Forensic Engineering Report

Regarding: Adams Landing Association
3444 Adams Shore Dr.
Waterford, MI 48329-4202
Client: Farmers Insurance Exchange
Reference Number: 7001953401-1
Nederveld File Number: 20805347
December 3, 2020

Paul Hauschild, PE
Forensic Engineer

Professional Engineer (PE) – License No. 40978
Licensed by the State of Michigan

David A. Weaver, PE, SE, RRC, CBIE
Nederveld, Inc.
Senior Forensic Engineer

Professional Engineer (PE) – License No. 42701
Licensed by the State of Michigan
Structural Engineer (SE) – License No. 081005568
Licensed by the State of Illinois
Registered Roof Consultant (RRC) – Registration No. 0691
Certified by IIBEC, Inc.
Certified Building Inspection Engineer (CBIE)
Certified by the Building Inspection Engineering Certification Institute

NEDERVELD

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Assignment Details

Based on an October 26, 2020, request, a site visit at 3444 Adams Shore Drive, Waterford, Michigan, was conducted on November 12, 2020, by Mr. Paul Hauschild, PE, with Nederveld, Inc. Mr. Jason Channell (Metro Group Management Corp.); Mr. Pete Randazzo (Adams Landing Condominium Association, owner of Unit 3444, Building A); Mr. Rob Locher (Adams Landing Condominium Association, owner of Unit 3440, Building A); and Mr. Michael Ladd (Adams Landing Condominium Association, owner of Unit 3370, Building G), were present during our site visit.

We were informed by a representative of our client that the third floor of this building is sagging. The reported date of loss is October 13, 2020.

Purpose and Scope

The purpose of our investigation was to determine the cause of the third-floor sagging.

The scope of our investigation included the following:
1) An assignment received on October 26, 2020, from a representative of our client, including instructions regarding the purpose and scope of our investigation.
2) A site visit completed on November 12, 2020, which included a visual inspection, taking photographs and measurements, and discussions with parties present.
3) A subsequent telephone conversation with the assigned representative of our client.
4) The preparation of the written report of our findings.
5) 261 photographs are on file.

Results of Investigation

Information provided by Mr. Jason Channell:
1) The units in question (3442 and 3444) are at the west end of Building A.
2) There are three floors in this building: the lower walk-out level, main level (garage level), and upper level.
3) The units are on the west end of the building.
4) Unit 3444 is on the upper level, Unit 3442 is on the main level, and Unit 3440 is on the lower level.
5) There was a sudden drop in the floor claimed by the owner in Unit 3444 on the upper level.
6) The main level owner in Unit 3442 reports no cracks but is not able to open the sliding door.
7) The building was constructed in 1984.

Information provided by Mr. Rob Locher and Mr. Pete Randazzo:
1) The previous owner of Unit 3442, on the main level (garage level), made modifications to the interior walls.
2) The previous owner (referred to as He herein) removed partition walls in the kitchen, including the pantry at the end of the kitchen counter and a wall in the laundry closet on the west side of the kitchen.
3) He moved a master bedroom closet wall to enlarge the bathroom.
4) He was cutting things in the floor structure above with a Sawzall (an electric reciprocating saw) where the pantry was removed and over the laundry closet by the kitchen for dryer vents.
5) He may have cut into the floor trusses above.
6) He was changing some flexible duct lines.
7) Mr. Locher checked at the building department and found out the previous owner did not have a building permit to do the renovation work.
8) He started remodeling/removing walls in the unit in 2017.
9) He left for four months and came back and continued the renovation work.
10) Mr. Locher believes there were no posts or temporary shoring posts in place after the kitchen pantry walls were removed and while the owner was away for four months (the plans show floor beams bearing on the northeast and southeast corners of the former pantry walls).
11) He took a couple years to complete and completed sometime in 2019.

12) Mr. Randazzo said he noticed sagging in his floor in November or December of 2019.
13) Mr. Randazzo has not repainted the walls since modifications were made by the previous owner in Unit 3442.
14) We were provided with an 8.5″x11″ print of a site drawing (on file) indicating some of the buildings at the site and unit numbers.
15) The site print shows Building A on the west side of the site, and Units 3440, 3442, and 3444 on the west end of Building A.
16) Mr. Locher had copies of existing 24″x36″ architectural drawings for Building A. We were provided copies of four plan sheets.
17) While in Unit 3442, Mr. Locher commented that the kitchen/laundry floor slopes up to the entry door landing to the garage. He said that the sloping floor there is typical in the main-level (garage level) units.
18) During a telephone conversation on November 27, 2020, Mr. Locher provided the following information:
    a) He believes there is no Gypgrete or concrete topping on top of the plywood subfloor.
    b) He observed plywood subfloor in his unit (3440) when he replaced carpeting.
    c) The previous owner of Unit 3442 poured a leveling layer underlayment in areas he installed floor tile finishes.
    d) He clarified that when the previous owner of Unit 3442 removed the kitchen pantry, he installed two 2x4s at the northwest corner of the pantry to support the beam above. (The beam(s) above were not left unsupported for four months as stated earlier.)

Information included in architectural drawings (on file, see Appendix) provided:
1) The architectural drawings were prepared by Louis Des Rosiers & Associates, P.C., Bloomfield Hills, Michigan.
2) The drawings were issued for ADD #2, dated December 12, 1985.
3) Drawings included:
    e) Foundation Plan – Unit ‘A’
    f) A-2 – Lower Level Floor Plan – Unit ‘A’
    g) A-3 – Intermediate Floor Plan – Unit ‘A’
    h) A-4 – Upper Level Floor Plan – Unit ‘A’
4) The foundation system consists of piles, concrete pile caps, and grade beams below the condominium units and spread footings around and in the garage.
5) Roof framing consists of wood trusses spaced at 24″ on-center, spanning north-south, over the dining room and bedrooms and 2x12 roof joists spaced at 24″ on-center, spanning east-west, over the living room.
6) The loft floor above the foyer is framed with 2x12 joists spaced at 16″ on-center.
7) Floor framing consists of 14″ wood trusses spaced at 24″ on-center, spanning east-west.
8) Floor framing for Unit 3444 bears on 3-1/8″x10-1/2″ Glulam beams (non-continuous) spanning north-south over the kitchen in Units 3440 and 3442 and north-south over the hallway and bearing on the southeast and northeast corners, respectively, of the pantry located on the west side of the kitchen counter.
9) The 3-1/8″x10-1/2″ Glulam beam over the kitchen in Unit 3442 supports Unit 3444 floor loads as well as floor loads from the east loft over the foyer.
10) The bearing wall on the east side of the pantry in the kitchen is bearing on a north-south foundation grade beam and piles.
11) The pantry walls in the kitchens for Units 3440 and 3442 are aligned.
12) The north end of the east pantry walls for Units 3440 and 3442 are aligned with the northwest corner of the wall framing around the spiral loft stair in Unit 3444 which is also a bearing location for a roof girder truss.
13) The roof girder truss spans approximately 18′ north-south over the opening between the east living room and west dining room of Unit 3444.
14) Unit 3440: The south wall of the foyer, kitchen, bath, and master bath in Unit 3440 is a concrete foundation wall aligned and supporting the south bearing wall in Unit 3442 above.
15) Unit 3442: The south wall of the foyer, kitchen, bath, and master bath in Unit 3442 is a bearing wall supporting floor framing for Unit 3444 over the garage on the south side of the wall and the 3-1/8″x10-1/2″ Glulam floor beam within Unit 3444 floor framing on the north side of the wall.
16) Unit 3444, south wall of hallway:
    a) Dimensional analysis of the plans shows that the south wall of the bedroom hallway in Unit 3444 is not in alignment with the south wall of Units 3440 and 3442.

b) The south wall of the bedroom hallway is approximately 12″ north of the south walls of Units 3440 and 3442.

General observations related to our site visit:
1) The front of Building A faces approximately north toward Loon Lake.
2) The subject structure is a three-story, light-framed building with a crawlspace.
3) The exterior walls of the building are clad with clay brick veneer and vinyl siding.
4) The roof of the building is covered with asphalt composition shingles.

We made the following observations during our assessment within the interior of the building:
1) All interior finishes are in place in Units 3444, 3442, and 3440.
2) Direct inspection of the floor or roof framing on the three levels was prevented due to the ceiling and wall finishes.
3) Unit 3444 (upper level):
   a) The floor plan for Unit 3444 has a different layout than the lower units 3442 and 3440.
   b) More living space area is available due to living space provided partially over the main-level garage.
   c) The south wall of the hallway to the southwest bedroom is a bearing wall and is stacked on bearing walls below in Units 3442 and 3440, which bear on the south foundation grade beam.
   d) The floors in the rooms on the south side of the south hallway, including the southwest bedroom, bathroom, laundry, and library, measured approximately level, using a 24″ digital carpenter's level (typical herein for plumb and level measurements).
   e) The floor begins to slope down on the north side of the door threshold into the southwest bedroom. (There is a noticeable transition where the sloping floor begins that the unit owner perceives as a "hump".)
   f) We measured the floor in the hallway, on the south side of the door opening to the kitchen, is sloping downward toward northeast approximately 1/4″ on 12″.
   g) Spiral stairs up to loft:
      i) There is a spiral stair on the east side of the kitchen (west side of the foyer).
      ii) There are stud walls on the north and west sides of the spiral stair.
      iii) The northwest corner of the spiral stair stud walls is aligned over the north stud assembly post at the west end of the kitchen counter below in Unit 3442 (originally the east wall of the pantry).
   h) Using a ZIPLEVEL® digital altimeter (used for elevation measurements herein), we measured relative elevations of the top of the floor on the west side of the house at various locations. A reference datum of 0.0″ elevation was set at the north exterior door of the living room. Relative elevation measurements of the top of the floor at various locations are as listed:
      i) Southwest bedroom: +1.0″.
      ii) Southwest bedroom, on west side of door, on north side of south bearing wall below: +0.6″.
      iii) South bathroom: +1.0″.
      iv) Library at the east end of the hallway: +0.5″.
      v) Hallway on the south side of the door opening to the kitchen: -0.1″.
      vi) Kitchen, approximate center of floor: -0.7″.
      vii) East side of kitchen counter in the vicinity of the northwest corner of the spiral stair walls: -0.7″.
      viii) North and south sides of the spiral stair, east side of kitchen: -0.6″.
      ix) At entry door, east side of unit, approximately 2′ north of the coat closet and south hallway: -0.4″.
   i) Our elevation measurements indicate the floor is sloping toward the lower elevations measured in the kitchen and in the vicinity of the spiral stair.
   j) The northwest corner of the spiral stair walls aligns with the north post at the west end of the kitchen counter in Unit 3442 below.
   k) The counters in the kitchen are topped with granite (or similar) surfaces.
   l) We observed no evidence of gypsum board cracking in the walls or ceiling in the vicinity of the northwest corner of the spiral stair walls.
   m) We observed no evidence of gypsum board or floor finishes (ceramic tile) cracking in the vicinity of the northwest corner of the spiral stairs.
   n) The north wall of the spiral stair measured plumb.

o) The door to the southwest bedroom is at the west end of the hallway.
p) The door to the southwest bedroom operated without difficulty.
q) There is a gap on the south side of the door to the southwest bedroom, between the top of the door and the door trim.
r) The door head trim measured level.
s) The ceiling above the door to the southwest bedroom is sloping downward approximately 1/4″ in 12″.
t) The gypsum board above the door to the southwest bedroom is tapered. The top of the door head trim is 12″ below the ceiling on the south side of the door and 11-1/2″ below the ceiling on the north side of the door.
u) There are no gypsum board or paint cracks around the door opening to the southwest bedroom or ceiling indicating no recent displacement. The tapered gypsum board above the door was present when the walls were painted and predate the loss event.
v) The doors to rooms in the south hallway operated without difficulty.
w) We observed no evidence of significant finish cracks in the ceiling or walls in the south hallway.

4) Unit 3442 (main level/garage level):
   a) The north and west walls of the kitchen pantry, as shown on the plan drawings, at the west end of the kitchen counter, were noted to be removed.
   b) Posts at former pantry corners:
      i) There are posts, covered with painted gypsum board, located at the northeast and southeast corners of the former kitchen pantry, as shown on the plans.
      ii) It appears the south post supports the south 3-1/8″x10-1/2″ Glulam floor beam over the kitchen and the north post supports the north 3-1/8″x10-1/2″ Glulam floor beam over the hallway opening.
      iii) The posts present as continuing down between the end of the kitchen counter on the east side of the posts and a short cabinet with trash receptacle and counter on the west side of the posts. (The posts are not bearing on the kitchen counter.)
      iv) There are gypsum board finish cracks at the top of the south post. The cracks and surrounding region of the ceiling present as poorly finished by the previous owner.
   c) We did not observe evidence of significant gypsum board cracks in the ceiling or walls in other regions of the unit.
   d) There is an “L-shaped” bump or raised area in the ceiling gypsum board finishes approximately 26″ west of the top of the south post.
   e) The floor in the hallway is sloping downward toward north approximately 1/8″ on 12″.
   f) The floor in the kitchen measured level.
   g) The ceiling in the kitchen is sloping downward toward the north approximately 1/8″ on 12″.
   h) The entry door and floor to the garage is located in the southwest corner of the kitchen/laundry room.
   i) The entry door and entry floor, including the hot water heater and furnace closets, are on the south side of the south bearing wall/foundation grade beams and piles.
   j) The kitchen/laundry floor in the vicinity of the door to the garage on the north side of the bearing/foundation wall, is sloping up to the garage entry area approximately 3/8″ on 12″. That is, the southwest region of the kitchen/laundry floor is sloping up to the floor on the south foundation wall and on the south side of the foundation wall.
   k) The floor finishes and wall finishes are cut to fit, indicating the sloping floor is an as-built condition and pre-dates the loss.
   l) We observed the east-west partition wall (parallel below the floor trusses) in the laundry closet, on the west side of the kitchen, was removed by the previous owner; this wall is not a bearing wall.
   m) The south wall of the master walk-in closet was moved approximately 3′ toward the north to increase the size of the master bathroom. The wall is below and parallel with the floor trusses and is not intended to be a bearing wall.
   n) We observed no evidence of significant finish cracks in the ceiling or walls.

5) Unit 3440 (lower walk-out level):
   a) The floor in the kitchen/laundry closet region measured level.
   b) The floor in the bedroom hallway measured level.
   We observed no evidence of significant finish cracks in the ceiling or walls

6) Analysis of the floor structure:
   a) The floor framing was analyzed per the information shown on the building plans, for the subject Unit 3444.
   b) Loading used in the analysis: 15 psf floor dead load (self-weight) and 40 psf floor live load (per code, not actual).
   c) Our analysis shows that the 3-1/8″10-1/2″ floor beam over the kitchen in Unit 3442 is over-stressed approximately 100% above its allowable bending stress capacity for dead loads and code required live loads.
   d) Deflection analysis of the floor system includes analysis of the floor trusses and the 3-1/8″x10-1/2″ Glulam beam over the kitchen.
   e) Analysis of the dead load (self-weight) deflection includes applicable factors for long-term creep deflection of the members per the building code. Long-term creep factors used in our analysis include 1.5 for the Glulam beam and 2.0 for the floor trusses.
   f) Our analysis shows the following expected total dead load deflections/displacements:
      i) 0.5″ for 12′ floor trusses over the kitchen in Unit 3442 (Unit 3444 floor framing).
      ii) 0.6″ for 16′ floor trusses over the living room and foyer in Unit 3442 (Unit 3444 floor framing).

Conclusion

Based on our investigation, it is our opinion the downward displaced (sagging) floor in Unit 3444, in the hallway and in the vicinity of the kitchen and spiral stair, is due to the following either individually or collectively:

1) Pre-existing (as-built) conditions from the time of construction.
2) Reported modifications in Unit 3442, by the previous owner, to the floor framing or support of the floor framing for Unit 3444.

Removal of ceiling gypsum board finishes in Unit 3442 in selected regions in the kitchen, laundry closet, bathroom, and master bathroom are required to confirm the condition of the floor framing in those locations.

The following are items pre-existing as-built conditions contributing to the displaced (sagging) floor conditions in Unit 3444:

1) The member sizes and stiffness of the floor framing elements and subsequent long-term dead load (self-weight) deflection of the floor framing including the floor trusses and 3-1/8x10-1/2″ Glulam beams over the kitchen in Unit 3442.
2) The south wall of Unit 3444 bedroom hallway:
   a) This partition wall is located 12″ north of the south bearing wall and foundation wall in Units 3442 and 3440 respectively. (This wall is not aligned with bearing walls below.)
   b) The self-weight of this wall is bearing on the floor framing for Unit 3444, including the 3-1/8″x10-1/2″ Glulam beam spanning over the kitchen in Unit 3442.
3) Our measurements of the floor elevations in Unit 3444, and observation in Unit 3442, indicate the top of the floors on the south side of the south bearing wall were constructed above the reference datum for the north region of the building ranging from 0.5″ in the east region to 1.0″ in the west region.
   a) The floor finishes on the north side of the south bearing wall slope up to the floor finishes on the south side of the bearing wall in Units 3444 and 3442.
   b) The apparent hump in the floor in the southwest bedroom to the hallway is located at the transition in the floor where the top of the floor above the south bearing wall is sloping down to the top of the floor on the north side of the wall.
   c) The floor framing in Unit 3442 is similarly displaced downward as evidenced by the kitchen/laundry floor sloping up to the south foundation/grade beam wall at the garage entry area on the south side of the south foundation wall.
   d) The condition is exacerbated by the differential stiffness of the south bearing wall with respect to the floor trusses on the north side of the wall.
      i) The south bearing wall below Unit 3444 is a very stiff, approximately zero deflection, structural element.

ii) The floor trusses on the north side and parallel with the south bearing wall were measured to be displaced downward due to the dead load (self-weight) deflection of the floor system.
iii) Our calculations confirm the downward deflection of the floor framing system due to the dead load and long-term creep deflection.

There is no indication of recent displacement of the floor or walls in Unit 3444 as evidenced by the following:

1) We observed no evidence of significant finish cracks in the ceiling, walls, or floor in Unit 3444.
2) We observed no evidence of significant finish cracks in the ceiling or walls in Units 3442 and 3440, below Unit 3444.
3) Tapered gypsum board wall finishes in Unit 3444 above the southwest bedroom door at the west end of the hallway indicate the condition was present when the walls were last repainted, which was reportedly before modifications made by the previous owner in Unit 3442 below.

The following items address other items of interest stated by those present during our site visit:

1) It is our opinion that it is unlikely the floor framing (the north and south 3-1/8″x10-1/2″ Glulam floor beams) for Unit 3444 was left unsupported, as reported, when the pantry walls were removed by the previous owner at the west end of the kitchen counter in Unit 3442. We estimate that the reaction at the ends of those beams, which are now supported by post assemblies, is approximately 2,500 pounds each for the self-weight (dead load) of the floor and roof girder truss for Unit 3444. The floor framing would have failed, and significant downward displacement would have occurred at that location if left unsupported for even a short period of time. However, this opinion does not attempt to validate that the framing installed is structurally adequate since we did not have the opportunity to inspect and evaluate (requires destructive examination).
2) The finish cracks in the ceiling gypsum board around the top of the south post assembly and the west end of the kitchen counter in Unit 3442 presents as poor finishing by the previous owner and do not indicate adverse structural conditions.
3) The L-shaped raised area in the ceiling gypsum board finishes, approximately 26″ west of the top of the south post, is located at the southwest corner of the previous pantry and presents as poorly finished by the previous owner and does not indicate adverse structural conditions.
4) The 3/4″ east-west misalignment of the post assemblies at the west end of the kitchen counter in Unit 3442 are likely due to misalignment of the locations of the 3-1/8″x10-1/2″ floor beams above.

The information contained in this report is based on information available at the time that this report was prepared. Nederveld, Inc., reserves the right to amend and/or modify this report if new and/or significant data becomes available that impacts the situation and parameters of this investigation.

Our services were performed using the degree of skill normally exercised by practicing professional individuals in this area and similar locales. No other warranty is either expressed or implied.

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Photographs

Photo #1 – West end of building on left; garage door for Unit 3442 on left, garage door for Unit 3444 second from left.

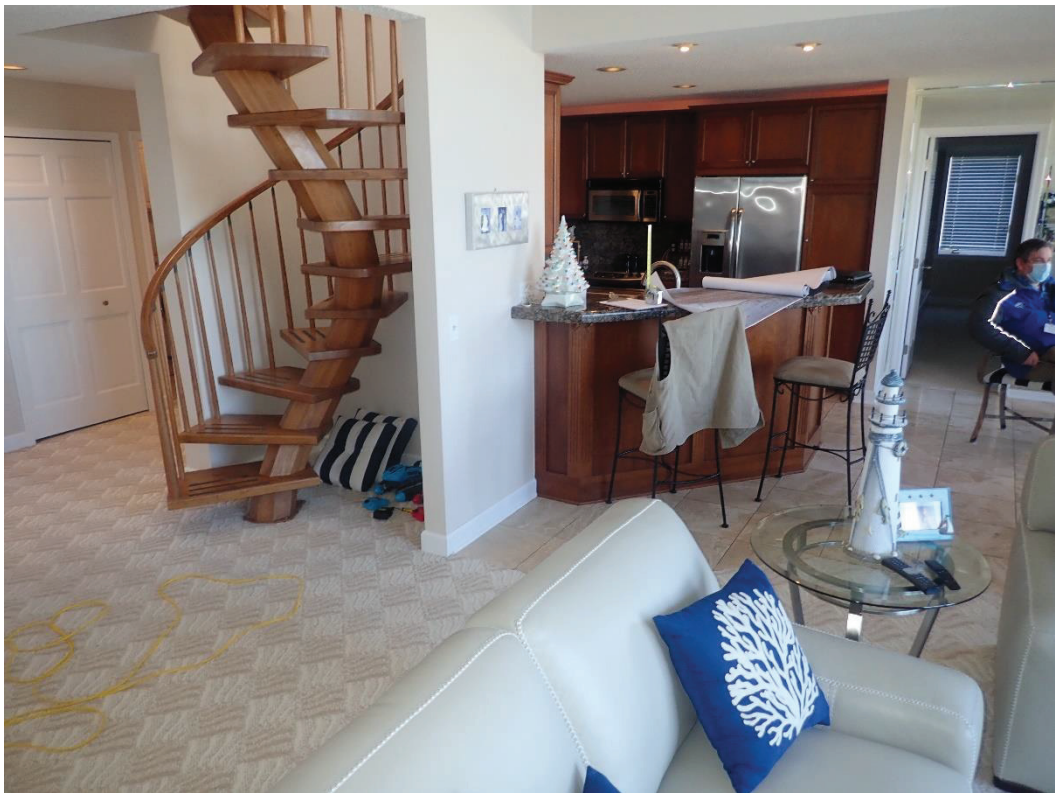


Photo #2 – Unit 3444: Spiral stair, northwest corner of stair walls on right side of stair.

Photo #3 – Unit 3444: Wall and floor tile in vicinity of northwest corner of spiral stair walls; no wall or floor finish cracks evident.

Photo #4 – Unit 3444: Wall and wall openings in vicinity of northwest corner of spiral stair walls; no significant gypsum board cracks evident.

Photo #5 – Unit 3444: No gypsum board cracks in walls or wall opening in south hallway.

Photo #6 – Unit 3444: South hallway, door to southwest bedroom at west end of hallway (background).

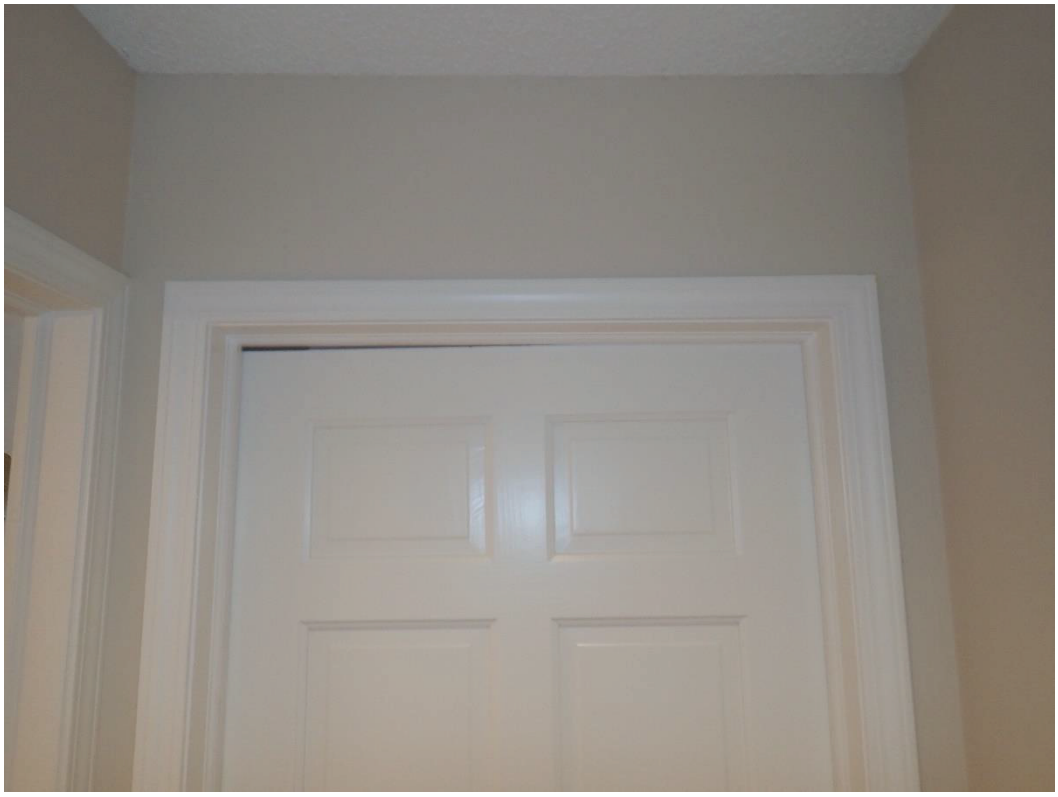


Photo #7 – Unit 3444: Gap at top of door to southwest bedroom,
west end of south hallway; no gypsum board cracks.

Photo #8 – Unit 3444: Door to southwest bedroom, south edge of top of trim 12″ below ceiling.

Photo #9 – Unit 3444: Door to southwest bedroom, north edge of top of trim 11-1/2″ below ceiling.

Photo #10 – Unit 3442: Posts supporting floor beams above; formerly in east wall of pantry that was removed.

Photo #11 – Unit 3442: Posts supporting floor beams above; formerly in east wall of pantry that was removed.

Photo #12 – Unit 3442: Posts supporting floor beams above; formerly in east wall of pantry that was removed.

Photo #13 – Unit 3442: Posts supporting floor beams above; formerly in east wall of pantry that was removed.

Photo #14 – Unit 3442: South post out-of-alignment with north post, 3/4″ toward west.

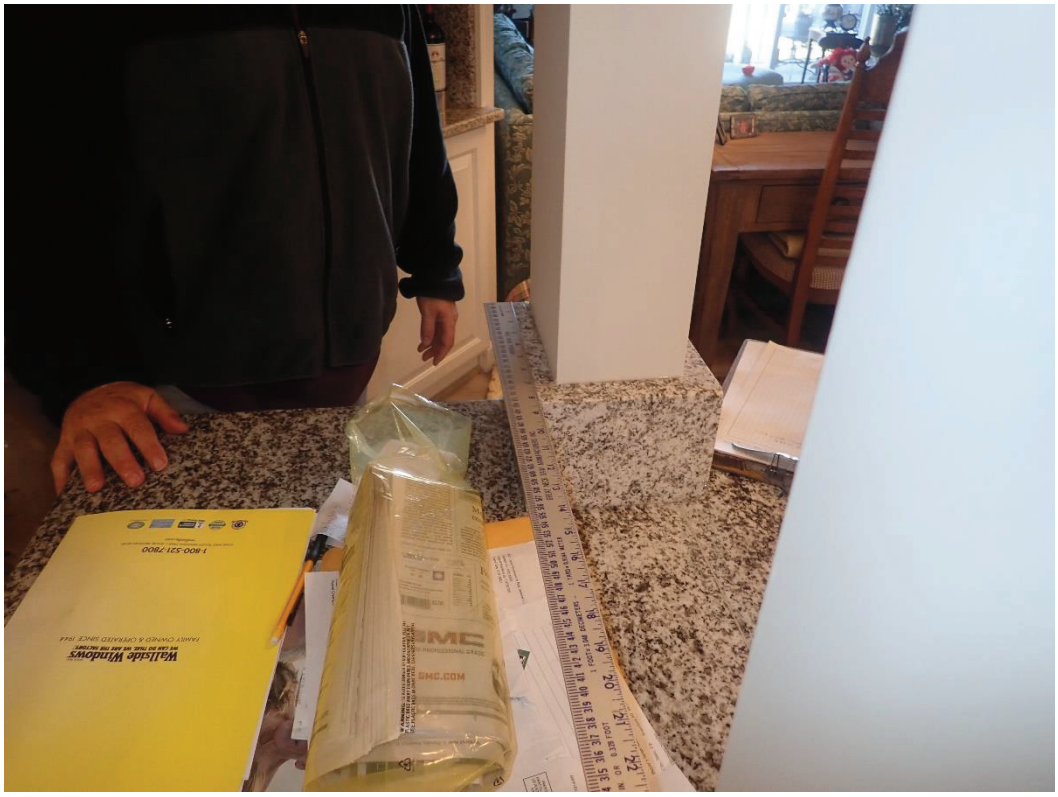


Photo #15 – Unit 3442: South post out-of-alignment with north post, 3/4″ toward west.

Photo #16 – Unit 3442: South post out-of-alignment with north post, 3/4″ toward west.

Photo #17 – Unit 3442: Gypsum board finish cracks at top of south post.

Photo #18 – Unit 3442: Gypsum board finish cracks at top of south post.

Photo #19 – Unit 3442: Bump in ceiling gypsum board finishes approximately 26″ west of south post, formerly southwest corner pantry that was removed.

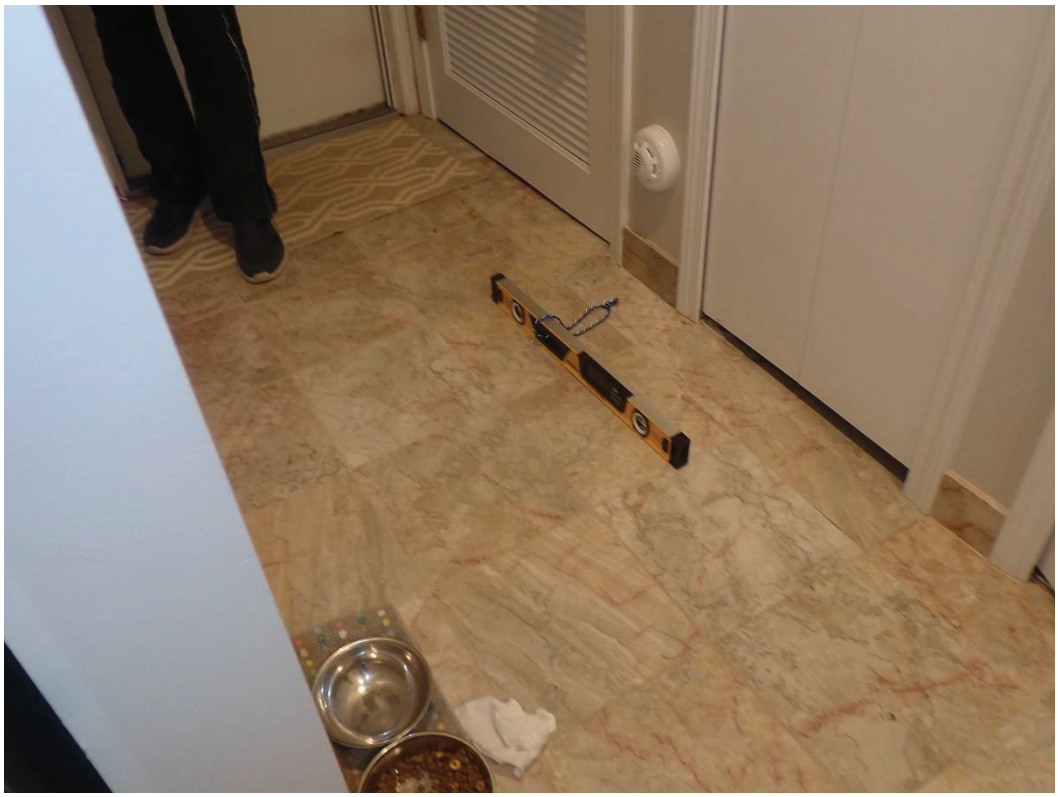
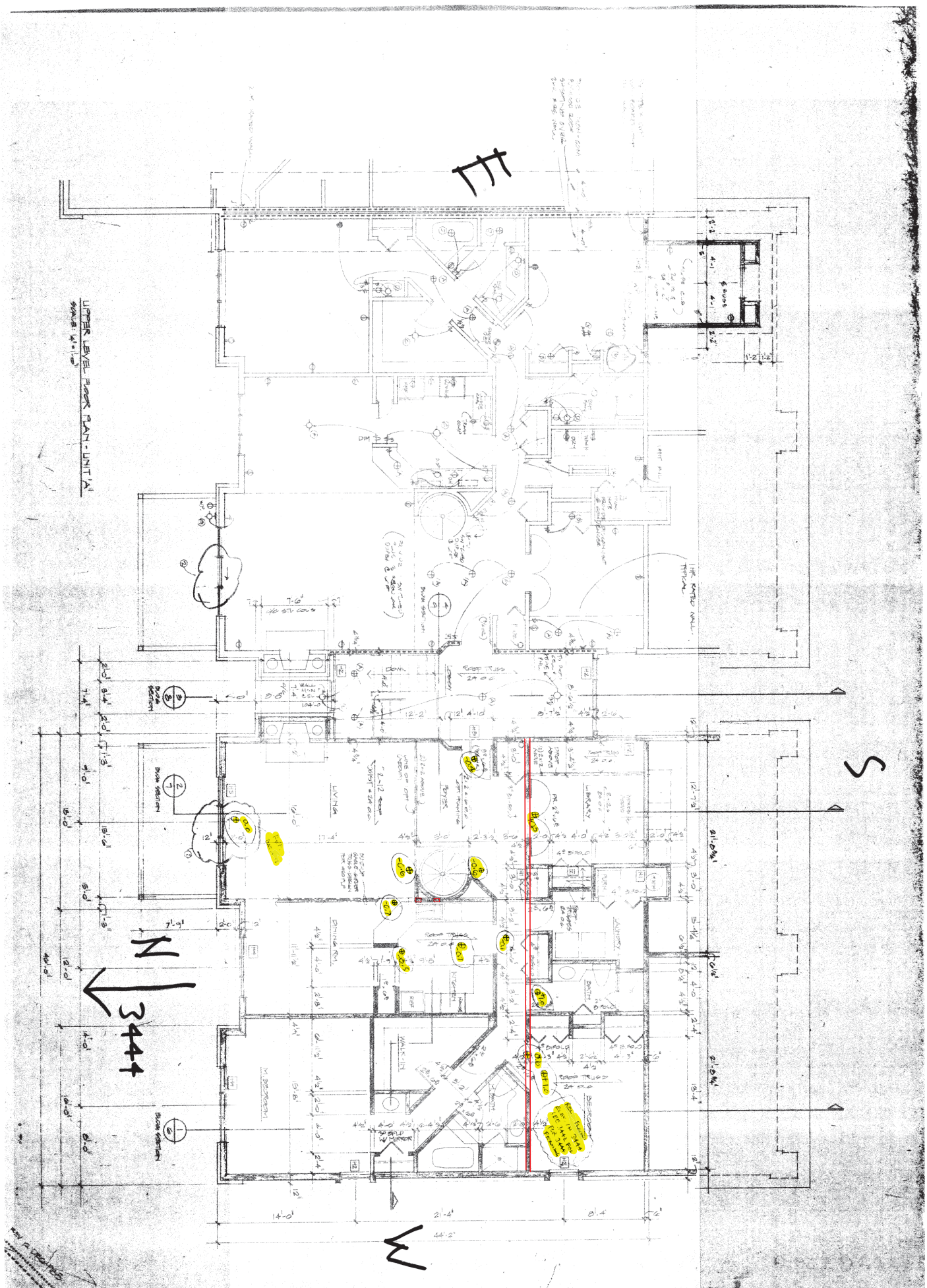


Photo #20 – Unit 3442: Southwest region of kitchen/laundry floor sloping up to garage entry floor on upper left.

Photo #21 – Unit 3442: Floor sloping up to garage entry, wall finishes/tile cut to fit.

Appendix

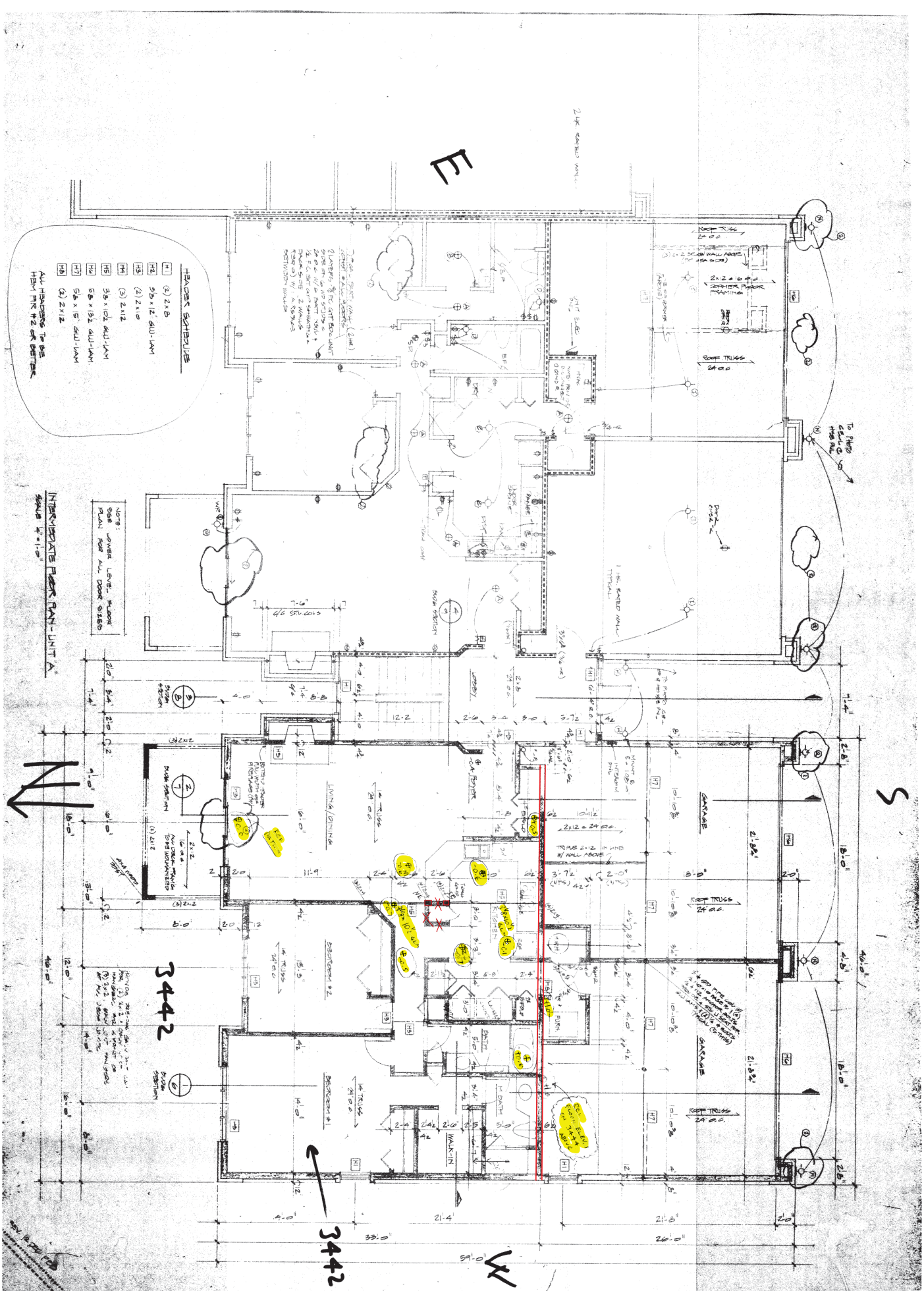
Architectural Drawings Prepared by Louis Des Rosiers & Associates, P.C.



LOUIS DEGROSIERS & ASSOCIATES, P.C. Architects A.I.A. 1591 N Woodward Suite 203 Bloomfield Hills, MI 642-7771

project title
ADAMS LANDING CONDOMINIUMS

UPPER LEVEL FLOOR PLAN



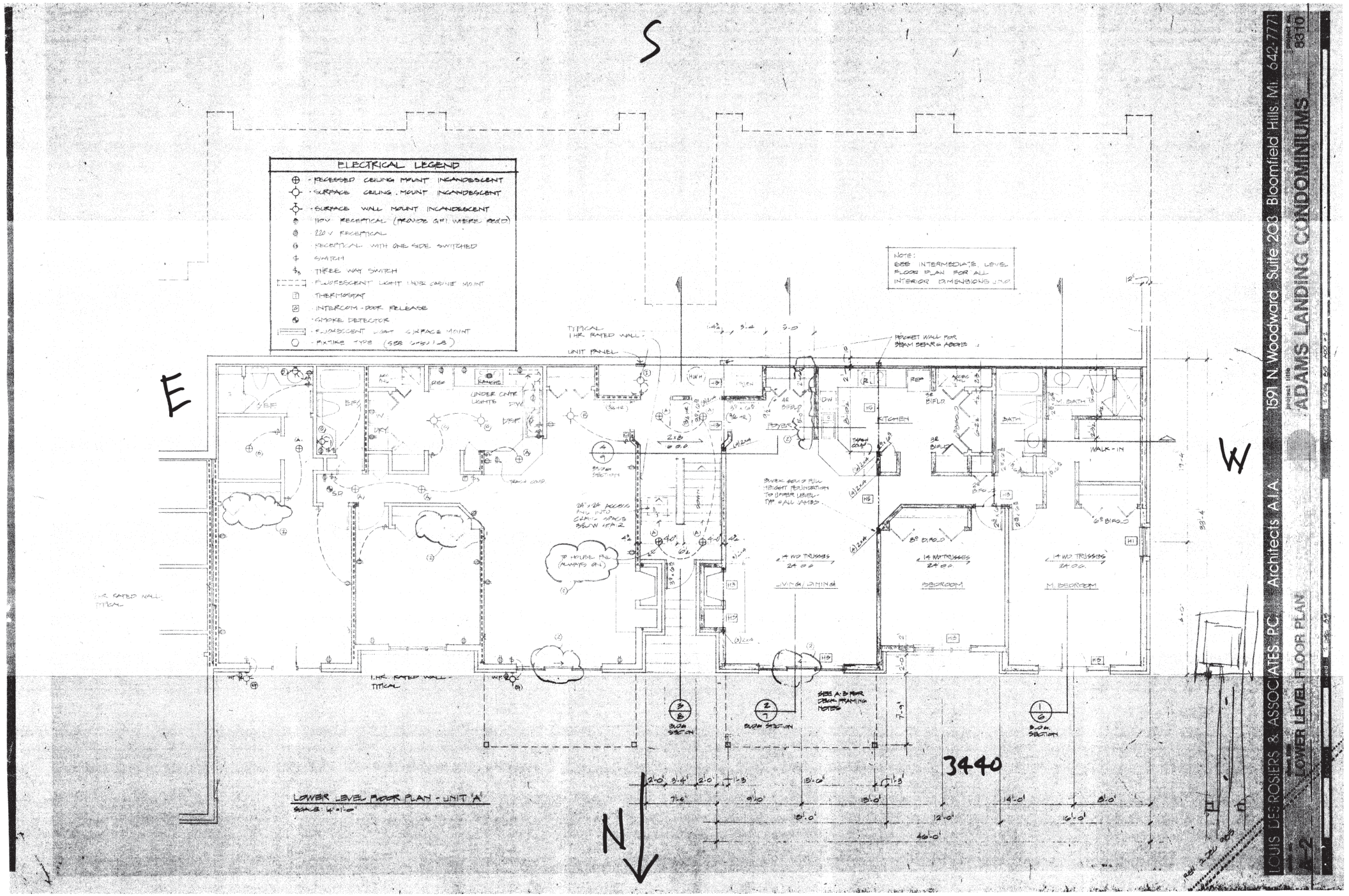
LOUIS DES ROSIERS & ASSOCIATES, P.C. Architects A.I.A. 1591 N. Woodward Suite 203 Bloomfield Hills, Mi. 642-7771

sheet title: INTERMEDIATE FLOOR PLAN

project title: ADAMS LANDING CONDOMINIUMS

A-3

revisions 12-28-87 ADD'A #2



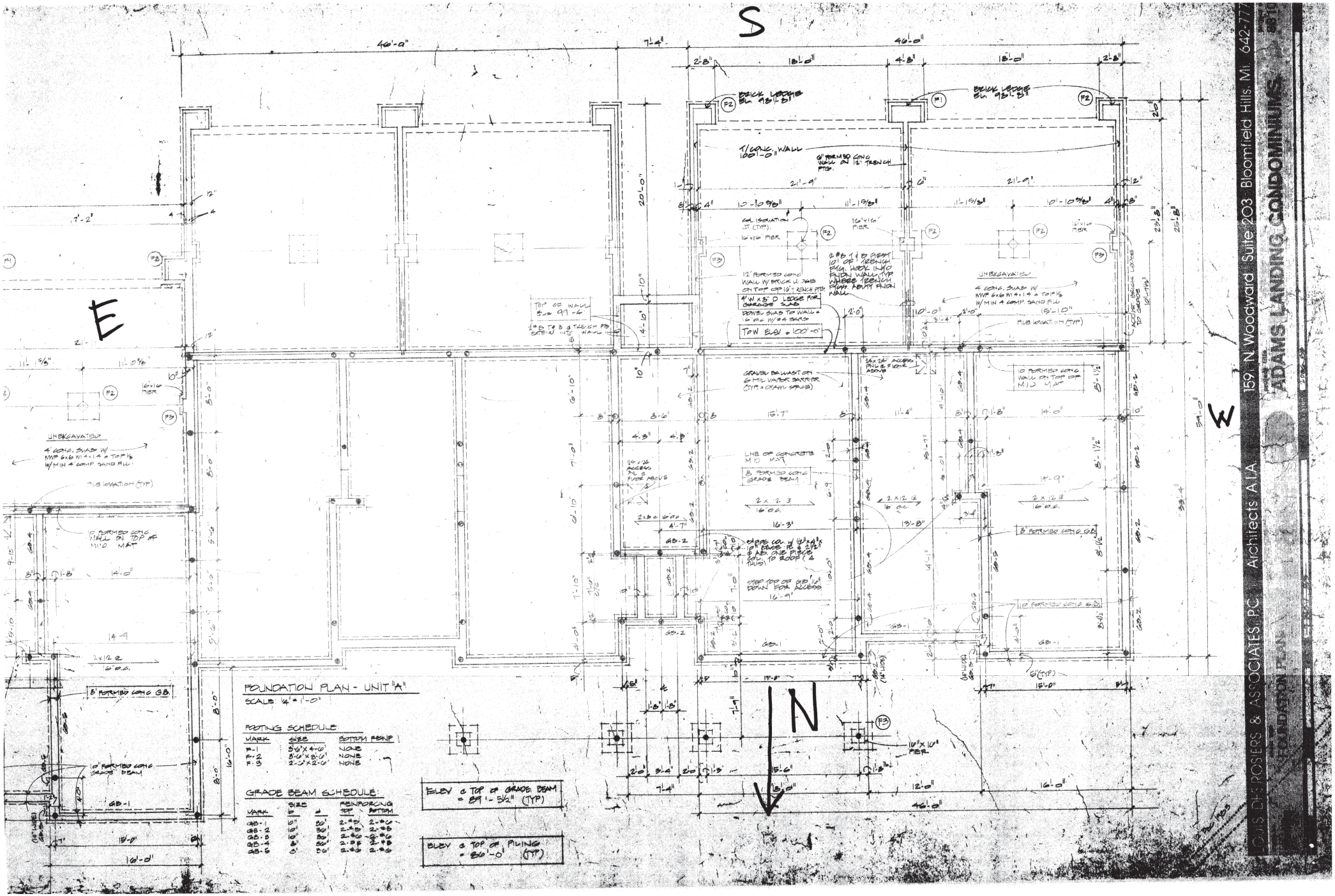
LOUIS DESROSIERS & ASSOCIATES, P.C. Architects A.I.A. 1591 N. Woodward Suite 203 Bloomfield Hills, Mi. 642-7771

project title
ADAMS LANDING CONDOMINIUMS

LOWER LEVEL FLOOR PLAN

sheet no. A-1

date 3/3/10


S
E
W
N
FOUNDATION PLAN - UNIT "A"
SCALE: 1/4" = 1'-0"
FOOTING SCHEDULE
GRADE BEAM SCHEDULE
ELEV @ TOP OF GRADE BEAM = 89'-5½" (TYP)
ELEV @ TOP OF PILING = 86'-0" (TYP)
ADAMS LANDING CONDOMINIUMS
159 N. Woodward Suite 203 Bloomfield Hills, Mi. 642-77
LOUIS DASPASSIOS & ASSOCIATES, P.C. Architects A.I.A.

800.222.1868
www.nederveld.com