

Introduction

Extrapolation in construction defect (CD) litigation is a hotly litigated issue. Not to mention, it makes defendants CRAZY! We have been dealing with it since the 1990's, but only in the last couple years have we seen it addressed well.

Here's how we see it: CD litigation is typically driven by the opinions of expert consultants. These experts base their opinions on data they collect during their observations. Experts often don't look at 100% of the locations (the "population") in question; instead they inspect or test a "sample" of locations and "extrapolate" to the remaining "population" to draw conclusions about the entire project. Contrary to the popular opinion of many defendants, there is nothing inherently wrong with this.... At least not in theory.

Scientists in all fields, every day, make observations, develop hypotheses, make predictions, conduct tests, compare their findings against the hypotheses, and draw conclusions. This is called the Scientific Method and it's the foundation of modern technology. And scientists commonly test relatively small samples and extrapolate findings. It's perfectly acceptable... But only if the "sample" is genuinely representative of the population. Here's the rub: Real scientists, including real building scientists, are VERY careful about how they select the "sample." Real scientists know that a poorly selected sample is not extrapolatable. And they know about

"biased data." Scientists know that biased data is insidious and ruins otherwise good work.

What we observe in construction defect litigation, is the use of biased data to extrapolate. And this is no bueno. We are going to show you how to select and extrapolate the right way.

Outline

1. Introduction
2. Building "Science"; Really?
3. Random Selection
4. The E Word (Extrapolation)
5. Playing Doctor
6. Do the Right Thing
7. Conclusion

Learning Objectives

- Explain the basics of applying the scientific method to building performance analysis
- Explain the process of randomly selecting inspection and testing locations
- Explain the process of extrapolating findings
- Show examples of good work

Backup Materials

1. Judge's Order including random selection of residences
2. Motion to Exclude Evidence
3. Daubert Motion to Preclude and Order Denying Extrapolation
4. PFCS Investigation Recommendations, Testing Summary and Testing Map
5. PFCS Random Selection and Inspection (& Testing) Request
6. PFCS Summary of Testing
7. PFCS Scope of Repair

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 - Program Outline
 - Learning Objectives
 - Back-Up Materials
 - Homework



We know buildings

- EXPERTISE
- PROJECT MANAGEMENT
- TECHNOLOGY
- STANDARDS
- RESULTS

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Pete Fowler
CONSTRUCTION
Services, Inc.

Random Selection and Extrapolation of Construction Defects



Pete Fowler
CONSTRUCTION
Services, Inc.

November 20, 2013

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Program Outline

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1. INTRODUCTION



1. INTRODUCTION

PFCS: Who We Are

SOLUTIONS

Pete Fowler Construction Services (PFCS) specializes in creating **REAL PRACTICAL SOLUTIONS** for property owners & managers, builders & developers, construction contractors, product manufacturers & suppliers, lawyers and insurers.



1. INTRODUCTION

PFCS: We Know Buildings



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1. INTRODUCTION

PFCS: We Know Buildings



CLIENTS

- Property Owners & Managers
- Builders & Developers
- Contractors
- Product Manufacturers
- Insurers
- Lawyers



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1. INTRODUCTION

PFCS: We Know Buildings

BUILDING LIFECYCLE MANAGEMENT

EVALUATION: We investigate building performance by inspecting, testing, interviewing and analyzing lots of documents and data.

SPECIFICATION: We consult with the Owners to maximize property value, specifying the right maintenance, repairs, and improvements.

QUALITY MANAGEMENT: Manage the scope, budget, schedule and contracts, and verify performance with quality control inspections.

CONSTRUCTION CLAIMS & LITIGATION

EVALUATION: We investigate building problems by inspecting, testing, and analyzing lots of documents and data.

SPECIFICATION: We create real, practical solutions for how the problems should be fixed and how much they will cost.

ALLOCATION: We compare project performance to standards and our experience so we can explain to others what happened, what should have happened and who is responsible.



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Pete Fowler

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Email pf@petefowler.com

Find him on [LinkedIn!](#)



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1. INTRODUCTION

Program Introduction

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1. INTRODUCTION

Program Introduction

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What we observe in construction defect litigation, is the use of biased data to extrapolate. And this is no bueno. We are going to show you how to select and extrapolate the right way.



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1. INTRODUCTION

Learning Objectives

- Explain the basics of applying the scientific method to building performance analysis
- Explain the process of randomly selecting inspection and testing locations
- Explain the process of extrapolating findings
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1. INTRODUCTION

Back-Up Materials

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1. INTRODUCTION

Case Study

A VERY SIMPLE RANDOM SELECTION

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1. INTRODUCTION

Case Study

A VERY SIMPLE RANDOM SELECTION

"...To select the twenty representative properties, the Court first numbered each of the 276 properties, in the order they appear on the list. The Court then used a Microsoft Excel spreadsheet and formula to generate twenty random numbers between 1 and 276. The function used was $=\text{RAND}()*(250-1)+1$ ". This function generates a random number from 1 – 276 twenty separate times, to ultimately generate twenty different rows - each with a different random number - in the first column of the spreadsheet..."

	A	B	C	D	E
1	161				
2	26				
3	59				
4	186				
5	240				
6	9				
7	104				
8	123				
9	125				
10	86				
11	192				
12	227				
13	118				
14	141				
15	208				
16	30				
17	182				
18	134				
19	221				
20	261				
21					

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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

CIVIL MINUTES - GENERAL

Case No. 1:07-cv-00388 DOC (DLBx)

Date: January 12, 2012

Title: ABARCA, et al. V. MERCK & CO., INC., et al.

DOCKET ENTRY

[I hereby certify that this document was served by first class mail or Government messenger service, postage prepaid, to all counsel (or parties) at their respective most recent address of record in this action on this date.]

Date: _____ Deputy Clerk: _____

PRESENT:

THE HONORABLE DAVID O. CARTER, JUDGE

Julie Barrera
Courtroom Clerk

Not Present
Court Reporter

ATTORNEYS PRESENT FOR PLAINTIFFS: ATTORNEYS PRESENT FOR DEFENDANTS:

NONE PRESENT

NONE PRESENT

PROCEEDING (IN CHAMBERS): SELECTION OF FLOOD CASE REPRESENTATIVE
PROPERTIES

The Court is in receipt of Plaintiffs' Amended Election of Property Pool for Flood Trial Pursuant to the Court's December 16, 2011 Order (Docket 1537). Defendants' objections, if any, were due by December 23, 2011. No objections were filed, so Plaintiffs' Amended List (Docket 1537-1) sets forth the final two hundred and seventy six (276) potential properties for the flood case. To select the twenty representative properties, the Court first numbered each of the 276 properties, in the order they appear on the list (i.e. 2432 Meadowbrook is #1 and 2184 N. Drake is #276). The Court then used a Microsoft Excel spreadsheet and formula to generate twenty random numbers between 1 and 276. The function used was " =RAND()*(250-1)+1 ". This function generates a random number from 1 - 276 twenty separate times, to ultimately generate twenty different rows - each with a different random number - in the first column of the spreadsheet. The selected numbers each correspond to a property on the Plaintiffs' list, and those twenty properties will be the representative properties in the flood case.

The selected representative properties are as follows:

Property 1: #161 - 1900 Ashby Road, #27

Property 2: #26 - 2131 Meadowbrook

Property 3: #59 - 2150 Beachwood

Property 4: #186 - 2078 Drake

Property 5: #240 - 2305 Teakwood Court

Property 6: #9 - 2120 Balboa

Property 7: #104 - 2042 Drake

Property 8: #123 - 2306 Meadowbrook

Property 9: #125 - 2363 Lance

Property 10: #86 - 2108 Balboa

Property 11: #192 - 2075 W. Cabot

Property 12: #227 - 2180 Cabot

Property 13: #118 - 1080 Thornton

Property 14: #141 - 2305 Fern

Property 15: #208 - 2305 Mesquite Court

Property 16: #30 - 2163 Meadowbrook

Property 17: #182 - 2151 Cabot

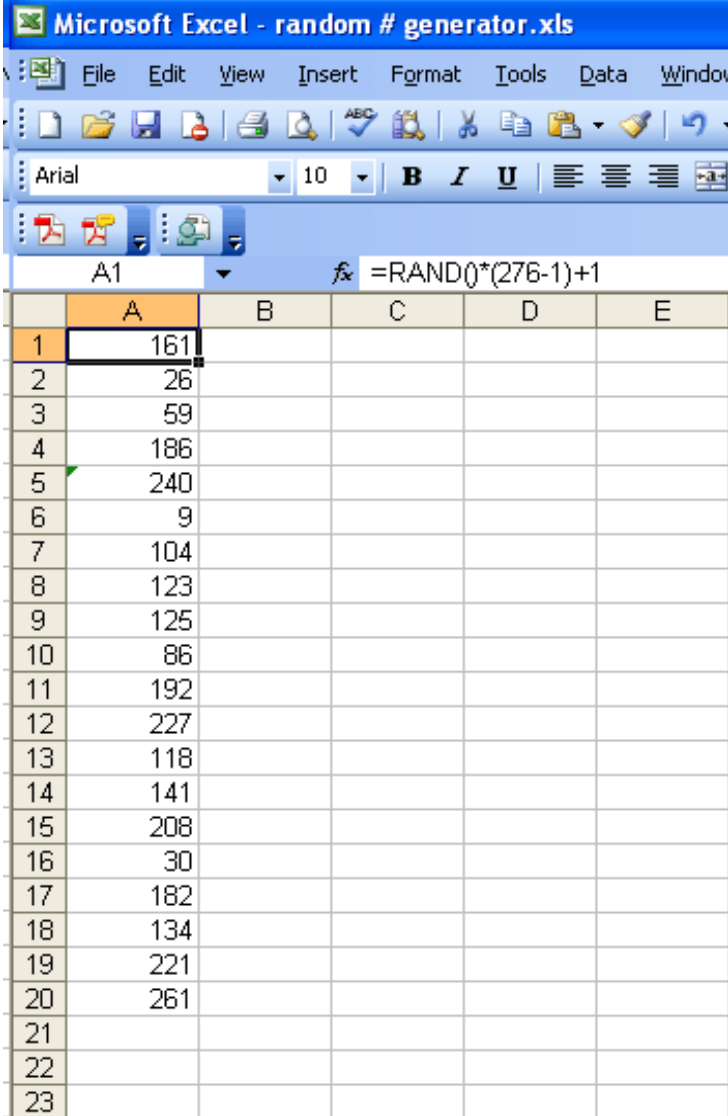
Property 18: #134 - 2352 Lobo Avenue

Property 19: #221 - 1848 Ashby Road, #55

Property 20: #261 - 2291 Wolf

For the parties' information, below is a screen shot of the formula and spreadsheet used to

generate the random number selection.



Microsoft Excel - random # generator.xls

File Edit View Insert Format Tools Data Window

Arial 10 B I U

A1 fx =RAND()*(276-1)+1

	A	B	C	D	E
1	161				
2	26				
3	59				
4	186				
5	240				
6	9				
7	104				
8	123				
9	125				
10	86				
11	192				
12	227				
13	118				
14	141				
15	208				
16	30				
17	182				
18	134				
19	221				
20	261				
21					
22					
23					

The Clerk shall serve this minute order on all parties to the action.

2. BUILDING “SCIENCE”; REALLY?



2. BUILDING “SCIENCE” REALLY?

Building “Science”; Really?

- Thinking Scientifically
- The Basics of “Building Science”
- Hypothesize
- Case Study



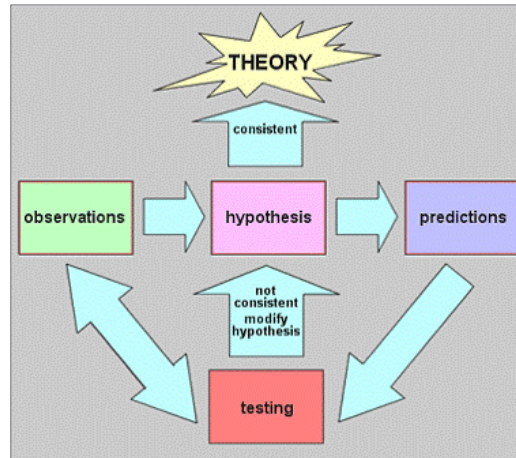
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2. BUILDING "SCIENCE" REALLY?

Thinking Scientifically

SCIENTIFIC METHOD

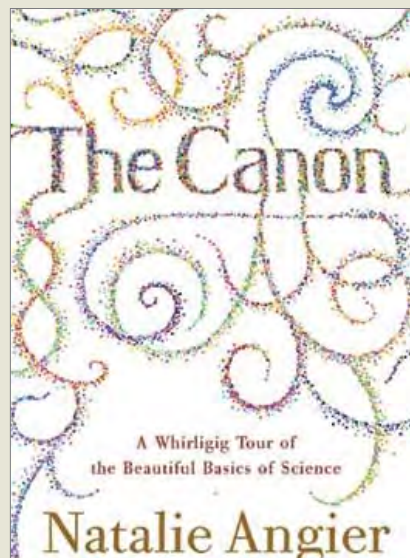
1. Observe
2. Hypothesize
3. Predict
4. Test
5. Repeat
6. Theory

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2. BUILDING "SCIENCE"; REALLY?

Thinking Scientifically

The Canon
by Natalie Angier

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2. BUILDING "SCIENCE"; REALLY?

Thinking Scientifically

"Science is not a body of facts. Science is a state of mind. It is a way of viewing the world, of facing reality square on but taking nothing on its face. It is about attacking a problem with the most manicured of claws and tearing it down into sensible, edible pieces.

People do not need a lab to follow a scientific game plan. For example, trying to fix a DVD player. They will do experiments and controls.

Step 1 is the observation: What is the picture quality, what are things that could be wrong, is it the player or the TV set? Then you come up with the hypothesis and start testing it. Borrowing a neighbor's DVD player and testing it with your TV, checking your A/V cables, etc. You can possibly track down the problem without knowing how a DVD player works."



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2. BUILDING "SCIENCE"; REALLY?

Thinking Scientifically

"Critical Thinking: Part of critical thinking includes the understanding that science doesn't deal with absolutes. Nonetheless, we can make statements that are quite powerful and have a high probability of being correct.

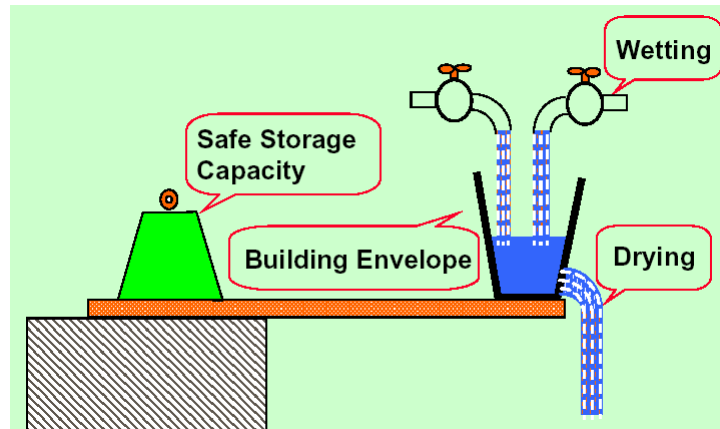
Barriers to critical thinking include cynicism (negative and dismissive reactions due to preset notions) and the habit of believing we already understand how many things work, especially simple things we were supposed to have learned in elementary school."



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2. BUILDING "SCIENCE"; REALLY?

The Basics of "Building Science"

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2. BUILDING "SCIENCE"; REALLY?

The Basics of "Building Science"

ASTM E2128: Standard Guide for Evaluating Water Leakage of Building Walls



Designation: E 2128 – 01a

Standard Guide for Evaluating Water Leakage of Building Walls¹

This standard is used to evaluate the water leakage of exterior walls. It is not intended to evaluate the water leakage of interior walls. It is not intended to evaluate the water leakage of walls that are not part of the exterior wall assembly.

1. Scope
 - 1.1 This guide describes methods for determining and evaluating causes of water leakage of exterior walls. For this purpose, water penetration is considered leakage, and therefore permeation, if it exceeds the planned resistance or temporary resistance and drainage capacity of the wall, is causing or is likely to cause premature deterioration of a building or its contents, or is adversely affecting the performance of other components. A wall is considered a system including its exterior and interior finishes, fenestrations, structural components and components for maintaining the building interior environment.
 - 1.2 Investigative techniques discussed may be intrusive, disruptive or destructive. It is the responsibility of the investigator to establish the limitations of use, to anticipate and to plan for potential and selective reconstruction as necessary.
 - 1.3 This practice does not purport to address all of the safety concerns, if any, associated with its use. Established appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Awareness of safety and health issues with age procedures are particularly important for abatement operations on the exterior of a building and destructive investigative procedures which typically are associated with the work described in this guide.
2. Referenced Documents
 - 2.1 ASTM Standards
 - E 133 Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference²
 - E 134 Test Method for Water Penetration and Leakage Through Masses³
 - E 147 Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference⁴
 - E 433 Terminology of Building Construction⁵
 - 2.2 Other Documents
 - E 1105 Test Method for Field Determination of Water Penetration of Isolated Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference⁶
 - 2.2.1 American Architectural Manufacturers Association (AAMA) Standards⁷
 - A612 Field Check of Metal Storefronts, Curtain Walls and Slated Glazing Systems for Water Leakage⁸
 - A62 Specification for Field Testing of Windows and Sliding Doors⁹
 - A63 Specification for Field Testing of Metal Storefronts, Curtain Walls and Slated Glazing Systems¹⁰
3. Terminology
 - 3.1 Refer to Terminology E 433.
 - 3.2 Definitions:
 - 3.2.1 accidental water—unplanned water infiltration that penetrates beyond the primary barrier and the backing or secondary barrier system, of such limited volume that it can escape or evaporate without causing adverse consequences.
 - 3.2.2 water absorption—a process in which a material takes in water through its pores and absorption and retains it wholly without transmission.
 - 3.2.3 water adhesion—a process in which water passes through a material or between materials in a system and reaches a space that is not directly or intentionally exposed to the water source.
 - 3.2.4 water leakage—water that is uncontrolled, exceeds the resistance, retention or discharge capacity of the system, or causes subsequent damage or premature deterioration.
 - 3.2.5 water permeation—a process in which water gains access into a material or system by passing through the surface exposed to the water source.
 - 3.2.6 water permeation—a process in which water enters, flows and spreads within and discharges from a material.
4. Significance and Use
 - 4.1 This guide is intended to provide building professionals with a comprehensive methodology for evaluating water leakage through walls. It addresses the performance expectations and service history of a wall, the various components of a wall, and the interaction between these components and adjacent components.

¹ This guide is under the jurisdiction of ASTM Committee E11 on Performance of Building and is the responsibility of Subcommittee E11.01 on Exterior Building Wall Systems.

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2. BUILDING "SCIENCE"; REALLY?

The Basics of "Building Science"

From ASTM E2128

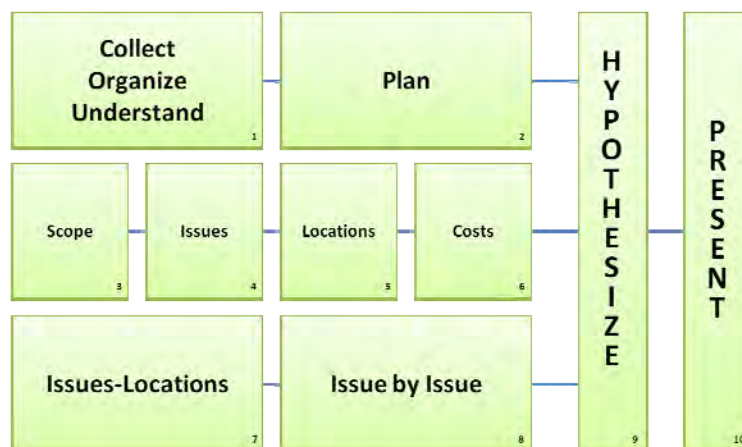
1. Review of Project Documents: **Observe.**
2. Evaluation of Design Concept: **Observe.**
3. Determination of Service History: **Observe. Hypothesize. Predict.**
4. Inspection: **Observe. Hypothesize. Predict.**
5. (As Necessary) Investigative Testing: **Test.**
6. Analysis: **Theory (Opinion or Opinions)**
7. Report Preparation



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2. BUILDING "SCIENCE"; REALLY?

Hypothesize



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2. BUILDING "SCIENCE"; REALLY?

Case Study

This project consists of two six-story buildings with a total of 96 one story units built in 2008.



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2. BUILDING "SCIENCE"; REALLY?

Case Study



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2. BUILDING "SCIENCE"; REALLY?

Case Study

1. Elevators were not working reliably.
2. Owner's mechanical engineering expert was told by the elevator company there was condensation problem in the elevator closets causing the problems, and assumed it was true.
3. Owner's engineer specified a \$100,000 solution to prevent condensation.
4. PFCS found no evidence of an on-going condensation problem, and lots of evidence of other potential causes for the failures.
5. PFCS tested by measuring the temperature and humidity in the closets over many months and found no opportunity for condensation.
6. The PFCS solution saved the builder more than \$50,000 and saved the owners the maintenance of mechanical equipment over the life of the project.



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1
2
3
4 IN THE CIRCUIT COURT OF THE STATE OF OREGON
5 FOR THE COUNTY OF WASHINGTON

6 [REDACTED] HOMEOWNERS
7 ASSOCIATION, an Oregon Homeowners
8 Association,

9 Plaintiff,

10 v.

Case No. C093539CV

11 DEFENDANTS [REDACTED], INC. AND
12 [REDACTED]'S OEC 104
13 MOTION TO EXCLUDE
14 PLAINTIFF'S ANTICIPATED
15 EXTRAPOLATION EVIDENCE

16 Oral Argument Requested

1 [REDACTED]
2 [REDACTED]
3 [REDACTED]
4 Defendants.

5 **UTCR INFORMATION**

6 Oral argument is requested on this motion. The estimate time for argument is 1-2 hours.
7 Official court reporting services are not requested.

8 **MOTION**

9 Defendants [REDACTED] (collectively "[REDACTED]") anticipate that
10 plaintiff's construction defect expert, [REDACTED]), will seek to
11 extrapolate the results of its limited forensic investigation to offer opinions about the [REDACTED]
12 project as a whole. [REDACTED] hereby applies to the court for an order, pursuant to Rules 104, 401,
13 402, 403, 702 and 703 of the Oregon Evidence Code, precluding plaintiff from offering this
14 evidence because the anticipated extrapolation testimony will lack scientific validity and will
15 thus be irrelevant and will result in unfair prejudice to [REDACTED] if presented to a jury.

16 This motion is based on the points and authorities below. It is anticipated that this
17 motion will be supplemented with exhibits prior to argument. The undersigned counsel will seek
18 to work with opposing counsel to arrive at an agreed-upon set of exhibits for the motion.

19 **INTRODUCTION**

20 [REDACTED] anticipates that plaintiff will argue that because [REDACTED] found what they believe to
21 be evidence of water intrusion and/or damage at certain specific locations, that this water
22 intrusion and/or damage must exist across the entire project, even in areas that have not been
23 investigated. However, principles of statistics dictate that if sampling is not random, it is not
24 representative and thus cannot be used as a basis to extrapolate. Any attempt by plaintiff to draw
25 conclusions about the project as a whole – based on non-representative samples – would be
26

1 speculative and contrary to well-settled principles of statistics. [REDACTED] has retained a statistician
2 that will opine as follows:

- 3 ➤ [REDACTED] Used an Insufficient Sample Size: Because [REDACTED] selected a small sample, it is
4 nearly impossible to conclude that the sample selected is representative of the entire
5 [REDACTED] project. In Phase 1 of the [REDACTED] project, for example [REDACTED] sampled
6 openings in only 14 out of 41 possible buildings. Especially with regard to Phase 1,
7 and possibly with regard to Phases 2 and 3, there were simply not enough buildings
8 sampled from which to form a reliable conclusion about the entire development.
- 9 ➤ [REDACTED]'s samples were not random, and thus not representative: Because [REDACTED] only
10 sampled a small cross-section of buildings, it appears likely that [REDACTED]'s samples were
11 not randomly selected. [REDACTED]'s statistician will testify that without random
12 selection, the samples cannot be considered to be representative of the whole project.
- 13 ➤ [REDACTED] did not appear to follow acceptable "sampling design and procedures": It does
14 not appear that [REDACTED] followed acceptable "sampling design and procedures" – a
15 necessary predicate to reliable sampling. Without sampling procedures in place, [REDACTED]
16 can offer no assurance that it's samples are representative.

17 APPLICABLE LEGAL STANDARDS

18 OEC 104(1) requires the court to determine preliminary questions concerning the
19 qualification of a person to be a witness and the admissibility of evidence. OEC 401 defines
20 relevant evidence, requiring that evidence must tend to make a fact more probable or less
21 probable than it would be without the evidence. OEC 402 prohibits admission of evidence that is
22 not relevant. OEC 403 prohibits admission of evidence if its probative value is substantially
23 outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury,
24 requiring the court to balance the probative value of the evidence against the harm likely to result
25 from its admission. "Unfair prejudice" means an undue tendency to suggest decisions on an
26 improper basis. 1981 Conference Committee Commentary to OEC 403. OEC 702 permits

1 expert testimony if the expert’s specialized knowledge will assist the trier of fact to understand
2 the evidence or to determine a fact in issue. OEC 703 limits the facts or data upon which an
3 expert bases an opinion to those types reasonably relied upon by experts in the field.

4 **A. Trial Judge’s Vital Gatekeeper Function**

5 “To be admissible, expert testimony must be relevant under OEC 401, must assist the
6 trier of the fact under OEC 702, and must not be subject to exclusion under OEC 403 because its
7 probative value is outweighed by the danger of unfair prejudice.” *Blake v. Cell Tech Int’l, Inc.*,
8 228 Or App 388, 399-400, 209 P3d 992 (2009) (citing *Marcum v. Adventist Health System/West*,
9 345 Or 237, 243, 193 P3d 1 (2008)). “In applying OEC 401, 702 and 403, the court must
10 identify and evaluate the probative value of the proffered scientific evidence, consider how that
11 evidence might impair rather than help the trier of fact, and decide whether truth finding is better
12 served by admission or exclusion.” *Id.* at 400 (quoting *State v. O’Key*, 321 Or 285, 299, 899 P2d
13 663 (1995); *see also Marcum*, 345 Or at 242, *Jennings v. Baxter Healthcare Corp.*, 331 Or 285,
14 301-02, 14 P3d 596 (2000) (involving a differential diagnosis ruling out all other possible factors
15 and a 95% correlation rate between the alleged exposure and symptoms.)

16 The court must play the “vital role” as “gatekeeper” in screening proffered scientific
17 testimony. *O’Key*, 321 Or at 307.

18 **B. Evidence Must Have Legitimate Scientific Basis**

19 In accordance with *State v. O’Key*, trial courts must function as gatekeeper by screening
20 evidence to determine whether it will *legitimately* assist the trier of fact. *Blake v. Cell Tech Int’l*,
21 *Inc.*, 228 Or App at 400 (citing *State v. O’Key*, 321 Or at 303).

22 “In performing its role as ‘gatekeeper,’ the trial court ensures that the trier of fact
23 does not attach an undue aura of reliability to ‘scientific’ evidence that is not
24 scientifically valid. Evidence that purports to be based on science beyond the
common knowledge of the average person that does not meet the judicial standard
for scientific validity can mislead, confuse, and mystify the jury.”

25 *State v. O’Key*, 321 Or at 303 n. 20.

26 The trial court’s gatekeeping role is particularly important “because of the
persuasive power of scientific evidence” as “[e]vidence perceived by lay jurors to

1 be scientific in nature possesses an unusually high degree of persuasive power.
2 The function of the court is to ensure that the persuasive appeal is legitimate. The
3 value of proffered expert scientific testimony critically depends on the scientific
4 validity of the general propositions utilized by the expert.” *Blake*, 228 Or App at
5 400 (quoting *State v. O’Key*, 321 Or at 291).

6 Importantly, in *State v. O’Key*, the Oregon Supreme Court held: (i) “[u]nless the
7 proffered evidence is supported by appropriate validation, it cannot qualify as “scientific
8 knowledge;” and (ii) “‘appropriate validation’ refers to scientific validity;” thus (iii)
9 “admissibility of scientific evidence requires a showing that it is based on scientifically valid
10 principle.” 321 Or at 301-303 (discussing and quoting *Daubert v. Merrell Dow Pharmaceuticals*,
11 509 US 57 (1993) (“*Daubert*”). In so holding, the Oregon Supreme Court discussed at length
12 the United States Supreme Court’s holding in *Daubert*, finding that “the Oregon Evidence Code
13 “is modeled on the federal paradigm” and that “[t]he decisional process to be applied for
14 admission and exclusion of scientific evidence articulated” in *Daubert* is “an appropriate further
15 development of the decisional process” for the admission and exclusion of expert testimony.
16 *State v. O’Key*, 321 Or at 306. Likewise, in *Marcum v. Adventist Health System/West*, the court
17 held that the alleged cause of damages must meet the test of scientific validity. 345 Or 237, 242
18 (2008).

19 Here, as noted, it is anticipated that [REDACTED] will seek to introduce extrapolation testimony.
20 To do so, [REDACTED] must root its testimony in reliable statistical evidence that is scientifically valid.
21 [REDACTED] should not be permitted to proffer general conclusions about the project as a whole unless
22 their conclusions are based on samples that are truly representative.

23 **C. Burden of Proof is on Plaintiffs, Who Must Show Admissibility by**
24 **Preponderance**

25 The burden of laying the proper foundation for the admission of the expert testimony is
26 on the party offering the expert, and must be shown by a preponderance of the evidence. OEC
305, 307; *State v. O’Key*, 321 Or at 303; see also *Siharath v. Sandoz Pharma. Corp.*, 131 F Supp
2d 1347, 1351 (N. D. Ga. 2001).

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1 thus not representative. Indeed, it is possible, if not likely, that [REDACTED] selectively “cherry-picked”
2 the “worst” homes in which there may have been homeowner complaints, or conspicuous signs
3 of water damage. As such, plaintiffs lack a scientific basis to introduce extrapolation testimony.

4 The Supreme Court of the United States, in a case utilizing the *Daubert* standard for
5 expert testimony, expressed in general terms the limitations of using such extrapolation
6 evidence:

7 Trained experts commonly extrapolate from existing data. But nothing in either
8 *Daubert* or the Federal Rules of Evidence requires a district court to admit
9 opinion evidence that is connected to existing data only by the ipse dixit of the
expert. A court may conclude that there is *simply too great an analytical gap*
10 *between the data and the opinion proffered.*
11 *General Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) (emphasis added). As noted in *Joiner*,
12 courts that wrestle with questions about the admissibility of extrapolation evidence are
13 particularly concerned with whether the analytical gap is too great for admission of expert
14 testimony. To cross this analytical gap, an expert must provide an appropriate foundation for the
15 extrapolation to be reliable. The requirement for an appropriate foundation to establish
16 reliability ensures that the expert’s opinion is “based on a scientifically valid principle.” *State v.*
O’Key, 321 Or at 301-303.

17 In the construction defect context, for example, courts have excluded extrapolation
18 testimony when the proper foundation is *not* provided to ensure reliability of that testimony. For
19 example, in *Harbor House Condominium Association v. Mass. Bay Insur. Co.*, 703 F. Supp.
20 1313, 1321 (N.D. Ill. 1988), plaintiff, a condominium association, which had experienced freeze
21 damage to a portion of its hot-water pipes, employed an expert who investigated and repaired
22 pipes in 23 units of a 278-unit building. *Id.* at 1316. Plaintiff’s expert’s selection of units was
23 admittedly “non-random” as it investigated units along the north section of building which
24 “contained the most obvious leaks” and “had more complaints than others.” *Id.* at 1315 & 1316
25 n.4. Plaintiff urged the court to allow the expert who examined the leaks to extrapolate damages
26 to the remaining portion of the building despite the fact that the remaining units had not been

1 examined. Significantly, the court responded to this argument by denying admissibility of the
2 extrapolation evidence, noting that the relevant inquiry was the reliability of the sample and
3 whether it was “representative”:

4 When Air Comfort performed the air pressure test on an additional six units, those
5 units were ***not randomly selected***. . . . Therefore, plaintiffs established freeze
6 damage in only twenty-three units without locating pipe damage in any of the
7 remaining 255 units. The fact that freezing caused damage to a portion of the
heating System is probative of the cause of damage to the entire System ***only if
the record evidence indicates that the damaged portion is representative*** of the
entire heating System. The record contains no such evidence.

8 *Id.* at 1318 (emphasis added). The court again – when squarely addressing the issue of
9 extrapolation – emphasized the importance of a representative sample:

10 Plaintiffs do not argue, and the ***Court does not conclude, that such a small
portion of the System is representative of the entire System***. Thus, plaintiffs
11 attempt to prove the extent of their damage by extrapolating from the cost to
12 repair past damage which is not the subject of this dispute. . . . It is undisputed
13 that plaintiffs' experts failed to locate additional damage to the pipes when
14 plaintiffs elected not to pressure test the System. Without locating the damage, the
expert opinions are mere speculation; therefore, their cost estimates prove
nothing.

15 *Id.* at 1321 (emphasis added). Thus, the court’s paramount concern when addressing the
16 admissibility of extrapolation evidence was the reliability of that evidence.

17 Cases decided in the class action context are also consistent with this view. For example,
18 in *Shuette v. Beazer Homes Holdings Corp.*, 124 P.3d 530 (Nev. 2005), the court refused to grant
19 class certification to homeowners who bought homes from the same developer in a particular
20 subdivision, stating:

21 [A]s a practical matter, single-family residence constructional defect cases will
22 rarely be appropriate for class action treatment. . . . [C]lass actions involving real
23 property are often “incompatible with the fundamental maxim that each parcel of
24 land is unique.” . . . [W]e recognize that, where specific characteristics of
different land parcels are concerned, “these uniqueness factors weigh heavily in
favor of requiring independent litigation of the liability to each parcel and its
owner.”

25 *Id.* at 844-45 (citations omitted).

1 Likewise, in *Hicks v. Kaufman & Broad Home Corp.*, 107 Cal.Rptr.2d 761 (2001),
2 another construction defect case involving multiple units, the court found that class certification
3 was inappropriate for the plaintiff's negligence claims because negligence requires the proof of
4 actual property damage, unlike warranty claims, which required only generalized proof of
5 damages. *Id.* at 767-75. As the court held, the plaintiffs were not allowed to proceed on their
6 negligence claims because "to recover under [negligence] theories of liability each class member
7 would have to come forward and prove specific damage to her home" In other words, the
8 court in *Hicks* held that the plaintiffs were not allowed to extrapolate their individualized
9 property damage to support their negligence claim from the property damage suffered by others.

10 Outside the construction law context, courts have similarly utilized their gatekeeping
11 function to bar extrapolation testimony that is based on statistically unreliable data. For instance,
12 in *Dunn v. Sandoz Pharmaceuticals Corp.*, the court denied plaintiff's expert witness from
13 extrapolating on studies that were "statistically insignificant and inconclusive on causation due in
14 part to a sample size that was inadequate." 275 F.Supp.2d 672, 681 (M.D.N.C. 2003). The court
15 noted that unreliable scientific methodology, markedly small sample size and selective use of
16 insignificant data were insufficient to support an opinion on whether the drug in question caused
17 the plaintiff's injury. *Id.* As *Dunn* demonstrates, allowing experts to extrapolate based on data
18 that is insignificant in volume, or specifically does not satisfy reliability standards required for
19 admission, can create an impermissible gap between the evidence presented and the opinion
20 proffered. *See also Wyndham Intern., Inc. v. Ace Am. Ins. Co.*, 186 S.W.3d 682 (Tex. App.
21 2006) (plaintiff's expert extrapolated forecasts of revenue for 163 hotels by sampling 101 hotels;
22 defendants argued such extrapolation was insufficient and failed to address the "myriad factors"
23 that affect the financial condition of each hotel; court agreed with defendant, holding that
24 "extrapolated projections" were "premised upon unreliable and flawed forecasts").

1 In this case, [REDACTED] anticipated extrapolation testimony should also be excluded due the
2 “impermissible gap between the evidence presented and the opinion proffered.” [REDACTED]’s proposed
3 extrapolation testimony should be barred for the following reasons:

4 ➤ [REDACTED] *s samples were non-random, and thus non-representative.*

5 The rules of statistical inquiry dictate that the sample *must* be representative in order to
6 extrapolate. Because [REDACTED] only sampled a small cross-section of buildings, [REDACTED]’s statistician
7 will opine that it is virtually certain that [REDACTED] samples were not random and therefore *not*
8 representative. As indicated, [REDACTED] sampled openings in only 14 out of 41 possible buildings in
9 Phase 1; 13 out of 30 possible buildings in Phase 2; and 18 out of 28 possible buildings in Phase
10 3. Such a small cross-section of sampling does not serve as reliable basis to extrapolate.

11 ➤ [REDACTED] *did not create or follow a “sampling design and procedures”*

12 [REDACTED]’s statistician will opine that in order to conduct reliable representative sampling,
13 the sampling party must create and follow acceptable “sampling design and procedures.” Such
14 procedures ensure that the sampling method generates a sample that is truly representative and
15 serves as an accurate representation of the remaining whole. There is no evidence [REDACTED] produced
16 any such sampling design and procedure, and thus its extrapolation testimony lacks a proper
17 scientific foundation.

18 ➤ [REDACTED] *“cherry-picked” the “worst” homes to investigate:*

19 Similar to plaintiff’s expert in *Harbor Homes*, [REDACTED] has, in all likelihood, selected homes
20 and structures that contained the “most obvious” defects and experienced “more complaints than
21 others.” [REDACTED]’s sampling is not spread out evenly across the development as one might expect
22 with random sampling. Rather, the sampled units are clustered together in a small subset of
23 buildings.

24 ➤ *Each parcel of land at [REDACTED] is unique*

25 As the *Shuette* and *Hicks* courts recognized, there are characteristics and criteria by which
26 each piece of construction differs from every other. The same logic applies in this case. For

1 instance, at [REDACTED] there are confounding variables that can impact the condition of a home.
2 These might include, for example, a home's orientation toward weather patterns and a
3 homeowner's maintenance and upkeep. Extrapolating general damages to all structures – even
4 those structures that were not investigated and where no damage was found – would be
5 “incompatible with the fundamental maxim that each parcel of land is unique.”

6 ➤ *Construction defect negligence claims require proof of actual damage:*

7 Plaintiff, as discussed previously, has the burden to prove the existence of actual, current
8 water damage caused by the contractors' allegedly negligent construction practices. Plaintiff
9 cannot rely on speculation or conjecture. Here, plaintiff's expert, [REDACTED], has only investigated and
10 found damage at a small subset of structures. Plaintiff cannot say, with any degree of certainty,
11 whether the remaining structures experienced similar damage; and if so, to what extent. As such,
12 plaintiff cannot satisfy its burden to prove actual damage for those structures not investigated.

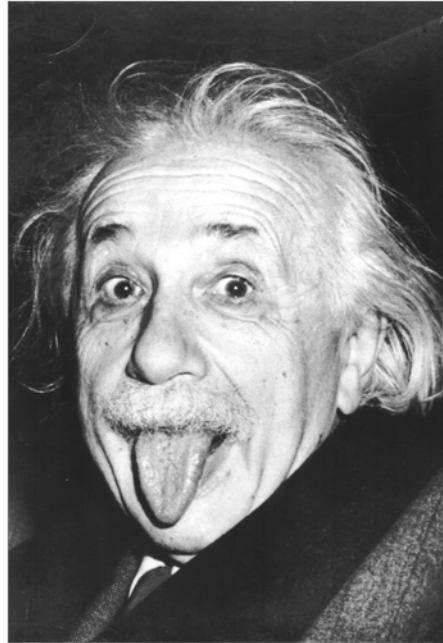
13 CONCLUSION

14 For all of the foregoing reasons, [REDACTED] requests this court issue an order excluding
15 [REDACTED]'s anticipated extrapolation testimony, and grant such other relief as this court deems just.

16 DATED this 15th day of July, 2010

3. RANDOM SELECTION

"God doesn't play dice..."
Albert Einstein



3. RANDOM SELECTION

Random Selection

- Definitions
- What is NOT random?
- Issues List: What and why?
- Locations List: Where?
- Issues-Locations Matrix
- Random Selection: How & How Many
- Case Study



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3. RANDOM SELECTION

Definitions

1. Random: (2.) Governed by or involving equal chances for each item.
2. Sample: (1.) A small part or quantity intended to show what the whole is like. (2.) A specimen taken for scientific testing or analysis. (3.) A portion drawn from a population, the study of which is intended to lead to statistical estimates of the attributes of the whole population.
3. Selection: (1.) The action or fact of carefully choosing someone or something as being the best or most suitable. (2.) A number of carefully chosen things.
4. Population: (6.) A finite or infinite collection of items under consideration.

Source: Google.com



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3. RANDOM SELECTION

What is NOT Random?

It is REALLY easy to get biased data:

1. It's NOT random when someone calls a list of owners and asks can you be home next Tuesday at 11:00 am so 9 inspectors can come crawl in, around, and on your home?
2. It's NOT random if the only locations inspected are those where the owners requested inspections.
3. It's NOT random when an expert shows, observes evidence of performance problems at particular assemblies, and performs and invasive investigations on those assemblies.



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Issues List: What and why?

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Issues List: What and why?

- Read about industry impacts on our blog at www.petefowler.com

Locations: Where?

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Locations: Where?

1. 123 Main Street
2. 234 Main Street
3. 345 Main Street
4. 456 Elm Drive
5. 567 Elm Drive
6. 678 Elm Drive
7. 890 Elvis Court
8. 012 Elvis Court
9. 123 Elvis Court

3. RANDOM SELECTION

Issues-Locations Matrix

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Charity Mansion v All Star Development

8/30/2010

Issues-Locations Matrix

Line	Defect	Building Totals	Unit Totals	Building %	Unit %	Notes																			
1	A	Erasing and Landscaping				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Defect		Building Totals	Unit Totals	Building %	Unit %	Notes																			
ing		0	0	0%	0%																				
on behind the cladding has caused framing damage		0	0	0%	0%																				
is not installed under the window nailing fins		0	0	0%	0%																				
is not installed in a workmanlike manner		0	0	0%	0%																				
between joists are missing		4	0	20%	0%																				
kitchen and living room deficiently sized resulting in excessive deflection from dead/live loads.		0	2	0%	20%																				
below beam between kitchen and living room.		0	1	0%	10%																				
od Defects		0	0	0%	0%																				
the porches are embedded in the concrete		1	0	5%	0%																				
s are damaged		4	0	20%	0%																				
s are not attached to the footing		11	0	55%	0%																				
gers are in contact with concrete walks		8	0	40%	0%																				
31	4 Wood stair stringers are in contact with concrete walks	8	0	40%	0%				X	X	X	X	X	X	X	X	X	X	X	X					
32	Y Exterior Wood Trim	0	0	0%	0%																				
33	1 The garage door posts are in contact with the concrete driveways	18	0	90%	0%	44	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
34	2 The wood trim at the porch columns is in contact with the concrete	3	0	10%	0%																				
35	3 Concrete wood trim is damaged and must be replaced	3	0	15%	0%								X												
36	4 Vertical wood siding placed in a poor grade	0	0	0%	0%																X	X			
37	5 Siding seams are missing behind the exterior wood trim	0	0	0%	0%																				
38	6 Columns trim is installed without glue	0	0	0%	0%																				
39	7 Window trim is incorrectly installed	0	0	0%	0%																				
40	8 Posts and rails are covered	0	0	0%	0%																				
41	9 Flat wood trim detail at columns not directing water away from board	0	0	0%	0%																				
42	G Hard/Plank Lap Siding	0	0	0%	0%																				
43	1 There is no glue between the Hard/Plank lap siding	0	0	0%	0%																				
44	2 Building paper is improperly lapped under Hard/Plank lap siding	0	0	0%	0%																				

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3. RANDOM SELECTION

Issues-Locations Matrix

Unit	1	2	3	4
1. B 2010 Siding	X	X		X
A. Leaks	X	X	X	X
B. Incorrect Nailing				
2. B 2060 Exterior Paint				
A. Deteriorated Trim			X	X
B. Delaminating			X	X
3. B 3001 Roof				
A. Damage	X			X
B. Leaks	X			X
C. Missing Underlayment	X		X	X
4. C 3011 Interior Paint				
A. Inadequate Coverage	X	X	X	X
B. Wrong Color		X		X

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3. RANDOM SELECTION

Random Selection: How & How Many

1. Consider the issues that are worth testing (cost vs. benefits)
2. Decide and list the Issues that will be tested
3. Consider the potential Locations (population) for each Issue
4. Decide on the number of test locations for each issue to be tested
5. List all of the possible locations (the population)
6. Consider the variations and decide on sample criteria. For example: Exposure, (N, S, E, W), phase, plan type, performance (visually distressed vs. no indication of distress), etc...
7. Select from the population at random



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3. RANDOM SELECTION

Random Selection: How & How Many

8. Populate the investigation recommendation using the locations selected in order. Select alternates, if applicable.
9. If the sample criteria are not met, use the first Locations in the population that meet the sample criteria. For example: If you need 4 locations facing each N, S, E and W, you may not get that mix in the first 16 Locations selected at random. If so, simply go on to the 17th random selection and beyond until all of the selection criteria are met.
10. Document the selection process.
11. When (inspecting or) testing do everything in your power to collect data at the randomly selected locations. It is easy to end up with biased data by allowing other than random selection to prevail.



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3. RANDOM SELECTION

Case Study

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Daubert Motion to Preclude

ARBITRATION COMPANY

NO. 2010 – 0544A

In the Matter of Arbitration Proceedings Before
The Honorable XXXXX
ARBITRATION COMPANY
Denver, Colorado 80202
Phone:

Claimant:

XXXXXX CONDOMINIUM ASSOCIATION, INC., a Colorado non-profit corporation;

Respondent and Third-Party Claimant:

XXXXX, a Colorado corporation;

Third-Party Respondents:

XXXXX, INC., et al.

Attorneys for Respondent and Third-Party Claimant:

**BUILDER’S MOTION TO PRECLUDE THE EXTRAPOLATED OPINION
TESTIMONY OF CLAIMANT’S ARCHITECTURAL EXPERT,
ARCHITECTURAL EXPERT**

Respondent and Third-Party Claimant BUILDER (hereinafter referred to as “BUILDER”), through its attorneys, Higgins, Hopkins, McLain & Roswell, LLC, and pursuant to the Colorado Uniform Arbitration Act and the Colorado Rules of Civil Procedure, submits this Motion to Preclude the Extrapolated Opinion Testimony of the HOA’s Architectural Expert, ARCHITECTURAL EXPERT, as follows:

Certificate of Compliance

The undersigned hereby certifies that counsel for BUILDER has not conferred with counsel for the Condominium Association, Inc. (the “HOA”) as such conferral would be useless given the relief herein sought.

Introduction

According to the most recent report prepared by ARCHITECTURAL EXPERT (“ARCHITECTURAL EXPERT”), he was hired by the HOA to prepare a preliminary defect list and repair recommendations. See Defect List & Repair Recommendations, dated May 25, 2010, true and correct portions of which are attached hereto as Exhibit “A.”¹ ARCHITECTURAL EXPERT asserts that his defect list and repair recommendations are based on defects observed during visual inspections and/or destructive testing, conducted on July 11-13, 2006, September 6-8, 2006, January 28-30, 2008, and February 24-26, 2010. Id. at p. 3. In this motion, BUILDER will demonstrate that this assertion is both inaccurate and highly misleading.

As the Claimant has indicated that ARCHITECTURAL EXPERT will testify consistent with the opinions set forth in his expert report,² the Arbiter should enter an order precluding ARCHITECTURAL EXPERT from offering opinion testimony based on extrapolation at the arbitration for the reasons to be discussed in detail below.

Background

This case involves the HOA’s claims of construction defects in connection with the development known as XXXXXX (hereafter “PROJECT”), which was constructed during the approximate timeframe of 2002-04. The PROJECT community is a condominium development comprising 29 residential buildings with 172 individual units. There are two additional buildings: a mail kiosk and a pool building.

¹ ARCHITECTURAL EXPERT’s report totals 197 pages in length. In the interest of judicial economy and efficiency, undersigned counsel has attached only those portions of Dinslage’s report that exemplify the arguments raised in this motion.

² See Claimant’s Amended First C.R.C.P. 26(a)(2)(B)(I) Expert Witness Disclosures.

The HOA filed suit against BUILDER on October 15, 2007 in the District Court for Arapahoe County. On April 24, 2009, Judge Wheeler ordered that the case between the HOA and BUILDER be determined by arbitration pursuant to provisions in the recorded Declaration of Covenants, Conditions and Restrictions pertaining to PROJECT.³ By prior written stipulation between the parties and filed with the Arbiter, this arbitration case is governed by Colorado substantive law, the Colorado Rules of Civil Procedure, and the Colorado Rules of Evidence.

Summary of Argument

Pursuant to Colorado Rule of Evidence 702, ARCHITECTURAL EXPERT's proffered expert opinion testimony should be precluded from the arbitration as unreliable, not useful to the Arbiter, and because its probative value is substantially outweighed by unfair prejudice.

Argument

A. C.R.E. 702 should govern an arbiter's determination as to whether scientific or other expert testimony should be admitted.

In 2001, the Colorado Supreme Court held that Colorado Rule of Evidence 702 governs a trial court's determination as to whether expert testimony should be admitted. See People of the State of Colorado v. Shreck, 22 P.3d 68, 70 (Colo. 2001). "Such an inquiry should focus on the reliability and relevance of the proffered evidence and requires a determination as to (1) the reliability of the scientific principles, (2) the qualifications of the witness, and (3) the usefulness of the testimony to the jury." Id.; see People v. Lehmkuhl, 117 P.3d 98 (Colo. App. 2004). When applying C.R.E. 702 to

³ Pursuant to the provisions of C.R.S. § 13-22-201, *et seq.*, all construction defect claims of the HOA were determined to be outside of the jurisdiction of the district court, and the HOA commenced this arbitration action on January 21, 2010.

determine the reliability of evidence, a trial court's inquiry should be broad in nature and consider the totality of the circumstances presented by each specific case.

More recently, the Colorado Court of Appeals described the focus of a C.R.E. 702 inquiry as "whether the substance of the testimony will be helpful to the trier of fact and whether the witness is qualified to render an expert opinion on the subject in question." See Snizek v. Colorado Dept. of Revenue, 113 P.3d 1280, 1284 (Colo. App. 2005). Here, the HOA disclosed ARCHITECTURAL EXPERT as an expert in its amended first C.R.C.P. 26(a)(2)(B)(I) expert witness disclosures. As such, C.R.E. 702 should govern the Arbiter's determination as to whether ARCHITECTURAL EXPERT's opinion testimony based on extrapolation is admissible at the arbitration. The Arbiter should focus on the reliability of the principles or methodology underlying ARCHITECTURAL EXPERT's defect list and repair recommendations, whether ARCHITECTURAL EXPERT is qualified to prepare a defect list and repair recommendations utilizing extrapolation, and whether ARCHITECTURAL EXPERT's opinion testimony based on extrapolation is useful to the Arbiter. Additionally, the Arbiter should focus on whether the probative value of ARCHITECTURAL EXPERT's extrapolated opinion testimony is substantially outweighed by the danger of unfair prejudice.

B. The methodology underlying ARCHITECTURAL EXPERT's defect list and repair recommendations is not reliable.

In its analysis in Shreck, the Colorado Supreme Court instructed that, in determining whether the expert evidence is reliable, a trial court should first consider whether the scientific principles as to which the witness is testifying are reasonably reliable. Shreck, 22 P.3d at 77. However, the court in Shreck declined to mandate any particular set of factors a trial court must consider when making its determination of

reliability “[g]iven the flexible, fact-specific nature of the inquiry.” Id. Instead, the Shreck court identified factors other courts have considered when making a Rule 702 determination. Those factors include:

- 1) whether the technique can and has been tested;
- 2) whether the theory or technique has been subjected to peer review and publication;
- 3) the scientific theory’s known or potential rate of error, and the existence and maintenance of standards controlling the technique’s operation;
- 4) whether the theory has been generally accepted;
- 5) the relationship of the proffered theory to more established modes of scientific analysis;
- 6) the existence of specialized literature dealing with the technique;
- 7) the non-judicial uses to which the technique are put;
- 8) the frequency and type of error generated by the theory; and
- 9) whether such evidence has been offered in previous cases to support or dispute the merits of a particular scientific procedure.

Id. (quoting Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579 (1993) and United States v. Downing, 753 F.2d 1224, 1238-39 (3d Cir. 1985)).

In its holding, the Colorado Supreme Court indicated that, when making a reliability determination, a trial court may, but need not consider any or all of the factors enumerated above, depending on the “totality of the circumstances of a given case.” Shreck, 22 P.3d at 78. A trial court may also consider other factors not identified above, if helpful in determining the reliability of the proffered expert evidence. Further guidance on the reliability requirement for the admission of expert testimony can be found in the Daubert case. There, the United States Supreme Court indicated that, when faced with the proffer of scientific expert testimony under Rule 702, the trial judge must make a preliminary assessment of whether the underlying scientific reasoning or methodology is valid and can properly be applied to the facts at issue. Daubert, 509 U.S. at 580.

The trial court's preliminary assessment has subsequently been referred to as the Daubert gatekeeping obligation. Although the Daubert case itself pertained to scientific evidence, the United States Supreme Court later held that the Daubert gatekeeping obligation is applicable to all expert testimony. See Kumho Tire Co., Ltd. V. Carmichael, 526 U.S. 137 (1999). In Kumho, the court also held that the Daubert factors, identified above, may apply to the testimony of engineers and other experts who are not scientists. Id. at 138. With regard to the standard of evidentiary reliability established by Rule 702, the Kumho court stated:

It requires a valid . . . connection to the pertinent inquiry as a precondition to admissibility. . . . And where such testimony's factual basis, data, principles, methods, or their application are called sufficiently into question . . . the trial judge must determine whether the testimony has a reliable basis in the knowledge and experience of the relevant discipline.

Id. at 149.

In Kumho, the issue concerned the use of respondents' tire failure analyst's two-factor test and his related use of visual/tactile inspection to draw conclusions on the basis of small observational differences. Id. at 157. The Kumho court noted it found no indication in the record that other experts in the industry use the two-factor test or that tire experts normally make very fine distinctions regarding the symmetry of greater shoulder tread wear observed to support their conclusions. Whilst the respondents' tire failure analyst claimed his method was accurate, "nothing in either Daubert or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert." Id. (quoting General Electric Co. v. Joiner, 522 U.S. 136, 146 (1997)).

Here, ARCHITECTURAL EXPERT's report contains virtually no narrative to explain the methodology he employed to prepare his defect list and repair recommendations. Rather, his report is organized by categories of alleged defects and, within each category, he has identified issues relative to said category of defect, which total approximately 150 issues.⁴ Under each alleged discrete defect issue, ARCHITECTURAL EXPERT provides the number of addresses or buildings where he and/or his associates actually investigated for the particular issue, the number of addresses or buildings where the alleged defect was observed, and a number of addresses or buildings where he predicts the alleged defect exists. It is this predictive number, which ARCHITECTURAL EXPERT refers to as "projected defective," that is flawed as a result of his unreliable methodology.

At his deposition, ARCHITECTURAL EXPERT referred to his methodology as a "straight line extrapolation." Id. at p.37:16-24. He agreed that his "straight line extrapolation" involves nothing more than the taking of a sample of varying sizes to attempt to predict mathematically or numerically what the sample tells him about the PROJECT project as a whole. Id. at p.74:12-22. As such, the basis for ARCHITECTURAL EXPERT's defect list and repair recommendations can be more accurately described as "straight-line speculation." In other words, ARCHITECTURAL EXPERT has performed an estimated 150 extrapolations in the preparation of his preliminary defect list as well as 150 extrapolations in the preparation of his repair recommendations. See Exhibit "B," p.51:12-14.

⁴ See Defect List & Repair Recommendations, Exhibit "A"; see also Deposition of ARCHITECTURAL EXPERT, dated July 20, 2010, p.50:15-51:11, true and correct copies of the relevant portions are collectively attached hereto as Exhibit "B."

At his deposition, ARCHITECTURAL EXPERT explained that his “straight line extrapolation” methodology involved the creation of a simple ratio. Id. at p.83:24-84:3. That is, the number of addresses or buildings inspected divided by the number of defects observed to obtain a percentage, which was then used to multiply or “extrapolate” the number of defects throughout the rest of the project.⁵ ARCHITECTURAL EXPERT agreed that he did not have to bring any experience to bear with regard to this simple ratio. Id. at p.84:4-8. Rather, all he had to do was plug the numbers into a calculator. In fact, ARCHITECTURAL EXPERT agreed that there was not a single extrapolation throughout his report that was explained other than to simply provide a calculated ratio. Id. at p.84:15-19.

- a. Claimant bears the burden of establishing its damages by a preponderance of competent evidence.

Essentially, ARCHITECTURAL EXPERT is attempting to make projections about the presence of construction defects throughout the PROJECT project with the use of his calculated ratio or “straight line extrapolation.” He also uses his calculated ratio to make his repair recommendations, which serve as a basis for the cost of repair damages Claimant seeks. Notably, Claimant bears the burden of establishing its damages by a preponderance of competent evidence. See Pomeranz v. McDonald’s Corp., 843 P.2d 1378, 1381 (Colo. 1993). Allowing Claimant to use ARCHITECTURAL EXPERT’s calculated ratio for purposes of projecting the presence of construction defects and/or resultant damage throughout the PROJECT project constitutes an improper shift of Claimant’s burden of proof. If ARCHITECTURAL EXPERT’s calculated ratio is

⁵ As will be discussed in more detail in this motion, ARCHITECTURAL EXPERT concluded his first day of deposition by testifying that his repair recommendations are often different than his extrapolated percentage defective.

allowed, the Claimant's burden of proof improperly shifts to BUILDER to disprove the existence of construction defects. However, the burden of proof is a fixed rule of law, and the burden never shifts from the party having the affirmative duty. See American Ins. Co. v. Naylor, 70 P.2d 349 (Colo. 1937). "The rule as to the burden of proof is important and indispensable in the administration of justice, and constitutes a substantial right of the party upon whose adversary the burden rests." Id. at 352. BUILDER should be allowed its substantial right as to the burden of proof resting upon the Claimant.

Further, Claimant bears the burden of proof with regard to proof of its damages. "The party seeking recovery must establish the nature and extent of damages with reasonable certainty. . . . The trier of fact may not base a judgment on speculation or guesswork, but must make a reasonable estimate of damage based upon the relevant data." See Harbor House Condominium Ass'n v. Massachusetts Bay Ins. Co., 703 F.Supp. 1313, 1318 (N.D. Ill. 1988).

The plaintiffs in Harbor House were seeking the replacement cost of an entire perimeter heating system for a 28-story building, containing 278 condominium units. Id. at 1314. However, the plaintiff had only located and repaired pipes in 23 of the building's 278 units at the time suit was filed. The plaintiffs had not located or repaired any pipes in the remaining 255 units. Instead, the plaintiffs abandoned the perimeter heating system and sought alternative methods for heating the building. Id. at 1316. In its lawsuit, plaintiffs sought recovery of the actual cash value of the entire perimeter heating system pursuant to a casualty insurance policy defendant had issued.

In the Harbor House case, the court indicated that the plaintiffs were not justified in speculating about their loss involving physical damage as the law required a higher

degree of proof with regard to physical damage. *Id.* at 1320. “Proof that damages have been suffered must be made ‘by credible evidence to a reasonable certainty’ and the amount of damages must be proven ‘at least to a reasonable probability.’” *Id.* at 1318 (*quoting Custom Automated Machinery v. Penda Corp.*, 537 F.Supp. 77, 85 (N.D. Ill. 1982)).

In its analysis, the Harbor House court was extremely critical of the plaintiff’s failure to visually inspect any of the pipes for which it was seeking recovery as well as plaintiff’s failure to locate any additional pipe damage. *Id.* at 1317. The court noted that, in the absence of an air pressure test and subsequent visual inspection of any damaged pipe, the record contained no competent evidence of additional pipe damage. “Thus, plaintiffs’ inability to quantify the extent of their damages was a result of their own conduct, not that of the defendant.” *Id.* at 1320. The Harbor House court indicated that plaintiffs were required to present physical evidence that tends to establish their loss to a reasonable degree of certainty and in such a form as to provide the trier of fact with a reasonable basis to compute an award.

Additionally, the court in Harbor House was critical of the plaintiffs’ expert testimony, referring to the same as “pure speculation.” *Id.* at 1318. Here, ARCHITECTURAL EXPERT’s proposed extrapolated opinion testimony is nothing more than pure speculation as he and/or the HOA failed to visually inspect all of the units and/or locate all of the resultant damage for which the HOA seeks recovery. In the absence of visually inspecting the units for the presence of alleged construction defects and resultant damage, the HOA submits ARCHITECTURAL EXPERT’s extrapolated defect list and repair recommendations. The methodology underlying

ARCHITECTURAL EXPERT's extrapolated defect list and repair recommendations is not reliable as he failed to adhere to any recognized statistical procedures, including the use of random samples, appropriate sample sizes, and hypothesis testing.⁶

Dr. STATISTICIAN, a professor of statistics at the University of Denver, was extremely critical of ARCHITECTURAL EXPERT's extrapolation methodology. Dr. STATISTICIAN's criticism includes ARCHITECTURAL EXPERT's use of non-randomized data, calculated from biased samples that were too small and inherently meaningless. According to Dr. STATISTICIAN, ARCHITECTURAL EXPERT's ratios cannot be used to make projections or generalizations about the PROJECT project as a whole "since they violate virtually every fundamental rule of estimation and inference in the science of statistics." See Exhibit "C," p. 4. As such, this Arbiter should enter an order precluding ARCHITECTURAL EXPERT's opinions based upon his "straight line extrapolations" as not reasonably reliable and inadmissible.

⁶ See Statistical Report of Dr. STATISTICIAN, dated September 30, 2010, p.4, a true and correct copy of portions thereof are collectively attached hereto as Exhibit "C."

b. ARCHITECTURAL EXPERT's extrapolated opinions use non-randomized and/or biased samples.

Initially, at his deposition, ARCHITECTURAL EXPERT testified that some of his testing locations were selected at random. See Exhibit "B," p. 36:19. Later, however, he explained what he had meant by the term "random." ARCHITECTURAL EXPERT explained that he would make a request of the Claimant's law firm to see a certain type of unit or certain element(s) of construction and the Claimant's law firm would compile a list of addresses from which he could select to inspect or destructively test. Id. at p.52:12-53:15. In other words, ARCHITECTURAL EXPERT apparently believes some sort of randomization of testing locations was achieved by selecting from the addresses the Claimant's law firm compiled. Id. at p.53:16-22. ARCHITECTURAL EXPERT did agree, however, that any degree of randomness achieved by his selection of an address or building from the list of addresses compiled by the Claimant's law firm was limited by two factors. Id. at p.71:15-p.72:15. The first limitation is the homeowner's willingness to allow the inspection or destructive testing to occur at their residence and the second is the law firm's willingness to allow the inspection or destructive testing to occur at a given residence.

When a sample is drawn in a non-random manner, sampling bias is automatically present. See Exhibit "C," p. 13. Use of a subjectively selected sample will render the results from the sample totally unreliable and unacceptable. Id. Additional bias can be introduced when identifiable factors may favor a specific outcome, such as the use of homeowner questionnaires in selection of units to be tested. When asked if he was given access to the homeowner questionnaires in this case, ARCHITECTURAL EXPERT

vaguely responded possibly but he could not recall. See Exhibit “B,” p.56:4-6. Dr. STATISTICIAN believes that the inclusion of approximately 80% of the residences where the homeowner surveys indicated complaints in ARCHITECTURAL EXPERT’s samples demonstrates probable sample bias. See Exhibit “C,” p. 13. As ARCHITECTURAL EXPERT’s samples were drawn in a non-random manner and likely include a sample bias, his samples are not valid to make projections about the PROJECT project as a whole and are inadmissible.

c. ARCHITECTURAL EXPERT’s sample sizes are too small.

At his deposition, ARCHITECTURAL EXPERT admitted that he had not set up a formal statistical model during the course of his work on this case. Id. at p.41:12-14. He admitted that his sample size was not statistically defined nor could he define what a statistically significant sample is. Id. at p.37:16-24; p.43:3-8. Importantly, in his report, ARCHITECTURAL EXPERT’s sample sizes vary within each category of alleged defects and some are as small as a sample size of 1 or 3. See Exhibit “A,” p. 50 (Issue 2.11), p. 98 (Issue 7.03), p. 176 (Issue 16.04). Issue 2.11 concerns allegedly improperly installed balcony drains, which ARCHITECTURAL EXPERT inspected and observed at only three addresses. See Exhibit “A,” page 51. While ARCHITECTURAL EXPERT inspected only three addresses for allegedly improperly installed balcony drains, he recommends repair for this issue at 173 balconies or at 100% of the balconies.

Similarly, Issue 7.03 concerns allegedly improperly driven trim fasteners through sliding glass door nail fins, which ARCHITECTURAL EXPERT inspected and observed at one address. Once again, while ARCHITECTURAL EXPERT inspected only one address for alleged improperly driven trim fasteners through sliding glass door nail fins,

he recommends repair for this issue at 173 balconies or at 100% of the balconies. Issue 16.04 concerns allegedly improper waterproof membranes at window potshelves, which ARCHITECTURAL EXPERT inspected and observed at three addresses. While ARCHITECTURAL EXPERT inspected only three addresses for allegedly improper waterproof membranes at window potshelves, he recommends repair for this issue at all vinyl windows at all units, or a total of 1,954 windows.

Notably, ARCHITECTURAL EXPERT's sample sizes also vary by unit of measure, *i.e.*, addresses vs. buildings. For the issues discussed above, ARCHITECTURAL EXPERT's unit of measure was by address. However, elsewhere in his report, his unit of measure is by building, such as the issues identified under category 1.0 for tile roofs. Dr. STATISTICIAN is highly critical of ARCHITECTURAL EXPERT's varying units of measure. See Exhibit "C," p. 7-9. Dr. STATISTICIAN notes that ARCHITECTURAL EXPERT incorrectly counts addresses or buildings when the item he is investigating is a more discrete element of construction, such as shingles on the roof, flashings, or doors. Dr. STATISTICIAN opines that the incorrect assignment of variables being tested alone will invalidate the results. Id. at p. 8. According to Dr. STATISTICIAN, when defects are counted as buildings or addresses, the actual variable data is diluted or aggregated and no longer indicates whether the observation includes one or more than one.

Dr. STATISTICIAN also notes a lack of evidence of any scientific calculation in ARCHITECTURAL EXPERT's sample sizes, referring to them as being "far too small." See Exhibit "C," p. 12. Sufficient sample sizes are essential for the sample to reliably predict any given characteristic of the larger group as a whole. Id. at p.16. Typically, a

sample size of 30 or greater is ideal. Given that ARCHITECTURAL EXPERT's samples lack randomization and more likely than not contain bias, his use of inadequate sample size further renders his extrapolations (used to prepare his defect list and repair recommendations) unreliable and inadmissible.

- d. ARCHITECTURAL EXPERT's methodology is neither sufficiently rigorous nor correct for making general projections.

Statistical methodologies exist that can provide precise procedures for making projections about a group of interest or a population, *i.e.*, interval estimation and hypothesis testing. See Exhibit "C," p. 19. Of course, these methodologies are based on unbiased random samples. ARCHITECTURAL EXPERT used neither methodology here. Dr. STATISTICIAN opined that ARCHITECTURAL EXPERT's simple ratio or "straight line extrapolation" is neither sufficiently rigorous nor correct for making general projections about the PROJECT project as a whole. Id.

The interval estimation approach is derived from observation and experiment, and proceeds in accordance with the following:

- 1) Define the population of interest;
- 2) Identify the random variable of interest;
- 3) Determine a desired level of confidence;
- 4) Determine an acceptable interval width for the estimate (such as $\pm 10\%$);
- 5) Calculate the estimated sample size;
- 6) Draw an unbiased random sample from the population; and
- 7) Calculate the interval estimate of the population proportion using the resulting sample proportion interval estimate.

Id. at p. 17.

The hypothesis testing approach is similar with the exception of stating a null hypothesis whereby a null hypothesis is stated about the general population that is

typically the opposite of what the researcher is interested in proving. The hypothesis testing approach proceeds as follows:

- 1) Define the population of interest;
- 2) Identify the random variable of interest;
- 3) State the null hypothesis and alternative hypothesis;
- 4) Determine a desired level of confidence;
- 5) Draw an unbiased random sample from the population;
- 6) Establish the acceptance/rejection criterion from alpha (probability of committing a Type I error or an error committed by rejecting a true null hypothesis) based on confidence level; and
- 7) Calculate the p-value from the sample result and test it against alpha. If the p-value is less than alpha, reject the null hypothesis and accept the alternative hypothesis.

Id. The p-value is the probability of observing the results indicated by the test, if the null hypothesis is true.

In the absence of visually inspecting the units for the presence of alleged construction defects and resultant damage, the HOA submits ARCHITECTURAL EXPERT's extrapolated defect list and repair recommendations. However, neither ARCHITECTURAL EXPERT's extrapolated defect list nor his repair recommendations are reliable. ARCHITECTURAL EXPERT's methodology fails to adhere to the recognized statistical procedures, discussed above, which are designed to ensure accuracy of the results, and includes the use of random samples, appropriate sample sizes, and hypothesis testing. Accordingly, this Arbiter should enter an order precluding ARCHITECTURAL EXPERT's opinions based upon his "straight line extrapolations" as not reliable and inadmissible.

C. ARCHITECTURAL EXPERT is not qualified to render an expert opinion based on extrapolation.

Colorado Rule of Evidence 702 requires a witness to be qualified as an expert by "knowledge, skill, experience, training, or education" to testify as an expert. See Shreck,

supra. Pursuant to Claimant's disclosure and ARCHITECTURAL EXPERT's testimony, he is an architect. See Exhibit "B," p.7:18-19. However, he employed extrapolation to prepare his defect list and repair recommendations in this case. ARCHITECTURAL EXPERT agreed that his extrapolation methodology involved the taking of samples of varying sizes in an attempt to predict mathematically or numerically the number of defects project wide at PROJECT, and from the number of extrapolated defects, he then extrapolated where repairs are necessary throughout the project. *Id.* at p.74:12-22. As the Merriam-Webster dictionary defines statistics as a branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data, BUILDER asserts that ARCHITECTURAL EXPERT must be qualified by knowledge, skill, experience, training or education in order to render an opinion based on a statistical analysis or extrapolation.

However, ARCHITECTURAL EXPERT is neither a mathematician nor a statistician. See Exhibit "B," p.37:9-24. He has never taken a formal course in statistics.⁷ *Id.* at p.44:14-16. Although he may have read articles pertaining to sample sizes in forensic investigations, ARCHITECTURAL EXPERT did not cite to any of those articles as a basis for his proposed expert opinions in this case. *Id.* at p.45:11-15. He has not attended any continuing education courses where statistics or statistical analysis was a portion of the program. *Id.* at p.50:10-14. He did not know what an interval of confidence is and thus, did not know how predictive his extrapolations were from a statistical analysis standpoint. *Id.* at p.69:7-24.

⁷ ARCHITECTURAL EXPERT did testify, however, that he had read articles regarding sample sizes in forensic investigations and had worked with statisticians on other projects. See Exhibit "B," p.44:20-45:7.

Rather, ARCHITECTURAL EXPERT confirmed he was writing his report as an architect. Throughout his first day of testimony, ARCHITECTURAL EXPERT repeatedly admitted that he “was not a statistician.” Id. at p.37:16-24, p. 42:15-20, p. 69:18-24, p. 75:17-24, p. 86:9, 14, p. 134: 9-13, p. 135:1-4. ARCHITECTURAL EXPERT admitted that he had not done anything to test his extrapolated numbers to verify accuracy. Id. at p. 75:8-24. He testified that he is not crunching numbers to determine degrees of probability. Id. Rather, he testified that he was relying on his architectural experience to ensure the accuracy of his extrapolations. When asked if he knew whether the term “extrapolation” had any meaning in the field of statistics, ARCHITECTURAL EXPERT did not know. Id. at p. 134:1419. He went onto testify that “[a]gain, you’re asking someone who is not a statistician, who has not studied statistics. You’re asking me questions about statistics. I don’t know. I’m not a statistician.” Id. at p. 135:1-4. In accordance with his own testimony, ARCHITECTURAL EXPERT is not qualified to render an expert opinion based on the extrapolated presence of construction defects and the extrapolated extent of repairs associated with the alleged defects. As a result, this Arbiter should enter an order precluding ARCHITECTURAL EXPERT from offering any opinion testimony based on extrapolation as inadmissible as he lacks the requisite qualifications to testify thereto.

D. ARCHITECTURAL EXPERT’s extrapolation-based opinion testimony would not be helpful to the Arbiter.

Colorado Rule of Evidence 702 also requires the expert testimony to assist the trier of fact to understand the evidence or determine a fact in issue. “The pivotal question trial courts must answer when exercising discretion concerning the admissibility of proffered expert testimony pursuant to C.R.E. 702 is whether ‘on this subject can a jury

from this person receive appreciable help.” People v. Miller, 981 P.2d 654, 659 (Colo. App. 1998) (*quoting* People v. Williams, 790 P.2d 796, 798 (Colo. 1990)).

For the reasons demonstrated above, ARCHITECTURAL EXPERT’s opinion testimony based on flawed extrapolations concerning the existence of defects and further flawed extrapolations regarding his recommended repairs is not be helpful to the Arbiter. Dr. STATISTICIAN believes that ARCHITECTURAL EXPERT’s extrapolations cannot be used to make projections about the PROJECT project as a whole “since they violate virtually every fundamental rule of estimation and inference in the science of statistics.” See Exhibit “C,” p. 4. Dr. STATISTICIAN opined that the application of ARCHITECTURAL EXPERT’s extrapolations have, not surprisingly, resulted in projections that have no more bearing or validity on the real percentages of defects at PROJECT “than rolling the dice.” Id. “The lack of randomization, the presence of extreme bias, and insufficient sample sizes combine to invalidate almost all of the defect ratios in the Adcock [ARCHITECTURAL EXPERT] report as predictors.” Id. at p. 16. Moreover, Dr. STATISTICIAN is critical of ARCHITECTURAL EXPERT’s math, “[r]ounding is not acceptable in statistics.” Id. at p. 20. Such error is then compounded when the rounded percentages are used together.

As a result, ARCHITECTURAL EXPERT’s findings are highly suspect and thus, cannot assist the Arbiter to understand or determine the extent of the alleged construction defects that actually exist at the PROJECT project.

E. The probative value of ARCHITECTURAL EXPERT’s extrapolation-based opinion testimony is outweighed by the danger of unfair prejudice.

Additionally, in Shreck, the Colorado Supreme Court instructed a trial court to also apply its discretionary authority under C.R.E. 403 to confirm that the probative value

of the expert evidence is not substantially outweighed by unfair prejudice. People v. Shreck, 22 P.3d at 70. A trial court is required to issue specific findings upon its analyses under C.R.E. 702 and 403. Id. Certainly, the probative value of ARCHITECTURAL EXPERT's opinion testimony based on extrapolation is substantially outweighed by unfair prejudice given his use of an unreliable and flawed methodology to prepare his defect list and repair recommendations. Accordingly, the Arbiter should enter an order precluding ARCHITECTURAL EXPERT from presenting testimony at the arbitration that is based upon extrapolation.

Conclusion

For the reasons discussed above, the Arbiter should enter an order whereby ARCHITECTURAL EXPERT's straight line extrapolation methodology is deemed unreliable, not helpful to the Arbiter and his opinions based thereon inadmissible. Additionally, the Arbiter should enter an order whereby ARCHITECTURAL EXPERT is deemed not qualified to testify with regard to any type of statistical analysis or extrapolation is utilized to determine the existence of alleged construction defects at the PROJECT project. Additionally, or in the alternative, the Arbiter preclude ARCHITECTURAL EXPERT's opinion testimony based on extrapolation as the probative value of such proposed testimony is certainly outweighed by the danger of unfair prejudice, given the unreliable nature of ARCHITECTURAL EXPERT's extrapolation methodology.



May 11 2011
4:01PM

[REDACTED] Denver, Colorado 80202 [REDACTED]	▲ COURT USE ONLY ▲ [REDACTED]
In Re the Arbitration of: [REDACTED] CONDOMINIUM ASSOCIATION, INC., a Colorado non-profit corporation; Claimant, v. [REDACTED] — [REDACTED], a Colorado corporation; Respondent and Third-Party, v. [REDACTED], et al. Third-Party Respondent.	
[REDACTED]	
ORDER REGARDING MOTION TO EXCLUDE EXTRAPOLATED OPINION TESTIMONY OF CLAIMANT ARCHITECTURAL EXPERT [REDACTED]	

This matter was heard by the Arbiter on April 13-15, 2011. Counsel presented argument, and the Arbiter received the testimony of [REDACTED], [REDACTED], Ph.d. (statistician) and [REDACTED], Ph.d. (statistician). The Arbiter has considered the testimony, the arguments of counsel, and the motion, response and reply. Being sufficiently informed the Arbiter finds and ORDERS as follows.

During the course of the proceedings, the parties entered into several stipulations. Claimant withdrew damages claims for some alleged defects and Respondent withdrew objections to Mr. [REDACTED]'s conclusions about other defects. Those stipulations are contained within the court reporter's record and are adopted by the Arbiter. Those stipulations are also reflected, to an extent, in subsequent filings by the parties. The chart included in Plaintiff's Position Statement Regarding Status of Claims and Extrapolation Hearing lists alleged defects included in Mr. [REDACTED]'s report which have been dropped by Plaintiff. Plaintiff's withdrawal of claims is adopted by the Arbiter. Likewise, [REDACTED] has set forth issues [REDACTED] concedes are not based on extrapolation, and thus not the subject of this motion, in Section II of the exhibit to Post-Hearing Position Statement of Respondent [REDACTED] Regarding Extrapolation Issue to be Determined Under Motion Filed Pursuant to C.R.E. 702. The Arbiter accepts [REDACTED]'s exclusion of those issues.

Claimant is required to prove the existence of "actual," not potential or probable, damages. It must prove the violation of code or of the standard of care that constitutes the defect. Plaintiff is restricted to recovering for actual damages or actual loss of use caused by the defects proven. C.R.S. § 12-20-804 (1); *A.C. Excavating v. Yacht Club II Homeowner's Assn*, 114 P.3d 862, 868 (Col. 2005).

Some courts have allowed the admission of valid and reliable statistical evidence as some evidence of the existence of construction defects. In the real world, some use of statistical probabilities makes sense, both for economic and convenience reasons. If destructive testing is required to determine the existence of a defect, extremely costly destructive testing and the subsequent repair/replacement would have been done, even if

no defect was found. Statistical evidence is inherently evidence of probability, not of actual damages, as is clear from the testimony of both experts. The entire science of statistics is about determining probabilities. This is also recognized in Mr. [REDACTED]'s report when his first recommendation for many categories of alleged defects is to "inspect" for the existence or scope of defect, and to "assume" existence of a projected amount of repairs.

Other Courts have held that the burden of proof is on the Claimant to prove the existence of "actual" defects and since "probability" is not the standard of proof, statistics are not admissible. Admitting statistics evidence allows Plaintiff/Claimant to shift the costs of determining the existence of defects to the Defendant/Respondent by requiring inspection/investigation to prove the absence of defects.

Expert opinion testimony is admissible if it is both relevant and reliable. *People v. Shreck*, 22 P.3d 68 (Colo. 2001). One of the prongs of the *Shreck* test is that the witness is qualified to opine on such matters. Mr. [REDACTED] is clearly qualified to testify as an expert in architecture. The issue is whether he can testify as to the extrapolation/statistics. He testified repeatedly that he is not a statistician and was not intending to apply a statistical analysis, merely an estimate based on his experience. He is not qualified as a statistician, and mere estimate is hardly evidence. To the extent, his calculations are not based on a recognized and applicable scientific methodology, the calculations do not meet the *Shreck* criteria.

A second prong of the *Shreck* test is whether the scientific principles the witness is testifying to are reliable. Dr. [REDACTED] testified generally in support of Mr. [REDACTED]'s methodology, i.e. qualitative analysis is an appropriate methodology. However,

qualitative analysis is used to find the source of problems once there is evidence to show a problem exists. For example, if there are water spots indicating a leaking roof, it is appropriate to focus attention on joints, valleys, penetrations. Subsequently, qualitative analysis may also be appropriate to estimate the cost of repair. Even Dr. [REDACTED] acknowledged that qualitative analysis is not a good process for determining the prevalence of a defect. It does not work well to establish the fact of damage and does not address causation. Unfortunately, Claimant's attempted use of the report is to submit Mr. [REDACTED]'s numbers as proof of the existence of damages beyond those actually observed, and the report assumes causation.

Dr. [REDACTED] had multiple criticisms of Mr. [REDACTED]'s efforts to quantify damages. He certainly agreed with Dr. [REDACTED] that the qualitative approach was not usable to determine prevalence of defects. The Arbiter found many of those criticisms persuasive, including those discussed below. The sampling was small and not random. Further, there is an ASTM Guideline for randomization in contexts such as this case which was not used. Mr. [REDACTED] was directed toward observations of locations/problems by counsel. Counsel had questionnaires that had been completed by 50% of owners identifying complaints. Eighty percent of the defects examined by [REDACTED] and included in his report were those referenced in completed questionnaires. As acknowledged by the statisticians, units that owners had identified as having problems will have more problems than those units that the owners have not identified as having any problems. Thus, the sampling is skewed in a fashion that exaggerates the prevalence of defects. That increases the danger of unfair prejudice in a C.R.C.P. Rule 403 analysis (prong four of *Shreck*). Mr. [REDACTED]'s report also inappropriately aggregates different types of

defects (for example in windows). The aggregate is based on examination of a small number of samples with overlapping problems. Each defect is counted separately, even if one window has three different types of defects. Then all window defects, of whatever type, are compiled and used to calculate a percent. That percent is then used to predict the number of defective windows in the entire project. Mr. [REDACTED] also inconsistently defines the component containing the defect in a manner that exaggerates the percentage of defects, i.e. one window out of 1900+ is a small percent of defective windows. However, one window out of 72 units or 29 buildings is a larger percent with defects. The larger percent is then used as the multiplier to determine the amount of repairs allegedly needed. Again, the methodology is skewed in a fashion that exaggerates the “probability” of further defects. The Arbiter also found the circularity of analysis questionable. There are some defect categories identified with so many alleged problems in sub-categories that just replacing everything is deemed appropriate. Then [REDACTED] fails to quantify or make specific recommendations for defects in the sub-categories because the global repair has already been recommended.

Even assuming that a reliable statistical analysis showing probability of prevalence of a defect could legally substitute for proof of (or be some evidence of) actual defect, the methodology used does not rise to the necessary level of reliability.

The Arbiter finds that the extrapolations of Mr. [REDACTED] will not be of assistance to the trier of fact (prong three of *Shreck*). Further, the probative value of the extrapolations is outweighed by the danger of unfair prejudice, because the methodology used consistently exaggerates the potential prevalence of defects.

That exaggeration could result in an erroneously large number of defects being “assumed” (██████’s recommendation language); then a dollar amount awarded for that “assumed” number. When ██████’s recommended inspection is done, if the “assumed” number of repairs are not needed, the excess dollars awarded in the arbitration would be a windfall to Claimant. Respondent would have paid for non-existent defects; that is the potential prejudice caused by the methodology.

The methodology purportedly used is not appropriate for the purpose proffered by plaintiffs. What Mr. ██████ did in his analysis did not reliably apply the principles or methodology of the type of statistical analysis which would have been appropriate to the facts or data. The small samplings provided insufficient data to support reliable conclusions. Mr. ██████ is not qualified to do a statistical analysis. The lack of reliability means that the danger of unfair means that the danger of unfair prejudice outweighs any potential usefulness of the opinions to the finders of fact.

ORDER

Mr. ██████ may testify as an architect. He may even testify that, in his experience, when there are defects in observed units, there are often additional defects found in other units. He may not use extrapolated numbers to project the prevalence of such defects, nor the number of total repairs needed as a result of the projected number of defects. If the opinion is not based on extrapolation, it may be proffered. If the opinion is covered by other repairs, and those repairs are for defects not based upon extrapolation, it may be proffered. If the opinion is based on other evidence, such as ██████’s testimony that none of the pot shelves have waterproof membranes, it may be proffered.

Mr. [REDACTED] may not testify as to any statistical probability that his estimates are accurate.

Entered this th 11 day of May, 2011.

[REDACTED]

4. THE E WORD (EXTRAPOLATION)



4. EXTRAPOLATION

The E Word (Extrapolation)

- Definitions
- To fix or not to fix, that is the question!
- When can we extrapolate?
- When can we NOT extrapolate?
- Extrapolation: How To
- Case Study



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4. EXTRAPOLATION

Definitions

1. Extrapolate: (1.) Extend the application of (a method or conclusion, esp. one based on statistics) to an unknown situation by assuming that existing trends will continue or similar methods will be applicable. (2.) Estimate or conclude (something) in this way. (3.) Extend (a graph, curve, or range of values) by inferring unknown values from trends in the known data
2. Biased: (1.) Show prejudice for or against (someone or something) unfairly. (2.) Influence unfairly to invoke favoritism.
3. Data: (1.) Facts and statistics collected together for reference or analysis. (2.) Things known or assumed as facts, making the basis of reasoning or calculation.
4. Information: (1.) Facts provided or learned about something or someone. (3.) What is conveyed or represented by a particular arrangement or sequence of things.

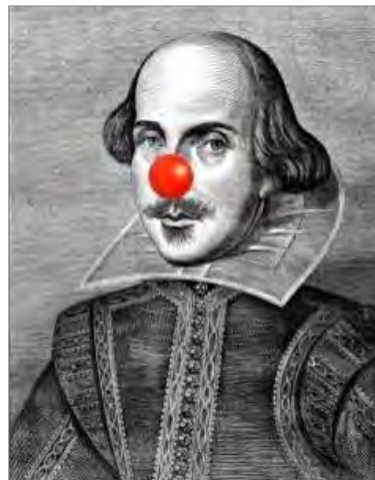
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4. EXTRAPOLATION

To fix or not
to fix, that is
the question!



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4. EXTRAPOLATION

When can we extrapolate?

We can extrapolate when:

1. ... the population being extrapolated to is consistent.
2. ... the testing sample is genuinely representative.
3. ... we have lots of good, unbiased data.
4. ... we selected the locations at random.



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4. EXTRAPOLATION

When can we NOT extrapolate?

We can NOT extrapolate when:

1. ... the population being extrapolated to is NOT consistent.
2. ... the testing sample is NOT genuinely representative.
3. ... the data is biased.



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4. EXTRAPOLATION

Extrapolation: How To

1. Decide on the pass-fail criteria for each Issue or test assembly.
2. Summarize the testing data, create information, including calculating the percentage of locations performing at various performance levels (pass vs. fail).
3. Consider graphic depiction of the data. Information (patterns of performance) often emerges that might not otherwise.
4. For each Issue consider 14 Questions from PFCS' *Analyzing Construction Defects*, especially: Where and how many times is it alleged? Is the assembly performing as the Owner might hope? Is the assembly performing as we should expect? Is it a defect? Is it causing damage? Is a repair required? What is a reasonable repair? How much will the repair cost?



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4. EXTRAPOLATION

Extrapolation: How To

5. Consider the practicality of repairing only a percentage of the locations. How will the people making the repairs decide which ones to repair? Are there visual clues like deteriorated sealant? For example: If 20% of windows tested leak, then how will it be decided which 20% get repaired? Is there a visual indication of a performance problem prior to testing?
6. Document the number of conditions in the population which are similar to those tested.
7. Apply professional judgment in interpreting the information to create a real, practical solution to any problems uncovered in the testing.
8. Remember that the best use of extrapolation is usually in figuring out what NOT to fix. Anyone can say "remove and replace everything."



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4. EXTRAPOLATION

Case Study

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4. EXTRAPOLATION

Case Study

Issue: Windows are leaking on a hotel with a harsh pacific coast exposure and require complete removal and replacement of all for approximately \$1.5 million.

Investigation, Analysis, Conclusion, Cost: PFCS observed visual evidence of leaks at most south-facing front elevation windows. We performed testing conforming with ASTM E2128 and AAMA 511 at 10% of the windows, selected at random. No damage was found at side or back elevations. We recommend reclad of the south elevation using a rain-screen system and new windows, but only replacement of the trim at 3 other elevations, for a cost of approximately \$400,000.

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P e t e F o w l e r
CONSTRUCTION
S e r v i c e s , I n c .

Investigation Recommendations

Date:	June 3, 2008
To:	CLIENT
From:	Pete Fowler Construction Services, Inc.
Project:	<i>Sample Project</i> PFCS Project No. 08-156 Address:
Regarding:	Investigation Recommendations
Note:	Confidential Attorney-Client and Attorney Work Product. Protected under all applicable evidence codes.

Dear Mr. Daly:

Please find our investigation recommendations below. Should you have any questions, please do not hesitate to contact our office.

1. *Standards*

We recommend conducting the investigation and any required testing in general conformance with the following standards:

- A. ASTM E2018 *Standard Guide for Property Condition Assessments*. This 19 page consensus standard offers a uniform method and systematic approach for conducting an assessment and reporting on the physical conditions of real property improvements by performing a walk-through and conducting research.
- B. ASTM E2128 *Standard Guide for Evaluating Water Leakage of Building Walls*. This 35 page consensus standard offers a uniform method and systematic approach for determining and evaluating the causes of water leakage in exterior walls. It refers to other applicable standards (including testing), performance expectations, and service history. It is, in essence, the application of recognized standards, logic and the scientific method to figuring out building problems.
- C. PFCS Building Performance Analysis Method as established in our seminar *Building Codes, Standards, Performance and Defects*, designed to cover the analysis of building performance from design, through construction and use.

2. *Pre-Inspection Analysis*

- A. Document Review is ongoing. We have collected and preliminarily reviewed several documents. As new documents are obtained we will continue.
- B. Issues List based on the Complaint and the Preliminary Defect List prepared by Western Architectural.
- C. Unit Matrix to include all units and buildings of the project by plan type and location.
- D. Inspection Checklists will be developed for interior and exterior inspections specifically related to the *Issues List*.

- E. Repair History investigation will be conducted primarily by analysis of available documentation. We will be looking for information through communications between the owners and associations, owners and developer, as related to the *Issues List*.
- F. Locations to be analyzed: Exterior visual observations at all unit exteriors and randomly selected interiors. The random selection ensures accurate extrapolation of our findings. If necessary, testing may be conducted at various locations.
- G. Allegations: The allegations to be analyzed by the research plan are based on the *Issues List* as created from the Complaint and Preliminary Defect List created by Western Architectural.
- H. Random Selection Protocol: PFCS would like to visually inspect 30% of the units (10 units total). Our random selection plan allows for an accurate extrapolation of our findings. If testing is necessary, it will be performed in a similar manner.

3. *Visual Inspections*

- A. Exterior visual inspections of all buildings and units. Please allow 2 hours per building (approximately 34 hours total).
- B. Interior visual inspections of 30% (10) of the units, identified at random. Please allow 1-1/2 hours per unit (approximately 15 hours total).
- C. Document observations with photographs, notes, sketches and diagrams.

4. *Preliminary Analysis*

- A. Review and summarize testing data and reporting by others (plaintiff, experts, etc.).
- B. Review and summarize visual inspections by others (plaintiff, experts, etc.).
- C. Analyze further investigation or testing requirements.
- D. Report findings of visual inspections, review of data from other sources and recommendations for testing, identifying potential locations and methods.

5. *Testing (Future)*

- A. Conduct testing as necessary, which will be outlined in our Testing Protocol.
- B. Analyze testing and summarize.

6. *Final Analysis (Future)*

- A. Compose final report of findings.
- B. Make repair recommendations.
- C. Compose construction estimates based on repair recommendations as needed.

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Testing Summary

#	Date	Who	PFCS Attend	DT No.	ABC / XB number	Phase	ABC / XB BLDG*	PFCS BLDG	Unit	Elevation	Testing Location	Description of Testing	SWI*	Damage	PFCS Observations
1	1/18/2008	XB		14.01	XB 6.01	1		26	7198 NE StoneXBter Street	Left	Window - 1st Level	Remove window sill trim at 1st level window.			Weather Resistive Barrier (WRB) lapped over, rather than under sill nailing fin (reverse lapped). No Damage.
2	1/18/2008	XB		14.02	XB 6.02	1		26	7198 NE StoneXBter Street	Left	Window - 1st Level	Remove window header trim at 1st level window, arched opening.			Head flashing sealed to siding. Vertical leg of flashing over WRB, reverse lapped. No Damage.
3	1/18/2008	XB		14.03	XB 6.03	1		26	7198 NE StoneXBter Street	Left	Window - 2nd Level	Remove trim components at sill, jambs, and header trim.			Per XB, rough opening of windows is not flashed. WRB reverse lapped over window sill. No Damage.
4	1/18/2008	XB		14.04	XB 6.04	1		26	7198 NE StoneXBter Street	Left	Window - 2nd Level	Remove window header trim at 2nd level window.			Flashing components sealed to siding. Vertical leg of flashing installed over WRB. No Damage.
5	1/18/2008	XB		14.05	XB 6.05	1		26	7198 NE StoneXBter Street	Front	Window - 1st Level	Remove window header trim at 1st level window.			Vertical leg of flashing reverse lapped over WRB. Flashing component sealed to siding. No Damage.
6	1/18/2008	XB		14.06	XB 6.06	1		26	7198 NE StoneXBter Street	Front	Window - 1st Level	Remove window sill trim at 1st level window.			WRB reverse lapped over window sill nailing flange. No Damage.
7	1/18/2008	XB		14.07	XB 6.07	1		26	7198 NE StoneXBter Street	Front	Siding at Foundation	Remove siding at entry flatwork			Concrete flatwork poured against siding. No Damage.
8	1/18/2008	XB		14.08	XB 6.08	1		26	7196 NE StoneXBter Street	Front	Exterior Bay Window - 1st Level	Remove window sill trim and jamb trim components.			XBter staining at surface of WRB. No Damage to substrate.
9	1/18/2008	XB		14.09	XB 6.09	1		26	7196 NE StoneXBter Street	Front	Exterior Bay Window - 1st Level	Remove window header trim at 1st level window.			Vertical leg of flashing reverse lapped over WRB. Flashing component sealed to siding. No Damage.
10	1/18/2008	XB		14.10	XB 6.10	1		26	7190 NE StoneXBter Street	Back	Exterior Bay Window - 2nd Level	Removal of belly band trim and right jamb trim of window at 2nd level.		Y	Damaged OSB above belly band , and to right of window.
11	1/18/2008	XB		14.11	XB 6.11	1		26	7190 NE StoneXBter Street	Back	Belly Band	Removal of siding at 2nd level.			Per XB, elevated moisture content of 25.2%. OSB appears clean. No Damage.
12	1/18/2008	XB		14.12	XB 6.12	1		26	7190 NE StoneXBter Street	Back	Exterior Bay Window - 1st Level	Removal of belly band trim at 2nd level.			Organic growth identified on surface of belly band trim component. Unprimed end cuts on SPF trim board.
13	1/18/2008	XB		14.13	XB 6.13	1		26	7196 NE StoneXBter Street	Front	2nd floor SGD	Removal of trim components at head of SGD, and side jambs			Head flashing reverse lapped at WRB. No Damage.
14	1/23/2008	XB		15.01	XB 7.01	1		26	7196 NE StoneXBter Street	Front	Window - 1st Level	Removal of window head trim at 1st level window.			Head flashing reverse lapped at WRB. No Damage.
15	2/1/2008	XB		16.01	XB 8.06	1				Front	Window - 2nd Level	Removal of siding above belly band, under a 2nd level window.			Vertical leg of flashing reverse lapped over WRB. No Damage.
16	2/1/2008	XB		16.02	XB 8.07	1		27	7158 NE StoneXBter Street	Front	Exterior Bay Window - 1st Level	Remove window sill trim and jamb trim components.		Y	Damaged OSB at sill. Two window array, damaged OSB is at the sill, between the two windows.
17	2/1/2008	XB		16.03	XB 8.08	1		27	7166 NE StoneXBter Street	Front	Roof to XBll	Removal of siding above roof to XBll condition.		Y	Damaged OSB right at the transition. Photo indicates removed flashing, felt paper is not lapped onto vertical face.
18	2/8/2008	XB		17.01	XB 9.04	1		27	7166 NE StoneXBter Street	Front	Siding at Foundation	Removal of siding from grade to bottom of window sill.			Metal flashing installed to protect OSB within 6" of grade. No Damage.

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Testing Summary

#	Date	Who	PFCS Attend	DT No.	ABC / XB number	Phase	ABC / XB BLDG*	PFCS BLDG	Unit	Elevation	Testing Location	Description of Testing	SWI*	Damage	PFCS Observations
19	2/15/2008	XB		18.01	XB 10.01	1		27	7150 NE StoneXBter Street	Back	Diverter at Balcony	Remove HardiPanel behind and below gutter to XBll interface.	Y		Signs of XBter stains, below confined rake, to the right of window on OSB. No damage visible to substrate.
20	2/15/2008	XB		18.02	XB 10.02	1		27	7150 NE StoneXBter Street	Back	Belly Band	Removal of Belly band trim component and surrounding HardiPanel above and below.		Y	Signs of XBter stains at OSB. Damaged OSB behind belly band trim component.
21	2/15/2008	XB		18.03	XB 10.03	1		25	7191 NE Rocky Brook Street	Front	Exterior Bay Window - 1st Level	Removal of Hardi siding panels around window at build-out. Per XB sheathing		Y	Per XB, sheathing XBs removed due to XBter damage. Signs of XBter staining on rough framing components.
22	2/15/2008	XB		18.04	XB 10.04	1		25	7191 NE Rocky Brook Street	Front	Juliet Balcony Sill	Removal of metal cap at Juliet balcony / top of build-out.		Y	Damaged sheathing at Juliet balcony, top of build-out. Per XB, reverse lapped flashing with WRB.
23	2/15/2008	XB		18.05	XB 10.05	1		25	7185 NE Rocky Brook Street	Front	Juliet Balcony Sill	Removal of metal cap at Juliet balcony / top of build-out.		Y	Damaged sheathing at Juliet balcony, top of build-out. Per XB, reverse lapped flashing with WRB.
24	2/15/2008	XB		18.06	XB 10.06	1		25	7185 NE Rocky Brook Street	Front	Juliet Balcony Sill	Removal of Belly band trim component and surrounding HardiPanel above and below.	Y		XBter staining at sheathing. No Damage to substrate.
25	2/15/2008	XB		18.07	XB 10.07	1		25	7185 NE Rocky Brook Street	Front	Juliet Balcony Sill	Removal of build-out cap sheathing.		Y	Organic growth at interior gypsum board.
26	2/15/2008	XB		18.08	XB 10.08	1		27	7174 NE StoneXBter Street	Back	Roof to XBll	Removal of Hardi siding panels above roof-to-XBll transition, exposing sheathing at vertical XBll assembly.	Y		Slight XBter staining at sheathing. No Damage to sheathing substrate.
27	2/15/2008	XB		18.09	XB 10.09	1		25	7191 NE Rocky Brook Street	Back	Window - 1st Level	Remove window sill trim and siding below a two-window array, exposing exterior gypsum board.		Y	XBter damage to exterior gypsum sheathing below windows.
28	2/21/2008	XB		19.01	XB 11.06	1		27	7174 NE StoneXBter Street	Back	Fascia Board at Balcony	Removal of Hardi siding above garage door.	Y		XBter staining visible at sheathing. No Damage.
29	2/21/2008	XB		19.02	XB 11.07	1		27	7174 NE StoneXBter Street	Back	Siding at Foundation	Removal of Hardi siding panels near grade.		Y	Damaged sheathing due to proximity of product to grade.
30	2/29/2008	XB		20.01	XB 12.05	1		25	7185 NE Rocky Brook Street	Back	Siding at Garage	Removal of Hardi siding panels to left of garage door.	Y		Slight XBter staining at sheathing. No Damage to sheathing substrate.
31	2/29/2008	XB		20.02	XB 12.11	1		25	7193 NE Rocky Brook Street	Back	2nd floor SGD	Removal of SGD sill trim and Hardi siding to left of SGD jamb.			Deck flashing reverse lapped with SGD nailing flange. No Damage.
32	2/29/2008	XB		20.03	XB 12.12	1		25	7193 NE Rocky Brook Street	Back	Diverter Flashing at 1st Level	Remove HardiPlank behind gutter end.		Y	Damaged sheathing below confined rake. XBter intrusion behind diverter flashing.
33	2/29/2008	XB		20.04	XB 12.13	1		25	7193 NE Rocky Brook Street	Back	Diverter at Balcony	Removal of Hardi siding to the left of man door, at garage.	Y		Slight XBter staining at sheathing near the garage door header. Damage to sheathing substrate at 2nd garage door panel.
34	2/29/2008	XB		20.05	XB 12.15	1		25	7193 NE Rocky Brook Street	Back	Diverter at Balcony	Removal of roofing materials, and roofing felt paper at eave, to left of single car garage door.		Y	Damaged roof sheathing as a result of XBter intrusion, area of confined rake, and balcony gutter discharge onto roof. Damaged fascia behind gutter.
35	2/29/2008	XB		20.06	XB 12.16	1		25	7193 NE Rocky Brook Street	Back	Fascia Board at Balcony	Removal of gutter at balcony edge. Exposing framing components behind		Y	Damaged framing components behind balcony edge gutter, above garage. Damage noted.
36	2/29/2008	XB		20.07	XB 12.17	1		25	7193 NE Rocky Brook Street	Back	Diverter at Balcony	Exposing foundation sill plate to left of single car garage door, and below confined rake.		Y	Damage and XBter intrusion in this area is related to XB 12.12, overwhelmed confined rake condition. Damage to foundation sill plate.

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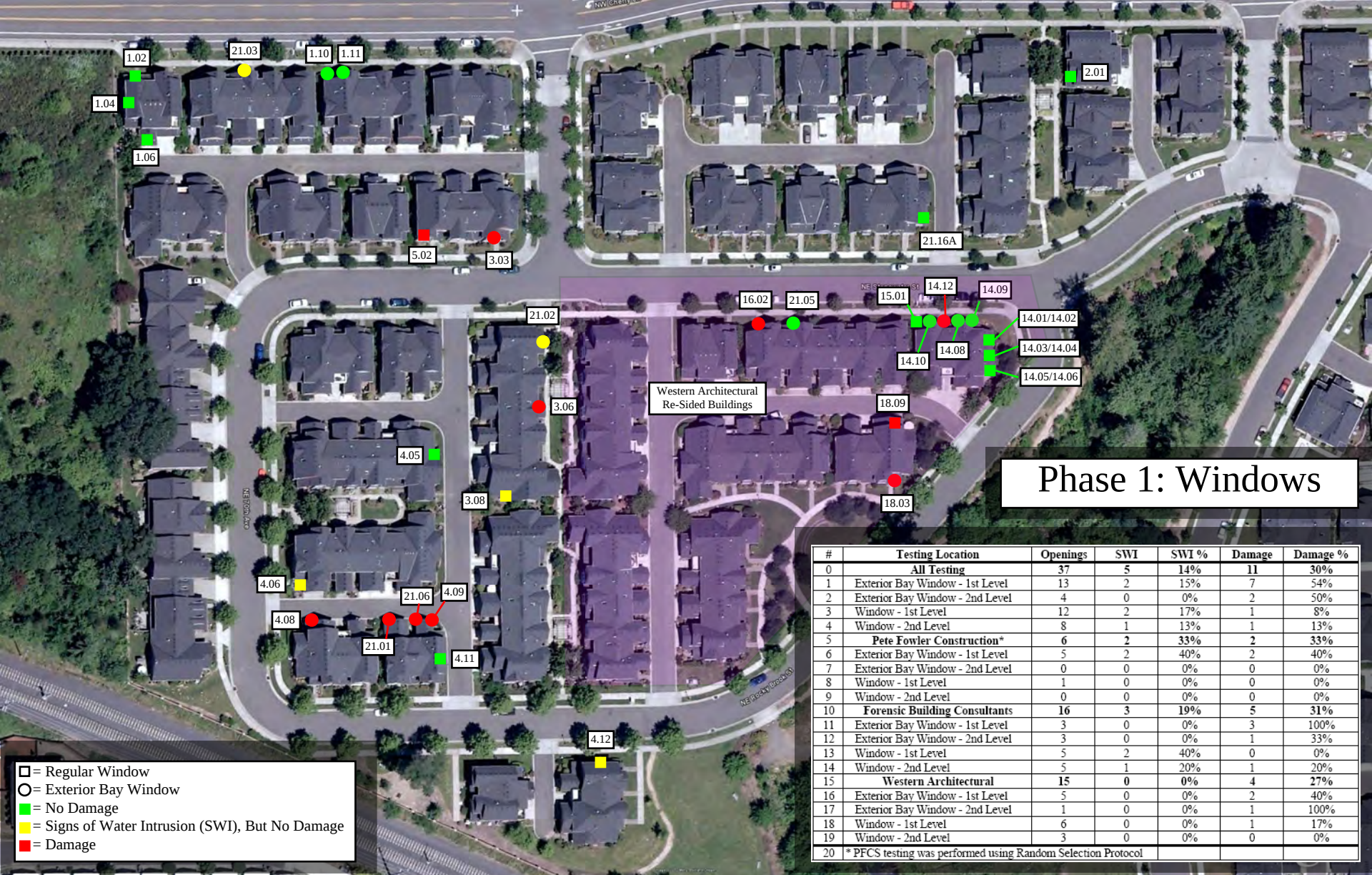
Testing Summary

#	Date	Who	PFCS Attend	DT No.	ABC / XB number	Phase	ABC / XB BLDG*	PFCS BLDG	Unit	Elevation	Testing Location	Description of Testing	SWI*	Damage	PFCS Observations
221	2/18/2010	PFCS	Y	24.07		3		86	7212 NE Stoneybrook Street	Front / West	Diverter Flashing at 2nd Level	Removal of siding panels behind gutter end cap, and below confined rake condition, to expose diverter location. (medium exposure location)			PFCS notes clean sheathing below diverter and behind gutter end cap. PFCS notes reverse lapped metal flashing at belly band. No SWI and No Damage.
222	4/28/2010	ABC	Y	25.01		3		72	798 NE 72nd Ave	Right / West	Window - 1st Level	Removal of siding panels around a 1st level window at head, sill, and jambs.			PFCS observed unprimed end cuts of sill trim board. PFCS notes proper integration of flashing components with WRB and window flanges. PFCS notes z-metal flashing over WRB.
223	4/28/2010	ABC	Y	25.02		3		72	798 NE 72nd Ave	Right / West	Dryer Vent	Removal of siding around dryer vent.			No SWI at unprimed trim components around dryer vent. Rough opening not flashed. Clean and dry Tyvek and OSB behind. No SWI, and No Damage.
224	4/28/2010	ABC	Y	25.03		3		73	782 NE 72nd Ave	Left / East	Window - 1st Level	Trim removal at head/sill/left jamb.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges.
225	4/28/2010	ABC	Y	25.04		3		74	799 NE 73rd Ave	Back / South	Window - 2nd Level	Removal of trim components around window.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges.
226	4/28/2010	ABC	Y	25.05		3		78	774 NE 72nd Avenue	Back	Window - 2nd Level	Removal of trim components around window and additional siding panel.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges. Clean and dry OSB around window.
227	4/28/2010	ABC	Y	25.06		3		79	736 NE 72nd Avenue	Right	Window - 1st Level	Removal of trim components around windows.	Y		PFCS observed primed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges. PFCS notes proper integration of z-flashing at window head.
228	4/28/2010	ABC	Y	25.07		3		82	705 NE 73rd Avenue	Front	Window - 1st Level	Removal of trim components around windows.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges.
229	4/28/2010	ABC	Y	25.08		3		83	7273 NE Stoneybrook Street	Right	Window - 1st Level	Removal of trim components around window and additional siding panel.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges. PFCS notes z-metal flashing over WRB.
230	4/28/2010	ABC	Y	25.09		3		89	7248 Stoneybrook Street	Left	Window - 2nd Level	Removal of sill trim component below a 2-window array at exterior bay, 2nd level.	Y		PFCS notes metal flashings at corners of sill. PFCS observed unprimed end cuts of sill trim board. PFCS notes proper integration of flashing components with WRB and window flanges.
231	4/28/2010	ABC	Y	25.10		3		73	788 NE 72nd Avenue	Left	Window - 1st Level	Removal of trim components around window and belly band below window.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges. PFCS notes z-metal flashing over WRB.
232	4/28/2010	ABC	Y	25.11		3		73	788 NE 72nd Avenue	Front	Window - 1st Level	Removal of trim components around windows.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges. Clean and dry OSB around window.
233	4/28/2010	ABC	Y	25.12		3		73	788 NE 72nd Avenue	Front	Siding at Foundation	Removal of siding at foundation below destructive testing 25.11			Pressure-treated wood sill plate. Clean OSB behind Tyvek. Clean insulation in building XBll cavity. No SWI and No Damage.
234	4/28/2010	ABC	Y	25.13		3		97	684 NE 73rd Avenue	Left	Window - 1st Level	Removal of trim components around window.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges. Clean and dry OSB around window.

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Testing Summary

#	Date	Who	PFCS Attend	DT No.	ABC / XB number	Phase	ABC / XB BLDG*	PFCS BLDG	Unit	Elevation	Testing Location	Description of Testing	SWI*	Damage	PFCS Observations
235	4/28/2010	ABC	Y	25.14		3		96	724 NE 73rd Avenue	Back	Window - 1st Level	Removal of trim components around windows.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges. Clean and dry OSB around window. MC reading of 24.5% below window sill.
236	4/28/2010	ABC	Y	25.15		3		99	616 NE 73rd Avenue	Front	Window - 2nd Level	Removal of trim components around window.			PFCS observed unprimed end cuts of trim components at window. PFCS notes proper integration of flashing components with WRB and window flanges. Rusted fasteners at window nail flange.
237	4/30/2010	ABC	Y	26.04		3		76	763 NE 73rd Avenue	Back	Fascia Board at Balcony	Removal of fascia board behind gutter at balcony edge	Y		Fascia board holding XBter and heavily stained on the back side and edges. MC readings at fascia board: 44.3%. No Damage to substrate.
238	4/30/2010	ABC	Y	26.03A		3		84	7251 NE Stoneybrook Street	Back	Diverter at Balcony	Removal of siding panels between garage head and balcony to expose diverter location. (high exposure location)		Y	PFCS notes heavy staining on surface of roofing, and gutters. Gutter is reverse sloped to XBrd the building. MC readings at OSB: 49%, 47.9%, and 78.2% Damage at OSB.
239	4/30/2010	ABC	Y	26.03B		3		84	7251 NE Stoneybrook	Back	Diverter at Balcony	Removal of siding panels between garage head and balcony to expose			Condition on surface appears to be free of any staining. Clean Tyvek and clean OSB behind.
240	4/30/2010	ABC	Y	26.04A		3		76	763 NE 73rd Avenue	Back	Diverter at Balcony	Removal of siding panels between garage head and balcony to expose diverter location. (high exposure location)		Y	PFCS notes heavy staining on surface of roofing, and gutters. MC readings at OSB: 88% Staining at Tyvek. XBter intrusion appears to be from behind diverter. Damage at OSB.
241	4/30/2010	ABC	Y	26.04B		3		76	763 NE 73rd Avenue	Back	Diverter at Balcony	Removal of siding panels between garage head and balcony to expose diverter location. (high exposure location)			Condition on surface appears to be free of any staining. Clean Tyvek and clean OSB behind. No SWI and No Damage.
242	*	Abbreviations: SGD = Sliding Glass Door, BLDG = Building, SWI = Signs of XBter Intrusion, NSWI = No Signs of XBter Intrusion, D = Damage, OSB = Oriented Strand Board, WRB = Weather Resistive Barrier, GWB = Gypsum XBll Board													
243	**	In this Testing Summary, we are defining Damage as deteriorated material requiring repair to the building XBll assembly.													
244	***	XB reports #1 through #5 were visual observations of phase I deck repairs. XB did not document damage at reports 1-5.													
245	****	XB reports #6 through #12 were visual observations of phase I repairs. XB documented damage due to original construction.													
246	*****	PFCS random testing protocol XBs applied for all PFCS openings.													
247	Notes														
248													43	47	
249															



Phase 1: Windows

#	Testing Location	Openings	SWI	SWI %	Damage	Damage %
0	All Testing	37	5	14%	11	30%
1	Exterior Bay Window - 1st Level	13	2	15%	7	54%
2	Exterior Bay Window - 2nd Level	4	0	0%	2	50%
3	Window - 1st Level	12	2	17%	1	8%
4	Window - 2nd Level	8	1	13%	1	13%
5	Pete Fowler Construction*	6	2	33%	2	33%
6	Exterior Bay Window - 1st Level	5	2	40%	2	40%
7	Exterior Bay Window - 2nd Level	0	0	0%	0	0%
8	Window - 1st Level	1	0	0%	0	0%
9	Window - 2nd Level	0	0	0%	0	0%
10	Forensic Building Consultants	16	3	19%	5	31%
11	Exterior Bay Window - 1st Level	3	0	0%	3	100%
12	Exterior Bay Window - 2nd Level	3	0	0%	1	33%
13	Window - 1st Level	5	2	40%	0	0%
14	Window - 2nd Level	5	1	20%	1	20%
15	Western Architectural	15	0	0%	4	27%
16	Exterior Bay Window - 1st Level	5	0	0%	2	40%
17	Exterior Bay Window - 2nd Level	1	0	0%	1	100%
18	Window - 1st Level	6	0	0%	1	17%
19	Window - 2nd Level	3	0	0%	0	0%
20	* PFCS testing was performed using Random Selection Protocol					

- = Regular Window
- = Exterior Bay Window
- = No Damage
- = Signs of Water Intrusion (SWI), But No Damage
- = Damage

Phase 2: Windows

#	Testing Location	Openings	SWI	SWI %	Damage	Damage %
1	All Testing	11	3	27%	4	36%
2	Exterior Bay Window - 1st Level	6	2	33%	4	67%
3	Exterior Bay Window - 2nd Level	1	0	0%	0	0%
4	Window - 1st Level	3	1	33%	0	0%
5	Window - 2nd Level	1	0	0%	0	0%
6	Pete Fowler Construction*	5	1	20%	3	60%
7	Exterior Bay Window - 1st Level	4	1	25%	3	75%
8	Exterior Bay Window - 2nd Level	1	0	0%	0	0%
9	Window - 1st Level	0	0	0%	0	0%
10	Window - 2nd Level	0	0	0%	0	0%
11	Forensic Building Consultants	6	2	33%	1	17%
12	Exterior Bay Window - 1st Level	2	1	50%	1	50%
13	Exterior Bay Window - 2nd Level	0	0	0%	0	0%
14	Window - 1st Level	3	1	33%	0	0%
15	Window - 2nd Level	1	0	0%	0	0%
16	* PFCS testing was performed using Random Selection Protocol					

□ = Regular Window
○ = Exterior Bay Window
● = No Damage
● = Signs of Water Intrusion (SWI), But No Damage
● = Damage

Map Labels: 22.01, 22.02A/22.02B, 6.10, 7.03, 22.03, 8.01, 22.05, 8.04, 8.06, 6.05

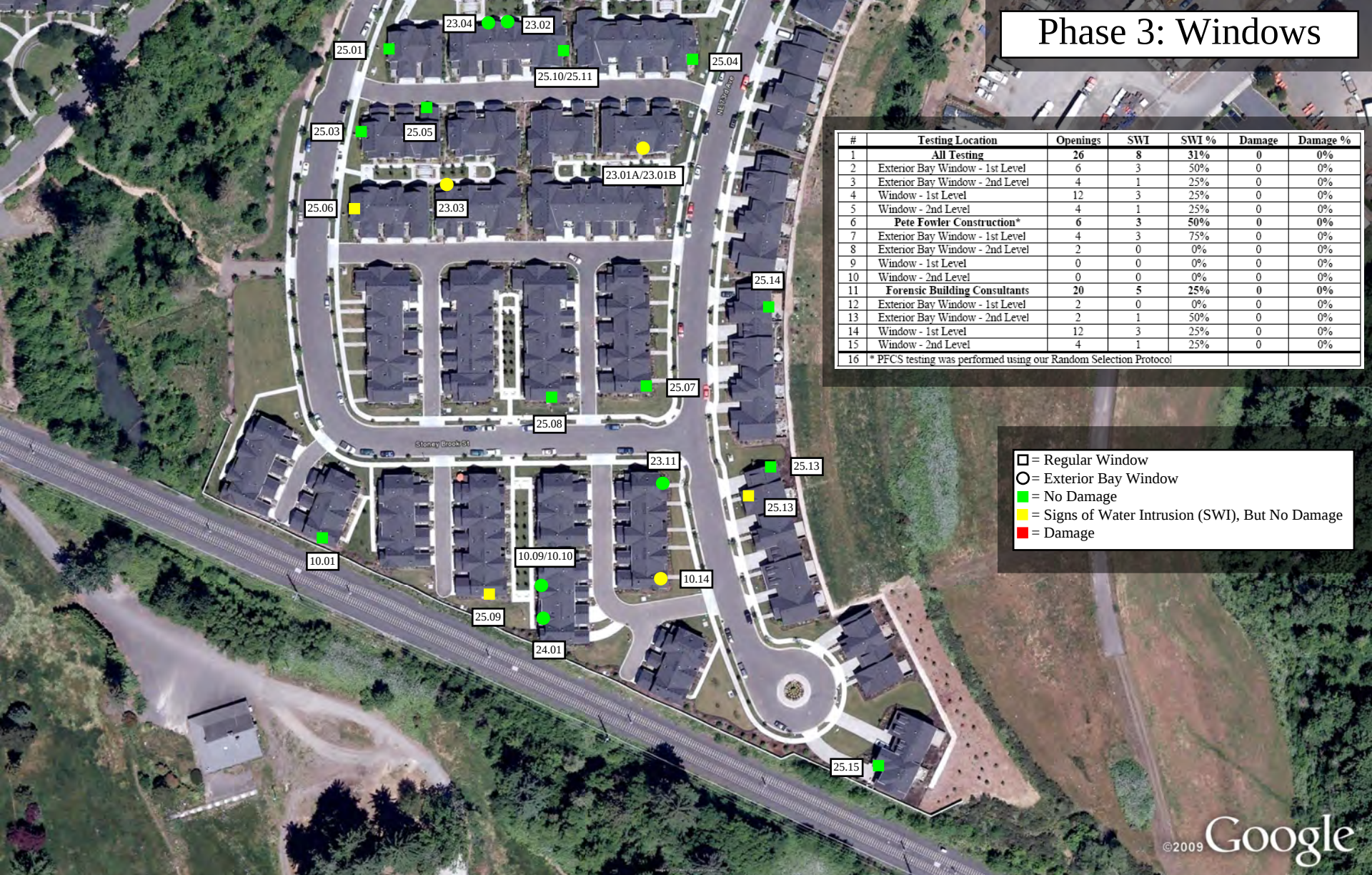
Streets: NW Stonegate St, NW Greenway

Watermark: ©2009 Google

#	Testing Location	Openings	SWI	SWI %	Damage	Damage %
1	All Testing	11	3	27%	4	36%
2	Exterior Bay Window - 1st Level	6	2	33%	4	67%
3	Exterior Bay Window - 2nd Level	1	0	0%	0	0%
4	Window - 1st Level	3	1	33%	0	0%
5	Window - 2nd Level	1	0	0%	0	0%
6	Pete Fowler Construction*	5	1	20%	3	60%
7	Exterior Bay Window - 1st Level	4	1	25%	3	75%
8	Exterior Bay Window - 2nd Level	1	0	0%	0	0%
9	Window - 1st Level	0	0	0%	0	0%
10	Window - 2nd Level	0	0	0%	0	0%
11	Forensic Building Consultants	6	2	33%	1	17%
12	Exterior Bay Window - 1st Level	2	1	50%	1	50%
13	Exterior Bay Window - 2nd Level	0	0	0%	0	0%
14	Window - 1st Level	3	1	33%	0	0%
15	Window - 2nd Level	1	0	0%	0	0%
16	* PFCS testing was performed using Random Selection Protocol					

☐ = Regular Window
☐ = Exterior Bay Window
☐ = No Damage
☐ = Signs of Water Intrusion (SWI), But No Damage
☐ = Damage

Phase 3: Windows



#	Testing Location	Openings	SWI	SWI %	Damage	Damage %
1	All Testing	26	8	31%	0	0%
2	Exterior Bay Window - 1st Level	6	3	50%	0	0%
3	Exterior Bay Window - 2nd Level	4	1	25%	0	0%
4	Window - 1st Level	12	3	25%	0	0%
5	Window - 2nd Level	4	1	25%	0	0%
6	Pete Fowler Construction*	6	3	50%	0	0%
7	Exterior Bay Window - 1st Level	4	3	75%	0	0%
8	Exterior Bay Window - 2nd Level	2	0	0%	0	0%
9	Window - 1st Level	0	0	0%	0	0%
10	Window - 2nd Level	0	0	0%	0	0%
11	Forensic Building Consultants	20	5	25%	0	0%
12	Exterior Bay Window - 1st Level	2	0	0%	0	0%
13	Exterior Bay Window - 2nd Level	2	1	50%	0	0%
14	Window - 1st Level	12	3	25%	0	0%
15	Window - 2nd Level	4	1	25%	0	0%
16	* PFCS testing was performed using our Random Selection Protocol					

- = Regular Window
- = Exterior Bay Window
- = No Damage
- = Signs of Water Intrusion (SWI), But No Damage
- = Damage



5. PLAYING DOCTOR

5. PLAYING DOCTOR

Playing Doctor

- Examine, Diagnose, Prescribe and the Hippocratic Oath
- Case Study: Residential Condos in Pacific Northwest



Read about industry impacts on our blog at www.petefowler.com

5. PLAYING DOCTOR

Examine, Diagnose, Prescribe

1. Examine: Structure the investigation. Compare performance to applicable, reasonable standards.
2. Diagnose: Its not always obvious
3. Prescribe: Do the right thing(s). And remember that one size does NOT fit all.
4. Hippocratic Oath: First do no harm.

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5. PLAYING DOCTOR

Case Study

RESIDENTIAL CONDO PROJECT IN PACIFIC NORTHWEST

- Data Analysis
- Map All Data Points
- Scope of Repair & Repair Map
- Bid Solicitation
- Bid Analysis / Award
- Contracts with Attachments
- Construction Management
- Key Learnings

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5. PLAYING DOCTOR

Case Study

RESIDENTIAL CONDO PROJECT IN PACIFIC NORTHWEST

Property is composed of 11 buildings, comprising of 50 units total. Built in early 1970s as apartments and converted to condos 13 years ago.



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5. PLAYING DOCTOR

Case Study

1. DATA ANALYSIS

- Review reports published by others
- Perform site inspection / openings
- Interview HOA / maintenance contractor
- Product research

#	Testing Location	Openings	PFCS Analysis of XXXXX				XXXXX			
			SWI*	%	Damage	%	SWI*	%	Damage	%
1	Siding	32	4	13%	5	16%	11	34%	24	75%
2	Removal of vinyl siding at window sill	32	4	13%	5	16%	11	34%	24	75%
3										
4	Roofing	8	3	38%	2	25%	1	13%	6	75%
5	Roof-to-Wall	8	3	38%	2	25%	1	13%	6	75%
6										
7	Penetrations	5	0	0%	0	0%	0	0%	0	0%
8	Removal of vinyl siding at head of electrical meter panel	3	0	0%	0	0%	0	0%	0	0%
9	Removal of vinyl siding at utility penetration	2	0	0%	0	0%	0	0%	1	0%
10										
11		45	7	16%	7	16%	12	27%	31	69%
12										
13	* SWI = Signs of Water Intrusion, but No Damage									



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Case Study

10-241 XXXXXX Condominiums
2A Testing Map

● No Damage
 ● Signs of Water Intrusion (S2)
 ● Damage

Unit Number	Unit Type	Unit Status	Unit Age	Unit Size	Unit Price	Unit Location
101	1 Bed	Active	10	1,000	\$150,000	101
102	1 Bed	Active	10	1,000	\$150,000	102
103	1 Bed	Active	10	1,000	\$150,000	103
104	1 Bed	Active	10	1,000	\$150,000	104
105	1 Bed	Active	10	1,000	\$150,000	105
106	1 Bed	Active	10	1,000	\$150,000	106
107	1 Bed	Active	10	1,000	\$150,000	107
108	1 Bed	Active	10	1,000	\$150,000	108
109	1 Bed	Active	10	1,000	\$150,000	109
110	1 Bed	Active	10	1,000	\$150,000	110
111	1 Bed	Active	10	1,000	\$150,000	111
112	1 Bed	Active	10	1,000	\$150,000	112
113	1 Bed	Active	10	1,000	\$150,000	113
114	1 Bed	Active	10	1,000	\$150,000	114
115	1 Bed	Active	10	1,000	\$150,000	115
116	1 Bed	Active	10	1,000	\$150,000	116
117	1 Bed	Active	10	1,000	\$150,000	117
118	1 Bed	Active	10	1,000	\$150,000	118
119	1 Bed	Active	10	1,000	\$150,000	119
120	1 Bed	Active	10	1,000	\$150,000	120
121	1 Bed	Active	10	1,000	\$150,000	121
122	1 Bed	Active	10	1,000	\$150,000	122
123	1 Bed	Active	10	1,000	\$150,000	123
124	1 Bed	Active	10	1,000	\$150,000	124
125	1 Bed	Active	10	1,000	\$150,000	125
126	1 Bed	Active	10	1,000	\$150,000	126
127	1 Bed	Active	10	1,000	\$150,000	127
128	1 Bed	Active	10	1,000	\$150,000	128
129	1 Bed	Active	10	1,000	\$150,000	129
130	1 Bed	Active	10	1,000	\$150,000	130
131	1 Bed	Active	10	1,000	\$150,000	131
132	1 Bed	Active	10	1,000	\$150,000	132
133	1 Bed	Active	10	1,000	\$150,000	133
134	1 Bed	Active	10	1,000	\$150,000	134
135	1 Bed	Active	10	1,000	\$150,000	135
136	1 Bed	Active	10	1,000	\$150,000	136
137	1 Bed	Active	10	1,000	\$150,000	137
138	1 Bed	Active	10	1,000	\$150,000	138
139	1 Bed	Active	10	1,000	\$150,000	139
140	1 Bed	Active	10	1,000	\$150,000	140
141	1 Bed	Active	10	1,000	\$150,000	141
142	1 Bed	Active	10	1,000	\$150,000	142
143	1 Bed	Active	10	1,000	\$150,000	143
144	1 Bed	Active	10	1,000	\$150,000	144
145	1 Bed	Active	10	1,000	\$150,000	145
146	1 Bed	Active	10	1,000	\$150,000	146
147	1 Bed	Active	10	1,000	\$150,000	147
148	1 Bed	Active	10	1,000	\$150,000	148
149	1 Bed	Active	10	1,000	\$150,000	149
150	1 Bed	Active	10	1,000	\$150,000	150
151	1 Bed	Active	10	1,000	\$150,000	151
152	1 Bed	Active	10	1,000	\$150,000	152
153	1 Bed	Active	10	1,000	\$150,000	153
154	1 Bed	Active	10	1,000	\$150,000	154
155	1 Bed	Active	10	1,000</		



Case Study

**Pete Fowler
CONSTRUCTION
Services, Inc.**

Scope of Repair

Date:	March 30, 2011
To:	Stockbridge Condominium Owners Association c/o David Hummel, Community Manager Invest West Management 12303 SE Mill Plain, Suite 200, Vancouver, WA 98684 T. 360.254.5700 E. david@investwestmanagement.com
Project:	Stockbridge Condominiums, Milwaukie, OR

Dear Stockbridge Condominium Owners Association Board of Directors and Mr. Hummel:

Per our second **Repair Recommendations** proposal dated 9/17/10 and executed on 10/11/10, this letter confirms completion of Section A. *Investigation and Repair Specifications*.

Following our site investigation on 3/30/11, the primary cause and source of the severe damage to our Tuffee Tuffex 1000 Series (TTO) has been identified as the use of our Tuffee Tuffex

- Read about industry impacts on our blog at www.petefowler.com

5. PLAYING DOCTOR

Case Study

3. SCOPE OF REPAIR & REPAIR MAP

Line Item	Scope Details	Quantity	Order of Magnitude Costs	Schedule: 0 to 6 Months	Schedule: 6 to 12 Months	Photo Reference?
1	1 Cleaning (CSI 01 74) Vinyl siding	All BLDGS	\$ 2,400	X		AP 2.010 AP 2.020 - AP 2.021 AP 1.132
2	A Vinyl siding can be cleaned with a power washer at low pressure. B To clean all siding with a pressure washer, hold the power washer straight at eye level to keep the water on top of the siding where it can clean most effectively. C Do not aim the power washer upward as water may be driven behind the siding. D Do not use pressure washer around wall penetrations. Use soft-bristle brush and gently erase around windows, doors, electrical connections and plumbing. Additional Comments: Maintenance procedure is based on the Vinyl Siding Institute's article "How to Clean".					
3	2 Rough Carpentry (CSI 06 10): Repair of damaged OSB (OSB = Oriented Strand Board; the wood sheathing clings to the exterior wall) below window sill. Connected to Item 5 - see below.	15% (11-13 Windows)	\$ 780	X		AP 2.484 - AP 2.485
9	A Removal of siding panels below window sills. This scope is covered in Item 5. B Exploration of substrate below window sill is required due to a high exposure condition. C If damage is identified, continue to expose OSB in order to determine amount of replacement required. D Replace damaged OSB. Under a siding panel as required by structural considerations. E Install weather-resistant barrier (WRB) in a weather-tight manner. Additional Comments: Conditions occur at approximately 12% of openings below windows.					
10	3 Rough Carpentry (CSI 06 10): Treat Exposed OSB	5 BLDGS	\$ 850	X		AP 2.017, AP 2.126
11	A Remove siding around exposed OSB to inspect for SWI (Signs of Water Intrusion). B Treat OSB with a "waterproofing" product such as Thompson's WaterSeal Advanced Clear Multi-Surface Waterproofer or like product. Follow manufacturer's application instructions. C Install WRB in weather-tight manner to cover all exposed OSB. D Install siding in a manner that covers all exposed OSB. Additional Comments: Conditions occur at garage portals at two buildings (Bldgs A and D).					
23	4 Roofing (CSI 07 30): Moss and Algae Removal from Asphalt Roofing Shingles.	9000 SF	\$ 3,100	X		SX 1.164 AP 2.157 AP 2.162 - AP 2.166

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5. PLAYING DOCTOR

Case Study

3. SCOPE OF REPAIR & REPAIR MAP

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5. PLAYING DOCTOR

Case Study

4. BID SOLICITATION

WORK TO BE PERFORMED: The documentation for the scope of work is contained in the following documents that constitute the entire request for proposal:

- A. Request for Proposal (this document, 2 pages)
- B. Scope of Work (1 page)
- C. Images and Information (7 pages)
- D. Repair Location Map: showing items 3, 5, and 8 (1 page)
- E. Representative Photographs of Project Scope items (13 pages)
- F. Building Envelope Innovations LLC "Wet-Flash System" Standard Installation. Please note inclusion of the installation guide is for reference purposes as it shows new installation only. The application and specific Wet-Flash system products utilized for this repair vary slightly due to the windows staying in place.
- G. Referenced standards in the Scope of Repair are available upon request

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9329 SW Barber Blvd., Suite 170, Portland, OR 97219 T: 503.246.3744 F: 549.240.3972

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5. PLAYING DOCTOR

Case Study

4. BID SOLICITATION

1. Vinyl Siding Cleaning - Optional House all buildings



AP 02100 Building A, Front elevation, 3 channel building water, no damage visible at



AP 02100 Building A, Unit 724/Unit 725, Front elevation, Roof to wall flashing lifting

8. Siding - Wrapping of specific locations



AP 02100 Building A, Back elevation, Metal siding (replace six courses)



28 01108 Building B, Unit 7544, Front elevation, Roof to wall flashing lifting

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Case Study

5. BID ANALYSIS / AWARD

 Pete Fowler CONSTRUCTION Services, Inc.		Bid Analysis Memorandum	
Date:	Date 12-21-2011		
To:	Construction Group Associates		
From:	Pete Fowler Construction, LLC, Inc.		
Project:	10000 Construction Memorial DR (PFC) Project 2011-10-241		
Location:	Sumner, Idaho		
Dear Construction Group of Owners:			
Our bidding process involved constructing 4 contractors in the Portland area, meeting them over the Internet, and receiving a complete bid based on the Scope of Project as presented in the Request for Proposals package. The deadline was set for the end of the business day, Friday May 1, 2011, however my bidline extended to the date which was represented on PFC's bid line complete as recommended. Bid/askline operations that allows for many, many-line complete and the bids are attached in their entirety at the end of the document.			
Summary of Bid:			
1. Bidder's: This bid is due by email 536.943.60 7000000 is a very old			

Line Item	Description	Quantity	Bidder #1	Bidder #2	Bidder #3	Bidder #4
1	Clearing (CSI 01 74): Vinyl siding - ON/MITTED	All BLDGS	-	-	-	-
2	Rough Carpentry (CSI 06 10): Repair of damaged OSB below window sill. Connected to Item 5 - see below	15% (11-13 Windows)	-	-	-	-
3	Rough Carpentry (CSI 06 10): Treat Exposed OSB	2 BLDGS	\$3,250.00	\$4,340.00	\$1,350.70	\$2,731.00
4	Omitted	N/A	\$420.00	\$1,920.00	\$766.36	\$14,633.00
5	Siding (CSI 07 46): Leaks at corners of Window Sill	76 Windows	-	-	-	-
6	Omitted	N/A	\$12,160.00	\$10,960.00	\$13,281.52	\$24,472.00
7	Siding (CSI 07 46): Siding Corner Trim Components	10 Each, 2 SF total	\$500.00	\$610.00	\$960.00	\$1,725.00
8	Siding (CSI 07 46): Siding Warping due to Reflected Sunlight	4 LOC, 10 SF total	\$400.00	\$190.00	\$117.90	\$5,520.00
9	Flashing and Sheet Metal (CSI 07 61): Lifting Roof to Wall Metal Flashing	All BLDGS, 450 LF total	\$675.00	\$580.00	\$576.50	\$5,175.00
10	Other (Supervision or General Conditions)	\$0.00	\$500.00	\$2,994.69	\$22,713.00	\$0.00
11	Overhead and Profit	\$3,288.60	\$2,860.00	\$5,177.54	\$0.00	\$0.00
12	Grand Total	\$20,693.60	\$20,960.00	\$25,225.21	\$76,969.00	\$0.00



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Case Study

6. CONTRACTS WITH ATTACHMENTS

(Where the Contract Price is a Lump Sum)

- AIA Contracts
- Scope of Repair
- Repair Exhibits
- Bid
- Manufacturer Specs.
- Payment Application
- Insurance Certificates

www.pdfstar.com

Payment Request Worksheet

Stockbridge Repair Project

Master Payment Application

7/1/2011

A	B	C	D	E	F	G	H	I	
Item	Description of work	QTY	Unit	Unit Price	Scheduled Value	Work completed The previous application period	Materials previously completed of scheduled value	% (G-C)	Retaining
						(D = E)	(F = G * E)	(H = G)	
1	Painted	20	sq ft	\$10.00	\$0.00				5%
2	Repair of damaged OSB below window sill	11	sq ft	\$40.00	\$4,400.00				
3	Reinforced OSB	2	sq ft	\$100.00	\$200.00				
4	Painted	20	sq ft	\$0.00	\$0.00				
5	Leads at corner of Window Sill	766	sq ft	\$10.00	\$10,960.00				
6	Painted	20	sq ft	\$0.00	\$0.00				
7	Galvan. Corner Trim Components	10	sq ft	\$40.00	\$400.00				
8	Leads Hanging due to Rusted Trim	4	sq ft	\$100.00	\$400.00				
9	Leads Lead in Trim Metal Fastener	400	sq ft	\$1.00	\$400.00				
10	General Conditions	1	sq ft	\$500.00	\$500.00				
	Sub-Total				\$19,100.00				
	Overhead			15%	\$2,865.00				
	Total				\$21,965.00				



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5. PLAYING DOCTOR

Case Study

7. CONSTRUCTION MANAGEMENT

- Periodic Inspections throughout repair time frame
- Document through photographs and field notes
- Resolve any new issues
- Change Orders
- Approve Payments
- Project Close-out



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5. PLAYING DOCTOR

Case Study

8. KEY LEARNINGS

- Significant savings to HOA
- Maximizing life cycle of products
- Minimal disturbance to unit owners
- HOA is able to maximize their funds
- Real. Practical. Solutions.



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Random Selection - Exterior Bay at Sill

Line	Number	Street	PFCS Bldg #	FBC Bldg #	Lot #	Phase	Random Selection	DT
1	7308	NE Stonewater Street	65	172	672	2	0.000998352	
2	938	NE 73rd Ave	56	148	148	2	0.00188116	
3	775	NE 73rd Ave	75	203	203	3	0.004604243	X
4	929	NE 73rd Ave	52	136	136	2	0.012133562	
5	786	NE 72nd Ave	73	196	196	3	0.01507808	X
6	7190	NE Stonewater Street	26	77	77	1	0.01585923	
7	7025	NE Rocky Brook Street	13	31	31	1	0.016180455	X
8	960	NE 73rd Ave	56	145	145	2	0.018222257	
9	898	NE 73rd Ave	58	152	152	2	0.030803228	
10	7184	NE Cherry Drive	40	106	106	1	0.031294947	
11	746	NE 72nd Ave	80	215	215	3	0.032266729	X
12	724	NE 73rd Ave	96	280	280	3	0.034878942	
13	7072	NE Stonewater Street	19	47	47	1	0.035418552	
14	822	NE 72nd Ave	71	191	691	2	0.037892536	
15	7326	NE Cherry Drive	44	116	116	2	0.044253438	X
16	7068	NE Stonewater Street	19	46	46	1	0.048808437	X
17	7239	NE Stoneybrook Street	84	235	235	3	0.055913885	
18	7399	NE Stonewater Street	61	161	661	2	0.057039672	
19	818	NE 72nd Ave	70	190	190	2	0.057095459	
20	7161	NE Rocky Brook Street	24	70	570	1	0.059251248	
21	7212	NE Stoneybrook Street	86	246	246	3	0.061051734	
22	916	NE 73rd Ave	57	150	150	2	0.061155941	
23	7202	NE Stoneybrook Street	86	243	243	3	0.068284502	
24	698	NE 73rd Ave	96	283	283	3	0.071390651	
25	7344	NE Stonewater Street	66	176	176	2	0.073055437	
26	7368	NE Cherry Drive	46	123	123	2	0.078360393	X
27	7381	NE Stonewater Street	62	164	164	2	0.0855465	X
28	611	NE 73rd Ave	93	273	273	3	0.088904852	
29	7024	NE Cherry Drive	2	3	3	1	0.091419803	X
30	7129	NE Stonewater Street	30	86	586	1	0.092854323	
31	7242	NE Stoneybrook Street	88	253	253	3	0.09837388	
32	7332	NE Cherry Drive	44	117	117	2	0.107314448	
33	656	NE 73rd Ave	97	287	287	3	0.108990266	
34	7308	NE Cherry Drive	43	113	613	2	0.110081872	
35	734	NE 72nd Ave	85	238	738	3	0.110710702	
36	7364	NE Cherry Drive	46	122	122	2	0.111103666	
37	7193	NE Rocky Brook Street	25	75	575	1	0.116728968	
38	7083	NE Rocky Brook Street	20	52	52	1	0.120387394	
39	7081	NE Stonewater Street	5	12	12	1	0.122152595	
40	854	NE 72nd Ave	42	111	111	1	0.128603133	
41	752	NE 70th Ave	15	37	537	1	0.129656481	
42	7155	NE Rocky Brook Street	23	69	569	1	0.130675401	
43	7362	NE Stonewater Street	67	178	178	2	0.132779904	
44	721	NE 73rd Ave	82	225	225	3	0.137642863	
45	756	NE 70th Ave	16	38	38	1	0.141736388	
46	872	NE 71st Ave	33	91	91	1	0.142402573	
47	7250	NE Stoneybrook Street	89	257	257	3	0.145489453	
48	768	NE 70th Ave	16	39	39	1	0.14734962	
49	725	NE 70th Ave	10	24	24	1	0.151073807	
50	7383	NE Cherry Drive	49	131	131	2	0.151847852	
51	7065	NE Rocky Brook Street	20	54	54	1	0.154432552	
52	758	NE 70th Ave	16	38	538	1	0.159537466	
53	742	NE 72nd Ave	79	214	214	3	0.160871814	
54	7393	NE Stonewater Street	61	161	161	2	0.167312929	
55	7372	NE Cherry Drive	46	124	124	2	0.170981599	
56	7005	NE Rocky Brook Street	14	33	533	1	0.171609462	
57	925	NE 73rd Ave	52	137	137	2	0.173657595	
58	787	NE 73rd Ave	74	198	698	3	0.175109698	

Random Selection - Exterior Bay at Sill

Line	Number	Street	PFCS Bldg #	FBC Bldg #	Lot #	Phase	Random Selection	DT
291	7097	NE Rocky Brook Street	20	51	551	1	0.857885243	
292	812	NE 72nd Ave	70	188	188	2	0.870743282	
293	675	NE 73rd Ave	92	268	268	3	0.873580952	
294	7159	NE Rocky Brook Street	24	70	70	1	0.876884354	
295	7153	NE Rocky Brook Street	23	69	69	1	0.879773807	
296	7084	NE Stonewater Street	19	49	49	1	0.88399157	
297	946	NE 73rd Ave	56	147	147	2	0.890145243	
298	731	NE 70th Ave	10	23	23	1	0.897067386	
299	7377	NE Cherry Drive	50	132	132	2	0.898042509	
300	7235	NE Stoneybrook Street	84	236	236	3	0.898299128	
301	7147	NE Stonewater Street	38	99	99	1	0.898994729	
302	632	NE 73rd Ave	98	289	289	3	0.899464735	
303	7383	NE Stonewater Street	62	163	163	2	0.901826833	
304	660	NE 73rd Ave	97	286	286	3	0.904443035	
305	988	NE 73rd Ave	55	143	143	2	0.905444052	
306	7100	NE Stonewater Street	22	61	61	1	0.90614117	
307	7141	NE Stonewater Street	29	84	84	1	0.907945273	
308	790	NE 72nd Ave	73	194	194	3	0.909220031	
309	774	NE 70th Ave	16	40	40	1	0.911759124	
310	898	NE 71st Ave	33	92	592	1	0.912755956	
311	7111	NE Rocky Brook Street	21	59	59	1	0.918089253	
312	681	NE 73rd Ave	92	267	267	3	0.918568316	
313	7016	NE Cherry Drive	2	2	2	1	0.924219149	
314	7103	NE Rocky Brook Street	21	60	560	1	0.93337636	
315	687	NE 73rd Ave	92	266	266	3	0.934376947	
316	7218	NE Stoneybrook Street	87	248	248	3	0.934683264	
317	794	NE 72nd Ave	72	193	193	3	0.93721131	
318	7257	NE Stoneybrook Street	83	228	728	3	0.940541906	
319	7147	NE Rocky Brook Street	23	68	68	1	0.941806611	
320	726	NE 70th Ave	15	35	35	1	0.944578997	
321	7113	NE Stonewater Street	31	88	588	1	0.944751272	
322	799	NE 70th Ave	8	17	17	1	0.945263325	
323	811	NE 73rd Ave	69	187	187	2	0.945683608	
324	7110	NE Stonewater Street	22	62	62	1	0.946673084	
325	7018	NE Stonewater Street	17	42	42	1	0.948213914	
326	728	NE 72nd Ave	85	239	239	3	0.949335808	
327	7095	NE Rocky Brook Street	20	51	51	1	0.951651681	
328	7051	NE Rocky Brook Street	20	55	55	1	0.952192132	
329	7102	NE Stonewater Street	22	61	561	1	0.954095144	
330	7074	NE Rocky Brook Street	12	29	29	1	0.955633868	
331	7068	NE Rocky Brook Street	12	28	528	1	0.959132651	
332	7274	NE Stoneybrook Street	90	261	261	3	0.965089322	
333	7129	NE Rocky Brook Street	21	56	56	1	0.968209288	
334	7177	NE Rocky Brook Street	24	73	73	1	0.97285582	
335	7314	NE Cherry Drive	43	114	114	2	0.974159411	
336	787	NE 70th Ave	8	18	518	1	0.975755561	
337	655	NE 73rd Ave	93	271	271	3	0.976913935	
338	750	NE 70th Ave	15	37	37	1	0.983078006	
339	735	NE 73rd Ave	82	223	223	3	0.983300413	
340	858	NE 73rd Ave	59	156	156	2	0.984464152	
341	7105	NE Rocky Brook Street	21	60	60	1	0.992408312	
342	7262	NE Stoneybrook Street	89	254	254	3	0.998480121	
343	740	NE 72nd Ave	79	213	213	3	0.998510549	
344	7001	NE Stonewater Street	7	16	16	1	0.999438974	

Pete Fowler
CONSTRUCTION
Services, Inc.

Inspection Request

Date:	February 1, 2010
To:	[REDACTED] 0 Portland, OR 97204-2020 T: (503) 2 [REDACTED]
From:	Pete Fowler Construction Services, Inc.
Project:	[REDACTED] HOA v [REDACTED] Development Corp PFCS Project No. 09-229
Regarding:	Inspection Request

Dear Mr. [REDACTED]

We are requesting access to the property for invasive inspections at the following locations. We would like to start this on Monday, February 15, 2010 and continue through Friday February 19, 2010. There may also be an additional "follow-up repair" days for the contractor on February 22-24, 2010.

Please note that these locations have been 100% randomly selected. In order to preserve the randomness and eliminate bias, we would prefer that none of the locations be changed. No interior access will be required, which should reduce any inconvenience for the homeowners.

We are attaching a building map and marked photographs to eliminate confusion as to which buildings/units are referenced.

Inspection Locations

Exterior Bay Sill @ Ground Level: 9 openings

PFCS will be removing panel siding and trim components at exterior bay window sill, below a two window array.

Phase 1:

- Building 13 – 7025 NE [REDACTED] Street
- Building 19 – 7068 NE [REDACTED] Street
- Building 2 – 7024 NE [REDACTED] Drive

Phase 2:

- Building 44 – 7326 NE [REDACTED] Drive
- Building 46 – 7368 NE [REDACTED] Drive
- Building 62 – 7381 NE [REDACTED] Street

Phase 3:

- Building 75 – 775 NE [REDACTED] Ave
- Building 73 – 786 NE [REDACTED] Ave
- Building 80 – 746 NE [REDACTED] Ave

Exterior Bay Head/Sill @ 9' Plate-line at SGD or Window Array: 9 openings

PFCS will be removing panel siding and trim components at exterior bay window head, above first level windows and below a two window array, or SGD at second level.

Phase 1:

- Building 7 – 7003 NE [REDACTED] Street*
 - Building 27 – 7158 NE [REDACTED] Street
 - Building 13 – 7039 NE [REDACTED] Street
- *Replacement unit per Plaintiff Request**

Phase 2:

- Building 62 – 7381 NE [REDACTED] Street
- Building 67 – 7356 NE [REDACTED] Street
- Building 65 – 7308 NE [REDACTED] Street

Phase 3:

- Building 91 – 7286 NE [REDACTED] Street
- Building 93 – 633 NE [REDACTED] Ave
- Building 73 – 788 NE [REDACTED] Ave

Diverter Flashing Below Balcony, over Single Car Garage: 6 openings

PFCS will be removing siding at confined rake location, below balconies over single car garages, at back elevations.

Phase 1:

- Building 29 – 7143 NE S [REDACTED] Street
- Building 12 – 7068 NE [REDACTED] Street

Phase 2:

- Building 69 – 813 NE [REDACTED] Ave
- Building 64 – 7335 NE [REDACTED] Street

Phase 3:

- Building 74 – 787 NE [REDACTED] Ave
- Building 81 – 759 NE [REDACTED] Ave

Diverter Flashing at Second Level Roof: 18 openings

PFCS will be removing siding below confined rake locations.

Phase 1:

- Building 8 – 787 NE [REDACTED] Ave
- Building 2 – 7046 NE [REDACTED] Drive
- Building 34 – 7120 NE [REDACTED] Drive
- Building 2 – 7038 NE [REDACTED] Drive
- Building 20 – 7083 NE [REDACTED] Street
- Building 37 – 7170 NE [REDACTED] Drive

Phase 2:

- Building 49 – 7385 NE [REDACTED] Drive
- Building 70 – 814 NE [REDACTED] Ave
- Building 70 – 816 NE [REDACTED]nd Ave
- Building 63 – 7355 NE [REDACTED] Street
- Building 61 – 7399 NE [REDACTED] Street
- Building 48 – 7391 NE [REDACTED]

Phase 3:

- Building 85 – 716 NE [REDACTED] Ave
- Building 86 – 7212 NE [REDACTED] Street
- Building 81 – 755 NE [REDACTED] Ave
- Building 88 – 7242 NE [REDACTED] Street
- Building 84 – 7243 [REDACTED] Street
- Building 77 – 766 [REDACTED] Ave

Diverter Flashing at Lower Level Roof (Or Roof that is not accepting discharge from other Roofs): 12 openings

PFCS will be removing siding at confined rake locations.

Phase 1:

- Building 12 – 7074 [REDACTED] Street
- Building 29 – 7141 NE [REDACTED] Street
- Building 28 – 7142 NE [REDACTED] Street
- Building 23 – 7155 NE [REDACTED] Street

Phase 2:

- Building 63 – 7343 NE [REDACTED] Street
- Building 59 – 866 NE [REDACTED] Ave
- Building 46 – 7372 NE [REDACTED] y Drive
- Building 60 – 822 NE [REDACTED] Ave

Phase 3:

- Building 92 – 687 NE [REDACTED] Ave
- Building 81 – 743 NE [REDACTED] Ave
- Building 86 – 7212 NE [REDACTED] Street
- Building 85 – 732 NE [REDACTED] Ave

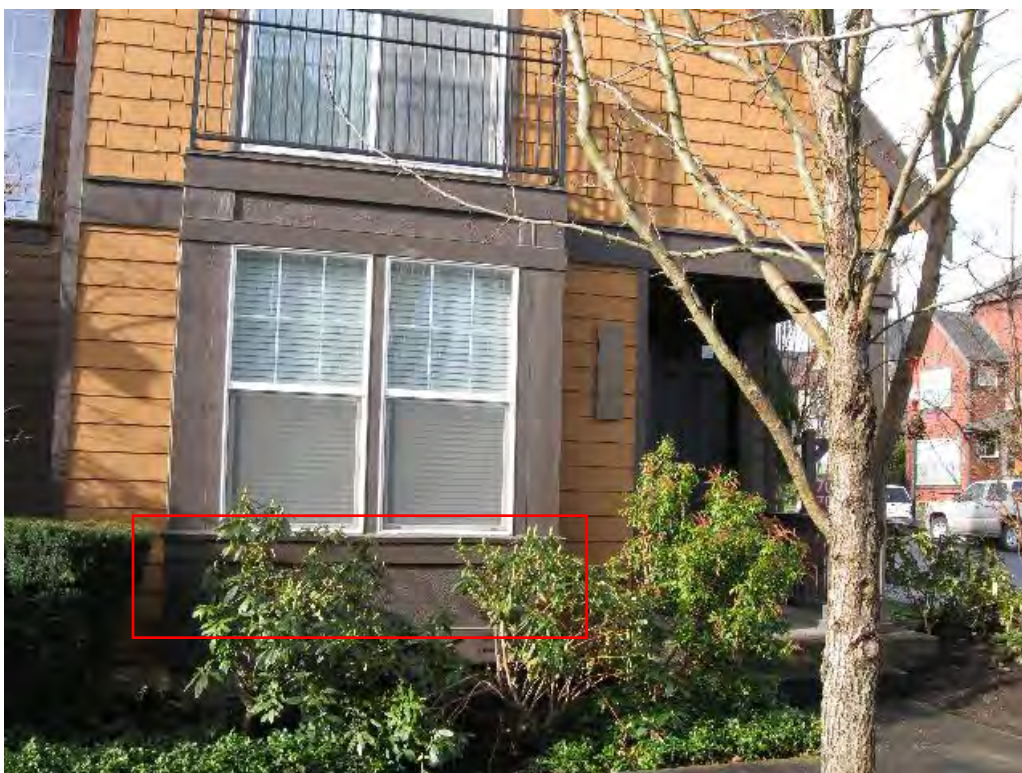
Exterior Bay Sill @ Ground Level: 9 openings

PHASE 1



Building 13; Front elevation

PHASE 1



Building 19; 7068 NE [redacted] Street; Front elevation



Building 02; 7024 NE [redacted]; Front elevation

PHASE 2



Building 67; 7356 NE [REDACTED] Street; Front elevation



Building 65; 7308 NE [REDACTED] Street; Front elevation

Diverter Flashing Below Balcony, over Single Car Garage: 6 openings

PHASE 1



Building 29; 7143 NE [REDACTED] Street; Back elevation



Building 12; 7068 NE [REDACTED] Street; Back elevation

PHASE 3



Building 74; 787 NE [redacted] Ave; Back elevation



Building 81; 759 NE [redacted] Ave; Back elevation

PHASE 3



Building 92; 687 NE [REDACTED] Ave; Front elevation



Building 81; 743 NE [REDACTED] Ave; Front elevation

PHASE 3

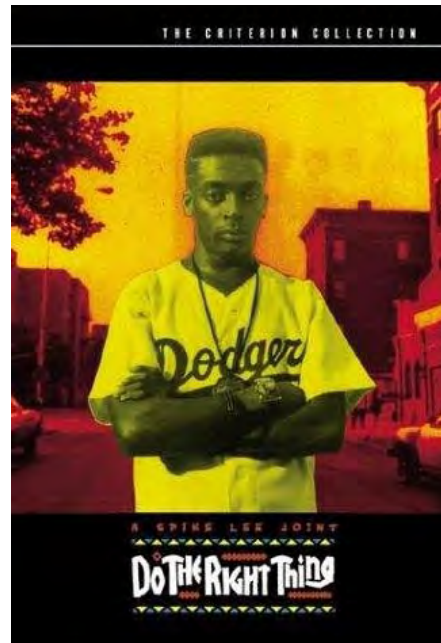


Building 86; 7212 NE [REDACTED] Street; Front elevation



Building 85; 732 NE [REDACTED] Ave; Front elevation

6. DO THE RIGHT THING



6. DO THE RIGHT THING

Do The Right Thing

- Two Reasons To Test
- Scope of Repair
- Managing Property Maintenance, Improvement and Repairs
- Request for Proposal



Read about industry impacts on our blog at www.petefowler.com

6. DO THE RIGHT THING

Two Reasons to Test

A GOOD REASON:

To assess building performance and diagnose problems. Sometimes this is to make sure it was done right the first time, but usually to figure out a problem. Other times it is simply to figure out who is at fault for obviously poor performance of the building assembly in question. Sometimes this assessment is to figure out the most cost effective means to repair.

A BAD REASON:

Simply to support a claim in the course of litigation, often with no complains or legitimate investigative purpose. If the purpose is to create evidence for the prosecution of a defect claim, in the absence of a building performance problem or a valid concern for the durability of the assembly, then it is improper to conduct testing.



Read about industry impacts on our blog at www.petefowler.com

6. DO THE RIGHT THING

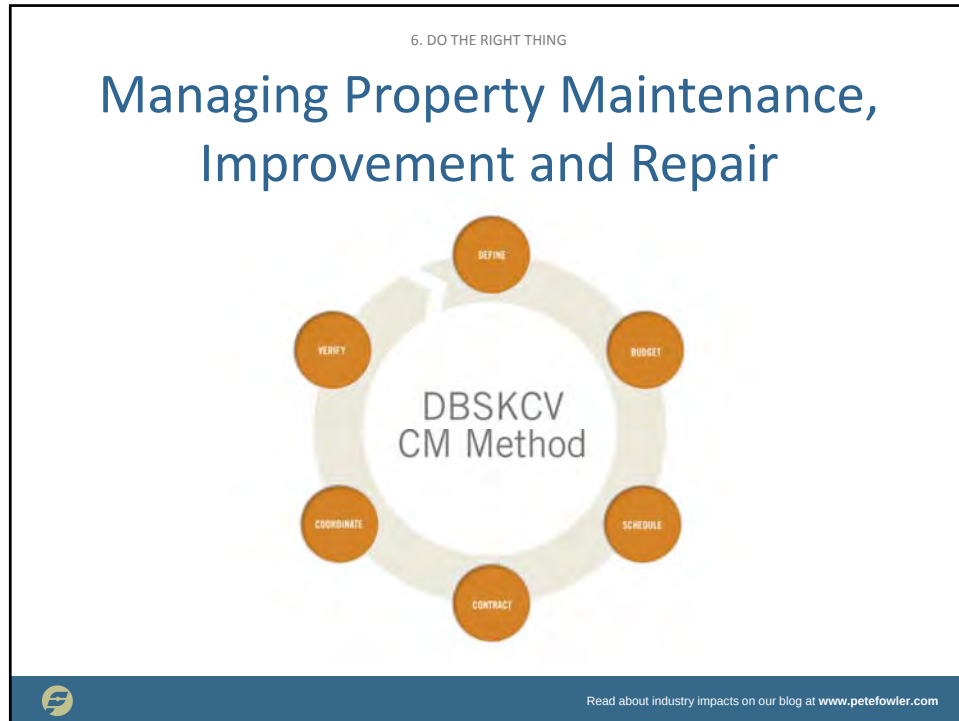
Scope of Repair

www.petefowler.com		Sunshine Gardens Scope of Repair	8/24/2013
Item	Item	Description	Notes
08 50	A	Adjust adjacent flashings to provide minimum 6" clearance from flashings to bottom edge of siding and trim. Siding shall be installed in accordance with ASTM E2112-07 (p. 13) before	Final of 12/15/12 @ 11 hours
08 50	B	Remove siding and trim under window and down to roof transition below window only.	Final of 12/15/12 @ 11 hours
08 50	C	Remove nails from window sill flange. Reinstall Moistop flashing under window sill flange, properly lap with adjacent jamb flashing and WRB.	Final of 12/15/12 @ 11 hours
08 50	D	Install appropriate flexible flashings, rigid flashings and WRB, integrated in weather-board fashion. Conform with ASTM E 2112.	Final of 12/15/12 @ 11 hours
08 50	E	Install new WRB, properly lapped under new sill Moistop in shingle style lap and over roof to wall flashing.	Final of 12/15/12 @ 11 hours
08 50	F	Install new apron and sill trim under window to match existing. Cut adjacent trim or replace to fit.	Final of 12/15/12 @ 11 hours
08 50	G	Install new Hardi-plank lap siding previously removed in conformance with manufacturers standards.	Final of 12/15/12 @ 11 hours
08 50	H	Install backer rod and sealant in conformance with ASTM E2112-07 (p. 26-). Sealant shall conform with ASTM C920 and be compatible with the flashings and paint (such as Fortifiber product family).	Final of 12/15/12 @ 11 hours
08 50	I	Prepare and paint exterior of siding and trim to match existing area.	Final of 12/15/12 @ 11 hours

08 50	Sill Flashing at Head Wall Condition	
A	Remove and discard sill and apron trim under window.	
B	Remove siding under window and down to roof transition below window only.	
C	Remove nails from window sill flange. Reinstall Moistop flashing under window sill flange, properly lap with adjacent jamb flashing and WRB.	
D	Install appropriate flexible flashings, rigid flashings and WRB, integrated in weather-board fashion. Conform with ASTM E 2112.	
E	Install new WRB, properly lapped under new sill Moistop in shingle style lap and over roof to wall flashing.	
F	Install new apron and sill trim under window to match existing. Cut adjacent trim or replace to fit.	
G	Install new Hardi-plank lap siding previously removed in conformance with manufacturers standards.	
H	Install backer rod and sealant in conformance with ASTM E2112-07 (p. 26-). Sealant shall conform with ASTM C920 and be compatible with the flashings and paint (such as Fortifiber product family).	
I	Prepare and paint exterior of siding and trim to match existing area.	
08 50	Sill Flashing at Window Sills (assume 5 locations, 6 if each)	
A	Remove siding and trim at sill. NOTE: Save siding and trim for reinstallation.	
B	Remove nails from window sill flange. Reinstall Moistop flashing under window sill flange, properly lap with adjacent jamb flashing and WRB.	
C	Install appropriate flexible flashings, rigid flashings and WRB, integrated in weather-board fashion. Conform with ASTM E 2112. Rigid head flashing shall have closed ends (ASTM E2112-07 see p. 48).	
D	Install new WRB under Moistop in shingle style lap to existing WRB.	
E	Install Hardi-plank lap siding previously removed.	
F	Install backer rod and sealant in conformance with ASTM E2112-07 (p. 26-). Sealant shall conform with ASTM C920 and be compatible with the flashings and paint (such as Fortifiber product family).	
G	Prepare and paint exterior of siding and trim to match existing area.	



Read about industry impacts on our blog at www.petefowler.com



6. DO THE RIGHT THING
- ## Request for Proposal
1. Cover / Invitation
 2. Executive Summary
 3. Project Documents
 4. Selection Process
 5. Scope of Work
 6. Supplemental Conditions
 7. Plans
 8. Specifications
 9. Progress Schedule
 10. Application for Payment Forms / Process
 11. Schedule of Values
-  Read about industry impacts on our blog at www.petefowler.com

[REDACTED] v [REDACTED] Development
Summary of Testing - All Phases

#	Testing Location	All Testing					PFCS*				
		Openings	SWI*	SWI %	Damage	Damage %	Openings	SWI*	SWI %	Damage	Damage %
1	Diverter	82	16	20%	17	21%	40	10	25%	2	5%
2	Diverter at Balcony	42	12	29%	14	33%	9	6	67%	1	11%
3	Diverter Flashing at 1st Level	20	1	5%	1	5%	12	1	8%	0	0%
4	Diverter Flashing at 2nd Level	20	3	15%	2	10%	19	3	16%	1	5%
5	Windows	74	16	22%	15	20%	17	6	35%	5	29%
6	Exterior Bay Window - 1st Level	25	7	28%	11	44%	13	6	46%	5	38%
7	Exterior Bay Window - 2nd Level	9	1	11%	2	22%	3	0	0%	0	0%
8	Window - 1st Level	27	6	22%	1	4%	1	0	0%	0	0%
9	Window - 2nd Level	13	2	15%	1	8%	0	0	0%	0	0%
10	SGD	16	3	19%	3	19%	4	1	25%	0	0%
11	SGD	1	0	0%	0	0%	0	0	0%	0	0%
12	2nd floor SGD	7	1	14%	0	0%	0	0	0%	0	0%
13	Juliet Balcony Sill	8	2	25%	3	38%	4	1	25%	0	0%
14	Balcony	20	4	20%	3	15%	0	0	0%	0	0%
15	Balcony	12	0	0%	1	8%	0	0	0%	0	0%
16	Fascia Board at Balcony	8	4	50%	2	25%	0	0	0%	0	0%
17	Siding	31	3	10%	8	26%	0	0	0%	0	0%
18	Siding at Foundation	6	0	0%	1	17%	0	0	0%	0	0%
19	Siding at Garage	1	1	100%	0	0%	0	0	0%	0	0%
20	Belly Band	6	0	0%	1	17%	0	0	0%	0	0%
21	Privacy Wall	8	1	13%	3	38%	0	0	0%	0	0%
22	Entry Column	6	1	17%	2	33%	0	0	0%	0	0%
23	Planter Box	1	0	0%	0	0%	0	0	0%	0	0%
24	Trellis at Building	2	0	0%	1	50%	0	0	0%	0	0%
25	Trellis at Garage	1	0	0%	0	0%	0	0	0%	0	0%
26	Roof	5	1	20%	1	20%	0	0	0%	0	0%
27	Roof	1	0	0%	0	0%	0	0	0%	0	0%
28	Roof to Wall	4	1	25%	1	25%	0	0	0%	0	0%
29	Penetrations	13	0	0%	0	0%	0	0	0%	0	0%
30	Utilities	1	0	0%	0	0%	0	0	0%	0	0%
31	Vent	9	0	0%	0	0%	0	0	0%	0	0%
32	Attic vent above garage	2	0	0%	0	0%	0	0	0%	0	0%
33	Dryer Vent	1	0	0%	0	0%	0	0	0%	0	0%
34											
35		241	43	18%	47	20%	61	17	28%	7	11%
36	* PFCS testing was performed using our Random Selection Protocol										
37	* SWI = Signs of Water Intrusion, but No Damage										

Development
Summary of Testing - All Phases

#	Testing Location	Openings	SWI*	SWI %	Damage	Damage %	Openings	SWI*	SWI %	Damage	Damage %
1	Diverter	35	3	9%	11	31%	7	3	43%	4	57%
2	Diverter at Balcony	27	3	11%	10	37%	6	3	50%	3	50%
3	Diverter Flashing at 1st Level	7	0	0%	0	0%	1	0	0%	1	100%
4	Diverter Flashing at 2nd Level	1	0	0%	1	100%	0	0	0%	0	0%
5	Windows	42	10	24%	6	14%	15	0	0%	4	27%
6	Exterior Bay Window - 1st Level	7	1	14%	4	57%	5	0	0%	2	40%
7	Exterior Bay Window - 2nd Level	5	1	20%	1	20%	1	0	0%	1	100%
8	Window - 1st Level	20	6	30%	0	0%	6	0	0%	1	17%
9	Window - 2nd Level	10	2	20%	1	10%	3	0	0%	0	0%
10	SGD	6	1	17%	0	0%	6	1	17%	3	50%
11	SGD	1	0	0%	0	0%	0	0	0%	0	0%
12	2nd floor SGD	5	1	20%	0	0%	2	0	0%	0	0%
13	Juliet Balcony Sill	0	0	0%	0	0%	4	1	25%	3	75%
14	Balcony	18	3	17%	2	11%	2	1	50%	1	50%
15	Balcony	12	0	0%	1	8%	0	0	0%	0	0%
16	Fascia Board at Balcony	6	3	50%	1	17%	2	1	50%	1	50%
17	Siding	25	2	8%	6	24%	6	1	17%	2	33%
18	Siding at Foundation	3	0	0%	0	0%	3	0	0%	1	33%
19	Siding at Garage	0	0	0%	0	0%	1	1	100%	0	0%
20	Belly Band	4	0	0%	0	0%	2	0	0%	1	50%
21	Privacy Wall	8	1	13%	3	38%	0	0	0%	0	0%
22	Entry Column	6	1	17%	2	33%	0	0	0%	0	0%
23	Planter Box	1	0	0%	0	0%	0	0	0%	0	0%
24	Trellis at Building	2	0	0%	1	50%	0	0	0%	0	0%
25	Trellis at Garage	1	0	0%	0	0%	0	0	0%	0	0%
26	Roof	3	0	0%	0	0%	2	1	50%	1	50%
27	Roof	1	0	0%	0	0%	0	0	0%	0	0%
28	Roof to Wall	2	0	0%	0	0%	2	1	50%	1	50%
29	Penetrations	13	0	0%	0	0%	0	0	0%	0	0%
30	Utilities	1	0	0%	0	0%	0	0	0%	0	0%
31	Vent	9	0	0%	0	0%	0	0	0%	0	0%
32	Attic vent above garage	2	0	0%	0	0%	0	0	0%	0	0%
33	Dryer Vent	1	0	0%	0	0%	0	0	0%	0	0%
34											
35		142	19	13%	25	18%	38	7	18%	15	39%
36	* PFCS testing was performed using our Random Selection Protocol										
37	* SWI = Signs of Water Intrusion, but No Damage										

[REDACTED] v [REDACTED] Development
Summary of Testing - Phase 1

#	Testing Location	All Testing					PFCS*				
		Openings	SWI*	SWI %	Damage	Damage %	Openings	SWI*	SWI %	Damage	Damage %
1	Diverter	33	9	27%	11	33%	14	5	36%	2	14%
2	Diverter at Balcony	19	6	32%	8	42%	4	2	50%	1	25%
3	Diverter Flashing at 1st Level	5	1	20%	1	20%	2	1	50%	0	0%
4	Diverter Flashing at 2nd Level	9	2	22%	2	22%	8	2	25%	1	13%
5	Windows	37	5	14%	11	30%	6	2	33%	2	33%
6	Exterior Bay Window - 1st Level	13	2	15%	7	54%	5	2	40%	2	40%
7	Exterior Bay Window - 2nd Level	4	0	0%	2	50%	0	0	0%	0	0%
8	Window - 1st Level	12	2	17%	1	8%	1	0	0%	0	0%
9	Window - 2nd Level	8	1	13%	1	13%	0	0	0%	0	0%
10	SGD	8	2	25%	3	38%	1	1	100%	0	0%
11	SGD	0	0	0%	0	0%	0	0	0%	0	0%
12	2nd floor SGD	3	0	0%	0	0%	0	0	0%	0	0%
13	Juliet Balcony Sill	5	2	40%	3	60%	1	1	100%	0	0%
14	Balcony	9	1	11%	3	33%	0	0	0%	0	0%
15	Balcony	5	0	0%	1	20%	0	0	0%	0	0%
16	Fascia Board at Balcony	4	1	25%	2	50%	0	0	0%	0	0%
17	Siding	16	2	13%	7	44%	0	0	0%	0	0%
18	Siding at Foundation	5	0	0%	1	20%	0	0	0%	0	0%
19	Siding at Garage	1	1	100%	0	0%	0	0	0%	0	0%
20	Belly Band	2	0	0%	1	50%	0	0	0%	0	0%
21	Privacy Wall	3	0	0%	2	67%	0	0	0%	0	0%
22	Entry Column	3	1	33%	2	67%	0	0	0%	0	0%
23	Planter Box	1	0	0%	0	0%	0	0	0%	0	0%
24	Trellis at Building	1	0	0%	1	100%	0	0	0%	0	0%
25	Trellis at Garage	0	0	0%	0	0%	0	0	0%	0	0%
26	Roof	4	1	25%	1	25%	0	0	0%	0	0%
27	Roof	1	0	0%	0	0%	0	0	0%	0	0%
28	Roof to Wall	3	1	33%	1	33%	0	0	0%	0	0%
29	Penetrations	5	0	0%	0	0%	0	0	0%	0	0%
30	Utilities	1	0	0%	0	0%	0	0	0%	0	0%
31	Vent	3	0	0%	0	0%	0	0	0%	0	0%
32	Attic vent above garage	1	0	0%	0	0%	0	0	0%	0	0%
33	Dryer Vent	0	0	0%	0	0%	0	0	0%	0	0%
34											
35		112	20	18%	36	32%	21	8	38%	4	19%
36	* PFCS testing was performed using our Random Selection Protocol										
37	* SWI = Signs of Water Intrusion, but No Damage										

[REDACTED] v [REDACTED] Development
Summary of Testing - Phase 1

#	Testing Location	Openings	SWI*	SWI %	Damage	Damage %	Openings	SWI*	SWI %	Damage	Damage %
1	Diverter	12	1	8%	5	42%	7	3	43%	4	57%
2	Diverter at Balcony	9	1	11%	4	44%	6	3	50%	3	50%
3	Diverter Flashing at 1st Level	2	0	0%	0	0%	1	0	0%	1	100%
4	Diverter Flashing at 2nd Level	1	0	0%	1	100%	0	0	0%	0	0%
5	Windows	16	3	19%	5	31%	15	0	0%	4	27%
6	Exterior Bay Window - 1st Level	3	0	0%	3	100%	5	0	0%	2	40%
7	Exterior Bay Window - 2nd Level	3	0	0%	1	33%	1	0	0%	1	100%
8	Window - 1st Level	5	2	40%	0	0%	6	0	0%	1	17%
9	Window - 2nd Level	5	1	20%	1	20%	3	0	0%	0	0%
10	SGD	1	0	0%	0	0%	6	1	17%	3	50%
11	SGD	0	0	0%	0	0%	0	0	0%	0	0%
12	2nd floor SGD	1	0	0%	0	0%	2	0	0%	0	0%
13	Juliet Balcony Sill	0	0	0%	0	0%	4	1	25%	3	75%
14	Balcony	7	0	0%	2	29%	2	1	50%	1	50%
15	Balcony	5	0	0%	1	20%	0	0	0%	0	0%
16	Fascia Board at Balcony	2	0	0%	1	50%	2	1	50%	1	50%
17	Siding	10	1	10%	5	50%	6	1	17%	2	33%
18	Siding at Foundation	2	0	0%	0	0%	3	0	0%	1	33%
19	Siding at Garage	0	0	0%	0	0%	1	1	100%	0	0%
20	Belly Band	0	0	0%	0	0%	2	0	0%	1	50%
21	Privacy Wall	3	0	0%	2	67%	0	0	0%	0	0%
22	Entry Column	3	1	33%	2	67%	0	0	0%	0	0%
23	Planter Box	1	0	0%	0	0%	0	0	0%	0	0%
24	Trellis at Building	1	0	0%	1	100%	0	0	0%	0	0%
25	Trellis at Garage	0	0	0%	0	0%	0	0	0%	0	0%
26	Roof	2	0	0%	0	0%	2	1	50%	1	50%
27	Roof	1	0	0%	0	0%	0	0	0%	0	0%
28	Roof to Wall	1	0	0%	0	0%	2	1	50%	1	50%
29	Penetrations	5	0	0%	0	0%	0	0	0%	0	0%
30	Utilities	1	0	0%	0	0%	0	0	0%	0	0%
31	Vent	3	0	0%	0	0%	0	0	0%	0	0%
32	Attic vent above garage	1	0	0%	0	0%	0	0	0%	0	0%
33	Dryer Vent	0	0	0%	0	0%	0	0	0%	0	0%
34											
35		53	5	9%	17	32%	38	7	18%	15	39%
36	* PFCS testing was performed using our Random Selection Protocol										
37	* SWI = Signs of Water Intrusion, but No Damage										

7. CONCLUSION



7. CONCLUSION

Conclusion

- Program Outline
- Learning Objectives
- Back-Up Materials
- Homework



Read about industry impacts on our blog at www.petefowler.com

7. CONCLUSION

Program Outline

1. Introduction
2. Building “Science”; Really?
3. Random Selection
4. The E Word (Extrapolation)
5. Playing Doctor
6. Do the Right Thing
7. Conclusion



Read about industry impacts on our blog at www.petefowler.com

7. CONCLUSION

Learning Objectives

- Explain the basics of applying the scientific method to building performance analysis
- Explain the process of randomly selecting inspection and testing locations
- Explain the process of extrapolating findings
- Show examples of good work



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7. CONCLUSION

Back-Up Materials

1. Judge's Order including random selection of residences
2. Motion to Exclude Evidence
3. Daubert Motion to Preclude and Order Denying Extrapolation
4. PFCS Investigation Recommendations, Testing Summary and Testing Map
5. PFCS Random Selection and Inspection (& Testing) Request
6. PFCS Summary of Testing
7. PFCS Scope of Repair



Read about industry impacts on our blog at www.petefowler.com

7. CONCLUSION

Homework

- Review the presentation handout for 10-20 minutes some time in the next 24 hours.
- Read each of the back-up documents some time in the next month (Put it on the night stand; it will help with insomnia).
- Calendar forward a month to review the presentation handout again for 10-20 minutes

Doing this will increase your long-term memory of the material by many times.



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P e t e F o w l e r
CONSTRUCTION
S e r v i c e s , I n c .

Request for Proposal

Date:	March 30, 2009
To:	Contractor
From:	Pete Fowler Construction Services, Inc.
Project:	██████████ Townhomes PFCS No. 08-156 Address: ██████████ Beaverton, OR, 97007
Regarding:	Request for Proposal (RFP)

Dear Contractor:

The project involves the ██████████ Townhomes located ██████████ in Beaverton, Oregon. The townhomes occupy 31 of the total 91 lots at the ██████████ development. There are 17 buildings containing 31 residential units (14 duplexes and 3 free standing units). The buildings are two-story wood framed structures primarily clad with HardiPlank lap siding. There are exterior brick masonry and/or stone veneer architectural details at the base of the front elevation columns and on front elevation garage walls at some units. The windows are vinyl-framed units. The roofs are pitched with asphalt composition shingles over felt and wood sheathing. The scope of work consists of targeted exterior repairs on all townhomes and is broken down in the following categories:

1. Masonry Veneer at Building Walls: 4 of the 17 buildings feature cultured stone wainscot veneers at the building walls adjacent to the garage doors. These areas of stone veneer are to be removed and replaced in order to properly integrate the water resistant barrier system with the adjacent building assemblies.
2. Deck Ledgers: 10 of the 31 units feature raised wood decks at the rear elevations. The deck ledger connections are to be disassembled and reassembled in order to flash and integrate the deck ledgers into the existing water resistant barriers.
3. Asphalt Shingle Roof System: An allowance shall be budgeted in order to cover roof service and repairs at all 31 units. Primary repairs will include extension of edge metals to lap the existing felt underlayment, sealing of punctures caused by scaffolding equipment used during original construction as well as general repair and service items.
4. Column Base Trim at Front Elevations: All 17 buildings feature front elevation columns consisting of masonry or stone veneered bases with wood panel siding and trim above. The horizontal sill and base trim is to be removed and replaced at all locations in order to provide a sloping water table that extends beyond the edge of the masonry veneers.
5. Post Base Trim at Back Elevations: 9 of the 31 units have wood posts with base trim in direct contact with the concrete patios at the back elevations. The post base trim is to be removed and replaced at these areas in order to provide proper clearance above the adjacent concrete surfaces.

6. Lap Siding in Contact with Grade: The townhome development features sloping lots with split level foundations and floor plans. As a result the exterior lap siding is installed close to the adjacent grade at several locations throughout the development. Adjustments to the adjacent grade are to be made in order to provide adequate clearance from lap siding and wood trim. In some locations the bottom edge of the siding and/or trim may need to be cut.
7. Sill Flashing at Head Wall Condition: At many of the units the second floor wall is set back from the lower level garage wall, creating a shed roof directly below the second floor window. Some of these locations are to be disassembled and reassembled in order to ensure proper installation and integration of the water resistant barrier system including roof to wall details.
8. Reverse Lap WRB at Sill Flange: The townhomes feature vinyl windows installed within a lap siding system over building paper, with the windows installed utilizing typical 6" wide window flashing paper. Some of these locations are to be disassembled and reassembled in order to ensure proper installation and integration of the water resistant barrier system
9. Exterior Painting and Coating: Prepare and paint all exteriors of all building after repairs are completed.

Bids are to clearly show costs for all repair sections listed above for all 31 townhomes. (Please see Repair Locations Matrix attached for count of repair locations).

The project will be coordinated by Pete Fowler Construction Services, Inc. and all contracts will be between the HOA (or its representative) and the Contractor. We will schedule a time for the contractor to visit the site and then come to our office to discuss the Scope of Work on a building-by-building basis. The contract will be for one building first and then for the rest, assuming things go well with the first. There will be a project kick-off meeting to set hold points as specified by the HOA (or its representative) and prepare a written repair schedule.

WORK TO BE PERFORMED: The documentation for the scope of work is contained in the following documents that constitute the entire request for proposal, and will ultimately become part of the contract for services:

1. Request for Proposal (this document, 3 pages)
2. Scope of Repair and Supplemental Conditions spreadsheets (4 pages)
3. Repair Locations Matrix (1 page)
4. Satellite Images of Site (2 pages)
5. Site and Exterior Photographs
6. Building & Unit Matrix (3 pages)
7. Elevation Maps with Markings of Repairs (all 17 buildings)
8. Schedule of Values/Payment Request Worksheet (1 page-Excel version available upon request)
9. Construction Schedule (1 page-Excel version available upon request)
10. AGC Document No. 205 "Standard Short Form Agreement between Owner and Contractor" is available upon request
11. Referenced standards in the Scope of Repair are available upon request

Request for Proposal

Each contractor will be given the opportunity to review any and all documentation necessary to formulate a detailed proposal, as well as to inspect the property prior to submitting a proposal. Each contractor should therefore understand that the change orders after commencement of the project will be closely scrutinized, and will only be permitted when it can be shown that an unforeseeable condition necessitates additional work. Change orders must be in writing, reviewed by the Owner or Owner's Representative and signed by the HOA prior to commencement of the extra work. Prior to any inspection, PFCS requires notification of date and time and the name(s) of people who will be on site at the inspection.

BID SELECTION PROCESS: The HOA and/or its representative will select one general contractor to perform most of the restoration work indicated in the scope of repair documents. A general contractor will be selected on the basis of the following:

- The completeness of the contractor's written proposal.
- The contractors demonstrated ability to complete the restoration work within the budget and with as few extras/change orders as possible.
- The contractors demonstrated ability to adhere to an agreed upon construction schedule.
- The total cost of the project.
- Interviews conducted by the Owner or Owner's Representative and / or the HOA.

MINIMUM QUALIFICATIONS: Each contractor must demonstrate the following qualifications:

- Contractor's license: A general building contractor (B) license in good standing, or the applicable trade-specific license(s). The contractors' bonds must be in good standing.
- Workers Compensation Insurance: Current active worker's compensation insurance. The Contractor selected for this project should be prepared to provide the homeowner with a Certificate of Insurance confirming coverage prior to commencement of any work.
- General Liability Insurance: A policy of liability insurance issued by a carrier authorized to write primary lines of insurance in the State of Oregon with minimum coverage of \$500,000 per occurrence for General Contractors and minimum coverage of \$300,000 per occurrence for Specialty Contractors. The insurance must provide completed operations coverage, and must include the HOA and their Consultant as additional insured. The Contractor will be required to provide the HOA and their Consultant with Certificates of Insurance prior to the commencement of any work.

TIMELINE: Please submit your proposal including the Schedule of Values and a completed written schedule at your earliest convenience (see No. 7 and 8 above). We expect to be choosing a contractor within three weeks of sending out this RFP. If you cannot meet this timeframe, please contact us to negotiate an alternate submission date.

If you have any questions please call us at 503.246.3744.

Sunshine Gardens

Scope of Repair

Line	Item	Description	Notes / Ref.
1	04 00	Masonry Veneer at Building Walls	Occurs @ 8 units.
2	A	Select a suitable masonry veneer system from a national manufacturer who publish explicit installation instructions. Submit installation instructions prior to beginning work on this assembly to the Owner / Construction Manager (CM) for approval. Installation shall conform with manufacturer's installation requirements.	
3	B	Remove and discard existing masonry veneer, lath, cement scratch and brown coat, and Weather-Resistive Barrier (WRB) installed at building walls adjacent to garage doors only. NOTE: Masonry veneers currently installed at column bases are to remain.	
4	C	Provide and install sheet metal transition flashings to integrate with all adjacent building assemblies including horizontal and vertical siding transition and transitions to adjacent concrete walls and curbs in order to provide a fully integrated and properly lapped WRB.	
5	D	Install new WRB, properly lapped with adjacent building assemblies and newly installed flashings.	
6	E	Install system components in conformance with manufacturer's installation requirements.	
7	F	Install new masonry veneers to match existing, conforming with manufacturer's instructions.	
8	G	All new or replaced exterior wood shall be prepared and primed on all six sides before installation	
9	H	Clean adjacent surfaces. Paint touch up at adjacent siding and trim to match.	
10			
11	07 25	Deck Ledgers	Occurs @ 10 homes
12	A	Remove deck planking adjacent to building wall as necessary to complete remaining scope of repair. NOTE: Set decking aside for reinstallation.	
13	B	Remove horizontal lap siding and exterior trim adjacent to deck ledger as necessary to complete remaining scope of repair. Save siding and trim for reinstallation.	
14	C	Install L-metal on top of existing deck ledger, fasten to building wall over existing WRB.	
15	D	Make horizontal cut in existing building paper along top edge of new L-metal. Install new flat stock sheet metal to be lapped under existing building paper and over top leg of new L-metal	
16	E	Install self-adhered membrane type flashing over installed flat stock sheet metal, lapped under existing building paper.	
17	F	Apply sealant at WRB and flashing transitions as necessary.	
18	G	Replace previously removed siding and trim. All new or replaced exterior wood shall be prepared and primed on all six sides before installation.	
19	H	Reinstall previously removed deck planking, replace damaged deck material with treated and sealed decking to match existing.	
20	I	Prepare and paint siding and trim to match adjacent surfaces.	
21			
22	07 30	Asphalt Shingle Roof System	Allowance per unit (Total 31 units)
23	A	Locate areas of shingle punctures, install 30# felt backing at puncture locations, tab and seal with mastic.	
24	B	Locate areas where felt underlayment does not extend to the rake or gutter edge. Install 6" wide flat stock sheet metal flashing lapped under existing underlayment and over existing edge metal. Fasten with corrosion resistant roofing nails or staples.	
25	C	Perform general service and repair walk through. Correct and seal unsealed or damaged roof shingles, exposed fasteners. Inspect seal or correct confined rake terminations.	
26			
27	07 46	Base Trim at Front Elevation Columns Above Masonry Veneers	100 columns
28	A	Remove and discard existing sill and horizontal trim adjacent to masonry veneers. Column oriented strand board (OSB) framing and finished siding to remain.	
29	B	Install sheet metal cap flashing over masonry veneer in order to separate masonry from wood trim. Flashing to extend under existing OSB column framing and beyond edge of existing masonry veneer with drip edge detail	
30	C	Prepare and prime existing siding. All new or replaced exterior wood shall be prepared and primed on all six sides before installation.	
31	D	Mill and install sloping cedar sill. Wood sill to provide a sloping top surface that extends beyond the edge of the existing masonry veneers with a drip kerf milled into the bottom edge.	
32	E	Install new horizontal 1x column trim. Cut existing vertical trim to fit	
33	F	Prepare and paint column trim to match existing.	
34			
35	07 46	Base Trim at Rear Elevation Posts in Contact with Concrete Paving	Occurs @ 9 homes (1 per home)
36	A	Remove and discard 1x base trim installed at posts.	
37	B	Trim bottom of existing post finish wrap to provide 1" clearance above concrete	
38	C	All new or replaced exterior wood shall be prepared and primed on all six sides before installation	
39	D	Install new cedar post base trim to match existing, maintain 1" clearance above concrete.	
40	E	Prepare and paint post and trim to match existing	
41			
42	07 46	Lap Siding and Trim in Contact with Grade	Total of 235.5 lf @ 23 homes

Sunshine Gardens

Scope of Repair

Line	Item	Description	Notes / Ref.
43	A	Adjust adjacent finish grade to provide minimum 6" clearance from finish grade surface to bottom edge of siding and trim. Replace landscape topping as necessary.	Total of 217.5 lf. @ 18 homes
44	B	Cut siding and trim above grade at areas where siding and trim extend well below the sill plate line.	Total of 18 lf @ 9 homes
45	C	Prime and paint cut edges of siding and trim	
46			
47	08 50	Sill Flashing at Head Wall Condition	Include unit price to be applied.
48	A	Remove and discard sill and apron trim under window.	
49	B	Remove siding under window and down to roof transition below window only.	
50	C	Remove nails from window sill flange. Reinstall Moistop flashing under window sill flange, properly lap with adjacent jamb flashing and WRB.	
51	D	Install appropriate flexible flashings, rigid flashings and WRB, integrated in weather-board fashion. Conform with ASTM E 2112.	
52	E	Install new WRB, properly lapped under new sill Moistop in shingle style lap and over roof to wall flashing.	
53	F	Install new apron and sill trim under window to match existing. Cut adjacent trim or replace to fit	
54	G	Install new Hardi-plank lap siding previously removed in conformance with manufacturers standards	
55	H	Install backer rod and sealant in conformance with ASTM E2112-07 (p. 26-). Sealant shall conform with ASTM C920 and be compatible with the flashings and paint (such as Fortifiber product family).	
56	I	Prepare and paint exterior of siding and trim to match existing area.	
57			
58	08 50	Sill Flashing at Window Sills (assume 5 locations, 6 lf each)	Include unit price to be applied.
59	A	Remove siding and trim at sill. NOTE: Save siding and trim for reinstallation	
60	B	Remove nails from window sill flange. Reinstall Moistop flashing under window sill flange, properly lap with adjacent jamb flashing and WRB.	
61	C	Install appropriate flexible flashings, rigid flashings and WRB, integrated in weather-board fashion. Conform with ASTM E 2112. Rigid head flashing shall have closed ends (ASTM E2112-07 see p. 48).	
62	D	Install new WRB under Moistop in shingle style lap to existing WRB	
63	E	Install Hardi-plank lap siding previously removed	
64	F	Install backer rod and sealant in conformance with ASTM E2112-07 (p. 26-). Sealant shall conform with ASTM C920 and be compatible with the flashings and paint (such as Fortifiber product family).	
65	G	Prepare and paint exterior of siding and trim to match existing area.	
66			
67	09 90	Painting and Coating	
68	A	Select a suitable top quality national paint manufacturer, such as Sherwin-Williams, Benjamin Moore, Dunn Edwards, Glidden, or similar. The manufacturer must have a local technical representative. Recommendations from the contractors will be welcomed. Submit material selection and application instructions prior to beginning work to the Owner / CM for approval. Application shall conform with manufacturer's requirements.	
69	B	Owner or Owner's Representative shall walk the project with the painter and make final decisions on an area-by-area basis for color and sheen.	
70	C	All surface preparation and paint application shall be in strict conformance with manufacturer's application recommendations.	
71	D	Coordinate with chosen paint manufacturer's technical representative for appropriate primers on all applicable materials. Document recommendations and forward to Owner or Owner's Representative.	
72	E	All new or replaced exterior wood shall be prepared and primed on all six sides before installation	
73	F	Once repairs are complete, mask as needed to provide protection for roofs, cars, landscaping, etc.	
74	G	Remove and replace all sealant with adhesive or cohesive failure by cutting old sealant away and completely removing it, preparing the joint for proper application, and using a top quality sealant that is compatible with the paint being applied and that conforms with ASTM C920.	
75	H	Where required, install backer rod and sealant in conformance with ASTM E2112-07 (p. 26-). Sealant shall conform with ASTM C920 and be compatible with the flashings and paint (such as Fortifiber product family)	
76	I	All exterior wood shall be prepared for paint, in accordance with the manufacturer's instructions, and receive one coat top quality latex acrylic primer and one top coat of top quality latex acrylic paint	
77	J	ALTERNATE: Apply a second coat of top quality latex acrylic paint to the exterior wood	
78			
79	00 00	Applicable Standards	
80	A	The following standards are available upon request.	
81	B	ASTM E241 Limiting Water-Induced Damage to Buildings	
82	C	ASTM E2266 Design Low-Rise BLDG Wall to Resist Water Intrusion	
83	D	ASTM E2112-07 Window Installation Standard 2007	
84	E	ASTM C920 - 08 Standard Specification for Elastomeric Joint Sealants	
85	F	Sealant joints at windows and doors shall conform with ASTM E2112-07 (p. 26-).	
86	G	Conform generally with sheet metal details in ASTM E2266 Appendix.	
87	H	Install appropriate flexible flashings, rigid flashings and WRB, integrated in weather-board fashion. Conform with ASTM E 2112. Rigid head flashing shall have closed ends (ASTM E2112-07 see p. 48).	
88	I	Rigid head flashing shall have closed ends (ASTM E2112-07 see p. 48).	

Sunshine Gardens

Supplemental Conditions

Line	CSI	Item	Issue
1	01 00		Supplemental Conditions (to Conditions in AGC Agreement)
2		A	All Contractors and/or Subcontractors shall (1.) be licensed for the work they are performing, (2.) have written agreements, (3.) have all bond and insurance required as stated in the prime contract in accordance with state requirements, (4.) deliver writ
3		B	All Contractors and/or Subcontractors are considered expert in their specific trades and it is understood that the means, methods and application techniques to be used in this project are considered under the control of the general contractor and individu
4		C	Supervision: Contractors and/or Subcontractors will provide competent supervisors at all times. There is to be at minimum a part-time supervisor on site by the General Contractor when work is being performed.
5		D	Change Orders: Contractors and/or Subcontractors are responsible for immediately informing the Owner or Owner's representative of any change in condition or contract. Change Orders will only be approved by written authorization from the Owner or Owner's R
6		E	Quality Control: Contractors will ensure work is being performed in a professional and workman like manner, consistent with the Scope of Work, in conformance with applicable code & municipal requirements, and consistent with quality and performance standa
7		F	Contractor has investigated project locations and is fully aware of all construction conditions reasonably disclosed by a site visit.
8		G	Contractor agrees to provide all labor, materials, tools and equipment needed to complete the work specified in this contract.
9		H	Contractor is responsible for any damage caused by contractor to his work and the work of others during the course of construction and will repair, replace or pay cost for repair or replacement of damaged work.
10		I	All materials are the property of the Contractor until permanently and correctly installed.
11		J	Owner shall not be liable to Contractor for any theft, damage or vandalism of materials, tools or equipment stored on job site unless otherwise covered by insurance.
12		K	Contractor is responsible for inspection and completion of any discrepancies in his work. Final retainage, in an amount equal to the value of any discrepancy, payment will be held until all discrepancies are corrected. The length of time for held payments
13		L	Permits: Contractors will acquire necessary permits and provide copies to the Owner or Owner's Representative.
14		M	Inspections: Contractors' supervisors or project manager to attend progress inspections.
15		N	Temporary Facilities: The approved Contractors and/or Subcontractors will provide required facilities to accommodate crew size and code as required.
16		O	Protect Existing: Contractors will be responsible for the integrity of the building and protection from the beginning of the project until completion of the project. Where Contractors overlap or are working on similar surfaces of the building exterior, th
17		P	Safety: All Contractors shall all be responsible for safety, as required by the Oregon OHSA, a division of Oregon Department of Consumer and Business Services and their state plan operated under an agreement with the federal OHSA.
18		Q	Contractors should visit the site before starting repair work to verify quantities and measurements, which are merely estimates, shown on the plans and specifications.
19		R	Coordinate with Owner to remove their own valuables and breakable items that might be easily broken in relocation.
20		S	All manufacturer's information, installation instructions and warranty information will be delivered to the owner or owner's representative before final payment will be issued.
21		T	Meet with the city to verify compliance with all necessary inspections before beginning work.
22		U	Contractor to verify quantity of repairs items during repairs on site.

Townhomes v
Repair Item Locations

3/30/2009

Line	CSI	Description	Notes / Ref.	Total		Building																
				Qty	Unit	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	04 00	Masonry Veneer at Building Walls	Approx. 144sf @ 4 Buildings (36sf avg.)	144	sf	0	0	0	0	36	0	0	36	0	0	0	0	36	0	0	36	0
2	07 25	Deck Ledgers	Approx. 332lf @ 10 homes (33sf avg)	10	loc	1	0	2	1	0	0	1	2	2	0	0	1	0	0	0	0	0
3	07 30	Asphalt Shingle Roof System	Allowance per unit (Total 31 units)	31	loc	2	1	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2
4	07 46	Base Trim and Front Elevation Columns Above Masonry Veneers	Approx. 100 columns @ 17 buildings.	107	Ea	6	3	6	7	7	7	7	7	7	5	3	7	7	7	7	7	7
5	07 46	Base Trim at Rear Elevation Posts in Contact with Concrete Paving	Occurs and 9 homes	9	loc	0	0	0	1	0	2	2	0	0	0	0	1	0	1	1	0	1
6	07 46	Lap Siding and Trim in Contact with Grade	Total of 236lf @ 23 homes																			
7	A	Adjust Adjacent Finish Grade	Total of 217 lf. @ 18 homes	217	lf	50.5	45	45	2	0	1	0	3	0	20	4	2	7	9	12	4	12
8	B	Cut Siding and Trim above Grade	Total of 19lf @ 9 homes	19	lf	0	0	6	1	4	0	3	2	0	0	1	0	0	0	2	0	0
9	08 50	Sill Flashing at Head Wall Condition	Provide Unit Price for additional locations	4	loc	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1	0
10	08 50	Sill Flashing at Window Sills	Provide Unit Price for additional locations	6	loc	0	1	1	0	0	0	0	1	0	0	0	1	0	0	1	0	1
11	00 00	Miscellaneous Repairs																				
12	A	OSB Repair at Building A	Provide Unit Price for additional locations	1	loc	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	B	Corner Trim Replacement at Building P	Provide Unit Price for additional locations	1	loc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
14																						

Townhomes

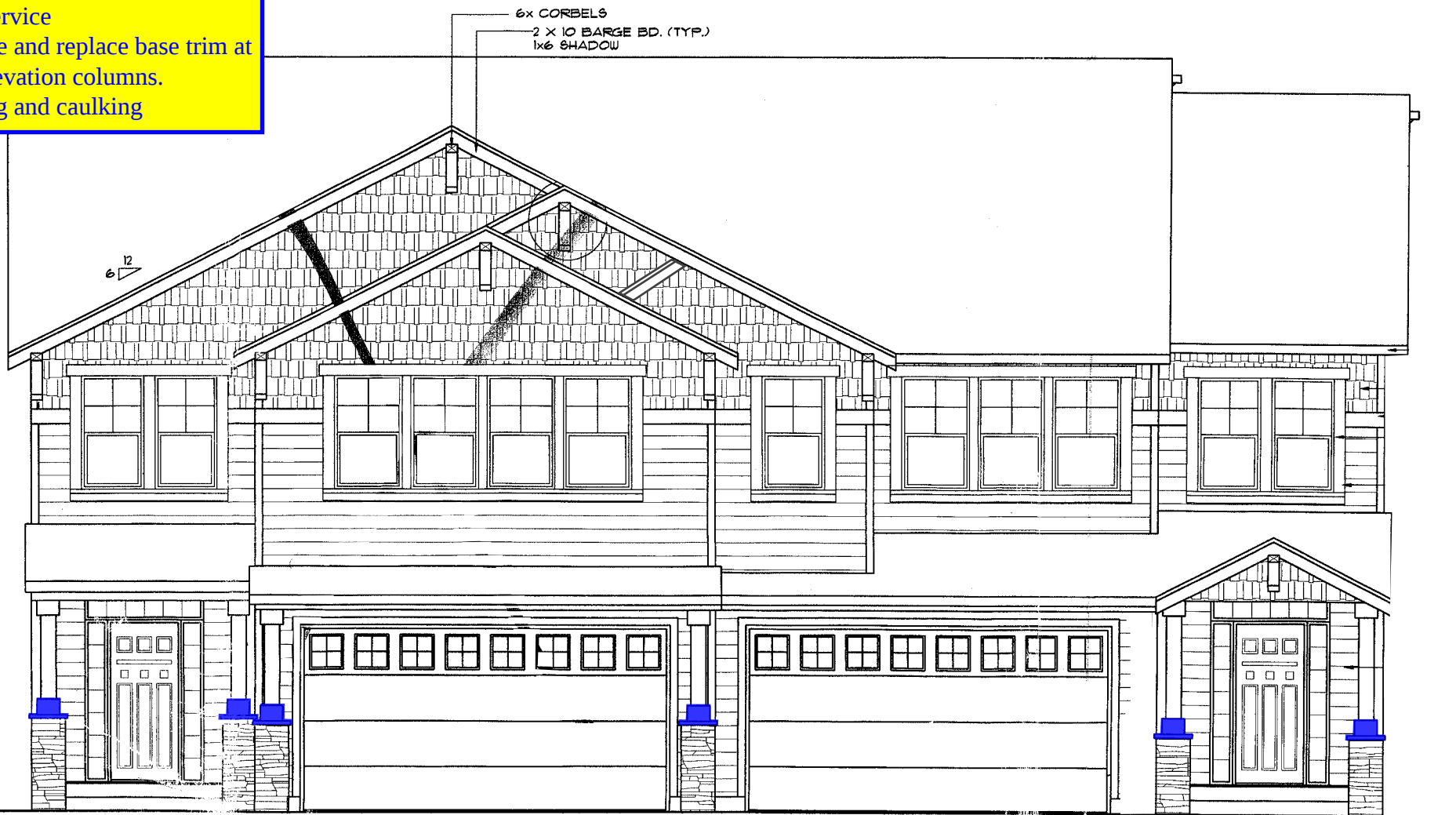


PFCS REPAIRS

Building A
15570 / 15580

Global Repairs

- Roof service
- Remove and replace base trim at Front Elevation columns.
- Painting and caulking



FRONT ELEVATION

SCALE : 1/4" = 1'-0"

Column Base Trim Repair

- 7 columns with brick veneer
 - Total repair is approximately 46 lf.
- NOTE: Masonry veneer on columns to remain.



REAR ELEVATION

SCALE : 1/4" = 1'-0"

PFCS REPAIRS

**Building A
15580**



RIGHT ELEVATION

SCALE : 1/4" = 1'-0"

PFCS REPAIRS

**Building A
15570**



LEFT ELEVATION

Remove and replace
damaged OSB.

SCALE : 1/4" = 1'-0"

Reposition ground
clamp and seal gas
penetration

PFCS REPAIRS

Building B
15590

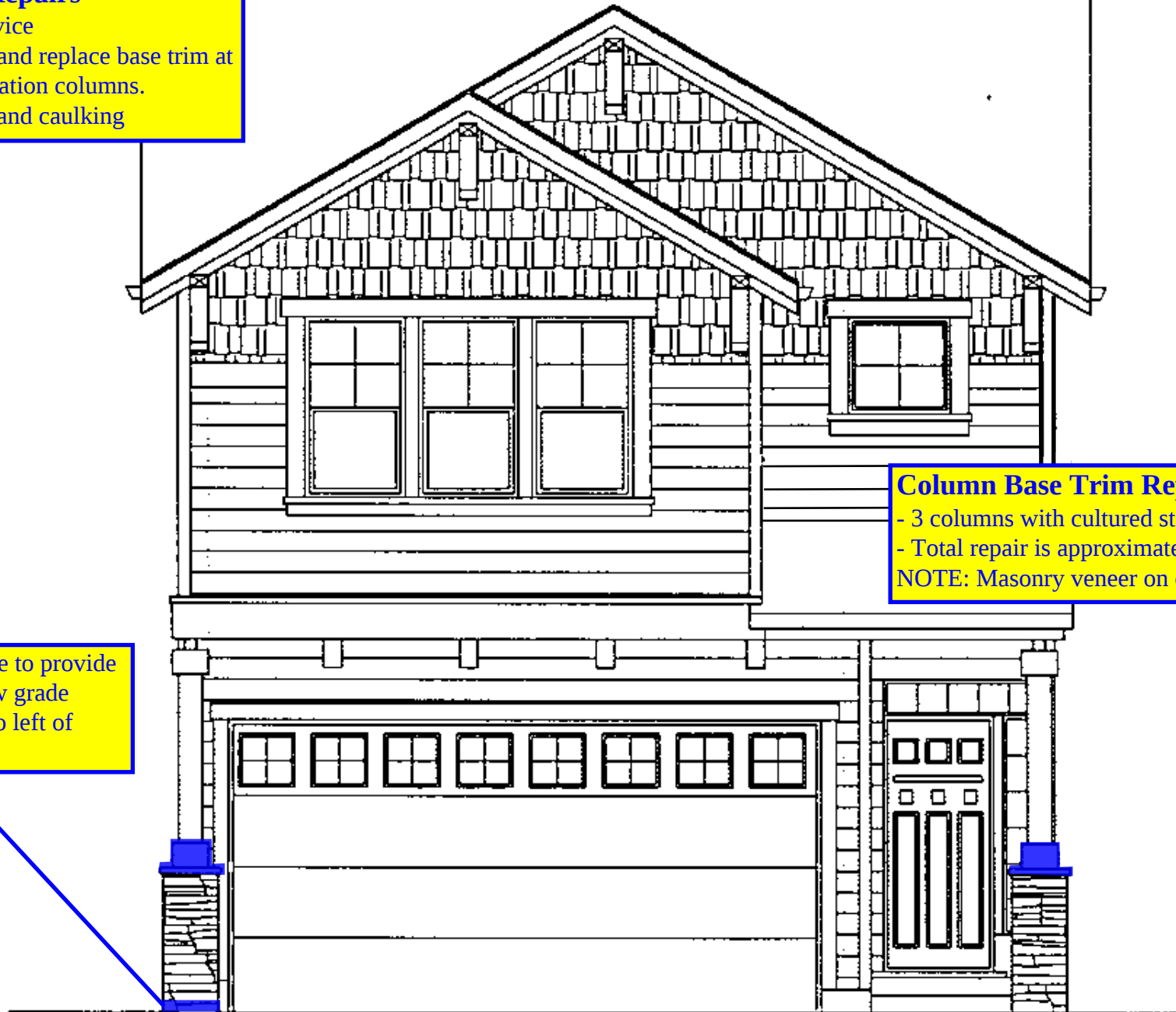
Global Repairs

- Roof service
- Remove and replace base trim at Front Elevation columns.
- Painting and caulking

Column Base Trim Repair

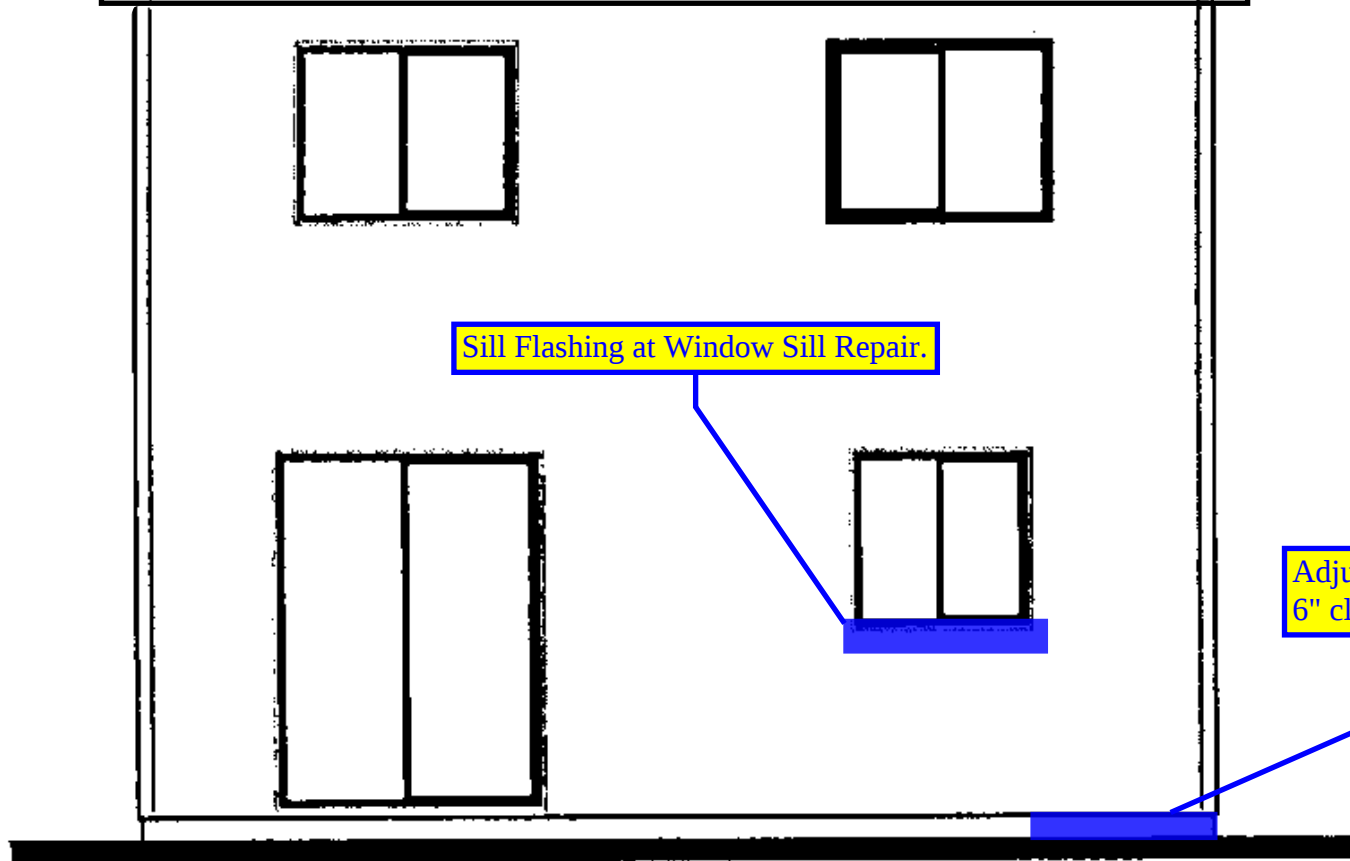
- 3 columns with cultured stone
 - Total repair is approximately 20 lf.
- NOTE: Masonry veneer on columns to remain.

Adjust finish grade to provide 6" clearance below grade (behind column, to left of garage door).



PFCS REPAIRS

**Building B
15590**



Sill Flashing at Window Sill Repair.

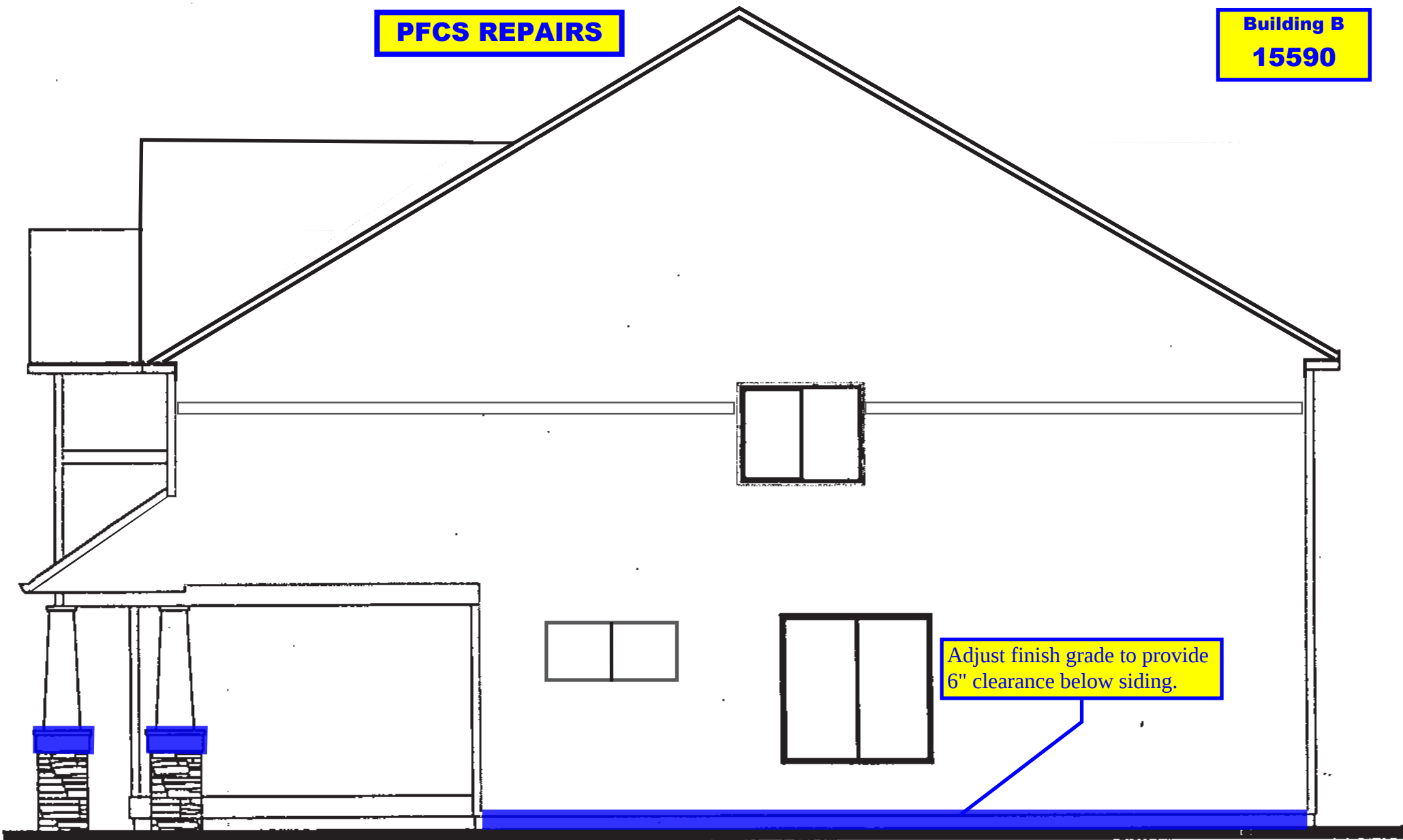
Adjust finish grade to provide
6" clearance below siding.

SCALE: 1/4" = 1'-0"

REAR ELEVATION

PFCS REPAIRS

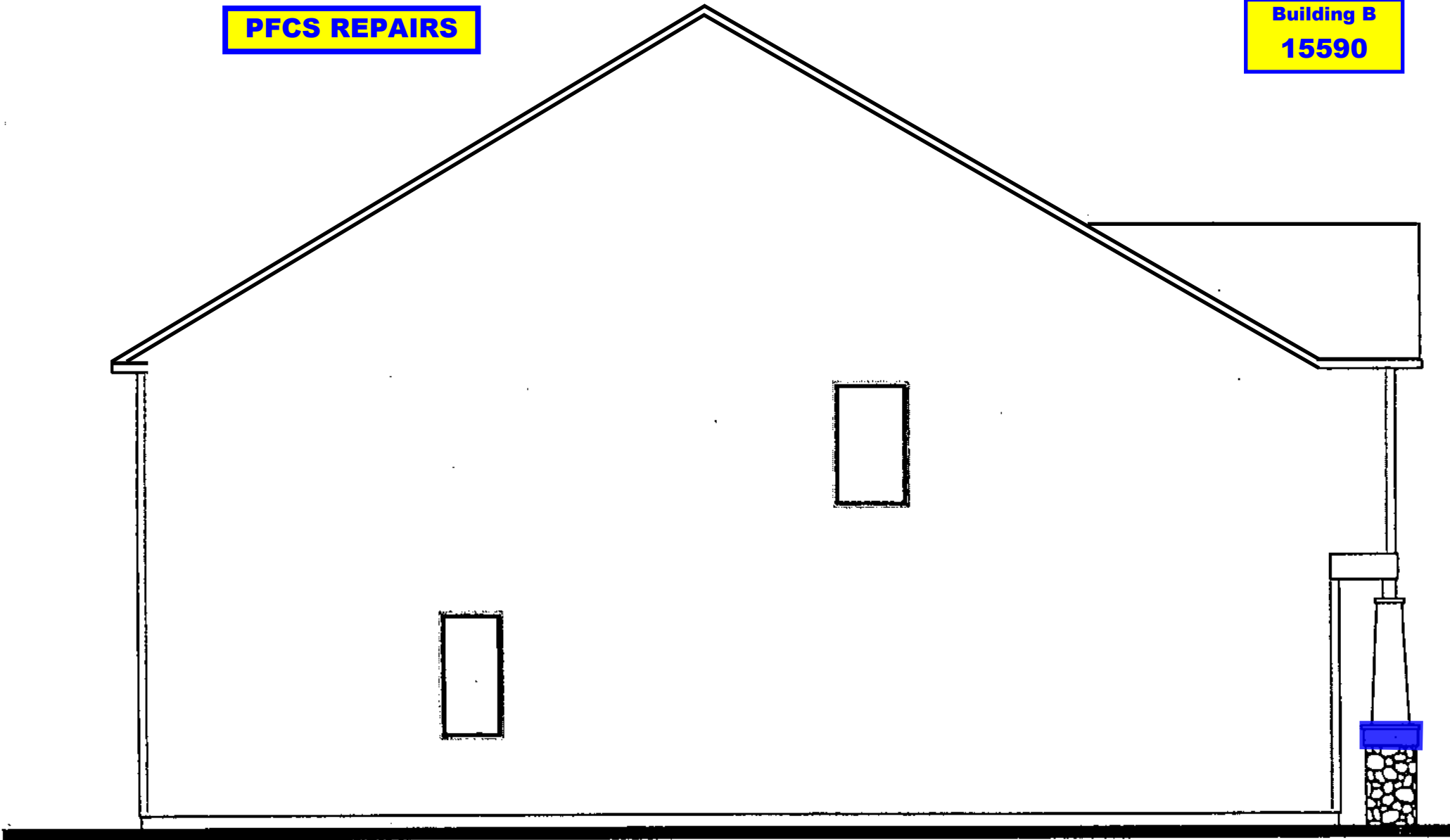
**Building B
15590**



SCALE: 1/4" = 1'-0"
RIGHT-SIDE ELEVATION

PFCS REPAIRS

**Building B
15590**



SCALE 1/4" = 1'-0"

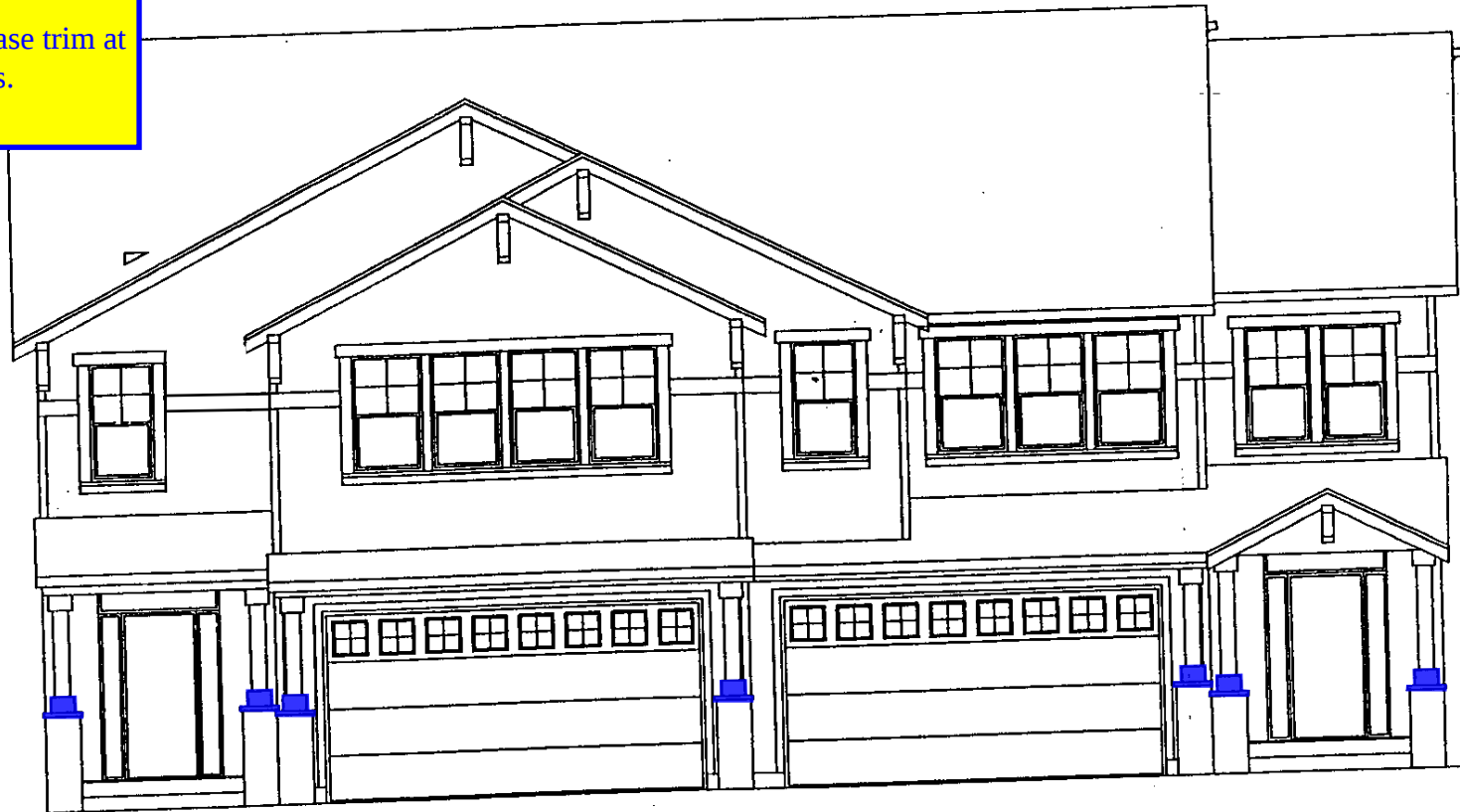
LEFT-SIDE ELEVATION

PFCS REPAIRS

Building C
15606 / 15610

Global Repairs

- Roof service
- Remove and replace base trim at Front Elevation columns.
- Painting and caulking



FRONT ELEVATION

SCALE: 1/4" = 1'-0"

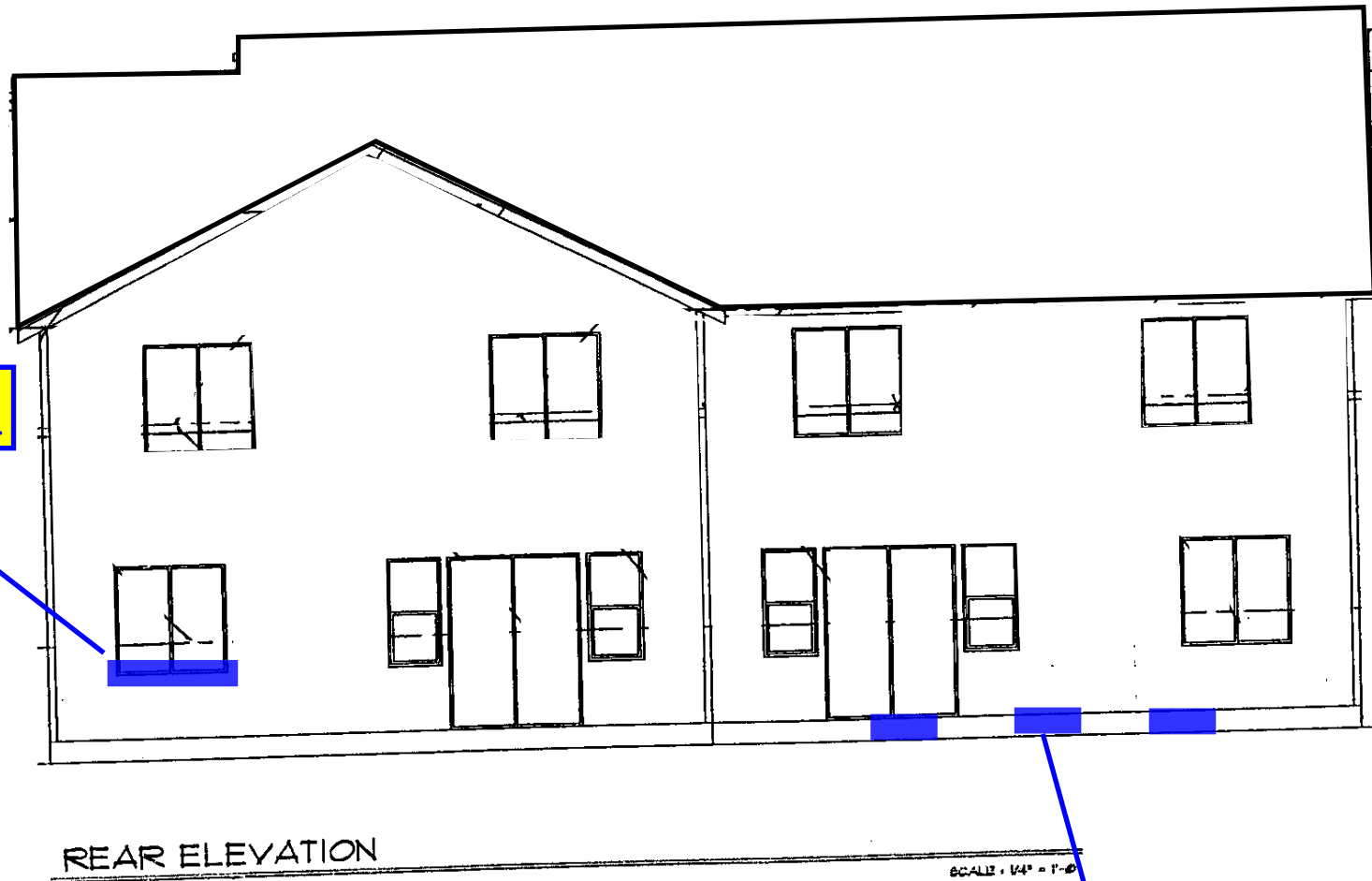
Column Base Trim Repair

- 7 columns with brick veneer
 - Total repair is approximately 46 lf.
- NOTE: Masonry veneer on columns to remain.

PFCS REPAIRS

Building C
15610 / 15606

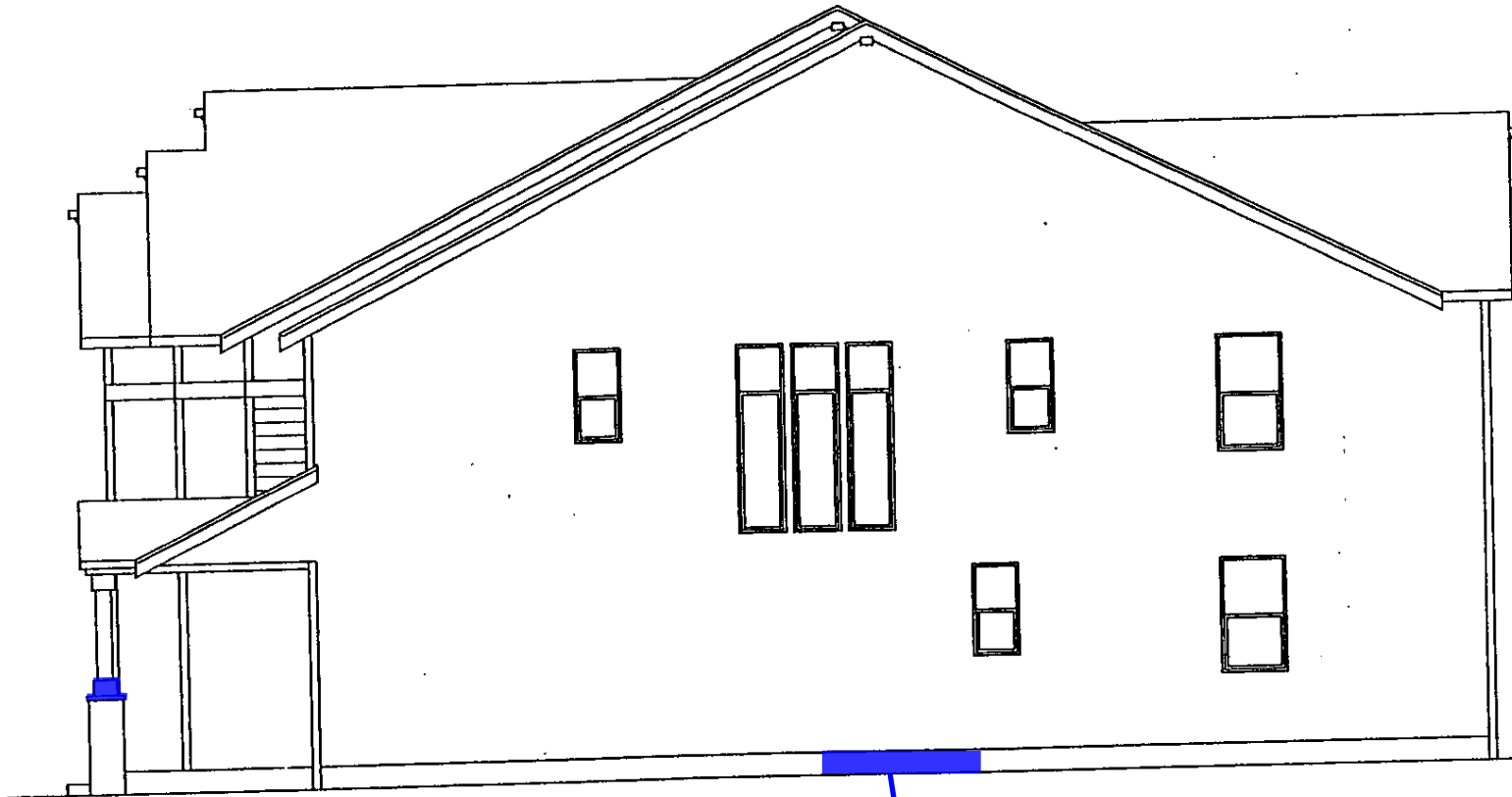
Sill Flashing at
Window Sill Repair.



Trim the existing siding to
provide 6" clearance above
grade (3 2-foot sections).

PFCS REPAIRS

**Building C
15610**



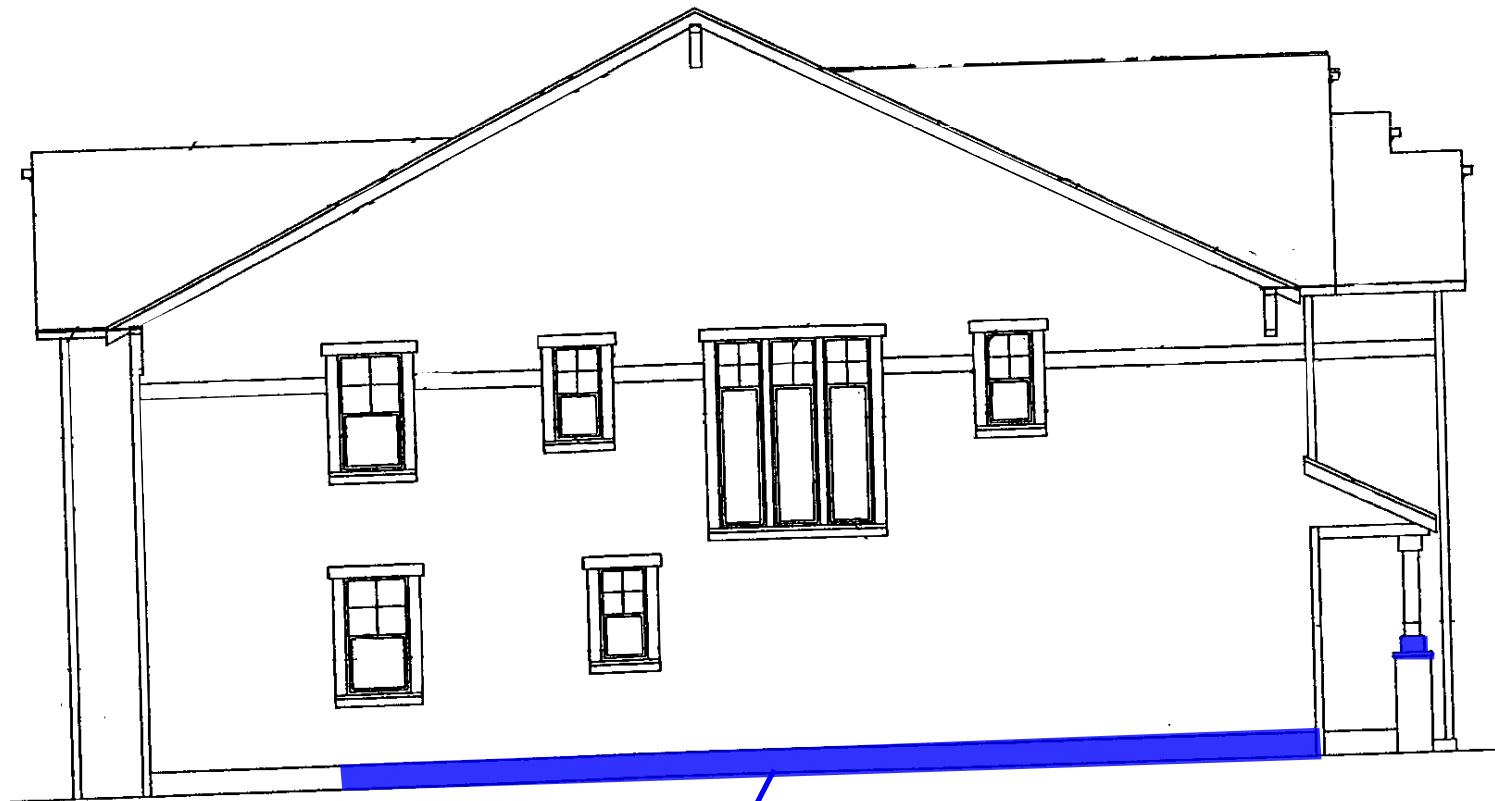
RIGHT ELEVATION

SCALE : 1/4" = 1'-0"

Adjust finish grade to provide
6" clearance below siding
(approximately 15-feet).

PFCS REPAIRS

**Building C
15606**



LEFT ELEVATION

Adjust finish grade to
provide 6" clearance
(approximately 30-feet).

SCALE : 1/4" = 1'-0"

PFCS REPAIRS

Building D
15620 / 15630

Global Repairs

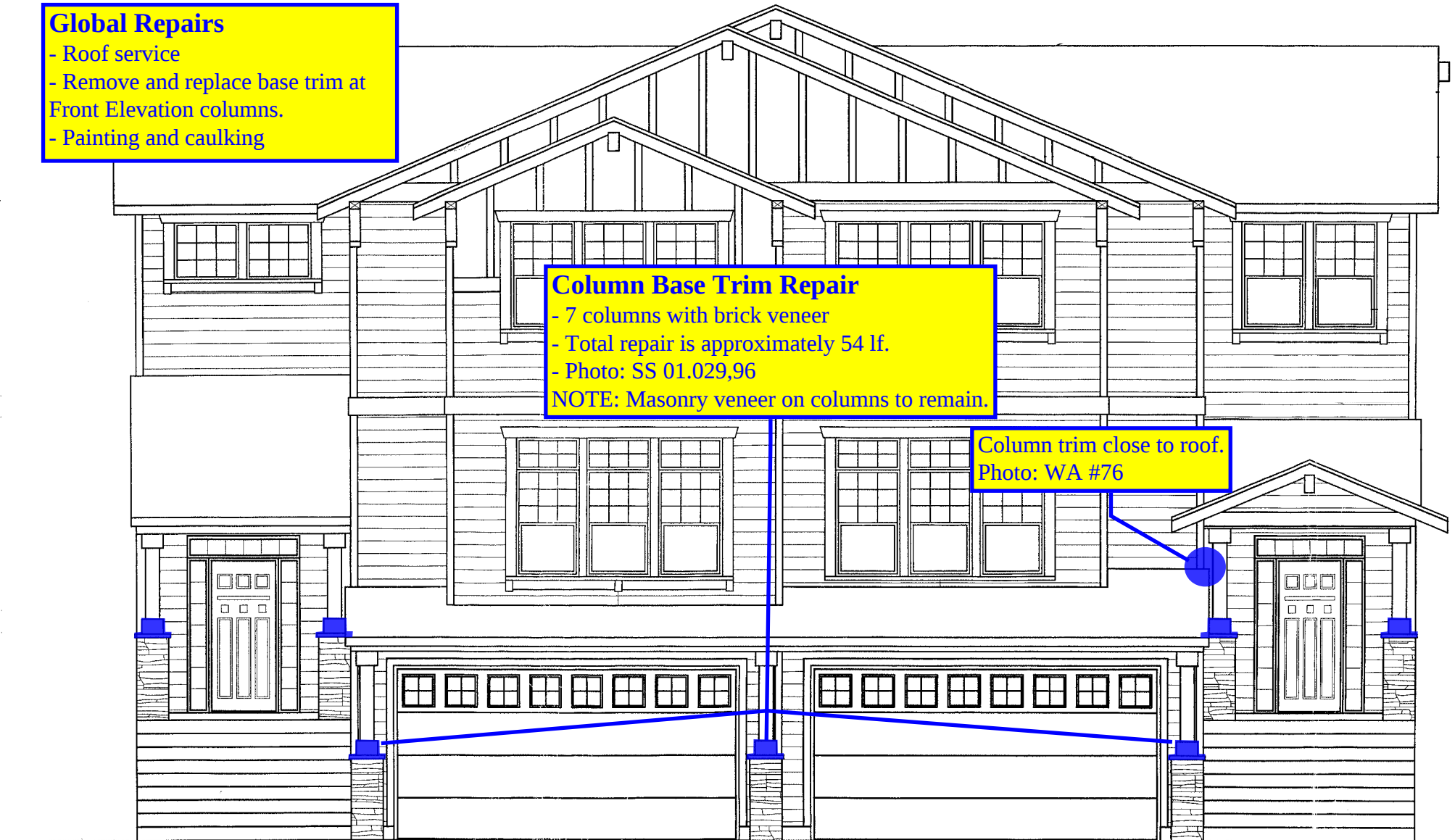
- Roof service
- Remove and replace base trim at Front Elevation columns.
- Painting and caulking

Column Base Trim Repair

- 7 columns with brick veneer
- Total repair is approximately 54 lf.
- Photo: SS 01.029,96

NOTE: Masonry veneer on columns to remain.

Column trim close to roof.
Photo: WA #76



ELEVATIONS

SCALE : 1/4" = 1'-0"

Townhomes

Unit Matrix

Line	Number	Street	Building Type	PFCS Building	Lot #	Year Built*	PFCS Exterior Inspection	Decks
1	15570	SW Snowy Owl Lane	Townhome	A	61	2004	X	X
2	15580	SW Snowy Owl Lane	Townhome	A	62	2004	X	
3	15590	SW Snowy Owl Lane	Free-Standing Townhome	B	63	2004	X	
4	15606	SW Snowy Owl Lane	Townhome	C	64	2004	X	X
5	15610	SW Snowy Owl Lane	Townhome	C	65	2004	X	X
6	15620	SW Snowy Owl Lane	Townhome	D	66	2003	X	X
7	15630	SW Snowy Owl Lane	Townhome	D	67	2002	X	
8	15640	SW Snowy Owl Lane	Townhome	E	68	2002	X	
9	15650	SW Snowy Owl Lane	Townhome	E	69	2002	X	
10	15700	SW Snowy Owl Lane	Townhome	F	70	2002	X	
11	15702	SW Snowy Owl Lane	Townhome	F	71	2002	X	
12	15714	SW Snowy Owl Lane	Townhome	G	72	2004	X	X
13	15726	SW Snowy Owl Lane	Townhome	G	73	2004	X	
14	15738	SW Snowy Owl Lane	Townhome	H	74	2004	X	X
15	15752	SW Snowy Owl Lane	Townhome	H	75	2004	X	X
16	15764	SW Snowy Owl Lane	Townhome	I	76	2004	X	X
17	15776	SW Snowy Owl Lane	Townhome	I	77	2004	X	X
18	15788	SW Snowy Owl Lane	Free-Standing Townhome	J	78	2005	X	
19	15800	SW Snowy Owl Lane	Free-Standing Townhome	K	79	2004	X	
20	15840	SW Snowy Owl Lane	Townhome	L	80	2004	X	X
21	15880	SW Snowy Owl Lane	Townhome	L	81	2004	X	
22	15900	SW Snowy Owl Lane	Townhome	M	82	2004	X	
23	15910	SW Snowy Owl Lane	Townhome	M	83	2004	X	
24	15920	SW Snowy Owl Lane	Townhome	N	84	2004	X	
25	15930	SW Snowy Owl Lane	Townhome	N	85	2004	X	
26	15940	SW Snowy Owl Lane	Townhome	O	86	2002	X	
27	15950	SW Snowy Owl Lane	Townhome	O	87	2002	X	
28	15960	SW Snowy Owl Lane	Townhome	P	88	2002	X	
29	15970	SW Snowy Owl Lane	Townhome	P	89	2002	X	
30	16000	SW Snowy Owl Lane	Townhome	Q	90	2002	X	X
31	16026	SW Snowy Owl Lane	Townhome	Q	91	2002	X	
32							31	11

Payment Request Worksheet

3/30/2009

Townhomes
Application #1 - MO-DY-YR

A	B				C	D	E	F	G	H	I	
Item	Description of Work	QTY	Unit	Unit Price	Scheduled	Work completed		Materials	Total	%	Balance	Retainage
No.					Value	From	This	presently	completed	(G/C)	to finish	
						previous	period	stored	& stored		(C - G)	
						application		(not D or E)	to date			
						(D + E)			(D + E + F)			5%
1	Masonry Veneer at Building Walls											
2	Deck Ledgers											
3	Asphalt Shingle Roof System											
4	Base Trim and Front Elevation Columns Above Masonry Veneer											
5	Base Trim at Rear Elevation Posts in Contact with Concrete Paving											
6	Lap Siding and Trim in Contact with Grade											
7	Sill Flashing at Head Wall Condition											
8	Sill Flashing at Window Sills (assume 5 locations 6 lf each)											
9	Painting and Coating											
10	Totals											

Townhomes
Project Schedule

		Weeks												
#	Description	Duration	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
1	Masonry Veneer at Building Walls													
2	Deck Ledgers													
3	Asphalt Shingle Roof System													
4	Base Trim and Front Elevation Columns Above Masonry Veneer													
5	Base Trim at Rear Elevation Posts in Contact with Concrete Paving													
6	Lap Siding and Trim in Contact with Grade													
7	Sill Flashing at Head Wall Condition													
8	Sill Flashing at Window Sills (assume 5 locations 6 lf each)													
9	Painting and Coating													



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