



Procedures for Performing Work in CD Computer Rooms For Task Managers, Construction Coordinators and Service Coordinators

Executive Summary

No activity in the computer rooms will be allowed to significantly degrade the environment. It is necessary to make modifications which may include deploying new equipment, relocating equipment and electrical, environmental or building modifications. However, it is essential that these actions, meant to improve the stability and operation of the data center, are not allowed to degrade conditions and threaten reliability and uptime.

Intended Audience

This document will provide additional background and good practices associated with coordinating work and services within the computer rooms that include construction, upgrades, maintenance, and repair services. The intended audience is the Facility Operations Department, Task Managers (TM) and Construction Coordinators (CC) as defined in FESHM 7010 and Service Coordinators (SC) as defined in FESHM 7020. Key points contained in this document should be included in the bid package for any large construction projects or upgrades so the contractor will be provided an overview of the working environments.

Disclaimers

Some items may be too inflexible while other items may not go far enough. One size does not fit all situations. This is a collection of good practices and lessons learned. It is incumbent on Construction Coordinators, Task Managers, and Service Coordinators to understand the needs of the user community and work seamlessly with customers and contractors to find the best win-win solution. This is a living document that will be updated frequently.

General Safety

Work safety is covered extensively in training, JHA, procedural documents, etc. However, two issues to bear in mind that can occur frequently. Remember that the

This procedure is controlled. Hard copies are valid for only the date printed. The most current version can be found on DocDB.

workers need to have the appropriate Personal Protective Equipment (PPE) for the work being performed. The safety and convenience of other employees who pass through or by the work area must be considered. Cones and barricade rope/tape should be used to secure the work area. If access to racks of equipment is temporarily blocked, access must be provided on a need basis to employees who require access to equipment.

The contractor and Construction Coordinator/Task Manager are responsible for generating and posting signage needed to inform the public of work that impacts normal traffic patterns or potentially impact the safety of employees.

Fire Doors & Physical Security

Most computer rooms are deemed Property Protection Areas, and the Physical Security of the rooms must be maintained throughout the entire project.

Fire Doors and any doors associated with the computer room may not be propped open. If there is a temporary need to have the doors open, someone must stand watch to maintain physical security of the room. Painting or work on the doors requires a plan that maintains physical security.

Physical piggybacking is a method for gaining access to controlled access areas by waiting for an authorized individual to arrive and open the door. Then the intruder follows the authorized individual and enters as well. Do not hold open the security doors for employees or subcontractors. If they have a valid badge, they will be able to gain access using their badge. The exceptions are sanctioned tours and situations where you are accompanying the other worker the entire duration they are in the computer room.

Computer Room Environment

Any activities that generate and inject dust and debris into the air in the Data Centers are a concern. There are many sources of particulates. Among the worst are packaging materials, clothing fibers, ceiling tiles, concrete and drywall, HVAC belts and motors and paper. Packing materials include cardboard, paper wrap, peanuts, plastic, wood and other such materials. Largely unseen by the naked eye, particulate circulating within a Data Center can accumulate and interfere with electronics causing a variety of potential problems, including failure of electronic circuits, media errors and data loss. Tape Libraries in the data centers can be particularly impacted by dust and airborne particulate. No activity in the Data Center should generate large amounts of dust, debris or garbage. Specifically, this includes cardboard and unpacking of materials in the Data Center.

Normal cutting, drilling or demolition is unacceptable without proper precautions. Any cutting or drilling should be done outside the room to minimize the activity necessary within the room. This will add time and effort, but will limit contaminant production within the room.

This procedure is controlled. Hard copies are valid for only the date printed. The most current version can be found on DocDB.

Not all activity can be performed outside the room, so it is also important that efforts are made to contain or arrest contaminants produced by activities performed within the controlled space. Plastic sheeting can be used to isolate work areas from other areas of the room. Vacuum units equipped with High Efficiency Particulate Air (HEPA) filtration should be used to address any contamination produced by drilling or sawing as soon as it is produced.

Drilling, sawing or activities that produce contaminants within a computer room must be coordinated and approved by Facility Operations prior to the start of the work. Any activity that creates vibrations or requires movement of any equipment racks, equipment within the rack or cables must also be coordinated and approved by Facility Operations. The details of the work process and mitigations should also be represented in the Job Hazard Analysis (JHA).

Remind employees and contractors that no food or beverages are allowed in the Computing Sector Data Centers and computer rooms (including transporting through a computer room - coffee spilled on a raised floor is a mess). These controlled environments include Feynman Computing Center - FCC2 & FCC3 computer rooms, Wilson Hall - WH8-FC server room and all parts of the Grid Computing Center (GCC) including the tech areas and network rooms. The small 4-gallon trash containers are for small amounts of trash from normal work being performed in the Data Centers. Any garbage, packing materials or waste brought into the data centers, or produced as a result of major projects within the data centers, must be removed the same day from the data centers.

Contaminant producing activities should be staged outside of the controlled areas of the Data Centers. Contact Facility Operations when planning new installations, upgrades or modifications.

Another significant source of dirt and dust in the Data Centers comes from people's shoes. Please ensure shoes are clear of mud, dirt, salt, rocks and debris before entering the Data Centers. Step on dust mats as appropriate when entering computer rooms and/or wear shoe covers stationed at the most dust sensitive locations.

Cleaning the Computer Rooms

When it comes to dirt in a Data Center, what you can't see is as important as what you can see. Twice a year, the Laboratory employs specialized Data Center cleaners to perform a thorough cleaning of the facilities. The Computing Sector makes this investment to minimize air borne particles that enter the computing equipment and to reduce maintenance and filter replacement on computer room air conditioning units.

This procedure is controlled. Hard copies are valid for only the date printed. The most current version can be found on DocDB.

For some construction and upgrades, it may be necessary to have a professional Data Center cleaning company come in as needed, or on a regular schedule. Localized cleanup of work areas on the raised floor should be done with a damp mop. Excessive water can activate the water detection system below the raised floor.

Air Management and Computing Equipment Racks

Air management in the computer rooms is important for cooling of computing equipment and energy efficiency. The use of air curtains, rack skirts, and rack plating is key to the operation of the computer rooms. If the air management is altered during an installation or retirement effort, the air management should be put back in to place after the work is completed.

Each computer room has many equipment racks that house important computing. Some racks house equipment that if disturbed, can impact the core computing services for the entire site. Therefore, the racks cannot be moved and the contents may not be disturbed. Careful considerations should be given to any work that will cause vibrations in the local area near computing racks. Any work that requires activity above the racks or in close proximity must be a highly coordinated effort so that the work does not disturb the sensitive computing equipment and cabling.

Due to the adverse effect on sub-floor pressure, the number of floor tiles pulled out of place must be kept to a minimum. The integrity of the raised floor can also be compromised when tiles are removed. When working in a raised floor room, always cone off the area, and no more than two contiguous floor tiles may be open at the same time. No more than six floor tiles in total may be open at the same time. All vented floor tiles must be returned to the positions from which they were removed and all air dams maintained in the position they were found.

To avoid creating unbalanced airflow and unsafe work conditions, no open holes of any kind may be left exposed in the data center raised floor if no work is being actively performed. No additional vents, grills or perforated tiles may be added or modified without coordination with Facility Operations.

Moving heavy equipment across a raised floor must be coordinated with Facility Operations. Consideration of the floor rating should be given when planning to use a man-lift, pallet jack or other heavy machinery.

When transporting a heavy load, common sense approaches need to be taken to protect the floor tiles, computer room floor or carpet outside the computer room.

Ceiling tiles may be removed temporarily. Caution should be taken to minimize the amount of particulates and dust generated.

This procedure is controlled. Hard copies are valid for only the date printed. The most current version can be found on DocDB.

Computer Room Monitoring Systems

Monitoring systems within the computer room may not be disabled or modified without coordination and approval of Facility Operations. This directly includes building and data center monitoring, however, no monitoring of any type should be disabled or modified without prior approval.

Storage of Materials in Computer Rooms

There is a minimal amount of storage within the Data Centers and computer rooms (especially GCC and WH8-FC). Most items are stored remotely or in two door cabinets. The storage of hardware, supplies, and packing materials can be a major source of contamination. Also, many of these same materials are flammable and pose a fire hazard. Stage material storage for jobs outside of the computer rooms and keep in mind that if owners of materials within the computer rooms cannot easily be identified, the materials may be relocated to general Sector storage areas or discarded.

For construction and major upgrade projects, a work area will need to be assigned, probably in the utility areas of the buildings. Job boxes, tools and other equipment will be stored outside the computer rooms. It may be necessary to have a small truck onsite for storage of tools and materials that are large or used infrequently.

Electrical Work

The work rules listed below are extracted from the “Procedures for Performing Work in CD Computer Rooms” (Docdb 628) <https://cd-docdb.fnal.gov:440/cgi-bin/ShowDocument?docid=628>

Work Rules

1. Persons in computer rooms must not touch breakers and controls on any electric distribution panel, power distribution unit, UPS or air conditioning unit. These are both safety and operational hazards. You must never reset a tripped electrical breaker. You must always contact Facility Operations (see contact list below).
2. Plugging or unplugging of computers into power outlets must be arranged in advance with Facility Operations.
3. Cords for tools, vacuums, etc. that are plugged into building receptacles may require a Ground Fault Circuit Interrupter (GFCI).

Contractors must not turn off or on electrical power in the building without consulting with the Task Manager or Construction Coordinator. Any required electrical outage must be coordinated and scheduled with the Facility Operations Management. A formal notification to the Sector may be required.

This procedure is controlled. Hard copies are valid for only the date printed. The most current version can be found on DocDB.

Construction contractors and maintenance service providers will only use “street”/utility power receptacles and outlets for their tools and work. The UPS power is reserved for the computing equipment and if there is any question whether power is supplied from a UPS, consult Facility Operations.

Maintenance and Service Hours

All contractors shall perform standard services during normal work hours. Generally, this will be 7:00AM to 3:30PM. Any deviation of work hours must be coordinated through the task manager or construction coordinator. Any work deemed critical to the operation, and all electrical work, requires the task manager or construction coordinator be on-site to monitor the job and be available for consultation. It is a good practice to target the work to end prior to the end of the business hours so the work and the work area can be properly cleaned up and staged for the next day.

Loaning Tools and Equipment

Loaning of Fermilab tools and equipment is not allowed unless the procedures in [FESHM 7010/7020](#) are followed.

Vehicle Parking

Work vehicles may load and unload at the Feynman Computing Center west or east loading dock. Parking during the work day is allowed in the normal parking lot. However, if there is a large team, the TM/CC/SC may request that vehicles be parked in the remote parking lot. No permanent parking is allowed in front of the building or in the loading docks. When using the loading dock, turn off the vehicle to minimize the fumes that are exhausted into the building.

Use of Chemical Liquids and Fluids

Industrial cleaning liquids or fluids used during maintenance or services must be pre-approved by the Task Manager, Construction Coordinator or Service Coordinator. Glues, varnishes, polishes, paints, solvents, paint thinners, and volatile organic compounds (VOCs) must be pre-approved by the Task Manager, Construction Coordinator or Service Coordinator (and the Sector Senior Safety Officer). The use of chemicals with a high level of airborne pollutants (fumes) must be carefully considered and coordinated before use in a building with high occupancy. This may include a review of Material Safety Data Sheets (MSDS).

This procedure is controlled. Hard copies are valid for only the date printed. The most current version can be found on DocDB.

Hardware, Furniture, Shelving in the Computer Rooms

No hardware, furniture, shelving or other materials may be removed or added to the data centers without written request and approval from Facility Operations. The furniture may not be used as a construction work bench.

Loud Noise

Activities that produce loud noise (drilling, sawing, coring, sanding, etc.) must be coordinated with Facility Operations, particularly in a densely occupied building. In most cases, the work in densely populated facilities will be conducted before or after normal work hours.

Computer Rooms are already noisy areas due to the computing. Radios (“boom boxes”) are not practical in a computer room and are not allowed. When working near adjacent office areas radios are not allowed. When working in utility and remote areas, the volume of radios will be set to a level appropriate for general office areas.

Temporary Dumpsters

If temporary dumpsters are required for a construction project or major upgrade, planning with the Construction Coordinator or Task Manager is required. Care should be taken not to block outside walkways, access to the building and access to the permanent dumpster and recycle bins. If dumpsters are loaded onto a truck in the parking lot, sweep the area for nails, screws and other metal objects that can impact vehicle tires.

Contact List

Function	Phone	Name	Email/Web Form
DSO	4081	Jon Ylinen	ylinenj@fnal.gov
Facility Operations	2696	Adam Walters	awalters@fnal.gov
	2695	Tim Kasza	kasza@fnal.gov
	3537	Mark Thomas	mthomas@fnal.gov
	5159	Scott Neill	neill@fnal.gov

*Task Manager (TM) and Construction Coordinator (CC) as defined in [FESHM 7010](#)
Service Coordinator (SC) as defined in [FESHM 7020](#)*

This procedure is controlled. Hard copies are valid for only the date printed. The most current version can be found on DocDB.