

# Roof Maintenance Plan Goals

Extend service life  
of existing roofs

Retain warranty  
coverage

Prioritize roof  
repairs/replacements

RMP begins before roof  
installed (selection)

Establish 5-10 year  
budgeting plan

Design and selection



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# Why Maintain Your Roof ?



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**1.**

**Facility managers under pressure to spend wisely while managing assets properly**



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**2.**

**Oftentimes, leaks can be occurring for days, weeks, or months before they are noticed in the inside of building**



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**3.**

**Active leaks affect building usage and occupant comfort**



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**4.**

**Unanticipated expenditures to address roofing “emergencies” (budgets and reputations can take a beating)**



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**5.**

**Roof replacement costs can easily exceed \$30/sf on institutional type facilities**



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# Roofing Costs

Job Name	City, State	Low Bid	Cost Per/Sq.Ft.
40 Erie St. XXX	Cambridge, MA	\$ 1,697,030.00	\$ 26.43
Lynch XXX	Winchester, MA	\$ 1,512,700.00	\$ 32.95
JFK XXX	Springfield, MA	\$ 1,738,349.00	\$ 19.53
German Gerena XXX	Springfield, MA	\$ 1,244,800.00	\$ 19.51
Pollard XXX	Needham, MA	\$ 2,800,500.00	\$ 27.05
Kennedy XXX	Woburn, MA	\$ 2,642,000.00	\$ 26.08
Edison XXX	Boston, MA	\$ 1,383,000.00	\$ 39.01
Glickman XXX	Springfield, MA	\$ 956,000.00	\$ 21.48
State University	Fitchburg, MA	\$ 606,500.00	\$ 23.33
Amesbury East XXX	Waltham, MA	\$ 679,000.00	\$ 48.50
Hartford XXX	Newington, CT	\$ 1,219,400.00	\$ 22.44
Homer XXX	Springfield, MA	\$ 442,000.00	\$ 23.09
Phillips Memorial Library XXX	Providence, RI	\$ 992,440.00	\$ 19.09
Woods Hole Oceanographic Institute - McLean	Woods Hole, MA	\$ 328,170.00	\$ 15.00
Woods Hole Oceanographic Institute - Smith	Woods Hole, MA	\$ 567,685.00	\$ 60.78
Dana Farber XXX	Boston, MA	\$ 1,142,000.00	\$102.88
XXX Hospital - Amory	Boston, MA	\$ 2,528,000.00	\$ 79.00
XXX Hospital - Tissue Typing	Boston, MA	\$ 798,000.00	\$ 84.00
XXX Medical Center - Reisman	Boston, MA	\$ 602,000.00	\$ 43.00
XXX Medical Center - Rose	Boston, MA	\$ 1,210,000.00	\$ 55.00
<b>TOTAL Average SF Cost</b>			<b>\$39.41</b>

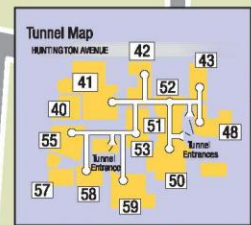


94 Buildings, 282 Roof Areas, 1.2M sf of Roofing



# University A

Average Age of Roofs is 18.38 Years, Roof Types (built up, modified bitumen, EPDM, TPO, PVC, asphalt shingle, slate)



# University A

Average SF Cost for Roof Replacement: \$30/SF  
Value of Roof Assets: \$36,000,000



# Common Roofing Misconceptions



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**Roof Just Sits There –  
Out of Sight / Out of Mind**



**UV Degradation / Heat Load**



**Wind / Ice / Snow / Hail**



**New Equipment / Penetrations**



**HVAC Maintenance Workers**

# I'm Covered – I Have a Warranty

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graph TD; A["I'm Covered – I Have a Warranty"] --> B["Warrantied that roof will last under normal conditions with periodic maintenance"]; B --> C["Not all inclusive / only materials provided by manufacturer"]; C --> D["Easily voided"]; D --> E["Covers leakage only / not replacement of wet materials"];
```

Warrantied that roof will last under normal conditions *with* periodic maintenance

Not all inclusive / only materials provided by manufacturer

Easily voided

Covers leakage only / not replacement of wet materials

# 15 Year Standard Warranty

Warranty Serial No.: 0000011998-238313.1

## ROOFING WARRANTY FOR COMMERCIAL BUILDING

Building Owner: [redacted] Hospital  
Building Name: [redacted] Hospital - [redacted] Building

### TERMS, CONDITIONS, LIMITATIONS

1. Owner shall notify [redacted] on the first business day immediately following the discovery of each leak in the Roofing System and confirm in writing within one week.
2. If on [redacted] inspection, [redacted] determines that the leak is caused by a defect in [redacted] Roofing Membrane or Accessory provided by [redacted] to the Applicator for this building or from a defect in the [redacted] Authorized Applicator's workmanship applied to that [redacted] Membrane, except as provided in the following paragraph three (3) Owner's remedies and [redacted] liability shall be limited to [redacted] repair of the Roofing Membrane or Accessory.
3. This warranty does not apply and may be null and void if any of the following occur:
  - (a) The Roofing Membrane or Accessory is damaged by a natural disaster including, but not limited to, earthquake, lightning, hail, windstorm in excess of 60 mph (97 km/h), hurricane, or tornado, or:
  - (b) The Roofing Membrane or Accessory is damaged by any act of negligence, accident, or misuse including, but not limited to, vandalism, falling objects, civil disobedience, or act of war, or:

3. This warranty does not apply and may be null and void if any of the following occur:
  - (a) The Roofing Membrane or Accessory is damaged by a natural disaster including, but not limited to, earthquake, lightning, hail, windstorm in excess of 60 mph (97 km/h), hurricane, or tornado, or:
  - (b) The Roofing Membrane or Accessory is damaged by any act of negligence, accident, or misuse including, but not limited to, vandalism, falling objects, civil disobedience, or act of war, or:
  - (c) A deficient pre-existing condition or equipment is causing water entry, or:
  - (d) Metal work or other accessories or equipment is used in the Roofing and causes leaks, or:
  - (e) There are any alterations or repairs made on or through the completed roof, or objects such as but not limited to fixtures, equipment, or structures are placed on or attached to the completed roof without first obtaining written authorization from [redacted].
  - (f) Failure by the Owner or his lessee to use reasonable care in maintaining the roof as described in the Owner's Guide provided with this warranty, including that of sealants and caulking, or:
  - (g) Loss of integrity of the building envelope and, or structure including, but not limited to partial or complete loss of roof decking, wall siding, windows, doors or other envelope components or from roof damage by wind blown objects, or:
  - (h) Condensation accumulates in the roof assembly due to incorrect design or due to a reduction in the vapor barrier effectiveness, or:
  - (i) A significant change in the use of the building by the Owner or his lessee effected by [redacted], effect the Roofing Membrane as originally installed, or:
  - (j) The Roofing Membrane is damaged by contaminates and/or spills, or:
  - (k) Deficient design applied to the Roofing Membrane such as membrane contact with incompatible materials and/or substrates, or:
  - (l) The Owner fails to comply with every term and condition stated herein.
4. During the period of this warranty, [redacted] its agents and employees, shall have free access to the roof during regular business hours.
5. Should the Roofing Membrane be concealed, the cost of exposure of the Roofing Membrane for purposes of [redacted] investigation and/or repair, such as removal and replacement of any paving or overburden, shall be the Owner's responsibility.
6. [redacted] shall have no obligation under this warranty until all invoices for materials, installation, and services have been paid for in full.
7. [redacted] failure at any time to enforce any of the terms or conditions stated herein shall not be construed to be a waiver of such provision.
8. This warranty is extended solely and exclusively to the owner of the Building at the time the [redacted] Roofing System is installed. It does not extend nor is it otherwise assignable or transferable to any other party unless approved in advance and in writing by [redacted] and the costs to process the transfer and to inspect and repair the [redacted] Roofing System, if necessary, are paid for by the original owner.
9. The Owner and [redacted] hereby agree that any and all claims (contractual, statutory, common law or otherwise), disputes, or suits that in any way, directly or indirectly, arise out of or relate to this Warranty, or the alleged breach thereof, or to any contracts between the owner and [redacted] or the alleged breach thereof, or to the design, manufacture, sale, distribution, installation, and/or inspection of the [redacted] Roofing System, shall first be submitted to non-binding mediation before a neutral mediator jointly selected by the parties or, in the absence of agreement, as designated by the American Arbitration Association. In the absence of resolution by mediation, all such claims shall be settled by arbitration by the American Arbitration Association in accordance with the Construction Industry Arbitration Rules. Any such mediation and/or arbitration shall take place in Boston, Massachusetts. This Warranty, and any claims, disputes or suits between the parties hereto shall be governed by, and construed and enforced in accordance with, the laws of the Commonwealth of Massachusetts.
10. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THE REMEDIES STATED HEREIN ARE EXCLUSIVE REMEDIES AND [redacted] SHALL NOT BE RESPONSIBLE OR LIABLE FOR ANY INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES INCLUDING THE PRESENCE OF MOLDS, FUNGI, BACTERIA, SPORES, MYCOTOXINS OR THE LIKE OR FURTHER LOSS OF ANY KIND WHATSOEVER, INCLUDING BUT NOT LIMITED TO, DAMAGE TO THE BUILDING ON WHICH THE COMPONENTS OF THE ROOF ARE SITUATED, DAMAGE TO THE CONTENTS THEREOF, LOSS OF USE OF THE BUILDING OR ANY COMPONENT PART THEREOF, OR DAMAGE TO ANY OTHER PROPERTY OR PERSONS.

NO REPRESENTATIVE OF [redacted] HAS AUTHORITY TO MAKE ANY REPRESENTATIONS OR PROMISES EXCEPT AS STATED HEREIN.

This Warranty Is Effective From: 6/3/2013 through: 6/2/2028

# 15 Year Standard Warranty

Warranty Serial No.: 0000011998-238313.1

## ROOFING WARRANTY FOR COMMERCIAL BUILDING

Building Owner: \_\_\_\_\_ Hospital  
 Building Name: \_\_\_\_\_ Hospital - \_\_\_\_\_ Building  
 Building Address: \_\_\_\_\_ Street  
 Boston, MA 02115  
 Applicator: \_\_\_\_\_ Telephone: \_\_\_\_\_  
 Date of Substantial Completion: 6/3/2013 Date of Inspection: N/A By: N/A

- (c) A deficient pre-existing condition or equipment is causing water entry, or:
- (d) Metal work or other accessories or equipment is used in the Roofing and causes leaks, or:
- (e) There are any alterations or repairs made on or through the completed roof, or objects such as but not limited to fixtures, equipment, or structures are placed on or attached to the completed roof without first obtaining written authorization from \_\_\_\_\_:
- (f) Failure by the Owner or his lessee to use reasonable care in maintaining the roof as described in the Owner's Guide provided with this warranty, including that of sealants and caulking, or:
- (g) Loss of integrity of the building envelope and, or structure including, but not limited to partial or complete loss of roof decking, wall siding, windows, doors or other envelope components or from roof damage by wind blown objects, or:
- (h) Condensation accumulates in the roof assembly due to incorrect design or due to a reduction in the vapor barrier effectiveness, or:
- (i) A significant change in the use of the building by the Owner or his lessee expected by \_\_\_\_\_ effect the Roofing Membrane as originally installed, or:
- (j) The Roofing Membrane is damaged by contaminates and/or spills, or:
- (k) Deficient design applied to the Roofing Membrane such as membrane contact with incompatible materials and/or substrates, or:
- (l) The Owner fails to comply with every term and condition stated herein.

- (l) Failure by the Owner or his lessee to use reasonable care in maintaining the roof as described in the Owner's Guide provided with this warranty, including that of sealants and caulking, or:
  - (g) Loss of integrity of the building envelope and, or structure including, but not limited to partial or complete loss of roof decking, wall siding, windows, doors or other envelope components or from roof damage by wind blown objects, or:
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  - (i) A significant change in the use of the building by the Owner or his lessee expected by \_\_\_\_\_ effect the Roofing Membrane as originally installed, or:
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  - (l) The Owner fails to comply with every term and condition stated herein.
4. During the period of this warranty, \_\_\_\_\_ its agents and employees, shall have free access to the roof during regular business hours.
  5. Should the Roofing Membrane be concealed, the cost of exposure of the Roofing Membrane for purposes of \_\_\_\_\_ investigation and/or repair, such as removal and replacement of any paving or overburden, shall be the Owner's responsibility.
  6. \_\_\_\_\_ shall have no obligation under this warranty until all invoices for materials, installation, and services have been paid for in full.
  7. \_\_\_\_\_ failure at any time to enforce any of the terms or conditions stated herein shall not be construed to be a waiver of such provision.
  8. This warranty is extended solely and exclusively to the owner of the Building at the time the \_\_\_\_\_ Roofing System is installed. It does not extend nor is it otherwise assignable or transferable to any other party unless approved in advance and in writing by \_\_\_\_\_ and the costs to process the transfer and to inspect and repair the \_\_\_\_\_ Roofing System, if necessary, are paid for by the original owner.
  9. The Owner and \_\_\_\_\_ hereby agree that any and all claims (contractual, statutory, common law or otherwise), disputes, or suits that in any way, directly or indirectly, arise out of or relate to this Warranty, or the alleged breach thereof, or to any contracts between the owner and \_\_\_\_\_ or the alleged breach thereof, or to the design, manufacture, sale, distribution, installation, and/or inspection of the \_\_\_\_\_ Roofing System, shall first be submitted to non-binding mediation before a neutral mediator jointly selected by the parties or, in the absence of agreement, as designated by the American Arbitration Association. In the absence of resolution by mediation, all such claims shall be settled by arbitration by the American Arbitration Association in accordance with the Construction Industry Arbitration Rules. Any such mediation and/or arbitration shall take place in Boston, Massachusetts. This Warranty, and any claims, disputes or suits between the parties hereto shall be governed by, and construed and enforced in accordance with, the laws of the Commonwealth of Massachusetts.
  10. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THE REMEDIES STATED HEREIN ARE EXCLUSIVE REMEDIES AND \_\_\_\_\_ SHALL NOT BE RESPONSIBLE OR LIABLE FOR ANY INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES INCLUDING THE PRESENCE OF MOLDS, FUNGI, BACTERIA, SPORES, MYCOTOXINS OR THE LIKE OR FURTHER LOSS OF ANY KIND WHATSOEVER, INCLUDING BUT NOT LIMITED TO, DAMAGE TO THE BUILDING ON WHICH THE COMPONENTS OF THE ROOF ARE SITUATED, DAMAGE TO THE CONTENTS THEREOF, LOSS OF USE OF THE BUILDING OR ANY COMPONENT PART THEREOF, OR DAMAGE TO ANY OTHER PROPERTY OR PERSONS.

NO REPRESENTATIVE OF \_\_\_\_\_ HAS AUTHORITY TO MAKE ANY REPRESENTATIONS OR PROMISES EXCEPT AS STATED HEREIN.

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## ROOFING WARRANTY FOR COMMERCIAL BUILDING

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 Building Name: \_\_\_\_\_ Hospital - \_\_\_\_\_ Building  
 Building Address: \_\_\_\_\_ Street  
 Boston, MA 02115  
 Applicator: \_\_\_\_\_ Telephone: \_\_\_\_\_  
 Date of Substantial Completion: 6/3/2013 Date of Inspection: N/A By: N/A  
 Building/Area Name: \_\_\_\_\_ Building  
 Used As: HEALTH - HOSPITALS Area Warranted: \_\_\_\_\_

\_\_\_\_\_ warrants to the owner of the building described above ("Owner"), that subject to the terms, conditions, and limitations stated herein, \_\_\_\_\_ will repair leaks originating from the \_\_\_\_\_ Roofing Membrane or \_\_\_\_\_ Roofing Accessories installed according to \_\_\_\_\_ Technical instructions by a \_\_\_\_\_ Authorized Roofing Applicator for a period of 15 (fifteen) years commencing with the date of substantial completion of the \_\_\_\_\_

5. Should the Roofing Membrane be concealed, the cost of exposure of the Roofing Membrane for purposes of \_\_\_\_\_ investigation and/or repair, such as removal and replacement of any paving or overburden, shall be the Owner's responsibility.
6. \_\_\_\_\_ shall have no obligation under this warranty until all invoices for materials, installation, and services have been paid for in full.
7. \_\_\_\_\_ failure at any time to enforce any of the terms or conditions stated herein shall not be construed to be a waiver of such provision.
8. This warranty is extended solely and exclusively to the owner of the Building at the time the \_\_\_\_\_ Roofing System is installed. It does not extend nor is it otherwise assignable or transferable to any other party unless approved in advance and in writing by \_\_\_\_\_ and the costs to process the transfer and to inspect and repair the \_\_\_\_\_ Roofing System, if necessary, are paid for by the original owner.
9. The Owner and \_\_\_\_\_ hereby agree that any and all claims (contractual, statutory, common law or otherwise), disputes, or suits that in any way, directly or indirectly, arise out of or relate to this Warranty, or the alleged breach thereof, or to any contracts between the owner and \_\_\_\_\_ or the alleged breach thereof, or to the design, manufacture, sale, distribution, installation, and/or inspection of the \_\_\_\_\_ Roofing System, shall first be submitted to non-binding mediation before a neutral mediator jointly selected by the parties or, in the absence of agreement, as designated by the American Arbitration Association. In the absence of resolution by mediation, all such claims shall be settled by arbitration by the American Arbitration Association in accordance with the Construction Industry Arbitration Rules. Any such mediation and/or arbitration shall take place in Boston, Massachusetts. This Warranty, and any claims, disputes or suits between the parties hereto shall be governed by, and construed and enforced in accordance with, the laws of the Commonwealth of Massachusetts.
10. **THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THE REMEDIES STATED HEREIN ARE EXCLUSIVE REMEDIES AND \_\_\_\_\_ SHALL NOT BE RESPONSIBLE OR LIABLE FOR ANY INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES INCLUDING THE PRESENCE OF MOLDS, FUNGI, BACTERIA, SPORES, MYCOTOXINS OR THE LIKE OR FURTHER LOSS OF ANY KIND WHATSOEVER, INCLUDING BUT NOT LIMITED TO, DAMAGE TO THE BUILDING ON WHICH THE COMPONENTS**

9. The Owner and \_\_\_\_\_ hereby agree that any and all claims (contractual, statutory, common law or otherwise), disputes, or suits that in any way, directly or indirectly, arise out of or relate to this Warranty, or the alleged breach thereof, or to any contracts between the owner and \_\_\_\_\_ or the alleged breach thereof, or to the design, manufacture, sale, distribution, installation, and/or inspection of the \_\_\_\_\_ Roofing System, shall first be submitted to non-binding mediation before a neutral mediator jointly selected by the parties or, in the absence of agreement, as designated by the American Arbitration Association. In the absence of resolution by mediation, all such claims shall be settled by arbitration by the American Arbitration Association in accordance with the Construction Industry Arbitration Rules. Any such mediation and/or arbitration shall take place in Boston, Massachusetts. This Warranty, and any claims, disputes or suits between the parties hereto shall be governed by, and construed and enforced in accordance with, the laws of the Commonwealth of Massachusetts.

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This Warranty Is Effective From: 6/3/2013 through: 6/2/2028

\_\_\_\_\_  
8/30/2013  
\_\_\_\_\_  
8/30/2013

# **Our In-House Maintenance Staff Takes Care of Roof**



**Requires specialized training, materials, equipment**



**Repairs do not work and compound problem**



**Wrong materials void warranty**



**Contractor not approved by manufacturer**



**Cut backs to facilities groups does not allow  
for in-house roof specialist**

# Roof Management Programs Extend through Service Life of Roof



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**Inspection: Quarterly or Semi-Annually**



**Maintenance of Roofs Required to  
Maintain Warranty Status**



**Leaks – Often Not Related to Roof**



**Rising Walls Adjacent to Roofs – Common Source of Leaks**



**Unflashed Penetrations Through Walls**





**Open Flashings**



**Pitch Pockets Not Warrantied**



**Termination Bars Sealant Dependent /  
High Maintenance / Not Warranted**



**Sealant Dependent Term Bar Not Warrantied**



**Sealant Dependent Term Bar Not  
Warrantied**



**Through-Wall Flashings Affect Roof  
Performance**



## Through-Wall Flashings Affect Roof Performance



**Fasteners Directly Under Membrane Cause Problems**





**Fasteners Directly Under Membrane Cause Problems**

# Initiation of a Roof Maintenance Plan (RMP)



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# Compile data

plans, specs, warranties, submittals, repair record, etc.



## Perform interior leak audit



## Building measure-ups



## Visually inspect roofs & note defects

**Roof test cuts**

optional



**Non-destructive survey**

optional



**Controlled leak testing**

optional



**Develop roof specific condition report**

roof plan, photos, recommendations, budget

# Non-Destructive Testing



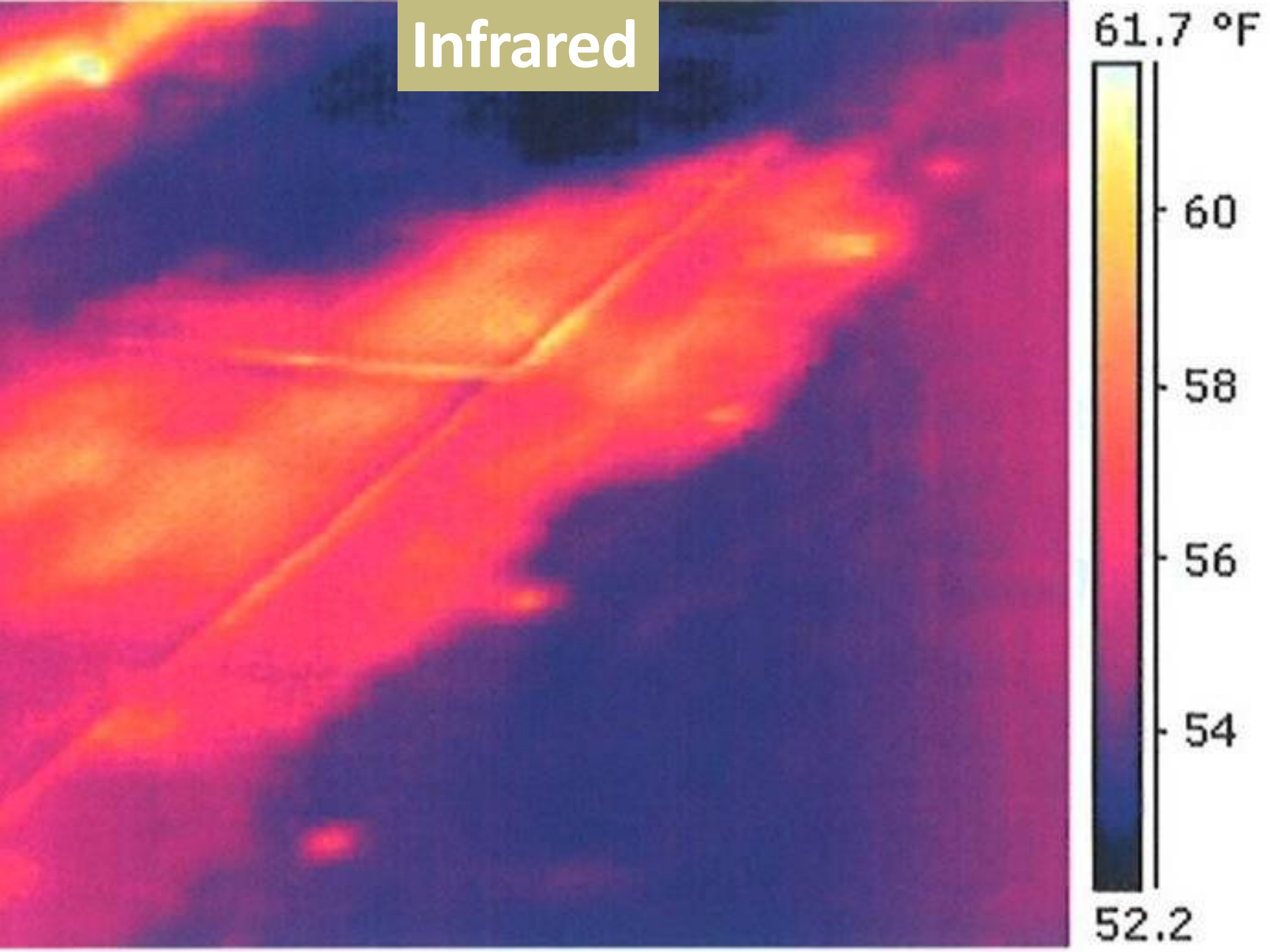
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Capacitance



Infrared





# Controlled Leak Testing

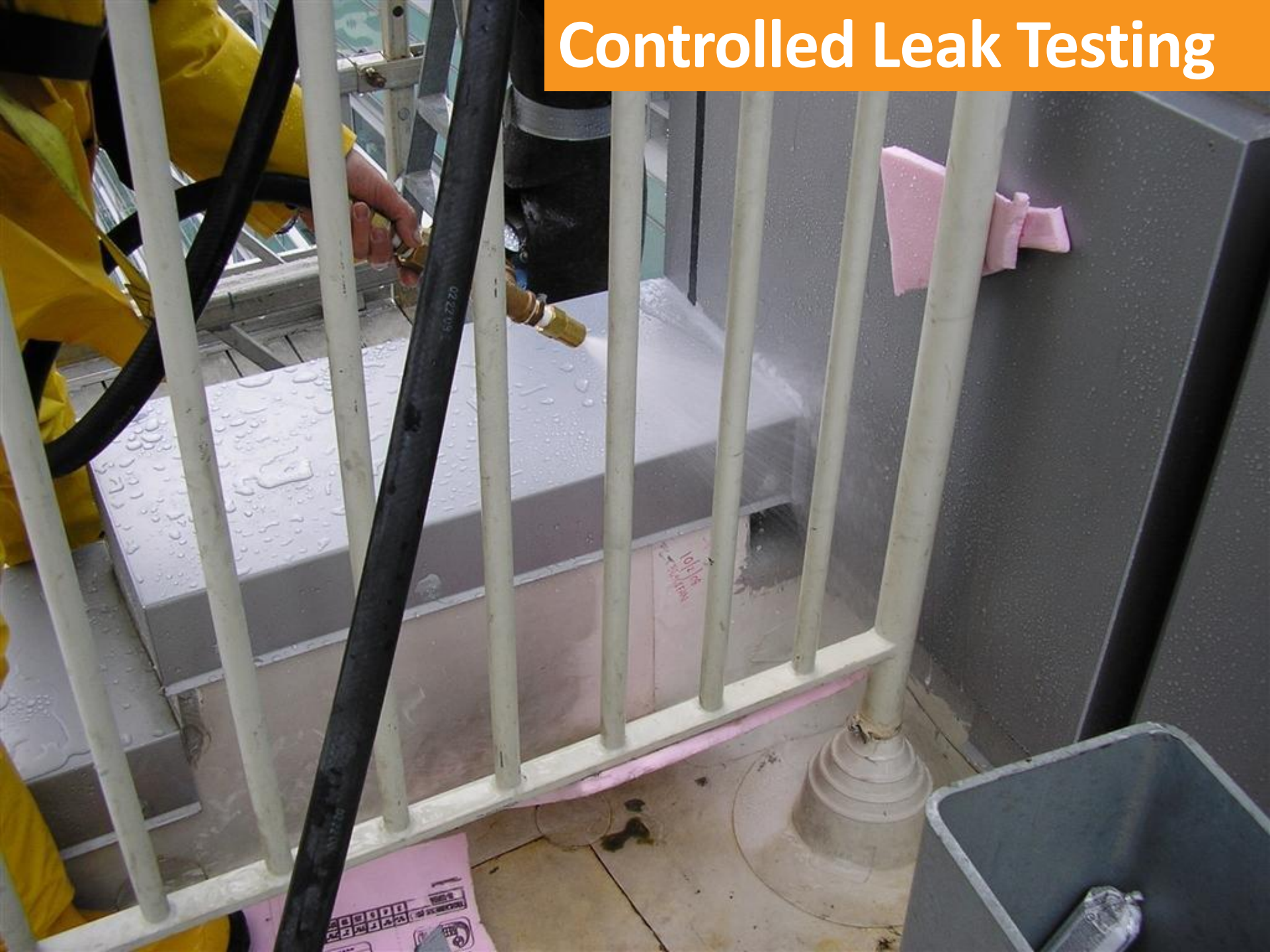


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# Leak Testing



# Controlled Leak Testing



# Condition Reports for Each Building

Roof description (age, type, configuration, etc.)

Recommendations for repairs

Roof area plans

Budgetary cost estimates

Plan notes types/ locations/quantities of roof defects



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# Develop roof specific condition report

roof plan, photos, recommendations, budget



## Develop prioritization plan



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# Prioritization based on:

Visual  
Evaluation

Leak  
history

Age of roof  
& repair  
history

Interior  
space  
usage

Owner  
input



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# A Roof Maintenance Program is Not Expensive

- Roof is a Valuable Asset
- RMP Maintains Warranty Status
- Insurance Carrier Can Delay Claim (e.g. hurricane) if Roof Not Maintained

	Average Maintenance Costs	Average Life Span
Roofs without RMP	\$0.25 / SF	13 Years
Roofs with RMP	\$0.14 / SF	+ 21 Years



**Ultimate Goal is to Achieve  
Maximum Service Life at Least  
Possible Cost**



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