ASSESSMENT OF RISK AND VIABILITY IN RADON MITIGATION PROJECTS OF MULTIFAMILY RESIDENTIAL PROPERTIES

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Abstract

Publication of ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings* has opened avenues for radon professionals to enter into significant multifamily residential projects in a uniform and responsible manner. Techniques used for building investigation, identification of known hazards, and the benefits of clear communication and coordination with known responsible parties, are quantified to provide a charted assessment of common risk factors found on properties. Viability is defined in terms of the weight of risk versus the potential for successful outcome. Four case studies are contrasted to provide insight into benefits of a well-constructed building investigation and assessment, and the impact risk factors have on project viability. Cooperation from and with responsible parties is also contrasted as part of an ongoing development of more effective communication with those having vested interest in multifamily assets.

Introduction

Multifamily residential radon mitigation projects present unique challenges with regard to planning, design, logistics, and execution, each of which impacts ultimate profitability. While large in scale and potentially more profitable than single family residential projects, the number of residents impacted by these types of mitigations, and the size of the investments involved in these projects, present greater inherent risks including exposure not only to consumer complaint but the potential for lawsuit. Viability, which is defined as the weight of risk versus the potential for successful outcome, which ultimately results in acceptable profit margins or profitability, has been observed to increase with the institution of uniform standards as implemented in the ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings*.

Prior to institution of uniform standards, expectations by investors and property managers often placed the radon mitigation professional in the precarious position of deciding whether or not to accept a project at a very low profit margin. A lack of uniformity in methodology and types of materials used at times left properties with sub-par mitigation system installations, whether due to design flaws, lack of quality in materials, insufficient number of sub-slab depressurization systems, or poor execution of the overall project. Without careful planning a radon mitigation

[1] *The author, as Director of Safety and Technical Services, has received funding and permission from S.W.A.T. Environmental for research leading to this publication.*
[2] *The author has a commercial interest in the methodologies and findings discussed in this paper. All data have been sterilized to protect client identity and confidentiality.*

professional could end up investing a significant outlay for little more than single digit profit margins. While some companies were able to command superior prices to perform mitigation projects, some projects were executed with little attention to the efficacy of the system design or the potential impact of the poor radon mitigation achieved. Correction of sub-par installations or retrofitting new construction projects became a niche market for some companies. The relative lack of professional accountability through implementation of a standard resulted in a more divisive and less reputable radon industry.

The institution of ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings* has provided the radon industry with opportunities for standardization of protocols and methodologies, by which professionals can outline and compare production. Uniformity in expectations has been met with varying degrees of approval, particularly in light of increases in the costs of materials and labor, and, in some cases, additional legislated costs such as installation stickers and licensure requirements. While radon professionals can agree that a regulated industry is good for reputation and consumer protection, it is the quantification of the benefits to the radon professional, and subsequent increased profit margin, which improve approval and endorsement of the RMS-MF overall.

Methodology

Access to a large data set of similar multifamily residential radon mitigation projects provides an opportunity to quantify the impact of consistent implementation of the ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings* within a small corporation. A timeframe of approximately three years was selected to enable compilation of the dataset. Selection of sites was made within locales with geographic bounds within the same major metropolitan areas. This facilitated normalization of data. Material pricing and labor were quantized over time, to enable equal comparisons within the datasets.

Datasets were drawn into four separate categories as described in Table (1).

Table (1): Selection Critera: Dataset selection based upon implementation of ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings;* Maximum of 20 Units.

Prior to Implementing RMS-MF (2013-2015)	After Implementing RMS-MF (2015-2016)
Project ≤ 12 Units	Project ≤ 12 Units
Project 12 < Units ≤ 20	Project 12 < Units ≤ 20

The selection of twelve or less units versus thirteen to twenty units roughly corresponds to partial complex mitigation projects versus full complex mitigation projects. Projects of greater than twenty units were not selected due to greater variability in material costs, scheduling, and insurance criteria. Additionally, at the beginning of the dataset (2013), a uniform number of projects over twenty units were not available from which to make a valid random selection. While aspects of ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily*

Buildings were implemented prior to 2015, consistent application of these standards in this small corporation was not in place until 2015.

At random, five projects were selected from projects within each of the four selection criteria. In order to further unify the data, projects were selected by geographic frequency, with two selections in each category being made from projects in the Greater Metropolitan Atlanta, Georgia region. Quantized and averaged data with regard to inputs were then used to compare the following five factors with regard to project viability, Table (2):

Table (2). Project Viability Metrics. Five factors were selected to assess project viability upon implementation of the ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings.*

Factor	Measures
Gross Revenue (Excluding Overhead)	Ability of the Project to Generate Revenue
Labor Units (1 Labor Unit = 4 Hours Labor)	Amount of Labor Expended
Material Overage	Ability to Accurately Predict Materials Used
Time of Estimate to Project Start Date	Client Decision Making and Scheduling
Service Calls Post-Installation	Quality of Installation or Client Issues

Gross Revenue (Gross Revenue = Gross – (Material Costs + Labor Costs + Per Diem + Travel)) excludes overhead (including salaries, advertising, operating costs, facilities, taxes, and additional inputs) in order to provide a uniform basis upon which to examine profitability. Gross Revenue was also time adjusted for average cost of materials and labor over the selected period. Gross Revenue does not include additional savings from subsequent service calls related to the installation, since distinct separation of mechanical failures versus installation related issues cannot be made. Data for Labor Units are reported in terms of eight-hour "Days". Data for Material Overage are reported in terms of percent of overall project material expenditures, whether retained stock (a liability) or excess spent. Data for Time of Estimate to Project Start Date are reported in terms of business days (based upon a standard five-day work week, excluding holidays). And Service Calls Post-Installation are reported in terms of percentages calculated from overall incidents within the first twelve months (or fraction therein through 2016) requiring actual technician presence on site.

Results

Gross revenues of projects occurring after implementation of the ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings* is observed to have increased between approximately 3% (projects ≤ 12 units) and 8% (projects 12 < units ≤ 20), with an estimated value between $33 and $70 per unit, dependent on the project.

Approximately one day was saved on total projects of < 12 units, whereas almost three days were saved on projects with > 12 units but ≤ 20 units. These values are irrespective of the total length of the project.

Project Viability Metrics for each of five factors are presented in Table (3).

Table (3): Project viability metrics with values. The sign denotes increase or decrease of each factor.

Factor	Project ≤ 12 Units	Project 12 < Units ≤ 20
Gross Revenue (%)	+3.3	+7.6
Labor Units (Days)	-0.8	-2.8
Material Overage (%)	-22.2	-7.57
Time of Estimate to Project Start Date (Days)	-1.7	-3.2
Service Calls Post-Installation (%)	-16.7	-46.2

The ability to predict the amount of material used was improved by approximately 22% in projects ≤ 12 units and approximately 8% in projects > 12 units but ≤ 20 units. These percentages are reported in terms of both amounts spent on materials above estimates and retained stock, which remains encumbered capital. The projected cost savings, whether in terms of expenditures or encumbrances, ranges between $52 and $130, dependent on the size and location of the project. There is a relationship between proximity of a project to major material vendors, and the necessity to procure additional materials in order to prevent stoppage due to insufficient stock. This relationship influences the projected cost savings on a regional basis.

Service calls per installation dropped most significantly in projects with > 12 units but ≤ 20 units, with almost half as many service calls being observed after implementation of the ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings*. Though less profound of a difference, in projects ≤ 12 units there was a drop of about 17%.

Discussion

Implementation of the ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings* solidifies the requirement for qualified radon mitigation professionals to conduct a thorough review of existing conditions and building specifications (Sections 4.1, 4.2), perform non-destructive on-site investigation and visual inspection (Section 6.1), and proper diagnostic investigation (Section 6.2). In so doing, the radon mitigation professional is compelled to understand building architecture, radon entrance pathways, and accessory factors (i.e. HVAC systems, existing sub-slab vents, drainage systems). Diagnostic investigation (Section 6.2), including pressure field and cross communication testing, enables the radon professional to properly design and scale full building radon mitigation solutions, which, in turn, allows for accurate prediction of the amount of materials and labor required to execute the project. This, in turn, permits a greater cost savings for both the client and the radon mitigation professional, thus increasing profits, especially noting that materials purchased in smaller quantities, while on site conducting installations, can be significantly more expensive than bulk quantities purchased prior to beginning the project. The overall percentage is more profound with regards to smaller projects, which has been observed in this dataset. Though less profound of an impact, the average number of days saved in execution of a project could also be reflected in a better awareness of existing hazards (Section 4.3) as well as better communication between radon mitigation professionals and responsible parties (Section 4.4).

Identification of and communication with responsible parties (Section 4.4) and residents, via access notices, (Section 4.5) may be reflected in a reduction in the number of days between the provision of the property manager or investor with an estimate and the scheduling of the project for installation. While there is less confidence in this correlation, due to changes in awareness of property managers and investors to execute radon projects in a timely manner, increased communication would tend to provide critical information by which such responsible parties could make informed and quality decisions, hence expediting the time needed to make such decisions.

Consistency in material selection and installation methodology may have the biggest impact on the overall number of service calls to sites, particularly in projects with > 12 units but ≤ 20 units, where service calls were reduced by almost half. Long-term operation, maintenance, and monitoring plans (Section 12.0) outline both radon mitigation professional as well as client obligations (Section 12.4.2), which may further decrease the number of overall service calls. The greater number of service calls observed in larger projects may be related to the size of the investment made and awareness of liabilities associated with radon mitigation system failures, however, the significance of the reduction of service calls, in projects of ≤ 12 units cannot be underestimated in terms of the impact on the radon mitigation professional, particularly in terms of lost opportunity and lost revenue.

Conclusion

Properly certified radon mitigation professionals implementing the ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings* are aware of potential liabilities to both their business as well as to property managers and investors through exposure to risk incurred by insufficient or improperly installed radon mitigation solutions. Initial findings based upon interpretation of datasets indicate that decreased service-related issues, increased efficiency in material and labor utilization, and increased overall gross profitability open the way for greater numbers of radon mitigation professionals to perform projects on multifamily residential properties. As both radon mitigation professionals and responsible parties become more aware of the benefits of implementation of the ANSI / AARST RMS-MF 2014 *Radon Mitigation Standards for Multifamily Buildings*, confidence in the radon industry may rise, reducing both resident and owner exposure to risk, and, in turn, improving willingness for proper radon mitigation techniques to be used in all situations warranting radon reduction.