Disclaimer: This guide offers ideas, guidelines, and links to additional information to help with your LEED certification practices. However, Green Badger, LLC assumes no responsibility as to the accuracy or usefulness of the information, nor do we warrant that any statements or other information on this guide or following these links comply with applicable laws and regulations, nor do we warrant the applicability of the information to the LEED certification process, as defined by the USGBC and GBCI.

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**INTRODUCTION:**

It is a new and exciting (or scary) time with the release of LEED Version 4 in November 2016 – the biggest change to the LEED rating system since its inception in 2001.

Construction credits are now design credits, new prerequisites are popping up, and acronyms like EPD, HPD and C2C are raining from the sky. It’s best summed by the Ghostbusters: “Fire and brimstone coming down from the skies! Rivers and seas boiling! Forty years of darkness! Earthquakes, volcanoes... The dead rising from the grave! Human sacrifice, dogs and cats living together... mass hysteria!”

Mass hysteria indeed! And for the general contractor, these changes are just one more challenge to getting your building built on time and on budget. Look, we love LEED, but some of this documentation is over the top, at times ineffective, and as we’re finding out, often unavailable. This guide is written to help you specifically navigate the requirements of earning the LEED v4 prerequisites and credits that are typically construction related (even if they no longer are, but we’ll get to that later).

This guide is written in the following format. Each credit begins with the actual LEED requirements, followed by a nuts and bolts overview of what that means to the GC, what specific action items are necessary to meet the credit requirements, and finishing with our strategies to most effortlessly document each one. These summaries should be able to give you enough information and resources to earn the point and move on with getting your project complete.

If you need more detail, then it is time to pour some coffee (or something stronger) and dive head first into the LEED reference guide. For those who just want to get to the point and move on, the following pages are for you.
SUSTAINABLE SITES
PREREQUISITE 1:

Construction Activity Pollution Prevention

REQUIREMENTS:
Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent. Projects must apply the CGP regardless of size. The plan must describe the measures implemented.

GENERAL CONTRACTOR SUMMARY:
Good news, the hard part is to develop the plan, make sure it meets EPA requirements, local requirements, and figuring out which are more stringent – and that is all done by the civil engineer (or someone that isn’t you!). For the GC, it comes down to implementation and verification – and since this is required pretty much everywhere in the country, is nothing new. Implement the measures that are detailed on the ESC plan (silt fence, inlet protection, dust control, etc), then perform routine inspections to verify all measures are implemented throughout construction. You’re likely doing this per local requirements anyway, and will be much more frequent than LEED requires. For LEED you simply need to demonstrate that inspections occurred on a regular basis (weekly, monthly, etc) and any issues were promptly addressed. Verify this through pictures (date/time stamped), written inspection reports, or third-party inspection reports.

ACTION ITEMS:
- Implement all measures in the ESC plan, and have plan designer confirm they were installed as per the plan and industry standards
- Document the installed measures are maintained over the course of construction by taking pictures, using inspection reports, or having a third-party provide inspections.
- If any corrective actions are required, implement immediately and document with more pictures or another inspection report (it’s ok if the silt fence falls down – just fix it!). NOTE: If USGBC sees an inspection report that notes a deficiency, they WILL ask for a followup report that shows it was fixed.
- Submit a sample of inspection reports to LEED Online
STRATEGIES:

1. Use the Green Badger mobile app to create inspection reports. You can simply select which ESC measures are on your jobsite, and it will provide a customized report you can use for verification. Take your pictures in the app, add your comments, and sign the report, and it will create pre-formatted ESC inspection reports with your pictures (date and time stamped) embedded in and formatted.

   Alternatively, use your own inspection report format to verify measures, and take lots of photos OR use a third-party inspection service to do the same.

2. Submit a handful of inspection reports for GBCI review from over the course of construction – one from the beginning, a few from the middle, and one from the end. 5 inspection reports should be sufficient.

3. If possible DO NOT submit a report that shows a need for corrective action.

4. Make sure to include dust control as a measure – GBCI has asked for this specifically on a number of occasions (measures include temporary watering, mulching, temporary seeding, and others).
MATERIALS AND RESOURCES PREREQUISITE 2 AND CREDIT 5:

Construction Waste Planning + Construction Waste Management and Diversion

REQUIREMENTS:

FOR THE PREREQUISITE:

Develop and implement a construction and demolition waste management plan:

➤ Establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion. Approximate a percentage of the overall project waste that these materials represent.

➤ Specify whether materials will be separated or commingled and describe the diversion strategies planned for the project. Describe where the materials will be taken and how the recycling facility will process the material.

➤ Provide a final report detailing all major waste streams generated, including disposal and diversion rates.

REQUIREMENTS:

FOR THE CREDIT:

Option 1: Diversion (1-2 points)

PATH 1. DIVERT 50% AND THREE MATERIAL STREAMS (1 POINT)
Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams.

OR

PATH 2. DIVERT 75% AND FOUR MATERIAL STREAMS (2 POINTS)
Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams.

OR

OPTION 2. REDUCTION OF TOTAL WASTE MATERIAL (2 POINTS)

Do not generate more than 2.5 pounds of construction waste per square foot (12.2 kilograms of waste per square meter) of the building’s floor area.

NOTE: Alternative daily cover (ADC) does not qualify as material diverted from disposal. Include materials destined for ADC in the calculations as waste.
GENERAL CONTRACTOR SUMMARY:

We’ll address the prerequisite and credit together for two reasons: 1) we’ve never seen a LEED project that was not attempting to earn points for construction waste recycling, and 2) the prerequisite makes you track all your waste anyway, so even if you weren’t planning on the credit, you’ve got to do all the tracking anyway.

To summarize, the GC needs to have 1) a written construction waste management plan, which must 2) ID at least 5 materials that can be recycled/diverted AND what percentage of the waste you think they will be, and 3) ID how those materials will be managed (separate dumpsters, commingled, who the hauler will be, what facility will they be taken to, THEN 4) provide a report summarizing all the materials recycled vs landfilled and corresponding weights (or volumes).

All of that is a requirement of the prerequisite. To earn points for the credit, you simply must have diverted 50% and 3 material streams for 1 point, or 75% and 4 material streams for 2 points. A material stream is a certain material being diverted in a specific manner, such as concrete being recycled in its own concrete dumpster on-site. The same material can be diverted 2 different ways and will count as 2 material streams. For example, brick is one material. During demo, brick was pulled of the building and donated to another project. That is one waste stream. Brick was also sent to a recycling facility where it was crushed for aggregate. This is considered a second stream (Material Stream 1 = Brick + Donation, Material Stream 2 = Brick + Recycling). On site separation is the most straight-forward way to meet this. Each separate material dumpster will end up being its own material stream.

If you opt for commingled, it becomes a bit more challenging. Commingled recycling facilities must be able to provide project-specific diversion rates or an average diversion rate for the facility that is regulated by the local or state authority. Commingled diversion rates must exclude ADC. Visual inspection is not an acceptable method of evaluating diversion rates (this means they cannot just look in the dumpster and estimate what percentage of each material is in there – you see that a lot – if your materials report comes back in nice round numbers, odds are it is visual estimated. Honestly, what are the odds your dumpster had exactly 60% drywall, 20% wood, and 20% cardboard?)
If the commingled recycling facility can track and produce documentation of specific materials recycled, you can count commingled waste as multiple waste streams for each material recycled. Otherwise, commingled waste sent to the same recycling sorting facility is counted as a single waste stream, and you will have to use the average diversion rate for that facility (which is often lower than what would be recycled with C&D materials).

Lastly, you can earn 2 points if you minimize waste. It is really tough to know until you get to the end of the project, since you tend to add waste up until the last day, but if you generate a total of less than 2.5 pounds per square foot of building area, you’ll earn 2 points. NOTE: this is TOTAL WASTE, regardless of it was recycled or landfilled – it is the total amount generated as a whole. The intent is to reward waste minimization efforts, not recycling efforts.

**ACTION ITEMS:**

- Identify at least 5 materials that will be recycled on your project AND what percentage of total waste they will make up.

- The plan must account for all materials, including land-clearing debris, materials to be used for alternative daily cover (ADC), and other materials not contributing to diversion but not included in the diverted waste total.

- Identify who the waste contractor will be, and how those materials will be managed on site (separate dumpsters/commingled, etc) AND how they will be recycled/diverted/disposed of.

- Document the diversion rates. Track each material and diversion strategy. If you divert more than 50% and 3 different waste streams or 75% and 4 waste streams, you’ll earn points under MRc5.

- Divide your total waste generated (recycled AND landfilled) and divide by building square footage. If it is less than 2.5 lbs/sf, you’ll earn 2 points.

- Fill out the LEED CWM Tracking Template, and upload that spreadsheet along with your CWM plan to LEED Online.

**STRATEGIES:**

1. Use the Green Badger’s Construction Waste Management template to create your baseline CWM plan. Within the template, update the relevant charts to show which materials you are going to track and how you’re doing to manage them. USGBC has put out no guidance on how to best estimate total weights. Our take is they are not likely to challenge your estimations (how could they?) but we’re working on a better answer. The Green Badger template includes waste proportions based on a sample of 15 prior LEED certified new construction projects, and can be used as a starting point.
2. Most projects will have at least
- Concrete
- Steel
- Wood
- Drywall
- Masonry
- Misc Metals
- Cardboard
- Asphalt
- Commingled

3. While the plan makes you identify 5 materials, to earn the points you only need 3 or 4 material streams. They don’t have to all occur at once. For example, a concrete dumpster at the beginning of the project, then steel during structural, followed by drywall during interiors, and a commingled dumpster is 4 material streams – and you only need 1-2 dumpsters on site at any given time.

4. There isn’t a hard and fast quantity requirement to become a waste stream – USGBC recommends 5% of total weight, but to our knowledge, that isn’t definitive. Thus if you donate 5 doors from the project that were extra or salvaged, that could potentially be a waste stream by itself. Not everything has to be tossed into a dumpster to count!

5. Log each dumpster pull (or monthly report) in Green Badger (or separate tracking tool) making sure to record material type, how it was diverted, and weight.

6. If you use commingled, please re-read the earlier guidance
- Visual inspection is not acceptable
- You’ll likely need a letter from the facility stating that they are sorting and weighing each dumpster individually
- OR use their certified facility average (which requires another letter stating what that is, and is likely lower than you’d like)

7. At the end of the project, use Green Badger to toggle between Options 1 and 2 and see which scores better (or get out your calculator and do the math).

8. Use Green Badger to export the CWM Plan and LEED CWM submittal template and upload to LEED Online (or manually fill out the LEED CWM submittal template if you are using a different tracking mechanism).
MATERIALS AND RESOURCES CREDIT 2
BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION:

Environmental Product Declarations

REQUIREMENTS:

Option 1. Environmental Product Declaration (EPD) (1 point)

Use at least 20 different permanently installed products sourced from at least five different manufacturers. Industry-wide EPDs count as ½ product, Product Specific Type III EPDs count as 1 product.

AND/OR

Option 2. Multi-attribute optimization (1 point)

Use products that comply with one of the criteria below for 50%, by cost, of the total value of permanently installed products in the project. Products will be valued as below.

Third party certified products that demonstrate impact reduction below industry average in at least three of the following categories are valued at 100% of their cost for credit achievement calculations.

- global warming potential (greenhouse gases), in CO2e;
- depletion of the stratospheric ozone layer, in kg CFC-11;
- acidification of land and water sources, in moles H+ or kg SO2;
- eutrophication, in kg nitrogen or kg phosphate; formation of tropospheric ozone, in kg NOx, kg O3 eq, or kg ethene; and
- depletion of nonrenewable energy resources, in MJ.

USGBC approved program -- Products that comply with other USGBC approved multi-attribute frameworks.

For credit achievement calculation, products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost.

Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.
GENERAL CONTRACTOR SUMMARY:

Let’s start with the easy one – As of August 1st, 2017, Option 2 is not achievable. There are no USGBC 3rd party approved programs/certifications available. If you see Option 2 (or 2 points for this credit) on your LEED scorecard, get the architect/LEED consultant on the phone ASAP! (This won’t be the last time we wave this flag either).

Option 1 is achievable – the project must use 20 permanently installed products from at least 5 different manufacturers that have EPDs. The two main types are Industry Wide EPDs, which count as ½ product – these are EPDs for entire product classes, regardless of manufacturer. Products like gypsum board, concrete and North American woods all have industry wide EPDs, and while they only count as a ½ product, can add up quickly and are on almost every project.

Product Specific Type III EPDs mean they are for a specific product from a specific manufacturer (or even manufacturing site). Example – the Mesa Ceiling Tile from Armstrong EPD – it is for that specific ceiling tile from that specific manufacturer and it is 3rd party verified. There are a number of organizations that verify these EPDs, including UL, SCS, NSF and ASTM.

NOTE: different from earlier versions of LEED, there is no dollar cost requirement associated with earning this credit. Simply use 20 products – even if it was $10 worth, and you will earn the point.

An important thing to note is that these credits often get dumped on the GC as a “construction credit” like earning local materials points in LEED 2009. THIS IS NOT THE CASE WITH V4! Earning this (and the other materials credits) are really much more design and spec driven, and require collaboration from the design and construction team. If you get handed a generic LEED spec that says, “get EPDs where available”, and doesn’t have specific products called out that have them, you’ve got your work cut out for you, and in fact are set up to fail. There aren’t that many products out there with EPDs (and HPDs, etc as well get to later) – the odds of coming across 20 by happenstance is not likely. If you simply request subs submit EPDs as part of their submittal, you’ll end up with zero.

The team needs to have a strategy in place to identify which products will be used for compliance. The good news is it can be pretty straightforward – it just requires that planning in advance. We’ll detail out some suggested routes in the Strategies section.
**ACTION ITEMS:**

- Review the spec and see if they call out 20 specific products that have EPDs.
  - If they don’t, call for a team meeting to come to an agreement of how this credit will be earned, and which products will be pursued.
- Develop a strategy of which products will be used to earn the point (see Strategy, below)
- Include a LEED v4 materials coversheet as a requirement for subcontractors. Check with your architect/LEED consultant or download from Green Badger
- Throughout construction, track products and collect EPDs – counting industry wide as ½ product, and product specific as 1 product. You’ll have to record Manufacturer, Product, Cost, EPD type, and have the actual EPD available
  - Tracking using Green Badger makes this really easy AND gives access to a database of LEED v4 compliant products AND all the backup documentation
  - Otherwise, use the USGBC’s Building Product Disclosure and Optimization (BPDO) spreadsheet (which is a very non-user friendly tool) or other tracking mechanism.
- Submit the BPDO spreadsheet and EPDs to LEED Online (If using Green Badger, it will export the populated BPDO spreadsheet and provide a zip file of all EPDs)

**STRATEGIES:**

1. Green Badger offers a database of LEED v4 compliant products, so you can search by keyword, brand, spec section, etc to identify products for use AND provides all the required backup data and documentation. Searching the database is one of the easiest and quickest ways to find and document this credit.

2. There are a number of strategies the team can take to earn this credit. The good news is you only need 20 products to earn Option 1 for both the EPD and MIR credit, and a lot of products double dip. If you need a suggestion of where to start looking for products, here’s a quick snapshot. As a quick note, this credit helps to have a diversity of products. For example, Armstrong has a number of ceiling tiles with EPDs and HPDs, and you can use multiple products from a manufacturer. But if you use 1 ceiling tile throughout, that is only 1 product, whereas if you can incorporate 5 different ceiling tiles (again, there isn’t a minimum amount that need to be used) then you’d be able to earn 5 products, or a quarter of the amount you need for the point.

**WOOD**

Most wood in North America will fall under the American Wood Council’s Industry Wide EPDs (that only count as a half-point each), but include softwood plywood, softwood lumber, OSB, LVLs, Glu-Lam timbers, I-joists, MDF, and particle board. You can easily pick up a handful of those w/o much work. Huber’s popular ZIP, Advantech an TruSpec products all have Product Specific Type 3 EPDs as well.

**WALLS, CEILING TILES AND GRID**

One of the most robust categories, Armstrong, CertainTeed and USG all offer a host of options with EPDs, HPDs and other Material Ingredient Reporting. Since you can use up to 5 products per manufacturer, if you are savvy, you can get a quarter of your EPD and MIR accounted for just in your ceilings. National Gypsum has a dozen HPDs for its products, and there is an industry-wide generic EPD for Type X gypsum board.
INSULATION
Insulation is another opportunity to get multiple products within the same manufacturer. While the choices are somewhat limited, CertainTeed and Knauff both offer thermal, acoustical, and mechanical insulation products with EPDs (and some with MIR compatibility).

FLOORING
Flooring is the mother load of EPDs and HPDs. You could probably get all twenty products for each credit in this category alone, when you look at carpet, tile, VCT, linoleum, rubber flooring, cove base and all the associated adhesives behind them. You’ve got almost limitless options here, as almost any carpet style will fall into one of the EPDs. Consider yourself in good shape with products from Armstrong, Beaulieu, Bentley Mills, Crossville, American Olean Tile, DalTile, ECORE, Emser, Forbo, Interface, Milliken, Mohawk, Patcraft and Shaw, while Laticrete, WF Taylor and XL Brands provide plenty of options to hold those products in place.

ROOFING
You’ve got options on top of your building almost no matter what type of roof you’re building. The Asphalt Roofing Manufacturers Association has industry wide EPDs for asphalt-based roofs, including mod-bit, built-up and shingles, while multiple manufacturers have EPDs for PVC membrane roofs including Carlisle, Duro-Last and GAF.

PAINTS
Paints have you covered (ha!) as well. Benjamin Moore, PPG, Sherwin Williams and ECOS all have a line (or more) that have EPDs and/or MIR compatibility. Each paint sheen can count as its own distinct product – Gloss, Semi-Gloss, Eggshell, and Flat paints of the same line will give you 4 contributing products.

METALS
Not a ton of options here. You’ve got industry wide EPDs for steel, and some product specific EPDs for Rebar from Gerdeau and interior metal framing and accessories from Merino+Ware – but it is enough to pick up another 5 products.

DOORS/WINDOWS/HARDWARE
If you’ve got commercial entries/windows/storefronts, a number of options exist from YKK, Assa Abloy and Kawneer, and there are a surprising number of door hinges, locks and hardware that have EPDs from the likes of Norton, Pemko, Sargent and Schlage.

PLUMBING
Not a lot of brand diversity in plumbing, but there are dozens of porcelain thrones and urinals from Kohler that offer EPDs. Get creating – a different toilet in each stall could pick up 5 EPDs. For flush valves, Sloan offers a number of options for both toilets and urinals.

There’s a host other options out there – this is just an early look at products that are found in most projects. Take a look at the lists below for a bit more detail on the narratives above.
➤ **DOORS/WINDOWS/HARDWARE**
- Assa Abloy – Multiple Options EPD
- Kawneer – multiple options EPD
- Norton – door closers – EPDs
- Pemko – door gaskets – dozens of EPDs
- Sargent – door locks – EPDs
- Schlage – door locks, EPDs
- YKK – multiple options EPD

➤ **FLOORING**
- American Olean Tile (EPD)
- Armstrong Flip Spray Adhesive (C2C)
- Armstrong S-599 Vinyl Sheet Adhesive (C2C)
- Armstrong S-799 Adhesive for Linoleum and Rubber (C2C)
- Armstrong LVT
- Armstrong VCT
- Armstrong Biobased
- Beaulieu – Multiple Options with EPD and HPD
- Bentley Mills (multiple with EPDs a few with C2C)
- Crossville Tile (EPD)
- Daltile (EPD)
- ECORE International – multiple flooring types (EPD)
- Emser Tile – Multiple options, HPD
- Forbo – dozens of options with EPD and HPD
- Interface – dozens with EPD
- Laticrete – multiple thin set and grout with EPD, over 100 products with HPDs
- Milliken – Multiple carpet options with EPD
- Mohawk – Multiple options with EPD and C2C
- Patcraft – multiple with EPD and C2C
- Shaw – dozens with EPDs and HPDs
- Tarkett/Tandus Centiva – multiple options – EPD, C2C
- XL Brands (dozne of adhesives – C2C)
- WF Taylor – Dozen of adhesives – C2C

➤ **INSULATION**
- Certainteed – multiple options of sound, thermal and mechanical insulation
- Knauff – multiple options of sound/thermal/pipe insulation with EPDs

➤ **METALS**
- Gerdau – Rebar (EPD)
- Marino Ware – interior metal framing and accessories (EPD)

➤ **PAINTS**
- Benjamin Moore (C2C/HPD)
- UltraSpec 500
- Natura
- Gennex
- ECOS – multiple with HPDs
- PPG – Speedhide Zero – EPD/HPD
- Sherwin Williams
  - Promar 200 Zero VOC,
  - Harmony – EPDs

➤ **PLUMBING**
- Kohler – dozens of options with EPDs

➤ **ROOFING**
- ARMA – mod bit (industry-wide)
- ARMA – Asphalt shingle (industry-wide)
- Carlisle – Single Ply PVC (EPD)
- Duro-Last – 4 different PVC membranes (EPD)
- GAF – PVC membrane EPD

➤ **WALLS/CEILING TILES AND GRID**
- Armstrong – 14 options with EPDs, 7 that also have MIR
- Certainteed – multiple options with EPDs and HPDs
- USG – multiple options with EPDs
- National Gypsum – Dozens of products with HPDs
- Gypsum Board – Industry-Wide EPD for Type X

➤ **WOOD**
(Note: All the North American Wood EPDs are industry-wide and count for ½ product each)
- North American Softwood Plywood
- North American Softwood Lumber
- North American OSB
- North American LVLs
- North American Glued Laminated Timbers
- North American I-Joists
- North American MDF
- North American Particleboard
- Huber – Zip System
- Huber – AdvanTech Subflooring
- Huber – TruSpec Engineered Wood

For the most up to date list of materials, please visit getgreenbadger.com/materials.
Baroque™, Directional Fissured, Fine Fissured, Sand Micro™, School Board® and Vantage 10™

Environmental Product Declaration

Six families of ceiling products with a range of aesthetic and performance properties to meet your needs in education, office, and healthcare buildings.

Certainteed Corporation, a subsidiary of Saint-Gobain, is a leading North American manufacturer of interior building materials including gypsum, ceilings, and insulation as well as exterior building materials which include roofing, vinyl and fiber cement siding, trim, fence, railing, decking, foundations, and pipe products. Certainteed respects the environment through the responsible development of sustainable building products and systems.

Architects, contractors and manufacturers continue to look for ways to reduce our industry’s impact on the environment while meeting customer demand for products that deliver beauty, comfort, and performance. Certainteed Ceilings’ respect for the environment is reflected in our ongoing emphasis on sustainable building products and systems. Open sharing of the data we gather on these effects - as embodied in Environmental Product Declarations - is central to the process, and sets Certainteed Ceilings apart.

For more information visit www.certainteed.com/ceilings
MATERIALS AND RESOURCES CREDIT 3
BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION:

Sourcing of Raw Materials

REQUIREMENTS:

Option 1. Raw material source and extraction reporting (1 point)

Use at least 20 different permanently installed products from at least five different manufacturers that have publicly released a report from their raw material suppliers which include raw material supplier extraction locations, a commitment to long-term ecologically responsible land use, a commitment to reducing environmental harms from extraction and/or manufacturing processes, and a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria.

➤ Products sourced from manufacturers with self-declared reports are valued as one half (1/2) of a product for credit achievement.

➤ Third-party verified corporate sustainability reports (CSR) which include environmental impacts of extraction operations and activities associated with the manufacturer’s product and the product’s supply chain, are valued as one whole product for credit achievement calculation.

Acceptable CSR frameworks include the following:

- Global Reporting Initiative (GRI) Sustainability Report
- Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises
- USGBC approved program: Other USGBC approved programs meeting the CSR criteria.

AND/OR

Option 2. Leadership extraction practices (1 point)

Use products that meet at least one of the responsible extraction criteria below for at least 25% by cost, of the total value of permanently installed building products in the project.

➤ Extended producer responsibility. Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility. Products meeting extended producer responsibility criteria are valued at 50% of their cost for the purposes of credit achievement calculation.
➤ Bio-based materials. Bio-based products must meet the Sustainable Agriculture Network’s Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material. Products meeting bio-based materials criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

➤ Wood products. Wood products must be certified by the Forest Stewardship Council or USGBC-approved equivalent. Products meeting wood products criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

➤ Materials reuse. Reuse includes salvaged, refurbished, or reused products. Products meeting materials reuse criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

➤ Recycled content. Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost. Products meeting recycled content criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

➤ USGBC approved program. Other USGBC approved programs meeting leadership extraction criteria.

For credit achievement calculation, products sourced (extracted, manufactured, and purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost. For credit achievement calculation, the base contributing cost of individual products compliant with multiple responsible extraction criteria is not permitted to exceed 100% its total actual cost (before regional multipliers) and double counting of single product components compliant with multiple responsible extraction criteria is not permitted and in no case is a product permitted to contribute more than 200% of its total actual cost.

Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.
GENERaL CoNtRaCtoR summaRy:

This is another case where we’re seeing an option that is not even able to earn, and as of August 1, 2017, that is Option 1. While it might seem easy, because most large companies have Corporate Social Responsibility (CSR) reports and utilize the Global Reporting Initiative (GRI) for reporting, none of those reports meet the LEED requirements. Here’s why. LEED requires these documents include a report from their raw material suppliers which include:

➤ raw material supplier extraction locations,
➤ a commitment to long-term ecologically responsible land use,
➤ a commitment to reducing environmental harms from extraction
➤ and/or manufacturing processes, and a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria.

While perhaps single component companies, if they exist, might be able to get that from suppliers, can you image every supplier that goes into a curtainwall system, paint, carpet or any other building product? And to have a single report that includes reports from each one of those suppliers about extraction locations, commitments to reducing harm, and the other requirements? Good luck!

So – let’s focus on the option that is achievable – Option 2, Leadership Extraction Practices. This is the option that is most similar to LEED 2009, with recycled content, FSC wood, material reuse etc. The total contributions by dollar value must equal 25% COMBINED, rather than as individual credits (you add up all the contributing recycled content, FSC etc into one big total).

The big difference here is local/regional is no longer a stand alone contributor. It is now a “bonus” AND has been reduced from 500 miles to 100 miles (good luck!). If so, it counts as double the contributing value. What does this mean? Here’s a basic example – you have Product A, which cost $100 and has 30% recycled content. This would normally count for $100 x 30% PC = $30. BUT – if this product was also extracted, harvest and manufactured within 100 miles – it would count double – so $60 would be the end contribution.

There is also a new category – extended producer responsibility, or product takeback programs. This means the manufacturer has a program in place to take back the product after its lifecycle is over. This is currently mostly within the carpet industry, but any products with an EPR count for 50% of the dollar value of contributing product.

Earning this credit tends to be similar to LEED 2009 – focus on big ticket items that have recycled and FSC content (for the most part). Local/regional is no longer nearly as important, unless the product is also recycled, biobased, salvaged or FSC. Focusing your efforts on certain items reduces the amount of tracking required – we suggest concrete, steel, interior metal studs, drywall, acoustic ceiling tile, masonry, hollow metal doors and frames, wood doors and millwork. NOTE: only 30% of the contributing value can come from structure or enclosure – thus of
the 25% total dollars necessary, only about a total of 7.5% can come from structure or enclosure.

What the heck about core and shell projects, which are nothing but structure or enclosure? Yup – you were originally screwed. However, USGBC released guidance in July 2017 that provides the option of using the project’s actual breakdown of structure/enclosure vs. other materials instead of the mandated 30%. Here’s how that works. Per the USGBC Addendum:

“Projects with significant amounts of structural and enclosure materials may exceed the 30% limit by calculating an alternative structure and enclosure limit”

What is the limit? A pretty easy calculation: 
Alternative Structure and Enclosure limit = (value $ of total building materials that are structural or enclosure) [divided by] (total actual materials value $). Use the results of the equation to replace the 30% contribution factor limit in determining compliance with the credit.

Note: this option is only available for projects that use the actual materials cost method (not the default cost method) to determine total project material costs.

Thus, if you add up your total structure and enclose costs, and they total $1,000,000, and your total construction cost is $2,000,000, then the contribution factor is increased from 30% to 50% ($1,000,000 / $2,000,000). Again, you’ll have to track everything to get that actual materials cost, but it can really help (especially on core and shell projects).
ACTION ITEMS

- Include sustainability requirements in project specifications for recycled content, FSC wood and other contributing factors

- Early in the estimating process, map out a plan for reaching a 25% threshold, recognizing 30% (of the 25%, or 7.5% total) can come from structure and/or enclosure (or do the additional calculation for Core and Shell projects). See Strategy, below, for additional guidance.

- Finalize total construction costs for Divisions 3-10, 31 and 32, and use to establish the basis of calculations
  - Update Green Badger or your tracking tool with this value.

- Include a LEED v4 materials coversheet as a requirement for subcontractors. Check with your architect/LEED consultant or download from Green Badger

- Throughout construction, track products and collect product data sheets validating EPR (counting as 50%), recycled content, FSC (make sure you collect FSC certifications AND invoices showing total cost AND FSC number), salvaged, and bio-based materials. If any are also extracted, harvested and manufactured within 100 miles, you get the bonus multiplier.
  - Tracking using Green Badger makes this really easy AND gives access to a database of LEED v4 compliant products AND all the backup documentation

  - Otherwise, use the USGBC’s Building Product Disclosure and Optimization (BPDO) spreadsheet (which is a very non-user friendly tool) or other tracking mechanism.

- Submit the BPDO spreadsheet and product data sheets to LEED Online (If using Green Badger, it will export the populated BPDO spreadsheet and provide a zip file of all data sheets)

STRATEGY

1. Green Badger offers a database of LEED v4 compliant products, so you can search by keyword, brand, spec section, etc to identify products for use AND provides all the required backup data and documentation. Searching the database is one of the easiest and quickest ways to find and document this credit. NOTE: due to the variability of recycled content from manufacturing locations, etc, the database has many more EPD/HPD products than Sourcing of Raw Materials (as of August 1, 2017). However, this database is continuously expanding.

2. There are a number of strategies the team can take to earn this credit. As with EPDs and MIR credits, the best bang for the buck are products that contribute across all three credit options.
Potential Structure/Enclosure Products
(can only contribute 30%)

- Almost all North American wood products have industry-wide EPDs. If you can get FSC wood from North America, you’ll double dip.

- Rebar, steel (structural, decking, joists, etc), interior metal studs have high recycled content as well as EPDs and HPDs

Non-structure/Enclose Products

- Wood: see above – when used in non-structural capacity, fit in here.

- Interior metal studs (per above)

- Select/require drywall made with post-consumer gypsum. Synthetic gypsum is an industrial byproduct used by most manufacturers when available close to their plants – and can make up to 90% of your gypsum board (as post industrial, it counts only as 50%) so you get a lot of recycled content PLUS industry-wide EPD. National Gypsum also has HPDS available.

- Many ceiling tiles come in high-recycled content versions, and Armstrong and USG have EPDs/HPDs available.

- Batt insulation typically has at least 30% recycled content, and those from KNauff and Certainteed have EPDs and HPDs available.

- Door hardware often has recycled content, and those from Norton, Pemko, Sargent and Schlage all have EPDs.

- Wood doors are easy to get in FSC – VT Industries, Eggers and others can contribute easily to this credit. Hollow metal doors and frames typically have around 35%-40% recycled content.

- Most carpet products have EPR as well as EPDs and HPDs, earning across all three credits.

- Millwork – Millwork will fall under the industry-wide EPD and if it is MDF, is likely 100% post-industrial recycled content. FSC certification is another great option here.
Material Ingredient Reporting

REQUIREMENTS:

Option 1. Material ingredient reporting (1 point)

Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm).

➤ Manufacturer Inventory. The manufacturer has published complete content inventory for the product following these guidelines:

- A publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CASRN) and/or European Community Number (EC Number)

- Materials defined as trade secret or intellectual property may withhold the name and/or CASRN/EC Number but must disclose role, amount and hazard screen using either:

➤ GreenScreen benchmark, as defined in GreenScreen v1.2.

- The hazard screen must be applied to each trade secret ingredient and the inventory lists the hazard category for each of the health hazards included in Part 3 of GHS (e.g. “GHS Category 2 Carcinogen”).

- Identify in the inventory all hazard classes for which a classification cannot be made because there are insufficient data for a particular endpoint(s).

➤ Health Product Declaration. The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open Standard.

➤ Cradle to Cradle. The end use product has been certified at the Cradle to Cradle v2 Basic level or Cradle to Cradle v3 Bronze level.

➤ Declare. The Declare product label must indicate that all ingredients have been evaluated and disclosed down to 1000 ppm.

➤ ANSI/BIFMA e3 Furniture Sustainability Standard. The documentation from the assessor or scorecard from BIFMA must demonstrate the product earned at least 3 points under 7.5.1.3 Advanced Level in e3-2014 or 3 points under 7.4.1.3 Advanced Level in e3-2012.
➤ Cradle to Cradle Material Health Certificate. The product has been certified at the Bronze level or higher and at least 90% of materials are assessed by weight.

➤ Product Lens Certification

➤ Facts - NSF/ANSI 336: Sustainability Assessment for Commercial Furnishings Fabric at any certification level

➤ USGBC approved program. Other USGBC approved programs meeting the material ingredient reporting criteria.

AND/OR

Option 2. Material ingredient optimization (1 point)

Use products that document their material ingredient optimization using the paths below for at least 25%, by cost, of the total value of permanently installed products in the project.

➤ GreenScreen v1.2 Benchmark. Products that have fully inventoried chemical ingredients to 100 ppm that have no Benchmark 1 hazards:

- If any ingredients are assessed with the GreenScreen List Translator, value these products at 100% of cost.

- If all ingredients are have undergone a full GreenScreen Assessment, value these products at 150% of cost.

➤ Cradle to Cradle Certified. End use products are certified Cradle to Cradle. Products will be valued as follows:

- Cradle to Cradle v2 Gold: 100% of cost
- Cradle to Cradle v2 Platinum: 150% of cost
- Cradle to Cradle v3 Silver: 100% of cost
- Cradle to Cradle v3 Gold or Platinum: 150% of cost

➤ International Alternative Compliance Path – REACH Optimization. End use products and materials have fully inventoried chemical ingredients to 100 ppm and assess each substance against the Authorization list – Annex XIV, the Restriction list – Annex XVII and the SVHC candidate list, (the version in effect in June 2013), proving that no such substance is included in the product. If the product contains no ingredients listed on the REACH Authorization, Restriction, and Candidate list, value at 100% of cost.

USGBC approved program. Products that comply with USGBC approved building product optimization criteria.
AND/OR
Option 3. Product Manufacturer Supply Chain Optimization (1 point)

Use building products for at least 25%, by cost, of the total value of permanently installed products in the project that:

➤ Are sourced from product manufacturers who engage in validated and robust safety, health, hazard, and risk programs which at a minimum document at least 99% (by weight) of the ingredients used to make the building product or building material, and

➤ Are sourced from product manufacturers with independent third party verification of their supply chain that at a minimum verifies:

➤ Processes are in place to communicate and transparently prioritize chemical ingredients along the supply chain according to available hazard, exposure and use information to identify those that require more detailed evaluation

➤ Processes are in place to identify, document, and communicate information on health, safety and environmental characteristics of chemical ingredients

➤ Processes are in place to implement measures to manage the health, safety and environmental hazard and risk of chemical ingredients

➤ Processes are in place to optimize health, safety and environmental impacts when designing and improving chemical ingredients

➤ Processes are in place to communicate, receive and evaluate chemical ingredient safety and stewardship information along the supply chain

➤ Safety and stewardship information about the chemical ingredients is publicly available from all points along the supply chain

Products meeting Option 3 criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

For credit achievement calculation of options 2 and 3, products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost. For credit achievement calculation, the value of individual products compliant with either option 2 or 3 can be combined to reach the 25% threshold but products compliant with both option 2 and 3 may only be counted once.

Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.
Holy cow – it took three pages just to get to the summary! WTF LEED? All this for maybe a point or two (max) because, yup, you guessed it – some options are not even available! (as of August 1, 2017). As of this writing, only Option 1 is readily achievable, and that involves finding 20 products that have Health Product Declarations, Cradle to Cradle Certifications, Declare labels, and a smattering of other certifications. HPDs are by far the most prevalent. Cradle to Cradle, for example, has less than 500 certified products, and that includes things like laundry detergent – only a few hundred are building-related. For Option 2, 25% of products by dollar value must have GreenScreen or Cradle to Cradle certifications, and those are typically not high dollar value products (lots of fabrics, some carpets, etc but not nearly enough to get to 25% except maybe in a fitout project). Finally, supply chain optimization has just not hit the market yet, so we’re not even discussing.

The summary and strategies here are very similar to Environmental Product Declarations, and with the overlap of products, the two credits should be analyzed together. NOTE: different from earlier versions of LEED, there is no dollar cost requirement associated with earning this credit. Simply use 20 products – even if it was $10 worth, and you will earn the point.

Health Product Declarations are the most prevalent form of documentation available, and most manufacturers follow the Health Product Declaration Collaborative’s format. There are two versions HPDv1 and HPDv2, but both are acceptable. The big caveat is NOT ALL HPDS are created equal! Any product can have an HPD – but that does not mean it is a LEED complaint HPD.

To comply, and HPD must:

**v1 HPDs**

(See screenshot of HPD with the buttons checked above). To qualify for this option, the HPD must include the following:

**Summary**

- Content assessed for health hazard warnings as required using Residuals Disclosure – measured to 1,000 ppm or 100 ppm must be checked
- Full Disclosure of Intentional Ingredients does not have to be checked
- Full Disclosure of Known Hazards must be checked
- Hazards checklist must be completed
Content in Descending Order of Quantity
- Ingredient Name – may be “Unknown” or “Undisclosed”
- % Weight must be filled in for all ingredients
- Role – must be filled in for all ingredients
- Hazards – must be filled in for all ingredients

v2 HPDs

Section 1: Summary
- Content Inventory Threshold – 100 ppm and/or 1,000 ppm must be checked; no other thresholds allowed (due to limits in the supply chain, consider submitting a Credit Interpretation Request when a nominal portion of the product is inventoried at a less stringent threshold level).

- Residuals and contaminants considered in X out of Y materials – there must be a general explanation of why or why not residuals and contaminants were or were not considered. There is no minimum number of “considered” materials for compliance.

- Characterized – must be “yes”

- Screened – must be “yes” except may be “no” when Inventory and Screening Notes must indicate that the only contents not Screened are regarded as Special Conditions by the HPDC and the inventory requirements posted in Emerging Best Practices have been followed.

- Identified – either “yes” or “no” may be checked

- Inventory and Screening Notes – must include statement about Special Conditions when “No” is indicated for “Screened” above.

For a detailed and visual dive into this, follow this link.

AS PER EPDs - an important thing to note is that these credits often get dumped on the GC as a “construction credit” like earning local materials points in LEED 2009. THIS IS NOT THE CASE WITH V4! Earning this (and the other materials credits) are really much more design and spec driven, and require collaboration from the design and construction team. If you get handed a generic LEED spec that says, get EPDs/HPDs where available, and doesn’t have specific products called out that have them, you’ve got your work cut out for you, and in fact are set up to fail.

There aren’t that many products out there with EPDs and HPDs – the odds of coming across 20 by happenstance is not likely. If you simply request subs submit EPDs/HPDs as part of their submittal, you’ll end up with zero.

The team needs to have a strategy in place to identify which products will be used for compliance. The good news is it can be pretty straightforward – it just requires that planning in advance. We’ll detail out some suggested routes in the Strategies section.
ACTION ITEMS

- Review the spec and see if they call out 20 specific products that have HPDs/Cradle to Cradle/etc.
  - If they don’t, call for a team meeting to come to an agreement of how this credit will be earned, and which products will be pursued.

- Develop a strategy of which products will be used to earn the point (see Strategy, below)

- Include a LEED v4 materials coversheet as a requirement for subcontractors. Check with your architect/LEED consultant or download from Green Badger

- Throughout construction, track products and collect HPDs/Cradle to Cradle/etc — You’ll have to record Manufacturer, Product, Cost, MIR type, and have the actual MIR documentation available. Make sure any HPDs meet the requirements above!
  - Tracking using Green Badger makes this really easy AND gives access to a database of LEED v4 compliant products AND all the backup documentation. Any HPD in Green Badger has been reviewed for compliance.
  - Otherwise, use the USGBC’s Building Product Disclosure and Optimization (BPDO) spreadsheet (which is a very non-user friendly tool) or other tracking mechanism.

- Submit the BPDO spreadsheet and MIR documentation to LEED Online (If using Green Badger, it will export the populated BPDO spreadsheet and provide a zip file of all MIR cut sheets)

STRATEGIES

Green Badger offers a database of LEED v4 compliant products, so you can search by keyword, brand, spec section, etc to identify products for use AND provides all the required backup data and documentation. Searching the database is one of the easiest and quickest ways to find and document this credit.

There are a number of strategies the team can take to earn this credit. The good news is you only need 20 products to earn Option 1 for both the EPD and MIR credit, and a lot of products double dip. If you need a suggestion of where to start looking for products, here’s a quick snapshot. As a quick note, this credit helps to have a diversity of products. For example, Armstrong has a number of ceiling tiles with EPDs
and HPDs, and you can use multiple products from a manufacturer. But if you use 1 ceiling tile throughout, that is only 1 product, whereas if you can incorporate 5 different ceiling tiles (again, there isn’t a minimum amount that need to be used) then you’d be able to earn 5 products, or a quarter of the amount you need for the point.

WOOD
Most wood in North America will fall under the American Wood Council’s Industry Wide EPDs (that only count as a half-point each), but include softwood plywood, softwood lumber, OSB, LVLs, Glu-Lam timbers, I-joists, MDF, and particle board. You can easily pick up a handful of those w/o much work. Huber’s popular ZIP, Advantech an TruSpec products all have Product Specific Type 3 EPDs as well.

WALLS, CEILING TILES AND GRID
One of the most robust categories, Armstrong, CertainTeed and USG all offer a host of options with EPDs, HPDs and other Material Ingredient Reporting. Since you can use up to 5 products per manufacturer, if you are savvy, you can get a quarter of your EPD and MIR accounted for just in your ceilings. National Gypsum has a dozen HPDs for its products, and there is an industry-wide generic EPD for Type X gypsum board.

INSULATION
Insulation is another opportunity to get multiple products within the same manufacturer. While the choices are somewhat limited, CertainTeed and Knauff both offer thermal, acoustical, and mechanical insulation products with EPDs (and some with MIR compatibility)

FLOORING
Flooring is the mother load of EPDs and HPDs. You could probably get all twenty products for each credit in this category alone, when you look at carpet, tile, VCT, linoleum, rubber flooring, cove base and all the associated adhesives behind them. You’ve got almost limitless options here, as almost any carpet style will fall into one of the EPDs. Consider yourself in good shape with products from Armstrong, Beaulieu, Bentley Mills, Crossville, American Olean Tile, Daltile, ECORE, Emser, Forbo, Interface, Milliken, Mohawk, Patcraft and Shaw, while Laticrete, WF Taylor and XL Brands provide plenty of options to hold those products in place.

ROOFING
You’ve got options on top of your building almost no matter what type of roof you’re building. The Asphalt Roofing Manufacturers Association has industry wide EPDs for asphalt-based roofs, including mod-bit, built-up and shingles, while multiple manufacturers have EPDs for PVC membrane roofs including Carlisle, Duro-Last and GAF.

PAINTS
Paints have you covered (ha!) as well. Benjamin Moore, PPG, Sherwin Williams and ECOS all have a line (or more) that have EPDs and/or MIR compatibility. Each paint sheen can count as its own distinct product – Gloss, Semi-Gloss, Eggshell, and Flat paints of the same line will give you 4 contributing products.

METALS
Not a ton of options here. You’ve got industry wide EPDs for steel, and some product specific EPDs for Rebar from Gerdeau and interior metal framing and accessories from Merino+Ware – but it is enough to pick up another 5 products.

DOORS/WINDOWS/HARDWARE
If you’ve got commercial entries/windows/storefronts, a number of options exist from YKK, Assa Abloy and Kawneer, and there are a surprising number of door hinges, locks and hardware that have EPDs from the likes of Norton, Pemko, Sargent and Schlage.

PLUMBING
Not a lot of brand diversity in plumbing, but there are dozens of porcelain thrones and urinals from Kohler that offer EPDs. Get creating – a different toilet in each stall could pick up 5 EPDs.

There’s a host other options out there – this is just an early look at products that are found in most projects. Take a look at the lists below for a bit more detail on the narratives above.
➤ **DOORS/WINDOWS/HARDWARE**
- Assa Abloy – Multiple Options EPD
- Kawneer – multiple options EPD
- Norton – door closers – EPDs
- Pemko – door gaskets – dozens of EPDs
- Sargent – door locks – EPDs
- Schlage – door locks, EPDs
- YKK – multiple options EPD

➤ **FLOORING**
- American Olean Tile (EPD)
- Armstrong Flip Spray Adhesive (C2C)
- Armstrong S-599 Vinyl Sheet Adhesive (C2C)
- Armstrong S-799 Adhesive for Linoleum and Rubber (C2C)
- Armstrong LVT
- Armstrong VCT
- Armstrong Biobased
- Beaulieu – Multiple Options with EPD and HPD
- Bentley Mills (multiple with EPDs a few with C2C)
- Crossville Tile (EPD)
- Daltile (EPD)
- ECORE International – multiple flooring types (EPD)
- Emser Tile – Multiple options with EPD and HPD
- Forbo – dozens of options with EPD and HPD
- Interface – dozens with EPD
- Laticrete – multiple thin set and grout with EPD, over 100 products with HPDs
- Milliken – Multiple carpet options with EPD
- Mohawk – Multiple options with EPD and C2C
- Patcraft – multiple with EPD and C2C
- Shaw – dozens with EPDs and HPDs
- Tarkett/Tandus Centiva – multiple options – EPD, C2C
- XL Brands (dozne of adhesives – C2C)
- WF Taylor – Dozen of adhesives – C2C

➤ **INSULATION**
- Certainteed – multiple options of sound, thermal and mechanical insulation
- Knauff – multiple options of sound/thermal/pipe insulation with EPDs

➤ **METALS**
- Gerdau – Rebar (EPD)
- Marino Ware – interior metal framing and accessories (EPD)

➤ **PAINTS**
- Benjamin Moore (C2C/HPD)
- UltraSpec 500
- Natura
- Gennex
- ECOS – multiple with HPDs
- PPG – Speedhide Zero – EPD/HPD
- Sherwin Williams
- Promar 200 Zero VOC,
- Harmony – EPDs

➤ **PLUMBING**
- Kohler – dozens of options with EPDs

➤ **ROOFING**
- ARMA – mod bit (industry-wide)
- ARMA – Asphalt shingle (industry-wide)
- Carlisle – Single Ply PVC (EPD)
- Duro-Last – 4 different PVC membranes (EPD)
- GAF – PVC membrane EPD

➤ **WALLS/CEILING TILES AND GRID**
- Armstrong – 14 options with EPDs, 7 that also have MIR
- Certainteed – multiple options with EPDs and HPDs
- USG – multiple options with EPDs
- National Gypsum – Dozens of products with HPDs
- Gypsum Board – Industry-Wide EPD for Type X

➤ **WOOD**
(Notice: All the North American Wood EPDs are industry-wide and count for ½ product each)
- North American Softwood Plywood
- North American Softwood Lumber
- North American OSB
- North American LVLs
- North American Glued Laminated Timbers
- North American I-Joists
- North American MDF
- North American Particleboard
- Huber – Zip System
- Huber – AdvanTech Subflooring
- Huber – TruSpec Engineered Wood

For the most up to date list of materials, please visit [getgreenbadger.com/materials](http://getgreenbadger.com/materials).
Indoor Environmental Quality Credit 2

Low Emitting Materials

Requirements

This credit includes requirements for product manufacturing as well as project teams. It covers volatile organic compound (VOC) emissions in the indoor air and the VOC content of materials, as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in seven categories, each with different thresholds of compliance. The building interior is defined as everything within the waterproofing membrane. The building exterior is defined as everything outside and inclusive of the primary and secondary weatherproofing system, such as waterproofing membranes and air- and water-resistant barrier materials.

Option 1. Product Category Calculations

Achieve the threshold level of compliance with emissions and content standards for the number of product categories listed in Table 2.

Table 1. Thresholds of compliance with emissions and content requirements for 7 categories of materials:

<table>
<thead>
<tr>
<th>Category</th>
<th>Threshold</th>
<th>Emissions and Content Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior Paints and Coatings (applied on site)</td>
<td>Emissivity: At least 90% by volume VOC: 100%</td>
<td>General Emissions Evaluation for paints and coatings applied to walls, floors and ceilings. VOC content requirements for wet-applied products</td>
</tr>
<tr>
<td>Interior Adhesives and Sealants Applied on-Site (including Flooring Adhesives)</td>
<td>Emissivity: At least 90% by volume VOC: 100%</td>
<td>General Emissions Evaluation VOC content requirements for wet-applied products</td>
</tr>
<tr>
<td>Flooring</td>
<td>100%</td>
<td>General Emissions Evaluation</td>
</tr>
<tr>
<td>Composite Wood</td>
<td>100% not covered by other categories</td>
<td>Composite Wood Evaluation</td>
</tr>
<tr>
<td>Ceilings, Walls, Thermal and Acoustic Insulation</td>
<td>100%</td>
<td>General Emissions Evaluation</td>
</tr>
<tr>
<td>Furniture (include in calculation if part of scope of work)</td>
<td>At least 90%, by cost</td>
<td>Furniture Evaluation</td>
</tr>
<tr>
<td>Healthcare/Schools Only: Exterior Applied Products</td>
<td>At least 90%, by volume</td>
<td>Exterior Applied Products</td>
</tr>
</tbody>
</table>
Table 2. Points for number of compliant categories of products

<table>
<thead>
<tr>
<th>Compliant categories</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC, CS, NC Retail, DC, WDC, NC Hos projects <em>without furniture</em></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>NC, CS, NC Retail, DC, WDC, NC Hos projects <em>with furniture, Cl, Cl Retail, Cl Hos</em></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Schools, HC <em>without furniture</em></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Schools, HC <em>with furniture</em></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

Option 2. Budget Calculation Method
If some products in a category do not meet the criteria, project teams may use the budget calculation method (Table 3).

Table 3. Points for percentage compliance, under budget calculation method

<table>
<thead>
<tr>
<th>Percentage of Total</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥50% and &lt;70%</td>
<td>1</td>
</tr>
<tr>
<td>≥70% and &lt;90%</td>
<td>2</td>
</tr>
<tr>
<td>≥90%</td>
<td>3</td>
</tr>
</tbody>
</table>
The budget method organizes the building interior into five assemblies:
- flooring;
- ceilings;
- walls;
- thermal and acoustic insulation;
- furniture

Include furniture in the calculations if it is part of the scope of work. Walls, ceilings, and flooring are defined as building interior products; each layer of the assembly, including paints, coatings, adhesives, and sealants, must be evaluated for compliance. Insulation is tracked separately.

GENERAL CONTRACTOR SUMMARY

We hope you like tracking quantities – because you’re going to need to. Whether you can pursue Option 1 (fingers crossed!) or have to pursue Option 2 (Doh!) it will be counting ounces, converting to liters, or measuring a ton of square footages. The vast majority of projects we’ve seen pursue Option 1, so we’re focusing there.

The new wrinkle for v4 is the need for paints, sealants and adhesives to have “emissivity” information available as well as the traditional VOC content. While VOC content is the measure of what is “in the can”, emissivity is the measure of how much off-gases over time in various settings. Don’t worry too much – all that matters is has the product been tested for emissivity – it doesn’t even matter if it is high or low – it just needs to be tested! The actual wording is:

**General emissions evaluation. Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010, using the applicable exposure scenario.**

Typically we’ve seen this documented by certifications such as UL’s Greenguard Gold, or SCS verification. See sample certification document on page 37 for an example.

So, for Sealants & Adhesives and Paints & Coatings, 100% of products must meet VOC content (as per LEED 2009, and 90% must have emissivity that is tested according to CDPH v1.1-2010 (v1.2 is also accepted). This is where the math comes in. You must track the volumes of all products used so that it can ensure 90% or more have emissivity. This also allows you to use 10% of your products (by volume), which do not have emissivity information. This is key, as many adhesives and sealants do not have this available.

For flooring, the emissivity requirements are met by the LEED 2009 standards – Floorscore and CRI Green Label plus, or other emissivity measurements for non-traditional products. Natural, unfinished products are exempt as they were in LEED 2009. Just note: You’ll need to get the actual emissivity test results – just showing it is Floorscore/Green Label Plus certified won’t be enough.

Composite wood changes as well. First, it only applies to wood that does not fall in another category, so if you have a composite wood product that falls in the Ceilings/Walls/Thermal/Acoustic category, it must meet those requirements. If it isn’t in a different category, it must meet the Composite Wood Evaluation. In a nutshell, this means composite wood products must be documented to have low formaldehyde emissions that meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins.

Ceilings/Walls/Thermal/Acoustic category requires the general emissions evaluation for 100% of products.

Furniture – 90% of furniture by cost must meet the furniture evaluation, which does not give you too much room for error. New furniture and furnishing items must be tested in accordance with ANSI/BIFMA Standard Method M7.1–2011. Comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard, Sections 7.6.1 (for half credit, by cost) OR 7.6.2 (for full credit, by cost), using either the concentration modeling approach or the emissions factor approach.

Based on our review, we recommend not counting on more than 1 point in this category. There just are too many products that can throw you off getting to the 90% and 100% compliance thresholds. Shoot for 1 point, and have a 2nd point as a “maybe” but don’t bet your certification level on it.
**ACTIONS**

- Review the spec to ensure products with emissivity are called out.

Pay special attention to:
  - Finish schedule (flooring, ceilings, walls, coatings, paint, etc)
  - Insulation

If they don’t, call for a team meeting to come to an agreement of how this credit will be earned, and which products will be pursued.

- Develop a strategy of which products will be used to earn the point (see Strategy, below).

- Include a LEED v4 materials coversheet as a requirement for subcontractors. Check with your architect/LEED consultant or download from Green Badger.

- Throughout construction, track products and collect low-emitting materials – You’ll have to record Manufacturer, Product, Cost, and General Emissions Evaluation compliance (Sealants/Adhesives and Paints&Coatings will also need VOC compliance AND volume of product used) and have data sheets that show compliance/test results.

  - Tracking using Green Badger makes this really easy AND gives access to a database of LEED v4 compliant products AND all the backup documentation.

  - Otherwise, use the USGBC’s Building Low Emitting spreadsheet (which is a very non-user friendly tool) or other tracking mechanism.

- Submit the Low Emitting spreadsheet and backup documentation to LEED Online (If using Green Badger, it will export the populated Low-Emitting spreadsheet and provide a zip file of all cut sheets).
STRATEGIES

1. Green Badger offers a database of LEED v4 compliant products, so you can search by keyword, brand, spec section, etc to identify products for use AND provides all the required backup data and documentation. Searching the database is one of the easiest and quickest ways to find and document this credit.

2. Set realistic goals. As we’ve stated, earning more than 1 point can be very difficult in this credit. We recommend:
   
a. Paints&Coatings and Flooring as the 2 categories to count on.

b. Depending on how much composite wood, that can be relatively easy to earn (but remember, it has to be shown to be CARB compliant, not just state no added urea-formaldehyde like in LEED 2009).

c. In simple buildings (drywall and ceiling tiles) Ceilings/Walls/Thermal/Acoustic can be easily achieved, but in more complex projects this can be difficult.

d. Finally, furniture is achievable but the furniture designers needs to take it upon themselves to make sure they are choosing furniture that meets the requirements. NOTE: Recent USGBC updates only gives ½ credit for products that meet ANSI/BIFMA e3-2011 Furniture Sustainability Standard, Sections 7.6.1. To get full credit, it must meet Section 7.6.2. 90% by cost must be compliant, so that can start to hurt pretty quickly.

3. Green Badger is putting out detailed analysis of which products comply, and will update it frequently in the application and on getgreenbadger.com. We are identifying which of the common sealants and adhesives have emissivity to ensure there is a product in at least each common product type (duct sealant, acoustical ceiling, fire caulk, flooring adhesives, glazing sealant, painter’s caulk, etc).

4. For the most up to date list of what common products have VOC and general emissions evaluations, please visit: [www.getgreenbadger.com/VOC](http://www.getgreenbadger.com/VOC)
SCS Global Services does hereby certify that an independent assessment has been conducted on behalf of:

W.F. Taylor Co., Inc.

800 College Dr., Dalton, CA, United States

For the following product(s):

Flooring Adhesives:
WF Taylor Adhesives 2027, 2033, 2037, 2040, 2071, 2083, 2084, 2087, 2090, 2091, 2098, Enviro Poxy 501, MS Bond-N-Weld, MS Plus Advance, MS Plus Resilient MBA, PS 580, Redi-Set

The product(s) meets all of the necessary qualifications to be certified for the following claim:

FloorScore®

Indoor Air Quality Certified to SCS-EC10.3-2014

Conforms to the CDPH/EHLB Standard Method v1.1-2010 (effective January 1, 2012) for the school classroom, private office, and single-family residence parameters when modeled as Flooring. Also, conforms to the SCQMD Rule 1168 - Adhesive and Sealants (January 2005).

Standard Product Application Amount: 612.8 g/m²

Measured Concentration of Total Volatile Organic Compounds (TVOC): Less than/equal to 0.5 mg/m³ (in compliance with CDPH/EHLB Standard Method v1.1-2010)

Methylene Chloride and Perchloroethylene are not intentionally added to certified products.

Registration #  SCS-FS-03175

Valid from: October 1, 2016 to September 30, 2017

SCS Global Services is currently the only certification body approved by the Resilient Floor Covering Institute (RFCI) to provide FloorScore® product certification; certified products are only listed on the SCS Green Products Guide, http://www.scsglobalservices.com/certified-green-products-guide.

Stanley Mathuram, PE, Vice President
SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
REQUIREMENTS

➤ Develop and implement an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building. The plan must address all of the following.


➤ Protect absorptive materials stored on-site and installed from moisture damage.

➤ Do not operate permanently installed air-handling equipment during construction unless filtration media with a minimum efficiency reporting value (MERV) of 8, as determined by ASHRAE 52.2–2007, with errata are installed at each return air grille and return or transfer duct inlet opening such that there is no bypass around the filtration media.

- Immediately before occupancy, replace all filtration media with the final design filtration media, installed in accordance with the manufacturer’s recommendations.

➤ Prohibit the use of tobacco products inside the building and within 25 feet (8 meters) of the building entrance during construction.

GENERAL CONTRACTOR SUMMARY

This credit is basically the same is LEED 2009 – create an IAQ plan that meets or exceeds the SMACNA guidelines and protects absorptive materials. Don’t operate air handlers during construction, and if you do, have MERV 8 filters over all returns. Prior to occupancy, replace all filtration media. The new requirement that must be included is banning smoking in AND w/in 25’ of all building entrances. All of these measures must be A) in a written plan, and B) verified with photo documentation (date and times stamped) throughout the course of construction.
ACTIONS

- Develop a written IAQ Management Plan that addresses (or download the template from Green Badger):
  - Meeting or exceeding SMACNA measures:
    - HVAC Protection
    - Pathway Interruption
    - Source Control
    - Housekeeping
    - Scheduling
  - Specifying procedures for protecting stored and installed absorptive materials from moisture damage.
  - Prohibiting smoking in the building and within 25’ of entrances
  - Not using air handling equipment OR protecting return air grills with MERV 8 filters AND replacing all filtration media prior to occupancy
- Distribute IAQ plan to all subcontractors and review the processes and expectations
- Throughout construction, take annotated photographs throughout construction to verify measures (Can be done in real time with the Green Badger Mobile App)
  - One report per month once HVAC equipment arrives tends to be sufficient
  - Photograph/document air filtration media and confirm MERV 8.
- Submit the IAQ Plan to LEED Online, along with any requested photographs/IAQ reports. If using Green Badger, export the reports (each in PDF format, with all pictures date/time stamped, and comments imbedded in).
STRATEGY

1. Green Badger offers a template for the IAQ management plan – simply update with project specific details.

2. Create monthly inspection reports using the Green Badger mobile app – simply snap pictures of IAQ measures, add your comments, and save into a preformatted report.

3. Do not use air handlers during construction. If this is unavoidable, make sure MERV 8 filters are protecting each return. Document with pictures, and replace prior to turnover.

4. Make sure the no smoking policy is clearly communicated with signage at prominent locations AND it is enforced by the GC team.

5. SMACNA Measures:

   a. HVAC Protection - Keep contaminants out of the HVAC system. Do not run permanently installed equipment if possible, or maintain proper filtration if it is used.

   - Seal all ductwork, registers, diffusers, and returns with plastic when stored on site or not in service. Seal unfinished runs of ductwork at the end of each day.

   - Replace all filtration media before occupancy.

   - Do not store materials in mechanical rooms, to reduce potential debris and contamination to mechanical systems.

   b. Source Control - Keep sources of contaminants out of the building and have a plan to eliminate any that are introduced.

   - Use low-toxicity and low-VOC materials to the greatest extent possible.

   - Develop protocols for the use of any high-toxicity materials. Isolate areas where high-toxicity materials are being installed and use temporary ventilation for that area.

   - Prevent exhaust fumes (from idling vehicles, equipment, and fossil-fueled tools) from entering the building.

   - Enforce the no-smoking job site policy.

   - Protect stored materials from moisture because absorbent materials exposed to moisture during construction can mold and degenerate long after installation. Store materials in dry conditions indoors, under cover, and off the ground or floor.

   c. Pathway interruption - Prevent circulation of contaminated air when cutting concrete or wood, sanding drywall, installing VOC-emitting materials, or performing other activities that affect IAQ in other work spaces.

   - Isolate areas of work to prevent contamination of other spaces, whether they are finished or not. Seal doorways, windows, or tent off areas as needed using temporary barriers, such as plastic separations. - Provide walk-off mats at entryways to reduce introduced dirt and pollutants.
- Depressurize the work area to allow a differential between construction areas and clean areas. Exhaust to the outdoors using 100% outdoor air, if possible.
- Use dust guards and collectors on saws and other tools.

d. Housekeeping - Maintaining a clean job site results in fewer IAQ contaminants to manage.

- Maintain good job site housekeeping on a daily basis. Use vacuum cleaners with high-efficiency particulate filters and use sweeping compounds or wetting agents for dust control when sweeping.

- Keep materials organized to improve job site safety as well as indoor air quality.

e. Scheduling - Sequence construction activities to reduce air quality problems in new construction projects. For major renovations, coordinate construction activities to minimize or eliminate disruption of operations in occupied areas.

- Keep trades that affect IAQ physically isolated on site and separated from each other by the construction schedule. For example, schedule drywall finishing and carpet installation for different days or different sections of the building. Consider after-hours or weekend work if practical.

- Install absorptive-finish materials after wet-applied materials have fully cured whenever possible. For example, install carpet and ceiling tile after paints and stains are completely dry.

- If applicable, plan adequate time to conduct a flush-out and/or perform IAQ testing before occupancy, in compliance with EQ Credit Indoor Air Quality Assessment.

- Remove all temporary filtration media and replace them with new filters before occupancy.
Action Items

Sustainable Sites Prerequisite 1 – Construction Activity Pollution Prevention

- Implement all measures in the ESC plan, and have plan designer confirm they were installed as per the plan and industry standards.

- Document the installed measures are maintained over the course of construction by taking pictures, using inspection reports, or having a third-party provide inspections.

- If any corrective actions are required, implement immediately and document with more pictures or another inspection report (it’s ok if the silt fence falls down – just fix it!). NOTE: If USGBC sees an inspection report that notes a deficiency, they WILL ask for a followup report that shows it was fixed.

- Submit a sample of inspection reports to LEED Online
Action Items

Materials and Resources Prerequisite 2: Construction Waste Planning AND Credit 5: Construction Waste Management and Diversion

- Identify at least 5 materials that will be recycled on your project AND what percentage of total waste they will make up.

- The plan must account for all materials, including land-clearing debris, materials to be used for alternative daily cover (ADC), and other materials not contributing to diversion but not included in the diverted waste total.

- Identify who the waste contractor will be, and how those materials will be managed on site (separate dumpsters/commingled, etc) AND how they will be recycled/diverted/disposed of.

- Document the diversion rates. Track each material and diversion strategy. If you divert more than 50% and 3 different waste streams or 75% and 4 waste streams, you’ll earn points under MRc5.

- Divide your total waste generated (recycled AND landfilled) and divide by building square footage. If it is less than 2.5 lbs/sf, you’ll earn 2 points.

- Fill out the LEED CWM Tracking Template, and upload that spreadsheet along with your CWM plan to LEED Online.
**Action Items**

**Materials and Resources Credit 2 – Building Product Disclosure and Optimization: Environmental Product Declarations**

- Review the spec and see if they call out 20 specific products that have EPDs.

- If they don’t, call for a team meeting to come to an agreement of how this credit will be earned, and which products will be pursued.

- Develop a strategy of which products will be used to earn the point (see Strategy, below)

- Include a LEED v4 materials coversheet as a requirement for subcontractors. Check with your architect/LEED consultant or download from Green Badger

- Throughout construction, track products and collect EPDs – counting industry wide as ½ product, and product specific as 1 product. You’ll have to record Manufacturer, Product, Cost, EPD type, and have the actual EPD available

  - Tracking using Green Badger makes this really easy AND gives access to a database of LEED v4 compliant products AND all the backup documentation
  - Otherwise, use the USGBC’s Building Product Disclosure and Optimization (BPDO) spreadsheet (which is a very non-user friendly tool) or other tracking mechanism.

- Submit the BPDO spreadsheet and EPDs to LEED Online (If using Green Badger, it will export the populated BPDO spreadsheet and provide a zip file of all EPDs)
Materials and Resources Credit 3 – Building Product Disclosure and Optimization: Sourcing of Raw Materials

- Include sustainability requirements in project specifications for recycled content, FSC wood and other contributing factors.

- Early in the estimating process, map out a plan for reaching a 25% threshold, recognizing on 30% (of the 25%, or 7.5% total) can come from structure and/or enclosure (or do the additional calculation for Core and Shell projects). See Strategy, below, for additional guidance.

- Finalize total construction costs for Divisions 3-10, 31 and 32, and use to establish the basis of calculations
  - Update Green Badger or your tracking tool with this value.

- Include a LEED v4 materials coversheet as a requirement for subcontractors. Check with your architect/LEED consultant or download from Green Badger.

- Throughout construction, track products and collect product data sheets validating EPR (counting as 50%), recycled content, FSC (make sure you collect FSC certifications AND invoices showing total cost AND FSC number), salvaged, and bio-based materials. If any are also extracted, harvested and manufactured within 100 miles, you get the bonus multiplier.
  - Tracking using Green Badger makes this really easy AND gives access to a database of LEED v4 compliant products AND all the backup documentation
  - Otherwise, use the USGBC’s Building Product Disclosure and Optimization (BPDO) spreadsheet (which is a very non-user friendly tool) or other tracking mechanism.

- Submit the BPDO spreadsheet and product data sheets to LEED Online (If using Green Badger, it will export the populated BPDO spreadsheet and provide a zip file of all data sheets)
Action Items

Materials and Resources Credit 4 – Building Product Disclosure and Optimization: Material Ingredient Reporting

- Review the spec and see if they call out 20 specific products that have HPDs/Cradle to Cradle/etc.
  - If they don’t, call for a team meeting to come to an agreement of how this credit will be earned, and which products will be pursued.

- Develop a strategy of which products will be used to earn the point (see Strategy, below)

- Include a LEED v4 materials coversheet as a requirement for subcontractors. Check with your architect/LEED consultant or download from Green Badger

- Throughout construction, track products and collect HPDs/Cradle to Cradle/etc – You’ll have to record Manufacturer, Product, Cost, MIR type, and have the actual MIR documentation available. Make sure any HPDs meet the requirements above!
  - Tracking using Green Badger makes this really easy AND gives access to a database of LEED v4 compliant products AND all the backup documentation. Any HPD in Green Badger has been reviewed for compliance.
  - Otherwise, use the USGBC’s Building Product Disclosure and Optimization (BPDO) spreadsheet (which is a very non-user friendly tool) or other tracking mechanism.

- Submit the BPDO spreadsheet and MIR documentation to LEED Online (If using Green Badger, it will export the populated BPDO spreadsheet and provide a zip file of all MIR cut sheets)
Action Items

Indoor Environmental Quality Credit 2 – Low Emitting Materials

- Review the spec to ensure products with emissivity are called out
- Pay special attention to:
  - Finish schedule (flooring, ceilings, walls, coatings, paint, etc)
  - Insulation
    - If they don’t, call for a team meeting to come to an agreement of how this credit will be earned, and which products will be pursued.
- Develop a strategy of which products will be used to earn the point (see Strategy, below)
- Include a LEED v4 materials coversheet as a requirement for subcontractors. Check with your architect/LEED consultant or download from Green Badger
- Throughout construction, track products and collect low-emitting materials
  - You’ll have to record Manufacturer, Product, Cost, and General Emissions Evaluation compliance (Sealants/Adhesives and Paints&Coatings will also need VOC compliance AND volume of product used) and have data sheets that show compliance/test results
    - Tracking using Green Badger makes this really easy AND gives access to a database of LEED v4 compliant products AND all the backup documentation.
    - Otherwise, use the USGBC’s Building Low Emitting spreadsheet (which is a very non-user friendly tool) or other tracking mechanism.
- Submit the Low Emitting spreadsheet and backup documentation to LEED Online (If using Green Badger, it will export the populated Low-Emitting spreadsheet and provide a zip file of all cut sheets)
Action Items

Indoor Environmental Quality Credit 3 – Construction IAQ Management

- Develop a written IAQ Management Plan that addresses (or download the template from Green Badger):
  - Meeting or exceeding SMACNA measures:
    - HVAC Protection
    - Pathway Interruption
    - Source Control
    - Housekeeping
    - Scheduling
  - Specifying procedures for protecting stored and installed absorptive materials from moisture damage.
  - Prohibiting smoking in the building and within 25’ of entrances
  - Not using air handling equipment OR protecting return air grills with MERV 8 filters AND replacing all filtration media prior to occupancy
  - Distribute IAQ plan to all subcontractors and review the processes and expectations
  - Throughout construction, take annotated photographs throughout construction to verify measures (Can be done in real time with the Green Badger Mobile App)
    - One report per month once HVAC equipment arrives tends to be sufficient
    - Photograph/document air filtration media and confirm MERV 8.
  - Submit the IAQ Plan to LEED Online, along with any requested photographs/IAQ reports. If using Green Badger, export the reports (each in PDF format, with all pictures date/time stamped, and comments imbedded in).