

Asset and Location Hierarchy

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Goals/Strategies & Business Drivers – Asset Management

"the coordinated activity of an organisation to realize value from assets." - ISO 55000, 2014 (3.3.1)

1. Improve maintenance/work **efficiency** to free up labor to do other things such as projects, focused improvements, and/or preventive/predictive reliability initiatives (through better work planning)
2. Ensure maintenance **effectiveness**, doing the right work and eliminating work that does not add value
3. **Maximize lifecycle** of assets/equipment
4. Enhance **equipment reliability, availability, & maintainability**
5. **Optimize** resources, materials, spare parts, and tools to support efficiency improvements and control operating costs
6. Enhance personnel skills, knowledge, ownership

Focus Areas/Notes from BOR Users/Sites

1. **“Do Meaningful Maintenance”**
 - a. Performing the right work on **assets/equipment** for the right reason and eliminating those that don't necessarily add value.
 - b. Optimizing equipment maintenance plans and sustainment strategies, utilizing the appropriate mix of planned, predictive, and run to failure
 - c. Understanding and assigning **asset criticality and priorities** to help determine where to focus efforts and resources
2. **“Have the right materials, spare parts, and tools at the right time to support efficient completion of work”**
 - a. Establish Kitting process and having the right parts and tools when needed to do the job to eliminate waste and delays
 - b. Better Inventory Management with appropriate min/max levels, storage locations, knowing where to get parts, and better coordination for ordering and receiving
 - c. Availability and ready access to spare parts to help maintenance get them when needed
3. **“Leverage and share information with other USBR sites”**
 - a. Maintenance history of shared & similar equipment
 - b. PM/Sustainment Plans to better maintain assets
 - c. **Asset information, history, criticality, spare parts lists, etc.**
 - d. Training and skills development
 - i. Carma/Maximo
 - ii. Maintenance/work practices
 - iii. Support/materials management processes
4. **“Implement improvements & enhancements to Carma to support USBR objectives and desired outcomes”**
 - a. Work order data entry and required work tracking
 - b. Compliance PMS - Track when things are due and when it was done. NERC CIP WECC
 - c. Standing work orders – meetings, training, admin
 - d. Operator rounds, collecting information, CBM, meter based PMs
 - e. Mobile capability in the field

Asset Management, Simplified

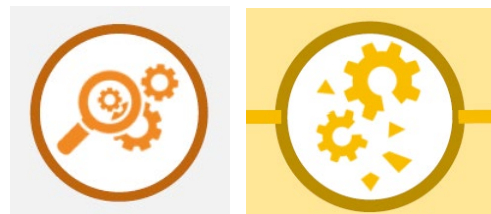
1

What facilities
& assets do
we have?



2

What
condition
are they in?



3

What do
they
need?



Best Practices for Asset Management

1



Facility/Asset
Inventory &
Organization
Hierarchies
Walkdowns

What facilities &
assets do we have?

2



Asset Criticality &
Condition
Assessments

What condition
are they in?

3



Asset Needs &
Lifecycle
Sustainment Plans

Deferred Maintenance,
Capital Improvements,
Funding and Annual
Work Plans

What maintenance and
other work do they need?

Assets

What is an Asset?

"An asset is an item, thing or entity that has potential or actual value to an organisation". - ISO 55000, 2014 (3.2.1)

Asset Criteria: To determine if something is an asset, employ the following litmus test, if the answer to both questions is “yes” then it should be tracked as an asset and entered as an ASSET record in CARMA, the questions are,

- (1) it is a singular, specific physical object or entity, “It can be touched”, i.e. a pump, motor, etc., **and**
- (2) USBR desires to have institutional information stored or tracked for it, i.e. property, value, lifecycle, cost, maintenance/sustainment strategy/PM, property, etc.

Asset Information – Recommended Asset Data

| <u>Primary Data Elements</u> | <u>Secondary Data Elements</u> |
|--|--|
| <ul style="list-style-type: none">• Unique Asset ID• Standardized Description• Location• Asset Classification• Failure Class• Priority/Criticality• Manufacturer• Model | <ul style="list-style-type: none">• Serial #• Installation Date• Expected Life/Expected End of Life• Purchase Cost• Total Cost• YTD Cost• Current Replacement Value• Spare Parts List |

Identified USBR Asset Classes

Source: CARMA 2.0 – IBM Maximo FACT Cohort Notes, Draft CARMA 2.0 Application Requirements

FIST Asset Priorities for Power Facilities (Asset Classes)

| Equipment | Priority | Equipment | Priority | Equipment | Priority | Equipment | Priority |
|---|----------|--|----------|-----------------------------------|----------|--|----------|
| Air compressors | 2 | Communication equipment | 3 | Hoists | 2 | Relay, auto transfer | 3 |
| Annunciator/sequence of events recorder | 2 | Control circuits | 4 | Hydraulic turbines | 4 | Relay, protective | 4 |
| Arresters | 3 | Control circuits | 3 | IT systems and hardware | 2 | Relays | 3 |
| Auxiliary piping systems | 3 | Cranes and hoists | 4 | Meters | 3 | Ropes, slings, chains and rigging hardware | 4 |
| Batteries | 4 | Electric gates and doors | 2 | Motor AC induction | 3 | SCADA systems | 3 |
| Battery charger | 4 | Elevators | 2 | Motor AC synchronous | 3 | Shaft couplings | 2 |
| Bearings | 3 | Emergency lighting | 2 | Motor vehicle and heavy equipment | 2 | Shop fabricated lifting devices and rigging hardware | 1 |
| Bushings | 3 | Exciters | 3 | Motors DC | 3 | Switch, disconnect manual | 3 |
| Buswork, enclosures, and insulators | 3 | Fire detection and alarm systems and CO ₂ | 3 | Outlet pipes | 4 | Switches, disconnect – medium and high voltage | 4 |
| Circuit breaker switch gear | 4 | Gates and valves | 4 | Packing/mechanical seals | 3 | Transducers | 3 |
| Circuit breakers MCC | 3 | Generating units | 4 | Penstock and fixed wheel gates | 4 | Transformer, station service | 4 |
| Circuit breakers, load center | 4 | Generator, emergency | 4 | Potheads and stresscones | 3 | Transformers | 4 |
| CO ₂ systems | 3 | Generator, portable | 2 | Power cables | 4 | Valve and outlet works | 3 |
| | | Governors | 4 | Pumps | 2 | Voltage regulators | 3 |
| | | Guard gate | 3 | | | | |

Identified USBR Asset Classes

Source: CARMA 2.0 – IBM Maximo FACT Cohort Notes, Draft CARMA 2.0 Application Requirements

Other Non-Power Asset Classes

| Equipment | Priority |
|--|----------|
| Bank Metal Pipe Corrugated 24” and other sizes | 3 |
| Bead filtration systems | 3 |
| Gate Electrical Plannles (Panels?) | 3 |
| Transfer Pumps | 3 |
| Holding Tanks | 3 |
| Radial Drum Gates | 3 |
| Valves PVC | 3 |

| Equipment | Priority |
|--|----------|
| Cranes | 4 |
| Pumps | 4 |
| Slide Gates & Stop Log Bays | 4 |
| Motors for Hoists and Cranes, | 4 |
| Fish Screens, Fish Viewing Tanks, Fish Ladders, Injector Air SEP in Fish Bldgs | 4 |
| Hydromet system, Power Control Boxes, | 4 |

Identified USBR Asset Classes

Asset Registry – Asset Classes (Non-Power?)

| Asset Registry Asset Classes | |
|------------------------------|----------------------|
| Boat Ramps | PCCP |
| Bridges | Pumping Plants |
| Buildings | Recreation |
| Conveyance Lines | Reservoirs |
| Conveyance Points | Roads & Parking Lots |
| Dams | Trails |
| Fish Structures | Transmission |
| Hydropower | Urban Canals |
| Land | Water Treatment |
| Levees | Wells |

Hierarchy

The Maximo Asset & Location Hierarchy

DEFINITION: A Hierarchy is a structured, intuitive, way to [organize your assets](#).

- The Location hierarchy is where asset management begins. It serves as the [structural relationship of physical and functional placeholders](#) necessary to logically organize assets.
- It is the [heart of implementing Asset Management Best Practices](#) as well as being the backbone of standards such as ISO-55001.
- [No two location hierarchies are exactly the same, it is critical to develop a proper structure that meets the needs of the organization](#) and implement asset & data management processes to support the ever changing hierarchy.

The Maximo Asset & Location Hierarchy

- The word “hierarchy” in Maximo is often used to refer to both the **Location Hierarchy and the Equipment Hierarchy**. It is important to understand that there are distinct differences. Both Locations and Assets play their part in effective asset management, and the organization of them is crucial.
- For modern asset management in Maximo the term “**asset hierarchy**” may be used to describe the **physical and functional fundamentally parent-child relationship of nodes built within the Location application**.
- **Physical equipment becomes the mostly-flat Asset Registry which is managed in the Assets application**. Assets can have sub-assemblies, but should not be linked more than two or three levels and definitely not entirely from highest to lowest level of major systems or to model the whole organization/enterprise.

Benefits of a well-developed Hierarchy

- To provide an intuitive, simple means of drilling down to locate assets that may be added to work orders and use for other Maximo functions.
- To provide the ability to track lifecycle costs for functional nodes where assets reside, also to allow costs to roll-up to any level in the structure.
- To enable use of other technologies such as GIS/GPS, process functional modelling, BIM, Predictive, AI, asset health monitoring, etc.
- To facilitate functional organization of systems, subsystems, assemblies to simplify reporting, reliability, RCM/sustainability analysis, and asset management continuous improvement.
- To facilitate organizing and grouping of nodes within an organization – which could be used to represent geographic, functional, or plant/operating systems.

Benefits of a well-developed Hierarchy

- To store key values such as GL Account, Priority, Criticality, and Failure Codes for the functional location.

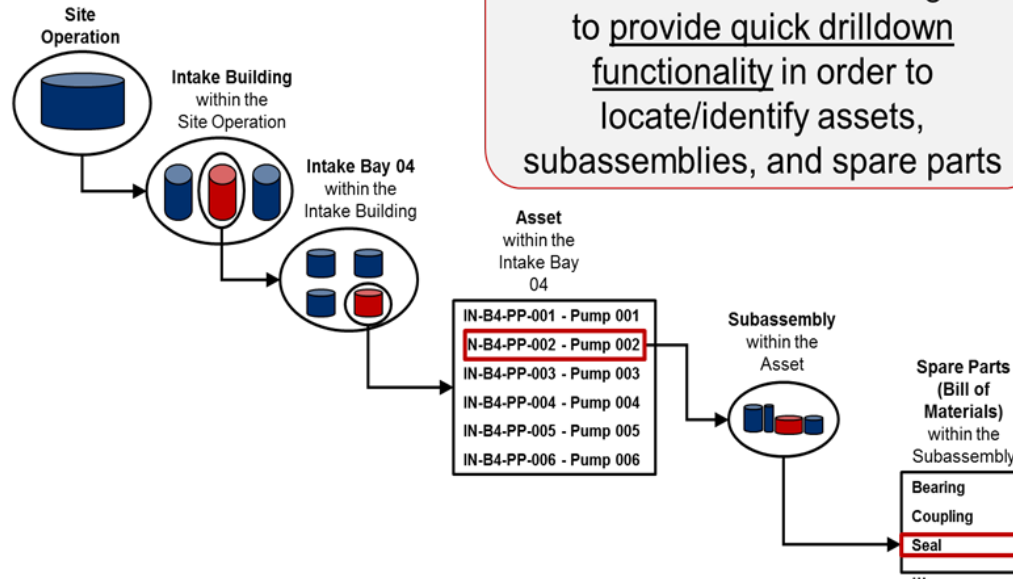
Assets may require different cost accounts or other information depending on where they fall within the function of a system or systems. Entering this static data once on the location record enables coding to work orders when assets in that location are applied to them, thus minimizing typing by the end-user and extra time required to change that data on assets when assets are moved to another operating system/location.

- To enable leveraging of Maximo rotating asset capabilities. Since a location is “fixed in space” within the hierarchy structure it will always have cost and work history tied to it.

Since assets can be removed/returned with a new asset installed in its place, it is desirable to both maintain the integrity of all costs and history for a functional location for all assets that have ever been installed in it while allowing assets to carry their asset-specific costs and history with them to other locations. This concept is critical to assets which are rotating, or “move around” from one location/system to another location (repair location, storeroom, salvage, etc.).

Physical Location Structural Convention

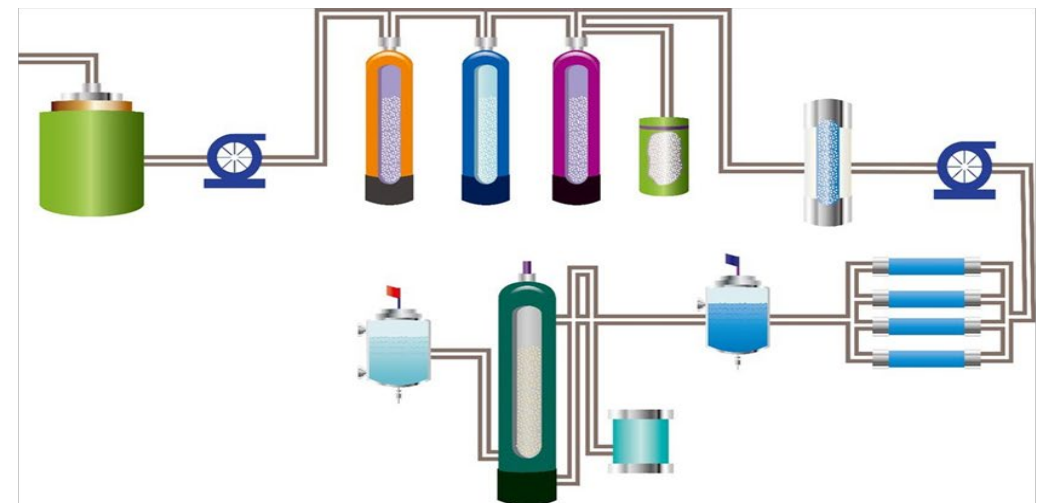
Relates an asset with its physical location



Hierarchy Structure Model

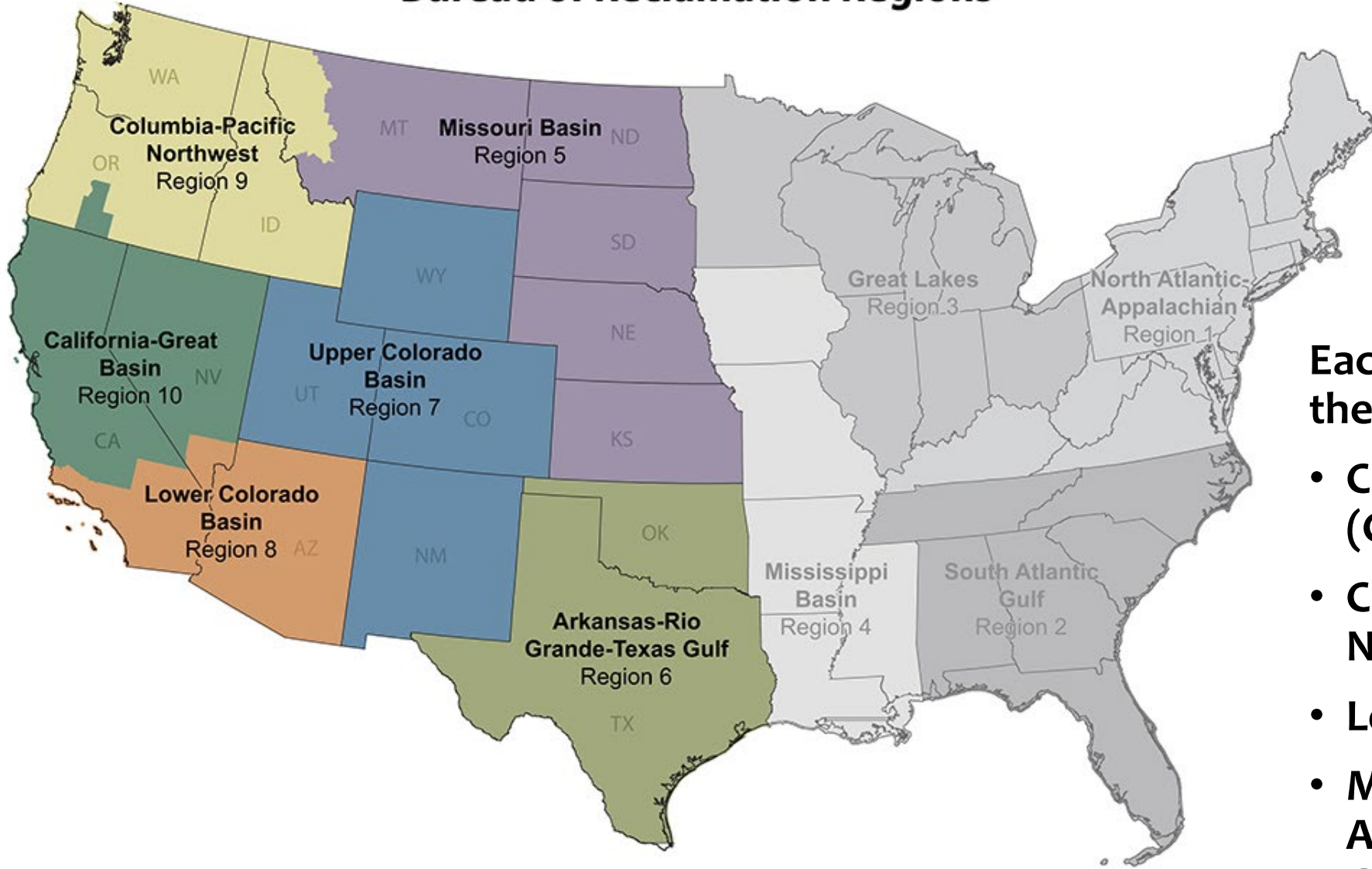
Functional Location Structural Convention

Relates an asset with other assets within a functional process or system (independent of physical location)



Defining the USBR Asset & Location Hierarchy

Bureau of Reclamation Regions



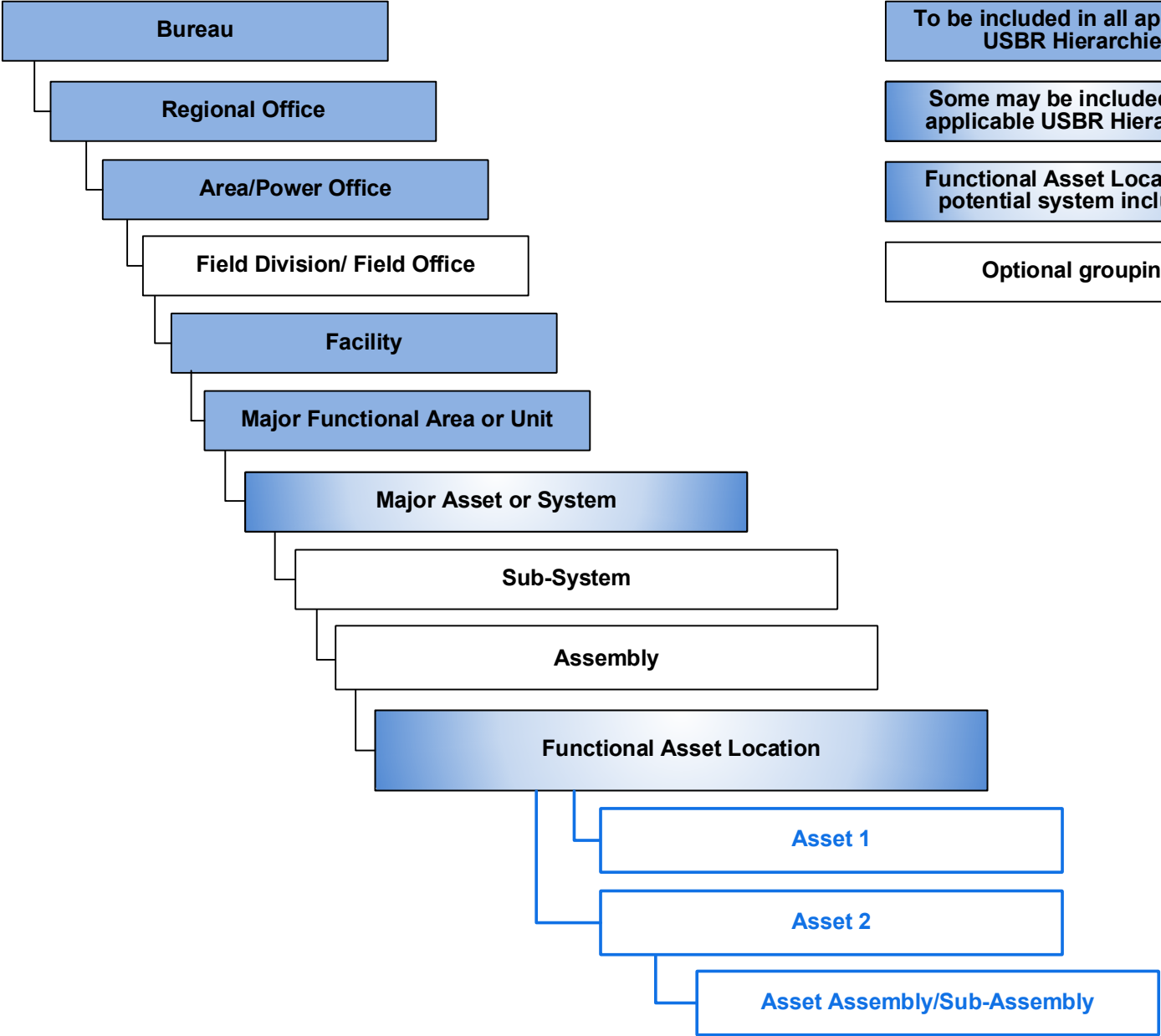
Each Region is a site under the USBR Organization:

- California - Great Basin (CGB)
- Columbia – Pacific Northwest (CPN)
- Lower Colorado Basin (LCB)
- Missouri Basin and Arkansas-Rio Grande-Texas Gulf (MB)
- Upper Colorado Basin (UCB)

USBR Location/ Asset Hierarchy Model

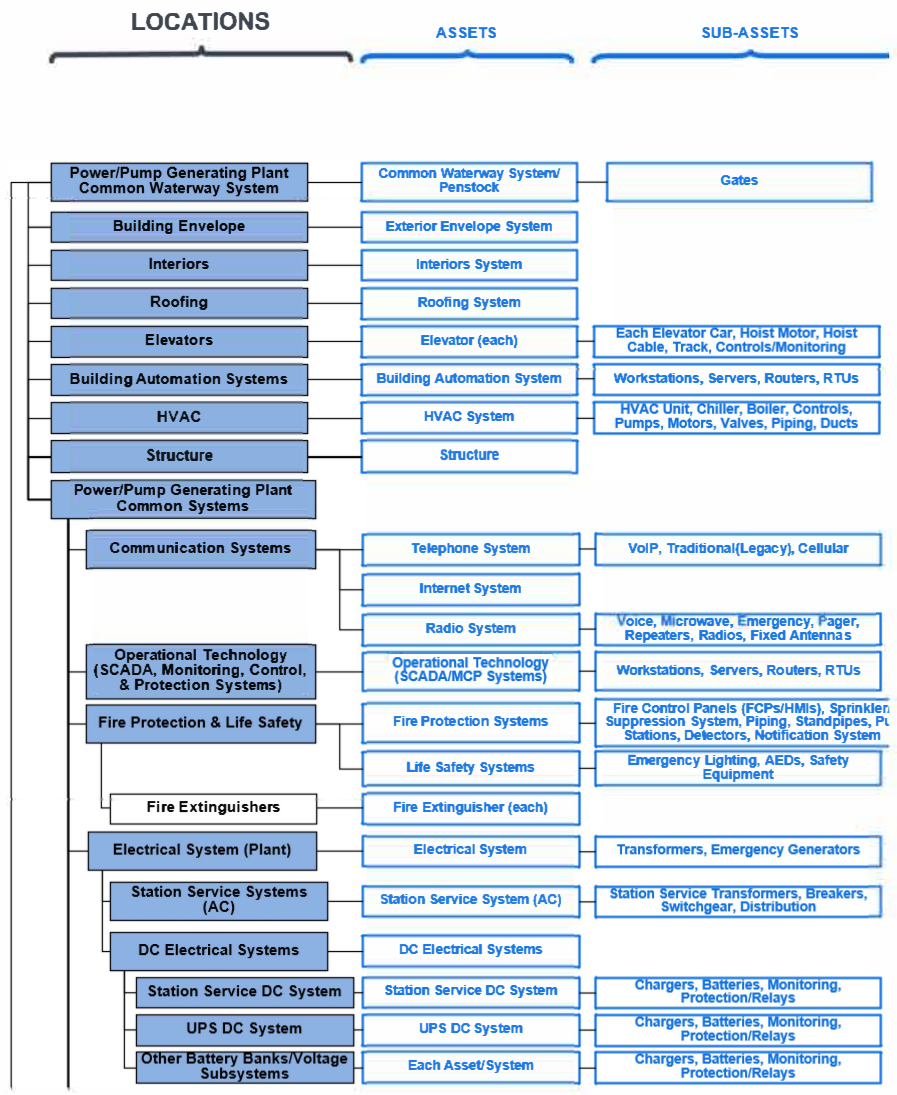
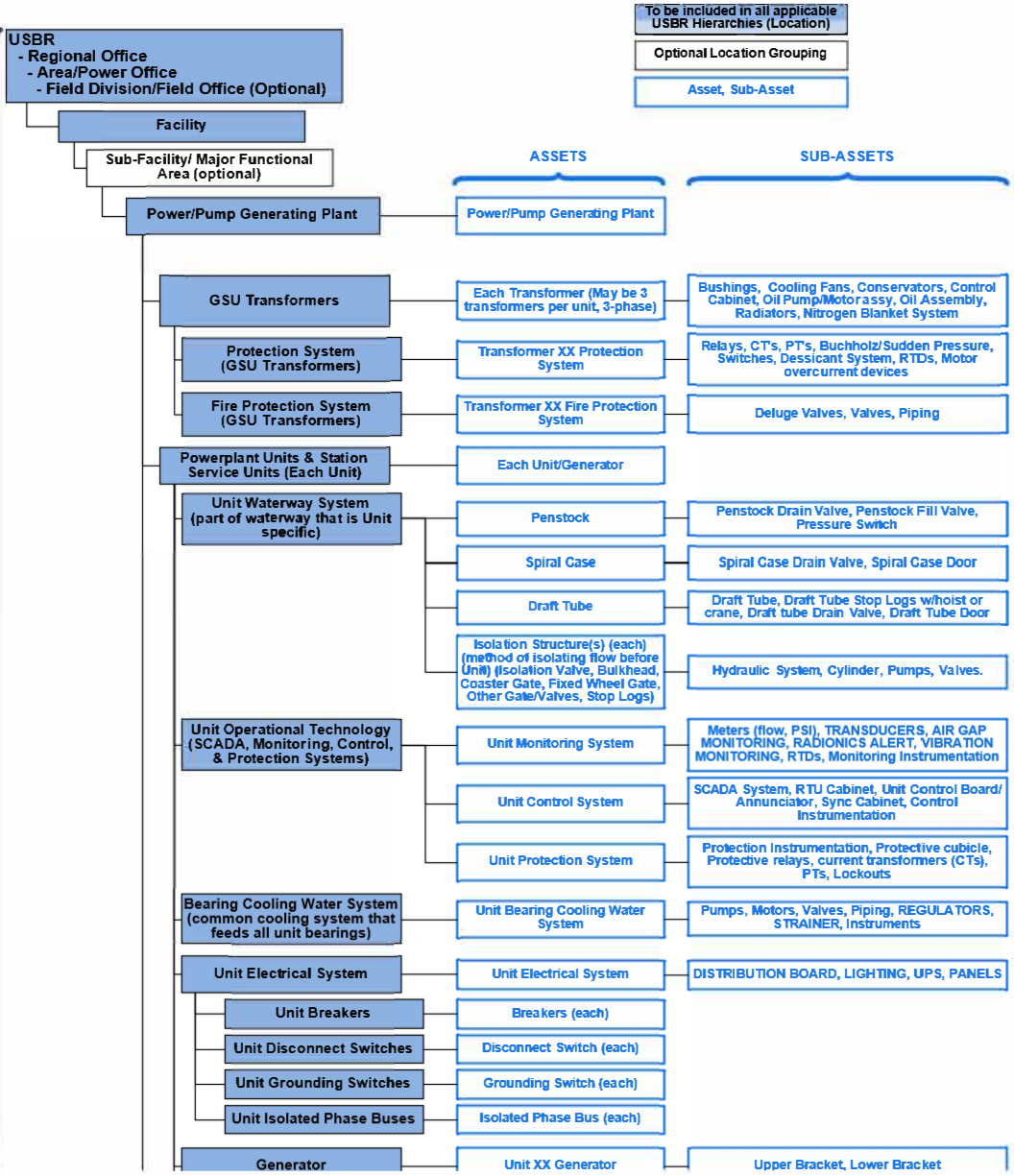
LOCATIONS

ASSETS

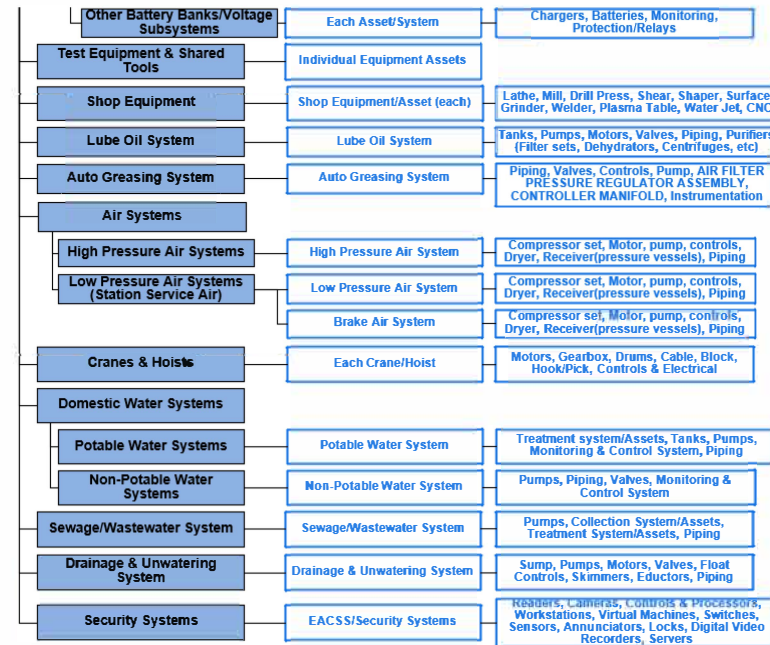
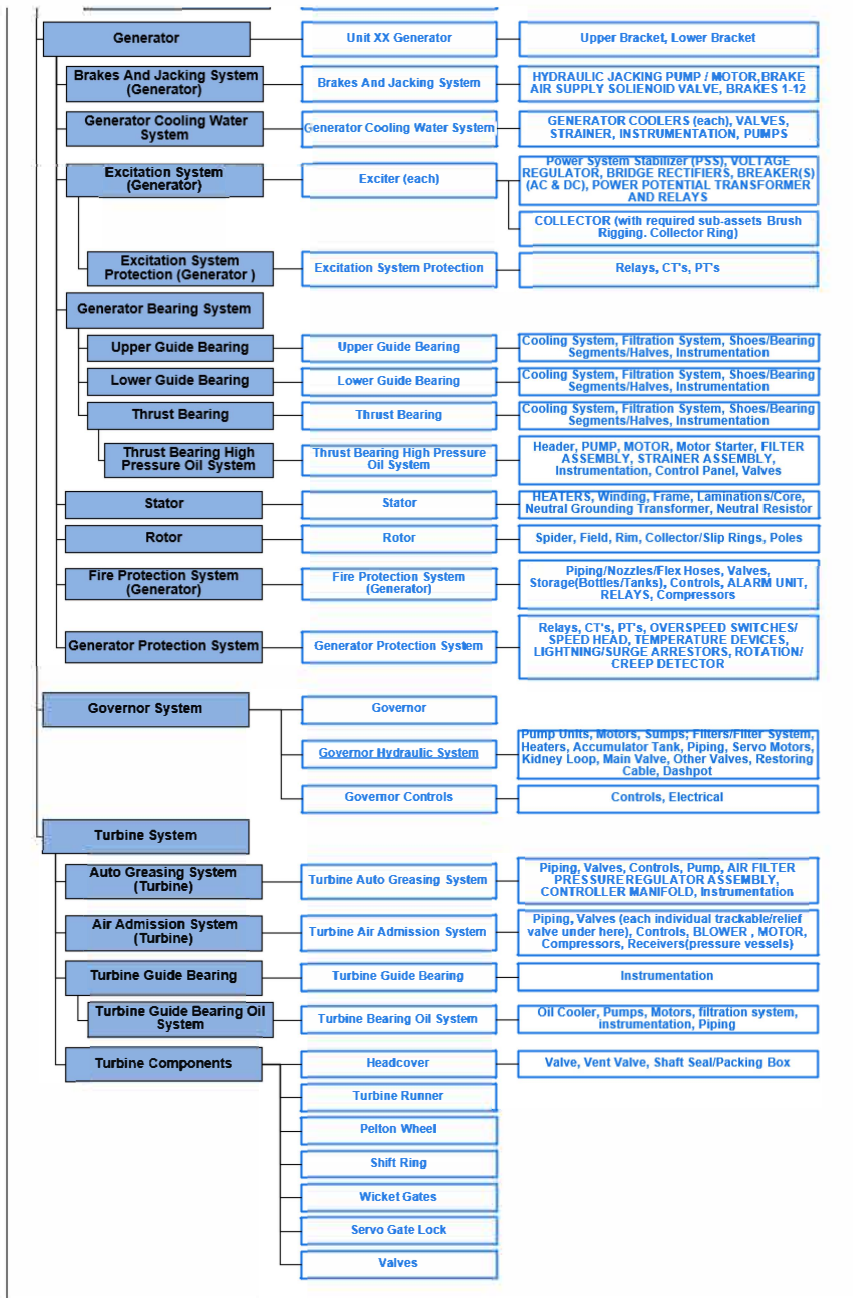


- To be included in all applicable USBR Hierarchies
- Some may be included in all applicable USBR Hierarchies
- Functional Asset Location or potential system inclusion
- Optional grouping

USBR Location Hierarchy – Power & Pump Generating Plant



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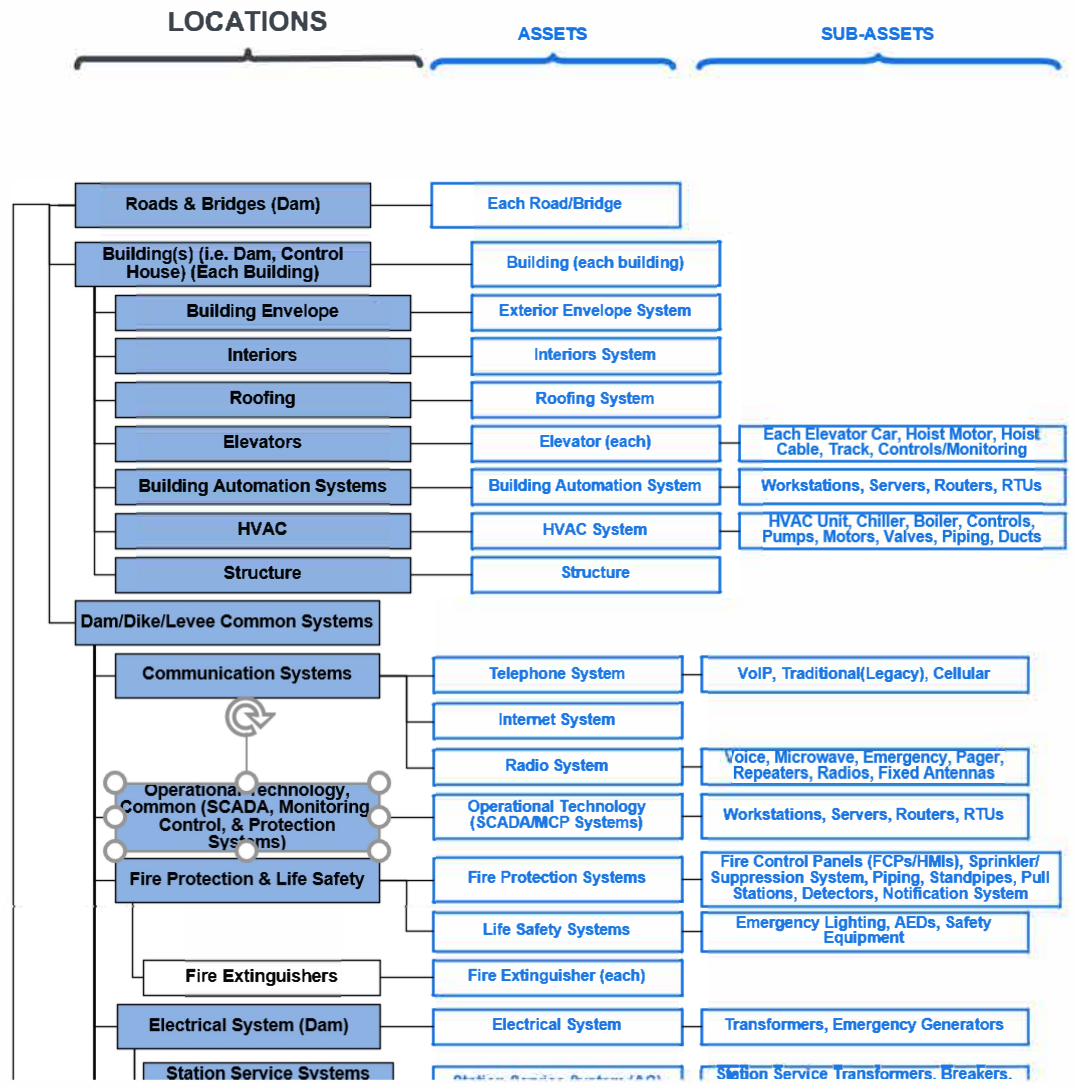
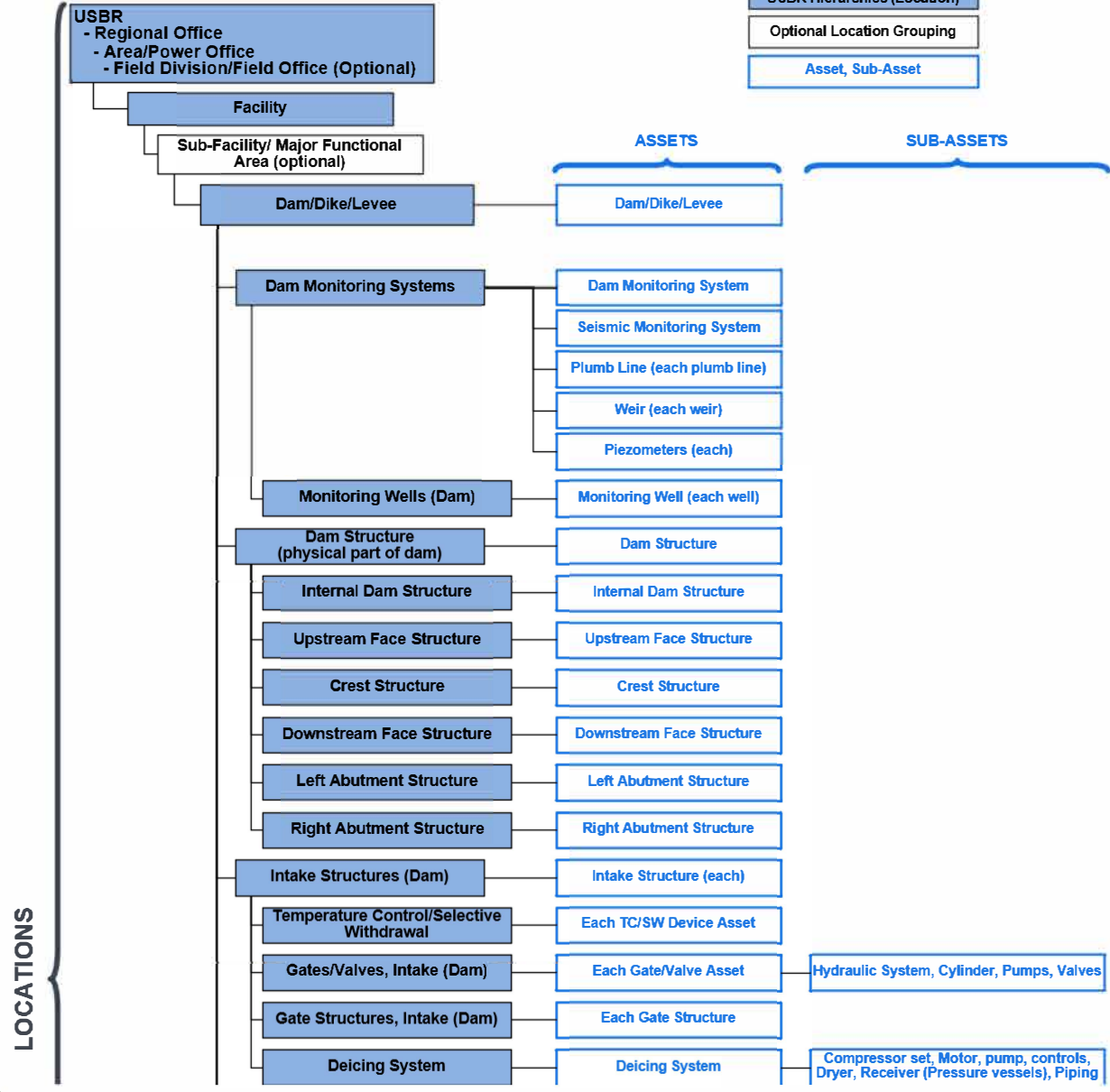


USBR Location Hierarchy – Dams, Dikes, & Levees

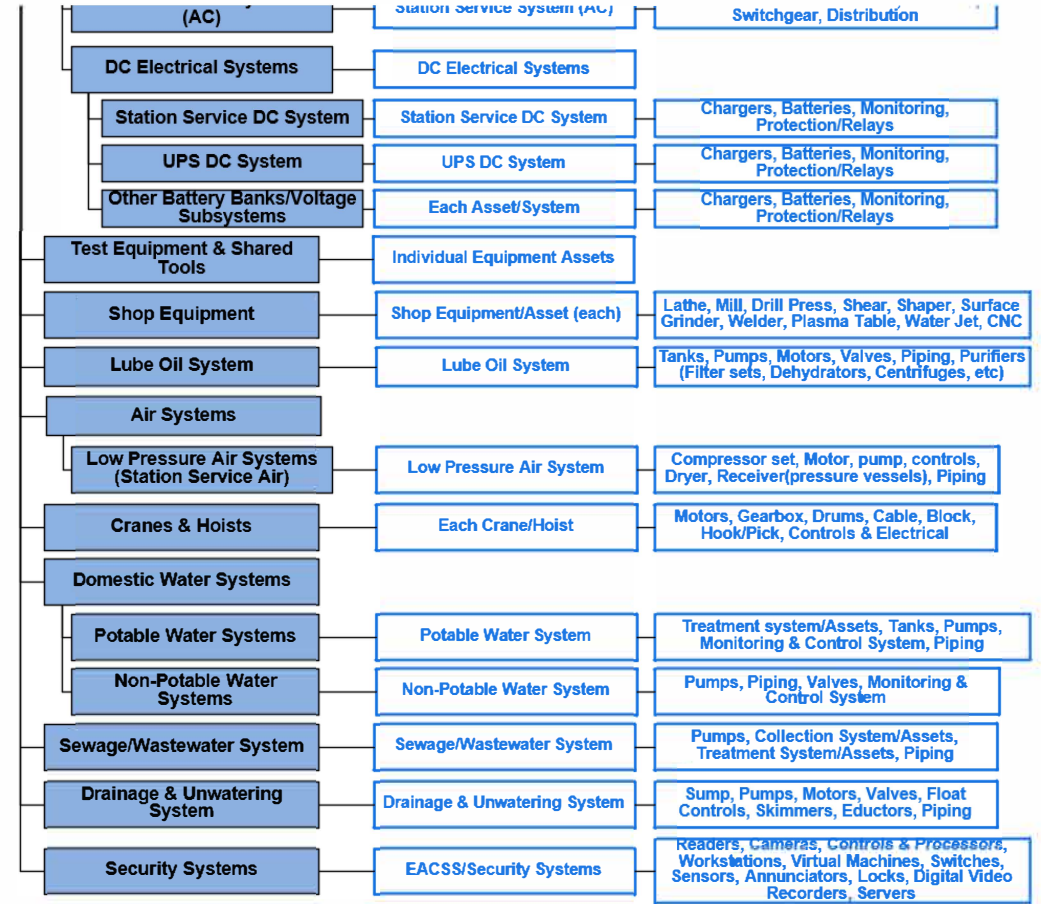
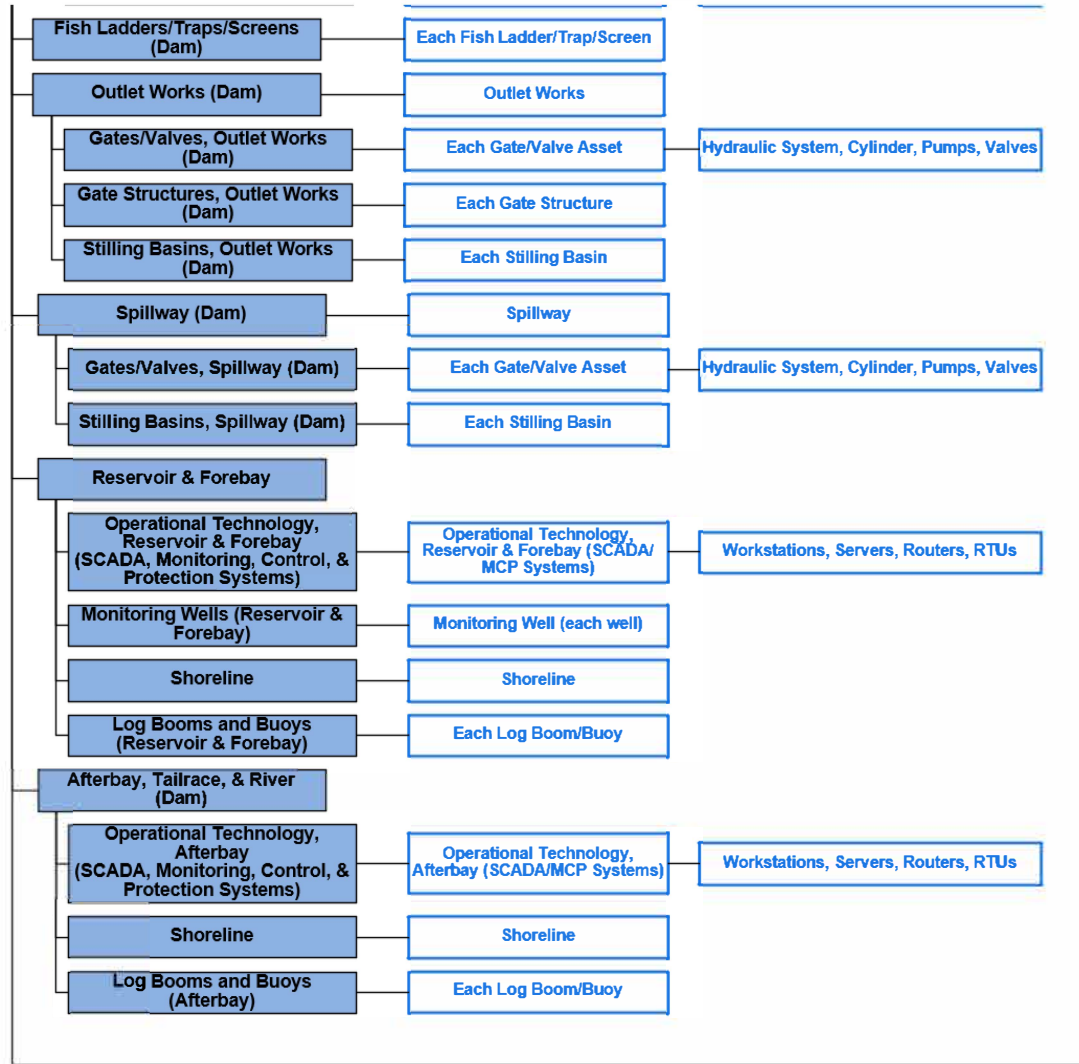
To be included in all applicable USBR Hierarchies (Location)

Optional Location Grouping

Asset, Sub-Asset



LOCATIONS



USBR Location Hierarchy – Buildings & Grounds

