and culverts shall be designed to convey the 100-year design storm flow.





- Floodplains: Floodplains shall be designed to efficiently convey 100-year design storm flood elevation as determined by the more restrictive of the following: Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, local agency floodplain/floodway maps, the results of hydraulic studies prepared for SANDAG, or other studies accepted by SANDAG.
- Stations, parking lots, and access roads: Surface drainage facilities (e.g., storm drainage inlets, underground storm drain systems) located within stations, streets, and parking lots shall be designed to convey the 50-year design storm flow or the local jurisdiction's criteria, whichever is more conservative.

The above design storm frequencies may be modified if the local jurisdictional agency has a more conservative standard, pending SANDAG approval.

#### 5.4.2.2 Ballasted Track

All design parameters shall comply with Volume 2—LRT Design Criteria, Section 1.1.2.1.

#### 5.4.2.3 Grade Crossings

All design parameters shall comply with Volume 2—LRT Design Criteria, Section 1.1.2.2.

#### 5.4.2.4 Underdrains

Underdrains, unless otherwise approved, shall not be used to collect surface drainage. Underdrains used to drain runoff from trackbed areas shall consist of perforated pipe as follows:

- Underdrains less than 500 feet shall be at least 6 inches in diameter.
- Underdrains greater than or equal to 500 feet shall be at least 8 inches in diameter.
- At least 6 inches of a gravel layer wrapped with filter fabric (minimum weight 4 ounces/square yard) shall be placed between the gravel and the surrounding soil.
- Underdrains shall connect to a drainage system or daylight to areas that will not be adversely affected by the anticipated drainage.
- Clean-outs shall be included on all underdrains at intervals and locations that allow for adequate maintenance.
- Underdrain outlets on retaining walls are not permitted where water would be allowed to drain across paved public areas or into a transit way.

#### 5.4.3 Water Quality and Hydromodification

Each project would be required to comply with the most current version of the *State Water Resources Control Board National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems Draining the Watersheds within the San Diego Region*. Where applicable, the project shall be supplemented with the applicable NPDES requirements of the local jurisdiction.





The project will be required to evaluate impacts to all waters. The project shall implement through contract specifications, source and treatment-control measures contained in local-related guidance documents (e.g., Caltrans, City of San Diego) to alleviate short- and long-term impacts to water quality.

Project design considerations should include, but not be limited to, local agency requirements and concerns; climate; land use; soil classification; geology; topography; sediment and receiving water risk levels; study area hydrologic units, areas, and sub-areas; study area watershed management areas; beneficial uses and water quality objectives of affected water bodies; Clean Water Act Section 303(d) impaired water bodies within the study area and associated water quality objectives and total maximum daily loads; water quality degradation from urban runoff caused by an increase in impervious surfaces.

Low impact development and hydromodification approaches should be incorporated into site design and storm-water management to maintain the site's predevelopment runoff rates and volumes as required by the local jurisdictions. SANDAG would select and implement specific low-impact development measures and techniques depending on site location/size and storm-water treatment needs.

#### 5.4.4 Floodplains/Floodways

The project will be required to evaluate avoidance of impacts associated with the modification of floodplains. Additionally, direct or indirect support of floodplain development where there is a practicable alternative shall be avoided. Further, the project will restore and preserve the natural and beneficial values served by floodplains impacted by the project. Project design considerations should include, but not be limited to, flooding potential from increased runoff/impervious surfaces; and changes to floodplains/floodways from bridge crossings, channel modifications, and longitudinal encroachments.

Freeboard requirements shall be evaluated against all applicable agency regulations (e.g., city, Caltrans, American Railway Engineering and Maintenance-of-Way Association (AREMA)). Where applicable, a minimum of 1 foot of freeboard shall be provided to any adjacent properties. Both SANDAG and local regulatory flood passage criteria shall be evaluated, and the more conservative criteria shall be adopted. Any deviations will require a design exception.

To the maximum extent practicable, the design shall minimize:

- Increases to the floodplain or inundation hazard to adjacent properties. The designed storm-water control and conveyance system shall not impact adjacent properties upstream or downstream of MTS and/or SANDAG facilities beyond historic and legal allowances without consent and documented approval from adjacent property owners and governing jurisdictions, including the San Diego Regional Water Quality Control Board (RWQCB), FEMA, and the jurisdictional Floodplain Manager.
- An increase to the flood level of a regulatory floodway. (Regulatory Floodway: the channel of a river or other water course and the adjacent land areas that shall be



reserved in order to discharge the FEMA-designated base flood without cumulatively increasing the water surface elevation more than a designated height).

- Reduction of the flood storage capacity or impedance of the movement of floodwater within a regulatory floodway.

#### 5.4.5 Project Requirements

The packages described below shall be submitted to appropriate agencies (e.g., RWQCB, city, Caltrans) for review. Designer shall attend review meetings and incorporate comments into the package as necessary.

##### 5.4.5.1 Hydrology/Hydraulics

Final design shall include plans and specifications for all structural, earthwork, civil, and landscape features necessary to provide hydrology/hydraulics for the project. The designer shall verify that the hydrology/hydraulics features are not in conflict with other project features.

In accordance with the design scope of work, the designer shall develop Drainage Plans for all areas disturbed by construction. At a minimum, the plans shall include layouts, profiles, cross sections, and details.

The hydrology/hydraulics design shall be incorporated into design documents (e.g., Drainage Report) as required by the local jurisdiction, as well as project specifications as part of the project bidding documentation.

At a minimum, the design documents should include the following:

- Topographic sheets (at an appropriate scale) with drainage areas outlined; existing and proposed facilities identified, including storm drains, culverts, inlets/outlets, and channels; and labeling of areas/subareas with acreage, flow arrows, and travel lengths.
- Soils classification and land use mapping.
- Hydrology calculations using the method identified by the local jurisdiction (e.g., Rational Method, National Resources Conservation Service) using industry-accepted software (e.g., HEC-HMS, AES, Civil Design). If a method is not specified, the Rational Method shall be used for drainage areas up to approximately 1 square mile in size and the National Resources Conservation Service hydrologic method shall be used for drainage areas exceeding approximately 1 square mile in size.
- Flow rates and velocities in channels, pipes, and structures (shall be shown in either figure or table format).

##### 5.4.5.2 Water Quality and Hydromodification

In accordance with local jurisdictional guidelines, the designer shall incorporate water quality and hydromodification measures into the Drainage and Grading Plans for all areas disturbed by the project. At a minimum, the plans shall include type, location, and installation. Final design shall include plans and specifications for all best management practices (BMPs). Additionally, the design must consider integration into the permanent



landscape of the project since these BMPs are to remain in place and operational. BMPs must be designed to maintain storm-water quality control after project completion. Construction BMPs shall be designed in accordance with Section 5.4.

The water quality and hydromodification design shall be incorporated into design documents (e.g., Storm Water Data Report, Water Quality Technical Report) as required by the local jurisdiction and project specifications as part of the project bidding documentation. For those cases where local jurisdictions have no design document requirements, a Storm Water Data Report shall be developed in accordance with the *Caltrans Storm Water Quality Handbooks* to document all storm-water quality design. Hydromodification design would be incorporated into the Drainage Report (see section 5.4.5.1).

#### 5.4.5.3 Floodplains/Floodways

In accordance with the design scope of work, the designer shall develop modeling for all water bodies disturbed by construction using industry-accepted software (e.g., HEC-RAS, SWIMM).

The floodplain/floodway design shall be incorporated into design documents (e.g., Location Hydraulic Studies, Floodplain Analysis Report) as required by the local jurisdiction. Additionally, the designer shall prepare all documentation, applications, and plans required for approval of any Flood Insurance Rate Maps revision in accordance with the FEMA regulations. Such applications include a Conditional Letter of Map Revision and/or a Letter of Map Revision, if required.

#### 5.4.6 References

- *Hydrology Manual*—County of San Diego
- *Drainage Design Manual*—City of San Diego
- *Storm Water Standards*—City of San Diego
- *Low Impact Development Handbook, Stormwater Management Strategies*—County of San Diego
- *Storm Water Quality Handbooks, Project Planning and Design Guide*—Caltrans

### 5.5 Erosion and Sediment Controls

#### 5.5.1 General

Unless otherwise specified, all water pollution control (WPC) (temporary construction site BMPs) and erosion control (EC) (post-construction site BMPs) design shall be in accordance with the current standard plans, specifications, and design guidelines of the local jurisdictions in whose right-of-way the project would be constructed. For those cases where the local jurisdictions have no design guidelines, the *Caltrans Storm Water Quality Handbooks*, referenced in Section 5.5.4, shall be used.

The project would be required to comply with the most current version of the State Water Resources Control Board NPDES *General Permit for Discharges of Storm Water Associated with Construction Activity* (also commonly referred to as the Construction



General Permit) or the *NPDES Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans)* or any reissuance thereafter. Where applicable, the project shall be supplemented with applicable NPDES requirements of the local jurisdiction.

#### 5.5.2 Best Management Practices

Each project would be required to mitigate for the short-term impacts to water quality during construction by use of construction site BMPs. BMPs that have been approved by the local jurisdiction are preferred, but alternative BMPs shall be allowed with SANDAG Project Manager approval. Where project conditions prohibit the use of approved BMPs, the designer shall consult the SANDAG Project Manager/department of the local jurisdiction.

#### 5.5.3 Project Requirements

In accordance with the design scope of work, the designer shall develop WPC Plans and EC Plans for all areas disturbed by construction. At a minimum, the plans shall include type, location, installation, and maintenance details. Additionally, the EC (post-construction) design must consider integration into the permanent landscape of the project. Post-construction site BMPs are to remain-in-place and operational after project completion and shall be designed to maintain storm-water quality control for a minimum of one rainy season after project completion.

The WPC and EC design shall be incorporated into design documents (e.g., Storm Water Data Report, Water Quality Technical Report, Storm Water Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan) as required by the local jurisdiction, as well as project specifications as part of the project bidding documentation. The WPC, EC, and SWPPP packages shall be submitted to appropriate local jurisdictional agencies (e.g., RWQCB, city, Caltrans) for review. The designer shall attend review meetings and incorporate comments into the package as necessary.

At a minimum, the design documents should include the following:

- Overview of the BMP selection and design process, regulations and permits, design compliance reporting, and annual reporting requirements
- Background information and guidance necessary for the appropriate selection of BMPs
- Identification of specific staff responsibilities (e.g., Qualified SWPPP Developer, Qualified SWPPP Practitioner, Designated Inspector(s))
- Determination of the feasibility of implementing construction and post-construction site BMPs and identification of project exemption criteria

#### 5.5.4 References

- *Storm Water Quality Handbooks, Project Planning and Design Guide*—Caltrans
- *Storm Water Quality Handbooks, Construction Site Best Management Practices*—Caltrans
- *Storm Water Standards*—City of San Diego



- *Construction General Permit*—State Water Resources Control Board
- *Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation*—State Water Resources Control Board

## 5.6 Utilities

### 5.6.1 General

These criteria shall govern the maintenance, support, restoration, relocation, and construction of new and/or existing utilities and services encountered or affected by construction of a transit system project. In the design, due consideration shall be given to the needs of the transit system, the requirements and obligations of the utility organizations, traffic impacts during construction and maintenance, and any existing agreements between the utility owner and SANDAG.

### 5.6.2 Existing Utilities

All designs involving maintenance, support, relocation, or other utility work shall conform to the applicable specification, criteria, and standard drawings of the concerned utility owner and/or the CPUC. After review by SANDAG, the consultant shall submit utility designs to each affected utility owner or agency for review and approval.

All utilities that are in conflict or affected by a transit project shall be categorized as follows, unless otherwise directed by the engineer:

- **Category 1:**  
Utilities that will be relocated or modified by the utility owner. The following types of privately owned utilities typically fall in this category: telephone, cable television, fiber optics, gas, petroleum, and power.
- **Category 2:**  
Utilities that will be relocated or modified by SANDAG. The following types of publicly owned utilities typically fall in this category: water and sewer.

The designer shall obtain record information, develop a utility plan, evaluate potential conflicts, pothole utilities, and determine which utilities will require relocation as described in this section.

#### a) Obtaining Record Information

Within two weeks following authorization to start design, the designer shall submit a request for Category 1 utility information and a project site plan to the SANDAG Utility Coordinator, unless the SANDAG Utility Coordinator delegates the responsibility to others. The Utility Coordinator will contact the utility companies and obtain facility information from the various Category 1 utility companies.

Within four weeks following authorization to start design, the designer shall obtain as-built information for all Category 2 utilities from the various agencies with Category 2 utilities located within the project limits.



b) Utility Plans

The designer shall take the record information and develop a utility base plan that shows the location of the existing utilities based on the historical information obtained. The utility base plan shall be included in the project's 35% submittal.

c) Evaluate Potential Conflicts

1) Following the 35% submittal, the designer shall identify and create a list of potential utility conflicts. The list shall include the following:

- Name of utility provider
- Approximate location by station number and offset
- Approximate elevation as applicable
- Size of existing utility
- Description of conflict

2) After completion of the above list the designer shall arrange a utility evaluation meeting with the utility coordinator and review each of the potential conflict locations. Each location of potential conflict shall be evaluated to determine if construction of the proposed improvement will likely impact the utility and then determine which locations could be avoided by making design changes, which locations are potentially unavoidable, and which locations should potentially be pot holed or located by other means to further assess the potential conflict. Wherever feasible, the designer shall avoid utility conflicts. Following the conclusion of the evaluation meeting, the designer shall:

- Locate in the field all utilities with potential conflicts and obtain additional field observed information.
- Once the information has been obtained after locating the utilities, it shall be used to further assess the potential conflicts and a list of confirmed conflicts shall be created. Each of the confirmed conflicts shall be evaluated by the designer to determine if design changes can be made to avoid the existing utility and permit it to be protected in place.

3) Prior to the 65% design submittal, the designer shall meet with the SANDAG utility coordinator and review each of the confirmed conflicts providing details on why the conflict is unavoidable. The designer shall provide the Utility Coordinator with a conflict list and plans that identify the utility conflicts.

d) Relocation Design and Coordination

The SANDAG Utility Coordinator will make arrangements with the utility companies to relocate Category 1 utilities. Relocation of utilities will occur either before or during construction. If the relocation work takes place concurrently with construction, then the designer shall include utility coordination language in the contract documents.

Where relocation of Category 2 utilities is needed, the design shall provide service equal to that offered by the existing installations, unless otherwise specified by the SANDAG





Director of Mobility Management and Project Implementation (MM&PI). Category 2 utilities shall be designed by the designer, and utility relocation plans shall be submitted to the utility owner for review and approval.

The designer shall identify all known utilities on the contract documents as "Existing Utility," "Abandoned Utility," "Protect in Place," or "Existing Utility to be Relocated by Others," including the name of the utility owner, size, and pothole data summary table. The designer shall show the proposed new locations of the relocated utilities in the contract documents. Drawings shall be submitted for approval to the SANDAG Utility Coordinator and Project Manager.

The design shall minimize interruption of existing utility service. Where temporary relocation is needed to perform work, the designer shall specify in the contract documents that the utilities shall be restored upon completion of work. Replacements for existing utilities shall be designed to provide service essentially equal to that offered by the existing installations. Designers must bring any proposal for betterment to the attention of SANDAG at an early stage of the design. No betterments shall be included unless specifically approved by the utility owner or public agency, and SANDAG prior to final design.

### 5.6.3 New Services

#### a) Design Requirements for New Utility Services and Equipment

Connection points for new utility services to existing utilities shall be shown on the contract documents, including, but not limited to, water, telephone, power, and sewer.

#### b) New Category 1 Services

The designer shall be responsible for coordinating with the SANDAG Utility Coordinator and the utility company on all new Category 1 utility services. The designer shall include in the contract documents the following requirements for new Category 1 utility services:

- 1) The designer shall include design and specifications for cabling raceways, access pads, clearances, and equipment pads as required to be in place by the utility prior to new service installation.
- 2) The designer shall specify that work inspection and acceptance by the utility company's inspector shall be coordinated by the contractor.
- 3) The contractor shall coordinate with the utility company to access the work site to pull in cables, set all necessary equipment, terminate all cables required to establish service, install metering equipment, and initiate the services upon completion of infrastructure installation.

Where directed in the contract or by the Project Manager, the designer shall provide a complete design of the Category 1 utility service and submit to utility company for review and approval.

For projects that require the utility distribution system to be extended (to the point of connection to the meter of the project), the designer shall notify the SANDAG utility



coordinator. The designer shall, at SANDAG's direction, design any needed Category 1 utility system extension.

Prior to beginning design of an extension, the designer shall request a meeting with the SANDAG Utility Coordinator and the utility company to identify existing utility facilities that can be used for the proposed service.

c) New Category 2 Services

The designer shall be responsible for designing all new Category 2 services and coordinating the location of service connections to existing utility facilities needed for the project.

#### 5.6.4 Design Requirements for Underground Utilities

All designs involving maintenance, support, relocation, or other utility work shall conform to the applicable specifications, criteria, and standard drawings of the utility owner and/or the CPUC. Pipes shall be located, where practical, to cross beneath the transit way at approximately 90 degrees but not less than 45 degrees.

Where a steel casing is used for utilities under a railroad or rail transit way, the depth of cover criteria should follow AREMA for all casing pipe, except that for casing pipe under LRT-only tracks the cover may be reduced to 4.5 feet with the written approval of the Project Manager.

Where casing pipe is installed without a protective coating or is not cathodically protected, the wall thickness shall be increased to the nearest standard size or a minimum of 0.063 inch greater than the thickness required, except for diameters less than 12 inches.

Casing pipe and joints shall be of steel and of leak-proof construction. The inside diameter of the casing pipe shall be at least 2 inches greater than the largest outside diameter of the carrier pipe, joints, or couplings and at least 4 inches greater for carrier pipe 6 inches and over in diameter. Casing pipe shall be sized to allow the carrier pipe to be removed without disturbing the casing pipe.

All non-metallic buried utilities shall have detection aids or tone wires within SANDAG right-of-way for field locating buried pipes. Pipes abandoned in place beneath a transit way shall be plugged and filled with suitable material approved by SANDAG.

Manholes, valves, vaults, and other utility-related appurtenances needing periodic access, maintenance, or operation should not be placed within the transit right-of-way (refer also to Section 5.6.8).

Where new utilities, not associated with a SANDAG project, are proposed to cross under a transit right-of-way, the designer shall be required to incorporate the most current utility design requirements into contract documents.





### 5.6.5 Pressurized Pipelines and Pipelines Conveying Flammable Substances

#### a) Carrier Pipe

Pressurized pipelines and pipelines carrying oil, liquefied petroleum gas, and other flammable liquid products shall be fabricated of steel pipe material and conform to the requirements of the current American National Standards Institute (ANSI) B 31.4, ANSI B 31.8, and other applicable ANSI codes. Carrier pipe must be coated and cathodically protected to industry standards (European Standards (EN) 12068:1999, EN 50162:2004, BS 7361-1:1991, National Association of Corrosion Engineers (NACE) SP0169:2007). Test sites (NACE TM 0497) for monitoring the pipeline shall be provided within 50 feet of the transit way crossing.

#### b) Casing Pipe

All pressurized pipelines and pipelines carrying flammable substances shall be encased except on pipelines where the stress in the pipe from internal pressure and external loads does not exceed 40 percent of the specified minimum yield strength of the steel pipe material, and as approved by the Project Manager. The length of the casing pipe shall extend across the width of the right-of-way. Casing pipes shall be designed to withstand freight railroad or transit loadings, whichever is greater, and shall be coated with a suitable material to provide cathodic protection (EN 12068:1999) in accordance with industry standards (refer to Section 5.8.4 (g), for load requirements).

### 5.6.6 Pipelines Conveying Nonflammable Substances

This section covers the minimum requirements for pipelines installed on or adjacent to transit right-of-way to carry steam, water, or any nonflammable substance not covered in Section 5.6.5.

#### a) Carrier Pipe

Pipelines carrying steam, water, or any nonflammable substance shall be of acceptable material and construction in conformance to the owner's requirements and as approved by the SANDAG Utility Coordinator or Project Manager.

#### b) Casing Pipe

All pressurized pipelines and pipelines carrying pressurized nonflammable substances shall be encased except on pipelines where the stress in the pipe from internal pressure and external loads does not exceed 40 percent of the specified minimum yield strength of the steel pipe material and as approved by the Project Manager. The length of the casing pipe shall extend across the width of the right-of-way. Casing pipes shall be designed to withstand freight railroad or transit loadings, whichever is greater, and shall be coated with a suitable material to provide cathodic protection (EN 12068:1999) in accordance with industry standards (refer to Section 5.8.4 (g), for load requirements).

#### c) Storm Drains and Sanitary Sewers

Storm drains and sewer crossings whose carrier pipes do not have sufficient strength to support transit loads are to be protected with a steel or concrete casing pipe or with



concrete encasements. Encasements and casing pipes shall be in accordance with Section 5.6.4.

Minimum pipe sizes for sanitary sewers shall be 6 inches in diameter. Sanitary sewers shall be designed to give velocities of not less than 2 feet per second when flowing full, based on the following formula:

$$V = \frac{1.486R^{2/3}S^{1/2}}{n}$$

Where:

V	=	Velocity of flow (feet per second)
R	=	Hydraulic radius (feet)
S	=	Slope of total head line (feet/feet)
n	=	Manning roughness coefficient

#### 5.6.7 Fire Protection Facilities

Maintenance, relocation, and support of existing fire protection facilities within SANDAG right-of-way shall be in strict conformance with the current standards of the agency having jurisdiction and shall be approved by SANDAG and the appropriate fire protection agency.

Design shall indicate which facilities are to be maintained complete in place, which are to be removed, which are to be maintained and supported, and which are to be temporarily relocated and replaced after SANDAG's work is completed. Lines to be abandoned in place, or lines that are already abandoned, shall also be indicated.

Design for new fire protection facilities shall be performed by the designer in compliance with current National Fire Protection Association and local building codes. See the LRT Design Criteria for design specifics applicable to the project.

#### 5.6.8 Easements and Encroachment Permits

The placement of any utility within SANDAG or transit-agency-owned right-of-way requires an entitlement agreement (easement or license) and right-of-entry permit for construction. These agreements are issued by the owner of the right-of-way. The designer shall assist the utility agency in preparation of entitlement agreements or and right-of-entry permit documentation. All required entitlement agreements shall be shown on the design plans (refer to Section 5.7).

The replacement or modification of an existing utility shall conform to the standards and criteria for new utilities as presented in these Design Criteria. If Category 1 utility companies submit a right-of-way description to SANDAG for the necessary right-of-way for a new or replacement location, the designer, upon request of the SANDAG Utility Coordinator, shall review the document and confirm the accuracy of the information submitted.

### 5.7 Right-of-Way

Right-of-way (ROW) is the composite total requirement of all interests and uses of real property needed to construct, maintain, protect, and operate the transit system. Some ROW



requirements are temporary and reversionary in nature, while other requirements are permanent as dictated by operating needs. The intent is to acquire and maintain the minimum ROW required consistent with the requirements of the system and good ROW practices. Because ROW plans approved by SANDAG are used as a basis for acquisition of property, all interest and uses required shall be shown on the ROW plans together with the detailed property dispositions.

#### 5.7.1 General

SANDAG is responsible for the actual descriptions of the property to be acquired for any transit project. The taking envelope is influenced by the topography, drainage, retaining walls, service roads, utilities, and the nature of the structures and side slopes selected. Therefore it is the responsibility of the designer to establish the right-of-way limits based upon the project design and the size and term for any temporary construction easements.

The designer shall develop a set of ROW plans showing limits of the permanent and temporary ROW. ROW shall be shown using simple curves and tangents. Spiral curves will not be used in ROW descriptions. Chords may be used instead of curves under special conditions approved by SANDAG.

#### 5.7.2 Types of Right-of-Way

The designer shall consider the following types of ROW when determining the envelope of design influence:

##### a) Fee Simple

Fee simple indicates full ownership of the property. Fee simple should always be the first type of ROW to be considered for any permanent surface or aerial construction. If this is not practical, then another type of ROW may be used.

##### b) Easement

A non-possessing interest held by one party in land of another whereby the first party is accorded partial use of such land for a specific purpose, such as surface, aerial, and underground uses. An easement can provide space for transit structures and for future maintenance of structures that support facilities located on private property. Limits of spatial use may be applied both laterally and vertically. When determining easement limits, the designer shall consider basic width, drainage, supporting slopes and structures, utilities, setbacks, and the overall effect on the property involved. The designer shall consider the following types of easements:

##### 1) Permanent Surface Easement

An easement that provides space for the transit facility when it is not practical or advisable to acquire a fee interest. This easement shall have the same parameters as fee ownership. Upper limits shall be described only where passing under an existing structure or aerial easement.



2) Permanent Underground Easement

An easement that encompasses the total transit facility located beneath the surface of the ground. This easement shall have definite upper and lateral limits to be shown on the drawings. Lower limits shall be described only where special limiting features exist.

3) Permanent Aerial Easement

A permanent aerial easement completely envelopes the aerial portion of the transit facility. This easement shall have definite lower and side limits and be shown on the drawings. Where required, the upper limits shall be described. Supporting elements must be considered and may require special treatment.

4) Construction Easement

A construction easement is temporary in nature with a defined duration, and shall provide sufficient space to allow for the use of property by a contractor for construction.

5) Utility Easement

Utility easements required to serve the transit system shall be treated as ROW. Bearings and distances along the sides shall be shown, as well as the length and widths of the easements and ties to the limits of the ROW. Utility easements shall be described by the designer unless the subject utility determines its own easement.

### 5.7.3 Right-of-Way Limits

The following criteria are provided as guidelines for establishing the limits of the ROW. The dimensions are given for minimum conditions and must be modified where engineering or real estate requirements dictate additional needs. All ROW limits shall be vertical or horizontal planes and includes either fee simple or easement interests.

a) At-Grade Construction

1) Height Limit

Normally, a height limit is not required. When an upper limit is required, the limit shall be described by the elevations of horizontal planes, stepped as required and co-locating the steps with existing property lines or prominent suitable topographical features.

2) Lateral Limit

The right-of-way needed will depend upon the nature of the facility, clearances, and whether slope banks and retaining walls or other structures are required. When considering a tie-back system, all tie-backs shall fall within the obtained right-of-way. For general applications, the designer shall refer to the standard minimum ROW limits of the agency within whose jurisdiction that portion of the project falls.

Additional ROW may be required beyond the minimum limits for the entire transit way, including associated slope banks and structures depending upon the



ownership and maintenance responsibilities of those facilities. Additional rights-of-way may be required for access roads, drainage facilities, maintenance access, construction areas, substations and other operational systems, public and private utilities-tree trimming, sight lines/distances, and construction staging. For example, additional ROW may be required where the proposed acquisition will leave the property owner with an uneconomic remnant. Any additional ROW required that necessitates deviation from the minimum limits set above shall require approval by SANDAG and/or the governing agency.

3) Depth Limit

The depth limit when required shall be defined in a manner similar to that for the height limit, using a minimum vertical distance below top of finish grade, except in retained fill sections. In retained fill sections, the depth limit shall include the structural support system required for fill sections.

b) Aerial Construction

1) Height Limit

When an upper limit is required, the limit shall be described by the elevations of horizontal planes, stepped as required and co-locating the steps with existing property lines or prominent suitable topographical features.

2) Lateral Limit

Lateral limit shall be a minimum of 2 feet beyond the limit of structures. Where transit way or station platforms are elevated, the lateral limit shall be the structure's drip-line. Improvements over private property and non-transportation ROW, the lateral limits must be established in coordination with the operating entity. Additional easements shall be described by the designer and acquired by SANDAG for maintenance of and repairs to structures.

3) Lower Limit

Where required by local conditions and/or specifically directed by SANDAG, the lower limit shall be ground level with specified use restrictions, except where crossing other ROW. For aerial support structures, the lower limit shall include support foundation and foundation for any anchoring mechanism.

c) Drainage and Utility Easements

ROW for public and private utility easements shall be sufficient to accommodate future maintenance and replacement.

1) Open Drainage Ditches

The minimum total width for surface drainage easements shall be governed by local agency requirements. Two feet of width from the outside edges of the ditch shall be provided, at a minimum. Where parallel access is not available, an additional width of 12 feet, on one side, would be required to accommodate maintenance. Transit wayside equipment shall not be placed within drainage ditch right-of-way.



## 2) Underground Drainage Utilities

The easement widths for underground drainage systems and utilities shall be approved by the local agency involved. As a guideline, the minimum easement width is 10 feet with 2 feet minimum clearance from the outside edge of the structure to the easement line or projected 1:1 slope starting from the outside edge of structure. Where 1:1 projection interferes with other structures, 2 feet minimum clearance shall apply.

## d) Stations

ROW required for stations shall include space needed for platforms, pedestrian and vehicular circulation, bus service operations, emergency and maintenance vehicle access, parking, bicycle lockers, utility services, operational systems, and ancillary facilities for stations.

ROW for station parking and access shall be based on patronage forecasts, bus service, and parking demand.

## e) ROW Fencing

Fencing may be required in certain areas to provide security and/or ensure safety. Fencing shall be parallel to the guideway, forming an open-ended envelope and allowing unrestricted transit movement. Fencing shall generally be provided along areas of exclusive transit ROW and operation. Fencing shall be installed at the ROW line as determined in Section 5.7.3 (a).

Fencing is not generally required in public ROW where SANDAG operations occur within the street; exceptions are where pedestrian movements across the SANDAG guideway are restricted to certain areas for safety reasons.

## 5.8 Structures

This section provides the criteria and guidelines for structures. Because the general criteria for structures is applicable to both highway and rail structures, both types of projects are presented together in this section and no separate criteria are provided in LRT Design Criteria and Bus Transit Design Criteria. However, the designer shall note that in Section 5.8.4, "Bridges," there are significant additional design criteria required for rail structures; therefore, separate paragraphs have been provided for highway and rail structures to distinguish between the two.

### 5.8.1 General

SANDAG's transit system includes structures for highways, light rail vehicles (LRVs), commuter trains, and shared transit/freight tracks. The type of structure will depend upon the characteristics of the particular site, what transit type the structure will be used for, and what type of transit function it will have.

### 5.8.2 Design Codes, Manuals, and Specifications

Unless otherwise specified herein, design requirements for bridges, tunnels, catenary anchorage, culverts, and retaining walls shall be as specified in the latest Edition of the





American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor (LRFD) Bridge Design Specifications (BDS) with Caltrans Amendments, and the following provisions for rail transit facilities:

- a) For structures carrying commuter rail and freight trains, or structures that carry other traffic over tracks used by freight trains, the provisions of the AREMA Manual shall be satisfied. Where provisions of AREMA differ from similar provisions in AASHTO, the resulting design must accommodate the most restrictive provisions.
- b) Buildings, including stations, station shelters, and maintenance buildings, shall be designed in accordance with the current edition of the California Building Code, with the prescribed wind and seismic forces per American Society of Civil Engineers 7-10. Seismic design provision shall be for Seismic Zone Four (D).
- c) Overhead Contact System (OCS) structures shall comply with the requirements of the CPUC General Orders including, but not limited to, General Order 95C.

### 5.8.3 Geotechnical

Prior to design of any structure, the designer shall evaluate and recommend the requirements for geotechnical investigation. The requirements for geotechnical investigations shall be outlined in the Basis of Design Report for the project, when applicable. Otherwise the geotechnical investigation shall be included in the design proposal. An investigation shall determine the nature of the foundation material and other pertinent subsurface characteristics required to support the design of the project. Geotechnical reports shall be prepared under the supervision of, and signed and stamped by, a geotechnical engineer or engineering geologist registered in the state of California.

#### a) Geotechnical Report

Geotechnical reports shall include an executive summary, soil boring logs, testing methods, and recommendations with alternatives. Logs for all exploration work shall include type of soil (based on the Uniform Soil Classification System), field density, groundwater level at each boring, and moisture content. Where required, geotechnical reports shall identify refusal depths and rock profiles. The report at a minimum shall include the following:

- 1) Embankments, including as needed analysis and recommendations for:
  - Slope stability of cuts and fills
  - Erosion control
  - Material, placing and compaction
  - Fill settlements, including settlement versus time
  - Expansion potential
  - Foundation soil preparation, including removal of unsuitable materials
  - Groundwater and subdrainage control
  - Retaining structures design parameters



2) Pavement Recommendations, including:

- Recommended structural pavement sections
- Identification and remediation alternatives for any expansive and settlement sensitive soils
- Pavement thickness, course classification and reinforcement
- Drainage requirements
- Overexcavation, backfill replacement, and subgrade treatment
- Subgrade reinforcement/geotextiles or chemical subgrade treatments, including rate of application and mixing requirements

3) Retaining Walls

In general, retaining walls are defined in Section 5.8.5 of these design criteria. In the case of alternative wall systems as defined in Section 5.8.5 (A) of these criteria, the geotechnical data and investigation criteria will be determined on a case-by-case basis and may include the requirements below as well as additional investigations and testing. The geotechnical reports for "Retaining Structures" shall include the following:

- Active fluid pressure on cantilever walls and at-rest earth pressures on top-restrained walls for level and sloping backfill (drained and undrained) and surcharge loads from adjacent structures, equipments, vehicles, and trains. Specify whether wall friction was considered.
- Active soil pressure on braced/rigid walls for level and sloping backfill (drained and undrained) and surcharge loads from adjacent structures, equipment, vehicles, and trains. Specify whether wall friction was considered. (Depending upon soil type and bracing, equivalent fluid pressure may not be appropriate. Ref. Naval Facilities Engineering Command Design Manual 7.2).
- Structural backfill specifications and compaction using excavated or imported material.
- Permeable materials specification for backfill behind retaining walls.
- Passive pressure, base friction factor, and combinations, including the amount of movement necessary to achieve passive pressure. Provide reduced passive pressure value for limited wall movement and/or sloping finished grade in front of the wall.
- Structure settlements, total and differential, including settlement versus time.
- Seismically induced settlements, including liquefaction settlements.
- Corrective measures for expansive soils.
- Corrosion problems due to soluble salts in the soil and recommendation for type of cement to be used.





- Drainage recommendations, including backfill type, subdrains, weep-holes, and brow ditches.
- Recommendations to establish overall stability of the retaining wall and adjoining improvements.

#### 4) Bridges

The soils reports for bridges shall include information as defined in the latest versions of *Caltrans Guidelines for Structures Foundation Reports* and *Foundation Report Preparation for Bridges*, including the following:

- A minimum of one exploratory boring shall be performed at each bridge abutment and at each column support, where practical.
- Exploratory borings shall extend below the proposed bottom of footings for spread footings and below the tip elevation of piles for pile foundations.

#### 5) Pipes

Soils reports for pipe trenches shall be evaluated in accordance with Section 5.8.3 for each individual storm drain, sewer, water, and other underground structures. In general, reports are required for pipe trenches where the pipe is 4 feet in diameter or greater and the cover over the pipe is 6 feet or greater. The report shall include the following:

- Recommended stable construction slope for pipe trench excavation with side slopes
- Lateral earth pressure for sheeting and shoring design for trenches and jacking pits using braced or cantilevered sheeting and shoring construction with level or sloping backfill
- Allowable bearing pressure and lateral earth pressures for permanent structures
- Buoyant weight of soil that may be used to resist uplift on structures and pipelines for high groundwater conditions
- Predicted scour depth for the river and stream crossings as provided in the project hydraulic report
- Groundwater and dewatering
- Settlement of pipe during and after construction
- Seismic considerations for pipe, including special construction recommendations
- Corrosion considerations, including problems due to soil type(s) and soluble salts in the soil
- Specifications for pipe bedding, initial backfill, placing and compacting requirements, including estimates for settlement of backfill
- Consideration and recommendation for control of water seeping through pipe bedding and backfill



#### 6) Tunnels

As part of the design effort, specific criteria shall be developed by the designer, and submitted to SANDAG for approval, specifying the extent of the geotechnical investigations, testing requirements, and types of reports to be used to develop design of major underground structures. These criteria will be required as part of the consultant's Basis of Design Report. Additional discussion for the tunnels is provided in Section 5.8.6.

#### 7) Trackwork

Soils report for trackwork shall provide analysis and recommendations as listed in 1) Embankments, and shall include evaluation of soil and water characteristics, as defined in LRT Design Criteria Section 3.2.5 for determination of the potential for corrosion and stray current effects.

### 5.8.4 Bridges

#### a) Type Selection Report

Prior to beginning final design, it shall be the responsibility of the designer to prepare and submit a Bridge Type Selection Report to the SANDAG Director of MM&PI for approval. The designer shall consider the applicable SANDAG Design Criteria, recommendation of Caltrans Memo to Designers Section 1-29 Attachment 4, Bridge Design Aids Manual, site constraints, geotechnical information, costs, etc., and include a recommendation for the preferred bridge type(s) to be considered. A meeting may be required to discuss the recommendations made in this report. Final design should not proceed until the Bridge Type Selection Report is approved by the SANDAG Director of MM&PI.

#### b) Clearances

Vertical and horizontal clearances for roadways and other facilities passing under bridges shall be provided in accordance with applicable federal, state, or local agency codes. Vertical and horizontal clearances for bridges passing over tracks carrying LRV/commuter rail/freight rail traffic, including provision for overhead contact wire systems, shall comply with applicable CPUC general orders. In addition, the designer shall consider clearances required for track maintenance and other special equipment. Bridges over or under the San Diego Northern Railway (formerly the Atchison, Topeka & Santa Fe Railway) will be subject to additional conditions specified by the North San Diego County Transit Development Board. Bridge vertical clearances over waterways will be governed by the standards of the regulatory body, with consideration of adequate freeboard for the passage of surface debris.

#### c) Fencing

Fencing shall be installed on new (or existing) bridges that pass over a transit guideway and are used by pedestrians. Fencing shall be designed to discourage dropping or throwing objects onto the ROW. Fencing shall have a curved top toward the inside of the bridge. The fence type typically used in this application is a 10-foot-high chain-link fence with a 1-inch mesh. However, architectural styles and material type may be considered in some areas for aesthetic reasons in coordination with



SANDAG and the local agency having jurisdiction. Fencing installation shall be discussed with the agency having jurisdiction over the bridge.

d) Stray Current Corrosion Protection

Bridges shall be designed with stray current protection measures and test stations. The designer shall prepare project-specific stray current protection details based on the recommendations of a corrosion specialist, for approval by SANDAG.

e) Railings and Barriers

All bridges shall be provided with hand railings. All pedestrian bridges and bridges with sidewalks shall have hand railings or fencing. Hand railings shall be galvanized or anodized and be provided on both sides of the structure; the railings shall be at 42 inches minimum height above the surface of the walkway and have a diameter of 1.5 inches. Fencing, when required, shall have a curved top toward the inside of the bridge, as described in (c) Fencing.

All fence and railing for bridges designed for electrified light rail shall be grounded

f) Dead Loads

Dead loads consist of the weight of the entire structure, including permanently installed trackwork, pavement, walls, partitions, overhead catenary poles and signaling systems, as well as supporting foundation/pedestal, safety walkways, parapet walls, pipes, conduits, and cables. Component dead load shall consist of the weights of all components and nonstructural attachments of the structure, including plinths and rails. Superimposed dead load shall include the weights of ballast, track ties, and all utilities attached to the structure, including OCS poles and catenary wires.

g) Live Loads

Design live loads shall be determined by the most conservative of service, maintenance, and construction loads on the bridge.

- Highway Live Loads

Highway design live loads shall be as specified in the latest version of AASHTO LRFD BDS with Caltrans Amendments.

- LRV Live Loads

LRV live loads (vehicle and loaded weights) shall be as specified in LRT Design Criteria Section 7.6.

- Commuter and Freight Live Loads

Freight trains operate on certain portions of the LRT system. Freight trains shall operate at 40 miles per hour (mph) maximum from Broadway south to the train yard, and LRVs will operate at 55 mph maximum. The design of structures carrying freight shall be based on freight loads of Cooper E-80 loading in accordance with the AREMA requirements.



The design of structures carrying freight north of Broadway shall be in accordance with NCTD requirements.

h) Live Load Dynamic Load Allowance

- Highway Loads:

Design of live loading of structures supporting highways shall be increased by the percentage specified in AASHTO LRFD BDS Section 3.6.2 and as shown in Table 3.6.2.1-1 for Dynamic Load Allowance, IM with Caltrans Amendment.

- Freight Trains and LRV Loads:

Design live loading of structures supporting freight shall be increased for vertical dynamic load allowance effect as specified in AREMA, with consideration for the type of structure being designed. Live loading of structures supporting LRT shall be increased by the percentage specified in AASHTO LRFD BDS Section 3.6.2 for Dynamic Load Allowance IM, and as shown in Table 3.6.2.1-1 with Caltrans Amendment.

In addition to the vertical dynamic load allowance, a horizontal dynamic load allowance or nosing force equal to 10 percent of rail transit design LRV load shall be applied to design live loading of structures supporting light rail. This force shall be equally distributed to the individual axles of the vehicle and shall be applied horizontally in the vertical plane containing each axle. The force shall be assumed to act in either direction transverse to the track through a point 4 feet above the top of low rail.

i) Derailment Loads

- Vertical Derailment Load

Vertical derailment load shall be that produced by two to four vehicles placed with their longitudinal axes parallel to the track.

Lateral vehicle excursion shall vary from 4 inches minimum to 3 feet maximum for tangent track and curved track with a radius greater than 5,000 feet. For track with smaller radii, the maximum excursion shall be adjusted so that the derailed wheel flange is located 8 inches from the rail traffic face of the nearest barrier, if any, or the edge of deck. In any case, for tracks protected by guardrails, the maximum excursion shall be limited to that allowed by the placement of the guardrails.

A dynamic load allowance of 100 percent of a single vehicle weight shall be applied in computing the equivalent static derailment load. This shall be in lieu of the impact provided in AASHTO LRFD BDS Article 3.6.2.

When checking any component of superstructure or substructure that supports two or more tracks, only one train on one track shall be considered to have derailed, with the other track(s) remaining operational.

All elements of the structure shall be checked assuming simultaneous application of all derailed wheel loads. However, the reduction of positive moment in



continuous slabs due to derailed wheel loads in adjacent spans shall not be allowed.

- Horizontal Derailment Load

For cross sections having clearance between vehicle and barrier wall of 6 inches to 3 feet, with maximum vehicle speeds of 55 mph, the force on the barrier/curb due to horizontal derailment loads shall be taken as 40 percent of a single vehicle weight acting 2 feet above top of rail or at top of curb and normal to the barrier wall for a distance of 10 feet along the wall. Barriers farther than 3 feet from vehicles need not be considered. For tracks protected by guardrails, this force shall be considered to be resisted by the guardrails. For train speeds greater than 55 mph, horizontal derailment load shall be as specified in AREMA.

- Loading Combinations

Incorporate rail transit loads into the loading combination provisions of AASHTO LRFD BDS Section 3.3.2 by means of the following modifications and as shown on Table 5-1:

Add to the list of terms:

- LL<sub>LRV</sub> = Light Rail Live load
- NF = Nosing Force
- DR = Derailment Load



**Table 5-1. Load Combinations and Load Factors**

Load Combination Limit State	DC DD DW EH EV ES EL PS CR SH	LL <sub>HL-93</sub> LL <sub>LRV</sub> IM CE NF BR PL LS	LL <sub>Permit</sub> IM CE	WA	WS	WL	FR	TU CR SH TTR TLR	TG	SE	EQ	BL	IC	CT	CV	DR
Strength – I	$\gamma_P$	1.75	-	1.00	-	-	1.00	0.5/ 1.20	$\gamma_{TG}$	$\gamma_{SE}$	-	-	-	-	-	-
Strength – II	$\gamma_P$	-	1.35	1.00	-	-	1.00	0.5/ 1.20	$\gamma_{TG}$	$\gamma_{SE}$	-	-	-	-	-	-
Strength – III	$\gamma_P$	-	-	1.00	1.40	-	1.00	0.5/ 1.20	$\gamma_{TG}$	$\gamma_{SE}$	-	-	-	-	-	-
Strength – IV	$\gamma_P$	-	-	1.00	-	-	1.00	0.5/ 1.20	-	-	-	-	-	-	-	-
Strength – V	$\gamma_P$	1.35	-	1.00	0.40	1.00	1.00	0.5/ 1.20	$\gamma_{TG}$	$\gamma_{SE}$	-	-	-	-	-	-
Extreme Event – I	1.00	$\gamma_{EQ}$	-	1.00	-	-	1.00	-	-	-	1.00	-	-	-	-	-
Extreme Event – II	1.00	0.5	-	1.00	-	-	1.00	-	-	-	-	1.00	1.00	1.00	1.00	-
Extreme Event – III	1.00	1.35	-	1.00	-	-	1.00	-	-	-	-	-	-	-	-	1.00
Service – I	1.00	1.00	-	1.00	0.30	1.00	1.00	1.00/ 1.20	$\gamma_{TG}$	$\gamma_{SE}$	-	-	-	-	-	-
Service – II	1.00	1.30	-	1.00	-	-	1.00	1.00/ 1.20	-	-	-	-	-	-	-	-
Service – III	1.00	0.8	-	1.00	-	-	1.00	1.00/ 1.20	$\gamma_{TG}$	$\gamma_{SE}$	-	-	-	-	-	-
Service – IV	1.00	-	-	1.00	0.70	-	1.00	1.00/ 1.20	-	1.00	-	-	-	-	-	-



**Table 5-1. Load Combinations and Load Factors (Continued)**

Load Combination Limit State	DC DD DW EH EV ES EL PS CR SH	LL <sup>HL-93</sup> LL <sup>LRV</sup> IM CE NF BR PL LS	LL <sup>P-15</sup> IM CE	WA	WS	WL	FR	TU CR SH TTR TLR	TG	SE	EQ	BL	IC	CT	CV	DR
Fatigue – I LL <sup>HL-93</sup> , LL <sup>LRV</sup> , IM, CE Only	-	1.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatigue – II LL <sup>PERMIT</sup> , IM, CE Only	-	-	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-

\* See AASHTO LRFD BDS Table 3.4.1-2 for load factors not shown.

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j) Longitudinal Forces

Longitudinal force due to train acceleration and deceleration shall be provided as follows:

Longitudinal Force = 25 percent of the LRT train loading for decelerating and accelerating trains.

This force shall be applied to the rails and supporting structure as a uniformly distributed load over the length of the train in a horizontal plane at the top of the low rail. Consideration shall be given to combinations of acceleration and deceleration forces where more than one track occurs. In ballasted tracks with continuously welded or bolted rails spanning the entire structure, up to 50 percent of this force may be assumed to be transferred outside the structure.

Longitudinal force for freight loadings shall be as specified in AREMA.

k) Centrifugal Force

Determination of centrifugal force due to rail vehicles on curved tracks shall be as provided in AASHTO LRFD BDS Section 3.6.3 and the resulting force shall be applied 4 feet above the top of low rail.

The effects of horizontal impact/nosing force on curved tracks need not be combined with centrifugal force and only the larger of the two forces shall be considered.

Centrifugal force due to freight and commuter trains shall be as specified in AREMA.

l) Wind Loads

Wind loads on structures carrying LRT shall be as specified in AASHTO LRFD BDS Section 3.8.

Wind loads on structures carrying freight and commuter trains shall be as specified in AREMA.

m) Wind on Live Load

For highway or exclusive light rail structures wind on live load shall be as specified in AASHTO LRFD BDS Section 3.8. Longitudinal and transverse loads shall be applied simultaneously. The transverse force shall be applied to the rails and superstructure as loads concentrated at the axle locations and in a plane 6 feet above the top of low rail. The longitudinal force shall be applied to the rails and superstructure as a load uniformly distributed over the length of the train in a horizontal plane 6 feet above the top of low rail.

For the design of substructure elements supporting two tracks, loads shall be increased by 30 percent when both tracks are loaded; this factor accounts fully for the shielding effect of vehicle on vehicle as the two trains run alongside each other.

For structures carrying freight loading, the wind on live load shall be as specified in AREMA. Wind loading on catenary shall be considered in the design of both





superstructure and substructure elements. Loads (magnitude and location) shall be determined per manufacturer specifications.

n) Sidewalk, Platforms, and Walkway Loadings

Maintenance and emergency walkways and their immediate supports shall be designed for a live load of 90 pounds per square foot of walkway area. Safety railings shall be provided and shall be designed in accordance with AASHTO LRFD BDS Sections 13.8.1 and 13.8.2.

Live loads for the design of pedestrian bridges shall be in accordance with AASHTO LRFD BDS Section 3.6.1.6.

o) Thermal Forces

Force effects due to uniform temperature changes, temperature gradients, shrinkage, and creep shall be considered in the design of structures in accordance with AASHTO LRFD BDS Section 3.12. The design shall consider the following values of temperature rise and fall and the coefficient of thermal expansion:

Concrete:

Coastal and central areas: Temperature rise and fall of  $\pm 35$  degrees Fahrenheit (F)

Inland and desert areas: Temperature rise and fall of  $\pm 40$  degrees F

Coefficient of expansion: 0.0000060/degree F

Structural steel:

Rise and fall of  $\pm 50$  degrees F

Coefficient of Expansion: 0.0000065/degree F

p) Water Loads

The effect of flowing water on piers shall be calculated as specified in AASHTO LRFD BDS Section 3.7 Water Loads.

- Force of Drift

Effects of drift shall be considered. Sufficient freeboard should be provided over waterways in accordance with the requirements of the agency having jurisdiction over the waterway.

- Buoyancy

Buoyancy shall be considered where it affects the design. The structure shall be designed to resist the stresses due to buoyancy in accordance with AASHTO LRFD BDS Section 3.7.2.



## q) Earth Pressure

Earth pressures shall be calculated as stated in AASHTO 3.11.5 Earth Pressure and as provided by the project Geotechnical Engineer. For freight loadings transmitted through earth, provisions of AREMA shall be satisfied.

## r) Seismic Forces

Seismic design shall be performed in accordance with the latest version of the Caltrans Seismic Design Criteria.

For structures carrying freight loads, the ground motion levels of AREMA Chapter 9 shall be considered in addition to those specified above.

## s) Reduction in Load Intensity

For structures carrying LRV loads, a track shall be treated as a traffic lane. Only for structures carrying more than two tracks, provisions of AASHTO LRFD BDS Section 3.6.1.1.2 for multiple presence factors will be applicable.

## t) Force due to Rail Restraint

For structures carrying direct fixation track work, the thermal rail-structure interaction shall be investigated for the entire structure including at least 200 feet of at grade track beyond each abutment. A project-specific Rail-Structure Interaction Report shall be prepared for SANDAG review and approval. This report shall address the maximum rail stresses and approach for inclusion of resultant forces, considered as temperature forces with the associated load factors, in the design of superstructure and substructure components of the aerial structure.

Two analyses shall be performed: One, with all rails continuous over the structure and beyond. The other, with one of the rails assumed broken at a point of maximum rail stress according to the first analysis. A temperature range of 68 degrees F +70 degrees F / -50 degrees F in the rail shall be used for the analyses. The broken rail gap shall be calculated on the basis of static equilibrium, and the magnitude of gap shall be limited based on the wheel diameter.

## u) Loading Combinations

The design of reinforced concrete structures shall be by LRFD and in accordance with AASHTO LRFD BDS for the load cases specified in Table 5-1.

For structures that carry freight, the load factor groups of AREMA must be considered, in addition to those specified above.

Design of structural steel and timber members for the load cases specified in Table 5-1 shall be in accordance with AASHTO LRFD BDS Sections 6 and 8, respectively.

## v) Distribution of Wheel Loads to Stringers, Longitudinal Beams, and Floor Beams

Rail transit loads shall be distributed per AASHTO LRFD BDS Section 4.6.2.1.5 provisions with the following exceptions:



- 1) Follow the appropriate provisions for all stringer and beam systems except concrete box girders and multi-beam precast concrete sections. When necessary to accommodate mixed train and truck traffic, divide the roadway into longitudinal strips, separate track space from truck lanes, and apply appropriate loads to the respective strips.
  - 2) Follow the appropriate provisions for multi-beam precast concrete sections.
  - 3) For concrete box girders, use the load distribution influence lines from the computer-aided concrete box girder distribution procedure developed by the Caltrans Office of Structures Design or other acceptable method.
- w) Distribution of Loads and Design of Concrete Slabs
- Rail transit loads shall be distributed per AASHTO LRFD BDS Section 4.6.2.1.5 provisions with the following exceptions:
- 1) Ballasted Track
 

Axle loads may be assumed as uniformly distributed longitudinally over a length of 3 feet, plus the depth of ballast under the tie, plus twice the effective depth of slab, except as limited by axle spacing.

Wheel loads may be assumed to have uniform lateral distribution over a width equal to the length of the tie plus the depth of ballast under the tie, except as limited by the proximity of adjacent tracks or the extent of the structure.
  - 2) Direct Fixation Track
 

Where wheel loads are transmitted to the deck slab through rail mountings placed directly on the slab, the wheel load shall be assumed as uniformly distributed over a length of 3 feet along the rail. This load may be distributed transversely (normal to the rail and centered on the rail) by the width of the rail fastener pad plus twice the depth of the deck and track concrete.

For derailment loads where the LRV wheels bear directly on the slab, the wheel loads shall be assumed to be distributed over 3 feet of the slab in a direction perpendicular to the main reinforcement.
- x) Distribution of Commuter Freight Loads
- Commuter and freight loads shall be distributed to elements as specified in AREMA.
- y) Ballasted Track on Bridges
- New structures under approximately 100 feet in length shall have ballasted trackways unless it is not practical for structural or maintenance reasons (e.g., weight of ballast, clearance, or profile restrictions) or aesthetic and visual impact reasons. A minimum of 9 inches of ballast shall be placed under the ties. Ballasted structures shall be designed to drain completely to keep the ballast as dry as possible, and a waterproofing membrane shall be installed on the bridge decks and up the sides to a



point level with the top of the rail. The edge of ballast must be retained by a curb or equivalent structure.

z) Direct Fixation

Direct fixation should be used on long structures in excess of approximately 300 feet in length and on shorter structures where clearance, structure depth, maintenance, and aesthetics are a concern.

aa) Cost Analysis: Direct Fixation vs. Ballasted Track on Bridges

A cost analysis should be performed on proposed bridges between 100 and 300 feet in length to determine the most cost-effective method of track construction. The proposed method of construction shall be included in the type selection report.

bb) Track Approaches to Structures

Track approaches to bridge abutments having a skew of 10 degrees or more from normal to the track shall be designed to ensure that the tracks enter normal to the structure by normalizing the bridge abutment to the tracks or adding a normalizing approach slab.

Approach slabs to control settlement shall be approved by the SANDAG Director of MM&PI before proceeding with the design.

cc) Guardrail

The use of guardrail is not required on light-rail-only structures and shall not be included without the approval of the SANDAG Director of MM&PI.

dd) Spans

The span configuration shall consider adjacent facilities (roadway, railway, and waterway), structure types, feasibility of falsework, time of construction, passage of flood debris, site seismicity, and costs.

ee) Material

Concrete is preferred for maintenance, cost, and appearance, but alternatives in steel may be considered if they can be shown to be superior and cost-effective on a life-cycle cost basis, including the costs of maintenance. Timber may be used only when upgrading, repairing, or matching an existing timber structure.

ff) Foundation Investigations

All substructure designs shall be based upon a geotechnical investigation and interpretation by a California-licensed engineering geologist or geotechnical engineer who specializes in foundations, including deep foundations for large bridge structures. Investigations must conform to provisions specified in AASHTO LRFD BDS and AREMA, as appropriate, and Section 5.8.3 "Geotechnical Investigations," of these design criteria.



gg) Foundation Type

Foundation type requirements shall be assessed by designers based on the review of existing soils and geotechnical information. The foundation type shall be agreed upon by the Structural Engineer and Geotechnical Engineer and shall be designed to the codes and standards of AASHTO LRFD BDS and AREMA, as appropriate.

hh) Abutments

Abutments shall be designed to the requirements of AASHTO LRFD BDS Section 11 and AREMA as appropriate. In addition, consideration shall be given to abutment stability during construction before inclusion of additional dead loads.

To provide a smooth transition from the ballasted at-grade section to the aerial structure, an approach slab shall be provided at all abutments. The approach slab shall have a length of not less than 20 feet.

ii) Embankments

Embankments shall be designed to the standards of Caltrans Standard Specifications, Section 19-6 and as specified in Section 5.8.3.

jj) Overhead Contact System Poles

In some cases, the length and profile of a structure may require the use of OCS poles within the structure. The required pole locations, pole loads, and pole base bolt patterns require the approval of SANDAG. Catenary poles on structures should be supported on a foundation/pedestal constructed inside the bridge structure below the pole. When OCS poles are included, CPUC specifies loading and requires clearances be provided for maintenance walkways, which shall also be incorporated into the length and profile of the design structure (refer to Part 3, Section 3.3.1 "Alignment and Clearance," for clearances).

kk) Provisions for Systems Equipment

The designer shall include provisions for all systems and station equipment required in Section 6.0 and Part 3, Section 3.2; this includes but is not limited to, the following:

- 1) Conduits for signal and traction power feeders, loops, lighting, outlets, video surveillance system, ticket vending machines, and destination signs
- 2) Additional platform area with anchor bolts for signal enclosures and signals
- 3) Raceways under station platforms

The designer shall consider when sizing the bridge members that some of the raceways will need to be installed in columns, under station platforms, and into the bases of feeder poles.



### 5.8.5 Retaining Walls

Retaining walls shall be designed in accordance with AASHTO LRFD BDS Section 11. Retaining walls specified shall be limited to those included in the Caltrans Standard Plans or proprietary wall system contained in the approved list by Caltrans for "Earth Retaining Systems." Other wall systems, or retaining walls with loading or height exceeding the Caltrans Standard Plans, will require a type selection study that must be approved by the SANDAG Director of MM&PI before final design can proceed.

A live load surcharge shall be applied where vehicle load is expected to act on the surface of the backwall within a distance equal to one-half the wall height behind the back face of the wall. If the surcharge is for a highway, the intensity of the load shall be in accordance with AASHTO LRFD BDS Section 3.11.6.4. Live load surcharge for different LRV loading, as shown in LRT Design Criteria Section 7.6, shall be calculated based on the project-specific parameters and included in the project's Basis of Design report.

#### a) Alternative Wall Systems

Alternative wall systems in general are acceptable in the following conditions:

- 1) Mechanically stabilized walls listed in Caltrans-approved "earth retaining systems" that do not exceed 15 feet design height.
  - 2) Gravity walls that do not exceed 6 feet in height.
  - 3) Alternate wall systems that exceed these requirements will be considered in a type selection study similar to Section 5.8.4 of these design criteria. All proprietary wall systems listed by Caltrans in its "earth retaining systems" and other proprietary system are acceptable for use but will still be subject to a complete structural analysis and will require an independent check by a registered California civil or structural engineer. Proprietary walls systems not listed in the Caltrans "earth retaining systems" can be used with approval of the SANDAG Director of MM&PI. In order for structural analysis and approval of an alternative wall system listed in the "earth retaining systems" or a proprietary system, the designer shall submit a complete set of design drawings and site-specific calculations signed by the EOR and independently checked by a registered Civil Engineer in the State of California.
- b) The overall stability of retaining walls shall be evaluated based on the provisions of AASHTO LRFD BDS Sections 11.6.2 and 11.6.3.
- c) Clearances

For standard gravity type walls, lateral limits for walls shall be 2 feet outside edge of footing. Additional walls may include mechanically stabilized earth retaining structures, ground anchor walls, and soil nail walls. Lateral limits for these walls shall be the same as for gravity walls; however, ROW shall also consider the reach of the wall's anchoring mechanism. Where a wall's anchoring mechanism's reach is beyond that of the wall's footing, the 2-foot extension shall apply to the anchoring mechanism.

Height limits above a wall's required function shall be in accordance with the local agency or as directed by SANDAG.





d) Safety Railings

Safety railings shall be installed on retaining structures in accordance with the *Caltrans Highway Design Manual*.

e) Landscaping

Where practical, landscaping should be incorporated into retaining structures where the structures are visible to passengers or the public.

f) Freeboard

Conventional retaining and crib walls shall be designed using Caltrans standards wherever possible. A minimum freeboard of 12 inches shall be used on retaining walls.

g) Graffiti Control

Reinforced concrete retaining walls shall be coated with an approved graffiti protection coating to 10 feet above grade, a landscape covering, or alternative surface treatment as approved by the SANDAG Director of MM&PI.

h) Provisions for Systems Equipment

The designer shall include provisions for all systems and station equipment required in retaining walls and foundations, including but not limited to, the following:

- 1) Conduits for signal and traction power feeders, loops, lighting, outlets, video surveillance, ticket vending machines, and destination signs
- 2) Additional platform area with anchor bolts for signal enclosures and signals

i) Architectural Treatments

Reinforced concrete retaining walls may include a surface texture treatment for aesthetic purposes, as approved by the Project Manager.

#### 5.8.6 Tunnels and Underground Stations and Underground Structures

Specific design criteria for these specialized facilities shall be developed by the designer and submitted as a separate design report. This design report must be approved by the SANDAG Director of MM&PI prior to proceeding with final design.

Tunnel structures required for LRT, buses, highway access under LRT track, and pedestrian access shall be considered buried structures or culverts, and shall be designed in accordance with AASHTO. All buried structures longer than 400 feet and designed to carry LRV shall have direct fixation track. Grade separation shall have a drainage system designed to prevent any freestanding water on the structure bottom slab and also prevent any ground-water infiltration under and into the structure.

a) Portals and U-Sections

- 1) Tunnels and box section entrance portals shall be designed in a manner to minimize the rate-of-change of pressure on a train or bus passing through the portal.
- 2) The pressure rise is a function of the cross-sectional area of the portal entrance, length of tunnel, vehicle nose configuration, and the entrance speed of the train or



bus. These factors shall be considered in the design in order to minimize pressure rise.

### 5.8.7 Barriers

Guardrail system and concrete barriers shall comply with Caltrans Standard Specifications (Section 83) and Standard Drawings. Modifications to the standards may be necessary on a project-specific basis depending on application. All modifications to Standards shall require approval by both the SANDAG Director of MM&PI and Caltrans.

## 5.9 Construction Phasing

### 5.9.1 Traffic Maintenance

- a) Design consideration for control and maintenance of traffic shall be in compliance with Caltrans Standard Specifications Sections, 7-1.03, "Public Convenience," 7-1.04, "Public Safety," and 12, "Temporary Traffic Control."
- b) Lane closure requirements shall be coordinated with the agency of jurisdiction in which the lane closure falls. Lane closure charts issued by the respective local agencies for local roadway closures or Caltrans for closures on state facilities shall be included with the design. Where detours are required for lane or roadway closures, the design shall include a list of appropriate personnel requiring notification prior to implementation of a detour. The following closure requirements and conditions shall be considered in design:
  - Closure schedule
  - Reopening of closures
  - Construction Zone Enhanced Enforcement Program
  - Traffic control systems

### 5.9.2 Construction Phasing Plans

Where the design scope of work requires construction staging or phasing plans, the consultant shall develop drawings and specifications to be included in the design documents that indicate a proposed sequencing of construction activities. Construction staging or phasing plans shall be developed in coordination with the local agencies and transit operator(s), as required, to show a logical reasonable sequence for construction activities. Construction staging or phasing plans shall show the proposed sequence of construction based on time and work limits by phase. Construction staging or phasing plans shall include consideration of known or expected limitations to work site access for traffic, rail operations, environmental restrictions or other limitations, limits to work hours for existing operations, noise or other factors, and delivery of critical long lead time material or equipment.

Construction cost estimates shall consider phasing in development of unit prices.





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## 6.0 TRANSIT CENTERS

The following design criteria shall be applicable to transit centers bus transit, electrified light rail transit (LRT). The general concepts can also be used for both bus and LRT-exclusive stations; however, for specific criteria relating to exclusively LRT and bus transit stations, the designer shall also refer to the Station sections in the San Diego Association of Government's (SANDAG's) LRT Design Criteria and Bus Transit Design Criteria.

General concepts for design criteria should include the following:

- a) The overall station design must seek to maximize passenger safety and convenience, maximize neighborhood value, and minimize design and construction costs and maintenance requirements. Long-term maintenance costs must also be weighed against short-term capital costs.
- b) The station, as an integral part of the transit system, must facilitate the movement of passengers to and from the transit vehicles and into and out of the immediate station or transfer area in a safe, convenient, and cost-effective manner.
- c) Adjacent movements and land use patterns shall be incorporated into the station design. Where adjacent areas are subject to redevelopment, station design should include potential integration of that development. Stations may be incorporated into large commercial and/or residential developments through a joint-development project.
- d) The station layout should direct passengers past fare equipment including ticket vending machines and personal card interface devices where applicable.

### 6.1 Codes and Standards

Stations shall be designed in accordance with the most current edition of the following:

- a) International Code Council, International Building Code
- b) California Building Code (CBC) (current version)
- c) National Fire Protection Association 130, Standard for Fixed Guideway Transit and Passenger Rail Systems
- d) National Electric Code
- e) Americans with Disabilities Act Accessibility Guidelines
- f) California Accessibility Reference Manual
- g) California State Department of Transportation (Caltrans) Standards
- h) City Standards (governing jurisdiction);
- i) County of San Diego Standards
- j) Occupational Safety and Health Standards 29 Federal Register Part 1910
- k) California Public Utilities Commission



- l) Metropolitan Transit System San Diego Trolley Station Sign Program: Design Guidelines Manual, latest edition

Where no provisions are made in the codes for particular features of the design because transportation and/or transit facilities are not covered or the provisions made are found infeasible, the best professional practice shall be followed with the approval of the SANDAG Director of Mobility Management and Project Implementation (MM&PI).

### 6.1.1 Accessibility

Transit center accessibility shall be provided by following the requirements of the 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design and the CBC. Where the federal ADA standards differ from the state CBC, the designer shall follow the most stringent requirements, as determined by SANDAG. Station designs will also be reviewed by the Social Services Transportation Advisory Council in regard to accessibility compliance.

Accessibility elements requiring consideration in design include, but are not limited to, the following:

- a) Accessible routes
- b) Parking
- c) Ramps
- d) Handrails
- e) Landings
- f) Cross slopes
- g) Flangeways
- h) Station amenities: phones and ticket vending machines
- i) Signage
- j) Safety
- k) Grate covers

## 6.2 Site Layout

### 6.2.1 General Circulation and Access

- a) Access Control

Access control shall be provided through the incorporation of clearly defined ingress and egress areas by use of sidewalks, ramps, walls, railing, fencing, planters, and lighting, supplemented with signage. Access control shall be conducive to transit patrons and definitive such as to deter loitering by clear and obvious designation of Fare Paid Zones.

- b) Pedestrian Assembly Areas

Pedestrian assembly areas, including platforms and mezzanines, shall be sized to accommodate the expected maximum demand, using 6 square feet of space per person



but not less than the minimum station design standards for light rail transit (LRT) and commuter rail platforms.

c) Pedestrian Circulation

Design for all pedestrian circulation shall be continuously connected by accessible routes in compliance with current CBC and ADA Guidelines Standards and provide safe and efficient movement of passengers in all areas of the station to which they routinely have access. Consider the following points for applicability in achieving good pedestrian orientation and circulation:

- Where applicable, provide access to the pedestrian network in the surrounding community.
- Locate passageways, stairways, elevators, and shelters to encourage balanced loading and unloading.
- Make passage from kiss-and-ride and park-and-ride areas and between transfer areas clear and simple with sufficient lighting.
- Provide a minimum of 8 feet clear space from the loading edge of curb. Ensure adequate room for mainstream pedestrian flow to maneuver around slower or hesitant pedestrians. Examples of obstructions and/or obstacles may include the following:
  - Ticket vending machines
  - Ticket/card validators
  - Pay phones
  - Stairs
  - Railings
  - Columns
  - Bicycle racks/lockers
  - Benches
  - Trash receptacles
  - Posts
  - Poles
  - Information sign frames
  - Monument signs
  - Planters
  - Shelters
  - Catenary poles
  - Light poles



Obstructions/obstacles such as these shall be kept outside of the main pedestrian through zone. In addition, the smaller items such as trash receptacles and benches shall be secured to the platform to prevent movement into pedestrian flow, interference with train operations, or vandalism.

- Avoid cross-circulation at fare vending locations and decision points (e.g., route maps and informational displays). All potential obstructions shall be plotted on the station plans for reference to ensure clear accessible routes and unobstructed pedestrian pathways.
- Provide landings at curb ramps and blended transitions with clear length of 48 inches and clear width at least as wide as the curb ramp, excluding flares. Provide clear boarding area of 96 inches measured perpendicular to the curb or vehicle roadway edge by clear width of 60 inches measured parallel to vehicle roadway. A clear path shall be provided between directional bar mats and tactile signs.
- Protruding objects between 27 inches and 80 inches above the finished floor shall protrude no more than 4 inches into walkways in accordance with CBC and 2010 ADA Standards.
- Provide ramps and other components as required for a complete and continuous accessible route in accordance with CBC/ADA requirements. Grades at stations shall be minimized through design and shall conform to slope criteria for accessibility, or stair and ramp criteria as noted in Section 6.2.1 (d).
- Cross flows, dead ends, and turns greater than 90 degrees are undesirable for both patron security and circulation.
- Shelter elements shall have sufficient transparency to provide adequate visual surveillance of the station area to discourage vandalism and enhance patron safety.
- Provide adequate sight distance and visibility along pedestrian routes at stations. Should visual impediments be deemed unavoidable, fast-moving pedestrians, such as skate boarders and bicyclists, should be considered, and other solutions to improve the line of site, such as mirrors, should be proposed by the designer.
- Provide a minimum of two points of access/egress from station loading areas that meet the requirements of National Fire Protection Association 130.
- Avoid potential crush points between a fixed object and the moving transit vehicles.

#### d) Vertical Circulation

(Note: Local or more recent code criteria may supersede the below listed criteria. The designer shall verify current criteria.)

Design criteria for vertical circulation will vary depending on the type and layout of a station.



The following are minimum design considerations:

- 1) For vertical changes less than 8 feet, use ramps and, in addition, if applicable, stairs.
- 2) For vertical changes 8 feet to 16.5 feet, use stairs and ramps. An elevator may also be incorporated where passenger demand or space limitation restrict the installation of accessible ramps and stairways. Installation of an elevator may be deferred as directed by SANDAG.
- 3) For vertical changes greater than 16.5 feet, stairs and two elevators per station are required.

4) Stairs

Stair configuration, including geometrics, treads, risers, railing, identification, and striping for the visually impaired shall comply with the CBC and the following additional requirements:

- Risers shall not be open.
- Maximum height between landings should be 12 feet. Minimum landing depth shall be at least equal to effective stair width.
- Minimum headroom measured perpendicular to tread at nosing is 7.5 feet. Continuous soffits without obstructions should be held at 10 feet
- Stairwells shall be illuminated.
- Treads shall be finished with non-slip surface material.
- The striping on stairs shall be yellow in conformance with federal color No. 33538.
- Exterior stair treads shall be designed so that water will not accumulate on the walking surface.
- Designer shall consider maximum flow through capacity when determining geometric layout of stairs.
- Where stairs are adjacent to an escalator, they shall be parallel to the angle of inclination of the escalator (30 degrees).

5) Ramps

Ramps should be as flat as possible. Ramp slopes shall be 1:15 maximum, where practical. A maximum ramp slope of 1:12 may be used with the approval of the Project Manager. Changes in level up to 0.25 inch may be vertical. It is desired that there be no vertical change within a ramp; however, where it cannot be avoided changes in level between 0.25 inch and 0.5 inch shall be beveled with a slope no greater than 1:2. Changes in vertical level greater than 0.5 inch shall be incorporated into the ramp.

Any pedestrian path of travel, except street sidewalks, with a slope greater than 1:20 shall be considered a ramp and shall be designed in accordance with CBC and ADA



requirements. Handrails, meeting the requirements of Article 9 below, are required for all ramps.

Designer shall consider maximum flow through capacity when determining geometric layout of ramps.

#### 6) Curb Ramps

Curb ramps shall be installed where a pedestrian way crosses a curb. Pedestrian curb ramps, including detectable warning surfaces and grooved borders, shall be placed in accordance with City of San Diego Standards. Curb ramps within Caltrans right-of-way shall be in accordance with Caltrans standards.

#### 7) Escalators

The use of escalators is discouraged due to maintenance concerns. Any proposed escalator will require approval of the SANDAG Director of MM&PI. If escalators are approved, design shall comply with the American Society of Mechanical Engineers A17.1, Title 8 (California Division of Occupational Safety and Health), and ADA. Escalators shall be protected from direct exposure to weather. Any proposed escalators shall be detailed in the Basis of Design Report with respect to justification, locations, cost, size, length, width, power consumption, and maintenance costs.

Where there is an indoor station with sufficient space and stairways at multiple levels or height of level changes are excessive, the station shall be designed for possible future installation of escalators.

Where escalators are necessitated and approved by the SANDAG Director of MM&PI, the following design criteria shall be followed:

- Escalators shall be dual speed, 1.5 feet per second (ft/s) and 2 ft/s in “up” and “down” directions. For purposes of design, capacities in person per minute (ppm) shall be assumed to be as follows:

48 inches nominal width	2 ft/s – 100 ppm
36 inches nominal width	1.5 ft/s – 75 ppm

- Desired width for escalator shall be 48 inches.
- Secured stop/start controls shall be provided on site.
- Escalators shall be full reversible and controlled by key-operated switches to stop or reverse direction. The top and bottom of the escalator shall be equipped with an “Emergency Stop” switch with covered alarm. Alarm shall be wired to central control and/or on site security station if applicable.
- Measures shall be taken to protect escalator machine room from flooding.
- Escalators shall be certifiable under State of California inspection.



## 8) Elevators

Elevator design shall comply with CBC and ADA requirements.

- Considerations—Elevators shall be considered whenever vertical differences exceed 16.5 feet. Any elevator will require approval of the SANDAG Director of MM&PI. Where an elevator is provided, the elevator cab equipment and operational controls shall be suitably designed for use by persons with disabilities. Elevators shall include accommodations for telephones and closed-circuit television within the cab, including conduit and cabling. Elevator machine rooms shall be located as near as practical to hoistways but clear of public platform areas. Where elevators provide a primary means of vertical circulation, a minimum of two elevators is required. A backup power system shall be provided where elevators are installed and there is no other ADA-accessible path. Construction contract special provisions shall clearly require elevator components rated for exterior applications subject to direct sunlight and rain.
- Cab Dimensions—Elevators shall be sized according to CBC and ADA requirements and to accommodate expected crowds, wheelchairs, stretchers, platform-mounted equipment, and station maintenance equipment.
- Cab and Hoistway Finishes—To enhance security, both the elevator cab and the elevator hoistway shall be designed to allow for observation into the cab from the exterior to the maximum extent possible. Hoistways shall be designed to prevent intrusion in conformance with Title 8. All metal cladding, doors, walls, railings, and trim shall be brushed stainless steel. All controls and appurtenances shall be vandal resistant.

## 9) Handrails and Wheel Guide Rails

Handrails required for stairs and ramps shall be between 34 inches and 38 inches high, in accordance with CBC and ADA requirements for ramps and stairs. The handgrip portion of the handrails shall not be less than 1.25 inches or more than 1.5 inches outside diameter, or the shape shall provide an equivalent gripping surface. Handrails shall be metal, non-painted, with a corrosion-resistant finish. Round handrail shapes are preferred. No curb is required when a guide rail is provided, centered 3 inches plus or minus 1 inch above the surface of the walk or ramp. Wheel guide rails shall be installed in accordance with CBC and ADA requirements. Elevated station platforms shall be enclosed with a metal safety railing 66 inches high. Drop-offs exceeding 4 inches in vertical height, such as at planters, require either a guide rail or a 6-inch curb in accordance with CBC requirements. Stations within street right-of-way shall consider vehicular site distance.

### 6.2.2 Modal Interchange

#### a) General

Station facilities shall be designed to promote convenient, efficient, and safe transfer of patrons between the various transportation modes, including rail transit, bus, bike, walk, and automobile. Other considerations for design in relation to modal interchange include parking, kiss-and-ride, taxi stands, and trip generators within a 0.5-mile radius of the





station. Station design shall include field inspections to review areas outside of the station limits for improvements to walkway, lighting, or traffic signals that would improve the station's functions. Any improvements to these facilities outside the station boundaries will be recommended to the Project Manager and approved by SANDAG prior to inclusion in the design.

b) Buses

The station shall be designed to include the number of bus bays proposed in preliminary engineering. In routing buses through the station, it is desirable to route buses to the station platform with a minimal increase in operating time and minimal conflict with other vehicles and station operations. Additional considerations are as follows:

- Where applicable, buses should load and unload adjacent to the rail platforms.
- Ingress and egress points should be free of delays from on-street vehicular movement.
- Wherever feasible, buses should have exclusive bus lanes that should be well designated to prevent automobile access.

Designer shall also incorporate provisions for para-transit operations. Drop-off locations for para-transit shall be as close as possible to transfer loading zones or accessibility points to the loading zones.

For more criteria related to bus-exclusive station requirements, the designer shall reference the Bus Transit Design Criteria.

c) Kiss-and-Ride/Taxi Access

Passenger drop-off and loading zones should comply with CBC and ADA requirements. Special drop-off and waiting areas for kiss-and-ride passengers and transition to taxi operations shall be located as close to the platform as possible. Provision shall be made for a drop-off area at the nearest curbside to the station entrance. Short-term parking may be provided near the platform for patron pick up as requested by the operating entity and approved by the Project Manager. The drop-off area should not conflict with pedestrian movement or other modal operations.

d) Bicycles

Bicycle storage areas shall be outside the loading zones. Provisions shall be made for bicycle racks and lockers such that they will be located out of walkways and pedestrian paths of travel and positioned so that bicycles in racks will be parallel to the adjacent path of travel. To promote security, bicycle storage areas should be visible from the street or station entrance.

e) Pedestrian Access Paths

Pedestrians transitioning between transportation modes should be directed to cross bus or vehicular lanes at curb ramps. The crossing area shall be clearly delineated and comply with the crosswalk marking requirements of the U.S. Department of



Transportation Federal Highway Administration's *Manual on Uniform Traffic Control Devices for Streets and Highways*.

In general, pedestrian access paths shall be located at the following locations when applicable:

- Between bus bays where curbing is parallel at bus ingress and egress points
- Between platform and station parking or shared-use parking where an active vehicle lane intersects pedestrian access
- Between adjacent sidewalks and station access points

All paths shall be adequately lit, in accordance with Title 24, for safety during evening operation, and comply with state and local requirements.

f) Coordination with Other Modes of Transportation

Where other modes of transportation utilize a station, design efforts shall be coordinated with other agencies involved in those various modes of transportation.

### 6.2.3 Clearances

All areas within the station providing access for both pedestrians and vehicles shall meet all clearance requirements for pedestrian and vehicular movement. Consideration shall be given to the following:

- a) Type of vehicles using the station facility or needing to gain access, including buses, maintenance vehicles, and emergency response vehicles
- b) Vertical clearances for overhead objects such as signs, lighting, shelters, stairwells, landscaping, and other structures within accessible areas
- c) Lateral clearances: ensure pedestrian-accessible areas meet accessibility (CBC/ADA) requirements for lateral clear space. Ensure driveways, parking lot aisles and stalls, and turning radius meet vehicular requirements.

### 6.2.4 Station Emergency Access

Station design shall allow for ingress and egress of emergency vehicles and personnel into station and onto platform area or at a minimum adjacent to the platform area. Consideration shall be given to clearances for emergency vehicles, personnel, and their equipment, such as gurneys or stretchers.

## 6.3 Parking (Park-and-Ride)

### 6.3.1 General

The design for parking lots shall be in conformance with the requirements of the agency in whose jurisdiction the project falls and the criteria herein. The design for parking lots shall, at a minimum, consider the following:

- a) Minimize the distances between the parking area and the bus and LRT platforms



- b) Lighting, circulation, and landscaping in conjunction with the safety and operations of the station
- c) Coordination with SANDAG regarding capacity
- d) Compliance with accessibility codes and standards (CBC/ADA)

### 6.3.2 Layout and Circulation

#### a) General

External circulation plans, including location of entrances and exits, traffic signals, and bus stop facilities, will be coordinated with local agencies during the planning stages.

Internal layout will be based on property shape and will be coordinated with local agencies during the planning and preliminary engineering stages.

Parking lot construction documents will include a signing and striping plan.

#### b) Entrance and Exit

Entrances and exits should be designed with the following considerations:

- Minimize automobile/bus conflicts.
- Provide adequate sight distances.
- Where more than one major roadway bounds the parking lot, provide an entrance and exit at each roadway. However, the following should be considered in finalizing the number of entrances and exits:
  - 1) Number of vehicles expected to use the facility
  - 2) Local traffic conditions
  - 3) Site configuration
- Entrances and exits shall not be located close to roadway intersections, but shall be located so as to facilitate inbound traffic.
- Dimensions shall be adequate to accommodate expected traffic flows, and configuration shall be in accordance with the local governing agency (lines up with an existing intersection or is at least 300 feet from an existing intersection).
- Where buses will be using an entrance/exit, the design shall provide for the additional traffic loads.
- Grade changes at entrance ways shall be designed to accommodate bus overhang and wheel base length with sufficient clearance to avoid contact with the pavement.



### c) Parking

Quantity, aisles, and spacing for parking should be laid out to provide the most efficient use of land and conform to the following:

- 1) Parking spaces should equate to approximately 100 stalls per acre.
- 2) Where possible, parking lot layout shall be oriented with aisles parallel to pedestrian flows along the shortest routes to station platforms to encourage pedestrians to walk down aisles where they can easily be seen by drivers.
- 3) When parallel aisles are not practical, perpendicular aisles shall be provided along with separate pedestrian sidewalks and crosswalks.
- 4) Parking spaces shall be standard stall dimension when possible. Where additional spaces are needed to accommodate higher usage, compact spaces shall be utilized.
- 5) When space allows, circulation within parking lots shall be internal having no need for public street access for additional access.

### 6.3.3 Accessible Requirements for Parking Lots

Accessible reserved parking spaces for persons with disabilities shall be provided at all LRT parking lots. These spaces shall be located nearest to the station platforms. The number of accessible spaces for each LRT lot shall be as shown below, in accordance with CBC and ADA requirements.

<u>Total Spaces in Parking Lot</u>	<u>Minimum Accessible Reserved Spaces</u>
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1,000	2 percent of total
1,001 and over	20 + 1 (for each 100 over 1,000)

Additional criteria:

- a) Standard accessible spaces for persons with disabilities shall be 14 feet wide; 9 feet for the vehicle and 5 feet for the access aisle, and 18 feet minimum in length.
- b) One in every eight accessible spaces, but not less than one, shall be van accessible, in accordance with CBC and ADA.



- c) A van-accessible space(s) shall be 17 feet wide; 9 feet for the vehicle and 8 feet for the access aisle, in accordance with Title 24.
- d) Accessible parking spaces shall be 18 feet long and located so that users are not required to travel behind parked cars other than their own.
- e) Accessible parking space access aisles shall connect directly to an accessible route and can be shared by two accessible parking spaces.
- f) For van-accessible space, the access aisle shall be to the right when pulling in forward.
- g) Accessible parking spaces shall be striped in accordance with CBC requirements.

#### 6.3.4 Grading and Drainage

Slope of access drives shall not be less than 0.5 percent or more than 10 percent. A separate pedestrian ramp shall be provided where the slope of an access drive exceeds 5 percent. Drainage shall be directed away from areas where pedestrians will walk. No parking stall shall have a slope from head end to back end of greater than 4 percent, or side slope of greater than 4 percent. Slopes in accessible parking stalls shall not exceed 2 percent in any direction in accordance with CBC and ADA requirements.

#### 6.3.5 Paving

Paving design shall conform to applicable Caltrans standards. Where buses utilize station bus pads or bus drop-off areas, bus pads will be 12 feet wide minimum and constructed of a minimum 9-inch-thick concrete over a 12-inch base (include minimum reinforcing or WWF). Additional concrete may be required in driveways and other areas depending on frequency and type of buses.

For circulation roads subject to bus loadings, use a minimum of 6 inches of asphaltic concrete (AC) over a minimum of 8 inches of crushed aggregate base (CAB). Where the soil R-value is less than 50 and greater than 10, add a minimum of 6 inches of granular subbase; if the R-value is less than 10, use a minimum of 12 inches of subbase. For areas of the parking lot not subject to bus traffic, use a minimum of 3 inches of AC for R-values greater than 40, and a minimum of 4 inches of AC for R-values less than 40, over a 6-inch CAB base.

Where paving may occur within the City of San Diego Right-of-Way, cement treated base shall be used in place of CAB.

#### 6.3.6 Wheel Stops

Wheel stops shall be used adjacent to any walkways, barriers, or landscaped areas. Wheel stops shall be 6 feet in length.

#### 6.3.7 Signs

See CBC, ADA and local requirements for sign lettering specifications, mounting requirements, and height.



A warning sign regarding unauthorized use of disabled parking spaces shall be posted at each parking lot entrance or adjacent to the accessible spaces in accordance with CBC requirements. Each parking space reserved for persons with disabilities shall be identified by a sign permanently posted immediately adjacent to and visible to each stall or space, and van-accessible spaces shall have an additional sign stating "VAN ACCESSIBLE" in accordance with CBC requirements.

Fencing plans shall be prepared for all projects requiring fencing as prescribed in these guidelines. Fencing plans shall identify fence type and location as well as gate locations. Fencing layout may be shown on appropriate plans of other disciplines with reference to detail sheets or standards.

### 6.3.8 Fencing Objectives

The fundamental objective of fencing within the station area is to control access in the following manner:

- a) Separate platform/paid zones from through pedestrian traffic
- b) Direct patron flow
- c) Designate station perimeter
- d) Safety

### 6.3.9 Fence Types

In general, the fencing types listed below shall follow Caltrans Standard Specifications and Standard Plans. The following descriptions are standard fencing types used by SANDAG. Exceptions can be made on an individual basis but only with the approval of the SANDAG Director of MM&PI.

#### a) Type 1: Standard 6-foot Chain-Link Fence

The fabric shall consist of 6-foot-wide, galvanized, No. 9 gauge chain link with 2-inch mesh. The framework shall consist of posts, top rails, and bottom rails, where required, made from 2.5-inch-diameter galvanized pipe. All posts shall be placed a maximum of 10 feet on center in 9-inches diameter, 2-foot-deep concrete foundations. Terminal posts, braces, and gate frames shall be constructed of 3-inch-diameter galvanized pipe. Gates may be slide or swing-type, but swing-type gates shall not be allowed to swing closer than 9 feet to the centerline of any track. No. 7 gauge galvanized tension wires with barbed selvages shall be used at the top and bottom of the chain-link fabric.

In some cases, black vinyl coated chain-link fabric may be used. The fabric shall be 11-gauge chain link with permafused black vinyl coating.

Standard 1-inch chain-link mesh shall be specified in areas known to have, or anticipated to have, high levels of trespassing across the right-of-way.

#### b) Type 2: Standard 4-foot Chain-Link Fence

This fence shall be constructed the same as Type 1 chain-link fence at a height of 4 feet.



c) Type 3: Standard 6-foot Steel-Picket Fence

This fence shall be constructed of prefabricated panels and posts made of welded or bolted heavy-gauge tubular steel members. Type 3 fencing shall be factory galvanized and primed. Fence color shall be as directed by the Project Manager and factory painted where applicable. The fence panels shall be welded or bolted to the posts, and all field-welded surfaces of the fence shall be painted with zinc rich primer and painted to match the fence, if applicable. Fence panels shall consist of pickets with a minimum 0.625-inch<sup>2</sup> cross-sectional area spaced 4.5 inches on center.

d) Type 4: Standard 4-foot Steel-Picket Fence

This fence shall be constructed the same as Type 3 steel-picket fence at a height of 4 feet. If a fence is adjacent to a pedestrian walkway with an abrupt change in level of 4 inches or more, then the fence shall have a guide rail provided, centered 3 inches plus or minus 1 inch above the surface of the walk in accordance with Title 24, Part 2.

For Type 3 and 4 fencing, final architectural appearance and configuration shall be as approved by the SANDAG Project Manager.

### 6.3.10 Fencing Applications

The fencing applications described below are typical; however, they may change or be modified or combined at the direction of the Project Manager.

a) Type 1 Fence

- Along both sides of the right-of-way unless a substantial barrier exists in conformance with California Public Utilities Commission General Order No. 143-B, Title 9.
- Along one side of right-of-way in areas where LRT tracks run parallel to drainage ditches, slopes, or existing walls or barriers. Determination of one side application shall be at the direction of the Project Manager.
- Perimeter of station where access is to be prohibited (typically along edge of parking lot farthest from LRT platform).
- Between tracks where ballasted track is within station platform area.
- Black vinyl shall be used at the direction of the Project Manager.
- Black vinyl along transition lines between station and urban centers (in locations farthest from the station).

b) Type 2 Fence

- Landscaped areas along right-of-way, where permissible (black vinyl shall be used in all landscaped areas).
- Black vinyl along transition lines between station and urban centers (in locations closest to the station).





c) Type 3 Fence

- Not used within station areas unless directed by Project Manager.
- For perimeter of a substation if the substation is within the limits of a LRT station (see LRT Design Criteria).

d) Type 4 Fence

- Landscaped areas where applicable
- Separation line between the LRT platform paid zone and adjacent pedestrian through traffic.

e) Gates

Fencing shall generally have lockable gates at suitable locations for easy access for maintenance vehicles and personnel. Gates shall be every 1,500 feet if no other access to the right-of-way is available. Gates shall be as close to a signal case as practical.

## 6.4 Station Amenities

### 6.4.1 Shelters

a) General

Stations shall have at least two or more shelters on each bus and LRT platform to provide shading and protection from inclement weather. Shelter types and styles shall be as approved by SANDAG Director of MM&PI.

b) Joint Use

Where a station is in conjunction with a joint-use development, shelter design, if necessitated, may require additional approvals by local agencies and/or private developers. Integration of shelters into the joint-use development shall be considered in the design.

c) Materials

- Shelter shall be designed with readily and locally available material
- Material shall be durable and able to withstand corrosive effects of the environment, withstand vandalism, and be economical to repair or replace.

d) Design Considerations

- Shelters must be designed to allow easy surveillance for patron security and to discourage vandalism.
- The extent of coverage must be evaluated on a station-by-station basis and maximum cover provided as appropriate and as the budget allows.
- Minimum size criteria for each shelter group are described below.

The types and placement of shelters shall be included in the 35 percent design submittal.

- Passenger Shelters





The minimum size of a shelter shall be 4 feet by 17 feet having a solid covered roof no less than 4 feet in width and no less than 7.5 feet in height. Height restrictions may apply in accordance with station operations or safety concerns. Shelters shall comply with ADA requirements.

- Operator Shelters

A 10-foot-square concrete pad shall be designed at an LRT terminus and other high volume stations as directed by the Project Manager to support a prefabricated operator's shelter. Power and phone conduits shall be stubbed-out in the slab at grade.

#### 6.4.2 Public Information Communications

Refer to the LRT Design Criteria in regard to public information communications.

#### 6.4.3 Passenger Seating

Benches shall be provided on rail platforms and bus transfer waiting areas. Platform benches shall also be included within the shelters and coordinated with the station finish materials. Benches shall not be placed so as to restrict circulation patterns or queuing areas. Benches in the bus transfer waiting areas shall be coordinated with appropriate bus operators. Locate at least one bench near the disabled boarding areas. Bench seats shall be 18 inches above the finished floor following adjacent grades. If the condition of a sloping platform or station occurs, the top of the bench seat surface shall be 17 inches minimum and 19 inches maximum above ground. Design drawings shall account for and reflect final platform/station grading and drainage design. Benches shall be located to provide space for wheelchair seating 30 inches wide by 48 inches long directly adjacent to the bench. Benches shall include dividers to designate seats and discourage lying down. Specified benches shall be highly vandal resistant. The quantity of benches shall be determined based on estimated ridership for the station.

##### a) Standard Benches

- Commercially available benches shall be used unless special station furnishings have been identified in planning or preliminary engineering.
- Benches shall be fabricated from minimum 10-gauge steel and have dividers to designate seats and discourage lying down.
- Benches shall be anchored to the platform.

##### b) Special Design

SANDAG, a local agency, and/or private developer may elect to use a special design. Special designed benches must include the following:

- Architectural, structural, plans and specifications
- Coordination of material with special design shelters
- Designed to discourage lying down
- CBC/ADA compliant



#### 6.4.4 Public Telephone

(Note: Applicable to transit centers and LRT stations only)

A minimum of one coin-operated telephone shall be provided at each station unless otherwise directed by the SANDAG Director of MM&PI and at least one location in the associated waiting areas shall be stubbed for a phone. At least one phone shall be equipped with a volume control and provide corresponding signage. All telephones shall comply with the requirements of ADA. Public phones shall be located near the waiting areas for use by patrons entering the system. A clear and level area 30 inches by 48 inches shall be provided at each pay phone for forward or side approach by a wheelchair. The designer shall specify half of the phones mounted with the highest operable part 48 inches above the floor (forward approach) and half of the phones mounted with the highest operable part 54 inches above the floor (side approach).

If an interior public phone is provided in a transit facility, or if four or more are provided at a station entrance and one is interior, one public text telephone must be provided according to ADA requirements. SANDAG and the system operator will request that the phone company provide a text telephone at stations forecast to have high ridership.

#### 6.4.5 Maintenance Features

(Note: Applicable to transit centers and LRT stations only)

The following maintenance features shall be provided at each station platform:

##### a) Water

Hose bibs with quick couplers in flush-mounted concrete hand holes shall be provided on each platform every 50 feet along platforms, plazas, and ramps. The plans shall include the water meter and back-flow preventer plotted to scale. Plans shall show existing or new water lines from the meter to the point of connection to the water main.

##### b) Power

A minimum of three waterproof, 120-volt, 20-amp, grounded duplex electrical convenience receptacles shall be provided on each platform and shall, typically, be mounted on light poles encased in a security J-box.

##### c) Service Panel

A central pedestal for an electric service panel, telephone, public address, train-to-wayside communications, and telemetry hardware with lockable door shall be located, where possible, near the end of a platform. The location shall not impede any pedestrian flow nor provide a hiding place.

##### d) Servicing

Space shall be provided adjacent to the platform for the parking of service vehicles (e.g., revenue, maintenance, and line supervisor trucks) and shall be so marked. This space shall be as close to the fare machines as possible and, at a minimum, shall accommodate one standard-sized truck or van. The parking space shall have a lighting



fixture placed within 10 feet of the space and positioned to illuminate this space and the surrounding area.

When space limitations preclude the provision of parking space adjacent to the platform, the platform itself will be used for the temporary parking of maintenance and other service vehicles. In this case, at least one platform at each station shall allow vehicle access without the need to mount a curb. The entrance to this platform shall be free of all obstructions, shall be long enough to park a full-sized van or pickup truck, and shall be wide enough that pedestrians will not be forced onto the track area when a maintenance vehicle is on the platform.

At stations designed in this manner, the ticket vending equipment shall be located within reasonable proximity to the on-platform vehicle parking area and not at the opposite end of the station. Any special design elements (such as architectural pavers) shall be located outside the vehicle parking area of the platform or shall be constructed so as to withstand vehicle traffic/parking.

#### 6.4.6 Restrooms

Restrooms for transit operators shall be considered at terminus stations and transfer stations. Restrooms for transit patrons shall be considered at rail terminus stations and transfer points, but only in conjunction with an agreement by a private or public entity to operate and maintain the restroom. Restrooms shall be designed only upon the approval of the SANDAG Director of MM&PI. At stations where public restrooms are specified to be provided, a separate water meter shall be shown so that sewer fees are not calculated based on irrigation flows. Restrooms shall be designed to meet the requirements of ADA and Title 24.

#### 6.4.7 Special Events

At terminus and transfer stations, an area shall be provided for placement of a Trolley ticket sales trailer during special events. The area shall be designed, sized, and located to meet the station requirements of the LRT Design Criteria.

#### 6.4.8 Clearances

See Section 6.2.3 for clearance requirements related to station amenities.

### 6.5 Fare Collection

See LRT Design Criteria Chapter 6.10.

### 6.6 Station System

See LRT Design Criteria Chapter 6.

### 6.7 Materials

The quality and character of station materials utilizing simple and durable materials have a direct effect on maintenance requirements and the image of each facility. This section specifies the basic requirements and criteria that have been established for such materials to



be used in public areas of the stations so that the quality level and maintenance requirements of these materials will be consistent throughout the system.

In specifying manufactured items or materials, preference shall be given to standard off-the-shelf items available from more than one supplier over custom-made or single-source items. This will help expedite maintenance procedures both in procurement and installation. This also shall apply to finish, size, color, pattern, or composition. Slight variations in appearance should be allowed so potentially less costly products or materials of equal quality can be used.

Designer may propose alternate materials that may be better suited to the environment and design of individual stations, provided that the materials meet the performance standards specified and have a proven track record for similar applications. Any proposed alternative will require approval by the SANDAG Project Manager.

#### 6.7.1 Performance Standards

##### a) Durability

Durable and cost-effective materials shall be used that have consistent wear, strength, and weathering qualities. Materials shall maintain their appearance throughout their useful life.

##### b) Low Maintenance

Life-cycle maintenance costs shall be considered in the evaluation of all materials and finishes.

##### c) Availability

Materials shall be readily available with minimal lead time for procurement and obtainable through multiple sources regionally or nationally.

##### d) Cleaning

Materials exposed to contact by the general public shall be selected that are easily cleaned through the use of common equipment and cleaning agents. Minor soiling should not be apparent.

##### e) Quality of Appearance

Materials shall be appealing in appearance and texture, and provide continuity throughout the station.

##### f) Repair or Replacement

In addition to the general statement above, in order to reduce inventory and maintenance costs, materials shall be standardized as much as possible for easy repair or replacement without undue cost or disruption of LRT operation.



## g) Non-slip

All surface areas for pedestrian traffic, such as stairways, platforms, ramps, landings, architectural enhancements, and hand grip surfaces, such as railing along ramps and stairs, shall be non-slip. Floor finishes shall be non-slip even when wet.

## h) Compatibility

Selected materials shall be compatible with the San Diego area climate. In addition, with the high variability of material types used in conjunction with each other, including incorporation of existing elements, material compatibility shall be analyzed as well. Materials selected shall also be compatible with chemical compounds found in common cleaning agents and their equipment as described in (d) above.

## i) Corrosion Resistance

Because of moisture and the electrical currents involved in transit operation, special consideration must be given to prevention of atmospheric corrosion control for the reduction of maintenance costs and preservation of appearance. Designer shall minimize atmospheric corrosion effects through the use of protective coatings, protective barriers, and selection of corrosive-resistant materials. The design shall avoid configurations that will entrap moisture. The design shall permit drainage and allow washing of pollutant particles. The use of dissimilar metal combinations, or use dielectric devices between dissimilar metal combinations, shall be avoided; when this is not possible, coatings or sealants shall be used. Non-corrosive metals shall be used when possible or required.

## j) Water Resistance

All finish materials in underground spaces shall be selected and detailed with proper attention to waterproofing, cavity walls, drainage, and venting. All drainage cavities shall have provisions for cleanouts.

## k) Fire Resistance

"Flame spread" ratings shall conform to the applicable building code definition for the material being used.

## l) Finish Materials

Dense, hard, nonporous materials shall be used in all applications. Finish materials shall be corrosion, acid, and alkali resistant and shall be compatible with chemical compounds required for maintenance.

## m) Detailing

Detailing of finishes shall avoid unnecessary surfaces that may collect dirt and complicate cleaning. Wall surfaces shall be vertical and flush. All edge and finish materials shall be detailed through incorporation of joints and textures that minimize requirements for true, visually perfect installation over long distances.



## n) Texture

Materials within reach of passengers shall be easily cleaned, with a finish to prevent or conceal scratching, soiling, and to maintain desired illumination levels. Materials with homogeneous colors shall be selected. The use of paint, stains, and coatings shall be minimized.

Graffiti-resistant products shall be used to protect surfaces susceptible to graffiti. Graffiti-resistant products shall allow for removal of graffiti without damage to the surface.

## o) Color

Materials shall be selected with consideration to symmetry and balance within a station and throughout the system. Materials with homogenous colors shall be selected over those with surface finishes or veneers. Colors shall be selected and/or approved by the SANDAG Director of MM&PI.

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## 7.0 ARCHITECTURAL TREATMENTS

### 7.1 Platforms

Platforms shall have non-skid durable surfaces designed to be easily maintained and, to the extent possible, hide dirt and stains. Platforms may be concrete, colored concrete, pavers, or other surfaces approved by the Project Manager. Trackway paving shall be concrete. Trackway paving is typically non-colored or dark grey-colored concrete. Platform architectural treatments may include the following:

- a) Textural treatments
- b) Color variations and stains
- c) Formed patterns
- d) Pavers

Detectable warning pavers shall comply with requirements of the California Building Code (CBC) and Americans with Disabilities Act (ADA), except detectable warning pavers for the Trolley system, which shall comply with the Federal Transit Administration approved equivalent facilitation for detectable pavers that provide a level landing area for the on-board access ramp:

- a) 4 inches thick by 24 inches wide pre-cast concrete paver
- b) Slip resistant
- c) Integrally tinted with yellow conforming to Federal Color No. 33538

A detectable warning paver strip shall be placed at the platform edge for the full length of the platform, except at ramps. The detectable warning shall be placed 6 inches behind the face of curb.

The detectable warning shall contrast with adjacent walking surfaces in conformance with the reflective formula stated in CBC Sections and ADA Standards for Accessible Design.

A 6-inch-wide strip cast in dark grey concrete or laid with dark grey or black pavers, along the platform side of the detectable warning the full length of the platform. Every 25 feet along the strip, the statement "STAND BEHIND LINE" shall be etched into the strip and painted in white, 4-inch letters.

### 7.2 Directional Bar Mat

A detectable directional texture mat shall be placed behind the detectable warning at the approximate positioning of the second door of the first light rail vehicle car for a three-car train on the boarding platforms, as shown in the Standard Plans, and comply with the dimensional requirements of the CBC. The texture mat shall be oriented such that the directional texture is perpendicular to the tracks. The detectable directional texture mat shall be urethane, slip resistant, and yellow, conforming to Federal Color No. 33538 in accordance with CBC requirements.





A tactile information sign shall be positioned directly behind the directional bar mat at the back of platform. If the tactile information sign cannot be located in this position due to other platform equipment or causes obstruction to pedestrian flow, the bar mat location shall be adjusted a maximum of 2 feet in either direction along the platform to accommodate the placement of the tactile information sign, which provides the station name and destination in Braille and in raised letters.

### 7.3 International Symbol of Accessibility

The international symbol of accessibility shall be painted behind the detectable warning on the platform at the first door of the first car to line up with the wheelchair lift location, as shown in the Standard Plans, in accordance with ADA Standards for Accessible Design. The international symbol of accessibility shall be located on the plans so that the area is kept clear for wheelchair maneuverability.

### 7.4 Lighting

#### a) General

The lighting criteria contained herein are intended to provide functional and aesthetic guidelines necessary to design lighting for stations, parking lots, bus transfer areas, and any special structures of the transit system and to ensure a safe and comfortable environment. Conformance with these criteria is required to ensure consistency for system facilities and to provide intended maintenance quality, convenience, safety, and efficiency of the transit facility.

General objectives for lighting are as follows:

- Promote safety by identifying and properly illuminating areas and elements of potential hazard
- Enhance the system's visual and functional clarity by differentiating between site circulation networks, station entrances, and platforms
- Reinforce the presentation of graphic messages
- Minimize impact on surrounding properties

#### b) Codes and Standards

Lighting and emergency systems shall be in accordance with applicable codes and standards as listed below:

- American National Standards Institute C2 National Electrical Safety Code
- National Fire Protection Association (NFPA) 70 National Electrical Code
- NFPA 101 Life Safety Code
- NFPA 110 Standard for Emergency and Standby Power Systems
- NFPA 130 Standard for Fixed Guideway Transit System
- CBC



- Illumination Engineering Society Lighting Handbook
  - Underwriters' Laboratories
  - San Diego Gas & Electric Service Standards and Guide Manual
  - Americans with Disabilities Act Accessibility Guidelines, Section 10.3.1(11)
- c) Standard Elements
- 1) Where possible, luminaries and lamp types shall be standardized system wide to provide design and perceptual unity and simplify maintenance requirements. If system-wide standardization cannot be obtained, at a minimum, standardization within each station shall be provided and material and model types shall be standard “off-the-shelf” items for ease of replacement and maintenance. Light poles are often used to mount appurtenances such as public address speakers, signs, and video cameras. Designers shall account for these loads when sizing the poles.
  - 2) Light fixtures and standards shall be incorporated into the structural and architectural elements of the stations as follows:
    - Signage
    - Platform
    - Shelters
    - Seating areas
    - Fare vending and validator equipment
    - Ramps, stairs, walls, and rails
    - Bus loading areas
    - Pedestrian walkways and crossings
    - All parking areas
  - 3) All lighting provided for stations and parking lots shall be full color spectrum. All light controls will work with a photo cell and time clock. Lighting circuits shall be designed so that reduced lighting levels could be provided after Trolley service ends by allowing alternate lights to be turned off.
  - 4) Station platform lights shall be mounted at a minimum of 15 feet high, spaced to meet the minimum illumination criteria but spaced at not more than every 60 feet apart. All station shelters shall have vandal-resistant lighting under the covered area. Parking lot lights shall be installed 30 feet above the ground. Fixtures shall be resistant to vandalism. Lights shall continue to operate when adjacent lights of a circuit fail.
- d) Illumination Levels
- Illumination levels shall define and differentiate between station areas, decision and transition points, and areas of potential hazard. In addition to quantity of light, illumination levels shall be uniform and minimize glare. Luminaries shall be so selected, located, and/or aimed that while accomplishing their primary purpose they will produce a minimum



of objectionable glare or interference with vehicular traffic, neighboring areas, and Trolley operations. Illumination levels for specified locations shall be as follows:

Location	Footcandles	
At-grade and aerial station platforms	5	
Fare collection, fare vending, and concession areas	15	
Stairs, escalators, and passageways	15	
Elevators	15	
	Minimum	
	<u>Normal</u>	
Vehicular access roadways	2	
Bus loading/unloading	5	
Kiss-and-ride	5	
Open parking	2	
	Average	
	Normal	
Underguideway parking	2	
Covered parking structures:		
Entrances	2	50*
Traffic lanes	2	10*
Storage	1	5*
Pedestrian ways:		
Walkways, ramps, and bridges	5	
Tunnels and passages	5	
At-grade crossings	5	
Yards and maintenance areas	5	
Traction power substations	50	Inside
Traction power substations	2	Outside
Emergency egress routes	1	

\*Sum of electric and daylight

e) Illumination Plan

An illumination plan shall be submitted prior to the start of final design showing source locations and probable illumination levels in the field of areas to be lighted. This plan shall be the basis for completing the lighting design plans. Lighting design plans shall be



overlaid with civil, architectural, structural, signage, electrical, and utility plans and all conflicts shall be resolved.

f) Emergency Lighting

Emergency lighting shall be provided for aerial and subterranean stations. Illumination level shall be as indicated in (d) above.

Exit lights, lights for essential signs, and emergency lights shall be included in the emergency lighting circuit. They shall be provided with a separate neutral and shall be separately wired from emergency distribution panels.

g) Emergency Backup Power System

The design of emergency backup power systems for emergency lighting and communication systems shall comply with all applicable federal, state, and local rules and regulations for the facility, in particular the NFPA. Upon loss of normal power, emergency circuits shall be in operation for 90 minutes, drawing power from the uninterruptible power system or other emergency lighting systems. A manual change-over switch and a receptacle shall be provided to accept a portable standby generator for the emergency lighting only. Additional loads for the backup power system shall be included at the direction of the Project Manager. Upon approval from SANDAG, a battery and charger system may be used in place of an uninterruptible power system design.

## 7.5 Trash Receptacles

Trash receptacles shall be provided on all station platforms and shall be coordinated with seating units. Trash receptacles shall be coordinated with the station finish materials and allow for easy service access and maintenance. Trash can enclosures shall be lockable and sized to accommodate a 300gallon trash can. Enclosures shall be secured to the surface to prevent removal by patrons but allow removal for maintenance. The number of trash can receptacles shall be determined based on estimated ridership for the station.

When finish is a painting or coating system, specifications should reflect custom color-matching with other elements of the station, platform, or canopy.

At key transit stations designated by the Metropolitan Transit System, explosion-resistant trash receptacles shall be provided, conforming to current Transit Security Administration requirements.



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## 8.0 LANDSCAPING AND IRRIGATION

### 8.1 Introduction

This section provides objectives, general criteria, and design parameters for the landscaping of San Diego Association of Governments (SANDAG) facilities. These include the following areas:

- a) Stations, including park-and-ride lots and kiss-and-ride areas
- b) Traction power substations
- c) Communications/signal facilities
- d) Yards and shops
- e) Right-of-way line sections

Given the varying size and complexity of projects, it is important that the design consider commonality with the projects' diverse settings. Therefore the designer is encouraged to provide recommendations or discuss deviations from the General Criteria where this might improve design. All designs shall be reviewed by SANDAG, San Diego Trolley, Inc., and San Diego Transit Corporation. Deviations to the guidelines provided in these documents, however, must be approved in writing by the SANDAG Director of Mobility Management and Project Implementation.

### 8.2 Objectives

- a) To provide a drought-resistant and low-maintenance landscape responsive to and compatible with intended transit operations, station architecture, graphics, and lighting design
- b) To provide an attractive environment at stations
- c) To assist in controlling the access to the system by reinforcing designated pedestrian and vehicular circulation system movement, and creating barriers elsewhere along the right-of-way as required
- d) To establish visual identity along the alignment through consistent use of a few basic paving, walls, and plant materials while maintaining visual interest and compatibility with adjacent areas through the use of other materials that vary from site to site
- e) To establish visual screening where necessary to soften the impact of unattractive adjacent land uses and provide privacy to adjacent residential property
- f) To coordinate grading required for landscape design with overall site grading improvements
- g) To discourage graffiti



## 8.3 Design Guidelines

### 8.3.1 Compatibility with the System Design

Based on the above objectives and in consideration of unique environmental conditions, the following landscape design criteria have been developed to ensure consistency throughout transit facilities:

- a) Where trees are proposed, trees shall be selected and placed to maintain a minimum clear distance of 20 feet from the nearest rail, except when trees are planted within a station where the minimum clear distance from rail shall be 14 feet.
- b) Shrubs and ground covers shall be located at a minimum of 10 feet from the nearest rail to minimize the deposit of plant litter in the ballast and ballast drainage system, and to avoid damage to plants from herbicide used within the ballast area. Plant litter shall include both deposit of foliage and rooting systems.
- c) Planting, where adjacent to or in combination with signaling cabinets, wayside communication, lighting, and signage, shall not interfere with access to any facilities for maintenance. Plant selection and location shall be coordinated with light rail transit (LRT) operational elements to avoid obstruction or interference. At a minimum, maintain 2 feet clear space for all non-access sides and 4 feet minimum clear distance in front of access areas.
- d) Where planting is applicable along bus routes and at transit centers in the bus area, plant selection and placement shall be such that line of sight or directional signs are not obstructed.

### 8.3.2 Operations, Safety, and Security

- a) Plant materials shall be selected and located to prevent the following:
  - Obstruction of transit operator's view of approaches to stations, curves, intersections with on-coming traffic, directional signs, special trackwork or grade crossings, signals, or vision through curves
  - Obstruction of auto/truck driver or pedestrian visibility of approaching transit vehicles at crossings
  - Restriction of access to or use of hydrants and safety walkway areas
  - Avoidance of conflicts with all existing utilities, including overhead utility lines, underground utilities, and underground vaults
  - Hindrance of surveillance by patrolling police, transit security, or surveillance cameras
- b) Waiting areas at bus stops and kiss-and-ride areas shall be pleasant and comfortable for short-term use but be visually accessible for security reasons.
- c) Plant material that has thorns or is poisonous shall not be located in areas accessible by patrons.



### 8.3.3 Access

Patrons shall have relatively unobstructed access to transit stations at designated entries. Plant materials may be used in combination with walls, fences, and walkways to control patron movement to these entries and discourage access at other locations. Barrier-type plantings shall be considered for locations where public streets parallel transit facilities. In addition to the required width of walkways and sidewalks, a natural design element that provides distinction from the walk surface shall be provided on the side away from bus stops and parking/passenger off-loading areas. This guide path may be a combination of design elements, but must be straight and uncomplicated in line.

### 8.3.4 Site Preparation

- a) Finish grading shall be sloped for adequate drainage. Wherever possible, slopes shall not exceed 4:1. For slopes steeper than 4:1, special planting and irrigation shall be required to minimize erosion.
- b) All slopes shall be stabilized to prevent physical failure, erosion, and maintenance problems. This may include non-plant material during the plant establishment stage.
- c) Soil amendments shall be specified based on tests made during design or specified in construction. The designer shall specify type, rate of application, and application method for soil amendments.

## 8.4 Selection of Plant Materials

### a) Cost, Availability, and Growth Rates

Shrub and plant materials shall not be selected that are unusually expensive, locally unavailable, or so exceptionally slow growing as to unduly delay the achievement of mature plantings. Shrub and plant materials shall be selected to produce minimum pollen in station areas. Shade trees shall be selected that produce a relatively mature canopy within 10 years of installation. Ground covers shall be selected that provide complete coverage within two years of installation. Plants shall not be aggressive such that they overtake other plants or require excessive maintenance in order to contain them within their designated planting areas.

### b) Environmental Adaptability

Plant materials shall generally be perennials having low water requirements and shall be tolerant of Southern California climatic conditions, including atmospheric pollutants. They should be resistant to disease, suitable for high traffic areas, long-lived, and not require frequent replacement.

### c) Maintenance

Landscape designs shall minimize maintenance requirements. Landscape designs shall not use lawn or any other plant materials requiring intensive care, such as clipped formal hedges, espaliers, pleached materials, plants unusually attractive to rodents or insects, plants that secrete or otherwise stain pavement, or plants that produce large amounts of litter. Plant selection shall consider plant size at maturity in spacing of materials in order to minimize pruning requirements. Planting designs shall consider ease of access by





maintenance crews to plant materials during transit operating hours. Areas that require erosion protection shall be landscaped with low-maintenance ground covers.

d) Station/Park-and-Ride Lots

Sidewalk stations shall incorporate a street tree pattern and shall match existing patterns or establish one where none exists. Where street trees exist near a site, similar species shall be used in new planting around the station where such planting conforms to these criteria. The use of tree grates is discouraged except where required to meet Americans with Disabilities Act clearance. Grid openings in gratings shall be limited to 0.5 inch in the direction of traffic flow in accordance with Americans with Disabilities Act requirements. Maximum slopes for planting shall be two horizontal to one vertical with a minimum 3-foot flat area at the top and bottom of the slope. Existing plant material shall be preserved wherever possible when the material is judged appropriate. If a sidewalk-station is within a city's right-of-way, plant selection and planting guidelines shall conform to that city's guidelines.

Transit park-and-ride areas should be screened from adjacent buildings by planting strips or changes in grade. Along the street perimeter, a low evergreen shrub mass, generally less than 3 feet in height, shall partially screen cars yet allow street surveillance into the lot. Taller accent plants may be used at various intervals where this does not limit surveillance.

At stations with park-and-ride or major bus transfer facilities, trees shall be located (where practical) around the perimeter and along the major pedestrian walks leading to the station to achieve the initial large scale subdivision of the site and to emphasize the major pedestrian routes to the station.

Small- and medium-sized tree plantings may be located so as to achieve secondary subdivision of the site and to provide an intermediate scale between the structure, the large tree pattern, and the smallest elements. Small trees shall be located to emphasize the direction of important internal traffic.

Ground cover and small shrubs shall be provided within the curbed areas between parking isles, at the ends of parking isles, and in borders and above and inside cribwalls or other retaining wall system accepting of planting.

e) Tree Protection and Support

Existing trees that are healthy and attractive shall be preserved wherever possible. Appropriate protection during construction shall be specified for those trees that are to remain.

All trees in pedestrian areas shall be staked. For non-pedestrian areas, trees under 24-inch box size shall be staked. Trees 24-inch box size or greater shall be guyed.

f) Miscellaneous

Landscaping outside of stations, except as indicated in this section, shall not be provided unless directed by the Project Manager.



Landscaping may be used outside of stations at substations, bridge approaches, retaining walls, erosion control locations, and as indicated in the mitigation requirements of the project environmental documents.

Landscaped areas should allow for periodic weed spraying as well as the cutting, pulling, and removal of weeds along the right-of-way.

## 8.5 Fertilizations/Herbicides

- a) Plant material shall be fertilized at the time of installation, and a fertilization schedule shall be established in the maintenance schedule.
- b) Herbicides considered for use shall be organic, when available, or a product that is proven to be non-persistent and non-damaging to the environment.

## 8.6 Irrigation

### a) Standards

Design of irrigation systems shall produce plans and specifications that provide a system in conformance to the requirements of Caltrans Standard Specifications, Section 20 – Erosion Control and Highway Planting. Plans, specifications, and estimates shall be based on unit costs for grading, soil improvements, planting, irrigation, and plant establishment maintenance. The SANDAG project manager may approve lump-sum contract provisions.

### b) Water Supply

All landscape provided on SANDAG projects, other than non-irrigated hydroseed slope protection, shall be irrigated. Irrigation shall be by a dedicated meter, using recycled water, if available, or assigned a separate irrigation billing rate, if available from the water provider. The plans shall indicate the main line water source, any laterals from the main to the meter required, and the party responsible for developing the laterals. The designer shall prepare the meter request and provide all application forms (filled out), calculations, meter cost and capacity cost estimates, and plans required by the water provider. SANDAG's Utility Coordinator shall process water meter applications and arrange for payment of meter and capacity fees.

Backflow preventers shall be designed and included on the plans in accordance with the requirements of the water provider. Backflow preventers shall be placed in a vandal-resistant locked steel enclosure on a concrete slab as shown in the regional standards.

### c) Automatic Control and Valves

All irrigation shall be automatically controlled using electrically powered irrigation controllers and valves provided with a metered power supply. Solar-powered controllers and valves may only be used with approval of the Project Manager. The plans shall show the meter locations and power sources, and indicate the party responsible for establishing the power meter connection.

Specifications for irrigation controllers and valve equipment shall indicate only the highest quality products. Where SANDAG has standardized a specific piece of equipment, sole



source may be used, as approved by the SANDAG Project Manager. All irrigation controllers shall be enclosed in vandal-resistant steel enclosures placed on a concrete foundation.

The plans and specifications shall indicate requirements for all strainers, pressure reducers, and other equipment required to meet state and local requirements and for a long-lasting and functioning irrigation system.

d) Distribution and Heads

Piping for the irrigation system shall conform to the Standard Specifications and these General Criteria.

Irrigation pipes crossing LRT or railroad tracks shall be placed in a sleeve. Sleeves that are 6 inches or smaller shall be schedule 80 polyvinyl chloride. Sleeves larger than 6 inches shall be steel per American Railway Engineering and Maintenance-of-Way Association Volume 1, Chapter 1, Part 5. The top of the sleeve shall be 5.5 feet below the top of tie and extend 25 feet beyond the centerline of the track or terminate 2 feet inside the LRT right-of-way line, where right-of-way is restricted.

Irrigation piping in station planter areas shall be a minimum of 2 feet below grade. Irrigation piping in station parking areas or parallel to rail tracks and within the SANDAG right-of-way shall be a minimum of 3 feet below grade. Piping in street right-of-way shall conform to the requirements of the controlling local agency.

To the greatest extent possible, all irrigation heads shall be designed to function below the surface grade. Where irrigation heads are required to be above surface grade, pop-up heads shall be evaluated before exposed heads on risers are considered. Irrigation heads have proven to be highly susceptible to vandalism; therefore, heads shall be specified that are economical to replace and of high quality. Generally irrigation heads shall be plastic with a minimum number of parts per head. Where SANDAG has standardized a specific piece of equipment, sole source may be used, as approved by the SANDAG Project Manager.

To assist in water conservation, drip or other alternative systems of irrigation may be designed, where applicable, as long as they meet the standard requirements herein and must obtain approval from the Project Engineer.



## 9.0 SAFETY AND SECURITY

### 9.1 Introduction

The purpose of this chapter is to establish safety and security standards for the design of elements of a bus rapid transit and/or a light rail transit (LRT) system. To ensure the safety and security of the system and to resolve hazards and mitigate vulnerabilities, the designer and contractors shall comply with the minimum requirements in this section and, where applicable, the latest version of the project's Safety and Security Management Plan and the Safety and Security Certification Plan, as well as with the State Safety Oversight Agency (in California, the Public Utility Commission's), approved System Safety Program Plan and System Security Plan.

### 9.2 General Safety and Security Design Requirements

General system safety and security design requirements are as follows:

- a) Identified hazards and vulnerabilities shall be eliminated or associated risk shall be reduced through design, including material selection or substitution. When potentially hazardous materials must be used, such materials selected shall pose the least risk throughout the life cycle of the system.
- b) Hazardous substances, components, and operations shall be isolated from other activities, areas, personnel, and incompatible materials.
- c) Equipment shall be located so that access during operations, servicing, maintenance, repair, or adjustment minimizes personnel exposure to hazards (e.g., hazardous chemicals, high voltage, electromagnetic radiation, cutting edges, or sharp points) and threats.
- d) Risk resulting from excessive environmental conditions (e.g. temperature, pressure, noise, toxicity, acceleration, and vibration) shall be minimized.
- e) Risk resulting from human error in system operation and support shall be minimized as part of the design effort.
- f) Risk resulting from excessive vulnerability to threats (e.g., theft, vandalism, sabotage, assault) shall be minimized as part of the design effort.
- g) In the case of risk from hazards and vulnerabilities that cannot be eliminated, alternatives that will minimize such risk shall be considered.
- h) The designer shall ensure power sources, controls, and critical components of redundant subsystems shall be protected by physical separation or shielding, or by other mutually acceptable methods.
- i) When alternate design approaches cannot eliminate a hazard, warning devices and cautionary notes shall be provided in assembly, operations, maintenance, and repair instructions, and distinctive markings shall be provided on hazardous components, equipment, and facilities to provide clear and sufficient warning of a hazard. These shall be standardized in accordance with commonly accepted commercial practice. Where no such common practice exists, the design shall propose the method or



methods to be used for review and approval. The design shall provide all warnings, cautions, and distinctive markings proposed for review and comment.

As directed by the Project Manager, a qualitative and quantitative analyses shall be prepared, documented, and furnished as part of the design process. At a minimum, on Federal Transit Administration (FTA) funded New Starts projects, a Preliminary Hazard Analysis and a Threat and Vulnerability Analysis shall be conducted for the project. Additional hazard analyses and threat and vulnerability analyses may be conducted to determine design requirements to mitigate a hazard or threat. If a recommended hazard resolution or vulnerability mitigation conflicts with the approved Design Criteria, it will be evaluated through the same process as any other deviation from the approved Design Criteria.

As directed by the Project Manager, a Safety and Security Certifiable Items List shall be prepared as the basis to develop design modifications and operating and maintenance procedures to eliminate or mitigate hazards and vulnerabilities.

Safety and security information and procedures shall be developed and included in the project specifications. These shall include, but not be limited to, hazard notifications, testing plans and procedures, training, maintenance procedures, and operating procedures for both normal and emergency situations. In the case of an extension to an operating system, existing plans and procedures will be evaluated.

### 9.3 General Safety and Security Design Criteria

The project design shall address system elements according to the requirements of the applicable standards listed in the Design Criteria. Should any standard or requirement conflict, the most stringent standard shall apply. Standards, specifications, regulations, design handbooks, safety and security design checklists, and other sources of guidance shall be reviewed for pertinent safety or security design requirements applicable to the system. The design shall establish criteria derived from applicable information.

#### 9.3.1 General Safety Criteria

General system safety criteria include the following:

- 1) Minimize exposure of personnel operating, maintaining, or repairing equipment to hazards such as entrapment, chemical burns, electrical shock, cutting edges, sharp points, electromagnetic radiation, or toxic atmospheres.
- 2) Emergency equipment/devices for public use shall be clearly identified and accessible.
- 3) Where failures could result in personal injury, major system damage, or inadvertent operation of safety critical equipment, redundancy or fail-safe principles shall be incorporated into the design.
- 4) Physical and functional interfaces between subsystems shall be analyzed. Those hazards associated with interfaces shall be specifically identified as system integration hazards and tracked for resolution.



- 5) There shall be no single-point failures in the system that can result in an unacceptable or undesirable hazard condition.
- 6) If an unacceptable or undesirable hazard condition can be caused by combining multiple incident failures, then the first failure shall be detected, and the system shall achieve a known safe state before subsequent failures occur.
- 7) All safety critical elements in a vital system shall be designed and implemented with fail-safe principles. Fail-safe principles shall be realized by designing the system to have intrinsically safe failure.
  - The following criteria shall be used, as a minimum, for implementing fail-safe functions and vital circuits:
    - Component failures or loss of input signals shall not cause unsafe consequences and shall not, when added to other failures, cause unsafe consequences.
    - Any number of simultaneous component failures attributable to the same cause or related causes shall not result in an unsafe condition.
  - The following criteria shall apply to electrical/electronic circuits:
    - Broken wires, damaged or dirty contacts, relays failing to respond when energized, or loss of power shall not result in an unsafe condition.
    - The relays used in vital circuits shall conform to all applicable parts of the American Railway Engineering and Maintenance-of-Way Association Communications and Signals Manual of Recommended Practice, Section 6, Relays.
    - Circuitry components fail in either the open or shorted condition. It shall be assumed that multi-terminal devices can fail with any combination of opens, shorts, or partial shorts between terminals.
- 8) Where redundancy is used in a safety critical area, there shall be no single point of failure that would result in the loss of safety protection. Redundant paths shall not contain a common failure mode.
- 9) Design shall include component interlocks wherever an out-of-sequence operation can cause a hazard.
- 10) Suitable warning and caution notes in operating, assembly, maintenance and repair instructions, and distinctive markings on hazardous components, equipment, or facilities for personal protection shall be provided.
- 11) Color-coding used for equipment and facilities shall be uniform.
- 12) The system safety analysis shall include review of fixed facilities and structures for employee access and maintenance safety.
- 13) Maintenance activities required to maintain safe operations shall be prescribed to the Operations Manager during the design phase. These maintenance activities shall be minimized in both frequency and complexity in design. The personnel qualifications required to adequately implement these activities shall also be identified.
- 14) Software faults shall not cause an unacceptable or undesirable hazard condition.





- 15) Unacceptable hazards shall be eliminated by design.
- 16) Hazardous substances, components, and operations shall be isolated from other activities, areas, personnel, and incompatible materials.
- 17) Risk resulting from excessive environmental conditions (e.g., temperature, pressure, noise, toxicity, acceleration, and vibration) shall be minimized.

### 9.3.2 General Security Criteria

System security shall be provided by a combination of procedures, subsystems, and devices to ensure the security of passengers, employees, equipment, and facilities.

The system security goal is to provide transit system facilities and operations that minimize threats to the employees, patrons, contractors, first responders, and the general public. Engineering designs must satisfy security design requirements applicable to the individual systems and elements, including the following:

- Designing security into the project by using such concepts as Crime Prevention through Environmental Design (CPTED).
- Incorporate security features into the designs to reduce threats and vulnerabilities, such as fencing, lighting, guard shack, security office, gates, sensors or motion detectors, burglar/intrusion alarm systems, closed circuit television (CCTV), public address systems, emergency telephones, silent alarm, and card or controlled access.
- Implement, as appropriate, recommendations included in the FTA's Transit Security Design Considerations, FTA-TRI-MA-26-7085-05, November 2004.
- Comply with any U.S. Department of Homeland Security, Office for Domestic Preparedness directives.
- Use the Transportation Research Board report *Deterrence, Protection, and Preparation* as guidance throughout the design.

The security design shall evaluate the following strategies as a part of the design process of new facilities:

- **Defensive Layering**  
Defensive layering provides multiple levels of security in order to slow or prevent unauthorized access to a site.
- **Crime Prevention through Environmental Design Principles**  
CPTED focuses on design techniques and use of a particular space to deter crime with four basic elements: natural surveillance, natural access control, territorial reinforcement, and maintenance. CPTED strategies include maximizing visibility of people, patron flow areas, and building/structure areas; providing adequate lighting and minimizing shadows; installing graffiti guards and shatter protection for glass windows; using landscape plantings that maximize visibility; using gateway



- treatments; controlling the perimeter; eliminating structural hiding places; and creating open lines of sight.
- **Target Hardening**

Target hardening employs structural techniques to increase the ability of a building to withstand an explosion while minimizing the loss of life and property damage.
  - **Situational Crime Prevention Principles**

Situational Crime Prevention is closely related to CPTED. It is the design of the physical environment to produce desired behaviors in those who enter a facility by such factors as assuring cleanliness, the type and amount of staffing, and various operational and physical measures.
  - **Physical Security System Elements**

Physical security elements are intended to achieve the following:

    - 1) Delay an intruder to allow time to detect them
    - 2) Inform responders of a penetration of a facility or protected area
  - **Passenger Security**

A train-borne intercom shall be provided for passengers to notify the operator of any urgent incidents on board the vehicle.
  - **Public Security**

In addition to application of CPTED design principles, public street areas where the vehicles will pick up and discharge passengers should be designed to enable them to be maintained in a clean and secure manner. Stop areas shall be marked and illuminated for maximum assurance of safety and security, and shelters shall be designed to minimize vandalism and graffiti.
  - **Facility Security**

CCTV cameras shall be designed as directed by the Project Manager for Maintenance and Storage Facilities, and placed in storage areas with high value equipment and parts. Fire and intrusion alarm systems shall be provided to monitor critical facilities and equipment, such as traction power substations and communications equipment. Alarms and CCTV will be monitored at the Metropolitan Transit System Control Center.
  - **Information and Information System Security**

Sensitive data such as personal identification information, procurement documents, and security information shall be stored in systems that are fortified against unauthorized access. Contract specifications will require contractors to establish a formal information protection plan that at least meets the following Security Sensitive Information requirements.





- Compliance with the Code of Federal Regulations regarding the release of transit-related Homeland Security information.
- Protected security-related information may not be subject to subpoena or discovery and may not be subject to inspection by the general public. This shall include the following:
  - Assessments, plans, or records that reveal susceptibility to terrorism
  - Drawings, maps, or plans showing locations of vulnerabilities of infrastructure
  - Records or other information that detail specific emergency response plans
  - Written information detailing response agency plans to a terrorist attack
  - Identification of equipment used for covert, emergency, or tactical operations
  - Response agency radio frequencies, codes, passwords, or programs
- Personal, financial, and medical information shall be protected in accordance with federal regulations (e.g., Freedom of Information Act, Privacy Act, Health Insurance Portability and Accountability Act, and Health and Human Services Standards for Privacy of Individually Identifiable Health Information).

#### 9.4 Site Considerations

Often site layouts can have a direct impact on the safety and security at the station or other facility. In order to improve safety and security, designers must understand and consider the following:

- Improving visibility (lines of sight, site illumination, and limiting physical impediments)
- Site control (camera placements, access points, subtle design features used to channel pedestrian flow, and security)
- Fare technology equipment and vending machine placement
- Conduit and cabling raceways
- Provisions for future technology deployments
- Various other site considerations

#### 9.5 Technology

The purpose of this section is to provide the designer with information about existing safety and security systems technologies to help guide the design effort to ensure that quality designs are created by the designer that are compatible and consistent with existing design approaches and technology deployments.

##### 9.5.1 Video Surveillance

The designer shall design or modify Video Surveillance Systems (VSS) at stations that are identified in the scope of work or as otherwise directed by the San Diego Association of Governments (SANDAG) Project Manager. VSS systems are covered in detail in the LRT Design Criteria, Chapter 6. The design of the VSS shall include, but not be limited to,



selection of camera types and locations, digital video recorders, poles and foundations, conduit and cabling, wide area network connections, and miscellaneous materials and equipment required for a complete installation. As directed by the Project Manager, security equipment shall be installed in its own enclosure or room. This enclosure or room shall be located near the utility service points or utility room. "Smart" cameras, also known as analytics, are desirable in stations.

VSSs shall be placed on the Wide Area Network. Microprocessor controllers and control system software shall be compatible with the existing system and shall support connections to a fiber-optic cable network without requiring replacement. All VSS cabling shall be outdoor-rated and properly sized for its intended use. The type of camera desired for the specific application shall dictate the type of communication method to be used between it and the network equipment (e.g., Ethernet, serial, or analog). All network cabling and interfaces shall conform to the requirements of LRT Design Criteria, Chapter 6 "Communications," "Local Area Network (LAN)."

If a station will be used by passengers going to or from a special event in the surrounding area on a regular basis, a Video Surveillance Monitoring Station shall be incorporated into existing monitoring stations in the Metropolitan Transit System Control Center unless otherwise directed by SANDAG.

#### 9.5.2 Intrusion Detection/Access Control

Intrusion Detection and Access Control shall be incorporated into design as specified in the design scope of work and as indicated below (refer also to LRT Design Criteria, Chapter 6).

##### a) Access Control of Systems Facilities

Control and system facilities, such as communications enclosures, railway signal cabinets, utility service cabinets, access doors, and traction power substations, shall be locked with standard locks acceptable to the operator to restrict access in conformance with Code of Federal Regulations Title 49 Part 236.3. Enclosures and cabinets shall be designed to accept the operator's standard padlocks to prevent intrusion. Traction power substation, communications building, and room doors shall be keyed to accept the operator's standard keys. Intrusion detection of communications enclosures, railway signal cabinets, utility service cabinets, access doors, and traction power substations shall be evaluated on a project-specific basis and is not required unless otherwise directed by the Project Manager.

##### b) Access Control of Secured Facilities

Doors that are intended to restrict public access at points of entry into secure facilities shall include existing access control systems, except where achieving compatibility is not feasible, then the designer shall develop design alternatives as approved by SANDAG and the operator. Facilities that typically require access control readers include, but are not be limited to, underground station ancillary areas, fare handling areas, records and high value storage areas, control centers, and security control facilities.



Access to yards and storage facilities shall be controlled using security fences, locked gated access points, video surveillance systems, bollards, and automated spike systems (refer to Section 9.6).

## 9.6 Fire Protection

The designer shall prepare complete Plans, Special Provisions, and Engineer's Estimate for fire protection systems where specified or required that shall conform to all applicable federal, state, and local requirements for fire protection systems and fire-resistant materials and construction including, but not limited to, the requirements of the California Building Code (CBC) (refer to Section 9.9 for additional fire protection requirements.)

The designer shall submit complete plan sets to the applicable agency (state and/or city fire marshals) for review and approval. Any site walks or meetings required for agency review and approval shall be coordinated by the designer with the state and/or city fire marshals. Revisions shall be incorporated into the plan set as needed for approval. Resubmittals shall continue until approval is obtained.

## 9.7 Facilities

Non-public facilities, including maintenance, office and storage buildings, and yards, shall include security hardening systems. Security hardening systems may include the following elements as required to adequately secure the facility:

- Security fencing—Security fencing shall be made of chain link or tubular steel. Chain-link fencing shall be in accordance with California Department of Transportation Section 80-4 and, as required, be designed with a barbed wire/razor wire configuration (Barbed Tape Concertina or Barbed Tape Obstacle). Tubular steel fencing shall have a curved speared top guard and be designed to prevent climbing. Placement of fences shall comply with all right-of-way and clearance requirements as given in Section 5.7 and Part 3, Section 3.3.1.2.
- Security gates—The number of security gates shall be minimized. Security gates shall include both vehicle and man gates and shall be designed with the same material and style as the adjoining fence.
- Video Surveillance System—Types and placement of cameras shall be coordinated with the Project Manager. Once type and location of cameras have been determined, the designer shall include layout for conduit runs, power sources, and connection points (refer to Section 9.4).
- Card Access Control—Refer to Section 9.5.2 (b).
- Lighting—Illumination from lighting shall be sufficient to allow the VSS to operate properly. All lighting designs shall be coordinated with the camera types and locations.
- Additional elements, such as bollards and automated spike systems, may be incorporated as directed by the Project Manager.



## 9.8 Tunnels

### 9.8.1 Safety

#### a) Emergency Ventilation

Tunnel ventilation systems shall be designed in accordance with the following guides, codes, and standards:

- National Fire Protection Association Standard (NFPA) 130 Fixed Guideway Transit Systems (2010 edition)
- U.S. Department of Transportation Subway Environmental Design Handbook and Subway Environment Simulation Computer Program, together with its associated volumes and parts (1976)

Tunnel ventilation system must handle normal, congested, and fire emergency conditions. In normal operation, trains move through the system according to schedule. Trains operating in a tunnel will generate heat due to traction power, braking, and on board conditioning units/systems. The tunnel ventilation system shall be designed to remove heat generated by the trains and provide an outside air supply to the tunnel. A train stopped inside a tunnel due to congestion or any abnormal non-fire condition, will result in congested operation. The maximum allowable average tunnel air temperature at the congested train location shall not rise above the outdoor temperature by more than 5 degrees Celsius. A train on fire inside a tunnel or station will result in emergency operation. Under emergency operation, when a train fire occurs within the station trackway or inside the tunnel between stations, a tenable path for passenger evacuation and fire-fighting purposes must be created. This can be achieved through longitudinal ventilation or local smoke evacuation.

A comprehensive and systematic air quality analysis of any tunnel ventilation system shall be performed to ensure that the emissions from tunnel ventilation systems do not result in any exceedances of either the National Ambient Air Quality Standards or California Air Resources Board (California Code of Regulations Title 17) guidelines.

#### b) Lighting/Emergency Lighting and Emergency Backup Power System

General lighting shall be provided throughout the tunnel at a minimum maintained illumination level of 1.5 footcandles at the walking surface of walkways and all other components of emergency exits.

Threshold lighting shall be provided in the tunnel for a distance of 100 feet from each portal, at a minimum maintained illumination level of 10 footcandles at the walkway surface.

Emergency lighting shall be provided throughout the tunnel at a minimum maintained illumination level of 0.25 footcandles at the walking surface of walkways and all other components of emergency exits. The design of emergency backup power systems for emergency lighting and communication systems shall comply with all applicable federal, state, and local rules and regulations for the facility, in particular NFPA 130-2014, Section 6.4.7. The emergency backup power system shall provide a minimum of three hours continuous operation and shall have a maximum start-up time of three seconds.



Additional loads for the backup power system shall be included at the direction of the Project Manager.

c) Evacuation/Emergency Egress

Tunnels shall have raised walkways along the tunnel wall on both inbound and outbound sides of the track. Curb height for walkway shall not be greater than 8 inches and shall be designed to facilitate direct egress through the side doors of transit vehicles. The width shall be no less than 4 feet with minimum lateral clearance of 30 inches from the walkway surface to a height of 7 feet. Walkways shall extend the entire length of the tunnel structure and tie into the station platform area and/or the tunnel portal access area. Maximum cross slope of walkways, toward the trackway, shall not exceed 1 percent. A continuous handrail, meeting CBC requirements, shall be included in the design. Where double track is divided by a separation wall, access doors shall be located every 100 feet.

Signage shall be provided on the tunnel walls indicating location and direction to the nearest exit. Signage shall be painted on walls with minimum vertical size of 12 inches and shall be located the full length of the tunnel at 50-foot intervals. Signage shall be well illuminated and emergency lighting shall be provided.

Emergency telephones shall be located every 300 feet along the walkway and comply with NFPA 130 and the authority having jurisdiction.

d) Emergency Access

Access to the tunnel from either the portal or station side shall be such that emergency response personnel may gain access along with emergency equipment. At portals, where access is gained by stairs, sufficient clearances shall be provided to allow access of emergency personnel and their equipment. Any roadways to portals shall be designed to accommodate emergency vehicles. The designer shall coordinate with local emergency responders for emergency vehicle requirements.

## 9.8.2 Security

Portals, both external and interior, shall be equipped with an intrusion detection system (IDS) or "Hardened." The IDS shall have both audible and visual alarms that will provide notification to light rail vehicle operators in the vicinity and provide an alarm at a security control center. In addition, the IDS shall have digital recording capacity with time stamping capability. The designer shall incorporate proven and upgradable technology with an intuitive Graphic User Interface that is compatible with current SANDAG network systems. The designer shall coordinate with the operator's security and information technology managers for current system platforms. All system components shall be tamper proof, National Electrical Manufacturers Association rated, and conform to applicable Underwriters Laboratories standards. Conceptual design, layout, and equipment proposed shall be submitted during the 35 percent submittal process.

a) Access Control of Tunnel Entry Points

At a minimum, tunnel entry points, such as portals and connections to underground stations, shall have automatic motion detection systems and audio/visual warning devices to cover a defined security zone (refer also to Section 9.5.2).



### 1) Motion Detection

All non-public and emergency entrances and exits shall have a rule-based motion detection system that will be able to differentiate between authorized vehicles such as light rail vehicle cars or maintenance vehicles, and intruders, such as people on foot or foreign objects. When activated, the motion detection system shall automatically deploy audio/visual alarms locally (see below) and at a designated security control center.

### 2) Audio/Visual Warning

Local audio alarms shall include audio annunciations or sirens through amplified speakers, either automated or manually performed through the security control center, and visual warnings such as spinning red lights, strobes, or high-capacity flashers upon perimeter breach. Additional audio/visual warnings shall be provided at the designated security control center, such as a buzzing/beeping alarm and/or flashing bulb indicators.

## 9.9 Elevated Guideway

Elevated guideways shall comply with NFPA 130.

## 9.10 Fire/Life/Safety

### a) General

System fire/life/safety design shall be in compliance with the California Public Utilities Commission, the Institute of Electrical and Electronics Engineers, the NFPA, the California Fire Code (CFC), the CBC, and Underwriters Laboratories standards and guidelines. The design shall include provisions to detect and notify patrons, operational personnel, and emergency response teams of hazardous conditions. These provisions shall allow for a safe and timely evacuation of patrons and operational personnel from the facility. The design shall also include safeguards to help minimize patrons, operational personnel, and emergency response forces' exposure to hazards. Systems to be considered in the design shall include, but not be limited to, the following:

Fire Protection—May include the following systems and/or components as needed or required by regulation or code:

- 1) Protective signaling systems, including fire and smoke detectors, audio/visual alarms, and warning devices.
- 2) Fire suppression system using either automatic/pre-action sprinkler protection or a clean agent, environmentally acceptable fire extinguishing system. Multipurpose portable fire extinguishers shall also be provided.
- 3) Water supply and fire hydrants sufficient for facility system.
- 4) Standpipes for at-grade, elevated, and subterranean facilities.
- 5) Emergency Management Panel shall be provided in any facility operating elevators, escalators, or emergency ventilation system. The Emergency Management Panel





shall be located in the immediate vicinity of the main or primary entrance to the facility.

**Emergency Lighting and Signing**—All required lights and signs for exits and places of safety shall be provided. Exit signs shall be illuminated internally. All emergency lighting shall be on the uninterruptible power supply. Signage for emergency contact information shall also be provided.

**Communication**—Refer to LRT Design Criteria, Chapter 6.

b) **Power Supply**

Uninterruptible power supply shall be provided for all critical fire/life/safety systems as directed by the SANDAG Director of Mobility Management and Project Implementation.

c) **Fire Lanes**

Fire lanes shall be designated around facilities in accordance with the CFC and as approved by the local and/or State Fire Marshall. Where facilities are elevated or subterranean, elevators and stairwells shall be designed in accordance to the CBC and CFC to accommodate passage of emergency response personnel and their equipment. Ancillary rooms shall allow for emergency access by keyed locks or electronic entry devices.

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APPENDIX A REQUEST TO DEVIATE FROM BASELINE DESIGN CRITERIA OR STANDARD

<p style="text-align: center;"><b>Request to Deviate from Baseline Design Criteria or Standard</b></p> <p style="text-align: center;">Date of Request: _____ Request No.: _____</p>							
<b>ORIGINATOR</b>	Requested By: _____ Consultant: _____ Project Name: _____ Project Number: _____						
<b>DEVIATION SOUGHT</b>	Attach relevant standard/criteria/drawing/document showing "before" and "after" proposed deviation. Specify Baseline Documents including item number to be deviated from below:						
<b>REASON FOR REQUEST</b>	Explain Reason For Request (Benefit or impact if not pursued):						
<b>JUSTIFICATION FOR DEVIATION</b>	Explain Justification for Deviation:  Cost Impact: \$ _____ Schedule Impact: _____						
<b>SANDAG APPROVALS</b>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%; border-bottom: 1px solid black;">Project Manager</td> <td style="width: 30%; border-bottom: 1px solid black;">Date</td> </tr> <tr> <td style="border-bottom: 1px solid black;">Principal Engineer/Corridor Director</td> <td style="border-bottom: 1px solid black;">Date</td> </tr> <tr> <td style="border-bottom: 1px solid black;">SANDAG Director of Rail</td> <td style="border-bottom: 1px solid black;">Date</td> </tr> </table>	Project Manager	Date	Principal Engineer/Corridor Director	Date	SANDAG Director of Rail	Date
Project Manager	Date						
Principal Engineer/Corridor Director	Date						
SANDAG Director of Rail	Date						





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**EXHIBIT B  
TPSS DESIGN DOCS**

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**SECTION 4.0 – TECHNICAL, MATERIALS, INSTALLATION, TESTING, MEASUREMENT AND PAYMENT, FURNISH, TEST, DELIVER, AND COMMISSION OF TRACTION POWER SUBSTATIONS SPECIFICATIONS (SCOPE OF WORK)**

**TRACTION POWER SUBSTATIONS**  
**MTS DOC. NO. L1032.0-12**

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**SECTION 4.0 – TECHNICAL, MATERIALS, INSTALLATION, TESTING, MEASUREMENT AND PAYMENT, FURNISH, TEST, DELIVER, AND COMMISSION OF TRACTION POWER SUBSTATIONS SPECIFICATIONS (SCOPE OF WORK)**

**PROCUREMENT SPECIFICATIONS**

**4.1 GENERAL**

4.1.1 Description of Work

The Contractor shall furnish all labor, equipment, materials and accessories required to design, manufacture, test, store, deliver, unload to a jobsite and field test all specified electrical assemblies, hardware and equipment for two (2) 2.0 MW and fifteen (15) 1.5 MW and with Option for seventeen (17) 1.5 MW Pre-fabricated Traction Power Substations (TPSS) for the rehabilitation of existing LRT system.

The Work also includes all assembly, mounting, wiring, subsystem and component testing, factory and field testing, spare parts, on-site technical services, training, and support services before and during system integration testing.

4.1.2 Reference Standards

A. American National Standards Institute (ANSI) Publications:

- B1.1 Unified Inch Screw Threads
- B1.13 M Metric Screw Thread
- C2 Section 14, National Electrical Safety Code
- C29.1 Test Methods for Electrical Insulators
- C34.2 Practices and Requirements for Semiconductor Power Rectifiers
- C37.04 Rating Structure for AC High-Voltage Circuit Breakers
- C37.06 AC High Voltage Circuit Breakers Rated on a symmetrical Current Basis
- C37.09 Test Procedure for AC High-Voltage Circuit Breakers
- C37.2 Electric Power System Device Function Numbers
- C37.11 Requirements for Electrical Control for AC High-Voltage Circuit Breakers (Consolidated Edition)
- C37.14 Low-Voltage DC Power Circuit Breakers Used in Enclosures
- C37.16 Preferred Ratings, Related Requirements and Application Recommendations for Low-Voltage Power Circuit Breakers
- C37.17 Trip Devices for AC and General-Purpose DC Low-Voltage Power Circuit Breakers
- C37.20 Metal-Clad Station Type Cubicle Switchgear

- C37.20.1 Metal Enclosed Low-Voltage Power Circuit Breakers Switchgear
- C37.20.2 Metal-Clad Station-Type Cubicle Switchgear
- C37.31 Indoor Apparatus Insulators
- C37.34 Test Code for High-Voltage Air Switches
- C37.9 Relays and Relay Systems Associated with Electric Power Apparatus
- C37.100 Definitions for Power Switchgear
- C39.1 Requirements for Electrical Analog Indicating Instruments
- C39.5 Safety Requirements for Electrical and Electronic Measuring and Controlling Instrumentation
- C57.12.01 General Requirements for Dry Type Distribution and Power Transformers
- C57.12.91 Test Code for Dry Type Distribution and Power Transformers.
- C57.13 Requirements for Instrument Transformers
- C57.18.01 IEEE Standard Practices and Requirements for Semiconductor Power Rectifier Transformers
- C80.3 Steel Electrical Metallic Tubing
- Z55.1 Gray Finishes for Industrial Apparatus
- Z358.1 Emergency Eyewash and Shower Equipment

B. American Society for Testing and Materials (ASTM) Publications:

- A48 Gray Iron Castings
- A36 Structural Steel
- A123S Specification for Zinc Coating (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- A575 Steel Bars, Carbon, Merchant Quality M-Grades
- A579 Steel Bars, Carbon, Hot-Wrought, Special Quality
- B3 Soft or Annealed Copper Wire
- B187 Copper Bus Bar, Rod and Shapes

- B633 Electrodeposited Coatings of Zinc on Iron and Steel
- D149D Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
- D570 Water Absorption of Plastics
- D635 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in Horizontal Position
- D638 Tensile Strength of Plastics
- D695 Compressive Properties of Rigid Plastics
- D790 Flexural Properties of Un reinforced and Reinforced Plastics and Electrical Insulating Materials
- D2000 Classification System for Rubber Products in Automotive Applications (SAE J200)
- D2240 Rubber Property - Durometer Hardness
- D2802 Ozone-Resistant Ethylene-Propylene Rubber Insulation for Wire and Cable
- D2863 Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics

C. California Administration Code (CAC):

- Title 24, Part 3 California Electrical Code

D. California Building Code (CBC)

E. Canadian Standards Association (CSA):

- C22.2 No. 142 Process Control Equipment

F. Electronics Industries Association (EIA) Publications:

- EIA-443 NARM Standard for Solid State Relay Service
- EIA-282 Silicon Rectifier Diodes

G. International Building Code (IBC)

H. Institute of Electrical and Electronics Engineers (IEEE) Publications:

- 31 6 Direct Current Instrument Shunts
- IEEE 450 Recommended Practice for Maintenance, Testing and Replacement of Ventilated Lead-Acid Batteries for Stationary Applications.

- IEEE 484 Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications.
  - IEEE 485 IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications
  - 693 Recommended Practice for Seismic Design for Substations
- I. Instrumentation, Systems and Analysis Society (ISA) Publications:
- S18.1 Annunciator Sequences and Specifications
- J. National Electrical Manufacturers Association (NEMA) Publications:
- 250 Enclosures for Electrical Equipment (1000 Volts Maximum)
  - AB1 Molded Case Circuit Breakers
  - BU 1 Busways
  - EI 2 Factory-Installed Electrical Interlocks
  - EI 21.1 Instrument Transformers for Revenue Metering
  - FBI Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
  - ICS 1 General Standards for Industrial Control and Systems
  - ICS 2 Industrial Control Devices, Controllers and Assemblies
  - ICS 4 Industrial Control and Systems: Terminal Blocks
  - ICS 6 Industrial Control and Systems: Enclosures
  - PB1 Panelboards
  - PE5 Utility Type Battery Chargers
  - PR4 Power Receptacle
  - RI-9 Silicon Rectifier Units for Transportation Power Supplies
  - SG4 Ac High Voltage Circuit Breakers
  - TRI Audible Sound Levels for Dry Type Transformers
  - SG 3 Low-Voltage Power Circuit Breakers
  - SG 5 Power Switchgear Assemblies
- K. National Fire Protection Association (NFPA) Publications:
- NFPA 70 National Electrical Code
  - NFPA 72E Automatic Fire Detectors



## L. Underwriters Laboratories (UL) Publications:

- 489 Molded Case Circuit Breakers
- 508 Industrial Control Equipment
- 797 Electrical Metallic Tubing - Steel
- 1059 Terminal Blocks
- 1077 Supplementary Protection

4.1.3 Regulations and Codes

Unless otherwise indicated, all materials, equipment, product design, manufacturing methods, system installation, and construction workmanship shall conform to the provisions in Section 86-1.02, "Regulations and Codes," of the Standard Specifications, Contract provisions, and these procurement specifications.

4.1.4 Definitions and Terms

The following definitions and terms are used throughout these procurement specifications:

- AC, ac Alternating Current
- CPU Central Processing Unit
- DC, dc Direct Current
- EPROM Erasable Programmable Read Only Memory
- GB Gigabit
- HMI Human Machine Interface
- IED Intelligent Electronic Devices
- I/O Input/Output
- LAP Local Annunciator Panel
- LED Light-Emitting Diode
- kV Kilovolt
- kW Kilowatt
- MRT Metropolitan Rail Transit
- MTS San Diego Metropolitan Transit System
- O & M Operations and Maintenance
- OCC Operations Control Center
- OCS Overhead Contact System

- PLC Programmable Logic Controller
- TCP/IP Transmission Control Protocol/Internet Protocol
- TFT Thin Film Transistor
- TPSS Traction Power Substation
- SANDAG San Diego Association of Governments
- SDG&E San Diego Gas & Electric Co.
- SDTI San Diego Trolley, Inc.

- Standard Specifications:

The directions, provisions, and requirements contained in the sections referenced in these procurement specifications only of The Standard Specifications of the State of California Department of Transportation (Caltrans), dated May 2006 (See link: [http://www.dot.ca.gov/hq/esc/oe/specifications/std\\_specs/2006\\_StdSpecs/2006\\_StdSpecs.pdf](http://www.dot.ca.gov/hq/esc/oe/specifications/std_specs/2006_StdSpecs/2006_StdSpecs.pdf)). When the words "Department," "District," "Director," or "State," are used in the Standard Specifications, they shall be taken to mean MTS and its comparable officer, unless otherwise defined within that section.

- Substation: Traction Power Substation or TPSS
- SVGA Super Video Graphic Array

#### 4.1.5 Submittals

The Contractor shall submit drawings, technical data, catalog cuts, calculations, installation instructions, test documents, and operations and maintenance manuals, in the English language, to MTS for approval. Submittals transmitted via facsimile will not be accepted. Metric units may be included in addition to the required English unit of measure. The submittals shall provide evidence that the Contractor has accurately interpreted the requirements of the Contract, and shall include a master schedule that shall provide for the control of all submittals with appropriate entries.

Each submittal shall indicate the corresponding article and/or section number of these procurement specifications and Contract Drawings under which it is required. Unless otherwise approved by MTS, the Contractor shall prepare and submit drawings in D-size (22" X 34"), and each drawing shall have its own drawing number and title clearly identified in the title block.

Standard IEEE device symbols and nomenclature shall be used unless otherwise approved by MTS. Part numbers and names shall be used to identify components. All submittals shall have a revision number and date.

MTS will review and approve submittals for design and compliance with these procurement specifications and Contract Drawings. MTS will return the submittals within fifteen (15) business days after receipt. In the event submittals require changes or further explanation, one (1) marked print of each submittal will be returned to the Contractor for corrections and shall be resubmitted. In the event the Contractor does not correct submittal, any further corrections after the second submittal shall be reimbursed by the Contractor to MTS for cost incurred for fees for time and expenses expended.

Contractor shall submit drawing list with each submittal including space for tracking the submittal status of each drawing. As part of the drawing lists, Contractor shall include the primary drawing numbering system, including the significance of characters. Nameplate on major equipment items shall include space for MTS numbers to be added by the Contractor.

The review of drawings shall be construed neither as permitting any departure from the Contract nor relieving the Contractor of the responsibility for any error.

A. Submittal Schedule

1. Within ninety (90) calendar days after Notice to Proceed, the Contractor shall submit the following for approval:
  - a. Engineering and design schedules
  - b. List of shop drawings
  - c. Manufacturing Plan
  - d. Program Management Plan
  - e. Quality assurance program plan
  - f. List of proposed sub-suppliers
  - g. Symbols and abbreviations used on all the submittals, all presented in one (1) or two (2) drawings
  - h. Single-line meter and relay diagram
  - i. AC circuit breaker control schematic
  - j. DC main circuit breaker control schematic
  - k. DC feeder circuit breaker control schematic
  - l. Rectifier-Transformer control schematic
  - m. Rectifier control schematic
  - n. Negative cubicle equipment [negative bus overvoltage protection, negative disconnect switch, meters, drainage equipment] control schematic
  - o. Auxiliary equipment [station service transformer, 125 V dc battery and charger system, 24-volt dc system, lighting, etc.] control schematics
  - p. TPSS Annunciator Panel and External Annunciation control schematic
  - q. SCADA points list and SCADA interface diagrams

- r. Equipment layouts and physical dimensions consisting of:
    - i. Plan Reviews
    - ii. Elevation views
    - iii. Sections
  - s. Technical data and catalog cuts on all devices, equipment, and materials
  - t. Instrument transformer ratio, phase angle and excitation characteristic curves
  - u. Substation floor plan details, identifying locations and sizes of conduit cutouts
  - v. Foundation loadings and mounting details of the substation enclosure, including weight of the complete substation
  - w. AC and DC equipment grounding plans and schematic diagrams.
  - x. Transfer trip related schematic diagrams for transfer-trip implementation
  - y. Emergency shutdown switches (ESS) schematic diagram including ESS box details
  - z. Traction Power SCADA:
    - i. Hardware Design Documents
    - ii. System Details and Design Concepts
    - iii. Bill of Materials
    - iv. Material Data Sheets
    - v. Product Catalog Cut
    - vi. Product Reliability Data
    - vii. Recommended Spare Parts and Special Tools
    - viii. Block diagrams showing interconnections between major components with supporting documentation as to the expansion capabilities of the system
    - ix. Design of interfaces related traction power, auxiliary, and OCC host systems
2. Within one hundred twenty (120) calendar days after Notice to Proceed, the Contractor shall submit the following for approval:
- a. Mounting details for each major equipment enclosure
  - b. Locations of all control and protective devices, and meters

- c. Section drawings of all equipment, showing accessibility for maintenance
- d. Smoke/Intrusion detection system schematics and equipment arrangement

The System Supplier of SCADA shall submit complete shop drawings including:

- a. Cabinet layout drawings with materials lists, terminal designations and other construction details
  - b. Equipment mounting arrangements
  - c. Elementary wiring diagrams
  - d. I/O termination diagrams
  - e. Equipment configuration settings and parameters
  - f. Cable assembly pinouts
  - g. Other such related details required by the Contract
3. Within one hundred fifty (150) calendar days after Notice to Proceed, the Contractor shall submit the following:
- a. Connection diagrams of all equipment showing internal wiring and terminal block arrangement and identification of each outgoing power and control terminal. All devices shall be shown in their respective physical locations. All terminal blocks and terminals shall be uniquely identified.
  - b. Interconnection diagrams of all equipment showing terminal blocks of individual units, interconnections between units, and connections to external equipment. All devices shall be indicated in their respective physical locations. All terminal blocks and terminals shall be uniquely identified.
  - c. Protective device range and setting calculations showing basis on which each relay is set. Protective device coordination curves shall be submitted showing coordination of all equipment. Plot, of rectifier design capability shall be included with actual margin of coordination (from breaker trip to design capability) clearly indicated for each of one hundred fifty (150%), three hundred (300%), and four hundred fifty (450%) percent full-load current and short-circuit current, taking into account de-rating for current imbalance due to loss of one (1) leg in each phase. Coordination between minimum setting of rate-of-rise relay and maximum current due to accelerating trains shall also be included. Timed over-current and low-level fault detection settings determination to be included:
  - d. Structural calculations for the substation enclosure, certified and stamped by a licensed professional structural engineer in the State of California

- e. Spare parts with the reference number for each item shall include the Contractor's and original manufacturer's part numbers
- f. Equipment, device, and component nameplate data
- g. Test Program Plan
- h. Ventilation Analysis and HVAC equipment sizing
- i. Seismic design calculations, including equipment bracing and anchoring; details for securing the TPSS to the foundation
- j. Acoustic / noise mitigation calculations
- k. Lighting calculations
- l. Performance characteristics of the interphase transformer including description of smoothing of the unbalanced output voltages from the two (2) 6-pulse diode rectifier units caused by any anticipated factors such as unbalanced utility company phase voltages
- m. Sizing calculations for the station service transformer
- n. Sizing calculations for the battery and battery charger
- o. Details for the high resistance grounding system of the rectifier enclosure and dc switchgear frames, including floor insulation and equipment anchoring
- p. Details for the high resistance grounding system of the rectifier enclosure and dc switchgear frames, including floor insulation and equipment anchoring
- q. Draft Operations and Maintenance Manual
- r. Submittals for utility approval: MTS will forward portions of the above submittals to San Diego Gas and Electric Company for review and approval. Contractor shall not proceed with building the metering section until written approval by way of MTS is received. As a minimum, the following items shall be submitted for utility review and approval:
  - i. Single-line meter and relay diagrams.
  - ii. Three-line diagrams for the ac switchgear.
  - iii. Mounting for metering equipment enclosure.
  - iv. Grounding details for the shield of the incoming cable, and maintenance grounding provisions for the ac bus.
  - v. Surge arrestor location and technical data.
  - vi. Other drawings and data requested by San Diego Gas and Electric Company.

- vii. Data for protective relay settings and coordination with the utility company.
- s. Software Design Documents: The Contractor shall submit software design specifications and control narrative prior to the implementation phase. The Contractor shall follow procedures outlined in the quality plan for any design changes that deviate from the previously approved method. Submittal content shall include but not be limited to the following:

PLC-based SCADA System Description and Overview consisting of:

- i. PLC design concept
- ii. Operational modes and interlocks
- iii. SCADA interfaces overview

LAP/HMI Functional Specifications of:

- i. Graphical display definitions and layouts
- ii. Identification of I/O points
- iii. Hierarchical screen navigation and user access
- iv. Alarm summaries
- v. Monitoring and Control links
- vi. Diagnostic capabilities and screens.

- 4. Within ninety (90) calendar days prior to the start of each test, the Contractor shall submit test procedures for approval. No test shall proceed until the test plan and procedures have been approved.
- 5. Within thirty (30) calendar days after completion of each test, the Contractor shall submit test reports to MTS for approval. Equipment shall not be shipped until all factory test reports documenting tests on the respective substation have been approved by MTS. Operations and Maintenance Manuals shall be submitted in accordance with the requirements of these procurement specifications.
- 6. Submittal schedule requirements for the training program shall be in accordance with those specified elsewhere in the Contract.

**B. Drawings, Technical Data and Catalog Cuts**

All drawings prepared for this Contract shall be prepared in the latest version of AutoCAD or approved equal. Drawings, technical data, and catalog cuts shall be submitted as follows:

- 1. For Review and Manufacture. One (1) good-quality reproducible and four copies of all drawings. Six (6) legible copies of all Contractor standard drawings, catalog cuts, instruction books, tabulations, and the like, which are not adaptable for the furnishing of reproducibles.

2. For Permanent Record. One (1) legible good quality Mylar of all Contractor drawings, which represent the as-built condition of the substations. Six (6) copies of all Contractor standard drawings, catalog cuts, instruction books, tabulations and the like, not adaptable for the furnishing of reproduces. Original clear copies of documents, catalog cuts, etc. must be submitted. Xerox copies shall not be submitted. Two (2) sets of CDs shall be furnished for all drawings prepared in AutoCAD. Design or manufacturing changes occurring after submittal shall be immediately reflected on the drawings and a new submittal of these drawings shall be made.

C. Calculations

Six (6) legible copies of all calculations which are required in support of design and test data as indicated in these procurement specifications shall be submitted and shall include the following:

1. Title of calculation
2. Statement of problem
3. Source of design criteria
4. Source of formulae and references

D. Test Documents

Test plan, procedures, and reports for all tests shall conform to the requirements herein. Six (6) copies of each test document shall be submitted.

E. Test Program Plan

The Contractor shall submit an overall test program plan to MTS for approval. The test program plan shall incorporate all tests specified and shall be used as a controlling document for all tests. The test program plan shall include the following information:

1. Detailed written description of test program and objectives
2. Title of each test with reference to the respective article or section number in procurement specifications
3. Name of organization performing each test
4. General description of each test to be performed Pass/Fail criteria for each test
5. Test location
6. Submittal date of each test procedure, test report, and certified test document
7. Starting date of each test



F. Test Procedures

The Contractor shall develop detailed test procedures for each test. Test procedures shall be stapled or bound in volumes. Each procedure shall be individually numbered in a logical sequence with all pages numbered. The first sheet of the procedure shall contain the title, date, and name of individuals who prepared and approved the procedure.

Based upon the results of the first items tested, the Contractor may initiate revisions to the test procedures if approved by MTS. The modified test procedures shall be resubmitted to MTS for approval and shall meet the same submittal requirements indicated unless waived by MTS. Each set of procedures shall contain a step-by-step procedure for performing the test, and shall include the following information:

1. Title of test
2. Test objectives
3. Test location and date of test
4. Equipment and instrumentation with the accuracies and calibration data
5. Test criteria including test setup with circuit diagrams and test sequence
6. Test criteria including data evaluation procedures
7. Test data requirements including forms and format for recording data
8. Primary and supporting test agency, and number of personnel required to perform the test, including witnesses.

G. Test Reports

The Contractor shall prepare test reports for each test to document test results. Each test report shall be stapled or bound in volumes, and shall be individually numbered in a logical sequence with all pages numbered. The first sheet of the report shall contain the title, date, and signature of individuals who prepared and approved the test report. Each test report shall include the following information:

1. Title of test
2. Test objectives
3. Test description, including instrumentation, test setup and procedures
4. Pass/Fail Criteria
5. Test results, including tables, curves, photographs, and any additional test data required to document the test
6. Summary and conclusions, including pass/fail judgment
7. Location and date of test
8. Descriptions of all failures and modifications, including reasons for such failures, and names of individuals approving modifications

9. Abbreviations and references
10. Signatures of test witnesses
11. Expected results

#### H. Operation and Maintenance Manuals

The Contractor shall provide Operation and Maintenance Manuals for the traction power substations as described this section and in Section 4.1.8 "Operations and Maintenance Manuals" of the Contract. The submittals for Operations and Maintenance Manuals shall be as follows:

1. Within one hundred fifty (150) calendar days after notice-to-proceed, the Contractor shall provide two (2) draft copies of the Operations and Maintenance Manuals for MTS' approval.
2. Thirty (30) calendar days prior to the commencement of the first set of training classes, the Contractor shall submit ten(10) copies of each manual. Within ninety (90) calendar days after the first set of training classes, the Contractor shall incorporate MTS' comments into the manuals and provide an addendum to the previously issued ten (10) manual sets.
3. Within thirty (30) calendar days prior to shipment of the first substation, the Contractor shall provide an additional fifteen (15) sets of Operations and Maintenance Manuals to MTS. The Contractor shall also provide at this time one (1) reproducible set of any drawings contained in the manuals and one (1) electronic file (Word Perfect, latest revision)(AutoCAD, latest revision) of the manuals and drawings.

#### I. Parts Catalog

Each manual shall include a parts catalog. The parts catalog shall enumerate and describe every part to the lowest level of replaceable components. The description shall include component symbol, description, rating, accuracy, manufacturer's name and address, manufacturer's part number, commercial equivalents, and quantity per assembly or subassembly. The description of each component shall be complete to the extent that the material composition of each component is given. The parts catalog shall identify the appropriate locations of the parts and shall group each component by assemblies or subassemblies within each subsystem so that each component can be identified as being part of the next larger assembly.

#### J. Manual Drawings and Illustrations

Each manual shall be supported by, and shall refer to, illustrations, drawings, or photographs to the extent necessary to assure comprehension. The parts catalog shall include parts identification drawings in isometric views or photographs of actual equipment identifying symbols used on the parts list, identification labels on equipment, and schematics. The drawings shall have dimensions of all assemblies, subassemblies and components and shall include the following:

1. Functional block diagrams
2. Control schematic diagrams
3. Simplified circuit diagrams

4. Wiring diagrams including wire color-coding, wire size, rating and terminal numbers.

K. Format

All manuals shall be in 3-ring binders, printed on good quality bond paper (20 pound minimum), with reinforced punched holes. The binders shall be resistant to oil, moisture, and wear, commensurate with their intended daily use. All text and illustrations used in these manuals shall be properly produced to assure legibility of lettering, symbols, lines, and other details. All manuals shall contain originals where catalog cuts are used for illustrations.

J. Manual Size

The manual shall be 8.5" X11" inches. Illustrations and drawing shall be 8.5" X 11" inches or 17" X 11" inches, folded and bound to conform to the 8.5" format. Folded sheets shall display identification on the last fold, legible without unfolding.

K. Revisions

The Contractor shall provide revised pages covering all changes, whether required by change of design or procedures or due to error. Revisions shall be dated and kept current during the warranty period. Manuals shall be bound to facilitate easy addition and removal of pages following revisions.

L. Maintenance and Operation Plan

Contractor shall develop a TPSS Maintenance and Operation Plan. The Maintenance Plan shall be developed jointly with MTS and shall be fully compatible with MTS maintenance capabilities and philosophy. The Maintenance and Operation Plan shall describe all required preventive and corrective maintenance environment recommended by Contractor for the TPSS equipment. The draft Maintenance and Operation Plan shall be provided for MTS review and shall be utilized in the training courses. The final version of the Maintenance and Operation Plan shall be provided for MTS approval within ninety (90) calendar days following the training courses.

#### 4.1.6 Quality Assurance

Experience

- A. Submit certification of at least ten (10) years "successful" experience in the planning, design, manufacture, assembly, installation, testing and commissioning of traction power substations of similar type defined as follows:
  1. TPSS's Rated between 1.5 MW and 2.0 MW;
  2. With incoming ac voltage in the 12 kV to 34.5 kV range;
  3. With utility short-circuit MVA capacity at 500 MVA minimum;
  4. With dc nominal voltage at 650 Vdc;
  5. With extra heavy-duty traction power service in accordance with NEMA RI-9.
  6. Programmable logic controllers
  7. Pre-fabricated, Pre-tested, fully integrated traction power substation. Contractor shall make every effort to minimize enclosure space requirements.

- B. Submit certification that the manufacturer of the 15 kV ac main switchgear and ac circuit breaker has at least ten years of successful and proven transit, industrial, or utility experience with the equipment proposed to be furnished under this Contract.
- C. Submit certification that the manufacturer, or manufacturers, of the rectifier-transformers, rectifiers, and dc switchgear assemblies, PLC, LAP/HMI for extra-heavy duty traction power service in accordance with NEMA RI-9 have manufactured equipment substantially equivalent to the equipment indicated in the Contract. Demonstrate that this equipment has operated successfully in revenue service on rail transit properties for at least fifteen (15) years and TPSS noise level is within the range specified.
- D. The certifications in items 1, 2, and 3 above shall each be substantiated with fully documented information and references.

4.1.7 Delivery, Storage and Handling of Material

- A. Delivery and Handling. The Contractor shall complete all deliveries pursuant to the production, assembly, delivery, and offloading milestones as follows:

**Table 4.1.7 A: TPSS Delivered to Site (Arrival) Dates:**

TPSS #	Delivered to Site (Arrival) Date
2.0 MW Substation	
1	3/26/2013
2	4/9/2013
1.5 MW Substation	
1	4/23/2013
2	5/8/2013
3	5/22/2013
4	6/5/2013
5	6/30/2013
6	7/25/2013
7	8/19/2013
8	9/13/2013
9	10/8/2013
10	11/2/2013
11	11/27/2013
12	12/22/2013
13	1/16/2014
14	2/10/2014
15	3/7/2014

All TPSS shall be delivered to an MTS-owned facility located in the County of San Diego, California, as specified in Section 4.1.7 "Delivery, Storage, and Handling of Material" of the Contract. All materials and equipment shall be delivered in unbroken packages, reels, or other forms of containers. The Contractor shall give MTS twenty (20) business days advance notice before each shipment is made and shall prepare all materials and equipment in such a manner as to protect them from damage in transit and at the delivery site. The Contractor shall also coordinate delivery with SANDAG and SANDAG's contractors. SANDAG will be contracting with an installation contractor. MTS will provide Contractor (TPSS procurement supplier) with additional contact information a minimum of twenty (20) business days prior to delivery of TPSS. The TPSS shall be delivered by a qualified and experienced common or contract carrier who is properly insured. Delivery shall be made between 8:00 AM and 3:00 PM Monday through Friday. No TPSS will be delivered on holidays observed by MTS. The Contractor shall arrange for the delivery of the TPSS and shall be responsible for all transportation costs. When a TPSS has been approved for shipment by the Contractor's Project Manager, a "release for shipment" form shall be given to MTS stating that the TPSS has been assembled in accordance with the Contract and is ready for shipment. A TPSS shall not be delivered until the TPSS has successfully passed all factory tests and MTS has countersigned the "release for shipment" form. The execution of the "release for shipment" form shall not in any respect relieve the Contractor of its obligations to complete the Work as required in the Contract nor impair MTS' ability to subsequently reject a TPSS, or to subsequently identify open items with respect to such TPSS.

The list of TPSS site locations, in no particular delivery order, is as follows:

**Table 4.1.7 B: Delivery Locations:**

TPSS	Address*
<b>2.0 MW TPSS</b>	
1	1192 Kettner Boulevard, San Diego, CA
2	152 South 13th Street, San Diego, CA
<b>1.5 MW Substation</b>	
<i>Blue Line</i>	
1	1270 East Harbor Drive, San Diego, CA
2	Near Pacific Fleet Trolley Station and McCandless Blvd
3	Closest known address: 309 W 8th Street, National City, CA, located close to intersection of trolley tracks and creek
4	651 Colorado Avenue (trolley tracks side)
5	1110 Industrial Boulevard, Chula Vista, CA
6	710 Hollister Street, San Diego, CA
7	2814 Elrose Drive San Diego, CA (trolley tracks side)
8	139 West Seaward Avenue, San Diego, CA
9	3085 East Beyer Boulevard, San Diego, CA
<i>Orange Line</i>	
1	2596 Commercial Street, San Diego, CA
2	4046 Lockridge Street San Diego, CA near Mt Hope Cemetery
3	5006 Market Street, San Diego, CA
4	6690 Akins Avenue, San Diego, CA
5	1894 Main Street, Lemon Grove, CA
6	3706 Rojo Tierra Drive, La Mesa, CA

\*Address listed is within a one half (0.5) mile radius of actual site.

Offloading, which includes placement on TPSS pad, including coordination with appropriate personnel and the rental of any required offloading equipment, at the project substation site shall be the responsibility of the Contractor and is included as part of the delivery of the TPSS. The offloading and placement on pad of the TPSS shall be completed on the same day as the date the TPSS is delivered to site. The Contractor shall provide a qualified Offloading Supervisor to manage and observe the offloading of each substation. The Contractor's Offloading Supervisor shall provide technical assistance in the complete installation of all substations and shall verify the proper connections (by others) of all substations furnished under this Contract.

B. Storage of TPSS

In the event that MTS requests a delivery date later than the date specified on Table 4.1.7A "TPSS Delivered to Site (Arrival) Dates", of these procurement specifications, the Contractor shall store the delayed TPSS in Contractor's storage facility. The Contractor will be compensated for TPSS storage per day starting after the TPSS has been accepted for shipment by MTS and after listed in Table 4.1.7A, not including the days during shipment, based on the Contractor rate in the bid form. MTS will notify the Contractor fifteen (15) business days prior to shipment of MTS request for a modification to the Contract delivery date. The Contractor is responsible for the TPSS while in the Contractor's storage facility and shall supply security and power for the TPSS.

4.1.8 Operations and Maintenance Manuals

A. General

1. Format - Submit manuals in electronic and paper formats below:
  - a. Electronic: Submit two (2) copies of all manuals, including all text, diagrams, and drawings, in CD ROM format. Format as "pdf" files.
  - b. Paper: All manuals shall be in 3-ring binders, printed on good quality bond paper (twenty [20] pound minimum), with reinforced punched holes. The binders shall be resistant to oil, moisture, and wear, commensurate with their intended daily use. All text and illustrations used in these manuals shall be properly produced to assure legibility of lettering, symbols, lines, and other details.
2. Manual Size - The manual shall be 8.5" X 11" inches. Illustrations and drawing shall be 8.5" X 11" inches or 11" X 17" inches, folded and bound to conform to the 8.5 inch format. Folded sheets shall display identification on the last fold, legible without unfolding.
3. Revisions - The Contractor shall provide revised pages covering all changes, whether required by change of design or procedures or due to error. Revisions shall be kept current during the warranty period.
4. Equipment manufacturers or suppliers - Standard Operations and Maintenance (O & M) manuals for stand-alone off-the-shelf equipment provided under this Contract that meet the above requirements and that include typewritten, published literature, and/or detailed shop drawings of the exact equipment provided and not a marked-up general catalog data sheet will be considered acceptable to MTS.

- B. O & M Manual Content
1. Contents - Write the manuals in English and provide detailed illustrations to the component level, including assemblies, subassemblies and components. Provide a detailed analysis of each nonstandard component so that maintenance personnel can effectively service, inspect, maintain, adjust, troubleshoot, and repair the equipment. Divide each manual into the following sections and ensure that all requirements indicated herein are fully complied with:
    - a. Introduction - Include the purpose of the manual, any required special tools and equipment, and any safety precautions. Also provide definitions and abbreviations.
    - b. General information and Specifications - Include a general description of the substation and specifications of the major equipments and components in the substation.
    - c. Recommended maintenance schedule and estimated work hours to perform maintenance.
    - d. Theory of Operations - Include the relationship of assemblies, sub-assemblies, components, interchange ability of components, and explanations and analysis of their functions to the smallest replaceable components.
    - e. Operating Procedures - Include the locations and functional descriptions of all controls and indicators.
    - f. Troubleshooting - Include a list, in tabular format, of all symptoms, probable causes of malfunction, of improper operation, and probable remedies to the smallest replaceable components.
    - g. Corrective Maintenance - Include step-by-step removal, replacement, and adjustment procedures and values to the smallest replaceable components. Include step-by-step detailed test procedures to test all components that have been reassembled or adjusted.
    - h. Preventive Maintenance - Include a list, in tabular format, of all lubrication requirements, types of lubricants, and frequency of application; inspection requirements and limits; component replacement and repair schedule; required adjustment] limits and tolerances; optimum test point readings; calibration charts; and procedures in performing preventive maintenance.
    - i. Replacement parts Catalog - Include a parts catalog as defined in the Contract.
    - j. Appendix - Include a list of all abbreviations and circuit symbols used. Provide all factory test procedures.
  2. Parts Catalog - Provide a parts catalog in each manual. Parts catalog to enumerate and consistently describe every part to the lowest level of replaceable components.

- a. Include component symbol, description, rating, accuracy, manufacturer's name and address, manufacturer's part number, commercial equivalents, and quantity per assembly or sub-assembly.
  - b. Make description of each component complete to extent that material composition of each component is given. Component descriptions to be such that first word not be common to many similar parts.
  - c. Identify the appropriate locations of the parts, and group each component by assemblies or sub-assemblies within each subsystem so that each component can be identified as being part of the next larger assembly.
3. Manual Drawings and Illustrations - Ensure that each manual supports, and refers to, illustrations, drawings, or photographs to the extent necessary to assure comprehension. In equipment isometric views or photographs of equipment in the parts catalog, include parts identification drawings identifying symbols used on the parts list, equipment identification labels, and schematics. Provide dimensions of all assemblies, sub-assemblies and components on the drawings and in addition include the following:

Functional block diagrams & flow charts

- a. Control schematic diagrams
  - b. Simplified circuit diagrams
  - c. Wiring diagrams including wire color-coding Method 4 coding, wire size, rating and terminal numbers.
  - d. Documentation of all software and parameters of relay settings.
- C. Submittal and Review
1. Make submittals in accordance with the following schedule:
    - a. Within one hundred fifty (150) calendar days after Notice-to-Proceed, Contractor shall provide an outline of the Operations and Maintenance Manuals for MTS' approval.
    - b. Within two hundred forty (240) calendar days after Notice-to-Proceed, but at least thirty (30) calendar days prior to the shipment of the substations, Contractor shall submit three preliminary sets of the Operations and Maintenance Manuals for MTS' review approval.
    - c. More than thirty (30) calendar days prior to the commencement of the first set of training classes, Contractor shall submit ten (10) sets of each manual. Within ninety (90) calendar days after the first set of training classes, Contractor shall incorporate MTS' comments into the manuals and provide an addendum to the previously issued ten (10) manual sets.
    - d. Within ninety (90) calendar days following the first set of classes, Contractor shall provide an additional fifteen (15) sets of Operations and Maintenance Manuals to MTS. Contractor shall also provide at this time one (1) reproducible set of any drawings contained in the manuals and one (1) electronic file (Microsoft Word, Excel,



PowerPoint, latest revisions), (AutoCAD, latest revision) of the manuals and drawings, Where existing circuit drawings are marked with x's and o's, Contractor is not required to generate new AutoCAD drawings. Specialized electronic listings or other data may be provided using other programs provided that MTS agrees and that means for reading and reproducing the data is also provided.

#### 4.1.9 Training Program

##### A. Guidelines

1. The training program shall include formal and informal hands on instruction during installation, as appropriate, and any models, mock-ups documentation, and aids to carry out the program.
2. Training shall include equipment maintenance and troubleshooting, and using laptops for review and checkups for the settings of electronic relays, and access to PLC data and configuration.
2. Materials used in the training program shall be durable construction and shall become the property of MTS.
3. Assume that the personnel to be trained have the basic electrical skills pertinent to their craft as outlined in MTS' job descriptions for the involved personnel.
4. Assume that MTS personnel to be trained by the training program have no special knowledge of features of equipment or systems to be taught which are different from the existing systems.

B. Instructors - The principal instructors provided by the Contractor shall have previous formal classroom instruction training and relevant experience with the provided systems equipment in an operating environment.

C. Training Materials and Equipment -The Contractor shall prepare training course outlines and submit them to MTS for review and approval prior to the start of the classroom instruction. The outlines shall be prepared specifically for use as training aids.

D. Classes - Prepare each class or session to accommodate at least eight (8) SDTI persons. Contractor shall provide Operations and Maintenance Manuals and classroom material for each person. There will be two (2) classes or sessions to be held and the duration of each session shall be thirty two (32) hours minimum, eight (8) hours a day. SDTI will furnish space for classroom lectures and equipment training. The Contractor may use spare parts furnished under this Contract as training aids, for demonstration, and for practical exercises in adjusting, testing, disassembly, and assembly of equipment. Ensure that the spare parts so used are repackaged and returned to SDTI spare parts storage in their original condition.

#### 4.1.10 Spare Parts and Supplier Recommended Spare Parts List with Prices

A. Manufacture, supply, test, package, and identify spare parts as directed by MTS. Spare parts shall be of new manufacture and shall conform in all respects to the applicable Contract Document sections of these procurement specifications.

B. The Contractor shall furnish, as a minimum, the following spare parts, complete units:

Description	Quantity
15 kV, 1,200 amp AC Circuit Breaker Element, Truck Mounted	1
DC Main 5000A Circuit Breaker Element, Truck Mounted	1
DC Main 4000A Circuit Breaker Element, Truck Mounted	1
DC Feeder Circuit Breaker Element, Truck Mounted	2
Relays and Metering Devices for a DC Feeder Breaker, Complete Set	1 Set
Relays and Metering Devices for a 15 kV Circuit Breaker, Complete Set	1 Set
Load Measuring Resistors, Complete Set	1 Set
Spare Battery Charger	1
Floating Negative High Resistance Ground System GTO/SCR complete assembly	1

C. In addition to the spare complete units indicated above, Contractor shall furnish spare components including as a minimum:

1. One (1) complete set of vacuum bottles for 15 kV ac circuit breaker
2. One (1) complete set of auxiliary and main draw-out contacts for 15 kV circuit breaker
3. One (1) closing coil for 15 kV ac circuit breaker
4. One (1) spring charging motor for 15 kV ac circuit breaker
5. One (1) trip coil for 15 kV ac circuit breaker
6. Two (2) closing coils for dc circuit breakers
7. Two (2) trip coils for dc circuit breakers
8. Two (2) spring charging motors for dc circuit breakers
9. One (1) complete set of all types of current limiting fuses
10. Three (3) rectifier power diodes and fuses
11. Three (3) complete sets of auxiliary contacts
12. One (1) complete set of main contacts for dc circuit breaker
13. Two (2) complete sets of each type of control fuses

#### 4.1.11 Warranty

A. Warranty

1. The Contractor shall provide warranty of at least twenty four (24) months after MTS date of final acceptance of the traction power substations following successful commissioning. The warranty shall include provisions for diagnostic testing and repair and/or replacement of failed equipment.

2. The Contractor shall extend any warranty from a subcontractor or supplier that exceeds the above warranty period.

B. Warranty Work

1. The Contractor is responsible for all warranty-covered repair work during the warranty period.
2. The Contractor shall provide at its own expense all spare parts, tools, and labor required for repairs. When warranty repairs are required, MTS and the Contractor shall agree on the most appropriate remedy to be performed within seven (7) calendar days. If the Contractor fails to remedy any failure or defect within a reasonable time, MTS shall have the right to replace, repair, or otherwise remedy the failure or defect at the Contractor's expense.
2. The Contractor shall reimburse MTS for all expenses for such repair work, including materials and labor, within sixty (60) calendar days of receipt of warranty claim.

C. Warranty on Repaired or Replaced Parts

Any materials, parts or components which are used for replacement under the initial warranty period shall be warranted again for the total original warranty period of the replaced particular material, part or component.

D. Systematic Failures

1. In the event that, during the warranty period, repairs or modifications necessitated by defective design, material, or workmanship occur to an extent in excess of ten (10%) percent of the components used for the same function in the same assembly or subsystem purchased under this Contract, Contractor shall promptly furnish all necessary labor and material to effect such repairs and modifications for every substation delivered under the Contract under the terms and conditions outlined, including system in which the item has not yet failed.
2. When requested by MTS, the Contractor will be required to provide a written failure analysis report for defective products supplied under this Contract and which occurred during the warranty period. The report shall be received by MTS within forty five (45) calendar days from the date of request.

4.1.12 Utility Interface

- A. The specifications and drawings only indicate the general requirements of the local utility (SDG&E). Contractor shall obtain from and coordinate all utility requirements with SDG&E through MTS to ensure that all necessary requirements of the utility are complied with in the manufacture of the substations, especially the metering cubicle and associated PT's & CT's requirements. All drawings must be approved & signed by SDG&E before manufacture.
- B. The utility system incoming service will be 12.0 kV nominal, 3-phase, 3- wire, 60 Hz, solidly grounded at the source. The substation equipment shall operate properly when subject to utility voltage regulation of minus five (5%) percent to plus five (5%) percent of nominal. The maximum utility fault level in the power company's 12 kV system is 500 MVA. Prior to energization of the substation, set the transformer tap in accordance with the voltage regulation provided by the utility at the time.

- C. Contractor to confirm the grounding method and conform to the type provided by the utility at the substation site.
- D. The utility will provide cabling to the interface point, which is the line side of the 15 kV circuit breaker. Provide deadbreak elbow connectors suitable for connection between the SDG&E incoming cables to the copper bus.
- E. The utility will make the connection at each interface point.
- F. The utility will provide and install its metering equipment, including current and potential transformers, at each traction power substation as indicated in the Contract. Contractor shall provide and manufacture enclosures conforming to the utility's requirements to accommodate all metering equipment.

#### 4.1.13 Nameplates

- A. The size and legends of all nameplates shall be submitted to MTS for approval. Each switchgear assembly, transformer unit, rectifier unit, circuit breaker unit, auxiliary unit, control panel, panel-mounted and auxiliary device shall be provided with a nameplate for proper identification. Similarly, nameplates shall be provided for all internally-mounted devices such as fuses, capacitors, and resistors.
- B. Nameplates identifying major equipment shall have lettering one (1) inch high (minimum). Where rear access is provided, two (2) nameplates shall be furnished, one on the front and one on the rear of the equipment.
- C. Nameplates identifying ac and dc circuit breakers shall have lettering one inch high (minimum). The inscription shall include circuit breaker number and service. One (1) nameplate shall be provided on the front, and one on the rear of each unit.
- D. Nameplates for relays, meters, control and instrument switches, fuses and auxiliary devices shall have 0.125 inch (minimum) lettering. For protective and auxiliary relays, the nameplate inscription shall include the device number, and function. Nameplates for fuses shall indicate fuse rating, polarity, and circuit identification.
- E. Nameplates identifying the substation shall be mounted next to each entry door. The nameplate shall have three (3) inch high lettering with the inscription: "To be provided later on".
- F. All nameplates inside the substation shall be laminated, three-ply plastic, with dull white surface and black core. All exposed edges shall be beveled. Nameplates shall be fastened with stainless steel screws. Use of self-tapping screws or adhesives will not be permitted. All the nameplates for exterior of the substations shall be stainless steel, 0.125 inch thick minimum, secured by stainless steel screws or an approved material.

#### 4.1.14 Ambient Conditions

The substations and other equipment shall be capable of operating satisfactorily in the environment as follows:

- A. CLIMATE - The greater San Diego area climate is considered to be mild in temperature and humidity
- B. ELEVATION - 0 to 400 ft.
- C. HUMIDITY - 5 to 100%.
- D. PRECIPITATION - 11 in. annually, 1 in./hr.
- E. AMBIENT TEMPERATURE 104°F
  - 1. Lowest recorded: 20°F
  - 2. Design for: 115°F
- F. ICE LOADING - None.
- G. LIGHTNING (Isokeraunic level) – 5

4.1.15 Seismic Conditions

- A. Enclosures and equipment will be located at sites that will be subjected to seismic events. Seismic forces for design of the substation enclosures and for equipment anchorage shall be in accordance with requirements of the International Building Code (IBC) 2009 Edition and California Building Code (CBC) 2010 Edition.
- B. Contractor shall submit calculations to show compliance with the above requirements prior to fabrication. Submittals shall be signed and sealed by a Registered Professional Structural Engineer licensed in the State of California.

**4.2 MATERIALS**

4.2.1 General

- A. All materials and equipment shall conform to the provisions of Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications, all applicable codes and standards, and these procurement specifications.
- B. All materials and equipment for installation of traction power substation systems shall be the products of manufacturers regularly engaged in the production of such material and equipment and shall be the manufacturer's latest design.
- C. Equipment Interchangeability - Similar equipment shall be of the same design and manufacture. Parts shall be interchangeable between similar equipment.
- D. Substation Equipment. Equipment and materials furnished as part of substation are to include the following major items:
  - 1. Substation enclosure
  - 2. AC switchgear
  - 3. Transformer-rectifier unit
  - 4. DC switchgear
  - 5. Transfer trip

6. Emergency shutdown switches
7. Battery system
8. Station service equipment Ac and Dc power panels (UL Listed equipment)
9. Supervisory Control and Data Acquisition
10. Local Annunciator and Human Machine Interface
11. Fire alarm and detection system (UL Listed equipment)
12. Ventilation system
13. Lighting system

#### 4.2.2 Substation Enclosure

##### A. Enclosure Type

Enclosure shall be a totally integrated weatherproof unit to house the indicated traction power substation equipment. The enclosure shall provide a dry, condensation-free, stable internal ambient temperature environment. Enclosure shall be of Type II one hour fire-resistive construction and has a Group B, Division 4 occupancy classification in accordance with IBC requirements.

Enclosure shall have wall panels to allow removal of major equipment into and out of the TPSS enclosure.

##### B. Design Criteria

1. Structural Loadings - The enclosure shall be engineered to withstand a vertical line roof loading of thirty (30) lbs/ft, a wind loading of twenty five (25) lbs.ft, seismic loading as described in Section 4.1.15 "Seismic Requirements", and the stresses caused during transportation. Doors, walls, and roof panels shall be reinforced by braces, stiffeners, and/or structural members to provide a rigid module. Deflection under the indicated loadings shall not exceed 1/4 inch per 10 feet of span. Supports, fasteners, structural insulators, and anchorages shall resist seismic loadings as specified in Section 4.1.15 "Seismic Requirements" and shall be designed in accordance with recommendations in IEEE 693.
2. Configurations - The substation enclosures for 2000 kW and 1500 kW TPSSs inside base dimensions shall be designed to accommodate the substation equipment furnished with optimum space utilization as indicated on the Contract Drawings. Interior working spaces and clearances shall comply with latest NFPA, Article 110, both in size and arrangement.
3. Ventilation
  - a. The enclosure shall be positive pressure ventilated. Ventilation louvers shall prevent the entry of leaves or paper. Inlet air filters shall be installed to minimize dust accumulation within the substation. Ventilation openings shall comply with the CBC occupancy classification.

- b. Ventilation system design and materials shall comply with NFPA 90A, and shall be based on the following conditions:
1. Substation operating at one hundred fifty (150%) percent of rated capacity
  2. Outside air temperature is 115 degrees F
  3. Inside air temperature as required to ensure that all the equipment shall be capable of the specified performance for sustained periods at the maximum air ambient temperature which will be attained during the overload period
  4. Provide an interior air temperature indicator with field adjustable alarm contact, which shall initiate local and future remote supervisory annunciation
  5. Lighting - Interior illumination level for working space areas shall not be less than thirty (30) foot candles at thirty two (32) inches above the floor. Emergency lighting shall provide a minimum illumination level of five (5) feet candle at floor level of working spaces
  6. Weatherproofing - Doors, joints, walls, roof, floor, vents, and louvers shall be rainproof under conditions of fifty five (55) miles per hour winds from any direction
  7. Metal components of the enclosure shall be grounded

C. Enclosure Shell

The enclosure, including doors, shall be constructed of not less than No. 14 gauge sheet steel mounted on a structural steel base frame to permit jacking, rolling, and skidding. Removable lifting lugs shall be provided on the base to lift each fully equipped assembly or module. Structural steel shall have a minimum allowable yield as specified in ASTM A36. Roof and wall panel steel shall have a minimum allowable yield as specified in ASTM A446 for Grade D. Ground pads shall be welded to enclosure base at four locations.

D. Door and Removable Panels

1. The substation shall have two entry doors locations as indicated on Contract Drawings. Doors shall be equipped with three-point crashbar safety latches to permit opening from within under all conditions. The latches shall have taper-proof locks. Entry doors shall be keyed alike. Unique key shall be provided for substation with provision for re-keying by the Authority after energization. Door closers shall be provided and door stops furnished to hold the door in the open position.
2. Hinged exterior access panels, with three-point latches and padlocking lugs, shall be provided behind equipment requiring access for cable makeup or maintenance as indicated on the Contract Drawings.

## E. Finish

The galvanized enclosure shall be finished in accordance with Section 59-1, 59 (General), 59-2 (Painting Structural Steel), and 59-3 (Painting Galvanized Surfaces), of the Standard Specifications.

The floor finish shall be gray lacquer providing a skid-resistant surface.

The interior walls and ceiling shall be white.

The exterior walls and roof shall be ANSI 61.

## F. Insulation

## 1. Electrical Insulation

- a. Minimum dielectric strength of the insulating material for standoff insulating fasteners and flooring shall not be less than 300 volts/lmil. Floor insulation thickness shall be a minimum of 1/4 of an inch.
- b. Entire floor shall be insulated.
- c. The substation walls behind and to the sides of the dc equipment enclosures shall be insulated with flame resistant insulating material.
- d. Insulation system design shall protect against any accidental contact between dc equipment enclosures and grounded metal surfaces.

2. Acoustical Insulation - The maximum permitted continuous noise level produced by the equipment located within the substation, as measured outward at a distance of one foot from any point of the substation building exterior surface, shall not exceed sixty five (65) dBA when the substation is operating at its rated kW output. Material used for insulation shall have a noise reduction coefficient of at least 0.6.

3. Insulating material shall be flame resistant and, when exposed to flames or electrical arcing, shall not produce gases or products of combustion which are harmful to personnel or the surrounding equipment.

## G. Interior Electrical Work

1. AC Distribution Panelboard - Provide AC distribution panelboard single phase, 3-wire, 120/240 volt for loads as indicated plus 20 percent spare I-pole breakers. Panel shall be UL listed.
2. Convenience Outlets - Provide GFI duplex, 20 ampere, 120 volt single-phase outlets near each entry door.
3. Lighting
  - a. Provide interior fluorescent lighting controlled by flush-mounted 3-way switches near each entry door.
  - b. Provide interior emergency lighting. One (1) emergency lighting fixture shall be located above each entry door. Emergency lighting fixtures shall have a self-contained battery and inverter unit which is capable of providing four (4) hours of illumination in the absence of 120 volt ac power.



- c. Provide exterior lighting as indicated.
  - d. Provide exterior blue light for alarm indication.
4. Wiring - Provide required internal wiring for substation equipment interconnections and enclosure interior electrical work. Wiring shall be protected from mechanical injury. Any wiring exceeding 600V shall be physically protected from personnel contact by suitable via barriers or conduit.
- a. Switchgear, transformer, and rectifier secondary and control wiring (low voltage) shall be minimum # 14 AWG, stranded copper conductors, type SIS insulation. High-voltage secondary and control wiring to be FEP insulated. Neatly lace and properly support wiring, use of double sided tape for wiring supports is not acceptable. Splice will not be permitted in any wiring. Isolate control and instrument wiring from high-voltage compartments and keep readily accessible. AC and DC control wiring shall be routed in separate raceways if of different voltage class insulation within and outside switchgear in the substation enclosure.
  - b. Protect control wiring by a suitable raceway open to the side or top, not from the bottom.
  - c. Make connections only at terminals on the devices, on terminal blocks, or the ground bus. No splices or taps are allowed between these terminal points. Make connections for wiring using ring-type compression connector with insulated compression sleeves. Have the insulated sleeve firmly grip the wire insulation, and the metallic connector firmly grip the strands of the conductors. Connect all control, metering, and relay circuits requiring external connections, and all unused terminals on auxiliary contacts, devices, relays, instrument transformers and control switches, to conveniently located terminal blocks having washer head screw-type terminals, circuit marking strips, and phenolic-laminated dust covers. Provide shorting-type terminal blocks for current transformer connections. Bring out all 650 VDC circuits to separate terminal blocks with a special cover to separate and specially guard opposite polarities. Provide separate terminal blocks for ac and dc control circuits if circuits are of different insulation classes. Provide a minimum of ten (10%) percent spare terminals, but no less than four (4) terminals, on each terminal block.
  - d. Provide terminal blocks with marking strips for wire identification. Identify all internal wiring with the Contractor's wire number at each termination indicating location of the beginning and final termination by means of a suitable plastic sleeve of yellow (for 1 kV-2kV) or white (for 24V-600V) PVC with machine-printed black marking on a matte surface. Tags relying upon adhesive or taped-on markers will not be acceptable. Provide identification on the terminal blocks for reconnection of control circuits disconnected to meet shipping requirements. Obtain MTS approval for the marking strips.

- e. Install and connect all control and instrument wiring, including all electrical interlocks and inter-compartment wiring, as required for proper operation and control. Design and install control wiring so that trouble in one (1) functional circuit cannot be communicated to the control wiring of another functional circuit.
- f. Bring out all secondary leads of each current transformer, and each potential transformer, to individual test block.

#### H. Ventilation

- 1. Fan assisted ventilation shall be provided and automatically operate when interior ambient temperature exceeds above the set temperature controller limit to assure temperature within the substation enclosure is maintained not to exceed equipment temperature design limits. Engineering calculations for sizing the ventilator units with positive pressure within the TPSS enclosure shall be based on the proper dissipation of the heat generated by the substation equipment. The calculations shall be submitted to MTS for approval.
- 2. Hooded louvers with dust filters shall be provided as required to protect against driving rain and infiltration of dust. Filters shall be removable and cleanable, with the type subject to MTS' approval.
- 3. Secure fans to the substation enclosure by the use of vibration dampening fasteners.
- 4. Do not locate fans directly over the transformer and rectifier. All roof openings for exhaust fans shall be water-tight.
- 5. A manual override switch shall be provided so maintenance personnel can turn on fans upon entering the enclosure.
- 6. Fans shall meet AMCA standards and shall be equipped with barometric relief dampers and throwaway filters.
- 7. Climatizing equipment such as electric heaters, shall be provided to maintain the specified performance and to prevent condensation.

#### I. Fire Alarm and Detection System

- 1. Fire Alarm System
  - a. Provide a proprietary fire detection signaling system within the substation enclosure in accordance with NFPA 72D. Two power sources (main and standby) shall be provided for equipment essential to operation of the system, using dedicated branch circuits clearly marked as "FIRE ALARM CIRCUIT CONTROL". Power supplies shall be monitored locally and by future SCADA.
  - b. The system shall be monitored for the integrity of the interconnecting conductors and shall provide NFPA 72D, Style A performance.
  - c. Fire alarm control panel shall include means for testing and monitoring the system, and shall transmit the designated trouble signals and fire alarm annunciation. Control unit shall be equipped with devices for shutdown of ventilating fans.

- d. Trouble signals and fire alarm annunciation shall be wired to the supervisory control interface terminal blocks, as indicated, by a four-wire shielded circuit. Local audible indication is not required.

## 2. Fire Detection System

- a. Provide smoke sensing fire detectors in accordance with NFPA 72E. Location and spacing of detectors within the enclosure shall be established by the Contractor.
- b. Smoke detector shall be a UL listed, dual chamber, ionization type. Detector shall not be dry battery powered nor shall it contain radium. Sensitivity shall be adjustable.
- c. Fire/smoke detector device, FSD, when activated shall initiate a signal to operate device ESS-RX to activate the lockout relay, device 186 trip all the local 12 kV ac and 650 V dc circuit breakers.

## J. Fire Extinguishers

Two (2) portable type fire extinguishers shall be included in the substation. One (1) extinguisher each shall be located inside and adjacent to each of the two (2) exit doors. Fire extinguishers shall be portable type, C02 charged only, rated ten (10) lbs., 2A:10BC, and in accordance with NFPA 10 and UL 1093.

## K. Intrusion Detection and Alarm System

Provide an electromechanical intrusion detection device on each door and hinged access panel. Device shall be actuated upon opening of the door by any means and shall be manually deactivated from an interior control panel or on command from future SCADA system. Provide connections to the supervisory control interface terminal for future remote annunciation and reset control.

## L. Transfer Trip Circuits

All hardware required for the inter-TPSS transfer tripping of feeder circuit breakers including fiber-optic modems or converters shall be provided by the Contractor. Each TPSS shall be equipped with the necessary equipment for transfer tripping implementation. The transfer tripping will be through a dedicated fiber-optic cable to be installed in the future by others.

## M. Emergency Shutdown Switches

Provide one (1) emergency shutdown switch (ESS) inside and outside near each entry door to substation as indicated on the Contract Drawings. Mount the emergency shutdown switch in a flush box with a stainless steel lockable, hinged cover for outdoor application and without a stainless steel lockable, hinged cover for indoor application. Use the same lock as that used for the substation access door. Clearly label the switch buttons and protect or guard the button from accidental operation. Operation of any ESS at the substation shall trip and lock-out all local 12 kV ac and 650 V dc breakers through a lockout relay, device 186. Operation of the ESS shall also initiate local and future remote supervisory control annunciations.

N. Emergency Eye Wash

Provide a hand operated, portable, disposable, wall mounted eyewash unit. Product shall be in conformance with CAL OSHA Industrial Safety Orders and ANSI Z358.1 and shall be Haws Drinking Faucet Company Model 7602 or approved equal.

O. Warning Signs

Warning signs shall be installed on both interior and exterior of entry doors and hinged access panels. Warning signs shall be stainless steel, 0.125 inch thick minimum, secured by stainless steel vandal proof screws, red enamel background with engraved, white enamel-filled lettering. A suitable plastic sign will be considered subject to approval by MTS. The warning signs shall be submitted to MTS for approval. The signs shall include a lightning bolt symbol and lettering as follows:

1. First line - DANGER  
Second line - HIGH VOLTAGE/QUALIFIED PERSONNEL ONLY
2. Interior warnings shall be provided with inscriptions as recommended by the Contractor and approved by MTS. Interior signs shall be similar in materials and finish to exterior signs.

P. Miscellaneous Equipment

Furnish miscellaneous equipment as indicated in the Contract or specified herein including hinged work table and plan holder as approved by MTS. Work table to be folding type with 1- 1/2" solid wood top at least 30" X 72" with heavy-duty hinges and chains as approved by MTS.

Q. Special Tools, Templates, and Test Equipment

The Contractor shall furnish all special tools, required for the operation and maintenance of all equipment furnished under this Contract. Special tools are unique to substation equipment, not commercially available, proprietary equipment required to maintain, service and operate the TPSS. The Contractor shall furnish three (3) sets of special tools. This equipment shall be included in the Contract price paid for the substations, and no additional compensation will be allowed. The Contractor shall submit a list of special tools, gauges, and templates required herein to MTS for approval.

1. General Special Tools and Equipment. - General special tools and equipment shall include but not be limited to special relay tools, extension cords for relays, test blocks, racking handles, manual closing handles, adjustment tools and gauges, and specialized test equipment for proper operation and maintenance of the substation.
2. Laptops – The Contractor shall furnish three (3) laptop computers which meet the following requirements:
  - Latest Windows operating system
  - Minimum two hundred fifty (250) GB hard drive
  - Ready for wireless communications and communication ports as needed, including USB ports

- Loaded with all software required for maintenance of all relays and PLCs, and troubleshooting inter-device communications. Including all license for firmware, if needed
- Equipped with all accessories needed for laptops use, such as batteries, chargers, cables, carrying bag, etc

#### 4.2.3 Electrical Metallic Tubing (EMT)

- A. Use EMT for indoor conduits.
- B. ANSI C80.3 and UL 797; lightweight thinwall conduit, rigid steel, electro-galvanized and enameled on the inside; "Allied E-Z Pull", "X-Duct Jr.," "GE EMT," "Electro-unit," or equal.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel, compression type. Setscrew or crimp-on type fittings are not acceptable.
- D. Connectors: Insulated throat type, Thomas and Betts, Appleton Electric Co. or equal.

#### 4.2.4 Anchors

- A. Expansion Anchors: FS FF-S-325, Interim Amendment 3, Group VIII, Type 1. Metal shall be ASTM A108 steel with electro-deposited zinc coating according to ASTM B633.
- B. Equipment Anchorages: Steel leveling plates, angles, and studs shall comply with ASTM A36, and shall be hot-dip galvanized in accordance with ASTM A153.

#### 4.2.5 Hangers and Supports

- A. Hanger Rods - ASTM A575 or ASTM A576. Threaded, hot-rolled steel, 3/8 inch diameter minimum with electro-deposited zinc coating, conforming to ASTM B633, Fe/Zn 5, Type III.
- B. Trapeze, Multiple Conduit Hangers:
  1. Fabricated of two (2) or more galvanized steel hanger rods, a steel channel horizontal member and U-bolts, clamps and other attachments necessary for securing hanger rods and conduits.
  2. Horizontal Member - Continuous slot galvanized metal channel single or double, as required.

#### 4.2.6 Low-Voltage Wire and Cable

- A. UL listed for the intended purpose.
- B. Conductors - Soft or annealed copper complying with ASTM 83.
  1. Control Circuits - Size No. 14 AWG, minimum, ASTM B8, Class B stranded, minimum.
  2. Wire that crosses hinge points shall be flexible Class C stranded.

- C. Insulation
  - 1. Control Circuits (except panel wiring) - NEC Type THW conforming to NEMA WC 5, or Type RHW conforming to NEMA WC 8.
  - 2. Flame-retardant, ozone-resistant, cross-linked polyolefin or ethylene propylene compound, with a minimum average thickness of twenty five (25) mils.
- D. Panel Wiring
  - 1. General - Each conductor shall be one continuous length from terminal to terminal with no splices or taps. The control wiring shall be so designed and installed that faults on power circuits cannot be communicated to the control wiring of that circuit or of another power circuit.
  - 2. Wiring 600 V and Below - Wiring for circuits with voltages 600V and below shall be NEC Type SIS or TBS. All wiring shall comply with UL flame retardant properties test.
- E. Color Coding of Conductors
  - 1. Color code of single-conductor 24V circuits control wires shall be blue with yellow tracer.
  - 2. Color of each pilot wire conductor pair shall be solid color coded by pigmentation of the conductor insulation.

#### 4.2.7 Cable Terminations

Terminations for Low-Voltage Wire and Cable: Terminal connections shall be UL listed and have capacity and insulation voltage ratings of not less than the ratings of the wire or cable terminated.

- 1. Terminals for No. 10 and smaller wire: Vinyl-insulated, electro-tinplated, electrolytic copper locking spade or ring type.
- 2. Terminals for No. 8 to No. 310 wire: Compression-type, tin-plated copper lug.
- 3. Terminals for No. 4/0 and larger wire: Long-barrel, tin-plated copper, compression-type, NEMA pads with two bolting holes in the pad.

#### 4.2.8 Wire Identification Markers

- A. Power Cable Identification Marker: Fungus and water-resistant, self-laminating vinyl, with opaque blank write-on section and transparent adhesive section to wrap around the cable and protect printing, similar to Brady, or approved equal.
- B. Wire Ties: Nylon strap with stainless steel locking barb and taper, black, ultraviolet ray resistant, or, in indoor applications, white.

#### 4.2.9 Terminal Blocks

- A. Terminal blocks shall comply with NEMA ICS 4 and UL 1059. Except where indicated otherwise, blocks shall have a minimum of twelve point terminals of the screw type with washer style head to accommodate terminals specified. Base and inter terminal barriers shall accommodate terminals for No. 8 AWG and smaller stranded copper wire connectors. The metallic parts shall be non-ferrous and corrosion resistant.
- B. Identification of terminal blocks and terminal points shall be alphanumeric with each terminal block having a unique identification.

- C. Each terminal block or terminal block group shall have at least twenty (20%) percent spare points.

4.2.10 High-Voltage AC Power Switchgear

- A. Switchgear

The ac power switchgear assembly shall comply with the requirements given in ANSI C37.20 for Metal-Clad Switchgear and NEMA SG 5, and the SDG&E service requirements. The ac switchgear assembly shall form a lineup of dead-front, freestanding cubicles of fully compartmental construction as indicated on the Contract Drawings. The indoor switchgear assembly shall include cable pull section, auxiliary power transformer section, bus transition section, draw-out circuit breaker, empty metering compartment, three phase bus and bus connections, and all other equipment and devices. The switchgear assembly shall receive power from SDG&E underground service originating from a pad mounted or pole mounted outdoor fused disconnect switch at 12 kV, 3- phase, 3- wire, 60 Hz.

- B. Ratings

The switchgear assembly shall have the following minimum ratings:

Nominal Operating Voltage, kV, rms	12
Rated Maximum Voltage, kV, rms	15
Frequency, Hz	60
Rated Insulation Levels:	
Power Frequency Withstand, kV, rms	36
Impulse Withstand, ( 1.2 x 50 microseconds), kV Crest	95
Rated Bus Continuous Current, A	1,200
Rated Momentary Current Withstand, kA, rms, minimum	39

- C. Structure

The indoor switchgear assembly shall consists of an incoming utility cable pull termination compartment for terminating the incoming high voltage cables entering from below, Ample space shall be provided for pulling and terminating incoming SDG&E cables in accordance with the latest edition of the SDG&E Service Guide, surge arresters, auxiliary compartment complete with draw-out primary fuses and a 12 kV - 240/120V, single phase, 60 Hz station service transformer adequately rated for the substations auxiliary electrical loads plus twenty five (25%) percent spare capacity and two (2) 12 kV - 120V potential transformers with draw-out primary fuses, a 12 kV main circuit breaker compartment, and utility metering compartment complete with potential transformers and current transformers to be provided and installed by SDG&E company unless with prior consent of SDG&E such CT's PT's are installed at the equipment manufacturer's shop subject to drawing approval by SDG&E. The structure shall be sufficiently rigid to support equipment under normal and short-circuit conditions.

#### D. Doors and Panels

Each compartment shall be provided with a separate hinged door for servicing without exposing circuits in adjacent compartments. Adequate provisions shall be made for the escape of compartment gases to the outside by means of louvered vent openings covered with grilles, and arranged in such a way that hot gases or other materials cannot be discharged in a manner hazardous to personnel should the vacuum bottle fail.

Hinged doors shall be provided for access to the utility termination compartment, utility metering compartment, auxiliary compartment, surge arresters, circuit breaker, and power cables as indicated on the Contract Drawings. A secondary enclosure shall be located above the auxiliary compartment and circuit breaker removable element and contain a hinged door upon which the necessary instruments, controls, and protective devices are mounted.

Relays, meters, instruments and secondary control devices shall be mounted on formed front-hinged access door, and provided with a handle, a three-point lockable latch, and stop to hold door in the open position. Equipment mounted on the panel shall be isolated by grounded metal barriers from all primary circuit elements.

Doors shall be formed of sheet steel and shall be properly reinforced against distortion by suitable flanges and stiffening members. Hinges shall be of a heavy-duty type.

Rear doors shall be locked with padlocks keyed to match locks on the existing substations. Front access shall be from inside the substation and rear access from outside the substation.

#### E. Circuit Breaker Compartment

1. Circuit breaker compartment shall be designed to house a removable-type circuit breaker element. Welded guide rails for positioning the circuit breaker shall be provided as an integral part of the compartment.
2. Automatic shutters shall be provided in the compartment to prevent accidental contact with the stationary primary disconnecting contacts when the circuit breaker element is withdrawn from the CONNECTED position.
3. A ground bus shall extend into the compartment to automatically ground the circuit breaker frame in the CONNECTED and TEST positions. The ground bus shall maintain grounding of the circuit breaker frame during the transition between the two positions.
4. Means shall be provided for positively holding the circuit breaker in place when it is in either the CONNECTED or TEST position within the compartment. Mechanical interlocks shall also prevent movement of a closed circuit breaker to or from any position within the compartment, and prevent closing of the circuit breaker within the compartment unless it is in the CONNECTED or TEST position. Provision shall be made for padlocking the circuit breaker removable element in a fully isolated position within the compartment by means of a 1/4 - in. diameter by 1-in. shackle padlock.
5. Circuit breaker compartments shall permit the interchange of circuit breaker removable elements of the same type and rating.



F. Buses and Connections

1. Main Bus

The main three-phase bus shall be made of copper, and be fully insulated over its entire length with flame-retardant, nonhygroscopic track-resistant insulation. Buses shall have silver or tinplated contact surfaces at joints and terminations.

The continuous current rating of all main bus and circuit breaker connections shall be at least six hundred (600) amperes. The main bus and connections shall be braced to withstand the mechanical stresses associated with rated short-circuit momentary currents without deformation or damage to supports.

2. Ground Bus

A copper ground bus, not less than 2" x ¼" inch shall extend the length of the switchgear sections with all bolted joints tinned or silvered. All joints in the ground bus shall be made with a minimum of two (2) bolts.

3. Control Power

a. A 125 V dc control power bus shall be provided along the entire switchgear assembly for circuit breaker operation. Control power for the switchgear will be obtained from the control power battery and accessories specified.

b. Provide separate MCB for each control circuit at the circuit breaker compartment. The device shall effectively isolate the operating mechanism from the control power bus.

c. The bus shall run in a protective raceway.

4. AC Control Bus

A 120 V ac, single phase, two-wire, 60 Hz dedicated feed shall supply each switchgear assembly. The bus shall be terminated on a terminal block for connection of the 120 V ac feeder cables from the AC distribution panel branch circuit breaker. The bus shall run in a protective raceway.

5. Cable Termination

Each switchgear assembly shall have provision for high-voltage and low-voltage cables to enter from either above or below, as indicated.

High-voltage incoming line termination compartment shall have adequate space for mounting factory molded stress cones for terminating shielded single conductor cables furnished by SDG&E Company. Provisions for supporting, connecting, and grounding the cables shall be included.

Terminal connectors shall be furnished, and shall be the long barrel, double indentation, compression type, with two hole plated copper pad, and suitable for copper conductors, sized (TBD).

6. Space Heaters

Furnish each switchgear assembly with space heaters. Refer to Section 4.2.11J for the specification requirements of the space heaters.

G. Utility Metering Requirements

Provisions shall be made to house the utility metering equipment in a separate compartment such that no other equipment is accessible from within the compartment. Metering equipment shall be visible from outside the enclosure behind a hinged door secured with an SDG&E approved lockset. Shop drawings must be approved & signed off by SDG&E before manufacture.

H. High-Voltage Circuit Breaker

Circuit breaker shall comply with the requirements given in ANSI C37.04, C37.06, C37.09, C37.11, C37.20.2, C37.90, C39.1, C57.13, and NEMA SG 4.

1. Type and Rating

Type - The circuit breaker shall be indoor, three-pole, draw-out type with sealed vacuum, and motor-charged spring-operated mechanism. Circuit breakers shall be physically and electrically interchangeable.

Ratings - The circuit breaker shall be rated on a symmetrical current basis and have the following ratings and the required related capabilities as defined in ANSI C37.04:

Nominal MVA Class	500
Nominal Operating Voltage, kV, rms	12
Rated Maximum Voltage, kV, rms	15
Rated Continuous Current at 60 Hz, amperes, rms	1,200
Required Symmetrical Current Interrupting Capability at Nominal Operating Voltage, kiloamperes, rms, minimum	24
Required Closing and Latching Capability, kiloamperes, rms, minimum	39
Rated Interrupting Time, Cycles	3
Rated Permissible Tripping Delay, Seconds	2

2. Insulation Structure

Materials used for circuit breaker insulation shall be of types that are noncombustible, hydroscopic, and tracking resistant. The mechanical strength and physical characteristics of the insulation structure shall match the stresses imposed by the circuit breaker required closing and latching current capability.

### 3. Removable Assembly

The Circuit breaker removable elements shall be a screw type manual racking mechanism, non-ratcheting, for horizontal draw-out in the circuit breaker compartment capable of racking the movable element from the disconnected to connected position. Each circuit breaker to have a test position in which the breaker may be operated electrically and manually with the primary contacts disconnected and separated by a safe distance. When the breaker element is fully racked-out, both primary and secondary devices shall be opened and separated by a safe distance. Provide positive stops at the disconnected, test and connected positions to prevent over-travel between positions. Provide guides to ensure proper alignment during insertion or removal. Equip the circuit breaker with a truck or wheels, pull bar or handles, suitable for one (1) person breaker removal.

The removable element shall be provided with a fully interlocked, manually-operated racking mechanism to move the circuit breaker between the TEST and CONNECTED positions. A clearly visible position indicator shall be provided.

The circuit breaker removable element's primary disconnecting contacts shall be provided with heavy-duty, self-aligning, spring-loaded, silver-plated, copper disconnect fingers that engage with the line-and load-side stationary disconnecting contacts.

Current interruption shall be achieved in a sealed vacuum chamber for each phase. For evaluation of wear on the main contactover the life of the circuit breaker, contact erosion indicator shall be provided in each interrupter pole assembly.

The circuit breaker removable element frame shall be provided with a full front metal shield to prevent access to any live primary bus or load terminals when the circuit breaker is in the CONNECTED position.

Control wiring connections, from the circuit breaker compartment to the removable element shall have provisions for maintaining or automatically reinstating circuit continuity when the removable element is moved between the CONNECTED and TEST positions. Suitable means shall be provided for simultaneous disconnection of control wiring connections when the removable element is fully withdrawn from the compartment.

### 4. Operating Mechanism

The circuit breaker operating mechanism shall be of the motor-charged, spring-operated type. The design of the mechanism shall prevent overcharging and ensure that the release of store energy for closing the circuit breaker main contacts is prevented unless the mechanism has been fully charged. The circuit breaker shall be electrically and mechanically trip-free. The operating mechanism shall be non-pumping.

The spring-operated mechanism shall be automatically recharged within fifteen (15) seconds after each breaker closing operation. Mechanism shall have provisions for manually charging the closing springs.

A white indicating light shall be located in front of the circuit breaker enclosure to indicate the stored-energy closing mechanism is charged. An interlock shall be provided to prevent the complete withdrawal of the circuit breaker removable element from the stationary compartment when the mechanism is in a fully charged state; or alternatively, automatically discharge the stored energy when the removable element is withdrawn from or inserted into the compartment.

Each mechanism shall be provided with a four-digit non-resettable mechanical register type operation counter to record each circuit breaker close-open cycle.

The mechanism shall be provided with OPEN and CLOSE mechanical control pushbuttons, mounted on the removable element escutcheon plate, for test purposes and for use in emergency. The mechanism shall also be furnished with an easily readable mechanical position indicator, mounted on the removable element, to indicate the OPEN and CLOSED positions of the main moving contacts.

#### 5. Circuit Breaker Control

The circuit breaker shall be designed for local electrical operation at 125 V dc nominal control power supply.

The closing mechanism shall be provided with a spring release coil, anti-pump relay, and spring charging motor suitable for operation over a voltage range of ninety (90) to one hundred forty (140) volts. The tripping mechanism shall be provided with a shunt trip coil suitable for operation over a range of seventy (70) to one hundred forty (140) volts, unless otherwise approved by MTS. The circuit breaker unit shall be provided with a LOCAL – REMOTE control selector switch, device No. 143 (see Section 4.2.11.I), arranged for operation as follows:

- a. Local Position - Permit local close operation of the circuit breaker by its associated electrical control switch when the removable element is in the CONNECTED or TEST position.
- b. Remote Position - Permit future open and close operation of the circuit breaker from the SCADA equipment when the removable element is in the CONNECTED position.
- c. Local opening of the circuit breaker shall be permitted without the use of "Local-Remote" control selector switch, device No. 143.

Indicating lights shall be located on the front of the circuit breaker enclosure to indicate the state of the circuit breaker. A red light shall indicate a closed breaker and a green light shall indicate a tripped or open breaker.

Each circuit breaker shall be provided with a pistol-grip handle for resetting the circuit breaker after a trip. A mechanical trip indication shall be provided at the control switch.

6. Surge Arresters

MOV Type Intermediate Class- Surge arresters shall comply with the requirements of ANSI C62.1, and C62.2, as applicable.

Rating - Arrester ratings, kV, rms shall be suitable for use at SDG&E nominal service voltage of 12 kV, three-phase, 60 Hz and shall not exceed the following ratings:

Nominal Voltage kV	System Voltage rms	Arrester Rating-kV, rms	Maximum 0.5 microsec Discharge Arrester MCOV*	Voltage kV- Crest**
12		15	12.6	43.3

\* Maximum Continuous Operating Voltage

\*\* Equivalent of a fast front 5 kA current producing a voltage wave cresting in 0.5 microseconds

Arrangement:

Arrester pressure relief diaphragm shall be arranged in the enclosure so that the vent ports are directed away from all adjacent apparatus. Preferably the generated ionized gases during normal operation shall be vented to the outside of the switchgear enclosure.

Arrester ground terminals shall be directly connected to the switchgear main ground bus.

I. Electronic Power Monitor

The AC Switchgear shall be provided with the electronic power monitor as indicated on the Contract Drawings.

The monitor shall measure the real- time RMS value of the phase currents (amperes), phase and line voltages (volts), KW, KW demand, KWHR, KVARH, KVA, KVA demand, power factor and frequency.

Potential, current and control power transformers, shorting terminal block, fuse blocks, and fuses shall be completely installed and wired to the power meter in the switchgear.

The electronic power monitor shall be Eaton (formerly known as Cutler-Hammer) IQ DP -4000 or GE Multilin Power Quality Meter (PQM) or equal.

**Snapshot Data**

The unit shall be set to take snapshots of all readings at user-definable intervals and maintain them in nonvolatile memory. The snapshot data is read using serial communications output.

**Communications**

The power monitors shall include communication interface to enable remote access of the device data. The unit shall support RS-232 computer interface port located on the front panel and RS-485 communications.

**Software**

The power monitor shall be supplied with software capable of displaying data in a Windows base Personal Computer.

### Installation

The power monitor shall be install on the door of the 12kV feeder breaker cubicle and shall be wired back to the Annunciator SCADA cabinet.

#### J. Indicating Lights

Indicating lights on equipment enclosures shall be light-emitting diodes (LEDs). The LEDs shall be suitable for operating over the range of control voltages as indicated in these procurement specifications. The LEDs shall be mounted in compact, rugged sockets, and shall be of the bayonet base design. Lenses and bezels shall be rectangular in design. The design shall permit ready replacement of the LEDs from the front. Lenses shall permit convenient reading of the LEDs from oblique angles. LED brightness shall be adequate, using cluster LEDs if necessary, so that the indications are clear and unmistakable from a distance of fifteen (15) feet in daylight conditions, and seen at a thirty (30) degree angle. Overall dimensions of the lens and bezel shall not exceed 1-3/8 inch in width and height.

#### K. Lockout Relays, Devices 86 and 186

High-speed, multi-contact, hand reset, utility grade lockout relays shall be furnished. The lockout relays shall be provided with mechanical targets, which indicate whether the relays are in the tripped or reset position, and shall be reset by a pistol grip handle. The lockout relays shall be tripped from the protective relays as indicated on the Contract Drawings: and shall in turn trip and lockout the appropriate circuit breakers. All dielectric materials used in the relay shall be non-hygroscopic and flame-retardant. Contacts shall be rated 10A continuous, 20A for one (1) minute, and 30A closing capacity. Dielectric strength shall be at 1-second duration for 2500 V ac between independent circuits, and 1000 V ac between terminals of an open contact. Mechanical life shall be certified for not less than five (5) million operations. The lockout relays shall be provided with contacts for local and future remote supervisory control annunciations as indicated.

#### L. Instrument Transformers

Instrument transformers shall comply with ANSI (257.13 and NEMA EI 2. and the following additional requirements:

##### 1. Current Transformers

Current transformers shall be multi-ratio, epoxy-encapsulated, bushing type. The transformers shall be capable of withstanding the thermal and mechanical stresses imposed by currents equal to the specified switchgear momentary ratings. The transformers shall comply with the requirements for class C relaying and 0.3 class accuracy under the burdens imposed by the devices connected and ratios indicated.

Current transformers shall be installed in a compartment isolated from the circuit control panel and high-voltage equipment except for primary connection bushings. Current transformer and secondary wiring shall be protected from induced voltages by metallic shielding.

Current transformer secondary wiring terminal blocks shall have covers. Secondary wiring shall be run to readily identifiable terminal blocks in the

control compartment. Terminal blocks shall be furnished with integral shorting bars.

2. Bus Voltage Transformers

Voltage transformers shall be molded rubber or epoxy-encapsulated, with current limiting primary fuses.

Voltage transformers shall be Group 2 class for line-to-line or line-to-neutral connection as appropriate for insulation class required. Primary voltage ratings and transformation ratios shall be as indicated. Voltage transformers shall have accuracy rating of not less than 0.3 class at the standard burden imposed by the connected device.

M. Utility Company Metering

Provide a totally enclosed indoor cubicle as part of 12 kV switchgear assembly for San Diego Gas & Electric (SDG&E) service metering, as indicated on Contract Drawings. Shop drawing(s) must be signed & approved by SDG&E before manufacture.

The cubicle shall house instrument transformers and energy meters that will be furnished by SDG&E.

The cubicle shall be provided with a set of three-phase, 1200 A main bus and supports, complete with terminals and connections as required for coupling of SDG&E instrument transformers. Main bus shall have an insulation level equal to that of the switchgear bus and shall be fully integrated with and connected to the adjacent switchgear bus. Switchgear ground bus shall be extended into the metering cubicle.

Metering cubicles for the SDG&E 12 kV shall comply with the latest edition of the utility Service Guide.

N. Station Service Transformer

Provide a 12000 - 240/120V, single phase, 3-wire epoxy, cast coil type transformer of adequate capacity, complete with draw-out primary fuses of adequate rating. The KVA power rating shall be determined by the Contractor, and shall be adequate to meet the maximum calculated load with twenty five (25%) percent spare capacity. The epoxy type of adequate capacity, transformer shall be two winding, energy efficient with copper winding type, minimum Class F transformer with full capacity taps on the high voltage winding in accordance with NEMA ST- 20. Transformer shall have the core and coil completely resin-encapsulated and shall have a minimum 185 degrees C insulation with 115 degrees C rise.

O. Supervisory Control Requirements

Switchgear assembly shall be provided with SCADA interface circuits as specified in Section 4.2.13, "Supervisory Control and Data Acquisition (SCADA)".

P. Annunciator Panel Circuits

Circuits shall be provided between each switchgear assembly and the local annunciator panel for the alarm points indicated.

Q. Control Switches

All control and selector switches shall be of the rotary-type, suitable for switchboard mounting with a rectangular front panel engraved plate showing switch positions. Each switch contact shall be of the self-clearing, readily renewable-type, and shall have adequate insulation and contact surface.

R. Test Switches

Test switches shall be provided for all ammeters, voltmeters, and between all instrument transformers, both current and potential, and the protective relay supplied by these transformers. Each test switch group shall be capable of holding at least six (6) current positions and four (4) voltage positions. A convenient dust cover shall provide for covering the test switches and contact when they are not in use.

S. Nameplates and Markings

Switchgear Assemblies: Each switchgear assembly shall be furnished with a standard identification nameplate providing the following minimum information:

1. Manufacturer's name and address.
2. Switchgear type designation and identification reference.
3. Rated maximum voltage, insulation levels, bus continuous current, and momentary current.
4. Equipment: Each item of equipment furnished with the switchgear assemblies, including circuit breaker, and instrument transformers be furnished with a manufacturer's nameplate. Nameplates shall provide the manufacturer's name and address, equipment type and designation number, and the required rated electrical characteristics called for in the applicable ANSI and NEMA standards. Where equipment numbers have been assigned, they shall be shown.

4.2.11 DC Power Switchgear

A. General Requirements

1. The switchgear assemblies shall comply with the requirements of ANSI C37.20 and NEMA SG 5 and shall form a lineup of dead-front, freestanding, indoor sheet-steel enclosures. Enclosures shall be designed for high-resistance grounding system.
2. Each switchgear assembly shall include draw-out, single-pole, dc power circuit breakers, dc positive buses and bus connections, indicating lights, terminal blocks, protective and auxiliary relays, control circuitry, wiring, and all other devices necessary to make a complete and operable assembly.
3. The height of components, relays, and devices installed in or on the switchgear assembly, which require servicing, maintenance, or adjustment, shall be limited to six (6) feet six (6) inches above floor level. Such components, relays, and devices shall be accessible from the front of the lineup.
4. The switchgear shall serve as the control and protective equipment for the distribution of DC power to the light rail vehicles.



- B. Ratings – The switchgear assemblies shall have the following ratings and requirements:
1. Rated Voltage, volts – 650
  2. Maximum Operating Voltage - 800
  3. Rated Bus Continuous Current, rms amperes -As indicated
  4. Rated Bus Momentary Current, amperes (minimum) - 100,000
  5. Power Frequency Withstand Insulation Level, kV, rms, (min.) - 4.2
  6. The switchgear assembly shall be comprised of the number of circuit breakers as indicated on the Contract Drawings.
- C. Circuit Breaker Compartments
1. A separate metal-enclosed compartment shall be provided to house each draw-out type circuit breaker element. Racking rails for positioning the removable element shall be provided as an integral part of the compartment.
  2. Means shall be provided for positively holding the circuit breaker in place in the housing when the removable element is in the CONNECTED or TEST position. Interlocks shall be provided to prevent movement of a CLOSED circuit breaker to or from the CONNECTED position and to prevent electrical closing of the circuit breaker within the compartment except in the CONNECTED or TEST position.
  3. Each circuit breaker compartment shall be furnished with line-side and load-side, self-aligning, primary-disconnecting contacts. The devices shall be suitably shrouded or provided with automatic safety shutters to prevent accidental contact with live parts.
  4. Circuit breaker compartments shall only permit the interchange of circuit breaker removable elements of the same type and rating.
- D. Doors and Panels
1. Each circuit breaker compartment shall be furnished with a formed hinged door on the front of the structure to cover the compartment opening. The door shall be provided with a handle and lockable latch. Doorstops shall hold door in one hundred twenty (120) degrees open position and provide unhindered withdrawal of the circuit breaker removable element from the compartment. The rear of the structure containing each circuit breaker shall be provided with bolted or removable glastic panels or an equivalent insulated panel type inside the door behind each breaker compartment that when removed it is possible to access the feeder cables. In order to remove the panels, the feeders must be isolated from the line and the DC circuit breakers must be racked out.
  2. Relays, instruments, and control devices shall be mounted on formed hinged panels and furnished with handle and latch. A stop shall hold panel in open position at 120'.
  3. Removable, bolted lexan covers shall be furnished to provide access to the bus and feeder cabling compartments.

## E. Main Bus and Connections

1. A dc switchgear positive bus shall be furnished for the full length of the switchgear assembly, and shall be made of electrical grade copper. The bus and bus connections shall be of adequate strength to withstand thermal and mechanical stresses associated with short circuit currents as specified above.
2. The dc bus overload rating shall be coordinated with that of the rectifier unit without exceeding the permitted hottest-spot temperature rise.
3. Bus connections, including bus taps, shall be silver-plated. Each main bus joint shall have conductivity at least equal to that of the bus bar and each joint shall be constructed so that no loss of conductivity will occur during the life of the switchgear. Connections to the bus shall be bolted. The bolts shall be zinc dichromate or similarly coated, Grade #5 high-strength steel, and of sufficient number and size to provide solidly bolted connections.

## F. Control Power Bus

1. Dedicated 125 V dc control power to each control cubicle, with 2 kV ac insulation level, shall be furnished the full length of the switchgear assembly for circuit breaker control and operation. Control power for the switchgear will be provided from the control power battery and accessories as specified.
2. A double-pole, MCB, dc rated, shall be provided at each circuit breaker compartment. The device shall effectively isolate the operating mechanism from the control bus.
3. A control power voltage monitoring relay shall be provided, and connected to the load side terminals of each circuit breaker. Relay shall be set to drop out at 85 V or below and shall initiate local and future remote supervisory control annunciations.
4. AC control power supply with 2 kV ac insulation level shall be provided if required for operation of protective devices and voltage transducers. Solid state type inverters shall be used to achieve this requirement. A voltage monitoring relay shall be provided at each compartment requiring ac power supply, which shall initiate local and future remote supervisory control annunciations. Relay shall be set to drop out at eighty five (85%) percent of the nominal voltage level.

## G. Cable Terminations

Each switchgear assembly shall have adequate space for termination of power cables to feeder circuit breakers entering from below or above as indicated on the Contract Drawings. Necessary means for supporting and connecting the cables at the terminals shall be furnished. The cable entry cover plate shall be bolted to permit field drilling of holes for conduit entry.

## H. Local Control Switches

Local control switches shall have heavy-duty pistol grip handles and operation targets. Switch positions shall be TRIP-CLOSE with spring return to normal. OPEN and CLOSED position indicating lights shall be furnished. An illuminated GREEN light shall indicate circuit breaker in the OPEN position; RED shall indicate the CLOSED position.

## I. Control Selector Switch

Control selector switch shall have oval handle. Local - Remote positions shall be provided with position indicating light. A WHITE indicating light shall indicate when the switch is in the LOCAL position. A BLUE indicating light shall be provided which shall indicate when the switch is in the REMOTE position. Two (2) separate isolated contacts shall be furnished for each control selector switch: one (1) contact shall be used for future remote supervisory control indication of LOCAL position and the other contact shall be used for future remote supervisory control indication of REMOTE position, as indicated. One (1) control selector switch shall be provided for the entire TPSS AC and DC circuit breakers and shall be mounted on the AC switchgear breaker cubicle.

## J. Space Heaters

Each switchgear assembly shall be furnished with thermostatically controlled space heaters in the quantity and capacity required to maintain the temperature inside the specified equipment enclosures above any anticipated dew point temperatures for the ambient conditions. Space heaters shall be designed for continuous operation on 120 volt, 60 Hz. single phase power supply.

## K. DC Power Circuit Breakers

## 1. General Requirements

- a. Circuit breakers shall comply with the requirements given in ANSI C37.14, C37.16, and NEMA SG 3, and as specified herein.
- b. The low-voltage power circuit breakers shall be direct current, air-break, single-pole, high-speed, high speed/insulated frame, draw-out type. Circuit breakers shall be electrically operated, suitable for local and future remote supervisory controls and provided with trip devices specified.
- c. Circuit interruption arc chutes shall be suitable for bi-directional current flow and designed for positive interruption of all currents within the circuit breaker ratings. Arc chutes shall be capable of interrupting the required currents without the use of air puffer devices.

## 2. Ratings

Circuit breakers shall be certified for use on transit systems using an overhead contact system. Circuit breakers shall have the following minimum required capabilities, as defined in ANSI C37.14, and based on test values given in ANSI C37.16, Table 11.

- a. Rated Continuous Current, rms, amperes - As indicated
- b. Maximum Operating Voltage, volts - 800
- c. Power Frequency Withstand Insulation Level, kV, rms - 4.2
- d. Short-Time Current, average amperes - 30,000
- e. Rated Momentary and Peak Current, amperes, Test 'a' -100,000
- f. Sustained Current, average amperes - Test 'a' - 80,000

## 3. Insulated Frame Structure

Materials shall be noncombustible, non-hygroscopic and tracking resistant. The mechanical strength and physical characteristics of the insulation structure shall match the stresses imposed by circuit breaker required closing and latching current capability.

## 4. Removable Assembly

- a. The circuit breaker removable element shall be truck or cradle mounted with handles and shall be suitable for manual removal and insertion of the assembly out of and into the stationary compartment.
- b. The removable assembly shall be provided with a fully interlocked, manually operated racking mechanism to move the circuit breaker between the "TEST, "CONNECTED" and "REMOVED" positions. A clearly visible position indicator shall be provided.
- c. The circuit breaker primary disconnecting contacts shall be comprised of heavy-duty, self-aligning, spring-loaded, silver-plated, copper disconnect fingers that engage with the line- and load-side stationary disconnecting contacts tested to 600 operations.
- d. Circuit breaker control wiring connections between the removable element and stationary compartment shall have provisions for maintaining, or automatically reinstating, circuit continuity when the removable element is moved between the "CONNECTED" and "TEST positions within the compartment. Means shall be provided for simultaneous disconnection of control wiring connections when the removable element is moved to a disconnected position.

## 5. Operating Mechanism

- a. The circuit breaker magnetically actuated operating system shall function such that the solenoid is held in when the circuit breaker is in the closed position. Mechanism shall be mechanically and electrically trip-free.
- b. The operating mechanism shall be furnished with mechanical indicators to show the "OPEN" and "CLOSED" positions of the main moving contacts.
- c. Each mechanism shall be provided with a six (6) digit non-reset able register type operation counter to record each circuit breaker close/open cycle.
- d. Magnetic trip operating mechanism
  - i. Circuit breaker closing shall be by energization of the solenoid. The circuit breaker shall then be electrically held.
  - ii. The design of the mechanism shall prevent closing the circuit breaker unless sufficient control power is present.

- iii. Means shall be provided that will prevent movement of the circuit breaker removable element from the TEST to CONNECTED position, and from the TEST to REMOVED position without first mechanically and electrically de-energizing the solenoid actuator.
    - iv. A mechanical opening device shall be provided on the front of the removable element for use in emergencies.
  - e. Each main (cathode) circuit breaker closing mechanism shall be furnished with a unique key interlock coordinated with the associated rectifier negative disconnect switch. The interlock system shall prevent closing of the circuit breaker unless the disconnect switch is closed and shall prevent the opening of the disconnect switch unless the circuit breaker is open.
  - f. A minimum of five (5) spare, electrically isolated sets of reversible auxiliary contacts shall be provided, in addition to those required for the circuit breaker control circuit. All auxiliary contacts shall be operated by the breaker mechanism in both the "CONNECTED" and "TEST" positions. All auxiliary contacts, both in use and spare, shall be wired to terminal blocks on the structure through a secondary disconnecting device contacts.
- 6. Circuit Breaker Control
  - a. The circuit breakers shall be designed for local electrical operation at 125 V dc nominal control power supply.
  - b. The closing mechanism shall be suitable for operation over a voltage range of 110 to 140 V dc. The tripping mechanism shall automatically be activated upon interruption of the electrical holding circuit.
  - c. All circuit breaker units shall be controlled locally and remotely from a single LOCAL-REMOTE control selector switch, device 143S, arranged for operation as follows:
    - i. Local Position - Permits local open and close operation of the circuit breaker by its associated electrical control switch and enable the TPSS ac and dc circuit breakers to be tripped remotely (future), when the removable element is in either the "CONNECTED" or the "TEST" position. For the feeder circuit breakers, CLOSE operation in the connected position shall normally be performed through the automatic reclosing and load measurement devices specified.
    - ii. Remote Position - Permits open and close operation of the circuit breaker from the remote (future) supervisory control system when the removable element is in the "CONNECTED" position only. For feeder circuit breakers, "CLOSE" operation shall be performed only through the automatic reclosing and load measurement devices. While in the remote position, the circuit breaker control switch shall not be able to close the circuit breaker in the connected position. With device 143SS in the remote position, the circuit breaker shall be permitted to open with the circuit breaker control switch when the breaker is in the connected position.

- d. Indicating lights shall be located on the front of the circuit breaker enclosure to indicate the state of the circuit breaker. A red light shall indicate a closed breaker, a green light shall indicate a tripped or open breaker.
- e. Circuit breakers shall have provision for electrical interlocking of close control circuits with open position status of other associated switching devices, as indicated.

## 7. Relays

### a. General Requirements

- i. Protective relays shall be designed, constructed, and tested in accordance with the applicable provisions of ANSI C37.90 and EIA RS 443. Relay functional designations and circuits shall be as indicated on the Contract Drawings.
- ii. Relay circuits shall be furnished, wired, and connected as indicated on the Contract Drawings. Additional components such as auxiliary relays, isolating diodes, similar devices not shown in the drawings, but required for a complete installation shall be provided. Final setting of relaying systems will be established during integrated system tests in the field. Switchgear ground relaying shall be furnished with a low high resistance grounding system as indicated on the Contract Drawings.
- iii. Protective relays shall be semi-flush mounted, with integral disconnect connectors or other means for testing the relay in its case. The relays shall have dustproof cases with transparent covers, and LEDS with hand resets and seal-in units. Contacts and adjusting devices shall be readily visible, accessible, and adjustable from the relay front.
- iv. Devices (relays, indicating lights, and test plugs) shall be arranged so as to be conveniently accessible and easily visible. The grouping shall be neat, modular, and logical, with related functions in proximity.
- v. Devices shall be plumb and square with the lines of the panels and mounted as recommended by the manufacturer. Care shall be taken to avoid wiring congestion. All auxiliary devices shall match the general appearance as far as possible. All devices on the panel face shall be semi-flush mounted.
- vi. At a minimum, protective devices shall be provided as shown on the substation's meter and relay single line diagram drawing. Additional protective devices recommended by the Contractor or equipment manufacturers may be installed with MTS approval.
- vii. Auxiliary relays shall be provided where required or specified. Auxiliary relays shall be front accessible and provided with dustproof cases. Relays shall be surface mounted within the equipment control compartment and

provided with transparent dust covers. Relay contacts shall be rated for the intended duty and meet the performance characteristics indicated.

- viii. The Contractor shall furnish protective relay coordination curves and proposed settings, together with supporting calculations.
  - ix. Protective relays to have rustproof metal or high impact plastic rectangular cases, finished in dull black. Clapper type relays or auxiliary relays to be mounted on a fixed portion of the structure. Protective relays to be furnished with visible targets, a hand reset for the target, and seal-in units. Contacts and adjusting devices to be readily visible, accessible, and adjustable from front of relay. Relay to have silver-to-silver, positive closing contacts. All relays \*to conform to the applicable portions of ANSI C37.1.
- b. Rectifier and DC Switchgear Enclosures - High-Resistance Grounding System
- i. The rectifier and dc switchgear enclosures shall be insulated from the substation enclosure floor and any adjacent grounded metal work. Enclosure shall be single point grounded by means of an insulated #4/0 AWG copper conductor connected directly to the substation buried ground grid.
  - ii. When the rectifier or dc switchgear enclosure is grounded by breaching the insulation system between the structure or a failure within the relay has occurred being monitor by device No. 164MR. Relays shall have an adjustment range of 5-20 V dc and a maximum pickup time of ten (10) to two hundred fifty (250) milliseconds. When the rectifier or dc switchgear enclosure is alive due to a fault or leakage between the bus and structure, device No. 164R is activated. Relay shall have an adjustment range of 30-45 V dc and a maximum pickup time of ten (10) to one hundred (100) milliseconds. Device No. 164MR shall initiate local and future remote supervisory annunciations. Device No. 164R shall initiate local and future remote supervisory control annunciations, shall operate the trip lock-out relays, device Nos. 86 and 186 and initiate signals to trip and lockout the local substation ac circuit breaker, main dc circuit breaker and all dc feeder circuit breakers as indicated on the Contract Drawings.
  - iii. Control power supply for the relay, device Nos. 164MR/164R, shall be monitored by an undervoltage relay, device 127S1. This device shall initiate local and future remote supervisory control annunciations on failure of power supply.
  - iv. The grounding system relaying shall be designed to operate without damage when maximum system fault current flows to ground for the period of time required to clear the fault.

- v. Two (2) test pushbuttons shall be provided. One (1) test pushbutton shall be used to test device No. 164MR and the other test pushbutton shall be used to test device No. 164R.
  
- c. Substation DC Main (Cathode) Circuit Breaker Relay – The main (cathode) circuit breaker shall be furnished with a reverse current, instantaneous trip relay, Device No. 132 with a pickup setting of ten (10%) percent rated current or as approved by MTS. The main breaker reverse current relay shall operate the unit trip lockout relay, Device No. 86.
  
- d. Substation DC Feeder Circuit Breaker Relays
  - i. Each dc feeder circuit breaker shall be provided with a direct acting, bi-directional, instantaneous series over-current trip Device No. 176, adjustable from two hundred (200%) percent to four hundred (400%) percent of the breaker rating.
  
  - ii. Each dc feeder circuit breaker shall also be provided with a multi-function digital protective unit and controller. The multi-function digital protective unit shall provide the following protective, control and metering functions:
    - 1) Adjustable impulse or rate-of-rise over-current trip Device No. 150 capable of discriminating between remote short-circuit currents and inrush currents or starting of trains. Di/dt settings shall be adjustable in 1A/ms increments from 2 - 200A/ms. Di/dt duration settings shall be adjustable from 10 - 200ms in increments of 1 ms.
  
    - 2) Definite time overcurrent protection relay, device 151, providing adjustable overcurrent pickup settings from 100 - 20,000 amperes in 100A increments and time settings from zero (0) to three hundred twenty (320) seconds in one (1) second intervals.
  
    - 3) Maximum overcurrent protection, I<sub>max</sub>, shall initiate a trip signal for currents that exceed the pickup and delay setting. Pickup shall be adjustable from 500 - 20,000 amperes in 1A increments. Delay shall be adjustable from 0 - 100ms in 0.1 ms increments.
  
    - 4) Load measure and reclosure (LM&R) logic and control shall be an integral part of the digital protective unit. The load measure and reclosing control function shall:



- a) The load measuring and automatic reclosing cycle shall be initiated when either the associated feeder circuit breaker receives a CLOSE signal from the local control switch, or when the circuit breaker is tripped automatically by the feeder circuit protection. A "lockout" status of the dc lockout relay or a "sustained short circuit" indication from the load measuring program shall disable the load measuring and automatic reclosing cycle. A lockout signal shall be used to light the Amber light in front of the breaker cubicle control switch.
- b) Initiation of the load measuring cycle shall be preceded by an adjustable time delay of three (3) – thirty (30) seconds with an adjustment resolution of one (1) second. At the commencement of the load measurement cycle, a voltage sensing circuit shall determine whether voltage is present on the section.
- c) If the voltage measuring circuit detects voltage potential greater than an adjustable preset value, it shall reclose the circuit breaker immediately. Pickup adjustment range shall cover a minimum voltage for train operation of 390 V dc. The voltage sensing relay shall be provided with an integral voltmeter to monitor the voltage in the OCS continuously and to provide local and future remote supervisory control annunciations in case of the OCS is de-energized.
- d) If the voltage sensing circuit detects potential greater than an adjustable preset value on one (1) side of the dc feeder breaker and no potential on other side, the load measuring device shall be initiated. The load measuring devices shall make repeated load measurements at suitable adjustable time intervals. If any load measurement determines that no fault is present, automatic reclosing of the circuit breaker shall be initiated. A successful reclosure, with no subsequent automatic trip within five (5) seconds, shall complete the load measurement cycle and reset the devices to their initial state. The test time for each test shall be adjustable from three (3) – seventy (70) seconds and the test extension time shall be adjustable from ten (10) seconds. All adjustments shall be in one (1) second increments. The number of test cycles shall be adjustable from 1-8.

- e) If potential is detected on both sides of the feeder breaker that is lower than an adjustable preset value, the system shall lock out the circuit breaker.
- f) If no successful reclosure takes place within the test period, the automatic reclosing and load measuring system shall lock out as a "sustained short circuit", and initiate local and future remote supervisory control annunciations, until the circuit is reset by an OPEN signal from either the local or remote control station.
- g) The load measuring resistors shall be rated for repeated operation. The load-measuring devices shall operate only if the circuit breaker is in the CONNECTED position and shall be disconnected from the 650 V dc potential when the circuit breaker is in either the test or disconnected position.

The digital protective unit shall initiate a transfer trip with reclose signal for device functions 150, 151, 176 . The front panel of the device shall include an LCD display with membrane keypad for navigation of displayed parameters. The display shall provide information on the following operating values:

- Iact - The present time value of the output current of the circuit breaker
- Uact - The present time value of the output voltage of the circuit breaker
- Ithav - The average load value of the output current in the variable length time window. The length is user defined
- The device shall have an event memory that shall record the event ID, value, date and time of tripping events due to overload, maximum current, di/dt, and delta I. Event memory shall allow storage of up to one thousand (1,000) entries in ring buffer configuration
- The language of the display and the event log shall be user selectable between English and Spanish

- Information regarding breaker status and control shall be available via a Profibus serial communications link
  - The multi-function digital protective unit and controller shall be a field proven design and shall have been satisfactorily installed in a transit system for a minimum of five (5) years
- iii. Transfer Trip Relay- Each dc feeder circuit breaker shall be provided with a bi-directional transfer- trip relay, to transfer trip the circuit breakers located on each end of an OCS section.
- 1) Transfer trip functions and characteristics shall be as follows:
  - 2) Transfer trip operation shall be initiated by relay device Nos. 150, 151, and 176. Contacts of these relays shall activate a transfer trip pilot wire relay, device No. 185, which shall initiate tripping of the associated circuit breaker at the local and adjacent substation through its transfer trip relay. Transfer trip disable switch shall be provided for purposes of disabling the transfer trip function and to initiate local and future remote supervisory control annunciations.
  - 3) Each transfer trip circuit between adjacent substations shall be supervised continuously by a low-current auxiliary relay, furnished with contacts for local and future remote supervisory annunciations. This device shall be provided at the receiving end of each transfer trip circuit and means shall be furnished at the sending end to adjust the value of supervision current in the circuit.
  - 4) The transfer trip devices shall be designed for operating over a fiber optic cable.
- iv. DC Feeder Cable Voltage Monitoring Relay
- 1) General. The Contractor shall furnish and install feeder cable voltage monitoring relay which shall be used to indicate whether the cable is energized or not. The voltage monitoring relay shall have one terminal connected to the load side of the feeder circuit breaker through an isolating transducer.
  - 2) Operation. The voltage monitoring relay shall pick up at a minimum voltage level of 300 Vdc and shall maintain the "OCS Energized" status until the voltage level drops to below eighty (80%) to ninety (90%) percent of the pickup level, subject to approval by MTS. The relay shall meet the following criteria:

- a) Relay output shall consist of several form-c dry contacts for local and future remote supervisory control annunciations of the status of the monitored feeder section, as shown on Contract Drawings.
- b) Relay shall be rated for a minimum operating voltage level of 125 Vdc.
- c) Relay shall be properly coordinated and function flawlessly with circuit protection devices.
- d) The relay shall be of a substantially similar design or design derivative of a relay proven in service in traction power substations for at least three (3) years. Relays shall conform to the applicable section ANSI C37.1.
- e) For relays associated with transformer-rectifier unit, refer to Section 4.2.12 "Transformer-Rectifier Unit".

e. Instruments, Meters and Switches

- i) Digital control units shall display circuit breaker current and voltages on both circuit breaker poles.
  - 1) Current displays shall show currents up to four hundred fifty (450%) percent of rated current, minimum.
  - 2) "Voltage displays shall show voltages up to 1,000 dc minimum and shall be equipped with voltage converter, device 96V for remote voltage monitoring to the Central Control Facility via the SCADA. The unit shall be set to take snapshots of all readings at user-definable intervals and maintain in nonvolatile memory. The snapshot data shall be communicated to the Programmable Logic Controller (PLC) via the serial communications output port.

The voltage monitor shall be supplied with software capable of displaying data in a Windows base Personal Computer.

The voltage monitor shall be installed on the door of each DC feed circuit breaker cubicle and shall be wired back to the Annunciator SCADA cabinet.

- ii) Transducer shunts shall comply with IEEE 316 and have a rated output of 60 mV.

## iii) Control Switches

All control switches to be rotary type, suitable for switchboard mounting with a rectangular, front-panel engraved escutcheon plate showing switch positions. Each switch contact to be self cleaning, readily renewable type, and have insulation and contact surface. All breaker control switches to be spring-return-to normal and have pistol grip handles or approved equal, and provided with mechanical indicating devices to shown the last operation of the switch. All instrument selector switches to have round knurled handles.

## iv) Common Supervisory Control Selector Switch Provide a single supervisory control selector switch wired to enable placing all ac and dc circuit breakers in remote to permit control from SCADA. Wire the local control switches so that it is possible to locally and remotely trip each breaker regardless of the position of the remote on/off switch. Provide oval selector switch handles with on – off positions.

## f. Annunciator Panel Circuits

Circuits shall be provided between each switchgear assembly and the local annunciator panel for the alarm points as indicated.

## g. Switchgear Maintenance Accessories

Contractor to furnish a combination ac/dc circuit breaker test cabinet containing umbilical cords and stab connectors for testing draw-out members for the 12kV and the 800 Vdc, circuit breakers furnished under this Contract. Contractor to provide the cabinet with trip and close buttons wired to 125 V dc supply.

4.2.12 Transformer-Rectifier Unit

## A. Equipment

1. The transformer-rectifier unit consists of a rectifier transformer and a rectifier as indicated in the Contract. Provide the unit complete with all equipment from the high voltage buswork entrance on the transformer to the ac cable connection to the rectifier unit and from the rectifier unit bus connection to the dc switchgear. Except as otherwise indicated, conform to ANSI C34.2, C57.12.01, C57.18 and C57.91, NEMA R1-9 and NEMA TRI and EIA RS-282 where applicable.
2. Ratings - Provide transformer-rectifier unit rated 1,500 kW or 2,000 kW at the output terminals. The transformer-rectifier unit shall be 12 pulse, designed for rectifier circuit No. 31 of ANSI C34.2. Design the equipment to meet the duty cycle indicated in NEMA RI-9 for extra heavy-duty traction service. Provide the transformer-rectifier unit with the following additional characteristics:
  - a. Overall Efficiency of the transformer-rectifier unit: Greater than ninety eight (98%) percent at full load continuous rating with normal ac rated supply voltage.

- b. Displacement power factor of the transformer-rectifier assembly: A value of 0.950 or greater from twenty five (25%) percent to full load at rated ac voltage.
- c. Regulation. With the nominal voltage maintained at the transformer primary and the transformer set at the rated voltage tap, the transformer-rectifier unit total regulation for the dc bus voltage shall be as follows:

<u>Loading</u>	<u>DC Bus Voltage Output</u>
Light Load (1 percent)	690 V
Full Load (100 percent)	660 V

Voltage regulation from light load to at least three hundred fifty (350%) percent load must not exceed four and a half (4.5%) percent. No load voltage to be limited to 715 V dc. Submit voltage regulation calculations prior to fabrication for MTS' review and approval.

- 3. Audible Noise - The transformer noise not to exceed the allowable audible sound levels specified in NEMA TRI.
- 4. Transients - Provide protection against transient surge voltages. If fuses are used in suppression networks, they are to be monitored by visual indicators and equipped with devices capable of monitoring by local and future remote supervisory control annunciations.

B. Rectifier Transformer

- 1. The rectifier transformer shall comply with the requirements of ANSI C57.18.01 and NEMA TRI. Each rectifier transformer to be solid cast coil or resin encapsulated type, self-cooled, 3-phase, 60 Hz, three winding, suitable for indoor service for the duty cycles indicated. Each cast coil shall be cast under vacuum to ensure complete, void-free epoxy resin impregnation throughout the insulation system. Coils for resin encapsulated type transformers shall be fabricated using the multi-cycle vacuum pressure encapsulation (VPE) process. Resin encapsulated type transformer manufactured with vacuum pressure impregnation (VPI) followed by encapsulation with a polyester resin mixture are also acceptable.
  - a. Winding Connections - High and low voltage windings to be copper. Winding insulation to be 185 degrees C (Class F). High-voltage windings to be three (3) phase, 60 Hz, 15 kV Class with a minimum BIL of 95 kV. High and low voltage winding connectors to ac switchgear and the rectifier to be made by copper bus with braided copper connections on the transformer end to reduce bus vibration.
  - b. Temperature Limits - The hottest-spot temperature of transformer to not exceed 185 degrees C.
  - c. Impedance - Select the transformer impedance to provide the specified rectifier output voltage as specified in Section 4.2.12C.5, "Power Rectifier".

- d. Taps - The high-voltage windings to have six (6) 2.5 percent, full capacity off-load taps, three above and three below the rated voltage of 12 kV. Tap changing to be by movable links. Tap connections to be brought out and rigidly supported on a terminal board located in the transformer enclosure, and be accessible through removable access panels. Access panels to contain observation windows for observing the connected tap. Tap connections to be clearly marked so that the tap selected is clearly identifiable through the observations window.

The tap changing links to be securely bolted in position. The design of links and connectors to make it impossible to short out sections of windings, or to select taps outside the prescribed range, by incorrectly connecting the links.

- e. Accessories - Provide all standard and indicated accessories and protective devices. All contacts to be electrically separate. Provide a winding temperature indicator with maximum reading pointer to detect transformer winding over-temperature and with a factory set, two (2) stage contact. Provide the first stage with a normally-closed contact that opens on temperature increase to initiate local and future remote supervisory control annunciations. Provide the second stage with a normally-open contact that closes on temperature increase to initiate tripping of the unit lockout relay, device 86.
- f. Assembly - Design the transformer so that part which require maintenance are readily accessible.
- i. Transformer Enclosure - Enclose the transformer in a rigid, self-supporting and self-contained, electrically-welded, indoor steel structure. Design the structure to be sufficiently rigid to withstand maximum short-circuit currents. Provide bolt-on doors on front and rear of enclosure to permit ready access for inspection and maintenance. Provide door switch (33T) on all transformer doors. Operation of any of the door switches shall initiate local and future remote supervisory control annunciations and operate the unit lockout relay, device 86. Provide nameplate in accordance with ANSI C57.18.
- ii. Base - Provide jacking facilities at each of the four corners of the base. Design the base to allow skidding of the transformer unit.
- iii. Lifting Hooks - Provide lifting hooks or eyes on the transformer to facilitate lifting the unit.

## C. Power Rectifier

### 1. General Requirements

- a. Types and Rating - The rectifier assembly shall be two six-pulse, delta-wye, double-way unit, designed for rectifier circuit No. 31 as identified in ANSI C34.2 and as shown on the Contract Drawings. The assemblies shall have continuous output ratings as indicated, at 660 V dc. The assemblies shall be designed to meet the extra-heavy traction rating class loading requirements which are as follows:

- i. After constant full-load temperatures are reached, the transformer and rectifier unit shall be capable of operating at one hundred (150%) percent of rated load amperes for two (2) hours.
  - ii. A superimposed cycle of overloads consisting of five (5) periods of one (1) minute each at three hundred (300%) percent of rated load amperes followed by one (1) period of four hundred fifty (450%) percent of rated load amperes for fifteen (15) seconds at the end of the two (2) hour period.
2. Fault Current Withstand - The ac-to-dc conversion assemblies, including interconnecting bus and switchgear, shall be certified as capable of withstanding one hundred (100%) percent of the theoretical maximum short-circuit current, with the short circuit applied at the load terminal of a dc feeder circuit-breaker, without damage to any component for the time period for the ac rectifier transformer main secondary breaker to open and clear the fault.
3. Efficiency - The overall efficiency of each ac-to-dc conversion assembly shall be greater than ninety eight (98%) percent at the kilowatt rating.
4. Power Factor - The displacement power factor of each AC-to-DC conversion assembly shall be 0.96 lagging or greater, from twenty five (25%) percent to one hundred (100%) percent rated kilowatts at rated AC primary voltage.
5. Total Voltage Regulation
  - a. The conversion assemblies shall have linear inherent direct-current voltage regulation of four and a half (4.5%) percent (plus or minus one half [0.5%] percent), between light (one [1%] percent) load voltage of 690 V dc and full load (100%) voltage of 660 V dc; initial voltage regulation of four and a half (4.5%) percent, starting from light load to at least three hundred fifty (350%) load, when rated primary voltage is applied to the ac line terminals of the rectifier transformer.
  - b. For the twelve (12) pulse rectification, double-way type conversion assemblies, at four hundred fifty (450%) percent of rated load the total voltage regulation shall be such that the voltage at the rectifier load terminals shall not be less than 545 V dc.
6. Rectifiers shall comply with the requirements of ANSI C34.2, EIA RS-282, and as specified.
7. Rectifiers shall be indoor, natural convection direct air-cooled, high energy efficient semiconductor type, mounted in a ventilated, freestanding, metal enclosure, and designed for a high-resistance grounding system as part of the DC switchgear ground relaying system as indicated on the Contract Drawings.
8. Rectifiers shall have a rated output voltage of 660 V dc at rated continuous output current and shall be designed for the specified traction rating classes at a maximum ambient temperature of forty six (46) degrees C.



9. An interphase transformer shall be provided in the twelve (12) pulse rectifier circuit, as required for ANSI circuit No. 31. The inter-phase transformer shall be mounted on elastomeric pads and enclosed in a nonmetallic enclosure designed to dampen audible noise. To achieve the lowest practical noise level, the core of the interphase transformer shall be designed to minimize the magnetostriction.

D. Construction

1. The rectifier unit shall be an integrated assembly consisting of silicon diodes, internal buses, negative disconnect switch, protective devices, control wiring, terminal blocks, and other required accessories.
2. Heat transfer surfaces shall be designed for easy cleaning and to minimize accumulations of dust and other contaminants expected in the operating environment.
3. Parallel stacks of diodes shall be electrically and geometrically similar and as symmetrical as practical to help balance the normal and surge electrical characteristics of each stack.
4. The rectifier shall be designed to maintain current balance between parallel-connected diodes in each phase. This current balancing scheme shall hold individual diode currents within their capabilities under the specified load conditions. Current balancing shall not be achieved by use of selectively matched diodes.
5. The rectifier shall be capable of carrying the specified overloads and short-circuit current on the dc switchgear bus with one parallel diode removed from each phase arm without exceeding safe junction temperature of the diodes each time it takes the ac transformer primary breaker to clear the fault. Each diode shall be capable of withstanding, at its maximum operating temperature during blocking periods, repetitive voltages having a value of not less than two and a half (2.5) times its working peak reverse voltage without a permanent change in diode characteristics.
6. Current-limiting fuses shall be provided in the connection to each diode, complete with a fuse monitoring system, device No. 198. Blowing of one fuse in each phase arm shall not reduce overload capacity, nor reduce short-circuit capability. Fuses shall be sized to the diode current rating and shall not open or fail on any external dc fault or rated overload condition. Only the fuse connected to a failed (shorted diode) shall open. No other rectifier diodes or fuses shall fail or be damaged when one diode fails. The diodes shall be readily replaced without the use of any special tools.
7. The rectifier unit shall be equipped with voltage surge suppressors to limit the reverse voltage across the silicon diodes to a value less than seventy five (75%) of the peak-reverse-voltage rating of the diode, irrespective of whether the voltage transient originates in the alternating current or direct current power circuits. Protection shall be provided against lightning surges on the ac and dc circuits.
8. Diode connected in series shall be provided with voltage equalizing devices to proportion reverse voltage equally across each individual diode. Transformer, bleeder resistor or capacitors are devices, which may be used to achieve reverse voltage division.

9. Open-circuit voltage shall not exceed 715 V dc at the DC circuit breaker. If required to prevent excessive voltage rise at open circuit, a bleeder resistance dummy load shall be provided.

E. Rectifier Enclosure

1. Each rectifier enclosure shall be an indoor, ventilated, metal structure with hinged doors. The enclosure shall be assembled with a rigid self-supporting structural steel framework and shall have principal structural members bonded together. The enclosure shall be constructed of not less than No. 11 MSG sheet metal. The access doors or panels shall be not less than No. 14 MSG sheet metal.
2. Convenient access shall be provided for normal maintenance and inspection. Each door shall be equipped with mechanical latches to hold the door fully and securely closed. Door stops shall be provided to hold the door in the open position. A shatterproof window or windows shall be provided to permit convenient inspection of the diodes and fuses. Doors shall be furnished with electrical interlocking contacts, device No. 133R. Operation of any of the door switches shall initiate local and future remote annunciations and operate the unit lockout trip relay, device 86.
3. A barrier shall be provided between positive and negative terminals of the rectifier.
4. Enclosure ground relaying shall comply with subsection entitled "Rectifier and DC Switchgear Enclosures - High-Resistance Grounding System," elsewhere in this Section.
5. Buses and Bus Connections - Rectifier buses shall be made of rigid, electrical grade copper with silver-plated contact surfaces. Buses shall be suitably braced between each other and to the enclosures with high-strength, non-tracking insulators. Buses shall be designed to safely withstand the theoretical maximum short circuit current without damage to the bus or the enclosure. Bus stand-off support insulators shall be molded epoxy or porcelain construction.

F. Negative Disconnect Switch

1. A negative disconnect switch shall be included within a separate metal-enclosed compartment at the rectifier unit. The disconnect switch shall be single-pole, single-throw, bolted contact, stationary type, rated at 1,000 V dc and with continuous and momentary current ratings to match the associated rectifier main (cathode) dc circuit breaker ratings.
2. The disconnect switch shall be furnished with an insulated operating handle and key-interlocked with the rectifier main circuit breaker. Interlocking shall prevent opening of the switch unless the main circuit breaker is open, and similarly, prevent the main circuit breaker from closing unless the disconnect switch is closed.
3. A glass viewing window for inspection shall be provided in the door of the disconnect switch. The switch contacts shall be visible through the window. The load terminals of the negative disconnect switch will be connected to the negative cables from the negative return running rails as indicated.

G. Bus and Bus Connections

1. Bus shall be electrical grade copper, complying with ASTM B187. Contact faces for bus joints and cable terminations shall be silver plated.
2. Bus shall have rated ampacity as indicated on the Contract Drawings. Bus shall be sized for a maximum current density of one thousand (1,000) amperes per square inch. temperature rise at the rated current shall not exceed thirty (30) degrees C.
3. Bus shall be braced to withstand a momentary current of no less than 30 kA asymmetrical.
4. Bus shall be supported by stand-off insulators of porcelain or molded epoxy construction, with corrosion-resistant inserts, complying with ANSI C37.31. Insulation level shall be 3.7 kV ac, rms, for a rated maximum voltage of 1000 V dc.

H. DC Shunts

DC instrument shunts shall comply with the requirements of IEEE 316. Shunt output shall be 50 mV at rated current.

I. Cable Terminations

Negative bus compartment shall provide adequate space for spreading and termination of the required number and size of stranded copper cables entering from below as indicated on the Contract Drawings.

J. Interconnecting Power Cables

The rectifier and rectifier transformer shall be interconnected using a grouping of cables. The interconnecting cables shall be insulated for 2000V. The size and number of cables shall be determined based, as minimum, on the two (2) hour one hundred fifty (150%) percent overload capability of the transformer-rectifier normal capacity of 1500 kW or 2000 kW.

K. Negative Drainage Equipment

The negative drainage equipment shall include the drainage circuit, disconnect switches, diodes, fuses, and provisions for connection of portable or stationary stray current measuring devices. The negative drainage panel shall be enclosed in a rigid, self-supporting and self-contained metal structure. Hinged door shall be provided for the front access to the negative-drainage equipment. The door shall be provided with stops and latches to hold them securely in the closed and open positions. The panel shall be sized to accommodate the connection of two drainage cables, switches, fuses, and diodes as indicated on the Contract Drawings. The disconnect, switches shall be manually operated, single-pole, single throw, 60 A, copper blade with silver-plated contacts. The switches shall be equipped with insulated operated handles. The diodes shall be rated 100 A nominal current, and 900 V reverse voltage.

## L. Negative Grounding Device

1. The negative grounding device shall consist of DC potential monitoring device 159G, current monitoring device 150G, time delay relays, auxiliary relays, and high current silicon controlled rectifier (SCR.) connected to provide bi-directional control of current flow. It shall be included as an integral part of the rectifier or negative return assembly. The bi-directional negative grounding device shall be installed between the 650 V DC traction power negative system and the station ground by the GTO thyristor (SCR device 57). It shall continuously monitor the DC potential between the negative system and ground and activate the device if the potential between the negative system and ground exceeds a preset, but adjustable between 0 and 150 volts level. The SCR shall continue to conduct until the current flow through the SCR reaches zero or until the polarity reverses across the SCR. The negative grounding equipment shall be solid-state construction.
2. The bi-directional negative grounding device shall be rated 400 A continuous and 1000 V DC Peak Reverse Voltage (PRV). This assembly shall withstand maximum expected dc short circuit current. The negative grounding unit shall operate in accordance with the single line diagrams as indicated on the Contract Drawings.

## M. Relays and Protective Devices

1. Protection and signal devices furnished shall include, but not limited to, the devices indicated. The following protective relays and devices shall be provided with the rectifier assembly:
  - a. A two (2)-stage factory-set rectifier over-temperature detector, device Nos. 126R and 126RH. First stage shall detect an abnormal rise in heat sink temperature and initiate local and future remote supervisory control annunciations. The second stage shall operate the lockout trip relay, device No. 86 and also initiate local and future remote supervisory control annunciations.
  - b. Rectifier first diode failed relay, device No. 198-1 shall initiate local and future remote supervisory control annunciations following the loss of any diode path. Rectifier second diode failed relay, device 198-2 shall operate the lockout trip relay, device 86 and initiate local and future remote supervisory control annunciations.
  - c. Surge protective devices Nos. 199X, which will limit reverse voltages across the silicon diodes to a value within the peak-reverse-voltage rating of the diode during voltage transients originating in either the alternating current or direct current power circuits. Device No. 199X shall initiate local and future remote supervisory control annunciations and operate the lockout trip relay, device No. 86, should they become inoperative.
  - d. Door interlocks contacts, device No. 133R, located at the top and bottom of the rectifier enclosure doors. Contacts shall operate the lockout trip relay, device No. 86 on opening of the door and shall prevent closing of the rectifier transformer ac primary circuit breaker and rectifier main dc circuit breaker when any of the rectifier enclosure doors are open. Operation of any device No. 133R shall also initiate local and future remote supervisory control annunciations, as indicated.

- e. Rectifier protective relay and device contacts shall be wired to terminal blocks located in the control compartment.
2. Enclosure Ground Relaying - High-Resistance Grounding System
 

The rectifier enclosure shall be insulated from the substation enclosure floor and any adjacent grounded metal work. Enclosure ground protection will be part of the DC switchgear enclosure ground protection relaying as indicated on the Contract Drawings.
  3. Control Power Requirements
 

Control power for the rectifier assemblies shall be at 125 V dc, obtained from the control power battery and accessories.
  4. A double-pole, pullout fuse block shall be provided at each rectifier enclosure. The device shall effectively isolate the rectifier assembly relays and protective devices from the power source.
 

A control power voltage monitoring relay, device 27, shall be provided and connected to the incoming line terminals of the 125V dc control power bus. Relay shall be set to drop out at 85 V or below and shall initiate local and remote supervisory control annunciations.
  5. Rectifier Accessories - Furnish special maintenance accessories.
  6. Annunciator Panel Circuits - Circuits shall be provided between the rectifier assembly and the substation annunciator panel for the alarm points indicated.

#### 4.2.13 Supervisory Control and Data Acquisition (SCADA)

##### A. System Requirements

1. The traction power SCADA system shall be furnished complete by the traction power substation manufacturer and fully integrated with all related traction power equipment and systems specified herein.
2. The substation SCADA architecture shall be based upon Programmable Logic Controllers (PLCs) networked to micro-processor based protective relays (MPRs), Intelligent Electronic Devices (IEDs) and other smart substation components to facilitate distributed monitoring and control of the traction power substations systems.
3. The PLC systems shall include all the necessary hardware and software to ensure a fully operational and coordinated system.
4. The PLCs shall be programmed specifically for the traction power substation application described in these procurement specifications. The PLCs shall replace the conventional hard-wired interfaces in the substation and programmed to support the following:
  - a. The full complement of I/O points defined in these procurement specifications with additional twenty (20%) percent active spare I/O wired to terminal blocks and fifty (50%) percent future expansion capability (CPU memory and I/O capacity).

- b. Logic and control algorithms as necessary for Operations Control Center (OCC) systems interface.
  - c. Status monitoring and alarm annunciation for discrete and analog inputs.
  - d. Substation control outputs.
  - e. Electrical interlocks (both hardwired and software-based permissive).
  - f. Interface and programmed logic for the emergency and transfer trip systems.
5. The traction power SCADA system shall employ a distributed architecture to reduce I/O field wiring between the major equipment cubicles.
  6. The SCADA system shall consist of Commercial-off-the-Shelf (COTS) hardware and software of scalable design and configurable features to ensure the interoperability, functionality and reliability of traction power system components and associated systems.
  7. Network drops within major equipment lineups/cubicles shall be shielded multi-conductor serial communication cable connected to the PLC and MPRs via RJ45 connectors. Network segments between grounded and ungrounded structures shall be optically isolated.
  8. Networking between intelligent substation components shall be based upon open standard industry protocols such as Profibus DP to facilitate data transfer and peer-to-peer communications within the fully integrated substation automation platform.
  9. The use of hardware or software products that rely on proprietary communications interfaces, protocols or special licensing subject to the terms of a single-source supplier and/or vendor is unacceptable. Support flexible termination methods for PLC I/O to simplify maintenance functions and equipment replacement.
    - a. Modular termination bases with pre-wired system cabling shall be employed to the extent possible to minimize individual I/O conductors within the primary equipment cubicles.
    - b. I/O system cabling shall be properly sized to support the voltage and current requirements for the I/O type.
    - c. Interposing relays shall be incorporated for I/O circuits that exceed the current carrying capability of the modular termination bases and associated cabling.
    - d. Signal isolators and transducers shall be furnished for all analog circuits as required for the application.

10. PLCs and other intelligent devices which provide a direct interface to the Operations Control Center (OCC) host SCADA system(s) shall interface with OCC host system(s) using the TCP/IP protocol, utilizing IEC 68070-5-104 and Modbus TCP/IP. MTS will provide the vendor with the interface bit assignments. Interface shall be via an RJ-45 Ethernet port. Contractor shall furnish and install all hardware and equipment required to create a complete link to the owner furnished twelve (12) strand single mode fiber optic riser entrance cable. The network equipment shall be connected via a Contractor furnished and installed CAT 6 patch cord the Contractor furnished and installed Single Mode fiber optic media converter. The media converter shall be connected via a Single Mode fiber patch cord to a Contractor furnish and install a wall mounted twelve (12) Strand SC Duplex Connector Housing in a Single-Panel Housing (Corning SPH-01P) or an approved equivalent. The Contractor shall provide a conduit race way for the twelve (12) strand single mode riser cable to enter the substation from the exterior of the substation. Raceway shall conform to the minimum bending radius requirements of the owner furnish single mode fiber rise cable.
11. The traction power SCADA system shall support the integration of microprocessor-based transformer temperature monitors accessible over the substation network. These temperature monitors can be used in lieu of hardwired I/O for transformer discrete status, alarm, and analog data.
12. The traction power SCADA system shall provide supervision and control of traction and auxiliary substation equipment, both locally and remotely, under normal and abnormal operating conditions.
13. The traction power SCADA system shall provide diagnostic and maintenance functions, both locally and remotely, to manage alarm/event conditions and maintain traction and auxiliary substation services and equipment.
14. The system shall provide automated alarm/event notification to operators and maintenance personnel through local HMI, OCC host systems, and local annunciation.
15. Traction power substation PLCs, network devices and other supported microprocessor-based equipment shall be furnished with removable compact flash or similar removable non-volatile memory modules to store configuration, data and application program files within the device. The memory modules shall be removable and transferable such that traction power SCADA equipment can be replaced and re-commissioned in the field by maintenance personnel without the use of special configuration or programming software.
16. In addition to the requirements defined in these procurement specifications and related sections, the Traction Power SCADA System shall, at a minimum, meet the following general performance criteria and functionality:
  - a. Provide control and alarm/event monitoring for traction power electrification and auxiliary systems.
  - b. The PLC(s) installed in each substation shall serve as the primary interface and data concentrator to the LAP/HMI and OCC SCADA host systems. PLCs shall communicate to the host system via TCP/IP protocol.

- c. The substation LAP/HMI operator interface shall be fully programmed to provide local monitoring, control functions and diagnostic screens for the traction power and ancillary systems.
- d. Equipment Local/Remote control switch must be in "Remote" mode to enable switching control between the OCC and substation HMI operator interface.
- e. The LAP/HMI shall be configured to poll the substation PLCs and other microprocessor-based devices to acquire traction power and auxiliary system data or receive data from these devices. The PLC shall collect and store localized data and emergency trip conditions via the substation network at a scan rate sufficient to ensure the integrity of the data and enable meaningful analysis on these data.
- f. The OCC SCADA host system shall be configured to poll the substation PLCs to acquire traction power and auxiliary system status or receive status report from these devices.
- g. For SCADA control functions, the PLCs shall accept command requests from the OCC host system and LAP/HMI, and in turn, provide supervisory messages in proper data format to the local MPRs and IEDs to activate the requested control sequence(s) via the substation network.
- h. The PLCs shall be responsible for monitoring alarm signal of all devices within TPSS and sending alarm signal to OCC and LAP/HMI.
- i. Networked MPRs shall provide circuit protection, breaker control, monitoring and metering for use on AC and DC feeders and suitable for incorporation into the integrated substation automation system. Relays shall communicate via RS-485 multi-drop serial and/or approved fieldbus networks using appropriate protocols.
- j. Capability to detect and respond by alarm, and where applicable, trip command(s) to associated SCADA circuits such as Emergency Trip System (ETS) switches, fire alarm, intrusion detection and other supervised circuits.
- k. A pair of dedicated fiber will be provided for future emergency trip and transfer trip functions between adjacent substations. Both emergency and transfer trip functions within the substation and between adjacent substations shall be routed through PLC. The latency between the initiation of the emergency and transfer trip and issuing trip command to corresponding breakers shall not exceed 100ms.
- l. Where the new TPSS is providing power to existing line the future transfer trip system shall be integrated between the new TPSS and the existing TPSS.
- m. The system shall perform self-diagnostics for error reporting and recovery. Record, display and annunciate equipment status, diagnostic registers and fault conditions for connected microprocessor-based devices.



B. Communication Equipment Requirements

1. Each TPSS shall include a SCADA/RTU Communication Cabinet to house communication gateways such as modems, fiber patch panels or RTUs as required to interface with the future communication fiber network to the OCC.
2. The PLC system shall consist of the following components for monitoring and control:
  - a. Primary and secondary chassis assemblies (as necessary) to house the PLC modules identified below with spare and future capacity
  - b. 24V dc Power supplies installed in each chassis with status/alarm contacts wired as discrete inputs to the PLC shall receive primary power from a circuit derived from the station dc/dc converter.
  - c. Central Processing Unit(s) with sufficient memory and processor capability to support the specified level of functionality with capacity for spare and future I/O expansion as outlined above. Additionally, CPUs shall meet the following performance criteria:
    - i. PLC scan rate of 50ms or less. This performance requirement is exclusive of any downloaded comment, symbol, tag or description content.
    - ii. CPU free memory (for configured I/O, state RAM and program sections) of fifty (50%) percent or greater. This performance requirement is exclusive of any downloaded comment, symbol, tag or description content.
    - iii. Shall be capable of PLC clock synchronization using Simple Network Time protocol (SNTP) or other approved signaling method.
    - iv. Programming software shall support, at a minimum, the following IEC 61131-3 compliant programming editors including ladder diagram, function blocks, and structured text.
    - v. Programming software shall support online simulation for testing and troubleshooting.
    - vi. Shall support addressable bits and registers accessible to the OCC host systems, LAP/HMI and other PC-based software tools for PLC system monitoring including:
      - 1) CPU status and alarm
      - 2) Internal battery condition
      - 3) Power supply status
      - 4) IO health (local, distributed and remote as applicable)
      - 5) Network status

- 6) Other relevant data used for alarm and diagnostic purposes
3. Network modules for fieldbus network modules as required based on the system suppliers design approach.
  4. Discrete and analog Input/Output (I/O) modules to support the I/O requirements are shown in Exhibit 1 of these procurement specifications and active spare points. PLC modules shall be selected based on the signal requirements (voltage and current) for each I/O signal type
  5. I/O module termination connector assemblies including termination bases, cable assemblies and interposing relays as required:
    - a. Breaker status, alarm and control screens
    - b. Alarm annunciation screen(s)
    - c. Diagnostic summary displays
    - d. Other data necessary for the monitoring, control and system maintenance
- C. Provide network connectors, optical bus terminals, and any other necessary hardware and software for connecting PLC, MPRss and IEDs within a TPSS to a local network for future connection of the TPSS to OCC. Network connection within major equipment or switchgear lineup can be realized by copper wire. The network connection between electrically isolated equipment must have optical isolation. Future network connection from TPSS to OCC shall be realized by fiber optic cable.
- D. Programmable Logic Controllers (PLC)

The programmable logic controllers shall be used for monitoring and control of the traction power equipment and auxiliary systems.

1. Hardware Requirements
  - a. The PLC shall be a chassis mounted modular system. The CPU will be capable of servicing I/O in its local backplane and shall support remote I/O or distributed I/O as specified below:
    - 1) Certifications: CSA C22.2 No, 142, UL508.
    - 2) Collect data, perform process control functions, communicate with other PLCs, and distribute process information along the local area network.
    - 3) Capable of program downloads from a remote workstation over the network or locally programmed from a portable laptop computer.
    - 4) Allow for the expansion of the system by addition and configuration of hardware modules and software functions.
    - 5) Executive firmware shall be stored in Flash memory and can be updated in the field using standard programming tools.

- 6) The Processor shall be capable of 256KB minimum of base program and sufficient data memory, with a maximum of sixty (60) programmable channels suitable for process control. In addition to the above specified communications capabilities, the processor shall have a dedicated port for PLC programming.
- 7) The PLC shall use lithium battery to back up the PLC RAM. A BAT light shall indicate when it is time to replace the battery. The battery shall be accessible from the front of the CPU. It shall be possible to change the battery while the CPU is running.
- 8) The PLC shall have on board status/display area to provide visual indication for CPU status and alarm functions
- 9) The PLC shall support analog, discrete and special function I/O modules compatible with the traction power substation I/O required.
- 10) Network Communication Capabilities: The PLC shall support serial and Ethernet communications using industry standard protocols such as Profibus, TCP/IP, etc.

## 2. PLC Programming Requirements

- a. All specified PLC platforms will be programmed using a single programming software package.
- b. PLCs that use multiple software programming packages will not be accepted.

### 4.2.14 Local Annunciator Panel (LAP)/Human Machine Interface (HMI)

The LAP/HMI terminals and associated configuration software for control and visualization of traction power equipment and auxiliary systems shall be provided.

#### A. General Requirements

1. Front panel rating of IP 65 and conform to IEC 60529. This rating shall be a NEMA 4X rating suitable for indoor use only. The back panel rating shall be IP 20 and conform to IEC60529.
2. HMI panels shall comply with the following general requirements as a minimum:
  - a. Certifications: CSA C22.2 No, 142, UL508.
  - b. Power Supply: nominal voltage of 24V dc with a range of 20.4 – 28V dc.
  - c. Real-time Clock: HMI Panels shall have a built-in real-time clock.
  - d. LED Diagnostics: A single LED visible from the front panel to indicate status of the terminal.

- e. Networking: The HMI/LAP shall indicate status of the terminal. This may be accomplished by the panel itself or via a single LED visible from the front panel.

B. The LAP/HMI panels shall be specified as follows:

1. Screen Dimensions - Minimum screen size of 8" diagonal as Local Annunciator Panel (LAP)/Human Machine Interface (HMI) and installed in the SCADA/RTU cabinet for substation monitoring, alarm annunciation and control purposes (Refer to Exhibit 2 of these procurement specifications showing the substation alarms list).. All components of the LAP/HMI panel shall have a minimum fifteen (15) year life span under normal operating condition. At a minimum, the LAP/HMI shall include displays dynamically linked via the substation network to the PLC depicting:
  - a. Breaker status, alarm and control screens
  - b. Alarm annunciation screen(s)
  - c. Diagnostic summary displays
  - d. Other data necessary for the monitoring, control and system maintenance
2. Touch Screen Type - Use a color TFT screen with 16,384 colors for flashing. The screen shall have an 640x480 pixel (SVGA) resolution, with a backlighting service life of fifty thousand (50,000) hours of continual usage. There shall be an embedded analog touch sensitive zone with a resolution of 1024x1024. The screen shall have eight (8) levels of brightness via tactile feedback.
3. Primary Memory - Shall have 32Mb flash EPROM memory minimum and a compact flash expansion memory slot. The compact flash slot shall be capable of supporting memory cards up to 1GB.
4. Communication Ports - Support necessary communications interfaces and protocols required for programming and communicating with the substation PLC.

C. Protection

1. Provide independent line fuses or circuit breakers, per the manufacturers' recommendation, for each Operator Interface Terminal.
2. Ensure that communication signals are properly conditioned for the HMI and protected from all sources of radiated energy or harmonics.

D. Spare Parts

Provide a list of suggested spare parts that includes part number, model number, component name, manufacturer's name and suggested quantities.

#### 4.2.15 Intelligent Electronic Devices (IEDs)

IED equipment shall include the following:

- A. IEDs shall be microprocessor-based devices capable of providing monitoring, control, and communications interfaces to related traction power equipment and systems.
- B. IEDs shall be capable of communicating with the PLC system via standard industry protocols such as Profibus.

#### 4.2.16 External Annunciator

All trouble functions shall also be annunciated summarize at the outside of the Substation by a flashing dome light. Operation of the "ACKNOWLEDGE" signal from the local annunciator panel shall change the lamp status from flashing to "OFF." Operation of the "LAMP TEST" shall enable the external dome lamp to be turned "ON".

#### 4.2.17 Busways

##### A. General Requirements

1. Bus assemblies shall comply with the applicable requirements given in ANSI C37.20 and NEMA BU 1 for self-cooled, metal-enclosed bus.
2. Bus conductors shall be high conductivity electrical grade copper complying with ASTM B187. Bus conductors, splices, and fittings shall be insulated within each bus enclosure. Insulation shall be flame-retardant and nonhygroscopic. Bus joints and terminations shall be silver-plated.
3. Bus conductors shall be electrically connected to equipment terminals by means of flexible braid or laminations. Bus enclosures shall be furnished with removable gasketed covers at bus connections for ease of installation and maintenance.
4. Low-voltage ac enclosure for the rectifier transformer-to-negative drainage cubicle shall be electrically insulated from the rectifier transformer enclosure, and connected the transformer enclosure to ground circuit only.

##### B. DC Busways

1. Type - DC buses shall be segregated type.
2. Current Ratings - Rectifier dc bus circuits to dc main circuit breaker and main circuit breaker to dc feeder circuit breakers shall have a continuous current rating not less than the circuit breaker rating. The momentary current rating shall be not less than 30 kA asymmetrical.
3. Voltage Ratings - Buses shall have a rated voltage of 650V dc. Insulation level shall be not less than 4.2 kV rms.

4.2.18 125V DC Battery and Battery Charger

- A. General - Battery system shall include a primary input circuit breaker, isolation transformer, the batteries, battery charger, DC filter, fused disconnect switch, battery racks, 125 V and 24 V dc panelboards, and accessories and all connections necessary to provide an operating battery system. Battery system to conform to the requirements of ANSI C2, Section 14 (Storage Batteries) and OSHA requirements for batteries.
- B. The batteries shall be of heavy-duty, sealed, deep-cycle, maintenance-free monoblock (multiple cells in a jar) design. The battery monoblocks shall:
1. Be nickel cadmium; sealed valve regulated lead acid types are not acceptable.
  2. Consist of individual cells in molded, flame-retardant, durable, and impact resistant cases.
  3. Have posts bolted with lead plated copper bars using stainless steel hex-head nuts.
  4. Be warranted free from defects in materials and workmanship for five (5) years.
  5. Be warranted to retain at least eighty (80%) percent of rated capacity for ten (10) years from the date of acceptance of the equipment.
  6. Not vent any gas under normal operation.
- C. Ratings - The battery voltage rating shall be 125 Vdc nominal with a minimum of eighty (80) ampere-hours at the eight (8) hour rate capacity to provide power at full charge to all equipment and devices requiring 125 Vdc power. The batteries to have the property of retaining full capacity during long term float service without additional maintenance.
- D. Discharge Rates - Batteries to be rated to supply the high discharge rates necessary to close and trip all electrically operated ac and dc circuit breakers. After the battery has supplied this power, without assistance from a charging source, battery to be capable of sustaining lower discharge rates required for indicating lights and relay coil loads from battery with the ac bus dead for eight (8) hours. Battery size to be based upon the following minimum requirements:
- a. Charger failure with the substation in full operation - Startup after ac supply failure for eight (8) hours duration, with the line breaker open; the line breaker must be closed before voltage to the charger is restored.
  - b. Trip and lockout of ac and dc main circuit breakers.
  - c. Trip and reclose all dc feeder circuit breakers.
  - d. Supervisory Control and Data Acquisition (SCADA) and associated devices load.

Contractor to be responsible for determining the battery and battery charger size. The Contractor to submit calculations showing how the battery size was determined for MTS' approval.

- E. Cell Containers - Battery containers to be sealed heat-resistant, plastic, flame retardant ABS L.O.I. greater than twenty eight (28) and not deteriorate. Cell covers to be cemented in place to provide a permanent leak-proof seal. Cell terminal posts to be compression rubber bushing, epoxy sealed, clearly and permanently identified.
- F. Nameplates - Each battery to have a nameplate legibly and permanently marked with the following:
- Manufacturer's name.
  - Battery and cell type.
  - One (1) minute, one (1) hour, and eight (8)-hour Ampere ratings.
  - Month and year of manufacture.
  - Ampere-hour capacity, eight (8) hours.
- G. Accessories- Accessories for normal operation and maintenance of batteries to be furnished for each battery and include the following:
- One (1) cell lifting sling complete with strap and spreader bar.
  - One (1) battery log book.
  - One (1) quart of terminal grease, if required.
  - One (1) set of special tools for maintenance, if required.
- H. Battery Racks - Battery rack shall be type RD 1617, one (1) row, three (3) tiers, constructed of steel channels. Battery to be mounted on racks with hold-downs designed for the specified seismic zone. Racks to be finish painted with at least two coats of alkaline resistant gray paint. Steel channels to be equipped with plastic insulation channels, arranged to fit snugly over the steel channels to insulate the cells from the steel racks. Plastic material to have necessary dielectric strength, and resist deterioration from battery electrolytes.
- I. Battery Charger/Eliminator - Battery charger shall be Type ARE-M13012A with Hi/Lo alarm, ground alarm, temperature compensation, and fully-regulated silicon-controlled rectifier, convection-cooled, constant-voltage type. Charge to be rated according to its associated battery capacity at 125 Vdc. Charger to be capable of recharging a fully discharged battery within eight (8) hours. Charger to be suitable for operation from a 120/240 VAC, 60 Hz, single-phase source. The output of the charger to be constant voltage, regulated within one (1%) percent over its complete load range. Charger to be current-limiting, adjustable within ninety (90%) to one hundred fifteen (115%) percent. Charger/eliminator, in addition to charging the battery, must carry the continuous load, while the battery supplies practically all of the heavy, short-time current demands. Charger to be able to operate as a DC power supply without batteries, and without affecting the normal operation of any equipment that is supplied by the battery system. During emergency or maintenance periods, when the ac supply to the charger is interrupted, the battery will furnish all of the required power. Battery charger to have a local indicator panel, equipped with the following:

1. AC power "ON" pilot light
2. Twenty four (24) hour high rate timer
3. Float and high rate charge voltage adjusting potentiometers
4. AC failure alarm relay and indicator light
5. Surge and transient protection
6. Ground detector relay and indicator light
7. DC high-low voltage alarm relay and indicator light
8. DC output circuit breaker, two (2) pole
9. DC ammeter and voltmeter

In addition, Items 4, 6 and 7 above will contain additional contacts for connection to the substation annunciator supervisory panel.

J. DC/DC Converter (125 DC Battery System)

1. Provide a DC/DC converter with N+1 redundancy for reliability. DC/DC converter shall be of modular design with built-in automatic current sharing feature that provide, the continued rated power output with failure of any one module. Converter design shall allow for "hot" replacement of modules. Key features of the DC/DC converter shall be as follows:
  - a. Input voltage - 125 V dc nominal. The converter's acceptable input voltage range shall be coordinated with the 125 V battery system so that the batteries float voltage and deep discharge levels are within the acceptable limits.
  - b. Output voltage - 24 V dc nominal, with adjustment capability.
  - c. Power rating - To be determined by the Contractor, so that the DC/DC converter provides a minimum of twenty five (25%) percent spare capacity when operating in N modules configuration.
  - d. Efficiency - Eighty (80%) percent at full load, or better.
  - e. Output Ripple/Noise - Less than one and a half (1.5%) percent of the output voltage, peak to peak.
  - f. Operating Temperature Range - Minus 7 degree C to plus 46 degrees C.
  - g. Protection - Over-voltage, over temperature, reverse input voltage.
  - h. Indications and Controls - At a minimum, each converter module shall have local LED indications for normal operations, trouble alarms, and a means to adjust the output voltage level.
  - i. Meters - Voltmeter and ammeter for measuring voltage and current on the 24 VDC side shall be provided. The meters may be either separate for each module, or common for the entire converter.



- K. Battery System Fused Disconnect Switch - A two (2) pole, external, handle-operated, fused disconnect switch to be provided to permit isolation of the battery from the battery charger. Fuse rating and switch size to be coordinated with the dc output circuit breaker in the battery charger. The disconnect switch and fuse to be mounted in a NEMA Type 1 enclosure.
- L. 125V and 24V DC distribution panels with appropriate number of DC breakers of adequate ratings shall be provided for the DC switchgear control power source and other substation loads as indicated. Charger to be wired to properly rated main breaker in 125V DC distribution panel.

#### 4.2.19 Telephone

Each substation shall be furnished with an exterior wall mounted NEMA rated type 304 stainless steel enclosure with plywood backboard and outlet for telephone company service. The stainless steel NEMA rated enclosure shall have minimum dimensions of two (2) ft. wide by two (2) ft. tall by eight (8) inches deep and include a lockable hasp to secure the enclosure door.

### 4.3 INSTALLATION

#### 4.3.1 General

- A. Installation work shall be in accordance with applicable requirements of NFPA 70, California Title 24, and with the regulations of IBC.
- B. Material and equipment shall be applied, installed, and connected as recommended by the manufacturers and as indicated on the Contract Drawings.
- C. The Contractor shall provide qualified personnel to assist in the complete mechanical and electrical system installation and testing commissioning. The equipment manufacturer's representative shall assist the installation contractor in resolving commissioning problems which may occur.

#### 4.3.2 Insulated Wire, Cable, and Accessories

- A. General
  - 1. Wire and cable shall be installed by means of equipment, devices, and methods recommended by manufacturer.
  - 2. AC switchgear, rectifier transformer, rectifier assembly and DC switchgear interior wiring and cabling shall be provided at the manufacturer's shop in accordance with the approved shop drawings.
  - 3. Wiring and cabling shall be terminated and connected by means of connectors, lugs, and other approved methods.
- B. Cable Identification: Cable identification tag shall be affixed to each cable at each entry to and exit from each terminal box, control panel, and switchgear assembly.

### C. Control Wiring

1. Multi-conductor control wiring with 600 V insulation between ac switchgear, rectifier transformer, rectifier assembly, dc switchgear equipment cubicles and control panels shall be installed in designated raceway as indicated. Multiconductor cables installed in the same conduit shall be pulled together.
2. Control wiring shall be run from end to end without splices. Each multi-conductor cable shall be identified at each end by specified markers.
3. Control cable shall be neatly laid and secured by specified strap. Cable entering AC switchgear, rectifier transformer, rectifier assembly, dc switchgear equipment cubicles and control panels shall be supported and secured to prevent tension on terminations. Adequate slack cable shall be provided and each wire terminated shall be double looped.
4. Interconnecting circuit wiring between ac switchgear, rectifier transformer, rectifier assembly, dc switchgear cubicles and control panel shall be terminated at terminal blocks.

#### 4.3.3 Busways

High voltage bus connections between the ac switchgear and rectifier transformer, the DC connections between the rectifier assembly-to-dc switchgear bus work and DC main breaker cubicle and DC feeder breaker cubicle buswork are done using busways, these shall be fabricated and installed to properly match and fit with the equipment.

#### 4.3.4 PLC and LAP/HMI Panel

- A. Install the PLC and LAP/HMI panel within Negative Drainage Cubicle.
- B. Ensure proper clearances for cabling and removable memory.
- C. Provide spacing around the HMI panel as required by the manufacturer to ensure adequate cooling. Ensure that the ambient temperature and humidity conditions are maintained within the manufacturer's specifications.
- D. PLC mounting shall be in accordance with manufacturers' requirements.
- E. Wiring, wire ducts, or other devices shall not obstruct the removal of modules from the rack.
- F. PLC indicators, selectors, communication ports, and memory card slots shall be accessible at all times.

## 4.4 TESTING

### 4.4.1 General Requirements

- A. The Contractor shall furnish all labor, material, equipment and incidentals necessary for testing and installation verification of the Work to be performed by the Contractor on the traction power substation equipment, materials and accessories furnished under this Contract. Factory tests shall be performed prior to shipment, and field tests shall be performed after shipment as indicated. Testing shall not commence until all design affecting the respective equipment has been reviewed and approved by MTS.

- B. Notification of Tests - MTS shall be notified not less than thirty (30) calendar days in advance of dates scheduled for tests and installation verification. Test procedures shall be approved by MTS prior to dates of scheduled tests and installation verification.
- C. Test Program Plan - The Contractor shall prepare and submit, for approval by MTS, a plan identifying the approach to be used for accomplishing each of the required shop and field tests. The projected schedule for test and installation verification procedures, test execution, and submittal of test results shall be included.
- D. Test Procedures - Shall include as a minimum:
  - 1. Objective and scope
  - 2. Test set up
  - 3. Test equipment to be used
  - 4. Personnel required for the test
  - 5. Estimated duration of test
  - 6. Pass/fail criteria
  - 7. Samples of data sheets to be used
- E. Test results will be reviewed by MTS and accepted as submitted or additional tests may be required. If additional tests are required because test results submitted do not comply with the requirements of these procurement specifications, the re-testing is to be documented and submitted to MTS as part of the Work.
- F. Test Reports - Test reports shall document the results obtained and be certified by the manufacturer. Reports shall include the following:
  - 1. Equipment tested, including model and serial numbers
  - 2. Title of test
  - 3. Objective of test and pass/fail criteria
  - 4. Summary and conclusions
  - 5. Location and date of test
  - 6. Test method and equipment used for test
  - 7. Results, including calculations, curves, photographs, and other supporting data
  - 8. Abbreviations and references
  - 9. Signatures of test supervisor and witnesses
- G. Test Witnessing - MTS or Authorized Representative will witness factory tests conducted by the Contractor. Test reports shall be submitted to MTS for review. Test reports shall be signed by all witnessing parties.

- H. Existing design test reports for identical equipment may be submitted for MTS approval.

#### 4.4.2 Factory Tests

- A. Factory tests shall include design and production tests performed by the Contractor, its supplier, or a testing agency prior to shipment of the equipment. Unless otherwise indicated, MTS may waive the requirements for design tests upon review of test procedures, test results, and/or certified documentation of like equipment. Tests results on like equipment or materials shall be submitted for the design tests which are to be waived.
- B. The Contractor shall test all wiring within the respective cubicles and all interconnecting wiring between cubicles before shipment. By means of high-potential, continuity, and operational tests, all wiring shall be checked for accuracy, open- and short-circuits, ground connections, and insulation integrity. All 2 kV dc wiring shall be given a high-potential test of 4,200 volts, 60 Hz to ground for one minute, and all other wiring shall be given a high-potential test of 2,500 volts dc to ground for one minute. The Contractor shall also verify that the wiring is in accordance with the wiring diagrams. The wiring shall be checked complete, including interconnections required at shipping splits.
- C. 15 kV AC Circuit Breaker
1. Design Tests - Following tests indicated in ANSI C37.09 as "Design Tests" to be performed on 15 kV circuit breaker in addition to the radio influence voltage tests described in NEMA SG4:
    - a. Rated maximum voltage
    - b. Rated voltage range factor
    - c. Rated frequency
    - d. Rated continuous current-carrying tests
    - e. Short-circuit rating
    - f. Rated standard operating duty
    - g. Rated permissible tripping delay
    - h. Rated interrupting time
    - i. Rated re-closing time
    - j. Dielectric withstand tests including rated low frequency withstand voltage and rated full-wave impulse withstand voltage
    - k. Rated control voltage
    - l. Load current switching
    - m. Mechanical life
  2. Production Tests - Following tests indicated in ANSI C37.09 as "Production Tests" to be performed on 15 kV circuit breaker:

- a. Current and voltage transformers
- b. Nameplate check
- c. Resistors, heaters, and coil check
- d. Control and secondary wire check
- e. Clearance and mechanical adjustment check
- f. Mechanical operation
- g. Timing
- h. Stored-energy system
- i. Electrical resistance of current path
- j. Low-frequency withstand voltage

D. 15 kV AC Switchgear

- 1. Design Tests - Following tests indicated in ANSI C37.20 as "Design Tests" to be performed on 15 kV metal-clad ac switchgear assembly:
  - a. Dielectric tests including power frequency withstand, impulse withstand, and bus bar insulation
  - b. Rated continuous current
  - c. Momentary current
  - d. Interrupting
  - e. Mechanical operation
  - f. Sequence
  - g. Flame retardant
- 2. Production Tests - Following tests indicated in ANSI C37.20.2 as "Production Tests to be performed on 15 kV metal-clad ac switchgear assembly:
  - a. Dielectric
  - b. Mechanical operation
  - c. Grounding of instrument transformers cases
  - d. Electrical operation and control wiring tests including control wiring, continuity, control wiring insulation, polarity, and sequence.

E. Rectifier Transformer

- 1. Design Tests - Following tests to be performed on one 2000 kW and one 1500 kW rectifier transformers. These tests will not be waived.

- a. Commutating reactance tests as described in ANSI C34.2.
  - b. Short-circuit tests as indicated in ANSI C57.12.01 and C57.12.91 to be performed to evaluate fully the capability of all windings. At least one (1) extreme of the tap range to be used in the tests. Faults to be applied on the secondary terminals.
  - c. Dielectric-impulse with positive polarity waves as described in ANSI C57.12.01 and C57.18 as applicable. The impulse tests to include one application of a reduced full-wave, two applications of a chopped wave, followed by one application of a full-wave. Tests to be performed after the short-circuit tests in accordance with NEMA RI-9.
  - d. Noise level tests to be performed with the rectifier transformer energized at rated ac voltage and at one hundred (100%) percent of rated load. Transformer to be housed in its enclosure with all panels bolted. The noise level measured at any point three (3) to six (6) inches from the surface of the enclosure not to exceed 64 dBA. A minimum of twenty (20) readings to be taken at locations, proposed by the Contractor, subject to MTS approval.
2. Production Tests - As applicable, following tests indicated in ANSI C57.12.01 and C57.18 to be performed:
- a. Resistance measurements of all windings on rated voltage connection and on all taps.
  - b. Ratio tests on the rated voltage connection and on all taps.
  - c. Polarity and phase relation tests on the rated voltage connection.
  - d. Impedance and load losses at rated current on the rated voltage connection and on all taps, including excitation loss and excitation current.
  - e. Dielectric low-frequency withstand, including applied-potential and induced-potential.
  - f. Partial discharge tests in accordance with ANSI C57.12.01, or as follows:
    - 1) The transformer to be subjected to an induced voltage of one and half (1.5) times the rated voltage at a frequency between 100 Hz and 400 Hz.
    - 2) Partial discharge measurements to be performed with a selected instrument operating at a frequency of 1.9 MHz.
    - 3) Partial discharge extinction level to be reached at an induced voltage higher than one and a half (1.2) times rated voltage.
    - 4) Partial discharge extinction level will be considered to have been reached when the reading at 1.9 MHz is less than 10 microvolts or 13 picocoulombs.

- F. Rectifier
  - 1. Tests. Perform rated current test indicated in ANSI 34.2.
  - 2. Production Tests. Perform following tests indicated in ANSI C34.2
- G. Transformer-Rectifier Unit - Design tests to be performed on transformer-rectifier unit including accessories and the busway connecting the transformer in accordance with ANSI C34.2. Tests to verify efficiency, voltage regulation, and displacement power factor at loads of zero (0%) percent, twenty five (25%) percent, fifty (50%), seventy five (75%), one hundred (100%), one hundred fifty (150%) percent, three hundred (300%), and four hundred fifty (450%) percent of rated load.
- H. DC Circuit Breakers
  - 1. Design Tests - MTS may waive the requirements for design tests upon review of equipment supplier certified test documents of like equipment. If not provided, following tests indicated in ANSI 37.14 as "Design Tests" to be performed on one (1) dc feeder breaker. These tests will not be waived:
    - a. Dielectric withstand
    - b. Continuous current
  - 2. Production Tests - Following tests indicated in ANSI C37.14 as "Production Tests" to be performed on all dc circuit breakers.
    - a. Control and secondary wiring check
    - b. Dielectric withstand
    - c. Mechanical operation
    - d. Calibration
- I. DC Switchgear
  - 1. Design Tests - Following tests, indicated in ANSI C37.20.1 as "Design Tests" to be performed on dc switchgear assembly. These tests not to be waived:
    - a. Dielectric including power frequency withstand, impulse withstand and bus bar insulation.
    - b. Rated continuous current.
    - c. Momentary current.
    - d. Interrupting.
    - e. Mechanical operation.
    - f. Sequence.
    - g. Flame-retardant test.
  - 2. Production Tests - Following tests indicated in ANSI C37.20.1 as "Production Tests" to be performed on all dc switchgear assemblies:

- a. Dielectric.
  - b. Mechanical operation.
  - c. Electrical operation and control wiring including control wiring continuity, control wiring insulation, polarity, and sequence.
- J. Busways
1. Design Tests - Following tests indicated in ANSI C37.20.1 as "Design Tests" to be performed on one (1) busway.
    - a. Dielectric including 60 Hz withstand and impulse withstand.
    - b. Momentary.
  2. Production Tests - Power frequency withstand tests indicated in ANSI C37.20.1 as "Production Tests" to be performed on all busways with all accessories in place.
- K. Relays
1. Design Tests - Design tests to be performed on one (1) relay of each type and rating in accordance with ANSI C37.90.
  2. Production Tests - Production tests to be performed on all relays in accordance with ANSI C37.90.
- L. Meters
1. Design Tests - Design tests to be performed on one (1) meter of each type and rating in accordance with ANSI C39.1.
  2. Production Tests - Production tests to be performed on all meters in accordance with ANSI C39.1.
- M. Instrument Transformers
1. Design Tests - Design tests to be performed on one (1) instrument transformer of each type and rating in accordance with ANSI C57.13.
  2. Production Tests - Production tests indicated in ANSI C57.13 as "Routine Tests" to be performed on all instrument transformers.
- N. Battery
1. Design Tests - Design tests indicated in IEEE 450 as "Service Tests" to be performed on battery.
  2. Production Tests - Production tests described in IEEE 450 as "Acceptance Tests" to be performed.
- O. Battery Charger
1. Design Tests - Following tests described in NEMA PE5 as "Design Tests" to be performed on a battery charger:



- a. Dielectric
  - b. Voltage adjustment
  - c. No-load
  - d. Temperature rise
  - e. Current-limit
  - f. Short-circuit
  - g. Static voltage deviation
  - h. Efficiency measurement
  - i. Power factor measurement
  - j. Ripple voltage measurement
  - k. Audible noise
  - l. Stability and response
  - m. Transient voltage withstand
  - n. Grounding of positive and negative polarity tests
2. Production Tests - Following tests indicated in NEMA PE5 as "Production Tests" to be performed on battery charger:
- a. Dielectric
  - b. Voltage adjustment
  - c. No-load
  - d. Current limit
  - e. Ripple voltage measurement
- P. Station Service Equipment
- 1. Design Tests - Perform design tests indicated in ANSI C57.12 on station service transformer.
  - 2. Production Tests - Perform production tests indicated in ANSI C57.12 as "Routine Tests".
- Q. Transfer Trip - Functional tests including operation of all devices in the transfer trip network.
- R. Emergency shutdown - Functional tests including operation of all devices in the emergency shutdown network.
- S. OCS Voltage Monitoring Relay - Proper operation of OCS voltage monitoring relay including associated components and devices.

- T. Supervisory Control and Data Acquisition (SCADA) and Local Annunciator Panel.
1. Comprehensive performance testing of all hardware, software/firmware and functional logic performed by SCADA system.
  2. Functional testing of all traction power equipment such as ac switchgear, rectifier transformer, rectifier unit, dc switchgear, and other equipment, SCADA hardware and software, networks and other components comprising the integrated substation automation system.
    - a. Simulate each output from the ac switchgear, rectifier transformer, rectifier unit, dc switchgear, and other equipment, and verify that the signal is received on the correct terminals.
    - b. Simulate each command in the supervisory control interface terminal blocks and verify that the correct operation occurs at the equipment.
- U. Traction Power Substation - Following tests to be performed on one (1) 2000 kW substation with all equipment installed in the substation enclosure prior to shipment, unless otherwise indicated:
1. Temperature Rise Tests - Temperature rise test shall be performed to verify that the limit of temperature rise of the rectifier transformer, rectifier, and busway or interconnecting cables are within the limits indicated in ANSI C34.2, ANSI C37.20, and ANSI C57.18. Loading of the transformer-rectifier unit shall be simulated by the short circuit method as indicated in ANSI C57.18.
 

The transformer-rectifier unit shall be operated at one hundred (100%) percent full-load until all parts have reached constant temperature, but not less than six (6) hours, before applying overloads. After constant temperature has been reached, the transformer-rectifier unit shall be operated at one hundred fifty (150%) percent full load for two (2) hours with five (5) cycles of three hundred (300%) percent full load for one (1) minute duration, each equally spaced throughout the two (2) hour period, followed by one (1) period of four hundred fifty (450%) percent full load for fifteen (15) seconds at the end of the two (2) hour period. Constant temperature is considered to have been reached when the temperature rise of no part changes more than one (1) degree Celsius in one (1) hour.
  2. Continuity and Control Function Tests - Continuity and control function tests of all circuits including relays, annunciation, indication circuits, and shutdown circuit functions shall be performed. Control circuits, including all equipment, devices, and interconnecting wire and cable, shall be tested prior to the operational tests with the controls energized, but with the controlled equipment and devices disconnected or otherwise made inoperable. For these tests, the control functions shall be checked for proper operation by actuating each contact that initiates a control operation and then following the control sequence through the various affiliated devices to ascertain that the correct results are obtained with each condition of interlocking. The actuating of contacts as required to initiate an operation and to set up the interlocking conditions shall be performed by simulating operating conditions. The minimum voltage required to operate breakers and the tap and time dial settings of all relays shall be verified in accordance with the relay coordination study which the Contractor will submit to MTS for approval. All relays shall be bench tested in accordance with the relay manufacturers' data and curves.

3. Functioning and control of the cooling equipment and its control circuitry.
4. Insulation test on structure to ground and operation of ground relays. Structure to ground shall be tested using 1500 V dc megohmmeter.
5. Minimum pickup and dropout of undervoltage relays.
6. Interlocks on power transformer removable panels, rectifier doors, negative disconnect switch compartment door, and dc circuit breaker doors for proper functioning and operation of substation shutdown circuits.
7. Check required setting of heater thermostats and manual on/off switch.
8. Dc short circuit tests shall be performed on a complete 2000 kW substation to verify proper calibration, function, and coordination of all protective devices, and to confirm adequate short-time capability of dc circuit breakers. The source shall be 12 kV plus or minus five (5%) percent, three (3) phase power with an interrupting capability of at least 500 MVA at 12 kV incoming voltage. One (1) bolted fault shall be applied at each of the following locations:
  - a. Load side of one dc feeder breaker. Test to verify that only this circuit breaker will trip.
  - b. Dc positive bus. Test to verify that only the AC & dc main breaker will trip for a fault applied on a close-in "bolted" fault.

The 12 kV ac circuit breaker, dc main breaker and dc feeder breakers of the substation shall all be monitored simultaneously to show the status of each circuit breaker during and after each short circuit application. In addition, each phase of the 12 kV ac circuit breaker shall be monitored. Test results, such as total inrush current, steady-state fault current, impulse time of faulted unit, and primary system capacity shall be recorded on oscillograph. All data recorded on oscillograph shall be properly labeled and identified. All equipment including the substation enclosure shall be inspected for damage including loose bolts after each short-circuit test. In addition, all breakers subjected to fault conditions shall be production tested in accordance with their applicable ANSI standards. Any reconditioning required to return these circuit breakers to original condition shall be at the Contractor's expense. Failure of the equipment to withstand these tests or to meet specified requirements shall be grounds for rejection of the equipment.

9. Reverse Current Trip - Contractor to apply injection of values equal to 25, 50, 75, and 100 amperes in the reverse direction to verify that the reverse current relay, device 132 initiates tripping of the lockout relay, device 86.
10. Fire Detection System - Contractor shall test the fire detection system in the substation for continuity and correct operation. Concealed calibrated test feature in each ionization detector to be used to check operational integrity of the detector chamber. Each ionization detector shall be operated to ensure that the indicating light at the annunciator panel is lit. After completion of the test, the ionization detectors shall be set for the correct sensitivity.

11. Intrusion Detection System - Contractor shall test the intrusion detection system in the substation for continuity and correct operation. Each detector shall be operated to ensure that the indicating light at the annunciator panel is lit. After completion of the test, the detectors shall be set for the correct sensitivity.
12. Weatherproofing/Water Test - The empty substation enclosure shall be tested in accordance with the weatherproofing test for outdoor metal-enclosed switchgear in accordance with ANSI C37.20.

#### 4.4.3 Field Tests

##### A. General

The Contractor shall perform the field tests indicated herein on each 2000 kW and 1500 kW substations (unless otherwise indicated) following installation of the substations in association with the installation contractor. The Contractor shall verify that each substation is properly installed, connected, and in operable condition. All applicable tests to each electrical subsystem elements as required per ANSI/NETA ATS-2009 shall be performed and recorded. No equipment shall be energized or placed in the operating mode until approved by MTS and manufacturer's representative.

##### B. Installation Verification Tests

1. Equipment Assembly Inspection: Verify that the following:
  - a. All equipment shipping bracing has been removed
  - b. Enclosures and equipment are anchored correctly
  - c. Assembled on-site equipment, including components and accessories, are installed and labeled in accordance with approved shop drawings, and are in operable condition
  - d. Record all part numbers and serial numbers, and rectifier transformer nameplate data and main coil identification numbers
2. Verify presence of voltage shock hazard and arc-flash hazard warning safety labels are visibly installed on the front side, and at other access points, of the equipment enclosures per NFPA 70E.
3. Grounding Connections Inspection: Verify that all enclosure, equipment, and relay grounding connections inside and outside of the ac and dc equipment houses, and rectifier transformer ground connections are in place, and properly made. Verify using approved drawings, which shall be marked as to completion.
4. Verify all control power connections, including alarms, trips, lights, heaters, and control power.
5. Verify all doors for correct gaskets, closing and latching, and padlock provisions. Temporary locks shall be provided for securing the enclosures.

- C. Mechanical Tests - Perform mechanical checks on the physical integrity of all equipment in each substation. These tests shall include, but shall not limited to, verifying the correct alignment of the racking mechanism of all circuit breakers by withdrawing and inserting the breaker module, verifying interlocks, contact gap spacing, correct bus connection torquing and placing of torque marks, and checking up doors and access panels.
- D. High Potential Tests - All cables rated two thousand (2,000) volts or more shall be given a high-potential test at voltages and for time durations in accordance with ICEA recommendations.
1. Substation Flooring Insulation Testing: Provide test to assure rectifier unit and DC switchgear are fully isolated and insulated from all other grounded structure including the substation housing. This shall indicate minimum reading of 5 mega-ohms. During this test, DC enclosure ground detection relay should be disconnected.
  2. Contractor shall conduct testing of DC switchgear/rectifier enclosure grounding relay and enclosure hot relay device as required.
  3. Contractor shall calibrate and test 12 kV main incoming feeder breaker relay devices 47, 50/51, 50/51N, 50/51B, 50N/51N-B, and 59.
- E. Continuity and Dielectric Tests - Perform continuity check and dielectric tests on interconnecting wiring and bus.
- F. Functional and Operational Tests - Perform functional and operating tests of equipment, devices, and circuits in accordance with approved control schematics for the stand-alone substation. These tests shall include proper operation of transfer tripping scheme through the activation of protective relay device nos. 150, 151, and 176. After successfully testing each function, the function shall be checked off on the applicable control schematic with a yellow marker and on the detailed step-by-step test procedures.
- G. Substations Loading Tests
- The Contractor shall conduct field tests on one (1) 2000 kW rated and one (1) 1500 kW rated substations to confirm the substation dc voltage regulation, ac power factor and efficiency at loads from zero (0) to at least three hundred (300%) percent of the nominal ratings. The loading shall be by using one (1) or two (2) trains, starting in the vicinity of the substation.
- H. Calibration Tests
1. The Contractor shall perform train start tests to verify the proper calibration and setting of the rate-of-rise relays. The Contractor shall monitor and record all train starting test data on recording oscillographs, copies of which shall be provided to MTS for its record. Tests shall be performed in two (2) phases as follows:
    - a. Phase 1 - Train start tests shall be performed with only one (1) substation energized and connected to the section of catenary normally fed by a minimum of two (2) substations. Any existing substation in this section shall be electrically disconnected during the test. The test shall consist of one (1) fully loaded four-car train set (AW2) starting under maximum acceleration and a second fully loaded four-car train set cruising.

- b. Phase 2 - Train start tests shall be performed with two (2) or three (3) substations energized and connected to the section of catenary normally fed by a minimum of two (2) substations. Prior to the preparation of the test procedures, the Contractor shall obtain input from MTS on the number of substations required to be energized during the tests and the locations of the tests. The test shall consist of two (2) fully loaded four-car train sets (AW2) starting simultaneously under maximum acceleration.
2. Low-level faults shall be applied at various locations along the track to obtain necessary data to verify proper operation of the rate-of-rise-relays in the selected substations furnished under this Contract. Proper operation shall require the rate-of-rise relay to close its contact to trip the feeder breaker associated with the fault. The Contractor shall monitor and record all low-level fault test data on recording oscillographs, copies of which shall be provided to MTS for its record. Low-level fault tests shall be performed in two phases as follows:
- a. Phase 1 - Low-level fault tests shall be performed with only one (1) substation energized and connected to the section of catenary normally fed by a minimum of two (2) substations. Any existing substation in this section shall be electrically disconnected during the tests. If deemed necessary by MTS, two (2) or three (3) sections of catenary shall be electrically connected during the tests.
  - b. Phase 2 - Low-level fault tests shall be performed with two (2) or three (3) substations energized and connected to the section of catenary normally fed by a minimum of two (2) substations. Prior to the preparation of the test procedures, the Contractor shall obtain input from MTS on the number of substations required to be energized during the tests and the locations of the tests. If deemed necessary by MTS, two (2) or three (3) sections of the catenary shall be electrically connected during the tests. A fault applied in the immediate vicinity of one (1) substation will be seen as a bolted fault by this substation, and a low-level fault by the other substation.
- I. Test Monitoring
- 1. The 15 kV ac circuit breaker, dc main breaker, and one (1) dc feeder breaker of the substation shall all be monitored simultaneously to show the status of each circuit breaker during and after each short circuit application. In addition, current in each phase of the ac circuit breaker shall be monitored. Test results, such as total inrush current, steady-state fault current, impulse time of faulted unit, clearing time of faulted unit, clearing time of other unit, and primary system capacity shall be recorded on oscillographs. All data recorded on oscillographs shall be properly labeled and identified.
  - 2. All equipment, including the substation enclosure, shall be inspected for damage including loose bolts after each short-circuit test. Any reconditioning required to return these circuit breakers to original condition shall be at the Contractor's expense. Failure of the equipment to withstand these tests or to meet specified requirements shall be grounds for rejection of the equipment.

- J. Noise Level Tests - The Contractor shall perform the noise level tests on the substation to verify that the maximum noise level measured at any point 3 to 6 inches from the surface of the substation enclosure shall not exceed 55 dBA. Noise level readings shall be taken while two (2) fully loaded 4-car trains are undergoing maximum acceleration in the immediate vicinity of the substation. One (1) meter shall be used per side with a total of four (4) readings taken simultaneously from each set of readings. A minimum of ten (10) sets of readings shall be taken. Ambient noise level shall be established with meters in place and the substation de-energized. This reading shall be taken before each test reading is taken under loaded conditions. Readings shall be taken at night to minimize impact of spurious ambient noise.
- K. High Resistance DC Equipment Grounding Tests - The Contractor shall perform enclosure alive and enclosure grounded tests to assure the protective devices perform in accordance to specification requirements.
- L. Floating Negative Automatic Grounding System - Contractor shall jumper OCS wire to ground at specific selected locations by MTS to verify that automatic negative grounding devices perform tripping and closing operations of dc circuit breakers specific to the substation which supplies power to the jumpered OCS wire to ground.
- M. Transfer Trip - Functional tests including operation of all devices in the transfer trip network and associated circuitry.
- N. Emergency Shutdown - Functional tests including operation of all devices in the emergency trip network and associated circuitry.
- O. OCS Voltage Monitoring Relay - Proper operation of the OCS voltage monitoring relay including associated components and devices and associated circuitry.

#### 4.4.4 Final Acceptance

Prior to Final Acceptance of the Traction Power Substations, Contractor shall have:

1. Completed satisfactorily all the field tests and commissioning of the substation on site and verified that they are ready to be energized.
2. Submitted all as-built documents, drawings and disk files and obtained the approval of these items from MTS.
3. Successfully performed all required testing and reporting of the test results.
4. Submitted all other deliverables including test equipment and tools, spare parts, manuals, and training and obtained the approval of these items from MTS.
5. Resolved all open issues with MTS.

## 4.5 MEASUREMENT AND PAYMENT

### 4.5.1 Furnish, Test, Deliver, and Commission Two (2) 2.0 MW and Fifteen (15) 1.5 MW Traction Power Substations

- A. Measurement - Furnishing, testing, delivering, and commissioning of two (2) 2.0 MW and fifteen (15) 1.5 MW traction power substations will be measured and paid as a completed assembly with all equipment and materials satisfactorily tested and placed into service.

- B. Payment - The Contract lump sum price paid for furnish, test, deliver, and commission two (2) 2.0 MW and fifteen (15) 1.5MW TPSSs shall include full compensation for furnishing all materials, labor, equipment, tools and incidentals, and for doing all the work involved in placing into service; as required by these procurement specifications, and the MTS Payment Schedule.

#### 4.5.2 Storage

- A. Measurement - Payment for storage as specified in Section 4.1.7 B "Storage of TPSS" of the Contract shall be paid per day, at the rate listed on the Contract bid form as invoiced by the Contractor.
- B. Payment - The number of days will be based on the calculated difference between the Contract delivery date, listed on Table 4.1.7 A "TPSS Delivered to Site (Arrival) Dates", and the new delivery date requested by MTS as required by these procurement specifications, the Contract provisions, and the MTS Payment Schedule. Payment for storage would only start after the TPSS has been accepted for shipment by MTS and after the dates listed in Table 4.1.7A.

#### 4.5.3 Furnish Operations and Maintenance Manuals

- A. Measurement - Furnishing Operations and Maintenance Manuals for the TPSS equipment furnished under this Contract.
- B. Payment - The Contract lump sum price paid for furnishing operations and maintenance manuals shall include full compensation for furnishing all materials, labor, and incidentals, and for delivering and obtaining final acceptance of Operations and Maintenance Manuals as required by these procurement specifications, the Contract provisions, and the MTS Payment Schedule.

#### 4.5.4 Training Program

- A. Measurement - Measurement for payment for training will be made by lump sum for completion of submittals and training as described herein:  
  
Up to fifty (50%) percent of the lump sum amount during the development, delivery and approval of training materials and course preparation.  
  
Remainder of the lump sum amount upon completion of the second session.
- B. Payment - The Contract lump sum payment for training shall include full compensation for the training efforts which include material preparation, instruction labor, and for any lodging and per diem costs associated with furnishing qualified instructors as required by these procurement specifications, the Contract provisions, and the MTS Payment Schedule.

#### 4.5.5 Spare Parts

- A. Measurement - Measurement of payment of spare parts shall be as a complete lump sum that is furnished, packaged, shipped, and received by MTS at a designated location in accordance with these procurement specifications.
- B. Payment - The Contract lump sum price paid for spare part shall include full compensation for furnishing all Spare parts, packaged, shipped and delivered to MTS designated location as required by these procurement specifications, the Contract provisions, and the MTS Payment Schedule.



#### 4.6 **FURNISH, TEST, DELIVER, AND COMMISSION SEVENTEEN (17) 1.5 MW TRACTION POWER SUBSTATIONS (OPTIONAL)**

Work described in this section is optional work. All or part of the optional work may be included in the Contract, if MTS determines that sufficient funding is available to include the work.

##### 4.6.1 General

This Contract shall contain an Option for up to seventeen (17) additional 1.5 MW Traction Power Substations (TPSS). Should MTS not exercise its right to include the Option in the initial Contract award, MTS shall retain the right to add all or part of the Option to the Contract for a period of five (5) years after the issuance of the Notice-to-Proceed (NTP) to the Contract. Optional work includes furnishing, testing, and commissioning of TPSS.

##### 4.6.2 Pricing of Option

The price for each additional optional 1.5 MW TPSS shall be based on the 1.5 MW Unit Price contained on the bid form. If MTS were to choose to execute part of or all of the Option, then the bid value for each 1.5 MW substation included on the bid form would be adjusted per the percentage rate of inflation for the Producer Price Index (PPI) of the United States Department of Labor (Washington, DC 20212), Bureau of Labor – Bureau of Labor Statistics (BLS) for the Index Item: “All other railroad and streetcar equipment, parts and accessories, incl. truck assemblies” (Series Identification Number: WPU14420304, Group: Transportation equipment) for the months covered from the month of Contract Execution to the month prior to the month the Contract Option is issued by MTS as a Contract change order that will incorporate the work covered by the Option (see the website at <http://www.bls.gov> for details). The first month will include the month of execution of Contract and the last month will be the month prior to the month in which MTS issues the Contract change order for the Option to the Contractor. The source of the data will be as printed monthly in the BLS “PPI Detailed Report”. The unadjusted indexes will be used. If the BLS corrects the PPI data, then the corrected data shall be used. The correction will be made in the form of an amendment or supplement to the Contract change order. Should the index data for the previous month not be available at the time the change order is issued, then MTS shall adjust the value using the available PPI data for the index listed above and shall issue a supplement to adjust the values following the release of the information by the BLS.

The calculation of the adjustment shall be performed by dividing the index for the month prior to issuance of Contract change order by the index for the month of execution of Contract. The index shall then be multiplied by the base Unit Price shown on the bid form to obtain the Adjusted Unit Price for each item. The actual measurement and payment for the TPSS will be based on the Measurement and Payment clause defined in the Contract. The actual measurement will be multiplied by the Adjusted Unit Price for all optional work executed.

If the BLS merely changes the title or recodes the index, then the data from the re-titled or recoded index shall be used. The re-titled or recoded index shall be listed in the PPI Detailed Report.

If the contracting officer determines that the index consistently and substantially fails to reflect market conditions, the contracting officer shall select an appropriate substitute index for determining price adjustments hereunder. The Contract shall be modified to reflect such substitute index, effective on the date the index specified in the Contract is no longer published or began to consistently and substantially fail to reflect market conditions.

The Option price includes all associated overhead costs required to perform the work contained in the Option. No additional compensation for overhead will be made in the event the Option is executed. The Option work includes all of the furnishing, testing and commissioning work required in the base Contract.

4.6.3. Availability of Funds

Funds are not presently available for performance under this Contract for the Option. The Option will be funded at the time of exercise of the Option. MTS' obligation for performance of this Contract for the Option is contingent upon the availability of appropriated funds from which payment for Contract purposes can be made.

END OF SECTION

**EXHIBIT 1****SCADA SYSTEM****MONITORING AND CONTROL INPUT/OUTPUT POINTS**

<b>Point No.</b>	<b>POINT DESCRIPTION</b>	<b>POINT TYPE</b>	<b>ACTIVATED STATUS</b>
1	Lockout Relay, Device 86	Alarm	Lockout Relay Activated
2	Lockout Relay, Device 186	Alarm	Lockout Relay Activated
3	12 kV AC Supply Phase Sequence, Device 47	Alarm	
4	Rectifier Diode Overtemperature, Device 126R	Alarm	
5	DC Enclosure Grounded, Device 164MR	Alarm	
6	Transformer Winding Overtemperature 1 <sup>st</sup> Stage, Device 49T	Alarm	
7	Rectifier Door Open Device 133R	Alarm	
8	Transformer Access Panel Removed, Device 33T	Alarm	
9	AC Main Breaker Loss of Control Power, 125 V DC	Alarm	
10	Reverse Current Trip Device 132	Alarm	
11	Rectifier Diode Overtemperature, 2 <sup>nd</sup> Stage, Device 126 RH	Alarm	
12	DC Enclosures Alive, Device 164R	Alarm	
13	Transformer Winding Overtemperature, 2 <sup>nd</sup> Stage, Device 49TH	Alarm	
14	DC Negative Rail to Ground Overvoltage, Device 159G	Alarm	
15	Negative Grounding Unit Overcurrent, Device 150G	Alarm	
16	Main DC Breaker Open 72M	Indication	
17	DC Feeder Breaker Open XXX	Indication	
18	Rectifier Diode Failure, Device 198	Alarm	
19	Battery Charger Failure	Alarm	
20	DC Feeder Transfer Trip Disable, TTS-XX	Alarm	
21	DC Switchgear Loss of Control Power (125V DC)	Alarm	
22	Rectifier AC/DC Surge Suppressors Device 199X	Alarm	
23	DC Feeder Breaker Transfer Trip Failure 185-XX	Alarm	
24	DC Loss of Control Power, 125V DC & 24V DC	Alarm	
25	Transfer Trip Activated	Alarm	
26	DC Feeder Cable De-energized, Device 127-XX	Alarm	
27	ESS1, ESS2, ESS3 and ESS4	Alarm	Emergency Switch Activated

Point No.	POINT DESCRIPTION	POINT TYPE	ACTIVATED STATUS
28	Substation Low Temperature	Indication	
29	Substation High Temperature	Indication	
30	PLC Trouble	Alarm	
31	Fire Alarm System	Alarm	Fire Smoke Detector Activated
32	Fire Alarm System Trouble	Indication	
33	DC Feeder Breakers Reclosure Lockout	Alarm	
34	12 kV & 650V DC Circuit Breakers on Local Control	Alarm	
35	12 kV & 650V DC Circuit Breakers on Remote Control	Indication	
36	Intrusion Detection Alarm System	Alarm	
37	Intrusion Detection Alarm System Trouble	Indication	
38	12 kV Main Breaker 52	Control	Close Command
39	12 kV Main Breaker 52	Control	Trip Command
40	650V DC Main Breaker 72M	Control	Close Command
41	650V DC Main Breaker 72M	Control	Trip Command
42	650V DC Feeder Breaker XXX	Control	Close Command
43	650V DC Feeder Breaker XXX	Control	Trip Command
	<b>METERING</b>		
44	12 kV line power meter KWHR	Raw pulse	
45	12 kV line power meter KVARH	Raw pulse	
46	12 kV line power meter KW	Raw pulse	
47	12 kV line power meter Volts	0 – 15000V	
48	12 kV line power meter Amps	As indicated	
49	12 kV line power meter Power Factor		
50	12 kV line power meter Frequency		
51	650V DC feeder 172-1 Voltage	0 – 1000V	
52	650V DC feeder 172-2 Voltage	0 – 1000V	
53	650V DC feeder 172-3 Voltage	0 – 1000V	
54	650V DC feeder 172-4 Voltage	0 – 1000V	
55	650V DC feeder 172-5 Voltage	0 – 1000V	
56	650V DC feeder 172-6 Voltage	0 – 1000V	
57	650V DC feeder 172-7 Voltage	0 – 1000V	
Note: Contractor shall develop a complete list of indications, alarms, and controls for all substation equipment as specified in the contract.			

**EXHIBIT 2**(LAP)/(HMI) - ALARM POINTS LIST

Point No.	POINT DESCRIPTION
1	Lockout Relay, Device 86
2	Lockout Relay, Device 186
3	12 kV AC Supply Phase Sequence, Device 47
4	Rectifier Diode Overtemperature, Device 126R
5	DC Enclosure Grounded, Device 164MR
6	Transformer Winding Overtemperature 1 <sup>st</sup> Stage, Device 49T
7	Rectifier Door Open Device 133R
8	Transformer Access Panel Removed, Device 33T
9	AC Main Breaker Loss of Control Power, 125 V DC
10	Reverse Current Trip Device 132
11	Rectifier Diode Overtemperature, 2 <sup>nd</sup> Stage, Device 126 RH
12	DC Enclosures Alive, Device 164R
13	Transformer Winding Overtemperature, 2 <sup>nd</sup> Stage, Device 49TH
14	DC Negative Rail to Ground Overvoltage, Device 159G
15	Negative Grounding Unit Overcurrent, Device 150G
16	Main DC Breaker Open 72M
17	DC Feeder Breaker Open XXX
18	Rectifier Diode Failure, Device 198
19	Battery Charger Failure
20	DC Feeder Transfer Trip Disable, TTS-XX
21	DC Switchgear Loss of Control Power (125V DC)
22	Rectifier AC/DC Surge Suppressors Device 199X
23	DC Feeder Breaker Transfer Trip Failure 185-XX
24	DC Loss of Control Power, 125V DC & 24V DC
25	Transfer Trip Activated
26	DC Feeder Cable De-energized, Device 127-XX
27	ESS1, ESS2, ESS3 and ESS4 Activated
28	PLC Trouble
29	Fire Alarm
30	DC Feeder Breakers Reclosure Lockout

EXHIBIT C  
PROPOSED LOCATION FOR YARD 1 AND 2

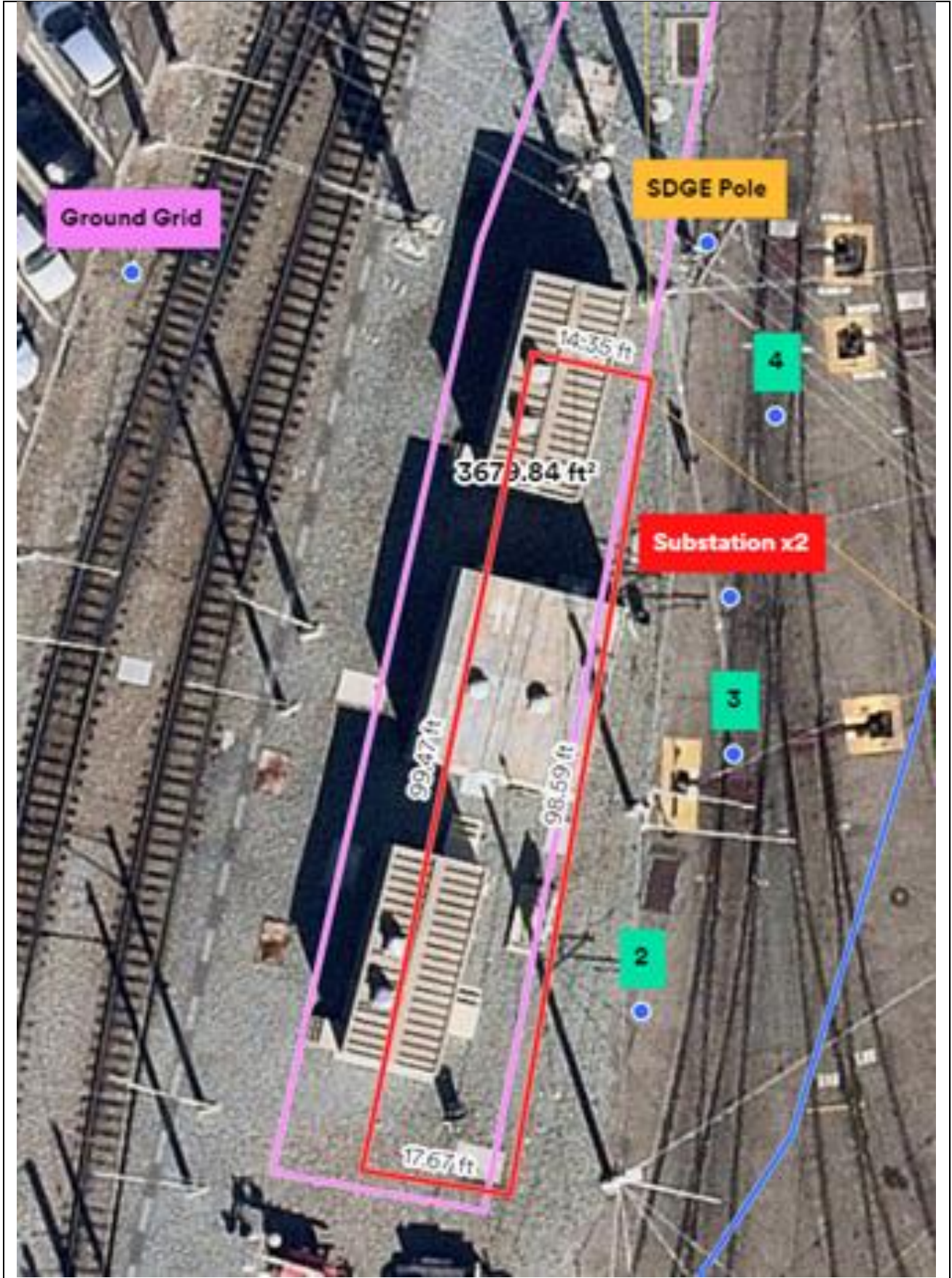




EXHIBIT D  
PROPOSED LOCATION FOR DAIRYMART



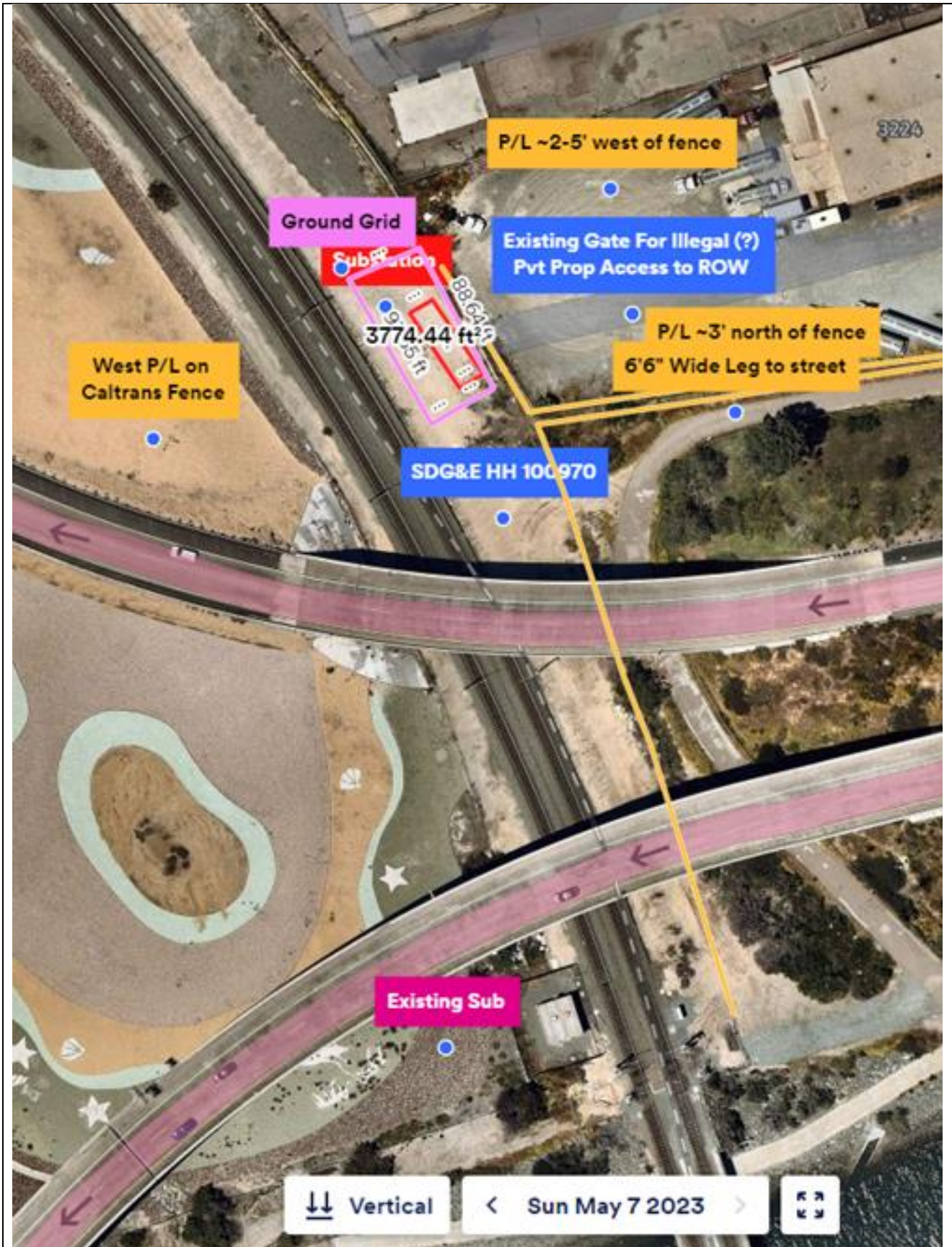


EXHIBIT E  
PROPOSED LOCATION FOR FLETCHER



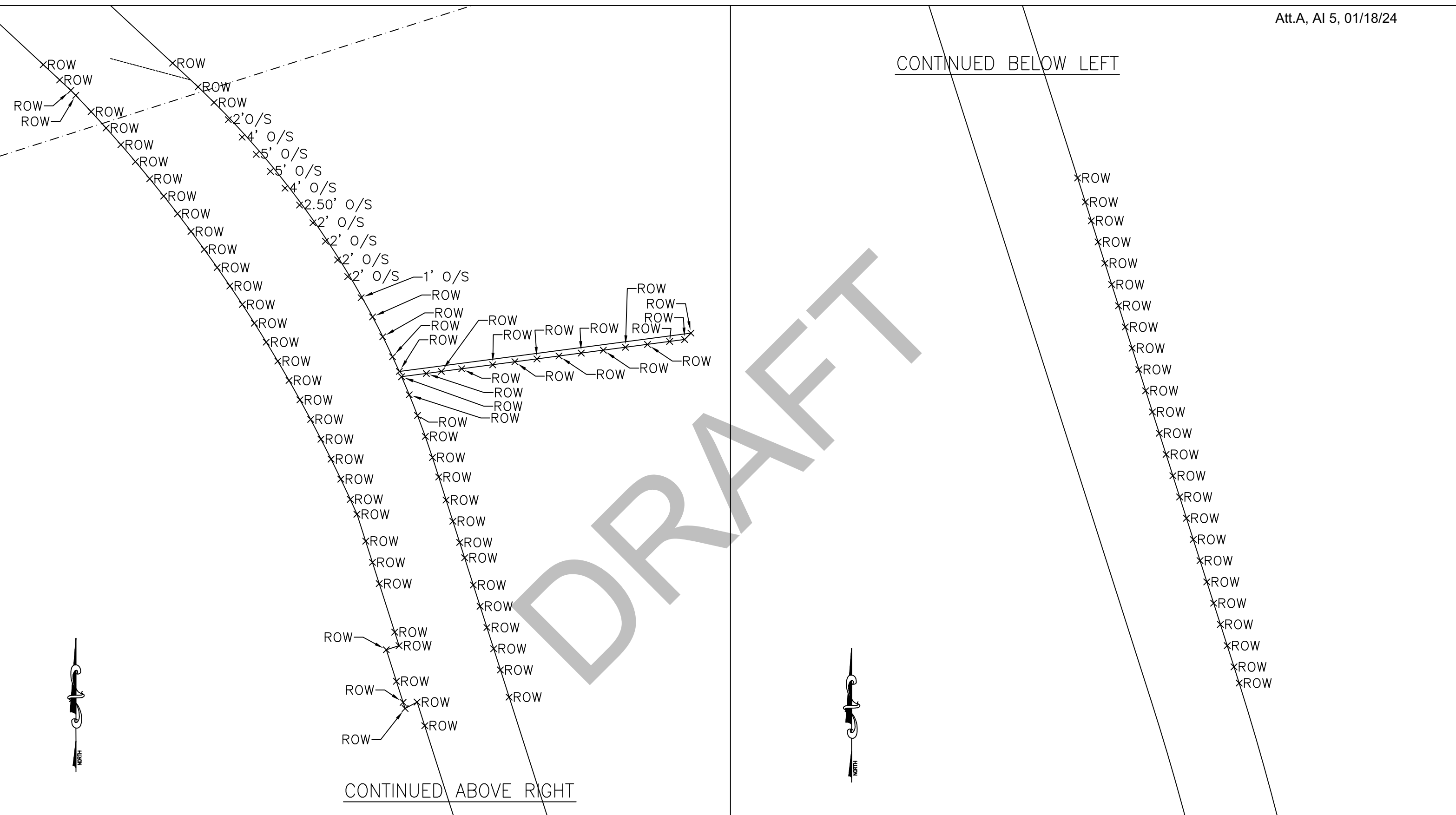


EXHIBIT F  
PROPOSED LOCATION FOR SWEETWATER



CONTINUED BELOW LEFT

CONTINUED ABOVE RIGHT



DESIGNED
DRAFTED JARROD SMITH
CHECKED DAN CALVILLO



7975 DUNBROOK RD., SUITE A  
 SAN DIEGO, CA 92126  
 (909) 484-4200 (T)  
 (909) 484-4229 (F)  
 WWW.CL-SURVEY.COM

# BOUNDARY LAYOUT

DATE: 6/21/23
SCALE: 1" = 100'
JOB NO. 2023-MTS-01

SHEET
1
AF239

**ATTACHMENT A1  
CONSULTANT'S PROPOSAL**

DRAFT

# 1. Project Team

CR Associates (CRA) will design plans to replace the existing Traction Power Substations (TPSSs) while minimizing impacts and delays to the system, maintain the operational efficiency of MTS's 65 miles of track, and keep the 300,000-weekday trips on schedule. While the system can handle a planned outage of one traction power substation (TPSS) out of service, having two (2) adjacent TPSS out of service simultaneously may cause a reduction in MTS service. CRA understands the importance of keeping the planned incidents down to a manageable level during the execution of a project.

CRA has assembled a team of specialized firms with a strong understanding of MTS aimed at addressing the specific needs for the MTS WWOXXXX-AE-31 Traction Power Substation (TPSS) Design Phase I project to replace the traction power substations that have been in service for more than 30 years. CRA has appointed STV Incorporated (STV) as the overall task lead. STV brings personnel with TPPS, overhead contact systems (OCS), and civil design and construction expertise. To address the geotechnical and survey requirements of the project, CRA will be utilizing the services of the Leighton Group (LG) and Aguirre & Associates (AA). NV5 will be tasked to address the San Diego Gas Electric (SDGE) medium voltage service to the proposed sites and identify possible underground utility conflicts. If landscape architecture is deemed required, CRA has on its bench Reddy Engineering (RE) Services to perform services.

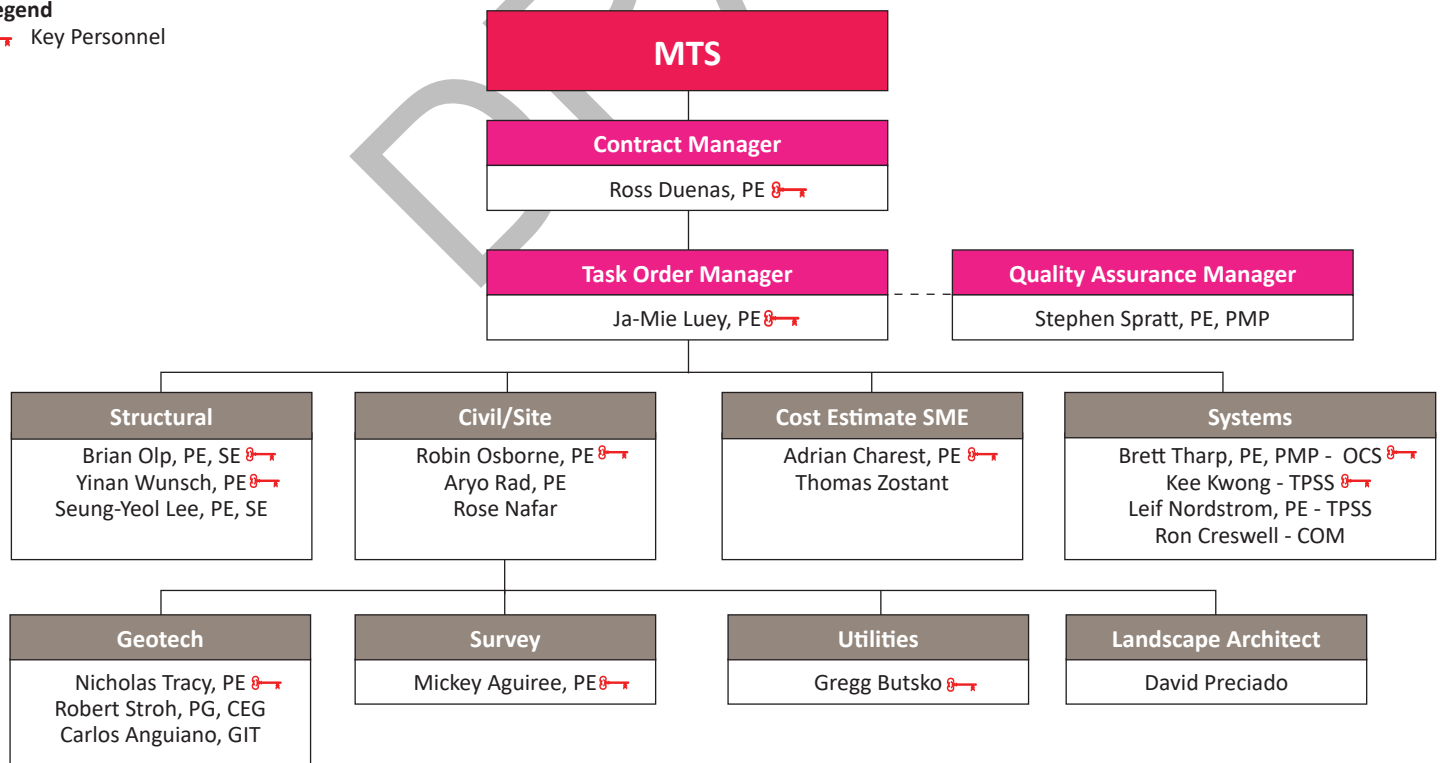
Our team has performed a virtual site tour of the proposed sites to assess the challenges that each site poses and is prepared to hit the ground running with MTS and this project.

## ORGANIZATIONAL CHART

CRA has thoughtfully chosen a team that is knowledgeable in all disciplines described in the RFP scope of work. The team has previous experience working with MTS on the Midcoast LRT Project, the Blue Line Project, and the Orange Line Project, and is familiar with MTS practices and processes. The team also has similar TPSS experience working on the Utah Transit Authority State of Good Repair TPSS Rehabilitation Project and the MTA Baltimore Substations Project. The team is dedicated and fully committed to working with MTS on this TPSS project.

**Legend**

 Key Personnel





## A., B., C. Personnel Profile, Qualifications, and Similar Experience

The chart below and on the next few pages is a brief summary of our proposed personnel that includes specific roles, relevant qualifications and experience, and time commitment to the project. For detailed experience regarding each team member, please see the resumes in the Exhibits section.



**Ross Duenas PE • CRA • Contract Manager**

**Years of Experience:** 18 **Education:** Bachelor of Science, Civil Engineering; Florida State University

**Professional Credentials:** Professional Engineer: California

Ross' experience has focused on designing and managing transportation and public works projects for public agencies. He has managed multi-disciplinary projects involving multimodal complete streets, traffic control, traffic calming, and large outdoor pedestrian spaces. Ross' responsibilities have included managing traffic-related improvement projects, designing, and preparing traffic control plans, as well as signing and striping plans, roadway design, site design, stormwater analysis and design, wet utility design, and water quality.

**Similar Experience:**

- MTS/SANDAG Bayshore Bikeway
- SANDAG Imperial Avenue Bikeway
- City of San Diego Downtown Cycle Track Network
- City of Chula Vista Heritage Road Bike Lanes
- National City Bayshore Bikeway Segment 5
- City of Oceanside Mission Avenue Streetscape



**Ja-Mie Luey, PE • STV • Task Order Manager**

**Years of Experience:** 30 **Education:** Bachelor of Science, Electrical Engineering; Oregon State University

**Professional Credentials:** Professional Engineer: California

With more than 30 years of experience in the design, manufacturing, and commissioning of traction power systems and OCS for LRT and rapid transit projects, Ja-Mie is exceptionally familiar with San Diego's TPSS. Before joining STV, he was the Engineering Manager at global traction electrification system equipment supplier Siemens, where he designed and oversaw the manufacturing and commissioning of the traction power equipment installed on the MTS Rehabilitation Project and SANDAG Orange Line Refurbishment.

**Similar Experience:**

- MTS Blue Line Rehabilitation
- UTA SOGR Traction Power Substation Rehabilitation
- Sound Transit Northgate/Eastlink Extensions (TPPS/OCS)
- METRO METRONext NHHIP GEC
- Metro Purple Line Extension Section 3 Stations



**Stephen Spratt, PE, PMP • STV • Quality Assurance Manager**

**Years of Experience:** 20 **Education:** Master of Business Administration; Marylhurst University / Bachelor of Science, Electrical Engineering; University of Victoria

**Professional Credentials:** Professional Engineer: California / Project Management Professional

Stephen has served in leadership roles for a variety of new rail systems and rail extension and improvement projects, and has a proven record of successfully managing projects under both conventional design-bid-build and design-build delivery models. Stephen provides structured reporting of progress, including risks and performance, for executive review. Prior to joining STV, he held positions of increasing responsibility at Siemens, including serving as a senior technical project manager in the Electrification Division, where he was responsible for all aspects of project execution from bid through closeout.

**Similar Experience:**

- TriMet Portland-Milwaukie LRT System
- Metro Purple Line Extension Section 3 Stations
- Metro Purple Line Extension Section 2
- Houston Metro LRT System Extension



**Brian Olp, PE • STV • Structural Engineer**

**Years of Experience:** 20 **Education:** Master of Structural Engineering; Illinois Institute of Technology / Bachelor of Science, Civil Engineering; Purdue University

**Professional Credentials:** Professional Engineer: California

Brian is skilled in conducting and checking design structural calculations, performing load rating evaluations, and preparing plans and specifications for structures. He is also adept at performing on-site inspections, documenting existing conditions, and developing rehabilitation recommendations. He recently worked on the UTA TPSS Project.

**Similar Experience:**

- UTA SOGR Traction Power Substation Rehab (OCS)
- SMART IOS-1 Larkspur & Windsor Extension Design-Build
- Metro Purple Line Extension Section 3 Stations DB
- CHSRA Madera to Fresno Construction Package 1



**Yinan Wunsch, PE, P.Eng,  
LEED AP • STV •  
Structural Engineer**

**Years of Experience:** 22 **Education:** Master of Science, Civil Engineering; University of Houston / Bachelor of Science, Civil Engineering; University of Fuzhou, China

**Professional Credentials:** Professional Engineer: California; LEED Accredited Professional

Yinan's experience includes providing civil and structural design services for transportation projects, including roadway and highway bridges and rail bridges throughout the United States. She has expertise in the analysis and design of various prestressed concrete bridges, straight steel bridges, and curved steel plate girder beam spans. Yinan also has extensive experience performing independent checks of bridge plan and design documents to help maintain project budgets and schedules. She recently worked on the UTA TPSS Project.

**Similar Experience:**

- UTA SOGR Traction Power Substation Rehabilitation
- Metro Gold Line Foothill Extension Phase II
- SMART Windsor Extension Design-Build
- CHSRA Madera-to-Fresno Construction Package 1



**Seung-Yeol Lee,  
PhD, PE, SE • STV •  
Structural Engineer**

**Years of Experience:** 20 **Education:** Doctor of Philosophy, Civil Engineering; University of Arizona / Master of Science, Civil Engineering; Yonsei University, Seoul Korea / Bachelor of Science, Civil Engineering; Yonsei University, Seoul, Korea

**Professional Credentials:** Professional Engineer: California / Structural Engineer: California

Lee is skilled at developing preliminary designs and cost estimates, performing static and seismic analyses, conducting scour design, and providing quality control (QC) review. Lee is knowledgeable of American Association of State Highway and Transportation Officials (AASHTO) load and resistance factor design (LRFD) specifications and American Railway Engineering and Maintenance-of-Way Association (AREMA) recommended practices. He recently worked on the UTA TPSS Project.

**Similar Experience:**

- UTA SOGR Traction Power Substation Rehabilitation
- Metro Purple Line Extension Section 2
- Metro Gold Line Foothill Extension
- CHSRA Fresno-to-Bakersfield Project Segment 3



**Robin Osborne, PE • STV •  
Civil Site Engineer**

**Years of Experience:** 24 **Education:** Bachelor of Science, Civil Engineering; University of West Indies, Trinidad

**Professional Credentials:** Professional Engineer: California

Robin has 20 years of experience providing design for transportation projects, including maintenance facilities, storage facilities, and light rail transit. He is skilled in transportation engineering, transit facilities design, and land development. His contributions at STV have included both extensive fieldwork and conceptual design of several large transit projects throughout California.

**Similar Experience:**

- SANDAG/MTS Blue Line Trolley Station Rehab
- SANDAG/MTS East County Bus Maintenance Facility
- SANDAG Midcoast Trolley/Blue Line Extension
- Metro C Line Extension to Torrance



**Rose Nafar • STV •  
Civil Site Engineering Specialist**

**Years of Experience:** 15 **Education:** Bachelor of Science, Civil Engineering; Tehran Polytechnic University, Iran

Rose's experience is in the design of transportation projects. She is skilled at designing civil site plans, grading, drainage, utilities, signing and striping, and plan and profile cross sections; providing plans, specifications, and estimates packages; scheduling; and preparing drawings for approval.

**Similar Experience:**

- CHSRA Madera-to-Fresno
- CHSRA Burbank-to-Anaheim Corridor
- RCTC Perris Valley Line
- SMART Initial Operating Segment Design-Build



**Aryo Rad, PE • CRA •  
Civil/Site Engineer**

**Years of Experience:** 25 **Education:** Bachelor of Science, Systems Engineering; Industrial Management Institute / Master of Science

Civil Engineering; California State

**Professional Credentials:** Professional Engineer: California

Aryo's experience includes planning, permitting, designing, bidding, and constructing bikeways, roadways, streetscapes, pedestrian facilities, storm drains, traffic, and transportation projects in Southern California. He has worked with public works and planning departments for more than 40 regional municipalities, including SANDAG, assisting with transportation and transit projects.

**Similar Experience:**

- SANDAG Bikeway
- OCTA Corridor F
- Caltrans District 7 SR-138
- Caltrans El Cajon Jamacha Road



**Adrian Charest • STV •  
Cost Estimator**

**Years of Experience:** 20 **Education:** Master of Science, Civil Engineering; University of Massachusetts / Bachelor of Science, Civil Engineering; University of New Hampshire

Adrian is a civil engineer with more than 20 years of experience providing estimating, engineering, and management for horizontal and vertical projects. He is familiar with conceptual and detailed estimating as well as applied data analytics for future projections. He is experienced with engineering design for heavy civil and building systems. He is a skilled project and operations manager ensuring that projects run smoothly, and deliverables are on time and at the highest levels of quality.

**Similar Experience:**

- MBTA Lynn Commuter Rail Station Improvements
- MBTA Commuter Rail Maintenance Facility
- MBTA Dual Generator Addition
- MBTA Bridge Replacement



**Thomas Zostant • STV •  
Cost Estimator**

**Years of Experience:** 30 **Education:** Bachelor of Science, Business Management; Strayer University

Tom has more than 30 years of experience in cost estimating and project cost control across a range of project types, from bridges and roadways to transportation facilities. He has demonstrated expertise in preparing estimates for education, residential, commercial, government, and military clients; analyzing and preparing change orders and negotiating with owners, contractors, and developers; and creating and maintaining accurate cost databases. Tom is well versed in leading the development of cost estimates for critical components of complex projects.

**Similar Experience:**

- UTA SOGR Traction Power Substation Rehabilitation
- Metro Purple Line Extension Section 2
- Metro Gold Line Foothill Extension
- CHSRA Fresno-to-Bakersfield Project Segment 3



**Brett Tharp, PE, PMP • STV •  
OCS Systems Engineer**

**Years of Experience:** 15 **Education:** Bachelor of Science, Mechanical Engineering, George Fox University

**Professional Credentials:** Professional Engineer: California / Project Management Professional

Brett is a mechanical engineer with more than 10 years of experience in overhead contact system design. He is skilled in project management, estimating, and equipment design. Brett has experience in providing requirements review, detailed design, validation through calculations, field engineering support, and training for maintainers. In positions of increasing responsibility with Siemens, he led the overall OCS engineering efforts for light rail transit projects throughout North America, including process improvements and standardizing design packages.

**Similar Experience:**

- BSD Traction Power Blanket Contract
- MBTA Green Line Extension Design-Build
- Metro Crenshaw/LAX Transit Corridor
- TriMet Portland to Milwaukie LRT Extension



**Kee Kwong • STV •  
TPSS Systems Engineer**

**Years of Experience:** 22 **Education:** Bachelor of Engineering, Electrical Engineering; Stony Brook University

Kee is an electrical engineer with more than 22 years of experience delivering engineering designs for major transit and commuter rail projects as well as transportation and wastewater treatment facilities throughout the New York metropolitan area. His rail design expertise includes traction power substations, electrical distribution systems, maintenance shop bug and stinger systems, supervisory control and data acquisition (SCADA) systems, and communications and security systems. Kee is skilled at facilitating project coordination during both the design and construction phases, including performing construction inspections and reviewing shop drawings. He is also familiar with FEMA Advisory Base Flood Elevation (ABFE) levels and has contributed to substation storm hardening efforts.

**Similar Experience:**

- UTA SOGR Traction Power Substation Rehabilitation
- MDOT MTA Replacement of 18 Prefabricated Traction Power Substations
- Metro-North Brewster Substation
- LIRR Vanderbilt Yard/ Pacific Park Substation Relocation





**Leif Nordstrom, PE, DBIA • STV • TPSS Systems Engineer**

**Years of Experience:** 8 **Education:** Bachelor of Engineering, Mechanical Engineering; George Fox University

**Professional Credentials:** Mechanical Engineer: California / Designated Design-Build Professional

Leif is a mechanical engineer with experience delivering designs for large transit and commuter rail projects in major urban areas, including Los Angeles, New York, Chicago, Boston, and Portland. He has developed designs for rail and bus transit stations and maintenance facilities, including efforts focused on traction power stations, electrical and communications systems, and mechanical and conduit layouts. Leif is skilled in 3D and building information modeling (BIM) software; and has provided multidisciplinary coordination to mitigate design conflicts.

**Similar Experience:**

- Metro Purple Line Extension Section 3 Stations
- Metro Purple Line Extension Section 2
- Sound Transit Northgate/ East Link Extension
- PANYNJ PATH Substation Upgrades



**Ronald Creswell • STV • COM Systems Engineer**

**Years of Experience:** 40 **Education:** Master of Science, Electrical Engineering; Worcester Polytechnic Institute / Bachelor of Science, Electrical Engineering; Worcester Polytechnic Institute

of Science, Electrical Engineering; Worcester Polytechnic Institute

Ronald has more than 40 years of experience in the design, installation, testing and commissioning of communication systems for a variety of LRT and commuter rail projects. His experience includes providing and managing design and system specifications, staff leadership, project/program management, QA/QC, and construction support. Ronald's experience includes systems integration, testing, and commissioning for rail startup and activation of rail systems, including traction electrification, train control, central control, communications, security, and computer systems.

**Similar Experience:**

- BART Measure RR Traction Power Facility Replacements Program Management
- BART Communications-Based Train Control CM
- Santa Clara VTA Guadalupe Corridor LRT Extension Substation Replacement
- Peninsula Corridor JPB/ Caltrain On-Call Signals and Communications Engineering



**Nicholas Tracy, PE, GE • LG • Geotechnical Engineer**

**Years of Experience:** 22 **Education:** Bachelor of Science, Civil Engineering; California Polytechnic State University, San Luis Obispo

Luis Obispo

**Professional Credentials:** Civil Engineer: California / Geotechnical Engineer: California

Nick has more than 22 years of experience providing a wide variety of geotechnical engineering services. He has performed geotechnical investigations using an array of techniques including hollow stem auger drilling equipment, cone-penetration testing equipment, backhoes, seismic refraction, and hand auger. Nick also has extensive forensic project experience on slope failures, differential settlement conditions, and erosional issues. Consulting services have been provided for public works, school, hospital, college, commercial, and residential developments.

**Similar Experience:**

- NAVFAC SW 69kV Substation NBSD
- MTS, SDG&E Bay Boulevard Underground Substation Relocation Getaway
- SANDAG MTS Light Rail Vehicle Maintenance Building Improvements
- SANDAG San Diego Regional Rail Corridor Alternative Alignment and Improvements



**Robert Stroh, PG, CEG • LG • Geotechnical Engineer**

**Years of Experience:** 40 **Education:** Bachelor of Science, Geological Science; San Diego State University

**Professional Credentials:** Engineering Geologist: California / Geologist: California

Bob has more than 40 years of experience in engineering geology and conducting geotechnical engineering evaluations. He is a past president of the San Diego Association of Geologists and is professionally recognized in the field of fault hazards. Bob has extensive experience in geotechnical and geologic investigations, including geologic field mapping; fault hazard investigations; soil settlement, seismic, and slope stability evaluations; geotechnical subsurface exploration sampling and logging; rock core logging, grading quality control, and soils testing; marine and coastal studies; and geophysical evaluations involving velocity, resistivity, and ground penetrating radar surveys.

**Similar Experience:**

- MTS Traction Power Substations
- SANDAG Blue Line Traction Power Substations
- SANDAG Batiquitos Lagoon Double Track
- SANDAG San Onofre to Pulgas Double Track Stage 2





**Carlos Anguiano, GIT • LG • Geotechnical Specialist**

**Years of Experience:** 12 **Education:** Bachelor of Science, Earth Science; University of California

**Professional Credentials:** Geologist in Training; California

Carlos is a Geologist in Training and has been involved in a variety of projects from a geotechnical and geologic perspective. He has provided observation and testing services during earthwork operations to assure general earthwork and grading specifications are implemented during all phases of construction. His field experience has been shaped by a wide array of projects, among these include utility, mass grading, transportation, and institutional. He has provided field observations, inspections, and compaction testing services for the following: sewer, water, storm drain, subgrade, aggregate base, asphalt concrete, and structural footings.

**Similar Experience:**

- SANDAG Inland Rail Trail Phase 2 Segment
- SANDAG San Diego Regional Rail Corridor Alternative Alignment and Improvements Conceptual Engineering Study
- SANDAG San Dieguito River Bridge Replacement
- SANDAG Mid-City Georgia - Meade and Landis Bikeways Project



**Mickey Aguirre, PE • AA • Survey Engineer**

**Years of Experience:** 40 **Education:** Master of Science, Electrical Engineering; Worcester Polytechnic Institute / Bachelor

of Science, Electrical Engineering; Worcester Polytechnic Institute

Mickey has more than 40 years of experience in managing, directing and performing civil engineering and land surveying tasks. His municipal and private survey and mapping experience includes a broad range of projects, including rail and light rail, public works, residential, commercial, churches, schools and other institutional projects. Mickey also has extensive surveying and mapping experience on rail projects for MTS and SANDAG.

**Similar Experience:**

- MTS Special Trackwork Replacement at Yard A
- MTS Division 6 Conceptual Layout and Report
- MTS Iris Rapid Corridor and Stations
- MTS El Cajon Transit Center Third Track



**Gregg Butsko • NV5 • Utility Coordination**

**Years of Experience:** 35 **Education:** Bachelor of Science, Business Administration, San Diego State University / Business Management, University of California

Gregg's experience includes electric, telecommunications, natural gas, cable television, data, alternative energy, and street lighting feasibility, planning, coordination, and design services. Gregg is known as the single source for clients' dry utility – electrical, telephone, cable television, fiber optics and natural gas – planning, management, design and engineering needs.

**Similar Experience:**

- SANDAG/MTS SDG&E Mid-Coast UTC TPSS
- SANDAG/MTS Mid Coast Light Rail
- SDG&E Contract Engineering & Design
- Port of San Diego Chula Vista Bayfront



**David Preciado • RE • Landscape Architect**

**Years of Experience:** 22 **Education:** Bachelor of Science, Civil Engineering; California Polytechnic State University

**Professional Credentials:** Civil Engineer: California / Geotechnical Engineer: California

David has more than 30 years of experience in landscape design, site planning, construction documents preparation, and construction observation services for public and private projects. His experience includes project management, coordinating design teams, conceptual planning, detailed design, construction document preparation, irrigation design, erosion control, revegetation, and visual impact analysis throughout Southern California. He specializes in public projects including agency coordination and public presentation to obtain community input and to inform the community. David has prepared numerous FHWA-compliant Visual Impact Assessments for Caltrans / SANDAG projects for use in EIS and EIR documents. He has also completed many PS&E Phase construction documents for SANDAG projects over the last twenty years.

**Similar Experience:**

- SANDAG Woodman Substation & Palm Avenue TPSS
- SANDAG Superloop UCSD Gilman Transit Center
- SANDAG Nobel Drive BRT Transit Station
- SANDAG Superloop BRT Stations, Phases 1 and 2



## 2. Project Team Capabilities

### A. Team Management, Coordination and Scheduling

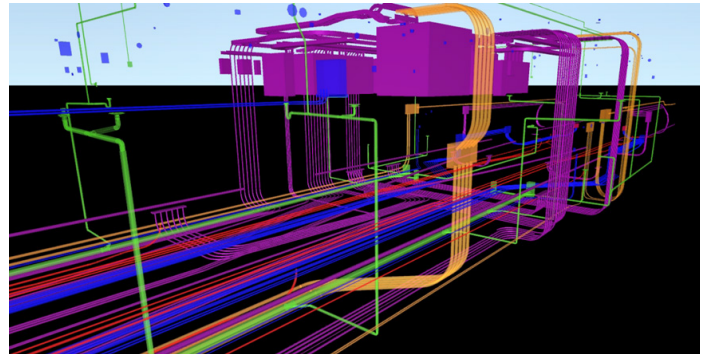
The CRA team understands the importance of having the civil design in place to support construction of the civil works in keeping the MTS procurement and delivery schedule of the TPSS. The CRA team has experience managing, coordinating, and scheduling the work necessary for TPSS installation. The CRA team understands the requirements of the TPSS to coordinate the interface between the civil and TPSS design. Our Task Order Manager, Ja-Mie Luey, has more than 30 years of experience specifically in the design, manufacturing, and installation of traction power substations, and has practical experience with ensuring that the civil interfaces are in place to accommodate traction power equipment. Ja-Mie has managed TPSS contracts ranging from \$200,000 to \$28 million in value, including the Sound Transit Indefinite Duration/ Indefinite Quantity (IDIQ), Sound Transit On-Call General/ Engineering contracts - Traction Electrification System Engineering, UTA SOGR TPSS Rehabilitation, and the TriMet I-205/Portland Mall MAX Green Line LRT Extension.



UTA SOGR project - New BWA in existing ROW

Every successful project has proper coordination and integration between design elements for both design and constructability. Ja-Mie’s coordination efforts have ranged from small (adding a new OCS BWA pole placement in the existing right-of-way for a new overlap as part of the UTA SOGR project) to complex like the Los Angeles Purple Line 2 Extension, where Ja-Mie and his team coordinated with civil,

mechanical, electrical, architectural disciplines to place traction power equipment and traction power connections to the third rail as part of the underground station.



The rendering above is for the LA Metro Purple Line Extension 2 Stations project showing modeling coordination.

Our team has practical experience scheduling similar activities that are required to develop the plans and specifications for the MTS TPSS Phase I Design Project. For example, to support the UTA SOGR project constraints (i.e., substation outages, special events, other UTA construction projects) and the contractor’s procurement and construction schedule on the UTA SOGR project, Ja-Mie and his team divided the project into three major packages (specifications, civil site plans, and traction power plans). Ja-Mie’s traction power team first focused on the specific site layouts to support the construction site access, and then they worked on the supporting traction power details. Concurrently, the civil team focused on the foundations while Ja-Mie personally addressed the traction power specifications.

### B. Staff Commitments and Priorities

The chart on the next page provides a detailed list of our proposed key staff, their roles, ongoing and current commitments, and the percentage of time they will allocate to the MTS TPSS project.

KEY STAFF • ROLE	ONGOING • CURRENT COMMITMENTS	% COMMITMENT TO MTS PROJECT
Ross Duenas, PE • Contract Manager	<ul style="list-style-type: none"> <li>SANDAG University Bikeway</li> <li>City of Murrieta, Murrieta Creek Trail</li> </ul>	10%
Ja-Mie Luey, PE • Task Order Manager	<ul style="list-style-type: none"> <li>UTA SOGR TPSS Rehabilitation –</li> <li>TriMet Traction Power Training Class Services</li> <li>Sound Transit Northgate Link and East Link Extensions</li> </ul>	90%
Brian Olp, PE • Structural Engineer	<ul style="list-style-type: none"> <li>Metro C Line Extension to Torrance Environmental Review and ACE</li> </ul>	60%
Yinan Wunsch, PE, LEED AP • Structural Engineer	<ul style="list-style-type: none"> <li>HERL</li> <li>CHSRA</li> </ul>	80%
Robin Osborne, PE • Civil/Site Engineer	<ul style="list-style-type: none"> <li>BART Silicon Valley</li> </ul>	60%
Adrian Charest • Cost Estimator	<ul style="list-style-type: none"> <li>PACE United Airlines Terminal B</li> <li>Jericho Park SFC Electric Bus</li> </ul>	100%
Brett Tharp, PE, PMP • OCS Systems Engineer	<ul style="list-style-type: none"> <li>Sound Transit Task Order</li> <li>UTA Task Order</li> <li>Houston Wheeler Station</li> <li>OC Transportation</li> <li>Gateway</li> <li>MARC Bayview</li> <li>CATS Silver Line</li> </ul>	80%
Kee Kwong • STV • Systems TPSS Engineer	<ul style="list-style-type: none"> <li>SEPTA 40th Street Substation</li> <li>CDOT Stamford MOE Facility</li> <li>UTA TPSS Rehabilitation</li> </ul>	60%
Nicholas Tracy, PE, GE • Geotechnical Engineer	<ul style="list-style-type: none"> <li>Sharp New Patient Tower</li> <li>Camp Pendleton Army Support Facility</li> <li>La Salle Monterey Postgraduate</li> </ul>	40%
Mickey Aguirre, PE • Survey Engineer	<ul style="list-style-type: none"> <li>MTS Yard A</li> <li>Various SANDAG task orders</li> <li>College Blvd. Oceanside</li> <li>Uptown Storm Drain Replacement</li> </ul>	35%
Gregg Butsko Utility • Utilities Engineer	<ul style="list-style-type: none"> <li>San Diego Airport Authority Terminal 1</li> <li>IQHQ Downtown San Diego Tower</li> <li>County of San Bernadino / Cal Trans I-215 Seaport Village</li> <li>San Diego Re-Development 1 PacHwy Midway Rising</li> <li>San Diego Stadium site Re-Development</li> </ul>	25%

### C. Managing Quality Assurance and Quality Control

The CRA team will establish, implement, and maintain an effective quality assurance program to manage, control, and document all work and to verify that the work has a level of quality commensurate with CRA, STV, and MTS standards and requirements.

**Quality Management:** Our Project Quality Plan is based on the guidelines for an ISO 9001:2015 Quality Management System, that outlines the necessary QA and QC activities specifically needed for the scope of work. These tools and approaches are part of the firm’s technical quality assurance and general

project management practices. Our approach to quality assurance for this contract will be as follows:

- Task Order Manager, Ja-Mie Luey, will provide leadership and create the proper climate for the performance of quality work. He will oversee development of the Project Quality Plan, the control plan, budget, and schedule and will communicate these to the task leaders and team.
- Quality Manager Stephen Spratt, will continuously and independently monitor work quality, code compliance, and conformance to relevant standards. He will also be responsible for quality assurance reviews on an ongoing basis, as well as review of QC records of documents prior to each submission.

- Task leaders will provide technical oversight and direction within their teams.
- Team members will provide technical expertise and perform work in accordance with the procedures and standards developed.

**Quality Control Plan:** Quality control is dependent upon a clear understanding and examination of project requirements. A Quality Control Plan will be formulated that accomplishes the following items:

- Scope of work definition based on our contractual obligations to MTS and the requirements of each task.
- Organization and resource planning and assignment of appropriate staff for each task.
- Internal management and project control tools initiation to enable accurate tracking of each task's progress.
- Project schedule that meets the contractual obligations and depicts submissions, meetings, and other milestones.
- Identification and research of design criteria, applicable codes, and standards.
- Quality training to familiarize staff with applicable quality procedures and training to maintain and improve necessary project skills.

**Quality Monitoring:** Reviews are a key element of the firm's quality program. This includes taking the following steps:

- Quality checks of all deliverables to the client.
- Technical reviews of documents, including design reports, drawings, specifications, calculations, and field reports to verify the technical accuracy, completeness, and adherence to applicable standards and procedures.
- All submittals/deliverables will go through the process of design, check, update, and verification. Coordination reviews and interdisciplinary checks will identify and eliminate discrepancies and conflicts. Interdisciplinary checks will utilize Bluebeam Studio sessions for review coordination at 35%, 65%, and 100% design phases.
- The Task Order Manager review will be performed to verify compliance with contractual and client team objectives.

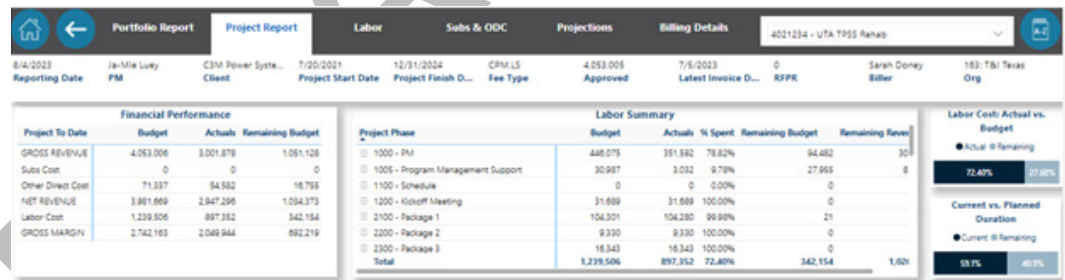
**Quality Audits:** An important feature of the QA/QC approach will be an independent reporting system to provide objective quality status directly to Ja-Mie. Planned and random audits

and surveillances directed by Stephen will be performed to verify QA/QC compliance. Findings and resulting actions and recommendations will be reported on a regular basis, as well as the implementation of corrective actions. Quality audit results will be available to MTS upon request.

**Subconsultant Quality Requirements:** Ja-Mie will verify that subconsultant services conform to contract requirements. Each subconsultant will either submit their own quality plan for review or agree to follow the Quality Plan. Whichever quality plan is more stringent will be utilized for the subconsultant. Each subconsultant will provide a written acknowledgment to Ja-Mie confirming either process. This written acknowledgment will be filed in the project files.

## D. Cost Management and Controls

Keeping projects within budget and on schedule is a critical responsibility of our project controls team. We use a tried-and-true project management methodology to develop realistic project budgets that meet the client's goals. All of these items will be detailed in the project management plan (PMP), which will define all operational elements of our contract with MTS. We track our budgets using the PM dashboard weekly to monitor progress and to stay within budget and on schedule.



*Project management dashboard for the UTA SOGR TPSS Rehabilitation project.*

## E. Staff Availability and Commitment

Please refer to the Staff Qualifications Chart starting on page 2, and the staff availability and commitment chart on page 8.

# 3. Project Understanding and Approach

## A. Staff Knowledge and Abilities to Meet Services and Requirements in the Scope of Work

The CRA team is excited to partner with MTS to deliver TPSS Design Phase 1 – WOA-AE-031 to support the MTS TPSS procurement. The CRA team understands the goals and objectives that MTS has for this contract and we have a



comprehensive understanding of your system. Our team’s understanding, combined with the technical expertise of our highly-skilled staff of professionals and their practical approach to design delivery, means the CRA team can help MTS accomplish all goals by successfully executing the work under this contract in a timely manner.

CRA has teamed with STV to provide Task Order Management and leads for cost estimating, structural, civil, and systems (traction power, overhead contact systems, communication) engineering. Under STV’s lead will be Aguirre & Associates (surveying), Leighton Group (geotech), NV5 (utilities), CRA (site design), and Reddy Engineering Services (landscape architecture). **See our organizational chart on page one for our teaming structure.**

## B. Address and Complete the Project and Services Required in Scope of Work

### Task 1: Project Management

While the overall contract resides with CRA, Task Order Manager Ja-Mie will be preparing a project management plan (PMP) to manage the scope, schedule and budget for WOA-AE-031. The PMP will identify the requirements for the monthly progress report, invoicing requirements, document control and submittal requirements specific to this contract. In addition to using the STV Internal Project Collaboration System (IPCS), STV has used multiple platforms for design collaboration, such as Box (UTA SOGR) and A2K (LA MTA PLE2 and PLE3S) and is prepared to use the Projectwise for this contract.



Project Management Plan  
Project Manual xxxxxx-0001

#### PROJECT MANUAL TASK DETAIL SHEET

TASK IDENTIFICATION:
INTRODUCTION/OVERVIEW/SCOPE OF WORK:
DESIGN CRITERIA:
DELIVERABLES /PROJECT SCHEDULE:
TASK ORGANIZATION:
BUDGET:
QUALITY CONTROL/DESIGN REVIEW:
SAFETY:
RISK MANAGEMENT:
COMMUNICATION CONTROL:
DOCUMENT AND RECORDS/TECHNICAL DOCUMENT CONTROL:
BIM/REVIT/CADD:
SCOPE CHANGE CONTROL:
TASK/STATUS REPORTS:
POST DESIGN SERVICES:
ATTACHMENTS (as applicable):
APPROVALS:
DISTRIBUTION:

Original Version Date: 3/17/2021 LRS  
Revision 0 Date: 3/17/2021 LRS

Sample PMP Project Manual Task Detail Sheet

As part of the natural design development the CRA team will provide submittals for the conceptual, 35%, 65%, 100% and conformed (IFC) design packages. After the site investigation and while survey is being performed by Aguirre & Associates and geotech work is performed by the Leighton Group, STV’s conceptual design will provide general site layout placement of the TPSS based on the MTS design parameters for space proofing the site. The 35% design will include the TPSS placement, manhole placement and locations for the new section insulators. The 65% design will include the conduit routing between the TPSS foundation, manholes, OCS poles, ground mat design, demolition plan and civil site detail. The 100% design will include the conduit cable schedules and system connection details and construction specifications. The conformed set will be signed and sealed after the 100% is approved by MTS.

STV will use the PM Dashboard to track earned value, to track the actual vs planned effort to monitor the design progress, and to ensure that the design stays on track.

### Task 2: Meetings

The CRA team believes that collaboration is the key to a successful project. Task Order Manager Ja-Mie will be using the systems V-model approach for this project that he has successfully applied throughout his career and on his recent UTA SOGR TPSS Rehabilitation project. The V-model approach is used as a tool to verify the requirements during the project definition phase (design) at the beginning of the project and to identify what the validating requirements will be during the integration phase (i.e., testing/commissioning phase) leading to the operation and maintenance of the system.

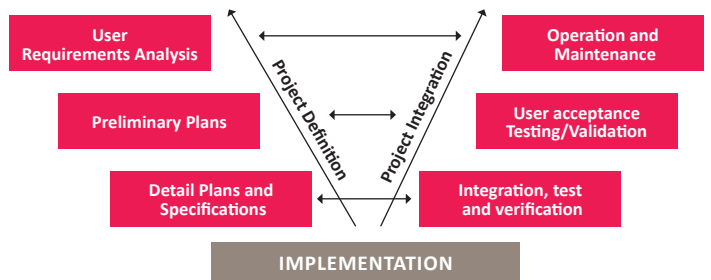


Diagram of the Systems V-Model Approach that will be utilized for the MTS TPSS Project.

As part of the Project Definition Phase, starting with the kickoff meeting, Ja-Mie will introduce the leads for each design element to MTS project management staff in order to clarify the roles and responsibilities of the project, and review MTS’s project requirements, goals, and objectives for each substation location.

Project development team meetings with MTS will be used by Ja-Mie and his team to prepare the Preliminary Plans. To finalize the Detailed Plans and Specifications, Ja-Mie will have regular Design Team Meetings with MTS to ensure involvement with the design progress until design completion.

### Task 3: Scope of Work Development and Data Collection

#### SITE INVESTIGATION:

To facilitate our site assessment we will work with MTS to review and confirm information from the as-built drawings for items such as existing survey markers, existing system infrastructure (manholes, conduits, feed locations) for the proposed sites.

### Task 4: Design Development 4.1 COST ESTIMATE

Cost estimators Thomas Zostant and Adrian Charest bring more than 30 years each of cost estimating experience across a wide range of project types that involve civil and systems facility estimates. Thomas has provided cost estimates for rail projects like the Sound Transit Northgate/Eastlink LRT and the NY Amtrak Sunnyside Yard Expansion. Adrian has performed estimates for MD Amtrak's Jerrico Park substation expansion. Key elements of our cost estimating experience include:

- Escalating project costs based off industry escalation trends to mid-point of construction, including accounting for post-COVID price volatility.
- Performing market surveys to validate pricing and trends in local markets and the validation of a baseline estimate against the project's available funding/budget.
- Identifying potential value engineering opportunities at the onset of design that align with the project scope and vision.

#### 4.1.1 CONCEPT COST ESTIMATE:

The concept cost estimate will be developed as a high-level tool for obtaining funding approval. It will utilize historical projects that have similar characteristics with factoring methods. Construction quantities will be derived from high-level project measurements with influence from the selected project's elements. Construction costs will be derived from the selected projects, escalated in time as well as localized to account for inflation and regional cost changes, respectively. Project markups will follow typical industry and STV standards with contingency recommendations according to AACE Recommended Practice for Cost Estimate Classification expected accuracy range, or equivalent.

#### 4.1.2 65% & 100% COST ESTIMATE:

The 65% Cost Estimate will utilize the respective phase documents prepared by the design team. Construction quantities will be derived more from drawn project elements and less from narratives that describe different components. Construction costs will be a mix of assemblies and unit lines with costing.

The 100% Cost Estimate will involve more deterministic methods than the 65% method. It will utilize the respective phase documents prepared by the design team. Construction quantities will be derived from drawn project elements and construction specifications. Construction costs will be unit lines with material, labor, and equipment costing.

Project markups will follow typical industry and STV standards with contingency recommendations according to AACE Recommended Practice for Cost Estimate Classification expected accuracy range, or equivalent.

### 4.2 SPECIFICATIONS

#### 4.2.1 100% SPECIFICATIONS:

Task Order Manager Ja-Mie and Civil/Site Engineer Robin Osborne will review and revise the existing MTS specifications for this contract. Ja-Mie and his team have experience modifying owner furnished specifications for the UTA SOGR, LA PLE2, LA PLE3S, and the Houston NEXT project.

### 4.3 TPSS INSTALLATION/CONNECTION

TPSS Systems Lead Kee Kwong and OCS Systems Lead Brett Tharp have been involved in all design aspects for TPSS Installation and Connection. Kee provided the complete traction Power design for the Maryland Transit Administration (MTA) Design Scope of Work for Replacement of 18 Prefabricated Traction Power Substations Project, and the MBTA Boston GLX TPS Project that included ground mat design; positive feeder and disconnect assembly details; negative return connections; and single line and sectionalizing diagrams. Most recently on the UTA SOGR Traction Power Substation Rehabilitation TPS, Kee was the traction power lead for all the ductbank routing and connections into the existing system. As the OCS lead for the MBTA GLX and UTA SOGR, Brett was responsible for all OCS layout design and arrangements.

COM Systems Lead Ron Creswell will oversee the fiber optic specification. Ron has more than 35 years of experience as a communications lead and most recently was the Communications Systems Oversight Lead for the BART

Measure RR Traction Power Facility Replacements Project. The project included review of engineering studies; site survey reports; the Conceptual Engineering Report; and 35%, 65%, 95%, 100%. He also provided plans, specifications, and estimates for the design packages.

**4.4 ENVIRONMENTAL**

This project will likely qualify for a CEQA Categorical Exemption (CE) based on the intent to complete all improvements within the MTS right-of-way. The civil group will design the improvements to substantiate the CE and support MTS in preparing the needed design documents.

**4.5 SURVEY**

**4.5.1 TOPOGRAPHIC SURVEY AND CONTROL:**

The team will establish the location of existing topography and surface infrastructure in and adjacent to the sites using California state plane coordinates. This work will be conducted to locate the existing infrastructure horizontally and vertically. The survey will be tied back into established local benchmarks and two durable work points will be set. The field work will also pick up any surface evidence of buried utilities which will be corroborated with as-built information that is collected.

**4.5.2 R/W/PROPERTY LINE SURVEY:**

The team will research existing record of surveys, as-builts, monument surveys, plats, legal descriptions, and similar documents to determine the location of nearby survey monuments. A field survey of nearby monuments will be used in conjunction with the researched survey data to establish the location of the right-of-way lines in the design drawings.

**4.6 STREET DESIGNS**

Determining site access is key to the success of the TPSS installation. Civil/Site Engineer Robin worked on the Blue Line Trolley Rehabilitation project which occurred concurrently with the replacement of several TPSS substations within the same corridor. He worked on developing access for the TPSS, including the one just south of the Pacific Fleet station. Work included looking at the capabilities of the delivery vehicle, pavement section requirements, driveway access from S 32nd Street, and future MTS maintenance access requirements. The team will work with MTS to determine the device parameters and dimensions for each install location. The team will use our understanding of work windows, construction phasing and constructability to determine site access needs and develop temporary roadway modification, access/installation, and the access plan. **For example, the installation of the TPSS that is near Dairy Mart Road, will not only need sufficient room to**

**accommodate delivery of the new TPSS unit, but since the old TPSS may be further away from the roadway access, it may also need to allow the old unit to be removed without impacting the recently installed unit.** The delivery options and potential routes to the site will be used along with our understanding of local municipalities to develop detour plans and traffic control plans.

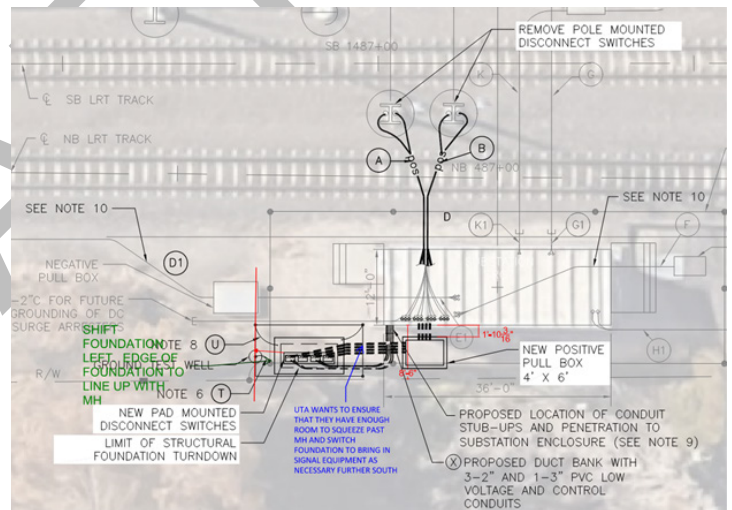
**4.7 SITE PREPARATION AND DEMOLITION**

The CRA team will oversee site development and demolition required for the new sites. They will work with TPSS Lead Kee Kwong to check feasibility of utilizing the existing traction power manholes to reduce costs to MTS.

**4.8 SITE PLANS**

**4.8.1 SITE CONCEPTS:**

As part of the site concept development, the team will identify proposed locations for all the civil infrastructure and connections to the OCS.



*Site Concept Design for UTA SOGR project.*

**4.9 GRADING AND DRAINAGE:**

**4.9.1 GRADING:**

Robin and the team will consider required equipment clearance, future maintenance access for workers and vehicles especially for larger pieces of equipment and proximity of existing infrastructure when designing slopes, retaining walls and other site features. For example, considerations such as placing the TPSS in coastal areas that may be tidally affected and above

the 100-year flood elevation with a buffer for anticipated sea level rise. Our team will consider soil cover to infrastructure such as pads, foundations, grounding nets and incoming conduit runs.

#### 4.9.2 DRAINAGE:

The CRA team will maintain positive drainage away from the TPSS, and intercept any offsite run-on. If the project creates more than 5,000 sq feet (about the area of a basketball court) of impervious area, or disturbs more than an acre it may be subject to the requirements of the Regional Water Quality Control Board (RWQCB) General Permit. There are exemptions allowed for maintenance projects and projects within a right-of-way so the team will work with the RWQCB to determine if the project is exempt.

#### 4.10 EROSION AND SEDIMENT CONTROLS:

The team understands the applicability of Best Management Practices (BMPs) to specific situations and will design the appropriate BMP per the situation. For example, hay bales are appropriate on gentle slopes, but are inappropriate for steeper slopes. Silt fences are more appropriate on steeper slopes. The Erosion and Sedimentation Control Plans (ESCPs) will cover the areas of temporary disturbance, site access, and final stabilization while accommodating the anticipated site activity.

#### 4.11 UTILITIES:

Utilities Lead Gregg Butsko will address the new utility service to the sites and ascertain possible underground conflicts. Gregg has San Diego Gas Electric (SDGE) experience and previously worked on the MTS Midcoast LRT project.

#### 4.12 STRUCTURES DESIGN FOR SUBSTATION FOUNDATIONS:

Structural Engineer Brian Olp and his team will provide a foundation design for the typical TPSS buildings and coordinate with the building suppliers for loadings and necessary structural support details. A concrete slab on grade will be provided for the TPSS foundation with anchorage bolts and connection plates specified for the TPSS building connection. Foundation preparation and any in-situ soil over excavation (if needed) will follow the Geotechnical report recommendations from Geotech Lead Nick Tracy of the Leighton Group. Associated details such as conduit locations, stairways, and aprons will also be detailed on the foundation plan based on requirements of TPSS buildings. Two typical TPSS designs are assumed to be required with associated details.

If excavation for the TPSS foundation, manholes, ductbanks

or associated subbase preparation is required near the active railroads, the team will evaluate and design a temporary shoring scheme considering the required live load surcharge pressures. **On the UTA SOGR project, Brian evaluated the surcharge at key locations where excavation was within 15' of the centerline of track and developed the shoring requirements for the general contractor to follow for the construction of the ductbank.**

#### 4.12.1 GEOTECHNICAL:

**Geotech Lead Nick Tracy will rely on his valuable past experience working with MTS, specifically on Traction Power Substations, to complete the geotechnical investigations for the five substation sites.**

Initial project setup and site coordination are key to the success of the project. The first steps will be to renew MTS safety training for field personnel, as needed, and prepare a Health and Safety Plan (HASP). Prior to any field work, Nick and his team will complete a Right-of-Entry Permit and request a flagger for our initial site walk. During the site walk, the proposed explorations will be marked out and cleared by a third-party utility locator (CPL) and Dig Alert will be notified. In addition, Nick and his team will obtain a drill permit from the County of San Diego as required for explorations deeper than 20 feet.

Upon receiving appropriate permits and approvals from MTS, Nick and the team will perform the geotechnical investigation, which will consist of 1 small diameter boring to a maximum depth of 50 feet and 1 field resistivity test using the Wenner Method (50 feet maximum spacing or as constrained by existing site conditions) at each TPSS location. The boreholes will be logged by a geologist and representative soil samples will be collected at 5-foot intervals and transferred to our laboratory for testing.

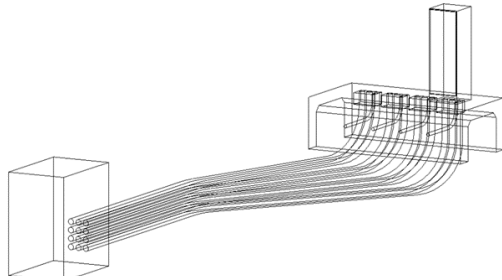
Following the field investigation, Nick and the team will prepare separate geotechnical reports for each TPSS summarizing the results of the field and laboratory testing and providing geotechnical recommendations for design of the TPSS foundations and ground mat.

## C. Innovative Approach and Timely Completion of the Project

Our team members have built a reputation in the transportation field for comprehensive analysis for optimal solutions, quality, and innovative approaches. Having worked for a traction power equipment supplier previously (Siemens), Task Order Manager Ja-Mie and some of his team members bring experience delivering traction electrification system solutions across North



America. Ja-Mie and his team can optimize a TPSS foundation design to accommodate a variety of traction power equipment suppliers such as Siemens, Secheron, and Balfour Beatty. Ja-Mie will be able to tap into STV's additional traction power resources to evaluate the MTS Yard 1 and 2 loading for confirmation of the 2.0 MW rating. Depending on the TPSS location, to minimize impacts to the track the team will evaluate the feasibility of reusing the existing manholes that connect to the track. For the UTA SOGR project, Ja-Mie and his team modeled the existing manhole, ductbank and new pad mounted disconnect switch to validate the constructability.



**UTA Existing MH and New Switch Ductbank Model**

Collaborating is one of the strongest assets for a timely completion of a project. One of the best practices the team recommends implementing is having a weekly technical working group with MTS to discuss design progress, to discuss any potential issues the design team is having, or address any

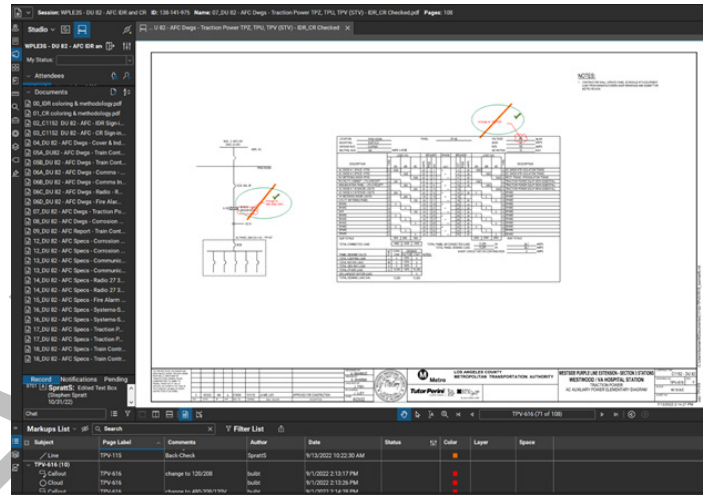


**New UTA Disconnect Switch Ductbank**

developing concerns from the MTS. Ja-Mie has successfully used this process with the UTA SOGR TPSS Rehabilitation Project for the traction power design, overhead contact

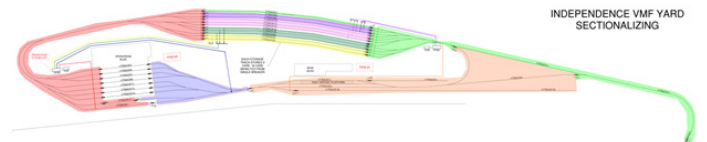
system, and structural design elements.

For our Quality Control process, the team will be utilizing Bluebeam Studio that allows for interdisciplinary reviews. Bluebeam Revu Studio Sessions combines the best of cloud storage and collaboration. The PDF will be uploaded to a Studio Session, and attendees will be invited to view and add markups to the same PDFs in real time. All session activity is tracked in a record that conveniently links back to the PDFs. Ja-Mie and Stephen have used this for the multi-disciplined Los Angeles MTA PLE2 and PLE3S projects where multiple firms were used for the design effort.



**Bluebeam Revu Studio project dashboard showing collaborative design work space.**

To address MTS's concerns with the MTS Yard 1 and Yard 2 TPSS sizing, the team will be able to evaluate the loading of the existing yard based upon track occupancy. As part of the Charlotte Area Transit System (CATS) Silver Line Project, team member Brett Tharp, evaluated TPSS sizing for two substations in the Independence Vehicle Maintenance Facility.



**CATS loading of existing yard based upon track occupancy.**

## 4. Schedule

### A. Team Ability to Meet MTS's Proposed Schedule

The overall team is comprised of CRA, STV, the Leighton Group, NV5, Aguirre & Associates, and Reddy Engineering. As outlined in the organizational chart, the is poised to meet MTS's proposed schedule by tackling the scope of work in a staggered fashion. Should it be required, the team has multiple resources who can work on key tasks for the differing sites concurrently to maintain schedule.

The general approach, at a high level, starts with receiving NTP (Notice to Proceed), requesting information, performing surveys, and gathering geotech and site testing information. The requested information includes as-built, site, and utilities information, as well as the MTS data necessary to perform a load TPSS sizing analysis to determine the yard traction power substation sizing.

In order to issue 100% designs for all locations within the scheduled timeframe, meetings between MTS, the design team, and the primary discipline leads, will be held weekly to ensure the coordination of topics between designers and MTS are addressed in a timely manner.

Concurrently, after receiving MTS's information and completion of survey, conceptual design will be conducted for Dairyland and Fletcher sites, and the TPSS sizing evaluation will be conducted for the Yard based on track occupancy to determine TPSS sizing requirements. Meetings and design with SDGE will be scheduled to start once site information is received from MTS, giving a basis for coordination. Dairyland and Fletcher 65%, and 100% design will be completed followed by design step estimates for each phase for these locations. Conformed drawings and specifications will be issued for these two sites.

Once the TPSS sizing analysis is completed for the Yard, the design team will also begin work on the conceptual design, 35%, 65%, and 100% designs for Sweetwater, Yard 1, and Yard 2 designs. There will be some efficiencies gained by the design team from having completed Dairyland and Fletcher first, allowing for an expedited design for the remaining three sites within MTS's proposed schedule.

## B. Local Resources to be Utilized for Proposed Services and How They Will Ensure Project Remains on Schedule

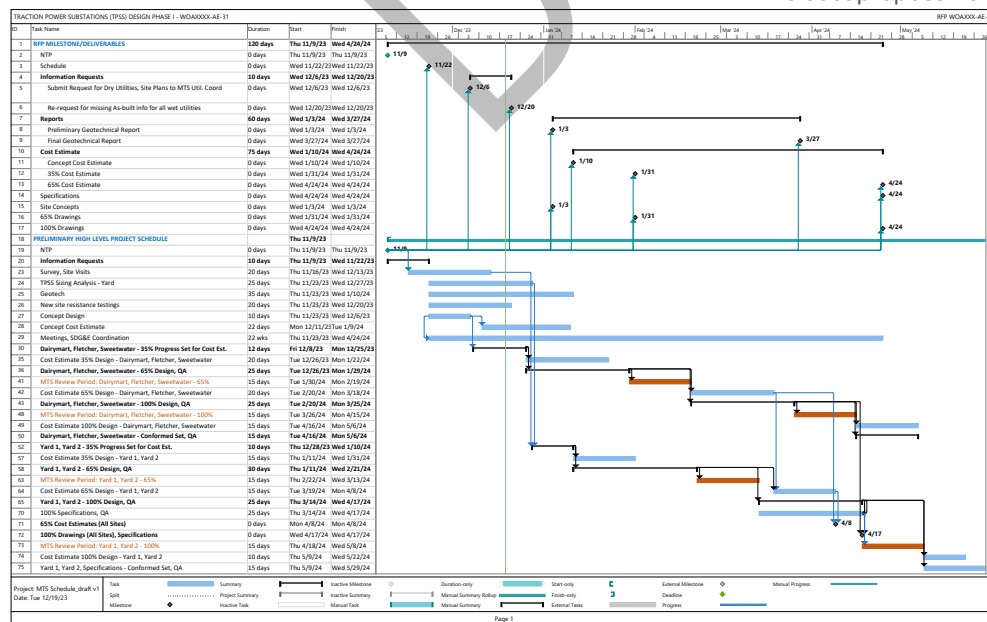
CRA understands the importance of having local firms with MTS experience to support the MTS's goals to remain on schedule with the Phase 1 Design. CRA's working relationships with local firms Aguirre & Associates, Leighton Group, NV5 and RES, along with STV, ensures open lines of communication and collaboration exists between firms. Our team has been collaborating about our approach to this work and have defined roles and responsibilities necessary to delivery a quality product to the MTS.

## 5. DBE Subcontractor Utilization Plan

CRA is a Caltrans certified Disadvantaged Business Enterprise (DBE). We have enlisted the services of two of our DBE subconsultants, Aguirre & Associates, for survey and mapping support and Reddy Engineering for Landscaping support. Overall, our estimated DBE percentage for this project will exceed 20%.

## Cost Proposal

The cost proposal for this task will be submitted separately.



CRA's Project Schedule for the MTS TPSS Project

**ATTACHMENT B  
NEGOTIATED FEE PROPOSAL**

DRAFT

**Work Order Estimate  
Summary**

Att.A, AI 5, 01/18/24



MTS Doc. No. **PWL357.0-22**  
 Work Order No. **WOA357-AE-31**  
 Attachment: **B**

Work Order Title: **TRACTION POWER SUBSTATIONS (TPSS) DESIGN  
PHASE I**

Project No:

**Table 1 - Cost Codes Summary (Costs & Hours)**

Item	Cost Codes	Cost Codes Description	Total Costs
1		Labor - CRA	\$339,768.19
2		Expenses - CRA	\$1,405.00
3		Labor - STV	\$1,290,431.99
4		Expenses - STV	\$53,452.80
5		Labor - NV5	\$160,818.00
6		Expenses - NV5	
7		Labor - Aguirre & Associates	\$54,993.56
8		Expenses - Aguirre & Associates	
9		Labor - Leighton Group	\$106,665.95
10		Expenses - Leighton Group	\$39,890.00

Totals = **\$2,047,425.49**

**Table 2 - TASKS/WBS Summary (Costs & Hours)**

Item	TASKS/WBS	TASKS/WBS Description	Labor Hrs	Total Costs
1	1	Project Management	332.0	\$93,864.71
2	2	Meetings	249.0	\$169,129.83
3	3	Scope of Work Development and Data Collection	382.0	\$111,432.76
4	4	Design Development	7,326.0	\$1,672,998.19
5				

Totals = **8,289.0**      **\$2,047,425.49**

**Table 3 - Consultant/Subconsultant Summary (Costs & Hours)**

(If Applicable, Select One)				Consultant	Labor Hrs	Total Costs
DBE	DVBE	SBE	Other			
x		x		CR Associates	1,713.0	\$341,173.19
				STV	5,074.0	\$1,343,884.79
				NV5	823.0	\$160,818.00
x		x		Aguirre & Associates	292.0	\$54,993.56
				Leighton Group	387.0	\$146,555.95

Totals = **8,289.0**      **\$2,047,425.49**

Note: Potholing will be conducted as needed upon MTS approval and will be invoiced at direct cost.

# Work Order Estimate Summary

Att.A, AI 5, 01/18/24

Total Hours =	1,713
Total Costs =	\$339,768.19

Consultant/Subconsultant: **CRA**

MTS Doc. No.: **PWL357.0-22**

Work Order Title: **TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I**

Work Order No.: **WOA357-AE-31**

Attachment: **B**

Item	TASKS/WBS	TASKS/WBS Description	ODCs (See Attachment)	Contract Manager	Project Manager	Senior Engineer	Engineer - 3	Engineer - 2	Engineer - 1	Intern	Admin - 2	Total Hours	Totals
				\$ 305.25	\$ 301.86	\$ 249.85	\$ 193.89	\$ 156.44	\$ 131.15	\$ 113.62	\$ 122.10		
<b>1</b>	<b>Task 1</b>	<b>Project Management</b>											
	1.1	Document Control and File Sharing		4	8		16				16	44	\$8,691.72
	1.2	Submittals (Conceptual, 35%, 65%, 100%, Conformed)		6	12	20						38	\$10,450.82
	1.3	Schedules		10	10							20	\$6,071.10
		Subtotals (Hours) =	N/A	20	30	20	16				16	102	\$25,213.64
		Subtotals (Costs) =		\$6,105.00	\$9,055.80	\$4,997.00	\$3,102.24				\$1,953.60	<b>102</b>	<b>\$25,213.64</b>
<b>2</b>	<b>Task 2</b>	<b>Meetings</b>											
		Kick Off Meeting		2	2	2						6	\$1,713.92
		Project Development Team Meetings	\$927.50		24	16	10					70	\$20,213.64
		Design Team Meetings		20	24	10	10					64	\$17,787.04
		Subtotals (Hours) =	N/A	42	50	28	20					140	\$39,714.60
		Subtotals (Costs) =	\$12,820.50	\$15,093.00	\$6,995.80	\$3,877.80						<b>140</b>	<b>\$38,787.10</b>
<b>3</b>	<b>Task 3</b>	<b>Scope of Work Development and Data Collection</b>											
		Review Record Documents & As-Built Drawings			4	16	24					44	\$9,858.40
		Site Investigation	\$477.50		4	20	20					44	\$10,559.74
		Subtotals (Hours) =	N/A		8	36	44					88	\$20,418.14
		Subtotals (Costs) =			\$2,414.88	\$8,994.60	\$8,531.16					<b>88</b>	<b>\$19,940.64</b>
<b>4</b>	<b>Task 4</b>	<b>Design Development</b>											
	4.1	Cost Estimate											
		Concept Cost Estimate		1	2	2	6	8	20			39	\$6,446.53
		65% Cost Estimate		1	2	2	6	8	20			39	\$6,446.53
		100% Cost Estimate		1	2	2	4	8	12			29	\$5,009.55
	4.2	Specifications (100% - Edits to MTS provided Specs)		2	8	16	28					54	\$12,451.90
	4.3	TPSS Installation / Connection Plans (65%, 100% - 5 sites)		6	8	8						22	\$6,245.18
	4.4	Environmental (provide 35% plans to MTS)			2	4						6	\$1,603.12
	4.5	Survey											
		Topographical Survey and Control		2	8	4	4					18	\$4,800.34
		R/W/Property Line Survey		2	8	4	4					18	\$4,800.34
	4.6	Street Designs		2	10	20						32	\$8,626.10
	4.7	Site Preparation & Demolition		6	16	20	40	40	80	20		222	\$38,435.86
	4.8	Site Plans		6	20	16	40	80	100	20		282	\$47,524.50
	4.9	Grading and Drainage											
		Grading		4	16	24	60	100	120	40		364	\$59,607.36
		Drainage		4	12	40	60	60	40			216	\$41,103.12
	4.10	Erosion and Sediment Controls		2	4	10						16	\$4,316.44
	4.11	Utilities		4	8		8					20	\$5,187.00
	4.12	Structures Design for Substation Foundations		2	4							6	\$1,817.94
		Subtotals (Hours) =	N/A	45	130	172	260	304	392	80		1,383	\$254,421.81
		Subtotals (Costs) =	\$1,405.00	\$13,736.25	\$39,241.80	\$42,974.20	\$50,411.40	\$47,557.76	\$51,410.80	\$9,089.60		<b>1,383</b>	<b>\$255,826.81</b>
		<b>Totals (Summary) =</b>										<b>1,713</b>	<b>\$339,768.19</b>
		Total (Hours) =	N/A	107	218	256	340	304	392	80	16	1713	
		Total (Costs) =	\$1,405.00	\$32,661.75	\$65,805.48	\$63,961.60	\$65,922.60	\$47,557.76	\$51,410.80	\$9,089.60	\$1,953.60		\$339,768.19
		Percentage of Total (Hours) =	N/A	6%	13%	15%	20%	18%	23%	5%	1%	100%	
		Percentage of Total (Costs) =	0%	10%	19%	19%	19%	14%	15%	3%	1%		100%

**Work Order Estimate  
Summary**

Att.A, AI 5, 01/18/24

Consultant/ Subconsultant: **CRA**

Contract No: **PWL357.0-22**

Work Order Title: **TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I**

Task Order No. **WOA357-AE-31**

Attachment: **B**

**TASKS/WBS (1-5)**

ODC Item	Description	Unit	Unit Cost	Task 1		Task 2		Task 3		Task 4		Task 5	
				Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total
1	Parking	EA	\$30.00			20	\$600.00	5	\$150.00				
2	Personal Mileage	MI	\$0.66			500	\$327.50	500	\$327.50				
3													
4													
5													
6													
7													
8													
9													
10													
				Subtotal =		Subtotal =	\$927.50	Subtotal =	\$477.50	Subtotal =		Subtotal =	

**TASKS/WBS (6-10)**

ODC Item	Description	Task 1		Task 2		Task 3		Task 4		Task 5		Totals	
		Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total
1	Parking											25	\$750.00
2	Personal Mileage											1,000	\$655.00
3													
4													
5													
6													
7													
8													
9													
10													
		Subtotal =		Subtotal =		Subtotal =		Subtotal =		Subtotal =		Totals =	\$1,405.00

Total Hours = **5,074**  
 Total Costs = **\$1,290,431.99**

Consultant/Subconsultant: **STV**

Revised from as-submitted

MTS Doc. No.: **PWL357.0-22**

Work Order No.: **WOA357-AE-31**

Work Order Title: **TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I**

Attachment: **B**

Item	TASKS/WBS	TASKS/WBS Description	ODCs (See Attachment)	Contract Manager	Project Manager	Technical Expert - QA/QC	Engineer - Principle (Structural)	Engineer - Senior (Structural)	Engineer - Principle (Traction Power)	Engineer - 3 (Traction Power)	Engineer - Principle (Civil)	Engineer - 3 (Civil)	Engineer - 2 (Civil)	Scheduler - Senior	Engineer - Principle (OCS)	Engineer - 3 (OCS)	Project Controls - 3 (Cost Est.)	Project Controls - Senior (Cost Est.)	Total Hours	Totals
1	<b>Task 1</b>	<b>Project Management</b>		\$ 332.54	\$ 280.50	\$ 297.45	\$ 319.48	\$ 227.48	\$ 319.48	\$ 183.71	\$ 319.48	\$ 183.71	\$ 128.96	\$ 207.28	\$ 319.48	\$ 183.71	\$ 182.22	\$ 201.48		
	1.1	Document Control and File Sharing	\$0.00	48		8													56	\$18,341.52
	1.2	Submittals (Conceptual, 35%, 65%, 100%, Conformed)		32		96													128	\$39,196.48
	1.3	Schedules		9		5								32					46	\$11,113.07
		Subtotals (Hours) =	N/A	89	0	109	0	0	0	0	0	0	0	32	0	0	0	0	230	\$68,651.07
		Subtotals (Costs) =	\$0.00	\$29,596.06	\$0.00	\$32,422.05	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$6,632.96	\$0.00	\$0.00	\$0.00	\$0.00	230	\$68,651.07
2	<b>Task 2</b>	<b>Meetings</b>		\$48,778.40																
		Kick Off Meeting		2		2	1	1	1	1	1			1	1	1	1	1	14	\$52,502.18
		Project Development Team Meetings		10		10	5	5	5	5					5	5			50	\$14,526.60
		Design Team Meetings		10		10	5	5	5	5					5	5			45	\$13,608.05
		Subtotals (Hours) =	N/A	22	0	22	11	11	11	11	0	0	0	1	11	6	1	1	109	\$80,636.83
		Subtotals (Costs) =	\$48,778.40	\$7,315.88	\$0.00	\$6,543.90	\$3,514.28	\$227.48	\$3,514.28	\$2,020.81	\$3,514.28	\$0.00	\$0.00	\$207.28	\$3,514.28	\$1,102.26	\$182.22	\$201.48	109	\$80,636.83
3	<b>Task 3</b>	<b>Scope of Work Development and Data Collection</b>																		
		Review Record Documents & As-Built Drawings		24		24	24	24	24	24	10	24			24				202	\$55,594.72
		Site Investigation		16						16	10	10			16				92	\$28,071.10
		Subtotals (Hours) =	N/A	40	0	24	24	24	48	40	20	34	0	0	40	0	0	0	294	\$86,340.22
		Subtotals (Costs) =	\$4,674.40	\$13,301.60	\$0.00	\$7,138.80	\$7,667.52	\$5,459.52	\$15,335.04	\$7,348.40	\$6,389.60	\$6,246.14	\$0.00	\$0.00	\$12,779.20	\$0.00	\$0.00	\$0.00	294	\$86,340.22
4	<b>Task 4</b>	<b>Design Development</b>																		
		4.1 Cost Estimate									10	15	15						0	\$0.00
		Concept Cost Estimate		2		2					10	15	15						484	\$91,632.83
		65% Cost Estimate		2		2					10	15	15						328	\$62,513.15
		100% Cost Estimate		2		2					10	15	15						244	\$46,744.43
		4.2 Specifications (100% - Edits to MTS provided Specs)		2		2	40		100	40	10								194	\$60,603.48
		4.3 TPSS Installation / Connection Plans (65%, 100% - 5 sites)		2		24		112	679	431					332	405			1,985	\$509,857.48
		4.4 Environmental (provide 35% plans to MTS)		2		2													4	\$1,259.98
		4.5 Survey																	0	\$0.00
		Topographical Survey and Control		2		2				5	10								19	\$4,694.48
		R/W/Property Line Survey		2		2				5	10								19	\$4,694.48
		4.6 Street Designs		2		2				72	96	138							310	\$59,695.18
		4.7 Site Preparation & Demolition		2		2				30									34	\$10,844.38
		4.8 Site Plans		2		2				28									32	\$10,205.42
		4.9 Grading and Drainage																	0	\$0.00
		Grading		2		2				34									38	\$12,122.30
		Drainage		2		2				34									38	\$12,122.30
		4.10 Erosion and Sediment Controls		2		2				34	72	92							202	\$37,213.74
		4.11 Utilities		2		2				50	40								92	\$23,987.48
		4.12 Structures Design for Substation Foundations		2		2	123	293											418	\$106,612.76
		Subtotals (Hours) =	N/A	32	0	50	163	405	779	431	362	283	275	0	332	405	660	264	4,441	\$1,054,803.87
		Subtotals (Costs) =	\$0.00	\$10,641.28	\$0.00	\$14,872.50	\$52,075.24	\$92,129.40	\$248,874.92	\$79,179.01	\$115,651.76	\$51,989.93	\$35,464.00	\$0.00	\$106,067.36	\$74,402.55	\$120,265.20	\$53,190.72	4,441	\$1,054,803.87
		<b>Totals (Summary) =</b>																	<b>5,074</b>	<b>\$1,290,431.99</b>
		Total (Hours) =	N/A	183	0	205	198	430	838	482	393	317	275	33	383	411	661	265	5,074	
		Total (Costs) =	\$53,452.80	\$60,854.82	\$0.00	\$60,977.25	\$63,257.04	\$97,816.40	\$267,724.24	\$88,548.22	\$125,555.64	\$58,236.07	\$35,464.00	\$6,840.24	\$122,360.84	\$75,504.81	\$120,447.42	\$53,392.20		\$1,290,431.99
		Percentage of Total (Hours) =	N/A	4%	0%	4%	4%	8%	17%	9%	8%	6%	5%	1%	8%	8%	13%	5%	100%	
		Percentage of Total (Costs) =	4%	5%	0%	5%	5%	8%	21%	7%	10%	5%	3%	1%	9%	6%	9%	4%		100%

Consultant/ Subconsultant: **STV**

Contract No: **PWL357.0-22**

Work Order Title: **TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I**

Task Order No. **WOA357-AE-31**

Attachment: **B**

ODC Item	Description	Unit	Unit Cost	TASKS/WBS (1-5)									
				Task 1		Task 2		Task 3		Task 4		Task 5	
				Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total
1	Airfare	EA	\$621.85		\$0.00	44	\$27,361.40	4	\$2,487.40		\$0.00		\$0.00
2	Lodging	EA	\$186.00		\$0.00	44	\$8,184.00	4	\$744.00		\$0.00		\$0.00
3	Per Diem	EA	\$74.00		\$0.00	88	\$6,512.00	8	\$592.00		\$0.00		\$0.00
4	Transportation(Lyft)	EA	\$60.00		\$0.00	44	\$2,640.00	8	\$480.00		\$0.00		\$0.00
5	Parking	EA	\$30.00		\$0.00	88	\$2,640.00	8	\$240.00		\$0.00		\$0.00
6	Personal Mileage	MI	\$0.66		\$0.00	2,200	\$1,441.00	200	\$131.00		\$0.00		\$0.00
7					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
8					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
9					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
10					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
				Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$48,778.40</b>	Subtotal =	<b>\$4,674.40</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>

ODC Item	Description	TASKS/WBS (6-10)										Totals			
		Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total		
		1	Airfare		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
2	Lodging		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>48</b>	<b>\$8,928.00</b>
3	Per Diem	<b>0</b>	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>96</b>	<b>\$7,104.00</b>
4	Transportation(Lyft)		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>52</b>	<b>\$3,120.00</b>
5	Parking		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>96</b>	<b>\$2,880.00</b>
6	Personal Mileage		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>2,400</b>	<b>\$1,572.00</b>
7	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>
8	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>
9	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>
10	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>
		Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Totals =	<b>\$53,452.80</b>



Total Hours = **823**  
 Total Costs = **\$160,818.00**

Consultant/Subconsultant: **NV5**

MTS Doc. No.: **PWL357.0-22**

Work Order No.: **WOA357-AE-31**

Work Order Title: **TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I**

Attachment: **B**

Item	TASKS/WBS	TASKS/WBS Description	ODCs (See Attachment)	Managing Principal	Design Principal	Technical Specialist / Expert	Senior Designer	PC	Designer 2					Total Hours	Totals
				\$ 206.00	\$ 206.00	\$ 204.00	\$ 170.00	\$ 127.00	\$ 159.00						
1	<b>Task 1</b>	<b>Project Management</b>													
	1.1	Document Control and File Sharing	\$0.00											0	\$0.00
	1.2	Submittals (Conceptual, 35%, 65%, 100%, Conformed)												0	\$0.00
	1.3	Schedules												0	\$0.00
		Subtotals (Hours) =	N/A	0	0	0	0	0	0	0	0	0	0	0	\$0.00
		Subtotals (Costs) =	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	\$0.00
2	<b>Task 2</b>	<b>Meetings</b>													
		Kick Off Meeting												0	\$0.00
		Project Development Team Meetings												0	\$0.00
		Design Team Meetings												0	\$0.00
		Subtotals (Hours) =	N/A	0	0	0	0	0	0	0	0	0	0	0	\$0.00
		Subtotals (Costs) =	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	\$0.00
3	<b>Task 3</b>	<b>Scope of Work Development and Data Collection</b>													
		Review Record Documents & As-Built Drawings												0	\$0.00
		Site Investigation												0	\$0.00
		Subtotals (Hours) =	N/A	0	0	0	0	0	0	0	0	0	0	0	\$0.00
		Subtotals (Costs) =	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	\$0.00
4	<b>Task 4</b>	<b>Design Development</b>													
	4.1	Cost Estimate												0	\$0.00
		Concept Cost Estimate												0	\$0.00
		65% Cost Estimate												0	\$0.00
		100% Cost Estimate												0	\$0.00
	4.2	Specifications (100% - Edits to MTS provided Specs)												0	\$0.00
	4.3	TPSS Installation / Connection Plans (65%, 100% - 5 sites)												0	\$0.00
	4.4	Environmental (provide 35% plans to MTS)												0	\$0.00
	4.5	Survey												0	\$0.00
		Topographical Survey and Control												0	\$0.00
		R/W/Property Line Survey												0	\$0.00
	4.6	Street Designs												0	\$0.00
	4.7	Site Preparation & Demolition												0	\$0.00
	4.8	Site Plans												0	\$0.00
	4.9	Grading and Drainage												0	\$0.00
		Grading												0	\$0.00
		Drainage												0	\$0.00
	4.10	Erosion and Sediment Controls												0	\$0.00
	4.11	Utilities		175	138	410	0	100	0					823	\$160,818.00
	4.12	Structures Design for Substation Foundations												0	\$0.00
		Subtotals (Hours) =	N/A	175	138	410	0	100	0	0	0	0	0	823	\$160,818.00
		Subtotals (Costs) =	\$0.00	\$36,050.00	\$28,428.00	\$83,640.00	\$0.00	\$12,700.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	823	\$160,818.00
	<b>Totals (Summary) =</b>												<b>823</b>	<b>\$160,818.00</b>	
	Total (Hours) =	N/A	175	138	410	0	100	0	0	0	0	0	0	823	\$160,818.00
	Total (Costs) =	\$0.00	\$36,050.00	\$28,428.00	\$83,640.00	\$0.00	\$12,700.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00		\$160,818.00
	Percentage of Total (Hours) =	N/A	21%	17%	50%	0%	12%	0%	0%	0%	0%	0%	0%	100%	
	Percentage of Total (Costs) =	0%	22%	18%	52%	0%	8%	0%	0%	0%	0%	0%	0%		100%

Consultant/ Subconsultant: **NV5**

Contract No: **PWL357.0-22**

Work Order Title: **TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I**

Task Order No. **WOA357-AE-31**

Attachment: **B**

ODC Item	Description	Unit	Unit Cost	TASKS/WBS (1-5)												
				Task 1		Task 2		Task 3		Task 4		Task 5				
				Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total			
1	Airfare	EA	\$621.85		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
2	Lodging	EA	\$186.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
3	Per Diem	EA	\$74.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
4	Transportation(Lyft)	EA	\$60.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
5	Parking	EA	\$30.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
6	Personal Mileage	MI	\$0.66		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
7					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
8					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
9					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
10					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	
Subtotal =				<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>

ODC Item	Description	TASKS/WBS (6-10)										Totals					
		Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total				
		1	Airfare		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>
2	Lodging		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>		
3	Per Diem	<b>0</b>	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>		
4	Transportation(Lyft)		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>		
5	Parking		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>		
6	Personal Mileage		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>		
7	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>		
8	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>		
9	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>		
10	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	<b>0</b>	<b>\$0.00</b>		
Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Totals =		<b>\$0.00</b>

Total Hours =

292

Total Costs =

\$54,993.56

Consultant/Subconsultant: Aguirre & Associates

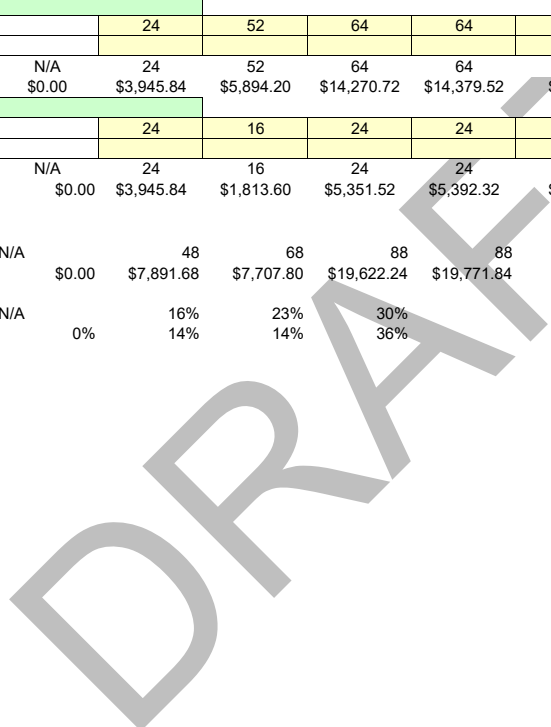
MTS Doc. No.: PWL357.0-22

Work Order No.: WOA357-AE-31

Work Order Title: TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I

Attachment: B

Item	TASKS/WBS	TASKS/WBS Description	ODCs (See Attachment)	Surveyor-Senior	Surveyor-3	Party Chief (PW)	Chainman (PW)	\$	\$	\$	\$	\$	Total Hours	Totals
			\$	164.41	113.35	222.98	224.68	-	-	-	-	-		
1	<b>Task 4.5.1</b>													
		Topographic Survey and Control		24	52	64	64						204	\$38,490.28
													0	\$0.00
		Subtotals (Hours) =	N/A	24	52	64	64	0	0	0	0	0	204	\$38,490.28
		Subtotals (Costs) =	\$0.00	\$3,945.84	\$5,894.20	\$14,270.72	\$14,379.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	204	\$38,490.28
2	<b>Task 4.5.2</b>													
		R/W Property Line Survey		24	16	24	24						88	\$16,503.28
													0	\$0.00
		Subtotals (Hours) =	N/A	24	16	24	24	0	0	0	0	0	88	\$16,503.28
		Subtotals (Costs) =	\$0.00	\$3,945.84	\$1,813.60	\$5,351.52	\$5,392.32	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	88	\$16,503.28
		<b>Totals (Summary) =</b>											<b>292</b>	<b>\$54,993.56</b>
		Total (Hours) =	N/A	48	68	88	88	0	0	0	0	0	292	
		Total (Costs) =	\$0.00	\$7,891.68	\$7,707.80	\$19,622.24	\$19,771.84	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00		\$54,993.56
		Percentage of Total (Hours) =	N/A	16%	23%	30%	30%	0%	0%	0%	0%	0	70%	
		Percentage of Total (Costs) =	0%	14%	14%	36%	36%	0%	0%	0%	0%	0		64%



Consultant/ Subconsultant: **Aguirre & Associates**

Contract No: **PWL357.0-22**

Work Order Title: **TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I**

Task Order No. **WOA357-AE-31**

Attachment: **B**

ODC Item	Description	Unit	Unit Cost	TASKS/WBS (1-5)											
				Task 1		Task 2		Task 3		Task 4		Task 5			
				Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total		
1					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
2					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
3					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
4					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
5					\$0.00		\$0.00	0	\$0.00		\$0.00		\$0.00		\$0.00
6					\$0.00		\$0.00	0	\$0.00		\$0.00		\$0.00		\$0.00
7					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
8					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
9					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
10					\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
				Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>

ODC Item	Description	TASKS/WBS (6-10)										Totals			
		Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total		
		1	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00
2	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	0	\$0.00
3	#REF!	0	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	0	\$0.00
4	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	0	\$0.00
5	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	0	\$0.00
6	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	0	\$0.00
7	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	0	\$0.00
8	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	0	\$0.00
9	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	0	\$0.00
10	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	0	\$0.00
		Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Subtotal =	<b>\$0.00</b>	Totals =	<b>\$0.00</b>

Consultant/Subconsultant: **Leighton Consulting, Inc.**

MTS Doc. No.: **PWL357.0-22**

Total Hours =	<b>387</b>
Total Costs =	<b>\$106,665.95</b>

Work Order No.: **WOA357-AE-31**

Work Order Title: **TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I**

Attachment: **B**

Item	TASKS/WBS	TASKS/WBS Description	ODCs (See Attachment)	Engineer - Principal	Engineer - Senior	Engineer - 3	Geologist - Senior	Geologist - 3	Geologist - 2	PW Filed Soils/Material Tester	Admin - 3	Admin - Senior	GIS Specialist - Senior	Total Hours	Totals
				\$ 280.13	\$ 231.06	\$ 129.33	\$ 225.95	\$ 140.06	\$ 107.65	\$ 221.20	\$ 96.09	\$ 102.06	\$ 163.01		
<b>1</b>	<b>Task 1 - Setup</b>														
	Project Setup			4	12						4	4		24	\$4,685.84
	Review Existing Geotechnical Information				5		4						3	12	\$2,548.13
	Obtain ROE Permits							16						16	\$2,240.96
	Flagging Requests							16						16	\$2,240.96
	Drill Permits							16						16	\$2,240.96
	Training							12						12	\$1,680.72
	Subtotals (Hours) =	N/A		4	17	0	4	60	0	0	4	4	3	96	\$15,637.57
	Subtotals (Costs) =	\$0.00	\$1,120.52	\$3,928.02	\$0.00	\$903.80	\$8,403.60	\$0.00	\$0.00	\$384.36	\$408.24	\$489.03		<b>96</b>	<b>\$15,637.57</b>
<b>2</b>	<b>Task 2 - Field</b>														
	Subcontractors	\$36,150.00												0	\$36,150.00
	Utility Markout			4				20						24	\$3,725.44
	Borings			4				40						44	\$6,526.64
	Wenner Resistivity Testing			4						50				54	\$11,984.24
	Drum Disposal							20						20	\$2,801.20
	Management			4	4	4						4	4	20	\$3,622.36
	Subtotals (Hours) =	N/A		4	16	4	0	80	0	50	0	4	4	162	\$64,809.88
	Subtotals (Costs) =	\$36,150.00	\$1,120.52	\$3,696.96	\$517.32	\$0.00	\$11,204.80	\$0.00	\$11,060.00	\$0.00	\$408.24	\$652.04		<b>162</b>	<b>\$64,809.88</b>
<b>3</b>	<b>Task 3 - Lab</b>														
	Laboratory Tests	\$3,740.00												0	\$3,740.00
	Analysis													0	\$0.00
	Subtotals (Hours) =	N/A		0	0	0	0	0	0	0	0	0	0	0	\$3,740.00
	Subtotals (Costs) =	\$3,740.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00		<b>0</b>	<b>\$3,740.00</b>
<b>4</b>	<b>Task 4 - Report</b>														
	Prepare Boring Logs							8						8	\$1,120.48
	Geotechnical Analysis			2	8	8	8	5						31	\$5,951.28
	Prepare Figures					8		8					16	36	\$5,171.52
	Prepare Final Reports (4)			8	16		8	8			10	4		54	\$10,235.22
	Subtotals (Hours) =	N/A		10	24	16	16	29	0	0	10	8	16	129	\$22,478.50
	Subtotals (Costs) =	\$0.00	\$2,801.30	\$5,545.44	\$2,069.28	\$3,615.20	\$4,061.74	\$0.00	\$0.00	\$960.90	\$816.48	\$2,608.16		<b>129</b>	<b>\$22,478.50</b>
	<b>Totals (Summary) =</b>													<b>387</b>	<b>\$106,665.95</b>
	Total (Hours) =	N/A		18	57	20	20	169	0	50	14	16	23	387	
	Total (Costs) =	\$39,890.00	\$5,042.34	\$13,170.42	\$2,586.60	\$4,519.00	\$23,670.14	\$0.00	\$11,060.00	\$1,345.26	\$1,632.96	\$3,749.23			\$106,665.95
	Percentage of Total (Hours) =	N/A		5%	15%	5%		44%	0%	13%	4%	4%	0.05943152	95%	
	Percentage of Total (Costs) =	37%	5%	12%	2%		22%	0%	10%	1%	2%	0.03514927		92%	

Consultant/ Subconsultant: Leighton Consulting, Inc.

Contract No: PWL357-0-22

Work Order Title: TRACTION POWER SUBSTATIONS (TPSS) DESIGN PHASE I

Task Order No. WOA357-AE-31

Attachment: B

ODC Item	Description	Unit	Unit Cost	TASKS/WBS (1-5)												
				Task 1		Task 2		Task 3		Task 4		Task 5				
				Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total			
1	Utility Locator	hr	\$375.00		\$0.00	20	\$7,500.00		\$0.00		\$0.00		\$0.00		\$0.00	
2	Driller	hr	\$525.00		\$0.00	42	\$22,050.00		\$0.00		\$0.00		\$0.00		\$0.00	
3	Drum Disposal	ea	\$350.00		\$0.00	10	\$3,500.00		\$0.00		\$0.00		\$0.00		\$0.00	
4	Coring	hr	\$350.00		\$0.00	6	\$2,100.00		\$0.00		\$0.00		\$0.00		\$0.00	
5	Drill Permit	ea	\$250.00		\$0.00	4	\$1,000.00	0	\$0.00		\$0.00		\$0.00		\$0.00	
6	Moisture & Density	ea	\$30.00		\$0.00		\$0.00	16	\$480.00		\$0.00		\$0.00		\$0.00	
7	Expansion Index	ea	\$130.00		\$0.00		\$0.00	4	\$520.00		\$0.00		\$0.00		\$0.00	
8	Sieve Analysis	ea	\$135.00		\$0.00		\$0.00	4	\$540.00		\$0.00		\$0.00		\$0.00	
9	Direct Shear	ea	\$285.00		\$0.00		\$0.00	4	\$1,140.00		\$0.00		\$0.00		\$0.00	
10	Corrosion Suite	ea	\$265.00		\$0.00		\$0.00	4	\$1,060.00		\$0.00		\$0.00		\$0.00	
Subtotal =				<b>\$0.00</b>	Subtotal =		<b>\$36,150.00</b>	Subtotal =		<b>\$3,740.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>

ODC Item	Description	TASKS/WBS (6-10)										Totals					
		Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total				
		1	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	20	\$7,500.00
2	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	42	\$22,050.00		
3	#REF!	0	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	10	\$3,500.00		
4	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	6	\$2,100.00		
5	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	4	\$1,000.00		
6	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	16	\$480.00		
7	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	4	\$520.00		
8	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	4	\$540.00		
9	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	4	\$1,140.00		
10	#REF!		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	4	\$1,060.00		
Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Subtotal =		<b>\$0.00</b>	Totals =		<b>\$39,890.00</b>



## Agenda Item No. 6

### MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM BOARD OF DIRECTORS

January 18, 2024

#### SUBJECT:

Regional Communications System (RCS) Radios Purchase and Installation – Sole Source Contract Award

#### RECOMMENDATION:

That the San Diego Metropolitan Transit System (MTS) Board of Directors authorize the Chief Executive Officer (CEO) to execute MTS Doc. No. G2846.0-24 (in substantially the same format as Attachment A), with Motorola Solutions, Inc in the amount of \$266,395.10 for a period of four (4) base years.

#### Budget Impact

The total cost of this contract is estimated to be \$266,395.10. The project will be funded by the Security Budget account 420010-571250.

#### DISCUSSION:

The San Diego - Imperial County Regional Communications System (RCS) provides public safety voice and data communications to over 116 local, state, and federal agencies in San Diego and Imperial counties, including over 20,000 active radios on the system. A high degree of coverage throughout both Counties is provided for the purpose of improving public safety, public service communications, and interoperability.

The RCS vision is to provide seamless communication for public safety and public service agencies that serve 3,700,000 people in San Diego County and Imperial County. The RCS is run through a shared governance structure. An RCS Board of Directors was created to provide Administrative direction and oversight and consists of Chief/Department Head level personnel from Fire, Law, and Public Service entities, representing their peer Agencies. The San Diego County Sheriff's Department's Wireless Services Division oversees the operation and maintenance of the RCS.

Use of the RCS system by MTS's Transit Security and Passenger Safety Department allows field personnel to communicate effectively and reliably with the communications center as well as their partners in the field. Communications take place using RCS radios.



MTS field personnel now use Motorola APX 6000 model 2.5 portable radios, Motorola APX 6500 vehicle mounted radios and base stations for our dispatch center for internal and external communications, utilizing existing San Diego RCS repeaters and support systems. Our field personnel, as well as the communications center dispatchers, can communicate directly with other public safety agencies such as the San Diego Sheriff's Department, the San Diego Police Department and various fire departments throughout the region.

The MTS Transit Security and Passenger Safety Department currently have 214 of the Motorola APX 6000 model 2.5 portable radios that are utilized by Transit Security management, 15 field supervisors (sergeants), 62 Code Compliance Inspectors (CCI) and approximately 200 contracted security officers.

On September 14, 2023 (AI 22), the Board approved an expansion of the Transit Security and Passenger Safety Department, equaling 47 new full-time positions. With the expansion, additional RCS radios (handheld and vehicle mounted), accessories and spare batteries are needed to properly equip the new employees.

Because Motorola radios are proprietary and sells radios at list pricing through all of its vendors, staff is not able to obtain multiple quotes for radio equipment. MTS must pay list pricing for Motorola radios.

However, MTS participates in RCS as a customer agency (ref: MTS Doc. No. G1893.0-16 as amended). RCS participants have the ability to use negotiated pricing with Motorola to purchase radios and other related equipment. Per County of San Diego contract number 553982, MTS is currently able to receive a discount from list pricing of radios and radio equipment. MTS would not be able to negotiate a lower price than what is offered through the RCS discount.

Today's proposed action would approve the sole source purchase and installation of an additional forty-one (41) handheld and seven (7) vehicle radios, including required accessories and a three-year service agreement to support the recent expansion of the Transit Security and Passenger Safety Department.

Staff's Independent Cost Estimate (ICE) is based on MTS' past purchase history with Motorola Solutions, Inc. In comparison with the ICE amount of \$285,943.22 and the offer received, staff has determined that the proposed cost is fair and reasonable.

The table below shows the savings by a comparison of MTS's ICE and Motorola Solutions, Inc's quote.

Description	Amount
MTS ICE	\$285,943.22
Motorola Solutions, Inc	\$266,395.10
MTS savings (MTS ICE vs Motorola's quote)	\$19,548.12

Therefore, staff recommends that the MTS Board of Directors authorize the CEO to execute MTS Doc. No. G2846.0-24, with Motorola Solutions, Inc. in the amount of \$266,395.10 for a period of four (4) base years.



/S/ Sharon Cooney

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Sharon Cooney  
Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)

Attachments: A. Draft Agreement, MTS Doc. No G2846.0-24  
B. Scope of Work  
C. Motorola Quote



# Metropolitan Transit System

## STANDARD AGREEMENT FOR MTS DOC. NO. G2846.0-24

THIS AGREEMENT is entered into this \_\_\_\_ day of \_\_\_\_\_, 2024 in the State of California by and between San Diego Metropolitan Transit System (“MTS”), a California public agency, and the following, hereinafter referred to as "Contractor":

Name: Motorola Solutions, Inc Address: 500 W Monroe St  
Chicago IL 60661  
 Form of Business: Corporation City State Zip  
 Telephone: (858) 864-3660 Email: [lauren.kirkland@motorolasolutions.com](mailto:lauren.kirkland@motorolasolutions.com)  
 Authorized person to sign contracts: Lauren Kirkland Area Sales Manager  
 Name Title

The Contractor agrees to provide services with goods as specified in the conformed Scope of Work/Technical Specification (Exhibit A), Contractor’s Cost/Pricing Form (Exhibit B), and in accordance with the Standard Agreement, including Standard Conditions (Exhibit C), Forms (Exhibit D).

The contract term is for a (4) year period (inclusive of the 3-year service support) effective January 19, 2024 through January 19, 2028.

Payment terms shall be net 30 days from invoice date. The total cost of this contract shall not exceed \$266,395.10 without the express written consent of MTS.

SAN DIEGO METROPOLITAN TRANSIT SYSTEM	MOTOROLA SOLUTIONS, INC
By: <u>Sharon Cooney, Chief Executive Officer</u>	By: _____
Approved as to form:	Title: _____
By: <u>Karen Landers, General Counsel</u>	





**Metropolitan  
Transit  
System**

## **San Diego Metropolitan Transit System Transit Security and Passenger Safety Department Handheld RCS and Vehicle Radio**

### **Scope of Work**

#### **Overview**

The San Diego Metropolitan Transit System, Department of Transit Security and Passenger Safety intends to acquire forty-one (41) Motorola APX 6000 2.5 portable radios and seven (7) Motorola APX6500 vehicle mounted radios. The Regional Communications System (RCS) is a wireless voice communications system used by law enforcement, fire departments and other emergency service providers in San Diego and Imperial Counties to communicate using wireless radios throughout San Diego and Imperial Counties.

#### **Objective**

The Regional Communications System (RCS) is a reliable system managed by the San Diego RCS. By switching to the RCS system in March 2021, the Transit Security and Passenger Safety Department immediately improved the ability of our field personnel to communicate effectively and reliably with the communications center as well as their partners in the field. Through the acquisition of our RCS radios, our field personnel now use Motorola APX 6000 model 2.5 portable radios, Motorola APX 6500 vehicle mounted radios and base stations for our dispatch center for internal and external communications, utilizing existing San Diego RCS repeaters and support systems. Our field personnel, as well as the communications center dispatchers, can now communicate directly with other public safety agencies such as the San Diego Sheriff's Department, the San Diego Police Department and various fire departments throughout the region.

The SDMTS Transit Security and Passenger Safety Department currently has 214 RCS radios that are utilized by Transit Security management, 15 field supervisors (sergeants), 62 Code Compliance Inspectors and approximately 200 contracted security officers. With the recent expansion of the Transit Security and Passenger Safety Department, an additional 41 handheld and 7 vehicle radios, accessories and spare batteries are much needed to continue a safe and efficient field operations.



Quantity	Item Description	Unit Of Measure (ea, lb., ft., box, gal)	Unit Price	Total Price*
41	<b>APX6000 Model 2.5 Portable Radio</b> Equipped with: - Astro Digital Operation - Smartzone Trunking Operation - P25 9600 Baud Trunking Operation - TDMA Operation (P25 Phase 2) - Li-Ion Impres 2, 5100 MAH Battery (PMNN4494) Tall - Over the air programming (OTAP)	ea	\$ 4,923.60	\$ 201,867.60
41	<b>APX Spare Battery</b> <i>Li-ion, 5100 MAH (Tall Battery)</i>	ea	\$ 196.02	\$ 8,036.82
41	Portable Radio - 3year warranty	ea	\$ 145.00	\$ 5,945.00
7	<b>APX6500 Vehicle Radios</b> Equipped with: - Palm Microphone - Astro Digital CAI OP APX - O7 Control Head - Remote Mount Mid Power - APX Control Head Software - P25 Trunking Software - Smartzone Operation APX6500 - Ant ¼ Wave 762-780 MHZ - Auxiliary Spkr 7.5 Watt - TDMA Operation (P25 Phase 2) - No GPS Antenna Needed - Over the air programming	ea	\$ 5,442.00	\$ 38,094.00
7	Magnetic Clip	ea	\$ 75.00	\$ 525.00
7	Vehicle Radio Installation	ea	\$ 4,285.20	\$ 29,996.40
7	Vehicle Radio - 3year warranty	ea	\$ 211.20	\$ 1,478.40



Shipping Address:  
 SAN DIEGO METROPOLITAN  
 TRANSIT SYSTEM  
 1341 COMMERCIAL ST  
 BUILDING B  
 SAN DIEGO, CA 92113  
 US

Quote Date:12/20/2023  
 Expiration Date:02/18/2024  
 Quote Created By:  
 Andy Grimm  
 agrimm@daywireless.com  
 858-864-3660

End Customer:  
 SAN DIEGO TROLLEY  
 Brianda Diaz  
 brianda.diaz@sdmts.com  
 619-557-4580

Contract: 32526 - COUNTY OF SAN  
 DIEGO RCS 553982

(41) APX6000 RCS Radios. Model 2.5 w Tall battery. Each radio comes with antenna, battery, plastic radio holder.  
 (7) APX6500 Mobiles with O7 Heads, with vehicle installation.

Line #	Item Number	Description	Qty	List Price	Sale Price	Ext. Sale Price
	APX™ 6000 Series	APX6000				
1	H98UCF9PW6BN	APX6000 700/800 MODEL 2.5 PORTABLE	41	\$3,595.00	\$2,606.38	\$106,861.58
1a	G996AU	ADD: PROGRAMMING OVER P25 (OTAP)	41	\$110.00	\$79.75	\$3,269.75
1b	QA05573AA	ALT: LI-ION IMPRES 2 IP68 5100MAH	41	\$156.45	\$113.43	\$4,650.63
1c	Q667BB	ADD: ADP ONLY (NON-P25 CAP COMPLIANT) (US ONLY)	41	\$0.00	\$0.00	\$0.00
1d	Q361AR	ADD: P25 9600 BAUD TRUNKING	41	\$330.00	\$239.25	\$9,809.25
1e	Q58AL	ADD: 3Y ESSENTIAL SERVICE	41	\$184.00	\$184.00	\$7,544.00
1f	QA00580AC	ADD: TDMA OPERATION	41	\$495.00	\$358.88	\$14,714.08
1g	H38BT	ADD: SMARTZONE OPERATION	41	\$1,320.00	\$957.00	\$39,237.00
1h	QA09113AB	ADD: BASELINE RELEASE SW	41	\$0.00	\$0.00	\$0.00



Any sales transaction following Motorola's quote is based on and subject to the terms and conditions of the valid and executed written contract between Customer and Motorola (the "Underlying Agreement") that authorizes Customer to purchase equipment and/or services or license software (collectively "Products"). If no Underlying Agreement exists between Motorola and Customer, then Motorola's Standard Terms of Use and Motorola's Standard Terms and Conditions of Sales and Supply shall govern the purchase of the Products.  
 Motorola Solutions, Inc.: 500 West Monroe, United States - 60661 ~ #: 36-1115800



Line #	Item Number	Description	Qty	List Price	Sale Price	Ext. Sale Price
1i	Q806BM	ADD: ASTRO DIGITAL CAI OPERATION	41	\$567.00	\$411.08	\$16,854.28
	APX™ 6500 / Enh Series	ENHANCEDAPX6500				
2	M25URS9PW1BN	APX6500 ENHANCED 7/800 MHZ MOBILE	7	\$3,383.12	\$2,452.76	\$17,169.32
2a	G996AS	ENH: OVER THE AIR PROVISIONING	7	\$110.00	\$79.75	\$558.25
2b	GA00580AA	ADD: TDMA OPERATION	7	\$495.00	\$358.88	\$2,512.16
2c	G51AU	ENH: SMARTZONE OPERATION APX6500	7	\$1,320.00	\$957.00	\$6,699.00
2d	G67DU	ADD: REMOTE MOUNT O7 APXM	7	\$327.00	\$237.08	\$1,659.56
2e	G78AT	ENH: 3 YEAR ESSENTIAL SVC	7	\$288.00	\$288.00	\$2,016.00
2f	GA01606AA	ADD: NO BLUETOOTH/ WIFI/GPS ANTENNA NEEDED	7	\$0.00	\$0.00	\$0.00
2g	B18CR	ADD: AUXILIARY SPKR 7.5 WATT APX	7	\$66.00	\$47.85	\$334.95
2h	GA00805AA	ADD: APX O7 CONTROL HEAD (STANDARD KEYPAD)	7	\$695.00	\$503.88	\$3,527.16
2i	G444AH	ADD: APX CONTROL HEAD SOFTWARE	7	\$0.00	\$0.00	\$0.00
2j	G335AW	ADD: ANT 1/4 WAVE 762-870MHZ	7	\$15.00	\$10.88	\$76.16
2k	G806BL	ENH: ASTRO DIGITAL CAI OP APX	7	\$567.00	\$411.08	\$2,877.56
2l	W22BA	ADD: STD PALM MICROPHONE APX	7	\$79.00	\$57.28	\$400.96
2m	QA09113AB	ADD: BASELINE RELEASE SW	7	\$0.00	\$0.00	\$0.00
2n	G193AK	ADD: ADP ONLY (NON-P25 CAP COMPLIANT) (US ONLY)	7	\$0.00	\$0.00	\$0.00
2o	G361AH	ENH: P25 TRUNKING SOFTWARE APX	7	\$330.00	\$239.25	\$1,674.75
Product Services						



Any sales transaction following Motorola's quote is based on and subject to the terms and conditions of the valid and executed written contract between Customer and Motorola (the "Underlying Agreement") that authorizes Customer to purchase equipment and/or services or license software (collectively "Products"). If no Underlying Agreement exists between Motorola and Customer, then Motorola's Standard Terms of Use and Motorola's Standard Terms and Conditions of Sales and Supply shall govern the purchase of the Products.

Motorola Solutions, Inc.: 500 West Monroe, United States - 60661 ~ #: 36-1115800



Line #	Item Number	Description	Qty	List Price	Sale Price	Ext. Sale Price
3	LSV00Q00203A	Install (7) APX6500 Mobile Radios in vehicles	1	\$5,900.00	\$5,900.00	\$5,900.00
Subtotal						\$248,346.40
Estimated Tax						\$18,048.70
Grand Total				<b>\$266,395.10(USD)</b>		

Notes:

- Shipping is included at no charge. Warranty and Installation is not taxed. Taxable amount is \$232,886.40. Tax rate 7.75%.





<b>Purchase Order Checklist</b>	
<b>Marked as PO/ Contract/ Notice to Proceed on Company Letterhead (PO will not be processed without this)</b>	
<b>PO Number/ Contract Number</b>	
<b>PO Date</b>	
<b>Vendor = Motorola Solutions, Inc.</b>	
<b>Payment (Billing) Terms/ State Contract Number</b>	
<b>Bill-To Name on PO must be equal to the <i>Legal</i> Bill-To Name</b>	
<b>Bill-To Address</b>	
<b>Ship-To Address (If we are shipping to a MR location, it must be documented on PO)</b>	
<b>Ultimate Address (If the Ship-To address is the MR location then the Ultimate Destination address must be documented on PO )</b>	
<b>PO Amount must be equal to or greater than Order Total</b>	
<b>Non-Editable Format (Word/ Excel templates cannot be accepted)</b>	
<b>Bill To Contact Name &amp; Phone # and EMAIL for customer accounts payable dept</b>	
<b>Ship To Contact Name &amp; Phone #</b>	
<b>Tax Exemption Status</b>	
<b>Signatures (As required)</b>	





**Metropolitan  
Transit  
System**

## **Agenda Item No. 7**

MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS

January 18, 2024

**SUBJECT:**

Operations Budget Status Report for November 2023

**INFORMATIONAL ONLY**

Budget Impact

None.

**DISCUSSION:**

This report summarizes the year-to-date operating results for November 2023 compared to the fiscal year (FY) 2024 budget for the San Diego Metropolitan Transit System (MTS). Attachment A-1 combines the operations', administrations' and other activities' results for November 2023. Attachment A-2 details the November 2023 combined operations' results and Attachments A-3 to A-7 present budget comparisons for each MTS operation. Attachment A-8 details budget comparisons for MTS Administration, and Attachment A-9 provides November 2023 results for MTS's other activities (For Hire Vehicle Administration/San Diego and Arizona Eastern Railway Company).

### **MTS NET-OPERATING SUBSIDY RESULTS**

As indicated within Attachment A-1, for the year-to-date period ending November 2023, MTS's net-operating income unfavorable variance totaled \$420,000 (-0.3%). Operations produced a \$2,359,000 (-1.9%) unfavorable variance and the administrative/other activities areas were favorable by \$1,939,000.

### **MTS COMBINED RESULTS**

Operating Revenues. Year-to-date combined revenues through November 2023 were \$42,309,000, compared to the year-to-date budget of \$42,783,000, representing a \$474,000 (-1.1%) unfavorable variance. Year-to-date passenger revenue was unfavorable by \$2,062,000 (-6.4%) through November. Passenger revenue is up by \$1,674,000 (5.9%) versus the prior year.

Other operating revenue was favorable by \$1,589,000 (14.8%), primarily due to interest income.



Operating Expenses. Year-to-date combined expenses through November 2023 were \$165,731,000, compared to the budget of \$165,785,000, representing a \$53,000 favorable variance.

Personnel Costs. Year-to-date personnel-related costs totaled \$73,362,000, compared to a budgetary figure of \$72,601,000, producing an unfavorable variance of \$761,000 (-1.0%). This is primarily due to unfavorable Operator, Flag-person, and Facility Maintenance wages, worker's compensation, and CalPERS management costs within Rail Operations as well as unfavorable health and welfare costs within Bus Operations.

Outside Services and Purchased Transportation. Total outside services through five months of the fiscal year totaled \$58,135,000, compared to a budget of \$59,031,000, resulting in a favorable variance of \$896,000 (1.5%). This is primarily due to favorable purchased transportation costs and performance bonuses within Contracted Services - Fixed Route due to service levels being lower than budgeted levels as a result of the driver shortage. Outside Services costs within Administration are also significantly favorable, primarily due to favorable Pronto software operating and maintenance costs.

Materials and Supplies. Total year-to-date materials and supplies expenses were \$7,288,000, compared to a budgetary figure of \$6,777,000, resulting in an unfavorable variance of \$512,000 (-7.5%). This is primarily due to unfavorable revenue vehicle parts expense within Rail and Bus Operations partially offset by favorable equipment maintenance supplies expense within Rail Operations.

Energy. Total year-to-date energy costs were \$20,612,000, compared to the budget of \$20,300,000, resulting in an unfavorable variance of \$312,000 (-1.5%). This is primarily due to unfavorable commodity rates for both compressed natural gas (CNG) and electricity. CNG costs are also unfavorable due to higher consumption versus budget.

Risk Management. Total year-to-date expenses for Risk Management were \$3,307,000 compared to the budget of \$3,861,000, resulting in a favorable variance totaling \$554,000 (14.4%). This is primarily due to favorable legal costs within Administrative, Bus and Rail Operations.

General and Administrative. The year-to-date general and administrative costs were \$2,303,000 through November 2023, compared to a budget of \$2,527,000, resulting in a favorable variance of \$223,000 (8.8%). This is primarily due to favorable credit card fees, fare materials, and office supplies.

Vehicle and Facility Leases. The year-to-date vehicle and facilities leases costs were \$723,000 compared to the budget of \$688,000, resulting in a \$35,000 (-5.1%) unfavorable variance.

#### YEAR-TO-DATE SUMMARY

The November 2023, year-to-date net-operating income totaled an unfavorable variance of \$420,000 (-0.3%). These factors include unfavorable variances in passenger revenue, personnel, materials and supplies, energy, and vehicle/facility lease costs; partially offset by favorable variances in other revenue, outside services, risk management, and general and administrative costs.

/S/ Sharon Cooney

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Sharon Cooney  
Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)

Attachment: A. Comparison to Budget

MTS  
CONSOLIDATED

COMPARISON TO BUDGET - FISCAL YEAR 2023  
NOVEMBER 30, 2023  
(in \$000's)

	YEAR TO DATE			
	ACTUAL	BUDGET	VARIANCE	VAR. %
Passenger Revenue	\$ 30,014	\$ 32,077	\$ (2,062)	-6.4%
Other Revenue	12,295	10,706	1,589	14.8%
<b>Total Operating Revenue</b>	<b>\$ 42,309</b>	<b>\$ 42,783</b>	<b>\$ (474)</b>	<b>-1.1%</b>
Personnel costs	\$ 73,362	\$ 72,601	\$ (761)	-1.0%
Outside services	58,135	59,031	896	1.5%
Materials and supplies	7,288	6,777	(512)	-7.5%
Energy	20,612	20,300	(312)	-1.5%
Risk management	3,307	3,861	554	14.4%
General & administrative	2,303	2,527	223	8.8%
Vehicle/facility leases	723	688	(35)	-5.1%
Administrative Allocation	-	0	0	0.0%
<b>Total Operating Expenses</b>	<b>\$ 165,731</b>	<b>\$ 165,785</b>	<b>\$ 53</b>	<b>0.0%</b>
<b>Operating Income (Loss)</b>	<b>\$ (123,422)</b>	<b>\$ (123,002)</b>	<b>\$ (420)</b>	<b>-0.3%</b>
<b>Total Non-Operating Activities</b>	<b>923</b>	<b>463</b>	<b>460</b>	<b>99.5%</b>
<b>Income (Loss) before Capital Contributions</b>	<b>\$ (122,499)</b>	<b>\$ (122,539)</b>	<b>\$ 40</b>	<b>0.0%</b>

**OPERATIONS  
CONSOLIDATED**

**COMPARISON TO BUDGET - FISCAL YEAR 2023**

**NOVEMBER 30, 2023**

**(in \$000's)**

	YEAR TO DATE			
	ACTUAL	BUDGET	VARIANCE	VAR. %
Passenger Revenue	\$ 30,014	\$ 32,077	\$ (2,062)	-6.4%
Other Revenue	375	266	109	41.2%
<b>Total Operating Revenue</b>	<b>\$ 30,389</b>	<b>\$ 32,342</b>	<b>\$ (1,953)</b>	<b>-6.0%</b>
Personnel costs	\$ 61,455	\$ 60,772	\$ (683)	-1.1%
Outside services	47,554	48,258	703	1.5%
Materials and supplies	7,273	6,760	(513)	-7.6%
Energy	20,081	19,783	(297)	-1.5%
Risk management	3,037	3,382	345	10.2%
General & administrative	386	436	50	11.4%
Vehicle/facility leases	587	576	(11)	-1.9%
Administrative Allocation	13,436	13,436	0	0.0%
<b>Total Operating Expenses</b>	<b>\$ 153,808</b>	<b>\$ 153,402</b>	<b>\$ (406)</b>	<b>-0.3%</b>
<b>Operating Income (Loss)</b>	<b>\$ (123,419)</b>	<b>\$ (121,060)</b>	<b>\$ (2,359)</b>	<b>-1.9%</b>
<b>Total Non-Operating Activities</b>	<b>329</b>	<b>400</b>	<b>(71)</b>	<b>-17.8%</b>
<b>Income (Loss) before Capital Contributions</b>	<b>\$ (123,090)</b>	<b>\$ (120,661)</b>	<b>\$ (2,430)</b>	<b>2.0%</b>

OPERATIONS

BUS - DIRECTLY OPERATED (SAN DIEGO TRANSIT CORP.)

COMPARISON TO BUDGET - FISCAL YEAR 2023

NOVEMBER 30, 2023

(in \$000's)

	YEAR TO DATE			
	ACTUAL	BUDGET	VARIANCE	VAR. %
Passenger Revenue	\$ 8,091	\$ 8,687	\$ (596)	-6.9%
Other Revenue	59	-	59	-
<b>Total Operating Revenue</b>	<b>\$ 8,150</b>	<b>\$ 8,687</b>	<b>\$ (538)</b>	<b>-6.2%</b>
Personnel costs	\$ 38,745	\$ 38,538	\$ (207)	-0.5%
Outside services	886	925	39	4.2%
Materials and supplies	3,074	2,910	(163)	-5.6%
Energy	3,513	3,491	(22)	-0.6%
Risk management	1,479	1,587	108	6.8%
General & administrative	187	197	10	5.2%
Vehicle/facility leases	217	169	(48)	-28.6%
Administrative Allocation	2,188	2,188	0	0.0%
<b>Total Operating Expenses</b>	<b>\$ 50,289</b>	<b>\$ 50,005</b>	<b>\$ (284)</b>	<b>-0.6%</b>
<b>Operating Income (Loss)</b>	<b>\$ (42,139)</b>	<b>\$ (41,318)</b>	<b>\$ (821)</b>	<b>-2.0%</b>
<b>Total Non-Operating Activities</b>	<b>194</b>	<b>265</b>	<b>(71)</b>	<b>-26.8%</b>
<b>Income (Loss) before Capital Contributions</b>	<b>\$ (41,945)</b>	<b>\$ (41,053)</b>	<b>\$ (892)</b>	<b>2.2%</b>

**OPERATIONS**  
**RAIL (SAN DIEGO TROLLEY INC.)**  
**COMPARISON TO BUDGET - FISCAL YEAR 2023**  
**NOVEMBER 30, 2023**  
**(in \$000's)**

	YEAR TO DATE			
	ACTUAL	BUDGET	VARIANCE	VAR. %
Passenger Revenue	\$ 12,395	\$ 12,802	\$ (407)	-3.2%
Other Revenue	316	266	51	19.1%
<b>Total Operating Revenue</b>	<b>\$ 12,711</b>	<b>\$ 13,067</b>	<b>\$ (356)</b>	<b>-2.7%</b>
Personnel costs	\$ 22,345	\$ 21,878	\$ (467)	-2.1%
Outside services	3,370	3,505	134	3.8%
Materials and supplies	4,179	3,816	(362)	-9.5%
Energy	12,355	12,142	(213)	-1.8%
Risk management	1,543	1,779	236	13.3%
General & administrative	194	225	31	14.0%
Vehicle/facility leases	221	252	31	12.2%
Administrative Allocation	10,047	10,047	0	0.0%
<b>Total Operating Expenses</b>	<b>\$ 54,254</b>	<b>\$ 53,645</b>	<b>\$ (610)</b>	<b>-1.1%</b>
<b>Operating Income (Loss)</b>	<b>\$ (41,543)</b>	<b>\$ (40,578)</b>	<b>\$ (966)</b>	<b>-2.4%</b>
<b>Total Non-Operating Activities</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Income (Loss) before Capital Contributions</b>	<b>\$ (41,543)</b>	<b>\$ (40,578)</b>	<b>\$ (966)</b>	<b>2.4%</b>

**OPERATIONS**  
**BUS - CONTRACTED SERVICES (FIXED ROUTE)**  
**COMPARISON TO BUDGET - FISCAL YEAR 2023**  
**NOVEMBER 30, 2023**  
**(in \$000's)**

	YEAR TO DATE			
	ACTUAL	BUDGET	VARIANCE	VAR. %
Passenger Revenue	\$ 8,944	\$ 9,999	\$ (1,055)	-10.6%
Other Revenue	-	-	-	-
<b>Total Operating Revenue</b>	<b>\$ 8,944</b>	<b>\$ 9,999</b>	<b>\$ (1,055)</b>	<b>-10.6%</b>
Personnel costs	\$ 298	\$ 284	\$ (13)	-4.7%
Outside services	35,952	36,557	605	1.7%
Materials and supplies	20	33	13	39.9%
Energy	3,868	3,780	(88)	-2.3%
Risk management	-	-	-	-
General & administrative	3	4	1	17.4%
Vehicle/facility leases	5	12	7	55.7%
Administrative Allocation	1,039	1,039	0	0.0%
<b>Total Operating Expenses</b>	<b>\$ 41,186</b>	<b>\$ 41,710</b>	<b>\$ 524</b>	<b>1.3%</b>
<b>Operating Income (Loss)</b>	<b>\$ (32,242)</b>	<b>\$ (31,711)</b>	<b>\$ (531)</b>	<b>-1.7%</b>
<b>Total Non-Operating Activities</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Income (Loss) before Capital Contributions</b>	<b>\$ (32,242)</b>	<b>\$ (31,711)</b>	<b>\$ (531)</b>	<b>1.7%</b>



**OPERATIONS**  
**BUS - CONTRACTED SERVICES (PARATRANSIT)**  
**COMPARISON TO BUDGET - FISCAL YEAR 2023**  
**NOVEMBER 30, 2023**  
**(in \$000's)**

	YEAR TO DATE			
	ACTUAL	BUDGET	VARIANCE	VAR. %
Passenger Revenue	\$ 585	\$ 589	\$ (4)	-0.7%
Other Revenue	-	-	-	-
<b>Total Operating Revenue</b>	<b>\$ 585</b>	<b>\$ 589</b>	<b>\$ (4)</b>	<b>-0.7%</b>
Personnel costs	\$ 67	\$ 72	\$ 5	6.7%
Outside services	7,211	7,136	(74)	-1.0%
Materials and supplies	-	-	-	-
Energy	345	370	25	6.8%
Risk management	15	15	0	0.3%
General & administrative	2	9	8	81.0%
Vehicle/facility leases	143	143	0	0.1%
Administrative Allocation	163	163	0	0.0%
<b>Total Operating Expenses</b>	<b>\$ 7,944</b>	<b>\$ 7,908</b>	<b>\$ (37)</b>	<b>-0.5%</b>
<b>Operating Income (Loss)</b>	<b>\$ (7,360)</b>	<b>\$ (7,319)</b>	<b>\$ (41)</b>	<b>-0.6%</b>
<b>Total Non-Operating Activities</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Income (Loss) before Capital Contributions</b>	<b>\$ (7,360)</b>	<b>\$ (7,319)</b>	<b>\$ (41)</b>	<b>0.6%</b>

**OPERATIONS  
CORONADO FERRY**

**COMPARISON TO BUDGET - FISCAL YEAR 2023  
NOVEMBER 30, 2023  
(in \$000's)**

	YEAR TO DATE			
	ACTUAL	BUDGET	VARIANCE	VAR. %
Passenger Revenue	\$ -	\$ -	\$ -	-
Other Revenue	-	-	-	-
<b>Total Operating Revenue</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>-</b>
Personnel costs	\$ -	\$ -	\$ -	-
Outside services	135	135	-	0.0%
Materials and supplies	-	-	-	-
Energy	-	-	-	-
Risk management	-	-	-	-
General & administrative	-	-	-	-
Vehicle/facility leases	-	-	-	-
Administrative Allocation	-	-	-	0.0%
<b>Total Operating Expenses</b>	<b>\$ 135</b>	<b>\$ 135</b>	<b>\$ -</b>	<b>0.0%</b>
<b>Operating Income (Loss)</b>	<b>\$ (135)</b>	<b>\$ (135)</b>	<b>\$ -</b>	<b>0.0%</b>
<b>Total Non-Operating Activities</b>	<b>135</b>	<b>135</b>	<b>-</b>	<b>0.0%</b>
<b>Income (Loss) before Capital Contributions</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>-</b>

ADMINISTRATION  
CONSOLIDATED

COMPARISON TO BUDGET - FISCAL YEAR 2023  
NOVEMBER 30, 2023  
(in \$000's)

	YEAR TO DATE			
	ACTUAL	BUDGET	VARIANCE	VAR. %
Passenger Revenue	\$ -	\$ -	\$ -	-
Other Revenue	11,752	10,272	1,480	14.4%
<b>Total Operating Revenue</b>	<b>\$ 11,752</b>	<b>\$ 10,272</b>	<b>\$ 1,480</b>	<b>14.4%</b>
Personnel costs	\$ 11,683	\$ 11,601	\$ (82)	-0.7%
Outside services	10,575	10,749	174	1.6%
Materials and supplies	16	16	1	4.9%
Energy	529	513	(16)	-3.1%
Risk management	244	443	199	45.0%
General & administrative	1,880	2,045	165	8.1%
Vehicle/facility leases	131	104	(27)	-25.5%
Administrative Allocation	(13,442)	(13,442)	(0)	0.0%
<b>Total Operating Expenses</b>	<b>\$ 11,615</b>	<b>\$ 12,029</b>	<b>\$ 414</b>	<b>3.4%</b>
<b>Operating Income (Loss)</b>	<b>\$ 137</b>	<b>\$ (1,758)</b>	<b>\$ 1,895</b>	<b>107.8%</b>
<b>Total Non-Operating Activities</b>	<b>828</b>	<b>63</b>	<b>765</b>	<b>1211.8%</b>
<b>Income (Loss) before Capital Contributions</b>	<b>\$ 965</b>	<b>\$ (1,694)</b>	<b>\$ 2,660</b>	<b>-157.0%</b>

**OTHER ACTIVITIES  
CONSOLIDATED**

**COMPARISON TO BUDGET - FISCAL YEAR 2023**

**NOVEMBER 30, 2023**

**(in \$000's)**

	YEAR TO DATE			
	ACTUAL	BUDGET	VARIANCE	VAR. %
Passenger Revenue	\$ -	\$ -	\$ -	-
Other Revenue	168	169	(1)	-0.7%
<b>Total Operating Revenue</b>	<b>\$ 168</b>	<b>\$ 169</b>	<b>\$ (1)</b>	<b>-0.7%</b>
Personnel costs	\$ 225	\$ 228	\$ 3	1.4%
Outside services	6	25	19	77.5%
Materials and supplies	-	0	0	-
Energy	2	3	1	25.8%
Risk management	26	37	11	28.7%
General & administrative	37	46	9	19.2%
Vehicle/facility leases	6	8	2	26.7%
Administrative Allocation	6	6	0	0.0%
<b>Total Operating Expenses</b>	<b>\$ 308</b>	<b>\$ 353</b>	<b>\$ 45</b>	<b>12.7%</b>
<b>Operating Income (Loss)</b>	<b>\$ (140)</b>	<b>\$ (184)</b>	<b>\$ 44</b>	<b>23.8%</b>
<b>Total Non-Operating Activities</b>	<b>(234)</b>	<b>-</b>	<b>(234)</b>	<b>-</b>
<b>Income (Loss) before Capital Contributions</b>	<b>\$ (374)</b>	<b>\$ (184)</b>	<b>\$ (190)</b>	<b>103.3%</b>



## Agenda Item No. 8

### MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM BOARD OF DIRECTORS

January 18, 2024

#### SUBJECT:

Network Equipment and Services – Contract Award

#### RECOMMENDATION:

That the San Diego Metropolitan Transit System (MTS) Board of Directors authorize the Chief Executive Officer (CEO) to execute MTS Doc. No. G2796.0-24 (in substantially the same format as Attachment A), with Axelliant LLC (Axelliant), a Minority Business Enterprise (MBE), for the purchase of network equipment, services and related license subscriptions, in the amount of \$871,391.03.

#### Budget Impact

The total cost of this contract is estimated to be \$871,391.03. The project will be funded by the Information Technology (IT) Operating Budget account 661010-571250, and by the Capital Improvement Program (CIP) account 1007106201 - Network Equipment Refresh.

#### DISCUSSION:

MTS has a deployment of 80+ physical routers, switches, and 300+ access points throughout the MTS trolley network (Group A) as well as MTS building network equipment (Group B). These network devices are MTS core communication components for all systems and applications, such as Fare systems, Trolley Supervisory Control and Data Acquisition (SCADA) devices, video servers, Voice over Internet Protocol (VoIP), Variable Message Signs (VMS), Radio and other equipment. The average life of a typical network device is five (5) years. Equipment that is at the end of life (beyond five (5) years old) result in increasingly high maintenance costs and a lack of parts availability.

This project is to replace trolley network and MTS building network infrastructure that has reached its lifespan limit before catastrophic failure and to maintain optimum performance and uptime. The contract will include equipment replacement and related services and license subscriptions.

On October 17, 2023, MTS issued an Invitation for Bid (IFB) requesting pricing for network equipment. In response, MTS received quotes from eleven (11) contractors. Although Draycor, Inc. was the lowest bidder, they submitted incomplete bid forms and were deemed non-



responsive. Staff therefore proceeded with the 2<sup>nd</sup> lowest responsive, responsible bidder, Axelliant.

Rank	Bidder	Minority Business Enterprise (MBE), Small Business (SB), Woman-Owned Business (WBE)	Bid Amount
1	Draycor Inc *	SB	\$ 556,849.98
<b>2</b>	<b>Axelliant LLC</b>	<b>MBE</b>	<b>\$ 871,391.03</b>
3	Datel Systems Incorporated	N/A	\$ 879,989.98
4	Saitech, Inc	MBE	\$ 884,058.61
5	Questivity, Inc	DBE & SB	\$ 907,836.73
6	Zones LLC	MBE	\$ 912,518.46
7	Phaeton Solutions, LLC	DBE	\$ 983,399.38
8	Gigakom	SB	\$ 1,026,854.04
9	Eyep Solutions Inc	SB	\$ 1,249,336.38
10	TAB Consultancy Services LLC	N/A	\$ 1,283,654.95
11	GovConnection, Inc	N/A	\$ 1,999,275.50

*\*Non-responsive bidder*

On December 15, 2023, MTS issued a Notice of Intent to Award to Axelliant.

Based on the price comparison of the bids received and MTS's Independent Cost Estimate (ICE) (\$1,112,017.72), staff has determined Axelliant's pricing to be fair and reasonable.

Therefore, staff recommends that the MTS Board of Directors authorize the CEO to execute MTS Doc. No. G2796.0-24 (in substantially the same format as Attachment A), with Axelliant, for the purchase of network equipment, services and related license subscriptions, in the amount of \$871,391.03.

/S/ Sharon Cooney

Sharon Cooney  
Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)

Attachments: A. Draft Agreement, MTS Doc. No. G2796.0-24  
B. Bid Form



# Metropolitan Transit System

## STANDARD AGREEMENT FOR

MTS DOC. NO. G2796.0-24

### NETWORK EQUIPMENT REFRESH

THIS AGREEMENT is entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2024 in the State of California by and between San Diego Metropolitan Transit System (“MTS”), a California public agency, and the following, hereinafter referred to as "Contractor":

Name: Axelliant LLC Address: 21250 Hawthorne Blvd.  
Torrance, CA 90503  
 Form of Business: LLC – S Corporation  
 (Corporation, Partnership, Sole Proprietor, etc.) Email: bidteam@axelliant.com  
 Telephone: (424) 535-1018  
 Authorized person to sign contracts Shahzad Munawwar Chief Operating Officer  
 Name Title

The Contractor agrees to provide services with goods as specified in the conformed Scope of Work/Minimum Technical Specification (Exhibit A), Contractor’s Bid/Pricing Forms (Exhibit B), and in accordance with the Standard Agreement, including Standard Conditions (Exhibit C), and Forms (Exhibit D).

The contract term is for five (5) years effective January 25, 2024 through January 24, 2029.

Payment terms shall be net 30 days from invoice date. The total cost of this contract (inclusive of CA 7.75% sales tax) shall not exceed \$871,391.03 without the express written consent of MTS.

SAN DIEGO METROPOLITAN TRANSIT SYSTEM	AXELLIANT LLC
By: <u>Sharon Cooney, Chief Executive Officer</u>	By _____
Approved as to form:	Title: _____
By: <u>Karen Landers, General Counsel</u>	





**Network Equipment Refresh - Bid Form**

MTS Doc. No. G2796.0-24 (Group A)

Bidder Name:  Axelliant LLC

Cooperative Purchasing Program ref. number: (e.g.GSA, NASPO, CMAS, OMNI reference) if applicable:  Open Market

\*Please specify the reference number of the Cooperative Purchasing Agreement used as the basis of your bid (if applicable).

ITEM	PART NUMBER	ITEM DESCRIPTION	QTY	UOM	UNIT PRICE	EXT. PRICE
<b>Equipment</b>						
1	C9407R	Cisco Catalyst 9400 Series 7 slot chassis	2	EA	\$2,421.28	\$ 4,842.56
2	C9400-PWR-3200AC	Cisco Catalyst 9400 Series 3200W AC Power Supply	6	EA	\$968.52	\$ 5,811.12
3	C9400X-SUP-2XL	Cisco Catalyst 9400 Series Supervisor 2XL Module	2	EA	\$11,647.22	\$ 23,294.44
4	C9400X-SUP-2XL/2	Cisco Catalyst 9400 Series Red Supervisor 2XL Module	2	EA	\$11,647.22	\$ 23,294.44
5	C9400-LC-48XS	Cisco Catalyst 9400 Series 48-Port 10 Gigabit Ethernet(SFP+)	4	EA	\$18,554.87	\$ 74,219.48
6	C9400-LC-48P	Cisco Catalyst 9400 Series 48-Port POE+ 10/100/1000 (RJ-45)	2	EA	\$3,560.73	\$ 7,121.46
7	QSFP-100G-LR4-S	Cisco100GBASE LR4 QSFP Transceiver, LC, 10km over SMF	8	EA	\$10,680.38	\$ 85,443.04
8	SFP-10G-LR-S=	Cisco10GBASE-LR SFP Module, Enterprise-Class	48	EA	\$814.15	\$ 39,079.20
9	SFP-10G-SR-S=	Cisco10GBASE-SR SFP Module, Enterprise-Class	48	EA	\$285.09	\$ 13,684.32
10	C9136I-B	Cisco Catalyst 9136I Series, Internal Antennas,-B Regulator	40	EA	\$1,208.08	\$ 48,323.20
<b>Services (5 Years)</b>						
1	CON-SSSNP-C9407R	SOLN SUPP 24X7X4 Cisco Catalyst 9400	2	EA	\$23,043.41	\$ 46,086.82
2	CON-SSTCM-C94A	SOLN SUPP SW SUBCisco Catalyst 9400	2	EA	\$2,716.06	\$ 5,432.12
3	CON-SSSNT-C9136IBX	SOLN SUPP 8X5XNBD Cisco Catalyst 9136I Series, Internal A	40	EA	\$531.71	\$ 21,268.40
4	CON-SSTCM-AIRDNA	Cisco SOLN SUPP SW SUBAironet CISCO DNA Ad	40	EA	\$132.93	\$ 5,317.20
<b>Subscriptions (5 Years)</b>						
1	C9400-DNA-A-5Y	Cisco Catalyst 9400 DNA Advantage - 5 Year License	2	EA	\$10,169.42	\$ 20,338.84
2	AIR-DNA-A-5Y	SOLN SUPP SW SUBAironet CISCO DNA Ad	40	EA	\$439.16	\$ 17,566.40
Sub-Total						\$ 441,123.04
Shipping/Delivery Charges						\$ -
<b>(BASIS OF AWARD) GRAND TOTAL (All Inclusive):</b>						\$ 441,123.04

**BIDDER ACCEPTS RESPONSIBILITY FOR ACCURACY AND PRESENTATION OF THE ABOVE NUMBERS.**

\*The above quantities are for bidding purposes only and are based on MTS' current usage. They represent what MTS anticipates as a requirement, but MTS does not guarantee this quantity. The actual quantity ordered may be more or less than what is anticipated on the pricing form, and it is dictated by MTS actual requirements and the available funding at the time each order is initiated.

**Bidders pricing should not include sales tax. MTS will add tax at PO issuance.**





**Network Equipment Refresh - Bid Form**

**MTS Doc. No. G2796.0-24 (Group B)**

**Bidder Name:   Axelliant LLC**

Cooperative Purchasing Program ref. number: (e.g. GSA, NASPO, CMAS, OMNI reference) if applicable:   Open Market  

\*Please specify the reference number of the Cooperative Purchasing Agreement used as the basis of your bid (if applicable).

ITEM	PART NUMBER	ITEM DESCRIPTION	QTY	UOM	UNIT PRICE	EXT. PRICE
<b>Equipment</b>						
1	C9300-48UXM-E	Cisco Catalyst 9300 48-port(12 mGig,36 2.5Gbps) Network Essentials	10	EA	\$6,397.46	\$ 63,974.60
2	PWR-C1-1100WAC-P/2	Cisco 1100W AC 80+ platinum Config 1 Secondary Power Supply	10	EA	\$902.05	\$ 9,020.50
3	C9300-NM-8X	Cisco Catalyst 9300 8 x 10GE Network Module	10	EA	\$1,210.64	\$ 12,106.40
4	SFP-10G-LR-S=	Cisco10GBASE-LR SFP Module, Enterprise-Class	10	EA	\$814.15	\$ 8,141.50
5	VG400-2FXS/2FXO	Cisco VG400 Analog Voice Gateway	10	EA	\$1,252.81	\$ 12,528.10
6	ACS-4220-RM-19	19 inch rack mount kit for Cisco ISR 4220 & VG400	10	EA	\$54.61	\$ 546.10
7	C9407R	Cisco Catalyst 9400 Series 7 slot chassis	2	EA	\$2,421.28	\$ 4,842.56
8	C9400-PWR-3200AC	Cisco Catalyst 9400 Series 3200W AC Power Supply	6	EA	\$968.52	\$ 5,811.12
9	C9400X-SUP-2XL	Cisco Catalyst 9400 Series Supervisor 2XL Module	2	EA	\$11,647.22	\$ 23,294.44
10	QSFP-40/100-SRBD	Cisco 100G and 40GBASE SR-BiDi QSFP Transceiver, LC, 100m OM4 MMF	8	EA	\$947.15	\$ 7,577.20
11	C9400X-SUP-2XL/2	Cisco Catalyst 9400 Series Red Supervisor 2XL Module	2	EA	\$11,647.22	\$ 23,294.44
12	C9400-LC-48XS	Cisco Catalyst 9400 Series 48-Port 10 Gigabit Ethernet(SFP+)	4	EA	\$18,554.87	\$ 74,219.48
13	C9400-LC-48P	Cisco Catalyst 9400 Series 48-Port POE+ 10/100/1000 (RJ-45)	2	EA	\$3,560.73	\$ 7,121.46
<b>Services (5 Years)</b>						
1	CON-SSSNT-C93E048X	Cisco SOLN SUPP 8X5XNBD Catalyst 9300 48-port(12 mGig36 2.5Gbps	10	EA	\$4,677.52	\$ 46,775.20
2	CON-SSTCM-C93E48	Cisco SOLN SUPP SW SUBC9300 DNA Essentials	10	EA	\$237.11	\$ 2,371.10
3	CON-SSSNC-VG4002FO	SOLN SUPP NCD Cisco VG400 Analog Voice Gateway	10	EA	\$314.46	\$ 3,144.60
4	CON-SSSNP-C9407R	SOLN SUPP 24X7X4 Cisco Catalyst 9400	2	EA	\$23,043.41	\$ 46,086.82
5	CON-SSTCM-C94A	SOLN SUPP SW SUBCisco Catalyst 9400	2	EA	\$2,716.06	\$ 5,432.12
<b>Subscriptions (5 Years)</b>						
1	C9300-DNA-E-48-5Y	Cisco C9300 DNA Essentials, 48-Port, 5 Year Term License	10	EA	\$887.81	\$ 8,878.10
2	C9400-DNA-A-5Y	(5 Years) Catalyst 9400 DNA Advantage - 5 Year License	2	EA	\$10,169.42	\$ 20,338.84
Sub-Total						\$ 385,504.68
Shipping/Delivery Charges						\$ -
<b>(BASIS OF AWARD) GRAND TOTAL (All Inclusive):</b>						<b>\$ 385,504.68</b>

**BIDDER ACCEPTS RESPONSIBILITY FOR ACCURACY AND PRESENTATION OF THE ABOVE NUMBERS.**

*\*The above quantities are for bidding purposes only and are based on MTS' current usage. They represent what MTS anticipates as a requirement, but MTS does not guarantee this quantity. The actual quantity ordered may be more or less than what is anticipated on the pricing form, and it is dictated by MTS actual requirements and the available funding at the time each order is initiated.*

**Bidders pricing should not include sales tax. MTS will add tax at PO issuance.**

Group A Total	\$ 441,123.04
Group B Total	\$ 385,504.67
Estimated Sales Tax (7.75%)	\$ 44,763.32
<b>MTS Doc. No. G2796.0-24 Solicitation Total</b>	<b>\$ 871,391.03</b>



**Metropolitan  
Transit  
System**

## **Agenda Item No. 9**

**MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS**

January 18, 2024

**SUBJECT:**

Trash Receptacles – Contract Award

**RECOMMENDATION:**

That the San Diego Metropolitan Transit System (MTS) Board of Directors authorize the Chief Executive Officer (CEO) to:

- 1) Execute MTS Doc. No. L1653.0-24 (in substantially the same format as Attachment A), with Big Belly Solar, LLC (“Big Belly”), for the provision of seventy-eight (78) Big Belly trash receptacles at a cost of \$300,097.18 (inclusive of shipping and taxes) plus an option to purchase an additional ninety-six (96) Big Belly trash receptacles in 2024-2025 at a cost of \$478,883.78 (inclusive of shipping and taxes), for an overall estimate contract total of \$778,980.96 (inclusive of shipping and taxes); and
- 2) Exercise the option purchase at the CEO’s discretion.

**Budget Impact**

The total cost of this contract is estimated to be \$778,980.96 (inclusive of shipping and taxes) (Attachment C). The project will be funded by the San Diego Trolley Incorporated (SDTI) Facilities Operating Budget account 380016-545400, and Southbay Transit Beautification Work Breakdown Structure (WBS) – 2009123801.

**DISCUSSION:**

The project is part of the South Bay beautification project and Social Equity Listening Tour (SELT) enhancement projects. The project includes new trash receptacles on transit centers from Bayfront E Street to the San Ysidro International Border Station and all Center City Loop Stations. New trash receptacles will upgrade the MTS waste management infrastructure. These trash receptacles will be equipped with the latest technology for smart waste management, including compaction and fullness indicators. Waste will no longer be visible as trash receptacles are enclosed and waste will be confined in the enclosed receptacles. Fullness indicators will alert MTS staff when compacted waste has reached capacity, reducing labor



hours. Bringing this new waste technology to MTS will enhance the cleanliness of our transit centers and provide a better riding experience for our customers.

On October 26, 2023, MTS issued an Invitation for Bids (IFB) seeking a contractor to provide trash receptacles. A single bid was received by the deadline of December 5, 2023, from Big Belly in the amount of \$800,264.00 (excluding tax). The bid meets federal Buy America Act requirements.

To ascertain that the solicitation was not restrictive, MTS contacted all the firms that had downloaded the IFB on PlanetBids or had expressed interest, and asked for their reasons for not submitting a bid. The results indicated they did not submit a bid due to their own internal business reasons. Therefore, MTS determined that competition was adequate, neither the IFB nor MTS's procurement processes played a role in their decision not to propose, and staff proceeded with this as a competitive solicitation.

MTS performed a cost/price analysis by comparing MTS's Independent Cost Estimate (ICE) at \$666,000.00 (excluding tax) which is approximately 20.16% lower than Big Belly's initial bid.

Under a single bid, negotiations with the single bidder is permissible. On December 22, 2023, MTS requested Big Belly to review its costs and submit a revised bid. In response, Big Belly submitted a revised bid at \$742,633.60 (excluding tax). However, staff noticed that the delivery fee increased by 55.65% for the base and 61.88% for the option, respectively. Big Belly stated there was an error and staff requested to submit a second revised bid to fix the error.

On December 27, 2023, MTS received the second revised bid at \$725,433.60 (excluding tax). As a result of staff negotiations, the agency was able to realize a savings of \$74,830.40.

Big Belly Initial Bid *	Big Belly Revised Bid *	Big Belly Second Revised Bid *	Firm Certification
\$800,264.00	\$742,633.60	\$725,433.60	N/A

*\*taxes are excluded*

MTS also conducted an additional cost and price analysis by reaching out to peer transit agencies and other customers to discern the latest transaction trends. Based on the analysis, MTS concluded that the pricing is still fair and reasonable.

Therefore, staff recommends that the MTS Board of Directors authorize the CEO:

- 1) Execute MTS L1653.0-24, (in substantially the same format as Attachment A) with Big Belly, for the provision of 78 Big Belly trash receptacles at a cost of \$300,097.18 (inclusive of shipping and taxes); plus an option to purchase an additional 96 Big Belly trash receptacles in 2024/2025 at a cost of \$478,883.78 (inclusive of shipping and taxes), for an overall estimate contract total of \$778,980.96 (inclusive of shipping and taxes); and
- 2) Exercise the option purchase at the CEO's discretion.

/S/ Sharon Cooney

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Sharon Cooney

Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)

Attachments: A. Draft Agreement, MTS Doc. No. L1653.0-24

B. Scope of Work

C. Bid Form



# Metropolitan Transit System

**STANDARD AGREEMENT  
FOR  
MTS DOC. NO. L1653.0-24  
TRASH RECEPTACLES**

THIS AGREEMENT is entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2024 in the State of California by and between San Diego Metropolitan Transit System (“MTS”), a California public agency, and the following, hereinafter referred to as "Contractor":

Name: Big Belly Solar, LLC Address: 150 A Street, Suite 103  
Needham MA 02494  
 Form of Business: LLC City State Zip  
 (Corporation, Partnership, Sole Proprietor, etc.) Email: [rgarcia@bigbelly.com](mailto:rgarcia@bigbelly.com)  
 Telephone: 617.431.5988

Authorized person to sign contracts Michael Mulvena Director of Finance  
 Name Title

The Contractor agrees to provide goods as specified in the conformed Scope of Work/Minimum Technical Specification (Exhibit A), Contractor’s Bid/Pricing Form (Exhibit B), and in accordance with the Standard Agreement, including Standard Conditions (Exhibit C), Federal Requirements (Exhibit D), and Forms (Exhibit E).

The total cost for the initial base quantity of seventy-eight (78) shall be in the amount of \$300,097.18, inclusive of sales tax and shipping, and the total cost for the option quantity of ninety-six (96) (if exercised) shall be in the amount of \$478,883.78, inclusive of tax and shipping. The total contract value shall not exceed \$778,980.96 without the express written consist of MTS.

Payment terms shall be net 30 days from invoice date.

SAN DIEGO METROPOLITAN TRANSIT SYSTEM	BIG BELLY SOLAR, LLC
By: <u>Sharon Cooney, Chief Executive Officer</u>	By _____ Title: _____
Approved as to form: By: <u>Karen Landers, General Counsel</u>	



# SCOPE OF WORK/TECHNICAL SPECIFICATIONS

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## 1. PROJECT OVERVIEW

MTS is seeking to upgrade its waste management infrastructure by implementing advanced and efficient solutions. To this end, we are interested in procuring an estimated of seventy-eight (78) Big Belly (or approved equal) trash cans. These trash cans should be equipped with the latest technology for smart waste management, including compaction and fullness indicator.

The Contractor shall provide option pricing for an additional estimated of ninety-six (96) Big belly (or approved equal) trash cans for 2024 or 2025 delivery. This option is exercisable at MTS's sole discretion and shall be contingent upon funding availability.

Included in Section 3.26 of the General Provisions is the Request for Approved equal (RFA) information. Complete documentation should be provided in support of any RFAs submitted by Bidders for MTS' review and response, and must be submitted by the deadline provided in the calendar of events. Any RFAs submitted with the bid package at bid opening will not be accepted.

## 2. BIGBELLY SENSE MAX (OR APPROVED EQUAL)

### 2.1. MINIMUM TECHNICAL SPECIFICATIONS/FEATURES

- a. Bigbelly's fully-enclosed Hopper disposal interface, standard on Sense Max bins, eliminates visible waste, rat and pest access, windblown litter, and prevents strewn litter caused by trash picking. The Hopper incorporates a 70° dump angle which reduces waste disposal jams.
- b. Embedded sensors detect fullness level.
- c. LED indicators on the front of the Sense Max display readiness to collect status (fullness level), machine status, and error codes.
- d. Unique built-in compaction technology delivers a 5-10x compaction ratio due to superior compaction penetration (ram travels to 9" from bottom of bin).
- e. The integrated Foot Pedal provides hands-free use

### 2.2. SAFETY FEATURES

- a. Hopper disposal interface provides a physical barrier between the user and the compacting mechanism
- b. Soft-open Hopper response with use of Foot Pedal
- c. Interlocked access doors protect users and service personnel
- d. Collection door automatically locks when closed
- e. No pinch points, sharp edges or corners

### 2.3. DURABILITY

- a. Weather-resistant, UV-stabilized polyester powder-coat finish on all exterior parts
- b. Electronic components temperature range of -40°F to +185°F (-40°C to +85°C)
- c. Fully weatherized; in the event of a flood, the bin can withstand:
  - I. Up to 20" (508 mm) of water without harming the electronics
  - II. Up to 36" (915 mm) of water with only minor damage to electronics

## 2.4. MATERIALS

- a. RoHS compliant
- b. Galvanized sheet metal steel interior and exterior construction
- c. Heavy-duty, recycled plastic side panels for dent and scratch resistance
- d. Leak-proof interior bin made of low-density polyethylene (LDPE) plastic

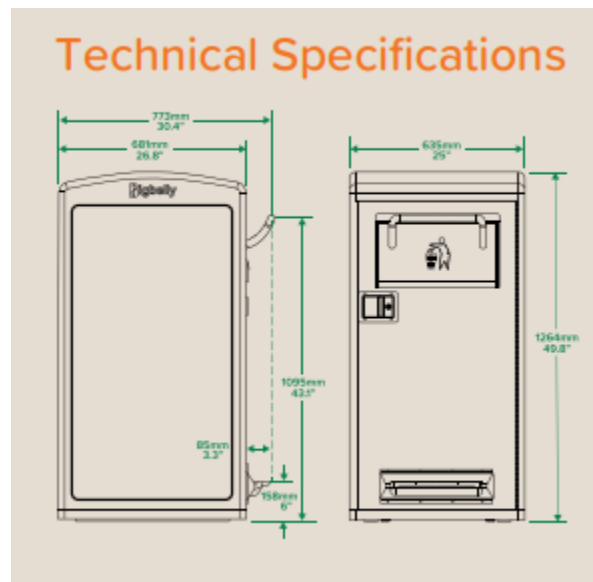
## 2.5. POWER AND ELECTRONICS

- a. Average operation uses less than 3 kwh energy per day, ensuring performance in any location, including in shade and under cloud cover
- b. Patented Skip-a-Cycle™ energy management technology protects against battery damage
- c. 28 Ah sealed lead acid, maintenance-free, extended life battery with insulation for optimized performance (average lifespan 5-8 years)
- d. Solar panel (up to 40 W)
- e. Solar panel protected by polycarbonate bubble
- f. Self-powered unit requires no wiring

## 2.6. ACCESSORIES TO BE INCLUDED

- a. Custom Graphic Wraps, Message Panels, and Stickers to comply with City of San Diego recycling waste bin requirements.
- b. Wheeled Interior Lift Bin (bar and comb styles)

## 2.7. DIMENSIONS



## 2.8. OVERALL MACHINE DIMENSIONS

- a. Height: 49.8" (1264 mm)
- b. Width: 25" (635 mm)
- c. Depth: 26.8" (681 mm)
- d. Handle Height (ADA Compliant): 43.1" (1095 mm)
- e. Weight: 270 lbs (122 kg)

- f. Shipping weight: 300 lbs (136.08 kg)
- g. Bin Volume (Hopper or Chute): 32 gal (120 L) compacted trash; approx. 150 gal (568 L) uncompacted trash.
- h. Bin Dimension: 24" x 20.4" x 21.65"  
(609 mm x 518 mm x 549 mm)

### **2.9. DISPOSAL INTERFACE DIMENSIONS**

- a. Hopper Opening: 16.5"W x 5"H x 8"D  
(419 mm x 127 mm x 203 mm)
- b. Chute Opening: 16"W x 5.5"H x 15"D  
(406 mm x 140 mm x 381 mm)

## **3. BIGBELLY SENSE (OR APPROVED EQUAL)**

### **3.10. MINIMUM TECHNICAL SPECIFICATIONS/FEATURES**

- a. Bigbelly's fully-enclosed Chute disposal interface, standard on Sense bins, eliminates visible waste, rat and pest access, and windblown litter.
- b. Embedded sensors detect fullness level.
- c. LED indicators on the front of the Sense display readiness to collect status (fullness level), machine status, and error codes.
- d. The integrated Foot Pedal provides hands-free use.
- e. Safety Features
- f. Soft-open Chute response with use of foot pedal
- g. Collection door automatically locks when closed
- h. No pinch points, sharp edges or corners

### **3.11. DURABILITY**

- a. Weather-resistant, UV-stabilized polyester powder-coat finish on all exterior parts
- b. Electronic components temperature range of -40°F to +185°F (-40°C to +85°C)
- c. Fully weatherized; in the event of a flood, the bin can withstand up to 36" (915 mm) of water with only minor damage to electronics

### **3.12. MATERIALS**

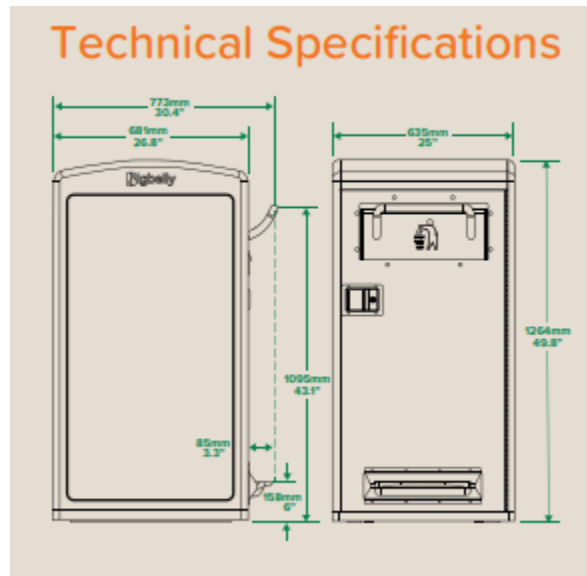
- a. RoHS compliant
- b. Galvanized sheet metal steel interior and exterior construction
- c. Heavy-duty, recycled plastic side panels for dent and scratch resistance
- d. Leak-proof interior bin made of low-density polyethylene (LDPE) plastic
- e. Power and Electronics
  - I. 5-year, maintenance-free, alkaline battery
  - II. Self-powered unit requires no wiring
  - III. Companion unit powered by hub unit

### **3.13. ACCESSORIES TO BE INCLUDED**

- a. Custom Graphic Wraps, Message Panels, and Stickers to comply with City of San Diego recycling waste bin requirements.
- b. Wheeled Interior Lift Bin (bar and comb styles)



### 3.14. DIMENSIONS



### 3.15. OVERALL MACHINE DIMENSIONS

- a. Height: 49.8" (1264 mm)
- b. Width: 25" (635 mm)
- c. Depth: 26.8" (681 mm)
- d. Handle Height (ADA Compliant): 43.1" (1095 mm)
- e. Weight: 150 lbs (68 kg)
- f. Shipping Weight: 180 lbs (82 kg)
- g. Bin Volume (Chute or Open): 50 gal (189 L)
- h. Bin Volume (Hopper): 32 gal (120 L)
- i. Bin Dimension (50 gal): 25" x 20" x 32.25"  
(635 mm x 508 mm x 819 mm)
- j. Bin Dimension (32 gal): 24" x 20.4" x 21.65"  
(609 mm x 518 mm x 549 mm)
- k. Disposal Interface Dimensions  
Chute Opening: 16"W x 5.5"H x 15"D  
(406 mm x 140 mm x 381 mm)
- l. Hopper Opening: 16.5"W x 5"H x 8"D  
(419 mm x 127 mm x 203 mm)

## 4. BUY AMERICA

This scope of work may trigger Buy America and/or Build America Buy America requirements, which apply to construction materials, manufactured products, rolling stock, iron and steel. The below list of definitions and examples is not exhaustive and is only to be used as illustrative and a guidance tool for Contractor compliance.

### 4.1. [NOT APPLICABLE] CONSTRUCTION MATERIALS

**4.2. MANUFACTURED PRODUCT**

Per IJJA Section 70912 (2)(B), all manufactured products used in the project must be produced in the United States. Examples for manufactured products provided per Appendix A to 49 CFR 661.3 include: Infrastructure projects not made primarily of steel or iron, including structures (terminals, depots, garages, and bus shelters), ties and ballast; contact rail not made primarily of steel or iron; fare collection systems; computers; information systems; security systems; data processing systems; and mobile lifts, hoists, and elevators.

**4.3. [NOT APPLICABLE] ROLLING STOCK**

**4.4. [NOT APPLICABLE] IRON OR STEEL**

**5. INVOICES**

Invoices must be sent to the MTS Accounting Department, via email, at [ap@sdmts.com](mailto:ap@sdmts.com). All invoices must have the Purchase Order and contract number clearly displayed to ensure timely payment. MTS will not pay on packing slips, receiving documents, delivery documents, or other similar documents. Invoices must be submitted for payment.

Payment terms shall be net 30 days from invoice date.

Contractors must also indicate if any of the invoiced amount(s) is for service or work provided by a subcontractor and indicate the amount that will be paid to the subcontractor. Contractors must also comply with the prompt payment requirements in the *Prompt Progress Payments* section of the Standard Conditions.

**6. [NOT APPLICABLE] MATERIAL SAFETY DATA SHEETS (MSDS)**

**7. WARRANTY**

Bidders shall outline in detail their warranty on the equipment offered, including the method of adjustment in cases of equipment, component or parts failure. Warranty shall also be stated for installation labor, materials, and method of adjustment.

**8. REPLACEMENT PARTS**

Replacement parts and technical support for the specified equipment must be guaranteed by the manufacturer; to be available for a ten (10) year period from the date of purchase. Manufacturer shall keep parts books and maintenance manuals up-to-date for that period.

**9. DELIVERY AND ACCEPTANCE**

Equipment or any deliverable provided under this contract shall be delivered F.O.B. to MTS, 100 16th Street, San Diego, California 92101 unless otherwise specified, in first class condition, complete and ready for operation, and the Contractor shall assume all responsibility and risk of loss incident to said delivery.

Contractor shall indicate delivery date on the Bid Form unless already specified, in which case, shall be made within the time set forth. Delivery is part of the consideration and must be adhered to as specified. Lead times identify the date MTS can anticipate the receipt of the items. MTS reserves the right to consider the lead time in award. Delivery shall be one-hundred (120) after MTS issues Notice to Proceed.

Contractor will not be held liable for failure to make delivery because of strikes, construction of property, governmental regulations, acts of God or any other causes beyond his control, provided a written extension of time is obtained from MTS.

Upon delivery, MTS will acknowledge receipt of said items or products. Delivery shall not constitute acceptance. Upon inspection and testing (if necessary) by MTS, a determination will be made whether said items or products are in conformance with contract requirements. If found in conformance, MTS shall approve the Contractor's invoice for payment; thereby constituting acceptance. Payment terms begin from this point. If the delivered items or products are found not in compliance, MTS will immediately notify the Contractor, and furnish all details of deficiencies. Contractor shall correct the deficiencies or supply new items or products (at the discretion of MTS), and resubmit for inspection and testing (if necessary).

- 10. **[NOT APPLICABLE] LIQUIDATED DAMAGES**
- 11. **[NOT APPLICABLE] ACQUISITION OF ROLLING STOCK**

**L1653.0-24  
Trash Receptacles IFB  
ATT 1 - Bid Form**

**\*\* Fill in the Green Cells \*\***

Delivery shall be one-hundred twenty (120) after MTS issues the Notice to Proceed.			Option shall be exercised at MTS discretion. (2024 or 2025)		
	Yes?	No? Provide lead time (in calendar days)		Yes?	No? Provide lead time (in calendar days)
Would you be able to meet this timeline?	Yes		Would you be able to meet this timeline?	Yes	

Estimated QTY	Item Description	Unit of Measure	Unit Price for Item	Total Price*	Estimated QTY	Item Description	Unit of Measure	Unit Price for Item	Total Price*
11	Bigbelly Sense Max - Trash	Each	\$ 4,460.40	\$ 49,064.40	48	Bigbelly Sense Max - Trash	Each	\$ 4,460.40	\$ 214,099.20
11	Bigbelly Sence Max - Recycling	Each	\$ 4,460.40	\$ 49,064.40	48	Bigbelly Sence Max - Recycling	Each	\$ 4,460.40	\$ 214,099.20
28	Bigbelly Sense -Trash	Each	\$ 2,939.40	\$ 82,303.20					
28	Bigbelly Sense - Recycling	Each	\$ 2,939.40	\$ 82,303.20					
	Delivery Cost (One-time cost & if applicable)			\$ 17,000.00		Delivery Cost (One-time cost & if applicable)			\$ 17,500.00
	<b>Total *</b>		\$	279,735.20		<b>Total *</b>		\$	445,698.40

**Overall Total (Basis of Award) \$ 725,433.60**

\*Bidders should not include sales tax. MTS will add tax at purchase order issuance.

Costs must be all-inclusive including but not limited to labor, insurance, and all other related costs necessary to purchase and deliver the trash receptacles to MTS.

Lead times identify the date MTS can anticipate the receipt of the items. MTS reserves the right to consider the lead time in award.

In order to be considered responsive, Bidders must provide pricing on all the line items. Charges not described on the bid form will not be considered valid and MTS will not pay additional costs. Bidder accepts responsibility for accuracy and presentation of the above numbers and must complete the bid forms as provided. Failure to do so may deem the bid non-responsive.

<b>Base</b> Total	\$262,735.20
Tax	\$20,361.98
<u>Delivery Cost</u>	<u>\$17,000.00</u>
Total for <b>Base</b>	\$300,097.18

<b>Option</b> Total	\$428,198.40
Tax	\$33,185.38
<u>Delivery Cost</u>	<u>\$17,500.00</u>
Total for <b>Option</b>	\$478,883.78

**Grand Total for Base and Option \$778,980.96**

This includes taxes and delivery cost



**Metropolitan  
Transit  
System**

## **Agenda Item No. 10**

**MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS**

January 18, 2024

**SUBJECT:**

Washington Street Wall Modification – Work Order Agreement

**RECOMMENDATION:**

That the San Diego Metropolitan Transit System (MTS) Board of Directors authorize the Chief Executive Officer (CEO) to execute Work Order No. MTSJOC348-09 (in substantially the same format as Attachment A), under MTS Doc. No. PWG348.0-22, with Veterans Engineering Inc. (Veterans), for the modification of the existing wall between the Washington Street Trolley Station and the North County Transit District (NCTD) tracks along the Green Line right-of-way in the amount of \$610,819.97.

**Budget Impact**

The total cost of this contract is estimated to be \$610,819.97. Under separate MTS Doc. No. L1282.0-16 with The Gordian Group, MTS will pay a 1.95% Job Order Contract (JOC) software license fee in the amount of \$11,910.99. The project will be funded by the Capital Improvement Program account (CIP) 1009111208 – Miscellaneous Capital.

**DISCUSSION:**

In early 2023, the California Public Utilities Commission (CPUC) and the Federal Railroad Administration (FRA) published an engineering report to document their joint analysis of heavy rail accidents and physical site conditions at the Washington Street Grade Crossing.

One of the recommended changes to the intersection was to reduce the height of the existing wall on the west side of the Washington Street Trolley Station. The existing wall that sits at the west edge of the southbound platform separates the trolley tracks and the heavy rail tracks. The report recommends reducing the wall height and wall type to enhance pedestrian visibility to heavy rail traffic (which does not stop at this grade crossing) on the tracks adjacent to the trolley station. The project will alter the full height of the wall (350 Linear Feet), reducing the solid wall height down to 24 inches. The old wrought iron fence will be removed, and a new wrought iron fence will be placed above the reduced 24-inch section. Once complete, the wall and fencing combined will be 4 feet tall and will provide extended visibility for pedestrians on



the trolley platform and Washington Street of the adjacent heavy rail tracks used by Amtrak, Coaster, and BNSF trains.

This work will be completed by issuing a JOC work order to MTS's JOC contractor for railroad construction services, Veterans. JOC is a procurement method under which public agencies may accomplish frequently encountered repairs, maintenance, and construction projects through a single, competitively procured long-term agreement.

The JOC program includes a catalog of pricing for a variety of potential tasks to be performed under the contract that have been pre-priced by the contractor, The Gordian Group. All potential contractors are subject to the pricing within this catalog. Each contractor then includes an adjustment factor, escalating their proposed price from the catalog price, to determine the total cost of the task order. The adjustment factor represents an average percentage increase over the catalog price (i.e. 1.25 adjustment factor represents 25% above the catalog price) for that respective task within the project. In order to select the lowest responsive and responsible bidder, MTS staff compares each contractor's proposed adjustment factor.

On June 16, 2022 (Agenda Item (AI) 12), after a competitive Invitation for Bids (IFB) process, the MTS Board approved MTS Doc. No. PWG348.0-22 with Veterans for Railroad Construction Services. Railroad Construction Services includes work that primarily consists of repair, remodeling or other repetitive work involving railroad construction improvements. This includes, but is not limited to, main Continuous Welded Rail (CWR) track rehabilitation/replacement, grade crossings (precast concrete panels, rubber panels, paved with rubber rail interface) special track work, direct fixation, signal systems, overhead catenary, traction power, and related civil construction improvements work; and all required incidental professional and technical services required for quality control monitoring and testing, shop drawings, safety, environmental, scheduling, traffic control, storm water pollution prevention, geotechnical, surveying, biological, and hazardous/contaminated materials.

Today's proposed action will issue a work order to Veterans under this JOC master agreement. Staff has reviewed the pricing for this repair work order and determined it to be fair and reasonable. Veterans will be providing all materials, labor and equipment for the project. Work is expected to be completed within 90 days of issuing a Notice to Proceed.

Therefore, staff recommends that the MTS Board of Directors authorize the CEO to execute Work Order No. MTSJOC348-09 (in substantially the same format as Attachment A), under MTS Doc. No. PWG348.0-22, with Veterans, for the modification of the existing wall between the Washington Street Trolley Station and the NCTD tracks along the Green Line right-of-way in the amount of \$610,819.97.

/S/ Sharon Cooney

Sharon Cooney  
Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)

Attachment: A. Draft Work Order MTS Doc No. MTSJOC348-09



# Metropolitan Transit System

## JOB ORDER CONTRACT WORK ORDER

PWG348.0-22  
CONTRACT NUMBER

MTSJOC348-09  
WORK ORDER NUMBER

THIS AGREEMENT is entered into this \_\_\_\_\_ day of \_\_\_\_\_ 2024, in the state of California by and between San Diego Metropolitan Transit System ("MTS"), a California public agency, and the following, hereinafter referred to as "Contractor":

Name: Veterans Engineering Services, Inc. Address: 5100 E La Palma Ave Suite 201

Form of Business: Corporation Anaheim, CA 92807  
(Corporation, partnership, sole proprietor, etc.)

Telephone: 714-733-1462

Authorized person to sign contracts: Paul Marshall President  
Name Title

Pursuant to the existing Job Order Contract (MTS Doc. No. PWG348.0-22), MTS issues a Work Order to Contractor to complete the detailed Scope of Work (attached as Exhibit A.), the Cost Breakdown for the Scope of Work (attached as Exhibit B.), and the subcontractor listing form applicable to this Work Order (attached as Exhibit C.)

TOTAL PAYMENTS TO CONTRACTOR SHALL NOT EXCEED \$610,819.97

SAN DIEGO METROPOLITAN TRANSIT SYSTEM | VETERANS ENGINEERING SERVICES, INC.

By: Sharon Cooney, Chief Executive Officer

Firm: \_\_\_\_\_

Approved as to form:

By: \_\_\_\_\_  
Signature

By: Karen Landers, General Counsel

Title: \_\_\_\_\_



EXHIBIT A  
(Scope of Work)





# San Diego Metropolitan Transit System

1255 Imperial Ave  
San Diego, California 92101

## Final Scope of Work

Date: 12/15/2023

Job Order Contracting

**To:** \_\_\_\_\_ **From:** \_\_\_\_\_

**Contract No:** PWG348.0-22  
**Job Order No:** MTSJOC348-09  
**Job Order Title:** Washington St Wall Modification  
**Location:** Green Line ROW  
 1255 Imperial Ave  
 San Diego, CA 92101

**Brief Scope of Work:**

This job order is for the modification of 350 linear feet of an existing wall between Washington Street Station and the North County Transit District (NCTD) tracks along the Green Line right-of-way.

The following items detail the scope of work as discussed at the site. All requirements necessary to accomplish the items set forth below shall be considered part of this scope of work.

The Contractor shall complete the construction of this project in its entirety, and shall provide all labor, materials, equipment, and traffic control required for all work including utility protection, procuring all materials, and performing all other work necessary to complete the work in accordance with this Detailed Scope of Work, and the Conformed Special Provisions.

This job order is for the modification of 350 linear feet of an existing wall between Washington Street Station and the North County Transit District (NCTD) tracks along the Green Line right-of-way.

The Contractor Shall:

- Procure necessary ROW permit with NCTD
- Send all workers to NCTD railroad worker training as required
- Remove and dispose of 350 LF of existing wrought iron fence
- Demolish and remove 350 LF of approximately 45 inches of the existing cast in place concrete wall leaving a 24-inch high stub wall in place
- Install temporary fence in location where wall is demolished
- Plaster the existing stub wall to match existing
- Procure and install 350 LF of new wrought 24-inch high iron fence into the existing 24-inch high stub wall using anchoring bolts and anchoring epoxy that is powder coated to match the paint color of the existing fence.

Work Windows:

NCTD will allow contractor to work under a single track from 10 PM through 5 AM on weeknights.

Submittals:

- Wrought iron fence shop drawings
- Paint swatch
- Phasing plan

Contractor exclusions:

- MTS flagging costs
- NCTD flagging costs

Specifications:

All work shall conform to the Special Provisions within the executed MTS Job Order Contract (JOC) PWG348.0-22

Contract Schedule:

All work shall be complete as soon as possible with 90 calendar days from issuance of NTP.

All job orders include the labor, equipment, and material costs for a complete and in-place installation, unless otherwise noted.

**EXHIBIT B**  
**(Cost Breakdown)**

# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Proposal Value: \$610,819.97

Approved Date: December 12, 2023

Job Order: MTSJOC348-09

Job Order Name: Washington St Wall Modification

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

Division		Install Total	NPP Total	Demo Total	Division Total
01	General Requirements	\$458,080.04	\$0.00	\$0.00	\$458,080.04
02	Existing Conditions	\$31,650.99	\$0.00	\$0.00	\$31,650.99
05	Metals	\$42,107.50	\$0.00	\$0.00	\$42,107.50
06	Wood, Plastics, and Composites	\$8,081.89	\$0.00	\$0.00	\$8,081.89
09	Finishes	\$25,794.33	\$0.00	\$0.00	\$25,794.33
32	Exterior Improvements	\$45,105.22	\$0.00	\$0.00	\$45,105.22
<b>Line Count: 33</b>			<b>Proposal Total:</b>		<b>\$610,819.97</b>

The Percentage of Non Pre-Priced on this Proposal: 0.0%

\* Includes Price Changes due to Construction Task Catalog update

# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Proposal Value: \$610,819.97

Approved Date: December 12, 2023

Job Order: MTSJOC348-09

Job Order Name: Washington St Wall Modification

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

**01 General Requirements** **\$458,080.04**

Record #	CSI Number	Description	Type	Quantity	Unit Price	UOM	Factor	Line Total
1	012216000004	Reimbursable Fees	Installation	8,500.00	\$1.00	EA	1.1619	\$9,876.15
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	EA	1.1619	\$0.00
		<b>Includes Labor No Includes Equipment No Includes Materials Yes</b>						
<i>Owner Comments: V:1.2-Permit fees should be regular working hours.</i>								
<b>User Note:</b> ROW Permit								
<b>Item Note:</b> Reimbursable Fees will be paid to the contractor for eligible costs as directed by Owner. Insert the appropriate quantity to adjust the base cost to the actual Reimbursable Fee. If there are multiple Reimbursable Fees, list each one separately and add a comment in the "note" block to identify the Reimbursable Fee (e.g. sidewalk closure, road cut, various permits, extended warranty, expedited shipping costs, etc.). A copy of each receipt shall be submitted with the Price Proposal.								
							<b>Total:</b>	<b>\$9,876.15</b>

2	012216000004	Reimbursable Fees	Installation	20,000.00	\$1.00	EA	1.1619	\$23,238.00
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Modified, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	EA	1.1619	\$0.00
		<b>Includes Labor No Includes Equipment No Includes Materials Yes</b>						
<i>Owner Comments: V:1.2-Safety training will occur during regular working hours.</i>								
<b>User Note:</b> Railway Safety Training								
<b>Item Note:</b> Reimbursable Fees will be paid to the contractor for eligible costs as directed by Owner. Insert the appropriate quantity to adjust the base cost to the actual Reimbursable Fee. If there are multiple Reimbursable Fees, list each one separately and add a comment in the "note" block to identify the Reimbursable Fee (e.g. sidewalk closure, road cut, various permits, extended warranty, expedited shipping costs, etc.). A copy of each receipt shall be submitted with the Price Proposal.								
							<b>Total:</b>	<b>\$23,238.00</b>

3	012220000023	Equipment Operator (Group 8)	Installation	500.00	\$102.69	HR	1.2449	\$63,919.39
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	HR	1.2449	\$0.00
		<b>Includes Labor Yes Includes Equipment No Includes Materials No</b>						
							<b>Total:</b>	<b>\$63,919.39</b>

\* Includes Price Changes due to Construction Task Catalog update

# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Proposal Value: \$610,819.97

Approved Date: December 12, 2023

Job Order: MTSJOC348-09

Job Order Name: Washington St Wall Modification

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

4	012220000024	Equipment Operator (Group 10)	Installation	240.00	\$102.86	HR	1.2449	\$30,732.10
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	HR	1.2449	\$0.00
<b>Includes Labor Yes Includes Equipment No Includes Materials No</b>								

**User Note:** Superintendent

**Item Note:** For tasks not included in the Construction Task Catalog® and as directed by owner only.

<b>Total:</b>	<b>\$30,732.10</b>
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5	012220000027	Laborer	Installation	600.00	\$78.51	HR	1.2449	\$58,642.26
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	HR	1.2449	\$0.00
<b>Includes Labor Yes Includes Equipment No Includes Materials No</b>								

**User Note:** 5 laborers for 15 days

**Item Note:** For tasks not included in the Construction Task Catalog® and as directed by owner only.

<b>Total:</b>	<b>\$58,642.26</b>
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6	012220000082	Project Manager	Installation	60.00	\$151.80	HR	1.2449	\$11,338.55
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	HR	1.2449	\$0.00
<b>Includes Labor Yes Includes Equipment No Includes Materials No</b>								

<b>Total:</b>	<b>\$11,338.55</b>
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7	012220000084	Flagperson For Traffic Control	Installation	480.00	\$78.51	HR	1.2449	\$46,913.81
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	HR	1.2449	\$0.00
<b>Includes Labor Yes Includes Equipment No Includes Materials No</b>								

<b>Total:</b>	<b>\$46,913.81</b>
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\* Includes Price Changes due to Construction Task Catalog update

# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Proposal Value: \$610,819.97

Approved Date: December 12, 2023

Job Order: MTSJOC348-09

Job Order Name: Washington St Wall Modification

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

8	01222000088	Transport Vehicle With Driver	Installation	120.00	\$126.20	HR	1.1619	\$17,595.81
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	HR	1.1619	\$0.00

**Includes Labor Yes Includes Equipment Yes Includes Materials No**

**Owner Comments:** V:1.2-Transport vehicle will not be in railroad ROW.

<b>Total:</b>	<b>\$17,595.81</b>
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9	012223000381	3 To 3-3/4 CY Hydraulic Excavator With Full-Time Operator	Installation	15.00	\$1,497.88	DAY	1.2449	\$27,970.66
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	DAY	1.2449	\$0.00

**Includes Labor No Includes Equipment No Includes Materials Yes**

<b>Total:</b>	<b>\$27,970.66</b>
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10	012223000381	3 To 3-3/4 CY Hydraulic Excavator With Full-Time Operator	Installation	4.00	\$1,497.88	DAY	1.2449	\$7,458.84
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	DAY	1.2449	\$0.00

**Includes Labor No Includes Equipment No Includes Materials Yes**

**Owner Comments:** V:1.2-Why the additional 4 days? There is already 15 days in the same item. Also, update factor.

<b>Total:</b>	<b>\$7,458.84</b>
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11	012223000399	3,000 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	Installation	15.00	\$872.68	DAY	1.2449	\$16,295.99
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	DAY	1.2449	\$0.00

**Includes Labor No Includes Equipment No Includes Materials Yes**

<b>Total:</b>	<b>\$16,295.99</b>
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\* Includes Price Changes due to Construction Task Catalog update

# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Job Order: MTSJOC348-09

Proposal Value: \$610,819.97

Job Order Name: Washington St Wall Modification

Approved Date: December 12, 2023

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

12	012223000469	7-1/3 CY, 330 HP, Heavy Duty Construction Loader With Full-Time Operator	Installation	15.00	\$1,570.19	DAY	1.2449	\$29,320.94
Accepted		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	Demo:	0.000000	\$0.00	DAY	1.2449	\$0.00
			Includes Labor No	Includes Equipment No	Includes Materials Yes			

<b>Total:</b>	<b>\$29,320.94</b>
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13	012223000469	7-1/3 CY, 330 HP, Heavy Duty Construction Loader With Full-Time Operator	Installation	5.00	\$1,570.19	DAY	1.2449	\$9,773.65
Accepted		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	Demo:	0.000000	\$0.00	DAY	1.2449	\$0.00
			Includes Labor No	Includes Equipment No	Includes Materials Yes			

**Owner Comments:** V:1.2-Why the additional 5 days? There is already 15 days in the same item. Also, update factor.

<b>Total:</b>	<b>\$9,773.65</b>
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14	012223001334	3/4 Ton, 4 x 4 Crew Cab Pickup Truck With Full-Time Truck Driver	Installation	15.00	\$273.45	DAY	1.2449	\$5,106.27
Accepted		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	Demo:	0.000000	\$0.00	DAY	1.2449	\$0.00
			Includes Labor No	Includes Equipment No	Includes Materials Yes			

<b>Total:</b>	<b>\$5,106.27</b>
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15	012223001334	3/4 Ton, 4 x 4 Crew Cab Pickup Truck With Full-Time Truck Driver	Installation	15.00	\$273.45	DAY	1.2449	\$5,106.27
Accepted		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	Demo:	0.000000	\$0.00	DAY	1.2449	\$0.00
			Includes Labor No	Includes Equipment No	Includes Materials Yes			

User Note: Welding Truck

Item Note:

<b>Total:</b>	<b>\$5,106.27</b>
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\* Includes Price Changes due to Construction Task Catalog update



# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Proposal Value: \$610,819.97

Approved Date: December 12, 2023

Job Order: MTSJOC348-09

Job Order Name: Washington St Wall Modification

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

16	012223001350	18 CY Rear Dump Truck With Full-Time Truck Driver	Installation	3.00	\$2,021.67	DAY	1.2449	\$7,550.33
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	DAY	1.2449	\$0.00

**Includes Labor Yes Includes Equipment No Includes Materials Yes**

<b>Total:</b>	<b>\$7,550.33</b>
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17	012223001358	2,000 Gallon Water Truck With Full-Time Driver	Installation	15.00	\$665.32	DAY	1.2449	\$12,423.85
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	DAY	1.2449	\$0.00

**Includes Labor No Includes Equipment No Includes Materials Yes**

<b>Total:</b>	<b>\$12,423.85</b>
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18	012223001369	Traffic Control Truck With Mounted Impact Attenuator/Crash Cushion And Arrow Board With Full-Time Truck Driver	Installation	15.00	\$1,292.78	DAY	1.2449	\$24,140.73
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	DAY	1.2449	\$0.00

**Includes Labor Yes Includes Equipment No Includes Materials Yes**

<b>Total:</b>	<b>\$24,140.73</b>
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19	012223001373	Vacuum Sweeper Truck, With Full-Time Truck Driver	Installation	10.00	\$1,885.38	DAY	1.2449	\$23,471.10
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	DAY	1.2449	\$0.00

**Includes Labor Yes Includes Equipment No Includes Materials Yes**

<b>Total:</b>	<b>\$23,471.10</b>
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\* Includes Price Changes due to Construction Task Catalog update

# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Proposal Value: \$610,819.97

Approved Date: December 12, 2023

Job Order: MTSJOC348-09

Job Order Name: Washington St Wall Modification

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

20	015219000002	Portable Chemical Toilet		Installation	4.00	\$65.66	WK	1.2449	\$326.96
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Modified, 1.4 Modified, 1.5 Accepted, 2.0 Accepted</i>		<b>Demo:</b>	0.000000	\$0.00	WK	1.2449	\$0.00

**Includes Labor No Includes Equipment No Includes Materials Yes**

**Owner Comments:** V:1.2-2 Weeks, not 15 weeks.  
V:1.4-3 Weeks should be enough. Time updated.

**User Note:** Chemical toilet for duration of work order

**Item Note:**

<b>Total:</b>	<b>\$326.96</b>
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21	015219000002	For Each Additional Servicing Per Unit Per Week, Add	<b>MOD: 0003</b>	Installation	1.00	\$25.00	WK	1.2449	\$31.12
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Modified, 1.4 Modified, 1.5 Accepted, 2.0 Accepted</i>							

**Includes Labor No Includes Equipment No Includes Materials Yes**

<b>Total:</b>	<b>\$31.12</b>
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22	015219000002	For Each Delivery, Add	<b>MOD: 0004</b>	Installation	2.00	\$26.00	WK	1.2449	\$64.73
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Modified, 1.4 Modified, 1.5 Accepted, 2.0 Accepted</i>							

**Includes Labor No Includes Equipment No Includes Materials Yes**

<b>Total:</b>	<b>\$64.73</b>
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23	015626000164	Relocate Temporary 10' High Chain Link Fence And Posts		Installation	350.00	\$8.04	LF	1.2449	\$3,503.15
<b>Accepted</b>		<i>History:</i>		<b>Demo:</b>	350.000000	\$0.00	LF	1.2449	\$0.00

**Includes Labor Yes Includes Equipment Yes Includes Materials No**

<b>Total:</b>	<b>\$3,503.15</b>
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\* Includes Price Changes due to Construction Task Catalog update

# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Proposal Value: \$610,819.97

Approved Date: December 12, 2023

Job Order: MTSJOC348-09

Job Order Name: Washington St Wall Modification

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

24	017419000017	10 CY Low-Boy Dumpster "Concrete Or Asphalt Only"	Installation	20.00	\$934.99	EA	1.2449	\$23,279.38
<b>Accepted</b>		<i>History:</i>	<b>Demo:</b>	0.000000	\$0.00	EA	1.2449	\$0.00
		<b>Includes Labor No</b>	<b>Includes Equipment No</b>	<b>Includes Materials Yes</b>				

<b>Total:</b>	<b>\$23,279.38</b>
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**02 Existing Conditions** **\$31,650.99**

Record #	CSI Number	Description	Type	Quantity	Unit Price	UOM	Factor	Line Total
25	024119130065	Saw Cut Rod Reinforced Concrete Walls Up To 4" Depth	Installation	1,400.00	\$13.91	LF	1.2449	\$24,243.18
<b>Accepted</b>		<i>History:</i>	<b>Demo:</b>	1400.000000	\$0.00	LF	1.2449	\$0.00
		<b>Includes Labor Yes</b>	<b>Includes Equipment Yes</b>	<b>Includes Materials Yes</b>				

**User Note:** In lieu of wall saw NPP. 350 LF \* 4 to get to proper depth.

**Item Note:**

<b>Total:</b>	<b>\$24,243.18</b>
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26	029055000009	Project Director / Document Consultant / Account Manager For Emergency Clean Up	Installation	40.00	\$159.39	HR	1.1619	\$7,407.81
<b>Accepted</b>		<i>History: 1.1 Added, 1.2 Modified, 1.3 Accepted, 1.4 Accepted, 1.5 Accepted, 2.0 Accepted</i>	<b>Demo:</b>	0.000000	\$0.00	HR	1.1619	\$0.00
		<b>Includes Labor Yes</b>	<b>Includes Equipment No</b>	<b>Includes Materials No</b>				

**Owner Comments:** V:1.2-Normal working hours.

<b>Total:</b>	<b>\$7,407.81</b>
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**05 Metals** **\$42,107.50**

Record #	CSI Number	Description	Type	Quantity	Unit Price	UOM	Factor	Line Total
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\* Includes Price Changes due to Construction Task Catalog update

# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Proposal Value: \$610,819.97

Approved Date: December 12, 2023

Job Order: MTSJOC348-09

Job Order Name: Washington St Wall Modification

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

27	055213000028	Powder Coated Steel, Wire Mesh Or Welded Wire Mesh, Railing Infill Panel	Installation	2,800.00	\$12.08	SF	1.2449	\$42,107.50
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<b>Accepted</b>		<i>History:</i>	<b>Demo:</b>	0.000000	\$0.00	SF	1.2449	\$0.00
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**Includes Labor No Includes Equipment No Includes Materials Yes**

**User Note:** For Fence sub in lieu of NPP.

**Item Note:**

<b>Total:</b>	<b>\$42,107.50</b>
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**06 Wood, Plastics, and Composites** **\$8,081.89**

Record #	CSI Number	Description	Type	Quantity	Unit Price	UOM	Factor	Line Total
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28	061323000008	4" x 12", Pine, Heavy Timber Beam	Installation	400.00	\$16.23	LF	1.2449	\$8,081.89
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<b>Accepted</b>		<i>History:</i>	<b>Demo:</b>	0.000000	\$2.04	LF	1.2449	\$0.00
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**Includes Labor No Includes Equipment No Includes Materials Yes**

**Owner Comments:** V:1.4-What is this item for?

<b>Total:</b>	<b>\$8,081.89</b>
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**09 Finishes** **\$25,794.33**

Record #	CSI Number	Description	Type	Quantity	Unit Price	UOM	Factor	Line Total
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29	090120910028	>250 SF, Chip, Clean And Repair Plaster/Stucco	Installation	1,400.00	\$13.23	SF	1.2449	\$23,058.04
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<b>Accepted</b>		<i>History:</i>	<b>Demo:</b>	1400.000000	\$0.00	SF	1.2449	\$0.00
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**Includes Labor Yes Includes Equipment Yes Includes Materials Yes**

**User Note:** For stucco/plaster sub in lieu of NPP

**Item Note:**

<b>Total:</b>	<b>\$23,058.04</b>
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\* Includes Price Changes due to Construction Task Catalog update

# Price Proposal Detail Report

## By Division

Version: 2.0

Approved

Proposal Value: \$610,819.97

Approved Date: December 12, 2023

Job Order: MTSJOC348-09

Job Order Name: Washington St Wall Modification

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

30	099113000100	2 Coats Paint, Sprayed, Paint Exterior Stucco Walls	Installation	1,400.00	\$1.57	SF	1.2449	\$2,736.29
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Accepted		History:	Demo:	1400.000000	\$0.00	SF	1.2449	\$0.00
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Includes Labor Yes Includes Equipment Yes Includes Materials Yes

User Note: For stucco/plaster sub in lieu of NPP

Item Note:

Total:	\$2,736.29
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31	099113000100	For Up To 100, Add	MOD: 0199	Installation	0.00	\$0.91	SF	1.2449	\$0.00
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Accepted		History:						
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Includes Labor No Includes Equipment No Includes Materials No

Total:	\$0.00
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32	099113000100	For >250 To 500, Add	MOD: 0201	Installation	0.00	\$0.19	SF	1.2449	\$0.00
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Accepted		History:						
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Includes Labor No Includes Equipment No Includes Materials No

Total:	\$0.00
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32 Exterior Improvements								\$45,105.22
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Record #	CSI Number	Description	Type	Quantity	Unit Price	UOM	Factor	Line Total
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33	323119000022	4' Double Wrought Iron Gate, Hardware And Associated Trim	Installation	350.00	\$103.52	LF	1.2449	\$45,105.22
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Accepted		History:	Demo:	0.000000	\$13.70	LF	1.2449	\$0.00
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Includes Labor Yes Includes Equipment Yes Includes Materials Yes

User Note: For Fence sub in lieu of NPP.

Item Note:

Total:	\$45,105.22
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Proposal Total: \$610,819.97

Div The Percentage of Non Pre-Priced on this Proposal: 0.0%

\* Includes Price Changes due to Construction Task Catalog update

# Price Proposal Detail Report



## By Division

Version: 2.0

Approved

Job Order: MTSJOC348-09

Proposal Value: \$610,819.97

Job Order Name: Washington St Wall Modification

Approved Date: December 12, 2023

Location: Green Line ROW 1255 Imperial Ave San Diego, CA 92101

Contractor: Veteran's Engineering Services

Contract Number: PWG348.0-22

Contract Name: JOC General Railroad Construction Services - Option 1

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\* Includes Price Changes due to Construction Task Catalog update

EXHIBIT C  
(Subcontractor Listing)

# San Diego Metropolitan Transit System

1255 Imperial Ave  
 San Diego, CA 92101

## Subcontractor Report

Date: 12/13/2023

Job Order Contracting

**Contract #:** PWG348.0-22  
**Job Order #:** MTSJOC348-09  
**Job Order Title:** Washington St Wall Modification  
**Job Order Value:** \$610,819.97  
**Location:** Green Line ROW  
**Contractor:** Veteran's Engineering Services  
**Subcontractor:**

Subcontractor Name	License Number	Describe Nature of Work (Trade)	Certifications	Subcontractor Total	%
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### Summary

Certification Name	Value	%
<b>Total</b>		<b>0.00%</b>





**Metropolitan  
Transit  
System**

## **Agenda Item No. 11**

MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS

January 18, 2024

**SUBJECT:**

MTS Board Policy No. 21: MTS Revenue-Generating Display Advertising, Concessions, and Merchandise – Revision Status Report

**INFORMATIONAL ONLY**

Budget Impact

Estimated revenue increase is approximately \$385,000 - \$770,000 annually.

**DISCUSSION:**

On June 15, 2023 (AI 22), the Board of Directors 1) Approved proposed revisions to MTS Board Policy No. 21 to remove the alcohol advertising prohibition on transit vehicles, Trolley stations, and transit centers; 2) Directed staff to work with City of San Diego on amendments to applicable policies to allow alcohol advertising on bus shelters and benches within the City of San Diego; 3) Pilot the policy changes for a two-year period, including responsible drinking messages on all alcohol brand specific advertisements along with reporting results in six months and 4) Include data tracking of the location of the advertisements to ensure there are no disparities in disadvantaged communities.

**Initial Six-Month Report on Alcohol Brand Advertising**

During the first six months of the revised Advertising Policy, one alcohol-related advertising agreement has been executed. Clear Channel Outdoor (CCO), MTS's contractor who sells the advertising space on vehicles and shelters, executed an agreement with Breckenridge Distillery for a Trolley wrap advertisement. The total campaign revenue for MTS is \$20,790. The advertisement included a responsible drinking message of "Don't drink and drive. Take the Trolley."

To date no comments or complaints have been received about the Breckenridge Distillery Trolley wrap on MTS social media accounts or through customer service channels.

During this same period, CCO has pitched the new alcohol advertising opportunity to 10 different companies including Miller Coors, Patron, Bacardi, New Belgian and Constellation Brands. According to CCO, it has been a challenge to gain interest with national alcohol brands because the timing of the amended policy did not coincide with the advertiser marketing budget



schedule. Advertisers are currently planning FY 2025 marketing budgets and CCO is continually reaching out to advertisers about this new opportunity.

Although sales have not matured yet, MTS also used the opportunity to advertise local events and sponsors where alcohol is served, which would have been barred or required modifications under the previous policy. For example, MTS executed a marketing partnership with La Mesa Oktoberfest organizers, with the advertisements including alcohol sponsors and images of attendees holding alcoholic beverages. Another example is a Trolley advertising wrap for the National Women's Soccer League championship game. The advertiser was able to include information about its presenting sponsor – Bud Light – on the wrap. Allowing these slight mentions of alcohol can help smooth relationships with advertisers and lead to future advertising sales and marketing partnerships.

Alcohol advertising at bus shelters has not been implemented yet. MTS staff is meeting regularly with City of San Diego staff on amendments to applicable policies to allow alcohol advertising on bus shelters and benches within the City of San Diego. Staff anticipates finalizing an agreement within the next six months. MTS and the City of San Diego are working on a new bus shelter Memorandum of Understanding, which includes a revenue sharing component for advertising within the city limits. The MOU would follow MTS' advertising policy. With 90% of bus shelters located within the City of San Diego, any substantial revenue increase from alcohol advertising at bus shelters would require the City to remove current restrictions.

As part of the Board's approved revisions, Policy 21, Section 21.6.3, includes the following restriction on the proximity of alcohol advertisements to specified uses:

Alcohol advertisement shall not be placed on shelters or digital shelters within 500 feet from, or intended to be read from, the following: schools, public parks/playgrounds, church-recognized, established, or stand-alone places of worship, daycare/preschool, hospitals, and cemetery/funeral homes.

With this policy restriction in mind, Bricehouse, MTS's Master Concessionaire, has completed its analysis of Trolley stations that are eligible for alcohol advertising. While most stations will comply with the amended policy to allow alcohol advertisements, Bricehouse has identified four Trolley stations that will not be eligible. San Diego State University Transit Center, Alvarado Station, 24<sup>th</sup> Street Station, and Beyer Blvd Station all have schools or hospitals in close proximity.

In summary, securing alcohol advertisers in the first six months has been slow. However, MTS staff and both of MTS's advertising contractors, CCO and Bricehouse, are making progress developing the appropriate guardrails for the amended policy, educating advertisers about the benefits of this new opportunity, and working on necessary policy amendments. Staff will report back to the Board in 12 months, with a more robust update. At that time, staff will have a better understanding of the revenue potential, updated policy guidelines, data on location of advertisements, community input and more.

/S/ Sharon Cooney  
Sharon Cooney  
Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)



**Metropolitan  
Transit  
System**

## Agenda Item No. 12

MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS

January 18, 2024

**SUBJECT:**

Addition of Full Time Equivalent Position: Grants Analyst

**RECOMMENDATION:**

That the San Diego Metropolitan Transit System (MTS) Board of Directors authorize the Chief Executive Officer (CEO) to add one (1) Grants Analyst to the position tables previously approved in the Fiscal Year 2024 budget.

Budget Impact

The Grants Analyst will be in Salary Grade #7 (\$50,383 - \$99,162). The total net annual cost for this additional position (including both wages and benefits) would be approximately \$96,285.64. The expense would be added into the annual Executive Admin. budget, and be reflected in the Fiscal Year 2024 mid-year budget amendment.

**DISCUSSION:**

With the passage of Senate Bill (SB) 125, recent additional Transit and Intercity Rail Capital Program (TIRCP) grant awards (\$60 million), and the recurring number of available state and federal grant opportunities to support MTS's growing Capital Improvement Program, MTS will manage and report on an increasing number of grant-awarded projects, requiring additional staff time and commitment to complete all grant requirements in accordance with specific program guidelines and schedules.

As a result of additional funding and the growth in available state and federal grants, one additional position has been identified as necessary for MTS in order to keep up and maintain competitiveness in grant-related opportunities. The additional reporting requirements for active and future grant awards has grown substantially since the creation of the newly formed Grants Team in 2021. Additionally, the demand for state and federal grant opportunities is growing as MTS continues to improve and increase its services and addresses its underfunded Capital Improvement Program.

Today's proposed action would authorize the CEO to create the additional full-time employment position, and to fund the position in the fiscal year 2024 budget:



### Grants Analyst

The requested Grants Analyst position will perform a broad range of tasks as a new member of the Grants Team, including researching, identifying, and assisting in the application and reporting of agency grants. Currently, the Grants Team is comprised of two areas, Administration and Finance, with four positions: Grants Administrator; Manager of Government Affairs; Financial Analyst; and Transit Asset Management Program Manager. The Grants Administrator and Financial Analyst positions are responsible for all day-to-day financial and grant administration processes. The Grants Analyst position would serve as an additional member to the Grants Team and will report to the Manager of Government Affairs. This position will work closely with the Grants Administrator and Financial Analyst in facilitating the coordination and completion of all grant requirements in accordance with specific program guidelines and schedules.

/S/ Sharon Cooney

Sharon Cooney  
Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)



**Metropolitan  
Transit  
System**

## **Agenda Item No. 13**

MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS

January 18, 2024

**SUBJECT:**

PRONTO Online Reduced Fare Application Update (Leanne Powell and Stacie Bishop)

**INFORMATIONAL ONLY**

Budget Impact

None.

**DISCUSSION:**

The regional fare ordinance requires the verification of eligibility for reduced fare passes. When PRONTO launched, the software application to verify the eligibility of reduced fares was not yet developed. In order to continue with the launch of PRONTO, and limit disruption of service to riders with a reduced fare, a temporary approval was granted for reduced fare users on the honor system. Both the San Diego Metropolitan Transit System and North County Transit District must ensure those using reduced fares are eligible and will resume mandatory verifications. The new, online reduced fare application is now available for customers and launched on December 5, 2023. Staff will provide a demonstration of the new application, will discuss preliminary results since the launch, and will present on the customer outreach plan.

/S/ Sharon Cooney  
Sharon Cooney  
Chief Executive Officer

Key Staff Contact: Julia Tuer, 619.557.4515, [Julia.Tuer@sdmts.com](mailto:Julia.Tuer@sdmts.com)



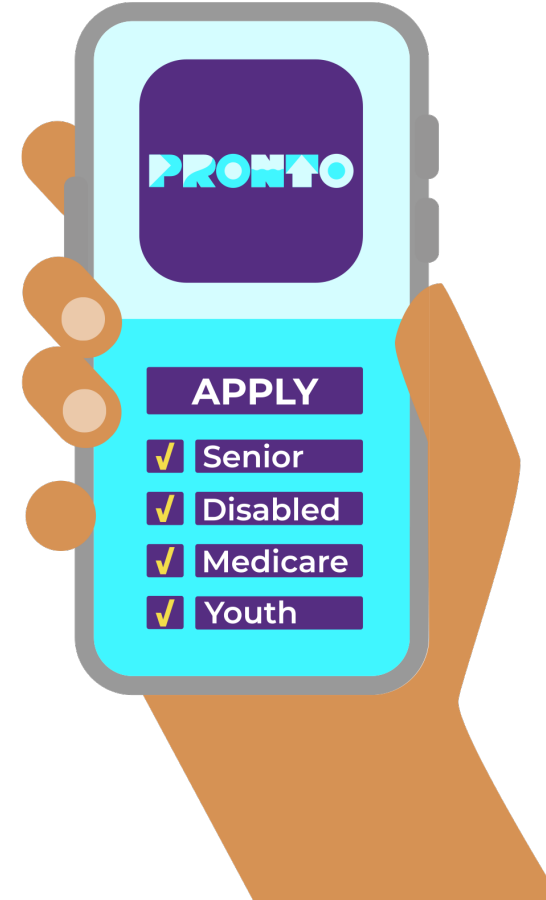


# Online Reduced Fare Application

Board of Directors Meeting  
January 18, 2024

# PRONTO Online Reduced Fare Application

- Project Background
- Why Now?
- How it Works
- Preliminary Results
- Outreach and Communication Plan



# Background

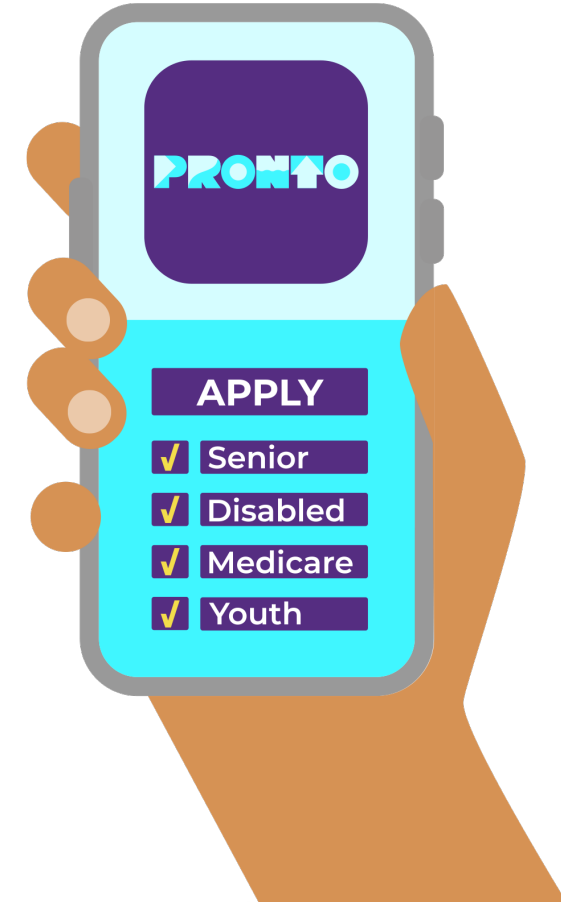
- PRONTO implemented as region's new fare collection system in summer 2021
- Prior policy: All reduced fares required verification of eligibility, only offered in person.
- Quick transition from Compass to PRONTO + new YOP program = high demand for reduced fares
- PRONTO Roadmap = new online option for verifying SDM and Youth riders.





# Why the Online Application?

- MTS returning to requiring proof of eligibility for a reduced fare: ensure only eligible users accessing free and reduced fare programs; keep transit fares low across the board
- NEW option for providing proof of eligibility documents for discounted fares (Senior, Disabled, Medicare and Youth)
- More flexibility for many riders: Apply anytime, anywhere
- One-time process for majority of riders
- No longer need to travel with proof of eligibility when riding



# How Does the Online Application Work?

Available in English and Spanish through PRONTO website

Need three things to apply: Email address, eligibility document and/or ID, profile picture (e.g. selfie)

1. **Login to the RidePRONTO website**
2. **Enter personal information (name/birthdate)**
3. **Upload documents (ID, proof of eligibility document, photo)**

Two paths: Automatic approval (seniors + youth 13+), manual review (all others)



Passport Book

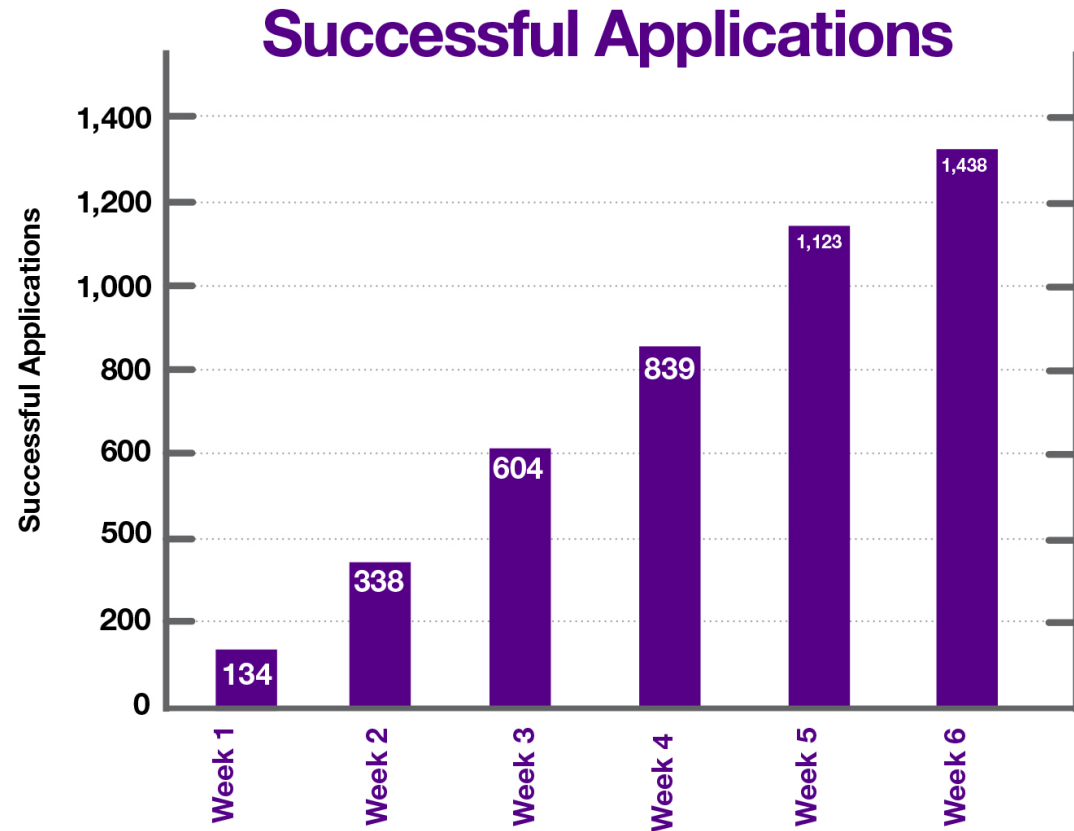


Passport Card



# Preliminary Results

- Over 1,400 accounts successfully verified since December 5, 2023
- 83% of all application submitted are successful
- 62% are given instant approval to a reduced fare
- Manual review period is taking less than 3 days



# Preliminary Feedback

Patron expresses gratitude for the online option to submit for the Reduced Fare Program.

She is visually impaired and found it hard to visit the transit store on her own as she does not frequent that location and always required someone to come with her to be able to present her proof in person.

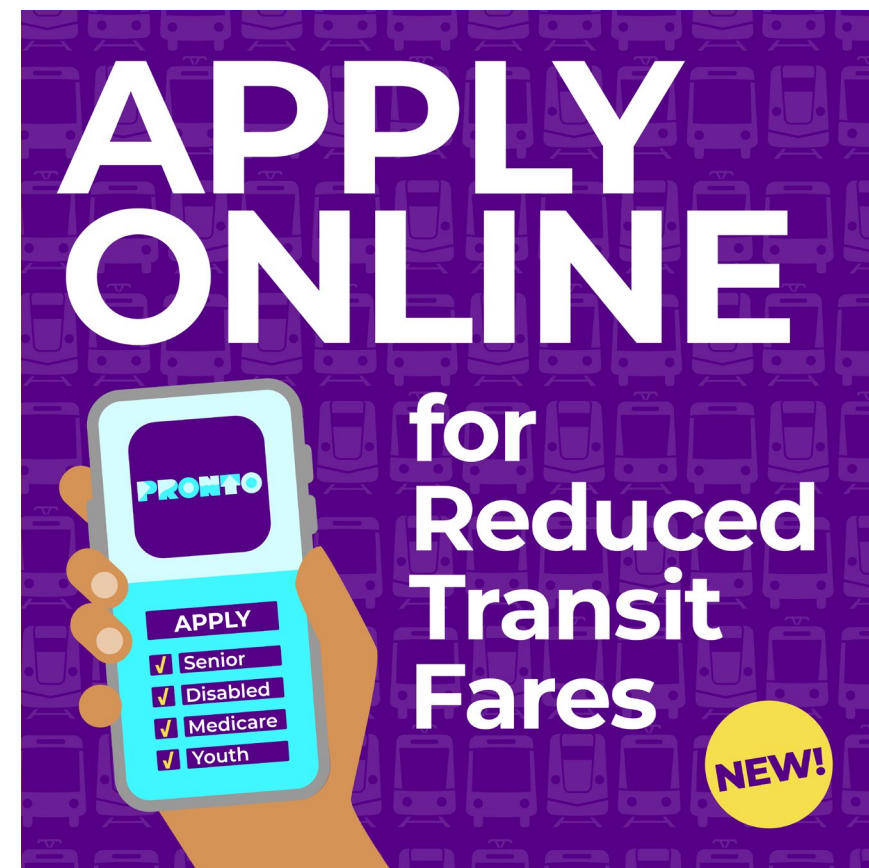


# Outreach & Communication Plan

**Application launched December 5: New users only.** Preliminary communication through website, email, social media.

**Before June 30, 2024:** All temporary SDM and Youth access must be verified.

- Estimated 36,000 active SDM and Youth users
- Anyone who: Received a free card at outreach, from a CBO or school, over-the-phone, etc. (August 2021 – November 2023)
- Those who don't verify by June 30, 2024 will be charged full adult fare



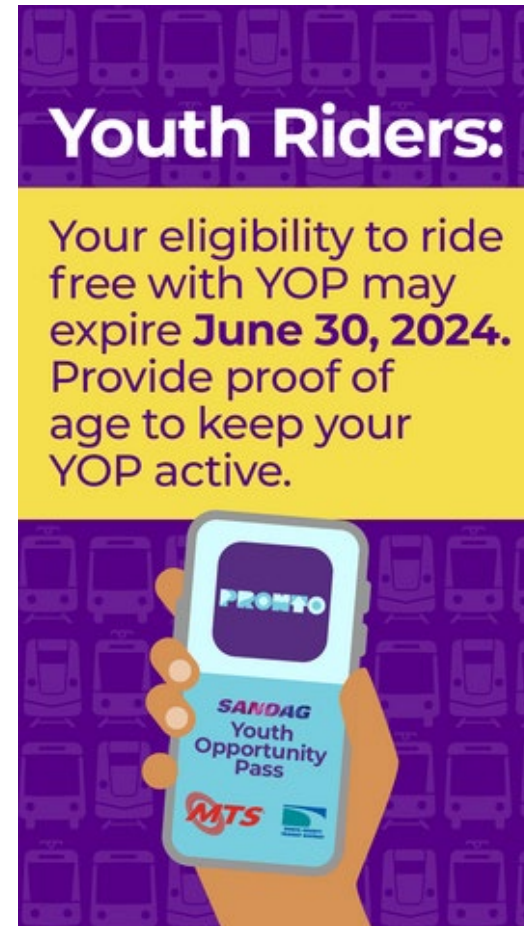
# Outreach & Communication Plan

## Partner Communications:

- Toolkits
- CBO outreach application: Due 1/31
- On-site verification events

## PRONTO-Enabled Communications:

- Targeted stop notifications
- Transit center pop-ups
- Email to SDM and Youth users
- Mass mailers to SDM and Youth users
- App notifications



# Questions/Comments



**Metropolitan  
Transit  
System**

## **Agenda Item No. 14**

**MEETING OF THE SAN DIEGO METROPOLITAN TRANSIT SYSTEM  
BOARD OF DIRECTORS**

January 18, 2024

**SUBJECT:**

Chief Executive Officer's Report

**INFORMATIONAL**

In accordance with Board Policy No. 52, "Procurement of Goods and Services", attached are listings of contracts, purchase orders, and work orders that have been approved within the CEO's authority (up to and including \$150,000) for the period December 6, 2023 – January 9, 2024

CEO TRAVEL REPORT (since last Board meeting)

N/A

BOARD MEMBER TRAVEL REPORT (since last Board meeting)

N/A

**1255 Imperial Avenue, Suite 1000, San Diego, CA 92101-7490 • (619) 231-1466 • [sdmts.com](http://sdmts.com)**

San Diego Metropolitan Transit System (MTS) is a California public agency comprised of San Diego Transit Corp., San Diego Trolley, Inc. and San Diego and Arizona Eastern Railway Company (nonprofit public benefit corporations). MTS member agencies include the cities of Chula Vista, Coronado, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Poway, San Diego, Santee, and the County of San Diego. MTS is also the For-Hire Vehicle administrator for nine cities.





<b>EXPENSE CONTRACTS</b>				
<b>Doc #</b>	<b>Organization</b>	<b>Subject</b>	<b>Amount</b>	<b>Day</b>
PWG348.0-22JOC348.10	VETERANS	FLETCHER BRIDGE CONNOLLY JOINTS	\$ 116,177.90	12/7/2023
G2498.0-21WOACM08	KLEINFELDER	OL CONSTR REVIEW	\$ 140,856.85	12/7/2023
B0703.10-19	FIRST TRANSIT	MOBILE LIFTS	\$ 62,614.63	12/7/2023
G2253.5-19	TRAPEZE	PASS MOBILE APP MAINTENANCE	\$ 8,400.00	12/8/2023
PWG324.01-21JOC18.2	ABCGC	CCO 2 MILLS SECURITY OFFICE	\$ 124,789.78	12/18/2023
PWB317.6-20	WESTERN PUMP	KMD HOISTS CCO 6	\$ 44,658.89	12/19/2023
PWB317.7-20	WESTERN PUMP	KMD HOISTS CCO 7	\$ 19,022.09	12/19/2023
G2386.3-20	DARKTRACE	CLOUD TRANSITION ADD USERS	\$ 67,785.00	12/20/2023
PWG330.4-21	ACM	AMD 4 ADD FUNDS	\$ 46,412.58	12/20/2023
PWB342.4-22	PALM	CCOS 4-12	\$ 74,105.66	12/21/2023
PWG324.0-21JOC19.01	ABCGC	CCO 1 IAD CHASSIS WASH COVER	\$ 129,993.88	12/21/2023
G2840.0-24	CERTIFIED FOLDER DISPLAY	COLLATERAL DISTRIBUTION SERVICES	\$ 121,573.44	12/22/2023
G1867.4-16	APTA	AMD 4 NAT RAIL CAR CONSORTIUM	\$ 46,000.00	12/22/2023
G2689.2-23	ADAPTIVEDGE	ADJUST MILESTONE AND TRAVEL EXPENSE	\$ 629.01	12/22/2023
PWB351.3-22	RMS	KMD GAS DETECT CCO 3	\$ 28,402.43	12/27/2023
PWG324.0-21JOC324-44	ABCGC	SECURITY TRAILER POWER	\$ 139,977.72	12/29/2023
G2498.0-21WOACM07	KLEINFELDER	SDSU SMOKE	\$ 43,145.15	1/9/2024

<b>REVENUE CONTRACTS AND MOUs</b>				
<b>Doc #</b>	<b>Organization</b>	<b>Subject</b>	<b>Amount</b>	<b>Day</b>
L5859.0-24	MCI	UNDERGROUND FIBER LAUREL ST ROW LICENSE	\$ 1,500.00	12/7/2023
G2774.0-24	CITY OF SD	PAXTON & LAURISTON LICENSE	\$ 1,500.00	12/7/2023
S200-24-841	NOVA SERVICES	PARKING LOT BORING SPRING ST ROE	\$ 750.00	12/13/2023
L5291.0-24	MCI	LICENSE CUYAMACA & PROSPECT CONDUIT ROW	\$ 1,500.00	12/13/2023
L5281.1-22	HP COMMUNICATIONS	CUYAMACA ST FIBER INSTALLATION ROE AMD 1	\$ 750.00	12/13/2023
S200-22-771.2	ORTIZ CORP	CITY WATER PIPE 69TH ST ROE PERMIT	\$ 750.00	12/21/2023
S200-24-836	GC FENCE CORP	GUARDRAIL INSTALLATION SPRING ST ROE PERMIT	\$ 969.16	12/22/2023
L5857.1-24	HMS	CONDUIT INVESTIGATION CEDAR ST ROE PERMIT	\$ 750.00	12/27/2023
L1160.5-14	ETIC	GROUNDWATER MONITORING H ST ROE PERMIT	\$ 750.00	1/8/2024

Purchase Orders							
PO Number	PO Date	Name	Prime Business Certification	Material Group	PO Value	DBE Sub Commitment	Non DBE SubCommitment
4400002665	12/7/2023	W.W. Grainger Inc		G190-SAFETY/MED SUPPLIES	\$ 315.76	\$ -	\$ -
4400002666	12/8/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 749.40	\$ -	\$ -
4400002667	12/8/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 59.03	\$ -	\$ -
4400002668	12/11/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 448.78	\$ -	\$ -
4400002669	12/11/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 135.74	\$ -	\$ -
4400002670	12/11/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 122.56	\$ -	\$ -
4400002671	12/11/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 3,187.25	\$ -	\$ -
4400002672	12/11/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 69.41	\$ -	\$ -
4400002673	12/11/2023	W.W. Grainger Inc		G190-SAFETY/MED SUPPLIES	\$ 837.08	\$ -	\$ -
4400002674	12/12/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 385.44	\$ -	\$ -
4400002675	12/12/2023	ODP Business Solutions, LLC		I110-INFORMATION TECH	\$ 79.77	\$ -	\$ -
4400002676	12/13/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 332.86	\$ -	\$ -
4400002677	12/13/2023	W.W. Grainger Inc		G150-FASTENERS	\$ 4.22	\$ -	\$ -
4400002678	12/13/2023	W.W. Grainger Inc		G140-SHOP SUPPLIES	\$ 88.25	\$ -	\$ -
4400002679	12/13/2023	Mcmaster-Carr Supply Co		M140-WAYSIDE SIGNALS	\$ 1,808.33	\$ -	\$ -
4400002680	12/15/2023	W.W. Grainger Inc		G130-SHOP TOOLS	\$ 222.25	\$ -	\$ -
4400002681	12/18/2023	W.W. Grainger Inc		G200-OFFICE SUPPLIES	\$ 588.21	\$ -	\$ -
4400002682	12/19/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 365.72	\$ -	\$ -
4400002683	12/19/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 924.69	\$ -	\$ -
4400002684	12/20/2023	W.W. Grainger Inc		G160-PAINTS & CHEMICALS	\$ 3,424.19	\$ -	\$ -
4400002685	12/20/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 523.76	\$ -	\$ -
4400002686	12/20/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 101.82	\$ -	\$ -
4400002687	12/20/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 41.27	\$ -	\$ -
4400002688	12/21/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 367.02	\$ -	\$ -
4400002689	12/22/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 67.53	\$ -	\$ -
4400002690	12/22/2023	W.W. Grainger Inc		G130-SHOP TOOLS	\$ 1,123.92	\$ -	\$ -
4400002691	12/22/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 183.82	\$ -	\$ -
4400002692	12/26/2023	W.W. Grainger Inc		G140-SHOP SUPPLIES	\$ 120.97	\$ -	\$ -
4400002693	12/26/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 1,187.34	\$ -	\$ -
4400002694	12/26/2023	W.W. Grainger Inc		G130-SHOP TOOLS	\$ 1,164.66	\$ -	\$ -
4400002695	12/26/2023	Mcmaster-Carr Supply Co		R230-RAIL/LRV MECHANICAL	\$ 68.37	\$ -	\$ -
4400002696	12/27/2023	W.W. Grainger Inc		G140-SHOP SUPPLIES	\$ 854.46	\$ -	\$ -
4400002697	12/28/2023	W.W. Grainger Inc		G130-SHOP TOOLS	\$ 110.89	\$ -	\$ -
4400002698	1/2/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 451.71	\$ -	\$ -
4400002699	1/2/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 556.16	\$ -	\$ -
4400002700	1/3/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 105.87	\$ -	\$ -
4400002701	1/3/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 372.84	\$ -	\$ -
4400002702	1/3/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 235.37	\$ -	\$ -
4400002703	1/3/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 78.03	\$ -	\$ -
4400002704	1/4/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 273.30	\$ -	\$ -
4400002705	1/5/2024	W.W. Grainger Inc		G140-SHOP SUPPLIES	\$ 2,336.71	\$ -	\$ -
4400002706	1/5/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 65.26	\$ -	\$ -
4400002707	1/5/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 297.98	\$ -	\$ -
4400002708	1/5/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 598.47	\$ -	\$ -
4400002709	1/5/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 637.77	\$ -	\$ -
4400002710	1/9/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 899.68	\$ -	\$ -
4400002711	1/9/2024	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 64.40	\$ -	\$ -
4500058189	12/7/2023	Transit Holdings Inc		B160-BUS ELECTRICAL	\$ 98.00	\$ -	\$ -
4500058190	12/7/2023	Siemens Mobility, Inc.		R160-RAIL/LRV ELECTRICAL	\$ 491.34	\$ -	\$ -
4500058191	12/7/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 620.72	\$ -	\$ -
4500058192	12/7/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 2,274.86	\$ -	\$ -
4500058193	12/7/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 12.59	\$ -	\$ -
4500058194	12/7/2023	Parts Authority, LLC		B160-BUS ELECTRICAL	\$ 10,916.87	\$ -	\$ -
4500058195	12/7/2023	Siemens Mobility, Inc.		R180-RAIL/LRV LIGHTING	\$ 2,811.85	\$ -	\$ -
4500058196	12/7/2023	Letter Publications Inc		P250-PARATRANSIT	\$ 674.00	\$ -	\$ -
4500058197	12/7/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 3,970.20	\$ -	\$ -
4500058198	12/7/2023	Mohawk Mfg & Supply Co		B140-BUS CHASSIS	\$ 7.45	\$ -	\$ -
4500058199	12/7/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 12,543.08	\$ -	\$ -
4500058200	12/7/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,135.79	\$ -	\$ -
4500058201	12/7/2023	VGP Holdings LLC		B200-BUS PWR TRAIN EQUIP	\$ 2,059.38	\$ -	\$ -
4500058202	12/7/2023	Hitachi Rail STS USA, Inc.		M140-WAYSIDE SIGNALS	\$ 2,945.35	\$ -	\$ -
4500058203	12/7/2023	Fastenal Company		G140-SHOP SUPPLIES	\$ 951.78	\$ -	\$ -
4500058204	12/7/2023	Siemens Mobility, Inc.		R160-RAIL/LRV ELECTRICAL	\$ 576.36	\$ -	\$ -
4500058205	12/7/2023	Init Innovations in Transportation		G290-FARE REVENUE EQUIP	\$ 2,972.60	\$ -	\$ -
4500058206	12/7/2023	Gillig LLC		B160-BUS ELECTRICAL	\$ 63,699.44	\$ -	\$ -
4500058207	12/7/2023	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 3,626.70	\$ -	\$ -
4500058208	12/7/2023	Robcar Corporation	Woman Owned Business	G110-BUS/TROLLEY SIGNAGE	\$ 377.13	\$ -	\$ -
4500058209	12/7/2023	FinishMaster Inc		F120-BUS/LRV PAINT BOOTHS	\$ 1,604.07	\$ -	\$ -
4500058210	12/7/2023	Mcmaster-Carr Supply Co		G140-SHOP SUPPLIES	\$ 387.46	\$ -	\$ -
4500058211	12/7/2023	Lawson Products, Inc.		R220-RAIL/LRV TRUCKS	\$ 1,170.67	\$ -	\$ -
4500058212	12/7/2023	Kirkland Printing & Mailing Svcs		G230-PRINTED MATERIALS	\$ 570.54	\$ -	\$ -
4500058213	12/7/2023	Continental Locks		F180-BUILDING MATERIALS	\$ 115.00	\$ -	\$ -
4500058214	12/7/2023	Inland Lighting Supplies Inc	Small Business	M180-STATION ELECTRICAL	\$ 1,703.53	\$ -	\$ -
4500058215	12/7/2023	Harbor Diesel & Equipment, Inc		B200-BUS PWR TRAIN EQUIP	\$ 21,143.01	\$ -	\$ -
4500058216	12/7/2023	General Signals Inc		M130-CROSSING MECHANISM	\$ 1,803.74	\$ -	\$ -
4500058217	12/7/2023	Hanning & Kahl LP		M130-CROSSING MECHANISM	\$ 4,730.23	\$ -	\$ -
4500058218	12/7/2023	Professional Contractors Supplies		G140-SHOP SUPPLIES	\$ 499.91	\$ -	\$ -
4500058219	12/7/2023	Home Depot USA Inc		G140-SHOP SUPPLIES	\$ 49.09	\$ -	\$ -
4500058220	12/7/2023	Home Depot USA Inc		F190-LANDSCAPING MAT'LS	\$ 258.47	\$ -	\$ -
4500058221	12/7/2023	Gillig LLC		B250-BUS REPAIR PARTS	\$ 293.10	\$ -	\$ -
4500058222	12/7/2023	W.W. Grainger Inc		G190-SAFETY/MED SUPPLIES	\$ 1,024.11	\$ -	\$ -
4500058223	12/7/2023	Clarran Inc.	DBE	G150-FASTENERS	\$ 71.89	\$ -	\$ -
4500058224	12/7/2023	Flyers Energy LLC		G170-LUBRICANTS	\$ 9,031.42	\$ -	\$ -
4500058225	12/7/2023	Schunk Carbon Technology LLC		R190-RAIL/LRV PANTOGRAPH	\$ 2,556.58	\$ -	\$ -
4500058226	12/7/2023	Cummins Inc		B120-BUS MECHANICAL PARTS	\$ 6,894.25	\$ -	\$ -
4500058227	12/7/2023	CDW LLC		B150-BUS COMM EQUIP.	\$ 1,308.51	\$ -	\$ -
4500058228	12/7/2023	Genfare, LLC		G290-FARE REVENUE EQUIP	\$ 336.35	\$ -	\$ -
4500058229	12/7/2023	Vern Rose Inc		G160-PAINTS & CHEMICALS	\$ 522.98	\$ -	\$ -
4500058230	12/7/2023	Init Innovations in Transportation		G290-FARE REVENUE EQUIP	\$ 641.12	\$ -	\$ -

Purchase Orders							
PO Number	PO Date	Name	Prime Business Certification	Material Group	PO Value	DBE Sub Commitment	Non DBE SubCommitment
4500058231	12/7/2023	Init Innovations in Transportation		G290-FARE REVENUE EQUIP	\$ 538.75	\$ -	\$ -
4500058232	12/7/2023	Gillig LLC		B160-BUS ELECTRICAL	\$ 1,498.44	\$ -	\$ -
4500058233	12/7/2023	AirSupply Tools, Inc		G200-OFFICE SUPPLIES	\$ 146.28	\$ -	\$ -
4500058234	12/8/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 17,383.25	\$ -	\$ -
4500058235	12/8/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 2,448.44	\$ -	\$ -
4500058236	12/8/2023	Hitachi Rail STS USA, Inc.		M150-PWR SWITCHES/LOCKS	\$ 4,161.95	\$ -	\$ -
4500058237	12/8/2023	Neopart Transit LLC		B250-BUS REPAIR PARTS	\$ 384.49	\$ -	\$ -
4500058238	12/8/2023	Gillig LLC		B130-BUS BODY	\$ 870.68	\$ -	\$ -
4500058239	12/8/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,210.55	\$ -	\$ -
4500058240	12/8/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 5,294.87	\$ -	\$ -
4500058241	12/8/2023	Init Innovations in Transportation		G290-FARE REVENUE EQUIP	\$ 3,050.84	\$ -	\$ -
4500058242	12/8/2023	MCI Carrillo Inc	Small Business	P210-NON-REV VEH REPAIRS	\$ 109.00	\$ -	\$ -
4500058243	12/8/2023	Freeby Signs		B250-BUS REPAIR PARTS	\$ 233.39	\$ -	\$ -
4500058244	12/8/2023	Staples Contract & Commercial LLC		G200-OFFICE SUPPLIES	\$ 1,995.36	\$ -	\$ -
4500058245	12/8/2023	Romaine Electric Corporation	Small Business	B160-BUS ELECTRICAL	\$ 2,330.18	\$ -	\$ -
4500058246	12/8/2023	Fehr Brothers Industries, Inc.		G140-SHOP SUPPLIES	\$ 69.24	\$ -	\$ -
4500058247	12/8/2023	W.W. Grainger Inc		G140-SHOP SUPPLIES	\$ 96.01	\$ -	\$ -
4500058248	12/8/2023	General Signals Inc		M130-CROSSING MECHANISM	\$ 7,365.38	\$ -	\$ -
4500058249	12/8/2023	SC Commercial, LLC		A120-AUTO/TRUCK GASOLINE	\$ 654.17	\$ -	\$ -
4500058250	12/8/2023	Citywide Auto Glass Inc		R120-RAIL/LRV CAR BODY	\$ 1,325.33	\$ -	\$ -
4500058251	12/8/2023	Mcmaster-Carr Supply Co		F110-SHOP/BLDG MACHINERY	\$ 522.23	\$ -	\$ -
4500058252	12/8/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 2,033.24	\$ -	\$ -
4500058253	12/8/2023	Home Depot USA Inc		F110-SHOP/BLDG MACHINERY	\$ 142.63	\$ -	\$ -
4500058254	12/8/2023	R.S. Hughes Co Inc		B250-BUS REPAIR PARTS	\$ 228.52	\$ -	\$ -
4500058255	12/8/2023	W.W. Grainger Inc		F110-SHOP/BLDG MACHINERY	\$ 49.68	\$ -	\$ -
4500058256	12/8/2023	Clarran Inc.	DBE	G150-FASTENERS	\$ 75.63	\$ -	\$ -
4500058257	12/8/2023	vCloud Tech Inc.	DBE	I120-INFO TECH, SVCS	\$ 41,883.75	\$ -	\$ -
4500058258	12/8/2023	National Railway Supply LLC		M130-CROSSING MECHANISM	\$ 6,425.24	\$ -	\$ -
4500058259	12/8/2023	ODP Business Solutions, LLC		G200-OFFICE SUPPLIES	\$ 302.25	\$ -	\$ -
4500058260	12/8/2023	Cable, Pipe & Leak Detection, Inc.	Small Business	P550-REAL ESTATE	\$ 1,225.00	\$ -	\$ -
4500058261	12/11/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 23.79	\$ -	\$ -
4500058262	12/11/2023	Motion Industries, Inc.		G170-LUBRICANTS	\$ 14,122.39	\$ -	\$ -
4500058263	12/11/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 75.25	\$ -	\$ -
4500058264	12/11/2023	Muncie Reclamation and Supply Co		B200-BUS PWR TRAIN EQUIP	\$ 28.75	\$ -	\$ -
4500058265	12/11/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 2,051.67	\$ -	\$ -
4500058266	12/11/2023	Vehicle Maintenance Program, Inc.	Woman Owned Business	B140-BUS CHASSIS	\$ 983.76	\$ -	\$ -
4500058267	12/11/2023	Siemens Mobility, Inc.		R120-RAIL/LRV CAR BODY	\$ 3,167.85	\$ -	\$ -
4500058268	12/11/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,144.24	\$ -	\$ -
4500058269	12/11/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 2,300.66	\$ -	\$ -
4500058270	12/11/2023	Inland Kenworth (US) Inc		B250-BUS REPAIR PARTS	\$ 32.65	\$ -	\$ -
4500058271	12/11/2023	ISC Applied Systems Corp		R150-RAIL/LRV COMM EQUIP	\$ 8,889.38	\$ -	\$ -
4500058272	12/11/2023	Transit Holdings Inc		B130-BUS BODY	\$ 901.48	\$ -	\$ -
4500058273	12/11/2023	Gillig LLC		B130-BUS BODY	\$ 1,025.97	\$ -	\$ -
4500058274	12/11/2023	Steven R Timme		G230-PRINTED MATERIALS	\$ 407.90	\$ -	\$ -
4500058275	12/11/2023	Professional Sports Publications, I		P310-ADVERTISING SERVICES	\$ 3,499.00	\$ -	\$ -
4500058276	12/11/2023	Ace Uniforms LLC	Small Business	C120-SPECIALTY CONTRACTOR	\$ 271.54	\$ -	\$ -
4500058277	12/11/2023	SC Commercial, LLC		A120-AUTO/TRUCK GASOLINE	\$ 2,607.80	\$ -	\$ -
4500058278	12/11/2023	Supreme Oil Co.		A120-AUTO/TRUCK GASOLINE	\$ 12,549.89	\$ -	\$ -
4500058279	12/11/2023	Zemarc Corporation	Small Business	R230-RAIL/LRV MECHANICAL	\$ 639.90	\$ -	\$ -
4500058280	12/11/2023	Grah Safe & Lock Inc	Small Business	G290-FARE REVENUE EQUIP	\$ 1,993.38	\$ -	\$ -
4500058281	12/11/2023	Prochem Specialty Products Inc	Small Business	G180-JANITORIAL SUPPLIES	\$ 1,718.62	\$ -	\$ -
4500058282	12/11/2023	Hitachi Rail STS USA, Inc.		M150-PWR SWITCHES/LOCKS	\$ 3,780.95	\$ -	\$ -
4500058283	12/11/2023	MCI Carrillo Inc	Small Business	B250-BUS REPAIR PARTS	\$ 1,811.19	\$ -	\$ -
4500058284	12/11/2023	San Diego Friction Products, Inc.		B120-BUS MECHANICAL PARTS	\$ 20,166.55	\$ -	\$ -
4500058285	12/11/2023	R.S. Hughes Co Inc		G140-SHOP SUPPLIES	\$ 2,824.33	\$ -	\$ -
4500058286	12/11/2023	Transit Products and Services		B130-BUS BODY	\$ 11,313.75	\$ -	\$ -
4500058287	12/11/2023	Genuine Parts Company Inc		G170-LUBRICANTS	\$ 189.36	\$ -	\$ -
4500058288	12/11/2023	Romaine Electric Corporation	Small Business	B160-BUS ELECTRICAL	\$ 3,359.90	\$ -	\$ -
4500058289	12/11/2023	USSC Acquisition Corp		B130-BUS BODY	\$ 625.53	\$ -	\$ -
4500058290	12/11/2023	Kurt Morgan		G200-OFFICE SUPPLIES	\$ 2,514.74	\$ -	\$ -
4500058291	12/11/2023	Knorr Brake Company, LLC		R160-RAIL/LRV ELECTRICAL	\$ 2,705.61	\$ -	\$ -
4500058292	12/11/2023	Cummins Inc		B120-BUS MECHANICAL PARTS	\$ 17,672.86	\$ -	\$ -
4500058293	12/11/2023	Cummins Inc		B120-BUS MECHANICAL PARTS	\$ 298.09	\$ -	\$ -
4500058294	12/11/2023	Clarran Inc.	DBE	G150-FASTENERS	\$ 137.60	\$ -	\$ -
4500058295	12/11/2023	The Sherwin-Williams Company		F120-BUS/LRV PAINT BOOTHS	\$ 191.28	\$ -	\$ -
4500058296	12/11/2023	Siemens Mobility, Inc.		R230-RAIL/LRV MECHANICAL	\$ 1,108.21	\$ -	\$ -
4500058297	12/11/2023	United Laboratories, Inc.		G180-JANITORIAL SUPPLIES	\$ 384.15	\$ -	\$ -
4500058298	12/11/2023	Staples Contract & Commercial LLC		G200-OFFICE SUPPLIES	\$ 41.16	\$ -	\$ -
4500058299	12/11/2023	Neopart Transit LLC		B250-BUS REPAIR PARTS	\$ 69.51	\$ -	\$ -
4500058300	12/11/2023	Compressed Air Systems		F110-SHOP/BLDG MACHINERY	\$ 524.75	\$ -	\$ -
4500058301	12/11/2023	Inland Kenworth (US) Inc		B200-BUS PWR TRAIN EQUIP	\$ 671.69	\$ -	\$ -
4500058302	12/11/2023	Muncie Reclamation and Supply Co		B130-BUS BODY	\$ 90.01	\$ -	\$ -
4500058303	12/11/2023	Mouser Electronics Inc		B250-BUS REPAIR PARTS	\$ 657.93	\$ -	\$ -
4500058304	12/11/2023	Allied Refrigeration Inc		B250-BUS REPAIR PARTS	\$ 73.38	\$ -	\$ -
4500058305	12/11/2023	Trentman Corp	Small Business	P280-GENERAL SVC AGRMNTS	\$ 976.34	\$ -	\$ -
4500058306	12/11/2023	Northwest Pump & Equipment Co		F110-SHOP/BLDG MACHINERY	\$ 358.81	\$ -	\$ -
4500058307	12/11/2023	Waxie's Enterprises, LLC		G140-SHOP SUPPLIES	\$ 1,206.84	\$ -	\$ -
4500058308	12/11/2023	vCloud Tech Inc.	DBE	I110-INFORMATION TECH	\$ 28,651.07	\$ -	\$ -
4500058309	12/12/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 94.39	\$ -	\$ -
4500058310	12/12/2023	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 27.07	\$ -	\$ -
4500058311	12/12/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 7,099.13	\$ -	\$ -
4500058312	12/12/2023	Siemens Mobility, Inc.		R230-RAIL/LRV MECHANICAL	\$ 60,115.80	\$ -	\$ -
4500058313	12/12/2023	Don Oleson Inc	Small Business	B120-BUS MECHANICAL PARTS	\$ 5,802.63	\$ -	\$ -
4500058314	12/12/2023	Vehicle Maintenance Program, Inc.	Woman Owned Business	B140-BUS CHASSIS	\$ 1,724.00	\$ -	\$ -
4500058315	12/12/2023	Home Depot USA Inc		G210-OFFICE FURNITURE	\$ 246.75	\$ -	\$ -
4500058316	12/12/2023	Cummins Inc		B250-BUS REPAIR PARTS	\$ 226.34	\$ -	\$ -
4500058317	12/12/2023	Transit Holdings Inc		B130-BUS BODY	\$ 162.24	\$ -	\$ -
4500058318	12/12/2023	Harbor Diesel & Equipment, Inc		G170-LUBRICANTS	\$ 6,203.60	\$ -	\$ -
4500058319	12/12/2023	Conisa Oropeza Enterprises Inc		G120-SECURITY	\$ 525.63	\$ -	\$ -

Purchase Orders							
PO Number	PO Date	Name	Prime Business Certification	Material Group	PO Value	DBE Sub Commitment	Non DBE SubComitment
4500058320	12/12/2023	Amazon.com Sales, Inc.		G220-OFFICE EQUIPMENT	\$ 26.04	\$ -	\$ -
4500058322	12/12/2023	No-Spill Systems Inc		B120-BUS MECHANICAL PARTS	\$ 108.98	\$ -	\$ -
4500058323	12/12/2023	Staples Contract & Commercial LLC		G200-OFFICE SUPPLIES	\$ 101.31	\$ -	\$ -
4500058324	12/12/2023	Midwest Bus Corporation		B130-BUS BODY	\$ 1,395.37	\$ -	\$ -
4500058325	12/12/2023	National Carwash Solutions Inc		G160-PAINTS & CHEMICALS	\$ 1,006.19	\$ -	\$ -
4500058326	12/12/2023	Madden Construction Inc		P280-GENERAL SVC AGRMNTS	\$ 214.50	\$ -	\$ -
4500058327	12/12/2023	CDW LLC		I110-INFORMATION TECH	\$ 4,733.04	\$ -	\$ -
4500058328	12/12/2023	W.W. Grainger Inc		G140-SHOP SUPPLIES	\$ 573.87	\$ -	\$ -
4500058329	12/12/2023	Custom Glass Solutions		R120-RAIL/LRV CAR BODY	\$ 14,720.81	\$ -	\$ -
4500058330	12/12/2023	D's Kustom Sales & Services, LLC		G130-SHOP TOOLS	\$ 4,564.52	\$ -	\$ -
4500058331	12/12/2023	Jose Arellano		M160-SUMP PUMP STATIONS	\$ 2,485.00	\$ -	\$ -
4500058332	12/12/2023	JDK Railroad Materials, Inc.		P280-GENERAL SVC AGRMNTS	\$ 1,950.00	\$ -	\$ -
4500058333	12/12/2023	Railroad Tools & Solutions LLC		G130-SHOP TOOLS	\$ 4,390.82	\$ -	\$ -
4500058334	12/12/2023	Western Sierra Supply Inc		M120-OVRHEAD CATENARY SYS	\$ 2,947.05	\$ -	\$ -
4500058335	12/12/2023	Home Depot USA Inc		G130-SHOP TOOLS	\$ 238.94	\$ -	\$ -
4500058336	12/12/2023	Knorr Brake Company, LLC		R220-RAIL/LRV TRUCKS	\$ 5,753.85	\$ -	\$ -
4500058337	12/12/2023	Willy's Electronic Supply Co Inc	Small Business	R150-RAIL/LRV COMM EQUIP	\$ 516.99	\$ -	\$ -
4500058338	12/12/2023	Winzer Franchise Company		G130-SHOP TOOLS	\$ 627.40	\$ -	\$ -
4500058339	12/12/2023	Clarran Inc.	DBE	G150-FASTENERS	\$ 150.13	\$ -	\$ -
4500058340	12/12/2023	Transit Holdings Inc		B160-BUS ELECTRICAL	\$ 3,235.06	\$ -	\$ -
4500058341	12/12/2023	Brady Industries of California, LLC		G180-JANITORIAL SUPPLIES	\$ 1,563.37	\$ -	\$ -
4500058342	12/12/2023	Annex Warehouse Company, Inc		F120-BUS/LRV PAINT BOOTHS	\$ 722.70	\$ -	\$ -
4500058343	12/13/2023	Vehicle Maintenance Program, Inc.	Woman Owned Business	B140-BUS CHASSIS	\$ 1,724.00	\$ -	\$ -
4500058344	12/13/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 3,574.61	\$ -	\$ -
4500058345	12/13/2023	Transit Holdings Inc		B160-BUS ELECTRICAL	\$ 2,748.03	\$ -	\$ -
4500058346	12/13/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,502.41	\$ -	\$ -
4500058347	12/13/2023	Jamison Professional Services, LLC	DBE	G170-LUBRICANTS	\$ 709.85	\$ -	\$ -
4500058348	12/13/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 31.98	\$ -	\$ -
4500058349	12/13/2023	Muncie Reclamation and Supply Co		B200-BUS PWR TRAIN EQUIP	\$ 206.86	\$ -	\$ -
4500058350	12/13/2023	Transit Holdings Inc		B160-BUS ELECTRICAL	\$ 1,259.60	\$ -	\$ -
4500058351	12/13/2023	Phoenix Contracting LLC		T110-TRACK, RAIL	\$ 19,966.50	\$ -	\$ -
4500058352	12/13/2023	SHI International Corp	Woman Owned Business	I110-INFORMATION TECH	\$ 77,173.22	\$ -	\$ -
4500058353	12/13/2023	Merrimac Petroleum Inc	Woman Owned Business	A120-AUTO/TRUCK GASOLINE	\$ 3,843.96	\$ -	\$ -
4500058354	12/13/2023	Gillig LLC		B140-BUS CHASSIS	\$ 2,639.47	\$ -	\$ -
4500058355	12/13/2023	Transit Products and Services		B130-BUS BODY	\$ 8,189.00	\$ -	\$ -
4500058356	12/13/2023	Fastenal Company		G130-SHOP TOOLS	\$ 2,444.06	\$ -	\$ -
4500058357	12/13/2023	Veterans Engineering Services, Inc.	Disabled Veteran Business	T110-TRACK, RAIL	\$ 146,673.79	\$ -	\$ 73,483.57
4500058358	12/13/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 2,550.03	\$ -	\$ -
4500058359	12/13/2023	Jamison Professional Services, LLC	DBE	G170-LUBRICANTS	\$ 193.69	\$ -	\$ -
4500058360	12/13/2023	Charter Industrial Supply Inc	Small Business	G150-FASTENERS	\$ 114.81	\$ -	\$ -
4500058361	12/13/2023	Tribologik Corporation		G140-SHOP SUPPLIES	\$ 3,398.31	\$ -	\$ -
4500058362	12/13/2023	Norman Industrial Materials Inc.		G140-SHOP SUPPLIES	\$ 86.44	\$ -	\$ -
4500058363	12/13/2023	Cummins Inc		B250-BUS REPAIR PARTS	\$ 1,717.39	\$ -	\$ -
4500058364	12/13/2023	R.S. Hughes Co Inc		B250-BUS REPAIR PARTS	\$ 205.58	\$ -	\$ -
4500058365	12/13/2023	Barry Sandler Enterprises		G180-JANITORIAL SUPPLIES	\$ 1,770.22	\$ -	\$ -
4500058366	12/13/2023	Staples Contract & Commercial LLC		G200-OFFICE SUPPLIES	\$ 330.75	\$ -	\$ -
4500058367	12/13/2023	San Diego Friction Products, Inc.		G140-SHOP SUPPLIES	\$ 313.37	\$ -	\$ -
4500058368	12/13/2023	Amazon.com Sales, Inc.		G200-OFFICE SUPPLIES	\$ 18.29	\$ -	\$ -
4500058369	12/13/2023	County of San Diego		P130-EQUIP MAINT REPR SVC	\$ 614.22	\$ -	\$ -
4500058370	12/13/2023	National Railway Supply LLC		M130-CROSSING MECHANISM	\$ 11,628.40	\$ -	\$ -
4500058371	12/13/2023	Dimensional Silk Screen Inc		G230-PRINTED MATERIALS	\$ 344.80	\$ -	\$ -
4500058372	12/13/2023	IFE North America, LLC		R140-RAIL/LRV DOORS/RAMP	\$ 7,145.98	\$ -	\$ -
4500058373	12/13/2023	Siemens Mobility, Inc.		R160-RAIL/LRV ELECTRICAL	\$ 665.90	\$ -	\$ -
4500058374	12/13/2023	Knorr Brake Company, LLC		R160-RAIL/LRV ELECTRICAL	\$ 489.72	\$ -	\$ -
4500058375	12/13/2023	San Diego Seal, Inc.	Small Business	R140-RAIL/LRV DOORS/RAMP	\$ 2,135.60	\$ -	\$ -
4500058376	12/13/2023	Facility Solutions Group, Inc.		R180-RAIL/LRV LIGHTING	\$ 350.19	\$ -	\$ -
4500058377	12/13/2023	JKL Cleaning Systems	Small Business	G140-SHOP SUPPLIES	\$ 350.16	\$ -	\$ -
4500058378	12/13/2023	Graybar Electric Co Inc		M180-STATION ELECTRICAL	\$ 1,266.07	\$ -	\$ -
4500058379	12/13/2023	Hi-Tec Enterprises		G140-SHOP SUPPLIES	\$ 657.28	\$ -	\$ -
4500058380	12/13/2023	Applied Industrial		G170-LUBRICANTS	\$ 1,310.47	\$ -	\$ -
4500058381	12/13/2023	Shilpark Paint Corporation		F180-BUILDING MATERIALS	\$ 210.80	\$ -	\$ -
4500058382	12/13/2023	Fastenal Company		G190-SAFETY/MED SUPPLIES	\$ 140.08	\$ -	\$ -
4500058383	12/14/2023	Mohawk Mfg & Supply Co		B140-BUS CHASSIS	\$ 14.10	\$ -	\$ -
4500058384	12/14/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 5,433.19	\$ -	\$ -
4500058385	12/14/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 159.60	\$ -	\$ -
4500058386	12/14/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 537.26	\$ -	\$ -
4500058387	12/14/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 2,100.62	\$ -	\$ -
4500058388	12/14/2023	Woojin IS America		R120-RAIL/LRV CAR BODY	\$ 1,764.09	\$ -	\$ -
4500058389	12/14/2023	W.W. Grainger Inc		G120-SECURITY	\$ 3,431.84	\$ -	\$ -
4500058390	12/14/2023	TK Services Inc		B250-BUS REPAIR PARTS	\$ 1,838.66	\$ -	\$ -
4500058391	12/14/2023	Canada Ticket Inc.		G280-FARE MATERIALS	\$ 9,452.26	\$ -	\$ -
4500058392	12/14/2023	The Gordian Group, Inc.		T110-TRACK, RAIL	\$ 2,860.13	\$ -	\$ -
4500058393	12/14/2023	United Site Svcs of Calif., Inc.		C130-CONSTRUCTION SVCS	\$ 12,462.58	\$ -	\$ -
4500058395	12/14/2023	The Gordian Group, Inc.		C120-SPECIALTY CONTRACTOR	\$ 5,782.97	\$ -	\$ -
4500058396	12/14/2023	The Gordian Group, Inc.		C120-SPECIALTY CONTRACTOR	\$ 2,922.41	\$ -	\$ -
4500058397	12/14/2023	Emilia P. Ringpis		G260-MEDIA	\$ 523.00	\$ -	\$ -
4500058398	12/14/2023	Western-Cullen-Hayes Inc		M130-CROSSING MECHANISM	\$ 616.33	\$ -	\$ -
4500058399	12/14/2023	Siemens Mobility, Inc.		M170-IMPEDANCE BOND	\$ 28,114.13	\$ -	\$ -
4500058400	12/14/2023	W. Baker Management Inc		R160-RAIL/LRV ELECTRICAL	\$ 14,146.50	\$ -	\$ -
4500058401	12/14/2023	Winzer Franchise Company		G130-SHOP TOOLS	\$ 130.98	\$ -	\$ -
4500058402	12/14/2023	Fastenal Company		G140-SHOP SUPPLIES	\$ 2,139.66	\$ -	\$ -
4500058403	12/14/2023	Home Depot USA Inc		F180-BUILDING MATERIALS	\$ 2,999.40	\$ -	\$ -
4500058404	12/14/2023	W.W. Grainger Inc		P280-GENERAL SVC AGRMNTS	\$ 114.00	\$ -	\$ -
4500058405	12/14/2023	JKL Cleaning Systems	Small Business	P130-EQUIP MAINT REPR SVC	\$ 455.87	\$ -	\$ -
4500058406	12/14/2023	Home Depot USA Inc		F180-BUILDING MATERIALS	\$ 360.51	\$ -	\$ -
4500058407	12/14/2023	Robcar Corporation	Woman Owned Business	G140-SHOP SUPPLIES	\$ 668.05	\$ -	\$ -
4500058409	12/15/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 923.68	\$ -	\$ -
4500058410	12/15/2023	Muncie Reclamation and Supply Co		B200-BUS PWR TRAIN EQUIP	\$ 46.93	\$ -	\$ -
4500058411	12/15/2023	Siemens Mobility, Inc.		R160-RAIL/LRV ELECTRICAL	\$ 5,725.73	\$ -	\$ -

Purchase Orders							
PO Number	PO Date	Name	Prime Business Certification	Material Group	PO Value	DBE Sub Commitment	Non DBE SubCommitment
4500058412	12/15/2023	Siemens Mobility, Inc.		R120-RAIL/LRV CAR BODY	\$ 34,810.27	\$ -	\$ -
4500058413	12/15/2023	Wesco Distribution Inc		M110-SUB STATION	\$ 1,457.26	\$ -	\$ -
4500058414	12/15/2023	Winzer Franchise Company		G150-FASTENERS	\$ 405.14	\$ -	\$ -
4500058415	12/15/2023	Fastenal Company		G190-SAFETY/MED SUPPLIES	\$ 987.37	\$ -	\$ -
4500058416	12/15/2023	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 588.67	\$ -	\$ -
4500058417	12/15/2023	Transit Holdings Inc		B130-BUS BODY	\$ 1,727.37	\$ -	\$ -
4500058418	12/15/2023	Staples Contract & Commercial LLC		P280-GENERAL SVC AGRMNTS	\$ 377.85	\$ -	\$ -
4500058419	12/15/2023	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 113.07	\$ -	\$ -
4500058420	12/15/2023	Home Depot USA Inc		F110-SHOP/BLDG MACHINERY	\$ 249.53	\$ -	\$ -
4500058421	12/15/2023	JB Equipment Inc		F110-SHOP/BLDG MACHINERY	\$ 1,083.12	\$ -	\$ -
4500058422	12/15/2023	San Diego Friction Products, Inc.		B120-BUS MECHANICAL PARTS	\$ 1,354.76	\$ -	\$ -
4500058423	12/15/2023	Esri, Inc		I110-INFORMATION TECH	\$ 38,587.70	\$ -	\$ -
4500058424	12/15/2023	Reg-A-Car Inc		B250-BUS REPAIR PARTS	\$ 475.00	\$ -	\$ -
4500058425	12/15/2023	Madden Construction Inc		P280-GENERAL SVC AGRMNTS	\$ 196.63	\$ -	\$ -
4500058426	12/15/2023	Steven R Timme		G230-PRINTED MATERIALS	\$ 472.56	\$ -	\$ -
4500058427	12/15/2023	Madden Construction Inc		P280-GENERAL SVC AGRMNTS	\$ 929.50	\$ -	\$ -
4500058428	12/15/2023	White Cap, LP		F110-SHOP/BLDG MACHINERY	\$ 6.95	\$ -	\$ -
4500058429	12/15/2023	Simmons-Boardman Books, Inc.		P540-MAINTENANCE TRAINING	\$ 910.30	\$ -	\$ -
4500058430	12/15/2023	VisioLogix Corporation		C120-SPECIALTY CONTRACTOR	\$ 4,962.14	\$ -	\$ -
4500058431	12/15/2023	Kenneth Place		P130-EQUIP MAINT REPR SVC	\$ 40.37	\$ -	\$ -
4500058432	12/15/2023	Morrison Metalweld Process Corp	Small Business	G130-SHOP TOOLS	\$ 4,302.93	\$ -	\$ -
4500058433	12/15/2023	Carmine Bausone DVM Inc.		G120-SECURITY	\$ 56.88	\$ -	\$ -
4500058434	12/15/2023	Madden Construction Inc		P280-GENERAL SVC AGRMNTS	\$ 1,001.34	\$ -	\$ -
4500058435	12/15/2023	Jose Arellano		C130-CONSTRUCTION SVCS	\$ 4,500.00	\$ -	\$ -
4500058436	12/15/2023	Carmine Bausone DVM Inc.		G120-SECURITY	\$ 273.00	\$ -	\$ -
4500058437	12/15/2023	Airgas Inc		G140-SHOP SUPPLIES	\$ 454.89	\$ -	\$ -
4500058438	12/15/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 19,604.04	\$ -	\$ -
4500058439	12/15/2023	Motion Industries, Inc.		B120-BUS MECHANICAL PARTS	\$ 3,169.85	\$ -	\$ -
4500058440	12/15/2023	Mohawk Mfg & Supply Co		B110-BUS HVAC SYSTEMS	\$ 505.95	\$ -	\$ -
4500058441	12/15/2023	Delphin Computer Supply	Small Business	G200-OFFICE SUPPLIES	\$ 545.97	\$ -	\$ -
4500058442	12/15/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 6,340.36	\$ -	\$ -
4500058443	12/15/2023	Harbor Diesel & Equipment, Inc		B200-BUS PWR TRAIN EQUIP	\$ 14,432.99	\$ -	\$ -
4500058444	12/15/2023	AlxTel Inc		I110-INFORMATION TECH	\$ 47,231.61	\$ -	\$ -
4500058445	12/15/2023	Veterans Engineering Services, Inc.	Disabled Veteran Business	C110-GENERAL CONTRACTORS	\$ 116,177.90	\$ -	\$ -
4500058446	12/15/2023	The Gordian Group, Inc.		C130-CONSTRUCTION SVCS	\$ 2,265.47	\$ -	\$ -
4500058447	12/18/2023	Transit Holdings Inc		B120-BUS MECHANICAL PARTS	\$ 132.99	\$ -	\$ -
4500058448	12/18/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 3,444.36	\$ -	\$ -
4500058449	12/18/2023	Transit Holdings Inc		B130-BUS BODY	\$ 8,915.24	\$ -	\$ -
4500058450	12/18/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 496.18	\$ -	\$ -
4500058451	12/18/2023	Siemens Mobility, Inc.		R160-RAIL/LRV ELECTRICAL	\$ 213.22	\$ -	\$ -
4500058452	12/18/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 645.86	\$ -	\$ -
4500058453	12/18/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 169.32	\$ -	\$ -
4500058454	12/18/2023	Transit Holdings Inc		B120-BUS MECHANICAL PARTS	\$ 1,127.44	\$ -	\$ -
4500058455	12/18/2023	Custom Glass Solutions		R120-RAIL/LRV CAR BODY	\$ 56,719.60	\$ -	\$ -
4500058456	12/18/2023	Init Innovations in Transportation		R160-RAIL/LRV ELECTRICAL	\$ 725.00	\$ -	\$ -
4500058457	12/18/2023	Bonsall Petroleum Construction Inc		F110-SHOP/BLDG MACHINERY	\$ 375.80	\$ -	\$ -
4500058458	12/18/2023	W.W. Grainger Inc		F110-SHOP/BLDG MACHINERY	\$ 39.90	\$ -	\$ -
4500058459	12/18/2023	Mcmaster-Carr Supply Co		F110-SHOP/BLDG MACHINERY	\$ 192.32	\$ -	\$ -
4500058460	12/18/2023	American Battery Corporation	Small Business	P280-GENERAL SVC AGRMNTS	\$ 824.29	\$ -	\$ -
4500058461	12/18/2023	Madden Construction Inc		P280-GENERAL SVC AGRMNTS	\$ 423.50	\$ -	\$ -
4500058462	12/18/2023	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 65.93	\$ -	\$ -
4500058463	12/18/2023	Gillig LLC		B250-BUS REPAIR PARTS	\$ 3,226.11	\$ -	\$ -
4500058464	12/18/2023	Madden Construction Inc		P280-GENERAL SVC AGRMNTS	\$ 379.00	\$ -	\$ -
4500058465	12/18/2023	Vinyard Doors, Inc.	Woman Owned Business	P280-GENERAL SVC AGRMNTS	\$ 327.50	\$ -	\$ -
4500058466	12/18/2023	Home Depot USA Inc		F110-SHOP/BLDG MACHINERY	\$ 386.07	\$ -	\$ -
4500058467	12/18/2023	Prochem Specialty Products Inc	Small Business	G180-JANITORIAL SUPPLIES	\$ 859.31	\$ -	\$ -
4500058468	12/18/2023	SC Commercial, LLC		A120-AUTO/TRUCK GASOLINE	\$ 2,539.98	\$ -	\$ -
4500058469	12/18/2023	Supreme Oil Co.		A120-AUTO/TRUCK GASOLINE	\$ 14,408.66	\$ -	\$ -
4500058471	12/18/2023	Professional Contractors Supplies		G160-PAINTS & CHEMICALS	\$ 1,453.91	\$ -	\$ -
4500058472	12/18/2023	Fastenal Company		R220-RAIL/LRV TRUCKS	\$ 2,005.77	\$ -	\$ -
4500058473	12/18/2023	Schunk Carbon Technology LLC		R190-RAIL/LRV PANTOGRAPH	\$ 2,732.33	\$ -	\$ -
4500058474	12/18/2023	Hitachi Rail STS USA, Inc.		M140-WAYSIDE SIGNALS	\$ 3,224.42	\$ -	\$ -
4500058475	12/18/2023	R.S. Hughes Co Inc		G140-SHOP SUPPLIES	\$ 1,982.14	\$ -	\$ -
4500058476	12/18/2023	Harbor Diesel & Equipment, Inc		B250-BUS REPAIR PARTS	\$ 17,597.00	\$ -	\$ -
4500058477	12/18/2023	W.W. Grainger Inc		G170-LUBRICANTS	\$ 1,756.93	\$ -	\$ -
4500058478	12/18/2023	ODP Business Solutions, LLC		G210-OFFICE FURNITURE	\$ 4,999.05	\$ -	\$ -
4500058479	12/18/2023	Patco Industries Inc		M140-WAYSIDE SIGNALS	\$ 2,370.52	\$ -	\$ -
4500058480	12/18/2023	SC Commercial, LLC		B120-BUS MECHANICAL PARTS	\$ 7,977.81	\$ -	\$ -
4500058481	12/19/2023	Annex Warehouse Company, Inc		F120-BUS/LRV PAINT BOOTHS	\$ 4,424.77	\$ -	\$ -
4500058482	12/19/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 3,274.94	\$ -	\$ -
4500058483	12/19/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 170.03	\$ -	\$ -
4500058484	12/19/2023	Parts Authority, LLC		B160-BUS ELECTRICAL	\$ 3,531.93	\$ -	\$ -
4500058485	12/19/2023	Gillig LLC		B140-BUS CHASSIS	\$ 3,882.73	\$ -	\$ -
4500058487	12/19/2023	Harbor Diesel & Equipment, Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,290.09	\$ -	\$ -
4500058488	12/19/2023	SC Commercial, LLC		A120-AUTO/TRUCK GASOLINE	\$ 2,712.60	\$ -	\$ -
4500058489	12/19/2023	Willy's Electronic Supply Co Inc	Small Business	B250-BUS REPAIR PARTS	\$ 18.41	\$ -	\$ -
4500058491	12/19/2023	The Gordian Group, Inc.		C120-SPECIALTY CONTRACTOR	\$ 2,433.40	\$ -	\$ -
4500058492	12/19/2023	Custom Glass Solutions		R120-RAIL/LRV CAR BODY	\$ 24,534.68	\$ -	\$ -
4500058493	12/19/2023	Clarran Inc.	DBE	G150-FASTENERS	\$ 379.96	\$ -	\$ -
4500058494	12/19/2023	Supreme Oil Co.		A120-AUTO/TRUCK GASOLINE	\$ 4,179.87	\$ -	\$ -
4500058495	12/19/2023	Transit Products and Services		B130-BUS BODY	\$ 6,896.00	\$ -	\$ -
4500058496	12/19/2023	CalMat Co.		T160-TRACK, AGGREGATES	\$ 3,578.75	\$ -	\$ -
4500058497	12/19/2023	Western Sierra Supply Inc		M120-OVRHEAD CATENARY SY	\$ 3,205.66	\$ -	\$ -
4500058498	12/19/2023	Altec Inc		G130-SHOP TOOLS	\$ 4,372.19	\$ -	\$ -
4500058499	12/19/2023	Myers & Sons Hi-Way Safety Inc		M140-WAYSIDE SIGNALS	\$ 1,854.76	\$ -	\$ -
4500058500	12/19/2023	Traffic and Parking Control Co Inc		M180-STATION ELECTRICAL	\$ 4,417.38	\$ -	\$ -
4500058501	12/19/2023	Maintex Inc		G170-LUBRICANTS	\$ 510.74	\$ -	\$ -
4500058502	12/19/2023	Home Depot USA Inc		G180-JANITORIAL SUPPLIES	\$ 851.83	\$ -	\$ -
4500058503	12/19/2023	All In One Poster Company, Inc.		P480-EE MAINTENANCE	\$ 655.35	\$ -	\$ -

Purchase Orders							
PO Number	PO Date	Name	Prime Business Certification	Material Group	PO Value	DBE Sub Commitment	Non DBE SubCommitment
4500058504	12/19/2023	Amazon.com Sales, Inc.		G200-OFFICE SUPPLIES	\$ 55.09	\$ -	\$ -
4500058505	12/19/2023	Harbor Diesel & Equipment, Inc		B250-BUS REPAIR PARTS	\$ 636.56	\$ -	\$ -
4500058506	12/19/2023	AirSupply Tools, Inc		G130-SHOP TOOLS	\$ 298.61	\$ -	\$ -
4500058507	12/19/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 3,517.98	\$ -	\$ -
4500058508	12/19/2023	Hitachi Rail STS USA, Inc.		M130-CROSSING MECHANISM	\$ 3,873.60	\$ -	\$ -
4500058509	12/19/2023	Init Innovations in Transportation		G290-FARE REVENUE EQUIP	\$ 641.12	\$ -	\$ -
4500058510	12/19/2023	Tribologik Corporation		G140-SHOP SUPPLIES	\$ 3,388.11	\$ -	\$ -
4500058511	12/19/2023	Madden Construction Inc		P280-GENERAL SVC AGRMNTS	\$ 205.13	\$ -	\$ -
4500058512	12/19/2023	San Diego Friction Products, Inc.		B120-BUS MECHANICAL PARTS	\$ 3,386.88	\$ -	\$ -
4500058513	12/19/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 523.40	\$ -	\$ -
4500058514	12/20/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 902.13	\$ -	\$ -
4500058515	12/20/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,835.95	\$ -	\$ -
4500058516	12/20/2023	Mohawk Mfg & Supply Co		B140-BUS CHASSIS	\$ 7.45	\$ -	\$ -
4500058517	12/20/2023	Transit Holdings Inc		B130-BUS BODY	\$ 1,383.30	\$ -	\$ -
4500058518	12/20/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 2,659.28	\$ -	\$ -
4500058519	12/20/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 287.44	\$ -	\$ -
4500058520	12/20/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 1.83	\$ -	\$ -
4500058521	12/20/2023	Jamison Professional Services, LLC	DBE	G170-LUBRICANTS	\$ 2,051.22	\$ -	\$ -
4500058522	12/20/2023	National Electrical Carbon Products		R190-RAIL/LRV PANTOGRAPH	\$ 23,621.49	\$ -	\$ -
4500058523	12/20/2023	Gillig LLC		B250-BUS REPAIR PARTS	\$ 2,525.40	\$ -	\$ -
4500058524	12/20/2023	Freeby Signs		B130-BUS BODY	\$ 100.01	\$ -	\$ -
4500058525	12/20/2023	Kurt Morgan		G200-OFFICE SUPPLIES	\$ 4,662.53	\$ -	\$ -
4500058526	12/20/2023	Winzer Franchise Company		G150-FASTENERS	\$ 412.69	\$ -	\$ -
4500058527	12/20/2023	Winzer Franchise Company		G150-FASTENERS	\$ 183.18	\$ -	\$ -
4500058528	12/20/2023	Veterans Engineering Services, Inc.	Disabled Veteran Business	C110-GENERAL CONTRACTORS	\$ 34,910.23	\$ -	\$ -
4500058529	12/20/2023	The Gordian Group, Inc.		C130-CONSTRUCTION SVCS	\$ 680.75	\$ -	\$ -
4500058530	12/20/2023	Home Depot USA Inc		F110-SHOP/BLDG MACHINERY	\$ 89.98	\$ -	\$ -
4500058531	12/20/2023	Neopart Transit LLC		B250-BUS REPAIR PARTS	\$ 23.17	\$ -	\$ -
4500058532	12/20/2023	Schunk Carbon Technology LLC		R190-RAIL/LRV PANTOGRAPH	\$ 34,028.53	\$ -	\$ -
4500058533	12/20/2023	Init Innovations in Transportation		G290-FARE REVENUE EQUIP	\$ 8,296.75	\$ -	\$ -
4500058534	12/20/2023	W.W. Grainger Inc		M180-STATION ELECTRICAL	\$ 117.88	\$ -	\$ -
4500058535	12/20/2023	Winzer Franchise Company		G150-FASTENERS	\$ 109.91	\$ -	\$ -
4500058536	12/20/2023	San Diego Friction Products, Inc.		B140-BUS CHASSIS	\$ 3,370.87	\$ -	\$ -
4500058537	12/21/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 4,128.28	\$ -	\$ -
4500058538	12/21/2023	Cummins Inc		B160-BUS ELECTRICAL	\$ 13,971.19	\$ -	\$ -
4500058539	12/21/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,052.69	\$ -	\$ -
4500058540	12/21/2023	Vehicle Maintenance Program, Inc.	Woman Owned Business	B140-BUS CHASSIS	\$ 983.76	\$ -	\$ -
4500058541	12/21/2023	Siemens Mobility, Inc.		R160-RAIL/LRV ELECTRICAL	\$ 2,129.93	\$ -	\$ -
4500058543	12/21/2023	Comfort Mechanical Inc	Small Business	C120-SPECIALTY CONTRACTOR	\$ 18,227.25	\$ -	\$ -
4500058545	12/21/2023	Waxie's Enterprises, LLC		G140-SHOP SUPPLIES	\$ 1,131.60	\$ -	\$ -
4500058548	12/21/2023	Schunk Carbon Technology LLC		R190-RAIL/LRV PANTOGRAPH	\$ 3,780.95	\$ -	\$ -
4500058549	12/21/2023	Knorr Brake Company, LLC		R220-RAIL/LRV TRUCKS	\$ 99,668.75	\$ -	\$ -
4500058552	12/22/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,669.05	\$ -	\$ -
4500058553	12/22/2023	Staples Contract & Commercial LLC		G200-OFFICE SUPPLIES	\$ 710.46	\$ -	\$ -
4500058554	12/22/2023	Winzer Franchise Company		G150-FASTENERS	\$ 145.47	\$ -	\$ -
4500058555	12/22/2023	Transit Products and Services		B130-BUS BODY	\$ 11,313.75	\$ -	\$ -
4500058556	12/22/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 2,549.48	\$ -	\$ -
4500058557	12/22/2023	Muncie Reclamation and Supply Co		B250-BUS REPAIR PARTS	\$ 17.50	\$ -	\$ -
4500058558	12/22/2023	Muncie Reclamation and Supply Co		B200-BUS PWR TRAIN EQUIP	\$ 7.87	\$ -	\$ -
4500058559	12/22/2023	Transit Holdings Inc		B120-BUS MECHANICAL PARTS	\$ 3,451.05	\$ -	\$ -
4500058560	12/22/2023	Siemens Mobility, Inc.		R120-RAIL/LRV CAR BODY	\$ 769.34	\$ -	\$ -
4500058561	12/22/2023	Cummins Inc		B120-BUS MECHANICAL PARTS	\$ 9,143.37	\$ -	\$ -
4500058562	12/22/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,093.96	\$ -	\$ -
4500058563	12/22/2023	Transit Holdings Inc		B130-BUS BODY	\$ 392.40	\$ -	\$ -
4500058564	12/22/2023	Transit Holdings Inc		B130-BUS BODY	\$ 619.21	\$ -	\$ -
4500058565	12/22/2023	Waxie's Enterprises, LLC		G180-JANITORIAL SUPPLIES	\$ 1,616.30	\$ -	\$ -
4500058566	12/22/2023	The Sherwin-Williams Company		F120-BUS/LRV PAINT BOOTHS	\$ 1,314.36	\$ -	\$ -
4500058567	12/22/2023	CDW LLC		B150-BUS COMM EQUIP.	\$ 327.13	\$ -	\$ -
4500058568	12/22/2023	Gillig LLC		B130-BUS BODY	\$ 3,648.34	\$ -	\$ -
4500058569	12/22/2023	W.W. Grainger Inc		F110-SHOP/BLDG MACHINERY	\$ 1,891.17	\$ -	\$ -
4500058570	12/22/2023	B&H Foto & Electronics Corp		R160-RAIL/LRV ELECTRICAL	\$ 2,262.11	\$ -	\$ -
4500058571	12/22/2023	Gillig LLC		B250-BUS REPAIR PARTS	\$ 297.52	\$ -	\$ -
4500058572	12/22/2023	Harbor Diesel & Equipment, Inc		B250-BUS REPAIR PARTS	\$ 350.00	\$ -	\$ -
4500058573	12/22/2023	Home Depot USA Inc		F110-SHOP/BLDG MACHINERY	\$ 46.28	\$ -	\$ -
4500058574	12/22/2023	Gillig LLC		B250-BUS REPAIR PARTS	\$ 114.18	\$ -	\$ -
4500058575	12/22/2023	Willy's Electronic Supply Co Inc	Small Business	G220-OFFICE EQUIPMENT	\$ 92.85	\$ -	\$ -
4500058576	12/22/2023	Clarran Inc.	DBE	G150-FASTENERS	\$ 340.97	\$ -	\$ -
4500058577	12/22/2023	Genuine Parts Company Inc		B250-BUS REPAIR PARTS	\$ 219.75	\$ -	\$ -
4500058578	12/22/2023	Charter Industrial Supply Inc	Small Business	G150-FASTENERS	\$ 558.43	\$ -	\$ -
4500058579	12/22/2023	Muncie Reclamation and Supply Co		B130-BUS BODY	\$ 81.22	\$ -	\$ -
4500058580	12/22/2023	Western-Cullen-Hayes Inc		M130-CROSSING MECHANISM	\$ 1,970.77	\$ -	\$ -
4500058581	12/22/2023	Init Innovations in Transportation		G290-FARE REVENUE EQUIP	\$ 3,717.38	\$ -	\$ -
4500058582	12/22/2023	Brady Industries of California, LLC		G180-JANITORIAL SUPPLIES	\$ 492.10	\$ -	\$ -
4500058583	12/22/2023	TK Services Inc		B250-BUS REPAIR PARTS	\$ 1,247.62	\$ -	\$ -
4500058584	12/22/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 19,604.04	\$ -	\$ -
4500058585	12/22/2023	Shilpark Paint Corporation		G160-PAINTS & CHEMICALS	\$ 119.61	\$ -	\$ -
4500058586	12/22/2023	Continental Locks		P120-BLDG/FACILITY REPRS	\$ 450.00	\$ -	\$ -
4500058587	12/22/2023	Continental Locks		P120-BLDG/FACILITY REPRS	\$ 120.00	\$ -	\$ -
4500058588	12/22/2023	Shilpark Paint Corporation		F180-BUILDING MATERIALS	\$ 140.64	\$ -	\$ -
4500058589	12/22/2023	Robcar Corporation	Woman Owned Business	G110-BUS/TROLLEY SIGNAGE	\$ 359.36	\$ -	\$ -
4500058590	12/22/2023	Ace Uniforms LLC	Small Business	G240-UNIFORM PROCUREMENT	\$ 1,464.07	\$ -	\$ -
4500058591	12/22/2023	Kaeser & Blair, Inc		G250-NOVELTIES & AWARDS	\$ 4,370.86	\$ -	\$ -
4500058592	12/22/2023	Steven R Timme		G230-PRINTED MATERIALS	\$ 181.63	\$ -	\$ -
4500058593	12/22/2023	Steven R Timme		G230-PRINTED MATERIALS	\$ 451.00	\$ -	\$ -
4500058594	12/22/2023	Signed Sealed Delivered by MSB LL		G260-MEDIA	\$ 3,304.89	\$ -	\$ -
4500058595	12/22/2023	University of San Diego		G260-MEDIA	\$ 100.00	\$ -	\$ -
4500058596	12/22/2023	Steven R Timme		G230-PRINTED MATERIALS	\$ 1,090.77	\$ -	\$ -
4500058597	12/22/2023	Data Controls Printworks, Inc.	Small Business	G230-PRINTED MATERIALS	\$ 474.10	\$ -	\$ -
4500058598	12/26/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 3,338.10	\$ -	\$ -

Purchase Orders							
PO Number	PO Date	Name	Prime Business Certification	Material Group	PO Value	DBE Sub Commitment	Non DBE SubCommitment
4500058599	12/26/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 451.71	\$ -	\$ -
4500058600	12/26/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 637.05	\$ -	\$ -
4500058601	12/26/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 14.76	\$ -	\$ -
4500058602	12/26/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 4,499.48	\$ -	\$ -
4500058603	12/26/2023	Muncie Reclamation and Supply Co		B250-BUS REPAIR PARTS	\$ 79.18	\$ -	\$ -
4500058604	12/26/2023	Muncie Reclamation and Supply Co		B120-BUS MECHANICAL PARTS	\$ 30.08	\$ -	\$ -
4500058605	12/26/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 4,524.32	\$ -	\$ -
4500058606	12/26/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 443.66	\$ -	\$ -
4500058607	12/26/2023	Vehicle Maintenance Program, Inc.	Woman Owned Business	B140-BUS CHASSIS	\$ 894.33	\$ -	\$ -
4500058608	12/26/2023	Home Depot USA Inc		G130-SHOP TOOLS	\$ 909.42	\$ -	\$ -
4500058610	12/26/2023	Supreme Oil Co.		A120-AUTO/TRUCK GASOLINE	\$ 12,963.99	\$ -	\$ -
4500058611	12/26/2023	White Cap, LP		F180-BUILDING MATERIALS	\$ 253.38	\$ -	\$ -
4500058612	12/26/2023	Robcar Corporation	Woman Owned Business	G110-BUS/TROLLEY SIGNAGE	\$ 237.05	\$ -	\$ -
4500058613	12/26/2023	Home Depot USA Inc		G200-OFFICE SUPPLIES	\$ 241.36	\$ -	\$ -
4500058614	12/26/2023	SC Commercial, LLC		A120-AUTO/TRUCK GASOLINE	\$ 2,990.03	\$ -	\$ -
4500058615	12/27/2023	Muncie Reclamation and Supply Co		B200-BUS PWR TRAIN EQUIP	\$ 4.72	\$ -	\$ -
4500058616	12/27/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 252.94	\$ -	\$ -
4500058617	12/27/2023	Transit Holdings Inc		B120-BUS MECHANICAL PARTS	\$ 780.18	\$ -	\$ -
4500058618	12/27/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 16.81	\$ -	\$ -
4500058619	12/27/2023	Ascendancy Corp		F180-BUILDING MATERIALS	\$ 890.56	\$ -	\$ -
4500058620	12/27/2023	Home Depot USA Inc		G200-OFFICE SUPPLIES	\$ 214.43	\$ -	\$ -
4500058621	12/27/2023	W.W. Grainger Inc		M180-STATION ELECTRICAL	\$ 1,888.90	\$ -	\$ -
4500058622	12/27/2023	Midwest Motor Supply Co. Inc		G180-JANITORIAL SUPPLIES	\$ 1,432.00	\$ -	\$ -
4500058623	12/27/2023	Knorr Brake Company, LLC		R220-RAIL/LRV TRUCKS	\$ 52,297.41	\$ -	\$ -
4500058624	12/27/2023	Patco Industries Inc		M140-WAYSIDE SIGNALS	\$ 7,273.13	\$ -	\$ -
4500058625	12/27/2023	Siemens Mobility, Inc.		R190-RAIL/LRV PANTOGRAPH	\$ 2,097.90	\$ -	\$ -
4500058626	12/27/2023	Mcmaster-Carr Supply Co		B250-BUS REPAIR PARTS	\$ 192.68	\$ -	\$ -
4500058627	12/27/2023	Uline Inc		G200-OFFICE SUPPLIES	\$ 175.74	\$ -	\$ -
4500058628	12/27/2023	Don Oleson Inc	Small Business	B120-BUS MECHANICAL PARTS	\$ 2,901.32	\$ -	\$ -
4500058629	12/27/2023	Southern Counties Lubricants LLC		G170-LUBRICANTS	\$ 4,622.48	\$ -	\$ -
4500058630	12/27/2023	Siemens Mobility, Inc.		R120-RAIL/LRV CAR BODY	\$ 24,186.53	\$ -	\$ -
4500058631	12/27/2023	American Battery Corporation	Small Business	P280-GENERAL SVC AGRMNTS	\$ 2,605.40	\$ -	\$ -
4500058632	12/27/2023	Brady Industries of California, LLC		G180-JANITORIAL SUPPLIES	\$ 1,563.37	\$ -	\$ -
4500058633	12/27/2023	Barry Sandler Enterprises		G180-JANITORIAL SUPPLIES	\$ 1,112.71	\$ -	\$ -
4500058634	12/27/2023	Kurt Morgan		G200-OFFICE SUPPLIES	\$ 3,929.67	\$ -	\$ -
4500058635	12/27/2023	Gillig LLC		B250-BUS REPAIR PARTS	\$ 48.34	\$ -	\$ -
4500058636	12/27/2023	Tolar Manufacturing Company Inc		P280-GENERAL SVC AGRMNTS	\$ 172.84	\$ -	\$ -
4500058637	12/27/2023	Transit Holdings Inc		B130-BUS BODY	\$ 346.65	\$ -	\$ -
4500058638	12/27/2023	Clarran Inc.	DBE	G150-FASTENERS	\$ 126.63	\$ -	\$ -
4500058639	12/27/2023	Vern Rose Inc		G140-SHOP SUPPLIES	\$ 308.91	\$ -	\$ -
4500058640	12/27/2023	Annex Warehouse Company, Inc		G160-PAINTS & CHEMICALS	\$ 3,687.31	\$ -	\$ -
4500058641	12/27/2023	Annex Warehouse Company, Inc		F120-BUS/LRV PAINT BOOTHS	\$ 8,906.83	\$ -	\$ -
4500058642	12/27/2023	U.S. Train Products LLC		R120-RAIL/LRV CAR BODY	\$ 4,363.88	\$ -	\$ -
4500058643	12/27/2023	Romaine Electric Corporation	Small Business	B160-BUS ELECTRICAL	\$ 3,608.55	\$ -	\$ -
4500058644	12/28/2023	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 96.85	\$ -	\$ -
4500058645	12/28/2023	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 2,743.51	\$ -	\$ -
4500058646	12/28/2023	Cummins Inc		B250-BUS REPAIR PARTS	\$ 282.33	\$ -	\$ -
4500058647	12/28/2023	Transit Holdings Inc		B160-BUS ELECTRICAL	\$ 6,368.88	\$ -	\$ -
4500058648	12/28/2023	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 487.76	\$ -	\$ -
4500058649	12/28/2023	Wesco Distribution Inc		F110-SHOP/BLDG MACHINERY	\$ 538.21	\$ -	\$ -
4500058650	12/28/2023	Motion Industries, Inc.		G140-SHOP SUPPLIES	\$ 185.36	\$ -	\$ -
4500058651	12/28/2023	Airgas Inc		G140-SHOP SUPPLIES	\$ 926.04	\$ -	\$ -
4500058652	12/28/2023	Transit Holdings Inc		B130-BUS BODY	\$ 1,641.89	\$ -	\$ -
4500058653	12/28/2023	Fastenal Company		G150-FASTENERS	\$ 3,104.95	\$ -	\$ -
4500058654	12/28/2023	R.S. Hughes Co Inc		G190-SAFETY/MED SUPPLIES	\$ 1,549.68	\$ -	\$ -
4500058656	12/28/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,476.90	\$ -	\$ -
4500058657	12/28/2023	Transit Holdings Inc		B130-BUS BODY	\$ 426.09	\$ -	\$ -
4500058658	12/28/2023	Shilpark Paint Corporation		F180-BUILDING MATERIALS	\$ 284.90	\$ -	\$ -
4500058659	12/28/2023	Shilpark Paint Corporation		G160-PAINTS & CHEMICALS	\$ 284.90	\$ -	\$ -
4500058660	12/28/2023	Team One Repair Inc		G290-FARE REVENUE EQUIP	\$ 3,198.99	\$ -	\$ -
4500058661	12/28/2023	Reid and Clark Screen Arts Co		R120-RAIL/LRV CAR BODY	\$ 3,814.35	\$ -	\$ -
4500058662	12/28/2023	Winzer Franchise Company		G150-FASTENERS	\$ 574.32	\$ -	\$ -
4500058663	12/28/2023	OneSource Distributors, LLC		M130-CROSSING MECHANISM	\$ 1,497.19	\$ -	\$ -
4500058664	12/28/2023	Hanning & Kahl LP		M130-CROSSING MECHANISM	\$ 1,521.43	\$ -	\$ -
4500058665	12/28/2023	Willy's Electronic Supply Co Inc	Small Business	R150-RAIL/LRV COMM EQUIP	\$ 258.49	\$ -	\$ -
4500058666	12/29/2023	Datel Systems Incorporated	Small Business	I110-INFORMATION TECH	\$ 8,437.00	\$ -	\$ -
4500058667	12/29/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 5,262.94	\$ -	\$ -
4500058668	12/29/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,281.45	\$ -	\$ -
4500058669	12/29/2023	Muncie Reclamation and Supply Co		B200-BUS PWR TRAIN EQUIP	\$ 425.86	\$ -	\$ -
4500058670	12/29/2023	Transit Holdings Inc		B140-BUS CHASSIS	\$ 2,252.58	\$ -	\$ -
4500058671	12/29/2023	Zen Industrial Services LLC	DBE	B160-BUS ELECTRICAL	\$ 48.65	\$ -	\$ -
4500058672	12/29/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 7,894.41	\$ -	\$ -
4500058673	12/29/2023	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,051.66	\$ -	\$ -
4500058674	1/2/2024	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 2,770.94	\$ -	\$ -
4500058675	1/2/2024	Transit Holdings Inc		B140-BUS CHASSIS	\$ 8,231.49	\$ -	\$ -
4500058676	1/2/2024	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 160.04	\$ -	\$ -
4500058677	1/2/2024	Certified Folder Display Service		G230-PRINTED MATERIALS	\$ 121,573.44	\$ -	\$ -
4500058678	1/2/2024	SC Commercial, LLC		A120-AUTO/TRUCK GASOLINE	\$ 3,051.68	\$ -	\$ -
4500058679	1/2/2024	MCI Carrillo Inc	Small Business	B250-BUS REPAIR PARTS	\$ 1,822.57	\$ -	\$ -
4500058680	1/2/2024	Supreme Oil Co.		A120-AUTO/TRUCK GASOLINE	\$ 10,583.25	\$ -	\$ -
4500058681	1/2/2024	Vehicle Maintenance Program, Inc.	Woman Owned Business	B140-BUS CHASSIS	\$ 1,788.65	\$ -	\$ -
4500058682	1/2/2024	Shilpark Paint Corporation		F180-BUILDING MATERIALS	\$ 113.14	\$ -	\$ -
4500058683	1/2/2024	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 537.26	\$ -	\$ -
4500058684	1/2/2024	Mohawk Mfg & Supply Co		B140-BUS CHASSIS	\$ 78.14	\$ -	\$ -
4500058685	1/2/2024	Transit Holdings Inc		B120-BUS MECHANICAL PARTS	\$ 110.42	\$ -	\$ -
4500058686	1/2/2024	W.W. Grainger Inc		A140-AUTO/TRUCK REPAIR	\$ 4,056.56	\$ -	\$ -
4500058687	1/2/2024	Gillig LLC		B250-BUS REPAIR PARTS	\$ 51.68	\$ -	\$ -
4500058688	1/2/2024	Inland Kenworth (US) Inc		B250-BUS REPAIR PARTS	\$ 1,928.51	\$ -	\$ -
4500058689	1/2/2024	Freeby Signs		B250-BUS REPAIR PARTS	\$ 164.17	\$ -	\$ -



Purchase Orders							
PO Number	PO Date	Name	Prime Business Certification	Material Group	PO Value	DBE Sub Commitment	Non DBE SubCommitment
4500058690	1/2/2024	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 1,360.39	\$ -	\$ -
4500058691	1/2/2024	Cummins Inc		B250-BUS REPAIR PARTS	\$ 369.82	\$ -	\$ -
4500058692	1/2/2024	Inland Kenworth (US) Inc		B250-BUS REPAIR PARTS	\$ 1,865.00	\$ -	\$ -
4500058693	1/2/2024	SC Commercial, LLC		A120-AUTO/TRUCK GASOLINE	\$ 2,286.19	\$ -	\$ -
4500058694	1/2/2024	Transit Holdings Inc		B130-BUS BODY	\$ 2,598.53	\$ -	\$ -
4500058695	1/2/2024	Clarran Inc.	DBE	G150-FASTENERS	\$ 110.68	\$ -	\$ -
4500058696	1/2/2024	Ace Uniforms LLC	Small Business	C120-SPECIALTY CONTRACTOR	\$ 294.10	\$ -	\$ -
4500058697	1/2/2024	Ace Uniforms LLC	Small Business	C120-SPECIALTY CONTRACTOR	\$ 2,828.16	\$ -	\$ -
4500058698	1/2/2024	Mcmaster-Carr Supply Co		R220-RAIL/LRV TRUCKS	\$ 2,985.96	\$ -	\$ -
4500058699	1/2/2024	Jamison Professional Services, LLC	DBE	G170-LUBRICANTS	\$ 1,442.99	\$ -	\$ -
4500058700	1/2/2024	AirSupply Tools, Inc		G150-FASTENERS	\$ 106.47	\$ -	\$ -
4500058701	1/2/2024	Harbor Diesel & Equipment, Inc		B120-BUS MECHANICAL PARTS	\$ 284.94	\$ -	\$ -
4500058702	1/2/2024	Mohawk Mfg & Supply Co		B120-BUS MECHANICAL PARTS	\$ 615.43	\$ -	\$ -
4500058703	1/2/2024	Staples Contract & Commercial LLC		G200-OFFICE SUPPLIES	\$ 2,015.58	\$ -	\$ -
4500058704	1/3/2024	Transit Holdings Inc		B130-BUS BODY	\$ 54.08	\$ -	\$ -
4500058705	1/3/2024	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 51.83	\$ -	\$ -
4500058706	1/3/2024	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 8.96	\$ -	\$ -
4500058707	1/3/2024	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 2,311.63	\$ -	\$ -
4500058708	1/3/2024	Transit Holdings Inc		B140-BUS CHASSIS	\$ 5,964.01	\$ -	\$ -
4500058709	1/3/2024	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 233.36	\$ -	\$ -
4500058710	1/3/2024	Transit Holdings Inc		B140-BUS CHASSIS	\$ 1,727.02	\$ -	\$ -
4500058711	1/3/2024	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 18.43	\$ -	\$ -
4500058712	1/3/2024	Siemens Mobility, Inc.		R120-RAIL/LRV CAR BODY	\$ 2,844.60	\$ -	\$ -
4500058713	1/3/2024	W.W. Grainger Inc		F110-SHOP/BLDG MACHINERY	\$ 335.86	\$ -	\$ -
4500058714	1/3/2024	Reg-A-Car Inc		B250-BUS REPAIR PARTS	\$ 601.00	\$ -	\$ -
4500058715	1/3/2024	Fastenal Company		R230-RAIL/LRV MECHANICAL	\$ 3,585.92	\$ -	\$ -
4500058716	1/3/2024	Home Depot USA Inc		F110-SHOP/BLDG MACHINERY	\$ 970.76	\$ -	\$ -
4500058717	1/3/2024	Gillig LLC		B250-BUS REPAIR PARTS	\$ 2,649.05	\$ -	\$ -
4500058718	1/3/2024	Waxie's Enterprises, LLC		G180-JANITORIAL SUPPLIES	\$ 4,390.28	\$ -	\$ -
4500058719	1/3/2024	Init Innovations in Transportation		G290-FARE REVENUE EQUIP	\$ 452.55	\$ -	\$ -
4500058720	1/3/2024	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 10,096.07	\$ -	\$ -
4500058721	1/3/2024	ISC Applied Systems Corp		R150-RAIL/LRV COMM EQUIP	\$ 1,885.63	\$ -	\$ -
4500058722	1/3/2024	Transit Holdings Inc		B130-BUS BODY	\$ 59.48	\$ -	\$ -
4500058723	1/3/2024	Gillig LLC		B140-BUS CHASSIS	\$ 4,160.67	\$ -	\$ -
4500058724	1/3/2024	Fastenal Company		R160-RAIL/LRV ELECTRICAL	\$ 3,399.82	\$ -	\$ -
4500058725	1/3/2024	Inland Kenworth (US) Inc		B130-BUS BODY	\$ 598.53	\$ -	\$ -
4500058726	1/3/2024	Harbor Diesel & Equipment, Inc		B200-BUS PWR TRAIN EQUIP	\$ 20,117.98	\$ -	\$ -
4500058727	1/3/2024	Harbor Diesel & Equipment, Inc		B200-BUS PWR TRAIN EQUIP	\$ 21,106.98	\$ -	\$ -
4500058728	1/3/2024	Clarran Inc.	DBE	G150-FASTENERS	\$ 48.84	\$ -	\$ -
4500058729	1/3/2024	Cummins Inc		B120-BUS MECHANICAL PARTS	\$ 2,052.49	\$ -	\$ -
4500058730	1/3/2024	USSC Acquisition Corp		B130-BUS BODY	\$ 660.53	\$ -	\$ -
4500058731	1/3/2024	Sportworks Global LLC		B130-BUS BODY	\$ 229.99	\$ -	\$ -
4500058732	1/3/2024	San Diego Friction Products, Inc.		G140-SHOP SUPPLIES	\$ 940.10	\$ -	\$ -
4500058733	1/4/2024	Transit Holdings Inc		G140-SHOP SUPPLIES	\$ 182.22	\$ -	\$ -
4500058734	1/4/2024	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,362.95	\$ -	\$ -
4500058735	1/4/2024	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 5,237.81	\$ -	\$ -
4500058736	1/4/2024	Transit Holdings Inc		B130-BUS BODY	\$ 4,039.01	\$ -	\$ -
4500058737	1/4/2024	Knorr Brake Company, LLC		R160-RAIL/LRV ELECTRICAL	\$ 5,840.05	\$ -	\$ -
4500058738	1/4/2024	Siemens Mobility, Inc.		R120-RAIL/LRV CAR BODY	\$ 3,167.85	\$ -	\$ -
4500058739	1/4/2024	Init Innovations in Transportation		G290-FARE REVENUE EQUIP	\$ 5,465.04	\$ -	\$ -
4500058740	1/4/2024	W.W. Grainger Inc		R180-RAIL/LRV LIGHTING	\$ 6,710.13	\$ -	\$ -
4500058741	1/4/2024	Prochem Specialty Products Inc	Small Business	G180-JANITORIAL SUPPLIES	\$ 859.31	\$ -	\$ -
4500058742	1/4/2024	Transit Holdings Inc		B120-BUS MECHANICAL PARTS	\$ 3,267.59	\$ -	\$ -
4500058743	1/4/2024	Grah Safe & Lock Inc	Small Business	G290-FARE REVENUE EQUIP	\$ 1,993.38	\$ -	\$ -
4500058744	1/4/2024	Applied Industrial		G170-LUBRICANTS	\$ 1,310.47	\$ -	\$ -
4500058745	1/4/2024	E W Truck & Equipment Co Inc		B120-BUS MECHANICAL PARTS	\$ 1,154.68	\$ -	\$ -
4500058746	1/4/2024	IFE North America, LLC		R140-RAIL/LRV DOORS/RAMP	\$ 3,572.99	\$ -	\$ -
4500058747	1/4/2024	W. Baker Management Inc		R160-RAIL/LRV ELECTRICAL	\$ 15,949.16	\$ -	\$ -
4500058748	1/4/2024	Robcar Corporation	Woman Owned Business	G190-SAFETY/MED SUPPLIES	\$ 2,055.32	\$ -	\$ -
4500058749	1/4/2024	Reid and Clark Screen Arts Co		R120-RAIL/LRV CAR BODY	\$ 3,111.28	\$ -	\$ -
4500058750	1/4/2024	Kleinfelder Construction Services,		C140-CONSTRUCTION MGT SRV	\$ 61,893.54	\$ -	\$ 59,677.75
4500058751	1/4/2024	Alstom Signaling Operation LLC		M140-WAYSIDE SIGNALS	\$ 3,743.24	\$ -	\$ -
4500058752	1/4/2024	Facility Solutions Group, Inc.		R180-RAIL/LRV LIGHTING	\$ 538.75	\$ -	\$ -
4500058753	1/4/2024	RS Americas, Inc.		G170-LUBRICANTS	\$ 2,671.34	\$ -	\$ -
4500058754	1/4/2024	Custom Glass Solutions		R120-RAIL/LRV CAR BODY	\$ 24,528.75	\$ -	\$ -
4500058755	1/4/2024	Home Depot USA Inc		G170-LUBRICANTS	\$ 1,166.29	\$ -	\$ -
4500058756	1/4/2024	CRH California Water, Inc.		M140-WAYSIDE SIGNALS	\$ 56.57	\$ -	\$ -
4500058757	1/4/2024	Supreme Oil Co.		A120-AUTO/TRUCK GASOLINE	\$ 3,719.55	\$ -	\$ -
4500058758	1/4/2024	Shilpark Paint Corporation		F180-BUILDING MATERIALS	\$ 180.32	\$ -	\$ -
4500058759	1/4/2024	Professional Contractors Supplies		G190-SAFETY/MED SUPPLIES	\$ 304.78	\$ -	\$ -
4500058760	1/4/2024	Carlos Guzman Inc	DBE	G150-FASTENERS	\$ 312.90	\$ -	\$ -
4500058761	1/4/2024	Mohawk Mfg & Supply Co		B200-BUS PWR TRAIN EQUIP	\$ 70.62	\$ -	\$ -
4500058762	1/4/2024	Gillig LLC		B120-BUS MECHANICAL PARTS	\$ 3,758.59	\$ -	\$ -
4500058763	1/4/2024	Waxie's Enterprises, LLC		G180-JANITORIAL SUPPLIES	\$ 2,049.33	\$ -	\$ -
4500058764	1/4/2024	Luminator Technology Group Global		R120-RAIL/LRV CAR BODY	\$ 646.50	\$ -	\$ -
4500058765	1/4/2024	Annex Warehouse Company, Inc		F120-BUS/LRV PAINT BOOTHS	\$ 2,610.83	\$ -	\$ -
4500058766	1/4/2024	Home Depot USA Inc		F110-SHOP/BLDG MACHINERY	\$ 94.72	\$ -	\$ -
4500058767	1/4/2024	Transit Holdings Inc		B140-BUS CHASSIS	\$ 5,766.78	\$ -	\$ -
4500058768	1/4/2024	Genfare, LLC		B190-BUS FARE EQUIP	\$ 127.87	\$ -	\$ -
4500058769	1/4/2024	Waytek Inc		G140-SHOP SUPPLIES	\$ 43.53	\$ -	\$ -
4500058770	1/4/2024	R.S. Hughes Co Inc		G140-SHOP SUPPLIES	\$ 1,497.31	\$ -	\$ -
4500058771	1/4/2024	Winzer Franchise Company		G150-FASTENERS	\$ 99.13	\$ -	\$ -
4500058772	1/4/2024	The Jankovich Company, LLC		G170-LUBRICANTS	\$ 550.21	\$ -	\$ -
4500058773	1/4/2024	Rambuilt Glass LLC		F180-BUILDING MATERIALS	\$ 4,600.00	\$ -	\$ -
4500058774	1/4/2024	Sid Tool Co., Inc.		G130-SHOP TOOLS	\$ 468.89	\$ -	\$ -
4500058775	1/4/2024	San Diego Seal, Inc.	Small Business	R220-RAIL/LRV TRUCKS	\$ 1,743.04	\$ -	\$ -
4500058776	1/4/2024	Muncie Reclamation and Supply Co		B110-BUS HVAC SYSTEMS	\$ 2,038.03	\$ -	\$ -
4500058777	1/4/2024	Datex Instruments, Inc.	Minority Owned Business	R150-RAIL/LRV COMM EQUIP	\$ 3,717.38	\$ -	\$ -
4500058778	1/4/2024	AirSupply Tools, Inc		G140-SHOP SUPPLIES	\$ 335.53	\$ -	\$ -

Purchase Orders							
PO Number	PO Date	Name	Prime Business Certification	Material Group	PO Value	DBE Sub Commitment	Non DBE SubCommitment
4500058779	1/4/2024	Willy's Electronic Supply Co Inc	Small Business	G220-OFFICE EQUIPMENT	\$ 92.85	\$ -	\$ -
4500058780	1/4/2024	Kurt Morgan		G140-SHOP SUPPLIES	\$ 3,130.21	\$ -	\$ -
4500058781	1/4/2024	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 3,778.51	\$ -	\$ -
4500058782	1/4/2024	W.W. Grainger Inc		B130-BUS BODY	\$ 194.34	\$ -	\$ -
4500058783	1/4/2024	Freeby Signs		B130-BUS BODY	\$ 108.49	\$ -	\$ -
4500058784	1/4/2024	Western-Cullen-Hayes Inc		M130-CROSSING MECHANISM	\$ 560.30	\$ -	\$ -
4500058785	1/4/2024	OneSource Distributors, LLC		R120-RAIL/LRV CAR BODY	\$ 243.52	\$ -	\$ -
4500058786	1/5/2024	Allied Refrigeration Inc		F110-SHOP/BLDG MACHINERY	\$ 461.97	\$ -	\$ -
4500058787	1/5/2024	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 1,749.00	\$ -	\$ -
4500058788	1/5/2024	Transit Holdings Inc		B120-BUS MECHANICAL PARTS	\$ 1,815.82	\$ -	\$ -
4500058789	1/5/2024	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 403.88	\$ -	\$ -
4500058790	1/5/2024	Cummins Inc		B250-BUS REPAIR PARTS	\$ 1,753.55	\$ -	\$ -
4500058791	1/5/2024	Transit Holdings Inc		B140-BUS CHASSIS	\$ 1,882.87	\$ -	\$ -
4500058792	1/5/2024	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 159.60	\$ -	\$ -
4500058793	1/5/2024	ISC Applied Systems Corp		R150-RAIL/LRV COMM EQUIP	\$ 1,562.38	\$ -	\$ -
4500058794	1/5/2024	Dimensional Silk Screen Inc		G230-PRINTED MATERIALS	\$ 5,301.30	\$ -	\$ -
4500058795	1/5/2024	Data Controls Printworks, Inc.	Small Business	G230-PRINTED MATERIALS	\$ 474.10	\$ -	\$ -
4500058796	1/5/2024	CalACT		P250-PARATRANSIT	\$ 1,585.00	\$ -	\$ -
4500058797	1/5/2024	1099Express.com Inc		P400-FINANCIAL & AUDIT	\$ 159.00	\$ -	\$ -
4500058798	1/5/2024	Braut Inc	Small Business	C120-SPECIALTY CONTRACTOR	\$ 3,564.00	\$ -	\$ -
4500058799	1/5/2024	Transit Holdings Inc		B130-BUS BODY	\$ 2,745.92	\$ -	\$ -
4500058800	1/5/2024	Romaine Electric Corporation	Small Business	M130-CROSSING MECHANISM	\$ 2,132.82	\$ -	\$ -
4500058801	1/5/2024	Gillig LLC		B250-BUS REPAIR PARTS	\$ 5,017.28	\$ -	\$ -
4500058802	1/5/2024	Airgas Inc		G190-SAFETY/MED SUPPLIES	\$ 868.02	\$ -	\$ -
4500058803	1/8/2024	Siemens Mobility, Inc.		R160-RAIL/LRV ELECTRICAL	\$ 1,137.95	\$ -	\$ -
4500058804	1/8/2024	Waxie's Enterprises, LLC		G180-JANITORIAL SUPPLIES	\$ 8,638.86	\$ -	\$ -
4500058805	1/8/2024	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 855.08	\$ -	\$ -
4500058806	1/8/2024	Cummins Inc		B120-BUS MECHANICAL PARTS	\$ 572.70	\$ -	\$ -
4500058807	1/8/2024	Transit Holdings Inc		B120-BUS MECHANICAL PARTS	\$ 436.63	\$ -	\$ -
4500058808	1/8/2024	Transit Holdings Inc		B160-BUS ELECTRICAL	\$ 7,779.56	\$ -	\$ -
4500058809	1/8/2024	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 2,330.43	\$ -	\$ -
4500058810	1/8/2024	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 103.71	\$ -	\$ -
4500058811	1/8/2024	Downtown SD General Auto Repair		P210-NON-REV VEH REPAIRS	\$ 160.00	\$ -	\$ -
4500058812	1/8/2024	Vinyard Doors, Inc.	Woman Owned Business	F110-SHOP/BLDG MACHINERY	\$ 559.78	\$ -	\$ -
4500058813	1/8/2024	Railroad Tools & Solutions LLC		G130-SHOP TOOLS	\$ 3,126.80	\$ -	\$ -
4500058814	1/8/2024	Linde Gas & Equipment Inc.		G140-SHOP SUPPLIES	\$ 424.45	\$ -	\$ -
4500058815	1/8/2024	SC Commercial, LLC		A120-AUTO/TRUCK GASOLINE	\$ 2,811.24	\$ -	\$ -
4500058816	1/8/2024	Altec Inc		G130-SHOP TOOLS	\$ 4,356.39	\$ -	\$ -
4500058817	1/8/2024	Motorola Solutions Inc		C120-SPECIALTY CONTRACTOR	\$ 3,654.46	\$ -	\$ -
4500058818	1/8/2024	Supreme Oil Co.		A120-AUTO/TRUCK GASOLINE	\$ 14,598.72	\$ -	\$ -
4500058819	1/8/2024	Home Depot USA Inc		G140-SHOP SUPPLIES	\$ 1,443.84	\$ -	\$ -
4500058820	1/8/2024	Kenneth Place		P130-EQUIP MAINT REPR SVC	\$ 121.50	\$ -	\$ -
4500058821	1/8/2024	Myers & Sons Hi-Way Safety Inc		M130-CROSSING MECHANISM	\$ 2,748.96	\$ -	\$ -
4500058822	1/8/2024	ABC General Contractor, Inc.		C110-GENERAL CONTRACTORS	\$ 139,977.72	\$ -	\$ 102,449.69
4500058823	1/8/2024	The Gordian Group, Inc.		C130-CONSTRUCTION SVCS	\$ 2,729.57	\$ -	\$ -
4500058824	1/8/2024	VGP Holdings LLC		B120-BUS MECHANICAL PARTS	\$ 1,994.46	\$ -	\$ -
4500058825	1/8/2024	Transit Holdings Inc		B250-BUS REPAIR PARTS	\$ 101.93	\$ -	\$ -
4500058826	1/8/2024	Inland Kenworth (US) Inc		B250-BUS REPAIR PARTS	\$ 371.50	\$ -	\$ -
4500058827	1/8/2024	ODP Business Solutions, LLC		B250-BUS REPAIR PARTS	\$ 256.42	\$ -	\$ -
4500058828	1/8/2024	CDW LLC		I110-INFORMATION TECH	\$ 4,991.77	\$ -	\$ -
4500058829	1/8/2024	Kurt Morgan		G200-OFFICE SUPPLIES	\$ 3,701.25	\$ -	\$ -
4500058830	1/8/2024	Warren Communications Inc		G260-MEDIA	\$ 2,412.26	\$ -	\$ -
4500058831	1/8/2024	TVEyes, Inc.		G260-MEDIA	\$ 2,400.00	\$ -	\$ -
4500058832	1/8/2024	711 Print Enterprises Inc		G230-PRINTED MATERIALS	\$ 556.30	\$ -	\$ -
4500058833	1/8/2024	Dimensional Silk Screen Inc		G230-PRINTED MATERIALS	\$ 782.27	\$ -	\$ -
4500058834	1/9/2024	Transit Holdings Inc		B130-BUS BODY	\$ 36.70	\$ -	\$ -
4500058835	1/9/2024	Cummins Inc		B200-BUS PWR TRAIN EQUIP	\$ 722.56	\$ -	\$ -
4500058836	1/9/2024	Mohawk Mfg & Supply Co		B120-BUS MECHANICAL PARTS	\$ 4.01	\$ -	\$ -
4500058837	1/9/2024	Transit Holdings Inc		B140-BUS CHASSIS	\$ 252.03	\$ -	\$ -
4500058838	1/9/2024	Transit Holdings Inc		B200-BUS PWR TRAIN EQUIP	\$ 433.07	\$ -	\$ -
4500058839	1/9/2024	Transit Holdings Inc		B140-BUS CHASSIS	\$ 1,453.09	\$ -	\$ -
4500058841	1/9/2024	Ray Allen Manufacturing LLC		G120-SECURITY	\$ 249.22	\$ -	\$ -
4500058843	1/9/2024	Ace Uniforms LLC	Small Business	G120-SECURITY	\$ 984.44	\$ -	\$ -
4500058844	1/9/2024	Zones, LLC	Minority Owned Business	I110-INFORMATION TECH	\$ 127,159.15	\$ -	\$ -