



Final Cost-Benefit Analysis

Chapter 296-155 WAC, Safety standards for construction work, Part S, Demolition

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Table of Contents

Chapter 1: Requirement of the Administrative Procedure Act.....	3
Chapter 2: Description of the Adopted Rule	4
Chapter 3: Description of the Affected Businesses and Workers	7
Chapter 4: Probable Costs of the Adopted Rule	12
Chapter 5: Probable Benefits of the Adopted Rule	15
Chapter 6: Least Burdensome Alternative Analysis.....	19
Chapter 7: Cost-Benefit Determination	22
Chapter 8: References	23

Chapter 1: Requirement of the Administrative Procedure Act

The Administrative Procedure Act (APA; Chapter 34.05 RCW) requires that, before adopting a significant legislative rule, the Department of Labor & Industries (L&I) must analyze the probable costs and benefits of the rule, and determine that the benefits are greater than its costs, taking into account both the qualitative and quantitative benefits and costs.” [RCW 34.05.328(1)(d)]

Under certain circumstances, a rule or rule component is exempt from this requirement. These exemption criteria are listed in RCW 34.05.328(5)(b) including:

- Emergency rules adopted under RCW 34.05.350;
- Rules relating only to internal governmental operations that are not subject to violation by a nongovernment party;
- Rules adopting or incorporating by reference without material change federal statutes or regulations, Washington state statutes, rules of other Washington state agencies, shoreline master programs other than those programs governing shorelines of statewide significance, or, as referenced by Washington state law, national consensus codes that generally establish industry standards, if the material adopted or incorporated regulates the same subject matter and conduct as the adopting or incorporating rule;
- Rules that only correct typographical errors, make address or name changes, or clarify language of a rule without changing its effect;
- Rules the content of which is explicitly and specifically dictated by statute;
- Rules that set or adjust fees under the authority of RCW 19.02.075 or that set or adjust fees or rates pursuant to legislative standards, including fees set or adjusted under the authority of RCW 19.80.045;

This cost-benefit analysis has been prepared in compliance with the APA for the rule amendments in chapter 296-155 WAC, Safety standards for construction work, Part S, Demotion, WACs 296-155-775 through 296-155-810 that do not fall under the exemptions described above.

Chapter 2: Description of the Adopted Rule

The Division of Occupational Safety and Health (DOSH) within Washington State Department of Labor & Industries (L&I) adopted updates to chapter 296-155 WAC, Safety standards for construction work, Part S, Demolition. This rulemaking was initiated by DOSH to remove confusing and unnecessary language, to add clarification where necessary throughout the rule, and to perform general updates and housekeeping changes throughout the chapter.

To support the development of the rule, DOSH held thirteen (13) stakeholder meetings in Spokane, Kennewick, Tukwila, Kelso, and Moses Lake, from June 2018 through October 2019. At these meetings, various stakeholders discussed with DOSH staff the rule as currently written, different components of proposed changes, and concerns and suggestions as identified by stakeholders.

Additionally, L&I researchers conducted a survey of a representative sample of the businesses involved in various types of demolition activities (the “Survey”), and their potential economic impact from the adopted amendments (see Appendix A). The sample of 227 businesses was randomly chosen from (1) a list of contractors obtained from demolition permit data from various counties, (2) the results of a general web search for demolition contractors in Washington State.¹

The amendments adopt clarifying language, new definitions, and new subsections needed to bring the current demolition safety standards up-to-date with current industry practices. The adopted changes aim to ameliorate workplace conditions while reducing workplace incidents from poor site preparation and material handling.

The following are the main amendments of the adopted rule.

WAC 296-155-774: Definitions and Applicability

Specifically, the adopted rule will:

- i. Include a scope of the rule.
- ii. Add the following new definitions to this subpart: *Competent Person*, and *Demolition*.
- iii. Add the following references related to the use of equipment: *Ladder Use requirements found in chapter 296-876 WAC; Scaffolds Use found in chapter 296-874 WAC; Crane and Derricks Use found in chapter 296-155 WAC, Safety standards for construction work, Part L; Elevated Work Platforms found in chapter 296-869 WAC; and use of Hoists found in chapter 296-155 WAC, Safety standards for construction work, Part R.*

¹ The search was filtered by company size (small, medium, and large) and by county.

WAC 296-155-775 Preparatory Operations

- i. Add clarifying language to subsection (1)(a) to be consistent with requirements under OSHA standard 29 CFR 1926.850(a).
- ii. Add subsection (2)(a) requiring the development and implementation of a written demolition plan to incorporate conditions identified in the engineering survey.
- iii. Add subsection (2)(b) to ensure that the written demolition plan be available on site for inspection.
- iv. Add clarifying language to subsection (8)(a) to include the inspection of adjacent structures for asbestos and other hazardous chemicals when such structures could be affected by the demolition process.
- v. Add subsection (9)(a) to deal with the removal of material exposing employees to airborne hazards by following requirements in chapter 296-841 WAC, Airborne contaminants; and subsection (9)(b), to deal with exposure to respirable crystalline silica by following requirements in chapter 296-840 WAC, Respirable crystalline silica.
- vi. Add language in subsection (11) to update the fall protection for employees working on, at, above, or near wall openings for alignment with the Unified Fall Protection rule under WAC 296-880-20005(4), whereby workers will be protected by the use of a guardrail system, safety net system, personal fall arrest system, or personal fall restraint system.
- vii. Add clarifying language in subsection (13)(a) for consistency with OSHA's fall protection rules under 29 CFR 1926.502(i)(2) and 29 CFR 1910.29(e)(1), and DOSH's Unified Safety Standards for Fall Protection in WAC 296-880-20005(3).²
- viii. Add a new subsection (13)(b) to adopt language to update signage to increase hazard warnings for consistency with fall protection requirements under OSHA 29 CFR 1926.502(i)(2), and DOSH' Unified Fall Protection rule under WAC 296-880-40015(3).
- ix. Add clarifying language to subsection (13)(c) for better understanding and for alignment with United Fall Protection rule under WAC 296-880-40015(2).

WAC 296-155-785 Chutes

- i. Add language to update subsection (1) for clarity and to be in accordance with WAC 296-155-775(12).

² DOSH's cover specifications strength requirements are addressed in WAC 296-880-40015(1)(b)

- ii. Add language to update subsection (5) for consistency with fall protection requirements under OSHA 29 CFR 1926.502(b)(1), and DOSH's Unified Fall Protection Rule under WAC 296-880-20005(4).

WAC 296-155-810 Catch Platforms

- i. Add language to update subsection (4) to be in accordance with chapter 296-874 WAC, Scaffolds.

Chapter 3: Description of the Affected Businesses and Workers

The major amendments adopted by this rulemaking are related to site preparation during the demolition process. The department utilized the Survey mentioned in chapter 2, to augment its understanding of demolition operations as well as the businesses potentially impacted by the adopted rule. Of the 227 businesses contacted for the survey, contact information for 48% was verified through telephone calls to the businesses, 35% of the contact information was obtained from annual filings with the Secretary of State³, and the remaining 17% of the contact information was obtained from the business website. The Survey consisted of 19 questions, and was conducted electronically by sending the questionnaire to the representative sample on February 13, 2020. The original deadline was set on February 29, 2020, but due to a low response rate the deadline for responses was extended to March 12, 2020. Two reminders were emailed to the sample group on February 27, 2020 and March 9, 2020 respectively.

A total of seventy-five responses were received, which represents 33% of the total sample. Of the responses received, 51% were completed, 28% were partially completed, 16% contained no information, and 5% contained un-usable information.⁴

The demolition process ranges from the survey of the demolition site and any adjacent structure(s) to the physical deconstruction of the interior or the actual tear down of the substructure or super structure. The industries most directly involved in these activities include both residential and nonresidential/commercial construction operations, so the rule would mostly impact those businesses engaged in such projects (see Table 1).

Table 1. Industries Most Likely Impacted by the Adopted Rule

4-digit NAICS	Industry Group	6-digit NAICS	Industry
2361	Residential Building Construction	236115	New Single-Family Housing Construction (except for-sale builders)
		236116	New Multifamily Housing construction (except for-sale builders)
		236117	New Housing for-sale builders
		236118	Residential Remodelers
2362	Nonresidential Building Construction	236210	Industrial Building Construction
		236220	Commercial and Institutional Building Construction

³ Contact information was obtained from the Washington Secretary of State website: <https://www.sos.wa.gov/>

⁴ Un-useable information would be no information on full-time employees or inconsistent information on worker count and type.

2371	Utility System Construction	237110	Water and Sewer Line and Related Structures Construction
		237120	Oil and Gas Pipeline and Related Structures Construction
2373	Highway, Street, and Bridge Construction	237310	Highway, Street, and Bridge Construction
2379	Other Heavy and Civil Engineering Construction	237990	Other Heavy and Civil Engineering Construction
2381	Foundation, Structure and Building Exterior Contractors	238120	Structural Steel and Precast Concrete Contractors
		238130	Framing Contractors
		238140	Masonry Contractors
		238190	Other Foundation, Structure, and Building Exterior Contractors
2382	Building Equipment Contractors	238210	Electrical Contractors and Other Wiring Installation Contractors
2389	Other Specialty Trade Contractors	238910	Site Preparation Contractors

The adopted amendments are intended to enhance the safety standards for workers engaged in demolition activities. The workers most directly affected by the adopted rule would be those from site preparation occupations (SOC: 47-0000) which includes Carpenters, Construction Laborers, Electricians, Plumbers, Pipefitters and Steamfitters, and First-Line Supervisors/Managers of Construction Trade and Extraction Workers. Other type of contractors within the construction industry who would also benefit from the adopted safety improvements are Hazardous Materials Removal Workers, Construction Managers, Civil Engineers, Explosives Workers, Ordnance Handling Experts, and Blasters, Operating Engineers and other construction equipment operators.

Table 2 presents a sample list of those occupations most likely directly impacted by the changes in the adopted amendments, and Table 3 presents a profile of those occupations.

Table 2. Occupations Most Likely Impacted by the Adopted Rule⁵

Occupation	SOC Code	Employment (2017) ⁶	Projected Employment (2027)	Avg. Annual Growth Rate	Average Wage ⁷
Specialty Trade Contractors					
Carpenters	47-2031	4,603	5,478	1.9%	\$ 29.74
First-Line Supervisors of Construction Trades and Extraction Workers	47-1011	1,872	2,203	1.8%	\$ 40.02

⁵ Source: ESD: All_occup_proj_alt_2019_ESD Data

⁶ Employment figures adjusted to reflect those within demolition operations.

⁷ Source: <https://esd.wa.gov/labormarketinfo/occupations>

Electricians	47-2111	2,210	2,540	1.5%	\$ 33.57
Plumbers, Pipefitters, and Steamfitters	47-2152	1,156	1,325	1.5%	\$ 32.18
Construction Laborers	47-2061	4,588	5,506	2.0%	\$ 23.51
Helpers--Carpenters	47-3012	42	50	2.0%	\$ 17.13
Helpers--Electricians	47-3013	11	12	1.1%	\$ 24.39
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	47-3015	61	72	1.7%	\$ 19.08
Helpers, Construction Trades, All Other	47-3019	10	11	1.7%	\$ 24.86
Other Contractors					
Construction Managers	11-9021	1,674	2,009	2.0%	\$ 49.09
Civil Engineers	17-2051	1,246	1,329	0.7%	\$ 45.55
Operating engineers and other construction equipment operators	47-2073	960	1,082	1.3%	\$ 32.89
Hazardous materials removal workers	47-4041	127	139	0.9%	\$ 30.35

Table 3. Profiles of Occupations Most Likely Impacted by the Adopted Rule ⁸

Hazardous Materials Removal Workers	
Employment	2017: 1,271 2027: 1,384 Avg. Annual Growth Rate: 0.9%
Hourly Wage (2019)	Hourly Mean Wage: \$29.79 Hourly Median Wage: \$29.18
Employment by Industry ⁹	Remediation and Other Waste Management Services: 18.77% Waste Treatment and Disposal: 4.55% Waste Collection: 1.13% Other Specialty Trade Contractors: 0.19% Local Government, excluding schools and hospitals: 0.02%
Carpenters	
Employment	2017: 46,026 2027: 54,781 Avg. Annual Growth Rate: 1.9%
Hourly Wage (2019)	Hourly Mean Wage: \$30.58 Hourly Median Wage: \$28.82

⁸ Occupations shown in this table are based on their representative size of a typical demolition crew according to the representative sample.

⁹ 2019 National Employment Matrix, BLS. Figures represent industries with the highest levels of employment in the occupation. Source: https://www.bls.gov/oes/current/oes_wa.htm#47-0000

Employment by Industry	Residential Building Construction: 27.32% Nonresidential Building Construction: 15.4% Building Finishing Contractors: 14.36% Foundation, Structure, and Building Exterior Contractors: 11.08% Other Specialty Trade Contractors: 2.51%
Construction Laborers	
Employment	2017: 45,880 2027: 55,062 Avg. Annual Growth Rate: 2.0%
Hourly Wage (2019)	Hourly Mean Wage: \$23.98 Hourly Median Wage: \$22.51
Employment by Industry	Other Specialty Trade Contractors: 24.11% Residential Building Construction: 16.13% Nonresidential Building Construction: 15.30% Foundation, Structure, and Building Exterior Contractors: 12.96% Utility System Construction: 21.30%
Operating Engineers and Other Construction Equipment Operators	
Employment	2017: 9,604 2027: 10,817 Avg. Annual Growth Rate: 1.3%
Hourly Wage (2019)	Hourly Mean Wage: \$33.50 Hourly Median Wage: \$32.78
Employment by Industry	Other Specialty Trade Contractors: 13.55% Utility Systems Construction: 10.35% Local Government, excluding schools and hospitals: 0.93% Highway, Street, and Bridge Construction: 13.61% State Government, excluding schools and hospitals: 0.76%
Construction Managers	
Employment	2017: 16,736 2027: 20,086 Avg. Annual Growth Rate: 2.0%
Hourly Wage (2019)	Hourly Mean Wage: \$49.16 Hourly Median Wage: \$46.53
Employment by Industry	Nonresidential Building Construction: 8.7% Residential Building Construction: 5.49% Building Equipment Contractors: 1.66% Utility System Construction: 3.31% Foundation, Structure, and Building Exterior Contractors: 1.86%
First-Line Supervisors of Construction Trades and Extraction Workers	
Employment	2017: 18,715 2027: 22,031 Avg. Annual Growth Rate: 2.56%
Hourly Wage (2019)	Hourly Mean Wage: \$39.64 Hourly Median Wage: \$40.02
Employment by Industry	Nonresidential Building Construction: 11.80% Building Equipment Contractors: 3.93% Residential Building Construction: 8.81%

	Foundation, Structure, and Building Exterior Contractors: 5.88% Other Specialty Trade Contractors: 6.11%
Electricians	
Employment	2017: 22,103 2027: 25,396 Avg. Annual Growth Rate: 2.23%
Hourly Wage (2019)	Hourly Mean Wage: \$32.11 Hourly Median Wage: \$33.57
Employment by Industry	Building Equipment Contractors: 22.22% Employment Services: 0.49% Local Government, exclusion schools and hospitals: 0.27% Nonresidential Building Construction: 1.31% Utility System Construction: 1.81%
Plumbers, Pipefitters, and Steamfitters	
Employment	2017: 11,561 2027: 13,253 Avg. Annual Growth Rate: 2.19%
Hourly Wage (2019)	Hourly Mean Wage: \$32.81 Hourly Median Wage: \$33.80
Employment by Industry	Building Equipment Contractors: 15.01% Nonresidential Building Construction: 2.02% Utility System Construction: 3.05% Local Government, exclusion schools and hospitals: 0.20% Employment Services: 0.18%

Chapter 4: Probable Costs of the Adopted Rule

First, it is worth noting the costs estimated in this report only represent the new costs of complying with the adopted rule amendments for the affected parties, excluding realized or potential costs associated with or originated from the current industry practices, or “baseline” standards under existing laws, rules or national consensus standards. Therefore, any compliance costs attributable to or insignificantly different from the baseline standards are not analyzed here.

A. New Requirements: Preparatory Operations

i. **WAC 296-155-775(2)**

Adopted Language: Under this subsection the demolition contractor must develop and implement a written demolition plan tailored to the operation and to the types of hazards involved. This demolition plan must also incorporate conditions of the framing, floors, and walls, and potential of unplanned collapse of any portion of the structure(s) identified in the engineering survey. Additionally, this subsection requires the demolition contractor make the plan available on the job site for inspection by the department.

Cost Implication: Currently, the demolition contractor is required to conduct an engineering survey to determine structural integrity and the possibility of unplanned collapse of any portion of the structure, including any adjacent structures where employees may be exposed, and to keep a copy of the survey report at the jobsite for the duration of demotion operation. The current rule also requires demolition contractors to keep a copy of the “plans and/or methods of operations” at the job site. However, the current rule does not explicitly require the employer to develop and follow the demolition plan or the safety recommendations contained in the survey. This adopted subsection is new and creates new requirements to (i) develop and implement a written tailored demolition plan incorporating structures from the engineering survey as well as the aforementioned conditions; and (ii) make the plan available on site for inspection. This requirement therefore creates a new cost for the demolition contractor.

In order to determine the total cost of compliance with this new requirement, the department must determine the average cost per square foot of demolition projects and then estimate the annual square footage of all demolition projects. The average cost per square foot was directly obtained from the survey while the annual total square footage of demolition projects was indirectly estimated from the square footage reported by the representative sample of businesses in the Survey and then generalized to the annual total based on the percentage this sample represents in the total affected businesses. To estimate the number of demolition contractors impacted by this adopted subsection, the department used the frequency data provided by the representative sample in the Survey. While the estimated number of

demolition contractors impacted by this rule is approximately 1,416, not all will be incurring new costs from this requirement.¹⁰ The proportion of demolition contractors that are currently adhering to this requirement is on average approximately 15%,-resulting in an average of 1,197 demolition contractors that will be subject to new costs from this requirement annually. Combined with the median cost data obtained from the Survey, the department estimates that this adopted amendment will impose approximately \$5.88 million to \$14.20 million annually on the impacted businesses. Table 4 below summarizes the cost estimates for compliance with this requirement.

Table 4. Estimated cost for compliance with development and implementation of a demolition plan¹¹

	Small Project	Medium Project	Large Project	Total
Total sq. ft. of work covered by demolition plans per year ¹²	1.85 million	8.90 million	13.74 million	24.62 million
Median cost per sq. ft.	\$0.58	\$0.26	\$0.24	-
Total annual cost -low	\$443,581	\$2,135,481	\$3,298,447	\$5,877,509
Total annual cost -high	\$1,071,987	\$5,160,746	\$7,971,247	\$14,203,980

The increasing digitization of material and use of digital devices means the demolition contractor can have the entire demolition plan in digital form available on site on a laptop or other mobile device at no additional cost. Therefore, the department believes that the requirement to make the demolition plan available onsite for inspection would impose minimal compliance costs for the demolition contractor.

ii. WAC 296-155-775(8)(a)

Adopted Language: Under this subsection the demolition contractor must determine if asbestos, hazardous materials, hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances are present at the work site and adjacent structures that could be affected by the demolition operation.

¹⁰ The number of demolition contractors was estimated from permit data from 2009 to 2019 obtained from several counties and cities in Washington State. This data was filtered to identify a reasonable count of businesses engaged in demolition activities.

¹¹ The low and high end of the total annual costs are derived from the total square footage of work for each size of projects multiplied by the lowest and highest cost per square foot (\$0.24 and \$0.58) respectively.

¹² These numbers are derived from the surveyed sample of businesses that reported the size of each type of projects (small, medium, large) and the number of projects they perform each year. Then the average total number of square footage of work per business per year is multiplied by the number of affected businesses to arrive at the total square footage of work for the whole population.

Cost Implication: The requirement to inspect adjacent structures that could be affected by the demolition process is already part of the engineering survey requirement, and folds into the “demolition worksite” for consideration purposes when such adjacent structures would be affected by the demolition. This language provides clarity to the rule and therefore does not constitute a new requirement. However, there were survey questions on inspections of asbestos and other dangerous substances for adjacent structures. This information is not included in this document.

iii. **WAC 296-155-775(11)**

Adopted Language: This subsection requires that employees working on, at, above, or near wall openings where the outside bottom edge is 4 feet or more above the lower level, and the inside bottom edge is less than 39 inches above the working surface, are protected from falling by a guardrail system, safety net system, personal fall arrest system, or personal fall restraint system.

Cost Implication: The language in this subsection was updated to provide clarity, and to be in alignment with WAC 296-880-20005(4) (Unified Fall Protection Rule), as well as for alignment with guardrail system specifications in OSHA’s fall protection rule under 29 CFR 1926.502(b)(1).¹³ As a result this subsection is exempted as a significant legislative rule requiring cost analysis under RCW 34.05.328(5)(b)(iii). Furthermore, this clarifying language provides additional options for employee fall protection, and, since this is an existing requirement to which industry is already subject, there is no new or increased cost to impacted businesses.

¹³ WAC 296-880-20005(4) was previously under chapter 296-155 WAC, Safety standards for construction work, Part C-1, Fall protection requirements for construction.

Chapter 5: Probable Benefits of the Adopted Rule

5.1 Quantitative Benefits from the Reduction in Nonfatal and Fatal Injuries

The demolition process is a complex set of tasks that involves structural dismantlement, site clearance, environmental remediation, salvage, recycling, and industrial recovery. These tasks includes the use of specialized tools such as hydraulic equipment, cranes, loaders, wrecking balls, and even explosives. The various types of demolition can include interior demolition, industrial demolition, commercial demolition, and deconstruction.¹⁴ A typical demolition process includes surveying the structure which needs to be demolished, removing any present hazardous materials, preparing the demolition plan, and addressing all safety measures.¹⁵ There are many different construction occupations involved in the demolition process and, depending on the method of demolition,¹⁶ can include a matrix of occupations as outlined in Table 2 and chapter 3 above. These workers are exposed to many different types of hazards such as falls, respirable issues from breathing dust and other harmful substances, as well as fatalities, not only from the project site but also from adjacent structures. In addition to worker exposure to these hazards, the public also face some hazards from demolition operations.

To better assess the number of demolition related injuries to quantify the benefits of the adopted requirements, the department relied upon the following assumptions.

Assumption 1

In addition to their unique set of hazards, demolition workers also face some of the same workplace hazards as other workers in the construction industry. However, there is a lack of detailed information on identifying the injuries suffered by workers engaged in demolition operations, as opposed to general construction operations. Therefore, the department relies on the presence of demolition contractors in the construction industry as a proxy for the estimate of injuries occurred to demolition workers. From our assessment, demolition contractors make up 10 percent of all construction contractors so L&I assumes that demolition related injuries represent a size equal, or approximate, to its total business industry representation (within a reasonable margin of error), which is approximately 10 percent. It is expected that the number of demolition related workplace injuries (fatal and non-fatal) estimated in this analysis is underestimated. In addition, the overall number of injuries - worker related plus public - related

¹⁴ <https://www.demolitionassociation.com/Industry-Resources/About-Demolition/Demolition-FAQ>

¹⁵ <https://theconstructor.org/structures/demolition-methods-process-buildings-structures/13941/>

¹⁶ The two main methods of demolition are (1) Non-explosive demolitions, and (2) Explosive demolitions.

to demolition activities is also underestimated given the fact that non-fatal injuries occurred to the public are not included here.

Assumption 2

The department does not have the information on the demolition related injuries to the public. However, fatalities suffered by the public from demolition related activities were reported, and the costs of these fatalities are assessed in our analysis at the value of a statistical life (VSL).¹⁷

The department examined both occupational injuries, fatal and nonfatal, as well as public fatality data. With the former, the department obtained these data from its internal database and estimated that on average approximately 449 non-fatal injuries and 1.6 fatalities occurred to workers in demolition operations between 2007 and 2016 in Washington. On the latter, the department researched public reports from news articles on major construction related non-fatal and fatal injuries and then filtered those which occurred as a result of the demolition process.¹⁸ The department identified one major public demolition-related accident resulting in 3 fatalities in 2015 in Washington.¹⁹

Table 5. Demolition Claims-Related Injuries as 10% of industry total

Injury Year	Nonfatal		Fatal	
	Claim Count	Average Claim Cost (state-fund claims)	Claim Count	Average Claim Cost
2007	859.5	\$19,785	-	-
2008	723.3	\$24,016	2	\$514,087
2009	476	\$25,439	4	\$753,423
2010	355.3	\$26,813	-	-
2011	351.4	\$25,830	2	\$478,105
2012	349.7	\$23,977	3	\$214,627
2013	413.8	\$20,525	-	-
2014	459.6	\$22,159	1	\$272,604
2015	374	\$16,239	1	\$706,563
2016	125.2	\$17,463	3	\$553,729
Annual Average	449	\$22,225	1.6	\$499,020

A review of the nature and causes of the injuries as they relate to the adopted amendments in the rule, suggests that the rule will have a positive impact on the frequency and numbers of those injuries.

¹⁷ The Value of a Statistical Life is estimated at \$9.6 million as per the USDOT.

¹⁸ These would be injuries involving non-construction workers who didn't file work-related injury claims.

¹⁹ <https://www.cdrecycler.com/article/family-killed-bridge-demolition-washington/>

The true impact of the rule amendments will probably be underestimated for several reasons. First, given the nature of the reporting of injuries where injuries (including the workers involved) are either misclassified as general construction (i.e. not demolition related), not properly captured in the claims database, or simply not reported, the true magnitude of this impact is greater than the actual claims indicate. Secondly, injuries suffered by the public (i.e. non-worker related injuries) are not reported and there's no method to track and account for those injuries. In rare cases where the injury results in a fatality, a public record, through news coverage creates a report which can be used for assessment purposes. However, if these do not also involve a worker injury, then the true account of such incidents as reported in Table 5 are also most likely underestimated. Thirdly, reporting may be inaccurate because workers un-related to the demolition activity or other occupations may be impacted by the hazards the rule addresses, and so may not be accounted in the official injury count. The ultimate result of the shortcomings in reporting means that there is an understatement in the total number of reported claims and in the overall number of related injuries when injury to the public is factored in. This implies that the prevention rates and ultimate beneficiaries as a result of rule amendments would conceptually be higher than stated in this analysis.

Based on the estimated number of fatal and nonfatal injuries prevented and the monetized savings from each injury, the total savings are estimated to be approximately \$34.3 million to \$50.7 million each year.

Table 6. Summary of the Benefits from the Reduction in Workplace Injuries

Direct claim cost for a nonfatal claim: \$16,239 - \$26,813
Indirect-to-direct cost ratio ²⁰ : 110% ²¹
Total cost per nonfatal injury: \$34,103 - \$56,308
Direct claim cost for a fatal claim: \$499,020
Value of a statistical life: \$9.6 million ²² - \$15.4 million ²³
Total cost per fatality: \$10.1 million - \$15.9 million
Approximate cost for a public fatality: \$9.6 million - \$15.4 million
Avg. number of nonfatal injuries prevented each year: 449
Avg. number of worker fatalities prevented each year: 1.6 ²⁴

²⁰ The indirect costs of an injury include, but are not limited to, property damage associated with the accidents, the costs attributed to loss of productivity of the workers involved, the cost of transportation to the nearest medical-treatment facilities, the costs affiliated with hiring replacement workers, and the additional administrative costs of dealing with the injuries.

²¹ Data Source: Benefits of the OSHA On-site Consultation Program-An Economic Analysis, OSHA, 2018.

²² Data Source: Departmental Guidance on Valuation of a Statistical Life (VSL) in Economic Analysis, USDOT, 2016. This was the most recent VSL estimate made by a federal government agency in its economic impact analyses.

²³ EPA VLS upper limit of \$12.1 million (\$2006), adjusted for inflation.

²⁴ This represents the average number of fatality claims for the 10-year period 2007-2016.

Avg. number of public fatalities prevented each year: 0.3 ²⁵
Cost savings from prevented nonfatal injuries each year: \$15.3 - \$25.3 million
Cost savings from prevented fatalities (occupational and public) each year: \$19- \$25.4 million
Annual cost savings from all prevented nonfatal and fatal injuries: \$34.3 - \$50.7 million

5.2 Qualitative Benefits Associated with the Adopted Rule Amendments

Beyond the benefits quantified above in Section 5.1, there are additional benefits which accrue as a result of the adopted rule but are traditionally difficult to quantify. Here, we discuss three main qualitative benefits of the adopted rule amendments.

First, the adopted rule offers both clarity and consistency to industry participants. The updated language and definitions remove ambiguities and uncertainty, and make it easier for industry participants to understand the latest updates as it relates to aligning current requirements with industry standards and best practices from organizations such as OSHA and ANSI. This further allows for the industry to be able to better stay in compliance and avoid unintended violations.

Second, it facilitates the leveling of the competitive playing field for industry participants. By translating industry best practices into requirements, industry participants will all be subject to the same higher/safer standards. This means that demolition contractors who benefited from an unfair advantage by avoiding costs for certain practices which were previously not required, would now be required to meet the same standards as all other participants. These safer standards should lend to the reduction in the injuries suffered from demolition operations.

A third qualitative benefit includes the avoidance of pain and suffering by victims and their families. There is a psychological, mental and emotional cost that accompanies serious accidents with often uncertain long-term impact. By improving the safety practices around demolition operations with the adopted amendments, the number of injuries can be reduced, and in the process the pain and suffering by victims and their families can be mitigated and/or avoided.

²⁵ This represents the average number of public fatalities for the 10-year period 2007-2016.

Chapter 6: Least Burdensome Alternative Analysis

The department considered different alternatives to what was adopted in this rule, and found they were either inadequate to protect workers, or more burdensome than the adopted rules. The following are a few examples:

Requirement for the development and implementation of a demolition plan.

Following an investigation, citation, and appeal of demolition violations related to the Highway 410 overpass collapse and a subsequent review of the citation history for the demolition requirements under chapter 296-155 WAC, Safety standards for construction work, Part S, Demolition, the department determined that rule changes were needed to ensure that demolition plans were developed and implemented. In the Highway 410 overpass collapse, a concrete slab weighing thousands of pounds fell from a Highway 410 overpass and landed on a vehicle driving on the highway, killing all three in the vehicle. The investigation conducted by the department found the company had concerns about the possibility of the barrier falling down during cutting, yet continued the work.

While the current rule requires a demolition survey with a demolition plan be conducted prior starting demolition, neither DOSH's rule nor OSHA's explicitly require the employer to follow the demolition plan it developed or the safety recommendations contained in the survey. Based on a review of inspections, including Highway 410 overpass collapse inspection, it was determined that without a clear requirement of a demolition plan that is based on the engineering survey information, more incidents exposing workers and the public are likely to occur.

If demolition is not conducted according to a plan consistent with the engineering survey, hazards such as unplanned collapses and hazards from flying or dropping debris, can injure both workers and the public. The adopted rule requires a demolition plan be developed specific to a particular demolition project and in consideration of the engineering survey for the specific project and that the plan be implemented.

Consistent with the goal of WISHA to ensure workers are provided a safe workplace free of recognized hazards, the adoption of this requirement into rule is the least burdensome option.

Requirement for the demolition plan to be available on site for inspection.

Adopted changes to WAC 296-155-775(2)(b) improve safety of employees working in the demolition industry and the public.

The increasing digitization of material and use of digital devices mean the demolition contractor can have the entire demolition plan in digital form available on site on a laptop or other mobile device at no additional cost. Therefore, L&I believes that the requirement to make the demolition plan available onsite for inspection would impose minimal compliance costs for the demolition contractor. No other alternative was submitted during the stakeholder process.

Requirement for protection against fall hazards

This subsection was updated to add clarifying language that a wall opening can include those with chutes attached, and to align with the fall protection requirements in chapter 296-880 WAC, Unified safety standards for fall protection.

This update adds language to clarify when a hazard exists from wall openings by aligning with existing requirements for when wall openings must be guarded (when there is a fall hazard of 4 feet or more, and the bottom of the opening is less than 39 inches above the working surface) previously under Part C-1 of this chapter, WAC 296-155-24609(5)(a), and then adopted under the Unified Fall Protection rule under WAC 296-880-20005(4).

Changes are to align with and be as effective as OSHA requirements. The current WAC requires protection “to a height of between 36 and 42 inches.” OSHA’s Demolition rule requires protection “to a height of approximately 42 inches.” OSHA’s fall protection rule under 29 CFR 1926.502(b)(1) requires the “top edge height of top rails, or equivalent guardrail system members, shall be 42 inches plus or minus 3 inches above the walking/working level.” The current requirement allowing a guardrail height of less than 39 inches is not as effective as OSHA’s requirements. This change will also align with the guarding requirements for openings in the Unified Fall Protection standard under WAC 296-880-20005(4), previously under chapter 296-155 WAC, Safety standards for construction work, Part C-1, Fall protection requirements for construction, in WAC 296-155-24609.

Furthermore, this update adds options for fall protection other than guardrail. These are additional options that an employer can choose to use as an alternative to the requirement for guardrails. As these options are already available to the employer, there is no cost for compliance. It is expected that employers will choose to use when it is a more feasible option.

Due to the fact that no alternatives were submitted or discussed during the stakeholder process, and the option of not adopting these requirements is not a viable option to achieve the safety goals specified in this rule, the final proposal is considered the least burdensome alternative that can achieve the objective outlined: making worker safety a higher priority than production, speed and profit by ensuring the workplace for demolition workers is free from recognized safety and health hazards.

Chapter 7: Cost-Benefit Determination

In compliance with the Administrative Procedures Act (APA), Chapter 34.05 RCW, the department has analyzed the probable costs and benefits, quantitatively and qualitatively, associated with the adopted amendments to chapter 296-155 WAC, Safety standards for construction work, Part S, Demolition.

There is an inherent uncertainty risk, as opposed to mathematical risk, arising from economic analyses. In this analysis, the uncertainty aspect comes from the reliance upon certain assumptions, though reasonable, and the statistical approach to analyzing available data, to arrive at estimates. This implies that the true cost and benefit implications of the adopted rule amendments, along with the economic impact, are unknown. However, the approach taken by the department to determine the impact of the adopted rule on the affected businesses and workers is considered the best one based on the available information and data at the time of this analysis.

The department estimates that the adopted rule amendments would probably impose additional costs of \$5.9 million to \$14.2 million each year. The total quantified benefits of the adopted rule are estimated to be between \$34.3 million and \$50.7 million annually, in addition to a number of significant but unquantifiable benefits. Therefore, the department concludes that the probable benefits exceeds its probable costs.

Chapter 8: References

ANSI/ASSE A10.6-2006. *Safety and Health Program Requirements for Demolition Operations*.

ANSI/ASSE A10.18-2007. *Safety Requirements for Temporary Roof and Floor Holes, Wall Openings, Stairways, and Other Unprotected Edges in Construction and Demolition Operations*.

Mewis, R. (2020) *Building Construction Costs with RSMeans Data*.

USDOT (2016) *Departmental Guidance on Valuation of a Statistical Life (VSL) in Economic Analysis*. U.S. Department Of Transportation, Washington D.C.

Appendix: Survey Questionnaire

Economic Impact of Proposed Demolition Rule for Construction Work

Instruction

The purpose of this survey is to determine any new costs your business may incur due to new or increased requirements in the proposed demolition rule (Chapter 296-155 WAC Safety standards for construction work, Part S Demolition). Your answers will also help us determine how the proposed rule could impact businesses of different types and sizes.

There are three sections in this survey:

Section 1: General questions about your business as a whole

Section 2: Questions on inspections of asbestos and other dangerous substances for adjacent structures

Section 3: Questions on demolition plans

Each section will ask you questions that will help us determine how these rules might affect your business.

Please answer the questions the best you can. If you do not have the exact information, use your best estimate. In order for your cost data to be assessed as part of the economic impact analysis of this rule, please complete the survey by March 12, 2020.

Per RCW 42.56.070(19), information gathered under chapter 19.85 RCW (Regulatory Fairness Act) or RCW 34.05.328 (Significant Legislative Rules) that can be identified to a particular business is exempt from public disclosure.

SECTION 1: GENERAL QUESTIONS ABOUT YOUR BUSINESS

*1) Please describe your role in your company.**

☐ Business Owner / Co-Owner

☐ President / CEO / Chairman

☐ General Manager

- ☐ Safety Manager / Director
 - ☐ First-line Supervisor
 - ☐ Engineer /Lead Worker
 - ☐ Other. Please specify: _____ *
-

SECTION 1: GENERAL QUESTIONS ABOUT YOUR BUSINESS

2) During 2019, what was the maximum number of full-time workers your company employed?*

SECTION 1: GENERAL QUESTIONS ABOUT YOUR BUSINESS

*3) Please check the one industry description that most closely identifies your demolition business. If more than one of these descriptions fits your business, select the one that represents the largest part of your business:**

- ☐ Business association
- ☐ Commercial and Institutional Building Construction
- ☐ Framing Contractors
- ☐ Highway, Street, and Bridge Construction
- ☐ Industrial Building Construction
- ☐ Masonry Contractors
- ☐ New Housing for-sale builders
- ☐ New Multi-family Housing Construction
- ☐ New Single-Family Housing Construction
- ☐ Oil and Gas Pipeline and Related Structures Construction
- ☐ Other Building Equipment Contractors
- ☐ Other Foundation, Structure, and Building Exterior Contractors
- ☐ Other Heavy and Civil Engineering Construction

- ☐ Residential Remodelers
- ☐ Site Preparation Contractors
- ☐ Trade Union
- ☐ Water and Sewer Line and Related Structures Construction
- ☐ All Other Specialty Trade Contractors
- ☐ Other, please specify: _____ *

SECTION 1: GENERAL QUESTIONS ABOUT YOUR BUSINESS

4) *In what counties do you perform demolition work (Please check all that apply)?*

- ☐ King
- ☐ Pierce
- ☐ Snohomish
- ☐ Spokane
- ☐ Clark
- ☐ Thurston
- ☐ Kitsap
- ☐ Yakima
- ☐ Whatcom
- ☐ Benton
- ☐ Skagit
- ☐ Cowlitz
- ☐ Other county in WA, please specify: _____
- ☐ Outside WA

SECTION 1: GENERAL QUESTIONS ABOUT YOUR BUSINESS

5) In which of the following methods and types of demolition activities does your company engage?

(Please check all that apply)*

☐ Interior demolition

☐ Selective demolition

☐ Dismantling/Deconstruction

☐ Total demolition

☐ Mechanical demolition

☐ Implosion

☐ Crane and ball

☐ All of the above

☐ Other. Please specify: _____ *

SECTION 1: GENERAL QUESTIONS ABOUT YOUR BUSINESS

6) Describe the average size of your demolition projects based on square footage. (You can provide a range)*

	Small Projects	Medium Projects	Large Projects
Square foot			

Comments:

SECTION 1: GENERAL QUESTIONS ABOUT YOUR BUSINESS

7) On average, how many demolition projects do you complete in a normal year? (You can provide a range)*

	Small projects	Medium projects	Large projects

# of projects	_____	_____	_____
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Comments:

SECTION 1: GENERAL QUESTIONS ABOUT YOUR BUSINESS

8) Please estimate the percentage of your workforce, by occupation, involved in demolition projects. (For instance, if you have 10 carpenters and only 5 are involved in demolition projects, then enter 50%).*

	% in demolition
Carpenters	_____
First-line construction trades supervisors	_____
Electricians	_____
Plumbers, pipefitters, and steamfitters	_____
Construction laborers	_____
Explosives workers, ordnance handling experts, and blasters	_____
Hazardous materials removal workers	_____
Construction managers	_____
Civil engineers	_____
Operating engineers and construction equipment operators	_____
Other workers	_____

Comments:

SECTION 2: INSPECTION OF ASBESTOS AND OTHER DANGEROUS SUBSTANCES

9) Do you typically inspect structures adjacent to the work site for asbestos, hazardous materials, and other flammable and dangerous substances?*

☐ Yes

☐ No

SECTION 2: INSPECTION OF ASBESTOS AND OTHER DANGEROUS SUBSTANCES

10) Is this inspection done separately from the inspection of the work site, or is it part of the work site inspection?

☐ Separate Inspection

☐ Part of the work site inspection

SECTION 2: INSPECTION OF ASBESTOS AND OTHER DANGEROUS SUBSTANCES

11) Please describe a typical work crew for the adjacent structure inspection by each size of structure. For instance, if it typically needs 1 Engineer and 2 Licensed Inspectors to conduct this type of inspection for a small structure, then enter 1 and 2 in Row 1 and Row 5 of Column 1 that specify Engineer and Licensed Inspector for small structure.

	Small structure	Medium size structure	Large structure
Engineer	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>
Construction manager	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>
Supervising contractor	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>
Outside consultant	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>

Licensed inspector	_____ _____ _____	_____ _____ _____	_____ _____ _____
Other	_____ _____ _____	_____ _____ _____	_____ _____ _____

12) For the crew you identified above, please estimate the number of hours it would take to complete the inspection and other necessary work on the asbestos and other dangerous substances. If you don't have this information, please skip to the next question that asks you to estimate the cost in terms of dollars.

	Small structure	Medium size structure	Large structure
# of hours	_____ _____	_____ _____	_____ _____

SECTION 2: INSPECTION OF ASBESTOS AND OTHER DANGEROUS SUBSTANCES

13) For each type of structure, what is the average cost range of the inspection of an adjacent structure? (if there is no cost, just enter 0)

	Small structure	Medium size structure	Large structure
\$	_____ _____	_____ _____	_____ _____

SECTION 2: INSPECTION OF ASBESTOS AND OTHER DANGEROUS SUBSTANCES

14) Who typically bears the cost of this inspection?

☐ My company

☐ Client

() Other: _____ *

SECTION 3: DEMOLITION PLAN

15) Do you typically complete and follow a written demolition plan?*

() Yes

() No

SECTION 3: DEMOLITION PLAN

16) Please describe a typical work crew for developing and completing demolition plan by each size of project. For instance, if it typically needs 2 Engineers and 2 Outside Consultants to complete a demolition plan for a small project, then enter 2 and 2 in Row 1 and Row 4 of Column 1 that specify Engineer and Outside Consultant for small project.

	Small demo project	Medium demo project	Large demo project
Engineer	_____ _____	_____ _____	_____ _____
Construction manager	_____ _____	_____ _____	_____ _____
Supervising contractor	_____ _____	_____ _____	_____ _____
Outside consultant	_____ _____	_____ _____	_____ _____
Other	_____ _____	_____ _____	_____ _____

17) For the crew you identified above, please estimate the number of hours it would take to complete a demolition plan for each type of project.

	Small project	Medium size project	Large project
# of hours	<hr/> <hr/>	<hr/> <hr/>	<hr/> <hr/>

SECTION 3: DEMOLITION PLAN

18) Who typically bears the cost of the demolition plan?

☐ My company

☐ Client

☐ Other: _____ *

Supplemental Question

19) Was the survey delivered to your inbox or junk email box initially?

☐ Inbox

☐ Junk email box

Thank You!