Integrated Project Delivery Spawns Innovation

PEER SEMM SEMINAR

November 8, 2010

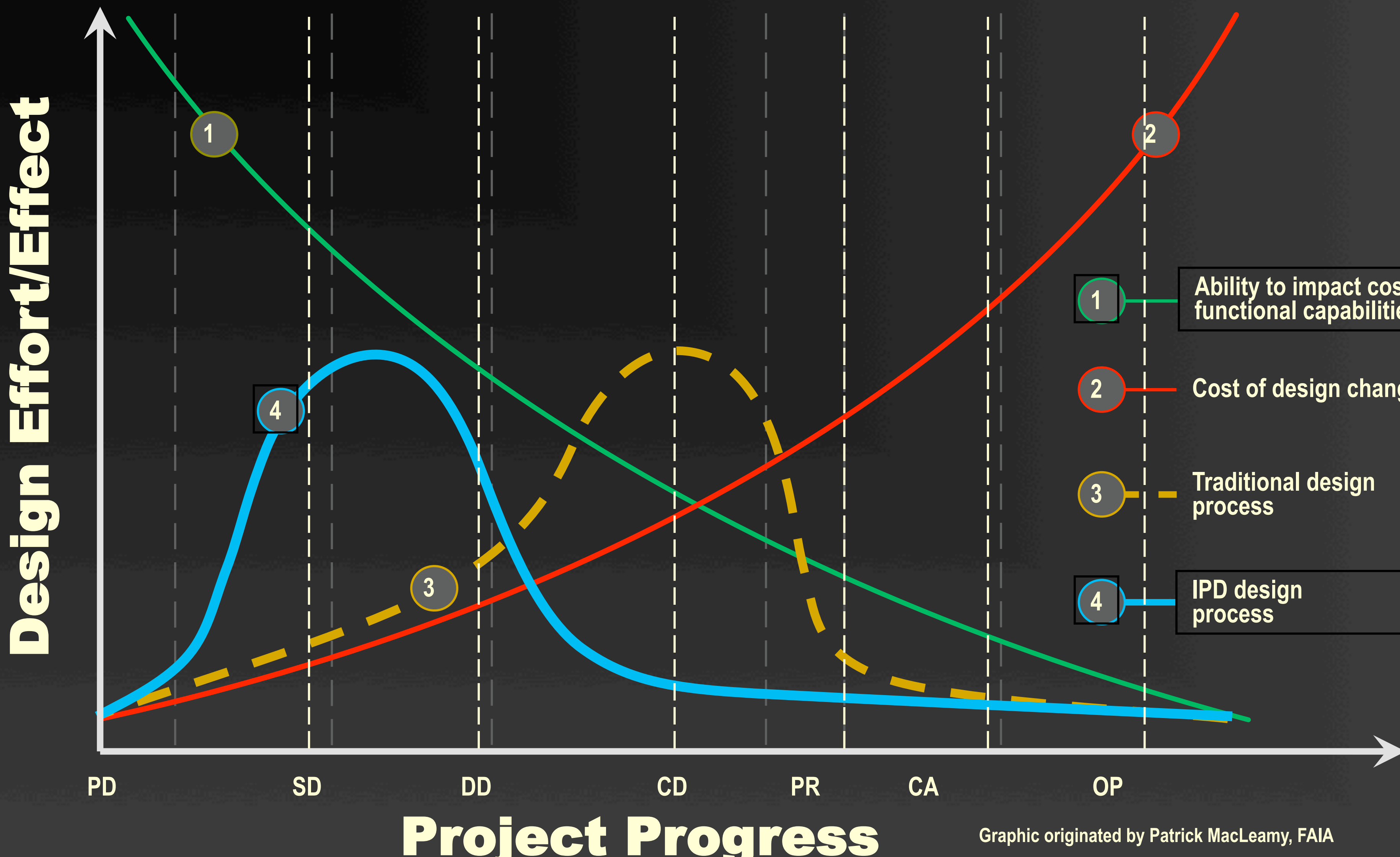
Traditional Project Delivery

- Design- Bid- Build
- Silo- based
- Inefficient
- Costly
- Litigious
- Does not encourage innovation
- Limited “value added” to project owner

What is IPD?

- Integrated and team-based approach to project delivery
- Early involvement of key team members
- Early resolution of issues
- More communication, sooner

What is IPD?



Graphic originated by Patrick MacLeamy, FAIA

What is IPD?

- Collaborative process
- Alignment of goals
- Collectively developed, validated, and tracked performance targets
- Collective Project Control
- Shared risk/reward based on the project outcome

IPD Requires:

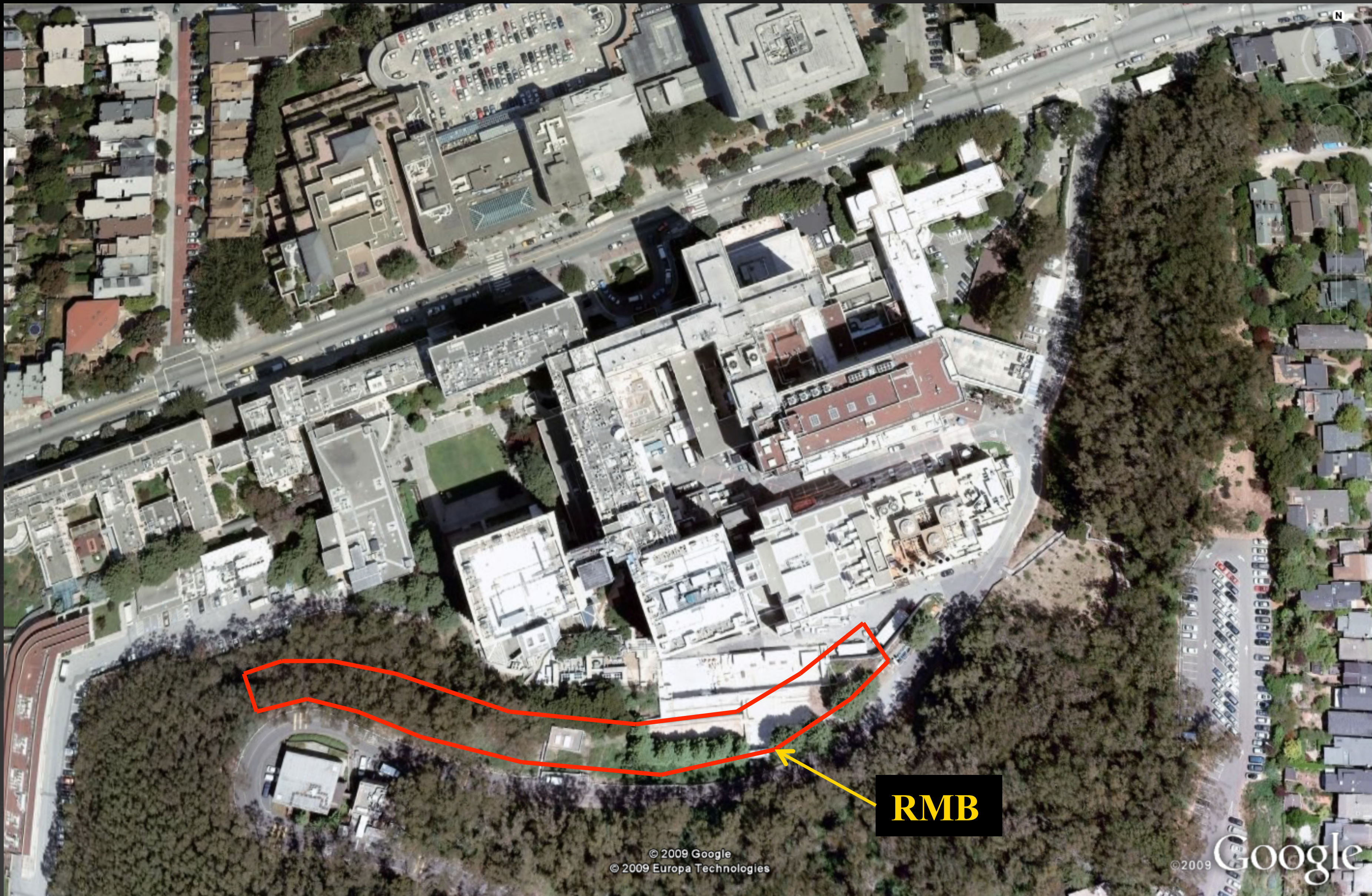
- Broad understanding of design and construction issues by all members
- Knowledge of the challenges of all players
- Commitment to <u>Team</u> success
- Enhanced communication
- Easy and timely access to information by using shared models

UCSF Regeneration Medicine Building – A Case Study

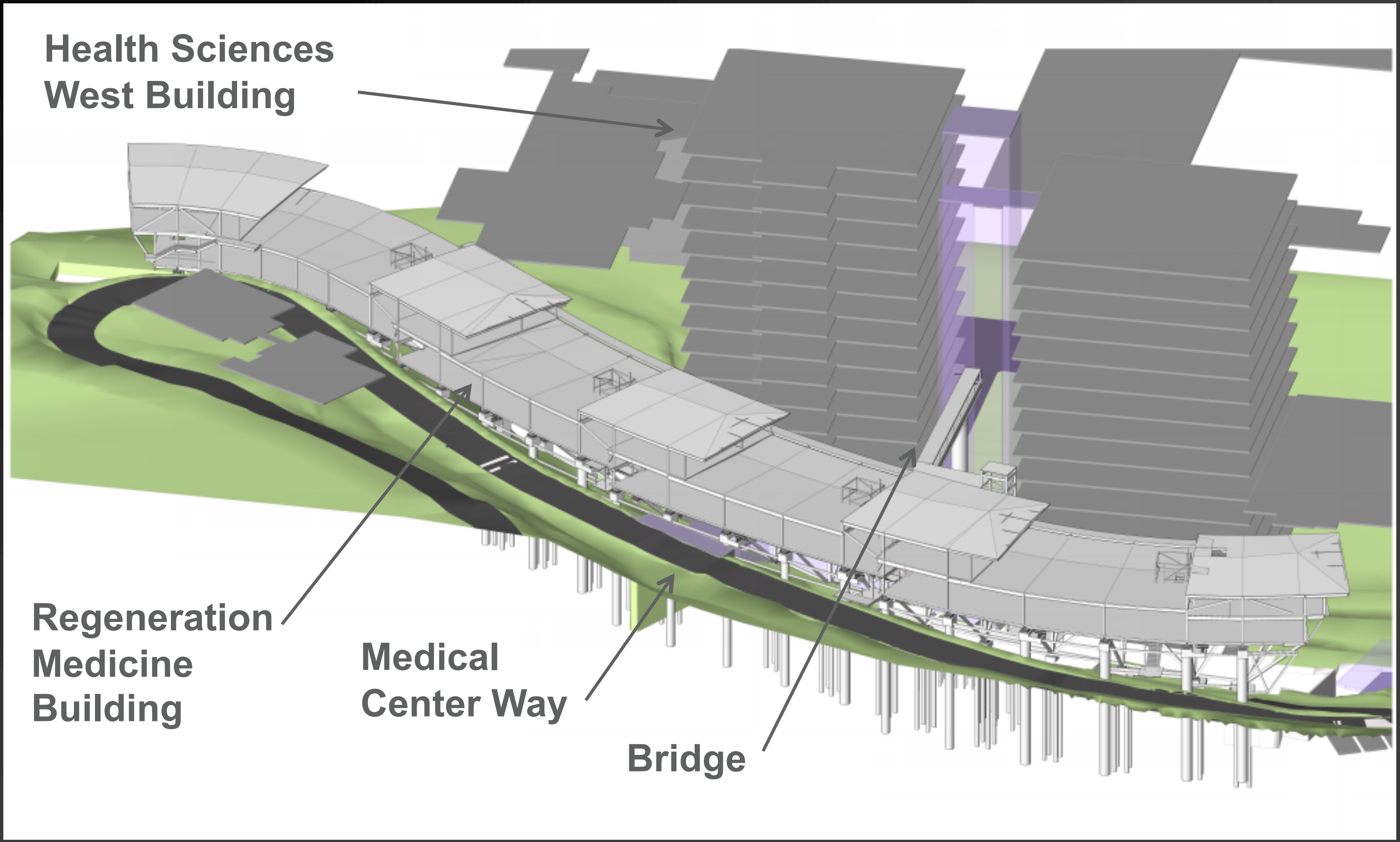
Project Team

Owner:	UCSF
Owner's Rep.:	Nova Partners
Contractor:	DPR Construction
Architect:	SmithGroup, Inc.
Structural:	Forell/Elsesser Engineers
Civil:	Creegan + D'Angelo
Mechanical:	ACCO Engineered Systems
Electrical:	Cupertino Electric

Parnassus Campus



Project Site

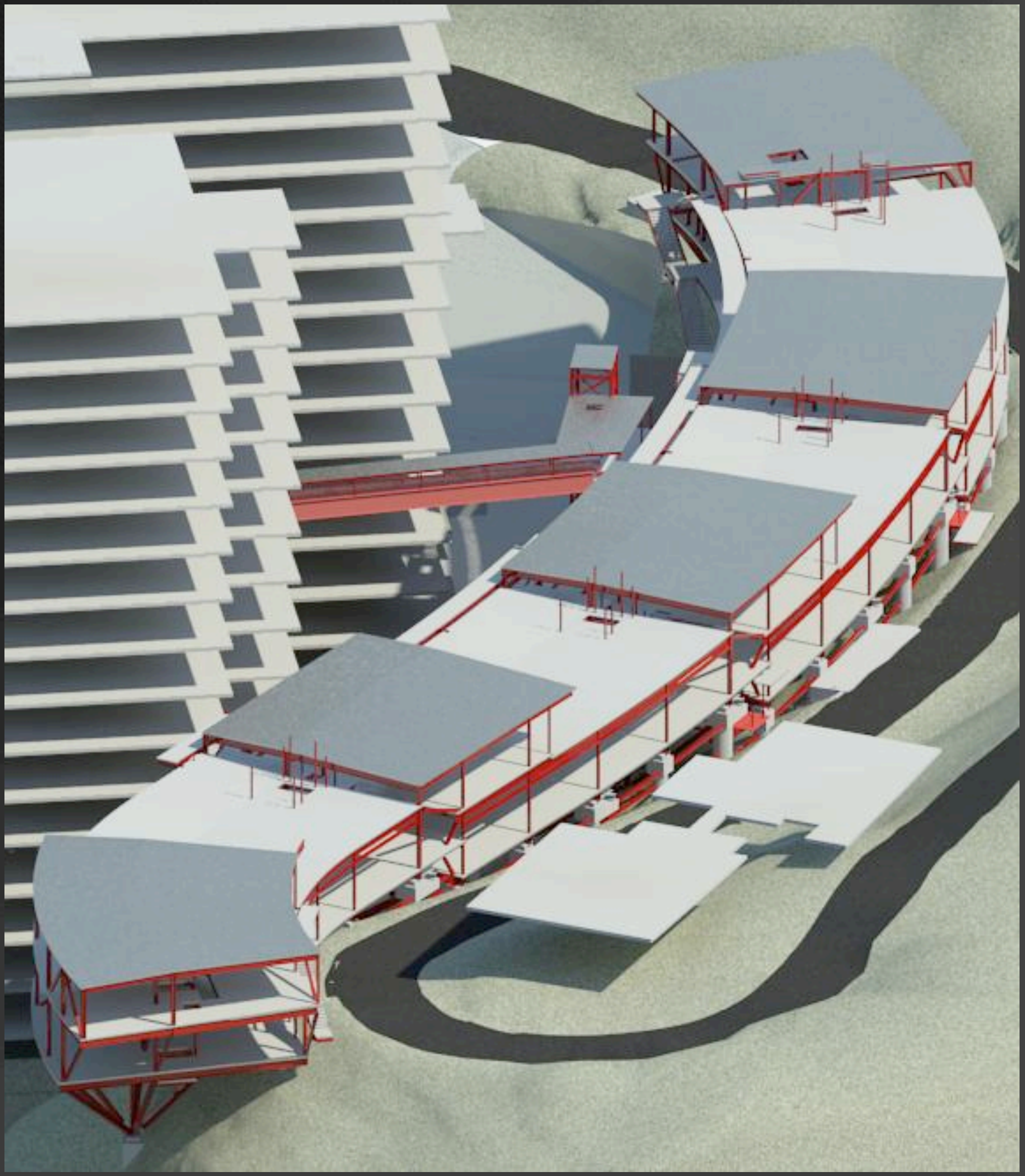


Project Funding

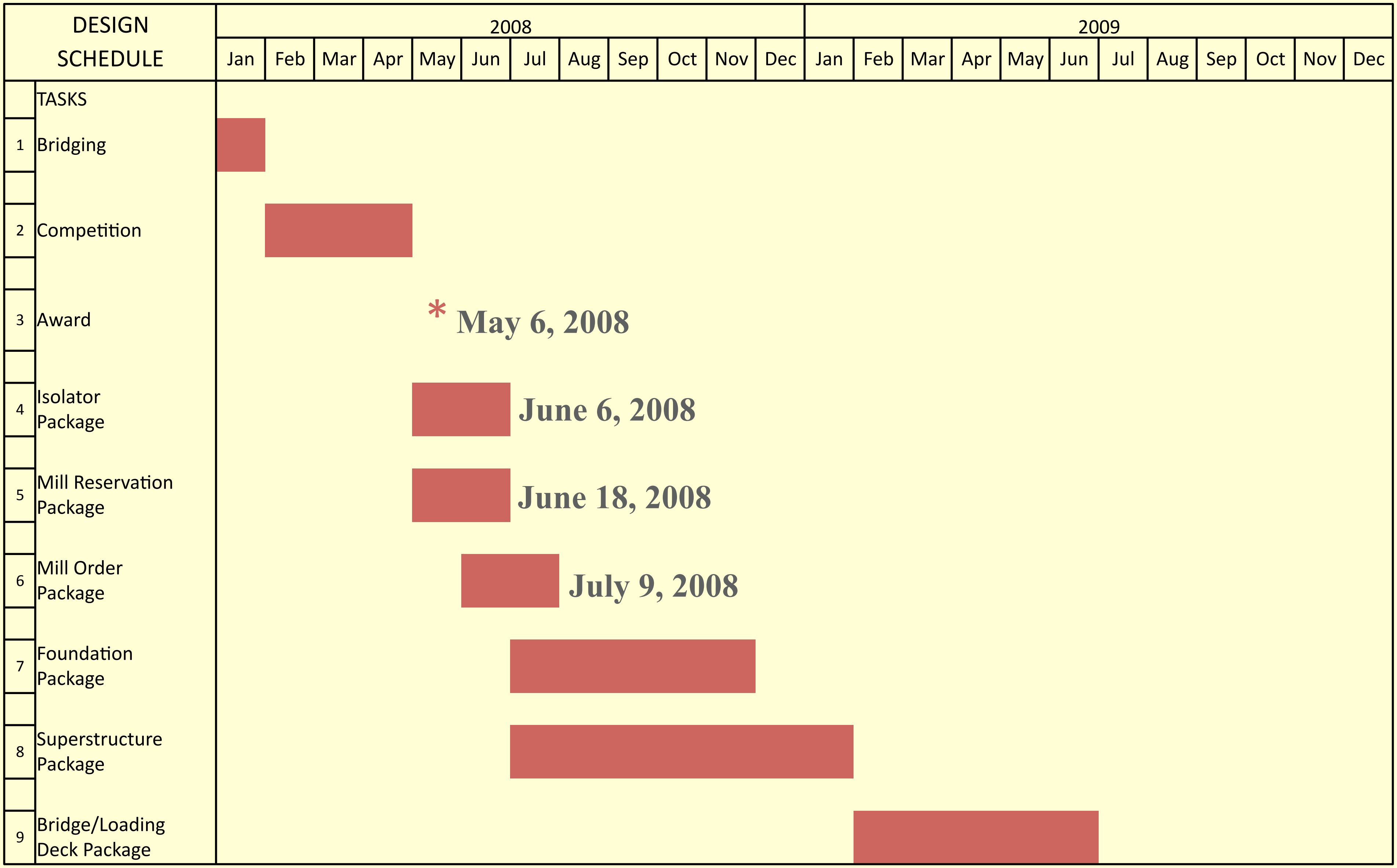
- Project Cost: $119M
- Construction: $76M
- CIRM Funds: $35M
- Balance: UCSF + Private Donations

Delivery Method

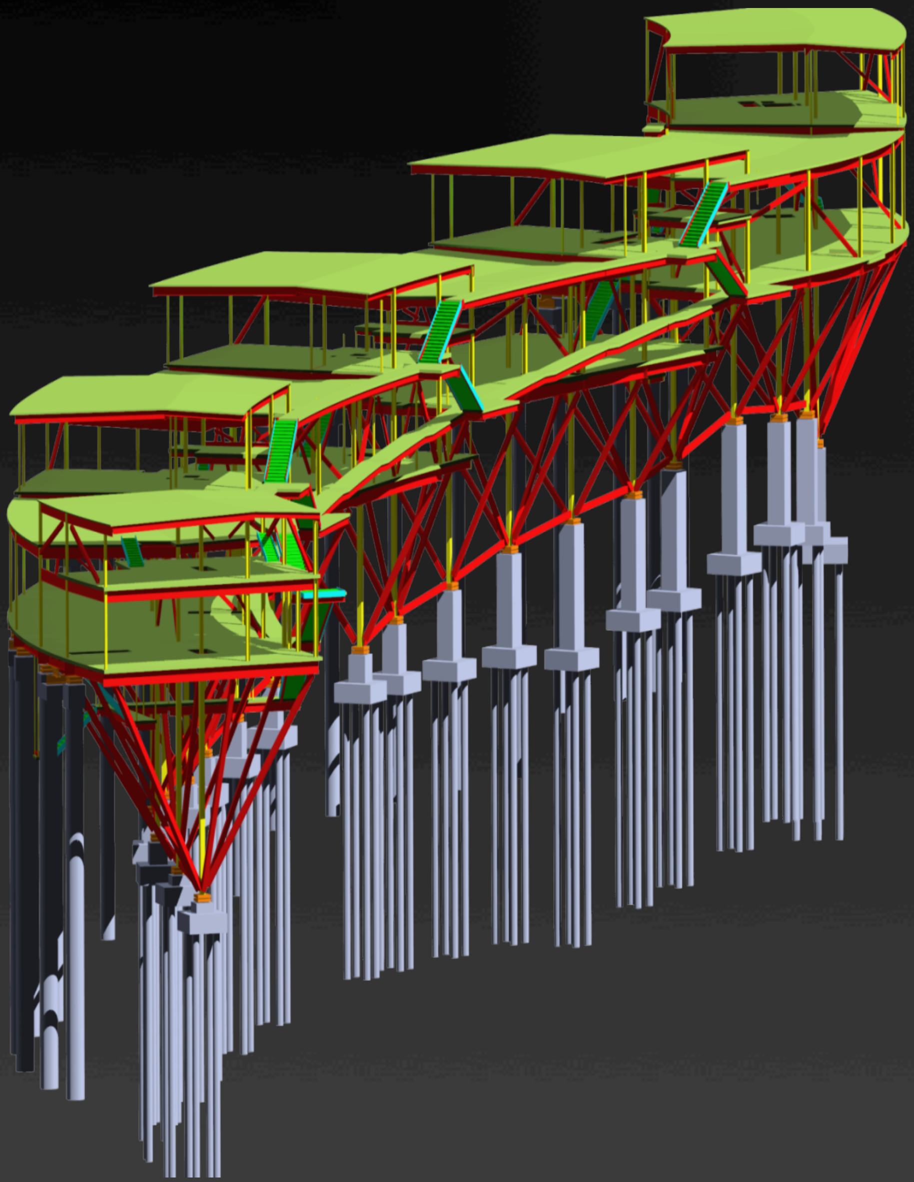
- Bridging Design
  - RVA/NYA
- Design/Build Competition
  - Funded Competition
  - Best Value Selection
- Results
  - Reduced Construction Cost $20 million
  - Reduced Overall Project Schedule 2 years



Design Process



IPD Characteristics



- Collaborative Relationship Between Owner and D-B Team
- Major Consultants and Sub-Contractor's On-Board Early
- Engagement with Bridging Team (RVA / NYA)
- Collectively Manage Owner's Contingency
- Incentive Program
- Effective Use of BIM

IPD Advantages

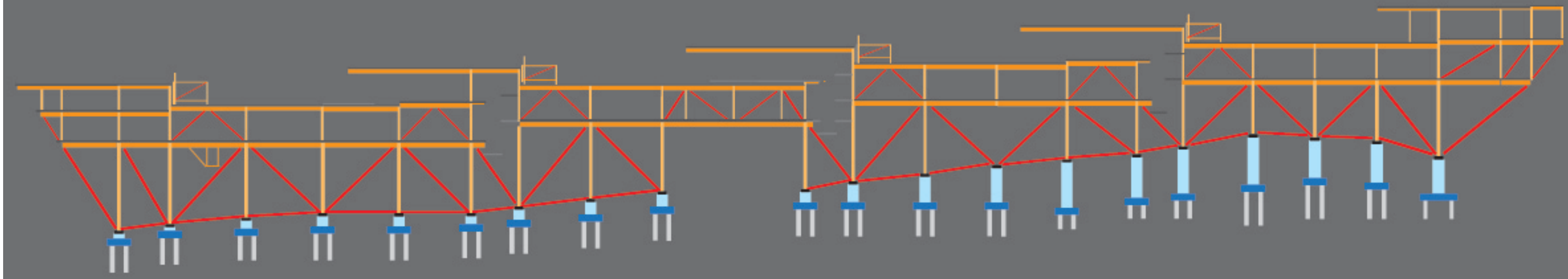
- Integrated Design Process
- Constructability Input
- Cost /Benefit Analysis
- Quick Resolution of Unforeseen Conditions

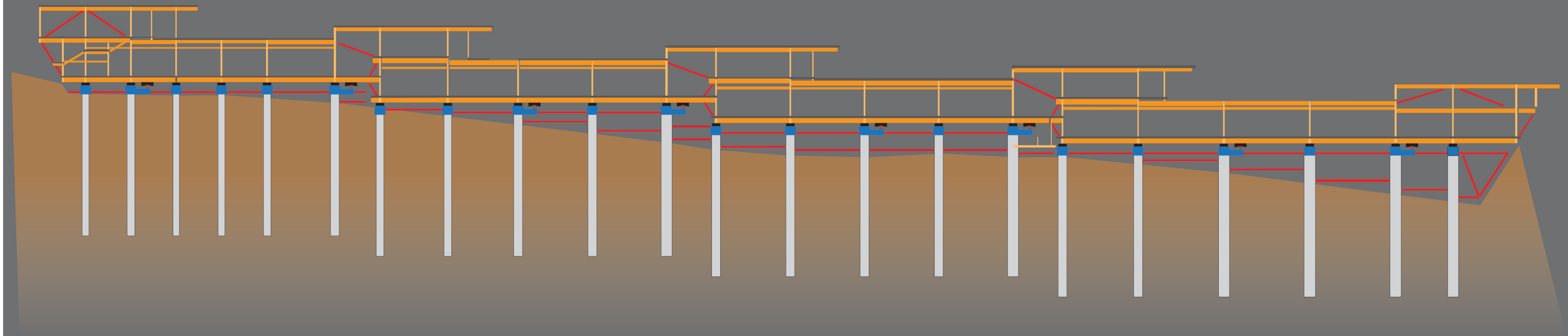
IPD Disadvantages

- Design Management
- Multiple Scheme Review
- Scope Creep

Plan Views

Elevations





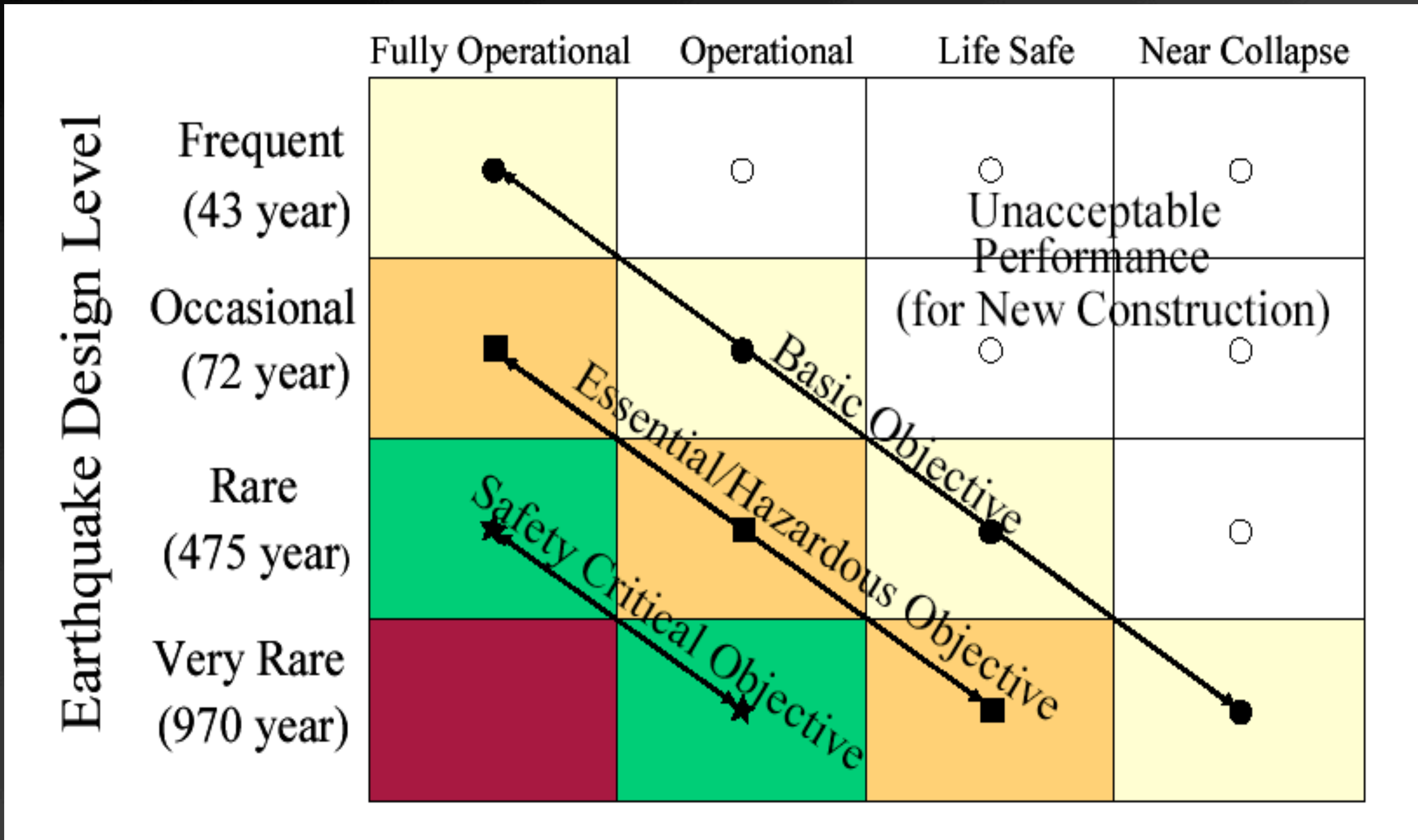
Bridge Structure

REVIT Model

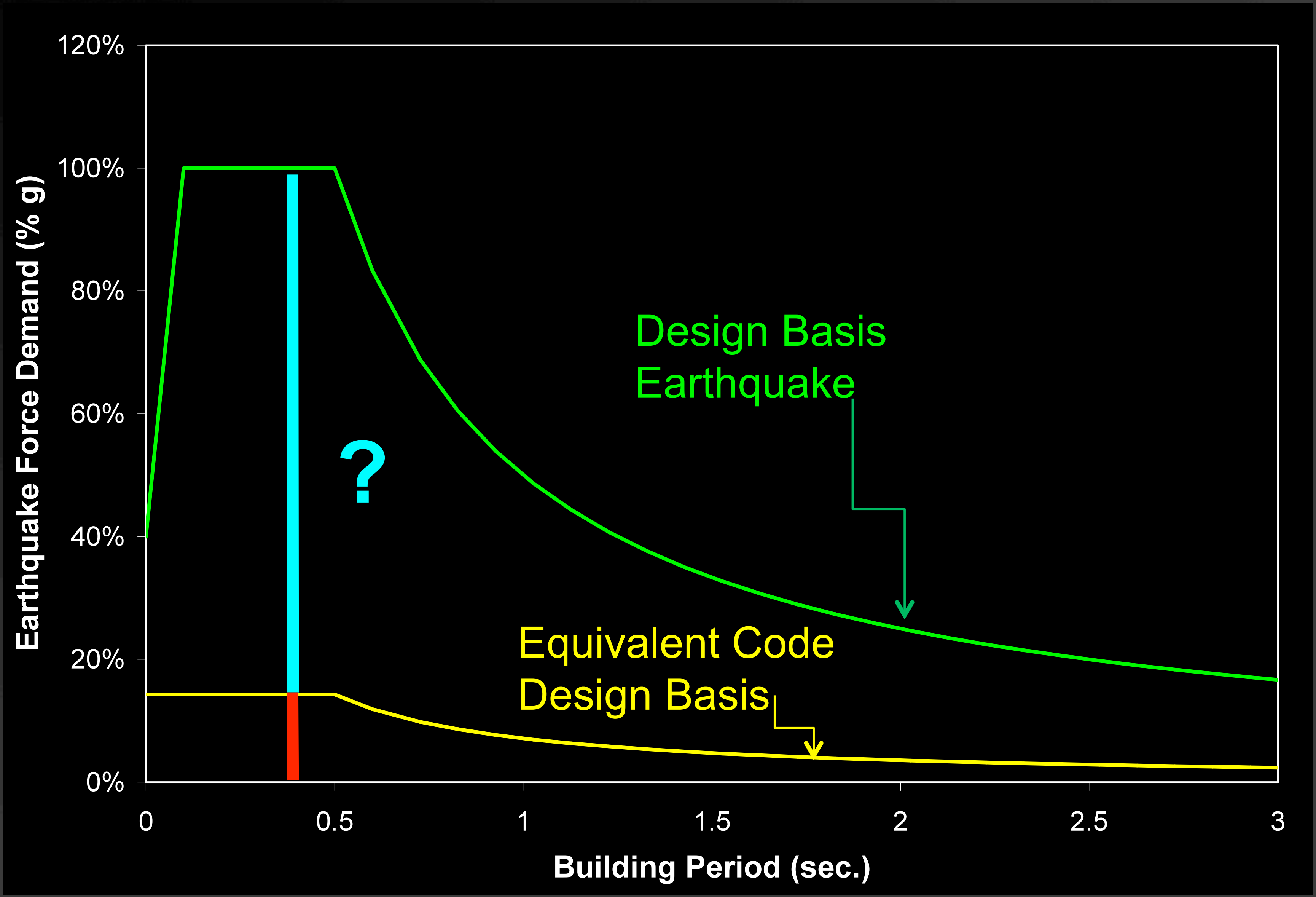
Structural Design Criteria

- Seismic Design Intent
  - DBE (475-YR): Fully Operational
  - MCE (970-YR): Operational
  - Structural Peer Review

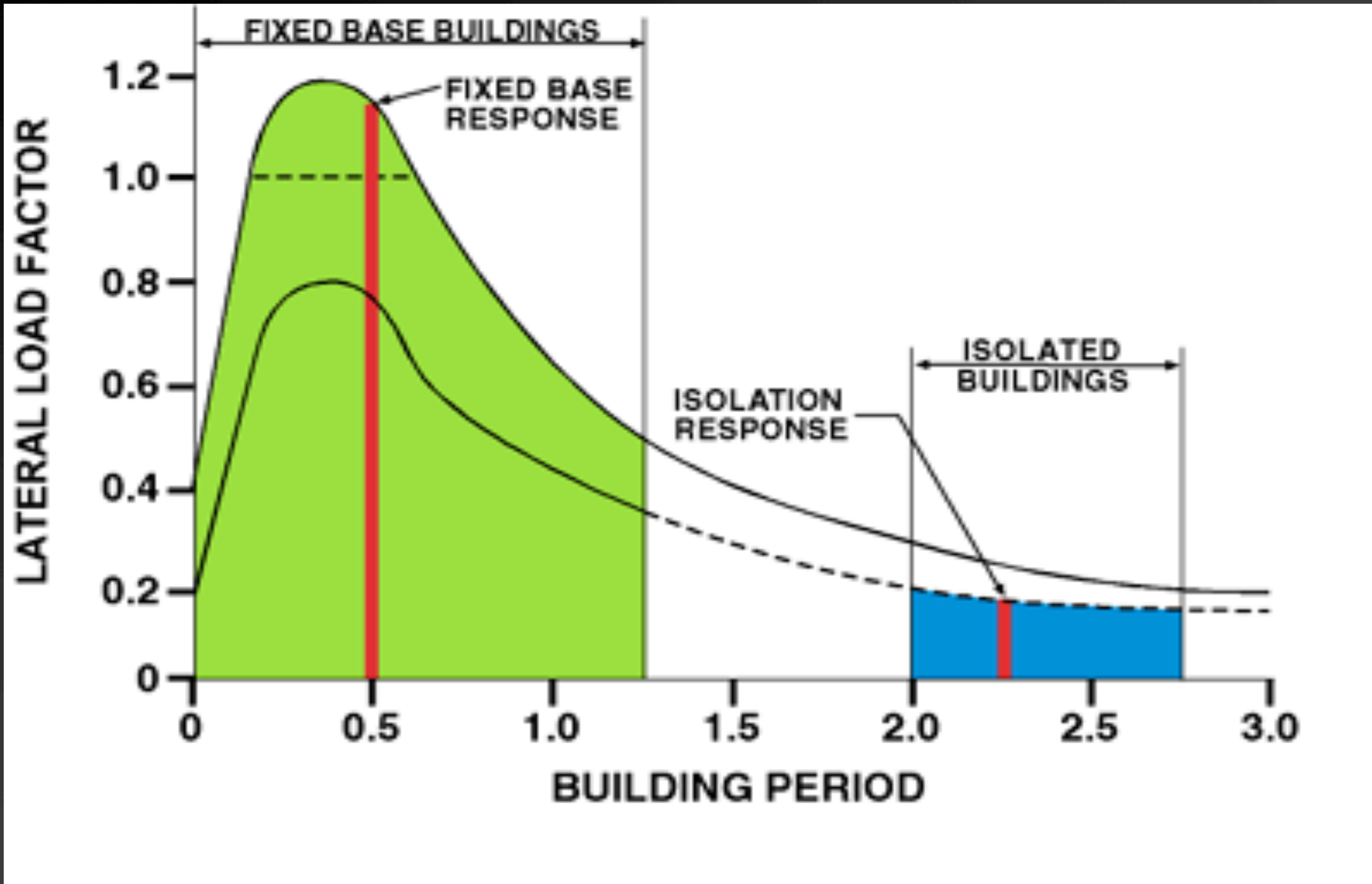
Earthquake Performance Levels



Code Design Basis for Conventional Structural Systems

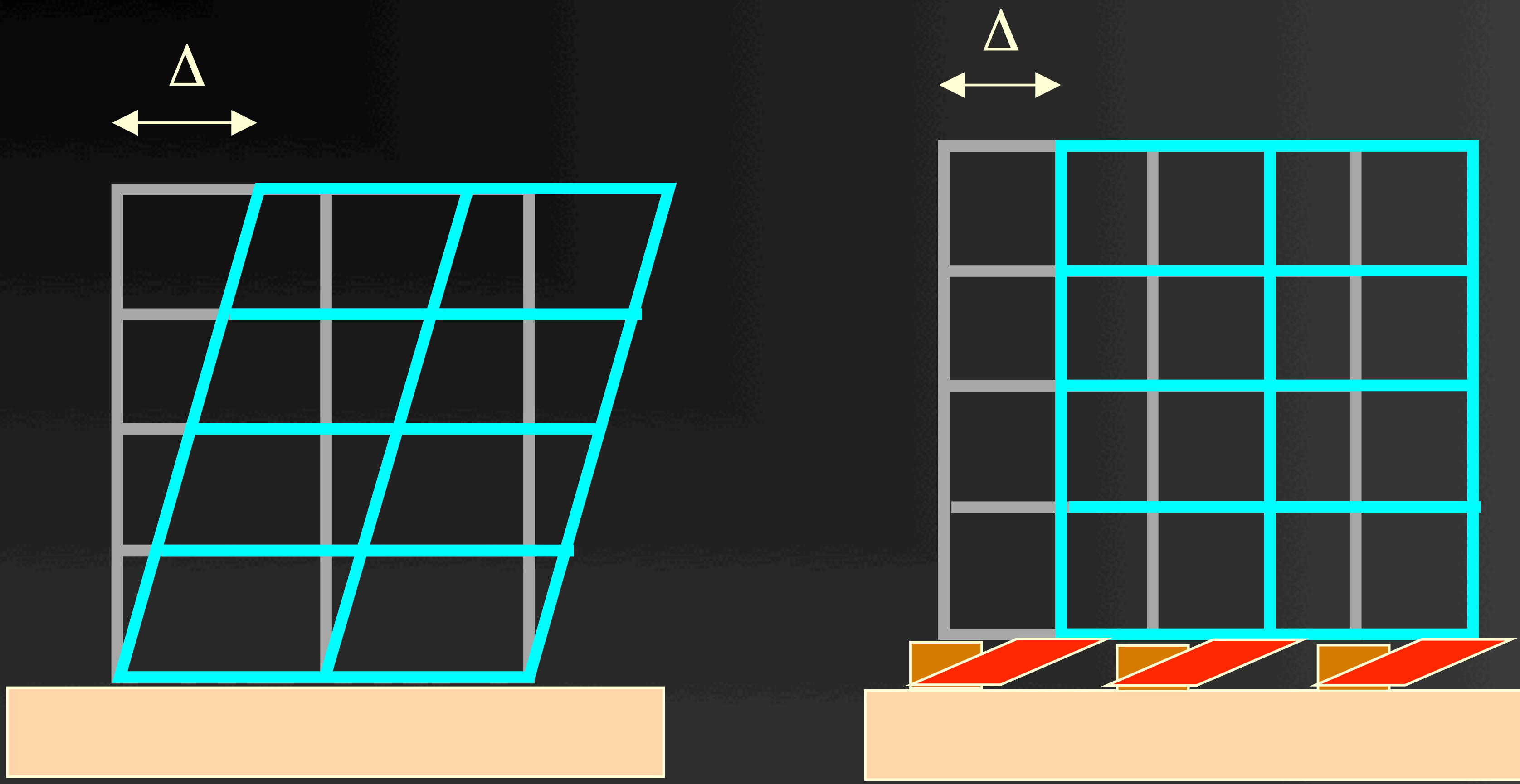


Base Isolation Advantage



Seismic Isolation Benefit

Altered Seismic Behavior

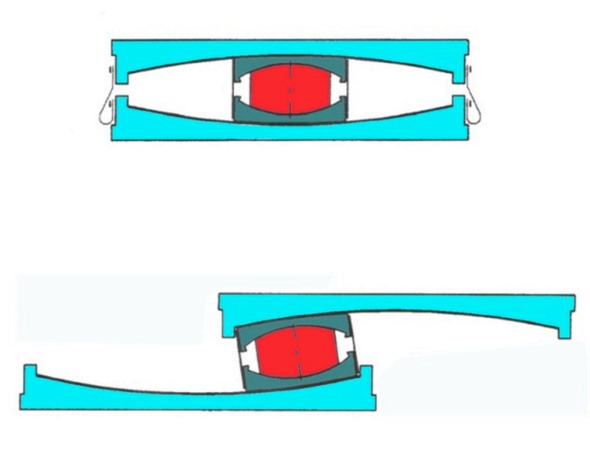


Large Interstory Drift

Small Interstory Drift

Friction Pendulum Isolator

Final Condition



Isolator Cross Section

Prototype Test

Design Considerations

- Site Conditions
- Complex Geometry
- Exposed Structure

Site Conditions

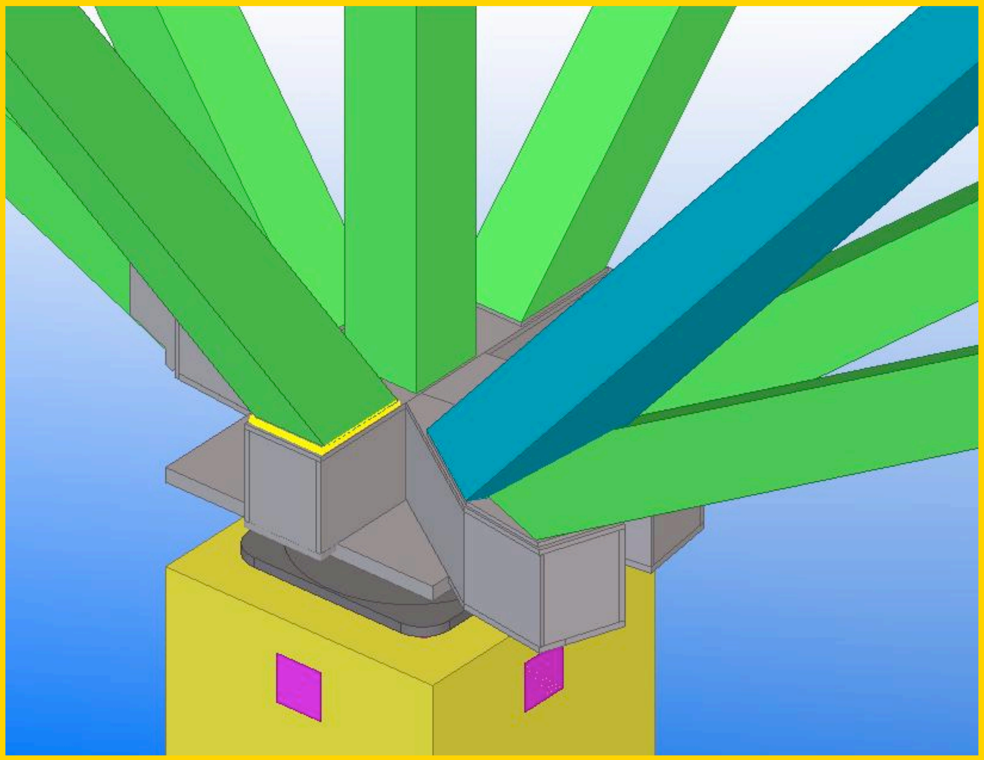
- Site Conditions
  - Steep Hill
  - Slide Zone
  - Existing Pump House

Geometry

- Geometry
  - Radial Grids
  - Varying Grades
  - Column Tree Design

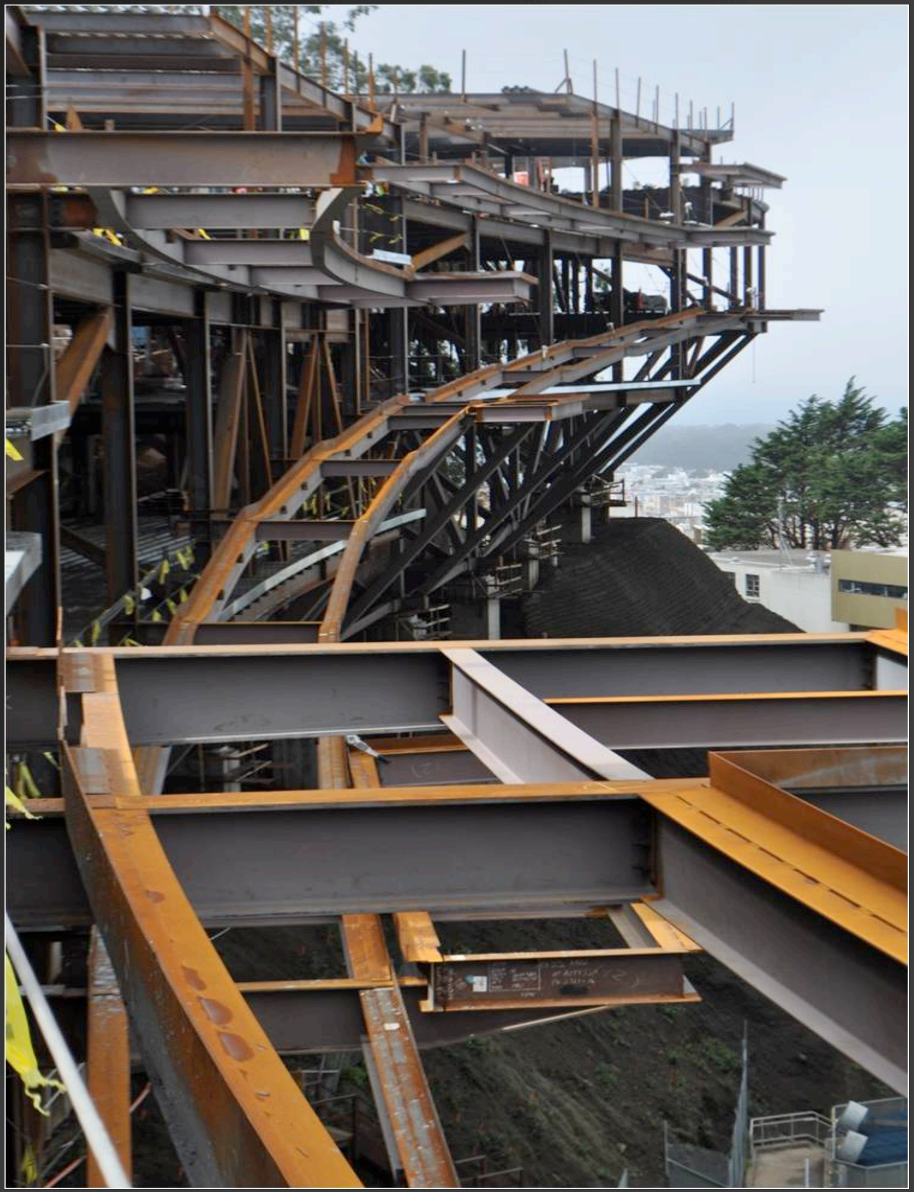
Geometry

TEKLA Model



Exposure Requirements

- Exposed structure considerations
  - Aesthetics
  - Corrosive Environment



Seismic Isolation Challenges

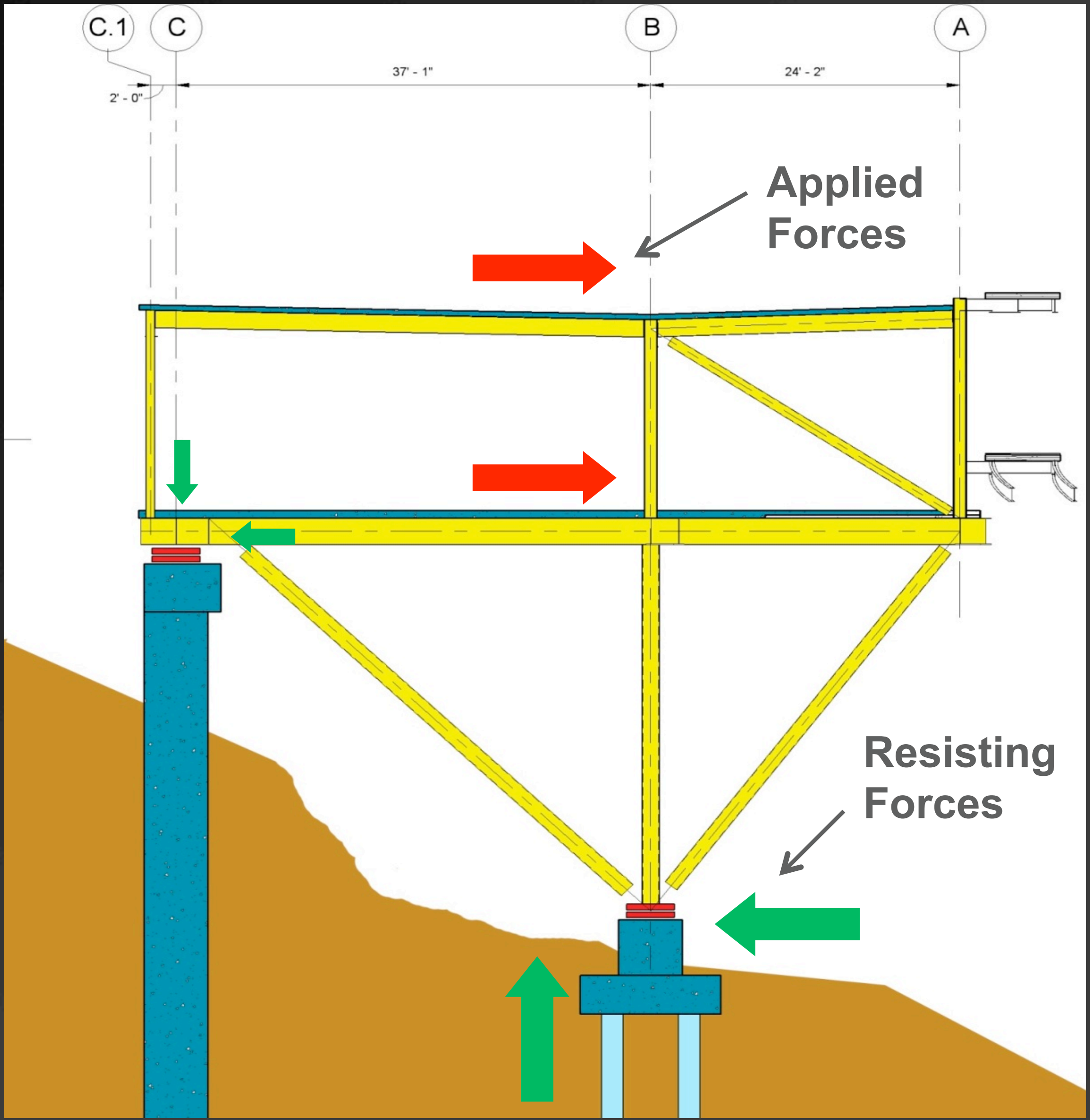
- Drilled Pier Properties
- Seismic Overturning
- Isolator Uplift

Drilled Piers

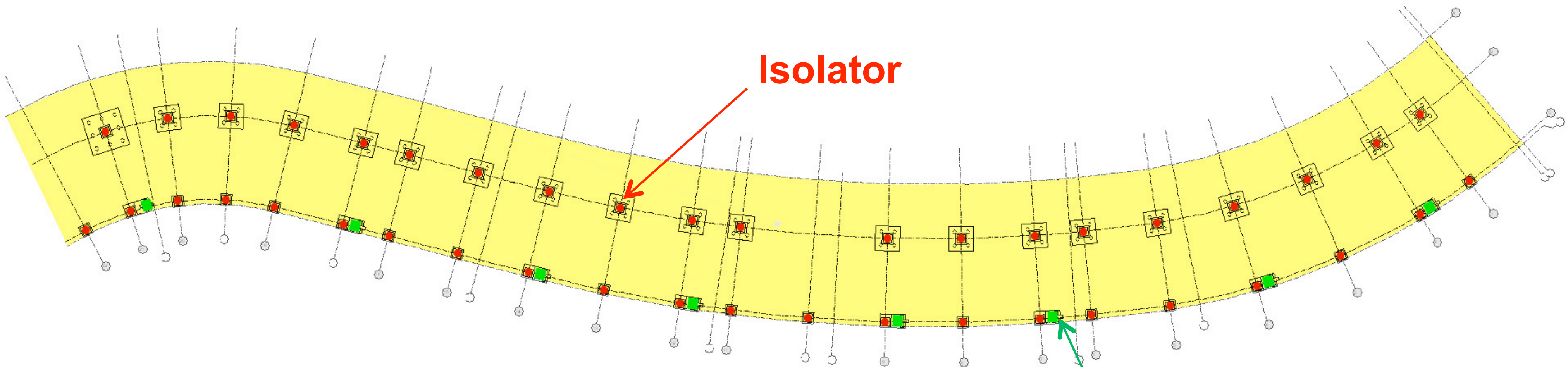
- Drilled Piers
  - Variable Heights
  - Variable Diameters

Seismic Overturning

- Overturning
  - Narrow Structure
  - Minimal Dead Load on Uphill Side
  - No Tension Capacity in Isolators

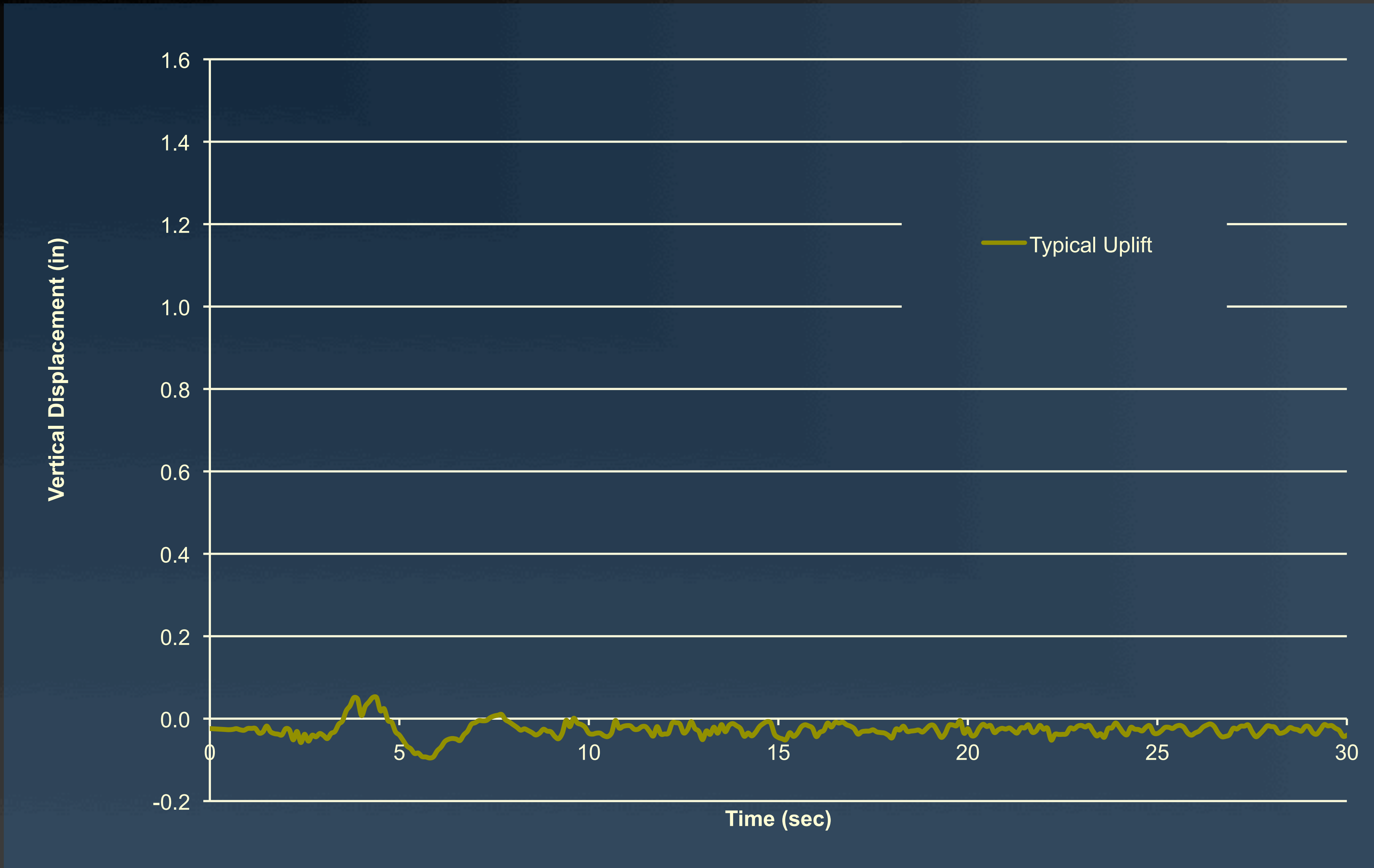


Isolator Plan View

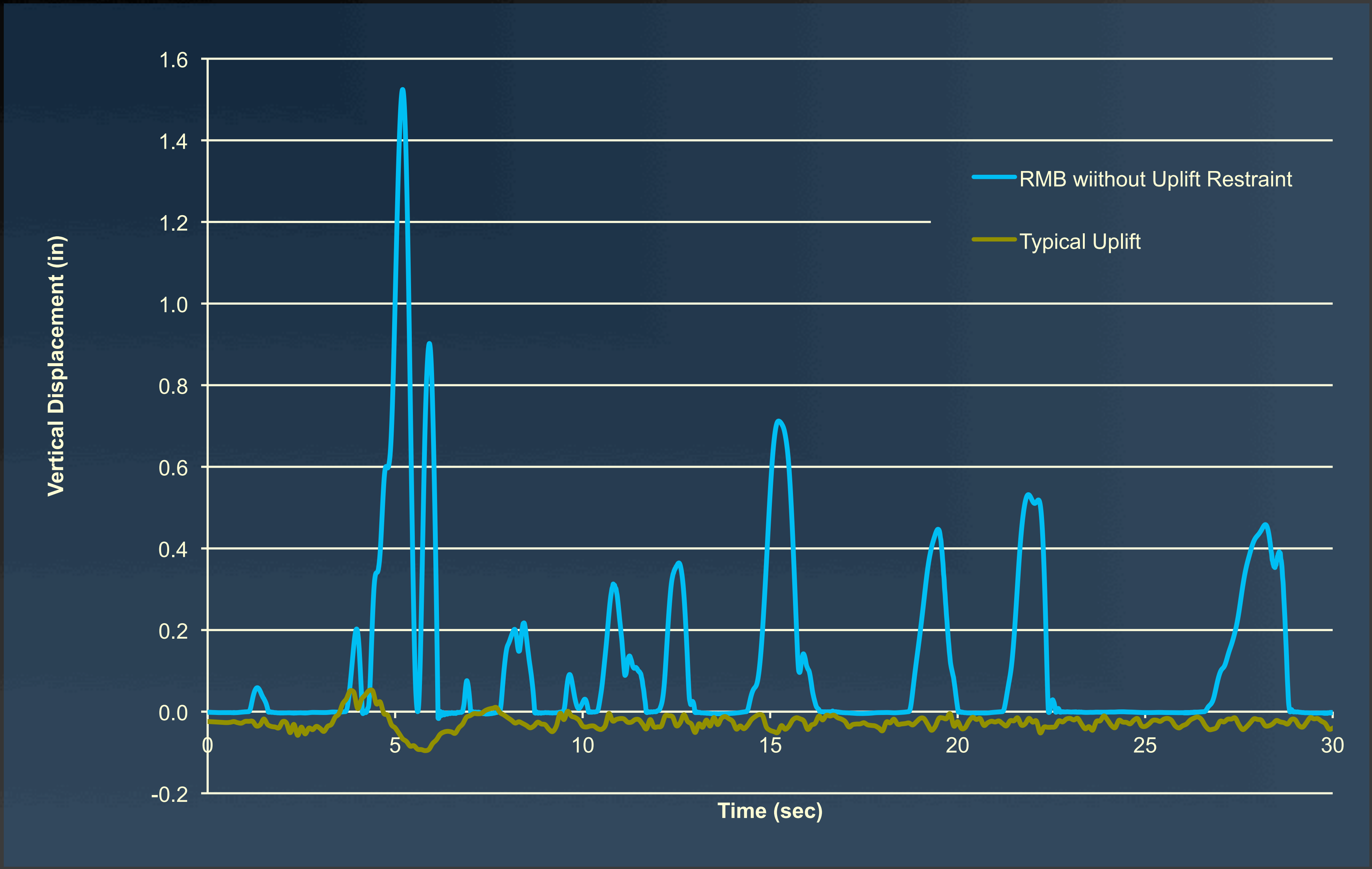


- 42 Friction Pendulum Isolators
- 8 Dynamic Uplift Restraints

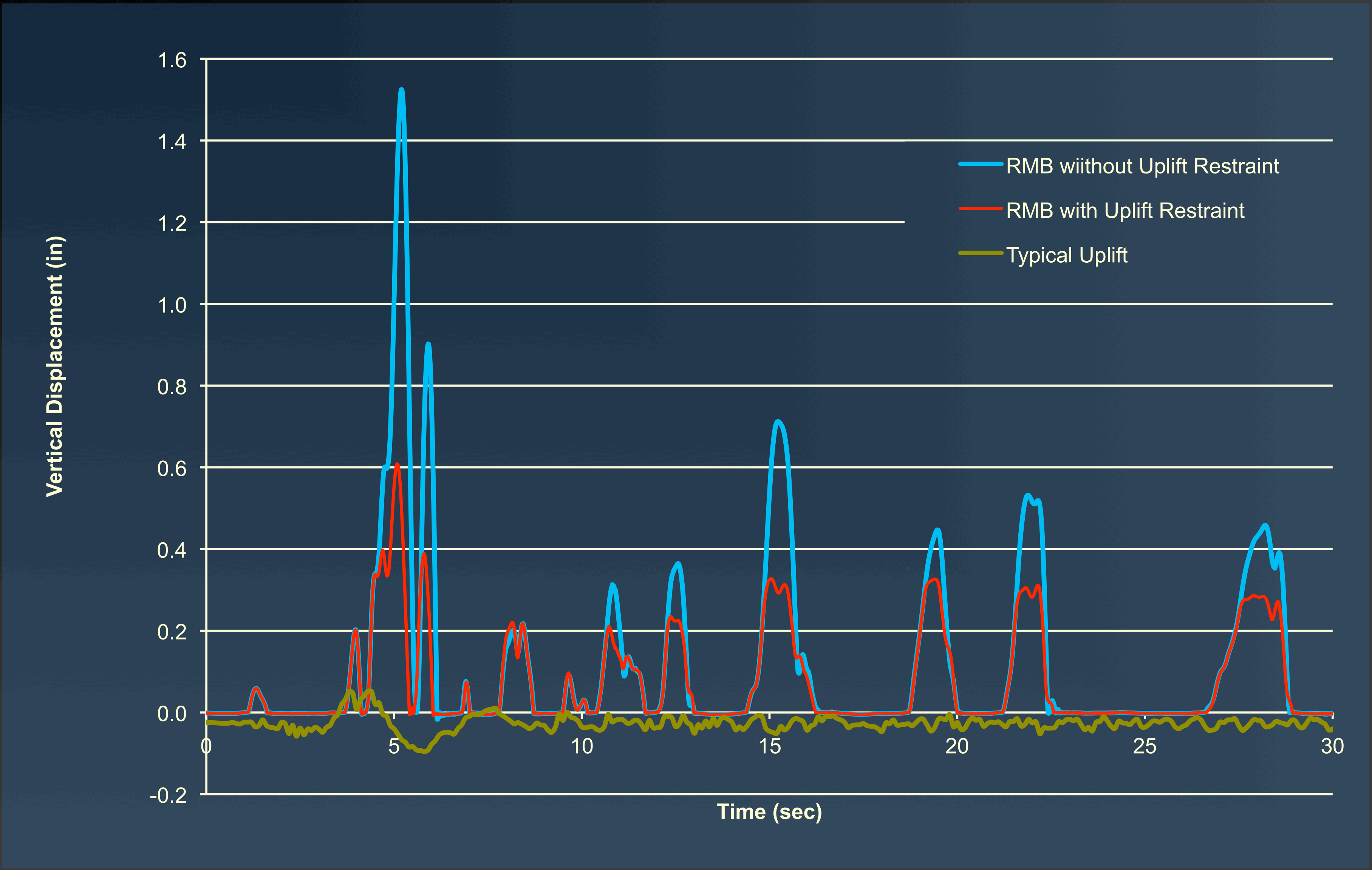
Typical Isolator Uplift



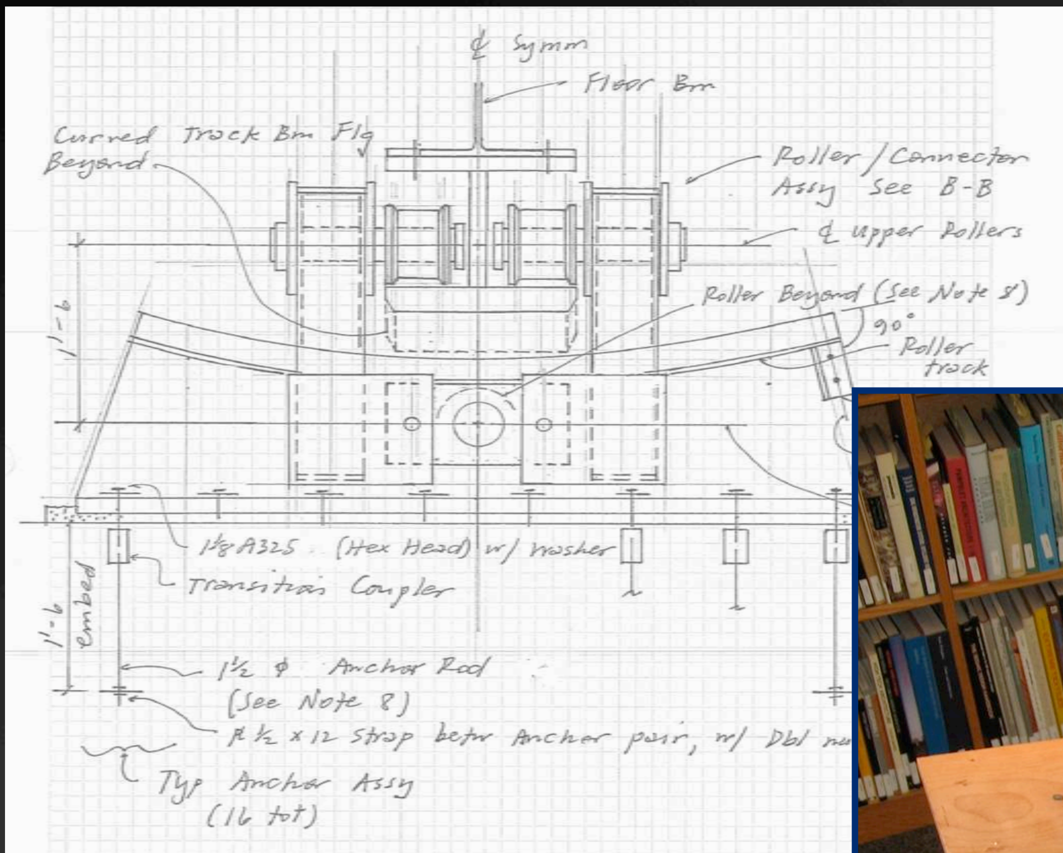
RMB without Uplift Restraint



RMB with Uplift Restraint

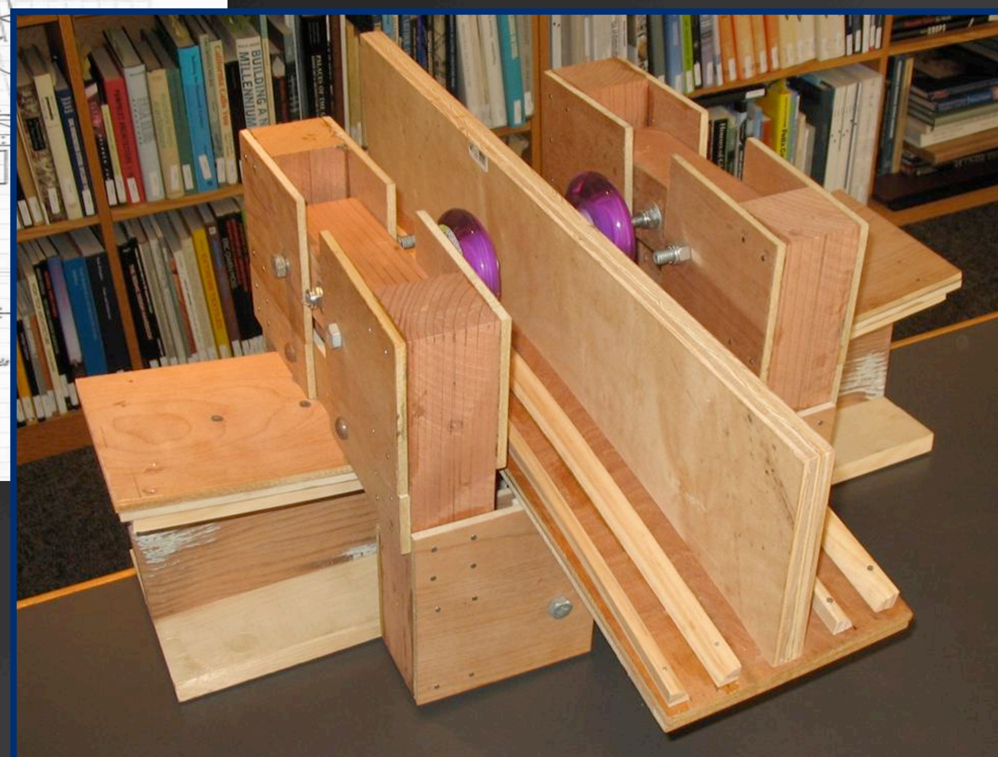


Uplift Restraint Design

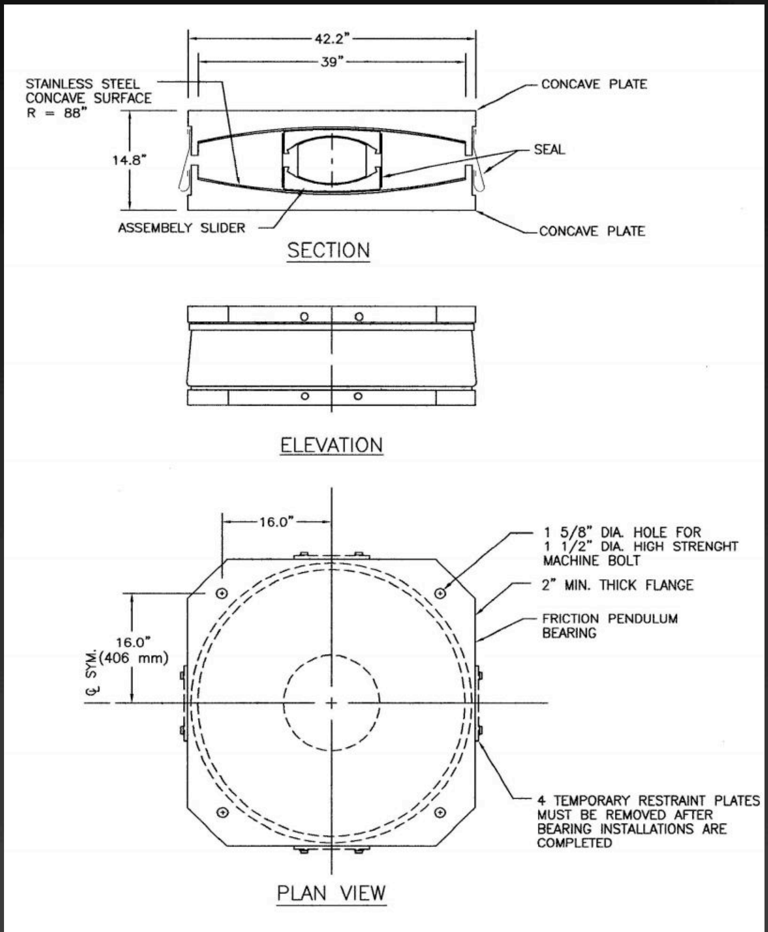


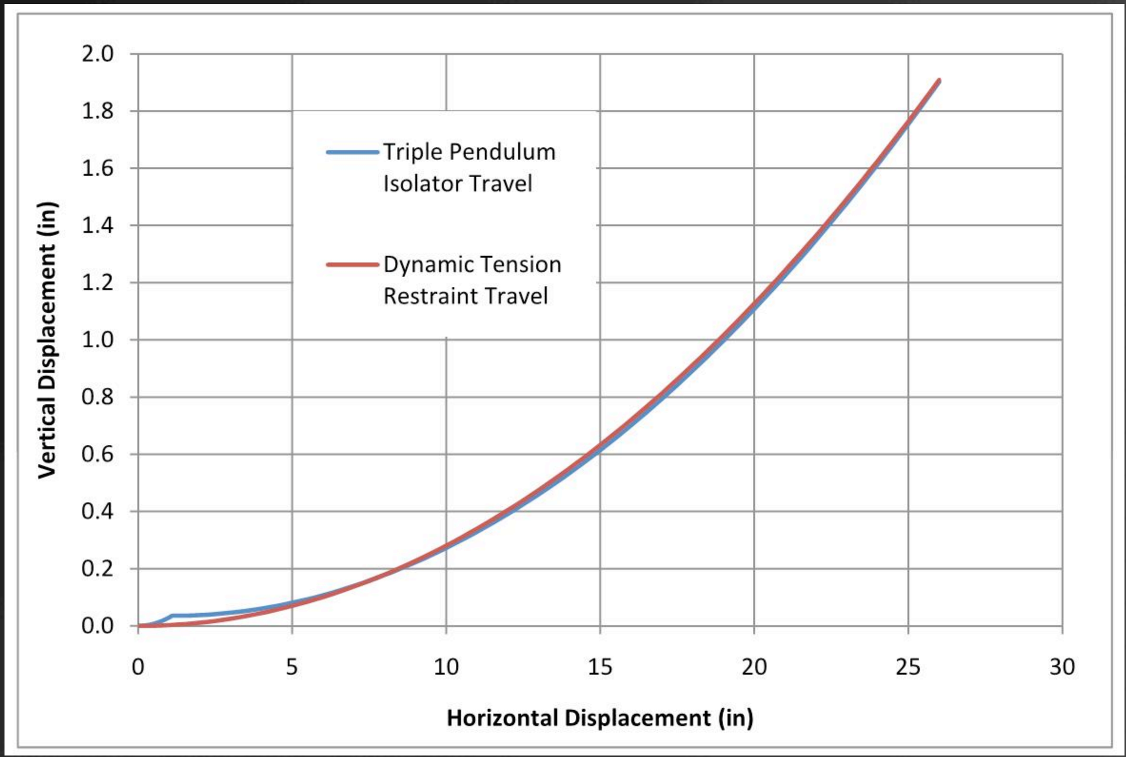
Concepts

Mockup

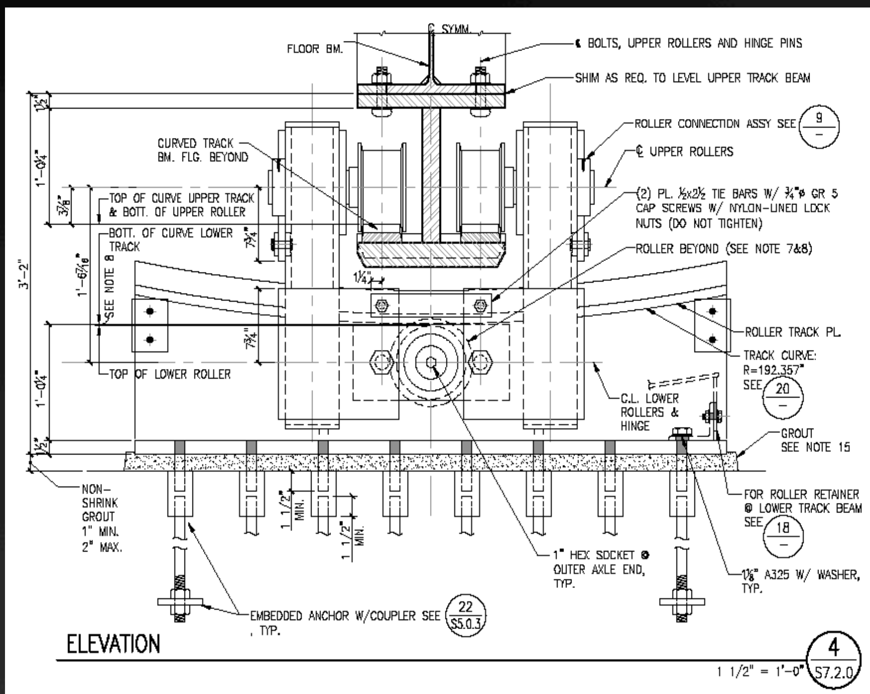


Uplift Restraint Travel





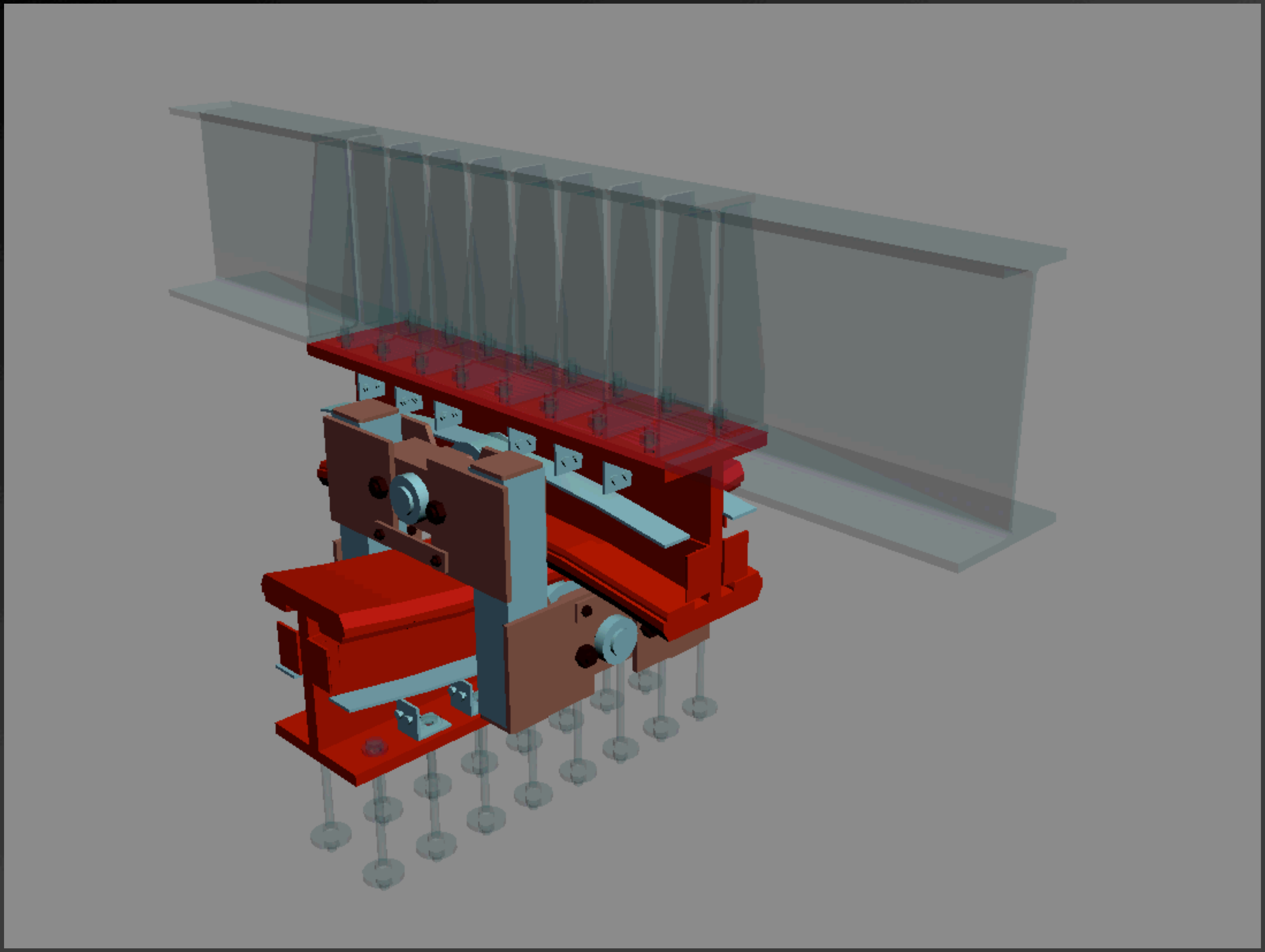
Uplift Restraint Design



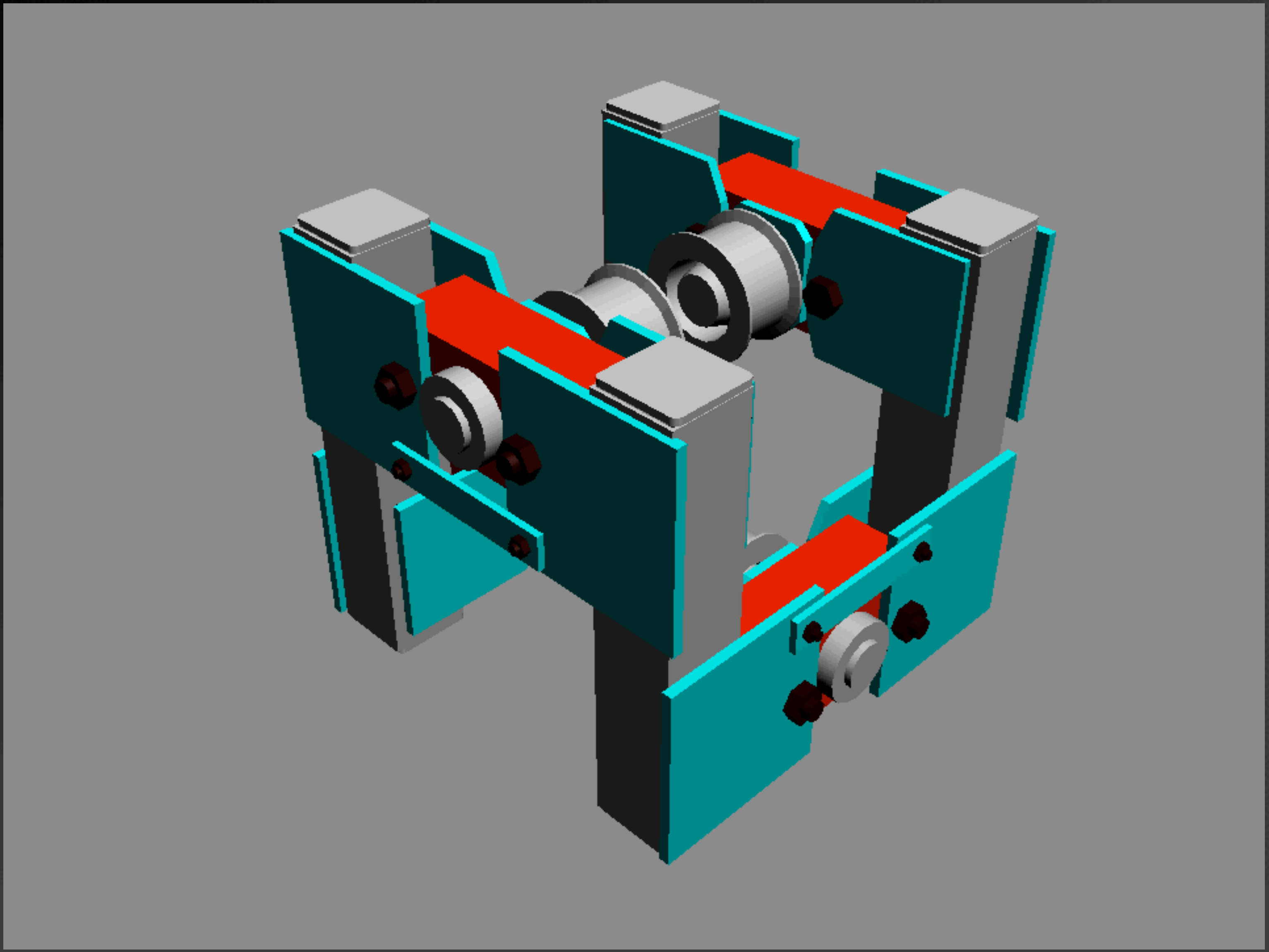
Working Drawings

Prototype

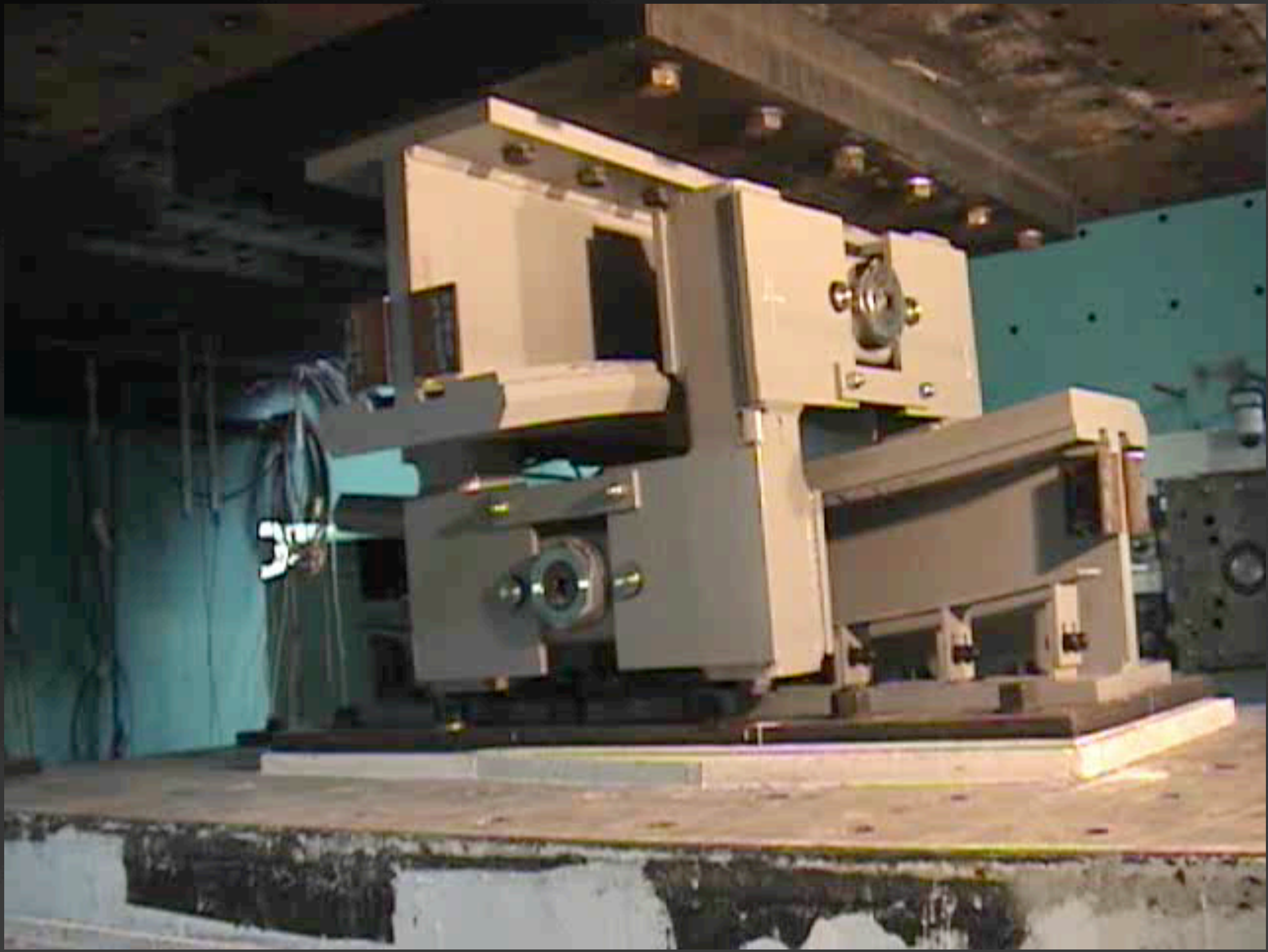
Uplift Restraint Simulation



Sub-Assemblage Simulation



Uplift Restraint Test



Uplift Restraint Installation


Questions?