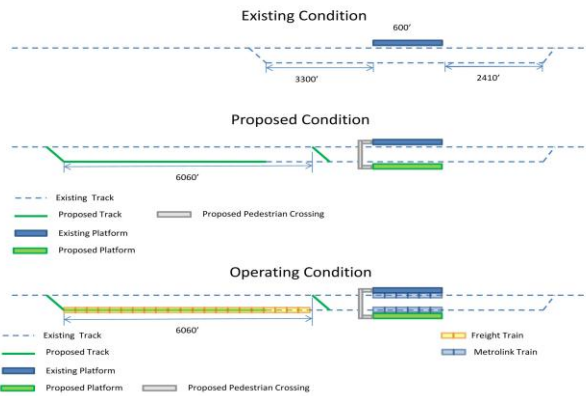




METROLINK

SCRRA Design Procedures Manual

Vincent Siding Extension Track Schematic



November 2014



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1.0 FORWARD

1.1 Purpose

This document serves to define the procedures that govern the initiation, progress, and execution of design work for the Southern California Regional Rail Authority (SCRRA). The standards and procedures presented in this document shall also be used for projects undertaken by SCRRA member agencies or other agencies that could have significant impacts on Right-of-Way or SCRRA's facilities. The General Engineering Consultant (GEC) shall use this document in union with the SCRRA's referenced standards, codes, specifications, guidelines, and manuals. Strict compliance with this document is required in order to facilitate completion of the design in a timely manner. The GEC is either the On-Call Professional Engineering Service Consultant(s); the On-Call Signal and Communications Services Consultant; or Project Management, Construction Management and Staff Assistant Services Consultant(s).

This is a control document and as such shall be updated on a periodic and as needed basis. The Director of Engineering and Construction will periodically issue revisions to this document. Special situations may call for variation from the recommended design practices, standards, policies and procedures, subject to SCRRA approval. Any deviation from the standards and procedures presented herein must be approved in advance by SCRRA. A process for requesting deviations from the recommended design practices and standards has been provided in this Manual.

Review and acceptance of submittals by SCRRA shall not relieve the GEC of responsibility for the design and construction of the projects, including responsibility for errors and omissions in submittals, and construction deviations from accepted design plans.

SCRRA advises the user to completely review this entire Manual and develop a thorough level of understanding prior to beginning a project or study involving the design of SCRRA projects. This document has been titled the "SCRRA Design Procedures Manual", or the "Manual" for short.

1.2 Changes/Updates

The most recent date shown in the lower right hand footer of each page is the effective date of this Manual. The most recent effective date shall supersede all previous versions. Revisions and updates to the Manual will be posted on the Metrolink website www.metrolinktrains.com. Users of this Manual shall be solely responsible for checking the website and utilizing the latest version.

Those individuals who regularly use this Manual can provide valuable assistance in identifying needed updates and improvements. Forward any suggested changes or suggestions to this Manual to the Assistant Director, Standards and Design for consideration. Suggested changes or suggestions should be submitted in writing by completing **SCRRA Form DPM-32: DPM Manual Comments Form**. Each suggested change will be reviewed and responded to by a committee of SCRRA managers shown on **SCRRA Form DPM-13: Request for Special Design Consideration Form**. If SCRRA committee agrees with the suggested change, the Manual will be updated to reflect the change in the next revision. Corrections of any typographical errors contained



herein that do not materially and significantly affect criteria will not require approval by the SCRRRA committee. **The current effective date of these Guidelines shall be November 2014.**

1.3 REFERENCE STANDARDS

The design shall meet all applicable parts of the State of California general laws, California Public Utilities Commission (CPUC) requirements, FRA safety requirements, and the specific project requirements. Where any conflict in criteria exists, the stricter criteria shall govern.

Unless specifically noted otherwise in these criteria, the latest edition of the standard, code, or guideline that is applicable at the time the design is initiated shall be used. If a new edition of or amendment to a standard, code, or guideline is issued before the design is completed, the design shall conform to the new requirements to the extent approved or required by the agency enforcing the standard, code, or guideline changed.

SCRRRA has developed a number of standard plans, specifications, and manuals that shall be applied to this project. In particular, standard plans and specifications shall be used wherever possible to reduce engineering and construction costs. All standards and manuals shall be adhered to throughout this project unless waived in writing by SCRRRA Director of Engineering and Construction.

The most recent editions of the following publications and documents shall be used:

REFERENCES	
AASHTO	American Association of State Highway and Transportation Officials, Geometric Design of Highways and Streets
ADA	Americans with Disabilities Act requirements
APWA	American Public Works Association, Standard Plans for Public Works Construction,
APWA	American Public Works Association, Standard Specifications for Public Works Construction (SSPWC), “Green Book”
AREMA	American Railway Engineering and Maintenance-of-Way Association (AREMA) Recommended Practice
CALTRANS	Caltrans, Highway Design Manual (HDM), Standard Plans, and Standard Specifications
CALTRANS	Caltrans, The California Manual on Uniform Traffic Control Devices (CA MUTCD)
CBC	California Building Code
CFR	Code of Federal Regulations (CFR), Title 23 and Title 49
CPUC	California Public Utilities Commission General Orders
CPUC	California Public Utilities Code (PU Codes)
FRA	Federal Railroad Administration, Track Safety Standards, particularly 49 Code of Federal Regulations (CFR) 213, 214, 234, and 236
FRA	Federal Railroad Administration - U.S. Department of



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	Transportation, Railroad-Highway Grade Crossing Handbook
FTA	Federal Transit Administration, Federal Highway Administration (FHWA)
ITE	Institute of Transportation Engineers, Traffic Engineering Handbook
OSHA	State of California Division of Occupational Safety and Health safety orders
UBC	Uniform Building Code, including seismic requirements
WATCH	Work Area Traffic Control Handbook
SCRRRA MANUALS	
	CADD Drafting Standards, Guidelines, and Criteria
	Design Criteria Manual
	Design Procedures Manual
	Design Quality Assurance Plan
	Engineering Standards
	Highway-Rail Grade Crossings Recommended Design Practices and Standards Manual
	Standard Specifications
	Track Maintenance, Right-of-Way and Structures Engineering Instructions
SCRRRA GUIDELINES	
	Excavation Support Guidelines
	Grade Separation Guidelines
	Landscape Design Guidelines
	Quiet Zone Implementation Guidelines and Procedures
	Rails-with-trails Design Guidelines
	Temporary Traffic Control Guidelines

1.4 Acronyms

The following acronyms are used in this Manual:

ADA	Americans with Disabilities Act
APWA	American Public Works Association
AREMA	American Railway Engineering and Maintenance of Way Association
ASTM	American Society for Testing and Materials
BNSF	Burlington Northern & Santa Fe Railway
Caltrans	California Department of Transportation
C&S	Communications and Signals
CADD	Computer-Aided Drafting and Design
CCB	Configuration Control Board
CFR	Code of Federal Regulations
CMF	Central Maintenance Facility
CMP	Change Management Process
CPM	Capital Program Management



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CPUC	California Public Utilities Commission
CTO	Contract Task Order
DBE	Disadvantaged Business Enterprises
DSA	Design Services Agreement
DSDC	Design Support During Construction
DQAP	Design Quality Assurance Plan
EIC	Employee-In-Charge
FCC	Federal Communication Commission
EAMF	Eastern Area Maintenance Facility
FRA	Federal Railway Administration
GEC	General Engineering Consultant
GO	General Orders
IEEE	Institute of Electrical and Electronic Engineers
IEOC	Inland Empire Orange County
IFB	Invitation for Bids
METRO	Los Angeles County Metropolitan Transportation Authority
MOC	Metrolink Operations Center
MSF	Melbourne Maintenance Support Facility
NCTD	North County Transit District
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NPDES	National Pollutant Discharge Elimination System
OCTA	Orange County Transportation Authority
OSHA	Occupational Safety and Health Administration
PM	Project Manager
PM/CM/SA	Project Management, Construction Management and Staff Assistance
PTC	Positive Train Control
PWP	Project Work Plan
QA/QC	Quality Assurance/Quality Control
RCTC	Riverside County Transportation Commission
ROW	Right-of-Way
SANBAG	San Bernardino Associated Governments
SCAG	Southern California Associated Governments
SCRRA	Southern California Regional Rail Authority
SOP	Standard Operating Procedures
SSPWC	Standard Specifications and Plans for Public Works Construction
SWPPP	Storm Water Pollution Prevention Plan
TCOSF	Train Controls Operations Support Facility
UP	Union Pacific Railroad
USA	Underground Service Alert
VCTC	Ventura County Transportation Commission



2.0 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY

2.1 Introduction

In August 1991, SCRRA, a regional Joint Powers Agency (JPA), was formed. Voting members with their respective number of votes are: Los Angeles County Metropolitan Transportation Authority (Metro), four votes; Orange County Transportation Authority (OCTA), two votes; Riverside County Transportation Commission (RCTC), two votes; San Bernardino Associated Governments (SANBAG), two votes; and Ventura County Transportation Commission (VCTC), one vote. Ex-officio members of the SCRRA include the Southern California Association of Governments (SCAG), the San Diego Association of Governments, and the State of California Department of Transportation (Caltrans).

SCRRA was established to plan, design, construct, operate, and maintain regional commuter rail lines that serve the counties of Los Angeles, Orange, Riverside, San Bernardino, and Ventura. SCRRA named the regional commuter rail system "Metrolink". The first three lines (San Bernardino, Santa Clarita, and Ventura) started operation in October 1992. The Riverside Line started operation in June 1993, and the Orange County Line, which extends 19 miles into northern San Diego County, started operation in March 1994. The sixth line, Inland Empire-Orange County, began operation in October 1995. Most recently, SCRRA initiated service of the 91 Line (Riverside-Fullerton-Downtown LA) in May 2002.

SCRRA's service territory is located in the Southern California metropolitan region. The operating environment can be typically categorized as urban and suburban, with some limited rural or undeveloped regions. With a system comprising 512 (includes shared miles) and 388 (excludes shared miles) route-miles, Metrolink is the nation's second largest commuter rail system, second only to the Long Island Railroad.

SCRRA is implementing an interoperable Positive Train Control (PTC) System on all of its line segments where passenger operations are conducted (as set forth in the Rail Safety Improvement Act of 2008 (RSIA08) and 49 CFR 236 Subpart I). The purpose of a PTC System is to prevent train-to-train collisions, over speed accidents, incursion into work zones, and movements through a misaligned switch by requiring automatic control systems to override mistakes by human operators. This PTC system will be designed and implemented to follow the standard and guidelines established by the Interoperable Train Control (ITC) Committee, which is composed of the four largest U.S. freight railroads - BNSF, CSX, NS, and UPRR. In addition to and concurrently with the implementation of the PTC System, SCRRA is replacing its current computer-aided dispatch (CAD) system with a new system that includes both a primary and secondary redundant/backup system.

2.1.1 Metrolink Mission Statement

SCRRA mission is to provide an outstanding passenger experience on every ride with safe, clean, dependable, and on-time operations.



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SCRRA does everything that demonstrates an appreciation for quality of life, and every act values the lives of our employees, contractor co-workers, customers and communities.

SCRRA operates on best practices and principles with a continued focus on providing high quality service to our customers every day on every ride.

SCRRA embraces innovative solutions and continuous improvement for the lowest cost and most efficient operations.

SCRRA continuously seeks creative, progressive and collaborative solutions to promote investment, develop partnerships and increase capacity to improve the mobility of Southern Californians.

Since 2008, Metrolink implemented several safety enhancements in its mission to become the safest commuter railroad in the nation. They include:

- Enhanced safety testing program that assesses the performance of contractor train crews
- Purchased 137 Guardian Fleet cars equipped with crash energy management technology
- Installed Automatic Train Stop technology at 49 locations to improve engineer situational awareness
- Became the first railroad company in the nation to install inward-facing video cameras in its locomotives
- Working to implement Positive Train Control technology throughout our system ahead of the federal mandate
- Partnered with the USC Viterbi School of Engineering to design and institute an advanced Rail System Safety Certification Program, an industry first that will pioneer efforts to standardize system safety leadership principles
- Awarded operating contract to Amtrak because of its commitment to passenger safety and complementary programs that enhance Metrolink's safety efforts

2.2 Metrolink Commuter Operations

2.2.1 Metrolink System

SCRRA operates service on seven lines. These are:

- Ventura County Line
- Antelope Valley Line
- San Bernardino Line
- Riverside Line
- Orange County Line
- Inland Empire-Orange County Line
- 91 (Riverside-Fullerton-Downtown LA) Line

All operations currently run Monday through Friday. Additional weekend services are provided on four (4) lines: the San Bernardino Line, Antelope Valley Line, Orange County Line, and Inland Empire-Orange County Line.



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With the exception of the Inland Empire-Orange County Line, all services extend from the terminal station to LA Union Station.

Metrolink has no operations on the following holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. Amtrak, BNSF, and UP, however, operate every day of the year on many SCRRRA lines.

Figure 2-1 below shows the Metrolink System including stations and connecting rail transit lines:

FIGURE 2-1



2.2.2 Services

Hours of operation vary by line. Scheduled passenger services are shown on the most recently issued passenger schedule, which may be obtained from the official Metrolink

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website at www.metrolinktrains.com. Additional special event trains may be operated on some weekends.

2.2.3 SCRRA Facilities and Infrastructure

Metrolink operates on conventional railroad track and Right-of-Way, which are owned either by one of the County Transportation Agencies or a private freight railroad company that has conveyed operating rights to SCRRA.

The design, operation, and maintenance of the Metrolink System are governed by Federal Railroad Administration (FRA) regulations and California Public Utilities Commission (CPUC) General Orders (GO).

SCRRA owns a fleet of locomotives and coaches that are maintained at the Metrolink Central Maintenance Facility (CMF) located at 1555 San Fernando Road, Los Angeles, CA. Vehicle inspection and light repair is also performed at various layover sites throughout the system. A new maintenance facility was completed in October 2009 in the City of Colton (1945 Bordwell Street, Colton, CA 92324) to service SCRRA locomotives and coaches.

Metrolink train operations are dispatched from the Metrolink Operations Center (MOC) located at 2558 Supply Street, Building A, Pomona, CA. MOC is manned 24 hours a day, 365 days per year. SCRRA is in a process of building a new Train Controls Operations Support Facility (TCOSF) at the northeast corner of Geary Avenue and SCRRA's Pasadena and San Gabriel Subdivision in the City of Pomona. This facility will house Metrolink dispatching, safety and other critical operation personnel. The facility is estimated to be complete by the end of 2013.

2.2.4 Operations

In addition to Metrolink service, the SCRRA system tracks also carry Amtrak passenger operations and freight operations. The primary freight carriers on the system are the BNSF and the UP.

2.3 Organization

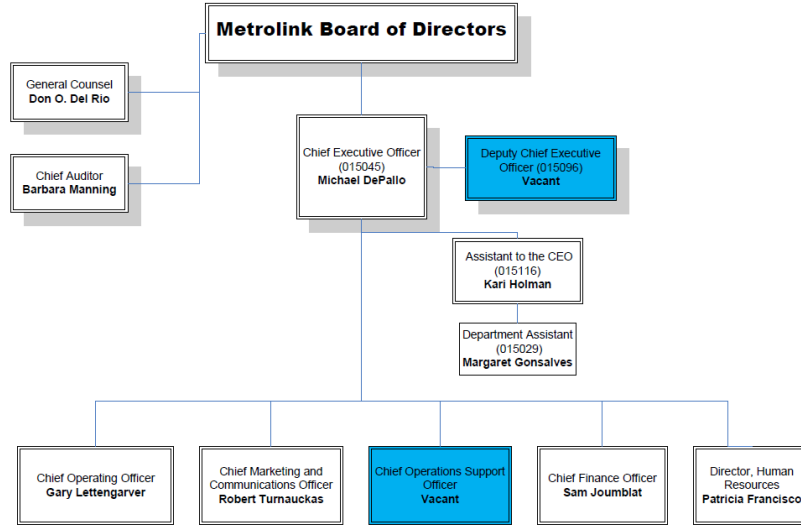
A board of directors, consisting of 11 members, who represent the five counties that comprise the agency, governs the SCRRA. An executive staff manages the operation of the system.

Figure 2-2 (next page) reflects the organization of the SCRRA operation:

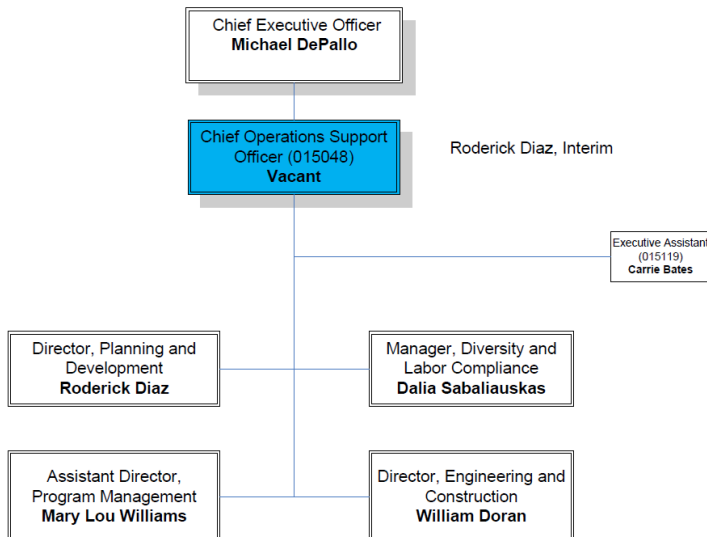


FIGURE 2-2

Southern California Regional Rail Authority
Office of the Chief Executive Officer



Southern California Regional Rail Authority
Office of the Chief Operations Support Officer





2.4 Funding

The SCRRA receives operating and capital funding from many sources. Metrolink fare box returns account for the largest portion of the operating cost for the system. Additional operating subsidies are received from the constituent counties based on a formula of the service miles in their county. Other sources of operating funds include utility easement fees, advertising revenue, and railroad user charges.

Capital funding is received from several sources and can vary year-to-year and project-to-project. The primary source of capital funds is from the constituent counties of the SCRRA. Other capital funding is received from federal sources and the State of California. Metrolink also obtains funds from third parties whose contracts require certain work to be performed by SCRRA forces. This is referred to as recollectable work.

2.5 Assets

The real estate holdings maintained and operated by SCRRA are owned by the individual counties that comprise the authority. The fixed improvements and equipment are owned collectively by the counties that are partners in the SCRRA Joint Powers Authority (JPA). Asset ownership is presented below in Table 2-1:

Table 2-1 SCRRA Track Assets

Real Property	Owner
Ventura County Line	In Los Angeles County: Metro & UP In Ventura County: VCTC & UP
Antelope Valley Line	Metro
River Corridor (Dayton to Soto)	Metro
San Bernardino Line	In Los Angeles County: Metro In San Bernardino County: SANBAG
Riverside Line	Riverside Terminal: RCTC rest of Riverside Line: UP
Orange County Line	Los Angeles to Fullerton: BNSF Fullerton to San Clemente: OCTA In San Diego County: NCTD
IEOC Line	Riverside to Atwood: BNSF Atwood to Orange: OCTA
91 Line	BNSF
Central Maintenance Facility	SCRRA
Pomona MOC	SCRRA
Passenger Stations	Varies; however, station sites are typically owned by the local municipality



3.0 OPERATIONS AND SAFETY

3.1 Overview

It is the explicit intent of the SCRRA to promote a safe operating commuter rail system. All the guidelines described in this manual are developed with the intent of promoting a system which provides for the safety of the rider, the general public, the roadway worker, and those having business on SCRRA property. All the actions of the Authority and of the contractors/GECs doing business for the Authority must be consistent with the SCRRA worker safety rules.

The organization of SCRRA's Engineering and Construction Department is presented in Figure 3-1 (see next page).

3.2 Track Occupancy for Inspection and Data Collection

As an operating railroad property, SCRRA's Right-of-Way presents inherent hazards. All individuals entering SCRRA property for any reason must be properly trained, equipped, and authorized to enter the Right-of-Way. While on SCRRA property, all persons must act in accordance with SCRRA safety regulations, as well as the referenced regulations having jurisdiction; these include the Federal Railroad Administration (FRA) and the Occupational Safety and Health Administration (OSHA), among others.

3.2.1 Training

All GEC and subconsultants' employees entering SCRRA Right-of-Way are required to have a training program that complies with SCRRA and applicable FRA Bridge Worker Safety and Roadway Worker On-Track Safety Instructions CFR 49 Part 214. GEC and subconsultants and their employees will be required to supply satisfactory evidence of compliance with necessary FRA and SCRRA training and certifications before entering SCRRA Right-of-Way.

3.2.2 Personal Protective Equipment

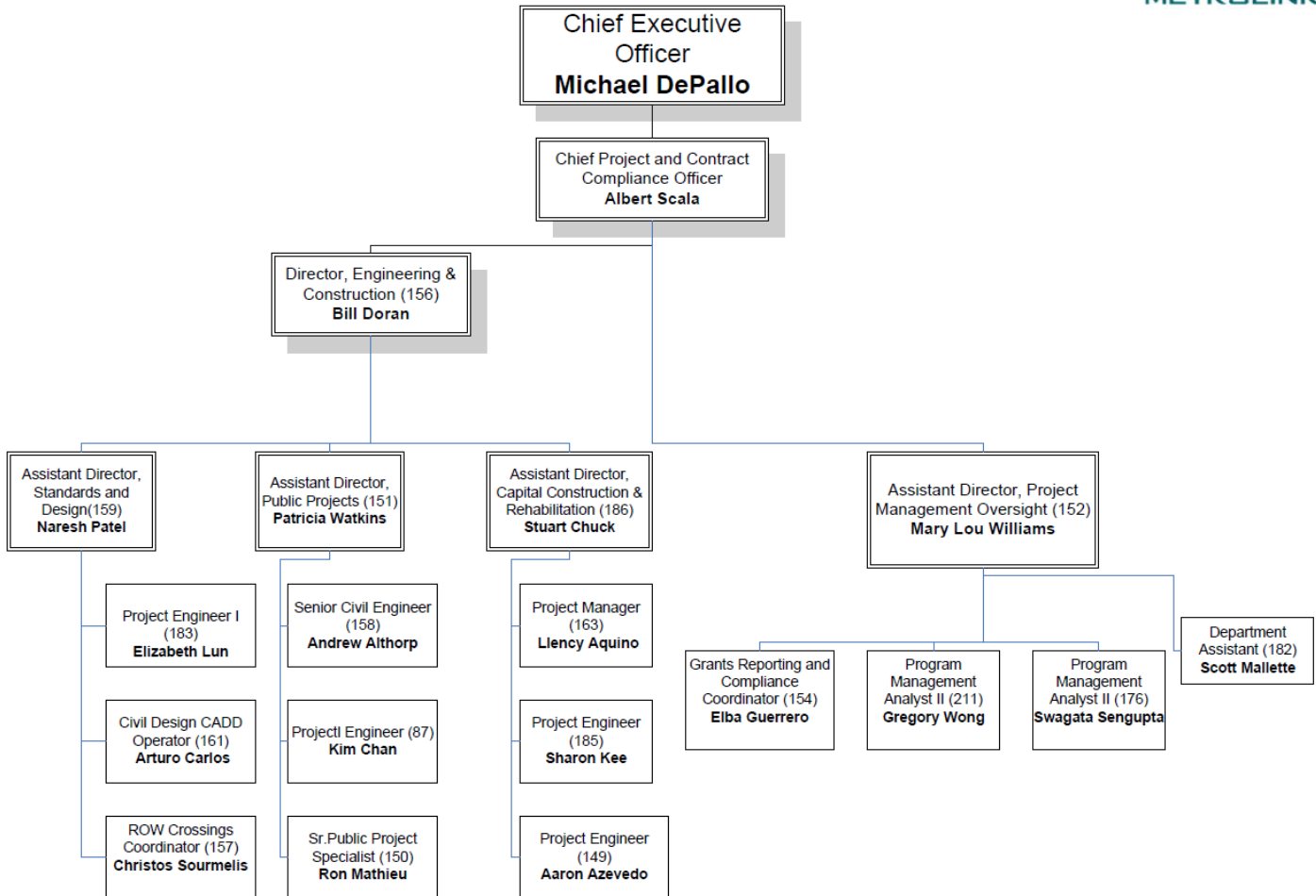
All persons, including GECs and contractors, who have business to occupy the SCRRA property are responsible to equip themselves properly according to the SCRRA Maintenance-of-Way Safety Instructions, as well as the referenced regulations having jurisdiction; these include those of the FRA and the OSHA, among others. Minimum equipment includes proper footwear, safety vest, hardhat, and safety glasses. All persons shall have the current SCRRA safety training sticker and shall carry personal identification with photograph.

All safety equipment necessary for the tools and equipment in use must be in place and properly operating. Employees will have a copy of the Maintenance of Way Operating Rules and Instructions, the current timetable, and the General Order in effect in their possession.



FIGURE 3-1

**Southern California Regional Rail Authority
Engineering and Construction**





3.2.3 Authorization to Enter Right-of-Way

The GEC shall notify the SCRRA ROW Crossings Coordinator of the need to enter the Right-of-Way in advance of doing so. The procedure and requirements for authorizing access varies according to the nature of the activities to be performed within the Right-of-Way.

Activities within the Right-of-Way will require scheduling of an employee-in charge by SCRRA.

The movements of oversize vehicles over SCRRA maintained and operated crossings require a fully executed SCRRA Form No. 4: Agreement for Moving Oversized Loads Over Highway-Rail Grade Crossings.

Unobtrusive activities within the Right-of-Way require completion and execution of SCRRA Form 5: Indemnification and Assumption of Liability Agreement, unless otherwise provided for in the GEC contract.

Most other activities within the Right-of-Way will require completion and execution of SCRRA Form 6: Temporary Right-of-Entry Agreement. The Right-of-Entry will require that the company requesting access provide evidence of railroad protective insurance. Preparation of a health and safety plan may also be required.

The process for obtaining approval to occupy the railroad Right-of-Way is further described in SCRRA Form 36: Right-of-Way Encroachment Approval Procedures. The GEC and its subconsultants will not be required to assume responsibility of flagging costs required to perform activities included in the approved CTO and authorized by SCRRA. Refer to Metrolink website for more information.

The rules and requirements to protect SCRRA's operations, including the proper manner of protecting the tracks, signals, fiber optic cables, pipe lines, other property, and tenants or licensees, as described in the SCRRA Form 37: Rules and Requirements for Construction on Railway Property, shall be adhered to during construction and/or maintenance activities on or adjacent to railway property.

3.2.4 Conduct

All persons, including GECs and contractors who have business to occupy the SCRRA Right-of-Way, must conduct themselves in a safe and responsible manner that does not jeopardize the operations of the railroad, the safety of the public, or the safety of the individual and others working on the Right-of-Way. All persons shall conduct themselves as described in the Maintenance of Way Operating Rules and Instructions and the General Safety Regulations for Third Party Construction and Utility Workers on SCRRA Property.

3.3 Safety Standards and Regulations

As an operating railroad under the jurisdiction of the FRA and the CPUC, the SCRRA is governed by the regulations of those agencies. Further, Metrolink operates under the Maintenance of Way Operating Rules and Instructions. Various other safety manuals and requirements govern contractors and others working on SCRRA Right-of-Way. These are briefly described in the subsections to follow. It is the GEC's responsibility to

**SCRRA Design Procedures Manual**

obtain, be familiar with, and conduct themselves and their employees and subconsultants in accordance with each of these manuals.

3.3.1 Maintenance-of-Way Operating Rules and Instructions (MOWORI)

These rules govern the operations of the railroads listed, for efficiency of operation, and for the protection of the railroad companies and the traffic they transport.

These rules also govern:

- Employees of the Maintenance-of-Way Division
- Employees of the Communications and Signal Division
- Employees of Contractors performing work on or about the railroad while under contract of the railroad
- Flag persons protecting the work on or about the railroad, and;
- Operators of on-track equipment

All employees, regardless of gender or firm, whose duties require occupancy of the railroad Right-of-Way, must comply with the latest Maintenance of Way Operating Rules and Instructions rules. The current Rules supersede all previous rulebooks and instructions.

3.3.2 Metrolink Timetable

The timetable governs the operation of the Metrolink Commuter Rail Service. All employees, whether under direct employment by or under contract to SCRRA, whose duties are affected by train operations, must comply with the timetable in effect. The current timetable supersedes all previous timetables and instructions. It includes System Special Instructions (All Subdivisions) & Additions and Revisions to MOWORI. The timetable is periodically reissued and shall be in force until replaced.

3.3.3 Maintenance-of-Way Safety Instructions

The SCRRA Maintenance-of-Way Safety Instructions governs all employees of the SCRRA and their contractors while working in the railroad Right-of-Way. It is the responsibility of each employee to keep this book readily available and be familiar with the specific rules that pertain to their assignment or craft.

The information contained in this book is based on careful judgment and years of experience, and is condensed from several manuals into this convenient form for each employee's personal use.

The intention of these safety rules is to keep employees working on SCRRA property mindful that safety is of the utmost importance. For this reason, employees to whom these rules and regulations apply shall:

- Be furnished a copy of the safety rules and regulations
- Be required to study these rules and regulations and pass required examinations
- Know and understand their application
- Obey them while on duty or on company property

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- Immediately call to the attention of a fellow employee any action not in compliance
- Hold daily safety meetings prior to beginning work

SCRRA management will regularly make observations and checks of work occurring in the Right-of-Way and advise SCRRA's Safety Manager to take the necessary action(s) to ensure compliance with the safety rules and regulations.

When conditions arise which are not covered by the rules, employees are expected to use sound judgment in applying the principles of safety. A thorough understanding of the Safety and General Rules is a prerequisite to the exercise of sound judgment.

3.3.4 Bridge Worker Safety Instructions

The purpose of Bridge Worker Safety Instructions is to prevent accidents and casualties to employees involved in certain railroad inspection, maintenance, and construction activities. These Instructions applies to all employees and contractors and their employees who perform work that is within the scope of this Instructions.

These Instructions prescribes the Federal safety standards for the railroad workplace safety subjects addressed herein. This policy does not restrict a worker or railroad contractor from adopting and enforcing additional or more stringent requirements not inconsistent with these Instructions.

These Instructions are intended to conform to CFR 49 Part 214. Where discrepancies might exist, CFR 49 Part 214 shall be the controlling factor, except that the most restrictive rule shall apply in all cases.

Any person (including any manager, supervisor, official, or other employee or agent of SCRRA or an SCRRA contractor) who violates any requirement of these Instructions or causes the violation of any such requirement is subject to all of SCRRA's policies concerning rules violations and Federal civil penalty of at least \$250 and not more than \$10,000 per violation, except that penalties may be assessed against individuals only for willful violations. Where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury, or has caused death or injury, a penalty not to exceed \$20,000 per violation may be assessed. See Appendix A to the policy for a statement of agency civil penalty policy. Fines for contractor employee actions are the responsibility of the contractor or employee.

3.3.5 Roadway Worker On-Track Safety Instructions

The objective of these Instructions is to provide all employees of SCRRA and their contractors with the rules, guidelines, and policies which conform to the FRA Regulations concerning Roadway Work Protection. The purpose of these instructions is to prevent accidents and injuries that result from being struck by trains or on-track equipment while performing duties.

This manual gives the responsibilities of the Roadway Worker, Employee-in-Charge (EIC), Lone Worker, Watchman/Lookout, and Roadway Maintenance Machine Operator, as well as the procedures for providing protection from trains or on-track equipment, clearing of tracks, and working in various settings.

These Instructions were prepared as a guideline, placing all safety, operating rules and procedures pertaining to on-track safety into one document, providing you with easy

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reference when on or about the track in any roadway worker capacity. Employees providing on-track safety for themselves or others must have these Instructions readily available at all times.

Similar federal penalties and fines apply to Roadway Worker safety as described in Section 3.3.4, above.

3.3.6 Track Maintenance, Right-of-Way and Structures Engineering Instructions

The Track Maintenance and Engineering Instructions are for the use of all SCRRA employees, contractors, and GEC's who comprise the SCRRA engineering team. Its instructions, policies, and guidelines cover many aspects of Railroad Engineering and Maintenance-of-Way activities.

3.3.7 General Safety Regulations for Third Party Construction and Utility Workers on SCRRA Property

The General Safety Regulations for Third Party Construction and Utility Workers on SCRRA Property provides instructions to third party contractor personnel working within SCRRA Right-of-Way. This manual is thoroughly reviewed at mandatory contractor safety training. Each trainee acknowledges receipt by signature after completion of training.

3.3.8 Standard Operating Procedures (SOPs)

SCRRA has developed SOPs for 20 safety critical functions related to its commuter rail system. These SOPs are in accordance with the SCRRA's System Safety Plan developed under APTA System Safety Requirements. Of the 20 safety critical functions, seven are related to operation, seven related to mechanical, and three related to engineering. Operating and flagging rules, track quality, and signal quality SOPs apply to engineering.

3.4 Safety Training Costs

It is the responsibility of the GEC to include in price proposals the cost of yearly in-class training for its staff. SCRRA may provide materials and classroom for training of GEC personnel. GEC personnel must attend the safety classes.



4.0 PROJECT MANAGEMENT AND ADMINISTRATION

4.1 Overview

SCRRA utilizes various mechanisms to procure design services for SCRRA infrastructure and facilities. Typically, SCRRA contracts for a GEC to provide engineering and design services to the SCRRA. These services may include track, structure, facility, signal, communication, and other specialty services as necessary. SCRRA may elect to utilize site-specific design or design-build contracts for projects that are of sufficient size or specialty. SCRRA may also utilize design services from GECs under contract to third parties doing business with the SCRRA, or may require third party designs to be reviewed by SCRRA staff and/or SCRRA GECs.

Each SCRRA design project may be assigned a CTO Project Manager, who may be an SCRRA employee, an employee of the GEC, or an employee of another consulting firm. The CTO Project Manager, however, shall not be an employee of the GEC assigned to provide engineering services for that project.

4.2 Contract Task Order-Based Contracts

GECs providing services through a GEC contract will be authorized to work on a contract task order (CTO) basis. The GEC shall manage the concurrent development of designs under approved CTOs in a manner that assures that work satisfies the standard of care requirements of the contract, and that the work is completed on schedule, within the approved budgets, and in satisfactory response to the scope of work. The CTO approval process is described below.

4.2.1 SCRRA Request for CTO Proposal

The CTO Project Manager and/or SCRRA Project Manager (Assistant Director, Standards and Design) will complete **SCRRA Form DPM-03: CTO Request for Proposal**, indicating the scope of work (a detailed scope of work may require additional attachment for larger complex projects) and **SCRRA Form DPM-06: CTO Cost Estimate**, indicating the estimated cost for the design services. The CTO is entered into Oracle by the Department Assistant. If the funding is provided by federal grants or funds, this form and a DBE Contract-Specific Goal Setting Request Form will be provided to SCRRA Contracts Department to obtain DBE goals from the SCRRA DBE GEC. Once the DBE goal is obtained, the SCRRA Project Manager provides the scope of services and DBE goals to the GEC to request a CTO proposal for the design services.

4.2.2 CTO Proposal

The GEC Project Manager shall respond to the request for CTO proposal within ten (10) business days with a detailed scope of services and fee proposal. Should the complexity of the scope of services require additional lead time for proposal preparation, the GEC shall notify the SCRRA Project Manager so that a mutually agreeable submission deadline can be determined.



The Proposal shall be developed by the GEC in collaboration with the SCRRA Project Manager and shall include a schedule, budget, and scope of work with sufficient detail to define the work limits, the facilities/infrastructure to be constructed or rehabilitated, and the specific performance requirements that the design shall achieve. If the scope of the services is not clearly identifiable, or the program budget not specifically defined, the CTO proposal shall be limited to concept or preliminary level to provide for refinement of the scope and budgetary requirements. In the case of a study or report, the GEC shall define the issue to be addressed and any factors for consideration. Further, the GEC shall define any schedule requirements and any budgetary limitations that affect the task.

Specifically, the CTO proposal shall include the following elements:

CTO Task Manager

In each CTO proposal the GEC shall identify a proposed CTO Task Manager, who will be responsible for the day-to-day performance of work under the CTO. The CTO Task Manager shall be subject to the approval of the SCRRA Project Manager and SCRRA Project Manager.

Scope of Work

The task proposal shall contain a narrative description of the purpose of the project (e.g., speed increases) and specific work to be performed under the CTO. The scope of work shall define assumptions used in developing the scope and estimate, and shall address known risks associated with these assumptions. Standards and criteria that will be applied in performing the work under the CTO shall be cited.

The GEC shall include in the proposed scope all necessary architectural/engineering services required to complete the assigned work. The scope shall include the investigation or verification of actual field conditions through document search, site visits, field surveys, utility potholing, and/or geotechnical investigations (as appropriate) as well as aerial photogrammetry, if budget allows.

Various subtasks shall be identified in the scope of work and the interrelationship of each of the subtasks shall be defined. Specific in-progress and final deliverables that will be made under the CTO shall be itemized. Proposed phasing of work progress shall also be identified. Progress submittal requirements are defined in Chapter 6. SCRRA has prepared Scope and Submittal matrices for various subjects and subtasks for each milestone submittals. The GEC will prepare the detailed design as per these matrices.

Milestone Schedule

The task proposal shall contain a schedule for execution of the engineering or design that defines the time required to complete each subtask and function. Specific submittal milestones shall be identified. The GEC shall, prior to submittal, review all progress and final submissions and that review period shall be specifically identified in the task schedule. Other outside predecessor and successor relationships shall be specifically identified. Additional submittals to third parties shall be identified and sufficient time for review shall be included according to that party's general practice. Refer to Section 6.4.4 for lead times for SCRRA review. The schedule shall start and shall be tracked based upon the date of CTO Notice to Proceed (NTP).



CTO Estimate

The CTO estimate shall present all estimated costs required to complete the work described in the CTO proposal, including labor costs (comprised of direct labor and allocated overhead), subconsultants' costs, other direct costs, and fixed fee. The nature of costs included shall be consistent with the provisions of the GEC contract. Detail shall be provided to show proposed staff (including name, classification, and hourly rate) required to complete each element of the work. Where appropriate, costs shall be broken down by phases (e.g., Concept Design, Preliminary Design, Interim Design) to allow for issuance of limited notice(s) to proceed by SCRRA.

The CTO estimate shall be submitted on **SCRRA Form DPM-7: CTO Pricing Proposal**. A separate Form DPM-7 shall also be provided for each subconsultant. The GEC will also complete **SCRRA Form DPM-1: Contract Task Order (CTO) Cost Summary**.

The CTO estimate submitted by the GEC will be reviewed and compared to the cost estimated at the beginning of the CTO process by the CTO Project Manager and/or SCRRA Project Manager. Appropriate changes will be made to GEC estimate and the final CTO proposal will be mutually determined and agreed. CTO Project Manager will check to see if the CTO fits within the current Contract authority and the CTO Project Manager will check to see if the CTO fits the current funding limits of the project.

The GEC will try to use the same persons and classifications provided in the CTO as much as possible. Persons with higher hourly rates and higher classifications shall not be used for a particular task which can be done by classifications provided in the CTO. The GEC shall keep track of actual personnel used for the services shown on the CTO on a regular basis. Any major changes in persons affecting the CTO services or fees shall be promptly corrected and reported to SCRRA.

4.2.3 SCRRA CTO Approval

The CTO Project Manager and/or SCRRA Contract Manager will approve the CTO and other documents and forms submitted by the GEC. The CTO package [CTO with original signatures, GEC forms, DBE form and goal (if applicable), CTO Project Manager's request for Proposal, scope of work, independent estimate, updated PM sheet, and any other pertinent documents] will be forwarded by the Department Assistant to the Project Management Oversight Coordinator, who will maintain a CTO tracking log. Project Management Oversight Coordinator will ensure that the CTO package is complete and that the CTO Project Manager and SCRRA Project Manager have signed the CTO, then put the CTO into a routing folder and process for approval from Project Management Oversight Department, Director of Engineering and Construction, and Contract Department. Once all internal department signatures have been obtained, the CTO is entered into Oracle by the Project Management Oversight Coordinator and then forwarded to the appropriate Department Assistant.

The Project Management Oversight Coordinator will review the contract terms and, if the CTO is within the original estimates, update the transaction already in Oracle for a PO/Contract Number. The Project Management Oversight Coordinator, after the Oracle update, will retain a copy of the CTO and all back-up material for the contract file and return the package to Department Assistant. The Department Assistant will create a PDF file of the CTO package; insert an e-copy into Engineering Drive; e-mail a notice to the CTO Project Manager, and SCRRA Project Manager, to let them know that CTO is



complete and the PDF version is available in the Engineering Drive. The CTO Project Manager will e-mail a PDF copy of the CTO with a Notice to Proceed letter to the GEC to start the design services included in the approved CTO.

4.3 Project Work Plan

Upon receipt of Notice-To-Proceed from SCRRRA, the GEC will develop a Project Work Plan (PWP) for their use and provide a copy to the SCRRRA Project Manager. The PWP shall address, but not be limited to, the following:

- A description of the Project and of all activities necessary for completing the scope of work
- Detail scope of work, schedule and project design fee
- List of performance criteria; i.e., design and speed, design life, and standards to be incorporated in the design
- Prior studies and estimates upon which the work will be based (attach or reference copy if available)
- List of key personnel (GEC and SCRRRA) and project responsibilities
- Priority works to be performed
- Project management approach including team organization, team decision making, roles and responsibilities
- List of stakeholders, including SCRRRA departments, cities, permitting agencies, etc.
- Lines of communication between GEC, SCRRRA, and other agencies
- Enumeration of what is expected of SCRRRA and other agencies
- Project filing system (See Section 4.4 below)
- Quality assurance and control procedures (See Section 4.5 below)

SCRRRA may request modifications or revisions to the PWP. The PWP shall be updated as appropriate throughout the period of design and shall serve as the management document for the task.

4.4 Project Records

At the beginning of the job the GEC will submit to SCRRRA, for approval, a procedure to control all documents and data that pertain to the work under the CTO. These include all hard copies and electronic files of internal and external origin such as:

- Studies
- Reports
- Calculations
- Standards
- Record Drawings
- Engineer's Estimate
- Technical Specifications
- Meeting Minutes/Resolutions



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- Correspondence

For each CTO assignment, the SCRRA Project Manager will provide the GEC with a SCRRA Project File Number, which represents a specific location and type of work. All correspondence shall include this number for reference and tracking.

4.5 Quality Control/Quality Assurance Procedures

The GEC and its subconsultants shall comply with the SCRRA **Design Quality Assurance Plan**. The Consultant is required to have an effective quality assurance/quality control process, which defines the procedures that govern the initiation, progress and execution of design work. The Consultant shall provide specific information on qualifications, experience and roles of the QA/QC manager and other personnel involved in QA/QC.

It will be the GEC’s responsibility to verify that all deliverables, including schematics, reports, and studies, have been reviewed for quality prior to their submittal to SCRRA.

4.6 Coordination with SCRRA

The GEC shall maintain ongoing communications with SCRRA throughout the development of project designs. Regular coordination with SCRRA will allow for timely project planning and decision-making.

Primary points of contact with SCRRA will be:

CTO Project Manager	For issues related to project scope, cost, schedule, design and construction progress, interdepartmental coordination, and third party coordination
Assistant Director, Program Management Office	For project management issues related to scope, schedule, and cost controls; and contract compliance support
Assistant Director, Standards and Design	For civil engineering issues related to contract authority, CTO budget and expenditures, progress schedule, design criteria (including SCRRA Engineering Standards and Standard Specifications), or design policy
Assistant Director, PTC Technical Services	For signal and communication issues related to contract authority, CTO budget and expenditures, progress schedule, design criteria (including SCRRA Engineering Standards and Standard Specifications), or design policy

This shall not prevent the GEC from responding to requests for information from other SCRRA staff or from member agencies; however, one or both of the above points of contacts shall be notified of such requests and provided with copies of responses. The GEC shall notify both the SCRRA Project Manager and the SCRRA CTO Project Manager (Assistant Director, Capital Construction and Rehab; or Assistant Director, Standards and Design; or Assistant Director, PTC Technical Services) immediately when such a request would require work outside of the approved CTO scope.



4.7 Progress Meetings

In general, progress meetings shall be held monthly between the CTO Project Manager, SCRRA Project Manager, GEC Project Manager, GEC CTO Task Manager(s), and appropriate GEC technical leaders. Additional progress meetings shall be scheduled at a frequency that is appropriate to the level of technical complexity and coordination requirements of each CTO.

At monthly progress meetings, the GEC shall be prepared to report on the status of all issues related to each CTO (see Section 5.4 Issues Tracking).

The GEC shall prepare and distribute minutes for all meetings utilizing **SCRRA Form DPM-10: Meeting Attendance & Meeting Minutes**.

4.8 Scope Changes

4.8.1 Minor Scope Changes

Throughout progress of the design, the GEC shall monitor the constancy of the work scope. Minor scope changes shall be noted in progress submittals. Any change to scope is considered minor and not subject to review by the SCRRA if it does not:

- Require SCRRA action in the future for any reason
- Result in any temporary or permanent impacts to operations and maintenance of Metrolink Systems
- Necessitate additional compensation to the GEC
- Impact the CTO schedule

For minor scope changes, the design fee established in the approved CTO proposal will remain unchanged and there will be no renegotiation of the design fee or scope of work.

4.8.2 Time Changes

The GEC shall monitor the schedule of the design throughout the progress of the design. If there are impacts to the schedule due to circumstances beyond the control of the GEC and if there are no impact to the design cost submitted previously, the GEC will complete **SCRRA Form DPM-05: CTO Request for Proposal Time Extension** to request time extension from the SCRRA Project Manager.

4.8.3 Significant Scope Changes

Upon identification of a change not considered minor, the GEC should evaluate the change to determine if the suggested change constitutes any additional work on its part and submit its findings in writing to the SCRRA Project Manager. If the change in scope requires extra effort other than agreed upon in approved task proposal, then that would be the basis for negotiations for additional compensation to the GEC. The GEC is expected to deliberate faithfully and reasonably during the evaluation of change in scope and subsequent computation for extra payment. The request for additional fee will be prepared in the same format used for calculating design fee. The SCRRA Project Manager or Contract Manager will complete **SCRRA Form DPM-04: CTO Request for**



Proposal Revision, indicating the scope of revision, and **SCRRA Form DPM-06: CTO Cost Estimate**, indicating the estimated cost for the revised design services.

The extra work effort and the additional compensation, as estimated by the GEC, are subject to review, reevaluation, and approval by the SCRRA Project Manager. **SCRRA Form DPM-11: Scope Change** shall be used by the GEC to document and obtain approval of scope changes prior to proceeding with additional work. If the GEC exceeds the fees agreed in the approved CTO prior to approval of a CTO revision, SCRRA will not be responsible to compensate the GEC for the unapproved and additional fees.

4.8.4 **SCRRA CTO Revision Approval**

The GEC will complete **SCRRA Form DPM-2: Contract Task Order (CTO) Revision Cost Summary** including necessary signature. The process for CTO revision approval will be similar to the process shown in Section 4.4.3 SCRRA CTO Approval. Once the CTO revision is executed by everyone, a Notice to Proceed will be given to the GEC to start the revised design services included in the approved CTO revision.

4.9 **Control of Subconsultants**

The GEC shall establish a procedure to provide subcontracted services that conform to specified requirements and fulfill SCRRA's expectations. The GEC shall comply with contract terms related to use of subconsultants. Subconsultants shall be selected based on their ability to meet the designated scope of work and attain SCRRA quality requirements.

The GEC Project Manager will conduct status and review meetings with subconsultants to review their progress, ensure that up-to-date information is being used and the appropriate activities are being performed—all of which will result in timely submissions meeting the project schedule. Prior to the start of work, the GEC will furnish the subconsultants with a copy of appropriate SCRRA manuals and criteria to ensure uniformity of all project documents. Subconsultants will submit all studies, reports, and plans to the GEC. The GEC will review the subconsultants' submissions for conformity with the project scope of work, directives, applicable codes, design criteria, and any other SCRRA requirements. The results will be reviewed with the subconsultants and re-submissions will be made, if necessary. All deliverables to SCRRA shall be through the GEC.

Subconsultants shall be required to adhere to the SCRRA DQAP. The subconsultants will maintain project quality control records. Copies of these records shall be provided by subconsultants to the GEC if requested by the GEC Project Manager. The GEC Project Manager shall review subconsultants' quality control records to ensure compliance with the SCRRA DQAP.

4.10 **Progress Reports and Billings**

The GEC shall prepare and compile CTO progress reports and billing statements, which will include budget and cost breakdown per task, and submit to the CTO Project Manager for review and approval on a monthly basis. All progress reports are due at SCRRA no later than two (2) weeks from the end of the month for which payment is sought. It is the sole responsibility of the GEC to ascertain that all assignments done



and current billings by the subcontractor(s) are included in each month's report submitted to SCRRA.

4.10.1 Schedule

The GEC shall submit a baseline schedule at the start of each CTO. The baseline schedule will serve as the basis for monitoring and controlling project activities to help GEC decide how to use their resources to achieve time and cost goals; help management to evaluate alternatives; form the basis for determining staffing resources, materials, and capital requirements; and, provide a means for tracking progress. The baseline schedule will be reviewed and approved by Contract Manager. The schedule shall show different tasks to be completed, expected sequence of design, and effect of any changes to the overall schedule. The schedule will use Oracle's Primavera product.

Baseline schedule shall utilize computerized Critical Path Method (CPM) network scheduling. Baseline schedule shall show the order in which the GEC proposes to carry out the work with logical links between work activities, and calculations made using the critical path method to determine the controlling operation or operations. The GEC will ensure that activity sequences are logical and that schedule shows a coordinated plan for complete performance of the work. The baseline schedule shall include the entire scope of work through the end of the CTO. The GEC will show how to complete the work, the activities that define the critical path and float on other activities.

The GEC will use the latest version of Primavera P6 Professional Project Management software.

4.10.2 Budget and Labor Reports

SCRRA Form DPM-08: Invoice Summary, Invoice Trackers, and Project Submittals shall be used to submit monthly invoices. The Invoice Trackers shall be updated monthly and submitted to the Capital Program Management Division and the Contract Manager. The Invoice Trackers will be reviewed and approved by the Capital Program Management Division.

4.10.3 Monthly Progress Reports

The GEC shall prepare monthly progress reports on a SCRRA standard electronic format for submittal to SCRRA. **SCRRA Form DPM-08: Invoice Summary, Invoice Trackers, and Project Submittals** shall be used for this purpose.

The summary of work progress shall include:

- SCRRA Project (Funding) Number
- Month and year the progress covers
- SCRRA Project Manager and GEC CTO Manager
- CTO Description
- Summary of monthly activities for the month which ended, and projections for current month activities
- Changes in Scope and significant events/occurrences for the month which ended

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- Schedule narrative and corrective actions required to be taken by SCRRA
- Other issues

4.10.4 Invoicing and Payment

The GEC shall submit an invoice to SCRRA detailing amount of compensation with breakdown to appropriate tasks and budget for the month that ended. The invoices shall be kept current and shall include current invoices from the subconsultants. SCRRA will make prompt payments for all work performed satisfactorily as stipulated in the contract agreement. Retention may be withheld from payment, in accordance with the contract terms, until after the completion of the task.

All subcontractors shall invoice the GEC for services rendered. In accordance with the provisions of the GEC contract, payment for work satisfactorily performed (less applicable retention) shall be made to subcontractors promptly after the GEC receives payment from SCRRA. SCRRA is not responsible for any direct payment to subcontractors.

Upon successful completion of the work under each CTO, the GEC shall request release of retention in accordance with contract requirements. Release of retention shall not be requested until project close-out has been completed as described below.

4.11 Project Closeout

Upon CTO completion, the GEC shall notify SCRRA in writing that it has satisfied all task requirements and intends to closeout a CTO.

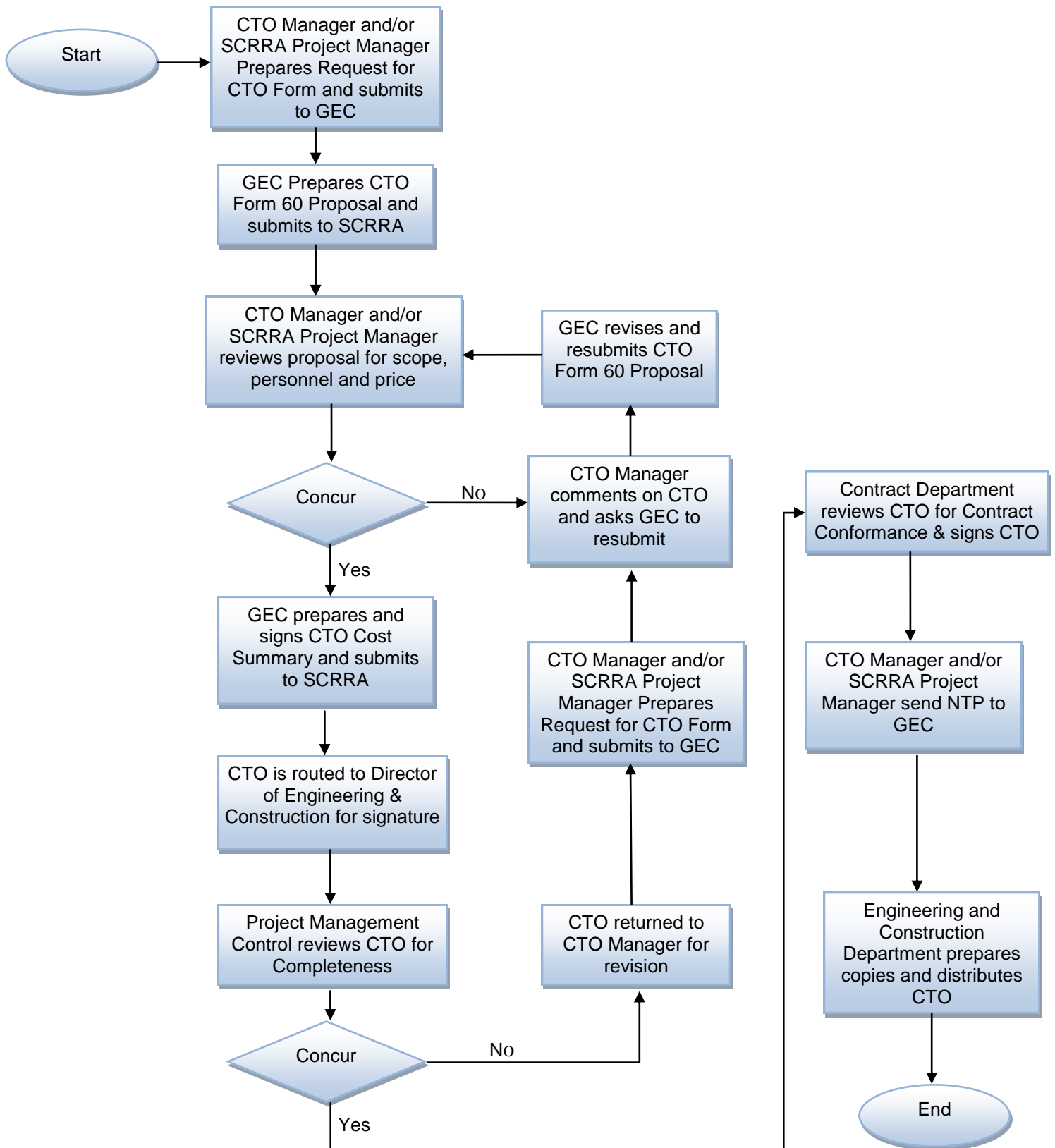
In order to complete the project closeout, all items in the **SCRRA Form DPM-09: CTO Closeout** form must be satisfactorily completed and approved by SCRRA.

After project closeout, the GEC shall be obligated to address any omissions and/or outstanding issues that should reasonably have been anticipated and resolved by the GEC during the work progress, regardless of whether these issues were identified in the review comments from SCRRA. The GEC is expected to rectify such omissions in an expedient manner.

SCRRA may ask the GEC to clarify issues or respond to questions related to design issues after project closeout. Any additional compensation for such items of work, if they constitute an effort beyond the original scope of work, will be negotiated on an as-needed basis.



**FIGURE 4-1
CTO Approval Process**





5.0 DESIGN DEVELOPMENT

5.1 General

5.1.1 Responsibility

The GEC shall manage the development of project designs in a manner such that:

- Design progresses in accordance with the approved CTO scope, budget, and schedule.
- Each progress submittal is adequately reviewed prior to submission.
- The Quality Control/Quality Assurance process is being satisfactorily implemented.
- Scope changes are readily identified and appropriate notifications are made to SCRRA of any schedule or budgetary impact at the time of their occurrence. Refer to Section 4.8 for procedures for identifying and obtaining approval for scope changes.
- Adequate information is provided to support the decision-making process of the SCRRA.

The design process is intended to result in a progressive refinement of the engineering solutions, resulting in a comprehensive, well-defined project design. The GEC shall manage, control, and report on the progress of the work to ensure that each progress submittal represents an advancement of the design toward established objectives. Chapter 6 provides guidance to the GEC in establishing the level of design development at each submittal stage.

Throughout the course of design development, the GEC shall ascertain that the design is practical and cost effective. It shall be the GEC's responsibility to compile applicable design criteria and to understand pertinent existing (field) conditions so that the final design document fully describes the work required to complete the project.

The design of track and structures, and/or signal and communication facilities affected by project design, will be conducted by SCRRA's On-Call professional engineering services consultant(s) and/or signal and communications design services consultant(s). The SCRRA's On-Call professional engineering services consultant(s) will coordinate the design with the SCRRA's On-Call signal and communications design consultant(s), or vice versa, as necessary and at appropriate times that will not affect the schedule of the project.

5.1.2 Professional Licensure

The GEC, including its subconsultants, will be required to sign and seal final bid documents, thus signifying that the design job was led and prepared by a Professional Engineer or Registered Architect, licensed in the State of California.

5.1.3 Design Standards and Regulatory Requirements

Designs performed for the SCRRA shall conform to all federal, state, local, and SCRRA standards and regulations applicable. In addition, they shall be consistent with industry



practice. The SCRRA standard requirements are defined in the **SCRRA Design Criteria Manual** under separate cover.

5.1.4 Ownership of Documents

The use and distribution of design data obtained by the GEC from SCRRA, or developed by the GEC under contract to SCRRA, shall be subject to the confidentiality and ownership provisions of the GEC contract. All design documents, including but not limited to hard copies, design records and electronic files, shall become the property of SCRRA, and the GEC shall not disseminate this information to third parties without prior authorization from SCRRA. The GEC shall also adhere to requirements regarding confidentiality and ownership of information as stated in the GEC contract.

5.2 Basis of Design

At the onset of each task, the GEC shall establish specific project goals and objectives as well as criteria and reference documents (e.g., maps, surveys, aerial mapping, track charts) that will be used in design development. These shall be approved by SCRRA and shall serve as the basis for future design decisions.

5.2.1 Initial Meetings

Kick-Off Meeting

The GEC shall, in coordination with the SCRRA Project Manager, schedule a “kick-off” meeting with project stakeholders in advance of beginning CTO design efforts. The purpose of this meeting will be the sharing of information and development of mutual understanding of project goals. This kick-off meeting shall be attended, at a minimum, by the GEC Project Manager, the assigned CTO Manager, the SCRRA Project Manager, subconsultants’ project managers, disciplinary leads, and assigned QA reviewers. During the meeting, the GEC Project Manager shall perform orientation on the scope and requirements of the CTO and shall distribute the Project Work Plan and required SCRRA standards and criteria.

The agenda for the kick-off meeting shall include:

- Scope of Project
- Project Work Plan
- Deliverables
- Project Schedule
- Standards and Criteria
- Project challenges
- Lessons learned from previous similar projects
- Communications Plan
- QA Plan
- Documentation Requirements



Site Meeting

The kick-off meeting shall be followed by a field site walk of the project limits. The GEC shall document the site walk with an appropriate number of photographs to record existing site conditions. The GEC shall also prepare a written record describing important site issues and documenting verbal directions or comments received from SCRRRA.

5.2.2 Project Definition

If not provided, the development of project designs shall begin with the preparation of a Project Definition Report (PDR), which defines the major project components, describes the project issues, recommends a preferred design approach, and establishes a conceptual cost estimate. The GEC shall prepare a Project Definition Report during the Concept Design phase. This report will serve as the basis for future design efforts. Deviation from the conclusions of the Project Definition Report shall be presented to SCRRRA for review and approval. Approval by project stakeholders as well as SCRRRA Project Manager(s) is required.

The Project Definition Report shall include the following elements as shown in Table 5-1.

Table 5-1 Project Definition Report Contents

Project Definition Element	Description
Cover Page	
Metrolink Logo Project Title Project Definition and Concept Design project photo or map GEC Name Date	
Project Summary	
Project Definition	Location: Subdivision, milepost limits, and identification of municipality Project: Length and nature of work, operating line, physical limits
Project Location	Describe project location. Provide map and aerial photograph (if available) of the project area.
Major Project Components	Briefly describe 5 to 10 major features of the project which may include: <ul style="list-style-type: none"> • Length and number of tracks to be built • Turnouts to be constructed or replaced (discuss speed increases if applicable) • Signal facilities to be constructed • Grade crossing(s) construction (discuss safety enhancements if applicable) • Drainage facilities/structures



Project Definition Element	Description
	<ul style="list-style-type: none"> • Other structures (bridges, retaining walls, buildings, etc.) • Mechanical and electrical facilities
Project Approval	Signature block for SCRRA Stakeholders

Project Definition Element	Description
Project Narrative	
Site Description	Describe existing conditions at the project site, including: <ul style="list-style-type: none"> • Right-of-Way • Existing track geometry and speed • Existing signal facilities and train control • Existing facilities (bridges, culverts, stations, industry sidings, etc.) • Access to the site before and after construction • Design constraints (e.g., vertical or horizontal clearance issues) • Evidence of existing utilities based on visual inspection
Project Concept	Describe the primary project concept in detail, discussing topics such as: <ul style="list-style-type: none"> • What the final project will look like (illustrated with conceptual plans and profiles) • How it fits together with existing facilities • Design criteria • Why this concept is preferred over other alternatives
Design Issues	Describe the main design issues to be resolved, which may include: <ul style="list-style-type: none"> • Limitations of concept design data • Modifications required to existing improvements and facilities (bridges, culverts, signal huts, grade crossings, stations, etc.) • Vertical and/or horizontal clearance constraints • Potential utility relocations • Probable permits required • Operational restrictions • Right-of-Way constraints or requirements, including review of ownership of properties abutting project corridor • Possible opportunity for additional project phases, i.e. discuss expansion possibilities
Alternative Concept	Describe the alternative concept (if any) in detail, discussing the same topics as in the Primary Concept narrative.
Appendices	



Project Definition Element	Description
Project Schematic	Attach a color-coded schematic drawing (track chart) of the project concept, showing existing and proposed conditions. Attach schematic signal layout drawing.
Estimate	Provide concept-level Engineer’s Estimate (see Section 5.7), including detailed construction cost estimate and materials list. Explain the assumptions made for the estimate. Assumptions may include but are not limited to the following: <ul style="list-style-type: none"> • Information known and unknown at the time of the estimate • Contracting method • Inflation rate used and date of expected construction
Site Photos	Attach photos of the project area including critical areas, design constraints, utilities, etc.
Assessor’s Maps	Attach copies of county assessor’s maps, showing properties that abut project corridor.

To ensure consistency of documents prepared by SCRRA and on behalf of SCRRA, the Project Definition Report shall conform to the format requirements shown in Table 5-2.

Table 5-2 Format for Project Definition Report

Item	Format Requirements
Margins	1” top; 1” bottom; 1.25” left; 1.25” right
Font	Body Text: Arial, 11 pt Title Text: Arial, 16 pt Bold Report Heading Text: Arial 12 pt, Bold, Italic Report Subheading Text: Arial 11 pt., Underline
Paragraphs	Justified
Header	0.5” from top No header on first page Header text: Arial, 12 pt. Flush Left: Metrolink Logo Flush Right: Project Title
Footer	0.5” from bottom Footer text: Arial, 10 pt. Flush Left: GEC Name or Logo Centered: Page # Flush Right: Date

Refer to the sample document in Appendix B.



5.2.3 Design Criteria and Deviations

The GEC shall define and document specific criteria to be used in design development. This shall include proposed design speeds, capacities, dimensions, and other critical features that are necessary to the utility of the project. The design criteria shall be subject to approval by SCRRA. Any proposed changes to or deviations from established design criteria shall be submitted to the SCRRA for approval prior to implementation in the design.

5.2.4 Special Design Considerations

Special design considerations from the recommended design practices and standards listed in this Design Procedures Manual will require the approval of the SCRRA Director of Engineering and Construction, or a Change Review Committee, designated by the Director. The Change Review committee will typically include a cross section of senior managers representing the SCRRA Civil, Signal, Safety, and Rail Crossings groups.

The current procedure for requesting a deviation from the manual is to prepare and then request the necessary approvals by completing the **SCRRA Form DPM-13: Request for Special Design Consideration Form**. The request should be signed and sealed by a registered engineer, preferably the lead engineer for the design.

5.2.5 Design Variance

The GEC is required to immediately notify SCRRA in writing and request for an information exchange meeting if it determines that:

- There will be significant changes in design philosophy at the next submittal which contravene the previous submittal or the previously established design criteria, CTO scope, or design approach.
- Significant design related issues, which were to be resolved or addressed, have not materialized and the progress of the design work as scheduled will be compromised.
- A new technology or design concept has been introduced in the industry that affects previous design decisions, requiring attention or decision by SCRRA.

5.2.6 Design Change Authority

Only the SCRRA Project Manager has authority to approve changes to previously-approved design solutions.

5.3 Design Interface

At each phase of design completion, the GEC shall ensure that the engineering approach and design solutions presented have adequately addressed interfaces among disciplines. Toward this end, the GEC shall initiate a procedure to ensure that changes to the design incorporate the requirements of all disciplines involved in the project as well as all the users and stakeholders of the project. Second, the procedure will provide assurance that all related disciplines and elements of the project address the change and provide for the integration of related project elements.



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The designer shall complete **SCRRA Form DPM-14: Design Interface Matrix** for each project submittal for inclusion as part of the submittal report. The Design Interface Matrix shall identify interdisciplinary or interdepartmental interfaces that exist in the design and shall confirm that these interfaces have been engineered to an integrated solution, at a level of detail appropriate to each design phase.

The Design Interface Matrix shall evolve with the project as the design progresses. Where areas of interface are identified, but integrated solutions are not yet defined, the matrix shall address these as “to be developed.”

Design Phase	Design Interface matrix shall include....
Preliminary Design	...definition of all major disciplinary interfaces
Interim Design	...definition of remaining interfaces and resolution of all major interfaces
Pre-Final Design	... engineering solution of all interfaces



At a minimum, the Design Interface Matrix shall address the following interfaces:

- Track geometry to bridge deck coordinates
- Track geometry/special trackwork to design speed
- Track geometry and earthwork to Right-of-Way
- Track geometry and earthwork to utility requirements
- Earthwork to signals and communications installations
- Structures to hydrology
- Track geometry to station platform geometry
- Construction work hours and limitations to operational requirements
- Track geometry to roadway geometry

The GEC shall add to this matrix as appropriate to the scope of work and specific technical challenges of the CTO.

5.4 Issues Tracking

Throughout the course of the design, the GEC shall maintain a log of project issues. **SCRRRA Form DPM-08: Invoice Summary, Invoice Trackers, and Project Submittals** shall be used to identify all outstanding issues related to the work, including schedule, budget, labor and Action Item status (variance against baseline); open technical questions; potential Right-of-Way and utilities conflicts; third party permits; and contractual concerns. The CTO Tracker shall identify the date the issue was opened; summary of issue and its implications; current status; next steps; “ball-in-court”; and projected date of resolution. Issues shall be marked closed/completed when satisfactorily addressed by the assigned/responsible party.

Action Item Tracker will be updated for presentation and discussion at regular progress meetings.

5.5 Drawing Preparation

Generally, design drawings are intended to show the type, size, and location, as well as fit, proximity, and geometry, of the installations. Drawings must indicate limits of work, staging and other pictorial information. In concert with the Standard Specifications, Project-Specific Specifications and the Schedule of Quantities and Prices, the drawings shall accurately depict existing conditions and clearly define the work that is to be performed.

The format and presentation of design drawings shall conform to the requirements of the **SCRRRA CADD Drafting Standards, Guidelines, and Criteria**.

5.6 Technical Specifications

5.6.1 General

Specifications are intended to define the product performance requirements, installation requirements, testing and certification requirements, and method of payment.



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Specifications may be method- or performance-based as appropriate, but individual item specifications should avoid combinations of these.

The GEC shall prepare technical specifications to accompany design drawings as necessary to define functional, performance, workmanship, installation, and warranty requirements for materials, equipment, and systems. The GEC shall avoid duplication of information on drawings and specifications.

The GEC will complete **SCRRA Form DPM-33: SCRRA Standard Specifications and Bid Quantity Items Checklist** prior to bidding. Completion of this Checklist will help GEC familiarize with SCRRA's Standard Specifications and bid schedule requirements and will be helpful in making sure that all issues affecting construction and change orders are thoroughly investigated prior to bidding.

5.6.2 Standard Specifications

SCRRA maintains a set of Standard Specifications that it uses for construction contracts performed within the SCRRA Right-of-Way. The GEC shall utilize the Standard Specifications when preparing designs and contract documents. The SCRRA Standard Specifications cover work items that are performed routinely within the Right-of-Way; they are general in nature, and are not all-inclusive.

The Standard Specifications will be included, in an unaltered state, in all Contract Documents prepared for SCRRA construction projects. As such, the GEC shall be thoroughly familiar with the Standard Specifications though will not be required to submit Standard Specifications as part of the CTO submittal. The SCRRA Contract Administrator will insert the Standard Specifications into the Contract Documents.

The Standard Specifications use the Construction Specifications Institute (CSI) Master Format section numbering system. A current and complete set of the SCRRA Standard Specifications are available on SCRRA's website for GEC use.

5.6.3 Project Specific Specifications

The GEC will typically be required to supplement the Standard Specifications with additional or Modified Specifications. The specifications developed by the GEC are called Project Specific Specifications.

The Project Specific Specifications, which shall describe project or site-specific requirements, consist of up to two types of written specifications. The two types are:

- Modifications to SCRRA Standard Specifications, called "Modified Specifications", and;
- Additions to SCRRA Standard Specifications, called "Supplemental Specifications"

Modified Specifications

Modified Specifications are those particular specification sections that already exist in the SCRRA Standard Specifications but require modification to address specific requirements of the project or the site.



Modified Specifications are to take the “Add, Delete, Replace” format in which only those parts of the Standard Specifications requiring modification are addressed. Each modification is to be preceded with an italicized phrase beginning with “Add...” “Delete...” or “Replace...” as appropriate.

The Modified Specifications are not to include any unchanged portions of the section. Only the modifications are to be included. Refer to the samples in Appendix B.

Supplemental Specifications

Supplemental Specifications are those specification sections that do not already exist in the SCRRA Standard Specifications and therefore must be written, in whole, by the GEC to address the specific requirements of the project or the site. Refer to the sample in Appendix B.

5.6.4 Integration into Contract Documents

The Contract Documents include Instructions to Bidders, Agreement, Bid Forms, Schedule of Quantities and Prices, General Conditions, Special Conditions, SCRRA Standard Specifications, Project Specific Specifications and Contract Drawings. The breakdown of responsibility for preparation of each of these documents is as follows:

Contract Document	Prepared By
Instructions to Bidders	SCRRA
Procurement and Contracting Requirements	SCRRA
Standard Specifications	SCRRA
Bid Forms	SCRRA/GEC
Schedule of Quantities and Prices	GEC
Project Specific Specifications	GEC
SCRRA Standard Specifications and Bid Quantity Items Checklist	GEC/SCRRA (PM)
Contract Drawings	GEC

Where documents are prepared by SCRRA, it is the responsibility of the GEC to provide input as requested by SCRRA and to ensure the documents written by the GEC do not conflict with those prepared by SCRRA. The GEC shall provide additional standard specifications for unique services and products that are not included as a part of SCRRA’s Standard Specifications.

Standard Specifications

The SCRRA Standard Specifications will be inserted in the contract documents by the SCRRA Contract Administrator.

Project Specific Specifications

The GEC must follow the following guidelines in presenting the Project Specific Specifications:

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- The Project Specific Specifications shall be presented in ascending numerical order of the sections without regard to whether they are modified specification sections or supplemental specification sections.
- An index covering only the Project Specific Specifications (not the SCRRA Standard Specifications) shall be included at the front of the document. It shall cover both modified and Supplemental Specifications, intermixed, in the order the specification sections appear.
- The index shall include the section number, the section title, and the number of pages included in that section, and shall denote by the letter (M) or (S) whether the section is a modified specification section or a supplemental specification section. A note explaining this convention is to be included in the index for clarity. Refer to sample in Appendix B.
- The Project Specific Specifications are to be presented as a cohesive supplement to the Standard Specifications, using the same formatting and general presentation approach.
- If appendices to the specifications are required, they shall follow the numbered specification sections. Each appendix shall be named in alphabetical order and shall include a separator page and index as appropriate.

Instructions to Bidders, Agreement, Bid Forms, General Conditions and Special Conditions

The SCRRA Contract Administrator will prepare these portions of the Contract Documents. The GEC will be required to provide information as requested by the Contract Administrator or the SCRRA Project Manager in a timely fashion to assist with the preparation of the document. The GEC must also become familiar with SCRRA-prepared documents, to the extent that they may affect the specifications being written by the GEC, and also to avoid conflicting language.

One important note is that all SCRRA-furnished material is to be included only in a list in the Special Conditions. All references to SCRRA furnishing materials in any other location, including the Specifications, Schedule of Quantities and Prices, or the Contract Drawings, are to be avoided.

5.6.5 Format

Project Specific Specifications shall be prepared in MS Word and shall include the following formatting shown in Table 5-3 (next page):



revision of each standard shall apply. The GEC shall review each reference to verify its applicability. Copies of referenced codes and standards shall be provided to SCRRRA.

Required Submittals

Where specific submittal documents are required, these shall be stated. Specific testing methods (e.g., ASTM) shall be established.

Quality Assurance / Quality Control

Contractor-Required quality control requirements shall be defined. Owner-provided quality assurance measures shall be stated.

Verifications of Existing Conditions

Where an item of work requires the contractor to verify project conditions, this shall be stated.

Testing Requirements

Testing and inspections to be performed by the contractor, including resulting test results or certifications, shall be defined.

Materials

The specification shall define the performance requirement of materials to be used in the construction. Sole source items shall not be specified unless approved in writing by SCRRRA.

Construction Methods

Where appropriate, methods or procedures required in performing the work shall be defined. The use of performance standards shall also be considered by the GEC in lieu of procedural requirements.

Measurement and Payment

The methods of measuring work and for making payment for the work shall be described. Measurement and payment provisions shall be consistent in each part and the Schedule of Quantities and Prices. Work for which no specific payment is required shall be clearly identified.

5.7 Project Cost Estimate

5.7.1 Overview

The GEC shall prepare an Engineer's Estimate at each phase of design completion. The Project Cost Estimate shall capture the full range of capital costs related to the project, including:

- Construction Costs (Engineer's Estimate)
- Construction Contingency

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- Design and Design Support Costs
- Project Management Costs
- Agency Costs
- Construction Management Costs
- Flagging Costs
- Owner-Provided Materials Costs
- Project Reserve/Contingency

Project cost items shall be developed to a level of detail appropriate to the phase of design. Each line item of the Project Cost Estimate shall be annotated with a comment noting the source or basis of calculation for the unit price or lump sum price.

The Project Cost Estimate shall include construction cost contingency and project-level contingency appropriate to the level of design completion. It is preferable that the overall construction cost contingency be based on the aggregate contingency of the various items of work; however, an overall percent-of-construction may be used for concept-level estimates or where deemed appropriate. The Project Cost Estimate shall also include escalation costs based on yearly escalation rate and midpoint of construction schedule.

The Project Cost Estimate shall be prepared utilizing MS Excel, following the format established in **SCRRA Form DPM-15: Project Cost Estimate**.

The Project Cost Estimate shall be supported by a detailed Construction Estimate and Materials List. Any changes from the preceding submitted estimate shall be supported by a detailed narrative explanation.

The GEC will promptly advise SCRRA if it finds that the project being designed will exceed or is likely to exceed the funding limitations and it is unable to design a usable facility within these limitations. Upon receipt of such information, SCRRA will review GEC's revised estimate of construction cost. SCRRA may, if it determines that the estimated construction contract price is so low that award of a construction contract not in excess of such estimate is improbable, authorize a change in scope or materials as required to reduce the estimated construction cost to an amount within the estimated construction contract price set forth by SCRRA, or SCRRA may adjust such estimated construction contract price. When bids or proposals are not solicited or are unreasonably delayed, SCRRA shall prepare an estimate of constructing the design submitted and such estimate shall be used in lieu of bids or proposals to determine compliance within the funding limitations.

If percent-of-construction methods are used to calculate cost items, the percentages used shall be appropriate to the level of uncertainty at each design phase. Appropriate cost percentages for each phase of design are presented in Table 5-4 (next page):



Table 5-4 Project Cost Estimate Percentages

COST ELEMENT	DESIGN PHASE				
	Concept (5% Design)	Preliminary (30% Design)	Interim (60% Design)	Pre-Final (90% Design)	Final (100% Design)
Construction Costs	As calculated by quantity take-off; summarized by major work category	As calculated by quantity take-off; line items to match technical specifications	As calculated by quantity take-off; line items to match technical specifications	As calculated by quantity take-off; line items to match technical specifications	As calculated by quantity take-off; line items to match technical specifications
Construction Contingency	15% of construction cost	10% of construction cost	10% of construction cost	10% of construction cost	10% of construction cost
Civil Design	9% of construction cost	9% of construction cost	9% of construction cost	9% of construction cost	9% of construction cost
Civil Design Support during Construction	3% of construction cost	3% of construction cost	3% of construction cost	3% of construction cost	3% of construction cost
S&C Design	3% of construction cost	3% of construction cost	3% of construction cost	3% of construction cost	3% of construction cost
S&C Design Support During Construction	2% of construction cost	2% of construction cost	2% of construction cost	2% of construction cost	2% of construction cost
Project Management	4% of construction cost	4% of construction cost	4% of construction cost	4% of construction cost	4% of construction cost
Construction Management	8% of construction cost	8% of construction cost	8% of construction cost	8% of construction cost	8% of construction cost
Flagging	6% of construction cost	6% of construction cost	6% of construction cost	6% of construction cost	6% of construction cost
Agency Costs	10% of construction cost	10% of construction cost	10% of construction cost	10% of construction cost	10% of construction cost
Materials Costs	Per materials list	Per materials list	Per materials list	Per materials list	Per materials list
Project Reserve/Contingency	20% of sum of above costs	15% of sum of above costs	12% of sum of above costs	10% of sum of above costs	5% of sum of above costs



Engineer’s Estimate

Detailed construction cost Estimates (“Engineer’s Estimate”) shall be prepared by the GEC to support the Project Cost Estimate. Construction estimate items shall be organized and assigned a numerical designator consistent with the CSI format and the SCRRA standard specifications. For concept-level estimates, work may be summarized by major category of work. For subsequent estimates, work shall be described in a manner consistent with the measurement and payment provisions of the Standard Specifications and the Project Specific Specifications. At design completion, the format of the Engineer’s Estimate shall be identical to the Schedule of Quantities and Prices.

The Construction Cost Estimate shall be prepared using **SCRRA Form DPM-16: Engineer’s Estimate**, which may be edited to add or hide rows as appropriate. Cost category descriptions shall match those used in the summary construction costs shown on the Project Cost Estimate.

Quantities shall be supported by engineering take-off calculations prepared in a manner consistent with the SCRRA DQAP. These quantity calculations shall be submitted to SCRRA with the final submittal.

Multiple construction schedules may be required by SCRRA to segregate costs according to grant funding source.

Materials List

Materials included in the Project Cost Estimate shall be supported by a Materials List. On the Materials List, the GEC shall identify all materials that will be provided by SCRRA for use in the project. SCRRA-provided materials typically include track materials (rail, ties, special trackwork), standard bridge elements, and signal equipment. SCRRA may elect, however, to procure other materials for installation from the contractor. The GEC shall coordinate with the SCRRA Project Manager to identify which materials SCRRA will purchase in advance of construction.

A detailed quantity take-off shall be performed to identify materials required to complete the work. Quantities shall be supported by calculations in accordance with the SCRRA DQAP. Quantity calculations shall be submitted with each Project Cost Estimate.

To ensure that adequate quantities of materials are available for project construction, the GEC shall apply a contingency to calculated quantities of each type of material as follows:

Rail	5% Contingency
Ties	1% Contingency
Cables and Conduits	5% Contingency

Owner-provided materials shall be presented on **SCRRA Form DPM-17: Materials List**. The CTO Project Manager will ensure that procurement contracts are in place for each material listed. The CTO Project Manager will also determine lead times required for material delivery, which shall be incorporated by the GEC into the overall project schedule.



If owner-provided materials required for the project will not be on hand before contractor NTP, the GEC shall prepare necessary contract language for incorporation into the project-specific specifications to inform the contractor when materials will be available.

5.7.2 Schedule of Quantities and Prices

The GEC shall prepare a Schedule of Quantities and Prices (Bid Schedule) to accompany the Camera-Ready document submittal. The bid schedule, along with the technical specifications, must provide a clear mechanism for payment of all work that is to be performed under the contract.

Format of the Bid Schedule shall be as shown in Table 5-5 and shall be consistent with the Construction Estimate, with unit prices and total amounts left blank, utilizing **SCRRRA Form DPM-18: Schedule of Quantities and Prices**. Refer to sample documents in Appendix B.

Table 5-5 Format for Bid Schedule

ITEM	BID SCHEDULE FORMAT REQUIREMENTS
Margins	1.25" top; 0.75" bottom; 0.75" left; 0.75" right
Font	Body Text: Arial, 10 pt.
Header	0.75" from top Header text: Arial Bold, 14 pt. Flush Left: [Schedule XX] [Project or Schedule Name] Centered: SCHEDULE OF QUANTITIES AND PRICES Flush Right: Bidder: _____
Footer	0.25" from bottom Footer text: Arial, 10 pt. Flush Left: [IFB/CONTRACT] NO. C-CCCC Centered: [SCHEDULE XX] SQP-[Page #] Flush Right: [AWARDED/ISSUED]: MM.DD.YY [ADDENDUM NO. XX] [ADDENDUM ISSUED: MM.DD.YY]
Where: "IFB" is indicated prior to contract award ("Issued") "Contract" is indicated on conformed documents ("Awarded") CCCCC = contract or IFB number, provided by SCRRRA Project Name or Schedule Name and Number is provided by SCRRRA Issued date is date of advertisement, provided by SCRRRA Awarded date is date of Board action, provided by SCRRRA Addendum No. and issue date, if appropriate, are provided by SCRRRA	



The format of the bid schedule shall be identical to the Construction Estimate portion of the Project Estimate, with unit prices and total amounts left blank. Refer to Chapter 6 and sample documents in Appendix B.

The GEC shall submit all quantity take-off calculations and documents used to prepare the Bid Schedule with the Final Design (100% Design) submittal. The quantity take-off calculations, sources of unit and lump sum prices, and pay item and measurement consistency with representation of work on drawings and specifications shall be checked by the GEC Manager, task manager, and quality assurance manager. The quality assurance manager must be an appropriately qualified person who has not worked on the project during the design phase. An independent qualified person from the subconsultant can be used if necessary. SCRRA may utilize the services of another On-Call Professional Engineering Design Services consultant or Construction Management and Project Management consultant to carry out independent quantity take-off calculations and check the GEC submittal.

5.8 Third Party Coordination

5.8.1 Utilities

The GEC shall coordinate with the CTO Project Manager, member agency real estate officer, and utility companies within the project area throughout the design process to ensure that potentially affected utilities are identified and appropriate actions are taken to protect or relocate utilities, as required.

Utilities shall be identified by the GEC by:

- Obtaining a list of project-area facilities from Underground Service Alert
- Reviewing utility agreements, as provided by SCRRA and/or member agencies
- Coordination with SCRRA's ROW Encroachments Administrator
- Requesting utility as-built plans from project-area utility companies
- Conducting a field survey to locate all visible utilities and determining location of all poles, manholes, valve boxes, street and traffic lights, and appurtenances
- Performing potholing as necessary

The GEC shall identify utility conflicts and required utility protections (e.g., encasements). The GEC shall also assist SCRRA in determining who will perform the required work—the SCRRA contractor or the utility company—and when the work must be completed. This information shall be provided to the CTO Project Manager. With input from and in close coordination with the CTO Project Manager, the GEC shall issue appropriate notices to utility companies. The GEC shall support the CTO Project Manager in finalizing utility agreements and ensuring timely implementation of required utility protections or rearrangements.

Utility coordination efforts and utility work required shall be tracked by the GEC using **SCRRA Form DPM-19: Utilities Matrix**. Utility contacts, data sources, and required actions shall be defined. This form shall be provided to SCRRA with each progress submittal.

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The GEC shall coordinate with the SCRRA PM and ROW Encroachments Administrator regarding any meetings, planned or proposed, with utility companies for the purpose of identifying and coordinating project utility work. SCRRA shall be provided with ample opportunity to attend utility meetings. SCRRA may, at its discretion, assume responsibility and retain authority for coordinating directly with any or all utility companies.

A standard format shall be used by the GEC to request information from utility companies that may be affected by the project. A **SCRRA Form DPM-20: Utility Information Request Letter** shall be used for this purpose. Copies of all correspondence to and from utilities, meeting minutes, and as-built plans received shall be provided to SCRRA.

Utility protections and rearrangement work shall be shown on the design drawings. A designation that utility work will be performed “By Others” shall be shown where applicable. The GEC shall include appropriate language in the contract documents (technical specifications and bid schedule) to describe utility coordination work required by the contractor.

5.8.2 Fiber Optic Lines

There are fiber optic lines located along the Right-of-Way under special easement agreements. These agreements usually have requirements related to relocation and responsible party for the cost of relocation. Relocations of these lines require that the pertinent fiber optic easement agreement be identified and studied to determine the responsibility for the relocation costs. Fiber optic line relocation should appear on the project schedule prepared by the GEC to determine which are on the critical path. The cost of the relocation, if it is a part of the project, will be included on the project management sheet by the GEC Project Manager. Assistance and identification of these items and terms of agreements may be obtained through coordination with SCRRA ROW Encroachments Administrator.

5.8.3 Third Party Permits

The GEC shall identify all third party permits that may be required to complete the project. The GEC will prepare and submit permits, plans, specifications, details, and other applicable documents to appropriate local statutory authority for initial review during earlier design progress submittals, preferably after Interim (60% Design) design submittal. Permits that can be obtained prior to award of the construction project shall be secured by the GEC in coordination with the SCRRA PM in advance of IFB. The GEC shall prepare a list of all permits for which the contractor will be responsible for incorporation by SCRRA into the Special Conditions.

Permit requirements shall be presented and tracked on **SCRRA Form DPM-21: Permit Matrix**. This matrix shall be provided with each design submittal. As a railroad property that supports interstate commerce, SCRRA is exempted from some local permitting requirements; the GEC shall request and obtain confirmation by the SCRRA PM of the applicability of all potential permits listed on the Permit Matrix.

Permits typically required for Metrolink projects are discussed below. All permit applications shall be prepared and submitted by the GEC by completion of Pre-Final

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Design. See Chapter 6. Permits not specifically addressed below may be required according to the nature and location of the project.

Projects funded by Caltrans may require disabled access review by the Department of General Services (Office of State Architect) and other State approvals before a construction contract is awarded. The GEC shall track the status of a State Architect review until final approval is received.

Environmental evaluations and permits commonly required for railroad work are discussed in SCRRA's Design Criteria Manual. Table 18-1 located at the end of Chapter 18 of this Manual lists typical SCRRA work and potential permits associated with that work.

California Public Utilities Commission (CPUC)

Application to the CPUC is required to construct or modify at-grade or grade-separated highway and railroad crossings. The GEC shall identify the type of CPUC permit required under CPUC rules of practice and procedures, which will be confirmed by the SCRRA Crossings and Encroachments Division. Pedestrian grade crossings shall be considered to be subject to the same requirements as vehicular crossings. The CPUC application process is illustrated in Figure 5-1 (see page 46). Refer to SCRRA's Grade Crossing Design Guidelines that includes SCRRA policy, regulatory responsibility, design criteria, crossing approval procedures, and design and construction requirements. The guidelines are available on SCRRA's website.

The SCRRA Crossings and Encroachments Division will act as the single point of contact with the CPUC. The GEC shall contact the designated SCRRA Crossings and Encroachments Representative and the SCRRA PM to set up on-site diagnostic meetings with CPUC, city/County representative, operating railroads, and SCRRA Signals representative as required during the permit process. The site diagnostic meeting shall be held after completion of Interim Design.

Applications to the CPUC will be prepared and submitted by the SCRRA Crossings and Encroachments Division; however, the GEC shall prepare grade crossing exhibits to accompany these applications. Because permit applications and legal descriptions (if applicable) require action by CPUC, lead times for approval may be ninety (90) days or more. The GEC shall complete and submit to SCRRA the CPUC grade crossing exhibits with the Interim Design submittal, or sufficiently early in the design process to allow for submission and approval prior to construction contract issue for bid.

The GEC shall track the status of CPUC applications until their final approval. Refer to Section 5.4.

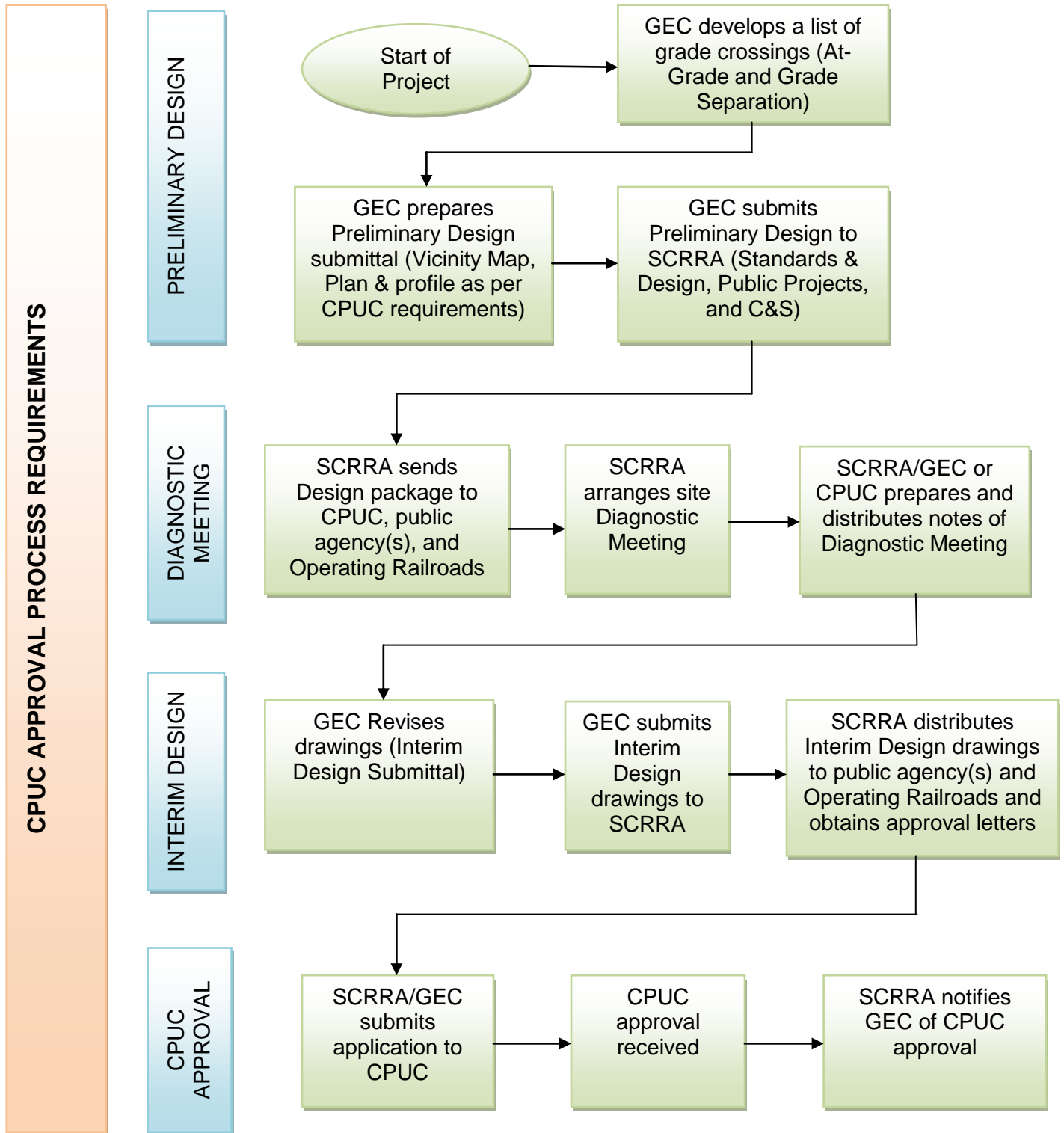
Temporary Traffic Controls

Safe and effective traffic control zones near a highway-rail grade crossing are an integral part of every project from planning through design and construction. The GEC will prepare and submit temporary traffic control plans, consistent with SCRRA temporary traffic control guidelines, for all activities located within or in the vicinity of highway-rail grade crossings to SCRRA and appropriate local statutory authority for initial review. The GEC is not responsible to obtain the actual permit.



FIGURE 5-1

CPUC Application Process





Clean Water Act Permits

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained. EPA's NPDES permit program controls discharges. CWA have many sections on waters. The following are the sections most important for this manual:

- Section 309 – Federal Enforcement Authority
- Section 308 – Inspection, Monitoring, Entry
- Section 401 – State Certification of Water Quality
- Section 402 – National Pollutant Discharge Elimination System
- Section 403 – Ocean Discharge Criteria
- Section 404 – Establishes a program to regulate the discharge of dredged and fills material into waters of the United States, including wetlands.

U. S. EPA develops and interprets policy, guidance, and environmental criteria used in evaluating permit applications; determines scope of geographic jurisdiction and applicability of exemptions; approves and oversees State and Tribal assumptions; reviews and comments on individual permit applications; has authority to prohibit, deny, or restrict the use of any defined area as a disposal site; can elevate specific cases; and enforces Section 404 provisions.

U. S. Army Corps of Engineers administers day-to-day program, including individual and general permit decisions; conducts or verifies jurisdictional determinations; develops policy and guidance; and enforces Section 404 provisions.

U. S. Fish and Wildlife Service and National Marine Fisheries Service evaluates impacts on fish and wildlife of all new federal projects and federally permitted projects, including projects subject to the requirements of Section 404, and elevates specific cases or policy issues pursuant to Section 404.

Pursuant to Section 401 of the CWA, projects that require an ACOE permit for discharge of dredge or fill material must obtain water quality certification or waiver that confirms a project complies with state water quality standards before the ACO permit is valid.

All CWA permit applications shall be prepared and submitted by the GEC.

The National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment and it provides a process for implementing these goals with the federal agencies. The NEPA process consists of an evaluation of the environmental effects of a federal undertaking. There are three levels of analysis depending on whether or not an undertaking could significantly affect the environment. These three levels include: categorical exclusion determination; preparation of an environmental assessment/finding of no significant impact; and preparation of an environmental impact statement.



The GEC shall perform the three levels of analyses and shall prepare and submit permit applications, along with appropriate documentation, to secure these permits in advance of IFB when necessary.

California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) was enacted in 1970 as a system of checks and balances for land-use development and management decisions in California. California's environmental review is rigorous and it extends beyond federal statutes established under the National Environmental Policy Act (NEPA).

In California, the development permit process is coordinated with the environmental review process under CEQA. Every development project which is not exempt from CEQA must be analyzed by the lead agency to determine the potential environmental effects of the project. This analysis is required by state law. It must be completed within specified time periods which are concurrent with the time periods in which an agency is required to approve or deny the project.

A lead agency is the California government agency with principal responsibility for carrying out a project, and therefore is principally responsible for preparing a CEQA document. The lead agency determines whether a negative declaration or environmental impact report will be prepared.

SCRRRA is the lead agency for all Metrolink projects under CEQA. Metrolink projects, which institute or increase passenger or commuter services on rail lines or high-occupancy vehicle lanes already in use, including the modernization of existing stations and parking facilities, are statutorily exempt from the reporting requirements of CEQA under Public Resources Code Section 21080(b)(11) and CEQA Guideline Section 15275(a). SCRRRA filed a Notice of Exemption for construction and operation of a commuter rail system on September 18, 1991. The GEC shall determine if a project is entirely located in the rail Right-of-Way. If projects are not located in Right-of-Way, CEQA requirements shall be followed in clearing the project from state and federal agencies.

The California Department of Fish and Game (DFG) play various roles under the CEQA process. The DFG has jurisdiction over conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations.

The GEC shall notify the California Department of Fish and Game of potential diversion, obstruction, or other alteration of natural flow, or of bed, channel, or bank of any river, stream, or lake (including wetlands). Permitting requirements are described in Section 1601 of the California Fish and Game Code.

The GEC shall perform the analyses required (including delineation of impacts and biology survey) and shall prepare and submit permit applications, along with appropriate documentation, to secure these permits in advance of IFB.

National Pollution Discharge Emission System (NPDES)

Water pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into the waters. Industrial, municipal,



and other facilities must obtain permits if their discharges go directly to surface waters. The primary method to control stormwater discharges is the use of Best Management Practices (BMPs). The California State Water Resources Control Board (CASWRCB) is responsible for administering the State's stormwater management program. Municipalities and counties must comply with the requirements established by their regional boards. Many large municipalities have stormwater programs of their own with additional treatment requirements. The counties of Los Angeles, Ventura, Orange, Riverside, and San Bernardino are required to develop and implement a SWMP with the goal of reduction pollutants from the stormwater and urban runoffs.

For projects with a disturbed area of more than one acre, the GEC shall prepare draft permit documents for construction-related activities as required by NPDES regulations. These documents shall include Notice of Intent and draft Storm Water Pollution Prevention Plan (SWPPP). The GEC shall coordinate as required with the appropriate regional office of the California Water Quality Control Board to identify local requirements for erosion or sediment control. The GEC shall prepare design drawings and technical specifications that define the location and nature of proposed erosion control measures in accordance with NPDES and Regional Water Quality Control Board requirements.

The GEC shall consult with SCRRA if the GEC considers that a permit related to industrial activities may be required.

The GEC, if required, shall prepare, submit and obtain approval of a Water Quality Management Plan (WQMP) in order to identify specific Best Management Practices (BMPs) that will be used onsite to control and treat project runoff and reduce pollution in storm water discharge for any grading permit or building permit for a project as required by the local agencies.

City and County Permits

To safeguard the public's safety and welfare, city and/or county regulates the design, construction, quality of materials, use, occupancy, location and maintenance of all dwellings, structures, certain equipment, and grading. Cities and counties also require permits for construction of any property, street, sidewalks, curbs, gutters, pavement, grading, sewers, storm drains, bridges, retaining walls, trees, culverts, traffic signals, and street lights.

The GEC shall obtain building, plumbing, electrical, mechanical, excavation, grading, drainage, extensive public works improvements, and sewer permits as required by city and county codes and requirements.

5.8.4 Public Agency Interaction

The GEC shall coordinate with the SCRRA PM regarding any meetings, planned or proposed, with public agencies. SCRRA shall be provided with ample opportunity to attend all meetings. SCRRA may, at its discretion, assume responsibility and retain authority for coordinating directly with any or all public agencies.

Copies of all correspondence to and from public agencies, meeting minutes, and other documents received from public agencies, shall be provided to SCRRA.

The GEC shall not meet with the public officials without direction of SCRRA.



5.8.5 Interaction with Other Railroads

All interactions with private railroads will be led by SCRRA. The GEC shall coordinate any proposed meetings or correspondence with private railroads through the SCRRA PM.

5.8.6 Public Relations

All public relations activities will be led by SCRRA. The GEC shall refer any public inquiries regarding the project to the SCRRA PM. The GEC may be requested by SCRRA to prepare exhibits for public presentation or to participate in public meetings.

As part of the interim design scope, the GEC shall prepare a report of design and construction issues relevant to local agencies and communities. The report shall address such issues as: anticipated night work, construction noise, traffic closures, restrictions to business access, removal or relocation of fencing or landscaping, etc.



6.0 DESIGN SUBMITTALS, DELIVERABLES AND REVIEWS

The design process for each project will generally involve developing a Project Concept with its specific Design Criteria, preparation of Preliminary, Interim and Pre-Final Design documents for review by SCRRA, and development of Final and Camera-Ready Bid Documents consisting of drawings, specifications and cost estimates. Each submittal shall clearly identify its milestone progress stage.

6.1 Transmittal of Submittals

Progress submittals shall be transmitted to SCRRA so that they are received by the CTO Project Manager on or before the date indicated in the approved CTO scope of work. Multiple copies of submittals may be required. The SCRRA PM will determine the submittal distribution procedure. The CTO Project Manager will review the submittal for conformance with SCRRA requirements and, if approved, will distribute submittal documents to appropriate reviewers. Alternatively, the GEC may be required to distribute the submittal to all recipients on the SCRRA PM provided distribution list. Refer to Section 6.2 Design Review.

A transmittal letter shall be prepared to accompany the submittal documents, according to the format set forth in **SCRRA Form DPM-22: Progress Submittal Transmittal Letter**. The letter shall reference the GEC contract number, CTO number, project name, and SCRRA project file number. The transmittal letter shall list the quantity, nature (level of completion or type of report), and format (hardcopy or electronic) of documents submitted. The transmittal letter shall also include a list of documents, included in the submittal, that have been used to track, monitor, and report design progress, as required by this Design Procedure Manual, including:

- Design Submittal Report
- QA Checklists (refer to SCRRA DQAP)
- Design Interface Matrix
- Design Review Comments
- Utilities Matrix
- Permit Matrix

6.2 Design Submittal Report

Each design submittal shall be accompanied by a design submittal report. This report shall briefly describe the major advancements in the design from the prior submittal. Significant changes to Drawings, Specifications, and Engineer's Estimate shall be described and explained. Special design considerations to SCRRA or other relevant design standards shall be identified as well as relevant permit and outside agency review comments. Significant design developments should be identified with justified recommendations where appropriate. Outstanding and unresolved issues, as well as special design considerations to the progress requirements, shall be identified; a plan for the resolution and advancement of these issues shall also be presented. A schedule of remaining design tasks shall be presented. For Interim, Pre-Final, and Camera-Ready submittals, the design submittal report shall also define the estimated construction

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duration. Finally, the submittal report shall address salient aspects of the QA/QC process that have been enacted as well as a general acknowledgement that the QA/QC process is being adequately implemented.

6.3 Milestone Submittals

The GEC shall develop detailed work scope, cost estimates, schedule and work plan required for preparing and completing the design elements, the level of design effort, and the engineering submittal required at each stage of design as described in the **SCRRA Form DPM-34: Design Scope Matrix and SCRRA Form DPM-35: Design Submittal Matrix**. The GEC will prepare the detailed design as per these matrices.

6.3.1 Project Concept & Design Criteria (5% Design)

This stage of design will require approximately 5% of the overall design effort.

The purpose of the concept submittal is:

- To compare alternative design solutions.
- To establish a program cost estimate and/or determine the appropriateness of the established budget.
- To confirm the correctness and completeness of the project objectives.
- To convey the project to transportation and other interested groups.
- To assure SCRRA Director-level approval of project concept.

During the concept design phase, the GEC shall perform the following work:

- Perform a field inspection to identify and measure critical clearances and evaluate existing conditions, including track alignment, evidence of utilities, identification and location of structures and railroad signal equipment, and identify potential Right-of-Way conflicts.
- Develop conceptual alignments and layouts utilizing digital photography (if available) enhanced to identifiable scale, with alignments in color. New alignments and structures, along with critical measurements, shall be identified.
- Obtain county assessor maps and railroad Right-of-Way maps to identify railroad property limits.
- Prepare Right-of-Way base maps for limits of the project.
- Contact Underground Service Alert (USA, or DigAlert) to identify utilities that may be affected by the project; begin assembling utility information using the SCRRA Utilities Matrix.
- Develop conceptual cost estimate.
- Single line signal design drawing identifying track configuration, signals and switches.
- Conceptual overview of alternative signal configuration.
- Prepare an SCRRA Project Definition Report to define the objective, major elements, anticipated schedule, and projected cost of the work.

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Deliverables shall include, but shall not be limited to:

- Design Submittal Report, including a list of reports and analyses that should be prepared as a part of preliminary design.
- Project Definition Report (minimum 5 color copies). Refer to Section 5.2.2.
- **SCRRA Form DPM-23: Project Concept Checklist.**

6.3.2 Preliminary Design (30% Design)

The Preliminary Design Phase will commence after the SCRRA Director of Engineering and Construction approves the Project Concept and design criteria including any special design considerations. At times, tasks will commence based on SCRRA developed concept. This phase of design will require about 30% of the overall effort, and on the average the engineering/technical work will be advanced to 30% of final design. The design criteria/special design considerations will continue to be refined progressively as the design advances.

The purpose of this design phase is to:

- Describe project objectives and goals based on engineering analysis.
- Identify all stakeholders and incorporate their inputs towards realizing the project.
- Determine the constructability and functional feasibility of the project.
- Advance the design to a level where potential impacts on the environment, utility lines and drainage can be identified, quantified and solutions can be explored.
- Prepare preliminary Right-of-Way requirements maps.
- Identify initial operating impacts.
- Quantify potential impacts on local traffic circulation and mobility during construction.
- Identify potential adverse environmental impacts that must be mitigated.
- Identify possible construction staging and contractor staging areas.
- Prepare a preliminary engineer's estimate, including preliminary SCRRA materials list so that procurement coordination may begin.
- Develop vital and non-vital software logic as needed for applications involved.
- Develop preliminary system-wide communication backbone that may be fiber-optic or communication based.
- Preliminary recommendations on current or new signal and communication technologies.

The GEC shall conduct project field work, work through SCRRA to initiate contacts with private and government agencies, individuals, and civic groups, and contact utility companies, as required, to ensure that the design job progresses smoothly and to avoid unexpected and costly omissions that would severely impact the project during the latter stages of design.

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Deliverables include:

Drawings

- Title sheet, including project location
- Index of drawings
- Preliminary typical sections
- Track plan and profile sheets, including tabular presentation of curve data (track no., curve no., degree of curve, overall length, superelevation, spiral length, passenger speed and unbalance, freight speed)
- Basemapping, to include Right-of-Way limits, as obtained from railroad Right-of-Way maps or purchase and sale agreements provided by SCRRA, and from parcel maps obtained from the County Assessor's office
- Cross-sections at critical locations
- Type/size/location drawings for structures
- Plan for station designs
- Right-of-Way base maps for the construction limits
- Preliminary signal circuit designs
- Preliminary discussion of alternatives and scaled layout of preferred alternative
- Preliminary aspect charts

Specifications

- List of standard and special specifications.
- List of standard and reference drawings.

Estimate

- Preliminary Project Cost Estimate

Exhibits, Calculations and Reports

- Design Submittal Report, including a summary of preliminary Right-of-Way issues, including potential acquisitions, encroachments, or easements, and describing any discrepancies among available Right-of-Way documents
- Track schematic, color-coded, illustrating existing and proposed conditions within project limits (11" high strip map)
- Preliminary Utility Matrix
- Preliminary Traffic Impact Report (if required)
- Preliminary Geotechnical Report
- Preliminary Permit Matrix
- Design Interface Matrix
- Design Review Comments form, with responses
- Preliminary (using SCRRA part numbers) material list for all added and new equipment
- Signal design basis report describing the reasons for the project and operational benefits
- **SCRRA Form DPM-24: Preliminary Design Checklist.**



6.3.3 Interim Design (60% Design)

The Interim design may proceed in advance of SCRRA review comments on the Preliminary Design submittal with the approval of the SCRRA PM and based on the approved CTO. This design phase will require an additional 30% of the overall design effort to bring the design level to 60% design completion.

The Interim Design submittal will include but not be limited to the following:

- Engineered alignments, based on up to date topographic information.
- Drainage layout and design, including Stormwater Management (SWM) facilities.
- Detailed mitigation measures for traffic related issues, if required.
- Coordination and preparation of temporary traffic control plans.
- Additional geotechnical investigations for final design purposes, if requested.
- Photometric calculations to support appropriate light levels as required by SCRRA and other agencies requirements.
- Developing landscaping details, where applicable.
- Identification of all permits requirements.
- Critical elevations, offsets and dimensions.
- Summary of potential public relations issues.
- Track layout with turnout details, including point of switch, headblock ties, frogs, and locations of insulated joints for all turnouts; except lateral turnouts of a single diverging track, standard crossover of two parallel tracks, and above-mentioned turnouts and crossovers where there is no roadway within 50 feet longitudinally or 25 feet laterally of the point of switch. This track layout with turnout details does not need to be a part of the final design package.
- Prepare Right-of-Way requirements map for project limits.
- Interim recommendations on current or new signal and communication technologies.
- Evaluation and modifications to existing adjacent highway-rail grade crossings and wayside signal locations circuit plan designs and equipment within affected approaches.
- Interim signal facility and insulated joint locations.
- Review and recommendation on maintainability, safety, operational, signal visibility, communications control system equipment, and reliability enhancements.
- Work with the electrical utility company(s) to identify all required AC feed locations to ensure availability at various sites and to secure basic technical information and agreements for the designs to proceed.
- Quiet Zone signal system in accordance with FRA requirements.
- Interim radio system design consistent with FCC regulations providing complete coverage of the operating area. The task will include a coverage analysis indicating the adequacy of existing receiver/transmitter location and/or determining the need for additional locations.
- Develop interim vital and non-vital software logic as needed for applications involved.
- Interim system-wide communication backbone that may be fiber-optic or communication based.

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The purpose of this design submittal is to:

- Confirm the designer's approach to the major engineering and functional issues.
- Confirm adequate advancement of the design.
- Confirm the adequacy program cost estimate and budgets or funding sources.
- Confirm that all affected agencies and utilities companies have agreed to the work.
- Identify preliminary signal facility layouts (by SCRRA signal GEC).
- Define expected construction duration.
- Participate in diagnostic reviews of crossings that will be modified, at meeting(s) set up by Crossings and Encroachments engineer with affected local and regulatory agencies.
- Confirm practical locations for insulated joints and headblocks, keeping in mind the walkway, drainage, roadway, and interference from nearby tracks.

This submittal may be omitted on tasks at the discretion of the CTO Project Manager and/or SCRRA Project Manager. In that case, the Pre-Final Design will serve as an Interim Design submittal.

The submittal for this phase of design will follow the format for Final submittal, except that the design is not advanced to 100% level. In general, all sheets to be included in the final design submittal shall be included at the interim submittal to demonstrate the work complete and the work remaining. The Track Signal Designer (SCRRA's Signal Designer) will utilize the approved Interim Design for all of its work. Review comments from the Preliminary Design will be incorporated during the progress of the Interim Design work.

Deliverables include:

Drawings

- Title Sheet with location map
- Index of Drawings
- General Notes
- Survey Control
- Track Schematic
- Track typical sections with station limits
- Photometric light levels
- Track plan and profile sheets, including tabular presentation of curve data (track no., curve no., degree of curve, overall length, superelevation, spiral length, passenger speed and unbalance, freight speed)
- Track geometry tables and sheets
- Track layouts showing the complete graphical turnout details to scale over the centerline of the track, including point of switch, headblock ties, frogs, and locations of insulated joints for all turnouts; except lateral turnouts of a single diverging track, standard crossover of two parallel tracks, and above-mentioned turnouts and crossovers where there is no roadway within 50 feet longitudinally or 25 feet laterally of the point of switch.

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- Earthwork cross-sections at 50 ft. intervals showing utilities at the right elevations¹
- Drainage calculations and layouts, including SWM systems
- Composite utility or utility rearrangement plans
- Grading, erosion and sediment control plans
- Grade crossing plans
- Signing and striping plans
- Right-of-Way mapping showing existing Right-of-Way and any additional land required
- Preliminary Maintenance of Traffic (Traffic Control) Plans, including access roads if required
- Preliminary Construction Phasing Plans
- Preliminary landscape drawings
- Electrical and Mechanical Drawings associated with system control
- Temporary traffic control plans
- Interim aspect charts and final scaled layout
- Interim circuit designs and plans. Track circuit fouling protection, bonding, and locations of insulated joints on the circuit plans
- Interim advanced standard crossing protection layouts for all the crossings on the corridor
- Interim design for upgrading power switch machines to high voltage, high speed machines, when necessary
- Fiber splice, fiber distribution panel connections, fiber node detail designs when necessary
- VHLC rack local control panel, relays, batteries, rectifier and miscellaneous equipment redesign for control points, when necessary
- Interim design of enclosures location avoiding underground facilities and minimizing vibration impacts by operational movements, while ensuring access and security
- Review for single switch indications on crossovers to allow for track and time on one track at a time during inspection and testing
- Complete (using SCRRA part numbers) material list for all added and new equipment
- Interim design of signal AC power system. This could include a system-wide redundant AC power supply, individual feeds required at each signal case, or a combination of both systems
- Interim design of new underground cables

Specifications

- Index of Specifications
- Draft Scope of Work and Hours of Operation Specifications
- List of all Standard Specifications and preliminary write up for Project-Specific Specifications

¹ For projects where no new earthwork is required (e.g. track rehabilitation), earthwork cross-sections need not be created or submitted.

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- Project-Specific Specifications are complete in draft form

Estimate

- Draft Engineer's Estimate
- Quantity Estimate for Owner-Provided Materials

Exhibits, Reports and Calculations

- Design Submittal Report
- Track schematic, color-coded, illustrating existing and proposed conditions within project limits (11" high strip map)
- Final drainage calculations
- Final Geotechnical Report
- Final Traffic Impact Report
- Complete Utility Matrix
- Complete Permit Matrix (all permits identified)
- CPUC exhibits
- Design Interface Matrix
- Design Review Comments form, with responses
- **SCRRA Form DPM-25: Interim Design Checklist.**

6.3.4 Pre-Final Design (90% Design)

The pre-final design will not commence until the client provides the GEC with Interim Design review comments and approval to proceed to 100% design unless otherwise authorized by the SCRRA Project Manager. This phase of design will require that the design be advanced to at least 90% of the overall design effort. Some components of the design may be progressed to 100% design.

After the GEC has received SCRRA approval of the Pre-Final Design, the GEC and its subconsultants shall at no additional cost to SCRRA, be responsible for promptly revising and correcting all post Pre-Final Design Submittals, plus plans, specifications and contract documents which contain errors, omissions, deficiencies, incomplete, poor quality or poorly coordinated work. This requirement for the GEC to promptly revise and correct errors, omissions, deficiencies, incomplete, poor quality or poorly coordinated work at no cost to SCRRA shall extend from the Pre-Final Design of the project through the remaining design, construction and project close-out phases.

The purpose of the Pre-Final Design submittal is:

- To confirm adequate advancement and quality of the design and design documents.
- To finalize locations of signal facilities and insulated joints.
- To identify all required Right-of-Way impacts (including temporary easements, acquisitions, and lease revisions).
- To identify all required utility protections or relocations.
- To obtain required approvals from regulatory agencies.
- To refine the project schedule.

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Deliverables are similar to the Interim Design submittal except that the design documents are advanced to 90% or higher design level, specifically:

- Top and toe of slope is identified
- Slope treatments are engineered
- Utility conflicts are engineered
- Culvert and utility crossing extensions are engineered
- Agreements are in place with agencies and utility companies
- Permit applications are complete
- Record of survey if there are property acquisitions
- **SCRRA Form DPM-26: Pre-Final Design Checklist**

6.3.5 Final Design (100% Design)

The final design will commence after the CTO Project Manager gives instructions and signed authorization to proceed to 100% design. Review comments from the 90% submittal will be incorporated during the progress of work to 100%.

The purpose of the Pre-Final Design submittal is:

- To confirm quality, completeness and adequacy of design for issuance for competitive bidding.

This phase of design will require that the final design deliverables be ready for bidding and construction. Deliverables shall comprise complete plans, specifications and shall include:

- Final Plans.
- Final Project-Specific Specifications
- Final Project Cost Estimate
- Schedule of Quantities and Prices
- Quantities take-off calculations and related drawings
- Track schematic, color-coded, illustrating existing and proposed conditions within project limits (11" high strip map)
- Final circuit designs and plans. Track circuit fouling protection, bonding, and locations of insulated joints on the circuit plans
- Complete (using SCRRA part numbers) material list for all added and new equipment

As well as:

- Design Submittal Report.
- Design Interface Matrix.
- Final Utility Matrix.
- Final Permits Matrix.
- Design Review Comments form, with responses.
- **SCRRA Form DPM-27: Final Design Checklist.**



6.3.6 Camera-Ready

The purpose of the Camera-Ready submittal is:

- To allow SCRRA to issue documents for competitive bidding.

Deliverables shall be suitable for issue as Invitation for Bids (IFB) and will include:

- Final plans, specifications and estimates (hardcopy plans and specifications affixed with seal of licensed engineer in responsible charge of the work)
- Schedule of Quantities and Prices
- CD containing above documents in native electronic format (i.e. MS Word, MS Excel, MicroStation)
- Engineering calculations
- Project Cost Estimate back-up
- Design Submittal Report
- Design Review Comments form, with responses
- **SCRRA Form DPM-28: Camera-Ready Checklist**

CTO Project Manager will transmit all pertinent information to Senior Contract Administrator according to the format set forth in **SCRRA Form DPM-29: Bidding Documents Checklist**. CTO Project Manager will complete and transmit **SCRRA Form DPM-30: Liquidated Damages Calculations Form** as part of the submittal to Senior Contract Administrator. The above information should be provided well in advance of the Invitation for Bids.

6.3.7 Post-Issuance Deliverables (Addenda)

Once submitted in camera-ready format, the plans, specifications, and bid form shall be considered controlled documents. Changes to drawings shall be called out in accordance with the requirements of the **SCRRA CADD Drafting Standards, Guidelines, and Criteria**.

Any revisions to the IFB documents resulting bidder questions or any other reason must follow the following procedure:

- Changes to the IFB documents that have been sealed and signed by a licensed engineer shall be made by the original preparer of that document.
- No other body except the GEC or SCRRA may initiate changes to documents.
- The GEC shall notify SCRRA in writing of any proposed changes to the documents. Changes to documents shall be made by the GEC only after review and approval by SCRRA.
- SCRRA will notify the GEC in writing of SCRRA-proposed changes to the documents.
- SCRRA will assign and provide to the GEC an Addendum number and issue date for use in preparing revised documents.
- Changes to drawings shall be made and annotated in accordance with the **SCRRA CADD Drafting Standards, Guidelines, and Criteria**.

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- Changes to specifications or bid forms shall be made and annotated as follows: Deletions to be indicated by strike-out. Additions to be indicated by boldface type. Changes to be marked with a vertical bar in each margin annotated with the appropriate change reference (e.g., A1 for Addendum 1). Footers to be modified to reflect addendum number and issue date. Refer to sample documents in Appendix B.

6.3.8 Conformed Documents

After award of the contract by SCRRA, the GEC shall prepare a consolidated set of contract documents, called the Conformed Set. The purpose of the Conformed submittal is:

- To prepare a single set of contract documents to be issued for construction.

The Conformed Set shall incorporate the latest revisions made during the bid period by means of addenda into the IFB documents. Refer to SCRRA CADD Drafting Standards, Guidelines and Criteria for conforming procedures. Headers and footers shall be revised to reflect contract issuance for construction. Refer to Section 4.8.5, sample documents in Appendix B, and the **SCRRA CADD Drafting Standards, Guidelines, and Criteria**.

Deliverables shall be suitable for issuance for construction and shall include:

- Conformed plans and specifications (hardcopy plans and specifications affixed with seal of licensed engineer in responsible charge of the work)
- Bid form, incorporating actual prices of lowest responsive and responsible bidder to whom contract has been awarded
- CD containing above documents in native electronic format (i.e. MS Word, MS Excel, MicroStation)
- Revised engineering calculations, if any

6.4 Design Submittal Reviews**6.4.1 General**

SCRRA will review design submittals for progress, adherence to scope and general correctness. It is the sole responsibility of the GEC to prepare adequately designed and constructible project bid packages, which meet all the applicable codes of practices and the established design criteria for the project within the agreed time frame.

The review comments from SCRRA and other agencies shall not exempt the GEC from assuming full responsibility for the quality and accuracy of the design product.

Design review meetings will be held between the SCRRA and GEC as required. The GEC will be responsible for preparation of minutes of meetings and including a list of action items.

6.4.2 Review Period

A period of two weeks shall be provided in the schedule for SCRRA review at each of the following design phases:

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- Project Concept and Design Criteria (5% Design)
- Preliminary Design (30% Design)
- Interim Design (60% Design)
- Pre-Final Design (90% Design)
- Final Design (100% Design)

SCRRA will notify the GEC if additional time is required for review. The project schedule will be revised accordingly.

The GEC shall not proceed with the next level of design phase unless specific approval is given by SCRRA to commence work.

6.4.3 Concurrent Reviews by SCRRA and Other Agencies

During the progress of the design work, outside agencies and civic groups in addition to SCRRA may review the design document as necessary. CTO Project Manager will be responsible for providing copies of the design document and collecting review comments from all interested parties. The GEC shall provide adequate copies as requested by SCRRA for distribution, based on the distribution list developed by the CTO Project Manager for each submittal.

Typical Distribution:

Internal SCRRA departments/divisions (refer to the SCRRA Project Management Manual):

- Capital Planning and Program Management
 1. Engineering & Construction
 - a. Civil Engineering
 - b. Communications and Signal (C&S) Engineering
 2. Capital Program Management
 - a. Track and Structures Rehabilitation
 - b. C&S Rehabilitation
 3. Strategic Sourcing, Contracts and Supply
- Commuter Rail Operations
 1. System Maintenance
 - a. Track Maintenance
 - b. Structures
 - c. Signal and Communications Maintenance
 2. Operations

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- a. Security
 3. Equipment
 4. Rail Corridor Crossings and Encroachments
- System Safety
 - Customer Engagement

Outside agencies:

- Federal Railroad Administration (FRA)
For projects which are funded by the Department of Transportation
- California Department of Transportation (Caltrans)
For projects which impact its facilities or Right-of-Way
- Local Municipalities, Public and Civic Groups
For projects that may pass through their jurisdictions
- California Public Utilities Commission (CPUC) for grade crossing improvements or alterations

6.4.4 SCRRA Reviews

SCRRA Departmental/Division reviews are necessary to develop well-coordinated projects. Each review shall consider the overall project submittal. The SCRRA Project Manager will identify appropriate reviewers and coordinate reviews of each design submittal (see SCRRA Project Management Manual). At each submittal stage, the CTO Project Manager will solicit and receive the concurrence of appropriate SCRRA directors and division managers that:

- The design solutions developed are consistent with the project performance criteria relative to his or her area of oversight;
- The design solutions developed are satisfactorily defined relative to the submittal stage;
- All previous review comments have been satisfactorily addressed.

Specific division emphasis is presented below:

Project Manager

The CTO Project Manager will review the submittal for overall conformance to the project scope and to the progress requirements set forth in the SCRRA Design Procedures Manual. Additionally the CTO Project Manager will review the submittal for conformance with the SCRRA Engineering Standards, Design Criteria, Standard Specifications, CADD Standards, and relevant technical codes and regulations.

Civil Design

The Assistant Director, Standards and Design will review the submittal for compliance with CTO scope and budget and with SCRRA Engineering Standards, Design Criteria,

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Standard Specifications, CADD Standards, and relevant technical codes and regulations.

Communications and Signals (C&S)

The Assistant Director, Communications and Signal will review the submittal for compliance with CTO scope and budget and with SCRRA Engineering Standards, Design Criteria, Standard Specifications, CADD Standards, and relevant technical codes and regulations.

The Assistant Director, Communications and Signal will review the design submittal for its impact on the existing signal and communications system and proposed changes to the systems. Interfaces including: signal house, signal mast, and insulated joint locations; satisfactory clearances, and space for signal facilities; and track and structure impacts to the systems, conduit requirements, and constructability will be considered.

Stations

The Engineering and Construction Department will review the design submittal for conformance with the station design manual, station design criteria, ADA requirements, CPUC requirements as they relate to stations, impacts on existing facilities, and compatibility of proposed improvements with the operations. Additionally, the Stations Manager will consider maintenance of operations, public safety, constructability, agency and municipality DSA requirements and compliance thereto, and all other station related project impacts.

Construction

The Assistance Director, Capital Construction and Rehabilitation will review the submittal for general constructability and for bid suitability. The review will include evaluation of the provisions for contractor's access to the site. The bid quantities and unit prices will be reviewed for consistency with SCRRA project history. Additionally, the submittal will be reviewed for conformance with SCRRA Engineering Standards, Standard Specifications, Design Criteria, CADD Standards, and relevant codes and regulations.

Commuter Rail Operations

The Commuter Rail Operations Department will review the design submittal for overall impacts to Metrolink passenger and tenant freight operations. The impact of the proposed construction on operations will be evaluated in consideration of other operational impacts that collectively affect operations. Hours of service as presented in technical specifications will be confirmed.

System Maintenance

The System Maintenance Department will review the submittal for general design intent, maintainability of the constructed project, and conformance to applicable maintenance standards including the SCRRA maintenance instructions. The evaluation will consider CPUC walkway/clearance conformance as well as impacts on other affected third parties. The review will consider the track access, coordination requirements with ongoing and proposed maintenance activities, contractor lay down areas, maintenance responsibilities during the contract period, disposition of salvaged material, impact on

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proper drainage, safety impacts to ongoing operations and maintenance activities, and other local issues affecting the prosecution of the work. Safety and flagging requirements will be evaluated for adequacy.

Structures

The Assistant Director, T&S Maintenance and Rehabilitation and the Engineering and Construction Department will review the submittal for general design intent as it relates to the structures. The review will ensure that agency coordination requirements have been considered, that SCRRA design criteria and the freight operational requirements are being followed, and that maintenance and constructability of the structures and requirements for interface with track have been considered.

Crossings

The Assistant Director, Public Projects will consider agency and municipality Memorandum of Understanding requirements and impacts, and CPUC requirements.

Encroachments

The Assistant Director, Standards and Design will consider Right-of-Way impacts, utility impacts, and all other third party impacts of the proposed improvements.

Equipment

The Equipment Department will consider the conformance of the design submittal to the equipment requirements.

System Safety

The System Safety Department will review the Project Concept & Design Criteria (5% Design) and Preliminary Design (30% Design) for impacts to safety and security of the overall system. The Safety and Security will submit comments and suggestions related to homeland security requirements.

Contract Administration and Procurement

The Purchasing, Contracts, and Contract Compliance Department will consider the conformance of the design submittal to the standard contract format. Insurance requirements will be considered. Review will also ensure that procurement mechanisms incorporated are consistent with SCRRA policy and applicable statutes.

Customer Engagement

The Customer Engagement Department will consider passenger and public impacts from the project and the mitigation of these impacts either within the contract scope or as an adjunct activity to the contract.

6.4.5 Comment Format

Review comments from SCRRA and outside agencies will be identified by number, shown neatly on the applicable drawings and/or narrated on a separate sheet bearing discipline titles, drawing number, and project identification number. The SCRRA PM

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shall provide each reviewer with a copy of **SCRRA Form DPM-31: Design Review Comments** (preprinted with the project name and submittal level) for this purpose. Maximum use of the Design Review Comments form (as opposed to free-form notes or comments on plans) is encouraged; however, sketches on DPM-31 or on plans may be used to clarify comments.

The SCRRA Project Manager will coordinate internal SCRRA reviews from the various departments. In addition, all outside agencies comments will be compiled and then submitted to the GEC.

6.4.6 Comment, Response and Resolution

The GEC shall be responsible for addressing all review comments to the satisfaction of SCRRA and third party reviewing agencies. In case of a conflict of interest between SCRRA and outside agencies requirements, the GEC shall notify SCRRA and request a meeting to resolve the outstanding issues. All review comments, responses, and resolutions will be made in writing and copies will be provided to the GEC. The GEC shall report on comment resolution in its subsequent Design Submittal Report.

6.4.7 Errors and Omissions

Errors and/or omissions (E&O) is defined as mistakes, inaccuracies, or the failure to incorporate all items necessary into a set of design plans during the performance of engineering services for SCRRA by the GEC. If SCRRA determines that the GEC had made any E&O in the work product delivered to SCRRA under the term of the Contract, the GEC shall make all necessary revisions or corrections resulting from E&O without additional cost to SCRRA.

Upon discovery of an apparent E&O during preliminary engineering phase or during construction phase, the GEC shall be notified and provided as much information as available at that time. If the plan E&O is identified and can be corrected without delay and without additional cost to SCRRA, the GEC shall be responsible to correct E&O. SCRRA will ask the GEC to maintain separate cost accounting specific to their efforts to resolve the E&O. SCRRA want to ensure that SCRRA do not inadvertently pay the GEC to correct the E&O.

In any event an E&O is identified that may substantially increase a project's cost, (a substantial increase in project is defined as being more than \$25,000.00), and requires construction contract changes, and/or change orders, SCRRA will establish a team of at least three persons to investigate the plan E&O. The SCRRA Chief Project & Contract Compliance Officer reserves the right to immediately make corrections and negotiate contract modifications, and change orders in the event it is determined to be in the best interest of SCRRA or the public.

The SCRRA team will evaluate the factors that may have contributed to the E&O and evaluate impacts to the project associated with the identified factors. Impacts to the project may include but are limited to contract delay, additional contract cost, utility agreements modifications, construction work occurring out of sequence, and cost of work materials that SCRRA would have incurred even if the original design was correct. If the SCRRA team determines that the issue under consideration is a result of E&O by the GEC, the following process will be followed:

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- SCRRA will send written notification to the GEC with a request for payment;
- If the GEC agrees with SCRRA decision, the GEC shall forward payment to SCRRA within ten business days from the SCRRA notification and SCRRA shall notify the GEC in writing within five business days from the receipt of payment that the issue has been resolved; or
- If the GEC disagrees with SCRRA decision, the GEC shall respond in writing within ten business days from the SCRRA notification requesting next level of SCRRA team review;
- If the GEC does not respond within specified timeframe, the GEC's non-response shall be deemed by SCRRA as the GEC's acceptance of the decision. SCRRA will send a non-responsive letter to the GEC notifying them of the termination of the SCRRA team review process and the GEC's action or inaction resulted in admission of SCRRA decision;
- If the GEC refuses to accept responsibility, the matter shall be turned over to the SCRRA Legal Counsel for consideration of further action.



7.0 DESIGN SUPPORT DURING CONSTRUCTION (DSDC)

The GEC, as a part of their DSDC, shall attend construction meetings as required; establish communication channels and procedures with the Resident Engineer; advise the contractor on the interpretation of the drawings and specifications as required; and, if required, issue supplementary details and instructions during the construction period as requested by the Resident Engineer. The GEC will review submittals for general compliance with the Contract Documents.

7.1 Meetings

The GEC will attend weekly job meetings to assist the Resident Engineer on design related issues that may come up at the meeting. The GEC will also visit the job site before the weekly job meeting, to observe the progress of the construction and resolve construction difficulties, without removing the responsibility from the contractor or the Resident Engineer to become satisfied with the quality of the work.

The GEC will bring a copy of the project plans and specifications to each job meeting.

7.2 Requests for Information (RFI) Reviews

During the project, the contractor and subcontractors may have questions about various technical issues. The contractor may use the RFI form to submit formally such questions. The GEC may be requested by the Resident Engineer to provide written response to the RFI. The GEC will respond quickly, in writing, to such formally submitted questions, depending on the urgency of the request. The GEC must send such responses to the CTO Project Manager and/or the Resident Engineer.

At the contractor's request, the GEC may be required to interpret and render, sometimes in writing, decisions on the requirements of the contract documents; instruct the contractor or Resident Engineer and subcontractors on behalf of SCRRA and prepare supplementary drawings or instructions needed to accomplish the work of the contract documents; and help SCRRA resolve any disputes and claims that occur with the contractors.

7.3 Change Notices (CN) Reviews

The GEC will provide review of Change Notices submitted by the contractor for a proposed change to the Contract as requested by the Resident Engineer. The services under this CN will include the review of the cost and expense and/or other information furnished by the Contractor and as requested by the Resident Engineer.

7.4 Shop Drawing Reviews

Shop drawing review is a major control factor in the approval of construction work. Shop drawing review provides the GEC with the opportunity to carefully review the essential elements of the works. GEC will ensure that the shop drawings comply with the contract documents and are coordinated with associated items of work. The GEC, Resident Engineer, and the contractor shall collaboratively ensure that each

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submission is received early enough to allow review and approval before the work begins, and to accommodate construction progress.

The CTO Project Manager familiar with the work and other personnel responsible for associated items of design will review shop drawings. Shop drawings that the GEC reviews must bear its approval stamps.

The GEC should follow the guidelines below in reviewing shop drawings:

- Receive shop drawings and maintain its own Shop Drawing Log.
- Review shop drawings, take appropriate action, (use stamp) and return them to the Resident Engineer expeditiously.
- Verify that the lead designer of each major discipline actually checked their shop drawings in detail.
- Issue detailed or supplemental drawings as required.

7.5 Shop Inspections

The GEC will make travel arrangements, receive shop inspection details, witness shop fabrication process, witness specific tests and test documents, review QA/QC test documents for material acceptance.

7.6 Facility Acceptance, Start-up, and Personnel Training

The GEC will prepare and inspect "Punch List" items for completion/acceptance with Resident Engineer, provide facility start-up support as per CTO, and provide operations and maintenance personnel training assistance.

7.7 As-Built Drawings

The GEC will submit As-Built drawings (two hard copies and one electronic MicroStation file) to SCRRA as per contractor's submittal of marked up As-Built Drawings and as verified and approved by the Resident Engineer for the project.

7.8 Signal Testing

The GEC will provide HVLC software support during in-service testing of signal system. The GEC will provide possible track circuit modifications and insulated joint relocation/installation to maximize use of available test and inspection windows for SCRRA and FRA required inspection and testing. The GEC shall review As-Built drawings at completion of field work and in-service testing to ensure jointly agreed upon changes to original design during the project life have been properly incorporated and reflected on appropriate drawings. The GEC shall notify, in writing, SCRRA Manager, C&S Engineering of concurrence and approval of identified changes.



8.0 POSITIVE TRAIN CONTROL (PTC)

8.1 General

SCRRRA is implementing an interoperable PTC System on all of its line segments where passenger operations are conducted (as set forth in the Rail Safety Improvement Act of 2008 (RSIA08) and 49 CFR 236 Subpart I). The purpose of a PTC System is to prevent train-to-train collisions, over speed accidents, incursion into work zones, and movements through a misaligned switch by requiring automatic control systems to override mistakes by human operators. This PTC system will be designed and implemented to follow the standard and guidelines established by the Interoperable Train Control (ITC) Committee, which is composed of the four largest U.S. freight railroads - BNSF, CSX, NS, and UPRR. In addition to and concurrently with the implementation of the PTC System, SCRRRA is replacing its current computer-aided dispatch (CAD) system with a new system that includes both a primary and secondary redundant/backup system.

PTC is an overlay technology on existing reactive train control systems which would not prevent collisions under all circumstances. PTC involves robust, predictive technology that detects upcoming conditions and takes control of the train when needed.

PTC technical architecture comprises four key segments; Back Office, Communications, Locomotive, Wayside, and Maintenance of Way (MOW). The Back Office or Back Office Server (BOS) typically comprises a computer-aided dispatching system, and a PTC server and database storing information about tracks, train consists, work zones, and speed restrictions. The Back Office Server issues movement authorities to locomotives based on aspect information received from PTC-enabled Wayside signals and switches, location information received from trains, and work status from maintenance-of-way vehicles and personnel. PTC improves upon in-track transponder-based train positioning

The major hardware/software/firmware components of the PTC system are PTC Back Office Server System; On-Board System Components; Wayside Signal Systems; Communication Network Components; Network Management Systems; Communications; and Computer Aided Dispatching System. The PTC Back Office Server (BOS) system is the storehouse for the speed restriction, track geometry, and wayside signaling configuration database.

The GEC services will also include field validation, PTC data Model creation, update shape files, and verify train simulation module graphics.

8.2 Reportable Changes

Accurate and up-to-date reporting of field work activity, especially activity that result in changes in signal and track assets, Track Charts, Composite Maps, PTC database is important for safe railroad operations. The safe and efficient operation of the PTC System is dependent upon maintaining an accurate database of the SCRRRA System. The combined efforts of PTC and Engineering & Construction Department's office,



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field operation and maintenance, and GEC personnel will be crucial in providing safe environment during and after PTC implementation.

All field activity and changes in track assets have to be accurately reported. There are two types of changes; one is change of track and signal features that do not affect the PTC system and another change that effect on the PTC system. The changes that affect the PTC and the changes that do not affect the PTC system are summarized in **SCRRA Form DPM-36: PTC Critical Assets, and SCRRA Form DPM-37: PTC Non-Critical Assets.**

8.3 Timeline Requirements

Geographical data and conversion of data into correct format which can be understood by the PTC compiler for all PTC critical asset changes shall be reported 30 days prior to going into service.

8.4 PTC Change Management

SCRRA has set up a PTC Configuration & Change Management Process (CM) by which changes to the project are formally defined, evaluated and approved prior to implementation. A Change Management Process is used to ensure that every change identified is formally communicated, documented, reviewed, approved and implemented. The CM document summarizes the process, responsibility and tools necessary to collect critical and non-critical track and signal assets necessary for the safe operation of passenger and freight trains on the SCRRA system. The CM document covers both changes done as part maintenance activities or design and construction activities.

8.5 Reporting Process for Design and Construction

The process for the design and construction changes and reporting by GEC or Construction Management Consultant is shown within PTC E&C change Management Process Manual. The responsibility and documents necessary for the design and construction changes by GEC is graphically shown in **SCRRA Form DPM-38: PTC Design and Construction Change Reporting Process.**

All changes proposed for PTC Critical Assets as defined in the CM shall be reported in writing to SCRRA using the following documents:

- **SCRRA Form DPM-39: PTC Change Request Form**
- **SCRRA Form DPM-40: GEC Change Notification Checklist**
- SCRRA Engineering Standard No. B4UC

THE GEC shall submit 90% Design documents, including phasing plans and schedule along with the above documents. SCRRA will determine if the design or construction will affect the critical assets of SCRRA system. If the determination is made that the activity will affect the PTC, the GEC or Project Management Consultant



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will provide all the information necessary for the creation of the Subdiv file. After the approval by SCRRRA the work will be carried out as approved.

8.6 Reporting Process for Maintenance

Currently, SCRRRA field operation and maintenance personnel report any changes in the track and signal assets by completing necessary forms included in SCRRRA's Track Maintenance, Right-of-Way, and Structures, Engineering Instructions. In the past, it was not necessary to report all changes made in the field that were deemed not important. With the implementation of PTC system, it is now essential that field personnel provide accurate information of the changes in an expeditious manner to the appropriate offices. As part of the implementation of PTC system, most of the assets have been surveyed and given a reference point (latitude, longitude, elevation). Any new changes in the field must be reported with proper references to the appropriate responsible SCRRRA offices.

8.7 Surveying and Mapping

Field assets that are critical to PTC must be geo-located to a horizontal and vertical precision to provide the accuracy necessary to safely warn or stop a locomotive. The geographical Information System (GIS) PTC critical data, such as clear points, edge of roadway, switch points, signal locations, signal files, speed change locations, mile post signs must be mapped to account for entry onto and exit from PTC track.

The GEC will provide high-accuracy ground control for design level photogrammetry. Aerial mapping and photogrammetry shall meet all the requirements shown on SCRRRA Design Criteria Manual Section 20.0, Right-of-Way Mapping and Surveying.

Planimetric and topographical survey shall include: all railroad hardware, such as switches, signals, utility boxes, signs, etc.; all utility features, such as poles, manholes, utility boxes/vaults, culverts and fiber optic markers; and other basic planimetric features, such as roads, drains, buildings, parking lots.

The GEC will collect direct field data on the top of rail for all rails within the Metrolink right-of-way. All rail shots must be taken on high rail; on tangents, every 100-foot interval; on curves, every 50-foot interval; at turnouts, about nine shots are needed: at switch points (PS - 2 shots), at point of frog (PF - 3 shots), and at the center of the last long tie (LLT - 4 shots); turnout sizes should be measured and determined in the field, then noted in the point descriptions for switch point shots; all shots along turnouts should be taken on the common rails.

8.8 PTC Database Conversion

After mapping is completed, the data obtained from mapping must be converted to PTC data model for use onboard the locomotives in a Subdiv file. PTC data model will include the following:

- Best-fit track alignment with plan and profile
- Track centerline points

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- Track segments. The track segment will include mile post and mile post helpers, PTC limits for each segments, speed limits and restrictions, and grade crossings
- Group points per data model definition
- Node locations, type and relations
- Location of switch and clear points
- Signal site device and equipment WIU
- WIU status library and signal enforcements
- Signal enforcement to WIU for signals and switches

There are two types of data elements in Subdiv files. They are static and dynamic. Static data includes railroad identification, subdivision track charts, maximum speed, speed restrictions, track rule (Timetable), MP helper (dispatch points), text points (station names), CP name changes, quiet zones, WIU data (signal department) and BOS. Dynamic data includes, track segment, node, center line, switch, signal, PTC limit, road crossing at grade, clearance points, device status configuration, device type and BOS polygon.

Office validation will include the following:

- Track Chart – Use the generated Microsoft Visio track chart and compare against the official Metrolink track chart and timetable. The generated track chart is compared against with existing track chart and time table to ensure all the required track features (signal, switch, grade crossing, Max Speed, turn out speed, etc.) are covered in subdiv file
- Track Difference – Use the generated difference report to verify that all intended changes were applied
- KML Verification – Use the generated KML file to verify the track features and block information. By navigating on the Google Earth map, ensure all required tracks are covered in subdiv file
- Track Validation in Lab Environment – Use a lab TMC connected to Wabtrax's Track Verify utility running on a PC/laptop to traverse the track in simulated mode using GPS simulator software

Field validation will include the following:

- Load the subdiv file on the Hy-Rail on-board equipment and run along the track to validate each feature, such as survey markers and signal aspects.
- Feature Point Validation: Compare physical location along the tracks with recorded GPS coordinates. Field readings are taken with the Trimble® GPS Pathfinder® ProXRT receiver using OmniSTAR differential correction messages
- Route Validation

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- Validate that Subdiv files can navigate through all routes
- Validate speed restrictions
- Validate track names and yard/spur names

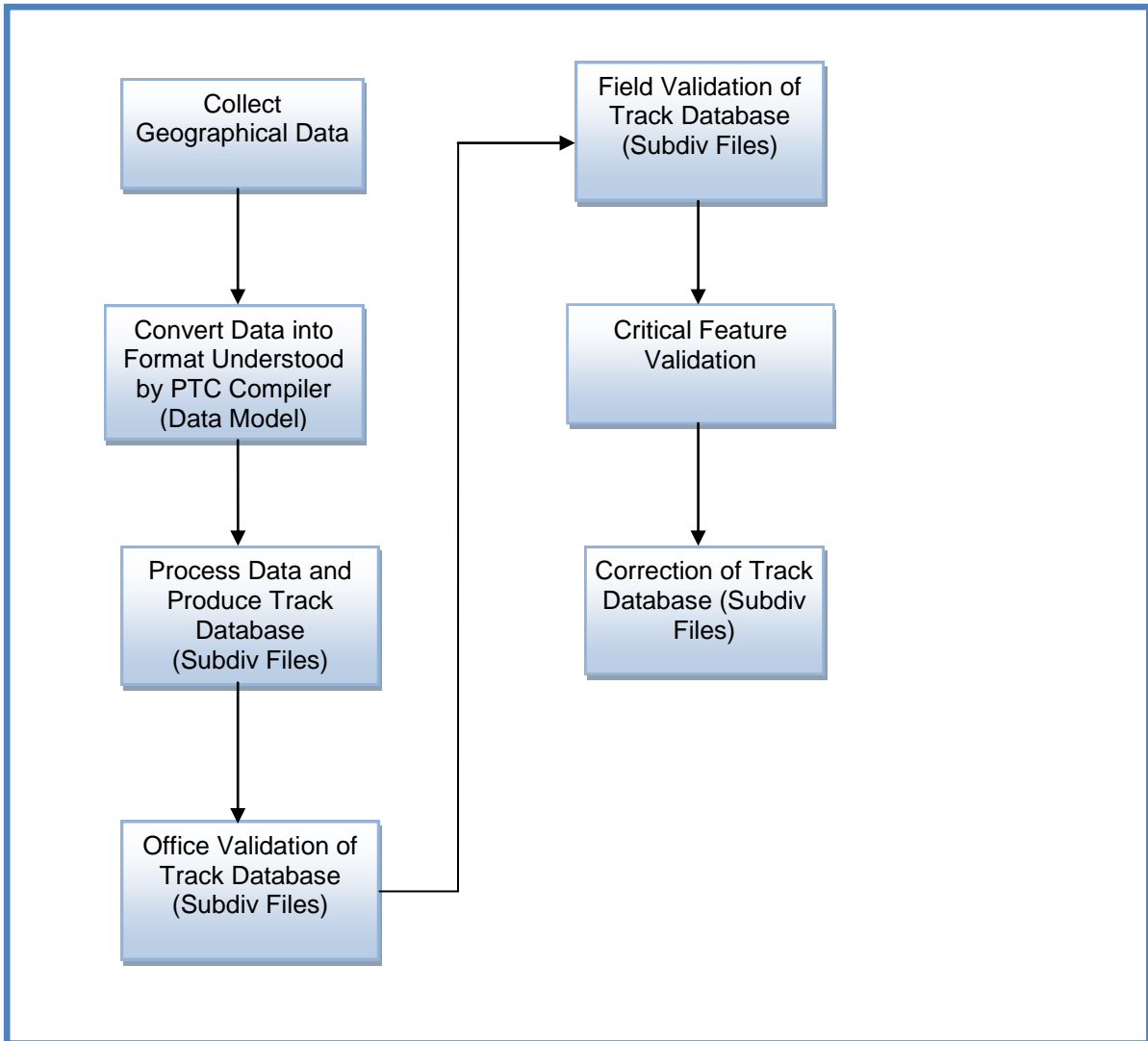
Critical Feature Validation:

Critical feature validation consists of aligning the vehicle's GPS antenna with the device survey point for the switch, signal, or edge of road crossing, etc. and record whether it's offset to the stored coordinates within the allowed 7-ft tolerance.

Track Database Correction:

PTC data model shall be corrected based on the discrepancy report produced as result of Track Database Office Validation & Track Database Field Validation.

The collection of geographic data, conversion of data into correct format which can be understood by the PTC Wabtrax compiler, creation of PTC data model, compilation of track database (also called Subdiv files), track database office validation, track database field validation, critical feature validation, and track database correction is the responsibility of the GEC. The process of track database development is shown below in a flow chart.



8.9 Post-Construction Documents

The GEC shall provide the following post-construction PTC critical information and documents to SCRRRA.

8.9.1 Post-Construction Surveying and Mapping

Survey activities will include post-construction ground control survey, aerial mapping and photography, planimetric and topographical survey, land surveying, and top of rail surveys.



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The post-construction survey will include the entire project limits. The survey will include vertical and horizontal controls and the survey will tie-in to previously established bench marks.

8.9.2 Track Charts and Aerial Composite Maps

The GEC will submit revised Track Charts and Composite maps to SCRRA. A sample Track Chart and Composite Map is shown in Appendix B.

Track charts will have a scale of 1"=500' and include infrastructure data, including track center line; track geometric data; turnouts, derails, crossovers; type of tracks and rails; culverts; roads, buildings, parking; signal masts; signal control points; and fiber optic gas and fuel lines. Composite maps will have a scale of 1"=200' and include right-of-way lines, ingress and egress points, main line track alignments, track geometry data, fiber optic and fuel pipelines and other key information. Reference will be made to existing track charts and composite maps prepared by SCRRA for the Metrolink system. Track charts will include spreadsheet inventory of key Metrolink infrastructures including control points, curve characteristics, structures, grade crossings and stations.

8.10 Accuracy

The locations of critical asset are very important for proper functioning of the PTC system. The location of all critical assets shall be maintained to an accuracy of three (3) feet.

8.11 Marking and Measuring Procedures

Two methods will be used to locate track and signal assets.

Surveying method will be used by GECs for all design and construction projects. A Survey crew will collect all necessary asset locations in the field during the design phase and also verify the location after the construction is completed. The GEC will then prepare revised track charts and composite maps based on the collected data. The data will then be provided to PTC personnel to create PTC models.

The second less accurate method will be used by SCRRA maintenance contractors in order to maintain all existing signs and markings. Simple measuring devices and tools (wheel, tape measure, disto) will be used to locate assets that are not located on a one-tenth of a mile marked location.

The following steps shall be used to locate a new asset, or to remove or replace a critical asset:

- a. Locate the 10th mile post marker on the rail that is closest to the asset
- b. Measure the distance from the asset to the marker along the track
- c. Add or subtract the measured distance to the known station of the 10th mile post to determine the stationing of the asset

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- d. Add or subtract the measured distance to the known 10th mile post to determine the mile post of the asset
- e. Use a mapping data base (track charts or composite maps) to determine the GIS location of the asset

SCRRA in the past couple of years inventoried all track and signal assets. These assets are shown on Track Charts and Composite Maps. SCRRA has marked the accurate locations of mile posts in the field by installing mile post signs at each mile post location. SCRRA has also marked the 10th milepost on the rails. At these locations, the mile post is painted on the outside web of the rail together with a downward arrow pinpointing the associated mile post on the center line of the track.

The GEC shall use the methods shown in **SCRRA Form DPM-41: PTC Marking and Measuring Procedures** to locate PTC critical assets.



APPENDIX A – SCRRA Standard Forms

SCRRA Form DPM-01	Contract Task Order (CTO) Cost Summary
SCRRA Form DPM-02	Contract Task Order (CTO) Revision Cost Summary
SCRRA Form DPM-03	CTO Request for Proposal
SCRRA Form DPM-04	CTO Request for Proposal Revision
SCRRA Form DPM-05	CTO Request for Proposal Time Extension
SCRRA Form DPM-06	CTO Cost Estimate
SCRRA Form DPM-07	CTO Pricing Proposal
SCRRA Form DPM-08	Invoice Summary, Invoice Trackers, and Project Submittals
SCRRA Form DPM-09	CTO Closeout
SCRRA Form DPM-10	Meeting Attendance & Meeting Minutes
SCRRA Form DPM-11	Scope Change
SCRRA Form DPM-12	Not Used
SCRRA Form DPM-13	Request for Special Design Consideration Form
SCRRA Form DPM-14	Design Interface Matrix
SCRRA Form DPM-15	Project Cost Estimate
SCRRA Form DPM-16	Engineer’s Estimate
SCRRA Form DPM-17	Materials List
SCRRA Form DPM-18	Schedule of Quantities and Prices
SCRRA Form DPM-19	Utilities Matrix
SCRRA Form DPM-20	Utility Information Request Letter
SCRRA Form DPM-21	Permit Matrix
SCRRA Form DPM-22	Progress Submittal Transmittal Letter
SCRRA Form DPM-23	Project Concept Checklist
SCRRA Form DPM-24	Preliminary Design Checklist
SCRRA Form DPM-25	Interim Design Checklist
SCRRA Form DPM-26	Pre-Final Design Checklist
SCRRA Form DPM-27	Final Design Checklist
SCRRA Form DPM-28	Camera-Ready Checklist
SCRRA Form DPM-29	Bidding Documents Checklist
SCRRA Form DPM-30	Liquidated Damages Calculations Form
SCRRA Form DPM-31	Design Review Comments
SCRRA Form DPM-32	Design Procedures Manual Comments Form
SCRRA Form DPM-33	Standard Specifications and Bid Quantity Items Checklist
SCRRA Form DPM-34	Design Scope Matrix
SCRRA Form DPM-35	Design Submittal Matrix



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SCRRA Form DPM-36	PTC Critical Assets
SCRRA Form DPM-37	PTC Non-Critical Assets
SCRRA Form DPM-38	PTC Design & Construction Change Reporting Procedures
SCRRA Form DPM-39	PTC Change Request Form
SCRRA Form DPM-40	PTC GEC Change Notification Checklist
SCRRA Form DPM-41	PTC Marking and Measuring Procedures



APPENDIX B – Sample Documents

1. Project Definition Report
2. CTO Scope of Work
3. SCRRA Standard Specifications
4. Project Specific Specifications
5. Contract Addendum
6. Engineer's Estimate
7. Schedule of Quantities and Prices
8. Schedule