General Engineering Condition Report

Townhouse Condominium
Sample, Massachusetts
Version 1
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Townhouse Condominium: General Engineering Condition Report

Townhouse Condominium is located on a rural wooded site in Sample, MA. There are twelve townhouse-style buildings. (4) 2-unit buildings & (8) 3-unit buildings. All have concrete foundations, some with rear walkout levels, and are typical wood-framed construction. Roofs are asphalt shingle. Units were constructed between 2009 and 2018, per aerial images.

Executive Summary

- Site condition generally appears good
    - Retaining wall tops should be guarded with fences for improved safety
    - Several drainage and grading issues adjacent to buildings should be corrected
    - Storm water detention basin needs maintenance
    - Driveway and sidewalk edges need backfill to improve safety in multiple locations
- General building condition appears good
    - Roof condition is generally good
        - Cleaning moss growth areas and adding copper strips to prevent reoccurrence is recommended
    - Vinyl siding is in generally good condition
        - Cleaning is recommended
        - Mechanical penetrations should be sealed
- Building and steps
    - Bottom front step does not meet code on many units
    - Some precast steps need proper backfill
    - Rear walkout step does not meet code on several units
- Rear decks
    - Significant rear deck structural issues were observed
    - Structural engineer should examine each deck and design repair for beams and support posts
    - Numerous minor structural issues observed
- Additional intrusive examinations recommended based on findings
    - Remove vinyl siding to verify envelope details
        - Check window & door flashing
        - Check deck flashing
        - Check mechanical penetrations flashing

Details on listed items can be found in report that follows.

Any recommendations and suggestions provided in the General Engineering Condition Report are not a design but should be considered and evaluated by competent professionals as part of the strategies needed to solve problems related to the association observed while conducting the site visit(s). These recommendations are not all encompassing and are not a substitute for a thorough inspection, analysis and design. These recommendations are based on experience with similar problems and solutions. No destructive testing/exploration was performed during site visit(s).

Site Observations:

General

- Retaining Walls
  - Safety would be improved if there were small fences or other barriers at top of retaining walls to prevent falls
  - 
- Water shut offs
  - Several water shut off handles are above grade in lawn areas and should be protected or cut flush with lawn to improve safety
  - 
  - Shut off handle off corner of unit 21 shown above
    - Unit 19 also among those that are incorrect

Drainage Adjacent to Buildings:

- No areas of significant puddling observed around most foundations
  - Cold weather site visit conditions may obscure some puddling
- Unit 26 did have puddling under rear deck that should be corrected

- Low area under deck should be filled

- Unit 4 low area adjacent to hatchway

- Recommendations
  - Annual inspection of grading around foundations recommended to assure proper surface slope so water flows away from buildings
    - Soil tends to settle around newly constructed buildings over time due to insufficient compaction when backfilling foundations

- Best practice to extend downspouts with leader pipes to deposit water at least 6’ away from building if practical

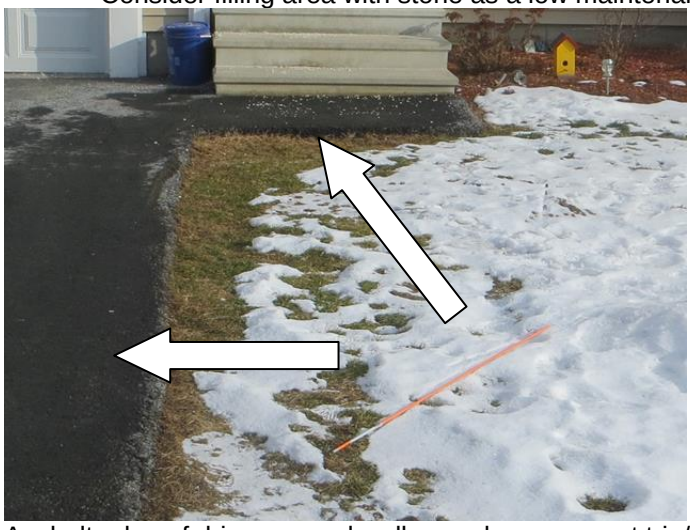
Clearance of Wood to Soil

- Code requires mulch/soil to be 8” below wood structural framing and 6” below wood sheathing or siding
- Difficult to maintain this clearance if building is constructed too low
    - Increase clearance as practical and switch to stone mulch
- Mulch/soil in closer proximity in dropped wall locations as shown in example photo of unit 1 below
- 
- Same detail can be seen on side of unit 8
- 
- In general, there is not much landscaping installed around buildings
    - Recommend eliminating wood mulch now and in future in favor of stone
        - Wood mulch decomposes and in effect raises grade closer to wood which should be avoided
        - Wood mulch can also harbor artillery fungus
            - Fungus can leave small brown spots on siding and create aesthetic problems
            - No artillery fungus spots were noted
    - Massachusetts law for buildings with 7 or more units prohibits wood mulch within 18” horizontal distance of building
        - Stone adjacent to building reduces risk of fire started by careless disposal of smoking materials

Storm Water Drainage:

- No details were available for system
- No known issues with current operation
- Detention basin behind units 7,8
  - There should be an required maintenance plan from subdivision approval process
    - Document should be located and followed by association
  - 
  - Inlet area is overgrown and needs to be cleared out to ensure free flow
  - 
  - Trees are not typically allowed to grow in basin
    - Young trees at arrow should be removed
    - Sediment may need to be removed periodically

Asphalt Roads, Driveways, Walkways, and Parking Area:

- Roadways, driveways, and parking area in good condition
  - Some edges, especially at driveways need to be backfilled to protect pavement edges and improve pedestrian safety
    - Areas where additional backfill needed should be inventoried in spring and reexamined at least annually
  - Backfill/landscaping material should be approximately level with asphalt surface
  - 
  - Landscape area between unit 4 & 5 driveways above is in poor condition
    - Consider filling area with stone as a low maintenance backfill
  - 
  - Asphalt edge of driveway and walkway above present trip/twisted ankle hazard

- Minor cracks along edge of road above across from unit 6

- Front walkway to driveway never installed on units 19,20,21

Building Exterior Observations:

Roofs:

- Keeping a building dry is number 1 priority
  - Not all roofs visible from ground
    - Rear roofs of buildings with walkout foundations especially
  - One layer of shingles from original construction
    - Shingles appear to be aging normally as examined with binoculars from ground
  - Trees are well away from buildings
    - Inspect trees annually to determine if they will need to be cut back to prevent shading of roof areas
    - Will allow roofs to dry more quickly
  - Clean/prevent moss growth on roofs as practical
    - Install copper strips in problem areas to reduce moss, algae, and lichen growth

- Front north facing roof areas between dormers on units 14,15,16 exhibit moss growth

- Moss on north facing front porch roof units 17,18
    - Also note vinyl siding in need of cleaning
- Take care if raking or removing snow and ice from roofs
    - Missing shingle tabs and gouging can result
    - No ice removal damage noted.

- General roof replacement recommendations
    - On-roof examination by roofing consultant or competent roofer to check for problem areas
    - Check that ridge and soffit vents are functional
    - Ensure that asphalt shingles have copper and other additives to prevent algae, moss, and lichen growth
    - Install copper strips at ridge of slopes that are vulnerable to algae, moss, and lichen growth

- Follow manufacturer instructions for spacing and location

- Use smooth ice and water barrier (Grace Ice and Water Shield or equal)
  - Higher initial cost
  - Lower life cycle cost
  - Better performance because it sticks to itself better than granular products
  - Two rows for a total of about 6’ should be installed at eaves to meet code requirements
  - Can be re-roofed over one time while maintaining warranty
    - Not the case for granular products
    - Granular products will have to be removed and that typically means replacing sheathing
- At roof to wall intersections, cut back siding to maintain clearance of 1-1/2” to roofing to eliminate moss growth at this intersection
- Install kickout flashings at roof to wall intersections
  - Arrow in photo below points to kickout flashing and siding is cut back away from roof.

  - Kickout flashings in photos above and below ensure that water does not get behind siding where roof ends
  - A trim board can be installed to allow access to step flashing in future

- 

Gutters:

- Need to be cleaned twice per year
- Check and reset pitch as required
- Clean roof areas prone to debris collection, valleys & skylights, when gutters are cleaned
- Due to distance from adjacent trees, gutter cleaning and debris on roof will be minimized

Siding and Walls:

- In general, vinyl siding appeared to be in good condition
- Mechanical wall penetrations
    - Many mechanical penetrations are not well sealed to vinyl siding and likely not well flashed under vinyl siding
    - Penetrations should be sealed and some penetrations should be examined for flashing details not visible
    - 
    - Pipe penetrations not sealed on side of unit 30
        - These pipes are likely for furnace and are missing proper termination pieces
        - Natural gas penetrations also need to be sealed and pipes painted on many units

- Pipes on side of unit 6

- Dryer vent termination is damaged at rear of unit 21
  - Also distance between what is likely a water heater exhaust pipe and dryer vent should be verified to check clearance requirements from exhaust to adjacent vents

- Some siding exhibits minor bulging/bucking at various locations

- Bulges to left of window at arrow above at rear of unit 31

        - Siding should be removed to determine cause
        - Also note seal failure of left window sash
        - Several window seal failures were noted
            - These are not association responsibility, but unit owners should contact window manufacturer for replacement
- Minor repairs
    - Loose siding rear, unit 25
    - 
    - Sill cock at rear of unit 2 is loose and in need of repair
    - 
- General recommendations
    - Siding needs to be cleaned periodically with gentle pressure washing
        - Aggressive pressure washing will likely result in water penetration & damage
    - Inspect at least annually for loose or damaged sections and make minor repairs
    - Inspect after high wind conditions

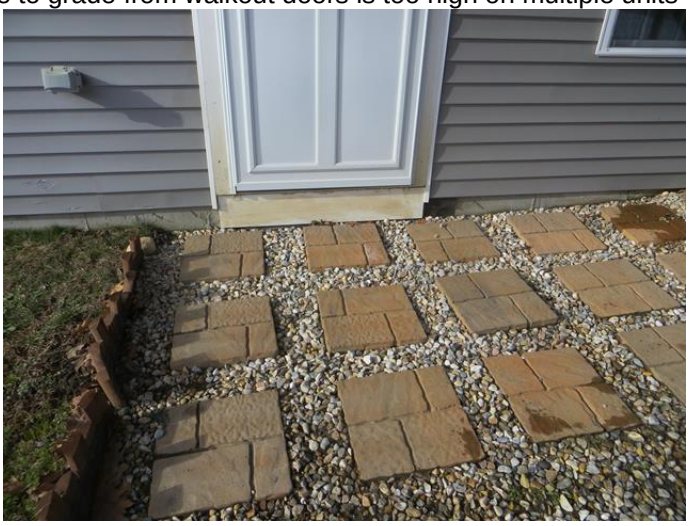
Building Stairs & Steps Observations:

Exterior Front Stairs:

- Precast concrete stairs do not meet code at bottom riser on many units
- 
- Bottom riser on unit 4 front step measures about 3-1/2” on left and 4-1/2” on right
    - Other risers are 7”
    - Maximum variation between step risers within flight of stairs is 3/8” per building code
- Recommendation
    - There is no easy solution to this problem unless precast steps are replaced
    - Grade is established by adjacent garage floor
    - Site built steps could equalize riser heights and meet code
- Design detail with precast step landing against vinyl siding at edge is poor
    - It will be difficult to install new siding with landing in place
- In several locations, precast steps are not sufficiently backfilled on sides and front to prevent animals from living under steps
- 
- Side of step at unit 12B above needs additional backfill

- 
- Side of step at unit 7 above needs additional backfill
- General recommendations
    - Inspect stairs and railings at least annually

Rear Step, Walkout Doors:

- Distance to grade from walkout doors is too high on multiple units
    - 
    - Distance is about 9-1/2” at rear of unit 7
    - Maximum riser in code is 8-1/4”
    - Landing (width of door x 36” in direction of travel minimum) should be installed outside of walkout doors at proper height
        - Note that clearance of siding to grade is below code also

- Landing at rear of unit 32 is too small in direction of travel
  - Height of step from door to landing may exceed 8-1/4”

Rear Deck Observations:

General:

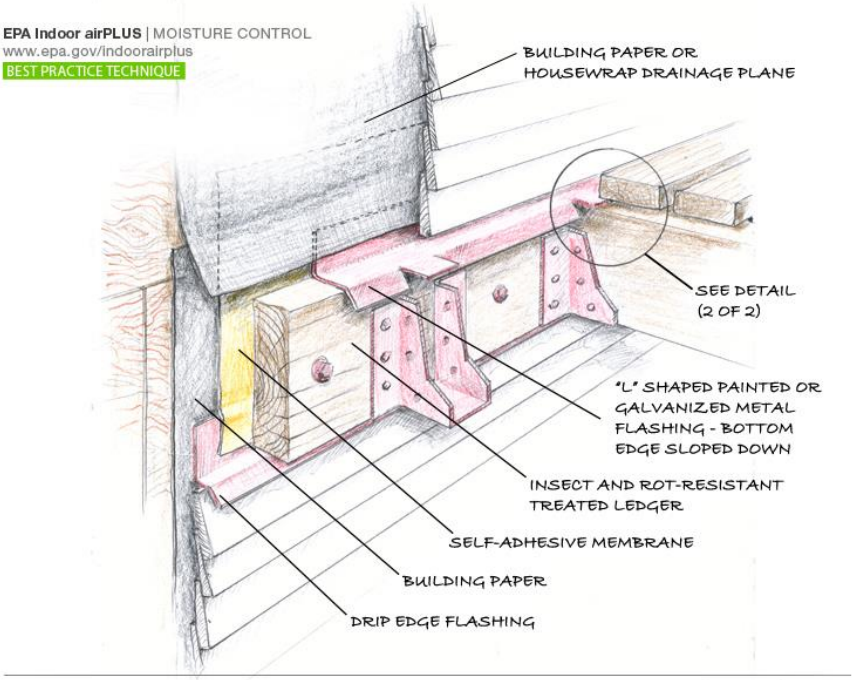
- In general, decks are the source of many injuries
  - Decks were built over several phases with possibly different builders/carpenters
  - Due to issues found, it is recommended that a structural engineer examine each deck and design repairs for each deck
- General recommendations
  - Inspect decks, stairs, and railings at least annually
- Structural summary for decks constructed at different times is presented below to illustrate issues found

Structural Deck Issue Examples:

- Unit 4 detailed issues, constructed 2017
  - Deck overview photo
  - 
  - 
  - Deck ledger board against house
    - Joist hangers
      - Incorrect fasteners used for installation are corroding
      - Nails in joist hanger brackets are not correct type
    - Screws for attachment of ledger board to building framing
      - No washer under lag screw attaching deck ledger to building
      - Size & spacing of screws appear inadequate and should be verified
    - Gray material is unknown flashing

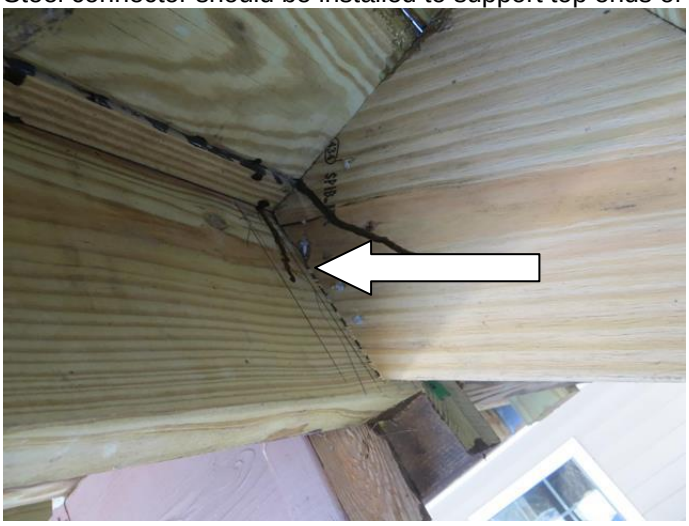
- Should be identified if possible to check if this material is rated for UV light exposure
- 
- Lag screw with no washer and not fully driven in
- 
- Deck ledger flashing details not visible
- Based on other deficiencies observed, it is recommended that vinyl siding be removed to examine flashing detail

- Flashing similar to detail below should be installed

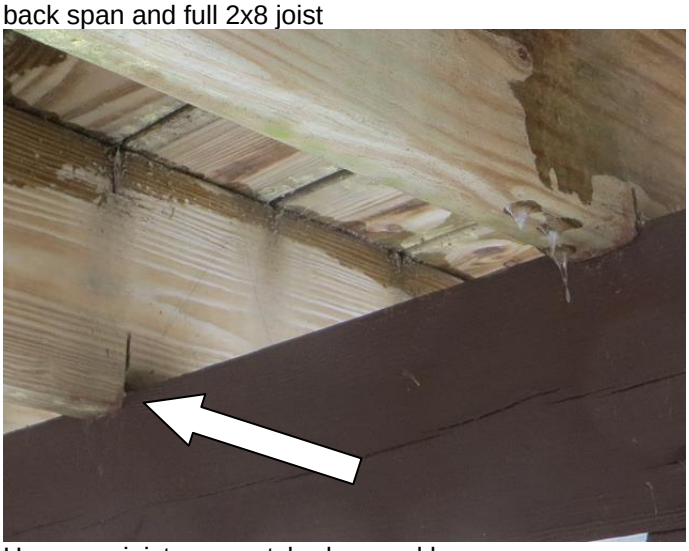


FLASHING DIVERTING WATER FROM DECK LEDGER (1 OF 2)

- 2x8 deck framing joists are cantilevered about 19" beyond beam
  - This is within the 25% of back span prescriptive requirement
  - 
  - Incorrect fasteners are corroding
    - Nails in steel hurricane tie bracket between beam and joist are not correct type
    - Structural hurricane ties are not required, but are good practice
      - Required fasteners for joist to beam connection per Table R602.3(1) in code
- Double 2x10 support beam under deck floor joists
  - Distance between 4"x6" posts under beam meets code
  - Beam is cantilevered beyond support posts within acceptable limits
    - Code limits cantilever to less than 25% of distance between supports

- Support posts
  - 
  - No structural tie between post and beam that is required by code
  - 
  - Missing nails in post anchor bracket
- Stairs
  - Steel connector should be installed to support top ends of stair stringers
  - 

- Unit 5 detailed issues, constructed 2017
  - Railings
    - In general, deck railings appear to meet code for decks
    - Stair railings do not meet code for passage of a 6” maximum diameter sphere between bottom rail and tread/riser
    - Graspable hand rail should be installed on stairs
  - Unit 5 is an example in photo below
  - 
  - Space will allow an 8-1/4” sphere
- Unit 14 detailed issues, constructed 2009
  - Deck overview photo
  - 

- Ledger board against house
  - 
  - Joist hangers
    - Nails in joist hanger bracket appear to be correct type
  - Screws for ledger attachment
    - Corroded washer under lag screw attaching deck ledger to building
    - Size & spacing of screws inadequate and should be verified
  - Ledger flashing not visible
- 2x8 joists are cantilevered about 22-1/2" beyond beam
  - This is within the 25% of back span prescriptive requirement based on 8' back span and full 2x8 joist
  - 
  - However, joists are notched around beam
    - This reduces size of joist and limits span
    - Calculation will be required to determine if notched joist structure meets code
      - Without calculation, if joist is considered a 2x6, then it does not meet code
  - Fasteners attaching joists to top of beam were not visible due to height of beam above grade
    - Fasteners should be verified per Table R602.3(1) in code

- 4x6 beam
  - Beam spans between 4”x6” posts (about 49”) meet code for double 2x6 beam (<5’11”) with joists span 8’ or less
  - However, beam is cantilevered beyond acceptable limits
    - Code limits cantilever to less than 25% of distance between supports
    - Distance between supports is about 49”, therefore maximum cantilever is about 12”
    - Actual cantilevers are about 27” and 19”
- Posts
  - 
  - No structural tie between post and beam that is required by code
  - One post is significantly warped and should be replaced
  - Posts are attached to concrete piers with proper bracket
- Stairs
  - Graspable hand rail should be installed
  - Stair stringer attachment at top of stairs should be reinforced with metal connector
  - Stair stringer unsupported span exceeds 6’
    - Proper support should be installed at mid-span
    - 
    - Example of inadequately supported stairs at unit 7
  - Stair risers should be closed to prevent 4” sphere from passing through
  - Riser heights should be verified

Foundation Issues

- No significant foundation cracks noted from exterior
- Small shrinkage cracks should be caulked to limit water entry

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