

The Perfect Project: Repair or Replace?

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Elements of Your Imagination

- I. Unicorns
- II. Leprechauns with Pots of Gold
- III. Genie in a Lantern
- IV. A Perfect (Restoration) Project



Overview

- I. Introduction
- II. Repair or Replace?
- III. A “Perfect” Project
- IV. Discussion



Introduction

Engineers



What my friends think I do



What my customer thinks I do



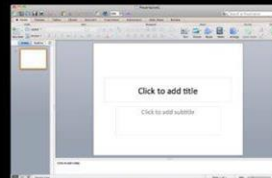
What society thinks I do



What my parents think I do



What I think I do



What I really do



Role of the Engineer

- I. Define the Project
 - a. What does the client want?
 - b. What does the building need?
- II. Design the Project
- III. Implement the Project



Repair or Replace?

What factors are
considered?



Repair or Replace?

- I. Condition of the component/system
- II. Age of the component/system vs. its intended service life
- III. Area affected by the component/system failure and restoration, impact on occupancy
- IV. Cost to repair and maintain vs. the cost to replace
- V. Building code required upgrades
- VI. Aesthetics
- VII. Safety
- VIII. Quality of Construction
- IX. Accessibility to make repairs



Repair or Replace?



Before



After



Example – Roof (removed/replaced)

- I. Condition: deteriorated, repairs becoming more frequent
- II. Age: beyond its intended service life
- III. Area affected: building interior
- IV. Costs to repair and maintain escalating with time
- V. Building code required upgrades: A/C supports
- VI. Impact on occupancy: contractor's exterior staging areas.
- VII. Aesthetics: N/A
- VIII. Safety: concrete roof slab structure protected
- IX. Quality of Construction: N/A
- X. Accessibility to make repairs: N/A



Repair or Replace?

Area affected by the component/system



Components/Systems:
*Roof, balconies, walkways,
plaza decks, planters,
windows, exterior wall
surfaces, guardrails*



Repair or Replace?

Cost to repair or replace

Considerations:

- Repair History/Frequency
- Repair Costs
- Replacement Cost
- Building Code Upgrades
- Service Life
- Warranties



Repair or Replace?

Aesthetics

- What Will The Final Product Look Like?
- Project Options For The Purpose Of Improving Appearance



Repair or Replace?

Safety



Repair or Replace?

Quality of Construction



The Perfect (Restoration) Project

Necessary Parties?



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Key Players

- I. Property Manager
- II. Owners
- III. HOA/Board of Directors
- IV. Engineer/Consultants
- V. Contractor
- VI. Building Department
- VII. Product Manufacturers



The Perfect (Restoration) Project

Four Phases

- I. Condition Survey Phase
- II. Design/Specification Phase
- III. Bidding and Negotiations Phase
- IV. Construction Phase Services



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Condition Survey Phase

- I. Representative Sample vs. Full Survey
- II. Non-Destructive Testing
 - a. Visual Survey of structure/components
 - b. Physical Sounding
 - c. Moisture Testing, Thermography
- III. Destructive Testing
- IV. Construction Materials Testing (CMT)
- V. Compilation of Information, Look for Patterns – Solve the Problem



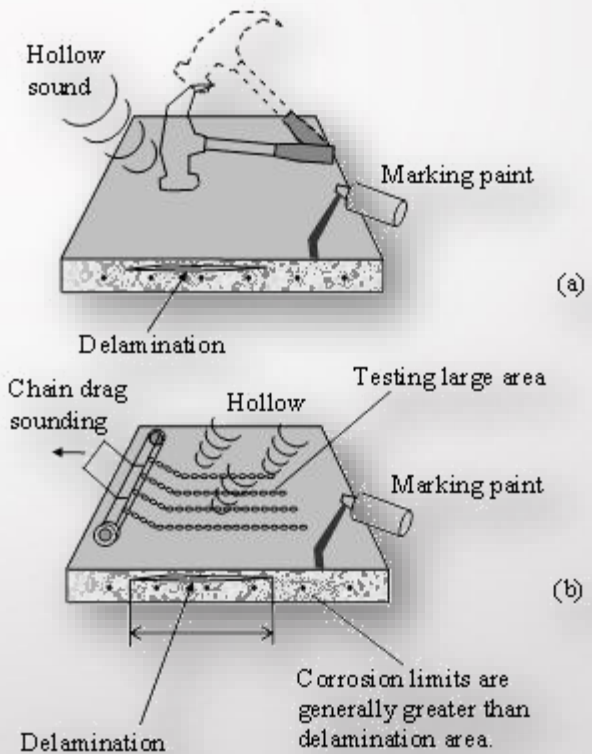
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Condition Survey Phase

- Non-Destructive Testing
 - Physical Sounding



www.fhwa.dot.gov



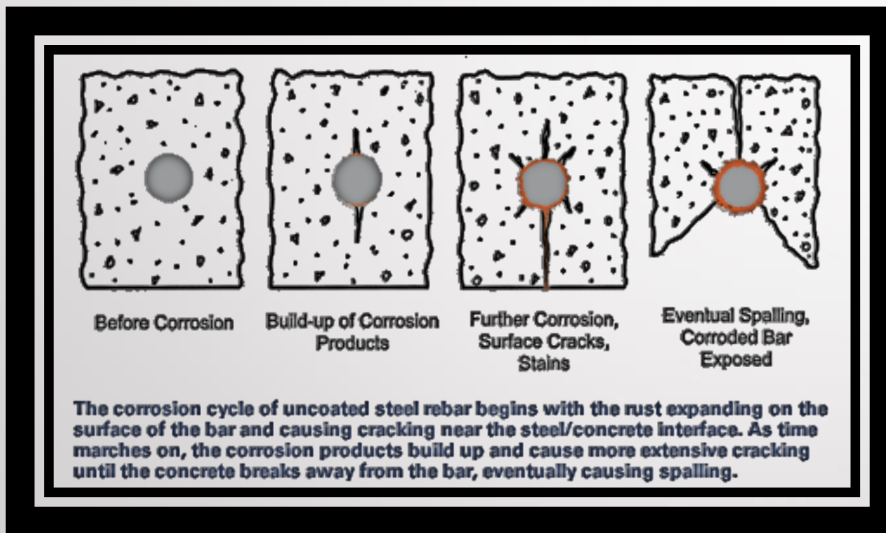
www.theconcreteportal.com



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Condition Survey Phase

- Physical Sounding



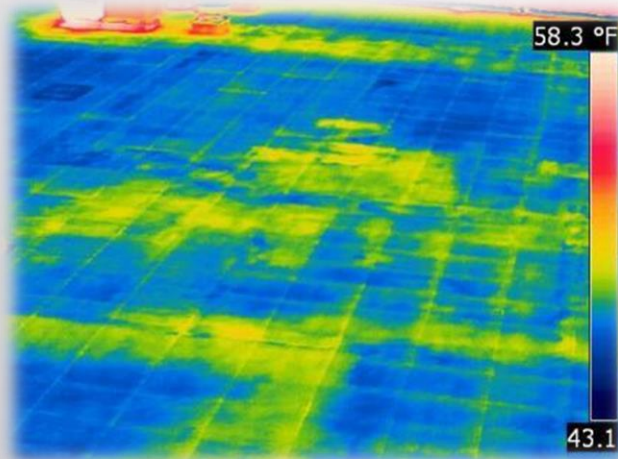
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Condition Survey Phase

- Non-Destructive Testing
 - Infrared Camera, Moisture Meter



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Condition Survey Phase

- Destructive Testing



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Condition Survey Phase

- Construction Materials Testing (CMT)



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Condition Survey Phase

Compilation of Information

- I. Conditions Observed
- II. CMT Results
- III. Approximate Repair Material Quantities Recommended
Scope of Work
- IV. Meeting to discuss findings
- V. Prioritize repairs



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Design/Specification Phase

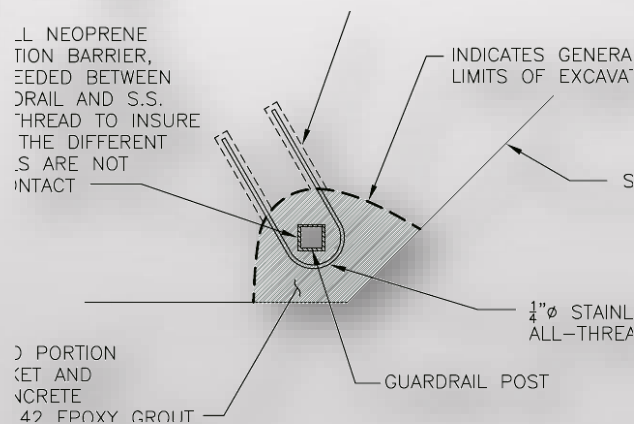
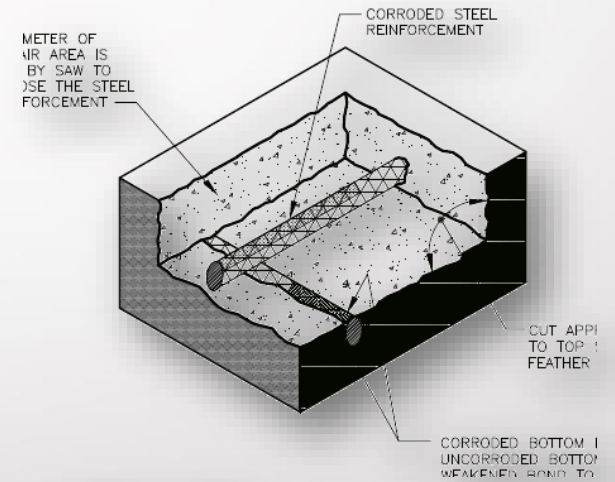
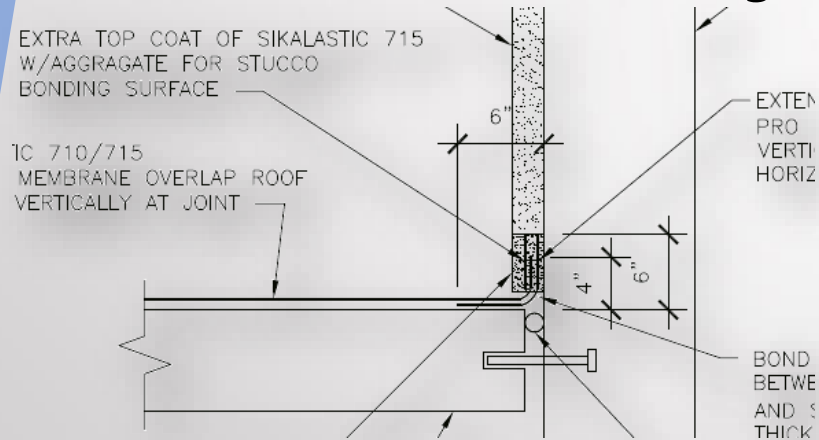
- I. Construction drawings
- II. General Conditions
- III. Bid Quantities
- IV. Bid Tabulation and Unit Costs
- V. Approved Products
- VI. Performance Criteria
- VII. Material Specifications
- VIII. Meeting to Discuss Project Options



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Design/Specification Phase

I. Construction drawings



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Design/Specification Phase

- Bid Quantities, Tabulation, and Unit Costs

BID ITEM NO. 5

Removal the minimal amount of balcony finishes and membranes in preparation for slab edge restoration and waterproofing. Estimated quantity is approximately 2920 square feet.

BID ITEM NO. 4 (i)

Balcony Concrete Repair: Delaminated areas, spalls, and exposed metal in horizontal concrete balcony surfaces. Estimated quantity is approximately 50 cubic feet.

BID ITEM NO. 4 (ii)

Balcony Concrete Repair: Delaminated areas, spalls, and exposed metal along concrete balcony slab edges. Estimated quantity is approximately 470 cubic feet.

BID ITEM NO.	COST
1	
2	
3	
4(i)	
4(ii)	
4(iii)	
4(iv)	
5(i)	
5(ii)	
6(i)	
6(ii)	
6(iii)	
7	

3. Removal of membranes/coatings from horizontal slab surfaces (per square foot)

\$ _____

4. Concrete horizontal surface repairs (per cubic foot)

\$ _____



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Design/Specification Phase

- I. Approved Products
- II. Performance Criteria
- III. Material Specifications

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Copper Sheet: ASTM B370, cold rolled 20-oz/sq ft; lacquered finish.
- C. Aluminum Sheet: Commercial quality, ASTM B209, 6063-T5 alloy, mill finish, shop precoated, 0.040" thick (minimum) except as otherwise indicated.
- D. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed, 24 gauge.
- E. Galvanized Steel: ASTM A653, Grade A, G90 zinc coating; 24-gauge core steel.

2.1 Horizontal Deck/Pavement/Floors Surface Repairs and Overlays (no exposed reinforcing steel)

A. Thicknesses from 1/4" (minimum depth) to 1/2":

Emaco R310 CI by BASF Building Systems
Thin-Top Supreme by Euclid
SD2 Repair Mortar by BASF Building Systems
SikaQuick 1000 by Sika

B. Thicknesses Greater than 1/2":

10-61 Rapid Mortar by BASF Building Systems
Emaco R310 CI by BASF Building Systems
Concrete-Top Supreme by Euclid
SikaQuick 1000 by Sika



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Bidding and Negotiations Phase

- I. Develop list of Qualified Bidding Contractors with input from Owners
- II. Compare bids
- III. Adjust Scope if Necessary to Meet Owner's Budget
- IV. Assist in Contractor Selection
- V. Interview Candidates



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Construction Phase Services

- I. Preconstruction Meeting
- II. Review Product Submittals
- III. Review Pay Request Applications
- IV. Review Change Orders
- V. Project Coordination Meetings
- VI. Construction Site Visits
- VII. Provide Dispute Resolution



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Construction Administration Phase

Meetings

- I. Preconstruction meeting – coordinate contractor, owner, property manager, consultant, etc.
- II. Periodic Project Coordination Meetings –
 - a. Project milestones
 - b. Contractor schedule
 - c. Unforeseen items/resolutions
 - d. Owner/Property Manager needs



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Construction Administration Phase

Pay Requests

- I. Review pay items requested
- II. Review quantity of work completed
- III. Review change orders submitted
- IV. Review credits to owner
- V. Review retainage

1. ORIGINAL CONTRACT SUM	\$	100.21
2. NET CHANGE BY CHANGE ORDERS	\$	66.12
3. CONTRACT SUM TO DATE (Line 1 ± 2)	\$	846.43
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)	\$	605.49
5. RETAINAGE:		
a. 10 % of Completed Work (Column D + E on G703)	\$	60,549.20
b. 0 % of Stored Material (Column F on G703)	\$	0.00
Total Retainage (Lines 5a + 5b or Total in Column I of G703)	\$	60.54
6. TOTAL EARNED LESS RETAINAGE	\$	544.94
(Line 4 Less Line 5 Total)		
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT	\$	477.81
(Line 6 from prior Certificate)		
8. CURRENT PAYMENT DUE	\$	67.12
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	\$	301,495.75

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTION
Total changes approved in previous months by Owner	\$ 59,929.29	\$
Total approved this Month	\$ 6,199.22	\$
TOTALS	\$ 66,128.51	\$
NET CHANGES by Change Order	\$	66.12

Item	Description	Quantity	Unit Price	Total Price	Retainage	Net Price	%	Balance	Net Price
6I	Balcony Guardrail Post Pocket, Remove and Replace Grout - 670 EA @ \$35.00 EA (DEDUCTION: \$4,430.00 DUE TO OVER BILLING)	23,450.00	27,880.00	-4,430.00	0.00	23,450.00	100.00 %	0.00	2,345.00
6II	Balcony Guardrail Post Pocket, Barrier - 300 EA @ \$65.00 EA	19,500.00	19,500.00	0.00	0.00	19,500.00	100.00 %	0.00	1,950.00
6III	Balcony Guardrail Post Pocket, Drill and Fill - 670 EA @ \$15.00 EA	10,050.00	10,050.00	0.00	0.00	10,050.00	100.00 %	0.00	1,005.00



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Construction Administration Phase

Construction Site Visits

- I. Consultant – completed work v. design intent
- II. Building Inspector
- III. Field Reports

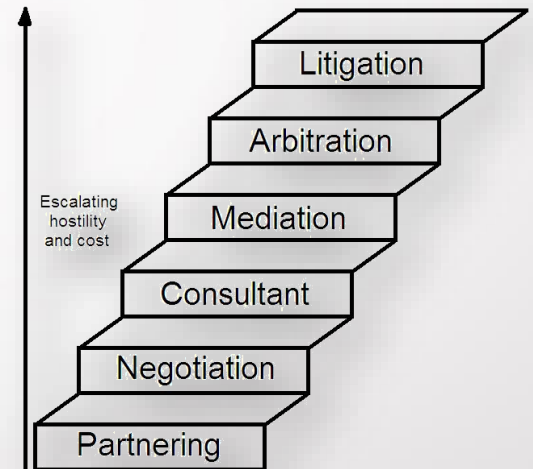


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Construction Administration Phase


Dispute Resolution

- I. Unknown Conditions
- II. Damages During Construction
- III. Resolution before escalation



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Questions? Thank you.

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