

Job Task Analysis Building Operations Journey-Worker

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Job Task Analysis Building Operations Journey Worker

August 2016

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Executive Summary

This report describes the process for creating a Job Task Analysis for a Building Operations Journey-worker (BOJ). The BOJ JTA is based on the comprehensive job task analysis for Building Operations Professionals previously created under the Better Buildings Workforce Guidelines. The competency (domains, tasks and associated knowledge) list, which defines the work performed by practitioners, was initially developed for the Building Operations Professional (BOP) by a representative panel of practitioners during a meeting held on February 10-12, 2014 in Orlando Florida. Following the identification of the job tasks and associated knowledge and skills, a validation survey was conducted of the finding of the JTA and the results of the validation study were reviewed by a representative panel of practitioners during a conference call held on May 30, 2014. This study was performed by Professional Testing Inc. The complete BOP JTA is incorporated for reference as Appendix C of this Report.

After development of the BOP JTA and scheme, it was determined that a reduced scope of work for a mid-level position was needed to support the development of certificate level programs leading to the BOP and its corresponding certification program. The National Institute of Building Sciences (NIBS) requested that a follow up study be conducted to identify a reduced scope falling within the Building Operations Professional job scope. Thus a validation study was conducted to identify the components of the domains, tasks and associated knowledge for Building Operations Professionals that would be pertinent for a Building Operations Journeyworker. Based on the results of the follow up study a final JTA containing tasks and related KSAs was developed and is included in this report.

Acronyms

ACM	Asbestos Containing Materials
BAS	Building Automated Systems
CMMS	Computerized Maintenance Management Software
DACUM	Developing a Curriculum
DDC	Direct Digital Controls
DOE	U.S. Department of Energy
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
GHS	Globally Harmonized System
HIPAA	Health Insurance Portability and Accountability Act
HOA	Hand-Off-Auto
IPMVP	International Performance Measurement and Verification Protocols
JTA	Job Task Analysis
NIBS	National Institute of Building Sciences
NREL	National Renewable Energy Laboratory
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
PACM	Presumed Asbestos Containing Materials
PPE	Personal Protective Equipment
SD	Standard deviation
SDS	Safety Data Sheets
SEM	Standard error of the mean
SME	Subject matter expert
SOP(s)	Standard Operating procedure(s)
TDS	Total Dissolved Solids
USGBC	U.S. Green Building Council
VAT	Vinyl Asbestos Tile
VOC	Volatile Organic Compound

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1 Building Operations Journey-worker Introduction

The National Institute of Building Sciences (NIBS) convened a study to identify the critical duties and tasks associated with the job of a Building Operations Professional (BOP) that would be pertinent for a Building Operations Journey-worker (BOJ). NIBS had identified that a Building Operations Journey-worker was a subset, reduced scope job that one would perhaps hold before moving on to a more experienced Building Operations Professional job. It was envisioned that the BOJ would be less qualified than the BOP and would mainly do technical activities as opposed to management activities.

To facilitate the identification of the competencies, Professional Testing was asked to take the existing BOP JTA and to revalidate the tasks and associated knowledge to identify those tasks and knowledge that would be relevant to the Building Operations Journey-worker. For reference, the BOP JTA is incorporated into this Report as Appendix C.

2 DACUM Chart for Building Operations Journey Worker

2.1 Building Operations Journey-worker Job Description

The Building Operations Journey-worker maintains and operates building systems and installed equipment, and performs general maintenance to maintain the building's operability, optimize building performance, and ensure the comfort, productivity and safety of the building occupants. The Building Operations Journey-worker may provide leadership and training to less senior personnel.

Professional Testing would like to thank the following individuals who contributed to the Building Operations Professional JTA (the foundation for this project): Mohamed Amin, Terry Bickham, Mike McBee, Robert Blakey, James Coates, Richard Dames, Howard Day, Charles Frost, Hadley Hartshorn, Christine Maurer, Carlos Santamaria, Daniel Sexton, Daryl Walker, Rod Weiss, and Anthony Zotto.

Professional Testing would also like to thank Deke Smith and Roger Grant from the National Institute of Building Sciences (NIBS).

2.2 Job Task Analysis DACUM Chart for Building Operations Journey-worker

	Duties and Tasks			
Α			Operating Buildings	
	1		Perform workplace hazard assessments	
	2		Participate in emergency drills	
	3		Manage the PPE program	
	4		Manage third party inspections	
	5		Respond to building emergencies	
	6		Manage responses to inclement weather conditions/issues	
	7		Respond to tenant requests/issues	
	8		Conduct equipment checks	
	9		Conduct daily rounds	
	10		Coordinate facility operations (normal)	
	11		Coordinate facility operations (other than normal)	
	12		Manage the work order process	
	13		Investigate indoor environmental quality	
	14		Conduct tenant relations activities	
	15		Monitor consumables (hazardous materials)	
	16		Manage outside facility contractors/service providers	
	17		Implement an energy management program	
	18		Maintain the facility and systems	

Table 1. Duties and Tasks of Building Operations Journey-worker

2

	19	Conduct facility repair activities
В		Optimizing the Facility
	1	Conduct measurement and verification activities
	2	Analyze system performance
	3	Identify cost saving measures
	4	Respond to changing energy costs
	5	Optimize system performance
	6	Identify sustainability opportunities
С		Conduct Planning Activities
	1	Update procedures (SOPs, BOPs, operating plans, emergency plans, etc.)
	2	Develop equipment operations plans
	3	Develop planned maintenance schedules
D		Conducting Budgeting Activities
	1	Contribute to facility operations budget

Table 2. Specialized Knowledge for Builiding Operations Journey-worker

Specialized Knowledge		
Adjusting equipment based on readings	Americans with Disabilities Act	
Asset inventories	Renewable energy systems	
BAS or monitoring systems	Baselines	
Basic data architecture	Basic financial terminology	
Basic knowledge of contaminant limits	Basic knowledge of tariffs	
Basic statistical analyses	Basic utility bill analysis	
Benchmarking	Best practices for emergency drills	
Biohazards and hazardous chemicals	Break-even analysis	
Budget categories	Building certification programs	
	Building systems* (* <u>see list on pages 6 & 7</u>)	
Ruilding operations and procedures	(including interdependencies, interoperability,	
building operations and procedures	limitations, operating plans, operations, and	
	performance expectations)	
Business case development	Chain of custody	
Common or frequent deficiencies	Communications plans	
Company labor policies	Comparing alternatives to satisfy demands	
Conditions under which a building should be evacuated	Consumable logistics	
Consumable requirements	Consumable sourcing guidelines	
Contaminant containment protocols	Contingency plans/data recovery	
Contract requirements	Contracts and service providers	
Contributors to carbon or environmental footprint	Control systems	
Control theory	Criticality of various systems and equipment	
Customer requirements for business	Decontamination requirements	
Demand management strategies	Distinguishing equivalency between equipment	
	and/or systems	
Emergency equipment operation	Emergency procedures including first aid and CPR	

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Specialized Knowledge			
Emerging technologies and tools	Energy basics		
Energy conservation opportunities	Energy efficiency measures (EEM) and economics		
Energy load profiles	EPA regulations		
Equipment operations and specifications	Expected life of major building components		
Facility knowledge	Failure modes		
Financial knowledge	Financial penalties for going above peak demand threshold		
First cost vs. lifecycle costs	First response mitigation techniques (what type of fire extinguisher to use, etc.)		
Fluid dynamics	Foot-candles/lumens and lighting concepts		
Funding sources	General knowledge of the authority having jurisdiction		
Hazard remediation/clean up	Hazardous materials disposal		
Hazards in the area (earthquakes, etc.)	Hazards management		
Health effects of contaminants (including stay times)	Heat transfer		
HIPAA requirements	Historical data associated with facility		
HVAC systems	Impact of change on tenant/occupant space		
Impact of facility operations on schoduling	Impact of operational changes (occupancy		
Impact of facility operations of scheduling	changes) on performance expectations		
Incident command systems (ICS)	Inclement weather escalation plans		
Inclement weather local logistics (shelter, food, transportation)	Indicators of problems with equipment		
Infection control procedures	Inspection agencies		
Inspection procedures	Insurance requirements		
Integrated work management systems structure	Interim life safety measures (fire watch, alternate evacuation routes, etc.)		
Interpreting equipment test readings	Inventory control systems		
Levels of maintenance	Licensing requirements		
Lifecycle accounting practices	Limitations of PPE		
Load demand schedules	Local water restrictions and requirements		
Local weather issues	Location of facility equipment		
Lock-out/tag-outs	Management requirements		
Manual equipment operation	Material availability		
Measured variables to verify system performance	Medical evaluation policies and requirements		
Mitigator of carbon or environmental footprint	Monitoring systems and equipment		
Municipal requirement for disposal and recycle of consumables	National Incident Management Systems (NIMs)		
New technologies	Normal equipment operating parameters/limits		
Normal routine operation of the facility	Obtaining measurements		
Occupancy types and typical evacuation	Operating baselines		
Operation equipment loads	Operational impact of inspections		
Operations within the facility	Options for extending the life of equipment and		
Organizational structures	Systems		
Organizationalstructures	Organization's budgeting process		

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Specialized Knowledge			
Safety Codes and Standards (including OSHA)	Other submetering systems		
Owner's long-term plan for the facility	Peak demand loads		
Permitting requirements	Plumbing systems		
Potential contaminants			
Potential environmental, health and safety (EHS)	PPF and proper usage and maintenance of PPF		
hazards and risks			
Procurement policies and procedures			
Proper procedures for isolating and removing	Psychrometrics		
hazards			
Rate schedules for utilities			
	Refrigerant recovery techniques		
Regulated consumables	Regulatory record requirements		
Relationship between deficiencies and energy	Remediation activities for contaminants		
efficiency			
Remediation procedures	Remote monitoring systems and equipment		
Remote system fluency (DDC, etc.)			
Reporting requirements for emergencies	Resource planning personnel management		
Resources required for typical tenant/occupant	Safety codes and standards (including OSHA)		
requests and issues	, , , ,		
Safety concerns associated with equipment	Safety practices		
operations			
Scope of work	Sequence of equipment operations		
Sequence of operations	Service level agreements		
Shelf life of consumables	SUPS related to equipment		
Specialized emergency equipment	State and local energy mandates		
Technical equirements for consumables	Sustainability options		
Technical equipment knowledge	Tenant/occupant chain of command		
Tenant/occupant contracts	Tenant/occupant equipment and requirements		
Tenant/occupant hours of operation	lenant/occupant needs and schedules		
Tenant/occupant operations and space uses	Tenant/occupant requirements		
Tenant/occupant tolerances in changes to systems	Testing and balancing procedures		
Thermodynamics	Trade knowledge for specific equipment and		
· · · · · · · · · · · · · · · · · · ·	systems		
I rend analysis	l ypical non-energy costs		
Understanding of all staff functions carried out in the facility	Understanding of interlocked equipment		
Understanding of load shedding and its			
importance	Understanding of photometric charts		
Uninterruptable and critical systems	Utility bill analysis		
Utility rate structures and schedules	Utility time of use		
Vendors	Ventilation requirements for consumables		
	Weather related factors affecting equipment		
Weather impact on the facility	(temperatures, dew points, etc.)		
When substitutions of equipment or systems are			
not allowed	when to conduct IEQ tests		

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Specialized Knowledge	
Whole building integration	Work control procedures
Work order processes	

Table 3. Building Systems Knowledge for Building Operations Journey-worker

* Building Systems	
Air compressor and distribution system	
Air distribution system	
Building automation system	
Building control system	
Building envelope	
Chilled water system	
Combined heat and power system	
Communication systems	
Condenser water system	
Conveyance systems	
Cooling generation equipment	
District energy systems	
Domestic hot water system	
Electrical power system	
Elevator/escalator systems	
Emergency alert systems	
Energy metering and monitoring system	
Energy recovery system	
Fresh air systems	
Fuel storage and distribution systems (USTs, ASTs, etc.)	
Heat generation equipment	
HVAC control system	
HVACR system	
Irrigation equipment	
Life safety systems	
Lighting control system	
Lighting system	
Onsite energy generation system (CHP, PV, Wind, Thermal, generators, etc.)	
Potable cold water system	
Primary sewer/gray water systems	
Process systems and controls	
Pumps and pumping system	
Renewable energy system	
Specialty exhaust systems	
Standpipe/sprinkler systems	
Steam and hot water system	

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Steam distribution system

Thermal energy storage system

Uninterruptible power systems (UPSs)/Building Energy Storage Systems (BSS)

Variable drive system

Water distribution and control system

Table 4. General Knowledge for Building Operations Journey-worker

General Knowledge
Calculations
Perform simple math operations of division
Perform simple math operations of addition
Perform simple math operations of subtraction
Perform simple math operations of multiplication
Use a calculator
Compare numbers
Perform mathematical operations with decimals
Collect information to solve a problem
Perform math operations using single and multiple digit numbers
Make rough estimates
Transfer number sequences from a source into a column
Figure averages
Perform mathematical operations with fractions
Solve percent problems
Solve ratio problems
Perform math operations using signed (positive and negative) numbers
Change numbers from fractions into decimals and back
Change numbers from percentages into decimals and back
Measure angles
Solve problems with graphs
Multiply and factor algebraic expressions
Solve formula calculations with one unknown
Basic Measurement
Read measurements taken with common measuring tools
Measure temperature to within 1 degree Fahrenheit
Measure linear distances (length, width, etc.)
Calculate the perimeter and areas of common figures
Estimate and approximate measurements
Record measurements, using appropriate unit notations (feet, yards, etc.)
Measure area (square inches, square centimeters, etc.)
Measure volume (cubic inches, liters, etc.)
Use tools to measure quantities and solve problems involving measurements
Find the dimensions of an object from a scale drawing

General Knowledge
Read, interpret, and use size-scale relationships
Read and use the scale of a drawing
Measure length to 1/4 of an inch
Measure length to 1/8 of an inch
Measure length to 1/16 of an inch
Measure weights using devices calibrated in ounces
Measure weights using devices calibrated in pounds
Find distances and directions on land maps
Make simple scale drawings
Convert measurements from one unit to another (English to Metric, etc.)
Measure length to 1/32 of an inch
Read and apply coefficient measurements indicated in a table or chart
Measure accurately to 0.01 inches
Measure board feet
Communications
Ask questions
Communicate using the vocabulary/terminology of a related trade
Follow verbal job instructions
Communicate with co-workers and/or business people verbally (face-to-face)
Listen
Read and follow directions found in equipment manuals and code books
Read and interpret directions found on labels, packages, or instruction sheets
Read drawings and specifications sheets
Communicate with co-workers and/or business people verbally (telephone, radio)
Evaluate options/alternatives
Read codes (building codes, electrical codes, standards, etc.)
Evaluate solutions
Read information from tables and graphs (bar, circle, etc.)
Explain procedures
Read and follow a map, chart, plan, etc.
Write words and numbers legibly
Communicate with co-workers and/or business people in writing (letters, memos)
Find information in catalogs
Find information in references (Machinery handbook, tap/drill charts, etc.)
Read flowcharts
Research information
Read statistical data
Participate in brainstorming
Present to others
Summarize information
Write reports

General Knowledge

Apply assertiveness

Compare names

Table 5. Attitudes for Building Operations Journey-worker

Attitudes
Safety conscious
Adaptable/Flexible
Analytic
Accurate/Precise
Common sense
Cooperative
Critical thinker
Dependable
Ethical/fair
Honest
Trustworthy
Integrity/tactful
Conscientious
Free of substance abuse
Customer-oriented
Detail-oriented/attention to detail
Manage stress/pressure
Organized
Professional
Work efficiently (resources)
Focused
Quality focused
Self-discipline
Team player
Punctual
Responsible/accountable
Work efficiently (time)
Confident
Good listener
Good time manager

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Multi-tasker
Non-aggressive/patient
Positive attitude
Self-control
Eager to learn new things
Goal-oriented
Industrious
Self-motivated
Mechanical aptitude

Table 6. Physical Conditions for Building Operations Journey-worker

Physical Conditions Position - How important is it that one can
Stand part of the time
Stand part of the time
Stoop kneer of crouch
Pond forward frequently
Sit part of the time
Work in a squatting position for more than five (E) minutes per hour
Stand all of the time
Mability How important is it that one can
Climb ladders stairs poles etc. using legs and/or arms
Walk
Crawl or creen
Lifting - How important is it that one can
Carry objects of up to 25 lbs
Lift 50 lbs. maximum
Lift objects from ground to waist level
Lift objects from waist to overhead level
Lift objects from ground to overhead level
Arm/Hand Use - How important is it that one can
Reach with arms and hands in any direction
Feel size, shane and temperature or texture of objects with the hands
Hold or move objects using the fingers
Push objects with arms or hands
Pull objects with arms or hands
Hold or move objects using the bands but not the fingers
Work with hands and arms over head level
Senses - How important is it that one can
Talk
Hear speech
Detect abnormal noises
See clearly at 20 inches or less (with/without optical assistance)
Judge depth (the position and distance of objects) with the eves
See and discriminate colors
See clearly at 20 feet or more (with/without optical assistance)
Working Conditions - How important is it that one can
Work while wearing protective equipment (respirators hoods etc.)
Work inside
Work while standing on portable ladders
Work outside
Work Outside

Physical Conditions
Work while standing on scaffolding
Work in changing temperatures (in and out of buildings repeatedly)
Work at heights of 1 to 25 feet above ground or floor level
Work around or near high voltage power sources or equipment
Work in high temperatures (85 to 130 degrees F)
Work in low temperatures (0 to 45 degrees F)
Work in noisy places (85 DB or higher with ear protection)
Work while sitting or standing on high roofs, overhangs, or I-beams
Work in damp places (high humidity, some standing water)
Work in one place (no change of work location)
Handle hot or cold objects
Work in dry places (lacking any natural moisture or humidity)
Work in dust, oils, fumes, or smells
Work around or near magnetic equipment or materials
Work in confined spaces
Work on slippery surfaces
Work in stale air (with some oxygen depletion)
Work with or near fiberglass or asbestos materials
Work at heights of 26 to 75 feet above ground or floor level
Handle toxic materials
Work in sub-zero temperatures (0 and lower)

Tools, Equipment, and Resources	
Adequate consumable storage devices	Analysis data
As-built drawings and documents	Backlogs and deferred activities list
Balancing reports	Basis of design
Better Buildings Resources	Better buildings website
Budgets	Building plans and related documents
Calculator	Case studies
Certifications	Certifications and licenses as required (EPA refrigerant handling certification - EPA rule 608, etc.)
Chemical analysis kit* (*see list on page 17)	Codes, standards, regulations and guidelines* (* <u>see lists on pages 17 & 18</u>)
Commissioning reports	Communication devices
Computer, peripherals and pertinent software* (<u>*</u> <u>see list on page 19</u>)	Computerized maintenance management system (CMMS)
Construction documents (drawings and specifications)	Contingency services and resources
Contracts	Corporate policies
Corporate social responsibility policies	Dashboard and remote monitoring systems
Data loggers	Data storage policies
DDC system	Department of Labor wage information
Documentation tools (note recording, etc.)	Emergency certifications (first aid, CPR, etc.)
Emergency plans	Energy market data
Energy modeling software	Energy Star
Equipment and system information (historical information, parts list, maintenance information, etc.)	Equipment and system warranties
Equipment energy consumption	Equipment manuals
Evacuation plans	Existing system information
External agencies (fire department, police department, etc.)	External resources for emergencies (Ammonia response team, confined space rescue team, etc.)
Facility information	Facility management plan
Financial calculator	Fire extinguishers
Fire hoses	Flammable storage cabinets
Foot-candles/light meters	Hand tools* (* <u>see list on page 19</u>)
НІРАА	HR Resources
Inclement weather resources (deicer, chain saw, PPE, etc.)	Industry and association reference materials
Industry expense references	Insurance policies
Insurance requirements	Inventory management system
IPMVP	ISO/IEC 50001
IT Resources	Labor and service provider contracts

Table 7. Tools, Equipment and Resources for Building Operations Journey-worker

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Lifecycle cost analysis reports and tools	Logs and plans
Tools, Equip	ment, and Resources
Logs of previous inspections	Maintenance records
Metering	Modelingsoftware
Monitoring systems	O&M manuals
Onsite logistic support resources	Operating manuals and documents
Operating references	Organizational standards
Owner's project requirements	Phase 1 or other historical documents
Plans and facility documentation	PM guides
Potential new system information	PPE* (* <u>see list on page 20</u>)
Previous year's budgets	Prior phase 1 reports
Procurement policies and procedures	Project schedules
Projected data	Projections versus actual
Psychrometric charts	Real time energy dashboard
Remote monitoring systems	Resources (Energy Star, FEMP, trade magazines, etc.)
Riser diagrams	Risk management data
Schematics	SDS
Sequence of operations	Service logs and historical equipment data
SOPs	Specialized emergency equipment
Specialized testing resources (consultants, etc.)	Specialized tools* (* <u>see list on page 20</u>)
Submetering systems	Submittals

	,
Utility interval data	Warranty maintenance requirements
Waste removal guidelines	Work orders
Chemical Analysis Kit	
pH strips	
pH/conductivity meter	
TDS meters	
non-chemically reactive tubing, pumps and flow meters	

Systems data and information Tenant/occupant lease or contract

Third party experts

USGBC

Technology tools* (*see list on page 21)

Test equipment

Training materials

Utility cost information

Table 8. Codes, Standards, Regulations and Guidelines for Building OperationsJourney-worker

Codes, Standards, Regulations and Guidelines	
Sources of information	
Most current editions of:	
AEE Handbook of Energy Audits	

Codes, Standards, Regulations and Guidelines

AEE Reference Books

American Institute of Architects -- Guideline for the Construction of Hospital and Health Care Facilities ASHRAE -- Building Performance Metrics Best Practices

Codes, Standards, Regulations and Guidelines

ASHRAE -- Handbooks: Fundamentals, Systems, Applications, Refrigeration

ASHRAE -- Procedures for Commercial Building Energy Audits; 2nd Edition

ASHRAE/ASPE/AWW -- Water Condition Standards

Cost Estimating Guides

NFPA Codes

EERE (Air Master, Motor Master, etc.)

General OSHA Guidelines

Illuminating Engineering Society -- The Lighting Handbook

International Performance Measurement and Verification Protocol

FEMP M&V Guidelines

MICA -- National Mechanical Insulation Standards

NIST -- Handbook 135 Life Cycle Costing Manual for Federal Energy Management Program

EPA Regulations regarding environmental hazards such as asbestos and lead paint

EPA Section 608 – Refrigerant handling

ISO/IEC 50001: NEED title

Department of Transportation 39

Department of Transportation 49

ASHRAE Guides, Etc.

ASHRAE Guide 10 -- Interactions Affecting the Achievement of Acceptable Indoor Environments

ASHRAE Guide 11 -- Field Testing of HVAC Controls Performance

ASHRAE Guide 12 -- Minimizing the Risk of Legionellosis with Building Water Systems

ASHRAE Guide 14 -- Measurement of Energy and Demand Savings

ASHRAE Guide 22 -- Instrumentation for Monitoring of Chilled Water Plant Efficiency

ASHRAE Guide 32 -- Sustainable High Performance Operation and Maintenance

ASHRAE Guide -- Energy Efficiency Guides for Existing Commercial Buildings: Business Case

ASHRAE Guide -- Energy Efficiency Guides for Existing Commercial Buildings: Technical Case

ASHRAE Standards

ASHRAE Standards 15 -- Safety Standards for Refrigeration Systems

ASHRAE Standards 34 -- Designation and Safety Classifications of Refrigerants

ASHRAE Standards 41.1 -- Standard Method for Temperature Measurement

ASHRAE Standards 41.7 -- Method Test for Measurement of Flow of Gas

ASHRAE Standards 55 -- Thermal Environmental Conditions for Human Occupancy

ASHRAE Standards 62.1 -- Ventilation and Acceptable Indoor Air Quality

ASHRAE Standards 90.1 -- Energy Standard for Buildings Except Low Rise Residential Buildings

ASHRAE Standards 100 -- Energy Conservation in Existing Buildings

Codes, Standards, Regulations and Guidelines

ASHRAE Standards 105 -- Standard Method of Measuring and Expressing Building Energy Performance

ASHRAE Standards 134 -- Graphic Symbols for Heating, Ventilating, Air Conditioning and Refrigeration Systems

ASHRAE Standards 154 -- Ventilation for Cooking Operations

ASHRAE Standards 169 -- Weather Data for Building Design Standards

ASHRAE Standards 170 -- Ventilation for Health Care Facilities

ASHRAE Standards 180 -- Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems

ASHRAE Standards 189.1 -- Standard for Design of High Performance Green Buildings

ASHRAE Standards 211 (P) -- Standard for Conducting commercial Building Audits

BSR/ASHRAE/USGBC/ASPE/AWWA Standard 191(P) -- Standard for the Efficient Use of Water in Building, Site, and Mechanical Systems

ASTM Standards

ASTM Standard E1934-10 -- Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermograph

ASTM Standard E1311-2010 -- Standard Test Methods for Minimum Temperature Detection Difference for Thermal Imaging Systems

ANSI Standards

ANSI/ASSE Z87.1: Occupational and Educational Personal Eye and Face Protection

ANSI/ISEA Z89.1: Industrial Head Protection

Table 9. Software for Building Operations Journey-worker

Software
Computerized maintenance management system (CMMS)
BIM Viewer
Building energy modeling software
CAD Viewer
Computer aided facility management (CAFM)
ECAM (Energy Charting and Metrics)
Energy Star Portfolio manager
eQuest
FEMP BLCC (Federal Energy Management Program, Building Life Cycle Costing)
Geospacial information systems (GIS)
Integrated work management system (IWMS)
MotorMaster
Spreadsheets

Table 10. Hand Tools for Building Operations Journey-worker

Hand Tools		
Adjustable pliers Adjustable wrench		
Allen wrenches	Amp Probe	
Ball-peen hammer	Chisel	

Hand Tools		
Clamps	Cleaning brushes	
Combination wrenches	Deburring tool	
Extension magnet	File	
Flashlight	Fuse puller	
Hacksaw	Hammers	
Inspection mirror	Lock-out/Tag-out equipment	
Locking pliers	Measuring devices	
Multimeter	Nut drivers	
Pipe wrenches	Pliers	
Pocket knife	Pocket level	
Ratchets	Rubber mallet	
Screw drivers	Small power tools (hand electric drill)	
Socket sets	Strap wrench	
Tape measure	Toilet plunger	
Torque wrench	Tube bender	
Tubing cutters	Vises	
Water key		

Table 11. Personal Protective Equipment for Building Operations Journye-worker

Personal Protective Equipment			
Arc flash protection (NFPA 70e)			
Back protection			
Dust masks			
Eye protection/safety glasses			
Face shield			
Fall protection			
Gloves			
Hardhat			
Hearing protection (plugs and muffs)			
Level C Suit (Tyvek, etc.)			
Respirator			
Rubber boots			
Safety harnesses			
Vests			
Welding jacket			
Work shoes (toe and shank protection)			

Table 12. Specialized Tools for Building Operations Journey-worker

Specialized Tools		
Anemometer	Borescope	
Circuit tracer	Combustion analyzing instruments	

Digital thermometer (surface and air)	Dosimeter
Flow meters	Gas Analyzers
Hydrometer	Infrared thermometer
Light meters	Manometer
Megohmmeter	Moisture meter
Plumbing snakes	Power analyzer
Psychrometers	Refractometer
Refrigeration tools	RPM Meter

Specialized Tools			
Anemometer	Borescope		
Circuit tracer	Combustion analyzing instruments		
Digital thermometer (surface and air)	Dosimeter		
Flow meters	Gas Analyzers		
Hydrometer	Infrared thermometer		
Light meters	Manometer		
Megohmmeter	Moisture meter		
Plumbing snakes	Power analyzer		
Psychrometers	Refractometer		
Refrigeration tools	RPM Meter		

Table 13. Technology Tools for Building Operations Jouney-worker

Technology Tools			
Smart phone with:			
Camera			
WiFi access			
Internet access			
Two-way communications			
Video recording/transmitting			
Computer with:			
Spreadsheet applications			
Internet access			
Word processing applications			
Data storage			
Graphics software			
External data storage/backup			
Data gathering:			
Data loggers with sensors (t/h/kw/on-off)			
Utility tariffs			
Real time pricing data stream			
DDC			
BEMS/BIMS			

This report is available at no cost from the National Institute of Building Sciences Commercial Workforce Credentialing Council at www.nibs.org/cwcc

Technology Tools		
Smart phone with:		
Camera		
WiFi access		
Internet access		
Two-way communications		
Video recording/transmitting		
Computer with:		
Spreadsheet applications		
Internet access		
Word processing applications		
Data storage		
Graphics software		
External data storage/backup		
Data gathering:		
Data loggers with sensors (t/h/kw/on-off)		
Utility tariffs		
Real time pricing data stream		
DDC		
BEMS/BIMS		

Table 14. Duties, Tasks, Steps, Specialized Knowledge, Skills, Abilities, Tools, Equipment, and Resources Required for Operating Buildings

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
A. Operating Buildings			
1. Perform workplace hazard assessment	nents		
Conduct daily building inspections	 Biohazards and hazardous chemicals 	 Analytical skills Attention to detail 	 Certifications Codes standards
Conduct monthly building inspections Conduct quarterly building inspections Identify confined workspaces Identify hazardous building components Review workplace injury records Review workplace biohazards and chemicals Obtain OSHA training Identify building obsolescence Create job hazard analyses reports Identify required PPE	 Chain of custody Limitations of PPE Operations within the facility Safety Codes and Standards (including OSHA) Safety practices Understanding of all staff functions carried out in the facility 	 Organizational skills Technical reading ability Verbal communication skills Written communication skills 	 Codes, standards, regulations and guidelines *(*see lists on pages 17 & 18) Organizational standards PPE* (*see list on page 20) SDS SOPs Specialized testing resources (consultants, etc.) Technology tools * (*see list on page 21)
2. Participate in Emergency Drills			
Schedule fire drills	Biohazards and hazardous	• Ability to remain calm in an	Codes, standards, regulations
Schedule emergency evacuation drills (earthquakes, fires, etc.)	Chemicals Chain of custody	emergency Critical thinker	and guidelines* (*see lists on pages 17 & 18)
Develop the EAPs (Emergency Action Plans)	 Limitations of PPE Operations within the facility Sofety Codes and Standards 	 Leadership skills Team management skills Varbal communication skills 	 Emergency certifications (first aid, CPR, etc.) Emergency plans
Coordinate with regional emergency agencies	 Safety codes and standards (including OSHA) Safety practices 	Written communication skills	 Evacuation plans Fire extinguishers
Coordinate with local emergency services	 Understanding of all staff functions carried out in the 		 Fire hoses Technology tools * (*see list
Monitor fire panels	facility		on page 21)
Monitor emergency generators			
Track and record evacuation times			
Create evacuation results reports			

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Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
Coordinate with building tenants/			
occupants regarding drills			
tenants/occupants with disabilities and			
needing assistance in evacuating			
Maintain emergency equipment (radios, communication devices, etc.)			
Develop communication protocol (ICS			
3. Manage the PPE Program			
Identify the hazards	• Decontamination requirements	Evaluation skills	Codes, standards, regulations
Train staff on hazards and PPE requirements	Hazards managementHIPAA requirements	Teaching skillsTechnical reading ability	and guidelines *(*see lists on pages 17 & 18)
Train staff on limitations of PPE	 Job responsibilities Medical evaluation policies and 	 Technical writing skills Verbal communication skills 	 HIPAA PPE* (*see list on page 20)
Label hazards and rooms with hazards	requirements	 Written communication 	 Prior phase 1 reports
Test staff on use of PPE for correct	• PPE and proper usage and	skills	• Technology tools * (*see list
usage	maintenance of PPE		on page 21)
Set up medical evaluations for some PPE (Respirators, etc.)	and removing hazards		 Training materials
Conduct a fit test of PPE			
Document training			
Document use compliance			
Document PPE testing			
Procure required PPE			
Verify required PPE is available			
Conduct audiometric testing (loudness)			
Enforce use of PPE			
Certify the PPE equipment on an annual basis			
Document the PPE program			

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
4. Manage third party inspections			
Determine types of inspection needed Schedule third party inspections Prepare equipment for inspections (shut down, etc.) Operate equipment for inspections (elevator recall, etc.) Participate in inspections (escort the inspector, etc.) Schedule inspections with internal staff affected	 Equipment operations and specifications Facility knowledge General knowledge of the authority having jurisdiction Inspection agencies Inspection procedures Operational impact of inspections 	 Ability to communication with regulatory authorities/inspectors Interpersonal skills Mechanical aptitude Teaching skills Verbal communication skills 	 Codes, standards, regulations and guidelines *(*see lists on pages 17 & 18) Communication devices Construction documents (drawings and specifications) Hand tools* (*see list on page 19) Logs of previous inspections Maintenance records O&M manuals
Verify safety for inspectors (hazards, etc.) Communicate with building tenants			 Specialized tools* (*see list on page 20) Technology tools * (*see list on page 21)
regarding inspection requirements			page 21)
Communicate results with parties			
Schedule inspections with tenants/occupants affected			
Review results of inspections			
Address identified deficiencies			
Coordinate re-inspections			

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
5. Respond to building emergencies			
Jestical and staff Identify emergencies Initiate emergency procedures Communicate with internal stakeholders and staff Secure impacted equipment and/or affected areas Respond to emergencies with no established procedures by isolating and mitigating the emergency Escalate for additional emergency support Communicate with external stakeholders Clean up after emergencies Conduct "lessons learned" activities Document emergencies Restock emergency supplies Make emergency/temporary repairs to stabilize problems Make permanent repairs Coordinate outside special services Plan for/accommodate non-English speaking building tenants/occupants and	 Building systems* (*see list on pages 6 & 7) Hazard remediation/clean up Hazardous materials disposal Hazards in the area (earthquakes, etc.) Potential environmental, health and safety (EHS) hazards and risks Normal routine operation of the facility Reporting requirements for emergencies Uninterruptable and critical systems 	 Ability to communicate with non-English speaking individuals Ability to think clearly in an emergency Leadership skills Verbal communication skills 	 External resources for emergencies (Ammonia response team, confined space rescue team, etc.) Riser diagrams SDS Technology tools * (*see list on page 21)
6. Manage responses to inclement weather conditions/issues			
Create inclement weather action plans Identify areas that are vulnerable to	 Communications plans Emergency equipment operation 	 Ability to forecast situational resources Ability to cope with stressful 	 Inclement weather resources (deicer, chain saw, PPE, etc.) Onsite logistic support
Redirect resources	Equipment operations and specifications	situations	resources
Prepare and stock for inclement weather incidents	 Facility knowledge HVAC systems 	 Ability to work in abnormal conditions 	 Specialized emergency equipment
Restock following inclement weather	Inclement weather escalation plans	Leadership skillsProject management skills	• Specialized tools* (*see list on page 20)

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
incidents Maintain inclement weather response resources Plan for processes/services that cannot be disrupted Communicate inclement weather activities with tenants/occupants and stakeholders Manage and schedule staff to address inclement weather conditions/issues Train staff on the inclement weather action plans Monitor inclement weather forecasts	 Inclement weather local logistics (shelter, food, transportation) Local weather issues Plumbing systems Safety codes and standards (including OSHA) 	 Verbal communication skills Written communication skills 	 Third party experts Technology tools *(*see list on page 21
7. Respond to tenant/occupant requests	and issues	I	I
Identify core issues of tenant/occupant requests Document tenant/occupant issues or requests Prioritize responses to tenant/occupant requests Identify staff to address tenant/occupant issues Communicate actions throughout the response to tenant/occupant requests Provide a lead-time for responses to tenant/occupant requests Manage tenant/occupant expectations Document resolution of responses to tenant/occupant requests and issues Track resources required for responses to tenant/occupant requests and issues Assess area for other issues Identify tenant/occupant request responsibilities Review prior requests (trend analysis,	 Building systems* (*see list on pages 6 & 7) Infection control procedures Remediation procedures Resources required for typical tenant/occupant requests and issues Tenant/occupant chain of command Work control procedures 	 Ability to evaluate facility conditions Critical thinker Diagnostic skills Listening skills Patience Verbal communication skills Written communication skills 	 Hand tools* (*see list on page 19) Plans and facility documentation PPE* (*see list on page 20) Specialized tools*(*see list on page 20) Technology tools * (*see list on page 21) Work orders

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
historical data)			
Identify opportunities for improvement			
Identify PPE need for response to			
tenant/occupant			
requests and issues			
8. Conduct equipment checks			
Identify staff responsibilities	Adjusting equipment based	• Ability to evaluate facility	• Hand tools* (* <u>see list on</u>
Identify equipment/systems that require	on readings	conditions	<u>page 19</u>)
daily check	• Building systems* (* <u>see list</u>	Critical thinker	 Plans and facility
Record equipment check readings	on pages 6 &	Diagnostic skills	documentation
Collect equipment operating data	<u>7</u>) (including	• Listening skills	• PPE* (* <u>see list on page 20</u>)
Respond to equipment anomalies	interdependencies,	Patience	• Specialized tools*(*see list
Conduct necessary equipment tests	limitations operating	• Verbal communication skills	<u>on page 20</u>)
Determine frequency of equipment checks	plans, operations, and	• Written communication skills	• Technology tools * (* <u>see list</u>
	performance		<u>on page 21</u>)
	expectations)		Work orders
	• Interpreting equipment test		
	readings		
	Normal equipment operating perameter limits		
	parameter mints		
	• SOPs related to equipment		
	• whole building integration		

Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
• Building systems* (* <u>see list on</u>	• Ability to relate graphic	• Documentation tools
 pages 6 & <u>7</u>) (including interdependencies, interopershility limitations 	 information to real world situations Analytical skills Attention to detail 	 (note recording, etc.) Hand tools*(*<u>see list on page 19</u>) PPE* (*see list on page 20)
 Interoperationally, initiations, operating plans, operations, and performance expectations) Common or frequent deficiencies Control systems Indicators of problems with equipment Location of facility equipment Relationship between deficiencies and energy 	 Data interpretation and management skills Listening skills Verbal communication skills Written communication skills 	 Remote monitoring systems Specialized tools* (*<u>see list on page 20</u>) Technology tools * (*<u>see list on page 21</u>)
 efficiency Remote monitoring systems and equipment Sequence of operations Tenant/occupant equipment and requirements Weather impact on the facility 		
 Emerging technologies and tools Historical data associated with facility Impact of facility operations on scheduling Impact of facility operations on scheduling Normal equipment 	Ability to manipulate equipment controls	 Certifications and licenses as required (EPA refrigerant handling certification - EPA rule 608, etc.) Technology tools * (*<u>see list</u> on page 21)
	 Specialized Knowledge Building systems* (*see list on pages 6 & 7) (including interdependencies, interoperability, limitations, operating plans, operations, and performance expectations) Common or frequent deficiencies Control systems Indicators of problems with equipment Location of facility equipment Relationship between deficiencies and energy efficiency Remote monitoring systems and equipment Sequence of operations Tenant/occupant equipment and requirements Weather impact on the facility Emerging technologies and tools Historical data associated with facility operations on scheduling Impact of facility operations on scheduling Normal equipment 	Specialized Knowledge Skills and Abilities • Building systems* (*see list on pages 6 & • Ability to relate graphic information to real world situations • 7) (including interdependencies, interoperability, limitations, operating plans, operations, and performance expectations) • Analytical skills • Common or frequent deficiencies • Attention to detail • Common or frequent deficiencies • Data interpretation and management skills • Indicators of problems with equipment • Verbal communication skills • Location of facility equipment • Written communication skills • Relationship between deficiency • Remote monitoring systems and equipment • Sequence of operations • Tenant/occupant equipment and requirements • Weather impact on the facility operations on scheduling • Ability to manipulate equipment controls • Impact of facility operations on scheduling • Mormal equipment

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Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
normal seasonal parameters Verify systems availability Evaluate alternative scheduling needs (holidays, inclement weather, etc.) Document building operations Operate renewable technologies (solar, wind, energy storage systems, distributed generation, water recovery systems, etc.) Maintain the BAS system Maintain the BAS system database Complete activity reports	 operating parameters/limits Peak demand loads Renewable energy systems Sequence of operations Understanding of interlocked equipment Utility time of use Weather related factors affecting equipment (temperatures, dew points, etc.) 		
11. Coordinate facility operations (other	than normal)	1	
Perform equipment shut downs for maintenances Perform equipment load sheddings Perform equipment lock-out/tag-out Shut down equipment for smoke control Schedule and rectify tenants/occupants of shut downs Adjust to utility shut downs Verify equipment is ready for normal operations Return to normal operations Document building operations	 Basic knowledge of tariffs Building systems* (*see list on pages 6 & 7 (including interdependencies, interoperability, limitations, operating plans, operations, and performance expectations) Lock-out/tag-outs Manual equipment operation Normal equipment operating parameters/limits Remote system fluency (DDC, etc.) Safety concerns associated with equipment operations Sequence of equipment operations Technical equipment knowledge Understanding of load shedding and its importance 	 Ability to follow written and sequenced directions Computer skills Project management skills Scheduling skills 	 Building plans and related documents Contingency services and resources Equipment manuals Hand tools*(*see list on page 19) Sequence of operations Specialized tools* (*see list on page 20) Technology tools * (*see list on page 21)

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
12. Conduct equipment checks			-
Obtain work orders	Asset inventories	Analytical skills	• Technology tools * (*see list
Build/maintain asset inventory	 Facility knowledge Work order processes 	 Computer skills Customer service skills 	on page 21)
Establish work order priorities	• Work order processes	 Data interpretation and 	
Establish response times		management skills	
Establish whether work order is open or closed		 Diagnostic skills Organizational skills 	
Document activities associated with work order (including completion verification)		 Patience Procurement skills 	
Identify responsible party for work order		 Troubleshooting skills Verbal communication skills 	
Track labor hours		Written communication	
Assign nominal value to work order		skills	
Identify if work order is recoverable (charge back, etc.)			
Track resolution of the work order foundation problem			
Identify the date of the work order			
Identify the time of the work order			
Verify quality of work associated with the work order			
Evaluate the efficiency of the work order process			
Train tenants/occupants regarding work order process			
Track and compile feedback on work order outcomes			

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
13. Investigate indoor environmenta	ıl quality		
Monitor remote monitoring systems Conduct indoor air quality checks Address drafts	 Basic knowledge of contaminant limits Building systems* (*see list on pages 6 & 7) Contaminant containment 	 Ability to prioritize Ability to read technical data Analytical skills Attention to detail 	 Codes, standards, regulations and guidelines* (*see lists on pages 17 & 18) Hand tools* (*see list on
Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
---	--	---	---
Investigate CO2 alarms	protocolsHazards management	• Data interpretation and management skills	page 19)Industry and association
Identify chemicals in the workplace	• Health effects of contaminants (including stay times)	• Verbal communication	reference materials
Investigate indoor air quality issues	 Monitoring systems and 	Written communication	documents
Investigate CO alarms	equipmentPotential contaminants	skills	 PPE* (*see list on page 20) SDS Specialized tools*(*see list on page 20) Technology tools * (*see list on page 21)
Conduct random testing to verify building automation systems	Remediation activities for contaminants		
Control chemicals brought into the workplace	Remote monitoring systems and equipment		
Verify air exchange (fresh air, exhaust fans) meets requirements	• When to conduct IEQ tests		Third party expertsWaste removal guidelines
Investigate and respond to moisture ssues			
Investigate gas smells (sewers, etc.)			
Follow protocols for IAQ testing (mold, etc.)			
Promote the use of low VOC paints			
Schedule construction remodeling work			
Manage ACM programs			
Manage PACM programs			
Develop IEQ plans			

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources	
14. Conduct tenant/occupant relations activities				
Check in with tenants/occupants	• Tenant/occupant contracts	• Interpersonal skills	• Codes, standards,	
Manage tenant/occupant expectations	 Tenant/occupant hours of operation Tenant/occupant operations and space uses 	 Verbal communication skills Written communication skills 	 regulations and guidelines *(*see lists on pages 17 & 18) Technology tools * (*see list on page 21) 	
Frain tenants/occupants in efficiency measures and protocols				
Communicate on a proactive basis with enants/occupants				
Confirm building protocols (acids not dumped in drains, etc.)				
Introduce new initiatives				
Solicit tenant/occupant feedback and nitiatives				
Communicate and manage about enant/occupant equipment (space neaters, etc.)				
Check in with tenants/occupants about mprovement activities				
Communicate with tenants/occupants about space uses				
15. Monitor consumables (hazardous r	naterials)			
Maintain consumable inventories	Chain of custody	Ability to compare	Adequate consumable	
Frack consumable usage	Consumable logistics	products	storage devices	
Establish restock levels	• Consumable requirements	• Ability to plan for future	• Flammable storage	
Conduct inventory control activities (fuel, parts, chemicals, etc.)	Consumable sourcing guidelines Inventory control systems	 Analytical skills Basic and advanced math 	 Inventory management system 	
Manage recyclables	 Municipal requirement for 	skills	• Operating manuals and	
Dispose of regulated consumables (batteries, paint, computers, etc.)	disposal and recycle of consumables	Computer skillsInventory skills	documentsPPE* (*see list on page 20)	
Manage chain of custody on disposal of regulated consumables (batteries, paint, computers, etc.)	 Procurement policies and procedures Regulated consumables	Organizational skills	 Procurement policies and procedures Safety materials (spill kits, 	

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
Schedule consumable deliveries	Safety practices		absorbables, etc.)
Accept delivery of consumables	• Shelf life of consumables		• SDS
Store consumables	 Shelf life of consumables Storage requirements for consumables Storage requirements for consumables Vendors Vendors Ventilation requirements for consumables 		• • Technology tools * (*see list on page 21)
16. Manage outside facility contractors/	/service providers		
Verify contractor/service providers licenses Verify contractor/service providers permits	 Contract requirements Facility knowledge Insurance requirements Licensing requirements 	 Leadership skills Management skills Verbal communication skills 	 As-built drawings and documents Codes, standards, regulations and guidelines*
Verify contractor/service providers insurance	Permitting requirementsScope of work		(*see lists on pages 17 & 18)
Verify contractor/service providers compliance with company policies and contract documents	• Service level agreements		 Construction documents (drawings and specifications) Contracts
Verify contract/service providers compliance with local codes			 Hand tools* (*see list on nage 19)
Distribute facility rules and regulations to contractors/service providers			 Insurance policies O&M manuals
Ensure training is provided to contractors/service providers			SOPsSubmittals
Enforce facility rules and regulations with contractor/service providers			• Technology tools * (*see list on page 21)
Check contractor/service providers work			• Third party experts
Verify contractor/services providers PPE			
Communicate environmental hazards to contractor/service providers			
Validate contractor/service providers work has been completed prior to			

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
payment (progress billing			
Obtain lien waivers			
Obtain close-out document (submittals, as-builts, etc.) or ongoing service documents			
Provide access to contractors/service providers			
Check actual performance against contracted service at periodic intervals			
Provide site specific orientation to contractors/service providers			

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
17. Implement an energy management	nt program		
 17. Implement an energy management Assist in the development of energy management programs Assist in the development of strategic energy plans Create baselines Set goals for energy improvement Maintain energy-related operating improvements Implement recommissioning or ongoing commissioning energy programs Determine targets for reductions Benchmark internally and externally Develop opportunities for energy improvement initiatives Obtain buy-in from building tenants/occupants Support outreach and marketing activities Evaluate utility bills Investigate opportunities for rebates Identify code requirements Document results Measure and verify savings 	 nt program Break-even analysis Building certification programs Building systems* (*see list on pages 6 & 7) (including interdependencies, interoperability, limitations, operating plans, operations, and performance expectations) Business case development Energy conservation opportunities Financial knowledge First cost vs. lifecycle costs Lifecycle accounting practices State and local energy mandates Utility bill analysis 	 Ability to analyze data Ability to compare costs of technologies Ability to compare data Analytical skills Leadership skills Marketing skills Verbal communication skills Written communication skills 	 Better Buildings Resources Codes, standards, regulations and guidelines *(*see lists on pages 17 & 18) Corporate policies Corporate social responsibility policies Energy market data Energy modeling software Energy Star Industry and association reference materials ISO/IEC 50001 Lifecycle cost analysis reports and tools Real time energy dashboard Risk management data Specialized tools* (*see list on page 20) Systems data and information Technology tools * (*see list on page 21) USGBC
18 Maintain the facility and systems			
Perform emergency maintenance	Americans with Disabilities	• Ability to follow written	Chemical analysis kit*
Perform preventive/predictive maintenance	 Act Building systems* (*see list on pages 6 & 7) (including 	 and sequenced directions Management skills Mechanical aptitude 	 (*see list on page 17) Codes, standards, regulations and guidelines
Perform scheduled maintenance	interdependencies,	Organizational skills	*(*see lists on pages 17 &
Ensure maintenance of life safety systems	interoperability, limitations, operating plans, operations,	 Physical attributes* (*See list) 	18)Equipment and system
Test emergency power systems	and performance	• Planning skills	information (historical
Maintain water/wastewater systems	expectations)	Recordkeeping skills	information, parts list,

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
Maintain plumbing systems	EPA regulations	Scheduling skills	maintenance information,
Maintain irrigation systems	• Equipment operations and	Technical aptitude	etc.)
Ensure maintenance of security systems	specifications Facility knowledge		 Hand tools* (*see list on
Maintain the building envelope	 Funding sources 		page 19)
Ensure maintenance of electrical systems	• Interim life safety measures		• PM guides
Maintain lighting systems	(fire watch, alternate		• Specialized tools*(*see list on page 20)
Maintain mechanical systems	 Procurement policies and 		 Technology tools * (*see
Maintain other non-facility equipment (food service, laundry, etc.)	proceduresRefrigerant recovery		list on page 21)
Ensure maintenance of elevator/escalator and other conveyance systems	techniquesSafety Codes and Standards		
Maintain access systems (locks, keys, etc.)	(including OSHA)Trade knowledge for		
Ensure maintenance of communications systems	specific equipment and systems		
Inspect structural systems			
Ensure maintenance of medical and aboratory gas systems			
Maintain wall systems and finishes (paint, drywall, picture frames, etc.)			
Ensure maintenance of firewall penetration integrity			
Oversee cleanliness of facility			
Oversee building improvements			
Oversee tenant/occupant improvements			
Oversee storm drainage system maintenance			
Oversee landscaping maintenance			

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
19 Maintain the facility and systems			
Duties, Tasks, and Steps19Maintain the facility and systemsPerform emergency maintenancePerform preventive/predictive maintenancePerform scheduled maintenancePerform scheduled maintenanceEnsure maintenance of life safety systemsSystemsTest emergency power systemsMaintain water/wastewater systemsMaintain plumbing systemsMaintain irrigation systemsEnsure maintenance of security systems	 Specialized Knowledge Americans with Disabilities Act Building systems* (*see list on pages 6 &7) (including interdependencies, interoperability, limitations, operating plans, operations, and performance expectations) EPA regulations Equipment operations and specifications Facility knowledge 	 Skills and Abilities Ability to follow written and sequenced directions Management skills Mechanical aptitude Organizational skills Physical attributes* (*See list) Planning skills Recordkeeping skills Scheduling skills Technical aptitude 	 Tools, Equipment, and Resources Chemical analysis kit* (*see list on page 17) Codes, standards, regulations and guidelines *(*see lists on pages 17 & 18) Equipment and system information (historical information, parts list, maintenance information, etc.) Facility information Hand tools* (*see list on
Maintain the building envelope Ensure maintenance of electrical systems Maintain lighting systems Maintain mechanical systems Maintain other non-facility equipment (food service, laundry, etc.) Ensure maintenance of elevator/escalator and other conveyance systems Maintain access systems (locks, keys, etc.) Ensure maintenance of communications systems	 Funding sources Interim life safety measures (fire watch, alternate evacuation routes, etc.) Procurement policies and procedures Refrigerant recovery techniques Safety Codes and Standards (including OSHA) Trade knowledge for specific equipment and systems 		 page 19) PM guides Specialized tools*(*see list on page 20) Technology tools * (*see list on page 21)
Inspect structural systems			
Ensure maintenance of medical and aboratory gas systems			
Maintain wall systems and finishes (paint, drywall, picture frames, etc.)			
Ensure maintenance of firewall penetration integrity			
Oversee cleanliness of facility			
Oversee building improvements			
Oversee tenant/occupant improvements			
L	3	5	

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
Oversee storm drainage system maintenance			
Oversee landscaping maintenance			
Manage pest management operations			
Ensure maintenance of air compressor and compressed air systems	-		
Ensure the maintenance of HVACR systems			
Ensure maintenance of building control systems (BAS, DDC, EMS, BMS,			
pneumatics, etc.)	_		
Ensure maintenance of hot water and steam systems			
Maintain utility submetering systems			
Maintain the onsite power generation systems			
Maintain the primary sewage and gray water systems			
Ensure maintenance of other building systems* (*See separate list)			
Maintain other facility use systems (operational systems such as package tracking, etc.)			
20. Conduct facility repair activities	•		
Ensure fire and life safety systems are monitored throughout the repair	 Americans with Disabilities Act Building systems* (*see list on 	• Ability to diagnose equipment and system failures	 As-built drawings and documents
Comply with safety regulations	pages 6 &7) (including	• Scheduling skills	• Certifications and licenses as
Make improvements and repairs to comply with ADA	interdependencies, interoperability, limitations, operating plans, operations, and performance		required (EPA refrigerant handling certification - EPA
Troubleshoot systems	expectations)		 Codes standards regulations
Identify and manage needed repairs	• EPA regulations		and guidelines *(*see lists on
Identify repair options or alternatives	Facility knowledge		pages 17 & 18)
Comply with infection control risk assessments	• Interim life safety measures (fire watch, alternate evacuation routes,		• Equipment and system warranties

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
Identify environmental issues (asbestos, VAT, ACMs, lead paint, etc.)	etc.)Procurement policies and		 Hand tools* (*see list on page 19)
Identify equipment/source suppliers	procedures		• Specialized tools* (*see list on
Order repair parts	Refrigerant recovery techniques		page 20)
Coordinate permitting	• Safety Codes and Standards (including OSHA)		• • Technology tools * (*see list on page 21)
Ensure business continuity	(
Communicate repair status to stakeholders			
Schedule repairs			
Repair equipment			
Identify sustainable materials (low VOC, etc.)			
Conduct repair verification and follow- up activities			
Dispose of waste			
Document repairs			
Update as-builts if equipment or systems change			

Table 15. Duties, Tasks, Steps, Specialized Knowledge, Skills, Abilities, Tools, Equipment and Resources for Optimizing the Facility

Duties, Tasks and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment and Resources
B. Optimizing the Facility			
1. Conduct measurement and verific	ation activities .		
Obtain equipment and system performance baselines Identify expectations from basis of design Obtain measurements validating performance against basis of design Revise basis of design based on new conditions Obtain M&V plan	 BAS or monitoring systems Basic statistical analyses Building systems* (*see list on pages 6 &7) (including interdependencies, interoperability, limitations, operating plans, operations, and performance expectations) Impact of operational 	 Ability to apply data to protocols Ability to compare data Basic and advanced math skills Data interpretation and management skills Measurement skills 	 Computer, peripherals and pertinent software * (* see list on page 19) Contracts Data loggers Financial calculator IPMVP Monitoring systems Submetering systems

Duties, Tasks and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment and Resources
	 changes (occupancy changes) on performance expectations Measured variables to verify system performance New technologies Obtaining measurements Other submetering systems Trend analysis 		 Systems data and information Technology tools * (*see list on page 21)
2. Analyze system performance			-
Conduct an energy audit (ASHRAE Level 1 or 2) Establish system performance baselines Gather information regarding system performance Determine if facility is being used the way the system was designed for it to be used Determine if adequate monitoring equipment exists Compare baselines to measured information Verify facility's needs are being met Validate current sequence of operations Select measuring equipment Obtain key measurements Estimate changing use and/or loads Look for non-performers (systems that are not performing) Compare system performance to internal and external benchmarks Identify equipment or system upgrade opportunities Develop a facility/equipment/system	 Baselines Benchmarking Building systems* (*<u>see list on pages 6 & 7</u>) Control theory Energy basics Testing and balancing procedures 	 Ability to integrate disparate systems and equipment Analytical skills Strong control system skills Systems thinking 	 Balancing reports Commissioning reports Computer, peripherals and pertinent software * (* see list on page 19) Construction documents (drawings and specifications) Hand tools*(*see list on page 19) Modeling software Monitoring systems Sequence of operations Service logs and historical equipment data Specialized tools* (*see list on page 20) Submetering systems Systems data and information Third party experts Technology tools * (*see list on page 21)

Duties, Tasks and Steps Specialized Knowledge		Skills and Abilities	Tools, Equipment and Resources
4. Respond to changing energy costs			
Analyze utility costs	Comparing	Analytical skills	Contracts
Obtain baselines	alternatives to	alternatives to • Meter calibration and	• Equipment energy consumption
Manage utility interval data (i.e. hourly consumption top establish use patterns) Develop contingency plans for energy	 Demand management strategies 	verification skillOrganizational skills	 Metering Systems data and information Technology tools * (*see list on
Develop communication plan for tenants/occupants Respond to real-time prices	 Financial penalties for going above peak demand threshold Load demand schedules 		 page 21) Third party experts Utility cost information
Change utility rates • Operating baselines			• Utility interval data
Implement demand management programs Perform meter analysis	 Operation equipment loads Tenant/occupant tolerances in changes to systems Utility rate structures and 		
	schedules		
5. Optimize system performance			
Verify the optimal stop/start routine	• Building systems* (* <u>see list</u>	Analytical skills	• Computer, peripherals and
Implement reset schedules (hot and cold water systems, static pressure, discharge temperature, etc.)	on pages 6 & <u>7</u>) (including interdependencies,		 pertinent software * (* see list on page 19) DDC system Hond tools* (*see list on page
Implement demand control strategies	interoperability, limitations,		• Hand tools* (* <u>see list on page</u> 19)
Verify existing sensors and add new as needed	and performance expectations)		• Industry and association reference materials
Research demand control ventilation	Control theory		Psychrometric charts
Verify critical tenant/occupant schedules and reduce where possible	Energy load profilesEquipment operations and		 SOPs Specialized tools* (*<u>see list on</u> page 20)
Optimize pressure, flow and temperatures in all central systems	specificationsFluid dynamics		• Technology tools * (* <u>see list</u> on page 21)
Adjust set point to eliminate simultaneous heating and cooling	Heat transferPsychrometricsSequence of operations		Third party experts
Ensure all capacity controls are operational	• Tenant/occupant		

Duties, Tasks and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment and Resources
Compare air balance to baseline	requirements		
Manage seasonal use of equipment	• Thermodynamics		
Maintain integration of access with user	Typical non-energy costs		
systems			
Contribute to the development of the			
energy management program			
6. Identify sustainable opportunities			
Participate in the waste management	• Building systems*	Ability to conduct economic	Codes, standards, regulations
program	• (*see list on pages 6 & 7)	analysis of alternatives	and guidelines *(* <u>see lists on</u>
Participate in water conservation	• Contributors to carbon or	• Leadership skills	<u>pages 17 & 18</u>)
programs	environmental footprint	• Research skills	Foot-candles/light meters
Participate in sustainable procurement	Facility knowledge		• Technology tools * (* <u>see list on</u>
programs	• Foot-candles/lumens and		<u>page 21</u>)
management programs	 Local water restrictions and 		
Participate in groop cleaning programs	requirements		
	 Mitigator of carbon or 		
Participate in recycling programs	environmental footprint		
Implement refrigerant management	 Procurement policies and 		
programs (reduction in CFCs etc.)	procedures		
Identify alternative sustainable systems	Sustainability options		
Contribute to business case for	Understanding of photometric shorts		
Desticiante in "energy terms" with facility	photometric charts		
Participate in green teams with facility tenants/occupants			
Conduct gap analysis to identify			
sustainabiliy options			
Participate in heat island reduction (roof			
and non-roof)			

Table 16. Duties, Tasks, Steps, Specialized Knowledge, Skills, Abilities, Tools, Equipment and Resources for Conducting Planning Activities

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources				
C. Conduct Planning Activities							
1.Update procedures (SOPs, BOPs, ope	erating plans, emergency plans, etc.).						
Evaluate existing procedures Evaluate existing procedures Evaluate building use changes Conduct gap analyses Document new procedures Update and test new/rvised procedures Implement revised procedures Train staff on new/revised procedures procedures	 Building operations and procedures Building systems* (*see list on pages 6 & 7) Company labor policies National Incident Management Systems (NIMs) Organizational structures 	 Adaptable Analytical skills Leadership skills Organizational skills Problem solving skills Teaching skills Technical writing skills 	 Codes, standards, regulations and guidelines *(*see lists on pages 17 & 18 External agencies (fire department, police department, etc.) Technology tools * (*see list on page 21) 				
Update emergency operating procedures							
2. Develop equipment operations plan Determine required start/stop times based on tenant occupancies Review O&M manuals and extract equipment specific information Develop system specific operation procedures (steps in operation) Train staff on system operations Develop operating logs	 Building systems* (*see list on pages 6 &7) (including interdependencies, interoperability, limitations, operating plans, operations, and performance expectations) Equipment operations and specifications Rate schedules for utilities 	 Ability to distinguish between manual and automatic operations Presentation skills Teaching skills Technical reading ability Verbal 	 O&M manuals Technology tools * (*see list on page 21) Tenant/occupant lease or contr 				
3. Develop planned maintenance sche Conduct equipment inventories Identify equipment specifications Identify O&M requirements Rank equipment in terms of priority	 dules Criticality of various systems and equipment Equipment operations and specifications Facility knowledge 	 Ability to follow written and sequenced directions Ability to read and interpret constructon documents 	 Codes, standards, regulations and guidelines *(*<u>see lists on</u> <u>pages 17 & 18</u>) Hand tools* (*<u>see list on page</u> 				

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
Determine level of service to be performed on equipment based on criticality of system Identify tasks to be outsourced	 Failure modes Levels of maintenance Resource planning personnel management Tenant/occupant needs and 	 Analytical skills Mechanical aptitude Organizational skills Reading ability Varbal communication skills 	 <u>19</u>) Resources (Energy Star, FEMP, trade magazines, etc.) Specialized tools * (*<u>see list on</u>
	schedules	• Verbal communication skills	page 20)
Identify required tools Identify opportunities for predictive maintenance Identify opportunities for reliability centered maintenance			 Technology tools * (*<u>see list on</u> page 21) Warranty maintenance requirements
Identify appropriate timing for maintenance (when can it be done to eliminate interference with operations)			
identify frequency of maintenance	-		
Compare needs to available budget			
Prioritize maintenance tasks			
Document maintenance procedures			
Create the maintenance programs			
Document any deviations from OEM standards			
Plan for third party inspections/ maintenance			
4. Contribute to construction standards	s and guidelines	1	
4. Contribute to construction standards Participate in construction meetings	Customer requirements for	Ability to read and interpret	Basis of design
Review construction specifications prior to construction design and bid	businessDistinguishing	Reading ability	 Certifications and licenses as required (EPA refrigerant handling certification - EPA
Review designs to actual building requirements	equivalency between equipment and/or	Verbal communication skills	rule 608, etc.) Codes, standards, regulations
Provide input based on existing systems	Systems Equipment operations and		and guidelines* (*see lists on
Review submittals	specifications		pages 17 & 18)
Contribute to commissioning planning	Equipment operations and		 Construction documents (drawings and specifications)
Participate in commissioning	specifications		 Owner's project requirements

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
Contribute to maintainability analysis prior to construction Conduct a surrounding site assessment	 Management requirements Scope of work When substitutions of equipment or systems are not allowed 		 Project schedules Submittals Technology tools* (*see list on page 21)
5. Contribute to capital renewal plans	·		·
Review existing capital renewal plans Review organizational strategic plans Develop and review facility condition indexes Advise on new conditions within the facility and property Identify timeline for system and equipment replacements Promote sustainable materials and practices for renewal Analyze ROI Conduct a project failure analysis Review system lifecycle assessments Review ongoing maintenance requirements Provide input into the facility strategic plan	 Emerging technologies and tools Expected life of major building components Facility knowledge Impact of change on tenant/occupant space Options for extending the life of equipment and systems Organization's budgeting process Owner's long-term plan for the facility 	 Ability to forecast situational resources Ability to identify options for extending useful life of equipment and systems Computer skills Data interpretation and management skills Verbal communication skills 	 Codes, standards, regulations and guidelines* (*<u>see lists on</u> pages 17 & 18) Computer, peripherals and pertinent software * (<u>* see</u> <u>list on page 19</u>) Industry and association reference materials Maintenance records Technology tools * (*<u>see list on</u> page 21)

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
6. Conduct data management activities			
Develop facility/equipment/system data acquisition and management plans Maintain asset inventories Maintain handwritten logs Maintain updated building as-built plans Maintain updated OEMs Maintain inspection records Develop data retention policies Determine data storage capabilities and needs	 Basic data architecture Building systems* (*see list on pages 6 & 7) Contingency plans/data recovery Facility knowledge Integrated work management systems structure Regulatory record requirements 	 Ability to forecast situational resources Ability to identify options for extending useful life of equipment and systems Computer skills Data interpretation and management skills Verbal communication skills 	 Codes, standards, regulations and guidelines* (*<u>see lists on</u> <u>pages 17 & 18</u>) Computer, peripherals and pertinent software * (<u>* see</u> <u>list on page 19</u>) Industry and association reference materials Maintenance records Technology tools * (*<u>see list on</u> <u>page 21</u>)
Determine offsite data storage requirements			
Determine data interoperability levels			
Determine data access levels			

Table 17. Duties, Tasks, Steps, Specialized Knowledge, Skills, Abilities, Tools, Equipment and Resources for Conducting Budgeting Activities

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources	
D. Conducting Budget Actvities				
1. Contribute to facility operations but	dget			

Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
Evaluate existing procedures	Basic financial terminology	Ability to understand contract	• Backlogs and deferred activities
Review previous budgets and performance against budgets	Budget categoriesContracts and service providers	documentsBenchmarking skills	list • Codes, standards,
Identify future changes in operations or occupancy usage projections	 Financial knowledge Material availability 	Computer skillsNegotiation skills	regulations and guidelines *(* <u>see lists on pages 17 &</u>
Benchmark operations budgets (RS means)		Reading abilityTeamwork skills	 Department of Labor wage
Evaluate equipment and potential failures		 Verbal communication skills Written communication skills 	 Facility management plan
Identify contractors/service providers requirements			Industry expense referencesLabor and service provider
Identify staffing requirements for future service activities			contractsPrevious year's budgets
Identify special maintenance needs			 Projections versus actual
Identify potential code changes affecting operations			Technology tools * (* <u>see list</u> on page 21)
Review maintenance backlog and deferred activities			
Identify rate increases			
Review non-normal operating categories (snow removal, etc.)			
Review contingencies			
Review existing contracts			
Manage actual expenditures to budgets			

3 Building Operations Journey-worker Title and Scope Meeting

A panel of subject matter experts was formed from volunteers from the members of the previous Building Operations Professional JTA Committee. Members who volunteered were:

1	Terry M. Bickham, CEM, LEED AP, CSDP	Ingersoll Rand/Trane
	Director , Energy Services and Solutions	Lees Summit, MO
2	Robert Blakey	CBRE – Group Health
	Sr. Manager - Operations	Seattle, WA
3	Mike McBee	Seattle Public Schools / IUOE Local 609
	Capital Mechanical Coordinator	Seattle, WA
4	James Coates, BS, CEM, LEED AP	International Union of Operating Engineers
	Training Fund Administrator	Local 399 ETF, Chicago, IL
5	Rick Dames, MSAE, CFM, CEM, OPMP, CEA	Boone County Schools
	Director of Facility Management	Florence, KY
6	Hadley Hartshorn	Laney College
	Instructor	Oakland, CA
7	Daniel Sexton, RPA	U.S. General Services Administration (GSA), PBS
	Director, Tampa Service Center	Tampa, FL
8	Michael Badame	
	Operating Engineers	
9	Chris Marsden	Town of Stockbridge
	BOC	Stockbridge, MA
10	Robert Burgess, RPA®, CEM, CEA, LEED AP	Burgess-Green Facilities Service
	ВОМІ	Gaithersburg, MD

 Table 18. Building Operations Journey-worker JTA Committee Members

A panel of the available subject matter experts met on April 27, 2016 to discuss the need for a certification/certificate JTA at a level less than Building Operations Professional. The SMEs discussed the need for both an entry level and an intermediate level but reached consensus to start with the development of a mid-level – Journey-person level. Based on the discussions, the SMEs arrived at the following two job titles and scope statements:

The Building Operations Journey-worker performs the maintenance and operation of building systems and installed equipment, and performs general maintenance to maintain the building's operability, optimize building performance, and ensure the comfort, productivity and safety of the building occupants. May provide leadership and training to less senior personnel.

or

The Building Operations Journey-worker maintains and operates building systems and installed equipment, and performs general maintenance to maintain the building's operability, optimize building performance, and ensure the comfort, productivity and safety of the building occupants. May provide leadership and training to less senior personnel.

The members who participated in this discussion included:

Robert Blakey	Mike McBee
Sr. Manager – Operations	Capital Mechanical Coordinator
CBRE – Group Health	Seattle Public Schools / IUOE Local 609
Seattle, WA	Seattle, WA
James Coates, BS, CEM, LEED AP	Daniel Sexton, RPA
Training Fund Administrator	Director, Tampa Service Center
International Union of Operating Engineers	U.S. General Services Administration (GSA), PBS
Local 399 ETF, Chicago, IL	Tampa, FL

A follow-up meeting was held on May 4, 2016 with the SMEs and the job title and scope statement were finalized. The final job title for the reduced JTA is Building Operations Journey-work and the final scope statement is:

The Building Operations Journey-worker maintains and operates building systems and installed equipment, and performs general maintenance to maintain the building's operability, optimize building performance, and ensure the comfort, productivity and safety of the building occupants. The Building Operations Journey-worker may provide leadership and training to less senior personnel.

4 Building Operations Journey-worker Survey Results

All data were included in the analyses, as people who skipped a question or task rating may have done so either accidentally or because they felt that the item was not applicable to their position. The sample size is large enough to allow reasonable confidence in the results of the survey. Results from the demographics questions will be presented first.

4.1 Building Operations Journey-worker State of Primary Employment

The largest number of respondents were from California (55.28%), Illinois (11.01%) and Pennsylvania (9.40%). Table 1 provides the summary of this data.

In which state do you primarily work?						
Arizona	0.23%	Maryland	0.46%	Pennsylvania	9.40%	
California	55.28%	Massachusetts	0.92%	Tennessee	0.23%	
Colorado	0.46%	Michigan	0.23%	Texas	2.29%	
Connecticut	0.23%	Minnesota	5.28%	Utah	0.23%	
Florida	0.23%	Montana	0.23%	Vermont	0.46%	
Georgia	0.23%	New Jersey	0.23%	Washington	3.90%	
Hawaii	0.46%	New York	0.46%	Wisconsin	0.23%	
Idaho	0.23%	North Carolina	0.23%	Multiple States	0.92%	
Illinois	11.01%	Ohio	1.15%	Other	2.52%	
Indiana	0.46%	Oklahoma	0.69%			
Indiana	0.23%	Oklahoma	0.23%			
lowa	0.23%	Oregon	0.46%	*States not listed were not selected		

Table 19 -	State of	Employme	ent of Res	pondents

Table 20 contains a list of write-in comments associated with "other"

Table 20 - List of	"Other" write-i	in Comments
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Other Responses					
Washington D.C.	0.92%				
Canada	0.69%				
Singapore	0.23%				
Nationally	0.23%				
Retired	0.23%				
N/A	0.23%				

4.2 Building Operations Journey-worker Highest Level of Education

Respondents were asked about their highest level of education. The majority of respondents indicated having 2 years of college or technical school. This is consistent with the targeted population. The majority of the respondents to the Building Operations Professional JTA had Bachelor's degrees but the majority of respondents to the Building Operations Journey-worker did not have a Bachelor's degree.



4.3 Building Operations Journey-worker Years of Experience

Respondents were asked to identify the number of years of experience they have in an energy related field (all job combined) and not necessarily specifically in Building Operations. Figure 6 following depicts this information. The majority of respondents (40.14%) had more than 21 years of experienced in an energy related field. The next largest group (17. 14%) indicated they had less than 5 years of experience. This was determined to be good as it reflected both experience as well as individuals who had newly entered the field. on the next page depicts this information.



Figure 2. Years of Experience in an Energy Related Industry

4.4 Building Operations Journey-worker Years of Building Operations Experience

The respondents were asked how many years of experience they had specifically in the area of Building Operations. The majority of the respondents indicated they had 21 years or more of experience in Building Operations. Figure 3 below depicts this information.



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4.5 Building Operations Journey-worker Position Description

Respondents were asked if they would describe their current position in Building Operations as being primarily management or operational. The goal was to obtain responses from a majority of workers who worked at an operational level instead of a management level. It was believed that a Building Operations Professional would operate at a management level but a Building Operations Journey-worker would operate at an operational level. The overwhelming majority (74.14%) reported they are currently working at an operational level. 14.65% indicated they are currently working at a management level and 11.21% indicated they are not currently working in Building Operations. Figure 4 below depicts this information.



4.6 Building Operations Journey-worker Work Sector

The respondents were asked whether they worked in a private or public (government) work sector. A majority (69.77%) indicated they worked in a private sector. Figure 5 following depicts this information.



Figure 5. Sector in Which Respondent Works

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5 Building Operations Journey-worker Post-Survey Conference Call/Webinar

Based on this information, a conference call facilitated by Professional Testing was held on July 19, 2016 to review and discuss the survey results. The meeting began by reviewing the demographic question results to confirm that the sample appeared to be representative of the industry. The attending Building Operations SMEs agreed that the group of respondents was representative of the industry.

5.1 Building Operations Journey-worker Adequacy of Respondent Demographics

Based on the results of the demographic data, the expert panel felt that the respondents were demographically representative and in fact the correct target population was reached.

5.2 Building Operations Journey-worker Job Task Ratings

A total of 42 tasks were included in the final version of the validation survey. These tasks were grouped based on the 5 content domains to be covered by the Building Operations Professional examination scheme. The Building Operations Journey-worker survey used several scales to assess the tasks.

Most importantly, the survey asked if a Building Operations Journey-worker would do this task. Respondents were to answer yes or no. If the respondents answered yes, then the respondents were asked to determine the frequency and important of the task to successful performance.

The survey used a 4-point rating scale for importance of task performance, using the following scale:

- 1 Not important
- 2 Somewhat important
- 3 Important
- 4 Very Important

In addition to the rating scale for task importance, a 6-point rating scale for the frequency of the task, using the following scale:

- 1 Never
- 2 1% to 25% of the time
- 3 26 to 50% of the time
- 4 51 to 75% of the time
- 5 76 to 99% of the time
- 6 100% of the time

It was determined that the frequency and importance scale would be most useful for establishing an examination blueprint. However, because the main purpose of this Building Operations

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Journey-worker validation study was to establish a JTA for certificate programs, an examination blueprint was not as important. However, the data was collected and tabulated and reviewed as part of the validation study. Should NIBS determine in the future that an examination blueprint for Building Operations Journey-worker is important it can easily be created.

6 Building Operations Journey-worker Elimination of Tasks

All tasks in which 40% or more of the respondents indicated that a Building Operations Journeyworker would not do this task were flagged for review by the committee. The following table (table 3) contains the tabulated data resulting from the validation survey. All of the tasks in red were highlighted because more than 40% of the respondents indicated that a Building Operations Journey-worker would not perform this task. It should be noted that the entire domain area "Managing Human Resources" was flagged for indication that this would not be performed which made perfect sense given the job title of being operational rather than management.

Content Areas	# said No	% said No	Frequency Ratings	Import Ratings	Overall Ratings	Overall Weighting
Operating Buildings				1001155	1001155	
Perform workplace hazard	32	15%	3.64	2.39	8.42	2.50%
assessments						
Participate in emergency drills	19	9%	3.43	2.46	8.35	2.47%
Manage the PPE program	68	33%	3.72	2.36	8.44	2.50%
Manage third party inspections	66	31%	3.17	2.01	7.19	2.13%
Respond to building emergencies	2	1%	4.03	2.75	9.52	2.82%
Managing building securities	102	49%	3.02	2.00	7.02	2.08%
Coordinate/conduct occupant training	113	54%	2.91	1.88	6.66	1.98%
Conduct risk management activities	110	54%	2.87	1.99	6.85	2.03%
Manage responses to inclement weather conditions/issues	44	21%	3.30	2.18	7.67	2.27%
Respond to tenant requests/issues	8	4%	4.52	2.66	9.84	2.92%
Conduct equipment checks	2	1%	4.63	2.80	10.23	3.03%
Conduct daily rounds	7	3%	4.70	2.73	10.16	3.01%
Coordinate facility operations (normal)	39	19%	3.93	2.26	8.45	2.51%
Coordinate facility operations (other than normal)	56	27%	3.30	2.13	7.56	2.24%
Manage the work order process	56	27%	4.13	2.32	8.76	2.60%
Investigate indoor environmental quality	26	13%	3.46	2.35	8.16	2.42%
Conduct tenant relations activities	96	47%	3.50	2.12	7.73	2.29%
Manage consumables	88	43%	3.52	1.92	7.37	2.18%
Manage outside facility	51	25%	3.71	2.19	8.08	2.39%

Table 21. Rating Scales for Journey-Worker Survey Tabulated

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Content Areas	# said No	% said No	Frequency Ratings	Import Ratings	Overall Ratings	Overall Weighting
contractors/service providers						
Manage environmental	99	48%	3.10	2.25	7.60	2.25%
requirements (permits, etc.)						
Implement an energy	79	38%	3.62	2.49	8.60	2.55%
management program						
Maintain the facility and systems	7	3%	4.70	2.79	10.27	3.05%
Conduct facility repair activities	8	4%	4.45	2.74	9.93	2.94%
Optimizing the Facility						
Conduct measurement and	39	19%	3.65	2.11	7.88	2.34%
verification activities						
Analyze system performance	35	17%	3.79	2.34	8.47	2.51%
Identify cost saving measures	42	21%	3.47	2.22	7.91	2.34%
Respond to changing energy	75	37%	3.26	2.20	7.65	2.27%
costs						
Optimize system performance	30	15%	3.75	2.36	8.48	2.51%
Identify sustainability	57	28%	3.35	2.04	7.44	2.21%
opportunities						
Conducting Planning Activities						
Update procedures (SOPs, BOPs,	88	43%	3.04	2.20	7.44	2.21%
operating plans, emergency						
plans, etc.)		0.60/	2.10	0.40		0.040/
Develop equipment operations	73	36%	3.18	2.13	7.44	2.21%
plans		260/	2 5 7	2.20	0.00	2.400/
Develop planned maintenance	53	26%	3.57	2.39	8.36	2.48%
Contribute to construction	80	40%	3.08	2 16	7.40	2 19%
standards and guidelines	80	4070	5.08	2.10	7.40	2.1970
Contribute to capital renewal	96	48%	2 93	1 98	6.89	2 04%
nlans	50	4070	2.55	1.50	0.05	2.0470
Conduct data management	99	49%	3.00	1.89	6.79	2.01%
activities		,.	0.00		0110	
Conducting Budgeting Activities						
Contribute to long term facility	94	46%	3.07	2.13	7.33	2.17%
budget plan (5 years)						
Contribute to facility operations	74	36%	3.29	2.17	7.62	2.26%
budget						
Contribute to capital	88	43%	3.09	2.13	7.34	2.18%
improvement budget(s)						
Managing Human Resources						
Develop workload analyses	123	61%	3.04	1.99	7.01	2.08%

Content Areas	# said	% said	Frequency	Import	Overall	Overall
	No	No	Ratings	Ratings	Ratings	Weighting
Analyze staffing productivity	118	59%	3.13	1.99	7.11	2.11%
Supervise building staff	80	40%	3.62	2.17	7.95	2.36%
Secure outside service providers	87	42%	3.57	2.16	7.88	2.34%
					337.25	100.00%

During the phone call, each of the tasks in red were discussed. Based on the discussions, several of the tasks were eliminated and the Table 22 depicts the final task list for the Building Operations Journey-worker.

Content Areas
Operating Buildings
Perform workplace hazard assessments
Participate in emergency drills
Manage the PPE program
Manage third party inspections
Respond to building emergencies
Manage responses to inclement weather conditions/issues
Respond to tenant requests/issues
Conduct equipment checks
Conduct daily rounds
Coordinate facility operations (normal)
Coordinate facility operations (other than normal)
Manage the work order process
Investigate indoor environmental quality
Conduct tenant relations activities
Monitor consumables (hazardous materials)
Manage outside facility contractors/service providers
Implement an energy management program
Maintain the facility and systems
Conduct facility repair activities
Optimizing the Facility
Conduct measurement and verification activities
Analyze system performance
Identify cost saving measures
Respond to changing energy costs
Optimize system performance
Identify sustainability opportunities

Table 22. Final Building Operations Journey-worker Task List.

Conducting Planning Activities
Update procedures (SOPs, BOPs, operating plans, emergency
plans, etc.)
Develop equipment operations plans
Develop planned maintenance schedules
Conducting Budgeting Activities
Contribute to facility operations budget

6.1 Building Operations Journey-worker Elimination of Knowledge

Respondents were also asked to evaluate whether a particular knowledge was needed by the Building Operations Journey-worker to perform his or her job. Respondents were give a 4-point scale:

No knowledge needed Some knowledge needed Moderate knowledge needed Extensive knowledge needed

Result were tabulated and any knowledge areas with a low rating were highlighted in red for consideration by the SMEs. The SMEs requested further information in a few of the cases so the original DACUM JTA Chart was consulted and a couple of the tasks and associated knowledge was reworded to better fit the Building Operations Journey-worker. The knowledge areas in red were considered and the blackened ones were eliminated by the committee. Table 23 contains the final list of knowledge associated with Building Operations Journey-worker.

Table 23. Final List of Knowledge associated with Building	Operations	Journey-w	orker
Specialized Knowledges	Means	SD	SEM
Adjusting equipment based on readings	2.56	0.62	0.05
Americans with Disabilities Act	1.66	0.85	0.06
Asset inventories	1.69	0.81	0.06
BAS or monitoring systems	2.39	0.76	0.06
Baselines	1.77	0.78	0.06
Basic data architecture	1.56	0.93	0.07
Basic financial terminology	1.41	0.81	0.06
Basic knowledge of contaminant limits	2.02	0.82	0.06
Basic knowledge of insurance policies for equipment and			
operations	1.36	0.98	0.08
Basic knowledge of tariffs	0.92	1.01	0.08
Basic statistical analyses	1.23	0.97	0.07
Basic utility bill analysis	1.52	0.94	0.07
Benchmarking	1.54	0.99	0.08

Table 23. Final List of Knowledge associated with Building Operations Journey-worker

Specialized Knowledges	Means	SD	SEM
Best practices for emergency drills	2.14	0.85	0.07
Biohazards and hazardous chemicals	2.33	0.76	0.06
Break-even analysis	1.28	1.05	0.08
Budget categories	1.35	1.06	0.08
Building certification programs	1.97	0.87	0.07
Building operations and procedures	2.60	0.67	0.05
Building systems (including interdependencies,			
interoperability, limitations, operating plans, operations, and			
performance expectations)	2.37	0.76	0.06
Business case development	1.11	1.04	0.08
Chain of custody	1.17	1.01	0.08
Change management techniques	1.22	1.00	80.0
Common or frequent deficiencies	1.58	0.88	0.07
Communications methods (Skype, Webinar, etc.)	1.45	0.90	0.07
Communications plans	1.54	0.86	0.07
Company labor policies	1.89	0.86	0.07
Comparing alternatives to satisfy demands	1.70	0.94	0.07
Conditions under which a building should be evacuated	2.46	0.70	0.05
Consumable logistics	1.40	1.02	0.08
Consumable requirements	1.38	1.00	0.08
Consumable sourcing guidelines	1.26	0.98	0.08
Contaminant containment protocols	2.22	0.82	0.06
Contingency plans/data recovery	1.75	1.03	0.08
Contract knowledge	1.83	0.92	0.07
Contract requirements	1.87	0.91	0.07
Contracts and service providers	1.84	0.90	0.07
Contributors to carbon or environmental footprint	1.59	0.99	0.08
Control systems	2.57	0.65	0.05
Control theory	2.25	0.85	0.07
Costs of systems or improvements	1.69	0.92	0.07
Criticality of various systems and equipment	2.33	0.80	0.06
Customer requirements for business	1.65	0.98	0.08
Decontamination requirements	1.95	0.99	0.08
Deferred issues (deferred maintenance)	1.83	0.86	0.07
Demand management strategies	1.49	0.93	0.07
Distinguishing equivalency between equipment and/or			
systems	1.89	0.90	0.07
Emergency equipment operation	2.54	0.69	0.05
Emergency procedures including first aid and CPR	2.25	0.79	0.06
Emerging technologies and tools	2.03	0.85	0.07

Specialized Knowledges	Means	SD	SEM
Energy basics	2.04	0.79	0.06
Energy conservation opportunities	1.93	0.81	0.06
Energy efficiency measures (EEM) and economics	1.86	0.89	0.07
Energy load profiles	1.78	0.93	0.07
EPA regulations	2.11	0.86	0.07
Equipment operations and specifications	2.43	0.74	0.06
Expected life of major building components	2.02	0.88	0.07
Facility knowledge	2.60	0.66	0.05
Failure modes	2.19	0.81	0.06
Familiarity with learning styles	1.59	0.87	0.07
Feasibility studies	1.28	0.91	0.07
Financial knowledge	1.36	0.93	0.07
Financial penalties for going above peak demand threshold	1.66	0.97	0.08
First cost vs. lifecycle costs	1.44	0.95	0.08
First response mitigation techniques (what type of fire			
extinguisher to use, etc.)	2.39	0.79	0.06
Fluid dynamics	1.91	0.86	0.07
Foot-candles/lumens and lighting concepts	1.85	0.78	0.06
Funding limitations	1.26	0.96	80.0
Funding sources	1.17	0.97	80.0
General knowledge of the authority having jurisdiction	1.70	0.88	0.07
Hazard remediation/clean up	2.23	0.80	0.06
Hazardous materials disposal	2.26	0.79	0.06
Hazards in the area (earthquakes, etc.)	2.09	0.83	0.06
Hazards management	2.03	0.80	0.06
Health effects of contaminants (including stay times)	2.17	0.81	0.06
Heat transfer	2.27	0.75	0.06
HIPAA requirements	1.86	0.95	0.08
Historical data associated with facility	1.83	0.83	0.07
Human resources	1.36	0.90	0.07
HVAC systems	2.72	0.54	0.04
Impact of change on tenant/occupant space	2.13	0.85	0.07
Impact of facility operations on scheduling	2.17	0.85	0.07
Impact of operational changes (occupancy changes) on			
performance expectations	2.07	0.85	0.07
Incident command systems (ICS)	1.64	0.92	0.07
Inclement weather escalation plans	1.96	0.84	0.07
Inclement weather local logistics (shelter, food,			
transportation)	1.73	0.93	0.07
Indicators of problems with equipment	2.37	0.71	0.06

Specialized Knowledges	Means	SD	SEM
Industry norms for manpower	1.60	0.93	0.07
Infection control procedures	1.89	0.97	0.08
Inspection agencies	1.77	0.91	0.07
Inspection procedures	1.92	0.84	0.07
Insurance requirements	1.46	1.02	0.08
Integrated work management systems structure	1.62	1.01	0.08
Interim life safety measures (fire watch, alternate evacuation			
routes, etc.)	2.28	0.78	0.06
Interpreting equipment test readings	2.34	0.71	0.06
Inventory control systems	1.69	0.87	0.07
Job responsibilities	2.59	0.59	0.05
Key logic systems (master keys vs. other keys)	2.21	0.75	0.06
Labor contract agreements	1.81	0.96	0.08
Levels of maintenance	2.40	0.65	0.05
Levels of service for various spaces	2.14	0.79	0.06
Licensing requirements	2.07	0.92	0.07
Life cycle assessments	1.68	0.92	0.07
Lifecycle accounting practices	1.38	1.01	0.08
Limitations of PPE	2.42	0.77	0.06
Load demand schedules	2.05	0.85	0.07
Local water restrictions and requirements	2.07	0.86	0.07
Local weather issues	2.00	0.80	0.06
Location of facility equipment	2.56	0.69	0.05
Lock-out/tag-outs	2.69	0.60	0.05
Long term goals of the organization	1.91	0.91	0.07
Maintenance costs of existing systems	1.86	0.90	0.07
Management requirements	1.75	0.99	80.0
Manual equipment operation	2.53	0.64	0.05
Material availability	1.97	0.78	0.06
Measured variables to verify system performance	2.08	0.80	0.06
Measurement equipment and techniques	2.15	0.80	0.06
Medical evaluation policies and requirements	1.52	0.96	0.08
Mitigator of carbon or environmental footprint	1.45	1.02	0.08
Monitoring systems and equipment	2.34	0.80	0.06
Municipal requirement for disposal and recycle of			
consumables	1.86	0.84	0.07
National Incident Management Systems (NIMs)	1.42	1.00	0.08
New technologies	1.97	0.78	0.06
Normal equipment operating parameters/limits	2.48	0.66	0.05
Normal routine operation of the facility	2.56	0.62	0.05

Specialized Knowledges	Means	SD	SEM
Obtaining measurements	2.10	0.79	0.06
Occupancy types and typical evacuation procedures for			
various occupancies	2.01	0.85	0.07
Operating baselines	1.90	0.91	0.07
Operation equipment loads	2.25	0.77	0.06
Operational impact of inspections	2.08	0.80	0.06
Operations within the facility	2.41	0.69	0.05
Options for extending the life of equipment and systems	2.30	0.77	0.06
Organizational security requirements (access requirements,			
levels of security, etc.)	1.72	0.91	0.07
Organizational structures	1.57	0.87	0.07
Organization's budgeting process	1.38	0.93	0.07
Other submetering systems	1.63	0.86	0.07
Outsourcing options	1.39	0.88	0.07
Owner's long-term plan for the facility	1.65	0.97	0.08
Payment policies	1.16	1.03	0.08
Peak demand loads	2.11	0.86	0.07
Performance improvement plans	1.86	0.82	0.07
Permitting requirements	1.75	0.98	0.08
Permitting resources	1.56	0.99	0.08
Personnel performance review processes	1.63	0.95	0.08
Plumbing systems	2.57	0.59	0.05
Potential contaminants	2.28	0.77	0.06
Safety Codes and Standards (including OSHA)	2.46	0.70	0.06
Potential environmental, health and safety (EHS) hazards and			
risks	2.19	0.72	0.06
PPE and proper usage and maintenance of PPE	2.50	0.65	0.05
Procurement policies and procedures	1.74	0.89	0.07
Procurement regulations	1.54	0.99	0.08
Proper procedures for isolating and removing hazards	2.33	0.73	0.06
Psychrometrics	1.80	0.93	0.07
Rate schedules for utilities	1.45	1.01	0.08
Reclamation techniques	1.74	0.93	0.07
Recommended maintenance schedules	2.30	0.66	0.05
Refrigerant recovery techniques	2.40	0.76	0.06
Regulated consumables	1.77	0.90	0.07
Regulatory record requirements	1.88	0.89	0.07
Relationship between deficiencies and energy efficiency	1.88	0.85	0.07
Remediation activities for contaminants	1.90	0.86	0.07
Remediation procedures	1.85	0.90	0.07

Specialized Knowledges	Means	SD	SEM
Remote monitoring systems and equipment	2.18	0.76	0.06
Remote system fluency (DDC, etc.)	2.28	0.80	0.06
Reporting capabilities of work order systems	2.04	0.80	0.06
Reporting requirements for emergencies	2.25	0.73	0.06
Resource planning personnel management	1.49	0.97	0.08
Resources required for typical tenant/occupant requests and			
issues	1.78	0.88	0.07
RFP Process	1.42	0.96	0.08
Root cause analysis techniques	1.50	1.04	0.08
Safety codes and standards (including OSHA)	2.41	0.72	0.06
Safety concerns associated with equipment operations	2.54	0.64	0.05
Safety practices	2.59	0.60	0.05
Scope of work	2.35	0.68	0.05
Security equipment (lighting, cameras, etc.)	1.92	0.85	0.07
Security policies and procedures	1.76	0.87	0.07
Sequence of equipment operations	2.61	0.57	0.05
Sequence of operations	2.58	0.59	0.05
Service level agreements	1.71	0.92	0.07
Services to be outsourced	1.69	0.89	0.07
Shelf life of consumables	1.49	0.92	0.07
SOPs related to equipment	2.10	0.91	0.07
Specialized emergency equipment	2.17	0.82	0.07
State and local energy mandates	1.77	0.94	0.08
Storage requirements for consumables	1.71	0.89	0.07
Sustainability options	1.64	0.90	0.07
System documentation requirements	1.97	0.81	0.06
Technical equipment knowledge	2.44	0.63	0.05
Technical knowledge	2.48	0.64	0.05
Tenant/occupant chain of command	1.76	0.90	0.07
Tenant/occupant contracts	1.37	1.02	0.08
Tenant/occupant equipment and requirements	1.85	0.89	0.07
Tenant/occupant hours of operation	1.87	0.83	0.07
Tenant/occupant needs and schedules	1.94	0.80	0.06
Tenant/occupant operations and space uses	1.85	0.84	0.07
Tenant/occupant requirements	1.84	0.88	0.07
Tenant/occupant tolerances in changes to systems	1.86	0.89	0.07
Testing and balancing procedures	2.19	0.84	0.07
Thermodynamics	2.21	0.85	0.07
Trade and Union requirements	2.13	0.87	0.07
Trade knowledge for specific equipment and systems	2.35	0.71	0.06

Specialized Knowledges	Means	SD	SEM
Trade terminology and definitions	2.25	0.73	0.06
Trend analysis	1.81	0.93	0.07
Typical characteristics of facilities and equipment	2.23	0.72	0.06
Typical non-energy costs	1.47	0.91	0.07
Typical training topics	1.77	0.87	0.07
Understanding of all staff functions carried out in the facility	1.85	0.90	0.07
Understanding of interlocked equipment	2.34	0.73	0.06
Understanding of load shedding and its importance	2.18	0.84	0.07
Understanding of photometric charts	1.79	0.96	0.08
Understanding of staffing models (vacation, sick leave, etc.)	1.67	0.97	0.08
Uninterruptable and critical systems	2.42	0.76	0.06
Utility bill analysis	1.53	1.00	0.08
Utility rate structures and schedules	1.53	1.01	0.08
Utility time of use	1.61	1.00	0.08
Vendors	1.64	0.85	0.07
Ventilation requirements for consumables	1.98	0.86	0.07
Weather impact on the facility	2.20	0.75	0.06
Weather related factors affecting equipment (temperatures,			
dew points, etc.)	2.29	0.76	0.06
When substitutions of equipment or systems are not allowed	2.06	0.83	0.07
When to conduct IEQ tests	1.85	0.91	0.07
Whole building integration	2.03	0.85	0.07
Work control procedures	1.99	0.82	0.07
Work order processes	2.18	0.79	0.06
7 Building Operations Journey-Worker Final JTA

Finally, the DACUM JTA chart was updated to reflect the final Building Operations Journeyworker Task list and knowledge as determined by the validation study. The final DACUM JTA chart was provided at the beginning of this Report.

8 Behavioral/Learning Objectives and Content Outline

Final behavioral/learning objectives and a suggested course content outline for the Building Operations Journey-worker job are available in a separate document from the Commercial Workforce Credentialing Council at www.nibs.org/cwcc.

APPENDIX A : Building Operations Journey-Worker Validation Survey

Survey begins on the following page..

Welcome!

The National Institute of Building Sciences (NIBS) Commercial Workforce Credentialing Council and industry stakeholders in support of the Better Buildings Workforce Guidelines program developed a scheme (job task analysis with related skills and knowledge requirements) for Building Operations Professionals in 2014. This scheme was designed to be used by educational providers and certification bodies to develop training and certification.

NIBS is now interested in developing a scheme for a related operations and maintenance job scope. In addition to a Building Operations Professional (whose job includes many management tasks), NIBS would like to develop a scheme for the <u>Building Operations Journey-Worker</u>. The Building Operations Journey-Worker maintains and operates building systems and installed equipment, and performs general maintenance to maintain the building's operability, optimize building performance, and ensure the comfort, productivity and safety of the building occupants. The Building Operations Journey-Worker may also provide leadership and training to less senior personnel.

In support of this effort, the National Institute of Building Sciences (NIBS), and Professional Testing, Inc. are seeking building operations personnel at all levels to participate in a nationwide research study validating job task analyses

The survey is nine pages and shouldn't take more than 30 minutes to complete.

The survey includes a list of tasks that were originally identified as a task that a Building Operations Professional would perform. You will be asked to first determine if the task is a task that would also be performed by a <u>Building Operations Journey-Worker</u>. If so, you will then be asked to rate the frequency and importance of the work tasks.

If you do not have time to complete the survey in one sitting, you can stop and complete the survey later (provided you use the same computer and have cookies enabled on that computer). The survey will resume where you stopped. If you do not have cookies enabled, the survey will start over from the beginning again.

Your responses will be kept confidential, and we appreciate your assistance. If you have any difficulty responding to this survey, please contact Professional Testing at cdwoodley@proftesting.com.

The survey will close on June 30th so please complete your responses prior to that date!

Building	Operations .	Journey-Worker	Validation	Survey
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Please answer the following background questions. Your responses will be kept confidential and this information will only be used for statistical purposes.

In which state do you primarily work?

Other	(please	specify)
-------	---------	----------

What is your highest level of education?

- Less than High School
- High School or Equivalent
- Some College
- Two Years of College/Technical School/Community College/Apprenticeship Program Graduate
- Bachelor's Degree
- Graduate Degree

How many years of experience do you have in an energy related industry (all jobs combined)?

- 5 years or less
- 6-10 years
- 11-15 years
- 16-20 years
- 21 or more years

How many years of experience do you have specifically in the area of Building Operations?

- none
- 5 years or less
-) 6-10 years
- 11-15 years
- 16-20 years
- 21 or more years

Would you describe your <u>current</u> position in Building Operations as primarily management or operational?
Management
Operational
I am not currently working in Building Operations
In which sector do you currently work?
Public (government at any level)
Private

Instruction Page

In the following pages, you will be asked to look at each task that a **Building Operations Professional** does and to determine if a *typical* <u>Building Operations Journey-Worker</u> with a basic level of competence *(one with about 5 years of experience)* would also do this work. If a Building Operations Journey-Worker would also perform this task you will then be asked to indicate the frequency with which a *typical* <u>Building Operations Journey-Worker</u> would also perform this task you will then be asked to indicate the frequency with which a *typical* <u>Building Operations Journey-Worker</u> would perform each task on a job and you will be asked to indicate how important it is that a <u>Building Operations Journey-Worker</u> knows how to do each of these tasks. To respond click the drop down menu and select your response.

Following the job task questions, you will be asked to select knowledge requirements for the **Building Operations Journey-Worker**. To respond, select one category for each knowledge area. Finally you will be asked to identify any gaps in the task and knowledge areas and weigh their typical time requirements.

Your participation will help us develop an accurate picture of the **Building Operations Journey-Worker** to guide the development of training and certificate programs aimed at improving building operations and efficiencies nation-wide.

The Building Operations Professional Job was broken down into the following categories:

Operating Buildings Optimizing Buildings Conducting Planning Activities Conducting Budgeting Activities Managing Human Resources

On the following pages you will find tasks in each of the above categories for you to rate in relation to a **<u>Building Operations Journey-</u> <u>Worker</u>**.

Building	Operations	Journey-Worker	Validation Survey
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As part of <u>Operating Buildings</u>, would a **Building Operations Journey-Worker** do any of the tasks belowect "yes" please indicate how frequently this task is performed on the job and how important this task is to a **Building Operations Journey-Worker (JW)**.

	Would a Building Operations Journey-Worker perform this task?	is this task performed by a Building Operations JW?	this task to the overall performance of a Building Operations JW?
Perform workplace hazard assessments			
Participate in emergency drills			
Manage the PPE program			
Manage third party inspections			
Respond to building emergencies			
Managing building securities			
Coordinate/conduct occupant training			
Conduct risk management activities			
Manage responses to inclement weather conditions/issues			
Respond to tenant requests/issues			
Conduct equipment checks			
Conduct daily rounds			
Coordinate facility operations (normal)			
Coordinate facility operations (other than normal)			

	Would a Building Operations Journey-Worker perform this task?	Frequency - How often is this task performed by a Building Operations JW?	Importance - How important is this task to the overall performance of a Building Operations JW?
Manage the work order process			
Investigate indoor environmental quality			
Conduct tenant relations activities			
Manage consumables			
Manage outside facility contractors/service providers			
Manage environmental requirements (permits, etc.)			
Implement an energy management program			
Maintain the facility and systems			
Conduct facility repair activities			

As part of <u>Optimizing the Facility</u> , would a Building Operations Journey-Worker do any of the tasks below? If you select "yes" please indicate how frequently this task is performed on the job and how important this task is to a Building Operations Journey-Worker (JW) .				
	Would a Building Operations Journey-Worker perform this task?	Frequency - How often is this task performed by a Building Operations JW?	Importance - How important is this task to the overall performance of a Building Operations JW?	
Conduct measurement and verification activities				
Analyze system performance				
Identify cost saving measures				
Respond to changing energy costs				
Optimize system performance				
Identify sustainability opportunities				

As part of <u>Conducting Planning Activities</u> , would a Building Operations Journey-Worker do any of the tasks below? If you select "yes" please indicate how frequently this task is performed on the job and how				
important this task is to a Building Operations Journey-Worker (JW) .				
	Would a Building Operations Journey-Worker perform this task?	Frequency - How often is this task performed by a Building Operations JW?	Importance - How important is this task to the overall performance of a Building Operations JW?	
Update procedures (SOPs, BOPs,				
operating plans, emergency plans, etc.)				
Develop equipment operations plans				
Develop planned maintenance schedules				
Contribute to construction standards and quidelines				
Contribute to capital renewal plans				
Conduct data management activities				

As part of <u>Conducting Budgeting Activities</u>, would a **Building Operations Journey-Worker** do any of the tasks below? If you select "yes" please indicate how frequently this task is performed on the job and how important this task is to a **Building Operations Journey-Worker (JW)**.

	Would a Building Operations Journey-Worker perform this task?	Frequency - How often is this task performed by a Building Operations JW?	Importance - How important is this task to the overall performance of a Building Operations JW?
Contribute to long term facility budget plan (5 years)			
Contribute to facility operations budget			
Contribute to capital improvement budget(s)			

As part of <u>Managing Human Resources</u>, would a **Building Operations Journey-Worker** do any of the tasks below? If you select "Yes", please indicate how frequently this task is performed on the job and how important this task is to a **Building Operations Journey-Worker (JW)**.

	Would a Building Operations Journey-Worker perform this task?	Frequency - How often would this task be performed by a Building Operations JW?	Importance - How important is this task to the overall performance of a Building Operations JW?
Develop workload analyses			
Analyze staffing productivity			
Supervise building staff			
Secure outside service providers			

Thinking about a **Building Operations Journey-Worker**, review the specialized knowledge below and indicate the depth of knowledge that would be required by the **Building Operations Journey-Worker** (if any).

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Adjusting equipment based on readings	0	\bigcirc	\bigcirc	\bigcirc
Americans with Disabilities Act	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Asset inventories	\bigcirc	\bigcirc	\bigcirc	\bigcirc
BAS or monitoring systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Baselines	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Basic data architecture	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Basic financial terminology	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Basic knowledge of contaminant limits	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Basic knowledge of insurance policies for equipment and operations	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Basic knowledge of tariffs	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Basic statistical analyses	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Basic utility bill analysis	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Benchmarking	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Best practices for emergency drills	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Biohazards and hazardous chemicals	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Break-even analysis	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Budget categories	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Building certification programs	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Building operations and procedures	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Building systems (including interdependencies, interoperability, limitations, operating plans, operations, and performance expectations)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Business case development	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Chain of custody	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Change management techniques	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Common or frequent deficiencies	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Communications methods (Skype, Webinar, etc.)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Communications plans	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Company labor policies	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Comparing alternatives to satisfy demands	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Conditions under which a building should be evacuated	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Consumable logistics	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Consumable requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Consumable sourcing guidelines	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Contaminant containment protocols	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Contingency plans/data recovery	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Contract knowledge	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Contract requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Contracts and service providers	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Contributors to carbon or environmental footprint	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Control systems	\bigcirc	\bigcirc	\bigcirc	0

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Control theory	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Costs of systems or improvements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Criticality of various systems and equipment	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Customer requirements for business	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Decontamination requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Deferred issues (deferred maintenance)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Demand management strategies	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Distinguishing equivalency between equipment and/or systems	\bigcirc	\bigcirc	\bigcirc	0
Emergency equipment operation	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Emergency procedures including first aid and CPR	\bigcirc	\bigcirc	\bigcirc	0
Emerging technologies and tools	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Energy basics	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Energy conservation opportunities	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Energy efficiency measures (EEM) and economics	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Energy load profiles	\bigcirc	\bigcirc	\bigcirc	\bigcirc
EPA regulations	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Equipment operations and specifications	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Expected life of major building components	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Facility knowledge	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Failure modes	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Familiarity with learning styles	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Feasibility studies	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Financial knowledge	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Financial penalties for going above peak demand threshold	\bigcirc	\bigcirc	\bigcirc	\bigcirc
First cost vs. lifecycle costs	\bigcirc	\bigcirc	\bigcirc	\bigcirc
First response mitigation techniques (what type of fire extinguisher to use, etc.)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Fluid dynamics	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Foot-candles/lumens and lighting concepts	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Funding limitations	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Funding sources	\bigcirc	\bigcirc	\bigcirc	\bigcirc
General knowledge of the authority having jurisdiction	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Hazard remediation/clean up	\bigcirc	\bigcirc	\bigcirc	\bigcirc

Thinking about a **Building Operations Journey-Worker**, review the specialized knowledge below and indicate the depth of knowledge that would be required by the **Building Operations Journey-Worker** (if any).

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Hazardous materials disposal	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Hazards in the area (earthquakes, etc.)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Hazards management	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Health effects of contaminants (including stay times)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Heat transfer	\bigcirc	\bigcirc	\bigcirc	\bigcirc
HIPAA requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Historical data associated with facility	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Human resources	\bigcirc	\bigcirc	\bigcirc	\bigcirc
HVAC systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Impact of change on tenant/occupant space	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Impact of facility operations on scheduling	\bigcirc	\bigcirc	\bigcirc	0
Impact of operational changes (occupancy changes) on performance expectations	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Incident command systems (ICS)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Inclement weather escalation plans	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Inclement weather local logistics (shelter, food, transportation)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Indicators of problems with equipment	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Industry norms for manpower	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Infection control procedures	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Inspection agencies	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Inspection procedures	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Insurance requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Integrated work management systems structure	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Interim life safety measures (fire watch, alternate evacuation routes, etc.)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Interpreting equipment test readings	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Inventory control systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Job responsibilities	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Key logic systems (master keys vs. other keys)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Labor contract agreements	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Levels of maintenance	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Levels of service for various spaces	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Licensing requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Life cycle assessments	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Lifecycle accounting practices	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Limitations of PPE	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Load demand schedules	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Local water restrictions and requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Local weather issues	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Location of facility equipment	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Lock-out/tag-outs	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Long term goals of the organization	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Maintenance costs of existing systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Management requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Manual equipment operation	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Material availability	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Measured variables to verify system performance	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Measurement equipment and techniques	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Medical evaluation policies and requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Mitigator of carbon or environmental footprint	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Monitoring systems and equipment	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Municipal requirement for disposal and recycle of consumables	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
National Incident Management Systems (NIMs)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
New technologies	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Normal equipment operating parameters/limits	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Normal routine operation of the facility	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Obtaining measurements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Occupancy types and typical evacuation procedures for various occupancies	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Operating baselines	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Operation equipment loads	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Operational impact of inspections	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Operations within the facility	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Options for extending the life of equipment and systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Organizational security requirements (access requirements, levels of security, etc.)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Organizational structures	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Organization's budgeting process	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Other submetering systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Outsourcing options	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Owner's long-term plan for the facility	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Payment policies	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Peak demand loads	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Performance improvement plans	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Permitting requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Permitting resources	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Personnel performance review processes	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Plumbing systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Potential contaminants	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Safety Codes and Standards (including OSHA)	\bigcirc	\bigcirc	\bigcirc	\bigcirc

Thinking about a **Building Operations Journey-Worker**, review the specialized knowledge below and indicate the depth of knowledge that would be required by the **Building Operations Journey-Worker** (if any).

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Potential environmental, health and safety (EHS) hazards and risks	\bigcirc	\bigcirc	\bigcirc	\bigcirc
PPE and proper usage and maintenance of PPE	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Procurement policies and procedures	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Procurement regulations	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Proper procedures for isolating and removing hazards	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Psychrometrics	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Rate schedules for utilities	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Reclamation techniques	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Recommended maintenance schedules	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Refrigerant recovery techniques	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Regulated consumables	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Regulatory record requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Relationship between deficiencies and energy efficiency	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Remediation activities for contaminants	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Remediation procedures	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Remote monitoring systems and equipment	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Remote system fluency (DDC, etc.)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Reporting capabilities of work order systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Reporting requirements for emergencies	\bigcirc	\bigcirc	\bigcirc	0
Resource planning personnel management	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Resources required for typical tenant/occupant requests and issues	\bigcirc	\bigcirc	\bigcirc	\bigcirc
RFP Process	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Root cause analysis techniques	\bigcirc	\bigcirc	\bigcirc	0
Safety codes and standards (including OSHA)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Safety concerns associated with equipment operations	\bigcirc	\bigcirc	\bigcirc	0
Safety practices	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Scope of work	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Security equipment (lighting, cameras, etc.)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Security policies and procedures	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Sequence of equipment operations	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Sequence of operations	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Service level agreements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Services to be outsourced	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Shelf life of consumables	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
SOPs related to equipment	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Specialized emergency equipment	\bigcirc	\bigcirc	\bigcirc	\bigcirc
State and local energy mandates	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Storage requirements for consumables	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Sustainability options	\bigcirc	\bigcirc	\bigcirc	\bigcirc
System documentation requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Technical equipment knowledge	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Technical knowledge	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Tenant/occupant chain of command	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Tenant/occupant contracts	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Tenant/occupant equipment and requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Tenant/occupant hours of operation	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Tenant/occupant needs and schedules	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Tenant/occupant operations and space uses	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Tenant/occupant requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Tenant/occupant tolerances in changes to systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Testing and balancing procedures	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Thermodynamics	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Trade and Union requirements	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Trade knowledge for specific equipment and systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Trade terminology and definitions	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Trend analysis	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Typical characteristics of facilities and equipment	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Typical non-energy costs	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Typical training topics	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Understanding of all staff functions carried out in the facility	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Understanding of interlocked equipment	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Understanding of load shedding and its importance	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Understanding of photometric charts	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Understanding of staffing models (vacation, sick leave, etc.)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Uninterruptable and critical systems	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Utility bill analysis	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Utility rate structures and schedules	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Utility time of use	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Vendors	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Ventilation requirements for consumables	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Weather impact on the facility	\bigcirc	\bigcirc	\bigcirc	0
Weather related factors affecting equipment (temperatures, dew points, etc.)	\bigcirc	\bigcirc	\bigcirc	\bigcirc
When substitutions of equipment or systems are not allowed	\bigcirc	\bigcirc	\bigcirc	0
When to conduct IEQ tests	\bigcirc	\bigcirc	\bigcirc	\bigcirc

	No knowledge needed	Some knowledge needed	Moderate knowledge needed	Extensive knowledge needed
Whole building integration	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Work control procedures	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Work order processes	\bigcirc	\bigcirc	\bigcirc	\bigcirc

Are there any tasks	related to the job o	f a Building O	perations Jour	mey-Worker th	nat are missing	g from th
Yes						
ves. what?						
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Building Operations Journey-Worker Validation Survey

Thinking about the total time that a **Building Operations Journey-Worker** spends in a year doing the following activities, please estimate the percentage of time that the typical **Building Operations Journey-Worker** would spend in each of the areas.

(Note: Your responses should add up to 100.)

Operating Buildings

Optimizing the Facility

Conducting Planning Activities

Conducting Budgeting Activities

Managing Human Resources

Thank you! We appreciate your input!

You have completed the survey, and we really appreciate the time you have taken to share your job with us! NIBS and Professional Testing would like to thank you for taking the time to help.

APPENDIX B BUILDING OPERATIONS PROFESSIONAL JOB TASK ANALYSIS

INTRODUCTION

The National Renewable Energy Laboratory (NREL), in conjunction with the National Building Institutes (NIBS) and the U.S. Department of Energy (DOE) convened a study in 2013 to identify the critical duties and tasks required of Building Operations Professionals. To facilitate the identification of the competencies, Professional Testing conducted a Job/Task Analysis (JTA) utilizing the DACUM (Developing a Curriculum) process.

A panel of subject matter experts was selected by NIBS and convened by Professional Testing for a three day meeting held on February 10 through 12, 2014 in Orlando Florida. The competencies identified during the meeting were then validated via a survey. This report reflects the completion and results of the study.

BUILDING OPERATIONS PROFESSIONAL JOB TASK ANALYSIS AND SURVEY VALIDATION

Table B1 - List of DACUM JTA Participants

Mohamed Amin, LEED AP, EIT Project Engineer U.S. Environmental Protection Agency (USEPA) Edison, NJ

Terry M. Bickham, CEM, LEED AP, CSDP Director, Energy Services and Solutions Ingersoll Rand/Trane Lees Summit, MO

Robert Blakey Sr. Manager - Operations CBRE – Group Health Seattle, WA

James Coates, BS, CEM, LEED AP Training Fund Administrator International Union of Operating Engineers Local 399 ETF Chicago, IL Christine C. Maurer, PE, CEM Energy Engineer Advanced Energy Raleigh, NC

Mike McBee Capital Mechanical Coordinator Seattle Public Schools / IUOE Local 609 Seattle, WA

Carlos Santamaria, MBA, RPA, LEED AP Vice President, Engineering Services Glenborough LLC / CEES-Advisors - Principle Napa, CA

Daniel Sexton, RPA Director, Tampa Service Center U.S. General Services Administration (GSA), PBS Tampa, FL

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Rick Dames, MSAE, CFM, CEM, OPMP, CEA Director of Facility Management Boone County Schools Florence, KY

Howard (Mike) Day Director of Operations ProSource Consulting Gainesville, VA

Charles Frost Energy Manager UC Berkeley Berkeley, CA Daryl R. Walker Instructor Renton Technical College Renton, WA

Rod Weiss Director of Development – Smart Energy Programs Coleman University San Diego, CA

Anthony Zotto, Operating Engineer, LEED G.A. Industry Skills Coordinator Thomas Shortman Fund Local 32BJ/Training Fund New York, NY

Hadley Hartshorn Instructor Laney College Oakland, CA

The DACUM JTA meeting was facilitated by Dr. Cynthia Woodley, psychometrician and Ms. Tracey Paschal, project manager with Professional Testing Inc. The three-day meeting developed a list of five domains or duties and 42 tasks through group discussions.

Building Operations Professional Survey Development

The task list was used to build a survey that was delivered using an online survey. The survey consisted of two major sections: Demographic Information and Building Operations Professional Tasks. The draft survey was shared with NREL/NIBS/DOE staff for initial review and then NIBS volunteered to send out the survey to appropriate respondents.

Building Operations Professional Survey Dissemination

NIBS sent out the survey to appropriate Building Operations Professionals. The survey was open for approximately 30 days in the spring of 2014 for data collection, during which time email reminders were delivered. The final collected data set included 122 respondents, some of whom started but did not complete the survey.

BUILDING OPERATIONS PROFESSIONAL RESULTS

All data were included in the analyses, as people who skipped a question or task rating may have done so either accidentally or because they felt that the item was not applicable to their position. The sample size is large enough to allow reasonable confidence in the results of the survey. Results from the demographics questions will be presented first.

	%	#
Other (please specify)	14.2%	15
California	10.4%	11
New York	9.4%	10
Multiple States	8.5%	9
Washington	7.5%	8
North Carolina	6.6%	7
Texas	6.6%	7
Virginia	5.7%	6
Colorado	3.8%	4
Maryland	3.8%	4
Pennsylvania	3.8%	4
Connecticut	2.8%	3
Florida	2.8%	3
Illinois	2.8%	3
Massachusetts	2.8%	3
Missouri	2.8%	3
New Jersey	2.8%	3
Hawaii	1.9%	2
Michigan	1.9%	2
South Carolina	1.9%	2
Wisconsin	1.9%	2
Arizona	0.9%	1
Kentucky	0.9%	1
Louisiana	0.9%	1
Maine	0.9%	1
New Mexico	0.9%	1
North Dakota	0.9%	1
Ohio	0.9%	1
Oregon	0.9%	1
Rhode Island	0.9%	1
Tennessee	0.9%	1
Alabama	0.0%	0
Alaska	0.0%	0
Arkansas	0.0%	0
Delaware	0.0%	0

Table B2- State of Employment of Respondents

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	%	#
Georgia	0.0%	0
Idaho	0.0%	0
Indiana	0.0%	0
lowa	0.0%	0
Kansas	0.0%	0
Minnesota	0.0%	0
Mississippi	0.0%	0
Montana	0.0%	0
Nebraska	0.0%	0
Nevada	0.0%	0
New Hampshire	0.0%	0
Oklahoma	0.0%	0
South Dakota	0.0%	0
Utah	0.0%	0
Vermont	0.0%	0
West Virginia	0.0%	0
Wyoming	0.0%	0
Answered question		106

Table contains a list of the write-in comments associated with "other". Several of the write-in comments actually were states where the respondent could have checked a participate state. However, Table B3 highlights international locations in which respondents work (highlighted in red).

"Other" Write-in Comments
China
Canada
Texas
India
Canada BC
District of Columbia
Israel
All US
Portugal
Greece
Czech
Asia/Taiwan
Jamaica
Guam USA
MU

Table B3 - list of "Other" write-in Comments

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Building Operations Professional Highest Level of Education

Respondents were asked about the highest level of education reached. The majority of respondents indicated completing a Bachelor's degree (30.2%, n=38) followed by a Graduate degree (27.8%, n=35). The result is that 58% (n=73) have a Bachelor's degree or higher. Table B4 and Figure B1 following depicts this information.

Answer Options	Response Percent	Response Count
Less than High School	0.8%	1
High School or Equivalent	7.9%	10
Some College	10.3%	13
Two Years of College/Technical School/Community College	23.0%	29
Bachelor's Degree	30.2%	38
Graduate Degree	27.8%	35
Answered question		126

Table B4 - Highest Level of Education

Figure B1 - Highest Level of Education



Building Operations Professional Years of Energy Experience

Respondents were asked to identify the number of years of experience they have in an energy related industry (all jobs combined) and not necessarily specifically as an Building Operations Professional. The majority of respondents (51.6%, n=65) have more than 21 years of experience. Table B5 and Figure 2 following depict this information.

Answer Options	Response Percent	Response Count
5 years or less	6.3%	8
6-10 years	20.6%	26
11-15 years	11.9%	15
16-20 years	9.5%	12
21 or more	51.6%	65
years		
Answered questio	n	126

Table B5 - Years of Energy Experience





Building Operations Professional Years of Building Operations Experience

The majority of respondents (37.6%, n=47) had 21 years or more of experience as a Building Operations Professional. The SME committee felt that this result was representative of the Building Operations field. Table B6 and Figure 3 below reflect this information.

Answer Options	Response Percent	Response Count
none	3.2%	4
5 years or less	14.4%	18
6-10 years	17.6%	22
11-15 years	10.4%	13
16-20 years	16.8%	21
21 or more	37.6%	47
years		
Answered question		125

Table B6 - Years of Experience Specifically as a Building Operations Professional

Figure B3- Years of Experience Specifically as a Building Operations Professional



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Building Operations Professional Work Sector

Answered question

Respondents were asked whether they worked in a private or public (government) work sector. A majority (62.3%, n =) indicated they worked in a private sector. Table B7 and Figure 4 below reflect this information.

	•	
Answer Options	Response	Response
	Percent	Count
Public (government at any level)	37.7%	46
Private	62.3%	76

Table B7 - Sector in Which Respondent Works

Figure B4 - Sector in Which Respondent Works

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Building Operations Professional Post-Survey Conference Call/Webinar

Based on this information, a conference call facilitated by Professional Testing was held on May 30, 2014 to review and discuss the survey results. The meeting began by reviewing the demographic question results to confirm that the sample appeared to be representative of the industry. The attending Building Operations SMEs agreed that the group of respondents was representative of the industry. They then reviewed the tasks which were flagged for potential elimination. The resolution of this conference call removed none of the competency statements.

Building Operations Professional Adequacy of Respondent Demographics

Based on the results of the demographic data, the expert panel felt that the respondents were demographically representative and in fact the correct target population was reached.

Building Operations Professional Job Task Ratings

A total of 42 tasks were included in the final version of the validation survey. These tasks were grouped based on the 5 content domains to be covered by the Building Operations Professional examination scheme. The survey used a 4-point rating scale for importance of task performance, using the following scale:

Not important Somewhat important Important Very Important

In addition to the rating scale for task importance, a 6-point rating scale for the frequency of the task, using the following scale:

Never 1% to 25% of the time 26 to 50% of the time 51 to 75% of the time 76 to 99% of the time 100% of the time

Responses were tabulated and means, standard deviations and standard errors were calculated for both the frequency scale and the importance scale. This information appears in Table B8 following.

Duties and Tasks	Frequency		Importance			
	Means	SD	SEM	Means	SD	SEM
Managing Human Resources						
Develop workload analyses	1.61	1.16	0.12	1.88	0.90	0.11
Analyze staffing productivity	1.87	1.35	0.13	2.08	0.86	0.11
Supervise building staff	2.64	1.46	0.14	2.29	0.82	0.11
Secure outside service providers	1.60	1.07	0.12	1.81	0.91	0.11
Conducting Planning Activities						
Update procedures (SOPs, BOPs,	1.69	1 1 2	0.12	2.06	0.71	0.10
operating plans, emergency plans, etc.)	1.00	1.12	0.12	2.00	0.71	0.10
Develop equipment operations plans	1.67	1.14	0.13	2.01	0.75	0.10
Develop planned maintenance schedules	2.15	1.50	0.14	2.40	0.74	0.10
Contribute to construction standards and	1 45	0 94	0 1 1	1 83	0 79	0.10
guidelines	1.45	0.54	0.11	1.05	0.75	0.10
Contribute to capital renewal plans	1.65	1.16	0.13	1.99	0.78	0.10
Conduct data management activities	1.65	1.25	0.13	1.68	0.78	0.10
Operating Buildings						
Perform workplace hazard assessments	1.95	1.54	0.15	2.14	0.82	0.11
Participate in emergency drills	1.93	1.62	0.15	2.01	0.83	0.11
Manage the PPE program	1.82	1.55	0.15	2.07	0.84	0.11
Manage third party inspections	1.49	1.19	0.13	1.59	0.80	0.11
Respond to building emergencies	2.66	1.79	0.16	2.65	0.63	0.09
Manage building securities	1.40	1.43	0.14	1.71	0.82	0.11
Coordinate/conduct occupant training	1.11	1.15	0.13	1.46	0.90	0.11
Conduct risk management activities	1.42	1.17	0.13	1.70	0.79	0.11
Manage responses to inclement weather conditions/issues	2.10	1.63	0.15	2.08	0.79	0.11
Respond to tenant requests/issues	2.79	1.62	0.15	2.32	0.67	0.10
Conduct equipment checks	2.44	1.64	0.15	2.27	0.70	0.10
Conduct daily rounds	2.47	1.85	0.16	2.07	0.83	0.11
Coordinate facility operations (normal)	2.77	1.75	0.15	2.27	0.70	0.10
Coordinate facility operations (other than normal)	2.27	1.71	0.15	2.23	0.83	0.11
Manage the work order process	2.19	1.48	0.14	2.03	0.72	0.10
Investigate indoor environmental quality	2.00	1.62	0.15	2.21	0.83	0.11
Conduct tenant relations activities	1.73	1.58	0.15	1.70	0.90	0.11
Manage consumables	1.74	1.55	0.15	1.41	0.85	0.11
Manage outside facility	2 1 2	1 56	0.15	1 02	0 00	0.11
contractors/service providers	2.12	1.30	0.15	1.92	0.05	0.11
Manage environmental requirements (permits, etc.)	1.88	1.62	0.15	2.03	0.73	0.10
Implement an energy management	2.34	1.57	0.15	2.37	0.78	0.10

Table B8 - Means, SDs and SEM of Rating Scale Responses

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Duties and Tasks	l	Frequency	/	Importance			
	Means	SD	SEM	Means	SD	SEM	
program							
Maintain the facility and systems	3.33	1.58	0.15	2.65	0.56	0.09	
Conduct facility repair activities	2.82	1.70	0.15	2.44	0.73	0.10	
Optimizing the Facility							
Conduct measurement and verification activities	2.00	1.45	0.14	2.00	0.81	0.11	
Analyze system performance	2.42	1.51	0.14	2.28	0.72	0.10	
Identify cost saving measures	2.45	1.46	0.14	2.37	0.74	0.10	
Respond to changing energy costs	1.93	1.54	0.14	1.87	0.86	0.11	
Optimize system performance	2.53	1.57	0.15	2.45	0.73	0.10	
Identify sustainability opportunities	2.03	1.53	0.14	1.86	0.96	0.12	
Conducting Budgeting Activities							
Contribute to long term facility budget plan (5 years)	2.00	1.56	0.15	2.17	0.71	0.10	
Contribute to facility operations budget	2.57	1.70	0.15	2.49	0.60	0.09	
Contribute to capital improvement budget(s)	2.19	1.53	0.14	2.28	0.75	0.10	

In Table 8, tasks in red represent tasks with less than 2.0 on frequency AND importance. These tasks were considered during the follow up webinar by the SMEs to consider whether they should be dropped or not. The SMEs determined all tasks were needed and decided to leave all tasks.

Responses to frequency and importance rankings were combined using the formula 2 x importance plus frequency to arrive at a single scale. The tabulated results of these items are below in Table B9 following.

Dutios and Tasks	Fr	equency	y Im		portance		Combined	Overall
Duties and Tasks	Means	SD	SEM	Means	SD	SEM	Ratings	Weights
Managing Human Resources								
Develop workload analyses	1.61	1.16	0.12	1.88	0.90	0.11	5.37	2.06%
Analyze staffing productivity	1.87	1.35	0.13	2.08	0.86	0.11	6.03	2.31%
Supervise building staff	2.64	1.46	0.14	2.29	0.82	0.11	7.22	2.76%
Secure outside service	1.60	1.07	0.12	1 01	0.01	0.11	E 21	2 0.0%
providers	1.00	1.07	0.12	1.01	0.91	0.11	5.21	2.00%
Conducting Planning Activities								
Update procedures (SOPs,								
BOPs, operating plans,	1.68	1.12	0.12	2.06	0.71	0.10	5.79	2.22%
emergency plans, etc.)								
Develop equipment operations	1 67	1 1 /	0.12	2 01	0.75	0.10	F 70	2 1 00/
plans	1.07	1.14	0.15	2.01	0.75	0.10	5.70	2.10/0
Develop planned maintenance	2.15	1.50	0.14	2.40	0.74	0.10	6.95	2.66%

Table B9 - Combined Frequency and Importance Scales

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Duties and Tasks	Frequency		Importance			Combined	Overall	
Duties and Tasks	Means	SD	SEM	Means	SD	SEM	Ratings	Weights
schedules								
Contribute to construction	1 / 5	0.94	0.11	1 83	0 79	0 10	5 11	1 96%
standards and guidelines	1.45	0.54	0.11	1.05	0.75	0.10	5.11	1.50%
Contribute to capital renewal	1.65	1 16	0.13	1 00	0.78	0 10	5.62	2 15%
plans	1.05	1.10	0.15	1.55	0.78	0.10	5.02	2.1370
Conduct data management	1.65	1 25	0.13	1.68	0.78	0 10	5.01	1 07%
activities	1.05	1.25	0.15	1.00	0.78	0.10	5.01	1.5270
Operating Buildings								
Perform workplace hazard	1 95	1 5/	0.15	2 1/	0.82	0 1 1	6 23	2 39%
assessments	1.55	1.54	0.15	2.14	0.02	0.11	0.25	2.3370
Participate in emergency drills	1.93	1.62	0.15	2.01	0.83	0.11	5.96	2.28%
Manage the PPE program	1.82	1.55	0.15	2.07	0.84	0.11	5.96	2.28%
Manage third party inspections	1.49	1.19	0.13	1.59	0.80	0.11	4.68	1.79%
Respond to building	2 66	1 70	0.16	2.65	0.63	0 00	7 95	3 05%
emergencies	2.00	1.75	0.10	2.05	0.03	0.09	7.95	3.05%
Manage building securities	1.40	1.43	0.14	1.71	0.82	0.11	4.83	1.85%
Coordinate/conduct occupant	1 1 1	1 1 5	0.12	1 46	0.00	0 1 1	4.02	1 5/1%
training	1.11	1.15	0.15	1.40	0.90	0.11	4.02	1.54%
Conduct risk management	1 / 2	1 1 7	0.12	1 70	0.70	0 1 1	1 82	1 95%
activities	1.42	1.17	0.13	1.70	0.79	0.11	4.02	1.05%
Manage responses to inclement	2 10	1.62	0.15	2 08	0.70	0 1 1	6.26	2 10%
weather conditions/issues	2.10	1.05	0.15	2.08	0.79	0.11	0.20	2.40%
Respond to tenant	2 70	1.62	0.15	2 3 2	0.67	0 10	7 11	2 85%
requests/issues	2.75	1.02	0.15	2.32	0.07	0.10	7.44	2.03/0
Conduct equipment checks	2.44	1.64	0.15	2.27	0.70	0.10	6.97	2.67%
Conduct daily rounds	2.47	1.85	0.16	2.07	0.83	0.11	6.61	2.53%
Coordinate facility operations	2 77	1 75	0.15	2 27	0.70	0 10	7 30	2 80%
(normal)	2.77	1.75	0.15	2.27	0.70	0.10	7.50	2.0070
Coordinate facility operations	2 27	1 71	0.15	2 23	0.83	0 1 1	6 72	2 58%
(other than normal)	2.27	1.71	0.15	2.25	0.85	0.11	0.72	2.30%
Manage the work order process	2.19	1.48	0.14	2.03	0.72	0.10	6.25	2.39%
Investigate indoor	2 00	1.62	0.15	2 21	0.83	0 1 1	6 4 2	2 16%
environmental quality	2.00	1.02	0.15	2.21	0.85	0.11	0.42	2.4070
Conduct tenant relations	1 73	1 58	0.15	1 70	0.90	0 11	5 13	1 97%
activities	1.75	1.50	0.15	1.70	0.50	0.11	5.15	1.5770
Manage consumables	1.74	1.55	0.15	1.41	0.85	0.11	4.56	1.75%
Manage outside facility	2 1 2	1 56	0.15	1 93	0.83	0 1 1	5 98	2 29%
contractors/service providers	2.12	1.50	0.15	1.55	0.05	0.11	5.50	2.2370
Manage environmental	1 88	1.62	0.15	2 03	0.73	0 10	5 93	2 27%
requirements (permits, etc.)	1.00	1.02	0.15	2.05	0.75	0.10	5.55	2.2770
Implement an energy	2 3/	1 5 7	0.15	2 3 7	0.78	0 10	7 07	2 71%
management program	2.34	1.57	0.15	2.57	0.70	0.10	7.07	2.71/0
Maintain the facility and	2 22	1 5 8	0 15	2 65	0 56	0 00	8.62	3 30%
systems	5.55	1.50	0.15	2.05	0.50	0.03	0.02	5.50%
Conduct facility repair activities	2.82	1.70	0.15	2.44	0.73	0.10	7.70	2.95%
Optimizing the Facility								

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Duties and Tasks	Frequency		Importance			Combined	Overall	
	Means	SD	SEM	Means	SD	SEM	Ratings	Weights
Conduct measurement and verification activities	2.00	1.45	0.14	2.00	0.81	0.11	6.00	2.30%
Analyze system performance	2.42	1.51	0.14	2.28	0.72	0.10	6.98	2.67%
Identify cost saving measures	2.45	1.46	0.14	2.37	0.74	0.10	7.18	2.75%
Respond to changing energy costs	1.93	1.54	0.14	1.87	0.86	0.11	5.68	2.18%
Optimize system performance	2.53	1.57	0.15	2.45	0.73	0.10	7.43	2.85%
Identify sustainability opportunities	2.03	1.53	0.14	1.86	0.96	0.12	5.75	2.20%
Conducting Budgeting Activities								
Contribute to long term facility budget plan (5 years)	2.00	1.56	0.15	2.17	0.71	0.10	6.33	2.43%
Contribute to facility operations budget	2.57	1.70	0.15	2.49	0.60	0.09	7.54	2.89%
Contribute to capital improvement budget(s)	2.19	1.53	0.14	2.28	0.75	0.10	6.74	2.58%
							261.08	100.00%

Building Operations Professional Examination Blueprint

Respondents were asked to provide a holistic weighting to the domain areas. Based on the responses, an examination blueprint was calculated for each domain. This information appears in Table B10 following.

Table B10 - Summary of Respondent Holistic Ratings

Domain	%
Managing Human Resources	14.15%
Conduct Planning Activities	15.13%
Operating Buildings	40.00%
Optimizing the Facility	20.85%
Conducting Budgeting Activities	10.94%

The SME Committee was asked to consider the tabulated frequency and importance scales together with the holistic ratings to arrive at a final examination blueprint for the Energy Manager Examination Scheme. Table B11 following depicts the final agreed-upon examination blueprint.

WeightsWeightsWeightItemsManaging Human Resources9%14%8%10Develop workload analyses2%1%1Analyze staffing productivity2%2%3Supervise building staff3%4%5Secure outside service providers2%1%1Update procedures (SOPs, BOPs, operating plans, emergency plans, etc.)2%2%2Develop pained maintenance schedules3%3%4Contribute to construction standards and guidelines2%2%2Contribute to capital renewal plans2%2%2Operating Buildings55%40%50%59Perform workplace hazard assessments2%2%2Operating Buildings2%2%33Manage the PE program2%2%22Manage the PE program2%2%22Manage the PE program2%2%22Manage the PE program2%2%22Conduct occupant training2%2%22Conduct equipment checks3%2%22Conduct enalt (conduct occupant training2%2%22Conduct enalt (conduct occupant training2%2%22Conduct equipment checks3%2%222Conduct enalt (conduct occupant training2%2%222Conduct enalt (co	Dutios and Tasks	Analytical	Holistic	Final	Final
Managing Human Resources9%14%8%10Develop workload analyses2%1%1Analyze staffing productivity2%2%3Supervise building staff3%4%5Secure outside service providers2%1%1Conducting Planning Activities13%15%18Update procedures (SOPs, BOPs, operating plans, emergency plans, etc.)2%2%2Develop equipment operations plans2%2%2Contribute to construction standards and guidelines2%2%2Contribute to capital renewal plans2%2%2Operating Buildings55%40%50%59Perform workplace hazard assessments2%2%3Participate in emergency drills2%2%2Manage the PPE program2%2%2Manage third party inspections2%2%2Conduct risk management activities2%2%2Manage third party inspections2%2%2Conduct risk management activities2%2%2Conduct risk management activities2%2%2Conduct risk management activities2%2%2Conduct risk management activities2%2%2Coordinate facility operations (normal)3%2%2Conduct risk management activities2%2%2Conduct risk management activities2%2%2		Weights	Weights	Weight	Items
Develop workload analyses2%1%1Analyze staffing productivity2%2%3Supervise building staff3%4%5Secure outside service providers2%11%1Conducting Planning Activities13%15%15%18Update procedures (SOPs, BOPs, operating plans, emergency plans, etc.)2%2%2Develop equipment operations plans2%2%2Develop equipment operations standards and guidelines2%2%2Contribute to construction standards and guidelines2%2%2Conduct data management activities2%2%2%2Operating Buildings55%40%50%59Perform workplace hazard assessments2%2%23Manage the PPE program2%2%22Coordinate/conduct occupant training2%2%22Conduct risk management activities2%2%22Conduct risk management activities3%2%22 <td< td=""><td>Managing Human Resources</td><td>9%</td><td>14%</td><td>8%</td><td>10</td></td<>	Managing Human Resources	9%	14%	8%	10
Analyze staffing productivity2%2%3Supervise building staff3%4%5Secure outside service providers2%1%1Conducting Planning Activities13%15%15%18Update procedures (SOPs, BOPs, operating plans, emergency plans, etc.)2%2%2Develop quipment operations plans2%2%2Develop planned maintenance schedules3%3%4Contribute to construction standards and guidelines2%2%2Contribute to capital renewal plans2%2%2Operating Buildings55%40%50%59Perform workplace hazard assessments2%2%3Manage the PPE program2%2%2%3Manage third party inspections2%2%22Manage building securities2%2%22Conduct risk management activities2%2%22Manage third party inspections2%2%22Manage building securities2%2%22Conduct risk management activities2%2%22Conduct risk management activities2%2%22Manage third party inspections3%2%22Conduct risk management activities2%2%22Conduct risk management activities2%2%22Conduct risk management activities3%<	Develop workload analyses	2%		1%	1
Supervise building staff3%4%5Secure outside service providers2%1%1Conducting Planning Activities13%15%15%18Update procedures (SOPs, BOPs, operating plans, emergency plans, etc.)2%2%2Develop equipment operations plans2%2%2Develop planned maintenance schedules3%3%4Contribute to construction standards and guidelines2%2%2Conduct data management activities2%2%2Operating Buildings55%40%50%59Perform workplace hazard assessments2%2%2Participate in emergency drills2%2%2Manage third party inspections2%2%2Manage building emergencies3%2%2Coordinate/conduct occupant training2%2%2Conduct risk management activities2%2%2Conduct risk management activities2%2%2Conduct daily rounds3%2%2Conduct equipment checks3%2%2Conduct equipment checks3%2%2Conduct adily operations (normal)3%2%2Coordinate facility operations (other than normal)3%2%2Manage the work order process2%2%3Investigate indoor environmental quality2%2%3Manage consumables2%2%2%2 </td <td>Analyze staffing productivity</td> <td>2%</td> <td></td> <td>2%</td> <td>3</td>	Analyze staffing productivity	2%		2%	3
Secure outside service providers2%1%1Conducting Planning Activities13%15%15%18Update procedures (SOPs, BOPs, operating plans, emergency plans, etc.)2%2%2Develop equipment operations plans2%2%2Develop planned maintenance schedules3%3%4Contribute to construction standards and guidelines2%2%2Contribute to capital renewal plans2%2%2Operating Buildings55%40%50%59Perform workplace hazard assessments2%2%3Participate in emergency drills2%2%2Manage the PPE program2%2%2Coordinate from gran2%2%2Manage thilding emergencies3%2%2Coordinate/conduct occupant training2%2%2Coordinate/conduct occupant training2%2%2Conduct risk management activities2%2%2Conduct daily rounds3%2%22Conduct daily rounds3%2%22Conduct daily rounds3%2%22Conduct facility operations (other than normal)3%2%2Manage the work order process2%2%3Manage the operations (other than normal)3%2%2Conduct facility operations (other than normal)3%2%2Manage the work order proc	Supervise building staff	3%		4%	5
Conducting Planning Activities13%15%18Update procedures (SOPs, BOPs, operating plans, emergency plans, etc.)2%3%4Develop equipment operations plans2%2%2Develop planned maintenance schedules3%3%4Contribute to construction standards and guidelines2%2%2Contribute to capital renewal plans2%2%2%2Conduct data management activities2%2%2%2Operating Buildings55%40%50%59Perform workplace hazard assessments2%2%3Participate in emergency drills2%2%3Manage the PPE program2%2%2Respond to building emergencies3%2%2Conduct risk management activities2%2%2Conduct risk management activities2%2%2Conduct risk management activities2%2%2Conduct risk management activities2%2%2Conduct ality rounds3%2%2Conduct ality operations (normal)3%2%2Coordinate facility operations (other than normal)3%2%2Manage the work order process2%2%2Conduct tails rounds3%2%2Conduct ality contractors/service providers2%2%2Manage environmental requirements (permits, etc.)2%2%2Manage ous	Secure outside service providers	2%		1%	1
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plans, emergency plans, etc.)2%3%4Develop equipment operations plans2%2%2Develop planned maintenance schedules3%3%4Contribute to construction standards and guidelines2%2%2Contribute to capital renewal plans2%2%2%Qperating Buildings2%2%2%2Operating Buildings55%40%50%59Perform workplace hazard assessments2%2%3Participate in emergency drills2%2%3Manage the PPE program2%2%2Manage third party inspections2%2%2Conduct risk management activities2%2%2Conduct occupant training2%2%2Conditions/issues2%2%2Manage responses to inclement weather conditions/issues2%2%2Coordinate facility operations (normal)3%2%2Coordinate facility operations (normal)3%2%2Coordinate facility operations (other than normal)3%2%2Manage the work order process2%2%3Investigate indoor environmental quality2%2%2Manage consumables2%2%2Manage environmental requirements (permits, erwiders2%2%2Manage environmental requirements (permits, erwiders2%2%2Manage environmental requirements (permi	Update procedures (SOPs, BOPs, operating	20/		2.0/	4
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	linglement on operations and program	20/		20/	Л
Maintain the facility and systems 2% 2% 4	Maintain the facility and systems	3%		20/	4 1

Table B11 - Final Proposed Examination Blueprint

This report is available at no cost from the National Institute of Building Sciences Commercial Workforce Credentialing Council at www.nibs.org/cwcc

Duties and Tasks	Analytical Weights	Holistic Weights	Final Weight	Final Items
Conduct facility repair activities	3%		2%	3
Optimizing the Facility	15%	21%	20%	24
Conduct measurement and verification activities	2%		3%	4
Analyze system performance	3%		4%	5
Identify cost saving measures	3%		3%	3
Respond to changing energy costs	2%		3%	3
Optimize system performance	3%		5%	6
Identify sustainability opportunities	2%		2%	3
Conducting Budgeting Activities	8%	10%	7%	8
Contribute to long term facility budget plan (5 years)	2%		2%	2
Contribute to facility operations budget	3%		3%	4
Contribute to capital improvement budget(s)	3%		2%	2
	100%	100%	100%	120

Tasks or Knowledge Missing

Survey respondents were asked if they felt there were any tasks or knowledge missing from the JTA. The Expert panel reviewed all of the comments and determined that no content was missing from the JTA.

Building Operations Professional Conclusions and Next Steps

The job analysis is the first step in the test development process, serving as the primary source of evidence for validity of the examination. The final DACUM JTA is now validated and may be used by training organizations to develop training programs and by a certification body or scheme committee to develop a certification scheme. The final Building Operations Professional JTA is available from the Commercial Workforce Credentialing Council at www.nibs.og/cwcc.

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