



SCOTT ENGINEERING, INC.
Consulting Engineers • Surveyors • Land Planners

January 12, 2023

Mr. Ian Gronau
English Village Condominiums
Harrow Drive
11 Ivy Hall
Dover, DE 19904

Re: Structural Inspection of Balconies

Inspection Date: December 6, 2022
Inspection Time: 9:00 AM
File Name: **English Village Condominiums**
Tax Map Parcel No. ED-05-076.06-02-01.00-000

S.E.I. Project No.: SI-3649

Present At Inspection:

Mr. Gregory R. Scott, P.E., Scott Engineering, Inc. - Engineer

Inspection Description:

The purpose of this inspection was to conduct a structural inspection of the cantilevered concrete balconies to determine if they were structurally sound or required repairs. The inspection was mandated by the City of Dover Building Inspections Department requiring that a structural engineer inspect noted defects in the concrete balconies.

General Property Description:

The structures are three-story, CMU block and wood framed, condominium units. There are a total of 9 buildings consisting of 12 condominium units per building. The 1st floor of the buildings is situated on a concrete slab. The 2nd and 3rd floor units have floors constructed with pre-stressed cable tension concrete deck panels. The balconies are approximately 7'-6" x 5'-0" x 8" and are extensions of the deck panels and cantilever out away from the buildings. For the purpose of this report the location of the front balconies is described based upon a view facing the front of the building. The location of the rear balconies is described based upon a view facing the rear of the building.

Photographs: See the following pages:

Inspection:

An inspection of the balconies from the ground level only noted that the condition of the balconies varied, having one or more of the following conditions.

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1. No structural concerns or defects.
2. Paint flaking off or bubbling on the sides or underside of the balcony
3. Minor cracking in the concrete on the underside of the balcony.
4. Minor cracking on the edges of the balcony.
5. Major cracking in the concrete on the underside of the balcony.
6. Major cracking on the edges of the balcony.
7. Broken or spalling concrete on the underside of the balcony.
8. Broken concrete on the edges or corners of the balcony.
9. Exposed and rusting rebar.

An inspection was not performed on the surface of the balconies as access to each unit was not available. It is recommended that each of the surfaces ultimately be inspected and if cracks are present that the surface should be properly sealed to prevent potential or further infiltration of water into the concrete and steel rebar. See recommendations for the sealing of the surface of the concrete.

Discussion:

The deteriorating condition of the balconies has been occurring for a number of years. The condition typically starts occurring when cracks occur in the top surface of the concrete balcony and water infiltrates the cracks and seeps into the concrete and reaches the steel rebar embedded in the concrete. Once the rebar is exposed to the water and oxygen the steel begins to corrode or oxidize. The iron in the steel reacts with the water and is oxidized to iron oxide (rust) which has greater volume than the steel. The force of this expansion is greater than the tensile strength of the concrete and so the cracks continue to occur in the concrete and typically continue to get larger over time. Once the cracks get large enough it is often common for the concrete to break or spawl off causing even more rebar to be exposed. The process will continue to get worse and often failure can occur.

In early 2105, it was noted that the front, left balconies for Essex Hall had reached a point of possible failure and large pieces of concrete had fallen from the underside of the balconies causing an unsafe condition. Efforts to repair the cracking and broken concrete in the past were unsuccessful and deterioration continued. The condition resulted in the removal of the deteriorated concrete balconies and their replacement with aluminum balconies. The plans for the repairs were prepared by Scott Engineering, Inc.

Observations and Recommendations:

The observations regarding the condition of each balcony are as follows:

All balconies:

It is recommended that the top surface of all balconies be inspected for cracks. If cracks are present the cracks and surface of the concrete should be sealed to prevent water intrusion into the cracks and down into the concrete and rebar. This will help prevent the oxidation of the steel rebar and further cracking of the concrete. The surface can be sealed with one of the following products depending upon the size or width of the crack. Surfaces with hairline or minor cracks can be sealed using Flex Seal Liquid Clear Dip Waterproof Rubberized Coating. More than one coat may be required. Surfaces with 1/8" to 1/2" cracks can have the cracks first sealed with Quikrete Polyurethane Concrete Crack Sealant and then have the Flex Seal Rubberized Coating applied. Cracks larger than 1/2" should have the cracks sealed with Drylok 00917 Cement

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Hydraulic WTRPRF. All materials should be applied in accordance with the manufacturer's recommendations. Any loose material should first be chipped away before applying any products.

Ivy Hall:

Front, Lower Left Balcony (Photograph #2 and #3)

- *Minor cracks on the sides of the balcony; use Repair #1*
- *Depression in bottom of balcony; use Repair #2*

Front, Upper Left Balcony (Photograph #4)

- *No repairs deemed necessary at this time*

Front, Lower, Right Balcony (Photograph #5 and #6)

- *Minor crack on front side of balcony; use Repair #1*

Front, Upper Right Balcony (Photograph #7 and #8)

- *Crack on front side of balcony; use Repair #3*
- *Minor crack on right underside of balcony; use Repair #1*

Rear, Lower Left Balcony (Photograph #9 and #10)

- *Minor crack on front side of balcony; use Repair #1*
- *Minor cracking on bottom of balcony; use repair #4*

Rear, Upper Left Balcony (Photograph #11)

- *Minor cracking on front side of balcony; use Repair #1*
- *Minor cracking on bottom of balcony; use Repair #4*

Rear, Lower Right Balcony (Photograph #12 and #13)

- *Minor cracking on sides of balcony; use Repair #1*
- *Minor cracking on bottom of balcony; use Repair #4*

Rear, Upper Right Balcony (Photograph #14)

- *Minor cracking on sides of balcony; use Repair #1*
- *Minor cracking on bottom of balcony; use Repair #4*

Atram Hall:

Front, Lower Left Balcony (Photograph #16 and #17)

- *Minor cracking on sides of balcony; use Repair #1*
- *Minor cracking on bottom of balcony; use Repair #4*

Front, Upper Left Balcony (Photograph #18)

- *Crack at right underside of balcony; use Repair #3*
- *Minor crack at left underside of balcony; use Repair #1*

Front, Lower Right Balcony (Photograph #19, #20 and #21)

- *Minor crack in left underside of balcony; use Repair #4*

Front, Upper Right Balcony (Photograph #22 and #23)

- *Minor cracking and paint flaking on underside of balcony; use Repair #4*

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- *Cracking and broken concrete at front, right corner of balcony; use Repair #2*

Rear, Lower Left Balcony (Photograph #24, #25 and #26)

- *Minor cracking and paint flaking on underside of balcony; use Repair #4. If larger pieces of material break away, use Repair #2.*

Rear, Upper Left Balcony (Photograph #27)

- *Minor cracking on sides of balcony; use Repair #1*
- *Minor cracking and paint chipping off on underside of balcony; use Repair #4*

Rear, Lower Right Balcony (Photograph #29)

- *Minor crack on underside of balcony at front edge and paint peeling off; use Repair #4*

Rear, Upper Right Balcony (Photograph #30)

- *Minor crack on underside of balcony at front edge and in center and paint peeling off; use Repair #4*
- *Broken concrete at front, right corner of balcony; use Repair #2*

Berwyn Hall:

Front, Lower Left Balcony (Photograph #32 and #33)

- *Minor cracking on sides of balcony; use Repair #1*
- *Minor crack on underside of balcony at front; use Repair #4*

Front, Upper Left Balcony (Photograph #34)

- *Cracking and spalling of concrete on underside of balcony; use Repair #2*

Front, Lower Right Balcony (Photograph #35 and #36)

- *Minor cracking on underside of balcony and paint chipping off; use Repair #4*

Front, Upper Right Balcony (Photograph #37)

- *Minor cracking on side of balcony; use Repair #1*
- *Cracking and paint flaking off on underside of balcony; use repair #4*

Rear, Lower Left Balcony (Photograph #38 and #39)

- *Minor cracking on side of balcony; use Repair #1*
- *Minor cracking and paint flaking on underside of the balcony; use Repair #4*

Rear, Upper Left Balcony (Photograph #40)

- *Broken concrete on front edge or side of balcony; use Repair #2*

Rear, Lower Right Balcony (Photograph #41 and #42)

- *Minor spalling or paint flaking on underside of balcony; use Repair #4. If larger pieces of concrete come off, use Repair #2*

Rear, Upper Right Balcony (Photograph #43)

- *No repairs deemed necessary at this time*

Chase Hall:

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Front, Lower Left Balcony (Photograph #45 and #46)

- *Minor cracking on side of balcony; use Repair #1*
- *Crack on underside of balcony; use Repair #3 and coat underside with Flex Seal Liquid white paint*

Front, Upper Left Balcony (Photograph #47 and #48)

- *Cracks on sides of balcony; use Repair #1*
- *Broken corner at front, left of balcony; use Repair #2*
- *Minor cracking on underside of balcony; use Repair #4*

Front, Lower Right Balcony (Photograph #49 and #50)

- *No repairs deemed necessary at this time*

Front, Upper Right Balcony (Photograph #51)

- *Minor crack on underside at front of balcony; use Repair #1*

Rear, Lower Left Balcony (Photograph #52 and #53)

- *Minor crack and paint flaking off on underside of balcony; use Repair #1*

Rear, Upper Left Balcony (Photograph #54)

- *Concrete spalling off and paint flaking off on underside of balcony; use Repair #4*

Rear, Lower Right Balcony (Photograph #55 and #56)

- *Paint flaking off on underside of balcony; use Repair #1*

Rear, Upper Right Balcony (Photograph #57)

- *Crack on underside of balcony near front edge; use repair #3 and coat underside with Flex Seal Liquid white paint*

Dover Hall:

Front, Lower Left Balcony (Photograph #59, #60 and #61)

- *Minor cracks on side of balcony; use Repair #1*
- *Major cracks and concrete spalling on underside of balcony; use Repair #2*

Front, Upper Left Balcony (Photograph #62)

- *Minor cracking on side of balcony; use Repair #1*
- *Paint flaking off underside of balcony; use Repair #1*

Front, Lower Right Balcony (Photograph #63 and #64)

- *Minor cracking on side of balcony; use Repair #1*
- *Paint flaking off on underside of balcony; use Repair #1*

Front, Upper Right Balcony (Photograph #65 and #66)

- *Minor cracking on side of balcony; use Repair #1*
- *Larger cracks on side of balcony at the front, right side of balcony; use repair #3. If larger pieces break off, use Repair #2*
- *Concrete spalling off underside of balcony; use Repair #2*

Rear, Lower Left Balcony (Photograph #67 and #68)

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- *Crack in underside and side of balcony near front, left corner; use Repair #3*

Rear, Upper Left Balcony (Photograph #69 and #70)

- *Minor cracking on side of balcony; use Repair #1*
- *Concrete breaking up on side of balcony near middle; use Repair #2*
- *Cracking on underside of balcony; use Repair #4*

Rear, Lower Right Balcony (Photograph #71 and #72)

- *Paint flaking of on underside of balcony; use Repair #1*

Rear, Upper Right Balcony (Photograph #73)

- *Minor cracking, spalling of concrete, and paint flaking off on underside of balcony; use Repair #4*

Essex Hall:

Front, Lower Left Balcony (Photograph #75 - #77)

- *No repair necessary*

Front, Upper Left Balcony (Photograph #78)

- *No repair necessary*

Front, Lower Right Balcony (Photograph #79, #80 and #81)

- *Cracking and broken concrete on side of balcony. No rebar is exposed, and the defect can be repaired, but this balcony may need replacement in the near future using Repair #5 if concrete continues to break off the balcony; use Repair #2. The balcony is still safe and structurally sound.*
- *Concrete is spalling off and separating on underside of balcony; use Repair #4*

Front, Upper Right Balcony (Photograph #82)

- *No repair is deemed necessary at this time*

Rear, Lower Left Balcony (Photograph #83 and #84)

- *No repair is deemed necessary at this time*

Rear, Upper Left Balcony (Photograph #85)

- *Paint is flaking off the sides and underside of balcony; use Repair #1*

Rear, Lower Right Balcony (Photograph #86 and #87)

- *Paint is flaking off underside of balcony; use Repair #1*

Rear, Upper Right Balcony (Photograph #88 and #89)

- *Concrete is breaking off side and underside of balcony and it appears that the rebar may be exposed on the underside of the balcony. The underside also has numerous cracks. The defects can be repaired but this balcony may need replacement in the near future using Repair #5 if concrete continues to break off the balcony; use Repair #2 for the sides and bottom repair. Wire brush and coat any exposed rebar with Rustoleum paint prior to performing repair. The balcony is still safe and structurally sound.*

Fox Hall:

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Front, Lower Left Balcony (Photograph #91 and #92)

- *Minor cracking on the sides and underside of the balcony; use Repair #1*

Front, Upper Left Balcony (Photograph #93)

- *Minor cracking on the side of the balcony; use Repair #1*
- *Cracking on the underside of the balcony; use Repair #4*

Front, Lower Right Balcony (Photograph #94 and #95)

- *Minor cracking on the side of the balcony; use Repair #1*
- *Cracks and paint flaking off on underside of balcony; use Repair #4*

Front, Upper Right Balcony (Photograph #96)

- *Minor cracking on the side and underside of the balcony; use repair #1*

Rear, Lower Left Balcony (Photograph #97 and #98)

- *Minor cracking on the side and underside of the balcony; use repair #1*

Rear, Upper Left Balcony (Photograph #99)

- *No repairs deemed necessary at this time*

Rear, Lower Right Balcony (Photograph #100 and #101)

- *Minor cracking on the sides and underside of the balcony; use Repair #1*

Rear, Upper Right Balcony (Photograph #102 and #103)

- *Minor cracking on the sides and underside of the balcony; use Repair #1*

Grand Hall:

Front, Lower Left Balcony (Photograph #105 and #106)

- *Minor cracking on the side of the balcony; use Repair #1*
- *Concrete spalling off and paint flaking off underside of balcony; use Repair #4*

Front, Upper Left Balcony (Photograph #107 and #108)

- *Minor cracking and concrete spalling off the side; use Repair #2*
- *Cracking on underside of balcony; use Repair #4*

Front, Lower Right Balcony (Photograph #109, #110 and #111)

- *Minor cracking on side of balcony; use Repair #1*
- *Concrete spalling off and paint flaking on underside of balcony; use Repair #2 or #4 if depth of concrete removed is minimal*

Front, Upper Right Balcony (Photograph #112)

- *Minor cracking on side of balcony; use Repair #1*
- *Concrete spalling off and paint flaking on underside of balcony; use Repair #2 or #4 if depth of concrete removed is minimal*

Rear, Lower Left Balcony (Photograph #113 and #114)

- *Crack on underside of balcony at front, left corner of balcony; use Repair #3*

Rear, Upper Left Balcony (Photograph #115)

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- *Concrete breaking off on side of balcony; use Repair #2*
- *Crack on underside of balcony and paint flaking off; use Repair #4*

Rear, Lower Right Balcony (Photograph #116, #117 and #118)

- *Minor cracking on side of balcony; use Repair #1*
- *Minor cracking on underside of balcony and paint flaking off; use Repair #1*

Rear, Upper Right Balcony (Photograph #119)

- *Paint flaking off on underside of balcony; use Repair #1*

Harlech Hall:

Front, Lower Left Balcony (Photograph #121 and #122)

- *Paint flaking off on side and underside of balcony; use Repair #1*

Front, Upper Left Balcony (Photograph #123)

- *Paint flaking off on side and underside of balcony; use Repair #1*

Front, Lower Right Balcony (Photograph #124 and #125)

- *No repair deemed necessary at this time*

Front, Upper Right Balcony (Photograph #126)

- *Minor cracks on side of balcony and paint flaking off on underside of balcony; use Repair #1*

Rear, Lower Left Balcony (Photograph #127 and #128)

- *No repairs deemed necessary at this time*

Rear, Upper Left Balcony (Photograph #129)

- *Concrete breaking at front, left corner of balcony; use Repair #2*
- *Minor cracking on underside of balcony; use Repair #1*

Rear, Lower Right Balcony (Photograph #130 and #131)

- *No repairs deemed necessary at this time*

Rear, Upper Right Balcony (Photograph #132)

- *No repairs deemed necessary at this time*

Recommended Repair Protocol:

Repair Type #1 – Clean off dirt, mold, mildew or any mossy substances. Chip or scrape away any loose, flaking or bubbled paint. Chip away any spalling or loose concrete. Coat sides and/or bottom of balcony with Flex Seal Liquid white paint. Apply per manufacturer's instructions. Multiple coats may be required.

Repair Type #2 – Chip or scrape away any loose, flaking or bubbled paint. Chip away loose concrete with chisel and hammer or grinder and repair and cover damaged area using a quick setting cement such as Quikrete Quick Setting Cement in conjunction with an Acrylic Fortifier mixture. See <https://www.quikrete.com/>. Install per manufacturer's directions and level surface to original and surrounding areas. Coat entire surface using Flex Seal Liquid white paint.

Repair Type #3 – Widen the crack to a minimum of $\frac{1}{4}$ " using a chisel and hammer making the sides of the crack vertical or beveled in an inverted "V". Break away any deteriorating concrete and remove loose material with a brush. Using a caulk gun, install Quikrete Polyurethane Concrete Crack Sealant and remove excess material with a trowel immediately after placement. Apply product per manufacturer's instructions. Coat entire surface with Flex Seal Liquid white paint.

Repair Type #4 – Clean surface of all dirt, mold, mildew or any mossy substances. Chip or scrape away any loose, flaking or bubbled paint. Chip away any spalling or loose concrete. Paint entire surface using Seal-Krete Epoxy-Seal 1-part Slate Gray Satin Concrete Paint. Multiple coats may be required. Paint over gray epoxy paint using Flex Seal Liquid white paint. Multiple coats may be required. Apply all products per manufacturer's instructions.

Repair Type #5 – Remove and replace concrete balconies with aluminum decks and supports the same as the balconies on the front, left of Essex Hall. Deck framing materials and products to be manufactured by Nexan Building Products, or equal.

Discussion:

Repairs recommended for the balconies are based upon a visual inspection of the balconies from the ground level of each building. An inspection of each balcony top surface should be made at the time other repairs are made to each balcony. It is extremely important that any surface cracks on the top side of the balcony be repaired or sealed, and the surface sealed to prevent water intrusion into the cracks, which will only cause the concrete balconies to continue to deteriorate and crack. Repairs recommended are based upon the condition noted from the visual ground inspection and what could be seen. Additional repairs or combinations of repairs may be required at the time repairs are made based upon conditions encountered, which may vary from those noted in the report. The engineer should be contacted and consulted should those conditions vary from those noted and should the recommendation made not apply to the actual condition found. Substitution of materials recommended may be considered, but the engineer should be consulted and supplied with the product information data sheets to obtain approval prior to using the material.

Conclusion:

It is my professional opinion that all of the balconies are still structurally sound and that the replacement of any balconies at this time is not necessary. However, several of the balconies in worse condition are those on Essex Hall and consideration should be given to budgeting for their replacement in the near future. In particular, the balconies on the front, right and on the rear, right of the building when facing the building from that side.

Limitations:


Services were performed in the manner defined above in this report. Comments and observations contained in this report represent the general condition of the structure as observed by the inspecting engineer. The opinions and comments contained in this report are based on the observation of the apparent performance of the structure and the qualified education, knowledge and experience of the observing engineer. Compliance with any specifications, legal, or code requirements, is specifically excluded from this report. The conclusions reached in this report are based upon the conditions observed at the time the inspection occurred. Should additional information and/or evidence become known, the author reserves the right to supplement the

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report as necessary. No guarantee or warranty as to future life, performance, or need for repair of any item inspected is intended or implied. This report is for use by the Condominium Association and the City of Dover only for determination of the structural stability and soundness of the structure and is not to be used for any other purpose. Any re-use of this report or the findings, conclusions or recommendations presented herein without the express permission of the author is prohibited.

Report prepared by,

SCOTT ENGINEERING, INC.


Gregory R. Scott, P.E.

