THE CITY OF WATERTOWN

FINANCE COMMITTEE MEETING-SPECIAL AGENDA

THURSDAY, NOVEMBER 02, 2023 AT 4:30 PM

MUNICIPAL BUILDING COUNCIL CHAMBERS – 106 JONES STREET, WATERTOWN, WI 53094

By Phone or GoToMeeting: Members of the media and the public may attend by calling:
+1 (571) 317-3122 **Access Code:** 153-925-469 or https://www.gotomeet.me/EMcFarland
All public participants' phones will be muted during the meeting except during the public comment period.

1. **CALL TO ORDER**
2. **REVIEW AND APPROVE MINUTES**
3. **BUSINESS**
   - A. Discuss and take possible action: borrowing resolution for fire station construction
   - B. Discuss and take action: hire of Police Chief
4. **ADJOURNMENT**

Persons requiring other reasonable accommodations for any of the above meetings, may contact the office of the City Clerk at mdunneisen@watertownwi.gov*, phone 920-262-4006*

A quorum of any City of Watertown Council, Committee, Board, Commission, or other body, may be present at this meeting for observing and gathering of information only

THE CITY OF WATERTOWN

Finance Departm
106 Jones Street
PO Box 477
Watertown, WI 53094-0477
(920) 262-4000

To: Finance Committee
From: Mark Stevens
Date: October 27, 2023
RE: Fire Station Cost Evaluation

A group of staff from Fire, Finance, and Administration have been working to assemble best estimates of pre-construction, construction, FFE (Furniture, Fixtures, Equipment) and other owner costs. The initial costs for construction originated from estimates from Five Bugles created a few years ago. SEH (architect firm) provided a "60% completed" set of drawings to Maas Brothers (construction manager) at the beginning of October. The Maas staff has been working to secure more accurate inputs from various subcontractors through the month to help to provide the realities of inflation (approx. 45% increase since initial estimates) and supply chain consequences. Another major pricing influencer is the receipt of the soils boring test results; a substantial amount of existing ground/contents (approx. 18,000 cubic yards) will be required to be exchanged for suitable materials to build an appropriate base foundation. FD staff have also secured initial alternate quotes for training tower options.

This group assembled yesterday to incorporate the Maas "60% plans" estimate into the project budget. They presented a construction budget range of $11.875M to $13.125M, so a mid $12.5M number was utilized as a starting amount. The total estimated costs, including a storage building ($450,000), training tower ($800,000) and owner purchases (FFE and specialty equipment), were approximately $16,850,000 (including $1.1M contingency of 8% construction costs).

Owner self-performing work

When reviewing the estimates, the City believes there may be savings by self-performing a few tasks or providing materials:

-100,000	Provide backfill from quarry or other local sources
- 75,000	Parks/Forestry: landscaping labor
- 20,000	Use existing FD turn-out gear lockers
-195,000	Estimated savings (eliminate from bidding)

Value Engineering Recommendations

Several items were introduced with the following agreements:

-100,000	Change 4 back doors of primary apparatus bay to all-glass sectionals
-250,000	Eliminate basement level (incorporate into training tower)
-520,000	Eliminate command vehicle garage (utilize storage building for parking)
-175,000	Exchange exterior stone veneer with utility brick (more economical material)
-100,000	Change storage building to wood-framed pole building with exterior metal panels
- 40,000	Hydraulic elevator (no equipment room) in lieu of traction elevator
-1,185,000	Estimated savings (value engineering)

The revised estimated cost, after incorporating the above alterations, is $15,360,000 (including $990,000 contingency of 8% construction costs).

Fire Station Cost Evaluation
Page 2 of 2

Consensus of the workgroup was to bid the storage building as an alternate and the upgrade of the back four apparatus doors back to original specification as an alternate. A key unknown is fortunately at the front of the process: exchanging soil for appropriate foundation base. Once that cost is determined, remaining contingency would allow for future decisions to be made.

Be reminded that we're working with "informed" estimates, but not final numbers. Outside of the elimination of both the training tower and storage building AND a reduction in square footage of the station, we cannot borrow the original amount of $12,500,000 to complete this project; inflationary costs on building materials have exceeded expectations. The options below (four right columns) exclude the storage building but still include the training tower ($800,000 estimate).

			If Borrow:	12,500,000	13,500,000	14,000,000	14,500,000
Financing costs		691,163		691,163	746,288	773,850	801,413
Contingency: 8% Construction		990,153					
			Exclusions:				
			Storage Building	(350,000)	(350,000)	(350,000)	(350,000)
Total Estimated Cost		**15,360,137**		15,010,137	15,065,262	15,120,387	15,175,512
Funding Sources							
2022 Fire Supplies [01-52-31-18]		5,500					
2023 Debt		600,000					
2024 Debt		13,165,000		13,165,000	14,215,000	14,740,000	15,265,000
2024 Fiber Fund [25-58-25-60]		10,000					
Borrowed funds interest earnings: 4%		250,000		250,000	270,000	280,000	290,000
Total Funding Sources		**14,030,500**		14,030,500	15,100,500	15,635,500	16,170,500
Shortfall		**(1,329,637)**		(979,637)	35,238	515,113	994,988

Possible Borrowing Scenarios:

- Borrow $13,500,000, and bids are lower: add storage building and/or doors
- Borrow $13,500,000, and bids come in as anticipated: build tower, but not storage building
- Borrow $13,500,000, but actual bids are greater: eliminate tower; perhaps build storage building
    - The basement is in the design intended for training purposes. If tower is eliminated, have you also eliminated any training resources because it is excluded above? Should the basement and other training features be a requested alternate?

- Borrow $14,000,000, and bids are lower: add storage building and doors alternate
- Borrow $14,000,000, and bids come in as anticipated: build tower and storage building
- Borrow $14,000,000, but actual bids are greater: there's approximately $515,000 available that affords costs extending into higher range of estimated costs; don't build storage building

Project Fire Station - Budget
2024-2025 Rev: 10/25/2023 Post mtg

Pre-construction							
Land survey	7,500						
Soil borings	10,000						
Architectural Design Services	547,580						
Design Reimbursable Expenses	10,000						
Unsuitable soils grading/erosion cntrl							
Pre-construction CM (Maas)	-						
		575,080					
Construction							
Builder's Risk Insurance	6,907						
Construction Costs - Fire Station/Site	12,500,000		33,850 SF				
- City provide backfill	(100,000)						
- City provide landscaping labor	(75,000)						
- FD use existing lockers	(20,000)						
- Change 4 back doors- glass sectionals	(100,000)						
- Eliminate basement level	(250,000)						
- Eliminate command car garage	(520,000)						
- Exchange exterior finish	(175,000)						
- Hydraulic elevator, not traction	(40,000)						
Construction Costs - Storage Building	450,000		3,360 SF (42x80) @ $134/SF				
- replace with pole building	(100,000)						
Construction Costs - Training Tower	800,000						
Construction Management Costs: 2.5%	incl above						
Insurance: .35%	incl above						
Performance bond: .53%	incl above						
General Conditions	incl above						
General Requirements	incl above						
		12,376,907					
FFE & Other Owner Costs							
IT cabling	26,918		DigiCorp				
IT network gear & UPS	31,349		DigiCorp				
Wireless Access Points (19)	18,916		DigiCorp				
Security cameras (6 out, 3 in)	29,426		DigiCorp				
Telecommunications gateway	2,500		Convergent Solutions				
Building access	25,000		LaForce				
AV equipment	60,000		Camera Corner: Training $40K; ConfRm $20K				
Furniture, Fixtures, & Equipment	219,225		EBI				
Fire specialty equipment	53,500		Hose washer $13K, hose / gear dryer $10.5K; ready rack $4K; air compressor $25K; SCBA $1K				
Paging System	200,000						
Gym equipment	25,000						
Kitchen appliances/hood	32,000						
Moving/relocation costs	3,000						
		726,834					
			If Borrow:	**12,500,000**	**13,500,000**	**14,000,000**	**14,500,000**
Financing costs		691,163		691,163	746,288	773,850	801,413
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Funding Sources							
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2024 Debt		13,165,000		13,165,000	14,215,000	14,740,000	15,265,000
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Total Funding Sources		**14,030,500**		14,030,500	15,100,500	15,635,500	16,170,500
Shortfall		**(1,329,637)**		(979,637)	35,238	515,113	994,988

$12.50M Fire Station

BAIRD

City of Watertown
HYPOTHETICAL FINANCING PLAN

YEAR DUE	NET GENERAL FUND EXISTING DEBT SERVICE (a)	2024 CIP $3,120,000 G.O. PROMISSORY NOTES Dated April 1, 2024 (First interest 12/1/24) PRINCIPAL (12/1/24 & 6/1 Annually)	NET INTEREST (b) (6/1 & 12/1) TIC= 4.63%	TOTAL	Project Fund: $12,500,000 Fire Station Project $13,165,000 Note Anticipation Note Dated April 1, 2024 (Due 10/1/25) INTEREST (4/1 & 10/1) TIC= 4.81%	Refunding of Note Anticipation Note $13,165,000 G.O. REFUNDING BONDS Dated April 1, 2025 (First interest 12/1/25) PRINCIPAL (6/1)	NET INTEREST (c) (6/1 & 12/1) TIC= 5.16%	TOTAL	FUTURE BORROWINGS (d) (e)	Overall Taxpayer Impact General Fund COMBINED DEBT SERVICE	COMBINED DEBT MILL RATE (f)	YEAR DUE
2023	$4,745,942								$0	$4,745,942	$2.54	2023
2024	$4,854,063	$625,000	$65,327	$690,327					$0	$5,544,390	$2.55	2024
2025	$4,443,850	$1,040,000	$116,663	$1,156,663	$691,163		$0	$0	$0	$5,600,513	$2.52	2025
2026	$3,875,638	$170,000	$80,363	$250,363		$385,000	$749,050	$1,134,050	$340,567	$5,600,617	$2.48	2026
2027	$3,479,531	$185,000	$69,713	$254,713		$405,000	$725,350	$1,130,350	$735,367	$5,599,960	$2.43	2027
2028	$3,345,531	$195,000	$58,313	$253,313		$430,000	$700,300	$1,130,300	$869,992	$5,599,135	$2.38	2028
2029	$2,415,856	$205,000	$46,313	$251,313		$460,000	$673,600	$1,133,600	$1,801,117	$5,601,885	$2.33	2029
2030	$2,026,906	$220,000	$33,563	$253,563		$490,000	$645,100	$1,135,100	$2,184,542	$5,600,110	$2.29	2030
2031	$1,953,561	$235,000	$19,913	$254,913		$520,000	$614,800	$1,134,800	$2,257,792	$5,601,065	$2.24	2031
2032	$726,403	$245,000	$6,431	$251,431		$550,000	$582,700	$1,132,700	$3,492,742	$5,603,275	$2.20	2032
2033	$338,531					$585,000	$548,650	$1,133,650	$4,130,242	$5,602,423	$2.16	2033
2034	$337,581					$620,000	$512,500	$1,132,500	$4,133,217	$5,603,298	$2.11	2034
2035	$341,481					$660,000	$474,100	$1,134,100	$4,126,192	$5,601,773	$2.07	2035
2036	$340,231					$700,000	$433,300	$1,133,300	$4,129,167	$5,602,698	$2.03	2036
2037	$338,881					$740,000	$390,100	$1,130,100	$4,131,992	$5,600,973	$1.99	2037
2038	$338,244					$790,000	$344,200	$1,134,200	$4,129,742	$5,602,185	$1.95	2038
2039	$338,125					$835,000	$295,450	$1,130,450	$4,132,417	$5,600,992	$1.91	2039
2040	$337,722					$890,000	$243,700	$1,133,700	$4,130,017	$5,601,439	$1.88	2040
2041						$945,000	$188,650	$1,133,650	$4,467,442	$5,601,092	$1.84	2041
2042						$1,000,000	$132,800	$1,132,800	$4,469,467	$5,602,267	$1.80	2042
2043						$1,055,000	$79,584	$1,134,584	$4,466,117	$5,600,701	$1.77	2043
2044						$1,105,000	$26,934	$1,131,934	$4,467,392	$5,599,326	$1.73	2044
	$34,578,079	$3,120,000	$496,596	$3,616,596		$13,165,000	$8,360,869	$21,525,869	$62,595,517	$122,316,060		

Assumes NAN principal paid with bond proceeds on 4/1/2025. Assumes NAN interest capitalized until 4/1/25.

(a) The City will make principal payments of $5,325,000 in 2024.
(b) Hypothetical bid premium on estimated interest cost in the amount of $58,248.
(c) Hypothetical capitalized interest on estimated interest cost in the amount of $507,067.
(d) Assumes future borrowings of $3,500,000 annually beginning in 2025 and thereafter amortized over 8 years at 3.00%.
(e) This information is provided for information purposes only. It does not recommend any future issuances and is not intended to be, and should not be regarded as, advice.
(f) Mill rate based on 2022 and 2023 Equalized Valuations (TID-OUT) of $1,868,971,600 and $2,174,589,800 respectively, with 2.00% growth thereafter.

$13.50M Fire Station

BAIRD

City of Watertown
HYPOTHETICAL FINANCING PLAN

YEAR DUE	NET GENERAL FUND EXISTING DEBT SERVICE (a)	2024 CIP $3,120,000 G.O. PROMISSORY NOTES Dated April 1, 2024 (First interest 12/1/24) PRINCIPAL (12/1/24 & 6/1 Annually)	NET INTEREST (b) (6/1 & 12/1) TIC= 4.63%	TOTAL	Project Fund: $13,500,000 Fire Station Project $14,215,000 Note Anticipation Note Dated April 1, 2024 (Due 10/1/25) INTEREST (4/1 & 10/1) TIC= 4.81%	Refunding of Note Anticipation Note $14,215,000 G.O. REFUNDING BONDS Dated April 1, 2025 (First interest 12/1/25) PRINCIPAL (6/1)	NET INTEREST (c) (6/1 & 12/1) TIC= 5.16%	TOTAL	FUTURE BORROWINGS (d) (e)	Overall Taxpayer Impact General Fund COMBINED DEBT SERVICE	COMBINED DEBT MILL RATE (f)	YEAR DUE
2023	$4,745,942								$0	$4,745,942	$2.54	2023
2024	$4,854,063	$625,000	$69,002	$694,002					$0	$5,548,066	$2.55	2024
2025	$4,443,850	$1,105,000	$114,788	$1,219,788	$746,288		$0	$0	$0	$5,663,638	$2.55	2025
2026	$3,875,638	$165,000	$76,688	$241,688		$415,000	$807,758	$1,222,758	$335,642	$5,675,724	$2.51	2026
2027	$3,479,531	$175,000	$66,488	$241,488		$440,000	$782,108	$1,222,108	$735,517	$5,678,643	$2.46	2027
2028	$3,345,531	$185,000	$55,688	$240,688		$470,000	$754,808	$1,224,808	$865,217	$5,676,243	$2.41	2028
2029	$2,415,856	$195,000	$44,288	$239,288		$495,000	$725,858	$1,220,858	$1,801,417	$5,677,418	$2.36	2029
2030	$2,026,906	$210,000	$32,138	$242,138		$530,000	$695,108	$1,225,108	$2,179,917	$5,674,068	$2.32	2030
2031	$1,953,561	$225,000	$19,088	$244,088		$560,000	$662,408	$1,222,408	$2,258,242	$5,678,298	$2.27	2031
2032	$726,403	$235,000	$6,169	$241,169		$595,000	$627,758	$1,222,758	$3,488,267	$5,678,595	$2.23	2032
2033	$338,531					$630,000	$591,008	$1,221,008	$4,116,067	$5,675,605	$2.18	2033
2034	$337,581					$670,000	$552,008	$1,222,008	$4,114,567	$5,674,155	$2.14	2034
2035	$341,481					$710,000	$510,608	$1,220,608	$4,113,067	$5,675,155	$2.10	2035
2036	$340,231					$755,000	$466,658	$1,221,658	$4,116,492	$5,678,380	$2.06	2036
2037	$338,881					$800,000	$420,008	$1,220,008	$4,119,767	$5,678,655	$2.02	2037
2038	$338,244					$850,000	$370,508	$1,220,508	$4,117,967	$5,676,718	$1.98	2038
2039	$338,125					$905,000	$317,858	$1,222,858	$4,116,167	$5,677,149	$1.94	2039
2040	$337,722					$960,000	$261,908	$1,221,908	$4,119,292	$5,678,921	$1.90	2040
2041						$1,020,000	$202,508	$1,222,508	$4,452,242	$5,674,749	$1.86	2041
2042						$1,080,000	$142,748	$1,222,748	$4,454,867	$5,677,614	$1.83	2042
2043						$1,135,000	$85,922	$1,220,922	$4,457,042	$5,677,964	$1.79	2043
2044						$1,195,000	$29,128	$1,224,128	$4,453,842	$5,677,970	$1.76	2044
	$34,578,079	$3,120,000	$484,334	$3,604,334		$14,215,000	$9,006,668	$23,221,668	$62,415,592	$123,819,672		

Assumes NAN principal paid with bond proceeds on 4/1/2025. Assumes NAN interest capitalized until 4/1/25.

(a) The City will make principal payments of $5,325,000 in 2024.
(b) Hypothetical bid premium on estimated interest cost in the amount of $54,623.
(c) Hypothetical capitalized interest on estimated interest cost in the amount of $546,805.
(d) Assumes future borrowings of $3,500,000 annually beginning in 2025 and thereafter amortized over 8 years at 3.00%.
(e) This information is provided for information purposes only. It does not recommend any future issuances and is not intended to be, and should not be regarded as, advice.
(f) Mill rate based on 2022 and 2023 Equalized Valuations (TID-OUT) of $1,868,971,600 and $2,174,589,800 respectively, with 2.00% growth thereafter.

$14.00M Fire Station

BAIRD

City of Watertown
HYPOTHETICAL FINANCING PLAN

YEAR DUE	NET GENERAL FUND EXISTING DEBT SERVICE (a)	2024 CIP $3,120,000 G.O. PROMISSORY NOTES Dated April 1, 2024 (First interest 12/1/24) PRINCIPAL (12/1/24 & 6/1 Annually)	NET INTEREST (b) (6/1 & 12/1) TIC= 4.63%	TOTAL	Project Fund: $14,000,000 Fire Station Project $14,740,000 Note Anticipation Note Dated April 1, 2024 (Due 10/1/25) INTEREST (4/1 & 10/1) TIC= 4.81%	Refunding of Note Anticipation Note $14,740,000 G.O. REFUNDING BONDS Dated April 1, 2025 (First interest 12/1/25) PRINCIPAL (6/1)	NET INTEREST (c) (6/1 & 12/1) TIC= 5.15%	TOTAL	FUTURE BORROWINGS (d) (e)	Overall Taxpayer Impact General Fund COMBINED DEBT SERVICE	COMBINED DEBT MILL RATE (f)	YEAR DUE
2023	$4,745,942								$0	$4,745,942	$2.54	2023
2024	$4,854,063	$625,000	$69,002	$694,002					$0	$5,548,066	$2.55	2024
2025	$4,443,850	$1,105,000	$114,788	$1,219,788	$773,850		$0	$0	$0	$5,663,638	$2.55	2025
2026	$3,875,638	$165,000	$76,688	$241,688		$430,000	$836,548	$1,266,548	$340,567	$5,724,439	$2.53	2026
2027	$3,479,531	$175,000	$66,488	$241,488		$455,000	$809,998	$1,264,998	$740,292	$5,726,308	$2.48	2027
2028	$3,345,531	$185,000	$55,688	$240,688		$485,000	$781,798	$1,266,798	$869,842	$5,722,858	$2.43	2028
2029	$2,415,856	$195,000	$44,288	$239,288		$515,000	$751,798	$1,266,798	$1,800,967	$5,722,908	$2.38	2029
2030	$2,026,906	$210,000	$32,138	$242,138		$545,000	$719,998	$1,264,998	$2,189,317	$5,723,358	$2.34	2030
2031	$1,953,561	$225,000	$19,088	$244,088		$580,000	$686,248	$1,266,248	$2,262,417	$5,726,313	$2.29	2031
2032	$726,403	$235,000	$6,169	$241,169		$615,000	$650,398	$1,265,398	$3,492,292	$5,725,260	$2.25	2032
2033	$338,531					$655,000	$612,298	$1,267,298	$4,119,942	$5,725,770	$2.20	2033
2034	$337,581					$695,000	$571,798	$1,266,798	$4,118,292	$5,722,670	$2.16	2034
2035	$341,481					$740,000	$528,748	$1,268,748	$4,116,642	$5,726,870	$2.12	2035
2036	$340,231					$785,000	$482,998	$1,267,998	$4,114,992	$5,723,220	$2.08	2036
2037	$338,881					$830,000	$434,548	$1,264,548	$4,123,192	$5,726,620	$2.04	2037
2038	$338,244					$885,000	$383,098	$1,268,098	$4,116,317	$5,722,658	$1.99	2038
2039	$338,125					$940,000	$328,348	$1,268,348	$4,119,442	$5,725,914	$1.96	2039
2040	$337,722					$995,000	$270,298	$1,265,298	$4,122,417	$5,725,436	$1.92	2040
2041						$1,060,000	$208,648	$1,268,648	$4,455,217	$5,723,864	$1.88	2041
2042						$1,120,000	$147,168	$1,267,168	$4,457,692	$5,724,859	$1.84	2042
2043						$1,175,000	$88,847	$1,263,847	$4,459,717	$5,723,564	$1.81	2043
2044						$1,235,000	$30,103	$1,265,103	$4,461,292	$5,726,395	$1.77	2044
	$34,578,079	$3,120,000	$484,334	$3,604,334		$14,740,000	$9,323,678	$24,063,678	$62,480,842	$124,726,932		

Assumes NAN principal paid with bond proceeds on 4/1/2025. Assumes NAN interest capitalized until 4/1/25.

(a) The City will make principal payments of $5,325,000 in 2024.
(b) Hypothetical bid premium on estimated interest cost in the amount of $54,623.
(c) Hypothetical capitalized interest on estimated interest cost in the amount of $566,298.
(d) Assumes future borrowings of $3,500,000 annually beginning in 2025 and thereafter amortized over 8 years at 3.00%.
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$14.50M Fire Station

BAIRD

City of Watertown
HYPOTHETICAL FINANCING PLAN

YEAR DUE	NET GENERAL FUND EXISTING DEBT SERVICE (a)	2024 CIP $3,120,000 G.O. PROMISSORY NOTES Dated April 1, 2024 (First interest 12/1/24) PRINCIPAL (12/1/24 & 6/1 Annually)	NET INTEREST (b) (6/1 & 12/1) TIC= 4.63%	TOTAL	Project Fund: $14,500,000 Fire Station Project $15,265,000 Note Anticipation Note Dated April 1, 2024 (Due 10/1/25) INTEREST (4/1 & 10/1) TIC= 4.81%	Refunding of Note Anticipation Note $15,265,000 G.O. REFUNDING BONDS Dated April 1, 2025 (First interest 12/1/25) PRINCIPAL (6/1)	NET INTEREST (c) (6/1 & 12/1) TIC= 5.15%	TOTAL	FUTURE BORROWINGS (d) (e)	Overall Taxpayer Impact General Fund COMBINED DEBT SERVICE	COMBINED DEBT MILL RATE (f)	YEAR DUE
2023	$4,745,942								$0	$4,745,942	$2.54	2023
2024	$4,854,063	$625,000	$64,836	$689,836					$0	$5,543,899	$2.55	2024
2025	$4,443,850	$1,105,000	$114,788	$1,219,788	$801,413		$0	$0	$0	$5,663,638	$2.55	2025
2026	$3,875,638	$165,000	$76,688	$241,688		$445,000	$865,725	$1,310,725	$350,417	$5,778,467	$2.55	2026
2027	$3,479,531	$175,000	$66,488	$241,488		$475,000	$838,125	$1,313,125	$744,917	$5,779,060	$2.50	2027
2028	$3,345,531	$185,000	$55,688	$240,688		$500,000	$808,875	$1,308,875	$884,167	$5,779,260	$2.46	2028
2029	$2,415,856	$195,000	$44,288	$239,288		$535,000	$777,825	$1,312,825	$1,809,917	$5,777,885	$2.41	2029
2030	$2,026,906	$210,000	$32,138	$242,138		$565,000	$744,825	$1,309,825	$2,197,967	$5,776,835	$2.36	2030
2031	$1,953,561	$225,000	$19,088	$244,088		$600,000	$709,875	$1,309,875	$2,270,767	$5,778,290	$2.31	2031
2032	$726,403	$235,000	$6,169	$241,169		$640,000	$672,675	$1,312,675	$3,495,417	$5,775,663	$2.27	2032
2033	$338,531					$680,000	$633,075	$1,313,075	$4,127,842	$5,779,448	$2.22	2033
2034	$337,581					$720,000	$591,075	$1,311,075	$4,130,817	$5,779,473	$2.18	2034
2035	$341,481					$765,000	$546,525	$1,311,525	$4,123,792	$5,776,798	$2.14	2035
2036	$340,231					$810,000	$499,275	$1,309,275	$4,126,767	$5,776,273	$2.09	2036
2037	$338,881					$860,000	$449,175	$1,309,175	$4,129,592	$5,777,648	$2.05	2037
2038	$338,244					$915,000	$395,925	$1,310,925	$4,127,342	$5,776,510	$2.01	2038
2039	$338,125					$970,000	$339,375	$1,309,375	$4,130,017	$5,777,517	$1.97	2039
2040	$337,722					$1,030,000	$279,375	$1,309,375	$4,132,542	$5,779,639	$1.94	2040
2041						$1,095,000	$215,625	$1,310,625	$4,464,892	$5,775,517	$1.90	2041
2042						$1,160,000	$152,325	$1,312,325	$4,466,917	$5,779,242	$1.86	2042
2043						$1,220,000	$92,138	$1,312,138	$4,463,567	$5,775,704	$1.82	2043
2044						$1,280,000	$31,200	$1,311,200	$4,464,842	$5,776,042	$1.79	2044
	$34,578,079	$3,120,000	$480,167	$3,600,167		$15,265,000	$9,643,013	$24,908,013	$62,642,492	$125,728,750		

Assumes NAN principal paid with bond proceeds on 4/1/2025. Assumes NAN interest capitalized until 4/1/25.

(a) The City will make principal payments of $5,325,000 in 2024.
(b) Hypothetical bid premium on estimated interest cost in the amount of $54,623.
(c) Hypothetical capitalized interest on estimated interest cost in the amount of $586,050.
(d) Assumes future borrowings of $3,500,000 annually beginning in 2025 and thereafter amortized over 8 years at 3.00%.
(e) This information is provided for information purposes only. It does not recommend any future issuances and is not intended to be, and should not be regarded as, advice.
(f) Mill rate based on 2022 and 2023 Equalized Valuations (TID-OUT) of $1,868,971,600 and $2,174,589,800 respectively, with 2.00% growth thereafter.

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October 26th, 2023 Ref Number: Q-2318261

Travis Teesch – Fire Chief
City of Watertown Fire Department
106 Jones St.
Watertown, WI. 53094
tteesch@watertownwi.gov

Dear Chief Teesch,

We are pleased to provide you with the following budgetary estimate utilizing our Sourcewell contract number 011822-JHK and the City of Watertown's Sourcewell contract number 200455 for a custom **3rd ALARM FOUR-STORY** WHP training simulator. The simulator would consist of a structure that would approximate the following

1. Section A will be a **Four-Story Tower** approximately 21'-11" W x 11'-8" L x 44'-0" H (to top of parapet).
    a. Three (3) interior floors (2nd , 3rd , 4th)
    b. One (1) flat roof with parapet roof guard system
    c. Two (2) 3'-0" chain gates, one (1) on each 11'-8" face of the tower
    d. Four (4) rappelling anchors on the roof
    e. One (1) 2'-6" x 3'-0" Bilco roof hatch
    f. One (1) vertical ladder from the 3rd floor up to the roof hatch
    g. One (1) four-story interior stair with welded stair railing
    h. One (1) 3' x 7' exterior plate steel door and hardware
    i. Four (4) 3' x 4' window openings with latching shutters
    j. One (1) 3' x 3' access hatch to residential attic
    k. One (1) wireless 30,000 CFM smoke machine with (8) PVC runs
    l. One (1) four-story galvanized standpipe with 2-head sprinkler run

2. Section B will be a **Two-Story Residential/Industrial** section approximately 21'-11" W x 24'-9" L x 24'-0" H.
    a. One (1) gable roof, 5/12 and 9/12 un-equal pitch with perimeter welded guardrail
    b. Two (2) 8'-0" chain gates, one (1) on each 24'-9" face of the residential/industrial gabled roof
    c. Two (2) chop outs on gabled roof, one (1) 48" x 48" chop out and one (1) 48" x 96" chop out
    d. One (1) attic space provided between the gabled roof and the second floor
    e. One (1) 3' x 3' framed window opening with latching shutter at exterior gabled end of the attic
    f. Six (6) 3' x 4' framed window openings with latching shutters
    g. One (1) 6' x 4' double window with latching shutters
    h. One (1) 6' x 7' exterior plate steel door and hardware
    i. One (1) 3' x 7' exterior plate steel door and hardware
    j. Two (2) 3' x 7' interior burn room plate steel door and hardware
    k. One (1) 12' x 12' burn room protected with a Padgenite Interlock™ liner system

l. One (1) 49” x 49” pallet style burn crib
m. One (1) maze starter kit

3. Section C will be a **One-Story Annex** approximately 21'-11" W x 14'-6" L x 10'-0" H.
   a. Two (2) 3' x 4' framed window openings with latching shutters
   b. One (1) 3' x 7' exterior burn room plate steel door and hardware
   c. Entire room shall be protected with a Padgenite Interlock™ liner system
   d. One (1) temperature monitoring system
   e. One (1) 49” x 49” pallet style burn crib

Materials and Freight are estimated at:	$415,486.60
Labor is estimated at:	$180,459.15
Total:	**$595,945.75**

Prevailing wage rates, if any will be applied to the labor cost to erect the simulator.

Optional items you might consider are as follows:

Soils Test	$3,806.25
Foundation Design	$4,750.00
Working surface at Annex with Parapet	$13,931.80
Exterior 5-story IBC stair with 2 doors Tower B-side	$52,329.15
4’ x 28’ 7” cantilevered balcony C-side	$23,992.35
Foundation Estimate (By Others) U.S. National Average	$87,339.98
Concrete 4” Fill on Deck (By Others) U.S. National Average	$37,085.86

All pricing is in US Dollars and is valid for 30 days. It is the policy of WHP Trainingtowers™ to provide a reasonable cost estimate for your budgeting purposes. It is not uncommon in the construction industry to offer cost estimates that are for low end or stripped down structures. WHP believes the cost estimate should reflect a training simulator that meets OSHA safety requirements, is of the highest quality, and will meet the expectations of the customer.

Schedule: We would require 2-4 weeks to prepare conceptual drawings after award of the contract or purchase order and 18-20 weeks for delivery after receipt of approved drawings. If the foundation is in place the erection would be complete approximately 8-10 weeks after delivery of building. Some optional items such as brick exteriors will require more time to complete erection.

Design Criteria: Pricing is based on the following structural design criteria per IBC 2009:

1. *Live Loads*- **(a)** Roof: 100 psf **(b)** Floor: 100 psf **(c)** Attic: 100 psf
2. *Wind Loads*- **(a)** Speed: 90 mph **(b)** Exposure: C
3. *Seismic Loads*- **(a)** Coefficient Ss [max]: 55 **(b)** Coefficient S1 [max]: 13
4. *Soil Capacity*- Minimum 1500 lbs/sq.ft.

*Requirements exceeding these loads may result in additional costs.

519 Duck Road, Grandview, MO 64030 | P: 800.351.2525 | www.TrainingTowers.com | Info@TrainingTowers.com

Exclusions: We exclude from our proposal: bonds, taxes, permits, special insurance requirements if any, field painting of exterior handrails and stairs, mechanical, electrical, fire protection systems, gas fired simulators, winter conditions, concrete foundations, foundation design, slab on grade, concrete fill on decks, anchor bolts, site work, excavation, engineering layout and general condition items and any other miscellaneous fees.

Terms: For materials a deposit of 25% on the building package is due on receipt of order (signing of contract). Balance of payment on materials due on delivery to site. No retention on materials. Labor will be billed monthly. Invoices not in dispute over 30 days will be assessed 1 ½ % per month on balances in excess of 30 days. Financing is available through lease purchase programs.

We hope you find the proposal acceptable. If we can provide you with further information please feel free to call.

Sincerely,

Jason Krautter
801-792-1232
jasonk@trainingtowers.com
WHP Trainingtowers™

PROPOSAL

FIRE FACILITIES INC.

314 WILBURN ROAD
SUN PRAIRIE, WI 53590-9401

"ASK BEFORE YOU BUY" - THE ONLY MAJOR STEEL FIRE TRAINING TOWER MANUFACTURED IN THE UNITED STATES

To:	From:		
Watertown Fire Department	John Schauf	Date:	October 25, 2023
Attention: Travis Teesch, Fire Chief	Regional Manager	Phone:	1-800-929-3726 or (608) 327-4100
		Fax:	1-866-639-7012 or (608) 834-1843
Proposal # 5493		E-mail:	jschauf@firefacilities.com

Remarks:

This proposal is regarding the price requested for Watertown, WI .
The total estimated weight for these materials is 127,745.39 lbs.
The total price for this fire tower or parts, F.O.B. destination is $563,512.00 as described below: * See tax note below
Freight: $3,750.00

Freight + Material Price: $567,262.00

Custom Painted Wesco Model FM-4 (Fire Marshall) w/ 20' Extended Annex w/ Attic and Varied Pitch Gabled Roof
Galv. Stairs And Railings Meet NFPA 1402/Building Code Requirements
10' Tall Fire Escape to Tower Inset Balcony
(1) Ships Ladder(s)
(1) 2'-6" x 4'-6" Bilco Roof Hatch(es)
(1) Brass Siamese Fire Dept. Conn. (NST Thread) With Galv. 4" Dia. Riser (Approx. 34 ft. high)
(1) Sprinkler system(s), 2-head
Artificial Smoke Distr. System, 6 outlets (Includes two cabinets, 115 V 60 Hz blower, gate valves, and 3" dia. schedule 40 pvc pipe
Smoke Generator (Output of 7,600 cfm) - 240 Volt 50/60 Hz; Includes 4 Gallons of Oil Based Fluid
(2) 10'-6" Long Ladder Hook Bar(s)
Foundation Design Included (Soils Report By Others)

Per Drawings Dated May 24, 2023

Option:
1. Remove Entire 20' Extended Annex w/ Attic Area Above - $78,231.00 less
2. Remove One Bay Of Residence Portion (Shortens Residence By 11'-4") - $35,728.00 less

Westec Burn Room Insulation System (The Industry's Best Includes A 15 Year Limited Warranty With Over 700 Installations Nationwide) This burn room insulation system exceeds all other systems and products that have been available to date. The system provides the highest insulation values on the market, it all but eliminates burn room maintenance by providing a durable, corrugated stainless steel protective face. It will withstand and provide continued protection at higher temperatures than any other product.

Payment is due in full, 30 days from ship date. Prices quoted in U.S. Dollars. Prices include the design, materials, fabrication, and freight only - foundation and erection labor prices only if shown.
Applicable taxes may need to be added based on location. Prices effective 60 days from date of this proposal.

From: Rick
To: Travis Teesch
Subject: RE: Towers
Date: Tuesday, October 24, 2023 10:32:52 AM

15’ Burn rooms cost about $63,000.00

From: Travis Teesch <TTeesch@watertownwi.gov>
Sent: Tuesday, October 24, 2023 10:13 AM
To: Rick <rick@americanfiretrainingsystems.com>
Subject: RE: Towers

Rick –

Thank you for this information. What is the cost to add a burn room to the P001070?

Travis

From: Rick <rick@americanfiretrainingsystems.com>
Sent: Tuesday, October 24, 2023 10:06 AM
To: Travis Teesch <TTeesch@watertownwi.gov>
Subject: FW: Towers

Travis,

Attached

Butte County CA- Non Burn- $608,000.00 built, delivered and set up on your prepared site. Per plan
Waupun, WI- Burn- $402,000.00 ----Same----. Per plan

Mark these plan up if you want changes, email back to me and I will put up a drawing and give you a quote.

Lead time is 325 days.

Yours in Safety,

Rick Gibson

National Sales Manager

American Fire Training Systems

(O) 1-630-257-3659

(C) 1-630-606-2539

Americanfiretrainingsystems.com

From: Rick
Sent: Tuesday, October 24, 2023 9:42 AM
To: tteesch@waterownwi.gov
Subject: Towers

Travis,

I will need a little more info.

One story could be $100,000.00
Two story could be $250,000.00
Tree story could be $500,000.00 - $750,000.00

All depends on how many burn rooms , mazes, etc.

Look over the web site and pick a couple. Let me know and I will get you pricing.

Yours in Safety,

Rick Gibson

National Sales Manager

American Fire Training Systems

(O) 1-630-257-3659

(C) 1-630-606-2539

Americanfiretrainingsystems.com

From: Chief Wesle
To: Travis Teesch
Cc: Steph Mazzoni
Subject: Re: fire training beaver dam
Date: Tuesday, October 24, 2023 11:49:22 AM
Attachments: image001.png

I have a few things on the calendar for the rest of this week but if you're flexible we can definitely fit a visit in. Thursday looks the best for me. Otherwise, shoot me a couple dates and times next week and we can get something set up.

Michael Wesle
Fire Chief
City of Beaver Dam

920-887-4609 x 4 | 920-296-8786
mwesle@ci.beaverdam.wi.gov
https://www.cityofbeaverdam.com
205 S. Lincoln Ave, Beaver Dam, WI 53916

From: Travis Teesch <TTeesch@watertownwi.gov>
Sent: Tuesday, October 24, 2023 10:57 AM
To: Chief Wesle <mwesle@ci.beaverdam.wi.gov>
Cc: Steph Mazzoni <smazzoni@watertownwi.gov>
Subject: RE: fire training beaver dam

Mike when would be a good time for us to come and take a look?

Travis

From: Chief Wesle <mwesle@ci.beaverdam.wi.gov>
Sent: Tuesday, October 24, 2023 9:57 AM
To: Travis Teesch <TTeesch@watertownwi.gov>
Subject: Re: fire training beaver dam

Chief,

She is doing well, nothing too serious. Thanks for the kind words and concern.

As far as the training tower goes:

We went with American Fire Training Systems out of Lockport Illinois. We considered Fire Facilities, but it just proved to be cost prohibitive. We also spoke with several other manufacturers but no one else had the experience or reputation that American Fire had.

Our facility is Class A only and has two burn rooms. The burn room on the first floor is roughly 14' X 14'. The second floor burn room is 7' X 14'. If you were considering Fire Facilites our guys would definitely have some suggestions on design features. We were fairly constrained with our budget for this project, so we are making some small modifications as we discover minor issues. Overall, we are very happy with the facility and have been able to conduct several burns. The culture here in Beaver Dam focusses heavily on training. Our people utilize the facility almost every day. In addition to improving the skills of our firefighters the training facility has really boosted morale. Having a consistent and available training facility is a huge asset to the department. In my opinion, it was well worth the money.

As far as costs for the facility:
Facility Cost
$343,500
Engineering
$5,000
Excavation
$6,300
Concrete Foundation (We opted for concrete piers and a gravel pad because of budget constraints. In a perfect world we would have had a full concrete pad.)
$25,515
Total
$380,315

If you guys are interested in visiting, we would love to show you around. Just let me know and we could set something up.

Michael Wesle
Fire Chief
City of Beaver Dam

920-887-4609 x 4 | 920-296-8786
mwesle@ci.beaverdam.wi.gov
https://www.cityofbeaverdam.com
205 S. Lincoln Ave, Beaver Dam, WI 53916

From: Travis Teesch <TTeesch@watertownwi.gov>
Sent: Tuesday, October 24, 2023 8:37 AM
To: Chief Wesle <mwesle@ci.beaverdam.wi.gov>
Subject: FW: fire training beaver dam

Chief –

I hope your firefighter that was treated after last evenings fire is doing well. if you need anything let me know.

Also, our elected officials are wondering about the cost for your training tower.

Do you have the costs for the structure and the labor to assemble it?

Travis

From: Emily McFarland <emcfarland@watertownwi.gov>
Sent: Monday, October 23, 2023 8:30 PM
To: Travis Teesch <TTeesch@watertownwi.gov>
Subject: Fwd: fire training beaver dam

Can you please find out if their number was just for materials or if it also included labor?

Emily McFarland
Mayor | City of Watertown

Sent from my iPhone

Begin forwarded message:

> **From:** Jonathan Lampe <JLampe@watertownwi.gov>
> **Date:** October 23, 2023 at 6:06:19 PM CDT
> **To:** Emily McFarland <emcfarland@watertownwi.gov>, Dana Davis <DDavis@watertownwi.gov>, Myron Moldenhauer <MMoldenhauer@watertownwi.gov>, Dan Bartz <dbartz@watertownwi.gov>
> **Subject: fire training beaver dam**
>
> https://dailydodge.com/bdfd-hosting-open-house-for-fire-training-facility/
>
> BDFD Hosting Open House For

Fire Training Facility | Daily Dodge

(Beaver Dam) The Beaver Dam Fire Department is inviting the public to an open house of their new training facility. The structure, the first of ... Read more

dailydodge.com

https://www.cityofbeaverdam.com/egov/documents/1669642710_95353.pdf

Budget and overview

Regards,

Jonathan Lampe
- City of Watertown District 2 Alderperson
- Serving on Finance, RDA and Parks, Recreation and Forestry (Through April 2024)
- jlampe@watertownwi.gov - 920-248-0656 (cell/text)

THE CITY OF WATERTOWN
Opportunity runs through it.

Apparatus & Equipment

The Use of Shipping Containers in Live Fire Training

The use of shipping containers for live fire training at fixed sites or as mobile units has become very popular in North America over the past decade. Much of the training has value to participating personnel, but there are some concerns about direct or indirect dangers to the firefighters being trained and to the trainers.

10.1.2018

Tags FE Volume 171 Issue 10 Fire Engineering Magazine Live-Fire Training Premium

BY DAVE CASEY

The use of shipping containers for live fire training at fixed sites or as mobile units has become very popular in North America over the past decade. Much of the tra
firefighters being train
health concerns; fire b

Building Fire Service Training Centers, and 1403, *Standard on Live Fire Training Evolutions* (interior attack mobile fire props). You can take steps to mitigate those concerns and to improve the value and safety of the experienc

Structural and Construction Issues

Shipping containers, also known as intermodal containers, conex boxes (Container Express), or more officially International Standards Organization (ISO) containers, are designed to be extremely strong; be stackable; be uniform in size and design; protect the contents from theft; and be easy to load, unload, and transport via truck, rail, or ship. The shipping container is an American invention and gained popularity through U.S. military use, with most now built in China. Shipping containers reduce the cost of loading freight by more than 90 percent, which reduces the final costs to consumers of most manufactured items.1

The first consideration in using containers for live fire training is to keep in mind that shipping containers were not designed or built for live fire training. That being said, with proper precautions and planning, you can use them to conduct a good training exercise within certain parameters.

The standard "dry" shipping container (photo 1) has the exterior dimensions of 40 feet long, 8 feet high, and 8 feet wide. Interior dimensions are 37 feet 7 inches long, 7 feet 8 inches wide, and 7 feet 10 inches high. They weigh 5,820 pounds empty and are rated for more than a 61,000-pound cargo capacity.

(1) ISO 40-foot standard "dry" shipping container. (*Photo by author.*)

The majority of their strength is in the four corner posts (photo 1, A) and the top (photo 1, B) and bottom (photo 1, C) horizontal rails. In each corner, top and bottom, are the corner castings (photo 1, D) that lock the containers together stacked and horizontally when being shipped or to secure the container to a truck or railcar bed (rail can also be stacked). The corner posts are cast steel, and the top and bottom rails are welded to them. It is important to note that containers are designed to bear loads only on their corner posts.2 ISO containers are designed for stacking up to six high.3 When using multiple containers, use the locking mechanisms to stack the containers or to keep them together horizontally; they are readily available and reasonably inexpensive (photo 2).

Fire Engineering

pping Containers for Live Fire Training Props

PROS	CONS
Easily obtained and inexpensive. Props can be built modularly; additional modules can be added later. Arrangements can allow primary burn rooms to be replaced when heat/weather damaged. Configurations are only limited by the imagination. Necessary metal work can generally be done locally and often by fire department members.	Cont cons Healt Shor "Firel reinf Not a mark

Source: *Live Fire Training Principles and Practice to NFPA 1403, 2nd edition*, by Dave Casey, Susar

The sides (photo 1, E) and front of the container (the doors are the "rear") as well as the roof are corrigated steel panels that provide further strength and are most often made of Cor-Ten® steel, a weathering steel that is a fusion with copper and is designed to form a patina of fine oxide that protects the steel from rust and corrosion, reducing the need for painting to protect the metal. It has chromium, manganese, and nickel added.

(2) There are several types of locking devices to secure the containers vertically and horizontally (*Photo by Dave Dorsette.)*

The side panels on the containers contribute to the structural strength; cutting window opening, doors, or large openings into the containers will weaken their vertical strength. If stacking containers or making large openings, reinforce the openings with tubular or other load-bearing steel from the bottom to the top horizontal supports (photo 3). Consult a structural engineer for such major modifications.

(3) When there are openings or cuts through the corrugated metal sides, structural support needs to be added. Note the vertical and horizontal steel beams added where the side walls were opened in two containers to form a larger room. (*Photo by Dave Dorsette.)*

The standard container roof is not designed to be load bearing, but it is intended to support an evenly distributed weight of 441 pounds, so roughly two people. It is not designed to add additional roof props or other items without further support using the top rails or from below.4 On the corrugated roof area, this comes out to roughly 1.5 pounds per square foot. NFPA 1402:10.2.4 calls for a minimum live load capacity of 50 pounds per square foot. Remember, the corner posts are designed to carry the weight of up to five stacked containers, so additional roof decking or roof props need to be supported by the corner posts.

The rear two doors have multiple locking latching points and gaskets to prevent/reduce water and pest intrusion. Using the container doors during live fire training can be dangerous because of the latching mechanisms unless you disable them. Use a standard sized or preferably wider entry door cut into the container. NFPA 1402 points out the concern with salvaged actual entry doors becoming warped and binding and suggests using purpose-built doors (photo 4).

(4) Salvaged actual entry doors can warp from heat and bind. Consider purpose-built doors. Note the door handle has not yet been installed. (*Photo by author.)*

The floor has steel cross members fastened within the bottom rail. The floor decking is most often wood, a violation of NFPA 1403. Note that you should not place containers directly on the ground because of damage to the wood floor and cross members from the lack of air circulation and dampness from water under the container. You can use steel decking, but it will get very hot and buckle near the fire area. You can also use fire brick or nonrefractory pavers without mortar (NFPA 1402:10.4.2.3).

Following are some additional considerations for using shipping containers:

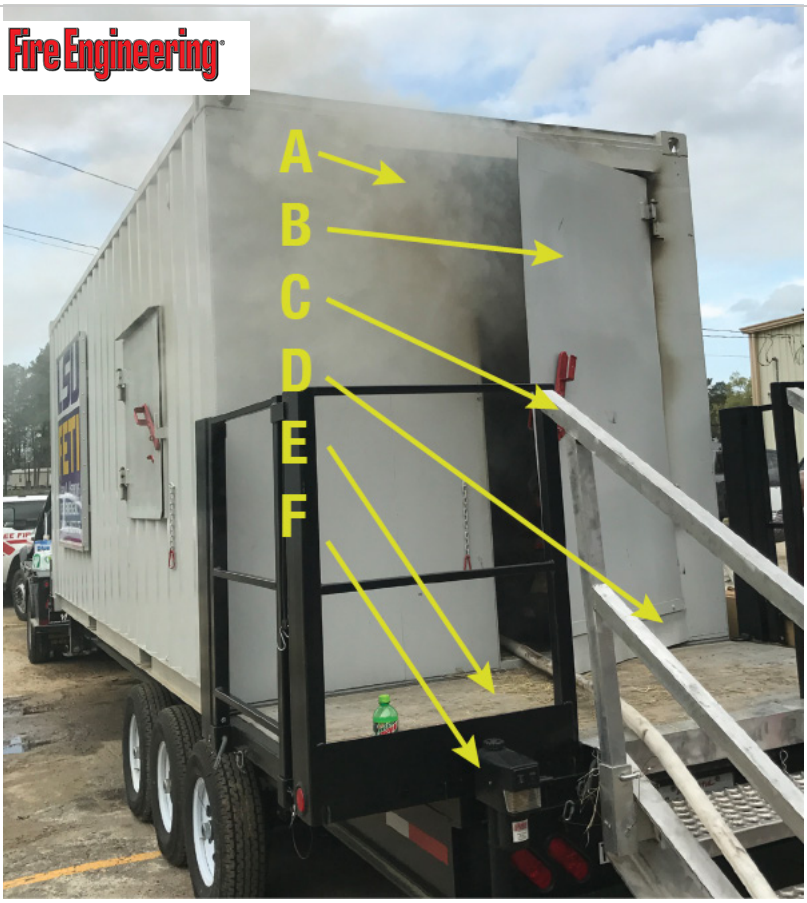
As mentioned above, do not use the standard two leaf rear doors with locking mechanisms on them as the primary entry/exit. Ensure adequate exiting by using standard size and operational doors (they can be heavy gauge metal with a frame) to provide multiple exit points. "Window" (shutter) openings should be low enough and wide enough for emergency bailout/egress and allow for easy push-to-open operation. Consider door "sweeps" to allow fire hose under a closed door (a piece of four- or five-inch large-diameter hose works well).

Put the containers at a slight grade with scuppers (cutouts) or drains for water runoff out of the containers. Pooled hot water will saturate personal protective equipment (PPE) knees and can cause burns and adds weight to the container. NFPA 1402: 10.2.3 recommends a grade of at least one-quarter inch per foot.

Make sure the containers are on a stable foundation. This is critical if you plan to stack units.

Pave or deck (with pavers, etc.) the area around the entry for safer evolutions. NFPA 1402:10.2.5 recommends paved areas for apparatus and lighter paved areas around the remainder. This will allow better footing for ladders and keep equipment from getting as dirty or muddy. NFPA 1402 further suggests adding curbs, poles, street signs, cabling to represent electric lines, and such to better replicate obstacles that you will encounter at real fire incidents.

Stacked containers can allow vertical fire spread after significant use and/or overly harsh fire conditions (photo 6).



(5) A vendor-modified container: A—rear doors removed; B—purpose-built door with easy-to-use latch; C—hand rail around "porch" and stairs (note this unit allows the stairs to be on either side or the back); D—hose sweep; E—trailer levelers; F—nonskid deck, safety tread on stairs. (Photo courtesy of JFB Enterprises.) (6) Heat/fire damage from fires in the container below this one. Note the steel floor cross-members under the wood decking. (Photo by author.)

There have been multiple reports of steam explosions occurring within the tubular steel structural members under high-heat conditions that have flung metal fragments. A long-time compartment fire behavior training (CFBT) instructor, Chief Ed Hartin of South Whidby Island, Washington, was present for such an occurrence: "... water (likely from rain or another environmental cause) entered the sealed square tube at the top of the container above the rear doors (likely through a small area of corrosion). Failure occurred during the process of burning in the container to remove any oils or residue from the construction process. A substantial fire was lit in the container and allowed to burn without intervention. Several minutes after the fire became fully developed, a loud hissing could be heard from the rear of the container as the water in the tube turned to steam and began to escape from the small opening that allowed water to enter. Pressure [illegible] small opening could allow it to escape, and the square tube failed."

Another such incident occurred in Switzerland after firefighters exited a prop. It is believed that rain had entered the tubular steel expanded, causing a violent rupture (photos 7 and 8).

(7) The upper channel over the container doors was blown apart from a steam explosion from a lack of venting the tubular steel. *(Photos 7 and 8 courtesy of ZAR.)* (8) Damage to the roof and the top of the doors. Note the top rail is not visible between the vertical posts.

Drill ⅛-inch vent holes on the bottom of the tubular steel rails to allow drainage and to release steam.

You can purchase shipping containers directly or through vendors that modify them for live fire training. They can use standard Class A fuels or gas-fired systems, both in accordance with NFPA 1402 and 1403.

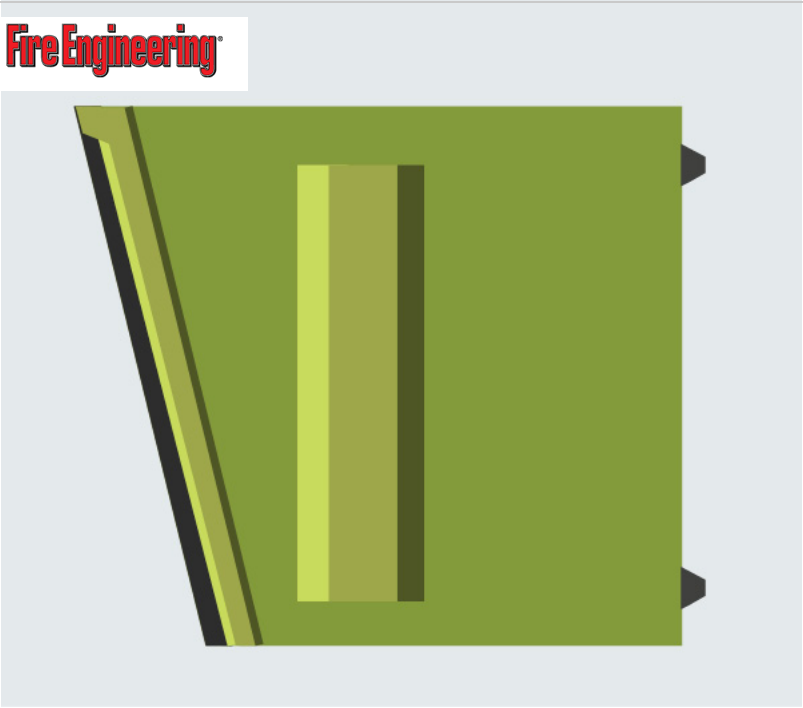
There are ways to protect the container from fire damage and extend its life span.

Thermal liners can be the same as for purpose-built concrete or steel props (photo 9) and are installed in many vendor-provided units and almost all gas-fired units. Because of the higher temperatures associated with Class A fuel-fired units, more heat resistive liners may be necessary. You can use an unlined container for the live fire training and locate it so it can be replaced more easily. You need to evaluate the cost benefit of thermal lining for Class A props, as the liners can easily be many times more expensive than the container itself.

Hearths or other protective measures will also extend the life span of the container. The University of Illinois Fire Service Institute and the Alabama Fire College use a standard dumpster with the lids removed and placed front down (photo 10) to form a hearth. The dumpster should be raised, using a poured concrete pad, patio pavers, bricks, or fire bricks. The dumpster hearth will reduce the direct flame impingement on the container ceiling and help keep the debris together.

(9) A—A "floating" metal ceiling below the container roof allows expansion without bucking; B—a roof vent, operable inside or outside; C—chains below the ceiling and on the walls with a rail to hold pallets or wood panels; D—a refractory tile thermal liner; E—fire brick pavers with no mortar; F—multiple scuppers. (*Photo courtesy of JFB Enterprises.)*

Purpose-built hearths can get the fuel off the floor and protect the ceiling and the container walls. By adding an open top steel bin or "drawer" below the hearth, staples, nails, and other debris can be contained that can be difficult to clean up and painful to kneel on (NFPA 1402:10.4.3; photo 11). The drawer slides out the side of the container to be dumped, or a container that is small enough to be carried can be used instead. Hearths can be built to be relocatable within the container or transferred to another container.



(10) A dumpster placed on its side can serve as a hearth. (Based on an illustration by author.)

(11) A hearth to protect the container roof and walls; the drawer below is to collect staples, nails, and debris that can be slid out to the left and dumped. (*Photo by author.)*

A sprinkler system at least one vendor provides an exterior sprinkler system to protect the container. According to the ma es not affect the fire behavior; however, it reduces the interior temperature caused by the heating onment for instructors resetting the prop between evolutions. The water spray protects the areas of the container most likely to be heat damaged, extending the life of the prop (photo 12).

(12) Exterior sprinklers protect the container and reduce interior temperatures between evolutions. (*Photo courtesy of 3sFire.)*

Mobile units can make entry/egress more difficult because of the trailer height. Wide stairs and even "porch landings" are good ideas (photo 5).

A wide open container interior reduces the realism of training exercises, as real structures will have walls, doorways, furniture, and other obstacles to a direct approach to a fire. NFPA 1403-compliant metal furnishings can be added at appropriate levels of training, and metal plate walls or walls of drywall and metal frames will add to the utility and realism.

Immediate and Longer-Term Safety and Health Concerns

Health hazards come from several sources. First is the obvious—heat and fire conditions. The smaller volume and lower ceiling height can lead to harsh conditions more quickly. Between evolutions, the containers tend to retain considerable heat.

Other concerns may not be as obvious. Dangers are present from contamination in the container from prior shipped products and/or fumigation, the paint on the container, and the fuel used for live fire training.

Shipping containers are routinely fumigated to kill insects. Contamination of the wood decking or other surfaces is possible, and an Australian study found residual chemicals in 74 of the 76 containers (97.4 percent) they checked, with eight percent exceeding the Australian Workplace Exposure Standards (WES) for one of the residual chemicals tested. However, airing out the containers dropped the levels almost immediately, with formaldehyde having a half-life of only 30 to 45 minutes. However, some of the fumigants last longer, such as hydrogen cyanide (half-life 0.9 years) and methyl bromide (half-life 0.3 to 1.6 years). Hydrogen cyanide and formaldehyde levels were reduced by approximately 80 percent after 24 to 36 hours.5 The primary concern should be the wood decking. Unless the container has been used for storage before acquisition by the fire service, it should be aired out already, but be cautious while removing wood decking. Clean the container interior before use.

Revinge is a large fire academy operated by the Swedish Civil Contingencies Agency. The instructors had a concern about their e products off-gassing from the paint on the shipping containers they used during live fire training. They engaged the SP Technica Institute of Sweden to complete an analysis.6 Using paint samples from several containers used for live fire training at elevated

temperatures, it determined what chemicals were released and at what amounts as the temperature increased. Several da
of special interest was the possible release of isocyanates, which can occur if the paint contains po
that the thermal degradation of polyurethanes will release isocyanates. Isocyanates are a known health hazard t*hrough inhalation and through dermal contact.* Health hazards include irritation of the skin, mucous membranes, eyes, nose, throat, and gastrointestinal tract; occupational asthma; chemical bronchitis; and pneumonitis. With occupational asthma, the respiratory tract becomes sensitized so that later, smaller exposures can trigger asthma attacks. Likewise, skin becomes more sensitive to the product. Some, but not all, isocyanates are associated with cancer. But the majority of health information is based on occupational or accidental exposure, not in the application of shipping containers or other painted metals exposed to high heat in fire training.

Based on the Swedish findings, it is difficult to quantify the specific level of hazard to a specific prop. Variables include the following:

- Air flow (fresh air into prop, smoke out).
- Temperature–the higher the temperature, the greater release. At just under 400°F, potentially harmful substances off-gas from the paint.
- Amount of paint present—a prop that has been in use and burned off much of the paint inside will release less product (unburned areas still will off-gas).
- Duration of exposure.

The training center that identified the problem now uses unpainted shipping containers made of Cor-Ten® steel.

Do not allow personnel in hot shipping containers without PPE and self-contained breathing apparatus (SCBA), and don't allow personnel without protection to be in the immediate area of the containers during fire operations. Use positive-pressure ventilation (PPV) fans between evolutions to help clear the air (keep personnel from being downwind of the air discharge).

Ensure personnel decontaminate their PPE and themselves.

To reduce concerns, consider using nonpainted thermal liners in the burn areas, or use unpainted shipping containers. Cor-Ten® steel containers are common but are most often painted. You can buy containers new without paint or stripped.

In painted boxes, burn the paint off in the areas of concern in an unoccupied container.

The wood products used in the containers for fuel are most often wood pallets, primarily southern yellow pine wood (18.9 percent) and white oak (17.1 percent).7

Engineered wood products such as oriented strand board, plywood, particleboard, and fiberboard contain binders; earlier versions had glue that contained formaldehyde and other dangerous chemicals. The newer "green" products contain less formaldehyde and dangerous chemicals, but the water-based glues do not provide the fire behavior that earlier versions did.

The aforementioned decontamination procedures are necessary, as is the mandatory PPE/SCBA use. The smoke conditions can be harsher in the smaller environment than a larger structure, and the instructors will generally have longer time exposures during training than in actual emergencies.

Fire Behavior Differences

In the late 1980s, two Swedish firefighters died in a flashover, and the consensus was that there was a lack of training in the recognition of an impending flashover and of the fire dynamics and behavior in a "compartment" (room). A curriculum was developed with the use of the containers to train firefighters in a realistic environment about flashovers by actual, close-up observation under controlled conditions. CFBT was initiated. Over the years, the use of containers has expanded to include multicontainers, large compartments, and enhanced training programs.

A problem with many of the programs in use in North America and the United Kingdom is the focus on the single compartment fire behavior, door entry room-and-contents fires. British fire trainer and author Dr. Paul Grimwood warned that "single compartment systems are subject to limitations in that they can prepare the firefighter only for door entry procedure and one-room fires" and that the firefighters will not be prepared for the structural fire setting that involves multiple rooms and larger areas.8

In a shipping container, because of the lower ceiling, smaller room volume, and steel construction, the heat increases quickly and the fire acts differently than a structure fire. Most often, the container environment will remain more heated than a structure after the fire is knocked down.

Regarding the fuel loading, the materials used in the training fire differ almost totally from the contents of a structure. The training fire is propane or natural gas fueled only, or the fuel is NFPA 1403-compliant Class A natural wood products and hay, straw, or excelsior in a very reduced quantity in the container.

Vertical ventilation is very important and must be large enough to vent fire conditions that are harsher than expected. A very important concept n the Swedish manual9 is that venting should "fail to safety" in its design. Many such props have "deadman" levers to keep the vent closed, and releasing the handle opens the vent. Vents should be operable inside the container in a location determined through operation where it is readily accessible (preferably leaving an instructor or safety officer with the control) *and* from outside.

The takeaway is that your firefighters need to be prepared for real-world firefighting, and the evolutions in the containers n rate at real-world incidents. Approaching the fire and directing streams in one manner for training do it differently "for real" weakens preparedness.

Compliance with NFPA 1402 and 1403

Even if your state or province hasn't adopted NFPA 1403 and 1402, you must use them as you plan your prop. That lack of legislative adoption often does not prevent reference to the standards in safety citations and findings by government departments for workplace safety and will most assuredly be used in civil litigation occurring from injuries.

It seems fairly simple to place containers together and form a valuable training resource, but it is important to meet the local legal requirements as well as necessary safeguards. Per NFPA 1402:1.3, not all training props are required to meet the local building codes, but this needs to be verified and sometimes debated with that authority. Specific to shipping container use, NFPA 1402:7.5 states that a professional engineer should design the props so that the building code requirements are met for the vertical loads (if stacked), horizontal loads, and foundation requirements.

The need for two means of egress from every burn room is found in both NFPA 1402 (10.3) and 1403. Not stipulated in either is a recommendation that egress direct to the exterior or at least rapid egress be available.

Doors and window shutters are critical concerns and affect the realism of the evolutions. Doors should not have doorstops that are floor mounted that could catch or crimp hoselines (1402:10.6.1), and exterior doors and window shutters should open outward in the path of egress (1402:10.6.2). Doors need to allow for the rapid heating and cooling that you will encounter in live fire training and that can cause a door to bind in the frame, impairing egress (1402:10.6.3). Any latching mechanisms need to be very simple to operate from the inside or outside. Do not use hydraulic door closers.

Leave gas installations to the professionals. Such installations need to comply with NFPA 54, *National Fuel Gas Code*, and NFPA 58, *Liquefied Petroleum Gas Code*. The standards prohibit liquefied flammable gases inside a structure.

Training Applications

Shipping containers can be a cost-efficient method of acquiring a permanent structural training prop or a mobile training prop. With proper precautions and proper use, they can be an excellent tool in training firefighters.

(13) The high-rise live fire training prop of the West Midlands Fire Service in England. The containers have simulated offices, apartments, and more. *(Photo courtesy of the West Midlands Fire Service.)*

Ingenuity will expand their applications and utility in training. A recent multicontainer high-rise prop was built for the West Midlands Fire Service in Oldsbury, England (photo 13). The prop is six stories tall and features many fire set areas with different configurations on each floor representing offices, residential occupancies, and so on. It is equipped with a pressurized stairwell, an elevator shaft, and smoke removal equipment and can simulate a wind-driven fire.

Endnotes

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Dave Casey, EFO, MPA, CFO, served as the superintendent of the Florida State Fire College and in a similar role for Louisiana's municipal firefighters. He is the lead author of the IAFC/NFPA/ISFSI textbook *Live Fire Training Principles and Practice* and coauthor of the Fire Engineering video series "The Right Seat–Officer Development Beyond the Textbook" and "The Right Seat–Volunteer Officer Development." He served as chief of the Clay County (FL) Fire Department for 11 years and with Sunrise (FL) Fire Rescue and the Plantation (FL) Fire Department. He is the co-owner of Ascend Leadership, a promotional testing and officer development company.

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