

NOVA SCOTIA COURT OF APPEAL

Citation: United Dominion Industries Ltd. v. North Sydney Associates,
2006 NSCA 58

Date: 20060512

Docket: CA 257847

Registry: Halifax

Between:

United Dominion Industries Limited

Appellant

v.

North Sydney Associates

Respondent

Judges: Roscoe, Bateman and Hamilton, JJ. A.

Appeal Heard: April 12, 2006, in Halifax, Nova Scotia

Held: Appeal is dismissed with costs per reasons for judgment of Roscoe, J.A.; Bateman and Hamilton, JJ.A. concurring.

Counsel: Michael J. Wood, Q.C., Ronald S. Noseworthy, Q.C. and Cory Withrow for the appellant
David R. Farrar, Q.C., Colin Piercey and Donn L. Fraser for the respondent

Reasons for judgment:

[1] The owner of the North Sydney Shopping Mall sued the manufacturer of the steel joists used to support the roof of the mall which was constructed in 1979, claiming as damages the costs of repairs it alleged were necessary to prevent a collapse of the roof. Following an eight-day trial, Justice Felix Cacchione found that the joists contained serious welding defects which constituted a real and substantial danger and that the repairs undertaken were reasonable. He awarded the plaintiff damages of \$553,327.

[2] The defendant manufacturer appeals, claiming that the trial judge erred in law in concluding that the plaintiff proved that all the defects were so significant as to constitute a real and substantial danger, in finding that all the repairs undertaken by the plaintiff were necessary to remove the danger and by placing a burden on the defendant to prove that the deficiencies did not constitute a real and substantial danger.

[3] At the trial the defendant admitted that there were some repairs necessary as a result of faulty welding of the joists and accepted responsibility for the cost of repairing missing welds, welds which were completely cracked and “welds which were proven to have insufficient capacity to carry the loads for which they were designed”. Basically the defendants claimed that the plaintiff had repaired many more welds than were necessary to eliminate the risk of roof collapse.

[4] Justice Cacchione after thoroughly reviewing the evidence and citing the relevant case law made the following findings of fact: (see: 2005 NSSC 206)

117 The following facts have been established from the testimony of the witnesses and the documentary evidence presented at trial. No contract existed between the parties. The claim advanced by the Plaintiff, based on the evidence presented, is in tort for economic loss. The amount claimed by the Plaintiff for repairs is \$553,327.28. The North Sydney Mall was built in 1979 and opened to the public in March 1980. The structure was framed with steel beams and columns which supported open web steel joists manufactured by the defendant. A metal decking or roof sat on the joists.

118 The joists consisted of a top and bottom chord made from double lengths of angle iron with solid round bars in between called web members. The web members are connected to the top and bottom chord by means of welds. Where

the web member meets the chord is referred to as a panel point. In a 40 foot long joist there are approximately 19 or 20 top and bottom panel points. Not all the joists in the construction of this building were of the same size.

119 A total of 876 joists were used in the construction of the mall. All joists were inspected either by certified welding inspectors working with structural engineers or by a structural engineer alone before the remediation work was done. Deficiencies in the bottom chord panel points were noted in 743 of the 876 joists. A total of 3381 deficiencies existed in the bottom chord panel points alone.

120 Few joists did not have any deficiencies in the bottom chord panel points. While some joists had only one or two bottom chord panel point defects, 332 joists had five or more such defects. There were 64 joists with 10 or more defects in the bottom chord panel points. Some joists had as many as 21 bottom chord panel point defects.

121 Defects in the bottom chord splices and top chord splices, bent web members, bent bottom chord and pinched bottom chord were also present. Five joists numbered 326(f), 369(a) and (d), 568(b) and 560(u) had defects in the three panel point welds at each end of the bottom chord. The load is the greatest at each end of the joist. The load on the top and bottom chords at each end of a joist is about the same.

122 The vast majority of the deficiencies found related to the welds on the bottom chord panel points. The top chords on the joists were not visually inspected because the metal roof was sitting on them, but they were tested with the use of a pry bar.

123 A visual inspection of the top chord would have been a very costly proposition entailing approximately an extra 1000 hours of inspection work at a cost of \$100.00 per hour for a structural engineer. The cost would have been higher if a certified welding inspector was also used.

124 The deficiencies found on the bottom chords consisted of cracked welds, missing welds, welds that were completely fractured, porous welds and undercuts, where the weld cut into the chord. Not all porous welds were repaired. Only those with huge amounts of porosity were marked for remediation.

125 Some of the undercuts were so severe that they had burned through the steel member to which the web member was attached. Undercuts can affect the load bearing capacity of a member.

126 Not all deficiencies were serious enough to warrant repairs. Repairs were made to serious deficiencies which affected the structural integrity of the joists such as welds which were of insufficient size, cracked welds, broken welds, non-existent welds and welds for the bottom angled splice connection.

127 The live load design for the roof, of 40 pounds per square foot was less than the 46.8 (psf) called for in the National Building Code in place at the time the mall was designed and less than the 47.2 (psf) called for at the time of remediation.

128 Non-welding related deficiencies such as bent web members and bent bottom chords were also present. However, some of these occurred during transportation and erection. I accept Mr. Underhill's evidence that the portion of repairs which could be attributed to deficiencies as a result of erection, transportation to the site and for design Codes was estimated to be 0.3%.

129 Three joists had bottom chords which were bent and seven joists had bent web members. These types of defects also affected the structural integrity of the joists. Some bottom chord members were missing enough welds so as to allow the bottom chord members to be pulled apart by hand. One of these bottom chords could be pulled apart for a distance of eight to ten feet.

130 Missing welds and bottom chord members which can be pulled apart by hand are serious deficiencies. One missing weld could cause a roof collapse.

131 I accept the evidence of Mr. Richardson and Mr. Underhill with respect to what they personally observed, that is the presence of cracked welds, missing welds, welds which were completely fractured and welds which had undercut the chord member.

[5] “Mr. Richardson” referred to by the trial judge is John Richardson, a structural engineer, who testified as an expert for the plaintiff and “Mr. Underhill” is Scott Underhill, an engineer and associate of Mr. Richardson’s, who were both involved in the remediation of the roof joists.

[6] The trial judge gave less weight to the evidence of Mr. Michel Comeau, the engineer who testified for the defendant, and explained his reasoning as follows:

138 The evidence of Mr. Comeau, the Defence expert, is given less weight than that of Mr. Richardson and Mr. Underhill for several reasons. The first being that Mr. Comeau, having been given the opportunity to observe the defects before

the remedial work began and knowing that the Plaintiff was interested in his opinion about whether the proposed work was excessive, did not personally see the defects.

139 Secondly his inspection, carried out in October 2004 after the remedial work had been completed, involved looking at a total of approximately 30 joists in five locations. He inspected approximately 15 to 20% of the panel points on those joists. If one accepts that a joist contains approximately 20 panel point welds on the bottom chord member it means Mr. Comeau viewed only 4 panel points [sic] welds on each joist he inspected compared to Mr. Underhill who looked at all the bottom chord panel point welds in approximately 175 joists he inspected.

140 Thirdly, Mr. Comeau's evidence concerning the determination of a proper weld size by measuring the geometry of the joists then using a computer program to measure the forces on the joists and then referring to the CSA Standard W59 in order to determine the required weld size needed to carry a particular load, is unreasonable when one considers that 876 joists were used to construct the mall. Each joists [sic] contained approximately 20 panel point welds on the bottom chord alone. His approach would require either a visual estimation or measurement of each weld to determine if the weld size noted was appropriate for the particular load on the joist.

141 His approach to determining if welds with craters or cracks present were sufficient to carry a particular load was also unreasonable. Mr. Comeau would have each crack measured and the size of the crack subtracted from the weld. The remaining weld would constitute the effective weld. This would then be compared to the calculated size of the required weld needed for a particular load to determine if the remaining effective weld was sufficient. This individual calculation approach involving a structural engineer would, in my opinion, be a time consuming and costly process given his evidence that it would take three to four minutes just to do a visual inspection of each bottom chord weld and longer for the top chord welds.

142 Fourthly, Mr. Comeau's opinion that he rarely rejected welds for undercutting reasons is of little value in the present case because the undercuts observed by the Plaintiff's witnesses were so severe that they had burned through the chord member. Such undercuts reduced the load bearing capacity of the chord member.

143 Fifthly, Mr. Comeau's second conclusion contained in his report that before the joists were inspected by BMR "the roof was subjected to heavy snow loading, including an all-time extreme ground snow load event in 1992" is unfounded and speculative. He could not say under oath that the roof was ever

subjected to the heavy snow load referred to in his report. His willingness to describe in his expert's report as fact something which was not is telling as to his credibility and the reliability of his evidence. His reported conclusion that "a quantity of the top chord welds which were repaired likely would not have required any repairs" is speculative and ignores the fact that five joists had defects in the three panel point welds at each end of the bottom chord.

144 Finally, Mr. Comeau's evidence that the size of welds, which could not be visually inspected, such as the top chord welds, could be approximated by touching the weld with a finger is at best a very imprecise method to be used by an expert whose work requires precision. This evidence by itself leads me to question the accuracy and reliability of Mr. Comeau's evidence as a whole.

145 I am not prepared, for reasons set out above, to attach any weight to Mr. Comeau's opinion that the remedial work carried out by the Plaintiff was excessive.

Issues:

[7] The appellant defines the issues on appeal as follows:

- (1) Did the Learned Trial Judge err in law in concluding that the evidence presented by the Respondent met the evidentiary burden which enabled the Learned Trial Judge to conclude that the defects found in the various welds were significant defects which would constitute a real and substantial danger to the occupants of the Mall?
- (2) Did the Learned Trial Judge err in law in concluding that the evidence presented by the Respondent met the evidentiary burden which required proof on a balance of probabilities that the weld repairs undertaken by the Respondent were necessary to remove the real and substantial danger to occupants of the Mall?
- (3) Did the learned trial Judge err in law in placing an evidentiary burden on the Appellant to show that deficiencies in the welds fabricated by the Appellants did not constitute a real and substantial danger to occupants of the Mall

Standard of Review:

[8] In **McPhee v. Gwynne-Timothy**, 2005 NSCA 80, Justice Saunders described the standard of review that is applicable in this type of case:

31 A trial judge's findings of fact are not to be disturbed unless it can be shown that they are the result of some palpable and overriding error. The standard of review applicable to inferences drawn from fact is no less and no different than the standard applied to the trial judge's findings of fact. Again, such inferences are immutable unless shown to be the result of palpable and overriding error. If there is no such error in establishing the facts upon which the trial judge relies in drawing the inference, then it is only when palpable and overriding error can be shown in the inference drawing process itself that an appellate court is entitled to intervene. Thus, we are to apply the same standard of review in assessing Justice Richard's findings of fact, and the inferences he drew from those facts. **H.L. v. Canada (Attorney General)** [2005] S.C.J. No. 24; **Housen v. Nikolaisen**, [2002] 2 S.C.R. 235; **Campbell MacIsaac v. Deveaux & Lombard**, [2004] N.S.J. No. 250, 2004 NSCA 87.

32 An error is said to be palpable if it is clear or obvious. An error is overriding if, in the context of the whole case, it is so serious as to be determinative when assessing the balance of probabilities with respect to that particular factual issue. Thus, invoking the "palpable and overriding error" standard recognizes that a high degree of deference is paid on appeal to findings of fact at trial. See, for example, **Housen**, supra, at ¶ 1-5 and **Delgamuukw v. British Columbia**, [1997] 3 S.C.R. 1010 at ¶ 78 and 80. Not every misapprehension of the evidence or every error of fact by the trial judge will justify appellate intervention. The error must not only be plainly seen, but "overriding and determinative."

33 On questions of law the trial judge must be right. The standard of review is one of correctness. There may be questions of mixed fact and law. Matters of mixed fact and law are said to fall along a "spectrum of particularity." Such matters typically involve applying a legal standard to a set of facts. Mixed questions of fact and law should be reviewed according to the palpable and overriding error standard unless the alleged error can be traced to an error of law which may be isolated from the mixed question of law and fact. Where that result obtains, the extricated legal principle will attract a correctness standard. Where, on the other hand, the legal principle in issue is not readily extricable, then the issue of mixed law and fact is reviewable on the standard of palpable and overriding error. See **Housen**, supra, generally at ¶ 19-28; **Campbell MacIsaac**, supra, at ¶ 40; **Davison v. Nova Scotia Government Employees Union**, 2005 NSCA 51.

[9] In **H.L. v. Canada (Attorney General)** 2005 SCC 25, Justice Fish discussed the notion of a “palpable and overriding error” in the following passages:

55 "Palpable and overriding error" is at once an elegant and expressive description of the entrenched and generally applicable standard of appellate review of the findings of fact at trial. But it should not be thought to displace alternative formulations of the governing standard. In *Housen*, for example, the majority (at para. 22) and the minority (at para. 103) agreed that inferences of fact at trial may be set aside on appeal if they are "clearly wrong". Both expressions encapsulate the same principle: an appellate court will not interfere with the trial judge's findings of fact unless it can plainly identify the imputed error, and that error is shown to have affected the result.

...

74 I would explain the matter this way. Not infrequently, different inferences may reasonably be drawn from facts found by the trial judge to have been directly proven. Appellate scrutiny determines whether inferences drawn by the judge are "reasonably supported by the evidence". If they are, the reviewing court cannot reweigh the evidence by substituting, for the reasonable inference preferred by the trial judge, an equally - or even more - persuasive inference of its own. This fundamental rule is, once again, entirely consistent with both the majority and the minority reasons in **Housen**.

[emphasis in original]

[10] With respect to the weight attributed to expert opinions, this court is likewise restrained in its ability to interfere with the trial judge's conclusions. The weight to be assigned to various pieces of evidence, including inferences to be drawn from conflicting expert opinion, is a matter for the trial judge and we ought not interfere unless we are persuaded that the result amounts to a palpable or overriding error: **Toneguzzo-Norvell v. Burnaby Hospital**, [1994] 1 S.C.R. 114 at ¶ 14 - 18.

[11] In the context of this case, it is important to acknowledge that whether or not the welding defects created a real and substantial danger is a question of fact. See **Privest Properties Ltd. v. Foundation Co. of Canada Ltd.**, [1997] B.C.J. No. 427 (B.C.C.A.), ¶ 35.

Analysis:

[12] Before dealing with the specific issues raised by the appellant, it is helpful to examine the basis upon which the claim is founded. In **Winnipeg Condominium Corporation No. 36 v. Bird Construction Co.**, [1995] 1 S.C.R. 85, the Supreme Court held that a contractor could be held liable in negligence to a non-privity subsequent purchaser for the cost of repairing dangerous defects in a building even in the absence of damage to property or personal injury. Construction of a dangerous building is one of the five categories for which recovery of pure economic loss is recoverable (¶ 12).

[13] In the **Winnipeg Condominium** case, construction of a 15 storey building was completed in 1974. Originally a rental property, it was converted to condos and changed ownership in 1978. In 1989, a 20 foot length of 4 inch thick stone cladding fell from the 9th storey onto the street below. Since the cladding fell in the middle of the night, there were no injuries or damage to other property. After inspection by engineers, the Condominium Corporation removed and replaced all of the cladding at a cost of \$1.5 million. The owners brought action against the general contractors, the architects and the masonry subcontractor. A summary judgment application by the defendants was dismissed in the Queen's Bench but allowed on appeal to the Manitoba Court of Appeal. The Supreme Court allowed the plaintiff's appeal.

[14] The Court confirmed the theories of responsibility as developed in **Anns v. London Borough of Merton**, [1977] 2 All E.R. 492 (H.L.) and as refined in **Kamloops (City) v. Nielsen**, [1984] 2 S.C.R. 2. The application of the principles from those cases lead LaForest, J., for the court, to formulate the basis of the tort as follows:

36 In my view, the reasonable likelihood that a defect in a building will cause injury to its inhabitants is also sufficient to ground a contractor's duty in tort to subsequent purchasers of the building for the cost of repairing the defect if that defect is discovered prior to any injury and if it poses a real and substantial danger to the inhabitants of the building. In coming to this conclusion, I adopt the reasoning of Laskin J. in **Rivtow**, which I find highly persuasive. If a contractor can be held liable in tort where he or she constructs a building negligently and, as a result of that negligence, the building causes damage to persons or property, it follows that the contractor should also be held liable in cases where the dangerous defect is discovered and the owner of the building wishes to mitigate the danger

by fixing the defect and putting the building back into a non-dangerous state. In both cases, the duty in tort serves to protect the bodily integrity and property interests of the inhabitants of the building.

...

Allowing recovery against contractors in tort for the cost of repair of dangerous defects thus serves an important preventative function by encouraging socially responsible behaviour.

38 This conclusion is borne out by the facts of the present case, which fall squarely within the category of what I would define as a "real and substantial danger". It is clear from the available facts that the masonry work on the Condominium Corporation's building was in a sufficiently poor state to constitute a real and substantial danger to inhabitants of the building and to passers-by. The piece of cladding that fell from the building was a storey high, was made of 4" thick Tyndall stone, and dropped nine storeys. Had this cladding landed on a person or on other property, it would unquestionably have caused serious injury or damage. Indeed, it was only by chance that the cladding fell in the middle of the night and caused no harm. In this light, I believe that the Condominium Corporation behaved responsibly, and as a reasonable home owner should, in having the building inspected and repaired immediately. Bird should not be insulated from liability simply because the current owner of the building acted quickly to alleviate the danger that Bird itself may well have helped to create.

...

41 Given the clear presence of a real and substantial danger in this case, I do not find it necessary to consider whether contractors should also in principle be held to owe a duty to subsequent purchasers for the cost of repairing non-dangerous defects in buildings. It was not raised by the parties. I note that appellate courts in New Zealand (in **Bowen**, *supra*), Australia (**Bryan v. Moloney**, Sup. Ct. Tasmania, No. A77/1993, October 6, 1993) and in numerous American states (e.g., **Lempke v. Dagenais**, 547 A.2d 290 (N.H. Sup. Ct. 1988); **Richards v. Powercraft Homes, Inc.**, 678 P.2d 427 (Ariz. Sup. Ct. 1984) (*en banc*); **Terlinde**, *supra*) have all recognized some form of general duty of builders and contractors to subsequent purchasers with regard to the reasonable fitness and habitability of a building. In Quebec, it is also now well-established that contractors, subcontractors, engineers and architects owe a duty to successors in title in immovable property for economic loss suffered as a result of faulty construction, design and workmanship (see arts. 1442, 2118-2120 of the **Civil Code of Quebec**, S.Q. 1991, c. 64; Pierre-Gabriel Jobin, **La vente dans le Code**

civil du Québec (1993), at pp. 79 and 142). However, it is right to note that from the tone of Dickson J.'s reasons in **Fraser-Reid v. Droumtsekas**, [1980] 1 S.C.R. 720, at pp. 729-31, he would appear to be cool to the idea, though he found it unnecessary to canvass the point. For my part, I would require argument more squarely focused on the issue before entertaining this possibility.

42 Without entering into this question, I note that the present case is distinguishable on a policy level from cases where the workmanship is merely shoddy or substandard but not dangerously defective. In the latter class of cases, tort law serves to encourage the repair of dangerous defects and thereby to protect the bodily integrity of inhabitants of buildings. By contrast, the former class of cases bring into play the questions of quality of workmanship and fitness for purpose. These questions do not arise here. Accordingly, it is sufficient for present purposes to say that, if Bird is found negligent at trial, the Condominium Corporation would be entitled on this reasoning to recover the reasonable cost of putting the building into a non-dangerous state, but not the cost of any repairs that would serve merely to improve the quality, and not the safety, of the building.

43 I conclude that the law in Canada has now progressed to the point where it can be said that contractors (as well as subcontractors, architects and engineers) who take part in the design and construction of a building will owe a duty in tort to subsequent purchasers of the building if it can be shown that it was foreseeable that a failure to take reasonable care in constructing the building would create defects that pose a substantial danger to the health and safety of the occupants. Where negligence is established and such defects manifest themselves before any damage to persons or property occurs, they should, in my view, be liable for the reasonable cost of repairing the defects and putting the building back into a non-dangerous state.

[15] Later in the decision when discussing fears of indeterminate liability, Justice LaForest explained that the class of potential claimants is limited to inhabitants of the building and successors in title during the useful life of the building (¶ 48 and 50) and with respect to the potential amount of liability:

49 ... there is no risk of liability in an indeterminate amount because the amount of liability will always be limited by the reasonable cost of repairing the dangerous defect in the building and restoring that building to a non-dangerous state. Counsel for Bird advanced the argument that the cost of repairs claimed for averting a danger caused by a defect in construction could, in some cases, be disproportionate to the actual damage to persons or property that might be caused if that defect were not repaired. For example, he expressed concern that a given plaintiff could claim thousands of dollars in damage for a defect which, if left

unrepaired, would cause only a few dollars damage to that plaintiff's other property. However, in my view, any danger of indeterminacy in damages is averted by the requirement that the defect for which the costs of repair are claimed must constitute a real and substantial danger to the inhabitants of the building, and the fact that the inhabitants of the building can only claim the reasonable cost of repairing the defect and mitigating the danger. The burden of proof will always fall on the plaintiff to demonstrate that there is a serious risk to safety, that the risk was caused by the contractor's negligence, and that the repairs are required to alleviate the risk.

[emphasis added]

[16] Since the **Winnipeg Condominium** case made its way to the Supreme Court on an appeal from a pre-trial application, the Court did not need to discuss some of the issues that arise in this case, for example, the nature of the evidence the plaintiff must tender to prove that the defects are dangerous and that the steps taken to repair the dangerous defects were reasonable.

1. Did the plaintiffs prove real and substantial danger?

[17] The appellant argues that the trial judge erred in finding that the respondent met the burden of proving a real and substantial danger. The appellant submits that it was necessary for the respondent to show that each and every weld that was repaired contained a defect that constituted a significant danger, that the evidence lacked that specificity, and therefore the trial judge erred in finding that element of the tort had been proven. The respondent says that substantial evidence was presented to prove that the overall condition of the joists was dangerous, in fact the appellant admitted that numerous welds were either missing or otherwise unable to carry the load of the roof which created a real and substantial danger.

[18] The mall owners, managers and eventually the receiver of the business had known for some years of a problem with the roof joists. The poor quality of the welding in Robb engineered joists had been responsible for the collapse of two roofs in Newfoundland in 1987 and 1995. As a result, owners of buildings with Robb joists were encouraged to inspect their roofs. The plaintiff in this case first did so in 1998, retaining Vaughan Engineering. The Vaughan engineers inspected 250 or 30 % of the joists and performed magnetic particle testing of 12 welds on each of 80 joists which showed missing welds, significant cracking and deficiencies in the quality of the welds. Repairs were recommended before any

snow loads accumulated on the roof. The estimated cost of repairs was \$400,000 to \$1.25 million. A second engineering firm, ADI Limited, was retained by the mall managers in 1999 to perform another inspection. After inspecting less than 10 % of the joists, they agreed that there were numerous deficiencies in the welding which affected the structural integrity of the roof and that repairs to small welds, poor quality welds, missing welds and cracked welds were necessary. ADI recommended an inspection of every joist by a certified welding inspector under the guidance of a structural engineer. The third inspection is described in detail by the trial judge beginning at ¶ 20:

20 The Hardman Group obtained a third engineering report this time from Brandys McBride and Richardson (BMR). In its proposal for the provision of structural engineering services BMR suggested using certified welding inspectors in addition to a structural engineer because this would enable a thorough inspection of the joists to ensure that no serious defects were overlooked while saving on unnecessary repairs which would result if a global repair method was used.

21 The Hardman Group retained BMR to do a level II inspection of 100% of the joists used in the construction of the mall. BMR was instructed to use certified welding inspectors as well as a structural engineer in conducting its inspection. BMR had conducted similar inspections in the past without the use of certified welding inspectors but because the Hardman Group wanted welding inspectors used BMR used them on this project.

22 Beginning in the late fall of 1999 BMR conducted an inspection of all the joists in the North Sydney Mall. In April 2000 BMR prepared a report based on its inspection of all the joists located in the North Sydney Mall (the BMR Report). The BMR Report was introduced as Exhibit 1, Tab 13.

23 Prior to the preparation of its report, BMR found some original structural drawings for the North Sydney Mall. These drawings, prepared by Murray Backler & Associates in 1979, showed the live load design for the mall roof was 40 pounds per square foot (psf) which was below the 46.8 (psf) called for by the National Building Code in effect at the time the structural drawings were prepared and also lower than the 47.2 (psf) mandated by the National Building Code in force at the time the inspection was commenced.

24 The BMR inspection was led by two engineers, Mark Reynolds and Scott Underhill. Scott Underhill, a structural engineer, was present for the entirety of the

inspection and remediation phases of the project. He and Mr. Reynolds were assisted by two certified welding inspectors, Deon Walsh and George Crocker.

25 Both George Crocker and Scott Underhill were called as witnesses by the Plaintiff at trial.

26 The certified welding inspectors examined at close proximity each accessible weld on each joist with the use of pry bars, mirrors and degree of undercut gauges. Out of a total of 876 joists in the mall, approximately 80% of these were inspected using the welding inspectors. The remaining 20% of the joists were not examined during the time the inspectors were on site because these were inaccessible due to the presence of gyproc ceilings.

27 The remaining 20% of the joists were examined, without the use of certified welding inspectors, by Mr. Underhill during the time when the remediation work was being done. He used the same method of inspection as did the welding inspectors, that is a visual examination of each weld on each joist using a pry bar, mirror and undercut gauge.

28 Mr. Underhill testified that while the welding inspectors were looking at each weld he was making notes of which joist and which welds needed repairs. He also looked at some of the welds which the inspectors noted as being deficient.

29 Mr. Underhill also examined all the accessible welds in the 20% of the joists he inspected alone.

30 Mr. Underhill's evidence was that initially he recorded not only the location of the deficient welds but also types of deficiencies found by the inspectors. This, however, took a considerable amount of time since there were approximately 19 panel point welds to be inspected on the bottom chord of each joist. Because there were over 800 joists to be inspected in the building it was decided to simply record the location of each deficient weld and to mark it with a tag so it could be identified for repair once the remediation work commenced.

31 Mr. Underhill personally observed cracked welds, missing welds, bent web members, welds that were completely fractured, porous welds and undercut welds. He also saw chords which came apart when a pry bar was used to put pressure on them.

32 Mr. Underhill testified it was the welding inspectors' decision as to what welds should be repaired and that he never overruled their decision. He did not give the inspectors direction as to the capacity or size of welds required.

33 The inspection done by Mr. Underhill alone coupled with the inspection done using certified welding inspectors resulted in a finding that 3381 bottom chord welds were defective. Of this number 3044 deficient welds were found by the inspectors and 337 by Mr. Underhill.

34 Mr. Underhill testified that the top chord welds were not inspected visually because the roof of the building was sitting on the top chord making a visual inspection very difficult, however, they were tested by using a pry bar.

35 It was Mr. Underhill's testimony that repairs were required because the fractured and partially fractured welds, missing welds and lack of fusion in welds made the welds inadequate. His evidence was also that the welds were integral to the structural integrity of the roof. He also testified that magnetic particle testing was used on some splices and deficiencies noted either through mag testing or visual inspection were repaired.

[19] The trial judge continued by summarizing the evidence of Mr. Crocker, the welding inspector, and that of Mr. John Richardson the plaintiff's structural engineer expert, who was qualified to give an opinion on the methodology, inspection and remediation of joists. The trial judge reviewed significant parts of Mr. Richardson's evidence:

51 Mr. Richardson was on-site three or four times and examined some of the joists himself. He noted what he termed serious deficiencies, such as three or four missing welds and cracked welds. His evidence concerning the effect of missing welds was that the load getting from the centre to the end of the joist does not work and at some point the joist could fail. He also referred to the load on the joist being greatest at each end of the joist and that welds at the centre of a joist are smaller than those at the ends.

52 He testified there were some very serious deficiencies requiring remedial work to be done and to be done quickly because of the concern of a roof collapse and the ensuing damage it might cause to both people and property. When the deficiencies were first observed by his engineering firm in the fall of 1999 they mentioned their concerns about a roof collapse to the Hardman Group.

...

54 Mr. Richardson's evidence was that defective welds affect the integrity of a structure, but it depends on the type of defect and what the load is at that

particular point. If the defect is bad enough the load is not transferred and the forces overstress the member which causes buckling and bending. He also referred to the inspection of joist 393 where 14 bad welds were observed.

55 It was Mr. Richardson's opinion that one missing weld could cause the roof to collapse.

56 His evidence was that 3044 panel point welds on the bottom chords were deficient because of either no welds, cracked welds, or welds that were too small. As a result of finding so many bad welds on the bottom chords the engineers felt it prudent to weld the top three panel points at each end on each joist.

57 Mr. Richardson personally observed one bottom chord where the members could be pulled apart by hand over a span of eight to ten feet. He also noticed others that could be pulled apart by hand, but were not as bad as the one previously mentioned. His evidence was that deficient welds and bent web members are so serious they could cause the roof to collapse. In his opinion it was a life-safety issue because if the snow load was large enough the roof could collapse.

58 Mr. Richardson acknowledged that some of the welds which were repaired may not have required repair. He stated however the cost of determining that outweighed the cost of just doing the welds. He opined that the extra cost in determining the capacity of each weld would have been in excess of \$200,000.00 just to do the inspection.

[20] After properly reviewing the applicable law, including the **Winnipeg Condominium** case, the trial judge confirmed that it was necessary for the plaintiff to prove that the defects were dangerous, that they posed a real and substantial danger, not just that there was shoddy or substandard workmanship. With that burden in mind, he concluded:

146 The totality of the evidence establishes that there were serious defects in the open web steel joists and those defects affected the structural integrity of the joists in that the load capacity of the joist was reduced to unacceptable levels. Remediation work was necessary in order to prevent the roof from collapsing.

...

150 All three engineering firms noted that the defects found in the joists compromised or affected the structural integrity of the joists. These defects,

previously referred to, included missing welds, cracked welds, broken welds and welds of insufficient size. The number of deficiencies found, in excess of 3300 together with the fact that 743 of the 876 joists contained deficiencies and that 64 of those joists had 10 or more deficiencies with one joist having as many as 21 deficiencies all give credence to Mr. Richardson's concern about the roof collapsing. Mr. Richardson's opinion that even one missing weld could cause the roof [to collapse] is strengthened by the number of defects found. I find that the nature and combination of the deficiencies in the joist together with the under-design of the roof load capacity was sufficient enough to decrease the safety margin afforded to the inhabitants of the building under the National Building Code, the CSA and the CWB standards thereby exposing them to increased risk of harm beyond that considered reasonable in our community. This, in my opinion, is sufficient to meet the test of real and substantial danger set out in **Winnipeg Condominium Corporation No. 36 v. Bird Construction Company**.

[21] The trial judge was cognizant of the appellant's argument and dealt with it as follows:

151 The Defendant accepts responsibility for the cost of repairing missing welds, welds which were completely cracked and welds that had insufficient capacity to carry the loads for which they were designed. This would appear to be an admission that the Defendant was negligent in fabricating the joists and that such defects existed. Accepting responsibility for the cost of such repairs is, in my opinion, an acknowledgement that those defects were dangerous defects which constituted a real and substantial danger given that the Plaintiff cannot recover costs associated with merely improving the quality of the building. Even if I am wrong in this conclusion the preponderance of evidence establishes that missing welds, broken welds and welds of insufficient size affected the structural integrity of the roof to such degree as to make the joists supporting the roof unsafe and dangerous.

152 The Defendant argues that no engineering analysis was done to determine the capacity of the defective welds observed. It is submitted that such an analysis is the key to determining if there was a risk posed by the defective welds. The suggested analysis would have been time-consuming and costly given that over 3300 defects were found. I accept that some welds were rewelded during the remediation which may not have required repair. I also accept, however, that the cost of determining by engineering analysis which of those welds did not need repair would have outweighed the cost of simply doing the repair.

[emphasis added]

153 The Defendant also submits that there is no evidence of structural defects in the welds which were repaired. This submission ignores the preponderance of evidence which establishes that missing welds, cracked welds, and welds of insufficient size all affect the structural integrity of the roof joists. The fact that some bottom chord members could be pulled apart by hand, including one which could be pulled apart over a distance of eight to ten feet belies the assertion that there was no evidence of structural defects. In addition, the Defendant's expert witness agreed that cracked welds have the potential of undermining the structural integrity of the weld and that the larger the crack the more reduced is the capacity of the weld. He also agreed that cracked welds should never be tolerated. If cracked welds affect the capacity of the weld it follows that missing welds or completely fractured welds affect the structural integrity of the joist.

154 It is the Defendant's position that the evidence presented does not establish a risk or danger. With respect I cannot agree. The Plaintiff's evidence, which I accept, clearly shows that the missing and cracked welds were of a serious enough nature to cause a roof collapse. The analogy used was that of a house of cards. If one card is removed it affects the integrity of the entire house. I have no doubt that the diligence of the mall personnel in monitoring snow loads on the roof and removing snow from the roof is the reason why the potential of a roof collapse did not become a reality.

155 That there was a clear risk of danger comes from both the evidence of the Plaintiff and the Defendant. The Defendant's expert, Mr. Comeau, did not suggest that no repairs were required but only that the repairs made were excessive. The Plaintiff's evidence clearly establishes a risk of danger given the number and types of defects found during the inspections and that those defects affected the structural integrity of the joist system used to support the metal roof structure.

[22] The appellant says this approach of the trial judge is flawed because he did not require the respondent to prove that each weld that was repaired was dangerous. The respondent should have been required to prove that there x number of missing welds, x cracked welds, x porous welds and so on. It is submitted that the evidence that there were 3300 deficient welds of various types was insufficient proof of its claim.

[23] The argument of the appellant might be persuasive if the trial judge had simply relied on the evidence of the mall owner or other unqualified persons who said the roof was unsafe because another roof had collapsed or they saw a couple of poor welds so they fixed the whole roof. Here, however, the trial judge relied on the evidence of experts who had experience inspecting and repairing Robb joists

and who examined every visible weld on every joist and recommended repair or replacement of approximately 40% of the panel point welds and 80% of the chord splice welds. The Richardson report, accepted by the trial judge, was that the deficient welds caused the connections to have reduced capacity. The deficiencies noted for repair were those that did not meet the construction standard required by W59, the Welded Steel Construction Code. The trial judge was satisfied, based on the evidence of Mr. Richardson, that the overall structural integrity of the roof presented a real and substantial danger to the occupants of the building as a direct result of more than 3000 faulty welds in the joists and that the method chosen by the plaintiff to repair the defects and the costs associated with the repair were reasonable.

[24] This finding of fact by the trial judge was amply supported by the evidence. I see no palpable or overriding error in the finding, based on the evidence before him, that collectively the welding deficiencies presented a real and substantial danger. I would dismiss this ground of appeal.

2. Did the plaintiffs prove that the weld repairs were necessary to remove the real and substantial danger?

[25] One of the points raised by the appellant under this issue is that although the trial judge accepted the evidence of Mr. Underhill that .3% of the weld deficiencies which were repaired were not caused by the negligence of the appellant during fabrication of the joists but probably occurred during transportation or erection, no reduction in the amount awarded was made. Respondent's counsel, Mr. Farrar, conceded during argument on the appeal that this was an error in calculation of the damage award and that an adjustment should be made to reduce the award by .3%. or \$1659.99.

[26] Another submission by the appellant is that when the mall was built, the roof was not designed according to the building code in effect at that time. The live load for the roof was 6.8 pounds per square foot less than required by the code. The trial judge noted this under-design in his decision at ¶ 150, quoted in full herein at ¶19, when he said:

...I find that the nature and combination of the deficiencies in the joist together with the under-design of the roof load capacity was sufficient enough to decrease the safety margin afforded to the inhabitants of the building under the National

Building Code, the CSA and the CWB standards thereby exposing them to increased risk of harm beyond that considered reasonable in our community. ...

[27] The appellant submits that the trial judge erred by finding it responsible for problems caused by the under-design of the roof. I disagree. Although the trial judge did not specifically mention it again or indicate why he made no reduction in the damages as a result of possible dangerousness caused by under-design, it was abundantly clear from the evidence of Mr. Richardson that the under-design was no longer a concern because in addition to repairing the welding on the joists, the mall owners were replacing the metal roof because it leaked. The new roof would be lighter so that the load required to be carried by the joists would be lessened and be within the current code criteria. The costs of replacing the roof was not included in the amount claimed against the appellant.

[28] The balance of the argument under this ground of appeal is similar to that made under the first ground of appeal in that it questions the finding of facts by the trial judge. The submission is that he erred in concluding that the manner of repair chosen by the plaintiff was reasonable and was required in order to alleviate the danger to the occupants of the mall. The appellant questions the finding that it was necessary to repair the top chord panel points in addition to the bottom chord panel points and says that even by the admission of Mr. Richardson, some repairs were done that may not have been necessary to reduce the danger.

[29] The trial judge accepted the opinion of the plaintiff's experts respecting the necessity of the repairs to the top chord panels. Although individual inspection of the welds on the top of the chords was impractical because the corrugated roof sat directly on top of the top chord, Mr. Richardson was of the view that since the same welders would have welded the top chords, they were very likely in the same condition as the bottom welds. He testified that it would have cost significantly more to inspect each top chord weld than it did to reinforce the last three welds on each end of the top chords where the required load bearing capacity was greatest. As for the possibility that some welds which were not creating a danger may have been fixed, Mr. Richardson explained: (p.206)

A. Well, there were around 755 joists in the mall and they would each have about 20 of these top cord panel points. That makes a total of about 15,000 joints. And assuming that you had to take these tiles out and get up there, stick the extension ladder up through the ceiling and get up there with a mirror and feel

around and so on, we're assuming that it might take about four minutes to review a panel point, because you're going to have to move the ladder almost every time, put the ceiling tile back and all that sort of thing. Anyways that came to about 1,000 hours, and at a charge-out rate of \$100 an hour, that's \$100,000 plus expenses. So we thought the expenses may be about \$30,000, and if we had both an engineer and a welding inspector involved in all of that process, we're thinking it could have been as much as \$200,000 just to do the inspection. We still would have found lots of bad welds that would have needed repair, so this would have been an extra cost on top of -- on top of what we already have in costs.

Q. Okay. And you compared that cost, did you not, to what it actually would cost to do the three welds at the end of the joists? And that's at page 3 of your report.

A. Yes.

Q. And what did you estimate the cost would be?

A. The cost of reinforcing the six welds in the top cords that we actually weld -- suggested be welded, and they were welded, was only about \$ 23,000...

Q. Okay.

A. ...based on the unit cost that we got from Marid Industries who did the work.

Q. Then in the second paragraph on page 3 you mention: "I also wish to point out that the very nature of the welds make it difficult to measure the welds and determine if each weld was adequate. The throat of the welds varied along the length of the welds, and when you take into account porosity, etc., it would have been very time consuming." Can you tell me what is the throat of the weld?

A. It's sort of the effective thickness of the weld. Where -- if the weld is going to crack, it will -- it will crack through this throat. That's the critical -- in measuring the size of the weld, that's what's important.

Q. Okay. And why do you say that it -- "The nature of the welds make it difficult to measure the welds individually"?

A. Well, the members involved were fairly small to start with, the rods and the angles. They're curved at the points where the welds are made. The rod goes up and turns around, comes back down. So the welds varied along the whole

length of that curve. It may be an eighth of an inch here, and a quarter of an inch further away it might be three-sixteenths inch, the throat. It's very, very difficult and time-consuming to try and measure those things. You'd be there for -- you know, you'd be there for minutes at each weld if you could see them, and many of them you couldn't even see.

Q. What impact would that have, if any, on the cost of remediation?

A. Cost of remediation may have been -- the cost of the repair, actual repair work, may have been slightly less had we been able to measure each weld and determine that perhaps some of the ones we repaired may not have needed repair -- repairing, but the cost involved in determining that would have been, you know, tenfold more than the time you would save by not welding it at specific panel points. When the welder is there and he's got his gear there and his welding rod, everything right in front of him, it just takes him a matter of seconds to do -- to weld a joint when he's welding the one next to it, but, you know, it's not a big deal to weld the odd extra weld.

[30] Based on this evidence, which was accepted by the trial judge, it cannot be said that there was palpable and overriding error in concluding:

152 ...I accept that some welds were rewelded during the remediation which may not have required repair. I also accept, however, that the cost of determining by engineering analysis which of those welds did not need repair would have outweighed the cost of simply doing the repair.

[31] Furthermore, the findings that the repairs were necessary to alleviate the danger and that the remediation method chosen was reasonable, are also reasonable conclusions of fact based on the evidence.

[32] I would dismiss this ground of appeal.

3. Did the trial judge err by placing a burden on the defendant to prove that the welding deficiencies did not constitute a danger?

[33] The appellant submits that the trial judge erred by combining the issue of whether the repairs were necessary to alleviate the danger with the issue of the reasonableness of the methodology of remediation and thereby did not properly address the former question. The appellant argues that the trial judge apparently mistakenly thought that the defendant was claiming that the plaintiff did not

mitigate its damages and thus confused the issue of liability for dangerous construction with that of mitigation of damages which it says is evident from this passage in the judgment:

161 I conclude, having regard to all the circumstances, that the Plaintiff's remedial actions were reasonable. The Plaintiff offered the Defendant an opportunity to have input on the remedial work prior to its commencement. The Defendant did not accept this offer. It cannot, at this stage, argue that the remedial work was unreasonable or excessive.

162 The Defendant has led no acceptable evidence to show that the Plaintiff acted in an unreasonable fashion. The Defendant has not established how and to what extent the loss claimed could have been minimized.

[34] The appellant submits that the respondent failed to prove that it was necessary to expend \$553,327 to alleviate a real and substantial danger caused by defective welds. It is argued that costs of inspections, engineering services and additional mall security during the repairs should not have been included in the damage award.

[35] I am unable to accept the characterization of the appellant that the trial judge confused liability with mitigation or placed any evidentiary burden on the defendant. The trial judge applied the law exactly as set out in **Winnipeg Condominium**. First, he found that the welding defects posed a real and substantial danger to the occupants of the building. Second, he concluded that the defendant was liable to pay the reasonable costs of putting the building into a non-dangerous state. Third, he found that the repairs undertaken by the plaintiff were required to eliminate the danger. (see ¶ 49 of **Winnipeg Condominium** quoted at ¶ 14 herein)

[36] Most of the evidence presented by the appellant at trial was directed to the issue of whether the plaintiff had repaired more welds than were necessary to put the building in a safe condition. There was little if any cross-examination of the plaintiff's witnesses about the actual amounts paid for either the inspections or the repairs. The trial judge assessed all that evidence and concluded that all the repairs were necessary to alleviate the danger. His remark that the defendant declined the

opportunity to comment on the scope of the work planned before it was done was factually correct. It was not in my view an improper reversal of the onus of proof.

[37] Again, under this ground of appeal, the appellant attacks what are essentially findings of fact: that the repairs undertaken were required to alleviate the danger and that the costs of the necessary repairs was reasonable. Those findings are once more supported by a preponderance of evidence and entitled to deference of this court. I would not interfere with those conclusions.

Conclusion:

[38] I would dismiss the appeal, with costs payable to the respondent by the appellant in the amount of 40% of the costs ordered after trial, plus reasonable disbursements, less \$1659.99, being the amount the respondent concedes should have been deducted from the damage award, as stated in ¶ 24.

Roscoe, J.A.

Concurred in:

Bateman, J.A.

Hamilton, J.A.