An Analysis of Construction Spending in the Pharmaceutical & Biotech Industry, *2019-2024*

Presented by:

PILMA
Pharmaceutical Industry Labor-Management Association

ICERES
Institute for Construction Employment Research

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Supporting Organizations

Pharmaceutical Industry Labor-Management Association (PILMA)

http://www.pilma.org/

For nearly 20 years, the Pharmaceutical Industry Labor-Management Association has united the biopharmaceutical industry and union workers with the dual goals of fostering innovation of life-saving cures and securing high-quality union construction jobs. As the partnership has grown over the years, so has its impact. Labor and industry recognize the strength in their partnership: strong industry naturally leads to good jobs and a vibrant economy.

The pharmaceutical industry members of PILMA recognize that the most highly skilled workers are needed to construct and maintain the highest quality research and manufacturing facilities. Following each new drug trial, research facilities must be wiped clean—entire systems must be changed, surfaces must be sterilized and other equipment replaced. This requires highly skilled reliable labor that the industry can depend on to do the job right. North America's Building Trades Unions spend $1.6 billion training their members each year. With state-of-the-art training facilities all over the country the building trades are ready to meet the needs of today and the challenges of tomorrow.

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The Institute for Construction Employment Research (ICERES) is a non-profit network of academic faculty and other scholars across the United States and Canada interested in conducting, collaborating on, and facilitating academic-quality research on construction labor issues. ICERES is committed to being an independent, non-partisan voice on labor market and public policy issues affecting the construction industry with the goal of finding and disseminating pragmatic solutions to problems affecting construction owners, developers, contractors and workers.

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INTRODUCTION

Recent political dialogue has centered on two important issues: increasing the competitiveness of American industries abroad and the need to generate good-paying jobs for blue-collar workers in this country. What has been lost in this dialogue, at times, has been that the United States already has many thriving, cutting-edge industries that are among the world's leading exporters and have long supported thousands of good-paying American jobs. One of these sectors is the pharmaceutical and biotech industry, as American companies have long been among the world's leaders in researching, developing, manufacturing, and exporting innovative life-saving and life-enhancing medications. Credit for decades of American leadership in global health is deserved by many—especially the world-renowned scientists and researchers at the heart of medical breakthroughs in the United States—but the success of the country's pharmaceutical and biotech industry has always been dependent on more than the knowledge and skills of scientists: it is also the result of world-class research facilities, laboratories and manufacturing plants.

Developing state-of-the-art pharmaceutical and biotech facilities in the United States relies on several critical elements. While state and federal governments have historically provided critical support, the private sector independently invests billions of dollars annually in pharmaceutical and biotech infrastructure. But none of this money would be sufficient without skilled construction tradespeople who are capable of building and maintaining high-tech facilities that meet exacting standards. This has led to a unique partnership between the pharmaceutical and biotech industry and the highly skilled tradespeople of North America's Building Trades Unions.

Beyond its importance for public health, the long-standing partnership between the pharmaceutical and biotech industry and construction unions has also had substantial economic benefits for local workers, families, and communities. The employment of union construction workers provides good jobs for thousands of local residents, including family-supporting wages, health insurance, and pension benefits. The decision to hire union workers and contractors also sustains skilled craft worker training and apprenticeship programs, strengthening workforce development for a region while promoting a pathway to the middle class for its blue-collar workers. All of this is done without a nickel of student debt or a dime of taxpayers' money.

To demonstrate the impact that the pharmaceutical and biotech industry has on the construction labor market—and regional economies as a whole—this report will examine privately-funded construction on major research, manufacturing, and distribution projects ($5+ million) for 18 states between 2019 and 2024. The states included in this report were selected by the Pharmaceutical Industry Labor-Management Association

(PILMA), a coalition of labor organizations and companies in the pharmaceutical industry with dual goals of fostering medical innovation and promoting high-quality construction jobs.

This report relies almost exclusively on data from Industrial Information Resources (IIR), a well-respected global consulting firm specializing in market data on major power, energy, and industrial infrastructure projects in the United States. This report will first identify major private-sector projects in each state and present IIR estimates of total industry construction spending and labor demand. To focus on private-sector investment in the infrastructure needed for pharmaceutical and biotech advancement, the projects included in this study intentionally feature a narrow focus: where possible, this study excludes government-sponsored projects, hospitals, veterinary-use projects, and facilities producing supplements or cannabis.[1] After detailing the included projects and overall spending in each state, this study will examine the pharmaceutical and biotech's impact on construction employment across 14 trades and union status between 2019 and 2024, including its financial support for union construction apprenticeship programs.

1) The data used in this study comes from Industrial Info Resources (IIR), which provided the author with a list of major ($5+ million) projects in the pharmaceutical and biotech sector that were located in the states covered in this report and active at any point between 2019 and 2024. The author, with the help of industry stakeholders, then deleted any projects owned by public agencies or directly controlled by universities as well as projects that were primarily focused on veterinary medicine, supplements, or cannabis. To do this, the author and industry stakeholders reviewed the IIR data on each project's owner and parent company (both at the time of construction and currently) as well as the project names (IIR includes a brief summary of each project's details). While the author has made a good-faith effort to remove projects that did not meet these criteria, the author acknowledges the possibility that some projects that should have been excluded are included (e.g., private equity ownership masking the involvement of a public-private partnership); any mistakes are entirely accidental. Finally, note that IIR's spending totals offered in this report are developed using algorithms based only on the projects included in this report, removing the influence of projects that the author asked to be excluded.

MAJOR CONSTRUCTION PROJECTS

In the 18 states selected for this study, Industrial Information Resources identified 1,048 major, privately-funded construction projects ($5+ million valuations) in the pharmaceutical and biotech sector that were active at any point between 2019 and 2024. These projects occurred at 703 distinct facilities in this 18-state area.[2] Combined, these projects represent $86.5 billion in capital investment in these 18 states over a six-year period. As outlined in Table 1, there have been significant infrastructure investments in every state included in this study. Between 2019 and 2024, 13 of 18 states analyzed in this study experienced over $1 billion in new construction on pharmaceutical and biotech production facilities. This was led by Massachusetts (197 projects, $19.6 billion valuation) and California (237 projects, $18.8 billion valuation) but even the state with the least amount—Connecticut—experienced $290 million worth of private investment.

Table 1. Number of Major Projects and Total Investment Value, by State, 2019-24

STATE	NO. OF PROJECTS	TOTAL VALUATION
Massachusetts	197	$19,622,250,000
California	237	$18,778,100,000
Indiana	85	$12,421,900,000
Pennsylvania	95	$6,967,500,000
New York	67	$5,863,200,000
New Jersey	71	$3,950,600,000
Maryland	50	$2,864,400,000
Ohio	38	$2,506,800,000
Washington	37	$2,481,200,000
Illinois	15	$2,192,000,000
Colorado	29	$2,138,500,000
Michigan	26	$1,816,100,000
Virginia	26	$1,703,100,000
Missouri	18	$964,000,000
Delaware	6	$846,000,000
Minnesota	16	$646,500,000
Oregon	14	$454,000,000
Connecticut	21	$290,000,000
TOTAL	**1,048**	**$86,506,150,000**

Source: Industrial Info Resources. Total investment value included for any major construction project ($5+ million TIV) active between 2019 and 2024.

An analysis of the largest ($100+ million) privately-funded pharmaceutical and biotech construction projects active between 2019 and 2024 reveal similar trends as above. First, investment is widespread across the country. There was at least one project of $100+ million in all 18 states and at least one project of $200+ million in 15 of 18 jurisdictions. A vast majority of these highest-valued projects ($200+ million) were concentrated in Massachusetts (66 projects) and California (61), although there were double-digit numbers of such projects in Pennsylvania (18), Indiana (12), New York (12), and Maryland (10).

Table 2 provides the location of the largest projects active at any point in these 18 states between 2019 and 2024. Led by a $7.7 billion project by Eli Lilly & Company at its location in Lebanon, Ind., there were 25 projects identified by IIR that cost $500 million or more. These projects spanned 10 states, led by six projects advanced by six different companies in Massachusetts.

2) These 1,048 construction projects occurred at 703 different sites, as Industrial Information Resources records distinct construction projects separately. For example, IIR reports three different construction projects at Moderna's location in Norwood, Mass., that were active between 2019 and 2024: a 2019-20 development center addition, a 2020-21 plant build-out, and a 2021-22 plant addition. While most locations featured only one project, there were four sites with 10 or more projects, led by 22 projects reported by IIR at Eli Lilly & Company's site in Indianapolis, Ind.

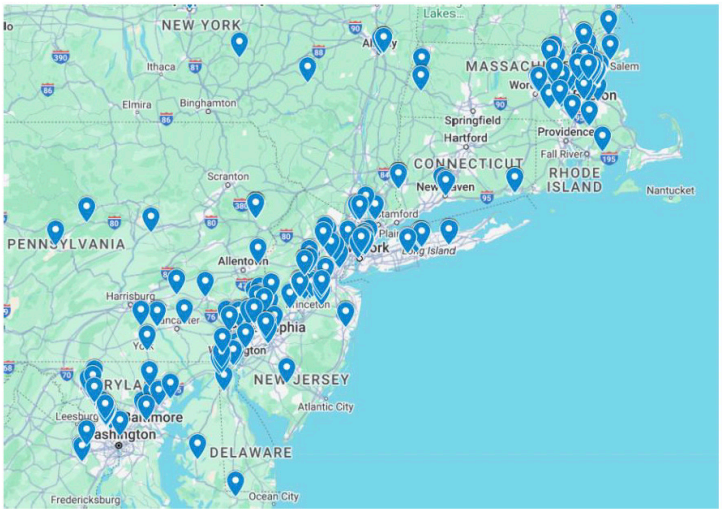
Table 2. Pharmaceutical and Biotech Construction Projects, $500+ Million Construction Value, Active Between 2019 and 2024

OWNER	CITY	STATE	ACTIVE	VALUE (IN $ MILLION)
Eli Lilly & Company	**Lebanon**	**IN**	**2023-28**	**$7,700.0**
Lebanon Grassroot (APIS) LP1 Production Buildings (LP131/ LP130) Campus Plant 1				
IQHQ Incorporated	**San Diego**	**CA**	**2021-24**	**$1,650.0**
San Diego Grassroot Research & Development District (RADD) Lab/Mixed-Use Campus				
Center for Breakthrough Medicines	**King of Prussia**	**PA**	**2020-23**	**$1,100.0**
King Of Prussia Brownfield Multi-Phase Plasmid DNA/Viral Vector/Cell Bank CDMO				
Merck and Company Incorporated	**Elkton**	**VA**	**2019-22**	**$1,000.0**
Elkton Sterile Injectable Plant Gardasil Expansion Project				
IQHQ Incorporated	**Boston**	**MA**	**2023-25**	**$1,000.0**
Boston Brownfield Fenway Life Science Research Center				
Agilent Technologies Incorporated	Frederick	CO	2023-25	$784.0
The Janus Property Company	New York	NY	2019-21	$700.0
Kilroy Realty Corporation	S. San Francisco	CA	2021-25	$700.0
BeOne Medicines Limited	Hopewell	NJ	2022-24	$700.0
Eli Lilly & Company	Boston	MA	2022-24	$700.0
Takeda Pharmaceuticals USA Incorporated	Cambridge	MA	2022-26	$700.0
Merck and Company Incorporated	Rahway	NJ	2024-26	$700.0
Regeneron Pharmaceuticals Incorporated	Tarrytown	NY	2022-26	$680.0
Deerfield Management	New York	NY	2019-22	$635.0
Eli Lilly & Company	Lebanon	IN	2023-27	$600.0
Spark Therapeutics Incorporated	Philadelphia	PA	2022-26	$575.0
CSL Behring LLC	Bradley	IL	2018-22	$550.0
Ivanhoe Cambridge	Boston	MA	2022-25	$545.0
AstraZeneca PLC	Cambridge	MA	2024-26	$533.5
Trammell Crow Company	Chicago	IL	2020-22	$530.0
BioMed Realty Trust Incorporated	Somerville	MA	2022-25	$514.0
WuXi STA	Middletown	DE	2022-26	$510.0
Janssen Global Services LLC	Raritan	NJ	2023-25	$500.0
Eli Lilly & Company	Lebanon	IN	2023-27	$500.0
Bristol-Myers Squibb Company	San Diego	CA	2024-26	$500.0

Source: Industrial Info Resources

The amount of investment in many of the states highlighted in the table is not surprising given the pharmaceutical and biotech industry is especially concentrated in major metropolitan areas. This is best reflected by Figure 1, which demonstrates the substantial construction activity in the pharmaceutical and biotech industry in the Northeast Corridor—stretching from Washington, D.C., to Boston—between 2019 and 2024. Similar clusters appear in California, with considerable activity in the Bay Area, Los Angeles and San Diego. Further, smaller but noticeable concentrations also appear in other major metropolitan regions throughout this study, including Chicago, Columbus, Denver, Indianapolis, St. Louis and Seattle.

Figure 1. Pharmaceutical and Biotech Construction Projects Active in Northeast ($5+M), 2019-2024



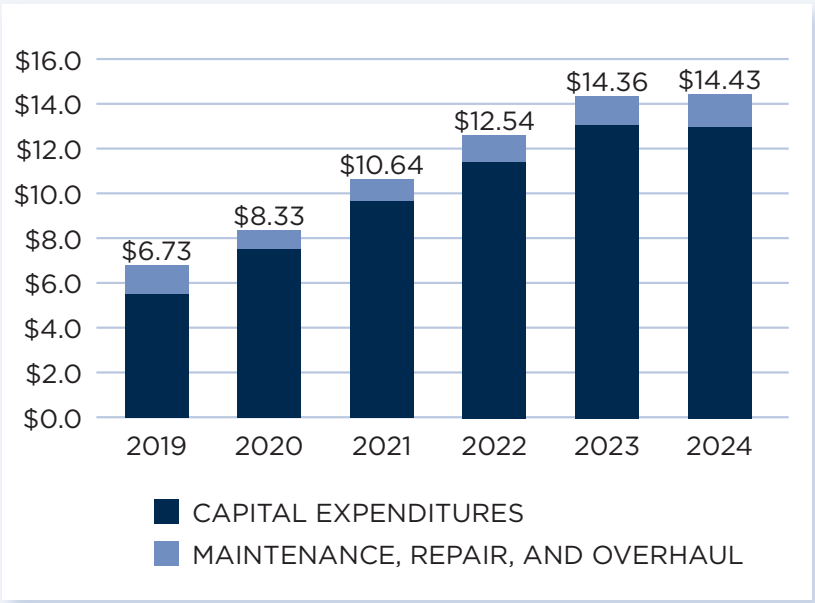
Source: Industrial Info Resources

While it is too early to know how pharmaceutical and biotech construction investment will play out over the next few years, IIR's database already includes many planned capital projects that are slated to start in 2025 and later. While the largest individual project is additional investment by Eli Lilly & Company at its plant in Lebanon, Ind., it appears that investment may be more geographically dispersed in the coming years. While Massachusetts and California are still heavily represented, three of the biggest 15 post-2024 projects in IIR's database as of April 2025 are located in New Jersey with two projects each in Colorado (Denver-Boulder) and Washington (Seattle area).

In comparing IIR project data for the current period (2019-24) to prior periods, one trend that comes to the forefront is the increased prevalence of real estate development companies and private equity firms investing in new capital projects in the pharmaceutical and biotech sector. The data provided make it difficult to assess a precise proportion of projects supported by these third party companies, however dialogue with researchers at IIR confirms a surge of venture capital into this sector in the years following the onset of COVID-19. While an analysis of the potential long-run sustainability and effects of increased private equity in the pharmaceutical and biotech space rests outside the scope of this study, industry stakeholders are encouraged to be aware of this trend in understanding investment patterns and industry capacity in the coming years.

CONSTRUCTION SPENDING

Figure 2. Annual Construction Spending (in $ billions), Pharmaceutical and Biotech Industry, 18 States, 2019-24



Source: Industrial Info Resources

The preceding analysis of major projects active at any point between 2019 and 2024 offers an incomplete analysis of private-sector construction spending on research, manufacturing and distribution infrastructure by the pharmaceutical and biotech industry during this six-year period. First and foremost, some of the projects outlined in the above analysis featured construction that started before 2019 or will finish after 2024. Second, this ignores the scores of construction projects that fell below the $5 million threshold. The pharmaceutical and biotech industry requires extensive construction work to annually maintain, repair and overhaul existing facilities; while some of these projects exceed $5 million, many others do not. Finally, while IIR is widely recognized as an industry leader in construction data, it recognizes that its extensive database may not account for every possible project. As a result, the section below addresses these concerns by offering IIR's "topline" construction spending estimates—which includes small projects, adds adjustments to account for unreported projects, and isolates spending on an annual basis—for the pharmaceutical and biotech industry for each of the 18 states included in this study.[3]

Overall, the pharmaceutical and biotech industry is estimated by IIR to have invested $67.0 billion in construction costs in building, renovating and maintaining private-sector production facilities in these 18 states between 2019 and 2024.[4] This aggregate number differs from the total provided in the previous section largely because this section restricts the focus on all spending in the given period (2019-24), where the earlier discussion of major projects includes activity that may have started before 2019 or will end after 2024. As outlined in Figure 2, the rate of private-sector investment increased sharply in the years from $6.73 billion in 2019 to $14.43 billion in 2024; after adjusting for inflation between the two years, this equates to a growth rate over 70% from the start to the end of the period addressed in this study.

3) All dollar values provided in this study are nominal (i.e., not adjusted for inflation) to summarize the actual spending and earnings accrued between 2019 and 2024. 4) After receiving the final data set from Industrial Information Resources, it was discovered that two projects in Philadelphia, Pennsylvania, that were active between 2021 and 2023—a $566 million project once owned by the Philadelphia Industrial Development Corporation and a $287 million project once owned by Drexel University—were mistakenly included in the sample despite not meeting the specifications established in the study. To rectify this situation, these two projects were removed from the analysis in the preceding section that addressed the number of value of major projects. The author also subtracted the combined value of the two projects ($853 million) from spending totals in the state and overall for the years 2021 through 2023, distributing a third of the reduction over each of the three years. This is imperfect given that construction spending may have been disparate across the three years and because the IIR algorithm may have built additional spending on the presence of those projects in the database, but this was the best good-faith solution the author identified given the situation (i.e., to not inflate spending by $853 million). That said, given that the data provided did not allow the author to identify the amount of labor hours associated with each project—labor hours are presented on an aggregate basis by IIR—the author made no changes to IIR's project labor hours for Pennsylvania for 2021-23 but acknowledges that the listed numbers are for the state which includes those two projects, making the listed totals somewhat inflated from the actual totals.

While a full accounting of the reasons driving such growth rests outside the scope of this report, some obvious reasons include massive investments to develop and manufacture COVID-19 vaccines, the "Ozempic Revolution" and rise of interest in GLP-1 medications, and the aforementioned surge of interest by real estate development companies and private equity firms in the pharmaceutical and biotech industry.

Table 3. Annual Construction Spending (in $ millions), Pharmaceutical and Biotech Industry, by State, 2019-24

STATE	2019	2020	2021	2022	2023	2024	TOTAL
California	$1,507.3	$1,444.0	$2,342.2	$3,537.9	$3,242.0	$2,635.1	$14,708.5
Massachusetts	$1,053.2	$1,333.4	$2,031.8	$2,625.0	$3,170.3	$2,871.4	$13,085.1
Indiana	$291.1	$552.5	$452.3	$505.4	$1,942.5	$2,919.2	$6,663.0
New York	$1,011.4	$1,533.2	$1,218.1	$894.0	$647.0	$750.4	$6,054.1
Pennsylvania	$475.8	$1,108.9	$1,144.1	$1,075.0	$1,128.4	$993.9	$5,926.0
New Jersey	$462.8	$382.1	$563.3	$481.5	$954.2	$1,186.4	$4,030.5
Maryland	$229.7	$293.8	$495.9	$899.6	$494.6	$421.5	$2,835.2
Ohio	$251.6	$105.1	$291.3	$474.5	$536.2	$516.2	$2,175.0
Michigan	$114.3	$131.2	$402.0	$443.9	$356.1	$380.4	$1,828.0
Virginia	$208.1	$367.2	$514.1	$483.6	$155.6	$98.7	$1,827.2
Colorado	$72.8	$50.2	$189.6	$234.7	$503.1	$701.0	$1,751.5
Washington	$229.9	$253.4	$327.6	$197.1	$379.4	$345.5	$1,733.0
Illinois	$291.7	$302.4	$298.5	$195.2	$175.4	$68.4	$1,331.5
Missouri	$208.4	$112.5	$78.4	$162.0	$247.2	$182.5	$991.1
Delaware	$88.1	$51.2	$33.0	$101.4	$139.3	$212.3	$625.4
Oregon	$85.8	$123.2	$74.1	$127.8	$74.8	$38.2	$523.9
Minnesota	$97.5	$118.4	$114.1	$46.7	$78.2	$35.3	$490.1
Connecticut	$51.6	$62.3	$65.0	$56.8	$132.9	$71.4	$440.1
TOTAL	**$6,731.2**	**$8,325.2**	**$10,635.4**	**$12,542.4**	**$14,357.4**	**$14,427.7**	**$67,019.2**

Source: Industrial Info Resources

To analyze individual state investment patterns, Table 3 details the annual construction spending on private pharmaceutical and biotech projects for the 18 states included in this study between 2019 and 2024. While generally consistent with state rankings of major project activity identified earlier, Table 3 demonstrates a significant concentration of construction spending on production facilities in six states—California, Massachusetts, Indiana, New York, Pennsylvania, and New Jersey—which all exceeded $4 billion in investment over the six years studied. Maintenance and repair costs help explain California's top-ranked position in Table 3, as the state's pharmaceutical and biotech industry spent $1.6 billion on this form of construction investment between 2019 and 2024, the most of any state addressed in this study. As a proportion of all spending, projected maintenance and repair costs were highest—by a considerable margin—in Connecticut, likely explaining why IIR data reflect that spending in the state ($440 million) exceeds the total value of new projects ($290 million) active at any point between 2019 and 2024. In contrast, maintenance and repair costs were relatively lower in Delaware, Colorado, and Massachusetts, where a substantially larger proportion of private-sector investment was devoted to building new facilities, additions and expansions.

The results from Table 3 also highlight that the year-over-year growth in private-sector infrastructure investment between 2019 and 2024 has been highly disparate across the 18 states featured in this study. Investment growth has been especially strong in Colorado—where annual investment jumped by nearly a multiple of 10 from 2019 to 2024—due in large part to a $784 million project by Agilent Technologies Incorporated in Frederick, Colo. Indiana has also exhibited approximately the same rate of growth largely due to Eli Lilly & Company's massive investment in its facility in Lebanon, Ind. While many states have experienced considerable year-over-year growth in investment spending, that is not a uniform conclusion across all 18 states in the study as highlighted by declines in New York and Illinois among others. Whether this is a troubling long-term signal or simply the cyclical nature of project investments is unclear.

CONSTRUCTION EMPLOYMENT & EARNINGS

Private-sector investment in new pharmaceutical and biotech capital projects has substantial economic benefits extending beyond the industry itself. This investment requires millions of labor hours by the skilled tradespeople of the American construction industry. As estimated by Industrial Information Resources and presented in Table 4, this equated to 136.3 million construction labor hours across 18 trades between 2019 and 2024. Electricians, instrumentation techs, and plumbers and pipefitters accounted for slightly more than 60% of that total. Substantial employment also occurred among operating engineers, carpenters, laborers, millwrights, and ironworkers, as pharmaceutical and biotech industry construction accounted for more than 4.5 million labor hours in each of those trades across the 18 states and six years analyzed in this study.

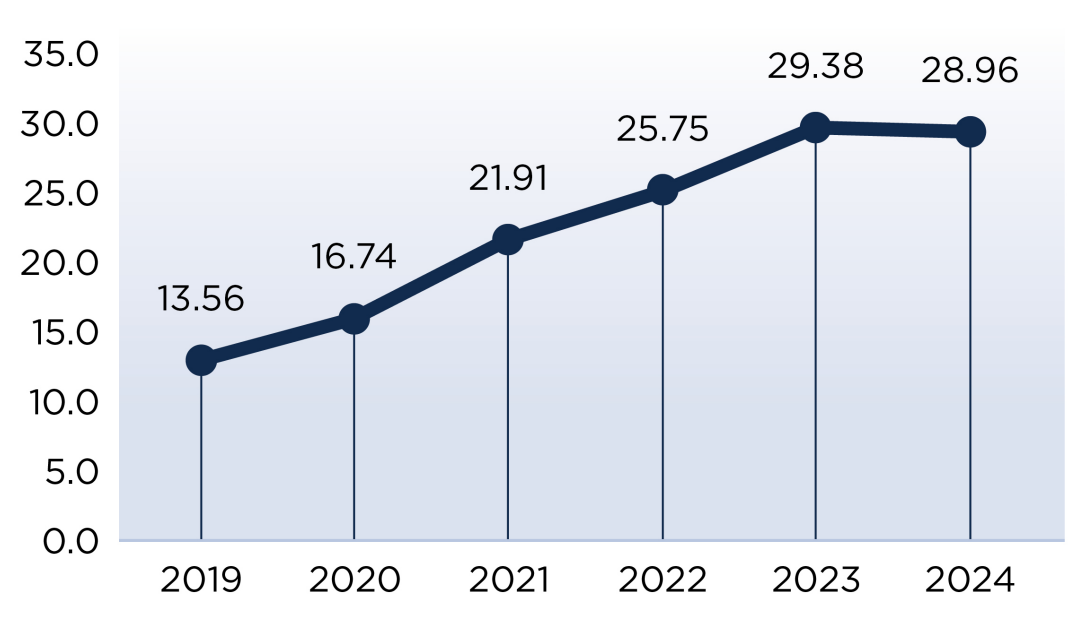
Table 4. Construction Labor Hours Demanded, Pharmaceutical and Biotech Industry, by Trade, 2019-24

TRADE	LABOR HOURS
Boilermaker	1,689,327
Carpenter	7,857,689
Electrician	42,542,440
HVAC Installers	3,901,256
Instrumentation Tech	24,567,646
Insulator	3,782,350
Ironworker	4,639,225
Laborer	7,706,482
Millwright	6,790,410
Operator	8,667,236
Painting	1,583,844
Plumber + Pipefitter	16,286,978
Scaffolding	3,008,083
Welder	3,281,394
TOTAL	**136,304,360 HOURS**

Source: Industrial Info Resources

As presented in Figure 3, the trend in annual hours across the 18 states largely mirrors that of construction spending between 2019 and 2024. IIR data suggest that construction employment on pharmaceutical and biotech projects has increased almost every year, rising from 13.56 million labor hours in 2019 to 28.96 million labor hours in 2024. It is too soon to know whether the leveling off of labor demand in 2024 is a one-year blip or an early signal of future decline, but the total is nevertheless still dramatically above labor demand totals at the start of the period. Assuming a 2,000-hour work year, the totals from 2024 suggest that the pharmaceutical and biotech sector employed 14,481 full-time construction workers across these 18 states that year.

Figure 3. Annual Construction Labor Hours Demanded (in millions), Pharmaceutical and Biotech Industry, 18 States, 2019-2024



Source: Industrial Info Resources

For perspective on these 136.3 million construction labor hours demanded between 2019 and 2024, it is important to recall that the exacting specifications of cutting-edge science and medical facilities require the employment of the construction industry's most skilled and experienced workers. As a result, the pharmaceutical and biotech industry often chooses union contractors and workers given the advantages wrought by the union sector's long-established—and highly effective—training and apprenticeship programs. The decision to hire union labor only amplifies the economic benefit of infrastructure investment for a local community. Union construction work represents a "good" job featuring family-supporting hourly wages, health and pension benefits, and a commitment to workplace safety. In sum, many of the construction jobs created by the pharmaceutical and biotech industry are not just any jobs: these are the types of blue-collar, middle class jobs that have long represented the backbone of American families and communities.

While union construction workers are known to comprise a substantial portion of the 136.3 million labor hours identified in this study, isolating an exact number is complicated by the fact that Industrial Information Resources does not sufficiently distinguish between union and non-union projects or labor hours. To compensate, this study offers what is believed to be conservative estimates of the amount of union labor on pharmaceutical and biotech industry construction projects; these are presented in Table 5. These estimates are generated by multiplying the number of labor hours required in each of the 18 states between 2019 and 2024 by an estimate of the union density among blue-collar workers in each state's non-residential construction sector. The results suggest that the pharmaceutical and biotech industry required a minimum of 65.0 million hours from union construction workers to build and renovate its facilities between 2019 and 2024.[5]

The conservative nature of these projections derives from the use of the statewide estimates of union density in the blue-collar, non-residential construction market. It is expected that union activity would be significantly more concentrated in highly technical areas of construction—such as pharmaceutical and biotech facilities—than it is in other parts of the non-residential market (e.g., big-box retail stores, low-rise office buildings). Thus, while estimated non-residential union densities may be the best available metric to measure union involvement in each state, the results offered in Table 5 likely undercount the actual contribution of union contractors and workers to pharmaceutical and biotech construction in the 18 states included in this study.

Table 5. Total Hours and Estimated Union Hours, Pharmaceutical and Biotech Industry Construction, by State, 2019-2024

STATE	TOTAL HOURS	ESTIMATED STATE UNION %	ESTIMATED UNION HOURS
California	29,557,642	50.7%	14,978,257
Colorado	3,503,764	12.6%	439,813
Connecticut	895,366	50.1%	448,661
Delaware	1,252,369	26.8%	335,425
Illinois	2,676,051	76.4%	2,045,016
Indiana	13,391,633	39.1%	5,235,476
Maryland	5,704,950	23.7%	1,353,157
Massachusetts	26,214,107	43.3%	11,338,069
Michigan	3,673,839	51.8%	1,902,595
Minnesota	988,543	57.0%	563,530
Missouri	2,001,925	58.8%	1,176,875
New Jersey	8,102,297	70.7%	5,730,508
New York	12,148,331	62.2%	7,556,497
Ohio	4,373,398	37.6%	1,643,410
Oregon	1,053,715	46.6%	490,883
Pennsylvania	13,623,355	57.1%	7,779,348
Virginia	3,670,784	7.4%	271,959
Washington	3,472,292	50.1%	1,740,477
TOTAL	**136,304,360**		**65,029,957**

Source: Industrial Info Resources, Current Population Survey, Quarterly Census of Employment and Wages

5) State-wide union densities among blue-collar, non-residential construction workers are estimated as follows. The numerator is drawn from the research site, unionstats.com, which provides state-by-state annual estimates of the number of private-sector union construction workers in 2019 through 2024 via an analysis of the Census Bureau's Current Population Survey; these are assumed to entirely be tradesworkers given the dearth of unionized front-office staff in construction companies generally. The denominator—an estimate of the number of total blue-collar workers in each state's non-residential construction industry each year—is calculated in two steps. First, data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages provides the total number of employees in non-residential construction in each state for 2019 through 2023 (2024 was excluded because QCEW data for that year was unavailable at the time of this report). Because the QCEW data includes both white-collar and blue-collar employment, this study uses data from the BLS's Occupational Employment and Wage Statistics series to identify the proportion of employment in each state's construction industry (NAICS=23) that are in blue-collar occupational categories (SOC codes 45 through 52). This results in annual union density estimates, which are then averaged over all years available (2019-23; 2024 data was not available at the time of this study) to provide the density for each state reported in Table 5. While this is the best available approach given the data known to the author, be mindful that the numerator is based on residents' place of residence while the denominator is based on the primary address of one's primary employer, which can be different and result in minor fluctuations in state union density estimates due to interstate work commutes in large cities near state lines (e.g., New York, Chicago, St. Louis).

Table 6. Estimated Union Earnings, Pharmaceutical and Biotech Industry Construction, by State, 2019-2024

STATE	ESTIMATED UNION EARNINGS
California	$588,210,680
Colorado	$13,447,802
Connecticut	$16,110,306
Delaware	$14,456,570
Illinois	$85,181,664
Indiana	$183,075,641
Maryland	$55,171,731
Massachusetts	$528,008,261
Michigan	$64,872,582
Minnesota	$23,226,610
Missouri	$37,495,462
New Jersey	$258,416,456
New York	$299,296,459
Ohio	$55,569,722
Oregon	$21,456,546
Pennsylvania	$309,785,930
Virginia	$7,585,134
Washington	$78,802,824
TOTAL	**$2,638,170,379**

Source: Industrial Info Resources, Current Population Survey

5) While this is the author's most preferred statistical approach in the absence of explicit residential/non-residential breakdown of union membership in construction by either the Census or BLS, it is recognized that this method implicitly assumes that union density in residential construction equals zero. Although it is well accepted that union density in residential construction is indeed minimal, any concerns that this decision overinflates union density in non-residential construction are offset by the fact that construction in the pharmaceutical and biotech industry is likely to have substantially higher union densities than non-residential construction as a whole (which also includes such projects as office buildings, retail spaces, restaurants, etc.). Further, while IIR data does include some data on whether projects are built by union labor, non-union labor, or a mix of both, there is not nearly enough observations to confidently use this data as a means of projecting union density in pharmaceutical and biotech construction. Nevertheless, what little data is provided supports a conclusion that the union densities offered in Table 5 are underestimates—and potentially considerable underestimates—of the true involvement of union labor in this type of construction. 6) The average union construction wage by state was calculated via an analysis of the 2019-2024 Current Population Survey. 7) There are two additional methodological reasons to suspect the totals in Table 6 underrepresent the true economic impact. First, this study assumes that each hour is paid at the average rate. However, this likely ignores a considerable amount of overtime pay that would be at a higher rate of pay. Second, due to sample size issues in the Current Population Survey, this study bases its calculations on the average union wage across a state's entire construction industry. This likely underrepresents the true wage on these projects given that the results of Table 4 demonstrated that employment is especially concentrated among some of the highest-paying trades in the in the industry (e.g., electricians, plumbers).

UNION CONSTRUCTION EARNINGS

By hiring union construction workers, the pharmaceutical and biotech industry is directly responsible for creating and promoting the types of blue-collar middle-class jobs that have long represented the backbone of many communities throughout the United States. These employment opportunities feature family-supporting wages, health insurance, retirement benefits and all the other hallmarks of a "good" job. This work not only brings economic and personal security to workers and their families, but it also adds hundreds of millions of dollars to regional economies and promotes high labor standards in local construction markets. To assess the economic impact of these "good" jobs, Table 6 presents state-by-state estimates of the total wages paid to union construction workers while working on pharmaceutical and biotech projects between 2019 and 2024. These projections are calculated by multiplying the number of union construction hours from the previous section by the average nominal union construction wage in each state across the six-year period of this study.[6] The results indicate that the industry was responsible for at least $2.64 billion in union construction wages across the 18 states over the six-year period identified in this study. This was led by California and Massachusetts, where the pharmaceutical and biotech industry was responsible for over $500 million in wages to union construction workers in each state. And there are reasons to suspect that the results in Table 6 considerably underrepresent the true economic impact. In addition to these calculations being based on conservative estimates of union labor hours (Table 5), the values offered in Table 6 do not include the hundreds of millions of dollars in health and retirement benefits paid to workers or the indirect economic benefits that derive to local communities as a result of increased spending power by these workers (i.e., the "multiplier effect").[7]

APPRENTICESHIP PROGRAMS AND FUNDING

The economic benefits of the employment of union construction workers goes beyond good wages, health insurance coverage, and increased regional spending: it also promotes the growth and sustainability of union apprenticeship programs. These programs are among the most successful and long-standing apprenticeship systems in the United States, allowing enrollees to "earn while they learn": apprentices develop skills while working on a job site during the day and supplement their training with classroom learning in the evening. While union construction apprenticeship programs have been around for generations, their importance to America's working families and the communities in which they live is at an all-time high. As economic opportunities for blue-collar workers in many other industries have deteriorated, union construction apprenticeship programs are one of the few remaining pathways to the middle class for workers without a four-year college degree. From a public policy perspective, there is no downside to supporting these workforce development programs: union construction apprenticeships provide workers with important education and training opportunities without imposing a nickel of student debt or requiring a dime of taxpayer money. Instead, programs in this sector are funded by union workers diverting a portion of their hourly compensation to support union apprenticeship training and the next generation of skilled tradespeople.

To estimate the financial impact of the pharmaceutical and biotech industry on union construction apprenticeship programs via these per-hour contributions, the data in Table 5 suggests that the sector required a minimum of 65.0 million labor hours by union workers in a 18-state area between 2019 and 2024. While worker contributions to apprenticeship programs differ across trades and locals, a conservative estimate of $0.30 per union labor hour would suggest that infrastructure investment by the pharmaceutical and biotech industry delivered at least $19.5 million to union apprenticeship programs in these states in

this six-year period. This is a conservative estimate given that the number of union labor hours is also a conservative projection. But this number undervalues the importance of the pharmaceutical and biotech companies to apprenticeships for another reason: the industry has been the training ground for generations of apprentices across the country, with a steady volume of employment opportunities for workers to earn a paycheck while developing their skills on the jobsite.

In essence, the partnership between the pharmaceutical and biotech industry and America's construction unions has contributed to a financially self-sufficient pipeline of skilled tradespeople who are capable of building world-class research and manufacturing facilities that are critical engines of economic growth in this country. The opportunities offered by the pharmaceutical and biotech industry strengthen a region's workforce development program by creating the construction jobs that represent the backbone of long-standing, well-regarded apprenticeship programs. In doing so, the industry is intrinsically supporting one of the few remaining pathways to the middle-class for millions of non-college educated men and women across the country: the skilled construction trades. In sum, the partnership between industry and labor has produced a virtuous cycle that simultaneously uplifts workers, regional economies, and public health around the world.

CONCLUSION

The medical breakthroughs advanced by renowned American scientists and researchers have long benefited from—and in some cases have been dependent upon—the world-class research, development, and manufacturing facilities that are economic engines in cities and towns across the United States. While the Federal government has historically played a critical role in supporting American scientific and medical breakthroughs, this report highlights that the private sector has also been vital in investing billions of dollars in developing these facilities. Using data supplied by Industrial Info Resources—a well-respected global consulting firm—this report highlights that the private sector invested **$67.9 billion** on pharmaceutical and biotech construction projects between 2019 and 2024 in the 18 states identified by the Pharmaceutical Industry Labor-Management Association. This includes **1,050 major ($5+ million), privately funded construction projects** active at any point in this six-year period, representing **$87.4 billion** in investment in research, development, and manufacturing facilities according to IIR data.

The infrastructure investments made by the pharmaceutical and biotech industry are largely reliant on the sector's unique partnership with the highly skilled construction workers of North America's Building Trades Unions. Building cutting-edge medical and science facilities require the most educated, skilled, and experienced construction labor force. Because of this, the pharmaceutical and biotech industry has come to rely on union workers and contractors to meet their high-tech construction standards. Reliable construction demand by the pharmaceutical and biotech industry helps keep union tradespeople employed and apprenticeship programs thriving. As outlined in this study, the sector required over 136 million labor hours in the last six years, or the equivalent of 14,481 full-time construction workers in 2024. Union workers comprised a significant portion of the labor force used to build these world-class facilities, with projections suggesting that the pharmaceutical and biotech sector required a conservative estimate of 65.0 million labor hours of union construction workers across these 18 states and paid out at least $2.6 billion in wages. In sum, private-sector investment by the pharmaceutical and biotech industry has helped sustain the types of "good" middle-class blue-collar jobs that have long represented the economic and social backbone of families and communities across the country.