RICK A RICE

Technical documents and proposals

PORTFOLIO

INTRODUCTION

This package includes examples of work done I have done in:

- technical writing (software development and IT networking)
- proposal development (Architecture/Engineering/Construction, Environmental, IT networking)
- marketing communications, and
- technical editing.

This work is represented in this portfolio by project excerpts and graphics. Complete samples of work are available upon request, other than in cases where distribution of proprietary information is not allowed. For additional information on my career as a writer, see:

- https://rickarice.com
- https://RARWRITER.com
- https://www.linkedin.com/in/rick-rice-975b4712/

Contents

TECHNICAL WRITING

META

TERRAGRAPH

Terragraph (TG) is a 60GHz, multi-node wireless Software Defined Network (SDN) that enables high-speed internet connectivity in multiple environments. It incorporates commercial, off-the-shelf components and industrial design for quick and affordable deployments across many markets. The network operates best in Line-Of-Sight (LOS) conditions to maximize connectivity. In its essence, Terragraph is "wireless fiber" with gigabit speeds, rapid deployment capability, and flexible use case support.

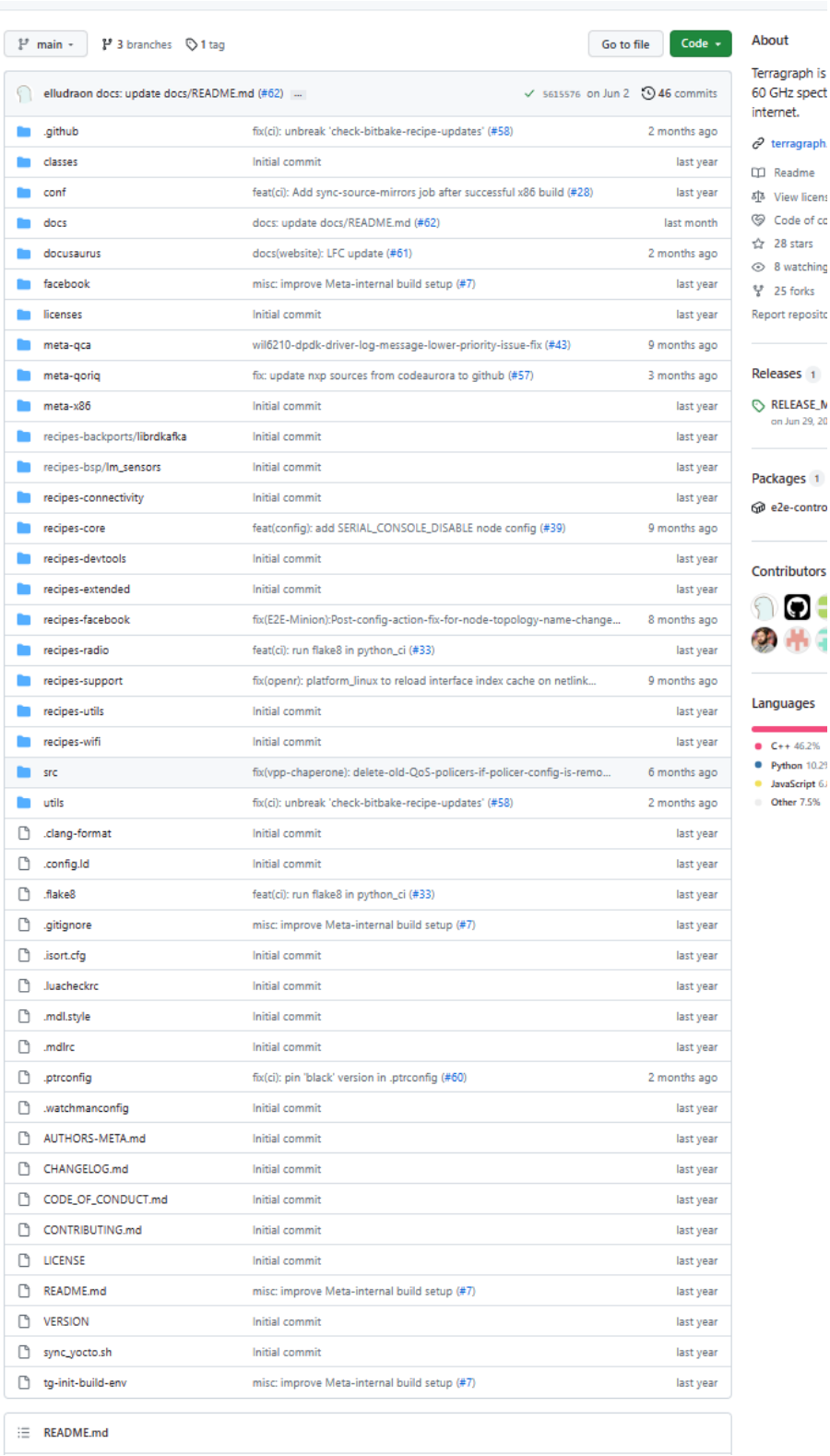
ROLE:

- Edited documentation developed by Terragraph developers, including the Runbook and Developer Guide.
- Worked with software engineers to publish a GitHub-hosted open-source website using the Facebook-developed static site generator Docusaurus.

KEY INFORMATION

- Text developed using Visual Studio-Code, an example of code-as-documentation publishing
- Converted text files to Markdown for Git publishing
- Published using a static site generator

TERRAGRAPH- GITHUB



PUBLISHED USING DOCUSAURUS

Docusaurus is an open-source project for building static websites. It is used to build, deploy, and maintain open-source documentation websites. It is built using React and Node.js and is used by many companies such as Facebook, Algolia, and Atlassian.

TERRAGRAPH- RUNBOOK

TERRAGRAPH – DEVELOPER MANUAL

Deployment and Installation

This document describes the installation procedure for the E2E controller and configuring nodes for communication with the controller.

Cloud Services

This section describes the installation and initial configuration of the full Terragraph cloud suite, including E2E services and the NMS backend. The Terragraph cloud suite is deployed as a Docker Swarm.

Docker Swarm Installation

Since Terragraph uses the Docker ecosystem, it would be helpful to be familiar with Docker and Docker Swarm.

System Requirements

Docker Swarm recommends at least 3 (Docker) hosts for redundancy. If redundancy is not required, the cloud suite can be run on a single host. To support a network composed of roughly 512 sectors, each Docker host must meet the following specifications.

- Ubuntu 18.04
- 4 vCPU
- 16GB of RAM
- 200GB of disk space
- Globally addressable IPv6 and private (or global) IPv4
- A unique and static hostname for each Docker node

Partitioning Scheme

Below is a suggested filesystem partitioning scheme for the Docker hosts. By default, all of the Terragraph-specific data is stored in `/opt/terragraph`.

Partition	Size	Description
`/opt`	130GB	Storage for all Terragraph data
`/var/lib/docker`	50GB	Storage for all Docker data

Installation

Terragraph comes with an installer that deploys and configures the Terragraph cloud suite. The installer is a PEX file which packages together Ansible, a Python CLI, and all of their dependencies into a single executable. An installation host that has SSH access to all the Docker hosts is necessary to run the installer. The installation host can be one of the Docker hosts.

For up-to-date installation instructions, see the Terragraph NMS repository.

1. Download the installer (`nms`) on the installation host.

```
$ wget https://github.com/terragraph/tgnms/releases/latest/download/nms
```

2. Make the `nms` binary executable.

```
$ chmod +x nms
```

3. Install Python 3.8 (`python3.8`) on the installation host, and optionally install `ssh-pass` if password-based SSH is used to access the Docker hosts.

Beamforming and Link Adaptation

Beamforming (BF) is the process of using signal propagation information between two antennas and modifying antenna characteristics to maximize the signal quality between those antennas. The BF process accomplishes this in a few discrete states, including passive acquisition, active signaling, and continuous refinement.

This document describes the Terragraph beamforming procedures, messages, and other information related to the beamforming process.

The Glossary collects the acronyms and defines the terms used in this document.

Link States and Transitions

A link represents the directional connectivity between a transmitter and a receiver. The transmitter and receiver shall independently maintain the state of the link. Conditions can exist where the state of a link as determined by the transmitter differs from the state of the link as determined by the receiver.

There are five link states: *Link Down*, *Link Unstable*, *Link Acquisition*, *Link Up*, and *Link Up with Simultaneous Reacquisition*. Figure 1 illustrates these states and the transitions between them. This link state machine exists independently for each link of a node.

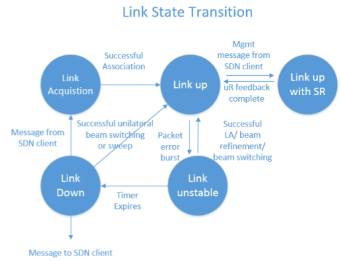


Figure 1, Link States and Transitions

NETWORK INFRASTRUCTURE SERVICES

Meta Network Infrastructure Services (NIS) operates Meta's global network of data centers. More recently, the NIS group has been setting up lab spaces for developers needing to test their Metaverse products in real world environments.

ROLE:

- Developed a complex, scalable wiki site to support users of the Meta lab services
- Worked with key NIS stakeholder teams to identify needs and create a project management plan
- Held regular working sessions to complete the year-long project

KEY INFORMATION

- Used Google Docs for database creation and to create wiki pages
- Edited documentation, as required
- Performed wiki coding to modify graphic design templates and format content

OSISOFT

OSIsoft is now part of AVEVA (see https://www.aveva.com/). Founded by Patrick Kennedy in the 1970s as an oil services firm (thus the name), OSIsoft became the gold standard in developing data collection software for a range of manufacturing operations.

ROLE:

- Embedded technical writer with three software development teams
- Responsible for all of the firm's many connector and interface products
    - PI Interface for ABB 800xA Production Response Batch
    - PI Connector for Cygnet
    - PI Connector for FANUC Focas
    - PI Connector for GE e-terrhabitat
    - PI Connector for IEC 61850
    - PI Connector for OPC UA
    - PI Connector for Wonderware Historian
    - PI Event Frame Generator
    - PI Interface for Emerson Syncade Batch
    - PI Interfaces for Batch and Manufacturing Execution Systems
    - Many other

KEY INFORMATION

- Attended daily scrum sessions
- Developed documentation for a CMS using DITA protocol and XMetaL XML editor
- Converted all documentation to Markdown for eventual publication through GitHub

SAMPLE EXCERPTS FOLLOW

Overview of PI Connectors

Introduction to PI connectors

PI connectors are among the classes of data communications software developed by OSIsoft for a range of data formats. (For a complete list of OSIsoft products, see the Product List (https://www.osisoft.com/pi-system/pi-capabilities/product-list/) under the PI System tab on the OSIsoft home page.) They represent a technology a generation beyond OSIsoft's earlier interface products, simplifying systems administration through the automation of key functions. (See Generations of PI connectors.)

With minimal configuration requirements managed through an HTML-5 compliant web-based dashboard (see PI connector administration), PI connectors automate many aspects of setting up an effective PI System, including:

- **Collection of data types**

  PI connectors automatically discover data on a data source when they are first connected. The administrator can then choose the data to be stored, which is done through the PI Data Collection Manager dashboard. PI connectors collect time-series data and metadata. Metadata does not necessarily change with time, but provides additional context about the data in the system; for example, the last maintenance date of a piece of equipment. Time-series data is saved to PI points in PI Data Archive, whereas metadata such as elements, attributes, and related Event Frames are saved in PI AF Server. PI connectors replicate the data model that exists on the data source.

- **Creation of PI points**

  PI connectors automatically create the PI points, elements, and attributes needed to store the data that has been selected for collection. Data streams are then auto-configured on the PI Server. A reference model is built in PI AF, which serves as a mirror image of the data source. This is a convenient starting point for integration with a more comprehensive PI AF model. New data streams added to the data source are automatically collected by PI connector, which monitors the source continuously. Automation of this process is particularly useful when dealing with large numbers of tags.

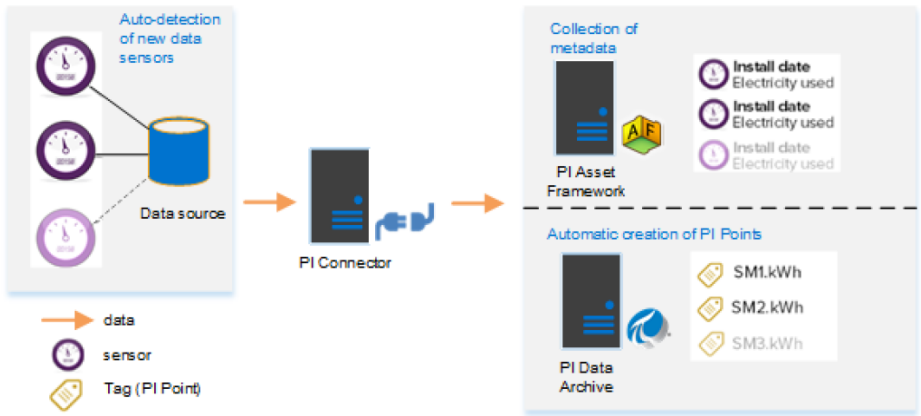
- **Data buffering**

  PI connectors have an automatic buffering mechanism. Buffering is always on and configuration involves nothing more than specifying the folder to store the buffered data. See PI connectors data buffering.

PI connectors provide additional advantages, including disconnected startup so a connector can start without a connection to a configured PI server. PI connectors support 64-bit processors, so are capable of storing more computational data than predecessor interfaces. Connectors also use internal protocol to communicate to PI Data Archive (see PI System components), AF SDK to communicate to PI AF Server, or AMQP to communicate to PI connector relays, which limits exposure of data.

PI connector workflow

PI connectors use the general workflow depicted in the following graphic, in which the connector automatically detects data from a data source, collects metadata in PI AF, and creates PI Points in PI Data Archive:



PI Connector workflow

How PI interfaces for batch and manufacturing execution systems work

Batch interfaces scan a data source for events of interest, such as the start or end of a level, and the acquisition and release of equipment. Based on these events, the interface generates event frames. To handle configurations in which multiple batch execution systems manage related batch processes that you want to merge, you can configure a single interface instance to read multiple data sources.

How interfaces process batch event data

The interface processes start and end events for each level. The level at which a recipe executes depends on the equipment it requires. For example, a batch-level recipe is most likely composed of unit procedures and procedures executed on multiple different units. By contrast, an operation-level recipe might execute a set of phases in a single unit. The interface automatically creates Procedures and UnitProcedures for operation- and lower-level recipes, even though the events in the data source do not include these levels. The BES events that trigger the start and end of each level are vendor-specific. For details, refer to the vendor-specific information in this document.

When creating event frames in PI AF, the interface creates a set of event frame templates in the target database, one template for each level in the standard s88 batch hierarchy. You can modify the templates to customize the data that is stored in the generated event frames. The interface creates equipment assets in PI AF based on allocation events from the BES, and populates the attributes of those assets with relevant data.

> **Caution:**
> To ensure compatibility with RtReports, any custom Event Frame batch template used must be derived from a default Batch Interface Event Frame Template.

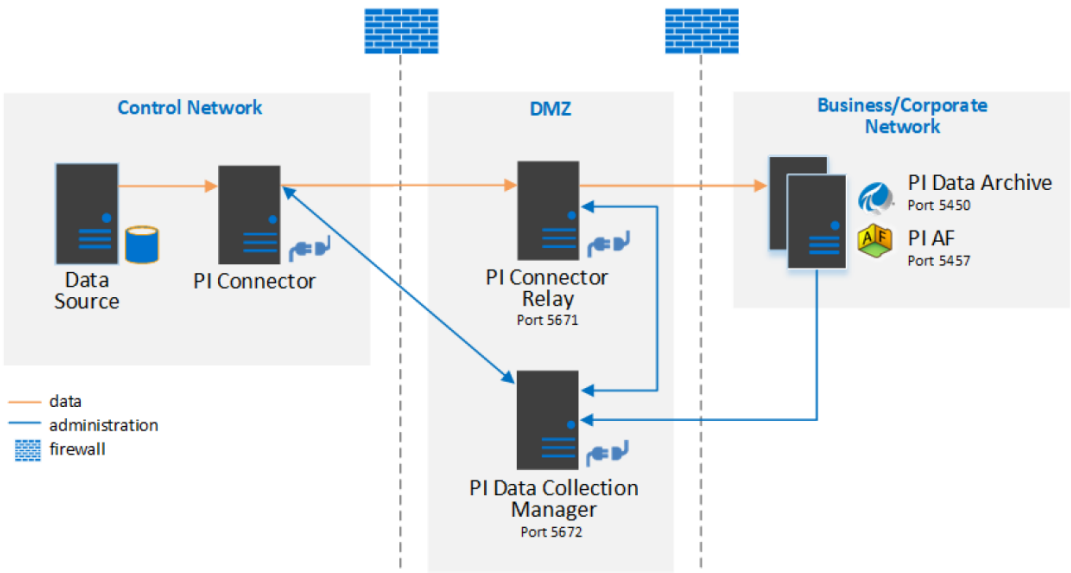
To compose the history that it stores in the PI System. the interface uses the timestamps from the data source, not the system time on the interface node. When updating health tags, the interface uses the system time on the interface node.

> **Note:**
> By default, when processing the incoming Batch ID, Name, Product, Recipe and Procedure fields, the interface replaces the following reserved characters with an underscore: * ' ? ` ". To override these replacement characters, use PI System Management Tools **Operation** > **AF Link** option to configure the desired replacement characters.

PI Connector for FANUC Focas operational overview

Each PI Connector (connector) is designed for a specific data source. The connector queries the data source to discover assets, relations between assets, time-series measurements, and relations between assets and time-series measurements that the data source contains. The connector creates generalized streams to convey the assets, relationships, and time-series measurements to one or more PI Connector Relays. The connector output streams are generalized in the sense that they are independent of the databases or historians that store data from the streams. For information about connectors in general, refer to the "Overview of PI Connectors" in Live Library (https://livelibrary.osisoft.com).

The following figure shows the data flow from a data source to PI AF and PI Data Archive. The data source in the figure refers to a CNC machine that supports FANUC Focas library functions.



PI Connector to PI AF and PI Data Archive data flow

In the figure, the connector communicates with PI Connector Relay over an encrypted TCP connection which allows it to be on a different computer. The connector does not communicate directly to any type of historian or database. Also, streams from the connector are strictly one-way to the PI Connector Relay host, which means that it cannot obtain any information from either PI AF or PI Data Archive.

Although the figure shows one PI Connector Relay host, the connector can replicate its output streams to multiple PI AF hosts. Similarly, a PI Connector Relay can support multiple PI AF servers and PI Data Archive servers, including collectives.

Both the connector and PI Connector Relay communicate with PI Data Collection Manager through which you specify all settings for the configuration. For additional information about PI Connector Relay and PI Data Collection Manager, refer to the "PI Connector Administration user guide" in Live Library (https://livelibrary.osisoft.com).

Manually approve PI point changes

To help avoid situations such as those described in Handle changes to Habitat databases, the connector also supports an option that gives you a chance to review and manually approve new and renamed PI points before it makes any changes in PI. This option also allows you to provide custom names for PI points that override the default names that the connector assigns.

To enable this option for a given query, include an element named `<Sync>` with a value of `"MANUAL"` in the connector's config file, as in the following example:

```
<Query>
 <Family value="EMS"/>
 <Application value="SCADA"/>
 <Database value="SCADAMOM "/>
 <RecordType value="ANALOG "/>
 <Fields>
  <Field value="DIS"/>
  <Field value="DFLAGS"/>
 </Fields>
 <Key value="*"/>
 <Sync value=”MANUAL”/>
</Query>
```

When the connector detects new or renamed records in a `MANUAL` query, instead of creating or renaming PI points immediately, it writes the proposed PI point changes to a file called `changes.txt`, located in the **Pending Changes** subdirectory of the directory where the connector is installed. Each line of the file represents a single change in PI, with two possible formats:

```
create|[item ID]|[PI point name]
rename|[current PI point name]|[new PI point name]
```

For example:

```
create|D3FC8D20-D613-4869-AC1D-FFE1235A5911.DIS|
EMS.SCADA.SCADAMOM.ANALOG.SUBSTN.SUB1.XFMR.T1.MEAS.MWMX.MW.DIS
rename|SUBSTN.SUB1.XFMR.T2.MEAS.MWMX.MW.DIS| SUBSTN.SUB1.XFMR.T3.MEAS.MWMX.MW.DIS
```

For `create` lines, `[item ID]` has the form `[MRID].[field]` for records that have an MRID and `[family].[application].[database].[record type].[composite key].[field]` for records that do not, while `[PI point name]` is the name that the connector will use for the new point. For `rename` lines, `[current PI point name]` is the name of an existing point that the connector intends to rename to `[new PI point name]`. In both cases you can modify the third column (that is, [PI point name] or [new PI point name]) to provide a custom name for the PI point.

Once you have edited `changes.txt` to suit your needs, move it from **Pending Changes** to a sibling directory called **Approved Changes**. The connector reads it, updates PI accordingly,

Security best practices for PI Connector for Wonderware Historian

The Wonderware Historian SDK requires a user account with necessary privileges to collect historical data. The minimum requirements the user account is a local account (administrator is not required) on the Wonderware Historian node that is at least a member of the Wonderware Windows group aaUsers. Please refer to the Wonderware Historian SDK documentation for proper setup of the security accounts.

Create the Windows account for the PI Connector

For security purposes, you should run the PI Connector on a host computer that is a member of a Windows domain and use a domain account for its identity. When choosing an account type, consider the following:

- Windows domain accounts are the more-secure option for hosting the PI Connector. In a domain environment, a domain controller performs authentication for centralized control.
- Windows workgroups are the less-secure option for hosting the PI Connector. In a workgroup environment, all computers are peers and authentication is performed locally.

Security best practices for Wonderware Historian

The Wonderware Historian SDK requires a user account with necessary privileges to collect historical data. The minimum requirements for the user account is a local account (administrator is not required) on the Wonderware Historian node that is at least a member of the Wonderware Windows group aaUsers. Please refer to the Wonderware Historian SDK documentation for proper setup of the security accounts.

Security best practices for Wonderware SQL Runtime Connection

The Wonderware Historian Connector requires an MSSQL user account with necessary read only privileges to the Wonderware Historian "runtime" database. This requirement is mandatory in order to get the Hierarchal view from Wonderware. The suggested level of privileges is to use the "db_datareader" role that is built into MSSQL. The db_datareader role allows the Connector to read the information but not edit it. Please see MSSQL documentation for additional information.

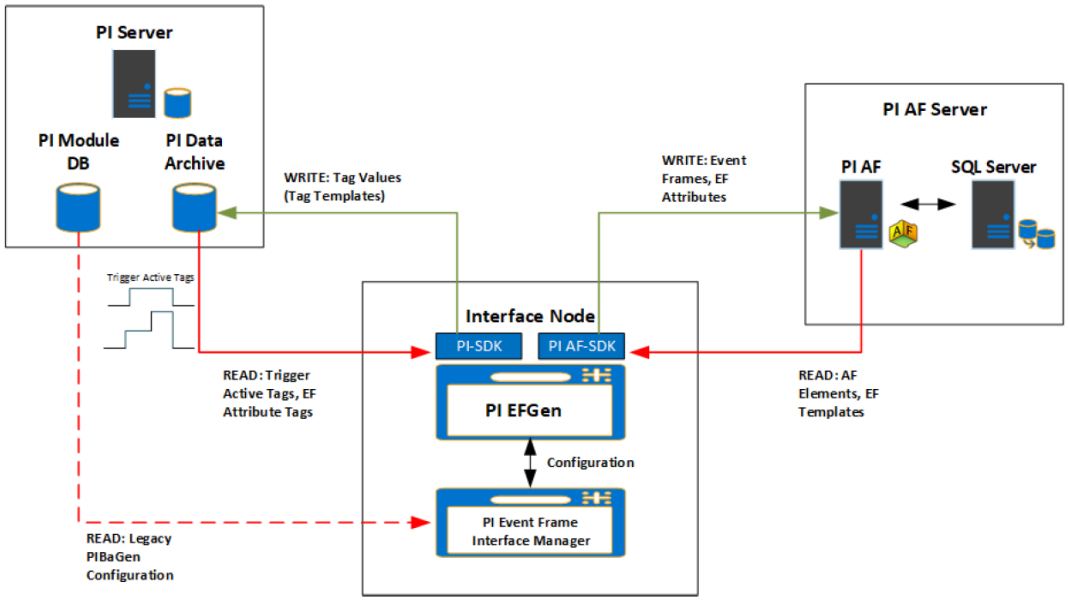
How PI EFGen works

In addition to triggering an event frame start and end time, PI EFGen can also populate attributes to record data that accompanies the event frame (such as its name). Event frame templates can be used to represent different types of events such as downtime, startups and shutdowns, process excursions, or batch data. PI EFGen includes a graphical configuration tool, the PI Event Frames Generator. You can migrate PIBaGen configurations to PI EFGen using this tool.

At startup, PI EFGen creates any required event frame templates. During operation, PI EFGen scans the PI Server data archive for changes to specified active points. When an active point indicates that an event or one of its child events has begun, PI EFGen generates an event frame, populating its attributes. If the event frame requires an asset (such as a unit) that does not exist in the AF database, PI EFGen creates the asset. When the active point indicates that the event has concluded, PI EFGen records the end time in the event frame.

> **Caution:**
> To ensure compatibility with RtReports, any custom Event Frame batch template used must be derived from a default Batch Interface Event Frame Template.

The following diagram shows how PI EFGen interacts with the PI Server and PI AF Server.

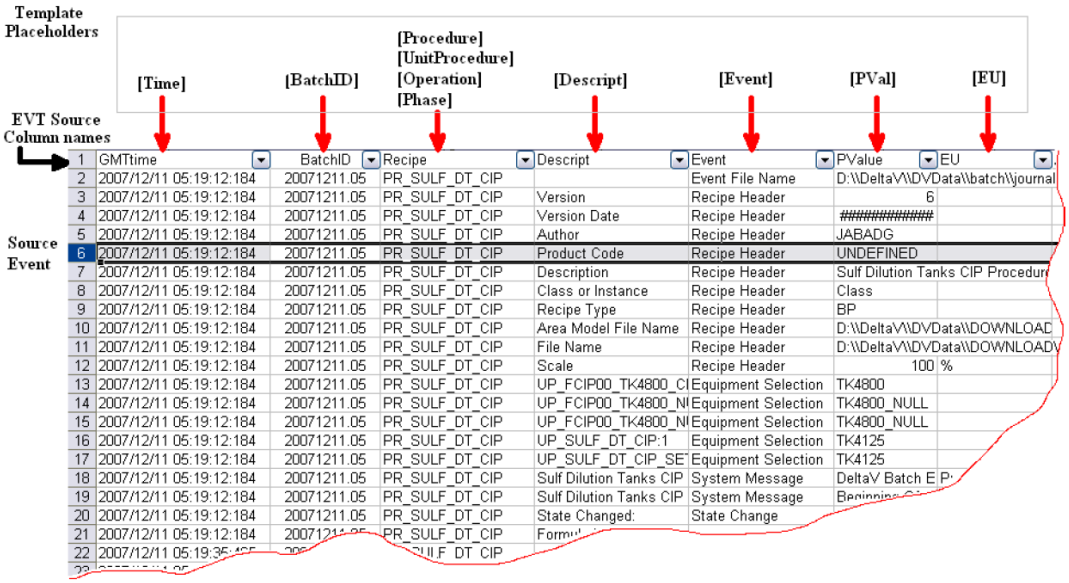


PI EFGen data flow

For best performance and to minimize competition for system resources, install PI EFGen on a dedicated interface node. Ensure that it can access port 5450 on the PI Server node and port 5457 on the PI AF Server node. If you cannot run PI EFGen on a dedicated node, it is preferable to install it on the PI AF Server node rather than the PI Server node, to minimize contention.

Placeholders and advanced parsing

Placeholders enable you to incorporate data from incoming events into tag names and data. Placeholders can be used in all types of templates. The precise set of placeholders supported by an interface depends on the data source. The following example illustrates how placeholders correspond to columns in a data source.



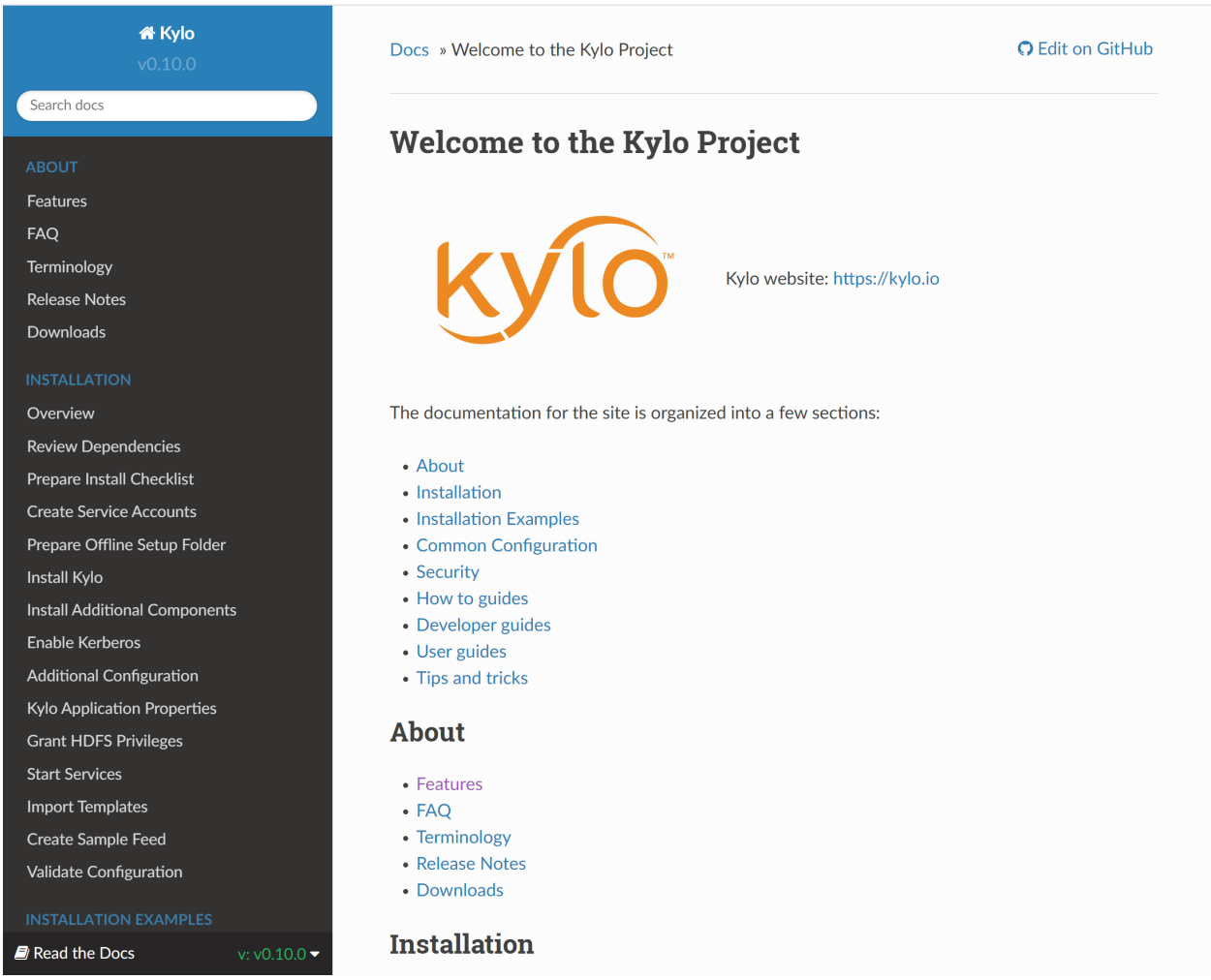
	GMTtime	BatchID	Recipe	Descript	Event	PValue	EU
1	GMTtime	BatchID	Recipe	Descript	Event	PValue	EU
2	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP		Event File Name	D:\\DeltaV\\DVData\\batch\\journal	
3	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Version	Recipe Header	6	
4	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Version Date	Recipe Header	############	
5	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Author	Recipe Header	JABADG	
6	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Product Code	Recipe Header	UNDEFINED	
7	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Description	Recipe Header	Sulf Dilution Tanks CIP Procedur	
8	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Class or Instance	Recipe Header	Class	
9	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Recipe Type	Recipe Header	BP	
10	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Area Model File Name	Recipe Header	D:\\DeltaV\\DVData\\DOWNLOAD	
11	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	File Name	Recipe Header	D:\\DeltaV\\DVData\\DOWNLOAD\	
12	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Scale	Recipe Header	100	%
13	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	UP_FCIP00_TK4800_CI	Equipment Selection	TK4800	
14	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	UP_FCIP00_TK4800_NI	Equipment Selection	TK4800_NULL	
15	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	UP_FCIP00_TK4800_NI	Equipment Selection	TK4800_NULL	
16	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	UP_SULF_DT_CIP:1	Equipment Selection	TK4125	
17	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	UP_SULF_DT_CIP_SE	Equipment Selection	TK4125	
18	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Sulf Dilution Tanks CIP	System Message	DeltaV Batch E	P
19	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Sulf Dilution Tanks CIP	System Message	Beginning	
20	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	State Changed:	State Change		
21	2007/12/11 05:19:12:184	20071211.05	PR_SULF_DT_CIP	Formul			
22	2007/12/11 05:19:35:425	20071211.05	PR_SULF_DT_CIP				

When you define templates using the PI Event Frame Interface Manager, you can choose from a list of supported placeholders. To use a placeholder in a field when editing a template, click the **Add Placeholder...** button and choose the desired placeholder.

You can define placeholders that read data from PI tags when triggered by batch events. To specify a tag-based placeholder, use the following syntax:

```
[Tag, Name="PI Tag Name", <comma-delimited list of parameters>]
```

THINKBIG ANALYTICS



Kylo is a full-featured Data Lake platform built on Apache Hadoop and Spark. Kylo provides a turn-key, business-friendly Data Lake solution enabling data ingest, data preparation, and data discovery. See the open-source website at https://kylo.readthedocs.io/en/v0.10.0/ .

ROLE:

- Developed a GitHub-hosted open-source website using the ReadtheDocs static site generator
- Worked as an embedded technical writer on a software development team in an agile environment

KEY INFORMATION

- Edited existing developer documentation in Google docs
- Used Pandoc and manual coding to convert Google Doc files to Markdown
- Published using a static site generator

NTT DATA/DELL IT SERVICES

NTT DATA

Information Type: Informative Documentation
Company Name: NTT Data Services
Information Owner: Willis Scott

LifeSys Modernization Project

Technical Requirements Documentation

Internal Use

The NTT Data/Dell IT Services project involved the migration of a huge data base of insurance company files from a mainframe system mainframe to an open systems (Linux) environment.

ROLE:

- Provided technical writing and project management services to NTT DATA in their absorption of Dell IT Services
- Developed LifeSys modernization technical requirements documentation
- Developed software developer guides for their straight-through-processing (STP) services
- Developed a transition guide for the migration of data from the mainframe to the Linux environment
- Developed procedural documentation for the migration of help desk services (voice migration).
- Developed ITIL-based process and procedure documentation for data center help desk operators, including email notifications and reports (client, executive management) concerning planned and unplanned outages
- Developed an INFOBLOX training guide for network administrators
- Worked with NTT DATA, Inc. staff to develop standards, methodologies, process, and procedure documents for their Information Security Management System (ISMS)

KEY INFORMATION

- Developed procedure documentation collaboratively with NTT Data trainers
- Worked with software developers on procedural documentation

3.4.8.3 Using the Dell Enterprise COBOL for Visual Studio IDE as part of the software lifecycle

The following diagram shows a proposed development lifecycle workflow using the Dell Enterprise COBOL for Visual Studio IDE. A similar workflow could be created if the uni-SPF Extended for UniKix solution (see section 4.2.2.3) is used to compile and manage source code.

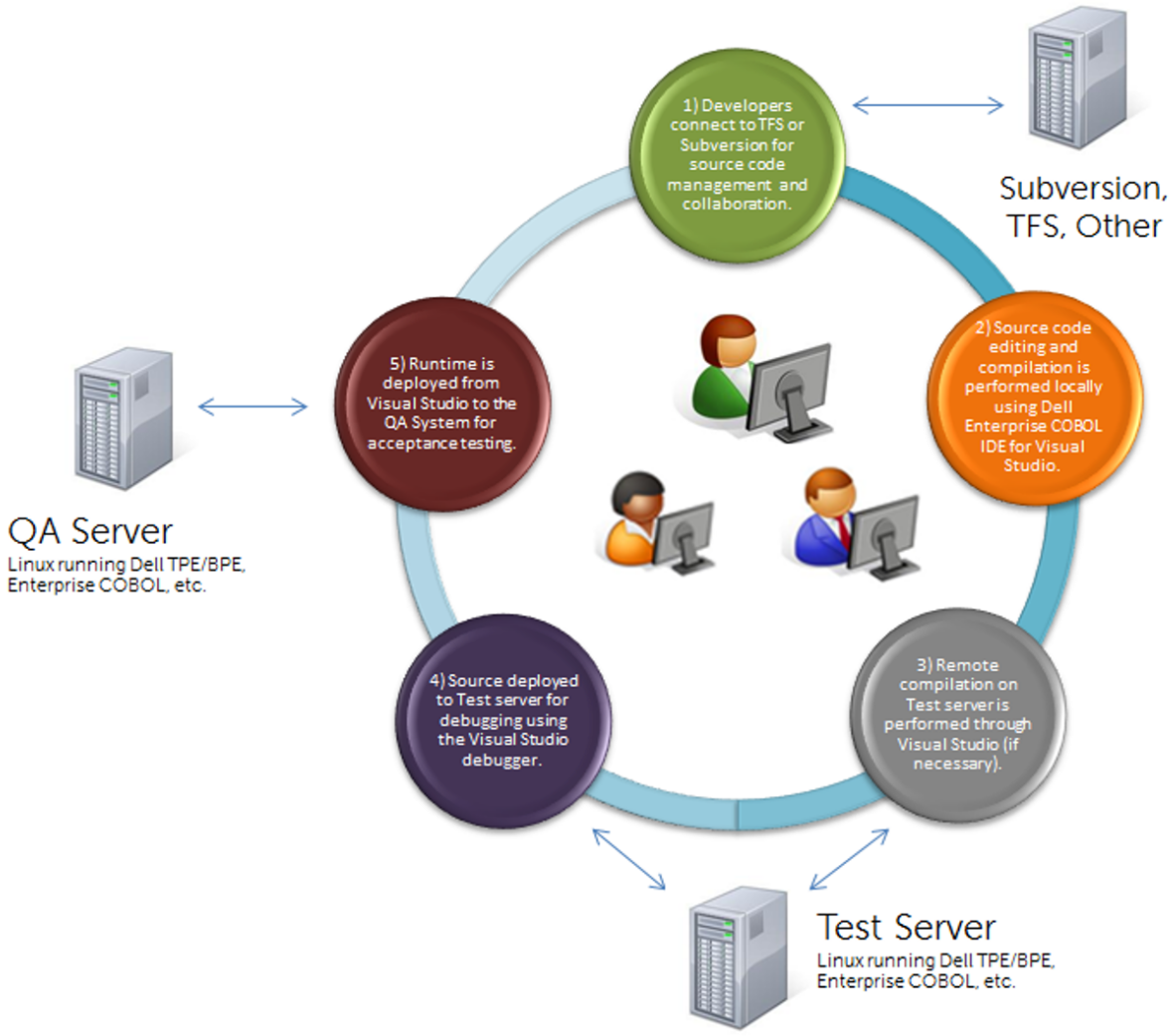


Figure 9: Proposed development lifecycle using Dell Enterprise COBOL for Visual Studio

In the lifecycle shown in figure 4-5, source can be checked out from the correct branch within the selected source code management solution (i.e. Subversion, or other selected solution) into Visual Studio, where it can be managed and compiled locally using Dell Enterprise COBOL. For programs that require remote compiles (i.e. DB2 pre-processing), the remote Dell Enterprise COBOL compiler should be configured on both the server (i.e. T1, T2, etc.) and local client. See section 4.2.2.3 for more information.

Source can be deployed to T1 or T2 using the Dell Enterprise COBOL remote deployment capability, where unit testing and remote debugging can take place. Note – the Dell Enterprise COBOL remote deployment feature allows CICS programs to be automatically new copied. Finally, source code can be checked back in and promoted to correct environment using an independently defined build process.

SUNGEVITY (SOLAR)

Sungevity was a solar company originally headquartered in Oakland, California, in business from 3007 to 2017. They sold solar and subcontracting work, but eventually went bankrupt and were sold.

ROLE:

- Documented Sungevity's supply chain operation
- Developed process and procedure documentation in preparation for a public offering.

KEY INFORMATION

- Interviewed key personnel to document their processes
- Provided a templated approach that presented procedural steps in a standardized, easy-to-access and understand manner

DEPARTMENT OF WATER RESOURCES

The California Department of Water Resources is part of the California Natural Resources Agency and is responsible for the management and regulation of the State of California's water usage.

Projects completed for the DWR include modernization of their Joint Operations Center (JOC), which manages critical infrastructure operations associated with the California Aqueduct and hydroelectric power generation operations.

ROLE:

- Worked with key SME to develop documentation for NERC and CIP regulatory compliance
- Worked with a team of design engineers to develop a security hardening plan for the facility – design architecture
- Developed a runbook for the JOC datacenter
- Documented numerous procedures for server configuration
- Developed a patching guide

KEY INFORMATION

- Developed procedural documentation through SME interviews
- Worked with developers to develop design architecture documentation
- Documented the DMZ, Dev, QA and SCADA production environments
- Documented the current environment for servers, virtualization, applications, storage, network and backup, Active Directory and DNS, and detailed the in-place monitoring, patching, and anti-malware solutions
- Documented proposed updates to achieve regulatory compliance in each of those areas

California Department of Water Resources –Technology Services

Division of Technology Services Documentation Guide

Procedures, Standards, Templates and Checklists

DTS Staff

July 6, 2023

The Director of the **California Department of Water Resources** requested the development of procedures and standards for the development of Division of Technology Services documentation.

ROLE:

- Developed procedures for documenting all aspects of the software or system development life cycle
- Developed business analysis processes, definition of key terms and agreements, identification of key documentation objectives, development of templates, and testing and revision processes for draft materials.

KEY INFORMATION

- Developed procedural documentation through reuse of existing materials and SME interviews
- Developed documentation procedures for Enterprise Infrastructure Services, Enterprise Computing Services, Enterprise Storage Management, Business Network & IT Security, Enterprise Telecommunications and Messaging, Information Technology Architecture, Operational Services, Enterprise Deployment, and Systems & Data Analysis
- Documented the Project Management Lifecycle

CISCO SYSTEMS

I have had a few engagements with Cisco Systems, and worked on a variety of projects with Cisco Cloud Services, and with software developers in agile and non-agile environments.

ROLE:

- Technical writer

KEY INFORMATION

- Developed a range of procedures for Cisco Smart Manager and Cisco Smart Satellite software
- Developed embedded help systems (XML)
- Developed a work plan for the development of Cisco Smart Workplace
- Developed open stack API user guides for Cisco System's Telstra client (Australian telecommunications provider)

Cisco Software Workspace (CSW)

CSW Help Project Workplan

Rick A. Rice – Technical Writer
December 22, 2014

Introduction

Cisco Software Workspace (CSW) is the portal through which Cisco customers are able to manage the applications that are provided to support all aspects of their supply chain management. CSW has been conceived as a "smart" portal.

CSW is cloud-based and is a next generation software lifecycle management resource. It seamlessly integrates Cisco Software, Commerce and Renewals. It allows the user the ability to view and manage subscriptions, entitlements and Smart Licensing Accounts.

CSW provides customers with the means to create "smart licensing", with one smart account established for each customer under which multiple domains may be established so that customer administrators may manage multi-party client systems.

What is a Smart Account

A Smart Account provides the repository for Smart-enabled products and enables users to manage Cisco Licenses. Once they are deposited, users can activate licenses, monitor license usage and track Cisco purchases.

What is a Holding Smart Account

A Holding Smart account is used to manage o
customer Smart accounts. A Holding Smart acc
partners or Customer Service. Employees of su

CSW Help Project Workplan

Rick A. Rice – Technical Writer
December 22, 2014

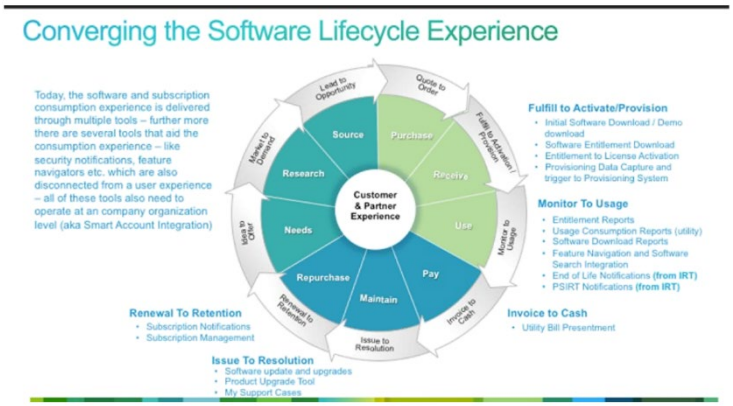


Figure 1: Software Lifecycle - Install and Licensing through Use

CSW is designed to facilitate the use of tablets and other smaller form factor devices. This is accomplished through the use of CSS3 and HTML5 static content and JavaScript delivery to Akamai Edge Caching. Mobile platforms will also be able to use future versions of CSW. UI widgets can be developed based on the customer profile information. Personas and Roles determine the level of access that users have in the UI.

Cisco Software Workspace
Web API

ACCOUNT DETAILS REQUEST

This method returns customer account information based on the customer account ID.

GET	https://api-dev.cisco.com/software/csws/compacc/services/rest/account/{ACCOUNT ID}

Returns customer account information, including status, identifiers, contact information for role assignees.
Returns data on assigned roles for the Smart Account.

Parameters

Name	Description	Details
"status"	Status of GET request	Complete, Pending
"data"	Parent class of data type	Account data
"account status"	Status of company account	ACTIVE, PENDING
"account name"	Registered name of company	Legal name of company
"domain"	Company identifier	Company website
"account identifier"	Numbered company account	5-digit company ID
"agreement status"	Status of Cisco contract	ACTIVE, PENDING
"account type"	Type of company account	CUSTOMER,
"category type"		
"category status"		
"product token gen flag"		
"account parties"	Child class 1 of	
"party number"		

Cisco Software Workspace
Web API

REST API service

Get Web API Account Details Request

GET https://api-dev.cisco.com/software/csws/compacc/services/rest/account/{ACCOUNT ID}

Retrieve attributes with Account ID

URI	HTTP Method
/{ACCOUNTID}	GET

Data Response

```
"data": {
   {
   "account_status": string,
   "account_name": string,
   "domain": string,
   "account_identifier": int,
   "agreement_status": string,
   "account_type": string,
   "category_type" : string,
   "category_status" : string,
   "product_token_gen_flag" : string,
"account_parties": [
   {
   "party_number": int,
   "party_type": string,
   "party_name": string,
```

Cisco Cloud Services – Open Stack API

Cisco Intercloud Services

CIS REST APIs Quick Start Guide

Published 6/19/2016

Introduction

This Quick Start Guide provides copy-and-paste API samples for creating a virtual machine on a remote server. This involves using an IP address to gain access to a server, and using OpenStack REST API calls to manage that server's resources.

This example is organized in three parts:

- **Part One: Accessing API** provides a procedure for generating an API Key.
- **Part Two: Environment Configuration** provides procedures downloading and the project RC File and using the API Key.
- **Part Three: Workflow to Create a Virtual Machine** illustrates how specific REST API are used to create a VM on a remote server.

2.5.1.1. Request

This operation does not accept a request body.

Example 2.5.1.1. List networks with VLAN transparency attribute: Request

```
curl -s -H "X-Auth-Token:2fb7c43d62bd4d6c8afa3d1b3becd897"  GET https://au-mel-
1.telstra.cloud.cisco.com:9696/v2.0/networks  | python -m json.tool
```

2.5.1.2. Response

Example 2.5.1.2. List networks with VLAN transparency attribute: JSON response


```
{
   "networks":[
      {
         "admin_state_up":true,
         "id":"26fbecbb-e870-40ee-99cc-b598c3ca0316",
         "name":"My network",
         "router:external":false,
         "shared":false,
         "status":"ACTIVE",
         "subnets":[
            "f86f9b2f-af54-41f4-be86-1664ecf9797a"
         ],
         "tenant_id":"09b1e304ef4e44bfadcdb330a78d1c07"
      },
      {
         "admin_state_up":true,
         "id":"68976754-2af4-42f5-b7d0-442970634987",
         "name":"public-floating-601",
         "router:external":true,
         "shared":false,
         "status":"ACTIVE",
         "subnets":[
            "abd75f60-f6c2-4273-9685-f9b74b569a16",
            "d2143f7d-603e-46ac-aa08-1c4616f3a12b"
         ],
         "tenant_id":"976dfa0f577c46928047863335029c3c"
      }
   ]
}
```

Cisco Intercloud Services

Rick wrote and tested cURL commands for the CIS open stack API.

Compute API

Reference Guide

Telstra Edition

Published 1/22/2016

Limits

Method	URI	Description
GET	/v2/{tenant_id}/limits	Lists the current absolute and rate limits for a specified project.

List limits

Method	URI	Description
GET	/v2/{tenant_id}/limits	Lists the current absolute and rate limits for a specified project.

Note. The TENANT_ID is available in the RC File that you download from your project to gain API Access..

Request Header

```
-H "X-Auth-Token:<Token_ID>
```

Request Example

```
curl -s -H "X-Auth-Token:60e266d21c0743e38881593febc22079"  GET https://au-mel-
2.telstra.cloud.cisco.com:8774/v2/09b1e304ef4e44bfadcdb330a78d1c07/limits  | python -m json.tool
```

This operation does not accept a request body.

Request Parameters

Parameter	Description
{tenant_id}	ID number of the tenant.

Response Example

```
{
    "limits": {
```

PACIFIC GAS & ELECTRIC

Data Center Replacement Project

Design Principles, Objectives and Specifications

Pacific Gas & Electric built a new datacenter – a critical infrastructure facility serving a power system covering a large part of the Northern and Central California.

ROLE:

- Completed (along with the manager of PG&E's datacenter operations) a training program provided by the International Consortium for Organizational Resilience (ICOR) on data center design best practices
- Developed a 350-page document that defines information security plans and protocols, disaster recovery and business continuity plans, incident management, risk management, audit and assessment reporting, and security service license agreements
- Document design, graphic design

KEY INFORMATION

- Tier 3 datacenter design

Excerpt Follows

This data center - 30 meters beneath Stockholm, Sweden - was designed by Albert France-Lanord Architects. Its interior design mimics its subterranean environment.

Facility Management:

Ensures the functionality of the built environment by integrating people, places, processes and technology

Provides a safe, healthy and productive working environment by managing the facility's primary, alternate and emergency capabilities.

1. Introduction to the Data Center

The data center is the foundation of our business. Having high performance data technology and the resources required to maintain it is essential to the achievement of PG&E's corporate goals. Figure A1-1 depicts data center facilities as the foundation of PG&E's business operations.

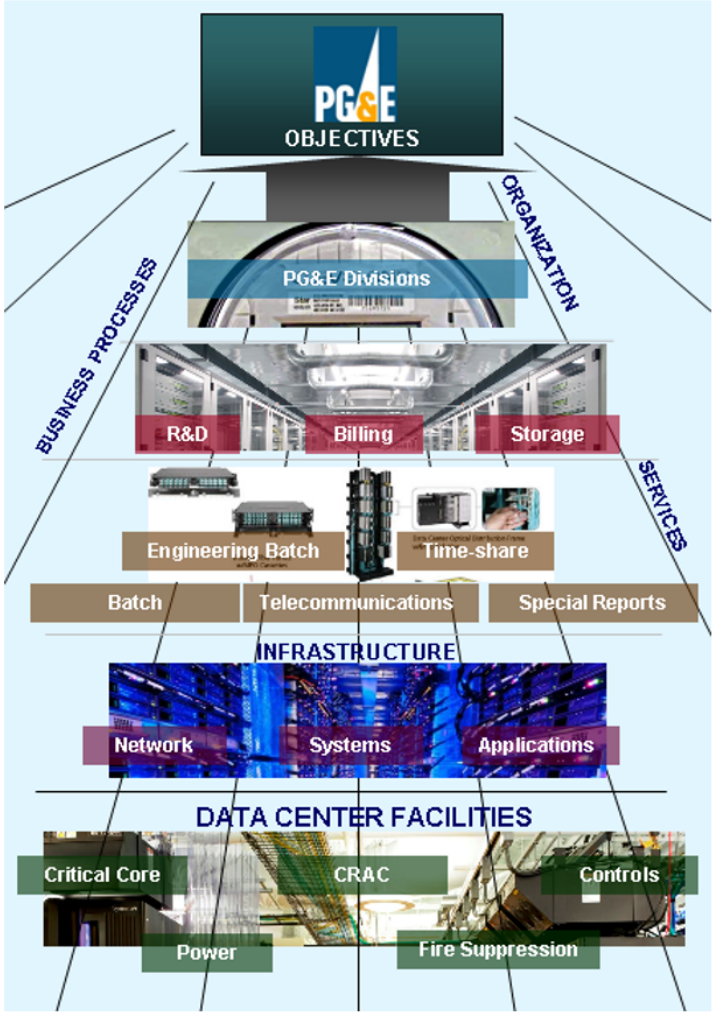


Figure A1-1: Data Centers Provide the Foundation for PG&E's Business Operations

Critical Infrastructure:

- *Protects systems to minimize the impact of disruptions.*

Critical infrastructure disciplines include:

- *Data protection*
- *Availability of services*
- *Privacy and data security*

Critical infrastructure design incorporates:

- *Technical design and architecture*
- *Protection and controls*
- *Equipment selection,*
- *Capacity planning*
- *Technical infrastructure*
- *Telecommunication sizing and connectivity*
- *Software*
- *Applications, utilities and technical tools*
- *Location and layers of protections from physical, human error, human malicious intent and cyber security*
- *Manages demand and optimizes supply in the provision of documents, records and assets*

There are tiers of infrastructure in a data center – security, network, storage, and application delivery – and each is part of a system critical to business operations. PG&E's two existing data centers are 25 to 30 years old and facing significant increases in demands of their operations and capacities, partly through the continued growth of the California utilities market but also through the emergence of power-intensive technologies, including:

- MobileConnect (formerly Enterprise Mobile)
- Engineering and Operations Smart Grid Infrastructure
- Energy Delivery Work Management
- Risk Management Controls Infrastructure

Increases related to Fabrication, Assembly, Integration, and Test (FAIT) programs are necessary to meet the needs of PG&E's lines of business by designing, developing and implementing new systems and technologies that support continued automation of business functions and processes.

PG&E's FFIOC primary enterprise data center is a "mission critical" facility with regard to the management of data and communications traffic. While the FFIOC has undergone upgrades and modifications since it was established there are basic elements of the site's design that are now obsolete. It is, for instance, near capacity for power and cooling and without the capability of handling anticipated future requirements.

PG&E's 30-year old site (SFIOC) is used as a disaster recovery site for the FFIOC. The SFIOC provides limited redundancy and has insufficient power and cooling capacity to handle the load were the FFIOC to fail. Moreover, the SFIOC is inefficient with a Power Usage Effectiveness (PUE) rating of 2.5, well below current industry standard. The SFIOC is located in the basement of a 32-floor high-rise building, while the mechanical cooling system is situated on the roof, creating significant cooling inefficiencies. Currently excepted best practices in the industry cannot be used do the inadequacies of the center's design. Both sites are subject to flood and earthquake risks. The SFIOC is further subject to security concerns.

For an organization to be resilient it must understand the nature of the information it is storing and the value the information has to the organization.

GOOGLED:

"In each (Google data center) cluster's first year, it's typical that 1,000 individual machine failures will occur; thousands of hard drive failures will occur; one power distribution unit will fail, bringing down 500 to 1,000 machines for about 6 hours; 20 racks will fail, each time causing 40 to 80 machines to vanish from the network; 5 racks will "go wonky," with half their network packets missing in action; and the cluster will have to be rewired once, affecting 5 percent of the machines at any given moment over a 2-day span. And there's about a 50 percent chance that the cluster will overheat, taking down most of the servers in less than 5 minutes and taking 1 to 2 days to recover." – From a 2008 presentation by Google Fellow Jeff Dean

Both of PG&E's primary data centers are significantly below enterprise data center norms in terms of design, age, facility staffing levels and operations processes and procedures.

1.1. Consequences of Downtime

Data center problems have major impacts on revenue and customer satisfaction. With regard to the FFIOC and SFIOC vulnerabilities, downtime to the critical infrastructure supporting either site could impact:

- Electric and gas control systems such as SCADA
- Energy Management System (EMS) and gas control
- Systems controlling the electrical grid and gas supply for Northern California

1.2. Data Center Complexity

While data center facilities may be described as "giant hair dryers", in terms of using energy and producing heat, they are complex facilities with respect to their many parts and functions. Moreover, they are always a work in progress, constantly readapting to changes in technology and service demands.

Installation and integration of these data center assets is of critical importance to the management of disruptions and the efficient integration of system functions.

PG&E's approach to the complexities of developing, operating and maintaining a resilient, robust data center that can handle future requirements is to use a design process that is based on modular construction.

By building the data center in phases, PG&E can achieve the flexibility required to incorporate the newest technologies at the times that build-outs occur.

PG&E's objective is to build two new data centers as Tier 3 "green" production centers. A key feature is redundant, high availability demand, with critical systems and applications running simultaneously at both sites. This allows for both data centers to be used ruing peak demand, providing the capability to perform system maintenance without system downtime.

1.3. Risk Factors for Data Centers

Data centers are exposed to risks of natural, human and data network origin. Table A1-1 provides lists of risk examples from the three most common risk categories. It also illustrates, for example purposes, how levels of risks for the FFIOC and SFIOC might be identified and ranked to help guide data center design.

PLANNING / DESIGN WORKSHEET A-1

Section A-1 – General Objectives in the Design of the Replacement Data Centers

Key Issues / Must be Addressed:

Alternatives:

Potential Risk:	Probability = P Impact = I			Risk Mitigation Approach
	Lo	Med	Hi	

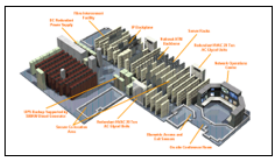
8

1-1: Risk Examples for PG&E's Data Centers

n	Examples of Risks	Probability = P Impact = I Lo	Med	H
ral	▪ Fire		P	I
	▪ Heat			PI
	▪ Cold	PI		
	▪ Water / Flood			PI
	▪ Earthquake			PI
	▪ Air Pollution / Contamination		P	I
	▪ Electro Magnetic Fields	P	I	
	▪ Power Failure	P		I
an	▪ Vandalism	P		I
	▪ Human Error	P		I
	▪ Sabotage	P		I
	▪ Terrorism	P		I
ork	▪ Network Saturation		P	I
	▪ Hackers		P	I
	▪ Virus			PI
	▪ Virus			PI

Identifying risk potentials is an important aspect of data center siting (location), architectural and engineering design. Each alternative site is analyzed in the context of its implications with regard to risk exposures.

Site alternatives must include analysis of topography, flood plain, air quality, prevailing weather conditions, and proximity to electro magnetic fields.



Media Razor Data Center

TIA 942 Standard – Data Center Spaces:

The Entrance Room (ER) is defined as the location of interface with campus and carrier entrance facilities. The Computer Room includes:

- ***Main Distribution Area (MDA)*** *– location of main cross-connect (MC)*
- ***Horizontal Distribution Area (HDA)*** *– location of horizontal cross-connect (HC)*
- ***Zone Distribution Area (ZDA)*** *– location of zone outlet (ZO) or consolidation point (CP)*
- ***Equipment Distribution Area (EDA)*** *– location of equipment cabinets and racks*

3.1 Facilities Requirements

The data center is a multi-function facility that must accommodate a variety of specialized activities and purposes.

Table A3-4 provides an overview of the areas within a data center and how functional requirements must be aligned with capacity.

Table A3-4: Facilities Requirements

Area	Purpose	Requirement
Holding	Receipt of goods, unpacking and inspection, preparation for movement to the Staging area	▪ Easy access via loading bay and route to staging area ▪ Spacious ▪ Proper garbage disposal ▪ Secure
Staging	System acclimation, inspection, configured (hardware and software), safe testing	▪ Separate and secure space ▪ Separate network if possible ▪ Separate power supply ▪ Environmentally controlled and monitored ▪ Fire protection and other safety
Computer/ Server Room	Safe production environment for systems run on 24x7 basis with minimal risk of interruption	▪ Separate and highly secure ▪ Protection and control of power quality ▪ Environmentally controlled and monitored ▪ Low EMF radiation levels ▪ Fire protection and other VESDA safety measures
Media Storage	Safe, secure and conditioned environment for documentation, tape, CD-ROM controlled storage	▪ Separate and secure ▪ Environmentally controlled and monitored ▪ Fire protection and other VESDA safety measures ▪ Shelter or Bunker

Area	Purpose	Requirement
UPS Room	24x7 Operation of Power Protection and Conditioning systems	▪ Separate and secure ▪ Environmentally controlled and monitored ▪ Fire protection and other VESDA safety measures
Battery Room	Battery storage	▪ Separate from UPS Room ▪ Secure ▪ Environmentally controlled and monitored ▪ Fire protection and other VESDA safety measures ▪ Vented
Service Corridor	Secure access from which supporting facilities can be serviced and monitored 24x7 without disturbing data center operations	▪ Separate and secure ▪ Environmentally controlled and monitored ▪ Fire protection and other VESDA safety measures
Standby Generator Set Room	Generator Set is located for safe operation with minimal disturbance	▪ Separate and secure ▪ Fire protection and other VESDA safety measures ▪ Fuel tanks (preferably underground, i.e., UST)
Meet Me / Handover Room	Carrier handover point, 24x7 operation with minimal risk of interruption	▪ Separate and secure ▪ Protection and control of power quality ▪ Environmentally controlled and monitored ▪ Fire protection and other VESDA safety measures
Security Room	Security functions on 24x7 basis	▪ Separate and secure ▪ Protection and control of power quality ▪ Fire protection and other VESDA safety measures
Network Operations Control and Command Center	Information and Communications Technology (ICT) infrastructure monitoring on 24x7 basis	▪ Separate and secure ▪ Protection and control of power quality ▪ Environmentally controlled and monitored ▪ Fire protection and other VESDA safety measures

Table A3-4: Facilities and Requirements (cont)

Design Considerations

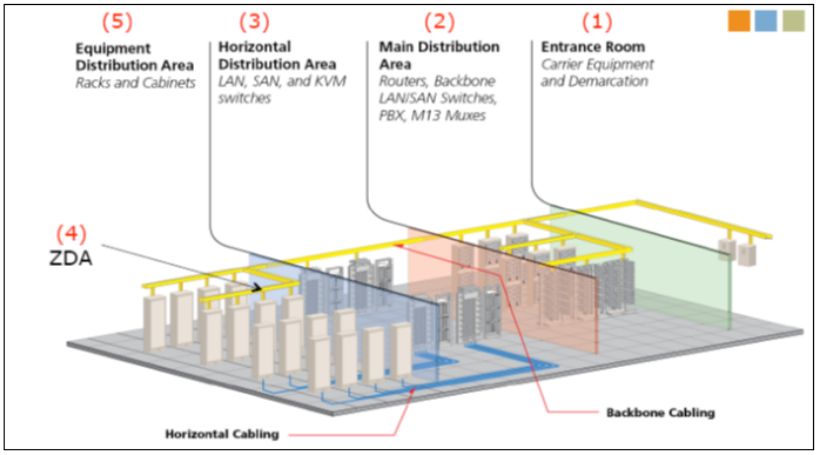


Figure A1-4: Data Center Spaces *(illustration from ADC's Optical Distribution Frame)*

3.2 Computer Room IEEE 802.3 HSSG Entrance Requirements

- Min clear height of 2.6m/8.5 ft
- Min door size 1m/3ft wide 2.13/7ft high
- Min dist floor loading 7.2 kPA/150lbf/ft2, recommended min 12 kPA/250 lbf/ft2
- 20 degrees C to 25 degrees C
- 40% to 55% relative humidity (reduces ESD)
- Any sprinkler systems must be pre-action system
- Common bonding network (CBN) – equipotential ground reference

3.3 Main Distribution Area (MDA) IEEE 802.3 HSSG Requirements

- Location of Main Cross-Connect (MC), the central point of distribution for data center structured cabling system
- Centrally located to avoid exceeding maximum distance restrictions (typically for E-1s, E-3s, T-1s and T-3s)

1. Scalable Network Infrastructure

Published in early 2005, the Telecommunications Industry Association's TIA-942 provides a Telecommunications Infrastructure Standard for Data Centers. The primary purpose of the standard is to provide a comprehensive understanding of the data center design including the facility planning, the cabling system, and the network design.

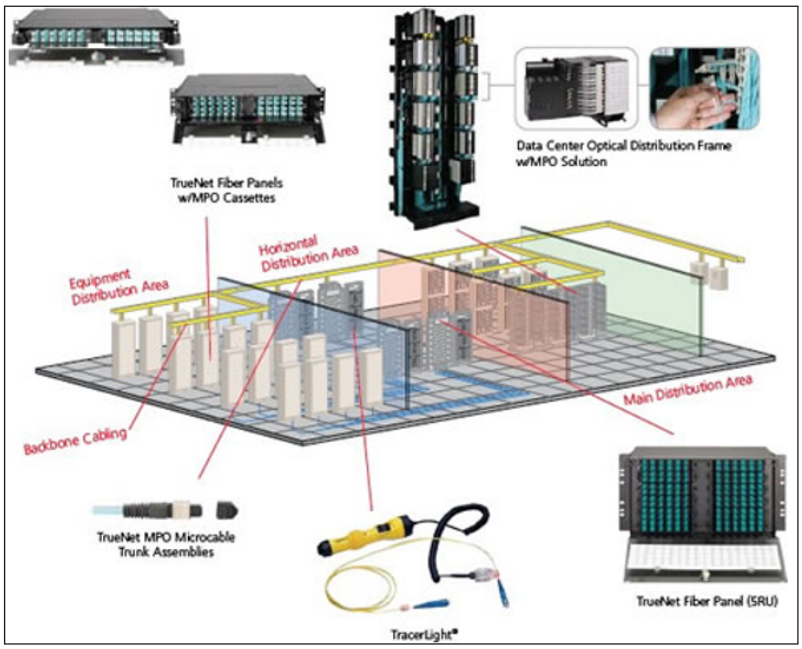


Figure B1-6: Data Center Distribution Network

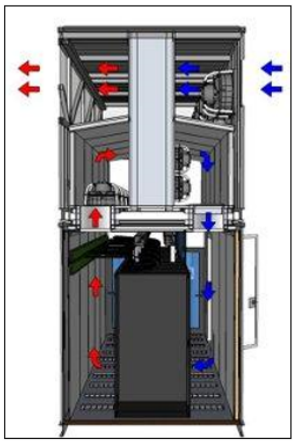
Published in early 2005, the Telecommunications Industry Association's TIA-942 provides a Telecommunications Infrastructure Standard for Data Centers. The primary purpose of the standard is to provide a comprehensive understanding of the data center design including the facility planning, the cabling system, and the network design.

In parallel and subsequent to the development of TIA-942, the IEEE 802.3 Ethernet working group published two twisted-pair copper standards, 1000 Mb/s Ethernet designated 1000BASE-T and 10 Gb/s Ethernet (10 GbE) designated 10GBASE-T, both

2. Data Center Floors and Ceilings

The issue of whether it is best to run power, data connections and cooling into a data center by routing from above through a suspended ceiling system or from below using a raised floor system, has become subject of considerable debate in recent years.

The change agent in the discussion has been the development of the POD design, discussed in Section 4. This concept, pioneered by Google and implemented in 2005, provides for complete modularity of integrated data center components, including computer networking, power and cooling systems.



Innovations in POD modular design have devised air circulation solutions that have obviated the need for traditional and expensive raised floor design. They have changed the focus from the seismic risk and maintenance requirements of raised floors to issues regarding pad strength and the means to move heavy equipment (Pods).

The design above, from Thor Data Center Technology (with AST) of Spain, stacks an air chiller pod above a rack pod to create a complete environment.

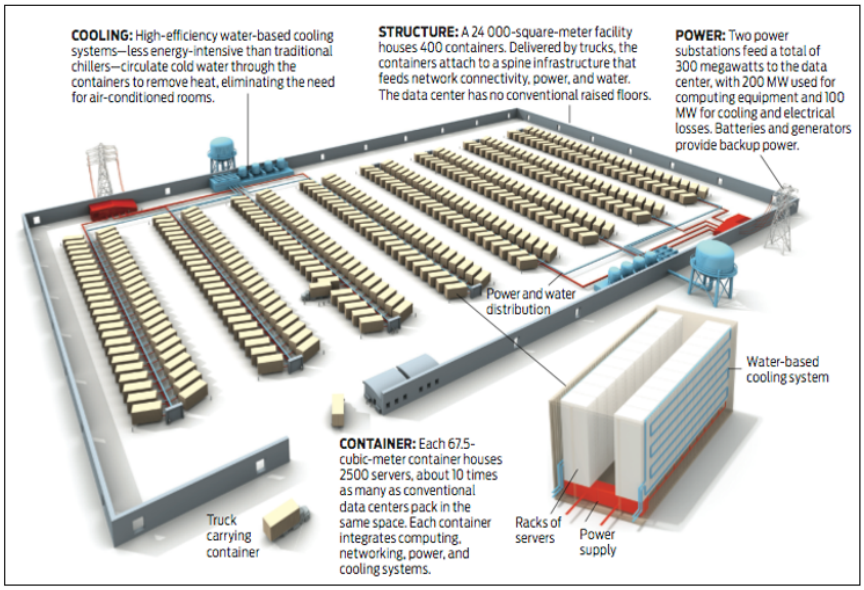


Figure B2-12: Air Circulation in a Million Server Data Center

▼*Utility Power In*

***DATA CENTER POWER INFRASTRUCTURE: Transfer Switch*▼**

***Generator Power*▼**

***Emergency Bus*▼**

***UPS – Mechanical - Lighting*▼**

***Critical Data Center*▼**

4. Power Infrastructure

PG&E's data centers are essentially commercial customers of PG&E's own power generation and distribution network, which is depicted in Figure B4-14.

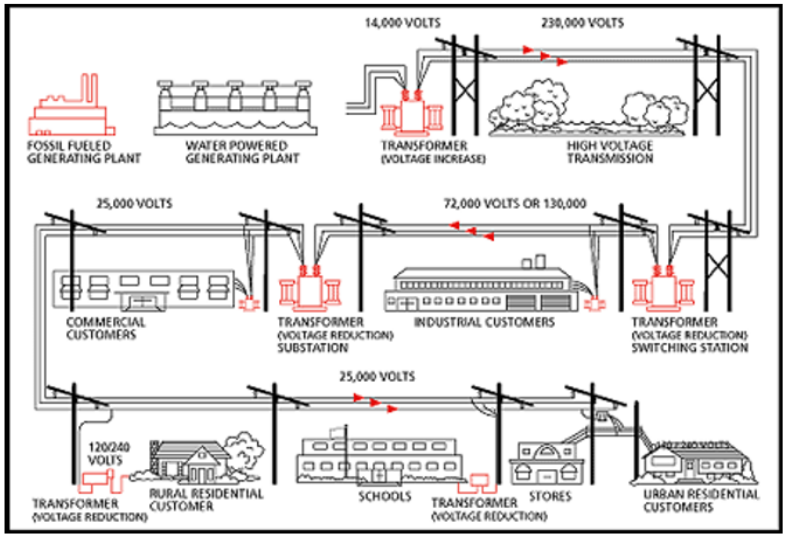


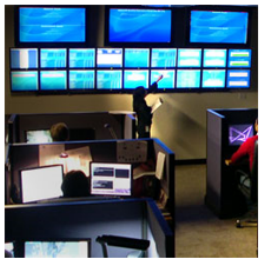
Figure B4-14: Power Supply *(Illustration fromsaskpower.com.)*

As with any large consumer of electrical energy, the PG&E data center is tasked with managing a 25 kV supply.

Power enters the facility from the utility supply and is routed through a transfer switch to an emergency bus, where it is distributed for the mechanical load, the lighting load, and most importantly to the Uninterrupted Power Supply (UPS) system. The UPS provides a redundant power supply that must be sized efficiently to maintain the critical IT load long enough for generator power to kick in. Sizing for power requirements is discussed in this section.

Figure B4-14 provides an overview of power supply and distribution within a data center. A sequence of key components is also shown in the left column of this page, showing the types of equipment designed for distributing, managing and generating power supplies.

Network Operations Center - NOC *(Solo Computer Services Facility)*



NOC in San Francisco. *(Serve Path Facility)*

8 Data Center Monitoring

The Network Operations Center (NOC) is typically situated near the center of the data center facility. There, certified systems administrators and network engineers, working in shifts to ensure continuous (24/7/365) staffing, monitor screens displaying real-time detail on network traffic and performance, power, temperature, security systems, services, applications, known vulnerabilities and RAID array status.

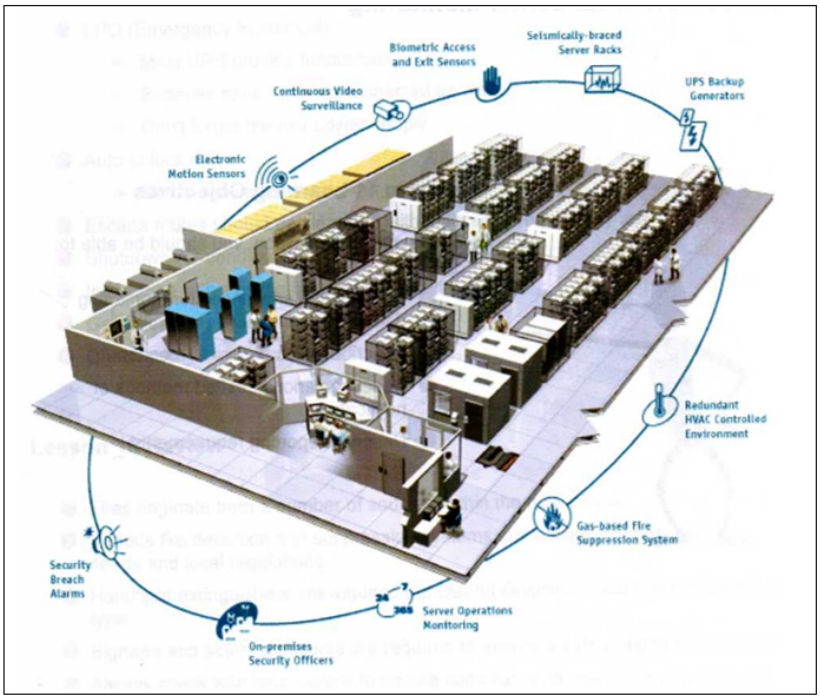


Figure B4-39: Multiple Risks to be Monitored in a Data Center

The variety and complexity of monitoring points in a data center are illustrated in Figure B4-39. Monitoring and managing data center facilities is of critical value to system availability, protecting human life and valuable physical assets from damage, protecting data, and ensuring continuity of business operations and production.

The monitoring systems should also create a history of alarms and trending data for analysis.

CALIFORNIA AIR RESOURCES BOARD

California Environmental Protection Agency
AIR RESOURCES BOARD

DRAFT

California Cap and Trade
Market Tracking System (CCTMTS)

Feasibility Study Report

California Air Resources Board
Research Division
Research & Economic Studies Branch
1001 I Street
P.O. Box 2815
Sacramento, CA 95812

April 15, 2010

Draft

California's historic Cap & Trade system was among the first such systems established, following the United Nation's 2005 Kyoto Protocol. Today there are sixty-four such carbon pricing initiatives around the world.

Consulting firm KPMG committed an engagement team to work with subject matter experts from the California Environmental Protection Agency's Air Resources Board to establish a greenhouse gases Cap & Trade system as mandated by a legislative action (Assembly Bill 32), signed during the Gov. Schwarzenegger administration. Rick Rice was hired to develop the feasibility study to determine execution alternatives.

ROLE:

- Analyzed existing ARB resources
- Conducted interviews with climate scientists
- Investigated existing carbon trading systems
- Identified and ranked alternatives for establishing a carbon trading program

KEY INFORMATION

- Rick Rice developed the initial feasibility study

Excerpt Follows

3. Business Case

This Business Case involves the role of the Air Resources Board (ARB), a department within the cabinet-level California Environmental Protection Agency (Cal/EPA), and its capacity for continuing its mission of energy conservation and environmental stewardship pursuant to the mandates of California State Assembly Bill (AB) 32, and ARB's ability to implement a "cap-and-trade program."

AB 32 is the landmark California Global Warming Solutions Act of 2006, was signed by Gov. Arnold Schwarzenegger to advance clean renewable energy and other solutions to lower California's Greenhouse Gas (GHG) emissions. Because of their continued leadership in implementing regulations to reduce air pollutants and their effects on the public and the environment, ARB was designated as the primary California governmental department responsible for the programs designed to combat climate change and meet the objectives of AB 32.

AB 32 directed ARB to design measures that achieve real, quantifiable, cost-effective reductions of GHG emissions and return California to 1990 levels by the year 2020.[1] This targeted level is estimated to be 33 percent lower than can be expected if emission rates of "covered entities" (discussed in Section 5 – Proposed Solution) continue down a business-as-usual path without change for the next 10 years.

This is a significant challenge to ARB, for in the details of complying with AB 32 there exist a confluence of drivers that have state and regional, and even national and international implications and influences. These include diverse points of view among stakeholder groups, including the public, business, government, and political organizations.

3.1.2. Assembly Bill 32 – California Global Warming Solutions Act of 2006

As described above, AB 32 is the primary legislation driving the California Air Resources Board's actions to reduce GHG emissions. AB 32 directed ARB to design measures that return California to 1990 levels of GHG[4] emissions and includes a number specific requirements:

- ARB shall prepare and approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions from sources or categories of sources of greenhouse gases by 2020.
- Identify the statewide level of greenhouse gas emissions in 1990 to serve as the emissions limit to be achieved by 2020
- Adopt a regulation requiring the mandatory reporting of greenhouse gas emissions.
- Adopt regulations by January 1, 2011 to achieve the maximum technologically feasible and cost-effective reductions in GHGs, including provisions for using both market mechanisms and alternative compliance mechanisms, to become operative on **January 1, 2012[5].**
- Identify and adopt regulations for discrete early actions that could be enforceable on or before January 1, 2010
- Adopt rules and regulations in an open and transparent public process.
- Monitor compliance with and enforce any rule, regulation, order, emission limitation, emissions reduction measure, or market-based compliance mechanism adopted by the state board, pursuant to specified provisions of existing law.
- Minimize the administrative burden of implementing and complying with the regulations.

AB 32 Climate Change Scoping Plan: Beyond developing discrete early actions to reduce GHG emissions, AB 32 directed ARB to prepare a scoping plan to explore and identify the best mechanisms for reaching the 2020 emissions target.

The Scoping Plan[6], adopted by ARB in December 2008 following a period of public review and comment, provides a framework for achieving the goals of AB 32, which include:

- Expanding and strengthening existing energy-efficient programs including the standards that apply to buildings and appliances

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[4] Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6)

[5] HSC §38562(a)

[6] http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm

- Achieving a statewide renewable-energy target for load serving entities of 33 percent by 2020
- Developing a California cap-and-trade program that links with other Western Climate Initiative (WCI) partner programs to create a regional market system
- Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets
- Adopting and implementing measures that were already in progress, including California's clean-car standards, goods-movement measures, and Low Carbon Fuel Standard

Cap-and-Trade: Building on the direction of the adopted Scoping Plan, ARB staff is currently developing the cap-and-trade regulation. This regulation establishes an emissions trading program and puts a cap on the total emissions generated by facilities covered under the system. The regulation requires entity's hold and submit emissions allowances, or permits to emit one ton of GHG. Because the number of allowances in the cap-and-trade program is fixed, the cap-and-trade approach provides a measure of environmental certainty about the total quantity of GHG emissions released from the covered emitters.

Emitters would receive allowance permits directly from the State or by purchase from an auction or an open market; allowances can be valued and traded through processes similar to those used in the transaction of financial stocks and bonds. Likewise, the State would require the registration of offset credits that are sold and purchased for use by regulated entities. Emitters would submit allowances and offset[7] credits, together referred to as compliance instruments, to ARB in amounts equal to their reported emissions at the end of the compliance period. To implement the system, ARB would create the allowances and issue the offsets. ARB would verify and enforce the GHG reductions resulting in offset credits and track their ownership. Over the course of the cap-and-trade program, the number of allowances in the system is scheduled to decline over time, thereby reducing California's allowable GHG emissions and bringing the State closer to our AB 32 goal of 1990 emissions levels by 2020.

California Cap-and-Trade Market Tracking System: The cap-and-trade regulation will require entities to provide information directly to ARB regarding ownership and submittal of compliance instruments; it will also require the acquisition of information on transactions between market participants. Some participants submitting information could be entities that do not have compliance obligations or that are not located within California. In addition to tracking cap-and-trade compliance obligations of entities, ARB would be responsible for tracking information

[7] An offset is defined as: means a tradable compliance instrument issued or approved by ARB that represents a GHG reduction or removal enhancement of one metric ton of CO2e.

regarding large volumes of compliance instrument transactions occurring as a result of the regulation. This data collection and administrative implementation is termed the California Cap-and-Trade Market Tracking System (CCTMTS). The CCTMTS needs are discussed further in Section 3.2.X

The remainder of this section describes ARB's progress on putting into practice the direction of AB 32 and the Scoping Plan, specifically focused on the current GHG reporting system and the cap-and-trade program to be supported. This includes the key business problems that the project will address, expected results to be achieved through the implementation of the proposed solution, and the business functional requirements for a new system.

3.1.3. Established Greenhouse Gas Strategy and Process

ARB currently monitors the GHG emissions of about 600 "covered entities" under the GHG Mandatory Reporting program. Operators of stand-alone Cogeneration or Electricity Generation facilities and General Stationary Combustion facilities (except oil and gas, NAICS 21111) who emit over 25,000 metric tons of carbon dioxide (CO_2) are required to report their emissions of GHG every year on April 1.

Each covered entity is responsible for contracting with an accredited verifier to perform audit and verification of their emissions reports. Verification reports on emissions from power producers are due by October 1. Other reporting sectors, including cement plants, oil refineries, hydrogen plants, and electricity retail providers and marketers, must report by June 1, with verification due by December 1.

ARB currently provides a Web-based Mandatory Reporting Tool, managed by the Planning and Technical Support Division (PTSD), that provides for registration of entities, submittal of emissions reports, and data query. The database for the Mandatory Reporting Tool is hosted off site in San Jose by DataPipe, a company owned by PQA.

PTSD administrators have access to the database information using SQL database query command program language. Select ARB staff has access (via operator accounts and VPN connection to the hosting facility) to a database copy which is run nightly for PTSD's use in running database query commands to generate specific data analysis. There are no automatic reports generated unless you use the SQL command language along with associated table views of the database fields.

According to CARB, California’s greenhouse gas emissions in 2019 were 5.3 percent below 1990 levels, meeting and exceeding the 2020 target four years ahead of schedule. The cap and trade program contributed to this achievement by covering about 80 percent of the state’s emissions and providing a price signal and flexibility for regulated entities to reduce their emissions cost-effectively.

CALIFORNIA OFFICE OF INFORMATION SECURITY

California
Office of Information Security & Privacy Protection
(OISPP)

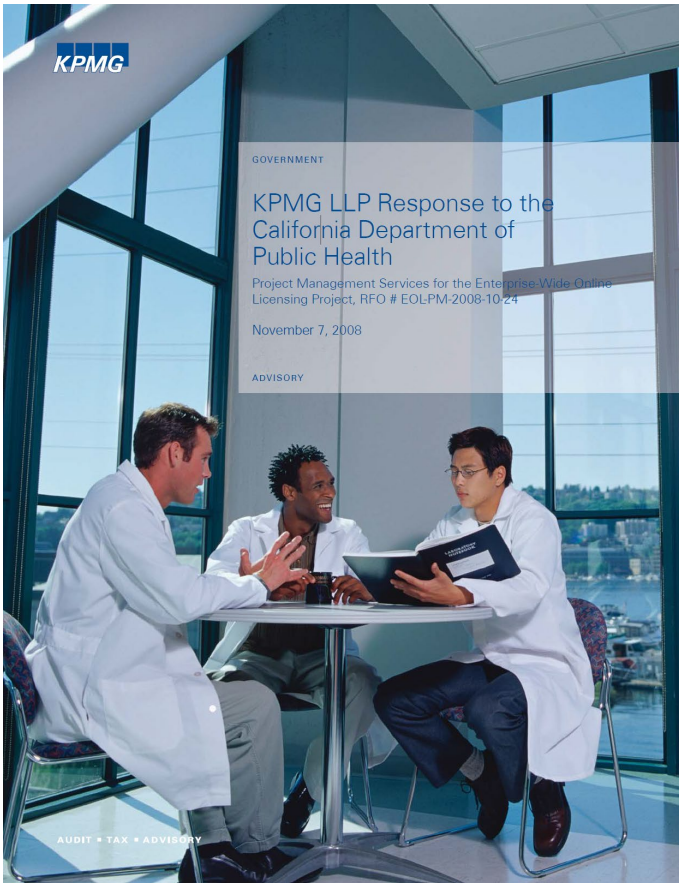
Regulatory Guideline Report

The California Office of Information Security & Privacy Protection (OISPP) mission is to unite consumer privacy protection with the oversight of government's responsible management of information, in order to ensure the trust of Californians.

ROLE:

- Documented an enterprise-wide approach and mechanism for the management of information security incidents consistent with statutory mandate, vision, mission, and business requirements
- Documented a method to generate timely alerts and supplemental notifications across state and local governments and higher education based on the type of incident and level of threat it poses.
- Documented a method to produce management reports identifying significant statewide trends and observations.
- Documented a method to push early alert warning information out to other state agencies possessing a need to know (Office of Homeland Security, Regional Terrorism Threat Assessment Center, etc.) and other states through the Multi-State Information Sharing and Analysis Center (MS-ISAC)

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH



KPMG provided Project Management Services for California Department of Public Health Enterprise-Wide Online Licensing project**,** which created a scalable, web-based, off-the-shelf software product with a centralized database to contain licensing, enforcement, and billing data for CDPH's applicable licensing programs. It provided interfaces to other CDPH external business systems.

ROLE:

- Developed a Project Work Plan, Project Management Plan, a phased development structure (Procurement Phase, SPR Phase, and DD&I Phase)
- Developed a Special Project Report (SPR) on implementation of the system

PROPOSALS

I have worked extensively as a proposal manager and writer. Most of my experience has been in the AEC sector, with a range of civil engineering projects (transportation, environmental), power generation, and mining contracts. I have experience with federal government contracting (Department of Defense, Department of Energy, General Services Administration) as well as other public and private contracting.

I have expertise in:

- RFx analysis – probability of win assessment
- Development of win strategies
- Development of compliance matrices
- Authorship of cover letters, firm profiles, technical approach, key personnel profiles and resumes, and relevant experience sections
- Data gathering through SME interviews
- Data gathering through secondary research
- Building and organizing proposal teams
- Managing proposal review and revision processes (Shipley – Red, Green, Gold)
- Document design and development
- Editing and rewrite

Following are examples of the proposals I have developed or been involved with developing.

CIVIL/ENVIRONMENTAL

Hamad International Airport – Qatar

Bechtel provided engineering, project management, and construction management services for Hamad International Airport in Qatar. The $16 billion project replaced Doha International Airport, and was the first airport to take incoming flights of the gigantic A380 Airbus. The airport was home to the airline's inaugural A380 service.

ROLE:

I was part of the large proposal team that won that contract. My work:

- Assembled Bechtel experience statements relative to airport projects to develop the initial relevant experience and approach sections of the submittal
- Assisted with the development of relevant experience and key personnel resumes
- Provided technical edit of all sections
- Provided quality assurance of all sections
- Assisted with special packaging for international delivery

I worked for Bechtel from 2000 to 2005, assisting with proposal development, development of feasibility studies, assisting with technical editing, and developing Project Management and Work plans.

Apple Park – Cupertino, California

Granite Construction played a key role in the development of Apple Computer's unique Cupertino, California campus. Granite performed utility relocation and road widening during the construction process.

ROLE:

- Developed the proposed Project Execution Plan
- Developed the proposed Quality Management Plan

Implementation of the QC Inspection and Test Plan

Granite's QC personnel will adhere to the three-phase control system for all work aspects. A Granite quality control representative will be onsite at all times during work progress and possess the authority to take any action necessary to ensure the work product is fully task order compliant.

Three Phases of Control

The Preparatory Phase will include performing the following tasks prior to beginning items of work:

- Review all applicable specifications.
- Review drawings.
- Assurance check that all materials/equipment have been tested, submitted, and approved.
- Review provisions for control inspection and testing.
- Examine work area for compliance.
- Inspect required materials, equipment, and sample work for conformance.
- Review hazard analyses and ensure that safety requirements are met.
- Discuss procedures for controlling quality of work.
- Ensure that work to be performed has been agreed to by Apple as discussed at the Pre-Activity Meeting(s).
- Discuss impending initial control phase.
- Apple notification, beginning of the preparatory control phase.

EXECUTION PLAN

Managing Work

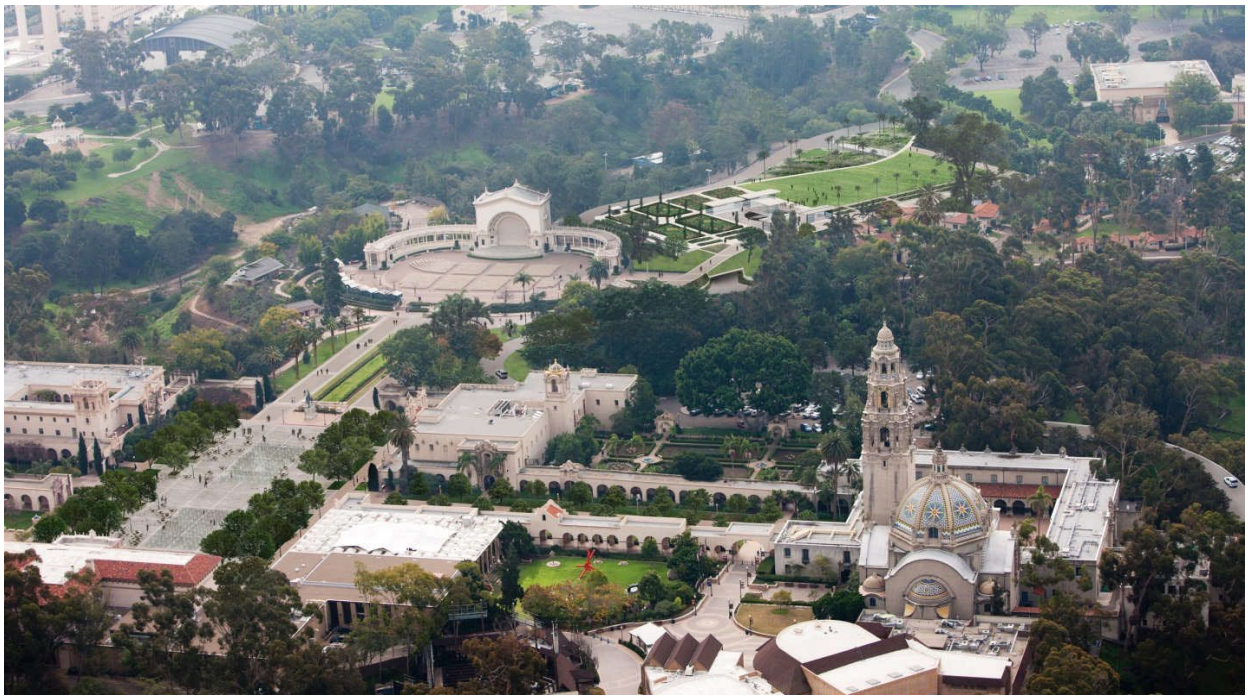
Granite organizes our projects through the development of a detailed *Work Plan* and *Quality Management Plan (QMP)*. These identify the individual elements or set of tasks involved in project execution, the persons responsible for each, the schedule for completion, and their quality management testing requirements, including check and hold points.

Coordinating Work

On a horizontal level, Granite's Project Manager, Construction Manager, Field Superintendent, Project Engineer and field personnel all work side-by-side to ensure performance in project quality and worker safety. On a vertical level, Granite is organized in a hierarchy structure, with increasing levels of responsibility given to the personnel at the higher reaches of the structure. This isolates, for review and monitoring purposes, those tasks that must be accomplished by individuals at each level of our organizational structure. Granite's communications are customized to provide the information required at each level of the organization. All project objectives and activities are integrated into the work plan, with the responsibilities for project execution spread across the project organization in accordance with the roles assigned to each member of the team.

I worked as a proposal manager and writer with Granite Construction from 2009 to 2014.

Plaza de Panama Project, Balboa Park – San Diego, California



Granite Construction proposed 2015 100-year Centennial Celebration of the Park. Granite recognizes this critical milestone and we confidently provide you with our proposal for construction services to open the Park on time to celebrate the New Year 2015.

ROLE:

- Provided proposal writing

Granite has performed $11.2 billion in Design-Build work over the past 15 years, and over the past five 5 has completed $139.6 million in Construction Manager-at-Risk (CMAR), and $568 million in Construction Manager / General Contractor (CM/GC) contracts. These alternative delivery projects – which put significant focus on client partnering, quality-governed design progression, value engineering, constructability, earned value management, risk management, critical path scheduling, maintenance of traffic planning, and project controls – have developed core competencies within Granite with respect to managing delivery of complex services such as will be required for KCM Group on this contract.

Construction Management

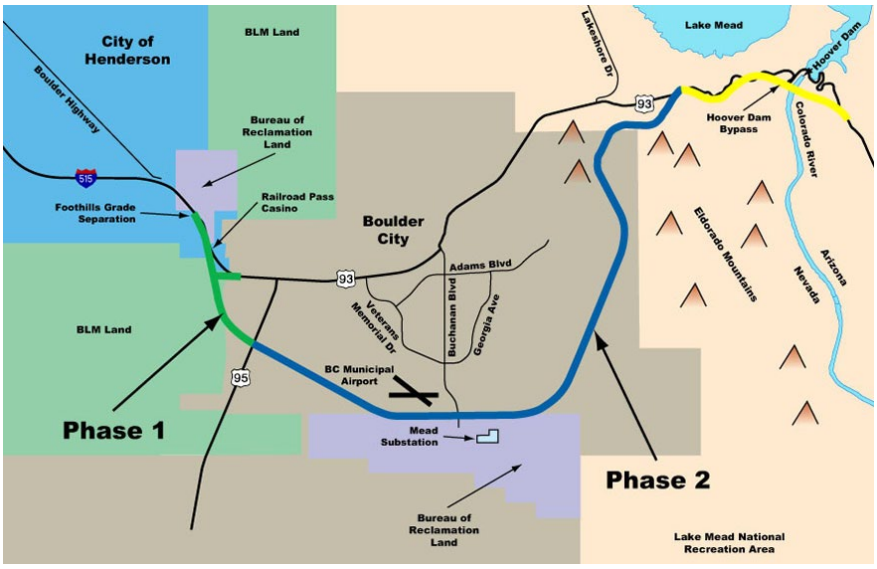
Our team will be led by David A. Donnelly, San Diego Area Manager. David brings over two-decades of experience in construction, project estimating, quality, safety, materials, and environmental management. He will maintain direct management and oversight of the project. Granite's management team will also include and be supported by dedicated project managers with combined 175-plus years of relevant construction experience. Jim Queener, Construction Manager will be dedicated to the project and will coordinate with the Estimators, Project Managers, Project Engineers, and Construction Superintendents assigned to the project.

3 Approach to the Work

Project Understanding

Balboa Park has had a rich history in San Diego for nearly one hundred years, having played host to International Expositions, countless celebrations of life, science and the arts, and having served its country as a hospital and training grounds for the US Military. The Plaza de Panama, West El Prado Plaza de California and Esplanade were initially constructed as open space intended for pedestrian use. These pedestrian open spaces were later converted for use as vehicle thoroughfares and parking areas. The purpose of this project is to return the Plaza de Panama, West El Prado Plaza de California and Esplanade to their historic use as pedestrian open space. This project will also expand open space available to visitors by creating 2 acres of park space atop a new three level parking structure. This parking structure, combined with renovations to the Alcazar Parking lot to expand available handicap parking, improved access via the new Centennial Bridge and Centennial Road, and more efficient use of tram service will allow Balboa Park to better accommodate its approximately 12 million annual visitors. The Balboa Park Plaza de Panama Project will be completed prior to the Centennial anniversary of the Panama-California Exposition that helped to establish Balboa Park as a park of national prominence.

I-11- BOULDER CITY BYPASS PROJECT – PHASE 2



Granite Construction pursued and won this complex transportation project in Nevada, a major 12.5-mile roadway project in the Mojave Desert southeast of Las Vegas, Nevada. It was the second segment of Interstate 11 (I-11) from US-95 to US-93 near the Hoover Dam Bypass Bridge, and was interesting in that it involved a Public-Private-Partnership (PPP) approach. Granite provided technical approaches for PPP and Design-Build alternatives, including plans for financing, design, construction, operations and maintenance.

ROLE:

- Provided proposal writing

Granite has performed $11.2 billion in Design-Build work over the past 15 years, and over the past five 5 has completed $139.6 million in Construction Manager-at-Risk (CMAR), and $568 million in Construction Manager / General Contractor (CM/GC) contracts. These alternative delivery projects – which put significant focus on client partnering, quality-governed design progression, value engineering, constructability, earned value management, risk management, critical path scheduling, maintenance of traffic planning, and project controls – have developed core competencies within Granite with respect to managing delivery of complex services such as will be required for KCM Group on this contract.

Project Delivery Method

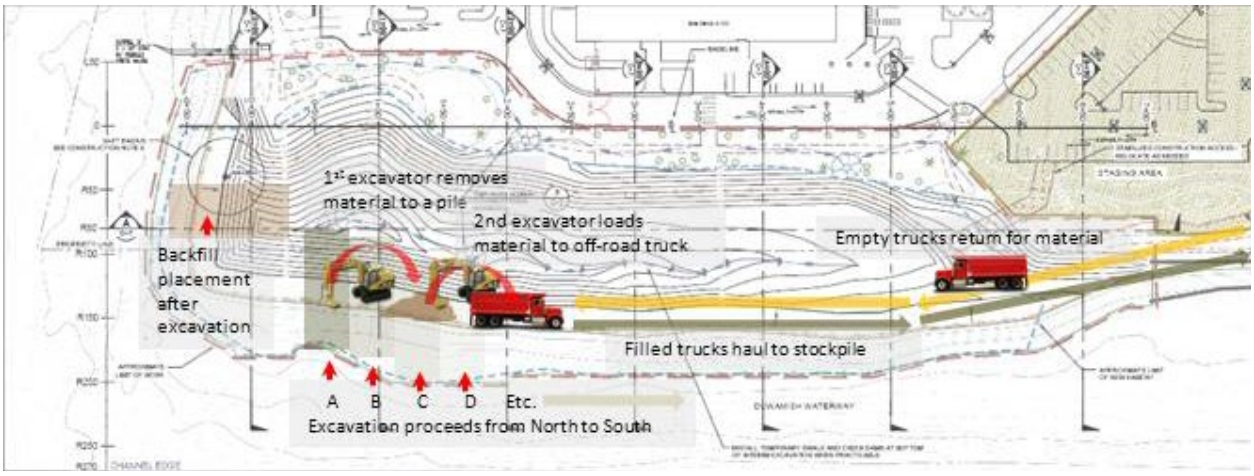
PPP-developed toll roads exist, or are under development, other than in Nevada, in Arizona, California, Florida, Georgia, Texas, and Virginia, i.e., those states that have passed enabling legislation.

PPP operations reduce the amount of public capital required, with equity investors providing a portion of the funding. The typical funding structure for PPP operations has been around 20 percent equity capital, and 80 percent bond debt. Equity investors risk that toll revenues will not meet what will be required to return their investment, though that seems unlikely in the tourist-rich Boulder City recreation area. The general expectation is that a funding base of equity plus debt is better able to withstand the high-risk early years of a toll road's life, because of the willingness of the equity investors to bear risk in anticipation of future gains.

From a design perspective, revenue sharing in the PPP model may allow for a larger, more elaborate project, as may be appropriate for a project with this profile. Design amenities may greatly improve the travel experience, and in future years the public will almost certainly receive a share of the revenue as a return on the government's up-front investment in the project.

I developed a Granite Construction guide to complex contracting mechanisms, including Design-Build (D-B), Public Private Partnerships, Construction Manager-at-Risk (CMAR), and Construction Manager/General Contractor (CM/GC) vehicles.

Boeing – Duwamish River Shoreline



Granite Construction pursued this Boeing project, which restored the shoreline along the Duwamish River paralleling their Seattle production facilities.

ROLE:

- Provided proposal management and writing
- Coordinated project teams

South Shoreline: Approximately 39,000 cubic yards of material will be excavated from the South Shoreline Area (Figure 3). Granite will manage the excavation in the following manner:

- Initial excavation: To create a work pad/haul road, the area beneath the concrete pad area (from the location of the existing bulkhead east to the 1:1 slope) will be excavated to elevation +12. This will be performed with by a dozer pushing material into piles, away from the water edge. From there an excavator will load the materials into trucks for direct transport to the designated transfer facility. This work pad/haul road will allow for more efficient and safer access into the excavation for trucks and equipment.
- Final excavation: Granite will use two excavation crews working in close coordination within the ebb tide windows, so excavation will always be performed in "dry" conditions. One crew will start at Sta 30+50 while the other starts at Sta 38+00, with each steadily progressing the excavation downstream. Excavation will be performed in strips perpendicular to the waterway. Each crew will have two excavators: one will be performing excavation and grading, while the other excavator is loading excavated material into trucks. Material will be hauled to an on-site stockpile. It is estimated that this excavation will be able to be performed 5 to 7 days of each month in accordance with tide schedules.

Figure 3: South Shoreline Zones

Excavation Below Water Table

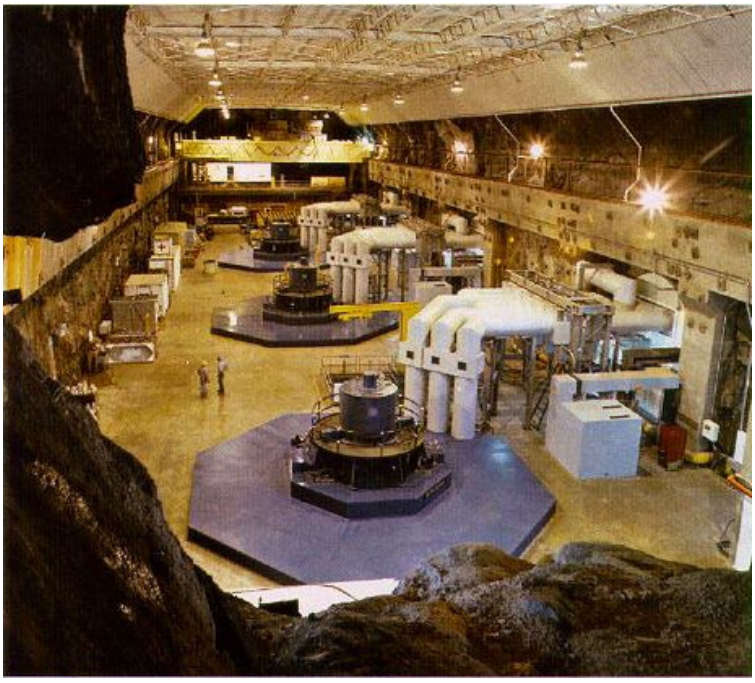
The water table in the construction zone is tidally influenced, with groundwater typically occurring at approximately +8 feet "mean lower low water" (MLLW), but fluctuating ±5 feet on a daily basis.

During the design preparation phase, Granite will engage in discussions with the Boeing design team to align our approach with their intent. Granite's past lessons learned combined with a discussion with the design engineers will help ensure alignment of schedule and purpose.

North Shoreline Interim Excavation: Earthwork along the waterway performed below +12 feet MLLW will be conducted during the approved construction window during ebb tide conditions. Excavated materials will be temporarily stockpiled for dewatering, with sumps used in the sediment catchment areas (low points of the interim excavation) to assist in the removal of free water encountered during the excavation process.

South Shoreline Pipe Installation: Pipe trenches below the water table will be excavated utilizing shoring boxes and pumps to reduce the amount of water and sediments that flow back into the trench excavation below the water table.

Helms Powerhouse Tunnels



Granite Construction worked with Pacific Gas & Electric (PG&E) to construct the Helms Pumped Storage Powerhouse in 1977-1982 and proposed for and won the TTVAT AND TPHAT PILLAR LINING AND T3 ACCESS TUNNEL SUMP INSTALLATION project.

ROLE:

- Provided proposal management and writing
- Coordinated project teams

Quality Control Program

Granite will provide a comprehensive QCP that will be reviewed, monitored and audited by regular Granite QC personnel, led by Kelly Curtis, P.E., and an *independent quality control* inspection team comprised of DVBE professionals **Moore Twining Associates, Inc**. (Per the information provided in the Supplier Diversity section, Granite maintains a comprehensive database of qualified WMDVBE contractors.) The independent review will ensure that Granite meets or exceeds PG&E's own QC reviews, also to be conducted by independent contractors. Granite is one hundred percent committed to the delivery of high quality products for the Helms Tunnel contract and our QCP is central to ensuring the results we intend to deliver.

Construction Philosophy

For over 90 years, Granite crews have successfully completed construction projects ranging in complexity from repaving private driveways to constructing new urban highways. All projects are based upon a commitment of excellence in construction built around this construction approach:

- Thoroughly understand the Work
- Assess the local conditions
- Develop effective work plans
- Select qualified craftsmen, subcontractors, and suppliers
- Provide the right tools and equipment
- Execute the work with optimal productivity, quality, and safety
- Manage critical interfaces
- Proactively resolve problems

Federal Highway Administration MULTIPLE AWARD TASK ORDER CONTRACT (MATOC)

Granite Construction proposed for and won a MATOC contract with the Federal Highway Administration. This task order involved expedited roadway surfacing, resurfacing, and repair projects in the Northwest.

ROLE:

- Provided proposal management and writing
- Coordinated project teams

1.2.1 Key Learnings and Best Practices from Yosemite Experience

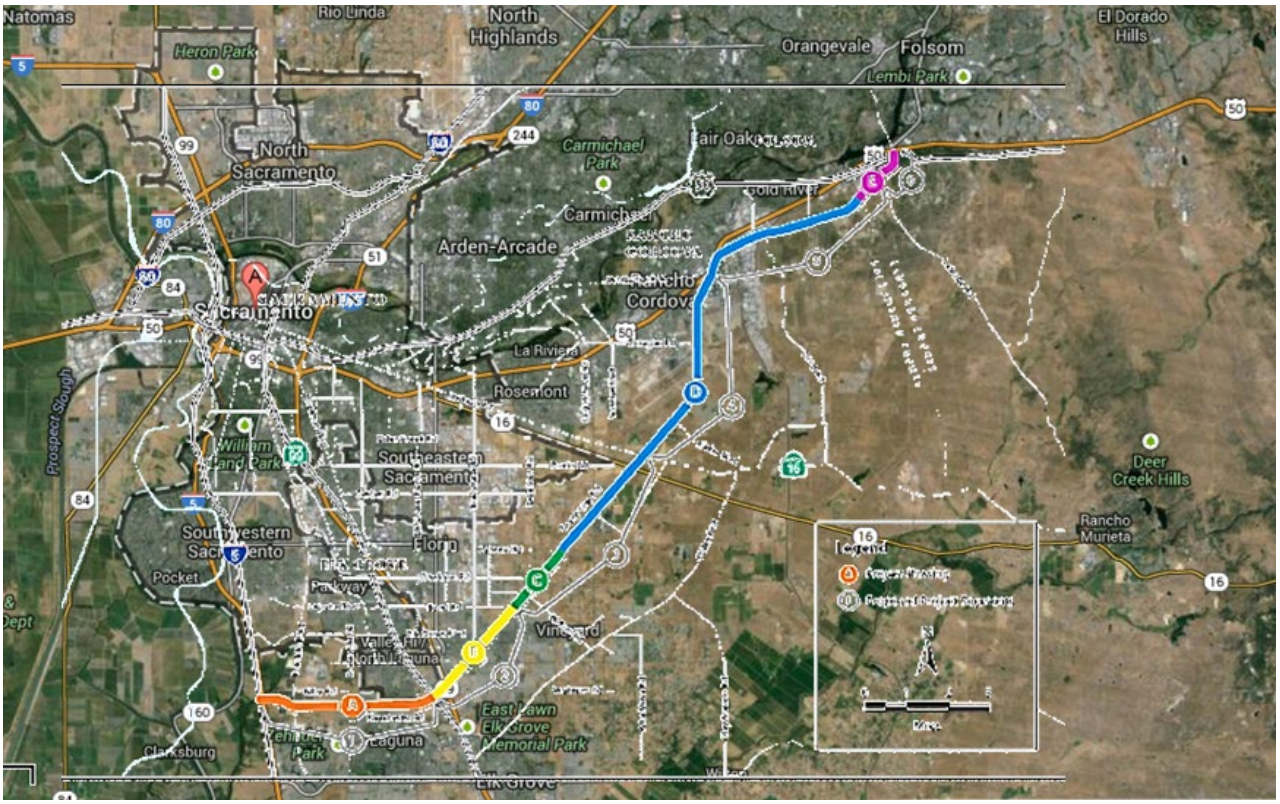
Our Yosemite micro surfacing project experience, and work of the same nature in similar National Park settings, has helped us develop techniques and approaches specifically suited to these largely natural but busy environments.

- **Prepare multi-level weekly work plans.** It is most often the case that the work will be done in an *operating environment*. Park operations and construction zone space will be limited, and will likely need to be shared. Our experience in resurfacing parking lots in Yosemite is that crews may be able to do only one-third of the lot at a time, so the other two-thirds can remain in use for regular park operations. ISS project managers will assign crews and mobilize equipment to alternative sites to optimize efficiencies by scheduling several operations to work concurrently, protecting the required "bandwidth" of park operations while progressing our work in accordance with our overall contract or task order schedule.

Past Performance Criteria Checklist

- ✓ Projects in remote, environmentally sensitive areas, with varying climates and high traffic volumes – Pages 4-12, *Sections 1.1 to 1.3*
- ✓ Expertise in micro surfacing, chip seals, flexible and rigid pavement patching, flexible and rigid crack/joint cleaning and sealing, pavement milling, and asphalt paving – Pages 12-18, *Section 1.4 to 1.5*
- ✓ Technical approach to quality results – Page 3, *Section 1*
- ✓ Past project details – Pages 6-12, *Section 1.3*
- ✓ Cost and schedule performance – Pages 6-12, *Section 1.3*
- ✓ Life cycle duration and preservation – Pages 12-18, *Section 1.4 to 1.5*
- ✓ Innovative approaches to accomplish an equal or better quality than required in the contract – *See the "Yosemite Spreader Box" example*

CAPITAL SOUTHEAST CONNECTOR JPA



Granite Construction proposed for and won the Design-Build Feasibility and Phasing Analysis contract for redevelopment of the southeast connector around Sacramento, a Joint Public Authority (JPA) pursuit. A JPA construction contract is a contract between two or more public agencies that have formed a Joint Powers Authority (JPA) to carry out a specific governmental function. The JPA is responsible for the construction project and the contract is between the JPA and the contractor.

ROLE:

- Provided project management
- Developed the technical approach and relevant experience sections
- Coordinated project teams

4. Specific Approach

The Granite team will familiarize itself with the Grant Line Road alternative selected by the JPA for the project's General Alignment, the details of its certified program EIR and subsequent PEIR.

In determining whether Design-Build or alternative delivery model is best for the Capital Southeast Connector project, the Granite team will use a formal approach (described in this section) to explore issues related to schedule, project complexity, and other issues.

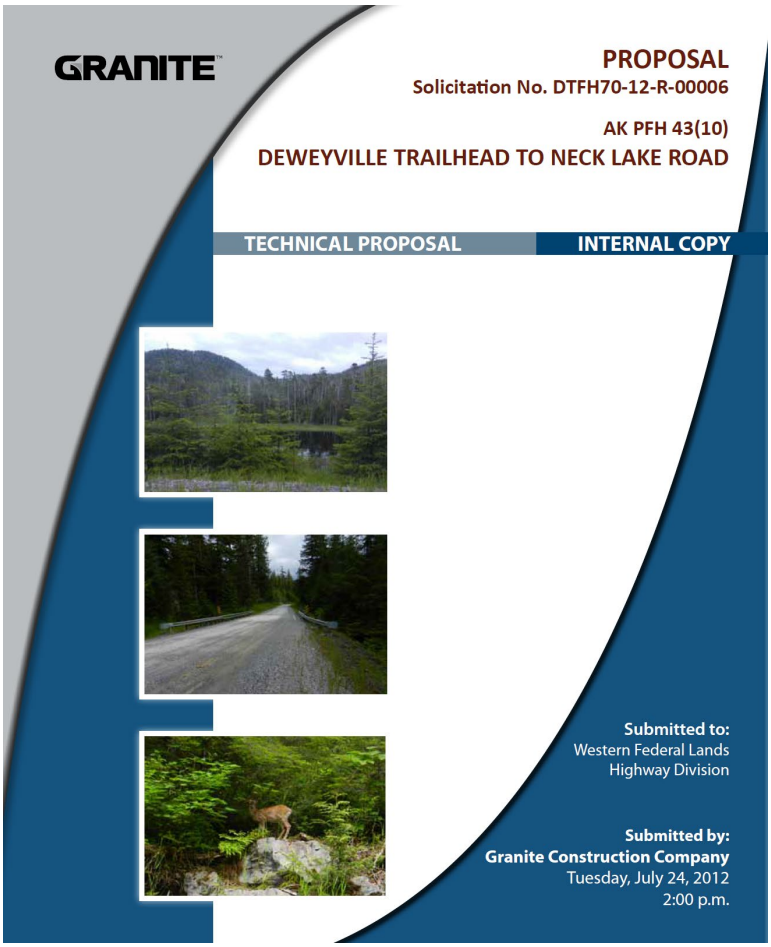
It is recognized that this report could be used to support legislative efforts to ensure the JPA has an appropriate "tool box" of project delivery methodologies to deliver a project of this magnitude.

Innovation: At each step of the feasibility study and analysis process, the Granite team will look for creative solutions to emphasize quality and safety and build innovation into the process and the project. This will be an important part of the dynamic to the Granite team's commitment to "Partner" with all stakeholders for the best interest of the project.

Factors in Design-Build: In the first part of this section we listed a number of factors that are important in considering Design-Build alternatives. Specific to the Capital Southeast Connector project, the Design-Build factors to be considered are:

- How does the White Rock Road widening and realignment impact on corridor development?
- What will be required to meet the requirements of agencies including Sacramento County, City of Elk Grove, unincorporated Sacramento County, City of Rancho Cordova, City of Folsom, and El Dorado County?
- What are the requirements of stakeholders in the El Dorado Hills, Franklin- Laguna, Vineyard, and Consumes communities?
- What are the Caltrans requirements?
- What are the utilities requirements?
- How do design-build alternatives address the design guidelines established for the project?

Deweyville Trailhead to Neck Lake Road



Granite Construction proposed for and won the Western Federal Lands Highway Division contract to construct a trailhead from Deweyville to Neck Lake Road.

ROLE:

- Provided project management
- Developed proposal sections
- Coordinated project teams

For the Deweyville Trailhead Project, among the principal issues in designing and building the project are:

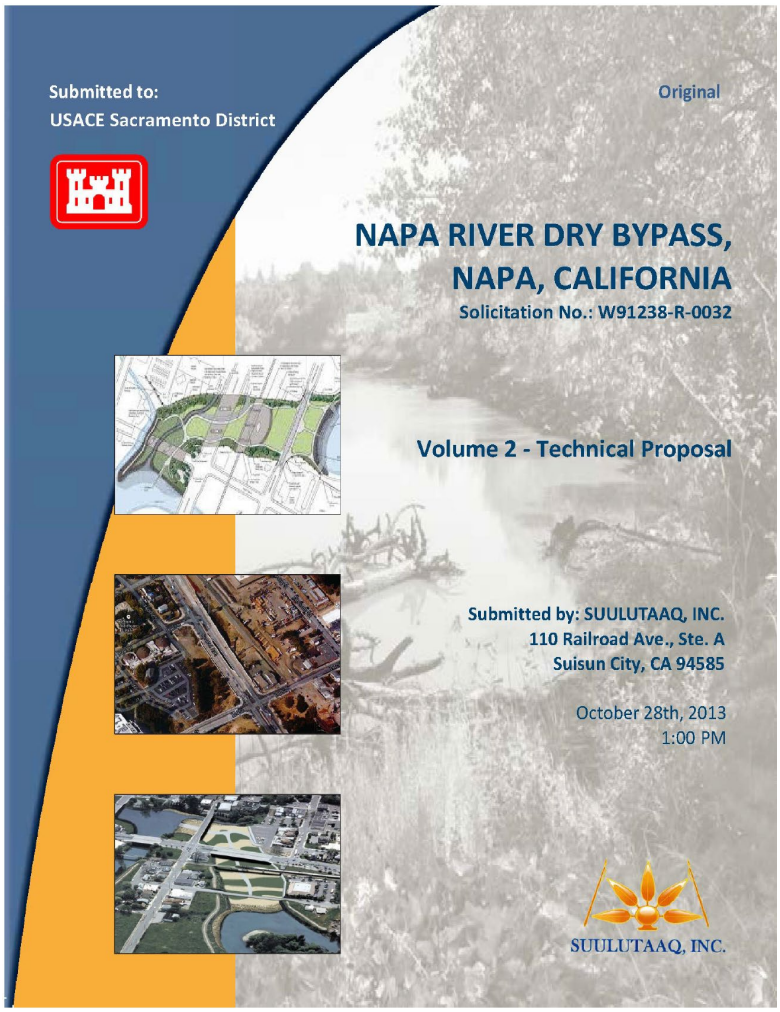
- Effectively analyzing and designing the road with the geotechnical terrain
- Developing a comprehensive plan to identify rock and sub-excavation sources and designated waste locations
- Having materials on hand to perform continuous excavate-and-fill operations in a manner that causes almost zero traffic impact
- Minimizing impacts to wetlands, streamlining the permitting process, and protecting streams and wetlands from turbid water
- Acquisition of permits
- Stringent settlement requirements

Section 2 - Technical Solutions - Geotechnical and Earthwork

Experience with the MP 68.8 to MP 81 project has shown that previous estimates of sub-excavation requirements in this area have been off by ratios as great as four-to-one. Sub-excavation depth on that section of road varied from 5 to 10 feet on average, with occasional depths as great as 25 feet, and the Deweyville Trailhead to Neck Lake Road section is expected to be similar. Initial estimates are that the work on this project could require 75,000 yards of sub-excavation per mile, and one yard of rock borrow to replace every yard of sub-excavation.

In order to limit settlement to no more than two inches over the next 50 years, and even more challenging, to limit differential settlement across fill/structure interfaces to one-half inch, the Granite Team is supplementing Shannon & Wilson's geotechnical design approach to include lessons learned from the MP 68.8 to 81 southern section under construction. Granite has prepared our bid to account for the geotechnical conditions while still satisfying the stringent project requirements and acknowledging the fact that this is a design-build project.

Napa River Dry Bypass



I have pursued many Army Corps of Engineers contracts, including this to mitigate flooding in Napa, California.

I assisted the Native Alaskan-owned engineering firm Suulutaaq with this pursuit, writing proposal sections and contributing graphics.

Suulutaaq, Inc., an Alaskan native-owned corporation, proposed for flood protection along the Napa River in Napa, California.

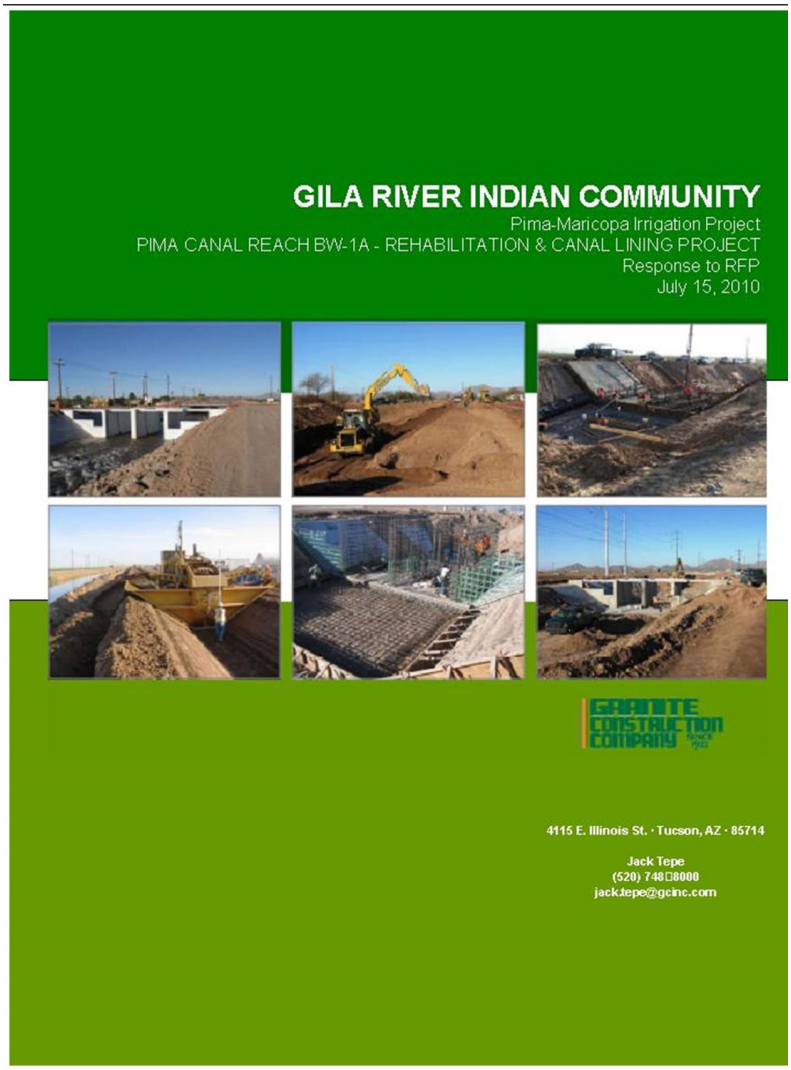
ROLE:

- Assisted with proposal strategy
- Developed proposal sections
- Document design (page limit)
- Supported the Suulutaaq project team

For the Deweyville Trailhead Project, among the principal issues in designing and building the project are:

- Effectively analyzing and designing the road with the geotechnical terrain
- Developing a comprehensive plan to identify rock and sub-excavation sources and designated waste locations
- Having materials on hand to perform continuous excavate-and-fill operations in a manner that causes almost zero traffic impact
- Minimizing impacts to wetlands, streamlining the permitting process, and protecting streams and wetlands from turbid water
- Acquisition of permits
- Stringent settlement requirements

Pima-Maricopa Irrigation Project

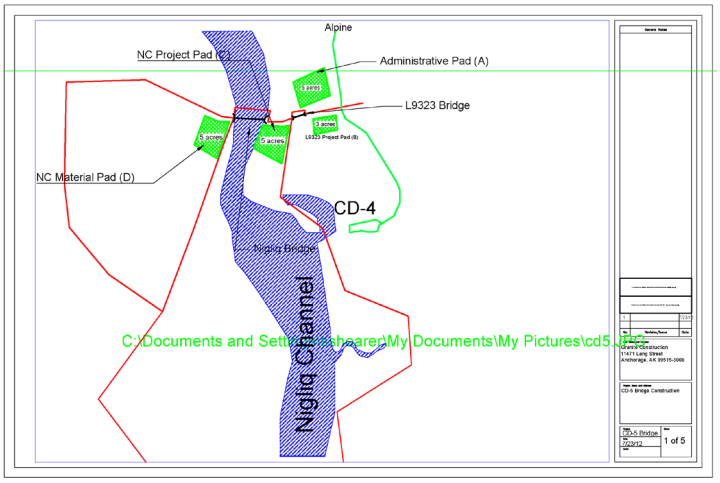


Granite Construction pursued and won this rehabilitation and canal lining project for the Gila River Indian Community in the Tucson, Arizona area.

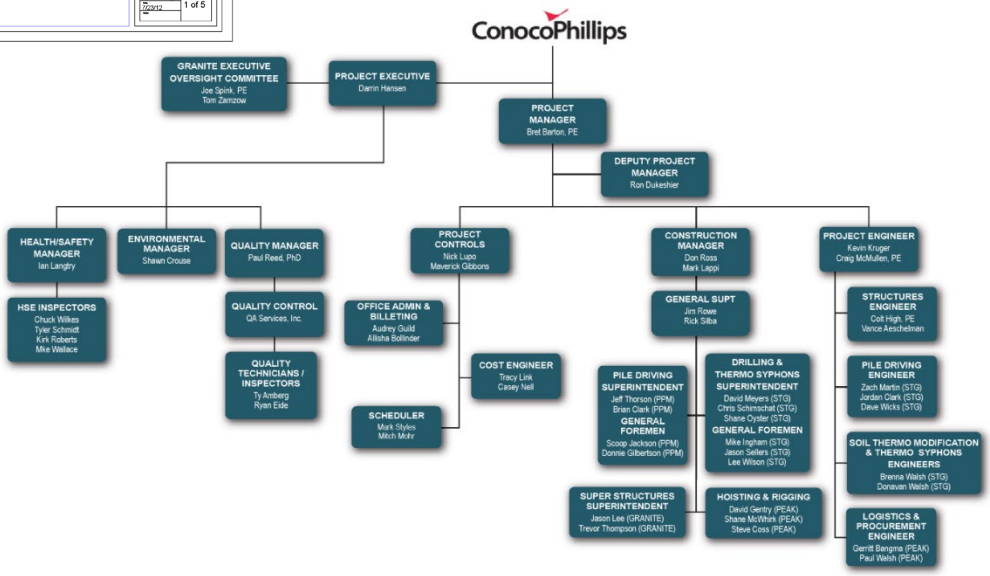
ROLE:

- Provided proposal management
- Developed proposal sections
- Coordinated the project team contributions

CD5 Nigliq Channel and L9323 Bridge Installation



Working for Granite Construction, I developed much of the Nigliq Bridge proposal, which included development of an Environmental Health & Safety Plan compliant with regulations regarding work on Alaska's challenging North Slope.



3.1.4.1 Sheet Pile Installation Plan

Figure 8 provides a top-down view of the sheet pile installation for the CD5 project. Granite will use a series of drill holes to the depth of the sheet pile installation specification, reducing the amount of top and permafrost layers that the pile will need to be installed through.

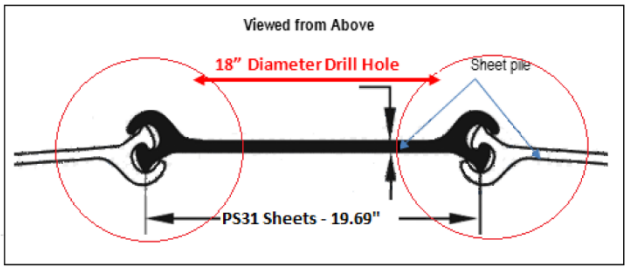


Figure 8: Sheet Pile Installation

Construction Equipment and Methods

The Granite team will use a vertical drill and a crane to predrill holes and pl

Sheet Pile Installation Sequence

1. Survey alignment of the sheet pile including the anchors
2. Drill 18-inch vertical holes centered on the alignment leaving approxin between the holes

Type 2 Piling- Drill & Set

Drilling of Type 2 piling will require equipment with the capabilities of drilling a large diameter hole to depths of one hundred feet below grade. To accomplish this drilling, a Liebherr LB36 drilling rig with Kelly bar assembly or similar type drilling rig will be used. The nature of a drilled hole is that the hole will not be perfectly straight. To account for imperfections in the drilling, each hole is required to be oversized from that which is called out in the plan documents. It is anticipated that a hole diameter of ten inches large than the piling diameter will be required to allow for proper final piling alignment and to meet tolerance specifications for connecting to cap beams.

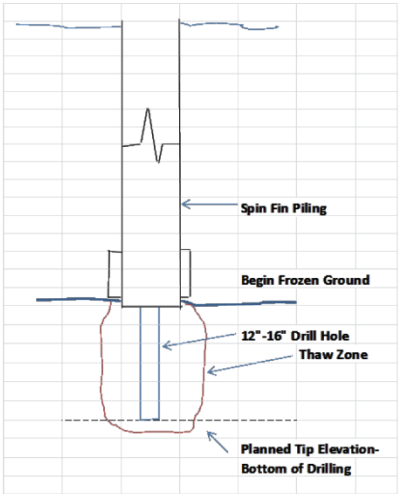


Figure 9: Thermal Modification

Though the increases in drill hole diameter will result in additional spoils and increase sand slurry quantities, overall efficiency of the Type 2 piling installation will be increased. Time consuming re-drilling of less than perfect holes will be greatly reduced. The larger annulus will also reduce the risk of voids in the sand slurry fill due to material bridging between the piling

3.0 Work Execution Plan

To the Granite Team, the CD5 bridge projects *unpacks* in a linear, if outwardly enveloping, fashion, starting from Notice to Proceed (NTP) and the initiation of the Pre-construction planning and Readiness phase, through an accelerated series of design, fabrication, mobilization and construction events. These are shown in Figure 7 as a pyramid, developing through refinement and execution of plans to the 2015 realization of the two steel structure bridges over the Nigliq Channel leading to the CPAI's CD5 site. The relative sizes of the blocks comprising the reverse pyramid approximate the resource allocations at each phase of development, culminating in completion of the large Nigliq Channel Bridge.

We have not developed site specific execution plans for each element of work. We have developed a plan for delivery of these plans during the Pre-construction Planning and Readiness phase of the project when active dialog between ite and CPAI can add to the plan.

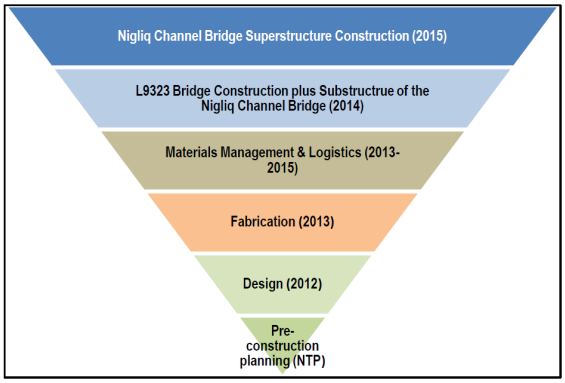


Figure 7: CD5 Project Development

Table 14: CD5 Procurement Overview

	2013			2014				2015
Subcontracts	**Qtr2**	**Qtr3**	**Qtr4**	**Qtr1**	**Qtr2**	**Qtr3**	**Qtr4**	**Qt1**
Bridge Fabricators	★	★	★	★	★	★		
Fuel				★				★★
Co-location Offices QT 1 '13	★	★	★					
Pile Drivers & Welders				★	★			★★
Heavy Equipment Operators				★	★			★★
Laborers				★	★			★★
Equipment								
Lighting - portable light plant (large)				★				★
Cranes				★	★			★★
Excavators				★	★			★★
Snow Blowers				★	★			★★
Motor Graders				★	★			★★
Heaters				★	★			★★
Tool Carriers				★	★			★★
Portable Shops				★	★			★★
Fuel and Lube Trucks				★	★			★★
Mechanic Trucks				★	★			★★
Welders				★	★			★★
Wheeled Loaders				★	★			★★
Bulk Materials								
Grout			★	★			★	★
Piling- sheets and Caissons			★	★			★	★
Plywood - forming, shoring			★	★			★	★
Expanded Polyethylene			★	★			★	★
Scaffolding pipe, clamps, toe boards, plywood, frames, storage racks			★	★			★	★
Spreader bars			★	★			★	★
Visqueen			★	★			★	★
Bearing Pads								
Welding Supplies & Dry shack			★	★			★	★
Consumable Items								
Cold - galv. spray, brush, roll								★
Fresh Air				★				★
Fresh air equipment (Supplied air only) - mask, hose, regulator, etc.				★				★

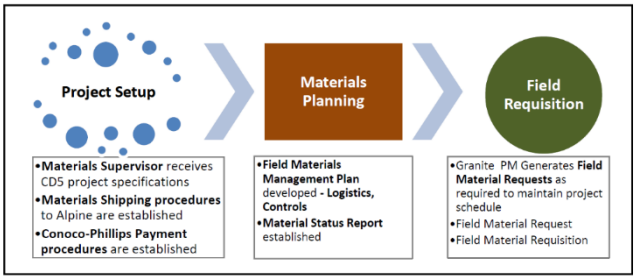


Figure 14: Key Elements of Materials Procurement

Table 10: Risks and Mitigations

Risks	Mitigations
Data Gaps: Initial geotechnical reports have been done only for the Nigliq Bridge, which is the larger of the two and the last to be constructed.	Perform bore testing of the L9323 bridge footprint to determine the depth of the permafrost and the geotechnical profile of the foundation.
Salinity: Salinity conditions may exist and create variations in the depth of the permafrost in pocketed sections. This creates the potential for a lower bond, particularly to sheet pilings.	Perform salinity test of new bore samples (latest from May 2012) to determine salinity levels, which is critical to determining piling depth requirements.
Thermal Modification: Thermal modification required for spin fin piling operations produces heat that causes surface melting and ponding of water.	Vacuum trucks should be available on site to manage water and wet soils to maintain a dry, frozen soil foundation.
Collateral Melting: Sheet pilings can cause melting on the surface due to thermosyphons	Vacuum trucks should be available on site to manage water and wet soils to maintain a dry, frozen soil foundation.
Thermosyphons: Thermosyphons for the CD5 bridges are currently at the 35 percent stage, which creates questions about how the designs will be developed to final shop drawings, and who will do them.	Granite's team includes STG Incorporated largely for their expertise in Arctic construction and specialty services including Thermosyphon design and thermo-modification. STG's expertise should be incorporated in the 100 percent design.
Thermokarst: Degradation of ice-rich permafrost is often accompanied by mechanical failure of previously frozen soils via solifluction, thermal erosion, thaw settlement, or collapse of the ground surface due to melting of massive ground ice, a phenomenon referred to as thermokarst.	Bore samplings should be extensive to ensure correct piling lengths for the substructure.
Materials Shortage: Further geotechnical discovery could reveal greater materials requirements than anticipated in the preliminary design.	CPAI has provided sufficient contingency in surfeit material that should meet project needs even if deeper pile drilling is required.
Damage to Sheet Pile: Galvanized tops and bare steel bottoms are subject to damage if using traditional vibratory processes in permafrost environments.	The Granite team has proposed an innovative drilling approach detailed in Section 3.1.4.2.

I have developed proposals for vertical, as well as horizontal construction.

PROJECT INFORMATION FORM #1: Edmond Coy Parking Structure

1.0 Experience Summary Matrix

Table 3 provides a summary of the projects presented in this section and with Past Performance Ques
These provide an overview of the team's experience on projects of relevant size and scope to that of
Warehouse. These projects are presented in the following sequential order:

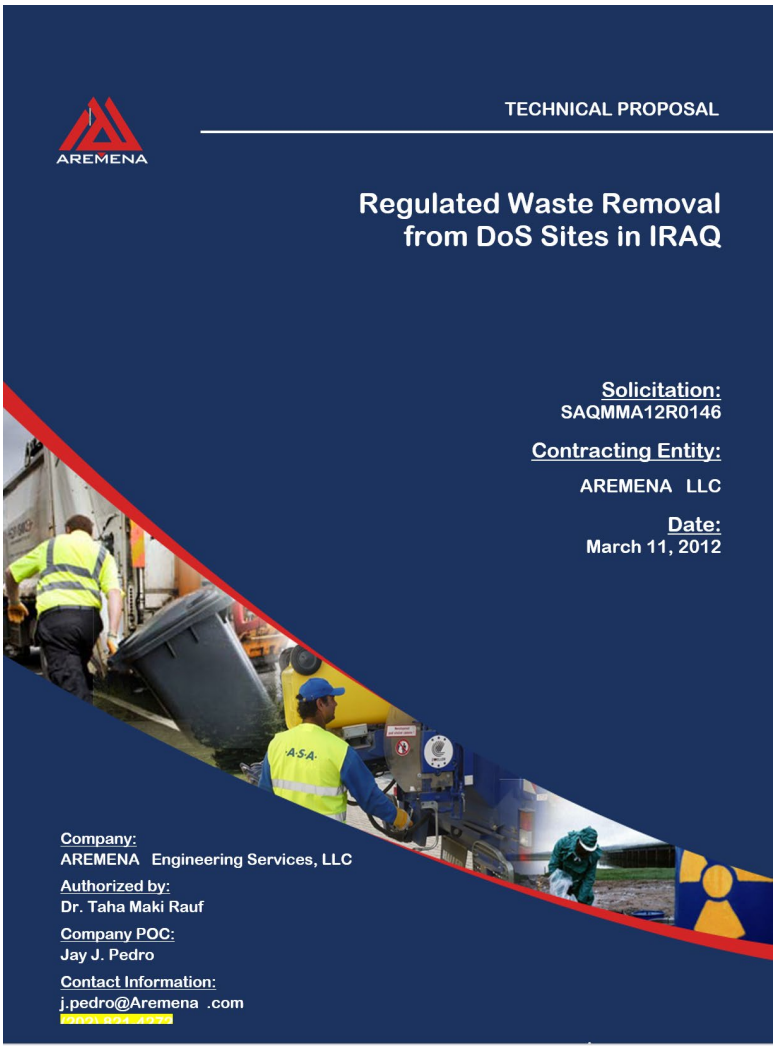
Table 3: Project Experience Summary Matrix

Capability \\ Example	#1	#2	#3	#4	#5
Prime Design-Build Project Management	**F&H** Coy Parking Structure	**F&H** Turning Basin ICE Facility	**F&H** Arena Parking Structure		
Architect-Engineer Design Firm				**Miyamoto** Cherry Logistic Center	**Miyamoto** West Corona Industrial
Structural Construction Effort					

1. Example Project Number:	1 – Design-Build Management Experience
2. Name of Contractor(s)/Key Subcontractor(s) that Project is Demonstrating Experience:	Prime - F&H Construction
3. Contract Number and Awarded Prime Contractor Name:	10-04-4984– F&H Construction
4. Title and Location:	Edmond Coy Parking Structure - 130 North Hunter Street Stockton, California 95202
5. Month and Year Project Work Commenced and Month and Year Project was Completed:	July 2004 to May 2005
6. Project Owner:	City of Stockton 425 N. El Dorado St Stockton, CA 95202
7. Point of Contact Name:	Jay Coffey
8. Point of Contact Telephone Number:	209-403-7305
9. Description of the Project:	

(1) The performance period in month and year: July 2004 to May 2005
(2) Final dollar value: $9.4 million
(3) Physical size: 224,289 square feet of parking and 15,156 square feet of office/retail space
(4) Principal elements and special features of the work self-performed by that contractor's employees:

Regulated Waste Removal for DoS Sites in Iraq



I have developed numerous proposals for work in the Middle East, including proposals for the AREMENA and AREEB companies.

FIELD SUPERVISION: **Dedicated Field Superintendents** for each of the three Mission Site sectors.

Aremena's Field Superintendents will be located throughout the North, Central and South mission site areas.

Aremena's qualified Field Superintendents will receive materials pickup details from the PM, and then coordinate with our subcontractor team to ensure that a properly provisioned and oriented crew is dispatched to the appropriate mission sites.

LOAD AND TRANSPORT CREWS: Provision of scheduled and on-call waste pickup service crews.

Aremena defines this to mean provision of trained personnel properly equipped to safely load and transport the regulated waste materials they have been commissioned to handle. Properly equipped includes provision of a small, truck-mounted loader or other appropriately sized loading machinery.

Aremena is also prepared to provide **Security** as required to help ensure delivery to the approved disposal sites.

RECORDKEEPING SYSTEMS: Characterization of regulated waste (Materials Profile Sheet).

Aremena will designate a responsible contractor within each load and transport subcontractor group to execute appropriate chain of custody recordkeeping procedures. Each waste pickup will generate a dated **Materials Profile Sheet**(s) (MPS) that describes the waste materials being loaded and transported, identify their volumes, and indicate the GOI-approved site to which they will be delivered.

The chain of custody documentation will be completed at the disposal site, with proof of delivery recorded and archived in a project management system.

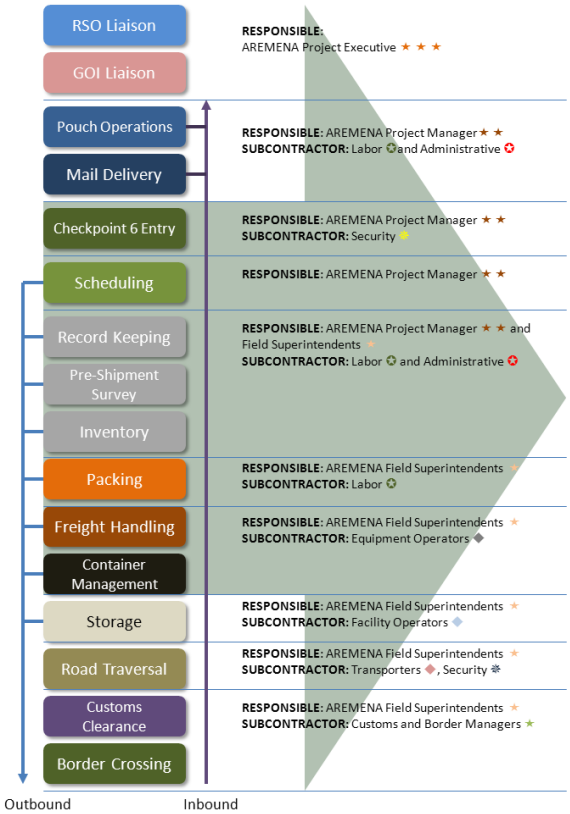
ROLE:

- Provided proposal management
- Provided document design
- Developed proposal sections

Project Management

Aremena is committed to the U.S. Department of Defence (DoD) and the Government of Iraq's (GOI) shared initiative to remove regulated waste left behind following the departure of U.S. forces from Iraq at the end of 2011. With this Volume, Aremena presents our integrated team solution to the removal of regulated waste from Department of State (DOS) sites throughout Iraq. This is an initiative that we are committed to performing to the applicable standards of the Environmental Protection Agency (EPA) accepted by the U.S. DoD.

Transportation and Mail Delivery Services for the U.S. Mission in Iraq



ROLE:

- Provided proposal management
- Provided document design
- Developed proposal sections

Technical Approach

With this proposal, AREMENA is providing information to qualify us for transportation and mail delivery services, packing, freight-handling, trucking, forwarding, cargo storage, customs clearance, registration of vehicles and other related services that apply to shipments originating from, consigned to, routed through, and/or moved within the geographic area(s) of Iraq, Jordan, Kuwait and Turkey. Figure 1 provides a graphic depiction of our reach and capacity, which allows us to execute the complete scope of work throughout all four of Iraq's regions as defined by the U.S. Embassy contract.

Fuel Storage/Distribution Facilities at FOB Dwyer, Afghanistan

I supported **Areeb Engineering** in developing a proposal for the management of fuel storage and distribution facilities at Forward Operating Base Dwyer.

ROLE:

- Provided proposal management
- Provided document design
- Developed quality control plans for all aspects of the work (design, controls, tracking, reporting, documentation, welding, steel fabrication, site development, pavement, utilities, concrete)

15 DEFINABLE FEATURES OF WORK

This project consists of the construction of Fuel Facilities at FOB Dwyer, Afghanistan. Areeb will provide services and construction to include mobilization to the site, construction and installation of 1,153 CM fuel storage tanks with secondary containment, construction of truck offload positions, underground Petroleum, Oil and Lubricants (POL) pipeline, truck loading facility, fueling/POL support building, install Building Information Systems, construct electric service and water, sewer and gas services, paving, walks, curbs, and gutters, storm drainage, site improvements and demolition, provide Site Information Systems, construct T-Wall Foundation antiterrorism protection, and perform design work, all in accordance with contract documents.

Design-Build Services Guard Force Housing and Training Compound, Camp Sullivan Expansion, Kabul, Afghanistan

I supported **Areeb Engineering** on phased development of the Camp Sullivan U.S. Embassy compound in Kabul. This was a THE U.S. DEPARTMENT OF STATE (DOS), Bureau of Overseas Buildings Operations (OBO) contract.

ROLE:

- Provided proposal management
- Provided document design
- Developed approach content

During the design-build phase we execute a program of client interaction designed to elicit the information most important to meeting the client's objectives for the project. We do our construction work by the book, literally following the defined processes outlined in our Project Management Plan, Quality Control Plan and Health and Safety Plan. We design the requirements of the client and to our own professional expectations of what it takes to do work well, and we build with care, ever mindful of schedule, budget, and worker safety.

Our post-construction support is beyond that provided by most design-build firms, but we view post-construction services as important opportunities for us to ensure owner satisfaction. We monitor compliance with contract documents to help ensure that all of our installations function at the highest specified levels. Our approach to identifying and correcting warranty issues gives our clients peace of mind that Areeb will be there to resolve, in a timely manner, any post-construction issues that may arise related to our contract obligations. We ensure that repairs, maintenance, and warranty work are handled throughout commissioning. We re-inspect and bring our key contractors with us to have your questions answered and problems remedied before warranties expire.

1.4 Organization and Comprehensive Approach

The organization of the Areeb Team is an extension of our firm's integrated approach to construction and design. We were established as a design-build entity and have organized our General Construction department to function as a collaborative contributor to our design units. This is critical to developing the organizational muscle required to do the type of design-build work we do, which is often under difficult conditions and compressed project time frames. We pride ourselves on the work we have done in Afghanistan and Iraq, which was made possible by our management of the design-build process that makes it possible to advance one aspect of the work while other aspects are still being designed. That facilitates scheduling to allow for permitting and approval processes and makes it possible to proceed with other construction documentation, including as-built drawings. Our comprehensive design-build approach puts highly qualified design engineers in the field and on-site with the Design Manager to respond immediately to discovery of situations that make it impossible to install an aspect of the work as designed. Experience has taught us that utility maps do not always accurately depict water and electrical lines, so we have created contingency plans so that we may be prepared with alternative design solutions.

IT NETWORKING

Raging Wire

RagingWire®
ENTERPRISE SOLUTIONS

Request for Proposal:

ISP Network Hardware Design

FOR

RagingWire Enterprise Solutions

April 13, 2007

CISCO

Working with a **Cisco Systems** proposal team, developed this winning proposal for a new data center.

ROLE:

- Provided administrative management
- Coordinated input of content from the Cisco Systems proposal database
- Provided technical edit

EDITING PROJECTS

I have done a wide variety of editing projects, including collaborations with professors from the University of California-Berkely, Oregon State University, and the University of Texas. These projects secured publication in technical journals and secured additional research funding.

Real Options Valuation of Phased Investments in Commercial Energy Retrofits under Building Performance Risk

Hyun Woo Lee, M.ASCE[1], Kunhee Choi, A.M.ASCE[2], and John A. Gambatese, M. ASCE[3]

ABSTRACT

Although the importance of energy efficiency investment has grown exponentially in recent years, there has been very little specifically aimed at developing a real options valuation (ROV) framework of such investment under private risks. The study objective is to develop and test a ROV framework: PIER (Phased Investment valuation for Energy Retrofits). PIER accounts for the building performance risk as one of the major contributors to the financial barrier by combining an option pricing binomial lattice model with Monte Carlo simulation, for the purpose of valuating the financial impact of phased investments in a building portfolio. To validate its reliability for commercial energy retrofits, PIER was tested with a case study of a subsidized investment in ten commercial buildings, which proved PIER's applicability in determining the level of subsidy that compensates for the value of the option to defer (wait-and-see). The case study reveals that the two-phase ROV produces a more realistic valuation than the traditional net present value method. Through the phased investment approach, PIER can assist building owners and decision-makers to evaluate the overall financial impacts of changes in the performance risk, thus enabling them to make better-informed decisions when they consider energy retrofits.

UC Berkeley Pavement Research Center paper published in the Journal for American Society of Civil Engineers.

Collaborative Research: Automating and Optimizing Construction Work Zone Impact Assessment Required for High-Impact Highway Infrastructure Construction Projects

The main objective of this research is to create, test, exploit, and validate a spatiotemporal analytical modeling framework that fully automates and optimizes impact assessments of construction work zones (CWZ). Changes to the Work Zone Safety and Mobility Rule, enacted by the Federal Highway Administration (FHWA) in October 2007, mandated that CWZ impact assessments be completed for all federally-funded highway infrastructure improvement projects. These impact assessments are critical to the selection of the best construction alternatives for road rehabilitation projects in high volume corridors, but they are also difficult and expensive to produce. State Transportation Agencies (STAs) immediately began to struggle with increased overhead costs and construction scheduling delays. As a solution to these issues, our team of Principal Investigators (PI) propose a decision-support model: Spatiotemporal Work zone Impacts Assessment (SWIA). SWIA utilizes large volumes of real-world traffic sensor data to integrate traffic prediction technique with CWZ impact assessment. It is applicable to any highway rehabilitation project. Under the proposed plan, the SWIA model first identifies spatiotemporal characteristics in a set of distinct signature clusters. These are referenced to three traffic conditions, measured by average daily traffic volumes, and characterized as low, medium, or heavy. Each represents a typical traffic pattern by accounting for other critical contributing parameters, such as length, direction, capacity, connectivity, density and locality of road networks. The derived 24/7 traffic signature patterns are then used to perform a what-if scenario analysis to evaluate the impact of twelve alternative construction plans. These are defined with respect to the duration and occurrence of four construction *alternatives* (nighttime, weekday, weekend, and 24/7 around-the-clock), each of which can be executed under three standard lane closure scenarios (single lane, double lane, full closure). Our PI team has significant experience in the proposed research fields, and this knowledge and expertise, combined with our cross-disciplinary work approach, places us in a uniquely competent position to conduct this high-payoff research.

Successful University of Texas Grant Proposal