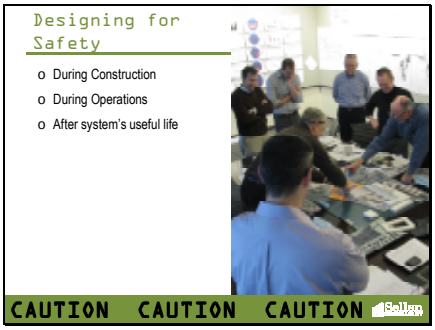
Slide 1


While new systems will always require a new look at safety protocol and procedures, designers play a large role in helping support the integration of both safety and sustainability into our projects.

Slide 2




Safety professionals should work with designers before construction begins to integrate green building systems in a way that keeps people safe:

- o During Construction
- o During Operations
- o After system's useful life

Slide 3


Whether they are being installed on the roof, in a confined space, on the exterior of the building, etc. green building systems often require specific safety equipment. Designers can support safe practices by thinking proactively about how work will be managed during the installation of a given system.

Safety professionals can leverage their constructability and safety knowledge to help inform design teams about added or new safety precautions so they can be incorporated into the project in a way that promotes health and well being.

Slide 4


Vegetated roofs are both environmentally beneficial and aesthetically pleasing. Often, design teams don't like to add things like guardrails on the roof because they feel it detracts from the look of the roof. If that is the case are there additional safety features we can incorporate into the design such as a buffer area between roof edge and vegetation?

Slide 5


Work on a green building system doesn't stop after it is installed. Certain green building systems may even require more maintenance than comparable non green building systems. With that in mind, safety professionals should work with maintenance crews and designers to ensure a given building and it's systems are safe and easy to maintain.

Slide 6

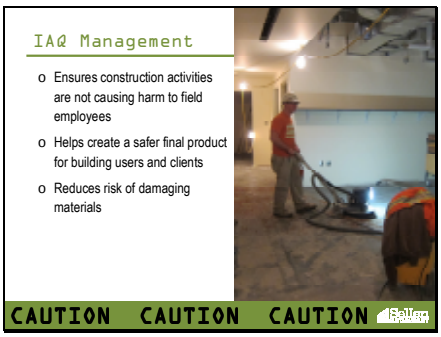

Shown here is an approach to ensuring cool roofing materials can be maintained in a safe, slip free manner.

INSTRUCTOR: Ask the audience – What else should be incorporated into the design to ensure maintenance crews can perform their work safely?
Answer: Anchors for tie offs, guard rails for fall protection

Slide 7


Anytime we introduce a new system or practice to a jobsite there may be more potential risks involved. That said, green buildings are creating a range of benefits to safety and it is important to be aware of how these new systems and practices can make construction sites safer.

Slide 8




One of the biggest green building benefits to safety comes from an increased attention to Indoor Air Quality (IAQ) Management. IAQ Management:

- Ensures construction activities are not causing harm to field employees
- Helps create a safer final product for building users and clients
- Reduces risk of damaging materials

Slide 9


One aspect of proper IAQ Management is Routine Housekeeping. Housekeeping saves time and money in the long run and leads to a safer jobsite. In addition:

- Proper housekeeping supports IAQ management
- Housekeeping reduces trip hazards and exposure to sharp objects that can cut or bruise field personnel
- Housekeeping keeps dust and other particulates out of the air creating a healthier, safer site

Slide 10


Green buildings often pay particular attention to healthy/more sustainable materials. Healthy materials:

- Reduces exposure of field employees to VOCs and other chemicals like Urea Formaldehyde
- Creates a healthier work, learning or living environment for building end users

Slide 11


To reduce energy and provide a more aesthetically pleasing, productive space, green building integrate daylighting much more frequently than typical construction projects. Added daylighting means:

- Fewer cords around the jobsite
- Reduced risk of electrical shock
- Well lit spaces makes identifying trip hazards easier

Slide 12


In addition to daylighting, natural ventilation is another passive design strategy that helps green projects reduce energy expenditures while providing healthier, happier spaces. The following are benefits associated with natural ventilation:

- Fresh air is much healthier than air inside a building with high particulates from construction
- VOCs from paints and sealants can be quickly diluted
- Work in confined spaces like stairwells is safer with natural ventilation
- Reduces need for fans which create trip hazards

Slide 13


In addition to new systems, green buildings are introducing new sustainable best practices and jobsite responsibilities. Let's take a look at a few examples.

Slide 14


No construction project and very few jobsite tasks can be completed with just one person. So why do we expect one person to be responsible for managing safety for an entire site? In addition to new systems, green buildings are driving a shift towards more sustainable construction practices. Company-wide sustainable best practices are requiring new roles and provide a unique opportunity to integrate safe practices.

Slide 15


Brownfield Site Coordinator:
The first sustainable best practice we'll cover is Brownfield Site Remediation. As the percentage of these sites increase, the demand for knowledgeable employees is on the rise. This role is often filled by both field and office personnel depending on the size of the project.

INSTRUCTOR: Ask the audience – Can anyone guess why brownfield redevelopment is most commonly associated with LEED Certified projects?

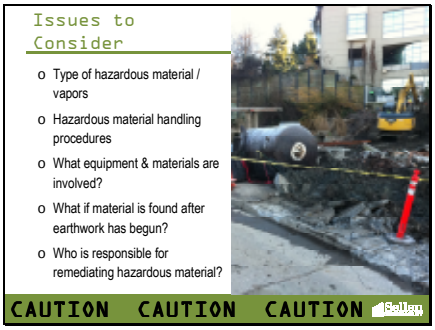
Potential Answers:
It is more sustainable to clean up a contaminated site than to develop over a greenfield site
LEED provides credit points for brownfield redevelopment
Brownfields are typically located in urban areas which is the type of development that the LEED Rating System encourages.

Slide 16


The Environmental Protection Agency defines brownfields as real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Repairing and redeveloping brownfields prevent further destruction of prime farmland and other green field sites. Brownfields can often be located in very attractive sites and they help prevent suburban sprawl.

Slide 17




Critical issues to consider when dealing with a brownfield site include:

- Type of hazardous material / vapors
- Hazardous material handling procedures
- What equipment & materials are involved?
- What if material is found after earthwork has begun?
- Who is responsible for remediating hazardous material?

Slide 18


Typically project owners or project teams can determine whether or not soil will be contaminated or have contaminants in it based on the past history of the site. For example, a recent rather large project in Seattle was built on the site of an old bus barn. The project team assumed that the bus barn had to have created pollution from runoff, oil, and other chemicals that were used in maintaining the school buses.

If site contamination is suspected project teams must conduct a Phase II Environmental Site Assessment and follow recommended action for clean up.

Slide 19


Sometimes project teams may come across contaminants after earthwork has already started. If that is the case all construction work should stop immediately until contaminants have been properly abated and are deemed safe to work around.
When contaminants like the oil drum shown here are found after construction has started safety risks increase making it very important to stop work, contact the right authority, and ensure the contaminants are removed from the site in a safe manner. If contaminants like the oil drum above are found it is important to prevent leaks and spills which could lead to further complications.

Slide 20


Key considerations when remediating brownfield sites include:

**Contaminants suspected:**

- **Preplanning –** If contaminants are known to be within the soil of the site you are working on preplanning is critical to keeping the site safe. Asking important questions such as “who should we contact to have the soil remediated?” or “what are the health risks associated with the known contaminant?” can help drive a safety plan.
- **HAZWOPER –** HAZWOPER training should be provided for anyone that may be required to work with the contaminated soil.
- **3rd Party Remediation –** One of the best ways to reduce exposure to contaminants is to hire a 3rd party specialist to clean up the site. In some cases 3rd party clean up is required. The 3rd party clean up group should be brought on

board before any work begins.

**Contaminants identified during construction:**

- **Stop work –** Sometimes we come across contaminants after construction has already begun (as can be seen in the image above). If contaminants are found during construction all work should cease.
- **Secure area –** After work is stopped the contaminated area should be secured. Once the area is secured a specialist should be notified to perform an environmental site assessment to determine if any additional areas within the site are contaminated and to develop a plan for remediation.

Slide 21

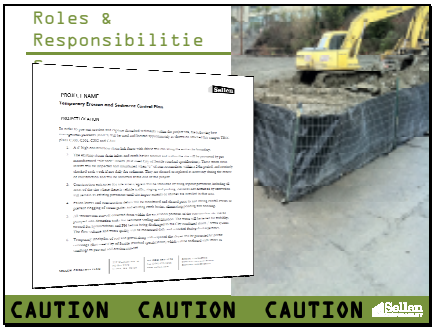

The next sustainable construction best practice we'll take a look at is Construction Activity Pollution Prevention. Construction Activity Pollution Prevention requires a lot of coordination and onsite management lending itself to potential overlap and collaboration opportunities between sustainability and safety.

Slide 22


When implementing Construction Activity Pollution Prevention measures consider the following:

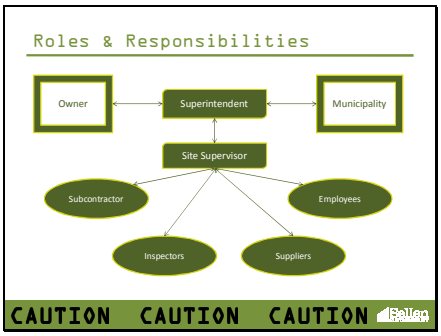
- Communication
- Erosion & Sedimentation Control
- Stormwater Management
- Dust Control
- Concerns with Existing Site
- Leaks, Spills & Emissions from Construction Equipment
- Worker Transportation
- Noise Pollution

Slide 23



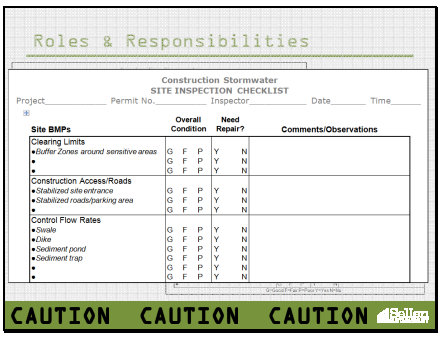

Every jobsite, especially in the state of Washington, should have a jobsite specific Temporary Erosion and Sediment Control (TESC) plan. As a site safety professional it is important to review the TESC plan to be aware of the types of activities and the actions that will be put into place when dealing with earth work and exterior construction. Additionally, how can we integrate safety into the TESC plan to address and support routine safety procedures that may cross scopes of work?

Slide 24




INSTRUCTOR – Ask the audience – Who oversees the TESC plan and how is it implemented?
Answer: On many green building projects there will be a specific jobsite TESC supervisor who is responsible for maintaining and implementing the plan. That said, everyone plays an important role in ensuring TESC best practices are as effective as possible.

Slide 25




A field checklist can be a very useful tool for implementing, documenting, and improving a TESC plan.

INSTRUCTOR: Ask the audience - How can we integrate safety into our existing tools and checklists like the Stormwater Field Checklist shown here?
Answer: Site safety coordinators may have existing checklists for safety job walks. Integrating TESC requirements into existing checklists is an easy way to ensure practices are being implemented.

Slide 26


Regular site walks and photo documentation should occur during construction to ensure the jobsites TESC plan is being implemented. How can we integrate TESC walks and photo documentation with site safety walks? TESC photo documentation can be utilized as a tool for improving site safety practices. It can also support the examination of new systems to ensure safety is being adequately addressed.

Slide 27


So what do TESC BMPs look like in practice in the field?

INSTRUCTOR: Ask the audience – What is happening here?

Temporary stabilization measures are implemented to prevent erosion. What are the safety issues associated with stabilization that we need to consider?

Potential Answers:
Slip hazards on the plastic
Trip hazards
Falls into the trench

Slide 28


The following are additional tasks assigned to whoever is managing the TESC plan. Shown here is an example of a wheel wash.

INSTRUCTOR: Ask the audience – What are some potential safety concerns with this system?

Answer: Trip hazards

Slide 29


The image shown here is an example of how an innovative idea became a cost/water savings stormwater management strategy. The project team working on a hospital expansion in Seattle, WA recognized early on in the preconstruction process that they would be demolishing some existing house structures that had solid concrete basements. The team decided that rather than demolish the basements they would leave them intact and use them as temporary detention ponds.
The team used a series of Baker Tanks and filters to clean the water that was collected in the basements. After being filtered, the water was used to fill the street sweepers and Water Buffalo that were being used to keep the site clean.
In the spirit of conserving resources, the project team installed a series of gutters that would collect the water that was used for street sweeping/cleaning which was then pumped back into the detention ponds to be reused over and over again.
All in all the project team ended up saving over $38,000 and close to 960,000 gallons of potable water.

Green building and sustainable practices are driving innovations like

this. As we become more innovative on the jobsite we need to be aware of how new practices may reduce or add safety risks.

Slide 30


Shown here is a Water Management Unit which replaces silt fabric in storm drains. The WMU is able to collect all of the oils and heavy metals that silt fabric lets pass through to the drain, keeping both sedimentation and pollution out of our water ways. After use the WMU is a lot heavier than standard silt fabric and may lead to strains or overexertion when replacing/maintaining the system which is required roughly every 6 months. Things to be aware of as we introduce new and improve systems into common jobsite best practices.

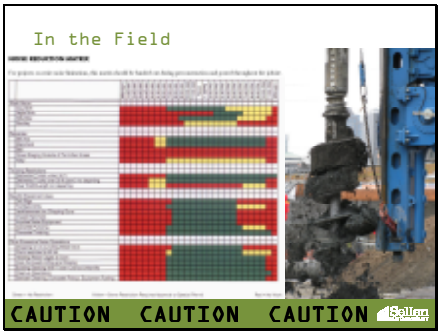
Slide 31


When construction occurs next to an occupied space there are a number of construction activity pollution and safety considerations that need to be taken into account. For example, how are pedestrians going to be directed around the site? Are any construction activities going to create dust or emissions that may be harmful to both field crews and the adjacent buildings? What materials or equipment are we using close to another building's fresh air intake and how may that impact health and safety of others?

Often the concerns from a construction activity pollution prevention and a safety standpoint are very similar. If we can get both our TESC coordinator and our safety coordinator in a room asking all of the right questions we can develop plans and actions to ensure our construction sites are as safe for

our field teams as they are for the surrounding communities.

Slide 32




Additional tools that are often used when dealing with construction activity pollution and stormwater management include a noise reduction matrix. Noise matrixes are very detailed and often identify at the very least all major construction activities and the decibel levels for each task on a given project. Safety professionals could utilize the noise reduction matrix to prepare field personnel for times where ear protection is required.

Slide 33


There are a number of parallels between safety supervision and construction activity pollution prevention. The following are a few examples of practices that support both construction activity pollution prevention and safety:

- Jobsite safety walks for exterior construction
- Trip and fall protection during exterior groundwork and construction
- Prevention of exposure to chemicals from leaks / spills
- Dust control to keep particulates out of airways
- Air quality associated with equipment emissions

By identifying practices and responsibilities that have synergies between multiple roles our jobsites can be made safer through collaboration.

Slide 34


When we move from the site to the building itself, green building is encouraging Building Reuse as a common sustainable construction practice. Building Reuse requires unique skill-sets and specialized roles.

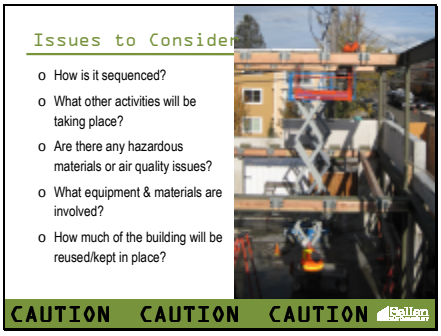
Slide 35


Building reuse involves the repurposing of existing structural elements to integrate those features into a new project. Often, older buildings provide aesthetic appeal that can't be matched by the projects we're building today.

INSTRUCTOR: Ask the audience – Why is Building Reuse so important to green building and LEED certification?

Potential Answers:
Embodied energy reduction
Aesthetics/character
Building Reuse supports the achievement of LEED credits

Slide 36




If you are working on a project that is going to be reusing existing infrastructure it is important to ask the following questions before work begins:

- How is it sequenced?
- What other activities will be taking place?
- Are there any hazardous materials or air quality issues?
- What equipment & materials are involved?
- How much of the building will be reused/kept in place?

Slide 37


Building reuse will begin with identifying which areas of an existing site can be kept in tact or upgraded to support the demands of a new project. When identifying the materials and structural features that will be reused it is important to be aware of the presence of any hazardous material such as lead based paint, mold or asbestos that may have been used in the original construction of a space.

Slide 38


Once specific reuse areas have been identified, deconstruction and demolition work can begin. During demolition and deconstruction it is very important to stabilize areas that need to be reinforced as well as any areas that will remain in place but eventually be supported by additional building columns, walls, etc.

Slide 39


Older buildings that are reused typically need to be seismically upgraded and reinforced with new materials. As building reuse progresses it is important to understand what needs to be upgraded and how everything will fit together. Building reuse requires a lot of overhead work that may other wise not be taking place and it is important to take extra precaution as things are being repaired and reinstalled.

Slide 40


Depending on the project, building reuse may create unique material installation requirements. Solid timber beams are very unique and rare in new projects today. That said, architectural features like single timber beams were very common practice in a lot of the older spaces that are beginning to be redeveloped. If a project has a lot of single timber beams instead of solid metal or concrete decking employees may have an increase in fall hazards until wood decking is in place.

Slide 41


When reusing a space the design has to be developed around what is left in tact. This can often lead to unique installation requirements for both new and reused materials. Fall hazards and overhead work should be adequately addressed before additional interior construction begins.

Slide 42


Not only is building reuse more sustainable, it often provides some of the more unique and most aesthetically pleasing spaces to work, learn and live in. By ensuring safety on projects like the one shown here we can help more projects reduce their environmental impact.

INSTRUCTOR: Ask the audience – Has anyone heard of embodied energy?

Embodied energy is all of the energy associated with a given material or product. Too often we only think of say a beam as a beam and we forget that there was a lot of energy involved in extracting, processing, shipping, reprocessing, installing, and finishing that beam. Building Reuse significantly reduces embodied energy.

Slide 43


Imagine the embodied energy saved by remodeling King St Station in downtown Seattle. Instructor: Ask the class what unique safety issues might be present in a project like this?

Slide 44


Low level lead based paint was one issue, shown here, it's being removed with a gel product so welders can reinforce these steel columns and not inhale the lead while welding

Slide 45


Plaster repairs were conducted but only after multiple asbestos tests were conducted

Slide 46


One of the largest safety issues during this phase of construction was the air quality. Without proper ventilation (shown here with fans in the windows, openings for cross ventilation, and a large filter bag in the lower right of this image) the 12 welders would be creating a lot of toxic air for themselves and other trades to breath.

Slide 47


Key takeaways to ensure safety when performing building reuse techniques include:

- **Material Handling –** Compared to demolition, building reuse requires more hands on activity and more material handling. Certain materials may contain contaminants and others may be heavy or uncommon to today's worker. Safety measures should be identified for all of the materials and practices that will be put into place during building reuse.
- **Selective Demolition –** More often than not building reuse requires teams to identify specific areas that will be left in place and then remove the rest of the existing space. When performing selective demolition it is important to take steps to ensure areas that will be left in place are secure and supported so that the structure does not collapse or fall in on workers within the space.
- **Hazardous Materials –** Building reuse is usually performed in older existing structures which means some of the materials may contain contaminants like asbestos or lead based paint. When reusing existing spaces it is important to note what materials will be left in place and which will need to be removed and refinished/reinstalled due to any hazardous material.
- **Air Quality –** Building reuse can generate a significant amount of dust. Dust control becomes especially important when contaminants may have been

located within the space the work is being conducted.

- **Overhead Protection –** Building reuse can often introduce unique situations for construction teams. In a typical construction project it is easy to build from the ground up without much work going on above us. Building reuse projects are much more like renovation projects and thus may require work be performed at varying elevations at the same time. It is important to clearly mark where overhead work is taking place during building reuse.
- **Overexertion –** With added material handling comes a higher risk of overexertion. Additionally, a lot of the materials that are reused are reused because of their uniqueness. Materials like solid timber beams that can't be found any more are a lot heavier and harder to work with than new glulam beams that may be installed in small easy to manage sections.

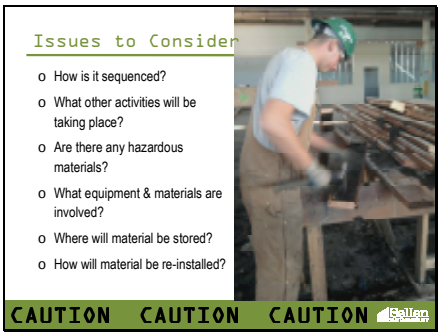
Slide 48


In addition to Building Reuse, Deconstruction & Salvage of building materials is quickly becoming a commonly used sustainable construction best practice.

Slide 49


Deconstruction is the practice of systematically taking apart a building structure in a way that promotes reuse/salvage. Deconstruction is a more sustainable alternative to demolition which typically crushes a structure then sorts material for recycling or the landfill.

Slide 50




Issues to consider before deconstruction and salvage begins include:

- How is it sequenced?
- What other activities will be taking place?
- Are there any hazardous materials?
- What equipment & materials are involved?
- Where will material be stored?
- How will material be re-installed?

Slide 51


As with Building Reuse, before any deconstruction work begins project team should have the site and materials inspected for anything that could be considered hazardous. In the state of Washington the Clean Air Act requires any contractors working with potentially contaminated materials to submit an AHERA report before any material can be sent to a landfill or recycling facility. When we deconstruct older buildings there is often lead based paint or asbestos which can be very dangerous from a health perspective due to the increase in material handling when performing deconstruction vs. demolition.

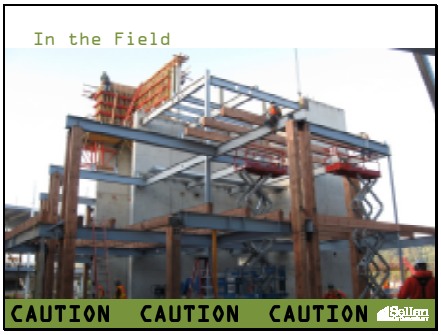
Slide 52


Materials that are salvaged may have additional hazards, such as nails, screws, etc., that need to be addressed to ensure everyone will remain safe when handling materials.
Salvaged materials should have a clearly marked storage area and a plan for remediation if hazardous materials are present.

Slide 53


After hazardous materials have been abated salvaged material can be reinstalled. Again, clearly marking storage areas is very important to ensure there is no cross contamination between hazardous and abated material and to ensure none of the material accidentally gets recycled.

Slide 54




Shown here is an example of salvaged material, that resulted from the deconstruction of an existing warehouse, being reinstalled in a new project. As you can see overhead work and fall protection are big concerns with this type of installation.
Depending on the materials that are salvaged during deconstruction the safety concerns will vary. One project may reclaim beams like those shown here, another may reclaim a floor.
Understanding and being aware of what will be reclaimed and where it will go is critical to developing proper safety plans and procedures.
Note: Many trades, including ironworkers and carpenters, had to collaborate and work together to build and install this structural system.

Slide 55


In this particular case, the project team decided to take their deconstruction, salvage, and reuse practices a step further by bringing a portable mill onto the jobsite to mill reclaimed lumber for immediate use including the creation of formwork for the rest of the project.

Slide 56


Green building and the pursuit of sustainable goals is driving a large shift in innovative solutions like this unique case study. As we continue to innovate and reduce our environmental impact it is important to continue to think proactively about new practices and strategies that are being developed to meet our sustainable goals.

Slide 57


Not only did the formwork reduce the demand for virgin materials it also created a very unique wood grain pattern that fit right into the natural feel of the building materials that were used in the project.

Slide 58


Key takeaways to ensure safety when performing deconstruction and salvage include:

- **Hazardous Materials –** Deconstruction and salvage typically takes place in existing buildings that are older which means some of the materials may contain contaminants like asbestos or lead based paint. When performing deconstruction and salvage it is important to note what materials will be removed and to identify any hazardous material that may be associated

with that material.

- **Impalement from Nails –** Materials that are removed for salvage may contain nails or screws that need to be removed before the materials can be refinished and reinstalled. If nails need to be removed it is important to be aware of impalement hazards from any materials that are being handled.
- **Job Rotation –** Certain activities performed during deconstruction, such as removing nails from lumber, efforts may be very tedious and repetitive. It is important to rotate tasks throughout the day to prevent strains or sprains and to support proper ergonomics.
- **Dust Control –** Like demolition, deconstruction activities can generate a lot of dust. Dust control is especially important if hazardous materials are present during deconstruction.
- **Overexertion & Material Handling -** Added material handling time, associated with deconstruction vs. demolition, can lead to overexertion. Again, job rotation and ergonomics play a big role in preventing overexertion.

Slide 59


The best way to prevent waste is to not create it in the first place through sustainable practices like Building Reuse and Deconstruction. That said our industry is still far from creating zero waste jobsites which makes Waste Recycling Management a very important sustainable construction practice.

Slide 60


Key issues to focus on when managing waste recycling include:

- o Waste Management Plan
- o Signage
- o Communication
- o Tracking & Reporting
- o Ensuring Clean Loads
- o Material Handling

Slide 61

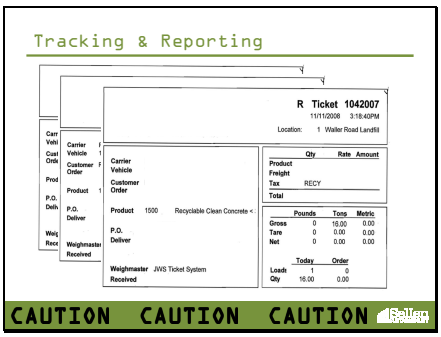

A Construction Waste Management plan, or Waste Recycling Management Plan, is a written plan that's critical to ensure there's clear direction on how company-wide practices get implemented. It outlines all the required components that project teams need to follow: who, what, why, when, where and how.

Safety professionals should review the waste management plan and know where that plan lives in case it is updated or revised during construction. Depending on the types of materials that are being installed on the jobsite will determine the specific health risks that need to be addressed.

Slide 62

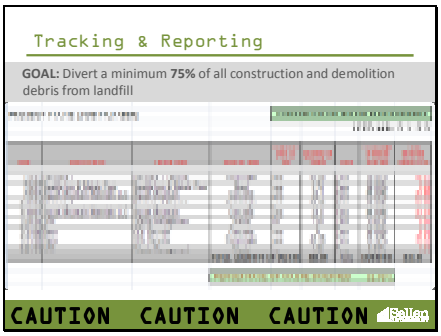

Waste Recycling Signage is critical to the successful implementation of a recycling plan. Signage needs to be clearly marked and added at appropriately sized-dimensions with appropriate message detail to all bins. Safety teams should work with field crews to identify materials that may be hazardous and develop appropriate signage with resources for dealing with and handling those materials.

Slide 63




Shown here are sample hauling tickets that a waste recycling coordinator maintains. These tickets let the coordinator know what material left the site, how much was hauled, where it went and how it was handled. Hauling tickets are important both for tracking waste diversion %'s but also for keeping track of hazardous materials.

Slide 64




Shown here is a sample waste tracking log. Information on the hauling tickets gets entered into this log to keep track of the overall waste diversion rate. This log is also a great way to sort and track by material and whether or not it was recycled.

All hazardous material needs to be kept out of recycling bins. Any material that makes its way into a recycling bin contaminates the whole load which may require 3rd party abatement and sending any recyclable material straight to the landfill.

Safety professionals should work with waste recycling coordinators to identify proper recycling/disposal procedures for hazardous materials to ensure a safe jobsite and a higher waste diversion rate.

Slide 65


Again, communication is key. As recycling continues to become standard practice throughout the industry how do we ensure our jobsites remain safe when we are sorting materials and storing bins onsite?

Slide 66


When recycling on the jobsite it is always very important to use the right tools and procedures for sorting materials to prevent overexertion. Heavy or dangerous objects should be put into bins using equipment, never by hand.

Slide 67


Key takeaways to ensure safety when performing construction waste recycling include:

- **Material Handling –** If materials are separated on site it means more time spent handling materials which puts workers at a greater risk of injury. Commingled recycling bins can reduce time spent handling materials and if the commingled bins are kept clean there will be no need for people to enter the dumpster to sort out materials that should not be in the bin.
- **Overexertion –** Added material handling time can lead to overexertion. Some materials are heavy and hard to hoist into the bin. If materials are big and heavy use the proper equipment to get them into the bin rather than trying to overexert yourself by placing them in by hand.
- **Access –** If materials do need to

be sorted in the bin or the bin needs to be compacted it is important that there is a safe and secure access point for entering the bin. If the bins ladder is damaged avoid using it and request a new bin after the next pickup.

- **Potential Hazardous Materials –** Certain waste materials may contain contaminants that are harmful to employees health. Especially during demolition, it is very important to be aware of what you are handling and how to properly dispose of it.

Slide 68


As waste recycling coordinator positions continue to evolve with the green building industry, there is a lot of opportunity for collaboration and coordination between waste recycling and safety supervision. The following are a few examples of practices that support both waste recycling and safety:

- Prevention of exposure to hazardous waste
- Safe handling of materials
- Jobsite signage
- Support jobsite cleanup and housekeeping

Slide 69

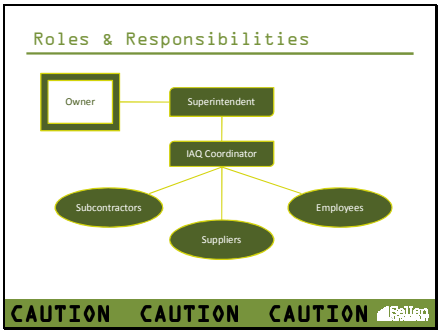

The final sustainable construction best practice we'll cover is Indoor Air Quality (IAQ) Management. The IAQ Coordinator role helps ensure worker safety and reduces risk to future users of the finished space.

Slide 70


When managing Indoor Air Quality (IAQ) consider the following:

- o Roles & Responsibilities
- o IAQ Management Plan
- o SMACNA Guidelines
- o Photo Documentation
- o Subcontractor Communication
- o Product Data & MSDS Sheets

Slide 71




Assigning an IAQ Coordinator or Manager can greatly increase the efficiency and effectiveness of an IAQ management program.

However, IAQ management isn't just the responsibility of the IAQ Coordinator: a host of people, including site safety supervisors, need to interact with and understand the plan.

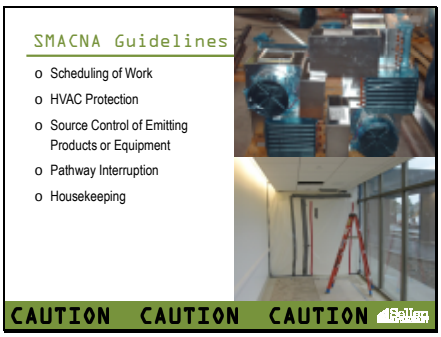
Slide 72


As with Construction Activity Pollution Prevention and Waste Recycling, the first step in managing IAQ is creating a plan.

Critical components of the plan include the who, what, why, when, where and how of the IAQ management process.

Identifying who the point people are and what their responsibilities are in relation to achieving the goals ensures everyone is clear about their roles, and knows where to go with questions.

Slide 73

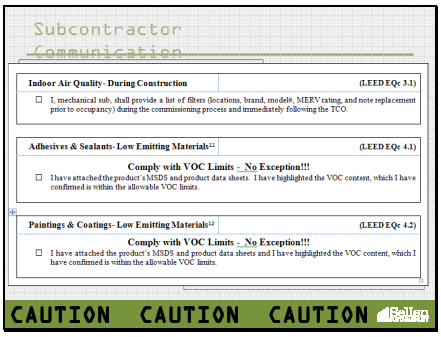



SMACNA is a prescriptive standard that represents industry best management practices that can be implemented to help a project manage Indoor Air Quality/pass an Indoor Air Quality test. SMACNA guidelines apply to all projects despite it being titled: Occupied Buildings Under Construction. It helps to interpret its intent if you consider construction workers as occupants and how the air quality they work in is important too.

The five SMACNA Guidelines include:

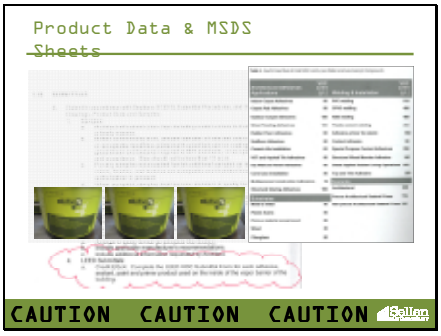
- Scheduling of Work
- HVAC Protection
- Source Control of Emitting Products or Equipment
- Pathway Interruption
- Housekeeping

Slide 74



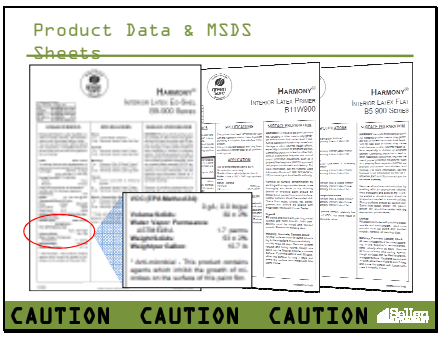

Like site walks, IAQ management tools and templates can be integrated into safety tools and templates or vice versa. Shown here is a sample IAQ submittal form to help inform subcontractors of IAQ procedures and documentation requirements for healthy/more sustainable materials.

Slide 75




A big part of IAQ management is identifying, selecting, and maintaining healthy materials such as paints, coatings, sealants, adhesives, carpet systems, agrifiber products, etc. Often safety professionals are responsible for maintaining MSDS sheets onsite. Material management may be another area where safety and sustainability can be integrated. As healthier products become more common health concerns caused by the materials our field crews use every day will hopefully become less apparent.

Slide 76




In addition to maintaining/reviewing MSDS sheets, safety professionals and IAQ coordinators should be reviewing product date to ensure VOC limits meet or are below designated thresholds. The lower the VOC content the better when it comes to the health and safety of our workforce as most VOCs are known carcinogens.

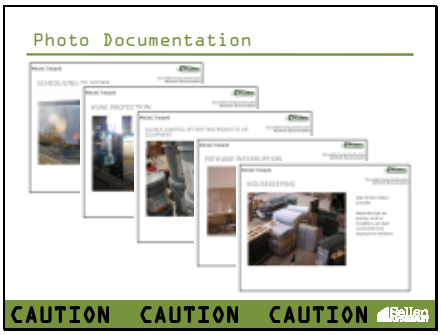
INSTRUCTOR: Ask the audience – What else beyond VOC's should we be looking for to improve worker safety and reduce exposure?

Answer: Low VOC doesn't necessarily mean safe. MSDS sheets should be checked for hazard levels and additional contaminants.

Skin exposure to chemicals in the workplace is a significant problem in the US. In 2010, 34,400 recordable skin diseases were reported by the Bureau of Labor Statistics (BLS) at a rate of 3.4 injuries per 10,000 employees, compared to 19,300 respiratory illnesses with a rate of 1.9 illnesses per 10,000 employees.
Most chemicals are readily absorbed through the skin and can cause other health effects and/or contribute to the dose absorbed by inhalation of the chemical from the air. Many studies indicate that absorption of chemicals through the skin can occur without being noticed by the worker. In many cases, skin is a more significant route of exposure than the lung. This is particularly true for non-volatile chemicals which are relatively toxic and which remain on work surfaces for long periods of time. The number of occupational illnesses caused by skin

absorption of chemicals is not known. However, it is argued that an estimated 60,000 deaths and 860,000 occupational illnesses per year in the US attributed to occupational exposure, a relatively small percentage caused by skin exposure would represent a significant health risk.(1)

Slide 77




In order to ensure the IAQ Management Plan is being thoroughly and effectively implemented/managed weekly jobsite IAQ walks should be conducted. Photos should be taken during the walks to demonstrate the plan being implemented. The photos can also be used to make adjustments where necessary to increase IAQ Management performance.
IAQ walks and site safety walks can easily be integrated which can save time, resources and money while effectively managing both safety and IAQ.

PRESENTER – Ask the audience – What are some examples of images that you should take/be looking out for, when conducting site safety walks?

Slide 78


Note: The following slides are examples of the SMACNA IAQ Guidelines referenced earlier. Please make a connection to the guidelines as you walk through the next five slides.

**Sequencing of work** enables the timing of interior material installation .
In this image drywall wouldn't be installed until after the roof is completed and exterior skin has been installed.
Items like elevator shafts, often need to be built out early, and you can maintain

the scheduling needs without compromising the IAQ by using a waterproof gypsum board like densglass to prevent moisture from growing mold.
Preventing mold growth equates to a healthier, safer site for our field teams and a healthier final product for end users. Scheduling of work for IAQ benefits can also support a safer jobsite in that moisture that could be a slip hazard is typically kept out of the building. Additional IAQ scheduling benefits include:
Mitigating dust and contaminants by doing any cutting or fabricating outside of the building skin

Slide 79


Ducting to deliver fresh air to the welders at King St Station

Slide 80


The image here is an example of a project that through IAQ Best Management Practices enabled the schedule to stay on track. By using temporary plastic in lieu of window systems that hadn't yet arrived, it was able to maintain the critical schedule and continue with the installation of interior drywall and insulation. The second layer of plastic was used for source separation of airborne particulates while soil grading was taking place outside.

In this photo, temporary enclosures are used for interior building elements to prevent damage from outside activities

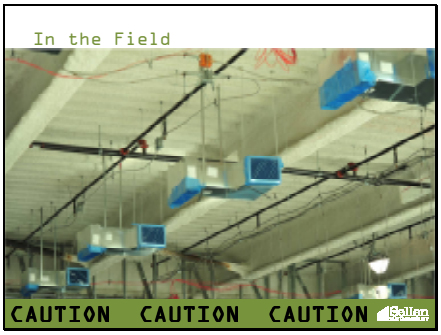
and weather. Mold resistant drywall board is used for any areas that may be subjected to moisture damage and contamination.

As we saw before, sometimes these innovative solutions can lead to additional unforeseen safety risks. What you can't see in this photo is the signage that was developed to let all field teams know there were ladders and other potential trip/struck-by hazards underneath the plastic barrier.

Slide 81


An example of good housekeeping and indoor air quality combined to help reduce trip hazards and improve air quality

Slide 82




It is critical to keep HVAC units covered from the point of manufacture through completion of construction. One potential safety hazards that may be associated with this IAQ best practice is the need for workers to be on ladders more frequently repairing and replacing any plastic that gets damaged or removed from the seal ductwork. The more precaution field crews take to cover ductwork before it enters the site, while it is stored, and while it is being installed, less maintenance will be required.

Slide 83


Common sense items can often be forgotten – keeping drywall dry – up & of the floor (as per photo), and or installing it half inch off floor prevents unnecessary moisture from soaking into materials and growing in wall cavities later.
More often than not, proper material storage leads to a safer jobsite with fewer trip hazards. Safety professionals should work with IAQ coordinators and field teams to ensure materials are properly stored and installed.

Slide 84


Ventilation combined with daylight by using a translucent material instead of the common plywood.

Slide 85


Chop saws within the building footprint should have access to collection boxes and vacuums to keep the area clean and to prevent airborne contaminates. This is another another best practice that promotes proper IAQ Management while keeping our employees safe and healthy.

Slide 86


To ensure safety when managing Indoor Air Quality during construction, safety supervisors and IAQ coordinators should:

- **Review MSDS –** MSDS sheets will identify contaminants and be a good resource for control measures when dealing with specific products. MSDS sheets are also where you will find VOC content for products which will

help advise field teams when selecting healthy materials.

- **Respiratory Protection –** If materials do contain contaminants or have high VOC levels respiratory protection should be worn by any employees that will be handling those products.
- **Housekeeping –** Housekeeping not only supports improved IAQ, but it can lead to a reduction in injuries as well. A clean jobsite reduces trip hazards and hazards associated with sharp and other potentially dangerous objects.
- **Material Handling –** Good IAQ Management stresses proper material handling and storage to prevent contaminants like mold from growing in a space. If materials are stored properly we can reduce risks associated with trip hazards and impalement.
- **Air Quality –** The goal of IAQ management during construction is two fold. First we want to protect the health of our employees in the field and second we want to contribute to a healthy final building. While best practices are implemented to ensure good air quality, it is important that they are comprehensive and routinely maintained/put into place.

Slide 87


IAQ best practices help support safety through:

- Healthy material selection and management
- Housekeeping to prevent trip hazards
- Managing air contaminants created by construction activities
- Integrated IAQ and Safety job walks
- Scheduling for a safer, healthier site