City of Richmond

Report to Committee

To:	General Purposes Committee	**Date:**	March 18, 2004
From:	Jim Hancock Fire Chief Robert Gonzalez, P.Eng. Director, Engineering	**File:**	2052-02-F4
Re:	**Community Safety Building Replacement - Sea Island Fire Hall**		

Staff Recommendation

1. That the attached report from the Fire Chief regarding Sprung Instant Structures be received for information, and that

2. That the replacement of the Sea Island Fire Hall proceeds as Option 3 – Recommended Fire Hall (Appendix 1) at a revised project cost of $2,875,000.

Jim Hancock
Fire Chief
(2700)

Robert Gonzalez, P.Eng.
Director, Engineering

Att.

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CONCURRENCE OF GENERAL MANAGER

1200283

Staff Report

Origin

At the General Purpose committee meeting of March 15, 2004 it was moved and seconded

That the report (dated February 24th, 2004, from the Fire Chief), regarding the Community Safety Building Replacement – Sea Island Fire Hall, be referred to staff for report on:

1. ***how the 'Sprung Instant Structure' compared to the building proposed in Option 3;***
2. ***the cost of the tower and all other considerations, as well as environmental and architectural aspects;***
3. ***the cost to replace the membrane of a 'Sprung Instant Structure';***
4. ***the design and appearance of a 'Sprung Instant Structure'; and***
5. ***the feasibility of undertaking a combined 'Sprung Instant Structure' and normal building design.***

This report responds to the questions above.

Background

Staff research undertaken during the Community Safety Building Replacement Master Plan study identified the need to replace four Richmond Fire Rescue (RFR) fire halls, including the Sea Island Fire Hall, and resulted in Council adopting a design standard of 7,650 sq.ft. for the new community fire halls. Subsequently, three alternative options were outlined as described in the attached reports dated January 22, 2004 and February 24, 2004 that went forward to General Purposes Committee.

Analysis

At the General Purposes Committee meeting of March 15, 2004, Mr. John C. Crawford presented an alternative solution to house the proposed fire hall utilizing a Sprung Instant Structure. Staff have met with the proponent in order to present direct comparables to the 3 options in the previous reports.

1. **Comparison of 'Sprung Instant Structure'**

The example and costs presented by Mr. Crawford were for a structure with a Gross Building Area of 6,035 sq. ft. The Gross Building Area for the recommended Option 3 – Recommended Fire Hall is 7,000 sq. ft. and 7,500 sq. ft for Option 1 - Pre-engineered Fire Hall.

The method of construction of a 'Sprung Instant Structure" is similar to Option 1, a Pre-engineered Fire Hall clad in steel siding. The main differences are in the materials utilized: an aluminium structural frame with a fabric skin cladding system and a life cycle of 30 years for the Sprung Instant Structure.

The aluminium system is portable and can be disassembled and reconstructed in a new location which makes it ideal for temporary facilities or utilitarian short term needs. Its greatest asset is the ability to free span large distances and it is ideal for a single storey application, although and independent mezzanine level of conventional building materials could be constructed within the overall Sprung Structure. This may pose some issues with the BC Building Code.

Although there are many large permanent facilities such as churches and casinos in a Sprung Instant Structure these are located in the United States. The examples within BC and Alberta are for industrial uses or for storage facilities such as storage of salt sands along highways. The company's head office is in Calgary. The City of Edmonton was considering erecting 2 firehalls with Sprung Instant Structures for a 5 year period and then replacing them with standard construction materials. These were viewed only as a temporary solution until sufficient capital funding was available. The City of Edmonton has not proceeded with these projects. The City of Calgary's Sprung material storage facility has 6 ft high concrete block walls under the Sprung structure for security and material containment purposes.

2. **Cost of Tower, Environmental and Architectural Considerations**

The cost to erect a Sprung Instant Structure is most closely similar to Option 1 – Pre-engineered Fire Hall in the appended report. The cost estimate of $1.19 million quoted at the General Purposes Committee meeting of March 15, 2004 was for a building area of 6,035 sq. ft., did not include a 60 ft. tower, mechanical considerations for the apparatus bay, emergency power generator, equal internal room divisions and construction, additional landscaping for environmentally sensitive location.

Following our meeting with Sprung Instant Structures and Ledcor Construction Ltd., staff has received the following updated cost estimates. The building is assumed to be one-storey meeting building code requirements for post-disaster and fire separations:

7,500 sq. ft building c/w internal construction and landscaping equal to other 3 options	$190/sf x 7500 = $1,425,000
Construction cost of 60' tower, exhaust extraction system, and emergency generator	$ 265,000
Total construction cost	$1,690,000

Building Type	Building Construction Cost
Sprung Structure 7,500 sq. ft.	$1.69 M
Pre –Engineered 7,500 sq.ft. (Option 1)	$1.56 M *
Conventional Design 7,000 sq.ft (Option 3)	$1.95 M

** May increase due to industry increases in steel costs*

3. Lifecycle, Replacement and Maintenance Costs, and Sustainability

(i) Facility Lifecycle

The Sprung Instant Structure consists of an aluminium substructure and a very high quality fabric skin. The substructure has a 30 year pro-rata guarantee although its life expectancy is claimed to be indefinite. The architectural membrane has a pro-rata guarantee of up to 20 years. The lifecycle would be considered to be 20 – 30 years.

(ii) Replacement and Maintenance Costs

A complete replacement of the outer membrane is expected to be required after 20 years. It can be purchased at a cost of approximately 18% of the then current selling price of the structure. In 2004 dollars, the outer membrane would be replaced at a cost of $52,572. Other maintenance costs for the building's mechanical, electrical, and foundation systems would be similar to other buildings.

The fabric skin can be sliced into by a sharp object such as a knife. Patches are available for repair or a complete section replacement of the outer layer. This will likely present a security concern because of the expensive equipment kept in the Fire Hall. The Fire Hall design does not include a security system and this additional security requirement would need to be addressed. The fabric is coated and should the facility be tagged, the paint can be removed with power washing.

(iii) Environmentally Sustainable

The aluminium substructure is fully recyclable and for this reason would be considered environmentally friendly. The building would otherwise be unlikely to contribute to improving our environment except in a limited fashion with the use of energy efficient lighting, some natural lighting, natural ventilation, and storm water management as included in the other options. LEEDs recognition would not be pursued.

4. Design and Appearance of 'Sprung Instant Structure'

Practically, placement of a single storey, 7,500 sq. ft. facility on the Sea Island Fire Hall site will limit on site circulation to the point where fire trucks would have to back into parking bays. Although the Sprung buildings could fit on the site, training and exercise areas would also be limited. It would not be financially feasible to purchase additional land.

Utilizing a Sprung Instant Structure would limit the degree of design variance between the sites and would not respond to specific neighbourhood needs without the addition of other architectural or structural elements.

The Sprung Instant Structures web site and technical support staff refer to these structures as semi-permanent. It has the appearance of a temporary facility providing a utilitarian function. Additional landscaping would be required for aesthetic purposes beyond the level of landscaping that would be anticipated on any other option. For this reason staff would add $50,000 in landscape screening.

From an urban design perspective, it should be noted that recent private developments including our Parks and City Hall reflect sophisticated quality urban design. The Sprung Instant Structure would not be in alignment with the urban design of a public facility in Richmond, nor would it meet the beautification standards invested by the City over the past few years.

5. **Combined 'Sprung Instant Structure' and Conventional Building Design**

The building construction methods would include conventional construction design and methods for the Tower component. It is also feasible to combine a 6ft high exterior perimeter wall of concrete block and then the Sprung Structure would sit on this wall. The introduction of a masonry perimeter wall would aid in security issues, vandalism issues, and aesthetics. This would, however, further increase the overall initial capital costs by an estimated $20,000. Since the Fire Hall's apparatus bay is considered more utilitarian, a pre-engineered structure could be utilized for this area combined with an architecturally designed working, training and living quarters, but would result in no additional cost savings.

Financial Impact

In analysing the construction costs of a Sprung Instant Structure, it is noted that the other project costs (consultant fees, permits, DCC's, IT, furniture and equipment) would be similar to that of Option 1 – Pre-engineering Fire Hall. In addition, the Sprung Instant Structures project costs include $70,000 for the perimeter wall and landscaping. The total estimated project budget would be $2.52 million and would not require an increase to the overall program funding.

Conclusion

This report responds to the requests made by the General Purposes Committee in order to consider the use of a Sprung Instant Structure for the replacement of the Sea Island Fire Hall. The initial capital costs are similar to other pre-engineered structures, however, the site constraints, lack of urban design and aesthetic quality, and shorter anticipated life span are too limiting for consideration as a fire hall. There are, however, various applications where the Sprung Instant Structure and other similar products would be well suited and as such will be considered by staff.

Staff recommend "*That the replacement of the Sea Island Fire Hall proceed as Option 3 at a revised project cost of $2,875,000*" as per the staff report dated January 22, 2004.

Mary Brunet, MAIBC
Project Manager
(1267)

Description	High Quality Sustainable Fire Hall 7,500 sq.ft	OPTION 1 Pre Engineered Fire Hall 7,500 sq.ft	OPTION 2 High Quality Sustainable Fire Hall 6,500 sq.ft	OPTION 3 "Recommended" Fire Hall 7,000 sq.ft	Sprung Instant Structure c/w Tower 7,500 sq.ft.
Accommodation					
Fire Rescue	✓	✓	✓	✓	✓
RCMP	✓shared	✓shared	✓shared	✓shared	✓shared
Community	✓shared	✓shared	✓shared	✓shared	✓shared
Tower	✓60'	✓60'	✓30'	✓60'	✓60'
Outdoor Fitness	✓		✓	✓possible	
Lifecycle					
Building Life Span	75 years	50 years	75 years	75 years	20 – 30 years
Maintenance & Replacement/Year	$28,000	$31,200	$24,700	$26,000	$56,300
Energy Dependency	low	high	low	average	average
Sustainable Initiatives (LEED)	Silver / Gold	None	Silver / Gold	None	None
Project Cost					
Construction	$2.1M	$1.56M	$1.85M	$1.95M	$1.69M
Other	$820K	$616K	$688K	$735K	$686K
Contingency	$210K	$150K	$93K	$190K	$150K
Total	**$3.13M**	**$2.33M**	**$2.63M**	**$2.875M**	**$2.52M**
Green (or LEED) Initiatives				$110K	
				$2.985K	

Appendix 1

Copy of Community Safety Building Replacement Sea Island Fire Hall Staff Report January 22, 2004

City of Richmond

Report to Committee

To:	General Purposes Committee	Date:	January 22, 2004
From:	Jim Hancock Fire Chief	File:	2052-02 F4
Re:	**Community Safety Building Replacement - Sea Island Fire Hall**		

Staff Recommendations:

1. That the replacement of the Sea Island Fire Hall proceeds as Option 3 at a revised project cost of $2,875,000.

Jim Hancock
Fire Chief
(2700)

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Budgets ..... Y ☑ N ☐	Jeff Day, P.Eng. Eng. & Public Works

1111528

Staff Report

Origin

Richmond Fire Rescue (RFR) and Facility Management staff have been working with architects and quantity surveyors to revise and refine the scope of work for the Sea Island Fire Hall project since the estimated construction cost for the project exceeds Council approved budget.

This report addresses the necessary changes to the project in order to remain closer to, or within the existing budget allocation, and seeks Committee's approval for the revised strategy.

Background

Staff research undertaken during the Community Safety Building Replacement Master Plan study identified the need to replace four fire halls, including the Sea Island Fire Hall, and resulted in Council adopting a design standard of 7,650 sq. ft. for the new community fire halls. A preliminary estimate, solely based on square footage and 2002 costs, was utilized for budgeting purposes.

Provincial guidelines require that all new fire halls be built to post disaster standards as per the Building Code. Furthermore, the selected site for the Sea Island Fire Hall must meet the Federal Department of Fisheries and Oceans' requirements to protect environmental sensitive fish habitat areas.

The final schematic design for an environmentally sustainable Fire Hall for Sea Island represents a facility of approximately 7,500 sq. ft. (Attachment 1) but with an estimated project cost of $3.13M, an increase of $0.5M from the approved budget of $2.63M.

Analysis

The following are adjustments to the scope of the project due to unexpected and non-controllable features, e.g.:

- On and off-site preparation associated with post-disaster, soil conditions and sustainability elements ($100,000);
- Department of Fisheries and Oceans' requirements for fish habitat compensation and landscaping costs to incorporate paths and a bridge into environmentally sensitive areas ($56,000);
- Traffic signalling pre-emption controls ($90,000);
- A recommended increase in design and construction contingency of 10% due to an anticipated "hot market" and higher regional construction costs ($118,000);
- Variable percentage increases in city costs i.e. Fees, F&E, Permits, DCC's, GST and overheads etc. ($136,000).

Discussion

In order to construct the Sea Island Fire Hall within the existing budget of $2.63M it is necessary to reduce the total building construction costs by up to $0.5M to compensate for the above factors. This can be done in one of two ways:

- Maintain the required RFR program space of 7,500 sq. ft. and reduce the overall quality, appearance and lifecycle of the building, or
- Maintain the quality, appearance and lifecycle of the building and reduce the program space (area).

A third option for consideration would be a compromise in reducing both space and quality without necessarily sacrificing the overall project values.

Option 1

Within budget - 7,500 sq.ft. Program Space – Low Quality – Minimal Sustainable Initiatives

To accommodate this option it would be necessary to abandon the current design principles and consider a simpler, steel framed or possibly a pre-engineered facility (Attachment 2).

Steel framed pre-engineered buildings are frequently used by the construction and warehouse industry for lightweight medium life buildings (up to 50 years) and have been adapted in many situations to fulfil the needs for a post disaster fire hall. Examples of this type of application can be found in Squamish and Oliver in B.C, and throughout the U.S.

This style of building would be "Power Smart" and would include permeable pavement to better manage storm water. It will also provide a post disaster facility within the current budget and meet the operational requirements of RFR.

Appendix I provides a summary table of advantages and disadvantages of this and other options.

Option 2

Within Budget – 6,500 Sq.Ft. Program Space - High Quality – Sustainable Initiatives

In this option it would be necessary to eliminate the RFR training room, multi-purpose room, and community meeting space, and potentially reduce the height of the training tower from 60 ft. to 30 ft. These items could then be planned for future addition as RFR operations dictate. (Attachment 3.)

The resultant fire hall would retain its primary program characteristics with the second floor becoming multi purpose to compensate for the loss of the Training and Education Development Centre (EDC) and a corresponding loss of community access space. Design concepts using brick construction and environmental sustainability would be maintained in keeping with the City's vision and commitment to environmental sustainability.

Since the Sea Island site is preloaded for a larger facility, Option 2 also provides the ability to revisit and expand into a 7,500 sq.ft. facility at some point in the future.

Staff anticipates that these measures would be sufficient to achieve the required cost reductions, but the resulting facility would not satisfy RFR operational requirements for a successful fire hall.

Option 3

Increase Budget - 7,000 Sq.Ft Program Space - Reduced Quality - Minimal Sustainable Initiatives (Recommended)

A number of reductions can be considered that would retain the larger benefits of meeting RFR operational needs, without sacrificing the existing design intent. These reductions in scope (Attachment 4) would reduce building size by approximately 500 sq. ft., which results in RFR sharing meeting space with the community. Building quality would be acceptably reduced using heavy steel frame construction, split concrete block and cladding rather than structural concrete and bricks. Sustainable "green" initiatives would also be impacted as noted in Option 1.

Implementing these reductions in the scope of work would necessitate an estimated increase of $244,000 in the budget. The resultant building would meet the basic operational requirements of RFR and reflect the City's vision and values for quality.

As evident from the impact summary as noted in Appendix I, Option 3 provides a compromise solution that maintains the integrity of the current design without sacrificing overall construction quality other than limiting "Green" initiatives. Option 3 facility would be approximately 7,000 sq. ft. and it will satisfy the basic operational requirements of RFR as well as provide continued access to meeting space for the community.

Financial Impact

Proceeding with Option 3 requires an increase of $244,000 to the original budget. This funding is available from the Community Safety Building Replacement budget with no increase in the overall global strategy at this time. Any surplus or savings realized during the project will be returned to the Community Safety buildings budget.

Conclusion

Option 3 provides a building that will meet the basic operational needs of RFR and the community through the sharing of meeting space. It is recommended as a compromise solution because of the fiscal realities currently facing the City.

The Sea Island Fire Hall is the first of four fire halls slated for replacement over the next several years. Dependent upon which option is selected, the decision will provide a "frame of reference" for the future RFR fire hall replacements and provide input into future design and budgets of fire halls in general.

David Naysmith, P. Eng.
Manager, Facility Planning & Construction
(3312)

Reg Smith
Deputy Chief
(2702)

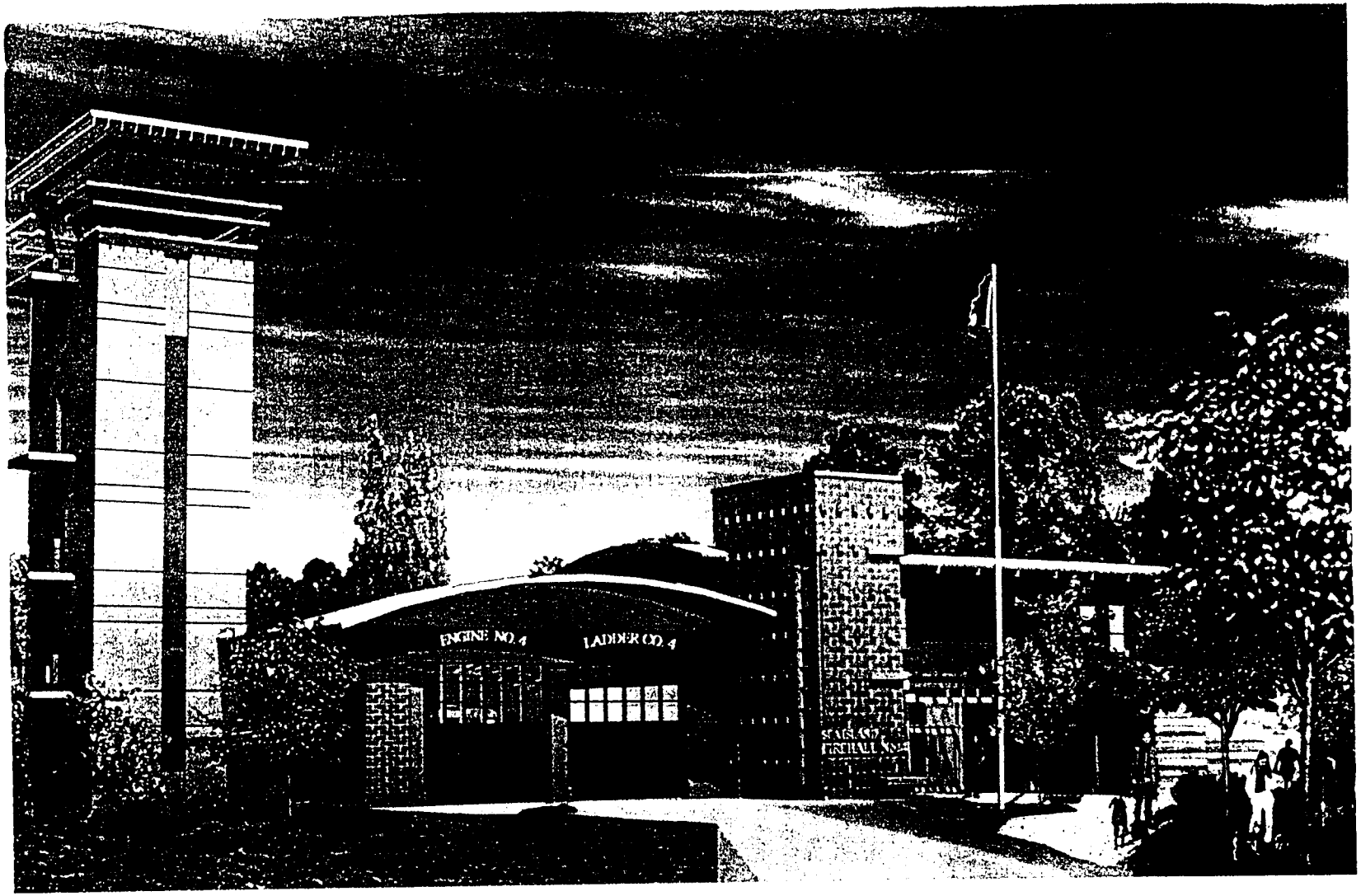
APPENDIX I: SUMMARY OF OPTIONS AND IMPACT SUMMARY

Description	Option 1 Pre-engineered 7,500 sq ft	Option 2 Custom-built 6,500 sq ft	Option 3 Custom-built 7,000 sq ft
Total budgeted project costs (*based on Nov 2003 Canadian Construction unit costs*)	$2,326,000	$2,631,000	$2, 875,000

Impact Summary:

Option 1 Pre-engineered 7,500 sq ft	Option 2 Custom-design 6,500 sq ft	Option 3 Custom-design 7,000 sq ft
Within budget	Within budget	Additional funding of $244,000 required
Meets long term needs of RFR	Does NOT meet the long term needs of RFR	Meets basic needs of RFR
Meets community access needs and requirements	Does NOT meet community access needs and requirements	Meets community access needs and requirements
Does NOT meet expectations of City vision: less "curb-appeal"	Meets full expectations of City vision	Meets basic expectations of City vision
Does NOT provide an environmentally sustainable building: Includes Power Smart and permeable pavement	Provides an environmentally sustainable building: "green initiatives"	Does NOT provide an environmentally sustainable building: Includes Power Smart and permeable pavement
Does NOT meet neighbourhood expectations for design	Meets neighbourhood expectations for design	Meets neighbourhood expectations for design
Maintenance and Lifecycle costs NOT optimized *	Maintenance and Lifecycle costs optimized	Maintenance and Lifecycle costs optimized
Lifecycle: up to 50 years	Maximizes building lifecycle: up to 75 years	Maximizes building lifecycle: up to 75 years

* **Option 1**, meeting the approved budget, operational requirements of RFR, and dedicated community meeting space is achieved to the detriment of building quality and environmental sustainability. Staff estimates this will have a maintenance and lifecycle impact of $220,000 from a reduced lifecycle over the 50 years, over Options 2 and 3.



City of Richmond
Firehall No. 4 - Sea Island
November 6th, 2003

ATTACHMENT #1

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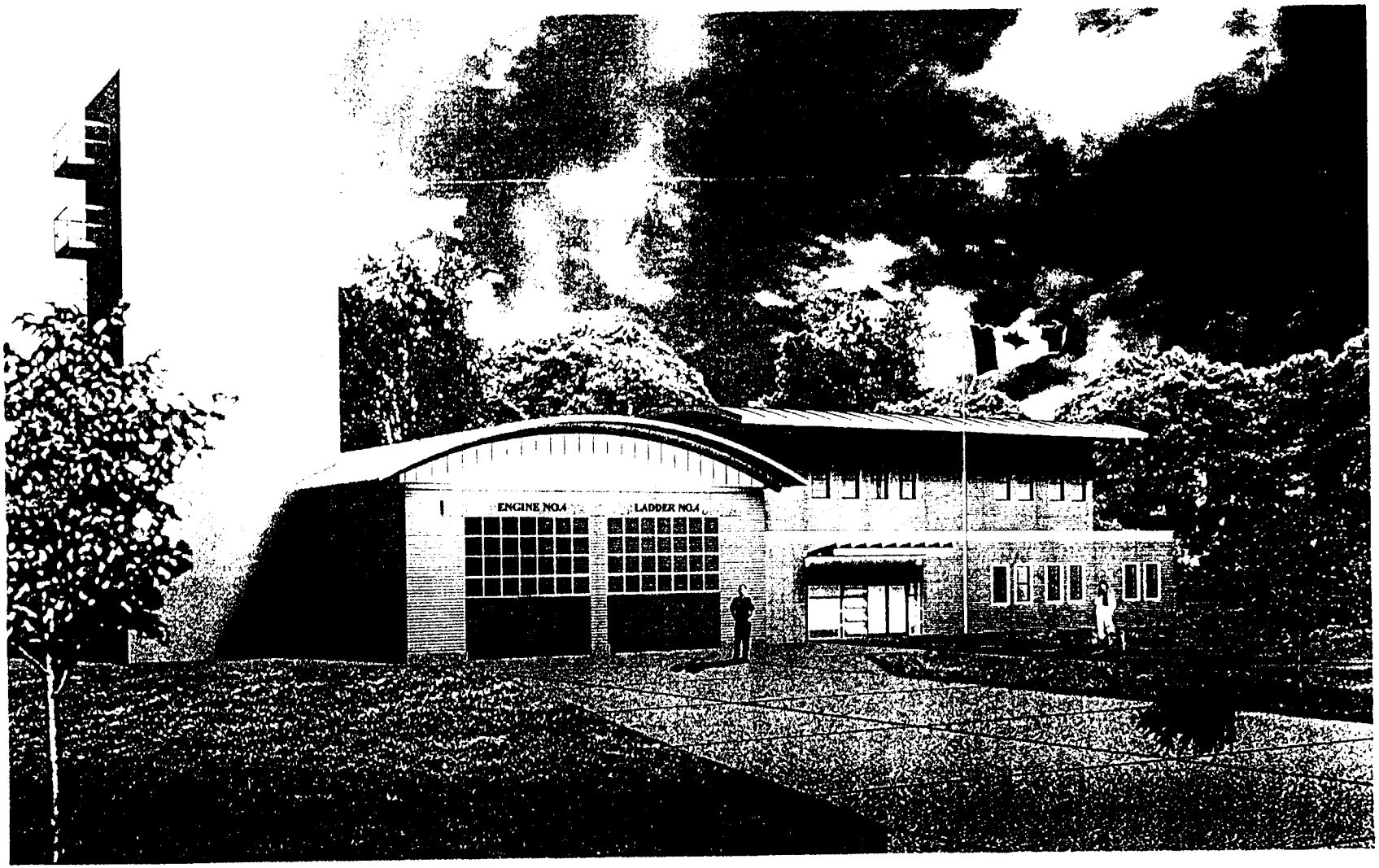

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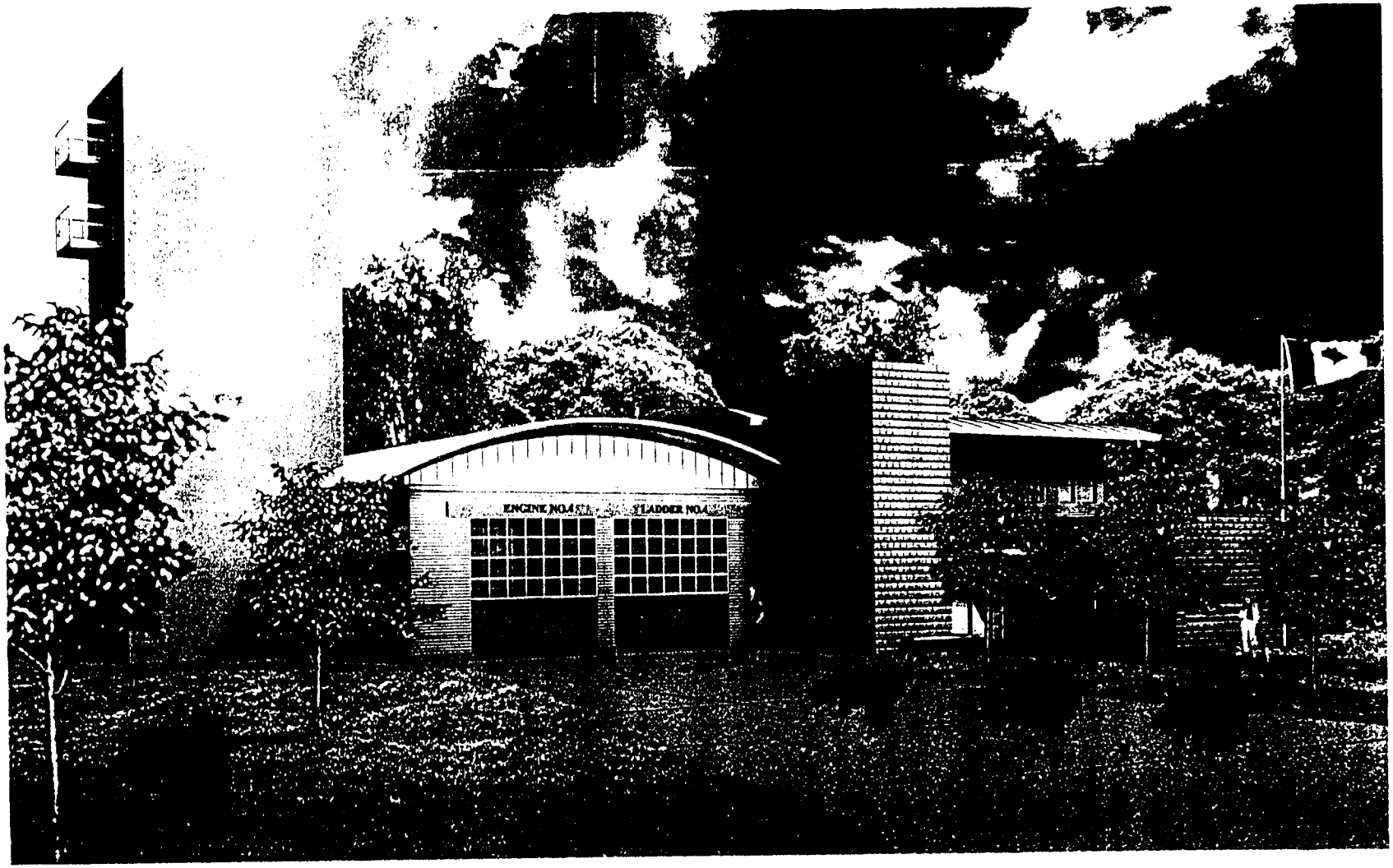

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