# WELDED STEEL MOMENT FRAME DEFECT LITIGATION

## I. The Problem:

1. Earthquakes: The 6.7 Northridge Earthquake struck Los Angeles on January 17, 1994. Owners of steel moment frame (high rise) buildings were shocked to learn that moment frame connections, critical for seismic resistance, had suffered brittle fracture failures.
2. Steel Frame Damage: In earthquakes, "*ductility" (flexibility) is the property that enables steel to distort without fracturing*. During the Northridge Earthquake, thousands of welded steel moment frame connections fractured. Once such fractures form, the beam-column connections experienced a significant loss of capacity. The connections fractured when their strength was needed most. *SAC 1.2.*Weld Metal Failures: An astonishing 99% of these failures in the beam-column connection occurred with "self-shielded flux-core" weld metal. (National Institute of Standards and Technology, NISTIR 5625 *A Survey of Steel Moment-Resisting Frame Buildings Affected by the 1994 Northridge Earthquake*).Steel Frame Ordinance: On March 1, 1995, the City of Los Angeles adopted a mandatory ordinance that required the inspection and repair of all steel high rise buildings with moment frame connections in designated earthquake damaged areas. Los Angeles Cal. Mun. Code §91.8908(a). Los Angeles Bans Flux Core: In 1996, the City of Los Angeles banned the further use of flux cored weld metal, including E70T-4 weld metal, because it could not meet required "toughness" standards.
3. Uniform Building Code Requirements
    1. The UBC defines a special moment-resisting frame as a "moment-resisting frame specially detailed to provide ductile behavior and comply with the requirements given in Chapter 16 or 22." The weld connections deposited with flux cored weld metal, including E70T-4, do not meet the criteria of either Chapter 22 or Chapter 16 of the Uniform Building Code (1994), have a very low fracture resistance, do not provide the UBC required ductile behavior, and developed fractures.
    2. Further, the Uniform Code for the Abatement of Dangerous Buildings (1994) does not allow a welded steel moment frame to be maintained with damaged connections.

## II. Products Liability

1. Defect Definition: Although California courts separate manufacturing defects from design defects, they have refused to limit the definition of a

defect. Barker v. Lull Eng'g Co., 20 Cal.3d 413; 143 Cal.Rptr. 225 (1978).

1. Manufacturing Defects: Manufacturing defects are those defects which deviate from the manufacturer's intended result. For example, a broken gear tooth constituted a manufacturing defect in *Montez v. Ford Motor Co.*, 101 Cal.App.3d 315; 161 Cal.Rptr. 578 (1980).Design Defects: Design defects involve either products that fail to perform as safely as the ordinary consumer would expect (consumer expectation test) *Campbell v. General Motors,* 32 Cal.3d 112; 184 Cal.Rptr. 891 (1982) or products as to which the *risk of danger inherent in the design outweighs the benefits of the design* (risk / benefit test). *Barker v. Lull Eng.'g Co., supra,* 20 Cal.3d 413.Consumer Expectation Test: If a product is something that an ordinary consumer would use, the consumer expectation test is the proper test to determine whether a design defect exists. For example, an ordinary consumer would not expect air bag inflation in a low speed collision to break the driver's arm. *Bresnahan v. Chrysler Corp.*, 32 Cal.App.4th 1559; 38 Cal.Rptr. 2d 446 (1995).
2. No Consumer Expectation: But, not all products are subject to ordinary consumer expectations.. Some products are so complex that a consumer may not have any minimum assumptions about its safe performance. In such a case, the risk benefit test applies. *Soule v. General Motors Corp.*, 8 Cal. 4th 548; 34 Cal.Rptr. 2d 607 (1994).

2. Construction Defects : Defects in construction cases are not merely deviations from plans and specifications, but can be established in a variety of ways including but not limited to:

    1. Inadequate Installation: A developer can be strictly liable for poor materials selection and faulty construction techniques, for example where the defect was an incorrectly installed radiant heating system in the building's cement floor. *Kriegler v. Eichler Homes, Inc.*, 269 Cal.App.2d 224; 74 Cal.Rptr. 749 (1969).Non Defective Building Placed in Wrong Location: A developer can be strictly liable for placing a nondefective product in the wrong place. In a California case, neither the condominiums nor their component parts were defective, however, they were built on unstable soils and the court found the improper location to constitute a "defect." *Del Mar Beach Club Owners Association v. Imperial Contracting Co.*, 123 Cal.App.3d 898; 176 Cal.Rptr. 886 (1991)Non Defective Component Placed in Wrong Location: A product may function safely in one location or use but the product, though faultlessly made, may not function safely in another location or use and therefore be defective. See, *Hyman v. Gordon*, 35 Cal.App.3d 769; 111 Cal.Rptr. 262 (1973).
        1. Non-Ductile Weld Metal Used for Seismic Resistance: While E70T-4 may perform well in other applications, the *Lehigh University,* and other industry studies have demonstrated that its use causes brittle fractures in critical

moment frame connections in seismic applications.

i. Deviations from the Plans and Specifications: Even if a product is not inherently defective, the manner of installation can be defective. Where the *drainage and irrigation system installed varied from the plans and specifications* the court found the deviation from the plans and specifications constituted a defect and awarded the association cost of repairs. *Raven's Cove Townhomes, Inc. v. Knuppe Development Co.*, 114 Cal.App.3d 783; 171 Cal.Rptr. 334, (1981).

    1. Deviations Using Flux Core Weld Metal: The self shielded flux-cored electrode (E70T-4) is an improper material to use in critical moment frame connections because of the foreseeability of earthquakes in California. Substituting E70T-4 flux core for a ductile electrode required by the structural engineer in the plans and specifications is an improper substitution of material.

ii. Poor Materials Selection by Manufacturer: A manufacturer was held liable where a defective 'aluminum 380' gearbox contributed to an auto accident. The gearbox material was held defective *for that purpose* because of high engine heat and because malleable iron which could have been used, was stronger and less likely to fail. Plaintiff successfully introduced evidence that three years after the accident defendant substituted malleable iron for aluminum 380. The court held that the evidence of the substitution was admissible. *Ault v. International Harvester Co.*, 13 Cal. 3d 113; 117 Cal.Rptr. 812 (1974).

    1. Improper Weld Metal: E70T-4 weld metal presents a similar situation. The flux core weld metal may function well for "non-earthquake" welding uses, but it is inadequate for critical moment frame connections which must resist seismic forces in steel moment frame construction.

3. Products Liability For "Marketing Activities": While numerous cases have applied strict liability to the developer or owner of a building, the first California case to apply strict liability to a manufacturer of a *non-defective* building component was based on the manufacturer's marketing activities and involvement in creating a market for a new product.

    1. In *Bay Summit Community Association v. Shell Oil Co., et al.*, 51 Cal.App.4$^{th}$ 762; 59 Cal.Rptr. 2d 322 (1996) after installation of polybutylene plumbing in a condominium project, the homeowners began to experience leaks in the plumbing systems. The polybutylene resin for the pipes was supplied in pellet form by Shell and was not defective. The homeowners association sued the developer, the two manufacturers of the plumbing system and Shell. Although *there was no evidence of a defect in the resin pellets* manufactured by Shell, the Court of Appeal held that Shell could be strictly liable if:

> *"(1) the defendant received a direct financial benefit from its activities and from the sale of the product, (2) the defendant's role was integral to the business enterprise such that defendant's conduct was a necessary factor in bringing the product to the initial consumer, and (3) the defendant had control over, or a substantial ability to influence, the manufacturing or distribution process."* *Id.* at 776.

1. Manufacturers' Weld Metal Marketing Activities: Thus, the manufacturers of E70T-4 or other flux core weld metals, may face imposition of strict liability by California courts, if they are shown to receive a direct financial benefit from the sale of the product, if their conduct was a necessary factor in bringing the product to the initial consumer market, and if they had either direct control over or substantial ability to influence the manufacturing or distribution process of flux cored weld metal.

2. Types of defendants for typical application of products liability:
    1. Manufacturer's Products Liability: Under traditional tort law, a manufacturer may be strictly liable if it places a defective product into the stream of commerce. *Greenman v. Yuba Power Products, Inc.*, 59 Cal.2d 57, 62; 27 Cal.Rptr. 697(1963). Retailers Products Liability: The California Supreme Court also extended the products liability doctrine to retailers, because retailers are an integral part of the overall commercial enterprise and are in a position to enhance product safety. *Vandermark v. Ford Motor Co.*, 61 Cal.2d 256, 262-263; 37 Cal.Rptr. 896 (1964).
    2. Vertical Distribution Liability: The California courts have since applied strict liability to others in the vertical distribution of consumer goods, although these defendants were not necessarily involved in the manufacture or design of the product. *Price v. Shell Oil Co.*, 2 Cal.3d 245; 85 Cal.Rptr. 178 (1970).
3. Residential versus commercial construction:
    1. Single Family Homes and Planned Developments: In *Kriegler v. Eichler Homes, Inc., supra*, 269 Cal.App.2d 224, the court extended the doctrine of strict liability to builders and developers of mass-produced single family residences. In *Del Mar Beach Club Owners Ass'n v. Imperial Contracting Co., supra*, 123 Cal.App.3d 898 the court further extended the doctrine to multi-unit , residential, planned development complexes.
    2. Builders and Developers of Commercial Buildings: California courts have not yet had occasion to apply the doctrine of strict liability to developers or builders of commercial structures. The same rationale however, would appear to apply, since the buyer relies on the builder's skill and expertise to insure that the building is built in a workmanlike manner and is reasonably fit for its intended purpose,

and the buyer did not participate in or observe the design and construction.

4. Jury Instructions: Strict liability attaches for an injury proximately caused by a design or manufacturing defect which existed when the article left possession of the seller, provided that the injury resulted from a use of the article that was reasonably foreseeable by the seller. *BAJI Jury Instruction No. 9.00* (7th ed., 1994).

## III. Contract - Warranty Remedies

1. Types of Breaches: The language of a construction contract may impose liability on a general contractor for substituting materials that are not equal to or better than materials called for in the plans or specifications. Thus, breach of contract liability may exist on the basis that inferior materials were substituted.

    1. Material Deviations: In *Shell v. Schmidt,* 164 Cal.App.2d 350; 330 P.2d 817 (1958), the general contractor was found to have made *"material" deviations from the plans and specifications* by substituting lath paper and chicken wire for wood sheathing on the exterior walls, by substituting one 35,000 B.T.U. capacity furnace for two 30,000 B.T.U. unit furnaces, and by substituting sheet rock with tape joints on interior walls for gypsum lath and plaster. *Id.* at 358. Failure to Conform With Contract Documents: In *Idaho State University v. Mitchell,* 97 Idaho 724, 552 P.2d 776 (1976), the Supreme Court of Idaho reviewed A.I.A. Document 201. Noting that Article 13.2.2 deals with work *not in accordance with the contract documents*, the court remarked that the contract "appears to impose liability without fault in claims arising under this provision." *Id.* at 728 (emphasis added.). Thus, the owner needs not prove negligence of the contractor. *The contractor is liable for damages incurred because of work that does not conform to the contract documents*. Equal of Better Substitutions: Washington and Oregon courts have held that substitutions that were not equal to or better than the materials specified in the contract constituted a material breach of contract.

        In *Beik, et al. v. American Plaza Co., et al.*, 280 Or. 547; 572 P.2d 305 (1977), there was liability where the sales agreement provided that the condominiums would be built according to the plans and specifications and the developer substituted sliding glass doors and air conditioning units, and the windows leaked. *Id.* at 559.

    1. Substitution of Specified Materials: The following are cases where substitution of specified materials constituted a breach of contract:

1. In a Washington case, liability was imposed where the contractor substituted Perlite light-weight aggregate in place of the specified sand. In *City of Seattle v. Kuney, et al.*, 50 Wash.2d 299; 311 P.2d 420 (1957), the court held that although the architect approved the substitution, the material was nevertheless improper, because the *contractor guaranteed that the substitute material was equal or better in all respects than the material specified and it was not. Id.* at 302-303.Insulation and Drains: In a New York case, a contractor was ordered to pay the cost of installing styrofoam insulation and footing drains called for by the contract but which the contractor thought were unnecessary and did not install. *Roudis v. Hubbard*, 176 A.D. 2d 388, 389; 574 N.Y.S. 2d 95 (1991). Cast Iron Sewer Line: In *Midland Motels, Inc. v. Central Plumbing & Heating Company*, 252 So.2d 729 (La. App. 3d Cir. 1971), the Louisiana Court of Appeal held that the evidence supported liability where the plans and specifications had called for the outside sewer piping to be cast iron and the contractor had installed a clay pipe that sagged and collapsed in the area of a motel driveway. *Id.* at 731.
2. Roofs and Floors: In Colorado, the court held that the contractor's construction of a roof and floor failed to comply with plans and specifications, where the contractor installed a 15 year roof instead of the specified 20 year roof; roof joists were not constructed as shown on the plans; the floor was not constructed to the thickness specified in the plans; the contractor had not installed stone or gravel under the floor; and the wire mesh was not properly imbedded in the concrete. *Summit Construction Co. v. Yeager Garden Acres, Inc.*, 28 Colo. App. 110, 118-119; 470 P.2d 870 (1970).

2. Express Warranty - Contract Documents: Contract documents often warrant how the work will be performed. A.I.A. General Conditions, Art. 4.5.1 (1976 edition) is an example of a generally-accepted provision:

*The Contractor warrants to the Owner and the Architect that all materials and equipment furnished under this Contract will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defectiveAn Illinois appellate court held that a contractor's warranty that the repairs would result in a leak-proof roof was breached when the roof leaked. Miller v. Racine Trust, 65 Ill.App.3d*

*207, 214-215; 382 N.E. 2d 41 (1978).*

1. *Manufacturers Express Warranties: Liability on a theory of express warranty may be based upon brochures supplied by the manufacturer.*

   *In Herman v. Bonanza Buildings, Inc., 223 Neb. 474; 390 N.W.2d 536 (1986), a manufacturer had prepared a brochure given to the owner extolling the virtues of the steel building and expressly promising that the manufacturer "would replace or repair defects resulting from poor workmanship." The brochure created an express warranty, such that the statements became part of the basis of the bargain. Id. at 483-484.In Little Rock School District of Pulaski County v. Celotex, 264 Ark. 757; 574 S.W.2d 669 (1979), an architect prepared the plans and specifications based upon information supplied to the architect by the manufacturer that the two-ply system was the equivalent of a four-ply conventional roof, would be bonded for up to 20 years, and would provide excellent weather protection. Id. at 763. The roof began leaking almost immediately. The Court held that these representations were sufficient to submit the issue of breach of express warranty to a jury. Id. at 766-767.*

   1. *Manufacturers' Express Warranties For Flux Core Weld Metal: The manufacturer of the self-shielded flux-cored arc welding electrode (E70T-4), publishes brochures stating that the electrodes are for "structural fabrication." The brochure also states that one of the eight reasons to select self shielded flux-cored electrodes, is that:*

      *[The electrode] resists weld cracking on heavy plate, restrained joints and medium carbon steel. Desulfurizes weld deposits so well that even high sulfur steels may be welded without incurring cracking due to hot shortness.*

      *The brochure further states that the self shielded flux-core electrode has been used in San Francisco specifically to withstand earthquakes:*

      > *Thirty-eight out of thirty-nine buildings on the San Francisco skyline have been erected using . . . Innershield electrode. Where buildings must be designed to withstand seismic disturbances, Innershield is the architects' choice. Because of its great cost reduction potential more new buildings are on the way.*

*Since virtually all of the brittle failures from the Northridge Earthquake*

*occurred with self shielded flux- cored electrodes (E70T-4), a compelling case can be made that this welding electrode does not conform to the express warranty that it resists weld cracking or is designed for seismic disturbances. Greenman v. Yuba Power Products, Inc., 59 Cal.2d. 57; 27 Cal.Rptr. 697 (1963); Keith v. Buchanan 173 Cal.App.3rd 13; 220 Cal.Rptr.392 (1985)*

1. *Breach of Implied Warranty: Pollard v. Saxe & Yolles Development Co., 12 Cal. 3d 374;115 Cal.Rptr. 648 (1974) was the first California case to apply the Uniform Commercial Code doctrine of implied warranties of quality and fitness to commercially owned property.*
    1. *In Pollard, apartment units in a complex suffered physical damage caused by the contractor's removal of center posts and installation of undersized headers and inadequate support beams.*
    2. *The court held that if timely notice is given, "a contract to build an entire building is essentially a contract for material and labor, and there is an implied warranty protecting the owner from defective construction." Green v. Superior Court, 10 Cal. 3d 616; 111 Cal.Rptr. 704 (1974); Kuitems v. Covell, 104 Cal. App. 2d 482; 231 P.2d 552 (1951).*
2. *Continued Application of Implied Warranty: Since Pollard, California courts have applied implied warranty concepts to the construction and sale of residential and commercial real property. An important limitation is that the implied warranties may only apply to new construction. East Hilton Drive Homeowners' Ass'n v. Western Real Estate Exchange, 136 Cal. App. 3d 630; 186 Cal.Rptr. 267 (1982).*

## *IV. Recovery for Economic Damages (No Manifestation)*

1. *Negligence Recovery For Economic Loss: In California, defects that do not cause actual physical damage are classified as economic damages. Economic damages are not normally recoverable in products liability cases. However, California courts allow negligence recovery for economic damages, if a "special relationship" is shown by application of 6 factors: 1) the extent to which the transaction was intended to affect the plaintiff; 2) the forseeability of harm to the plaintiff; 3) the degree of certainty that the plaintiff suffered injury; 4) the closeness of the connection between the defendant's conduct and the injury suffered; 5) the moral blame attached to the defendant's conduct; and, 6) the policy of preventing future harm. J'Aire Corp. V. Gregory 24 Cal.3d 799,806 (1979); Huang v. Garner 157 Cal.App.3d 404, 419-420; 203 Cal.Rptr. 800 (1984); Fieldstone Co. v. Briggs Plumbing Products Inc. 54 Cal.App.4$^{th}$ 357,(1997)*
2. *Contract: Parties may also recover economic damages under contract causes of action. Contract remedies are available whether or not the welds have fractured or shown any other manifestation of physical damage, if "ductile" weld metal was specified for the building and "brittle" weld metal was*

*substituted. Economic damages are recoverable under both breach of contract and express warranty theories. Seely v. White Motor Co., 63 Cal.2d 9; 45 Cal.Rptr. 17 (1965).*

3. *Insurance: Economic damages may be excluded from third party insurance coverage under standard CGL policies as "economic losses." This is because the definition of property damage requires "physical injury to or destruction of tangible property." Maryland Casualty Co. v. Reeder, 221 Cal.App.3d 961, 968-971; 270 Cal.Rptr. 719 (1990).*

## *V. Statute of Limitations Defense*

*California has three relevant statutes of limitations for property damage:*

1. *The 10 year statute of limitations for latent defects, California Code of Civil Procedure §337.15The four year statute of limitations for patent defects, California Code of Civil Procedure §337.1*
2. *The statute of limitations for discovered injury to property is three years. California Code of Civil Procedure §338(b).*

> *The three year statute does not begin to run until the plaintiff is aware of the injury and its negligent cause. Jolly v. Eli Lilly & Co. (1988) 44 Cal.3d 1103, 1110; 245 Cal.Rptr. 658.*
>
> *The fact that the Northridge Earthquake caused damage to a steel frame building may not start the running of the statute of limitations absent evidence that the owner was aware of the negligent cause of the injury.*

*Since the City of Los Angeles did not require inspections until after the adoption of the ordinance on March 1, 1995, the accrual date for the statute of limitations will likely commence from the date the owners received inspection reports from expert consultants. The statute of limitations will thus be determined on a case by case basis.*

## *VI. Disclosure Liability*

1. *Duty To Disclose Use of Non-Ductile Weld Metal: As the dangers associated with "brittle fractures" become known, the duty to disclose building connections fabricated with such weld metal will arise. These disclosure duties should apply equally to both commercial and residential properties. Miller and Starr, California Real Estate 2d, supra at §1:121*

   *If adequate information exists to conclude that self shielded flux core E70T4 will suffer brittle fracture failures during moderate Northridge*

*type earthquakes, it must be disclosed.The duty to disclose arises where the defendant has knowledge of material facts which are not reasonably accessible to the plaintiff. Rothstein v. Janss Inv. Corp., 45 Cal. App. 2d 64; 113 P.2d 465 (1941). The steel frame inspections required by Los Angeles Ordinance No. 170406 will provide steel moment frame owners with material information that will have to be disclosed.*

1. *Common Law Duty Of Disclosure: If a seller knows of facts materially affecting the value or desirability of property and also knows that such facts are not known to, and cannot be discovered by diligent observation of the buyer, the seller has a duty to disclose these facts to the buyer. Failure to disclose is "negative fraud." Herzog v. Capital Co., 27 Cal. 2d 349; 164 P.2d 8 (1945); Barnhouse v. City of Pinole, 133 Cal. App. 3d 171; 183 Cal.Rptr. 881 (1982).*

    1. *Red Flags: Normally, a seller of real property does not have an obligation to undertake complex investigations to discover potential problems. Miller and Starr, supra at §1:121 (Bancroft-Whitney 1975). However, when there are "red flags," the law imposes a duty to make further investigations or inspections to determine whether a problem exists. Id.*
2. *Brittle Welds As Material Facts: A fact is "material" if a party would not have entered into a contract had the true facts been known. Wood v. Kalbaugh, 39 Cal. App. 3d 926, 932; 114 Cal.Rptr. 673 (1974). "Materiality" is a question of fact. Fractured welds and potential building collapse are undoubtedly "material" facts. Judicially determined "material" facts are: the existence of unstable soil or fill (Hefferan v. Freebairn, 34 Cal. 2d 715; 214 P.2d 386 (1950); structural defects (Herzog v. Capital Co., supra 27 Cal. 2d 349; termites and dry rot (Piazini v. Jessup, 153 Cal. App. 2d 58; 314 P.2d 196 (1957). Duty Of Disclosure To Subsequent Purchasers: Privity of contract is not required for a duty of disclosure to exist. An action for fraudulent concealment or deceit does not require privity of contract. Lingsch v. Savage, 213 Cal. App. 2d 729, 736; 29 Cal.Rptr. 201 (1963). Thus, future grantees can hold valid claims based on past non disclosures. Barnhouse v. City of Pinole, supra, 133 Cal. App. 3d 171.*
3. *Brokers' - Agents' Duties Of Disclosure: The real estate broker is held to a greater standard of care than an ordinary seller of real estate.*

    *In Easton v. Strassburger, 152 Cal. App. 3d 90; 199 Cal.Rptr. 383 (1984), the driveway was destroyed because fill had not been properly compacted. The broker had inspected the property and was aware of "red flags" indicating potential soil problems, but did not request further investigation or testing. The court said that "[I]f a broker were required to disclose only known defects, but not also those that are reasonably*

*discoverable, he would be shielded by his ignorance on that which he holds himself out to know." Id. at 100.*

## *VI. CGL INSURANCE*

1. *Continuous Trigger: In 1995, the California Supreme Court adopted a "continuous injury" trigger rule for third party insurance coverage.*

   *In Montrose Chemical v. Admiral Insurance 10 Cal. 4th 645; 42 Cal.Rptr.2d 324 (1995) the Court held each successive general liability carrier responsible to defend such claims. California courts subsequently applied this rule to construction defect cases. (Insurance Company of North America v. National American Insurance Company of California 37 Cal. App.4th 195; 43 Cal.Rptr.2d 518 (1995), Stonewall Insurance v. City of Palos Verdes 46 Cal.App.4th 1810; 54 Cal.Rptr.2d 176 (1995).)*

   1. *Each Carrier on Risk: Under these cases, each and every on risk insurer, from the first exposure until the time the property damage ceases, is liable, with the loss equitably allocated among all liable insurers.*

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