

Wet Lab Space Guidelines and Utilization Studies

Study of Past Guidelines and New Recommendations Addendum: January 2021

Office of the Assistant Vice Chancellor and Assistant Dean of Operations &
Facilities Management

Wet Lab Space Guidelines

Methodology

- Fall 2018 Wet Lab Research Pilot Study - Goals
 - reviewed peer benchmarks
 - revisited wet lab guidelines used for the planning of Couch Biomedical Research Building
 - recommended wet lab space guidelines going forward
- FY20/21 - Planning of the Neuroscience Research Building (NRB)
 - further study of NASF/FTE for 90+ PI teams that are targeted to occupy the new research building
 - further study of space premium required for specific scientific equipment
- The planning methodology used for the Couch Building and the NRB remains the underlying principal for future planning and wet lab utilization study:

FTE: Full Time Equivalents

Space is allocated by number of FTEs

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Wet Lab Space Guidelines

Methodology

- Lessons learned from the occupancy of Couch Building, BJC Institute of Health (BJCIH), planning of the Neuroscience Research Building (NRB) and the ongoing study of current wet lab utilization in all WUSM campus buildings have contributed to creating a revised approach.
- These [Lessons Learned](#) are highlighted throughout the guideline document and compiled at the end.

Wet Lab Space Guidelines

FTEs – Full-time Titled Staff

- FTE vs Headcount
 - **FTE (full-time equivalent)** and **Headcount** are two methods of counting the number of lab members occupying a PI's lab.
 - **Headcount** is the actual number of bodies in the lab. When using the term *headcount*, each individual person counts as one employee whether their appointment is full time or part time.
 - **FTE** is the hours worked by one employee on a full-time basis. The concept is used by many organizations to convert the hours worked by several part-time employees into the hours worked by full-time employees.
- When planning for and studying the occupancy/utilization of wet lab research space, the recommended methodology of calculating FTEs is to include only full-time titled staff.
 - See Appendix for list of typical full-time titled wet lab research staff titles
 - If Departmental Planners need assistance, OFMD's Director of Space Programming is able to verify with WUSTL Human Resources by using the employee's ID number.

Wet Lab Space Guidelines

Calculating Total FTEs

- Full-time titled staff member = 1 FTE
 - Once a PI's wet lab staff members are documented and titles are verified, full-time (1.0) titled FTEs are calculated.

Example:

A wet lab has 10 staff/lab members in addition to the PI. Eight (8) of those lab members have been confirmed to have full-time (1 FTE) titles.

- *This lab would be considered a PI+8 FTEs*

- Part-time/temporary/rotating students
 - Part-time / temporary titled staff positions are not included in the FTE calculation for wet lab utilization study. However, if a lab typically has numerous rotating students or hosts Visiting Researchers, the Departmental Planner may consider adding additional FTEs to capture these part-time/temporary titled lab members.
 - [Lesson Learned \(A\)](#)

Example:

A wet lab has 14 staff/lab members in addition to the PI. Nine (9) of those lab members have been confirmed to have full-time (1 FTE) titles. The remaining five (5) are rotating students. The PI advises at least two (2) are in the lab at one time.

- *This lab would be considered a PI+11 FTEs (2 FTEs for pt/temp positions)*

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Wet Lab Space Guidelines

Precedents

- The Couch Building was planned and designed as an open lab research building at **PI +6 = 1,200 NASF**.
 - This original metric included a proportion of amenity spaces such as conference rooms and break rooms.
 - If amenity spaces were excluded from the original Couch Building design metric: PI+6 = 1,040 NASF.
 - [Lesson Learned \(B\)](#)
- The NRB is planned and being designed as an open lab research building at **PI +6 = 1,350 NASF** (average of 85 wet labs).
 - PI+6 varies in the NRB: PI+6 = 1,269 – 1,500 NASF (dependent on equipment / type of research)
 - This metric intentionally excludes amenity spaces such as conference rooms and break rooms.
 - [Lesson Learned \(C\)](#)

Wet Lab Space Guidelines

Recommended Guideline

- WUSM has a variety of building types with a variety of science departments and types of research conducted in these buildings. There are both open lab concepts and cellular facilities on campus.
- Going forward, WUSM elected to exclude amenity spaces from the metric given these spaces vary greatly across the campus building inventory.
- After conducting research on current use of all WUSM buildings, including the planning of the NRB, WUSM's recommended wet lab guideline for campus-wide wet lab utilization study is **PI + 6 = 1,350 NASF**.
 - [Lesson Learned \(D\)](#)

Wet Lab Space Guidelines

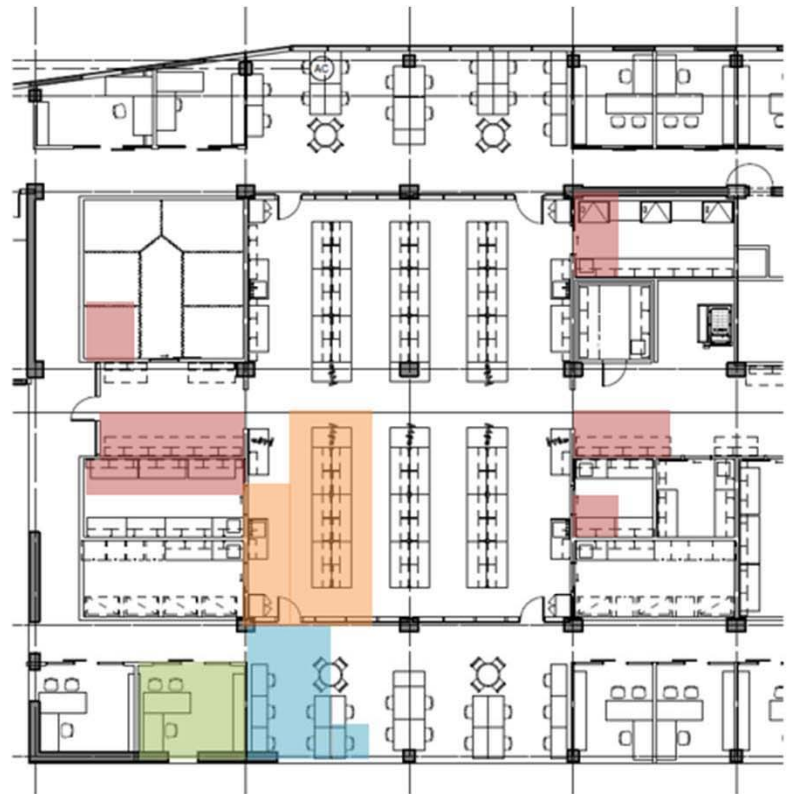
Space Types Included in the Recommended Guideline





Recommended guidelines include the following space types assigned to a PI. (OSIS room type code definitions are included for reference)

- Wet Lab
 - 250 Non-Class Wet Laboratory
- Wet Lab Support (dedicated and pro-rated portion of shared)
 - 254 Dark Room
 - 255 Non-Class Wet Laboratory Service
 - 256 Glass Wash
 - 257 Warm Room
 - 258 Cold Room
 - 259 Electron Microscope
 - 260 Clean Room
- PI Office
 - 330 Faculty Office
- Write-ups (aka open workstations)
 - Majority of this existing type of space is coded under (included with) 250 Non-Class Laboratory; may be coded as 251 Non-Class Dry Laboratory (open workstations in an open lab concept lab)
- Satellite Animal Housing / Procedure Rooms (should be assigned to department/PI; not DCM)
 - 571 Animal Quarters – Non-Barrier Space
 - 577 Animal Procedure Laboratory

Wet Lab Space Guideline

Graphic Representation



	Principal Investigator (PI) Office	100-120 NASF
	Write-up / Open Workstations (6 FTEs)	216-236 NASF
	Wet Lab (bench & support) (6 FTEs)	507 NASF
	Wet Lab Support	<u>507 NASF</u>
	Total	1,350 NASF

Couch Building is the background but purpose of the graphic is meant to be generic (open or cellular) in nature

Departmental Wet Lab Utilization Studies

Analyzing People and Grant \$ Over Space

- When studying a PI's wet lab utilization there are two primary measures:
 1. Space: NASF (net assignable square feet)
 2. People: FTEs (full-time equivalents)
- How much NASF/FTE? Per the Wet Lab Space Guideline:
 - **PI + 6 FTEs = 1,350 NASF (120 NASF/PI + 205 NASF/FTE)**
- When studying a PI's wet lab utilization there are other considerations and/or secondary measures:
 - PI team size: is the team under the average PI+6?
 - Does the PI mentor a large amount of students?
 - Grant dollars - specifically modified total direct costs (MTDC). How much MTDC / NASF?

Departmental Wet Lab Utilization Studies

Analyzing People and Grant \$ Over Space

- Minimum NASF for a PI team size below the average 6 FTEs
 - WUSM recognizes the need to establish a minimum amount of space for PIs just starting out and recruiting staff.
 - [Lesson Learned \(E\)](#)
 - **PI +0 to 3 FTEs = 735 NASF/PI**
 - 120 NASF (PI office) + 615 NASF (wet lab + wet lab support)
 - once PI is +4 FTEs: +205 NASF / each additional FTE
 - until = PI+6 FTEs @ 1,350 NASF (120 NASF/PI + 205 NASF/FTE)
 - This metric is proportional to the team size per the Wet Lab Space Guidelines

Departmental Wet Lab Utilization Studies

Data Sources

- NASF Source: Manage Space/OSIS
 - WUSM highly recommends departments keep departmental and PI space assignments in Manage Space/OSIS up to date throughout the year.
 - Department Planners and Project Managers use this data everyday to aide in studying and analyzing immediate space requests, departmental 5-Year space needs, current utilization studies and future vacant space planning.
 - OSIS – Space Codes
 - The following space types will be observed more closely during the wet lab space walk-throughs (part of the utilization study process) given the variation of ways these space types may be utilized across campus.
 - 330 Faculty Office
 - Lesson Learned (F)
 - 310 General Office
 - Lesson Learned (G)
 - 251 Non-Class Dry Laboratory
 - Lesson Learned (H)
 - MTDC Source: Finance

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Departmental Wet Lab Utilization Studies

Data Sources

- MTDC Source: Finance
 - An additional utilization metric being studied is MTDC (Modified Total Direct Cost) per NASF, which allows us to look at utilization from a financial standpoint. MTDC is used as the numerator as these are the costs on a grant that can be identified specifically with a particular sponsored project, tying the grants back to the space.
 - [Lesson Learned \(I\)](#)

Departmental Wet Lab Utilization Studies

FAQ

Why PI +6 versus +4 or +8 instead?

- During the planning of the Couch Building and the NRB, PI+6 was the average team size on WUSM campus. WUSM has found this average size still stands and remains as the prototype for space planning purposes.
 - [Lesson Learned \(J\)](#)

What is the minimum NASF for teams below the average size?

- After studying wet lab utilization within multiple departments and building types, WUSM's recommendation for minimum NASF is that equivalent to a PI+3.
 - [Lesson Learned \(E\)](#)

What about Dry Lab/Computational PIs?

- There are pure dry lab/computational PIs (versus pure wet or hybrid) on WUSM campus. The space types for these particular PIs are not included in the Wet Lab Space Guidelines. Adjustments can be made during planning for dry/computational teams based on the work the particular team does.
 - [Lesson Learned \(K\)](#)

Departmental Wet Lab Utilization Studies

FAQ

Are adjustments made for type of research?

- Yes; adjustments to the guidelines can be considered when planning for the design and occupancy of specialty labs. These adjustments would be based on the work the particular team does.
 - [Lesson Learned \(L\)](#)

Are a PI's grant dollars taken into consideration?

- Grant dollars are not a factor but can be a secondary measure when studying wet lab utilization.
 - [Lesson Learned \(I\)](#)

What is the ideal ratio wet lab:wet lab support?

- When planning new research buildings and major gut/lab renovations, WUSM advises the planners, PMs and consultants involved to study the need of wet lab:wet lab support more closely. The need may vary depending upon type of science; however, generally a 50:50 ratio is found to be an average satisfactory metric.
 - [Lesson Learned \(M\)](#)

Departmental Wet Lab Utilization Studies

FAQ

What is the difference between an open lab vs. a cellular lab / facility?

- An open lab is a large open wet lab “neighborhood” recently designed and constructed in an open concept that is likely accommodating multiple PIs. Wet lab support spaces are typically shared among multiple PI teams and are directly adjacent to the open wet lab benches.
- A cellular lab is a more “traditional” wet lab likely accommodating only one PI and may have many ancillary support spaces either directly adjacent to the lab or located on the building floor.
 - [Lesson Learned \(N\)](#)

What is a Co-Investigator?

- A Co-Investigator may be from another department or from the same department as the Principal Investigator (PI). The Co-Investigator would not have a wet lab of their own, would occupy the PI’s wet lab and would have grant \$ on the PI’s wet lab space. Given a Co-Investigator doesn’t have wet lab space of their own, they would be eligible to count as a full-time titled FTE in the PI’s lab. When entered into the Co-Investigator section of the utilization template, the MTDC\$ associated with this Co-Investigator will be pulled into and rolled up with the PI’s MTDC\$.
 - [Lesson Learned \(R\)](#)

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Departmental Wet Lab Utilization Studies

FAQ

I am a PI and have another faculty member in my lab who occupies an office. Is this taken into consideration during the wet lab utilization study?

- Yes, the Departmental Planner will also review all offices coded as 310 General Office.
- When planning new space for a lab: If a faculty member with one the following titles are working in a Principal Investigator's (PI) lab, it is recommended that those on the investigator track be assigned an office and those on the research track be assigned a write-up (aka workstation): Instructor, Assistant Professor, Associate Professor, Professor.
 - [Lesson Learned \(G\)](#)

Lessons Learned

- A. When planning for and studying the utilization of wet lab research space, the recommended methodology of calculating FTEs is to include only full-time titled staff. Once a PI's wet lab staff members are documented and titles are verified, full-time (1.0) titled FTEs can be calculated.
- Part-time/temporary titled staff positions are not included in the FTE calculation for the wet lab utilization study. However, if a lab heavily mentors students or hosts Visiting Researchers, the Departmental Planner may want to consider adding additional FTEs to capture these part-time/temporary titled lab members.
 - The Departmental Planner should inquire with the PI on how many pt/temp staff occupy the lab at one time and use their discretion on determining how many additional FTEs to add for these pt/temp positions.
 - In the past, WUSM has found a 20% multiplier added to the full-time titled FTE subtotal as an average metric.
- B. The original metric (PI+6 = 1,200 NASF) for Couch Building included a proportion of amenity spaces such as conference rooms and break rooms. Going forward, WUSM elects to exclude amenity spaces from the metric given these spaces vary greatly across the campus's building inventory. The revised Couch Building design metric – excluding amenities – would be PI+6 = 1,040 NASF.

Lessons Learned

- C. The NRB is planned and being designed as an open lab research building at PI+6 = 1,350 NASF (average of 85 wet labs).
- PI+6 varies in the NRB: PI+6 = 1,269 – 1,500 NASF (dependent on equipment / type of research)
 - This metric intentionally excludes amenity spaces such as conference rooms and break rooms.
- D. WUSM has a variety of building types with a variety of science departments and types of research conducted in these buildings. There are both open lab concepts and cellular facilities on campus. After conducting research on current use of all WUSM buildings, including the planning of the NRB, WUSM's recommended wet lab guideline for campus-wide wet lab utilization study is PI+6 = 1,350 NASF.
- E. If our prototype for space planning purposes is PI+6, it is the +6 (FTEs) that require the most space (vs. the PI). This is fair to say for the majority of established PIs at this average size or larger. WUSM recognizes the need to establish a minimum amount of space for PIs just starting out and recruiting staff.
- PI+0 to 3 FTEs = 735 NASF/PI
 - once PI is +4 FTEs: +205 NASF / each additional FTE
 - until = PI+6 FTEs @ 1,350 NASF (120 NASF/PI + 205 NASF/FTE)
 - This metric is proportional to the team size per the Wet Lab Space Guidelines

Lessons Learned

- F. If a research PI is also a clinician, it is possible their only campus office is remote from their research lab and instead near their clinical space. If this is the case, the Department Planner is to exclude the remote office from the wet lab utilization study.
- G. When studying how write-up stations are being used in other buildings on campus, WUSM Planners have found some 310 General Offices being used as write-up stations (versus the workstation in the wet lab) because of the desire to have food/drink while doing computer work. Also, these offices have been found to be occupied by other faculty members (research track) other than the PI. These offices should be included in the study under the “General Office” category.
- H. Couch Building was designed to have the write-up workstations physically separate from the wet lab (250). As a result, these spaces were coded differently in OSIS; coded as 251 Non-Class Dry Laboratory. These spaces should be included in the study.
- I. An additional utilization metric being studied is MTDC (Modified Total Direct Cost) per NASF, which allows us to look at utilization from a financial standpoint.
 - MTDC is used as the numerator as these are the costs on a grant that can be identified specifically with a particular sponsored project, tying the grants back to the space.

Lessons Learned

- MTDC is essentially a gross number for the research dollars while IDRs (indirects) are a derivative of the MTDC to cover a range of items one of which is rent. However, the rent is only for the Wet Lab research space and does not cover office space which is included in the utilization study. Although, IDRs move in tandem with MTDC, the MTDC is a more accurate representation of a lab's income and is free of any of the adjustments made in the Wet Lab Rent for Space model.
- J. During the planning of the Couch Building, PI+6 was the average team size on WUSM campus. WUSM has found this average size still stands and remains as the prototype for space planning purposes.
- K. There are pure dry lab/computational PIs (versus pure wet or hybrid) on WUSM campus. The space types for these particular PIs are not included in the Wet Lab Space Guidelines. Adjustments can be made during planning for dry/computational teams based on the work the particular team does.
- L. Adjustments to the wet lab space guidelines can be considered when planning for the design and occupancy of specialty wet research labs. These adjustments would be based on the work the particular team does.

Lessons Learned

- M. When planning new research buildings and major gut/lab renovations, WUSM advises the planners, PMs and consultants involved to study the need of wet lab:wet lab support more closely. The need may vary depending upon type of science; however, generally a 50:50 ratio is found to be an average satisfactory metric.
- BCIH is a well utilized research building; however the lack of wet lab support compared to wet lab bench space is one of the largest disadvantages.
 - The Couch Building was planned and designed with this lesson learned in mind. Couch was planned, designed and mostly occupied at the 50:50 ratio.
- N. Open Lab vs. Cellular Lab
- An open lab is a large open wet lab “neighborhood” recently designed and constructed in a open concept that is likely accommodating multiple PIs. Wet lab support spaces are typically shared among multiple PI teams and are directly adjacent to the open wet lab benches.
 - A cellular lab is a more “traditional” wet lab likely accommodating only one PI and may have many ancillary support spaces either directly adjacent to the lab or located on the building floor.
- O. A PI may have lab members embedded within their lab that affiliate with another department. Department Planners are to study these PIs normally under their department’s utilization study.

Lessons Learned

- P. A department may choose to loan space to another department instead of returning it to the Space Bank and/or The Dean. WUSM highly encourages the two departments to have an MOU (Memorandum of Understanding) in place.
- If an MOU is not established, the Department Planner is to recommend the two departments establish one.
 - When space is loaned, the “owner” of the space should be under the Assignee category and the department loaning the space should be under the Occupant category in the OSIS database. Department Planners will include the space departments are loaning to other departments under the designated section on the Assignee/Owner’s departmental Wet Lab Utilization Summary spreadsheet.
- Q. Satellite animal housing (Animal Quarters – Non-Barrier Space - code 571) and animal procedure/behavior rooms (Animal Procedure Laboratory – code 577) is departmental space - not Division of Comparative Medicine (DCM) space – and should be assigned to the PI and affiliated department housing the animals and conducting the research. If the Department Planner comes across any discrepancies, please share with WUSM’s Director of Space Programming and agree on revisions to the Manage Space data.

Lessons Learned

- R. A Co-Investigator may be from another department or from the same department as the Principal Investigator (PI). The Co-Investigator would not have a wet lab of their own, would occupy the PI's wet lab and would have grant \$ on the PI's wet lab space. Given a Co-Investigator doesn't have wet lab space of their own, they would be eligible to count as a full-time titled FTE in the PI's lab. When entered into the Co- Investigator section of the utilization template, the MTDC\$ associated with this Co- Investigator will be pulled into and rolled up with the PI's MTDC\$.
- When a Co-Investigator is identified, the Department Planner should inquire if this scientist has a wet lab of their own. If they do, it is likely this investigator does not physically work in the PI's wet lab.
 - If the Co-Investigator occupies only the PI's wet lab, they can be considered a full-time titled (1.0) FTE.
 - Does the Co-Investigator have grant dollars under their name that roll up to the PI? If so, only then enter this Co-Investigator into the correct input column on the utilization spreadsheet.
 - Department Planner to clarify the number of Fiscal Years (FY) the Co- Investigator has had grant dollars on the PI's space.

Appendix

FTEs – Full-time & Part-time/Temporary Titles

The titles listed below are verified titles (WUSTL Human Resources) typically found in a WUSM wet research lab.

- **Principal Investigator (PI)**
 - Instructor
 - Assistant Professor
 - Associate Professor
 - Professor
- **Full-time Titles**
 - Postdoc Research Associate
 - Postdoc Research Scholar
 - Research Assistant
 - Research Lab Supervisor
 - Research Specialist
 - Senior Scientist
 - Senior Research Tech
 - Senior Research Review Specialist
 - Staff Scientist
 - Instructor / Assistant / Associate / Professor
 - (only if under the PI / no assigned space of their own)

FTEs – Full-time & Part-time/Temporary Titles

The following titles are typically considered full-time; however, should be verified with the department.

- *DBBS Graduate Research Assistant
- *DBBS Pre Doc Trainee
- *Graduate Fellowship
- *Graduate Research Assistant
- Research Tech I
- Research Tech II

**Has the student completed their rotation and joined the lab for the next 4-5 years? If so, this title should be considered full-time. If still rotating, the student is considered part-time / temporary.*

- **Part-time / Temporary Titles**

- Lab Asst I/Glasswasher
- Student Assistant
- *Visiting Researcher
- WU Student (undergrad)

**A Visiting Researcher is considered part-time / temporary unless occupying the wet research lab full-time for 1 year or more at the time of occupancy (of new space) and/or when a wet lab utilization study is conducted.*

Peer Medical Schools – Benchmark Review

1. University of California LA

- Allocation methodology: FTEs: Full-time Equivalents
 - Adjustments made for type of research / specialty labs
 - Grant dollars not a factor
- Average: 1,200 - 1,500 NASF / PI
 - Depends on type of building and type of research

2. University of Michigan

- Allocation methodology: FTEs & Grant formula
 - Annual review of grant dollars and FTEs
 - Grant dollars not a factor
- Average: 1,300 NASF / PI

3. Johns Hopkins University

- Allocation methodology: FTEs & Grant formula
- Average: 1,500 NASF / PI
 - 40% lab; 40% lab support; 20% office

Source:

1)A study performed for WUSM by JCI: Medical School Research Space Allocation Metrics (2012)

2)Subsequent 2018 & 2019 verification by JCI that peer Medical School space allocations remain current and comparable to WUSM's recommended guidelines.

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Wet Research Labs – Benchmark Review

24 wet research labs (institutions unnamed) were presented as case studies during a national conference focusing on research space.

1. Average FTE / PI: 5.8
 - round up to 6
2. Average NASF / PI team: 1,150 NASF
 - 192 NASF / FTE
 - excludes PI office
3. Average Office / PI: 120 NASF
 - 120 NASF / PI

Summary: Average PI+6 = 1,270 NASF

Source:

- 1) Tradeline Conference: Research 2019
 - a) Seminar: Fundamentals of Planning & Design of Research Facilities Chernoff Thompson Architects
TrenorHL, Science and Technology Henderson
Engineers, Inc.

Utilization Examples in Couch Building

PI Example 1

- PI+12 FTEs occupy 2,982 NASF in Couch Building
- Current Utilization vs (recommended guideline)
 - 136 NASF/PI (120 NASF/PI)
 - 237 NASF/FTE (205 NASF/FTE)
- NASF over or (**under**) the Recommended Guideline
 - PI: 16 NASF
 - FTEs: 384 NASF
 - TOTAL: 400 NASF over the recommended guideline

PI Example 2

- PI+7 FTEs occupy 1,415 NASF in Couch Building
- Current Utilization vs (recommended guideline)
 - 122 NASF/PI (120 NASF/PI)
 - 185 NASF/FTE (205 NASF/FTE)
- NASF over or (**under**) the Recommended Guideline
 - PI: 2 NASF
 - FTEs: (**140**) NASF
 - TOTAL: (**138**) NASF under the recommended guideline

PI Example 3

- PI+21 FTEs occupy 3,876 NASF in Couch Building
- Current Utilization vs (recommended guideline)
 - 136 NASF/PI (120 NASF/PI)
 - 178 NASF/FTE (205 NASF/FTE)
- NASF over or (**under**) the Recommended Guideline
 - PI: 16 NASF
 - FTEs: (**567**) NASF
 - TOTAL: (**551**) NASF under the recommended guideline