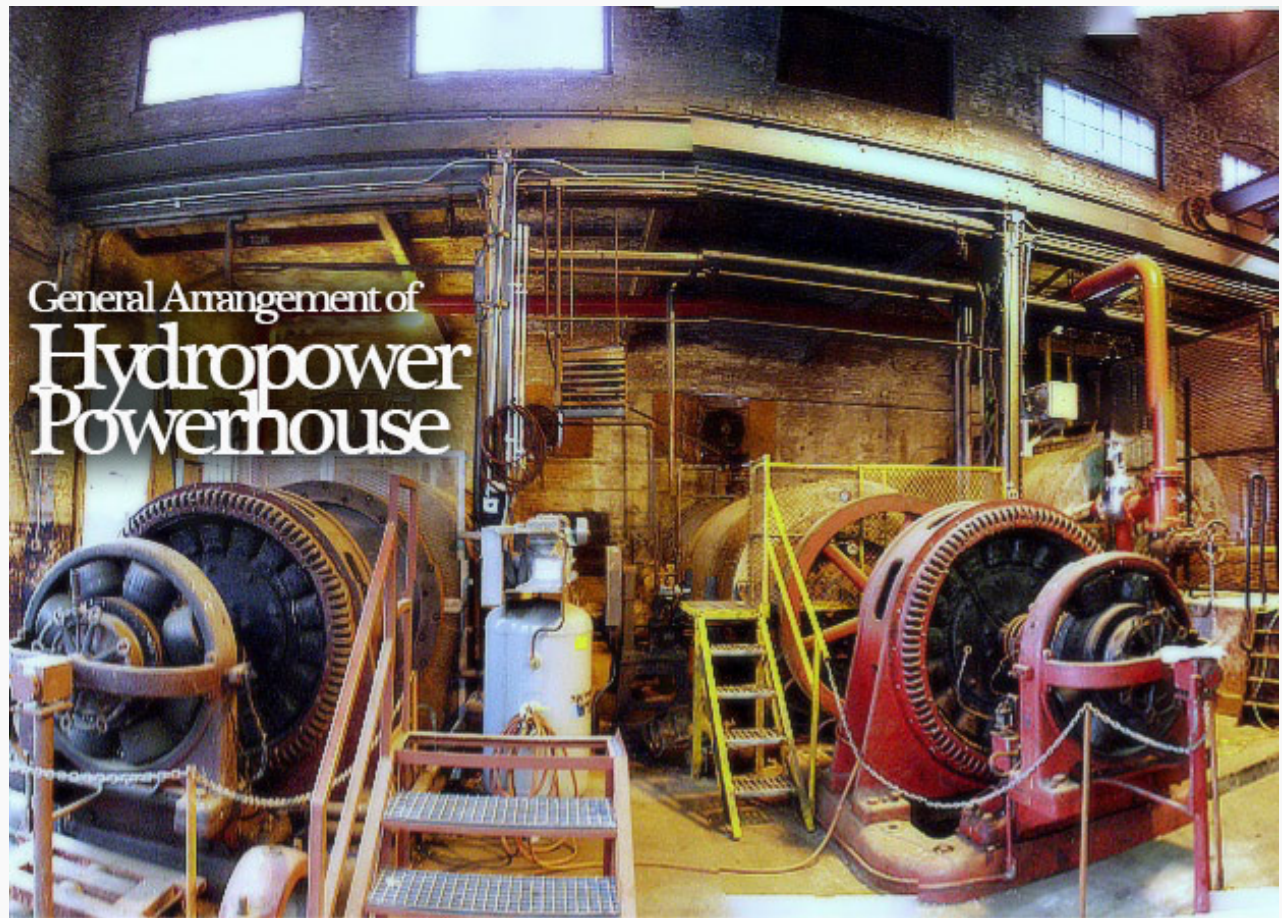


General Arrangement of Hydropower Powerhouse

Edvard



General Arrangement of Hydropower Powerhouse (on photo: Woronoco Powerhouse Before Rehabilitation by SRHOCO; swiftriverhydro.com)

Introduction to Powerhouse

In general, a powerhouse in hydropower plant may be divided into three areas:

1. Main powerhouse structure

The **generator room** is the main feature of the powerhouse about which other areas are grouped.

It is divided into **bays** or **blocks** with one generating unit normally located in each block. The width (*upstream-downstream dimensions*) of the **generator** room for the indoor type should provide for a passageway or aisle with a minimum width of 10 feet between the generators and one powerhouse wall.

The **height of the generator room** is governed by the maximum clearance height required for **dismantling and/or moving major items of equipment**, such as parts of generators and turbines; location of the crane rails due to erection bay requirements; the crane clearance requirements; and the type of roof framing.

All clearances should be adequate **to provide convenient working space** but should not be excessive.

The elevation of the turbine room floor should be established so as to provide a minimum requirement of 3 feet of concrete over a steel spiral case, or a minimum roof thickness of **4 feet** for a semispiral concrete case.

In establishing the ***distance between the generator and turbine room floors***, if they are not combined, the size of equipment to be handled in the turbine room, the head room between platforms in the turbine pit, and the generator room floor construction should be considered.

2. Erection bay

In general, ***the erection bay*** should be located at ***the end of the generator room***, preferably at the same floor elevation and with a length equal to at least one generator bay.

The above length should be increased sufficiently ***to provide adequate working room*** if railroad access is provided into the erection bay at right angles to the axis of the powerhouse.

However, no additional space should be required if the access railroad enters from the end of the powerhouse.

In cases where the elevation of the crane rail would be dependent on the requirement that a transformer with bushings in place be brought under the crane girder, consideration should be given to the possible advantages of revising the layout to permit bringing the transformer in at the end of the structure, at the end of the generator room, if the generator room is at a lower elevation than the erection bay, or removing bushings before moving transformer into powerhouse.

If the height required ***for untanking a transformer*** appears to be the controlling dimension, a study should be made of the economy of installing a hatchway and pit in the erection bay floor to provide the required height.

3. Service area

Service areas include: offices, control and testing rooms, storage rooms, maintenance shop, auxiliary equipment



Waddamana Power Station A generator room (photo by Ben Short via Flickr)

rooms, and other rooms for special uses.

For plants located at the toes of gravity dams, **the space available between the generator room and the face of the dam** is a logical location for most of the features enumerated above.

However, in all cases an economic study, which should include **the cost of any added length of penstock required**, should be made before deciding to increase the space between the dam and powerhouse to accommodate these features. The offices are frequently located on upper floors, and the control room and other service rooms on lower floors.

The most advantageous location for the maintenance shop is usually **at the generator room floor level**.

Space allocations

Space should be provided for some or all of the following features and uses, as required:

1. **Public areas:** main public entrance, reception area, public rest rooms, exhibits, and elevator.

2. **Employee areas:** employee entrance, equipment entrance, offices, office storage, rest rooms for office use, control room, rest rooms for control room operators, kitchen for control room



Elevation of the crane rail in hydropower plant



Ontario Hydro Niagara Falls Power Plant Control Room

operators, repair and test room for instruments, main generator rooms, main turbine rooms, station service or fish

water units area, erection and/or service areas.

3. **Shops:** machine, electrical, electronic, pipe, welding, sheet metal, carpenter, and paint with spray booth.

4. **Storage and miscellaneous areas:** [storage battery and battery charger rooms](#), cable galleries, cable spreading room under control room, telephone and carrier current equipment room, oil storage tank room, oil purification room, storage for paints and miscellaneous lubricants, storage rooms, locker rooms with showers and toilet facilities, first aid room, lunch room with kitchen facilities, elevator, heating, ventilation, and air conditioning equipment rooms, and auxiliary equipment rooms.

Reference: *Planning and Design of Hydro-Electric Power Plants – Gilbert Gedeon, P.E.; Continuing Education and Development, Inc.*

Source:

<http://electrical-engineering-portal.com/general-arrangement-of-hydropower-powerhouse>