PHOTOS: COURTESY DURO-LAST ROOFING

Toronto roofing contractor Guycan Aluminum installed 130,000 sf of single-ply roofing at Olympia Tile & Stone, Toronto, in the middle of the Canadian winter.

How Building Teams Choose Roofing Systems

As thousands of architects, structural engineers, general contractors, roofing contractors, and building owners make preparations to attend the International Roofing Expo in Las Vegas (February 16-18), *Building Design+Construction* took the opportunity to ask a representative sample of our readers how and why they choose the roofing systems they use.

By Robert Cassidy, Editorial Director

KEY FINDINGS OF THE ROOFING SURVEY

- Respondents named metal (56%) and EPDM (50%) as the roofing systems they (or their firms) employed most in projects. However, the results show that they used a wide variety of roofing types, including built-up, shakes and shingles, modified bitumen, TPO, PVC, and tiles.
- Insulation choice was also spread among several product categories, with polyisocyanurate leading the way (62%) and EPS, XPS, and sprayed polyurethane foam also showing support.
- More than half of respondents (53%) said their roofing projects were essentially all low-slope jobs (2/12 rise or less), but nearly a third (31%) said steep-slope roofs (>2/12 rise) comprised all or almost all of their roofing-related projects.
- New construction and retrofits were fairly evenly split among respondents' roofing-related projects over the last couple of years.
- Initial cost is *not* the most important factor in choosing a roofing system. That honor went to durability and reliability, at least from the experience of respondents and their perception of their clients' priorities.
- In a related finding, it is not surprising that "leaks or failures" (42%) was the single biggest concern or worry expressed by respondents, along with such related factors as "quality/performance" (17%) and "incorrect installation" (11%). Again, cost was not the key concern, with only 13% of respondents checking it as their number one worry.
- In terms of "green" factors, energy efficiency (52%) is far and away the crucial component of a roofing system, followed distantly by life cycle cost (25%).
- Building information modeling is still largely in its infancy in respondents' roofing-related projects, with less than one-third

Table 1. Respondents Cover the Building Team

Designers Lead Cross-Section of Professions

Architect/Designer	52%
Owner/Developer/Facility or Asset Manager	18%
Contractor	14%
Engineer	12%
Other, incl. Consultant, Specification Writer	5%

n = 263 | Note: Percentages do not add up to 100 due to rounding.

While architects and designers made up the majority of respondents, the survey drew a balanced representation from owners, contractors, and engineers as well.

Table 2. Broad Geographical Representation

In the last 18-24 months, where have most of your roofing-related projects (or your firm's) been located?

All or most of the continental U.S.	8%
Canada	1%
Northeast	18%
Mid-Atlantic	8%
Southeast	17%
Midwest/Upper Plains	26%
Southwest	12%
West/Alaska	16%
Hawaii	3%

n = 258 | Note: Percentages do not add up to 100 due to rounding.

Respondents' roofing work was spread across the U.S., with strong concentration in the center of the country. The Mid-Atlantic states appear to be slightly underrepresented.

Table 3. New Construction vs. Retrofit

In the last 18-24 months, how much of your roofing projects (or your firm's) involved new construction? How much involved retrofit or reconstruction?

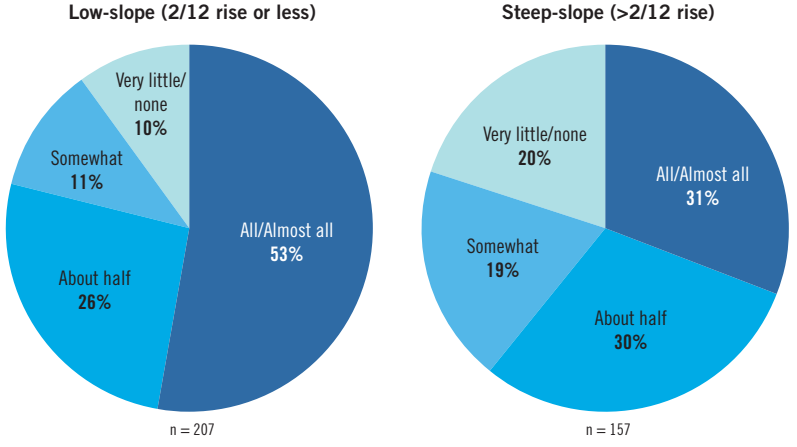
All/almost all new construction	16%
Mostly new construction, some retrofit	28%
About half and half	20%
Mostly retrofit, some new construction	20%
All/almost all retrofit	16%

n = 219

Respondents (or their firms) said they were involved in a mix of roofing projects, both new construction as well as reconstruction and retrofit projects.

Chart 1. Low-slope Edges Out Steep-slope

How much of your work (or your firm's) involves low-slope vs. steep-slope roofing?



More respondents (187) said they (or their firms) did at least some low-slope roofs than was the case for steep roofs (125), with the majority (53%) stating that low-slope accounted for all or almost all of their roofing work.

(32%) saying that they used BIM. However, the use of BIM is expected to grow to about 59% over the next two years or so.

- Only a small percentage of respondents (4%) said they (or their firms) have made extensive use of photovoltaics on roofs in the last two years, but three in 10 (30%) had used PVs in a few projects. The upside is that 57% plan to do so in the next 18-24 months.
- Similarly, the extensive use of green vegetative roofs is limited (2%), but 23% of respondents (or their firms) have tried them in at least a few projects in the last two years, and 38% said they intend to do so in the next 18-24 months.

SURVEY METHODOLOGY

The survey was emailed to a representative sample of *BD+C*'s subscriber list. No incentive was offered; 263 qualified returns were obtained. The majority of responses (52%) came from architects and designers, a group that represents half of *BD+C*'s subscriber base; however, respondents were spread across the professions and included nearly one-fifth (18%) from among owners and facilities directors. In terms of location, respondents' roofing-related projects covered the entire U.S. (and a bit in Canada), although the Mid-Atlantic region may have been underrepresented (8%). A margin of error of 6-7% at the 95% confidence level can be applied in most cases.

Note: Some of the tables refer to "Top % rank," the percentage of respondents who rated the factor as their single most important factor. "Weighted score" was calculated by tripling the number of respondents who rated the factor #1, doubling those who rated the factor #2 by 2, multiplying by one those who rated the factor #3 by 1, and dividing the sum by three to obtain the average.

Table 4. Types of Roofing Systems Used

Which roofing systems have you (or your firm) used in the last 18-24 months? (Multiple answers permitted.)

Metal	56%
EPDM (ethylene propylene diene monomer)	50%
BUR (built-up roofing)	38%
Shakes/shingles	37%
Modified bitumen	34%
TPO (thermoplastic polyolefin)	31%
PVC (polyvinyl chloride)	21%
Tiles	19%
Other	31%

n = 219

Metal roofs—steel, aluminum, copper, zinc, etc.—led the way among respondents, followed closely by EPDM. The results strongly indicate that AEC professionals and building owners use many different types of roof systems.

Table 5. Types of Insulation Used

Which type or types of insulation have you (or your firm) used in roofing projects in the last 18-24 months? (Multiple answers permitted.)

Polyisocyanurate	62%
EPS (expanded polystyrene)	45%
XPS (extruded polystyrene foam)	31%
Sprayed polyurethane foam	27%

n = 202

Polyiso was the insulation of choice for a substantial majority of respondents (or their firms). However, respondents indicated they used a wide variety of insulation types in roofing projects.

43 Education Sessions at International Roofing Expo

The International Roofing Expo will be held February 16-18 at the Las Vegas Convention Center.

Education sessions include "Research on Flammability of Rooftop Photovoltaic Products," "Constructing Vegetative Green Roofs that Comply with the Building Code," "Common Faux Pas of Metal Roofing," "The Pros, Cons, and How To of BIPVs" (building-integrated photovoltaics), "Building Code Compliance Misconceptions and Pitfalls," "How Green Codes and Standards Will Change Your Business," and "Rooftop Solar 2100 and Beyond."

Additional IRE education courses will cover "BIM for the Roofing Industry" and "Introducing 'Roofpoint,' A New Measure for Environmental Innovation."

More information on IRE: www.theroofingexpo.com.

Table 6. Top Roofing Attribute: Durability/Reliability

From your experience and that of your clients, which GENERAL FACTORS are most important in choosing a roofing system? (Rank 1, 2, 3.)

	Top % rank (Rank #1)	Weighted score (Average rank)
Durability/reliability	46%	138
Initial cost (including installation)	17%	101
Performance/quality	16%	61
Aesthetics	11%	36
Warranty length	3%	16

n = 218

The combination of durability and reliability clearly outranked very other factor in respondents' perception of importance, even more than initial cost. Other factors not shown here, notably wind uplift rating (2%), fire/life safety rating (2%), ease of maintenance (<1%), and industry rating (1%), scored 2% or less on top ranking.

How the factors were calculated: "Top % rank" refers to the percentage of respondents who rated the factor as their single most important factor. "Weighted score" was calculated by multiplying by 3 the number of respondents who rated the factor #1, multiplying by 2 those who rated the factor #2, multiplying by 1 those who rated the factor #3, and dividing the sum by 3 to obtain the average score.

Table 7. Energy Efficiency Tops Green Roofing Attributes

From your experience and that of your clients, which SUSTAINABILITY FACTORS are most important in choosing a roofing system? (Rank 1, 2, 3.)

	Top % rank (Rank #1)	Weighted score (Average rank)
Energy efficiency	52%	154
Life cycle costs	25%	113
LEED points or other green rating	9%	41
Solar Reflectance Index	5%	30
Reflectivity/emittance	5%	35

n = 218

The majority of respondents ranked energy efficiency as the key "green" factor, but life cycle costs showed surprising strength. Solar Reflectance Index is used in LEED. Other factors, such as local sourcing (2%), recycled content (2%), and recyclability (1%) may have been viewed as included in LEED points.

Table 8. Biggest Concern for Roofs: Leaks

From your experience and that of your clients, what are your biggest concerns or worries with regard to roofing projects? (Rank 1, 2, 3.)

	Top % rank (Rank #1)	Weighted score (Average rank)
Leaks or failures	42%	129
Quality/performance of roofing system	17%	77
Cost	13%	69
Incorrect installation	11%	59
Roofing contractor's expertise	5%	34
Damage to reputation from a poor job	5%	17

n = 218

Once again, cost is not the main focus for respondents. Avoiding leaks or failures and quality/performance are clearly related, as are installation errors and the roofing contractor's reputation. Scoring 1% or less were such factors as code compliance, financing, safety, and schedule disruption.

Table 9. Use of BIM to Increase

In the past 18-24 months, to what extent have you or your firm used BIM or BIM objects in roofing-related projects? To what extent do you think you or your firm will use BIM in roofing projects in the next 18-24 months?

	Past 18-24 months	Next 18-24 months
Extensive use of BIM	7%	11%
Use BIM in about half of projects	7%	11%
Use BIM in a few projects	18%	37%
No use of BIM in roofing-related projects	69%	41%

n = 218

Most respondents (or their firms) are currently not using BIM on roofing-related projects, but 31% (rounding error) are doing so in at least a few projects, and 59% said they intend to do so in the next two years.

Table 10. Roof-installed PVs to Rise

In the past 18-24 months, to what extent have you or your firm used solar photovoltaics in roofing-related projects? To what extent do you think you or your firm will use PVs in roofing projects in the next 18-24 months?

	Past 18-24 months	Next 18-24 months
Extensive use of PVs	4%	3%
Use PVs in about half of projects	3%	8%
Use PVs in a few projects	23%	46%
No use of PVs in roofing-related projects	70%	44%

n = 222

Only three in 10 respondents (30%) said they (or their firms) were using roofing integrated photovoltaics to any extent, but a majority (57%) said they intend to use PVs in the next two years or so, at least in some projects.

Table 11. Photovoltaics: Where Cost Really Counts

From your experience and that of your clients, what are the most important factors related to including PVs in roofing projects? (Rank 1, 2, 3.)

	Top % rank (Rank #1)	Weighted score (Average rank)
Initial cost	42%	112
Ability to integrate PVs into roofing system	14%	54
Length of payback period	12%	35
Suitability of PVs for the project	8%	29
Government incentives	5%	25

n = 197

Initial cost runs away with the prize for "most important factor" in whether to include photovoltaics in a roofing project, according to survey respondents.

Table 12. Vegetative Roofs Show Some Promise

In the past 18-24 months, to what extent have you (or has your firm) installed vegetative roofs? To what extent do you think you or your firm will do so in the next 18-24 months?

	Past 18-24 months	Next 18-24 months
Extensive use of vegetative roofs	2%	2%
Use vegetative roofs in about half of projects	2%	3%
Use vegetative roofs in a few projects	19%	33%
No use of vegetative roofs	77%	61%

n = 223

Vegetative roofs were not high on the priority list of respondents and their firms, although 23% did have some experience with them in a few projects. However, interest in using them is expected to rise in the next two years: Nearly two-fifths (39%) said they expect to use such green roofs in at least a few projects in that time period.

Table 13. Cost: Key Factor in Vegetative Roof Decision

From your experience (and your clients'), what are the most important factors related to including vegetative roofs in projects? (Rank 1, 2, 3.)

	Top % rank (Rank #1)	Weighted score (Average rank)
Initial cost	26%	79
Ability to integrate into roofing system	21%	62
Suitability of a vegetative roof for the project	20%	57
Maintenance and operations	12%	58
Familiarity with the technology	9%	31
LEED points	6%	19

n = 181

As with photovoltaics, respondents' first cause for concern with vegetative roofs was cost. However, due to the margin of error (6-7%), "ability to integrate" and "suitability for the project" deserve careful consideration by Building Teams.

Durability and reliability, not initial cost, are the most important factors in choosing a roofing system, say AEC professionals.