

9th California Unified Program
Annual Training Conference

CalARP Seismic Assessment Overview

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February 12-15, 2007

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Seismic Assessments Support a RMP

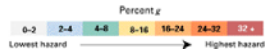
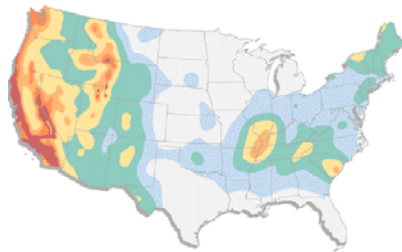
- Program 2 or 3 Component
- External Events Analysis

RMP Lead Provides Equipment List

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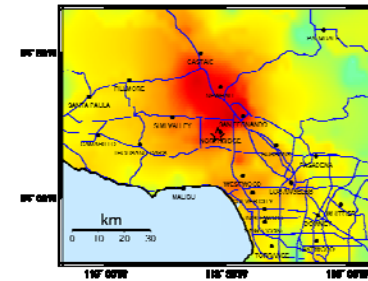


Predicted Seismic Activity

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V	Weak		Medium		Strong		Very Strong		Extreme		Notes
	min	max	min	max	min	max	min	max	min	max	
0.05-0.10	0.10	0.15	0.15	0.20	0.20	0.25	0.25	0.30	0.30	0.35	0.35
0.10-0.15	0.15	0.20	0.20	0.25	0.25	0.30	0.30	0.35	0.35	0.40	0.40
0.15-0.20	0.20	0.25	0.25	0.30	0.30	0.35	0.35	0.40	0.40	0.45	0.45
0.20-0.25	0.25	0.30	0.30	0.35	0.35	0.40	0.40	0.45	0.45	0.50	0.50
0.25-0.30	0.30	0.35	0.35	0.40	0.40	0.45	0.45	0.50	0.50	0.55	0.55
0.30-0.35	0.35	0.40	0.40	0.45	0.45	0.50	0.50	0.55	0.55	0.60	0.60
0.35-0.40	0.40	0.45	0.45	0.50	0.50	0.55	0.55	0.60	0.60	0.65	0.65
0.40-0.45	0.45	0.50	0.50	0.55	0.55	0.60	0.60	0.65	0.65	0.70	0.70
0.45-0.50	0.50	0.55	0.55	0.60	0.60	0.65	0.65	0.70	0.70	0.75	0.75

1994 Northridge Earthquake Loads

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Why Perform A Seismic Evaluation Of An Existing System?

- Older Equipment
- Deterioration
- Not Engineered
- Not Maintained

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Seismic Guidance Document

- CalARP Program Seismic Guidance Committee
- Region I Local Emergency Planning Committee (LEPC)
- OES Administering Agency Guidance Resource

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Seismic Guidance Document Development

1990 – Initial Issue

1992 – Revised / Expanded

1998 – Revised / Expanded

2004 – Revised / Expanded

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Seismic Guidance Document

- Latest Issue January 2004
- Three Significant Changes Since 1998 Version
 - Updated Seismic Evaluation Requirements To Be Compatible With Current Design Rules
 - Updated For Five-Year Revalidation Process
 - Added Minimum Report Requirements Section

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Five-Year Revalidation Process

- Review Previous Reports
 - Equipment in Scope
 - Seismic Load
 - Recommendation
- Walkdown Equipment and Systems
 - Equipment in Scope
 - As-Maintained
 - New Nearby Components

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Minimum Report Requirements

- Reason for Study
- List of Equipment
- Soil Profile / Hazard Determination
- Walkdown Summary and Findings
- Recommendations
- Certification

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Walkdown Approach

- Focus on Walkdown Observations / Risk Ranking
- Broad Categories
 - Okay As-Is
 - Not Okay
 - Further Evaluation Required
- Develop Remediation Design Concepts in the Field
- Documentation

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The image shows two forms side-by-side, both titled "Seismic Evaluation: CalARP Walk Down Review Sheet".

The left form is for "Mechanical Equipment". It includes fields for Component ID, Date, Component Type, and By. It has a table for "Evaluation Summary" with columns for Adequate, Not Adequate, and Further Evaluation Required. Below this are fields for Right Y, Semi Right Y, and Left Y, and a section for "Other systems (steel concrete frames, concrete pipe, etc. (note items belong to file))". It also has a table for "Bottom of Equipment to Foundation/Structure" with columns for Y, N, and a section for "Notes".

The right form is for "Piping". It includes fields for Line Number, Date, Drawing Number, and By. It has a table for "Evaluation Summary" with columns for Adequate, Not Adequate, and Further Evaluation Required. Below this is a table for "Inspection Attributes" with columns for Yes, No, Inac, and Comments. The table includes rows for Isolated, Corrosion, Support/Restraint, Anchorage, Piping Stress, Fatigue, and Continuity. It also has a section for "Supports" and "Supports (Revisions)".

Representative CalARP Seismic Walkdown Forms

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Program Methodology

- **Walkdown** – What is The As-Built And As-Maintained Condition. Bounding Curves / Risk Ranking / Sampling
- **Observation** – “By Inspection” Assessments And “Simple Fix” Approach
- **Calculation** – Bound Hand, Detailed Hand , Computer
- **Remediation** – Minimal Effort To Meet Criteria

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Experience

- Newer Vs. Older Systems
- Engineered Vs. Non-Engineered Systems
- Maintenance Level Variation

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Representative Remediation Issue

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Representative Further Evaluation Issue

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Remediated Bracing On Spheres

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Good Equipment Bracing

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No Anchorage Identified During Walkdown

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Anchorage Remediation

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Anchorage Deterioration

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No Anchorage Identified During Walkdown

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Anchorage Remediation

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No Anchorage Identified During Walkdown

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Anchorage Remediation

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Additional Anchorage Required

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Additional Anchorage Required

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Maintenance Issue

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Piping Remediation Issue - Flexibility

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Piping Remediation Issue – Seismic Interaction

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Piping Remediation Issue – Loss of Support

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Remediated Piping – Good Lateral Restraint

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