



Metal Roof Installation Manual

Chapter 11: Delivery, Receipt, Storage & Handling of Materials

METAL CONSTRUCTION ASSOCIATION

8735 W. Higgins Road, Suite 300, Chicago, IL 60631

847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org

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Chapter 11: Delivery, Receipt, Storage and Handling of Materials

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11. INTRODUCTION

A roof installation can be ruined or jeopardized before the work even begins if the material and supplies are not delivered, received, stored, and handled properly. Unlike other construction materials, most metal roof panels and trim are fragile and easily damaged. Material can be lost or damaged during shipping or unloading. Prior to installation, many panels can be permanently stained and damaged from exposure to moisture, dirt, and a harsh job site environment. (Figure 11-1) This chapter will address "pre-installation" issues the installer must address for a smooth installation with minimum surprises.



Figure 11-1

Damage Often Occurs After Material Is Received On-Site and Before Installation

Procedures and methods may vary from installation to installation. These differences may be based on contracted negotiations, union and labor contract obligations, security issues, and even the site location itself.

11.1 The Job Site

Every job site is different and must be assessed based on the needs of the roof installation. (Figure 11-2) Job safety is always a priority and is covered in Section 9.1, *Job Site Safety*. Check and review the posted safety rules at each job

site. Always ask, never assume, when it comes to the rules of the work area.

Installer Note

Some of these activities may be performed by others who are not part of the installation team, or may be working in conjunction with the installation team. Each installer should be mindful that others helping with the installation may not be familiar with proper methods, procedures, and characteristics unique to a metal roof system. This may require the installer to notify, inform, or instruct and train others in the safe and proper requirements necessary.



Figure 11-2

Every Job Site Is Different and Should Be Evaluated

In addition to safety, evaluate each job site for three types of space:

- Transportation space
- Storage space
- Working space

Transportation space is having enough space to safely deliver and move the material to the best location for unloading, storage, and installation. Be mindful that material will likely be delivered via a tractor trailer or flatbed trailer, and that a fork lift or crane will most likely be necessary to off-load the material and transport it across the job site.

Consider the ground surface and travel route. Uneven, muddy, or dangerous surfaces should be avoided. Watch for and avoid narrow paths, sharp turns, and areas with no turn around area.

Storage space will involve several areas during the installation. (Proper storage methods and protection are discussed in Section 11.3.7.) Roof material may need to be stored when initially off-loaded, when prepped and staged for initial installation, and when moved to its final location on the roof, where it will be installed. Adding to the concern is that these storage locations may be indoors, outdoors, ground level, above ground, or even roof top. They may be in a secured or an unsecured area. Again, keep in mind that movement of material to these locations will likely involve a crane, fork lift, or some mechanical device with its own set of space requirements.

Working space will most directly affect the installers and their activities. This area must include the necessary space for any installation equipment, and equipment needed to move, form, bend, trim, and cut material; including space for moving and handling long panels. Do not overlook the space required for unpacking, separating, and sorting the material. Instructions and smaller parts are often shipped within other packages. Some material, such as sealers, adhesives, and touch-up materials, may need to be unpacked immediately, and may require special storage conditions.

Give consideration to other work being performed in the area and avoid any interference. Evaluate the flow and path of the work. Paths should be clear, well-marked, and free from obstructions and hazards. Avoid high traffic areas whenever possible. Above ground or roof top work areas should avoid any work near edges or openings. Where applicable, follow all

OSHA and safety rules in marking roof edges, openings, and other hazards.

11.2 Arranging and Scheduling Delivery

Responsibility for the transportation and delivery of the roof system, and its related materials, equipment, and supplies will vary from job to job, and is based on negotiated terms which were established prior to starting the work. Depending on the agreed upon terms, the party responsible may be the roof manufacturer, roof contractor, or a general contractor. Any of these parties may also sub-contract this portion of the work to other parties, adding to the confusion. Ask and make sure all parties understand and are in agreement on the pre-installation details of the roof system.

It's been said that "timing is everything," and there is truth to this statement when applied to the delivery of metal roof material. The issues associated with late deliveries are well-known, but early deliveries cause problems which are just as significant. When material arrives early, there may or may not be equipment and manpower available for off-loading. Then the material must be stored even longer than originally planned, until needed for installation. There may or may not be available storage space, plus there is the added risk of damage while being stored.

Time from on-site delivery of the material to installation should be kept to a minimum, and will require exceptional planning, communication, and cooperation between all parties involved.

11.2.1 Ensure Adequate Space

The space required when the roof system is delivered will depend on several factors. The quantity and size of the manufactured materials and how the manufacturer packs and ships the material will determine

specifics of the equipment needed and the area required for the material.



Figure 11-3

Ensure Adequate Space for Equipment and Material

Job site characteristics, combined with the space requirements necessary to unload the material, will determine the specific location where the material can be safely unloaded (Figure 11-3). Some jobsites have pre-determined delivery locations, and may provide separate means of unloading and delivering the material within the work area.

11.2.2 Ensure Proper Equipment and Adequate Personnel

The equipment and personnel necessary at the time of delivery will largely depend on the size of material and how it was packaged for shipping. This includes the weight of the material and individual packages.

The vehicle or trailer used to deliver the material will also be a factor. Some styles of trailers will not be able to be unloaded using certain equipment. Certain configurations may require a dock or elevated area in order to unload the roof material, while flatbed trailers and job site conditions may require a forklift designed for outdoor use.

Equipment specifics are covered more thoroughly in Section 11.3, *Unloading, Receiving, and Storing Materials*.

Another item that is often overlooked involves security. The critical component to security

is the key to the lock. Make sure that the key for any secured gates, areas, and locks will be available at the time the material arrives. It is also important that security personnel be notified of the expected delivery and pertinent details.

11.3 Unloading, Receiving, and Storing Materials

Note: Indented paragraphs in this section are reprinted with permission from the MBMA Metal Roofing Systems Design Manual.

As previously mentioned, the responsibility for unloading and receiving the material may vary based on negotiated agreements. "Unloading", however, should not be confused with "receiving," as the two terms have entirely different meanings. "Unloading" is the physical act of furnishing labor, equipment, rigging, and expertise to remove materials from trucks (normally open flatbeds) at the project site, and to place them in the storage or distribution area.

"Receiving" has other implications which are discussed below. If an independent contractor is responsible for unloading and installation, it does not mean that he automatically accepts responsibility for receiving the material. In fact, the opposite is more often the common practice. Contract language should spell out *how* these responsibilities are divided and coordinated. In lieu thereof, normal practice is that the installation contractor "offloads", but the party who has furnished the material "receives". If the party responsible for receiving does not have a representative present at

the time of delivery to check the shipment and sign documents, the installation contractor may do so, but normally only as an agent for the absent party.

11.3.1 Check Weight of Bundles Versus Equipment Capacity

Handling of individual metal roof panels is covered in Section 9.3, *Handling Materials*. While individual metal roof panels are lightweight, bundles are not. The length, coupled with the weight of the bundles, necessitates the use of equipment to lift, move, and transport the bundles of material as shown in Figure 11-4. Any time equipment is used with bundles of material, make sure the weight of the bundle is known and the load limits of the equipment are known. The bundle weight should be marked on the bundle itself, available on the shipping documentation, or can be found by calling the manufacturer of the roofing material.



Figure 11-4

Moving Bundled Roof Panels Requires Equipment

The equipment load limits should be clearly marked on the equipment itself. If unknown, the equipment load limits could be determined by checking online, or contacting the manufacturer of the equipment. Additional equipment may also require the use of spreader bars and/or straps.

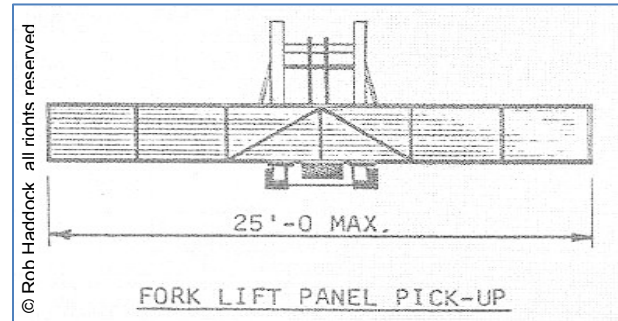


Figure 11-5

Many Shorter Panels May be Moved by a Fork Lift

Large crates and bundles of material may have different handling requirements from one manufacturer to the next. Some panels are more fragile than others when they are bundled. This is a function of the panels' shape, gauge, material, width, and length dimensions. Crating procedures and designs vary amongst manufacturers as well. Some utilize very elaborate crates which are designed in truss-like fashion to help support panels. Others simply block and band, and still others may offer options. The handling requirements are usually spelled out by each manufacturer in their installation manuals. These requirements should be reviewed by the installation contractor prior to arrival of materials at the site so that he can make arrangements for any special training, hoisting equipment, or rigging that may be needed.

11.3.2 Panel Length / Spreader Bar

While specifics about pick-points can vary greatly, some general statements can be made regarding the handling of bundles of material. Normal over-the-road shipments will involve length restrictions of about 41 feet. Such bundle lengths require some special lifting considerations and separation of

pick-points. Rarely will a conventional forklift, as shown in Figure 11-5, be adequate. When using a spreader beam, as shown in Figure 11-6, two pick-points are often adequate.

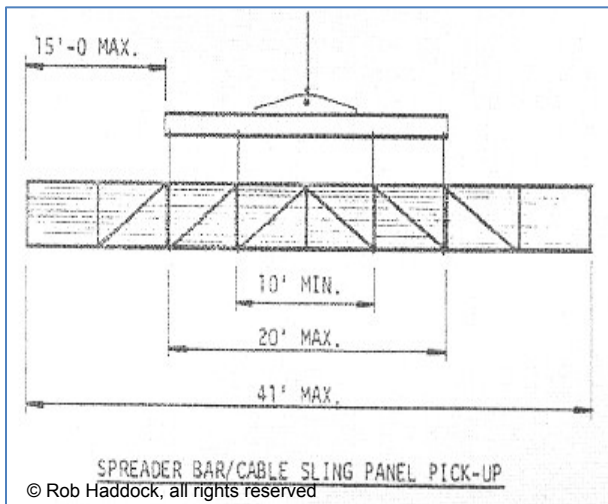


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Figure 11-6

Spreader Beam with Two Pick-Points

In rare cases, as shown in Figure 11-7, three or more pick-points may be necessary due to panel length, while bundle weights will not usually exceed 3,000 lbs. Always check and confirm the load limit of any lifting device.



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Figure 11-7

Longer Panels Require 3 or More Pick-Points

11.3.3 Type of Slings

Two bridled wire rope slings are sometimes used in lieu of a spreader beam, but wire rope should not be

used in direct contact with roof panels or sheet metal trim. Nylon webbed slings are the rigging of choice, and are available in many widths. Sling widths of 4" or more are recommended to minimize damage to the panel edges. When full-length (40') bundles are set on the ground or roof, they should be supported at a minimum of one place for each ten feet of length.

Straps should be clean and free from debris to avoid marring and damaging panels when lifting. Always check the condition of any straps and wire ropes. Any fraying of wire rope, or red threads visible on cloth or nylon straps, spells danger and should not be used. Frayed or damaged straps may break or tear causing damage, injury, or even death.

11.3.4 Preplan for Material Layout

Proper planning of material layout can save significant amounts of time and money during the installation as well as prevent damage to the roof material. In addition to planning the layout of larger panels and pieces, the installer should also plan the location, storage and availability of the smaller material and accessories like clips, fasteners, and sealant.

Material layout should also consider the location of on-site roll-formers, brakes, and trimming tools. Even consideration of the left or right-handedness of the installer will allow the work to flow smoother and can eliminate unnecessary twisting and turning.

Preloading Materials

A common trade practice is to "pre-load" and stage panels and other materials onto the building or roof structure prior to the actual commencement of roofing work. This is shown in Figure 11-8. The

objective is to place materials in close proximity to where they will be needed, which reduces time and traffic involved in moving materials from place to place. On new construction, this is often done during the installation of the structure. On retrofit and renovation work, it is sometimes done immediately upon delivery of material, or otherwise just prior to the start of the roof installation. In other cases, it may be done at various intervals as the work progresses. That can reduce labor costs, expedite the roof installation, and greatly reduce the possibilities of material damage.



Figure 11-8

Pre-Staging Material on the Roof Has Many Advantages But Caution Must Be Used

Roof panels can also occupy an inordinate amount of physical space on a jobsite when stored on the ground; hence, pre-loading can relieve congestion on the site. When panel material is pre-loaded, it also seems to stay much cleaner by not being exposed to mud splashes and other ground traffic like the panels shown in Figure 11-9.



Figure 11-9

Ground Locations Are Subject To Mud Splashes

There are a number of factors which must be considered before pre-loading any materials. The structure must be in a condition to accommodate the point loads which will occur from pre-loading. This will usually mandate that loads are placed directly over a primary framing component, and not in the middle of a bay, as seen in Figure 11-10. It may also require some special shoring of certain secondary structural components.

Existing construction must be carefully inspected to determine where such bearing points are prior to setting any loads on the roof. Individual bundle weights should be investigated and quantified to be sure they do not exceed what the structure will tolerate. Care should also be taken with regard to nestable hardware, sub-purlins and the like, as the weight of *these* items can far exceed that of panel bundles. An existing roof should not be pre-loaded with construction materials at a time of year when it is likely to

experience design live loads such as snow or ice.



Figure 11-10
Material Should Be Staged at the
Bearing Points of the Roof

When pre-loading, attention should be given to installation particulars, like sheeting direction and bundle quantities, in order to stage materials correctly. Because bundles must be placed over a frame-line, the bundle quantities must also match up with the bay length. For instance, if the bay length is 20', then the bundle size for 24" panels should be ten panels - or alternatively twenty panels if they are to cover two bays. When looking at these particulars, it may be necessary to re-bundle material before loading in order to have it staged correctly. Because most products are directional in their installation, and, therefore, have an "upslope" and "downslope" end, care must be taken to place them accordingly.

11.3.5 Check Materials Delivered Against Bill of Material (BOM)

The material received should be checked against the Bill of Material (BOM) prior to beginning any installation. This confirms

that the material received is the same as the material ordered, and matches the ordered quantity.

11.3.6 Check for Damaged Materials

Along with confirmation of the BOM, checking allows for a quick inspection of the material for initial damage. When the truck with the roofing material is received at the site, a transaction occurs whereby the shipper is released from this responsibility. This transaction occurs when the party receiving the material, sometimes the installer, acknowledges (by signature) that the goods are free from damage or loss. For this reason, it is important that a reasonable effort is made to confirm that, in fact, the shipment is complete and free from damage. If shipping damage or loss has occurred, it must be noted on the Delivery Receipt. Normally the Receipt will have a signature line, which says, "*Received in good condition except as noted.*" When this line is signed without notation, it is acknowledgment by the receiving party that all containers and material noted thereon has been received complete and without visible damage.

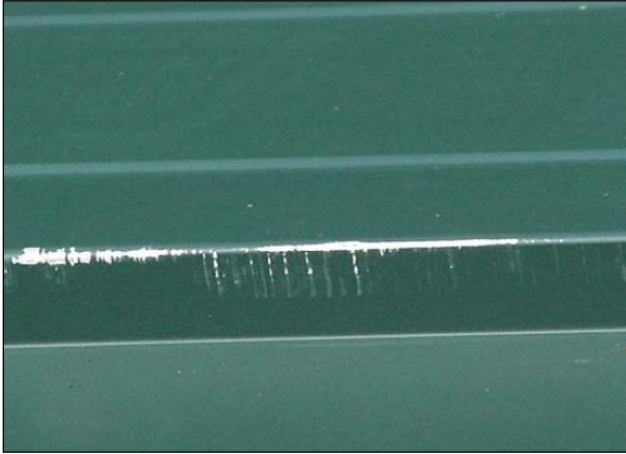


Figure 11-11

Early Detection of Damaged Material Will Help Avoid Delays and Speed Replacement

It is good practice that if damage to a container is visible, it be investigated to be sure that the contents are complete and unharmed, and then noted on the Delivery Receipt: “*One container damaged- no loss or damage apparent.*” Such notation preserves the right to assert a claim later, if upon closer examination, loss or damage is found, as seen in Figure 11-11.

It is common practice that at the time of delivery, the shipment is checked for completeness according to quantities of bags, boxes, and bundles. It is *not* necessary to count screws, clips, or bolts in a container to ascertain the completeness of each, or to count panels within a crate. The objective is to be sure that the number of crates, bundles, boxes, and so forth are delivered as manifested, and not visibly damaged. Shortages of containers, as manifested, are an issue to be taken up with the freight carrier. A shortage within a container is an issue to be taken up between buyer and seller (shipper). A truck should not be unreasonably detained in order to count parts and pieces, as

long as manifested bundles and containers are properly accounted for on the shipping documentation. If there is an observed shortage, or damage to the shipment, it should be noted on the Delivery Receipt. In addition, the shipper and purchaser should be notified immediately so that arrangements can be made for a freight claim, as well as replacement materials.

Never sign for material which is obviously damaged, or received in a damaged container, without noting such damage on the paperwork at the time of signing. Also notify the appropriate parties of any damage so replacement material can be ordered.

Liability for damaged material will depend on when the damage occurred and circumstances surrounding the manner in which the damage took place.

Installer Note

If an installer proceeds and uses visibly damaged material, the liability of the responsible party is often removed. This means there can be no compensation for damaged material, including labor costs.

Inspection also allows a knowledgeable installer to identify the material and determine if it seems to be correct for the installation.

11.3.7 Protecting Panels Until Installation

Once on-site, it is critical that metal roof materials be protected until installation. This includes any storage, staging, and handling activities. Often material is damaged after it is received, and prior to final installation. Most damage which takes place during this period is caused by:

- **Moisture**

- **Handling**
- **Dirt**
- **Physical damage**

Standing water and condensation are the primary causes of **Moisture** damage to roof panels and trim. (See Figure 11-12) Both causes may be eliminated by proper storage methods which allow for drainage of any standing water and "room to breathe" (air flow through the material) especially between individual panels.

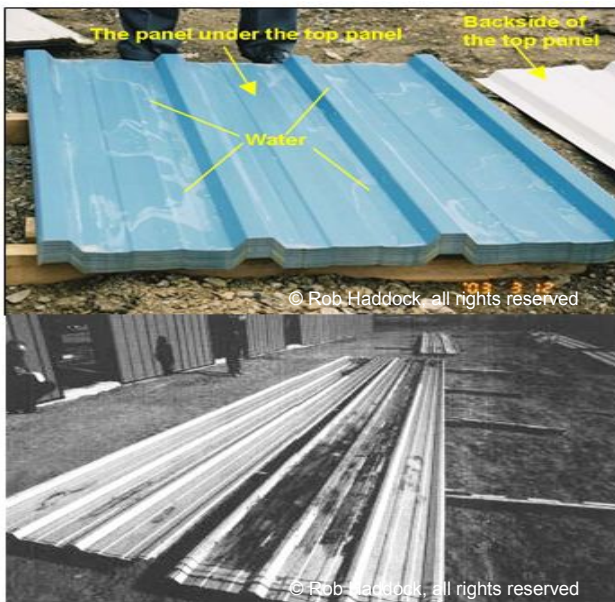


Figure 11-12

Pre-Installation Moisture Damage of Roof Panels

The ideal storage method is illustrated in Figure 11-13. When storage using this ideal method is not entirely possible, the following key points must be addressed in order to prevent damage to the material:

- Cover with a water-resistant **not** a water-proof material. Do not use plastic. Plastic does not allow the area to breathe and produces condensation.
- However, if plastic tarps or sheets are the only material available, they should be blocked off the bundle to allow adequate ventilation.
- Top wrap of the cover overlaps bottom wrap to avoid entrance and ponding of water runoff.
- Stacked material should be sloped for drainage.
- Stacked material should be blocked so the stack is approximately one foot above the ground surface. This allows good air flow as well as avoids ground moisture and surface drainage that may occur. Spacing of the blocks should be close enough to prevent the panel from sagging or distorting. Long panels should be blocked at least every 10 feet.
- Secure the cover to allow air to circulate under the surface.
- Consider inserting spacer blocks between the individual panels. Blocks will allow for air flow and drainage to keep the panels dry, avoiding staining.

If panels or bundles do become wet, it is important to un-bundle and allow them to air-dry to prevent corrosion. Corrosion and staining tendencies will vary based on the material, profile, and bundling method used for the panel. Most manufacturers address this issue in the instructions shipped with the material.

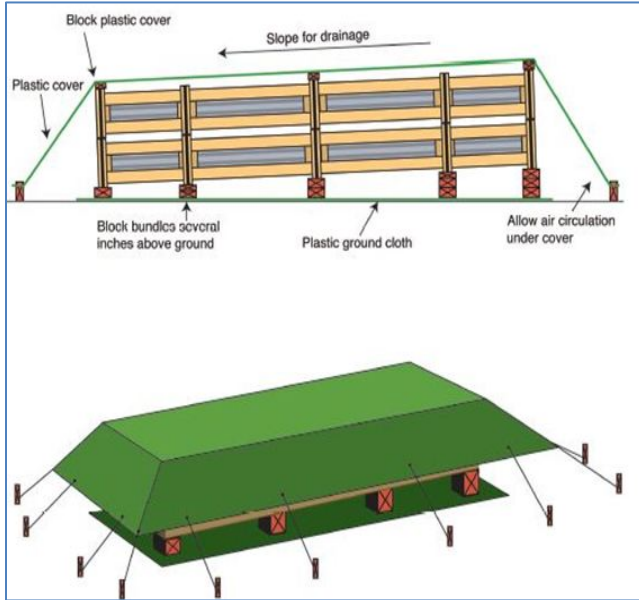


Figure 11-13
Proper Storage of Roof Panels

Handling damage may include the obvious damage resulting from improper lifting of bundles. Proper handling of bundles was covered earlier in Section 11.3, but panel damage also comes from improper handling of panels by individuals with improper protection. Some panels are damaged by body oils, dirt, and residue from bare skin or contaminated gloves. This kind of damage is shown in Figure of 11-14. Always read and follow the manufacturer's handling instructions. Often this type of damage does not show up until after the roof has been in service for a period of time.

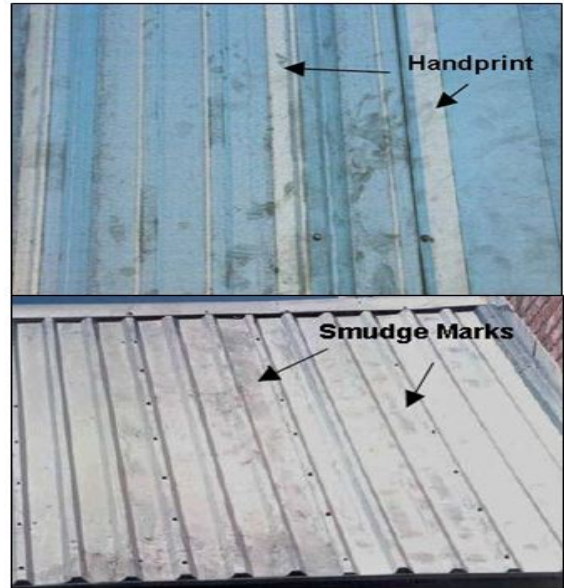


Figure 11-14
Panel Damage Caused by Improper Handling

Dirt is inevitable in the construction trades and eliminating dirt on a jobsite, as shown in Figure 11-15, is neither practical nor possible. Yet dirt is a very real enemy to a metal roof and can damage, or at least mar, the appearance of any roof surface. The long term effects of dirt accumulations will shorten the life of even the best installed roof.

When not in use, panels and materials should be covered to prevent dust and dirt from settling on the top surfaces as well as any accidental splashing or spilling of material. (See Figure 11-16)



Figure 11-15
An Impossible Situation
(Eliminating Dirt From Construction Sites)



Figure 11-16
Uncovered, Stacked, Material Will Accumulate
Significant Dirt on the Top Panel

Eliminate, or minimize, walking on roof panels while stacked or even after installation. Designated walk areas will confine any additional tracked dirt, and reduce any necessary clean up, to those specific areas, especially if a non-slip walking surface is provided. Figure 11-17 shows staining likely caused by inattention to the potential damage from careless walking and improper footwear.

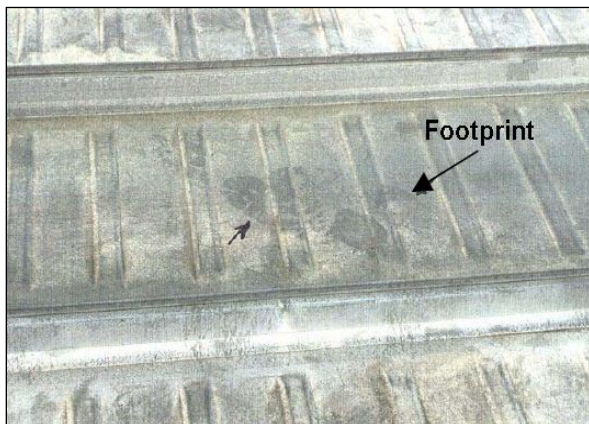


Figure 11-17
Panel Damage Resulting From Foot Traffic

The metal roof surface can also be damaged by dirt from work being performed in the area. Work done by other trades, like masons, electricians, and carpenters, as well as processes like cutting, sawing, welding, and soldering, all create dirt which can damage the roof surface. Figure 11-18

shows corrosion of a roof panel from dirt and debris which was not cleaned up promptly after work was performed in the area. Prevention and prompt clean-up of all dirt and debris, along with careful scheduling and coordinating of work between the trades is essential.



Figure 11-18
Corrosion Caused By Failure to Clean Up After Work
Was Performed

Physical damage can occur to the roof material when the staged material is used as a work surface, support for other material, or even a table for breaks and lunch. Material located near a common walk way is also vulnerable to damage from others taking shortcuts or careless transportation of materials catching the staged material. Protective cones or warnings should be considered in such areas.

11.3.8 Masking and Strippable Films

Many panels have a protective covering or film applied to their surface right after manufacturing and prior to packaging and shipping. This process is shown in Figure 11-19. The protective film serves the same purpose and is similar to the film found on new television screens, computer monitors, or cell phone displays. These films must be removed at the time the panel

