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2022 RESEARCH BENCHMARKING

2022 RESEARCH PROJECTIONS

BUILDING PROJECTIONS
MINES RESEARCH EXPENDITURES

PER NATIONAL SCIENCE FOUNDATION

$59,477,000

$60,372,000

$70,397,000

$78,517,000

MINES RESEARCH EXPENDITURES
PER NATIONAL SCIENCE FOUNDATION


NON-S&E

SCIENCE

ENGINEERING

$59,477,000 $60,372,000 $70,397,000 $78,517,000

$78,517,000

SMITHGROUP
MINES RESEARCH PEERS

ARIZONA STATE UNIVERSITY

CALIFORNIA INSTITUTE OF TECHNOLOGY

COLORADO STATE UNIVERSITY

GEORGIA INSTITUTE OF TECHNOLOGY

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

MICHIGAN TECHNOLOGICAL UNIVERSITY

MISSOURI UNIVERSITY OF SCIENCE & TECHNOLOGY

NEW JERSEY INSTITUTE OF TECHNOLOGY

NEW MEXICO TECH

RENSSELAER POLYTECHNIC INSTITUTE

SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY

WORCESTER POLYTECHNIC INSTITUTE

UNIVERSITY OF COLORADO
RESEARCH EXPENDITURES BY INSTITUTION
PER NATIONAL SCIENCE FOUNDATION

GIT
$1,048,988,000
$987,968,000

MIT
$900,524,000
$673,357,000

ASU
$730,488,000

CU
$405,154,000

CALTECH
$313,238,000

CSU
$730,488,000

NJIT
$59,091,000

RENSSELAER
$107,310,000

MTU
$12,156,000

MISSOURI S&T

WPI
$14,490,000

NMT

SD MINES
$200,000,000
$400,000,000
$600,000,000
$800,000,000
$1,000,000,000
$1,200,000,000

RESEARCH PERSONNEL METRICS BY INSTITUTION

2019 PER NSF, PRINCIPAL INVESTIGATORS

- Worcester Polytechnic Institute
- University of Colorado at Boulder
- South Dakota School of Mines and Technology
- Rensselaer Polytechnic Institute
- New Mexico Institute of Mining and Technology
- New Jersey Institute of Technology
- Missouri University of Science and Technology
- Michigan Technological University
- Massachusetts Institute of Technology
- Georgia Institute of Technology
- Colorado State University, Fort Collins
- Colorado School of Mines
- California Institute of Technology
- Arizona State University, All Campuses

Numerical values:
- 559
- 220
RESEARCH EXPENDITURES PER PI BY INSTITUTION

2019 PER NSF, RESEARCH EXPENDITURES PER PRINCIPAL INVESTIGATOR

- Worcester Polytechnic Institute
- University of Colorado at Boulder
- South Dakota School of Mines and Technology
- Rensselaer Polytechnic Institute
- New Mexico Institute of Mining and Technology
- New Jersey Institute of Technology
- Missouri University of Science and Technology
- Michigan Technological University
- Massachusetts Institute of Technology
- Georgia Institute of Technology
- Colorado State University, Fort Collins
- Colorado School of Mines
- California Institute of Technology
- Arizona State University, All Campuses

$518,385 EXP/PI

$319,986
Research ASF per PI by Institution
2019 Per NSF, Assignable Square Feet per Principal Investigator

- Worcester Polytechnic Institute
- University of Colorado at Boulder
- South Dakota School of Mines and Technology
- Rensselaer Polytechnic Institute
- New Mexico Institute of Mining and Technology
- New Jersey Institute of Technology
- Missouri University of Science and Technology
- Michigan Technological University
- Massachusetts Institute of Technology
- Georgia Institute of Technology
- Colorado State University, Fort Collins
- Colorado School of Mines
- California Institute of Technology
- Arizona State University, All Campuses

1,306 ASF/PI

Recent ASF Benchmarking and Projections Update
2022 RESEARCH PROJECTIONS
VARIABLES

PROJECTED TOTAL NSF EXPENDITURES CHANGE PER YEAR

2, 6 & 9%

2017-2021 AVERAGE 5%
RANGE IS -2% TO +17%
FY24 TARGET IS $100M
VARIABLES
PROJECTED RESEARCH EXPENDITURES PER T/TT STARTING FY22

$385k

2017-2021 AVERAGE $305K RANGE IS $271 TO 348K INCREASE 2% PER YEAR
VARIABLES
RESEARCH ASSIGNABLE SQUARE FEET PER T/TT

1,339

2017, 2019, 2021 AVG 943 ASF
RANGE IS 639 TO 1,339 ASF
RESEARCH EXPENDITURE GROWTH

PER NSF | FY21 PER MINES

$77M
222 T/TT. 297k ASF
RESEARCH EXPENDITURE GROWTH

PER NSF | FY21 PER MINES | FY24 PROJECTED | FY31 PROJECTED

<table>
<thead>
<tr>
<th>Year</th>
<th>$</th>
<th>$</th>
<th>$</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>222 T/TT</td>
<td>297k ASF</td>
<td>82M</td>
<td>94M</td>
</tr>
<tr>
<td>2018</td>
<td>92M</td>
<td>100M</td>
<td>139M</td>
<td></td>
</tr>
</tbody>
</table>
| 2019 | 77M | 94M | 183M | 9%
| 2020 | 82M | 100M | 139M | 6%
| 2021 | 92M | 100M | 183M | 2%
BUILDING PROJECTIONS
2% GROWTH BUILDING PROJECTIONS

2% PROJECTION MODEL DOES NOT REQUIRE ANY ADDITIONAL SQUARE FOOTAGE IN ORDER TO MEET RESEARCH EXPENDITURE TARGETS

THIS MODEL ACTUALLY REQUIRES LESS ASSIGNABLE SQUARE FOOTAGE THAN THE UNIVERSITY IS CURRENTLY ALLOCATING FOR RESEARCH DUE TO THE HIGHER EXPENDITURES PER T/TT EXPECTATIONS USED IN MODEL.

<table>
<thead>
<tr>
<th>FY21 RESEARCH SF</th>
<th>FY24 RESEARCH SF</th>
<th>FY31 RESEARCH SF</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXISTING RESEARCH ASF</td>
<td>EXISTING RESEARCH ASF</td>
<td>EXISTING RESEARCH ASF</td>
</tr>
<tr>
<td>297K ASF</td>
<td>297K ASF</td>
<td>297K ASF</td>
</tr>
<tr>
<td>NO ADDITIONAL SQUARE FOOTAGE REQUIRED</td>
<td>NO ADDITIONAL SQUARE FOOTAGE REQUIRED</td>
<td>NO ADDITIONAL SQUARE FOOTAGE REQUIRED</td>
</tr>
</tbody>
</table>

smithgroup.com
6% GROWTH BUILDING PROJECTIONS

6% MODEL REQUIRES ADDITIONAL SQUARE FOOTAGE TO MEET RESEARCH EXPENDITURE REQUIREMENTS

THIS MODEL WOULD NECESSITATE A SMALL EXPANSION OF EXISTING RESEARCH SF IN ORDER TO MEET FY24 REQUIREMENTS (WHICH COULD BE ACCOUNTED FOR IN THE ERMF PROJECT) AND THEN THE CONSTRUCTION OF A NEW DEDICATED RESEARCH BUILDING BY FY31 FOR FUTURE NEEDS.

<table>
<thead>
<tr>
<th>FY21 RESEARCH SF</th>
<th>FY24 RESEARCH SF</th>
<th>FY31 RESEARCH SF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Research ASF</td>
<td>Add 11K ASF/18K GSF</td>
<td>Add 95K ASF/159K GSF</td>
</tr>
<tr>
<td>297K ASF</td>
<td>297K ASF</td>
<td>297K ASF</td>
</tr>
<tr>
<td>Lab</td>
<td>Office</td>
<td>Building Support</td>
</tr>
<tr>
<td>11K ASF</td>
<td>95K ASF</td>
<td>FY31</td>
</tr>
</tbody>
</table>

EXPAND RESEARCH BUILDING CAPACITY BY 18,000 GSF TO MEET FY24 DEMAND

BUILD ONE NEW FULLY RESEARCH BUILDING OF ~160,000 GSF TO MEET FY31 DEMAND
9% GROWTH BUILDING PROJECTIONS

9% MODEL REQUIRES ADDITIONAL SQUARE FOOTAGE TO MEET RESEARCH EXPENDITURE REQUIREMENTS

THIS MODEL WOULD NECESSITATE AN EXPANSION OF EXISTING RESEARCH SF IN ORDER TO MEET FY24 REQUIREMENTS (LIKELY ERMF PLUS AN ADDITIONAL PROJECT) AND THEN THE CONSTRUCTION OF ONE NEW DEDICATED RESEARCH FACILITY BY FY28 AND ANOTHER BY FY31 FOR FUTURE NEEDS.

**FY21 RESEARCH SF**

- **EXISTING RESEARCH ASF**
  - 297K ASF

**ADD 38K ASF/63K GSF**

**FY24 RESEARCH SF**

- **EXPAND RESEARCH BUILDING CAPACITY BY 63,000 GSF TO MEET FY24 DEMAND**
  - 297K ASF

**FY31 RESEARCH SF**

- **ADD 198K ASF/330K GSF**
  - 297K ASF

- **BUILD TWO NEW FULLY RESEARCH BUILDINGS OF ~160,000 GSF TO MEET FY31 DEMAND**
  - 38K ASF

FY28

- Building Support
- Office
- Lab

FY31

- Building Support
- Office
- Lab