



***AMENDED, RESTATED AND REVISED
LEADER REPLACEMENT SYSTEM
AGREEMENT***

***Exhibit W (Statement of Work for CalSAWS Cloud
Enablement Project and Interim Maintenance and
Operations)***

***Inclusive of Schedule 1 (Contractor Assumptions),
Schedule 2 (CalSAWS Cloud Enablement and
IM&O Pricing Schedule), Schedule 3 (CalSAWS
Cloud Enablement Compute Resource
Specifications), Schedule 4 (Hardware/Software
Specifications), Schedule 5 (IM&O Production
Operations Specifications), and Schedule 6 (API
Statement of Requirements and Contractor
Assumptions)***

**CalSAWS Consortium,
a California Joint Powers Authority**

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1. INTRODUCTION AND OVERVIEW

For the purposes of this Exhibit W to the Amended, Restated and Revised Leader Replacement System Agreement For A California Statewide Automated Welfare System ("Agreement") the meaning of all terms used in this Exhibit W shall have those meanings as set forth in the Agreement, unless otherwise specified herein. Section 1 (Introduction and Overview) describes the scope of Work that CONTRACTOR shall perform for the CalSAWS Cloud Enablement Project, or "CEP," and interim maintenance and operations ("IM&O") associated with operating the LRS application on a cloud-hosted architecture.

The CEP effort is anticipated to re-platform the LRS application from its current "on premises" datacenter architecture to an Amazon Web Services ("AWS") cloud-hosted architecture, which includes modifications to LRS technical services and the deployment of environments and services to support the CalSAWS DD&I Project. This Exhibit W is a continuation of the CEP effort commenced under Exhibit V (Cloud Enablement Project – Bridge).

Exhibit W also includes production operations services for interim maintenance and operations of the LRS application on the AWS cloud-hosted architecture through the C-IV Counties' cutover to the CalSAWS Software on the AWS cloud-hosted architecture.

1.1 SCHEDULE:

The term of this Scope of Work ("SOW") shall commence on August 1, 2019 and continue through September 30, 2021. Both the CEP effort and IM&O of the LRS System will commence on August 1, 2019 and continue through September 30, 2021, the date in which C-IV Counties' cutover to the CalSAWS Software is expected to complete.

2. SCOPE OF WORK:

This Section 2 describes the Work CONTRACTOR will perform under this SOW. Tasks 1 through 7 describe the Work CONTRACTOR will perform to re-platform

the LRS application from its on-premises data center architecture to the AWS cloud-based architecture (collectively, the “Cloud Enablement Work”). Task 8 describes the Work CONTRACTOR will perform for IM&O. Task 9 describes the Work CONTRACTOR will perform for implementing application programming interfaces (“APIs”) for the CalSAWS to enable the Counties to continue using certain existing County services with the CalSAWS.

1. **Task 1 – Project Management**
2. **Task 2 – Network**
3. **Task 3 – Environment Deployment and Support**
4. **Task 4 – Application Architecture (Technical Services)**
5. **Task 5 – Application Development**
6. **Task 6 – Analytics**
7. **Task 7 – Innovation Lab**
8. **Task 8 – Interim Maintenance and Operations**
9. **Task 9 – Application Programming Interfaces**

To accomplish the Cloud Enablement Work, CONTRACTOR will work collaboratively with key stakeholders, including Users, and State, Federal and other external agencies as necessary.

2.1 TASK 1: PROJECT MANAGEMENT

2.1.1 Subtask: Project Management

The Cloud Enablement Delivery Manager is responsible for the day-to-day operations of the CEP.

2.1.2 Subtask: Workplan Management

The CEP Work Plan will include Tasks, planned durations, budgets, resources assignments and dependencies. The CEP Work Plan, developed and maintained with Microsoft Project, will be updated monthly. Updates may include modifications to Tasks, budgets, time frames, and expected due dates. As the CEP progresses, additional detail will be added to activities as necessary.

2.1.3 Subtask: Financial Management

The CONTRACTOR Staff will perform the following activities on the CEP: accounts payable; accounts receivable; budget execution; cost management; purchasing; and standard general ledger. Some of the daily Tasks will involve planning and budgeting, project accounting and reporting, staff accounting, and others.

2.2 TASK 2: NETWORK:

CONTRACTOR will design, build, deploy, and operate infrastructure services required for transition of the LRS System to AWS. CONTRACTOR will perform the following infrastructure services:

2.2.1 Subtask: Upgrade Networks

CONTRACTOR will perform the procurement, design, build, and deployment of the equipment and services for new Los Angeles County Points of Presence (PoPs) locations to support connectivity to AWS.

2.2.2 Subtask: Partner Connectivity

CONSORTIUM requires new partner connectivity to support LRS in AWS. CONTRACTOR will complete the procurement, design, build, deployment and testing for equipment and services in coordination with the following external partners listed in Table 1 below.

Table 1 – Los Angeles (LA) County Partner Connectivity

| Partner Host (Connectivity) | Interface Partner Name |
|------------------------------------|-------------------------------|
| LA County | APP - CCRC |
| LA County | ARS |
| LA County | BOA |
| LA County | CHDP |
| LA County | CHP (GRHCP) DMH |

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| LA County | CSC (LAGAN) KANA |
| LA County | CWMDM |
| LA County | DCFS |
| LA County | Death Match |
| LA County | Direct Cert. |
| LA County | E2LITE |
| LA County | EBT |
| LA County | eCAPS |
| LA County | EDMS |
| LA County | Employee Roster |
| LA County | GR Housing |
| LA County | IVR |
| LA County | Jail Match |
| LA County | LA CSSD |
| LA County | LEADS (AB109) |
| LA County | LMRS |
| LA County | Mobile App |
| LA County | Outbound Call |
| LA County | Phase |
| LA County | Probation |
| LA County | SYEP |
| LA County | TTC |
| Internet | Direct Cert. LAUSD |
| Internet | DMS |

| | |
|----------|------------------------|
| Internet | E-ICT (CALWIN) |
| Internet | E-ICT (C-iV) |
| Internet | LAHSA |
| Internet | NPP (Maximus) |
| State | CCSAS |
| State | CMIPS II |
| State | Express Lane |
| State | Fraud EBT Card |
| State | Horizontal Integration |
| State | IEVS |
| State | MEDS |
| State | QCIS |
| State | SAVE |
| State | SCI |
| State | SED |
| State | WDTIP |
| CalHEERS | CalHEERS |
| FIS-EBT | FIS-EBT |

2.2.3 Subtask: Vendor Management Support

CONTRACTOR will coordinate with the above vendors supporting the partner connectivity, telecommunications and exchange connections.

2.3 TASK 3: ENVIRONMENT DEPLOYMENT AND SUPPORT

The CONTRACTOR will design, build, deploy, and operate the environments listed in Section 2.3.2. below for the CalSAWS DD&I Project.

The CONTRACTOR will perform the following activities:

2.3.1 Subtask: Plan and Coordinate Environment Usage

Plan and coordinate environment usage – work with development, test, and conversion team leads to coordinate the availability, code deployment, and usage of environments listed in section 2.3.2 (Subtask: Environment Support).

2.3.2 Subtask: Environment Deployment

The following environments will be maintained and will exist during the listed dates. CONTRACTOR’s maintenance of environments for the CalSAWS DD&I Project beyond September 30, 2021 are not included in this SOW. The prices and scope for CONTRACTOR to maintain environments for the CalSAWS DD&I Project for October 1, 2021 onward will be included in a separate statement of work.

Table 2 – Environments for CalSAWS DD&I Project

| Environment | Start Date | End Date |
|----------------------------|----------------|--------------------|
| LRS Innovation Environment | August 1, 2019 | September 30, 2021 |
| LRS Dev | August 1, 2019 | September 30, 2021 |
| LRS AT2 | August 1, 2019 | September 30, 2021 |
| LRS AT1 | August 1, 2019 | September 30, 2021 |
| LRS PAT | August 1, 2019 | September 30, 2021 |
| LRS Batch Regression 1 | August 1, 2019 | September 30, 2021 |
| LRS Batch Regression 2 | August 1, 2019 | September 30, 2021 |
| Online Enhancement | August 1, 2019 | August 31, 2021 |
| Batch Enhancement | August 1, 2019 | August 31, 2021 |

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| LRS System Test 1 | August 1, 2019 | September 30, 2021 |
| LRS System Test 2 | August 1, 2019 | September 30, 2021 |
| LRS System Test 3 | August 1, 2019 | September 30, 2021 |
| LRS System Test 4 | August 1, 2019 | September 30, 2021 |
| LRS System Test 5 | August 1, 2019 | September 30, 2021 |
| LRS System Test 6 | August 1, 2019 | September 30, 2021 |
| CalHEERs1 | August 1, 2019 | September 30, 2021 |
| CalHEERs2 | August 1, 2019 | September 30, 2021 |
| CalHEERs3 | August 1, 2019 | September 30, 2021 |
| GAGR1 | August 1, 2019 | September 30, 2021 |
| GAGR2 | August 1, 2019 | September 30, 2021 |
| GAGR3 | August 1, 2019 | September 30, 2021 |
| CalSAWS Dev Training 1 | August 1, 2019 | September 30, 2021 |
| CalSAWS Dev Training 2 | August 1, 2019 | September 30, 2021 |
| LRS Perf Test | August 1, 2019 | September 30, 2021 |
| CalSAWS Batch Perf Test | August 1, 2019 | September 30, 2021 |
| CalSAWS UAT | April 1, 2021 | September 30, 2021 |
| LRS Staging | August 1, 2019 | September 30, 2021 |
| LRS Staging2 | November 1, 2019 | September 30, 2021 |
| Production | November 1, 2019 | September 30, 2021 |
| Training Production | November 1, 2019 | September 30, 2021 |
| LRS/CalSAWS PRT | December 1, 2019 | September 30, 2021 |

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| CalSAWS Sand Box | December 1, 2019 | September 30, 2021 |
| Demo | August 1, 2019 | September 30, 2021 |
| C-IV Copy | September 1, 2021 | September 30, 2021 |
| Conversion (C-IV) | August 1, 2019 | February 28, 2021 |
| Conversion (CalWIN) | August 1, 2019 | September 30, 2021 |
| Conversion (CalWIN) | August 1, 2019 | September 30, 2021 |
| Conversion Sync (C-IV) | August 1, 2019 | September 30, 2021 |
| Conversion Sync (CalWIN) | August 1, 2019 | September 30, 2021 |
| Conversion Sync (CalWIN) | August 1, 2019 | September 30, 2021 |
| Conversion Mock (C-IV) | March 1, 2021 | September 30, 2021 |
| Conversion Mock (CalWIN) | June 1, 2021 | September 30, 2021 |
| Converted Data Test (C-IV) | January 1, 2021 | April 30, 2021 |
| Converted Data Test (CalWIN) | January 1, 2021 | August 31, 2021 |
| Conversion Data County Review | February 1, 2021 | September 30, 2021 |
| YBN Dev | August 1, 2019 | September 30, 2021 |
| YBN Sys | August 1, 2019 | September 30, 2021 |
| YBN UAT | August 1, 2019 | September 30, 2021 |
| YBN Prod | November 1, 2019 | September 30, 2021 |

2.3.3 Subtask: Monitor and Support

- Monitor availability and performance of the environments listed in section 2.3.2 – verify components are working correctly as necessary to support development, production, training and conversion activities.

- Support development team activities, builds, and deployments to environments listed in section 2.3.2.

2.4 TASK 4: APPLICATION ARCHITECTURE (TECHNICAL SERVICES)

2.4.1 Subtask: Backend Technical Services Applications

2.4.1.1 Subtask: AMP Transition

The CONTRACTOR will perform the following services to complete the migration of AMP to AWS:

- Setup, configure and load the production AMP data in the CONTRACTOR selected Aurora MySQL database for AMP application.
- Complete build and configuration of the AMP application to work with Spring Boot embedded Apache Tomcat application server container, Kafka distributed stream-processing platform and Aurora MySQL database.
- Complete updates to the LRS application architecture and configuration to work with the updated AMP application.
- Deploy the production AMP application to run on Aurora MySQL database in AWS.
- Complete updates and schedule the performance reports to replace the current reports supported by existing AMP application.
- Complete regression tests of the LRS system using the updated AMP application running on the Aurora MySQL database.
- Complete performance tests of the LRS system using the updated AMP application running on the Aurora MySQL database.

2.4.1.2 Subtask: Audit Application Transition

The CONTRACTOR will perform the following services to complete the migration of Audit to AWS:

- Setup, configure and load the production Audit data in the Aurora MySQL database for Audit application.
- Complete build and configuration of the Audit application to work with a non-Oracle application server container, Kafka distributed stream-processing platform and the Aurora MySQL database.
- Complete updates to LRS application architecture and configuration to work with the updated Audit application.
- Deploy the ported Audit application running on the Aurora MySQL database in AWS.
- Complete regression tests of the Audit application and LRS system using the updated Audit application running on the Aurora MySQL database.
- Complete performance tests of the LRS system using the updated Audit application on the Aurora MySQL database.

2.4.1.3 Subtask: LMS Lite Application Transition

The CONTRACTOR will perform the following services to complete the transition of the LMS Lite application to AWS:

- Setup, configure and load the production LMS Lite data in the Aurora MySQL database for LMS Lite application.
- Complete build and configuration of the LMS Lite application to work with a non-Oracle application server container and the Aurora MySQL database.
- Deploy the ported LMS Lite application running on the Aurora MySQL database.
- Complete regression tests of the ported LMS Lite application running on the Aurora MySQL database.

2.4.1.4 Subtask: LRS Dashboard Application Transition

Migrate the LRS Dashboard application to AWS to support the transition of the LRS system to AWS. The CONTRACTOR will perform the following services to complete this migration:

- Setup and configure the Aurora MySQL database for the LRS Dashboard application.
- Complete build and configuration of the LRS Dashboard application to work with Spring Boot embedded Tomcat application server container and the Aurora MySQL database.
- Deploy the ported LRS Dashboard application running on the Aurora MySQL database.
- Complete regression tests of the ported LRS Dashboard application running on the Aurora MySQL database.

2.4.1.5 Subtask: Webservices Transaction Schema Transition

The CONTRACTOR will perform the following services to complete the webservices transaction schema migration to AWS:

- Setup, configure and load the production Webservices Transaction data in the Aurora MySQL database for Webservices Transaction schema.
- Complete build and configuration of the LRS application architecture to work with the updated webservices transaction schema in AWS.
- Complete regression tests of the LRS system using the updated webservices transaction schema to functionally validate the web-service endpoints listed in section 2.2.2 Subtask Partner Connectivity , which includes CalHEERS.

2.4.2 Subtask: Technical Services Transition

2.4.2.1 Subtask: Oracle WebCenter Content (WCC) Transition

The CONTRACTOR will perform the following services to complete the migration of document storage functionality of the LRS application to AWS:

- Complete setup and configuration of the new architecture for storage and retrieval of all functional documents used by the LRS application in a suitable file structure on AWS S3 storage to replace the current Oracle WCC content management system.
- Complete build and deployment of the a REST based application to provide a document service interface for the AWS S3 backend storage.
- Complete updates to the LRS application configuration and architecture to work with the new REST based document service.
- Complete implementation and execution of batch jobs to import the LRS system documents from the Oracle WCC database into the AWS S3 storage.
- Complete regression tests of the LRS system using the AWS S3 storage.
- Complete performance tests of the LRS system using the AWS S3 storage.

2.4.2.2 Subtask: Adobe Experience Manager - Software as a Service

The CONTRACTOR will perform the following services to update the dynamic document architecture from the on-premise hosted Adobe Experience Manager (“AEM”) to AEM Software As A Service (“SAAS”).

- Complete build and deploy the Open Service Gateway Initiative (“OSGI”) bundle to the AEM SAAS instance for LRS system to use.
- Complete updates to LRS application architecture and configuration to work with the with AEM SAAS.

- Implement an operational strategy for managing the existing document templates and fonts in AEM SAAS to be used for dynamic document generation.
- Complete regression tests of the LRS system using the AEM SAAS interface for dynamic document generation functionality.
- Complete performance tests of the LRS system using the AEM SAAS interface for dynamic document generation functionality.

2.4.2.3 Subtask: Person Search Indexing

The CONTRACTOR will perform the following services to update the Person Search indexing.

- Complete regression tests of the Person Search functionality in the LRS system with reduced columns indexing.
- Complete performance tests of the LRS system using Person Search functionality with reduced columns indexing.

2.4.2.4 Subtask: Person Search Work Managers Implementation

The CONTRACTOR will perform the following services to implement the Work Managers for Person Search.

- Complete build and configuration of the WebLogic Work Managers for Person Search in the LRS production system.
- Complete regression tests of the Person Search functionality in the LRS system with WebLogic Work Managers for Person Search.

2.4.3 Subtask: YBN Transition to AWS

The CONTRACTOR will perform the following services to transition the Your Benefits Now (“YBN”) application to AWS.

- Complete lift and shift of the existing on-premise YBN application to AWS cloud.

- Complete the transfer of production data from the on-premise YBN database to AWS using Snowball device and import into an equivalent Oracle database.
- Complete regression tests of the YBN production application on the AWS platform.

2.4.4 Subtask: Database Upgrade

The CONTRACTOR will perform the following services to complete the upgrade of the LRS database to Oracle18c:

- Complete implementation of identified changes to the LRS application online and batch to support the Oracle 18c upgrade.
- Complete regression testing of the LRS online and batch with the Oracle 18c database.
- Complete performance testing of the LRS online and batch with the Oracle 18c database.

2.4.5 Subtask: Oracle Database High Availability

CONTRACTOR will test and implement the selected solution to allow a clean failback of the primary Oracle database in AWS. As noted during the AWS Proof of Concept, the Oracle Dataguard replication method that will be used for High Availability does not allow for as fast of a failover as the current on-premises Real Application Cluster.

2.4.6 Subtask: LRS Data Migration and Support

The CONTRACTOR will perform the following services to complete migration of LRS production data to AWS and maintain the LRS data in AWS in sync with LRS on-premise data changes.

- Synchronize the LRS on-premise data changes to AWS cloud using services such as AWS Data Migration Service or Oracle Dataguard.
- Monitor and support the data synchronization.

2.4.7 Subtask: Batch Streams Architecture

The CONTRACTOR will perform the following services for the CalSAWS DD&I Project to address batch performance:

- Evaluate the following open source stream processing technologies for implementation of a new batch streams architecture framework:
 - Apache Kafka Streams or
 - Apache Flink
- Based on the above evaluation, CONTRACTOR will select an open source stream processing technology.
- Design, build and implement an event-driven streams architecture framework with the chosen technology for the batch jobs identified as underperforming for CalACES (40-County) workloads; specifically for MEDS, CCSAS and EDBC sweeps.
- Support the application development team in the remediation of the MEDS, CCAS and EDBC sweeps batch jobs.

2.4.8 Subtask: Cloud Native Architecture

The CONTRACTOR will perform the following services for the CalSAWS DD&I Project to support Cloud Native Architecture.

- Evaluate application containerization options such as Docker to increase efficiencies in application development and operational management of applications.
- Evaluate container orchestration systems such as Kubernetes for deploying, dynamic scaling and management of containerized applications.
- Based on the above evaluation, CONTRACTOR will select the container and orchestration software.
- Evaluate and prototype a micro-services architecture framework on Journal functionality.

- Develop a containerization strategy to build applications and deploy them at scale with reduced or zero dependency on software platform vendors and cloud providers.

2.4.9 Subtask: Security Stack

The CONTRACTOR will perform the following services for replacement of the current Oracle Security Stack used in the LRS application architecture.

- Evaluate Central Authentication Server (“CAS”) as a replacement to Oracle Access Manager (“OAM”) for authentication services with Microsoft Active Directory and LDAP servers .
- Evaluate suitable open source products to replace other Oracle security products used by the LRS, specifically:
 - Oracle Internet Directory (“OID”)
 - Oracle Access Gateway (“OAG”)
 - Oracle HTTP Server (“OHS”)
 - Oracle Service Bus (“OSB”).
- Based on the above evaluation, CONTRACTOR will select the open source products to replace the above-mentioned Oracle security products.
- Design and build security architecture frameworks with the new replacement open source products to replace the current Oracle based security architecture.
- Perform application functional validation and regression testing with the new security stack built into the application.

2.5 TASK 5: APPLICATION DEVELOPMENT

2.5.1 Subtask: MEDS

Perform a code analysis of the MEDS interface to identify common search criteria for changes that must be sent to the MEDS interface partner. Taking advantage of architecture changes described in Section

2.4.7, the CONTRACTOR will perform the following services based on the outcomes of the code analysis:

- Modify online application logic to log changes to a central location for downstream batch processes to consume
- Update the twenty-one (21) separate MEDS interface batch Java classes to use the Batch Streams architecture to trigger changes to the MEDS interface partner
- Update the twenty-one (21) separate MEDS interface batch Java classes to maintain the current logic of only sending case/person changes which occurred after the last successful run of the interface.
- Perform side-by-side file comparison between a file created with the current production architecture and the new architecture outlined in section 2.4.7
- Perform interface partner testing with the MEDS interface partner
- Conduct performance testing

2.5.2 Subtask: CCSAS

Perform a code analysis of the CCSAS interface to identify common search criteria for changes that must be sent to the CCSAS interface partner. Taking advantage of architecture changes described in Section 2.4.7 the CONTRACTOR will perform the following services based on the outcomes of the code analysis:

- Modify online application logic to log changes to a central location for downstream batch processes to consume
- Update the ten (10) separate CCSAS interface batch Java classes to use the Batch Streams Architecture to trigger changes to the CCSAS interface partner

- Update the ten (10) separate CCSAS interface batch Java classes to maintain the current logic of only sending case/person changes which occurred after the last successful run of the interface.
- Perform side by side file comparison between a file created with the current production architecture and the new architecture outlined in section 2.4.7
- Perform interface partner testing with the CCSAS interface partner
- Conduct performance testing

2.5.3 Subtask: EDBC Sweeps

Perform a code analysis of the batch EDBC sweeps to identify common search criteria for programs that must be run through batch EDBC. Taking advantage of architecture changes described in section 2.4.7, the CONTRACTOR will perform the following services based on the outcomes of the code analysis:

- Data Driven Sweeps – Sweeps that trigger when a value is updated in the database (ex: program status, person status, household status, etc.)
 - Modify online application logic to log changes to a central location for downstream batch processes to consume
 - Update the sixty-two (62) separate Data Driven Sweeps batch Java classes to use the Batch Streams Architecture to insert into the batch eligibility transaction table
 - Compare the data being inserted into the batch eligibility transaction table from the current production architecture and the new architecture outlined in section 2.4.7
 - Conduct performance testing
- Date Driven Sweeps – Sweeps that trigger when a specific time period has been reached (e.g.ex: person reaches a certain age, RE

period reached, periodic reporting not returned by certain date, etc.)

- Create new batch jobs that log date triggers into a central location to be consumed by downstream date driven sweeps
- Update the forty-two (42) separate Date Driven Sweeps batch Java classes to use the Batch Streams Architecture to insert into the batch eligibility transaction table
- Compare the data being inserted into the batch eligibility transaction table from the current production architecture and the new architecture outlined in section 2.4.7
- Conduct performance testing

2.5.4 Subtask: EDBC Tuning

Analyze and modify the queries that are executed in EDBC determination to enhance the system performance to support CalSAWS projected volume. The CONTRACTOR will perform the following services:

- Analyze up to 100 queries involved in EDBC execution
- Modify the queries identified during analysis to contribute to the degradation of the EDBC response time described in the performance requirements for Daily Peak Usage Hours ED/BC Response Time and Daily Prime Business Hours ED/BC Response Time in the Base Agreement
- Analyze the feasibility of joining multiple queries that fetch data from the same combination of database tables and modify the queries based on the analysis
- There are several instances in the system where a single query is fetching the same data multiple times. CONTRACTOR will analyze the possibility of storing results during the initial fetch so it can be used for future reference. This may reduce the database calls made by a single query which may improve EDBC performance.

- CONTRACTOR will use the test approach outlined below for the changes mentioned above:
 - Run batch EDBC on total caseload with the current Production build and capture the results.
 - Run batch EDBC on total caseload with the suggested query modifications and capture results
 - Compare the EDBC results to evaluate the time taken for EDBC execution
 - Confirm the functional test results are same for all EDBC programs pre and post query changes

2.6 TASK 6: ANALYTICS

The CONTRACTOR will perform the following infrastructure services to design, build, and deploy a “data lake” for the transition of LRS and C-IV system reporting onto AWS:

2.6.1 Subtask: Big Data Core and Infrastructure

2.6.1.1 Subtask: Data Ingestion Framework

The CONTRACTOR will implement a Data Ingestion Framework that will be a collection of ingestion patterns to be applied when data is moved to the AWS platform. The Data Ingestion Framework will support the following patterns:

- Data from external JDBC databases
- Data from file sources
- Data that is continually changing (Change Data Capture)
- Data from real-time systems

2.6.1.2 Subtask: Data Consumption Framework

The CONTRACTOR will implement a Data Consumption Framework to support the consumption of data. The Data Consumption Framework will support the consumption of data from the following:

- Data that resides in Relational Database Services (“RDS”)
- Data that is built into flat files
- Data that is visualized
- Data that resides in Amazon Web Services Simple Storage Service (“S3”)
- Data that will reside in Hadoop Distributed File System (“HDFS”)

2.6.1.3 Subtask: S3 Bucket and Partition Approach

The CONTRACTOR will develop a S3 bucket and partition approach that will include the following:

- Naming conventions
- Bucket layout and folder strategy
- Identity and Access Management (“IAM”) Access Restrictions/Group Policy
- Personally Identifiable Information (“PII”) data policies
- Data Lifecycle Policies
- Archiving Policies
- PII Data Handling
- Domain Name System (“DNS”) Record Preferences
- Uniform Resource Locator (“URL”) format for cross-region/Availability Zone (“AZ”) scripting

2.6.1.4 Subtask: RDS (Relational Data Stores) Table Design

The CONTRACTOR will develop the tables and models to support the movement of data S3 storage into an RDBMS (relational database management system) to support visualization of the data.

CONTRACTOR development activities will include:

- RDS table design restrictions
- RDS Group and IAM policy restrictions
- Restricted Data Pattern

- Build mapping of source and target systems for RDBMS

2.6.1.5 Subtask: Environment Version Control

The CONTRACTOR will implement environment version control to support consistency across environments and manage the automated environment build out scripts. The implementation will include the following:

- Infrastructure as code design
- Platform Formation Templates
- Repository and Artifactory control

2.6.1.6 Subtask: Data Lineage & Governance

The CONTRACTOR will implement a catalog and governance control policy to support the capability to trace data back to its origins and manage the data. The catalog and governance control policies will include:

- Create 1 AWS Glue Design & Configuration Document
- Create 1 Data Governance Control Policy Document
- Create 1 Enterprise Data Cataloging Guidelines Document
- Create 1 Platform On-Boarding Template

2.6.2 Subtask: OBIEE (LRS and CIV)

The CONTRACTOR will design, build and deploy 337 OBIEE reports that are currently in the LRS and the C-IV System onto the new analytical platform. The CONTRACTOR will perform the following activities:

2.6.2.1 Subtask: Ingestion

This task involves connecting to the LRS, extracting the data, and detecting the changed data from the previous extracted reference point for movement to the AWS S3 storage. It is the beginning of the data pipeline, where ingestion jobs obtain or import data for further usage.

Data will be ingested in batches. Data is ingested in change sets at a periodic interval of time. The process involves prioritizing data tables, validating individual files and routing data items to the correct destination.

For the ingestion activity, a total of 450 simple ingestion jobs (i.e. moving data without applying any transformation or business logic) will be created in Talend or Spark to fetch data from approximately 1,700 tables from the LRS System.

Activities included are:

- Define software architecture
- Design ingestion implementation patterns
- Design Ingestion Pipeline
- Technical Design for coding and unit testing
- Develop Ingestion Jobs
- Conduct unit test

2.6.2.2 Subtask: Curation

This task involves creating Spark and/or Talend jobs for processing the ingested data. Once the ingested data is moved into the Big Data Core using the curation jobs, the business logic and transformations will be carried out in these set of activities. The aim of this activity is to create built-for-purpose outputs that the visualization tools can directly consume without having to apply complex logic.

Table 3 below provides the quantities of curation jobs by each categorization of job complexity (e.g. Simple, Medium, Complex) that CONTRACTOR will create to support the visualization component of the OBIEE reports.

Table 3 – Quantities of Curation Jobs for OBIEE Reports

| Quantities of Curation Jobs by Complexity | | |
|-------------------------------------------|--------|---------|
| Simple | Medium | Complex |
| 57 | 54 | 27 |

The three categories of curation job complexities for OBIEE reports are defined in Table 4 below.

Table 4 – Definitions and Attributes of Curation Job Complexities for OBIEE Reports

| Simple | Medium | Complex |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A “simple” curation job includes the following attributes:</p> <ul style="list-style-type: none"> • Less than three (3) database tables/files accessed • Single database access • Simple transformations/ validation using code | <p>A “medium” curation job includes the following attributes:</p> <ul style="list-style-type: none"> • Three (3) to twelve (12) database tables/files used • Multiple database access • Multiple transformations/validation using code | <p>A “complex” curation job includes the following attributes:</p> <ul style="list-style-type: none"> • Greater than twelve (12) database tables/files • Multiple databases are accessed • Complex transformations/ validation via code |

Activities involved in creating curation jobs to feed the visualization tool includes:

- Design logical data model
- Design physical model
- Technical Design for creating jobs and unit testing
- Develop Jobs
- Conduct unit test

2.6.2.3 Subtask: Visualization

This task enables the data to be viewed by the user. During this activity CONTRACTOR will recreate a total of 337 OBIEE reports from LRS and C-IV on Tableau.

These reports will be accessible via the current reports landing page present on the LRS application.

Table 5 below provides the complexity details for the 337 OBIEE reports, including the quantities of OBIEE reports from the LRS and the C-IV System that CONTRACTOR will recreate on Tableau by the categorizations of visualization complexity (e.g. Simple, Medium, Complex).

Table 5 – Quantities of OBIEE Reports by Visualization Complexity

| | Quantities of OBIEE Reports by Visualization Complexity | | |
|------------------------------------------|----------------------------------------------------------------|-------------|--------------|
| Visualization Complexity Category | LRS | C-IV | Total |
| Complex | 32 | 62 | 94 |
| Medium | 94 | 27 | 121 |
| Simple | 106 | 16 | 122 |
| Total OBIEE Reports | 232 | 105 | 337 |

Table 6 below provides the high-level definitions of the three categories of visualization complexities referenced in Table 5 above:

Table 6 – Attributes and Definitions of Visualization Complexities for OBIEE Reports

| Simple | Medium | Complex |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A “simple” visualization includes the following attributes:</p> <ul style="list-style-type: none"> • Simple query • One (1) data source • One (1) data output (no multi-site-specific distribution) • Straightforward data retrieval <p>A “simple” visualization includes the following logic:</p> <ul style="list-style-type: none"> • Minimal processing and/or formatting | <p>A “medium” visualization includes the following attributes:</p> <ul style="list-style-type: none"> • Moderate query complexity • One (1) data source • One (1) to three (3) data outputs (possibly two (2) to three (3) sites) • Some relational cross-checking and validation <p>A “medium” visualization</p> | <p>A “complex” visualization includes the following attributes:</p> <ul style="list-style-type: none"> • Complex query • More than one (1) data source • More than three (3) outputs and/or multi-site distribution (more than three (3) sites) • Data from multiple functional areas or Data Marts <p>A “complex” visualization</p> |

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| | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • No charts or graphs • Limited development effort required • Minimal or no aggregation, calculation, sorting, grouping, breaking | <p>includes the following logic:</p> <ul style="list-style-type: none"> • Some processing and/or formatting logic • One (1) to two (2) charts/graphs • Moderate development effort required • Moderate aggregation, calculation, sorting, grouping, and breaking • Some field transformations may be needed | <p>includes the following logic:</p> <ul style="list-style-type: none"> • Significant processing and/or formatting logic • Three (3) or more charts/graphs • Large development effort required (complex logic) • Complex aggregation, calculation, sorting, grouping, and breaking • Complicated data retrieval • Required field transformations |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Activities involved in creating built-for-purpose schemas and visualization report include:

- Create RDS Tables
- Technical Design for reports and unit testing
- Develop Reports
- Conduct unit test

2.6.2.4 Subtask: Testing

The CONTRACTOR will test the developed visualizations. Test activities include the following:

- Define test approach
- Create test plan
- Create test cases and scenarios
- Perform System Test, Performance Test and Solutions Test for the end to end application
- Perform Integration Testing by combining the individual elements and testing as a group

- Provide up to 900 hours of support for User Acceptance Testing (“UAT”)

2.6.2.5 Subtask: Deployment

The key objective of this task is to prepare the production and operating environments for system roll-out or ‘Go-Live’ to the users and other application stakeholders. The CONTRACTOR will perform go-live readiness activities in coordination with the application team for readiness of the application.

The deployment of Analytics Reports into Production will be done in nine (9) releases and will include the below activities:

- Establish implementation approach
- Create implementation plan and support procedures
- Develop cutover schedule in collaboration with the Release Management team
- Prepare for migration
- Authorize deployment of reports to production environment
- Complete migration (tables, business logic, reports)
- Fine tune Application

2.6.3 BIP and State Reports (LRS and C-IV)

The CONTRACTOR will design, build and deploy four (4) reports. The goal of this task is to build out one (1) number 267 State report (categorized as Complex), and three (3) BIP reports (one (1) Simple, one (1) Medium, and one (1) Complex) onto the new analytical platform. The categorizations of complexity levels for curation jobs and report visualizations are defined in Tables 8 and 10 below, respectively. The CONTRACTOR will perform the following activities:

2.6.3.1 Subtask: Curation

This task involves creating Spark and/or Talend jobs for processing the ingested data. Once the ingested data is moved into the Big Data Core using the curation jobs, the business logic and transformations will be carried out in this set of activities. The aim of this Subtask is to create built-for-purpose outputs that the visualization tools can directly consume without having to apply complex logic.

Table 7 below provides the quantities of curation jobs by each categorization of job complexity (e.g. Simple, Medium, Complex) that CONTRACTOR will create to support the visualization component of the BIP and State reports.

Table 7 – Quantities of Curation Jobs for BIP and State Reports

| Quantities of Curation Jobs by Complexity | | |
|--------------------------------------------------|---------------|----------------|
| Simple | Medium | Complex |
| 1 | 1 | 2 |

The three categories of curation job complexities for BIP and State reports are defined in Table 8 below.

Table 8 – Definitions and Attributes of Curation Job Complexities for BIP and State Reports

| Simple | Medium | Complex |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A “simple” curation job includes the following attributes:</p> <ul style="list-style-type: none"> • Less than three (3) database tables/files accessed • Single database access • Simple transformations/validation using code | <p>A “medium” curation job includes the following attributes:</p> <ul style="list-style-type: none"> • Three (3) to twelve (12) database tables/files used • Multiple database access • Multiple transformations/validation using code | <p>A “complex” curation job includes the following attributes:</p> <ul style="list-style-type: none"> • Greater than twelve (12) database tables/files • Multiple databases are accessed • Complex transformations/validation via code |

Activities involved in creating curation jobs to feed the visualization tool includes:

- Design logical data model
- Design physical model
- Technical Design for creating jobs and unit testing
- Develop Jobs
- Conduct unit test

2.6.3.2 Subtask: Visualization

This task enables the data to be viewed by the user. For this activity, CONTRACTOR will create four (4) reports. One (1) State report numbered 267 will be created in Microsoft Excel format and three (3) BIP reports will be created in Tableau.

These reports will be accessible via the current reports landing page present on the LRS application.

Table 9 below provides the complexity details for the four (4) BIP and State reports, including the quantities of reports that CONTRACTOR will create by the categorizations of visualization complexity (e.g. Simple, Medium, Complex).

Table 9 – Quantities of BIP and State Reports by Visualization Complexity

| | Quantities of BIP and State Reports by Visualization Complexity | | |
|------------------------------------------|------------------------------------------------------------------------|----------------------|----------------------|
| Visualization Complexity Category | BIP Reports | State Reports | Total Reports |
| Complex | 1 | 1 | 2 |
| Medium | 1 | 0 | 1 |
| Simple | 1 | 0 | 1 |
| Grand Total | 3 | 1 | 4 |

Table 10 below provides the high-level definitions of the three categories of visualization complexities referenced in Table 9 above:

Table 10 - Attributes and Definitions of Visualization Complexities for BIP and State Reports

| Simple | Medium | Complex |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A “simple” visualization includes the following attributes:</p> <ul style="list-style-type: none"> • Simple query • One (1) data source • One (1) data output (no multi-site-specific distribution) • Straightforward data retrieval <p>A “simple” visualization includes the following logic:</p> <ul style="list-style-type: none"> • Minimal processing and/or formatting • No charts or graphs • Limited development effort required • Minimal or no aggregation, calculation, sorting, grouping, breaking | <p>A “medium” visualization includes the following attributes:</p> <ul style="list-style-type: none"> • Moderate query complexity • One (1) data source • One (1) to three (3) data outputs (possibly two (2) to three (3) sites) • Some relational cross-checking and validation <p>A “medium” visualization includes the following logic:</p> <ul style="list-style-type: none"> • Some processing and/or formatting logic • One (1) to two (2) charts/graphs • Moderate development effort required • Moderate aggregation, calculation, sorting, grouping, and breaking • Some field transformations may be needed | <p>A “complex” visualization includes the following attributes:</p> <ul style="list-style-type: none"> • Complex query • More than one (1) data source • More than three (3) outputs and/or multi-site distribution (more than three (3) sites) • Data from multiple functional areas or Data Marts <p>A “complex” visualization includes the following logic:</p> <ul style="list-style-type: none"> • Significant processing and/or formatting logic • Three (3) or more charts/graphs • Large development effort required (complex logic) • Complex aggregation, calculation, sorting, grouping, and breaking • Complicated data retrieval • Required field transformations |

Activities involved in creating built-for-purpose schemas and visualization report includes:

- Create RDS Tables

- Technical Design for reports and unit testing
- Develop Reports
- Conduct unit test

2.6.3.3 Subtask: Testing

The CONTRACTOR will test the developed visualizations. Testing activities include the following:

- Define test approach
- Create test plan
- Create test cases and scenarios
- Perform System Test, Performance Test and Solutions Test for the end to end application
- Perform integration testing by combining the individual elements and testing as a group
- Provide up to forty (40) hours of support for user acceptance testing (“UAT”)

2.6.3.4 Subtask: Deployment

The key objective of this task is to prepare the production and operating environments for system roll-out or ‘Go-Live’ to the users and other application stakeholders. We would perform go-live readiness in coordination with the application team for readiness of the application.

The deployment of Analytics Reports into Production will be done in one (1) release and will include the below activities:

- Establish implementation approach
- Create implementation plan and support procedures
- Develop a cutover schedule in collaboration with the Release Management team.
- Prepare for migration
- Authorize Deployment of reports to production environment

- Complete migration of tables, business logic, and reports
- Fine tune Application

2.6.4 Subtask: Change Enablement

The CONTRACTOR will support the introduction of the analytics solution. Below activities will be supported by CONTRACTOR up to the capacity of two (2) full time resources for six (6) months:

- Training sessions about the new features/capabilities of the visualization tool used (e.g. Tableau)
- Support a training management network composed of representatives of each stakeholder group to help coordinate role impact and training issues and events
- Plan and conduct workshops for identified groups from the stakeholder teams
- Plan and conduct ‘brown bag’ discussions of the deployed tools for interested groups
- Monitor progress

2.6.5 Production Operations for Analytics

The CONTRACTOR will provide ongoing production operations support services for the Analytics solution. The staffing levels and hours for production operations support services for the Analytics solution are based on those documented in Schedule 2 (CalSAWS Cloud and IM&O Pricing Schedule 2. These ongoing production operations support services will initially focus on continuing the support structure, including processes and governance structure. The duration of these support services will commence November 1, 2019 and continue through September 30, 2021.

The following activities are included:

- Infrastructure is monitored to enable quick identification and resolution of data and system issues.

- Incident Management: Incident management deals with resolving and prevention of incidents that affects the normal running of the services.
- Problem Management: Problem management deals with identifying the root cause of the incidents and problems and providing workarounds or permanent solutions to avoid similar incidents.
- Preventative Maintenance: Anticipation, identification and resolution of potential problems and incidents where possible before they occur.
- Application Monitoring: Regular monitoring of key performance indicators of solutions to ensure they are functioning properly. Warnings and failures are dealt with as part of incident management.

2.7 TASK 7: INNOVATION LAB

The innovation lab will be responsible for the evaluation of emerging technologies and integration of selected technologies into the CalSAWS platform. The CONTRACTOR will provide the following full-time resources to support the innovation lab:

- One (1) Manager
- One (1) Consultant
- Three (3) Analysts

Services for the innovation lab are included in this SOW through September 30, 2021. The prices and scope for CONTRACTOR to provide Services for the innovation lab for October 1, 2021 onward will be included in a separate statement of work.

2.8 TASK 8: INTERIM MAINTENANCE AND OPERATIONS

Production Operations services are required for maintaining and operating the re-platformed LRS application on AWS cloud-hosted architecture. CONTRACTOR

will provide Production Operations services for administration of the Wide Area Network and production operations support, which are further described below.

2.8.1 Subtask: Wide Area Network (WAN) Administration

CONTRACTOR will provide administration of the Wide Area Network, which is comprised of telecommunications services and co-location facilities, required for interim maintenance and operations of the LRS System. Co-location facilities or “exchanges” provide a dedicated network connection between the CalSAWS MPLS network and the CalSAWS production and development environments hosted in the AWS Cloud. WAN Administration includes the following:

- Management of the telecommunications circuits that provide connectivity between:
 - The CalSAWS MPLS network and the exchanges to connect to the AWS Cloud.
 - The Los Angeles County and certain CalWIN County Sites (e.g. point of presence locations) and the CalSAWS MPLS network.
 - The CalSAWS central sites (e.g., the PMO in Norwalk, California, the central print facilities) and the CalSAWS MPLS network.
- Management of the connections between the exchanges and:
 - CalSAWS production and development environments
 - Los Angeles County and certain CalWIN County sites
 - CalSAWS central sites

2.8.2 Subtask: Production Operations Support

The CONTRACTOR will provide Production Operations support for the central service desk that is required for interim maintenance and operations of the LRS application.

- **Service Desk Operations Support.** The CONTRACTOR will provide central support for the central Service Desk solution for the 40

Consortium Counties. Production Operations include support of the AWS Connect-based Service Desk system and management and administration of the accompanying third-party manufacturer Hardware and Software.

- Production Operations are based on supporting a maximum of twenty-five (25) Service Desk for September 30, 2021.
- Contractor will provide Level 3 support for the central Service Desk system:
 - Troubleshoot and resolve tickets reported by Service Desk staff
 - Work with Level 1 support staff to coordinate the resolution of tickets
- Contractor will perform regular maintenance tasks and upgrades for the central Service Desk system:
 - Install and configure software updates and patches
 - Monitor Production and Development infrastructure
 - Monitor the contact center system application
 - Process roll-on/off requests for Service Desk staff
 - Support centralized CalSAWS Service Desk call flows
 - Manage and administer third-party applications for reporting, work force management, and quality assurance

2.9 TASK 9: APPLICATION PROGRAMMING INTERFACES

CONTRACTOR shall design, build, test, and implement application programming interfaces (“APIs”) as documented in the Statement of Requirements attached to this Statement of Work.

3. SCHEDULE 1 CONTRACTOR ASSUMPTIONS

Schedule 1 includes CONTRACTOR assumptions associated with completing the Cloud Enablement Work for the CalSAWS CEP. CONTRACTOR's performance of the Cloud Enablement Work, at the pricing and within the CalSAWS CEP Schedule provided is dependent on the assumptions in Schedule 1, this SOW, and the Base Agreement. In the event the assumptions are incomplete or inaccurate, the Parties will enter into an appropriate Amendment to the Agreement for such Cloud Enablement Work to address any incremental costs or timeline changes incurred by CONTRACTOR or in connection with such Cloud Enablement Work.

4. SCHEDULE 2 CALSAWS CLOUD AND IM&O PRICING SCHEDULE

Schedule 2 attached hereto includes the CONTRACTOR payments for the CalSAWS CEP and IM&O.

CONTRACTOR will invoice its Innovation Lab Services (Task 7) on a time-and-materials basis and invoices will be issued on the first of the month after which such Services were performed. CONTRACTOR's rates for the Innovation Lab Services are set in Schedule 2c (Innovation Lab Services) of Schedule 2 (CalSAWS Cloud and IM&O Pricing Schedule). Based on the above assumptions in Task 7 and Section 3 (Contractor Assumptions), fees are estimated to be Four Million, One Hundred Forty-Seven Thousand, One Hundred One US Dollars (\$4,147,101.00) (the "Total Innovation Lab Services Fee Amount"). The Total Innovation Lab Services Fee Amount is inclusive of taxes and out-of-pocket expenses.

CONTRACTOR will notify CONSORTIUM in writing (email is acceptable) when the amount of fees expended to date reach Seventy-five percent (75%) of the Total Innovation Lab Services Fee Amount and provide an estimate for the additional amount, if any, of Innovation Lab Services Fee Service Fees needed to complete the Innovation Lab Task (Task 7) (the "75% Expended Notice"). Within five (5) business days of receipt of the 75% Expended Notice, CONSORTIUM

will notify CONTRACTOR whether CONSORTIUM wishes to proceed with the Innovation Lab (Task 7) services.

If CONSORTIUM determines it wishes CONTRACTOR to continue to provide the Innovation Lab Service (Task 7) and incur fees in excess of the Total Innovation Lab Services Fee Amount, the Parties will in good faith negotiate the amount of any adjustment to the Total Innovation Lab Services Fee Amount and document same in an Amendment to the Base Agreement and this SOW.

CONTRACTOR has no obligation to continue to perform Services under Innovation Lab (Task 7) once the Total Innovation Lab Services Fee Amount is expended without a mutually executed Amendment increasing the Total Innovation Lab Services Fee Amount.

5. SCHEDULE 3 AWS COMPUTE RESOURCE SPECIFICATION

Schedule 3 attached hereto, documents provides a list of estimated compute resources required in the AWS Cloud for execution of the CEP. As changes become necessary or refinements are developed, these will be discussed with the CONSORTIUM. As outlined in Section 3, Assumptions, the CONSORTIUM must make the resources identified in Schedule 3 available to support the delivery of CEP. Delays in making such resources available will delay the delivery of the CEP and, in turn, push out the projected completion date. Schedule 3 does not include the estimated compute resources required for IM&O of the LRS application running in the AWS Cloud.

6. SCHEDULE 4 HARDWARE/SOFTWARE SPECIFICATIONS

Schedule 4 attached hereto outlines software/licensing required for the execution of the CEP. As changes become necessary or refinements are developed, these will be discussed with the CONSORTIUM. As outlined in Section 3, Assumptions, the CONSORTIUM must make the software/licensing identified in Schedule 4 available to support the delivery of CEP. Delays in making such software/licensing available will delay the delivery of the CEP and, in turn, push out the projected completion date.

7. SCHEDULE 5 IM&O PRODUCTION OPERATIONS SPECIFICATIONS

Schedule 5 attached hereto outlines the specifications for production operations services for the LRS System running in the AWS Cloud as part of IM&O. Such specifications include a listing of county sites, central sites for the CONSORTIUM, addresses for the county and central sites, quantities, unit prices, service specifications (e.g. type of service, bandwidth, etc.), and schedule for each service. These specifications serve as the basis for the Wide Area Network solution and production operations support services CONTRACTOR will provide under this SOW.

8. SCHEDULE 6 API STATEMENT OF REQUIREMENTS AND CONTRACTOR ASSUMPTIONS

Schedule 6 includes the API Statement of Requirements resulting from the API functional design sessions and CONTRACTOR assumptions associated with completing this API Work. CONTRACTOR's performance of the API Work, at the pricing within Schedule 2, is dependent on the assumptions in Schedule 6, this SOW, and the Base Agreement. In the event the assumptions are incomplete or inaccurate, the Parties will enter into an appropriate Amendment to the Agreement for such API Work to address any incremental costs or timeline changes incurred by CONTRACTOR or in connection with such API Work.