How the Cost Data Is Built: An Overview

A Complete Reference for the Facility Manager

This data set was designed as a complete reference and cost data source for facility managers, owners, engineers, and contractors, or anyone who manages real estate. A complete facilities management program starts with a building audit. The audit describes the structures, their characteristics and major equipment, and apparent deficiencies. An audit is not a prerequisite to using any data contained in this data set, but it does provide an organizational framework. A list of equipment and deficiencies forms the basis for a repair budget and preventive maintenance program. An audit also provides facility size and usage criteria on which the general maintenance (cleaning) program will be based. Together, the five sections of this data set provide a framework and definitive data for developing a complete program for all facets of facilities maintenance.

Even if you have a regular building audit and preventive maintenance program in place, this information will be useful.

For the occasional user, the data set provides:

- a reference for time and material requirements for maintenance & repair tasks to fill in where your organization lacks its own historical data;
- preventive maintenance (PM) checklists with labor-hour standards that can be used to benchmark your program;
- a quick reference for general maintenance (cleaning) productivity rates to analyze proposals from outside contractors;
- an explanation of Life Cycle Cost analysis as a tool to assist in making the correct budget decisions; and
- data to validate line items in budgets.

For the frequent user, the data set supplies all of the above, plus:

- guidance for getting the audit under way;
- a foundation for zero-based budgeting of maintenance & repair, preventive maintenance, and general maintenance;
- cost data that can be used to estimate preventive maintenance, deferred maintenance (repairs), and general maintenance (cleaning) programs; and
- detailed task descriptions for establishing a complete PM program.

How to Use the Cost Data: The Details

This section contains an in-depth explanation of how the data is arranged and how you can use it to determine a reliable maintenance & repair cost estimate. It includes information about how we develop our cost figures and how to completely prepare your estimate.

Section 1: Maintenance & Repair (M&R)

The Maintenance & Repair section is a listing of common maintenance tasks performed at facilities. The tasks include removal and replacement, repair, and refinishing. This section is organized according to the UNIFORMAT II system.

The purpose of Section 1 is to provide cost data and an approximate frequency of occurrence for each maintenance & repair task. This data is used by facility managers, owners, plant engineers, and contractors to prepare estimates for deferred maintenance projects. The data is also used to estimate labor-hours and material costs for in-house staff. The frequency listing facilitates preparation of a zero-based budget.

Under the System Description column, each task, including its components, is described. In some cases additional information (such as ''2% of total roof area'') appears in parentheses. The next column, Frequency, refers to how often one should expect, and therefore estimate, that this task will have to be performed. Labor-hours have been enhanced, where appropriate, by 30% to include setup and delay time. In some cases, the list of steps comprising the task includes most of the potential repairs that could be made on a system. For those tasks, individual items, as appropriate, can be selected from the all-encompassing list.

Maintenance & Repair

B30 ROOFING | **B3013 Roof Covering**

B3013 105 Built-Up Roofing

	System Description	Freq. (Years)	Crew	Unit	Labor Hours	2017 Bare Costs Material	Labor	Equipment	Total	Total In-House	Total w/O&P
0600	**Place new BUR membrane over existing**	20	G-5	Sq.							
	Set up, secure and take down ladder				.020		.86		.86	1.29	1.55
	Sweep / spud ballast clean				.500		21.50		21.50	32	39
	Vent existing membrane				.130		5.60		5.60	8.35	10.10
	Cut out buckled flashing				.024		1.04		1.04	1.54	1.86
	Install 2 ply membrane flashing				.027	.41	1.16		1.57	2.16	2.59
	Install 4 ply bituminous roofing				3.733	139	150	35	324	410	485
	Reinstall ballast				.381		16.45		16.45	24.50	29.50
	Clean up				.390		16.85		16.85	25	30.50
	Total				5.205	139.41	213.46	35	387.87	**504.84**	**600.10**
0700	**Total BUR roof replacement**	28	G-1	Sq.							
	Set up, secure and take down ladder				.020		.86		.86	1.29	1.55
	Sweep / spud ballast clean				.500		21.50		21.50	32	39
	Remove built-up roofing				2.500		99		99	131	161
	Remove insulation board				1.026		41		41	54	66
	Remove flashing				.024		1.04		1.04	1.54	1.86
	Install 2" perlite insulation				.879	107	38		145	175	202
	Install 2 ply membrane flashing				.027	.41	1.16		1.57	2.16	2.59
	Install 4 ply bituminous membrane				2.800	139	113	26.50	278.50	345	405
	Clean up				1.000		43		43	64.50	77.50
	Total										

B3013 120 Modified Bituminous / Therm

	System Description	Freq. (Years)	Crew	Un
0100	**Debris removal by hand & visual inspection**	1	2 ROFC	M.S
	Set up, secure and take down ladder			
	Pick up trash / debris & clean up			
	Visual inspection			
	Total			

The Construction Specifications Institute (CSI) and Construction Specifications Canada (CSC) have produced the 2014 edition of MasterFormat®, a system of titles and numbers used extensively to organize construction information.

All unit prices in the RSMeans cost data are now arranged in the 50-division MasterFormat® 2014 system.

Section 2: Preventive Maintenance (PM)

The Preventive Maintenance section provides the framework for a complete PM program. The establishment of a program is frequently hindered by the lack of a comprehensive list of equipment, actual PM steps, and budget documentation. This section fulfills all these needs. The facility manager, plant engineer, or owner can use these schedules to establish labor-hours and a budget. The maintenance contractor can use these PM checklists as the basis for a comprehensive maintenance proposal or as an estimating aid when bidding PM contracts. Copies or print-outs of individual sheets can also be distributed to maintenance personnel to identify the procedures required. The hours listed are predicated on work being performed by experienced technicians familiar with the PM tasks and equipped with the proper tools and materials.

The PM section lists the tasks and their frequency, whether weekly, monthly, quarterly, semi-annually, or annually. The frequency of those procedures is based on non-critical usage (e.g., in ''normal use'' situations, not facilities such as surgical suites or computer rooms that demand absolute adherence to a limited range of environmental conditions). The labor-hours to perform each item on the checklist are listed in the next column. Beneath the table is cost data for the PM schedule. The data is shown both annually and annualized to provide the facility manager with an estimating range. If all tasks on the schedule are performed once a year, the *annually* line should be used in the PM estimate. The *annualized* data is used when all items on the schedule are performed at the frequency shown.

Preventive Maintenance

D30 HVAC | **D3025 130** | **Boiler, Hot Water, Oil/Gas/Comb.**

	PM Components	Labor-hrs.	W	M	Q	S	A
PM System D3025 130 1950							
Boiler, hot water; oil, gas or combination fired, up to 120 MBH							
1	Check combustion chamber for air or gas leaks.	.077					√
2	Inspect and clean oil burner gun and ignition assembly, where applicable.	.658					√
3	Inspect fuel system for leaks and change fuel filter element, where applicable.	.098					√
4	Check fuel lines and connections for damage.	.023		√	√	√	√
5	Check for proper operational response of burner to thermostat controls.	.133			√	√	√
6	Check and lubricate burner and blower motors.	.079			√	√	√
7	Check main flame failure protection and main flame detection scanner on boiler equipped with spark ignition (oil burner).	.124		√	√	√	√
8	Check electrical wiring to burner controls and blower.	.079					√
9	Clean firebox (sweep and vacuum).	.577					√
10	Check operation of mercury control switches (i.e., steam pressure, hot water temperature limit, atomizing or combustion air proving, etc.).	.143		√	√	√	√
11	Check operation and condition of safety pressure relief valve.	.030		√	√	√	√
12	Check operation of boiler low water cut off devices.	.056		√	√	√	√
13	Check hot water pressure gauges.	.073		√	√	√	√
14	Inspect and clean water column sight glass (or replace).	.127		√	√	√	√
15	Clean fire side of water jacket boiler.	.433					√
16	Check condition of flue pipe, damper and exhaust stack.	.147			√	√	√
17	Check boiler operation through complete cycle, up to 30 minutes.	.650					√
18	Check fuel level with gauge pole, add as required.	.046		√	√	√	√
19	Clean area around boiler.	.066		√	√	√	√
20	Fill out maintenance checklist and report deficiencies.	.022		√	√	√	√
	Total labor-hours/period			.710	1.069	1.069	3.641
	Total labor-hours/year			5.680	2.138	1.069	3.641

Description	Labor-hrs.	Cost Each					
		2017 Bare Costs				Total	Total
		Material	Labor	Equip.	Total	In-House	w/O&P

Section 3: General Maintenance (GM)

This section provides labor-hour estimates and costs to perform day-to-day maintenance. The data is used to estimate cleaning times, compare and assess estimates submitted by maintenance companies, or to budget in-house staff. The information is divided into *Interior* and *Exterior* maintenance. A common maintenance laborer (*Clam*) is used to perform these tasks.

Section 4: Facilities Audits

The facilities audit is generally the basis from which the maintenance & repair, preventive maintenance, and general maintenance estimates are prepared. The audit provides the following:

1. A list of deficiencies for the maintenance & repair estimate
2. A list of equipment and other items from which to prepare a preventive maintenance estimate
3. A list of facilities' usage and size requirements to prepare a general maintenance estimate

The Introduction to Facilities Audits in this section explains the rationale for the audit and the steps required to complete it successfully.

This section also provides forms for listing all the organization's facilities, and a separate detailed form for the specifics of each facility. Checklists are provided for major building components. Each checklist should be accompanied by a blank audit form. This form is used to record the audit findings, prioritize the deficiencies, and estimate the cost to remedy these deficiencies.

Reference Section

This section includes information on Equipment Rental Costs, Crew Listings, Travel Costs, Reference Tables, Life Cycle Costing, and a listing of abbreviations.

Equipment Rental Costs: This section contains the average costs to rent and operate hundreds of pieces of construction equipment.

Crew Listings: This section lists all the crews referenced. For the purposes of this data set, a crew is composed of more than one trade classification and/or the addition of power equipment to any trade classification. Power equipment is included in the cost of the crew. Costs are shown both with bare labor rates and with the installing contractor's overhead and profit added. For each, the total crew cost per eight-hour day and the composite cost per labor-hour are listed.

Travel Costs: This chart provides labor-hour costs for round-trip travel between a base of operation and the project site.

Reference Tables: In this section, you'll find reference tables, explanations, estimating information that support how we develop the unit price data, technical data, and estimating procedures.

Life Cycle Costing: This section provides definitions and basic equations for performing life cycle analyses. A sample problem is solved to demonstrate the methodology.

Abbreviations: A listing of the abbreviations used throughout this data set, along with the terms they represent, is included in this section.

The Design Assumptions of this Data Set

This data set is designed to be as easy to use as possible. To that end, we have made certain assumptions and limited its scope.

1. Unlike any other data set, *Facilities Maintenance & Repair Costs with RSMeans Data* was designed for estimating a wide range of maintenance tasks in diverse environments. Due to this diversity, the level of accuracy of the data is +/– 20%.
2. We have established material prices based on a national average.
3. We have computed labor costs based on a 30-city national average of union wage rates.
4. Except where major equipment or component replacement is described, the projects in this data set are small; therefore, material prices and labor-hours have been enhanced to reflect the increased costs of small-scale work.
5. The PM frequencies are based on non-critical applications. Increased frequencies are required for critical environments.

General Maintenance

01 93 Facility Maintenance

01 93 04 – Landscaping Maintenance

	01 93 04.15 Edging	Crew	Daily Output	Labor-Hours	Unit	2017 Bare Costs Material	Labor	Equipment	Total	Total In-House	Total Incl O&P
0010	**EDGING**										
0020	Hand edging, at walks	1 Clam	16	.500	C.L.F.		14.70		14.70	18.35	23
0030	At planting, mulch or stone beds		7	1.143			33.50		33.50	42.00	52.50
0040	Power edging, at walks		88	.091			2.67		2.67	3.33	4.16
0050	At planting, mulch or stone beds	↓	24	.333	↓		9.80		9.80	12.20	15.25
	01 93 04.20 Flower, Shrub and Tree Care										
0010	**FLOWER, SHRUB & TREE CARE**										
0020	Flower or shrub beds, bark mulch, 3" deep hand spreader	1 Clam	100	.080	S.Y.	3.57	2.35		5.92	6.85	8.10
0030	Peat moss, 1" deep hand spreader		900	.009		2.60	.26		2.86	3.19	3.66
0040	Wood chips, 2" deep hand spreader		220	.036	↓	1.80	1.07		2.87	3.31	3.92
0050	Cleaning		1	8	M.S.F.		235		235	293.00	365
0060	Fertilizing, dry granular, 3#/M.S.F.		85	.094		2.40	2.77		5.17	6.10	7.30
0070	Weeding, mulched bed		20	.400			11.75		11.75	14.65	18.30
0080	Unmulched bed		8	1	↓		29.50		29.50	36.50	46
0090	Trees, pruning from ground, 1-1/2" caliper		84	.095	Ea.		2.80		2.80	3.49	4.36
0100	2" caliper		70	.114			3.36		3.36	4.19	5.25
0110	2-1/2" caliper		50	.160			4.70		4.70	5.85	7.35
0120	3" caliper	↓	30	.267			7.85		7.85	9.75	12.20
0130	4" caliper	2 Clam	21	.762			22.50		22.50	28.00	35
0140	6" caliper		12	1.333			39		39	49.00	61
0150	9" caliper		7.50	2.133			62.50		62.50	78.00	97.50
0160	12" caliper	↓	6.50	2.462			72.50		72.50	90.00	113
0170	Fertilize, slow release tablets	1 Clam	100	.080		2.50	2.35		4.85	5.70	6.80
0180	Pest control, spray		24	.333		.26	9.80		35.80	41.00	48