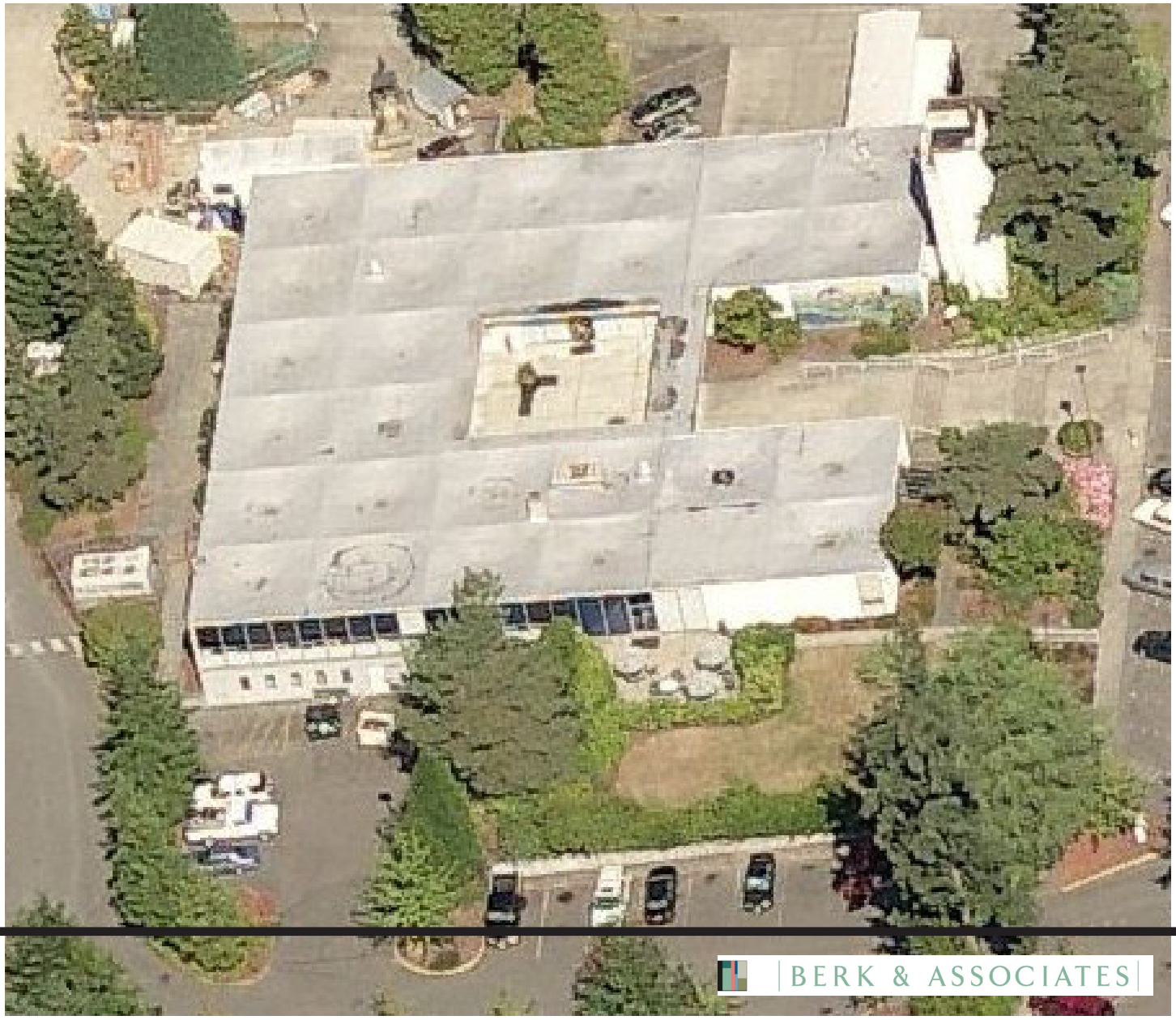
MOUNTLAKE TERRACE

September 2006

Town Center Planning Project

Synthesis of Past Reports and Assessments Concerning the Civic Center Building



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CITY OF MOUNTLAKE TERRACE

TOWN CENTER PLANNING PROJECT

Synthesis of Past Reports and Assessments Concerning the Civic Center Building

EXECUTIVE SUMMARY

PURPOSE

This report provides a history of the Mountlake Terrace Civic Center building and recent efforts to renovate or replace the building. A collection of documents relating to the building is synthesized, and actions taken by the City in response to recommendations in the documents are noted.

Included in the synthesis are the following reports and assessments relating to the building that have been written by architecture and engineering firms on contract to the City:

- (1988) ***Civic Center Space Needs and Building Analysis: Final Report.*** M.L. Blackstone, Planning Director. Architects West (Architecture, Planning, Interior Design & Landscape Architecture).
- (1991) ***Letter to Robert G. White, Mountlake Terrace City Manager, re: Study of Revised Plans and Roofing for the Mountlake Terrace City Hall Structure.*** Fred L. Stumpf, Architects West (Architecture, Planning, Interior Design & Landscape Architecture).
- (1993) ***Letter to Ron DeMars, Building Official, re. Mountlake Terrace City Hall Structural Review.*** Theodore E. Smith, PE, SE. Smith & Huston, Inc. (Consulting Engineers).
- (2000) ***Mountlake Terrace Civic Center Structural Assessment for The City of Mountlake Terrace.*** Saad E. Moustafa, PhD., P.E., Project Manager. WJE: Wiss, Janney, Elstner Associates, Inc. (Engineers, Architects, Material Scientists).
- (2001) ***Letter to Jerry Trojan Re. Post Earthquake Assessment of Mountlake Terrace Civic Center.*** Saad E. Moustafa, PhD., P.E., Affiliated Consultant. WJE: Wiss, Janney, Elstner Associates, Inc. (Engineers, Architects, Material Scientists).

SUMMARY

The Civic Center building has outlived its designed lifetime. In 1991 an architecture firm (Architects West) tasked with making some minor modifications to the building said that renovating the building was not cost effective, and it should instead be replaced. Since then further structural deficiencies of have been identified, but have not been corrected. Building codes have since been strengthened, further demonstrating the inherent problems with the building's design and construction.

The building's problems can be broadly categorized as Safety-related and Usability-related.

The major **safety** problems that remain today are:

- A roof support system that no longer meets code, and a roof design that has led to leaks and rusting of internal reinforcing
- Design flaws in the way side-to-side shaking forces are distributed—the south wall is overloaded
- Original material strength specifications that do meet current code (masonry blocks in the walls, and the mortar binding the blocks together, are too weak)
- Connections between the structural walls and the floor and roof are not strong enough
- Unreinforced masonry block interior partition walls—without proper reinforcement, the walls are likely to topple during an earthquake
- No fire sprinklers
- Asbestos in the ceiling material, and possibly elsewhere
- Other fire safety issues may remain regarding the fire rating of doors and door frames, and the layout of interior corridors

The primary **usability** issues that remain are:

- Poor energy efficiency: insufficient roof insulation, and single-pane, unglazed windows with aluminum frames lead to heat build-up in the summer, and heat loss in the winter
- HVAC system cannot be controlled precisely enough to fix individual temperature problem spots
- Handicap accessibility problems
- Not enough restrooms
- The roof support columns interfere with efficient building layout

Some problems have been addressed since 1988. **Actions** taken by the City include:

- Built new police facility (1991)
- Removed some asbestos (1992?)

- Installed handicap accessible exterior doors (1992?)
- Improved electrical service to the building (1992?)
- Patched the roof (1992?)
- Demolished entry-area roof (2001)
- Built new fire station (2005)

In 2001 the City Council reached the same conclusion that Architects West did in 1991: the Civic Center building needs to be replaced. The City Council agreed to replace the Civic Center building with a new fire station and a new City Hall building and has reaffirmed that decision since then. The new fire station was built in 2005, leaving just the new City Hall to be designed and constructed.

On the fold-out page that follows, Exhibit ES-1: Civic Center Building History identifies and explains key actions and decisions related to the building. It focuses on the timing of the reports used to write this document, the recommendations they provide to the City, and the actions of the City in response.

Exhibit ES-1
Civic Center Building History

Year	Construction/Addition	Renovation	Study/Memo/Action	Recommendations/Decisions	Status relative to Code	Notes
1961	Original building constructed				Designed to meet 1958 Uniform Building Code for Zone 3	City has 5,000 residents
1975	2nd apparatus bay added to Fire Station					
1986				Decision: Library building approved by City Council		
1988	Library building constructed					
1988	Sunroom added to Council Conf. Room					
1988			June 8 letter: Public Safety Equipment & Building Study Committee (Citizen Advisory Group)	Recommendation: $2M bond for new Police facility, new fire equipment, new Civic Center roof & insulation, asbestos removal, enclose covered courtyard area, add accessible restrooms		City has 16,455 residents
1988			June 20 report: "Civic Center Space Needs and Building Analysis," Architects West	Recommendation: Option 1—new Police facility, small addition to west side of Civic Center building, new roof & insulation, enclose covered courtyard area, fire sprinklers, asbestos removal, other modernization	Issues: asbestos, accessibility, ceiling height, 1-hour rated corridors, dead-end corridors, exit pathways, lobby used as return-air plenum, apparatus bay exhaust system, water quality lab ventilation/emergency shower	Roof leaks—add new roof over top of existing
1988				June 20 Decision: City Council accepts Advisory Group's recommendation		Election vote: General Obligation Bond levy for $2M
1988				Sept. 20 Decision: Voters approve bond measures		
1989/90			Estimate for Demolition: $400-$450k			
1991				May 17 Decision : Ron De Mars: cost of rehab. means fire sprinklers required	Must install sprinkler system	
1991			July 11: Architects West stymied on designing new roof, courtyard enclosure, and accessible restrooms	Recommendation: replace building, don't renovate		Keeps finding problems with aspects of design. New roof has structural issues. Plumbing pipe fugitive. Wouldn't result in sufficient space. Construction material cost inflation.
1991	Summer/Fall: new Police Facility					
1991			Oct. 2: Civic Center Rehabilitation Project Committee meeting—rethink the rehabilitation?			
1991		Fall: Space reallocation			Fire department sleeping quarters not to code	
early 1990s			Building 'sick survey'	Recommendation: make some changes in administration area		
early 1990s		Some changes in administration area				
1992?		Some asbestos removal; air system cleaned; electrical service upgraded; new carpet; accessible doors; computer data cabling; temporary roof repairs				
1993			Aug. 2: walk-through building assessment by Smith & Huston, Consulting Engineers	Immediate: reconstruct part of south wall; deal with (fix or remove) the entry-way shells 5-yr: improve chord tie and lateral load collector; improve connections between shear walls and roof & floor 10-yr: more thorough review & renovation	Reinforcing in the walls insufficient; connections between walls and floor and roof may be insufficient; design of shells makes connections between them suspect; cracking at points where loads are highest; south wall not long enough, with cracking; entry-area shells are a severe life-safety hazard; interior CMU walls a likely life-safety hazard	
2000			Oct. 11: "Mountlake Terrace Civic Center Structural Assessment," WJE (Engineers, Architects, Material Scientists)	Recommendations: 2- to 3-yr: Seismic upgrade of main building structure Priority: upgrade or remove courtyard roof 2- to 3-yr: upgrade shear-capacity of walls; upgrade connection between shear walls and roof/foundation Before upgrades: complete structural condition assessment	Load-bearing wall materials (masonry blocks, mortar) too weak	
2001				Decision by City Council: staff should prepare financial plan to replace building		
2001						Feb. 28: Nisqually Earthquake
2001			March 3: Post-Earthquake walk-through by WJE			
2001			March 12: Post-Earthquake assessment report by WJE	Recommendation: upgrade or demolish courtyard roof		
2001		Spring: courtyard roof removed				
2002			Assessment of Fire Station condition by an architect		Many code violations; asbestos; seismic concerns	
2002				May Decision: City Council has goal of replacing Fire Station and Civic Center		
2003			Feb. 3: Staff Report on Cost of Renovating Existing City Hall Facility	Replace, don't renovate		Building at end of useful life
2003				2003-07 Six-Year Capital Plan: City Council approves recommendation for new fire station, replacing Civic Center in 2005		
2003			Mar. 13: Staff Report to City Council	Recommendation: replace Fire Station, and replace Civic Center with new City Hall	Issus with FD occupying space 24-hrs; sleeping quarters & fumes	Building architect said it was designed & constructed inexpensively
2003			2003-04 Budget: new fire station, replace civic center			
2003			Fall: Civic Campus Master Plan study and design process, Otak			
2004			January: "Civic Campus Master Plan Final Draft Report," Otak	Construct New City Hall, and construct new fire station, both on Civic Campus site		City has 20,390 residents
2005	new Fire Department Building					
2006			Town Center Planning process			

CONTENTS

1. INTRODUCTION

Purpose & Scope

Since 1988, the City of Mountlake Terrace has undertaken several efforts to determine the fitness of the Civic Center building for fulfilling its primary role: housing many of the administrative functions of the City government, in a safe, efficient, and effective manner.

This report synthesizes a collection of documents relating to those efforts. Included among the documents are the following reports and assessments relating to the building that have been written by architecture and engineering firms on contract to the City:

- (1988) ***Civic Center Space Needs and Building Analysis: Final Report.*** M.L. Blackstone, Planning Director. Architects West (Architecture, Planning, Interior Design & Landscape Architecture).
- (1991) ***Letter to Robert G. White, Mountlake Terrace City Manager, re: Study of Revised Plans and Roofing for the Mountlake Terrace City Hall Structure.*** Fred L. Stumpf, Architects West (Architecture, Planning, Interior Design & Landscape Architecture).
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Contents of this Report

This report is divided into five sections. Following this **Introduction** is a section providing an overview of the Civic Center's structure, the **Building Description**. Next is the **Review of Existing Documents**, which summarizes key reports concerning the building. The **Civic Center Building Discussion** synthesizes the issues identified in the reports, provides an assessment of compliance with building and safety codes, and walks the reader through a history of the City's decisions and actions concerning the building. It concludes with a **Summary**.

2. BUILDING DESCRIPTION

The Mountlake Terrace Civic Center building was constructed in 1961, seven years after the City was incorporated in 1954. It sits on the northwest corner of the Civic Center Campus near the corner of 58th Avenue East and 232nd Street S.W.

It is a U-shaped building, open to the east, surrounding a courtyard that provides access to the main entrance (see Exhibit 1). The main floor and partial basement (Exhibit 3) comprise 21,043 gross square feet of original construction. Two small additions have been made to the east ends of the original U: in 1975 a second garage (apparatus bay) and a tower were added to the fire station, and in 1988 a sunroom was added to the Council Conference room.

Exhibit 1
Civic Center Building, Looking Straight Down

Source: maps.google.com 2006, and USGS

The building sits on a concrete slab that is four inches thick over at-grade footings, and eight inches thick over the basement and areas of fill. Two-thirds of the building's foundation is deep 'conventional spread footings,' up to twenty feet deep surrounded by fill, and the rest has a conventional foundation two to five feet below the slab.

The population of the City at the time of construction was around 5,000. All of the City government offices, including police headquarters and the fire station, were originally housed in the Civic Center building. As the City has grown, so have the city administration and services. Several departments have moved out of the building over the years, most visibly the Police Department in 1991 and the Fire Department in 2005. The building is currently home to the City Council, Mayor, City Manager, Administrative Services, and Community Development.

The Exhibits on the following three pages show the outline of the building's main floor (Exhibit 2) and basement (Exhibit 3); oblique aerial views of building looking to the east (Exhibit 4), west (Exhibit 5), and north (Exhibit 6); and a table summarizing key points of the building's structure and history (Exhibit 7).

Exhibit 2
Civic Center Building Outline, Main Floor

Source: Architects West, 1988, and Berk & Associates, 2006

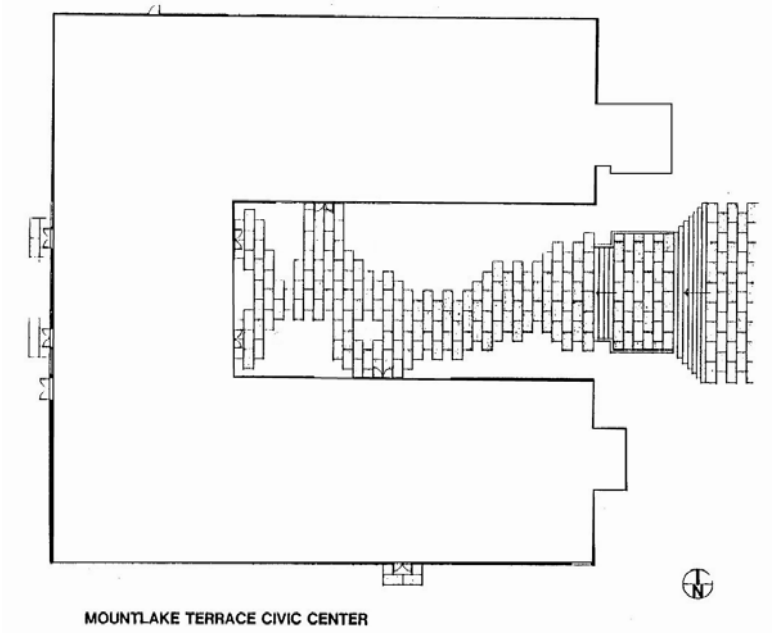

Exhibit 3
Civic Center Building Outline, Basement

Source: Architects West, 1988, and Berk & Associates, 2006

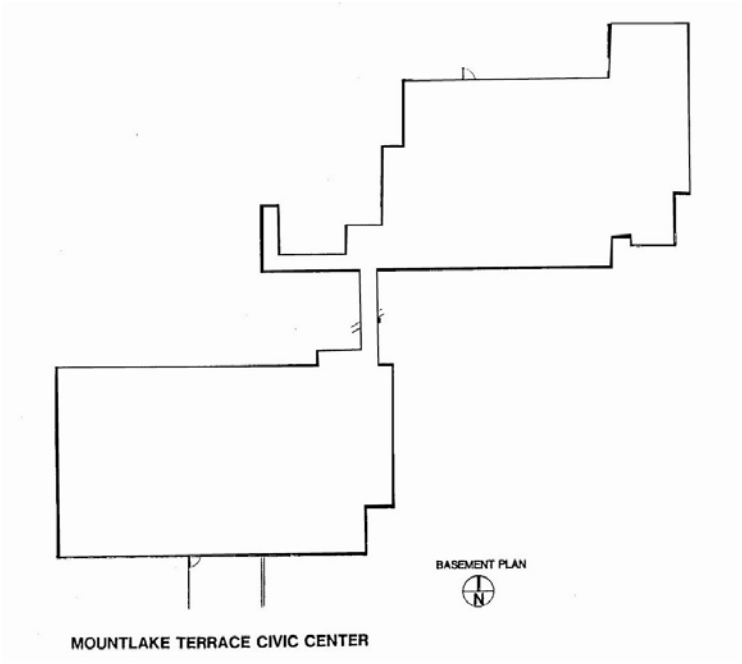

Exhibit 4
Looking East

Source: Microsoft Corporation 2006 (live.local.com), and Pictometry International Corp., 2005

Exhibit 5
Looking West

Source: Microsoft Corporation 2006 (live.local.com), and Pictometry International Corp., 2005

Exhibit 6
Looking North

Source: Microsoft Corporation 2006 (live.local.com), and Pictometry International Corp., 2005

Exhibit 7
Building Summary

Date Constructed	1961
Size	17,043 gross square feet main floor ~4,000 gross square feet basement
	21,043 gross quare feet total ~17,000 square feet of useable space
Foundation	Spread pile footings, up to 20 feet deep
Floor	8" structural slab over basement and fill, 4" structural slab over at-grade foundation
Structural Walls	Concrete Masonry Unit (CMU) blocks reinforced with vertical rebar every 48" and wires laid in joints
Roof	Structural system of 28 hyperbolic paraboloid concrete shells tied together with steel dowls and grout
Roof Support	28 precast concrete and rebar columns. Roof drain through center of columns. Outer edge of roof panels joined to structural walls with steel dowls.
Additions	1975: 2nd Apparatus Bay, Fire Station, east wall, north end 1988: Sunroom added to Council Conference Room, east wall, south end

Source: Architects West, 1988; WJE, 2000; and Berk & Associates, 2006

3. REVIEW OF EXISTING DOCUMENTS

This section provides summaries of the key reports and assessments concerning the Civic Center Building. Other documents that relate to the building are listed in the bibliography and are cited in the text of the Discussion section as appropriate.

Report Summaries

(1988) ***Civic Center Space Needs and Building Analysis: Final Report.***

This report by Architects West is composed of several component reports:

- ***Building Evaluation – Mountlake Terrace Civic Center.*** Architects West.

  This three-page report describes the building's construction and remodeling history, size, type of construction, and building materials. It provides a list of code deficiencies that would need to be addressed in a major remodel:

  - Creation of 1-Hour Rated Corridors (improved fire safety)
  - Dead End Corridors must be eliminated (improved fire safety)
  - Corridor System of Fire Exiting Pathways must be better defined (improved fire safety)
  - Handicap Access—to mezzanine level of fire station, restrooms, drinking fountains, and some offices
  - Minor issues: a handrail is needed on a short set of stairs, and fire protection needs to be added to the steel beams supporting the air conditioning unit
- ***Evaluation of Existing Civic Center – Mountlake Terrace, Washington.*** Riley Engineering, Inc. (Consulting Engineers).

  This two-page document covers the building's services infrastructure: electrical service and internal wiring, lighting, plumbing, heating/ventilation/air conditioning (HVAC), insulation and energy efficiency, and code compliance associated with these factors. While generally positive, it notes the following issues:

  - Not enough electrical outlets, resulting in some overloaded outlet circuits
  - Electrical outlets not provided with isolated ground conductors
  - Not enough light—fixtures should be upgraded, and incandescent fixtures should be replaced by more efficient sources
  - Muffler on the emergency power generator should be insulated to avoid burns from accidental contact
  - No handicapped-accessible restrooms
  - Plumbing upgrade required for backflow prevention
  - Entry Lobby used as a return air plenum, which is no longer allowed by code
  - Employee complaints about ventilation problems—HVAC system can't be adjusted enough in some areas to provide comfort, but to fix this would be prohibitively costly
  - Existing glass allows excessive heat-buildup on south side of building

- Fire station needs carbon monoxide exhaust system
- Water Quality lab needs better ventilation and an emergency shower

- ***Evaluation of Existing Civic Center – Mountlake Terrace, Washington.*** Atwood-Hinzman, Inc. (Consulting Engineers).

  Also two-pages long, this report stems from a visual assessment of the building's structure. Problems noted were:

  - Cracks at the top of the west exterior masonry shear wall
  - Major cracking of one interior masonry partition wall
  - Minor cracking in floor slabs (but overall in good condition)
  - Major cracks in main entry stair
  - One roof panel has leaked next to its drain

  For addressing the noted issues, the report recommends adding a new roof over the existing roof to keep water off the concrete panels, and to add insulation.

- ***Preliminary Asbestos Report for Mountlake Terrace Civic Center.*** Brydon Associates (asbestos consulting firm).

  This subcontractor preformed tests for airborne asbestos, and analysis of several material samples, to determine whether or not there was asbestos in the building. The testing is described as limited, rather than a full inspection of every space and potentially suspect material. Six samples of building material were analyzed, and five were shown to contain asbestos. Six air tests were performed, and all were found to be within federal limits for safe air. The report recommended that all spray-on ceiling material be removed, and further inspection be performed to discover if other building material contains asbestos.

- ***Space Needs*** *(*including ***Planning Base****).* Architects West.

  Thirty-two pages are devoted to an analysis of the future space needs of the city government.

- ***Analysis of Options.*** Architects West

  Based on the analyses of the building, and the projected space needs, Architects West provided 24 pages of recommendations. Five options for providing additional space were developed. The options were combinations of these eight individual opportunities:

  1. Expand under the Police Department by excavating a new basement
  2. Expand above the 1975 addition to the Fire Station
  3. Enclose the covered entry area (part of the center of the U-shaped building)
  4. Enclose the uncovered entry area (the rest of the center of the U)
  5. Expand to the west by building a small addition to the middle of the west wall
  6. Expand to the west by building a major addition along the entire west wall
  7. Build a new Police Facility elsewhere on the Civic Campus
  8. Demolish existing Civic Center, build new building on current site

In consultation with City staff and a citizens advisory board (the Public Safety Equipment & Building Study Committee), Architects West recommended their **Option 1,** which entailed the following elements:

A. Enclose the covered entry area
B. Expand to the west by building a small addition to the middle of the west wall
C. Build a new Police Facility elsewhere on the Civic Campus
D. Renovate the existing Civic Center:
    - Modernize the building to meet code
    - Add new roof and insulation
    - Add fire sprinkler system
    - Remove asbestos

(1991) ***Letter to Robert G. White, Mountlake Terrace City Manager, re: Study of Revised Plans and Roofing for the Mountlake Terrace City Hall Structure.***

In a July 11, 1991 letter to City Manager Robert White, Architects West Director of Bellevue Operations Fred L. Stumpf wrote of challenges discovered during the design of renovations to the Civic Center building. Due to the combination of the building site, the existing building construction, and code compliance requirements, he determined it was not possible to construct cost-effective renovations that would meet code. He had serious problems getting the new roof to pencil out; the new bathrooms would likely go over budget due to plumbing issues; and space renovations would be hampered by interior walls that could not be moved. He concluded that the additional space to be gained by enclosing the covered entry area would not be sufficient to meet the City's needs. While he did end up producing designs, his ultimate recommendation was that the building "really ought to be replaced over a period of years and maybe serve a single City function."

(1993) ***Letter to Ron DeMars, Building Official, re. Mountlake Terrace City Hall Structural Review.***

In early August of 1993 the firm of Smith & Huston, Inc. conducted a limited review of the Civic Center building through visual observations during a building walk-though with city official Ron DeMars. Mr. DeMars pointed out areas of concern he had, and also provided the consultants with original construction drawings.

The report provides a description of the existing building; an overview of the region's seismic activity and definitions of 'magnitude' and 'intensity' in relation to earthquakes; comments on the Civic Center's resilience to earthquakes and the structure's existing condition; and recommendations of needed repairs to the building.

Concerns noted in the report include:

- The structural walls were built using a reinforcing method ("small wires laid in the mortar joints of the block(s)") that is no longer approved for use in areas like Puget Sound where there are significant earthquake hazards. It was considered fine at the time of construction, but "poor performance in seismic events" led the Uniform Building Code to require more substantial reinforcement.

- The existing "minimal reinforcing of the connection" between the structural walls and the floor below and the roof above "would not be expected to perform well in an earthquake and may not meet current design requirements."
- Cracking at the joins between the walls and the roof on the west side is evidence that the distribution of lateral forces is compromised by construction that does an insufficient job of tying the building's parts together.
- The structural wall on the south side is not long enough, meaning there is inadequate support for the roof on this side of the building, especially for lateral forces. The consultants observed "some cracking of the tops of the columns at the southwest corner of the building where we would expect relatively high stresses" if the building had inadequate structural support.
- The roof over the entryway has no lateral support, and appears to be "a distinct hazard in the event of an earthquake." Because several building exits are underneath this roof, it constitutes "a severe life-safety hazard."

Other damage noted during the walk-through:

> 1) "Some cracking has been observed in the roof shell slabs and water leakage has been observed in the cracks. Some rust staining was observed which indicates that some deterioration of the reinforcing steel is occurring." The damage did not appear to constitute an immediate hazard, however, and the roof is repairable.
>
> 2) With regard to the narrow center drain pipes through the center of each roof support pillar: "Without the removal of the roofing and a detailed inspection of the top and bottom surface of the concrete it is impossible to tell how much deterioration there may be due to moisture intrusion from water leaks, freeze thaw action or other types of deterioration of the thin shell roof slabs."
>
> 3) "There are a number of interior unreinforced CMU walls. These walls do not appear to be adequately connected to the floor or roof diaphragms and appear to contribute nothing to the vertical or lateral force capacity of the building. Gaps were observed between the tops of some of the walls and the roofs slabs. This may be a severe hazard in the event of an earthquake."
>
> 4) "Stair step cracks were observed at the south end of the west wall at the air conditioning unit. These may relate to the south shear wall and lateral load collector deficiencies."
>
> "We also discussed several nonstructural problems with the building which include:
>
> 1) Poor energy efficiency and low effectiveness of air conditioning
> 2) Poor layout of office spaces
> 3) Column location interfere with office layouts
> 4) Shell drains become plugged because they are too small and there are no cleanouts
> 5) Some room finishes include asbestos
> 6) Poor lighting"

The report concludes with recommendations for repairs, categorized as "Immediate Repairs" that should be performed if the building is to remain occupied; "Five Year Repairs" that should be performed if it will be in use for another five years; and "Ten Year Repairs."

Immediate Repairs:

1) Reconstruct the west end of the south wall to make it a shear wall
2) The roof shells over the covered entry area "should either be removed, braced or tied into the rest of the building to prevent collapse" in an earthquake

Five Year Repairs:

1) Improve the way the building is tied together to distribute lateral stresses
2) Improve the connections between the structural walls and the floor and ceiling

Ten Year Repairs:

"If the building is going to be used longer than ten years we suggest that a much more comprehensive review and renovation program by undertaken."

(2000) ***Mountlake Terrace Civic Center Structural Assessment for The City of Mountlake Terrace.***

The firm of Wiss, Janney, Elstner Associates, Inc. (WJE) was hired by the City in 2001 determine "whether it is financially feasible to renovate and upgrade the existing building structurally to meet applicable building codes." To accomplish this, the firm reviewed available documents (including original engineering drawings and specifications, and the 1988 report by Architects West); created a computer simulation structural model of the existing structure; and analyzed the model for the capacity to resist seismic and wind loads as required by current building codes.

They found that design specifications for the strength of the masonry blocks used in the shear walls, and for the mortar used to cement the blocks together, were less than half the strength required by current code.

Computer analysis of the models they created for the concrete roof units, precast concrete columns, and shear walls show that all are strong enough to support the building if all it faces is gravity. The connections between the roof panels are sufficient to keep the 28 primary panels together as a unit during an earthquake.

The design of the roof shell and supporting columns was supposed to create a frame that would resist lateral forces due to wind or earthquake. However, the report finds that under current code it does not qualify as a lateral force-resisting frame.

The shear walls also no longer meet code for their designed function as load-bearing walls. The masonry blocks and mortar are not strong enough, and the firm also has doubts about whether the connections between the walls and the floor and roof are adequate.

The report's recommendations are as follows:

1. "The main building structure does not meet seismic requirements of recent codes. Seismic upgrade of the main building should be performed within the next two to three years.

2. The courtyard cover represents a seismic hazard. A seismic upgrade of this area or removal by demolition should be a priority. Upgrade options for the courtyard may be achieved by the addition of moment-resisting steel frames or steel cross bracing.
3. Upgrade options of the main building structure will depend on the existing condition of the structural elements of the system and their connections. One, or a combination of several, of the following may be used:

   A. Upgrading the existing shear capacity
      i. Carbon fiber or glass fiber wrapping of the CMU shear walls to develop adequate shear capacity to resist seismic forces
      ii. Adding a six inch layer of reinforced shotcrete to the CMU shear walls
      iii. Adding cast-in-place concrete shear walls
      iv. Adding steel cross bracing

   B. Upgrading the connection between the shear walls and the roof/foundation
      i. Steel angles and bolted connections between the roof concrete shell and the CMU shear walls/foundation
      ii. Drilled-in and grouted dowel connection between the roof concrete and the CMU shear walls/foundation
4. Structural condition assessment, including an evaluation of structural capacities of the existing roof shells, CMU shear walls, their reinforcement, and connections should be performed before any upgrade design."

(2001) ***Letter to Jerry Trojan Re. Post Earthquake Assessment of Mountlake Terrace Civic Center.***

The City asked WJE to perform an assessment of the Civic Center building to judge its integrity in the wake of the Nisqually earthquake of February 28, 2001. The only damage seen was to the four columns supporting the roof panels over the entryway. "Horizontal hairline cracks were observed near the top of the four columns supporting the courtyard roof. The cracks are new as indicated by the flaking of the paint and appear to have formed during the earthquake." While the damage was not seen to render the columns "unstable," WJE repeated its opinion that the columns "are not capable of providing adequate lateral support," and the roof above the courtyard should be repaired or demolished immediately.

4. CIVIC CENTER BUILDING DISCUSSION

4.1 Building Issues

As noted in the reports, there are a number of problems with the building that need to be addressed should the building to continue to be occupied. These can be categorized as relating to Structural Safety, Fire Safety, Other Health Safety Factors, Accessibility, Energy Efficiency, and Comfort and Ease of Use.

Structural Safety

The structural assessments concur that, while the building will not fall down under its own weight, the threat posed by this region's earthquakes make the structure unsafe. It was designed and likely constructed to meet the Uniform Building Code of 1958 for Region 3, but those standards have proven insufficient to maintain building stability during seismic events. Changes to the Code no longer allow the low degree of material strength in the building's structural walls, or the lack of resistance to side-to-side motion provided by the roof panel's support columns and connections between the shear walls and floor/roof.

Exhibit 8
Civic Center Structural Support System

Source: Architects West, 1988, and Berk & Associates, 2006;
Aerial Photograph Source: Microsoft Corporation 2006 (live.local.com), and Pictometry International Corp., 2005

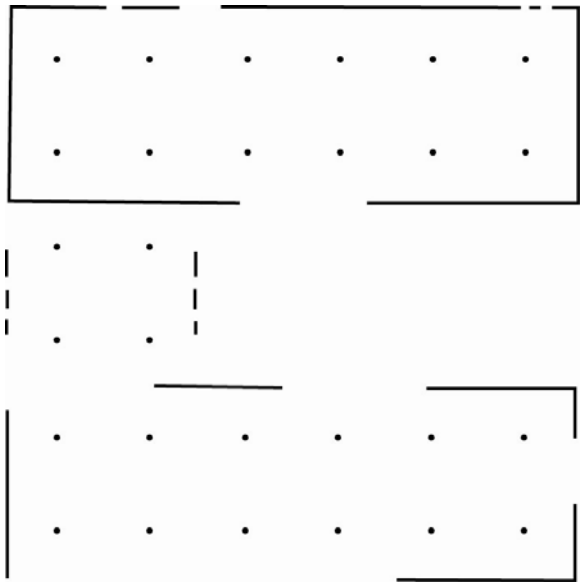

Exhibit 8 illustrates the building's structural support system: each circle is one roof panel support column, and the heavy lines are the structural walls. Note the short length of the wall on the southern side—the rest of the southern wall is comprised mostly of windows.

The 1993 structural assessment found that the masonry blocks are not strong enough; the mortar joining the blocks is not strong enough; the method of joining the walls to the floor is not strong enough; the method of attaching the wall to the roof panels is not strong enough; the roof-supporting

section of the south wall is not long enough; and the roof panels over the courtyard have no resistance to side-to-side motion. A decent-sized earthquake would likely bring down the four roof panels over the courtyard, which would block many of the building's exits. That same earthquake would also bring a fair chance of overloading the south structural wall, because too much load from the roof is transferred to too short a section of structural wall. Given the low strength of the blocks and the mortar, that load could collapse portions of the wall, leaving part of the building roof in the same position as the courtyard roof—with no resistance to side-to-side motion, and subject to collapse.

These issues are exacerbated by water damage to roof panels that is causing the reinforcing wire mesh inside the concrete to rust. The drains in the middle of each roof panel are small and frequently clog up, causing water to collect in the bowl of the panels. There is a roofing surface protecting the concrete from moisture, but roofs are not perfectly impermeable, and water has leaked through to the concrete. This is most likely to occur at the drain where the roof material and drain meet. Rusting of the reinforcing mesh would decrease the strength of the roof panels.

The downspouts inside the concrete and steel columns are also narrow and subject to clogging, but their actual condition has not been evaluated. A clog inside a downspout could lead to leaks into the interior of the column, which could rust the steel that provides much of the vertical strength and nearly all of the side-to-side resistance in the columns.

There are also unreinforced masonry block walls used as partitions inside the building that are likely to topple over in a moderate earthquake.

Fire Safety

Several lapses in fire safety have been noted in the building assessment reports. Among them are:

- No sprinkler system
- Dead-end corridors
- Corridor system to guide people to building exits is not properly defined
- Doors and door frames that do not meet guidelines for fire safety—i.e. would burn through too quickly
- Overloaded electrical circuits
- No fire-proofing of the steel beams supporting the air conditioning equipment

Other Health Safety Factors

- Asbestos was used in the original construction. The 1988 asbestos assessment confirmed its presence in the building's spray-on acoustic ceiling material. Assessment was not performed to establish the make-up of other materials that may contain asbestos, such as water pipe insulation, floor tile, heating ducts, etc.

- In 1988 and 1993 it was noted that the fire station's apparatus bays did not have appropriate ventilation for vehicle exhaust. In 2003 concerns were noted that the doors to the sleeping quarters, located in-between the two apparatus bays, did not close all the way, which could lead to air from the garages getting into the dormitory.

- In the early 1990's there were concerns about the Civic Center being a 'sick-building'.

Accessibility

The building was constructed before the Americans with Disabilities Act was passed, and the original design presented some barriers to the physically handicapped. Entry doors were not accessible, nor were the restrooms and many of the interior doors. The Fire Department had a mezzanine that could only be reached via stairs.

Energy Efficiency

- While the original construction was considered energy efficient at the time, technological improvements since then have far surpassed the original design and materials. The building still has most of its original single-pane, aluminum-framed, unglazed windows. These allow heat to build up inside the building on the south and west sides during the summer, and allow heat to escape during the winter.
- The concrete roof panels were also considered good insulation in 1961, but are no longer. One of the attractive features of the idea of building a new roof over the existing one was the opportunity to add insulation.
- The original lighting was incandescent bulbs, which are considered inefficient.

Comfort and Ease of Use

- The original artificial lighting provided lighting levels that are too dim. This is particularly an issue in the rooms that have no natural light.
- The excessive heat gain through the single-pane windows on south side creates overly warm temperatures that the added air-conditioning system is unable to fully mitigate.
- The HVAC system was designed in such a way that temperatures are inconsistent in different parts of the building, and cannot be controlled with sufficient specificity to correct problems in some locations.
- The 28 roof support columns interfere with efficient use of interior space by constraining the location of other interior elements such as hallways, partitions, and desks.

4.2 Code Compliance

It is assumed that when the building was designed and constructed in 1961, it met the standards of the 1958 Uniform Building Code for Zone 3, which offered minimal seismic protection. However, it was industry standard at that time to allow for up to 5% of variance from the written standards. There has not been a documented assessment of the actual construction to confirm that it did meet the 1958 standards, however, and the architect has been quoted as saying that it was designed and built inexpensively.

Since it was constructed, building codes have continued to evolve. Standards for lateral strength to resist earthquakes have increased consistently, and standards for lateral resistance to wind have both increased and decreased. Building codes are updated every three years, and the State typically adopts them the following year. Between 1958 and today there have been upwards of 15 cycles of code review and adoption (although not every update has been immediately adopted).

An example of the changes to code is brought out in the structural assessment performed in 2000 by Wiss, Janney, Elstner Associates, Inc. (WJE). They note that, "It is apparent that the original design counted on the columns to provide lateral support, as evidenced by the connection between the columns and the roof shell…. However, the column dimensions, reinforcing steel detail, and the roof shell do not qualify as a lateral force-resisting frame under recent codes."

Concrete actually gains strength over time, and concrete structures can last for millennia if properly built and maintained. The Civic Center building is not a candidate for longevity, however, due to problems with its design. The roof does not have sufficient support for lateral forces, and the bowl-shaped panels collect water that can seep into the concrete when the drains back up. Both these problems can lead to a cycle of deterioration that increases over time.

In an evaluation performed in 1988 by Atwood-Hinzman, Inc., Consulting Engineers, leaking was noted adjacent to one of the roof drains. This indicates that either water was leaking around the downspout or through the concrete of the roof panel. Either one provides on opportunity for moisture to interact with the reinforcing wire mesh in the roof panel, and the steel in the support pillar, causing rust and separation of the concrete from the steel, weakening the structure. The 2000 report by WJE noted the leaking mentioned in the earlier report and added, "the severity of reinforcing steel corrosion and possible delamination of the concrete shell is very critical. Therefore, it is important to perform a condition survey of the roof shell elements to determine the extent and rate of reinforcing steel corrosion, as well as areas of delamination."

It is not just the roof panel and support columns that are of concern. The CMU shear walls are also problematic, due to the strength of their component materials. WJE noted in 2000 that "they no longer qualify as seismic shear walls, as their specified material strength is much lower than the minimum required by recent codes. Both the CMU block and the mortar specified strengths do not meet current code requirements." While the walls won't fall down just by themselves, they are likely to in an earthquake.

An assessment performed in 1993 by Smith & Huston, Inc., Consulting Engineers, found cracking "at the joints between roof panels at the west side of the building at each end of the center section of the building where it abuts the CMU shear wall at the north and south wings of the building." They also "observed cracking of the tops of the columns at the southwest corner of the building where we would expect relatively high stresses and deflections due to deflection of the lateral load collector and the relatively short shear wall along the south side of the building." There were also "stair step cracks … at the south end of the west wall at the air conditioning unit. These may relate to the south shear wall and lateral load collector deficiencies." Just as worrying is "cracking … observed in the roof shell slabs and water leakage … observed in the cracks. Some rust staining was observed which indicates that some deterioration of the reinforcing steel is occurring."

Exhibit 9
Building Strength and Building Code

Source: Berk & Associates, 2006 in consultation with Eagle Eye Consulting Engineers

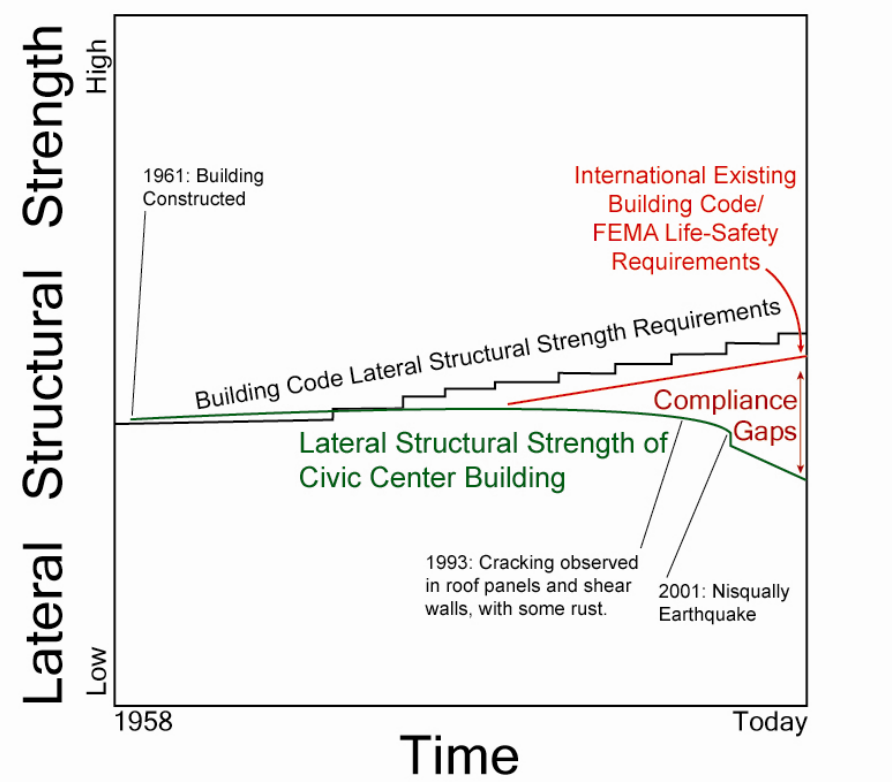

Exhibit 9 illustrates, in general terms, the concepts of advances in building code requirements, and the loss of building strength over time due to cracking and rusting. The stair-stepped **black line** labeled "Building Code Lateral Structural Strength Requirements" illustrates how the three-year cycle of amendments to the Uniform Building Code have led to more robust standards since the Civic Center building was designed and constructed. The **red line** that parallels the black line represents the Federal Emergency Management Agency's standards intended to ensure that a structure will remain standing during an earthquake long enough to safely evacuate the occupants. The standards are not as robust as the Uniform Building Code, which are intended to keep a building habitable during and after shaking of a specified intensity. The **green line** illustrates how the Civic Center building was designed and constructed to meet the 1958 Uniform Building Code, become slightly stronger early on as its masonry and concrete aged, and then has become weaker as clogged drains led to standing water on the roof panels, which seeped into the concrete and caused the steel mesh to rust. Design problems with the collection and distribution of lateral forces have also led to cracking of structural elements. Following the Nisqually earthquake it is assumed that deterioration increased due to further cracking and water intrusion, and continued problems with distributing lateral forces. The **gap** between the building's strength and the strength required by building codes grows over time.

The past building codes only required that older buildings be upgraded to meet current code if renovations costing a certain percentage of the current value of the building were performed. As long as a building's renovation costs stayed under that threshold, the law did not require full code compliance. Of course, a building that technically avoids coming up to code can still be a very unsafe, or uncomfortable, building.

4.3 Past Decisions and Actions

Working in parallel with an assessment being done by Architects West during the spring of 1988, a citizen's advisory board called the Public Safety Equipment & Building Study Committee examined issues facing the City's ability to provide services from its existing location, with existing equipment. The Fire Department and the Police Department were the primary focus of their attention, but the group also studied the Civic Center building in general. In June of 1988 the Committee recommended to the City Council that a bond measure be floated to fund the following:

1. Replace existing fire fighting equipment with modern vehicles and other modern tools and apparatus: $575,000
2. Build a new police department building: $571,340
3. Partial remodel and small addition to the Civic Center building: remove asbestos, add new roof (with insulation), enclose the covered entry area, and perform upgrades necessary for handicapped access (including new restrooms): $533,610

With fees and contingencies, they recommended a $2 million bond. They also recommended that further remodeling of the Civic Center be included within a future Parks and Recreation levy.

Their recommendation diverged from Architects West's recommended Option 1 by not including a small addition on the west side of the buildings, fire sprinklers, and other work to bring the building up to code.

The City Council agreed to put two bond measures on the fall ballot that totaled $2 million: one for the police station and Civic Center remodel, and one for the Fire and Aid Equipment. The measures were both approved by the voters in September of 1988.

The police station was designed, constructed, and occupied during 1991. The department had moved out of the Civic Center building by Sept. 12, 1991.

In 1991 the City amended the scope of the Civic Center remodel to include creating a dormitory in the fire station area. It was to be paid for by a federally-funded Community Development Block Grant, with some interim swapping of bond proceeds that would be repaid by the City's Real Estate Excise Tax receipts.

Adding this renovation to the cost of the other planned work put the total value of the work over one-half the cost of the building, which triggered the requirement for additional code compliance. Most significantly, a sprinkler system would have to be installed throughout the building to meet fire code (memo from Ron DeMars, May 17, 1991).

Due to issues of cost and structural support complications, it was later decided to re-roof the existing concrete units rather than add a new roof structure to divert water away. The documents are not clear as to what the re-roofing entailed, but there may be fabric or other tar-based roofing material on top of the concrete to serve as a moisture barrier and direct water to the center drains.

In January of 1992 City Staffer Elaine Brown prepared a summary timeline of the Civic Center project for the City Manager and City Council. In it she notes additional issues that have come to light:

1. Because the fire department now runs 24-hours a day, it requires sleeping quarters. And, because there are now female firefighters, they need separate quarters and locker/restroom facilities.
2. City code requires sprinklers
3. The garages for the new fire trucks (the apparatus bays) need ventilation
4. Brittle glass in doorways
5. Uneven, slippery sidewalks
6. Concerns about air quality in the building
7. Door hardware and locks
8. Plumbing problems
9. Overcrowding of the building
10. Furnishings were not funded by the bond measures (partitions, furniture, paint, floor coverings, counter fixture for the new lobby)
11. Lobby counter security
12. Electrical upgrade will improve service to the building, but inadequate interior wiring will not be addressed
13. "Mechanical engineer feels requested improvements to existing HVAC may cause additional, excessive noise and may not improve the operation greatly."

She also notes that an architect had provided an estimate for the cost of building demolition (and asbestos disposal) some two years prior.

Some renovation of the building did take place in the mid-1990s. According to a staff report prepared for the City Council in March 2003, the following improvements were made:

a. Removed some of the asbestos
b. Cleaned the air handling system
c. Improved the electrical service
d. Installed carpeting
e. Installed handicap-accessible doors
f. Lowered insulated ceiling and work areas
g. Installed communication wiring for computers
h. Temporary patch repairs to the roof

No additions were constructed, no modifications were made to improve the structural integrity of the building, and the roof over the courtyard was left as-is during this decade.

It appears that no further actions or decisions were made until early 2001. Prior to the February earthquake the City Council reviewed the structural assessment performed in the fall of 2000 and concluded that the building needed to be replaced. City staff were instructed to prepare a financial plan to fund replacement of the building.

The Nisqually earthquake provided an interruption that led to a single action: later in the spring of 2001 the roof over the entry courtyard was demolished, per the recommendation of Smith & Huston in 1993 and WJE in 2000 and 2001.

In 2002 the City Council established a goal of replacing the fire station and the Civic Center building.

The 2003-07 Capital Improvement Plan, as approved by the City Council, includes replacing the Civic Center Building and the fire station.

The 2003-04 City budget includes replacement of the Civic Center as a goal.

In 2004 the City contracted with Otak to have a Master Plan developed for the Civic Campus. A public design preference process resulted in the ***Civic Campus Master Plan Report, Final Draft Report*** recommending two basic concepts for the location and layout of a new City Hall building on the Civic Campus, and a single concept for a new fire station on the Civic Campus.

The new fire station was constructed in 2005.

In 2006 the City is developing a plan for the Town Center district. As the Civic Campus is part of the heart of the Town Center Neighborhood, further planning is underway on the future of the Civic Center building.

SUMMARY

The Civic Center building has outlived its designed lifetime. In 1991 an architecture firm (Architects West) tasked with making some minor modifications to the building said that renovating the building was not cost effective, and it should instead be replaced. Since then further structural deficiencies of have been identified, but have not been corrected. Building codes have since been strengthened, further demonstrating the inherent problems with the building's design and construction.

The building's problems can be broadly categorized as Safety-related and Usability-related.

The major **safety** problems that remain today are:

- A roof support system that no longer meets code, and a roof design that has led to leaks and rusting of internal reinforcing
- Design flaws in the way side-to-side shaking forces are distributed—the south wall is overloaded
- Original material strength specifications that do meet current code (masonry blocks in the walls, and the mortar binding the blocks together, are too weak)
- Connections between the structural walls and the floor and roof are not strong enough
- Unreinforced masonry block interior partition walls—without proper reinforcement, the walls are likely to topple during an earthquake
- No fire sprinklers
- Asbestos in the ceiling material, and possibly elsewhere

- Other fire safety issues may remain regarding the fire rating of doors and door frames, and the layout of interior corridors

The primary **usability** issues that remain are:

- Poor energy efficiency: insufficient roof insulation, and single-pane, unglazed windows with aluminum frames lead to heat build-up in the summer, and heat loss in the winter
- HVAC system cannot be controlled precisely enough to fix individual temperature problem spots
- Handicap accessibility problems
- Not enough restrooms
- The roof support columns interfere with efficient building layout

Some problems have been addressed since 1988. **Actions** taken by the City include:

- Built new police facility (1991)
- Removed some asbestos (1992?)
- Installed handicap accessible exterior doors (1992?)
- Improved electrical service to the building (1992?)
- Patched the roof (1992?)
- Demolished entry-area roof (2001)
- Built new fire station (2005)

In 2001 the City Council reached the same conclusion that Architects West did in 1991: the Civic Center building needs to be replaced. The City Council agreed to replace the Civic Center building with a new fire station and a new City Hall building and has reaffirmed that decision since then. The new fire station was built in 2005, leaving just the new City Hall to be designed and constructed.

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