



Department of Public Works

# SELECTION OF STRUCTURAL RETROFIT APPROACH FOR CENTRAL LIBRARY EARTHQUAKE RETROFIT AND BUILDING REPAIRS PROJECT

City Council  
August 21, 2023  
Item #10





# Presentation Overview

Department of Public Works

- Background
  - > Building History
  - > Serving the Community
  - > Building Evaluation & Closure
  - > Design Team & Appointed Committees
- Development of Earthquake Retrofit Approaches
  - > Project Goals & Design Standards
  - > Earthquake Repair Approaches
  - > Structural Performance Comparison
- Cost Plan
- Evaluation Matrix
- Public Outreach & Commissions
- Next Steps & Schedule
- Recommendation



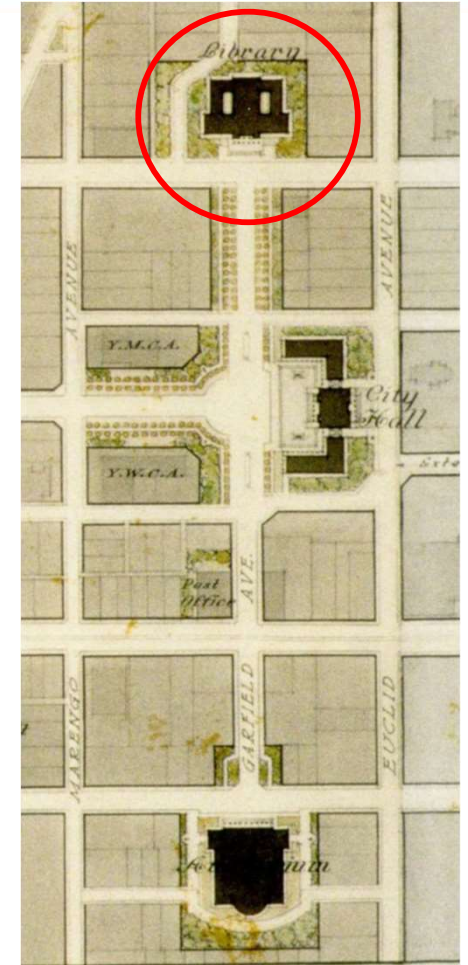


# Central Library Building History

Department of Public Works

Pillar of Planned Civic Center, along with City Hall & Civic Auditorium

- First to be constructed: 1925 – 1927
- 120,000 sf floor space
- Designed by renowned architects, Myron Hunt & H.C. Chambers
- National Register of Historic Landmarks
- Building's systems remain original to the building



Original Bennett Plan for the Pasadena Civic Center

PASADENA



# Central Library Building History

Department of Public Works

## Historic Character-Defining Features

- Exterior
  - > Mediterranean Revival style
  - > Walled entrance courtyard with central fountain
  - > Red clay tile roofs
  - > Stucco with cast stone decorative trim





# Central Library Building History

Department of Public Works

## Historic Character-Defining Features

- Interior
  - > Circulation Hall
  - > Built-in casework with integrated air conditioning delivery system
  - > Interior finishes including cork tile flooring, paneled wood wainscoting, textured acoustic plaster walls, coffered wood ceiling, and decorative light fixtures





# Serving the Community

Department of Public Works

Home to wide variety of programs and services

- 30,000-40,000 community members attended events annually
  - > Storytimes
  - > Author visits
  - > Cultural events
  - > Recitals and plays
- Home to the Office of the Young Child
- Hub for historical archives and 300,000 items that cannot be accessed at branch libraries



PASADENA



# Building Evaluation & Closure

Department of Public Works

- Initiated in 2020 – Central Library Building Systems & Structural Assessment project (71910)
- April 2021- KPFF Consulting Engineers structural assessment
- Visible cracking
- May 3, 2021 – City Officials ordered library closed
- Independent evaluation by Nabih Youssef & Associates



PASADENA





# Design Team & Stakeholder Committees

Department of Public Works

- Design Team – Contract awarded January 2023
  - > Gruen Associates & 13 sub-consultants, including
    - KPFF Structural Engineers
    - Historic Resources Group
    - MGAC Cost Estimator
- City's peer review & advisory consultants
  - Nabih Youssef & Associates
  - Krakower & Associates Structural Engineers
- City's independent site evaluation consultants
  - WJE – Materials Testing
  - GeoPentech – Geotechnical Testing



# Design Team & Stakeholder Committees

Department of Public Works

## Technical Oversight Committee

- Appointed by Mayor Victor Gordo
- Committee responsibilities
  - > Review reports, findings and retrofit approaches and provide advice/feedback

## Programming Committee

- Appointed by Interim City Manager, Cynthia Kurtz
- Committee responsibilities:
  - > Recommend next steps and path forward to enhance offerings at Central Library as a result of the necessary retrofit and restoration work
  - > Issued the Central Library Community Programming Committee Report on February 27, 2023



Department of Public Works



# DEVELOPMENT OF EARTHQUAKE RETROFIT APPROACHES



# Project Goals & Design Standards

Department of Public Works

## Project Goals and Objectives

- **EARTHQUAKE REPAIRS** – Improve seismic performance to allow the building to have greater resilience to earthquakes
- **HISTORIC IMPACTS** – Preserve the building's historic fabric, its character defining features, and its historic listings
- **ACCESSIBILITY** – Adopt universal access principles to accommodate different levels of ability and mobility
- **PUBLIC BENEFIT** – Re-occupy building as quickly as reasonable so that patrons can have use of the library and its services
- **BUILDING SYSTEMS** – Ability to upgrade building systems (HVAC, electrical, plumbing, fire alarm and fire sprinklers, technology) without significant impacts
- **FUNCTION / FLEXIBILITY** – Ability to utilize spaces as desired into the future
- **COST EFFECTIVENESS** – Lowest cost that meets earthquake performance goals



# Project Goals & Design Standards

Department of Public Works

- Design Standards
  - > Pasadena Municipal Code – URM Ordinance Section 14.06.030
  - > California Historic Building Code
  - > California Existing Building Code
  - > Secretary of the Interior's Standards for Historic Buildings
  - > ASCE41-17 – Industry standard for seismic evaluation and retrofit of existing buildings



# Earthquake Retrofit Approaches

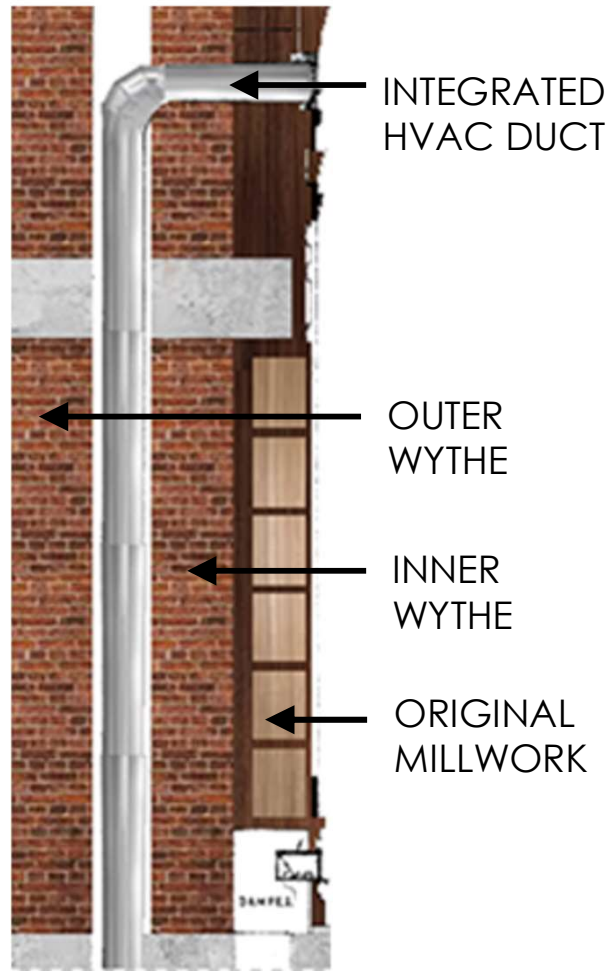
Department of Public Works

## Existing Key Features



← PLASTER

← ORIGINAL  
MILLWORK

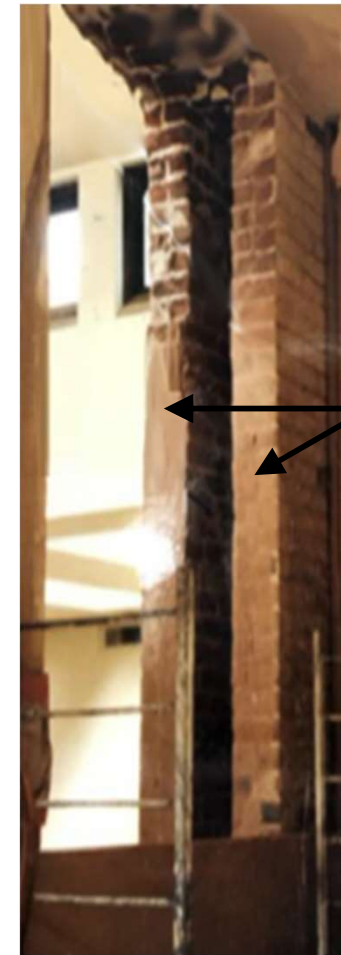


← INTEGRATED  
HVAC DUCT

← OUTER  
WYTHER

← INNER  
WYTHER

← ORIGINAL  
MILLWORK



← WYTHES



# Earthquake Retrofit Approaches

Department of Public Works

## I. Baseline Approach

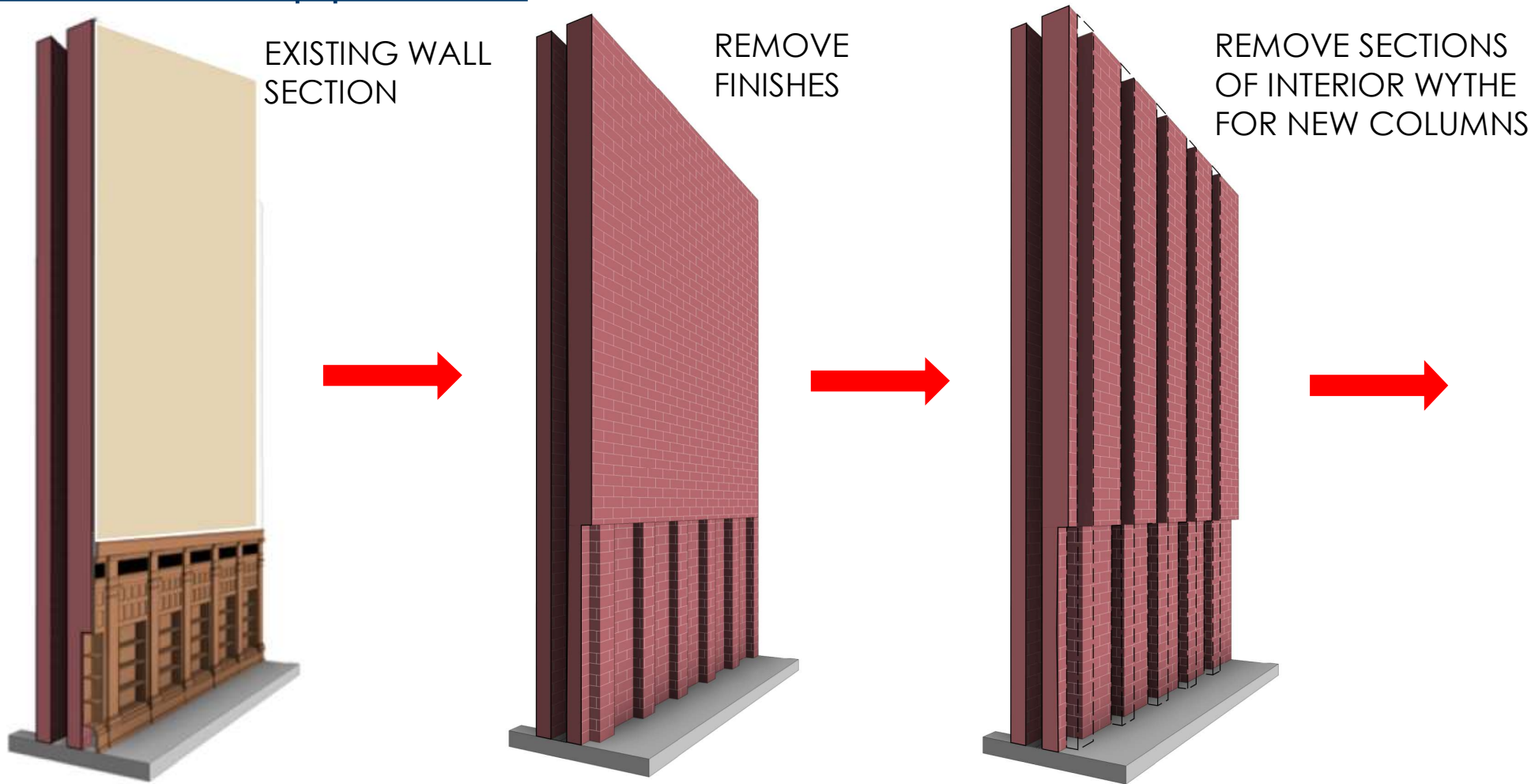
- Removes limited amounts of inner-brick wythe to install concrete columns to support remaining brick, floors, and roof
- Permanent formwork to be installed and remain in place to support backing of the columns
- Meets minimum code requirements for historic URM retrofit
- Does not meet basis of design equivalent to **new** building performance
- Pros
  - > Lowest cost
  - > Shorter construction duration
- Cons
  - > Lowest level of structural performance of three approaches
  - > Constructability concerns



# Earthquake Retrofit Approaches

Department of Public Works

## I. Baseline Approach



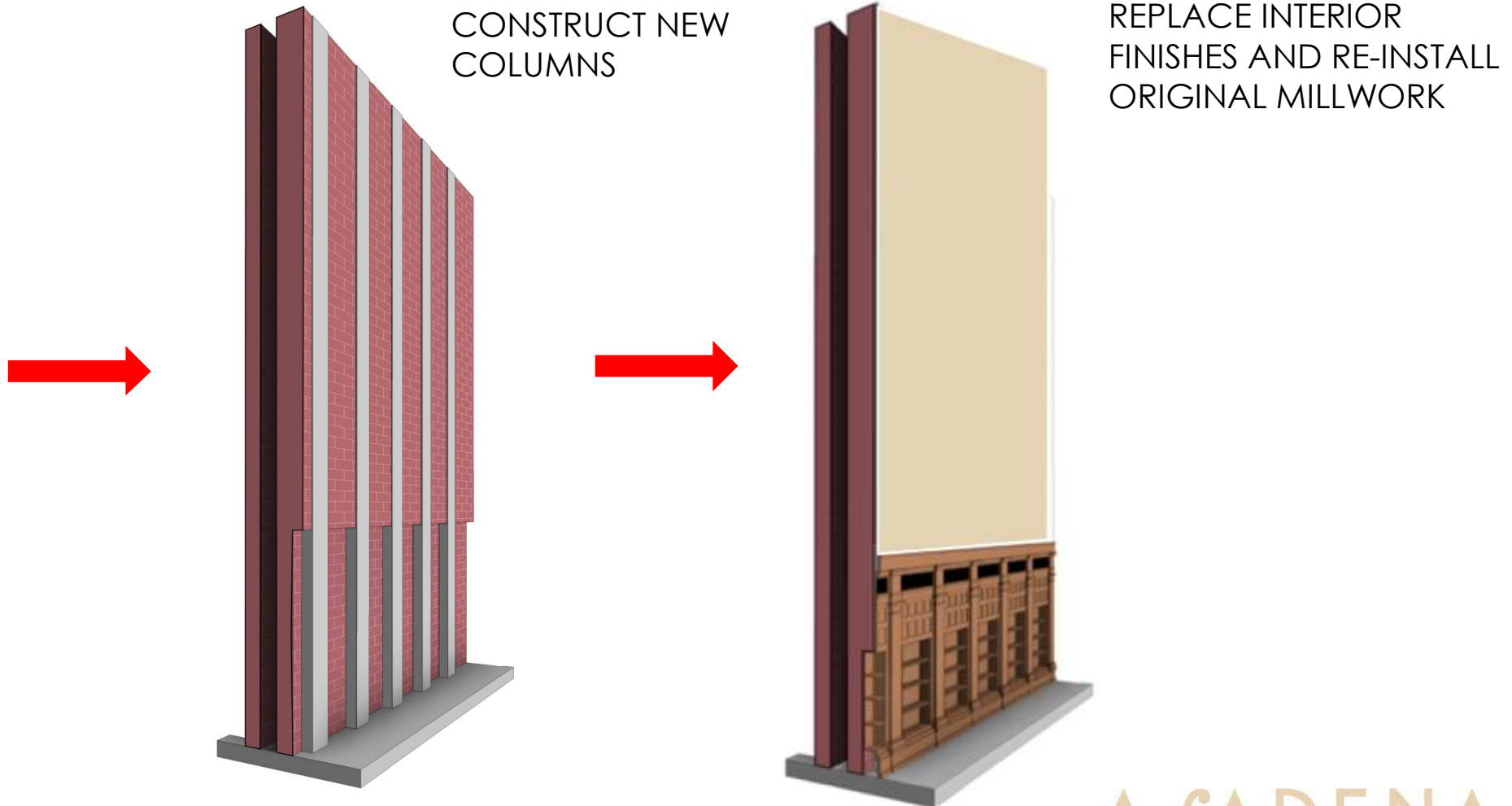




# Earthquake Retrofit Approaches

Department of Public Works

## I. Baseline Approach (continued)

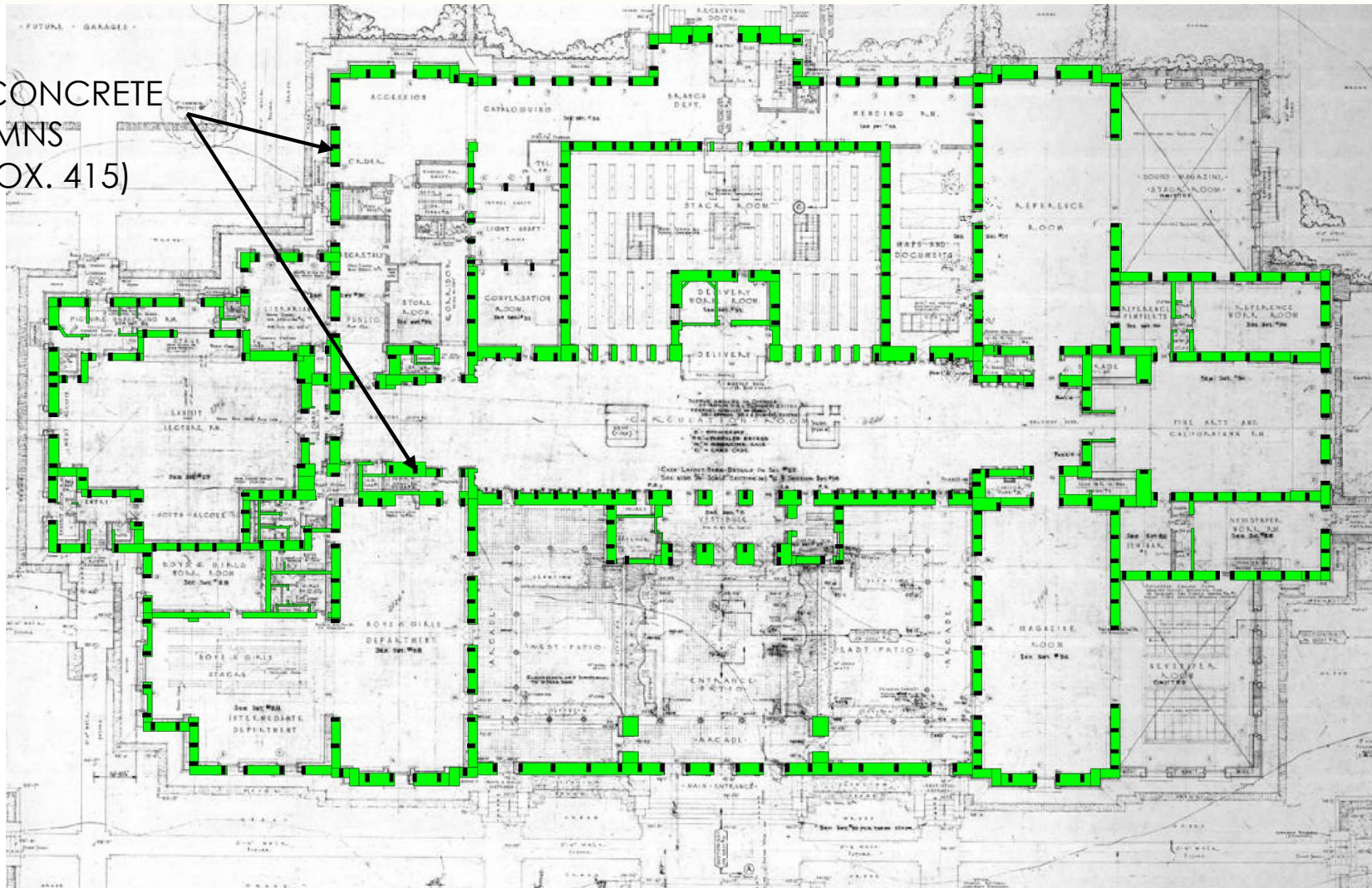




# Earthquake Retrofit Approaches

Department of Public Works

NEW CONCRETE  
COLUMNS  
(APPROX. 415)





# Earthquake Retrofit Approaches

Department of Public Works

## II. Concrete Shear Wall Approach

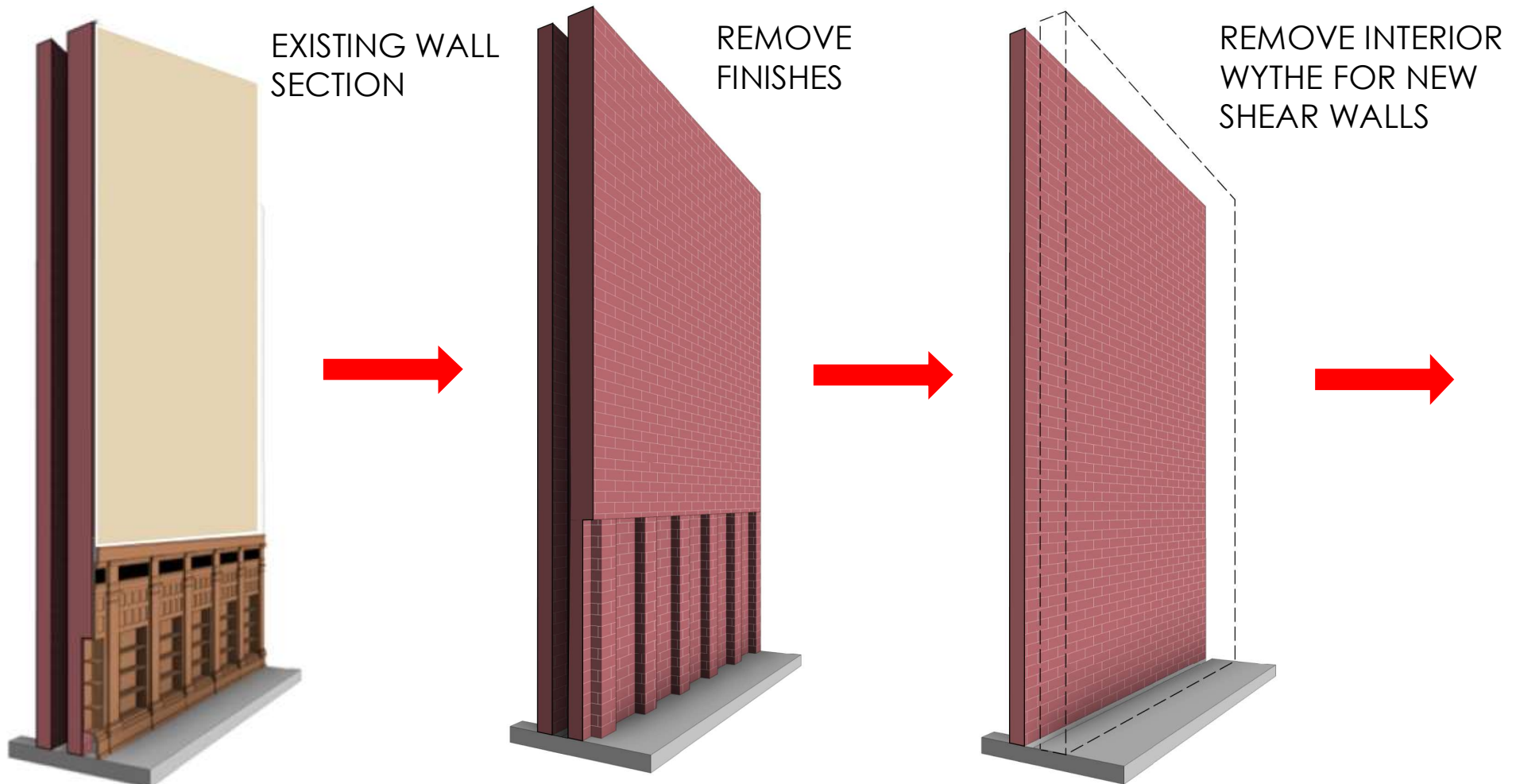
- Removes inner-brick wythe and replaces it with a concrete shear wall supporting out wythe of brick, floors, and roof
- Permanent formwork to be installed and remain in place to support backing of the shear walls
- Meets basis of design equivalent to **new** building performance
- Pros
  - > Shorter construction duration (same as Baseline Approach)
  - > Common and proven engineering and construction approach
  - > Lowest cost approach that meets basis of design
- Cons
  - > Greater potential for damage and longer recovery time after major earthquake compared to Base Isolation Approach



# Earthquake Retrofit Approaches

Department of Public Works

## II. Concrete Shear Wall Approach

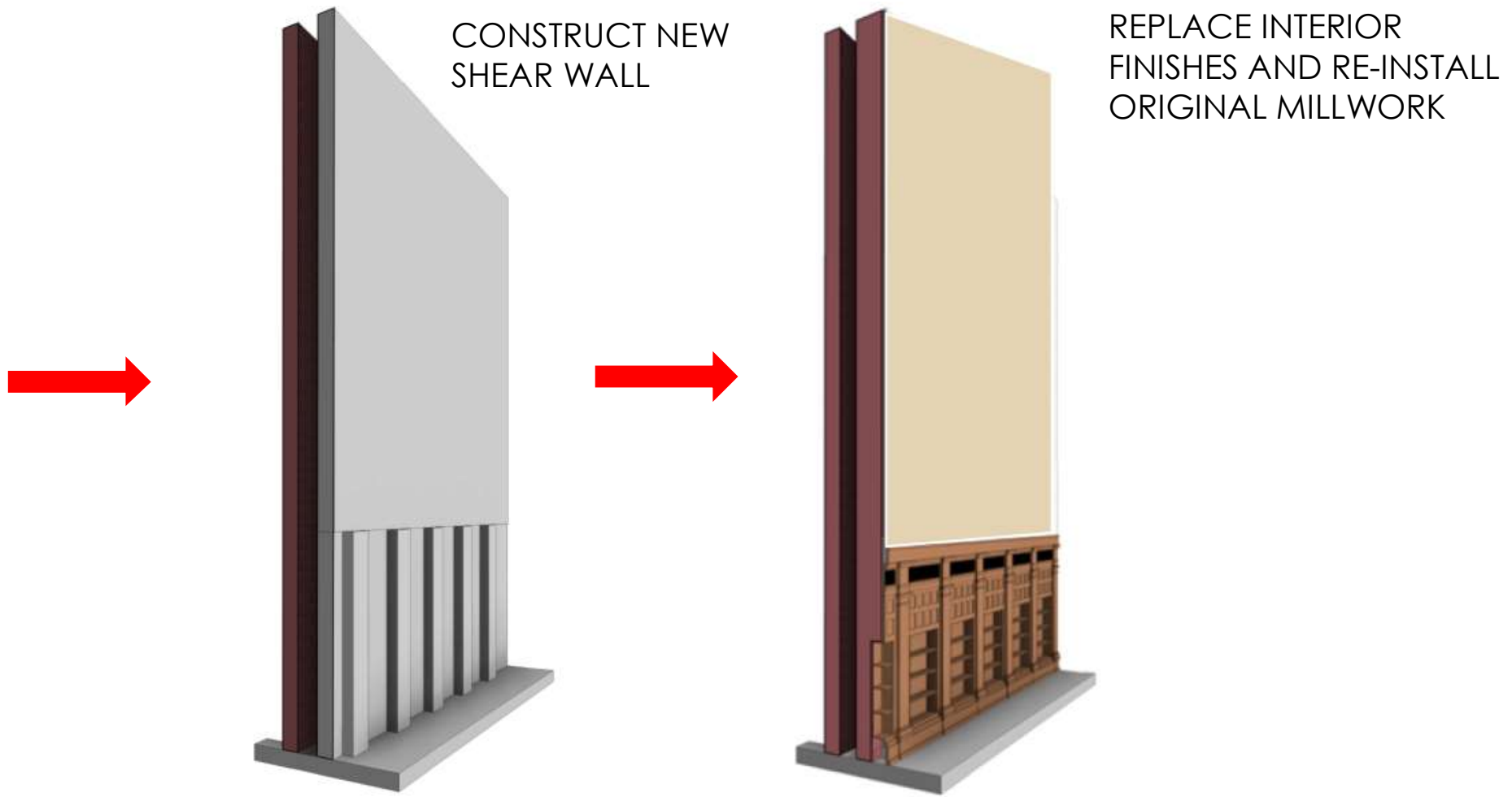




# Earthquake Retrofit Approaches

Department of Public Works

## II. Concrete Shear Wall Approach (continued)





# Earthquake Retrofit Approaches

Department of Public Works

NEW CONCRETE  
SHEAR WALLS  
(APPROX. 2500 LF)





# Earthquake Retrofit Approaches

Department of Public Works

## III. Base Isolation Approach

- Removes limited amounts of inner-brick wythe and replaces with concrete columns to support remaining brick, floors, and roof (similar to Baseline Approach)
- Utilizes base isolators under ground floor around perimeter and under new concrete columns
- Permanent formwork to be installed and remain in place to support the backing of the columns
- Exceeds basis of design equivalent to **new** building performance



# Earthquake Retrofit Approaches

Department of Public Works

## III. Base Isolation Approach (continued)

- Pros

- > Quickest recovery time after major earthquake compared to other approaches
- > Reduces magnitude of ground motion impacts and potential for damage in moderate and major earthquakes

- Cons

- > Reduces basement's usable square footage compared to other approaches
- > Highest cost
- > Constructability concerns
- > Increases duration of design and construction and, therefore delays project completion

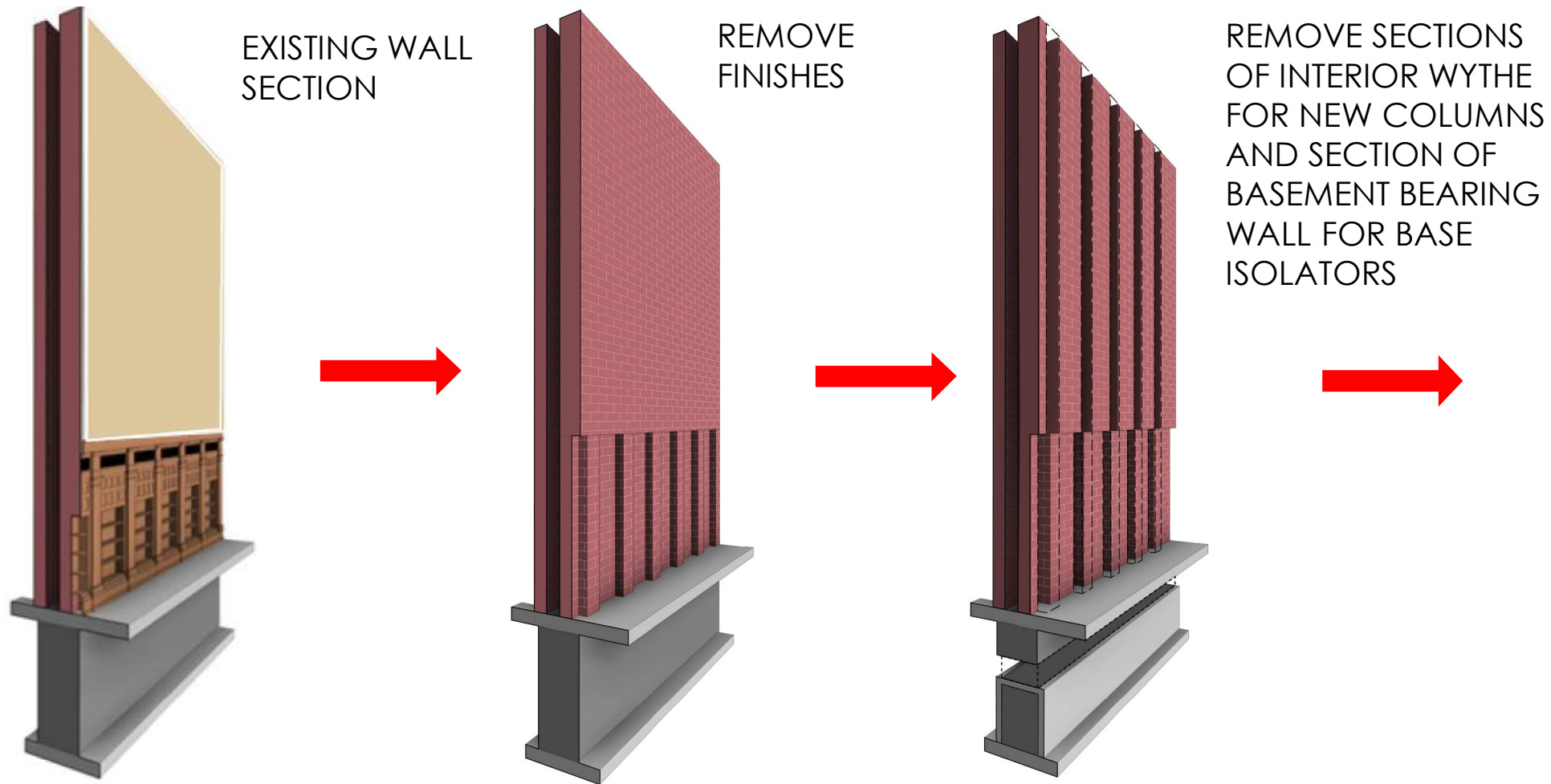




# Earthquake Retrofit Approaches

Department of Public Works

## III. Base Isolation Approach

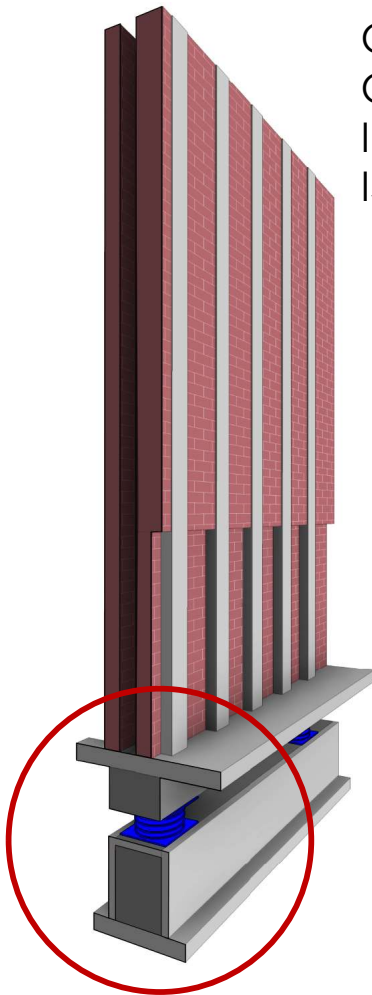




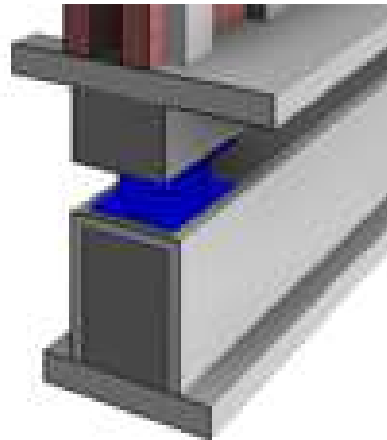
# Earthquake Retrofit Approaches

Department of Public Works

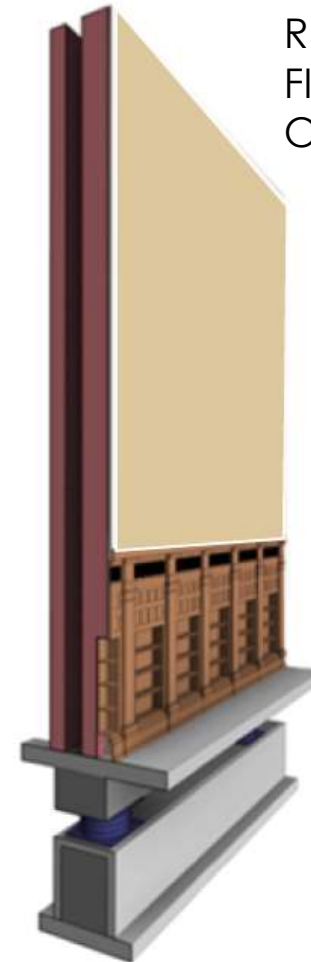
## III. Base Isolation Approach (continued)



CONSTRUCT NEW  
COLUMNS AND  
INSTALL NEW BASE  
ISOLATORS



REPLACE INTERIOR  
FINISHES AND RE-INSTALL  
ORIGINAL MILLWORK



PASADENA



# Earthquake Retrofit Approaches

Department of Public Works

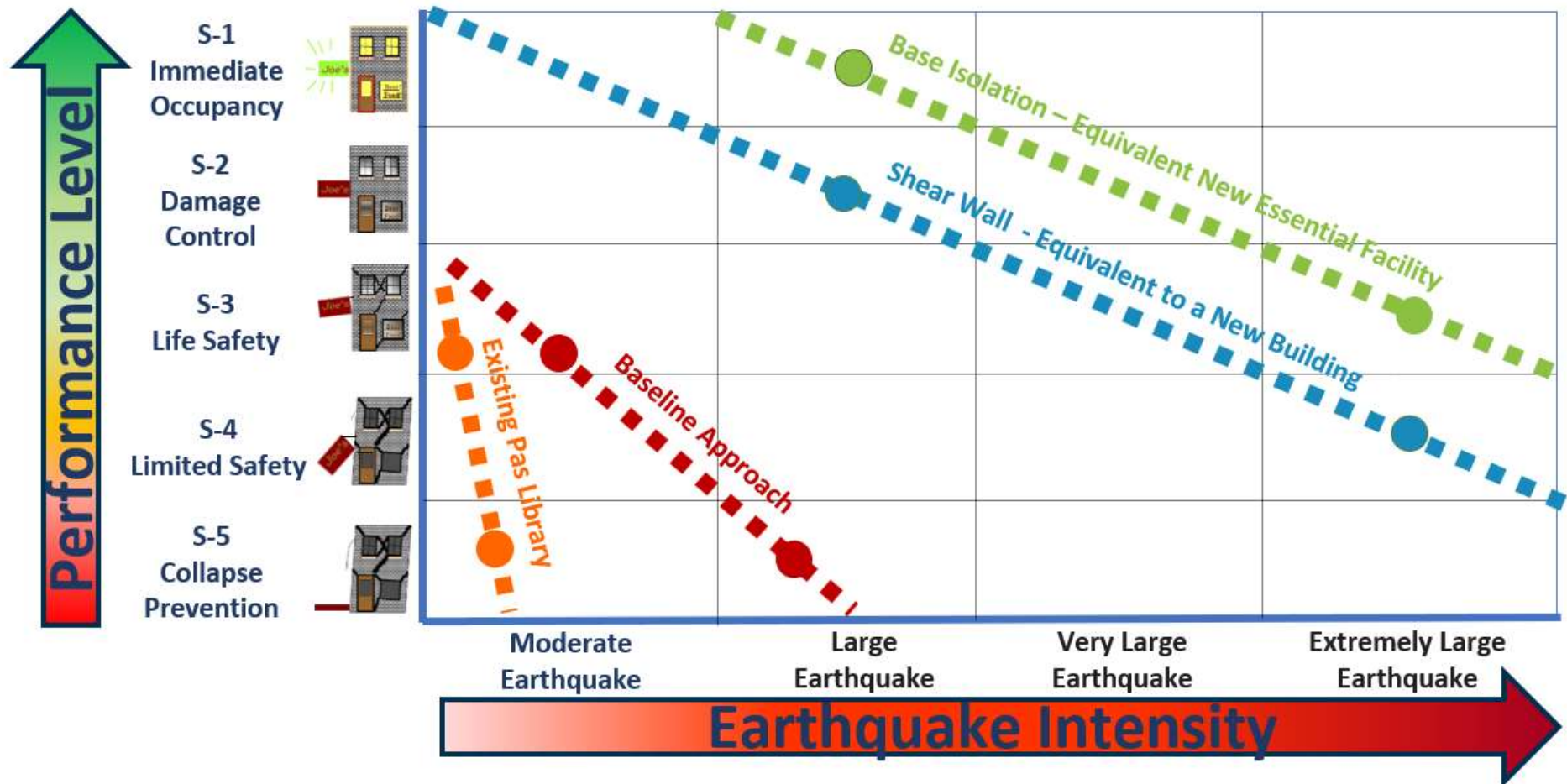
NEW BASE ISOLATORS  
(APPROX. 100)





# Structural Performance Comparison

Department of Public Works





## Department of Public Works



# COST PLAN



# Cost Plan

Department of Public Works

- MGAC – Certified Cost Estimator (26 years experience)
- Cost Plan includes:
  - > Construction; contingencies; cost escalations; project/construction management; inspection & move-in
  - > Cost ranges account for predictable market condition escalations at time of projected construction
  - > Actual costs may vary should market conditions differ significantly from predicted at time of construction
- Design team tasked to estimate the most cost-effective solutions for the following:
  - > Structural retrofit approaches & constructability
  - > Repair and upgrade century-old infrastructure systems (HVAC, electrical, plumbing)
  - > Serve the public into the next century

PASADENA



# Cost Plan

Department of Public Works

	Baseline (\$million)	Concrete Shear Wall (\$million)	Base Isolation (\$million)
<b>1. Earthquake &amp; Fire Life Safety Compliance</b> <ul style="list-style-type: none"> <li>• Structural Retrofit</li> <li>• Fire Alarm and Sprinkler System</li> <li>• Roof Repairs</li> <li>• ADA Upgrades (Code Required)</li> </ul>	\$128 - \$148	\$133 - \$153	\$178 - \$198
<b>2. Building Repairs*</b> <ul style="list-style-type: none"> <li>• Mechanical, Electrical &amp; Plumbing Systems Replacement</li> <li>• Technology Upgrades</li> <li>• Tenant Improvements</li> <li>• Site Improvements</li> </ul>	\$42	\$42	\$42
<b>TOTAL COST (Construction Phase)</b>	<b>\$170 - \$190</b>	<b>\$175 - \$195</b>	<b>\$220 - \$240</b>

\*If deferred, future cost in five years: **\$91M**



# APPROACH COMPARISON MATRIX





# Approach Comparison Matrix

Department of Public Works

<b>PROJECT GOALS</b>	<b>BASELINE APPROACH</b>	<b>SHEAR WALL APPROACH</b>	<b>BASE ISOLATION APPROACH</b>
<b>EARTHQUAKE REPAIRS</b> - Performance equivalent to a new building		✓	✓
<b>HISTORIC IMPACTS</b> - Ability to maintain character defining features and historic listing	✓	✓	✓
<b>ACCESSIBILITY</b> - Ability to make building meet universal design and ADA	✓	✓	✓
<b>PUBLIC BENEFIT</b> - Time needed to restore Library to Public Use	✓	✓	
<b>BUILDING SYSTEMS</b> - Ability to upgrade the building systems without significant impacts	✓	✓	✓
<b>FUNCTION/FLEXIBILITY</b> - Ability to utilize spaces in the manner desired without impacts	✓	✓	✓
<b>COST EFFECTIVENESS</b> - Lowest cost that meets earthquake performance		✓	



Department of Public Works





# Public Outreach & Commissions

Department of Public Works

## Community Events

- May 24, 2023 – Community Outreach Meeting @ Jefferson School
- May 31, 2023 – West Pasadena Residents' Association Annual Meeting @ Maranatha High School
- July 8, 2023 – Farmers' Market Pop-Up Event @ Victory Park
- July 15, 2023 – Colorado Street Bridge Party Pop-Up
- August 1, 2023 – National Night Out Pop-Up @ Civic Center



# Public Outreach & Commissions

Department of Public Works

## Commission Presentations

- July 18, 2023 – Historic Preservation Commission
- July 19, 2023 – Library Commission
- July 25, 2023 – Design Commission
- Each commission commented and supported staff's recommendation of proceeding with Concrete Shear Wall Approach



# NEXT STEPS & SCHEDULE



# Next Steps

## Department of Public Works

- Proceed with environmental & final design
- Further structural analysis & materials testing
  - > Seek opportunity to minimize impact to building's structure and its historic fabric
- Find ways to economize for cost efficiency
- Continue community outreach
- Present funding strategy to City Council



# Project Schedule

Department of Public Works

- Schematic Plans & Cost Estimate Fall 2023
- 60% Design Plans & Cost Estimate Spring 2024
- Potential Bond Measure November 2024
- 100% Plans & Plan Check Spring 2025
- Bid & Construction Contract Award  
(pending construction funding) Summer 2025
- Anticipated Construction Duration 30-36 months
- Projected Construction Completion Late 2028







# Recommendation

Department of Public Works

Direct staff to proceed with the Concrete Shear Wall structural retrofit approach for the Central Library Earthquake Retrofit and Repair project.



**Thank you!**