# Quality Workmanship Standards

on Fort Leavenworth, Kansas

Historic Buildings

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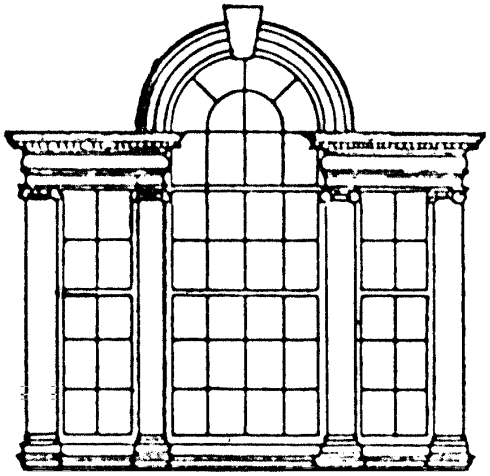
# Purpose of the Standards

1. To provide a clear, visual standard to contractors, DPW and COE inspectors on all woodworking and masonry projects on Historic Buildings at Fort Leavenworth, Kansas.
2. By providing a standard, each worker and inspector can understand what level of quality is expected before the project begins.
3. During the construction phase, the inspector(s) will use the standard as a visual guide for identifying acceptable and unacceptable workmanship. Therefore, it also becomes a continuous training tool for contractor(s) and inspector(s).
4. Increasing the level of quality produces:
   - A longer-lasting product
   - A work of craftsmanship
   - A savings of repair and replacement dollars

# Introduction

## How the Standards Work



## To Contractors and Inspectors:

These standards shall be the guide for all work and inspections on historic buildings at Fort Leavenworth, Kansas. Historic buildings require strict construction practices and a high degree of quality work.

By not following these standards and/or identified by the Government Representative or representative, will require the contractor to remove the unacceptable work and replace it, at contractor's cost, with the acceptable, quality craftsmanship described in these standards.

These standards will help the contractor and the inspector to clearly identify acceptable craftsmanship, as well as, poor workmanship on historic projects. Following these acceptable practices preserves the existing historical material, prolongs the life of a new repair and restoration work, delivers a higher quality product that will last, and save future funding dollars.

# Section I

## Quality Woodworking Standards

Section I. Quality Woodworking Standards

Acceptable Practices

- Areas of Concern: Wood Repair and Restoration
- Miter Joints
- Railings/Flooring
- Edge Joints
- Special Cuts
- Coping Trim

Unacceptable Practices

- Working with Original Historic Materials
- Poor Wood Cutting Techniques
- Poor Joinery Techniques
- Substandard Wood Quality
- Poor Wood Member Attachments
- Painting/Clean-Up

Conclusion

# Acceptable Woodworking Practices ~ Exterior

This is the first ever comprehensive standard to visually, as well as descriptively, describe acceptable practices in renovation and building repair on historic military structures.

These standards will initially be applied as guidelines to allow design, construction, and inspection to utilize and adapt to them - and to provide valuable feedback for further development.

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Areas of Concern: Wood Repair and Restoration

Quality Assurance

- Under Architectural Woodworking Institute (AWI) Requirements, all finished work shall be Custom Grade.

Original Historic Materials:

- Match existing historic design of materials or use historic drawings.
- Follow the way the individual wood members are cut and designed.

Wood Cutting Techniques:

- Paint all end cuts with oil based primer - DO NOT THIN OUT!
- Cuts shall be clean, with no rough edges, sanded smooth, mounted flush, with no gaps to the attaching surface.
- Caulking shall be used as an exception, rather than the rule and shall not be used to cover poor woodcuts and poor joint fits.
- Molding Matches.
- Eliminate multiple molding cuts, use one piece.

Joinery Techniques:

- Miter Cuts: A maximum tolerance of 1/32" space between members, such as miter cuts, and member to member attachment.
- Joint Fitting Criteria

Wood Quality

- Dryness 12 - 15%
- Decision to Use or Not to Use
- Defects Use/Fix Criteria

Block Sanding Methods:

- Sanding shall follow the wood grain, unless you just want to remove a lot of material in the "roughing" stage.
    - If you are doing something long, like a leading edge, be sure to start at one end with part of the block off the workpiece and move the entire length of the workpiece. A very common mistake on a leading edge is to do shorter strokes spending more time on the center portion and then ending up with a curved leading edge. To avoid this, do long end-to-end strokes and stop frequently to make sure it's still straight.
    - Visual - Use only clean, smooth face materials that are exposed to the visual so that it does not detract from the beauty of the construction.
    - Sanding requirements: Before panting over an existing painted or primed surface, sand with a light 150 grit sandpaper, blow or wipe off dust residue, then paint.
    - Structural Requirements/
    - Solutions to Defects - Glue, with clamps, Bracing, Plates, Epoxy.

### Wood Member Attachments

- Nails - Use galvanized nails for exterior work only.
- Set nails below the surface of the wood to receive filler putty, let dry, then sand the wood surface smooth for a clean finish, then prime and paint. Screws and Bolts - Use lag bolts and washers where there may be structural concerns.

### Use Detailing from DPW

- The DPW will supply details for porch elements where there are several kinds of unmatching wood trim, columns, bases, spindles, and railings.

### Paint Clean-up

- *Preventive* - The contractor shall take measures to ensure protection of areas not to be painted. Examples are adjacent brick, stone, other painted areas, sidewalks, and metal elements.
- *Clean up mistakes* - If the contractor allows new paint to drop on adjacent brick, stone, other painted areas, sidewalks, or metal elements, it shall be cleaned completely with no paint residue showing.

### Caulking Cracks - Criteria

- If there is more than 1/32" space between members, such as miter cuts, member to member attachment, it will be the responsibility of the contractor to remove the member(s), re-cut a new member, and tighten the joint spacing.
- Use elastomeric, expanding type caulking.

Inspection Process

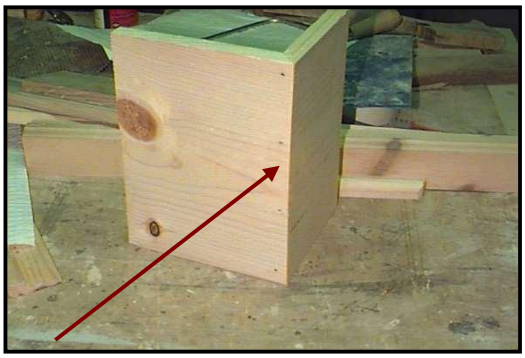
- Daily, Weekly, Unannounced.
- Use different times. Do not use the same schedule of Inspection. Don't be predictable.
- Be consistent with accepting quality work; encourage the contractor when work is done with quality.
- Be consistent with rejecting.

## Woodwork & Trim

- Ensure exact profiles and original materials when replacing and rebuilding molding profiles, siding profiles, balusters and ornamental trim.
- Documentation of original or similar style/date building should be provided for any design change or missing ornamentation; Victoria's Heritage Advisory Committee must approve design changes.
- There are few heritage buildings on which plywood is historically accurate; most old porches were fir floored with bull-nosed edges and stair treads; such materials are still commonly available.
- All woodwork must be primed on all sides at time of installation; be sure your quote includes both priming and finishing paint, and installation.

## Windows

- All windows will be operational after painting even if the window was not operational before painting.
- Windows with bars if the bars cannot be removed the contractor will paint through the bars and because of extra labor to do this given the cost to remove and replace the security bars.

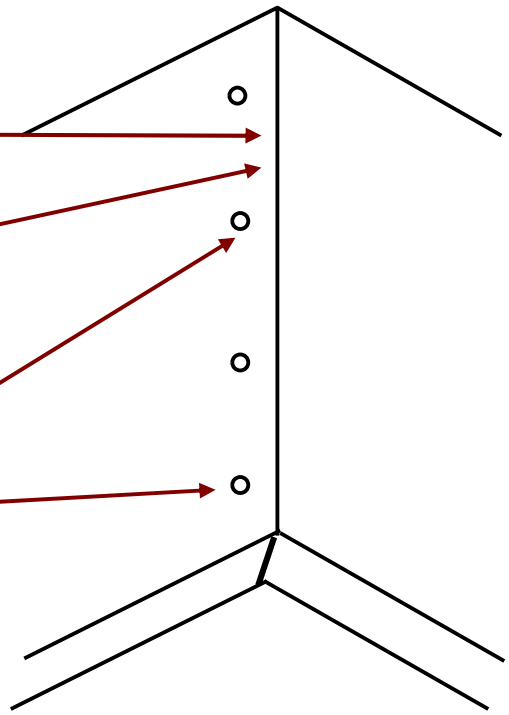


# Miter Joints

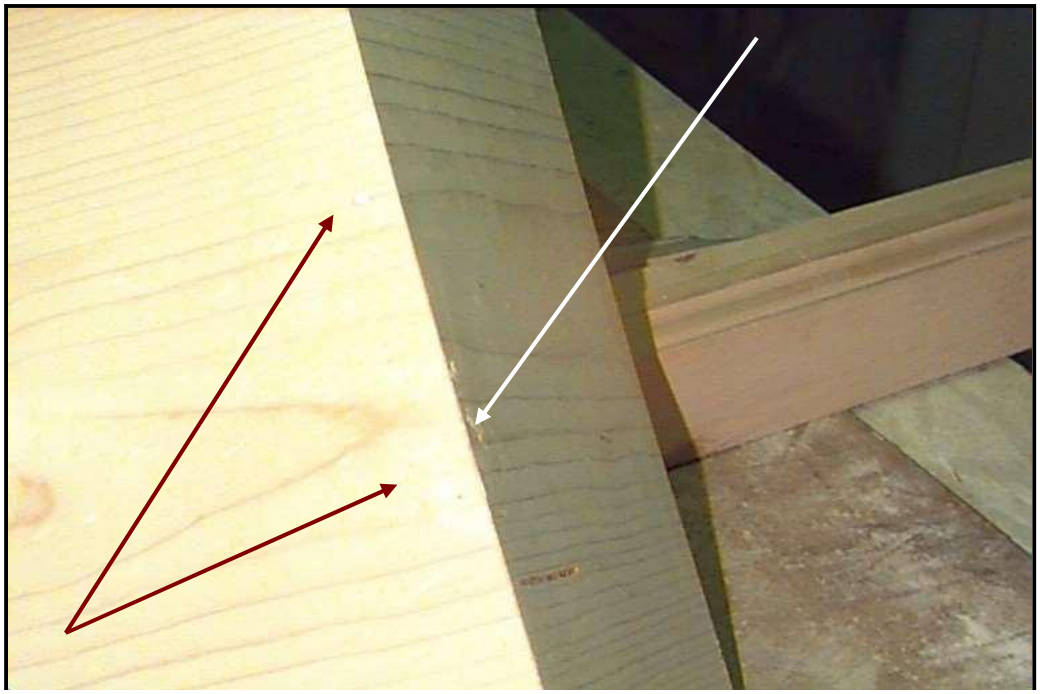
The first requirement of a good miter joint is that **the two mating surfaces must fit together perfectly.** This means there are no discernible gaps. For edge joining, the mating surfaces must be flat and square to both faces of the board. Nails should be recessed for caulking.

## Drawing Notes

- Horizontal and vertical cuts. Members fit tight, no gaps or uneven cuts.
- Good miter cuts have no need for caulking. Joints are clean, no gaps, no inaccurate cutting.
- Edges should be sharp and level
- Nails should recess deep enough to receive exterior caulking.



Miter Cut is clean, tight, and requires no caulking.



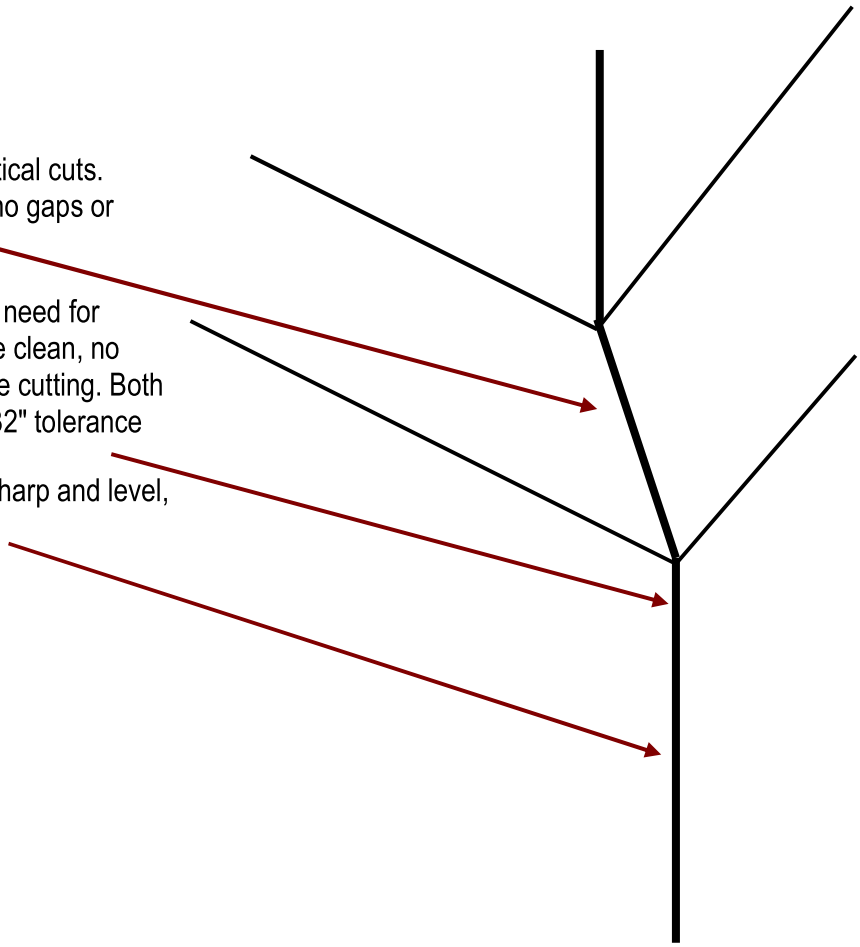
Nails are recessed and puttied, dried, then sanded.

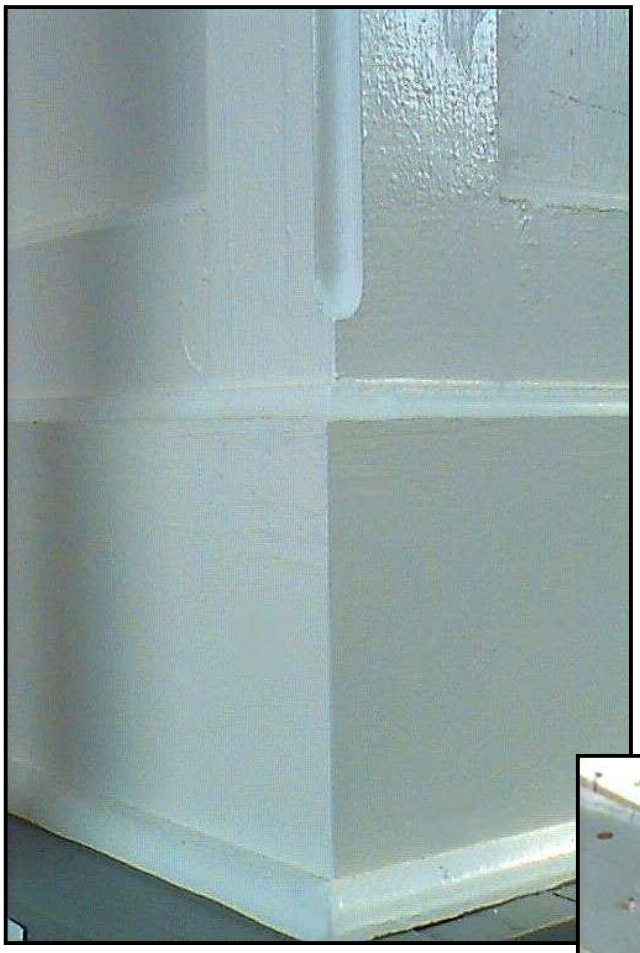
## Standard

The first requirement of a good edge joint is that the **two mating surfaces must fit together perfectly**. This means there are no discernible gaps. For edge joining, the mating surfaces must be flat and square to both faces of the board.

## Drawing Notes

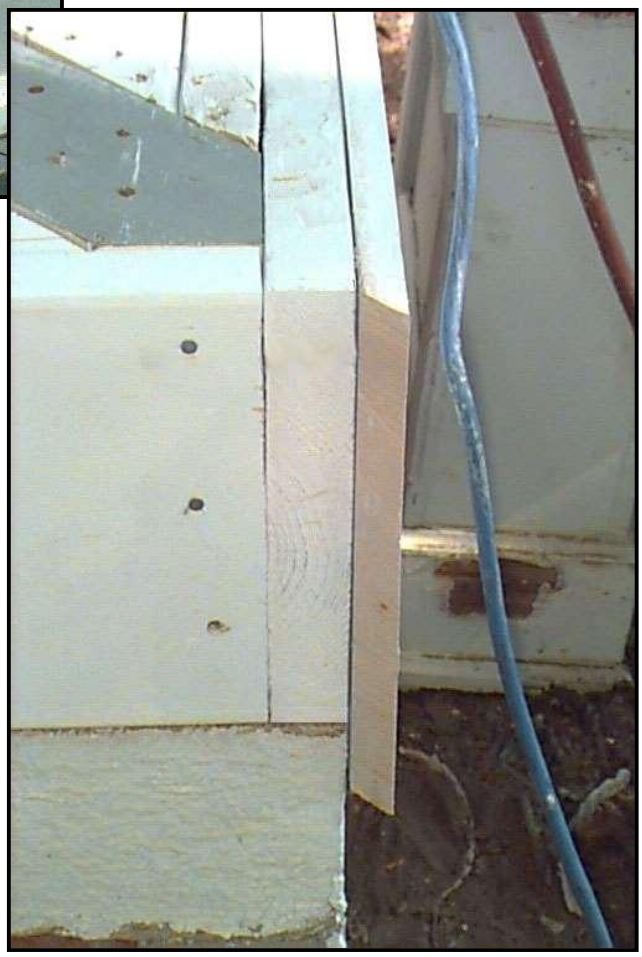
- Horizontal and vertical cuts. Members fit tight, no gaps or uneven cuts.
- Miter cuts have no need for caulking. Joints are clean, no gaps, no inaccurate cutting. Both pieces fit within 1/32" tolerance
- Edges should be sharp and level, no filler required.





## Photo Notes

- Horizontal and vertical cuts. Members fit tight, no gaps or uneven cuts.
- Miter cuts have no need for caulking. Joints are clean, no gaps, no inaccurate cutting. Both pieces fit within 1/32" tolerance
- Edges should be sharp and level, no filler required.
- Should have a full coverage of the required paint coatings.



## Photo Notes

- Structural boards are flush and cut evenly.
- Miter cuts are clean with no inaccurate cutting.
- Edges should be sharp and level

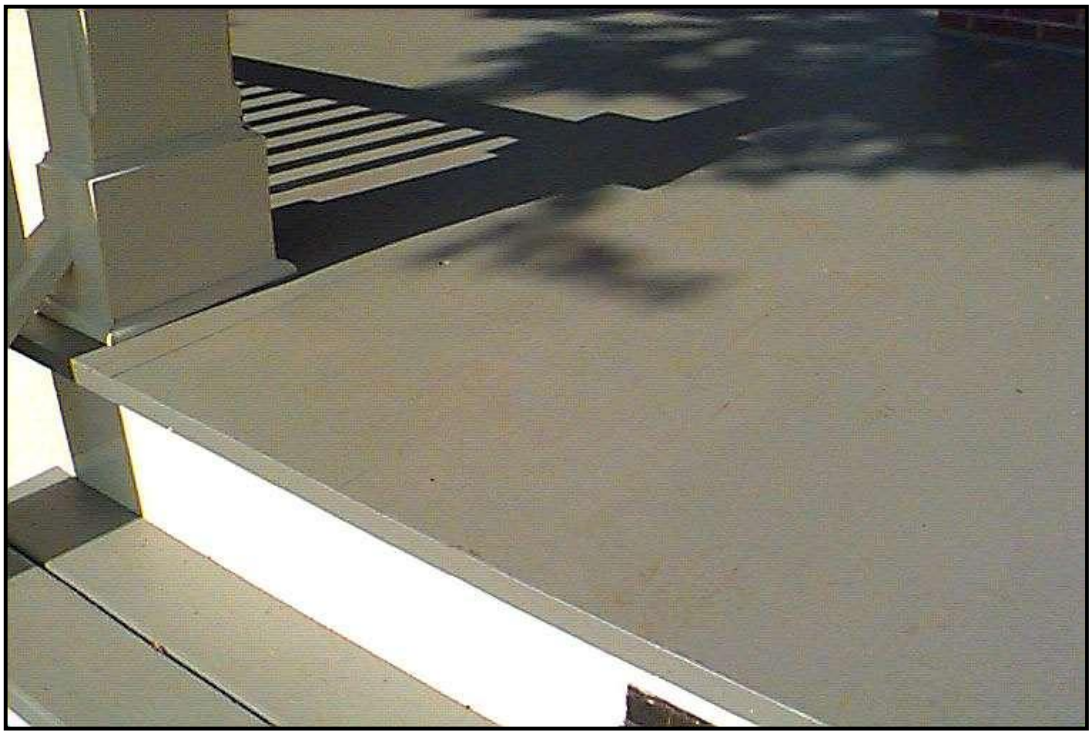
# Railings

# Spindles

Building No. 44 - Size 3 ½” square by 19” tall

Building No. 58 – Size 2 ½” square by 22” tall

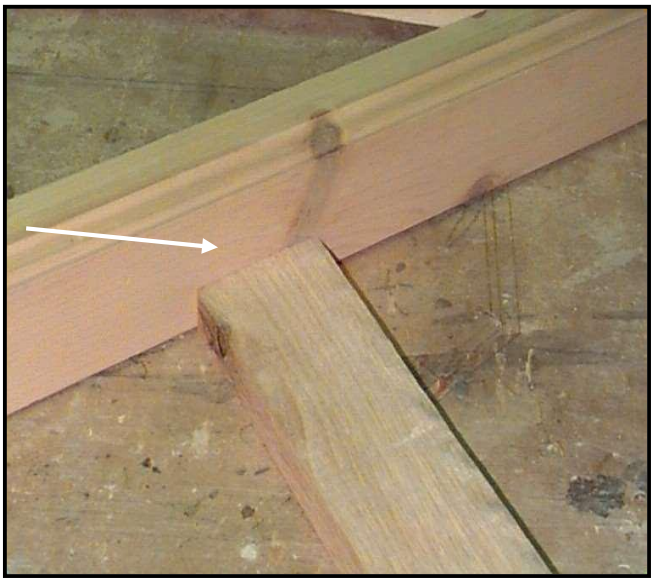
# Railings/Flooring



# Edge Joints

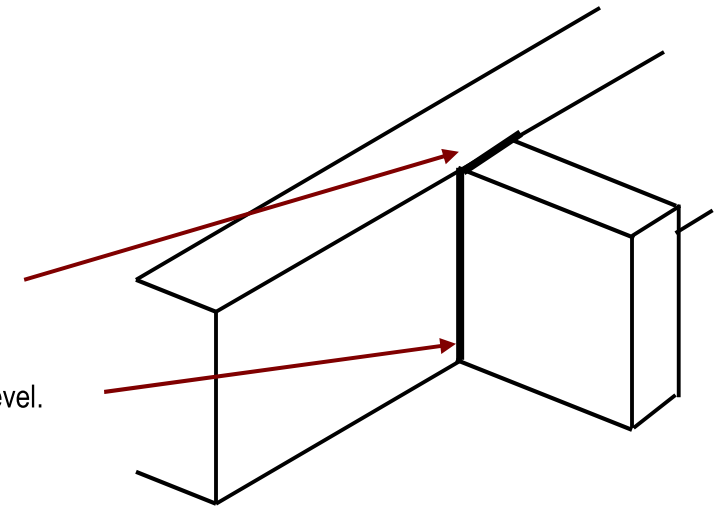
## Standard

The first requirement of a good edge joint is that the **two mating surfaces must fit together perfectly**. This means there are no discernible gaps. For edge joining, the mating surfaces must be flat and square to both faces of the board.



## Drawing Notes

- Horizontal and vertical cuts. Members fit tight, no gaps or uneven cuts.
- Edges should be sharp and level.

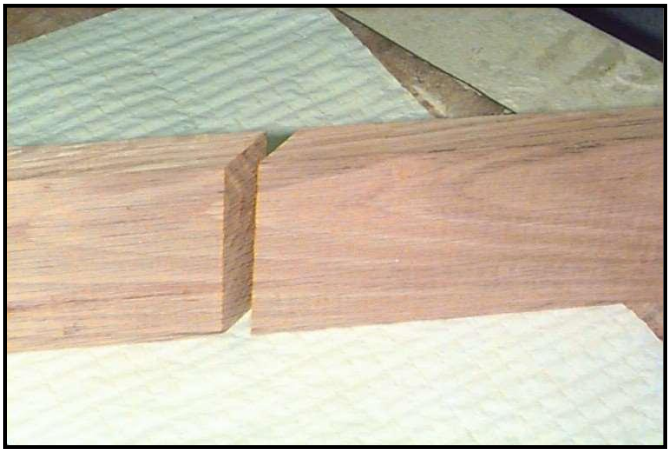


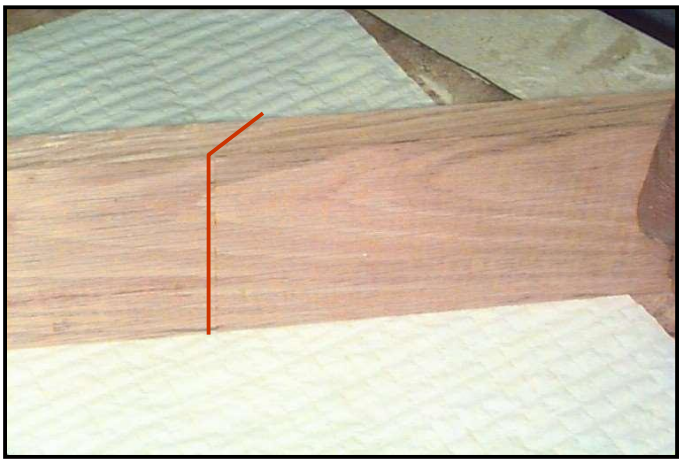
# Special Cuts

## Standard

**The two mating surfaces must fit together perfectly**. This means there are no discernible gaps. For edge joining, the mating surfaces must be flat and square to both faces of the board. Nails should be recessed for caulking.

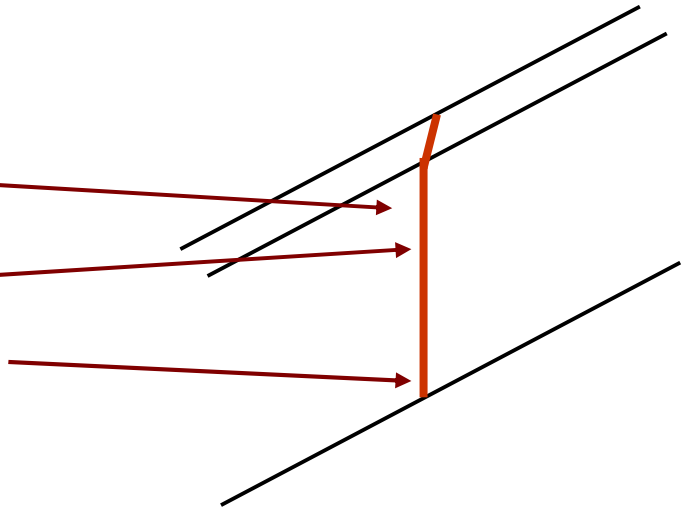
**Note: All end cuts shall be primed before joined together.**





## Drawing Notes

- Members fit tight, no gaps or uneven cuts.
- Joints are clean, no gaps, no inaccurate cutting
- Edges should be sharp and level.



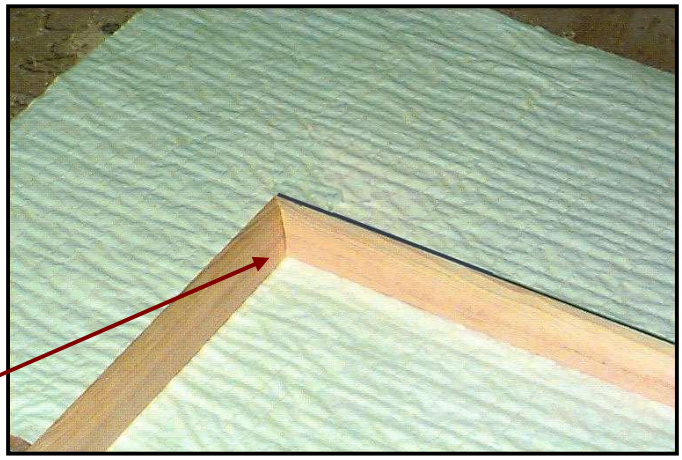
# Coping Trim

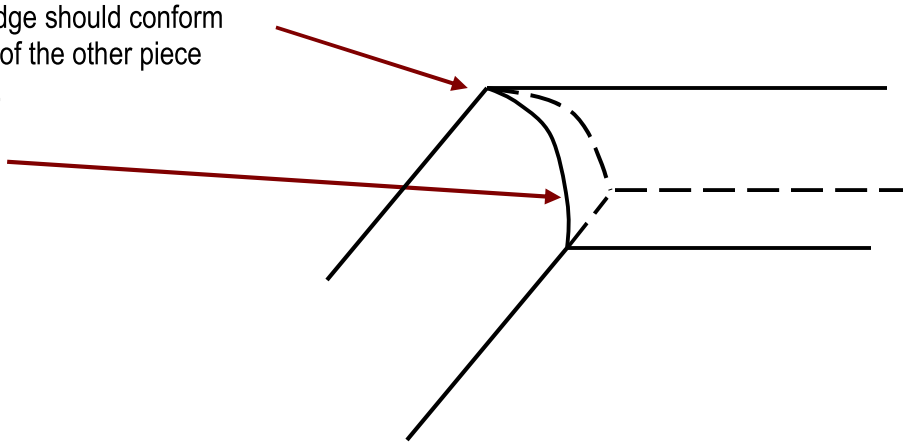
## Standard

The first piece is butted to the wall. The second piece is mitered as for an inside corner, but the mitered end is cut off where it meets the molding face, leaving a negative profile that fits over the butted piece tightly.

## Drawing Notes

- Members fit tight, no gaps or uneven cuts.
- Good coping cuts have no need for caulking. Joints are clean, no gaps, no inaccurate cutting.
- Edges should be sharp and level.
- The coped edge should conform to the shape of the other piece with no gaps.





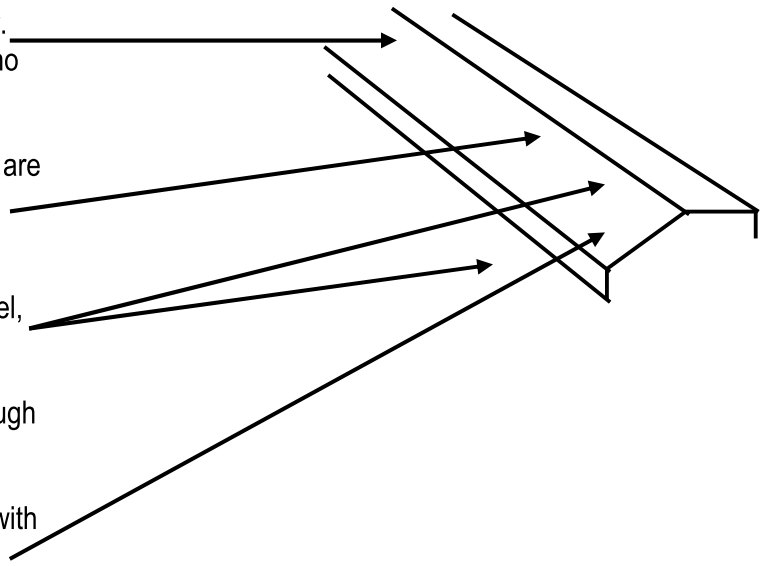
# Top Rail

## Standard

The first piece is butted to the wall. The second piece is mitered as for an inside corner, but the mitered end is cut off where it meets the molding face, leaving a negative profile that fits over the butted piece tightly.

## Drawing Notes

- Horizontal and vertical cuts are at the proper angle to each other. Members fit tight to spindles, no gaps or uneven cuts.
- Good top rails have joints that are clean, no gaps, no inaccurate cutting.
- Edges should be sharp, parallel, and level.
- Nails should recess deep enough to receive exterior caulking.
- Surfaces are flat and smooth with no saw cut or hammer marks.



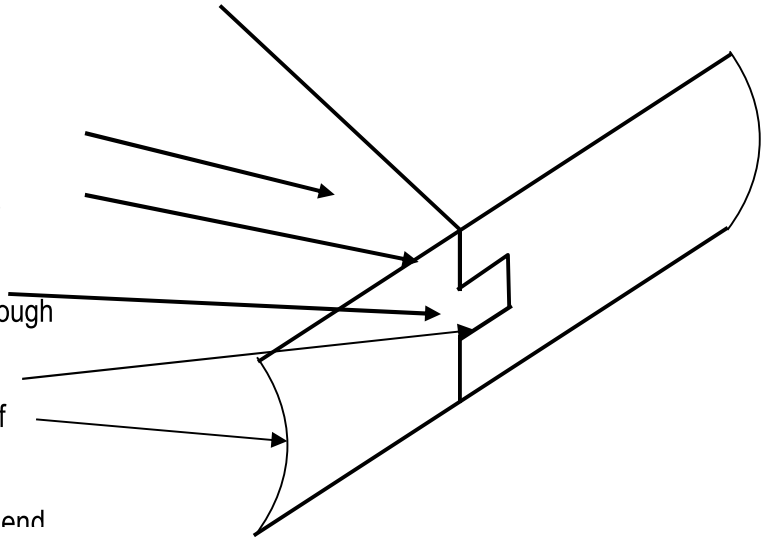
# Porch Decking

## Standard

The first requirement of good decking is the tongue and groove **mating surfaces that fit together perfectly**. This means there are no discernible gaps. For edge joining, the mating surfaces must be flat and square to both faces of the board. Nails should be deep within the groove to allow a tight fit.

## Drawing Notes

- Members fit tight, no gaps or uneven cuts.
- Joints are clean, no gaps, no inaccurate cutting.
- Nails should recess deep enough to receive tongue.
- Install bead of caulk length of tongue
- Round edge of flooring, seal end



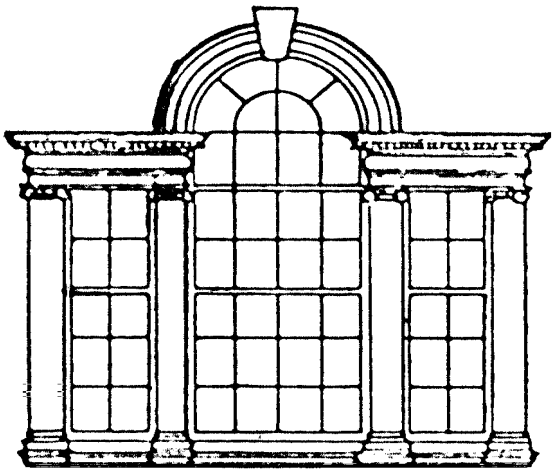
## Standard

Areas under columns required additional support.

Boxed-in areas shall be designed as to distribute the loading of each column on all porches and structural support areas.

# Structural

# Unacceptable Practices



Note to Contractor:

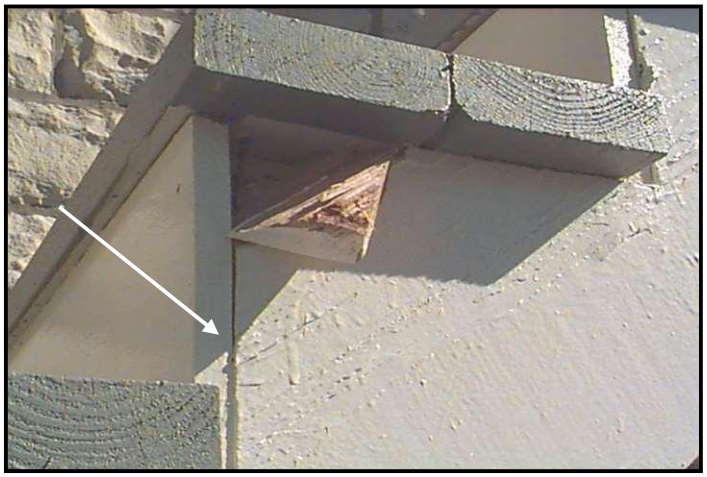
If the Contacting Officer or Representative observes any Unacceptable Woodworking Practice described within this Standard, the Contractor, at his/her own expense, shall replace the member or structural unit or woodworking system to the satisfaction of the Contacting Officer or representative.

All work on Fort Leavenworth shall comply with these Quality Standards.

*It takes only a few extra minutes to do a job correctly*
*...it may take hours to correct a hurried job.*

Pieces of wood split off because of a poor section of wood, nail, screw, or bolt protrusion

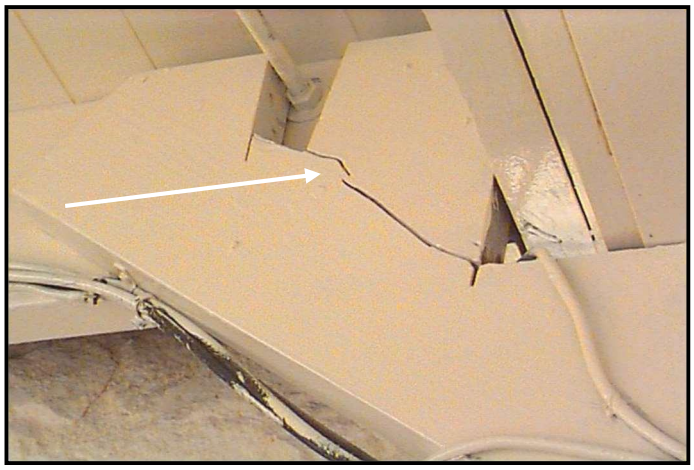
Pieces of wood that are not placed to form a clean, 90 degree even-edge, but leaves gaps. Meeting wood members should have a tight fit and flush to one another.



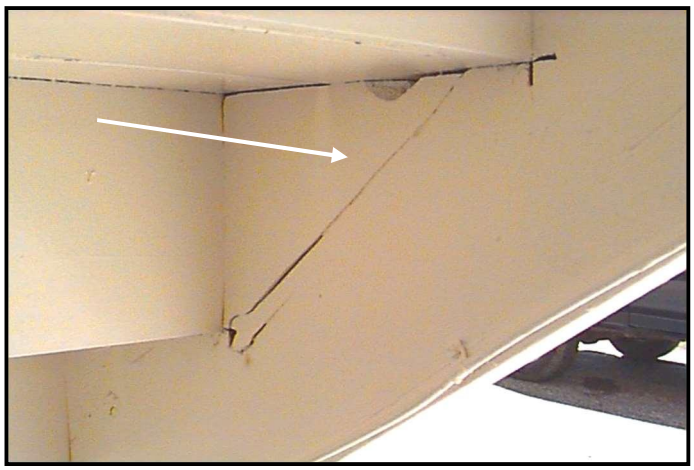
When pieces of wood split or pop off, either reattach with a bonding agent or replace entire member, depending on the loss of material. Replace if the structural integrity is compromised.

## Unacceptable Woodworking Practices ~ Exterior

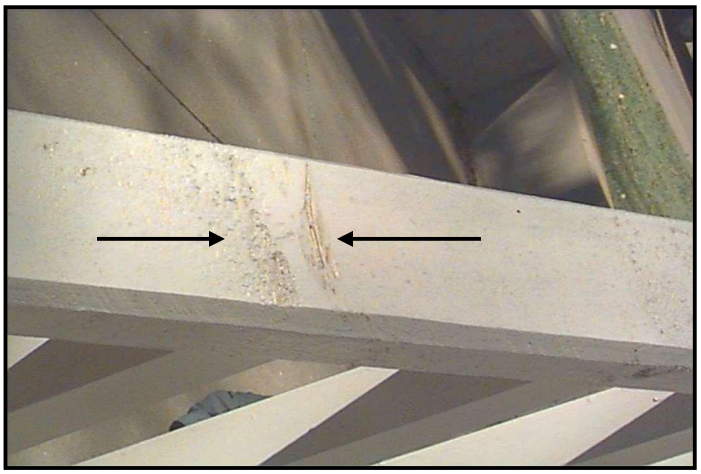
Structural members shall not have broken parts or splitting through members.



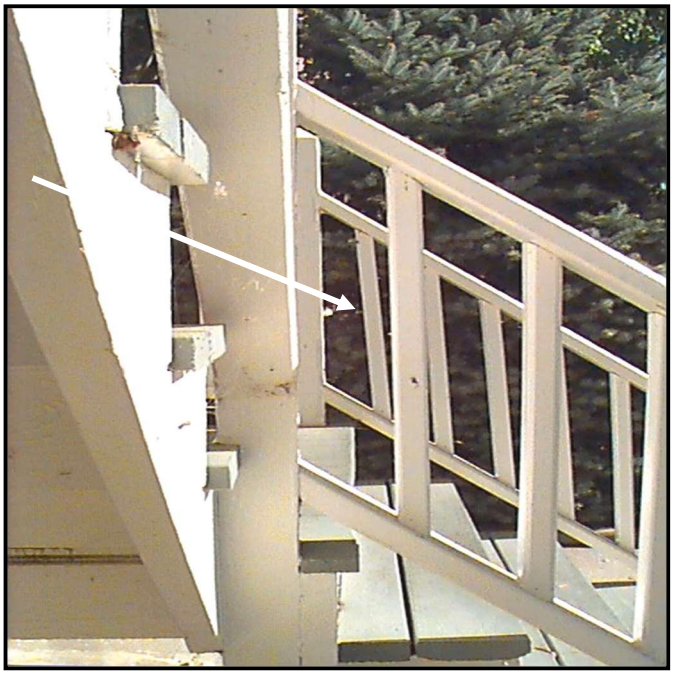
Structural members, with this kind of poor wood quality, shall be replaced by contractor.



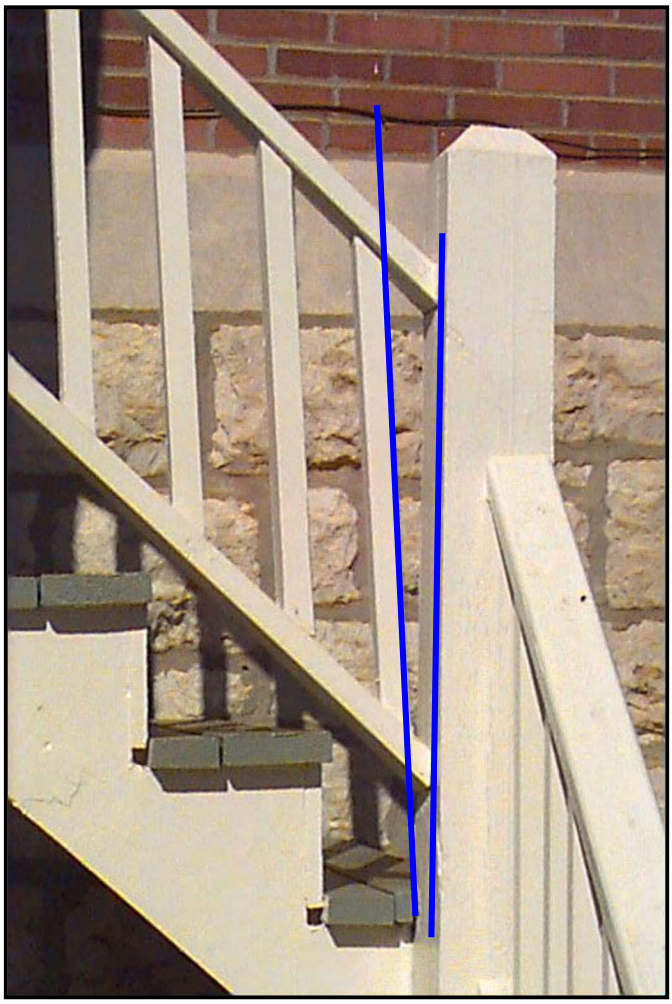
Unsanded, visual surfaces with wood particles under the paint job.



Non-square, unleveled, or out of line workmanship on any wood system. REPLACE entire system to create a square, even look to the



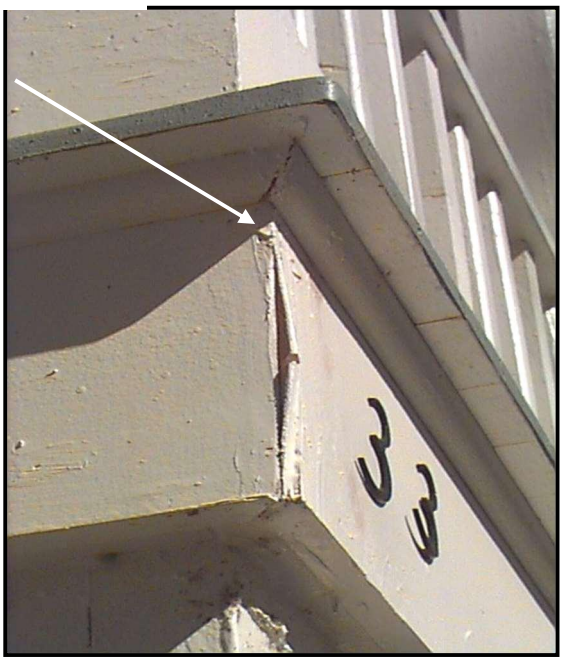
Non-square, unleveled, or out of line workmanship on any wood system shall be REPLACED. New work shall be square, parallel, level, and even.



## Unacceptable Woodworking Practices ~ Exterior

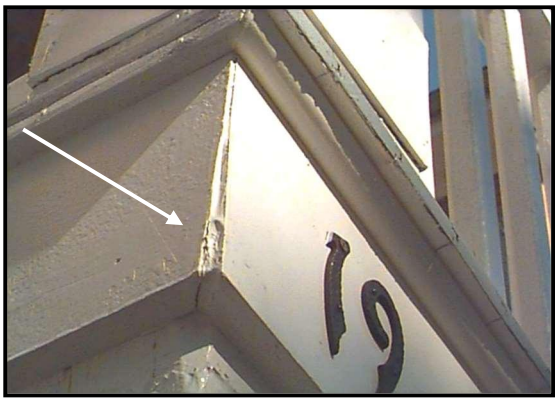
Uneven Miter Cuts: Miter cuts should not require caulking to complete the work. Caulking in wide joints will pop out and open the end cuts to moisture penetration.

REPLACE both boards.



Uneven Miter Cuts: Using poor miter cuts that produce wide joints requiring caulking.

REPLACE poorly cut piece(s).

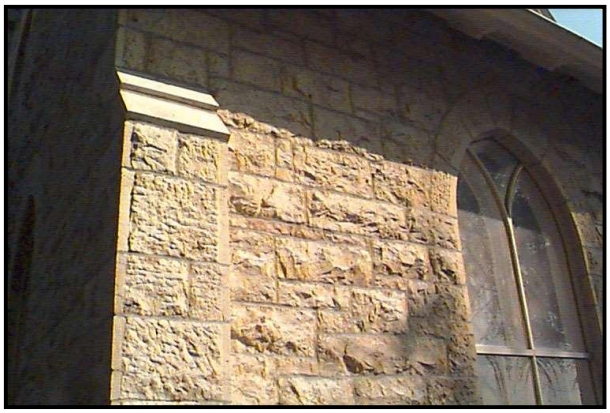


Uneven Miter Cuts: Using poorly sawn miter cuts that require resawing to meet the corner.

REPLACE both boards.

# Section II.

## Acceptable Masonry Practices



Section I. Quality Masonry Standards

Acceptable Practices

- Quality Assurance
- Original Historic Brick and Stone Materials
- Tuck-pointing Techniques
- Matching Brick and Stone
- Mortar Application Techniques
- Mock-Ups Requirements
- Use of Hand Tools/Power Equipment
- Mortar Mix Quality
- Clean-Up and Finish Work

Unacceptable Practices

- Working with Original Historic Materials
- Poor Mortar Application Techniques
- Poor Mortar Mixing Techniques
- Clean-Up and Finish Work

Acceptable Masonry Practices

## What is Quality Masonry Restoration?

Quality is key to masonry restoration and is defined as a "degree or grade of excellence" according to The American Heritage Dictionary. However, quality is still not clearly defined but we all know it when we see it. However, with these visual standards, quality can be identified, at least, in regards to masonry restoration. This will help improve the life span of these historic properties.

## Tuck-pointing

Tuck-pointing is the re-pointing of the deteriorated mortar joints in an existing masonry wall.

Once mortar joints are ground out to desired depth**, we recommend a minimum of 1/2" deep**, dust out joints with brush to remove dust particles. Then, rinse joint with water hose to make it dust-free and ensure proper bonding. Proceed with tuck-pointing and look for the following quality standards:

- No air bubbles in mortar in joint
- No openings in mortar in joint
- Mortar is flush with brick (or as specified)
- No mortar is on the face of the brick, that is, smeared
- No dust is on edge of brick reducing proper bonding

Allow time for joints to dry. If the mortar turns white and smears the brick, it is too dry. If mortar begins to turn white, misting is needed and color of joint.

## When to re-tuck-point

- When a lot of mortar falls out and the joint is already a 1/4".
- Appearance is poor and you ant to dress it up.
- Tuck-point 100% solid when more than 50% of the joints are deteriorated. Recommend using type N mortar.

## Patching Masonry

Patching masonry is repairing deteriorated/spalled masonry such as concrete, brick, stone and terra cotta to ensure it being weather-tight and/or to repair the masonry so it looks better and is not a safety hazard.

One product in particular that is superior is **Jahn Restoration Mortars** manufactured by Cathedral Stone Products, Inc. installed by trained craftspeople that are certified to install Jahn products.

When patching masonry with any material, the applicator will generally follow these steps:

- Remove all loose materials in patched area
- Square off edges to be patched
- Create a minimum of a 1/2" deep for patched area
- Dust out area to remove dust and dirt
- Apply primer with brush to area
- Apply paint/rust inhibitor to exposed rebar
- Apply patching material with margin trowel
- Apply straight edge to material and smooth out to ensure material is flush with adjacent masonry surfaces
- Mist patched area three times a day for three consecutive days

## Look for these performance standards:

- Material is flush/even
- No dents or holes in patch
- No smear on outside of patch
- Area is damp
- Texture matches existing

## Knowing when to patch masonry

- Where loose masonry is severely cracking, spalling, rupturing, or popping off.
- When you have water damage or leaks inside.
- When the appearance is very noticeable.
- When the deterioration could cause damage to property and/or persons.

## Cleaning Masonry

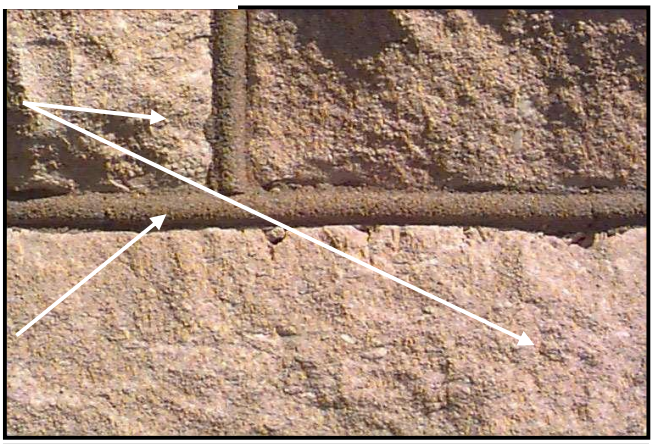
There are several methods of cleaning masonry. Knowing which method is vital to restoring/preserving existing masonry. Most masonry can be cleaned using only water at varying pressures (psi). However, some form of chemical cleaning and/or sandblasting may be necessary when your masonry has any of the following problems; deep rust stains, chemical residue, efflorescence, graffiti, paint, and years of neglect. Determine what chemical and psi will cut existing dirt/stains. Always do a sample when chemical cleaning masonry and get data sheets.

## Historical Preservation

- Do not ever sandblast a historical site unless you do not mind losing its historical heritage and/or recognition.
- Always use a low psi between 300-1000 when cleaning masonry on a historical site.
- Always use a properly mixed historical mortar consisting of the following:
    1. 6 parts sand or matching aggregates
    2. 1/5 part Portland cement
    3. 2 parts hydrated lime
    4. 5 gallons of water or until mortar can be rolled into a ball and provides a thumbprint
- Screws and Bolts - Use lag bolts and washers where there may be structural concerns.
- Use Detailing from DPW - the DPW will supply details for porch elements where there are several kinds of mismatched wood trim, columns, bases, spindles, and railings.

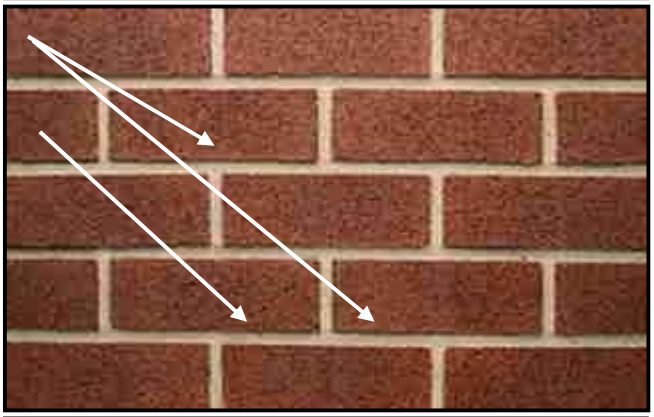
## Acceptable Masonry Practices

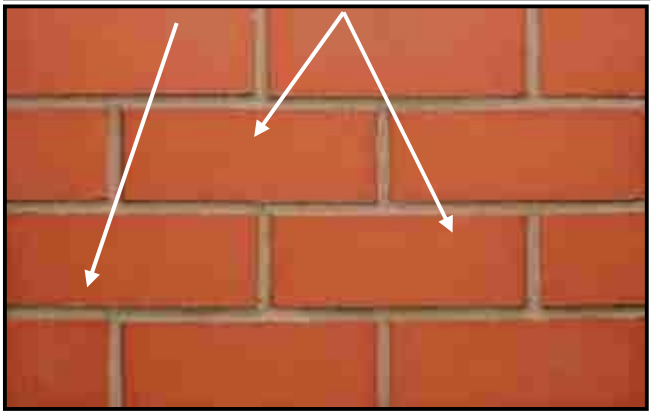
Stone brick face is free from unwanted mortar and has a clean look and feel.



Mortar joints are clean, smooth, uniform, within the spaces between the stones, and consistent with color. Matching color of existing historic mortar.

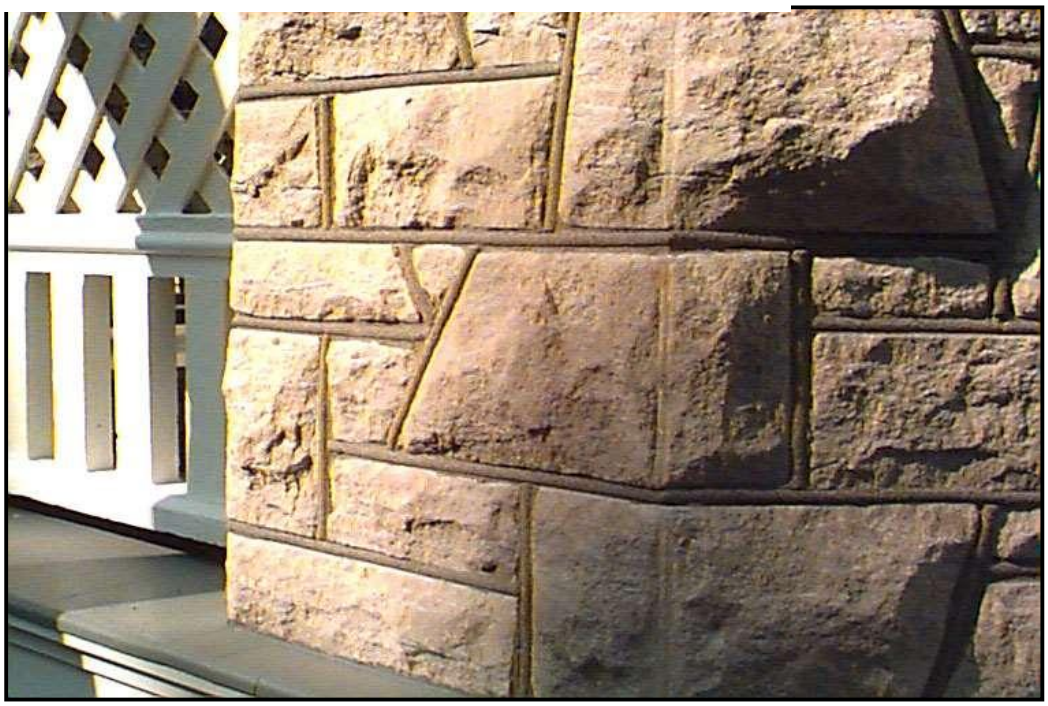
Brick is free from unwanted mortar and has a clean look and feel.



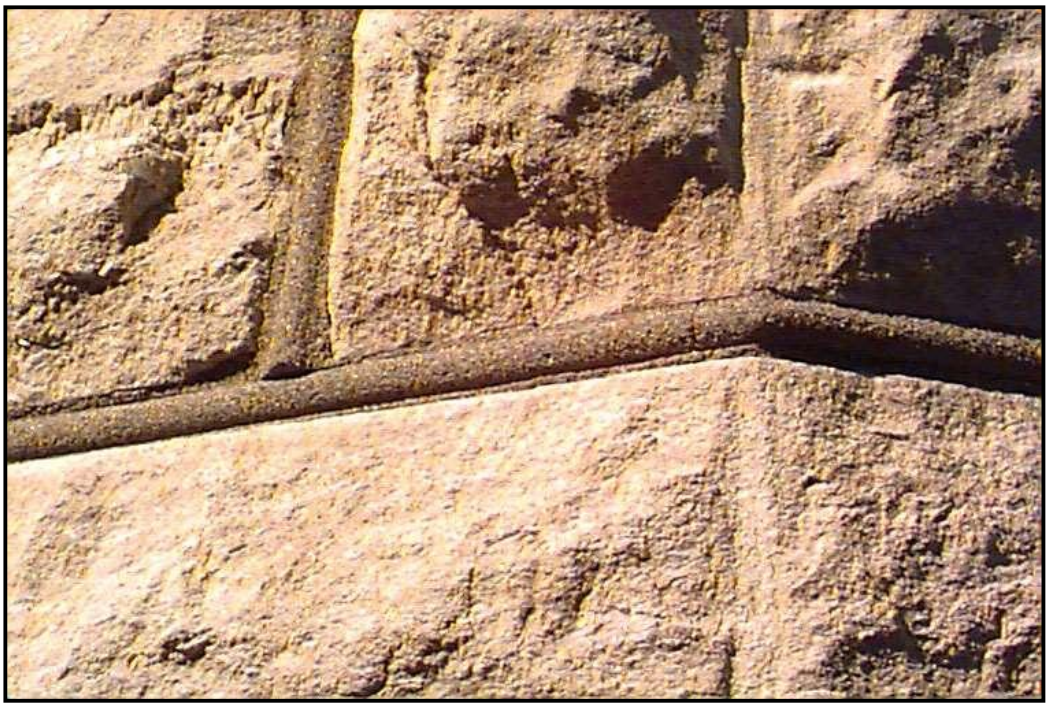


Masonry mock-ups are required before starting work. Construct 3' x 5' units. Mortar must be completely dry before inspection and final acceptance before work begins.

## Acceptable Masonry Practices

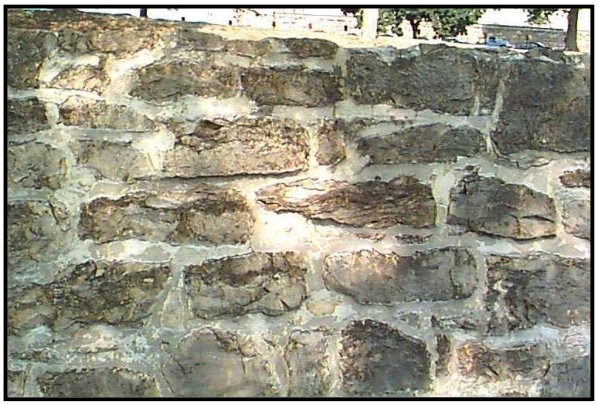


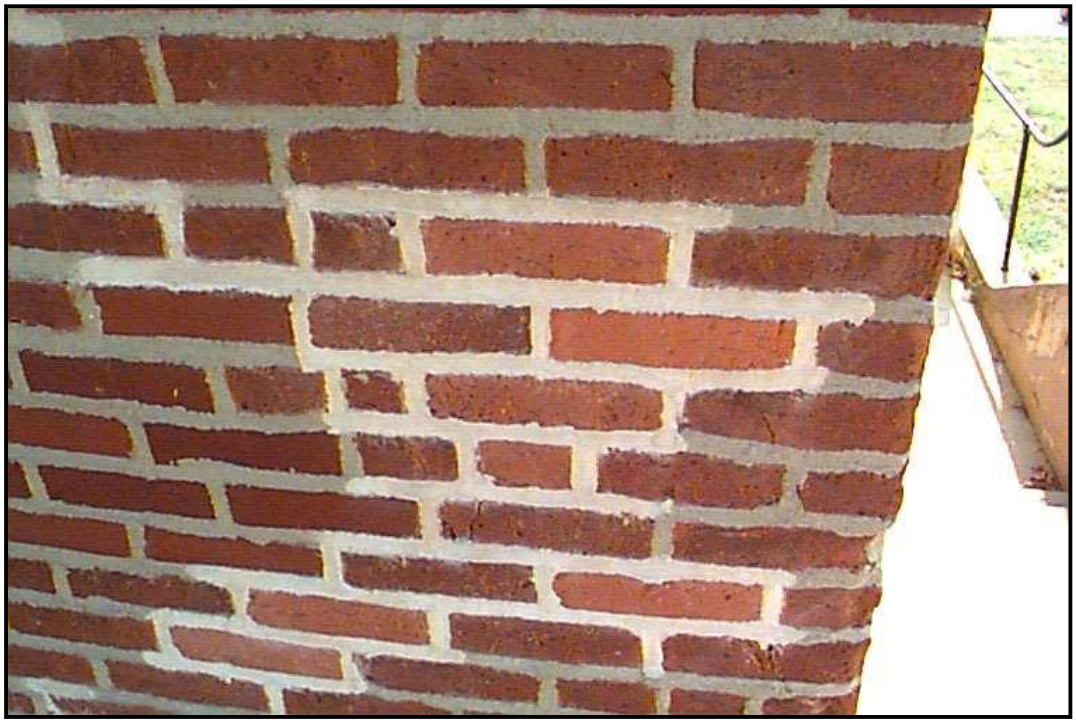
Structural members shall not have broken parts or splitting through members.



# Unacceptable Practices

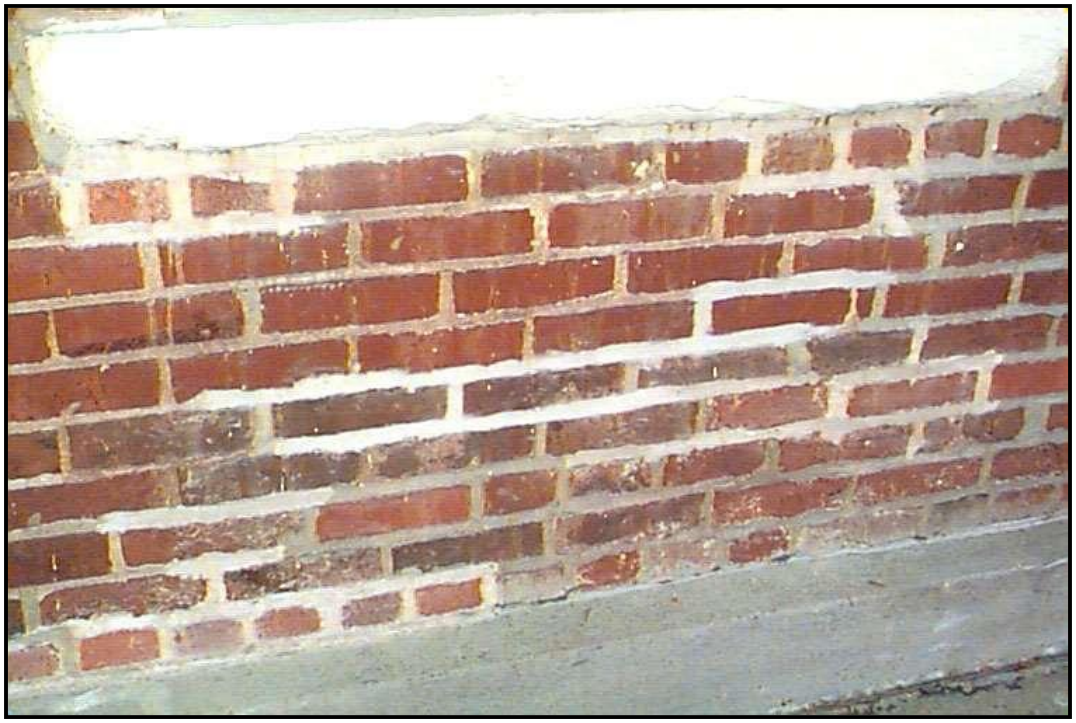
Mortar is smeared or left across stone or brick face.

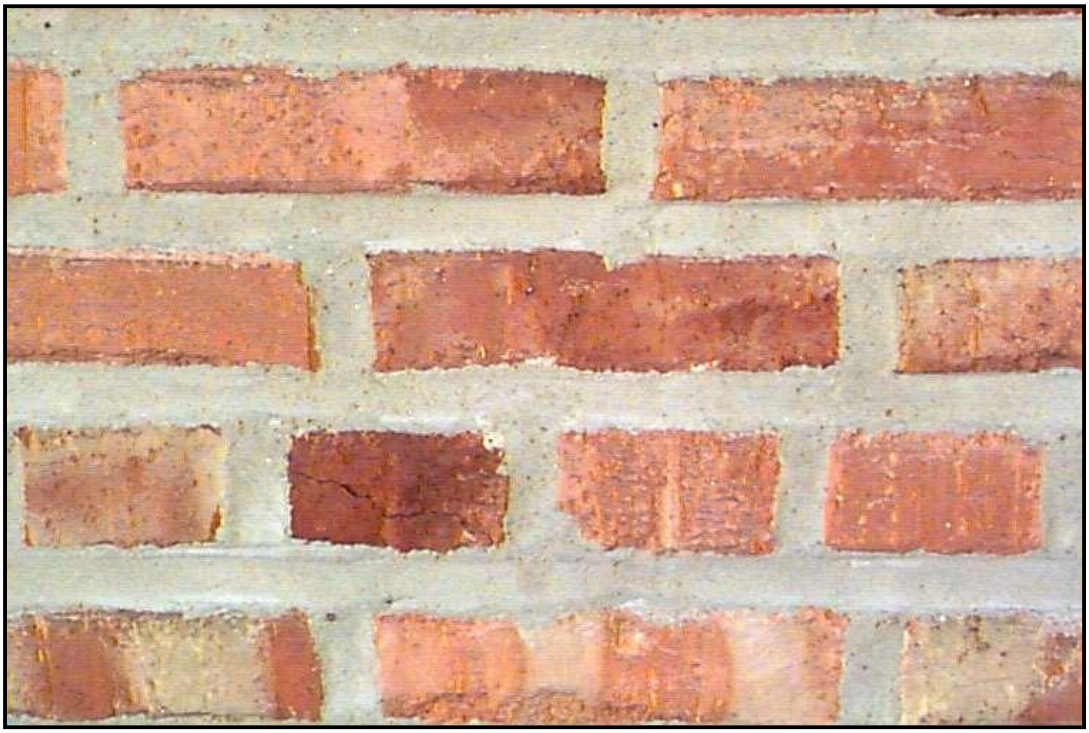




Applying the wrong color of mortar, which should match the existing mortar.

Poor color selection of brick.





# Historic Preservation Standards

# From the Secretary of the Interior's Standards for Rehabilitation of Historic Buildings

## IDENTIFY, PRESERVE, PROTECT, MAINTAIN, REPAIR, and REPLACEMENT OF HISTORIC MATERIALS

### Required

Identifying, retaining, and preserving wood features that are important in defining the overall historic character of the building such as siding, cornices brackets, window architraves, and doorway pediments; and their paints, finishes, and colored walls, brackets, railings, cornices, windows architraves, door pediments, steps, and columns and details such as tooling and bonding patterns, coatings, and color.

Protecting and maintaining wood features by providing proper drainage so that water is not allowed to stand on flat, horizontal surfaces or accumulate in decorative features.

Replacing an entire wood feature such as a cornice or wall when repair of the wood and limited replacement of deteriorated or missing parts are appropriate.

### Not Allowed

Removing or radically changing wood features which are important in defining the overall historic character of the building so that, as a result, the character is diminished.

Removing a major portion of the historic wood from a facade instead of repairing or replacing only the deteriorated wood, then reconstructing the facade with new material in order to achieve a uniform or "improved" appearance.

**Recommended**

Repairing wood features by patching, piecing-in, consolidating, or otherwise reinforcing the wood using recognized preservation methods. Repair may also include the limited replacement in kind, or with compatible substitute material, of those extensively deteriorated or missing parts of features where there are surviving prototypes such as brackets, molding, or sections of siding.

**Recommended**

Replacing in kind an entire wood feature that is too deteriorated to repair, if the overall form and detailing are still evident, using the physical evidence as a model to reproduce the feature. Examples of wood features include a cornice, entablature or balustrade.

***Recommended***

*Designing and installing a new wood feature such as a cornice or doorway when the historic feature is completely missing. It may be an accurate restoration using historical, pictorial, and physical documentation; or be a new design that is compatible with the size, scale, material, and color of the historic building.*

***Not Recommended***

*Creating a false historical appearance because the replaced wood feature is based on insufficient historical, pictorial, and physical documentation.*
*Introducing a new wood feature that is incompatible in size, scale, material and color.*

Brick was destroyed by pneumatic tools and wider the space.

## Standard

Areas under columns required additional support.

Boxed-in areas shall be designed as to distribute the loading of each column on all porches and structural support areas.

**DIRECTORATE OF PUBLIC WORKS**
**820 McCLELLAN AVE**
**FORT LEAVENWORTH, KANSAS 66027**

## PROJECT TASK ORDER RECONCILIATION FORM

Project Name: _____
Project Number: _____
Task Order number: _____

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_____ _____
Signature of Contracting Officer's Representative Date

_____ _____
Signature of Contractor Date

Continuation Form

| Line item No. | Description | Quantity | Cost per Unit | Cost |
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