Mays Consulting
&Evaluation Services, Inc.
A Professional Consulting & Evaluation Organization

A Guide to Roof Asset Management Procedures

PREFACE

The purpose of this manual is for the user to have a quick reference to general considerations concerning roofing-related needs. It is not intended to be an outline of all practices to be considered during roofing projects. For more detailed information, contact Mays Consulting and Evaluation Services, Inc., 740-363-9511, or email at info@mces.com. There are numerous professional roof consultants/engineers on staff that will be happy to help you.

There are three (3) distinct parts to a successful roofing system: Design, Material and Installation. If any one (1) of these three (3) fail, the roof system fails.

P.O. Box 1020 • Delaware, Ohio 43015 • (740)363-9511 • Fax (740)363-3050
E-Mail: info@mces.com
www.mces.com

Table of Contents

V. Repair Considerations

A. Built-Up Roofing
B. Modified Bitumen Roofing
C. Thermoplastic Single-Ply Membrane (PVC)
D. Thermoset Single-Ply Membrane (EPDM)
E. Metal Roofing

VI. Contractor Pre-Qualification

A. Questionnaire
B. Good Things to Do

VII. Manufacturer Pre-Qualification

A. Material Line
B. Warranty Agreement
C. Contractor Base
D. Other Considerations

VIII. Project Meetings

A. Pre-Bid Meeting Agenda
B. Pre-Construction Meeting Agenda
C. Progress Meeting Agenda

VIII. Construction Administration/Management

A. On-site Inspection Form
B. Application for Payments
C. Change Orders

X. Project Close-Out

A. Punch List Inspection
B. Substantial Completion Form
C. Operation and Maintenance Manual
D. Final Application for Payment

Glossary

Abbreviations

I. Recommendations

B. Repair Projects

1. Proactive/planned repairs.

    a. For a proactive repair project, it would be prudent to employ a professional roof design firm.

2. Reactive repairs (if you have a leak)

    a. Service Contract

        1. At the beginning of each year, invite three to five (3 to 5) pre-qualified contractors to bid on a service contract for a one (1)-year period. The service contract does not include warranted roof areas (see warranted roof areas in this section).
        2. The service contract should have bid line items that include a contractor providing two (2) men on-site for two (2)-hour, four (4)-hour, and eight (8)-hour periods. Each of these bid line items should be inclusive of travel time.
        3. The service contract should also stipulate that the contractor will itemize material and charge on a cost-plus-percentage basis. Typically, 15% is acceptable for mark-up on material.
        4. The service contract should have a requirement for the contractor to provide drawings of where repairs were made and photographs of the repair area.
        5. Provide a roof plan, showing the building outline and separate roof areas and highlighting which areas are to be included in the service agreement. Identify which areas are under warranty and instruct the contractor to stay off of these areas.
        6. There should be a response time listed that the contractor agrees to.
        7. Establish the contact names and telephone numbers of each party.
        8. Establish the reporting mechanism, i.e. who the contractor reports to when arriving at the site.

9. Assign the responsibility of verifying quantity and inspecting the contractor's procedures. This person should be knowledgeable of the service contract agreement.

b. Warranted Roof Areas

If you have a leak on a warranted roof area, follow the instructions on the roof system warranty form. Typically, you are to contact the Manufacturer first, and they will in turn contact the appropriate contractor to service the warranted roof area. Caution is given to follow the procedures outlined on the roof system warranty. Deviating from these procedures can void your warranty.

c. Procedures once a service contract is established

1. Once you are aware of a leak, barricade and demarcate the area to avoid slip and fall hazards and damage to stored materials.
2. Contact your service contract contractor and report the problem.
3. The service contract should already have the protocols established for the contractor to follow.
4. Inspect the contractor's work to ensure the repair was installed according to the guidelines established in the service contract.
5. If the repair was not installed within guidelines, contact the contractor and ask him to return to the site and make the repair according to the agreement.
6. If the repair was installed within guidelines, promptly pay the contractor the predetermined amount.

The benefit of having a service contract is to have competitive bidding on unit pricing for repair procedures. This eliminates inflation due to contractor availability and promotes timely response.

II. Typical Responsibility

A designer is responsible to perform the specific tasks to the extent of which he is employed. The following are responsibilities typical to a designer but not necessarily applicable, dependent upon the contractual requirements.

A. Designer Responsibility

1. A designer is responsible to take into consideration and implement all local, state and federal codes. In addition, the designer should take into consideration all industry, manufacturer, energy, drainage, thermal, vapor, wind, structural, insurance and detail requirements of each roofing system they design.
2. A designer should be aware of roof system characteristics in order to make a selection of what system is applicable to given situations.
3. A designer is responsible to articulate project requirements through the use of specifications and drawings.
4. A designer is responsible for knowing the applicability and compatibility of roofing materials.
5. A designer should inspect the installation of their design to ensure installation meets with their design requirements.
6. A designer is responsible to represent solely and to look out for the best interest of his client and public safety. **A designer should not install, manufacture, or sell roofing materials.** This ensures a non-proprietary approach to your roofing needs.
7. A designer should keep detailed records of a roofing project including: design criteria, meeting minutes, correspondence, on-site inspections, material lists, shop drawings, as-built drawings, application for payments, change orders, corrective actions and contractor compliance with specification and schedule requirements.
8. **Following roofing manufacturer's specifications** does not mean the manufacturer assumes responsibility for the roofing system design requirements (see A.1 above). Manufacturer's specifications are guidelines for their warranted systems. Manufacturers do not take responsibility for roof design. Most prudent manufacturers recommend that a professional designer be employed to handle the responsibility of proper roof design.

III. Pros and Cons of Different Roofing Systems

The following information is presented for a general overview of typical industry products. Specific project conditions and variables in material manufacturer's products, as well as an established contractor base with employees that are trained in the efficient application of the product, affect viability of the product.

A. Built-Up Roofing Systems

A built-up roofing system consists of multiple plies (typically 3 or 4) of fiberglass or organic felts bonded together with inter-ply moppings of either asphalt or coal tar pitch, flood coat surfacing with or without embedded gravel. Asphalt and fiberglass felts are the common built-up roof of today.

1. Pros:

    a. Exterior Fire Resistance with gravel surface
    b. Impact Resistant
    c. Redundancy of multiple plies
    d. Approximately 5-8 lbs. per square foot installed weight
    e. Roughly 3/8 to 1/2-inch in thickness of membrane
    f. No exclusion for ponding water (coal tar only)
    g. Used on slope of :
        1. Coal Tar 0 to ½" in 12, restrictions apply
        2. Asphalt ¼" to 6" in 12, restrictions apply

2. Cons

    a. Labor intensive
    b. Diminishing qualified labor force
    c. Difficult to locate leaks (gravel-surfaced roofs)
    d. Difficult to repair
    e. Susceptible to damage from animal fats and solvents
    f. Odors
    g. Fire hazard (during installation)
    h. Dangerous to handle
    i. Chemical burns from Coal Tar
    j. Susceptible to cold weather cracking (coal tar)
    k. Complex details
    l. Intensive Quality Control
    m. Field manufactured waterproofing layers (susceptible to being installed outside of industry and manufacturer tolerances)

n. Difficult to install within industry tolerances, i.e. application temperatures, mopping weights, maintaining proper head lap

IV. Replacement Considerations

D. Wind

Wind issues, in regards to roofing, are difficult to express in basic terms. We are going to outline one (1) of the common procedures to follow for wind uplift. We will outline the general criteria of appropriate wind design for your roofing system. Every area of the nation has a designated wind speed that should be used to determine the wind uplift pressure on your roofing assemblies. Factory Mutual has developed guidelines to establish the density of fasteners in relation to the wind uplift pressure for your area.

1. The formula to determine wind uplift forces is quite complex and utilizes the following to determine uplift pressure:

    a. Ground roughness
    b. Wind speed
    c. Building height
    d. Parapet height
    e. Openings in walls and roof
    f. Building location

2. After the uplift pressure is determined, you need to apply a safety factor of two. Hence, if the uplift pressure is 45 lb/sf, then the design uplift pressure will be 90 lb/sf.

    What this means is that, for a standard 4'-0 x 8'-0 sheet of insulation (32 sf), you need to base your fastening pattern on 2,880 lbs. of uplift pressure (90lb/sf x 32 sf). This pressure is the design uplift pressure in the field of the roof. You must determine what the pullout resistance is of the type of fasteners you are going to use in the deck material. If, for example, the pullout resistance of the screws you want to use in your metal deck have a pullout resistance of 300 lb, then the number of fasteners per board of insulation would be 9.6 or 10 (2880/300). You then would be able to determine how many fasteners to use on the perimeter and in the corners of your building. There is a multiplier of 1.5 and 1.75, respectively, to the perimeter and corners.

3. Concerns:

    a. If proper fastening is not determined and a failure occurs, your insurance company may have grounds to void the claim.
    b. If a failure does occur, your building will be unprotected from the elements for an extended amount of time. A contractor will have to be brought in to replace the roofing system to the extent of the damage. Downtimes of tenants could result in surcharges for lost time.
    c. There are many variables in calculating design uplift pressure and the appropriate attachment to use for decking, insulations, and membrane.
    d. Special design considerations need to be addressed for perimeter edge conditions.

V. Repair Considerations

The following comments are based on semi-permanent repair considerations. Emergency repairs can be made by utilizing various products that retard or stop water entry. Certain emergency repair products may do permanent damage to the existing roof system components and therefore increase the cost of semi-permanent repairs. Caution is advised when selecting emergency repair material.

For each category of roofing systems, we are going to list some dos and don'ts as they pertain to making repairs.

A. Built-Up Roofing

1. Do

    a. Use asphalt-based materials for repairs to asphalt roofs.
    b. Use coal tar-based materials for repairs to coal tar roofs.
    c. Use Polyurethane caulking for sheet metal, masonry and termination bars.
    d. Use like material to repair expansion joint covers.
    e. Remove all damaged or wet material including insulation prior to making a permanent repair.
    f. Have an owner's representative quantify the repair.
    g. Use pourable sealer to fill pitch pans.
    h. Use SBS or APP modified bitumen sheets to repair the flashings or membrane.
    i. Use fiberglass mesh as a reinforcement when using roof cement.
    j. Use asphalt primer when adhering to an existing membrane or substrate.

k. Demarcate interior space below a leak.
l. Inspect the decking from the underside to verify there is no deterioration.

2. Do Not

a. Use roof cement to repair metal.
b. Use roof cement only to repair the membrane or base flashings.
c. Mix coal tar and asphalt products.
d. Use caulking to repair asphalt-based materials.
e. Use silicone sealant.
f. Use roof cement to fill pitch pockets.
g. Repair anything over wet materials.
h. Leave debris from repairs on roof.
i. Apply coatings over newly applied asphalt-based products.
j. Allow repairs on warranted roof areas without first reviewing the requirements of the roof system warranty.
k. Use Polyisobutylene (PIB, commonly referred to as peel-and-stick or Ice and water guard) as anything but an underlayment.

VI. Contractor Pre-Qualification

B. Good Things To Do

1. Send your prospective contractors a questionnaire. The previous form is an example of information that is useful in pre-qualifying contractors.
2. Call the contractor's references.
3. Visit the contractor's office. See for yourself if the business is legitimate or a virtual-business.
4. Contact Dun and Bradstreet and get a credit report.
5. Create a searchable database of the information provided on the questionnaire.
6. Contact the manufacturers that the contractor lists on the questionnaire. Ask the manufacturer for contractor's reputation and their payment history.
7. Be wary of any contractor whose EMR rating is over 1.0.
8. Be wary of any contractor whose liability insurance coverage is below $1 million.
9. Ask for list and experience of personnel that will be working on your facility.

VII. Manufacturer Pre-Qualification

B. Warranty Agreement

Quality manufacturers should have a range of warranty agreements. They should encompass a range from a basic warranty to a full-system warranty. Basic warranties typically cover the roofing membrane only, while full-system warranties typically cover the roofing system. A roofing system is defined as the components of a roof from the deck up, i.e. insulations, membrane, surfacing, flashings, etc. There are also No Dollar Limit warranties that are typically a full-system warranty without prorated terms. With an NDL warranty, if your roof fails at 19 out of 20 years for a 20-year warranted system, you would be reimbursed the full value of the roof system in lieu of 1/20th the value.

VIII. Project Meetings

C. Progress Meeting Agenda

1. It is recommended to have progress meetings on Tuesday, Wednesday or Thursday. This allows setting the next week's work schedule and also, if there is any corrective action needed, gives the contractor time within the week to make any changes necessary.
2. Discuss past week's progress.
3. Discuss upcoming week's schedule and requirements to keep project on schedule.
4. Discuss installation procedures and if there needs to be any changes.
5. Discuss material deliveries.
6. Discuss any concerns with communication, operations, schedule or installation.
7. Discuss safety.
8. Review project details for incorporation for the following week's work.
9. Document discrepancies and unit price work.

IX. Construction Administration/management

B. Application for Payments

Applications for Payments are a tool an owner or consultant uses to quantify the payments made to the contractor. There is a certain amount of information that should be requested from the contractor for any application for payment. The American Institute of Architects documents G702 and G703 are good documents to use for payment requests.

1. Information that should be contained on or with a payment application is as follows:

    a. Application Number
    b. Period Application covers
    c. Original Contract Sum
    d. Net change by change orders
    e. Contract sum to date
    f. Total work completed and stored to date
    g. Retainage percentage and amount
    h. Total earned less retainage
    i. Current Payment Due
    j. Change order summary
    k. Partial waiver of liens
    l. Schedule of values
    m. Balance to finish each value

2. All the information above can be used to verify if the contractor's application is in line with the work performed.

3. Provide checklist of items to be submitted by the contractor with each payment application.

X. Project Close-Out

B. Substantial Completion Form

1. A certificate of substantial completion should be issued to the contractor with the date that the owner's representative accepts the contractor's work as complete.
2. The certificate of substantial completion is used as a marker for when labor and material warranties begin.