Maintaining Performance

Evidence-Based Educational Facility Management Through A Decision-Support Tool

Leveraging Prior Empirical Research

by

Michael A. Beauregard

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Graduate Supervisory Committee:

Steven K. Ayer, Chair
Dominique-Claude Laroche
G. Edward Gibson, Jr.

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ABSTRACT

Public institution facility operations and maintenance is a significant factor enabling an institution to achieve its stated objectives in the delivery of public service. To meet the societal need, Facility Directors must make increasingly complex decisions managing the demands of building infrastructure performance expectations with limited resources. The ability to effectively measure a return-on-investment, specific to facility maintenance indirect expenditures, has, therefore, become progressively more critical given the scale of public institutions, the collective age of existing facilities, and the role these institutions play in society.

This research centers on understanding the method of prioritizing routine work in support of indirect institutional facility maintenance expense through the lens of K-12 public education in the state of Arizona. The methodology documented herein utilizes a mixed method approach to understand current facility maintenance practices and assess the influence of human behavior when prioritizing routine work. An evidence-based decision support tool, leveraging prior academic research, was developed to coalesce previously disparate academic studies. The resulting process provides a decision framework for prioritizing decision factors most frequently correlated with academic outcomes.

A purposeful sample of K-12 unified districts, representing approximately one-third of the state's student population and spend, resulted in a moderate to a strong negative correlation between facility operations and student outcomes. Correlation results highlight an opportunity to improve decision making, specific to the academic needs of the student. This research documents a methodology for constructing, validation, and

testing of a decision support tool for prioritizing routine work orders. Findings from a repeated measures crossover study suggest the decision support tool significantly influenced decision making specific to certain work orders as well as the Plumbing and Mechanical functional areas. However, the decision support tool was less effective when prioritizing Electrical and General Maintenance work orders.

Moreover, as decision making transitioned away from subjective experience-based judgment, the prioritization of work orders became increasingly more consistent. The resulting prioritization, therefore, effectively leveraged prior empirical, evidence-based decision factors when utilizing the tool. The results provide a system for balancing the practical experience of the Facility Director with the objective guidance of the decision support tool.

DEDICATION

For Guap, who often reminded me "anyone can do this" yet gave selflessly to ensure I

wasn't alone in the journey.


For Cooper, Brooklyn, and Taylor reminding me to always be my best and teaching me

that a life less challenged is a life less fulfilled.

ACKNOWLEDGMENTS

This research would not have been possible without the tireless dedication, patience, and support of many people. I am thankful for my advisor and committee chair, Dr. Steven K. Ayer, for his guidance and insight throughout my studies at Arizona State University. Dr. Ayers professionalism and approach to academic research has encouraged me to perceiver when I otherwise may have faltered. I am grateful for your inspiration, patience, and motivation to follow my ambition and continuously challenge the system. I am also appreciative to my committee members Dr. Dominique-Claude Laroche Ph.D. and Dr. G. Edward Gibson, Jr., Ph.D., P.E. for their collective guidance and support of my vision. Their leadership, insight, and experience often served as a beacon, directing my progress along this journey.

I would like to acknowledge the Arizona School Facilities Board, the Washington Association of Maintenance and Operations Administrators, and the many district Facility Directors who so generously gave their time, contributing their collective experience to this research. Having completed this journey, I've come to understand better the challenges and sacrifices made in support of our educational system.

Most importantly, I would like to acknowledge my family: my wife, Julie Beauregard Esq., MBA, my children Cooper Max and Brooklyn for their patience, understanding, and quiet encouragement. Each of you has endured this journey with me. Collectively you have sacrificed, enabled, and provided me the opportunity to pursue my passion for learning. Thank you for enabling me to become the best version of myself. You are my everything, and I love you.

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CHAPTER 1

INTRODUCTION

Facility operations and maintenance organizations provide value by optimizing facility conditions to support the overall performance of a public institution. In order for these facility operations and maintenance organizations to successfully provide this value, the decisions they make must directly address the needs of the institution. More specifically, building system and or environmental conditions that enable improved performance should factor in the decision-making process.

The practice of facility management is at a crossroads, and educational building infrastructure is not spared from the issues that plague the profession of facility management. There is mounting evidence that building infrastructure is underfunded (ASCE 2013;2017; Leachman et al., 2016), and the availability of qualified technical personnel is declining (Sullivan et al., 2010). At this same time, facility equipment and building infrastructure are becoming progressively complex. Institutions are increasingly relying on the availability and performance of facilities to meet the expectations of institutional performance goals. Prioritizing the day-to-day maintenance decisions may best serve the academic district in the long-term. Additionally, the ability of a facility operations and maintenance organization to align these prioritization decisions with the strategic objective of the K-12 academic district enables institutional performance. While this may appear reasonable, there is little evidence to suggest decision factors such as this are currently taken into consideration when allocating resources or prioritizing routine work.

The nation's school systems are not alone in their endeavor to create increased

public value while minimizing the costs associated with facility management. Across the

nation, public institutions occupy more than three billion square feet of building

infrastructure (US General Services Administration, 2012). The cost to maintain these

facilities exceeds $30 billion annually, and by many accounts, this figure falls

considerably short of what is needed (ASCE, 2017). The availability of data specific to

the Nation's public-school systems provides an instrument from which to study the larger

issues facing the Nation's institutional building infrastructure. This research utilizes K-12

education in the state of Arizona to study the problem

America's educational infrastructure by many accounts is underfunded and in a

state of decline. At the same time, society has a higher degree of visibility to academic

performance and standardized test scores. To address this issue, the state of Arizona

allocates approximately one-billion dollars annually to maintain the facility operations of

primary and secondary educational buildings (Auditor General, 2016). Nationally the

data suggests Arizona residents are not alone in their efforts to provide well managed

educational facilities. Each year a similar amount is spent, per state, for this same purpose

(NCES, 2016; Snyder et al., 2016).

Academic research suggests this funding is critical, playing an essential role in the

performance of school systems. A growing body of academic research has established a

positive correlation between the performance of building systems, facility conditions, and

academic outcomes (Cash, 1993; Earthman, 2002; Duyar, 2010). Considering that

academic research has established this relationship, together with the lack of evidence

that facilities maintenance and operations teams are currently using this research to guide

decision-making, highlights an opportunity for researchers to create a better way for practitioners to make decisions that are guided by existing research. The opportunity to influence decision-making in a strategic and targeted way motivates this research.

This dissertation utilizes a mixed-method approach to explore the extent to which decision factors are accounted for when prioritizing routine facility maintenance spending. The findings provide an opportunity for improved, evidence-based decision making enabling the greatest benefits to student learning for the money spent.

This chapter evolves by first introducing the reader to the research questions addressed and referenced throughout the dissertation. Next, the research methods are introduced, leading to a presentation of research contributions. Chapter 1 concludes by presenting the overall organization of the dissertation.

## 1.1    Motivation

I began this research having studied and practiced in the areas of Architecture, Construction, Facility Management, Finance, and Strategic Sourcing. My experience is deliberately structured to provide a comprehensive understanding of the built environment. Moreover, I have strived to understand the role of decision making and how those decisions impact the use and associated costs of maintaining building infrastructure.

At that time, I recognized two truths specific to the practice of Facility Management. Firstly, Facility Operations and Maintenance is an enabling organization. Executed efficiently, institutional facilities enable an organization to do what they do, only better. Secondly, experience had taught me that facility maintenance decisions were primarily made based on the needs of the asset, defined in terms of preventative,

predictive, and corrective maintenance. With the noted exception of an annual budget, neither the Owner nor Facility Management appeared to prioritize the needs of the organization over the apparent needs of the asset.

However, Facility Operations and Maintenance appears to be at a crossroad. There is mounting evidence building infrastructure is underfunded, and the availability of qualified technical personnel is declining. At this same time, facility equipment and building infrastructure are becoming progressively complex. Institutions are increasingly relying on the availability and performance of facilities to meet the expectations of institutional performance goals. How then are the day-to-day decisions made to prioritize work that best serves the performance goals of the organization? Furthermore, how are these prioritization decisions aligned with performance goals and strategic objectives of the institution, positioning a facility maintenance organization to enable performance? Collectively, these questions constitute the basis of my motivation for this dissertation.

## 1.2    Research Questions

Throughout this study research questions were used to help guide the overall direction and focus of the dissertation. The research questions, listed in terms of the research paper supported, are as follows:

Chapter 2, research article 1(Beauregard and Ayer, 2018):

RQ1:    Does a correlation exist between facility maintenance expense spending and educational outcomes suggesting that practitioners are leveraging prior research?

RQ2: What processes or procedures guide discretionary spending decision-making?

Chapter 3, research article 2 (Beauregard and Ayer, 2019):

RQ3: Can prior academic research detailing the beneficial impact of facility condition with regard to academic performance be leveraged to aid decision-making?

RQ4: Does the resulting decision support tool (DST) provide a method of decision making that is both comprehensive and easy-to-use?

Chapter 4, research article 3:

RQ5: To what extent does the DST influence the prioritization of routine facility maintenance work orders?

RQ6: In what contexts does the DST impact, or not impact prioritization?

### 1.3    Research Method

This study utilizes a mixed method approach to the research, leveraging qualitative and quantitative research techniques to develop and analyze the data. The approach consists of a comprehensive literature review, structured and informal interviews, questionnaire surveys, focus groups, and a repeated measures crossover activity. Collectively, this research approach allowed the study to define the performance opportunity and address the contexts by which the proposed DST may or may not influence decision making. Furthermore, the mixed method approach enabled the

researcher to achieve a greater degree of understanding specific to the process of prioritizing work in support of institutional building infrastructure.

The development of this Ph.D. dissertation consisted of three research stages (see Figure 1). Each research stage represented a milestone, culminating in the publication of an academic article. Dissertation chapters 2,3, and 4 provide further detail of the methodology specific to each stage of research.

The author met with industry professionals throughout the study, who collectively provided insight into the inner workings of a Facility Maintenance organization. The resulting conclusions represent a permutation of multiple sources collected over the four-year duration of the investigation.

| OBJECTIVE | METHOD | DESCRIPTION |
|---|---|---|

**Chapter 2**

Objective 1:
Explore and document the engagement of FM with respect to K-12 education

**Literature Review**

A comprehensive literature review of FM as an enabler of academic performance

Objective 2:
Ascertain the relationship between FM spending and academic outcomes

**Correlative Analysis**

Quantitative Study:
Identify and define K-12 FM spending; compile standardized test results; frame the relationship

Objective 3:
Develop a conceptual framework of a K-12 FM organization

**Structured Interviews**

**Questionnaire**

Qualitative Study:
Comprehensive understanding of the organization and system(s) for work order prioritization

**Chapter 3**

Objective 4:
Explore decision support methodologies

**Literature Review**

Develop the framework for a visual AHP decision support tool; identify category & decision factors

Objective 5:
Develop a decision support tool for the prioritization of work

**Focus Groups**

Qualitative Study:
Validate the structure and practical application of the tool

**Chapter 4**

Objective 6:
Test the decision support tool

**Research Activity**

Quantitative Study:
Define the context and measure the tool's ability to influence the prioritization

*Figure 1*: Methodology and stages of the dissertation

## 1.4    Scope of Research

There are limited examples of academic studies that have resulted in empirical evidence establishing an association between institutional performance and facility maintenance and operations indirect expense spending (OpEx). More often, prior research addressing this relationship has largely refrained from differentiating between Capital Expense (CapEx) projects and OpEx maintenance. Considering that public institutions have performance targets that are often unique to the institution, facility maintenance research and academic writings have traditionally prioritized the needs of the asset in terms of preventative or predictive maintenance. As a result, efforts were taken to overcome this limitation to some degree, by conducting informal interviews with academic district Superintendents and Facility Directors to define the research opportunity better and identify relevant sources of information that could be used to define the research approach.

The scope of this research is limited to spending associated with Plant Maintenance and Operations OpEx, omitting work orders defined as CapEx. The funding mechanism for capital projects is separate and distinct from OpEx funding. Additionally, the decision-making and spending associated with CapEx projects for a school district can be quite complex and politically charged, at times involving multiple departments, public committees, or public hearings. The decision process, therefore, may not require a formal work order. By contrast, the process for allocating and prioritizing OpEx is largely subjective, often determined by the Functional Area Lead or Technician (Beauregard and Ayer, 2018). For these reasons, a decision was made to omit CapEx projects from the research scope.

The scope is further limited to work orders associated with regular and routine asset maintenance. Decision-making specific to work orders determined to be consistent with Emergency or Critical repairs are fundamentally limited as these decisions are routinely given the highest level of priority due to the critical nature of the repair. Therefore, Emergency and Critical repair work orders are not in scope for this research. This process of strategically reducing the scope of work orders to only include routine OpEx work orders enabled the researcher to study how decision-making would be impacted for the types of work orders that may be most impacted by current, potentially subjective, decision-making practices.

The resulting methodology is intended to subordinate the needs of the asset for the needs of the institution. Furthermore, the methodological approach detailed herein uses both qualitative understandings and quantitative empirical data to define the relationship between OpEx prioritization and institutional performance.

## 1.5    Research Contribution

Facility operations and maintenance is widely recognized as an enabling organization. However, academic studies addressing the role of facility condition and operational performance provide limited distinction between the financial allocation of CapEx projects and facility operations and maintenance OpEx initiatives. Therefore, an understanding of the function that routine work order prioritization plays in the successful execution of operational objectives has received relatively little attention. The purpose of this research is to coalesce previously disparate research to enable evidence-based decision-making in support of institutional performance. K-12 education in the state of

Arizona provides an institutional framework for this study. The contributions that this research offers to facility operation and maintenance literature and the AEC industry are as follows:

- Development of an evidence-based DST for the prioritization of routine facility maintenance work orders
- Development and demonstration of a methodology to investigate and organize the decision factors that influence institutional performance
- Testing of the DST effectively influences the process of decision-making in support of K-12 academic facility management
- Defining the contexts in which the DST may or may not affect the prioritization of work

The intended outcome is to provide a process enabling institutional facility administrators to make pro-active and informed decision aligned with the strategic direction of the organization they support. The expected outcome from the research will add to the body of knowledge in Facilities Management as well as providing a practical tool for K-12 facility administration.

### 1.6    Dissertation Organization

Chapter 2 presents a comprehensive literature review, a qualitative understanding of facility management for a K-12 district in Arizona, and a correlative analysis. The literature review first takes a macro-approach to the role of facility management as an enabler of institutional performance, then narrows the focus to two main facets: Building conditions as an enabler of academic performance and remediation or replacement of

specific facility assets associated with academic performance. Meetings were then held with a purposeful sample of academic Facility Managers to understand better the detail and nuances associated with the day-to-day responsibilities of managing an academic portfolio. Finally, a correlative analysis was conducted to demonstrate if the relationship as defined in the literature review and subsequent qualitative interviews translated to a measurable correlation between plant maintenance and operation indirect expense spending and academic performance as measured by standardized academic testing.

The third chapter is methodological, presenting a framework for a DST derived from the initial journal article, findings from the literature review and feedback from industry professionals. The resulting DST defines both Decision Categories and Decision Factors based upon prior quantitative and qualitative academic studies. Moreover, chapter three introduces a modified analytical hierarchy process to visually organize and then aid decision making.

Chapter 4 details a method for validating the DST defined in the prior chapter. Here, a repeated measures crossover study is used to provide a baseline and additional data necessary to measure a perceived change in behavior. Moreover, this chapter identifies decision factors and environmental context(s) influencing decision making as defined in research question RQ5 and RQ6.

The fifth chapter comprehensively summarizes the findings from this work. This chapter also proposes opportunities for future research based on the data presented in this dissertation. Chapter 5 concludes by addressing the research contribution to the overall body of academic knowledge associated with strategic facility management.

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CHAPTER 2

CORRELATING FACILITY CONDITIONS AND ACADEMIC PERFORMANCE

An emphasis on academic performance has gained both political and public momentum in recent years, specifically the implementation of standardized systems for evaluating student performance. This pursuit of academic achievement culminated in the implementation of Common Core or equivalent testing methods adopted by more than forty states (Coburn et al. 2016). Today, academic standards-based testing is administered to align educational curriculum, educator professional development, and establishing a baseline for measuring academic performance (M. S. Smith et al. 1991). Greater accountability is expected with respect to academic spending as the expectations of educational administrators intensify. The importance of establishing processes designed to deliver repeatable and measurable value specific to facility infrastructure spending is, therefore, one of many important aspects of educational reform (Young et al. 2003). The scope of facility infrastructure spending, explicitly the process of prioritizing plant maintenance and operations work, is inherently complex and, for the most part, subjective (Atkin and Brooks 2014). The maintenance and upkeep of educational facilities are at the discretion of academic districts. Therefore, this research aims to understand the method for decision–making that guides this discretionary thought process.

Capital costs are out of the scope of this paper. Educational infrastructure CapEx improvement projects traditionally have a dedicated source of funding whereby, performance expectations are explained in detailed project specifications, and scope of work clearly defines a metric of success. Although many academic districts would prefer

new facilities, it is not reasonable to expect CapEx projects as a remedial course in place of routine preventative maintenance of existing capital assets.

Academic districts faced with economic constraints are forced to make difficult and, at times, highly complex decisions concerning facility maintenance. For context, the U.S. spends an estimated $50B annually, maintaining public school infrastructure that collectively averages fifty years of age (NCES 2014). A 2013 study by the American Society of Civil Engineers (ASCE) estimates the price tag for infrastructure remediation at primary and secondary K-12 educational facilities exceeds $270B (ASCE 2013). More recently, ASCE published findings which estimate the funding gap increases annually by approximately $38B (ASCE 2017). Although the figures identified by ASCE are substantial, the discretionary budget at a district level has become increasingly constrained (see Figure 2) (Snyder et al., 2016). To summarize, the nation's educational infrastructure has been suggested to be in a state of decline (Alexander and Lewis 2014). Therefore, this work aims to determine how work is being prioritized as a guide to maximizing the return on investment of future maintenance initiatives.

An existing body of academic research has established a relationship between CapEx improvement projects to educational infrastructure and academic outcomes. The purpose of this paper is to empirically assess if a similar relationship is observable between facility operational indirect expense spending and educational outcomes. The primary goal is to answer the following research questions: does a correlation exist between facility maintenance expense spending and educational outcomes suggesting that practitioners are leveraging prior research (RQ1)?; and what processes or procedures guide discretionary spending decision-making (RQ2)? To explore this topic, publicly

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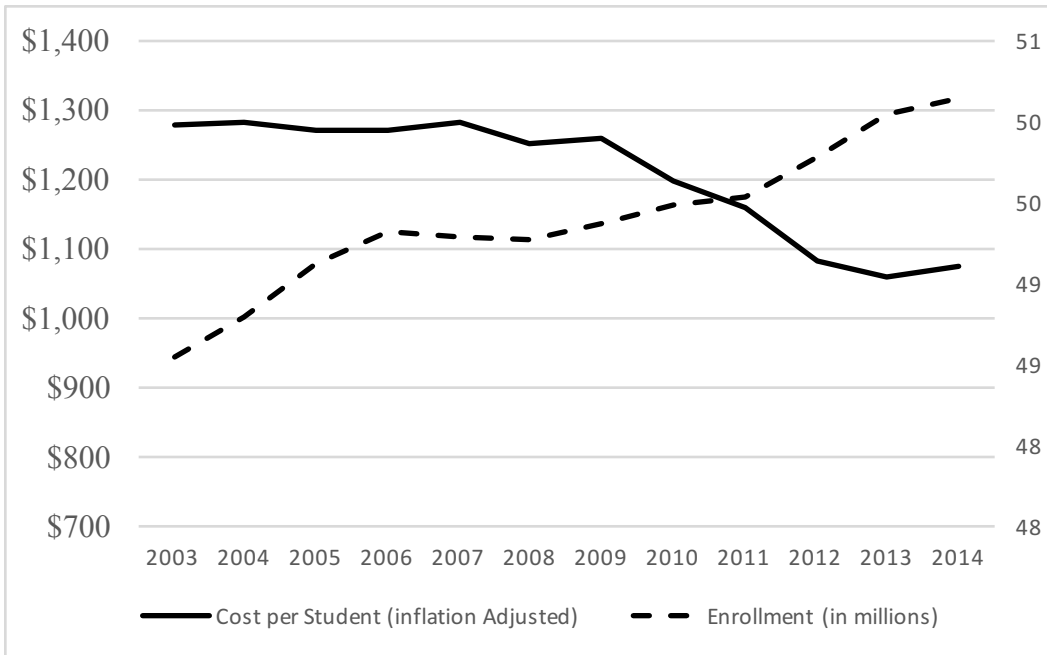
*Figure 2*: National educational per student spending (inflation adjusted) and student
enrollment

available data including the OpEx spending associated with Plant Maintenance

and Operations and the results of standardized academic testing was collected for public

school districts in the state of Arizona from 2010 through 2015. A correlative analysis

was performed using this data for a sample population and performed again for a

purposeful sample of schools of similar size, demographics, and spending. Furthermore,

Facility Directors within the purposeful sample were interviewed to understand the

organizational structure of the Facility Maintenance and Operations department and how

the process of prioritizing reoccurring work may factor into the correlation. Key

differences in the results of the correlation are identified, highlighting the potential

impact of business processes on the correlation. Finally, results of the study are

summarized, providing a potential direction for future research.

## 2.1 Background

A well-managed facility maintenance organization enables the conversion of operational expense to a return on that investment (Womack et al. 1990). Optimization of the facility, therefore, requires the identification of value, defined in terms of a product, a capability and or the customer (Womack and Jones 2010). A business's ability to identify the intended value of an operational expense, then to manage the asset in accordance to the value proposition is defined in terms of a Return-On-Assets (Selling and Stickney 1989) and is understood to be a metric of operational effectiveness. If the organization is civic, the perceived value may become unclear. Such is the case with the nation's public-school systems.

Academic studies have highlighted the importance of building condition and educational environment as an enabler of education, constructing a method of delivering Return-On-Assets. An investigation by the Milwaukee public school's system determined the physical condition of the facility have the most significant impact on the academic success of the student (Lewis 2001). A similar study of the Scottsdale Unified District concluded that a positive relationship was present between upgraded school facilities and math achievement (Maxwell 1999). Additional studies point out specific building systems such as heating, ventilation and air conditioning (HVAC) and lighting as enablers of academic performance (Schneider 2002). These studies indicate strategic CapEx improvements as catalysts for change. However, the majority of educational environment costs are expense-related, not capital, and are therefore discretionary. In this regard, it is vital that decisions made specific to the prioritization of facility maintenance

and operations work provide the most value given the economic constraints placed on the educational system (Wenglinsky 1997).

The level of satisfaction teachers and students have in the condition of their respective school facilities has a direct influence on the performance of the teacher and subsequent academic performance of the student (Hopland and Nyhus 2015; Schneider 2002). Findings from a 2001 study of the Milwaukee school system, performed by the Council of Educational Facility Planners (Association for Learning Environments), identified Facility Management attributable for 10% to 15% of the difference in school-to-school academic performance (Lewis 2001). Lewis writes:

> *"When differences in individual ability are controlled, facility condition may impact student performance more than many social and economic variables."*

Similar studies conducted in Washington DC (Edwards 1991; Berry 2002), Scottsdale (Maxwell 1999), and New York (Durán-Narucki 2008) have yielded comparable results. Additional studies link the performance of specific building systems such as indoor air quality, natural lighting, interior use of color and quality of finishes with a direct impact on student performance. Moreover, the performance of building systems may influence indirect performance factors such as teacher retention and student absentee rates (Hanushek 1989; Kok et al. 2015; Schneider 2002). Studies such as these appear to suggest an expectation of a Return-On-Assets measured in terms of academic outcomes. A 2015 study by the National Bureau of Economic Research concluded that per-pupil spending benefited not only educational outcomes but also positively influenced wages, family income, long-term wealth and a reduction in adult poverty (Jackson et al. 2015).

Academic research specific to facilities management and education categorizes educational environments as either being in a state of decline (ASCE 2017), serving as an impediment to educational outcomes (Durán-Narucki 2008; Cash 1993), or as an enabler of improved student performance resulting from a building renewal project or the replacement of building systems (Buckley et al. 2004; Duyar 2010). Research addressing the opportunity presented by an investment in educational infrastructure to positively affect educational outcomes, highlight capital investments by an academic district, institution, or school board as a systemic catalyst for change. A growing body of peer-reviewed research on building systems to include air quality (Cash 1993; Earthman 2002; Schneider 2002), thermal comfort (Schneider 2002, Earthman 2002), natural lighting (Higgins et al. 2005; Lemasters 1997; Schneider 2002), building quality (Tanner 2000; Tanner and Lackney 2006; Earthman 2009; Schneider 2002), and building acoustics (Woolner et al. 2007; Woolner 2010) have collectively built a case for investment in educational infrastructure. There is little evidence in prior research, however, that differentiates between CapEx improvements and the day-to-day prioritization of routine facilities maintenance. It is therefore uncertain if a similar relationship exists between total plant maintenance and operations indirect expense spending and student academic performance. Furthermore, it is not clear if these day-to-day decisions regarding the allocation of facility operations resources create value for the benefit of the student, as the prior research might suggest. Considering the annual expense specific to plant maintenance and operations of K-12 schools, determining a correlation and understanding the method by which work is prioritized in support of that correlation may

enable future researchers to develop tools that will allow districts to allocate and

prioritize resources more efficiently.

## 2.2    Research Methodology

A correlation was performed utilizing a bivariate dataset consisting of

standardized test scores and plant maintenance and operation indirect expense spending

per student. Following the correlation, the author met with academic districts to complete

an informative questionnaire and participation in a semi-structured interview. The

resulting mixed method analysis (see Figure 3) provided an in-depth understanding of the

facility maintenance and operations organizational structure, processes, and the

prioritization of routine work in support of the objectives of the districts they support.

R.Q. 1                                                R.Q. 2

| Identify the sample population | Capture the Data | Perform Pearson Correlation | Administer Questionnaire | Semi-Structured Interview | Analysis and Findings |
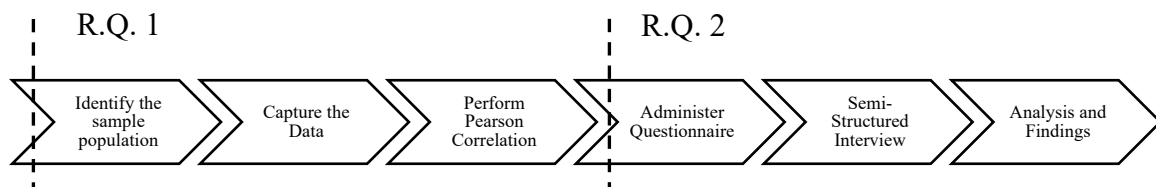
*Figure 3*: Mixed method process of understanding

For this paper, the term data is defined as publicly available information regarding

the results of standardized academic testing and Plant Maintenance and Operation

spending by academic districts in the state of Arizona. Because decisions regarding the

prioritization of facility maintenance are centralized, all measures were aggregated to a

district level. The research utilized education spending information based upon

information provided by the State of Arizona Department of Education and the State of

Arizona Auditor General's office. The results of standardized academic testing are made

available by the State of Arizona Superintendent of Public Instruction. These academic

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test scores were used as a measure of building occupant performance, a measure of value, to determine if similar trends to those suggested by prior research are observable.

The study utilized a mixed method analysis to understand better the academic district's process of prioritizing facility maintenance and operational OpEx spending. A quantitative study of facility expense spending and student academic performance was measured over a five-year period establishing a basis for the correlation. A subsequent qualitative analysis of district Facility Maintenance and Operation organizations, to include a questionnaire and interview, was then applied to construct a more thorough understanding of those factors used by the academic district to prioritize maintenance. The following sections provide a methodology for both the quantitative and qualitative aspects of the research.

### 2.2.1 Academic Performance

Standardized academic testing in the state of Arizona was used to measure educational outcomes. Academic test results were identified by district for the Arizona Instrument to Measure Standards (AIMS) test administered in academic years 2010 through 2014 and again for the AzMERIT standardized test conducted by the state in 2015. Derived from Common Core (Porter et al. 2011), both the AIMS and AzMERIT assess student understanding and proficiency in Math, English, and Science. Only those districts identified as "Public Districts" were explored in this paper. Test results were collected and aggregated by subject. For this paper, a filter was applied isolating "Mean" scores which were aggregated by district. The AzMERIT allows for filtering by Test Level (Grade Level), Subgroup/Ethnicity, and Performance Level whereas the AIMS test

provided a single category for all students who completed the exam. For this paper, the AzMERIT mean test results were collected and aggregated by district, filtering for "ALL" Test Levels and "ALL" Subgroups. The data presented therefore reflects the overall mean score per subject by year within the study's total sample population.

### 2.2.2 Plant Maintenance and Operation Indirect Expense Spending

The Uniform System of Financial Records (USFR) account code 2600 was used to determine the extent of facility maintenance related expenses. This account code is used by all public schools in the state of Arizona to include "Activities concerned with keeping the physical plant open, comfortable, and safe for use, and keeping the grounds, buildings, and equipment in effective working condition and state of repair (Auditor General 2016)." Therefore, this account code includes spending information from each district related to these activities. For example, should a school replace a light bulb, repaint a wall, or perform preventative maintenance on an air handler, the cost would be archived in the 2600 cost code for that fiscal year.

It is important to note that USFR account code 2600 should not include CapEx or the procurement of items that may otherwise be depreciated. The lack of CapEx is of specific importance to this paper as capital spending is associated with particular district bond initiatives, federal improvement grants, or additional dedicated sources of revenue. Capital spending has also been the traditional focus of academic research studying the impact of the built environment on student performance. Therefore, the use of this account code enabled the author to specifically study whether a relationship exists between current facility management spending and student performance.

For this paper, Plant Maintenance and Operations OpEx spending totals are aggregated by district according to information provided by the Arizona Department of Education. Performance metrics specific to accounting cost code 2600 were then gathered from the state Auditor General's public reports.

### 2.2.3   Determining a Sample Population

The primary filter used to establish a sample population aggregated data at a district level. The decisions regarding maintenance and operations of academic facilities, except for daily custodial services, are managed centrally at a district level. Furthermore, data regarding indirect facility expense and educational performance are similarly aggregated and communicated at a district level.

A secondary filter excluded academic districts identified by the state as either Private or Charter from the sample population. The construction of public K-12 schools within the state of Arizona is formulaic, accounting for growth projections within the community and include such amenities as gymnasiums, sports fields, playgrounds, bus access, and adequate parking. In contrast, Charter and Private schools are designed and constructed in support of an approved charter or business model, providing for a significant degree of ambiguity with respect to the infrastructure and amenities (Bulkley 2005). Furthermore, the Charter school movement in Arizona is a relatively new practice, introduced by the state legislature in 1994. Many charter schools are, therefore, new or recently constructed thereby mitigating the related facility expense costs associated with the aging infrastructure of public schools within the state.

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The residual database consisted of more than 200 academic districts throughout the state of Arizona. Collectively, these academic districts range in size from a single schoolhouse supporting a rural community to large urban districts servicing tens of thousands of students requiring several million square feet of educational facilities. Apart from the regional disparity, the structure and targeted student population of each academic district create an additional layer of differentiation and complexity. This complexity is reflected in annual facility expense spend, resulting in data outliers requiring an extra level of data clarity.

More than one-third (39%) of the public districts identified for the study reported $0.00 U.S. dollars of annual OpEx spend for the period beginning January 2010 through December 2015. While it is theoretically possible to subordinate facility maintenance to the point of defunding the program, it is more plausible the expenses were not accounted for per USFR requirements. Therefore, for this paper, academic districts reporting no spend associated with USFR account code 2600 were excluded from the results, hence providing a more credible source of data for analysis. Furthermore, given the purpose of the correlation, districts that failed to report standardized test results were also omitted from the sample population. Finally, one district reported an annual profit associated with facility maintenance, contradicting the base assumption of an expense associated with facility maintenance. The data, if accurate, may indicate either an error in reporting on the part of the district or a material difference in the management of district employees. The district reporting a net profit was therefore excluded from the sample population.

A secondary purposeful sample consisting of eight Unified academic districts, serving students enrolled in grades Kindergarten through Grade Twelve, was then

selected in cooperation with the Arizona School Facilities Board (AZSFB). Districts

selected for the purposeful sample have relative equality concerning funding, location,

and utilization (see Table 1). Similarities within the purposeful sample may serve to

address those factors which have been shown to influence educational outcomes such as

poverty and proximity to social services (Earthman 2002). The resulting purposeful

sample represents approximately one-third of the students enrolled in public K-12

education in the state of Arizona and an equivalent amount of the state's Plant

Maintenance and Operations annual budget.

Table 1: Profile of the Purposeful Sample

| District | Annual Operations Spend | Gross Square Feet (GSF) | Facility Spending per Student | Facility Spending per GSF | Students Teacher Ratio | Graduation Rate |
|---|---|---|---|---|---|---|
| 1 | $76.3 M | 4.4 M | $1,861 | $6.69 | 19:1 | 92% |
| 2 | $32.6 M | 4.4 M | $1,001 | $5.28 | 18:1 | 92% |
| 3 | $20 M | 4.8M | $562 | $5.32 | 16:1 | 89% |
| 4 | $43.2 M | 8.3M | $715 | $6.46 | 19:1 | 76% |
| 5 | $28 M | 4.7M | $791 | $5.71 | 18:1 | 93% |
| 6 | $34 M | 4.2 M | $1,461 | $5.66 | 20:1 | 87% |
| 7 | $25.1 M | 8 M | $547 | $6.44 | 19:1 | 80% |
| 8 | $4.6 M | 1.3M | $391 | $7.52 | 19:1 | 86% |
| **State Total** | **$965.5 M** | **138.6 M** | **$1,025** | **$6.09** | **18:1** | **75%** |

The purposeful sample represents approximately 27% of the state's spending total and
29% of the gross facility square feet. A more detailed listing of state totals may be found
in Appendices A, B, and C.

### 2.2.4   Correlation

A Pearson bivariate correlation model was used to explore the relationship between academic performance, as expressed in standardized testing and USFR account code 2600 facility operations and maintenance spending. Data was collected covering a five-year period from 2010 through 2015 for this study. Annual correlations of cost per student and academic outcomes, as well as cost per gross square foot with academic outcomes, were measured then plotted year-over-year over the duration of the study.

### 2.2.5   Questionnaire and Qualitative Analysis

A qualitative assessment was employed to understand better the process and procedures used by a district to govern the prioritization of facility maintenance and operations, eschewing the use of the empirically based correlation. The heuristic nature of the qualitative analysis allowed the author to understand the method for prioritizing work at each of the districts identified for the purposeful sample utilizing the author' experience and knowledge to drive the raw material from the empirical data. The interview-based qualitative research study was conducted and written following a hermeneutic phenomenological perspective (Willig and Rogers 2008). This method of understanding enabled the research to appreciate better the role of the senior Facility Director and the responsibility of allocating and prioritizing OpEx spend in support of the academic district's primary objectives.

Each of the purposeful sample districts employs a full-time Facility Director charged with the strategy and management of facility maintenance and operations at the district. These Facility Directors are responsible for managing a top-down budget,

forecasting headcount, managing capital planning and projects, and executing a strategy supporting facility expenditures to maintain the districts educational infrastructure. Facility Directors representing the purposeful sample were asked to participate in an initial questionnaire to establish a baseline understanding of the district's real estate portfolio and the scope of the Facilities Maintenance and Operations department. Facility Directors were asked to provide information relevant to measuring the scale and related performance of the organization, including:

- Annual facility maintenance and operation spend

- Gross Square Feet of the real estate portfolio

- Total Acres of Land owned or managed by the district

- Organizational structure

The data provided by the districts not only served to construct an overall scope and responsibility for the Facilities Management organization, but the information also helped to validate data provided by the Arizona Department of Education and the State Auditor General.

Once the initial questionnaire was complete, a one-hour semi-structured interview served as a basis for the qualitative analysis. The author met with Facility Directors from each of the districts completing a questionnaire. Interviews were open to Functional Area Leads (Custodial, Landscape, Technical Services) and maintenance management system administrators as needed. Unlike the survey, a semi-structured interview allowed the researcher to better discern the attitudes and motives of the participating Facility Directors (H. W. Smith 1981). Employing this method also prevented the participant

from seeking external support in responding to the questions (Bailey 2008). A formal

interview guide was developed to include clear directions for both the interviewer and

interviewee, ensuring consistency in the structure of the interview and comparable data

resulting from the discussion (Cohen and Crabtree 2006). The interview was categorized

in terms of (1) Organizational Structure, (2) Performance Metrics, and (3) Budgeting

Process and included such questions and prompts as:

- Describe your organizational structure.;

- Does the district use mobile technicians?;

- How often are rounds and readings conducted? And;

- Is there a formalized process for prioritizing work orders?

Secondary follow-up interviews, 1 hour in length, were conducted to address

survey questions or provide additional context not addressed in the initial meeting. In

summary, the questionnaire and interview provided a construct of the organization and

context regarding how routine work is prioritized by a district (see Figure 4).
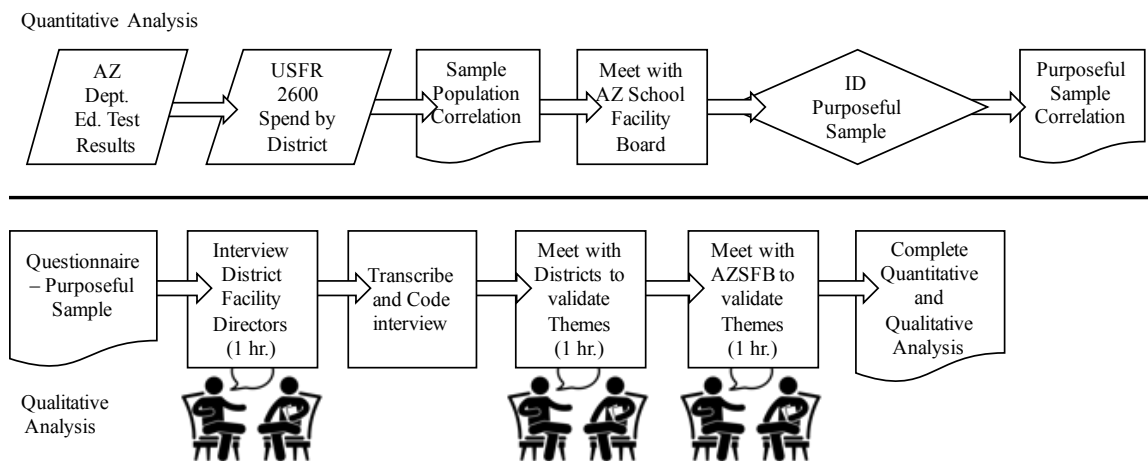


*Figure 4*: Process of Understanding, Quantitative and Qualitative

Structured interviews were audio-recorded with the verbal consent of the

participant, following Institutional Review Board requirements. All interviews were later transcribed for analysis. The theoretical basis for the study employed a phenomenology analysis method. Moustakas's (Moustakas 1994) method of analysis of phenomenological data provided a consistent and structured method to assess the role of the Facility Director and the process by which work is identified and prioritized with each of the participants interviewed. The process of analyzing the interview transcripts included the following measures:

- Coding of all statements relevant to the prioritization of work and the measurement of performance.

- Codes (meaning units) were then clustered to form themes.

- Meaning units and themes were synthesized to form contextual descriptions.

- A revised narrative, capturing the interview and transcript, was constructed based on the descriptions as authored by the researcher. Initial codes were then reviewed and verified for accuracy and structure of the coding. Final coding aligned to Strauss and Corbin's (Corbin and Strauss 1990; Strauss and StCorbin 1998) process producing central themes (see Figure 5).

| | | |
|---|---|---|
| • "Eliminate any **work order over 60 days**"<br>• **Standardize** building materials<br>• Assets are not loaded into the **CMMS**<br>• "**Relationship** Building"<br>• "we are **mobile**"<br>• "rounds and readings, **explain** that real quick"<br>• "I don't think we have to to **do that** (rounds and readings)"<br>• "**explain that** (Key Performance Index)"<br>• "we do have **dashboards** on our utilities"<br>• No **district standards**<br>• **Performance** is not measured by the district<br>• "what were the answers from other districts on that"<br>• "we try to **partner** with other districts"<br>• Are facility performance metrics tracked at the district – "I don't know | • "Being Proactive, **Predictive**, Prescriptive"<br>• "Better **delivery** with **work order** system"<br>• "TMA **Work Order** System"<br>• "everything we did is **reactive**"<br>• "each tech will have 10 to 15 **work orders** per tech"<br>• "we **react** a lot"<br>• "Our **staffing** levels have decreased since 2010" | "Looking for untapped **resources**"<br>"**Budget** is never enough"<br>"service **contracts** for some of our maintenance"<br>"**Budget** is provided by the Superintendent"<br>"We take it (training) out of our **M & O** (Maintenance and Operations Budget)"<br>"The custodial site manager is **out of us** (budget) and all of the Custodians"<br>"some of our campus' are **multi-metered**"<br>"It's **Top Down** (Budget)"<br>"(District) real **frugal at spending** anything…"<br>"we are not in the **process** (budgeting)" |
| **Performance Metrics** | **Work Order Prioritization** | **Budgeting** |

Figure 5: Identification of relevant Codes and development of interview Themes

## 2.3    Results

The results of the research are organized according to the correlation, questionnaire, and categories of the semi-structured survey. Furthermore, the results correspond to the two research questions presented: (RQ1) is there an empirical correlation between facility OpEx spending and educational outcomes; and, (RQ2) what the processes and the procedures are governing discretionary spending by a district. A summary analysis of both the research questions and the qualitative interview is then documented in the Discussion of this paper.

### 2.3.1   Correlation

To expect a relationship between the physical condition of a school, campus, or district with the academic performance of students would appear reasonable. For example, a well-cared for school may convey confidence the environment is more conducive to learning. The first correlation, however, which included a sample population of K-12 public school districts throughout Arizona, resulted in virtually no

correlation (see Table 2). A secondary correlation of the purposeful sample was then used

to measure the linear relationship while mitigating variability, given the many inherent

differences between academic districts in the total sample population. Again, the results

of the study did not align with the findings of prior research as essentially no positive

relationship was observed (see Table 3). Unlike the first correlation, the purposeful

sample yielded a moderate to a strong negative correlation (μ -0.423) between academic

outcomes and indirect facility operations and maintenance expense spend. There are

various potential reasons for this, as outlined in the discussion section.

Table 2: Correlation of public K-12 schools in the State of Arizona

| CORRELATION | $ / GROSS SQUARE FEET | $ / STUDENT |
|---|---|---|
| MATH | -0.102 | -0.156 |
| SCIENCE | -0.109 | -0.149 |
| READING | -0.035 | -0.065 |
| WRITING | -0.038 | -0.077 |

Table 3: Correlation of Purposeful Sample

| CORRELATION | $ / GROSS SQUARE FEET | $ / STUDENT |
|---|---|---|
| MATH | -0.056 | -0.569 |
| SCIENCE | -0.008 | -0.359 |
| READING | -0.145 | -0.273 |
| WRITING | -0.204 | -0.489 |

## 2.3.2   Questionnaire

A questionnaire was issued to each of the districts identified for the purposeful

sample. A subsequent semi-structured interview was then completed for those districts

responding to the survey. Results of the study provided a contextual baseline from which

to understand better the complexity of each district. Furthermore, results of the

questionnaire were used to identify potential differences, outliers, between districts that

may have influenced the results of the correlation. A review of the facility maintenance

organization for academic districts enabled the author to identify similar roles and responsibilities creating a standard specification for the Facility Management organization for the analysis. Although there were slight differences between the role(s) and responsibilities of the Facility Directors and their respective organizational structures, the bases of each facility management department aligned, achieving the desired outcomes of each district. The facility-related process was intended to support the strategic objectives of each district by creating an appropriate educational environment.

Each of the districts responding to the questionnaire utilized a subscription-based Computerized Maintenance Management System (CMMS) to generate and manage work orders. All but one of the districts employed a dedicated CMMS manager, responsible for managing work orders in the system and providing the initial prioritization of work orders. When generating a work order, each district allowed the author of the work order the ability to assign a "priority level" to that work order. Once a work order was logged in the system, four of the districts utilized the CMMS application to assign the second level of prioritization of work orders based on the developers' specifications. The CMMS application developer customized the prioritization of work orders according to district specifications at two participant districts. Despite the utilization rate of a CMMS application, a key finding of the questionnaire was that all but one of the districts had not completed an inventory of assets nor had the districts entered asset tags into the CMMS. Furthermore, the final degree of work order prioritization was at the discretion of the mobile technician or on-site manager/custodian.

Given the lack of positive correlation between facility maintenance expense spending and academic performance, the study found that four districts identified for the

purposeful sample believe the prioritization of work orders is aligned with the stated

mission and objectives of the academic district. Moreover, all of the districts believe in

some degree the prioritization of work met the needs of the student, while five of the

districts thought the work performed by the facility maintenance organization promoted

academic achievement.

### 2.3.3 Organizational Structure

Each participant district utilized similar organizational structures, serving as the

facilities maintenance leadership team for the district (see Figure 6). The organizational

structure, therefore, was not a primary factor differentiating the ability of a district to

prioritize and disposition work orders. The organization structure of the facility

maintenance and operations department does, however, provide insight into the

mechanisms governing the dispositioning of work orders.
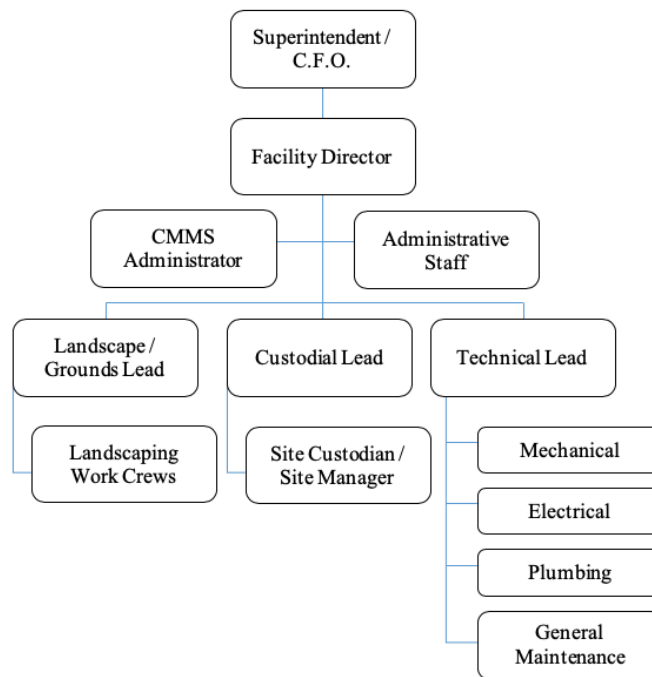
*Figure 6*: Organizational structure of Facility Maintenance and Operations at a district

A maintenance Site Lead or Custodial Lead, reporting to either the district Facility Director or school Principal, serves as the first responder for work orders, emergency services, and visual inspections of the school. The Site / Custodial Lead is a lower skilled position within the organization, capable of performing a limited variety of recurring and related tasks. All but one of the districts interviewed employed the Lead as a full-time employee within the Facilities Department. A central administrator dispositions work orders to both a Functional Area Lead and a Site / Custodial Lead as the district receives work orders. Site Leads serve as initial responders, enabled to either fulfill the work order on-site or deny the service request, pushing it back into the system for dispositioning by the Functional Area Lead or Facility Director. Site Leads also serve a necessary function in troubleshooting simple facility maintenance issues, providing a cause analysis or simply referring the service ticket to the mobile technician.

### 2.3.4 Performance Metrics

A common theme of each interview was the perceived importance of establishing operational goals and measuring departmental performance. Given that Plant Maintenance and Operations spending levels are on average lower today than in 2010 (see Figure 2), economic constraints placed on each district warrant a sound fiscal policy supported by robust performance indicators. Despite the apparent need for analytics, a significant finding of the questionnaire was the absence of performance metrics. The ability to quantify performance, aligned with district goals, may have enabled progress reporting specific to the objectives verbally discussed by the districts, to include the cost contribution of facility expense as a measure of value defined in terms of academic performance. Instead of a formal managerial dashboard, an informal system of

accountability appears to be present whereby the facility operations staff strived to close out work orders, provide routine maintenance of facility equipment, while subjectively identifying opportunities to enhance the educational experience.

### 2.3.5 Prioritization

Districts interviewed for the purposeful sample did not indicate or provide a defined procedure for prioritizing regular and routine work orders. A common trait of each district interviewed, however, was the reactive assessment of the challenges presented on any given day. This element of perceived unpredictability was commonly understood as both a measure of job satisfaction by the district Facility Directors while also recognized as a primary challenge in the management of the district. Each of the districts interviewed cited the unpredictable nature of their role as a principal factor inhibiting the authoring of written process and procedures intended to govern the day-to-day operations of the Facility Maintenance and Operations department.

Two districts interviewed for the study claimed to have a written process for prioritizing corrective work orders, one of which provided written documentation of the process. The similarity in the organizational structure and use of a CMMS, however, indicate the districts interviewed for the purposeful sample share a common informal process of prioritization. The prioritization of preventive and corrective work appeared to start with the Functional Area Leads, whereby work was either assigned to the Site / Custodial Lead or assigned to a Mobile Technician. Prioritization of work orders beyond this point, although at the discretion of the technician, is influenced by the number of backlog work orders within the district and the geographic proximity or grouping of work

orders. Prioritization was, therefore, a mostly informal, organic, and yet coherent process. Given the lack of documentation specific to the process of prioritization and performance metrics, it remains unclear to what extent the prioritization of work may have leveraged the learnings of prior research. Findings of the correlation and subsequent qualitative analysis indicate an opportunity, at a district level, to implement a performance-based decision-support tool, thereby directly adding value in the form of academic outcomes.

A critical observation of the study was the disparity between full-time employees and the backlog of work orders. Within the current system, the existing work order backlog at several of the districts would require either staff augmentation or the dispositioning of work orders to effectively reduce the volume of backlog work orders to a manageable level. For example, one of the districts participating in the study managed a backlog of existing work orders in the CMMS exceeded 600 days. As the backlog of work orders increases in the CMMS, the importance of establishing a formal process of prioritization becomes increasingly essential, presenting a more significant challenge for the organization.

## 2.4    Discussion

The performance metric Return-On-Assets is an indicator of operational effectiveness. For this paper, the metric applies to educational infrastructure, defined as a product of academic achievement and expressed in terms of standardized test scores. Prior research, cited herein, observed a positive relationship between facility CapEx improvement projects and academic outcomes. This paper distinguishes itself in using facility maintenance OpEx spending as the independent variable. The findings represent

the ability of an institutional facilities management strategy to enable organizational objectives thus creating value, which, in this situation, is measured as the academic performance by a school district. The prioritization of ongoing routine work within a district is an essential factor in this strategy.

Given the two variables, a correlation of facility maintenance and academic achievement did not indicate a positive relationship. In both the sample population as well as the purposeful sample no such positive association was observed. Due to the category and nature of spending present in USFR account code 2600, attributing facility management as a causal relation to academic outcome cannot be determined from a correlation alone. Instead, the findings more accurately suggest two factors are contributing in whole or in part to the negative correlation.

First, current methods of prioritization do not result in a similar positive relationship with academic performance, as indicated by prior research. This finding is counter-intuitive, as many of the processes that fall within the scope of account code 2600 directly impact the performance of those building systems that have been suggested to enable improved student academic achievement. To be clear, the author does not suggest that the findings illustrate a shortcoming concerning the management of district Plant Maintenance and Operation spending. Instead, they suggest that there is not currently evidence that the conclusions of the prior research are already being leveraged on a large scale.

Second, the decline in Arizona's OpEx spending may directly contribute to a deferred or corrective maintenance strategy.   It is estimated that Arizona's backlog of

deferred maintenance exceeds $200 Million (Filardo, 2016). Although the focus of this research is not to address the impact of deferred maintenance, it has been established that a deferred maintenance strategy will increase the life cycle cost of an asset (Lewis and Payant, 2007). If all other factors remain unchanged, increasing the cost associated with facility operations and maintenance will have a negative impact on the correlation with academic outcomes.

Findings such as these highlight an opportunity for future work to specifically explore whether strategic spending decisions, leveraging prior research findings, could lead to similar performance benefits through targeted and strategic operational spending as those observed with CapEx improvement spending.

K-12 Facility Maintenance organizations have an opportunity to leverage prior research, thereby prioritizing those work orders that maximize educational benefit. However, the current method of each of the districts studied is to prioritize the needs of the asset, adhering to a top-down budget, and thereby reducing costs while increasing the usable life of the asset. Specific to this study, the district's understanding or recognition of an assets ability to enable the delivery of education was a critical gap in their process of prioritizing work. For example, accounting for the ability of lighting to positively influence academic attainment or air quality to influence student engagement (Earthman 2004) may materially influence the prioritization of one work order over another. In this way, leveraging academic research as a primary method when prioritizing work orders would give precedence to educational outcomes.

While the opportunity exists to leverage prior research more directly in facility maintenance work order prioritization, there is also a likely need to continue to leverage

the current Facility Directors for decision making. Collectively, these experienced professionals have an understanding of the logistical challenges and needs of a particular school building. Their knowledge could help in decision-making to ensure that prioritized work orders are performed in a manner which mitigates any possible negative impact on the students. For example, this may involve strategically delaying work order remediation until the close of a school day or between classes when the associated tasks would not interrupt student learning activities. The combination of a generalizable, research-based, decision support tool and building-specific knowledge could yield benefits for student performance without negatively impacting the learning environment during the completion of the work order.

## 2.5    Limitations

The study may not reflect each district's approach to Facility Maintenance and Operation. Furthermore, a fundamental assumption of this paper is the sample population accurately account for expenses associated with facility maintenance and operations. The views and methods shared by the districts identified in the purposeful sample, however, may not reflect the opinions and practices of other districts within the state of Arizona.

The study aimed to identify if a correlation between OpEx spending and academic outcomes was present. Additionally, the study sought to understand better if or how the prioritization of work factored into that correlation. The author was not able to identify with specificity the role of work order prioritization as a causality due to the inherent complexity of an academic district and the absence of a formalized process of prioritizing routine work. Despite these limitations, the author was able to determine similarities in

the organizational structure and system for managing the district assets, resulting in a common informal process of prioritizing work orders.

## 2.6    Conclusion

The purpose of this paper was two-fold. First, the objective was to quantify the relationship between facility maintenance OpEx spending and the goals of the organization. In answer to this question, a quantitative bivariate correlation resulted in no significant positive relationship between the two variables. The lack of positive correlation should not be understood as a resolution to defund facility maintenance supporting K-12 education. To the contrary, a number of academic studies have in fact established a strong positive correlation between the condition of the built environment with educational outcomes (Young et al. 2003; Duyar 2010; Earthman and Lemasters 1998). Moreover, there is a direct link between a decline in academic performance and the degradation of academic facilities (Walberg 1982). Rather, the results of this study suggest there may be an opportunity for performance improvement concerning indirect facility maintenance expense and questions how facility maintenance work is prioritized to fulfill that opportunity.

The paper also strived to understand the process of prioritizing regular and reoccurring work orders. More specifically, the author explored how the prioritization of work may factor into the performance of the organization, leveraging prior research, and thereby creating value. To this end, the qualitative analysis addressing each district's process and method of prioritizing work was perhaps the more insightful aspect of the paper's mixed method approach. Here the research findings indicate there is no clear

prioritization of work orders at a district level, highlighting the need for an empirically based DST for the prioritization of work. Moreover, the author identified an opportunity to link a DST to performance metrics aligned to the strategic objectives of the district. In contrast, the author observed an informal yet familiar process whereby written processes and procedures were directly or indirectly subordinate to the daily function of problem-solving. Within the Facility Maintenance and Operations organization, a lack of formalized procedures specific to the prioritization of work resulted in each district utilizing an informal process of actively managing workflow and subjectively prioritizing departmental objectives within the district. Similarities in the organizational structure and asset management system, however, contributed to a shared approach to work order prioritization.

While the sample studied was localized to Arizona, the types of decisions that need to be made by facility managers due to an aging infrastructure may match the workload requirements of many other K-12 facility managers throughout the nation, requiring strategic, operational spending. In this way, the findings from this work justify future research aimed at directly incorporating prior research findings into a decision-support tool that may aid facility managers to more effectively prioritize facility maintenance and operation OpEx spending.

CHAPTER 3

A DECISION SUPPORT TOOL FOR INSTITUTIONAL FACILITY MAINTENANCE

Within the United States, Federal and local governments are increasingly faced with constrained resources, while managing a vast amount of building infrastructure, ranging from schools to stadiums to hospitals. The primary purpose of these facilities is to serve a public function deemed necessary and commonly understood to be of public benefit. Institutional facilities must, therefore, be managed and maintained expertly to serve their intended purpose while in operation.

Frequently, this process of maintenance requires facility managers to prioritize work in a manner that best supports the intended purpose of the facility. In other words, for these types of institutions, facility managers are often inundated with requests to address reported building problems (i.e., replace a burned-out light, or adjust the temperature for a given space). Often there are more of these types of work order requests than there are available personnel or resources to address them. The subsequent backlog creates a need to prioritize work orders, resulting in the completion of those work orders deemed most important and of highest priority. Others that are determined to be less critical may be delayed or dispositioned, based on the facility manager's judgment.

This process of informed prioritization and subsequent completion of work orders can have a significant impact on the overall performance of a building and the performance of those people working in a facility. Many research publications, as well as anecdotal evidence, indicate that poor facility conditions can hinder operational performance. For example, there is a variety of institutional research, specific to Kindergarten through 12th grade (K-12) education, indicating that attributes of the built

environment can have a direct impact on student performance (Cash, 1993). This impact can be beneficial or detrimental, depending on the specific condition. While most prior studies do not explicitly state that effective facility management (FM) can directly lead to better student performance, it is clear that effective FM can impact the condition of a built space, which prior works have indicated can impact student performance. Furthermore, prior research that explores trends in the performance of various public institutions indicates that there are opportunities for significant improvements in the way buildings are managed, including K-12 specifically (Beauregard and Ayer, 2018), and other public institutions in general (Amaratunga and Baldry, 2003; ASCE, 2001; Herrmann, 2013). This highlights the opportunity for decision-makers to directly leverage the findings of prior research to prioritize work based on what has been reported to be beneficial for the overall performance of a facility.

While the potential need for a better decision-making process in public institutions may seem apparent from a cursory review of the literature, the process for guiding decision-making is less transparent. Therefore, this work proposes a methodological approach to create a DST that leverages existing literature that specifies attributes of the built environment that may benefit the overall performance of the institution. This approach leverages principles suggested by Analytical Hierarchy Process (AHP) literature and also includes methods for identifying and organizing existing literature related to building performance. The developed tool is intended to be comprehensive, yet easy-to-use, enabling building managers to implement the tool on a daily basis.

The author chose to use K-12 education as the field for testing this DST development approach. There is a wealth of published literature related to attributes of the built environment that impact student performance, and there is also an opportunity for improvement for K-12 infrastructure. While K-12 was the focus of the study, the aim was to create a methodology that could be used to generate evidence-based DST's for other types of building environments that require work order prioritization. The developed DST was validated using a targeted focus group of industry professionals and includes four primary FM categories. The DST structure and overall process used for development of the DST are envisioned to be usable for a variety of building applications. The contribution of this work is in providing a reusable methodology that may be implemented to create subsequent DST's for enabling evidence-based decision-making among building managers in various built environments.

### 3.1  Background

The U.S. Federal Government is the nation's largest institutional property owner and manages more than 3.3 billion square feet of real estate, which costs more than $30 billion annually (US General Services Administration, 2012). The portfolio of federal properties includes 43 million gross square feet (GSF) of correctional facilities, 266 million GSF of educational space, and almost 130 million GSF of hospital facilities (US General Service Administration, 2018). The U.S. Postal Service alone manages approximately 30,000 sites across the nation (US General Service Administration, 2018). The list of institutional facilities includes public parks, universities, school districts, transit sites, police and fire stations, courthouses, correctional facilities, and similar

governmental properties requiring regular preventive, predictive, and corrective maintenance.

The ability of a facility operations organization to successfully integrate the management of building infrastructure maintenance with the strategic near- and long-term objectives of an institution contributes to an environment that supports the primary objectives of that institution (Barrett and Baldry, 2009). When appropriately managed, the FM organization can positively impact an institution's end requirements (Becker, 1999). Similarly, the metric of institutional facility efficiency may be realized as that institution's success in creating public value (Amaratunga and Baldry, 2003; Tucker and Pitt, 2009).

While many different factors can impact overall FM performance, one of the critical tasks that must be accomplished among FM teams relates to the prioritization and completion of routine work orders that support the quality of the built environment and enable overall organizational effectiveness. Facility managers and directors are typically responsible for assigning priority to routine maintenance requests (work orders). While some evidence suggests opportunities for this prioritization process to be improved (Beauregard and Ayer, 2018), these managers are tasked with a complicated job that frequently requires them to balance competing interests. They must prioritize work orders to utilize institutional resources efficiently, support a financial return on investment, support organizational performance, maximize assets, assess environmental impact, and most recently anticipate social awareness (Alexander, 2013). Furthermore, they may face a host of issues internal to facility maintenance including continuous operations, optimized performance, human resources, and the active integration of FM with the

parent business or institution (Tay and Ooi, 2001). Therefore, this paper does not aim to suggest that the current facility managers are failing at their jobs. Instead, the author suggests that the current environmental factors that surround work order prioritization make it nearly impossible for any individual to consistently make spending decisions that will always provide the most significant positive impact on a facility. For this reason, the author intended to create a structured DST aimed at supporting consistent, evidence-based, spending decisions to empower decision-makers.

### 3.1.1 Academic Districts

This research studies the prioritization of work at institutional facilities, using the public K-12 education system as a paradigm. Prior research frequently suggests a relationship between the condition of educational buildings and academic performance (Earthman, 2002; Earthman and Lemasters, 1998). More specifically, research has shown relationships between the built environment and various factors, including teacher retention (Buckley et al., 2004; Earthman and Lemasters, 2009); school culture (Bejou, 2013); and academic climate (Billings and Terkla, 2014; Tanner, 2008). Similarly, a 2002 study by Amaratunga and Baldry identified a positive correlation between facility condition and organizational performance (Amaratunga and Baldry, 2003). These prior works collectively highlight the potential for FM organizations to use prior evidence when guiding work order prioritization.

Despite these opportunities for K-12 spending decisions to impact student performance, data from the National Center for Educational Statistics shows that funding for routine facility maintenance in support of education infrastructure is in a state of

decline (Snyder et al., 2016). Presently, many K-12 organizations are resorting to a

deferred maintenance approach for prioritizing spending (Alexander and Lewis, 2014).

For example, facility maintenance spending for K-12 education buildings in the state of

Arizona was $1,170 per student for the 2003 academic year, which equates to

approximately $1,430, when adjusting for inflation. In 2014, the annual spend per student

totaled $922, a decline of approximately 21%. Over this same period, student enrollment

in Arizona's K-12 educational system increased by more than 26% (NCES, 2014).

Moreover, the National Center for Educational Statistics estimates the states K-12

enrollment will continue to grow by another 9% by 2027. While the exact enrollment and

spending trends vary by state (Hunting, 2013), the need for the U.S.'s K-12 academic

institutions to perform better with fewer resources is consistent among many states.

When considered in conjunction with the wealth of prior literature indicating specific

attributes of the built environment that may uniquely support academic performance, this

highlights a significant opportunity for a structured DST to offer value to FM decision-

making.

### 3.1.2   AHP as a Decision Support Tool for Facility Management

This paper employs principles of AHP to guide FM decision-makers to leverage

findings reported by prior research. AHP provides a technique for handling uncertain,

multi-criteria information, utilizing pair-wise comparisons while leveraging the

experience of subject matter experts (SME) to derive priorities objectively (Saaty, 1999,

2008). The selection of AHP as a decision method provides insight where existing

decision protocol such as Life Cycle Asset Management, Return on Investment, and Net

Present Value do not address both the economic and analytical factors influencing the

decision process (Chan et al., 2000; Klir and Yuan, 1996). AHP has been practically applied as a decision support archetype for healthcare facilities (Lavy and Shohet, 2007), building maintainability (Das et al., 2010), facility benchmarking (Gilleard and Wong Yat-lung, 2004), building renovation (Nielsen et al., 2016), residential asset management (Shen et al., 1998; Vilutienė and Zavadskas, 2003), along with many other relevant aspects of construction and building management. This research contributes to the existing body of work applying AHP as a decision framework. The methodology for organizing previously un-structured research into an easy-to-use DST for routine FM OpEx spending, specific to large-scale institutional facilities, constructively expands upon the existing research.

### 3.2    Methodology

The process for developing a DST that leverages prior research for prioritizing FM spending was created through four sequential steps (see Figure 7). A comprehensive literature review was initially developed to identify, and then aggregate, institutional performance enablers specific to facility infrastructure and K-12 education. Analytical hierarchy process was then selected as an archetype decision support methodology based on AHP's ability to facilitate complex, multi-variate, problems. Moreover, AHP provides SME's a vehicle to influence their decision. A framework was then constructed, based on K-12 education, to enable decision-makers to determine the extent to which a given work order would align with building attributes suggested to enable student success. Lastly, a targeted focus group consisting of practicing Facility Directors, technicians, and SME's was convened for validating the feasibility and practical application of the developed DST. The resulting process provides a reusable method for developing a DST that

leverages existing research aligned with institutional objectives for the prioritization of routine work orders. This section describes the process for development of the DST.
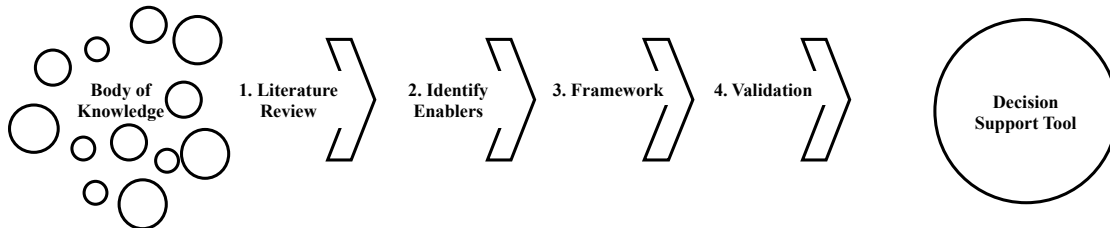


*Figure 7*: Four-step research method

### 3.2.1  Step 1: Literature Review

A literature review of academic publications documenting the relationship between facility condition and institutional performance (academic outcomes) provides the underpinning for this research. The author considered three publishers' databases (Elsevier, Emerald Insight, and Taylor and Francis) compiling and aggregating a comprehensive body of knowledge for this study. These bibliographic databases were selected because they all have high quality, peer-reviewed, publications that specifically relate to the practice of FM, Facilities, and Education.

Prior research has identified a positive correlation between facility condition and organizational performance (Amaratunga and Baldry, 2002). Comparable studies have established a similar relationship between the condition of educational facilities and the academic outcomes of students (Earthman, 2002). Initially, search terms relating to facility attributes, and building systems that may relate to institutional performance were selected based on previously published work (Cash, 1993). The scope of FM, however, extends beyond building systems and architectural attributes. Therefore, the list of search terms was expanded to include facility infrastructure attributed to the development of an

institution's climate and culture as that correlation became better understood (Maslowski, 2001; Wang et al., 1997). Climate (ambiance) and culture (ethos) can be influenced by work orders addressing items such as signage, seasonal landscaping, repaint, and custodial, which can collectively influence the performance of an organization (Kumari and Dhull, 2017).

After identifying relevant papers that relate facility conditions to organizational objectives, an additional layer of filters was applied to further refine the search results. Academic journals were first filtered to limit publications to only those dated 1990 through 2018. Given the changes in FM such as technology innovation, building systems, maintenance management systems, and asset management analytics, the filter excluded those studies that may now be out of date. Furthermore, if any publications in this time frame cited technologies or other practices that are no longer used, they were omitted from the analysis. Results were further refined to include only scholarly academic journals. Professional practice or Academic publications, such as those published by the Building Owners and Managers Association (BOMA), the International Facility Management Association (IFMA) and the Association for Learning Environments, although informative, were excluded from the search findings as these publications are not generally peer-reviewed. Furthermore, papers published as a result of conference proceedings were also omitted. Often conference papers represent incremental findings that support larger research efforts published in peer-reviewed journals. By excluding conference proceedings, it enabled the author to prevent redundant findings that would artificially indicate greater importance from the same work previously published in various outlets.

The final filter used for this study narrowed the scope of research to a selected public institution: K-12 education in the United States. International studies have been published detailing a relationship between facility condition and academic performance (Hopland and Nyhus, 2015; Mei-yung Leung and Ivan Fung, 2005). The nature of educational funding and academic infrastructure in other parts of the world does not necessarily apply to domestic K-12 education. Interstate similarities with respect to instructional delivery, educational infrastructure, funding mechanisms, and the assessment of academic performance provide an ideal environment from which to assess the viability of the DST domestically. Furthermore, where prior studies have documented the results of CapEx improvements to facility infrastructure (Edwards, 1991; Lewis, 2000; Maxwell, 1999), this study documents a methodology for prioritizing routine work orders, which are indirect financial expenses.

### 3.2.2 Step 2: Development Approach

The literature review intent is to understand the role of institutional facilities' infrastructure through the lens of K-12 education. This specific focus enabled the author to identify fundamental aspects of educational infrastructure that have been suggested to have a positive relationship with academic performance. To organize these aspects of infrastructure, Analytical Hierarchy Process provides an ideal decision framework as it allows for multiple independent variables according to how each variable serves the needs of the organization (Saaty, 1990). Moreover, AHP utilizes pairwise comparisons, relying on the assessment of SME's to establish priority (Saaty, 2008). The process of AHP enables the user to categorize multiple independent variables based on the variables' ability to influence, and positively impact the organization. The framework of

AHP is transferable, thereby allowing for the development of institution-specific solutions.

In selecting AHP as a method of prioritizing research, the author had to address the tradeoff between a precise calculation of preference with the practical usability of the tool. A distinguishing benefit of AHP as a decision support archetype is the pairwise comparison, allowing the decision-maker the ability to assign value and thus prioritize multiple variables. The challenge of adopting AHP as a decision method, however, is the eigenvalue method of calculating priorities (Saaty and Hu, 1998), which for some users presents a challenge. Using this traditional method, the final decision is ultimately a mathematical calculation accounting for both a weighted distribution and conditioning factors.

For a large-scale institution, a proper pairwise comparison may quickly become labor intensive as facility SME's are asked to evaluate and quantify hundreds of variables. Moreover, the perceived complexity of the mathematical calculations may inhibit adoption. Consequently, practitioners may revert to their initial subjective assessment rather than adopt the numerical pair-wise valuation (Scholz, 1983). This concern, if realized, would negate the whole motivation of developing a structured DST.

In response to this challenge, the author chose a modified AHP structure that utilizes a visual 5 stage (very high, high, moderate, low, very low) linear multi-attribute selection method to mitigate potential challenges related to the complexity that might be present for decision-makers (Baloi and Price, 2003; Boucher and Gogus, 2002). The resulting DST establishes priority through visual assessment enabling the efficient

prioritization of work. The simplicity a visual analytical hierarchy process (VAHP) of assessment was selected to support the practical adoption of the proposed tool. Moreover, a linear VAHP selection method provides a consistent and repeatable platform for evaluating maintenance, improving the accuracy of the work order prioritization.

### 3.2.3    Step 3: Constructing a Decision Framework

A total of four primary categories were selected to serve as the principal framework for the DST: Influence, Building Status, Building Usage, and Institutional Enabler(s). Each category was selected based on either the universal application of the category or prior academic research establishing a positive relationship between the category and the successful operations of a facility. Furthermore, this structure allows the DST to first address operational (macro-level) categories of performance before narrowing the focus to those factors enabling operational success.

Within each category resides a secondary layer of variables specific to the targeted institution. This secondary layer of variables provides FM and operational administration the opportunity to customize the DST to the specific needs of their organization while also providing a platform by which to prioritize work orders aligned with the strategic objectives of that organization. The secondary variables within each category, for this study, are aligned with K-12 education.

Central to the development of each category is defining the voice of the customer (Griffin and Hauser, 1993). The prioritization of work orders is a method for value creation and responds to the needs of the customer. The allocation of resources, aligned with facility attributes is, therefore, prioritized according to those work orders that are

systemic to the success of the customer, synergistic with the objectives of the organization, or at some lesser level discrete (Palmer, 2004). For K-12 education, defining who the customer may or may not be can be difficult and may be politically charged. This study defines the Teacher-Student engagement as the customer, given that academic performance is the primary measure of success for academic districts (Christenson et al., 2012; Wang et al., 1997). The term systemic, specific to K-12 facility maintenance, addresses those facility characteristics with the most significant impact on the delivery of education. The following paragraphs summarize the process of identifying each category and subsequently selecting the variables.

The first category, 'Influence,' addresses "who is most likely to benefit from completing the work order and what is their role in creating value?" Traditionally the owner is responsible for creating value and is, therefore, the primary stakeholder or customer in the maintenance and operations of a facility (Alshubbak et al., 2015). Similarly, the selection of Influence as the primary category of the decision support framework recognizes the department, team, or individuals most capable of generating value for the organization. A report by the Mid-Atlantic lab for student success identified "Classroom Management" and "Student/Teacher Social Interaction" as two primary factors in the delivery of education (Wang et al., 1997). Hence, concerning K-12 education, the Teacher was identified as the primary customer having the most influence generating value for an academic district and is, therefore, FM's primary customer (Griffin and Hauser, 1993). The priority given to other organizational roles and responsibility, such as district or school administration and support staff, declines as the intended work moves further away from the teacher-student engagement.

The second category, 'Building Status,' represents the relative importance of the building or space regarding function and usage (Shen, 1997; Spedding and Holmes, 1994). The category, therefore, prioritizes work orders that have the most significant effect on the overall institution. For example, building systems such as cooling towers or boilers may service an entire site, warranting a higher FM priority. By contrast, the risk associated with the failure of a lighting ballast may be limited to the given range of the failed light. Moreover, the surrounding light fixtures or natural day-lighting may supplement the failing ballast. Therefore, a work order associated with an overhead fluorescent light may, therefore, be a lower priority than a work order associated with primary building systems, such as cooling towers. Concerning K-12 education, work orders impacting an overall campus are assigned a higher priority than an alternate work order that may service a building, a classroom, or a single administrative office, (see Figure 8).
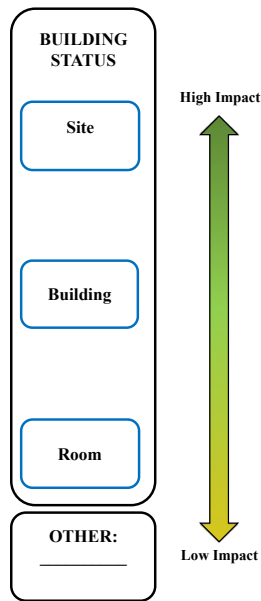


Figure 8: Primary Category, Building Status
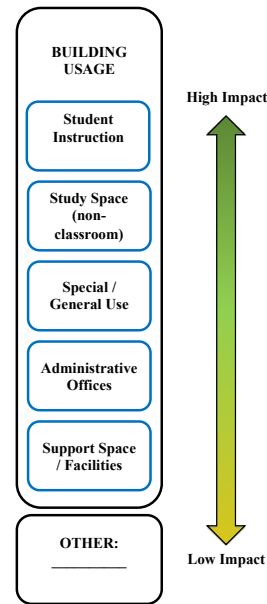


Figure 9: Primary Category, Building Usage

'Building Usage', the third category (see Figure 9), represents the importance of the building function and answers how a given space contributes to an organization's overall productivity, prioritizing those spaces having a use most closely aligned with the organization's mission (Shen et al., 1998; Spedding and Holmes, 1994). Prior research suggests that most real estate officers do not integrate their activities with the activities of other functional areas (Gibler et al., 2002). Therefore, this category encourages decision-makers to actively consider how a given work order will impact the function of the facility. For example, a manufacturer might prioritize the up-time of the manufacturing floor thereby maximizing operational output. Similarly, for prioritizing education, this category recognized the importance of instructional spaces over non-instructional (administrative offices, multi-purpose space, support facilities), as instructional spaces have the most significant impact on student performance (Earthman and Lemasters, 1998, 2009; Tanner, 2008). Support spaces and support facilities are assigned the lowest priority, which may include such areas as transportation yards, central storerooms, janitorial closets, utility yards, or other tertiary spaces supporting the district (Cyros and Korb, 2006).

The fourth category of the decision framework leverages the findings of the literature review (step one of the methodology) to identify and categorize scholarly publications that report a relationship between facility condition and academic outcomes. Furthermore, facility infrastructure or improvements to the existing facility infrastructure, architectural elements, or building envelope shown to have a positive effect on academic climate or culture were identified (Ariani, 2015; Bejou, 2013; Gonder and Hymes, 1994; Hines, 1996). The resulting category, 'Institutional Enabler(s),' prioritizes the findings of

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Table 4: Academic research citations attributing academic performance with facility conditions

| Academic Enabler | Percentage of Citations |
|---|---|
| Play | 21% |
| Instructional Space | 19% |
| Technology Zone | 17% |
| Reference Space | 14% |
| Creative Space | 9.0% |
| Comfort | 5.0% |
| Landscaping | 4.0% |
| Cafeteria | 1.0% |
| Lighting | 1.0% |
| Magnet School | 1.0% |
| Paint / Patch | 1.0% |
| Room Equipment and Furnishings | 1.0% |
| Air Quality | 1.0% |
| Circulation | 1.0% |
| Electrical | 1.0% |
| Hardware | 1.0% |
| Safe Place | 1.0% |
| Visualization | 1.0% |
| Bathroom | 0.40% |
| Acoustics | 0.27% |
| Plumbing | 0.24% |
| Overall Impression | 0.17% |
| Natural Lighting | 0.13% |
| Temperature Control | 0.10% |
| Quiet Room | 0.07% |
| Activity Pockets | 0.05% |
| Learning Zone | 0.02% |
| **Total** | **100%** |

the literature review according to the volume of scholarly publications (see Table 4). In doing so, this study provides a method for assessing a work order based on that work order's potential impact to the building elements most often reported to benefit education.

To better illustrate this structure, of the scholarly publications identified through the literature review, 17% addressed Technology Zones and academic outcomes. This hierarchy is not claiming that completion of the work order will result in a pre-determined percentage of improvement in academic outcomes. Furthermore, the author is not suggesting that Technology Zones are more significant than building systems or other building attributes cited less frequently. Instead, the structure places a value on a work order associated with Technology Zones based on the prevalence of academic research correlating Technology Zones with academic outcomes.

Having identified institutional enablers specific to K-12 education, the author then established a hierarchy aligned with a visual AHP providing Facility Managers a method to quickly prioritize a given work order leveraging prior research (see Figure 10).

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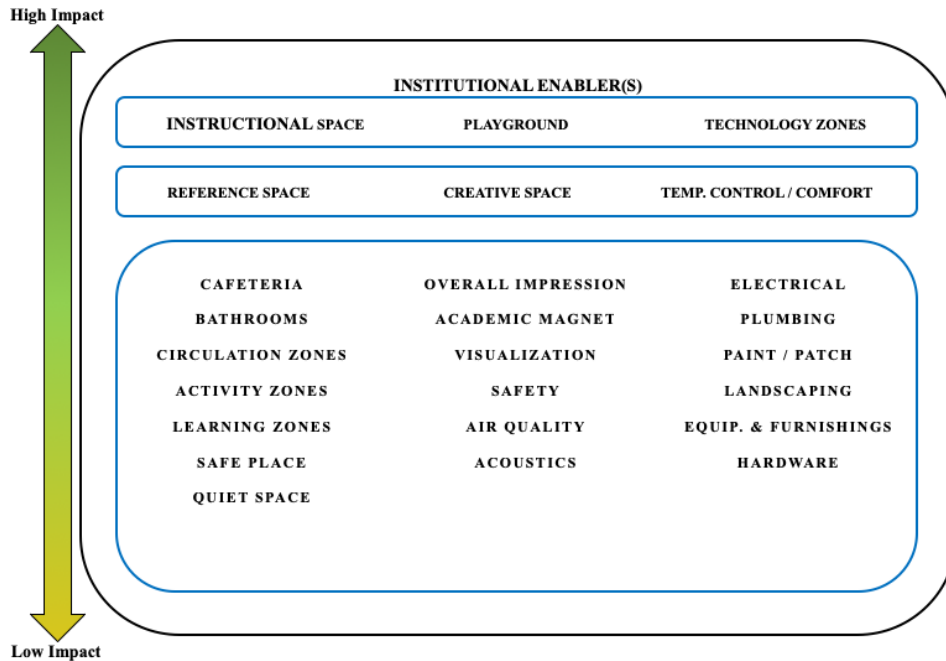
Figure 10: Primary Category 4, Academic Enablers

Each of the four categories as detailed in this methodology are intended to be universally applied to institutional facilities. The aim of identifying variables within each category is to provide a customizable framework that could enable the efficient prioritization of work orders while introducing to the facility operations team research-based factors that may not have otherwise been considered. The purpose of this research is not to elicit 100% agreement on all work orders nor is the intent to provide a comprehensive list of variables. Use of the DST is intended to create consistent relative value for the institution as it incorporates the subject matter expertise of facility management, addresses the voice of the client, integrates relevant academic research, and aligns with the strategic direction of the institution. In other words, identifying more elements of higher priority on the DST should guide thinking for work orders that were otherwise seemingly similar.

**3.2.3.1 Scope of Work**

For this study and the intent of the DST, work orders defined as major repairs, including "Emergency" or "Critical Break-Fix" are out of scope and not intended to be prioritized with the aid of the DST. Response times for such work orders are of the highest priority and may, in fact, proceed without the formal documentation of a work order. The issues that constitute a major repair are defined and developed by the parent institution as a method to mitigate risk. Although the definition of a major repair is subjective according to the needs of the institution, the intent to signify a heightened sense of priority and a timely response is common in FM (Lewis and Payant, 2007). For these reasons, the DST methodology excludes Emergency or Critical issues, focusing instead on those work orders defined by an organization as routine or regular.

### 3.2.4   Step 4: Targeted Focus Group

After constructing the framework, the fourth and final step was to validate whether current practitioners would understand the developed DST for prioritizing routine work. A targeted focus group was convened for validating the proposed DST using a non-directed, yet controlled, discussion (Flores and Alonso, 1995). The use of a focus group was intended to provide a more in-depth perspective resulting from the interaction between the moderator and the participants (Lederman, 1990). A moderator was selected and charged with facilitating the discussion following the study's objectives. For this study, the focus group participants collectively formed a "purposive" sample of the target population, which in this case references facility maintenance personnel responsible for the prioritization of work orders (Lederman, 1990). The focus group also served a phenomenological function, sharing their perceptions and experiences specific to the prioritization of work (Moustakas, 1994).

The targeted focus group included facility maintenance and operation professionals from Arizona State University. The framework of the tool is intended to be universally applied to large-scale institutional facilities, although the research utilizes K-12 education as an area of focus. Soliciting critical feedback from the university's Facility Maintenance and Operations staff provided a format that was both institutional in scale and transferable concerning the complexity and organizational mission. Focus group participants were understood to be SME's in their field. The individual responsibilities of participants included those with management responsibilities to include the allocation of resources for prioritizing and completing work orders. In total, 5 Facility Administrators volunteered to participate in the targeted focus group, which utilized a snowball sampling technique (Burgess, 1984).

Participants were asked to prioritize five example work orders representative of routine K-12 facility maintenance. The participants then responded to questions concerning the logic, viability, and practical application of the DST. Discussion questions encouraged dialog specific to the construction and functionality of the tool such as:

- How might one edit the DST to improve the ease of use and/or logic to enhance the tool making it a more intuitive experience? And;

- What does the process of prioritizing work orders involve and what factors are considered?

Additional probing questions addressed the practical application of the DST:

- Please explain how the introduction of a DST might influence resource allocation. And;

- How might the tool align with the institution's objectives?

Focus group discussions were audio recorded for later transcription. Transcripts were coded manually using NVivo® software to produce a categorization of data thereby expanding upon the moderator's notations to add clarity and specifics. The process of overlaying the notes and audio transcript aligns with the "note-expansion" approach enabling a more rigorous understanding of the notes (Bertrand, 1992). Transcript coding was then used to develop primary themes and learnings. Several subcategories were developed further within the themes to provide greater context.

Primary themes and learnings from the focus group were used to modify and improve the developed DST. Additionally, the author reviewed specific recommendations or directives from the participants for constructively enhancing the tool.

## 3.2.5    Prioritizing a Routine Work Order

In this section, routine work orders are used to explain and illustrate the implementation process of the proposed visual AHP multi-criteria decision support methodology. An initial example is provided. Then five actual work orders are prioritized by a focus group of industry professionals using the DST methodology.

## 3.2.6    Illustrative Example

A routine work order is provided to better illustrate the utilization of the proposed visual AHP DST, (see Table 5). Suppose a work order was generated by an employee and must now be reviewed by an operations administrator or someone with similar

responsibilities charged with the prioritization of work. According to the steps described

herein, the individual decision-maker must evaluate multiple decision alternatives

utilizing the framework of the DST as a method of categorizing and understanding each

alternative.

Table 5: Example of a routine work order submitted by an academic district

| Work Order # | OP-142027 | | Request Date | 09/25/2017 11:55 |
|---|---|---|---|---|
| Location ID | GHSGND – PRKG LOT | | Completion Date | |
| WO Type Description | Corrective Maintenance | | | |
| Request | Channel drain behind kitchen falling apart, can we have it repaired/replaced | | Total Hours | |
| Priority Description | Routine | | Total Cost | 0 |
| Item Description | Item Number | Item Type | Task Code | Task Description |
| Parking Lot-PRKG Lot | GHSGND-PRKG LOT | Area | PL11020 | Inspection |

The scope of the work order, "flush valve in the Men's restroom," has a direct

impact on the educational staff, male teachers (Influence $C_1$), working within the building

where the flush value has presumably failed. It may be reasonable to expect there is more

than one faculty Men's restroom servicing the campus. At this point, however, it is

unclear if this is the only faculty Men's restroom servicing the building (Building Status

$C_2$). Restrooms are not considered to be "instructional spaces," nor would the restroom be

"administrative." Therefore, the function of the Men's restroom, building usage $C_3$, can

be defined as "Special / General Use." Within this category, and specific to K-12

education, the term "Special / General Use" may apply to such areas as administrative

offices, restrooms, multi-purpose rooms or similar tertiary spaces available to faculty,

students, and staff supporting the primary function of the institution (Cyros and Korb,

2006).

The fourth category in the DST (Institutional Enabler $C_4$) includes those factors identified through a comprehensive literature review that meet the criteria of the filters and thus imply a relationship between academic performance and facility condition. Here the DST leverages the professional experience of the Facility Manager given the work order may address "Plumbing" as a building system and "Bathroom" as a quality of the campus.

In summary, completing the DST and prioritizing the work accordingly may result in a visual assessment of "Moderate" to "High" given the aggregate score of each of the four categories (see Figure 11). In practice, however, the tool requires the input of the Facility Manager to be successful. For example, specific to this work order, the building may have multiple Men's restrooms, there may be no male employees at this school, or the leak may simply be overstated given the experience of the service technician. Regardless, the DST methodology requires both a subjective and objective assessment of the work order to appropriately prioritize the work.
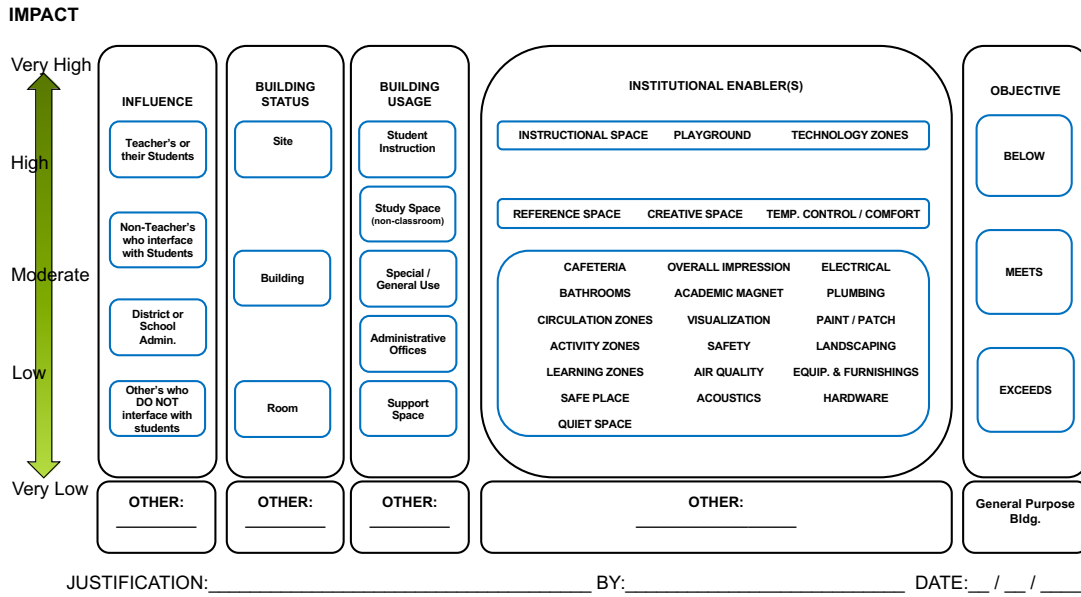
*Figure 11*: Decision support tool for prioritizing routine facility maintenance, K-12 academic districts

## 3.3    Findings and Discussion

To verify the effectiveness of the proposed DST, work orders representing routine facility maintenance at a K-12 district were presented to the focus group. For comparison purposes, all work orders were obtained from a participating academic district and provided to the focus group with limited edits to anonymize the source of the original work orders. The focus group included five Facility Managers responsible for decision-making concerning routine facility maintenance and repair. The participants of the focus group $FG_P$ (P=1, …, 5) were asked to evaluate five work orders $WO_n$ (n=1, …, 5) utilizing the four categories as presented in the DST, where $C_1$ represents 'Influence', $C_2$ represents 'Building Status', $C_3$ represents 'Building Usage', and $C_4$ represents 'Institutional Enabler.'

The prioritization activity was purposefully designed to familiarize the

participants with each of the four categories, introducing the variables within each category. Work order "1" was intended to be understood as a "Very High" priority work order, given the scope of work and by virtue that all four categories should theoretically be marked as such on the DST. In contrast, work order "2" was purposefully selected as "Very Low," again reflecting the intent of the DST. Work order "3" addressed a fire sprinkler system and was intended to be identified as an "Emergency" repair and thereby omitted from the results. According to the methodology, matters of Fire/ Life Safety are deemed Emergency and of the highest priority. The objective of the DST is to prioritize those work orders that may be categorized as routine and prioritized subjectively at the discretion of the institution. The observed results indicate the DST was effectively used and understood by the participants, without requiring clarification. Participants were quickly able to translate the scope of work, as documented in the work order, to the DST format. At this stage in the research, the order of prioritization is subordinate to the process of utilizing the DST. The findings suggest the DST successfully functioned as a usable and efficient method for prioritizing work orders.

Having completed the prioritization exercise, participants were asked a series of qualitative questions intended to solicit constructive dialog within the focus group. According to the panel, the format and process of completing the DST were understood to be intuitive and user-friendly. Once the method of evaluating the visual AHP was understood, participants estimated the time to complete a DST specific to a given work order, would "*not add more than 15 seconds to the process.*" The focus group did express reservations, however, with the volume of work orders entered into the asset management system and that point at which the DST would become a burden on the system

administrator or Functional Area Lead tasked with prioritizing work orders. While this feedback makes sense from a practical perspective, it also seems to highlight the underlying motivation for why a DST would be necessary with such a plethora of work orders to handle. Furthermore, when considering the types of tasks necessary to schedule a work order currently, the estimated 15 additional seconds to complete this DST may not be unreasonable if it were to be broadly implemented.

The focus group agreed on the four primary categories of Influence, Building Status, Building Usage, and Institutional Enablers to accurately frame the scope and responsibilities of a FM operation. Moreover, the focus group recognized the importance of modifying the DST according to the needs of an institution while preserving the overall structure of the tool as significant. In doing so, the transferability of the tool resonated with the focus group and was generally understood to be of benefit. Furthermore, the simplicity of the design was recognized to be a positive attribute, adding to the transferability of the tool. One participant noted "*I like the simplicity*," expressing that as an institutional facility becomes more complicated the tendency of the technician is to complicate the prioritization of the work orders in the queue. The DST's framework encourages the technician to simplify the process, resulting in a more objective assessment of the work order.

The findings from the purposive focus group suggest that while the DST is transferable between institutional facilities, the subcategories or determinants within each category are dependent on the nature and function of the institution. While this limits the transferability of the specific DST developed by the author, it provides further validation to the DST process development defined in this paper (i.e., steps 1-3), which require

future researchers to first identify or define institutional enablers that are appropriate to a new type of institution. As the needs and characteristics of an organization are unique identifiers, so too are the forces which govern the prioritization of work.

The allocation of resources and ultimately the prioritization of work is likely to be influenced by the function of the institution, geographic layout of the building infrastructure, the complexity of the building systems, and the personal experience or ability of the technician charged with prioritizing work. While this might initially seem like a limitation for a DST to rely partly on potentially subjective judgments of technicians, this approach also allows for considerations related to the context of a specific work order that may be nuanced and not directly considered by the previous research findings, which are incorporated into the DST. There are, in fact, many competing variables that factor into the prioritization of work. The involvement of human judgment in this process may help to handle qualitative assessments that a strictly quantitative approach might incorrectly assess.

### 3.4 Limitation

The objective of this paper is to propose a methodology illustrating the process and development of a DST for the prioritization of routine facility maintenance. Although the results suggest the process can successfully lead to a DST that is understood by practitioners, the author cannot at this time claim the extent to which the proposed DST influences the decision-making process.

A working prototype of the DST, built upon the results of this study and in cooperation with facility maintenance and operations SME's, will be developed to serve

as a basis for a counterbalance measures assessment. This next phase of research will A.) validate the prototype DST's ability to standardize the prioritization of work, and B.) assess the ability of the tool to influence the end users thought process when prioritizing routine facility maintenance requests.

## 3.5    Conclusion

This paper proposes a visual multi-criteria methodology for the prioritization of routine institutional facility maintenance. Regarding initial focus group testing results, it is clear that when utilizing differing work orders and the proposed structure of four primary categories, the proposed visual AHP methodology can effectively be used and understood to prioritize multi-criteria work orders. Furthermore, this process can support the development of a DST that is simple to use, which may offer value for practical implementation by organizations in the future. The findings documented in this paper suggest that the proposed visual AHP multi-criteria methodology has a potential application for the prioritization of routine institutional facility maintenance. The contribution of this paper is in providing a reusable methodology that aims to coalesce the findings of disparate research findings into an easy-to-use DST that allows practitioners to make evidence-based spending decisions about routine facility maintenance in order to improve overall institutional performance.

CHAPTER 4

EVIDENCE-BASED EDUCATIONAL FACILITY MANAGEMENT

The maintenance and operations of K-12 academic infrastructure in the United States represent a considerable cost for both State and the Federal government's and directly impacts the conditions of facilities where American students are educated. The importance of K-12 academic district facilities cannot be overstated in providing a foundation for the nation's civic and economic development. A 2001 paper commissioned by the Mid-Atlantic Institute for Student Success concluded that "when differences in individual ability are controlled, facility condition may impact student performance more than many social and economic variables (Lewis, 2001)." Similar studies from throughout the country echoed these findings (Buckley et al., 2004; Maxwell, 1999; Picus et al., 2005). The prioritization of routine building maintenance that has been shown to influence academic performance, creating long term-value, requires special consideration by facility operations and maintenance staff (Durán-Narucki, 2008; Earthman, 2002; Lemasters, 1997).

K-12 academic facility administrators face an extremely complicated task. Not only must they make complex decisions regarding the maintenance of district assets, but these decisions may be influenced by environmental factors such as limited data, the risk of building system failure, and declining indirect expense budgets. In the state of Arizona, Plant Maintenance and Operation spending when adjusted for inflation declined by 21% between 2003 and 2014 (Auditor General, 2016). During this same period, student K-12 enrollment in Arizona has increased by 26% (NCES, 2016). Arizona is not alone in its challenge to fund education. Across the nation, enrollment numbers have

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increased while per-pupil spending has declined (NCES, 2014; Snyder et al., 2016). In order for facility management teams to support effective educational environments, they must address work orders that provide the most significant return using any available funding.

The need for educational institutions to better support student performance has pushed educational researchers to study different attributes of the built environment to understand how those attributes impact learning. A large body of literature reports various potential benefits and drawbacks related to various building characteristics. For example, Earthman and Lemasters' research specifically addressed the condition of educational buildings and academic performance (Earthman, 2002; Lemasters, 1997), while other studies address the ability of specific building systems to influence educational outcomes (Cash, 1993; Schneider, 2002). Despite scholarly literature suggesting specific building attributes that may enable student performance, there is not clear evidence that academic facility operation and maintenance teams are effectively able to leverage this knowledge (Beauregard and Ayer, 2018). This may be due in large part to the disparate nature of reported findings related to educational environments and student performance. In other words, it may take years for a facility administrator to become versed in relevant publications in order to strategically prioritize spending based on student performance because there is not a simple method to apply these disparate findings quickly.

This paper evaluates a previously designed visual analytical hierarchy-based DST that coalesces the disparate research findings related to building attributes and student performance in order to guide work order prioritization (Beauregard and Ayer, 2019).

The DST provides a process for prioritizing routine work that is two-fold. First, the tool leverages prior academic research correlating specific facility conditions with measured academic performance. Second, the tool uses a visual analytical hierarchy process (Boucher and Gogus, 2002; Saaty, 2008) to enable the facility maintenance practitioner to leverage her or his unique experience when establishing the importance and subsequent priority of the work order. This paper addresses the following research questions: To what extent does the DST influence the prioritization of routine facility maintenance work orders? Moreover, in what contexts does the DST impact, or not impact prioritization?

Findings from this work will help K-12 institutions determine whether they should implement a similar DST, and also guide them to determine the context in which the use of this type of tool is appropriate. This can lead to more consistent and predictable decision making in K-12 organizations. Beyond offering value for K-12 education, if future studies leverage the previously-defined methodology for developing this DST (Beauregard and Ayer, 2019), the findings from this paper may offer evidence-based strategies for supporting spending decisions in other types of institutional organizations. The findings from this paper will help those organizations determine how they should implement the tool to yield prioritized work orders benefiting specific performance goals.

## 4.1     Background

A 1999 study commissioned by the U.S. Department of Education National Center for Educational Statistics (NCES) found that approximately one-quarter of the nation's schools required extensive repairs (US Department of Education, 1999). The nation's General Accounting Office (GAO) agreed, estimating the cost of building

infrastructure maintenance and repair to exceed $100 billion (US GAO, 1996). More than a decade later, the American Society of Civil Engineers (ASCE) estimated the cost to bring the nation's K-12 educational facilities infrastructure up to acceptable standards exceeded $300 billion (ASCE, 2017). While there appears to be a consensus at the national level that significant K-12 facility funding is needed, the funding responsibility resides with the States, and secondarily, with individual communities.

Funding for school facilities dropped by approximately 50% since 2007 (Snyder et al., 2016). A study by the Center on Budget and Policy Priorities found that funding for K-12 education dropped below 2008 levels in 31 states (Leachman et al., 2016). During this same period, not only has academic enrollment continued to grow (Alexander and Lewis, 2014; NCES, 2014), but more pressure has been placed upon academic districts to increase in-class spending (Kumari and Dhull, 2017). As a result, Facility Administrators have to do more with less. Economic pressures have resulted in a shift to facility maintenance strategy, moving districts away from predictive and preventative maintenance towards a corrective maintenance strategy (Beauregard and Ayer, 2018).

### 4.1.1 Continuity

An essential factor for consideration when prioritizing work orders is the continuity within a facility maintenance organization. The process of prioritizing routine facility maintenance work orders is largely subjective (Atkin and Brooks, 2014; Beauregard and Ayer, 2018). While the technicians interviewed in these studies frequently reported making decisions based on what is best for the students, their own experience guided the prioritization process, which can lead to inconsistencies between decision-makers.

An empirical study of facility maintenance and operations determined the profession was "at risk," given the rate of attrition and the absence of an adequate professional pipeline for qualified facility administrators (Sullivan et al., 2010). If Sullivan's assessment is accurate, and funding for plant operations and maintenance continues to decline (ASCE, 2017; NCES, 2016), the profession can expect a higher degree of attrition specific to the full-time employees tasked with prioritizing work. This further highlights the need for a strategic work order prioritization system that can retain critical institutional memory to balance attrition and turnover.

Successfully maintaining institutional infrastructure requires multifaceted decisions involving multiple stakeholders who, at times, may have divergent objectives (Lewis and Payant, 2007). To successfully manage a K-12 district building infrastructure, Facility Administrators must quickly determine who will benefit most from servicing a building system and what their role in creating value for the district may be (Alshubbak et al., 2015). Therefore, Facility Administrators will benefit from an objective DST enabling the optimization and allocation of limited resources that is not solely dependent on human intuition.

### 4.1.2 Decision Support Tool

DST's provide a structured and repeatable process intended to generate value for the organization. Utilizing a DST enables the effective use of limited district resources, aligning those factors that optimize organizational outcomes while providing a structure for improved institutional performance.

Prior academic research acknowledges the complex relationships between building systems, building components, and the challenges faced by facility operation

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and maintenance organizations (Harris, 1996; Lavy and Bilbo, 2009; Shohet and Perelstein, 2004). Categorizing the components of building infrastructure into a hierarchical framework of functional systems, risk, and opportunity is central to the application of the analytical hierarchy process methodology (AHP) (Saaty, 1996). This study presents the AHP methodology facilitating the structure of the DST.

AHP has been used to enable objective decision making in site selection (Alavi et al., 2013; Mohajeri and Amin, 2010; Yalcin, 2008), project delivery method selection (Al Khalil, 2002; Mahdi and Alreshaid, 2005), and supplier selection (Fong and Choi, 2000; Sarkis and Talluri, 2002). Several studies have similarly used AHP to determine the most effective prioritization of ongoing facility maintenance (Shen et al., 1998; Shen and Spedding, 1998; Spedding, 1994) and to assess existing educational facilities (Masood Badri et al., 2016). These studies are similar in their use of existing conditions as a method of building hierarchies of criteria and their use of pairwise analysis to facilitate any final decision. By contrast, the use of VAHP to enable the practical application of the DST differentiates this study from prior academic research. Moreover, the coalescence of disparate academic studies identifying building factors that may enable academic performance further distinguish this study from prior research.

### 4.1.3 Previously-Developed Decision Support Tool

The author developed a DST employing VAHP to organize disparate academic research and professional experience for the prioritization of facility operations and maintenance spending (Beauregard and Ayer, 2019). The previous paper provides a reusable methodology that may aid future developers in creating a similar type of tool for other applications. Facility Administrator interviews were used to validate the

methodology, ensuring the tool was understandable and logical by current practitioners. However, the resulting DST was not empirically tested. This paper aims to test it with K-12 facility practitioners to determine how it impacts decision-making.

The developed DST's structure consists of four primary decision categories, which collectively serve as the principal framework for the DST:

1. *Influence* identifies who is most likely to benefit from the completed work order;

2. *Building Status* represents the relative importance of the building or space;

3. *Building Usage* addresses how a building or space contributes to an organization's overall productivity; and,

4. *Institutional Enabler* leverages research literature to identify building attributes or conditions that are consistently reported as beneficial for organizational outcomes.

The DST (see Figure 12, adapted from Beauregard and Ayer, 2019) was designed to apply to K-12 organizations, but the methodology and framework used to create the tool are intended to be universally applicable to any institutional facility (Beauregard and Ayer, 2019). The variables within each of the four categories are customizable to meet the specific needs of the organization or institution.

*Figure 12*: Decision support tool for the prioritization of routine maintenance supporting K-12 academic building infrastructure (adapted from Beauregard and Ayer, 2019

Using this DST, Facility Administrators read work orders and select the relevant decision factor(s) they believe relate to the work order. Items that are listed higher in the tool correspond to topics that are most frequently cited as having a positive impact on educational performance. After reviewing and selecting items from the four categories listed, the user can visually determine where the majority of their selections are located in the tool and mark the location on the "Impact" continuum that they believe indicates the average location of their selections, as shown in Figure 13. This paper explores how educational facilities practitioners' use of the tool impacts their prioritization of work orders.

| Work Order # | OP-142027 | | Request Date | 09/25/2017 11:55 |
| Location ID | GHSGND – PRKG LOT | | Completion Date | |
| WO Type Description | Corrective Maintenance | | | |
| Request | Channel drain behind kitchen falling apart, can we have it repaired/replaced | | Total Hours | |
| Priority Description | Routine | | Total Cost | 0 |
| Item Description | Item Number | Item Type | Task Code | Task Description |
| Parking Lot-PRKG Lot | GHSGND-PRKG LOT | Area | PL11020 | Inspection |



*Figure 13:* Example of a work order with an adapted decision support tool for the prioritization of routine maintenance (Beauregard and Ayer, 2019)

## 4.2    Methodology

A representative sample of work orders that should theoretically be prioritized differently was identified to evaluate the extent to which the DST impacts decision making. A modified repeated measures crossover method was applied at the Washington Association of Maintenance and Operations Administrators (WAMOA) annual conference in 2018 to test decision making in various contexts, with and without the

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DST. The collected data was analyzed to identify results and noteworthy trends. The subsequent sections detail this methodological process.

### 4.2.1 Work Order Selection

A representative sample of routine work orders that collectively illustrate the scope, technical skill set, and breadth of facility operations supporting a K-12 academic district was required to evaluate the DST adequately. A sample of 30 work orders was purposefully selected for this study, according to the strategy defined in subsequent paragraphs. All work orders were selected from a large sample of actual work orders that were exported from a partnering K-12 institution's asset management software. The only modifications made to the content involved removing specific school names or other identifying information that could enable future participants to determine the source of the work orders.

The scope of work orders addressed by the proposed DST was limited to those work orders categorized as regular and routine. For this research, work orders designated as "Emergency Response" or "Critical" were determined to be out-of-scope as they may require immediate attention, making these work orders a top priority and thereby eluding the typical prioritization process.

However, to better understand how Facility Administrators would disposition a work order that could, in theory, be interpreted as "Critical", the author deliberately reclassified two of the thirty work orders as Fire Life Safety. In doing so, the author is not claiming that either of these work orders is or is not a life safety corrective repair, rather, it is plausible that another academic district may have considered one or both to be of a higher priority. Editing the two work orders in this way acknowledged alternative

interpretations of the scope of work while providing a context to observe if Facility

Administrators would recognize the potential risk associated with the work. Accordingly,

the scope of omitted work orders includes:

- Disruption to Service
- Federal or State Compliance
- Structural or Building System Failure
- Critical Environment
- Security

Finally, the purposeful sample of work orders included at least one work order

reflecting the following contexts (providing a representative sample for the study):

- Administratively generated work order;

- Teacher-generated work order; and,

- Repair to a supplemental space.

After selecting 30 work orders for the study, the purposeful sample was separated

further into two sets of 15. Additional care was taken to ensure that the scope of work and

context of the work orders in each set was equally represented. These two sets of work

orders provided two completely different packets of work orders for evaluation with and

without the DST. Structuring the activity in this way eliminated the chance that participants

using the DST would be influenced by their prior evaluation of the same work order when

they did not have the tool. Furthermore, participants were divided in half and randomly

assigned one of the two packets of 15 work orders. Half of the participants began with

packet A, and the other half of participants began with packet B. This helped to reduce any

potential differences in their decision making that may have been related to the specific

work orders chosen. Table 6 further illustrates this methodology.

Table 6: Distribution of work orders for the repeated measures crossover study.

| Distribution of Work Orders | First Envelope Provided to Participants | Second Envelope Provided to Participants |
|---|---|---|
| Group 1: Half of the participants randomly assigned to treatment group | Packet A (Work Order No. 1-15) | Packet B (Work Order No. 16-30) |
| Group 2: The residual participants randomly assigned to treatment group | Packet B (Work Order No. 16-30) | Packet A (Work Order No. 1-15) |

### 4.2.2   Study Participants

Participants for this work were recruited from the 2018 WAMOA annual conference. This event brings together facility operation and maintenance administrators representing a variety of K-12 educational districts from throughout the state of Washington. The participants consisted of experienced facility management professionals responsible for prioritizing routine work orders.

Although there may be complete or more subtle differences between the building infrastructure and facility conditions of academic districts, there is no evidence to suggest the condition of educational facilities or the experience of facility personnel would materially change state-to-state. For example, both Arizona and Washington educate approximately one-million K-12 students in 206 and 294 school districts respectively. In 2013 Arizona spent approximately $894 per student for Plant maintenance and Operations, or roughly $6.44 per gross square foot of educational facilities. By contrast, Washing spent $893 per student or $6.92 per gross square foot (Alexander and Lewis, 2014; NCES, 2014). Therefore, the volunteer WAMOA Facility Administrators recruited

to participate in this study represent a cross-section of districts, similar to that of Arizona, enabling the study to evaluate the DST's impact on work order prioritization.

### 4.2.3 Experimental Procedure

Participants were provided informed consent forms upon arrival following Institutional Review Board (IRB) requirements. The participants then completed pre-activity questionnaires intended to provide an understanding of their experience, technical expertise (functional area), and their respective school district strategic goals.

Next, participants were introduced to the work order prioritization activity consisting of two main prioritization exercises where participants evaluated and prioritized work orders, with and without the DST. In the first exercise, participants simply prioritized the work orders according to their judgment and experience without the DST. In the second exercise, participants prioritized work orders utilizing the DST in several contexts that strategically included or removed opportunities to be influenced by their subjective judgment. This helped to isolate the specific contexts in which the DST affected decision making and also allowed for a comparison of these contexts to the initial subjective decisions, which has been reported as the predominant mode of work order prioritization in K-12 organizations (Atkin and Brooks, 2014; Beauregard and Ayer, 2018). The subsequent paragraphs detail these prioritization activities.

### 4.2.4 Subjective Prioritization ("R1")

For the first prioritization (Subjective Prioritization R1), equal portions of participants were randomly assigned work orders in either Packet A or Packet B. Regardless of the packet assigned, all participants were asked to read their given work orders and then prioritize them based on the extent to which they believed the orders

would positively impact a K-12 learning environment, according to their own professional experience. Participants were asked to organize the 15 work orders so that the top work order represented their highest perceived level of impact and the bottom work order represented the lowest perceived level of impact. Next, participants numbered their work orders from 1 (highest priority) to 15 (lowest priority) to ensure that their ranking decisions were accurately interpreted. This initial prioritization process did not introduce the DST to participants. Rather, it was intended to replicate the type of unstructured prioritization process that is currently performed in K-12 institutions (Beauregard and Ayer, 2018).

### 4.2.5 Prioritization with Decision Support Tool ("R2")

After completing the initial prioritization exercise, participants engaged in a second prioritization exercise utilizing the DST in several contexts. Before beginning, the DST was introduced to participants to demonstrate the process of using the tool through several example work orders. None of the example work orders presented were included in the packets distributed to participants; they simply illustrated the process of filling out the DST. Before participants evaluated any work orders on their own, a brief discussion was held to answer any questions raised by participants. After all of the questions were answered, participants began the second work order prioritization exercise.

In this second exercise with the DST, participants reviewed a different packet of 15 work orders than in the first exercise (i.e., if they started by reviewing Packet A, they were provided with Packet B and vice versa). This strategy allowed all work orders to be reviewed twice: once with the DST and once without it. It also allowed all participants to organize a different set of work orders in each prioritization exercise. Structuring the

activity in such a way forced the participants to consider each work order and not merely recall and duplicate their prioritization of a work order from the first exercise.

**4.2.5.1 Assessing Impact Based on Decision Support Tool ("R2-Impact Assessment")**

First, participants reviewed the work orders and identified the relevant decision factors in each DST category they believed would be impacted by the work order. They also selected a point on the *impact* continuum at the right side of the DST, based on the critical mass of individual decision factors selected in each category. While participants defined the impact for each work order, they were instructed not to assign a priority to the work orders (i.e., they assigned a level of importance, but they did not determine whether one work order was a higher or lower priority than another work order). Instead, they merely reviewed all work orders in the given order of the packet and assigned levels of impact.

**4.2.5.2 Administrative Prioritization Based on Impact Level Identified ("R2-Impact Ranking")**

After assigning levels of impact (R2-Impact Assessment), participants exchanged their packets of work orders with another participant to re-order the work orders based on impact (R2-Impact Ranking). After exchanging packets, each participant examined the point of "impact" selected by their peer and organized the fifteen work orders based only on the location marked on the impact continuum on the DST. In other words, they arranged the work orders placing the work order with the highest point of impact at the top of the pile and the work order with the lowest point of impact at the bottom of the pile. During this administrative activity, participants were only asked to arrange the work orders based on the identified point of impact, and not to take time to read the work order

or provide their subjective judgment. Theoretically, this process of re-organizing work orders based only on the point of impact could have been performed by the original reviewers from R2-Impact Assessment, but it is very likely that their prior opinions from reviewing the initial work orders may have subconsciously influenced their behavior. By exchanging work orders with a peer, the study aimed to reduce subconscious bias by forcing participants to organize a different set of work orders for which they had no involvement in evaluating. After the participants organized the work orders according to the identified impact noted, the work orders were numbered and returned to the original evaluator.

**4.2.5.3 Comprehensive Prioritization Based on Impact and Experience**

**("R2-Comprehensive Ranking")**

Once the participants received their re-organized stack of work orders (from R2-Impact Ranking), they had a final opportunity to change the prioritization of work orders, based not only on impact but also using their subjective experience. This final organization of work orders (R2-Comprehensive Ranking) allowed participants to consider both the ranking of the work order determined by their objective responses from the DST, but also their personal experience and perceptions, similar to how they completed the initial, subjective prioritization exercise. The process of this activity allowed for the identification of any deviations between what the DST might suggest for a level of importance of a work order and what the participant's experience might suggest for a level of importance.

Furthermore, by re-organizing work orders by the level of impact during R2-Impact Ranking, the results illustrate instances where participants made deliberate

decisions to change a work order's priority away from what the DST might have indicated. This process enabled an understanding of the contexts in which participants used (or trusted) the DST as well as contexts where they did not.

Overall, the steps followed in this second prioritization process with the DST (i.e., R2-Impact Assessment; R2-Impact Ranking; and R2-Comprehensive Ranking) allowed the author to determine how varying levels of human involvement impact prioritization. For example, it is possible that if a decision-maker rated a work order as low importance based on the DST, but felt that it was highly significant based on her judgment, she might choose to rank the work order comparatively high, low, or somewhere in between. Regardless of her subjective decision, one cannot know what guided her thought process if this task were performed in a single step. Separating the prioritization process into distinct steps allows for an understanding of the contexts in which the DST impacted decision making and the contexts in which it did not.

### 4.2.6   Data Analysis

Data was collected and analyzed according to the two main prioritization exercises (R1 and R2). The first step in this analysis involved identifying the mean ($\mu$) priority ranking of each work order for both of the prioritization exercises and during each of the sub-activities involved in the second prioritization exercise with the DST. Identifying the mean for each activity quickly enabled the study to determine if the DST influenced decision making. A Mann-Whitney U test was then performed to measure the degree to which decision making changed.

Next, the data was standardized (see Figure 14) then the difference in mean priority for each of the 30 work orders was calculated. This process was performed for

the rankings obtained from R1, R2-Impact Ranking, and R2-Comprehensive Ranking. A Mann-Whitney U test was used to determine if the differences between prioritization activities were statistically significant to indicate a change in decision making. This test was appropriate for this study considering the data collected in each of the three prioritization activities was approximately continuous, having a prioritization score for each work order that ranged from 1 to 15. Furthermore, this statistical test may be used in instances where non-paired data, as collected in this study, is compared. This analysis approach enabled the author to determine the types of work orders for which the DST impacted decision-making.

$$x_{new} = \frac{x - \mu}{\sigma}$$

Where $\chi$ is the number to be standardized;
$\mu$ is the mean of the range;
$\sigma$ is the standard deviation of the range, and;
$x_{new}$ is the resulting standardized number.

*Figure 14*: Equation for standardizing the data set.

### 4.2.7   Pairwise Comparison and Sensitivity Testing

The structure of a VAHP-based decision support tool enabled participants to consider their own subjective opinions as well as the objective aim of the tool. By contrast, a pairwise comparison mitigates subjectivity by limiting user engagement in the evaluation to the weighting of decision categories. To further determine how subjective judgment may impact decision-making, a traditional AHP pairwise comparison was replicated based on the items that participants selected from the DST files submitted during the study. The comparison enabled the author to identify trends in responses based only on the selections within the decision factors.

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The analysis began by assigning all four decision categories a value of 1, meaning each decision category was of equal importance. Weighting the decision categories accordingly enabled the author to assess the importance and subsequent prioritization of the work orders based only on the decision factors selected by the Facility Administrator. The decision factor values within each category were defined based on their relative importance of each decision factor indicated by prior research (Beauregard and Ayer, 2019). For example, Academic Enabler decision factors, which were more consistently reported in the research literature (i.e., Technology Zones) were assigned a higher value of intensity importance than less frequently cited decision factors (i.e., Landscaping). Therefore, the resulting intensity importance for these decision factors aligned with their frequency of reporting. The process of a pairwise comparison is illustrated in Figure 15, using the decision factor *Influence* as an example (see Figure 15).

Next, the author wanted to understand how the DST's ability to influence decision making may be affected by changes in the perceived value of each decision category. While each decision category was initially rated equally, it is likely that some institutions would value and weight the factors differently, based on their unique needs. Therefore, a total of 154 sensitivity tests were performed, constituting a representative sample of the possible weighting combinations and providing a 95% confidence level in the results. For each test, the different decision category weights were intentionally changed to identify how these changes would impact the rankings yielded through the pairwise prioritization process. In each of these sensitivity tests, the categories of Influence, Building Status, Building Usage, and Academic Enablers were assigned all weightings ranging from 3 to 9. This process of selecting different intensities of importance followed the process used

in prior research (Wind and Saaty, 1980). Randomly assigning higher or lower weightings to the different decision categories helped to simulate the various ways that future users of a similar DST may value different categories more or less than others.

The process for calculating the importance of different work orders based on the specific items selected in the DST remained consistent for all pairwise analyses and all weightings explored through the sensitivity analysis. The value of each decision factor was calculated using a pairwise comparison. The selected decision factors were translated to a numerical value based on their frequency of reporting, according to Beauregard and Ayer (2019). Then the sum of the numerical values for the selected decision factors for each category was multiplied by the weight assigned to each decision category in all iterations of the sensitivity analysis. The resulting values for each category were totaled for each work order. Finally, the work orders were arranged according to these numerical totals. The order yielded through this study enabled the author to directly identify noteworthy trends in rating the same work orders with varying levels of subjectivity in the decision-making process. Furthermore, it enabled the author to identify the attributes involved in decision-making that consistently led to an agreement with or divergence from, the developed DST as compared to the other, more subjective, decision making contexts explored.

**①**

| Influence Decision Factors | Importance |
|---|---|
| Teachers or Their Students | 9 |
| Non-Teachers who interface with Students | 7 |
| District or School Administration | 5 |
| Others Who DO NOT Interface with Students | 3 |
| Other | 1 |

1. Determine the importance of each decision factor
2. Calculate the Intensity Importance for each decision factor and populate the pairwise comparison

**②**

$$Intensity\ Importance = \frac{Teachers\ or\ Their\ Students}{District\ or\ School\ Administration} = 1.80$$

$$Intensity\ Importance = \frac{District\ or\ School\ Administration}{Teacher\ or\ Their\ Students} = 0.56$$

**③** Sum each decision factor, left to right, then divide the total by the sum total of all decision factors to calculate the pairwise priorities

| Influence Decision Factors | Teachers or Their Students | Non-Teachers who interface with Students | District or School Admin. | Others Who DO NOT Interface with Students | Other |
|---|---|---|---|---|---|
| Teachers or Their Students | 1.00 | 1.29 | 1.80 | 3.00 | 9.00 |
| Non-Teachers who interface with Students | 0.78 | 1.00 | 1.40 | 2.33 | 7.00 |
| District or School Administration | 0.56 | 0.71 | 1.00 | 1.67 | 5.00 |
| Others Who DO NOT Interface with Students | 0.33 | 0.43 | 0.60 | 1.00 | 3.00 |
| Other | 0.11 | 0.14 | 0.20 | 0.33 | 1.00 |

| Influence Decision Factors | Priority Value |
|---|---|
| Teachers or Their Students | = (1.00 + 1.29 + 1.80 + 3.00 + 9.00)/44.68 = 0.360 |
| Non-Teachers who interface with Students | = (0.78 + 1.00 + 1.40 + 2.33 + 7.00)/44.68 = 0.280 |
| District or School Administration | = (0.56 + 0.71 + 1.00 + 1.67 + 5.00)/44.68 = 0.200 |
| Others Who DO NOT Interface with Students | = (0.33 + 0.43 + 0.60 + 1.00 + 3.00)/44.68 = 0.120 |
| Other | = (0.11 + 0.14 + 0.20 + 0.33 + 1.00)/44.68 = 0.04 |

**④**

| Influence Decision Factors | Priority Value |
|---|---|
| Teachers or Their Students | = 0.360 / 0.360 |
| Non-Teachers who interface with Students | = 0.280 / 0.360 |
| District or School Administration | = 0.200 / 0.360 |
| Others Who DO NOT Interface with Students | = 0.120 / 0.360 |
| Other | = 0.04 / 0.360 |

Figure 15: The process of pairwise comparison for Influence decision factors

## 4.3    Results

A total of thirty-two K-12 district Facility Administrators from across the state of Washington participated in the study. The sample population of Facility Administrators included both men and women representing multiple areas of technical expertise. Moreover, the professional experience of these participants ranged from those having less than five years of professional experience to Senior Facility Administrators having more than 15 years of experience in the profession.

The purpose of the DST, as defined by Beauregard and Ayer (2019) is to leverage prior empirical evidence correlating facility condition and academic performance to influence decision making. Therefore, this study aims to identify a change in the perceived priority of routine work orders and if that change was statistically significant. Such a finding would indicate the decisions support tool can consistently influence decision making, providing continuity and predictability to the process of prioritizing work orders.

A comparison of the mean work order ranking was performed for the initial subjective prioritization (R1) and for when the participants used the DST (R1 v R2-Impact Ranking and R1 v R2-Comprehensive Ranking). A fourth comparison was then made based on the participants' initial subjective prioritization (R1) and their selection of un-weighted decision factors when using the tool (R1 v Pairwise) (see Table 7). Results indicate an observed change in the prioritization rank, to a greater or lesser extent, for each of the work orders included in the study. However, table 7 also identifies in bold font those work orders re-prioritized to a statistically significant degree when utilizing the DST in any one of the three methods, R2-Comparison, R2-Impact or Pairwise.

Table 7: Comparison of the mean work order ranking with bold font indicating a statistically significant change in mean rank order prioritization.

| Functional Area | μ R1 | μ R2: Comprehensive Ranking | Δ% | μ R2: Impact Ranking | Δ% | μ Pairwise | Δ% |
|---|---|---|---|---|---|---|---|
| *Electrical* | 6.980 | 8.765 | -26% | 7.867 | -13% | **8.988** | **-29%** |
| Work Order 1 | 1.471 | 6.538 | -345% | 3.500 | -138% | **9.308** | **-533%** |
| 2 | 7.412 | 6.500 | 12% | 7.583 | -2% | **6.000** | **19%** |
| 3 | 13.000 | 11.786 | 9% | **12.636** | **3%** | 10.846 | 17% |
| 4 | 2.882 | 6.692 | -132% | 3.833 | -33% | **6.308** | **-119%** |
| 5 | 6.294 | 8.714 | -38% | 8.083 | -28% | **10.167** | **-62%** |
| 6 | 11.643 | **11.471** | **1%** | 10.938 | 6% | 10.938 | 6% |
| *F.L.S.* | 4.750 | 6.588 | -39% | 7.250 | -53% | **8.484** | **-79%** |
| 1 | 3.929 | 5.353 | -36% | 5.938 | -51% | **9.533** | **-143%** |
| 2 | 5.571 | 7.824 | -40% | 8.563 | -54% | 7.500 | -35% |
| *General Maintenanc* | 8.646 | **8.757** | **-1%** | 9.027 | -4% | **8.212** | **5%** |
| 1 | 8.235 | **14.071** | **-71%** | **14.545** | **-77%** | 13.846 | -68% |
| 2 | 6.941 | 8.929 | -29% | 9.182 | -32% | 10.538 | -52% |
| 3 | 12.824 | **7.500** | **42%** | **8.545** | **33%** | 5.538 | 57% |
| 4 | 11.647 | **4.714** | **60%** | 5.583 | 52% | 2.846 | 76% |
| 5 | 4.286 | 7.588 | -77% | 8.063 | -88% | 8.438 | -97% |
| 6 | 8.412 | 11.143 | -32% | **11.818** | **-40%** | 12.000 | -43% |
| 7 | 11.000 | 8.571 | 22% | 9.545 | 13% | 8.231 | 25% |
| 8 | 8.000 | 11.412 | -43% | 11.313 | -41% | **9.688** | **-21%** |
| 9 | 9.357 | 9.588 | -2% | 9.688 | -4% | 7.188 | 23% |
| 10 | 8.588 | **8.357** | **3%** | 7.909 | 8% | **9.154** | **-7%** |
| 11 | 4.647 | 5.143 | -11% | 4.167 | 10% | **5.615** | **-21%** |
| 12 | 9.059 | 7.571 | 16% | 7.818 | 14% | **5.308** | **41%** |
| *I.T.* | 7.588 | 3.786 | 50% | 4.182 | 45% | **3.923** | **48%** |
| 1 | 7.588 | 3.786 | 50% | 4.182 | 45% | **3.923** | **48%** |
| *Mechanical* | 5.304 | 4.368 | 18% | **4.063** | **23%** | **3.188** | **40%** |
| 1 | 6.000 | 4.235 | 29% | **4.000** | **33%** | 2.813 | 53% |
| 2 | 3.357 | 3.706 | -10% | 3.188 | 5% | 2.313 | 31% |
| 3 | 4.929 | 3.882 | 21% | 3.625 | 26% | 3.438 | 30% |
| 4 | 6.929 | 5.647 | 18% | 5.438 | 22% | 4.188 | 40% |
| *Plumbing* | 11.114 | **9.729** | **12%** | 9.813 | 12% | 10.725 | 4% |
| 1 | 11.643 | 10.000 | 14% | **9.000** | **23%** | 10.750 | 8% |
| 2 | 9.357 | 9.706 | -4% | 10.438 | -12% | **10.563** | **-13%** |
| 3 | 8.929 | **8.471** | **5%** | 8.750 | 2% | 10.250 | -15% |
| 4 | 11.929 | **9.588** | **20%** | 9.563 | 20% | 9.875 | 17% |
| 5 | 13.714 | **10.882** | **21%** | 11.313 | 18% | 12.188 | 11% |

Results show that there were some noteworthy differences between the rankings of work orders in the subjective prioritization activity (R1) and the prioritization activity R2-Comprehensive Ranking. In both of these activities, participants were able to use their subjective expertise when ranking work orders. However, in R2-Comprehensive

Ranking, participants also had the added information of an initial ranking based on the developed DST. With each ranking, as human experience-based judgement is controlled to a greater degree, the prioritization of work orders is progressively more objective.

Table 8 documents the calculated P-Value when the comparison met or exceeded the confidence threshold of 95% (0.05) indicating that the observed change in priority was statistically significant. An arrow is then used to indicate if the perceived priority of the work order increased or decreased as a result of introducing the DST. Results of the comparison indicate that introducing the DST to aid in the prioritization of work orders significantly impacted the mean ranking of 27% of the work orders used for the study (see Table 8). In other words, in these instances, the mean ranking of work orders was changed to a statistically significant degree from the mean ranking observed through R1, which represents the current mode of prioritization used by K-12 institutions.

Furthermore, when considering the functional areas represented by the work orders in the purposeful sample selected, several functional areas included one or more work orders that obtained a significant mean ranking change in R2-Comprehensive Ranking, as compared to R1. The re-prioritization is an indication that when participants are able to subjectively assign a ranking to work orders using the developed DST, the resulting priorities of approximately one-quarter of the work orders and across most functional areas may be influenced.

Table 8: Comparison of the DST's ability to significantly influence decision making and the change in the perceived importance of a work order.

| Functional Area | μ R1 | R1 v R2 Comp. | R1 v R2 Impact |
|---|---|---|---|
| *Electrical* | 6.98 | | |
| Work Order 1 | 1.47 | | |
| 2 | 7.41 | | |
| 3 | 13.00 | | 0.002 ↑ |
| 4 | 2.88 | | |
| 5 | 6.29 | | |
| 6 | 11.64 | 0.038 ↑ | 0.019 ↑ |
| *Fire Life Safety* | 4.75 | | |
| 1 | 3.93 | | |
| 2 | 5.57 | | |
| *Maintenance* | 8.65 | 0.087 ↓ | |
| 1 | 8.24 | 0.000 ↓ | 0.000 ↓ |
| 2 | 6.94 | | |
| 3 | 12.82 | 0.000 ↑ | 0.000 ↑ |
| 4 | 11.65 | 0.001 ↑ | 0.004 ↑ |
| 5 | 4.29 | | |
| 6 | 8.41 | | 0.001 ↓ |
| 7 | 11.00 | | |
| 8 | 8.00 | | |
| 9 | 9.36 | | |
| 10 | 8.59 | 0.034 ↑ | |
| 11 | 4.65 | | |
| 12 | 9.06 | | |
| *Information* | 7.59 | | |
| 1 | 7.59 | | |
| *Mechanical* | 5.30 | | 0.012 ↑ |
| 1 | 6.00 | | 0.032 ↑ |
| 2 | 3.36 | | |
| 3 | 4.93 | | |
| 4 | 6.93 | | |
| *Plumbing* | 11.11 | 0.000 ↑ | 0.000 ↑ |
| 1 | 11.64 | | 0.039 ↑ |
| 2 | 9.36 | | |
| 3 | 8.93 | 0.004 ↑ | 0.026 ↑ |
| 4 | 11.93 | 0.010 ↑ | 0.005 ↑ |
| 5 | 13.71 | 0.000 ↑ | 0.000 ↑ |

While the results between R1 and R2-Comprehensive Ranking indicate that the DST did impact a substantial number of work orders, it is not clear how much the level of subjectivity impacted decision making from that comparison alone. Therefore, the author also compared R1 to R2-Impact Ranking. In this comparison, participants used the selected decision factors to identify a level of impact and the resultant priorities were compared to those from R1. This analysis strategically removes some ability to interject subjective expertise into the prioritization process. These results indicate that 37% of the total work orders had a different mean rank than in R1. This percentage of work orders impacted is higher than the percentage obtained when comparing R1 to R2-Comprehensive Ranking. Furthermore, equal or greater numbers of work orders from different functional areas impacted, comparing R1 to R2-Comprehensive Ranking were observed.

The finding that R2-Impact Ranking impacts more work orders across equal or greater functional areas than R2-Comprehensive Ranking is largely intuitive. R2-Impact Ranking eliminates some of the ability of participants to interject their subjective expertise into the prioritization process. Therefore, this process more directly diverges from the current, purely subjective, process replicated in R1.

To further determine the contexts in which participants' subjective judgment impacts prioritization, a pairwise analysis and subsequent sensitivity tests were conducted. In these comparisons, decision factors selected by the participants determined the work order ranking. While work order assessment subjectivity remains (i.e., a participant could select that a particular work order impacts a "room" or a "building" depending on how they interpret the space), the actual prioritization process is automated

and standardized. As a result, when all decision categories were weighted equally, 70% of the work orders across all functional areas were impacted to a statistically significant degree (see Table 9).

Table 9: Comparison of R1 Mean Ranking and Pairwise Comparison using the DST.

| Functional Area | μ R1 | Pairwise P-Value & Change in Priority | Sensitivity Tests & Change in Priority |
|---|---|---|---|
| *Electrical* | 6.98 | **0.001** ↓ | |
| Work Order 1 | 1.47 | **0.003** ↓ | **0.001** ↓ |
| 2 | 7.41 | **0.006** ↑ | |
| 3 | 13.00 | | **0.000** ↓ |
| 4 | 2.88 | **0.037** ↓ | **0.000** ↓ |
| 5 | 6.29 | **0.001** ↓ | |
| 6 | 11.64 | | **0.000** ↓ |
| *Fire Life Safety* | 4.75 | **0.008** ↓ | **0.037** ↓ |
| 1 | 3.93 | **0.022** ↓ | |
| 2 | 5.57 | | |
| *Maintenance* | 8.65 | **0.000** ↑ | **0.001** ↑ |
| 1 | 8.24 | | **0.000** ↑ |
| 2 | 6.94 | | |
| 3 | 12.82 | **0.001** ↑ | |
| 4 | 11.65 | **0.000** ↑ | **0.050** ↑ |
| 5 | 4.29 | **0.012** ↓ | |
| 6 | 8.41 | **0.044** ↓ | |
| 7 | 11.00 | | |
| 8 | 8.00 | **0.009** ↓ | |
| 9 | 9.36 | | |
| 10 | 8.59 | **0.000** ↓ | **0.011** ↓ |
| 11 | 4.65 | **0.003** ↓ | **0.000** ↓ |
| 12 | 9.06 | **0.000** ↑ | |
| *Information* | 7.59 | **0.000** ↑ | **0.000** ↑ |
| 1 | 7.59 | **0.000** ↑ | **0.000** ↑ |
| *Mechanical* | 5.30 | **0.000** ↑ | **0.000** ↑ |
| 1 | 6.00 | **0.001** ↑ | **0.000** ↑ |
| 2 | 3.36 | **0.000** ↑ | **0.000** ↑ |
| 3 | 4.93 | **0.006** ↑ | **0.000** ↑ |
| 4 | 6.93 | **0.000** ↑ | **0.000** ↑ |
| *Plumbing* | 11.11 | **0.000** ↓ | **0.000** ↓ |
| 1 | 11.64 | | **0.000** ↓ |
| 2 | 9.36 | **0.008** ↓ | **0.000** ↓ |
| 3 | 8.93 | | **0.004** ↓ |
| 4 | 11.93 | **0.005** ↑ | **0.000** ↑ |
| 5 | 13.71 | **0.000** ↑ | **0.000** ↑ |

Similarly, when a representative sampling of sensitivity tests was conducted the mean number of work orders influenced when using the DST was 60% of work orders. The results indicate that even if different institutions have different priorities that they apply to the decision categories, the results calculated from a pairwise comparison consistently elicit the largest percentage of work orders impacted (mean ranking) as compared to subjective expertise alone. These results further illustrate that current practitioners can use the developed DST to influence decision making. Moreover, the context regarding the tool's use, that may enable subjectivity in the process, can directly impact the output of the prioritization process.

The prior analysis indicates that the developed DST can impact work order prioritization when compared to the current method of prioritization. Beyond merely illustrating that this tool can impact mean prioritization, the impact of the DST is further evident when considering the variance in the resultant data in the different contexts where users had more or less opportunity to incorporate their subjective expertise. Table 10 documents the change in standard deviation between each of the four prioritization activities (see Table 10). For example, the average standard deviation measured in the initial subjective prioritization (R1) measured 6.956. By comparison, the average standard deviation for R2-Comprehensive Ranking declined to 3.395, a reduction of 51%. When human behavior is controlled to a greater extent, such is the case in R2-Impact Ranking, the average standard deviation declined again to 3.125. Finally, the pairwise comparison which would limit human engagement to the weighting of decision categories further reduced the standard deviation to 2.896 representing a 58% decline.

These findings suggest that the method of implementation has a direct impact on the predictability or control of prioritization outcomes. As human perception (experience-based bias) becomes increasingly limited, the standard deviation is reduced thereby leading to more consistent outcomes.

Table 10: Comparison of the standard deviation with bold font indicating a statistically significant degree of change.

| Functional Area | St. Dev. R1 | Standard Deviation R2: Comprehensive Ranking | Δ% | Standard Deviation R2:Impact Ranking | Δ% | Standard Deviation Pairwise | Δ% |
|---|---|---|---|---|---|---|---|
| *Electrical* | 4.876 | 4.228 | -13% | 4.418 | -9% | **4.074** | **-16%** |
| Work Order 1 | 1.068 | 4.156 | 289% | 3.261 | 205% | **4.553** | **326%** |
| 2 | 3.299 | 2.410 | -27% | 2.314 | -30% | **4.243** | **29%** |
| 3 | **2.761** | **2.887** | **5%** | **2.157** | **-22%** | 2.609 | -6% |
| 4 | 1.654 | 5.376 | 225% | 3.639 | 120% | **4.973** | **201%** |
| 5 | 2.823 | 3.221 | 14% | 2.843 | 1% | **1.467** | **-48%** |
| 6 | **2.925** | **3.393** | **16%** | **3.276** | **12%** | 2.720 | -7% |
| *F.L.S.* | 4.750 | 3.751 | -21% | 4.008 | -16% | **3.150** | **-34%** |
| 1 | 2.999 | 3.639 | 21% | 3.890 | 30% | **2.264** | **-25%** |
| 2 | 3.777 | 3.540 | -6% | 3.794 | 0% | 3.596 | -5% |
| *General Maintenance* | 8.646 | 4.398 | -49% | 4.244 | -51% | 4.224 | -51% |
| 1 | 8.235 | 0.917 | -89% | **0.522** | **-94%** | 0.987 | -88% |
| 2 | 6.941 | 3.852 | -44% | 3.868 | -44% | 3.573 | -49% |
| 3 | 12.824 | 3.878 | -70% | **3.142** | **-75%** | 3.307 | -74% |
| 4 | 11.647 | 4.196 | -64% | **4.100** | **-65%** | 2.115 | -82% |
| 5 | 4.286 | 4.515 | 5% | 4.524 | 6% | **3.898** | **-9%** |
| 6 | 8.412 | 3.697 | -56% | **2.523** | **-70%** | 2.236 | -73% |
| 7 | 11.000 | 3.956 | -64% | 3.751 | -66% | 3.166 | -71% |
| 8 | 8.000 | 4.094 | -49% | 3.240 | -60% | **3.092** | **-61%** |
| 9 | 9.357 | 4.651 | -50% | 4.301 | -54% | 4.490 | -52% |
| 10 | 8.588 | 2.341 | -73% | 2.844 | -67% | **2.672** | **-69%** |
| 11 | 4.647 | 3.278 | -29% | 2.517 | -46% | **3.820** | **-18%** |
| 12 | 9.059 | 3.480 | -62% | 3.816 | -58% | **2.287** | **-75%** |
| *I.T.* | 7.588 | 2.517 | -67% | 2.272 | -70% | **1.706** | **-78%** |
| 1 | 7.588 | 2.517 | -67% | 2.272 | -70% | **1.706** | **-78%** |
| *Mechanical* | 5.304 | 2.926 | -45% | **2.981** | **-44%** | **2.181** | **-59%** |
| 1 | 6.000 | 3.113 | -48% | **3.266** | **-46%** | **3.082** | **-49%** |
| 2 | 3.357 | 2.173 | -35% | 1.834 | -45% | **0.873** | **-74%** |
| 3 | 4.929 | 2.421 | -51% | 2.217 | -55% | **2.421** | **-51%** |
| 4 | 6.929 | 3.622 | -48% | 3.915 | -43% | **1.328** | **-81%** |
| *Plumbing* | 11.114 | 3.382 | -70% | **3.288** | **-70%** | **3.118** | **-72%** |
| 1 | 11.643 | 3.335 | -71% | **3.633** | **-69%** | **3.088** | **-73%** |
| 2 | 9.357 | 3.368 | -64% | 2.780 | -70% | **3.577** | **-62%** |
| 3 | 8.929 | 4.460 | -50% | **4.008** | **-55%** | **2.793** | **-69%** |
| 4 | 11.929 | 2.785 | -77% | **2.804** | **-76%** | **3.222** | **-73%** |
| 5 | 13.714 | 2.595 | -81% | **2.701** | **-80%** | **2.713** | **-80%** |

In addition to exploring the extent to which the DST impacted work order prioritization, additional factors or context that may have impacted the decision-making process were also explored. Each of the functional areas represented by the purposeful

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sample includes at least one work order impacted by at least one of the decision-making contexts tested in this work. This indicates that the developed DST can have an impact in guiding prioritization across all functional areas, but this does not necessarily indicate that all of the functional areas will be impacted to the same degree. For example, plumbing was the most consistently influenced by the DST with at least 60% of the work orders across the different prioritization cases being influenced. By contrast, the Mechanical functional area had instances where no work orders were influenced (i.e., R2-Comprehensive Ranking v R1).

The observed change in decision-making is supported by the Facility Administrator's selection of decision factors when using the tool. Table 11 documents the average value of each decision category per work order based upon the decision factors selected by the participants (see Table 11). Here, data suggests that the perceived *Influence* of Plumbing, as a functional area, was limited to administrative or non-educational space. Consequently, participants selected decision factors that were valued to a lesser degree, thereby negatively impacting the mean value of the *Influence* decision category. Furthermore, the DST only included two *Academic Enablers,* Bathroom, and Plumbing, both of which were of limited importance and therefore valued to a lesser degree. By contrast, participants perceived Mechanical work orders as having a high impact on Teacher-Student engagement, directly benefiting classroom and similar educational environments.

Therefore, it is possible that this variation in impact based on functional area could be a result of the developed DST itself. By using the findings reported in prior literature to guide decision making as defined in Beauregard and Ayer (2019), it is

possible that the resultant DST does not include equal amounts of content related to all

functional areas, which could influence decision making. Conversely, it is also possible

that when participants were enabled to use their subjective evaluation of work orders, the

resultant priorities more-closely matched the initial R1 results. This is further evident by

the comparatively high percentage of work orders in functional areas impacted when

comparing R1 results to those of the pairwise analysis.

Table 11: Average value of each decision category, per work order, based upon the participant's selection of decision factors.

| Functional Area | Influence | Bulding Status | Building Usage | Academic Enablers | | |
| --- | --- | --- | --- | --- | --- | --- |
| | | | | Primary | Secondary | Tertiary |
| *Electrical* | 5.85 | 3.18 | 3.11 | 5.00 | 4.00 | 1.19 |
| 1 | 5.31 | 3.86 | 2.58 | 5.00 | | 1.21 |
| 2 | 8.38 | 3.14 | 4.14 | 5.00 | | 1.21 |
| 3 | 3.92 | 3.57 | 2.38 | 5.00 | 4.00 | 1.00 |
| 4 | 6.86 | 3.14 | 3.77 | 5.00 | | 1.15 |
| 5 | 6.17 | 3.08 | 2.69 | | 4.00 | 1.23 |
| 6 | 4.76 | 2.38 | 3.00 | 5.00 | 4.00 | 1.31 |
| *F.L.S.* | 4.55 | 4.13 | 2.52 | 5.00 | 4.00 | 1.13 |
| 1 | 4.20 | 3.87 | 2.50 | 5.00 | 4.00 | 1.07 |
| 2 | 4.88 | 4.38 | 2.53 | 5.00 | | 1.20 |
| *Gen. Maint.* | 6.14 | 3.40 | 3.10 | 5.36 | 4.00 | 1.16 |
| 1 | 3.00 | 1.86 | 1.93 | | | 1.10 |
| 2 | 3.43 | 3.64 | 2.21 | 5.00 | 4.00 | 1.27 |
| 3 | 8.23 | 3.21 | 4.54 | 5.00 | | 1.09 |
| 4 | 9.00 | 3.21 | 5.00 | 6.54 | | 1.33 |
| 5 | 4.53 | 4.29 | 2.75 | 5.00 | 4.00 | 1.19 |
| 6 | 5.29 | 2.23 | 2.50 | | 4.00 | 1.00 |
| 7 | 7.62 | 4.64 | 2.43 | 5.00 | | 1.21 |
| 8 | 4.18 | 3.59 | 2.71 | | 4.00 | 1.25 |
| 9 | 5.25 | 3.19 | 2.67 | 5.00 | 4.00 | 1.10 |
| 10 | 7.71 | 3.29 | 2.64 | | 4.00 | 1.23 |
| 11 | 7.57 | 4.23 | 3.31 | 5.00 | | 1.00 |
| 12 | 9.00 | 3.14 | 4.79 | 5.00 | | 1.08 |
| *I.T.* | 9.00 | 3.29 | 4.85 | 5.36 | | 1.00 |
| 1 | 9.00 | 3.29 | 4.85 | 5.36 | | 1.00 |
| *Mechanical* | 8.91 | 3.02 | 4.93 | 5.00 | 4.00 | 1.19 |
| 1 | 8.75 | 3.00 | 4.87 | 5.00 | 4.00 | 1.00 |
| 2 | 9.00 | 3.00 | 5.00 | 5.00 | 4.00 | 1.30 |
| 3 | 9.00 | 3.06 | 5.00 | 5.00 | 4.00 | 1.00 |
| 4 | 8.88 | 3.00 | 4.87 | 5.00 | 4.00 | 1.33 |
| *Plumbing* | 4.64 | 3.29 | 2.32 | 5.00 | | 1.17 |
| 1 | 4.13 | 3.38 | 2.33 | | | 1.31 |
| 2 | 4.63 | 3.19 | 2.33 | 5.00 | | 1.13 |
| 3 | 5.93 | 3.06 | 2.56 | | | 1.00 |
| 4 | 5.63 | 3.38 | 2.60 | | | 1.29 |
| 5 | 2.87 | 3.44 | 1.73 | 5.00 | | 1.13 |

In summary, these findings suggest that subjective experience-based decision-making influences the prioritization or work and accordingly the allocation of district resources. The results of this study also suggest the participant's perception of specific functional areas, i.e., Mechanical, may already be directionally aligned with the DST's prescriptive approach to prioritization whereas other functional areas may provide an opportunity for improved resource allocation. However, should a district aim to reduce variance in prioritization, aligning facility spending decisions with academic outcomes, a pairwise comparison provides more consistent and repeatable results.

### 4.4    Discussion

In response to the first research question "*To what extent does the DST influence the prioritization of routine facility maintenance work orders,*" results of the R2-Comprehensive Ranking and R2-Impact Rankings demonstrate the DST's influence on routine decision making influenced 27% and 37% of the work orders respectively to a statistically significant degree. Moreover, environmental contexts defining the work order and the process of evaluation were critical factors in decision making and the perceived importance of the work order. Consequently, it is the second research question "*in what contexts does the DST impact, or not impact prioritization,*" that provides the greatest insight into the DST's ability to influence behavior. The significance of continuity, Facility Administrator participation, and the implementation method and weighting of decision categories are observations further developed herein.

### 4.4.1    Continuity

Results of the study suggest that decision making specific to a work order and the perceived importance of a functional area are independent evaluations and are not

mutually exclusive. The ability of the DST to influence a functional area to a significant degree does not necessarily imply a majority of the work orders within that functional area are equally influenced. Similarly, having multiple work orders significantly influenced would not necessarily result in an equally significant change in the perception of the functional area.

Moreover, the level of variance specific to the perceived importance of work orders highlights an opportunity to prioritize routine work orders more effectively. For example, collectively the data indicates a high degree of variance in the prioritization of work orders between activities R1, R2-Comprehensive, and R2-Impact. Data collected from activity R1 provides empirical evidence of the perceived importance and subjective experience-based judgment factoring into the prioritization of routine work. However, the observed variance between prioritization activities R2-Comprehensive and R2-Impact also illustrate a subjective interpretation of the work order despite the Facility Administrator's selection of decision factors within the DST.

To elucidate the subjective judgment that is present in determining the impact of a work order and the need for continuity in the prioritization process, one Electrical and one Plumbing work order are deconstructed to provide context. When using the DST to prioritize work, the facility administrator is asked to identify how a work order *influences* the academic environment (see Table 12a). In both examples, facility administrators selected virtually every option provided by the tool to describe how that work order should influence the educational process. In total, the decision category *Influence* represented approximately 75% of the variation present in the study (see Table 12b).

Table 12a: Intensity Importance assigned to decision factor *Influence*.

| INFLUENCE | Importance |
|---|---|
| Teachers or their Students | 9 |
| Non-Teachers who interface with Students | 7 |
| District or School Administration | 5 |
| Other's who DO NOT interface with students | 3 |
| Other | 1 |

Table 12b: Average variance by decision factor based on participant DST decision factor selections

| Functional Area | Variance by Decision Factor | | | Total | Avg. Variance / Work Order |
|---|---|---|---|---|---|
| | Influence | Building Status | Building Usage | | |
| *Electrical* | 9.759 | 0.898 | 1.407 | 12.065 | 9.741 |
| *Gen. Maint.* | 9.855 | 1.630 | 1.822 | 13.306 | 7.289 |
| ***Mechanical*** | **0.299** | **0.015** | **0.127** | 0.441 | 0.431 |
| *Plumbing* | 8.487 | 2.205 | 0.795 | 11.486 | 10.147 |
| ***Total*** | **76%** | **13%** | **11%** | | |

Despite the apparent subjectivity in the decision-making process, the DST impacted decision making as evidenced by the P-value, the observed change in priority importance, and the selection of decision factors.

### 4.4.2   Facility Administrator Participation

Throughout this study, data suggest that limiting subjective-experience when prioritizing routine work promotes facility conditions that may best influence academic outcomes. However, the data has also illustrated a potential limitation of the DST. Work orders related to decision factors included in the four decision categories are sufficiently represented, thereby enabling prioritization. By contrast, work orders that may not relate to the decision factors lack adequate representation and may prohibit a representative prioritization. For example, a lower level of importance for plumbing related *Influence*

decision factors was observed as a trend. The observed trend stands to reason as plumbing fixtures and equipment are typically limited to lab space and not present in traditional classrooms.

The DST includes a decision factor labeled as "Other," designed to accommodate situations where the scope of the work order may not be sufficiently represented by current scholarly research or may not otherwise be defined by the DST. Additionally, the Facility Administrator is provided an opportunity to justify her or his prioritization of the work order in the event their experience-based judgment of the work order conflicted with the direction of the DST. In total, the "Other" decision factor accounted for fewer than 5% of the total decision factors selected in the study. Furthermore, there was no evidence the Facility Administrators opted to justify their prioritization of the work order based on their selection of decision factors and professional judgment. Therefore, there is little evidence to suggest the design of the DST or the omission of any specific decision factors that influenced the results of the study to a significant degree.

Data explicitly collected to the selection of decision factors indicated a trend to not assign an *Academic Enabler* decision factor to Plumbing work orders. Of the five Plumbing work orders, Facility Administrators only identified two of these work orders as having a high *Academic Enabler* decision factor value. Facility Administrators elected not to select any second-tier *Academic Enabler*, which included Reference Space, Creative Space, Temperature Control and Comfort. As a result, the mean value of Plumbing's decision category *Academic Enabler* was only 3.172, more than 50% less than the next highest functional area's mean *Academic Enabler* value.

Here again, the number of scholarly publications correlating academic outcomes with Plumbing related facility conditions is low as compared to other functional areas where more research has been conducted. Therefore, fewer decision factors are represented in the DST, resulting in lower mean value for the decision category. This finding should not imply that Plumbing work orders should always be subordinate to other functional areas due to the lack of scholarly research. Instead, it simply means there is not currently evidence to suggest a greater value should be placed on Plumbing work orders specific to that functional area's ability to enable academic outcomes.

Similarly, there are environmental factors that a school or academic district could prioritize which may not have a positive correlation with academic outcomes or may not currently be represented in academic research. For example, work orders that address environmental issues such as school security (i.e., perimeter fencing, metal detectors, advanced door hardware), graffiti response, or exterior lighting each deserve a degree of importance relative to the unique needs of a district. Facility conditions such as these provide examples of where the DST may not comprehensively address all of the decision factors that require attention on the part of the Facility Administrator. This apparent gap in prior research or the lack of a positive correlation highlight a need for human involvement in the prioritization of work orders. For these reasons, the author recognizes the importance of balancing the objective decision factors presented in the DST with the Facility Administrator's experience-based judgment.

### 4.4.3 Implementation Method and Weighting of Decision Categories

Results of the study indicate that the method of implementation had an impact on the perceived importance of a work order and, moreover, the perceived importance of the

functional area. Therefore, the method of implementing the DST next served as a context by which to evaluate the tool. For example, one-third of the Electrical work orders were influenced to a statistically significant degree when administratively prioritized, R2-Impact Ranking. In total, the functional area was not influenced to a similar degree in either R2-Impact or R2-Comprehensive Rankings. When prioritizing the same work orders using a pairwise comparison, without assigning a value to the decision category, the number of work orders influenced increased to 67% and, moreover, the functional area was influenced to a statistically significant degree.

Furthermore, the observed variance within Electrical declined by approximately 45% when comparing the standardized R1 variance of 1.283 to the standardized mean sensitivity test variance of 0.699. This finding was consistent throughout the study in each of the functional areas observed. To summarize, prioritizing work using a VAHP-based approach can influence decision making to a significant degree. However, given the degree to which subjective experience influenced the selection of decision factors, a VAHP-based approach may not provide the level of stability necessary to drive predictive or prescriptive results. By contrast, when implementing the tool using a pairwise comparison, the ability of the tool to influence behavior increased in every measure.

### 4.5    Limitations

The purpose of this research is to validate a previously developed DST's ability to influence behavior, as measured by a change in the prioritization of routine work orders. The extent of the study was limited to the scope of work as documented in the thirty work orders and did not reflect all aspects of K-12 routine facility operations and maintenance.

It is possible that other work orders may present a different set of concerns not directly addressed in this study. Moreover, the research does not account for workplace or environmental factors, which may influence the prioritization process. For example, the impact of deferred maintenance and the availability of parts both present practical implications that should be factored into the prioritization process, but are not addressed in this study.

Similarly, the study was conducted in a controlled setting free of the influences or constraints of a K-12 district. Therefore, the results of the study further emphasize the need for a process of prioritizing routine work, given the impact of subjective, experience-based, bias as documented in this study.

The methodology for developing the fourth decision category, Academic Enablers, is limited by the availability of academic literature addressing the relationship between a building system or facility condition and student outcomes. That said, it is theoretically possible that alternate facility conditions may have an equal or similar correlation with academic outcomes but lack the necessary academic precedent. Therefore, the resulting list of Academic Enablers is not intended to be the final, definitive listing of facility conditions correlating with academic outcomes.

This study cannot claim to what extent facility administrators may or may not currently be utilizing similar information to make informed decisions. Additionally, it is theoretically plausible that professional experience may influence decision making in a manner comparable to the DST. Therefore, the tool's ability to influence prioritization 100% of the time was never an objective of this study.

Despite these limitations, this research provides empirical evidence that the DST influenced decision-making, including the role subjective experience-based decision making has concerning the alignment of facility conditions and the perceived benefit to academic outcomes.

### 4.6    Conclusions

Facility operation and maintenance administrators are continually evaluating the merits of routine work orders as a vehicle for allocating resources, reducing costs, and prolonging the life cycle of institutional assets. To effectively maintain the required performance of the facility systems and infrastructure, routine work orders should be prioritized in a consistent and predictive manner. The prioritization of this work must also align with the strategic objectives of the academic district, with the intent of providing a targeted benefit to the district that is measurable over a long term implementation. This paper provides empirical validation of a VAHP-based decision support tool for making evidence-based prioritization decisions, leveraging both academic and professional experience. Implemented successfully, the DST is a vehicle for supporting the districts strategic objectives, providing a method for measuring performance.

The primary contributions of this work are the understandings by which the DST may or may not influence decision making. Results of the study indicate the tool influenced the prioritization of routine work orders, to varying degrees, in each of the functional areas evaluated. Moreover, the data indicates the perceived importance of one or more work orders and the perceived importance of functional areas are independent. These findings indicate that the DST may be a useful tool for influencing decision-making specific to Plumbing, Electrical, or General Maintenance work orders. However,

the tool was shown to be less effective when prioritizing Mechanical work orders where the participant's subjective experience may more closely align with the DST's decision factors.

Furthermore, the data indicates that implementing the tool using a traditional AHP-based approach mitigates subjective experience-based judgment while enabling the Facility Administrator to influence the importance of decision categories. The pairwise approach resulted in a lower degree of variance, reduced standard deviation, and a greater degree of control over the prioritization process.

To summarize, if a district aims to effectively manage district assets for the benefit of student performance and academic outcomes, having a consistent and repeatable prioritization process is of specific importance. The DST developed by Beauregard and Ayer (2019) and tested for this study provides such a process. However, the methodology promoting an evidence-based prioritization process may also marginalize those functional areas or aspects of work that may not benefit from prior academic research. Therefore, academic districts should aim to balance the role of objective decision factors and subjective experience-based judgment play in the prioritization of routine work orders.

CHAPTER 5

RESEARCH CONTRIBUTION AND FUTURE RESEARCH

This research addresses the role of decision-making at public K-12 academic

districts as an enabler of institutional performance. An analysis of plant maintenance and

operations spending illustrates a moderate to strong negative correlation with academic

performance ($\mu$ -0.423). This finding should not be interpreted as a declaration to

constrain further or altogether stop K-12 plant maintenance and operation spending.

Rather, the correlation suggests an opportunity exists to improve the allocation of district

resources to serve the academic needs of the student better. Results of a literature review

indicate there are preferable facility conditions that may, in part or collectively, support

the academic performance of students. However, interviews with a purposeful sample of

academic districts in Arizona suggest facility administrators may not currently be

utilizing academic precedent when prioritizing work.

A tangential factor contributing to the negative correlation, in whole or in part, is

the impact of a differed maintenance strategy. The decline in Arizona's OpEx spending

mirrors that of the nation (NCES, 2016; Snyder et al., 2016). A 2016 study sponsored in

part by the National Council on School Facilities and the 21st Century School fund

estimates the cost of differed maintenance in the U.S. exceeds $500 Billion (Filardo,

2016). In writing "State of Our Schools" Filardo estimates that Arizona's portion of that

total represents more than $200 Million in differed maintenance costs, which is

problematic for two reasons. First, managing a differed maintenance strategy will

increase the life cycle cost of an asset (Lewis and Payant, 2007). Second, since we

understand that well maintained facilities have a positive impact on academic

performance, as cited herein, it logically follows that poorly maintained facilities will have an equally adverse effect on academic performance.

To summarize, the investigative process suggests there is an opportunity for Facility Administrators' to more-effectively prioritize routine work given the financial constraints effecting the Nation's K-12 academic districts.  Changing the behavior that influences decision making may enable Facility Administrators to prioritize those facility attributes that are most consistently reported to offer benefits to students.

The author developed a DST to better support this shift in work order prioritization which can be used by facility administrators (decision-makers) for the prioritization of otherwise routine work. The developed process leverages existing, disparate research findings to generate a DST based on a visual analytical hierarchy process. Focus groups consisting of current facility administrators helped direct the development of the decision framework, ultimately validating the final DST.

The DST was tested with a sample population of K-12 facilities administrators to determine the extent to which the tool influenced their decision-making. The validation process involved practitioners evaluating two purposeful samples of work orders- with and without the development DST. This approach enabled the author to strategically compare results in order to identify impacts that the tool had on decision-making.

Through the methodology detailed herein, the research has addressed the targeted research questions:

**RQ1:** Does a correlation exist between facility maintenance expense spending and educational outcomes suggesting that practitioners are leveraging prior research?

- The data obtained from academic districts in the state of Arizona indicate a negative correlation was present between Plant Maintenance and Operation spending and academic performance. Results of this analysis suggest there is an opportunity for facility administrators to align the prioritization of routine work (allocation of resources) with the strategic academic objectives of the district.

**RQ2:** What processes or procedures guide discretionary facility spending decisions?

- Research observations and interviews with participating K-12 academic districts indicate facility administrators may not be utilizing published research evidence when deciding the prioritization of work. Rather, the prioritization of routine work appears to be mostly a subjective process, governed by the day-to-day environmental factors of the district.

**RQ3:** Can prior academic research detailing the beneficial impact of facility condition with regard to academic performance be leveraged to aid decision-making?

- Various building systems and environmental attributes, cited herein, establish a relationship between facility condition and academic performance. The research methodology used for this study proposed a framework for decision making based upon the frequency of citations specific to a building system and environmental factor (climate and culture). The resulting decision categories and decision factors are not intended to convey a specific academic outcome. Rather, the proposed framework serves to align the allocation of district resources with environmental factors that may lead to improved academic outcomes.

**RQ4:** Does the resulting DST provide a method of decision making that is both comprehensive and easy-to-use?

- Observations from a focus group consisting of current facility management practitioners suggest the tool is both practical and comprehensive, having the ability to serve K-12 academic districts. Moreover, the methodology and decision framework may be adapted to serve alternate, non-academic, institutional facilities.

**RQ5:** To what extent does the DST influence the prioritization of routine facility maintenance work orders?

- Research findings suggest DST's implementation method has a direct bearing on the DST's ability to influence decision making. Results of the study indicate that the Facility Administrator prioritization can be influenced to a statistically significant level, dependent on the functional area and scope of the work order. However, the tool's ability to influence the prioritization of work orders when utilizing a pairwise comparison was statistically significant in more than 70% of the work orders tested and in each of the functional areas.

**RQ6:** In what contexts does the DST impact, or not impact prioritization?

- The DST did not have an equal influence on decision-making, suggesting context is a factor to consider when implementing the tool.
- When using the DST, the perceived importance of work orders and functional areas was largely independent. Statistically significant decisions made regarding the prioritization of routine work orders did not influence the perception of functional areas to a similar degree.
- The DST may be an effective method for prioritizing work orders specific to Plumbing, Electrical, and General Maintenance scopes of work. However, there

are other functional areas such as Mechanical where the tool has a limited impact.
These findings suggest a tailored implementation may provide the greatest benefit
to an academic district.

- Facility Administrator experience-based subjective judgment is a limiting factor
  when implementing the DST. By contrast, reducing human engagement to the
  weighting of decision categories increased the impact of the DST, as measured by
  the number of work orders influenced to a statistically significant degree.
  Furthermore, reducing human engagement resulted in a reduction of the mean
  ranking standard deviation, suggesting the prioritization of work orders is more
  consistent when human engagement is controlled.

- The methodology used to create the DST currently subordinates building
  infrastructure and environmental factors that either may not directly influence
  academic outcomes or may not currently benefit from academic research. As a
  result, academic districts should balance the object direction of decision factors
  with the experience-based subjective assessment of Facility Administrator's when
  prioritizing routine work orders.

To summarize, results of the study indicate a visual analytical hierarchy process,
leveraging prior research and the unique experience of the facility technician, enables
facility maintenance practitioners to make evidence-based decisions when establishing
the importance and subsequent priority of routine work orders. Moreover, the resulting
DST may benefit the overall performance of the institution by aligning the allocation of
resources with those environmental factors that have been shown to influence academic
performance positively.

## 5.1    Conclusions

The primary objective of this research was to explore the impact of facility operations and maintenance as an enabler of institutional performance. The following conclusions summarize the key findings of the research. Subsequent sections provide a summary of the research, the relevant limitations of the study and recommendations for further research.

### 5.1.1   Key Learnings

1. *An opportunity for improved decision-making*: The lack of a positive correlation between facility OpEx spending and academic outcomes indicates an opportunity for improvement specific to the allocation of resources. The qualitative observations suggest a need for a process to govern decision-making. Moreover, the study found that facility administrators may not currently be leveraging academic findings to make evidence-based decisions when prioritizing routine work. Collectively, this research highlights an opportunity for improved decision-making to meet the strategic academic objectives of the district better.

2. *Framework for a decision support structure*: Findings from a literature review, district interviews, and subsequent focus group(s) form the framework for a DST, relating facility administrators with relevant category and decision factors attributed in part to academic performance. Areas of specific interest to the study include the voice of the client, academic climate and culture.

    a. *The client*: The prioritization of work orders, as a method for value creation, must respond to the needs of the client. Allocating resources according to those work orders that are systemic to the

success of the customer, synergistic with the objectives of the organization, is a method for creating value. Defining the Teacher-Student relationship as the client, and thereby strategically aligning district resource in support of the Teacher-Student engagement is a key learning of this research.

b. *Academic Culture and Climate*: Traditionally, facility operation and maintenance work orders address the performance needs of an asset. For example, is the asset due for scheduled preventative maintenance or is corrective maintenance necessary given the assets performance or lack thereof. Another key learning of this research is prioritizing environmental factors that contribute, in whole or in part, to the academic climate and culture of the school for the benefit of the Teacher-Student engagement.

3. *Decision Support Tool*: The decision tool was shown to be an effective method for prioritizing routine work. However, the contexts by which the DST influenced behavior was a finding of greater significance. Here results illustrate that the facility administrator's perception of a functional area, positive or negative, did not influence their perception of work within the context of that functional area. Moreover, the ability of the DST to influence decision making, changed to a greater or lesser degree, depending on the functional area. These findings suggest that functional area provides an element of context influencing the ability of the DST to impact decision making.

## 5.2     Practical Implications

The ability of the DST to influence decision making, as evidenced herein, serves to bridge the gap between Facility Management and academic research supporting the profession. Prior to this study, academic research correlating building systems and environmental factors was largely disparate. The research methodology documented herein provides a framework for facility administrators to effectively aggregating this research, providing a process and DST for evidence-based decision-making. Moreover, the resulting DST was shown to influence each of the functional areas tested to a greater or lesser degree.

Although the data collected as part of this study was sufficient to understand the statistical significance of the decisions support tool's ability to influence behavior, the results of the study provide an initial proof of concept. Further research, to include the long term adoption of the DST by an academic district, are needed to provide a clearer understanding of the tool's ability to improve the relationship between facility conditions and academic performance.

Academic districts can benefit from tailoring the implementation of the DST to meet the unique needs of the district: utilizing the tool where it has been shown to add value and impact academic performance or leveraging experience-based subjective judgment when human engagement provides the greatest insight. Adopting the DST to aid in the prioritization of routine work orders should serve to align the strategic objectives of an academic district with the professional challenges of managing an academic districts' building infrastructure.

## 5.3     Research Limitations

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Despite limitations, this research provides both observed and empirical evidence supporting the need for a DST and the ability of such a tool to significantly influence decision making specific to the prioritization of routine work orders. However, future research should consider the following:

- Building infrastructure and Facility portfolios are complex systems having many interconnected and dependent relationships. Adding to this complexity is the organizational politics governing the performance requirements of the Facility Operations and Maintenance organization. This research was limited to K-12 public academic districts. The current form of the DST is limited to this scope and influence. However, the general framework of the DST was designed to be transferable and may be adapted to service other institutional building infrastructure utilizing the methodology as defined.

- The methodology behind the first three decision categories (*Influence*, *Building Status*, and *Building Use*) prioritizes facility characteristics having the most significant impact on the delivery of education. By contrast, the decision category *Academic Enabler* constructs explicitly a hierarchy of value based on the frequency of reported benefits that a building system, facility condition, or environmental factor may have on academic outcomes. The greater the number of citations, the higher the importance of that specific decision factor. Therefore, the potential limitations of the study include the availability of academic precedent correlating facility condition with academic outcomes.

- Although the scope of this research was limited to K-12 educational facilities, the author cannot claim the DST would have an equivalent impact on all academic districts given the range of variables present in any district real estate portfolio.

- The study was conducted in a controlled setting, free of the influences or constraints of a district setting. Results of the study further emphasize the need to have a process in place to prioritize work and impact decision making considering the influence subjective, experience-based, bias has in the current prioritization of work orders as documented in this study.

- The study does not account for any scope of work not defined by the thirty work orders used for the activity, nor does the study account for priorities outside the spectrum of academic performance that may ultimately influence the decision-making process. Priorities influencing a work order that may not be documented in a work order include such factors as the procurement and availability of maintenance repair and operations parts or the extent to which deferred maintenance impacts an academic district. While both part availability and deferred maintenance are critical factors influencing the prioritization process, neither are documented in a work order and therefore cannot factor into the prioritization process. Should the DST be implemented at a district, justification for factors such as these that influence priority are accounted for in the structure of the tool.

### 5.4    Future Research

The author recommends the following areas for future research based on the observations and experience of the current research study:

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1. *Case Study*: The DST as tested in this research is a proof of concept. The adaptation and long term adoption of the DST to aid a specific academic district or institutional infrastructure may provide an opportunity for future research to study the efficacy of the DST as a case study.

2. *Institutional Facility Management*: The body of work supporting this dissertation emphasizes the correlation between plant maintenance and operations and the prioritization of routine work to further the strategic objectives of K-12 academic districts. The resulting DST was designed for this purpose, highlighting institutional enablers specific to academic success. However, future studies must explore opportunities to employ a similar DST, translating the methodology to support other, non-academic, institutional real estate portfolios.

3. Capital Projects: This dissertation explores the role of OpEx spending as an enabler of institutional performance. Future studies can explore if a similar relationship exists between capital spending and institutional performance. More specifically, how may an empirically-based decision structure better support decision-making specific to the allocation of capital funding and how does the process of decision-making account for strategic performance objectives.

The structure of the DST was intended to support alternate, non-education, facilities. The author recommends further developing the DST's fourth category, institutional enabler(s), to accommodate the needs of additional public institutions. If public institutions, like K-12 education, are faced with increasing expectations and constrained public funding, the ability to make informed spending decisions specific to

facility operations and maintenance increasingly become critical to the successful

performance of that public institution.

## 5.5    Final Remarks

Facility Operations and Maintenance is an enabling organization and an integral

component to the overall success of an organization and or institution. The profession of

Facility Management is a demanding and challenging profession, requiring the

practitioner to balance competing objectives continually. Decisions regarding the

preventative maintenance of an asset are often dependent on the needs of the asset,

independent of the needs of the overall organization, despite this complexity. Academic

empirical-based research has identified building systems and facility conditions that may

positively contribute to the performance of the overall organization. Leveraging this prior

research in cooperation with the practical experience of industry professional offers a

method to support the needs of the institution strategically, prioritizing work that may

provide the greatest benefit to the organization. This dissertation bridges the divide

between academia and the practice of facility maintenance by introducing a methodology

to prioritize routine work in support of a public institution. The findings of this research,

as detailed herein, provide a methodology for prioritizing work in support of K-12

educational facilities. The resulting DST is both scalable and may be tailored to meet the

needs of an institutional facility portfolio.

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# APPENDIX A

## ENROLLMENT DATA PER DISTRICT

(Arizona Department of Education)

| # | Entity ID | CTD | Entity Name | GSF | Year-Over-Year Attenance by District | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2010 Attendance | 2011 Attendance | 2012 Attendance | 2013 Attendance | 2014 Attendance | 2015 Attendance |
| 1 | 4403 | 100201000 | Tucson Unified District | 8,968,427 | 53,269 | 52,191 | 51,262 | 49,890 | 49,012 | 49,010 |
| 2 | 4235 | 70204000 | Mesa Unified District | 8,530,135 | 65,116 | 65,662 | 64,892 | 64,932 | 64,532 | 64,532 |
| 3 | 4241 | 70269000 | Paradise Valley Unified District | 5,085,048 | 33,012 | 33,478 | 33,380 | 32,927 | 32,732 | 32,732 |
| 4 | 4239 | 70241000 | Gilbert Unified District | 4,833,949 | 38,084 | 37,240 | 38,211 | 37,935 | 37,240 | 37,236 |
| 5 | 4242 | 70280000 | Chandler Unified District #80 | 4,773,688 | 38,875 | 40,190 | 40,594 | 41,653 | 42,664 | 42,664 |
| 6 | 4237 | 70211000 | Peoria Unified School District | 4,584,353 | 36,860 | 36,944 | 36,988 | 37,052 | 37,069 | 37,064 |
| 7 | 4246 | 70297000 | Deer Valley Unified District | 4,447,281 | 35,189 | 35,009 | 34,616 | 33,978 | 34,365 | 34,365 |
| 8 | 4286 | 70510000 | Phoenix Union High School District | 4,361,240 | 24,947 | 25,906 | 25,827 | 26,392 | 26,814 | 26,813 |
| 9 | 4240 | 70248000 | Scottsdale Unified District | 4,303,438 | 26,234 | 26,268 | 25,899 | 25,361 | 24,451 | 24,451 |
| 10 | 4243 | 70289000 | Dysart Unified District | 3,283,430 | 24,279 | 25,259 | 26,187 | 26,440 | 26,712 | 26,712 |
| 11 | 4260 | 70406000 | Washington Elementary School District | 2,929,727 | 22,336 | 22,466 | 22,800 | 23,249 | 23,281 | 23,281 |
| 12 | 4406 | 100210000 | Amphitheater Unified District | 2,560,557 | 14,679 | 14,417 | 14,229 | 14,165 | 13,807 | 13,797 |
| 13 | 4267 | 70428000 | Kyrene Elementary District | 2,556,290 | 17,816 | 18,025 | 18,032 | 17,670 | 17,642 | 17,642 |
| 14 | 4285 | 70505000 | Glendale Union High School District | 2,365,011 | 14,839 | 15,033 | 14,975 | 15,181 | 15,254 | 15,254 |
| 15 | 4287 | 70513000 | Tempe Union High School District | 2,326,820 | 13,834 | 13,784 | 13,830 | 14,062 | 13,959 | 13,959 |
| 16 | 4282 | 70483000 | Cartwright Elementary District | 2,143,391 | 17,672 | 18,388 | 18,919 | 19,110 | 18,901 | 18,901 |
| 17 | 4407 | 100212000 | Sunnyside Unified District | 1,970,356 | 17,317 | 17,614 | 17,631 | 17,725 | 17,160 | 17,154 |
| 18 | 4258 | 70403000 | Tempe School District | 1,818,774 | 12,066 | 12,175 | 12,020 | 12,060 | 12,159 | 12,159 |
| 19 | 4192 | 30201000 | Flagstaff Unified District | 1,747,421 | 10,121 | 9,494 | 9,606 | 9,756 | 9,779 | 9,775 |
| 20 | 4404 | 100206000 | Marana Unified District | 1,717,323 | 12,878 | 12,562 | 12,353 | 12,351 | 12,523 | 12,518 |
| 21 | 4248 | 70260000 | Higley Unified School District | 1,677,682 | 10,094 | 10,532 | 10,969 | 11,254 | 11,459 | 11,459 |
| 22 | 4280 | 70468000 | Alhambra Elementary District | 1,583,925 | 14,036 | 14,245 | 14,420 | 14,271 | 13,928 | 13,928 |
| 23 | 79598 | 80220000 | Kingman Unified School District | 1,517,377 | 7,224 | 7,182 | 7,072 | 6,917 | 6,789 | 6,789 |
| 24 | 4279 | 70466000 | Roosevelt Elementary District | 1,487,676 | 10,493 | 10,558 | 10,356 | 10,071 | 9,614 | 9,614 |
| 25 | 4507 | 140570000 | Yuma Union High School District | 1,474,177 | 11,110 | 11,042 | 10,798 | 10,732 | 10,684 | 10,684 |
| 26 | 4271 | 70440000 | Glendale Elementary District | 1,441,452 | 12,790 | 13,311 | 13,600 | 13,934 | 13,897 | 13,896 |
| 27 | 4413 | 100220000 | Vail Unified District | 1,326,723 | 10,615 | 10,935 | 11,604 | 11,863 | 12,315 | 12,314 |
| 28 | 4288 | 70514000 | Tolleson Union High School District | 1,310,221 | 9,391 | 9,783 | 10,078 | 10,649 | 11,314 | 11,314 |
| 29 | 4283 | 70492000 | Pendergast Elementary District | 1,261,632 | 9,669 | 9,853 | 9,772 | 9,888 | 10,019 | 10,019 |
| 30 | 4437 | 110201000 | Florence Unified School District | 1,249,830 | 8,188 | 8,459 | 8,259 | 7,985 | 8,324 | 8,324 |
| 31 | 4256 | 70401000 | Phoenix Elementary District | 1,168,665 | 7,116 | 7,724 | 7,462 | 7,581 | 7,459 | 7,459 |
| 32 | 4281 | 70479000 | Litchfield Elementary District | 1,161,345 | 10,303 | 10,508 | 10,722 | 11,013 | 11,424 | 11,424 |
| 33 | 4499 | 140401000 | Yuma Elementary District | 1,098,098 | 9,578 | 9,133 | 9,140 | 9,027 | 9,007 | 9,004 |
| 34 | 4263 | 70414000 | Creighton Elementary District | 995,558 | 6,692 | 6,610 | 6,693 | 6,660 | 6,515 | 6,510 |
| 35 | 4289 | 70516000 | Agua Fria Union High School District | 991,777 | 6,743 | 6,851 | 6,938 | 7,235 | 7,535 | 7,535 |
| 36 | 4158 | 10224000 | Chinle Unified District | 975,701 | 3,786 | 3,685 | 3,591 | 3,554 | 3,323 | 3,323 |
| 37 | 4244 | 70293000 | Cave Creek Unified District | 952,246 | 5,818 | 5,794 | 5,555 | 5,412 | 5,419 | 5,419 |
| 38 | 4284 | 70501000 | Buckeye Union High School District | 903,133 | 3,680 | 3,691 | 3,751 | 1,320 | 3,989 | 3,989 |
| 39 | 4442 | 110221000 | Coolidge Unified District | 901,352 | 4,143 | 3,763 | 3,638 | 3,729 | 3,568 | 3,568 |
| 40 | 4446 | 110404000 | Casa Grande Elementary District | 896,907 | 7,542 | 7,403 | 7,369 | 7,067 | 7,014 | 7,014 |

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| # | Entity ID | CTD | Entity Name | GSF | Year-Over-Year Attenance by District | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2010 Attendance | 2011 Attendance | 2012 Attendance | 2013 Attendance | 2014 Attendance | 2015 Attendance |
| 41 | 4259 | 70405000 | Isaac Elementary District | 876,839 | 7,412 | 7,215 | 7,260 | 7,431 | 7,411 | 7,411 |
| 42 | 4175 | 20268000 | Sierra Vista Unified District | 856,511 | 5,642 | 5,571 | 5,515 | 5,467 | 5,780 | 5,780 |
| 43 | 4368 | 80201000 | Lake Havasu Unified District | 846,080 | 5,891 | 5,675 | 5,743 | 5,658 | 5,727 | 5,723 |
| 44 | 4441 | 110220000 | Maricopa Unified School District | 837,081 | 5,965 | 5,849 | 5,801 | 2,687 | 6,219 | 6,217 |
| 45 | 4245 | 70295000 | Queen Creek Unified District | 833,228 | 5,276 | 5,296 | 5,016 | 5,186 | 5,483 | 5,483 |
| 46 | 4469 | 130222000 | Humboldt Unified District | 826,072 | 6,051 | 5,982 | 5,860 | 5,781 | 5,827 | 5,824 |
| 47 | 4411 | 100230000 | Sahuarita Unified District | 814,183 | 4,984 | 5,131 | 5,313 | 5,566 | 5,672 | 5,672 |
| 48 | 4410 | 100216000 | Catalina Foothills Unified District | 808,947 | 4,882 | 5,064 | 5,068 | 5,012 | 5,082 | 5,080 |
| 49 | 4405 | 100208000 | Flowing Wells Unified District | 789,539 | 5,394 | 5,397 | 5,571 | 5,567 | 5,609 | 5,607 |
| 50 | 4443 | 110243000 | Apache Junction Unified District | 783,426 | 5,032 | 4,879 | 4,740 | 4,686 | 4,645 | 4,645 |
| 51 | 4466 | 130201000 | Prescott Unified District | 764,467 | 5,229 | 5,095 | 4,961 | 4,916 | 4,454 | 4,454 |
| 52 | 4270 | 70438000 | Madison Elementary District | 762,711 | 5,753 | 6,130 | 6,241 | 6,136 | 6,223 | 6,223 |
| 53 | 4272 | 70444000 | Avondale Elementary District | 760,287 | 6,049 | 5,748 | 5,652 | 5,702 | 5,737 | 5,736 |
| 54 | 4457 | 120201000 | Nogales Unified District | 750,318 | 5,866 | 5,822 | 5,859 | 5,909 | 5,824 | 5,824 |
| 55 | 4501 | 140413000 | Crane Elementary District | 712,076 | 6,079 | 6,119 | 6,308 | 6,229 | 6,374 | 6,371 |
| 56 | 4276 | 70459000 | Laveen Elementary District | 660,163 | 5,176 | 5,502 | 5,916 | 6,151 | 6,402 | 6,402 |
| 57 | 4396 | 90227000 | Kayenta Unified District | 654,650 | 2,097 | 2,057 | 2,002 | 1,908 | 1,876 | 1,876 |
| 58 | 4445 | 110244000 | J O Combs Unified School District | 653,277 | 4,289 | 4,477 | 4,582 | 4,556 | 4,555 | 4,554 |
| 59 | 4196 | 30208000 | Page Unified District | 638,103 | 2,882 | 3,009 | 2,878 | 2,799 | 2,781 | 2,780 |
| 60 | 4278 | 70465000 | Littleton Elementary District | 631,086 | 5,115 | 5,119 | 5,339 | 5,561 | 5,594 | 5,594 |
| 61 | 4394 | 90220000 | Whiteriver Unified District | 626,577 | 2,160 | 2,229 | 2,240 | 2,300 | 2,335 | 2,335 |
| 62 | 4154 | 10208000 | Window Rock Unified District | 626,340 | 2,532 | 9 | 2,370 | 2,173 | 2,172 | 2,172 |
| 63 | 4453 | 110502000 | Casa Grande Union High School District | 603,851 | 3,736 | 3,674 | 3,587 | 3,732 | 3,796 | 3,796 |
| 64 | 4174 | 20227000 | Douglas Unified District | 603,041 | 4,130 | 4,165 | 3,911 | 3,753 | 3,867 | 3,867 |
| 65 | 4157 | 10220000 | Ganado Unified School District | 587,701 | 1,579 | 1,493 | 1,431 | 1,445 | 1,563 | 1,563 |
| 66 | 4273 | 70445000 | Fowler Elementary District | 559,846 | 4,609 | 4,604 | 4,640 | 4,679 | 4,842 | 4,840 |
| 67 | 4269 | 70433000 | Buckeye Elementary District | 546,169 | 4,411 | 4,501 | 4,632 | 4,822 | 4,998 | 4,998 |
| 68 | 4262 | 70408000 | Osborn Elementary District | 539,469 | 3,125 | 3,037 | 3,025 | 2,978 | 2,924 | 2,924 |
| 69 | 4397 | 90232000 | Blue Ridge Unified School District No. 32 | 532,157 | 2,403 | 2,343 | 2,252 | 2,159 | 2,023 | 2,023 |
| 70 | 4155 | 10210000 | Round Valley Unified District | 530,690 | 1,422 | 1,375 | 1,348 | 1,350 | 1,342 | 1,334 |
| 71 | 4505 | 140432000 | Gadsden Elementary District | 513,519 | 5,068 | 5,156 | 5,289 | 5,384 | 5,412 | 5,412 |
| 72 | 4458 | 120235000 | Santa Cruz Valley Unified District | 494,529 | 3,500 | 3,443 | 3,413 | 3,368 | 3,407 | 3,407 |
| 73 | 4247 | 70298000 | Fountain Hills Unified District | 483,159 | 2,042 | 2,024 | 1,950 | 1,813 | 1,721 | 1,721 |
| 74 | 4218 | 50201000 | Safford Unified District | 479,116 | 3,096 | 3,175 | 3,175 | 3,277 | 3,194 | 3,194 |
| 75 | 4387 | 90201000 | Winslow Unified District | 478,581 | 2,281 | 2,251 | 2,202 | 2,193 | 2,081 | 2,081 |
| 76 | 4393 | 90210000 | Show Low Unified District | 451,741 | 2,297 | 2,342 | 2,387 | 2,382 | 2,434 | 2,431 |
| 77 | 4268 | 70431000 | Balsz Elementary District | 446,570 | 2,752 | 2,754 | 2,682 | 2,717 | 2,579 | 2,579 |
| 78 | 4391 | 90205000 | Snowflake Unified District | 428,183 | 2,627 | 2,563 | 2,555 | 2,485 | 2,404 | 2,404 |
| 79 | 4236 | 70209000 | Wickenburg Unified District | 428,117 | 1,192 | 1,173 | 1,196 | 1,197 | 1,170 | 1,165 |
| 80 | 4378 | 80415000 | Bullhead City School District | 424,264 | 3,325 | 3,410 | 3,284 | 3,084 | 2,901 | 2,901 |

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| # | Entity ID | CTD | Entity Name | GSF | 2010 Attendance | 2011 Attendance | 2012 Attendance | 2013 Attendance | 2014 Attendance | 2015 Attendance |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Year-Over-Year Attenance by District | | | | | |
| 81 | 4381 | 80502000 | Colorado River Union High School District | 418,757 | 2,396 | 2,279 | 2,158 | 2,094 | 2,002 | 2,002 |
| 82 | 4389 | 90203000 | Holbrook Unified District | 412,976 | 2,001 | 2,153 | 2,227 | 2,154 | 2,132 | 2,124 |
| 83 | 4209 | 40210000 | Payson Unified District | 403,279 | 2,475 | 2,410 | 2,329 | 2,418 | 2,351 | 2,341 |
| 84 | 4264 | 70417000 | Tolleson Elementary District | 392,313 | 2,711 | 2,835 | 2,799 | 2,935 | 3,037 | 3,037 |
| 85 | 4266 | 70425000 | Liberty Elementary District | 380,368 | 3,554 | 3,214 | 3,208 | 3,285 | 3,333 | 3,333 |
| 86 | 4156 | 10218000 | Sanders Unified District | 379,556 | 969 | 886 | 835 | 807 | 756 | 756 |
| 87 | 4254 | 70290000 | Saddle Mountain Unified School District | 374,207 | 1,286 | 1,337 | 1,395 | 1,439 | 1,436 | 1,436 |
| 88 | 4467 | 130209000 | Sedona-Oak Creek JUSD #9 | 372,234 | 1,251 | 1,321 | 1,298 | 1,228 | 1,199 | 1,199 |
| 89 | 4210 | 40220000 | San Carlos Unified District | 369,835 | 1,514 | 1,468 | 1,434 | 1,488 | 1,536 | 1,536 |
| 90 | 4510 | 150227000 | Parker Unified School District | 366,028 | 1,829 | 1,999 | 2,016 | 2,046 | 2,010 | 2,010 |
| 91 | 4390 | 90204000 | Pinon Unified District | 344,152 | 1,245 | 1,323 | 1,307 | 1,311 | 1,272 | 1,272 |
| 92 | 4208 | 40201000 | Globe Unified District | 336,783 | 1,776 | 1,623 | 1,644 | 1,862 | 1,885 | 1,885 |
| 93 | 4439 | 110208000 | Mammoth-San Manuel Unified District | 335,849 | 919 | 943 | 940 | 918 | 850 | 850 |
| 94 | 4474 | 130251000 | Chino Valley Unified District | 333,773 | 2,419 | 2,354 | 2,335 | 2,313 | 2,347 | 2,345 |
| 95 | 4211 | 40240000 | Miami Unified District | 327,598 | 1,211 | 1,235 | 1,201 | 1,160 | 1,153 | 1,153 |
| 96 | 4412 | 100240000 | Baboquivari Unified School District #40 | 315,281 | 992 | 966 | 1,056 | 1,082 | 1,006 | 998 |
| 97 | 4487 | 130406000 | Cottonwood-Oak Creek Elementary District | 312,330 | 2,157 | 2,127 | 2,127 | 2,145 | 2,156 | 2,156 |
| 98 | 4500 | 140411000 | Somerton Elementary District | 312,037 | 2,722 | 2,725 | 2,777 | 2,860 | 2,861 | 2,861 |
| 99 | 4265 | 70421000 | Murphy Elementary District | 305,100 | 2,089 | 2,277 | 2,222 | 2,057 | 2,014 | 2,014 |
| 100 | 4153 | 10201000 | St Johns Unified District | 297,133 | 859 | 839 | 808 | 804 | 787 | 777 |
| 101 | 4408 | 100213000 | Tanque Verde Unified District | 280,121 | 1,664 | 1,747 | 1,914 | 2,003 | 2,080 | 2,079 |
| 102 | 4219 | 50204000 | Thatcher Unified District | 276,740 | 1,412 | 1,501 | 1,614 | 1,700 | 1,729 | 1,729 |
| 103 | 4230 | 60218000 | Morenci Unified District | 273,528 | 1,187 | 1,267 | 1,342 | 1,352 | 1,632 | 1,632 |
| 104 | 4170 | 20213000 | Willcox Unified District | 273,508 | 1,295 | 1,253 | 1,196 | 1,210 | 1,146 | 1,146 |
| 105 | 4470 | 130228000 | Camp Verde Unified District | 245,725 | 1,395 | 1,384 | 1,425 | 1,448 | 1,457 | 1,457 |
| 106 | 4168 | 20201000 | Tombstone Unified District | 231,447 | 840 | 875 | 889 | 917 | 866 | 866 |
| 107 | 4169 | 20202000 | Bisbee Unified District | 228,248 | 771 | 760 | 784 | 797 | 662 | 662 |
| 108 | 4159 | 10227000 | Red Mesa Unified District | 227,658 | 1,012 | 952 | 724 | 674 | 728 | 727 |
| 109 | 4379 | 80416000 | Mohave Valley Elementary District | 220,035 | 1,758 | 1,738 | 1,611 | 1,525 | 1,411 | 1,411 |
| 110 | 4388 | 90202000 | Joseph City Unified District | 211,184 | 503 | 495 | 461 | 401 | 406 | 403 |
| 111 | 4261 | 70407000 | Wilson Elementary District | 207,691 | 1,136 | 1,391 | 1,181 | 1,278 | 1,245 | 1,245 |
| 112 | 4277 | 70462000 | Union Elementary District | 202,597 | 1,652 | 1,747 | 1,773 | 1,870 | 2,028 | 2,028 |
| 113 | 4488 | 130504000 | Mingus Union High School District | 198,724 | 1,203 | 1,162 | 1,196 | 1,220 | 1,151 | 1,151 |
| 114 | 79226 | 20209000 | Benson Unified School District | 194,192 | 1,147 | 1,193 | 1,123 | 1,126 | 1,245 | 1,238 |
| 115 | 4257 | 70402000 | Riverside Elementary District | 192,409 | 740 | 894 | 825 | 952 | 927 | 927 |
| 116 | 4438 | 110203000 | Ray Unified District | 191,243 | 535 | 541 | 559 | 522 | 493 | 493 |
| 117 | 4221 | 50207000 | Fort Thomas Unified District | 183,357 | 543 | 510 | 565 | 575 | 577 | 577 |
| 118 | 4212 | 40241000 | Hayden-Winkelman Unified District | 179,222 | 364 | 339 | 302 | 293 | 297 | 297 |
| 119 | 4440 | 110215000 | Superior Unified School District | 171,807 | 445 | 461 | 443 | 420 | 408 | 408 |
| 120 | 4450 | 110422000 | Toltec School District | 170,495 | 1,302 | 1,203 | 1,168 | 1,169 | 1,189 | 1,189 |

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| # | Entity ID | CTD | Entity Name | GSF | Year-Over-Year Attenance by District | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2010 Attendance | 2011 Attendance | 2012 Attendance | 2013 Attendance | 2014 Attendance | 2015 Attendance |
| 121 | 4370 | 80214000 | Colorado City Unified District | 168,595 | 384 | 428 | 444 | 481 | 591 | 591 |
| 122 | 4392 | 90206000 | Heber-Overgaard Unified District | 164,182 | 494 | 515 | 487 | 480 | 448 | 448 |
| 123 | 4448 | 110411000 | Eloy Elementary District | 157,960 | 1,056 | 1,044 | 1,019 | 1,014 | 971 | 971 |
| 124 | 4395 | 90225000 | Cedar Unified District | 156,043 | 307 | 250 | 187 | 164 | 151 | 148 |
| 125 | 4454 | 110540000 | Santa Cruz Valley Union High School District | 151,633 | 433 | 374 | 357 | 395 | 425 | 425 |
| 126 | 4449 | 110418000 | Sacaton Elementary District | 148,862 | 506 | 464 | 440 | 449 | 502 | 502 |
| 127 | 4193 | 30202000 | Williams Unified District | 146,180 | 664 | 621 | 620 | 619 | 618 | 618 |
| 128 | 4228 | 60202000 | Duncan Unified District | 136,458 | 364 | 410 | 364 | 389 | 382 | 381 |
| 129 | 4180 | 20349000 | Palominas Elementary District | 129,873 | 1,424 | 1,431 | 1,435 | 1,398 | 1,409 | 1,409 |
| 130 | 4220 | 50206000 | Pima Unified District | 119,300 | 792 | 713 | 803 | 823 | 848 | 848 |
| 131 | 4473 | 130243000 | Mayer Unified School District | 118,214 | 432 | 470 | 497 | 561 | 570 | 570 |
| 132 | 4447 | 110405000 | Red Rock Elementary District | 118,105 | 317 | 306 | 301 | 343 | 312 | 312 |
| 133 | 4506 | 140550000 | Antelope Union High School District | 117,018 | 300 | 296 | 284 | 295 | 255 | 255 |
| 134 | 4418 | 100351000 | Altar Valley Elementary District | 116,000 | 969 | 980 | 981 | 941 | 981 | 979 |
| 135 | 4238 | 70224000 | Gila Bend Unified District | 110,813 | 440 | 472 | 410 | 408 | 418 | 418 |
| 136 | 4409 | 100215000 | Ajo Unified District | 107,122 | 439 | 449 | 441 | 439 | 428 | 428 |
| 137 | 4195 | 30206000 | Fredonia-Moccasin Unified District | 106,127 | 310 | 284 | 261 | 238 | 258 | 258 |
| 138 | 4369 | 80208000 | Peach Springs Unified District | 102,653 | 225 | 233 | 227 | 230 | 245 | 244 |
| 139 | 4468 | 130220000 | Bagdad Unified District | 98,396 | 425 | 430 | 453 | 458 | 479 | 479 |
| 140 | 4451 | 110424000 | Stanfield Elementary District | 97,461 | 678 | 654 | 599 | 529 | 524 | 524 |
| 141 | 4472 | 130240000 | Seligman Unified District | 90,327 | 133 | 145 | 141 | 144 | 138 | 138 |
| 142 | 4173 | 20221000 | St David Unified District | 88,586 | 446 | 458 | 429 | 426 | 435 | 435 |
| 143 | 4374 | 80209000 | Littlefield Unified District | 82,633 | 505 | 513 | 462 | 424 | 459 | 459 |
| 144 | 4194 | 30204000 | Grand Canyon Unified District | 76,786 | 294 | 285 | 310 | 324 | 294 | 294 |
| 145 | 4416 | 100339000 | Continental Elementary District | 75,361 | 712 | 671 | 690 | 755 | 801 | 800 |
| 146 | 4481 | 130326000 | Beaver Creek Elementary District | 74,916 | 460 | 460 | 480 | 437 | 431 | 425 |
| 147 | 4444 | 110302000 | Oracle Elementary District | 72,929 | 773 | 721 | 738 | 692 | 695 | 693 |
| 148 | 4435 | 110100000 | Mary C O'Brien Accommodation District | 72,051 | 222 | 217 | 206 | 213 | 216 | 216 |
| 149 | 4462 | 120520000 | Patagonia Union High School District | 70,799 | 70 | 57 | 54 | 61 | 64 | 62 |
| 150 | 4275 | 70449000 | Palo Verde Elementary District | 66,790 | 497 | 447 | 430 | 447 | 455 | 455 |
| 151 | 4214 | 40312000 | Pine Strawberry Elementary District | 66,745 | 156 | 182 | 159 | 150 | 173 | 171 |
| 152 | 4504 | 140424000 | Wellton Elementary District | 60,797 | 342 | 358 | 312 | 272 | 241 | 241 |
| 153 | 4190 | 20522000 | Valley Union High School District | 59,812 | 122 | 103 | 99 | 98 | 86 | 86 |
| 154 | 4515 | 150576000 | Bicentennial Union High School District | 57,537 | 125 | 136 | 131 | 103 | 97 | 97 |
| 155 | 4471 | 130231000 | Ash Fork Joint Unified District | 53,260 | 286 | 263 | 232 | 244 | 234 | 234 |
| 156 | 4511 | 150404000 | Quartzsite Elementary District | 53,125 | 239 | 247 | 215 | 233 | 231 | 231 |
| 157 | 4502 | 140416000 | Hyder Elementary District | 52,656 | 122 | 107 | 102 | 103 | 98 | 98 |
| 158 | 4486 | 130403000 | Clarkdale-Jerome Elementary District | 48,288 | 434 | 479 | 455 | 455 | 469 | 469 |
| 159 | 4503 | 140417000 | Mohawk Valley Elementary District | 47,820 | 158 | 151 | 146 | 150 | 144 | 144 |
| 160 | 4171 | 20214000 | Bowie Unified District | 46,243 | 79 | 82 | 70 | 52 | 39 | 38 |

| # | Entity ID | CTD | Entity Name | GSF | Year-Over-Year Attenance by District | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2010 Attendance | 2011 Attendance | 2012 Attendance | 2013 Attendance | 2014 Attendance | 2015 Attendance |
| 161 | 4172 | 20218000 | San Simon Unified District | 45,061 | 95 | 89 | 114 | 146 | 137 | 137 |
| 162 | 4222 | 50305000 | Solomon Elementary District | 44,339 | 249 | 250 | 268 | 280 | 299 | 294 |
| 163 | 4213 | 40305000 | Young Elementary District | 43,872 | 60 | 59 | 56 | 33 | 45 | 45 |
| 164 | 4160 | 10306000 | Concho Elementary District | 41,015 | 239 | 232 | 244 | 248 | 205 | 194 |
| 165 | 4163 | 10323000 | Mcnary Elementary District | 39,692 | 169 | 154 | 167 | 155 | 169 | 169 |
| 166 | 4484 | 130350000 | Canon Elementary District | 38,230 | 258 | 221 | 205 | 206 | 185 | 185 |
| 167 | 4274 | 70447000 | Arlington Elementary District | 36,618 | 263 | 275 | 258 | 253 | 260 | 260 |
| 168 | 4514 | 150430000 | Salome Consolidated Elementary District | 36,533 | 107 | 100 | 102 | 118 | 120 | 120 |
| 169 | 4176 | 20323000 | Naco Elementary District | 36,034 | 416 | 411 | 383 | 382 | 428 | 428 |
| 170 | 4251 | 70375000 | Morristown Elementary District | 33,637 | 217 | 190 | 194 | 190 | 175 | 173 |
| 171 | 4461 | 120425000 | Sonoita Elementary District | 31,797 | 103 | 103 | 116 | 113 | 113 | 112 |
| 172 | 4249 | 70363000 | Aguila Elementary District | 31,788 | 216 | 219 | 216 | 220 | 219 | 211 |
| 173 | 4186 | 20422000 | Pearce Elementary District | 31,322 | 89 | 92 | 107 | 100 | 101 | 101 |
| 174 | 4185 | 20412000 | Elfrida Elementary District | 29,737 | 124 | 127 | 114 | 124 | 122 | 122 |
| 175 | 4199 | 30310000 | Maine Consolidated School District | 29,567 | 146 | 168 | 134 | 129 | 150 | 149 |
| 176 | 4188 | 20364000 | Pomerene Elementary District | 28,867 | 172 | 126 | 151 | 136 | 134 | 134 |
| 177 | 4224 | 50316000 | Bonita Elementary District | 27,239 | 92 | 93 | 89 | 92 | 89 | 89 |
| 178 | 4452 | 110433000 | Picacho Elementary District | 26,788 | 226 | 203 | 206 | 195 | 195 | 195 |
| 179 | 4479 | 130317000 | Congress Elementary District | 26,000 | 170 | 166 | 152 | 147 | 158 | 155 |
| 180 | 4177 | 20326000 | Cochise Elementary District | 25,613 | 86 | 81 | 96 | 91 | 88 | 88 |
| 181 | 4512 | 150419000 | Wenden Elementary District | 25,590 | 88 | 106 | 119 | 114 | 106 | 106 |
| 182 | 4162 | 10309000 | Vernon Elementary District | 24,218 | 170 | 179 | 164 | 147 | 166 | 164 |
| 183 | 4253 | 70386000 | Mobile Elementary District | 22,880 | 21 | 27 | 33 | 23 | 0 | 0 |
| 184 | 4234 | 70199000 | Maricopa County Regional District | 22,509 | 411 | 429 | 479 | 530 | 367 | 367 |
| 185 | 4459 | 120328000 | Santa Cruz Elementary District | 22,461 | 282 | 291 | 256 | 249 | 290 | 287 |
| 186 | 4386 | 90199000 | Navajo County Accommodation District #99 | 22,178 | 1 | 9 | 11 | 0 | 0 | 0 |
| 187 | 4187 | 20453000 | Ash Creek Elementary District | 21,432 | 44 | 27 | 20 | 19 | 28 | 28 |
| 188 | 4250 | 70371000 | Sentinel Elementary District | 21,004 | 30 | 29 | 39 | 32 | 37 | 37 |
| 189 | 4485 | 130352000 | Yarnell Elementary District | 20,499 | 69 | 76 | 54 | 47 | 45 | 33 |
| 190 | 4371 | 80303000 | Hackberry School District | 19,916 | 35 | 48 | 63 | 79 | 58 | 44 |
| 191 | 79379 | 130199000 | Yavapai Accommodation School District | 19,116 | 71 | 67 | 79 | 65 | 72 | 72 |
| 192 | 4215 | 40333000 | Tonto Basin Elementary District | 16,896 | 101 | 94 | 90 | 66 | 72 | 72 |
| 193 | 4179 | 20345000 | Double Adobe Elementary District | 16,164 | 72 | 61 | 55 | 59 | 67 | 62 |
| 194 | 4255 | 70394000 | Paloma School District | 15,280 | 95 | 84 | 100 | 104 | 117 | 115 |
| 195 | 4161 | 10307000 | Alpine Elementary District | 14,868 | 64 | 69 | 67 | 68 | 68 | 57 |
| 196 | 4380 | 80322000 | Valentine Elementary District | 13,430 | 76 | 71 | 70 | 80 | 79 | 72 |
| 197 | 4513 | 150426000 | Bouse Elementary District | 13,327 | 40 | 42 | 35 | 41 | 30 | 30 |
| 198 | 4460 | 120406000 | Patagonia Elementary District | 12,483 | 74 | 78 | 90 | 94 | 86 | 86 |
| 199 | 4480 | 130323000 | Kirkland Elementary District | 10,452 | 105 | 96 | 104 | 94 | 97 | 97 |
| 200 | 4181 | 20355000 | McNeal Elementary District | 8,550 | 82 | 83 | 56 | 66 | 56 | 56 |
| 201 | 4478 | 130315000 | Skull Valley Elementary District | 8,550 | 48 | 48 | 53 | 40 | 42 | 39 |
| 202 | 4414 | 100335000 | San Fernando Elementary District | 7,630 | 18 | 12 | 25 | 25 | 26 | 26 |
| 203 | 4377 | 80313000 | Yucca Elementary District | 7,616 | 25 | 36 | 37 | 44 | 43 | 35 |
| 204 | 4482 | 130335000 | Hillside Elementary District | 7,229 | 35 | 36 | 30 | 25 | 29 | 29 |
| 205 | 4178 | 20342000 | Apache Elementary District | 1,720 | 10 | 10 | 7 | 0 | 0 | 0 |
| 206 | 4231 | 60322000 | Blue Elementary District | 1,600 | 11 | 5 | 8 | 0 | 19 | 19 |

APPENDIX B

PLANT MAINTENANCE AND OPERATIONS SPEND PER DISTRICT

(Arizona Department of Education)

Year-Over-Year Spending by District

| # | Entity ID | CTD | Entity Name | GSF | 2010 Fac Ops Spend | 2011 Fac Ops Spend | 2012 Fac Ops Spend | 2013 Fac Ops Spend | 2014 Fac Ops Spend | 2015 Fac Ops Spend |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4403 | 100201000 | Tucson Unified District | 8,968,427 | $2,819,336 | $347,041 | $746,419 | $2,220,491 | $48,611,656 | $25,136,842 |
| 2 | 4235 | 70204000 | Mesa Unified District | 8,530,135 | $2,732,373 | $0 | $0 | $0 | $0 | $43,173,127 |
| 3 | 4241 | 70269000 | Paradise Valley Unified District | 5,085,048 | $0 | $1,073,940 | $555,897 | $0 | $54,814,345 | $54,323,863 |
| 4 | 4239 | 70241000 | Gilbert Unified District | 4,833,949 | $0 | $0 | $0 | $12,115 | $24,270,502 | $19,927,148 |
| 5 | 4242 | 70280000 | Chandler Unified District #80 | 4,773,688 | $0 | $0 | $0 | $575 | $26,339,602 | $76,347,129 |
| 6 | 4237 | 70211000 | Peoria Unified School District | 4,584,353 | $1,513 | $1,823,708 | $349,136 | $452,662 | $27,588,190 | $27,925,652 |
| 7 | 4246 | 70297000 | Deer Valley Unified District | 4,447,281 | $180,923 | $0 | $0 | $6,791 | $30,710,807 | $32,638,050 |
| 8 | 4286 | 70510000 | Phoenix Union High School District | 4,361,240 | $1,679,200 | $0 | $66,027 | $47,717 | $34,627,202 | $38,190,660 |
| 9 | 4240 | 70248000 | Scottsdale Unified District | 4,303,438 | $221,547 | $166,773 | $0 | $40,424 | $36,747,745 | $34,010,329 |
| 10 | 4243 | 70289000 | Dysart Unified District | 3,283,430 | $2,621,696 | $111,389 | $100,579 | $1,536 | $10,373,782 | $68,672,316 |
| 11 | 4260 | 70406000 | Washington Elementary School District | 2,929,727 | $702,099 | $254,542 | $572,897 | $261,976 | $16,280,475 | $16,112,897 |
| 12 | 4406 | 100210000 | Amphitheater Unified District | 2,560,557 | $83,930 | $0 | $0 | $0 | $13,909,239 | $14,122,971 |
| 13 | 4267 | 70428000 | Kyrene Elementary District | 2,556,290 | $120,849 | $105,362 | $0 | $262,009 | $16,126,463 | $41,761,241 |
| 14 | 4285 | 70505000 | Glendale Union High School District | 2,365,011 | $363,168 | $403,559 | $4,159 | $128,711 | $16,471,080 | $18,466,890 |
| 15 | 4287 | 70513000 | Tempe Union High School District | 2,326,820 | $0 | $47,807 | $632,684 | $11,667 | $7,976,817 | $7,791,581 |
| 16 | 4282 | 70483000 | Cartwright Elementary District | 2,143,391 | $155,253 | $27,890 | $0 | $6,423 | $2,092,341 | $486,373 |
| 17 | 4407 | 100212000 | Sunnyside Unified District | 1,970,356 | $0 | $948,062 | $8,322,566 | $1,245,601 | $6,885,540 | $6,544,671 |
| 18 | 4258 | 70403000 | Tempe School District | 1,818,774 | $263,493 | $209,574 | $156,459 | $201,952 | $25,319,653 | $50,922,079 |
| 19 | 4192 | 30201000 | Flagstaff Unified District | 1,747,421 | $682 | $0 | $0 | $0 | $6,515,599 | $6,862,554 |
| 20 | 4404 | 100206000 | Marana Unified District | 1,717,323 | $288,430 | $0 | $98,626 | $135,373 | $7,670,006 | $8,120,451 |
| 21 | 4248 | 70260000 | Higley Unified School District | 1,677,682 | $1,668,326 | $4,844 | $0 | $3,528 | $8,957,046 | $49,253,672 |
| 22 | 4280 | 70468000 | Alhambra Elementary District | 1,583,925 | $0 | $0 | $0 | $0 | $0 | $6,695,164 |
| 23 | 79598 | 80220000 | Kingman Unified School District | 1,517,377 | $875,457 | $390,551 | $45,510 | $40,292 | $6,830,282 | $6,939,744 |
| 24 | 4279 | 70466000 | Roosevelt Elementary District | 1,487,676 | $0 | $0 | $0 | $0 | $0 | $6,076,120 |
| 25 | 4507 | 140570000 | Yuma Union High School District | 1,474,177 | $0 | $250,381 | $20,034 | $56 | $15,761,627 | $764,664 |
| 26 | 4271 | 70440000 | Glendale Elementary District | 1,441,452 | $0 | $0 | $0 | $27,138 | $4,011,279 | $3,123,012 |
| 27 | 4413 | 100220000 | Vail Unified District | 1,326,723 | $29,765 | $110,558 | $9,044,254 | $8,307,683 | $9,931,978 | $4,610,085 |
| 28 | 4288 | 70514000 | Tolleson Union High School District | 1,310,221 | $192,778 | $1,156,762 | $625,069 | $654,204 | $26,177 | $11,025,812 |
| 29 | 4283 | 70492000 | Pendergast Elementary District | 1,261,632 | $86,870 | $620,454 | $0 | $252 | $5,893,870 | $11,467,695 |
| 30 | 4437 | 110201000 | Florence Unified School District | 1,249,830 | $1,683,666 | $346,300 | $0 | $0 | $3,563,781 | $3,617,015 |
| 31 | 4256 | 70401000 | Phoenix Elementary District | 1,168,665 | $0 | $0 | $0 | $18,406 | $9,758,325 | $9,477,735 |
| 32 | 4281 | 70479000 | Litchfield Elementary District | 1,161,345 | $2,186,279 | $366,043 | $456,484 | $0 | $4,335,263 | $5,436,714 |
| 33 | 4499 | 140401000 | Yuma Elementary District | 1,098,098 | $5,390 | $210,110 | $122,733 | $2 | $3,310,459 | $266,352 |
| 34 | 4263 | 70414000 | Creighton Elementary District | 995,558 | $338,077 | $82,859 | $72,369 | $5,306 | $3,797,263 | $4,535,743 |
| 35 | 4289 | 70516000 | Agua Fria Union High School District | 991,777 | $32,138 | $126,594 | $45,313 | $62,679 | $8,369,771 | $26,686,649 |
| 36 | 4158 | 10224000 | Chinle Unified District | 975,701 | $0 | $308,500 | $165,526 | $1,095,617 | $465,963 | $0 |
| 37 | 4244 | 70293000 | Cave Creek Unified District | 952,246 | $52,895 | $136,412 | $5,016,735 | $927,193 | $363,465 | $15,741,904 |
| 38 | 4284 | 70501000 | Buckeye Union High School District | 903,133 | $316,333 | $2,076 | $9,000 | $198 | $6,163,618 | $21,057,090 |
| 39 | 4442 | 110221000 | Coolidge Unified District | 901,352 | $303,693 | $70,591 | $568,210 | $22,527 | $364,667 | $3,287,557 |
| 40 | 4446 | 110404000 | Casa Grande Elementary District | 896,907 | $29,484 | $39,059 | $153,574 | $322,002 | $3,805,787 | $2,782,661 |

Year-Over-Year Spending by District

| # | Entity ID | CTD | Entity Name | GSF | 2010 Fac Ops Spend | 2011 Fac Ops Spend | 2012 Fac Ops Spend | 2013 Fac Ops Spend | 2014 Fac Ops Spend | 2015 Fac Ops Spend |
|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 4259 | 70405000 | Isaac Elementary District | 876,839 | $0 | $0 | $0 | $0 | $102,666 | $0 |
| 42 | 4175 | 20268000 | Sierra Vista Unified District | 856,511 | $0 | $143,195 | $156,478 | $0 | $0 | $103,908 |
| 43 | 4368 | 80201000 | Lake Havasu Unified District | 846,080 | $33,818 | $49,850 | $70,060 | $0 | $5,781,177 | $6,919,289 |
| 44 | 4441 | 110220000 | Maricopa Unified School District | 837,081 | $1,193,475 | $1,368,387 | $2,561,936 | $100,971 | $3,978,767 | $3,536,687 |
| 45 | 4245 | 70295000 | Queen Creek Unified District | 833,228 | $166,627 | $206,231 | $3,011 | $73,034 | $5,687,025 | $13,840,881 |
| 46 | 4469 | 130222000 | Humboldt Unified District | 826,072 | $33,881 | $79,714 | $9,866 | $159,146 | $3,629,325 | $3,553,482 |
| 47 | 4411 | 100230000 | Sahuarita Unified District | 814,183 | $253,322 | $16,194,435 | $4,873,512 | $454,376 | $267,257 | $5,670,035 |
| 48 | 4410 | 100216000 | Catalina Foothills Unified District | 808,947 | $8,604 | $6,600 | $0 | $0 | $89 | $4,077,124 |
| 49 | 4405 | 100208000 | Flowing Wells Unified District | 789,539 | $170,274 | $181,589 | $1,549 | $318,465 | $2,971,568 | $2,604,016 |
| 50 | 4443 | 110243000 | Apache Junction Unified District | 783,426 | $84,825 | $451,526 | $6,005 | $719 | $6,799,553 | $6,451,203 |
| 51 | 4466 | 130201000 | Prescott Unified District | 764,467 | $0 | $0 | $0 | $108,039 | $451,272 | $2,609,881 |
| 52 | 4270 | 70438000 | Madison Elementary District | 762,711 | $37,181 | $0 | $0 | $92,827 | $10,524,128 | $11,075,816 |
| 53 | 4272 | 70444000 | Avondale Elementary District | 760,287 | $15,703 | $0 | $0 | $0 | $3,501,392 | $3,420,565 |
| 54 | 4457 | 120201000 | Nogales Unified District | 750,318 | $0 | $0 | $0 | $42,666 | $755,355 | $660,248 |
| 55 | 4501 | 140413000 | Crane Elementary District | 712,076 | $135,001 | $84,562 | $11,671 | $2,696 | $1,847,931 | $2,009,364 |
| 56 | 4276 | 70459000 | Laveen Elementary District | 660,163 | $86,440 | $233,025 | $10,372,903 | $1,145,594 | $2,834,128 | $1,982,488 |
| 57 | 4396 | 90227000 | Kayenta Unified District | 654,650 | $0 | $0 | $0 | $0 | $328 | $0 |
| 58 | 4445 | 110244000 | J O Combs Unified School District | 653,277 | $647,216 | $553,739 | $197,154 | $37,776 | $2,813,095 | $2,154,674 |
| 59 | 4196 | 30208000 | Page Unified District | 638,103 | $0 | $0 | $0 | $65,146 | $2,900,249 | $2,706,259 |
| 60 | 4278 | 70465000 | Littleton Elementary District | 631,086 | $43,828 | $478,652 | $0 | $55,671 | $2,939,523 | $3,209,939 |
| 61 | 4394 | 90220000 | Whiteriver Unified District | 626,577 | $0 | $0 | $0 | $0 | $1,924,303 | $1,969,785 |
| 62 | 4154 | 10208000 | Window Rock Unified District | 626,340 | $150,597 | $111,191 | $0 | $226,514 | $3,585,036 | $356,644 |
| 63 | 4453 | 110502000 | Casa Grande Union High School District | 603,851 | $100,182 | $0 | $0 | $640,686 | $3,071,322 | $1,429,513 |
| 64 | 4174 | 20227000 | Douglas Unified District | 603,041 | $47,602 | $225,605 | $0 | $29,109 | $692,419 | $1,063,601 |
| 65 | 4157 | 10220000 | Ganado Unified School District | 587,701 | $0 | $155,224 | $862,752 | $108,657 | $3,270,129 | $393,965 |
| 66 | 4273 | 70445000 | Fowler Elementary District | 559,846 | $0 | $437,866 | $12,553 | $24,394 | $2,437,539 | $8,555,610 |
| 67 | 4269 | 70433000 | Buckeye Elementary District | 546,169 | $534,569 | $10,201 | $0 | $48,132 | $1,994,382 | $1,705,475 |
| 68 | 4262 | 70408000 | Osborn Elementary District | 532,469 | $5,652 | $0 | $0 | $0 | $6,311,272 | $4,522,293 |
| 69 | 4397 | 90232000 | Blue Ridge Unified School District No. 32 | 532,157 | $35,460 | $21,142 | $0 | $2,181 | $2,684,978 | $2,452,656 |
| 70 | 4155 | 10210000 | Round Valley Unified District | 530,690 | $117,159 | $263,749 | $0 | $31,999 | $0 | $899,461 |
| 71 | 4505 | 140432000 | Gadsden Elementary District | 513,519 | $49,217 | $11,372 | $0 | $0 | $136,451 | $508,553 |
| 72 | 4458 | 120235000 | Santa Cruz Valley Unified District | 494,529 | $10,211 | $177,810 | $0 | $381,020 | $111,248 | $713,573 |
| 73 | 4247 | 70298000 | Fountain Hills Unified District | 483,159 | $534,569 | $1,756,446 | $0 | $0 | $1,200,088 | $1,030,000 |
| 74 | 4218 | 50201000 | Safford Unified District | 479,116 | $25,500 | $42,084 | $0 | $241,972 | $1,112,521 | $1,088,336 |
| 75 | 4387 | 90201000 | Winslow Unified District | 478,581 | $40,473 | $0 | $0 | $0 | $455,543 | $449,316 |
| 76 | 4393 | 90210000 | Show Low Unified District | 451,741 | $79,272 | $0 | $0 | $0 | $670 | $43,991 |
| 77 | 4268 | 70431000 | Balsz Elementary District | 446,570 | $0 | $0 | $0 | $49 | $2,968,740 | $3,600,070 |
| 78 | 4391 | 90205000 | Snowflake Unified District | 428,183 | $98,033 | $103,877 | $0 | $12,245 | $1,340,339 | $4,324,338 |
| 79 | 4236 | 70209000 | Wickenburg Unified District | 428,117 | $26,522 | $4,086 | $728 | $5,557 | $5,876,057 | $2,307,762 |
| 80 | 4378 | 80415000 | Bullhead City School District | 424,264 | $0 | $0 | $0 | $40,423 | $24,500 | $599,926 |

| | | | | | Year-Over-Year Spending by District | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| # | Entity ID | CTD | Entity Name | GSF | 2010 Fac Ops Spend | 2011 Fac Ops Spend | 2012 Fac Ops Spend | 2013 Fac Ops Spend | 2014 Fac Ops Spend | 2015 Fac Ops Spend |
| 81 | 4381 | 80502000 | Colorado River Union High School District | 418,757 | $23,652 | $0 | $5,745 | $470,915 | $2,347,058 | $2,450,336 |
| 82 | 4389 | 90203000 | Holbrook Unified District | 412,976 | $93,315 | $227,321 | $0 | $0 | $324,294 | $365,509 |
| 83 | 4209 | 40210000 | Payson Unified District | 403,279 | $135,693 | $0 | $773,040 | $534,001 | $165,888 | $2,931,723 |
| 84 | 4264 | 70417000 | Tolleson Elementary District | 392,313 | $0 | $0 | $0 | $0 | $1,971,337 | $1,650,163 |
| 85 | 4266 | 70425000 | Liberty Elementary District | 380,368 | $0 | $225,000 | $162,128 | $7,399 | $1,114,825 | $1,738,657 |
| 86 | 4156 | 10218000 | Sanders Unified District | 379,556 | $0 | $2,960 | $0 | $37,204 | $0 | $3,589 |
| 87 | 4254 | 70290000 | Saddle Mountain Unified School District | 374,207 | $21 | $9,508 | $0 | $8,546 | $4,051,589 | $41,962 |
| 88 | 4467 | 130209000 | Sedona-Oak Creek JUSD #9 | 372,234 | $84,914 | $161,579 | $0 | $0 | $6,474,170 | $6,387,047 |
| 89 | 4210 | 40220000 | San Carlos Unified District | 369,835 | $504,136 | $20,021 | $0 | $0 | $712,131 | $0 |
| 90 | 4510 | 150227000 | Parker Unified School District | 366,028 | $0 | $75,374 | $0 | $0 | $0 | $0 |
| 91 | 4390 | 90204000 | Pinon Unified District | 344,152 | $0 | $0 | $0 | $0 | $0 | $0 |
| 92 | 4208 | 40201000 | Globe Unified District | 336,783 | $1,606 | $48,566 | $0 | $0 | $123,908 | $867,469 |
| 93 | 4439 | 110208000 | Mammoth-San Manuel Unified District | 335,849 | $3,473 | $20,804 | $0 | $12,145 | $171,337 | $8,967 |
| 94 | 4474 | 130251000 | Chino Valley Unified District | 333,773 | $86,453 | $5,759 | $0 | $312,453 | $44,464 | $316,547 |
| 95 | 4211 | 40240000 | Miami Unified District | 327,598 | $5,723 | $163,012 | $0 | $3,625 | $58,361 | $103,537 |
| 96 | 4412 | 100240000 | Baboquivari Unified School District #40 | 315,281 | $317,283 | $2,406 | $0 | $0 | $0 | $1,391,960 |
| 97 | 4487 | 130406000 | Cottonwood-Oak Creek Elementary District | 312,330 | $87,361 | $137,333 | $0 | $15,475 | $0 | $48,128 |
| 98 | 4500 | 140411000 | Somerton Elementary District | 312,037 | $4,960 | $0 | $0 | $0 | $531,960 | $526,215 |
| 99 | 4265 | 70421000 | Murphy Elementary District | 305,100 | $24,763 | $0 | $0 | $0 | $167,772 | $1,479,554 |
| 100 | 4153 | 10201000 | St Johns Unified District | 297,133 | $14,093 | $642,387 | $0 | $0 | $0 | $76,831 |
| 101 | 4408 | 100213000 | Tanque Verde Unified District | 280,121 | $137,506 | $10,140 | $3,735,537 | $48 | $101,746 | $1,538,907 |
| 102 | 4219 | 50204000 | Thatcher Unified District | 276,740 | $42,938 | $222,213 | $0 | $26,701 | $721,679 | $2,103,259 |
| 103 | 4230 | 60218000 | Morenci Unified District | 273,528 | $80,044 | $0 | $0 | $0 | $0 | $0 |
| 104 | 4170 | 20213000 | Willcox Unified District | 273,508 | $465,859 | $154,696 | $5,000 | $15,060 | $1,224,837 | $1,655,123 |
| 105 | 4470 | 130228000 | Camp Verde Unified District | 245,725 | $64,768 | $0 | $0 | $0 | $0 | $779,883 |
| 106 | 4168 | 20201000 | Tombstone Unified District | 231,447 | $261,927 | $8,788 | $0 | $14,000 | $52,447 | $495,854 |
| 107 | 4169 | 20202000 | Bisbee Unified District | 228,248 | $48,388 | $498,472 | $159,770 | $0 | $882,145 | $25,650 |
| 108 | 4159 | 10227000 | Red Mesa Unified District | 227,658 | $4,585 | $7,043 | $0 | $0 | $3,021 | $28,391 |
| 109 | 4379 | 80416000 | Mohave Valley Elementary District | 220,035 | $10,586 | $49,306 | $0 | $125,311 | $1,323,362 | $1,460,690 |
| 110 | 4388 | 90202000 | Joseph City Unified District | 211,184 | $174,000 | $43,540 | $3,976 | $15,406 | $706,290 | $392,758 |
| 111 | 4261 | 70407000 | Wilson Elementary District | 207,691 | $0 | $0 | $390,108 | $0 | $472,782 | $144,491 |
| 112 | 4277 | 70462000 | Union Elementary District | 202,597 | $34,887 | $34,887 | $0 | $0 | $367,675 | $359,087 |
| 113 | 4488 | 130504000 | Mingus Union High School District | 198,724 | $3,240 | $0 | $0 | $0 | $1,566,570 | $1,568,789 |
| 114 | 79226 | 20209000 | Benson Unified School District | 194,192 | $312,704 | $39,698 | $9,946 | $5,459 | $44,382 | $725,388 |
| 115 | 4257 | 70402000 | Riverside Elementary District | 192,409 | $0 | $14,750 | $0 | $961 | $6,044,894 | $7,023,938 |
| 116 | 4438 | 110203000 | Ray Unified District | 191,243 | $0 | $0 | $0 | $28 | $281,151 | $265,701 |
| 117 | 4221 | 50207000 | Fort Thomas Unified District | 183,357 | $35,064 | $50,995 | $0 | $3,200 | $202,654 | $0 |
| 118 | 4212 | 40241000 | Hayden-Winkelman Unified District | 179,222 | $41,428 | $11,541 | $102,267 | $15,055 | $1,025,811 | $892,501 |
| 119 | 4440 | 110215000 | Superior Unified School District | 171,807 | $16,112 | $3,107 | $0 | $114,434 | $261,301 | $249,738 |
| 120 | 4450 | 110422000 | Toltec School District | 170,495 | $15,198 | $0 | $89 | $0 | $1,916,413 | $806,624 |

Year-Over-Year Spending by District

| # | Entity ID | CTD | Entity Name | GSF | 2010 Fac Ops Spend | 2011 Fac Ops Spend | 2012 Fac Ops Spend | 2013 Fac Ops Spend | 2014 Fac Ops Spend | 2015 Fac Ops Spend |
|---|---|---|---|---|---|---|---|---|---|---|
| 121 | 4370 | 80214000 | Colorado City Unified District | 168,595 | $0 | $0 | $0 | $0 | $195,512 | $183,570 |
| 122 | 4392 | 90206000 | Heber-Overgaard Unified District | 164,182 | $0 | $1,078 | $0 | $33,815 | $858,400 | $855,500 |
| 123 | 4448 | 110411000 | Eloy Elementary District | 157,960 | $0 | $0 | $0 | $860 | $30,238 | $118,675 |
| 124 | 4395 | 90225000 | Cedar Unified District | 156,043 | $0 | $0 | $0 | $146,996 | $0 | $503,651 |
| 125 | 4454 | 110540000 | Santa Cruz Valley Union High School District | 151,633 | $195,860 | $166,910 | $49,649 | $216,063 | $1,716,940 | $1,673,457 |
| 126 | 4449 | 110418000 | Sacaton Elementary District | 148,862 | $6,178 | $41,311 | $31,769 | $6,287 | $40,162 | $0 |
| 127 | 4193 | 30202000 | Williams Unified District | 146,180 | $17,487 | $1,330 | $1,397,771 | $890,615 | $477,047 | $1,319 |
| 128 | 4228 | 60202000 | Duncan Unified District | 136,458 | $375,613 | $48,335 | $398,068 | $96,103 | $356,748 | $294,500 |
| 129 | 4180 | 20349000 | Palominas Elementary District | 129,873 | $504 | $0 | $0 | $255,102 | $0 | $0 |
| 130 | 4220 | 50206000 | Pima Unified District | 119,300 | $5,921 | $0 | $0 | $0 | $153,550 | $0 |
| 131 | 4473 | 130243000 | Mayer Unified School District | 118,214 | $0 | $0 | $0 | $5,084 | $280,512 | $159,775 |
| 132 | 4447 | 110405000 | Red Rock Elementary District | 118,105 | $208,120 | $0 | $0 | $0 | $237,064 | $0 |
| 133 | 4506 | 140550000 | Antelope Union High School District | 117,018 | $27,558 | $15,527 | $0 | $0 | $235,943 | $228,193 |
| 134 | 4418 | 100351000 | Altar Valley Elementary District | 116,000 | $10,280 | $0 | $0 | $0 | $8,385 | $0 |
| 135 | 4238 | 70224000 | Gila Bend Unified District | 110,813 | $47,735 | $32,366 | $0 | $122,048 | $592,368 | $724,424 |
| 136 | 4409 | 100215000 | Ajo Unified District | 107,122 | $72,937 | $10,640 | $283,813 | $3,179 | $26,525 | $5,344 |
| 137 | 4195 | 30206000 | Fredonia-Moccasin Unified District | 106,127 | $14,796 | $1 | $0 | $99,500 | $43 | $0 |
| 138 | 4369 | 80208000 | Peach Springs Unified District | 102,653 | $37,287 | $23,769 | $37,025 | $16,481 | $16,766 | $1,408 |
| 139 | 4468 | 130220000 | Bagdad Unified District | 98,396 | $0 | $16,719 | $0 | $0 | $13,903 | $0 |
| 140 | 4451 | 110424000 | Stanfield Elementary District | 97,461 | $2,942 | $0 | $0 | $0 | $154,538 | $13 |
| 141 | 4472 | 130224000 | Seligman Unified District | 90,327 | $0 | $0 | $0 | $0 | $27,381 | $0 |
| 142 | 4173 | 20221000 | St David Unified District | 88,586 | $0 | $14,285 | $0 | $450,000 | $374,939 | $340,282 |
| 143 | 4374 | 80209000 | Littlefield Unified District | 82,633 | $22,403 | $0 | $0 | $3,307 | $190,175 | $336,613 |
| 144 | 4194 | 30204000 | Grand Canyon Unified District | 76,786 | $0 | $0 | $0 | $0 | $713,385 | $50,053 |
| 145 | 4416 | 100339000 | Continental Elementary District | 75,361 | $0 | $0 | $0 | $0 | $7,716 | $945,137 |
| 146 | 4481 | 130326000 | Beaver Creek Elementary District | 74,916 | $8,346 | $10,349 | $0 | $12 | $365,655 | $409,927 |
| 147 | 4444 | 110302000 | Oracle Elementary District | 72,929 | $0 | $0 | $41,800 | $65,433 | $31,524 | $0 |
| 148 | 4435 | 110100000 | Mary C O'Brien Accommodation District | 72,051 | $0 | $0 | $20,846 | $0 | $624 | $72,344 |
| 149 | 4462 | 120520000 | Patagonia Union High School District | 70,799 | $0 | $65,475 | $2,040 | $152,898 | $340 | $0 |
| 150 | 4275 | 70449000 | Palo Verde Elementary District | 66,790 | $116,969 | $38,800 | $0 | $219,197 | $170,489 | $178,377 |
| 151 | 4214 | 40312000 | Pine Strawberry Elementary District | 66,745 | $12,274 | $0 | $0 | $0 | $0 | $0 |
| 152 | 4504 | 140424000 | Wellton Elementary District | 60,797 | $0 | $0 | $0 | $569 | $2,053 | $0 |
| 153 | 4190 | 20522000 | Valley Union High School District | 59,812 | $49,153 | $16,357 | $10,516 | $10,153 | $32,020 | $175,109 |
| 154 | 4515 | 150576000 | Bicentennial Union High School District | 57,537 | $167,542 | $0 | $0 | $0 | $22,918 | $394,522 |
| 155 | 4471 | 130231000 | Ash Fork Joint Unified District | 53,260 | $0 | $0 | $0 | $0 | $0 | $0 |
| 156 | 4511 | 150404000 | Quartzsite Elementary District | 53,125 | $10,428 | $41,970 | $0 | $19,181 | $27,178 | $339,398 |
| 157 | 4502 | 140416000 | Hyder Elementary District | 52,656 | $18,689 | $10,480 | $20,055 | $23,089 | $9,065 | $263,141 |
| 158 | 4486 | 130403000 | Clarkdale-Jerome Elementary District | 48,288 | $13,886 | $0 | $111,042 | $15 | $39,451 | $107,038 |
| 159 | 4503 | 140417000 | Mohawk Valley Elementary District | 47,820 | $0 | $1,394 | $0 | $0 | $218,292 | $602,496 |
| 160 | 4171 | 20214000 | Bowie Unified District | 46,243 | $12,629 | $20,797 | $0 | $0 | $41,034 | $33,954 |

Year-Over-Year Spending by District

| # | Entity ID | CTD | Entity Name | GSF | 2010 Fac Ops Spend | 2011 Fac Ops Spend | 2012 Fac Ops Spend | 2013 Fac Ops Spend | 2014 Fac Ops Spend | 2015 Fac Ops Spend |
|---|---|---|---|---|---|---|---|---|---|---|
| 161 | 4172 | 20218000 | San Simon Unified District | 45,061 | $50,441 | | $920 | $0 | $9,673 | $0 |
| 162 | 4222 | 50305000 | Solomon Elementary District | 44,339 | $35,293 | $8,113 | $0 | $24,783 | $69,631 | $14,805 |
| 163 | 4213 | 40305000 | Young Elementary District | 43,872 | $334,139 | $0 | $0 | $12,095 | $92,607 | $0 |
| 164 | 4160 | 10306000 | Concho Elementary District | 41,015 | $0 | $0 | $3,448 | $0 | $102,147 | $98,650 |
| 165 | 4163 | 10323000 | Mcnary Elementary District | 39,692 | $3,588 | | $0 | $3,131 | $3,411 | $18,245 |
| 166 | 4484 | 130350000 | Canon Elementary District | 38,230 | $11,607 | $52,730 | $0 | $25,233 | $12,089 | $74,018 |
| 167 | 4274 | 70447000 | Arlington Elementary District | 36,618 | $0 | $0 | $0 | $0 | -$270,101 | $821,897 |
| 168 | 4514 | 150430000 | Salome Consolidated Elementary District | 36,533 | $11,462 | $0 | $0 | $9,894 | $1,607 | $0 |
| 169 | 4176 | 20323000 | Naco Elementary District | 36,034 | $114,789 | $108,257 | $0 | $10 | $0 | $0 |
| 170 | 4251 | 70375000 | Morristown Elementary District | 33,637 | $0 | $0 | $0 | $0 | $65,213 | $0 |
| 171 | 4461 | 120425000 | Sonoita Elementary District | 31,797 | $0 | $0 | $0 | $0 | $181 | $0 |
| 172 | 4249 | 70363000 | Aguila Elementary District | 31,788 | $4,131 | $0 | $0 | $400,207 | $425,704 | $0 |
| 173 | 4186 | 20422000 | Pearce Elementary District | 31,322 | $0 | $0 | $0 | $0 | $943 | $0 |
| 174 | 4185 | 20412000 | Elfrida Elementary District | 29,737 | $0 | $191 | $0 | $2,691 | $0 | $3,565 |
| 175 | 4199 | 30310000 | Maine Consolidated School District | 29,567 | $30,823 | $3,501 | $0 | $0 | -$1,142 | $0 |
| 176 | 4188 | 20364000 | Pomerene Elementary District | 28,867 | -$560 | $0 | $0 | $0 | $34,458 | $502,760 |
| 177 | 4224 | 50316000 | Bonita Elementary District | 27,239 | $9,500 | $898 | $0 | $1,265 | $0 | $77,271 |
| 178 | 4452 | 110433000 | Picacho Elementary District | 26,788 | $80 | $0 | $148,503 | $0 | $16,179 | $12,589 |
| 179 | 4479 | 130317000 | Congress Elementary District | 26,000 | $177,106 | $380 | $0 | $9,734 | $0 | $0 |
| 180 | 4177 | 20326000 | Cochise Elementary District | 25,613 | $5,813 | $4,746 | $0 | $0 | $0 | $0 |
| 181 | 4512 | 150419000 | Wenden Elementary District | 25,590 | $13,042 | $2,186 | $3,079 | $0 | $0 | $0 |
| 182 | 4162 | 10309000 | Vernon Elementary District | 24,218 | $0 | $135,585 | $0 | $266,606 | $0 | $28,233 |
| 183 | 4253 | 70386000 | Mobile Elementary District | 22,880 | $39,562 | $5,076 | $0 | $481,446 | $3,809 | $96,711 |
| 184 | 4234 | 70199000 | Maricopa County Regional District | 22,509 | $0 | $0 | $0 | $6,363 | $125,772 | $0 |
| 185 | 4459 | 120328000 | Santa Cruz Elementary District | 22,461 | $7,052 | $0 | $0 | $0 | $0 | $0 |
| 186 | 4386 | 90199000 | Navajo County Accommodation District #99 | 22,178 | $0 | $616,216 | $0 | $0 | $629 | $0 |
| 187 | 4187 | 20453000 | Ash Creek Elementary District | 21,432 | $0 | $0 | $44,270 | $15,195 | $708 | $0 |
| 188 | 4250 | 70371000 | Sentinel Elementary District | 21,004 | $0 | $0 | $0 | $3,914 | $0 | $0 |
| 189 | 4485 | 130352000 | Yarnell Elementary District | 20,499 | $0 | $0 | $0 | $0 | $0 | $31,447 |
| 190 | 4371 | 80303000 | Hackberry School District | 19,916 | $0 | $0 | $0 | $0 | $0 | $0 |
| 191 | 79379 | 130199000 | Yavapai Accommodation School District | 19,116 | $0 | $0 | $0 | $0 | $0 | $0 |
| 192 | 4215 | 40333000 | Tonto Basin Elementary District | 16,896 | $0 | $11,374 | $22,987 | $0 | $44,380 | $87,016 |
| 193 | 4179 | 20345000 | Double Adobe Elementary District | 16,164 | $0 | $20,468 | $0 | $7,304 | $103,003 | $0 |
| 194 | 4255 | 70394000 | Paloma School District | 15,280 | $21,047 | $3,804 | $3,602 | $122,880 | $170,801 | $24,505 |
| 195 | 4161 | 10307000 | Alpine Elementary District | 14,868 | $25,060 | $0 | $0 | $0 | $35,089 | $0 |
| 196 | 4380 | 80322000 | Valentine Elementary District | 13,430 | $0 | $22,106 | $0 | $13,744 | $14,011 | $221,389 |
| 197 | 4513 | 150426000 | Bouse Elementary District | 13,327 | $3,065 | $0 | $0 | $1,000 | $4,470 | $0 |
| 198 | 4460 | 120406000 | Patagonia Elementary District | 12,483 | $47 | $14,726 | $0 | $29,654 | $1,466 | $0 |
| 199 | 4480 | 130323000 | Kirkland Elementary District | 10,452 | $4,101 | $10,752 | $0 | $0 | $0 | $33,587 |
| 200 | 4181 | 20355000 | McNeal Elementary District | 8,550 | $1,208 | $10,678 | $113,835 | $6,775 | $24,057 | $8,521 |
| 201 | 4478 | 130315000 | Skull Valley Elementary District | 8,550 | $3,773 | $0 | $0 | $28,283 | $59,775 | $0 |
| 202 | 4414 | 100335000 | San Fernando Elementary District | 7,630 | $0 | $0 | $0 | $0 | $0 | $0 |
| 203 | 4377 | 80313000 | Yucca Elementary District | 7,616 | $4,760 | $0 | $0 | $0 | $4,582 | $0 |
| 204 | 4482 | 130335000 | Hillside Elementary District | 7,229 | $0 | $0 | $28,256 | $0 | $5,440 | $0 |
| 205 | 4178 | 20342000 | Apache Elementary District | 1,720 | $0 | $24,498 | $4,660 | $0 | $0 | $0 |
| 206 | 4231 | 60322000 | Blue Elementary District | 1,600 | 0 | 30934 | 0 | 0 | 0 | 0 |

# APPENDIX C
## STANDARDIZED TEST RESULTS PER DISTRICT

(Arizona Department of Education)

| # | Entity ID | CTD | Entity Name | GSF | 2010 Math | 2010 Science | 2010 Reading | 2010 Writing |
|---|---|---|---|---|---|---|---|---|
| 1 | 4403 | 100201000 | Tucson Unified District | 8,968,427 | 32% | 42% | 50% | 46% |
| 2 | 4235 | 70204000 | Mesa Unified District | 8,530,135 | 52% | 60% | 64% | 53% |
| 3 | 4241 | 70269000 | Paradise Valley Unified District | 5,085,048 | 57% | 67% | 73% | 70% |
| 4 | 4239 | 70241000 | Gilbert Unified District | 4,833,949 | 63% | 63% | 78% | 74% |
| 5 | 4242 | 70280000 | Chandler Unified District #80 | 4,773,688 | 63% | 71% | 73% | 71% |
| 6 | 4237 | 70211000 | Peoria Unified School District | 4,584,353 | 59% | 61% | 75% | 69% |
| 7 | 4246 | 70297000 | Deer Valley Unified District | 4,447,281 | 55% | 61% | 76% | 67% |
| 8 | 4286 | 70510000 | Phoenix Union High School District | 4,361,240 | 26% | 46% | 43% | 36% |
| 9 | 4240 | 70248000 | Scottsdale Unified District | 4,303,438 | 68% | 71% | 81% | 74% |
| 10 | 4243 | 70289000 | Dysart Unified District | 3,283,430 | 50% | 59% | 66% | 62% |
| 11 | 4260 | 70406000 | Washington Elementary School District | 2,929,727 | 53% | 53% | 68% | 72% |
| 12 | 4406 | 100210000 | Amphitheater Unified District | 2,560,557 | 52% | 56% | 63% | 58% |
| 13 | 4267 | 70428000 | Kyrene Elementary District | 2,556,290 | 78% | 80% | 88% | 86% |
| 14 | 4285 | 70505000 | Glendale Union High School District | 2,365,011 | 38% | 69% | 50% | 48% |
| 15 | 4287 | 70513000 | Tempe Union High School District | 2,326,820 | 31% | 72% | 49% | 44% |
| 16 | 4282 | 70483000 | Cartwright Elementary District | 2,143,391 | 50% | 37% | 63% | 61% |
| 17 | 4407 | 100212000 | Sunnyside Unified District | 1,970,356 | 34% | 40% | 55% | 48% |
| 18 | 4258 | 70403000 | Tempe School District | 1,818,774 | 55% | 55% | 72% | 77% |
| 19 | 4192 | 30201000 | Flagstaff Unified District | 1,747,421 | 48% | 51% | 62% | 61% |
| 20 | 4404 | 100206000 | Marana Unified District | 1,717,323 | 56% | 66% | 75% | 68% |
| 21 | 4248 | 70260000 | Higley Unified School District | 1,677,682 | 63% | 63% | 78% | 72% |
| 22 | 4280 | 70468000 | Alhambra Elementary District | 1,583,925 | 55% | 43% | 67% | 59% |
| 23 | 79598 | 80220000 | Kingman Unified School District | 1,517,377 | 42% | 52% | 57% | 46% |
| 24 | 4279 | 70466000 | Roosevelt Elementary District | 1,487,676 | 43% | 37% | 58% | 63% |
| 25 | 4507 | 140570000 | Yuma Union High School District | 1,474,177 | 26% | 20% | 34% | 29% |
| 26 | 4271 | 70440000 | Glendale Elementary District | 1,441,452 | 47% | 46% | 59% | 66% |
| 27 | 4413 | 100220000 | Vail Unified District | 1,326,723 | 74% | 82% | 90% | 81% |
| 28 | 4288 | 70514000 | Tolleson Union High School District | 1,310,221 | 26% | 45% | 44% | 45% |
| 29 | 4283 | 70492000 | Pendergast Elementary District | 1,261,632 | 56% | 50% | 71% | 69% |
| 30 | 4437 | 110201000 | Florence Unified School District | 1,249,830 | 44% | 58% | 67% | 58% |
| 31 | 4256 | 70401000 | Phoenix Elementary District | 1,168,665 | 43% | 38% | 61% | 56% |
| 32 | 4281 | 70479000 | Litchfield Elementary District | 1,161,345 | 69% | 75% | 82% | 83% |
| 33 | 4499 | 140401000 | Yuma Elementary District | 1,098,098 | 50% | 47% | 67% | 64% |
| 34 | 4263 | 70414000 | Creighton Elementary District | 995,558 | 47% | 45% | 63% | 61% |
| 35 | 4289 | 70516000 | Agua Fria Union High School District | 991,777 | 40% | 37% | 65% | 58% |
| 36 | 4158 | 10224000 | Chinle Unified District | 975,701 | 22% | 23% | 44% | 44% |
| 37 | 4244 | 70293000 | Cave Creek Unified District | 952,246 | 73% | 73% | 88% | 86% |
| 38 | 4284 | 70501000 | Buckeye Union High School District | 903,133 | 45% | 39% | 72% | 67% |
| 39 | 4442 | 110221000 | Coolidge Unified District | 901,352 | 36% | 38% | 59% | 55% |
| 40 | 4446 | 110404000 | Casa Grande Elementary District | 896,907 | 60% | 56% | 72% | 63% |
| 41 | 4259 | 70405000 | Isaac Elementary District | 876,839 | 46% | 42% | 57% | 62% |
| 42 | 4175 | 20268000 | Sierra Vista Unified District | 856,511 | 57% | 60% | 75% | 65% |
| 43 | 4368 | 80201000 | Lake Havasu Unified District | 846,080 | 61% | 68% | 83% | 79% |
| 44 | 4441 | 110220000 | Maricopa Unified School District | 837,081 | 44% | 43% | 63% | 60% |
| 45 | 4245 | 70295000 | Queen Creek Unified District | 833,228 | 61% | 68% | 80% | 85% |
| 46 | 4469 | 130222000 | Humboldt Unified District | 826,072 | 57% | 69% | 73% | 64% |
| 47 | 4411 | 100230000 | Sahuarita Unified District | 814,183 | 57% | 59% | 70% | 67% |
| 48 | 4410 | 100216000 | Catalina Foothills Unified District | 808,947 | 83% | 73% | 93% | 91% |
| 49 | 4405 | 100208000 | Flowing Wells Unified District | 789,539 | 55% | 57% | 71% | 65% |
| 50 | 4443 | 110243000 | Apache Junction Unified District | 783,426 | 49% | 62% | 66% | 67% |
| 51 | 4466 | 130201000 | Prescott Unified District | 764,467 | 68% | 73% | 85% | 79% |
| 52 | 4270 | 70438000 | Madison Elementary District | 762,711 | 71% | 74% | 82% | 74% |
| 53 | 4272 | 70444000 | Avondale Elementary District | 760,287 | 52% | 57% | 70% | 62% |
| 54 | 4457 | 120201000 | Nogales Unified District | 750,318 | 49% | 31% | 65% | 60% |
| 55 | 4501 | 140413000 | Crane Elementary District | 712,076 | 58% | 55% | 72% | 77% |
| 56 | 4276 | 70459000 | Laveen Elementary District | 660,163 | 55% | 47% | 68% | 63% |
| 57 | 4396 | 90227000 | Kayenta Unified District | 654,650 | 31% | 25% | 49% | 53% |
| 58 | 4445 | 110244000 | J O Combs Unified School District | 653,277 | 53% | 49% | 76% | 73% |
| 59 | 4196 | 30208000 | Page Unified District | 638,103 | 41% | 35% | 56% | 54% |
| 60 | 4278 | 70465000 | Littleton Elementary District | 631,086 | 47% | 49% | 63% | 59% |

| # | Entity ID | CTD | Entity Name | GSF | 2010 Math | 2010 Science | 2010 Reading | 2010 Writing |
|---|---|---|---|---|---|---|---|---|
| 61 | 4394 | 90220000 | Whiteriver Unified District | 626,577 | 20% | 18% | 39% | 38% |
| 62 | 4154 | 10208000 | Window Rock Unified District | 626,340 | 28% | 22% | 47% | 44% |
| 63 | 4453 | 110502000 | Casa Grande Union High School District | 603,851 | 23% | 44% | 44% | 39% |
| 64 | 4174 | 20227000 | Douglas Unified District | 603,041 | 40% | 31% | 55% | 51% |
| 65 | 4157 | 10220000 | Ganado Unified School District | 587,701 | 31% | 28% | 51% | 50% |
| 66 | 4273 | 70445000 | Fowler Elementary District | 559,846 | 49% | 45% | 62% | 59% |
| 67 | 4269 | 70433000 | Buckeye Elementary District | 546,169 | 49% | 47% | 67% | 61% |
| 68 | 4262 | 70408000 | Osborn Elementary District | 539,469 | 56% | 49% | 64% | 64% |
| 69 | 4397 | 90232000 | Blue Ridge Unified School District No. 32 | 532,157 | 57% | 55% | 76% | 69% |
| 70 | 4155 | 10210000 | Round Valley Unified District | 530,690 | 45% | 55% | 68% | 70% |
| 71 | 4505 | 140432000 | Gadsden Elementary District | 513,519 | 44% | 29% | 52% | 62% |
| 72 | 4458 | 120235000 | Santa Cruz Valley Unified District | 494,529 | 46% | 41% | 61% | 48% |
| 73 | 4247 | 70298000 | Fountain Hills Unified District | 483,159 | 66% | 70% | 84% | 83% |
| 74 | 4218 | 50201000 | Safford Unified District | 479,116 | 50% | 46% | 69% | 58% |
| 75 | 4387 | 90201000 | Winslow Unified District | 478,581 | 43% | 48% | 67% | 63% |
| 76 | 4393 | 90210000 | Show Low Unified District | 451,741 | 53% | 57% | 74% | 63% |
| 77 | 4268 | 70431000 | Balsz Elementary District | 446,570 | 49% | 38% | 56% | 58% |
| 78 | 4391 | 90205000 | Snowflake Unified District | 428,183 | 59% | 61% | 76% | 66% |
| 79 | 4236 | 70209000 | Wickenburg Unified District | 428,117 | 57% | 70% | 78% | 65% |
| 80 | 4378 | 80415000 | Bullhead City School District | 424,264 | 48% | 47% | 69% | 63% |
| 81 | 4381 | 80502000 | Colorado River Union High School District | 418,757 | 26% | 50% | 50% | 48% |
| 82 | 4389 | 90203000 | Holbrook Unified District | 412,976 | 48% | 38% | 66% | 65% |
| 83 | 4209 | 40210000 | Payson Unified District | 403,279 | 54% | 47% | 79% | 70% |
| 84 | 4264 | 70417000 | Tolleson Elementary District | 392,313 | 54% | 50% | 70% | 59% |
| 85 | 4266 | 70425000 | Liberty Elementary District | 380,368 | 60% | 64% | 76% | 74% |
| 86 | 4156 | 10218000 | Sanders Unified District | 379,556 | 25% | 26% | 42% | 37% |
| 87 | 4254 | 70290000 | Saddle Mountain Unified School District | 374,207 | 34% | 47% | 53% | 52% |
| 88 | 4467 | 130209000 | Sedona-Oak Creek JUSD #9 | 372,234 | 61% | 65% | 78% | 75% |
| 89 | 4210 | 40220000 | San Carlos Unified District | 369,835 | 14% | 7% | 26% | 21% |
| 90 | 4510 | 150227000 | Parker Unified School District | 366,028 | 40% | 37% | 60% | 54% |
| 91 | 4390 | 90204000 | Pinon Unified District | 344,152 | 25% | 15% | 40% | 41% |
| 92 | 4208 | 40201000 | Globe Unified District | 336,783 | 37% | 37% | 59% | 50% |
| 93 | 4439 | 110208000 | Mammoth-San Manuel Unified District | 335,849 | 48% | 41% | 76% | 66% |
| 94 | 4474 | 130251000 | Chino Valley Unified District | 333,773 | 51% | 56% | 76% | 61% |
| 95 | 4211 | 40240000 | Miami Unified District | 327,598 | 41% | 44% | 68% | 48% |
| 96 | 4412 | 100240000 | Baboquivari Unified School District #40 | 315,281 | 15% | 11% | 33% | 25% |
| 97 | 4487 | 130406000 | Cottonwood-Oak Creek Elementary District | 312,330 | 55% | 61% | 76% | 70% |
| 98 | 4500 | 140411000 | Somerton Elementary District | 312,037 | 47% | 37% | 62% | 69% |
| 99 | 4265 | 70421000 | Murphy Elementary District | 305,100 | 45% | 34% | 61% | 50% |
| 100 | 4153 | 10201000 | St Johns Unified District | 297,133 | 51% | 62% | 72% | 68% |
| 101 | 4408 | 100213000 | Tanque Verde Unified District | 280,121 | 79% | 73% | 93% | 88% |
| 102 | 4219 | 50204000 | Thatcher Unified District | 276,740 | 69% | 69% | 79% | 69% |
| 103 | 4230 | 60218000 | Morenci Unified District | 273,528 | 59% | 57% | 78% | 71% |
| 104 | 4170 | 20213000 | Willcox Unified District | 273,508 | 41% | 34% | 55% | 54% |
| 105 | 4470 | 130228000 | Camp Verde Unified District | 245,725 | 47% | 41% | 68% | 62% |
| 106 | 4168 | 20201000 | Tombstone Unified District | 231,447 | 40% | 38% | 70% | 64% |
| 107 | 4169 | 20202000 | Bisbee Unified District | 228,248 | 37% | 33% | 67% | 63% |
| 108 | 4159 | 10227000 | Red Mesa Unified District | 227,658 | 24% | 16% | 44% | 50% |
| 109 | 4379 | 80416000 | Mohave Valley Elementary District | 220,035 | 50% | 53% | 69% | 71% |
| 110 | 4388 | 90202000 | Joseph City Unified District | 211,184 | 58% | 53% | 74% | 74% |
| 111 | 4261 | 70407000 | Wilson Elementary District | 207,691 | 57% | 51% | 66% | 62% |
| 112 | 4277 | 70462000 | Union Elementary District | 202,597 | 43% | 41% | 59% | 54% |
| 113 | 4488 | 130504000 | Mingus Union High School District | 198,724 | 35% | 38% | 66% | 52% |
| 114 | 79226 | 20209000 | Benson Unified School District | 194,192 | 57% | 57% | 82% | 68% |
| 115 | 4257 | 70402000 | Riverside Elementary District | 192,409 | 40% | 32% | 61% | 59% |
| 116 | 4438 | 110203000 | Ray Unified District | 191,243 | 56% | 46% | 74% | 64% |
| 117 | 4221 | 50207000 | Fort Thomas Unified District | 183,357 | 19% | 22% | 42% | 42% |
| 118 | 4212 | 40241000 | Hayden-Winkelman Unified District | 179,222 | 40% | 29% | 64% | 65% |
| 119 | 4440 | 110215000 | Superior Unified School District | 171,807 | 38% | 36% | 68% | 46% |
| 120 | 4450 | 110422000 | Toltec School District | 170,495 | 40% | 44% | 62% | |

| # | Entity ID | CTD | Entity Name | GSF | 2010 Math | 2010 Science | 2010 Reading | 2010 Writing |
|---|---|---|---|---|---|---|---|---|
| 121 | 4370 | 80214000 | Colorado City Unified District | 168,595 | 72% | 66% | 83% | 73% |
| 122 | 4392 | 90206000 | Heber-Overgaard Unified District | 164,182 | 65% | 49% | 79% | 77% |
| 123 | 4448 | 110411000 | Eloy Elementary District | 157,960 | 34% | 34% | 55% | 58% |
| 124 | 4395 | 90225000 | Cedar Unified District | 156,043 | 29% | 15% | 39% | 42% |
| 125 | 4454 | 110540000 | Santa Cruz Valley Union High School District | 151,633 | 24% | 20% | 30% | 23% |
| 126 | 4449 | 110418000 | Sacaton Elementary District | 148,862 | 19% | 10% | 39% | 32% |
| 127 | 4193 | 30202000 | Williams Unified District | 146,180 | 46% | 41% | 68% | 51% |
| 128 | 4228 | 60202000 | Duncan Unified District | 136,458 | 45% | 45% | 74% | 75% |
| 129 | 4180 | 20349000 | Palominas Elementary District | 129,873 | | | | |
| 130 | 4220 | 50206000 | Pima Unified District | 119,300 | 52% | 53% | 71% | 62% |
| 131 | 4473 | 130243000 | Mayer Unified School District | 118,214 | 45% | 40% | 63% | 57% |
| 132 | 4447 | 110405000 | Red Rock Elementary District | 118,105 | 53% | 62% | 73% | 75% |
| 133 | 4506 | 140550000 | Antelope Union High School District | 117,018 | 33% | 16% | 59% | 57% |
| 134 | 4418 | 100351000 | Altar Valley Elementary District | 116,000 | 53% | 48% | 63% | 57% |
| 135 | 4238 | 70224000 | Gila Bend Unified District | 110,813 | 24% | 20% | 40% | 37% |
| 136 | 4409 | 100215000 | Ajo Unified District | 107,122 | 23% | 23% | 50% | 41% |
| 137 | 4195 | 30206000 | Fredonia-Moccasin Unified District | 106,127 | 40% | 47% | 61% | 47% |
| 138 | 4369 | 80208000 | Peach Springs Unified District | 102,653 | 21% | 13% | 47% | 42% |
| 139 | 4468 | 130220000 | Bagdad Unified District | 98,396 | 48% | 49% | 72% | 72% |
| 140 | 4451 | 110424000 | Stanfield Elementary District | 97,461 | 51% | 44% | 60% | 63% |
| 141 | 4472 | 130240000 | Seligman Unified District | 90,327 | 26% | 29% | 55% | 55% |
| 142 | 4173 | 20221000 | St David Unified District | 88,586 | 64% | 63% | 78% | 73% |
| 143 | 4374 | 80209000 | Littlefield Unified District | 82,633 | 35% | 33% | 65% | 66% |
| 144 | 4194 | 30204000 | Grand Canyon Unified District | 76,786 | 43% | 57% | 67% | 54% |
| 145 | 4416 | 100339000 | Continental Elementary District | 75,361 | 63% | 62% | 77% | 82% |
| 146 | 4481 | 130326000 | Beaver Creek Elementary District | 74,916 | 49% | 48% | 65% | 58% |
| 147 | 4444 | 110302000 | Oracle Elementary District | 72,929 | 59% | 59% | 75% | 72% |
| 148 | 4435 | 110100000 | Mary C O'Brien Accommodation District | 72,051 | 40% | 69% | 72% | 63% |
| 149 | 4462 | 120520000 | Patagonia Union High School District | 70,799 | 40% | 26% | 70% | 60% |
| 150 | 4275 | 70449000 | Palo Verde Elementary District | 66,790 | 62% | 56% | 75% | 75% |
| 151 | 4214 | 40312000 | Pine Strawberry Elementary District | 66,745 | 55% | 60% | 84% | 56% |
| 152 | 4504 | 140424000 | Wellton Elementary District | 60,797 | 47% | 49% | 61% | 51% |
| 153 | 4190 | 20522000 | Valley Union High School District | 59,812 | 69% | 45% | 93% | 86% |
| 154 | 4515 | 150576000 | Bicentennial Union High School District | 57,537 | 58% | 45% | 69% | 56% |
| 155 | 4471 | 130231000 | Ash Fork Joint Unified District | 53,260 | 34% | 39% | 64% | 37% |
| 156 | 4511 | 150404000 | Quartzsite Elementary District | 53,125 | 39% | 36% | 61% | 69% |
| 157 | 4502 | 140416000 | Hyder Elementary District | 52,656 | 62% | 48% | 57% | 69% |
| 158 | 4486 | 130403000 | Clarkdale-Jerome Elementary District | 48,288 | 73% | 77% | 86% | 81% |
| 159 | 4503 | 140417000 | Mohawk Valley Elementary District | 47,820 | 68% | 45% | 83% | 68% |
| 160 | 4171 | 20214000 | Bowie Unified District | 46,243 | | | | |
| 161 | 4172 | 20218000 | San Simon Unified District | 45,061 | 42% | | 83% | 50% |
| 162 | 4222 | 50305000 | Solomon Elementary District | 44,339 | 69% | 43% | 82% | 76% |
| 163 | 4213 | 40305000 | Young Elementary District | 43,872 | | | | |
| 164 | 4160 | 10306000 | Concho Elementary District | 41,015 | 60% | 70% | 77% | |
| 165 | 4163 | 10323000 | Mcnary Elementary District | 39,692 | 41% | 36% | 47% | 38% |
| 166 | 4484 | 130350000 | Canon Elementary District | 38,230 | 62% | 85% | 73% | 56% |
| 167 | 4274 | 70447000 | Arlington Elementary District | 36,618 | 46% | 50% | 69% | 52% |
| 168 | 4514 | 150430000 | Salome Consolidated Elementary District | 36,533 | 53% | 59% | 74% | 64% |
| 169 | 4176 | 20323000 | Naco Elementary District | 36,034 | 25% | 17% | 43% | 34% |
| 170 | 4251 | 70375000 | Morristown Elementary District | 33,637 | 46% | 47% | 77% | 64% |
| 171 | 4461 | 120425000 | Sonoita Elementary District | 31,797 | 63% | 86% | 87% | 81% |
| 172 | 4249 | 70363000 | Aguila Elementary District | 31,788 | 57% | 22% | 60% | 50% |
| 173 | 4186 | 20422000 | Pearce Elementary District | 31,322 | 48% | 46% | 71% | 63% |
| 174 | 4185 | 20412000 | Elfrida Elementary District | 29,737 | 45% | 63% | 70% | 75% |
| 175 | 4199 | 30310000 | Maine Consolidated School District | 29,567 | 79% | | 87% | 64% |
| 176 | 4188 | 20364000 | Pomerene Elementary District | 28,867 | 73% | 81% | 86% | 68% |
| 177 | 4224 | 50316000 | Bonita Elementary District | 27,239 | 60% | 64% | 69% | 45% |
| 178 | 4452 | 110433000 | Picacho Elementary District | 26,788 | 54% | 35% | 63% | 73% |
| 179 | 4479 | 130317000 | Congress Elementary District | 26,000 | 84% | 55% | 87% | 74% |
| 180 | 4177 | 20326000 | Cochise Elementary District | 25,613 | 68% | 91% | 78% | 83% |

| # | Entity ID | CTD | Entity Name | GSF | 2010 Math | 2010 Science | 2010 Reading | 2010 Writing |
|---|-----------|-----|-------------|-----|-----------|--------------|--------------|--------------|
| 181 | 4512 | 150419000 | Wenden Elementary District | 25,590 | | | | |
| 182 | 4162 | 10309000 | Vernon Elementary District | 24,218 | 51% | 84% | 87% | 86% |
| 183 | 4253 | 70386000 | Mobile Elementary District | 22,880 | | | | |
| 184 | 4234 | 70199000 | Maricopa County Regional District | 22,509 | 9% | 12% | 31% | 31% |
| 185 | 4459 | 120328000 | Santa Cruz Elementary District | 22,461 | 61% | 66% | 80% | 87% |
| 186 | 4386 | 90199000 | Navajo County Accommodation District #99 | 22,178 | | | | |
| 187 | 4187 | 20453000 | Ash Creek Elementary District | 21,432 | | | | |
| 188 | 4250 | 70371000 | Sentinel Elementary District | 21,004 | | | | |
| 189 | 4485 | 130352000 | Yarnell Elementary District | 20,499 | | | | |
| 190 | 4371 | 80303000 | Hackberry School District | 19,916 | | | | |
| 191 | 79379 | 130199000 | Yavapai Accommodation School District | 19,116 | 14% | 11% | 62% | 52% |
| 192 | 4215 | 40333000 | Tonto Basin Elementary District | 16,896 | 64% | 55% | 82% | |
| 193 | 4179 | 20345000 | Double Adobe Elementary District | 16,164 | 45% | 45% | 73% | |
| 194 | 4255 | 70394000 | Paloma School District | 15,280 | 55% | | 73% | |
| 195 | 4161 | 10307000 | Alpine Elementary District | 14,868 | | | | |
| 196 | 4380 | 80322000 | Valentine Elementary District | 13,430 | 36% | | 73% | |
| 197 | 4513 | 150426000 | Bouse Elementary District | 13,327 | | | | |
| 198 | 4460 | 120406000 | Patagonia Elementary District | 12,483 | 67% | 75% | 75% | |
| 199 | 4480 | 130323000 | Kirkland Elementary District | 10,452 | 49% | 53% | 59% | |
| 200 | 4181 | 20355000 | McNeal Elementary District | 8,550 | | | | |
| 201 | 4478 | 130315000 | Skull Valley Elementary District | 8,550 | | | | |
| 202 | 4414 | 100335000 | San Fernando Elementary District | 7,630 | | | | |
| 203 | 4377 | 80313000 | Yucca Elementary District | 7,616 | | | | |
| 204 | 4482 | 130335000 | Hillside Elementary District | 7,229 | | | | |
| 205 | 4178 | 20342000 | Apache Elementary District | 1,720 | | | | |
| 206 | 4231 | 60322000 | Blue Elementary District | 1,600 | | | | |

| # | Entity ID | CTD | Entity Name | GSF | 2011 Math | 2011 Science | 2011 Reading | 2011 Writing |
|---|-----------|-----|-------------|-----|-----------|--------------|--------------|--------------|
| 1 | 4403 | 100201000 | Tucson Unified District | 8,968,427 | 45% | 19% | 29% | 35% |
| 2 | 4235 | 70204000 | Mesa Unified District | 8,530,135 | 54% | 20% | 22% | 40% |
| 3 | 4241 | 70269000 | Paradise Valley Unified District | 5,085,048 | 55% | 28% | 22% | 44% |
| 4 | 4239 | 70241000 | Gilbert Unified District | 4,833,949 | 61% | 23% | 21% | 44% |
| 5 | 4242 | 70280000 | Chandler Unified District #80 | 4,773,688 | 59% | 16% | 20% | 26% |
| 6 | 4237 | 70211000 | Peoria Unified School District | 4,584,353 | 53% | 27% | 26% | 44% |
| 7 | 4246 | 70297000 | Deer Valley Unified District | 4,447,281 | 45% | 20% | 29% | 39% |
| 8 | 4286 | 70510000 | Phoenix Union High School District | 4,361,240 | 50% | 33% | 28% | 50% |
| 9 | 4240 | 70248000 | Scottsdale Unified District | 4,303,438 | 62% | 28% | 21% | 44% |
| 10 | 4243 | 70289000 | Dysart Unified District | 3,283,430 | 41% | 16% | 30% | 37% |
| 11 | 4260 | 70406000 | Washington Elementary School District | 2,929,727 | 44% | 22% | 29% | 43% |
| 12 | 4406 | 100210000 | Amphitheater Unified District | 2,560,557 | 49% | 18% | 26% | 38% |
| 13 | 4267 | 70428000 | Kyrene Elementary District | 2,556,290 | 47% | 27% | 25% | 53% |
| 14 | 4285 | 70505000 | Glendale Union High School District | 2,365,011 | 61% | 30% | 23% | 39% |
| 15 | 4287 | 70513000 | Tempe Union High School District | 2,326,820 | 62% | 13% | 16% | 27% |
| 16 | 4282 | 70483000 | Cartwright Elementary District | 2,143,391 | 65% | 22% | 18% | 34% |
| 17 | 4407 | 100212000 | Sunnyside Unified District | 1,970,356 | 45% | 21% | 32% | 39% |
| 18 | 4258 | 70403000 | Tempe School District | 1,818,774 | 68% | 23% | 14% | 37% |
| 19 | 4192 | 30201000 | Flagstaff Unified District | 1,747,421 | 74% | 21% | 11% | 21% |
| 20 | 4404 | 100206000 | Marana Unified District | 1,717,323 | 47% | 22% | 27% | 37% |
| 21 | 4248 | 70260000 | Higley Unified School District | 1,677,682 | 80% | 19% | 11% | 29% |
| 22 | 4280 | 70468000 | Alhambra Elementary District | 1,583,925 | 64% | 23% | 17% | 33% |
| 23 | 79598 | 80220000 | Kingman Unified School District | 1,517,377 | | | | |
| 24 | 4279 | 70466000 | Roosevelt Elementary District | 1,487,676 | 65% | 18% | 12% | 30% |
| 25 | 4507 | 140570000 | Yuma Union High School District | 1,474,177 | | | | |
| 26 | 4271 | 70440000 | Glendale Elementary District | 1,441,452 | 57% | 34% | 21% | 43% |
| 27 | 4413 | 100220000 | Vail Unified District | 1,326,723 | 53% | 20% | 19% | 36% |
| 28 | 4288 | 70514000 | Tolleson Union High School District | 1,310,221 | 85% | 6% | 4% | 12% |
| 29 | 4283 | 70492000 | Pendergast Elementary District | 1,261,632 | 56% | 19% | 20% | 33% |
| 30 | 4437 | 110201000 | Florence Unified School District | 1,249,830 | 73% | 15% | 13% | 28% |
| 31 | 4256 | 70401000 | Phoenix Elementary District | 1,168,665 | 43% | 24% | 31% | 45% |
| 32 | 4281 | 70479000 | Litchfield Elementary District | 1,161,345 | 67% | 15% | 16% | 32% |
| 33 | 4499 | 140401000 | Yuma Elementary District | 1,098,098 | | | | |
| 34 | 4263 | 70414000 | Creighton Elementary District | 995,558 | 51% | 26% | 24% | 41% |
| 35 | 4289 | 70516000 | Agua Fria Union High School District | 991,777 | 37% | 19% | 28% | 41% |
| 36 | 4158 | 10224000 | Chinle Unified District | 975,701 | 58% | 20% | 17% | 34% |
| 37 | 4244 | 70293000 | Cave Creek Unified District | 952,246 | 47% | 18% | 28% | 31% |
| 38 | 4284 | 70501000 | Buckeye Union High School District | 903,133 | 60% | 17% | 15% | 26% |
| 39 | 4442 | 110221000 | Coolidge Unified District | 901,352 | 64% | 15% | 20% | 30% |
| 40 | 4446 | 110404000 | Casa Grande Elementary District | 896,907 | 49% | 25% | 23% | 39% |
| 41 | 4259 | 70405000 | Isaac Elementary District | 876,839 | 36% | 27% | 30% | 44% |
| 42 | 4175 | 20268000 | Sierra Vista Unified District | 856,511 | 67% | 22% | 16% | 35% |
| 43 | 4368 | 80201000 | Lake Havasu Unified District | 846,080 | 47% | 13% | 32% | 43% |
| 44 | 4441 | 110220000 | Maricopa Unified School District | 837,081 | 71% | 18% | 16% | 29% |
| 45 | 4245 | 70295000 | Queen Creek Unified District | 833,228 | 58% | 19% | 20% | 28% |
| 46 | 4469 | 130222000 | Humboldt Unified District | 826,072 | | | | |
| 47 | 4411 | 100230000 | Sahuarita Unified District | 814,183 | 49% | 20% | 26% | 41% |
| 48 | 4410 | 100216000 | Catalina Foothills Unified District | 808,947 | 38% | 24% | 35% | 40% |
| 49 | 4405 | 100208000 | Flowing Wells Unified District | 789,539 | 51% | 21% | 26% | 34% |
| 50 | 4443 | 110243000 | Apache Junction Unified District | 783,426 | 58% | 15% | 24% | 33% |
| 51 | 4466 | 130201000 | Prescott Unified District | 764,467 | 34% | 13% | 25% | 49% |
| 52 | 4270 | 70438000 | Madison Elementary District | 762,711 | 60% | 27% | 21% | 44% |
| 53 | 4272 | 70444000 | Avondale Elementary District | 760,287 | 50% | 21% | 21% | 38% |
| 54 | 4457 | 120201000 | Nogales Unified District | 750,318 | 46% | 19% | 27% | 33% |
| 55 | 4501 | 140413000 | Crane Elementary District | 712,076 | | | | |
| 56 | 4276 | 70459000 | Laveen Elementary District | 660,163 | 47% | 18% | 23% | 27% |
| 57 | 4396 | 90227000 | Kayenta Unified District | 654,650 | 61% | 19% | 17% | 31% |
| 58 | 4445 | 110244000 | J O Combs Unified School District | 653,277 | 62% | 20% | 24% | 36% |
| 59 | 4196 | 30208000 | Page Unified District | 638,103 | 60% | 15% | 17% | 27% |
| 60 | 4278 | 70465000 | Littleton Elementary District | 631,086 | 72% | 17% | 14% | 32% |

| # | Entity ID | CTD | Entity Name | GSF | 2011 Math | 2011 Science | 2011 Reading | 2011 Writing |
|---|---|---|---|---|---|---|---|---|
| 61 | 4394 | 90220000 | Whiteriver Unified District | 626,577 | 49% | 23% | 23% | 43% |
| 62 | 4154 | 10208000 | Window Rock Unified District | 626,340 | 36% | 26% | 34% | 49% |
| 63 | 4453 | 110502000 | Casa Grande Union High School District | 603,851 | 56% | 15% | 25% | 33% |
| 64 | 4174 | 20227000 | Douglas Unified District | 603,041 | 61% | 27% | 21% | 42% |
| 65 | 4157 | 10220000 | Ganado Unified School District | 587,701 | 48% | 25% | 29% | 40% |
| 66 | 4273 | 70445000 | Fowler Elementary District | 559,846 | 34% | 23% | 26% | 41% |
| 67 | 4269 | 70433000 | Buckeye Elementary District | 546,169 | 55% | 32% | 26% | 43% |
| 68 | 4262 | 70408000 | Osborn Elementary District | 539,469 | 50% | 27% | 23% | 42% |
| 69 | 4397 | 90232000 | Blue Ridge Unified School District No. 32 | 532,157 | 56% | 20% | 20% | 34% |
| 70 | 4155 | 10210000 | Round Valley Unified District | 530,690 | 47% | 27% | 31% | 44% |
| 71 | 4505 | 140432000 | Gadsden Elementary District | 513,519 | | | | |
| 72 | 4458 | 120235000 | Santa Cruz Valley Unified District | 494,529 | 49% | 18% | 23% | 40% |
| 73 | 4247 | 70298000 | Fountain Hills Unified District | 483,159 | 51% | 14% | 28% | 34% |
| 74 | 4218 | 50201000 | Safford Unified District | 479,116 | 52% | 26% | 24% | 43% |
| 75 | 4387 | 90201000 | Winslow Unified District | 478,581 | 64% | 18% | 19% | 32% |
| 76 | 4393 | 90210000 | Show Low Unified District | 451,741 | 60% | 17% | 18% | 28% |
| 77 | 4268 | 70431000 | Balsz Elementary District | 446,570 | 58% | 26% | 23% | 45% |
| 78 | 4391 | 90205000 | Snowflake Unified District | 428,183 | 51% | 18% | 21% | 34% |
| 79 | 4236 | 70209000 | Wickenburg Unified District | 428,117 | 55% | 27% | 25% | 43% |
| 80 | 4378 | 80415000 | Bullhead City School District | 424,264 | 66% | 19% | 17% | 38% |
| 81 | 4381 | 80502000 | Colorado River Union High School District | 418,757 | 58% | 20% | 18% | 30% |
| 82 | 4389 | 90203000 | Holbrook Unified District | 412,976 | 52% | 21% | 24% | 35% |
| 83 | 4209 | 40210000 | Payson Unified District | 403,279 | 66% | 20% | 14% | 31% |
| 84 | 4264 | 70417000 | Tolleson Elementary District | 392,313 | 50% | 27% | 26% | 51% |
| 85 | 4266 | 70425000 | Liberty Elementary District | 380,368 | 61% | 19% | 19% | 39% |
| 86 | 4156 | 10218000 | Sanders Unified District | 379,556 | 44% | 22% | 25% | 39% |
| 87 | 4254 | 70290000 | Saddle Mountain Unified School District | 374,207 | 52% | 22% | 21% | 36% |
| 88 | 4467 | 130209000 | Sedona-Oak Creek JUSD #9 | 372,234 | | | | |
| 89 | 4210 | 40220000 | San Carlos Unified District | 369,835 | 68% | 16% | 12% | 29% |
| 90 | 4510 | 150227000 | Parker Unified School District | 366,028 | | | | |
| 91 | 4390 | 90204000 | Pinon Unified District | 344,152 | 50% | 23% | 26% | 43% |
| 92 | 4208 | 40201000 | Globe Unified District | 336,783 | 67% | 16% | 16% | 31% |
| 93 | 4439 | 110208000 | Mammoth-San Manuel Unified District | 335,849 | 51% | 18% | 28% | 41% |
| 94 | 4474 | 130251000 | Chino Valley Unified District | 333,773 | | | | |
| 95 | 4211 | 40240000 | Miami Unified District | 327,598 | 66% | 18% | 14% | 30% |
| 96 | 4412 | 100240000 | Baboquivari Unified School District #40 | 315,281 | 57% | 17% | 18% | 36% |
| 97 | 4487 | 130406000 | Cottonwood-Oak Creek Elementary District | 312,330 | | | | |
| 98 | 4500 | 140411000 | Somerton Elementary District | 312,037 | | | | |
| 99 | 4265 | 70421000 | Murphy Elementary District | 305,100 | 61% | 23% | 19% | 39% |
| 100 | 4153 | 10201000 | St Johns Unified District | 297,133 | 46% | 24% | 28% | 41% |
| 101 | 4408 | 100213000 | Tanque Verde Unified District | 280,121 | 45% | 23% | 27% | 38% |
| 102 | 4219 | 50204000 | Thatcher Unified District | 276,740 | 55% | 27% | 20% | 40% |
| 103 | 4230 | 60218000 | Morenci Unified District | 273,528 | 75% | 17% | 13% | 28% |
| 104 | 4170 | 20213000 | Willcox Unified District | 273,508 | 52% | 19% | 22% | 41% |
| 105 | 4470 | 130228000 | Camp Verde Unified District | 245,725 | | | | |
| 106 | 4168 | 20201000 | Tombstone Unified District | 231,447 | 55% | 19% | 19% | 30% |
| 107 | 4169 | 20202000 | Bisbee Unified District | 228,248 | 50% | 22% | 23% | 36% |
| 108 | 4159 | 10227000 | Red Mesa Unified District | 227,658 | 55% | 18% | 17% | 34% |
| 109 | 4379 | 80416000 | Mohave Valley Elementary District | 220,035 | 37% | 16% | 34% | 34% |
| 110 | 4388 | 90202000 | Joseph City Unified District | 211,184 | 55% | 16% | 15% | 31% |
| 111 | 4261 | 70407000 | Wilson Elementary District | 207,691 | 21% | 13% | 40% | 44% |
| 112 | 4277 | 70462000 | Union Elementary District | 202,597 | 42% | 18% | 23% | 38% |
| 113 | 4488 | 130504000 | Mingus Union High School District | 198,724 | | | | |
| 114 | 79226 | 20209000 | Benson Unified School District | 194,192 | | | | |
| 115 | 4257 | 70402000 | Riverside Elementary District | 192,409 | 66% | 21% | 14% | 29% |
| 116 | 4438 | 110203000 | Ray Unified District | 191,243 | 57% | 19% | 19% | 37% |
| 117 | 4221 | 50207000 | Fort Thomas Unified District | 183,357 | 51% | 26% | 23% | 40% |
| 118 | 4212 | 40241000 | Hayden-Winkelman Unified District | 179,222 | 48% | 32% | 30% | 46% |
| 119 | 4440 | 110215000 | Superior Unified School District | 171,807 | 57% | 22% | 19% | 35% |
| 120 | 4450 | 110422000 | Toltec School District | 170,495 | 56% | 18% | 20% | 33% |

| # | Entity ID | CTD | Entity Name | GSF | 2011 Math | 2011 Science | 2011 Reading | 2011 Writing |
|---|---|---|---|---|---|---|---|---|
| 121 | 4370 | 80214000 | Colorado City Unified District | 168,595 | 53% | 17% | 25% | 33% |
| 122 | 4392 | 90206000 | Heber-Overgaard Unified District | 164,182 | 41% | 16% | 32% | 41% |
| 123 | 4448 | 110411000 | Eloy Elementary District | 157,960 | 60% | 18% | 18% | 29% |
| 124 | 4395 | 90225000 | Cedar Unified District | 156,043 | 56% | 14% | 21% | 30% |
| 125 | 4454 | 110540000 | Santa Cruz Valley Union High School District | 151,633 | 25% | 24% | 35% | 47% |
| 126 | 4449 | 110418000 | Sacaton Elementary District | 148,862 | 62% | 19% | 27% | 33% |
| 127 | 4193 | 30202000 | Williams Unified District | 146,180 | 68% | 17% | 12% | 24% |
| 128 | 4228 | 60202000 | Duncan Unified District | 136,458 | 67% | 17% | 14% | 29% |
| 129 | 4180 | 20349000 | Palominas Elementary District | 129,873 | 61% | 14% | 18% | 38% |
| 130 | 4220 | 50206000 | Pima Unified District | 119,300 | 52% | 25% | 22% | 39% |
| 131 | 4473 | 130243000 | Mayer Unified School District | 118,214 | | | | |
| 132 | 4447 | 110405000 | Red Rock Elementary District | 118,105 | 40% | 25% | 24% | 34% |
| 133 | 4506 | 140550000 | Antelope Union High School District | 117,018 | | | | |
| 134 | 4418 | 100351000 | Altar Valley Elementary District | 116,000 | 55% | 15% | 15% | 22% |
| 135 | 4238 | 70224000 | Gila Bend Unified District | 110,813 | 35% | 24% | 31% | 44% |
| 136 | 4409 | 100215000 | Ajo Unified District | 107,122 | 47% | 20% | 27% | 41% |
| 137 | 4195 | 30206000 | Fredonia-Moccasin Unified District | 106,127 | 75% | 11% | 10% | 25% |
| 138 | 4369 | 80208000 | Peach Springs Unified District | 102,653 | 56% | 17% | 24% | 37% |
| 139 | 4468 | 130220000 | Bagdad Unified District | 98,396 | | | | |
| 140 | 4451 | 110424000 | Stanfield Elementary District | 97,461 | 41% | 24% | 31% | 47% |
| 141 | 4472 | 130240000 | Seligman Unified District | 90,327 | | | | |
| 142 | 4173 | 20221000 | St David Unified District | 88,586 | 61% | 28% | 24% | 41% |
| 143 | 4374 | 80209000 | Littlefield Unified District | 82,633 | 50% | 21% | 24% | 41% |
| 144 | 4194 | 30204000 | Grand Canyon Unified District | 76,786 | 75% | 16% | 11% | 27% |
| 145 | 4416 | 100339000 | Continental Elementary District | 75,361 | 45% | 13% | 24% | 33% |
| 146 | 4481 | 130326000 | Beaver Creek Elementary District | 74,916 | | | | |
| 147 | 4444 | 110302000 | Oracle Elementary District | 72,929 | 49% | 23% | 20% | 29% |
| 148 | 4435 | 110100000 | Mary C O'Brien Accommodation District | 72,051 | 55% | 21% | 22% | 35% |
| 149 | 4462 | 120520000 | Patagonia Union High School District | 70,799 | 52% | 14% | 32% | 34% |
| 150 | 4275 | 70449000 | Palo Verde Elementary District | 66,790 | 27% | 21% | 36% | 41% |
| 151 | 4214 | 40312000 | Pine Strawberry Elementary District | 66,745 | 56% | 30% | 21% | 41% |
| 152 | 4504 | 140424000 | Wellton Elementary District | 60,797 | | | | |
| 153 | 4190 | 20522000 | Valley Union High School District | 59,812 | 74% | 21% | 10% | 26% |
| 154 | 4515 | 150576000 | Bicentennial Union High School District | 57,537 | | | | |
| 155 | 4471 | 130231000 | Ash Fork Joint Unified District | 53,260 | | | | |
| 156 | 4511 | 150404000 | Quartzsite Elementary District | 53,125 | | | | |
| 157 | 4502 | 140416000 | Hyder Elementary District | 52,656 | | | | |
| 158 | 4486 | 130403000 | Clarkdale-Jerome Elementary District | 48,288 | | | | |
| 159 | 4503 | 140417000 | Mohawk Valley Elementary District | 47,820 | | | | |
| 160 | 4171 | 20214000 | Bowie Unified District | 46,243 | 55% | 18% | 21% | 38% |
| 161 | 4172 | 20218000 | San Simon Unified District | 45,061 | 57% | 24% | 20% | 38% |
| 162 | 4222 | 50305000 | Solomon Elementary District | 44,339 | 62% | 25% | 21% | 33% |
| 163 | 4213 | 40305000 | Young Elementary District | 43,872 | 46% | 30% | 26% | 45% |
| 164 | 4160 | 10306000 | Concho Elementary District | 41,015 | 45% | 18% | 29% | 38% |
| 165 | 4163 | 10323000 | Mcnary Elementary District | 39,692 | 44% | 24% | 24% | 41% |
| 166 | 4484 | 130350000 | Canon Elementary District | 38,230 | | | | |
| 167 | 4274 | 70447000 | Arlington Elementary District | 36,618 | 35% | 23% | 26% | 43% |
| 168 | 4514 | 150430000 | Salome Consolidated Elementary District | 36,533 | | | | |
| 169 | 4176 | 20323000 | Naco Elementary District | 36,034 | 73% | 19% | 13% | 32% |
| 170 | 4251 | 70375000 | Morristown Elementary District | 33,637 | 61% | 25% | 20% | 35% |
| 171 | 4461 | 120425000 | Sonoita Elementary District | 31,797 | 46% | 20% | 27% | 34% |
| 172 | 4249 | 70363000 | Aguila Elementary District | 31,788 | 65% | 17% | 14% | 26% |
| 173 | 4186 | 20422000 | Pearce Elementary District | 31,322 | 59% | 21% | 18% | 42% |
| 174 | 4185 | 20412000 | Elfrida Elementary District | 29,737 | 55% | 18% | 20% | 35% |
| 175 | 4199 | 30310000 | Maine Consolidated School District | 29,567 | 68% | 10% | 18% | 23% |
| 176 | 4188 | 20364000 | Pomerene Elementary District | 28,867 | 66% | 19% | 16% | 32% |
| 177 | 4224 | 50316000 | Bonita Elementary District | 27,239 | 53% | 30% | 25% | 42% |
| 178 | 4452 | 110433000 | Picacho Elementary District | 26,788 | 48% | 16% | 24% | 23% |
| 179 | 4479 | 130317000 | Congress Elementary District | 26,000 | | | | |
| 180 | 4177 | 20326000 | Cochise Elementary District | 25,613 | 74% | 19% | 13% | 30% |

| # | Entity ID | CTD | Entity Name | GSF | 2011 Math | 2011 Science | 2011 Reading | 2011 Writing |
|---|---|---|---|---|---|---|---|---|
| 181 | 4512 | 150419000 | Wenden Elementary District | 25,590 | | | | |
| 182 | 4162 | 10309000 | Vernon Elementary District | 24,218 | 55% | 15% | 20% | 29% |
| 183 | 4253 | 70386000 | Mobile Elementary District | 22,880 | 58% | 24% | 22% | 40% |
| 184 | 4234 | 70199000 | Maricopa County Regional District | 22,509 | 63% | 23% | 20% | 35% |
| 185 | 4459 | 120328000 | Santa Cruz Elementary District | 22,461 | 27% | 20% | 37% | 40% |
| 186 | 4386 | 90199000 | Navajo County Accommodation District #99 | 22,178 | 63% | 24% | 19% | 38% |
| 187 | 4187 | 20453000 | Ash Creek Elementary District | 21,432 | 69% | 15% | 14% | 29% |
| 188 | 4250 | 70371000 | Sentinel Elementary District | 21,004 | 60% | 18% | 22% | 35% |
| 189 | 4485 | 130352000 | Yarnell Elementary District | 20,499 | | | | |
| 190 | 4371 | 80303000 | Hackberry School District | 19,916 | 30% | 16% | 24% | 41% |
| 191 | 79379 | 130199000 | Yavapai Accommodation School District | 19,116 | | | | |
| 192 | 4215 | 40333000 | Tonto Basin Elementary District | 16,896 | 62% | 35% | 19% | 37% |
| 193 | 4179 | 20345000 | Double Adobe Elementary District | 16,164 | 51% | 18% | 21% | 37% |
| 194 | 4255 | 70394000 | Paloma School District | 15,280 | 55% | 28% | 20% | 35% |
| 195 | 4161 | 10307000 | Alpine Elementary District | 14,868 | 58% | 25% | 21% | 42% |
| 196 | 4380 | 80322000 | Valentine Elementary District | 13,430 | 49% | 26% | 37% | 39% |
| 197 | 4513 | 150426000 | Bouse Elementary District | 13,327 | | | | |
| 198 | 4460 | 120406000 | Patagonia Elementary District | 12,483 | 82% | 12% | 11% | 22% |
| 199 | 4480 | 130323000 | Kirkland Elementary District | 10,452 | | | | |
| 200 | 4181 | 20355000 | McNeal Elementary District | 8,550 | 68% | 14% | 15% | 28% |
| 201 | 4478 | 130315000 | Skull Valley Elementary District | 8,550 | | | | |
| 202 | 4414 | 100335000 | San Fernando Elementary District | 7,630 | 32% | 22% | 34% | 40% |
| 203 | 4377 | 80313000 | Yucca Elementary District | 7,616 | 45% | 32% | 23% | 46% |
| 204 | 4482 | 130335000 | Hillside Elementary District | 7,229 | | | | |
| 205 | 4178 | 20342000 | Apache Elementary District | 1,720 | 58% | 11% | 20% | 35% |
| 206 | 4231 | 60322000 | Blue Elementary District | 1,600 | 85% | 12% | 7% | 21% |

| # | Entity ID | CTD | Entity Name | GSF | 2012 Math | 2012 Science | 2012 Reading | 2012 Writing |
|---|---|---|---|---|---|---|---|---|
| 1 | 4403 | 100201000 | Tucson Unified District | 8,968,427 | 40% | 53% | 58% | 36% |
| 2 | 4235 | 70204000 | Mesa Unified District | 8,530,135 | 55% | 64% | 67% | 46% |
| 3 | 4241 | 70269000 | Paradise Valley Unified District | 5,085,048 | 54% | 74% | 68% | 50% |
| 4 | 4239 | 70241000 | Gilbert Unified District | 4,833,949 | 66% | 68% | 79% | 64% |
| 5 | 4242 | 70280000 | Chandler Unified District #80 | 4,773,688 | 66% | 78% | 79% | 66% |
| 6 | 4237 | 70211000 | Peoria Unified School District | 4,584,353 | 61% | 69% | 77% | 59% |
| 7 | 4246 | 70297000 | Deer Valley Unified District | 4,447,281 | 61% | 68% | 76% | 60% |
| 8 | 4286 | 70510000 | Phoenix Union High School District | 4,361,240 | 26% | 41% | 38% | 27% |
| 9 | 4240 | 70248000 | Scottsdale Unified District | 4,303,438 | 65% | 74% | 79% | 64% |
| 10 | 4243 | 70289000 | Dysart Unified District | 3,283,430 | 52% | 63% | 71% | 52% |
| 11 | 4260 | 70406000 | Washington Elementary School District | 2,929,727 | 52% | 57% | 71% | 47% |
| 12 | 4406 | 100210000 | Amphitheater Unified District | 2,560,557 | 57% | 61% | 72% | 53% |
| 13 | 4267 | 70428000 | Kyrene Elementary District | 2,556,290 | 77% | 82% | 88% | 74% |
| 14 | 4285 | 70505000 | Glendale Union High School District | 2,365,011 | 33% | 72% | 46% | 46% |
| 15 | 4287 | 70513000 | Tempe Union High School District | 2,326,820 | 33% | 78% | 49% | 40% |
| 16 | 4282 | 70483000 | Cartwright Elementary District | 2,143,391 | 56% | 44% | 68% | 35% |
| 17 | 4407 | 100212000 | Sunnyside Unified District | 1,970,356 | 38% | 45% | 56% | 33% |
| 18 | 4258 | 70403000 | Tempe School District | 1,818,774 | 58% | 58% | 75% | 51% |
| 19 | 4192 | 30201000 | Flagstaff Unified District | 1,747,421 | 49% | 63% | 64% | 42% |
| 20 | 4404 | 100206000 | Marana Unified District | 1,717,323 | 55% | 65% | 75% | 57% |
| 21 | 4248 | 70260000 | Higley Unified School District | 1,677,682 | 67% | 79% | 80% | 67% |
| 22 | 4280 | 70468000 | Alhambra Elementary District | 1,583,925 | 54% | 52% | 67% | 36% |
| 23 | 79598 | 80220000 | Kingman Unified School District | 1,517,377 | 48% | 55% | 66% | 43% |
| 24 | 4279 | 70466000 | Roosevelt Elementary District | 1,487,676 | 43% | 41% | 60% | 32% |
| 25 | 4507 | 140570000 | Yuma Union High School District | 1,474,177 | 18% | 27% | 34% | 31% |
| 26 | 4271 | 70440000 | Glendale Elementary District | 1,441,452 | 50% | 55% | 65% | 40% |
| 27 | 4413 | 100220000 | Vail Unified District | 1,326,723 | 73% | 84% | 85% | 78% |
| 28 | 4288 | 70514000 | Tolleson Union High School District | 1,310,221 | 29% | 50% | 46% | 41% |
| 29 | 4283 | 70492000 | Pendergast Elementary District | 1,261,632 | 59% | 51% | 74% | 50% |
| 30 | 4437 | 110201000 | Florence Unified School District | 1,249,830 | 49% | 63% | 65% | 42% |
| 31 | 4256 | 70401000 | Phoenix Elementary District | 1,168,665 | 52% | 48% | 66% | 35% |
| 32 | 4281 | 70479000 | Litchfield Elementary District | 1,161,345 | 74% | 82% | 85% | 69% |
| 33 | 4499 | 140401000 | Yuma Elementary District | 1,098,098 | 56% | 56% | 70% | 38% |
| 34 | 4263 | 70414000 | Creighton Elementary District | 995,558 | 53% | 48% | 67% | 39% |
| 35 | 4289 | 70516000 | Agua Fria Union High School District | 991,777 | 35% | 60% | 56% | 47% |
| 36 | 4158 | 10224000 | Chinle Unified District | 975,701 | 27% | 27% | 49% | 24% |
| 37 | 4244 | 70293000 | Cave Creek Unified District | 952,246 | 70% | 75% | 80% | 69% |
| 38 | 4284 | 70501000 | Buckeye Union High School District | 903,133 | 36% | 46% | 69% | 48% |
| 39 | 4442 | 110221000 | Coolidge Unified District | 901,352 | 33% | 41% | 55% | 34% |
| 40 | 4446 | 110404000 | Casa Grande Elementary District | 896,907 | 63% | 59% | 74% | 42% |
| 41 | 4259 | 70405000 | Isaac Elementary District | 876,839 | 50% | 48% | 62% | 32% |
| 42 | 4175 | 20268000 | Sierra Vista Unified District | 856,511 | 61% | 70% | 79% | 67% |
| 43 | 4368 | 80201000 | Lake Havasu Unified District | 846,080 | 64% | 73% | 81% | 65% |
| 44 | 4441 | 110220000 | Maricopa Unified School District | 837,081 | 49% | 52% | 69% | 46% |
| 45 | 4245 | 70295000 | Queen Creek Unified District | 833,228 | 64% | 73% | 88% | 79% |
| 46 | 4469 | 130222000 | Humboldt Unified District | 826,072 | 58% | 76% | 72% | 51% |
| 47 | 4411 | 100230000 | Sahuarita Unified District | 814,183 | 55% | 63% | 73% | 59% |
| 48 | 4410 | 100216000 | Catalina Foothills Unified District | 808,947 | 77% | 81% | 93% | 85% |
| 49 | 4405 | 100208000 | Flowing Wells Unified District | 789,539 | 56% | 59% | 76% | 57% |
| 50 | 4443 | 110243000 | Apache Junction Unified District | 783,426 | 50% | 64% | 66% | 47% |
| 51 | 4466 | 130201000 | Prescott Unified District | 764,467 | 68% | 71% | 86% | 61% |
| 52 | 4270 | 70438000 | Madison Elementary District | 762,711 | 73% | 78% | 85% | 61% |
| 53 | 4272 | 70444000 | Avondale Elementary District | 760,287 | 55% | 57% | 70% | 46% |
| 54 | 4457 | 120201000 | Nogales Unified District | 750,318 | 54% | 41% | 68% | 43% |
| 55 | 4501 | 140413000 | Crane Elementary District | 712,076 | 63% | 62% | 75% | 49% |
| 56 | 4276 | 70459000 | Laveen Elementary District | 660,163 | 64% | 53% | 73% | 48% |
| 57 | 4396 | 90227000 | Kayenta Unified District | 654,650 | 35% | 27% | 51% | 39% |
| 58 | 4445 | 110244000 | J O Combs Unified School District | 653,277 | 50% | 56% | 73% | 45% |
| 59 | 4196 | 30208000 | Page Unified District | 638,103 | 45% | 39% | 53% | 36% |
| 60 | 4278 | 70465000 | Littleton Elementary District | 631,086 | 57% | 52% | 70% | 40% |

| # | Entity ID | CTD | Entity Name | GSF | 2012 Math | 2012 Science | 2012 Reading | 2012 Writing |
|---|---|---|---|---|---|---|---|---|
| 61 | 4394 | 90220000 | Whiteriver Unified District | 626,577 | 25% | 28% | 52% | 28% |
| 62 | 4154 | 10208000 | Window Rock Unified District | 626,340 | 30% | 30% | 48% | 29% |
| 63 | 4453 | 110502000 | Casa Grande Union High School District | 603,851 | 35% | 54% | 38% | 32% |
| 64 | 4174 | 20227000 | Douglas Unified District | 603,041 | 39% | 38% | 58% | 40% |
| 65 | 4157 | 10220000 | Ganado Unified School District | 587,701 | 33% | 40% | 58% | 35% |
| 66 | 4273 | 70445000 | Fowler Elementary District | 559,846 | 59% | 52% | 71% | 41% |
| 67 | 4269 | 70433000 | Buckeye Elementary District | 546,169 | 54% | 53% | 71% | 40% |
| 68 | 4262 | 70408000 | Osborn Elementary District | 539,469 | 57% | 53% | 68% | 46% |
| 69 | 4397 | 90232000 | Blue Ridge Unified School District No. 32 | 532,157 | 56% | 61% | 74% | 49% |
| 70 | 4155 | 10210000 | Round Valley Unified District | 530,690 | 48% | 68% | 70% | 47% |
| 71 | 4505 | 140432000 | Gadsden Elementary District | 513,519 | 52% | 36% | 58% | 41% |
| 72 | 4458 | 120235000 | Santa Cruz Valley Unified District | 494,529 | 52% | 49% | 66% | 40% |
| 73 | 4247 | 70298000 | Fountain Hills Unified District | 483,159 | 65% | 77% | 85% | 76% |
| 74 | 4218 | 50201000 | Safford Unified District | 479,116 | 51% | 62% | 69% | 47% |
| 75 | 4387 | 90201000 | Winslow Unified District | 478,581 | 50% | 51% | 64% | 44% |
| 76 | 4393 | 90210000 | Show Low Unified District | 451,741 | 54% | 70% | 77% | 47% |
| 77 | 4268 | 70431000 | Balsz Elementary District | 446,570 | 55% | 40% | 63% | 34% |
| 78 | 4391 | 90205000 | Snowflake Unified District | 428,183 | 62% | 65% | 79% | 59% |
| 79 | 4236 | 70209000 | Wickenburg Unified District | 428,117 | 65% | 67% | 76% | 51% |
| 80 | 4378 | 80415000 | Bullhead City School District | 424,264 | 60% | 58% | 73% | 43% |
| 81 | 4381 | 80502000 | Colorado River Union High School District | 418,757 | 26% | 34% | 64% | 54% |
| 82 | 4389 | 90203000 | Holbrook Unified District | 412,976 | 45% | 44% | 62% | 43% |
| 83 | 4209 | 40210000 | Payson Unified District | 403,279 | 50% | 55% | 75% | 54% |
| 84 | 4264 | 70417000 | Tolleson Elementary District | 392,313 | 52% | 50% | 69% | 36% |
| 85 | 4266 | 70425000 | Liberty Elementary District | 380,368 | 61% | 69% | 80% | 57% |
| 86 | 4156 | 10218000 | Sanders Unified District | 379,556 | 34% | 36% | 54% | 37% |
| 87 | 4254 | 70290000 | Saddle Mountain Unified School District | 374,207 | 56% | 61% | 75% | 48% |
| 88 | 4467 | 130209000 | Sedona-Oak Creek JUSD #9 | 372,234 | 53% | 65% | 76% | 64% |
| 89 | 4210 | 40220000 | San Carlos Unified District | 369,835 | 11% | 11% | 29% | 16% |
| 90 | 4510 | 150227000 | Parker Unified School District | 366,028 | 40% | 38% | 57% | 37% |
| 91 | 4390 | 90204000 | Pinon Unified District | 344,152 | 30% | 26% | 52% | 26% |
| 92 | 4208 | 40201000 | Globe Unified District | 336,783 | 40% | 43% | 57% | 30% |
| 93 | 4439 | 110208000 | Mammoth-San Manuel Unified District | 335,849 | 53% | 49% | 70% | 48% |
| 94 | 4474 | 130251000 | Chino Valley Unified District | 333,773 | 58% | 59% | 77% | 55% |
| 95 | 4211 | 40240000 | Miami Unified District | 327,598 | 45% | 56% | 62% | 34% |
| 96 | 4412 | 100240000 | Baboquivari Unified School District #40 | 315,281 | 19% | 18% | 41% | 19% |
| 97 | 4487 | 130406000 | Cottonwood-Oak Creek Elementary District | 312,330 | 59% | 66% | 77% | 46% |
| 98 | 4500 | 140411000 | Somerton Elementary District | 312,037 | 57% | 43% | 71% | 46% |
| 99 | 4265 | 70421000 | Murphy Elementary District | 305,100 | 48% | 34% | 62% | 29% |
| 100 | 4153 | 10201000 | St Johns Unified District | 297,133 | 53% | 60% | 77% | 54% |
| 101 | 4408 | 100213000 | Tanque Verde Unified District | 280,121 | 80% | 88% | 93% | 85% |
| 102 | 4219 | 50204000 | Thatcher Unified District | 276,740 | 72% | 71% | 86% | 72% |
| 103 | 4230 | 60218000 | Morenci Unified District | 273,528 | 57% | 59% | 78% | 51% |
| 104 | 4170 | 20213000 | Willcox Unified District | 273,508 | 41% | 37% | 62% | 37% |
| 105 | 4470 | 130228000 | Camp Verde Unified District | 245,725 | 48% | 50% | 68% | 36% |
| 106 | 4168 | 20201000 | Tombstone Unified District | 231,447 | 50% | 57% | 75% | 54% |
| 107 | 4169 | 20202000 | Bisbee Unified District | 228,248 | 44% | 49% | 75% | 48% |
| 108 | 4159 | 10227000 | Red Mesa Unified District | 227,658 | 34% | 33% | 48% | 32% |
| 109 | 4379 | 80416000 | Mohave Valley Elementary District | 220,035 | 54% | 57% | 72% | 43% |
| 110 | 4388 | 90202000 | Joseph City Unified District | 211,184 | 63% | 68% | 81% | 72% |
| 111 | 4261 | 70407000 | Wilson Elementary District | 207,691 | 60% | 56% | 72% | 46% |
| 112 | 4277 | 70462000 | Union Elementary District | 202,597 | 56% | 47% | 68% | 40% |
| 113 | 4488 | 130504000 | Mingus Union High School District | 198,724 | 35% | 68% | 51% | 44% |
| 114 | 79226 | 20209000 | Benson Unified School District | 194,192 | 60% | 62% | 83% | 64% |
| 115 | 4257 | 70402000 | Riverside Elementary District | 192,409 | 42% | 40% | 61% | 30% |
| 116 | 4438 | 110203000 | Ray Unified District | 191,243 | 51% | 61% | 74% | 50% |
| 117 | 4221 | 50207000 | Fort Thomas Unified District | 183,357 | 32% | 26% | 46% | 22% |
| 118 | 4212 | 40241000 | Hayden-Winkelman Unified District | 179,222 | 31% | 25% | 59% | 29% |
| 119 | 4440 | 110215000 | Superior Unified School District | 171,807 | 35% | 27% | 66% | 32% |
| 120 | 4450 | 110422000 | Toltec School District | 170,495 | 48% | 42% | 66% | 24% |

| # | Entity ID | CTD | Entity Name | GSF | 2012 Math | 2012 Science | 2012 Reading | 2012 Writing |
|---|-----------|-----|-------------|-----|-----------|--------------|--------------|--------------|
| 121 | 4370 | 80214000 | Colorado City Unified District | 168,595 | 56% | 68% | 76% | 53% |
| 122 | 4392 | 90206000 | Heber-Overgaard Unified District | 164,182 | 65% | 63% | 84% | 66% |
| 123 | 4448 | 110411000 | Eloy Elementary District | 157,960 | 45% | 27% | 59% | 32% |
| 124 | 4395 | 90225000 | Cedar Unified District | 156,043 | 26% | 21% | 46% | 19% |
| 125 | 4454 | 110540000 | Santa Cruz Valley Union High School District | 151,633 | 18% | 32% | 44% | 23% |
| 126 | 4449 | 110418000 | Sacaton Elementary District | 148,862 | 35% | 23% | 55% | 12% |
| 127 | 4193 | 30202000 | Williams Unified District | 146,180 | 52% | 49% | 70% | 48% |
| 128 | 4228 | 60202000 | Duncan Unified District | 136,458 | 43% | 55% | 71% | 59% |
| 129 | 4180 | 20349000 | Palominas Elementary District | 129,873 | 78% | 79% | 86% | 63% |
| 130 | 4220 | 50206000 | Pima Unified District | 119,300 | 65% | 70% | 82% | 61% |
| 131 | 4473 | 130243000 | Mayer Unified School District | 118,214 | 45% | 45% | 65% | 39% |
| 132 | 4447 | 110405000 | Red Rock Elementary District | 118,105 | 59% | 82% | 78% | 49% |
| 133 | 4506 | 140550000 | Antelope Union High School District | 117,018 | 35% | 38% | 68% | 49% |
| 134 | 4418 | 100351000 | Altar Valley Elementary District | 116,000 | 56% | 55% | 69% | 31% |
| 135 | 4238 | 70224000 | Gila Bend Unified District | 110,813 | 27% | 27% | 56% | 35% |
| 136 | 4409 | 100215000 | Ajo Unified District | 107,122 | 31% | 34% | 58% | 23% |
| 137 | 4195 | 30206000 | Fredonia-Moccasin Unified District | 106,127 | 49% | 49% | 66% | 42% |
| 138 | 4369 | 80208000 | Peach Springs Unified District | 102,653 | 22% | 15% | 45% | 22% |
| 139 | 4468 | 130220000 | Bagdad Unified District | 98,396 | 45% | 49% | 71% | 54% |
| 140 | 4451 | 110424000 | Stanfield Elementary District | 97,461 | 53% | 45% | 66% | 32% |
| 141 | 4472 | 130240000 | Seligman Unified District | 90,327 | 42% | 32% | 68% | 45% |
| 142 | 4173 | 20221000 | St David Unified District | 88,586 | 70% | 68% | 80% | 65% |
| 143 | 4374 | 80209000 | Littlefield Unified District | 82,633 | 39% | 53% | 72% | 53% |
| 144 | 4194 | 30204000 | Grand Canyon Unified District | 76,786 | 40% | 54% | 68% | 41% |
| 145 | 4416 | 100339000 | Continental Elementary District | 75,361 | 66% | 60% | 79% | 57% |
| 146 | 4481 | 130326000 | Beaver Creek Elementary District | 74,916 | 57% | 57% | 68% | 39% |
| 147 | 4444 | 110302000 | Oracle Elementary District | 72,929 | 57% | 68% | 73% | 48% |
| 148 | 4435 | 110100000 | Mary C O'Brien Accommodation District | 72,051 | 54% | 51% | 79% | 74% |
| 149 | 4462 | 120520000 | Patagonia Union High School District | 70,799 | 53% | 50% | 89% | 67% |
| 150 | 4275 | 70449000 | Palo Verde Elementary District | 66,790 | 72% | 62% | 79% | 65% |
| 151 | 4214 | 40312000 | Pine Strawberry Elementary District | 66,745 | 67% | 82% | 80% | 65% |
| 152 | 4504 | 140424000 | Wellton Elementary District | 60,797 | 56% | 43% | 71% | 37% |
| 153 | 4190 | 20522000 | Valley Union High School District | 59,812 | 43% | 47% | 83% | 83% |
| 154 | 4515 | 150576000 | Bicentennial Union High School District | 57,537 | 40% | 32% | 62% | 23% |
| 155 | 4471 | 130231000 | Ash Fork Joint Unified District | 53,260 | 44% | 55% | 74% | 49% |
| 156 | 4511 | 150404000 | Quartzsite Elementary District | 53,125 | 53% | 58% | 67% | 34% |
| 157 | 4502 | 140416000 | Hyder Elementary District | 52,656 | 75% | 78% | 73% | 46% |
| 158 | 4486 | 130403000 | Clarkdale-Jerome Elementary District | 48,288 | 71% | 84% | 85% | 63% |
| 159 | 4503 | 140417000 | Mohawk Valley Elementary District | 47,820 | 54% | 64% | 80% | 40% |
| 160 | 4171 | 20214000 | Bowie Unified District | 46,243 | | | | |
| 161 | 4172 | 20218000 | San Simon Unified District | 45,061 | 73% | 62% | 77% | 58% |
| 162 | 4222 | 50305000 | Solomon Elementary District | 44,339 | 74% | 65% | 78% | 51% |
| 163 | 4213 | 40305000 | Young Elementary District | 43,872 | | | | |
| 164 | 4160 | 10306000 | Concho Elementary District | 41,015 | 68% | 82% | 81% | 47% |
| 165 | 4163 | 10323000 | Mcnary Elementary District | 39,692 | 30% | | 57% | 43% |
| 166 | 4484 | 130350000 | Canon Elementary District | 38,230 | 57% | 58% | 76% | 41% |
| 167 | 4274 | 70447000 | Arlington Elementary District | 36,618 | 61% | 66% | 75% | 44% |
| 168 | 4514 | 150430000 | Salome Consolidated Elementary District | 36,533 | 32% | 42% | 47% | 69% |
| 169 | 4176 | 20323000 | Naco Elementary District | 36,034 | 27% | 14% | 41% | 23% |
| 170 | 4251 | 70375000 | Morristown Elementary District | 33,637 | 51% | 60% | 79% | 56% |
| 171 | 4461 | 120425000 | Sonoita Elementary District | 31,797 | 72% | 93% | 87% | 75% |
| 172 | 4249 | 70363000 | Aguila Elementary District | 31,788 | 71% | 59% | 71% | 39% |
| 173 | 4186 | 20422000 | Pearce Elementary District | 31,322 | 35% | 92% | 64% | 26% |
| 174 | 4185 | 20412000 | Elfrida Elementary District | 29,737 | 45% | 80% | 74% | 53% |
| 175 | 4199 | 30310000 | Maine Consolidated School District | 29,567 | 72% | 73% | 86% | 66% |
| 176 | 4188 | 20364000 | Pomerene Elementary District | 28,867 | 70% | 84% | 83% | 66% |
| 177 | 4224 | 50316000 | Bonita Elementary District | 27,239 | 66% | 72% | 76% | 45% |
| 178 | 4452 | 110433000 | Picacho Elementary District | 26,788 | 54% | 50% | 65% | 36% |
| 179 | 4479 | 130317000 | Congress Elementary District | 26,000 | 86% | 92% | 87% | 78% |
| 180 | 4177 | 20326000 | Cochise Elementary District | 25,613 | 90% | | 80% | 80% |

| # | Entity ID | CTD | Entity Name | GSF | 2012 Math | 2012 Science | 2012 Reading | 2012 Writing |
|---|---|---|---|---|---|---|---|---|
| 181 | 4512 | 150419000 | Wenden Elementary District | 25,590 | 33% | | 66% | 22% |
| 182 | 4162 | 10309000 | Vernon Elementary District | 24,218 | 64% | 78% | 82% | 61% |
| 183 | 4253 | 70386000 | Mobile Elementary District | 22,880 | | | | |
| 184 | 4234 | 70199000 | Maricopa County Regional District | 22,509 | 23% | 15% | 38% | 27% |
| 185 | 4459 | 120328000 | Santa Cruz Elementary District | 22,461 | 69% | 66% | 84% | 75% |
| 186 | 4386 | 90199000 | Navajo County Accommodation District #99 | 22,178 | | | | |
| 187 | 4187 | 20453000 | Ash Creek Elementary District | 21,432 | | | | |
| 188 | 4250 | 70371000 | Sentinel Elementary District | 21,004 | | | | |
| 189 | 4485 | 130352000 | Yarnell Elementary District | 20,499 | | | | |
| 190 | 4371 | 80303000 | Hackberry School District | 19,916 | | | | |
| 191 | 79379 | 130199000 | Yavapai Accommodation School District | 19,116 | 20% | 43% | 91% | 64% |
| 192 | 4215 | 40333000 | Tonto Basin Elementary District | 16,896 | 57% | 70% | 75% | 38% |
| 193 | 4179 | 20345000 | Double Adobe Elementary District | 16,164 | | | | |
| 194 | 4255 | 70394000 | Paloma School District | 15,280 | 29% | | 67% | 54% |
| 195 | 4161 | 10307000 | Alpine Elementary District | 14,868 | | | | |
| 196 | 4380 | 80322000 | Valentine Elementary District | 13,430 | | | | |
| 197 | 4513 | 150426000 | Bouse Elementary District | 13,327 | | | | |
| 198 | 4460 | 120406000 | Patagonia Elementary District | 12,483 | 50% | 60% | 80% | |
| 199 | 4480 | 130323000 | Kirkland Elementary District | 10,452 | 72% | | 82% | 86% |
| 200 | 4181 | 20355000 | McNeal Elementary District | 8,550 | 62% | | 85% | 54% |
| 201 | 4478 | 130315000 | Skull Valley Elementary District | 8,550 | | | | |
| 202 | 4414 | 100335000 | San Fernando Elementary District | 7,630 | | | | |
| 203 | 4377 | 80313000 | Yucca Elementary District | 7,616 | | | | |
| 204 | 4482 | 130335000 | Hillside Elementary District | 7,229 | | | | |
| 205 | 4178 | 20342000 | Apache Elementary District | 1,720 | | | | |
| 206 | 4231 | 60322000 | Blue Elementary District | 1,600 | | | | |

| # | Entity ID | CTD | Entity Name | GSF | 2013 Math | 2013 Science | 2013 Reading | 2013 Writing |
|---|---|---|---|---|---|---|---|---|
| 1 | 4403 | 100201000 | Tucson Unified District | 8,968,427 | 39% | 40% | 61% | 35% |
| 2 | 4235 | 70204000 | Mesa Unified District | 8,530,135 | 55% | 65% | 70% | 46% |
| 3 | 4241 | 70269000 | Paradise Valley Unified District | 5,085,048 | 56% | 70% | 77% | 51% |
| 4 | 4239 | 70241000 | Gilbert Unified District | 4,833,949 | 66% | 66% | 84% | 70% |
| 5 | 4242 | 70280000 | Chandler Unified District #80 | 4,773,688 | 69% | 75% | 84% | 67% |
| 6 | 4237 | 70211000 | Peoria Unified School District | 4,584,353 | 61% | 64% | 78% | 60% |
| 7 | 4246 | 70297000 | Deer Valley Unified District | 4,447,281 | 63% | 68% | 79% | 58% |
| 8 | 4286 | 70510000 | Phoenix Union High School District | 4,361,240 | 24% | 35% | 38% | 26% |
| 9 | 4240 | 70248000 | Scottsdale Unified District | 4,303,438 | 65% | 71% | 83% | 64% |
| 10 | 4243 | 70289000 | Dysart Unified District | 3,283,430 | 52% | 53% | 72% | 52% |
| 11 | 4260 | 70406000 | Washington Elementary School District | 2,929,727 | 52% | 53% | 72% | 43% |
| 12 | 4406 | 100210000 | Amphitheater Unified District | 2,560,557 | 55% | 60% | 72% | 52% |
| 13 | 4267 | 70428000 | Kyrene Elementary District | 2,556,290 | 77% | 78% | 89% | 71% |
| 14 | 4285 | 70505000 | Glendale Union High School District | 2,365,011 | 43% | 70% | 61% | 40% |
| 15 | 4287 | 70513000 | Tempe Union High School District | 2,326,820 | 33% | 74% | 53% | 43% |
| 16 | 4282 | 70483000 | Cartwright Elementary District | 2,143,391 | 59% | 42% | 69% | 40% |
| 17 | 4407 | 100212000 | Sunnyside Unified District | 1,970,356 | 34% | 41% | 58% | 30% |
| 18 | 4258 | 70403000 | Tempe School District | 1,818,774 | 57% | 56% | 76% | 51% |
| 19 | 4192 | 30201000 | Flagstaff Unified District | 1,747,421 | 48% | 60% | 64% | 42% |
| 20 | 4404 | 100206000 | Marana Unified District | 1,717,323 | 59% | 61% | 78% | 54% |
| 21 | 4248 | 70260000 | Higley Unified School District | 1,677,682 | 68% | 69% | 87% | 68% |
| 22 | 4280 | 70468000 | Alhambra Elementary District | 1,583,925 | 54% | 45% | 68% | 36% |
| 23 | 79598 | 80220000 | Kingman Unified School District | 1,517,377 | 47% | 48% | 64% | 41% |
| 24 | 4279 | 70466000 | Roosevelt Elementary District | 1,487,676 | 42% | 37% | 61% | 31% |
| 25 | 4507 | 140570000 | Yuma Union High School District | 1,474,177 | 22% | 22% | 40% | 27% |
| 26 | 4271 | 70440000 | Glendale Elementary District | 1,441,452 | 50% | 49% | 65% | 39% |
| 27 | 4413 | 100220000 | Vail Unified District | 1,326,723 | 74% | 83% | 90% | 69% |
| 28 | 4288 | 70514000 | Tolleson Union High School District | 1,310,221 | 28% | 45% | 57% | 47% |
| 29 | 4283 | 70492000 | Pendergast Elementary District | 1,261,632 | 58% | 51% | 75% | 49% |
| 30 | 4437 | 110201000 | Florence Unified School District | 1,249,830 | 50% | 64% | 72% | 51% |
| 31 | 4256 | 70401000 | Phoenix Elementary District | 1,168,665 | 48% | 42% | 66% | 33% |
| 32 | 4281 | 70479000 | Litchfield Elementary District | 1,161,345 | 76% | 79% | 87% | 66% |
| 33 | 4499 | 140401000 | Yuma Elementary District | 1,098,098 | 60% | 54% | 72% | 46% |
| 34 | 4263 | 70414000 | Creighton Elementary District | 995,558 | 53% | 45% | 65% | 38% |
| 35 | 4289 | 70516000 | Agua Fria Union High School District | 991,777 | 36% | 50% | 60% | 49% |
| 36 | 4158 | 10224000 | Chinle Unified District | 975,701 | 27% | 24% | 47% | 21% |
| 37 | 4244 | 70293000 | Cave Creek Unified District | 952,246 | 70% | 77% | 82% | 75% |
| 38 | 4284 | 70501000 | Buckeye Union High School District | 903,133 | 40% | 63% | 71% | 56% |
| 39 | 4442 | 110221000 | Coolidge Unified District | 901,352 | 30% | 29% | 55% | 32% |
| 40 | 4446 | 110404000 | Casa Grande Elementary District | 896,907 | 62% | 54% | 74% | 44% |
| 41 | 4259 | 70405000 | Isaac Elementary District | 876,839 | 47% | 44% | 61% | 38% |
| 42 | 4175 | 20268000 | Sierra Vista Unified District | 856,511 | 59% | 64% | 84% | 62% |
| 43 | 4368 | 80201000 | Lake Havasu Unified District | 846,080 | 65% | 69% | 85% | 57% |
| 44 | 4441 | 110220000 | Maricopa Unified School District | 837,081 | 47% | 53% | 67% | 42% |
| 45 | 4245 | 70295000 | Queen Creek Unified District | 833,228 | 70% | 74% | 87% | 76% |
| 46 | 4469 | 130222000 | Humboldt Unified District | 826,072 | 60% | 74% | 77% | 58% |
| 47 | 4411 | 100230000 | Sahuarita Unified District | 814,183 | 54% | 63% | 73% | 58% |
| 48 | 4410 | 100216000 | Catalina Foothills Unified District | 808,947 | 82% | 79% | 94% | 84% |
| 49 | 4405 | 100208000 | Flowing Wells Unified District | 789,539 | 54% | 55% | 76% | 48% |
| 50 | 4443 | 110243000 | Apache Junction Unified District | 783,426 | 51% | 63% | 64% | 45% |
| 51 | 4466 | 130201000 | Prescott Unified District | 764,467 | 64% | 72% | 86% | 57% |
| 52 | 4270 | 70438000 | Madison Elementary District | 762,711 | 74% | 77% | 86% | 61% |
| 53 | 4272 | 70444000 | Avondale Elementary District | 760,287 | 53% | 52% | 71% | 47% |
| 54 | 4457 | 120201000 | Nogales Unified District | 750,318 | 52% | 37% | 74% | 44% |
| 55 | 4501 | 140413000 | Crane Elementary District | 712,076 | 64% | 60% | 76% | 51% |
| 56 | 4276 | 70459000 | Laveen Elementary District | 660,163 | 59% | 50% | 72% | 45% |
| 57 | 4396 | 90227000 | Kayenta Unified District | 654,650 | 37% | 27% | 59% | 36% |
| 58 | 4445 | 110244000 | J O Combs Unified School District | 653,277 | 56% | 54% | 74% | 51% |
| 59 | 4196 | 30208000 | Page Unified District | 638,103 | 44% | 33% | 58% | 33% |
| 60 | 4278 | 70465000 | Littleton Elementary District | 631,086 | 61% | 51% | 72% | 42% |

| # | Entity ID | CTD | Entity Name | GSF | 2013 Math | 2013 Science | 2013 Reading | 2013 Writing |
|---|---|---|---|---|---|---|---|---|
| 61 | 4394 | 90220000 | Whiteriver Unified District | 626,577 | 30% | 21% | 56% | 27% |
| 62 | 4154 | 10208000 | Window Rock Unified District | 626,340 | 30% | 31% | 52% | 29% |
| 63 | 4453 | 110502000 | Casa Grande Union High School District | 603,851 | 30% | 46% | 44% | 37% |
| 64 | 4174 | 20227000 | Douglas Unified District | 603,041 | 40% | 37% | 58% | 43% |
| 65 | 4157 | 10220000 | Ganado Unified School District | 587,701 | 33% | 25% | 58% | 31% |
| 66 | 4273 | 70445000 | Fowler Elementary District | 559,846 | 56% | 45% | 71% | 36% |
| 67 | 4269 | 70433000 | Buckeye Elementary District | 546,169 | 56% | 54% | 70% | 36% |
| 68 | 4262 | 70408000 | Osborn Elementary District | 539,469 | 57% | 46% | 68% | 44% |
| 69 | 4397 | 90232000 | Blue Ridge Unified School District No. 32 | 532,157 | 62% | 62% | 79% | 53% |
| 70 | 4155 | 10210000 | Round Valley Unified District | 530,690 | 58% | 55% | 72% | 41% |
| 71 | 4505 | 140432000 | Gadsden Elementary District | 513,519 | 55% | 35% | 61% | 48% |
| 72 | 4458 | 120235000 | Santa Cruz Valley Unified District | 494,529 | 54% | 44% | 71% | 47% |
| 73 | 4247 | 70298000 | Fountain Hills Unified District | 483,159 | 64% | 69% | 88% | 69% |
| 74 | 4218 | 50201000 | Safford Unified District | 479,116 | 54% | 56% | 71% | 42% |
| 75 | 4387 | 90201000 | Winslow Unified District | 478,581 | 48% | 45% | 72% | 44% |
| 76 | 4393 | 90210000 | Show Low Unified District | 451,741 | 53% | 72% | 72% | 47% |
| 77 | 4268 | 70431000 | Balsz Elementary District | 446,570 | 57% | 41% | 64% | 36% |
| 78 | 4391 | 90205000 | Snowflake Unified District | 428,183 | 67% | 64% | 83% | 65% |
| 79 | 4236 | 70209000 | Wickenburg Unified District | 428,117 | 62% | 53% | 79% | 54% |
| 80 | 4378 | 80415000 | Bullhead City School District | 424,264 | 63% | 65% | 75% | 46% |
| 81 | 4381 | 80502000 | Colorado River Union High School District | 418,757 | 32% | 40% | 54% | 41% |
| 82 | 4389 | 90203000 | Holbrook Unified District | 412,976 | 52% | 40% | 68% | 34% |
| 83 | 4209 | 40210000 | Payson Unified District | 403,279 | 53% | 62% | 72% | 46% |
| 84 | 4264 | 70417000 | Tolleson Elementary District | 392,313 | 52% | 47% | 69% | 39% |
| 85 | 4266 | 70425000 | Liberty Elementary District | 380,368 | 63% | 67% | 79% | 55% |
| 86 | 4156 | 10218000 | Sanders Unified District | 379,556 | 30% | 22% | 46% | 23% |
| 87 | 4254 | 70290000 | Saddle Mountain Unified School District | 374,207 | 54% | 47% | 72% | 45% |
| 88 | 4467 | 130209000 | Sedona-Oak Creek JUSD #9 | 372,234 | 56% | 62% | 76% | 62% |
| 89 | 4210 | 40220000 | San Carlos Unified District | 369,835 | 15% | 11% | 29% | 15% |
| 90 | 4510 | 150227000 | Parker Unified School District | 366,028 | 47% | 38% | 60% | 29% |
| 91 | 4390 | 90204000 | Pinon Unified District | 344,152 | 33% | 20% | 52% | 27% |
| 92 | 4208 | 40201000 | Globe Unified District | 336,783 | 36% | 40% | 57% | 39% |
| 93 | 4439 | 110208000 | Mammoth-San Manuel Unified District | 335,849 | 54% | 46% | 77% | 50% |
| 94 | 4474 | 130251000 | Chino Valley Unified District | 333,773 | 57% | 54% | 77% | 55% |
| 95 | 4211 | 40240000 | Miami Unified District | 327,598 | 43% | 50% | 65% | 38% |
| 96 | 4412 | 100240000 | Baboquivari Unified School District #40 | 315,281 | 20% | 15% | 46% | 19% |
| 97 | 4487 | 130406000 | Cottonwood-Oak Creek Elementary District | 312,330 | 57% | 65% | 77% | 42% |
| 98 | 4500 | 140411000 | Somerton Elementary District | 312,037 | 59% | 38% | 71% | 40% |
| 99 | 4265 | 70421000 | Murphy Elementary District | 305,100 | 46% | 30% | 62% | 30% |
| 100 | 4153 | 10201000 | St Johns Unified District | 297,133 | 63% | 65% | 85% | 63% |
| 101 | 4408 | 100213000 | Tanque Verde Unified District | 280,121 | 80% | 84% | 94% | 84% |
| 102 | 4219 | 50204000 | Thatcher Unified District | 276,740 | 69% | 68% | 89% | 71% |
| 103 | 4230 | 60218000 | Morenci Unified District | 273,528 | 67% | 52% | 84% | 58% |
| 104 | 4170 | 20213000 | Willcox Unified District | 273,508 | 49% | 41% | 66% | 34% |
| 105 | 4470 | 130228000 | Camp Verde Unified District | 245,725 | 51% | 51% | 74% | 42% |
| 106 | 4168 | 20201000 | Tombstone Unified District | 231,447 | 56% | 56% | 83% | 52% |
| 107 | 4169 | 20202000 | Bisbee Unified District | 228,248 | 42% | 47% | 75% | 43% |
| 108 | 4159 | 10227000 | Red Mesa Unified District | 227,658 | 34% | 23% | 52% | 24% |
| 109 | 4379 | 80416000 | Mohave Valley Elementary District | 220,035 | 63% | 59% | 78% | 51% |
| 110 | 4388 | 90202000 | Joseph City Unified District | 211,184 | 64% | 51% | 83% | 59% |
| 111 | 4261 | 70407000 | Wilson Elementary District | 207,691 | 62% | 53% | 73% | 43% |
| 112 | 4277 | 70462000 | Union Elementary District | 202,597 | 52% | 39% | 68% | 45% |
| 113 | 4488 | 130504000 | Mingus Union High School District | 198,724 | 37% | 74% | 52% | 41% |
| 114 | 79226 | 20209000 | Benson Unified School District | 194,192 | 71% | 60% | 87% | 58% |
| 115 | 4257 | 70402000 | Riverside Elementary District | 192,409 | 48% | 34% | 62% | 41% |
| 116 | 4438 | 110203000 | Ray Unified District | 191,243 | 49% | 66% | 79% | 39% |
| 117 | 4221 | 50207000 | Fort Thomas Unified District | 183,357 | 40% | 20% | 57% | 25% |
| 118 | 4212 | 40241000 | Hayden-Winkelman Unified District | 179,222 | 31% | 27% | 61% | 33% |
| 119 | 4440 | 110215000 | Superior Unified School District | 171,807 | 43% | 30% | 71% | 48% |
| 120 | 4450 | 110422000 | Toltec School District | 170,495 | 47% | 38% | 65% | 26% |

| # | Entity ID | CTD | Entity Name | GSF | 2013 Math | 2013 Science | 2013 Reading | 2013 Writing |
|---|---|---|---|---|---|---|---|---|
| 121 | 4370 | 80214000 | Colorado City Unified District | 168,595 | 63% | 61% | 79% | 44% |
| 122 | 4392 | 90206000 | Heber-Overgaard Unified District | 164,182 | 67% | 59% | 84% | 60% |
| 123 | 4448 | 110411000 | Eloy Elementary District | 157,960 | 46% | 28% | 62% | 24% |
| 124 | 4395 | 90225000 | Cedar Unified District | 156,043 | 22% | 11% | 35% | 13% |
| 125 | 4454 | 110540000 | Santa Cruz Valley Union High School District | 151,633 | 26% | 23% | 57% | 35% |
| 126 | 4449 | 110418000 | Sacaton Elementary District | 148,862 | 41% | 21% | 57% | 23% |
| 127 | 4193 | 30202000 | Williams Unified District | 146,180 | 47% | 51% | 70% | 55% |
| 128 | 4228 | 60202000 | Duncan Unified District | 136,458 | 48% | 48% | 70% | 58% |
| 129 | 4180 | 20349000 | Palominas Elementary District | 129,873 | 78% | 83% | 87% | 56% |
| 130 | 4220 | 50206000 | Pima Unified District | 119,300 | 62% | 62% | 80% | 62% |
| 131 | 4473 | 130243000 | Mayer Unified School District | 118,214 | 44% | 50% | 64% | 37% |
| 132 | 4447 | 110405000 | Red Rock Elementary District | 118,105 | 61% | 85% | 79% | 43% |
| 133 | 4506 | 140550000 | Antelope Union High School District | 117,018 | 33% | 23% | 73% | 39% |
| 134 | 4418 | 100351000 | Altar Valley Elementary District | 116,000 | 57% | 51% | 70% | 25% |
| 135 | 4238 | 70224000 | Gila Bend Unified District | 110,813 | 31% | 23% | 52% | 28% |
| 136 | 4409 | 100215000 | Ajo Unified District | 107,122 | 46% | 38% | 65% | 37% |
| 137 | 4195 | 30206000 | Fredonia-Moccasin Unified District | 106,127 | 47% | 55% | 72% | 31% |
| 138 | 4369 | 80208000 | Peach Springs Unified District | 102,653 | 11% | 12% | 35% | 22% |
| 139 | 4468 | 130220000 | Bagdad Unified District | 98,396 | 50% | 55% | 79% | 39% |
| 140 | 4451 | 110424000 | Stanfield Elementary District | 97,461 | 50% | 31% | 62% | 31% |
| 141 | 4472 | 130240000 | Seligman Unified District | 90,327 | 56% | 44% | 81% | 48% |
| 142 | 4173 | 20221000 | St David Unified District | 88,586 | 70% | 82% | 85% | 53% |
| 143 | 4374 | 80209000 | Littlefield Unified District | 82,633 | 41% | 35% | 67% | 45% |
| 144 | 4194 | 30204000 | Grand Canyon Unified District | 76,786 | 51% | 62% | 68% | 51% |
| 145 | 4416 | 100339000 | Continental Elementary District | 75,361 | 68% | 73% | 81% | 55% |
| 146 | 4481 | 130326000 | Beaver Creek Elementary District | 74,916 | 54% | 57% | 70% | 33% |
| 147 | 4444 | 110302000 | Oracle Elementary District | 72,929 | 49% | 66% | 73% | 36% |
| 148 | 4435 | 110100000 | Mary C O'Brien Accommodation District | 72,051 | 60% | 47% | 78% | 63% |
| 149 | 4462 | 120520000 | Patagonia Union High School District | 70,799 | 60% | 37% | 85% | 65% |
| 150 | 4275 | 70449000 | Palo Verde Elementary District | 66,790 | 69% | 69% | 80% | 68% |
| 151 | 4214 | 40312000 | Pine Strawberry Elementary District | 66,745 | 56% | 85% | 82% | 62% |
| 152 | 4504 | 140424000 | Wellton Elementary District | 60,797 | 60% | 46% | 72% | 25% |
| 153 | 4190 | 20522000 | Valley Union High School District | 59,812 | 67% | 53% | 80% | 79% |
| 154 | 4515 | 150576000 | Bicentennial Union High School District | 57,537 | 49% | 43% | 76% | 52% |
| 155 | 4471 | 130231000 | Ash Fork Joint Unified District | 53,260 | 65% | 54% | 83% | 49% |
| 156 | 4511 | 150404000 | Quartzsite Elementary District | 53,125 | 45% | 41% | 63% | 31% |
| 157 | 4502 | 140416000 | Hyder Elementary District | 52,656 | 87% | 70% | 82% | 47% |
| 158 | 4486 | 130403000 | Clarkdale-Jerome Elementary District | 48,288 | 72% | 75% | 85% | 56% |
| 159 | 4503 | 140417000 | Mohawk Valley Elementary District | 47,820 | 48% | 34% | 74% | 38% |
| 160 | 4171 | 20214000 | Bowie Unified District | 46,243 | | | | |
| 161 | 4172 | 20218000 | San Simon Unified District | 45,061 | 77% | | 87% | 52% |
| 162 | 4222 | 50305000 | Solomon Elementary District | 44,339 | 72% | 74% | 86% | 60% |
| 163 | 4213 | 40305000 | Young Elementary District | 43,872 | | | | |
| 164 | 4160 | 10306000 | Concho Elementary District | 41,015 | 63% | 71% | 83% | 41% |
| 165 | 4163 | 10323000 | Mcnary Elementary District | 39,692 | 32% | 32% | 64% | 18% |
| 166 | 4484 | 130350000 | Canon Elementary District | 38,230 | 41% | 60% | 71% | 34% |
| 167 | 4274 | 70447000 | Arlington Elementary District | 36,618 | 53% | 45% | 76% | 48% |
| 168 | 4514 | 150430000 | Salome Consolidated Elementary District | 36,533 | 17% | | 42% | 33% |
| 169 | 4176 | 20323000 | Naco Elementary District | 36,034 | 40% | 39% | 49% | 17% |
| 170 | 4251 | 70375000 | Morristown Elementary District | 33,637 | 55% | 54% | 74% | 48% |
| 171 | 4461 | 120425000 | Sonoita Elementary District | 31,797 | 67% | 92% | 86% | 71% |
| 172 | 4249 | 70363000 | Aguila Elementary District | 31,788 | 74% | 70% | 85% | 78% |
| 173 | 4186 | 20422000 | Pearce Elementary District | 31,322 | 47% | | 80% | 14% |
| 174 | 4185 | 20412000 | Elfrida Elementary District | 29,737 | 62% | 61% | 76% | 53% |
| 175 | 4199 | 30310000 | Maine Consolidated School District | 29,567 | 69% | 88% | 67% | 66% |
| 176 | 4188 | 20364000 | Pomerene Elementary District | 28,867 | 63% | 72% | 83% | 64% |
| 177 | 4224 | 50316000 | Bonita Elementary District | 27,239 | 59% | 74% | 83% | 64% |
| 178 | 4452 | 110433000 | Picacho Elementary District | 26,788 | 43% | 34% | 54% | 28% |
| 179 | 4479 | 130317000 | Congress Elementary District | 26,000 | 78% | 91% | 90% | 66% |
| 180 | 4177 | 20326000 | Cochise Elementary District | 25,613 | 62% | | 77% | 62% |

| # | Entity ID | CTD | Entity Name | GSF | 2013 Math | 2013 Science | 2013 Reading | 2013 Writing |
|---|-----------|-----|-------------|-----|-----------|--------------|--------------|--------------|
| 181 | 4512 | 150419000 | Wenden Elementary District | 25,590 | 50% | 54% | 70% | 28% |
| 182 | 4162 | 10309000 | Vernon Elementary District | 24,218 | 58% | | 76% | 57% |
| 183 | 4253 | 70386000 | Mobile Elementary District | 22,880 | | | | |
| 184 | 4234 | 70199000 | Maricopa County Regional District | 22,509 | 6% | 8% | 29% | 29% |
| 185 | 4459 | 120328000 | Santa Cruz Elementary District | 22,461 | 71% | 67% | 87% | 76% |
| 186 | 4386 | 90199000 | Navajo County Accommodation District #99 | 22,178 | | | | |
| 187 | 4187 | 20453000 | Ash Creek Elementary District | 21,432 | | | | |
| 188 | 4250 | 70371000 | Sentinel Elementary District | 21,004 | | | | |
| 189 | 4485 | 130352000 | Yarnell Elementary District | 20,499 | | | | |
| 190 | 4371 | 80303000 | Hackberry School District | 19,916 | | | | |
| 191 | 79379 | 130199000 | Yavapai Accommodation School District | 19,116 | 9% | | 64% | 36% |
| 192 | 4215 | 40333000 | Tonto Basin Elementary District | 16,896 | 36% | 36% | 45% | |
| 193 | 4179 | 20345000 | Double Adobe Elementary District | 16,164 | | | | |
| 194 | 4255 | 70394000 | Paloma School District | 15,280 | 27% | | 82% | 18% |
| 195 | 4161 | 10307000 | Alpine Elementary District | 14,868 | | | | |
| 196 | 4380 | 80322000 | Valentine Elementary District | 13,430 | | | | |
| 197 | 4513 | 150426000 | Bouse Elementary District | 13,327 | | | | |
| 198 | 4460 | 120406000 | Patagonia Elementary District | 12,483 | 59% | 80% | 80% | 53% |
| 199 | 4480 | 130323000 | Kirkland Elementary District | 10,452 | | | | |
| 200 | 4181 | 20355000 | McNeal Elementary District | 8,550 | | | | |
| 201 | 4478 | 130315000 | Skull Valley Elementary District | 8,550 | | | | |
| 202 | 4414 | 100335000 | San Fernando Elementary District | 7,630 | | | | |
| 203 | 4377 | 80313000 | Yucca Elementary District | 7,616 | | | | |
| 204 | 4482 | 130335000 | Hillside Elementary District | 7,229 | | | | |
| 205 | 4178 | 20342000 | Apache Elementary District | 1,720 | | | | |
| 206 | 4231 | 60322000 | Blue Elementary District | 1,600 | | | | |

| # | Entity ID | CTD | Entity Name | GSF | 2014 Math | 2014 Science | 2014 Reading | 2014 Writing |
|---|---|---|---|---|---|---|---|---|
| 1 | 4403 | 100201000 | Tucson Unified District | 8,968,427 | 40% | 45% | 56% | 33% |
| 2 | 4235 | 70204000 | Mesa Unified District | 8,530,135 | 53% | 63% | 73% | 49% |
| 3 | 4241 | 70269000 | Paradise Valley Unified District | 5,085,048 | 56% | 67% | 76% | 53% |
| 4 | 4239 | 70241000 | Gilbert Unified District | 4,833,949 | 68% | 67% | 86% | 70% |
| 5 | 4242 | 70280000 | Chandler Unified District #80 | 4,773,688 | 68% | 76% | 83% | 70% |
| 6 | 4237 | 70211000 | Peoria Unified School District | 4,584,353 | 62% | 63% | 80% | 60% |
| 7 | 4246 | 70297000 | Deer Valley Unified District | 4,447,281 | 63% | 69% | 80% | 62% |
| 8 | 4286 | 70510000 | Phoenix Union High School District | 4,361,240 | 21% | 33% | 46% | 37% |
| 9 | 4240 | 70248000 | Scottsdale Unified District | 4,303,438 | 63% | 69% | 82% | 63% |
| 10 | 4243 | 70289000 | Dysart Unified District | 3,283,430 | 59% | 55% | 78% | 56% |
| 11 | 4260 | 70406000 | Washington Elementary School District | 2,929,727 | 53% | 50% | 72% | 43% |
| 12 | 4406 | 100210000 | Amphitheater Unified District | 2,560,557 | 52% | 60% | 70% | 47% |
| 13 | 4267 | 70428000 | Kyrene Elementary District | 2,556,290 | 77% | 77% | 88% | 66% |
| 14 | 4285 | 70505000 | Glendale Union High School District | 2,365,011 | 43% | 71% | 70% | 50% |
| 15 | 4287 | 70513000 | Tempe Union High School District | 2,326,820 | 33% | 74% | 66% | 49% |
| 16 | 4282 | 70483000 | Cartwright Elementary District | 2,143,391 | 57% | 37% | 69% | 37% |
| 17 | 4407 | 100212000 | Sunnyside Unified District | 1,970,356 | 35% | 39% | 56% | 36% |
| 18 | 4258 | 70403000 | Tempe School District | 1,818,774 | 56% | 52% | 76% | 49% |
| 19 | 4192 | 30201000 | Flagstaff Unified District | 1,747,421 | 48% | 59% | 66% | 47% |
| 20 | 4404 | 100206000 | Marana Unified District | 1,717,323 | 53% | 60% | 80% | 58% |
| 21 | 4248 | 70260000 | Higley Unified School District | 1,677,682 | 73% | 74% | 93% | 74% |
| 22 | 4280 | 70468000 | Alhambra Elementary District | 1,583,925 | 52% | 43% | 66% | 33% |
| 23 | 79598 | 80220000 | Kingman Unified School District | 1,517,377 | 44% | 48% | 63% | 39% |
| 24 | 4279 | 70466000 | Roosevelt Elementary District | 1,487,676 | 42% | 33% | 60% | 31% |
| 25 | 4507 | 140570000 | Yuma Union High School District | 1,474,177 | 24% | 16% | 45% | 27% |
| 26 | 4271 | 70440000 | Glendale Elementary District | 1,441,452 | 47% | 47% | 65% | 39% |
| 27 | 4413 | 100220000 | Vail Unified District | 1,326,723 | 73% | 83% | 90% | 71% |
| 28 | 4288 | 70514000 | Tolleson Union High School District | 1,310,221 | 32% | 44% | 62% | 49% |
| 29 | 4283 | 70492000 | Pendergast Elementary District | 1,261,632 | 56% | 49% | 75% | 45% |
| 30 | 4437 | 110201000 | Florence Unified School District | 1,249,830 | 53% | 61% | 74% | 53% |
| 31 | 4256 | 70401000 | Phoenix Elementary District | 1,168,665 | 47% | 38% | 64% | 33% |
| 32 | 4281 | 70479000 | Litchfield Elementary District | 1,161,345 | 76% | 78% | 86% | 67% |
| 33 | 4499 | 140401000 | Yuma Elementary District | 1,098,098 | 57% | 52% | 72% | 42% |
| 34 | 4263 | 70414000 | Creighton Elementary District | 995,558 | 49% | 40% | 63% | 37% |
| 35 | 4289 | 70516000 | Agua Fria Union High School District | 991,777 | 39% | 46% | 65% | 52% |
| 36 | 4158 | 10224000 | Chinle Unified District | 975,701 | 25% | 26% | 54% | 27% |
| 37 | 4244 | 70293000 | Cave Creek Unified District | 952,246 | 71% | 72% | 90% | 79% |
| 38 | 4284 | 70501000 | Buckeye Union High School District | 903,133 | 40% | 48% | 69% | 54% |
| 39 | 4442 | 110221000 | Coolidge Unified District | 901,352 | 31% | 30% | 53% | 33% |
| 40 | 4446 | 110404000 | Casa Grande Elementary District | 896,907 | 58% | 49% | 73% | 44% |
| 41 | 4259 | 70405000 | Isaac Elementary District | 876,839 | 42% | 40% | 59% | 33% |
| 42 | 4175 | 20268000 | Sierra Vista Unified District | 856,511 | 63% | 61% | 83% | 59% |
| 43 | 4368 | 80201000 | Lake Havasu Unified District | 846,080 | 62% | 68% | 87% | 62% |
| 44 | 4441 | 110220000 | Maricopa Unified School District | 837,081 | 50% | 56% | 70% | 48% |
| 45 | 4245 | 70295000 | Queen Creek Unified District | 833,228 | 68% | 74% | 85% | 71% |
| 46 | 4469 | 130222000 | Humboldt Unified District | 826,072 | 56% | 67% | 73% | 49% |
| 47 | 4411 | 100230000 | Sahuarita Unified District | 814,183 | 58% | 61% | 76% | 57% |
| 48 | 4410 | 100216000 | Catalina Foothills Unified District | 808,947 | 78% | 80% | 94% | 81% |
| 49 | 4405 | 100208000 | Flowing Wells Unified District | 789,539 | 57% | 54% | 77% | 55% |
| 50 | 4443 | 110243000 | Apache Junction Unified District | 783,426 | 49% | 59% | 65% | 47% |
| 51 | 4466 | 130201000 | Prescott Unified District | 764,467 | 62% | 70% | 80% | 62% |
| 52 | 4270 | 70438000 | Madison Elementary District | 762,711 | 73% | 75% | 86% | 65% |
| 53 | 4272 | 70444000 | Avondale Elementary District | 760,287 | 51% | 49% | 71% | 43% |
| 54 | 4457 | 120201000 | Nogales Unified District | 750,318 | 60% | 35% | 76% | 54% |
| 55 | 4501 | 140413000 | Crane Elementary District | 712,076 | 66% | 60% | 77% | 49% |
| 56 | 4276 | 70459000 | Laveen Elementary District | 660,163 | 60% | 51% | 75% | 48% |
| 57 | 4396 | 90227000 | Kayenta Unified District | 654,650 | 39% | 26% | 59% | 34% |
| 58 | 4445 | 110244000 | J O Combs Unified School District | 653,277 | 50% | 51% | 78% | 56% |
| 59 | 4196 | 30208000 | Page Unified District | 638,103 | 41% | 38% | 59% | 34% |
| 60 | 4278 | 70465000 | Littleton Elementary District | 631,086 | 55% | 54% | 71% | 38% |

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| # | Entity ID | CTD | Entity Name | GSF | 2014 Math | 2014 Science | 2014 Reading | 2014 Writing |
|---|---|---|---|---|---|---|---|---|
| 61 | 4394 | 90220000 | Whiteriver Unified District | 626,577 | 29% | 17% | 55% | 30% |
| 62 | 4154 | 10208000 | Window Rock Unified District | 626,340 | 29% | 20% | 55% | 29% |
| 63 | 4453 | 110502000 | Casa Grande Union High School District | 603,851 | 21% | 31% | 42% | 35% |
| 64 | 4174 | 20227000 | Douglas Unified District | 603,041 | 38% | 34% | 60% | 46% |
| 65 | 4157 | 10220000 | Ganado Unified School District | 587,701 | 32% | 26% | 55% | 33% |
| 66 | 4273 | 70445000 | Fowler Elementary District | 559,846 | 54% | 44% | 69% | 36% |
| 67 | 4269 | 70433000 | Buckeye Elementary District | 546,169 | 57% | 55% | 73% | 39% |
| 68 | 4262 | 70408000 | Osborn Elementary District | 539,469 | 63% | 49% | 71% | 44% |
| 69 | 4397 | 90232000 | Blue Ridge Unified School District No. 32 | 532,157 | 56% | 56% | 80% | 53% |
| 70 | 4155 | 10210000 | Round Valley Unified District | 530,690 | 61% | 54% | 76% | 51% |
| 71 | 4505 | 140432000 | Gadsden Elementary District | 513,519 | 57% | 34% | 63% | 45% |
| 72 | 4458 | 120235000 | Santa Cruz Valley Unified District | 494,529 | 51% | 48% | 70% | 49% |
| 73 | 4247 | 70298000 | Fountain Hills Unified District | 483,159 | 69% | 68% | 85% | 74% |
| 74 | 4218 | 50201000 | Safford Unified District | 479,116 | 55% | 53% | 78% | 46% |
| 75 | 4387 | 90201000 | Winslow Unified District | 478,581 | 43% | 38% | 69% | 47% |
| 76 | 4393 | 90210000 | Show Low Unified District | 451,741 | 62% | 71% | 82% | 51% |
| 77 | 4268 | 70431000 | Balsz Elementary District | 446,570 | 49% | 36% | 62% | 28% |
| 78 | 4391 | 90205000 | Snowflake Unified District | 428,183 | 68% | 66% | 83% | 63% |
| 79 | 4236 | 70209000 | Wickenburg Unified District | 428,117 | 52% | 53% | 76% | 52% |
| 80 | 4378 | 80415000 | Bullhead City School District | 424,264 | 64% | 64% | 76% | 44% |
| 81 | 4381 | 80502000 | Colorado River Union High School District | 418,757 | 29% | 37% | 44% | 46% |
| 82 | 4389 | 90203000 | Holbrook Unified District | 412,976 | 53% | 46% | 75% | 44% |
| 83 | 4209 | 40210000 | Payson Unified District | 403,279 | 52% | 51% | 78% | 59% |
| 84 | 4264 | 70417000 | Tolleson Elementary District | 392,313 | 52% | 39% | 71% | 37% |
| 85 | 4266 | 70425000 | Liberty Elementary District | 380,368 | 60% | 62% | 79% | 50% |
| 86 | 4156 | 10218000 | Sanders Unified District | 379,556 | 28% | 13% | 51% | 23% |
| 87 | 4254 | 70290000 | Saddle Mountain Unified School District | 374,207 | 60% | 44% | 72% | 51% |
| 88 | 4467 | 130209000 | Sedona-Oak Creek JUSD #9 | 372,234 | 51% | 58% | 78% | 62% |
| 89 | 4210 | 40220000 | San Carlos Unified District | 369,835 | 12% | 9% | 35% | 13% |
| 90 | 4510 | 150227000 | Parker Unified School District | 366,028 | 41% | 38% | 70% | 37% |
| 91 | 4390 | 90204000 | Pinon Unified District | 344,152 | 40% | 18% | 57% | 29% |
| 92 | 4208 | 40201000 | Globe Unified District | 336,783 | 34% | 35% | 61% | 28% |
| 93 | 4439 | 110208000 | Mammoth-San Manuel Unified District | 335,849 | 54% | 40% | 75% | 53% |
| 94 | 4474 | 130251000 | Chino Valley Unified District | 333,773 | 60% | 50% | 82% | 51% |
| 95 | 4211 | 40240000 | Miami Unified District | 327,598 | 42% | 43% | 71% | 44% |
| 96 | 4412 | 100240000 | Baboquivari Unified School District #40 | 315,281 | 24% | 14% | 50% | 20% |
| 97 | 4487 | 130406000 | Cottonwood-Oak Creek Elementary District | 312,330 | 58% | 61% | 76% | 44% |
| 98 | 4500 | 140411000 | Somerton Elementary District | 312,037 | 54% | 35% | 69% | 41% |
| 99 | 4265 | 70421000 | Murphy Elementary District | 305,100 | 47% | 38% | 66% | 27% |
| 100 | 4153 | 10201000 | St Johns Unified District | 297,133 | 70% | 66% | 82% | 60% |
| 101 | 4408 | 100213000 | Tanque Verde Unified District | 280,121 | 84% | 85% | 93% | 85% |
| 102 | 4219 | 50204000 | Thatcher Unified District | 276,740 | 70% | 67% | 88% | 69% |
| 103 | 4230 | 60218000 | Morenci Unified District | 273,528 | 71% | 55% | 85% | 56% |
| 104 | 4170 | 20213000 | Willcox Unified District | 273,508 | 52% | 45% | 66% | 31% |
| 105 | 4470 | 130228000 | Camp Verde Unified District | 245,725 | 52% | 50% | 77% | 42% |
| 106 | 4168 | 20201000 | Tombstone Unified District | 231,447 | 58% | 46% | 82% | 57% |
| 107 | 4169 | 20202000 | Bisbee Unified District | 228,248 | 41% | 51% | 68% | 37% |
| 108 | 4159 | 10227000 | Red Mesa Unified District | 227,658 | 36% | 20% | 58% | 31% |
| 109 | 4379 | 80416000 | Mohave Valley Elementary District | 220,035 | 62% | 66% | 77% | 41% |
| 110 | 4388 | 90202000 | Joseph City Unified District | 211,184 | 72% | 70% | 81% | 63% |
| 111 | 4261 | 70407000 | Wilson Elementary District | 207,691 | 57% | 48% | 75% | 42% |
| 112 | 4277 | 70462000 | Union Elementary District | 202,597 | 47% | 33% | 66% | 43% |
| 113 | 4488 | 130504000 | Mingus Union High School District | 198,724 | 41% | 66% | 79% | 62% |
| 114 | 79226 | 20209000 | Benson Unified School District | 194,192 | 68% | 65% | 88% | 58% |
| 115 | 4257 | 70402000 | Riverside Elementary District | 192,409 | 57% | 45% | 70% | 37% |
| 116 | 4438 | 110203000 | Ray Unified District | 191,243 | 46% | 51% | 72% | 40% |
| 117 | 4221 | 50207000 | Fort Thomas Unified District | 183,357 | 54% | 25% | 65% | 33% |
| 118 | 4212 | 40241000 | Hayden-Winkelman Unified District | 179,222 | 37% | 21% | 63% | 31% |
| 119 | 4440 | 110215000 | Superior Unified School District | 171,807 | 36% | 18% | 64% | 37% |
| 120 | 4450 | 110422000 | Toltec School District | 170,495 | 46% | 40% | 68% | 33% |

| #   | Entity ID | CTD       | Entity Name                                 | GSF     | 2014 Math | 2014 Science | 2014 Reading | 2014 Writing |
|-----|-----------|-----------|---------------------------------------------|---------|-----------|--------------|--------------|--------------|
| 121 | 4370      | 80214000  | Colorado City Unified District              | 168,595 | 56%       | 53%          | 75%          | 39%          |
| 122 | 4392      | 90206000  | Heber-Overgaard Unified District            | 164,182 | 71%       | 60%          | 86%          | 68%          |
| 123 | 4448      | 110411000 | Eloy Elementary District                    | 157,960 | 44%       | 25%          | 62%          | 25%          |
| 124 | 4395      | 90225000  | Cedar Unified District                      | 156,043 | 26%       | 10%          | 44%          | 13%          |
| 125 | 4454      | 110540000 | Santa Cruz Valley Union High School District | 151,633 | 28%      | 5%           | 66%          | 41%          |
| 126 | 4449      | 110418000 | Sacaton Elementary District                 | 148,862 | 40%       | 23%          | 61%          | 20%          |
| 127 | 4193      | 30202000  | Williams Unified District                   | 146,180 | 42%       | 46%          | 66%          | 45%          |
| 128 | 4228      | 60202000  | Duncan Unified District                     | 136,458 | 46%       | 45%          | 73%          | 52%          |
| 129 | 4180      | 20349000  | Palominas Elementary District               | 129,873 | 72%       | 76%          | 87%          | 59%          |
| 130 | 4220      | 50206000  | Pima Unified District                       | 119,300 | 52%       | 59%          | 78%          | 60%          |
| 131 | 4473      | 130243000 | Mayer Unified School District               | 118,214 | 36%       | 40%          | 70%          | 44%          |
| 132 | 4447      | 110405000 | Red Rock Elementary District                | 118,105 | 69%       | 79%          | 80%          | 50%          |
| 133 | 4506      | 140550000 | Antelope Union High School District         | 117,018 | 33%       | 22%          | 72%          | 37%          |
| 134 | 4418      | 100351000 | Altar Valley Elementary District            | 116,000 | 49%       | 50%          | 74%          | 32%          |
| 135 | 4238      | 70224000  | Gila Bend Unified District                  | 110,813 | 32%       | 25%          | 60%          | 28%          |
| 136 | 4409      | 100215000 | Ajo Unified District                        | 107,122 | 51%       | 54%          | 72%          | 46%          |
| 137 | 4195      | 30206000  | Fredonia-Moccasin Unified District          | 106,127 | 56%       | 44%          | 74%          | 47%          |
| 138 | 4369      | 80208000  | Peach Springs Unified District              | 102,653 | 26%       | 33%          | 43%          | 21%          |
| 139 | 4468      | 130220000 | Bagdad Unified District                     | 98,396  | 56%       | 60%          | 85%          | 44%          |
| 140 | 4451      | 110424000 | Stanfield Elementary District               | 97,461  | 47%       | 44%          | 59%          | 26%          |
| 141 | 4472      | 130240000 | Seligman Unified District                   | 90,327  | 56%       | 41%          | 73%          | 51%          |
| 142 | 4173      | 20221000  | St David Unified District                   | 88,586  | 75%       | 76%          | 89%          | 65%          |
| 143 | 4374      | 80209000  | Littlefield Unified District                | 82,633  | 46%       | 44%          | 67%          | 50%          |
| 144 | 4194      | 30204000  | Grand Canyon Unified District               | 76,786  | 52%       | 57%          | 69%          | 57%          |
| 145 | 4416      | 100339000 | Continental Elementary District             | 75,361  | 53%       | 71%          | 78%          | 60%          |
| 146 | 4481      | 130326000 | Beaver Creek Elementary District            | 74,916  | 46%       | 60%          | 69%          | 34%          |
| 147 | 4444      | 110302000 | Oracle Elementary District                  | 72,929  | 48%       | 55%          | 67%          | 37%          |
| 148 | 4435      | 110100000 | Mary C O'Brien Accommodation District       | 72,051  | 57%       | 47%          | 73%          | 67%          |
| 149 | 4462      | 120520000 | Patagonia Union High School District        | 70,799  | 81%       | 56%          | 88%          | 81%          |
| 150 | 4275      | 70449000  | Palo Verde Elementary District              | 66,790  | 58%       | 47%          | 70%          | 61%          |
| 151 | 4214      | 40312000  | Pine Strawberry Elementary District         | 66,745  | 55%       | 70%          | 81%          | 55%          |
| 152 | 4504      | 140424000 | Wellton Elementary District                 | 60,797  | 60%       | 51%          | 62%          | 41%          |
| 153 | 4190      | 20522000  | Valley Union High School District           | 59,812  | 61%       | 48%          |              | 84%          |
| 154 | 4515      | 150576000 | Bicentennial Union High School District     | 57,537  | 68%       |              | 81%          | 65%          |
| 155 | 4471      | 130231000 | Ash Fork Joint Unified District             | 53,260  | 70%       | 47%          | 78%          | 42%          |
| 156 | 4511      | 150404000 | Quartzsite Elementary District              | 53,125  | 35%       | 64%          | 59%          | 29%          |
| 157 | 4502      | 140416000 | Hyder Elementary District                   | 52,656  | 71%       |              | 85%          | 70%          |
| 158 | 4486      | 130403000 | Clarkdale-Jerome Elementary District        | 48,288  | 69%       | 75%          | 84%          | 68%          |
| 159 | 4503      | 140417000 | Mohawk Valley Elementary District           | 47,820  | 38%       | 46%          | 64%          | 30%          |
| 160 | 4171      | 20214000  | Bowie Unified District                      | 46,243  |           |              |              |              |
| 161 | 4172      | 20218000  | San Simon Unified District                  | 45,061  | 55%       | 42%          | 81%          | 45%          |
| 162 | 4222      | 50305000  | Solomon Elementary District                 | 44,339  | 74%       | 53%          | 73%          | 73%          |
| 163 | 4213      | 40305000  | Young Elementary District                   | 43,872  |           |              |              |              |
| 164 | 4160      | 10306000  | Concho Elementary District                  | 41,015  | 66%       | 51%          | 81%          | 46%          |
| 165 | 4163      | 10323000  | Mcnary Elementary District                  | 39,692  | 25%       | 22%          | 51%          | 17%          |
| 166 | 4484      | 130350000 | Canon Elementary District                   | 38,230  | 58%       | 53%          | 81%          | 57%          |
| 167 | 4274      | 70447000  | Arlington Elementary District               | 36,618  | 71%       | 67%          | 84%          | 53%          |
| 168 | 4514      | 150430000 | Salome Consolidated Elementary District     | 36,533  | 32%       |              | 57%          | 36%          |
| 169 | 4176      | 20323000  | Naco Elementary District                    | 36,034  | 37%       | 21%          | 48%          | 9%           |
| 170 | 4251      | 70375000  | Morristown Elementary District              | 33,637  | 61%       | 57%          | 84%          | 59%          |
| 171 | 4461      | 120425000 | Sonoita Elementary District                 | 31,797  | 53%       | 71%          | 83%          | 77%          |
| 172 | 4249      | 70363000  | Aguila Elementary District                  | 31,788  | 63%       | 60%          | 76%          | 64%          |
| 173 | 4186      | 20422000  | Pearce Elementary District                  | 31,322  | 32%       |              | 74%          | 36%          |
| 174 | 4185      | 20412000  | Elfrida Elementary District                 | 29,737  | 56%       | 77%          | 75%          | 37%          |
| 175 | 4199      | 30310000  | Maine Consolidated School District          | 29,567  | 76%       | 76%          | 87%          | 58%          |
| 176 | 4188      | 20364000  | Pomerene Elementary District                | 28,867  | 69%       | 71%          | 88%          | 43%          |
| 177 | 4224      | 50316000  | Bonita Elementary District                  | 27,239  | 61%       |              | 78%          | 65%          |
| 178 | 4452      | 110433000 | Picacho Elementary District                 | 26,788  | 39%       | 50%          | 58%          | 26%          |
| 179 | 4479      | 130317000 | Congress Elementary District                | 26,000  | 83%       | 67%          | 89%          | 77%          |
| 180 | 4177      | 20326000  | Cochise Elementary District                 | 25,613  | 50%       |              | 92%          | 64%          |

| # | Entity ID | CTD | Entity Name | GSF | 2014 Math | 2014 Science | 2014 Reading | 2014 Writing |
|---|---|---|---|---|---|---|---|---|
| 181 | 4512 | 150419000 | Wenden Elementary District | 25,590 | 43% | 64% | 79% | |
| 182 | 4162 | 10309000 | Vernon Elementary District | 24,218 | 45% | 57% | 85% | 40% |
| 183 | 4253 | 70386000 | Mobile Elementary District | 22,880 | | | | |
| 184 | 4234 | 70199000 | Maricopa County Regional District | 22,509 | 8% | 11% | 32% | 22% |
| 185 | 4459 | 120328000 | Santa Cruz Elementary District | 22,461 | 68% | 68% | 85% | 66% |
| 186 | 4386 | 90199000 | Navajo County Accommodation District #99 | 22,178 | | | | |
| 187 | 4187 | 20453000 | Ash Creek Elementary District | 21,432 | | | | |
| 188 | 4250 | 70371000 | Sentinel Elementary District | 21,004 | | | | |
| 189 | 4485 | 130352000 | Yarnell Elementary District | 20,499 | | | | |
| 190 | 4371 | 80303000 | Hackberry School District | 19,916 | | | | |
| 191 | 79379 | 130199000 | Yavapai Accommodation School District | 19,116 | 20% | 15% | 61% | 28% |
| 192 | 4215 | 40333000 | Tonto Basin Elementary District | 16,896 | | | | |
| 193 | 4179 | 20345000 | Double Adobe Elementary District | 16,164 | | | | |
| 194 | 4255 | 70394000 | Paloma School District | 15,280 | 41% | 27% | 55% | 91% |
| 195 | 4161 | 10307000 | Alpine Elementary District | 14,868 | | | | |
| 196 | 4380 | 80322000 | Valentine Elementary District | 13,430 | 33% | | 58% | |
| 197 | 4513 | 150426000 | Bouse Elementary District | 13,327 | | | | |
| 198 | 4460 | 120406000 | Patagonia Elementary District | 12,483 | 48% | 50% | 71% | 40% |
| 199 | 4480 | 130323000 | Kirkland Elementary District | 10,452 | | | | |
| 200 | 4181 | 20355000 | McNeal Elementary District | 8,550 | | | | |
| 201 | 4478 | 130315000 | Skull Valley Elementary District | 8,550 | | | | |
| 202 | 4414 | 100335000 | San Fernando Elementary District | 7,630 | | | | |
| 203 | 4377 | 80313000 | Yucca Elementary District | 7,616 | | | | |
| 204 | 4482 | 130335000 | Hillside Elementary District | 7,229 | | | | |
| 205 | 4178 | 20342000 | Apache Elementary District | 1,720 | | | | |
| 206 | 4231 | 60322000 | Blue Elementary District | 1,600 | | | | |

| # | Entity ID | CTD | Entity Name | GSF | 2015 Math | 2015 Science | 2015 Reading |
|---|---|---|---|---|---|---|---|
| 1 | 4403 | 100201000 | Tucson Unified District | 8,968,427 | 25% | 36% | 28% |
| 2 | 4235 | 70204000 | Mesa Unified District | 8,530,135 | 38% | | 33% |
| 3 | 4241 | 70269000 | Paradise Valley Unified District | 5,085,048 | 39% | 61% | 42% |
| 4 | 4239 | 70241000 | Gilbert Unified District | 4,833,949 | 51% | | 49% |
| 5 | 4242 | 70280000 | Chandler Unified District #80 | 4,773,688 | 53% | 73% | 52% |
| 6 | 4237 | 70211000 | Peoria Unified School District | 4,584,353 | 40% | | 41% |
| 7 | 4246 | 70297000 | Deer Valley Unified District | 4,447,281 | 44% | 64% | 44% |
| 8 | 4286 | 70510000 | Phoenix Union High School District | 4,361,240 | 23% | 25% | 20% |
| 9 | 4240 | 70248000 | Scottsdale Unified District | 4,303,438 | 47% | 62% | 48% |
| 10 | 4243 | 70289000 | Dysart Unified District | 3,283,430 | 29% | 47% | 31% |
| 11 | 4260 | 70406000 | Washington Elementary School District | 2,929,727 | 29% | 54% | 32% |
| 12 | 4406 | 100210000 | Amphitheater Unified District | 2,560,557 | 36% | 50% | 38% |
| 13 | 4267 | 70428000 | Kyrene Elementary District | 2,556,290 | 54% | 76% | 51% |
| 14 | 4285 | 70505000 | Glendale Union High School District | 2,365,011 | 29% | 68% | 28% |
| 15 | 4287 | 70513000 | Tempe Union High School District | 2,326,820 | 30% | 71% | 32% |
| 16 | 4282 | 70483000 | Cartwright Elementary District | 2,143,391 | 24% | 42% | 18% |
| 17 | 4407 | 100212000 | Sunnyside Unified District | 1,970,356 | 16% | 33% | 16% |
| 18 | 4258 | 70403000 | Tempe School District | 1,818,774 | 32% | 51% | 31% |
| 19 | 4192 | 30201000 | Flagstaff Unified District | 1,747,421 | 30% | | 25% |
| 20 | 4404 | 100206000 | Marana Unified District | 1,717,323 | 36% | 62% | 38% |
| 21 | 4248 | 70260000 | Higley Unified School District | 1,677,682 | 54% | 78% | 51% |
| 22 | 4280 | 70468000 | Alhambra Elementary District | 1,583,925 | 26% | 44% | 19% |
| 23 | 79598 | 80220000 | Kingman Unified School District | 1,517,377 | 27% | 39% | 24% |
| 24 | 4279 | 70466000 | Roosevelt Elementary District | 1,487,676 | 20% | 34% | 17% |
| 25 | 4507 | 140570000 | Yuma Union High School District | 1,474,177 | 15% | 16% | 20% |
| 26 | 4271 | 70440000 | Glendale Elementary District | 1,441,452 | 22% | 44% | 18% |
| 27 | 4413 | 100220000 | Vail Unified District | 1,326,723 | 58% | 81% | 49% |
| 28 | 4288 | 70514000 | Tolleson Union High School District | 1,310,221 | 9% | 28% | 16% |
| 29 | 4283 | 70492000 | Pendergast Elementary District | 1,261,632 | 29% | 43% | 31% |
| 30 | 4437 | 110201000 | Florence Unified School District | 1,249,830 | 29% | 46% | 29% |
| 31 | 4256 | 70401000 | Phoenix Elementary District | 1,168,665 | 21% | 39% | 21% |
| 32 | 4281 | 70479000 | Litchfield Elementary District | 1,161,345 | 48% | 75% | 49% |
| 33 | 4499 | 140401000 | Yuma Elementary District | 1,098,098 | 33% | 50% | 25% |
| 34 | 4263 | 70414000 | Creighton Elementary District | 995,558 | 24% | 31% | 21% |
| 35 | 4289 | 70516000 | Agua Fria Union High School District | 991,777 | 23% | 36% | 26% |
| 36 | 4158 | 10224000 | Chinle Unified District | 975,701 | 15% | | 9% |
| 37 | 4244 | 70293000 | Cave Creek Unified District | 952,246 | 58% | 75% | 56% |
| 38 | 4284 | 70501000 | Buckeye Union High School District | 903,133 | 26% | 51% | 19% |
| 39 | 4442 | 110221000 | Coolidge Unified District | 901,352 | 10% | 23% | 11% |
| 40 | 4446 | 110404000 | Casa Grande Elementary District | 896,907 | 31% | 47% | 27% |
| 41 | 4259 | 70405000 | Isaac Elementary District | 876,839 | 16% | 35% | 15% |
| 42 | 4175 | 20268000 | Sierra Vista Unified District | 856,511 | 43% | | 40% |
| 43 | 4368 | 80201000 | Lake Havasu Unified District | 846,080 | 41% | 60% | 37% |
| 44 | 4441 | 110220000 | Maricopa Unified School District | 837,081 | 27% | 50% | 27% |
| 45 | 4245 | 70295000 | Queen Creek Unified District | 833,228 | 44% | 74% | 39% |
| 46 | 4469 | 130222000 | Humboldt Unified District | 826,072 | 31% | 60% | 36% |
| 47 | 4411 | 100230000 | Sahuarita Unified District | 814,183 | 36% | 52% | 35% |
| 48 | 4410 | 100216000 | Catalina Foothills Unified District | 808,947 | 63% | 76% | 63% |
| 49 | 4405 | 100208000 | Flowing Wells Unified District | 789,539 | 30% | 48% | 31% |
| 50 | 4443 | 110243000 | Apache Junction Unified District | 783,426 | 28% | 46% | 27% |
| 51 | 4466 | 130201000 | Prescott Unified District | 764,467 | 37% | 63% | 36% |
| 52 | 4270 | 70438000 | Madison Elementary District | 762,711 | 49% | 76% | 48% |
| 53 | 4272 | 70444000 | Avondale Elementary District | 760,287 | 23% | 50% | 25% |
| 54 | 4457 | 120201000 | Nogales Unified District | 750,318 | 27% | 31% | 24% |
| 55 | 4501 | 140413000 | Crane Elementary District | 712,076 | 43% | 62% | 36% |
| 56 | 4276 | 70459000 | Laveen Elementary District | 660,163 | 32% | 51% | 27% |
| 57 | 4396 | 90227000 | Kayenta Unified District | 654,650 | 12% | 21% | 11% |
| 58 | 4445 | 110244000 | J O Combs Unified School District | 653,277 | 31% | 41% | 30% |
| 59 | 4196 | 30208000 | Page Unified District | 638,103 | 18% | | 15% |
| 60 | 4278 | 70465000 | Littleton Elementary District | 631,086 | 25% | 44% | 19% |

| # | Entity ID | CTD | Entity Name | GSF | 2015 Math | 2015 Science | 2015 Reading |
|---|---|---|---|---|---|---|---|
| 61 | 4394 | 90220000 | Whiteriver Unified District | 626,577 | 10% | 11% | 7% |
| 62 | 4154 | 10208000 | Window Rock Unified District | 626,340 | 9% | | 11% |
| 63 | 4453 | 110502000 | Casa Grande Union High School District | 603,851 | 16% | 49% | 22% |
| 64 | 4174 | 20227000 | Douglas Unified District | 603,041 | 21% | | 23% |
| 65 | 4157 | 10220000 | Ganado Unified School District | 587,701 | 10% | | 8% |
| 66 | 4273 | 70445000 | Fowler Elementary District | 559,846 | 29% | 37% | 23% |
| 67 | 4269 | 70433000 | Buckeye Elementary District | 546,169 | 27% | 49% | 28% |
| 68 | 4262 | 70408000 | Osborn Elementary District | 539,469 | 33% | 49% | 21% |
| 69 | 4397 | 90232000 | Blue Ridge Unified School District No. 32 | 532,157 | 40% | 54% | 36% |
| 70 | 4155 | 10210000 | Round Valley Unified District | 530,690 | 38% | | 29% |
| 71 | 4505 | 140432000 | Gadsden Elementary District | 513,519 | 25% | 32% | 25% |
| 72 | 4458 | 120235000 | Santa Cruz Valley Unified District | 494,529 | 30% | 42% | 26% |
| 73 | 4247 | 70298000 | Fountain Hills Unified District | 483,159 | 43% | 62% | 40% |
| 74 | 4218 | 50201000 | Safford Unified District | 479,116 | 28% | 49% | 25% |
| 75 | 4387 | 90201000 | Winslow Unified District | 478,581 | 22% | 35% | 19% |
| 76 | 4393 | 90210000 | Show Low Unified District | 451,741 | 27% | 62% | 30% |
| 77 | 4268 | 70431000 | Balsz Elementary District | 446,570 | 25% | 34% | 14% |
| 78 | 4391 | 90205000 | Snowflake Unified District | 428,183 | 52% | 70% | 46% |
| 79 | 4236 | 70209000 | Wickenburg Unified District | 428,117 | 36% | 49% | 27% |
| 80 | 4378 | 80415000 | Bullhead City School District | 424,264 | 37% | 63% | 25% |
| 81 | 4381 | 80502000 | Colorado River Union High School District | 418,757 | 12% | 42% | 19% |
| 82 | 4389 | 90203000 | Holbrook Unified District | 412,976 | 25% | 37% | 20% |
| 83 | 4209 | 40210000 | Payson Unified District | 403,279 | 29% | 44% | 29% |
| 84 | 4264 | 70417000 | Tolleson Elementary District | 392,313 | 29% | 46% | 25% |
| 85 | 4266 | 70425000 | Liberty Elementary District | 380,368 | 35% | 62% | 38% |
| 86 | 4156 | 10218000 | Sanders Unified District | 379,556 | 10% | | 5% |
| 87 | 4254 | 70290000 | Saddle Mountain Unified School District | 374,207 | 32% | 35% | 20% |
| 88 | 4467 | 130209000 | Sedona-Oak Creek JUSD #9 | 372,234 | 32% | 55% | 37% |
| 89 | 4210 | 40220000 | San Carlos Unified District | 369,835 | 6% | 9% | 2% |
| 90 | 4510 | 150227000 | Parker Unified School District | 366,028 | 21% | 35% | 16% |
| 91 | 4390 | 90204000 | Pinon Unified District | 344,152 | 17% | 17% | 10% |
| 92 | 4208 | 40201000 | Globe Unified District | 336,783 | 16% | 37% | 12% |
| 93 | 4439 | 110208000 | Mammoth-San Manuel Unified District | 335,849 | 19% | 33% | 24% |
| 94 | 4474 | 130251000 | Chino Valley Unified District | 333,773 | 30% | 53% | 33% |
| 95 | 4211 | 40240000 | Miami Unified District | 327,598 | 17% | 37% | 17% |
| 96 | 4412 | 100240000 | Baboquivari Unified School District #40 | 315,281 | 8% | 12% | 7% |
| 97 | 4487 | 130406000 | Cottonwood-Oak Creek Elementary District | 312,330 | 31% | 59% | 31% |
| 98 | 4500 | 140411000 | Somerton Elementary District | 312,037 | 20% | 37% | 17% |
| 99 | 4265 | 70421000 | Murphy Elementary District | 305,100 | 14% | 28% | 15% |
| 100 | 4153 | 10201000 | St Johns Unified District | 297,133 | 37% | | 36% |
| 101 | 4408 | 100213000 | Tanque Verde Unified District | 280,121 | 54% | 76% | 52% |
| 102 | 4219 | 50204000 | Thatcher Unified District | 276,740 | 41% | 64% | 44% |
| 103 | 4230 | 60218000 | Morenci Unified District | 273,528 | 37% | 63% | 29% |
| 104 | 4170 | 20213000 | Willcox Unified District | 273,508 | 24% | | 19% |
| 105 | 4470 | 130228000 | Camp Verde Unified District | 245,725 | 23% | 53% | 20% |
| 106 | 4168 | 20201000 | Tombstone Unified District | 231,447 | 25% | | 26% |
| 107 | 4169 | 20202000 | Bisbee Unified District | 228,248 | 14% | | 15% |
| 108 | 4159 | 10227000 | Red Mesa Unified District | 227,658 | 10% | | 10% |
| 109 | 4379 | 80416000 | Mohave Valley Elementary District | 220,035 | 33% | 49% | 24% |
| 110 | 4388 | 90202000 | Joseph City Unified District | 211,184 | 32% | 51% | 32% |
| 111 | 4261 | 70407000 | Wilson Elementary District | 207,691 | 25% | 48% | 23% |
| 112 | 4277 | 70462000 | Union Elementary District | 202,597 | 23% | 30% | 23% |
| 113 | 4488 | 130504000 | Mingus Union High School District | 198,724 | 21% | 61% | 22% |
| 114 | 79226 | 20209000 | Benson Unified School District | 194,192 | 41% | 57% | 41% |
| 115 | 4257 | 70402000 | Riverside Elementary District | 192,409 | 25% | 44% | 23% |
| 116 | 4438 | 110203000 | Ray Unified District | 191,243 | 13% | 60% | 18% |
| 117 | 4221 | 50207000 | Fort Thomas Unified District | 183,357 | 16% | 18% | 12% |
| 118 | 4212 | 40241000 | Hayden-Winkelman Unified District | 179,222 | 10% | 28% | 15% |
| 119 | 4440 | 110215000 | Superior Unified School District | 171,807 | 9% | 16% | 8% |
| 120 | 4450 | 110422000 | Toltec School District | 170,495 | 19% | 40% | 19% |

| # | Entity ID | CTD | Entity Name | GSF | 2015 Math | 2015 Science | 2015 Reading |
|---|---|---|---|---|---|---|---|
| 121 | 4370 | 80214000 | Colorado City Unified District | 168,595 | 40% | 70% | 33% |
| 122 | 4392 | 90206000 | Heber-Overgaard Unified District | 164,182 | 38% | 72% | 32% |
| 123 | 4448 | 110411000 | Eloy Elementary District | 157,960 | 17% | 30% | 12% |
| 124 | 4395 | 90225000 | Cedar Unified District | 156,043 | 16% | 28% | 12% |
| 125 | 4454 | 110540000 | Santa Cruz Valley Union High School District | 151,633 | 7% | 14% | 16% |
| 126 | 4449 | 110418000 | Sacaton Elementary District | 148,862 | 18% | 21% | 13% |
| 127 | 4193 | 30202000 | Williams Unified District | 146,180 | 13% | 40% | 16% |
| 128 | 4228 | 60202000 | Duncan Unified District | 136,458 | 20% | 44% | 20% |
| 129 | 4180 | 20349000 | Palominas Elementary District | 129,873 | 45% | | 40% |
| 130 | 4220 | 50206000 | Pima Unified District | 119,300 | 27% | 59% | 36% |
| 131 | 4473 | 130243000 | Mayer Unified School District | 118,214 | 11% | 45% | 13% |
| 132 | 4447 | 110405000 | Red Rock Elementary District | 118,105 | 30% | 70% | 35% |
| 133 | 4506 | 140550000 | Antelope Union High School District | 117,018 | 8% | 14% | 10% |
| 134 | 4418 | 100351000 | Altar Valley Elementary District | 116,000 | 22% | 39% | 19% |
| 135 | 4238 | 70224000 | Gila Bend Unified District | 110,813 | 7% | 25% | 12% |
| 136 | 4409 | 100215000 | Ajo Unified District | 107,122 | 25% | 39% | 25% |
| 137 | 4195 | 30206000 | Fredonia-Moccasin Unified District | 106,127 | 24% | 53% | 25% |
| 138 | 4369 | 80208000 | Peach Springs Unified District | 102,653 | 5% | 19% | 6% |
| 139 | 4468 | 130220000 | Bagdad Unified District | 98,396 | 20% | 39% | 19% |
| 140 | 4451 | 110424000 | Stanfield Elementary District | 97,461 | 20% | 25% | 11% |
| 141 | 4472 | 130240000 | Seligman Unified District | 90,327 | 15% | 55% | 16% |
| 142 | 4173 | 20221000 | St David Unified District | 88,586 | 34% | | 49% |
| 143 | 4374 | 80209000 | Littlefield Unified District | 82,633 | 23% | 47% | 21% |
| 144 | 4194 | 30204000 | Grand Canyon Unified District | 76,786 | 20% | 52% | 29% |
| 145 | 4416 | 100339000 | Continental Elementary District | 75,361 | 37% | 59% | 38% |
| 146 | 4481 | 130326000 | Beaver Creek Elementary District | 74,916 | 15% | 52% | 14% |
| 147 | 4444 | 110302000 | Oracle Elementary District | 72,929 | 26% | 49% | 20% |
| 148 | 4435 | 110100000 | Mary C O'Brien Accommodation District | 72,051 | 25% | 37% | 33% |
| 149 | 4462 | 120520000 | Patagonia Union High School District | 70,799 | 46% | 58% | 38% |
| 150 | 4275 | 70449000 | Palo Verde Elementary District | 66,790 | 36% | 58% | 31% |
| 151 | 4214 | 40312000 | Pine Strawberry Elementary District | 66,745 | 37% | 75% | 31% |
| 152 | 4504 | 140424000 | Wellton Elementary District | 60,797 | 25% | 47% | 15% |
| 153 | 4190 | 20522000 | Valley Union High School District | 59,812 | 23% | 39% | 26% |
| 154 | 4515 | 150576000 | Bicentennial Union High School District | 57,537 | 21% | 36% | 23% |
| 155 | 4471 | 130231000 | Ash Fork Joint Unified District | 53,260 | 49% | 84% | 42% |
| 156 | 4511 | 150404000 | Quartzsite Elementary District | 53,125 | 16% | 34% | 26% |
| 157 | 4502 | 140416000 | Hyder Elementary District | 52,656 | 53% | 76% | 33% |
| 158 | 4486 | 130403000 | Clarkdale-Jerome Elementary District | 48,288 | 41% | 73% | 39% |
| 159 | 4503 | 140417000 | Mohawk Valley Elementary District | 47,820 | 11% | 24% | 8% |
| 160 | 4171 | 20214000 | Bowie Unified District | 46,243 | 4% | | |
| 161 | 4172 | 20218000 | San Simon Unified District | 45,061 | 28% | 68% | 29% |
| 162 | 4222 | 50305000 | Solomon Elementary District | 44,339 | 36% | 64% | 39% |
| 163 | 4213 | 40305000 | Young Elementary District | 43,872 | 34% | | 46% |
| 164 | 4160 | 10306000 | Concho Elementary District | 41,015 | 33% | | 27% |
| 165 | 4163 | 10323000 | Mcnary Elementary District | 39,692 | 12% | | 11% |
| 166 | 4484 | 130350000 | Canon Elementary District | 38,230 | 36% | 75% | 42% |
| 167 | 4274 | 70447000 | Arlington Elementary District | 36,618 | 22% | 34% | 16% |
| 168 | 4514 | 150430000 | Salome Consolidated Elementary District | 36,533 | 15% | 13% | 11% |
| 169 | 4176 | 20323000 | Naco Elementary District | 36,034 | 7% | 19% | 12% |
| 170 | 4251 | 70375000 | Morristown Elementary District | 33,637 | 24% | 63% | 30% |
| 171 | 4461 | 120425000 | Sonoita Elementary District | 31,797 | 42% | | 48% |
| 172 | 4249 | 70363000 | Aguila Elementary District | 31,788 | 20% | 47% | 19% |
| 173 | 4186 | 20422000 | Pearce Elementary District | 31,322 | 29% | 53% | 24% |
| 174 | 4185 | 20412000 | Elfrida Elementary District | 29,737 | 21% | 70% | 28% |
| 175 | 4199 | 30310000 | Maine Consolidated School District | 29,567 | 28% | 83% | 33% |
| 176 | 4188 | 20364000 | Pomerene Elementary District | 28,867 | 37% | | 32% |
| 177 | 4224 | 50316000 | Bonita Elementary District | 27,239 | 36% | | 37% |
| 178 | 4452 | 110433000 | Picacho Elementary District | 26,788 | 11% | 44% | 13% |
| 179 | 4479 | 130317000 | Congress Elementary District | 26,000 | 77% | 83% | 66% |
| 180 | 4177 | 20326000 | Cochise Elementary District | 25,613 | 46% | | 48% |

| # | Entity ID | CTD | Entity Name | GSF | 2015 Math | 2015 Science | 2015 Reading |
|---|---|---|---|---|---|---|---|
| 181 | 4512 | 150419000 | Wenden Elementary District | 25,590 | 18% | 36% | 15% |
| 182 | 4162 | 10309000 | Vernon Elementary District | 24,218 | 17% | 50% | 19% |
| 183 | 4253 | 70386000 | Mobile Elementary District | 22,880 | | | |
| 184 | 4234 | 70199000 | Maricopa County Regional District | 22,509 | 3% | 13% | 3% |
| 185 | 4459 | 120328000 | Santa Cruz Elementary District | 22,461 | 40% | 63% | 42% |
| 186 | 4386 | 90199000 | Navajo County Accommodation District #99 | 22,178 | | | |
| 187 | 4187 | 20453000 | Ash Creek Elementary District | 21,432 | 5% | | 19% |
| 188 | 4250 | 70371000 | Sentinel Elementary District | 21,004 | 43% | | 35% |
| 189 | 4485 | 130352000 | Yarnell Elementary District | 20,499 | 41% | | 44% |
| 190 | 4371 | 80303000 | Hackberry School District | 19,916 | 56% | | 63% |
| 191 | 79379 | 130199000 | Yavapai Accommodation School District | 19,116 | 3% | 17% | 10% |
| 192 | 4215 | 40333000 | Tonto Basin Elementary District | 16,896 | 32% | | 45% |
| 193 | 4179 | 20345000 | Double Adobe Elementary District | 16,164 | 13% | | 21% |
| 194 | 4255 | 70394000 | Paloma School District | 15,280 | 13% | | 17% |
| 195 | 4161 | 10307000 | Alpine Elementary District | 14,868 | 62% | | 57% |
| 196 | 4380 | 80322000 | Valentine Elementary District | 13,430 | 7% | 23% | 10% |
| 197 | 4513 | 150426000 | Bouse Elementary District | 13,327 | 21% | | 25% |
| 198 | 4460 | 120406000 | Patagonia Elementary District | 12,483 | 31% | 36% | 32% |
| 199 | 4480 | 130323000 | Kirkland Elementary District | 10,452 | 33% | | 33% |
| 200 | 4181 | 20355000 | McNeal Elementary District | 8,550 | 16% | | 13% |
| 201 | 4478 | 130315000 | Skull Valley Elementary District | 8,550 | 50% | | 57% |
| 202 | 4414 | 100335000 | San Fernando Elementary District | 7,630 | | | |
| 203 | 4377 | 80313000 | Yucca Elementary District | 7,616 | 42% | | 33% |
| 204 | 4482 | 130335000 | Hillside Elementary District | 7,229 | 11% | | 21% |
| 205 | 4178 | 20342000 | Apache Elementary District | 1,720 | | | |
| 206 | 4231 | 60322000 | Blue Elementary District | 1,600 | 15% | | 33% |

APPENDIX D

DISTRICT QUESTIONNAIRE AND STRUCTURED INTERVIEW

# Qualitative Analysis of Facility Management Strategy

Please take a few minutes to fill out this survey regarding your experience.

## General Information

Please provide your title, and the district and or school you support:

Title: _____

District / School: _____

Years with the District: _____ years

To better understand the Districts real estate portfolio, please provide the following:

Approx. annual Facility Operations (Facility Operations) budget: $_____ USD.

Approx. Total Gross Sq. Ft: _____ GSF; Approx. Total Acreage: _____

- Academic Buildings: _____ %
- Administration Buildings: _____ %
- General Purpose Buildings: _____ %
- Average Age of Buildings: _____ years

How many years of professional experience do you have in this role:

☐ <5 years          ☐ 5 - 10 years          ☐ 10 – 15 years          ☐ >15 years experience

Do you hold a degree or professional certificate in Facilities Management:

☐ Yes          ☐ No          List Certificate(s):_____

Are you an active member of either the Building Owners and Managers Association (BOMA), the Association of Physical Plant Administrators (APPA,) and/or the International Facilities Management Association (IFMA)? Please check all that may apply:

☐ BOMA          ☐ APPA          ☐ IFMA

Other: _____

## FACILITIES MANAGEMENT QUESTIONNAIRE:

Do you currently use or have previously used a Building Management System (BMS) or Computerized Maintenance Management System (CMMS), if so please provide the application(s):

☐ Yes               ☐ No        Application(s):    _____

If Yes, please rate your experience working with BMS / CMMS:

No Experience ☐        ☐           ☐           ☐           ☐ Very Experienced

Please rate your perceived value the BMS / CMMS brings to your role at the district:

No Value       ☐       ☐           ☐           ☐           ☐ Very High Value

Do you currently use or have previously have used an Energy Management System (EMS), if so please provide the application(s):

☐ Yes               ☐ No        Application(s):    _____

If Yes, please rate your experience working with an EMS:

No Experience ☐        ☐           ☐           ☐           ☐ Very Experienced

Please rate your perceived value the EMS brings to your role at the district:

No Value ☐             ☐           ☐           ☐           ☐ Very High Value

Do you currently perform regular *preventative* maintenance on building systems?  If so, please circle the maintained systems:

☐ Yes                         ☐ No
HVAC       Roof       Elevator.       Mechanical.       Electrical.       Water Treatment
Other:_____

Do you currently perform regular *predictive* maintenance on building systems?  If so, please circle the maintained systems:

☐ Yes                         ☐ No
HVAC       Roof       Elevator       Mechanical       Electrical       Water Treatment
Other:_____

Do you utilize a *run-to-fail* option on building systems?  If so, please circle the maintained systems:

☐ Yes                         ☐ No
HVAC       Roof       Elevator       Mechanical       Electrical       Water Treatment
Other:_____

## INTERVIEW

This is a semi-structured anonymous interview in accordance with IRB Study 00005522 approval and consent form. For the purpose of this interview we will be focusing on Plant Maintenance and Operations, Uniform System of Financial Records (USFR) Cost Code 2600. For the purpose of this interview the terms Plant Maintenance and Operations and Facility Maintenance and Operations (FacOps) are understood to be equivalent terms.

- Walk me through a typical day in the life of a district Facility Director? A site Facility Manager?
- How is the work prioritized on a daily basis?
- For you, as the senior Facilities Director within the district, what does success look like? Please define success in terms of how you are measured, how the department is measured, and how you would measure success.

### OPERATIONS AND ORGANIZATION

1. Please describe the Plant Maintenance and Operations organization structure?
2. Are Facility Managers assigned to each school? If not, what is the determinate used in placing a Facility Manager at a school?
3. Are mobile technicians utilized by the district? If yes, please explain their role?
    a. Are Mobile technicians shared by districts?
4. At what frequency are rounds and readings conducted and by whom?
5. Does the district have a budget for on-going training and or certification of Facility Managers?
6. How are Facility Managers used by a school? For example, are Facility Managers responsible for custodial work, traffic coordination, etc. at the school they are assigned?

### PERFORMANCE

1. How are you measuring success and conversely measuring potential stress in the system?
    a. For Example: The State Auditor General measures financial "stress" levels specific to Plant Maintenance and Operations in terms of Cost per Gross Square foot and Cost per Student, are you in agreement with these metrics of success? Please explain your position.
2. Are additional Key Performance Metrics (KPI's) or equivalent measures of performance specific to Plant Maintenance and Operations used at a district or school level? If so, please explain the metric(s).
3. Are there any requirements by the district regarding the implementation and or development of "best known methods" or similar performance evaluations? If so, please define the districts approach to evolving industry standards?
4. Does the district utilize benchmarking data as published by BOMA, or an equivalent source, as a metric of facility performance?
    a. Does the district partner with neighboring districts in terms of sharing processes / procedures, leveraging third party spend, utilizing building system expertise?
5. When prioritizing work, is potential influence on academic achievement accounted? Are facility performance metrics tied to academic performance at the district? If so, please explain?
6. Are you aware of studies linking the performance of building systems to student academic success? If so, have steps been taken to replicate the spend?

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## BUDGETING

1. Please describe the process by which you establish the annual Plant Maintenance and Operations Budget? For example, is the budget developed Top Down, Bottom Up, Zero Baseline or similar?
   a. Who or which department(s) participates in the Facilities budgeting process?
   b. Are you, as the senior Facilities Director, a contributing member in the districts budgeting process?

2. Please speak to the districts approach to defining and proliferating Capital Expense requirements?
   a. Is there a Capital Expense threshold and if so what is that threshold?
   b. Is there written process and or procedure in place at the schools regarding Capital Expense?

3. Are purchase cards (PCards) used by the district?
   a. If yes, are PCards issued for the purpose of facility maintenance held by the Principle's office, the schools site Facility Manager, or are PCards held at the district level?
   b. How often are PCards purchases reconciled?

4. Please walk me through which Building Systems are outsourced to third party facility maintenance providers and why?
   a. What percentage of plant maintenance and operations is currently outsourced?
   b. What is the preferred method for procuring such services PCard, Purchase Orders, or Service Contract(s)?
   c. Does the District and or Schools within the district utilize "open" purchase orders?
   d. Are service contracts for outsourced services established and managed at a district level or at the school level
   e. Are contractor certificates of insurance on file with the district

5. Are Utility spends captured in USFR Cost Code 2600? If so, is would you please walk me through how to identify that spend?

APPENDIX E

INITIAL DECISION SUPPORT TOOL

(Beauregard and Ayer, 2019)

**IMPACT**

Very High — High — Moderate — Low — Very Low

**INFLUENCE**
- **DIRECT** TEACHER STUDENT
- **INDIRECT** STAFF ADMIN

OTHER: _____

**BUILDING STATUS**
- CAMPUS
- BUILDING
- ROOM

OTHER: _____

**BUILDING USAGE**
- INSTRUCTION
- SUPPLEMENTAL - ADMINISTRATIVE
- SUPPORT SPACE

OTHER: _____

**INSTITUTIONAL ENABLER(S)**
- PLAYGROUND
- INSTRUCTIONAL SPACE
- TECHNOLOGY ZONES
- REFERENCE SPACE
- CREATIVE SPACE
- TEMP CONTROL / COMFORT
- LANDSCAPING
- CAFETERIA
- PAINT / PATCH
- BATHROOMS
- MAGNET / LEARNING SIGNATURE
- AIR QUALITY
- SAFE PLACE
- LIGHTING
- ELECTRICAL
- VISUALIZATION
- CIRCULATION ZONES
- OVERALL IMPRESSION
- ROOM F.F.E.
- HARDWARE
- PLUMBING
- ACOUSTICS
- QUIET SPACE
- ACTIVITY ZONES
- LEARNING ZONES

OTHER: _____

**OBJECTIVE**
- BELOW
- MEETS OR EXCEEDS

OTHER: _____

JUSTIFICATION: _____

BY: _____     DATE: __ / __ / __

APPENDIX F

FOCUS GROUP CONSENT FORM AND SCRIPT

### Purpose

You are invited to participate in a study conducted by the Ira A. Fulton School of Sustainable Engineering and the Built Environment at Arizona State University under the supervision of Professor Steven K. Ayer, Ph.D. The purpose of this study is to evaluate a proposed facility maintenance and operations decision-support tool for use in prioritizing routine maintenance of K-12 educational infrastructure. Specifically, we want to understand the relevance and professional application of the proposed tool. We will use this information to support ongoing research in the field of facility maintenance and operations and subsequent publication purposes.

### Procedures

If you participate in this study, you will be in a group of approximately seven to nine facility maintenance professionals. There will be a facilitator who will ask questions and facilitate the discussion, and a note-taker to write down the ideas expressed within the group. If you volunteer to participate in this focus group, you will be asked some questions relating to your experience managing facility operations to include the prioritization of routine work orders. These questions will help the researchers to better understand the process by which work is prioritized to include the practical application of the decision-support tool.

The focus group will be audio recorded, with your written consent. Please let the group facilitator know if you do not want to participate in the audio recording. You may elect to change your mind after the focus group has started. Should you elect to terminate your participation in the focus group at any time, please declare your intent to the group facilitator.

If you have any questions concerning the research, please contact the primary investigator Professor Steven K. Ayer, Ph.D. at Sayer@asu.edu or at (480) 965-0557. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

**Your participation is voluntary. You may withdraw from this study at any time without penalty.**

### Benefits and Risks

Your participation may benefit you, your facility maintenance colleagues, and K-12 academic Facility Directors by helping to improve the prioritization of routine work orders in accordance with established academic enablers. No risks greater than those experienced in ordinary conversations are anticipated.

### Confidentiality

Anonymous data from this study will be analyzed by researchers in the School of Sustainable Engineering and the Built Environment and shared with Arizona State University. No individual participant will be identified or linked to the results. Study records, including this consent form signed by you, may be inspected by the administrators. The results of this study may be presented to Arizona State University representatives; however, your identity will not be disclosed. All information obtained in this study will be kept strictly confidential. All materials will be stored in a secure location within the academic department and access to files will be restricted to paid research staff.

### Consent

By signing this consent form, you are indicating that you fully understand the above information and agree to participate in this focus group.

Participant's Signature: _____ Date:_____

Printed Name: _____

Welcome and thank you for your participation in this study. The purpose of this gathering is to solicit your experience regarding how facility maintenance and operations can better serve institutional performance through the management and operations of facilities. Specifically, we want to influence the way routine work is prioritized, aligned with the strategic objectives of the parent organization or institution. Learnings from this focus group will be used to modify a proposed decision-support tool to better support to K-12 academic Facility Directors. We recognize you bring a level of expertise that will help us understand how to further developed and improve upon our proposed decision-support tool, which is why you have been asked to participate in this study.

Let me introduce myself. I am Michael Beauregard, a graduate research Ph.D. candidate at ASU and I will be moderating today's discussion. The format we are using is a focus group. A focus group is a conversation that focuses on specific questions in a safe and confidential environment. I will guide the conversation by asking questions that each of you can respond to. There are no right or wrong answers to these questions. Just be honest. If you wish, you can also respond to each other's comments, like you would in an ordinary conversation. It is my job to make sure that everyone here gets to participate and that we stay on track. ASU Assistant Professor Steven K. Ayer, Ph.D. is here to record and summarize your comments.

Before we begin, I want to let you know two things. First, the information we learn today will be compiled into a final report for publication purposes. That report will include a summary of your comments and recommendations. It will be shared with the research team and the dissertation committee. Secondly, you do not have to answer any questions that you do not feel comfortable with. This focus group today is anonymous and confidential. "Anonymous" means that we will not be using your names and you will not be identified as an individual in our report of this project. "Confidential" means that what we say in this room should not be repeated outside of this room. If you would prefer to not answer any questions or discuss any topics that are brought up during this session, you may decline to respond at any time. private.

As you can see, we will be audio recording this focus group. The recording will only be used to make sure our notes are correct and will not be heard by anyone outside of this project.

With that, let's begin with an overview and introductions.

- 5 minutes: Facilitator introduces a TMA work order, speaking to the various aspects of a completed work order
- 5 minutes: Facilitator walks the focus group through the prioritization of that work order utilizing the decision-support tool.

Each of you will be provided 5 work orders selected at random. Each work order includes a decision-support tool for reference. Additionally, your package contains an enlarged decision-support tool. Please take 10 minutes to prioritize the work orders, numbering them from 1 to 5. Work order number 1 represents the work order with the highest priority. Once complete, please stack your documents and raise your hand notifying the facilitator you are complete.

Questions and Probes:

1. Q: Was the tool user friendly? Was the tool intuitive? Please explain?
   a. P: What of subjectivity, did the tool provide an opportunity to force a specific result?
   b. P: Was the time required to understand the process, complete an assessment reasonable?
2. Q: Briefly explain if the categories accurately capture facility infrastructure?
   a. P: Specific to education?
   b. P: What confidence would you have that the five categories identified in the decision-support tool apply to other, non-educational, institutional facility portfolio's?
3. Q: If this decision protocol is applied, what are the consequences and or potential negative impacts you envision?
   a. P: What is your primary concern?
   b. P: Have you considered constrained resources? Would this tool create a real or perceived addition to the work?
4. Q: In your own words, would the tool effectively address and align with the concerns or operations of a facility?
   a. P: Would the tool add value, or perhaps not, please explain?
   b. P: Would the tool provide functional direction?

Closing Questions:

5. Q: If you could make a recommendation on whether or how to proceed with the development of this proposed decision-support tool what would you say?
6. The purpose of this was to explore your feelings and opinions on the use and practical application of the proposed decision support tool.
   a. Q: Is there anything we failed to address or consider in the development of the proposed tool? Please explain
   b. Q: Is there anything you would like to add that we didn't get an opportunity to address?

I see our time has come to an end. Thank you so much for sharing your insight and useful information with us.

APPENDIX G

RESULTS OF FOCUS GROUP

<u>GENERAL OBSERVATIONS</u>: Decision Categories: Influence, Building Status & Usage

- Opportunity to improve findings based on the initial data

- Observed relative consistency in the selection of variables defining each of the

  first three categories

  - Influence        72% (4 variables, two choices)
  - Status   65% (three choices)
  - Usage   57% (4 variables, three choices)

<u>LEARNINGS TO DATE:</u>

- 5 work orders resulted in a split assessment regarding influence and 5 work orders
  regarding building usage.
- Variables with two or more reasonable definitions may lead to ambiguity; i.e.,
  Teacher / student or supplemental / administrative
- Clarification between a literal read of a work order and an interpretive read of that
  same work order
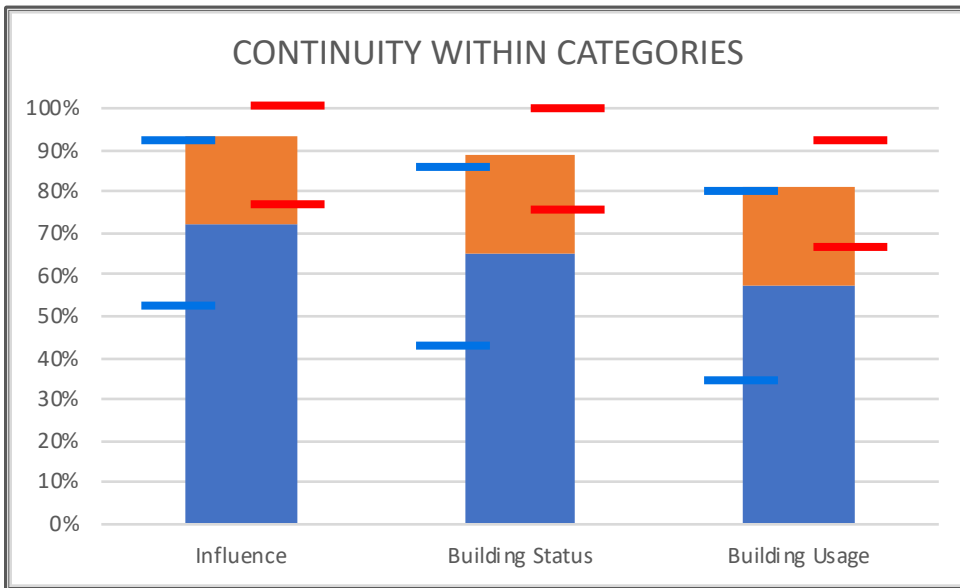
## OBSERVATIONS: INFUENCE

- Teacher / student related work orders take clear priority

- 5 of 30 work orders prioritizations split equally between teacher / student and admin. / staff

  - This split is equally present in *building usage*

- Expected to see greater differentiation between admin. / staff and "other"

- Unclear if participant defined "other" as a summation of teacher / student and admin. / staff or if "other" is being defined as something more

## LEARNINGS TO DATE:

- Students are not submitting work orders, therefore the designation of student in the variable may be misunderstood

- Admin at a district level differs from admin at a school; schools may have the ability to prioritize and close out a work order internally, without the aid of the district facility management staff
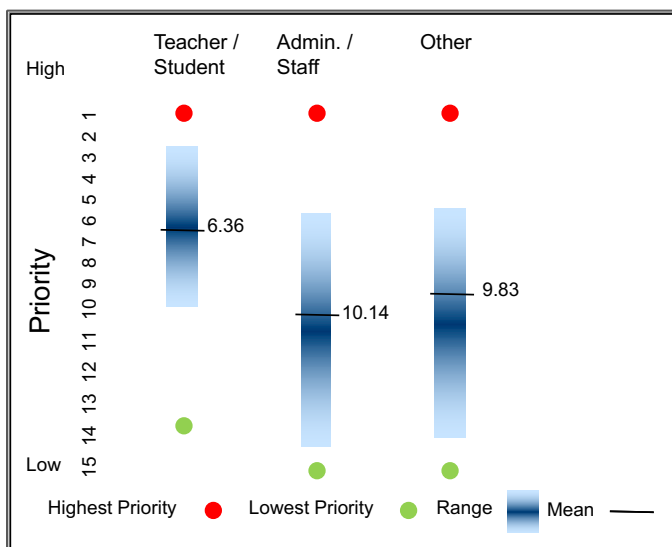
OBSERVATION: BUILDING STATUS

- Room may be artificially high given the relation to teacher / student and instructional space

- 3 of 30 work orders prioritizations split equally between variables, lowering the perceived rate of consistency

- Campus has the largest standard deviation at 4.38

  - Given the definition and higher weight assigned to campus one would expect to see a tighter standard deviation.

- Unclear if participant defined "other" as a summation of the variables or if "other" is being defined as something more

LEARNINGS TO DATE:

- Variation in the definition of the decision factors
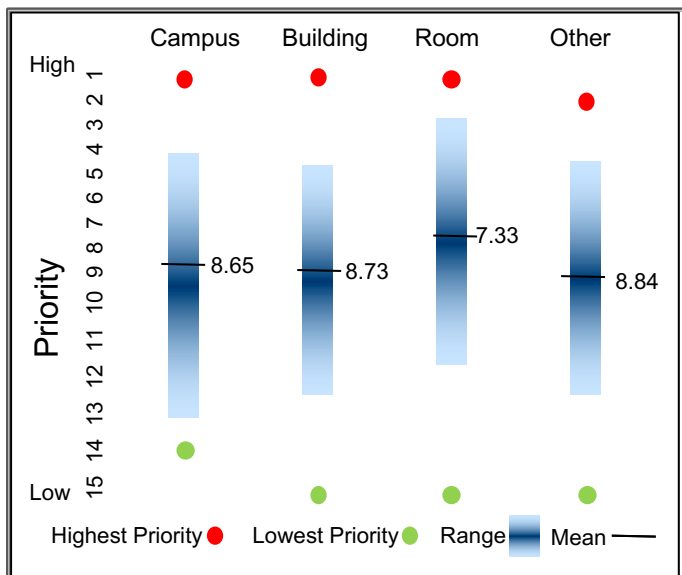
# VARIATION IN THE READING OF THE OF A WORK ORDER

| Work Order # | OP-192027 | | Request Date | 09/25/2017 11:55 |
| Location ID | Grey H.S. GND – PRKG LOT | | Completion Date | |
| WO Type | Corrective Maintenance | | | |
| Description | | | | |
| Request | Channel drain behind kitchen falling apart, can we have it repaired/replaced | | Total Hours | |
| Priority Description | Routine | | Total Cost | 0 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Parking Lot-PRKG Lot | GHSGND-PRKG LOT | Area | PL11020 | Inspection |

| Work Order | Participant | Group | C1 | C2 | C3 | C4-A | C4-B | C4-C |
|---|---|---|---|---|---|---|---|---|
| 192027 | 3998 | A-1 | Staff/Admin | Room | Support Space | Plumbing | | |
| 192027 | 5433 | B-1 | Staff/Admin | Other | Supplemental - Administrative | Cafeteria | Plumbing | |
| 192027 | 9313 | B-1 | Other | Other | Support Space | Plumbing | | |
| 192027 | 8804 | B-1 | Teacher/Student | Building | Support Space | Cafeteria | Air Quality | Plumbing |
| 192027 | 5100 | A-1 | Other | Building | Support Space | Cafeteria | | |
| 192027 | 5326 | A-1 | Staff/Admin | Room | Support Space | Plumbing | | |
| 192027 | 5196 | A-1 | Other | Building | Other | Plumbing | | |

## OBSERVATIONS: BUILDING USAGE

- 16 of the 176 work orders do not utilize the building usage category

- Supplemental / administration space was intended to be secondary to instruction

- Results would indicate a relative equal weight within this category, instruction excluded

- Again, it is unclear if participant defined "other" as a summation of the variables or if "other" is being defined as something more

## LEARNINGS TO DATE:

- Items that impact the classroom are perceived to be of the highest priority

- Variations in the category, specific to a work order, would suggest there is ambiguity in the understanding of the terminology
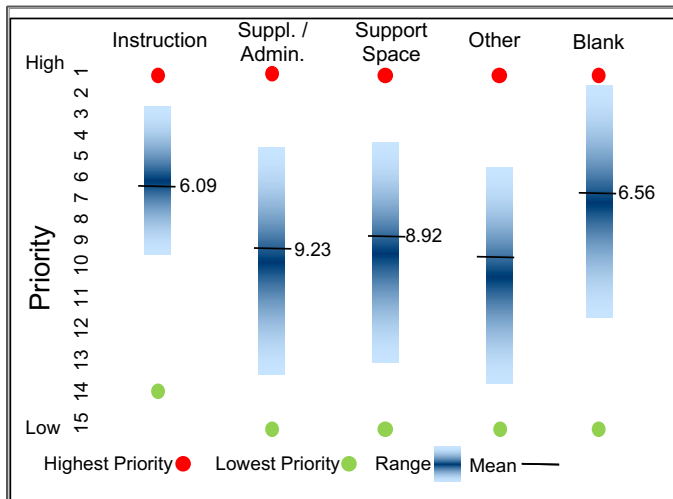
OBSERVATIONS: ACADEMIC ENABLERS

- Two of the participants elected not to categorize the school as instructed

- 3% of work orders identified as out of scope

- 10% when including participant 5196 who identified 10 work orders as out of scope

- Only 1 work order deemed "emergency"

- Mean priority of 2.8 for the 5 work orders identified as "critical"

LEARNINGS TO DATE:

- Budget mandates all work orders are corrective

- Emergency repairs are prioritized external to the CMMS system

- Observation of "meets" influences a slightly lower priority than "exceeds"
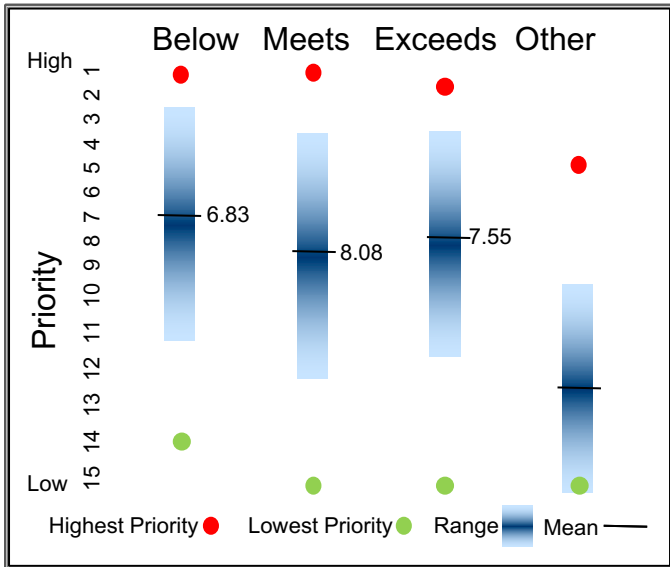
APPENDIX H

WORK ORDER FLOW DIAGRAM
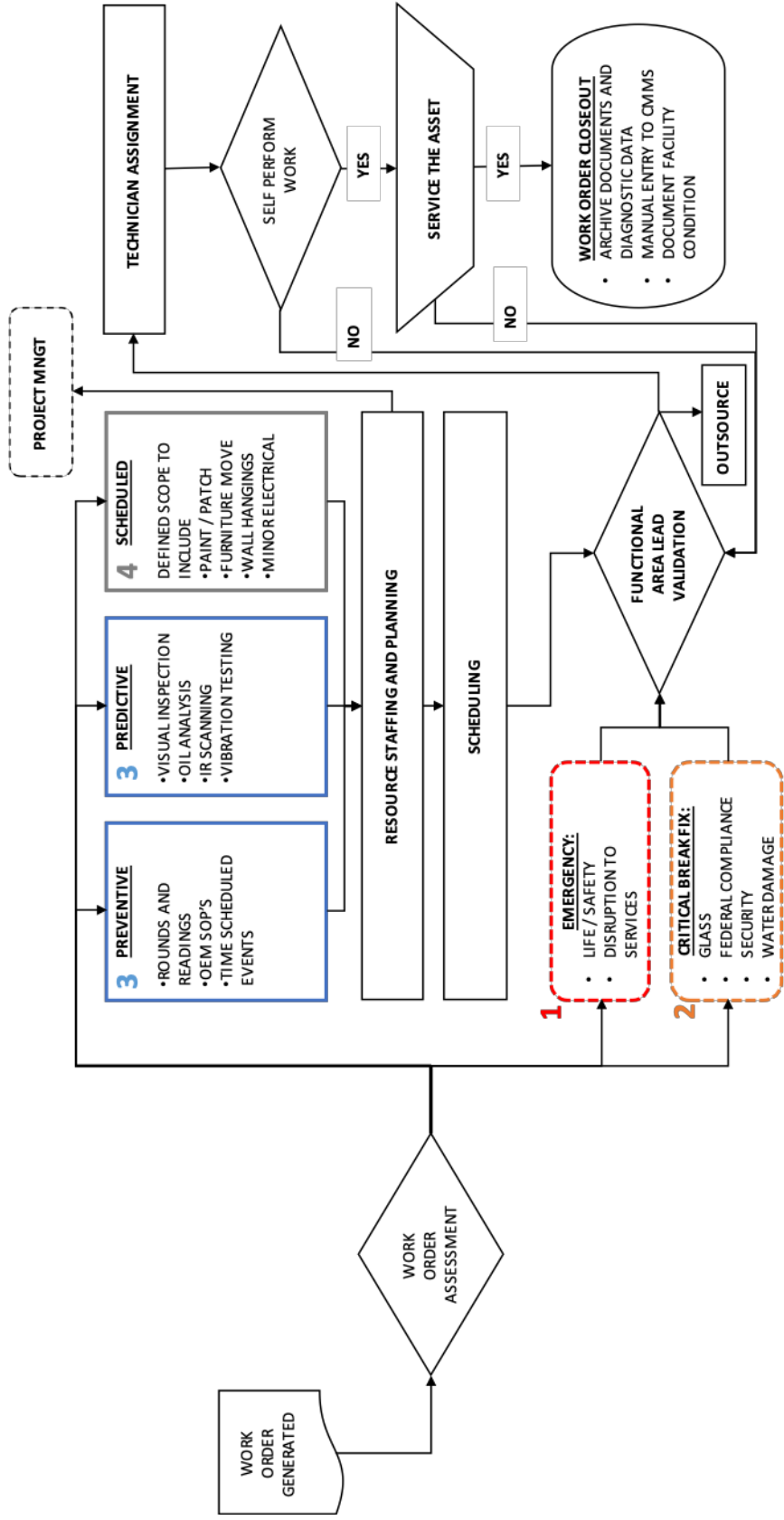
APPENDIX I

DECISION SUPPORT TOOL

(Adapted from Beauregard and Ayer, 2019)

IMPACT

Very High
High
Moderate
Low
Very Low

**INSTITUTIONAL ENABLER(S)**

INSTRUCTIONAL SPACE   PLAYGROUND   TECHNOLOGY ZONES

REFERENCE SPACE   CREATIVE SPACE   TEMP. CONTROL / COMFORT

| | | |
|---|---|---|
| CAFETERIA | OVERALL IMPRESSION | ELECTRICAL |
| BATHROOMS | ACADEMIC MAGNET | PLUMBING |
| CIRCULATION ZONES | VISUALIZATION | PAINT / PATCH |
| ACTIVITY ZONES | SAFETY | LANDSCAPING |
| LEARNING ZONES | AIR QUALITY | EQUIP. & FURNISHINGS |
| SAFE PLACE | ACOUSTICS | HARDWARE |
| QUIET SPACE | | |

**BUILDING USAGE**

Student Instruction

Study Space (non-classroom)

Special / General Use

Administrative Offices

Support Space / Facilities

**BUILDING STATUS**

Site

Building

Room

**INFLUENCE**

Teacher's or their Students

Non-Teacher's who interface with Students

District or School Admin.

Other's who DO NOT interface with students

OTHER:

OTHER:

OTHER:

OTHER:

JUSTIFICATION: _____   BY: _____   DATE: __ / __ / __

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APPENDIX J

INSTITUTIONAL REVIEW BOARD CONSENT FORM

## Purpose

You are invited to participate in a study conducted by the Ira A. Fulton School of Sustainable Engineering and the Built Environment at Arizona State University under the supervision of Professor Steven K. Ayer, Ph.D.. The purpose of this study is to evaluate a proposed facility maintenance and operations decision-support tool for use in prioritizing routine maintenance of K-12 educational infrastructure. Specifically, we want to understand the extent to which this tool enables consistent decision-making. We will use this information to support ongoing research in the field of facility maintenance and operations and subsequent publications.

## Procedures

If you participate in this study, you will be in a group of several other individuals. There will be a facilitator who will ask questions and facilitate the activity. If you volunteer to participate in this activity, you will be asked to complete a pre and post-activity questionnaire relating to your experience managing facility operations and prioritizing routine work orders (if you have any) as well as your assessment of the decision-support tool provided. Your responses will help the researchers to understand better how work is prioritized to support practical application of the decision support tool.

You may elect to change your mind after the activity has started and stop participation. Should you choose to terminate your participation in the activity at any time, please declare your intent to the facilitator.

If you have any questions concerning the research, please contact the primary investigator Professor Steven K. Ayer, Ph.D. at Sayer@asu.edu or at (480) 965-0557. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

**Your participation is voluntary. You may withdraw from this study at any time without penalty.**

## Benefits and Risks

Your participation may benefit you, your facility maintenance colleagues, and K-12 academic Facility Directors by helping to improve the prioritization of routine work orders in accordance with established academic enablers. No risks greater than those experienced in ordinary conversations are anticipated.

## Confidentiality

Anonymous data from this study will be analyzed by researchers in the School of Sustainable Engineering and the Built Environment and shared with Arizona State University. No individual participant will be identified or linked to the results. Study records, including this consent form signed by you, may be inspected by the administrators. The results of this study may be presented in publications, but your identity will not be

disclosed. All information obtained in this study will be kept strictly confidential. All materials will be stored in a secure location within the academic department and access to files will be restricted to paid research staff.

**Consent**
By signing this consent form, you are indicating that you fully understand the above information and agree to participate in this study.

Participant's
Signature: _____ Date:_____

Printed Name: _____

APPENDIX K

EXPERIENCE OF PARTICIPATING FACILITY ADMINISTRATORS

| | Participant # | Experience | Functional Area | Experience Prioritizing Work Orders |
|---|---|---|---|---|
| 1 | 4653 | >15 Years | OTHER | YES |
| 2 | 9824 | >15 Years | OPERATIONS | YES |
| 3 | 8992 | >15 Years | OPERATIONS | YES |
| 4 | 3462 | >15 Years | OPERATIONS | YES |
| 5 | 8077 | >15 Years | DIRECTOR | YES |
| 6 | 9424 | >15 Years | OPERATIONS | YES |
| 7 | 4136 | >15 Years | DIRECTOR | YES |
| 8 | 7862 | >15 Years | OTHER | YES |
| 9 | 2884 | >15 Years | OPERATIONS | YES |
| 10 | 2600 | >15 Years | CUSTODIAL | YES |
| 11 | 2648 | >15 Years | OPERATIONS | YES |
| 12 | 4670 | >15 Years | OTHER | |
| 13 | 2622 | >15 Years | OPERATIONS | YES |
| 14 | 6625 | >15 Years | OPERATIONS | YES |
| 15 | 2139 | 10 - 15 Years | CUSTODIAL | YES |
| 16 | 1669 | 10 - 15 Years | OPERATIONS | |
| 17 | 6733 | 10 - 15 Years | OTHER | YES |
| 18 | 2056 | 10 - 15 Years | OTHER | YES |
| 19 | 2425 | 10 - 15 Years | OPERATIONS | YES |
| 20 | 1659 | 5 - 10 Years | CUSTODIAL | YES |
| 21 | 9310 | 5 - 10 Years | OTHER | YES |
| 22 | 3737 | 5 - 10 Years | TECHNICAL SERVICE | YES |
| 23 | 9146 | 5 - 10 Years | OTHER | YES |
| 24 | 8730 | 5 - 10 Years | OPERATIONS | YES |
| 25 | 6413 | Less than 5 Years | OPERATIONS | YES |
| 26 | 5921 | Less than 5 Years | DIRECTOR | NO |
| 27 | 5291 | Less than 5 Years | OPERATIONS | YES |
| 28 | 3101 | Less than 5 Years | OPERATIONS | YES |
| 29 | 3113 | Less than 5 Years | OTHER | YES |
| 30 | 3466 | Less than 5 Years | TECHNICAL SERVICE | YES |
| 31 | 3665 | Less than 5 Years | OTHER | YES |

APPENDIX L

RESULTS OF THE PRE AND POST ACTIVITY QUESTIONNAIRE

Paired Questions:

1. To what extent do you believe your current organization's prioritization of work supports the goals of the district?
2. To what extent do you believe your organization's process of prioritizing work is consistent?

3. To what extent do you believe your organization's current process of prioritizing work is easily understood?

5. To what extent are you familiar with the strategic objectives of the school district?

6. How well does the process of prioritizing work orders align with the strategic objectives of the district?

7. How likely do you believe the current process of prioritizing work enables improved educational outcomes?

8. To what extent do you agree the physical condition of a school relates to academic outcomes?

Residual Post-Activity Questions:

4. Is there ever a need to document the justification of prioritizing one work order over another?

9. To what extent do you believe the variables within each category accurately capture the facility portfolio of the academic district?

10. To what extent would you be willing to use this tool for prioritizing routine maintenance in the future?

11. To what extent do you agree with the suggested content of the proposed decision support tool?

12. To what extent would you be willing to require new hires use the decision support tool for the prioritization of routine work?

13. To what extent do you believe the decision support tool would likely offer the Facility Maintenance department value by supporting evidence-based justifications for higher FM budget requests?

| | Pre-Activity Questionnaire Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Participant # and Question | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | 4653 | 5 | 4 | 4 | YES | 5 | 4 | 4 | 5 |
| 2 | 9824 | 5 | 5 | 4 | YES | 5 | 5 | 5 | 5 |
| 3 | 8992 | 3 | 1 | 2 | YES | 5 | 1 | 4 | 4 |
| 4 | 3462 | 4 | 4 | 4 | YES | 5 | 3 | 3 | 4 |
| 5 | 8077 | 3 | 3 | 2 | YES | 4 | 3 | 3 | 5 |
| 6 | 9424 | 4 | 4 | 3 | YES | 4 | 3 | 3 | 4 |
| 7 | 4136 | 5 | 4 | 2 | NO | 4 | 4 | 5 | 5 |
| 8 | 7862 | 4 | 3 | 3 | YES | 5 | 4 | 4 | 5 |
| 9 | 2884 | 4 | 4 | 3 | YES | 4 | 4 | 4 | 4 |
| 10 | 2600 | 4 | 2 | 4 | YES | 3 | 3 | 4 | 4 |
| 11 | 2648 | 4 | 4 | 5 | NO | 2 | 3 | 4 | 5 |
| 12 | 4670 | 4 | 3 | 3 | NO | 4 | 4 | 4 | 4 |
| 13 | 2622 | 4 | 4 | 3 | NO | 4 | 4 | 4 | 5 |
| 14 | 6625 | 5 | 4 | 4 | YES | 5 | 4 | 4 | 4 |
| 15 | 2139 | 4 | 2 | 3 | NO | 4 | 3 | 3 | 5 |
| 16 | 1669 | 4 | 4 | 4 | NO | 4 | 4 | 4 | 5 |
| 17 | 6733 | 4 | 4 | 4 | YES | 4 | 4 | 4 | 5 |
| 18 | 2056 | 5 | 4 | 2 | YES | 5 | 4 | 5 | 4 |
| 19 | 2425 | 4 | 2 | 4 | YES | 3 | 4 | 4 | 5 |
| 20 | 1659 | 4 | 2 | 3 | NO | 4 | 3 | 3 | 5 |
| 21 | 9310 | 5 | 3 | 2 | YES | 4 | 4 | 4 | 5 |
| 22 | 3737 | 4 | 1 | 1 | NO | 4 | 3 | 3 | 1 |
| 23 | 9146 | 2 | 3 | 3 | NO | 3 | 3 | 3 | 4 |
| 24 | 8730 | 4 | 4 | 4 | NO | 4 | 4 | 4 | 5 |
| 25 | 6413 | 4 | 4 | 4 | NO | 4 | 4 | 4 | 5 |
| 26 | 5921 | 2 | 2 | 2 | YES | 4 | 2 | 4 | 4 |
| 27 | 5291 | 3 | 2 | 3 | YES | 4 | 3 | 2 | 5 |
| 28 | 3101 | 5 | 4 | 4 | YES | 4 | 4 | 4 | 2 |
| 29 | 3113 | 4 | 4 | 2 | YES | 5 | 4 | 3 | 3 |
| 30 | 3466 | 5 | 5 | 5 | YES | 5 | 5 | 5 | 5 |
| 31 | 3665 | 2 | 2 | 1 | YES | 3 | 3 | 2 | 5 |
| | Mean | 3.9677 | 3.2581 | 3.129 | 64% Yes | 4.0968 | 3.5484 | 3.7419 | 4.3871 |
| | Median | 4 | 4 | 3 | 36% No | 4 | 4 | 4 | 5 |
| | Standard Deviation | 0.8608 | 1.0767 | 1.0393 | | 0.7342 | 0.7967 | 0.7606 | 0.9394 |

Post-Activity Questionnaire Results

| Participant # and Question | | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4653 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 |
| 2 | 9824 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 5 | 5 |
| 3 | 8992 | 2 | 1 | 2 | 1 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 4 |
| 4 | 3462 | 4 | 3 | 3 | 3 | 3 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 4 |
| 5 | 8077 | 4 | 3 | 3 | 3 | 3 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 5 |
| 6 | 9424 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 7 | 4136 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 4 |
| 8 | 7862 | 4 | 3 | 3 | 4 | 5 | 5 | 3 | 4 | 4 | 4 | 4 | 3 | 4 |
| 9 | 2884 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 0 | 0 | 0 |
| 10 | 2600 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 11 | 2648 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 12 | 4670 | 2 | 3 | 2 | 3 | 2 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 3 |
| 13 | 2622 | 4 | 4 | 4 | 3 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4 |
| 14 | 6625 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 5 | 4 |
| 15 | 2139 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 1669 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 |
| 17 | 6733 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 4 | 3 | 3 |
| 18 | 2056 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 2425 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 |
| 20 | 1659 | 3 | 2 | 2 | 3 | 3 | 5 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| 21 | 9310 | 5 | 3 | 2 | 4 | 4 | 3 | 5 | 5 | 4 | 5 | 4 | 5 | 5 |
| 22 | 3737 | 4 | 1 | 3 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 5 | 3 |
| 23 | 9146 | 2 | 4 | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 5 | 4 | 5 |
| 24 | 8730 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 | 6413 | 4 | 2 | 4 | 2 | 3 | 5 | 2 | 3 | 2 | 5 | 4 | 5 | 4 |
| 26 | 5921 | 4 | 3 | 3 | 3 | 3 | 5 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| 27 | 5291 | 3 | 2 | 2 | 2 | 2 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 |
| 28 | 3101 | 5 | 4 | 4 | 4 | 5 | 3 | 4 | 4 | 4 | 3 | 4 | 5 | 4 |
| 29 | 3113 | 4 | 3 | 2 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 30 | 3466 | 2 | 5 | 4 | 5 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 1 | 2 |
| 31 | 3665 | 2 | 1 | 1 | 3 | 2 | 4 | 4 | 4 | 2 | 3 | 3 | 4 | 5 |
| | Mean | 3.2258 | 2.9032 | 2.7742 | 3.1935 | 3.1935 | 3.7419 | 3.5484 | 3.5484 | 3.3548 | 3.6452 | 3.4516 | 3.4194 | 3.4194 |
| | Median | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | Standard Deviation | 1.3845 | 1.4448 | 1.2368 | 1.3541 | 1.33 | 1.3905 | 1.4105 | 1.3159 | 1.3087 | 1.4039 | 1.4775 | 1.6019 | 1.4978 |
| | | 0.036 | 0.036 | 0.412 | 0.006 | 0.373 | 0.332 | 0.006 | | | | | | |
| | P-Value | -0.742 | -0.355 | -0.355 | -0.903 | -0.355 | 0 | -0.839 | | | | | | |

# APPENDIX M

## μ WORK ORDER RANK PER ACTIVITY AND FUNCTIONAL AREA

| Functional Area | μ R1 Ranking | μ R2:Comprehensive Ranking | μ R2:Impact Ranking | μ Pairwise Ranking |
|---|---|---|---|---|
| **Electrical** | **7** | **9** | **8** | **9** |
| Work Order 1 | 1 | 7 | 4 | 9 |
| 2 | 7 | 7 | 8 | 6 |
| 3 | 13 | 12 | 13 | 11 |
| 4 | 3 | 7 | 4 | 6 |
| 5 | 6 | 9 | 8 | 10 |
| 6 | 12 | 11 | 11 | 11 |
| **F.L.S.** | **5** | **7** | **7** | **8** |
| 1 | 4 | 5 | 6 | 10 |
| 2 | 6 | 8 | 9 | 8 |
| **Geneneral Maintenance** | **9** | **9** | **9** | **8** |
| 1 | 8 | 14 | 15 | 14 |
| 2 | 7 | 9 | 9 | 11 |
| 3 | 13 | 8 | 9 | 6 |
| 4 | 12 | 5 | 6 | 3 |
| 5 | 4 | 8 | 8 | 8 |
| 6 | 8 | 11 | 12 | 12 |
| 7 | 11 | 9 | 10 | 8 |
| 8 | 8 | 11 | 11 | 10 |
| 9 | 9 | 10 | 10 | 7 |
| 10 | 9 | 8 | 8 | 9 |
| 11 | 5 | 5 | 4 | 6 |
| 12 | 9 | 8 | 8 | 5 |
| **I.T.** | **8** | **4** | **4** | **4** |
| 1 | 8 | 4 | 4 | 4 |
| **Mechanical** | **5** | **4** | **4** | **3** |
| 1 | 6 | 4 | 4 | 3 |
| 2 | 3 | 4 | 3 | 2 |
| 3 | 5 | 4 | 4 | 3 |
| 4 | 7 | 6 | 5 | 4 |
| **Plumbing** | **11** | **10** | **10** | **11** |
| 1 | 12 | 10 | 9 | 11 |
| 2 | 9 | 10 | 10 | 11 |
| 3 | 9 | 8 | 9 | 10 |
| 4 | 12 | 10 | 10 | 10 |
| 5 | 14 | 11 | 11 | 12 |

APPENDIX N

ACTIVITY WORK ORDERS AND PRIORITIZATION RESULTS

| Work Order # | OP-190023 | | Request Date | 09/22/2017 |
|---|---|---|---|---|
| Location ID | Purple Elem. – Elec. Closet | | Completion Date | |
| WO Type Description | Corrective Maintenance | | | |
| Request | Switchgear in elect. Closet shows signs of arching | | Total Hours | 2 |
| Priority Description | Routine Maintenance | | Total Cost | |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Elec. Closet | Purple Elem. | Elec. Closet | EL4300 | Inspect and test switchgear - Electrical |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Electrical | OP-190023 | | 3 | 3 | 2 |
| Electrical | OP-190023 | | 8 | 2 | 1 |
| Electrical | OP-190023 | | 7 | 7 | 8 |
| Electrical | OP-190023 | | | 1 | 4 |
| Electrical | OP-190023 | | 1 | 1 | 9 |
| Electrical | OP-190023 | | 10 | 6 | 9 |
| Electrical | OP-190023 | | 11 | | 12 |
| Electrical | OP-190023 | | 11 | 11 | 13 |
| Electrical | OP-190023 | | 8 | 6 | 13 |
| Electrical | OP-190023 | | 2 | 1 | 14 |
| Electrical | OP-190023 | | 12 | | 12 |
| Electrical | OP-190023 | | 9 | 1 | 9 |
| Electrical | OP-190023 | | 1 | 2 | 15 |
| Electrical | OP-190023 | 2 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | | 2 | 1 | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 5 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 2 | | | |
| Electrical | OP-190023 | 3 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 1 | | | |
| Electrical | OP-190023 | 1 | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Work Order #** | OP-191874 | | **Request Date** | 09/20/2017 08:20 | |
| **Location ID** | Brown Elem. - 101 | | **Completion Date** | | |
| **WO Type** | Corrective Maintenance | | | | |
| **Description** | | | | | |
| **Request** | There is a GFI outlet on the smaller sink that only one of the outlets is working. Can this be looked at? | | **Total Hours** | 1.0 | |
| **Priority Description** | Routine | | **Total Cost** | 29.09 | |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Classroom/Preschool 101 | Brown Elem. - 101 | Area | EL4005 | Repair/Replace Switches or Receptacles |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Electrical | OP-191874 | | 2 | | 1 |
| Electrical | OP-191874 | | 7 | | 2 |
| Electrical | OP-191874 | | 5 | 8 | 2 |
| Electrical | OP-191874 | | 5 | 5 | 2 |
| Electrical | OP-191874 | | 4 | 4 | 5 |
| Electrical | OP-191874 | | 7 | 8 | 7 |
| Electrical | OP-191874 | | 6 | 6 | 6 |
| Electrical | OP-191874 | | 8 | 9 | 4 |
| Electrical | OP-191874 | | 6 | 9 | 5 |
| Electrical | OP-191874 | | 10 | 11 | 8 |
| Electrical | OP-191874 | | 5 | 5 | 8 |
| Electrical | OP-191874 | | 9 | 10 | 14 |
| Electrical | OP-191874 | | 11 | 10 | 14 |
| Electrical | OP-191874 | 13 | | | |
| Electrical | OP-191874 | 2 | | | |
| Electrical | OP-191874 | | 6 | 6 | |
| Electrical | OP-191874 | 8 | | | |
| Electrical | OP-191874 | 7 | | | |
| Electrical | OP-191874 | 7 | | | |
| Electrical | OP-191874 | 11 | | | |
| Electrical | OP-191874 | 6 | | | |
| Electrical | OP-191874 | 2 | | | |
| Electrical | OP-191874 | 6 | | | |
| Electrical | OP-191874 | 4 | | | |
| Electrical | OP-191874 | 8 | | | |
| Electrical | OP-191874 | 12 | | | |
| Electrical | OP-191874 | 11 | | | |
| Electrical | OP-191874 | 10 | | | |
| Electrical | OP-191874 | 9 | | | |
| Electrical | OP-191874 | 5 | | | |
| Electrical | OP-191874 | 5 | | | |

| Work Order # | OP-191886 | Request Date | 09/20/2017 12:04 |
|---|---|---|---|
| **Location ID** | Grey H.S. - GROUNDS | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | |
| **Request** | Can we get a quote to see what it would take to run electricity up to top of visitors side bleachers? | **Total Hours** | 2.5 |
| **Priority Description** | Routine | **Total Cost** | 72.73 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Grounds - GROUNDS | Grey H.S. - GROUNDS | Area | EL4015 | Install/Replace elect. wiring |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Electrical | OP-191886 | | 15 | 13 | 7 |
| Electrical | OP-191886 | | 8 | | 8 |
| Electrical | OP-191886 | | 8 | 8 | 10 |
| Electrical | OP-191886 | | 13 | | 9 |
| Electrical | OP-191886 | | 13 | 14 | 11 |
| Electrical | OP-191886 | | 15 | 15 | 8 |
| Electrical | OP-191886 | | 14 | | 12 |
| Electrical | OP-191886 | | 6 | 14 | 11 |
| Electrical | OP-191886 | | 13 | 13 | 14 |
| Electrical | OP-191886 | | 13 | 13 | 10 |
| Electrical | OP-191886 | | 13 | 13 | 11 |
| Electrical | OP-191886 | | 14 | 13 | 15 |
| Electrical | OP-191886 | | 11 | 14 | 15 |
| Electrical | OP-191886 | 14 | | | |
| Electrical | OP-191886 | 15 | | | |
| Electrical | OP-191886 | | 9 | 9 | |
| Electrical | OP-191886 | 15 | | | |
| Electrical | OP-191886 | 10 | | | |
| Electrical | OP-191886 | 14 | | | |
| Electrical | OP-191886 | 15 | | | |
| Electrical | OP-191886 | 12 | | | |
| Electrical | OP-191886 | 13 | | | |
| Electrical | OP-191886 | 5 | | | |
| Electrical | OP-191886 | 15 | | | |
| Electrical | OP-191886 | 12 | | | |
| Electrical | OP-191886 | 15 | | | |
| Electrical | OP-191886 | 15 | | | |
| Electrical | OP-191886 | 14 | | | |
| Electrical | OP-191886 | 15 | | | |
| Electrical | OP-191886 | 9 | | | |
| Electrical | OP-191886 | 13 | | | |

| Work Order # | OP-191910 | | Request Date | 09/20/2017 15:19 |
|---|---|---|---|---|
| **Location ID** | Orange M.S. - 121 | | **Completion Date** | |
| **WO Type** | Corrective Maintenance | | | |
| **Description** | | | | |
| **Request** | The light switch it's broken and it's doing short circuit. Thanks. | | **Total Hours** | 1.5 |
| **Priority Description** | Routine | | **Total Cost** | 43.64 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Classroom/Vacant 121 | Orange M.S. - 121 | Area | EL4005 | Repair/Replace Switches or Recepticles |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Electrical | OP-191910 | | 1 | 1 | 1 |
| Electrical | OP-191910 | | 8 | 7 | 4 |
| Electrical | OP-191910 | | 2 | 2 | 3 |
| Electrical | OP-191910 | | 4 | 3 | 3 |
| Electrical | OP-191910 | | 2 | 1 | 1 |
| Electrical | OP-191910 | | 3 | 2 | 3 |
| Electrical | OP-191910 | | 4 | 8 | 4 |
| Electrical | OP-191910 | | 3 | 2 | 6 |
| Electrical | OP-191910 | | | 2 | 6 |
| Electrical | OP-191910 | | 12 | 3 | 8 |
| Electrical | OP-191910 | | 14 | | 14 |
| Electrical | OP-191910 | | 15 | | 14 |
| Electrical | OP-191910 | | 15 | 13 | 15 |
| Electrical | OP-191910 | 1 | | | |
| Electrical | OP-191910 | 3 | | | |
| Electrical | OP-191910 | | 4 | 2 | |
| Electrical | OP-191910 | 3 | | | |
| Electrical | OP-191910 | 4 | | | |
| Electrical | OP-191910 | 3 | | | |
| Electrical | OP-191910 | 2 | | | |
| Electrical | OP-191910 | 2 | | | |
| Electrical | OP-191910 | 1 | | | |
| Electrical | OP-191910 | 2 | | | |
| Electrical | OP-191910 | 2 | | | |
| Electrical | OP-191910 | 3 | | | |
| Electrical | OP-191910 | 3 | | | |
| Electrical | OP-191910 | 1 | | | |
| Electrical | OP-191910 | 7 | | | |
| Electrical | OP-191910 | 2 | | | |
| Electrical | OP-191910 | 6 | | | |
| Electrical | OP-191910 | 4 | | | |

| Work Order # | OP-191913 | | Request Date | 09/20/2017 15:26 |
|---|---|---|---|---|
| Location ID | Orange M.S. - RR | | Completion Date | |
| WO Type | Corrective Maintenance | | | |
| Description | | | | |
| Request | The light in restroom next to room 108 it's not on. Lightbulb was replaced but still off probably the ballast it's damage. Thanks | | Total Hours | 2.0 |
| Priority Description | Routine | | Total Cost | 58.18 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Boy's Restroom | Orange M.S. - RR | Area | EL4000 | Repair/Replace Lights |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Electrical | OP-191913 | | 12 | | 7 |
| Electrical | OP-191913 | | 11 | 9 | 9 |
| Electrical | OP-191913 | | 10 | 10 | 12 |
| Electrical | OP-191913 | | 6 | 4 | 9 |
| Electrical | OP-191913 | | 9 | 8 | 10 |
| Electrical | OP-191913 | | 13 | 12 | 10 |
| Electrical | OP-191913 | | 4 | 4 | 10 |
| Electrical | OP-191913 | | 10 | 10 | 10 |
| Electrical | OP-191913 | | 11 | | 10 |
| Electrical | OP-191913 | | 7 | 7 | 11 |
| Electrical | OP-191913 | | 12 | 11 | 12 |
| Electrical | OP-191913 | | 8 | 11 | 12 |
| Electrical | OP-191913 | 6 | | | |
| Electrical | OP-191913 | 6 | | | |
| Electrical | OP-191913 | | 7 | 5 | |
| Electrical | OP-191913 | 11 | | | |
| Electrical | OP-191913 | 8 | | | |
| Electrical | OP-191913 | 6 | | | |
| Electrical | OP-191913 | 7 | | | |
| Electrical | OP-191913 | 3 | | | |
| Electrical | OP-191913 | 3 | | | |
| Electrical | OP-191913 | 3 | | | |
| Electrical | OP-191913 | 3 | | | |
| Electrical | OP-191913 | 9 | | | |
| Electrical | OP-191913 | | 2 | 6 | |
| Electrical | OP-191913 | 13 | | | |
| Electrical | OP-191913 | 6 | | | |
| Electrical | OP-191913 | 6 | | | |
| Electrical | OP-191913 | 4 | | | |
| Electrical | OP-191913 | 7 | | | |
| Electrical | OP-191913 | 6 | | | |

| | | | | |
|---|---|---|---|---|
| **Work Order #** | OP-196576 | | **Request Date** | 09/22/2018 |
| **Location ID** | ADMIN. OFFICES | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | |
| **Request Priority Description** | Check Outlet in Office 318 | | **Total Hours Total Cost** | 1 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| electrical | Admin Offices - 318 | 318 | EL6576 | Check electrical outlet on wall |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Electrical | OP-196576 | | 13 | 13 | 6 |
| Electrical | OP-196576 | | 9 | 9 | 7 |
| Electrical | OP-196576 | | 15 | 15 | 11 |
| Electrical | OP-196576 | | 6 | 6 | 11 |
| Electrical | OP-196576 | | 11 | 11 | 10 |
| Electrical | OP-196576 | | 8 | 8 | 7 |
| Electrical | OP-196576 | | 6 | 6 | 9 |
| Electrical | OP-196576 | | 6 | 10 | 12 |
| Electrical | OP-196576 | | 14 | 14 | 12 |
| Electrical | OP-196576 | | 10 | 10 | |
| Electrical | OP-196576 | | 15 | 15 | 15 |
| Electrical | OP-196576 | | 14 | 14 | 9 |
| Electrical | OP-196576 | | 15 | 15 | 13 |
| Electrical | OP-196576 | | 11 | 11 | 12 |
| Electrical | OP-196576 | | 14 | | 13 |
| Electrical | OP-196576 | | 15 | 12 | 14 |
| Electrical | OP-196576 | | 13 | 6 | 14 |
| Electrical | OP-196576 | 15 | | | |
| Electrical | OP-196576 | 7 | | | |
| Electrical | OP-196576 | 15 | | | |
| Electrical | OP-196576 | 13 | | | |
| Electrical | OP-196576 | 13 | | | |
| Electrical | OP-196576 | 6 | | | |
| Electrical | OP-196576 | 13 | | | |
| Electrical | OP-196576 | 13 | | | |
| Electrical | OP-196576 | 11 | | | |
| Electrical | OP-196576 | 10 | | | |
| Electrical | OP-196576 | 11 | | | |
| Electrical | OP-196576 | 14 | | | |
| Electrical | OP-196576 | 14 | | | |
| Electrical | OP-196576 | 8 | | | |

| Work Order # | OP-192025 | | Request Date | 09/25/2017 09:20 |
|---|---|---|---|---|
| Location ID | Blue H.S. -FLDHOUSE | | Completion Date | |
| WO Type Description | Corrective Maintenance | | | |
| Request | Football stadium: Fire Sprinkler system under bleachers is leading water on South end at coupling. Need repaired | | Total Hours | 2.00 |
| Priority Description | Routine | | Total Cost | 62.28 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Field House | Blue H.S. - FLDHOUSE | Area | PL11025 | Fire Sprinkler Water Line |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Fire Life Safety | OP-192025 | | 5 | 5 | 6 |
| Fire Life Safety | OP-192025 | | 4 | 7 | 6 |
| Fire Life Safety | OP-192025 | | 6 | 6 | 8 |
| Fire Life Safety | OP-192025 | | 4 | 4 | 9 |
| Fire Life Safety | OP-192025 | | 1 | 1 | 7 |
| Fire Life Safety | OP-192025 | | 5 | 5 | 9 |
| Fire Life Safety | OP-192025 | | 1 | 1 | 11 |
| Fire Life Safety | OP-192025 | | 9 | 8 | 10 |
| Fire Life Safety | OP-192025 | | 8 | 8 | 8 |
| Fire Life Safety | OP-192025 | | 13 | 13 | 13 |
| Fire Life Safety | OP-192025 | | 9 | 9 | 11 |
| Fire Life Safety | OP-192025 | | 1 | 1 | 12 |
| Fire Life Safety | OP-192025 | | 4 | 4 | 10 |
| Fire Life Safety | OP-192025 | | 3 | 11 | 10 |
| Fire Life Safety | OP-192025 | | 11 | 11 | 13 |
| Fire Life Safety | OP-192025 | 8 | | | |
| Fire Life Safety | OP-192025 | 4 | | | |
| Fire Life Safety | OP-192025 | 3 | | | |
| Fire Life Safety | OP-192025 | 1 | | | |
| Fire Life Safety | OP-192025 | | 1 | 1 | |
| Fire Life Safety | OP-192025 | 1 | | | |
| Fire Life Safety | OP-192025 | 4 | | | |
| Fire Life Safety | OP-192025 | 1 | | | |
| Fire Life Safety | OP-192025 | 6 | | | |
| Fire Life Safety | OP-192025 | 2 | | | |
| Fire Life Safety | OP-192025 | 8 | | | |
| Fire Life Safety | OP-192025 | 4 | | | |
| Fire Life Safety | OP-192025 | 2 | | | |
| Fire Life Safety | OP-192025 | | 6 | | |
| Fire Life Safety | OP-192025 | 1 | | | |
| Fire Life Safety | OP-192025 | 10 | | | |

| Work Order # | OP-193957 | | | Request Date | 11/20/2017 08:38 |
| Location ID | Blue H.S. - GROUNDS | | | Completion Date | |
| WO Type | Corrective Maintenance | | | | |
| Description | | | | | |
| Request | Can we get the stadium area cleaned up and the field groomed today or tomorrow, we are host some state championship football games this weekend | | | Total Hours | 2.0 |
| Priority Description | Routine | | | Total Cost | 44.12 |
| Item Description | Item Number | Item Type | Task Code | Task Description | |
| Grounds - GROUNDS | Blue H.S. - GROUNDS | Area | GR5001 | Athletic Grounds Field Prep | |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Fire Life Safety | OP-193957 | | 2 | 2 | 2 |
| Fire Life Safety | OP-193957 | | 3 | 7 | 5 |
| Fire Life Safety | OP-193957 | | 13 | 13 | 1 |
| Fire Life Safety | OP-193957 | | 12 | 15 | 6 |
| Fire Life Safety | OP-193957 | | 9 | 9 | 5 |
| Fire Life Safety | OP-193957 | | 8 | | 6 |
| Fire Life Safety | OP-193957 | | 5 | 3 | 8 |
| Fire Life Safety | OP-193957 | | 13 | 12 | 11 |
| Fire Life Safety | OP-193957 | | 8 | 8 | 6 |
| Fire Life Safety | OP-193957 | | 6 | 6 | 8 |
| Fire Life Safety | OP-193957 | | 10 | 10 | 6 |
| Fire Life Safety | OP-193957 | | 7 | 7 | 10 |
| Fire Life Safety | OP-193957 | | 3 | 4 | 8 |
| Fire Life Safety | OP-193957 | | 10 | 9 | 13 |
| Fire Life Safety | OP-193957 | | 5 | 12 | 13 |
| Fire Life Safety | OP-193957 | | 12 | 13 | 12 |
| Fire Life Safety | OP-193957 | 3 | | | |
| Fire Life Safety | OP-193957 | 2 | | | |
| Fire Life Safety | OP-193957 | 2 | | | |
| Fire Life Safety | OP-193957 | 9 | | | |
| Fire Life Safety | OP-193957 | | 7 | 7 | |
| Fire Life Safety | OP-193957 | 9 | | | |
| Fire Life Safety | OP-193957 | 1 | | | |
| Fire Life Safety | OP-193957 | 2 | | | |
| Fire Life Safety | OP-193957 | 11 | | | |
| Fire Life Safety | OP-193957 | 4 | | | |
| Fire Life Safety | OP-193957 | 6 | | | |
| Fire Life Safety | OP-193957 | 3 | | | |
| Fire Life Safety | OP-193957 | 13 | | | |
| Fire Life Safety | OP-193957 | 6 | | | |
| Fire Life Safety | OP-193957 | 7 | | | |

| Work Order # | OP-191867 | | Request Date | 09/20/2017 09:16 |
| **Location ID** | Purple Elem. - MPRM | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | |
| **Request** | Check outlet in MPR | | **Total Hours** | 1.0 |
| **Priority Description** | Routine | | **Total Cost** | 29.09 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
| --- | --- | --- | --- | --- |
| Multipurpose/Multipurpose Room - MP | Purple Elem. - MPRM | Area | EL4005 | Repair/Replace Switches or Recepticles |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
| --- | --- | --- | --- | --- | --- |
| General Maintenance | OP-191867 | | 15 | | 13 |
| General Maintenance | OP-191867 | | 15 | 15 | 15 |
| General Maintenance | OP-191867 | | 14 | 14 | 13 |
| General Maintenance | OP-191867 | | 13 | 14 | 13 |
| General Maintenance | OP-191867 | | 14 | 14 | 15 |
| General Maintenance | OP-191867 | | 14 | 15 | 14 |
| General Maintenance | OP-191867 | | 15 | | 13 |
| General Maintenance | OP-191867 | | 12 | 14 | 14 |
| General Maintenance | OP-191867 | | 14 | | 15 |
| General Maintenance | OP-191867 | | 15 | 15 | 14 |
| General Maintenance | OP-191867 | | 13 | 15 | 15 |
| General Maintenance | OP-191867 | | 14 | 15 | 12 |
| General Maintenance | OP-191867 | | 14 | 14 | 14 |
| General Maintenance | OP-191867 | 5 | | | |
| General Maintenance | OP-191867 | 8 | | | |
| General Maintenance | OP-191867 | | 15 | 15 | |
| General Maintenance | OP-191867 | 6 | | | |
| General Maintenance | OP-191867 | 5 | | | |
| General Maintenance | OP-191867 | 11 | | | |
| General Maintenance | OP-191867 | 14 | | | |
| General Maintenance | OP-191867 | 11 | | | |
| General Maintenance | OP-191867 | 10 | | | |
| General Maintenance | OP-191867 | 8 | | | |
| General Maintenance | OP-191867 | 5 | | | |
| General Maintenance | OP-191867 | 11 | | | |
| General Maintenance | OP-191867 | 9 | | | |
| General Maintenance | OP-191867 | 7 | | | |
| General Maintenance | OP-191867 | 12 | | | |
| General Maintenance | OP-191867 | 3 | | | |
| General Maintenance | OP-191867 | 8 | | | |
| General Maintenance | OP-191867 | 7 | | | |

| Work Order # | OP-191956 | | | Request Date | 09/21/2017 15:11 |
| Location ID | Red M.S. - ENT | | | Completion Date | |
| WO Type Description | Corrective Maintenance | | | | |
| Request | Trim on the outside is bubbling and needs to be replaced. Multiple water leaks | | | Total Hours | 31.0 |
| Priority Description | Routine | | | Total Cost | 2746.45 |
| Item Description | Item Number | Item Type | Task Code | | Task Description |
| Entire Area - ENT | Red M.S. - ENT | Area | GM17000 | | General Maintenance |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-191956 | | 4 | 3 | 2 |
| General Maintenance | OP-191956 | | 5 | 6 | 6 |
| General Maintenance | OP-191956 | | 10 | | 8 |
| General Maintenance | OP-191956 | | 8 | 9 | 10 |
| General Maintenance | OP-191956 | | 3 | 3 | 9 |
| General Maintenance | OP-191956 | | 13 | 12 | 12 |
| General Maintenance | OP-191956 | | 12 | 12 | 12 |
| General Maintenance | OP-191956 | | 13 | | 11 |
| General Maintenance | OP-191956 | | 12 | 11 | 12 |
| General Maintenance | OP-191956 | | 10 | | 13 |
| General Maintenance | OP-191956 | | 14 | 12 | 13 |
| General Maintenance | OP-191956 | | 3 | 15 | 15 |
| General Maintenance | OP-191956 | | 10 | 10 | 14 |
| General Maintenance | OP-191956 | 4 | | | |
| General Maintenance | OP-191956 | 5 | | | |
| General Maintenance | OP-191956 | | 8 | 8 | |
| General Maintenance | OP-191956 | 4 | | | |
| General Maintenance | OP-191956 | 2 | | | |
| General Maintenance | OP-191956 | 4 | | | |
| General Maintenance | OP-191956 | 5 | | | |
| General Maintenance | OP-191956 | 4 | | | |
| General Maintenance | OP-191956 | 11 | | | |
| General Maintenance | OP-191956 | 15 | | | |
| General Maintenance | OP-191956 | 14 | | | |
| General Maintenance | OP-191956 | 5 | | | |
| General Maintenance | OP-191956 | 8 | | | |
| General Maintenance | OP-191956 | 9 | | | |
| General Maintenance | OP-191956 | 5 | | | |
| General Maintenance | OP-191956 | 5 | | | |
| General Maintenance | OP-191956 | 10 | | | |
| General Maintenance | OP-191956 | 8 | | | |

| Work Order # | OP-191963 | | Request Date | 09/22/2017 11:21 |
|---|---|---|---|---|
| Location ID | Grey H.S. - 112 | | Completion Date | |
| WO Type | Corrective Maintenance | | | |
| Description | | | | |
| Request | Can we get 6 ceiling tiles replaced in room 1112 and 3 replaced in room 1114? | | Total Hours | 1.5 |
| Priority Description | Routine | | Total Cost | 61.64 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Classroom | Grey H.S. - 112 | Area | GM17000 | General Maintenance |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-191963 | | 6 | 8 | 3 |
| General Maintenance | OP-191963 | | 4 | 4 | 5 |
| General Maintenance | OP-191963 | | 1 | | 3 |
| General Maintenance | OP-191963 | | 11 | | 2 |
| General Maintenance | OP-191963 | | 2 | 3 | 2 |
| General Maintenance | OP-191963 | | 3 | 7 | 6 |
| General Maintenance | OP-191963 | | 12 | 13 | 4 |
| General Maintenance | OP-191963 | | 9 | 10 | 6 |
| General Maintenance | OP-191963 | | 6 | | 4 |
| General Maintenance | OP-191963 | | 7 | 9 | 7 |
| General Maintenance | OP-191963 | | 12 | 7 | 6 |
| General Maintenance | OP-191963 | | 11 | 11 | 13 |
| General Maintenance | OP-191963 | | 11 | 12 | 11 |
| General Maintenance | OP-191963 | 11 | | | |
| General Maintenance | OP-191963 | 14 | | | |
| General Maintenance | OP-191963 | | 10 | 10 | |
| General Maintenance | OP-191963 | 12 | | | |
| General Maintenance | OP-191963 | 13 | | | |
| General Maintenance | OP-191963 | 13 | | | |
| General Maintenance | OP-191963 | 12 | | | |
| General Maintenance | OP-191963 | 10 | | | |
| General Maintenance | OP-191963 | 14 | | | |
| General Maintenance | OP-191963 | 14 | | | |
| General Maintenance | OP-191963 | 13 | | | |
| General Maintenance | OP-191963 | 13 | | | |
| General Maintenance | OP-191963 | 14 | | | |
| General Maintenance | OP-191963 | 10 | | | |
| General Maintenance | OP-191963 | 13 | | | |
| General Maintenance | OP-191963 | 13 | | | |
| General Maintenance | OP-191963 | 14 | | | |
| General Maintenance | OP-191963 | 15 | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Work Order #** | OP-191965 | | **Request Date** | 09/22/2017 11:03 | |
| **Location ID** | Grey H.S. - 1114 | | **Completion Date** | | |
| **WO Type Description** | Corrective Maintenance | | | | |
| **Request** | Can we get a projector screen relocated from 7001 to 1114? | | **Total Hours** | 1.0 | |
| **Priority Description** | Routine | | **Total Cost** | 29.09 | |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Classroom | Grey H.S. - 1114 | Area | CM17000 | General Maintenance |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-191965 | | 7 | 8 | 1 |
| General Maintenance | OP-191965 | | 1 | 1 | 1 |
| General Maintenance | OP-191965 | | 1 | 1 | 1 |
| General Maintenance | OP-191965 | | 1 | 1 | 1 |
| General Maintenance | OP-191965 | | 2 | 2 | 2 |
| General Maintenance | OP-191965 | | 5 | 5 | 4 |
| General Maintenance | OP-191965 | | 4 | | 4 |
| General Maintenance | OP-191965 | | 1 | | 2 |
| General Maintenance | OP-191965 | | 1 | 5 | 7 |
| General Maintenance | OP-191965 | | 3 | 7 | 2 |
| General Maintenance | OP-191965 | | 10 | 11 | 2 |
| General Maintenance | OP-191965 | | 6 | 6 | 3 |
| General Maintenance | OP-191965 | | 10 | 6 | 7 |
| General Maintenance | OP-191965 | 7 | | | |
| General Maintenance | OP-191965 | 13 | | | |
| General Maintenance | OP-191965 | | 14 | 14 | |
| General Maintenance | OP-191965 | 7 | | | |
| General Maintenance | OP-191965 | 15 | | | |
| General Maintenance | OP-191965 | 12 | | | |
| General Maintenance | OP-191965 | 13 | | | |
| General Maintenance | OP-191965 | 9 | | | |
| General Maintenance | OP-191965 | 15 | | | |
| General Maintenance | OP-191965 | 13 | | | |
| General Maintenance | OP-191965 | 10 | | | |
| General Maintenance | OP-191965 | 14 | | | |
| General Maintenance | OP-191965 | 11 | | | |
| General Maintenance | OP-191965 | 12 | | | |
| General Maintenance | OP-191965 | 8 | | | |
| General Maintenance | OP-191965 | 14 | | | |
| General Maintenance | OP-191965 | 13 | | | |
| General Maintenance | OP-191965 | 12 | | | |

| | | | |
|---|---|---|---|
| **Work Order #** | OP-192256 | **Request Date** | 09/29/2017 06:21 |
| **Location ID** | Blue H.S. - ENT | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | |
| **Request** | We got tagged last night on East side of building 5 and I don't have either color to paint over the damage, it's not profane just vandalized, can we get some help from the painters, please. | **Total Hours** | 8.5 |
| **Priority Description** | Routine | **Total Cost** | 311.17 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Entire Area | Blue H.S. - ENT | Area | PA9020 | Remove Graffiti |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-192256 | | 13 | 12 | 5 |
| General Maintenance | OP-192256 | | 8 | 8 | 6 |
| General Maintenance | OP-192256 | | 1 | 1 | 5 |
| General Maintenance | OP-192256 | | 14 | 14 | 4 |
| General Maintenance | OP-192256 | | 5 | 5 | 5 |
| General Maintenance | OP-192256 | | 7 | 6 | 7 |
| General Maintenance | OP-192256 | | 1 | | 9 |
| General Maintenance | OP-192256 | | 5 | 5 | 5 |
| General Maintenance | OP-192256 | | 5 | 5 | 6 |
| General Maintenance | OP-192256 | | 8 | 3 | 7 |
| General Maintenance | OP-192256 | | 9 | 13 | 11 |
| General Maintenance | OP-192256 | | 7 | 7 | 15 |
| General Maintenance | OP-192256 | | 14 | 14 | 13 |
| General Maintenance | OP-192256 | | 2 | 2 | |
| General Maintenance | OP-192256 | | 4 | 8 | 8 |
| General Maintenance | OP-192256 | | 12 | 12 | 15 |
| General Maintenance | OP-192256 | | 14 | 14 | 14 |
| General Maintenance | OP-192256 | 1 | | | |
| General Maintenance | OP-192256 | 1 | | | |
| General Maintenance | OP-192256 | 6 | | | |
| General Maintenance | OP-192256 | 2 | | | |
| General Maintenance | OP-192256 | 14 | | | |
| General Maintenance | OP-192256 | 2 | | | |
| General Maintenance | OP-192256 | 4 | | | |
| General Maintenance | OP-192256 | 7 | | | |
| General Maintenance | OP-192256 | 3 | | | |
| General Maintenance | OP-192256 | 1 | | | |
| General Maintenance | OP-192256 | 2 | | | |
| General Maintenance | OP-192256 | 3 | | | |
| General Maintenance | OP-192256 | 5 | | | |
| General Maintenance | OP-192256 | 9 | | | |

| Work Order # | OP-192261 | | | Request Date | 09/29/2017 |
|---|---|---|---|---|---|
| **Location ID** | Purple Elem. - Office | | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | | |
| **Request** | (staff workroom) key hole tumbler seems to be malfunctioning to door entering staff workroom key gets stuck | | | **Total Hours** | 2.0 |
| **Priority Description** | Routine | | | **Total Cost** | 58.18 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Office/Administrative - Office | Purple Elem. - OFFICE | Area | LK8000 | Repair/Replace Existing Locks |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-192261 | | 6 | 8 | 7 |
| General Maintenance | OP-192261 | | 4 | | 10 |
| General Maintenance | OP-192261 | | 15 | 13 | 10 |
| General Maintenance | OP-192261 | | 15 | 15 | 11 |
| General Maintenance | OP-192261 | | 13 | 12 | 13 |
| General Maintenance | OP-192261 | | 14 | 14 | 14 |
| General Maintenance | OP-192261 | | 12 | 10 | 12 |
| General Maintenance | OP-192261 | | 13 | | 11 |
| General Maintenance | OP-192261 | | 8 | 8 | 12 |
| General Maintenance | OP-192261 | | 14 | 10 | 13 |
| General Maintenance | OP-192261 | | 9 | 12 | 13 |
| General Maintenance | OP-192261 | | 15 | 15 | 15 |
| General Maintenance | OP-192261 | | 7 | | 15 |
| General Maintenance | OP-192261 | 8 | | | |
| General Maintenance | OP-192261 | 7 | | | |
| General Maintenance | OP-192261 | | 11 | 13 | |
| General Maintenance | OP-192261 | 5 | | | |
| General Maintenance | OP-192261 | 14 | | | |
| General Maintenance | OP-192261 | 5 | | | |
| General Maintenance | OP-192261 | 3 | | | |
| General Maintenance | OP-192261 | 5 | | | |
| General Maintenance | OP-192261 | 8 | | | |
| General Maintenance | OP-192261 | 4 | | | |
| General Maintenance | OP-192261 | 7 | | | |
| General Maintenance | OP-192261 | 15 | | | |
| General Maintenance | OP-192261 | 10 | | | |
| General Maintenance | OP-192261 | 14 | | | |
| General Maintenance | OP-192261 | 9 | | | |
| General Maintenance | OP-192261 | 8 | | | |
| General Maintenance | OP-192261 | 11 | | | |
| General Maintenance | OP-192261 | 10 | | | |

| Work Order # | OP-192302 | | Request Date | 10/02/2017 07:06 |
| Location ID | Orange M.S. | | Completion Date | |
| WO Type | Corrective Maintenance | | | |
| Description | | | | |
| Request | Can we get a larger crosswalk area painted on the West side where the students pass to and from the portables, maybe a large crosshatch area between the 2 driveways. | | Total Hours | 13 |
| Priority Description | Routine | | Total Cost | 438.01 |
| Item Description | Item Number | Item Type | Task Code | Task Description |
| Entire Area | Orange M.S. | Area | PA9000 | Paint/Patch Existing Facilities |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-192302 | | 12 | | 1 |
| General Maintenance | OP-192302 | | 2 | | 7 |
| General Maintenance | OP-192302 | | 4 | 4 | 5 |
| General Maintenance | OP-192302 | | 9 | 12 | 7 |
| General Maintenance | OP-192302 | | 6 | 6 | 8 |
| General Maintenance | OP-192302 | | 5 | | 6 |
| General Maintenance | OP-192302 | | 15 | 5 | 8 |
| General Maintenance | OP-192302 | | 9 | 9 | 11 |
| General Maintenance | OP-192302 | | 10 | 13 | 9 |
| General Maintenance | OP-192302 | | 10 | 15 | 11 |
| General Maintenance | OP-192302 | | 11 | 11 | 11 |
| General Maintenance | OP-192302 | | 7 | 9 | 10 |
| General Maintenance | OP-192302 | | 15 | 14 | 13 |
| General Maintenance | OP-192302 | 15 | | | |
| General Maintenance | OP-192302 | 12 | | | |
| General Maintenance | OP-192302 | | 5 | 7 | |
| General Maintenance | OP-192302 | 13 | | | |
| General Maintenance | OP-192302 | 9 | | | |
| General Maintenance | OP-192302 | 10 | | | |
| General Maintenance | OP-192302 | 9 | | | |
| General Maintenance | OP-192302 | 8 | | | |
| General Maintenance | OP-192302 | 9 | | | |
| General Maintenance | OP-192302 | 12 | | | |
| General Maintenance | OP-192302 | 11 | | | |
| General Maintenance | OP-192302 | 10 | | | |
| General Maintenance | OP-192302 | 4 | | | |
| General Maintenance | OP-192302 | 13 | | | |
| General Maintenance | OP-192302 | 15 | | | |
| General Maintenance | OP-192302 | 11 | | | |
| General Maintenance | OP-192302 | 12 | | | |
| General Maintenance | OP-192302 | 14 | | | |

| Work Order # | OP-192313 | | Request Date | 10/02/2017 12:26 |
| --- | --- | --- | --- | --- |
| Location ID | District Office - 501 | | Completion Date | |
| WO Type | Corrective Maintenance | | | |
| Description | | | | |
| Request | Wood railing/counter on pony wall is loose and needs repaired. Located at reception area of professional development in Bld F. See Receptionist in area. | | Total Hours | 2.0 |
| Priority Description | Routine | | Total Cost | 71.66 |
| Item Description | Item Number | Item Type | Task Code | Task Description |
| District Administration Center | District Office - 501 | Facility | CAR1015 | General Carpentry Repair |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
| --- | --- | --- | --- | --- | --- |
| General Maintenance | OP-192313 | | 15 | 12 | 3 |
| General Maintenance | OP-192313 | | 10 | 10 | 8 |
| General Maintenance | OP-192313 | | 8 | 8 | 8 |
| General Maintenance | OP-192313 | | 15 | 13 | 10 |
| General Maintenance | OP-192313 | | 6 | 6 | 5 |
| General Maintenance | OP-192313 | | 15 | | 11 |
| General Maintenance | OP-192313 | | 14 | 14 | 14 |
| General Maintenance | OP-192313 | | 7 | 11 | 11 |
| General Maintenance | OP-192313 | | 12 | 12 | 8 |
| General Maintenance | OP-192313 | | 15 | 15 | 11 |
| General Maintenance | OP-192313 | | 12 | 12 | |
| General Maintenance | OP-192313 | | 5 | 5 | 8 |
| General Maintenance | OP-192313 | | 14 | 15 | 13 |
| General Maintenance | OP-192313 | | 15 | 13 | 9 |
| General Maintenance | OP-192313 | | 15 | 15 | 11 |
| General Maintenance | OP-192313 | | 13 | 13 | 15 |
| General Maintenance | OP-192313 | | 3 | 7 | 10 |
| General Maintenance | OP-192313 | 4 | | | |
| General Maintenance | OP-192313 | 15 | | | |
| General Maintenance | OP-192313 | 9 | | | |
| General Maintenance | OP-192313 | 4 | | | |
| General Maintenance | OP-192313 | 7 | | | |
| General Maintenance | OP-192313 | 8 | | | |
| General Maintenance | OP-192313 | 5 | | | |
| General Maintenance | OP-192313 | 5 | | | |
| General Maintenance | OP-192313 | 7 | | | |
| General Maintenance | OP-192313 | 9 | | | |
| General Maintenance | OP-192313 | 14 | | | |
| General Maintenance | OP-192313 | 12 | | | |
| General Maintenance | OP-192313 | 11 | | | |
| General Maintenance | OP-192313 | 2 | | | |

| Work Order # | OP-192355 | | Request Date | 10/03/2017 11:29 |
|---|---|---|---|---|
| **Location ID** | Pink M.S. - GROUNDS | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | |
| **Request** | I need to get a soccer goal welded one of the bars welds broke | | **Total Hours** | 2.5 |
| **Priority Description** | Routine | | **Total Cost** | 75.15 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Grounds-GROUNDS | Pink M.S. - GROUNDS | Area | WE13000 | General Welding |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-192355 | | 11 | 8 | 3 |
| General Maintenance | OP-192355 | | 15 | 15 | 1 |
| General Maintenance | OP-192355 | | 14 | 14 | 2 |
| General Maintenance | OP-192355 | | 5 | 4 | 3 |
| General Maintenance | OP-192355 | | 8 | 11 | 3 |
| General Maintenance | OP-192355 | | 1 | 1 | 5 |
| General Maintenance | OP-192355 | | 2 | 8 | 5 |
| General Maintenance | OP-192355 | | 13 | | 8 |
| General Maintenance | OP-192355 | | 6 | 6 | 6 |
| General Maintenance | OP-192355 | | 5 | 5 | 7 |
| General Maintenance | OP-192355 | | 13 | 14 | 8 |
| General Maintenance | OP-192355 | | 10 | 10 | 10 |
| General Maintenance | OP-192355 | | 15 | 15 | 14 |
| General Maintenance | OP-192355 | | 14 | 12 | 12 |
| General Maintenance | OP-192355 | | 6 | 7 | 13 |
| General Maintenance | OP-192355 | | 14 | 14 | 15 |
| General Maintenance | OP-192355 | 11 | | | |
| General Maintenance | OP-192355 | 14 | | | |
| General Maintenance | OP-192355 | 10 | | | |
| General Maintenance | OP-192355 | 3 | | | |
| General Maintenance | OP-192355 | | 11 | 11 | |
| General Maintenance | OP-192355 | 6 | | | |
| General Maintenance | OP-192355 | 7 | | | |
| General Maintenance | OP-192355 | 12 | | | |
| General Maintenance | OP-192355 | 14 | | | |
| General Maintenance | OP-192355 | 9 | | | |
| General Maintenance | OP-192355 | 7 | | | |
| General Maintenance | OP-192355 | 12 | | | |
| General Maintenance | OP-192355 | 11 | | | |
| General Maintenance | OP-192355 | 9 | | | |
| General Maintenance | OP-192355 | 6 | | | |

| Work Order # | OP-193226 | | Request Date | 09/24/2017 |
|---|---|---|---|---|
| **Location ID** | Pink M.S. - 404 | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | |
| **Request** | Student Cafeteria or Kitchen has a bad odor | | **Total Hours** | 2 |
| **Priority Description** | Routine Maintenance | | **Total Cost** | |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Cafeteria | Pink M.S. - 404 | 404 GM | GM4300 | Determine the source of the smell, correct as needed |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-193226 | | 13 | 13 | 9 |
| General Maintenance | OP-193226 | | 5 | 5 | 6 |
| General Maintenance | OP-193226 | | 9 | | 5 |
| General Maintenance | OP-193226 | | 9 | 9 | 9 |
| General Maintenance | OP-193226 | | 8 | 8 | 8 |
| General Maintenance | OP-193226 | | 7 | 7 | 10 |
| General Maintenance | OP-193226 | | 8 | 7 | 9 |
| General Maintenance | OP-193226 | | 7 | 10 | 10 |
| General Maintenance | OP-193226 | | 9 | 4 | 11 |
| General Maintenance | OP-193226 | | 6 | 6 | 6 |
| General Maintenance | OP-193226 | | 6 | 6 | 12 |
| General Maintenance | OP-193226 | | 9 | | 9 |
| General Maintenance | OP-193226 | | 8 | | 15 |
| General Maintenance | OP-193226 | 12 | | | |
| General Maintenance | OP-193226 | 11 | | | |
| General Maintenance | OP-193226 | | 13 | 12 | |
| General Maintenance | OP-193226 | 14 | | | |
| General Maintenance | OP-193226 | 12 | | | |
| General Maintenance | OP-193226 | 8 | | | |
| General Maintenance | OP-193226 | 8 | | | |
| General Maintenance | OP-193226 | 15 | | | |
| General Maintenance | OP-193226 | 7 | | | |
| General Maintenance | OP-193226 | 11 | | | |
| General Maintenance | OP-193226 | 12 | | | |
| General Maintenance | OP-193226 | 6 | | | |
| General Maintenance | OP-193226 | 5 | | | |
| General Maintenance | OP-193226 | 5 | | | |
| General Maintenance | OP-193226 | 1 | | | |
| General Maintenance | OP-193226 | 7 | | | |
| General Maintenance | OP-193226 | 3 | | | |
| General Maintenance | OP-193226 | 9 | | | |

| | | | |
|---|---|---|---|
| **Work Order #** | OP-195389 | **Request Date** | 09/24/2017 |
| **Location ID** | White Elem. - GRNDS | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | |
| **Request** | Playground Swing foundation has separated, needs replacement | **Total Hours** | 3 |
| **Priority Description** | Routine | **Total Cost** | TBD |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Playground | White Elem. - GRNDS | GRNDS | GM1700 | Replace Playground Swing Set foundation |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-195389 | | 1 | 2 | 1 |
| General Maintenance | OP-195389 | | 5 | | 1 |
| General Maintenance | OP-195389 | | 6 | 5 | 4 |
| General Maintenance | OP-195389 | | 3 | 3 | 3 |
| General Maintenance | OP-195389 | | 3 | 4 | 5 |
| General Maintenance | OP-195389 | | 2 | 3 | 2 |
| General Maintenance | OP-195389 | | 4 | 3 | 5 |
| General Maintenance | OP-195389 | | 7 | 1 | 8 |
| General Maintenance | OP-195389 | | 5 | 5 | 5 |
| General Maintenance | OP-195389 | | 5 | 5 | 7 |
| General Maintenance | OP-195389 | | 5 | 5 | 7 |
| General Maintenance | OP-195389 | | 9 | | 11 |
| General Maintenance | OP-195389 | | 3 | 3 | 14 |
| General Maintenance | OP-195389 | 3 | | | |
| General Maintenance | OP-195389 | 4 | | | |
| General Maintenance | OP-195389 | | 14 | 11 | |
| General Maintenance | OP-195389 | 9 | | | |
| General Maintenance | OP-195389 | 3 | | | |
| General Maintenance | OP-195389 | 2 | | | |
| General Maintenance | OP-195389 | 4 | | | |
| General Maintenance | OP-195389 | 13 | | | |
| General Maintenance | OP-195389 | 4 | | | |
| General Maintenance | OP-195389 | 7 | | | |
| General Maintenance | OP-195389 | 8 | | | |
| General Maintenance | OP-195389 | 2 | | | |
| General Maintenance | OP-195389 | 2 | | | |
| General Maintenance | OP-195389 | 3 | | | |
| General Maintenance | OP-195389 | 2 | | | |
| General Maintenance | OP-195389 | 6 | | | |
| General Maintenance | OP-195389 | 4 | | | |
| General Maintenance | OP-195389 | 3 | | | |

| | | |
|---|---|---|
| **Work Order #** | OP-196342 | **Request Date** 09/22/2017 |
| **Location ID** | Red M.S. – 301C | **Completion Date** |
| **WO Type Description** | Corrective Maintenance | |
| **Request** | Replace ceiling tiles in classroom 301C; Re-Paint the wall damaged by monsoon rains (Water Stain) | **Total Hours** 2 |
| **Priority Description** | Routine Maintenance | **Total Cost** |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Classroom | Red M.S. – 301C | 301C | GM1700 | Paint / Patch |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| General Maintenance | OP-196342 | | 2 | 1 | 1 |
| General Maintenance | OP-196342 | | 11 | 4 | 3 |
| General Maintenance | OP-196342 | | 3 | | 5 |
| General Maintenance | OP-196342 | | 5 | 5 | 6 |
| General Maintenance | OP-196342 | | 6 | 9 | 4 |
| General Maintenance | OP-196342 | | 7 | 7 | 3 |
| General Maintenance | OP-196342 | | 7 | | 5 |
| General Maintenance | OP-196342 | | 12 | 12 | 7 |
| General Maintenance | OP-196342 | | 10 | 10 | 8 |
| General Maintenance | OP-196342 | | 7 | 11 | 5 |
| General Maintenance | OP-196342 | | 11 | 12 | 5 |
| General Maintenance | OP-196342 | | 12 | 11 | 8 |
| General Maintenance | OP-196342 | | 10 | | 9 |
| General Maintenance | OP-196342 | 10 | | | |
| General Maintenance | OP-196342 | 9 | | | |
| General Maintenance | OP-196342 | | 3 | 4 | |
| General Maintenance | OP-196342 | 10 | | | |
| General Maintenance | OP-196342 | 11 | | | |
| General Maintenance | OP-196342 | 15 | | | |
| General Maintenance | OP-196342 | 6 | | | |
| General Maintenance | OP-196342 | 14 | | | |
| General Maintenance | OP-196342 | 6 | | | |
| General Maintenance | OP-196342 | 9 | | | |
| General Maintenance | OP-196342 | 6 | | | |
| General Maintenance | OP-196342 | 7 | | | |
| General Maintenance | OP-196342 | 7 | | | |
| General Maintenance | OP-196342 | 8 | | | |
| General Maintenance | OP-196342 | 11 | | | |
| General Maintenance | OP-196342 | 12 | | | |
| General Maintenance | OP-196342 | 2 | | | |
| General Maintenance | OP-196342 | 11 | | | |

| Work Order # | OP-197664 | | Request Date | 09/22/2017 |
| --- | --- | --- | --- | --- |
| **Location ID** | Brown Elem. 215B | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | |
| **Request** | Internet connection is cutting out repeatedly during class | | **Total Hours** | 1 |
| **Priority Description** | Routine Maintenance | | **Total Cost** | |

| Item Description | Item Number | Item Type | Task Code | Task Description |
| --- | --- | --- | --- | --- |
| Comp. Lab 215B | Brown Elem. – 215B | IT | IT3400 | IT – inspect internet connectivity, router/wifi |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
| --- | --- | --- | --- | --- | --- |
| Information Technology | OP-197664 | | 2 | 2 | 2 |
| Information Technology | OP-197664 | | 3 | 3 | 3 |
| Information Technology | OP-197664 | | 5 | 2 | 1 |
| Information Technology | OP-197664 | | 2 | 6 | 5 |
| Information Technology | OP-197664 | | 1 | 7 | 4 |
| Information Technology | OP-197664 | | 6 | | 6 |
| Information Technology | OP-197664 | | 9 | 9 | 4 |
| Information Technology | OP-197664 | | 1 | 2 | 6 |
| Information Technology | OP-197664 | | 4 | 4 | 4 |
| Information Technology | OP-197664 | | 4 | 4 | 3 |
| Information Technology | OP-197664 | | 4 | 4 | 3 |
| Information Technology | OP-197664 | | 3 | | 3 |
| Information Technology | OP-197664 | | 8 | | 7 |
| Information Technology | OP-197664 | 9 | | | |
| Information Technology | OP-197664 | 10 | | | |
| Information Technology | OP-197664 | | 1 | 3 | |
| Information Technology | OP-197664 | 2 | | | |
| Information Technology | OP-197664 | 6 | | | |
| Information Technology | OP-197664 | 9 | | | |
| Information Technology | OP-197664 | 10 | | | |
| Information Technology | OP-197664 | 7 | | | |
| Information Technology | OP-197664 | 12 | | | |
| Information Technology | OP-197664 | 10 | | | |
| Information Technology | OP-197664 | 9 | | | |
| Information Technology | OP-197664 | 4 | | | |
| Information Technology | OP-197664 | 6 | | | |
| Information Technology | OP-197664 | 4 | | | |
| Information Technology | OP-197664 | 4 | | | |
| Information Technology | OP-197664 | 10 | | | |
| Information Technology | OP-197664 | 15 | | | |
| Information Technology | OP-197664 | 2 | | | |

| Work Order # | OP-192049 | | Request Date | 09/26/2017 06:44 |
|---|---|---|---|---|
| **Location ID** | Red M.S. - 316A | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | |
| **Request** | 300-bld, room 316 a/c is not working room got really warm yesterday! | | **Total Hours** | 3.0 |
| **Priority Description** | Routine | | **Total Cost** | 93.42 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Office 316A | Red M.S. - 316A | Area | HV6000 | Room Temperature Problems |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Mechanical | OP-192049 | | 3 | 3 | 2 |
| Mechanical | OP-192049 | | 4 | 6 | 1 |
| Mechanical | OP-192049 | | 1 | 1 | 1 |
| Mechanical | OP-192049 | | 2 | 2 | 1 |
| Mechanical | OP-192049 | | 5 | 1 | 2 |
| Mechanical | OP-192049 | | 6 | 2 | 1 |
| Mechanical | OP-192049 | | 2 | 2 | 1 |
| Mechanical | OP-192049 | | 3 | 3 | 1 |
| Mechanical | OP-192049 | | 2 | 3 | 1 |
| Mechanical | OP-192049 | | 2 | 2 | 1 |
| Mechanical | OP-192049 | | 2 | 2 | 5 |
| Mechanical | OP-192049 | | 4 | | 3 |
| Mechanical | OP-192049 | | 1 | 2 | 4 |
| Mechanical | OP-192049 | | 10 | 10 | 1 |
| Mechanical | OP-192049 | | 11 | 11 | 11 |
| Mechanical | OP-192049 | | 9 | 9 | 9 |
| Mechanical | OP-192049 | 9 | | | |
| Mechanical | OP-192049 | 6 | | | |
| Mechanical | OP-192049 | 5 | | | |
| Mechanical | OP-192049 | 7 | | | |
| Mechanical | OP-192049 | | 5 | 5 | |
| Mechanical | OP-192049 | 3 | | | |
| Mechanical | OP-192049 | 10 | | | |
| Mechanical | OP-192049 | 7 | | | |
| Mechanical | OP-192049 | 3 | | | |
| Mechanical | OP-192049 | 10 | | | |
| Mechanical | OP-192049 | 3 | | | |
| Mechanical | OP-192049 | 9 | | | |
| Mechanical | OP-192049 | 6 | | | |
| Mechanical | OP-192049 | 3 | | | |
| Mechanical | OP-192049 | 3 | | | |

| Work Order # | OP-192052 | | Request Date | 09/26/2017 08:16 |
| Location ID | Purple Elem. - R1 | | Completion Date | |
| WO Type | Corrective Maintenance | | | |
| Description | | | | |
| Request | When A/C kicks on, it makes a really load noise, teacher says that kids can barely hear in the room. Could I get it checked out please. Thank You | | Total Hours | 2.5 |
| Priority Description | Routine | | Total Cost | 77.85 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Classroom/Special Ed | Purple Elem. - R1 | Area | HV6040 | Inspection |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Mechanical | OP-192052 | | 7 | 6 | 1 |
| Mechanical | OP-192052 | | 1 | 5 | 1 |
| Mechanical | OP-192052 | | 2 | 4 | 2 |
| Mechanical | OP-192052 | | 4 | 2 | 2 |
| Mechanical | OP-192052 | | 2 | 1 | 2 |
| Mechanical | OP-192052 | | 6 | 1 | 2 |
| Mechanical | OP-192052 | | 1 | 1 | 2 |
| Mechanical | OP-192052 | | 7 | | 2 |
| Mechanical | OP-192052 | | 3 | 3 | 4 |
| Mechanical | OP-192052 | | 4 | 4 | 4 |
| Mechanical | OP-192052 | | 6 | 4 | 2 |
| Mechanical | OP-192052 | | 2 | 2 | 3 |
| Mechanical | OP-192052 | | 4 | 4 | 3 |
| Mechanical | OP-192052 | | 3 | 3 | 3 |
| Mechanical | OP-192052 | | 1 | 1 | 2 |
| Mechanical | OP-192052 | | 7 | 7 | 2 |
| Mechanical | OP-192052 | 6 | | | |
| Mechanical | OP-192052 | 8 | | | |
| Mechanical | OP-192052 | 1 | | | |
| Mechanical | OP-192052 | 6 | | | |
| Mechanical | OP-192052 | | 3 | 3 | |
| Mechanical | OP-192052 | 4 | | | |
| Mechanical | OP-192052 | 3 | | | |
| Mechanical | OP-192052 | 6 | | | |
| Mechanical | OP-192052 | 1 | | | |
| Mechanical | OP-192052 | 1 | | | |
| Mechanical | OP-192052 | 4 | | | |
| Mechanical | OP-192052 | 1 | | | |
| Mechanical | OP-192052 | 1 | | | |
| Mechanical | OP-192052 | 4 | | | |
| Mechanical | OP-192052 | 1 | | | |

| Work Order # | OP-192054 | | Request Date | 09/26/2017 10:09 |
|---|---|---|---|---|
| **Location ID** | White Elem. - 111 | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | |
| **Request** | Room 111 is having problems cooling down, its hot most of the day, thanks | | **Total Hours** | 3.25 |
| **Priority Description** | Routine | | **Total Cost** | 101.21 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Classroom | White Elem. - 111 | Area | HV6000 | Room Temperature Problems |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Mechanical | OP-192054 | | | 2 | 3 | 3 |
| Mechanical | OP-192054 | | | 4 | 4 | 2 |
| Mechanical | OP-192054 | | | 2 | 2 | 3 |
| Mechanical | OP-192054 | | | 6 | 2 | 3 |
| Mechanical | OP-192054 | | | 4 | 4 | 1 |
| Mechanical | OP-192054 | | | 1 | 1 | 2 |
| Mechanical | OP-192054 | | | 1 | 2 | 3 |
| Mechanical | OP-192054 | | | 5 | | 1 |
| Mechanical | OP-192054 | | | 2 | 1 | 1 |
| Mechanical | OP-192054 | | | 6 | 6 | 6 |
| Mechanical | OP-192054 | | | 5 | 3 | 4 |
| Mechanical | OP-192054 | | | 2 | 2 | 3 |
| Mechanical | OP-192054 | | | 1 | 3 | 4 |
| Mechanical | OP-192054 | | | 8 | 7 | 4 |
| Mechanical | OP-192054 | | | 4 | 5 | 4 |
| Mechanical | OP-192054 | | | 4 | 4 | |
| Mechanical | OP-192054 | | | 9 | 9 | 11 |
| Mechanical | OP-192054 | 10 | | | | |
| Mechanical | OP-192054 | 5 | | | | |
| Mechanical | OP-192054 | 4 | | | | |
| Mechanical | OP-192054 | 5 | | | | |
| Mechanical | OP-192054 | 2 | | | | |
| Mechanical | OP-192054 | 5 | | | | |
| Mechanical | OP-192054 | 8 | | | | |
| Mechanical | OP-192054 | 2 | | | | |
| Mechanical | OP-192054 | 8 | | | | |
| Mechanical | OP-192054 | 5 | | | | |
| Mechanical | OP-192054 | 5 | | | | |
| Mechanical | OP-192054 | 4 | | | | |
| Mechanical | OP-192054 | 2 | | | | |
| Mechanical | OP-192054 | 4 | | | | |

| Work Order # | OP-192151 | | Request Date | 09/26/2017 10:24 |
| Location ID | Green H.S. - 114 | | Completion Date | |
| WO Type Description | Corrective Maintenance | | | |
| Request | Heat is on in the room | | Total Hours | 3.0 |
| Priority Description | Routine | | Total Cost | 260.18 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Classroom / 4th grade - 114 | Green H.S. - 114 | Area | HV6000 | Room Temperature Problems |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Mechanical | OP-192151 | | 1 | 1 | 3 |
| Mechanical | OP-192151 | | 9 | 9 | 4 |
| Mechanical | OP-192151 | | 4 | 6 | 4 |
| Mechanical | OP-192151 | | 7 | 4 | 3 |
| Mechanical | OP-192151 | | 3 | 3 | 3 |
| Mechanical | OP-192151 | | 1 | 1 | 2 |
| Mechanical | OP-192151 | | 4 | 4 | 4 |
| Mechanical | OP-192151 | | 5 | 5 | 4 |
| Mechanical | OP-192151 | | 5 | 5 | 4 |
| Mechanical | OP-192151 | | 5 | 5 | 4 |
| Mechanical | OP-192151 | | 3 | | 4 |
| Mechanical | OP-192151 | | 7 | 5 | 5 |
| Mechanical | OP-192151 | | 3 | 3 | 5 |
| Mechanical | OP-192151 | | 6 | 2 | 7 |
| Mechanical | OP-192151 | | 14 | 15 | 4 |
| Mechanical | OP-192151 | | 6 | 6 | 7 |
| Mechanical | OP-192151 | 14 | | | |
| Mechanical | OP-192151 | 3 | | | |
| Mechanical | OP-192151 | 12 | | | |
| Mechanical | OP-192151 | 12 | | | |
| Mechanical | OP-192151 | | 13 | 13 | |
| Mechanical | OP-192151 | 5 | | | |
| Mechanical | OP-192151 | 3 | | | |
| Mechanical | OP-192151 | 9 | | | |
| Mechanical | OP-192151 | 4 | | | |
| Mechanical | OP-192151 | 6 | | | |
| Mechanical | OP-192151 | 2 | | | |
| Mechanical | OP-192151 | 10 | | | |
| Mechanical | OP-192151 | 5 | | | |
| Mechanical | OP-192151 | 7 | | | |
| Mechanical | OP-192151 | 5 | | | |

| Work Order # | OP-192027 | | Request Date | 09/25/2017 11:55 |
|---|---|---|---|---|
| **Location ID** | Grey H.S. GND – PRKG LOT | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | |
| **Request** | Channel drain behind kitchen falling apart, can we have it repaired/replaced | | **Total Hours** | |
| **Priority Description** | Routine | | **Total Cost** | 0 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Parking Lot-PRKG Lot | GHSGND-PRKG LOT | Area | PL11020 | Inspection |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Plumbing | OP-192027 | | 12 | 5 | 5 |
| Plumbing | OP-192027 | | 11 | 6 | 6 |
| Plumbing | OP-192027 | | 9 | 9 | 9 |
| Plumbing | OP-192027 | | 7 | 7 | 8 |
| Plumbing | OP-192027 | | 10 | 8 | 9 |
| Plumbing | OP-192027 | | 8 | 8 | 13 |
| Plumbing | OP-192027 | | 11 | 11 | 12 |
| Plumbing | OP-192027 | | 2 | 2 | 10 |
| Plumbing | OP-192027 | | 11 | 11 | 12 |
| Plumbing | OP-192027 | | 15 | 15 | 9 |
| Plumbing | OP-192027 | | 7 | 7 | 9 |
| Plumbing | OP-192027 | | 11 | 11 | 12 |
| Plumbing | OP-192027 | | 12 | | 14 |
| Plumbing | OP-192027 | | 14 | 14 | 14 |
| Plumbing | OP-192027 | | 7 | 7 | 15 |
| Plumbing | OP-192027 | | 15 | 15 | 15 |
| Plumbing | OP-192027 | 2 | | | |
| Plumbing | OP-192027 | 13 | | | |
| Plumbing | OP-192027 | 14 | | | |
| Plumbing | OP-192027 | 14 | | | |
| Plumbing | OP-192027 | | 8 | 8 | |
| Plumbing | OP-192027 | 12 | | | |
| Plumbing | OP-192027 | 14 | | | |
| Plumbing | OP-192027 | 14 | | | |
| Plumbing | OP-192027 | 12 | | | |
| Plumbing | GHS-192027 | 15 | | | |
| Plumbing | OP-192027 | 13 | | | |
| Plumbing | OP-192027 | 6 | | | |
| Plumbing | OP-192027 | 10 | | | |
| Plumbing | OP-192027 | 10 | | | |
| Plumbing | OP-192027 | 14 | | | |

| | | | | |
|---|---|---|---|---|
| **Work Order #** | OP-192028 | | **Request Date** | 09/25/2017 11:58 |
| **Location ID** | Grey H.S. 1004-STANDA | | **Completion Date** | |
| **WO Type Description** | Corrective Maintenance | | | |
| **Request** | Drinking fountains broken at home side concession stands. Can we have them repaired? | | **Total Hours** | 2.5 |
| **Priority Description** | Routine | | **Total Cost** | 99.85 |
| **Item Description** | **Item Number** | **Item Type** | **Task Code** | **Task Description** |
| Concession Stand A | Grey H.S. -STANDA | Area | PL11020 | Inspection |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Plumbing | OP-192028 | | 9 | | 5 |
| Plumbing | OP-192028 | | 10 | 10 | 8 |
| Plumbing | OP-192028 | | 12 | 12 | 7 |
| Plumbing | OP-192028 | | 3 | 6 | 7 |
| Plumbing | OP-192028 | | 8 | 9 | 5 |
| Plumbing | OP-192028 | | 4 | 11 | 10 |
| Plumbing | OP-192028 | | 14 | 14 | 10 |
| Plumbing | OP-192028 | | 4 | 4 | 15 |
| Plumbing | OP-192028 | | 9 | 9 | 8 |
| Plumbing | OP-192028 | | 10 | 10 | 14 |
| Plumbing | OP-192028 | | 12 | 13 | 15 |
| Plumbing | OP-192028 | | 10 | 9 | 11 |
| Plumbing | OP-192028 | | 13 | 14 | 12 |
| Plumbing | OP-192028 | | 12 | 12 | 14 |
| Plumbing | OP-192028 | | 13 | 13 | 15 |
| Plumbing | OP-192028 | | 13 | 12 | 13 |
| Plumbing | OP-192028 | | 9 | 9 | |
| Plumbing | OP-192028 | 7 | | | |
| Plumbing | OP-192028 | 11 | | | |
| Plumbing | OP-192028 | 7 | | | |
| Plumbing | OP-192028 | 11 | | | |
| Plumbing | OP-192028 | 10 | | | |
| Plumbing | OP-192028 | 11 | | | |
| Plumbing | OP-192028 | 3 | | | |
| Plumbing | OP-192028 | 8 | | | |
| Plumbing | OP-192028 | 12 | | | |
| Plumbing | OP-192028 | 11 | | | |
| Plumbing | OP-192028 | 7 | | | |
| Plumbing | OP-192028 | 9 | | | |
| Plumbing | OP-192028 | 12 | | | |
| Plumbing | OP-192028 | 12 | | | |

| Work Order # | OP-192029 | | Request Date | 09/25/2017 13:12 |
|---|---|---|---|---|
| Location ID | Blue H.S. - 2SC | | Completion Date | |
| WO Type Description | Corrective Maintenance | | | |
| Request | The flush valve in the men's restroom in the teacher's lounge is not working, it's one of those dual flush type with the green handle | | Total Hours | 1.5 |
| Priority Description | Routine | | Total Cost | 46.71 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Men's Restroom | Blue H.S. - 2SC | Area | PL11020 | Inspection |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Plumbing | OP-192029 | | 2 | | 7 |
| Plumbing | OP-192029 | | 7 | 7 | 7 |
| Plumbing | OP-192029 | | 15 | 15 | 7 |
| Plumbing | OP-192029 | | 8 | 7 | 6 |
| Plumbing | OP-192029 | | 13 | 13 | 10 |
| Plumbing | OP-192029 | | 8 | 8 | 7 |
| Plumbing | OP-192029 | | 12 | 12 | 9 |
| Plumbing | OP-192029 | | 3 | 3 | 12 |
| Plumbing | OP-192029 | | 13 | 10 | 10 |
| Plumbing | OP-192029 | | 3 | 3 | 13 |
| Plumbing | OP-192029 | | 3 | 5 | 13 |
| Plumbing | OP-192029 | | 3 | 3 | 14 |
| Plumbing | OP-192029 | | 12 | 12 | 13 |
| Plumbing | OP-192029 | | 11 | 11 | 11 |
| Plumbing | OP-192029 | | 13 | 13 | 11 |
| Plumbing | OP-192029 | | 12 | 12 | 14 |
| Plumbing | OP-192029 | 5 | | | |
| Plumbing | OP-192029 | 10 | | | |
| Plumbing | OP-192029 | 8 | | | |
| Plumbing | OP-192029 | 8 | | | |
| Plumbing | OP-192029 | | 6 | 6 | |
| Plumbing | OP-192029 | 8 | | | |
| Plumbing | OP-192029 | 13 | | | |
| Plumbing | OP-192029 | 11 | | | |
| Plumbing | OP-192029 | 10 | | | |
| Plumbing | OP-192029 | 5 | | | |
| Plumbing | OP-192029 | 12 | | | |
| Plumbing | OP-192029 | 8 | | | |
| Plumbing | OP-192029 | 8 | | | |
| Plumbing | OP-192029 | 8 | | | |
| Plumbing | OP-192029 | 11 | | | |

| Work Order # | OP-192050 | | Request Date | 09/26/2017 07:48 |
| **Location ID** | White Elem. -ENT SITE | | **Completion Date** | |
| **WO Type** | Corrective Maintenance | | | |
| **Description** | | | | |
| **Request** | South drinking fountain is vibrating and making a loud noise also, May also have the same issue as the other fountain. | | **Total Hours** | 0.50 |
| **Priority Description** | Routine | | **Total Cost** | 15.57 |
| **Item Description** | **Item Number** | **Item Type** | **Task Code** | **Task Description** |
| Entire Area-ENT SITE | White Elem. -ENT SITE | Area | HV6040 | Inspection |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
| --- | --- | --- | --- | --- | --- |
| Plumbing | OP-192050 | | 3 | 4 | 5 |
| Plumbing | OP-192050 | | 9 | 9 | 9 |
| Plumbing | OP-192050 | | 9 | 8 | 8 |
| Plumbing | OP-192050 | | 10 | | 10 |
| Plumbing | OP-192050 | | 10 | 10 | 6 |
| Plumbing | OP-192050 | | 7 | 7 | 6 |
| Plumbing | OP-192050 | | 7 | 7 | 14 |
| Plumbing | OP-192050 | | 12 | 13 | 13 |
| Plumbing | OP-192050 | | 11 | 11 | 7 |
| Plumbing | OP-192050 | | 8 | 8 | 9 |
| Plumbing | OP-192050 | | 8 | 8 | 12 |
| Plumbing | OP-192050 | | 9 | 10 | 7 |
| Plumbing | OP-192050 | | 11 | 11 | 11 |
| Plumbing | OP-192050 | | 11 | 9 | 15 |
| Plumbing | OP-192050 | | 9 | 9 | 12 |
| Plumbing | OP-192050 | | 15 | 15 | 14 |
| Plumbing | OP-192050 | 13 | | | |
| Plumbing | OP-192050 | 9 | | | |
| Plumbing | OP-192050 | 13 | | | |
| Plumbing | OP-192050 | 10 | | | |
| Plumbing | OP-192050 | | 14 | 14 | |
| Plumbing | OP-192050 | 15 | | | |
| Plumbing | OP-192050 | 12 | | | |
| Plumbing | OP-192050 | 10 | | | |
| Plumbing | OP-192050 | 9 | | | |
| Plumbing | OP-192050 | 13 | | | |
| Plumbing | OP-192050 | 15 | | | |
| Plumbing | OP-192050 | 15 | | | |
| Plumbing | OP-192050 | 7 | | | |
| Plumbing | OP-192050 | 13 | | | |
| Plumbing | OP-192050 | 13 | | | |

| | | |
|---|---|---|
| **Work Order #** | OP-192144 | **Request Date** 09/25/2017 09:58 |
| **Location ID** | Green H.S. GRN-ENT AREA | **Completion Date** |
| **WO Type Description** | Corrective Maintenance | |
| **Request** | Need the storm drain cleaned. | **Total Hours** 2.00 |
| **Priority Description** | Routine | **Total Cost** 62.28 |

| Item Description | Item Number | Item Type | Task Code | Task Description |
|---|---|---|---|---|
| Entire Area-ENT AREA | GRNHS GRN-ENT AREA | Area | PL11015 | General Plumbing Repair |

| Functional Area | Work Order | R1 | R2:Comprehensive Ranking | R2:Impact Ranking | Pairwise Comparison Ranking |
|---|---|---|---|---|---|
| Plumbing | OP-192144 | | 9 | 9 | 9 |
| Plumbing | OP-192144 | | 12 | 12 | 10 |
| Plumbing | OP-192144 | | 10 | 10 | 12 |
| Plumbing | OP-192144 | | 10 | 10 | 9 |
| Plumbing | OP-192144 | | 10 | 10 | 6 |
| Plumbing | OP-192144 | | 11 | | 12 |
| Plumbing | OP-192144 | | 12 | 12 | 14 |
| Plumbing | OP-192144 | | 12 | 14 | 12 |
| Plumbing | OP-192144 | | 10 | 10 | 14 |
| Plumbing | OP-192144 | | 4 | 4 | 13 |
| Plumbing | OP-192144 | | 10 | 10 | 10 |
| Plumbing | OP-192144 | | 11 | 14 | 15 |
| Plumbing | OP-192144 | | 14 | 14 | 15 |
| Plumbing | OP-192144 | | 13 | 13 | 15 |
| Plumbing | OP-192144 | | 8 | 11 | 14 |
| Plumbing | OP-192144 | | 14 | 13 | 15 |
| Plumbing | OP-192144 | 12 | | | |
| Plumbing | OP-192144 | 12 | | | |
| Plumbing | OP-192144 | 11 | | | |
| Plumbing | OP-192144 | 15 | | | |
| Plumbing | OP-192144 | | 15 | 15 | |
| Plumbing | OP-192144 | 11 | | | |
| Plumbing | OP-192144 | 15 | | | |
| Plumbing | OP-192144 | 15 | | | |
| Plumbing | OP-192144 | 15 | | | |
| Plumbing | OP-192144 | 14 | | | |
| Plumbing | OP-192144 | 14 | | | |
| Plumbing | OP-192144 | 13 | | | |
| Plumbing | OP-192144 | 15 | | | |
| Plumbing | OP-192144 | 15 | | | |
| Plumbing | OP-192144 | 15 | | | |