California ISO

Transmission Asset Implementation Guide

Version 2.6

Revision History

Version	Date	Description
1	2/14/18	Initial Version
1.1	8/27/18	Clarification to section 3 & 4
2	7/310/19	Bundle 1 & 2 timeframe. Updates to section 4, 6, 7 & 8 for modeling -84 day timeline.
2.1	12/3/2019	Removal PeakRC
2.2	7/6/2020	Updates to the Bundle Timeframe and FNM schedule
2.3	3/14/2022	6.2 & 6.3 – New project creation Logic & Voting Addition of Appendix E
2.4	10/18/2022	Section 6.4 – Moving earliest date
2.5	11/28/2022	Section 17 - PTO Data Gathering Template
2.6	10/01/2023	Addition of Section 17.2 Shunt Equipment Data Template and 17.3 FERC880 Dynamic MVA ICCP Template

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1 Introduction

This guide is designed to assist each Participating Transmission Owner (PTO) a smooth transition into the design and implementation of the ISO Full Network Model (FNM). It is meant to provide guidance on deliverables and clarify why a deliverable is sometimes required to be resubmitted. Each PTO must report all transmission changes to the ISO in accordance to BAL-005 and TOP-001. Each PTO shall report all transmission work to the ISO through the provided bulk loading excel spreadsheet or other agreed format.

The ISO has implemented a bundle date system that is derived from the equipment type energization date. A series of bundle approval dates are calculated and then provided to the PTO single point of contact. **These dates should be viewed as CAISO acceptance dates not the last day to submit information, forms or details required to move the project forward.** If additional information is needed, the ISO will contact the designated points of contact with internal group comments.

2 Definitions

PTO transmission coordinator: The TO transmission coordinator is a person or team of people that coordinate transmission projects within the PTO and reports all projects to the ISO through the ISO supplied bulk loading spreadsheet. The coordinator is the ISO single point of communication with that person or team.

Resource Interconnection Management System (RIMS): RIMS Transmission is a database module that the ISO pulls transmission projects for modeling, internal implementation, readiness process and coordinating before energizing a PTO transmission project.

Transmission Project Bulk Data Upload spreadsheet: This bulk loading spreadsheet can be downloaded from within the RIMS UI and is formatted specifically for loading single to many changes into the ISO RIMS/ PTO Dashboard. The PTO is responsible to report all transmission projects using the bulk loading spreadsheet. This spreadsheet is located under the MPAI Dashboard →Transmission →Transmission Project Bulk Data Upload.

3 Getting Started

3.1 Access

Potential or existing participating transmission owners will be required to have user access to RIMS. The process to gain user access to RIMS is as follows:

1. Establish a User Access Administrator (UAA) with the ISO Customer Service Department. If you are unsure whether a UAA has already been established with the CAISO for your entity, please contact the ISO Client Relations Department at UAARequests@caiso.com.

If a UAA is not already established you may create one following the steps below.

    a. Go to www.CAISO.com and navigate to "Application Access" by selecting "PARTICIPATE" in the selection menu at the top of the webpage.
Select the "User access administrator guide".

    b. Complete Steps 1 and 2 of the User Access Administrator Guide, "Designate a UAA" and "Complete the non-disclosure agreement".

2. Once your UAA has been established, complete steps 3-5 using the User Access Administrator Guide.

    a. Request application access

    b. Conform with information security standards

    c. Install and renew digital certificates

3. Transmission module users will need to be provisioned by the UAA to access Transmission project codes.

3.2 Transmission Asset Project and Equipment Types Defined

The ISO transmission RIMS Database is where the PTO's submit transmission work that the ISO is required to model in accordance to BAL-005 and TOP-001. RIMS has a Transmission Asset Project number to Equipment Type (ET) number structure. One project may have multiple Equipment Types associated. Project and Equipment Types are defined below.

3.3 Transmission Asset Project

Transmission Asset Project, ISO Project Number, is a single entry into RIMS. The project entry is a high level representative of one or many items, ET's, of a transmission asset needing to be modeled in the ISO Network application (ISO Full Network Model, (FNM)). The project entry has at a minimum one, to many ET's as needed for the PTO to correctly report phasing, staging, or stepping a transmission asset into production or energizing with the ISO.

3.4 Transmission Asset Equipment Type

A transmission asset Equipment Type (ET) is equipment or transmission asset(s) that energizes on one particular date. There must be at least one ET to each ISO Project Number. The intention of the ET is to inclusively only include transmission equipment or assets that will energize on one particular date. An ET has two dates, the Earliest Date as a modeling date and a Target Date which is used for the actual energization date, these are both listed on the bulk loading spreadsheet. An ET should be broken out to those transmission equipment, asset(s), or steps that will energize **on** a single date. *An*

ET is not to be misunderstood as transmission equipment, asset(s), or steps are energizing before the phase end date reported to the ISO through the bulk loading spreadsheet. The ISO models transmission equipment or asset(s) based only on the earliest date reported and loaded into the ISO transmission project server.

3.5 Transmission Asset Equipment Type Examples

Remedial Action Scheme (RAS) being installed and put into service, an ISO transmission project needs to be created, if one hasn't been made, and an ET added to RIMS. The Target Date for a RAS phase is the in service date.

Further, an ET entry under the ISO Project number in RIMS can indicate other PTO activities the ISO must participate in. This includes, but is not limited to, the date of the PTO's final point to point testing of the Inter-Control Center Protocol (ICCP) data.

Other types of ISO transmission projects and Equipment Types that need to be loaded into RIMS are covered in Section 5.1.1 of the BPM for Managing Full Network Model. However the BPM does not cover the following changes to the network model and those are, but not limited to:

- Shoofly configuration that is temporary. The ISO asks that the PTO provide these projects in order for the ISO to have the option of informing the PTO whether to model, operational planning assessment and training if needed.
- Any new transmission asset that is connected to the 60kV and up transmission system. This includes distribution level connection changes of a non-radial type connection.
- Radial distribution connections that are adding a significant amount of load that traverses the 60kV and up. The ISO requires that the PTO add these projects to the transmission project server.
- RAS\SPS installation and in service activities.
- Balancing area changes.

3.6 Reliability Coordinator

Each PTO shall provide the required documentation through the RIMS Transmission Implementation process. By providing this to the ISO you are also providing this modeling information to RCWest.

3.7 RIMS Submission

Each PTO transmission project and associated documentation must be uploaded through the RIMS Transmission module and must contain the Internal ISO number found on the returned PTO Auto RIMS Export. These numbers can be provided by the PTO transmission RIMS contact and be found on the bulk loading spreadsheet.

3.8 File Naming Convention

The PTO should include the Internal ISO Number from the bulk loading spreadsheet header in the filename convention of each deliverable.

All files uploaded to RIMS should be clearly labeled. Please use the Transmission Market Asset Implementation Quick Reference Filename Guide names in Column B "Example Filename" along with the internal ISO project number and version number in the file name. Any file submitted with special characters in the file name will be rejected. These characters include:
~, #, %, & , @, * , { , } , : , ; , < , > , ? , / ,\ , | , [,] , - , " ,

The PTO has the responsibility to submit documents using the correct file naming convention standards. Below is an example of how a file shall be submitted to RIMS.

Filename guideline for submittal attachments:

Example: 20TRANS12345 Ph2 4 6 SLD VerX (X = Number)

Each filename must contain the Project Number
- **20TRANS12345** Ph2 4 6 SLD VerX (X = Number)

Each filename must contain the reserved title
- 20TRANS12345 Ph2 4 6 **SLD** VerX (X = Number)

Each filename must contain a version number
- 20TRANS12345 Ph2 4 6 SLD **VerX** (X = Number)

3.9 Quick Reference FileName Convention

Quick Reference FileName Conventions	
Document Title	Example Filename
Bundle 1	
Single Line Drawing	**20TRANS1234 SLD Ver1**
Phase Sequence Drawing	**20TRANS1234 PHSequence Ver1**
Transmission ICCP	**20TRANS1234 ICCP Ver1**
SPS ICCP	**20TRANS1234 SPSICCP Ver1**
Change Files	**20TRANS1234 PSLF** or **EPCL Ver1**
Three Line Drawing	**20TRANS1234 3LD Ver1**
Meter Configuration Worksheet for SQMD	**20TRANS1234 SQMD MeterConfig Ver1**
Meter Configuration Worksheet	**20TRANS1234 MeterConfig Ver1**
Bundle 2	
Operating Procedure Manual	**20TRANS1234 ProManual Ver1**
Special Protection System	**20TRANS1234 SPSManual Ver1**
Remedial Action Scheme	**20TRANS1234 RASManual Ver1**
Bundle 3	
Finalized Special Protection System	**20TRANS1234 SPSManual Ver1**
Move Program	**20TRANS1234 MoveProgram Ver1**
Bundle 4	
Meter and Site Verification Sheet	**20TRANS1234 MSVS 123456 Ver1**
Bundle 5	
-	-
Bundle 6	
Updated Single Line Drawing	**20TRANS1234 SLD Ver2**
Updated Operational Diagram	**20TRANS1234 OperationalDiagram Ver1**

File examples above identifies single or multiple Equipment Types of a particular document.

4 PTO Auto RIMS Export Spreadsheet

4.1 Spreadsheet Updates

Each PTO must inform the ISO of updates, new projects and equipment types regarding new/additional information and dates through the RIMS Transmission module via the PTO Auto RIMS Export spreadsheet. Once the update has been completed a digest email notification will be generated that will provide a line by line change log of any items that were updated within RIMS from the bulk loader spreadsheet.

Please note that a PTO cannot make new projects through the RIMS User Interface, the bulk loading spreadsheet is currently the only way to do so. However, the PTO may update existing equipment types and/or projects via the User Interface.

Digest scenarios that may occur:
- Voting - New or existing projects with the earliest date under 83 days: Due to the 84 day advance notice transmission projects or phases where not added or updated. Unaccepted earliest dates are examined and voted on by EMS and Operation Engineering business units
- Missing Information: New or Existing Project with not enough information. PTO must resubmit a new bulk loader that includes the missing information.
- Transmission Equipment Added: Projects created. PTO will receive a new ISO Project number and/or new Equipment Type number.
- Transmission Equipment Updated: Successful updates. PTO will receive confirmation of recorded changes for each item that has changed on each ET.
- Project status may not change if one or more Equipment Types are In Progress: Project status may not change if one or more Equipment Types are In Progress, unless the project is in an "On Hold" status. PTO must resubmit update once the Equipment Type status is remedied.
- Equipment status may not change from Canceled/Complete to In Progress: Project status may not change if one or more Equipment Types are In Progress. PTO must create a new project and/or Equipment Type
- ISO Project ID and ISO Equipment Type ID do not match: Equipment Type number not valid. PTO must resubmit an update with the correct Equipment Type and/or ISO Project number.

4.2 Adding a New Project with a Single Equipment Type

Required fields that each project and Equipment Type is needed to start a new or add to an existing project.

New ISO Project

Each new project must have at minimum a parent row which includes:
- Project name – column B
- Project description – column C
- PTO Project Status – column D
- Equipment status selected – column i
- Equipment Type selected – column J
- Earliest date – column M

Note: Never fill in columns P and Q, the system will assign the new numbers. Columns P and Q, are indicators to the system that the row is new as long as column B, C, D, i, J and M in.

4.3 Adding a New Project with Multiple Equipment Types

Adding more equipment with a New ISO project

Use excel to insert a row below the parent row, the drop down list will carry with the new row.

Each initial new project must have at minimum a parent row which includes:
- Project name – column B
- Project description – column C
- PTO Project Status – column D
- Equipment status selected – column i
- Equipment Type selected – column J
- Earliest date – column M

Each subsequent New Equipment Type after the initial project line added under the new project row must include at a minimum:
- Blank or empty column B – text in this column will cause an error
- Blank or empty column C – text in this column will cause an error
- Equipment status selected – column i
- Equipment Type selected – column J
- Earliest date – column M

Note: Never fill in columns P and Q, the system will assign the new numbers. Columns P and Q, are indicators to the system that the row is new as long as column i, J and M in.

4.4 Existing Project with New Equipment Type

Existing ISO Project – adding a new Equipment Type
- Each New Equipment Type added to an existing project must be under its parent row, and at minimum include:
  - Blank or empty column B – text in this column will cause an error
  - Blank or empty column C – text in this column will cause an error

- Equipment status selected – column i
- Equipment Type selected – column J
- Real Earliest date – column M

Note: Never fill in columns P and Q, the system will assign the new numbers. Columns P and Q, are indicators to the system that the row is new as long as column i, J and M are filled in.

5 RIMS User Interface (UI)

The PTO will have the option to update Projects and Equipment Types via the RIMS user interface (UI), once these updates are validated and successfully updated an export spreadsheet will be sent out once a day reflecting the updated changes. New projects cannot be created through the UI, only through the bulk uploader.

5.1 Associating Queue Number to Transmission Project

Equipment types that need to associate a queue number to the transmission project will do so under the "Equipment Queue" section within the RIMS UI/ PTO Dashboard.

In RIMS the PTO will use the drop down queue picker under the "Equipment Queue" Section. Once this is added to an ET, the associated generation projects will be linked in the UI. Here the PTO will be able to view and monitor the progress of the project. The queue numbers that will be displayed are PTO specific within the dropdown.

Please note once a new queue number has been associated the next bulk loader spreadsheet that is exported will contain this updated information. This association is now only done in the RIMS UI and no longer via the bulk loader spreadsheet.

For instructions on how to do this please see below:
1. Navigate to the PTO Trans Dashboard
2. Select your ET
3. Scroll down to the "Associated Resource Projects" section
4. Click the pencil
5. Click "New Row"
6. Select desired queue number from the drop down
7. Click Update
8. Any related generation projects will then populate to the "Related Generation Projects", you have the ability to view the project in a read only capacity.

* If associating multiple Queue numbers, the above instructions will be repeated to add additional rows per queue number.

6 CAISO Bundle Date Timeline

Bundle date timelines are dates derived from the earliest date, model date, of a transmission asset or a group of transmission assets designated in RIMS. A bundle date could have multiple required items, which are files, the PTO submits to the ISO for review and approval. Each Bundle Date is the approval date, not the submission date. The PTO should also give adequate time to submit deliverables, at least 10 days in advance, so that the ISO is able to review and comment if resubmission of a document occurs.

It is imperative that required documents are submitted at least 10 days in advance of the bundle approval date. The 10 days before the bundle approval date is for internal review of the submitted documents. If the documents is sent too close to a bundle date and a revision of the document is required and the bundle date has expired then the earliest date will need to be moved later, thus possibly moving the modeling date so that the new revised document can be accepted into the system and reviewed.

Depending on the type of transmission project not all of the following bundle items are required to be submitted for modeling, implementation and energizing purposes. Please contact MPAI@caiso.com if there are any Equipment Types in question.

Since the Bundle dates are derived from the earliest date, or the model scope date, it is imperative to declare an aggressive earliest date. If the date is moved up in the calendar year, then required document submissions will be needed sooner. If the earliest date is moved later in the calendar year, more time is given to submit your deliverables.

Each Transmission project and Equipment type that enters RIMS needs will need to be in the FNM Energy Management System (EMS) and market model on or before the earliest date entered into RIMS by the PTO. Please See the Schedule of Full Network Model Database Release for the latest submission and model deployment dates.

6.1 Uploading Required Filenames

The correctly formatted file attachment(s) will be processed and passed to each ISO business unit for the purposes of modeling, training, and implementing the transmission asset.

6.2 Full Network Model Scheduling of Transmission Assets

The CAISO website has posted the dates of when new <u>Full Network Model</u> (FNM) production models will be released.

Full network models are released monthly. Changes must be submitted in advance of the target date of the model change. The following items within the schedule are important to plan and abide by.

1. <u>FNM Label</u>: Model Build identifying label for each production release.
2. <u>Customer Model Document Submission Deadline</u>: All necessary Bundle 1& 2 items must be submitted to be considered in the scope of the corresponding FNM model build by this date.
3. <u>ISO Published Final Scope</u>: The ISO completes final approved scope after considering submissions for completeness, timeliness and available ISO bandwidth to build the model.
4. <u>Production Deployment</u>: The week that the ISO is targeting to push implementation into Production.

FNM Label	Customer Model Document Submission Deadline	ISO Publishes Final Scope	Production Deployment
22M1_DB110	10/14/2021	11/4/2021	Week of 1/10/2022
22M3_DB111	12/15/2021	1/5/2022	Week of 3/14/2022
22M4_DB112	2/2/2022	2/23/2022	Week of 4/25/2022
22M6_DB113	3/17/2022	4/7/2022	Week of 6/13/2022
22M7_DB114	5/5/2022	5/26/2022	Week of 7/25/2022
22M8_DB115	6/16/2022	7/7/2022	Week of 8/29/2022
22M10_DB116	7/21/2022	8/11/2022	Week of 10/3/2022
22M11_DB117	8/25/2022	9/15/2022	Week of 11/14/2022

Bundle 1 and Bundle 2 acceptance dates are now derived from the Customer Model Document Submission Deadline date posted on the <u>Full Network Model</u> (FNM) schedule. In order to be assigned to a Full Network Model, the PTO must have the required Bundle 1 items accepted by the FNM Document Submission Deadline date.

Bundles 3 -5 dates will continue to be derived from the projects estimated earliest date. It is imperative to declare a **realistic** earliest date. If the earliest date is moved out in the calendar year, more time is given to submit your deliverables. For example, if the estimated earliest date is pushed out by one day, the Bundles 3-5 acceptance dates will be pushed out by one day.

6.2.1 Project Creation Date Validation

Project creation will operate off of the Earliest Date, verifying that the earliest date for the desired model build is at least 15 calendar days after the production deployment date and that the Customer Model Document Submission deadline has not passed.

- Allow up to 10 days document review time for projects with regards to the Customer Model Document Submission Deadline.
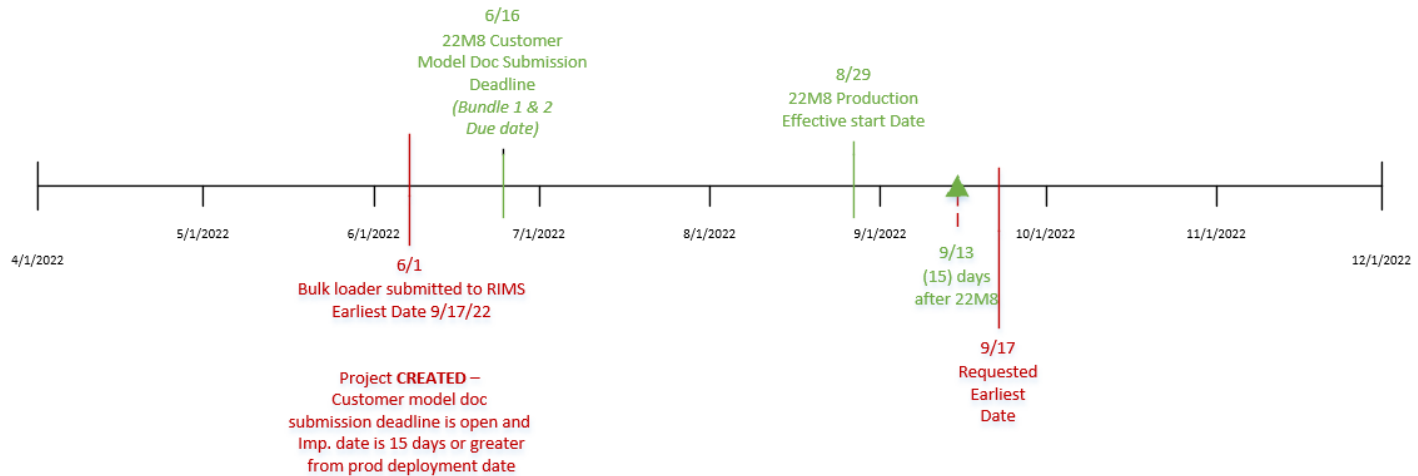
6.3 Voting: Unaccepted Earliest Dates

When a project enters RIMS that does not meet the above criteria, this project will <u>not</u> automatically be added to RIMS database, instead this project will go into a holding table called "Voting" where unaccepted end dates are examined and voted on by EMS and Operation Engineering business units. If a date is accepted you will be notified and provided with an updated export spreadsheet that reflects the addition, if the date is not accepted you will be notified to move the date.

NOTE: When an existing project moves the earliest date up (or in) and has a DB model assigned, the system will validate the earliest date is at least 15 days after the production deployment date. If it meets this criteria the date will update and the project will NOT go into voting.

6.4 Moving an Earliest date

- The earliest date listed in the RIMS project can be moved out to a later date at any time.
- Moving the Implementation date to an earlier date, the following conditions must be met:

- o If the ET has an assigned DB model, RIMS will validate that the proposed new earliest date is at least 15 calendar days after the assigned DB models Production Deployment date.

FNM Label	Customer Model Document Submission Deadline	ISO Publishes Final Scope	Production Deployment	Earliest Project creation Implementation Date
22M1 DBI10	10/14/2021	11/4/2021	Week of 1/10/2022	1/25/2022
22M3 DBI11	12/15/2021	1/5/2022	Week of 3/14/2022	3/29/2022
22M4 DBI12	2/2/2022	2/23/2022	Week of 4/25/2022	5/10/2022
22M6 DBI13	3/17/2022	4/7/2022	Week of 6/13/2022	06/28/2022
22M7 DBI14	5/5/2022	5/26/2022	Week of 7/25/2022	08/09/2022
22M8 DBI15	6/16/2022	7/7/2022	Week of 8/29/2022	09/13/2022
22M10 DBI16	7/21/2022	8/11/2022	Week of 10/3/2022	10/18/2022
22M11 DBI17	8/25/2022	9/15/2022	Week of 11/14/2022	11/29/2022
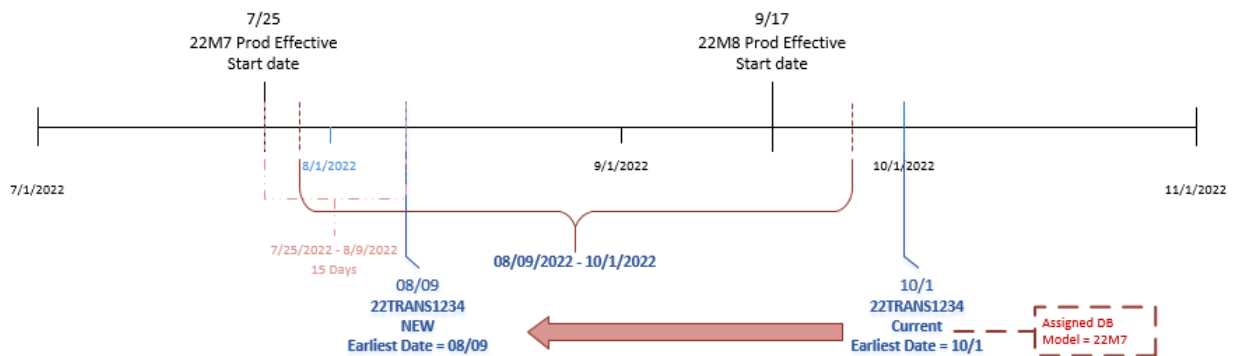
- o If the ET does not have an assigned DB model, RIMS will verify that the earliest date for the desired model build is at least 15 calendar days after the Production Deployment date and that the Customer Model Document Submission deadline has not passed, similar to the project creation logic mentioned above. If this requirement is not met the ET will go into Voting.

6.5 Bundle Email Notifications

PTO's will receive email notifications 21 days in advance from the ISO for the following scenarios:

- Bundle 1 Notification Reminder
  - o This notification informs the PTO that the Bundle 1 deliverable for the specific equipment type is due within 21 days from the earliest date and are either not accepted or have not been received. Typically this request will include PSLF, SLD, ICCP and Phase Sequence deliverables.
- Bundle 1 Load Notification Reminder
  - o This notification informs the PTO that the Bundle 1 Load deliverable for the "Load" equipment type is due within 21 days from the earliest date and

are either not accepted or have not been received. Typically this request will include SLD, 3LD and Meter Configuration Worksheet deliverables.

- Bundle 2 Notification Reminder
  - o This notification informs the PTO that the Bundle 2 deliverable for the specific equipment type is due within 21 days from the earliest date and are either not accepted or have not been received. Typically this request will include Preliminary SPS/RAS Manual deliverables.
- Bundle 3 SPS/RAS Notification Reminder
  - o This notification informs the PTO that the Bundle 3 deliverable for the specific equipment type is due within 21 days from the earliest date and are either not accepted or have not been received. Typically this request will include Final SPS/RAS Manual deliverables.
- Bundle 4 Load Notification Reminder
  - o This notification informs the PTO that the Bundle 4 Load deliverable for the "Load" equipment type is due within 21 days from the earliest date and are either not accepted or have not been received. Typically this request will include Meter Site Verification Sheet (MSVS) deliverables.
- Transmission Assets or Equipment Types about to Energize
  - o This notification informs the PTO that the transmission assets or equipment types about to energize within 21 days from the target date. CAISO is requesting the PTO to start an outage with the CAISO and include the ISO Project Number and Equipment ID on the RIMS tab.

7 Scoping Transmission Assets - Bundle 1

Bundle 1 is a list of PTO required information, drawings and Outage Coordination enhancement. This bundle initiates a transmission asset for modeling in the ISO FNM release. Without this initial information the ISO cannot guarantee the transmission asset will be modeled with the next FNM release date. For additional detail see **Examples** in the **Appendix.**

Note: Submitted drawings in particular, should only include those drawings that reflect the representation in single line and three line form of the transmission asset. Drawings of foundation footing; fence construction; substation cross section views etc. are not required with this bundle, however maybe required and submitted with other ISO interconnection agreement tracking activity.

7.1 Single Line drawings (PTO Action)

CAISO business units will utilize construction grade single line drawings to help determine certain FNM configurations. The single line drawings shall include, at a minimum, the information from Section 5.3 of the BPM for Managing Full Network Model. Single line drawings should also include:

- CAISO specific metering location of the meter on the generation bus or line
- Correct revision history and title block to avoid confusion (including correct date)
- Correct labels on breakers and transformers. The labels will be the actual name in the CAISO EMS
- Clearly state the connection point to the grid. The drawing should show the nearest substation with bay location at switchyard/switch station, or line tap point with pole number in each direction. This can also be submitted as a supplemental document.
- Correct and clearly labeled Auxiliary load and load ratings
- Capacitor bank and breaker labels need to be included
- The drawing(s) must be marked as "Issued for Construction" in some form
- Each drawing must bear an Electrical Engineer's Professional Engineer (PE) stamp.

A preferred single line drawing package submission would be a phase by phase layout that shows the progress of each step of the construction and how the transmission assets configuration progresses through the construction process in the field. The ISO prefers single line drawings of each change to the transmission project in line of the move program in order to identify each change made. The ISO performs biannual assessments regarding information submitted by PTOs.

Document Title: **SLD** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 SLD Ver1

7.2 Positive Sequence Load Flow Data (PTO Action)

PTOs must submit PSLF data to the CAISO for modeling of a particular project. EPC may be provided in place of a PLSF. If it is not possible to produce and EPC or PSLF, refer to Appendix A in this guide. Additionally, the ISO does **not** accept PSSE files in place of a PSLF.

Document Title: **PSLF or EPCL or M** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 PSLF Ver1

7.3 Phase Sequence Drawing (PTO Action)

PTO is to provide some type of drawing presentation that links the equipment to be energized per Equipment Type that is entered in RIMS. A step by step drawing or presentation that shows each Equipment Type phase as the progression of the work continues per Equipment Type phase. If the project is a single phase, then please provide an existing and future Phase Sequence diagram.
Please see Appendix C for an illustrative example of a Phase Sequence Drawing.

Document Title: **PHSequence** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 PHSequence Ver1

7.4 Transmission ICCP SCADA Mapping (PTO Action if applicable)

Inter-Control Center Protocol (ICCP) mapping for transmission assets is essential to running the ISO market. When new transmission assets are scheduled to be released in the next FNM the ISO expects the ICCP naming has been provided to the ISO at the time of scoping and designing of the network modeling changes. Without the ICCP naming delivered in this bundle there is no guarantee the ISO will allow the transmission Equipment Type or asset to energize.

Document Title: **ICCP** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 ICCP Ver1

7.5 ICCP RAS Mapping (PTO Action if applicable)

PTOs will submit the available list of all SCADA points related to the RAS document and/or PTO SCADA display in addition to submitted within Excel spreadsheets with description, point number, and point status. The CAISO will choose the relevant information from the spreadsheet and complete any necessary calculations. The CAISO also wants to be notified of any changes that are being made regarding RAS.

Note: It has become a common practice for PTOs to provide the ISO with an updated excel list of all available ICCP points around the beginning of each month. This excel spreadsheet must contain normal position for discrete points.

Document Title: **SPSICCP** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 SPSICCP Ver1

7.6 Transmission Registry Entries for Outage Coordination (PTO Action if applicable)

The Transmission Registry (TR) is an essential part of taking an Outage out for a new transmission asset that will be energized. The PTO should, at this point, know the ratings of the new asset energizing and those ratings should be entered into the TR for New Construction projects, the effective date can be dated well beyond the actual effective date. The CAISO is only interested in transmission lines, associated facilities, and entitlements that are subject to the ISO's Operational Control. Without TR ratings

entered early there is no guarantee the ISO will allow the transmission Equipment Type or asset to energize. The ISO will not allow PTO's to use nearby TR locations or entries for new transmission asset energizing.

For additional information about the transmission register check the ISO website at http://www.caiso.com/market/Pages/TransmissionOperations/Default.aspx under the Transmission register section. There is also additional information within the BPM for Managing the Full Network Model regarding the transmission register.

7.7 Three Line drawings (PTO Action if applicable)

Three line drawings are only required when ISO metering is to be installed on the transmission lines. Three line drawings shall include at a minimum the following:
- Correct polarity markings for the CTs
  - Show polarity marks on each phase
  - Polarity must point out to the grid connection.
  - Existing CT/PT must show accurate drawings of the CT polarity
- Correct revision history and title block to avoid confusion (including correct date)

Document Title: 3LD (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 3LD Ver1

7.1 Meter Configuration Worksheet (PTO Action if applicable)

When CAISO metering is required on transmission assets the designated PTO is responsible for completing and submitting the ISO Meter Configuration Worksheet to the ISO. The designated PTO is responsible for the accuracy of the information within the Meter Configuration Worksheet. Any questions or concerns can be sent to EDAS@caiso.com.

Document Title: **MeterConfig** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 MeterConfig Ver1

7.1 SQMD Meter Configuration Worksheet (PTO Action if applicable)

When CAISO metering is required on transmission assets the designated PTO is responsible for completing and submitting the ISO SQMD Meter Configuration Worksheet to the ISO. The designated PTO is responsible for the accuracy of the information within the Meter Configuration Worksheet. Any questions or concerns can be sent to EDAS@caiso.com.

Document Title: SQMD **MeterConfig** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 SQMD MeterConfig Ver1

7.2 Outage Place Holders for each Equipment Type (PTO Action)

A submitted Outage card is required to energize a transmission asset or equipment. The Outage card only needs to have the bare minimum amount of information when first submitted and can be updated later in the implementation process discussed later in this guide. A completed template consists of: the Market Participant's unique project number, identification of all new equipment that affects power flow on the ISO gird, identification of all equipment being removed from service, and any qualifying notes. Please refer to the BPM for Managing Full Network Model. Note: an Outage card is only for the specific asset equipment type that will be energized, it does not include assets that will energize at another date.

Additional information regarding Outages can be found on the CAISO website under Outage Coordination. Any questions regarding Outages can be sent to ops-north-outage@caiso.com or ops-south-outage@caiso.com.

8 Transmission Operations Preparation - Bundle 2

As the PTO has the obligation to train transmission personnel, the ISO has a training schedule for all new transmission assets that require training. The items below are not directly the responsibility of the PTO's, however the following items affect the training knowledge of the ISO transmission operators. A six week period is required to train all operators on the impact of the new assets. Additional time before the delivery of the training is required to develop the training.

8.1 ISO Transmission Project Server Update (PTO Action)

Update RIMS Equipment Types with the latest target date. This is done through the RIMS bulk loading method or through the User Interface that each PTO RIMS coordinator uses.

8.2 PTO Procedure and/or Manuals (PTO Action if applicable)

The PTO procedure and/or manual provides the operational instructions that explain the changes or how the new or modified transmission asset is to be monitored in the event of an emergency or to operate this asset. From the PTO procedure or manual the ISO may need to update or create new procedures and manuals based on the changes the PTO is making to the network model. ProManual requirements detail is found in Appendix E.

Document Title: **ProManual** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 ProManual Ver1

8.3 Operation Engineering Preparation (PTO Action if applicable)

ISO Operation Engineering Preparation requires PTOs to submit preliminary Special Protection System (SPS) or Remedial Action Scheme (RAS) documentation for review and comment. The final version of this document serves as an operating procedure for the CAISO Operators to reference should the need arise. This should include a screenshot of the display built showing the RAS points, screenshot should be displayed in .pdf or .jpg format. (Effective Sept 11, 2020)

Document Title: **SPSManual or RASManual** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 SPSManual Ver1

8.4 RAS Real-time ICCP Point Changes (PTO Action if applicable)

PTOs will submit any ICCP point changes related to the RAS and be reflected in the Excel spreadsheets described earlier. The CAISO will choose the relevant information from the spreadsheet and complete any necessary calculations. The CAISO also wants to be notified of any changes that are being made regarding RAS.

Document Title: **SPSICCP** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 SPSICCP Ver1

8.5 Transmission Project Drawing Finalization (TO Action)

Submit updated PTO transmission single line drawings for the ISO real-time operator's computer cataloging system. Also submit any relevant information regarding the single line drawings.

Document Title: **SLD** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 SLD Ver1

8.6 Finalized Contract Agreement (PTO Action if applicable)

Finalized contract agreements only apply to <u>balancing area changes or new</u> PTO energizing a new transmission line. Balancing area changes are caused by PTO transmission projects where there is an intertie added or removed.

8.7 Update Outage (PTO Action)

If there have been any changes or additional information for an asset, it is necessary to update the Outage card before energizing a transmission asset or equipment. The ISO requires Outage information updated as soon as there has been a change to, or additional information.

9 FERC Submission (-75 days) (ISO Internal if applicable)

FERC submissions are a filing of the agreement with the CAISO and the site. PTOs are served the filing of the agreement and are able to review the agreement. The FERC filing is a public process so all FERC filings involving the CAISO may be viewed at http://www.caiso.com/informed/Pages/RegulatoryFilingsAndOrders.aspx.

10 Transmission Operation Readiness - Bundle 3

This bundle date is to update exiting or finalize new operational transmission manuals, SPS, and RAS manual.

10.1 Move Program (PTO Action)

Move Program (Start program/Test program) consists of sequence of tasks for an outage provided by PTO, which includes equipment reconfiguration by changing position on breaker/disconnector if applicable. For additional detail see **Examples** in the **Appendix**.

Document Title: **MoveProgram** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 MoveProgram Ver1

10.2 Finalized Special Protection Scheme Updates (PTO Action if applicable)

The SPS or RAS needs to be finalized and submitted in order to complete training with the ISO operational readiness efforts. Additional information related to SPS and RAS can be found within the BPM for Managing the Full Network Model.

Document Title: **SPSManual or RASManual** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 SPSManual Ver1

10.3 ISO Transmission Project Server Update (PTO Action)

Update ISO transmission project server with the most current information available. The ISO will notify the PTO 21 calendar days before energizing the asset(s) in order to ensure that the information is correct.

11 Transmission Equipment Energize Readiness - Bundle 4

The ISO must prepare for the transmission asset to energize and have available personnel scheduled to situate the new or changing asset into the ISO market model. The PTO is responsible for providing the following bundle items in order to guarantee the energizing is on time as scheduled in RIMS.

11.1 CAISO Meter Site Verification Sheet (PTO Action if applicable)

When CAISO metering is required on transmission assets the designated PTO is responsible for completing and submitting the Meter Site Verification Sheet (MSVS) form to the ISO. Any questions email the following address EDAS@caiso.com.

- California ISO Meter and Site Verification Sheet

Document Title: **MSVS** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 MSVS Ver1

11.2 Outage Information Update (PTO Action)

If there have been any changes or additional information for an asset, it is necessary to update the Outage card before energizing a transmission asset or equipment. If necessary, the PTO will update the information needed for Outage Coordination with the ISO.

11.3 ISO Transmission Project Server Update (PTO Action)

Update the Equipment Type energize date associated to the asset that is in the production. Thirty days before the energizing date the ISO will contact the PTO to double check the information in RIMS.

11.4 ICCP SCADA End to End Testing (PTO Action)

The ISO performs all transmission related upgrades or new project SCADA updates via ICCP through the FNM process. All external model updates are tested and incorporated in the FNM build process. End to End testing is used to check the data quality of the polarity of digital points and flow direction of analog points. Testing should be scheduled from Monday – Friday, 8:00am – 4:00pm. However, arrangements can be made to have the ISO available to test outside of the work week. PTO's will coordinate this testing with

the appropriate ISO EMS counterpart. Testing may be scheduled by contacting
EMSOn-Call2@caiso.com.

11.5 ICCP RAS End to End Testing (PTO Action if applicable)

Testing should be scheduled from Monday – Friday, 8:00am – 4:00pm. However, arrangements can be made to have the ISO available to test outside of the work week. PTO's will coordinate this testing with the appropriate ISO Operational Engineer counterpart. Testing may be scheduled by contacting Ops-Planning-North@caiso.com or Ops-Planning-South@caiso.com.

11.6 Final Phase Sequence Drawing Finalized (PTO Action if applicable)

PTO to provide some type of drawing presentation that links the equipment to be energized per Equipment Type that is entered in RIMS. A step by step drawing or presentation that shows each phase as the progression of the work continues per phase.

Document Title: **PHSequence** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 PHSequence Ver1

11.7 Transmission Registry Update (PTO Action if applicable)

Update the Transmission Registry entry that was started at Bundle 1 with the actual ratings and transmission asset(s). At this point the PTO should know the final ratings of the assets to be energized in order to update the TR accordingly. Without TR ratings entered early there is no guarantee the ISO will allow the transmission equipment type or asset to energize.

11.8 TO Submits Outage to Test/Energize (PTO Action)

PTO submits the outage to test or to energize the equipment. The outage that is submitted shall have the equipment type number in the RIMS tab of the outage.

12 Update Outages to Energize - Bundle 5

Before energizing an asset equipment it is imperative for the PTO transmission coordinator and outage coordinator to synchronize the outage and the Transmission equipment type number in the RIMS tab of the outage.

12.1 Outage Information Update (PTO Action)

The PTO's Outage Coordinator will update the outage card information as needed once the equipment type number is associated with the outage.

12.2 **Transmission Project Server Update (PTO Action)**

If necessary, the PTO's transmission coordinator will update the outage date associated to the asset that is in process to energize.

13 Announce Energizing Asset (-7 Days) Bundle 6

At this stage the PTO and CAISO are preparing to energize an asset. It is necessary for both parties to have the same information available in order to complete energizing.

13.1 **Confirm Energize Date (TO Action)**

The PTO will contact the ISO Outage coordination in order to confirm the energize date before going live. The outage information will also be updated to reflect the current status of the project.

13.2 **PTO Confirm ICCP Data Validation is Complete (PTO Action if applicable)**

The PTO is responsible for confirming the ICCP data is accurate and consistently being sent and received, at least seven (7) calendar days before the energize date is reached.

13.3 **ISO Signoff before Energize (ISO Action)**

The CAISO will complete an internal signoff once the PTO has scheduled a point validation test with the EMS team. This signoff is meant to internally confirm that all information is current and that testing is ready to begin.

13.4 **PTO Submits Updated System Operating Diagram (PTO Action if applicable)**

The PTO must have the most up to date system operating diagram submitted to the ISO before the energize date is reached. Ensure that standard practices (such as labeling and naming conventions) are followed in order to avoid confusion.

Document Title: **OperationalDiagram** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 OperationalDiagram Ver1

13.5 **PTO Submits Updated Substation Single Line Diagram (PTO Action if applicable)**

The PTO must have the most up to date substation single line diagram submitted to the CAISO before the energize date is reached. Ensure that standard practices, such as labeling and naming conventions, are followed in order to avoid confusion.

14 Energize Equipment (PTO Action)

In order to reach the energizing the equipment it is necessary to have the most up to date information from the PTO regarding the asset to be energized. This information includes: outages, single line drawings, three line drawings, RIMS information, and a scheduled point validation test.

14.1 Complete the Outage Information (PTO Action)

The information required for Outage Coordination between the ISO and PTO will be completed on the energize date.

14.2 ISO Energize Equipment Sign Off (ISO Action)

Once the energize phase has started the CAISO performs an internal signoff that states that everything is up to date and ready to be tested/energized.

14.3 ISO ICCP Validation with PTO Transmission SCADA (ISO Action)

Before the ISO Transmission project server Equipment Type status is changed to complete it is necessary for the ISO to validate that the telemetry breaker open/closed status and flow direction are correct.

14.4 ISO ICCP Validation with PTO RAS SCADA (ISO Action)

Before the ISO Transmission project server Equipment Type status is changed to complete it is necessary for the ISO to validate that the telemetry breaker open/closed status and flow direction are correct.

15 Final Information Submission (30 Days post implementation)- Bundle 7

15.1 Submit Final Modeling Information to the ISO (PTO Action)

The PTO is responsible for submitting final PSLF cases or information to the ISO.

16 ISO Modeling Clean-up (90 Days post implementation) (ISO Action)

After the Equipment Type is complete, the CAISO will remove pseudo modeling from the ISO network model. This model will be created by the final single line drawings and any other relevant information that has been submitted after energizing the project phase.

17 Incremental Updates (as needed)

The following files should be uploaded to the "General File Documents Upload" section within the Transmission section in RIMS.

17.1 PTO Data Gathering Template (Incremental updates as needed) (PTO Action)

PTO users can use the PTO Data Gathering Template to submit updates to one or several IRO-010 requirements such as the facility ratings, geo-coordinate information, line routing, and equipment long name to RDFID mapping in one document.

The 6.10 request is for facility ratings, which can be provided for normal, emergency, seasonal, and dynamic. For dynamic ratings, seasonal ratings with transition dates should also be provided. Dynamic ratings will only be used in real-time, but the normal ratings can be seasonally adjusted and are used for the Operational Planning Analysis (OPA). RC West publishes two seasonal ratings at a time, but up to four seasons can be submitted.

The 6.13 request is for longitude and latitude for each substation with voltage levels > 100kV or with total plant generation >= 50MW.

The 6.14 request is for line routing for all lines 100kV and above.

With regards to 6.23, this file should have only one row per RDFID and there should be no empty rows. For the Long Name, PTO Users can choose any name with no special characters and it is not longer than 30 characters.

Document Title: **PTO Data Gathering Template** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 PTO Data Gathering Template Ver1

17.2 Shunt Equipment Data Template

PTO users can use the Shunt Equipment template to submit updates, list of shunt devices normally on AVR. These shunts are those that can automatically connect/disconnect at a specified voltage setpoint without operator intervention. The list shall include the voltage setpoint(s) and any time delays prior to automatic switching.

Document Title: **Shunt Equipment** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 **Shunt Equipment** Ver1

17.3 FERC881 Dynamic MVA ICCP Template

PTO users can use the Dynamic MVA ICCP template to submit updates. Dynamic Facility Ratings on those Facilities (transformers and transmission lines) that are part of Bulk Electric System. Entities can fill out up to 4 emergency ratings in MVA that are in ascending order. It is recommended that entities determine the minimum and maximum reasonability limits for each equipment based on seasonal limits (+/- 15% of seasonal limit).

Document Title**: Dynamic MVA ICCP** (See above: File Naming Convention and Version Control Standards)

File naming example: 20TRANS1234 **Dynamic MVA ICCP** Ver1

18 Appendix A Example Checklist

The following is a general checklist used by the ISO for PTO Data Requests listing the data that is require to connect equipment to the network model. The ISO requires the one-line drawing and/or change file for that project.

| Equipment Type	Additional Documentation
Transmission Lines	1. One-line diagrams of both substations at each end of the transmission line, Series Capacitor, or Series Reactor 2. In-Service Yes/No 3. Impedance (R and X)-PU 4. B-PU 5. Ratings (Summer Normal, Summer Emergency, Winter Normal, Winter Emergency) 6. Area and Zone
Shunt Cap\Reactor\ SVD's	1. B-PU 2. Area and Zone 3. B actual 4. Voltage Deadband PU 5. B-step and # of Steps

| Transformers	1. Transformer test reports
	2. In Service Yes/No
	3. If the transformer is a 2-winding transformer:
	1. Impedance
	2. MVA Base
	3. Type (Fixed, Auto LTC, Manual LTC)
	4. Regulating Bus (if any)
	5. Side on which the LTC is located (high/low)
	6. From nominal voltage
	7. To nominal voltage
	8. From Fixed Tap
	9. To Fixed Tap
	10. Max variable tap
	11. Min variable tap
	12. Max constant V
	13. Min constant V
	14. Step size
	15. Ratings (Summer Normal, Summer Emergency, Winter Normal, Winter Emergency)
	16. Area and Zone
	4. If the transformer is a 3-winding transformer:
	(include the parameters requested for 2-winding transformers above plus)
	1. Tertiary and internal bus parameters
	2. Impedance from primary to tertiary
	3. Tertiary nominal voltage
	4. Tertiary Fixed Tap
	5. If the transformer is a phase shifter:
	(include the parameters requested for 2-winding transformers above plus)
	1. Variable Angle

Substation\Load	1. Bus #
	2. Bus Name
	3. Nominal Voltage
	4. Scheduled Voltage
	5. Max Voltage
	6. Min Voltage
	7. Area and Zone
	8. Change files (i.e. Breaker configuration, Voltage level upgrade, Equipment moving from one bus to another, Etc.)
	Are there a Load Bank added
	    1. PLOAD
	    2. QLOAD or Power Factor (PF)
	    3. Area and Zone

RAS/SPS	1. Specify if the RAS/SPC is a new or existing RAS/SPS 2. Provide all RAS/SPS points with their SCADA/ICCP IDs and specify the normal status of each point 3. Provide a screenshot of the display built showing the RAS/SPC points
Breaker(s)\Disconnect(s)	1. Provide a single line diagram (SLD) showing the location and name of all the Breakers/Disconnects.
Shoofly Install\Removal	1. One-line diagram showing the location of the shoofly 2. One-line diagrams of both substations at each end of the shoofly 3. In-Service Yes/No 4. Impedance (R and X)-PU 5. B-PU 6. Ratings (Summer Normal, Summer Emergency, Winter Normal, Winter Emergency) 7. Area and Zone
Condenser	1. Qmax/Qmin Limits 2. Scheduled Voltage 3. Base MVA 4. Single Line Diagram showing the location of the Condenser
Direct Transfer Trip	No additional modeling documentation required

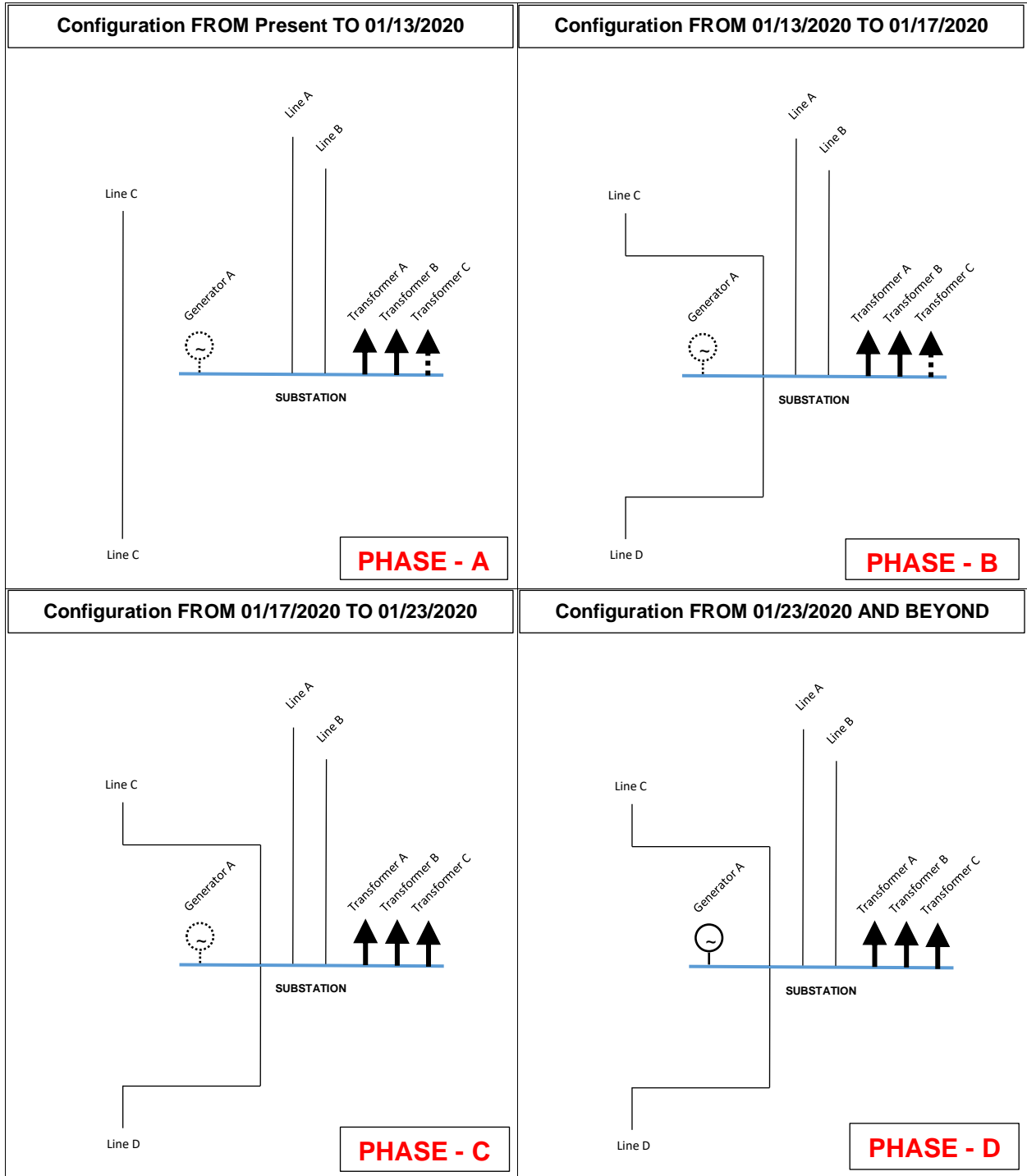## 19 Appendix B – EXAMPLE OF SINGLE LINE DRAWING

Existing
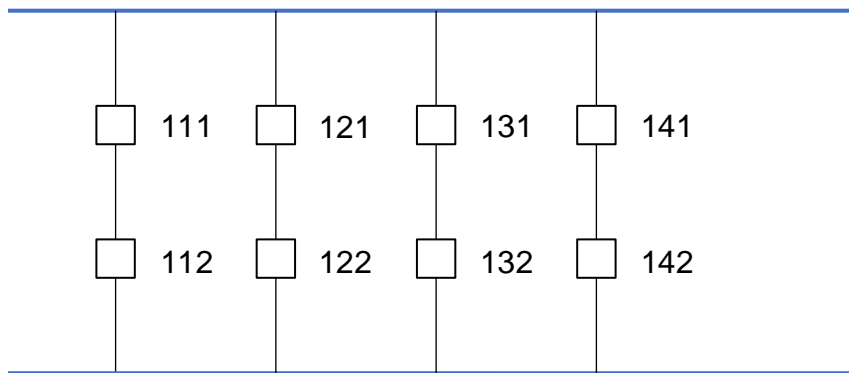
Future
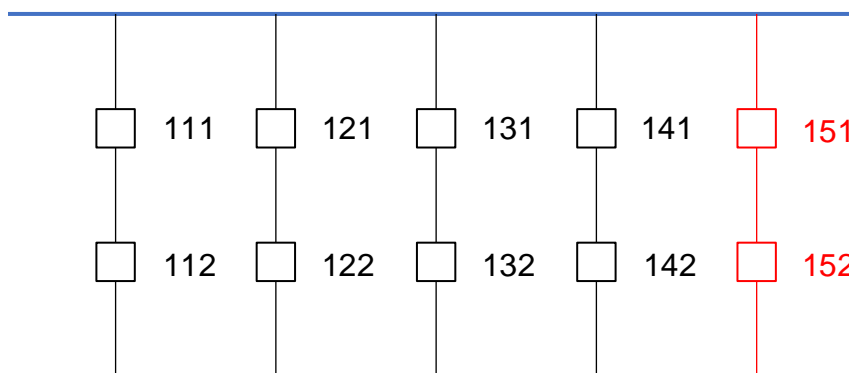
Energization: 03/04/2020

20 Appendix C – EXAMPLE OF PHASE SEQUENCE DIAGRAM

21 Appendix D – EXAMPLE OF MOVE / START / TEST PROGRAM

{TITLE OF PROJECT}

{DATE}

{SUMMARY OF PROJECT}

{SUMMARY OF SEQUENCES FOR THE MOVE / START / TEST PROGRAM}

Move or Section # 1

Move or Section # 2

…

{DETAILS OF EACH SEQUENCE SUMMARIZED ABOVE}

Ideally, this section should describe any outages needed, clearance points, work to be performed, or reporting that needs to be done.

Move or Section # 1

- Open CBs A and B at Station X and CBs C and D at Station Y de-energizing the line.
- Perform relay test of CB C
- Close CBs A and B at Station X and CBs C and D at Station Y energizing the line.

Move or Section # 2

…

{CONTACT NAME}

{CONTACT PHONE NUMBER}

22 Appendix E – ProManual Requirement Detail:

1. If new or modified transmission asset triggers SOB, operations procedure, or manual updates.
   - Provide ProManual
2. If new or modified transmission asset requires operational instructions to explain how asset will be monitored in the event of an emergency.
   - Provide ProManual
3. If new or modified transmission asset does not trigger updates as specified above
4.

No ProManual requirement is needed - Request exception for ProManual requirement by email to MPAI@caiso.com