

Maintenance Trades Staffing Guidelines

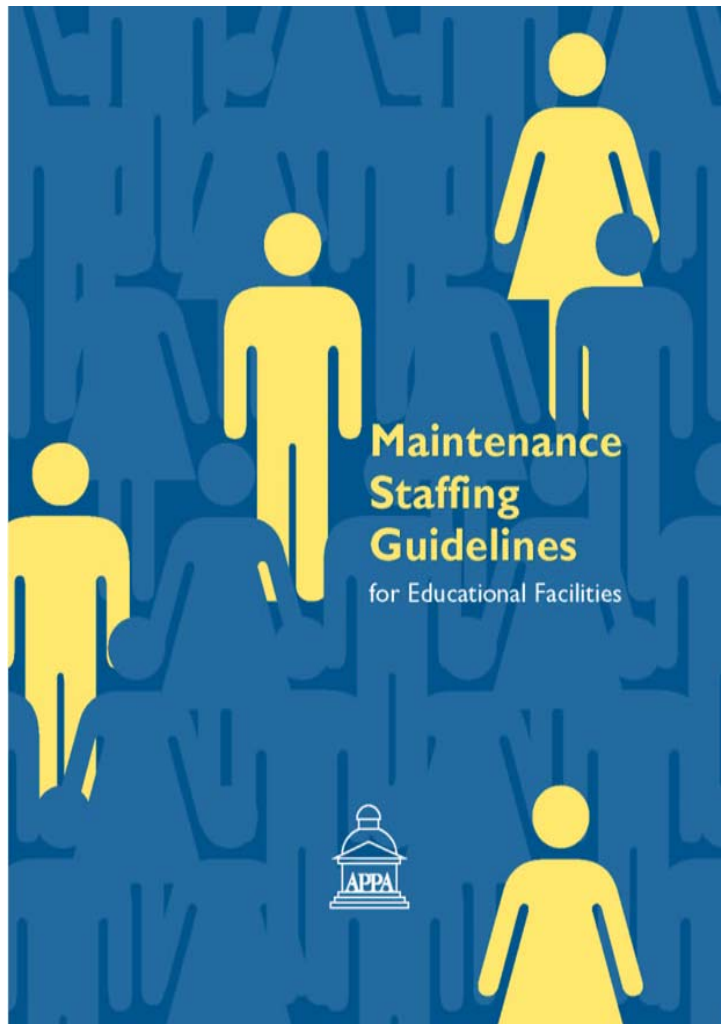
MAPPA 2004

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“Maintenance Trades and Staffing Guidelines”



Current Trends

- Justification of plant budgets
- Maintenance vs. chargeable projects
- Productivity of labor
- Measurement of results

Key Considerations

- Common vocabulary
- Recognition of institutional/business environment
- Prioritization of trade activities
- Establish accountability
- Recognize the total cost of ownership (TCO)

Maintenance Types

- Level I Preventive Maintenance
 - Inspections
- Level II Preventive Maintenance
 - Adjustment, testing, invasive
- Level III Schedule Maintenance
 - Overhaul, and up to 50% components

Other Maintenance Activities

- UPM – Unplanned Maintenance
- Training – Professional Development
- Good Will – Customer discretionary work
- Overhead

Staffing Models

- Detailed peer benchmarks
- Supply side determination
- Demand side determination
- Zero-based build up

Peer Benchmarking

- APPA is a starting point
- Data collection is difficult
 - Data forms
 - Lack of urgency
 - Accuracy
- Both sides of the equation
 - Service standards
 - Physical plant uniqueness

Supply-side Staffing

- There is never enough money
 - Fund based accounting
- Delineation of “core” services
- Education of consequences
- Service levels becomes key
 - Fire hose approach vs. targeted
- Measurement is difficult

Demand Side Determination

- Perceived work load
 - Supervisors and trades
- Actual recorded load (CMMS)
 - Work orders and annual reports
- Rationalization of load
 - Core vs. non-core
 - Productivity

Zero-based Model

- Shifts discussion from data to solution
- Built-in prioritization
 - Business rules
 - “Mason-jar” effect
- Establishes program
 - Actual maintenance activities
- Ultimate accountability

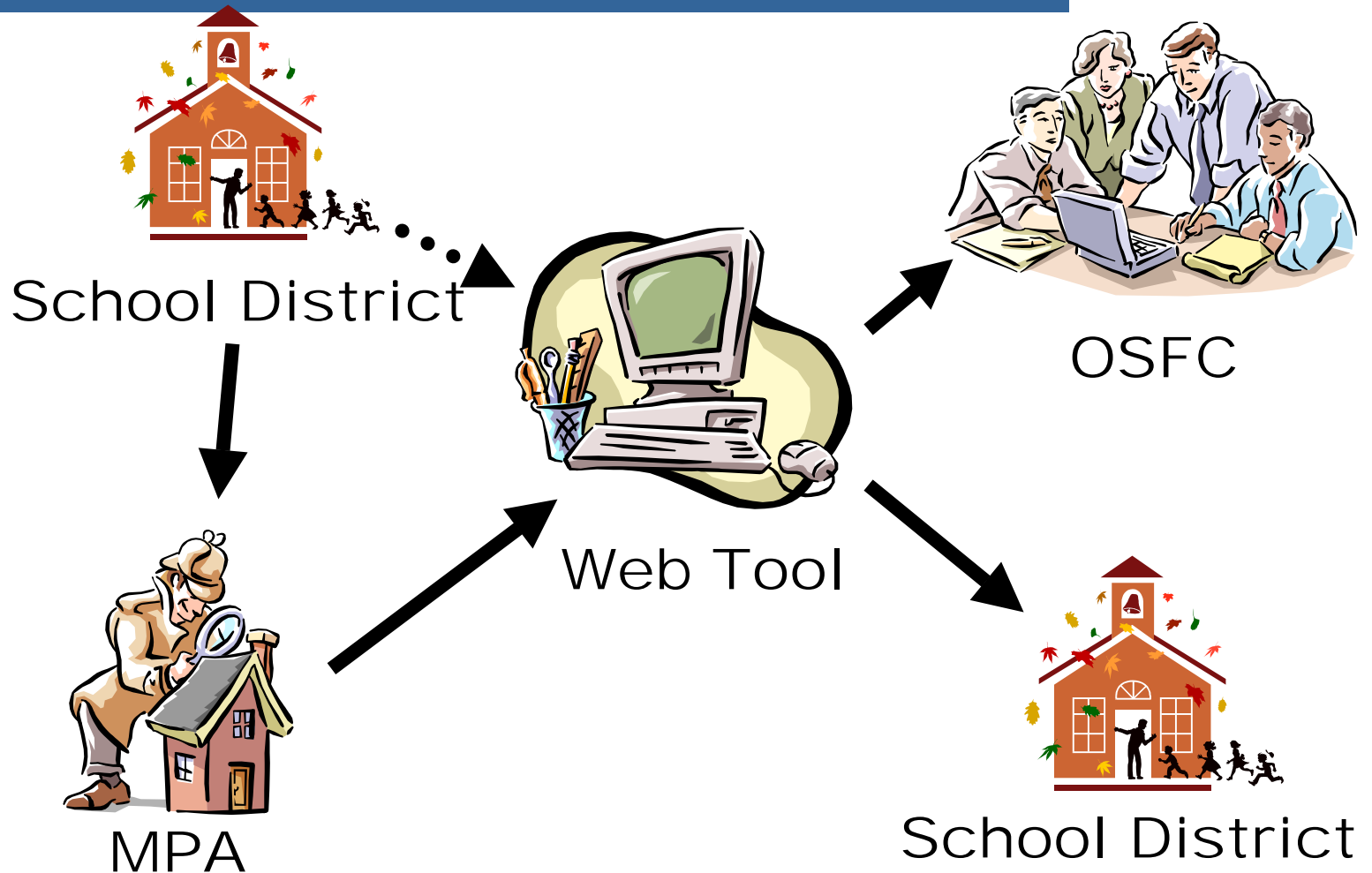
Staff Resource Management

- Trade resource match-up with proper work scope
- Fencing of resources
 - Budgetary
 - Organizational
- Professional Development
 - 2% allocation
 - Organized program

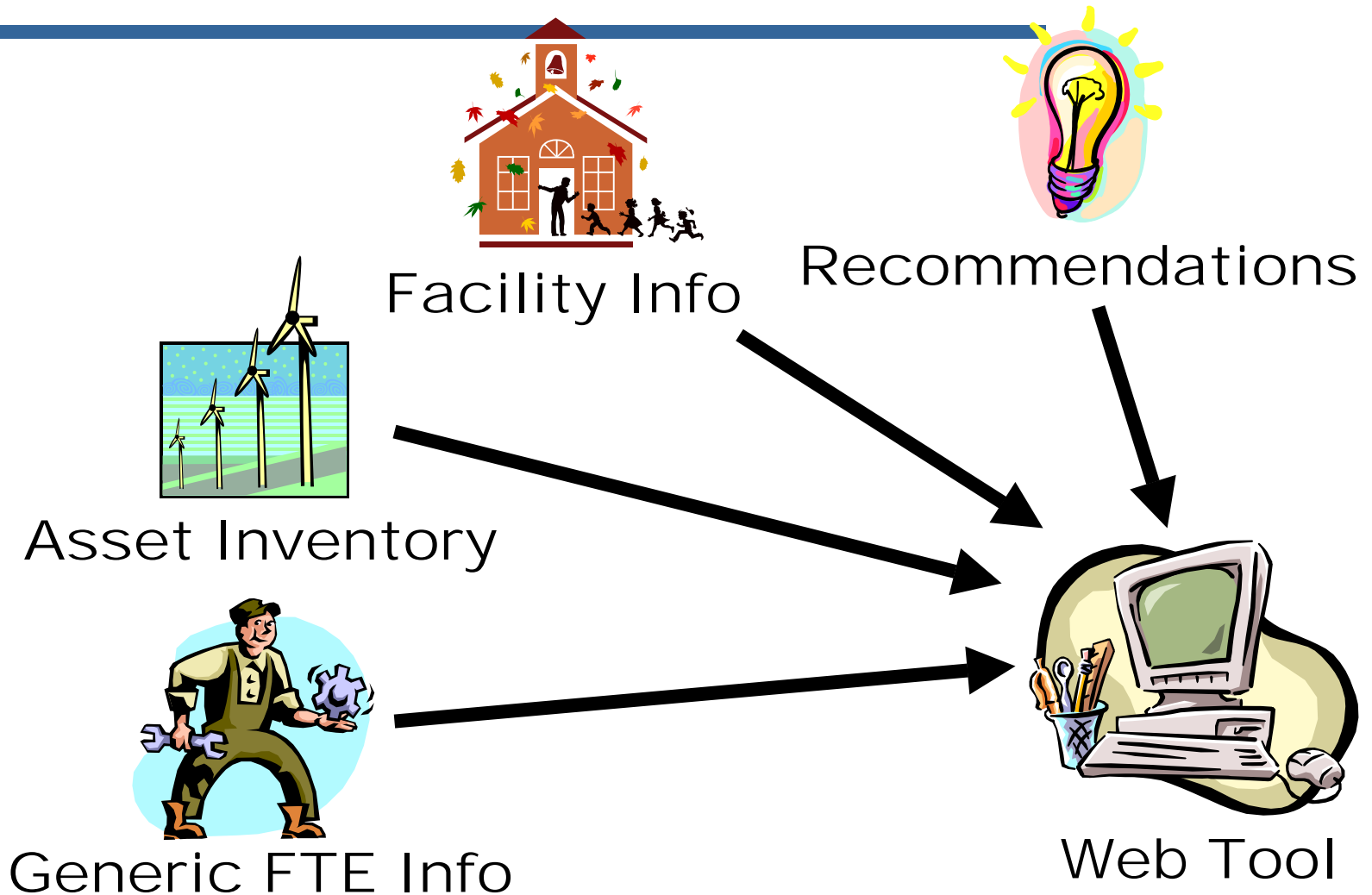
Case Study

- Ohio School Facilities Commission
 - Supreme Court Decision on equity
 - Result; \$26 Billion in const./renov.
 - % set aside for maintenance
 - Unbiased, factual maintenance budgets and activities

OSFC - The Concept



Data Gathered



Results Provided



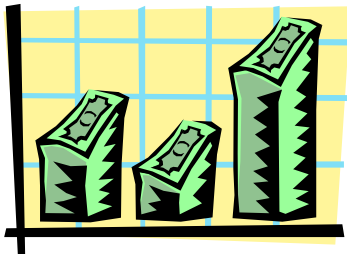
Web Tool



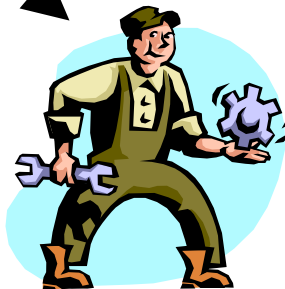
Startup Costs



Maintenance Steps



Cost of Stewardship



FTE's Required



Maintenance Schedule

Cost Summary Matrix

Maintenance Worksheet										
<i>Category Summary Costs</i>										
Building area:		188,664 sq. ft.								
Category	Preventive Maintenance		Unplanned Repair		Planned Repair		Total Maintenance		Capital Renewal	
	Cost	\$/ft ²	Cost	\$/ft ²	Cost	\$/ft ²	Cost	\$/ft ²	Cost	\$/ft ²
<u>Life/Fire Safety</u>	\$12,127.23	\$0.06	\$3,031.81	\$0.02	\$4,286.53	\$0.02	\$19,445.57	\$0.10	\$0.00	\$0.00
<u>ADA/Elevators/Lifts</u>	\$6,292.94	\$0.03	\$1,573.24	\$0.01	\$5,065.98	\$0.03	\$12,932.16	\$0.07	\$0.00	\$0.00
<u>HVAC Systems</u>	\$16,034.90	\$0.08	\$8,658.85	\$0.05	\$23,822.09	\$0.13	\$48,515.83	\$0.26	\$18,440.00	\$0.10
<u>Building Envelope</u>	\$10,433.22	\$0.06	\$5,425.27	\$0.03	\$33,795.87	\$0.18	\$49,654.37	\$0.26	\$0.00	\$0.00
<u>Plumbing</u>	\$17,940.88	\$0.10	\$11,302.76	\$0.06	\$13,766.59	\$0.07	\$43,010.23	\$0.23	\$0.00	\$0.00
<u>Electrical</u>	\$6,040.71	\$0.03	\$2,839.14	\$0.02	\$73,333.59	\$0.39	\$82,213.44	\$0.44	\$0.00	\$0.00
<u>Misc. Equipment</u>	\$10,092.00	\$0.05	\$5,046.00	\$0.03	\$0.00	\$0.00	\$15,138.00	\$0.08	\$0.00	\$0.00
<u>Interiors</u>	\$6,327.66	\$0.03	\$3,290.39	\$0.02	\$76,628.60	\$0.41	\$86,246.65	\$0.46	\$0.00	\$0.00
<u>Site</u>	\$1,002.00	\$0.01	\$521.04	\$0.00	\$63,303.71	\$0.34	\$64,826.75	\$0.34	\$0.00	\$0.00
<u>Structure/Support</u>	\$623.50	\$0.00	\$374.10	\$0.00	\$0.00	\$0.00	\$997.60	\$0.01	\$0.00	\$0.00
<u>Kitchen Equipment</u>	\$3,986.73	\$0.02	\$1,993.37	\$0.01	\$0.00	\$0.00	\$5,980.10	\$0.03	\$15,746.67	\$0.08
Total	\$90,901.79	\$0.48	\$44,055.95	\$0.23	\$294,002.97	\$1.56	\$428,960.70	\$2.27	\$34,186.67	\$0.18

System Type Summary Costs for New K-12 FMR in Adena Local School District of Ross County

Home	MBP Outline	Report Information	Facility Information	Cost Summary Matrix		FMR Submissions
Labor	Expendables	Setup Items	Warranties	Reports	SMPA Evaluations	

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Read-only access granted for this FMR.

New K-12 FMR

Life/Fire Safety

Select a System Type

Life/Fire Safety						
<i>Systems and Cost Details</i>						
System	Preventive Maintenance Costs	Unplanned Repair Costs	Planned Repair	Total	Capital Renewal	
General	\$10,837.25	\$2,709.31	\$4,081.07	\$17,627.63	\$0.00	
Kitchen and Lab	\$1,288.88	\$322.22	\$205.47	\$1,816.57	\$0.00	
Emergency Eyewash/Shower	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
Fire Extinguisher	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
Total	\$12,126.13	\$3,031.53	\$4,286.53	\$19,444.20	\$0.00	

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Designed and Developed for The Ohio School Facilities Commission by

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Please click on or as close to the problem page as possible!

New K-12 FMR
Life/Fire Safety : Kitchen and Lab
 Select a Component from the left, or request a new one

Life/Fire Safety
Kitchen and Lab
Components and Cost Details

Component				Preventive Maintenance Costs			Unplanned Repair Costs		Planned Repair	Total Maintenance	Capital Renewal
Name	Quantity	Units	Size	Hours	Material	Annual Cost	Material	Labor	Annualized Cost		Annualized Cost
<u>Kitchen Hood</u>	2	each	unit	41.72	\$79.00	\$1,288.88			\$205.47	\$1,494.35	\$0.00
<u>Lab Hood</u>	0	each	unit	0	\$0.00	\$0.00			\$0.00	\$0.00	\$0.00
Totals				41.72	\$79.00		\$19.75	\$302.47			

Preventive Maintenance Total	\$1,288.88
Unplanned Repair Total	\$322.22
Planned Repair Total	\$205.47
Total Maintenance Expense	\$1,816.57
Capital Renewal Total	\$0.00

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Asset Activities for New K-12 FMR in Adena Local School District of Ross County

Home	MBP Outline	Report Information	Facility Information	Cost Summary Matrix		FMR Submissions
Labor	Expendables	Setup Items	Warranties	Reports	SMPA Evaluations	

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Category
Life/Fire Safety
System Type
Kitchen and Lab
Component
Kitchen Hood
Asset
HOOD-1

Read-only access granted for this FMR.

New K-12 FMR

Kitchen Hood

Preventive Maintenance

Activity	Man-Hours	Frequency	Asset Quantity (each)	Annual Labor Cost	Annual Material Cost
Inspection	1.49	every month	2	\$1,037.04	\$39.50

SPECIAL INSTRUCTIONS:

In general, it is recommended that the servicing of these systems be entrusted to representatives of fire extinguishing installation companies. The work required by this procedure may cause the activation of an alarm and/or a supervisory signal. **The field office manager and control center or fire department that will receive the alarm or signal must be notified prior to start of work.** When replacement cylinders are received from supplier, check that hydrostatic test date is current.

STEPS:

1. Check each cylinder for the date of the last hydrostatic test (all dates are stamped on cylinder).
2. Replace those cylinders for which the elapsed time exceeds:
 - a. Carbon dioxide - 12 years
 - b. Halon - 20 years
 - c. Dry Chemical - 12 years
3. Weigh or check pressure on remaining cylinders. Replace if:
 - a. Carbon dioxide - weight loss is 10% or greater.
 - b. Halon - weight loss is 5% or greater or if pressure loss (adjusted for temperature)

- b. Flamm - weight loss is 5% or greater or if pressure loss (adjusted for temperature) is 10% or greater.
- c. Dry Chemical - weight loss in gas expellant cylinder exceeds acceptable limit on system (or the cylinder) or if pressure gauge indicates "inoperable" range.
- 4. Check the entire piping system (including cylinders) for leaks, obstructions, physical damage, and proper support. Examine all nozzles to insure they are properly positioned, clean, and not clogged. Replace or repair as necessary. Replace seals on all systems. For dry chemical systems, check dry chemicals in storage container(s) to be sure they are free flowing and without lumps (this does not apply to stored pressure systems). Replace old chemical agent every 12 years or earlier if necessary by annual inspection. Replace all fusible alloy type fixed temperature elements (fusible links).
- 5. For all systems, test (and clean if necessary) all mechanical, manual, and automatic detection equipment and actuating devices according to manufacturer's instructions. Replace or repair those yielding unsatisfactory performance.
- 6. For all systems, test ("dry run" trip test) the system in accordance with the manufacturer's instructions.
- 7. Check for proper operation of all alarms and signals at the fire alarm control panel.
- 8. Restore system to "ready" status and record data on system tag.

Inspection	1.49	every half-year	2	\$172.84	\$39.50
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STEPS:

- 1. Check and clean grease off of duct interiors at connections to the hood.
- 2. Check and clean grease from duct interiors at access panels.
- 3. Check access panels for tight seal to prevent air leaks and for grease leaks. Clean, repair, and tighten seals as required.
- 4. Check and clean grease from all visible and accessible duct seams or joints.
- 5. Check hood exhaust fans for grease including exterior surfaces, fan housing, blades and protective grills or screens. Clean as required.
- 6. Check and clean building surfaces at the discharge end of the exhaust duct or exhaust fan housing.
- 7. Remove grease from interior surfaces of exhaust system ducts, including but not limited to horizontal and vertical shafts, fan and fan housing, and fan motor exterior (fan motor interior excluded).

Planned Repair

5. Check hood exhaust fans for grease including exterior surfaces, fan housing, blades and protective grills or screens. Clean as required.
6. Check and clean building surfaces at the discharge end of the exhaust duct or exhaust fan housing.
7. Remove grease from interior surfaces of exhaust system ducts, including but not limited to horizontal and vertical shafts, fan and fan housing, and fan motor exterior (fan motor interior excluded).

Planned Repair

Activity	Man-Hours	Frequency	Cost	Asset Quantity (each)	Annual Labor Cost	Annualized Cost
Replace Kitchen Fire Hood	2.667	every 10 years	\$950.00	2	\$15.47	\$190.00

STEPS:

1. Lockout and Tagout disconnect.
2. Remove existing Fan unit.
3. Install new Fan unit.
4. Check rotation.
5. Return system to normal.

Capital Renewal

Activity	Frequency	Cost	Asset Quantity (each)	Annualized Cost
Replacement of HOOD-1	every 10 years	\$0.00	2	\$0.00

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Full-Time Employees

Category	Direct Labor	Direct Overhead	G & A	Profit %	Total %	Total Rate
Life/Fire Safety	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00
ADA/Elevators/Lifts	\$38.50	33.3%	244.6%	15.0%	292.9%	\$151.28
HVAC Systems	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00
Building Envelope	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00
Plumbing	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00
Electrical	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00
Misc. Equipment	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00
Interiors	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00
Site	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00
Structure/Support	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00
Kitchen Equipment	\$15.00	33.3%	60.0%	0.0%	93.3%	\$29.00

Labor Factors	
<i>based on a 2,080 man-hour year</i>	Hours
Holiday / Vacation / Sick	—
Training	—
Administrative	—
Other	—
Total Actual Work Hours per FTE	2,080

Zero-Based Labor Estimate			
	Hours	Right-sourced Hours	FTEs
Preventive Maintenance	2,203	—	1.1
Unplanned Repair	1,061	—	0.5
Planned Repair	1,406	—	0.7
Total	4,671	0	2.2

Emerson College – Case Study

■ Issues

- Changing from predominately re-used brownstones in the Backbay area to mid-rise office buildings, both old and new.
- Review right-sourcing mix.

■ Features

- High customer service focus on preventive maintenance/delivery

ZBB

#	Building	Toilets	Urinals	Sinks	Show ers	Tubs	Slop Sinks	Other				
								Drinking Fountains	Water Heaters	Fire Sprinklers (per ksf)	Backflow Preventer	Grease Traps
1	180 Tremont	56	14	56			9	14	1	97	1	
2	216 Tremont	30	8	24			7	9	1	45	1	
3	219 Tremont	30	15	20			2	15	1	25	1	
4	10 Boylston (PPC)	48	11	70	10		16		20	78	1	
5	80 Boylston	161	36	163	132	12	22	12	1	217	1	4
6	120 Boylston	42	5	31			4	10	20	172	1	
7	Piano Row	-	-	-	-	-	-					
8	420 Boylston	-	-	-	-	-	-					
9	6 Arlington	19	0	18	15	3	2	10	1	37	1	1
10	132-134 Beacon	19	0	19	13	5	3	4	1	19	1	
11	126-130 Beacon											
12	100 Beacon	38	0	40	31	6	10	10	1	44	1	
13	96 Beacon	6	4	7			1	4	1	15	1	
14	67-69 Brimmer											
15	647A Summer St											
	Totals	449	93	448	201	26	76	88	48	749	10	5

ZBB

Operable Windows and Doors						Other
#	Building	Est. Doors	Stair Doors	Roll-up Doors	Est. Oper. Windows	Roof Inspections (sf)
1	180 Tremont	1,030	28	0	0	6,929.93
2	216 Tremont	190	18	0	288	5,043.11
3	219 Tremont	110	25	1	0	12,743.50
4	10 Boylston (PPC)	330	20	3	0	7,800.00
5	80 Boylston	1,400	48	1	1,200	18,073.08
6	120 Boylston	720	20	1	750	21,476.75
7	Piano Row	960	28	1	500	13,214.29
8	420 Boylston					
9	<i>6 Arlington/0 Marlborough</i>	200	20	0	150	3,748.30
10	<i>132-134 Beacon</i>	100	8	0	100	4,776.50
11	126-130 Beacon					
12	<i>100 Beacon</i>	270	20	0	150	4,416.50
13	<i>96 Beacon</i>	80	8	0	50	3,819.00
14	69 Brimmer					
15	647A Summer St.					
	Totals	5390	243	7	3188	102,040.96

ZBB

Elevatory Inventory				
		Elevators		
#	Building	Passenger	Freight/ Service	Lifts
1	180 Tremont	3		1
2	216 Tremont	2		1
3	219 Tremont			
4	10 Boylston (PPC)			
5	80 Boylston	6	2	1
6	120 Boylston	3	1	
7	Piano Row			
8	420 Boylston			
	<i>6 Arlington/O</i>			
9	<i>Marlborough</i>	1	1	
10	<i>132-134 Beacon</i>	1		
11	<i>126-130 Beacon</i>			
12	<i>100 Beacon</i>	1	1	
13	<i>96 Beacon</i>	1		
14	69 Brimmer			
15	647A Summer St.			
			26	

The Build-up Process

- Straight square foot modeling isn't accurate enough
- Whitestone has models but they don't fit all buildings or cases
- Solution is a hybrid of model and detailed survey

Whitestone Data

B2010	Clay Brick, Exterior, 1st Fl	CBE1	Clean & Reseal Clay Brick Exterior	SF
B2010	Clay Brick, Exterior, 2nd Fl	CBE2	Clean & Reseal Clay Brick Exterior	SF
B2010	Clay Brick, Exterior, 3rd Fl	CBE3	Clean & Reseal Clay Brick Exterior	SF

Whitestone data (cont.)

Clay Brick, Exterior, 1st Fl	0.032	0.27	10
Clay Brick, Exterior, 2nd Fl	0.0408	0.27	10
Clay Brick, Exterior, 3rd Fl	0.0496	0.27	10

Modeling steps

- Utilize Whitestone model (1 of 50)
- Scale (up or down) to match building
- Adjust modeled quantities against known quantities
- Re-compute labor hours and materials

Some next steps

- Predictive measures
- Value engineering
- Total Cost of Ownership
- Benchmarking

Questions

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