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Kennesaw State University - Maintenance Optimization and Cost Analysis

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KENNESAW STATE UNIVERSITY HOUSING:

Maintenance Standardization and Cost Analysis

Kennesaw State University

ISYE 4900

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Abstract:

Utilizing the DMAIC model of Define, Measure, Analyze, Improve and Control, we began a study of the Marietta Housing Maintenance and Facilities Processes. We aim to collect relevant data pertaining to room turnovers occurring within residential areas as well as determine new standards for how each task should be completed and ways that time and money can be saved by the department. Our overarching goal is to determine cost down methods for the department as well as setting standard operating procedures for room turnovers.

Executive Summary

The Department of Housing and Residence Life was looking for ways to improve the quality of their work while saving costs at the same time. The department allowed the team to look over their work orders where the team noticed over 50% of the work orders were related to room turnover. After this discovery, the team focused all efforts on room turnover and went over the process in detail with management. The team asked to see the standard operating procedure for room turnover and learned that most of the staff did not know they had one.

The team wanted to investigate why the staff was not aware of the SOP, so the team met with the assistant director of housing facilities to discuss why the SOP was not in use. He expressed that the SOP was not specific enough to direct the technicians in what the department was looking for. This led the team to begin thinking about creating a new SOP.

After some research, the team learned that reducing variability was a good way of saving costs and that standard operating procedures were a reliable way of reducing variability. The team spoke with the department and reached the decision that a new SOP was the right decision for the department.

The team began by shadowing the technicians to learn how the procedure should be done and where improvements could be made. As the team shadowed, they learned that resident assistants were supposed to be performing the inspections. This inspired the team to continue with creating the SOP but to also fully shift inspection duties to the resident assistants. After discussions with the housing department management, the new SOP created by the team was accepted and the trial runs with resident directors performing the inspections began. The team recommended that the department make the new SOP available to all resident and student assistants to ensure that each inspection was done in the same manner to reduce variability and rework.

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Chapter 1: Preface

1.1 Introduction.

At Kennesaw State University on the Marietta Campus, the Department of Housing and Residence Life was entering maintenance work data into a data base but had not utilized this data in an effective way. They needed their data analyzed to optimize time to complete jobs and to optimize the cost of jobs.

1.2 Initial Findings and Project Focus.

After reviewing initial data regarding maintenance procedures, the team discovered that room turnover is about 55.73% of all maintenance procedures which is shown in Figure 1. Therefore, the team tackled room turnover. As the problem was explored, the team found that the department was not using the standard operating procedure associated with room turn. The SOP that the department was using did not include enough detail for it to be effective. There was no standard on how to conduct a room turn inspection which led to high variability and a large amount of rework needed.
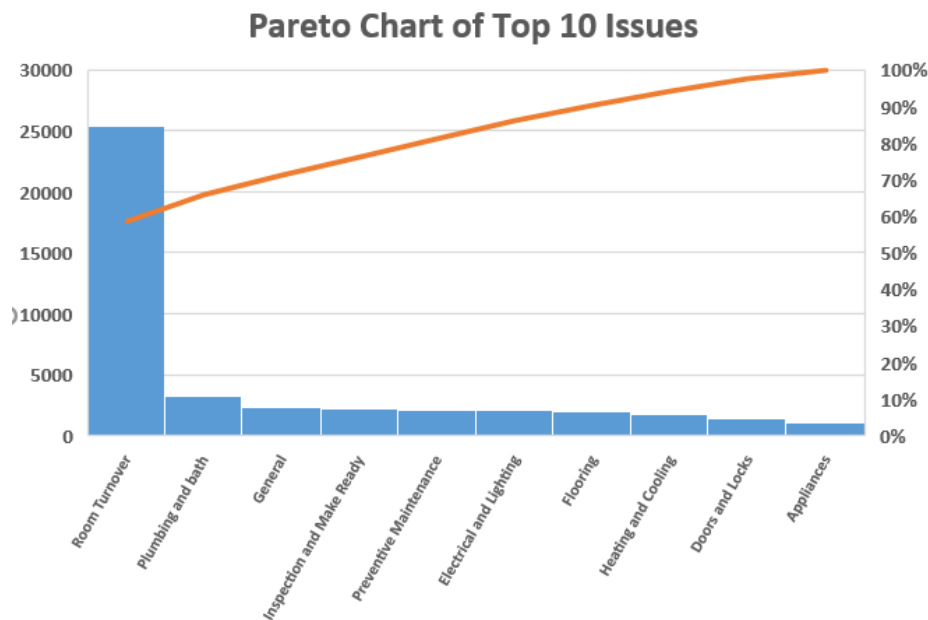
Figure 1. Pareto Chart

1.3 Project Background.

Kennesaw State University continues to have an increasing demand for on campus housing, and as a result, the university dedicated an entire department to providing students with a specialized experience revolving around housing and life on campus. This department oversees everything

from electrical issues within the housing units to repairing a leg on a chair within a dorm. All jobs are typically divided among the maintenance technicians based on their specialized areas, but all the technicians perform room turnovers.

A room turnover is the process of assessing a room and determining what needs to be fixed after a resident moves out in preparation for incoming residents. During peak turn periods such as summer and winter, contractors perform about 75% of the work such as painting, deep cleaning and flooring repair, while the other 25% of the work consisting of room "punches" are handled by the technicians. Room "punches" are tasks such as plumbing check, lighting check, overall room condition inspections and many others. During the slower seasons, all work is handled by on campus maintenance techs and custodial staff members. The technicians were told to change, fix, or report a problem that needed to be attended by judging the issue for themselves. They were not following a set of clear criteria of what was to be defined as a defective or old part that needed changing. That uncertainty led to a large amount of variation and rework.

1.4 Objective and Justification.
The objective of this study was to reduce room turnover variability by 5% by April 22, 2020. It was the department's belief that inconsistent room turnovers were resulting in a worse experience for the students that live or will live in on-campus housing. By reducing the variability that was associated with room turnovers, each room would be completed using the same criteria giving students an idea of what to expect. This ensured that residents could look forward to more consistent and higher-quality living situations and residential experiences.

1.5 System Overview.
The DMAIC model was used to model the process improvement of room turnovers in the Kennesaw State University Housing and Residence Life Department. The model included all of the following stages: Define, Measure, Analyze, Improve, Control.

Chapter 2: Literature Review

2.1 DMAIC Model – History.

At a Motorola television factory in Schaumburg, IL, Bill Smith and Mikel Harry developed a four-stage process including Measure, Analyze, Improve, Control. Two years later in 1987, Bob Galvin, Motorola's CEO, launched "The Six Sigma Quality Program" that set 3.4 DPMO (defects per million opportunities) as the new standard for all their products. [1] Today, Six Sigma is known worldwide as a quality improvement tool and a business management strategy that focuses on quality to provide a domino effect that will positively impact everything from customer satisfaction to cost.

2.2 Implementation of Six Sigma

Through research, the team found some key procedures that cannot be ignored when implementing Six Sigma into projects.

1. Define: The problem must be properly defined before any work can be done, and everyone involved in the project must understand why the project is needed [2] and what the customer requirements are. [1] [3] This includes management; management must be fully committed to the project for it to implemented successfully. [4]

2. Measure: Taking time to understand the process that is being measured as well as recording accurate measurements are key to creating a reliable base data set. [5] A good tool that can be used to understand the process being measured is process mapping. "Any process mapping technique is acceptable as long as regarding the steps in the process and their interaction with one another." [6]

3. Control: The process must be continually evaluated by collecting and analyzing data, and this information must be made available to everyone to view and reflect upon. [7]

2.3 Standard Operating Procedures.

Standard operating procedures are widely accepted as tools that are required for "consistent operation of a given process." [8] Standard operating procedures or SOPs are needed to ensure that each process is being approached and completed in the same way to reduce variability and increase effectiveness. [9] [10] There are some critics of SOPs that say it limits creativity and forces workers to stop putting in thought to their jobs. [8] The best way to encourage employees to follow the SOP is to make sure that it is worth following. The people doing the work are going to be the best way to understand how the process works. As the SOP is being developed, the employees should be given a chance to make suggestions and work alongside the developers. [8]

Chapter 3: Define

The define stage includes the problem, design requirements and specifications, minimum success criteria, and resources.

3.1 The Problem.

Room turnovers were a common but unregulated process that had a lot of variation due to unclear goals and generalized criteria. The standard operating procedure was not used because of this, and a portion of the staff did not know they even had a standard operating procedure. The team estimated that the continuous variability in their processes could be resulting in roughly $3500 per year in extra labor and expenses.

3.2 Design Requirements and Specifications.

The new standard operating procedure must be able to dictate how to accurately record the duration of a room turn and must have standard times and detailed steps and instructions for the corresponding tasks. Time and cost data must be easily accessible by housing management and easy to update.

3.3 Minimum Success Criteria.

The new process model must provide information to management to understand their most historically common tasks, determine the standard time for room turnover, and provide a standard operating procedure on how to do a room turn. It must also determine how much time/money the department could save in a single year by reducing room turnover variability.

3.4 Required Resources.

The project required access to any and all historical data, as well as access to the facilities and facility logs. Time recording devices were needed to record the time to complete a room turn. Excel was be used to perform economic analysis to compare present and future values.

3.5 Budget

The budget included the hours worked by the engineers at $50/hour/engineer. The project did not require direct funds but did require time with technicians and management. The budget (below) does not include the time taken to write this paper. It only includes time taken directly working on the project for the housing department.

Description	Work Time in Hours			Total Hours/Task	Total Cost/Task
	Mary	David	Luke		
Project Scope meeting 2/6/20	2	2	2	6	$300.0
Meeting write up & information follow up 2/6/20		0.5		0.5	$25.0
Data Analysis 2/1/20 - ()		0.5	7	7.5	$375.0
Data Analysis 2/9/20		1.25		1.25	$62.5
Chart theories and analysis options 2/11/20		0.5		0.5	$25.0
Gantt Chart 1/15/20 - ()	3			3	$150.0
Write IDR 1/12/20	2	1	1	4	$200.0
Research 1/15/20 - ()	1	1	1	3	$150.0
Consultation meeting 2/13/20	0.75	0.75		1.5	$75.0
Research 2/4/20		1.5		1.5	$75.0
Project Set up 1/14/20	5	5	5	15	$750.0
Group Meeting 2/13/20	2	2	2	6	$300.0
Group Meeting 2/13/20	1	1	1	3	$150.0
Consulting 2/20		1		1	$50.0
Consulting 2/25	1	1	1	3	$150.0
Shadow workers 3/11	2	2	2	6	$300.0
Data Entry 3/14		1		1	$50.0
Flowchart generation Part 1		2		2	$100.0
Research 3/4		1.5		1.5	$75.0
Research 3/12	3			3	$150.0
Economic Analysis			1	1	$50.0
Group Meeting 2/13/20	1		1	2	$100.0
SOP Generation 3/6/20-3/10/20		2.75		2.75	$137.5
HRL Management Meeting 4/21/20		0.5		0.5	$25.0
	23.75	28.75	24	76.50	$3,825.0

Figure 2. Engineer Budget

3.6 Responsibilities and Schedule.

The schedule was designed to give the team as much time as possible to collect data while still leaving time to complete all analyses needed. All responsibilities were given to team members based on interest and amount of time available to complete the task. Please refer to Appendix E: Gantt Chart.

Chapter 4: Measure

The measure stage defines what data needs to be collected and how it should be collected.

4.1 Data Required.

The time to complete a room turn needed to be recorded. The average cost of materials used to complete room turnovers and the average salary of the technicians needed to be collected.

4.2 Data Collection.

The time taken to complete room turnovers was collected using time studies. The costs associated with the project was provided by the Kennesaw State Department of Housing and Residence Life with consent.

The preliminary data collection for the time studies within the residence halls started on March 4, 2020 with approval from the Housing and Residence Life Facility Coordinator. The team was able to follow maintenance technicians to three distinct residential rooms, one located in the University Columns, one in the Hornet Village Suites, and one in Howell Hall. Through following the technicians, the team was able to observe and document the general procedures currently utilized by maintenance technicians to inspect the quality of a room. Utilizing this data, the team was able to create a flowchart/process map for the single style suite in Hornet Village Suites.

4.3 Problem Solving Approaches to Consider.

These are the different solutions to be considered after reviewing the initial data.

- Have resident and student assistants help with the room turn process. Resident assistants do not get paid, but instead receive free housing in the dorms. Having the residents help with the turn process seemed like a good solution, but the drawback was finding a way to motivate them to do a thorough job. Although student assistants do get paid by the hour, they can serve as a second option when a resident assistant is not available.
- Contract the entire turn process to outside vendors. The number of contracts that the department had with outside vendors who were paid for the number of rooms completed ranged anywhere from $1,000 to $8,000. The department did not want to spend any more than they had to on contractors due to the increased number of vendors.
- Hire more maintenance technicians to do the turn process. The maintenance technicians were not being trained in how to successfully complete a room turn determined by the

department standards. The technicians that were already on staff simply needed to be trained in room turns.

- Improve standard operating procedures. Improving the standard operating procedure would set clear criteria and clear standards of what was expected in a room turn. It would stream-line the process, so each technician would be performing the room turn in the same way. This solution would reduce variability and the amount of rework needed.

4.4 Target Problem Solving Approach: Standard Operating Procedure.

The team studied the way each technician performed room turnovers using time studies. The time studies were analyzed to create a time standard for each process needed to complete a room turn. The team then created a flow chart of how the room turns were being performed and used the standard time to create a simulation of the room turn in Arena. The first process, the inspection process, was where most of the variation was suspected of taking place. The team focused on improving the inspection process with a standard operating procedure.

Chapter 5: Analyze

The analyze stage reviews how the data collected will be analyzed to find results.

5.1 Shadowing the Technicians.

The team collaborated with the department to find some time to shadow the technicians during a number of room turns. The team went with the technicians to each housing unit that was to be turned, and the technicians walked the team through the entire inspection process as they completed it. The team was trained in what to look for during inspection as well as what the next steps would be in the room turn process. The team was also able to record the time it took to complete the inspection process which was about 14 minutes. It was at this point, that the team learned that a lot of the work done in the turn process was simply that first step of inspecting the rooms.

As the team followed the technicians throughout the communities, the technicians were asked what would help them complete their room turns more effectively and efficiently. They informed the team that a number of inspections were being done on the same room because resident assistants and student assistants were not effectively inspecting the rooms. If these inspections were done only once, a lot of time would be saved. At this time, the team began to investigate the role that resident assistants and student assistants play in the room turn process.

5.2 Root Cause Analysis.

In the past, resident assistants and student assistants have done preliminary inspections as part of the move out process. If utilized correctly, this preliminary inspection could potentially save the technicians from the extra inspections that they are dealing with. The team decided to create a standard operating procedure for the resident assistants and student assistants to follow in order to eliminate the inspection step during room turns. The team also decided to look at the training process to ensure that all resident assistants and student assistants were proficient in the inspection process to reduce variability during the room turns. (This is explained in further detail in the Improve Stage.)

5.3 Flow Chart.

The team created a flow chart to visualize the process for the Hornet Village single style suite using the steps learned from shadowing the technicians. The team then filled out the gaps in the flowchart using information from the technicians as well as others who worked in the department. This flowchart was crucial to ensure that no steps were overlooked in creating the

standard operating procedure. The team used this information to then create a second flow chart to represent and visualize the process for a double suite. (Please see Figures 1-2)
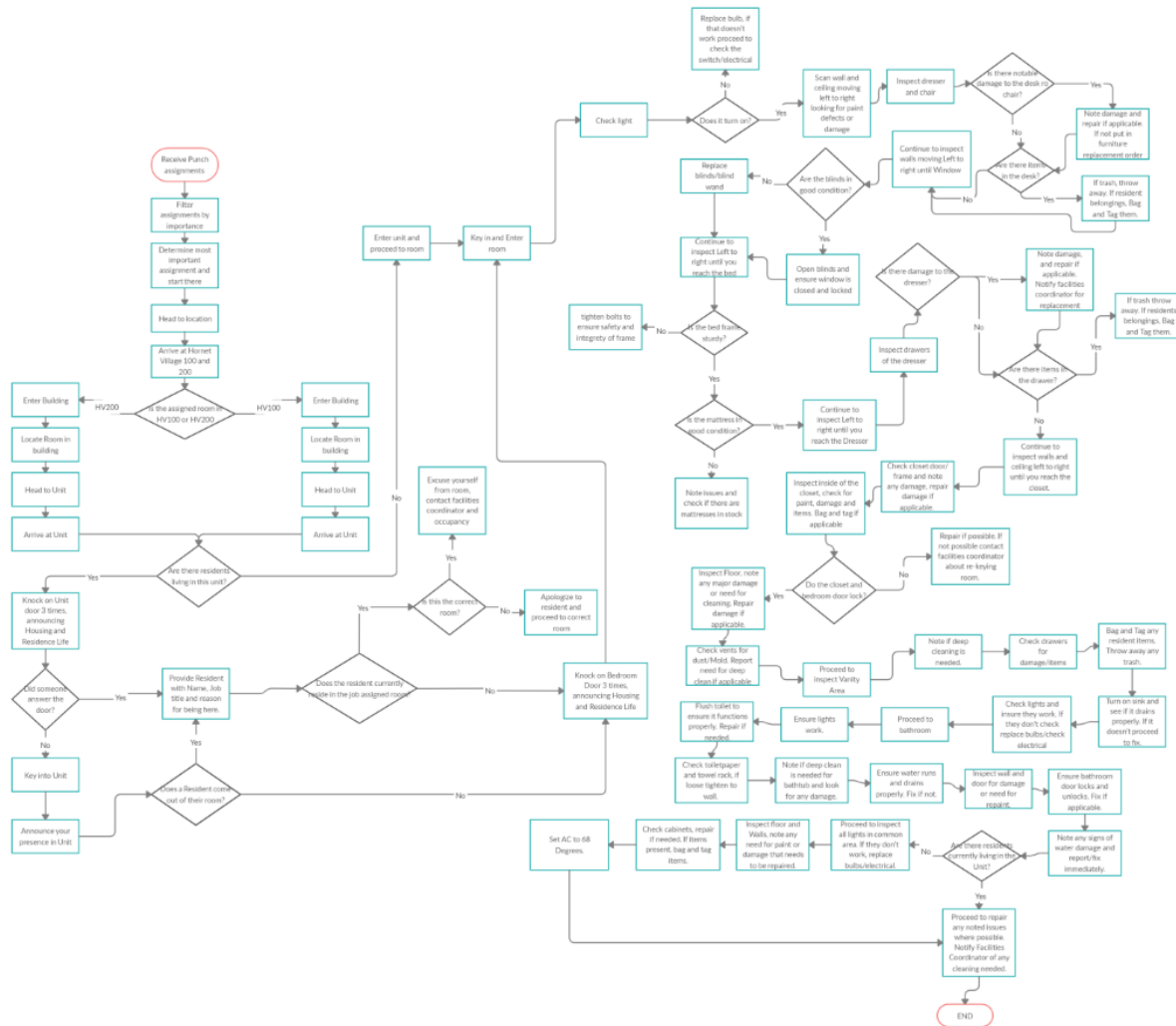
Figure 3. Hornet Village Single Suite Flow Chart
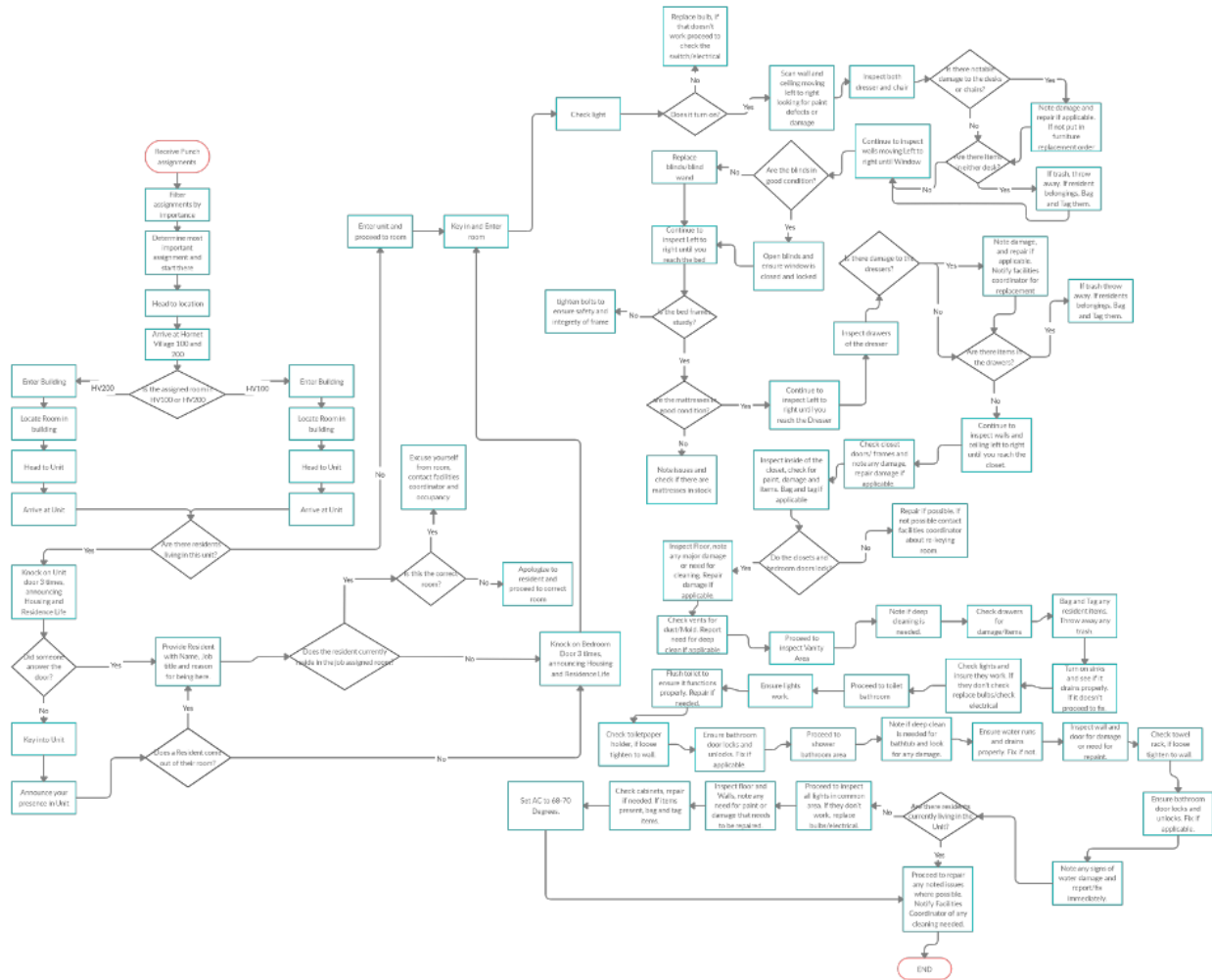
Figure 4. Hornet Village Double Suite Flow Chart

5.4 Economic Analysis.

The present and future costs were analyzed to show the effects of eliminating the inspection process from the technicians. This analysis was done using the average reported technician salary as well as estimates for how long it takes to complete the punch process. Remembering that resident assistants do not get paid in wages but in housing, the team calculated how much it costs the department to have technicians perform the inspections versus how much the department could save by shifting that task to resident assistants instead. The team also calculated how much it would cost to have student assistants to complete the inspections even though that would be a last option. (Please refer to Tables 1-4)

Tech Name	Classification	Yearly salary 2019	Avg weeks worked	Hourly Salary
Tech 1	Residential Technician	$34,972.55	50	$17.48

Time Required for Average Punch (Units: per hour)	Cost for Tech to Punch Room	Number of Rooms Punched per Summer	Cost of Punched Rooms per Summer	
0.24	$4.19	600	$2,514.00	

Time Required for Average Punch (Units: per hour)	Cost for Tech to Punch Room	Number of Rooms Punched during Spring and Fall Semester	Cost of Punched Rooms During Spring and Fall	
0.24	$4.19	250	$1,047.50	

		Total Cost per Year in Labor for Punch	$3,561.50	

Table 1. Economic Analysis using Sample Punch Time Data

(This was an estimate using averaged salary data and sampled punch time. Refer to Time Study Sheet for sample punch time.)

Tech Name	Classification	Yearly salary 2019	Avg weeks worked	Hourly Salary
Tech 1	Residential Maintenance Technician	$34,972.55	50	$17.48

Time Required for Average Punch (Units: per hour)	Cost for Tech to Punch Room	Number of Rooms Punched per Summer	Cost of Punched Rooms per Summer	
0.16	$2.79	600	$1,678.08	

Time Required for Average Punch	Cost for Tech to Punch Room	Number of Rooms Punched during Spring	Cost of Punched Rooms During	

(Units: per hour)		and Fall Semester	Spring and Fall
0.16	$2.79	250	$699.20
	Total Cost per Year in Labor for Punch		**$2,377.28**
	Savings by using SOP		**$1,184.22**

Table 2. Economic Analysis using SOP
(This was an estimate using the trial SOP for the inspection process to be done by resident assistants. Average punch time was reduced by four minutes.)

Tech Name	**Classification**	**Yearly salary 2019**	**Avg weeks worked**	**Hourly Salary**
Student Assistant	Student Assistant	RAs do not get paid	20	$9.25

Time Required for Average Punch (Units: per hour)	Cost for RA to Punch Room	Number of Rooms Punched per Summer	Cost of Punched Rooms per Summer
0.16	$1.48	600	$888.00

Time Required for Average Punch (Units: per hour)	Cost for RA to Punch Room	Number of Rooms Punched during Spring and Fall Semester	Cost of Punched Rooms During Spring and Fall
0.16	$1.48	250	$370.00
	Total Cost per Year in Labor for Punch		**$1,258**

Table 3. Economic Analysis with Inspection Process Done by Student Assistants using SOP

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Tech Name	Classification	Yearly salary 2019	Avg weeks worked	Hourly Salary
Resident Assistant	Resident Assistant	RAs do not get paid	32	$0.00

Time Required for Average Punch (Units: per hour)	Cost for RA to Punch Room	Number of Rooms Punched per Summer	Cost of Punched Rooms per Summer
0.16	$0.00	600	$0.00

Time Required for Average Punch (Units: per hour)	Cost for RA to Punch Room	Number of Rooms Punched during Spring and Fall Semester	Cost of Punched Rooms During Spring and Fall
0.16	$0.00	250	$0.00
	Total Cost per Year in Labor for Punch		**$0.00**

Table 4. Economic Analysis with Inspection Process Done by Resident Assistants using SOP (Resident assistants were already supposed to be inspecting room after moveouts.)

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Chapter 6: Improve

The improve stage consists of finding a solution to the problem and implementing that solution.

6.1 Implementing the Solution.

The team followed a tool called the action plan that was mentioned in Dr. Lois Jordan's manual *Strategic Business Performance Improvement* for implementing the solution. The action plan detailed each step for what needed to be done to implement the solution as well as who needed to do it. It was a way of tracking the progress of the implementation while keeping the team responsible at the same time. The below table was the action plan the team created for the department of Housing and Residence Life.

Subject	How	Who	When	Status
New SOP	Create new standard operating procedure. Approve new standard operating procedure.	Six Sigma Project team CL/CG/ZP	Spring 2020 Determined by department	Complete Pending
Train the trainer	Lead technician train Resident Directors and other personnel.	SC/ZP/CG	Determined by department	Pending
Train the Resident Assistants	Resident life pro-staff train resident and student assistants.	HRL personnel (RD's/ACs/SRA's)	Determined by department	Pending
Trial run with new SOP	Pilot test the new SOP.	SA's/RA's/SRA's	Determined by department	Pending
Using new SOP	SA's, RA's, SRA's, and new techs will read SOP to ensure consistent inspections	SA's/RA's/SRA's New Technicians	Determined by department	Pending

Table 5. Action Plan

6.2 The Standard Operating Procedure.

The standard operating procedure was created using the information gathered from shadowing the technicians as well as information provided by the department. The team made it a priority to be as detailed as possible while also being clear and concise. It needed to be detailed so as not to miss steps in the process, and it needed to be clear to ensure that reinspection would not be necessary. The department then looked over the standard operating procedure and approved its use in room turns.

6.3 Training Methods.

Training resident directors and resident assistants boils down to management making sure that they read the new standard operating procedure. Each resident assistant should be given the new standard operating procedure and be trained in the new quality standards. Resident assistants, student assistants, and new technicians should have the new standard operating procedures provided to them whenever completing inspections. This was done to ensure that steps in the inspection process were not overlooked while simultaneously decreasing variation in the overall process. Because of time restrictions, the team could not implement a full training program, but one is recommended in the control stage. Instead, individual employees were trained to do the pilot tests.

6.4 Pilot Test.

The team utilized the trial standard operating procedure, SOP, for the double style suites. Members of the team shadowed a resident director who had never done an inspection and allowed them to do the first inspection with information that the department had provided on how to complete an inspection. This test acted as a baseline comparison. During the inspection the resident director expressed confusion over what was being asked by the instructions provided by the department and overlooked several issues in the room including sink drainage issues, bed frame quality, and light switch that did not work. In the next unit, the team provided the resident director with the team's trial SOP. While using the SOP, the resident director did not overlook any of the previous issues she had missed and informed the team that by reading the SOP, it cleared up the confusion that she had regarding the inspection process.

The team also used this opportunity to catch small errors in the SOP that had previously been overlooked and made changes to the SOP during the testing phase. The additions included fire extinguisher standards, vanity board replacement and department standards of cleanliness. Upon completion of the second inspection, the resident director went back to the previous room and re-

inspected it using the SOP. Using the SOP, the second time around, she was able to find all the things she had previously missed.

6.5 Using the Trial SOP.

Because of the circumstances under which the team was working, the team could not collect accurate data on its implementation, but the SOP was used a few times for feedback on its construction. The feedback received was that it was easy to understand and easy to follow while doing the job. Furthermore, after reviews by multiple technicians, it was determined that the new SOP covered everything that the technicians looked for when performing inspections.

Chapter 7: Control

The control stage is used to make sure that the implemented changes are sustained and validated.

7.1 Verification.

According to feedback from the managers, resident directors, and resident assistants, the new standard operating procedure included all aspects of the inspection process and was well-written and very detailed. The new SOP reflected the departments quality standards and was easy to understand by all who utilized it. While the team would have like to complete a statistical analysis on the effectiveness of the SOP, due to COVID-19, the team was unable to collect further data to verify the process.

7.2 Data Monitoring.

The team recommended that the housing department collect and monitor data to ensure that the inspection process was being done correctly. If the process was not monitored, it would become unstable and regress back to where it started.

- *Data Collection.* Times should be continuously recorded for each room turn to ensure that standard times are met. The clock should be started when the inspector opens the door of the room and should be stopped when the inspector closes the door behind them. Any rework or reinspection should also be notated.
- *Data Analysis.* Times should be compared to the standard time to ensure that each room turn was being completed in a timely manner. Any rework or reinspection should also be investigated to understand why it was needed and if any further action such as retraining needed to take place.

7.3 Training.

After the team explained the SOP to Housing and Residence Life leadership and provided any edits or clarification, the department had the final say as to who they viewed to have the best qualifications to teach the SOP to student assistants and resident assistants as well as new technicians. It would be the team's recommendation to make SOP available to all HRL personnel who might be performing inspections and have the facilities director or facilities coordinator be the point contact if there was any clarification required. The purpose of the SOP was to provide detailed instructions with minimal training which would be beneficial for a busy organization like KSU HRL.

Chapter 8: Results and Discussions

8.1 Findings and Results.

The team's findings from the project was that the Department of Housing and Residence Life did not have a standard operating procedure that reflected the standards they held themselves to. The team was able to work with the department to provide the following: the standard time to complete the inspection process, the data collection method to record the standard time, and a standard operating procedure that reflects the quality standards that the department wanted to uphold.

8.2 Limitations of the Project.

The team began the project expecting only to be limited by time but found other limitations such as knowledge and the COVID-19 pandemic. Time was an expected limitation because all team members were full-time students and were also working at other jobs. The knowledge limitation was somewhat expected, but the team had to do a lot of research and read through a Green Belt Six Sigma manual to successfully complete the project.

COVID-19 was the unexpected curveball that brought the analyze stage to a halt. The team was no longer permitted to be on the Kennesaw State University campus to collect data because the housing department was working to limit unnecessary contact. The team had to do their best to analyze the small amount of data they already had. The only analysis that could be done with the time study data was an average time to do the inspection that was later used as the standard time.

The team took these drawbacks in stride and approached each problem with vigor resulting in a successful project that provided the housing department with a new standard operating procedure and a standard time to complete the inspection process.

Chapter 9: Conclusions

9.1 Summary.

The team was able to use resources provided by the Department of Housing and Residence Life to analyze the standard operating procedure for the room turn inspection process that the department had at the time to determine whether it lived up to the quality standards the department was seeking. The team discovered that the SOP was too vague, so the team began creating a new, detailed SOP to reduce variability which would reduce rework and reinspection.

As the team investigated the proper way to do an inspection for room turnover, the team learned that resident assistants and student assistants could do the inspections. Therefore, along with creating an SOP, the team worked to shift inspection duties to the resident and student assistants. In the end, the SOP was accepted by the housing department, and the resident and student assistants began performing the inspections.

9.2 Recommendations.

The team recommended that the Department of Housing and Residence Life continue with the trial runs using the SOP and use feedback from the trail runs to continually improve. The department should implement a strong training program for resident directors and resident assistants as well as continue to sit down with technicians to have open conversations about the turn process.

References

[1] L. Jordan, Strategic Business Performance Improvement, Transformation Technologies Inc., 2019.

[2] A. Cherrafi, S. Elfezazi, K. Govindan, J. A. Garza-Reyes, K. Benhida and A. Mokhlis, "A Framework for the Integration of Green and Lean Six Sigma for Superior Sustainability Performance," *International Journal of Production Research,* vol. 55, no. 15, pp. 4481-4515, 2017.

[3] P. Kaushik and D. Khanduja, "Application of Six Sigma DMAIC Methodology in Thermal Power Plants: A Case Study," *Total Quality Management & Business Excellence,* vol. 20, no. 2, pp. 197-2001, 2009.

[4] M. Kumar, J. Anthony and M. K. Tiwari, "Six Sigma Implementation Framework for SME's - A Roadmap to Manage and Sustain the Change," *International Journal of Production Research,* vol. 49, no. 18, pp. 5449-5467, 2011.

[5] A. Gupta, P. Sharma, S. C. Malik, N. Agarwal and P. C. Jha, "Productivity Improvement in the Chassis Preparation Stage of the Amplifier Production Process: A DMAIC Six Sigma Methodology," *International Journal of Reliability, Quality & Safety Engineering,* vol. 23, no. 6, 2016.

[6] S. R. Dyass, M. S. Greenfield, S. Thotakura, S. Gholston, T. Doughty and M. Hays, "Process-Improvement Cost Model for the Emergency Department," *Journal of Healthcare Management,* vol. 60, no. 6, pp. 442-458, 2015.

[7] S. S. Chakravorty and D. N. Hales, "Sustainability of Process Improvements: An Application of the Experimental Learning Model (ELM)," *International Journal of Production Research,* vol. 55, no. 17, pp. 4931-4947, 2017.

[8] S. De Treville, J. Antonakis and N. M. Edelson, "Can Standard Operating Procedurs be Motivating? Reconciling Process Variability Issues and Behavioural Outcomes," *Total Quality Management,* vol. 16, no. 2, pp. 231-241, March 2005.

[9] G. Amare, "Reviewing the Values of a Standard Operating Procedure," *Ethiopian Journal of Health Sciences,* vol. 22, no. 3, pp. 205-208, November 2012.

[10] C. Hongdiyanto, "The Importance of Production Standard Operating Procedure in a Family Business Company," *IOP Conference Series: Materials Science and Engineering,* vol. 277, no. 012024, December 2017.

Appendix A: Acknowledgements

The team would like to express gratitude to the two advisors of this project, Dr. Adeel Khalid and Dr. Lois Jordan, who gave their time and guidance to assist in the completion of this successful project.

The team would also like to extend thanks and appreciation to all those in the Department of Housing and Residence Life who volunteered their time and expertise including:

Jenny Cotton, Executive Director of Housing and Residence Life
Ama Economy, Director of Housing and Residence Life, Marietta
Chris Gasquez, Residential Facilities Coordinator
Zarko Pilic, Assistant Director of Housing Facilities
Caleb Lee, Associate Director of Facility Housing and Residence Life
Slade Chatman, Maintenance Foreperson
Jhasmine Wade, Resident Director
Courtnae Brown, Area Coordinator
Mimi Burgen, Area Coordinator
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Appendix B: Contact Information

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Appendix C: Reflections

Luke Fowler. At the beginning of the project, I was a little worried about how exactly I could help, as it was not an area that I have any experience in. However, once we were able to get enough information and data to be able define the project well, I realized that I could apply ideas and lessons taught to me in various classes as well as use experiences I have had in other fields and apply them to this project. This realization challenged me to use the knowledge that I have acquired through experience and studying to make sure this project succeeded.

This project turned out to be a little more unpredictable than I first expected. Individually as well as collectively, we had challenges that we had to overcome throughout this project. Some of the unpredictability and challenges that we faced came from our own assumptions and short comings, while others came from the field and people we were working with. However, I think the team was able to overcome these shortcomings with creative ideas and solutions for the problems we were facing by taking our time and asking the important questions that were necessary to get the information we needed to be able to successfully complete this project.

One of our biggest challenges that we faced was that we had a tendency as a group to try and work on tasks that we saw needed improvement, but they did not fit into the scope of our project. This caused us to go off on tangents a few times and in the long run, caused us some delay in completing the project. We were able to overcome this tendency/challenge thanks to Dr. Lois Jordan walking us through project scopes and the define stage of the DMAIC model as well as using meeting agendas and only discussing the info and topics that were on the agendas. The info given to us by Dr. Jordan and using the meeting agendas kept us focused on the topics at hand and allowed us to have productive discussions about them.

David Murphy. Throughout this project I was able to learn a great deal of information regarding the real-world importance and application of Industrial Engineering tools and principles. The focus on Six Sigma allowed for our project to keep its focus and provided a guideline on what needed to be done to ensure we had the proper foundation for our project. The original scope for our project was too broad and it resulted in our focus being muffled and confused. After shortening the scope, it allowed us to be more focused. We utilized time studies, root cause analysis, six sigma principles, quality control principles, and action plans to conclude that the department of Housing and Residence Life at Kennesaw State did not utilize a proper standard operating procedure (SOP) for their room turn and inspection process. This resulted in excess variation in their processes and procedures. However, by creating an effective SOP for the

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housing department we were able to decrease variation in their processes and allow for more improved training models for new employees. Unfortunately, due to department constraints and COVID19 our control stage was cut short, so our testing phase was minimized but we still learned a great deal from this experience, and it gave us ideas to apply to future industry projects.

Mary Ogidigben. I was very excited about this project because I have always had an interest in Six Sigma. This was the best way to gain real world experience while being able to work closer with professors to steer us in the right direction. Dr. Adeel Khalid worked with us right from the start by letting us know that our scope was too broad. He knew that our project was too big and warned us that if we didn't narrow the scope, we wouldn't be able to successfully complete the project. We wanted to fix every problem that we saw but knew that we needed to choose one that was attainable and measurable. Dr. Lois Jordan helped us to narrow our scope by letting us use her book and notes from her Lean Six Sigma class as a guide.

In the end, David, Luke, and I put our heads together to determine one problem (the inspection process of the room turn process) and solve only that problem. I think this led to a good project, but unfortunately, due to COVID-19, we were not able to gather as much data as we wanted to and couldn't do all of our analyses. We ended up cutting out some major parts of our project, but eventually we pulled it all together to make one successful project.

This project taught me the value of teamwork, six sigma principles, and how to deal with curveballs as they come. I was a bit nervous when the Kennesaw campuses were shut down, but we reorganized the project and gave the housing department some suggestions to finish our project when they're ready. Overall, it was a great experience with some great people.

Appendix D: Team Contributions

Luke Fowler. Luke worked on data analysis on the data that the housing department provided as well as did the economic analysis and some of the PowerPoints.

David Murphy. David set up all the meetings with the housing department, wrote the "root cause analysis" and "shadowing the technicians" sections of the paper, helped with editing, made the video, created the flow charts, created the SOP's, and made some of the PowerPoints.

Mary Ogidigben. Mary wrote the majority of the paper (except for "root cause analysis" and "shadowing the technicians") and made the Gantt chart and the poster.

Appendix E: Time Study Sheet

Task	Start time	Pause/start	End Time	Notes/Description
Knock on door	9:16:25		9:16:34	-Knock 3 times is policy, only knocked twice. on main door
Enter room	9:16:35		9:18:10	-Enter main unit and make way to designated room
Enter Individual Room	9:18:10		9:18:40	*knock 3 times and key in if neccesary*
Start Inspection	9:18:40			-Turn on bedroom light and start inspecting moving Left to right
				-Check closet door and inspect inside looking for damge to wall
				and damage to closet interior.
				-Continue to inspect moving left to right until you reach the desk
				in which you will check every drawer for materials and ensure
				the structural integrity of the desk and chair
	9:20:03		9:20:42	-Check be frame and ensure that it is sturdy and ensure the
				mattress doesn't have damage or is the wrong mattress
				-Also check the walls around the bed looking for paint and scuffs
	9:20:42		9:21:34	-Check window for blinds and ensure they aren't bend/broken and
				that there's a wand for the blinds
				-Check the window and ensure that it is closed and not damaged
				-Continue moving L-R and check walls and ceiling until you reach
				the dresser
	9:22:09		9:22:22	-Inspect the dresser looking for damage and items
				-Any items left in the room will need to be inspected and potentially
				bagged and tagged
	9:23:29		9:23:53	-Check the chair and desk for cracks in furniture,
				-since its a double inspect the other closet
	9:24:20		9:24:30	-check the door to ensure it locks and closes properly
				-Pin holes in the wall arent an issue but anything bigger can be
				-For doubles you are doing the continuous inspection so 2 dressers
				2 desks, 2 beds, 2 closets
				-Move to common area and inspect*
	9:27:48		9:28:20	-Check vanity area (doesnt matter if dirty, thats cleaning work)
	9:28:20		9:28:55	-Check sink to ensure it drains naturally, stop the drain and see if
				drains like its supposed to when its filled
	9:29:15		9:30:00	-check bathroom (toilet room) (check toilet paper holder, toilet, walls)
				-If there's a towel holder check to ensure its sturdy, major holes etc
	9:30:38		9:31:02	-Check tub status and make sure no major damage
				*Techs cant touch residents belongings (except during water intrusion)
				*Blinds only replaced if super broken or bent
				*after the inspection they go and get the materials needed to fix stuff

Table 6. Time Sheet 1

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knock on outside door	9:42		9:42:31	-Doesn't really knock, just keys in
enter house				-Enter House 3
				-Locate Room 104
				-Knock on door 2-3 times
				-Inspect Lights to ensure it works
				-Move Left to right in the inspection process
				-Reach the bathroom, it was locked, proceed to unlock the door
				-Continue to inspect the bedroom
				-Check for wall damage
				-Check light switch
				- Check power outlet *i think this isnt standard, idk*
				-inspect dresser
				*if you see stuff make a note of it and bag and tag
				-Continue to check wall/ceiling
				-check blinds and windows (window 1)
				-Check the bed
				bed is wobbly, so needs to be tightened
				*bolts need to be tightened
				-Check window/blinds on window 2
				-Check wall behind the headboard to look for damage
				-Check wall over the desk
				*touch up paint around the desk
				-Inspect Desk/Chair
				*bag and tag if there are items
				-Check vents for dust/mold
				-Inspect Closet
				*needs light paint
				-Inspect Floor/Carpet
				-Backtrack and inspect bathroom
				-Check sinks
				*one doesnt drain so it will need to be fixed
				-Check ceiling/light/tub
				*there's a light switch issue
				-Check toilet to make sure it works
	9:59:23			leave room

Table 7. Time Sheet 2

Appendix F: Gantt Chart

PROJECT PLAN-ISYE4900				
Team Name: Luke Fowler, David Murphy, Mary Ogidigben				
ref	task	responsibility	start date	end date
1	Define	all members	13-Jan	21-Jan
1.1	Project Idea	all members	13-Jan	15-Jan
1.2	Minimum Success Criteria	all members	15-Jan	15-Jan
1.3	Initial Research	Mary	15-Jan	18-Jan
1.4	Design Requirements	Luke	15-Jan	18-Jan
1.5	System Overview	David	15-Jan	18-Jan
1.6	Verification/Resources	all members	15-Jan	18-Jan
1.7	Report	Mary	15-Jan	20-Jan
1.8	Presentation	Luke/David	15-Jan	20-Jan

Figure 5. Stage1: Define

PROJECT PLAN-ISYE4900				
Team Name: Luke Fowler, David Murphy, Mary Ogidigben				
ref	task	responsibility	start date	end date
2	Measure	all members	22-Jan	8-Mar
2.1	Pareto Chart - Maintenance Problems	Luke	22-Jan	12-Feb
2.2	Time Studies	all members	25-Feb	17-Mar
2.3	Flow Chart - Room Turnover	Mary	25-Feb	27-Mar
2.4	Cost of Time	David	12-Feb	18-Feb
2.5	Research	Mary	22-Jan	8-Mar
2.6	Report	Mary	11-Feb	17-Feb
2.7	Presentation	David	11-Feb	18-Feb

Figure 6. Stage 2: Measure

PROJECT PLAN-ISYE4900				
Team Name: Luke Fowler, David Murphy, Mary Ogidigben				
ref	task	responsibility	start date	end date
3	Analyze	all members	19-Feb	17-Mar
3.1	Time Study Analysis	Luke	17-Mar	25-Mar
3.2	Flow Chart - Room Turnover	David	18-Mar	28-Mar
3.3	Economic Analysis	Luke	20-Mar	30-Mar
3.4	Research	David	19-Feb	10-Mar
3.5	Report	Mary	11-Mar	14-Mar
3.6	Presentation	David	11-Mar	17-Mar

Figure 7. Stage 3: Analyze

ref	task	responsibility	start date	end date
PROJECT PLAN-ISYE4900				
Team Name: Luke Fowler, David Murphy, Mary Ogidigben				
4	**Improve**	**all members**	**18-Mar**	**7-Apr**
4.1	Economic Analysis	Luke	18-Mar	20-Mar
4.2	Flow Chart - Room Turnover	David	18-Mar	20-Mar
4.3	SOP	David	20-Mar	27-Mar
4.4	Run by Housing Department	David	27-Mar	1-Apr
4.5	Research	Luke	18-Mar	1-Apr
4.6	Report	Mary	1-Apr	5-Apr
4.7	Presentation	David	1-Apr	7-Apr

Figure 8. Stage 4: Improve

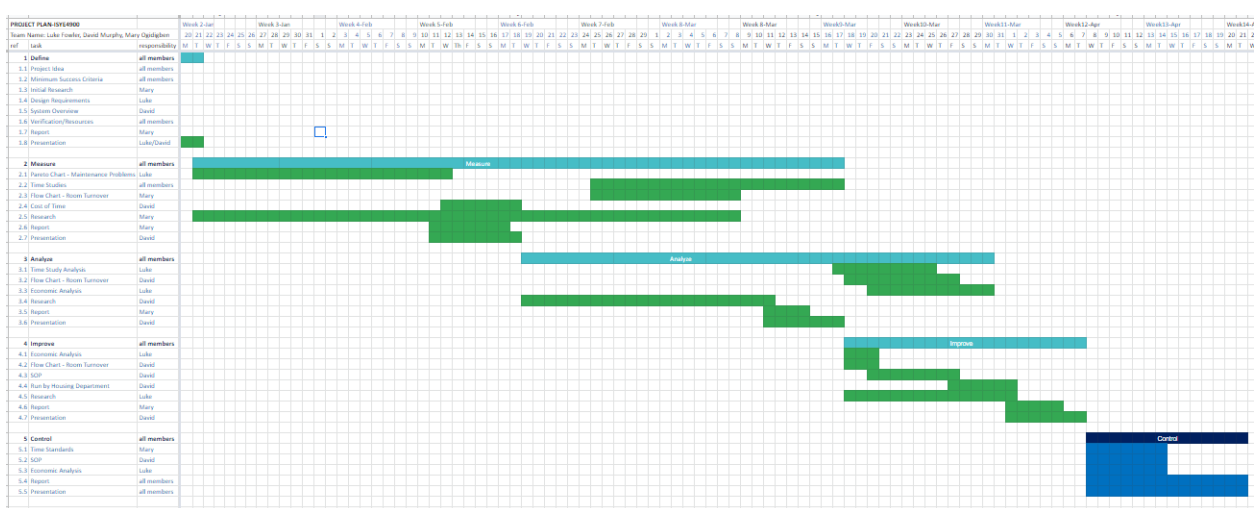| ref	task	responsibility	start date	end date	days
PROJECT PLAN-ISYE4900					
Team Name: Luke Fowler, David Murphy, Mary Ogidigben					
5	**Control**	**all members**	**8-Apr**	**21-Apr**	**13**
5.1	Time Standards	Mary	8-Apr	14-Apr	6
5.2	SOP	David	8-Apr	14-Apr	6
5.3	Economic Analysis	Luke	8-Apr	14-Apr	6
5.4	Report	all members	8-Apr	21-Apr	13
5.5	Presentation	all members	8-Apr	21-Apr	13

Figure 9. Stage 5: Control

Figure 10. Visual Overview

Appendix G: Single Suite Style Standard Operating Procedure

1. Master SOP

2. Objectives & Scope

Complete preliminary room turn inspection for the purpose of informing Maintenance Technicians and Housing and Residence Life facilities of openly visible defects in the quality of a room.

3. Abbreviations and definitions

HRL: Abbreviation for "Housing and Residence Life"

HV: Abbreviation for "Hornet Village Suites" often followed by the building number of "100" or "200"

Single Style Suite: A style of housing unit on the Marietta Campus, traditionally in the Hornet Village Suites and Columns, that holds two residents in a two-bedroom unit. In this unit there is a single shared bathroom, two vanity areas and cabinet space located near the unit entry door.

MasterSet: A ring of keys containing physical hard keys needed to enter specific housing related locations around campus.

Master-Access: Salto Access given to HRL personnel that can be used to enter residential areas on the respective campus where the employee works.

Key-in: The act of utilizing a MasterSet or University ID to enter a room

Bag and Tag: The act of taking residents' items and placing them in bags and labeling them with the resident's name and information for the resident to pick up at a later date. Take picture to determine if an item is "bag & tag" vs trash items.

Light Clean: Minimal cleaning required. Wiping down surfaces with a cleaner or minor vacuuming or sweeping required. Room is close to move in ready.

Moderate Clean: Standard level of cleaning required. All surfaces need to be either wiped down or cleaned. There is a small amount of trash present. The toilet or shower might need a light scrubbing, vacuuming and sweeping/mopping required.

Deep Clean: More cleaning than normal required. Large amounts of trash present in unit. Heavy scrubbing of surfaces, tiles, toilet and shower required. Unit could take considerable amount of time to clean.

4. Tasks, responsibilities and accountabilities

Task	Authorized/Person Assigning task
Inspect Assigned units	
Submit Inspection Form	
Follow up with Facilities Coordinator regarding any issues not listed in inspection form	

5. SOP: Room Inspection Procedures

5.1 Preliminary/Starting Procedures

- Receive assignment from facilities coordinator or facilities director via determined department methods. (Use iPad if provided by department.)
- Determine If residents currently reside in Unit. (Verify with occupancy or residence life personnel if possible.)
- Ensure Salto access has been granted to inspecting party for specific unit.
- Acquire MasterSet to gain access to room in case bedroom is locked.
- Familiarize oneself with inspection documentation required by department.
- Depart for assignment building location.
- Locate specific unit within building.

5.2 Standard Knocking/Announcement Procedures

- Knock on door three times, announcing your presence. "Housing and Residence life Maintenance" or "Housing and Residence Life" (allow 10 seconds between each consecutive knock).
- When entering a unit announce your presence. "Housing and Residence Life [optional Job title] entering."

5.3 Entering the Unit

5.3.1 If residents are present in unit
- Knock on unit door using standard knocking procedures.

5.3.1.1 If resident does NOT answer the door
- If no one answers the door, scan key card onto Salto unit and enter the Residential Unit.
- Upon crossing the entrance threshold to the unit, follow standard announcement procedures.
- Approach the specific room assignment and knock on bedroom door using standard knocking procedures.
- If no one answers, utilize MasterSet to enter bedroom.

5.3.1.2 If resident answers the door
- Introduce yourself as Housing and Residence life: (title, name).
- Provide reasoning for being at the unit (ex: I am here to inspect room HVXXXX).
- Ask resident if you may enter the unit and ask if they live in the room you are inspecting. If the resident says yes, thank them for their time and contact facilities coordinator & occupancy to confirm if the room is supposed to be empty. Return later to inspect. If no, continue inspection as normal.
- Upon entering the unit, approach specific room assignment and utilize standard knocking procedures. If no one answered, utilize standard announcement procedures and use MasterSet to key into room.

- Begin inspection process.

5.3.2 If residents are NOT present in unit

- If there is no resident residing in the Unit, utilize abbreviated standard knocking and announcing procedures (3-5 second wait time between knocks). If no one comes to the door, then utilize your Master-Access to enter the unit.
- Announce your presence as you enter the room and approach desired room needing to be inspected.
- Once located, utilize abbreviated standard knocking and announcing procedures (3-5 second wait time between knocks). If no one comes to the door, then utilize your MasterSet to enter the room.
- If a resident answer's the door, confirm you are at the correct unit, thank the resident for their time and confirm with Occupancy that the unit is supposed to be vacant.
- Begin inspection process.

5.4 Individual Room Inspection Process

- Notate any issues in the room, so they can be addressed after the inspection by appropriate staff. (Maintenance technicians address any issues after your inspection is complete.)

5.4.1 Begin inspection

- **Be sure to specify which side of the room an issue is on.**
  - Left side of the room is X1, and Right side is X2.
  - Ex: HV1100 A1: Desk chair broken, extremely wobbly. Might need screws tightened.

5.4.2 Inspect bedroom door

- Confirm that bedroom door locks and unlocks.
  - Test the condition of the handle and locking mechanism to ensure it works properly.
- Inspect door for any noticeable damage.
  - Check hinges, stopper, paint and door structure.

5.4.3 Start inspection process moving from the left side of the room to the right side of the room.

5.4.4 Inspect walls and ceiling

- Look for paint scratches, defects in paint, water damage, any wall or ceiling damage larger than a pinhole.
  - Water damage will look like brown spots on the ceiling: note size and location.
- If painting is required, note level of painting needed.
  - Small paint scuffs may need light level of painting.
  - Larger scuffs or damage could require more paint or a room repaint.

5.4.5 Inspect desk

- Open and close all drawers and ensure they work properly.

- o Check for items in the drawers. If there is trash, note it for the cleaning crew. If there are resident personal items, then bag and tag them.
    - Take picture to determine whether to "bag or tag" or trash.
- o Check integrity of the desk and ensure that it is sturdy (a light nudge should be adequate).
- o Note any damage or visible defects.
    - Note: Chips in laminate covering does not count as a visible defect.

5.4.6 Inspect chair

- o If wooden chair:
    - Check integrity of the chair and note if structurally unsound.
    - Check to ensure the screws in the bottom of the chair are in properly.
    - Check for any cracking or splintering of the wood of the chair.
- o If metal/fabric chair:
    - Check integrity of the chair and note if structurally unsound.
    - Inspect the condition of the fabric and note any serious stains or condition defects.
- o Plastic Chair/Other:
    - Check integrity of the chair and note if structurally unsound.
    - Inspect overall quality. Note if there are any broken parts of the chair, or if there's a need to replace the furniture.

5.4.7 Inspect window/blinds

- o Check the conditions of the blinds. If in poor condition, note they need to be replaced.
    - Note: Slightly bent blinds are acceptable conditions while broken or extremely bent blinds are considered poor condition and need to be replaced.
- o Ensure blinds work as designed/intended.
- o Ensure window is closed and locked.
- o Inspect window and note any visible defects or issues with the window.
    - Note: Example of issues: Cracks in window. Window not locking/closing properly.
- o Check to see if window screen is present. If not present, note it.

5.4.8 Inspect bed

- o Check quality of mattress.
    - Note: Check for any major indents in bed or damage to mattress.
- o Inspect bedframe.
    - Give frame a firm shake to ensure it is sturdy.
    - Note any loose/missing bolts in bedframe.

5.4.9 Inspect dresser

- o Open and close all drawers and ensure they work properly.
- o Check for items in the drawers. If there is trash, note it for the cleaning crew. If there are resident personal items, then bag and tag them.
    - Take picture to determine if "bag & tag" or trash.

- o Check integrity of the dresser and ensure that it is sturdy. (A light nudge should be adequate.)
- o Confirm the total of number of half dressers to be two and note if there are any missing.
- o Note any damage or visible defects.
  - ▪ Note: Chips in laminate covering does not count as a visible defect.

5.4.10 Inspect closet

- o Confirm that closet door locks and unlocks.
  - ▪ Test the condition of the handle and locking mechanism to ensure it works properly.
- o Inspect door for any noticeable damage.
  - ▪ Check hinges, stopper, paint and door structure.
- o Check paint and note if there are any noticeable scuffs or damage.
- o Check walls for damage.
- o Ensure rack in closet is sturdy.
- o Bag and tag personal items left behind and note if it needs to be cleaned.
  - ▪ Take picture to determine if "bag & tag" or trash.

5.4.11 Inspect carpet

- o Check for any holes or areas of noticeable wear and tear.
  - ▪ Good condition is when it looks like the office standard carpet.
  - ▪ Bad condition is when carpet has tears or holes.
- o Note the size and location of large stains on flooring.
- o Note the severity of cleaning required—light, standard, or deep.
  - ▪ Take picture if in doubt.

5.4.12 Inspect vents

- o Note if vents need to be cleaned.
  - ▪ If there is mold or condensation present, report to facilities coordinator immediately.

5.4.13 Check smoke detectors

- o Make sure they are up and not flashing red.

5.4.14 Note level of cleaning required for general room—light, moderate, or deep

5.4.15 Upon completing inspection of bedroom, lock the unit using MasterSet if you are not performing the punch yourself.

5.5. Vanity Inspection Process

5.5.1 Inspect cabinets

- o Bag and tag residential items and note if things need to be thrown away.
  - ▪ Take picture to determine if "bag & tag" or trash.
- o Check drawers to ensure they open and close properly.

- o Note if they need paint.
  - If cabinets are peeling, note it.
- o Note if vanity panel is on or off.
  - This is the slanted panel under the sink.

5.5.2 Inspect medicine cabinets
- o Bag and tag residential items and note if things need to be thrown away.
  - Take picture to determine if "bag & tag" or trash.
- o Check cabinet and ensure it opens and closes properly.

5.5.3 Inspect sink
- o Turn on water and let run. Watch to see if water drains properly.
- o Use stopper to stop sink and turn on the water and let it run. Check drain speed.
  - If the sink drains slow, note it, so it can be fixed.
- o Ensure hot/cold water works.

5.5.4 Inspect lights/light switches
- o Check to make sure all bulbs function properly.
- o Make sure light switch turns on lights.

5.5.5 Inspect towel rack
- o Give towel racks a light tug to ensure they are firmly in the wall.

5.5.6 Note level of cleaning required—light, moderate, or deep

5.6 Restroom: Toilet Area Inspection Process

5.6.1 Inspect Toilet
- o Check to make sure it flushes and look for any potential for water intrusion.
- o Make sure both buttons work.
  - Larger buttons are for solid waste.
  - Smaller button for liquid waste.
- o Make sure toilet sticker is on the tank.

5.6.2 Inspect bathtub
- o Ensure water turns on from main faucet.
- o Ensure water comes out of shower head.
  - Check water pressure and shower head setting if needed.
- o Note any damage.
- o Note any cleanliness issues.
  - Note if mold or mildew is present and level of cleaning needed—light, moderate, deep.

5.6.3 Inspect walls/ceiling
- o Note any damage or need for repaint.
  - Note paint peeling.
- o Check for water damage and note any signs of damage.
  - Make special note of pink/black residue in case it is mold or mildew.
- o Note if there are noticeable signs of condensation accumulating on the wall.

5.6.4 Inspect vents
- o Check exhaust vent and ensure it turns on when activating the switch.
- o Inspect cleanliness of vents.
  - ▪ Note if dusty or if there is suspected presence of mold.

5.6.5 Inspect floor
- o Note any issues with floor tiles.
- o Note any signs of water damage.

5.6.6 Inspect bathroom door
- o Confirm that bathroom door locks and unlocks.
  - ▪ Test the condition of the handle and locking mechanism to ensure it works properly.
- o Inspect door for any noticeable damage.
  - ▪ Check hinges, stopper, paint and door structure.

5.6.7 Inspect towel and toilet paper holders
- o Note if toilet paper holder is loose from the wall.
- o Note if missing toilet paper holder.

5.7 Common Area Inspection

- • Only perform common area inspection if unit is cleared of all residents; however, you can still note any specific issues that might need to be addressed.

5.7.1 Inspect walls and ceiling
- o Look for paint scratches, defects in paint, water damage, or any wall or ceiling damage larger than a pinhole.
  - ▪ Water damage will look like brown spots on the ceiling. Note size and location.
- o If painting is required, note level of painting needed.
  - ▪ Small paint scuffs may need light level of painting.
  - ▪ Larger scuffs or damage could require more paint, or a room repaint.

5.7.2 Check thermostat
- o Set temperature to 68-70 degrees.
- o Note If temperature in room does not reflect temperature set.
  - ▪ EX: Room set at 70 but it's 75 in the unit.

5.7.3 Inspect flooring
- o Note any major scuffs or damage to flooring.

5.7.4 Check CO2 alarms and fire alarms
- o Make sure they are up and not flashing red.

5.7.5 Inspect fire extinguisher
- o Make sure indicator is on green not yellow/red.

5.7.6 Inspect cabinets
- o Bag and tag residential items and note if things need to be thrown away.
  - ▪ Take picture to determine if "bag & tag" or trash.

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- o Check drawers to ensure they open and close properly.
- o Note any damage to cabinets.
- o Note the need for paint if applicable.

5.7.7 Inspect electrical box
- o Ensure electrical box can be opened or closed.

5.7.8 Inspect main door
- o Confirm that bedroom door locks and unlocks.
  - ▪ Test the condition of the handle and locking mechanism to ensure it works properly. Set deadbolt.
- o Inspect door for any noticeable damage.
  - ▪ Check hinges, stopper, paint and door structure.
- o Inspect door frame.
  - ▪ Note any visible structural issues with the door frame.
- o Inspect peephole.
  - ▪ Note if you can see through the peephole.
  - ▪ Note any damage that is present.

6. Related Forms

2020 Spring Facilities inspection form:

https://ksuhousing.wufoo.com/forms/marietta-spring-2020-facilities-inspections/

7. Photographic References

8. Related Documents

KENNESAW STATE
U N I V E R S I T Y

Housing and Residence Life	PROCESS: Input of Work Orders after Move-Out	
Business Process Document	Last Update:	DATE: 07.02.19 NAME: Caleb Lee
	Last Reviewed:	
	Process Owner:	Facilities Coordinator

Area:	HRL: Housing Facilities
Name of Process:	Facilities Input of Work Orders after Move-Out
Purpose of Process:	To assess the amount of work needed in each room space after a move-out for labor and budgetary, tracking and recording. To ensure a clean, student ready room on an assigned move-in day.
Effective Date:	7.02.19
Process Performed By:	HRL Facilities Coordinator
Process Reviewed By:	Director of Hub & Associate Director of Housing Facilities
Secondary Process Reviewer:	Assistant Director of Housing Hub
Process Frequency:	This process is to be repeated daily, based on move-outs

LIST OF REPORTS/FORMS USED (AND SOURCE)
Check-Outs Yesterday Report via Starrez

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U N I V E R S I T Y

Overview:

This process pertains specifically to the Work Orders created when a student moves out of their room, releasing the room back to Housing and Residence Life.

Process:

1. The Facilities Coordinator (FC) will receive the "Check-outs Yesterday" Report daily.
2. Each day, the FC will use the Check-Outs Yesterday report to input three (3) separate work orders for Paint, Punch, and Clean. This will create a record, and will help prevent rooms from falling through the cracks. If a room is vacant, there should be punch, paint, and clean work orders submitted at all stages of the academic year.
3. All three work orders should be assigned to the "Room Turnover" Maintenance Category
    a. If the vacancy occurs within the normal academic year, then the work orders should be assigned to Technicians by the Assistant Director or their Lead Technicians.
    b. If the vacancy occurs during the months of May, June, or July:
        i. Paint and Clean work orders should be assigned to their Turn Contractor
        ii. A work order for Carpet Cleaning should be opened and assigned to the appropriate Turn Contractor
        iii. Punch Work Orders should be assigned to the Hub Technicians by the Assistant Director of the Hub, or the Lead Technician.
        iv. Final Inspection should be opened and assigned to the Zone Leader over that area.
4. Work Order Lists for contractors, Contractor Escorts, Zone Leaders, and other partners should be pulled from the list of open work orders NOT the Room List feature of Starrez.
5. If a Work Order that was assigned to a vendor is completed in-house, then that work order should be reassigned to an in-house technician prior to closing it out.
6. All Work Orders should be closed out on the day the work is completed, but no later than 24 hours after work has been completed.
    a. During the Academic Year, all turnover work orders should be closed out within 7 days of the room's vacancy.

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Appendix H: Double Style Suite Standard Operating Procedure

1. Master SOP

2. Objectives & Scope

Complete preliminary room turn inspection for the purpose of informing Maintenance Technicians and Housing and Residence Life facilities of openly visible defects in the quality of a room.

3. Abbreviations and Definitions

HRL: Abbreviation for "Housing and Residence Life"

HV: Abbreviation for "Hornet Village Suites" often followed by the building number of "100" or "200"

Double Style Suite: A style of housing unit on the Marietta Campus, traditionally in the Hornet Village Suites and Columns, that holds four residents in a two-bedroom unit (two residents per room). In this unit there are two separate shared bathrooms, one with a toilet and one with a standing shower, two vanity shared areas beside the bedroom doors and cabinet space located between the two rooms.

MasterSet: A ring of keys containing physical hard keys needed to enter specific housing related locations around campus.

Master-Access: Salto Access given to HRL personnel that can be used to enter residential areas on the respective campus where the employee works.

Key-in: The act of utilizing a MasterSet or University ID to enter a room

Bag and Tag: The act of taking residents' items and placing them in bags and labeling them with the resident's name and information for the resident to pick up at a later date. Take picture to determine if an item is "bag & tag" vs trash items.

Light Clean: Minimal cleaning required. Wiping down surfaces with a cleaner or minor vacuuming or sweeping required. Room is close to move in ready.

Moderate Clean: Standard level of cleaning required. All surfaces need to be either wiped down or cleaned. There is a small amount of trash present. The toilet or shower might need a light scrubbing, vacuuming and sweeping/mopping required.

Deep Clean: More cleaning than normal required. Large amounts of trash present in unit. Heavy scrubbing of surfaces, tiles, toilet and shower required. Unit could take considerable amount of time to clean.

4. Tasks, Responsibilities and Accountabilities

Task	Authorized/Person Assigning task	
Inspect Assigned units		
Submit Inspection Form		
Follow up with Facilities Coordinator regarding any issues not listed in inspection form		

5. SOP: Room Inspection Procedures

5.1 Preliminary/Starting Procedures
- Receive assignment from facilities coordinator or facilities director via determined department methods. (Use iPad if provided by department.)
- Determine If residents currently reside in Unit. (Verify with occupancy or residence life personnel if possible.)
- Ensure Salto access has been granted to inspecting party for specific unit.
- Acquire MasterSet to gain access to room in case bedroom is locked.
- Familiarize oneself with inspection documentation required by department.
- Depart for assignment building location.
- Locate specific unit within building.

5.2 Standard Knocking/Announcement Procedures
- Knock on door three times, announcing your presence. "Housing and Residence life Maintenance" or "Housing and Residence Life" (allow 10 seconds between each consecutive knock).
- When entering a unit announce your presence. "Housing and Residence Life [optional Job title] entering."

5.3 Entering the Unit

5.3.1 If residents are present in unit
- Knock on unit door using standard knocking procedures.

5.3.1.1 If resident does NOT answer the door
- If no one answers the door, scan key card onto Salto unit and enter the Residential Unit.
- Upon crossing the entrance threshold to the unit, follow standard announcement procedures.
- Approach the specific room assignment and knock on bedroom door using standard knocking procedures.
- If no one answers, utilize MasterSet to enter bedroom.

5.3.1.2 If resident answers the door
- Introduce yourself as Housing and Residence life: (title, name).
- Provide reasoning for being at the unit (ex: I am here to inspect room HVXXXX).
- Ask resident if you may enter the unit and ask if they live in the room you are inspecting. If the resident says yes, thank them for their time and contact facilities coordinator & occupancy to confirm if the room is supposed to be empty. Return later to inspect. If no, continue inspection as normal.

- Upon entering the unit, approach specific room assignment and utilize standard knocking procedures. If no one answered, utilize standard announcement procedures and use MasterSet to key into room.
- Begin inspection process.

5.3.2 If residents are NOT present in unit

- If there is no resident residing in the Unit, utilize abbreviated standard knocking and announcing procedures (3-5 second wait time between knocks). If no one comes to the door, then utilize your Master-Access to enter the unit.
- Announce your presence as you enter the room and approach desired room needing to be inspected.
- Once located, utilize abbreviated standard knocking and announcing procedures (3-5 second wait time between knocks). If no one comes to the door, then utilize your MasterSet to enter the room.
- If a resident answer's the door, confirm you are at the correct unit, thank the resident for their time and confirm with Occupancy that the unit is supposed to be vacant.
- Begin inspection process.

5.4 Individual Room Inspection Process

- Notate any issues in the room, so they can be addressed after the inspection by appropriate staff. (Maintenance technicians address any issues after your inspection is complete.)

5.4.1 Begin inspection

- **Be sure to specify which side of the room an issue is on.**
  - Left side of the room is X1, and Right side is X2.
  - Ex: HV1100 A1: Desk chair broken, extremely wobbly. Might need screws tightened.

5.4.2 Inspect bedroom door

- Confirm that bedroom door locks and unlocks.
  - Test the condition of the handle and locking mechanism to ensure it works properly.
- Inspect door for any noticeable damage.
  - Check hinges, stopper, paint and door structure.

5.4.3 Start inspection process moving from the left side of the room to the right side of the room

5.4.4 Inspect walls and ceiling

- Look for paint scratches, defects in paint, water damage, any wall or ceiling damage larger than a pinhole.
  - Water damage will look like brown spots on the ceiling: note size and location.
- If painting is required, note level of painting needed.

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- Small paint scuffs may need light level of painting.
- Larger scuffs or damage could require more paint, or a room repaint.

5.4.5 Inspect desk
- Open and close all drawers and ensure they work properly.
- Check for items in the drawers. If there is trash, note it for the cleaning crew. If there are resident personal items, then bag and tag them.
  - Take picture to determine whether to "bag or tag" or trash.
- Check integrity of the desk and ensure that it is sturdy (a light nudge should be adequate).
- Note any damage or visible defects.
  - Note: Chips in laminate covering does not count as a visible defect.

5.4.6 Inspect chair
- If wooden chair:
  - Check integrity of the chair and note if structurally unsound.
  - Check to ensure the screws in the bottom of the chair are in properly.
  - Check for any cracking or splintering of the wood of the chair.
- If metal/fabric chair:
  - Check integrity of the chair and note if structurally unsound.
  - Inspect the condition of the fabric and note any serious stains or condition defects.
- Plastic Chair/Other:
  - Check integrity of the chair and note if structurally unsound.
  - Inspect overall quality. Note if there are any broken parts of the chair, or if there's a need to replace the furniture.

5.4.7 Inspect window/blinds
- Check the conditions of the blinds. If in poor condition, note they need to be replaced.
  - Note: Slightly bent blinds are acceptable conditions while broken or extremely bent blinds are considered poor condition and need to be replaced.
- Ensure blinds work as designed/intended.
- Ensure window is closed and locked.
- Inspect window and note any visible defects or issues with the window.
  - Note: Example of issues: Cracks in window. Window not locking/closing properly.
- Check to see if window screen is present. If not present, note it.

5.4.8 Inspect bed
- Check quality of mattress.
  - Note: Check for any major indents in bed or damage to mattress.
- Inspect bedframe.
  - Give frame a firm shake to ensure it is sturdy.
  - Note any loose/missing bolts in bedframe.

5.4.9 Inspect dresser
- Open and close all drawers and ensure they work properly.
- Check for items in the drawers. If there is trash, note it for the cleaning crew. If there are resident personal items, then bag and tag them.
  - Take picture to determine if "bag & tag" or trash.
- Check integrity of the dresser and ensure that it is sturdy. (A light nudge should be adequate.)
- Confirm the total of number of half dressers to be two and note if there are any missing.
- Note any damage or visible defects.
  - Note: Chips in laminate covering does not count as a visible defect.

5.4.10 Inspect closet
- Confirm that closet door locks and unlocks.
  - Test the condition of the handle and locking mechanism to ensure it works properly.
- Inspect door for any noticeable damage.
  - Check hinges, stopper, paint and door structure.
- Check paint and note if there are any noticeable scuffs or damage.
- Check walls for damage.
- Ensure rack in closet is sturdy.
- Bag and tag personal items left behind and note if it needs to be cleaned.
  - Take picture to determine if "bag & tag" or trash.

5.4.11 Inspect carpet
- Check for any holes or areas of noticeable wear and tear.
  - Good condition is when it looks like the office standard carpet.
  - Bad condition is when carpet has tears or holes.
- Note the size and location of large stains on flooring.
- Note the severity of cleaning required—light, standard, or deep.
  - Take picture if in doubt.

5.4.12 Inspect vents
- Note if vents need to be cleaned.
  - If there is mold or condensation present, report to facilities coordinator immediately.

5.4.13 Check smoke detectors
- Make sure they are up and not flashing red.

5.4.16 Note level of cleaning required for general room—light, moderate, or deep

5.4.17 Upon completing inspection of bedroom, lock the unit using MasterSet if you are not performing the punch yourself.

5.5. Vanity Inspection Process

5.5.1 Inspect cabinets
- Bag and tag residential items and note if things need to be thrown away.
  - Take picture to determine if "bag & tag" or trash.
- Check drawers to ensure they open and close properly.
- Note if they need paint.
  - If cabinets are peeling, note it.
- Note if vanity panel is on or off.
  - This is the slanted panel under the sink.

5.5.2 Inspect medicine cabinets
- Bag and tag residential items and note if things need to be thrown away.
  - Take picture to determine if "bag & tag" or trash.
- Check cabinet and ensure it opens and closes properly.

5.5.3 Inspect sink
- Turn on water and let run. Watch to see if water drains properly.
- Use stopper to stop sink and turn on the water and let it run. Check drain speed.
  - If the sink drains slow, note it, so it can be fixed.
- Ensure hot/cold water works.

5.5.4 Inspect lights/light switches
- Check to make sure all bulbs function properly.
- Make sure light switch turns on lights.

5.5.5 Inspect towel rack
- Give towel racks a light tug to ensure they are firmly in the wall.

5.5.6 Note level of cleaning required—light, moderate, or deep

5.6 Restroom: Toilet Area Inspection Process

5.6.1 Inspect Toilet
- Check to make sure it flushes and look for any potential for water intrusion.
- Make sure both buttons work.
  - Larger buttons are for solid waste.
  - Smaller button for liquid waste.
- Make sure toilet sticker is on the tank.

5.6.2 Inspect walls/ceiling
- Note any damage or need for repaint.
  - Note paint peeling.
- Check for water damage and note any signs of damage.
  - Make special note of pink/black residue in case it is mold or mildew.
- Note if there are noticeable signs of condensation accumulating on the wall.

5.6.3 Inspect vents
- Check exhaust vent and ensure it turns on when activating the switch.

- o Inspect cleanliness of vents.
  - ▪ Note if dusty or if there is suspected presence of mold.

5.6.4 Inspect floor
- o Note any issues with floor tiles.
- o Note any signs of water damage.

5.6.5 Inspect bathroom door
- o Confirm that bathroom door locks and unlocks.
  - ▪ Test the condition of the handle and locking mechanism to ensure it works properly.
- o Inspect door for any noticeable damage.
  - ▪ Check hinges, stopper, paint and door structure.

5.6.6 Inspect towel and toilet paper holders
- o Note if toilet paper holder is loose from the wall.
- o Note if missing toilet paper holder.

5.7 Restroom/Shower Area Inspection Process

5.7.1 Inspect standing shower
- o Ensure water turns on from main faucet.
- o Ensure water comes out of shower head.
  - ▪ Check water pressure and shower head setting if needed.
- o Note any damage.
- o Note any cleanliness issues.
  - ▪ Note if mold or mildew is present.
  - ▪ Note level of cleaning needed—light, moderate, or deep.

5.7.2 Inspect walls/ceiling
- o Note any damage or need for repaint.
  - ▪ Note if paint is peeling.
- o Note if there are noticeable signs of condensation accumulating on the wall.
- o Check for water damage and note any signs of damage.
  - ▪ NOTE: Pay specific attention to any potential mold growth on the floorboards near shower.

5.7.3 Inspect vents
- o Check exhaust vent and ensure it turns on when activating the switch.
- o Inspect cleanliness of vents.
  - ▪ Note if dusty or if there is suspected presence of mold.

5.7.4 Inspect floor
- o Note any issues with floor tiles.
- o Note any signs of water damage.

5.7.5 Inspect towel racks
- o Note if it is loose from the wall.

5.8 Common Area Inspection

- Only perform common area inspection if unit is cleared of all residents; however, you can still note any specific issues that might need to be addressed.

5.8.1 Inspect walls and ceiling
- o Look for paint scratches, defects in paint, water damage, or any wall or ceiling damage larger than a pinhole.
    - Water damage will look like brown spots on the ceiling. Note size and location.
- o If painting is required, note level of painting needed.
    - Small paint scuffs may need light level of painting.
    - Larger scuffs or damage could require more paint, or a room repaint.

5.8.2 Check thermostat
- o Set temperature to 68-70 degrees.
- o Note If temperature in room does not reflect temperature set.
    - EX: Room set at 70 but it's 75 in the unit.

5.8.3 Inspect flooring
- o Note any major scuffs or damage to flooring.

5.8.4 Check CO2 alarms and fire alarms
- o Make sure they are up and not flashing red.

5.8.5 Inspect fire extinguisher
- o Make sure indicator is on green not yellow/red.

5.8.6 Inspect cabinets
- o Bag and tag residential items and note if things need to be thrown away.
    - Take picture to determine if "bag & tag" or trash.
- o Check drawers to ensure they open and close properly.
- o Note any damage to cabinets.
- o Note the need for paint if applicable.

5.8.7 Inspect electrical box
- o Ensure electrical box can be opened or closed.

5.8.8 Inspect main door
- o Confirm that bedroom door locks and unlocks.
    - Test the condition of the handle and locking mechanism to ensure it works properly. Set deadbolt.
- o Inspect door for any noticeable damage.
    - Check hinges, stopper, paint and door structure.
- o Inspect door frame.
    - Note any visible structural issues with the door frame.
- o Inspect peephole.
    - Note if you can see through the peephole.
    - Note any damage that is present.

6. Related Forms

2020 Spring Facilities inspection form:
https://ksuhousing.wufoo.com/forms/marietta-spring-2020-facilities-inspections/

7. Photographic References

8. Related Documents

KENNESAW STATE
U N I V E R S I T Y

Housing and Residence Life	PROCESS: Input of Work Orders after Move-Out	
Business Process Document	Last Update:	DATE: 07.02.19 NAME: Caleb Lee
	Last Reviewed:	
	Process Owner:	Facilities Coordinator

Area:	HRL: Housing Facilities
Name of Process:	Facilities Input of Work Orders after Move-Out
Purpose of Process:	To assess the amount of work needed in each room space after a move-out for labor and budgetary, tracking and recording. To ensure a clean, student ready room on an assigned move-in day.
Effective Date:	7.02.19
Process Performed By:	HRL Facilities Coordinator
Process Reviewed By:	Director of Hub & Associate Director of Housing Facilities
Secondary Process Reviewer:	Assistant Director of Housing Hub
Process Frequency:	This process is to be repeated daily, based on move-outs

LIST OF REPORTS/FORMS USED (AND SOURCE)

Check-Outs Yesterday Report via Starrez

KENNESAW STATE
U N I V E R S I T Y

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