

# MICHAUD engineering

*Professional Engineering Services to Help You Make Better Decisions*



## **Maintenance Consulting Solutions:**

*Most building owners and managers intuitively understand that maintenance is necessary, but may not have the time or experience to develop, deploy, and manage an effective maintenance program. Whether your facility has a Computerized Maintenance Management (CMMS) system in place or you operate on a break – fix mode, Michaud Engineering can help you get the most out of your maintenance dollars.*

- Analysis of your buildings and their equipment
- Development of a comprehensive maintenance program with preventive maintenance tasks
- Development of a Reliability Centered Maintenance (RCM) program for your facility
- Assistance in deployment of a CMMS or integration of PM plans into an existing system
- Ongoing support to improve the effectiveness of the maintenance program



## **Building Inspection and Condition Assessment Services:**

*Whether you need a building inspection as part of a real estate transaction or to better understand your maintenance and capital improvement needs, you need the professional experience of Michaud Engineering to provide you with the detailed analysis needed to make the best decisions for your buildings.*

- Michaud Engineering is a member of the National Academy of Building Inspection Engineers (NABIE), the only inspection organization that requires its member to be licensed Professional Engineers.
- Inspections provide detailed information about all building systems and include photographs and narrative reports, not simple checklists of findings.
- Condition assessments of buildings allow owners to better understand the current state of their building systems and projected costs for upcoming capital investments such as major systems replacements.
- Reports provide owners and managers with a better understanding of the total cost of ownership.



## **General Consulting / Project Management Services:**

*Many building owners lack the time or the experience to effectively manage their building services contractors. Michaud Engineering can provide that experience and take the time to work with contractors and ensure that their services and performance meet your needs*

- Develop clear scopes of work and / or review of your sub-contractor agreements with service providers.
- Interface with the sub-contractors to ensure that your needs are implemented and feedback necessary information received from the service providers.
- Conduct periodic surveys and inspections to evaluate the effectiveness of the sub-contractors.
- Provide project management services for construction, renovation or equipment replacement.
- Provide third party commissioning services for major renovations and equipment installations.



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## Helping You Get The Most Out of Your Building Maintenance Budget

### Are You Spending Too Much On Maintaining Your Buildings? How Do You Know?

There are always other business priorities that need funding, but deferring maintenance spending now almost always results in a higher repair cost later.

Efficient and effective maintenance spending is the best way to minimize the total cost of ownership of your buildings.

Michaud Engineering Inc. can help you by:

- Analyzing your current building systems and maintenance practices
- Using tools and principles such as Failure Mode and Effects Analysis (FMEA) and Reliability Centered Maintenance (RCM), develop a new, comprehensive maintenance strategy for addressing your specific needs
- Work with you to evaluate the subcontractor agreements and develop comprehensive scopes of work to help you better manage these agreements
- Provide follow up evaluation and management services to ensure the effectiveness of the maintenance program.

The screenshot shows an Excel spreadsheet titled 'Michaud Engineering - FMEA - Tulsa Tube Bending.xls'. The spreadsheet contains an FMEA table with columns for Component, Function, Failure Mode, Failure Effect, Severity, Occurrence, Detection, and Consequence. The table is color-coded by risk level: Red (High), Yellow (Medium), and Green (Low). A 'Default Action' column is also present. The table includes entries for 'Head Roller Cylinder' and 'Head Roller Electric Motor and Pump'.

| COMPONENT GROUP | COMPONENT | FUNCTION                            | FUNCTIONAL FAILURE                               | FAILURE MODE (Cause of Failure)  | FAILURE EFFECT                      | SEV | OCC | DET | CONSEQUENCE EVALUATION | Default Action | INITIAL INTERVA      | PERFORMED BY | RECOMMENDED ACTION  | Comments       |
|-----------------|-----------|-------------------------------------|--|----------------------------------|-------------------------------------|-----|-----|-----|------------------------|----------------|----------------------|--------------|---|----------------|
| 11              |           |                                     |  |                                  |                                     | 8   | 4   | 2   | 64                     | Y N N Y        | 1 / yr.              | Maintenance  | Periodic check of fluid level and fluid quality, hose integrity                         | 8 - 4 - 1 - 32 |
| 14              | Table     | Head Roller Cylinder                | Positions the bracket that the head roller is on | Fails to move                    | Broken hydraulic line               | 8   | 4   | 2   | 64                     | Y N N Y        | 1 / yr.              | Maintenance  | Periodic check for cracks, loose bolts, etc.  | 8 - 4 - 1 - 32 |
| 15              | Table     | Head Roller Cylinder                | Positions the bracket that the head roller is on | Fails to move                    | Broken connection                   | 8   | 4   | 2   | 64                     | Y N N Y        | 1 / yr.              | Maintenance  | Periodic check for cracks, loose bolts, etc.  | 8 - 4 - 1 - 32 |
| 16              | Table     | Head Roller Electric Motor and Pump | Pumps fluid to the head roller cylinder          | Stop pumping                     | Loss of electrical power / cut wire | 8   | 4   | 6   | 192                    | Y N N Y        | 1 / day              | Operations   | Inspect cord periodically & consider a rigid installed electrical connection.           | 8 - 3 - 1 - 24 |
| 17              | Table     | Head Roller Electric Motor and Pump | Pumps fluid to the head roller cylinder          | Does not develop enough pressure | Worn gears                          | 8   | 4   | 10  | 320                    | Y N N Y        | 1 / use (bi-monthly) | Operations   | Install gauge and tag to record data on pump. Test and record pressure before each use. | 8 - 4 - 1 - 32 |
| 18              | Table     | Head Roller Electric Motor and Pump | Open and close                                   | Arm does not                     | Insufficient oil                    | 6   | 4   | 2   | 48                     | Y N N Y        | 1 / week             | Maintenance  | Inspect oil level at sight glass  | 6 - 4 - 2 - 48 |

**Effective maintenance management doesn't happen by accident. Michaud Engineering Inc. can help you get the most of your maintenance budget.**



# MICHAUD engineering

## The Experienced Eye to Evaluate Your Buildings

### The First Step in Managing Your Buildings is Understanding What You Have.

Many times building assessments or inspections are done as part of a real estate transaction, and that is certainly a critical time to conduct one, but it isn't the only time. Understanding the condition and construction of your buildings and their support systems is the key to managing them well. If you haven't yet taken the time to do this, it may be your next step.

Michaud Engineering Inc. can help you by:

- Conducting thorough visual inspection of your buildings and their support systems
- Evaluate the overall condition of the buildings and their systems
- Identification of potential areas of concern, grandfathered code issues, and lifecycle observations to help you understand what building systems may need to be repaired or replaced with budgetary estimates if requested
- Provide you with a detailed inspection report in narrative format with photographs to illustrate the various components of interest and areas of concern

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Building Condition Evaluation  
Your Building  
Performed by: Robert S. Michaud, P.E.  
Michaud Engineering Incorporated  
February 10, 2018



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**1.1.4 - 2015 Asset Condition Summary** 10/7/2015

**What Do We Own?**

**Rainbow Federal Credit Union**  
201 Lincoln Street  
Lewiston, ME

**What is the Performance?**

Relative to Incorporated Threshold Cost Index

| Element  | PCI  |
|----------|------|
| Renew    | 2.18 |
| Maintain | 2.18 |
| Operate  | 0.00 |
| Replace  | 0.00 |
| Upgrade  | 0.00 |
| Repair   | 0.00 |
| Energy   | 0.00 |
| Water    | 0.00 |

5 Plan Years  
1000 Increase

**What is Our Condition?**

**Renew Performance**

A Performance Condition Index (PCI) measures the condition of an asset (system, building, the element, portfolio, etc) to perform to the level desired. The amount provides an indicator in \$/SF above or below the planned threshold. Above the threshold means the building is expensive relative to expected cost. PCI allows comparisons of the relative performance of buildings of different sizes, uses and costs.

| Other   | Renew | Cost  | Prod. Inage | Other | Total |
|---------|-------|-------|-------------|-------|-------|
| \$K     | 0     | 20    | 27          | 74    | 144   |
| CMV     | 0     | 268   | 16          | 124   | 344   |
| GC      | 0     | 128   | 278         | 898   | 1204  |
| Plan    | 308   | 208   | 308         | 208   | 208   |
| Differ. | -308  | -208  | -76         | 308   | 1204  |
| \$/SF   | 0.00  | -1.83 | 0.46        | 0.84  | 0.21  |

For the 201 Lincoln Street Building the PCI is 2.18 indicating a building in Fair condition at a planned spend rate of \$0 per year. The Performance Condition is \$2.18 per year higher than plan.

**Maintain Operation**

A Performance Condition Index (PCI) measures the condition of an asset (system, building, the element, portfolio, etc) to perform to the level desired. The amount provides an indicator in \$/SF above or below the planned threshold. Above the threshold means the building is expensive relative to expected cost. PCI allows comparisons of the relative performance of buildings of different sizes, uses and costs.

| Other   | Maintain | Cost | Prod. Inage | Other | Total |
|---------|----------|------|-------------|-------|-------|
| \$K     | 0        | 0    | 0           | 0     | 0     |
| CMV     | 0        | 318  | 98          | 124   | 344   |
| GC      | 0        | 0    | 0           | 0     | 0     |
| Plan    | 0        | 0    | 0           | 0     | 0     |
| Differ. | 0        | 0    | 0           | 0     | 0     |
| \$/SF   | 0        | 0    | 0           | 0     | 0     |

For the 201 Lincoln Street Building the PCI is 0K indicating a building in Good condition at a planned spend rate of \$0 per year. The Performance Condition is \$0 per year higher than plan.

**Maintenance Service**

A Performance Condition Index (PCI) measures the condition of an asset (system, building, the element, portfolio, etc) to perform to the level desired. The amount provides an indicator in \$/SF above or below the planned threshold. Above the threshold means the building is expensive relative to expected cost. PCI allows comparisons of the relative performance of buildings of different sizes, uses and costs.

| Other   | Maintain | Cost | Prod. Inage | Other | Total |
|---------|----------|------|-------------|-------|-------|
| \$K     | 0        | 0    | 0           | 0     | 0     |
| CMV     | 0        | 0    | 0           | 0     | 0     |
| GC      | 0        | 0    | 0           | 0     | 0     |
| Plan    | 0        | 0    | 0           | 0     | 0     |
| Differ. | 0        | 0    | 0           | 0     | 0     |
| \$/SF   | 0        | 0    | 0           | 0     | 0     |

**Control Resource Use**

A Performance Condition Index (PCI) measures the condition of an asset (system, building, the element, portfolio, etc) to perform to the level desired. The amount provides an indicator in \$/SF above or below the planned threshold. Above the threshold means the building is expensive relative to expected cost. PCI allows comparisons of the relative performance of buildings of different sizes, uses and costs.

| Other   | Maintain | Cost | Prod. Inage | Other | Total |
|---------|----------|------|-------------|-------|-------|
| \$K     | 0        | 0    | 0           | 0     | 0     |
| CMV     | 0        | 0    | 0           | 0     | 0     |
| GC      | 0        | 0    | 0           | 0     | 0     |
| Plan    | 0        | 0    | 0           | 0     | 0     |
| Differ. | 0        | 0    | 0           | 0     | 0     |
| \$/SF   | 0        | 0    | 0           | 0     | 0     |

**The operations & maintenance of your buildings starts with a thorough understanding of them. Michaud Engineering Inc. can better understand your buildings.**



# MICHAUD engineering

## Your Consulting Partner For Technical Expertise

The Engineering Resource You Need To Help You Make Well Informed Business Decisions. Many organizations don't have their own engineering department. Some have an engineering department, but lack the specific expertise to solve certain problems. Whatever your case may be, partnering with Michaud Engineering can be a cost effective way to address specific needs on a case by case basis.

Some of the advantages of hiring Michaud Engineering as a consultant include:

- Focused attention to a specific building, manufacturing or maintenance problem
- Contracts can be project or time specific, depending your needs
- Close integration with your on-site staff to find solutions that best meet your methods and processes
- Cost effectiveness as you contract for only the services you need and avoid the loaded costs of hiring additional staff

**PM Task / Inspection Form**

PM Task Name: AHU - Monthly PM      PM Task Desc: AHU Monthly PM  
Frequency: Monthly

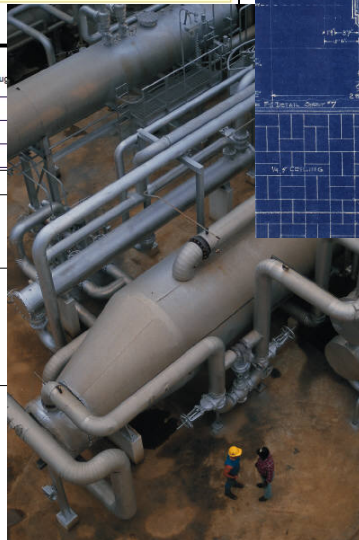
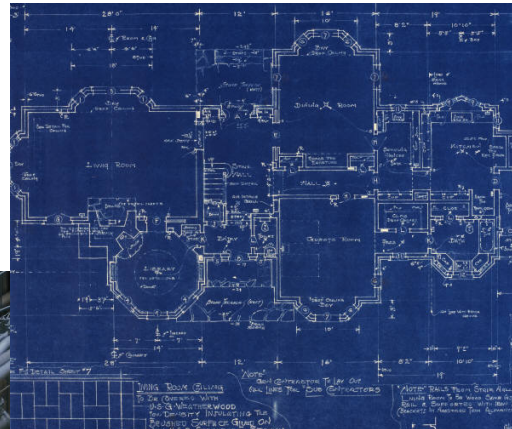
| Equipment Data:    |                     |                 |              |
|--------------------|---------------------|-----------------|--------------|
| Category:          | Equipment I         | Equipment Name: | Asset Tag #: |
| AHU                | 2799 AHU 2          |                 | 1807-0083    |
| Manufacturer:      | Model:              | Serial #:       |              |
| American Blower Co | ORDER NUMBER 235548 |                 |              |
| Description:       |                     |                 |              |
| AHU                |                     |                 |              |
| Bldg:              | Location:           |                 |              |
| Museum of S        | Basement mech room  |                 |              |
| Equipment Type:    | In Service (Y/N)    |                 |              |

**PM Task Line Items**

- 1 Visually inspect all components while operating. Look for air leaks, plug drains, loose belts, noisy bearings, etc. Repair any worn items
- 2 Isolate from power source
- 3 Check filters and change as needed.
- 4 Return to service

Completed by: \_\_\_\_\_  
Date: \_\_\_\_\_  
Hours: \_\_\_\_\_

Notes and observations:  
\_\_\_\_\_



**Michaud Engineering Inc. is the technical partner you need to solve challenging problems.**