Water Intrusion / Mold Mitigation Plan 02-11-2022

Pepper Construction Project Team to fill out the "Water Intrusion Checklist"

PRE-CONSTRUCTION

- ❑ During the Contractor – Owner – A/E Kick-off meeting, discuss water infiltration response procedures, mold avoidance procedures, and mold mitigation procedures. Adopt any Owner specific response procedures/guidance documents.
- ❑ On a renovation, addition, or demolition, perform a preexisting mold survey on the existing building before construction begins to ensure that preexisting mold conditions are noted and discussed with the Owner to develop an appropriate remediation strategy (formal remediation or Trade Contractors handle if appropriate). This survey will not typically cover latent or hidden conditions.
- ❑ Review Lessons Learned for water infiltration/building envelope watch-outs or mold-related entries.
- ❑ Constructability Review – Design is not the Contractor's responsibility; however, if during any review of the Contract Documents required by written agreement with the Owner ("The Agreement"). The pepper project management team becomes aware of a design element which, based on Pepper's experience as a builder, rather than as a design professional, may have the potential for water infiltration and resultant mold growth, the project team could send a request for information to the architect or designer of record in the manner set forth in the Agreement. Pepper Construction should make no guarantee of a comprehensive design review that will ensure no water infiltration.
    - Water infiltration and potential for conducive mold conditions from design details, methods, construction materials, and/or HVAC system requirements are sometimes related to the following design elements:
        - Building Envelope
        - Windows and Doors
        - Roofing Systems
        - Vertical Enclosure Systems
        - HVAC Systems
        - Plumbing
        - Duct Chases and Elevator Shafts
        - Site Conditions
        - Permanent Drainage Systems
        - Foundation Damp Proofing Interior Walls
        - Finishes (avoid vinyl wallpaper)
        - Landscaping and Grading
    - Inform the Owner about:
        - Third-party peer reviews for mechanical systems & building envelope designs
        - Commissioning of the building envelope.

PROJECT START-UP

If Pepper Construction was not involved in Pre-Construction, to the extent required in the Agreement review and complete the steps prescribed in the Pre-Construction section of this Contractor Mold Mitigation Plan template.

PURCHASING

- ❑ Scope/Bid Package Development considerations:
  - Existing mold conditions
  - Special health and safety precautions/protective measures, if applicable
  - Specialty products appropriate, recommended, required, etc.
  - Storage considerations for moisture-sensitive building materials/components
  - Trade Contractor responsibility for mold awareness mitigation
  - Material substitutions for moisture-sensitive bldg. materials/components where allowed & with A/E approval
  - Require Trade Contractor to include manufacturer recommended installation instructions as part of their submittal requirements
  - Consider purchasing temporary sealing of door and window openings, pipe chases, elevators shafts, roof openings, and penetrations from weather
  - Require certain trade contractors whose work is susceptible to mold growth to develop and submit their own project-specific Mold Mitigation Plan to Pepper Construction.
  - Require in Bid Packages that every Trade Contractor shall establish and provide to Pepper Construction a Materials Control Plan to detail procedures to ensure the protection of materials during delivery, storage, installation, and post-installation (ex., use of tarps for protection of stored materials or work-in-progress, etc.)
- ❑ Ensure that all Trade contracts explicitly address the responsibility for:
  - Taking necessary, proactive precautions to avoid creating situations conducive to mold growth repair
  - Remediation of water damage and/or resultant mold growth
  - Include program in the Job Specific Quality Plan
- ❑ Water intrusion events need to be addressed as quickly as possible to minimize damage and possible mold growth. Below is a list of suggested equipment that may need to be purchased to prepare for potential water infiltration. It may be appropriate for certain projects to purchase this kit from the Drywall Trade Contractor under certain conditions.
  - (1) moisture meter
  - (1) fan
  - (1) dehumidifier
  - (1) wet-dry vacuum
  - (1) container of “Copper 8 Quinolinolate” or equivalent fungicide

During all Scope Reviews, discuss how moisture will be removed from the building during construction (ex., concrete curing times, etc.) Insert the following language into all bid documents:

> ***Water Spills, Leaks, or Unplanned Discharge. In the event the Trade Contractor spills, leaks, or discharges any water during the course of construction, the Trade Contractor shall immediately take such measures as are required to stop the discharge, remove excess water, dry out and clean or replace all surfaces, materials, fixtures, equipment, etc., affected by the spill or discharge. Trade Contractor shall provide immediate verbal notification and written notice (within 24 hours) of the spill/ discharge to Pepper Construction. Trade Contractor shall be liable for any loss or damage to any work in place, surfaces, materials, fixtures, and equipment resulting from a water spill or discharge by Trade Contractor or its subcontractors, suppliers, or agents.***

Mold Mitigation Planning in the Quality Process

Develop a list of construction materials to be used on the project that are the most susceptible to the growth of mold (see following examples) and ensure that these materials are protected from water and/or condensation impact

- ❑ CSI 06000 Wood Products (Rough and Finish Carpentry, Woodwork)
- ❑ CSI 07200 Building insulation
- ❑ CSI 07250 Building Fireproofing
- ❑ CSI 09000 Finishes (Lath and Plaster, Ceiling Tiles, Carpeting, Wall Coverings, etc.)
- ❑ CSI 09250 Drywall
- ❑ CSI 09500 Sound Attenuation Materials
- ❑ CSI 15250 Mechanical Insulation
- ❑ Other applicable sections

Receive and review the required Materials Control Plan from each Trade contractor detailing their procedures to ensure the protection of materials during delivery, storage, installation, and post-installation.
Delivery of materials to the site:

- Utilize just-in-time deliveries for moisture-sensitive building components/ materials
- Ensure moisture-sensitive building components/materials are protected while en route to the site
- Conduct more frequent first delivery inspections (Quality Program) of materials arriving on-site, specifically looking for signs of water damage and/or mold growth
- Reject materials with evidence of water damage or mold growth
- Reschedule delivery of moisture-sensitive building components/materials during inclement weather

Storage of materials:

- Ensure building components/materials are being properly stored at the Trade Contractors' facilities (i.e., protection from moisture).
- Ensure Trade Contractors are properly storing their building components/ materials on site
- Ensure building components/materials are stored away from the edge of the building that is unprotected from the weather.
- Ensure all building components/materials are raised off the floor/ground (Pepper's Nothing Hits the Ground program).
- Ensure all covered building components/materials are adequately ventilated to help condensation evaporate.

Submittals

- ❑ Obtain for any mold specialty products (biocides, mold-resistant drywall, etc.)
- ❑ Trade Contractor specific Mold Mitigation Plan for any Trade Contractor whose work has a significant likelihood of introducing water or moisture into the building
- ❑ Obtain manufacturer recommended installation instructions from Trade Contractors for moisture critical building materials/components

Trade Kick-Off and Worker Orientation

- ❑ Discuss critical details, work procedures, etc. at the trade kick-off meeting
- ❑ Provide project management and workers with information on the importance and methods of preventing mold growth
- ❑ Discuss coordination of different Trade Contractors in terms of how their combined work comes together to prevent water infiltration

CONSTRUCTION ADMINISTRATION

- ❑ During all stages of construction, field installations shall be reviewed for compliance with design, proper workmanship, proper transition between materials, protection, repair, and dryness.
- ❑ When requested by the Owner as a scope change, retain a third party to test the building envelope for water tightness
- ❑ Build-in strict accordance with design and specifications
- ❑ Utilize Pepper Construction's existing Quality Program with regard to:
  - Inspecting work before covering up/closing in
  - Conduct interim Quality inspections
  - Consider recommending benchmarks/mock-ups of certain moisture critical elements of concern to obtain Owner and A/E approval before final installation
- ❑ Delivery of interior materials (e.g., drywall, paneling, ceiling tiles, framing lumber):
  - Schedule so interior materials will arrive after the exterior of the building has been sealed
  - Provide for dry storage of materials - off the ground (Nothing Hits the Floor Procedures) away from moisture sources
  - Minimize storage time (especially in high humidity environments)
  - Inspected all materials upon delivery for preexisting mold contamination and/or water damage and moisture content (use moisture meter) - REJECT ANY MATERIAL EXHIBITING SIGNS OF WATER DAMAGE AND/OR MOLD GROWTH
  - Ensure breathable sheeting or tarps used to cover materials are secured loosely to allow air circulation
  - Separate stacked materials to allow airflow circulation
- ❑ Keep interior materials dry (per manufacturer's specs) before, during & after installation
- ❑ Do not install wet building materials
- ❑ Schedule installation of moisture sensitive building components/materials during dry weather periods
- ❑ Document installation of moisture critical building materials/components, including photographs
- ❑ Notify the A/E immediately if the team has difficulty with the installation of a specific design element
- ❑ Perform interim inspections; invite the Architect, Envelop Engineer, Mechanical Engineer, manufacturer's representatives to inspect for mold-related issues
- ❑ Protection of ongoing and completed flashings, waterproofing, roofing, and vapor barriers during construction
- ❑ Once the building is weathertight, to the extent possible, maintain low indoor humidity (< 60% RH; ideally 30-50 %). Temporarily conditioning spaces while certain work is being installed and/or until the space can be permanently controlled via the building's HVAC systems. However, consideration will need to be given towards protecting the system from construction dust.
- ❑ Removal of standing water from the building
- ❑ Equipment that requires water such as tile saws, mixers, etc. shall be placed in tubs during indoor operation to control the spread and seepage of water
- ❑ Consider work that requires water as part of the installation process and how it will be handled when used in the building.
- ❑ Avoid trapping water in finished work; allow materials to dry out - make part of Quality Closure Inspections
- ❑ Frequently collecting and removing waste materials subject to mold growth (e.g., cellular materials) - keeping the work areas clean.
- ❑ Wet and/or moldy materials shall be removed from the site immediately. Contact Regulatory Services for proper removal protocols.
- ❑ Incorporate mold avoidance into weekly Trade Contractor meetings

SYSTEMS

Foundations

- ❑ Ensure foundation is/stays dry:
  - Ensure all water drains away
  - Ensure grade is sloped away
  - Ensure roof drains are properly supported and braced
  - Ensure landscaping sprinklers will not water the foundation

Plumbing

- ❑ Confirm that all plumbing penetrations are properly sealed to ensure no water can enter the structure
- ❑ Inspect all water services (including fire sprinklers) and waste lines for:
- ❑ Proper installation; tight fittings; checked for leakage
- ❑ Water lines (particularly chilled water) properly insulated
- ❑ Ensure multiple inspectors are on-site during the filling or hydro testing of sprinkler systems to check for any leakages over the piping being tested
- ❑ Domestic water lines should be made live in the building for as long as possible before drywall installation begins; inspect all charged lines daily
- ❑ Immediately repair all plumbing leaks
- ❑ Sump pumps in low areas of the building shall be installed and placed in operation as early as possible to prevent flooding
- ❑ Keep all drains open and unobstructed

Envelope

- ❑ Ensure all building penetrations and other moisture critical points are properly installed and checked for leakage:
  - Doors
  - Windows
  - Balconies and decks
  - Roof membranes (proper lapping at corners and joints)
  - Roofing systems and penetrations
  - Flashings and caulking
  - Ventilation/exhaust ducts
- ❑ Ensure all tears, openings, or punctures in vapor barriers have been repaired
- ❑ Ensure all flashings and caulking are checked for proper lapping and application
- ❑ Ensure all roof drains drain away from the foundation
- ❑ If EFIS being installed, ensure installers that follow performance standards, specifications, and methods of application guidelines from the EFIS Industry Members Association. (www.eima.com)
- ❑ Roof drains are properly supported and braced for large volume storms
- ❑ Curtainwall Construction
- ❑ Inspect complex intersections and conditions that are potential leak locations. Focus on:
  - Intersection of curtainwall/windows with the help of other trades
  - Intersection of curtainwall/windows with balcony and deck intersections
  - Adequate structural support for tie-in of curtainwall/window systems
  - Proper size and support for sealing of curtainwall/window perimeter conditions to the structure
  - Conduct field water testing of the curtainwall/window system using an independent testing agency. Ensure third-party testing agency prepares a written report of the testing with findings and photographs

- Inspect the interior and exterior of the curtainwall after one (1) year and immediately before the end of the warranty period, if other than one (1) year, to determine the existence of any potential deficiencies.

HVAC

- ❑ Ensure all HVAC components delivered to the site are protected from dust and moisture throughout construction
- ❑ Ensure that installed HVAC components are sealed to avoid duct interior contamination (ex., dust) during construction
- ❑ Ensure correct filters properly installed - ASHRAE Dust Spot Efficiency per specifications, no filters missing or misaligned
- ❑ Do not utilize the new HVAC system to provide environmental controls for finish work without approval of the Owner and appropriate protective measures (i.e., filters on intakes). Consider whether purchase of extended warranty is necessitated.
- ❑ Ensure the HVAC system is cleaned and commissioned. Third-party certification of HVAC (test and balance report). The American Society of Heating Refrigerating and Air Conditioning Engineers has published a good practice commissioning procedure (ASHRAE Guide #1).
- ❑ Ensure all duct joints are sealed properly
- ❑ Inspect all drip pans associated with cooling coils for proper drainage
- ❑ Confirm that all exhaust fans are vented to the exterior
- ❑ Temporarily condition/dehumidify building spaces where certain mold prone work occurs until the building's HVAC systems can permanently control the space

Drywall

- ❑ Install only during optimal job site conditions and per manufacturer requirements:
  - Temperature above 40°F
  - Relative humidity below 70%
  - Documented and approved methods for removing standing water
  - Proper ventilation
- ❑ Inspect drywall at point of delivery for wet and/or mold-contaminated sheets (gypsum drywall should not exceed 0.5% moisture using a gypsum moisture meter or 12% using a wood calibrated moisture meter (verify with manufacturer) - reject any sheets that appear wet or moldy Confirm on-site storage of drywall meets the following minimum requirements:
  - Drywall placed in an enclosed area protected from all types of weather
  - Area is protected from freezing
  - Area is clean (minimal dust, i.e., mold food source)
  - Drywall placed on wood risers spaced no more than twenty-eight (28) inches apart and within two (2) feet from the ends of the sheets
- ❑ Consider leaving an appropriate amount of space between drywall and the floor (suggest a minimum of ½" in wet areas and ¼" minimum per ASTM recommendations). In areas of potential water intrusion (ex., basements, mechanical rooms, etc.) a space of up to one (1) foot may be needed to assure non-contact of water and drywall. Once space is dried-in, fill gaps
- ❑ Confirm proper installation of protection plates on framing members to protect plumbing lines

Miscellaneous

- ❑ Ensure all attics, crawl spaces, pipe chases, or other enclosed areas are properly ventilated
- ❑ Ensure all moisture-generating equipment vented outdoors
- ❑ Pour and cure all gypsum cementitious flooring underlayment before installation of drywall
- ❑ Consideration for use of specified Biocides/Sealants
    - Applicability and effectiveness
    - Acceptable to Owner as a response measure
    - Application requirements (ex. license, etc.)
    - School systems may require applicants to be registered
    - Collection/disposal of unused product (ex. hazardous waste)
    - Worker training and protection
    - Indoor air quality issues during and after construction
    - Follow Contractor's Water Infiltration Response Procedure
    - Report any water damage, leaks or intrusion to project manager immediately
    - Document the condition in keeping with Contractor's protocols
- ❑ Ensure concrete slabs are dry before installing mold susceptible materials

POST-CONSTRUCTION (BEFORE OFFICIAL TURNOVER TO OWNER)

- ❑ Ensure manufacturers have inspected installations for warrantee purposes as required Respond immediately to any voiced Owner concerns regarding moisture/water infiltration
- ❑ Fix leaky plumbing and leaks in the building envelope as soon as they are discovered.
- ❑ Watch for condensation and wet spots in the building. Fix source(s) of moisture problem(s) as soon as possible.
- ❑ Keep heating, ventilation, and air conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.
- ❑ Maintain low indoor humidity, below 60 percent relative humidity (RH), ideally 30-50 %, if possible
- ❑ Don't let foundations continually stay wet. Provide for drainage and slope the ground away from the foundation
- ❑ Ensure all building penetrations have been properly sealed.
- ❑ Ensure landscape watering systems do not spray onto the building.
- ❑ Perform a final visual inspection of pipe chases, basements, utility tunnels, and areas above drop ceilings that are exposed to water or waste lines or that are directly below the roof.
- ❑ Install new air filters upon turning the building over to the Owner.
- ❑ Ensure the Owner and A/E are part of the building's final punch listing process as part of accepting the building (include looking for mold related issues as part of the punch listing process).
- ❑ Brief the Owner on keys to prevent mold growth after they have occupied the building and are maintaining it (to be included in any applicable owner training being given).

Water Infiltration Response for Mold Growth Avoidance

- ❑ In the event of a water/significant moisture infiltration event in a building where materials or components having an affinity for water have already been installed, Primary Contractor's personnel must act quickly to limit impact to those materials. Detailed below are procedures intended to assist in this circumstance. Any procedures set forth in the Contract Documents, or direction from or protocols established with the Owner for the project that exceed or deviate from the requirements detailed herein would supersede.

I. RESPOND IMMEDIATELY

- ❑ Eliminate the water/moisture infiltration source
- ❑ Consider immediately applying a biocidal agent (Copper 8 Quinolinolate, Cunilate 2000 or equivalent agent) on impacted building material/components.
- ❑ Remove all standing water
- ❑ utilize shop vacs or other available means
- ❑ Dehumidify the area and dry out materials in the affected area
- ❑ If the building HVAC system is not yet operational to the point where it can be successfully used for this purpose bring portable dehumidification units into the area
- ❑ If the building is not yet weather tight, dehumidification may be more difficult but should still be undertaken
- ❑ direct heat sources, water extraction vacuums, etc. can be utilized to dry out impacted materials
- ❑ Establish Desirable Environmental Conditions
- ❑ Temperature should be 68°F - 76°F
- ❑ Relative humidity should be 30% - 60%

II. EVALUATE IMPACT

- ❑ Note the known or likely amount of time that materials or components have been exposed to the water/moisture (ex., is this an event that occurred overnight or over a weekend when the building was not occupied and therefore not discovered for 12, 24, 48 hours, etc.)
- ❑ Visually inspect all materials and components in the area of the water/moisture infiltration (be sure to consider materials in wall cavities, above ceilings, etc.)
- ❑ For porous materials in the impacted area that do not display visual evidence of impact, utilize a moisture meter in a representative number of locations to adequately assess nonvisual impact (be sure to consider materials in wall cavities, above ceilings, etc.) – document all readings
    - Moisture meters are readily available at many larger hardware stores. One web source for this equipment is www.moisture-meter.com/store (Protimeter)
    - Any material location where the moisture reading is greater than or equal to 12% should be considered impacted
- ❑ Catalog any materials or components that have been determined to have been impacted (visually or through moisture readings) document in writing and photos/video

III. TAKE APPROPRIATE CORRECTIVE MEASURES

- ❑ Refer to the EPA Guidelines for Response to Clean Water Damage
    - Certain porous materials that have been impacted for less than 24 hours can either be dried and wiped down with a biocidal agent (ex., 10% chlorine bleach solution, Copper 8 Quinolinolate, etc.) or replaced (refer to EPA guide to determine which porous materials may be saved) Note: When using any biocidal agents, health & safety considerations must be addressed.
    - Any porous materials that have been wet for more than 24 hours must be replaced
    - Any porous material with visible mold growth must be replaced regardless of the time since impact
    - Nonporous materials can be dried and wiped or sprayed with a biocidal agent. If additional treatment is warranted, these nonporous surfaces can be treated with a sealant such as Fiberlock (www.Fiberlock.com).

Specifically:

- Do not replace impacted materials until appropriate building/area environmental conditions have been achieved and can be maintained
- When replacing materials apply the protocol below for removal extent decision making consistently in all areas:
- For all impacted areas, use a moisture meter to determine the extent of impact beyond that which is visible, then add a buffer of at least one foot (1') beyond that point or more (if a greater quantity/level makes sense for efficiency or quality of replacement).
- Determine whether it is necessary or advisable to treat (spray/coat with a biocidal agent or a sealant) surfaces or cavities behind the removed material before replacement
- Properly document the replacement process:
- All moisture readings associated with the replacement extent decision making noted above (especially the moisture readings of material to remain)
- The existing conditions (in writing and with photos/video)
- Exact quantities and locations of materials to be replaced
- Procedure for removal and transport out of the building (with Owner approval/sign off if necessary or warranted)
- Any licensing, certification, or training requirements for personnel performing the work Any required or appropriate Health & Safety Plan (HASP) or other documentation necessary for the PPE utilized
- Photos or video of the area after removal but before the replacement
- The environmental conditions at the time of installation of replacement materials (temperature and relative humidity)
- Photos or video after replacement is complete
- MSDS's for any biocidal or sealant products used

Other Considerations:

- Determine any qualification or licensing requirements in the project State or Local jurisdiction for personnel removing material with visible mold growth. If no other specific regulations or requirements apply, this work does fall under OSHA's General Duty Clause.
- Consider appropriate means of removing and transporting any material with mold growth to ensure that mold spores are not introduced into other building environments
- Consider the implications of the use of biocidal agents and/or sealants as these chemicals typically require personal protective equipment (PPE) and potentially special disposal of associated wastes
- Collection and analysis of mold samples (air, wipe or bulk) is not recommended without prior consultation with Contractor's Regulatory Services as there are currently no established regulatory levels to which any obtained results could be compared. Therefore, an agreement must first be achieved with the Owner to establish a reasonable level for sample results of any type.