

# *Economic Impact of the MSU Grand Rapids Research Center*

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Commissioned by:  
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## *I. Executive Summary*

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**PURPOSE OF REPORT** Michigan State University (MSU) recently approved construction of the Grand Rapids Research Center (GRRC), a biomedical research facility that will be located in downtown Grand Rapids, Michigan. This facility will accommodate up to 44 lead researchers (called “principal investigators” or PIs) and their research teams. The research center will also expand MSU’s presence in Grand Rapids. Currently, this includes the MSU College of Human Medicine’s Secchia Center, a medical education building that opened in 2010, and the MSU Extension’s Kent County Office.

Michigan State University commissioned Anderson Economic Group to evaluate the benefits of the GRRC to the Grand Rapids area. We estimate the net economic impact of the GRRC’s construction and operations on the region. We describe the benefits of attracting a talented workforce to the area. We also note the contribution that this facility will make to efforts in cultivating a biomedical research cluster in Grand Rapids.

**OVERVIEW OF APPROACH**

We define the net economic impact of the GRRC as the amount of activity that occurs exclusively due to the project. In our conservative methodology, we consider the effects of spending and employment in a well-defined region, and we exclude any activity that would displace other existing local spending, employment, and development. We estimate the economic impact on the Grand Rapids area, which we define as Kent, Ottawa, and Muskegon Counties.

We only evaluate the economic impact of the activities associated with the GRRC building, which excludes any potential commercial or residential uses for the area of the parcel that surrounds the GRRC. We relied on MSU for data on planned construction and operations for the GRRC. Some of the research that will take place at the GRRC will be conducted by existing research teams that currently work in lab space that MSU leases from the Van Andel Institute (VAI) and Grand Valley State University (GVSU). We used data from MSU on these researchers’ current operations at VAI and GVSU to inform our analysis of their planned GRRC operations. Our analysis assumes that the vacated VAI and GVSU lab space will be used by other researchers who will operate at the current scale and are either hired directly by VAI or GVSU or work for another entity and lease the space.

See “Appendix A. Methodology” on page A-1 for more on our methodology and data sources and “Appendix B. Exhibits” on page B-1 for detailed exhibits.

**OVERVIEW OF FINDINGS**

The GRRC would have a positive impact in the Grand Rapids area by contributing to efforts to build a biomedical research cluster and by increasing employment, earnings, and economic output in the area. In particular, we find that:

*1. MSU's Grand Rapids Research Center will contribute significantly to regional efforts to establish a biomedical research hub in the Grand Rapids area, adding a second major research center to the burgeoning cluster.*

Increasing the presence of biomedical research in Grand Rapids has long been a goal of the city's leaders and business community. Known as the Medical Mile, medical-related development in downtown Grand Rapids has been expanding over the past two decades. By adding up to 44 teams of research scientists and technicians to the region, the GRRC will durably increase the base of scientific talent in the area. This could make the Grand Rapids area more attractive to others who benefit from such clusters of talent, such as additional new research facilities, suppliers, graduate schools, and investors in spin-off businesses.

See "Biomedical Research Cluster" on page 9 for further discussion.

*2. Construction of the GRRC would increase employment by 728 job-years, increase earnings by \$55 million, and increase output by \$96 million in the Grand Rapids area.*

Spending for construction of the GRRC would primarily take place from FY 2015 through the beginning of FY 2018. Additional spending will take place between FY 2018 and FY 2021 for building out a shelled floor in the GRRC.

We present our estimates of the economic impact of the GRRC's construction in Table 1 on page 3. We estimate that the GRRC's construction would increase employment in the Grand Rapids area by 728 job-years—of which, 666 job-years would be due to activity that takes place during the FY 2015 through FY 2018 period. In addition, earnings and economic output in the Grand Rapids area would increase by \$55 million and by \$96 million, respectively, due to construction of the GRRC. We estimate that \$50 million of the earnings and \$88 million of the economic output will be due to spending that takes place during the main construction period.

See "Economic Impact of GRRC Construction" on page 13 for further discussion

**TABLE 1. Economic Impact of GRRC Construction on the Grand Rapids Area**

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2018 - FY 2021 <sup>a</sup>	Total
Employment (job-years)	28	242	387	9	61	728
Earnings (millions)	\$1.4	\$18.5	\$29.6	\$0.7	\$4.6	\$54.8
Output (millions)	\$4.0	\$31.7	\$50.7	\$1.2	\$8.1	\$95.6

*Source: AEG analysis based on data sourced from Michigan State University; Kramer Management Group; and Bureau of Economic Analysis RIMS II Multipliers*

- a. MSU anticipates that construction for build-out of a shelled floor will take place sometime between FY 2018 and FY 2021. See “Economic Impact of GRRC Construction” on page 13 for further details.

*3. Once operating at full capacity, the GRRC will create over 400 jobs annually in the Grand Rapids area. In addition, the GRRC will increase earnings and economic output by \$28 million each.*

The MSU College of Human Medicine anticipates that the GRRC will reach full capacity with 44 PIs in FY 2025. After an initial start-up period, we estimate that GRRC will have a long-term annual employment impact of about 409 jobs on the Grand Rapids area. We also estimate that the GRRC will increase both earnings and gross sales in the area by \$28 million each.

During the start-up period, we estimate that the employment impact will peak at 425 jobs and that the earnings and output impacts will each peak at about \$29 million. See Table 2 below for a summary of these estimates and “Economic Impact of GRRC Operations” on page 14 for further discussion.

**TABLE 2. Annual Economic Impact of GRRC Operations on the Grand Rapids Area**

	Peak during Start-up Period (FY 2025 - FY 2028)	FY 2029 & After
Employment (jobs)	425	409
Earnings (millions)	\$28.7	\$27.8
Output (millions)	\$29.0	\$28.1

*Source: AEG analysis based on data sourced from Michigan State University; and Bureau of Economic Analysis RIMS II Multipliers*

**ABOUT ANDERSON  
ECONOMIC GROUP**

Anderson Economic Group, LLC is a research and consulting firm specializing in economics, public policy, business valuation, and industry analysis. AEG has conducted economic and fiscal impact studies for private, public, and non-profit clients across the United States. For more information, please see “Appendix C: About Anderson Economic Group” on page C-1 or visit [www.AndersonEconomicGroup.com](http://www.AndersonEconomicGroup.com).

## *II. Overview of the Grand Rapids Research Center*

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The construction of the Grand Rapids Research Center marks the next chapter in expanding Michigan State University's presence in West Michigan. In 2010, the MSU College of Human Medicine moved its headquarters to the Secchia Center in Grand Rapids with support and input from community stakeholders, such as Spectrum Health, Van Andel Institute, Mercy Health Saint Mary's, the Right Place, Inc., and Grand Action. In addition to the college headquarters, the Secchia Center serves as a medical education building. Nearly five years later, the university is embarking on the next phase by building a world-class research facility.

In this section, we briefly describe the planned site of the GRRC and the research activities that will take place after it opens. We also discuss Michigan State University's plans for financing the GRRC's construction and operations.

### **DESCRIPTION OF THE GRRC**

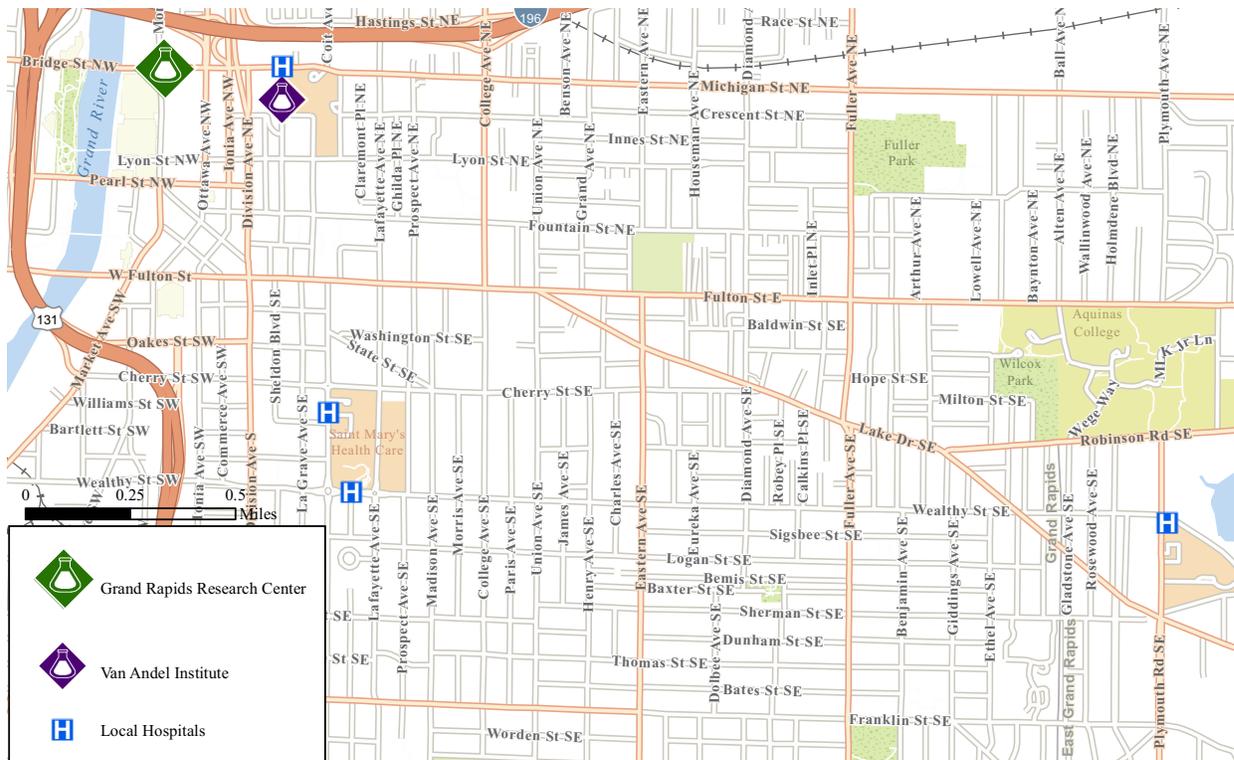
The Grand Rapids Research Center will be a 160,000 square-foot, multi-story research facility that could accommodate up to 44 principal investigators and their research teams. The GRRC is planned to open in late 2017, and at this time, about 21 PIs and their teams would begin to move into the building. The MSU College of Human Medicine would steadily recruit additional research faculty each year, and the GRRC would reach full capacity with 44 PIs in 2025.

The GRRC will be built at the site of the former Grand Rapids Press building in downtown Grand Rapids. In 2012, Michigan State University purchased the site and nearby parcels, about 7.85 acres of land. The Grand Rapids Press moved out of the building in 2013, which remained vacant until demolition started in March 2015. The GRRC will occupy about half of the parcel, and MSU plans to explore public-private partnerships for complementary projects on the remainder of the site.

The GRRC's location is situated at the west end of the Grand Rapids Medical Mile, a cluster of medical-related development in downtown Grand Rapids. The facility will join the Van Andel Institute, the GVSU Cook DeVos Center for the Health Sciences, and the Spectrum Health Research Laboratories to form a robust nexus for biomedical research in the city. The MSU College of Human Medicine is currently leasing laboratory space from VAI and GVSU for about 17 MSU faculty who are conducting biomedical research.

In Map 1 in page 5, we present the locations of the GRRC and VAI in downtown Grand Rapids, along with nearby hospital systems.

MAP 1. Grand Rapids Research Center and Nearby Medical-Related Institutions in Downtown Grand Rapids



Source: Anderson Economic Group, LLC

## RESEARCH ACTIVITIES AT THE GRRC

The MSU College of Human Medicine plans to conduct basic research at the GRRC in order to make advances in precision medicine. It will also adopt a “bench-to-bedside” approach that will involve translating discoveries in the laboratory into effective diagnosis and treatment of patients. In order to achieve this vision, researchers at the GRRC will work collaboratively with other institutions in the Grand Rapids area. We describe precision medicine and the opportunities for collaboration in further detail below.

### Precision Medicine

“Precision medicine” refers to a novel approach to medical treatment in which treatment is tailored to the individual characteristics of patients and patient populations. Not to be confused with creating specific drugs or medical devices that are unique to a patient, precision medicine aims to provide preventative or therapeutic interventions to those who will benefit from them and spare the expense and side effects from those who do not.<sup>1</sup>

Precision medicine classifies individuals into subpopulations that differ in several factors such as: their susceptibility to a particular disease; the biology or

prognoses of those diseases; or their response to specific treatment. In order to classify patients in such a manner and deliver such tailored treatment, precision medicine depends on knowledge networks that consist of genetic data, electronic medical records, community data, and social media data.

Basic research in precision medicine at the GRRC will focus on the following areas: neurosciences, women's health, pediatrics, transplantation, cancer, genetics, and epigenetics. In the neurosciences, plans include using high-throughput drug screening to identify new drugs for treatment of Alzheimer's and Parkinson's. There will also be a focus on developing advanced cellular therapies for these diseases. Women's health research will work to address problems related to infertility, cancer, premature birth, and birth defects. Pediatric research will focus on autism, cancer, infection diseases, newborn condition, and improving health outcomes for children.

### *Opportunities for Collaboration*

The GRRC's proximity to several other medical-related institutions in downtown Grand Rapids will assist in realizing the vision of transferring discoveries in the laboratory to the patient. The GRRC's location facilitates the formation of partnerships on projects for basic research and the collaboration with hospitals to conduct clinical trials. The MSU College of Human Medicine anticipates that PIs at the GRRC will work with the Van Andel Institute and area health care providers in order to solve important medical problems. Examples of potential and existing partners include: Spectrum Health, Mercy Health St. Mary's, Mary Free Bed Rehabilitation Hospital, and Pine Rest Christian Mental Health Services.

We briefly note a handful of collaborations that are already underway:

- An MSU basic scientist and pharmacologist has worked with a physician scientist in Spectrum Health's Helen DeVos Children's Hospital to develop a novel drug for the treatment of the childhood cancer, neuroblastoma.
- A trio of MSU basic scientists has teamed with another trio of physician scientists from the Lemmen-Holton Cancer Pavilion, which is part of the Spectrum Health system. They are researching bone marrow transplantation by exploring the nature of graft rejection and the cells involved. Their goal is to develop cell therapies that treat cancer.
- Another MSU basic scientist has been working with a clinician psychiatrist at Pine Rest, who also has an appointment with MSU, to explore the potential role of inflammation in depression and suicidality.

MSU researchers in Grand Rapids have also collaborated with researchers at VAI. It is likely that such collaborations with VAI will not only continue, but

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1. National Research Council, "Toward Precision Medicine: Building a Knowledge Network for Biomedical Research and a New Taxonomy of Disease," National Academies Press, 2011.

also flourish, with the opening of the GRRC. Not only will the number of MSU biomedical research faculty increase due to the GRRC, but it will also free up lab space at VAI that would accommodate additional VAI research teams.

## **FINANCING THE GRRC**

### *Funding for GRRC Construction*

Michigan State University will use a traditional, university-financed model to fund the \$88.1 million budget for demolition of the Grand Rapids Press building and construction of the GRRC. MSU will contribute over half of the budget, about \$48.1 million from both its general fund and debt financing. The remaining \$40 million will be raised through philanthropy.

Of the \$88.1 million budget, about \$65.5 million would be spent directly on construction of the GRRC. This includes labor, materials, and equipment rental. The remaining \$22.6 million would be spent on “soft costs,” such as design services, building equipment, and other costs.

### *Funding for GRRC Operations*

Michigan State University plans to support the GRRC’s operations through a variety of revenue sources: research grants, partner contributions, college and university support, and start-up funding.

The largest single source of revenue will be grant revenue raised by PIs to fund their research. Grant funding supports both direct costs and indirect costs. Direct costs include salary, travel, and supplies, which are directly associated with research activities. Indirect costs include the cost of the building and support provided by individual departments, the College of Human Medicine, and the university.

Each PI will receive start-up funding during the first four years at the GRRC. This start-up funding provides PIs with resources for setting up their labs and funding a portion of their research teams. MSU anticipates that the GRRC will reach full capacity with 44 PIs in FY 2025. The PIs that come on board this year will receive start-up funding through FY 2028. In FY 2029, the start-up funding for these PIs will be exhausted, and we assume that this year is a representative year of GRRC’s long-term, annual revenues at full capacity. Actual revenues may vary from year-to-year due to factors such as turnover.

Contributions from local partners and university-sourced funding will make up the remainder of the GRRC’s revenue portfolio. These sources provide support for salaries and other costs that are not covered by start-up and grant funding.

See Table 3 on page 8 for a detailed breakdown of anticipated annual revenues once the GRRC reaches full capacity. We present the peak revenues during the start-up period as well as annual revenues during a representative year.

**TABLE 3. Anticipated Annual Revenues for GRRC Operations (millions)**

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<b>Revenue Category</b>	<b>Peak during Start-up Period (FY 2025 - FY 2028)</b>	<b>FY 2029 &amp; After</b>
Research Grant Funding (NIH, Federal, Private, other) - Direct	\$15.1	\$15.1
Research Grant Funding (NIH, Federal, Private, other) - Indirect	\$6.8	\$6.8
Partner Funding	\$2.4	\$2.4
MSU CHM Funding for Salary Support <sup>a</sup>	\$5.2	\$5.2
MSU CHM Funding for Partner Match	\$2.0	\$2.0
Start-up Funding	\$2.2	
<b><i>Total Anticipated Operating Revenues</i></b>	<b><i>\$33.7</i></b>	<b><i>\$31.5</i></b>

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*Note: AEG's estimates are based on work done and assumptions made for the original pro forma accounting statement for the GRRC, which was conducted by JLL.*

*Source: AEG analysis based on data sourced from Michigan State University*

a. This includes an estimate for anticipated Academic Competitiveness funding.

### *III. The Grand Rapids Research Center's Contributions to Economic Development*

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In this section, we discuss several ways in which the Grand Rapids Research Center will contribute to economic development in the Grand Rapids area. In particular, we discuss how the GRRC will: contribute to developing a biomedical research cluster, attract a highly talented workforce to the area, and improve the neighborhood and quality of life.

#### **BIOMEDICAL RESEARCH CLUSTER**

Through building the GRRC, MSU envisions developing a “model biosciences corridor” in Grand Rapids with local leaders and community partners.<sup>2</sup> As we discussed in the previous chapter, the GRRC will be located near several other existing medical-related institutions in downtown Grand Rapids. Once constructed and in operation, the facility will be only one of two comprehensive, stand-alone research facilities in the city—the other being the Van Andel Institute, which was established in 1996. The presence of a second stand-alone facility is an important step in building a biomedical research cluster in the Grand Rapids area.

The basic science and translational research at the GRRC may attract research and development (R&D) firms and spin-off start-up companies to the Grand Rapids area. The university anticipates that the intellectual property generated by PIs at the GRRC would be commercialized. The existing medical-related institutions and initiatives, such as the Grand Rapids SmartZone<sup>SM</sup>, provide an environment to support such activity.

SmartZones<sup>SM</sup> are technology parks intended to spur the growth of technology- or research-oriented businesses and employment opportunities. In particular, the Grand Rapids SmartZone's<sup>SM</sup> mission is to “support growth in new life-sciences and the medical device industry companies through accelerated technology commercialization.”<sup>3</sup> Partners in this initiative include: VAI, GVSU, Grand Rapids Community College (GRCC), the City of Grand Rapids, and the Right Place, Inc.

The Grand Rapids SmartZone<sup>SM</sup>'s incubator program was established in 2003, which currently aims to support high-tech start-ups and technology commercialization from universities and research institutions. The program provides wet

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2. Michigan State University, “MSU, Grand Rapids Community Team Up on Proposed Biomedical Research Facility,” September 2013, <http://msutoday.msu.edu/news/2013/msu-grand-rapids-community-team-up-on-proposed-biomedical-research-facility/>, accessed May 2015.

3. Smart Zone Local Development Financial Authority, “2014 Board Book,” <http://http://greycity.us/design-and-development-services/Economic-Development/Documents/2014%20SZ%20Board%20Book.pdf>, accessed May 2015.

lab space at the GVSU Cook-DeVos Center for Health Sciences and co-working space in a separate building in downtown Grand Rapids. While we have not assessed whether the existing supply of incubator space in Grand Rapids would meet future demand, the current existence of such programs demonstrates that there is already interest in developing and supporting nascent businesses in the life sciences industry.

The geographic proximity of basic and applied research activity with entrepreneurs—a defining characteristic of a research cluster—fosters collaborations that accelerate the translation of science.<sup>4</sup> In addition to improvements in quality of life for patients who benefit from translational research, the Grand Rapids area also stands to benefit. The “bench-to-bedside” research that will take place at the GRRC could catalyze additional economic activity. The partnerships with area hospitals for clinical trials and related research will potentially attract patients who are seeking cutting edge treatments for both general and specialized conditions. In turn, this may lead to the growth of dining, accommodations, and retail businesses that serve such visitors and their families.

## **TALENT ATTRACTION**

As a research university, Michigan State University produces a talented workforce, attracts and retains talent in the state, and develops and nurtures talent networks.<sup>5</sup> Research facilities, such as the planned GRRC, contribute to the second of these three functions. We discuss how the GRRC will attract talent to the Grand Rapids area and describe how talent attraction benefits the community.

In Anderson Economic Group's talent report for Michigan's University Research Corridor (URC),<sup>6</sup> we identified indicators of talent attraction. The GRRC will contribute to three key indicators: research expenditures, the number of faculty, and attract individuals with high educational attainment.

When the GRRC reaches long-term operations at full-capacity, we estimate that R&D spending associated with the GRRC will total \$34 million.<sup>7</sup> Based on the 17 MSU PIs that are currently working at VAI, R&D spending would increase by about \$18.6 million. This net increase is equivalent to nearly 1% of the \$2.1

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4. Philip A. Sharp, “Meeting global challenges: Discovery and innovation through convergence,” *Science Magazine*, December 19, 2014.

5. Alex Rosaen and Patrick Anderson, “Attracting, Fostering, and Inspiring Talent for the Global Economy: A Report for Michigan's University Research Corridor,” Anderson Economic Group, LLC, May 2015, <http://www.andersoneconomicgroup.com>.

6. The University Research Corridor is an alliance of Michigan's three public research universities: Michigan State University, University of Michigan, and Wayne State University.

7. Based on the definition of R&D spending according to the National Science Foundation (NSF) Higher Education Research and Development (HERD) survey.

billion in R&D spending by the entire URC and nearly 4% of the R&D spending by MSU.

As noted previously, there are currently about 17 MSU research faculty leasing lab space in downtown Grand Rapids. These faculty would move into the GRRC, once completed. At full-capacity, the GRRC will accommodate 44 PIs, which would increase the faculty count at MSU by 27 researchers. This increase is equivalent to nearly 1% of the total number of faculty at MSU.

The MSU College of Human Medicine plans to staff the GRRC with highly-skilled workers—both for research and for building operations. Typical research teams consist of a principal investigator, a faculty research associate, a lab manager, and a research assistant. The exact composition of the team varies in accordance with the science and funding mechanisms. Building operations will require an operations manager, facilities manager, security manager, Office of Radiation, Chemical & Biological Safety (ORCBS) manager, purchasing agent, administrators, and other support staff.

The level of educational attainment is often used as a measure of a talented workforce. At full capacity, we estimate that 197 positions at the GRRC require a bachelor’s degree or higher, which make up over 90% of the total positions for the facility. Of those 197 positions, 176 will require a graduate degree. We present further details in Table 4 below. By increasing the number of educated workers in the area, the GRRC will increase the share of educated workers in the Grand Rapids area compared to the share in the absence of the GRRC.

**TABLE 4. GRRC Employees in Positions that Require a Bachelor’s Degree or Higher**

<b>Minimum Educational Attainment<sup>a</sup></b>	<b>Number of Employees</b>	<b>Share of Total GRRC Employees</b>
Doctorate Degree	88	41%
Master’s Degree	88	41%
Bachelor’s Degree	21	10%
<b>Total GRRC Employees in Positions that Require a Bachelor’s Degree or Higher</b>	<b>197</b>	<b>91%</b>
<i>Memo: Total GRRC Employees at Full Capacity</i>	217	

*Source: AEG analysis of data sourced from Michigan State University*

a. Some positions require a minimum degree level and minimum level of work experience or a combination of equivalent education and work experience. To be conservative, we used the lowest degree level for such positions.

Educational attainment is an important factor in economic development.<sup>8</sup> The knowledge spillovers that result from the growth of human capital increase the productivity of all workers. As we discuss in our talent report for the URC, empirical studies have confirmed a positive relationship between educational attainment and the growth of cities. By attracting highly-educated researchers

and other staff, it stands to reason that the GRRC will contribute to the growth of the Grand Rapids area.

## NEIGHBORHOOD DEVELOPMENT

In addition to helping the Grand Rapids area's long-term goals in hosting biomedical and life sciences research and to creating jobs in the area (see the next section), the GRRC will add to the vitality of its immediate neighborhood east of the Grand River and south of Interstate 196. Before MSU approved construction of the GRRC, the building occupying the site (formerly home to the Grand Rapids Press) had been vacant. Having a new building occupied with workers will make general contributions to the neighborhood and quality of life.

The GRRC will increase the daytime population and pedestrian foot traffic at the site due to employees working at and visitors to the facility. The physical improvement of the site will also generate interest in the area and has spillover effects in attracting interest in nearby properties.

The new daytime population and physical improvements will likely catalyze additional development. For example, plans to redevelop the former Rowe Hotel building, which is across the street from the planned GRRC, are motivated by the growth of West Michigan's life science industry and are intended serve professionals that relocate to the city for hospital, university, and research jobs.<sup>9</sup> Plans include filling the property with apartments and condominiums, as well as restaurant and retail space.

Development may also take place in the remaining area of the MSU-owned parcel that surrounds the planned site for the GRRC. In our judgment, the site may be well-suited for commercial office or medical office space, given its proximity to the freeway, the GRRC, and the Medical Mile. Another potential use could be additional incubator space for supporting start-ups in medical testing and similar areas that are related to research conducted at the GRRC. The site may also be suited for retail activity if the redevelopment of the Rowe Hotel takes place and improvements are made to make the site more accessible for pedestrian traffic from the core of downtown.<sup>10</sup>

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8. Rosaen and Anderson, "Attracting, Fostering, and Inspiring Talent for the Global Economy", Prepared for Michigan's University Research Corridor, June 28th 2015.

9. Mike Nichols, "Developer plans to transform old hotel downtown," Grand Rapids Business Journal, December 30, 2014, <http://www.grbj.com/articles/81378-developer-plans-to-transform-old-hotel-downtown>, accessed May 2015.

10. The Michigan Street Corridor Plan acknowledges the need for such improvements in the area. See City of Grand Rapids, "Michigan Street Corridor Plan," May 2015, [http://grcity.us/design-and-development-services/Planning-Department/Documents/MSCP%20May%202019\\_2015%20web.pdf](http://grcity.us/design-and-development-services/Planning-Department/Documents/MSCP%20May%202019_2015%20web.pdf), accessed June 2015.

## *IV. Economic Impact of the Grand Rapids Research Center*

In this section, we quantify the economic impact that the Grand Rapids Research Center will have on the Grand Rapids area. We estimate the economic impacts of both the GRRC’s construction and the GRRC’s operations.

### **ECONOMIC IMPACT OF GRRC CONSTRUCTION**

Construction for the GRRC will occur in two phases. After demolition of the Grand Rapids Press building in spring 2015, the majority of the construction will take place between June 2015 and mid-2017. Every floor, except for one, will be built out and ready for occupancy at the end of this period. Construction for the remaining floor (the “shelled” floor) would take place sometime between FY 2018 and FY 2021; however, the exact timing is still under evaluation.

See “Economic Impact of GRRC Construction” on page A-2 for a discussion of our methodology.

#### *Employment Impact of Construction*

During the entire construction period, GRRC construction would increase employment by 728 job-years in the Grand Rapids area during the construction period. We estimate that 166 job-years would be directly due to the GRRC construction and 561 job-years would be indirectly due to the circulation of spending throughout the regional economy. The main construction of the GRRC, which will take place during the first four fiscal years, will increase employment by 666 job-years, with the peak impact during FY 2017.

**TABLE 5. Employment Impact of GRRC Construction on the Grand Rapids Area (job-years)**

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2018 - FY 2021 <sup>a</sup>	Total
Direct impact	1	57	92	2	14	166
Indirect impact	27	185	295	7	47	561
<b>Total Employment Impact</b>	<b>28</b>	<b>242</b>	<b>387</b>	<b>9</b>	<b>61</b>	<b>728</b>
<i>Memo: Total for FY 2015 - FY 2018</i>				666		

Source: AEG analyses based on data sourced from Kramer Management Group; Bureau of Economic Analysis, RIMS II Multipliers

a. Construction for build-out of shelled floor will take place sometime between FY 2018 and FY 2021.

#### *Earnings Impact of Construction*

Based on our analysis of GRRC construction spending, we estimate the earnings in the Grand Rapids area will increase by about \$60 million. About \$32 million will be due to GRRC construction payroll, and the remaining \$28 million will be the indirect impact. During the main construction phase, GRRC construction

would increase earnings by \$50 million. The earnings impact during this period would peak in FY 2017 with nearly \$30 million in earnings.

**TABLE 6. Earnings Impact of GRRC Construction on the Grand Rapids Area (millions)**

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2018 - FY 2021 <sup>a</sup>	Total
Direct impact	\$0.1	\$11.1	\$17.8	\$0.4	\$2.7	\$32.2
Indirect impact	\$1.2	\$7.4	\$11.8	\$0.3	\$1.9	\$22.6
<b>Total Earnings Impact</b>	<b>\$1.4</b>	<b>\$18.5</b>	<b>\$29.6</b>	<b>\$0.7</b>	<b>\$4.6</b>	<b>\$54.8</b>
<i>Memo: Total for FY 2015 - FY 2018</i>				\$50.2		

Source: AEG analyses based on data sourced from Kramer Management Group; Bureau of Economic Analysis, RIMS II Multipliers

a. Construction for build-out of shelled floor will take place sometime between FY 2018 and FY 2021.

### Output Impact of Construction

We estimate that construction for the GRRC will have a \$96 million impact on output on the Grand Rapids area. This breaks out to a \$45 million direct impact and a \$51 million indirect impact. The total impact during the main construction phase would be about \$88 million. The output impact would peak in FY 2017 with \$51 million in business volume.

**TABLE 7. Output Impact of GRRC Construction on the Grand Rapids Area (millions)**

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2018 - FY 2021 <sup>a</sup>	Total
Direct impact	\$2.2	\$14.8	\$23.7	\$0.5	\$3.8	\$45.0
Indirect impact	\$1.8	\$16.9	\$27.0	\$0.6	\$4.3	\$50.6
<b>Total Output Impact</b>	<b>\$4.0</b>	<b>\$31.7</b>	<b>\$50.7</b>	<b>\$1.2</b>	<b>\$8.1</b>	<b>\$95.6</b>
<i>Memo: Total for FY 2015 - FY 2018</i>				\$87.6		

Source: AEG analyses based on data sourced from Kramer Management Group; Bureau of Economic Analysis, RIMS II Multipliers

a. Construction for build-out of shelled floor will take place sometime between FY 2018 and FY 2021.

## ECONOMIC IMPACT OF GRRC OPERATIONS

The GRRC will open in late 2017 after the main construction of the building is complete. The MSU College of Human Medicine estimates that about 21 PIs and their research teams will move into the building at this point. Operations will ramp up gradually as additional PIs are hired on and move into the building. The GRRC is expected to reach full capacity FY 2025 with 44 PIs.

As we discussed previously, the PIs that are hired in FY 2025 will receive start-up funding for setting up their labs through FY 2028. In FY 2029, the start-up funding for these PIs would be exhausted, and we assume that this year is a rep-

representative year of the GRRC’s long-term annual spending at full capacity. Actual spending may vary from year-to-year due to factors such as turnover.

We estimate the economic impact of the GRRC’s operations also in terms of employment, earnings, and output. See “Economic Impact of GRRC Operations” on page A-3 for a discussion of our methodology.

*Employment Impact of Operations*

We estimate that GRRC operations will increase employment in the Grand Rapids area by over 400 jobs in FY 2029 and each year after, compared to if the GRRC were not in operation. The GRRC will directly create 195 jobs, due to employees that work at the GRRC, and indirectly create about 214 jobs, due to the circulation of operations spending throughout the regional economy. See Table 8 on page 15 for further details.

We estimate that the impact of the GRRC’s operations when it opens in 2017 will be at least half of these amounts. During the start-up period, the annual employment impact could reach as high as 425 jobs.

**TABLE 8. Annual Employment Impact of GRRC Operations on the Grand Rapids Area (jobs)**

	Peak during Start-up Period (FY 2025 - FY 2028)	FY 2029 & After
Direct impact	205	195
Indirect impact	220	214
<b>Total Employment Impact</b>	<b>425</b>	<b>409</b>

*Source: AEG analyses based on data sourced from Michigan State University; Bureau of Economic Analysis, RIMS II Multipliers*

*Earnings Impact of Operations*

We estimate that the GRRC operations will increase earnings in the area by \$28 million annually from FY 2029 onward. We estimate that the GRRC will directly increase earnings by over \$20 million, due to spending on salaries and benefits to its employees. As this spending, as well as spending for nonpayroll items, is circulated throughout the regional economy, the GRRC will create an indirect impact of nearly \$8 million in earnings. See Table 9 on page 16 for further details.

The impact of the GRRC’s operations when it opens in 2017 would be at least half of these amounts. During the start-up period, the GRRC’s annual impact on earnings would be peak at about \$29 million.

**TABLE 9. Annual Earnings Impact of GRRC Operations on the Grand Rapids Area (millions)**

	Peak during Start-up Period (FY 2025 - FY 2028)	FY 2029 & After
Direct impact	\$20.9	\$20.2
Indirect impact	\$7.8	\$7.6
<b>Total Earnings Impact</b>	<b>\$28.7</b>	<b>\$27.8</b>

*Source: AEG analyses based on data sourced from Michigan State University; Bureau of Economic Analysis, RIMS II Multipliers*

*Output Impact of Operations*

GRRC’s operations will increase output, or gross sales, in the Grand Rapids by over \$28 million annually starting in FY 2029. The GRRC’s direct impact will be \$7 million, due to spending on employee benefits and on goods and services to vendors in the Grand Rapids area. As this spending circulates throughout the economy, the GRRC’s indirect impact on output will be \$21 million. See Table 10 on page 16 for further details,

Again, when it opens in 2017, we estimate that the GRRC’s impact will be at least half of these amounts. The annual impact on output would peak at about \$29 million during the start-up period.

**TABLE 10. Annual Output Impact of GRRC Operations on the Grand Rapids Area (millions)**

	Peak during Start-up Period (FY 2025 - FY 2028)	FY 2029 & After
Direct impact	\$7.1	\$6.9
Indirect impact	\$21.9	\$21.2
<b>Total Output Impact</b>	<b>\$29.0</b>	<b>\$28.1</b>

*Source: AEG analyses based on data sourced from Michigan State University; Bureau of Economic Analysis, RIMS II Multipliers*

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## *Appendix A. Methodology*

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In this appendix, we describe the data sources and our methodology for the analyses in this report.

### **DATA SOURCES**

We primarily relied on the following data sources for our analyses:

- Bureau of Economic Analysis (BEA) RIMS II Multipliers for Kent-Ottawa-Muskegon County region, which we defined as the Grand Rapids area,
- Michigan State University for description of planned activities at the GRRC, estimates of revenues associated with construction and operations of the GRRC, employment and spending associated with operations of the GRRC, and
- Kramer Management Group for estimates of employment and spending associated with construction of the GRRC.

### **TALENT ATTRACTION**

To evaluate the extent to which the GRRC would contribute to attracting talent to the Grand Rapids area, we reviewed descriptions for GRRC positions that were provided by MSU. We then identified the positions that require a minimum of a bachelor's degree. More specifically, we identified positions that include bachelor's degrees, master's degrees, or doctorate degrees in their minimum education requirements. Based on MSU's hiring plans for the GRRC, we then estimated the total number of GRRC employees in positions that require a bachelor's degree or higher.

Some positions require both a minimum level of education and minimum work experience *or* an equivalent combination of education and experience. For example, one position requires an associate's degree and one to three years of work experience *or* a bachelor's degree and six months of work experience. In cases like these, we used the lower level of educational attainment to be conservative; thus, we excluded this particular position.

### **ECONOMIC IMPACT DEFINED**

We define the net economic impact of the GRRC as the amount of activity that occurs exclusively due to the project. We consider the effects of spending and employment in a well-defined region, and we exclude any activity that would displace other existing local spending, employment, and development. We refer to spending or employment that occur exclusively due to a project as *net new* economic activity. The economic impact includes both direct and indirect impacts. *Direct impact* is the spending for a project on goods and services that remain in the region of analysis. The *indirect impact* is the ripple effect as this initial spending recirculates throughout the regional economy.

Our region of analysis for the economic impact is the Grand Rapids area, which we define as Kent, Ottawa, and Muskegon Counties.

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We only evaluate the impact of the GRRC and do not include any potential commercial or residential uses for the area of the parcel surrounding the GRRC. We also assume that VAI will fill the space that will be vacated by current MSU PIs and their research teams with newly-hired teams operating at around the current scale. These teams might work directly for VAI or GVSU or they might lease the space with an arrangement that is similar to MSU's current lease. There are no guarantees that this space will be fully utilized going forward, as research grants are competitively awarded and subject to changes in federal spending priorities. Nevertheless, it is our judgment that this assumption is realistic for the foreseeable future based on VAI's track record, the desirability of the VAI's relatively new facilities (a major expansion was completed in 2009), and on the advice of the leadership of the MSU College of Human Medicine.

## **ECONOMIC IMPACT OF GRRC CONSTRUCTION**

We took the following steps to estimate the economic impact of the GRRC's construction:

1. We used data provided by Kramer Management Group to estimate employment and spending in the Grand Rapids area for the GRRC's construction. The firm provided a manpower schedule during the construction period, which we converted to full-time equivalent employment. The firm estimated that 85% of employees for construction would be located in the Grand Rapids area and that 85% of non-payroll spending for goods and services would be paid to vendors in the Grand Rapids area.

We also estimated that 10% of spending for soft costs related to the GRRC's construction would stay in the region. Soft costs include design costs, building equipment, and other miscellaneous costs that are not associated with the direct construction of the facility.

2. We then accounted for substitution, or the amount of employment and spending that would have taken place in the Grand Rapids area in the absence of the GRRC. Based on our professional judgment, we estimated that about 90% of the employment and spending for the GRRC's construction would have been exclusively due to the project.

3. After accounting for substitution, we applied the following BEA RIMS II final demand multipliers for the following industries to our employment and spending estimates in order to estimate the employment, earnings and outputs impacts:

**Salaries and wages:** "households"

**Fringe benefits:** "insurance carriers"

**Soft costs:** weighted average of "architectural, engineering, and related services" and "wholesale trade" based on the share of spending spent to each industry

**Equipment:** "Commercial and industrial machinery and equipment rental and leasing"

**Materials:** weighted average of "ready-mix concrete manufacturing," "steel product manufacturing from purchased steel," "truck transportation," and "wholesale trade" based on our professional judgment of the spending spent to each industry

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For detailed exhibits that outline our economic impact estimates, see “Appendix B. Exhibits” on page B-1.

**Note on Employment Impact Estimates.** We express the total employment impact in terms of “job-years.” However, this estimate is the sum of a job-years estimate (the direct impact) and a total employment estimate (the indirect impact). The following discussion explains the rationale for adding the two impacts, even though the units are inconsistent.

We define “job-years” as the number of people who work full-time, year-round in order to complete the construction work. We do this because construction projects often involve many individual workers that participate for varying amounts of time, ranging from days to months. Because of this, reporting employment in terms of headcounts often does not adequately reflect labor requirements for construction projects. For example, Kramer Management Group provided employment data for the GRRC construction in terms of man-hours. We converted these manhours to job-years in order to express employment in terms of a person working full-time for an entire year.

The indirect impact is measured in terms of the total number of jobs, which includes total full-time and part-time jobs, with no adjustment for whether these are year-round or seasonal positions. This is due to the definition of employment in the BEA RIMS II model that is used to estimate the industry multipliers. We used these multipliers to estimate the indirect employment impact.

## **ECONOMIC IMPACT OF GRRC OPERATIONS**

We took the following steps to estimate the economic impact of the GRRC’s construction:

1. We used data provided by Michigan State University to estimate employment and spending for the GRRC’s operations. MSU provided employment and payroll information for building operations, which are independent of the number of research teams. MSU also provided employment, payroll, and non-payroll data on a per-PI basis. The employment and payroll estimates are based on the assumption that PIs would hire between four and five research support personnel during start-up, and that their research teams would reduce by one person to between three and four support personnel after start-up.
2. We then estimated the amount of employment and spending that would remain in the Grand Rapids area. We assumed that 90% of employees would live in the region. We used data from existing MSU PIs who are working at VAI to estimate the share of the research non-payroll spending that would support vendors in the Grand Rapids area.
3. We also accounted for substitution, based on estimates provided by MSU and our own professional judgment. We estimate that 90% of the GRRC personnel and payroll spending in the Grand Rapids area would be net new due to the GRRC. These estimates, as they relate to research personnel and payroll, were based on the assumption that VAI and GVSU will backfill the space currently leased by MSU researchers with personnel working on a similar scale as current

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operations. We estimate that 95% of non-payroll spending would be exclusively due to the GRRC.

4. After accounting for substitution, we applied the BEA RIMS II final demand multipliers for the following industries to our employment and spending estimates:

**Salaries and wages:** “households”

**Fringe benefits:** “insurance carriers”

**Supplies, Equipment:** “laboratory apparatus and surgical appliance and supplies manufacturing”

**Travel:** “Travel arrangement and reservation services”

**Miscellaneous:** average of “telecommunications” and “postal service”

**Publications:** “periodical publishers”

**Indirect costs:** weighted average of “Electric power generation, transmission, and distribution,” “water, sewage and other systems,” “other computer related services, including facilities management,” “office administrative services,” “facilities support services,” “services to building and dwellings,” and “junior colleges, colleges, universities, and professional schools” based on the respective share of indirect costs that are spent on the cost of the space and that are sent back to the college departments.

For detailed exhibits that outline our economic impact estimates, see “Appendix B. Exhibits” on page B-1.

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## *Appendix B. Exhibits*

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This appendix contains the following detailed exhibits:

- Table B-1, “Employment Impact of GRRC Construction on the Grand Rapids Area,” on page B-2
- Table B-2, “Earnings Impact of GRRC Construction on the Grand Rapids Area,” on page B-3
- Table B-3, “Output Impact of GRRC Construction in the Grand Rapids Area,” on page B-4
- Table B-4, “Employment Impact of GRRC Operations on the Grand Rapids Area,” on page B-5
- Table B-5, “Earnings Impact of GRRC Operations on the Grand Rapids Area,” on page B-6
- Table B-6, “Output Impact of GRRC Operations on the Grand Rapids Area,” on page B-7

**TABLE B-1. Employment Impact of GRRC Construction on the Grand Rapids Area**

<i>Net New Spending in the Grand Rapids Area</i>	% Net New	Year of Construction <sup>(a)</sup>					FY 2018 through FY 2021 <sup>(b)</sup>	Total
		FY 2015	FY 2016	FY 2017	FY 2018			
<i>Payroll Expenditures</i>								
Salaries and wages	90%	\$ 54,785	\$ 4,110,741	\$ 6,574,469	\$ 157,583	\$ 994,924	\$ 11,892,502	
Fringe benefits	90%	\$ 58,620	\$ 4,398,493	\$ 7,034,682	\$ 168,614	\$ 1,064,569	\$ 12,724,977	
<i>Subtotal: Payroll Expenditures</i>		\$ 113,405	\$ 8,509,233	\$ 13,609,150	\$ 326,198	\$ 2,059,493	\$ 24,617,479	
<i>Non-payroll Expenditures</i>								
<sup>(c)</sup> Soft costs	90%	\$ 2,034,000	\$ -	\$ -	\$ -	\$ 217,350	\$ 2,251,350	
Equipment	90%	\$ 13,861	\$ 1,040,017	\$ 1,663,341	\$ 37,733	\$ 251,521	\$ 3,006,472	
Materials	90%	\$ 124,746	\$ 9,360,157	\$ 14,970,065	\$ 339,595	\$ 2,263,687	\$ 27,058,249	
<i>Subtotal: Payroll Expenditures</i>		\$ 2,172,606	\$ 10,400,174	\$ 16,633,406	\$ 377,327	\$ 2,732,557	\$ 32,316,071	
<i>Employment Impact on the Grand Rapids Area</i>	Final Demand Multipliers - Employment <sup>(d)</sup>	FY 2015	FY 2016	FY 2017	FY 2018	FY 2018 through FY 2021 <sup>(b)</sup>	Total	
<i>Payroll Expenditures</i>								
Salaries and wages	x 8.9797	0	37	59	1	9	107	
Fringe benefits	x 11.8596	1	52	83	2	13	151	
<i>Subtotal: Payroll Impact</i>		1	89	142	3	22	258	
<i>Non-payroll Expenditures</i>								
Soft costs	x 12.1017	25	-	-	-	3	27	
Equipment	x 9.6876	0	10	16	0	2	29	
Materials	x 9.1430	1	86	137	3	21	247	
<i>Subtotal: Non-payroll Impact</i>		26	96	153	3	26	304	
<i>Direct Employment</i>		1	57	92	2	14	166	
<i>Plus: Indirect Impact</i>		27	185	295	7	47	561	
<b>Total Employment Impact of GRRC Construction on the Grand Rapids Area</b>		<b>28</b>	<b>242</b>	<b>387</b>	<b>9</b>	<b>61</b>	<b>728</b>	

Source: AEG analysis based on data sourced from Michigan State University; Kramer Management Group; and Bureau of Economic Analysis, RIMS II Multipliers

<sup>(a)</sup> Expressed in terms of fiscal years (FY). Michigan State University's fiscal year starts in July 1 and ends on June 30th of the next calendar year (CY).

<sup>(b)</sup> Assumed that PIs that receive start-up funding hire between 4 and 5 research support personnel and PIs that no longer receive research start-up funding hire 3 between 3 and 4 research support personnel.

<sup>(c)</sup> Assumed that PIs receive \$800,000 of start-up funding over the first 4 years at the GRRC, which is annualized to \$200,000 per year. Estimated that 10% of non-payroll start-up expenses remain in the Grand Rapids area based on data for existing PIs working at VAL.

<sup>(d)</sup> Employment multiplier is equivalent to the number of jobs per \$1 million increase in final demand.

<sup>(e)</sup> This is expressed in terms of full-time equivalent job-years: number of people who would have to work at full-time for a full year in order to complete an equivalent amount of work.

**TABLE B-2. Earnings Impact of GRRC Construction on the Grand Rapids Area**

<i>Net New Spending in the Grand Rapids Area</i>	% Net New	Year of Construction <sup>(a)</sup>					FY 2018 through FY 2021 <sup>(b)</sup>	Total
		FY 2015	FY 2016	FY 2017	FY 2018			
<i>Payroll Expenditures</i>								
Salaries and wages	90%	\$ 54,785	\$ 4,110,741	\$ 6,574,469	\$ 157,583	\$ 994,924	\$ 11,892,502	
Fringe benefits	90%	\$ 58,620	\$ 4,398,493	\$ 7,034,682	\$ 168,614	\$ 1,064,569	\$ 12,724,977	
<i>Subtotal: Payroll Expenditures</i>		\$ 113,405	\$ 8,509,233	\$ 13,609,150	\$ 326,198	\$ 2,059,493	\$ 24,617,479	
<i>Non-payroll Expenditures</i>								
<sup>(c)</sup> Soft costs	90%	\$ 2,034,000	\$ -	\$ -	\$ -	\$ 217,350	\$ 2,251,350	
Equipment	90%	\$ 13,861	\$ 1,040,017	\$ 1,663,341	\$ 37,733	\$ 251,521	\$ 3,006,472	
Materials	90%	\$ 124,746	\$ 9,360,157	\$ 14,970,065	\$ 339,595	\$ 2,263,687	\$ 27,058,249	
<i>Subtotal: Payroll Expenditures</i>		\$ 2,172,606	\$ 10,400,174	\$ 16,633,406	\$ 377,327	\$ 2,732,557	\$ 32,316,071	
<i>Earnings Impact on the Grand Rapids Area</i>	Final Demand Multipliers - Earnings	FY 2015	FY 2016	FY 2017	FY 2018	FY 2018 through FY 2021 <sup>(b)</sup>	Total	
<i>Payroll Expenditures</i>								
Salaries and wages	x 0.2824	\$ 15,471	\$ 1,160,873	\$ 1,856,630	\$ 44,502	\$ 280,967	\$ 3,358,443	
Fringe benefits	x 0.5184	\$ 30,389	\$ 2,280,179	\$ 3,646,779	\$ 87,410	\$ 551,872	\$ 6,596,628	
<i>Subtotal: Payroll Impact</i>		\$ 45,860	\$ 3,441,052	\$ 5,503,409	\$ 131,911	\$ 832,839	\$ 9,955,071	
<i>Non-payroll Expenditures</i>								
Soft costs	x 0.5656	\$ 1,150,471	\$ -	\$ -	\$ -	\$ 122,938	\$ 1,273,409	
Equipment	x 0.4587	\$ 6,358	\$ 477,056	\$ 762,974	\$ 17,308	\$ 115,373	\$ 1,379,069	
Materials	x 0.3691	\$ 46,041	\$ 3,454,613	\$ 5,525,099	\$ 125,336	\$ 835,473	\$ 9,986,562	
<i>Subtotal: Non-payroll Impact</i>		\$ 1,202,870	\$ 3,931,669	\$ 6,288,073	\$ 142,644	\$ 1,073,784	\$ 12,639,040	
		\$ 148,242	\$ 11,123,181	\$ 17,789,739	\$ 426,402	\$ 2,692,147	\$ 32,179,711	
		\$ 1,248,730	\$ 7,372,721	\$ 11,791,482	\$ 274,556	\$ 1,906,622	\$ 22,594,110	
<b>Total Earnings Impact of GRRC Construction on the Grand Rapids Area</b>		<b>\$ 1,396,972</b>	<b>\$ 18,495,902</b>	<b>\$ 29,581,221</b>	<b>\$ 700,958</b>	<b>\$ 4,598,769</b>	<b>\$ 54,773,821</b>	

Source: AEG analysis based on data sourced from Michigan State University; Kramer Management Group; and Bureau of Economic Analysis, RIMS II Multipliers

<sup>(a)</sup> Expressed in terms of fiscal years (FY). Michigan State University's fiscal year starts in July 1 and ends on June 30th of the next calendar year (CY).

<sup>(b)</sup> Assumed that PIs that receive start-up funding hire between 4 and 5 research support personnel and PIs that no longer receive research start-up funding hire 3 between 3 and 4 research support personnel.

<sup>(c)</sup> Assumed that PIs receive \$800,000 of start-up funding over the first 4 years at the GRRC, which is annualized to \$200,000 per year. Estimated that 10% of non-payroll start-up expenses remain in the Grand Rapids area based on data for existing PI's working at VAI.

**TABLE B-3. Output Impact of GRRC Construction in the Grand Rapids Area**

<i>Net New Spending in the Grand Rapids Area</i>	% Net New	Year of Construction <sup>(a)</sup>				FY 2018 through FY 2021 <sup>(b)</sup>	Total
		FY 2015	FY 2016	FY 2017	FY 2018		
<i>Payroll Expenditures</i>							
Salaries and wages	90%	\$ 54,785	\$ 4,110,741	\$ 6,574,469	\$ 157,583	\$ 994,924	\$ 11,892,502
Fringe benefits	90%	\$ 58,620	\$ 4,398,493	\$ 7,034,682	\$ 168,614	\$ 1,064,569	\$ 12,724,977
<i>Subtotal: Payroll Expenditures</i>		\$ 113,405	\$ 8,509,233	\$ 13,609,150	\$ 326,198	\$ 2,059,493	\$ 24,617,479
<i>Non-payroll Expenditures</i>							
<sup>(c)</sup> Soft costs	90%	\$ 2,034,000	\$ -	\$ -	\$ -	\$ 217,350	\$ 2,251,350
Equipment	90%	\$ 13,861	\$ 1,040,017	\$ 1,663,341	\$ 37,733	\$ 251,521	\$ 3,006,472
Materials	90%	\$ 124,746	\$ 9,360,157	\$ 14,970,065	\$ 339,595	\$ 2,263,687	\$ 27,058,249
<i>Subtotal: Payroll Expenditures</i>		\$ 2,172,606	\$ 10,400,174	\$ 16,633,406	\$ 377,327	\$ 2,732,557	\$ 32,316,071
		<b>Final Demand Multipliers - Output</b>			<b>FY 2018 through FY 2021 <sup>(b)</sup></b>		<b>Total</b>
<i>Output Impact on the Grand Rapids Area</i>							
<i>Payroll Expenditures</i>							
Salaries and wages	x 1.0732	\$ 58,795	\$ 4,411,647	\$ 7,055,720	\$ 169,119	\$ 1,067,752	\$ 12,763,033
Fringe benefits	x 1.8963	\$ 111,161	\$ 8,340,862	\$ 13,339,867	\$ 319,743	\$ 2,018,741	\$ 24,130,374
<i>Subtotal: Payroll Impact</i>		\$ 169,957	\$ 12,752,509	\$ 20,395,586	\$ 488,862	\$ 3,086,494	\$ 36,893,407
<i>Non-payroll Expenditures</i>							
Soft costs	x 1.7831	\$ 3,626,907	\$ -	\$ -	\$ -	\$ 387,565	\$ 4,014,472
Equipment	x 1.8528	\$ 25,681	\$ 1,926,944	\$ 3,081,837	\$ 69,911	\$ 466,018	\$ 5,570,392
Materials	x 1.8163	\$ 226,579	\$ 17,001,132	\$ 27,190,577	\$ 616,816	\$ 4,111,602	\$ 49,146,706
<i>Subtotal: Non-payroll Impact</i>		\$ 3,879,167	\$ 18,928,077	\$ 30,272,415	\$ 686,727	\$ 4,965,185	\$ 58,731,570
		<i>Direct Output</i>	\$ 2,231,226	\$ 14,798,667	\$ 23,668,087	\$ 545,942	\$ 45,041,048
		<i>Plus: Indirect Impact</i>	\$ 1,817,897	\$ 16,881,918	\$ 26,999,914	\$ 629,647	\$ 50,583,929
		<b>Total Output Impact of GRRC Construction on the Grand Rapids Area</b>	\$ 4,049,123	\$ 31,680,585	\$ 50,668,001	\$ 1,175,589	\$ 95,624,977

Source: AEG analysis based on data sourced from Michigan State University; Kramer Management Group; and Bureau of Economic Analysis, RIMS II Multipliers

<sup>(a)</sup> Expressed in terms of fiscal years (FY). Michigan State University's fiscal year starts in July 1 and ends on June 30th of the next calendar year (CY).

<sup>(b)</sup>

Assumed that PIs that receive start-up funding hire between 4 and 5 research support personnel and PIs that no longer receive research start-up funding hire 3 between 3 and 4 research support personnel.

<sup>(c)</sup> Assumed that PIs receive \$800,000 of start-up funding over the first 4 years at the GRRC, which is annualized to \$200,000 per year. Estimated that 10% of non-payroll start-up expenses remain in the Grand Rapids area based on data for existing PIs working at VAI.

**TABLE B-4. Employment Impact of GRRC Operations on the Grand Rapids Area**

Expenditure Category	Direct Expenditures in the Grand Rapids area			% Net New	Net New Expenditures in the Grand Rapids area			Final Demand Multipliers - Employment <sup>(a)</sup>	Economic Impact - Employment		
	Peak during Start-up Period (FY 2025 - FY 2029)	FY 2029 & After			Peak during Start-up Period (FY 2025 - FY 2029)	FY 2029 & After			Peak during Start-up Period (FY 2025 - FY 2029)	FY 2029 & After	
<i>(b) Payroll Expenditures</i>											
<u>Operations Personnel</u>											
Salaries and wages	\$ 1,194,300	\$ 1,194,300	90%	\$ 1,074,870	\$ 1,074,870		8.9797	10	10		
Fringe benefits	\$ 369,324	\$ 369,324	90%	\$ 332,392	\$ 332,392		11.8596	4	4		
<i>(c) Research Personnel</i>											
Salaries and wages	\$ 15,666,750	\$ 15,171,750	90%	\$ 14,100,075	\$ 13,654,575		8.9797	127	123		
Fringe benefits	\$ 3,669,930	\$ 3,496,680	90%	\$ 3,302,937	\$ 3,147,012		11.8596	39	37		
<i>Subtotal: Payroll Expenditures</i>	<i>\$ 20,900,304</i>	<i>\$ 20,232,054</i>		<i>\$ 18,810,274</i>	<i>\$ 18,208,849</i>			<i>179</i>	<i>174</i>		
<i>Non-payroll Expenditures</i>											
<i>(d) Start-up expenses</i>											
Supplies	\$ 52,545	\$ 38,215	95%	\$ 49,918	\$ 36,304		8.5085	0	0		
Equipment	\$ 43,788	\$ 31,845	95%	\$ 41,598	\$ 30,253		8.5085	0	0		
Travel	\$ 10,947	\$ 7,961	95%	\$ 10,400	\$ 7,563		16.7791	0	0		
Miscellaneous	\$ 8,758	\$ 6,369	95%	\$ 8,320	\$ 6,051		12.0155	0	0		
<i>(e) Grant expenses</i>											
Supplies / Services	\$ 1,477,494	\$ 1,443,915	95%	\$ 1,403,620	\$ 1,371,719		8.5085	12	12		
Travel	\$ 118,200	\$ 115,513	95%	\$ 112,290	\$ 109,738		16.7791	2	2		
Publications	\$ 78,800	\$ 77,009	95%	\$ 74,860	\$ 73,158		11.8062	1	1		
<i>(f) Indirect Costs</i>											
	\$ 1,846,887	\$ 1,846,887	95%	\$ 1,754,543	\$ 1,754,543		14.2754	25	25		
<i>Subtotal: Non-payroll Expenditures</i>	<i>\$ 3,637,418</i>	<i>\$ 3,567,715</i>		<i>\$ 3,455,547</i>	<i>\$ 3,389,329</i>			<i>41</i>	<i>40</i>		
								<i>Direct Impact</i>	<i>205</i>	<i>195</i>	
								<i>Plus: Indirect Impact</i>	<i>220</i>	<i>214</i>	
								<b>Total Annual Employment Impact of GRRC Operations on the Grand Rapids Area</b>		<b>425</b>	<b>409</b>

Source: AEG analysis of data sourced from Michigan State University; Bureau of Economic Analysis, RIMS II Multipliers

- (a) Employment multiplier is the number of jobs per \$1 million change in output delivered to final demand.
- (b) Estimated that about 90% of GRRC personnel would live in the Grand Rapids area.
- (c) Assumed that PIs that receive start-up funding hire between 4 and 5 research support personnel and PIs that no longer receive research start-up funding hire 3 between 3 and 4 research support personnel.
- (d) Assumed that PIs receive \$800,000 of start-up funding over the first 4 years at the GRRC, which is annualized to \$200,000 per year. Estimated that 10% of non-payroll start-up expenses remain in the Grand Rapids area based on data for existing PIs working at VAI.
- (e) Estimated that about 34% of non-payroll expenses from grant funding (except indirect costs) remain in the Grand Rapids area based on data for existing PIs working at VAI.
- (f) Indirect costs include the costs of the space (e.g., facilities operations, security, custodial services, debt service on the building, etc.) and costs that go back to various departments, the College of Human Medicine, and to the university for support functions. Estimated that 37% of the building operations portion of indirect costs remain in the Grand Rapids area based on data for existing PIs working at VAI, that 100% of the department portion remain in the Grand Rapids area, and none of the College and university portion remain in the Grand Rapids area.

**TABLE B-5. Earnings Impact of GRRC Operations on the Grand Rapids Area**

Expenditure Category	Direct Expenditures in the Grand Rapids area			% Net New	Net New Expenditures in the Grand Rapids area			Final Demand Multipliers - Earnings	Economic Impact - Earnings		
	Peak during Start-up Period (FY 2025 - FY 2029)	FY 2029 & After			Peak during Start-up Period (FY 2025 - FY 2029)	FY 2029 & After			Peak during Start-up Period (FY 2025 - FY 2029)	FY 2029 & After	
<i>(a) Payroll Expenditures</i>											
<u>Operations Personnel</u>											
Salaries and wages	\$ 1,194,300	\$ 1,194,300	90%	\$ 1,074,870	\$ 1,074,870		0.2824	\$ 303,543	\$ 303,543		
Fringe benefits	\$ 369,324	\$ 369,324	90%	\$ 332,392	\$ 332,392		0.5184	\$ 172,312	\$ 172,312		
<i>(b) Research Personnel</i>											
Salaries and wages	\$ 15,666,750	\$ 15,171,750	90%	\$ 14,100,075	\$ 13,654,575		0.2824	\$ 3,981,861	\$ 3,856,052		
Fringe benefits	\$ 3,669,930	\$ 3,496,680	90%	\$ 3,302,937	\$ 3,147,012		0.5184	\$ 1,712,243	\$ 1,631,411		
<i>Subtotal: Payroll Expenditures</i>	<i>\$ 20,900,304</i>	<i>\$ 20,232,054</i>		<i>\$ 18,810,274</i>	<i>\$ 18,208,849</i>			<i>\$ 6,169,959</i>	<i>\$ 5,963,378</i>		
<i>Non-payroll Expenditures</i>											
<i>(c) Start-up expenses</i>											
Supplies	\$ 52,545	\$ 38,215	95%	\$ 49,918	\$ 36,304		0.4579	\$ 22,857	\$ 16,624		
Equipment	\$ 43,788	\$ 31,845	95%	\$ 41,598	\$ 30,253		0.4579	\$ 19,048	\$ 13,853		
Travel	\$ 10,947	\$ 7,961	95%	\$ 10,400	\$ 7,563		0.5404	\$ 5,620	\$ 4,087		
Miscellaneous	\$ 8,758	\$ 6,369	95%	\$ 8,320	\$ 6,051		0.5478	\$ 4,557	\$ 3,314		
<i>(d) Grant expenses</i>											
Supplies / Services	\$ 1,477,494	\$ 1,443,915	95%	\$ 1,403,620	\$ 1,371,719		0.4579	\$ 642,717	\$ 628,110		
Travel	\$ 118,200	\$ 115,513	95%	\$ 112,290	\$ 109,738		0.5404	\$ 60,681	\$ 59,302		
Publications	\$ 78,800	\$ 77,009	95%	\$ 74,860	\$ 73,158		0.4749	\$ 35,551	\$ 34,743		
<i>(e) Indirect Costs</i>	<i>\$ 1,846,887</i>	<i>\$ 1,846,887</i>	<i>95%</i>	<i>\$ 1,754,543</i>	<i>\$ 1,754,543</i>		<i>0.5010</i>	<i>\$ 879,085</i>	<i>\$ 879,085</i>		
<i>Subtotal: Non-payroll Expenditures</i>	<i>\$ 3,637,418</i>	<i>\$ 3,567,715</i>		<i>\$ 3,455,547</i>	<i>\$ 3,389,329</i>			<i>\$ 1,670,116</i>	<i>\$ 1,639,118</i>		
								<i>Direct Impact</i>	<i>\$ 20,900,304</i>	<i>\$ 20,232,054</i>	
								<i>Plus: Indirect Impact</i>	<i>\$ 7,840,075</i>	<i>\$ 7,602,436</i>	
								<b>Total Annual Earnings Impact of GRRC Operations on the Grand Rapids Area</b>	<b>\$ 28,740,379</b>	<b>\$ 27,834,490</b>	

Source: AEG analysis of data sourced from Michigan State University; Bureau of Economic Analysis, RIMS II Multipliers

- (a) Estimated that about 90% of GRRC personnel would live in the Grand Rapids area.
- (b) Assumed that PIs that receive start-up funding hire between 4 and 5 research support personnel and PIs that no longer receive research start-up funding hire 3 between 3 and 4 research support personnel.
- (c) Assumed that PIs receive \$800,000 of start-up funding over the first 4 years at the GRRC, which is annualized to \$200,000 per year. Estimated that 10% of non-payroll start-up expenses remain in the Grand Rapids area based on data for existing PI's working at VAI.
- (d) Estimated that about 34% of non-payroll expenses from grant funding (except indirect costs) remain in the Grand Rapids area based on data for existing PI's working at VAI.
- (e) Indirect costs include the costs of the space (e.g., facilities operations, security, custodial services, debt service on the building, etc.) and costs that go back to various departments, the College of Human Medicine, and to the university for support functions. Estimated that 37% of the building operations portion of indirect costs remain in the Grand Rapids area based on data for existing PI's working at VAI, that 100% of the department portion remain in the Grand Rapids area, and none of the College and university portion remain in the Grand Rapids area.

**TABLE B-6. Output Impact of GRRC Operations on the Grand Rapids Area**

Expenditure Category	Direct Expenditures in the Grand Rapids area			Net New Expenditures in the Grand Rapids area			Final Demand Multipliers - Output	Economic Impact - Output		
	Peak during Start-up Period (FY 2025 - FY 2029)	FY 2029 & After	% Net New	Peak during Start-up Period (FY 2025 - FY 2029)	FY 2029 & After	Peak during Start-up Period (FY 2025 - FY 2029)		FY 2029 & After		
<i>(a) Payroll Expenditures</i>										
<u>Operations Personnel</u>										
Salaries and wages	\$ 1,194,300	\$ 1,194,300	90%	\$ 1,074,870	\$ 1,074,870	1.0732	\$ 1,153,550	\$ 1,153,550		
Fringe benefits	\$ 369,324	\$ 369,324	90%	\$ 332,392	\$ 332,392	1.8963	\$ 630,314	\$ 630,314		
<i>(b) Research Personnel</i>										
Salaries and wages	\$ 15,666,750	\$ 15,171,750	90%	\$ 14,100,075	\$ 13,654,575	1.0732	\$ 15,132,200	\$ 14,654,090		
Fringe benefits	\$ 3,669,930	\$ 3,496,680	90%	\$ 3,302,937	\$ 3,147,012	1.8963	\$ 6,263,359	\$ 5,967,679		
<i>Subtotal: Payroll Expenditures</i>	<i>\$ 20,900,304</i>	<i>\$ 20,232,054</i>		<i>\$ 18,810,274</i>	<i>\$ 18,208,849</i>		<i>\$ 23,179,425</i>	<i>\$ 22,405,633</i>		
<i>Non-payroll Expenditures</i>										
<i>(c) Start-up expenses</i>										
Supplies	\$ 52,545	\$ 38,215	95%	\$ 49,918	\$ 36,304	1.7736	\$ 88,534	\$ 64,389		
Equipment	\$ 43,788	\$ 31,845	95%	\$ 41,598	\$ 30,253	1.7736	\$ 73,779	\$ 53,657		
Travel	\$ 10,947	\$ 7,961	95%	\$ 10,400	\$ 7,563	1.7832	\$ 18,544	\$ 13,487		
Miscellaneous	\$ 8,758	\$ 6,369	95%	\$ 8,320	\$ 6,051	1.7104	\$ 14,229	\$ 10,349		
<i>(d) Grant expenses</i>										
Supplies / Services	\$ 1,477,494	\$ 1,443,915	95%	\$ 1,403,620	\$ 1,371,719	1.7736	\$ 2,489,460	\$ 2,432,881		
Travel	\$ 118,200	\$ 115,513	95%	\$ 112,290	\$ 109,738	1.7832	\$ 200,235	\$ 195,684		
Publications	\$ 78,800	\$ 77,009	95%	\$ 74,860	\$ 73,158	1.9432	\$ 145,467	\$ 142,161		
<i>(e) Indirect Costs</i>										
	\$ 1,846,887	\$ 1,846,887	95%	\$ 1,754,543	\$ 1,754,543	1.5755	\$ 2,764,294	\$ 2,764,294		
<i>Subtotal: Non-payroll Expenditures</i>	<i>\$ 3,637,418</i>	<i>\$ 3,567,715</i>		<i>\$ 3,455,547</i>	<i>\$ 3,389,329</i>		<i>\$ 5,794,543</i>	<i>\$ 5,676,902</i>		
							<i>Direct Impact</i>	<i>\$ 7,090,876</i>	<i>\$ 6,868,733</i>	
							<i>Plus: Indirect Impact</i>	<i>\$ 21,883,092</i>	<i>\$ 21,213,802</i>	
							<b>Total Annual Output Impact of GRRC Operations on the Grand Rapids Area</b>	<b>\$ 28,973,967</b>	<b>\$ 28,082,535</b>	

Source: AEG analysis of data sourced from Michigan State University; Bureau of Economic Analysis, RIMS II Multipliers

- (a) Estimated that about 90% of GRRC personnel would live in the Grand Rapids area.
- (b) Assumed that PIs that receive start-up funding hire between 4 and 5 research support personnel and PIs that no longer receive research start-up funding hire 3 between 3 and 4 research support personnel.
- (c) Assumed that PIs receive \$800,000 of start-up funding over the first 4 years at the GRRC, which is annualized to \$200,000 per year. Estimated that 10% of non-payroll start-up expenses remain in the Grand Rapids area based on data for existing PI's working at VAI.
- (d) Estimated that about 34% of non-payroll expenses from grant funding (except indirect costs) remain in the Grand Rapids area based on data for existing PI's working at VAI.
- (e) Indirect costs include the costs of the space (e.g., facilities operations, security, custodial services, debt service on the building, etc.) and costs that go back to various departments, the College of Human Medicine, and to the university for support functions. Estimated that 37% of the building operations portion of indirect costs remain in the Grand Rapids area based on data for existing PI's working at VAI, that 100% of the department portion remain in the Grand Rapids area, and none of the College and university portion remain in the Grand Rapids area.

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## *Appendix C: About Anderson Economic Group*

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Anderson Economic Group, LLC was founded in 1996 and today has offices in East Lansing, Michigan and Chicago, Illinois. AEG is a research and consulting firm that specializes in economics, public policy, financial valuation, and market research. AEG's past clients include:

- *Governments* such as the states of Michigan, North Carolina, and Wisconsin; the cities of Detroit, MI and Cincinnati and Sandusky, OH; counties such as Oakland County, Michigan, and Collier County, Florida; and authorities such as the Detroit-Wayne County Port Authority.
- *Corporations* such as Ford Motor Company, First Merit Bank, Lithia Motors, Spartan Stores, Nestle, and InBev USA; automobile dealers and dealership groups representing Toyota, Honda, Chrysler, Mercedes-Benz, General Motors, Kia, and other brands.
- *Nonprofit organizations* such as the convention and visitor bureaus of Lansing, Ann Arbor, Traverse City, and Detroit, as well as Experience Grand Rapids; higher education institutions including Michigan State University, Wayne State University, and University of Michigan; trade associations such as the Michigan Manufacturers Association, Service Employees International Union, Automation Alley, the Michigan Chamber of Commerce, and Business Leaders for Michigan.

Please visit [www.AndersonEconomicGroup.com](http://www.AndersonEconomicGroup.com) for more information.

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