PIP-II-LIN-Cable Scaling Methodology

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# Purpose

This document explains the process for estimating cable counts and types based on CMTS1 data for the PIP2 project. PIP2 cable counts should scale according to the information captured in the CMTF cable database.

# Methodology

Cables should scale based on length for the warm front end (WFE) or the number of cavities for the remainder of the super conducting LINAC based on CMTS1 data. This leads to the following scale factors for signal cable:

|  |  |  |
| --- | --- | --- |
| Location | Scale Factor | Comments |
| WFE | 1.29 | PIP-II WFE: 22m  PIP2IT WFE: 17m |
| HWR | 1 | PIP-II: 8 Cavities  CMTS1: 8 Cavities |
| SSR1 | 1.5/2 (Heliax) | PIP2: 0.75 x # of modules for non-heliax, # of cavities for heliax  CMTS1: # of cavities |
| SSR2 | 5.25/4.75(Heliax) | PIP2: 0.75 x # of modules for non-heliax, # of cavities for heliax  CMTS1: # of cavities |
| LB650 | 9/4.5 | PIP2: 0.75 x # of modules for non-heliax, # of cavities for heliax  Multiply all values by (36/33) for cavity change  CMTS1: # of cavities |
| HB650 | 3 | PIP2: 0.75 x # of modules  CMTS1: # of cavities |

BTL signal cable and power cable counts came from meetings with individual system owners and are not scaled according to Cable DB. In instances where systems have known cable counts and types, the values were subtracted from the scaled value to present a more accurate picture. In some cases, this leads to a minor increase in expected cable counts.

# Counts

|  |  |  |
| --- | --- | --- |
| Location | Count | Comments |
| PIP2IT WFE | 752 | CMTF Cable DB |
| CMTS1 | 884 | CMTF Cable DB |
| Location | **Count** | **Comments** |
| Scaled PIP2 | 17,825 | Total Count: 19,411 |
| Super conducting LINAC Power Cables | 309 |  |
| BTL Signal Cables | 1,145 |  |
| BTL Power Cables | 132 |  |
| Location | **Count** | **Comments** |
| BOE Signal Cables | 19,221 | Per CD-2  Total Count: 19,662 |
| BOE Power Cable Count | 441 | Per CD-2 |

# References

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| Reference | Location |
| CMTF Cable DB | https://ad.fnal.gov/cgi-bin/cable/cableIndex.pl?areaID=16 |
| PIP2 Cable DB | https://ad.fnal.gov/cgi-bin/cable/cableIndex.pl?areaID=19 |
| Room Data Sheet | Teamcenter ED0009544 |
| CD2 Electrical BOE Spreadsheet | PIP-II-DocDB-1989 |