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Canada

Roofing Maintenance Software Review: "The Art of Roofing Condition Inspections" (First Report)

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Abstract

This report on 'commercially available' roofing inspection, maintenance and evaluation software is a work in progress, the authors anticipate subsequent reports of this nature. When more information is acquired, or as demand dictates, the existing information will be updated, and extended, and reported at roofing conferences or in roofing industry publications. This report focuses on four roof inspection packages available in North America and identifies their features and capabilities for approximately 50 preselected categories and criteria. The report also provides background information on seven other roofing programs. The report does not rate or rank the four packages, but provides building owners, roofing contractors and roofing consultants with an objective review of systems available currently. This report is presented to assist users to locate software tools for decisions about roofing maintenance, to provide data about the general nature of the available software, and to help building owners, contractors and consultants make decisions about automating data collection, monitoring and retrieval.

Résumé

Ce rapport, qui porte sur les logiciels que l'on trouve sur le marché dans le domaine de l'inspection, de l'entretien et de l'évaluation des couvertures, ne constitue qu'une première étape; les auteurs prévoient d'autres rapports de cette nature. Lorsqu'ils disposeront de données complémentaires ou pour satisfaire à la demande, ils réviseront l'information existante et en feront état lors de conférences sur les toits ou dans les publications de l'industrie des couvertures. Ce rapport traite de quatre progiciels d'inspection de couvertures existant en Amérique du Nord; il décrit leurs caractéristiques et leurs capacités sur la base d'une cinquantaine de catégories et de critères choisis à l'avance. Il renferme aussi de l'information de base sur sept autres programmes concernant les couvertures. Les quatre progiciels ne sont pas évalués ni classés en ordre, le rapport ne visant qu'à donner aux propriétaires de bâtiments et aux entrepreneurs ou consultants en couvertures une idée des systèmes offerts sur le marché. Ce document a pour but d'aider les utilisateurs à trouver des outils logiciels d'aide à la décision en matière d'entretien de toits, de fournir de l'information sur la nature générale des logiciels existants, ainsi que d'aider les propriétaires de bâtiments et les entrepreneurs ou consultants en couvertures à prendre des décisions concernant l'automatisation de la collecte, du contrôle et de l'extraction des données.

1. Introduction

The Building Envelope Life Cycle Asset Management project (BELCAM) is a multi-year research activity sponsored by the National Research Council Canada (NRCC) and Public Works and Government Services Canada (PWGSC). The BELCAM project investigates life cycle asset management of the building envelope, but in this first phase of the project it is concentrating on roofing systems as a "proof of concept" domain. The BELCAM objectives are to assist asset managers optimize life cycle maintenance expenditures and to help them predict the remaining service life of roofing systems.

One of the deliverables of the BELCAM Project (www.nrc.ca/irc/belcam) is the evaluation of existing software used in roofing maintenance management and service life prediction. This report is the first of many software evaluation reports, subsequent reports will follow as more software programs are made available and as the existing packages are enhanced.. This report does not rate or rank the four packages evaluated herein, but provides building owners, roofing contractors and roofing consultants with an objective review of systems available currently. This report is presented to assist users to locate software tools for decisions about roofing maintenance, to provide data about the general nature of the available software, and to help building owners, contractors and consultants make decisions about automating data collection, monitoring and retrieval.

NRCC and PWGSC have considerable experience with the use of software tools, as well as the formal evaluation of software products (Vanier, 1985). Unfortunately, there have been few evaluations or comparisons of software in the construction industry (Amistadi, 1995) and only one or two reviews in the roofing industry (Novitski, 1992). It is hoped that this report encourages others to use software tools in the industry and acts as a catalyst for others to report their finding about capabilities, features and problems with roofing maintenance management software.

1.1 Parameters of the review

There is a wide variety of software developed for the roofing industry. This variety includes software tools for design, estimating, repair, sales support, evaluation and service life prediction. It could also include any preventive maintenance, maintenance management or financial information management system that claims to have something to do with roofing, roofing activities, roofing supplies or roofing systems. This variety of software is beyond the scope of this report.

This report focuses only on packages dealing with roofing evaluation and service life prediction. Complete evaluations of four commercially available software packages are included; however, background data have been provided to identify points of contacts and general information about proprietary roofing inspection systems and well-known applications in other roofing domains such as estimating and design.

1.2 Limitations of the review

The report is the first report of a series dealing with the evaluation of roofing inspection software. It is not a comprehensive evaluation of ALL the technical and interface features of ALL available software packages, either commercial products or proprietary services. It is an overview of a number of commercial software packages that are well-known to the industry, and that are currently available and

supported. The report identifies only specific features and capabilities related to asset management and service life prediction, but does not rate or rank these products or their capabilities.

2. The Review Process

2.1 Software Selection

The selection of the software was made by the authors based on their extensive experience in the roofing industry, from information obtained from knowledgeable contacts in industry, and from data acquired from extensive searching of the Internet and other electronic databases. It was quickly discovered that there is precious little information available about roofing inspection software, and that the most reliable information came from knowledgeable individuals.

Only commercially-available software was evaluated in this first report owing to time, personnel and administrative constraints. It is hoped that some proprietary systems mentioned in this report can be evaluated in subsequent reports.

Four products were selected for a complete evaluation in this report:

- CAMP - Roofing Management program from CAMP. Inc.
- REVS - from Roofing EValuation System from Bruco Enterprises, Inc.
- ROOFER - from US Army Corps of Engineers, Civil Engineering Research Laboratories
- ROOFWORKS - from Jim D. Koontz & Associates, Inc.

2.2 Software Features and Capabilities

All the software products evaluated in this report were obtained directly from the developer and represent the most current version of the software. The installations were carried out following the developers' instructions, and the features and capabilities were reviewed based on the software provided, the instructions from the developers, and the user manuals provided by the developer.

It must be emphatically noted that this review was initiated and designed to meet the goals of the BELCAM project; therefore, the evaluation, or even identification, of "interesting" features of specific products is omitted because these are outside the scope of this review.

2.3 Reviewer Selection

The reviewers (a.k.a. authors) are experienced construction engineers with considerable experience in the roofing industry. The reviewers all have extensive experience with software tools and all have considerable "hands-on" experience with at least one of the roofing packages evaluated in this report.

As one goal of this review is to enumerate the features and capabilities of a limited number of software products, no attempt was made in this process to represent users from any specific sector of the industry, level of experience, or classification of profession. In fact, the reviewers are all multi-disciplinarians; they have a collection of degrees in architecture, building engineering, or civil engineering; they are practicing as either researchers, educators, asset managers or roofing consultants, and all have been up on a roof to perform a roofing inspection.

3. Background Software Information

3.1 Evaluated Software

Roof EValuation System (,)
Contact: C. Bruce Cotton, Bruco Enterprises Inc. (491659), PO Box 2556, Spring, TX 77383-2556
Tel: (281) 353-9541 **Fax:** (281) 353-3845
Email: bruco@flash.net **Web Site:** www.flash.net/~bruco

CAMP -- Roof Management Program
Contact: Michael Reynolds, Computer Assisted Management Programs, Inc., 36 Elynhill Drive, North York, ON, M2R 1C6
Tel/Fax: (416) 222-6105

ROOFER
Developed by: U.S. Army Construction Engineering, Research Laboratories, CECER-FL-M, P.O. Box 9005, Champaign, IL 61826-9005
Supported by: University of Illinois at Urbana-Champaign, Technical Support Center
Contact: Lynn Brownfield, ROOFER Technical Support Center, University of Illinois at Urbana-Champaign, 302 E. John Street, Suite 202, Champaign, IL 61820
Tel: (217) 333-2882 **Fax:** (217) 333-9561
Email: padilla@ux1.cso.uiuc.edu **Web site:** www.conted.ceps.uiuc.edu/support_center

RoofWorks
Contact: Jim D. Koontz**,** Jim D. Koontz & Associates, Inc., P.O. Box 1054, Hobbs, NM 88240
Tel: (505) 392-7676 **Fax:** (505) 392-7602
Email: in process of changing, please check web site **Web Site:** http://www.jdkoontz.com

3.2 Software NOT evaluated

In the authors' quest for locating available software in the roofing domain, it was quickly discovered that good information about roofing software is hard to find and these leads are difficult to track down. In some cases for example, off-shore products were tracked down, but found to be design or estimating applications. In order to save others from having to duplicate our investigative work, the authors provide background data about products or services that are currently available but do not fall into the scope of the evaluation.

If others are aware of additional roofing inspections products or services, they are asked to contact Dana Vanier by email at dana.vanier@nrc.ca or by telephone at (613) 993-9699 (Fax 954-5984).

The following software tools were not evaluated in this report owing to time restraints, because of the proprietary nature of the product, or because the software was outside of the established scope of the report. The information provided herein was received from the developers, web pages or printed literature. In the case of TRIM, a full evaluation was attempted, but the results are not presented owing to the proprietary nature of the software and the fact that only a demonstration version, and not a fully-

operational application, was provided. It is hoped that in the publication of subsequent reports that a few of these software packages can be included in the evaluation.

3.2.1 Proprietary Systems

Bradford Management System
Contact: Dane Bradford, Bradford Roofing Management, P.O. Box 20502, Billings, MT 59104
Tel: (406) 252-2278
Application: Proprietary software used for roofing management. The developer provides copies of the software to their roofing clients for them to maintain the data on their own roofs. Their clients include many large industrial and governmental agencies.

Facefacts (RAMP)
Contact: J.J.(Jim) Watson, Building Technology Associates, Inc., 21850 Greenfield Road, Oak Park, MI, 48237
Tel: (810) 967-4630 **Fax:** (810) 967-4640
Application: Economic evaluations of roof service life. The developer provides copies of the software to their roofing clients for them to maintain the data on their own roofs. Also does asset management for other applications. Facefacts is used by Building Technology Associates, Inc. to inspect roofs of industrial and governmental clients and to assist them in evaluating the service life of roofing systems, based on sophisticated economic and technical models.

ROOFA - ROOFing Alberta management system, Alberta Public Works
Contact: Barrie Dennis, Alberta Public Works, 3rd Floor, 6950 100th Street, Edmonton, AB, T6H 5V7
Tel: (403) 422-7420 **Fax:** (403) 422-7479
Email: barrie.dennis@gov.ab.ca
Application: This is a DOS application written by Alberta Public Works (APW) that is based on the original ROOFER package from the Construction Engineering Research Laboratories. It is supported and updated by APW.

RoofMAP
Contact: Paul Mitchell, PSI, 6200 SOM Center Road, Suite C23, Solon, Oh 44139
Tel: (440) 498-1234 **Fax:** 440 498-1236
Email: pmmitchell@compuserve.com **Web site:** http://www.psiusa.com/services/randp.htm
Application: Proprietory Software used for roofing management. The developer provides copies of the software to their roofing clients for them to maintain the data on their own roofs. Company is currently replacing the original DOS software with a completely redesigned Windows version.

TRIM
Contact: Joseph (Joe) H. Dandelé, Tremco, Roofing Division, 140 Graden Street, Gananoque, ON K7G 1H9
Tel: (613) 769-3285 **Fax:** (613) 382-8357
Application: TRIM is a portfolio management tool provided by Tremco to do roofing inspection. The software received by the reviewers is a demonstration copy which does not allow the user to add or modify data. TRIM is provided by Tremco as part of contracted inspection services (membrane, insulation, flashing, etc.). TRIM runs on FoxPRO under Windows 3.1. and has an interesting feature that combines a glossary of roofing and defect terms with graphics.

3.2.2 Other Roofing Systems

PROS, Personalized Roofing Operations System
Contact: Gregg Steinbrenner, Texstar Computer Systems, 1111 South Main Street, Suite A, Duncanville, TX 75137
Tel: (972) 298-9596 **Fax:** (972) 298-6166
Web Site: www.roofingnet.com/PROS.HTML
Application: PROS is positioned as a sales support tool for roofing contractors and roofing product sales staff. It is also a roofing replacement estimating and quantity take-off package. PROS also handles written estimates, work orders, purchase orders, accounts receivable, and has a report generator. It runs on DOS, Win95 and WinNT.

RoofMaster
Contact: Rowan Morgan**,** Rowan Morgan Computer, New Zealand
Tel: 64 (09) 268 2326
Email: rcl@ihug.co.nz
Application: Estimating software, along with Buildmaster, which has been selling for about 12 years. It is also a quantity calculation program. A normal house done manually would take most estimators about 3 to 4 hours, with Buildmaster software it should take only 30 to 40 minutes and that includes the full pricing along with quantities. It is currently available as a DOS product but the developers hope to have a Windows version in late 1997.

3.2.3 Systems lost, missing, discontinued or fictitious

Roofstar (California) -- Nothing found
Roofing Management Information System (Saskatchewan) -- Nothing found

4. Software Evaluation

Appendix A is a table of the features and capabilities of commercial products. These criteria were established prior to the evaluation process and were only slightly modified during the evaluation process. Whenever possible, explanations are provided by the reviewers. An asterisk '*' in Appendix A indicates that the software provides this functionality. Because some of the review categories are quite general, it may be difficult for the reader to determine the meaning of an asterisk in "Tracks Roof Leaks", for example. To the reviewers it means that the software has some way of recording when and where leaks occurred; the asterisk does not indicate that the product did it effectively or is able to locate that information easily.

Appendix B provides sample "screen captures" selected by the authors to represent the software and demonstrate the graphical and technical capabilities of the product. The "screen captures" should be examined for content, as well as presentation style, as the images provide additional insight into the software capabilities.

4.1 Discussion

It is encouraging to the authors to see such a fine selection of software products for roofing inspection. In general, the products are professionally designed, marketed, supplied and supported. All of the products were easy to install and stable in operation. Although most of the products have some very minor flaws (bugs), none of these prevented the reviewers (or users in general) from using the products,

as designed and represented. In addition, on a personal note, all of the product developers were friendly, helpful, informative and knowledgeable (of both their product and the roofing industry).

As stated earlier, it is not the intention of this report to rate or rank the products. However, the authors can state that none of the developers is misrepresenting their products in their literature, and that the evaluations provided in this report are a fair representations of the listed software features and capabilities. Of course, there are features and capabilities of products that are not discussed or identified in this report, much to the disappointment of the developers; this is because these features are outside of the scope of the review.

It must be remembered that all of these products are moving targets, as they are all constantly being updated to enhance their capabilities and to meet ever-changing hardware and software requirements and opportunities. This review, of course, is a snap-shot of features and capabilities of these products in January 1998. It is the authors' intentions to publish subsequent reports at roofing conferences or in well-distributed roofing journals. The subsequent reports will review these products, and hopefully add others.

All of the software products have a niche market. As can be gleaned from Appendix A, CAMP is an entry level system with minimal hardware requirements; REVS is a comprehensive roofing assessment, recording and reporting database; ROOFER is a sophisticated service life prediction tool, and RoofWork's strengths are in its data collection, financial modeling and portfolio analysis. This controversial statement does not mean that the above products do not possess any other functions, nor does it mean that the above products do not possess functionality attributed to their competitors; it simply means that, if potential users fall into one of these identified niches they should seriously investigate and evaluate that niche product. They should also obtain information about the others.

5. Conclusions

Four software products are reviewed in this report in categories related to roofing asset management and service life prediction. In addition, the background data from another seven products are presented. The four software products fall into niche markets: CAMP is an entry level system with minimal hardware requirements; REVS is a comprehensive roofing assessment, recording and reporting database; ROOFER is a sophisticated service life prediction tool, and RoofWork's strengths are in its data collection, financial modeling and portfolio analysis. The other software packages listed in this report are either proprietary systems used by specific companies in their inspection process or are packages that address roofing needs outside of the domain of roofing inspection. The products reviewed in this report are professionally designed, marketed, supplied and supported. All of these products were easy to install and stable in operation. Although some of the products had some very minor flaws (bugs), none of these prevented the reviewers (or users in general) from using the products as designed and represented.

6. Acknowledgments

The authors acknowledge the support of the BELCAM project and the members of the BELCAM consortium. The authors also wish to thank the developers of the products for their evaluation software, their information and technical support, and for their cooperation in participating in this evaluation. The authors also wish to thank the staff at the other companies identified in this report for their time and information, as well as, to thank Bruce Holman for contact names and information provided.

7. References

Amastidi, H. (1995) CAD-Building Load Software Review, *Engineered Systems*, Jun, pp 50-67.
Novitski, B.J. (1992) Roofing Systems Software, *Architecture*, Feb, pp 101-104.
Vanier, D.J. (1985) *Benchmark Procedure to Evaluate Computer-Aided Design and Drafting Systems for Building Industry Applications*, Building Practice Note 58, NRCC, Ottawa, 58p.

Appendix B

Version	Roof Management Program	REVS System 2000	MicroRoofer	RoofWorks Second Edition
Tested	Version 3.09e	Version 7.0	Version 1.3	Version 2.02
Users				
Inspection	*	*	*	*
Maintenance	*	*	*	*
Other		Evaluation	Evaluation	Estimating, Costs
Hardware-Minimum (tested)				
RAM	400 Kb (486)	8 Mb (40Mb)	8 Mb (32)	16 Mb (40)
Platform	IBM PC and up (486)	386+(Pentium)	386DX-33Mhz (P200MMX)	486+(Pentium)
Operating System	DOS or DOS box (DOS)	95, NT 16/32 (95)	3.1, NT, 95 (95)	Win 3.1, 95 (95)
Monitor	640 x 480 (VGA req'd for display of Roof plans)	640 x 480 or 800 x 600 (800 x 600)		640 x 480 (800 x 600)
Colour		256 colours	256 Colours	256
Mouse		Mandatory	Mandatory	Mandatory
Disk Supplied	1 Floppy	5 Floppies for base program (CD ROM in near future)	2 Floppies	6 Floppies
Disk Space (application-data)	1 Mb to 5 Mb	5 Mb - 15 Mb	10 Mb	16 Mb -image dependent
Other				Scanner
Software				
Type of Software Shell	Flat file	Relational Database Shell	Relational Database Shell	Relational Database Shell
Shell (if applicable)		Paradox 7 Runtime	Access 1.X	Paradox 4.5 Runtime
Software Interface (Graphical User Interface - GUI)	DOS Menus	GUI	GUI	GUI
Architecture (Client / Server, Mobile Units)	Networkable, multi-user, records in use locked (not tested)	Networkable, multi-user, records in use locked (not tested)	Networkable, mobile edition available separately	Networkable, multi-user, only one user at a time (not tested)

Appendix B

Installation	Disk copying with installer	Disk copying with installer	Disk copying with installer	Disk copying with installer
Future Enhancements	Will be migrating to Windows	Program will be developed using Borland Delphi as standalone executable		V3.0 in Apr. '98, more reports, searching, NT
Other			Pen Based Mobile	
Price	**Approx. $1000 CDN**	**$ 500+ US for base unit, $ 800 for full version**	**$ 375 US**	**$500 US** custom programming
Technical Features				
Organizational Structure	Client has divisions have buildings, have roofs	Client has site, has buildings, has roofs, has equipment, has components	Multi-Facility with many roof areas/facility	Client has properties, have building, have roofs
Maximum number of sections or buildings	999	Unlimited	Unlimited	Unlimited
Creating components	Add, Modify, Delete	Add, Modify, Delete	Add, Modify, Delete	Add, Modify, Delete
Tracks Roof Leaks		Repairs are linked to all roofs and components	*	* with charts
Maintenance/Repair Tracking	*	*	Limited	*
Costing - Repair	Input costs & tracking	*	*	* with future projections
Costing - Maintenance	Input costs & tracking	*	*	* financial analysis
Additional Features				
Budgeting	5 year period	*	*	*
Library of Components	*	*	Defaults and Categories	*
Charts		*	*	* for most reports
Roofing Condition Index (RCI)		Ratings 1-7 for membrane and insulation form the RCI in conjunction with user input of age and design life	Elaborate - Based on years of empirical data - RCI based on deduct values and related to age and service life	RCI is based on user assigned 0-100. A subjective rating can also be entered, also red, yellow, green coding or remaining life
Condition Assessment Surveys		For all roof components, flashings, membrane,	There are flashing, membrane, insulation	General roofing data can be entered

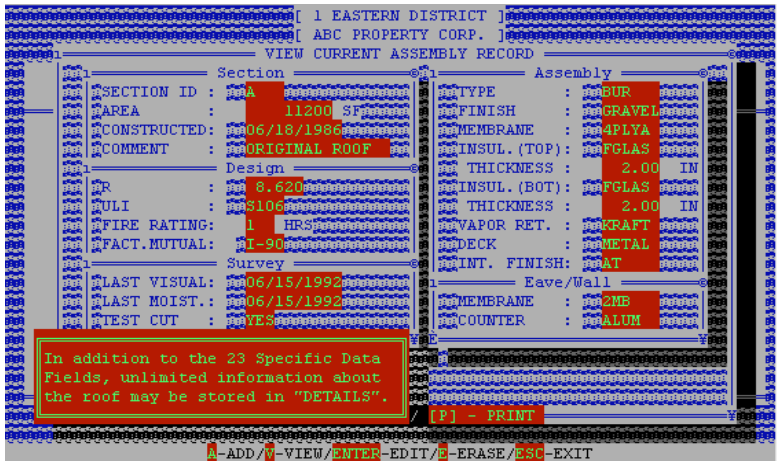
		insulation, parapets, etc.	condition indexes.	
Other	Unlimited amount of detail can be provided		Pictures, warranty information,	Data on manufacturer, consultant, contractor, etc.
Links to Other Applications	Standalone	Standalone	Standalone	Standalone
Financial Information	Internal Budgeting	Internal Budgeting	Internal	Internal - projections
Preventive Maintenance		Internal	Internal	Internal
Maintenance Management	Internal	Internal	Limited Internal	Internal
Work Orders		Internal	Limited Internal	Reports
Geographical Information System (GIS)			Prototypes have been developed	
Photos		*		*
CADD Import	Import of Autocad files for display only (not tested)	Slick!(AutoCad reader).dwg, .gif or any scanned image	Can draw sketches	Roof dwgs are integral to data entry. Photos tied to dwg location. AutoCAD, scanned images possible
CADD Export		Redline printing		Printing, Faxing
Other	Roof plans - PCX format			
Export Features		Custom work	Export to mobile Roofer	Custom work
Tab Delimited		Paradox export	*	Paradox export
Other formats		Paradox export		Paradox export
Security				
Passwords	*	*	*	*
Backup	*			Detailed instructions
Other	*			Data export to spread sheets
Reports		(not available for evaluation)		
Internal format		Printouts of screen output forms and reports	Printout of forms and reports	Printouts of screen output forms and reports
Data output in tab delimited form	Standard and ad-hoc report formats available	Paradox engine		Paradox engine
Other	On-the-fly user comments may be added			Roofing warranty can be scanned for reports

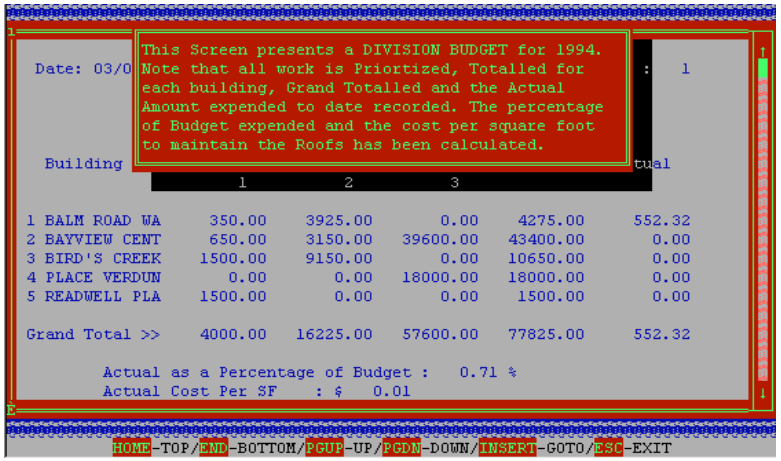
Appendix B

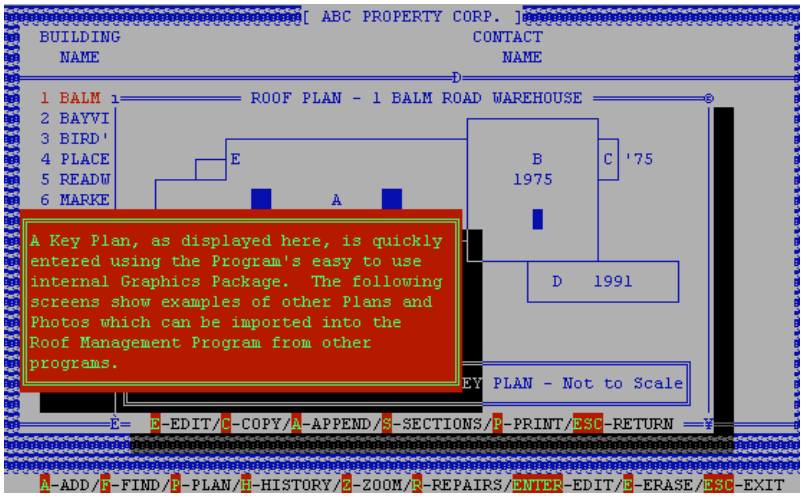
Help (On-line, off-line, Balloon Help, Manuals)	Manual - 43 pages includes screen captures	Manual - 50 pages includes screen captures	4 Manual	Manual -120 pages includes screen captures
Contents	*	On line for Paradox		Online for RoofWorks
How to use help	rudimentary	for Paradox		*
Context-sensitive Help		for Paradox		for RoofWorks
Other		Phone support	Telephone support & training through RIEI, UIUC. Price includes 1 year support. Renewal of subscription is US $300 and includes all upgrades	1-800 service, one hour free for subscribers
Notes (restrictions)		Only US States		
		no extensions, yet	Recording a roof replacement, ROOFER deletes historical data	12 numeric characters for phones, etc.
	Imperial or SI (no conversion)	Only Imperial Units	Only Imperial Units	Only Imperial Units

Appendix B

Sample Screen Captures from CAMP

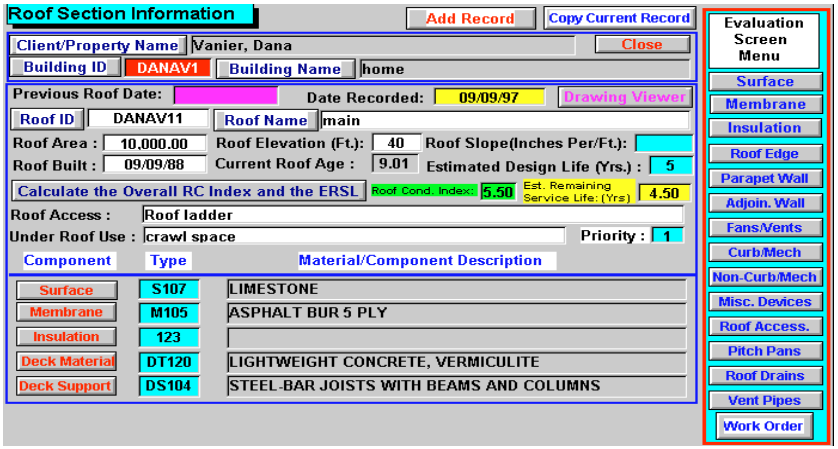


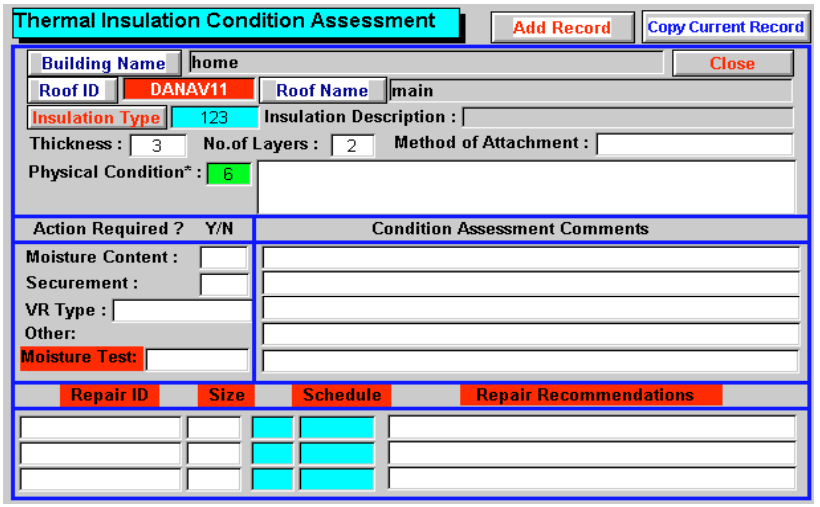


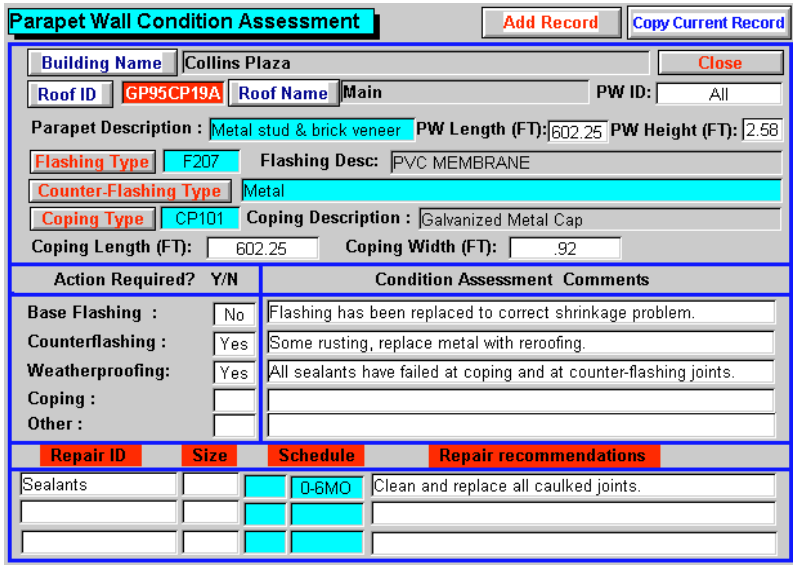


Appendix B

Sample Screen Captures from REVS

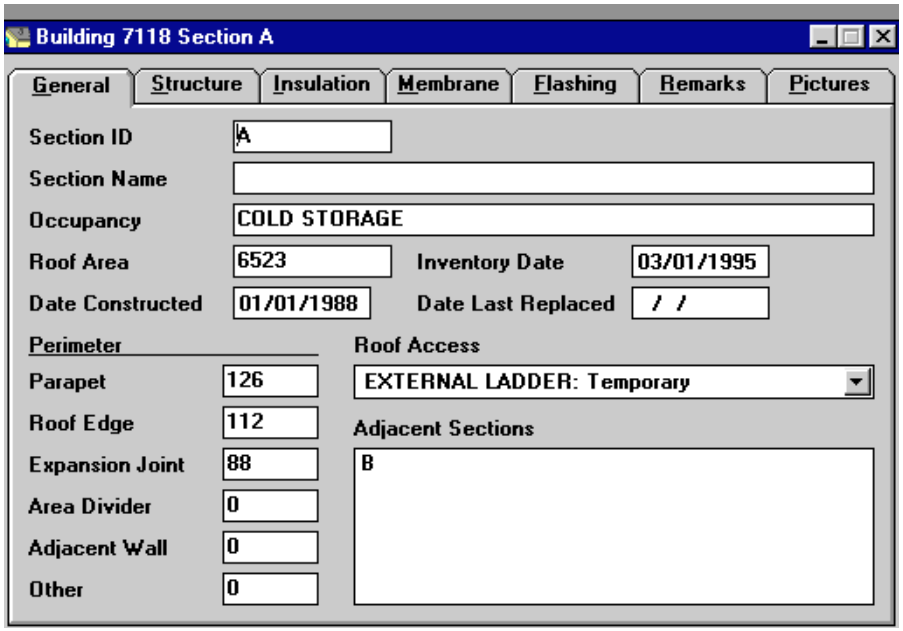


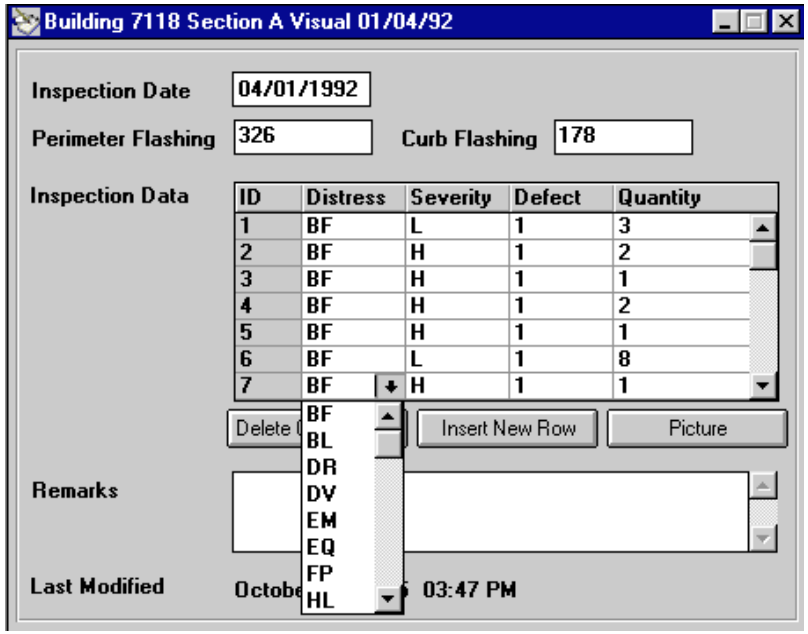


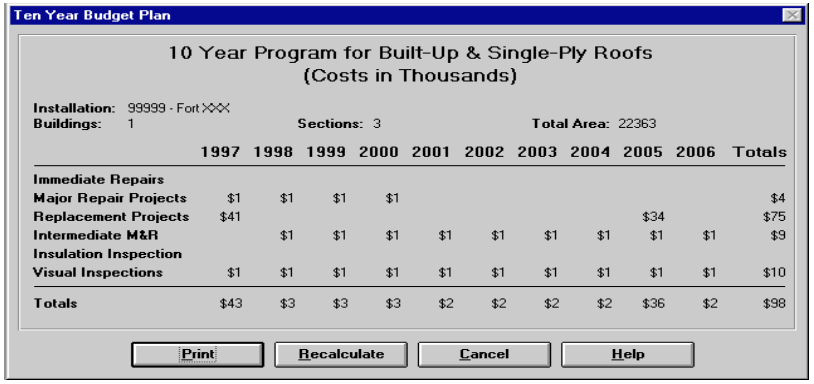


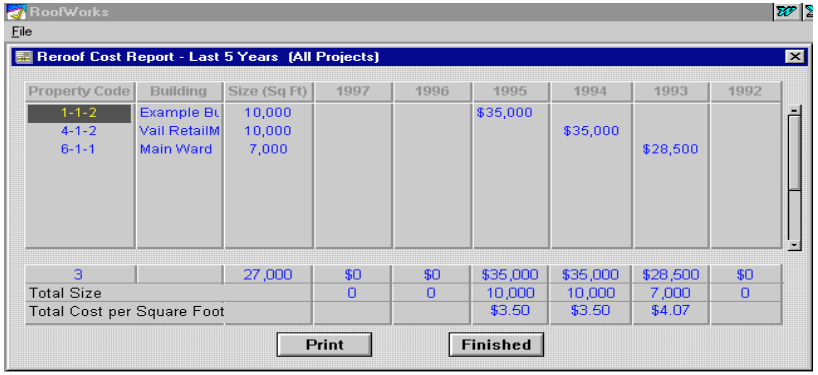
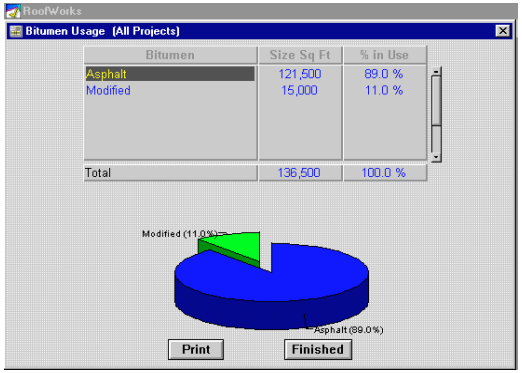
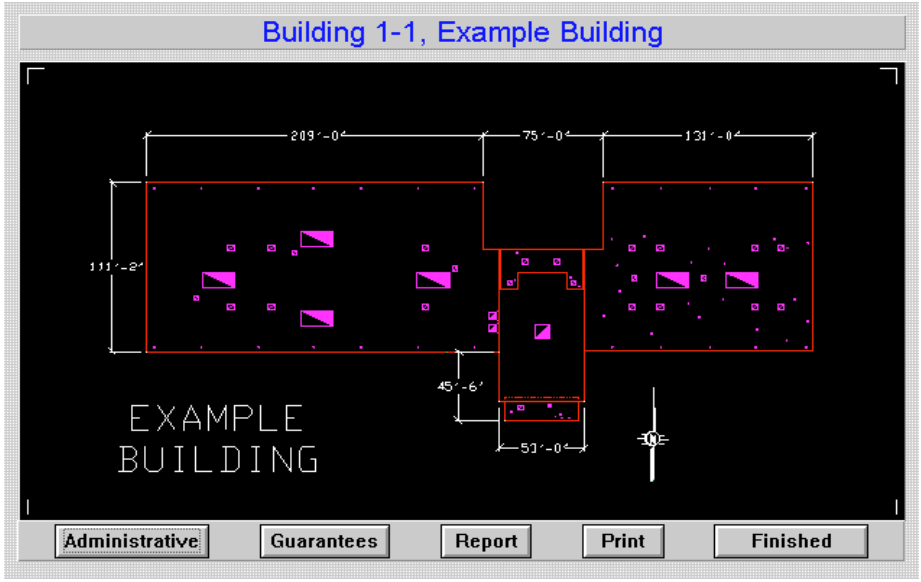
Appendix B

Sample Screen Captures from ROOFER







Appendix B

Sample Screen Captures from RoofWorks