

Commissioning Proposal

# Jefferson Elementary

February 28, 2020



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Henderson County BOE  
c/o John Hagan Codell  
Codell Construction Co.  
4475 Rockwell Road  
Winchester, Kentucky 40392

**Re: Commissioning Services for the new Jefferson Elementary School**

Dear Mr. Codell,

We appreciate the opportunity to propose on performing commissioning services for the Jefferson Elementary School project. In response to your request, we are providing sufficient information for you to understand our interest in this project. Our capabilities and team members' expertise as commissioning providers are displayed in this proposal.

We are a third-party commissioning firm committed to delivering the highest quality commissioning available today by utilizing a true Owner-first team approach. We have built our business on this principle; past and current clients can verify this fact. We are 100% committed to the commissioning process, the value it provides, and ensuring you receive its maximum benefit. We take this commitment very seriously.

Those who know us—Contractors, Engineers, and Owners alike—will attest to our quality of work, attention to detail, and willingness to get the job done right the first time. We understand you are hiring a Commissioning Agent to ensure quality. We have grown steadily by doing just that. ZHCx is not your typical Commissioning Provider—we don't just test and document—we collaborate with the team. This unique approach helps us to avoid the common pitfalls of the construction process.

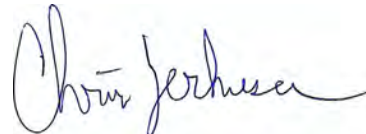
You can be sure we at ZHCx will use all our passion and knowledge to think on behalf of Henderson County Schools. When you engage with us in business, you are hiring a partner dedicated to using all our resources to ensure the project is delivered at or above your expectations.

Thank you for the opportunity, and we look forward to working with you.

Respectfully,



Ian Holten, CxA, LEED AP  
Partner  
Ian@ZHCommissioning.com



Chris Zerhusen, CxA, CEM, EMP  
Partner  
Chris@ZHCommissioning.com

**Cover Letter**

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**Thank You**

Section 1

# Statement of Qualifications



### Experience

Chris Zerhusen and Ian Holten formed ZH Commissioning (Zerhusen Holten Commissioning) after spending over 15 years in the Commissioning and Consulting MEP Engineering industries. ZHCx has made a lasting impression by NOT being your typical commissioning provider. While we are not the largest or longest-established provider, we offer an unparalleled level of service by sticking to simple principles:

1. We are not afraid to get our hands dirty when necessary.
2. We will investigate where others will not.
3. We assume everything we are investigating is, “guilty until proven innocent.”
4. We test to fail (we believe in Murphy’s Law).

These simple, yet effective, principles are not just tag lines to win a job. They have been formed from tried-and-true industry experience. We have personally gotten to know nearly every single type of building system, application, and manufacturer that exists today. We are true students of the building sciences and make our living on ensuring our clients can rest easy when severe situations occur and equipment MUST work. At the end of the day, our EXPERIENCE is your ASSURANCE.

### Knowledge of Operation & Maintenance Requirements

Our roles as Energy Managers for multiple Kentucky school districts such as Erlanger-Elsmere and Beechwood make us unique compared to other commissioning providers. As a byproduct of helping these schools save energy, we have seen the direct correlation between energy and maintenance costs. Through our energy management services, we have had clients go from bi-annual belt changes to 18-month belt changes. Likewise, by optimizing air handling equipment, we have witnessed facilities that historically needed monthly filter changes, reduced to quarterly filter changes.

We strongly believe that even in a time of sophisticated automated controls and systems, nothing can beat a well-trained and experienced human mind in optimizing a facility’s operation. Our job as commissioning providers is to help our clients understand the systems we commission, and assist them with keeping those systems operating at a high level.

### Understanding of Test and Balance Procedures

A critical step in the commissioning process that we find is commonly overlooked, is the direct involvement, assistance, and optimization of systems with the Balancing Contractor. This includes documenting system startup parameters and data; such as pump impeller sizing. This type of involvement requires commitment from the commissioning agent to be both flexible and available during these project activities. Too often, we find functional and operational issues that persist into occupancy that should have been identified during startup and balancing. For this reason, ZHCx is committed to being an active team member, participating in BOTH equipment startup and system balancing activities.

### Knowledge and Experience with Building Codes

Our previous roles in the MEP consulting engineering industry have provided us with a solid foundation and understanding of the various commercial building and energy codes such as the IMC, NEC, NFPA, and IECC. The knowledge of these codes makes us even stronger commissioning agents.

### Certified Commissioning Authority

Ian Holten and Chris Zerhusen are both Certified Commissioning Authorities. Ian Holten will be the Lead CxA responsible for the commissioning team. All team resumes are included in this proposal.



## Section 2

# Project References



#### Kings Local School District Kings Mills, Ohio



#### Project Details

Ian Holten has guided the district through multiple control and equipment related projects and upgrades. This effort has aided in the development, planning, implementation, and operation of various mechanical and lighting systems throughout the school district.

ZH Commissioning has worked with Kings Local Schools to identify, optimize, and implement a host of energy-saving strategies in each school. As a result of our efforts, Kings is embarking on a new District-wide energy project in which the objective is to correct issues identified during the commissioning and retro-commissioning activities. The project will increase the District's already impressive energy reduction by an estimated 10%.

.....

<b>Date Completed</b>	July 2015
<b>Building Type</b>	K-12 School
<b>Contact</b>	<b>Mr. Steve Waldmann</b> Manager of School Business Affairs Kings Local School District 1797 King Avenue PO Box 910 Kings Mills, OH 45034 (513) 398-8050 swaldmann@kingslocal.net
<b>Systems Commissioned</b>	<ul style="list-style-type: none"> <li>HVAC + Temperature Controls</li> </ul>
<b>Project Highlights &amp; Successes</b>	<ul style="list-style-type: none"> <li>Managed multiple projects</li> <li>Thermal Storage revitalization</li> <li>Central energy management</li> <li>35% reduction in demand costs at JF Burns Elementary School</li> <li>250 KW decrease in demand (KW) at Kings High School</li> <li>Improved preventative maintenance</li> </ul>

*I am pleased to be able to take this opportunity to provide some feedback regarding ZH Commissioning and the services provided by their representative, Ian Holten.*

*Ian has been able to address a number of issues that frankly others could not. He lived up to accountability expectations, understood that we want results, and he has excelled in delivering constructive outcomes. I cannot say enough regarding the quality of service Ian has provided for our district. Suffice it to say I would not consider using anyone other for commissioning and I depend on his expertise when we are faced with the challenges of providing HVAC services throughout our district.*

**Steve Waldmann**  
Former Manager of School Business Affairs  
Kings Local School District



#### Lloyd High School Phase 3 Erlanger, Kentucky



#### Project Details

Hired at the construction document review phase, ZH Commissioning immediately began identifying issues with the construction documents that would have otherwise likely resulted in change orders for the project.

During the Functional Testing process, ZHCx identified a vast array of issues within the mechanical equipment and temperature control system that had gone unchecked during the process. Under the guidance of ZHCx, the District is currently in the process of repairing mistakes that went undiscovered until Phase 3.

ZHCx's role as the District's Energy Manager ensured the new addition was designed and installed with energy efficiency, maintenance ease, and equipment-life in mind. Although the project added eight classrooms and a new boiler, the energy cost for Lloyd High School did not increase after the addition was brought online.

<b>Date Completed</b>	December 2013
<b>Building Type</b>	K-12 School
<b>Contact</b>	<b>Dr. Kathlyn Burkhardt</b> Superintendent Erlanger-Elsmere Independent Schools 500 Graves Avenue Erlanger, KY 41018 (859) 727-2009 kathy.burkhardt@erlanger.kyschools.us
<b>Systems Commissioned</b>	<ul style="list-style-type: none"> <li>• HVAC + Temperature Controls</li> <li>• Lighting and Lighting Controls</li> <li>• Domestic Hot Water Systems</li> </ul>
<b>Project Highlights &amp; Successes</b>	<ul style="list-style-type: none"> <li>• 10 Classroom Addition</li> <li>• 3rd Phase of Multiphase project</li> <li>• Square footage added with no additional cost to the District's energy bill.</li> <li>• ZHCx identified numerous issues overlooked in the previous phases.</li> <li>• Issues identified during Commissioning Drawing Review efforts helped the District avoid change order costs during construction including:               <ol style="list-style-type: none"> <li>1. Omitted Boiler Plant Controls</li> <li>2. Omitted AHU Controls</li> <li>3. A number of maintenance access issues</li> </ol> </li> </ul>

.....

*Mr. Holten has analyzed all of our buildings and our district as a whole and has led us in developing a focused approach to continuous improvement. He has also commissioned our recent construction projects and guided us in planning for energy efficiency on these projects. Through our collaboration and monthly meetings, Mr. Holten has assisted us in empowering our staff and students to not only improve our buildings; he has also helped us to change our behaviors in terms of energy use. I would highly recommend Mr. Holten and ZH Commissioning to any school district wanting to become a more efficient and more responsible energy consumer.*

*Kathlyn Burkhardt, Ed.D.  
Superintendent  
Erlanger-Elsmere Schools*



#### Washington County High School Springfield, Kentucky



#### Project Details

Washington County High School is a new K-12 academic school for grades 9-12. It is 99,000 SF with a total project cost of \$13,000,000. Chris Zerhusen was hired directly by the Washington County Board of Education to act on their behalf as a Commissioning Authority.

During his time on the project, Mr. Zerhusen successfully completed the commissioning process for the HVAC systems, Lighting and Domestic Hot Water. Mr. Zerhusen continues to work with the school district as they transition into the occupancy phase of their new high school. The district has relied on Mr. Zerhusen for answers as they have questioned design practices and installation during the entire process.

<b>Date Completed</b>	December 2014
<b>Building Type</b>	K-12 School
<b>Size (square feet)</b>	99,000
<b>Total Project Cost</b>	\$13,000,000
<b>Contact</b>	<b>Ms. Judy Spalding</b> CPA, Director of Financial Services Washington County Schools 120 Mackville Hill P.O. Box 72 Springfield, KY 40069 (859) 336-5470 <a href="mailto:judy.spalding@washington.kyschools.us">judy.spalding@washington.kyschools.us</a>
<b>Systems Commissioned</b>	<ul style="list-style-type: none"> <li>• HVAC and Automatic Controls</li> <li>• Lighting and Lighting Controls</li> <li>• Domestic Water Heating</li> </ul>
<b>Project Highlights &amp; Successes</b>	<ul style="list-style-type: none"> <li>• Owner thoroughly involved</li> <li>• Excellent coordination with project contractors</li> <li>• The Commissioning Agent was required to communicate to the board at monthly board meetings</li> <li>• 100% Testing; No Sampling (ZHCx Standard)</li> <li>• ZHCx had clear communication with the owner.</li> <li>• The owner's maintenance staff was involved.</li> </ul>

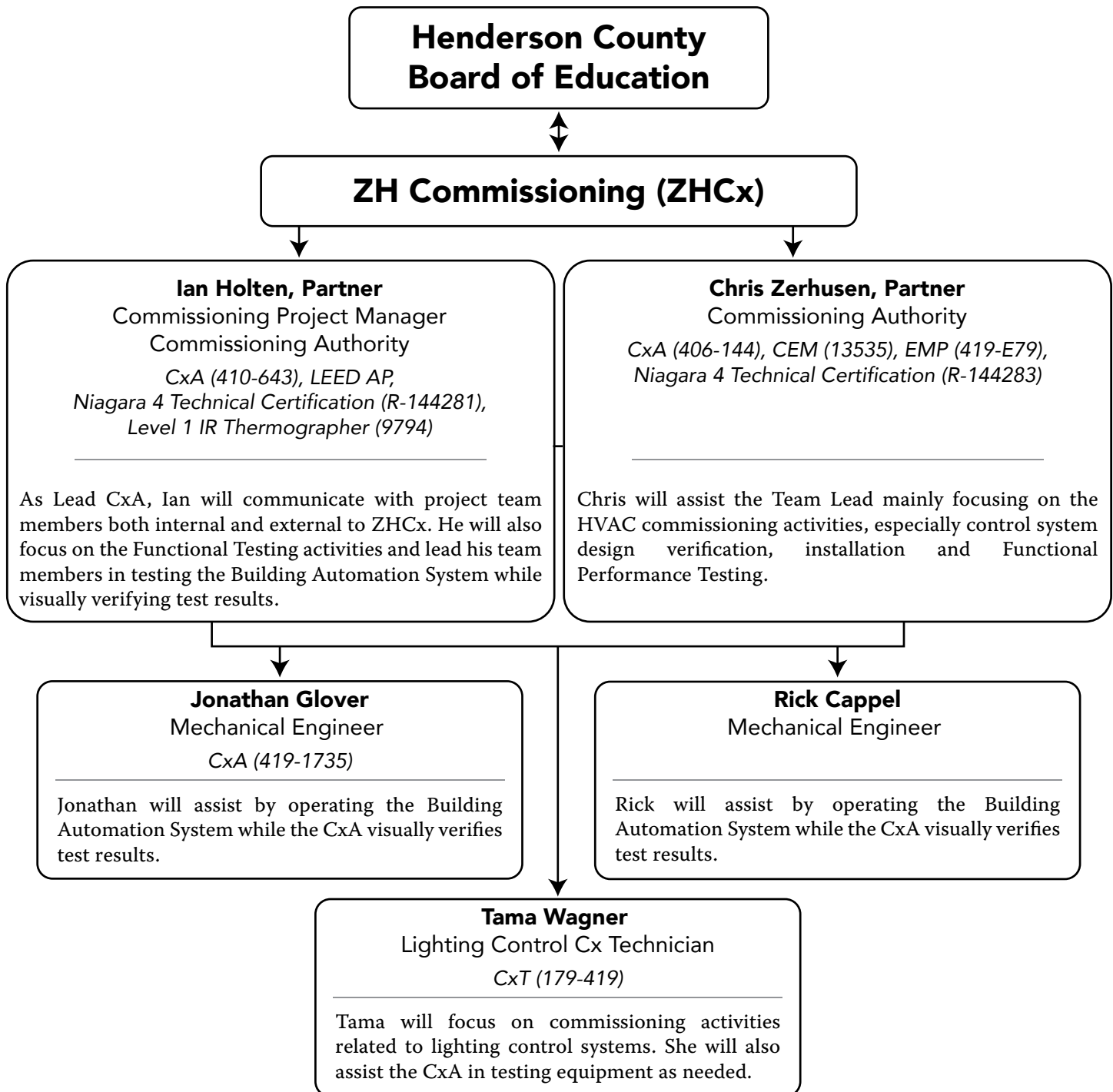
Section 3

# Commissioning Team



### The Team

In order to meet your commissioning goals, we have formed the team below. This team is prepared, qualified and ready to lead the commissioning process for the Jefferson Elementary School project. Our team will begin work once the proposal is accepted.



### Education

Northern Kentucky University  
2006—Bachelor of Science, Construction Technology  
2006—Associate Degree, Construction Management

### Cx Tasks Expertise

Cx Team Members Management  
Cx Specification Development  
Commissioning Schedule Development  
Commissioning Plan Development  
Commissioning Meeting Management  
Design Document Review  
Contractor Submittal Review  
Equipment Startup Verification  
Testing Procedure Development  
Testing Checklist Development  
Equipment Testing  
Resolution Tracking Form Management  
Owner Training Verification  
Systems Manual Development  
Final Report Development

### Other Expertise

Energy Management  
Equipment Troubleshooting

### Certifications

Certified Commissioning Authority, CxA (410-643)  
LEED Accredited Professional  
Level 1 IR Thermographer (9794)  
Niagara 4 Technical Certification (R-144281)

### Professional Memberships

AABC Commissioning Group (ACG)  
United States Green Building Council

### Ian Holten, Partner Lead Commissioning Authority



Simply put, Ian Holten has become a true student of the Building Sciences. With nearly 15 years of construction experience, his career in Commissioning began 8 years ago and quickly became his passion. This passion ultimately led to co-founding ZH Commissioning in 2011. In that time, he has served as the lead commissioning authority for a vast array of projects including retail, industrial, healthcare, education, and

civic markets. Additionally, he provides ongoing Energy Management services for many building owners in Kentucky, Ohio, and Indiana.

Always asking the question, “How can I make this better?” Ian is constantly exploring and studying new ways to broaden his knowledge of the building sciences to enhance every project in which he is involved. Ian is willing to take the time to do the things right—even when they aren’t the easiest—to build trust with his clients. Ian’s dedication to constant improvement has served as a solid foundation for fostering success, project after project.

### ..... Select Commissioning Project Experience .....

#### Ohio

Cincinnati Police Department,  
District 3 Headquarters\*†  
Cleveland Clinic, Richard E.  
Jacobs Health Center  
Good Samaritan / Miami Valley  
Hospital North  
School for Creative and  
Performing Arts  
The Children’s Theatre of  
Cincinnati\*  
The Christ Hospital, OS Tower\*  
West Clermont High School\*  
Wright Patterson Air Force Base,  
Advanced Power and Thermal  
Research Lab\*

#### Kentucky

Alltech Global Headquarters  
Boonesborough Elementary  
Hart County High School  
Howell Elementary  
Irvington Elementary  
L’Oréal USA\*  
Lloyd High School  
Northern Kentucky University,  
Dorothy Westerman Herrmann  
Natural Science Center, Retro Cx  
River Center, Towers 1 and 2  
Silver Creek Elementary  
St. Elizabeth, Edgewood

\* LEED Registered/Certified Projects

† Designed for Net Zero

### Education

Northern Kentucky University  
1998—Bachelor of Science, Construction Technology

### Cx Tasks Expertise

Cx Team Members Management  
Cx Specification Development  
Commissioning Schedule Development  
Commissioning Plan Development  
Commissioning Meeting Management  
Design Document Review  
Contractor Submittal Review  
Equipment Startup Verification  
Testing Procedure Development  
Testing Checklist Development  
Equipment Testing  
Resolution Tracking Form Management  
Owner Training Verification  
Systems Manual Development  
Final Report Development

### Other Expertise

Energy Management  
Equipment Troubleshooting

### Certifications

Certified Commissioning Authority (406-144)  
Certified Energy Management Professional (419-E79)  
Certified Energy Manager (13535)  
Niagara 4 Technical Certification (R-144283)

### Professional Memberships

AABC Commissioning Group (ACG)  
United States Green Building Council

### Chris Zerhusen, Partner Lead Commissioning Authority



To describe Chris Zerhusen as “passionate about Commissioning” would be an understatement. After observing a void in the industry, Chris devoted his career to implementing the commissioning process. During the ten years Chris has been practicing commissioning, he has obtained two credentials associated with his career passion—CxA and CEM.

In 2011, his dream became reality when he started ZHCx with Mr. Ian Holten. As the company has grown, its service offerings have expanded to Energy Management, Troubleshooting, and the newest service offering of Building Envelope Testing.

### ..... Select Commissioning Project Experience .....

#### Ohio

Cincinnati Memorial Hall  
Cincinnati Music Hall  
Cincinnati Police Department, District 3 Headquarters\*†  
Cintrifuse, Union Hall  
City of Kettering Fire Department, Station #32, #34 and #36  
Miami County Courthouse  
Moerlein Lager House\*  
Oxford Lane Library\*  
VA Dayton Medical Center, Building 305  
Wright Patterson Air Force Base, 445th Airlift Wing  
Wright Patterson Air Force Base, Building 79 Optics Lab\*  
Wright Patterson Air Force Base, Info. Technology Complex\*

#### Kentucky

Bath County High School  
Boone County Cooperative Extension Office\*  
Boone County Schools  
Ignite Academy  
Lewis County Elementary  
Northern Kentucky University, Dorothy Westerman Herrmann Natural Science Center, Retro Cx  
VA Lexington Medical Center  
Washington County HS  
Wilmore Elementary Retro Cx (Volunteer Project with USGBC)

\* LEED Registered/Certified Projects

† Designed for Net Zero

### Education

Mississippi State University  
2014—Bachelor of Science, Mechanical Engineering

Louisiana State University  
2010—Bachelor of Arts, Music

### Cx Tasks Expertise

Cx Team Members Management  
Cx Specification Development  
Commissioning Schedule Development  
Commissioning Plan Development  
Commissioning Meeting Management  
Design Document Review  
Contractor Submittal Review  
Equipment Startup Verification  
Testing Procedure Development  
Testing Checklist Development  
Equipment Testing  
Resolution Tracking Form Management  
Owner Training Verification  
Systems Manual Development  
Final Report Development

### Other Expertise

Equipment Troubleshooting  
Energy Modeling

### Certifications

Certified Commissioning Authority, CxA (419-1735)

### Professional Memberships

United States Green Building Council

## Jonathan Glover, Mechanical Engineer Commissioning Authority



Jonathan Glover's dedication to detail and process improvement enhances all aspects of the projects in which he is involved. After completing a Bachelor's degree in Mechanical Engineering at Mississippi State University, he designed refrigeration systems for the largest grocery retailer in the United States. In this position, he gained invaluable insight into the principals and practices used in design and construction as well as

a deeper understanding of mechanical and thermodynamic systems involved in the building sciences. Along with designing refrigeration systems, he was involved in projects ranging from energy reclaim to sequence-of-operations of specialized building systems.

As a systems-oriented engineer, the opportunity for a more hands-on experience with all types of building systems and equipment, and the chance to work with new, energy-saving technologies, is what guided him toward the field of commissioning. Jonathan's eagerness to learn about new systems and equipment helps to strengthen ZHCx's commitment to provide excellent service to its customers.

### ..... Select Commissioning Project Experience .....

#### Ohio

Aqua on the Levee  
Cincinnati Memorial Hall  
Cincinnati Music Hall  
Cincinnati Public Schools  
Columbus Public Schools  
Good Samaritan / Miami Valley Hospital North  
Keystone Hilton Garden Inn \*  
Miami Township Police Department  
Oxford Lane Library\*  
West Clermont High School\*  
Youthland Academy\*

#### Kentucky

Alltech Global Headquarters  
Beechwood Local School District  
Boone County Public Library, Florence Branch  
Boone County Schools Maintenance Facility  
Cecilia Valley Elementary  
Hart County High School  
Northern Kentucky University, Dorothy Westerman Herrmann Natural Science Center Retro Cx  
River Center, Tower 2  
Silver Creek Elementary  
Stanford Elementary

\* LEED Registered/Certified Projects

† Designed for Net Zero



### Education

University of Cincinnati

2018—Bachelor of Science, Mechanical Engineering Technology

Cincinnati State

2011—Associate of Science, Mechanical Engineering Technology and Design

### Cx Tasks Expertise

Commissioning Plan Development

Equipment Startup Verification

Testing Checklist Development

Equipment Testing

Resolution Tracking Form Management

### Other Expertise

Equipment Troubleshooting

### Professional Memberships

United States Green Building Council



### Rick Cappel, Mechanical Engineer Commissioning Technician



Rick Cappel is the newest member of ZHCx. He is dynamic, team-focused, and performance driven with a combination of leadership, business, manufacturing, and quality experience. Rick spent eight years with a construction renovation company where he learned the crucial principles and practices used in construction. Rick recently earned

a bachelor's degree in Mechanical Engineering from the University of Cincinnati before becoming an employee with ZHCx.

With ZHCx, Rick can apply his range of skills and knowledge while also learning about new systems, equipment, and the commissioning process. He is always willing to go above and beyond and is excited to be a part of the ZHCx team.

### ..... Select Commissioning Project Experience .....

#### Ohio

3CDC Race and Vine

Bethany School

Dater High School

Highland Elementary

Indian Springs Elementary

Keystone Hilton Garden Inn

Oyler School

Walnut Ridge High School

#### Kentucky

Alice Lloyd College

Alltech New HQ Expansion

Ballyshannon Middle School

Bath County HS

Hebron Branch Library

Georgetown Middle School

Grant County Public Library

Great Crossing HS

Hardinsburg Elementary

Hart County High School

Ignite Institute

Johnson Elementary

Steeplechase Elementary

Stephens Elementary

\* LEED Registered/Certified Projects

† Designed for Net Zero



### Education

Northern Kentucky University  
2009—Bachelor of Arts in Graphic Design

### Cx Tasks Expertise

Commissioning Schedule Development  
Commissioning Plan Development  
Design Document Review  
Contractor Submittal Review  
Testing Procedure Development  
Testing Checklist Development  
Equipment Testing  
Resolution Tracking Form Management  
Owner Training Verification  
Systems Manual Development  
Final Report Development

### Other Expertise

Energy Auditing — Lighting  
Equipment Troubleshooting

### Certifications

Certified Commissioning Technician, CxT (179-419)

### Professional Memberships

United States Green Building Council  
Illuminating Engineering Society



### Tama Wagner Commissioning Technician, Lighting Control



Tama Wagner began working with ZHCx in 2014. In the beginning, Tama used her experience and skills in graphic design to create a professional brand identity for ZHCx, ensuring Chris and Ian's passion for Building Commissioning shined in their marketing materials.

Next, Tama used her organizational skills and creative thinking to develop an online system that allows members of ZHCx to save time on office tasks such as project checklists and reporting. This directly allowed the team more time to work on project tasks, enhancing productivity and quality.

Tama has used her high attention to detail and proficient organization skills and applied them to lighting and lighting control testing. This includes design reviews, sensor layout and setup, centralized system programming, and system commissioning.

### ..... Select Commissioning Project Experience .....

#### Ohio

Brookville Fire Station  
Carriage House\*  
Cincinnati Music Hall  
Cincinnati Police Department,  
District 3 Headquarters\*†  
Cintrifuse  
City of Kettering Fire Station #32,  
#34, #36 and #37  
Clermont County Public Library  
Miami Township Branch  
Good Samaritan / Miami Valley  
Hospital North  
Kroger Culinary Center\*  
Oxford Lane Library\*  
Strietmann Building\*  
Wright Patterson Air Force Base,  
445th Airlift Wing

#### Kentucky

Alltech Global Headquarters  
Ballyshannon Middle School  
Boone County Cooperative  
Extension Office\*  
Boone County Schools  
Maintenance Facility  
Hardinsburg Elementary  
Hart County High School  
Irvington Elementary  
Nicholas County Elementary  
Northern Kentucky University,  
Dorothy Westerman Herrmann  
Natural Science Center, Retro Cx  
Silver Creek Elementary  
The EDGE Office Building,  
Tenant Fit-out\*  
Washington County High School

\* LEED Registered/Certified Projects

† Designed for Net Zero

## Section 4

# Commissioning Approach



ZHCx approaches the commissioning process, specifically our testing procedures, with a guilty-until-proven-innocent mindset. In our world, every point we check, operation sequence we watch, and performance metric we measure is assumed as incorrect until we prove otherwise. Although this may seem like a negative approach to the process, the reality is that it helps us find issues that frankly, others do not. Only AFTER we have proven that a control point or device is working properly and mapped appropriately, do we believe “the picture on the screen.” We find that much too often, industry-wide, control professionals, engineers, and commissioning agents rely on the data presented on a computer screen without first validating that data. We understand it takes more effort to actually go and physically verify equipment operation, but we are 100% committed to taking this approach. In our world, seeing is believing and assuming is dangerous.

An example of this approach is how we test freeze protection devices and strategies. For instance, after physically verifying a freeze stat has been installed in the proper location, we actually use freeze spray on the device’s sensing tube to ensure the capillary tubing isn’t compromised. We have seen others bypass this step, they simply manually initiate a closure at the freeze stat. While that method will prove the contact closes properly, it does not ensure the entire device is functional. Our method does.

This is just one of ways in which we test-to-fail. Our approach for functionally testing equipment is designed with Murphy’s Law in mind. We believe that if through commissioning we are able to damage, freeze, or otherwise compromise equipment, then so will our Owner. We have developed and refined our functional testing procedures based on both this premise and our collective experience.

The result; you can be assured that when extremely cold temperatures arrive, your equipment will be safe. You can be assured that when a life safety system is called upon to operate, it will. The bottom line is that our approach to commissioning and functional testing goes way beyond simply filling in boxes on a checklist. Rather, when we finish testing a piece of equipment, you will know that not only has it been verified “fail-safe,” it has also been optimized for energy, maintenance, and operation. You cannot get those results without your commissioning agent thinking at a high level, above and beyond a checklist.

That’s the ZHCx way.



### Online Reports

Our reports are created utilizing an online user-friendly reporting system. Checklists are generated for each system and are specific to the project. The online report is then generated from the findings discovered while using the online checklists. A URL will be provided to the team with instructions on how to access and view the online report. The following pages of this proposal provide an example of our checklists and reports.

### Pre-Construction Phase

#### Design Review Comments Report

ZHCx will review the Design Documents applicable to the systems included in the commissioning process. All comments from the Design Document Review will be listed on the Design Review Comments Report. This information will be provided via our online reporting system.

### Construction Phase

#### Submittal Review Comments Report

ZHCx will review all submittals applicable to the systems included in the commissioning process. All comments from the review will be listed on the Submittal Review Comments report. This information will be provided via our online reporting system.

### Equipment Start-up Reports

The Commissioning Agent who attends the equipment startup will create an Equipment Start-up Report with all findings and recommendations discovered during the startup. Each item in the report is written as a narrative so that anyone reading the report can have a full understanding of how the start-up occurred along with the results of the start-up. This information will be provided via our online reporting system.

### Commissioning Findings Log

Items discovered during prefunctional and functional commissioning activities will be housed via ZHCx's online reporting system. This online report will be updated throughout the process. Anyone can view the most current report at any time using the unique URL provided.

### Lighting Control Checklists/Reports

Lighting Control Checklists are generated using a user-friendly online system that functions like a spreadsheet. This checklist will be specific to your project. Each room will be listed, and for each room, several points will be checked such as the correct installation of various light fixture types, foot-candle readings, time-delay to auto-off, etc. This information will be provided via our online reporting system.

### Resolution Tracking Form

As items are resolved on the Commissioning Findings Log, items that are completed/resolved are pushed to the bottom of the list. Unresolved/outstanding items are sorted towards the top of the report with the oldest items nearest the top. Each item should be addressed, in writing, with resolutions provided by the assigned contractor.

### Resolved Commissioning Findings Log

As items on the Commissioning Findings Log are resolved, ZHCx will perform a back-check of the item to verify its resolution and mark it complete. The Commissioning Agent will document the date the item was completed along with how the item was resolved.

### Post-Construction Phase

#### Opposite-Season Testing Report

Once outside air conditions permit, opposite-season testing will be performed by ZHCx. The report will include all findings discovered during this testing, along with recommendations on how to resolve that finding.

### Final Commissioning Report

ZHCx will compile a Final Commissioning Report. This report will include an executive summary, issues log with resolutions, completed pre-functional testing checklists, final TAB report, and completed functional performance testing checklists. This report will be delivered as a PDF and/or printed and bound.



\*Reports provided vary based on scope of services.

### Example Report URL and Instructions

The user will receive a URL via e-mail. This URL will take the user to the online report. Only users with the URL can view the report online. The e-mail sent to the team will also provide basic instructions for viewing and printing the report.

ZH Commissioning uses an online reporting system to provide you with the most up-to-date information on our testing. With this system, all reporting is centralized in one location and spans all visits. This will allow you to see all open and resolved items in one location on one page.

#### **General Instructions:**

##### **Viewing the Report**

Please click on the following link to view the live report:

<https://app.smartsheet.com/b/publish?EQBCT=43f1add2bdaa49>

\*\*\*Save this e-mail or bookmark the URL, as this will be how you will view all commissioning reports for the duration of this project.\*\*\*

##### **Live Reporting**

This “read only,” live report includes all items that have been reported by the CxA, both resolved and unresolved, up to date. You DO NOT need an account to view this report.

##### **Original Report Date**

This column shows the date the item was originally reported. This date will not change.

##### **Resolved Date**

Once the item is resolved, the Commissioning Agent will enter the date the item was resolved in the “Resolved Date” column. Items without a “Resolved Date” in the rightmost column are considered unresolved at this time. This could mean the item is truly unresolved, or that the CxA hasn't back-checked the item to mark it complete. If you see items on the report that are ready to be back checked, please let the CxA know.

##### **Report Sorting**

The report is sorted according to Resolved Date, Original Report Date, and then Equipment ID. Resolved items will be at the bottom of the sheet.

##### **Photos and Attachments**

The Findings or Recommendations may refer to a photo or attachment. You can view photos or attachments by clicking on the paperclip icon in the far left column of the row. You may view the photos or attachments online, or download them to your computer.

##### **Discussions**

Discussions can be viewed by clicking on the speech bubble symbol on the far left.

##### **Printing**

You may print the live report by clicking on the print button in the toolbar on the left.

##### **Viewing Updates**

To quickly highlight changes that have been made within a certain time period, click on the highlighter button located in the toolbar on the left. (This will allow you to easily see what has changed as the report evolves.)



### Example Online Report

The online report is “live” and is updated as items are added or resolved. The user can choose to create a PDF of the report for printing. The report is created in a spreadsheet format, creating an intuitive report.

### Report Items

Each row contains the Item Number, Date of Report, Equipment ID, Area Served or the Room Name where the equipment is located, Finding, Recommendation, and the party responsible for addressing the item.

Item #0129A	11/20/15	AHU-1	P01 Penthouse	The exhaust air damper was set up to modulate inversely from the return air damper. This was allowing the exhaust air damper to open even though the building pressure was under the building pressure set point.	Simon/JCI and Ian/ZH discussed changing the exhaust air damper to control to space static pressure.	Temperature Control Contractor
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Row ID	Original Report Date	Equipment ID	Area Served / Room Name	Findings	Recommendations	Responsible Party	Resolved Date	Resolution
Item #0162A	11/20/15	AHU-1	P01 Penthouse	up. On 11/20/15, we found AHU-1 would not start up using this strategy as the supply fans would ramp to maintain static pressure in the supply duct work. The return fans were remaining at a minimum speed while the supply fan reached 52%. This appears to be causing a DC Bus Undervolt at the return fan VFD and the units alarm and shut down.	fan tracking strategy to offset the return fan from the supply fan speed with a % speed (adjustable).	Temperature Control Contractor		
Item #0129A	11/20/15	AHU-1	P01 Penthouse	The exhaust air damper was set up to modulate inversely from the return air damper. This was allowing the exhaust air damper to open even though the building pressure was under the building pressure set point.	Simon/JCI and Ian/ZH discussed changing the exhaust air damper to control to space static pressure.	Temperature Control Contractor		
Item #0128A	11/20/15	AHU-2	P01 Penthouse	When we arrived onsite 11/20/15, AHU-2 was continually tripping on high and low discharge/suction static pressure even though the duct static pressure sensor was only reading .12 HWC.	Troubleshoot	Temperature Control Contractor		
Item #0014B	11/20/15	HWP-1	P01 Penthouse	The thermometer on the secondary hot water pumps has not yet been installed.	Install the thermometer per the base mounted pump detail.	Mechanical Contractor		
Item #0015B	11/20/15	HWP-2	P01 Penthouse	The thermometer on the secondary hot water pumps has not yet been installed.	Install the thermometer per the base mounted pump detail.	Mechanical Contractor		
Item #0021C	09/18/15	CT-1	P01 Penthouse	During prefunctional testing, we found 2 of the cooling tower air diffusers were installed upside down, allowing water to drip from the tower and onto the roof.	Reinstall the diffusers in the correct orientation.	Mechanical Contractor	09/18/15	Diffusers were removed and installed properly.
Item #0024C	09/18/15	CT-2	P01 Penthouse	During prefunctional testing, we found 2 of the cooling tower air diffusers were installed upside down, allowing water to drip from the tower and onto the roof.	Reinstall the diffusers in the correct orientation.	Mechanical Contractor	09/18/15	Diffusers were removed and installed properly.
Item #0027C	09/18/15	CTP-1	P01 Penthouse	Balancing valves have not been provided.	Place balancing valve in water loop per detail.	Mechanical Contractor	09/18/15	Update: Balancing valves were not submitted or installed due to the pumps having VFD's installed. Item resolved.
Item #0029C	09/18/15	CTP-2	P01 Penthouse	Balancing valves have not been provided.	Place balancing valve in water loop per detail.	Mechanical Contractor	09/18/15	Update: Balancing valves were not submitted or installed due to the pumps having VFD's installed. Item resolved.
Item #0012C	10/12/15	CH-3		The Arctichill machine was started on 10/12/15 without notice. We did not witness the start up of this equipment and pumps.	Information Only.	N/A	10/12/15	N/A
Item #0005G	10/14/15	FP-1	Building	The jockey pump rotation was incorrect when bumped with power.	Correct the rotation of the jockey pump.	Mechanical Contractor	10/13/15	Pump rotation was corrected

### Report Attachments and Images

The paper clip icon means an attachment has been provided. This attachment could be any type of file, including image files. Multiple attachments and images can be uploaded per row. The user can view uploaded images online or download them to his or her computer.

### Resolved Items

Resolved Items remain on the report, but are moved to the bottom of the list. The item is marked with a Resolved Date and a Resolution is documented.

## Section 5

# Outline of Services and Procedures





#### Systems to be Commissioned

##### Heating, Ventilating,

##### Air Conditioning & Controls

- a. Ground Source Plant (Geothermal)
- b. Energy Recovery Units
- c. Water to Air Heat Pumps
- d. Hydronic Pumping
- e. Variable Air Volume Boxes Supply
- f. Variable Air Volume Boxes Exhaust/Return
- g. Variable Frequency Drives
- h. Ductless Split System Units
- i. Computer Room Air Conditioning Units
- j. Exhaust Systems
- k. Unit Heaters

##### Lighting and Lighting Controls

- a. Interior
- b. Exterior

#### Design Phase

##### Commissioning Plan

The Commissioning Plan is created by ZHCx and shared with the commissioning team. It defines the roles of all the team members during the commissioning process, intertwines the commissioning activities into the project schedule and provides guidance to the team in respect to commissioning throughout the project.

#### Construction Phase

##### Commissioning Kick-off Meeting

ZHCx organizes a Commissioning Kick-off Meeting with all members. The purpose of the meeting is to help the entire team, including installing contractors, understand their specific roles in the commissioning process. This meeting will occur prior to installation of materials by associated trades who are involved in the commissioning process.

##### Coordinating Activities

Ian Holten will act as the lead commissioning agent for the project and the point of contact for the client. Ian's extensive experience in both project management and field testing will help ensure the commissioning process is implemented in the best way possible from all ZHCx team members.

Additionally, we plan to have a presence during recurring project construction meetings. We find these meetings are the best way to coordinate and integrate the commissioning process with the construction schedule. This step is important in order for us to provide our services at the right time for the project during and after the project has been completed.

##### Job Site Visits and Construction Meetings

ZHCx will attend a minimum of six regularly-scheduled construction meetings as well as conduct commissioning meetings as necessary. Job site visits will occur following meetings and during other pertinent points of the project.

##### Prefunctional Performance Testing

ZHCx develops project-specific checklists to ensure the designed and approved equipment is installed. Each checklist will be specific to the equipment designed and installed. ZHCx personnel are responsible for these inspections including completing the checklists. All equipment within the scope is tested; sampling is not involved in our testing.

##### Witness Equipment Startups

ZHCx strives for direct involvement, assistance, and optimization of systems with the balancing contractor. This includes documenting system start-up parameters and data. This type of involvement requires commitment from the commissioning agent to be both flexible and available during these project activities. Too often, we find functional and operational issues that persist into occupancy that should have been identified during startup and balancing. ZHCx is committed to being an active team member participating in BOTH equipment startup and system balancing activities.

##### Functional Performance Testing

ZHCx will lead and document Functional Performance Testing. The performance of the installed equipment and systems is verified utilizing checklists developed by ZHCx. The success of the Functional Performance Testing process will be ensured by monitoring the building throughout the entire year. All equipment within the scope is tested; sampling is not involved in our testing.

##### Lighting and Receptacle Control

Interior and Exterior lighting control devices and systems will be tested specifically to confirm all hardware and software is calibrated, adjusted, programmed and in proper working condition. Also, occupancy sensors will be tested in a realistic setting to verify that they are placed correctly, ensuring lights and receptacles do not turn off automatically when they should not. Time of day controls will be tested to ensure they are functioning properly and as intended. Lastly, the commissioning agent will ensure photo-sensor control devices reduce light levels as designed. All of this testing information will be documented via online checklists (for more detailed info) as well as the Commissioning Report (which narrows the information down to specific findings that need to be addressed).

#### Construction Phase Continued

##### Witness Testing, Adjusting, and Balancing

As part of our process, ZHCx intends to meet with the balancing contractor prior to work commencing to discuss pertinent or potential issues, expectations, and methodology. We have found the balancing contractors appreciate this coordination and understand our expectations thoroughly. This leads to well-balanced, highly optimized systems.

##### Tracking System

In order to keep our information simple and organized, ZHCx utilizes a user-friendly online system to develop and complete checklists and reports. These checklists and reports can be accessed using a computer, tablet, or smartphone. In order for the project team to view the report, we will provide a URL unique to the project. As findings and resolutions are documented by the commissioning team, this up-to-date information can be viewed online by any member of the project team using the URL provided.

##### Resolution Tracking

ZHCx works toward the resolution of deficiencies during the entire project. We provide access to an online report that displays all open and closed items. These items are tracked throughout the project and remain open until resolved. Once resolved, the resolution is documented and the item is closed.

#### Operation Phase

##### Training

ZHCx will attend and participate in Owner training sessions to verify the staff has received adequate training.

##### Seasonal Testing

Following initial completion of Functional Performance Testing, ZHCx will schedule testing of sub-systems, systems, and interactions between systems that could not be carried out prior to acceptance due to unsuitable weather conditions.

##### Final Commissioning Report

ZHCx will meet with the team to determine the expectations for a Final Report. It is important to us to include usable information, rather than providing a report just for the sake of meeting a requirement. The Final Commissioning Report will include the Resolution Tracking information, completed checklists, and any other information deemed necessary.



Section 6

## Commissioning Fee



### Fixed Fee Quotation

ZHCx proposes a lump sum, not to exceed fee of \$30,885.00 (thirty thousand eight hundred eighty five dollars) to perform commissioning services during the design, construction and operation phases of the Jefferson Elementary School project.

### Hourly Rates of Staff

Staff	Hourly Rate
Commissioning Agent	\$135
Commissioning Technician	\$105
Administrator	\$65

### Terms and Conditions

ZHCx will bill the Client on a progress basis with payment to be made within thirty (30) days of invoice date. Interest in the amount of one and one-half percent (1.5%) per month shall accrue on all invoices ninety (90) days after invoice date. ZHCx shall have the right to suspend its work on the Project, after giving the Client seven (7) days written notice of its intent to suspend services, if any invoice becomes more than ninety (90) days past due.

If the Project is commenced and then for any reason, including but not limited to failure of payment, suspended for more than three (3) months, ZHCx shall have the right to renegotiate the balance of its fee, and the cost of Project restart, or to terminate this Agreement.

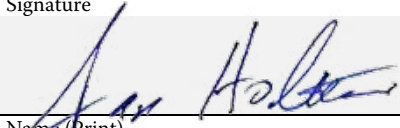
This proposal includes time for one back-check per item. If a large number of issues require more than one back-check, due to contractor negligence, ZHCx reserves the right to additional compensation.

All work will be performed during normal business hours (8am-5pm). Any costs associated with work outside normal business hours will need to be coordinated between the client and ZH Commissioning.

If you find the proposal acceptable, please fill out the information on the following page.

### Contract Signature

If you find the proposal acceptable, please sign below and return.

Company Zerhusen Holten Commissioning, LLC	
Signature 	
Name (Print) Ian Holten	
Title Partner	Date 2/28/20

Company	
Signature	
Name (Print)	
Title	Date

### Contact Information

Please fill out the information below and return, or click on the URL below to submit contact information electronically to ZHCx.

[Project Contact Information Form](#)

Project Title <b>Commissioning Services for Jefferson Elementary School</b>
--

#### Project Contact:

Name and Title	E-mail	Phone Number
Address		

#### Billing Contact:

Name and Title	E-mail	Phone Number
Address	Address Invoices To <i>(If invoices should be addressed to a business or person other than the billing contact, please provide the name and address of the business or person to whom the invoices should be addressed)</i>	
Comments for Billing		

Section 7

# Attachments





# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

02/11/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must have **ADDITIONAL INSURED** provisions or be endorsed. If **SUBROGATION** IS **WAIVED**, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

<b>PRODUCER</b> Tri-City Insurance Service Inc 234 Main Street P.O. Box 245 Florence KY 41042	<b>CONTACT NAME:</b> Sonya Garrison <b>PHONE (A/C, No, Ext):</b> (859) 371-7006 <b>FAX (A/C, No):</b> (859) 371-9070 <b>E-MAIL ADDRESS:</b> sonyag@tciky.com																					
<b>INSURED</b> Zerhusen Holten Commissioning 267 Main St Florence KY 41042	<table><tr><th colspan="2">INSURER(S) AFFORDING COVERAGE</th><th>NAIC #</th></tr><tr><td>INSURER A :</td><td>Grange Mutual Insurance</td><td>14060</td></tr><tr><td>INSURER B :</td><td>Kentucky Employers Mutual Ins</td><td>10320</td></tr><tr><td>INSURER C :</td><td>AmWINS Brokerage</td><td></td></tr><tr><td>INSURER D :</td><td></td><td></td></tr><tr><td>INSURER E :</td><td></td><td></td></tr><tr><td>INSURER F :</td><td></td><td></td></tr></table>	INSURER(S) AFFORDING COVERAGE		NAIC #	INSURER A :	Grange Mutual Insurance	14060	INSURER B :	Kentucky Employers Mutual Ins	10320	INSURER C :	AmWINS Brokerage		INSURER D :			INSURER E :			INSURER F :		
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INSURER C :	AmWINS Brokerage																					
INSURER D :																						
INSURER E :																						
INSURER F :																						

**COVERAGES****CERTIFICATE NUMBER:** CL19112615539**REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> <b>COMMERCIAL GENERAL LIABILITY</b> <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			BP 2722231	12/09/2019	12/09/2020	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 AICRG \$
A	<input checked="" type="checkbox"/> <b>AUTOMOBILE LIABILITY</b> <input checked="" type="checkbox"/> ANY AUTO OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS HIRED AUTOS ONLY <input type="checkbox"/> NON-OWNED AUTOS ONLY			CA 2725110	12/09/2019	12/09/2020	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ Uninsured motorist \$ 1,000,000
A	<input checked="" type="checkbox"/> <b>UMBRELLA LIAB</b> <input checked="" type="checkbox"/> OCCUR <b>EXCESS LIAB</b> <input type="checkbox"/> CLAIMS-MADE DED <input type="checkbox"/> RETENTION \$			CUP2752456	12/09/2019	12/09/2020	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 EACH OCCURRENCE \$ 1,000,000 AGGREGATE \$ PER STATUTE <input type="checkbox"/> OTH-ER <input type="checkbox"/>
B	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y / N <input type="checkbox"/>	N / A	406073	08/08/2019	08/08/2020	E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$
C	Professional Liability			0000-00175551F	02/17/2020	02/17/2021	Limit \$2,000,000 Deductible \$1,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

**CERTIFICATE HOLDER****CANCELLATION**

\*\* PRESENTATION ONLY \*\*

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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The undersigned agent, being duly sworn, states that neither he/she nor his/her firm has any relationship (financial or through kinship) to:

- ☒ Any school board member or the superintendent;
- ☒ Any or all prime contractors or material suppliers when using the construction management method of construction.

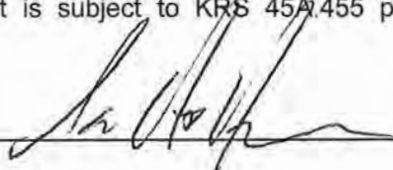
The undersigned further states that he/she has not entered into any agreement or collusion with any person relative to the price bid by anyone nor has he/she attempted to induce anyone to refrain from bidding.

Explain below any kinship or financial relationship you may have to any parties as mentioned above on this project.

none

This affidavit is subject to KRS 45A.455 prohibition against conflict of interest, and gratuities and kickbacks.

Ian Holten  
Name

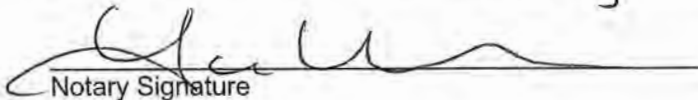


Partner  
Title

Zerhusen Holten Commissioning, LLC  
Name of Company

Subscribed and Sworn to Me this

5<sup>th</sup> day of February, 19.

  
Notary Signature

My Commission expires:

5/27, 2022.





Building Commissioning  
Energy Solutions  
Thermal Imaging  
Building Envelope Testing  
Maintenance Consultation

## Thank You

We appreciate the opportunity Henderson County Schools has given us—allowing us to demonstrate our commissioning qualifications. Our passion for successful implementation of the commissioning process is displayed in our response.

Thank you for your consideration of ZH Commissioning!

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[www.ZHCommissioning.com](http://www.ZHCommissioning.com)

267 Main Street  
Florence, KY 41042  
(859) 282-6467