NEVADA COMMISSION FOR
CULTURAL CENTERS AND HISTORIC PRESERVATION (CCCHP)

GRANT APPLICATION FOR FY2021-2022

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Initials: CC
Received: 02-28-22
Postmarked: 02-24-22
Delivery Svc: USPS

APPLICATION COVER PAGE *(This **unaltered** form must be submitted with the application.)*

Applicant Organization: City of Boulder City
EIN (Taxpayer Identification Number): 88-0084978
Mailing Address: 401 California Avenue
City: Boulder City County: Clark ZIP: 89005
Project Contact: Michael Mays Title: Community Development Director
Daytime Phone: 702.293.9261 Evening Phone: 702.293.9261
Fax: 702.293.9392 Email: mmays@bcnv.org
Property Owner Name and Address: City of Boulder City, 401 California Avenue, Boulder City, NV 89005
Project Title: Boulder City Water Filtration Plant
Project Address: 300 Railroad Avenue
City: Boulder City County: Clark ZIP: 89005

Project Type: ☒ Rehabilitation/Construction ☐ Planning/Construction
☐ Architectural/Engineering Study/Construction

Historic Property Name: Boulder City Water Filtration Plant Date Built: 1932
Property Insured: ☒ Yes; please enclose one copy of policy ☐ No; please explain: _____

Project Synopsis (brief): It is the city's desire to restore this important piece of the history of Boulder City and Hoover Dam. The Boulder City Council approved as part of the FY22 Capital Improvement Plan money for building restoration with the hope that approximately $200,000 of that cost would be provided through a CCCHP grant. The restoration effort would include lead paint mitigation, electrical work, window rehabilitation, brick work and other preservation efforts to allow the building to be accessible to the public.

Proposed Start Date: 12.01.22 Proposed End Date: 11.01.23

Project Budget Summary:

Amount Requested:	$ 199,880
Proposed Match: Cash	$ 299,820
In-Kind/Donations:	$
Total Project Budget:	$ 499,700

Applicant's authorized signature:

Name (*please print*): Michael Mays

Title: Community Development Director

Date: February 24, 2022

☒ I HAVE READ THE 2021-2022 CCCHP APPLICATION GRANTS MANUAL*

PLEASE NOTE—IF THIS PAGE IS NOT SIGNED, THE APPLICATION IS CONSIDERED INCOMPLETE, AND CANNOT MOVE FORWARD IN THE FUNDING PROCESS.

I HAVE READ THE GRANTS MANUAL AND COMPLETED THIS **CCCHP APPLICATION FOR 2021-2022** AND CERTIFY THE INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

Applicant's authorized signature:

Title: Director of Community Development

Name (*please print*): Michael Mays

Date: February 24, 2022

PART II – NARRATIVE DESCRIPTION

The city's Historic Water filtration plant ("Filtration Plant") was built in 1931 as part of the water supply system from Hoover Dam to Boulder City under the Boulder Canyon Project Act. The original system under the auspices of the United States Bureau of Reclamation (USBR) included a pipeline from Hoover Dam, pumping plant, filter plant and associated storage.

It is the city's desire to restore this important piece of history which is tied to the development of Boulder City and Hoover Dam. As part of the Boulder City Council approved budget for FY22, $125,000 was approved to hire a consultant to prepare a historic structure and assessment report for the Filtration Plant. The city recently hired LGA Architecture and North Wind Resource Consulting, Inc. to prepare the report which will guide the city with its CCCHP application due on February 25, 2022.

The Boulder City Council also approved as part of the FY22 Capital Improvement Plan $300,000 for building restoration with the hope that approximately an additional $200,000 could be provided through a CCCHP grant for the approximately $500,000 project. The restoration effort would include lead paint and asbestos mitigation, window rehabilitation and brick tuck pointing to allow the building to be more accessible to the public.

It is anticipated that with the restoration of the building, it will become a key feature for a local cultural center that includes an existing community garden and sculpture park. It will allow the city to better tell the role the building played in the early construction of Boulder City and Hoover Dam.

1. **Project Description**

- What building(s), prehistoric feature, historic feature or culturally significant feature are you restoring/rehabilitating?
    a. **The original Boulder City Water Filtration Plant located at 300 Railroad Avenue.**
- What is the historical significance of the property?
    a. **As part of the Boulder Canyon Project which included the construction of Hoover Dam, it was determined by the Bureau of Reclamation that housing would need to be constructed near the dam project for the construction workers. Called Boulder City, the new government owned town would require housing, streets and infrastructure which included a water treatment plant. As part of the infrastructure development, the water Filtration Plant at 300 Railroad Avenue was completed in February 1932. The completed Filtration Plant brought treated Colorado River water to the new homes being constructed in Boulder City. The Filtration Plant continued to serve the water needs of the city until its decommission in the early 1980's.**

      In addition to the key role the Filtration Plant had in the development of Hoover Dam, it is a contributing resource to the Boulder City Historic District as determined by North Wind Resource Consulting, Inc. Further, North Wind believes the Filtration Plant is eligible for individual listing under the National Register of Historic Places under Criterion A, Engineering and Community Planning and Development.

- How do you propose to restore/rehabilitate it?
    a. **Based on LGA Architecture's Historic Structures Report dated February 23, 2022, (Attachment 1) they recommend focusing on the following building improvements:**
        I. **Window restoration**
        II. **Exterior brick tuck pointing**

III. **Lead paint and asbestos abatement**
IV. **Structural stabilization**

- Who will be doing the work?
  a. **The City will solicit bids from qualified contractors with knowledge in the improvements highlighted above.**
- What is the timeline for the project?
  a. **Should the city successfully receive the grant award in approximately November 2022, the city would be able to bid and complete construction 11 months after that date.**
- Who holds title to the property?
  a. **The City of Boulder City, an incorporated municipality in the State of Nevada. A copy of the parcel with APN is included as Attachment 2.**

2. **Building Use/Community Involvement**

- How and by whom will the facility be used?
  a. **The City of Boulder City along with local non-profit organizations use the building and the surrounding land for educational and community uses. Zoned as Government Park, the adjacent land is used as a community garden and sculpture park. The building hosts tours annually for the public to better understand the role the Filtration Plant played in the making of Hoover Dam and Boulder City.**
- Who will be responsible for management of the building and its programs/activities?
  a. **City of Boulder City**
- How has the community been involved in your project?
  a. **Annually the Boulder City Historic Preservation Committee holds a Historic Preservation Day. For the past several years (pre COVID) the Committee included as part of that day's efforts a tour of the Filtration Plant and the role it played in the history of Hoover Dam and Boulder City.**
- How will the community continue to be involved in your project?
  a. **Following building stabilization, the city plans to further engage the public on future uses for the building. That public input will help shape future budgeting and building improvements that will meet the community goals.**
- How will the community continue to be involved in the use of the building?
  a. **The city plans to continue Historic Preservation Day tours of the Filtration Plant with the hope that this reinvestment will better preserve the building and provide greater access for the public.**
- How are your restoration/rehabilitation plans related to the uses of the building?
  a. **Project focus on building preservation, hazardous mitigation and structural integrity will help improve public accessibility to the Filtration Plant.**
- What importance to tourism (cultural or otherwise) will the facility have?
  a. **One of the main economic drivers for the local economy is tourism. The historical and unique character of the community helps to drive that tourism. The Filtration Plant's role in the development of Boulder City and Hoover Dam is an important piece of the history of the community.**

3. **Project Support/Financial**

- What specific contributions (cash, land, labor, materials, etc.) your community and other sources have already made to the project?
    a. **The following contributions have been committed to the project:**
        - **Cooper Roofing & Solar provided an in-kind donation valued at $49,400 for roof tile repair.**
        - **As part of the Boulder City FY22 budget, $125,000 was approved to hire a consultant to prepare a Historic Structures Report to identify preservation priorities.**
        - **The City Council also approved with the FY22 budget $300,000 for this project.**
- What grants and additional funding (last three years), including amounts, has the organization received or will receive for this project?
    a. **See response to question above.**
- What additional contributions are projected to complete the project?
    a. **Following stabilization, the community goal will be to have further conversations with the community on additional uses of the building and land and budget/seek grants to accomplish those goals.**
- How will your facility sustain itself financially in the future?
    a. **The city will continue to budget for ongoing maintenance for the Filtration Plant and plan for future capital improvements following community engagement regarding future use of the building.**
- Please provide evidence that you can implement the project and maintain a viable program in the future.
    a. **The Boulder City Council has already committed $425,000 for this project through its approval of the FY22 budget. The 2025 Boulder City Strategic Plan calls for focus on historic preservation efforts including the preservation of city-owned, historically significant properties.**

4. **Planning**

- If your project includes planning, please describe the process.
    a. **N/A**
- Who will participate in the planning?
    a. **N/A**
- Who will coordinate it?
    a. **N/A**
- How will the community be involved? Please note that projects requesting funds for planning may be supported only if the planning is part of a construction project.
    a. **One of the city's 2025 Strategic Plan goals is to Promote Historic Preservation Efforts. This goal was identified following public outreach by staff and the City Council on what community priorities should be. This plan was adopted by the City Council on December 11, 2018.**
- If your project is based on previous planning, please describe.
    a. **One of the prior Historic Preservation Committee goals, which was endorsed by the City Council, was to identify historic buildings to repurpose and reuse. This effort meets that goal.**

1. **Photographs of all exterior elevations with views, identified and keyed to a site plan**

   Please see pages 22 through 31 of the North Wind Cultural Resources Report No. 030556 dated February 23, 2022 (Attachment 3).

2. **Photographs of all major rooms and project rooms, labeled and keyed to a floor plan; and**

   Please see pages 1 through 17 of the Structural Report prepared by Silman and Mel Green Associates Report, February 23, 2022 (Attachment 4).

3. **Organization's mission statement, including length of time established, and history**

   The following was adopted as part of the Boulder City 2025 Strategic Plan in 2018:

   Mission Statement: The City of Boulder City's mission is to deliver outstanding services to enhance the quality of life within our community, our economic vitality and the safety of those who reside, work in, visit or travel through our community.

   Vision Statement: The City of Boulder City is committed to preserving its status as a small town, with a small-town charm, historical heritage and unique identity, while proactively addressing our needs and enhancing our quality of life.

4. **A detailed report on current CCCHP grant status (if applicable), as well as the outcome of previous CCCHP or CCA grants (if applicable)**

   The city has not previously applied for a CCCHP grant for this project.

5. **An insurance policy for the building/facility (one copy only)**

   Please see Attachment 5 for a copy.

6. **A list of current board members for the organization (required)**

   Kiernan McManus, Mayor
   Claudia Bridges, Mayor pro tem
   James Howard Adams, Councilmember
   Sherri Jorgensen, Councilmember
   Matt Fox, Councilmember

7. **Resumes (maximum two pages per resume) for all principal professionals involved in the planning, design and/or management of the proposed project (required).**

   Please see Attachment 6 for a copy.

8. **A copy of the organization's long-range plan including information on how frequently the plan is updated (required).**

- The Boulder City 2025 Strategic Plan is provided as Attachment 7. This is a five-year plan adopted in late 2018 for the period of 2020 to 2025.
- The Boulder City Historic Preservation Plan is provided via a link because of document size: https://www.bcnv.org/DocumentCenter/View/9640/Boulder-City-Historic-Preservation-Plan_0921- This is the city's first historic preservation plan.

9. **A list of the organization's activities for the past fiscal year (i.e., July 1, 2020 – June 30, 2021) or calendar year, if applicable.**

   A summary of the city's activities for fiscal year 2021 is included as part of the 2025 Strategic Plan update included here as Attachment 8.

   NOTE: The Boulder City FY21 audit is included in this packet as Attachment 9 following the Part III Budget Form.

GRANT APPLICATION FOR 2021-2022
PART III BUDGET FORM

Applicant:_CITY OF BOULDER CITY_____

1. Personnel:

	Position Title	Hours	Hourly Rate (HR)	✓ if HR includes Fringe Benefits	% of HR that is a fringe benefit	Amount of fringe benefit	Total Amt	State Share	Non-State Share
a.						0.00	0.00		
b.						0.00	0.00		
c.						0.00	0.00		
d.						0.00	0.00		
e.						0.00	0.00		
f.						0.00	0.00		
g.						0.00	0.00		
h.						0.00	0.00		
i.						0.00	0.00		
j.						0.00	0.00		
						Sub-total:	**$0.00**	**$0.00**	**$0.00**

2. Travel: *(see GSA rates in the application document)*

		Rate	Miles/# of days	Total Amount	State Share	Non-State Share
a.	**Mileage**					
	1. Person #1-			0.00		
	2. Person #2-			0.00		
b.	**Per Diem** (Breakfast)			0.00		
	Per Diem (Lunch)			0.00		
	Per Diem (Dinner)			0.00		
c.	Transportation costs (parking fees, taxi, etc.)			0.00		
d.	**Lodging**					
	1. Weeknight (Sun-Th)			0.00		
	2. Weekend (Fri-Sat only)			0.00		
e.	Other:			0.00		
f.	Other:			0.00		
			Sub-total:	**$0.00**	**$0.00**	**$0.00**

GRANT APPLICATION FOR 2021-2022
PART III BUDGET FORM

3. Contractual Services: Attach itemized lists or contractor quotes showing the breakdown of materials and labor costs for all proposed work items. Add columns as needed.

***When listing materials, break out by type *When listing labor, define specific activities**

	Contractual Service	Total Amount	State Share	Non-State
a.	General and Existing Conditions	35,389.00	14,155.60	21,233.40
b.	Concrete and Masonry Repairs	79,751.00	31,900.40	47,850.60
c.	Metals	16,194.00	6,477.60	9,716.40
d.	Wood, Plastics, Composites	42,005.00	16,802.00	25,203.00
e.	Thermal and Moisture Protection	7,879.00	3,151.60	4,727.40
f.	Openings	56,261.00	22,504.40	33,756.60
g.	Finishes	2,369.00	947.60	1,421.40
h.	Contingencies	228,989.00	91,595.60	137,393.40
i.	Hazardous Material Abatement	30,863.00	12,345.20	18,517.80
j.				
	Sub-total:	**$499,700.00**	**$199,880.00**	**$299,820.00**

4. Operating: List estimated operating expenses relating to the proposed project.

		# of	Rate	Flat Rate	Total Amount	State Share	Non-State
a.	Photocopying						
b.	Film and Processing						
c.	Maps						
d.	Postage						
e.	Telephone						
f.	Utilities						
g.	Supplies (specify):						
h.	Other (specify):						
i.	Other (specify):						
				Sub-total:	**$0.00**	**$0.00**	**$0.00**

5. Other (please specify or attach detailed budget):

		Rate	Amount	State Share	Non-State
a.					
b.					
c.					
d.					
		Sub-total:	**$0.00**	**$0.00**	**$0.00**

GRANT APPLICATION FOR 2019-2020
PART III BUDGET FORM

6. Section #1- 5 Subtotals:

		Amounts	State Share	Non-State Share
1.	Personnel	0.00	0.00	0.00
2.	Travel	0.00	0.00	0.00
3.	Contractual Services	499,700.00	199,880.00	299,820.00
4.	Operating	0.00	0.00	0.00
5.	Other	0.00	0.00	0.00
	Sub-total:	**$499,700.00**	**$199,880.00**	**$299,820.00**

7. Requested State Share Total: **Subtotal:** **$199,880.00**

8. Potential Non-State Share: **Subtotal:** **$299,820.00**

10. Proposed Project Costs Grand Total: **$499,700.00**

Attachment 1

LGA
ARCHITECTURE

City of Boulder City Historic Water Filtration Plant
Historic Structures Final Report

February 23, 2022

Table of Contents

*Blue type indicates copy from 1/20/22 Preliminary Draft Report

*Red type indicates copy from 12/14/21 Preliminary Draft Report

ACKNOWLEDGMENTS

This document was prepared by LGA for the City of Boulder City.

LGA wishes to thank those who contributed to this report.

City of Boulder City

Michael Mays
Director of Community Development
City of Boulder City
702-293-9200
mmays@bcnv.org

Jim Keane, PE
City Engineer
City of Boulder City
702-293-9200
jkeane@bcnv.org

LGA

Lance J. Kirk, AIA, LEED AP
Principal
702-789-4160
ljkirk@lgainc.com

Robert K. Olson, AIA, NCARB
Project Manager
515-975-5090
bolson@lgainc.com

Jaclyn Kidd
Project Designer
702-790-1186
jkidd@lgainc.com

Christian Contreras
Project Designer
702-405-7440
ccontreras@lgainc.com

North Wind Resource Consulting

Courtney Mooney, M.S., AICP
Architectural Historian
702-858-3885
courtney.mooney@northwindgrp.com

Greta Rayle, M.A., RPA
Historical Archeologist
602-568-6506
grayle@northwindgrp.com

O'Connor Construction Management, LLC

Kimberly Corkill, AEP
Regional Estimating Manager
702-896-6926
kcorkill@ocmi.com

Silman

Nathan Hicks, PE, SE
Structural Engineer
760-579-9135
hicks@silman.com

Mel Green Associates

Mel Green, SE
Structural Engineer
310-792-9252
mgreen@mgreenassoc.com

TJK Consulting Engineers, LLC

Neal Blodgett
Project Director
Electrical-Mechanical-Plumbing-Technology
702-488-8328
nblodgett@tjkengineers.com

Barry Lasseigne
Electrical Engineer

Michael Peterson
Mechanical Engineer

John De Salvo
Plumbing Engineer

TERPconsulting

Bryan L. Douglass, PE
Principal Fire Protection Engineer
702-738-3355
bdouglass@terpconsulting.com

Ninyo & Moore

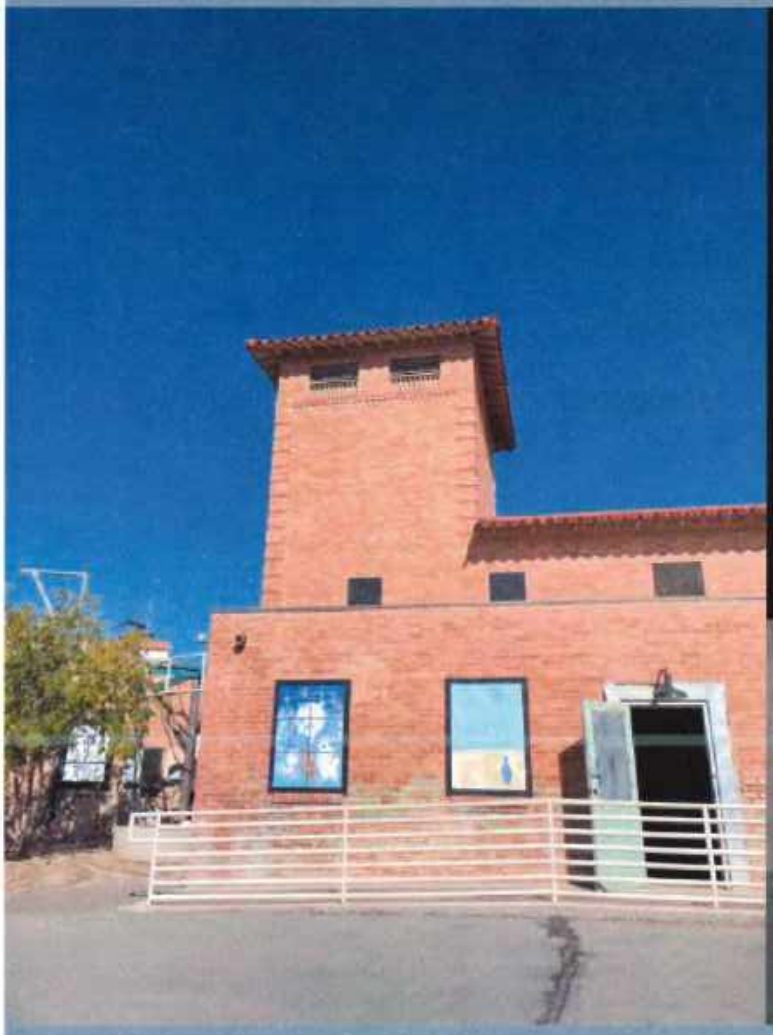
Amir Bajramovic, EIT
Staff Engineer
702-433-0330
abajramovic@ninyoandmoore.com

Courtney J. Brooks, CEM
Chief Hydrogeologist
702-433-0330
cbrooks@ninyoandmoore.com

LGA
ARCHITECTURE

A Introduction & Background

Prepared by LGA Architecture



LGA
ARCHITECTURE

February 23, 2022

Michael Mays
Director of Community Development
City of Boulder City
401 California Avenue
Boulder City, NV 89005

Re: Final Assessment Report (ROADMAP) to Help Boulder City Realize the Enormous Potential of its "Historic Boulder City Water Filtration Plant Building & Site"

City of Boulder City, Clark County, Nevada

Mr. Mays:

LGA Architecture (LGA) is pleased to submit our final Historic Structure and Preservation Assessment Report re: architectural, historical significance, structural engineering, (MEP) mechanical, electrical, & plumbing engineering assessments, life-safety assessments, and hazardous materials assessment for the Boulder City Water Filtration Plant project. This Final Assessment Report also now contains a Section 6; Cost Consultant Report. This cost estimate is for the strategy we are recommending moving forward to protect and preserve this building for a future Community Vision.

Also included, immediately following this cover letter, is the PowerPoint presentation made to The Boulder City Historic Preservation Commission Meeting on January 26, 2022. This presentation also summarizes the recommended strategy moving forward as well as providing some preliminary cost estimates (please see new Section 6 for more detail and more current estimate) and examples of other adaptive re-use and preservation projects.

RECOMMENDED STRATEGY MOVING FORWARD

We are recommending that the majority of any CCCHP grant funds be allocated to the exterior envelope repair of the original building and minimum work on the two additions. This would include tuck pointing all masonry areas necessary on the original building, repairing and reglazing all historical windows, and structural/seismic bracing on the original building. The only exception to this recommendation is that the entire building be abated. Both the original building and the addition have new roofs; no work required. This stabilizes and protects the critical original building, will probably require the majority of the grant funds, and leaves the additions in place; until a future use is determined.

Craig S. Galati FAIA, FSMPS, CPSM John A. Haddad Jason Jorjorian, AIA, LEED AP Lance J. Kirk, AIA, NCARB, LEED AP

702.263.7111 LGAarchitecture.com 241 W. Charleston Blvd., Suite 107, Las Vegas, NV 89102

One additional item we'd recommend is to consider an add alternate for tuck pointing the exposed walls of the two additions, minimizing further deterioration.

Thank you for this opportunity; we look forward to continuing to work with Boulder City and help them realize the enormous VISION potential the Boulder City Water Plant Building and Site has for the Community of Boulder City.

Sincerely,
LGA Architecture

Robert K. Olson, AIA, NCARB
Project Manager

Lance J. Kirk, AIA, NCARB, LEED AP
Principal

Presentation Slides for:
The Boulder City Historic Preservation Commission Meeting

1/26/22

We are recommending that the majority of any CCCHP grant funds be allocated to the exterior envelope repair of the original building and minimum work on the two additions. This would include tuck pointing all masonry areas necessary on the original building, repairing and reglazing all historical windows, and structural/seismic bracing on the original building. The only exception to this recommendation is that the entire building be abated. Both the original building and the addition have new roofs; no work required. This stabilizes and protects the critical original building, will probably require the majority of the grant funds, and leaves the additions in place until a future use is determined.

One additional item we'd recommend is to consider an add alternate for tuck pointing the exposed walls of the two additions, minimizing further deterioration.

1/26/22

Figure 4 – Second *(left)* and Third *(right)* Floor Key Plans

1950-1955 -

1931/1932 -

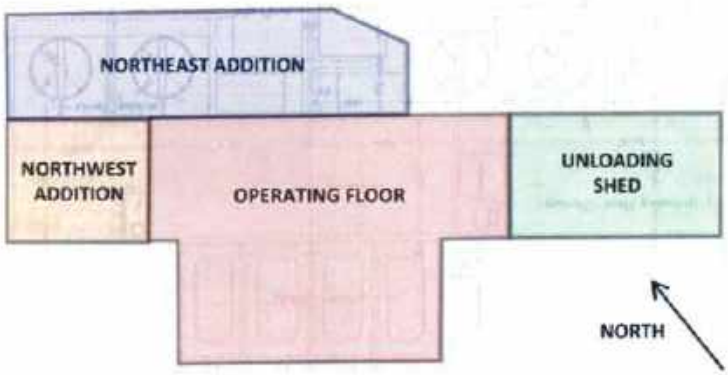


Figure 3 – First Floor Key Plan

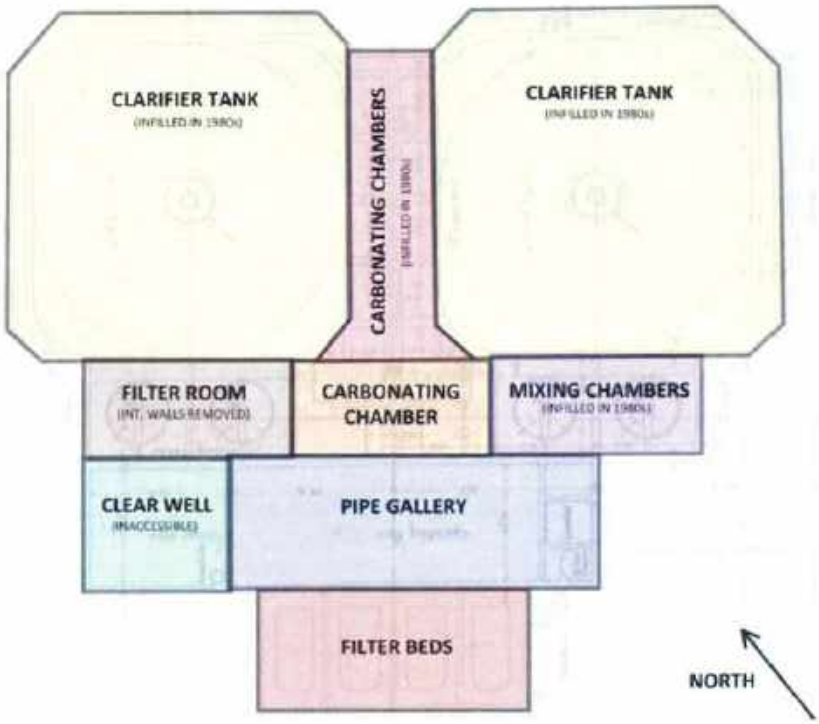
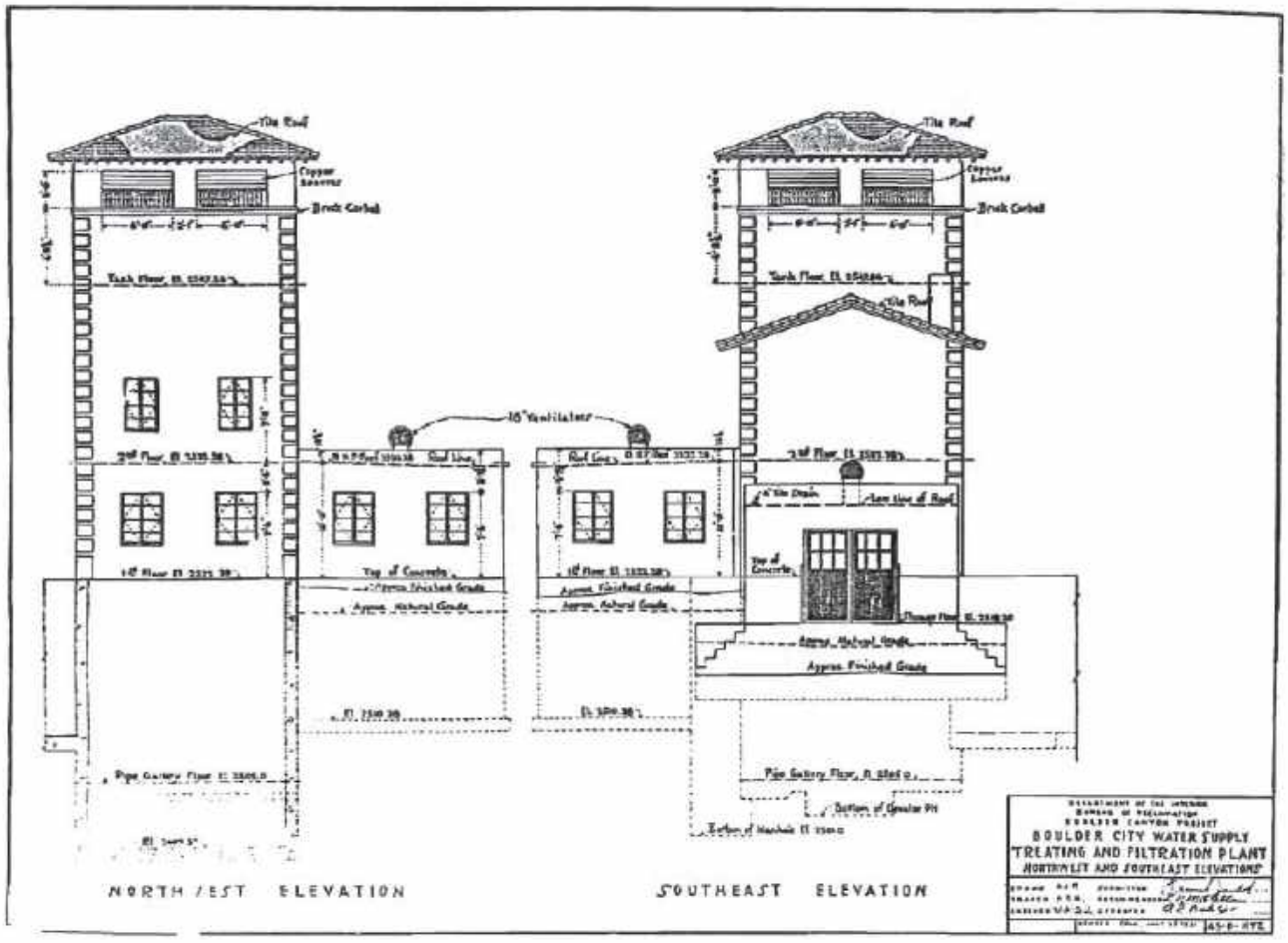
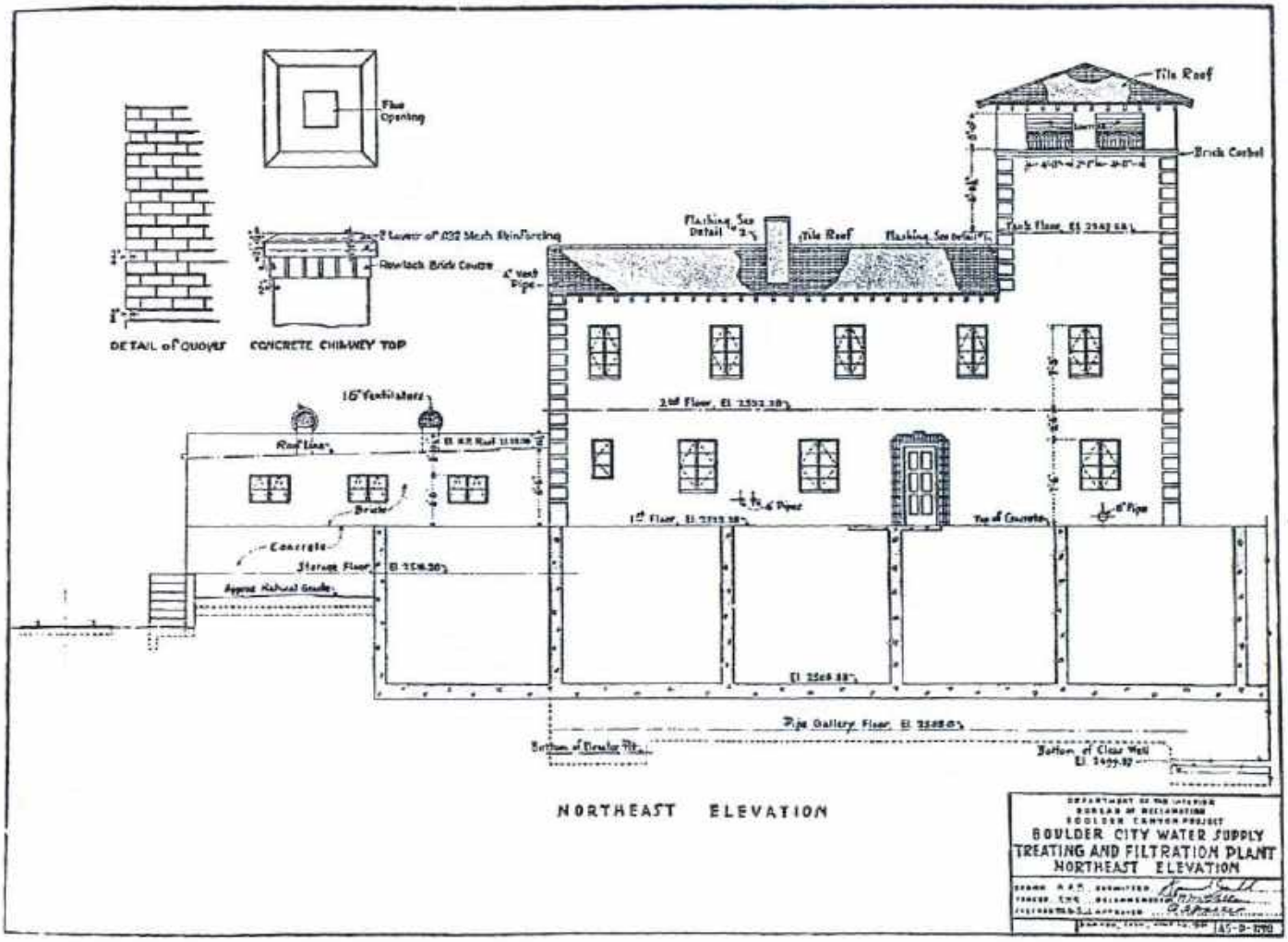


Figure 2 – Basement Floor Key Plan

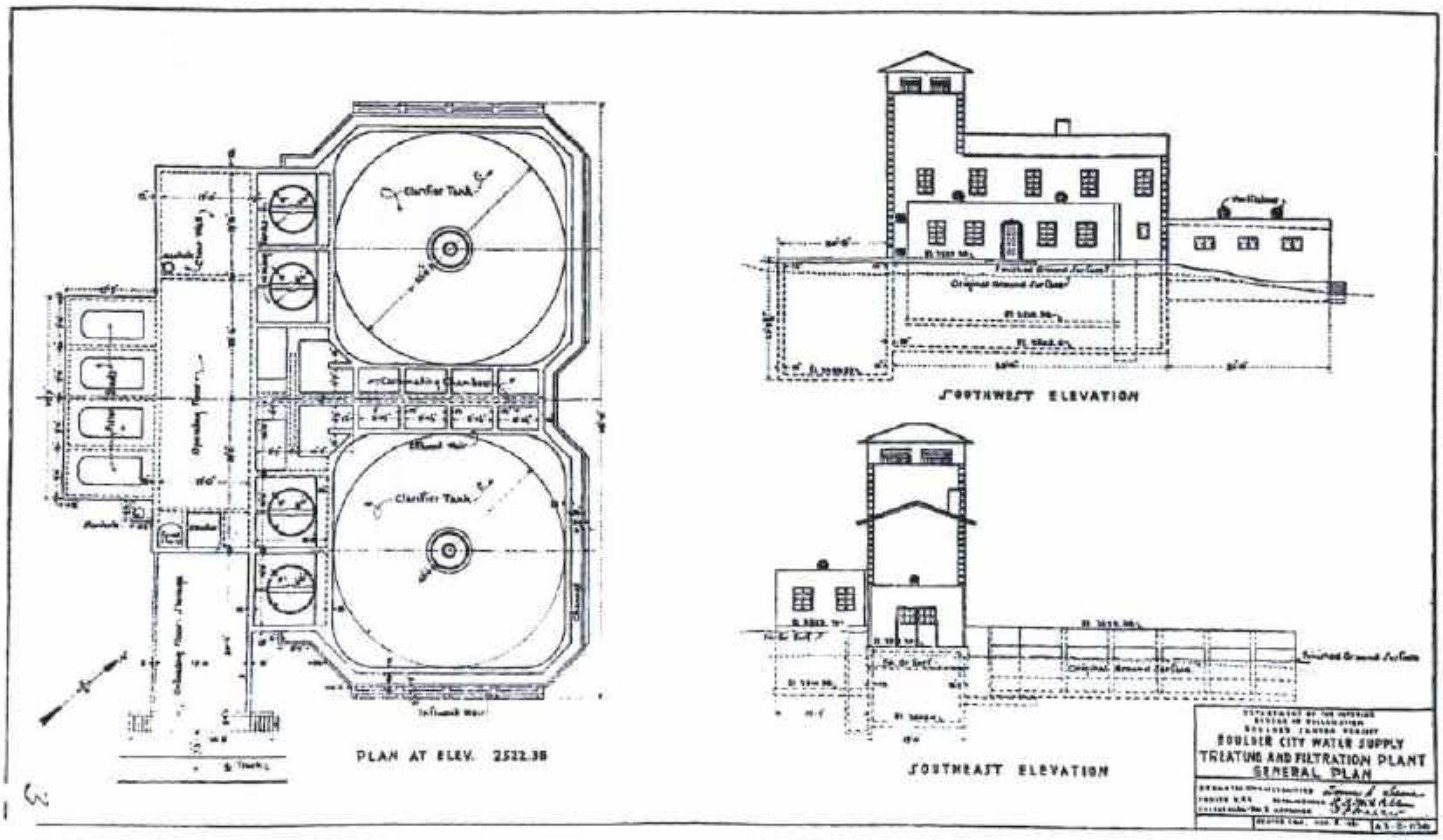
1/26/22


Tile Roof
Copper Scuppers
Brick Corbel
Tank Floor El. 3347.33
16" Ventilator
2nd Floor El. 3335.38
1st Floor El. 3321.38
Top of Concrete
Approx. Finished Grade
Approx. Natural Grade
El. 3310.38
Pipe Gallery Floor El. 3305.0
El. 3309.38
Tile Roof
Tank Floor El. 3346.66
2nd Floor El. 3335.38
4" Tile Drain
Low line of Roof
1st Floor El. 3321.38
Top of Concrete
Approx. Natural Grade
Approx. Finished Grade
Pipe Gallery Floor, El. 3305.0
Bottom of Chamber Pit
Bottom of Manhole El. 3300.0
NORTH WEST ELEVATION
SOUTHEAST ELEVATION
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
BOULDER CANYON PROJECT
BOULDER CITY WATER SUPPLY
TREATING AND FILTRATION PLANT
NORTHWEST AND SOUTHEAST ELEVATIONS
43-D-472

1/26/22


Flue Opening
DETAIL of QUOINS
2 Layers of #22 Mesh Reinforcing
Rowlock Brick Course
4" Vent Pipe
CONCRETE CHIMNEY TOP
Flashing See Detail "A"
Tile Roof
Flashing See Detail "B"
Tile Roof
Brick Corbel
Tank Floor, El 2543.58
16" Ventilators
Roof Line
2nd Floor, El 2533.38
Brick
Concrete
Storage Floor, El 2514.30
Approx. Natural Grade
1st Floor, El 2523.38
4" Pipe
Top of Concrete
El 2508.88
Pipe Gallery Floor, El 2508.0
Bottom of Elevator Pit
Bottom of Clear Well El 2499.87
NORTHEAST ELEVATION
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
BOULDER CANYON PROJECT
BOULDER CITY WATER SUPPLY
TREATING AND FILTRATION PLANT
NORTHEAST ELEVATION

1/26/22


Clarifier Tank
Clarifier Tank
PLAN AT ELEV. 2532.38
SOUTHWEST ELEVATION
SOUTHEAST ELEVATION
BOULDER CITY WATER SUPPLY
TREATING AND FILTRATION PLANT
GENERAL PLAN

1/26/22

PRELIMINARY BUDGET & SF NUMBERS MOVING FORWARD

- Total Building Areas:

Basement @ approx.	2,900 SF
First floor @ approx.	3,400 SF
Second floor @ approx.	1,000 SF
Third floor @ approx.	300 SF

Combined Building Area @ 7,600 SF

- Original Building Areas:

First floor @ approx.	2,000 SF
Second floor @ approx.	1,000 SF
Third floor @ approx.	300 SF

Original Building Area @ 3,300 SF

The below preliminary budget number would include tuck pointing all masonry areas necessary on the original building, repairing and reglazing all historical windows, and structural/seismic bracing on the original building. The only exception to this recommendation is that the entire building be abated; included as a different budget number:

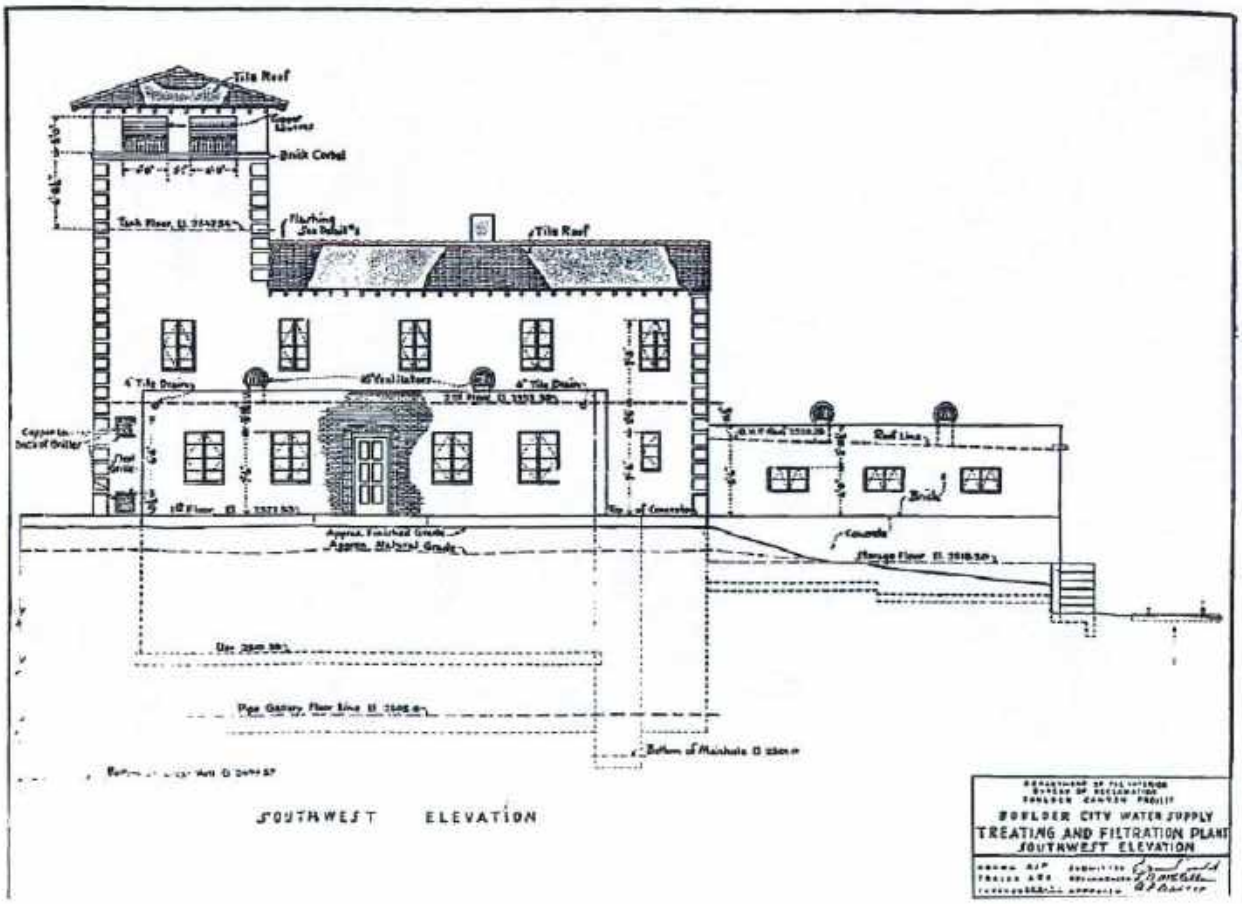
Using $137.50/SF for the above applied to 3,300 SF would require approximately: $453,750

Using $6.25/SF for the abatement applied to 7,600 SF would require approximately: $47,500

TOTAL ESTIMATED FUNDING REQUIRED FOR STRATEGY MOVING FORWARD: $501,250

PRELIMINARY BUDGET NUMBERS FOR RECOMMENDED ADD ALTERNATE

Using $32.00/SF for tuck pointing applied to 1,500 SF would require approximately: $48,000

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RAILROAD AVE
BOULDER CITY ALLEY 3
ASH ST
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BOULDER CITY ALLEY 2
CHERRY ST
DATE ST
ARIZONA ST
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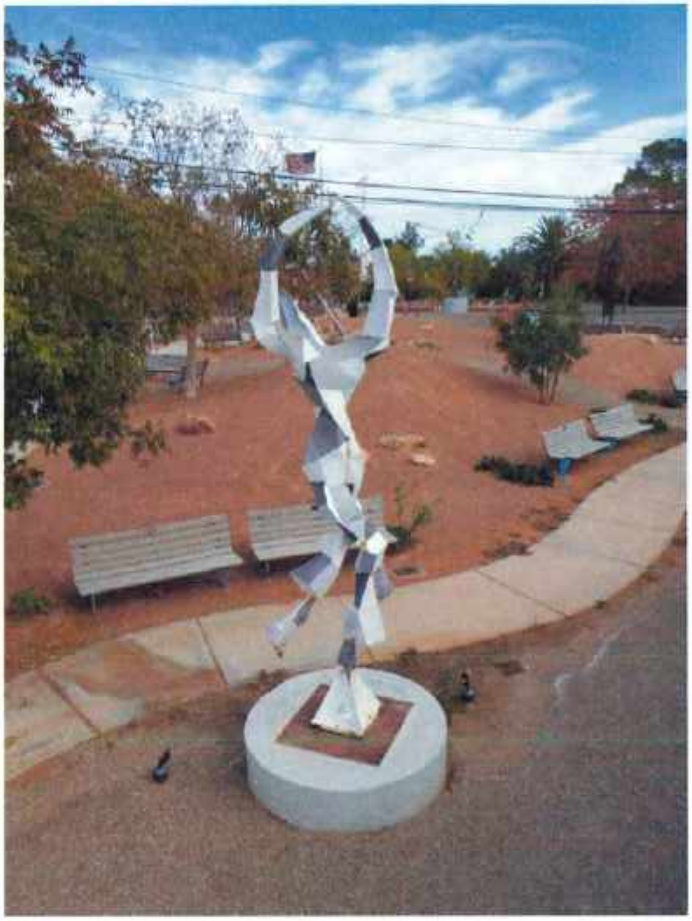

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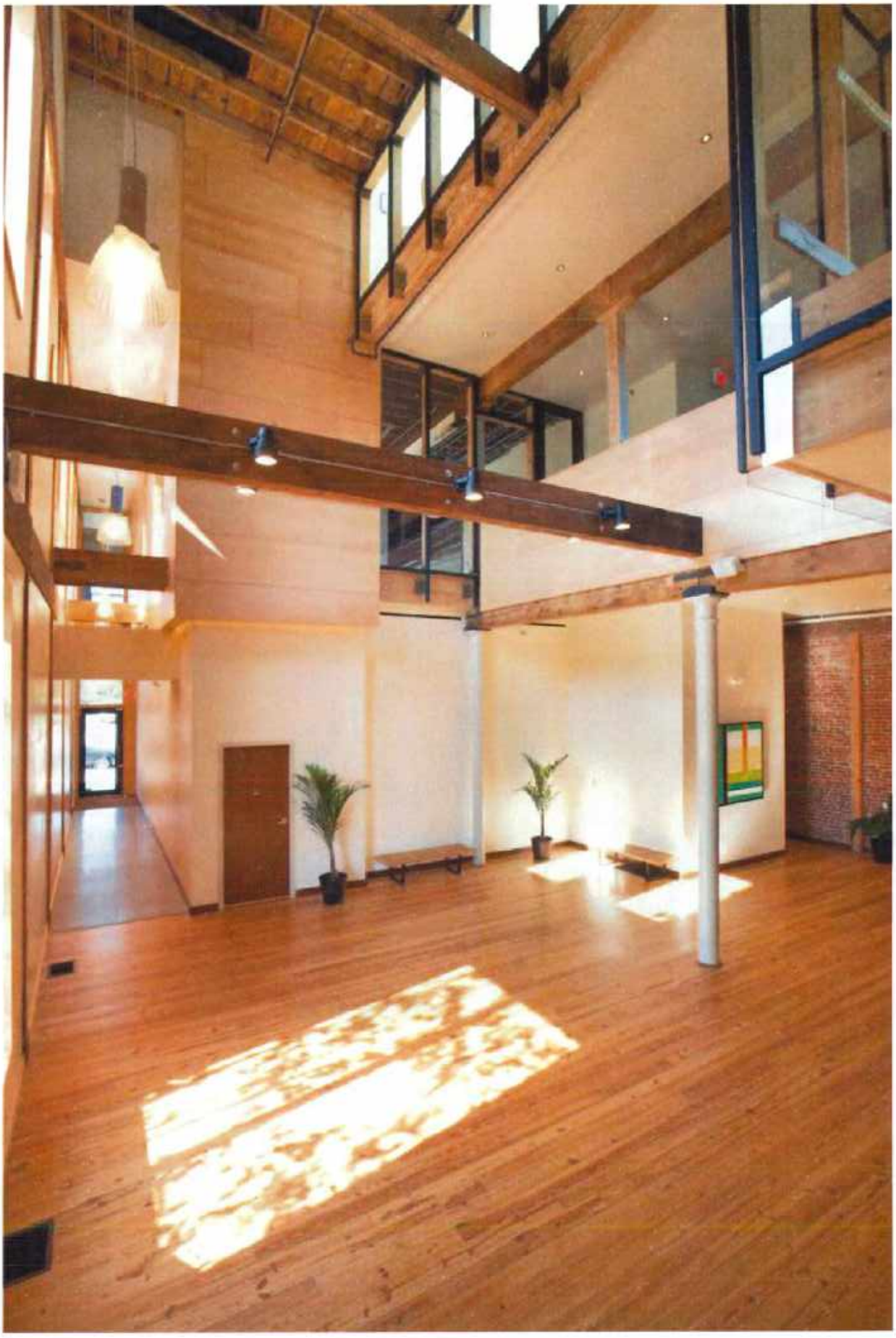

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Children's Museum
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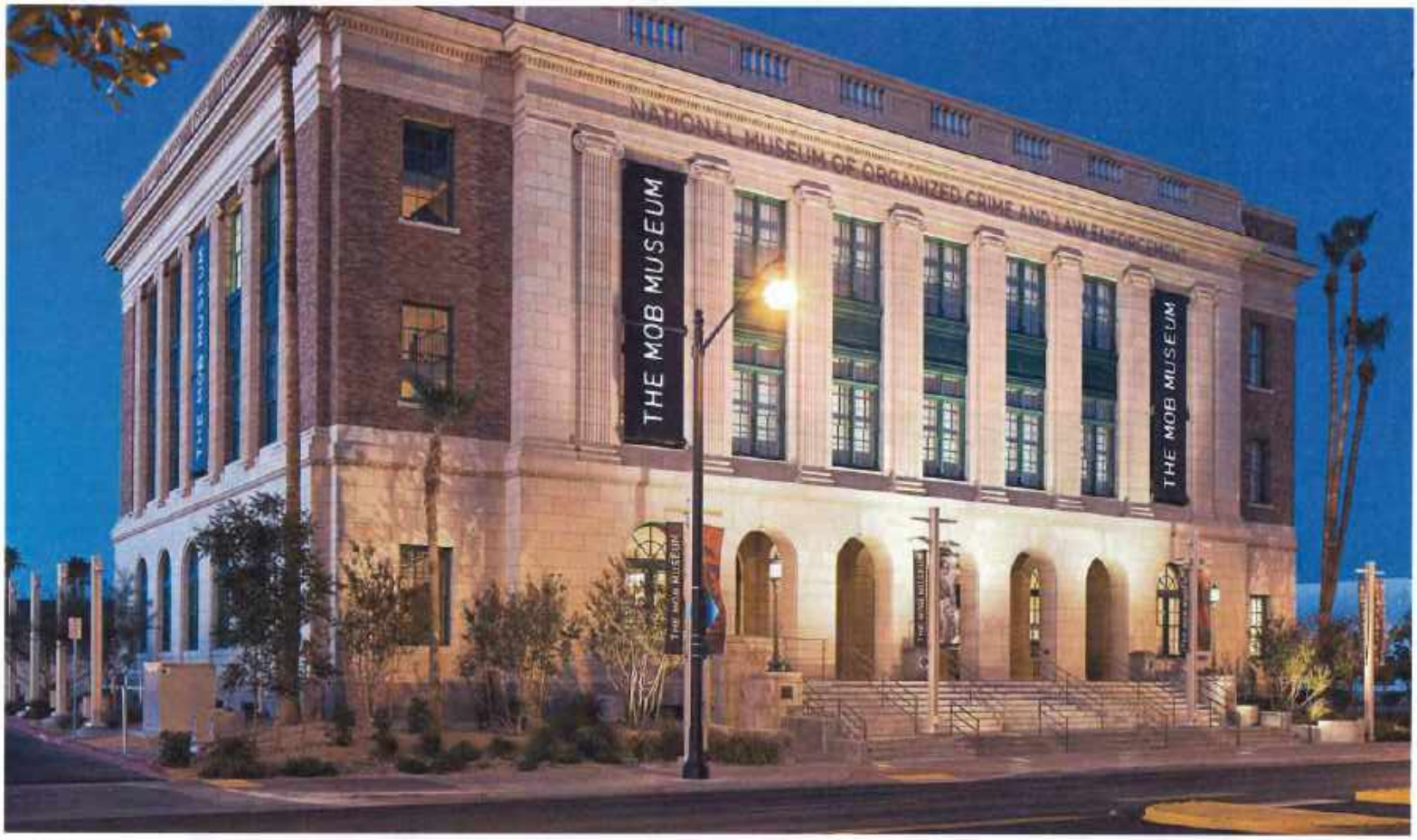
NATIONAL MUSEUM OF ORGANIZED CRIME AND LAW ENFORCEMENT
THE MOB MUSEUM
THE MOB MUSEUM

1/26/22

1/26/22

LGA
ARCHITECTURE

January 20, 2022

Michael Mays
Director of Community Development
City of Boulder City
401 California Avenue
Boulder City, NV 89005

Re: A (2nd draft) ROADMAP to Help Boulder City Realize the Enormous Potential of its "Historic Boulder City Water Filtration Plant Building & Site"

City of Boulder City, Clark County, Nevada

Mr. Mays:

LGA Architecture (LGA) is pleased to submit our second draft of the historic structure and preservation assessment report re: architectural, historical significance, structural engineering, (MEP) mechanical, electrical, & plumbing engineering assessments, life-safety assessments, and hazardous materials assessment for the Boulder City Water Filtration Plant project. This second draft as well as this Cover Letter below attempts to address Boulder City's comments as well as lay out a suggested strategy moving forward. This strategy was mentioned briefly during our virtual meeting last week, is further explained here, and will be discussed in more detail at next week's Historic Commission Meeting on January 26, 2022.

Part of this revised draft includes edited versions of all Consultant reports, with edits made in response to the City of Boulder City's comments received 12/29/21. These comments were included in two documents received by LGA. The first was a marked up copy of our December 14, 2021 Draft Report with comments, indicated in red, by Jim Keane, City Engineer. The second document was a two page spreadsheet with additional bulleted "Improvement Suggestions"; a few with question marks. The following addresses a number of the City's comments in both documents and is organized by Consultant discipline.

CONSULTANT #1: NORTH WIND (Architectural Historian)

"The plant is located in the Government Park zoning district, not Industrial.":

This is good to know when the current Assessment Report and this ongoing phase evolves into the Visioning or Discovery Phase. This is the phase that could review all community information generated so far and combine that analysis with utilizing a Community Engagement strategy. This strategy would explore all the exciting potential new uses for the building and site. Elements of this

Craig S. Galati FAIA, FSMPS, CPSM John A. Haddad Jason Jonjonian, AIA, LEED AP Lance J. Kirk, AIA, NCARB, LEED AP

702.263.7111 LGAarchitecture.com 241 W. Charleston Blvd., Suite 107, Las Vegas, NV 89102

strategy would be Community Workshops to properly conduct "Feasibility" and "Highest and Best Use" analysis within a community enriching perspective.

"Should the City be considering removal of the additions?":

In talking with both North Wind and our structural consultants, it was determined that we do not know enough now to make a recommendation to remove either or both additions. As with many outstanding decisions, the final use for the building and the site may determine which direction to pursue.

CONSULTANT #2: MEL GREEN & SILMAN (Structural)

"What additional information is needed on the re-roofing project?":

We've since had conversations with the Cooper Roofing, the contractor who completed the pro bono project. The good news they did an outstanding job with a new membrane roof on all one-story sections as well as a restoring the clay tile roofs on both the two-story gable and the three-story hip roof. Besides roofing, this included new flashing, parapet caps, and a non-structural underlayment. Details and much more specific information appears to not be available, but our hope was that some plywood sheathing may have been added to help Seismic and structural concerns. This was not the case, so our Structural Engineers will be recommending some additional work within the minimal scope outline.

"What is the 2018 Nevada Building Code?":

The applicable codes will need to be completely understood and interrupted for any future use of the building. The assumption here is the reference is probably to the International Building Code for Existing Buildings (2018 is the edition most municipalities have adopted). This IBCEB allows a bit more concessions than the similar code for new buildings. Until a use or uses are considered and explored, the applicable sections of any code can not be adequately be understood, interrupted, and applied.

CONSULTANT #3: TJK CONSULTING ENGINEERS (MEP: Mech, Elec, & Plumbing)

"Will the addition of HVAC and ducting significantly impact interior historical integrity?':

The simple and honest answer is that if done creatively and sensitively the historical integrity will not be compromised but should be enhanced and celebrated. The Team involved in this Assessment Phase of the project have been involved in numerous successful Adaptive Re-use projects of Historically Significant buildings.

CONSULTANT #4: TERP/FIRE + LIFE SAFETY (Life Safety Report)

"Under what conditions would a sprinkler system be required?":

The primary condition that may require a sprinkler system will be the final use or Occupancy of the the site and building. Other conditions or factors that should be considered, moving into the next phase of the project, are fire insurance premiums and life-safety issues.

"Is it feasible to provide egress to this building? Can we achieve CCCHP requirements with grant as a cultural center without access?":

Fortunately we have enough site to work with and there are a number of alternatives that can be explored to provide ADA access to a completed and occupied building. Testing of these alternatives again, will largely depend on final use. The CCCHP requirements will need a bit more research but we feel that as long as there is a commitment to make the final use 100% ADA accessible; funds should be available.

CONSULTANT #5: NINYO & MOORE (Hazardous Materials)

The Ninyo and Moore, our hazardous material consultant, report had a few minimal comments that should be addressed in the edited report contained in this second draft of the historic structure and preservation assessment report.

LGA CONCLUSIONS

OCMI's services were listed as an optional service within our original proposal but is now part of our agreement per an initial kick-off meeting; they are not part of this 12/14 DRAFT report. They will take this draft report and apply high level cost estimates that will be available for our 1/10/22 meeting.

Improvement Suggestions

- Masonry repairs: Refer to "Recommended Strategy Moving Forward."
- Concrete repairs: Refer to "Recommended Strategy Moving Forward."
- Seismic repairs: Refer to "Recommended Strategy Moving Forward."
- Floor strengthening: Refer to "Recommended Strategy Moving Forward."
- Chimney removal: This was discussed during last week's virtual meeting & the recommendation is to possible leave the "chimney fragment" for historical reasons & make sure it is adequately supported & safe for life-safety reasons.
- Northwest addition ceiling removal?: Not at this time; refer to "Recommended Strategy Moving Forward."
- Add heating & cooling?: Not at this time; refer to "Recommended Strategy Moving Forward."
- Water, Sewer, Power: Not at this time; refer to "Recommended Strategy Moving Forward."
- Lead & asbestos mitigation: Whole building should be done as part of this phase; refer to "Recommended Strategy Moving Forward."

- Should windows be demolished?: None of the windows should be demolished since original steel sash is still in place in nearly all historical windows. All of the windows on the original building should be repaired & reglazed; refer to "Recommended Strategy Moving Forward."

Thank you for this opportunity; we look forward to continuing to work with Boulder City and help them realize the enormous VISION potential the Boulder City Water Plant Building and Site has, for the Community of Boulder City.

Sincerely,
LGA Architecture

Robert K. Olson, AIA, NCARB
Project Manager

Lance J. Kirk, AIA, NCARB, LEED AP
Principal

LGA
ARCHITECTURE

December 14, 2021

Michael Mays
Director of Community Development
City of Boulder City
401 California Avenue
Boulder City, NV 89005

Re: A (1st draft) ROADMAP to Help Boulder City Realize the Enormous Potential of its "Historic Boulder City Water Filtration Plant Building & Site"

City of Boulder City, Clark County, Nevada

Mr. Mays:

LGA Architecture (LGA) is pleased to submit our first draft of the historic structure and preservation assessment report re: architectural, historical significance, structural engineering, (MEP) mechanical, electrical, & plumbing engineering assessments, life-safety assessments, and hazardous materials assessment for the Boulder City Water Filtration Plant project.

INTRODUCTION

The Boulder City Water Filtration Plant (WFP) consists of a 4,300-square foot brick and stone building with a concrete foundation, tile roof, and associated water filtration equipment. The building was constructed in 1931 as part of the water supply system from Hoover Dam to Boulder City authorized by the Boulder Canyon Project Act. Two building additions were added in the following several decades, possibly compromising the integrity of the original 1931 structure. The WFP was determined to be obsolete and subsequently abandoned in the early 1980s, after which the property was deeded to the City. The building has not been occupied since the transfer. However, the City has secured the building to prohibit unauthorized access, landscaped the site, and partnered with local residents and organizations to develop a portion of the 1.92-acre parcel into a sculpture park with benches and a community garden. Additionally, the City Water and Sewer Department has used the building for storage and staging. In 2006, the City prepared the Preliminary Report Facility Reuse Plan: Historic Boulder City Water Filtration Plant that provides a brief history of the building, existing conditions, and recommendations for adaptive reuse. The Boulder City Water Supply System report, completed in 1991, documented the original Boulder City Water Supply System, known as the "BC Line," and recommended the system as eligible for listing in the National Register of Historic Places (NRHP) under Criteria A and C. In 2019, the City

Craig S. Galati FAIA, FSMPS, CPSM John A. Haddad Jason Jorjorian, AIA, LEED AP Lance J. Kirk, AIA, NCARB, LEED AP

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conducted the Boulder City Building Assessment that included the WFP. The report provided general observations about the condition of the building, as well as recommendations for addressing the observed deficiencies. The following year North Wind Resource Consulting (North Wind) documented and evaluated the building as part of an update to the NRHP-listed Boulder City Historic District, completed earlier in 2021. LGA and six consultants were hired in the fall of 2021 to begin this comprehensive assessment report to be finalized in February of 2022.

BACKGROUND

LGA ARCHITECTURE: ALL COORDINATION, ASSESSMENTS, & RECOMMENDATIONS

LGA will continue to coordinate with the City and project team to schedule all site visits, virtual meetings, and workshops, as necessary. LGA will also coordinate with all consultants, making up the project team, to assist in their respective assessments, draft reports, and final report.

The interior and exterior of the WFP, including interior equipment and machinery, and the site have been documented via photography, 3D camera technology, sketches, and notes. The building and site condition, character-defining features, original and non-original materials, and alterations have been substantially recorded.

CONSULTANT #1: NORTH WIND

A draft HSR, by North Wind is being submitted to the City in PDF format. The HSR minimally includes a title page, abstract, table of contents, and introduction describing the project's location, purpose, and environmental setting. The HSR also includes a historical context for the WFP and applicable research themes and fieldwork methodology, as well as NRHP eligibility recommendations, treatment approach based on eligibility and applicable uses, regulatory requirements for work, all photographs with a photo log, and a bibliography. All efforts to complete the HSR will be conducted using accepted professional standards consistent with The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings (National Park Service 2017). Additionally, the HSR will follow the recommended format found in Preservation Brief No. 43, The Preparation and Use of Historic Structure Reports (National Park Service 2005).

North Wind has conducted an onsite archival and online historical research. The research team has obtained secondary literature regarding the history and development of the Boulder City Water Supply System, the WFP, Boulder City, Hoover Dam, and Reclamation. The primary goal is to prepare a historic context and chronology of use and alterations in order to evaluate the WFP's historical significance.

CONSULTANT #2: MEL GREEN & SILMAN

Mel Green and Nathan Hicks, with Silman, has documented and completed a preliminary assessment of the current condition of the existing structural systems, their integrity, and noted any seismic concerns and preliminary recommendations. Silman's preliminary report is contained within this overall DRAFT Report.

CONSULTANT #3: TJK CONSULTING ENGINEERS

TJK Consulting Engineers have documented the current WFP's existing mechanical, electrical, and plumbing systems. TJK's DRAFT report is broken up into separate sections for each of the systems within the WFP. The three different sections offer preliminary assessments and preliminary recommendations for the mechanical, electrical, and plumbing systems future for the WFP Building.

CONSULTANT #4: TERP/FIRE + LIFE SAFETY

TERP Fire and Life Safety Consultants have completed a thorough review and assessment of the current condition of the WFP existing infrastructure relative to life-safety and ADA accessibility. Substantial issues will need to be addressed prior to any future use and occupancy. While these may have minimal effect relative to stabilizing and preserving the WFP building, they will ultimately need to be addressed and implemented once a final use or uses is determined for this incredible Boulder City ASSET.

CONSULTANT #5: NINYO & MOORE

Ninyo and Moore, a hazardous material consultant, has completed and documented a preliminary assessment of positive and potential hazardous materials within the current WFP building, specifically for both asbestos and lead-based paints. Ninyo and Moore has also reviewed all prior hazardous material reports provided by the City of Boulder City. The good news is that Ninyo and Moore's preliminary findings indicate less of a substantial risk than initially assumed.

CONSULTANT #6: OCMI COST ESTIMATING

OCMI's services were listed as an optional service within our original proposal but is now part of our agreement per an initial kick-off meeting; they are not part of this 12/14 DRAFT report. They will take this draft report and apply high level cost estimates that will be available for our 1/10/22 meeting.

Thank you for this opportunity. Please review and contact me with any questions or clarifications you may have or need. LGA is providing in the CONCLUSIONS & NEXT STEPS Section, at the end of this report, alternative opinions for some consultant's conclusions as well as additional field clarification that will be required. We look forward to continuing to work with Boulder City and help them realize the enormous VISION potential the Boulder City Water Plant Building and Site has, for the Community of Boulder City.

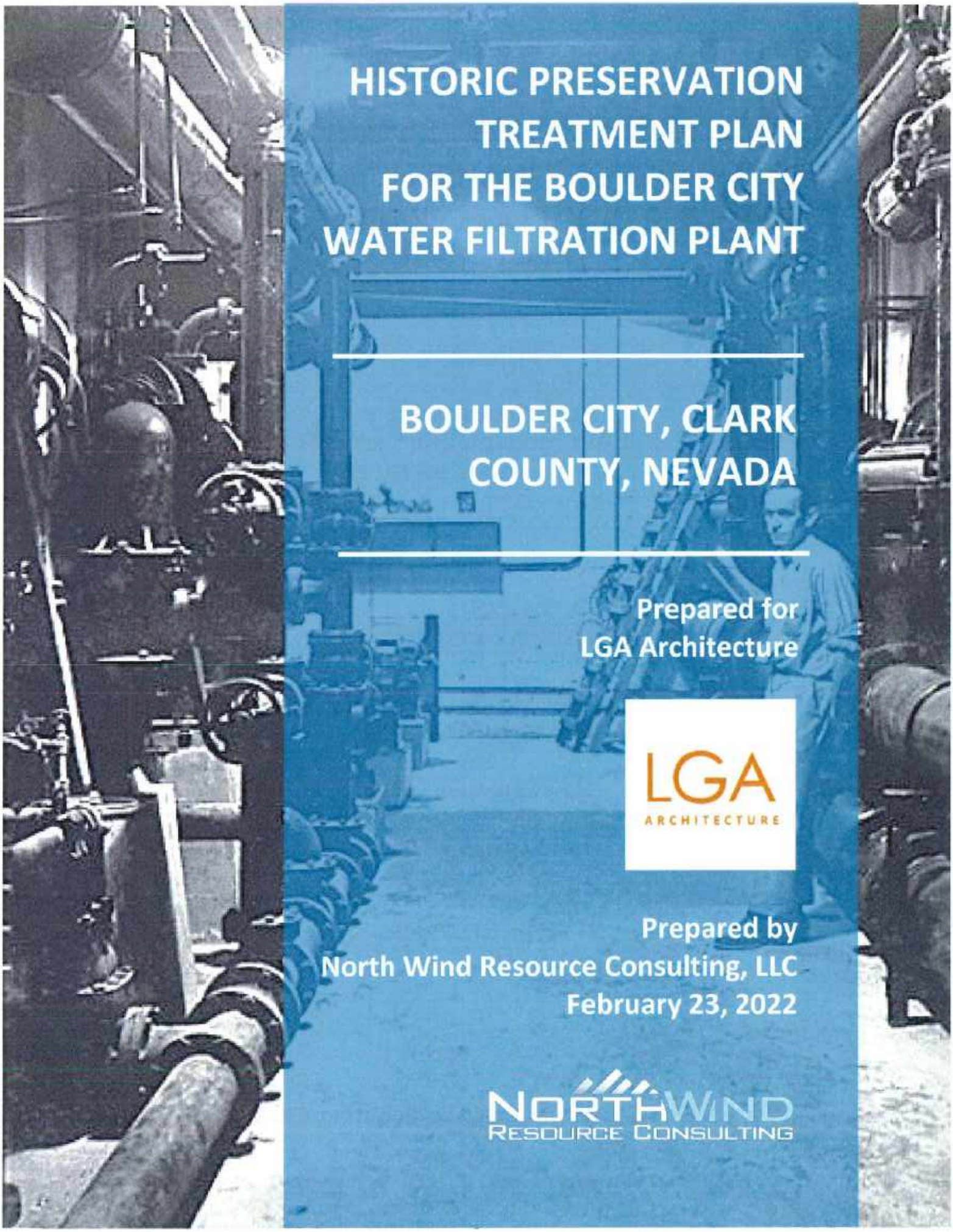
Sincerely,
LGA Architecture

Robert K. Olson, AIA, NCARB
Project Manager

Lance J. Kirk, AIA, NCARB, LEED AP
Principal

1 Architectural Historian Report

Prepared by North Wind Resource Consulting



HISTORIC PRESERVATION TREATMENT PLAN FOR THE BOULDER CITY WATER FILTRATION PLANT

BOULDER CITY, CLARK COUNTY, NEVADA

Prepared for
LGA Architecture

LGA
ARCHITECTURE

Prepared by
North Wind Resource Consulting, LLC
February 23, 2022

NORTHWIND
RESOURCE CONSULTING

HISTORIC PRESERVATION TREATMENT PLAN FOR THE BOULDER CITY WATER FILTRATION PLANT, BOULDER CITY, CLARK COUNTY, NEVADA

Prepared for

LGA Architecture
241 W. Charleston Blvd. Suite #107
Las Vegas, Nevada 89102

Prepared by

NORTHWIND
RESOURCE CONSULTING

Courtney Mooney, M.S., AICP
Greta Rayle, M.A., RPA,
and
Kasey Fulwood, M.A.,
570 Arville Street, Suite 209
Las Vegas, NV 89118

February 23, 2022

North Wind Cultural Resources Report No. 030556

REPORT ABSTRACT

Report Title:	Historic Preservation Treatment Plan for the Boulder City Water Filtration Plant, Boulder City, Clark County, Nevada
Project Location:	Boulder City, Clark County, Nevada
Project Locator UTM:	694757 mE, 3983826 mN (Zone 11, NAD 83)
Project Sponsor:	City of Boulder City
Lead Agency:	N/A
Other Involved Agencies:	Nevada State Historic Preservation Office (SHPO)
Applicable Regulations:	N/A
Funding Source:	City of Boulder City
Description of the Project/ Undertaking:	North Wind, on behalf of LGA Architecture, has prepared a Historic Preservation Treatment Plan (HPTP) for the Boulder City Water Filtration Plant located at 300 Railroad Avenue in Boulder City, Clark County, Nevada. The HPTP is one component of a larger Historic Structure Report (HSR) prepared by LGA. The HSR is intended for use by the City as they move forward with the rehabilitation of and potential expanded uses for the property.
Legal Description:	The water filtration plant is located in the southwest quarter (SW¼) of Section 4, Township 23 South (T23S), Range 64 East (R64E) and is depicted on the 1958; 2018 USGS 7.5' Boulder City, Nev. topographical map.
Land Jurisdiction:	Municipal
Total Acres:	1.55
Consultant Firm/ Organization:	North Wind Resource Consulting, LLC (North Wind)
North Wind Project No.:	030556

Summary:

North Wind Resources Consulting, LLC, (North Wind) on behalf of LGA Architecture (LGA), has prepared an HPTP with historic context, evaluation of integrity, and treatment approach recommendations for the Boulder City Water Filtration Plant (Plant), located at 300 Railroad Avenue in Boulder City, Clark County, Nevada. North Wind, along with Mel Green & Associates (structural engineer), Ninyo & Moore (environmental consultants), TERPconsulting (fire and life safety consultants), and TJK Engineers (mechanical, electrical, and plumbing [MEP] consultants) conducted a site visit on November 9, 2021, to photo-document the property and evaluate its condition; no destructive testing was performed. Extensive notes were taken, and staff of the current property owner, the City of Boulder City (City), were interviewed regarding existing conditions, prior studies, and previous work on the Plant.

The HPTP is one component of a larger Historic Structure Report (HSR), prepared by LGA and intended for use by the current and/or future owners, as well as any private contractors who may be involved in the planning and/or rehabilitation of the building.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF PHOTOGRAPHS

INTRODUCTION

North Wind, on behalf of LGA, has prepared an HPTP with historic context, evaluation of integrity, and treatment approach recommendations for the Plant, located at 300 Railroad Avenue, Boulder City, Clark County, Nevada (Figure 1; Figure 2). North Wind's HPTP is one component of a larger HSR document that defines significant architectural features and provides detailed existing interior and exterior materials conditions, and prioritized treatment and maintenance recommendations for the Plant. The HRS is intended for use by the City as they move forward with the rehabilitation of and potential expanded uses for the property.

The Boulder City Water Filtration Plant was built by the Bureau of Reclamation (Reclamation) during the City's first construction phase. Construction of the Plant was overseen by Reclamation inspector G. G. Walter, who was also responsible for the construction of the City's sewage disposal plant. The Spanish Revival style building was built by the Stearns-Roger Manufacturing Company of Denver, Colorado, at a cost of approximately $30,000. It was completed in February of 1932 and was operational by March of that year. The purpose of the Plant was to purify and soften the water from the Colorado River prior to its distribution to the City's residential and business districts. The Plant remained a vital part of the City's water works until 1982 when the Reclamation water system was discontinued following the completion of the Southern Nevada Water Project. The Plant was declared surplus by the General Services Administration (GSA) in 1984, and ownership of the property was transferred to Boulder City in January 1985.

North Wind's Project Director and Architectural Historian Courtney Mooney, along with Boulder City staff, LGA Architecture, Mel Green & Associates, Ninyo & Moore, TERPconsulting, and TJK Engineers (hereinafter referred to as the team), conducted a site visit on November 9, 2021, to photo-document and evaluate the existing condition of the Plant. Ms. Mooney documented existing conditions of the interior and exterior of the building, as well as the surrounding site, with a focus on character-defining architectural features and any alterations to the building.

Following the site investigations, the team determined that the WFP will require structural enhancements to the roof and remaining chimney base, window restoration, door replacement, hazardous material abatement, and masonry repointing. No design work was included as part of this project. North Wind's report describes each treatment and provides a recommended approach for compliance with the City's Historic Exterior Design Guidelines for City Buildings and the Secretary of the Interior's Standards for Rehabilitation, as well as references to applicable Preservation Briefs published by the National Park Service (NPS).

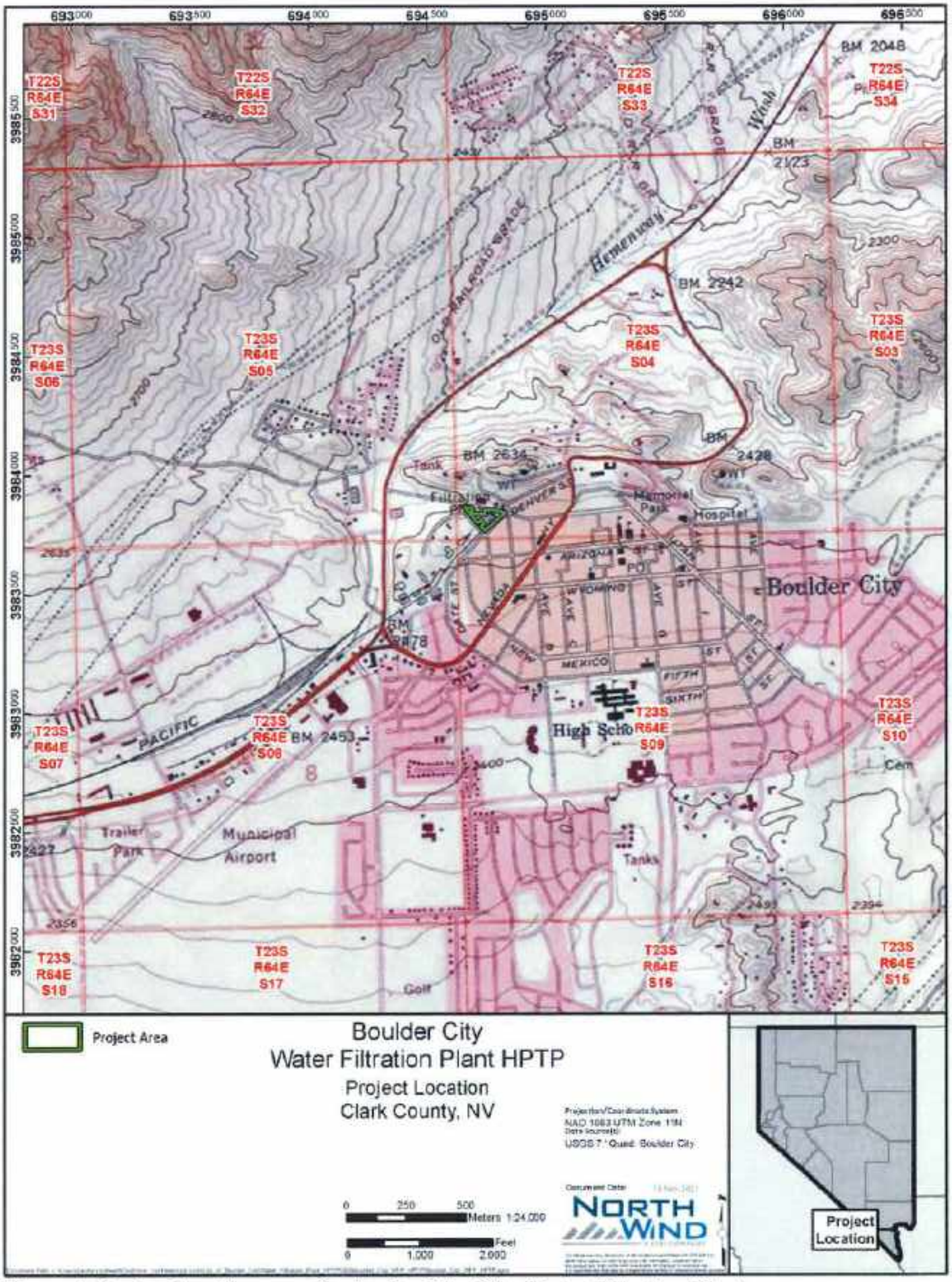


Figure 1. Project location map for the Boulder City Water Filtration Plant.

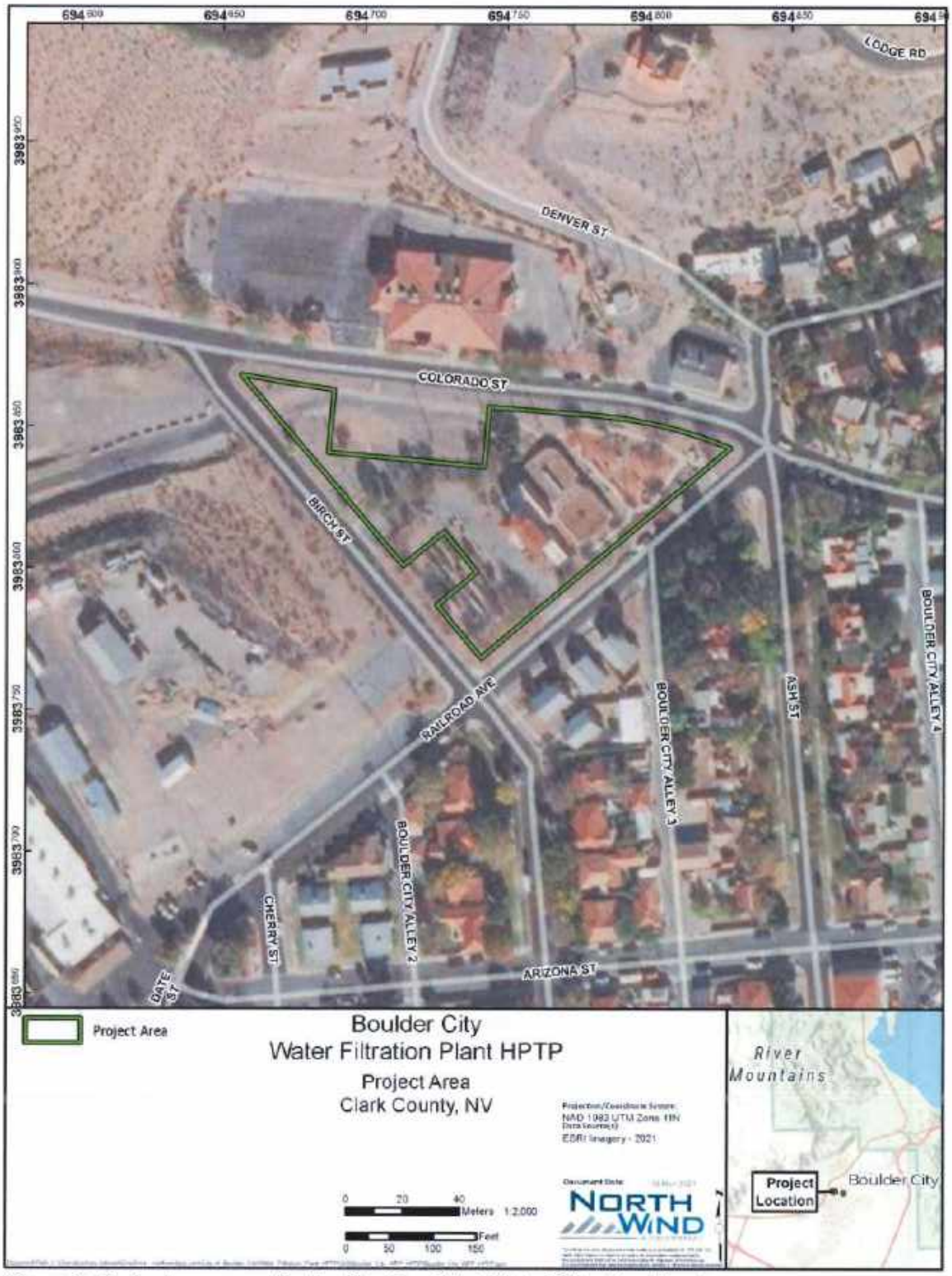


Figure 2. Project area map for the Boulder City Water Filtration Plant.

PHYSICAL SETTING

The Boulder City Water Filtration Plant is located within the southwest quarter (SW¼) of Section 4, Township 23 South (T23S), Range 64 East (R64E) and is depicted on the 1958/2018 USGS 7.5′ Boulder City, Nev. topographical map (see Figure 1 and Figure 2). The Project Locator UTM is 694757 mE, 3983826 mN (Zone 11, NAD 83).

The Plant is located in Boulder City, an incorporated town in the east-central portion of Clark County, Nevada. The City overlooks Lake Mead, a reservoir impounded by the Hoover Dam. The City is situated in the Basin and Range physiographic province, which is characterized by low desert and broad, alluvium-filled valley floors surrounded by fault-block mountain ranges (DeCourten and Biggar 2017). The River Mountains are located to the north of the City, and the El Dorado Valley is located to the southwest. The Plant is located within the City's Government Park zoning district, which is centered in the northwest portion of the town and is bounded by Railroad Avenue on the southeast and Colorado Street on the north (Photograph 1). Note: All photographs included in this document were taken by North Wind during the 2021 site visit unless otherwise noted.

Photograph 1. Overview of the Boulder City Water Filtration Plant from Railroad Avenue, facing north.

RESEARCH METHODOLOGY

North Wind conducted background and historical research to better understand the role that the Plant played in the development of a reliable water supply for the City, and its contribution to the overall growth of the community. Existing materials, including Janus Associates, Inc.'s 1983 National Register of Historic Places (NRHP) nomination for the Boulder City Historic District (Woodward et al. 1983), were reviewed to create a

chronological narrative of the Plant's development. Historic photographs and plans were obtained from the City and the Boulder City-Hoover Dam Museum. These documents provided additional information on the architects, builders, and developers responsible for the design and construction of the property, as well as information about later additions/alterations to the Plant. Historic newspapers, available online from the Las Vegas-Clark County Library District, were consulted to confirm initial construction dates, building details, and changes in the Plant's operations. Additionally, research was conducted through Historicaerials.com, which included aerial photographs of Boulder City for the years 1980 through 2015 and topographic maps for the years 1959, 1961, 1965, 1978, 1976, 1983, 2012, 2015, and 2018. Subsequent to the on-site inspection, Ms. Mooney met with the project team to discuss field observations and challenges/opportunities for adaptive reuse.

BRIEF HISTORIC CONTEXT

HISTORY OF THE BOULDER CANYON PROJECT

In the early twentieth century, the expansion of the railroad system led to population increases in the West that taxed the region's limited water supply and created a need for comprehensive legislation to regulate water use for irrigation and power generation. Following the passage of the Newlands Reclamation Act of 1902, the U.S. Bureau of Reclamation was created by Secretary of the Interior E. A. Hitchcock to oversee the reclamation of arid western lands (Woodward et al 1983). Shortly after Reclamation was established, American engineer and later Reclamation director, Arthur Powell Davis, envisioned the construction of a multipurpose dam on the Colorado River that would provide increased flood control, water for irrigation, and hydroelectric power for the region (Stevens 1988). Over the next several years, canyons and gorges along the Colorado River were investigated as potential dam sites. Beginning in 1919, geologic and topographic surveys were conducted that narrowed the final selection to two sites located in the lower Colorado River Basin (Reclamation 1932). These sites—known as Black and Boulder canyons—consisted of narrow gorges located downstream from the Colorado's confluence with the Virgin River near the Arizona-Nevada border.

With the site selection process already underway, the biggest obstacle to the dam's construction was determining the fair allocation of river waters between the states of the Colorado River Basin. To resolve interstate water claims and assure equitable water distribution, representatives of the seven states that fell within the basin—Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming—formed the Colorado River Commission in 1922 (Reclamation 1932). The commission was overseen by Secretary of Commerce Herbert Hoover, who also served as the group's chairman. In November 1922, members of the commission devised an interstate agreement known as the Colorado River Compact that divided the Colorado River Basin into the upper and lower basins and apportioned a use of the Colorado River system to each of them. Nevada, along with portions of Mexico, California, Arizona, New Mexico, and Utah made up the lower basin (Colorado River Commission 1923). Each basin would be apportioned 7,500,000 acre-feet of water per year following the completion of a dam on the Colorado River (Colorado River Commission 1923). Crucially, all water stored in the upper basin that was not designated for beneficial use

would be allowed to flow to the lower basin states of Arizona, Nevada, and California (Papa 2017).

At nearly the same time as the creation of the Colorado River Compact, Rep. Phil Swing and Sen. Hiram W. Johnson, both of California, introduced the first in a series of bills seeking congressional authorization for the construction of a high dam on the Colorado River (Papa 2017). The first Swing-Johnson Bill was introduced in 1922, but initially failed to come to a vote due to opposition from eastern legislators, who failed to understand the benefit of the project for their own constituency, and the power lobby, who resented federal involvement in private enterprise (Hiltzik 2010). The bill would eventually be reintroduced several times over the next six years. In 1924, the results of further investigations showed that the proposed Boulder Canyon location had significant accessibility issues, and Black Canyon was ultimately selected by Reclamation as the preferred site for the construction of a concrete arch-gravity dam on the Colorado River (Simonds 1995).

In 1928, the third iteration of the Swing-Johnson Bill finally passed both houses of Congress and was signed by President Calvin Coolidge on December 21 (Figure 3) (Hiltzik 2010). Although Black Canyon had officially been selected as the site for the dam, a bill had already been introduced into Congress in which the name "Boulder Canyon" was assigned to the project. Therefore, when the bill was finally enacted into law, it was designated as the "Boulder Canyon Project Act," and the proposed dam was referred to as "Boulder Dam" (Papa 2017). Following the act's approval, all state legislatures, except Arizona, ratified the

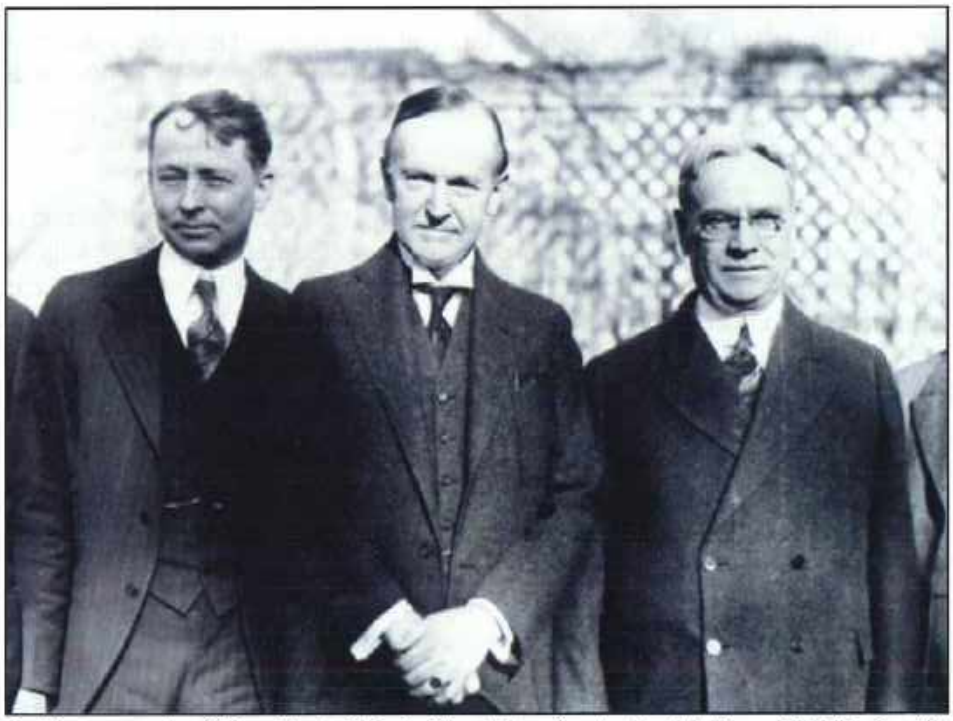


Figure 3. Photograph of President Calvin Coolidge (center) with Rep. Phil Swing (left) and Sen. Hiram Johnson (right), ca. 1930 (Photograph courtesy of the Security Pacific National Bank Photo Collection, Los Angeles Public Library, Los Angeles, California).

Colorado River Compact on June 25, 1930 (Papa 2017). President Herbert Hoover then signed the Second Deficiency Appropriation bill, making $10,660,000 immediately available for construction of a dam at the Black Canyon location (Reclamation 1932). The terms of the Black Canyon Project Act dictated that revenue from the dam's power plant would pay for the cost of construction within a period of 50 years (Reclamation 1932).

The job of overseeing the construction of the Boulder Dam fell to Secretary of the Interior Ray L. Wilbur. In July 1930, Wilbur informed Reclamation chairman, Dr. Elwood Mead, that construction on the project could begin. Mead established a headquarters in Denver, Colorado and enlisted 175 engineers to create plans for the proposed dam (Papa 2017). By December 1930, the government was ready to begin soliciting bids for the project's construction. The winning bid of $48,890,955.50 was submitted by Six Companies Inc. of San Francisco, California, and accepted by Ray Wilbur in March 1931 (Papa 2017).

HISTORIC DEVELOPMENT OF THE BOULDER CITY WATER FILTRATION PLANT

Before construction on the Boulder Dam could get underway, Reclamation officials determined that the remote location of the dam site would require the construction of housing and infrastructure to provide accommodations for dam workers. Ray Wilbur was opposed to housing workers in Las Vegas due to its distance from the project and the "proliferation of vice" within the City limits (Papa 2017). As an alternative, Wilbur proposed the construction of a satellite community, called "Boulder City," which could comfortably house workers and their families (McBride 1992). Commissioner Mead joined Wilbur in advocating for the construction of a new government-owned town that would be a model of community planning (McBride 1992; Papa 2017). To this end, the Second Deficiency Appropriation bill, which had been signed by President Hoover in July 1930, set aside $525,000 of the more than $10,000,0000 appropriation for the construction of buildings, streets, and a water and sewer system for the City (Papa 2017).

Reclamation construction engineer Walker R. Young was charged with overseeing the construction of the Boulder City townsite. Following site selection, Young was confronted with the problem of procuring an adequate water supply for the isolated desert community (Reclamation 1932). The two potential water sources suggested by Reclamation were the artesian wells located near Las Vegas and river water from the Colorado River. Initially, the artesian wells were considered the superior choice as their water was clear and free of bacteria and contained a much lower silt content than the water obtained from the Colorado River (Reclamation 1932). The cost to construct a 25-mile-long water line from Las Vegas to Boulder City was considered to be exorbitant, however, and the Colorado River was ultimately selected as the primary water source for the new community (Reclamation 1932).

The first step in the creation of the City's water works was the construction of a two-million-gallon water storage tank, which was erected on a hill at the northwest end of town in 1931 (Papa 2017). The water tank was the first permanent structure built in the City, further demonstrating the importance of a reliable water supply to the community's overall development (Figure 4) (Woodward et al. 1983). In 1932, the tank was followed by an elaborate water delivery system that included a pretreatment works, situated on the banks of

Figure 4. Photograph of water tank shortly after construction, ca. 1931 (Photograph courtesy of the Boulder City 31ers Club Collection, UNLV Libraries, Las Vegas, Nevada).

the Colorado River about a mile below the dam site, and the filtration, or softening, plant, located in the City's industrial district.

To utilize the waters of the Colorado River for domestic use, the water first had to undergo a multistep treatment process to remove the silt and destroy harmful bacteria (Reclamation1932). The initial stage in the process occurred at the pretreatment plant which consisted of the river intake, pre-sedimentation clarifier, sludge pump, a 30,000-gallon sump tank, and the high head pumps that delivered the water to the filtration plant at Boulder City (Kelly 1932). The result of early analyses made in the vicinity of Black Canyon indicated that the average suspended solids content in Colorado River water was slightly over 6,000 parts per million (ppm), or 5,750 ppm more than the filtration plant could economically handle. Therefore, the large amount of sediment contained in the river water made pre-sedimentation necessary before the water could be chemically treated at the filtration plant (Kelly 1932).

The City's pretreatment works were placed in operation on August 27, 1931 (Kelly 1932). Pre-sedimentation involved pumping water directly from the Colorado River via the river intake, which drew in water and deposited it in the pre-sedimentation clarifying basin located on a rock ledge overlooking the river (Figure 5) (Kelly 1932). In the clarifying basin, the water was allowed to settle for approximately two hours, which removed 97 percent of the silt (Nelson 1932). The sediment was then removed from the basin using a 94-gallon per minute sludge pump that deposited it back into the river (Reclamation 1932). From the pre-sedimentation basin, clarified water flowed by gravity to an adjacent 30,000-gallon sump

Figure 5. Photograph of the pre-sedimentation clarifying basin overlooking the Colorado River, ca. 1932 (Photograph courtesy of the Elton and Madelaine Garret Photo Collection, UNLV Libraries, Las Vegas, Nevada).

tank that fed three centrifugal pumps at Pumping Plant No. 1. From Pumping Plant No. 1, water was forced through 19,094 feet of steel pipe to Pumping Plant No. 2, where it was discharged through an additional 14,578 feet of pipe to an aerator on top of the 100,000-gallon receiving tank at Boulder City. The aerator was designed to reduce the amount of carbon dioxide in the water subsequent to the softening operation (Kelly 1932). Following aeration, water flowed into an equalizing tank and then to the nearby Plant.

The Plant, located at 300 Railroad Avenue, was completed in February 1932 by Reclamation (Kelly 1932). The building was built by the Stearns-Roger Manufacturing Company of Denver, Colorado using of crew of 80 to 90 men and its construction was overseen by Reclamation inspector G. G. Walter, who was also responsible for the construction of the City's sewage disposal plant (*Las Vegas Review-Journal* 1932). The filtration plant was needed to purify and soften the water from the Colorado River prior to its distribution to the water tank and, eventually, to the City's residential and business districts (Woodward et al. 1983). In the early months of the City's development, water was treated with sodium aluminate and alum, chlorinated, and delivered to the consumer directly from the pretreatment works (Kelly 1932). As time progressed, however, the hardness of the river water was considered uneconomical as it required additional laundering, dishwashing, bathing, and increased plumbing costs (Kelly 1932). Wasted soap was also a huge burden on many local families, with one resident reporting that his family's monthly soap bill accounted for between $5 and $10 ($100 to $200 per month when adjusted for inflation) (Kelly 1932).

The Plant was designed to soften the river water through a modified form of excess lime-soda ash treatment, which was considered "the latest innovation in water softening practice" (Kelly 1932). This treatment was recommended by the Plant's designer, Burton Lowther of Denver, Colorado, who also served as consulting engineer for the project (Kelly 1932). The process included a two-stage agitation, sedimentation, carbonation, and sludge recirculation process that, at the time of its construction, distinguished the Plant as one of only five of its kind operating in the country (Figure 6) (Reclamation 1932).

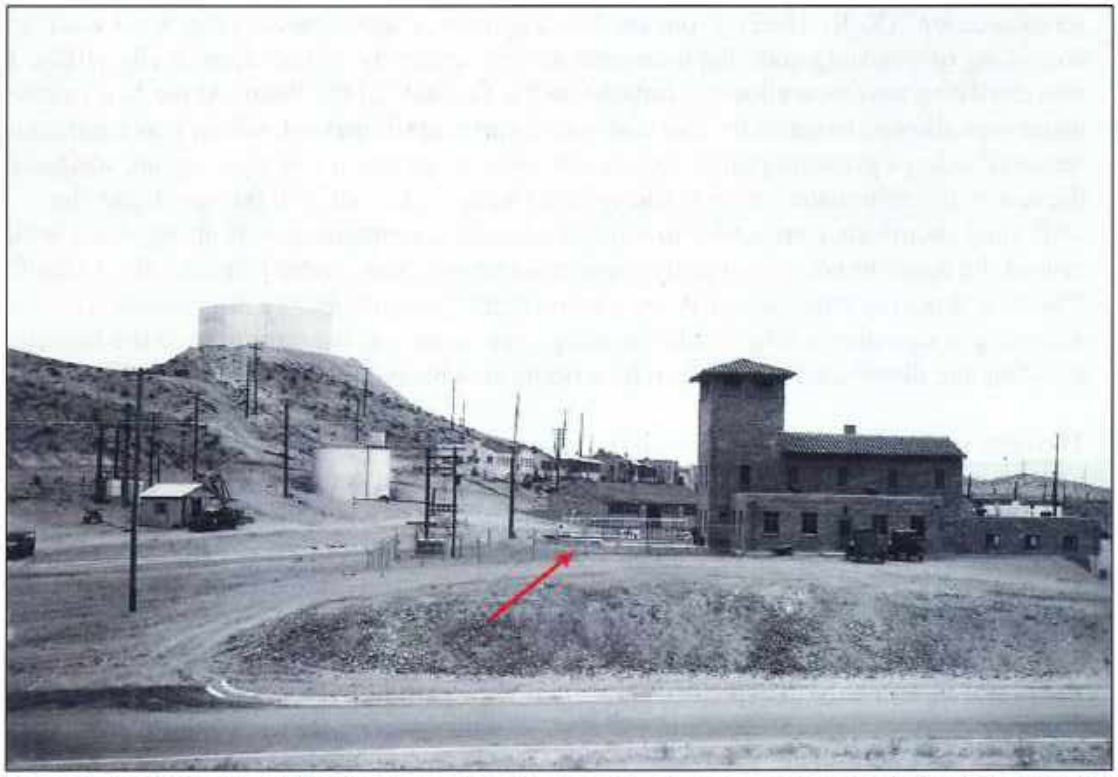


Figure 6. Photograph of the Plant shortly after construction, showing receiving tank and two-million-gallon water storage tank in the background, ca. 1932. Note the infrastructure associated with the clear well at the north end of the building marked with a red arrow. The northwest addition was constructed over the well shortly after this photograph was taken (Photograph courtesy of the National Archives and Records Administration at Denver, Broomfield, Colorado).

The Plant officially went into operation in March of that year under the supervision of D. M. Forester, sanitation engineer for Reclamation (Kelly 1932). The building's basement—which served as "the 'heart' of the plant"—contained a pipe gallery with all the necessary piping and valves for the filtering operation, as well two Dorrco pressure pumps, filtered water centrifugal pumps, and a carbon dioxide generating plant (Kelly 1932; *Las Vegas Review-Journal* 1932). The main floor contained four International Filter operating tables, lime and soda ash dry feed machines, a basin level regulator, flow meter, two chlorinators, electrical control apparatus, sludge recirculation control box, and a laboratory (Kelly 1932). Chemicals required for operations were delivered via a railroad spur that extended from the U.S.

Construction Railroad (U.S. Government Railroad) to an unloading floor within the plant. An electric elevator was used to move the bulk chemicals from the unloading area to a chemical storage room on the building's second floor (Kelly 1932).

The Plant worked using aerated water from the equalizing tank, which flowed into the building via an inlet and entered the No. 1 agitator. In the agitator, lime and soda ash were added to the water and mixed for 15 minutes. The water then flowed from the No. 1 agitator to the No. 2 agitator, where it was gently mixed for an additional 15 minutes until a chemical reaction occurred which left the water "in a well-flocculated condition, ideal for rapid sedimentation" (Kelly 1932). From the No. 2 agitator, water flowed to the No. 1 clarifier, consisting of a settling tank that measured 45 feet square by 10 feet deep (Kelly 1932). The two clarifying tanks were located outside on the east side of the Plant. At the No. 1 clarifier, water was allowed to settle for two hours to remove additional silt, which was continually removed using a pressure pump. Excess silt could be stored in a sludge lagoon, washed down the sewer, or recirculated through the system (Kelly 1932). Also in the No. 1 clarifier, additional chemicals were added to remove calcium and magnesium from the water which caused the water to become slightly caustic. To remedy this, water from the No. 1 clarifier flowed to a nearby basin where it was carbonated for approximately 30 minutes. The carbon dioxide gas was supplied by a coke-burning plant located in the basement of the filtration building and distributed to the basin by a perforated brass-pipe grid system (Kelly 1932).

The next step in the process involved the addition of inert sludge from the No. 2 clarifier, which was then agitated, and flocculated for 30 minutes in Agitator Nos. 3 and 4. The flocculated water then flowed to the No. 2 clarifier where additional sludge was removed and then filtered through rapid sand filters (Figure 7) (Kelly 1932). There were four sand filters in the building, each of which measured 9 feet wide by 14 feet 2 inches long. Water to wash the filters was obtained from a 5,000-gallon steel water tank located in the tower of the filtration plant. Filtered water flowed from the filtration plant to a covered 22-foot-deep clear well, where it was then chlorinated and pumped to the two-million-gallon storage reservoir for distribution to the City (Kelly 1932).

Following its completion, the Plant provided the first pure, potable water for City residents (Woodward et al. 1983). The Plant started delivering water into the City's water mains on March 2, 1932. That day, the raw water from the Colorado River showed a total hardness of 470 ppm, while the filtered water leaving the City's filtration plant showed only 80 ppm and had zero causticity (Kelly 1932). According to Elton Garrett, managing editor of the *Boulder City Journal*, water treated in "Uncle Sam's well-planned purifier…will be as different from the water which courses the bottom of Black canyon as water can very well be" (*Las Vegas Review-Journal* 1932). As completed, the cost of the water works totaled approximately $470,000, with the Plant itself estimated at $30,000 (Nelson 1932; *Las Vegas Review-Journal* 1932). The high costs associated with the project were offset by consumer savings from the state-of-the-art water softening treatment, which was expected to save homeowners approximately $28,300 per year in soap costs alone (Kelly 1932).

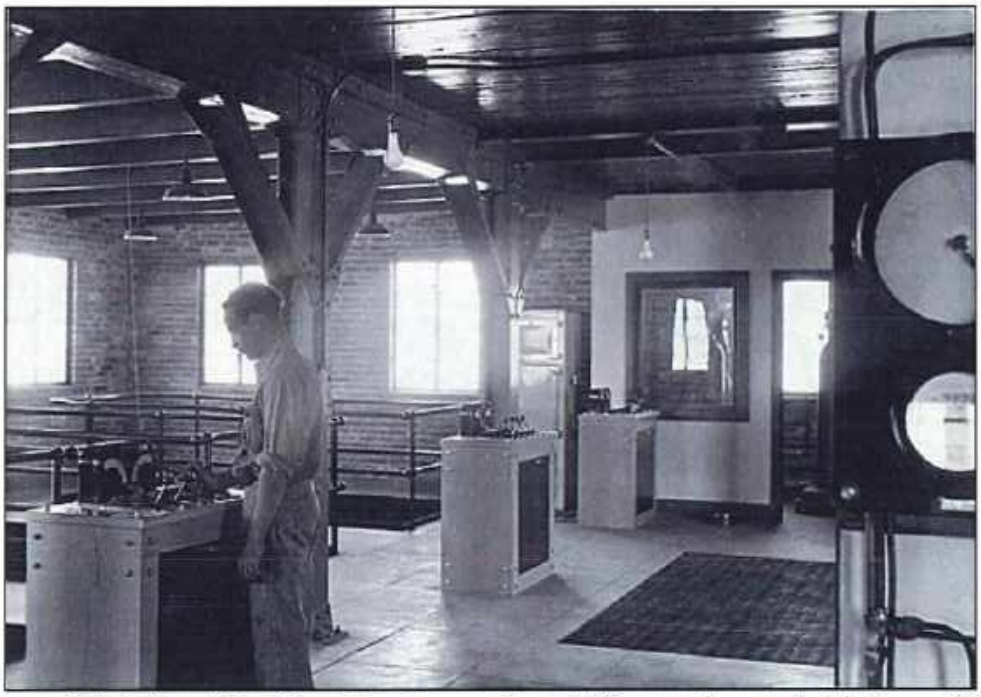


Figure 7. Interior of the Plant showing rapid sand filters and control at left, ca. 1932 (Photograph courtesy of the National Archives and Records Administration at Denver, Broomfield, Colorado).

By 1934, a one-story addition was constructed on to the northwest corner over the clear well, and the coke-burning furnace in the building's basement was replaced with an oil furnace in 1935 (Figure 8) (*Las Vegas Review-Journal* 1935). However, the City's water supply was designed to support only a small, temporary population of approximately 6,000 dam workers, and by World War II (WWII), wartime population growth in southern Nevada was straining the existing infrastructure in the City.

By the late 1940s, the City's meager water supply was no longer considered adequate to meet the community's needs. In 1949, the City's water supply was expanded with the construction of a supplemental water system, consisting of an additional pumping plant and pipeline—called the auxiliary or "A" line— that ran parallel to the old system (Reclamation 1991). The improvements were promoted by Sen. Pat McCarran who worked closely with Reclamation to speed the development of the new system and prevent future water shortages (*Las Vegas Review-Journal* 1948). The Plant building was also expanded at this time with one masonry addition on the east façade (Figure 9).

Figure 8. Aerial view of the Plant (center of photo) taken on April 12, 1934, showing the northwest addition (Courtesy Boulder City Museum & Historical Association Archives, photo no. 0007:0238).

In the late-1940s, many City residents became increasingly displeased with the federal government's management of the community and the lack of citizen participation in the local government. Most of the dissatisfaction with federal control came from business interests who felt that the government was restricting the community's economic growth during the postwar period (Papa 2017). The concerns of City residents were echoed by federal authorities who felt that the maintenance of the community was draining Reclamation's limited resources. The process of severing the City's relationship with the federal government began in 1951 when Secretary of the Interior Oscar Chapman issued Order No. 2650, separating the administrative responsibilities of the Boulder Canyon Project from the City and creating an advisory council of citizen representatives (McBride 1992). However, citizens remained divided on the issue of incorporation and delayed the process for several more years. In 1957, Congress attempted to end the community's inaction through the passage of the Boulder City Act, which authorized the disposal of federal property in the City. The act was signed by President Eisenhower in 1958 (McBride 1992). The act stipulated that while the water tanks would be turned over to municipal control, Reclamation would continue to operate and maintain the other parts of the City's water supply, including the water transmission lines and treatment facilities, with a maximum rate of delivery of 3,560 gallons per minute (Armantrout 2005).

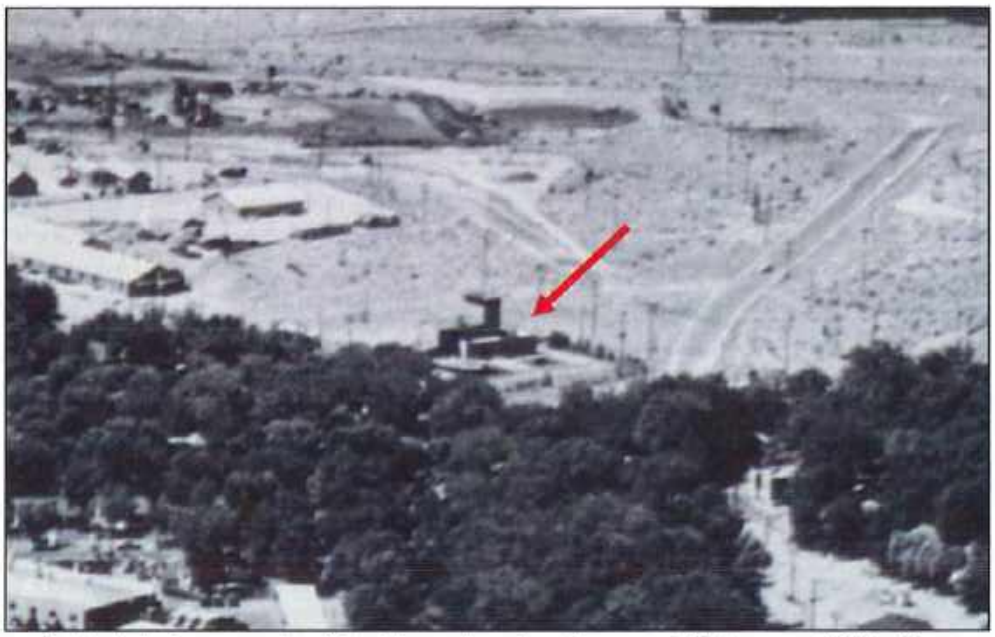


Figure 9. Aerial photograph of the Plant showing the east addition, ca. 1955 (Photograph courtesy of the Morgan Sweeney Photograph Collection, UNLV Libraries, Las Vegas, Nevada).

The decline of the Plant began in earnest in the late 1960s. Increased tourism led to a population boom in southern Nevada that further strained the existing water supply, and regional leaders turned to the federal government to alleviate the water crisis. As a result of political negotiations on the part of Secretary of the Interior, Stewart Udall, and Nevada State Senator, Alan Bible, Senate Bill 32 was introduced in May 1965 (Rogers 2006). The bill called for the construction of a two-stage water delivery system capable of treating and conveying's the state's total allotment of 300,000 acre-feet per year of water from Lake Mead. The bill, funding what was now called the Southern Nevada Water Project, was finally signed by President Johnson five months later, and by 1968, construction on the SNWP had begun (Rogers 2006). Nevada was not able to fund the entire construction project and a portion was allocated to Reclamation to construct a federal water project. By the end of the project's first stage of construction in 1971, the SNWP had constructed a total of six pumping plants, a regulatory reservoir, 31 miles of pipelines from Lake Mead, and the Alfred Merritt Smith Water Treatment Facility on Saddle Island, northeast of the City (Rogers 2006). In addition to these achievements, the SNWP system substantially increased the capacity of the City's water system to support the community's growing population. The Reclamation system continued to operate independently from the SNWP to supply treated water to the City; however, the outdated water delivery system struggled to compete with the modern SNWP system, contributing only 20 percent of the City's annual water requirement by the early 1970s (Armantrout 2005).

To keep pace with the continued population growth of the Las Vegas Valley, a second phase of construction for the SNWP occurred from 1977 to 1983 (Rogers 2006). In anticipation of the expanded SNWP capabilities, and lower costs associated with treating water with the new system, the Reclamation water supply system was discontinued in 1982 (Armantrout 2005).

At that time, Reclamation estimated that the cost to upgrade the Plant's aging infrastructure would be too expensive and the Plant was taken out of service. In June 1984, the Plant was declared surplus by the GSA and transferred to the City through the U.S. Department of Health and Human Services (Armantrout 2005). The Department of Health and Human Services granted permission for the City to occupy the property in October 1984 and officially transferred ownership of the Plant to the City in January 1985 (Armantrout 2005). The City initially planned to use the Plant as an emergency backup system for their potable water supply, however, it was determined that the equipment was too outdated and would require costly upgrades to bring back into operation. Since the City's acquisition of the property, the Plant building has been used infrequently for storage by the municipal government and has been secured against vandalism. However, no other improvements have been made.

ARCHITECTURAL CONTEXT

The monumental nature of the Boulder Dam encouraged Reclamation to experiment with more complex architectural styles and to hire professional architects and planners to consult on the City's overall design (Pfaff 2007). The federal government enlisted the expertise of Los Angeles-based architect Gordon B. Kaufmann to serve as consulting architect for the Reclamation buildings in the Boulder City townsite (Pfaff 2007). Kaufman was asked to submit plans for the major government buildings, as well as floor plans for four-, five-, and six-room residences for Reclamation personnel (Pfaff 2007). Final plans for the Reclamation residences and main civic buildings were based on Kaufmann's designs and were all constructed in a Spanish Revival architectural style that was favored by Kaufmann (Papa 2017). Revival styles gained in popularity during the Eclectic Movement in American architecture, which occurred from about 1880 through the 1940s and drew inspiration from the domestic architecture of various European countries. The Spanish Revival style was most popular for domestic architecture in America beginning from about 1915 to 1940 and was most prevalent in the southwestern United States (McAlester 2015).

The Plant was constructed to support the operation and maintenance of the City. Although it was a utilitarian structure, the Plant also incorporated characteristics of the Spanish Revival architectural style that had been established for other Reclamation buildings throughout the City. The use of the Spanish Revival style for the filtration plant fostered a cohesive appearance that was indicative of the careful planning inherent in the community's overall design. As constructed, the Plant is comprised of a two-story brick rectangular mass with an offset third-story tower and exhibits many characteristics of the Spanish Revival style including a low-pitched red tile roof and asymmetrical massing (Figure 10) (Woodward et al. 1983).

Figure 10. Photograph of the Plant showing the tile roof and asymmetrical massing characteristic of the Spanish Revival architectural style, ca. 1932 (Photograph courtesy of the National Archives and Records Administration at Denver, Broomfield, Colorado).

Final plans for the Plant were executed in the Reclamation Denver Office and were assigned number 45-D-1189, with the number "45" signifying the Boulder Canyon Project (Pfaff 2007). The final plans were approved in July 1931 by Raymond F. Walter, the project's chief engineer. Construction on the Plant began in November 1931 by the Stearns-Roger Manufacturing Company of Denver, Colorado, with T. H. Shannon serving as the supervising contractor (*Las Vegas Review-Journal* 1931). The building's foundation was excavated by Mahoney and Cline of Las Vegas (*Las Vegas Review-Journal* 1931). Upon completion of the Plant in February 1932, the building was considered, "most attractive in appearance" (Kelly 1932). Today, the Plant represents an exceptional example of industrial architecture built by Reclamation during the City's initial phase of development.

PREVIOUS STUDIES

The Plant was first documented by Janus Associates, Inc. in 1982. The following year, when the Boulder City Historic District (District) was listed in the NRHP, the Plant was determined eligible for listing as a contributing property to the District. In 1991, the Plant was again documented during a survey of the Boulder City Water Supply System that was completed by Reclamation. At that time, the property was determined to also be a contributing resource to the NRHP-eligible Boulder City Water Supply System, also known as the "BC Line" (Reclamation 1991). In 2006, a Preliminary Facility Reuse Study for the Plant was developed by the Boulder City Community Development Department. The study contained background information on the Plant's development, an evaluation of existing facility conditions, and future proposed uses for the building (Armantrout 2005). Additionally, in 2019, the City completed an Existing Building Conditions Assessment

Report for the Plant that evaluated the interior and exterior building conditions to identify critical maintenance and repair needs (City of Boulder City 2019).

Most recently, in 2020, the Plant was evaluated by North Wind as part of an updated architectural survey and inventory of the Boulder City Historic District. North Wind concurred with the previous determination that the Plant is eligible for listing in the NRHP as a contributing resource of the District and also recommended that the building is individually eligible for NRHP listing at the local level under Criterion A at the local level of significance, under the themes of Engineering and Community Planning and Development. The period of significance has been identified as beginning in 1931, with the construction of the Plant, and ending in 1982 with its closure.

As part of the updated survey, North Wind completed a Nevada State Historic Preservation Office (SHPO) Architectural Resource Assessment form for the Plant. As these forms can be brief, more detailed discussions of the Plant's NRHP-eligibility and historic architectural integrity was not included. An evaluation of integrity is provided below to better assist with future discussions regarding the rehabilitation and adaptive reuse of the Plant.

EVALUATION OF HISTORIC ARCHITECTURAL INTEGRITY

North Wind has determined that the Plant retains integrity of location, materials, workmanship, feeling, and association, as defined by the NRHP:

***Location**: the place where the historic property was constructed or the place where the historic event occurred.* The Plant has not been moved from its original location.

***Design:** the combination of elements that create the form, plan, space, structure, and style of a property.* The Plant no longer retains its original design due to the additions on the north and east sides of the building that altered the original massing and covered original architectural details. Additionally, the concrete steps at the east end of the dock (south façade) were removed to accommodate an opening, and one below-grade chemical mixing tank was removed when the east addition was constructed ca. 1950.

***Setting**: the physical environment of a historic property.* Although the Plant's setting in a historically industrial part of the City, southwest of the water storage tank on Lodge Road[1] is considered significant, the majority of the components that made up the original setting are no longer extant or have been altered significantly, including: the railroad spur designed to deliver chemicals and other supplies to the Plant was removed; much of the Reclamation facilities located southwest of the Plant were demolished and/or new facilities constructed; and the receiving tank, formerly located northeast of the Plant, was removed. Additionally, the historic industrial setting was altered by the installation of the sculpture garden at the east end of the property. Therefore, the Plant no longer retains integrity of setting.

[1] Official address for the water storage tank per the Clark County Assessor's Office is 1310 Mountain View Place; however, local residents also give its location as Lodge Road as the access road to the tank spurs from this road.

Materials: *the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.* Despite the additions on the east and north sides of the Plant, the building retains the key exterior materials dating from the period of significance (1931-1982), including the brick, board formed concrete, steel casement windows, Spanish tile roofs, copper louvers, and turned wood balustrades, and therefore retains integrity of materials. It is not known to what extent the additions are reversible; however, it appears that they were constructed over the exterior walls of the Plant and their removal could possibly restore the original north and east facades to their original appearance.

Workmanship: *the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.* The Plant retains the majority of the historic workmanship, including the brick exterior, decorative brick surround at the main (west) entrance, the Spanish tile roof, the copper louvers, and turned wood balustrades. In the interior, the steel beams, scored concrete floor, and exposed ceiling beams and sheathing are also retained. These materials and construction methods were typical in the United States for utilitarian buildings during this time period, especially within Boulder City. These elements convey a regional application of both technological practices and aesthetic principles. Therefore, the Plant retains integrity of workmanship.

Feeling: *a property's expression of the aesthetic or historic sense of a particular period of time.* The Plant retains the physical features that, taken together, convey the property's historic character and function as a 1930s Reclamation facility in Boulder City. These features include certain elements that make up the setting, design, materials, and workmanship of the building.

Association: *the direct link between an important historic event or person and a historic property.* The Plant is able to convey its original function as a water treatment facility and therefore its association with engineering achievements that supported the growth and development of Boulder City during the early twentieth century.

HISTORIC BUILDING CONDITION ASSESSEMENT

PHYSICAL DESCRIPTION

Below is a physical description of the Plant, followed by the building's character-defining features and areas of concern observed during the field visit. All photographs were taken by North Wind during a visit to the site on November 9, 2021, unless otherwise noted.

The Plant, including the building and remediated clarifying tanks, is located on a triangular shaped lot bounded by Colorado St. on the north, Railroad Ave. on the southeast, and Birch St. on the southwest. The Plant is located at the center of the southeast end of the lot. A sculpture garden is located at the northeast corner of the lot, and a community garden is located at the southwest corner of the lot. The majority of the lot is owned by the City, while a 0.29-acre parking area at the north end of the lot (Lot 18), and a small (0.08 acre) square parcel where the north half of the community garden is located (Lot 19), are owned by the federal government (Figure 11).

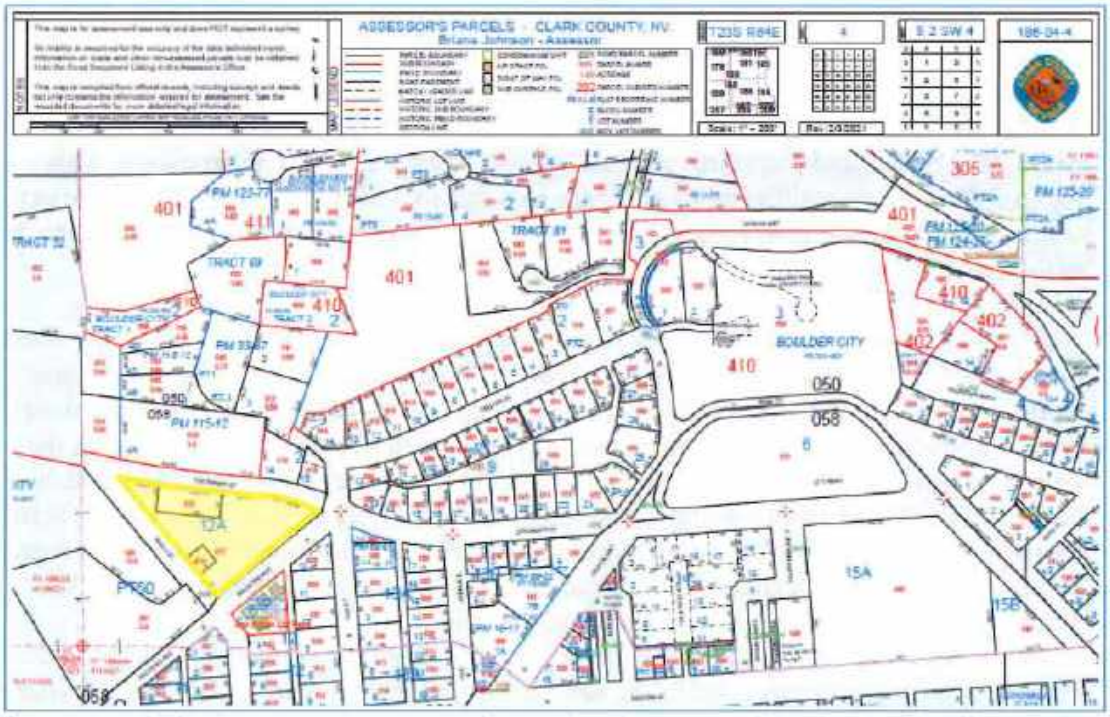


Figure 11. Clark County Assessor parcel map showing 300 Railroad Ave. in yellow. Lots 18 and 19 are owned by the federal government (Clark County Assessor 2021).

The Plant was constructed with an irregular plan oriented northwest-southeast with a southwest facing main entrance.[2] The original building consisted of the central two-story building with basement and third-story tower on the north end, the one-story extension with basement level on the west end, and the one-story extension with loading dock on the south end (Figure 12; Figure 13). The central building houses the operating floor, office space, space for an emergency shower, and restroom on the main floor, and the "pipe gallery" in the basement. The tower, accessed by an interior steel ladder at the north end of the main building, houses a water tank. Four below-grade rapid sand filter beds are located in the west extension. The south extension, constructed of a board-formed concrete base approximately 4' high, and brick upper walls, contains a storage room. A three-story steel spiral staircase and elevator separates the south extension from the main building. The roof of the central two-story building has a south-facing gable with a moderate slope, while the tower is capped with a moderately-sloped hipped roof. The west and south extensions have flat roofs with parapet walls and circular air ventilators on top (Figure 10). The central building and tower are notable for their brick quoins and Spanish tile roofs. The tower contains additional details such as vents with copper louvers and turned wood balustrades resting upon a dentiled brick cornice. Original windows are multi-lite steel casement style with brick sills (Department of the Interior, 1931). Number of lites vary depending upon the location, and most have been infilled with painted plywood.

[2] For the purposes of this report, the southwest (main) façade will be referred to as the west façade. Remaining facades are named accordingly north, south, and east.

By ca. 1934, a one-story square addition with a flat roof and brick exterior was constructed on the northwest end of the building. The addition was constructed over a clear well and currently contains pumping equipment. A one-story rectangular addition with basement was constructed on to the east side of the building ca. 1950 (Figure 14).[3] The addition was constructed over two below-grade chemical mixing tanks (two of which were proposed for removal in 1950) with a steel grate floor. The roof is gabled with an almost imperceptible slope, and a low parapet is located on the south and east facades. The addition is constructed of brick with the exception of the notched southeast corner that is constructed of wood (Department of the Interior, 1950).

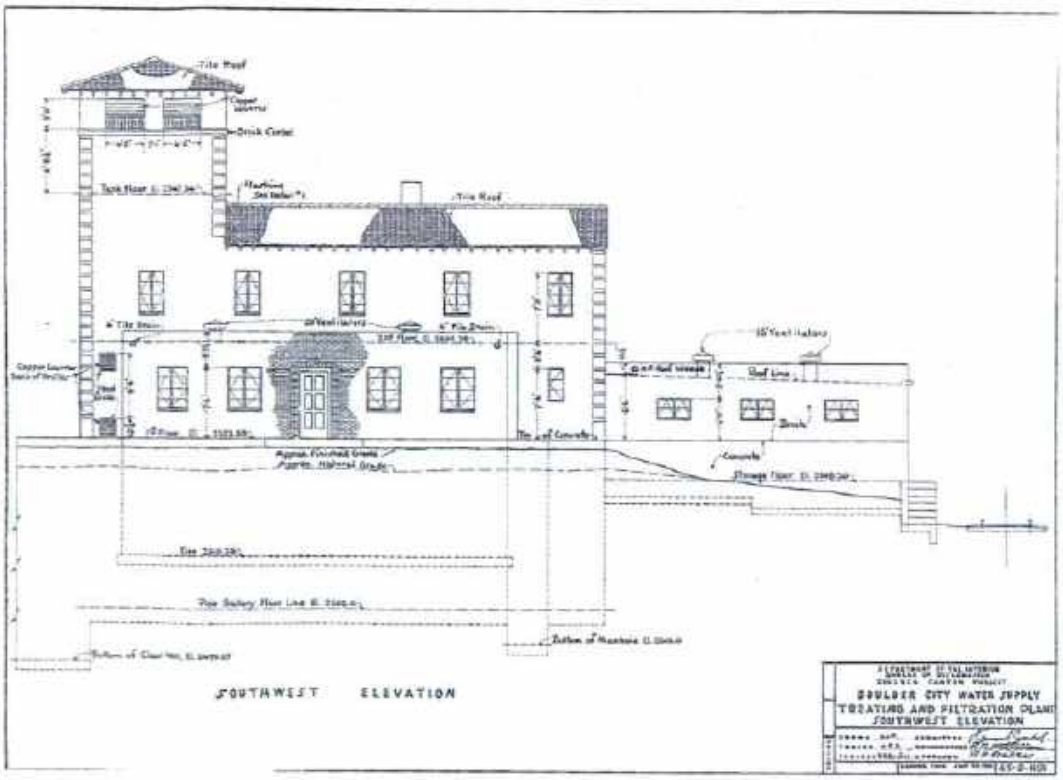


Figure 12. Original southwest elevation drawings for 300 Railroad Avenue, 1931 (Department of the Interior 1931).

[3] The current massing was achieved with this final addition.

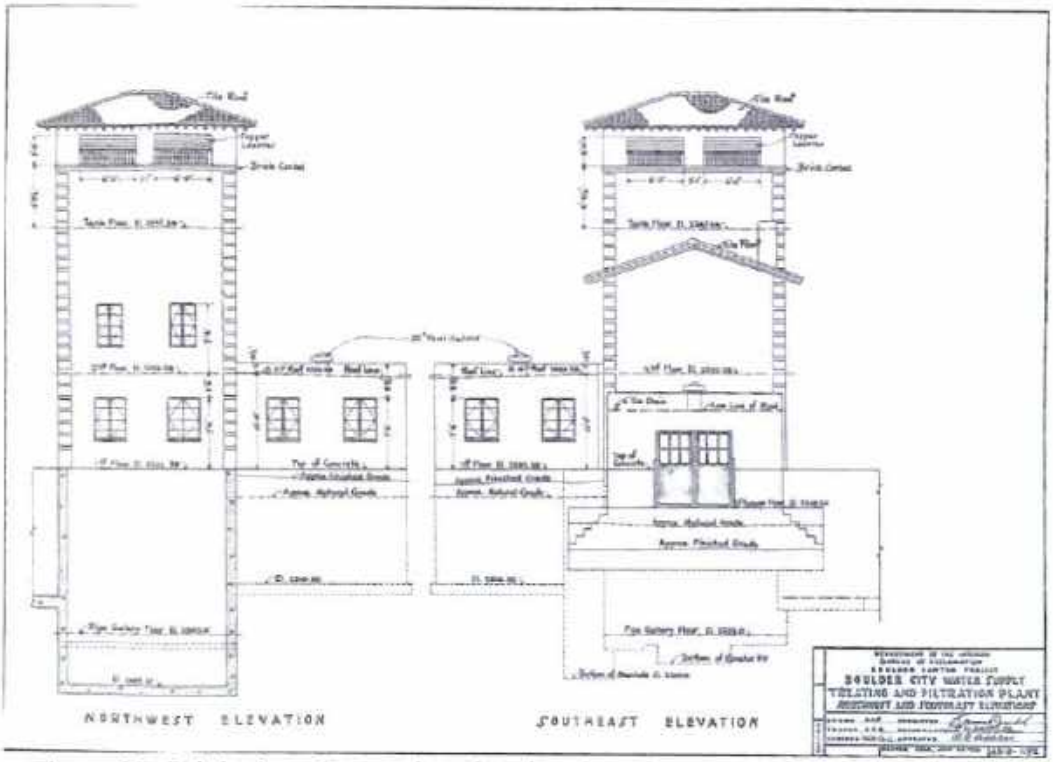
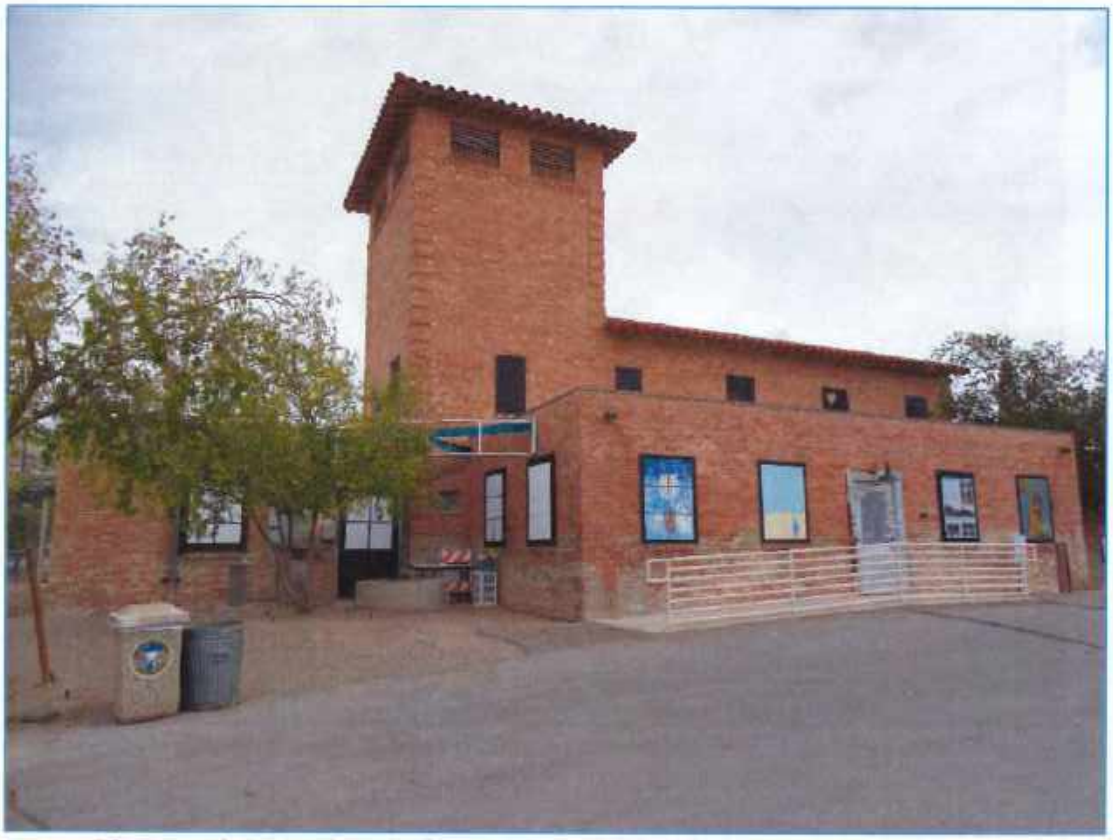


Figure 13. Original northwest elevation drawings for 300 Railroad Avenue, 1931 (Department of the Interior 1931).

Figure 14. Ca. 1934 and 1950 additions outlined in red and blue, respectively (Google Maps 2021).

The west (main) façade consists of, from left (north) to right (south), the west façade of the northwest addition, central building and tower, the west extension, and west façade of the loading dock (Photograph 2). The west façade of the northwest addition contains an infilled window on the north end, and a single-leaf metal door with infilled window on the south end. What appears to be a capped well in the form of a raised concrete cylinder is located west of the door. A steel sculpture supporting a metal awning frame rests atop the cylinder. The metal frame consists of two crossed steel beams supporting a curved metal frame. Utility equipment is located to the north of the door. An opening with a decorative metal grill is located to the south of the door on the lower portion of the west façade of the tower. Two infilled windows face north on the west extension.



Photograph 2. North end of the west (main) façade of the Plant, facing east.

The main entry is centered on the west façade of the west extension, flanked by two infilled windows on either side of the entry. One window is infilled with an interpretive marker. The entry consists of a metal door with infilled opening and a thick metal frame. The door and frame are not original to the building. The frame covers the original decorative brick surround.[4] A modern concrete ramp with metal pipe handrails is located in front of the west façade. Two tile roof drains are located at the north and south end of the parapet wall. A concrete pad with steel doors leading to a chamber below grade, and a water pump, are located at the south end of the west façade. The south façade of the west extension contains two infilled windows. The west façade of the loading dock extension contains three smaller infilled windows. The west façade of the tower includes two louvered openings at the top of the tower (all four sides of the tower are identical), and five evenly spaced infilled windows at the second story level. The finished grade slopes southward here, revealing the loading dock's board-formed concrete base (Photograph 3).

[4] A matching surround is located at the former east entry, now covered by the east addition.

Photograph 3. South end of the west (main) façade of the Plant, facing northeast. Note board-formed concrete at the base of the loading dock extension.

The south façade of the loading dock contains a set of double metal doors with infilled windows and steel door guards in the center of the façade (Photograph 4). A shallow concrete dock with a set of three concrete steps on the west end is located in front of the doors. The steps are trimmed with metal safety treads, and a piece of steel angle iron trims the front (south) of the dock. According to the original building drawings a matching set of concrete steps was located at the east end of the dock. It appears that they have been removed to accommodate an opening under the dock. A piece of wood is bolted to the north end of the dock. The east façade of the loading dock extension mirrors the west and contains three infilled window openings; however, the northernmost window is slightly larger. A large pipe extends from the south end of the extension and turns south at an angle before continuing below grade. The south façade of the concrete clarifying tanks extends from the east façade of the loading dock extension. A short railroad spur (no longer extant) of the U.S. Construction Railroad (U.S. Government Railroad) that delivered chemicals required for Plant operations to the Plant's loading dock was located just south of the dock along the north side of Railroad Avenue.

Photograph 4. South façade showing the loading dock (center) and west end of the clarifying tanks (left), facing northwest.

The east façade of the second floor of the central building contains five window openings, three of which are infilled. The two southernmost windows left uncovered are eight-lite steel casement style. The northernmost opening is different in that a horizontal component extends northward from the top of the window to create an upside-down L shape. The east façade of the rectangular addition contains, from left (south) to right (north), a single-leaf entry and three window openings. The notched corner at the southeast corner of the addition is constructed of wood and has a smooth finish (Department of the Interior, 1950). Two tile roof drains are located at the south and north ends of the addition's east parapet wall. The north façade of the addition contains three infilled windows. Two infilled windows face north on the tower's second story. A set of concrete steps with metal pipe handrails leads from the north parking area to a gravel area north of the building (Photograph 5).

Photograph 5. North façade of the plant showing concrete stairs leading to the north parking area.

Two 45-foot diameter concrete clarifying tanks, a series of concrete recarbonizing chambers located in between the clarifying tanks, two chemical mixing tanks located west of the clarifying tanks, and associated equipment are located to the east of the building. The above-ground board-formed concrete linings of the clarifying tanks, the top surfaces of the chemical mixing tanks and the concrete recarbonizing chambers, and above-tank equipment are extant; however, the tanks and chambers have been infilled with dirt. Additionally, two chemical mixing tanks were removed as part of the 1950 addition. Metal pipe handrails and chain link fencing line the tanks (Photograph 6).

Photograph 6. East façade of the Plant, facing west. The clarifying tanks are the large, raised concrete structures in the foreground.

POTENTIAL FUNDING OPPORTUNITIES

Below is a list of common potential funding sources for rehabilitation of historic buildings. The list is not exhaustive, and the City is encouraged to conduct its own research as the planning process proceeds. A great resource is preservationdirectory.com which maintains a comprehensive list of preservation related grant funding at https://www.preservationdirectory.com/PreservationGeneralResources/GrantsFundingSources.aspx#nthp. Preservation Directory also partners with Historicfunding.com, a paid membership service that can assist the City with finding applicable funding through a "search for funding" tool. The site includes over 7,000 funding sources, including grants, loans, tax incentives, rebate programs, CLG funds, and easement programs.

Most historic preservation related grant programs require a matching contribution and that any and all work meets SOI standards. A note about review and compliance: if the City conducts, especially rehabilitation work or planning using state or federal funds, a multi-layered review may be required from the planning stages to final walk-through. Additionally, some grants, such as the Nevada Commission for Cultural Centers and Historic Preservation (CCCHP) grant, will require the City to agree to restrictive covenants on the property for a length of time commensurate with the amount of grant award.

Nevada Commission for Cultural Centers and Historic Preservation Grant Program
The CCCHP, established by State law (NRS 383) and funded through the State's bonding program, provides financial assistance to governmental agencies (and nonprofit organizations) for projects that preserve and protect historic buildings, structures, and objects (and archaeological sites) for the purpose of developing a network of cultural centers and activities. A match contribution is encouraged, and participation requires consent to a covenant on the property, the terms of which are dependent upon the amount of assistance awarded. The City is encouraged to contact the Nevada SHPO to learn more about this program, and/or visit: https://shpo.nv.gov/homepage/commission-for-cultural-centers-and-historic-preservation-ccchp.

National Trust Preservation Funds (NTPF)
These grants are funded through the National Trust for Historic Preservation. Per the NTPF webpage, these funds are intended to encourage preservation at the local level by supporting on-going preservation work and by providing seed money for preservation projects. These matching grants are typically awarded to public agencies, and 501(c) (3) or other nonprofit organizations for planning and education and outreach. However, as of October 1, 2021, Nevada is not included in the list of states the NTPF grant program has dedicated funding to, and applicants are encouraged to contact savingplaces.org to discuss other National Trust grant opportunities. For more information visit: https://forum.savingplaces.org/build/funding/grant-seekers/preservation-funds.

Historic Preservation Tax Incentives (HPTI)
The HPTI program was created by the Tax Reform Act of 1976 to encourage private sector investment in the qualified rehabilitation and re-use of historic buildings. In Nevada, this program is supported jointly by the Internal Revenue Service (IRS), the NPS, and the Nevada SHPO. A 20% income tax credit is available for the rehabilitation of historic, income-producing buildings that are determined by the SOI, through the NPS, to be "certified historic structures." For the Plant, The Nevada SHPO and NPS would review the rehabilitation work to ensure that it complies with the SOI. The IRS defines qualified rehabilitation expenses on which the credit may be taken. If interested in this program, the City should first contact the Nevada SHPO about the feasibility of tax credits for the Plant and to learn more about the criteria and conditions that must be met to take advantage of these incentives. Project teams are benefitted by consulting an accountant, tax attorney, legal counsel, and/or the Internal Revenue Service. For more information, visit: https://shpo.nv.gov/services/taxcredits, and https://www.nps.gov/tps/tax-incentives.htm.

Historic Preservation Fund (HPF) Subgrants
The HPF subgrants are administered by the Nevada SHPO from the state's annual Historic Preservation Fund (HPF) award, which originates with the NPS. The City took advantage of this opportunity to fund the 2020 Boulder City Historic District ARS and is familiar with the process. This subgrant also funds qualified rehabilitation projects. For more information about the HPF subgrant program, visit https://shpo.nv.gov/services/historic-preservation-fund-subgrants.

BUILDING ANALYSIS

METHODOLOGY

North Wind, along with City staff and members of the project team, conducted a site visit on November 9, 2021, to photo-document and evaluate the existing condition of the Plant. North Wind photo-documented interior and exterior conditions of the building and site. Special attention was paid to the Plant's character-defining features and any visible structural, mechanical, and maintenance areas of concern. The photo-documentation of the Plant began at the southwest corner of the building and proceeded in a counter-clockwise fashion. The first interior photographs were taken of the entire ground floor upon entering from the west entrance, followed by the upper levels.

CHARACTER-DEFINING FEATURES OF THE PLANT

The NPS defines a building's distinguishing character as, "all those visual aspects and physical features that comprise the appearance of every historic building."[5] This document identifies the character-defining features of the Plant, including exterior architectural features, landscape, and circulation elements, and interior features. Defining the character-defining features is key to prioritizing and implementing any preservation treatment program. Ultimately, the preservation of cultural resources in their existing states should always receive first consideration. If greater intervention is necessary, an interpretive program should follow, and all work should comply with an approved plan and be thoroughly documented for stakeholder review and archiving.

Below is a discussion of the exterior and interior character-defining features of the Plant with associated images.

EXTERIOR CHARACTER-DEFINING FEATURES

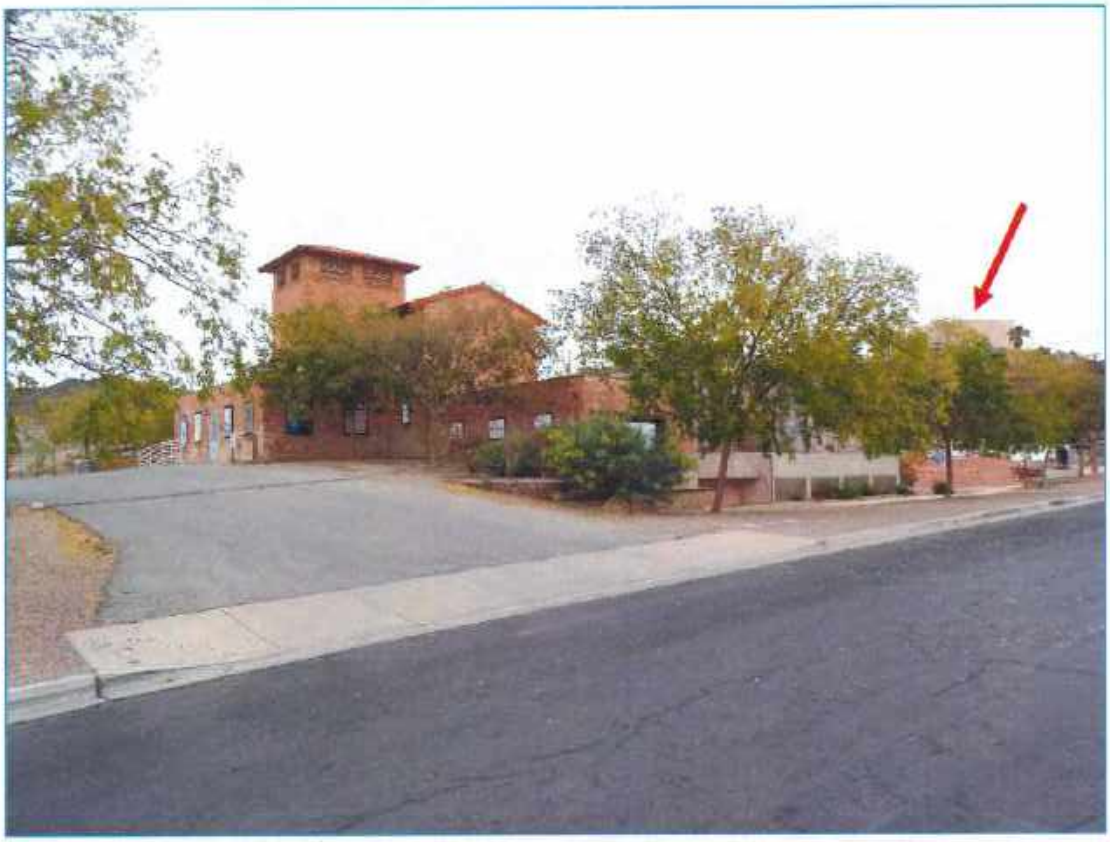
Setting

Setting is the physical environment of a property that provides clues to how the building came to be in its location and why it appears the way it does. Elements that make up a property's setting can include its relationship to surrounding features, such as topographic features, vegetation, and open space, and manmade elements such as sidewalks, parking areas, roads, and other buildings.

The most significant feature of the Plant's setting is its location in a historically industrial part of the City, southwest of the water storage tank on Lodge Road at the south slope of the River Mountains. The hill provides a backdrop for the Plant and serves the still relevant function of elevating the water storage tank above the majority of the townsite (Photograph 7). Additionally, the location of the Plant as it relates to other extant historic Reclamation (formerly Six Companies) properties along Railroad Avenue is significant. The hill upon which the water tank sits remains largely undeveloped and appears much as it did when the

[5] Nelson, Lee H. (1988). *National Park Service Preservation Brief 17: Architectural Character – Identifying Visual Aspects of Historic Buildings as an Aid to Preserving their Character*. Washington DC: U.S. Government Printing Office.

Plant was constructed. However, much of the historic built environment to the north, east, and west of the Plant has changed with demolition and alteration of original Six Companies/Reclamation facilities located to the southwest and northeast.



Photograph 7. West (main) and south facades of the Plant, showing the 1931 water storage tank and hill denoted by the red arrow at right.

Shape

Shape is defined as the overall massing, which includes the footprint, height, roof form, façade recessions or projections, and setbacks, of a building. The significant features of the Plant's shape are its irregular plan and varying building heights corresponding to the mechanical and operational function of each individual space within the building. The irregular massing is also a characteristic of Spanish Revival style architecture.

Roof and Related Features

The hipped and gabled Spanish tile roofs with open eaves are considered significant features.

Openings

A building's openings include not only windows and doors themselves, but also fenestration patterns and façade recessions. The Plant's significant openings include the exterior steel casement windows (with projecting brick sills), still extant behind plywood infill, and interior steel casement windows (formerly exterior, prior to the northwest and east additions); the

copper louvered vents with turned wood balustrades on all four tower facades (Photograph 8); the main (west) and east entrances with decorative brick surrounds (east entrance currently partially covered by a non-original steel frame); the double steel doors at the loading dock; and the decorative grill located south of the entrance on the northwest addition.

Photograph 8. Copper louvered vents with turned wood balustrades on all four sides of the tower, and brick quoins, are significant features of the Plant.

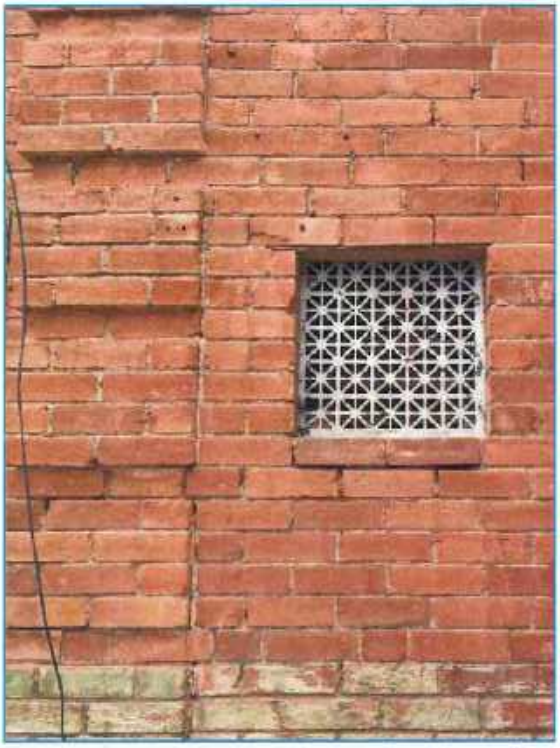
Projections

Projections can be described as any feature that projects from the primary massing of the building. The concrete dock and clarifying tanks, although altered, are considered character-defining projections of the Plant, as are any projecting pipes and other visible infrastructure visible on the exterior.

Materials and Craftsmanship

Materials play a large roll in defining the visual character of a building. Additionally, the type, variety, arrangement, craftsmanship, and textures often provide information about popular architectural styles and regional preferences; the era in which work was done; tools and processes that were used; alterations and maintenance work; availability of certain materials; original uses; economic or site constraints; and experience level of local builders and craftspersons. The Plant is an example of a Spanish Revival style building, as evidenced by the low-sloped Spanish tile roof, turned wood balustrade features, decorative brick surrounds at the main (west) and former east entrances, brick quoins, and varied massing. All

of these features, including the copper louvers and balustrades on all four sides of the tower, decorative grate at the west façade, and board-formed concrete are considered examples of excellent craftsmanship representative of the era and are considered significant (Photograph 9).



Photograph 9. Decorative grate at opening and brick quoins at west façade.

INTERIOR CHARACTER-DEFINING FEATURES

Individual Spaces

Because the Plant is a utilitarian building with a single purpose, almost every individual space has an important function that is distinctly related to the use and operation of, and circulation through, the Plant. Spaces within the Plant are clearly defined by their special function in the water filtration process through the presence of equipment specific to that function, and by virtue of location within the process. Additionally, spaces are also defined by changes in grade and floor material. Unlike non-utilitarian buildings that may include "back of house" spaces not meant to be experienced by the general public, and therefore may not be considered as character-defining, the entire Plant is designed to house a series of mechanical operations overseen by employees. Indeed, the main (west) entrance leads not to a lobby or front office, but directly into the operations room housing the rapid sand filter tanks. Therefore, every space within the building can be considered character-defining; however, the primary character-defining spaces, excluding the restroom, are those included in the original construction, with secondary spaces including the east and northwest additions.

Related Spaces and Sequences of Spaces

Related spaces are defined by the NPS in Preservation Brief 17 *Architectural Character: Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character* as "visually or physically related so that, as you move through them, they are perceived not as separate spaces, but as a sequence of related spaces that are important in defining the interior character of the building" (NPS 1988). As such, the significant sequence of spaces in the Plant are related to the mechanical functions of the Plant as constructed in 1931, as opposed to how Plant workers moved through the building during a typical workday. The mechanical flow begins with the series of tanks and chambers on the east side of the building that received pretreated water from the Colorado River to be further treated through a multi-stage process. From here, the water flowed through the sand filters to the clear well to be chlorinated, and finally, pumped to the water tank on Lodge Road before being distributed to the City. The sand filters were washed via water from the tank in the building's tower. Ancillary processes involved receiving chemicals delivered by train to the loading dock, and periodic testing of the water via the laboratory on the operating floor. North Wind suggests all of the original spaces within the Plant are interrelated and therefore significant for their ability to convey the historic function of the Plant.

Interior Features

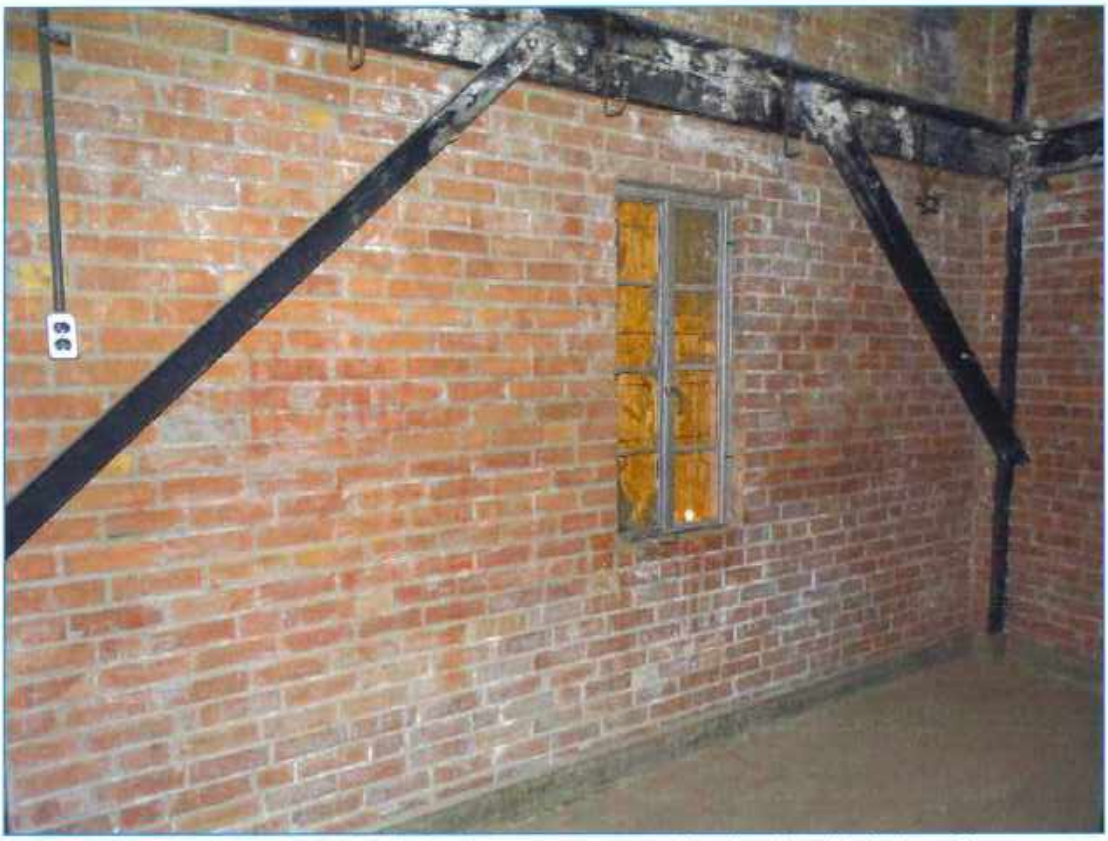
Interior features that help define the character of the Plant include the rapid sand filter tanks; metal pipe handrails; floor grates and scored concrete floor; mechanical equipment; pumping equipment, pipes, and conduit (Photograph 10); interior steel casement windows; exposed roof beams and sheathing; structural steel beams and columns (Photograph 11); elevator, spiral staircase, steel steps, and steel ladder providing access to tower; and north tank in tower.

Photograph 10. The pumping equipment, pipes, and conduit in the basement pipe gallery are considered significant interior features.

Photograph 11. Interior of Operating Floor showing structural steel beams and columns with rivets, facing northeast. The columns and beams are considered character-defining features.

Surface Finishes and Materials

The Plant's interior is primarily sheathed in painted and exposed brick, followed by board-formed concrete, poured concrete, and a smooth finish demarking the original laboratory and chlorinator rooms at the north end of the operating floor. The painted and exposed brick and board-formed concrete of the original structure are considered significant interior finishes (Photograph 12).



Photograph 12. Exposed brick in the tower. Exposed and painted brick surfaces are considered significant interior features.

NRHP TREATMENT APPROACHES

The Standards (Grimmer 2017) addresses four distinct, but interrelated, treatment approaches including preservation, rehabilitation, restoration, and reconstruction. Each treatment approach has a set of related standards that are intended to apply to all types of historic buildings and include exterior and interior work. The Standards are written specifically for use by historic building owners and building managers, preservation consultants, architects, contractors, and project reviewers prior to beginning work.

Typically, one approach and accompanying set of standards will apply to a property undergoing treatment, depending upon the property's significance, existing physical condition, the extent of documentation available, proposed use, mandated code requirements, interpretive goals, and economic and technical feasibility. The following is a discussion of the four treatment approaches.

1) **Preservation** focuses on the maintenance and repair of existing historic materials and retention of a property's form as it has evolved over time.

2) **Rehabilitation** acknowledges the need to alter or add to a historic property to meet continuing or changing uses while retaining the property's historic character.
3) **Restoration** depicts a property at a particular period of time in its history, while removing evidence of other periods.
4) **Reconstruction** re-creates vanished or non-surviving portions of a property for interpretive purposes.

North Wind recommends the Rehabilitation approach for the Plant, as the on-going use of the property will require flexibility. The rehabilitation approach will allow for certain modifications in order to meet current building and fire safety codes and Americans with Disabilities Act (ADA) requirements, introduce a new use(s), and improve mechanical equipment and systems. This approach will guide the treatment recommendations in the Historic Building Assessment Summary of Findings & Recommendations section. For more detailed information, see Appendix A. Secretary of the Interior's Standards for Rehabilitation.

The Standards provides a more detailed definition of the Rehabilitation approach below:

> "Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values. The Rehabilitation Standards acknowledge the need to alter or add to a historic building to meet continuing or new uses while retaining the building's historic character."

HISTORIC BUILDING ASSESSMENT SUMMARY OF FINDINGS & RECOMMENDATIONS

Below are summaries of each team member's recommendations for the rehabilitation of the Plant, followed by North Wind's treatment recommendations. As detailed designs were not developed as part of this project, North Wind's recommendations are general and reference the appropriate NPS Preservation Brief(s) (Brief) as a resource for more detailed information. The ultimate goal of preserving the character-defining features of the Plant stated in this report should be kept at the forefront of any and all treatment planning stages.

North Wind recommends that all design work follow the Secretary of the Interior's Standards for Rehabilitation (included in Appendix A), which provides general concepts about maintaining, repairing, and replacing historic materials, as well as designing new additions or making alterations, and the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (Guidelines) (Rehabilitation chapter is included as Appendix A). The Guidelines provides detailed design and technical recommendations to assist in applying the Standards to a specific property. The recommendations cover building materials, features and systems, interior spaces, features, and finishes, building sites and setting, code-required work, resilience and sustainability, and new additions/construction. Together, the Standards and Guidelines provide a framework and guidance for decision-making about work or changes to a historic property. North Wind has included some information from the

Standards, Guidelines, and Briefs in our treatment recommendations below; however, it is important to review these documents in their entirety prior to any design and implementation of improvements. North Wind has also included language from the City's "Historic Preservation Design Guidelines for City-Owned Buildings" in the treatment recommendations. The City's design guidelines for the Plant are included in Appendix B.

STRUCTURAL (MGA AND SILMAN)

1. Masonry repairs to include repointing the mortar for the entire building, including the additions.
2. Concrete repair for first floor slabs and concrete foundation walls.
3. Seismic/Structural repairs to include additional anchorage of floor and roof diaphragms to masonry walls will be required; a plywood overlay to be installed over existing wood sheathed floors/roofs; removal of the remaining unstable chimney base from the pipe gallery. Further investigations of the northwest addition ceiling and second floor wood framing is recommended.

Treatment Recommendations:

Mortar Repairs: Before undertaking any mortar repair, the cause of the deterioration should be determined and addressed. Often it is a drainage issue from deteriorating roof components (including gutters and downspouts), inadequate site drainage, vegetation allowed to grow in contact with building materials, and rising damp, etc. If these issues are not addressed prior to mortar repair, the City will be repairing mortar on the Plant more often than is necessary. Additionally, water penetration can be extremely damaging to building structural and historic interior features and materials and is often not seen until it is too late.

When replacing or repairing mortar, an appropriate mortar match must be found in order to ensure that the repointing work is not only physically and visually appropriate to the Plant, but also that the work does not immediately fail or cause damage to the brick. Preservation Brief 2: "Repointing Mortar Joints in Historic Masonry Buildings," published by the NPS in 1998, is a comprehensive guide to mortar repairs, including how to conduct a mortar analysis, budgeting and scheduling, contractor selection, cleaning, and maintenance to preserve the mortar and masonry. Per the Brief, the following criteria for new mortar are key:

- The new mortar must match the historic mortar in color, texture, and tooling. If a laboratory analysis is undertaken, it may be possible to match the binder components and their proportions with the historic mortar, if those materials are available.
- The sand must match the sand in the historic mortar. The color and texture of the new mortar will usually fall into place if the sand is matched successfully.
- The new mortar must have greater vapor permeability and be softer (measured in compressive strength) than the masonry units.
- The new mortar must be as vapor permeable and as soft or softer (measured in compressive strength) than the historic mortar. Softness or hardness is not necessarily an indication of permeability; old, hard lime mortars can still retain high permeability.

Concrete Repairs: Preservation Brief 15: "Preservation of Historic Concrete," published by the NPS in 2007, recommends that concrete repair projects should be divided into three phases, including the development of trial repair procedures, trial repairs and evaluation, and production repair work. The trial repair process involves investigation, laboratory analysis, trial samples, mock-ups, and full-scale repairs to allow for the ongoing refinement of the repair work as well as implementation of quality-control measures. The trial repair process provides an opportunity for the City, architect, engineer, and contractor to evaluate the concrete mix design and the installation and finishing techniques, including sealants, for the repairs from both technical and aesthetic standpoints.

The Brief further states that the final repair materials and procedures should match the original concrete in appearance while meeting the established criteria for durability. The City's "Historic Preservation Design Guidelines for City-Owned Buildings" for the Plant states that, "Any replacement flatwork should be plain uncolored concrete" (Resolution 5371, 2009). North Wind recommends where the concrete is scored in a grid pattern, patched and/or replaced areas should match this grid pattern. Where the concrete has a flat, smooth finish, patched and/or replaced areas should match this finish.

Seismic Repairs: North Wind recommends that any seismic repairs retain as much as possible the Plant's historic materials in order to protect the character-defining features of the building as stated in this document. Preservation Brief 41: "The Seismic Rehabilitation of Historic Buildings," published by the NPF in 2016, provides four important preservation principles to keep in mind during the planning and undertaking of seismic retrofit projects:

- Historic features and materials, both structural and nonstructural, should be preserved and retained, not as museum artifacts, but to continue to fulfill their historic function to the greatest extent possible, and not be replaced wholesale in the process of seismic strengthening.
- If historic features and materials are damaged beyond repair, or must be removed during the retrofit, they should be replaced in kind or with compatible substitute materials. If they must be removed during the retrofit, they should be removed carefully and thoroughly documented to ensure they can be properly re-installed in their original location.
- New seismic retrofit systems should work in concert with the inherent strengths of the historic structural system, and, whether hidden or exposed, should respect the character and integrity of the historic building, be visually unobtrusive and compatible in design, and be selected and designed with due consideration to limiting the damage to historic features and materials during installation.
- Seismic work should be reversible whenever feasible to allow its removal for future installation of improved systems as well as repair of historic features and materials.

MECHANICAL, PLUMBING, & ELECTRICAL (TJK CONSULTING, INC.)

1. Heating, ventilation, and air-conditioning (HVAC) system installation.

2. Existing waste system, below grade piping, water system, plumbing fixtures, and gas service to be demolished and removed (retain interior piping as nonfunctional for historic interpretation purposes).
3. Install new electrical service and supplementary grounding electrode system.
4. Install new distribution equipment, potentially with access controls; new internal breakers, fused, switches, contactors, and conductors; and new conduit and raceway.
5. Install additional lighting fixtures using LED light sources; egress lighting and exit signage; and lighting controls.
6. Modify elevator to comply with current codes; replace shaft lighting, shaft receptacles and sump pump provisions.
7. Install new telephone/data infrastructure and remove existing.
8. Install a fire alarm system.

Treatment Recommendations:

HVAC: North Wind recommends the City begin the planning process for MEP upgrades and installation of a modern HVAC system as soon as possible. Adequate planning and preparation time will ensure that the design and installation of new or upgraded equipment is sensitive to the historic building fabric, appropriate for the demand, and can be supported by the existing structure. Fortunately for the City, much of the planning process is completed with this current effort. Preservation Brief 24: "Heating, Ventilating, and Cooling Historic Buildings—Problems and Recommended Approaches," published by the NPS in 1991, focuses on installing and/or upgrading HVAC systems; however, the planning steps included in the document can be used for a broader MEP improvement plan as well. Brief 24 provides the following key recommendations for HVAC/MEP improvements:

- Prioritize the preservation objectives.
- Understand the impact of new interior climate conditions on historic materials.
- Integrate preservation with mechanical and code requirements.
- Understand the visual and physical impact of various installations.
- Identify maintenance and monitoring requirements for new or upgraded systems.
- Plan for the future removal or replacement of the system.

Plumbing: If demolition and removal of any of the water treatment infrastructure is necessary, North Wind recommends a thorough documentation of any components to be removed, including below-grade components. Any and all new infrastructure and/or equipment that needs to be installed should be as visually unobtrusive as possible, reuse, preserve, and maintain as much as possible the existing equipment, and preserve and protect the historic character-defining features as stated in this document.

Electrical: Any and all new electrical equipment that needs to be installed should be as visually unobtrusive as possible, reuse, preserve, and maintain as much as possible the

existing equipment, and preserve and protect the historic character-defining features as stated in this document.

Lighting: Any and all new lighting equipment that needs to be installed should reuse, preserve, and maintain as much as possible the existing fixtures and equipment, and preserve and protect the historic character-defining features as stated in this document. Exit signs with finishes and materials sensitive to the historic architecture of the building, as available, should be considered.

Elevator: Alterations to the elevator and equipment should be as minimal as possible so as to preserve the original components and aesthetics of the equipment. If alterations necessary to maintain the operation of the elevator significantly impact the aesthetics of the elevator itself, or require substantial new, visually obtrusive equipment, the City should consider an alternate use for the elevator such as providing a static space within a non-operational elevator. Installing a new elevator in a secondary space within the building would meet code and, depending upon location and other visual impacts, can meet the Secretary of the Interior's Standards for Rehabilitation. Installing an elevator on the exterior, even if the design of the housing is compatible with the architecture of the Plant and in a minimally visible location, is advisable only when it cannot be accommodated in the interior without resulting in the loss of significant historic spaces, features, or finishes.

Telephone/Data Infrastructure: Any and all new tele-data equipment that needs to be installed should be as visually unobtrusive as possible, reuse, preserve, and maintain as much as possible the existing equipment, and preserve and protect the historic character-defining features as stated in this document.

Fire Safety: Any and all new fire alarm equipment that needs to be installed should be as visually unobtrusive as possible and preserve and protect the historic character-defining features as stated in this document.

LIFE SAFETY (TERPCONSULTING)

1. Install sprinkler system (dependent upon occupancy types and associated calculated occupant load) and fire pump (dependent upon water pressure).
2. Alternative fire extinguishing systems can be explored using the 2019 NFPA 914, *Code for the Protection of Historic Structures,* if available to use by the City.
3. Design egress improvements to meet current code.

Treatment Recommendations:

Fire Suppression: Any and all new fire suppression and/or alarm equipment that needs to be installed should be as visually unobtrusive as possible and preserve and protect the historic character-defining features as stated in this document while not impacting the equipment's abilities to protect the Plant's occupants. North Wind recommends planning the fire safety equipment upgrades along with HVAC upgrades as some newer systems are integrated and can combine interior climate control with fire suppression, lighting, air filtration, temperature and humidity control, and security detection. Computers regulate the performance of these

integrated systems based on the time of day, day of the week, occupancy, and outside ambient temperature.

Egress Improvements: Multiple noncompliant egress conditions were identified by TERPconsulting, many of which will require substantial redesign, demolition, and/or removal of existing historic fabric that was originally designed for limited use by trained personnel. As no design work for this issue is included as part of this project, North Wind cannot comment on proposed design solutions; however, North Wind recommends that all work to improve egress and circulation within the Plant be designed in a manner that preserves adjacent character-defining features and spaces, even if this means that the element becomes non-operational or restricted. The design team should evaluate existing openings on secondary or less-visible elevations or, if necessary, create new openings on secondary or less-visible elevations to accommodate second egress requirements. If code-required stairways or elevators cannot be accommodated within the historic building, a new exterior addition located on a secondary or minimally visible elevation is recommended. Any and all new additions should be compatible with the historic architecture of the Plant.

HAZARDOUS MATERIALS (NINYO & MOORE)

1. Asbestos found in the office tile and mastic.
2. Lead-based paint found in three areas.

Treatment Recommendations:

North Wind concurs with Ninyo & Moore's recommendations to not disturb areas where asbestos and lead are detected unless absolutely necessary. If removal of lead paint is required, the Guidelines recommend using a poultice method to neatly and safely remove the paint so as not to damage historic material. Protection of adjacent materials is also recommended. North Wind recommends working closely with the City's code officials to determine where flexibility or alternatives that reduce damage to the Plant's historic materials and features are allowed on all code-compliant issues.

Preservation Brief 37: "Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing," published in 2006, states, "From a preservation standpoint, selecting a hazard control method that removes only the deteriorating paint, or that involves some degree of repair, is always preferable to the total replacement of a historic feature…the gentlest method possible should be used to remove the offending substance-lead-laden dust, visible paint chips, lead in soil, or extensively deteriorated paint. Overly aggressive abatement may damage or destroy much more historic material than is necessary to remove lead paint, such as abrading historic surfaces."

MISCELLANEOUS (LGA ARCHITECTURE)

1. Repair all windows and historic doors.
2. Replace non-historic doors.

Treatment Recommendations:

Historic Window Repair: The Plant's original windows are steel casement type. The Standards require that "where historic windows are individually significant features, or where they contribute to the character of significant facades, their distinguishing visual qualities must not be destroyed. Further, the Guidelines recommend against changing the historic appearance of windows through the use of inappropriate designs, materials, finishes, or colors which radically change the sash, depth of reveal, and muntin configuration; the reflectivity and color of the glazing; or the appearance of the frame" (NPS 1984).

The City's "Historic Preservation Design Guidelines for City-Owned Buildings" for the Plant states that, "The steel windows should be glazed with clear glass set in putty (individual panes). The building should be secured with internally mounted security screens" (Resolution 5371, 2009). North Wind recommends evaluating alternative methods to installing security screens on the interior of windows. Adding interior storm panels of polycarbonate, acrylic, or synthetic clear glazing to existing window systems is among the most discrete alternatives for addressing both security and energy conservation needs.

North Wind recommends an evaluation of the best practices for thermal insulation for historic windows is completed prior to repairing the Plant's historic windows. Preservation Brief 13: The Repair and Thermal Upgrading of Historic Steel Windows," published in 1984, states that "metal windows can be made more energy efficient in several ways, varying in complexity and cost. [Simple] caulking around the masonry openings and adding weatherstripping, for example, are important first steps in reducing air infiltration around the windows [and] usually have a rapid payback period. Other treatments include applying fixed layers of glazing over the historic windows, adding operable storm windows, or installing thermal glass in place of the existing glass. In combination with caulking and weatherstripping, these treatments can produce energy ratings rivaling those achieved by new units."

Non-historic Door Replacement: North Wind concurs with LGA regarding the replacement of all non-historic doors and/or installing new doors with a design that is compatible with the original doors. The City's "Historic Preservation Design Guidelines for City-Owned Buildings" for the Plant states that, "The damaged exterior steel doors should be replaced with steel replications; the damaged steel doors should be repaired." (Resolution 5371, 2009). North Wind recommends a thorough analysis of historic maintenance records and photographs before determining which doors should be replaced. Historic images show metal frame doors with large divided-lite window openings at the top of the doors. This matches the current west-facing main entrance into the Plant, as well as the south-facing doors at the loading dock. Therefore, these doors may just need to be repaired. The former exterior east-facing door has been removed and will need to be replaced. The current metal frame around the west-facing door is not original and should be removed.

SUMMARY

North Wind, on behalf of LGA, conducted a site visit on November 9, 2021, to photo-document and evaluate the existing condition of the Plant, followed by the preparation of this HPTP that defines significant architectural features; provides existing interior and exterior materials conditions, and prioritized treatment and maintenance recommendations.

North Wind concurs with our previous recommendation that the Plant is individually eligible for listing in the NRHP under Criterion A at the local level of significance, under the themes of Engineering and Community Planning and Development, at the local level of significance. The period of significance is identified as beginning in 1931, with the construction of the Plant, and ending in 1982 with its closure.

And finally, North Wind recommends the Rehabilitation approach which will allow for certain life safety, building system, and ADA compliance modifications in order to support flexibility of uses.

RECOMMENDED RESOURCES

The following is a list of Preservation Briefs published by the NPS Technical Preservation Services, as well as a links to the Guidelines that contains the Standards for Rehabilitation. The documents listed below provide information on how to recognize and resolve common problems prior to work and recommend methods and approaches for rehabilitating historic buildings that preserve their historic character. All of North Wind's recommendations in this report are based on the Standards and Guidelines. The briefs selected for this document are related to the specific areas of concern for the Plant. The full list of briefs can be found at https://www.nps.gov/tps/how-to-preserve/briefs.htm.

The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings: https://www.nps.gov/tps/standards.htm

NPS Preservation Brief 1: Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings: https://www.nps.gov/tps/how-to-preserve/briefs/1-cleaning-water-repellent.htm

NPS Preservation Brief 2: Repointing Mortar Joints in Historic Masonry Buildings: https://www.nps.gov/tps/how-to-preserve/briefs/2-repoint-mortar-joints.htm.

NPS Preservation Brief 3: Improving Energy Efficiency in Historic Buildings: https://www.nps.gov/tps/how-to-preserve/briefs/3-improve-energy-efficiency.htm

NPS Preservation Brief 4: Roofing for Historic Buildings: https://www.nps.gov/tps/how-to-preserve/briefs/4-roofing.htm

NPS Brief 6: Dangers of Abrasive Cleaning to Historic Buildings: https://www.nps.gov/tps/how-to-preserve/briefs/6-dangers-abrasive-cleaning.htm

NPS Preservation Brief 13: The Repair and Thermal Upgrading of Historic Steel Windows: https://www.nps.gov/tps/how-to-preserve/briefs/13-steel-windows.htm

NPS Preservation Brief 14: New Exterior Additions to Historic Buildings: Preservation Concerns: https://www.nps.gov/tps/how-to-preserve/briefs/14-exterior-additions.htm

NPS Preservation Brief 15: Preservation of Historic Concrete: https://www.nps.gov/tps/how-to-preserve/briefs/15-concrete.htm

NPS Preservation Brief 21: Repairing Historic Flat Plaster Walls and Ceilings: https://www.nps.gov/tps/how-to-preserve/briefs/21-flat-plaster.htm

NPS Preservation Brief 24: Heating, Ventilating, and Cooling Historic Buildings – Problems and Recommended Approaches: https://www.nps.gov/tps/how-to-preserve/briefs/24-heat-vent-cool.htm

NPS Preservation Brief 28: Painting Historic Interiors: https://www.nps.gov/tps/how-to-preserve/briefs/28-painting-interiors.htm

NPS Preservation Brief 30: The Preservation and Repair of Historic Clay Tile Roofs: https://www.nps.gov/tps/how-to-preserve/briefs/30-clay-tile-roofs.htm

NPS Preservation Brief 32: Making Historic Properties Accessible: https://www.nps.gov/tps/how-to-preserve/briefs/32-accessibility.htm

NPS Preservation Brief 37: Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing: https://www.nps.gov/tps/how-to-preserve/briefs/37-lead-paint-hazards.htm

NPS Preservation Brief 38: Removing Graffiti from Historic Masonry: https://www.nps.gov/tps/how-to-preserve/briefs/38-remove-graffiti.htm

NPS Preservation Brief 39: Holding the Line: Controlling Unwanted Moisture in Historic Buildings: https://www.nps.gov/tps/how-to-preserve/briefs/39-control-unwanted-moisture.htm

NPS Preservation Brief 41: The Seismic Rehabilitation of Historic Buildings: https://www.nps.gov/tps/how-to-preserve/briefs/41-seismic-rehabilitation.htm

NPS Preservation Brief 47: Maintaining the Exterior of Small and Medium Size Historic Buildings: https://www.nps.gov/tps/how-to-preserve/briefs/47-maintaining-exteriors.htm

NPS Preservation Tech Notes, Masonry No. 4: Non-destructive Evaluation Techniques for Masonry Construction: https://www.nps.gov/tps/how-to-preserve/tech-notes/Tech-Notes-Masonry04.pdf

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APPENDIX A. RESOLUTION 5371, EXHIBIT A4: HISTORIC PRESERVATION DESIGN GUIDELINES FOR CITY-OWNED BUILDINGS WITHIN THE BOULDER CITY HISTORIC DISTRICT: OLD WATER FILTRATION PLANT BUILDING

RESO. 5371, EXHIBIT A4: HISTORIC PRESERVATION DESIGN GUIDELINES FOR CITY-OWNED BUILDINGS WITHIN THE BOULDER CITY HISTORIC DISTRICT

CURRENT BUILDING NAME/USE: **Old Water Filtration Plant building**
FORMER BUILDING NAME/USE: Water Filtration & Purification Plant

BUILDING ADDRESS: 300 Railroad Avenue

HISTORIC STATUS / YEAR BUILT: Yes, 1932

COMMENTS / EXTERIOR DESIGN FEATURES:

From National Register of Historic Places Inventory – Nomination Form: The Water Purification and Filtration Plan (#333) is an exceptional example of industrial architecture, and is composed of a two-story brick rectangular mass with offset tower, and single-story brick masonry wings extending from each elevation. Its Period Revival style includes elements from Italian Renaissance Revival architecture such as low-pitched red tile roofs, asymmetrical massing, and brick detailing including quoins and dentils. (Volume I, Item 7, p. 3)

Recommendations for enhancement and future remodeling:

1. The roof covering should be inspected and repaired (to match existing).
2. Brick should be inspected by a qualified firm and stabilized per their report.
3. The building should be repainted where required.
4. The steel windows should be glazed with clear glass set in putty (individual panes). The building should be secured with internally mounted security screens.
5. The damaged exterior steel doors should be replaced with steel replications. The damaged steel doors should be repaired.
6. Any replacement flatwork should be plain uncolored concrete.

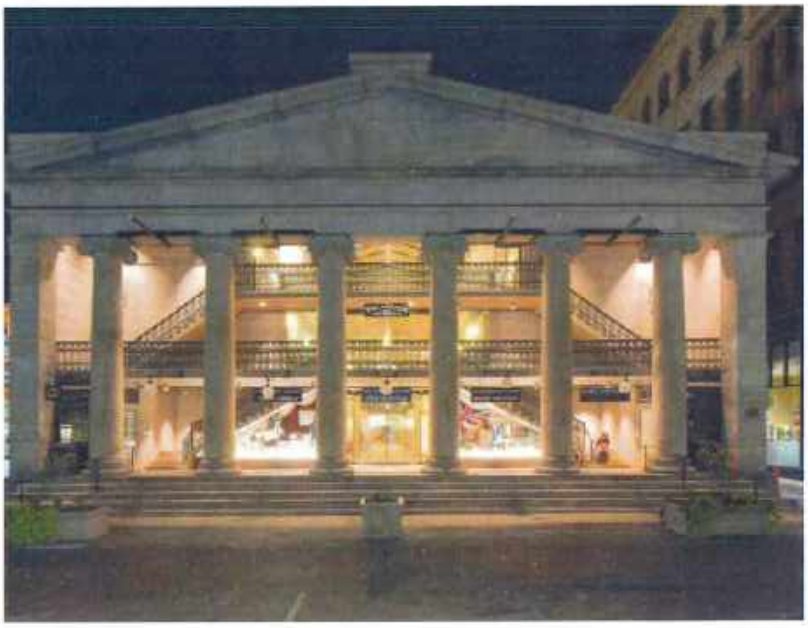
Building: Old Water Filtration Plant building
Historic Photo for: Water Filtration & Purification Plant, 1932, façade facing Colorado

APPENDIX B. STANDARDS FOR REHABILITATION & GUIDELINES FOR REHABILITATING HISTORIC BUILDINGS: REHABILITATION

STANDARDS FOR REHABILITATION & GUIDELINES FOR REHABILITATING HISTORIC BUILDINGS

Rehabilitation

Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.



Standards for Rehabilitation

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

GUIDELINES FOR REHABILITATING HISTORIC BUILDINGS

INTRODUCTION

In **Rehabilitation**, historic building materials and character-defining features are protected and maintained as they are in the treatment **Preservation**. However, greater latitude is given in the **Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings** to replace extensively deteriorated, damaged, or missing features using either the same material or compatible substitute materials. Of the four treatments, only **Rehabilitation** allows alterations and the construction of a new addition, if necessary for a continuing or new use for the historic building.

Identify, Retain, and Preserve Historic Materials and Features

The guidance for the treatment **Rehabilitation** begins with recommendations to identify the form and detailing of those architectural materials and features that are important in defining the building's historic character and which must be retained to preserve that character. Therefore, guidance on ***identifying, retaining, and preserving*** character-defining features is always given first.

Protect and Maintain Historic Materials and Features

After identifying those materials and features that are important and must be retained in the process of **Rehabilitation** work, then ***protecting and maintaining*** them are addressed. Protection generally involves the least degree of intervention and is preparatory to other work. Protection includes the maintenance of historic materials and features as well as ensuring that the property is protected before and during rehabilitation work. A historic building undergoing rehabilitation will often require more extensive work. Thus, an overall evaluation of its physical condition should always begin at this level.

Repair Historic Materials and Features

Next, when the physical condition of character-defining materials and features warrants additional work, ***repairing*** is recommended. **Rehabilitation** guidance for the repair of historic materials, such as masonry, again begins with the least degree of intervention possible. In rehabilitation, repairing also includes the limited replacement in kind or with a compatible substitute material of extensively deteriorated or missing components of features when there are surviving prototypes features that can be substantiated by documentary and physical evidence. Although using the same kind of material is always the preferred option, a substitute material may be an acceptable alternative if the form, design, and scale, as well as the substitute material itself, can effectively replicate the appearance of the remaining features.

Replace Deteriorated Historic Materials and Features

Following repair in the hierarchy, **Rehabilitation** guidance is provided for ***replacing*** an entire character-defining feature with new material because the level of deterioration or damage of materials precludes repair. If the missing feature is character defining or if it is critical to the survival of the building (e.g., a roof), it should be replaced to match the historic feature based on physical or his-

toric documentation of its form and detailing. As with repair, the preferred option is always replacement of the entire feature in kind (i.e., with the same material, such as wood for wood). However, when this is not feasible, a compatible substitute material that can reproduce the overall appearance of the historic material may be considered.

It should be noted that, while the National Park Service guidelines recommend the replacement of an entire character-defining feature that is extensively deteriorated, the guidelines never recommend removal and replacement with new material of a feature that could reasonably be repaired and, thus, preserved.

Design for the Replacement of Missing Historic Features

When an entire interior or exterior feature is missing, such as a porch, it no longer plays a role in physically defining the historic character of the building unless it can be accurately recovered in form and detailing through the process of carefully documenting the historic appearance. If the feature is not critical to the survival of the building, allowing the building to remain without the feature is one option. But if the missing feature is important to the historic character of the building, its replacement is always recommended in the **Rehabilitation** guidelines as the first, or preferred, course of action. If adequate documentary and physical evidence exists, the feature may be accurately reproduced. A second option in a rehabilitation treatment for replacing a missing feature, particularly when the available information about the feature is inadequate to permit an accurate reconstruction, is to ***design*** a new feature that is compatible with the overall historic character of the building. The new design should always take into account the size, scale, and material of the building itself and should be clearly differentiated from the authentic historic features. For properties that have changed over time, and where those changes have acquired significance, reestablishing missing historic features generally should not be undertaken if the missing features did not coexist with the features currently on the building. Juxtaposing historic features that did not exist concurrently will result in a false sense of the building's history.

Alterations

Some exterior and interior alterations to a historic building are generally needed as part of a **Rehabilitation** project to ensure its continued use, but it is most important that such alterations do not radically change, obscure, or destroy character-defining spaces, materials, features, or finishes. Alterations may include changes to the site or setting, such as the selective removal of buildings or other features of the building site or setting that are intrusive, not character defining, or outside the building's period of significance.

Code-Required Work: Accessibility and Life Safety

Sensitive solutions to meeting code requirements in a **Rehabilitation** project are an important part of protecting the historic character of the building. Work that must be done to meet accessibility and life-safety requirements must also be assessed for its potential impact on the historic building, its site, and setting.

Resilience to Natural Hazards

Resilience to natural hazards should be addressed as part of a **Rehabilitation** project. A historic building may have existing characteristics or features that help to address or minimize the impacts of natural hazards. These should always be used to best advantage when considering new adaptive treatments so as to have the least impact on the historic character of the building, its site, and setting.

Sustainability

Sustainability should be addressed as part of a **Rehabilitation** project. Good preservation practice is often synonymous with sustainability. Existing energy-efficient features should be retained and repaired. Only sustainability treatments should be considered that will have the least impact on the historic character of the building.

The topic of **sustainability** is addressed in detail in ***The Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings.***

New Exterior Additions and Related New Construction

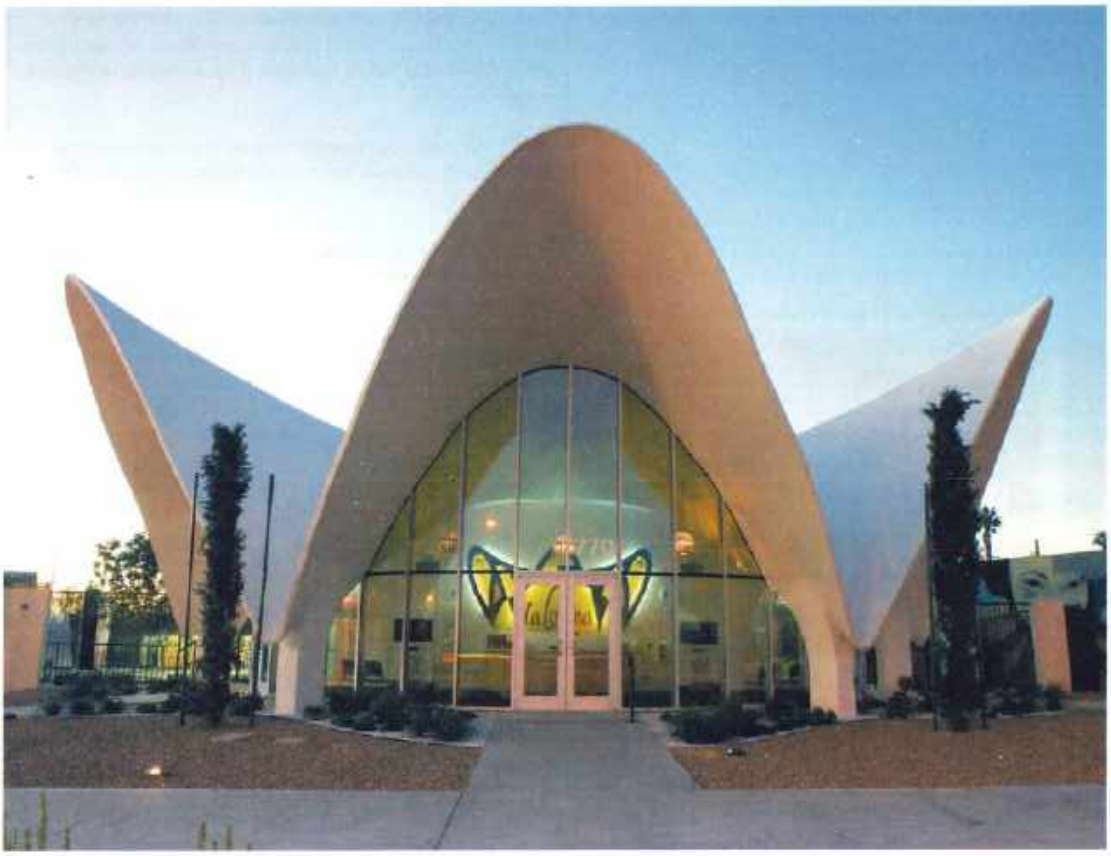
Rehabilitation is the only treatment that allows expanding a historic building by enlarging it with an addition. However, the **Rehabilitation** guidelines emphasize that new additions should be considered only after it is determined that meeting specific new needs cannot be achieved by altering non-character-defining interior spaces. If the use cannot be accommodated in this way, then an attached exterior addition may be considered. New additions should be designed and constructed so that the character-defining features of the historic building, its site, and setting are not negatively impacted. Generally, a new addition should be subordinate to the historic building. A new addition should be compatible, but differentiated enough so that it is not confused as historic or original to the building. The same guidance applies to new construction so that it does not negatively impact the historic character of the building or its site.

Rehabilitation as a Treatment. *When repair and replacement of deteriorated features are necessary; when alterations or additions to the property are planned for a new or continued use; and when its depiction at a particular time is not appropriate, Rehabilitation may be considered as a treatment. Prior to undertaking work, a documentation plan for Rehabilitation should be developed.*

MASONRY: STONE, BRICK, TERRA COTTA, CONCRETE, ADOBE, STUCCO, AND MORTAR

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining and preserving masonry features that are important in defining the overall historic character of the building (such as walls, brackets, railings, cornices, window and door surrounds, steps, and columns) and decorative ornament and other details, such as tooling and bonding patterns, coatings, and color.	Removing or substantially changing masonry features which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Replacing or rebuilding a major portion of exterior masonry walls that could be repaired, thereby destroying the historic integrity of the building. Applying paint or other coatings (such as stucco) to masonry that has been historically unpainted or uncoated to create a new appearance. Removing paint from historically-painted masonry.
Protecting and maintaining masonry by ensuring that historic drainage features and systems that divert rainwater from masonry surfaces (such as roof overhangs, gutters, and downspouts) are intact and functioning properly.	Failing to identify and treat the causes of masonry deterioration, such as leaking roofs and gutters or rising damp.
Cleaning masonry only when necessary to halt deterioration or remove heavy soiling.	Cleaning masonry surfaces when they are not heavily soiled to create a "like-new" appearance, thereby needlessly introducing chemicals or moisture into historic materials.
Carrying out masonry cleaning tests when it has been determined that cleaning is appropriate. Test areas should be examined to ensure that no damage has resulted and, ideally, monitored over a sufficient period of time to allow long-range effects to be predicted.	Cleaning masonry surfaces without testing or without sufficient time for the testing results to be evaluated.

[1] An alkaline-based product is appropriate to use to clean historic marble because it will not damage the marble, which is acid sensitive.

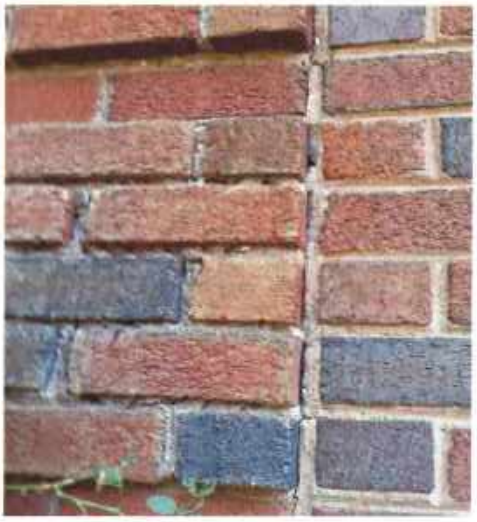


[2] Mid-century modern building technology made possible the form of this parabola-shaped structure and its thin concrete shell construction. Built in 1961 as the lobby of the La Concha Motel in Las Vegas, it was designed by Paul Revere Williams, one of the first prominent African-American architects. It was moved to a new location and rehabilitated to serve as the Neon Museum, and is often cited as an example of Googie architecture. *Credit: Photographed with permission at The Neon Museum, Las Vegas, Nevada.*

MASONRY: STONE, BRICK, TERRA COTTA, CONCRETE, ADOBE, STUCCO, AND MORTAR

RECOMMENDED	NOT RECOMMENDED
Cleaning soiled masonry surfaces with the gentlest method possible, such as using low-pressure water and detergent and natural bristle or other soft-bristle brushes.	Cleaning or removing paint from masonry surfaces using most abrasive methods (including sandblasting, other media blasting, or high-pressure water) which can damage the surface of the masonry and mortar joints. Using a cleaning or paint-removal method that involves water or liquid chemical solutions when there is any possibility of freezing temperatures. Cleaning with chemical products that will damage some types of masonry (such as using acid on limestone or marble), or failing to neutralize or rinse off chemical cleaners from masonry surfaces.

[3] **Not Recommended:** The white film on the upper corner of this historic brick row house is the result of using a scrub or slurry coating, rather than traditional repointing by hand, which is the recommended method.



[4] **Not Recommended:** The cupins on the left side of the photo show that high-pressure abrasive blasting used to remove paint can damage even early 20th-century, hard-baked, textured brick and erode the mortar, whereas the same brick on the right, which was not abrasively cleaned, is undamaged.

MASONRY: STONE, BRICK, TERRA COTTA, CONCRETE, ADOBE, STUCCO, AND MORTAR

RECOMMENDED	NOT RECOMMENDED
Using biodegradable or environmentally-safe cleaning or paint-removal products.	
Using paint-removal methods that employ a poultice to which paint adheres, when possible, to neatly and safely remove old lead paint.	
Using coatings that encapsulate lead paint, when possible, where the paint is not required to be removed to meet environmental regulations.	
Allowing only trained conservators to use abrasive or laser-cleaning methods, when necessary, to clean hard-to-reach, highly-carved, or detailed decorative stone features.	
Removing damaged or deteriorated paint only to the next sound layer using the gentlest method possible (e.g., hand scraping) prior to repainting.	Removing paint that is firmly adhered to masonry surfaces, unless the building was unpainted historically and the paint can be removed without damaging the surface.
Applying compatible paint coating systems to historically-painted masonry following proper surface preparation.	Failing to follow manufacturers' product and application instructions when repainting masonry features.
Repainting historically-painted masonry features with colors that are appropriate to the historic character of the building and district.	Using paint colors on historically-painted masonry features that are not appropriate to the historic character of the building and district.
Protecting adjacent materials when cleaning or removing paint from masonry features.	Failing to protect adjacent materials when cleaning or removing paint from masonry features.
Evaluating the overall condition of the masonry to determine whether more than protection and maintenance, such as repairs to masonry features, will be necessary.	Failing to undertake adequate measures to ensure the protection of masonry features.
Repairing masonry by patching, splicing, consolidating, or otherwise reinforcing the masonry using recognized preservation methods. Repair may include the limited replacement in kind or with a compatible substitute material of those extensively deteriorated or missing parts of masonry features when there are surviving prototypes, such as terra-cotta brackets or stone balusters.	Removing masonry that could be stabilized, repaired, and conserved, or using untested consolidants and unskilled personnel, potentially causing further damage to historic materials. Replacing an entire masonry feature, such as a cornice or balustrade, when repair of the masonry and limited replacement of deteriorated or missing components are feasible.

MASONRY: STONE, BRICK, TERRA COTTA, CONCRETE, ADOBE, STUCCO, AND MORTAR

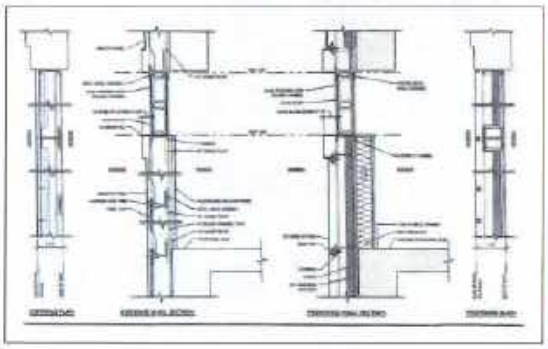
RECOMMENDED	NOT RECOMMENDED
Repairing masonry walls and other masonry features by repointing the mortar joints where there is evidence of deterioration, such as disintegrating mortar, cracks in mortar joints, loose bricks, or damaged plaster on the interior.	Removing non-deteriorated mortar from sound joints and then repointing the entire building to achieve a more uniform appearance.
Removing deteriorated lime mortar carefully by hand raking the joints to avoid damaging the masonry.	
Using power tools only on horizontal joints on brick masonry in conjunction with hand chiseling to remove hard mortar that is deteriorated or that is a non-historic material which is causing damage to the masonry units. Mechanical tools should be used only by skilled masons in limited circumstances and generally not on short, vertical joints in brick masonry.	Allowing unskilled workers to use masonry saws or mechanical tools to remove deteriorated mortar from joints prior to repointing.
Duplicating historic mortar joints in strength, composition, color, and texture when repointing is necessary. In some cases, a lime-based mortar may also be considered when repointing Portland cement mortar because it is more flexible.	Repointing masonry units with mortar of high Portland cement content (unless it is the content of the historic mortar). Using "surface grouting" or a "scrub" coating technique, such as a "sack rub" or "mortar washing," to repoint exterior masonry units instead of traditional repointing methods. Repointing masonry units (other than concrete) with a synthetic caulking compound instead of mortar.
Duplicating historic mortar joints in width and joint profile when repointing is necessary.	Changing the width or joint profile when repointing.
Repairing stucco by removing the damaged material and patching with new stucco that duplicates the old in strength, composition, color, and texture.	Removing sound stucco or repairing with new stucco that is different in composition from the historic stucco. Patching stucco or concrete without removing the source of deterioration. Replacing deteriorated stucco with synthetic stucco, an exterior finish and insulation system (EFIS), or other non-traditional materials.

MASONRY: STONE, BRICK, TERRA COTTA, CONCRETE, ADOBE, STUCCO, AND MORTAR

RECOMMENDED	NOT RECOMMENDED
Using mud plaster or a compatible lime-plaster adobe render, when appropriate, to repair adobe.	Applying cement stucco, unless it already exists, to adobe.
Sealing joints in concrete with appropriate flexible sealants and backer rods, when necessary.	
Cutting damaged concrete back to remove the source of deterioration, such as corrosion on metal reinforcement bars. The new patch must be applied carefully so that it will bond satisfactorily with and match the historic concrete.	Patching damaged concrete without removing the source of deterioration.

[5] Rebars in the reinforced concrete ceiling have rusted, causing the concrete to spall. The rebars must be cleaned of rust before the concrete can be patched.

[6] Some areas of the concrete brise soleil screen on this building constructed in 1967 are badly deteriorated. If the screen cannot be repaired, it may be replaced in kind or with a composite substitute material with the same appearance as the concrete.



(7) (a) J.W. Knapp's Department Store, built 1937-38, in Lansing, MI, was constructed with a proprietary material named "Maul Macotta" made of enameled steel and cast-in-place concrete panels. Prior to its rehabilitation, a building inspection revealed that, due to a flaw in the original design and construction, the material was deteriorated beyond repair. The architects for the rehabilitation project devised a replacement system (b) consisting of enameled aluminum panels that matched the original colors (c). Photos and drawing (a-b): Quinn Evans Architects; *Photo (c): James Haefner Photography.*

MASONRY: STONE, BRICK, TERRA COTTA, CONCRETE, ADOBE, STUCCO, AND MORTAR

RECOMMENDED	NOT RECOMMENDED
Using a non-corrosive, stainless-steel anchoring system when replacing damaged stone, concrete, or terra-cotta units that have failed.	
Applying non-historic surface treatments, such as water-repellent coatings, to masonry only after repointing and only if masonry repairs have failed to arrest water penetration problems.	Applying waterproof, water-repellent, or non-original historic coatings (such as stucco) to masonry as a substitute for repointing and masonry repairs.
Applying permeable, anti-graffiti coatings to masonry when appropriate.	Applying water-repellent or anti-graffiti coatings that change the historic appearance of the masonry or that may trap moisture if the coating is not sufficiently permeable.
Replacing in kind an entire masonry feature that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. Examples can include large sections of a wall, a cornice, pier, or parapet. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Removing a masonry feature that is unrepairable and not replacing it, or replacing it with a new feature that does not match. Using substitute material for the replacement that does not convey the same appearance of the surviving components of the masonry feature.
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a replacement masonry feature, such as a step or door pediment, when the historic feature is completely missing. It may be an accurate restoration based on documentary and physical evidence, but only when the historic feature to be replaced coexisted with the features currently on the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	Creating an inaccurate appearance because the replacement for the missing masonry feature is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature to be replaced did not coexist with the features currently on the building. Introducing a new masonry feature that is incompatible in size, scale, material, or color.

WOOD: CLAPBOARD, WEATHERBOARD, SHINGLES, AND OTHER FUNCTIONAL AND DECORATIVE ELEMENTS

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining and preserving wood features that are important in defining the overall historic character of the building (such as siding, cornices, brackets, window and door surrounds, and steps) and their paints, finishes, and colors.	Removing or substantially changing wood features which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Removing a major portion of the historic wood from a façade instead of repairing or replacing only the deteriorated wood, then reconstructing the façade with new material to achieve a uniform or "improved" appearance. Changing the type of finish, coating, or historic color of wood features, thereby diminishing the historic character of the exterior. Failing to renew failing paint or other coatings that are historic finishes. Stripping historically-painted surfaces to bare wood and applying a clear finish rather than repainting. Stripping paint or other coatings to reveal bare wood, thereby exposing historically-coated surfaces to the effects of accelerated weathering. Removing wood siding (clapboards) or other covering (such as stucco) from log structures that were covered historically, which changes their historic character and exposes the logs to accelerated deterioration.
Protecting and maintaining wood features by ensuring that historic drainage features that divert rainwater from wood surfaces (such as roof overhangs, gutters, and downspouts) are intact and functioning properly.	Failing to identify and treat the causes of wood deterioration, such as faulty flashing, leaking gutters, cracks and holes in siding, deteriorated caulking in joints and seams, plant material growing too close to wood surfaces, or insect or fungal infestation.

WOOD: CLAPBOARD, WEATHERBOARD, SHINGLES, AND OTHER FUNCTIONAL AND DECORATIVE ELEMENTS

RECOMMENDED	NOT RECOMMENDED
Applying chemical preservatives or paint to wood features that are subject to weathering, such as exposed beam ends, outriggers, or rafter tails.	Using chemical preservatives (such as creosote) which, unless they were used historically, can change the appearance of wood features.
Implementing an integrated pest management plan to identify appropriate preventive measures to guard against insect damage, such as installing termite guards, fumigating, and treating with chemicals.	
Retaining coatings (such as paint) that protect the wood from moisture and ultraviolet light. Paint removal should be considered only when there is paint surface deterioration and as part of an overall maintenance program which involves repainting or applying other appropriate coatings.	Stripping paint or other coatings from wood features without recoating.

(B) Rotted clapboards have been replaced selectively with new wood siding to match the originals.

WOOD: CLAPBOARD, WEATHERBOARD, SHINGLES, AND OTHER FUNCTIONAL AND DECORATIVE ELEMENTS

RECOMMENDED	NOT RECOMMENDED
Removing damaged or deteriorated paint to the next sound layer using the gentlest method possible (e.g., hand scraping and hand sanding) prior to repainting.	Using potentially-damaging paint-removal methods on wood surfaces, such as open-flame torches, orbital sanders, abrasive methods (including sandblasting, other media blasting, or high-pressure water), or caustic paint-removers. Removing paint that is firmly adhered to wood surfaces.
Using chemical strippers primarily to supplement other methods such as hand scraping, hand sanding, and thermal devices.	Failing to neutralize the wood thoroughly after using chemical paint removers so that new paint may not adhere. Removing paint from detachable wood features by soaking them in a caustic solution, which may roughen the surface, split the wood, or result in staining from residual acids leaching out of the wood.
Using biodegradable or environmentally-safe cleaning or paint-removal products.	
Using paint-removal methods that employ a poultice to which paint adheres, when possible, to neatly and safely remove old lead paint.	
Using thermal devices (such as infrared heaters) carefully to remove paint when it is so deteriorated that total removal is necessary prior to repainting.	Using a thermal device to remove paint from wood features without first checking for and removing any flammable debris behind them. Using thermal devices without limiting the amount of time the wood feature is exposed to heat.
Using coatings that encapsulate lead paint, when possible, where the paint is not required to be removed to meet environmental regulations.	
Applying compatible paint coating systems to historically-painted wood following proper surface preparation.	Failing to follow manufacturers' product and application iristructions when repainting wood features.
Repainting historically-painted wood features with colors that are appropriate to the building and district.	Using paint colors on historically-painted wood features that are not appropriate to the building or district.

WOOD: CLAPBOARD, WEATHERBOARD, SHINGLES, AND OTHER FUNCTIONAL AND DECORATIVE ELEMENTS

RECOMMENDED	NOT RECOMMENDED
Protecting adjacent materials when working on other wood features.	Failing to protect adjacent materials when working on wood features.
Evaluating the overall condition of the wood to determine whether more than protection and maintenance, such as repairs to wood features, will be necessary.	Failing to undertake adequate measures to ensure the protection of wood features.

[9] Smooth-surfaced cementitious siding (left) may be used to replace deteriorated wood siding only on secondary elevations that have minimal visibility.

[10] **Not Recommended:** Cementitious siding with a raised wood-grain texture is not an appropriate material to replace historic wood siding, which has a smooth surface when painted.

WOOD: CLAPBOARD, WEATHERBOARD, SHINGLES, AND OTHER FUNCTIONAL AND DECORATIVE ELEMENTS

RECOMMENDED	NOT RECOMMENDED
Repairing wood by patching, splicing, consolidating, or otherwise reinforcing the wood using recognized conservation methods. Repair may include the limited replacement in kind or with a compatible substitute material of those extensively deteriorated or missing components of wood features when there are surviving prototypes, such as brackets, molding, or sections of siding.	Removing wood that could be stabilized, repaired, and conserved, or using untested consolidants and unskilled personnel, potentially causing further damage to historic materials. Replacing an entire wood feature, such as a cornice or balustrade, when repair of the wood and limited replacement of deteriorated or missing components is feasible.
Replacing in kind an entire wood feature that is too deteriorated to repair (if the overall form and detailing are still evident) using physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. Examples of such wood features include a cornice, entablature, or a balustrade. If using wood is not feasible, then a compatible substitute material may be considered.	Removing a wood feature that is unrepairable and not replacing it, or replacing it with a new feature that does not match. Using substitute material for the replacement that does not convey the same appearance of the surviving components of the wood feature.
Replacing a deteriorated wood feature or wood siding on a *primary or other highly-visible* elevation with a new matching wood feature.	Replacing a deteriorated wood feature or wood siding on a *primary or other highly-visible elevation* with a composite substitute material.
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a replacement masonry feature, such as a step or door pediment, when the historic feature is completely missing. It may be an accurate restoration based on documentary and physical evidence, but only when the historic feature to be replaced coexisted with the features currently on the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	Creating an inaccurate appearance because the replacement for the missing masonry feature is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature to be replaced did not coexist with the features currently on the building. Introducing a new wood feature that is incompatible in size, scale, material, or color.

METALS: WROUGHT AND CAST IRON, STEEL, PRESSED METAL, TERNEPLATE, COPPER, ALUMINUM, AND ZINC

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving metal features that are important in defining the overall historic character of the building (such as columns, capitals, pilasters, spandrel panels, or stairways) and their paints, finishes, and colors. The type of metal should be identified prior to work because each metal has its own properties and may require a different treatment.	Removing or substantially changing metal features which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Removing a major portion of the historic metal from a façade instead of repairing or replacing only the deteriorated metal, then reconstructing the façade with new material to achieve a uniform or "improved" appearance.
Protecting and maintaining metals from corrosion by providing proper drainage so that water does not stand on flat, horizontal surfaces or accumulate in curved decorative features.	Failing to identify and treat the causes of corrosion, such as moisture from leaking roofs or gutters. Placing incompatible metals together without providing an appropriate separation material. Such incompatibility can result in galvanic corrosion of the less noble metal (e.g., copper will corrode cast iron, steel, tin, and aluminum).
Cleaning metals when necessary to remove corrosion prior to repainting or applying appropriate protective coatings.	Leaving metals that must be protected from corrosion uncoated after cleaning.

[1] The stainless steel doors at the entrance to this Art Deco apartment building are important in defining its historic character and should be retained in place.

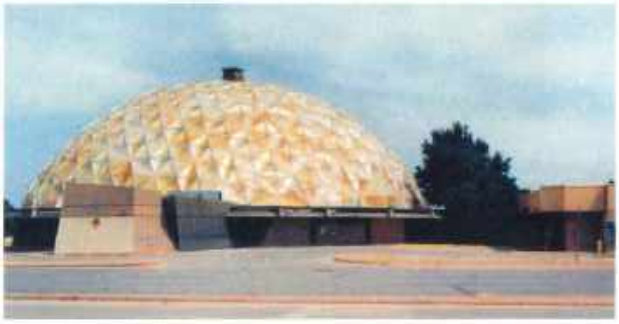
METALS: WROUGHT AND CAST IRON, STEEL, PRESSED METAL, TERNEPLATE, COPPER, ALUMINUM, AND ZINC

RECOMMENDED	NOT RECOMMENDED
Identifying the particular type of metal prior to any cleaning procedure and then testing to ensure that the gentlest cleaning method possible is selected; or, alternatively, determining that cleaning is inappropriate for the particular metal.	Using cleaning methods which alter or damage the color, texture, or finish of the metal, or cleaning when it is inappropriate for the particular metal. Removing the patina from historic metals. The patina may be a protective layer on some metals (such as bronze or copper) as well as a distinctive finish.
Using non-corrosive chemical methods to clean soft metals (such as lead, tinplate, terneplate, copper, and zinc) whose finishes can be easily damaged by abrasive methods.	Cleaning soft metals (such as lead, tinplate, terneplate, copper, and zinc) with abrasive methods (including sandblasting, other abrasive media, or high-pressure water) which will damage the surface of the metal.
Using the least abrasive cleaning method for hard metals (such as cast iron, wrought iron, and steel) to remove paint buildup and corrosion. If hand scraping and wire brushing have proven ineffective, low-pressure abrasive methods may be used as long as they do not abrade or damage the surface.	Using high-pressure abrasive techniques (including sandblasting, other media blasting, or high-pressure water) without first trying gentler cleaning methods prior to cleaning cast iron, wrought iron, or steel.
Applying appropriate paint or other coatings to historically-coated metals after cleaning to protect them from corrosion.	Applying paint or other coatings to metals (such as copper, bronze or stainless steel) if they were not coated historically, unless a coating is necessary for maintenance.
Repainting historically-painted metal features with colors that are appropriate to the building and district.	Using paint colors on historically-painted metal features that are not appropriate to the building or district.
Applying an appropriate protective coating (such as lacquer or wax) to a metal feature that was historically unpainted, such as a bronze door, which is subject to heavy use.	

METALS: WROUGHT AND CAST IRON, STEEL, PRESSED METAL, TERNEPLATE, COPPER, ALUMINUM, AND ZINC

RECOMMENDED	NOT RECOMMENDED
Protecting adjacent materials when cleaning or removing paint from metal features.	Failing to protect adjacent materials when working on metal features.
Evaluating the overall condition of metals to determine whether more than protection and maintenance, such as repairs to metal features, will be necessary.	Failing to undertake adequate measures to ensure the protection of metal features.

[12] This historic steel window has been cleaned, repaired, and primed in preparation for painting and reglazing.



[13] The gold-colored, anodized aluminum geodesic dome of the former Citizen's State Bank in Oklahoma City, OK, built in 1958 and designed by Robert Roloff, makes this a distinctive mid 20th century building.

(14) Interior cast-iron columns have been cleaned and repainted as part of the rehabilitation of this historic market building for continuing use.

(15) New enameled-metal panels were replicated to replace the original panels, which were too deteriorated to repair, when the storefront of this early 1950s building was recreated.

METALS: WROUGHT AND CAST IRON, STEEL, PRESSED METAL, TERNEPLATE, COPPER, ALUMINUM, AND ZINC

RECOMMENDED	NOT RECOMMENDED
Repairing metal by reinforcing the metal using recognized preservation methods. Repair may include the limited replacement in kind or with a compatible substitute material of those extensively deteriorated or missing components of features when there are surviving prototypes, such as column capitals or bases, storefronts, railings and steps, or window hoods.	Removing metals that could be stabilized, repaired, and conserved, or using improper repair techniques, or unskilled personnel, potentially causing further damage to historic materials.
Replacing in kind an entire metal feature that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. Examples of such a feature could include cast-iron porch steps or steel-sash windows. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Replacing an entire metal feature, such as a column or balustrade, when repair of the metal and limited replacement of deteriorated or missing components are feasible. Removing a metal feature that is unrepairable and not replacing it, or replacing it with a new metal feature that does not match. Using a substitute material for the replacement that does not convey the same appearance of the surviving components of the metal feature or that is physically or chemically incompatible.
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a replacement metal feature, such as a metal cornice or cast-iron column, when the historic feature is completely missing. It may be an accurate restoration based on documentary and physical evidence, but only when the historic feature to be replaced coexisted with the features currently on the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	Creating an inaccurate appearance because the replacement for the missing metal feature is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature to be replaced did not coexist with the features currently on the building. Introducing a new metal feature that is incompatible in size, scale, material, or color.

ROOFS

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving roofs and their functional and decorative features that are important in defining the overall historic character of the building. The form of the roof (gable, hipped, gambrel, flat, or mansard) is significant, as are its decorative and functional features (such as cupolas, cresting, parapets, monitors, chimneys, weather vanes, dormers, ridge tiles, and snow guards), roofing material (such as slate, wood, clay tile, metal, roll roofing, or asphalt shingles), and size, color, and patterning.	Removing or substantially changing roofs which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Removing a major portion of the historic roof or roofing material that is repairable, then rebuilding it with new material to achieve a more uniform or "improved" appearance. Changing the configuration or shape of a roof by adding highly visible new features (such as dormer windows, vents, skylights, or a penthouse). Stripping the roof of sound historic material, such as slate, clay tile, wood, or metal.
Protecting and maintaining a roof by cleaning gutters and downspouts and replacing deteriorated flashing. Roof sheathing should also be checked for indications of moisture due to leaks or condensation.	Failing to clean and maintain gutters and downspouts properly so that water and debris collect and cause damage to roof features, sheathing, and the underlying roof structure.
Providing adequate anchorage for roofing material to guard against wind damage and moisture penetration.	Allowing flashing, caps, and exposed fasteners to corrode, which accelerates deterioration of the roof.
Protecting a leaking roof with a temporary waterproof membrane with a synthetic underlayment, roll roofing, plywood, or a tarpaulin until it can be repaired.	Leaving a leaking roof unprotected so that accelerated deterioration of historic building materials (such as masonry, wood, plaster, paint, and structural members) occurs.
Repainting a roofing material that requires a protective coating and was painted historically (such as a terneplate metal roof or gutters) as part of regularly-scheduled maintenance.	Failing to repaint a roofing material that requires a protective coating and was painted historically as part of regularly-scheduled maintenance.
Applying compatible paint coating systems to historically-painted roofing materials following proper surface preparation.	Applying paint or other coatings to roofing material if they were not coated historically.
Protecting a roof covering when working on other roof features.	Failing to protect roof coverings when working on other roof features.
Evaluating the overall condition of the roof and roof features to determine whether more than protection and maintenance, such as repairs to roof features, will be necessary.	Failing to undertake adequate measures to ensure the protection of roof features.

ROOFS

RECOMMENDED	NOT RECOMMENDED
Repairing a roof by ensuring that the existing historic or compatible non-historic roof covering is sound and waterproof. Repair may include the limited replacement in kind or with a compatible substitute material of missing materials (such as wood shingles, slates, or tiles) on a main roof, as well as those extensively deteriorated or missing components of features when there are surviving prototypes, such as ridge tiles, dormer roofing, or roof monitors. Using corrosion-resistant roof fasteners (e.g., nails and clips) to repair a roof to help extend its longevity.	Replacing an entire roof feature when repair of the historic roofing materials and limited replacement of deteriorated or missing components are feasible.

[16] The deteriorated asphalt shingles of this porch roof are being replaced in kind with matching shingles.

ROOFS

RECOMMENDED	NOT RECOMMENDED
Replacing in kind an entire roof covering or feature that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. Examples of such a feature could include a large section of roofing, a dormer, or a chimney. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Removing a feature of the roof that is unrepairable and not replacing it, or replacing it with a new roof feature that does not match. Using a substitute material for the replacement that does not convey the same appearance of the roof covering or the surviving components of the roof feature or that is physically or chemically incompatible.
Replacing only missing or damaged roofing tiles or slates rather than replacing the entire roof covering.	Failing to reuse intact slate or tile in good condition when only the roofing substrate or fasteners need replacement.
Replacing an incompatible roof covering or any deteriorated non-historic roof covering with historically-accurate roofing material, if known, or another material that is compatible with the historic character of the building.	
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a new roof covering for a missing roof or a new feature, such as a dormer or a monitor, when the historic feature is completely missing. It may be an accurate restoration based on documentary and physical evidence, but only when the historic feature to be replaced coexisted with the features currently on the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	Creating an inaccurate appearance because the replacement for the missing roof feature is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature to be replaced did not coexist with the features currently on the building. Introducing a new roof feature that is incompatible in size, scale, material, or color.

ROOFS

RECOMMENDED	NOT RECOMMENDED
Alterations and Additions for a New Use	
Installing mechanical and service equipment on the roof (such as heating and air-conditioning units, elevator housing, or solar panels) when required for a new use so that they are inconspicuous on the site and from the public right-of-way and do not damage or obscure character-defining historic features.	Installing roof-top mechanical or service equipment so that it damages or obscures character-defining roof features or is conspicuous on the site or from the public right-of-way.
Designing rooftop additions, elevator or stair towers, decks or terraces, dormers, or skylights when required by a new or continuing use so that they are inconspicuous and minimally visible on the site and from the public right-of-way and do not damage or obscure character-defining historic features.	Changing a character-defining roof form, or damaging or destroying character-defining roofing material as a result of an incompatible rooftop addition or improperly-installed or highly-visible mechanical equipment.
Installing a green roof or other roof landscaping, railings, or furnishings that are not visible on the site or from the public right-of-way and do not damage the roof structure.	Installing a green roof or other roof landscaping, railings, or furnishings that are visible on the site and from the public right-of-way.

[17] New wood elements have been used selectively to replace rotted wood on the underside of the roof in this historic warehouse.

WINDOWS

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving windows and their functional and decorative features that are important to the overall character of the building. The window material and how the window operates (e.g., double hung, casement, awning, or hopper) are significant, as are its components (including sash, muntins, ogee lugs, glazing, pane configuration, sills, mullions, casings, or brick molds) and related features, such as shutters.	Removing or substantially changing windows or window features which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Changing the appearance of windows that contribute to the historic character of the building by replacing materials, finishes, or colors which noticeably change the sash, depth of the reveal, and muntin configurations; the reflectivity and color of the glazing; or the appearance of the frame. Obscuring historic wood window trim with metal or other material. Replacing windows solely because of peeling paint, broken glass, stuck sash, or high air infiltration. These conditions, in themselves, do not indicate that windows are beyond repair.
Protecting and maintaining the wood or metal which comprises the window jamb, sash, and trim through appropriate treatments, such as cleaning, paint removal, and reapplication of protective coating systems.	Failing to protect and maintain window materials on a cyclical basis so that deterioration of the window results.
Protecting windows against vandalism before work begins by covering them and by installing alarm systems that are keyed into local protection agencies.	Leaving windows unprotected and subject to vandalism before work begins, thereby also allowing the interior to be damaged if it can be accessed through unprotected windows.
Making windows weathertight by recaulking gaps in fixed joints and replacing or installing weatherstripping.	
Protecting windows from chemical cleaners, paint, or abrasion during work on the exterior of the building.	Failing to protect historic windows from chemical cleaners, paint, or abrasion when work is being done on the exterior of the building.
Protecting and retaining historic glass when replacing putty or repairing other components of the window.	Failing to protect the historic glass when making window repairs.

WINDOWS

RECOMMENDED	NOT RECOMMENDED
Sustaining the historic operability of windows by lubricating friction points and replacing broken components of the operating system (such as hinges, latches, sash chains or cords) and replacing deteriorated gaskets or insulating units.	Failing to maintain windows and window components so that windows are inoperable, or sealing operable sash permanently. Failing to repair and reuse window hardware such as sash lifts, latches, and locks.
Adding storm windows with a matching or a one-over-one pane configuration that will not obscure the characteristics of the historic windows. Storm windows improve energy efficiency and are especially beneficial when installed over wood windows because they also protect them from accelerated deterioration.	
Adding interior storm windows as an alternative to exterior storm windows when appropriate.	

[18] The historic metal storm windows in this 1920s office building were retained and repaired during the rehabilitation project.

[19] Installing a mockup of a proposed replacement window can be helpful to evaluate how well the new windows will match the historic windows that are missing or too deteriorated to repair.

(20 a-d) The original steel windows in this industrial building were successfully repaired as part of the rehabilitation project (left).

WINDOWS

RECOMMENDED	NOT RECOMMENDED
Installing sash locks, window guards, removable storm windows, and other reversible treatments to meet safety, security, or energy conservation requirements.	
Evaluating the overall condition of the windows to determine whether more than protection and maintenance, such as repairs to windows and window features, will be necessary.	Failing to undertake adequate measures to ensure the protection of window features.
Repairing window frames and sash by patching, splicing, consolidating, or otherwise reinforcing them using recognized preservation methods. Repair may include the limited replacement in kind or with a compatible substitute material of those extensively deteriorated, broken, or missing components of features when there are surviving prototypes, such as sash, sills, hardware, or shutters.	Removing window features that could be stabilized, repaired, or conserved using untested consolidants, improper repair techniques, or unskilled personnel, potentially causing further damage to the historic materials. Replacing an entire window when repair of the window and limited replacement of deteriorated or missing components are feasible.
Removing glazing putty that has failed and applying new putty; or, if glass is broken, carefully removing all putty, replacing the glass, and reputtying.	
Installing new glass to replace broken glass which has the same visual characteristics as the historic glass.	
Replacing in kind an entire window that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Removing a character-defining window that is unrepairable or is not needed for the new use and blocking up the opening, or replacing it with a new window that does not match. Using substitute material for the replacement that does not convey the same appearance of the surviving components of the window or that is physically incompatible.

[21] The windows on the lower floor, which were too deteriorated to repair, were replaced with new steel windows matching the upper-floor historic windows that were retained.

WINDOWS

RECOMMENDED	NOT RECOMMENDED
Modifying a historic single-glazed sash to accommodate insulated glass when it will not jeopardize the soundness of the sash or significantly alter its appearance.	Modifying a historic single-glazed sash to accommodate insulated glass when it will jeopardize the soundness of the sash or significantly alter its appearance.
Using low-e glass with the least visible tint in new or replacement windows.	Using low-e glass with a dark tint in new or replacement windows, thereby negatively impacting the historic character of the building.
Using window grids rather than true divided lights on windows on the upper floors of high-rise buildings if they will not be noticeable.	Using window grids rather than true divided lights on windows in low-rise buildings or on lower floors of high-rise buildings where they will be noticeable, resulting in a change to the historic character of the building.
Ensuring that spacer bars in between double panes of glass are the same color as the window sash.	Using spacer bars in between double panes of glass that are not the same color as the window sash.
Replacing all of the components in a glazing system if they have failed because of faulty design or materials that have deteriorated with new material that will improve the window performance without noticeably changing the historic appearance.	Replacing all of the components in a glazing system with new material that will noticeably change the historic appearance.
Replacing incompatible, non-historic windows with new windows that are compatible with the historic character of the building; or reinstating windows in openings that have been filled in.	
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a new window or its components, such as frames, sash, and glazing, when the historic feature is completely missing. It may be an accurate restoration based on documentary and physical evidence, but only when the historic feature to be replaced coexisted with the features currently on the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	Creating an inaccurate appearance because the replacement for the missing window is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature to be replaced did not coexist with the features currently on the building. Installing replacement windows made from other materials that are not the same as the material of the original windows if they would have a noticeably different appearance from the remaining historic windows.

(a)

(b)

(c)

(22) **Not Recommended:** (a-b) The original wood windows in this late-19th-century building, which were highly decorative, could likely have been repaired and retained. (c) Instead, they were replaced with new windows that do not match the detailing of the historic windows and, therefore, do not meet the Standards (above).

(23) (a)This deteriorated historic wood window was repaired and retained (b) in this rehabilitation project.

WINDOWS

RECOMMENDED	NOT RECOMMENDED
Alterations and Additions for a New Use	
Adding new window openings on rear or other secondary, less-visible elevations, if required by a new use. The new openings and the windows in them should be compatible with the overall design of the building but, in most cases, not duplicate the historic fenestration.	Changing the number, location, size, or glazing pattern of windows on primary or highly-visible elevations which will alter the historic character of the building. Cutting new openings on character-defining elevations or cutting new openings that damage or destroy significant features. Adding balconies at existing window openings or new window openings on primary or other highly-visible elevations where balconies never existed and, therefore, would be incompatible with the historic character of the building.
Replacing windows that are too deteriorated to repair using the same sash and pane configuration, but with new windows that operate differently, if necessary, to accommodate a new use. Any change must have minimal visual impact. Examples could include replacing hopper or awning windows with casement windows, or adding a realigned and enlarged operable portion of industrial steel windows to meet life-safety codes.	Replacing a window that contributes to the historic character of the building with a new window that is different in design (such as glass divisions or muntin profiles), dimensions, materials (wood, metal, or glass), finish or color, or location that will have a noticeably different appearance from the historic windows, which may negatively impact the character of the building.
Installing impact-resistant glazing, when necessary for security, so that it is compatible with the historic windows and does not damage them or negatively impact their character.	Installing impact-resistant glazing, when necessary for security, that is incompatible with the historic windows and that damages them or negatively impacts their character.
Using compatible window treatments (such as frosted glass, appropriate shades or blinds, or shutters) to retain the historic character of the building when it is necessary to conceal mechanical equipment, for example, that the new use requires be placed in a location behind a window or windows on a primary or highly-visible elevation.	Removing a character-defining window to conceal mechanical equipment or to provide privacy for a new use of the building by blocking up the opening.

ENTRANCES AND PORCHES

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving entrances and porches and their functional and decorative features that are important in defining the overall historic character of the building. The materials themselves (including masonry, wood, and metal) are significant, as are their features, such as doors, transoms, pilasters, columns, balustrades, stairs, roofs, and projecting canopies.	Removing or substantially changing entrances and porches which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Cutting new entrances on a primary façade. Altering utilitarian or service entrances so they compete visually with the historic primary entrance; increasing their size so that they appear significantly more important; or adding decorative details that cannot be documented to the building or are incompatible with the building's historic character.
Retaining a historic entrance or porch even though it will no longer be used because of a change in the building's function.	Removing a historic entrance or porch that will no longer be required for the building's new use.
Protecting and maintaining the masonry, wood, and metals which comprise entrances and porches through appropriate surface treatments, such as cleaning, paint removal, and reapplication of protective coating systems.	Failing to protect and maintain entrance and porch materials on a cyclical basis so that deterioration of entrances and porches results.
Protecting entrances and porches against arson and vandalism before work begins by covering them and by installing alarm systems keyed into local protection agencies.	Leaving entrances and porches unprotected and subject to vandalism before work begins, thereby also allowing the interior to be damaged if it can be accessed through unprotected entrances.
Protecting entrance and porch features when working on other features of the building.	Failing to protect materials and features when working on other features of the building.
Evaluating the overall condition of entrances and porches to determine whether more than protection and maintenance, such as repairs to entrance and porch features, will be necessary.	Failing to undertake adequate measures to ensure the protection of entrance and porch features.
Repairing entrances and porches by patching, splicing, consolidating, and otherwise reinforcing them using recognized preservation methods. Repair may include the limited replacement in kind or with a compatible substitute material of those extensively deteriorated features or missing components of features when there are surviving prototypes, such as balustrades, columns, and stairs.	Removing entrances and porches that could be stabilized, repaired, and conserved, or using untested consolidants, improper repair techniques, or unskilled personnel, potentially causing further damage to historic materials. Replacing an entire entrance or porch feature when repair of the feature and limited replacement of deteriorated or missing components are feasible.

[24] Rotted boards in the beaded-board porch ceiling are being replaced with new matching beaded board.

ENTRANCES AND PORCHES

RECOMMENDED	NOT RECOMMENDED
Replacing in kind an entire entrance or porch that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Removing an entrance or porch that is unrepairable and not replacing it, or replacing it with a new entrance or porch that does not match. Using a substitute material for the replacement that does not convey the same appearance of the surviving components of entrance or porch features or that is physically incompatible.

[25] The new infill designs for the garage door openings in this commercial building (a) converted for restaurant use and in this mill building (b) rehabilitated for residential use are compatible with the historic character of the buildings.

ENTRANCES AND PORCHES

RECOMMENDED	NOT RECOMMENDED
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a new entrance or porch when the historic feature is completely missing or has previously been replaced by one that is incompatible. It may be an accurate restoration based on documentary and physical evidence, but only when the historic entrance or porch to be replaced coexisted with the features currently on the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	Creating an inaccurate appearance because the replacement for the missing entrance or porch is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature to be replaced did not coexist with the features currently on the building.
Alterations and Additions for a New Use	
Enclosing historic porches on secondary elevations only, when required by a new use, in a manner that preserves the historic character of the building (e.g., using large sheets of glass and recessing the enclosure wall behind existing posts and balustrades).	Enclosing porches in a manner that results in a diminution or loss of historic character by using solid materials rather than clear glazing, or by placing the enclosure in front of, rather than behind, the historic features.
Designing and constructing additional entrances or porches on secondary elevations when required for the new use in a manner that preserves the historic character of the building (i.e., ensuring that the new entrance or porch is clearly subordinate to historic primary entrances or porches).	Constructing secondary or service entrances and porches that are incompatible in size and scale or detailing with the historic building or that obscure, damage, or destroy character-defining features.

(26) **Not Recommended:** Installing a screened enclosure is never recommended on a front or otherwise prominent historic porch. In limited instances, it may be possible to add screening on a porch at the rear or on a secondary façade; however, the enclosure should match the color of the porch and be placed behind columns and railings so that it does not obscure these features.

STOREFRONTS

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving storefronts and their functional and decorative features that are important in defining the overall historic character of the building. The storefront materials (including wood, masonry, metals, ceramic tile, clear glass, and pigmented structural glass) and the configuration of the storefront are significant, as are features, such as display windows, base panels, bulkheads, signs, doors, transoms, kick plates, corner posts, piers, and entablatures. The removal of inappropriate, non-historic cladding, false mansard roofs, and other later, non-significant alterations can help reveal the historic character of the storefront.	Removing or substantially changing storefronts and their features which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Changing the storefront so that it has a residential rather than commercial appearance. Introducing features from an earlier period that are not compatible with the historic character of the storefront. Changing the location of the storefront's historic main entrance. Replacing or covering a glass transom with solid material or inappropriate signage, or installing an incompatible awning over it.
Retaining later, non-original features that have acquired significance over time.	Removing later features that may have acquired significance.

[28] This new storefront, which replaced one that was missing, is compatible with the historic character of the building.

STOREFRONTS

RECOMMENDED	NOT RECOMMENDED
Protecting and maintaining masonry, wood, glass, ceramic tile, and metals which comprise storefronts through appropriate treatments, such as cleaning, paint removal, and reapplication of protective coating systems.	Failing to protect and maintain storefront materials on a cyclical basis so that deterioration of storefront features results.
Protecting storefronts against arson and vandalism before work begins by covering windows and doors and by installing alarm systems keyed into local protection agencies.	Leaving the storefront unprotected and subject to vandalism before work begins, thereby also allowing the interior to be damaged if it can be accessed through unprotected entrances.
Protecting the storefront when working on other features of the building.	Failing to protect the storefront when working on other features of the building.
Evaluating the overall condition of the storefront to determine whether more than protection and maintenance, such as repairs to storefront features, will be necessary.	Failing to undertake adequate measures to ensure the protection of storefront features.

[27] This original c. 1940s storefront, with its character-defining angled and curved glass display window and recessed entrance with a decorative terrazzo paving, is in good condition and should be retained in a rehabilitation project.

STOREFRONTS

RECOMMENDED	NOT RECOMMENDED
Repairing storefronts by patching, splicing, consolidating, or otherwise reinforcing them using recognized preservation methods. Repair may include the limited replacement in kind or with a compatible substitute material of those extensively deteriorated or missing components of storefronts when there are surviving prototypes, such as transoms, base panels, kick plates, piers, or signs.	Removing storefronts that could be stabilized, repaired, and conserved, or using untested consolidants, improper repair techniques, or unskilled personnel, potentially causing further damage to historic materials.
Replacing in kind an entire storefront that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Replacing a storefront feature when repair of the feature and limited replacement of deteriorated or missing components are feasible. Using a substitute material for the replacement that does not convey the same appearance of the surviving components of the storefront or that is physically incompatible. Removing a storefront that is unrepairable and not replacing it or replacing it with a new storefront that does not match.
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a new storefront when the historic storefront is completely missing or has previously been replaced by one that is incompatible. It may be an accurate restoration based on documentary and physical evidence, but only when the historic storefront to be replaced coexisted with the features currently on the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	Creating an inaccurate appearance because the replacement for the missing storefront is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature to be replaced did not coexist with the features currently on the building. Using new, over-scaled, or internally-lit signs unless there is a historic precedent for them or using other types of signs that obscure, damage, or destroy character-defining features of the storefront and the building.

STOREFRONTS

RECOMMENDED	NOT RECOMMENDED
Replacing missing awnings or canopies that can be historically documented to the building, or adding new signage, awnings, or canopies that are compatible with the historic character of the building.	Adding vinyl awnings, or other awnings that are inappropriately sized or shaped, which are incompatible with the historic character of the building; awnings that do not extend over the entire length of the storefront; or large canopies supported by posts that project out over the sidewalk, unless their existence can be historically documented.
Alterations and Additions for a New Use	
Retaining the glazing and the transparency (i.e., which allows the openness of the interior to be experienced from the exterior) that is so important in defining the character of a historic storefront when the building is being converted for residential use. Window treatments (necessary for occupants' privacy) should be installed that are uniform and compatible with the commercial appearance of the building, such as screens or wood blinds. When display cases still exist behind the storefront, the screening should be set at the back of the display case.	Replacing storefront glazing with solid material for occupants' privacy when the building is being converted for residential use. Installing window treatments in storefront windows that have a residential appearance, which are incompatible with the commercial character of the building. Installing window treatments that are not uniform in a series of repetitive storefront windows.

[29] The rehabilitation of the 1910 Malalpea General Store (a), which served the workers' camp at the Wailuku Sugar Company on the Hawaiian island of Maui, included the reconstruction of the original parapet (b).

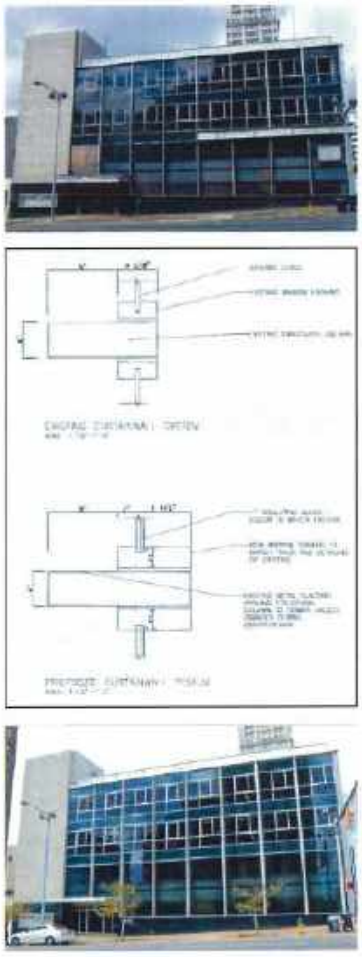
CURTAIN WALLS

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving curtain wall systems and their components (metal framing members and glass or opaque panels) that are important in defining the overall historic character of the building. The design of the curtain wall is significant, as are its component materials (metal stick framing and panel materials, such as clear or spandrel glass, stone, terra cotta, metal, and fiber-reinforced plastic), appearance (e.g., glazing color or tint, transparency, and reflectivity), and whether the glazing is fixed, operable or louvered glass panels. How a curtain wall is engineered and fabricated, and the fact that it expands and contracts at a different rate from the building's structural system, are important to understand when undertaking the rehabilitation of a curtain wall system.	Removing or substantially changing curtain wall components which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Replacing historic curtain wall features instead of repairing or replacing only the deteriorated components.
Protecting and maintaining curtain walls and their components through appropriate surface treatments, such as cleaning, paint removal, and reapplication of protective coating systems; and by making them watertight and ensuring that sealants and gaskets are in good condition.	Failing to protect and maintain curtain wall components on a cyclical basis so that deterioration of curtain walls results. Failing to identify, evaluate, and treat various causes of curtain wall failure, such as open gaps between components where sealants have deteriorated or are missing.
Protecting ground-level curtain walls from vandalism before work begins by covering them, while ensuring adequate ventilation, and by installing alarm systems keyed into local protection agencies.	Leaving ground-level curtain walls unprotected and subject to vandalism before work begins, thereby also allowing the interior to be damaged if it can be accessed through unprotected glazing.
Protecting curtain walls when working on other features of the building.	Failing to protect curtain walls when working on other features of the building.
Cleaning curtain wall systems only when necessary to halt deterioration or to remove heavy soiling.	Cleaning curtain wall systems when they are not heavily soiled, thereby needlessly introducing chemicals or moisture into historic materials.

CURTAIN WALLS

RECOMMENDED	NOT RECOMMENDED
Carrying out cleaning tests, when it has been determined that cleaning is appropriate, using only cleaning materials that will not damage components of the system, including factory-applied finishes. Test areas should be examined to ensure that no damage has resulted.	Cleaning curtain wall systems without testing or using cleaning materials that may damage components of the system.
Evaluating the overall condition of curtain walls to determine whether more than protection and maintenance, such as repair of curtain wall components, will be necessary.	Failing to undertake adequate measures to protect curtain wall components.
Repairing curtain walls by ensuring that they are watertight by augmenting existing components or replacing deteriorated or missing sealants or gaskets, where necessary, to seal any gaps between system components. Repair may include the limited replacement of those extensively deteriorated or missing components of curtain walls when there are surviving prototypes.	Removing curtain wall components that could be repaired or using improper repair techniques. Replacing an entire curtain wall system when repair of materials and limited replacement of deteriorated or missing components are feasible.
Applying sealants carefully so that they are not readily visible.	
Replacing in kind a component or components of a curtain wall system that are too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature. If using the same kind of material is not feasible, then a compatible substitute material may be considered as long as it has the same finish and appearance.	Removing a curtain wall component or the entire system, if necessary, that is unrepairable and not replacing it or replacing it with a new component or system that does not convey the same appearance.
Replacing masonry, metal, glass, or other components of a curtain wall system (or the entire system, if necessary) which have failed because of faulty design with substitutes that match the original as closely as possible and which will reestablish the viability and performance of the system.	Using substitute material for the replacement that does not convey the same appearance of the surviving components of the curtain wall or that is physically incompatible.

[30] Rather than replace the original curtain wall system of the 1954 Simms Building in Albuquerque, NM, with a different color tinted glass or coat it with a non-historic reflective film, the HVAC system was isolated to improve energy efficiency. *Photo: Harvey M. Kaplan.*



[31 a-c] (a) The rehabilitation of the First Federal Savings and Loan Association building in Birmingham, AL, constructed in 1961, required replacing the deteriorated historic curtain wall system because the framing and the fasteners holding the spandrel glass and the windows had failed. (b) Comparative drawings show that the differences between the replacement system, which incorporated new insulated glass to meet wind-load requirements, and the original system are minimal. (c) The replacement system, shown after completion of the project, has not altered the historic character of the building.

CURTAIN WALLS

RECOMMENDED	NOT RECOMMENDED
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a new curtain wall or its components when the historic feature is completely missing. It may be an accurate restoration based on documentary and physical evidence, but only when the historic feature to be replaced coexisted with the features currently on the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	Creating an inaccurate appearance because the replacement for the missing curtain wall component is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature did not coexist with the features currently on the building. Introducing a new curtain wall component that is incompatible in size, scale, material, color, and finish.
Alterations and Additions for a New Use	
Installing new glazing or an entire new curtain wall system, when necessary to meet safety-code requirements, with dimensions, detailing, materials, colors, and finish as close as possible to the historic curtain wall components.	Installing new glazing or an entire new curtain wall system, when necessary to meet safety-code requirements, with dimensions and detailing that is significantly different from the historic curtain wall components.
Installing impact-resistant glazing, when necessary for security, so that it is compatible with the historic windows and does not damage them or negatively impact their character.	Installing impact-resistant glazing in a curtain wall system, when necessary for security, that is incompatible with the historic curtain walls and damages them or negatively impacts their character.

STRUCTURAL SYSTEMS

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving structural systems and visible features of systems that are important in defining the overall historic character of the building. This includes the materials that comprise the structural system (i.e., wood, metal and masonry), the type of system, and its features, such as posts and beams, trusses, summer beams, vigas, cast-iron or masonry columns, above-grade stone foundation walls, or load-bearing masonry walls.	Removing or substantially changing visible features of historic structural systems which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Overloading the existing structural system, or installing equipment or mechanical systems which could damage the structure. Replacing a load-bearing masonry wall that could be augmented and retained. Leaving known structural problems untreated, such as deflected beams, cracked and bowed walls, or racked structural members.
Protecting and maintaining the structural system by keeping gutters and downspouts clear and roofing in good repair; and by ensuring that wood structural members are free from insect infestation.	Failing to protect and maintain the structural system on a cyclical basis so that deterioration of the structural system results. Using treatments or products that may retain moisture, which accelerates deterioration of structural members.

[33] Retaining as much as possible of the historic wood sill plate and replacing only the termite-damaged wood is always the preferred and recommended treatment.

STRUCTURAL SYSTEMS

RECOMMENDED	NOT RECOMMENDED
Evaluating the overall condition of the structural system to determine whether more than protection and maintenance, such as repairs to structural features, will be necessary.	Failing to undertake adequate measures to ensure the protection of structural systems.
Repairing the structural system by augmenting individual components, using recognized preservation methods. For example, weakened structural members (such as floor framing) can be paired or sistered with a new member, braced, or otherwise supplemented and reinforced.	Upgrading the building structurally in a manner that diminishes the historic character of the exterior or that damages interior features or spaces. Replacing a historic structural feature in its entirety or in part when it could be repaired or augmented and retained.

(32) (a-b) The rehabilitation of the 1892 Carson Block Building in Eureka, CA, for its owner, the Northern California Indian Development Council, included recreating the missing corner turret and sensitively introducing seismic reinforcement (c) shown here (opposite page) in a secondary upper floor office space. Photos: Page & Turnbull

STRUCTURAL SYSTEMS

RECOMMENDED	NOT RECOMMENDED
Installing seismic or structural reinforcement, when necessary, in a manner that minimizes its impact on the historic fabric and character of the building.	
Replacing in kind or with a compatible substitute material large portions or entire features of the structural system that are either extensively damaged or deteriorated or that are missing when there are surviving prototypes, such as cast-iron columns, trusses, or masonry walls. Substitute material must be structurally sufficient, physically compatible with the rest of the system, and, where visible, must have the same form, design, and appearance as the historic feature.	Using substitute material that does not equal the load-bearing capabilities of the historic material; does not convey the same appearance of the historic material, if it is visible; or is physically incompatible. Installing a visible or exposed structural replacement feature that does not match.
Replacing to match any interior features or finishes that may have to be removed to gain access to make structural repairs, and reusing salvageable material.	

STRUCTURAL SYSTEMS

RECOMMENDED	NOT RECOMMENDED
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Alterations and Additions for a New Use	
Limiting any new excavations next to historic foundations to avoid undermining the structural stability of the building or adjacent historic buildings. The area next to the building foundation should be investigated first to ascertain potential damage to site features or archeological resources.	Carrying out excavations or regrading land adjacent to a historic building which could cause the historic foundation to settle, shift, or fail, or which could destroy significant archeological resources.
Correcting structural deficiencies needed to accommodate a new use in a manner that preserves the structural system and individual character-defining features.	Making substantial changes to significant interior spaces or damaging or destroying features or finishes that are character defining to correct structural deficiencies.
Designing and installing new mechanical or electrical equipment, when necessary, in a manner that minimizes the number and size of cuts or holes in structural members.	Installing new mechanical or electrical equipment in a manner which reduces the load-bearing capacity of historic structural members.
Inserting a new floor when required for the new use if it does not negatively impact the historic character of the interior space; and if it does not damage the structural system, does not abut window glazing, and is not visible from the exterior of the building.	Inserting a new floor that damages or destroys the structural system or abuts window glazing and is visible from the exterior of the building and, thus, negatively impacts its historic character.
Creating an atrium, light court, or lightwell to provide natural light when required for a new use only when it can be done in a manner that preserves the structural system and the historic character of the building.	Removing structural features to create an atrium, light court, or lightwell if it negatively impacts the historic character of the building.

MECHANICAL SYSTEMS: HEATING, AIR CONDITIONING, ELECTRICAL, AND PLUMBING

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving visible features of early mechanical systems that are important in defining the overall historic character of the building, such as radiators, vents, fans, grilles, and plumbing and lighting fixtures.	Removing or substantially changing visible features of mechanical systems that are important in defining the overall historic character of the building so that, as a result, the character is diminished.
Protecting and maintaining mechanical, plumbing, and electrical systems and their features through cyclical maintenance.	Failing to protect and maintain a functioning mechanical system, plumbing, and electrical systems and their visible features on a cyclical basis so that their deterioration results.
Improving the energy efficiency of existing mechanical systems to help reduce the need for a new system by installing storm windows, insulating attics and crawl spaces, or adding awnings, if appropriate.	
Evaluating the overall condition of mechanical systems to determine whether more than protection and maintenance, such as repairs to mechanical system components, will be necessary.	Failing to undertake adequate measures to ensure the protection of mechanical system components.
Repairing mechanical systems by augmenting or upgrading system components (such as installing new pipes and ducts), rewiring, or adding new compressors or boilers.	Replacing a mechanical system when its components could be upgraded and retained.
Replacing in kind or with a compatible substitute material those extensively deteriorated or missing visible features of mechanical systems when there are surviving prototypes, such as ceiling fans, radiators, grilles, or plumbing fixtures.	Installing a visible replacement feature of a mechanical system, if it is important in defining the historic character of the building, that does not convey the same appearance.

MECHANICAL SYSTEMS: HEATING, AIR CONDITIONING, ELECTRICAL, AND PLUMBING

RECOMMENDED	NOT RECOMMENDED
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Alterations and Additions for a New Use	
Installing a new mechanical system, if required, so that it results in the least alteration possible to the historic building and its character-defining features.	Installing a new mechanical system so that character-defining structural or interior features are radically changed, damaged, or destroyed.
Providing adequate structural support for the new mechanical equipment.	Failing to consider the weight and design of new mechanical equipment so that, as a result, historic structural members or finished surfaces are weakened or cracked.
Installing new mechanical and electrical systems and ducts, pipes, and cables in closets, service areas, and wall cavities to preserve the historic character of the interior space.	Installing systems and ducts, pipes, and cables in walls or ceilings in a manner that results in extensive loss or damage or otherwise obscures historic building materials and character-defining features.
Concealing HVAC ductwork in finished interior spaces, when possible, by installing it in secondary spaces (such as closets, attics, basements, or crawl spaces) or in appropriately-located, furred-down soffits.	Leaving HVAC ductwork exposed in most finished spaces or installing soffits in a location that will negatively impact the historic character of the interior or exterior of the building.
Installing exposed ductwork in a finished space when necessary to protect and preserve decorative or other features (such as column capitals, pressed-metal or ornamental plaster ceilings, coffers, or beams) that is painted, and appropriately located so that it will have minimal impact on the historic character of the space.	Installing exposed ductwork in a finished space when necessary to protect and preserve decorative or other features that is not painted, or is located where it will negatively impact the historic character of the space.
Lowering ceilings, installing a dropped ceiling, or constructing soffits to conceal ductwork in a finished space when this will not result in extensive loss or damage to historic materials or decorative and other features, and will not change the overall character of the space or the exterior appearance of the building (i.e., lowered ceilings or soffits visible through window glazing).	Lowering ceilings, installing a dropped ceiling, or constructing soffits to conceal ductwork in a finished space in a manner that results in extensive loss or damage to historic materials or decorative and other features, and will change the overall character of the space or the exterior appearance of the building.

MECHANICAL SYSTEMS: HEATING, AIR CONDITIONING, ELECTRICAL, AND PLUMBING

RECOMMENDED	NOT RECOMMENDED
Installing appropriately located, exposed ductwork in historically-unfinished interior spaces in industrial or utilitarian buildings.	
Installing a split system mechanical unit in a manner that will have minimal impact on the historic character of the interior and result in minimal loss of historic building material.	Installing a split system mechanical unit without considering its impact on the historic character of the interior or the potential loss of historic building material.
Installing heating or air conditioning window units only when the installation of any other system would result in significant damage or loss of historic materials or features.	
Installing mechanical equipment on the roof, when necessary, so that it is minimally visible to preserve the building's historic character and setting.	Installing mechanical equipment on the roof that is overly large or highly visible and negatively impacts the historic character of the building or setting.
Placing air conditioning compressors in a location on a secondary elevation of the historic building that is not highly visible.	Placing air conditioning compressors where they are highly visible and negatively impact the historic character of the building or setting.

[34] The new ceiling ducts installed during the conversion of this historic office building into apartments are minimal in design and discretely placed above the windows.

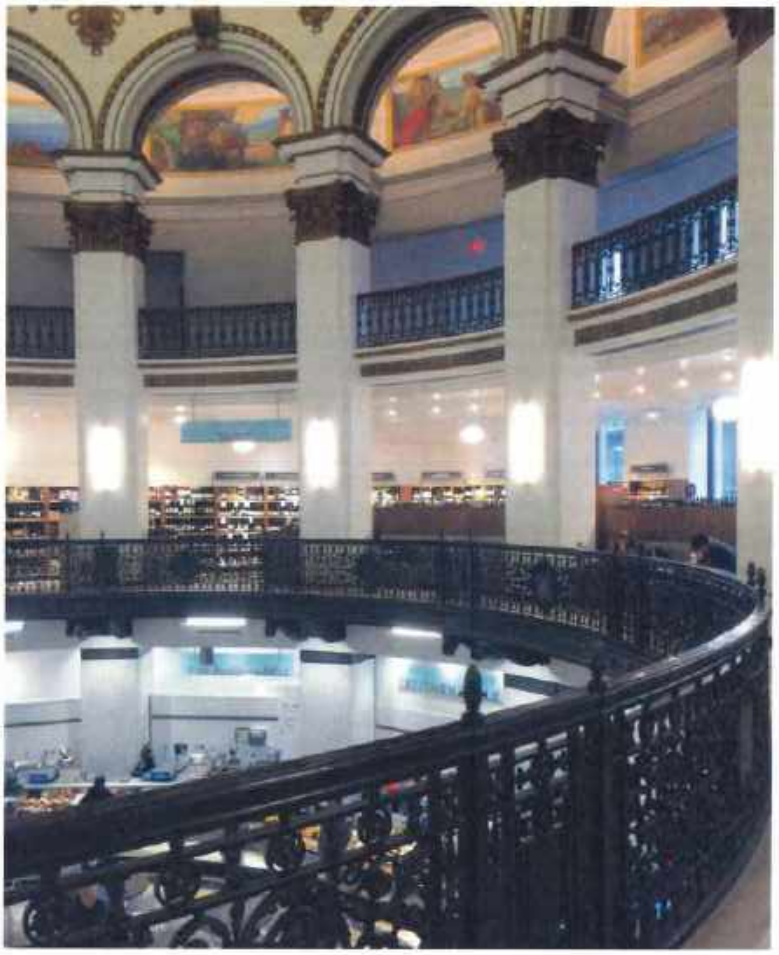
INTERIOR SPACES, FEATURES, AND FINISHES

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving a floor plan or interior spaces, features, and finishes that are important in defining the overall historic character of the building. Significant spatial characteristics include the size, configuration, proportion, and relationship of rooms and corridors; the relationship of features to spaces; and the spaces themselves, such as lobbies, lodge halls, entrance halls, parlors, theaters, auditoriums, gymnasiums, and industrial and commercial interiors. Color, texture, and pattern are important characteristics of features and finishes, which can include such elements as columns, plaster walls and ceilings, flooring, trim, fireplaces and mantels, paneling, light fixtures, hardware, decorative radiators, ornamental grilles and registers, windows, doors, and transoms; plaster, paint, wallpaper and wall coverings, and special finishes, such as marbleizing and graining; and utilitarian (painted or unpainted) features, including wood, metal, or concrete exposed columns, beams, and trusses and exposed load-bearing brick, concrete, and wood walls.	Altering a floor plan, or interior spaces (including individual rooms), features, and finishes, which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Altering the floor plan by demolishing principal walls and partitions for a new use. Altering or destroying significant interior spaces by inserting additional floors or lofts; cutting through floors to create lightwells, light courts, or atriums; lowering ceilings; or adding new walls or removing historic walls. Relocating an interior feature, such as a staircase, so that the circulation pattern and the historic relationship between features and spaces are altered. Installing new material that obscures or damages character-defining interior features or finishes. Removing paint, plaster, or other finishes from historically-finished interior surfaces to create a new appearance (e.g., removing plaster to expose brick walls or a brick chimney breast, stripping paint from wood to stain or varnish it, or removing a plaster ceiling to expose unfinished beams). Applying paint, plaster, or other coatings to surfaces that have been unfinished historically, thereby changing their character. Changing the type of finish or its color, such as painting a historically-varnished wood feature, or removing paint from a historically-painted feature.

INTERIOR SPACES, FEATURES, AND FINISHES

RECOMMENDED	NOT RECOMMENDED
Retaining decorative or other character-defining features or finishes that typify the showroom or interior of a historic store, such as a pressed-metal ceiling, a beaded-board ceiling, or wainscoting.	Removing decorative or other character-defining features or finishes that typify the showroom or interior of a historic store, such as a pressed-metal ceiling, a beaded-board ceiling, or wainscoting.
Protecting and maintaining historic materials (including plaster, masonry, wood, and metals) which comprise interior spaces through appropriate surface treatments, such as cleaning, paint removal, and reapplication of protective coating systems.	Failing to protect and maintain interior materials and finishes on a cyclical basis so that deterioration of interior features results.
Protecting interior features and finishes against arson and vandalism before project work begins by erecting temporary fencing or by covering broken windows and open doorways, while ensuring adequate ventilation, and by installing alarm systems keyed into local protection agencies.	Leaving the building unprotected and subject to vandalism before work begins, thereby allowing the interior to be damaged if it can be accessed through unprotected entrances.
Protecting interior features (such as a staircase, mantel, flooring, or decorative finishes) from damage during project work by covering them with plywood, heavy canvas, or plastic sheeting.	Failing to protect interior features and finishes when working on the interior.

[35] (a) Although deteriorated, the historic school corridor, shown on the left, with its character-defining features, including doors and transoms, was retained and repaired as part of the rehabilitation project (b).



[36] The elaborate features and finishes of this historic banking hall in the Union Trust Company Building, in Cleveland, OH, were retained and repaired as part of its conversion into a food market.

INTERIOR SPACES, FEATURES, AND FINISHES

RECOMMENDED	NOT RECOMMENDED
Removing damaged or deteriorated paint and finishes only to the next sound layer using the gentlest method possible prior to repainting or refinishing using compatible paint or other coating systems.	Using potentially damaging methods, such as open-flame torches or abrasive techniques, to remove paint or other coatings. Removing paint that is firmly adhered to interior surfaces.
Using abrasive cleaning methods only on the interior of industrial or warehouse buildings with utilitarian, unplastered masonry walls and where wood features are not finished, molded, beaded, or worked by hand. Low-pressure abrasive cleaning (e.g., sand-blasting or other media blasting) should only be considered if test patches show no surface damage and after gentler methods have proven ineffective.	Using abrasive methods anywhere but utilitarian and industrial interior spaces or when there are other methods that are less likely to damage the surface of the material.
Evaluating the overall condition of the interior materials, features, and finishes to determine whether more than protection and maintenance, such as repairs to features and finishes, will be necessary.	Failing to undertake adequate measures to ensure the protection of interior materials, features, and finishes.
Repairing interior features and finishes by patching, splicing, consolidating, or otherwise reinforcing the materials using recognized preservation methods. Repairs may include the limited replacement in kind or with a compatible substitute material of those extensively deteriorated or missing parts of interior features when there are surviving prototypes, such as stairs, balustrades, wood paneling, columns, decorative wall finishes, and ornamental pressed-metal or plaster ceilings. Repairs should be physically and visually compatible.	Removing materials that could be repaired or using improper repair techniques. Replacing an entire interior feature (such as a staircase, mantel, or door surround) or a finish (such as a plaster) when repair of materials and limited replacement of deteriorated or missing components are feasible.

[37] Exposed and painted ducts were appropriately installed here in a retail space in Denver's historic Union Station after considering other options that would have impacted the ceiling height, or damaged or obscured the ornamental plaster crown molding. *Photo: Heritage Consulting Group.*

[39] Leaving the ceiling structure exposed and installing exposed ductwork where it does not impact the windows, are appropriate treatments when rehabilitating an industrial building for another use.

[38] The rehabilitation project retained the industrial character of this historic factory building, which included installation of a fire-rated, clear glass enclosure that allows the stairway, an important interior feature, to remain visible.

INTERIOR SPACES, FEATURES, AND FINISHES

RECOMMENDED	NOT RECOMMENDED
Replacing in kind an entire interior feature that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature. Examples could include wainscoting, window and door surrounds, or stairs. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Removing a character-defining interior feature that is unrepairable and not replacing it, or replacing it with a new feature or finish that does not match the historic feature. Using a substitute material for the replacement that does not convey the same appearance of the interior feature or that is physically incompatible. Using a substitute material for the replacement that does not convey the same appearance of the interior feature or that is physically incompatible.
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a new interior feature or finish when the historic feature or finish is completely missing. This could include missing walls, stairs, mantels, wood trim, and plaster, or even entire rooms if the historic spaces, features, and finishes are missing or have been destroyed by inappropriate alterations. The design may be an accurate restoration based on documentary and physical evidence, but only when the feature or finish to be replaced coexisted with the features currently in the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	Creating an inaccurate appearance because the replacement for the missing feature is based upon insufficient physical or historic documentation; is not a compatible design; or because the feature did not coexist with the feature currently on the building. Introducing a new interior feature or finish that is incompatible in size, scale, material, color, and finish.
Alterations and Additions for a New Use	
Installing new or additional systems required for a new use for the building, such as bathrooms and mechanical equipment, in secondary spaces to preserve the historic character of the most significant interior spaces.	Subdividing primary spaces, lowering ceilings, or damaging or obscuring character-defining features (such as fireplaces, windows, or stairways) to accommodate a new use for the building.

INTERIOR SPACES, FEATURES, AND FINISHES

RECOMMENDED	NOT RECOMMENDED
Installing new mechanical and electrical systems and ducts, pipes, and cables in closets, service areas, and wall cavities to preserve the historic character of interior spaces, features, and finishes.	Installing ducts, pipes, and cables where they will obscure character-defining features or negatively impact the historic character of the interior.
Creating open work areas, when required by the new use, by selectively removing walls only in secondary spaces, less significant upper floors, or other less-visible locations to preserve primary public spaces and circulation systems.	
Retaining the configuration of corridors, particularly in buildings with multiple floors with repetitive plans (such as office and apartment buildings or hotels), where not only the floor plan is character defining, but also the width and the length of the corridor, doorways, transoms, trim, and other features, such as wainscoting and glazing.	Making extensive changes to the character of significant historic corridors by narrowing or radically shortening them, or removing their character-defining features.
Reusing decorative material or features that had to be removed as part of the rehabilitation work (including baseboards, door casing, paneled doors, and wainscoting) and reusing them in areas where these features are missing or are too deteriorated to repair.	Discarding historic material when it can be reused to replace missing or damaged features elsewhere in the building, or reusing material in a manner that may convey a false sense of history.
Installing permanent partitions in secondary, rather than primary, spaces whenever feasible. Removable partitions or partial-height walls that do not destroy the sense of space often may be installed in large character-defining spaces when required by a new use.	Installing partitions that abut windows and glazing or that damage or obscure character-defining spaces, features, or finishes.
Enclosing a character-defining interior stairway, when required by code, with fire-rated glass walls or large, hold-open doors so that the stairway remains visible and its historic character is retained.	Enclosing a character-defining interior stairway for safety or functional reasons in a manner that conceals it or destroys its character.
Locating new, code-required stairways or elevators in secondary and service areas of the historic building.	Making incompatible changes or damaging or destroying character-defining spaces, features, or finishes when adding new code-required stairways and elevators.

[41] **Not Recommended:** Leaving fragments of deteriorated or "sculpted" plaster is not a compatible treatment for either finished or unfinished interior spaces.

[40] **Not Recommended:** Removing a finished ceiling and leaving the structure exposed in a historic retail space does not meet the Standards for Rehabilitation.

INTERIOR SPACES, FEATURES, AND FINISHES

RECOMMENDED	NOT RECOMMENDED
Creating an atrium, light court, or lightwell to provide natural light when required for a new use only when it can be done in a manner that preserves significant interior spaces, features, and finishes or important exterior elevations.	Destroying or damaging character-defining interior spaces, features, or finishes, or damaging the structural system to create an atrium, light court, or lightwell.
Inserting a new floor, mezzanine, or loft when required for a new use if it does not damage or destroy significant interior features and finishes and is not visible from the exterior of the building.	Inserting a new floor, mezzanine, or loft that damages or destroys significant interior features or abuts window glazing and is visible from the exterior of the building, and, thus, negatively impacts its historic character.
Inserting a new floor, when necessary for a new use, only in large assembly spaces that are secondary to another assembly space in the building; in a space that has been greatly altered; or where character-defining features have been lost or are too deteriorated to repair.	Inserting a new floor in significant, large assembly spaces with distinctive features and finishes, which negatively impacts their historic character.
Installing exposed ductwork in a finished space when necessary to protect and preserve decorative or other features (such as column capitals, ornamental plaster or pressed-metal ceilings, coffers, or beams) that is designed, painted, and appropriately located so that it will have minimal impact on the historic character of the space.	Installing exposed ductwork in a finished space when necessary to protect and preserve decorative or other features that is not painted, or is located where it will negatively impact the historic character of the space.
Lowering ceilings, installing a dropped ceiling, or constructing soffits to conceal ductwork in a finished space when they will not result in extensive loss or damage to historic materials or decorative and other features, and will not change the overall character of the space or the exterior appearance of the building (i.e., lowered ceilings or soffits visible through window glazing).	Lowering ceilings, installing a dropped ceiling, or constructing soffits to conceal ductwork in a finished space in a manner that results in extensive loss or damage to historic materials or decorative and other features, and will change the overall character of the space or the exterior appearance of the building.
Installing a split system mechanical unit in a manner that will have minimal impact on the historic character of the interior and will result in minimal loss of historic building material.	Installing a split system mechanical unit without considering its impact on the historic character of the interior or the potential loss of historic building material.

BUILDING SITE

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving features of the building site that are important in defining its overall historic character. Site features may include walls, fences, or steps; circulation systems, such as walks, paths or roads; vegetation, such as trees, shrubs, grass, orchards, hedges, windbreaks, or gardens; landforms, such as hills, terracing, or berms; furnishings and fixtures, such as light posts or benches; decorative elements, such as sculpture, statuary, or monuments; water features, including fountains, streams, pools, lakes, or irrigation ditches; and subsurface archeological resources, other cultural or religious features, or burial grounds which are also important to the site.	Removing or substantially changing buildings and their features or site features which are important in defining the overall historic character of the property so that, as a result, the character is diminished.

[42] This garden is an important character-defining landscape feature on this college campus.

BUILDING SITE

RECOMMENDED	NOT RECOMMENDED
Retaining the historic relationship between buildings and the landscape.	Removing or relocating buildings or landscape features, thereby destroying the historic relationship between buildings and the landscape. Removing or relocating buildings on a site or in a complex of related historic structures (such as a mill complex or farm), thereby diminishing the historic character of the site or complex. Moving buildings onto the site, thereby creating an inaccurate historic appearance. Changing the grade level of the site if it diminishes its historic character. For example, lowering the grade adjacent to a building to maximize use of a basement, which would change the historic appearance of the building and its relation to the site.
Protecting and maintaining buildings and site features by providing proper drainage to ensure that water does not erode foundation walls, drain toward the building, or damage or erode the landscape.	Failing to ensure that site drainage is adequate so that buildings and site features are damaged or destroyed; or, alternatively, changing the site grading so that water does not drain properly.
Correcting any existing irrigation that may be wetting the building excessively.	Neglecting to correct any existing irrigation that may be wetting the building excessively.
Minimizing disturbance of the terrain around buildings or elsewhere on the site, thereby reducing the possibility of destroying or damaging important landscape features, archeological resources, other cultural or religious features, or burial grounds.	Using heavy machinery or equipment in areas where it may disturb or damage important landscape features, archeological resources, other cultural or religious features, or burial grounds.
Surveying and documenting areas where the terrain will be altered to determine the potential impact to important landscape features, archeological resources, other cultural or religious features, or burial grounds.	Failing to survey the building site prior to beginning work, which may result in damage or loss of important landscape features, archeological resources, other cultural or religious features, or burial grounds.

BUILDING SITE

RECOMMENDED	NOT RECOMMENDED
Protecting (e.g., preserving in place) important site features, archeological resources, other cultural or religious features, or burial grounds.	Leaving known site features or archeological material unprotected so that it is damaged during rehabilitation work.
Planning and carrying out any necessary investigation before rehabilitation begins, using professional archeologists and methods, when preservation in place is not feasible.	Allowing unqualified personnel to perform data recovery on archeological resources, which can result in damage or loss of important archeological material
Preserving important landscape features through regularly-scheduled maintenance of historic plant material.	Allowing important landscape features or archeological resources to be lost, damaged, or to deteriorate due to inadequate protection or lack of maintenance
Protecting the building site and landscape features against arson and vandalism before rehabilitation work begins by erecting temporary fencing and by installing alarm systems keyed into local protection agencies.	Leaving the property unprotected and subject to vandalism before work begins so that the building site and landscape features, archeological resources, other cultural or religious features, or burial grounds can be damaged or destroyed. Removing or destroying features from the site, such as fencing, paths or walkways, masonry balustrades, or plant material.
Installing protective fencing, bollards, and stanchions on a building site, when necessary for security, that are as unobtrusive as possible.	Installing protective fencing, bollards, and stanchions on a building site, when necessary for security, without taking into consideration their location and visibility so that they negatively impact the historic character of the site.
Providing continued protection and maintenance of buildings and landscape features on the site through appropriate grounds and landscape management.	Failing to protect and maintain materials and features from the restoration period on a cyclical basis so that deterioration of the site results.
Protecting buildings and landscape features when working on the site.	Failing to protect building and landscape features during work on the site or failing to repair damaged or deteriorated site features.

BUILDING SITE

RECOMMENDED	NOT RECOMMENDED
Evaluating the overall condition of materials and features to determine whether more than protection and maintenance, such as repairs to site features, will be necessary.	Failing to undertake adequate measures to ensure the protection of the site.
Repairing historic site features which have been damaged, are deteriorated, or have missing components order reestablish the whole feature and to ensure retention of the integrity of the historic materials. Repairs may include limited replacement in kind or with a compatible substitute material of those extensively deteriorated or missing parts of site features when there are surviving prototypes, such as paving, railings, or individual plants within a group (e.g., a hedge). Repairs should be physically and visually compatible.	Removing materials and features that could be repaired or using improper repair techniques. Replacing an entire feature of the site (such as a fence, walkway, or drive) when repair of materials and limited replacement of deteriorated or missing components are feasible.

[43] The industrial character of the site was retained when this brewery complex was rehabilitated for residential use.

[44] **Not Recommended:** (a-b) The historic character of this plantation house (marked in blue on plan on opposite page) and its site was diminished and adversely impacted when multiple new buildings like this (#3 on plan) were constructed on the property (c).

BUILDING SITE

RECOMMENDED	NOT RECOMMENDED
Replacing in kind an entire feature of the site that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature. Examples could include a walkway or a fountain, a land form, or plant material. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Removing a character-defining feature of the site that is unrepairable and not replacing it, or replacing it with a new feature that does not match. Using a substitute material for the replacement that does not convey the same appearance of the surviving site feature or that is physically or ecologically incompatible. Adding conjectural landscape features to the site (such as period reproduction light fixtures, fences, fountains, or vegetation) that are historically inappropriate, thereby creating an inaccurate appearance of the site.

(45) Undertaking a survey to document archeological resources may be considered in some rehabilitation projects when a new exterior addition is planned.

BUILDING SITE

RECOMMENDED	NOT RECOMMENDED
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a new feature on a site when the historic feature is completely missing. This could include missing outbuildings, terraces, drives, foundation plantings, specimen trees, and gardens. The design may be an accurate restoration based on documentary and physical evidence, but only when the feature to be replaced coexisted with the features currently on the site. Or, it may be a new design that is compatible with the historic character of the building and site.	Creating an inaccurate appearance because the replacement for the missing feature is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature did not coexist with the features currently on the site. Introducing a new feature, including plant material, that is visually incompatible with the site or that alters or destroys the historic site patterns or use.
Alterations and Additions for a New Use	
Designing new onsite features (such as parking areas, access ramps, or lighting), when required by a new use, so that they are as unobtrusive as possible, retain the historic relationship between the building or buildings and the landscape, and are compatible with the historic character of the property.	Locating parking areas directly adjacent to historic buildings where vehicles may cause damage to buildings or landscape features or when they negatively impact the historic character of the building site if landscape features and plant materials are removed.
Designing new exterior additions to historic buildings or adjacent new construction that are compatible with the historic character of the site and preserves the historic relationship between the building or buildings and the landscape.	Introducing new construction on the building site which is visually incompatible in terms of size, scale, design, material, or color, which destroys historic relationships on the site, or which damages or destroys important landscape features, such as replacing a lawn with paved parking areas or removing mature trees to widen a driveway.
Removing non-significant buildings, additions, or site features which detract from the historic character of the site.	Removing a historic building in a complex of buildings or removing a building feature or a landscape feature which is important in defining the historic character of the site.
Locating an irrigation system needed for a new or continuing use of the site where it will not cause damage to historic buildings.	Locating an irrigation system needed for a new or continuing use of the site where it will damage historic buildings.

SETTING (DISTRICT / NEIGHBORHOOD)

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving building and landscape features that are important in defining the overall historic character of the setting. Such features can include circulation systems, such as roads and streets; furnishings and fixtures, such as light posts or benches; vegetation, gardens and yards; adjacent open space, such as fields, parks, commons, or woodlands; and important views or visual relationships.	Removing or substantially changing those building and landscape features in the setting which are important in defining the historic character so that, as a result, the character is diminished.

[46] The varied size, shapes, and architectural styles of these historic buildings are unique to this street in Christiansted, St. Croix, USVI, and should be retained in a rehabilitation project.

[47] Original paving stones contribute to the character of the historic setting and distinguish this block from other streets in the district.

[48] Old police and fire call boxes, which are distinctive features in this historic district, have been retained, and now showcase work by local artists.

SETTING (DISTRICT / NEIGHBORHOOD)

RECOMMENDED	NOT RECOMMENDED
Retaining the historic relationship between buildings and landscape features in the setting. For example, preserving the relationship between a town common or urban plaza and the adjacent houses, municipal buildings, roads, and landscape and streetscape features.	Altering the relationship between the buildings and landscape features in the setting by widening existing streets, changing landscape materials, or locating new streets or parking areas where they may negatively impact the historic character of the setting. Removing or relocating buildings or landscape features, thereby destroying the historic relationship between buildings and the landscape in the setting.

[49] Low stone walls are character-defining features in this hilly, early-20th-century residential neighborhood.

SETTING (DISTRICT / NEIGHBORHOOD)

RECOMMENDED	NOT RECOMMENDED
Protecting and maintaining historic features in the setting through regularly-scheduled maintenance and grounds and landscape management.	Failing to protect and maintain materials in the setting on a cyclical basis so that deterioration of buildings and landscape features results. Stripping or removing historic features from buildings or the setting, such as a porch, fencing, walkways, or plant material.
Installing protective fencing, bollards, and stanchions in the setting, when necessary for security, that are as unobtrusive as possible.	Installing protective fencing, bollards, and stanchions in the setting, when necessary for security, without taking into consideration their location and visibility so that they negatively impact the historic character of the setting.
Protecting buildings and landscape features when undertaking work in the setting.	Failing to protect buildings and landscape features during work in the setting.
Evaluating the overall condition of materials and features to determine whether more than protection and maintenance, such as repairs to materials and features in the setting, will be necessary.	Failing to undertake adequate measures to ensure the protection of materials and features in the setting.
Repairing features in the setting by reinforcing the historic materials. Repairs may include the replacement in kind or with a compatible substitute material of those extensively deteriorated or missing parts of setting features when there are surviving prototypes, such as fencing, paving materials, trees, and hedgerows. Repairs should be physically and visually compatible.	Failing to repair and reinforce damaged or deteriorated historic materials and features in the setting. Removing material that could be repaired or using improper repair techniques. Replacing an entire feature of the building or landscape in the setting when repair of materials and limited replacement of deteriorated or missing components are feasible.

SETTING (DISTRICT / NEIGHBORHOOD)

RECOMMENDED	NOT RECOMMENDED
Replacing in kind an entire building or landscape feature in the setting that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Removing a character-defining feature of the building or landscape from the setting that is unrepairable and not replacing it or replacing it with a new feature that does not match. Using a substitute material for the replacement that does not convey the same appearance of the surviving building or landscape feature in the setting or that is physically or ecologically incompatible.
The following work is highlighted to indicate that it is specific to **Rehabilitation** *projects and should only be considered after the preservation concerns have been addressed.*	
Designing the Replacement for Missing Historic Features	
Designing and installing a new feature of the building or landscape in the setting when the historic feature is completely missing. This could include missing steps, streetlights, terraces, trees, and fences. The design may be an accurate restoration based on documentary and physical evidence, but only when the feature to be replaced coexisted with the features currently in the setting. Or, it may be a new design that is compatible with the historic character of the setting.	Creating an inaccurate appearance because the replacement for the missing feature is based upon insufficient physical or historic documentation; is not a compatible design, or because the feature did not coexist with the features currently in the setting. Introducing a new building or landscape feature that is visually or otherwise incompatible with the setting's historic character (e.g., replacing low metal fencing with a high wood fence).
Alterations and Additions for a New Use	
Designing new features (such as parking areas, access ramps, or lighting), when required by a new use, so that they are as unobtrusive as possible, retain the historic relationships between buildings and the landscape in the setting, and are compatible with the historic character of the setting.	Locating parking areas directly adjacent to historic buildings where vehicles may cause damage to buildings or landscape features or when they negatively impact the historic character of the setting if landscape features and plant materials are removed.
Designing new exterior additions to historic buildings or adjacent new construction that are compatible with the historic character of the setting that preserve the historic relationship between the buildings and the landscape.	Introducing new construction into historic districts which is visually incompatible or that destroys historic relationships within the setting, or which damages or destroys important landscape features.
Removing non-significant buildings, additions, or landscape features which detract from the historic character of the setting.	Removing a historic building, a building feature, or landscape feature which is important in defining the historic character of the setting.

CODE-REQUIRED WORK

RECOMMENDED	NOT RECOMMENDED
Sensitive solutions to meeting accessibility and life-safety code requirements are an important part of protecting the historic character of the building and site. Thus, work that must be done to meet use-specific code requirements should be considered early in planning a ***Rehabilitation*** *of a historic building for a new use. Because code mandates are directly related to occupancy, some uses require less change than others and, thus, may be more appropriate for a historic building. Early coordination with code enforcement authorities can reduce the impact of alterations necessary to comply with current codes.*	
ACCESSIBILITY	
Identifying the historic building's character-defining exterior features, interior spaces, features, and finishes, and features of the site and setting which may be affected by accessibility code-required work.	Undertaking accessibility code-required alterations before identifying those exterior features, interior spaces, features, and finishes, and features of the site and setting which are character defining and, therefore, must be preserved.
Complying with barrier-free access requirements in such a manner that the historic building's character-defining exterior features, interior spaces, features, and finishes, and features of the site and setting are preserved or impacted as little as possible.	Altering, damaging, or destroying character-defining exterior features, interior spaces, features, and finishes, or features of the site and setting while making modifications to a building, its site, or setting to comply with accessibility requirements.

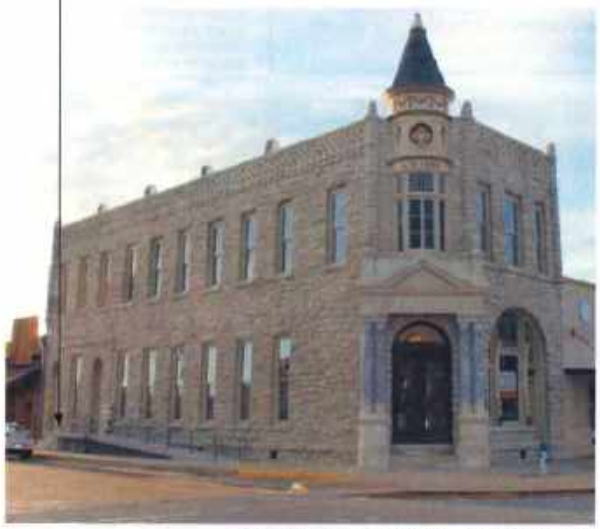
[50] This kitchen in a historic apartment complex was rehabilitated to meet accessibility requirements.

[51] A new interior access ramp with a simple metal railing is compatible with the character of this mid-century-modern building.

CODE-REQUIRED WORK

RECOMMENDED	NOT RECOMMENDED
Working with specialists in accessibility and historic preservation to determine the most sensitive solutions to comply with access requirements in a historic building, its site, or setting.	Making changes to historic buildings, their sites, or setting without first consulting with specialists in accessibility and historic preservation to determine the most appropriate solutions to comply with accessibility requirements.
Providing barrier-free access that promotes independence for the user while preserving significant historic features.	Making modifications for accessibility that do not provide independent, safe access while preserving historic features.
Finding solutions to meet accessibility requirements that minimize the impact of any necessary alteration on the historic building, its site, and setting, such as compatible ramps, paths, and lifts.	Making modifications for accessibility without considering the impact on the historic building, its site, and setting.

(52) The access ramp blends in with the stone façade of the First National Bank in Stephenville, TX, and is appropriately located on the side where it is does not impact the historic character of the building. *Photo: Nancy McCoy, QuimbyMcCoy Preservation Architecture, LLP.*



(53) This entrance ramp (right) is compatible with the historic character of this commercial building.

(54) The gently-sloped path in a historic park in Kansas City, MO, which accesses the memorial below, includes a rest area part way up the hill. *Photo: STRATA Architecture + Preservation.*

CODE-REQUIRED WORK

RECOMMENDED	NOT RECOMMENDED
Using relevant sections of existing codes regarding accessibility for historic buildings that provide alternative means of code compliance when code-required work would otherwise negatively impact the historic character of the property.	
Minimizing the impact of accessibility ramps by installing them on secondary elevations when it does not compromise accessibility or by screening them with plantings.	Installing elevators, lifts, or incompatible ramps at a primary entrance, or relocating primary entrances to secondary locations to provide access without investigating other options or locations.
Adding a gradual slope or grade to the sidewalk, if appropriate, to access the entrance rather than installing a ramp that would be more intrusive to the historic character of the building and the district.	
Adding an exterior stair or elevator tower that is compatible with the historic character of the building in a minimally-visible location only when it is not possible to accommodate it on the interior without resulting in the loss of significant historic spaces, features, or finishes.	
Installing a lift as inconspicuously as possible when it is necessary to locate it on a primary elevation of the historic building.	
Installing lifts or elevators on the interior in secondary or less significant spaces where feasible.	Installing lifts or elevators on the interior in primary spaces which will negatively impact the historic character of the space.

[55] The lift is compatible with the industrial character of this former warehouse.

[56 a-b] In order to continue in its historic use, the door openings of this 1916 Colonial Revival-style fire station had to be widened to accommodate the larger size of modern fire trucks. Although this resulted in some change to the arched door surrounds, it is minimal and does not negatively impact the historic character of the building. (a) Above, before; *Photo: Fire and Emergency Medical Services Department (FEMS), Washington, D.C.*; below, after.

CODE-REQUIRED WORK

RECOMMENDED	NOT RECOMMENDED
LIFE SAFETY	
Identifying the historic building's character-defining exterior features, interior spaces, features, and finishes, and features of the site and setting which may be affected by life-safety code-required work.	Undertaking life-safety code-required alterations before identifying those exterior features, interior spaces, features, and finishes, and features of the site and setting which are character defining and, therefore, must be preserved.
Complying with life-safety codes (including requirements for impact-resistant glazing, security, and seismic retrofit) in such a manner that the historic building's character-defining exterior features, interior spaces, features, and finishes, and features of the site and setting are preserved or impacted as little as possible.	Altering, damaging, or destroying character-defining exterior features, interior spaces, features, and finishes, or features of the site and setting while making modifications to a building, its site, or setting to comply with life-safety code requirements.
Removing building materials only after testing has been conducted to identify hazardous materials, and using only the least damaging abatement methods.	Removing building materials without testing first to identify the hazardous materials, or using potentially damaging methods of abatement.
Providing workers with appropriate personal equipment for protection from hazards on the worksite.	Removing hazardous or toxic materials without regard for workers' health and safety or environmentally-sensitive disposal of the materials.
Working with code officials and historic preservation specialists to investigate systems, methods, or devices to make the building compliant with life-safety codes to ensure that necessary alterations will be compatible with the historic character of the building.	Making life-safety code-required changes to the building without consulting code officials and historic preservation specialists, with the result that alterations negatively impact the historic character of the building.
Using relevant sections of existing codes regarding life safety for historic buildings that provide alternative means of code compliance when code-required work would otherwise negatively impact the historic character of the building.	

[57] Workers wear protective clothing while removing lead paint from metal features.

[59] (a-d) The decorative concrete balcony railings on this 1960s building did not meet life-safety code requirements. They were replaced with new glass railings with a fritted glass pattern matching the original design—a creative solution that satisfies codes, while preserving the historic appearance of the building when viewed from the street (c-d). *Photos: (a, b, d) ERA Architects, Inc.; (c) Nathan Cyprys, photographer.*

CODE-REQUIRED WORK

RECOMMENDED	NOT RECOMMENDED
Upgrading historic stairways and elevators to meet life-safety codes so that they are not damaged or otherwise negatively impacted.	Damaging or making inappropriate alterations to historic stairways and elevators or to adjacent features, spaces, or finishes in the process of doing work to meet code requirements.
Installing sensitively-designed fire-suppression systems, such as sprinklers, so that historic features and finishes are preserved.	Covering character-defining wood features with fire-retardant sheathing, which results in altering their appearance.
Applying fire-retardant coatings when appropriate, such as intumescent paint, to protect steel structural systems.	Using fire-retardant coatings if they will damage or obscure character-defining features.
Adding a new stairway or elevator to meet life-safety code requirements in a manner that preserves adjacent character-defining features and spaces.	Altering, damaging, or destroying character-defining spaces, features, or finishes when adding a new code-required stairway or elevator.
Using existing openings on secondary or less-visible elevations or, if necessary, creating new openings on secondary or less-visible elevations to accommodate second egress requirements.	Using a primary or other highly-visible elevation to accommodate second egress requirements without investigating other options or locations.
Placing a code-required stairway or elevator that cannot be accommodated within the historic building in a new exterior addition located on a secondary or minimally-visible elevation.	Constructing a new addition to accommodate code-required stairs or an elevator on character-defining elevations or where it will obscure, damage, or destroy character-defining features of the building, its site, or setting.
Designing a new exterior stairway or elevator tower addition that is compatible with the historic character of the building.	

[58] Fire doors that retract into the walls have been installed here (not visible in photo) preserve the historic character of this corridor.

RESILIENCE TO NATURAL HAZARDS

RECOMMENDED	NOT RECOMMENDED
Resilience to natural hazards should be addressed as part of the treatment Rehabilitation. A historic building may have existing characteristics or features that help address or minimize the impacts of natural hazards. These should be used to best advantage and should be taken into consideration early in the planning stages of a rehabilitation project before proposing any new treatments. When new adaptive treatments are needed they should be carried out in a manner that will have the least impact on the historic character of the building, its site, and setting. .	
Identifying the vulnerabilities of the historic property to the impacts of natural hazards (such as wildfires, hurricanes, or tornadoes) using the most current climate information and data available.	Failing to identify and periodically reevaluate the potential vulnerability of the building, its site, and setting to the impacts of natural hazards.
Assessing the potential impacts of known vulnerabilities on character-defining features of the building, its site, and setting; and reevaluating and reassessing potential impacts on a regular basis.	
Documenting the property and character-defining features as a record and guide for future repair work, should it be necessary, and storing the documentation in a weatherproof location.	Failing to document the historic property and its character-defining features with the result that such information is not available in the future to guide repair or reconstruction work, should it be necessary.
Ensuring that historic resources inventories and maps are accurate, up to date, and accessible in times of emergency.	
Maintaining the building, its site, and setting in good repair, and regularly monitoring character-defining features.	Failing to regularly monitor and maintain the property and the building systems in good repair.
Using and maintaining existing characteristics and features of the historic building, its site, setting, and larger environment (such as shutters for storm protection or a site wall that keeps out flood waters) that may help to avoid or minimize the impacts of natural hazards	Allowing loss, damage, or destruction to occur to the historic building, its site, or setting by failing to evaluate potential future impacts of natural hazards or to plan and implement adaptive measures, if necessary to address possible threats.
Undertaking work to prevent or minimize the loss, damage, or destruction of the historic property while retaining and preserving significant features and the overall historic character of the building, its site, and setting.	Carrying out adaptive measures intended to address the impacts of natural hazards that are unnecessarily invasive or will otherwise adversely impact the historic character of the building, its site, or setting.

[60] In some instances, it may be necessary to elevate a historic building located in a floodplain to protect it. But this treatment is appropriate only if elevating the building will retain its historic character, including its relationship to the site, and its new height will be compatible with surrounding buildings if in a historic district. The house on the right, which has been raised only slightly, has retained its historic character. The house on the left has been raised several feet higher, resulting in a greater impact on the historic character of the house and the district.

RESILIENCE TO NATURAL HAZARDS

RECOMMENDED	NOT RECOMMENDED
Ensuring that, when planning work to adapt for natural hazards, all feasible alternatives are considered, and that the options requiring the least alteration are considered first.	
Implementing local and regional traditions (such as elevating residential buildings at risk of flooding or reducing flammable vegetation around structures in fire-prone areas) for adapting buildings and sites in response to specific natural hazards, when appropriate. Such traditional methods may be appropriate if they are compatible with the historic character of the building, its site, and setting.	Implementing a treatment traditionally used in another region or one typically used for a different property type or architectural style which is not compatible with the historic character of the property.
Using special exemptions and variances when adaptive treatments to protect buildings from known hazards would otherwise negatively impact the historic character of the building, its site, and setting.	
Considering adaptive options, whenever possible, that would protect multiple historic resources, if the treatment can be implemented without negatively impacting the historic character of the district, or archeological resources, other cultural or religious features, or burial grounds.	

Sustainability

Sustainability is usually a very important and integral part of the treatment Rehabilitation. Existing energy-efficient features should be taken into consideration early in the planning stages of a rehabilitation project before proposing any energy improvements. There are numerous treatments that may be used to upgrade a historic building to help it operate more efficiently while retaining its character.

The topic of sustainability is addressed in detail in **The Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings.**

NEW EXTERIOR ADDITIONS TO HISTORIC BUILDINGS AND RELATED NEW CONSTRUCTION

RECOMMENDED	NOT RECOMMENDED
New Additions	
Placing functions and services required for a new use (including elevators and stairways) in secondary or non-character-defining interior spaces of the historic building rather than constructing a new addition.	Expanding the size of the historic building by constructing a new addition when requirements for the new use could be met by altering non-character-defining interior spaces.
Constructing a new addition on a secondary or non-character-defining elevation and limiting its size and scale in relationship to the historic building.	Constructing a new addition on or adjacent to a primary elevation of the building which negatively impacts the building's historic character.
Constructing a new addition that results in the least possible loss of historic materials so that character-defining features are not obscured, damaged, or destroyed.	Attaching a new addition in a manner that obscures, damages, or destroys character-defining features of the historic building.
Designing a new addition that is compatible with the historic building.	Designing a new addition that is significantly different and, thus, incompatible with the historic building.
Ensuring that the addition is subordinate and secondary to the historic building and is compatible in massing, scale, materials, relationship of solids to voids, and color.	Constructing a new addition that is as large as or larger than the historic building, which visually overwhelms it (i.e., results in the diminution or loss of its historic character).

NEW EXTERIOR ADDITIONS TO HISTORIC BUILDINGS AND RELATED NEW CONSTRUCTION

RECOMMENDED	NOT RECOMMENDED
Using the same forms, materials, and color range of the historic building in a manner that does not duplicate it, but distinguishes the addition from the original building.	Duplicating the exact form, material, style, and detailing of the historic building in a new addition so that the new work appears to be historic.
Basing the alignment, rhythm, and size of the window and door openings of the new addition on those of the historic building.	
Incorporating a simple, recessed, small-scale hyphen, or connection, to physically and visually separate the addition from the historic building.	
Distinguishing the addition from the original building by setting it back from the wall plane of the historic building.	

[6] a-b] The materials, design, and location at the back of the historic house are important factors in making this a compatible new addition. *Photos: © Maxwell MacKenzie.*

NEW EXTERIOR ADDITIONS TO HISTORIC BUILDINGS AND RELATED NEW CONSTRUCTION

RECOMMENDED	NOT RECOMMENDED
Ensuring that the addition is stylistically appropriate for the historic building type (e.g., whether it is residential or institutional).	
Considering the design for a new addition in terms of its relationship to the historic building as well as the historic district, neighborhood, and setting.	

(62) The stair tower at the rear of this commercial building is a compatible new addition.

NEW EXTERIOR ADDITIONS TO HISTORIC BUILDINGS AND RELATED NEW CONSTRUCTION

RECOMMENDED	NOT RECOMMENDED
Rooftop Additions	
Designing a compatible rooftop addition for a multi-story building, when required for a new use, that is set back at least one full bay from the primary and other highly-visible elevations and that is inconspicuous when viewed from surrounding streets.	Constructing a rooftop addition that is highly visible, which negatively impacts the character of the historic building, its site, setting, or district.

[63] (a) A mockup should be erected to demonstrate the visibility of a proposed rooftop addition and its potential impact on the historic building. Based on review of this mockup (orange marker), it was determined that the rooftop addition would meet the Standards (b). The addition is unobtrusive and blends in with the building behind it.

New addition

NEW EXTERIOR ADDITIONS TO HISTORIC BUILDINGS AND RELATED NEW CONSTRUCTION

RECOMMENDED	NOT RECOMMENDED
Limiting a rooftop addition to one story in height to minimize its visibility and its impact on the historic character of the building.	Constructing a highly-visible, multi-story rooftop addition that alters the building's historic character. Constructing a rooftop addition on low-rise, one- to three-story historic buildings that is highly visible, overwhelms the building, and negatively impacts the historic district. Constructing a rooftop addition with amenities (such as a raised pool deck with plantings, HVAC equipment, or screening) that is highly visible and negatively impacts the historic character of the building.

(64) Not Recommended: It is generally not appropriate to construct a rooftop addition on a low-rise, two- to three-story building such as this, because it negatively affects its historic character.

NEW EXTERIOR ADDITIONS TO HISTORIC BUILDINGS AND RELATED NEW CONSTRUCTION

RECOMMENDED	NOT RECOMMENDED
Related New Construction	
Adding a new building to a historic site or property only if the requirements for a new or continuing use cannot be accommodated within the existing structure or structures.	Adding a new building to a historic site or property when the project requirements could be accommodated within the existing structure or structures.
Locating new construction far enough away from the historic building, when possible, where it will be minimally visible and will not negatively affect the building's character, the site, or setting.	Placing new construction too close to the historic building so that it negatively impacts the building's character, the site, or setting.

(65) (a) This (far left) is a compatible new outbuilding constructed on the site of a historic plantation house (b). Although traditional in design, it is built of wood to differentiate it from the historic house (which is scored stucco) located at the back of the site so as not to impact the historic house, and minimally visible from the public right-of-way (c).

NEW EXTERIOR ADDITIONS TO HISTORIC BUILDINGS AND RELATED NEW CONSTRUCTION

RECOMMENDED	NOT RECOMMENDED
Designing new construction on a historic site or in a historic setting that it is compatible but differentiated from the historic building or buildings.	Replicating the features of the historic building when designing a new building, with the result that it may be confused as historic or original to the site or setting.
Considering the design for related new construction in terms of its relationship to the historic building as well as the historic district and setting.	
Ensuring that new construction is secondary to the historic building and does not detract from its significance.	Adding new construction that results in the diminution or loss of the historic character of the building, including its design, materials, location, or setting. Constructing a new building on a historic property or on an adjacent site that is much larger than the historic building. Designing new buildings or groups of buildings to meet a new use that are not compatible in scale or design with the character of the historic building and the site, such as apartments on a historic school property that are too residential in appearance.
Using site features or land formations, such as trees or sloping terrain, to help minimize the new construction and its impact on the historic building and property.	
Designing an addition to a historic building in a densely-built location (such as a downtown commercial district) to appear as a separate building or infill, rather than as an addition. In such a setting, the addition or the infill structure must be compatible with the size and scale of the historic building and surrounding buildings—usually the front elevation of the new building should be in the same plane (i.e., not set back from the historic building). This approach may also provide the opportunity for a larger addition or infill when the façade can be broken up into smaller elements that are consistent with the scale of the historic building and surrounding buildings.	

2 Structural Report

Prepared by Silman and Mel Green Associates

Silman

Boulder City Water Filtration Plant
Historic Structure Report – Structural Assessment

February 23, 2022

Prepared for
LGA, Inc.
241 West Charleston Boulevard, Suite 107
Las Vegas, NV 89102

Prepared by
Silman
707 Wilshire Blvd #4900
Los Angeles, CA 90017

Silman Project #W3966

TABLE OF CONTENTS

INTRODUCTION

The Historic Water Filtration Plant is located at 300 Railroad Avenue in Boulder City, Nevada (see Figure 1). Silman and Mel Green Associates (MGA) have been retained to perform a structural assessment of the building as part of a larger Historic Structures Report (HSR) and Preservation Treatment Plan. As part of the assessment existing documents were reviewed and an on-site investigation was performed with the rest of the design team on November 9, 2021. Following the site visit observations analyses were performed to assess the live load capacity of the framing and the ability of the structure to resist lateral loading (wind and seismic).

Figure 1 – Aerial of Site Looking North *(Google Earth)*

The building is up to three stories tall above grade with a large basement space. The structure consists of concrete foundations and below grade walls, steel/concrete framing at the first floor, wood framing at upper floors/roofs and exterior brick masonry walls above grade. Total square footage for the building is estimated to be around 7600 sf broken out as follows: 2900 sf at the basement level (non-infilled areas), 3400 sf at the first floor, 1000 sf at the second floor, and 300 sf at the third floor.

The purpose of the report herein is to provide the following:

- Descriptions of the existing structural systems (floor framing, roof framing, walls, etc.)
- Observations on existing conditions of structural elements
- Analysis of existing live load capacities for floors/roofs
- Preliminary seismic evaluation to highlight potential hazards
- Summary of structural recommendations for repairs based on conditions assessment and analyses

For the purposes of the report key plans have been provided below so that consistent nomenclature when referencing different areas and elevations of the building (see Figure 2, Figure 3, and Figure 4).

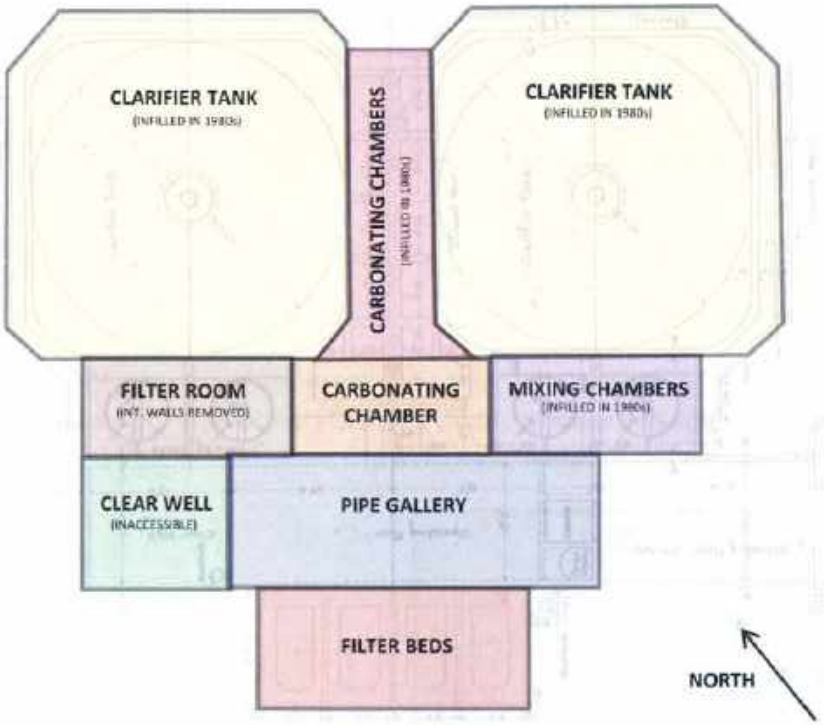


Figure 2 – Basement Floor Key Plan

Figure 3 – First Floor Key Plan

Figure 4 – Second *(left)* and Third *(right)* Floor Key Plans

For the elevation references the front of the building is the Southwest Elevation, the rear with the Clarifier Tanks is the Northeast Elevation, the end with the unloading shed is the Southeast Elevation, and the side with the additions is the Northwest Elevation (see Figure 5).

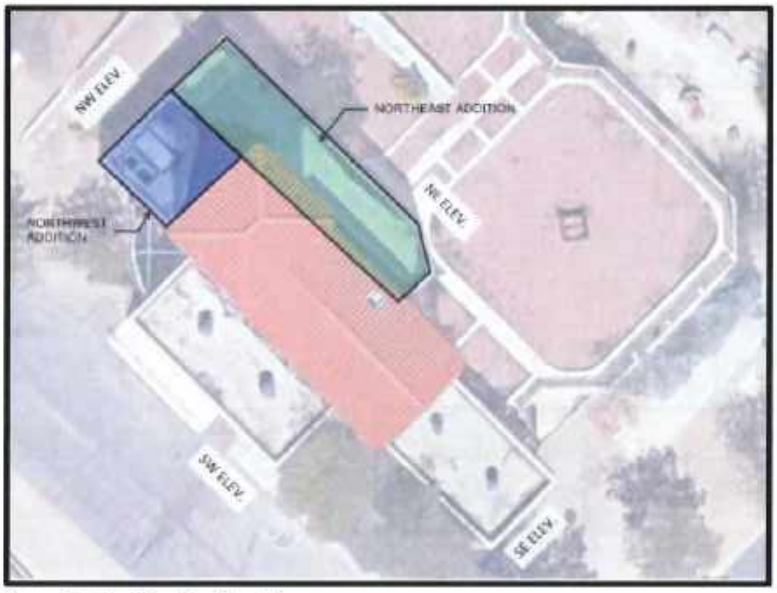


Figure 5 – Key Plan for Elevations

Building History

The building history is focused on changes that have impacted the structure of the Historic Water Filtration Plant. A more comprehensive history can be reviewed by referencing the 2006 Facility Reuse Plan and the various drawings that have been made available to the design team.

- 1931 – The Boulder City Water Filtration Plant was constructed in order supply water from Hoover Dam under the Boulder Canyon Project Act (see Figure 6).

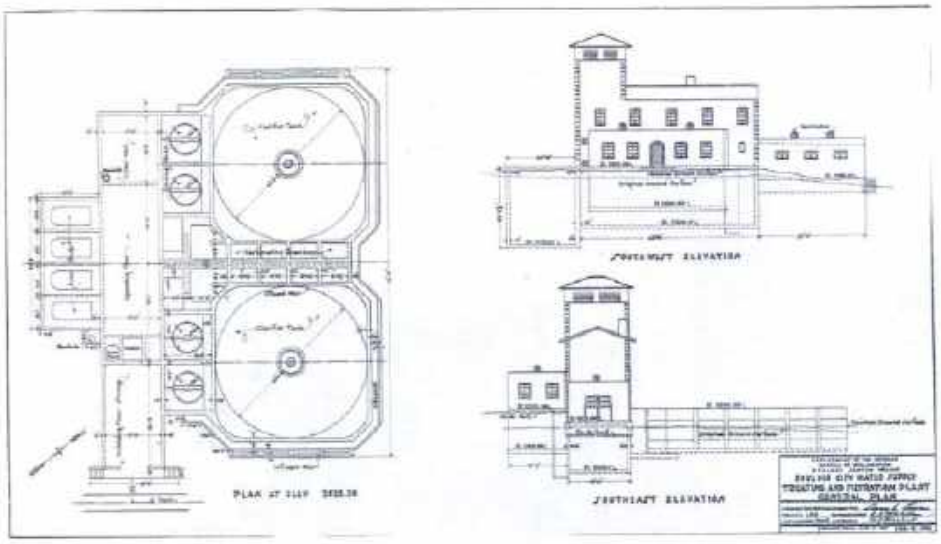


Figure 6 – General Plan from Original 1931 Drawings

- 1932 – The NW Addition appears to have been added shortly after the original construction based on photos recently uncovered by the design team. The NW addition is added over top of the Clear Well which was part of the original construction. The NW Addition is the first addition as it is noted as existing in the NE Addition drawings.
- 1950-1969 – The second one-story addition is added to the building. Drawings were produced for the NE addition in 1950; however, the as-builts are dated 1969 (see Figure 7). As a result, there is still some question as to exactly when construction occurred. The NE addition was added over top of the North Mixing Chambers (now Filter Room) and the South Carbonating Chambers. It was at this time that the interior walls for these spaces were removed.

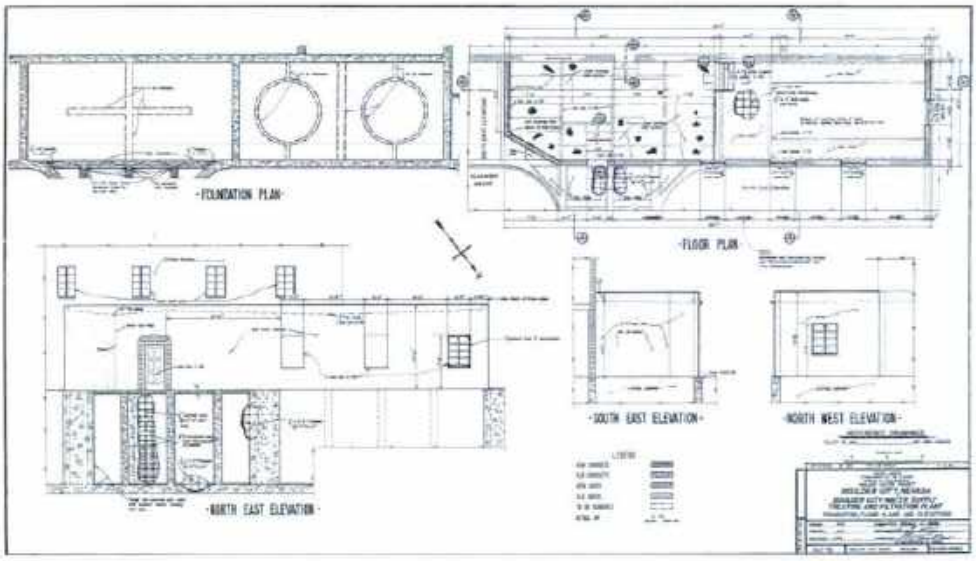


Figure 7 – Floor Plans and Elevations from 1950 Drawings for the NE Addition

- 1982 – The facility is closed and mothballed by GSA (see Figure 8).

Figure 8 – 1982 Photo Looking Northwest from NRHP Nomination

- 1984-1985 – GSA declares the building surplus property and transfers ownership to Boulder City.
- Late 1980s – The city infills the two Clarifier Tanks, the north Carbonating Chambers, and the east Mixing Chambers to address safety concerns. Use of the building is limited to storage.
- 1990s – The community adds an arts park to the eastern side of the parcel and a community garden to the western side of the parcel.
- 2018 – It is reported that a re-roofing project occurred of the high gable and hip roofs as well as the three flat roof areas on the one-story section. Re-roofing project stripped the old roofing product down to the existing wooden deck but does not appear to have added any new structural sheathing.

INVESTIGATION

The investigation herein is based on site observations from November 2021 combined with a review of past drawings, reports, and photos that were made available to the design team. While on site observations were made at both the interior and exterior of the building. In general, the structure was readily visible, and access was possible for almost all building areas. At the interior all spaces were documented except for the Clear Well and the tanks/chambers infilled by the city in the late 1980s. At the exterior all elevations were documented and only the roofs were not directly observed.

Past relevant documentation that was made available to the structural team at the time of the investigation included the following:

- 1931 Original Drawings – Total of 8 sheets of the original 1931 drawings with a high quality scan and good resolution
    - General Plan (45-D-1156)
    - Reinforcement Details-Wall Elevations (45-D-1157)
    - Second and Tank Floor Plans and Details (45-D-1189)
    - Northeast Elevation (45-D-1190)
    - Southwest Elevation (45-D-1191)
    - Northwest and Southeast Elevations (45-D-1192)
    - Longitudinal Section and Details (45-D-1193)
    - Cross Section and Details (45-D-1194)
- 1950 Addition Original Drawings – Total of 2 sheets with a high quality scan and good resolution
    - Foundation, Floor Plans and Elevations (45-301-4092)
    - Roof Plan and Sections (45-301-4093)
- 1983 National Register of Historic Places (NRHP) Nomination for Boulder City Historic District (Volume I and Volume II) by Janus Associates
- 2006 "Facility Reuse Plan – Historic Boulder City Water Filtration Plant" dated January 31, 2006 and put together by the City of Boulder City – Community Development Department
- 2006 "Facility Reuse Plan - Appendix A: Copy of Deed" – 1985 deed to the City of Boulder City
- 2006 "Facility Reuse Plan - Appendix B: Copy of Original Plans for Construction of Facility" – 32 sheets of the original drawings from 1931 with a low-quality scan and poor resolution. Relevant structural sheets not included elsewhere include (note that several sheets related to piping, lighting and equipment have been omitted):
    - Clarifiers and Carbonization Chambers (45-D-1110)
    - Mixing Tanks (45-D-1111)
    - Reinforcement Plan (45-D-1112)
    - Rapid Sand Filter: Foundation and Sections – Reinforcing Details (45-D-1116)
    - Steel Superstructure Framing (45-D-?)
    - Pipe Gallery and Clear Well: Plan and Sections (45-D-1154)
    - Pipe Gallery and Clear Well: Reinforcement Details – Wall Elevations (45-D-?)
    - Pipe Gallery and Clear Well: Reinforcement Details (45-D-1174)
    - Pipe Gallery and Clear Well: Reinforcement Details (45-D-1175)

- Pipe Gallery, Clear Well and Loading Platform: Reinforcement Schedule (45-D-1176)
- Loading Platform (45-D-1177)
- First Floor Plan – Lintel Schedules (45-D-118?)
- Miscellaneous Building Details (45-D-1195)
- Section Thru Pipe Gallery (45-D-1203)
- Floor Plans – Equipment Layout (45-D-1204)
- Elevator Installation (45-D-1212)
- Miscellaneous Iron Details (45-D-1215)
- Grading Plan (45-D-1241)

- 2019 "Boulder City Assessments – Old Filtration Plant (300 Railroad Avenue)" dated February 14, 2019 and put together by Stantec

Structural Description & Assessment

Foundation

Under most of the building there appears to a reinforced concrete mat foundation. Scaling the historic drawings, the mat appears to be on the order of 12 inches thick and serves as the exposed basement slab. The basement elevation varies and is anywhere from about 10 feet below surrounding grade (at the Filter Beds) to upwards of 22 feet below grade (at the Clear Well). The elevation of the basement slab at the infilled Clarifier Tanks and surrounding chambers is approximately equal to the Filter Bed elevation; however, the grading drops off towards the northeast end of the site making those (no longer exposed) slabs only about 6 feet above grade. Although the first floor of the Unloading Shed is several feet lower than the adjacent Operating Floor this is the one area of the building without a basement below. There is a 2 foot deep pit to accommodate the elevator at the Pipe Gallery foundation mat.

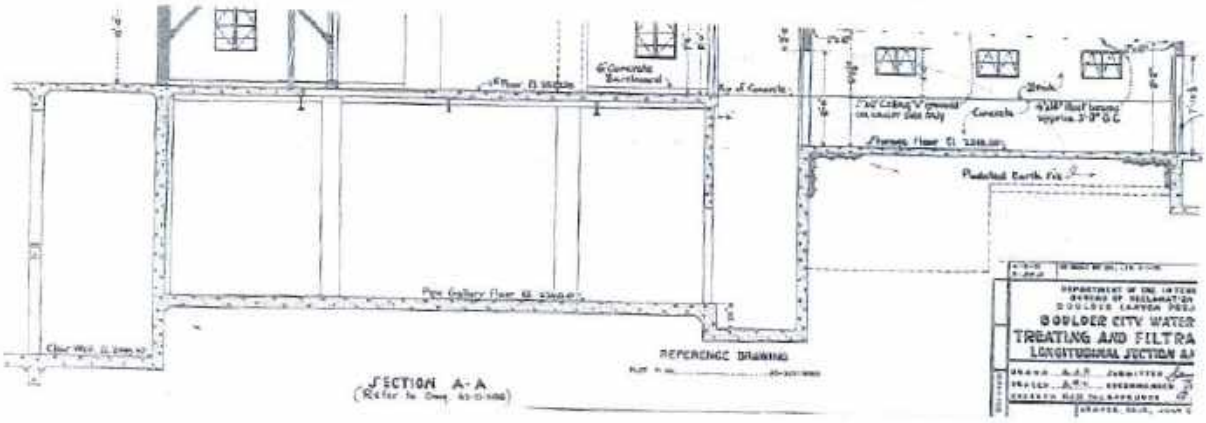


Figure 9 – Section Showing Foundations Through Clear Well (left), Pipe Gallery (center) and Unloading Shed (right)

At the Unloading Shed the foundations vary a bit from the mat found elsewhere. This portion of the building appears to have the exterior load bearing walls sitting on shallow concrete spread footings and with a more traditional slab on grade that appears to be about 6 inches thick.

Similarly, the Clarifier Tanks are also a bit different from the rest of the structure at the foundation level. The perimeter walls for the tanks are essentially concrete cantilever retaining walls with shallow spread

footings measuring 7'-6" wide and 15 inches deep. At the center of each tank there was a large concrete pier that sat on a shallow spread footing about 9 foot square in plan and 3 foot deep. The sloping bottom of the tanks was formed with a 6 inch slab on grade (see Figure 10).

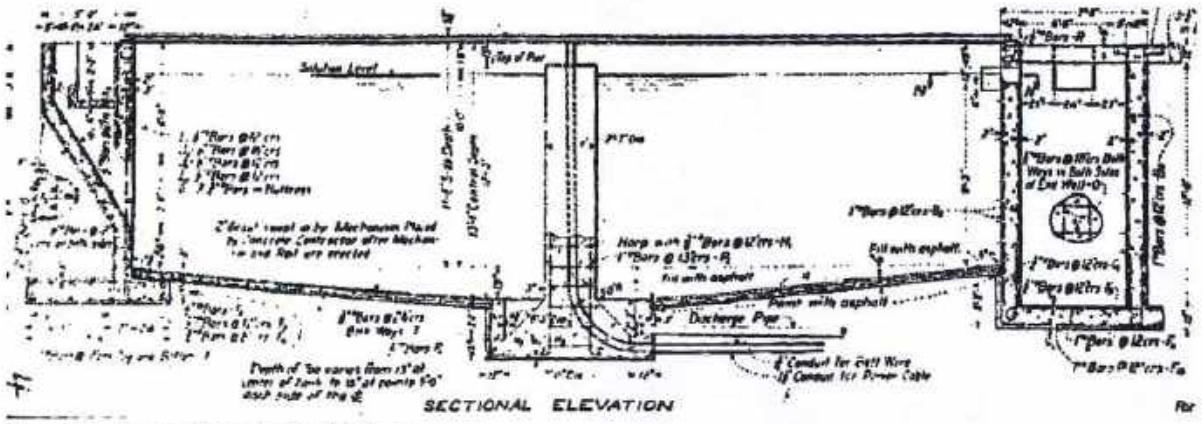


Figure 10 – Section Through a Clarifier Tank

At the building there are typically reinforced concrete foundation walls up to the first floor level. Most of the concrete foundation walls appear to be 12 inches thick, although there are a few exceptions such as the walls around the Filter Beds and the Unloading Shed, which are 8 inches thick. At the Unloading Shed the concrete walls extend up about 4 feet above the slab on grade so that there is a consistent top of concrete elevation and transition to brick masonry (Figure 11).

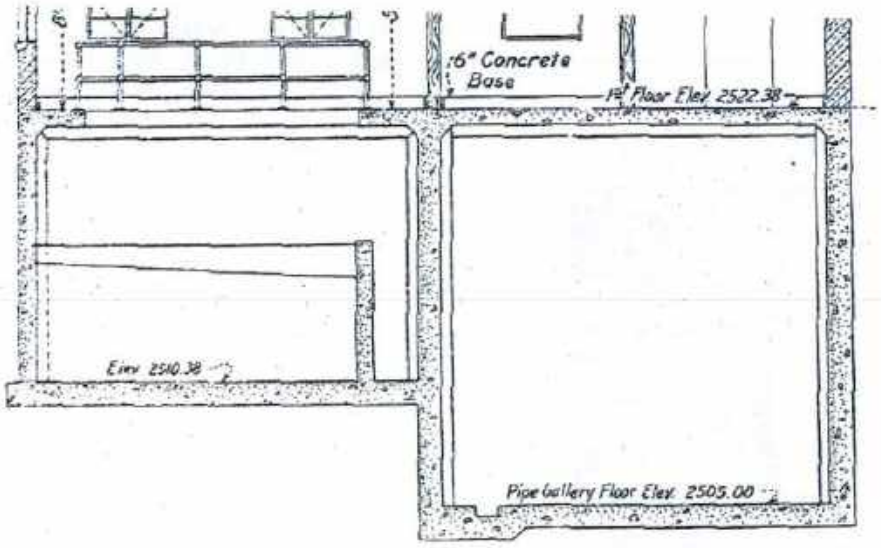


Figure 11 – Section Showing Concrete Foundations Walls at Filter Beds (left) and Pipe Gallery (right)

Condition Assessment

Many of the foundation elements are below grade and not directly visible. Where observations could be made the slabs were in fair to good condition. Similarly, the concrete foundation walls were also in fair

to good condition where exposed to view. At the Pipe Gallery there were isolated areas where the concrete walls have begun to spall and expose the rusted reinforcing bars (see Figure 12).

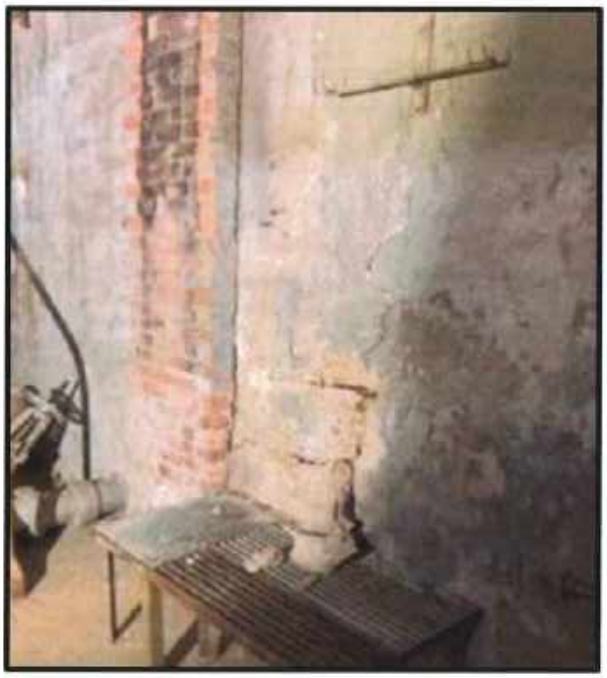


Figure 12 – Concrete Spalling and Deterioration at Pipe Gallery Foundation Wall

There is limited evidence of differential settlement at the site except for the Unloading Shed. Some vertical and diagonal cracking was noted in both the concrete stem walls and the brick masonry walls above. The foundations for this portion of the building are not on mat and are at a higher elevation than the rest of the structure, which may partially explain some of this observed distress (see Figure 13).

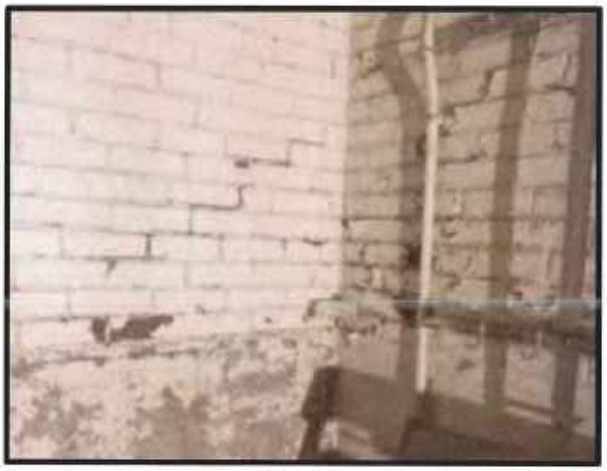


Figure 13 – Step Cracking at South Corner of Unloading Shed

Floor Framing

The first floor of the building is typically concrete framed with 8 inch thick reinforced concrete slabs. The slabs often bear on concrete foundation walls with beams at isolated locations.

The floor above the Filter Beds has large openings and consists of 8 inch thick concrete slabs that cantilever off the concrete foundation walls. The slabs cantilever up to 3 foot from the face of the wall (see Figure 14).

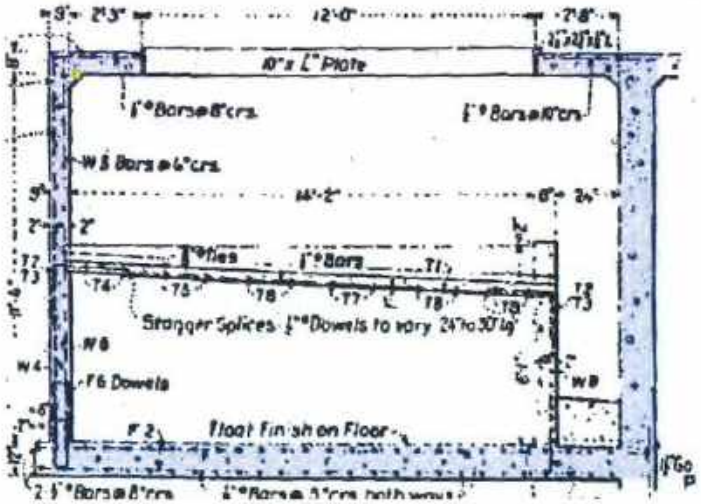


Figure 14 – Section Showing Cantilever First Floor Slabs at Filter Beds (left)

The operating floor above the pipe gallery consists of (3) 14 inch deep north-south running steel wide flange beams spanning about 17 feet between concrete foundations walls. The beams support a one-way concrete slab spanning about 12 feet between steel beams. There are two openings in the floor; the elevator shaft at the south end framed out with concrete foundation walls, and one at the north end framed out with additional east-west running steel beams and with steel grating above (see Figure 15).

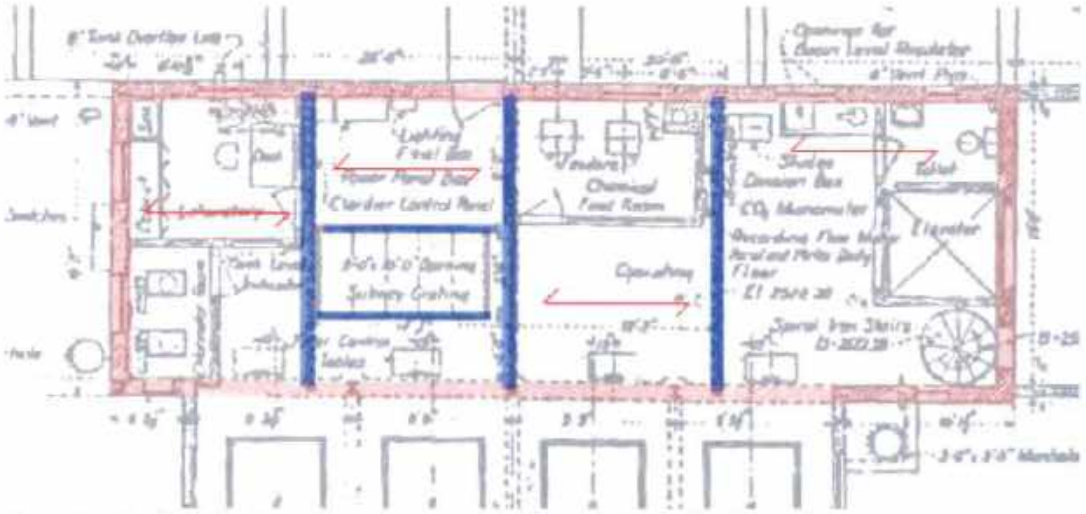


Figure 15 – First Floor Framing at Operating Room (steel beams in blue and walls in red)

At the Northeast Addition, the south end of the first floor above the Carbonating Chamber was an open space and the first floor over the basement was added as part of the addition. This floor is elevated about 2 feet above the adjacent first floors and consists of 8 inch deep steel wide flange beams spanning in the north-south direction that support steel bar grating (see Figure 16).

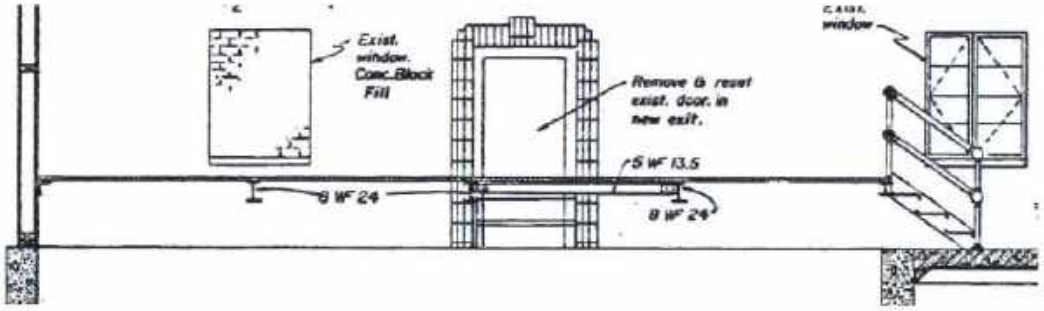


Figure 16 – Steel Framed Floor with Grating at Northeast Addition (1950 Drawings)

The north end of the Northeast Addition above the Filter Room has a large opening in the floor which consist of 8 inch thick concrete slabs supported by a combination of concrete walls and 5 inch deep steel wide flange beams (see Figure 17). Like the south end these new floor slabs all date to the time of the addition as the chambers below were previously open to the outdoors.

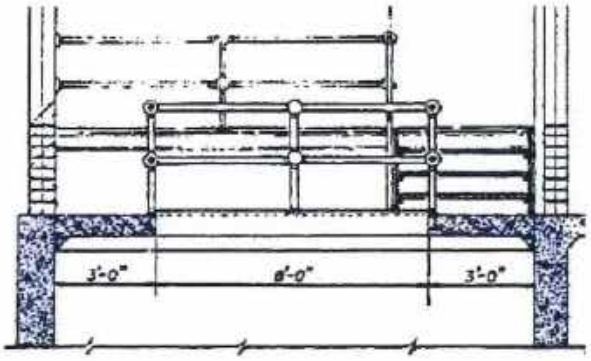


Figure 17 – Section through First Floor of Northeast Addition Above Filter Room (1950 Drawings)

At the Northwest Addition the first floor is the old roof over the Clear Well. The structure here appears to be an 8 inch thick concrete slab spanning in the east-west direction to the concrete foundation walls and a north-south running concrete beam in the center of the span (see Figure 18).

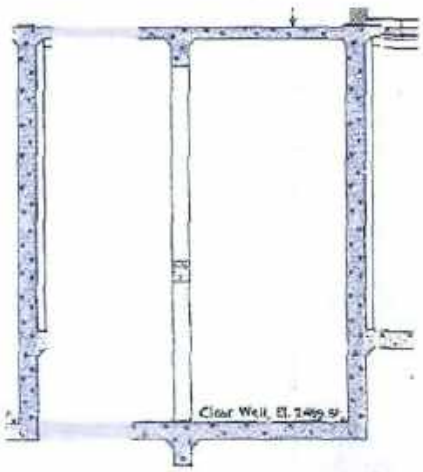


Figure 18 – Section Through Clear Well Showing First Floor of Northwest Addition

The Storage Floor is the only second floor level at the building. No observations could be directly made as a ceiling was in place but based on provided documentation it is believed that the framing consists of (2) 2x8 (nominal) wood floor joists spiked together (see Figure 19). The joists span in the north-south direction 19 foot across the space.

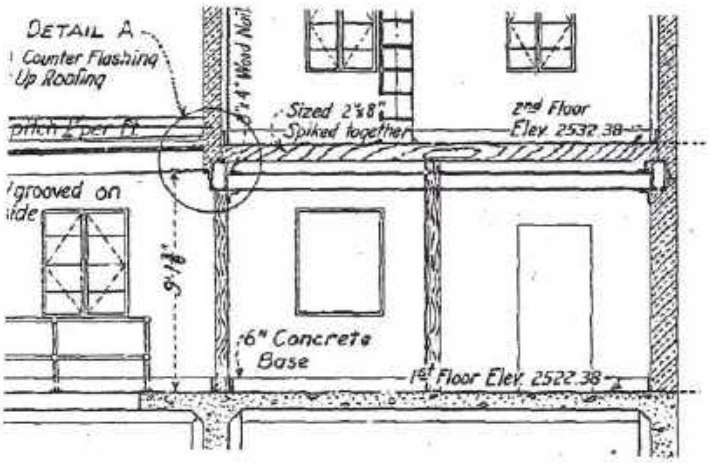


Figure 19 – Section Through Storage Floor Showing 2x8 Second Floor Joists

They are supported by a brick masonry wall at the north end and a steel frame at the south end (see Figure 20). Spacing of the joists is not provided but is likely 16 inches on-center. There is straight wood sheathing above the floor joists.


Figure 20 – Underside of Second Floor Framing and Steel Frame Supporting South End of Second Floor

There is a steel spiral staircase at the south end of the Storage Floor that connects the basement, first floor and second floor levels. From the second floor there is a ladder to get up to the third floor.

The Tank Floor is a small third floor area that houses a 10 foot diameter tank. There is a steel frame around the perimeter of the room with columns and beams partially embedded in the exterior brick masonry walls. The floor itself consists of (6) east-west running steel beams spanning the 15 foot

distance across the tower and spaced at around 2 to 3 feet on-center. Above the steel beams there is 1 inch thick wood sheathing that forms the floor.

Figure 21 – Tank Floor as Viewed from the Second Floor Below

Condition Assessment

The floor framing is generally in fair to good condition where observations could be made. In particular, the wood and steel floor framing appear to be in good condition relative to their age, with few signs of deterioration outside of some surface corrosion on the steel and water staining on the wood (see Figure 22).

Figure 22 – Good Condition of Floors at Northeast Addition

At the concrete framed floors some spalling was evident at the underside of the slabs. The most significant damage observed was at the underside of the Operating Floor where several spalls exposed underlying corroded rebar (see Figure 23).

Figure 23 – View of Spalling at Underside of Operating Floor Concrete Slab

Roof Framing

At the one-story portions of the building the roofs are flat and the framing consists of 4x10 (nominal) wood rafters spanning in the north-south direction and bearing on brick masonry walls. The rafters have straight wood sheathing (2x laid flat at original construction) and a built-up roof above. Over the Unloading Shed and Filter Beds the rafters are spaced at 36 inches on-center, whereas the spacing increases to 48 inches on-center at the new additions (see Figure 24).

Figure 24 – Roof Framing at Unloading Shed

The Storage Floor has a gable roof which consists of 2x6 (nominal) wood rafters at 16 inches on-center. At every other rafter there is a 2x6 horizontal tie and vertical at the peak to essentially create a truss. Above the rafters there is 7/8 inch thick straight sheathing, 3-ply built-up roofing and a tile roof. The roof framing spans 19 feet, has a 4:12 roof pitch, and bears on a 2x sill above the north/south brick masonry walls (see Figure 25).

Figure 25 – Roof Framing above Storage Floor

Above the Tank Floor the tower has a hipped roof. The framing consists of 2x10 (nominal) hip rafters and 2x6 (nominal) rafters at 16 inches on center. Like the second floor roof there is 7/8 inch thick straight sheathing, 3-ply built-up roofing and a tile roof (see Figure 26).

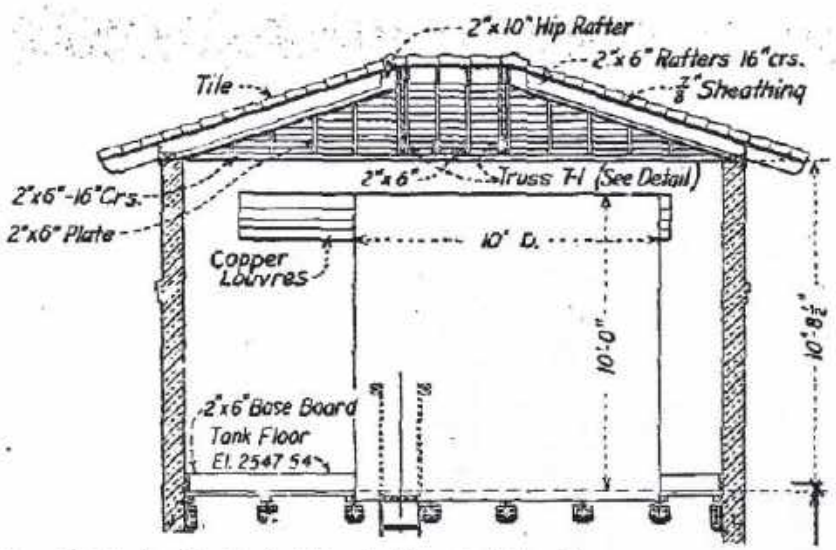


Figure 26 – Section Showing Roof Framing Above Tank Floor Tower

Condition Assessment

The wood roof framing is in fair condition. At the original 1931 construction there has been some moisture infiltration over time, but it appears to have caused limited structural damage. Some water staining is evident at rafter and sheathing, and the paint is failing, but it does not appear to have caused any significant section loss of the wood. At the two flat roofs added over the addition more significant water damage is evident. There are signs of significant water damage at the Northwest Addition. A ceiling is in place, so observations were limited, but the interior finishes had started to fail in response to the moisture and it is very likely there is damage to the underlying roof rafters (see Figure 27).

Figure 27 – Plaster Ceiling Failure at NW Addition

Exterior

The exterior of the building consists of load bearing brick masonry walls. The walls range from 8 to 12 inches thick. The thicker walls are typically concentrated at the heavier loaded areas of the original construction, whereas the thinner walls occur in areas such as the second floor of Storage Floor, the Unloading Shed, and the additions. At the south end of the Northeast addition there are two short exterior wall segments that are wood framed. The brick masonry walls typically sit on the concrete foundation walls near grade.

The windows and door openings typically have steel angle lintels embedded in the brick masonry. Openings have been boarded up around the building perimeter to prevent intrusion.

At the south end of the Unloading Shed there is an exterior concrete framed stair/loading dock that has been partially demolished. At the east end of the site several feet of the concrete walls around the Clarifier Tanks are still visible (see Figure 28).

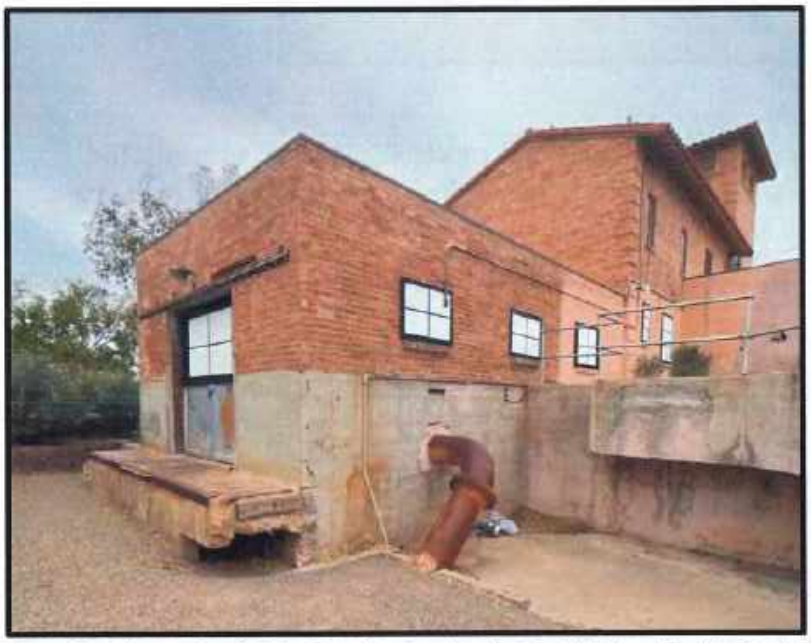


Figure 28 – Photo at South End of Site Showing Loading Dock (left) and Clarifier Tanks (right)

Condition Assessment

The exterior walls are in fair condition. Some mortar loss is evident in the brick masonry particularly at drains and near grade where rising damp has accelerated the mortar deterioration. Repointing will likely be required on the exterior elevations (see Figure 29).

Figure 29 – Mortar Loss Due to Rising Damp

Some concrete cracking and spalling is evident at the exposed concrete foundation elements. The damage is particularly evident at the exposed portions of the Clarifier Tanks. Spalling and horizontal cracks are most evident near the top of the wall (see Figure 30).

Figure 30 – Concrete Damage at Top of Walls

Vertical cracks appear at a regular spacing along the wall, with the largest cracks found at corners (see Figure 31). At some of the vertical cracks underlying rusted rebar has been exposed.

Figure 31 – Crack at Clarifier Tank Retaining Wall

There is a chimney that was within the two story portion of the Operating Floor, which was demolished at some point in the past. Portions of this chimney remain at the basement level and pose a falling hazard with questionable stability (see Figure 32).

Figure 32 – One Wythe of Old Chimney Still Remains

Lateral System

The lateral force resisting system relies on the unreinforced masonry shear walls. Unreinforced masonry is not ideal in a high seismic region such as Boulder City, as the material has very little ductility and can fail with little warning during an earthquake. In addition, the masonry is quite heavy when compared with similarly sized steel or wood framed buildings. This presents a couple issues; (1) the seismic force is

directly proportional to the weight and (2) should the masonry walls collapse they present a much greater risk to life safety given their weight.

While the building was not explicitly designed for seismic it does appear there were some detailing considerations given to anchoring the diaphragms to the walls. Tie rods and anchor bolts are typically used to provide some positive attachment between the wood framed floors/roofs and the masonry walls. Spacing of the anchorage varies, but in some cases is up to 6 feet on-center (see Figure 33).

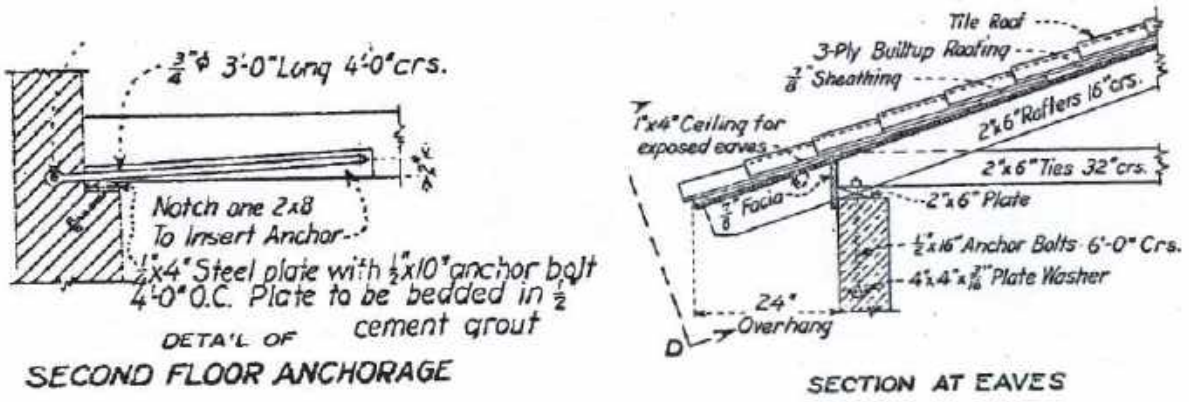


Figure 33 – Detail of Second Floor (left) and Roof (right) Anchorage to Masonry Walls

ANALYSIS

The analysis herein uses the 2018 International Building Code (IBC) and International Existing Building Code (IEBC). Design loads and analysis procedures are based on these model building codes and referenced standards. For the preliminary lateral assessment, the Tier 1 Checklists from the ASCE 41-17 (Seismic Evaluation and Retrofit of Existing Buildings) were used to highlight potential deficiencies.

Assumed Material Properties

Assumed material properties used in analysis will be based on values appropriate to the period of construction. The ASCE 41 has assumed minimum property values that can be used for historic materials in the absence of documentation or testing.

Masonry

- Compressive Strength (f'_m) = 800 psi → allowable ~200 psi
- Allowable flexural tensile strength = 5 psi
- Allowable shear strength = 30 psi

Timber

- Assumed Douglas Fir Larch #1
- Reference Design Bending (F_b) = 1000 psi
- Reference Design Shear Parallel to Grain (F_v) = 180 psi

Steel

- Structural Steel Yield Strength (F_y) = 33 ksi

Concrete

- Concrete Compressive Strength (f'_c) = 2 ksi
- Reinforcement Yield Strength (f_y) = 33 ksi

Design Loads

The loads presented below assume the structure is Risk Category II (ASCE 7-16, Table 1.5-1), but that decision will need to be re-evaluated once a final occupancy is determined.

Dead Loads

Typical Flat Roof = 15 psf → total area ~ 2700 sf so $W_{flat\ roof}$ = 41 k

- Rafters = 4 psf
- Sheathing = 4 psf
- Roofing = 1 psf
- Ceiling = 4 psf
- Misc. = 2 psf

Typical Sloped Roof = 25 psf → total area ~ 1400 sf so $W_{sloped\ roof}$ = 35 k

- Wood Framing = 4 psf
- Sheathing = 3 psf
- Roofing & Clay Tiles = 16 psf
- Misc. = 2 psf

Typical Wood Floor = 18 psf → total area ~ 1300 sf so $W_{wood\ floor}$ = 24 k

- Wood Framing = 6 psf
- Sheathing = 3 psf
- Ceiling Finishes = 4 psf
- Misc. & Piping = 5 psf

Typical Framed Concrete Floor = 110 psf → total area ~ 1700 sf so $W_{conc\ floor}$ = 187 k

- 8 inch slab = 100 psf
- Misc, Partitions & Piping = 10 psf

Exterior Walls = 115 psf (assumes 12" masonry) → total area ~ 7000 sf so W_{walls} = 805 k

Live Loads

The following values are specified by the applicable codes and standards. These loadings will need to be refined once an occupancy has been determined.

Occupancy or Use	Live Load	
	Uniform *(psf)*	Concentrated *(lbs)*
Assembly Areas	100	-
Catwalks	40	-

Offices	50	2,000
Roofs	20	-
Stairs and Exit Ways	100	-
Light Storage	125	-
Heavy Storage	250	-
Stores	100	1,000

Snow Loads

Loading not applicable for Boulder City, Nevada.

Wind Loads

- Basic Wind Speed *(by jurisdiction)* — V = 99 mph
- Wind Directionality Factor (ASCE 7-16, Table 26.6-1) — $K_d = 0.85$
- Exposure Category (ASCE 7-16, §26.7) — B
- Topographic Factor (ASCE 7-16, §26.8) — $K_{zt} = 1.0$
- Ground Elevation Factor *(ASCE 7-16, Table 26.9-1)* — $K_e = 0.93$
- Velocity Pressure Coefficient *(ASCE 7-16, Table 26.10-1)* — $K_e = 0.90$ (at 20')
- Gust Effect Factor (ASCE 7-16, §26.11) — G = 0.85
- Enclosure Classification (ASCE 7-16, §26.12) — Enclosed
- Internal Pressure Coefficient (ASCE 7-16, Table 26.13-1) — $GC_{pi} = \pm 0.18$
- Velocity Pressure *(ASCE 7-16, Eqn. 26.10-1)* — $q_z = 18$ psf
- Design Wind Pressure *(MWFRS)* — p = 16 psf
- Wind Area — 2100 sf (N-S) & 1200 sf (E-W)
- Wind Base Shear — $V_{NS} = 34$ k & $V_{EW} = 20$ k

Seismic Loads

The seismic force-resisting system has been assumed as unreinforced masonry shear walls. Seismic parameters below have been provided using both the ASCE 7 and ASCE 41.

ASCE 7-16 Seismic Parameters

- Soil Site Class *(Assumed)* — D
- Short Period Design Spectral Acceleration — $S_{DS} = 0.468$ g
- One Second Period Design Spectral Acceleration — $S_{D1} = 0.249$ g
- Seismic Design Category (ASCE 7-16, §11.6) — D
- Seismic Importance Factor (ASCE 7-16, Table 1.5-2) — $I_e = 1.0$
- Response Modification Coeff. (ASCE 7-16, Table 12.2-1) — R = 1.5
- Seismic Response Coefficient (ASCE 7-16, Eqn. 12.8-2) — $C_s = 0.312$ g
- Effective Seismic Weight — W = 725 kips
- Seismic Base Shear — V = 363 kips (controls lateral)

ASCE 41-17 Seismic Parameters

The building is at a site with a high level of seismicity as defined by the ASCE 41. The Basic Performance Objective for Existing Buildings (BPOE) is as outlined below:

- To achieve a life safety structural and nonstructural performance for BSE-1E seismic hazard, and
- To achieve a collapse prevention structural performance and hazards reduced nonstructural performance for a BSE-2E seismic hazard

BSE-1E Seismic Hazard *(earthquake with 20% probability of exceedance in 50 years – 225 year return period)*

- Short Period Design Spectral Acceleration $S_{XS} = 0.184$ g
- One Second Period Design Spectral Acceleration $S_{X1} = 0.123$ g

BSE-2E Seismic Hazard *(earthquake with 5% probability of exceedance in 50 years – 975 year return period)*

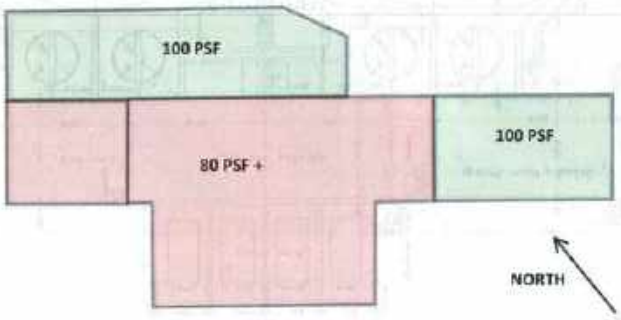
- Short Period Design Spectral Acceleration $S_{XS} = 0.497$ g
- One Second Period Design Spectral Acceleration $S_{X1} = 0.266$ g

Analysis Results

Live Load Capacities

Based on the limited information found in existing drawings, the first-floor member capacity may be between 80 and 100 pounds per square foot (see Figure 34). Additional probes are required to confirm the design assumptions used in the strength calculations as this capacity is based on select members where information could be gathered in the field or from provided documentation – many structural elements withing the floor assembly have not yet been evaluated due to lack of information.

The spacing of the second-floor wood joists is currently unknown. Preliminary assumptions are that the joist spacing may be between 12 to 24 inches. At a 12-inch spacing the member exhibited a deflection deficiency at 40 psf. Additional probes to identify wood species and joist spacing will help confirm the capacity.



a)

b)

c)

Figure 34 – Schematic plan showing preliminary capacities of a) ground floor, b) second floor, and c) tank floor level

Lateral Load Assessment

An ASCE 41-17 Tier 1 quick check utilizing a seismic hazard with a return period of 5% in 50 years was used to identify shear stress deficiencies in the unreinforced masonry shear walls. Unreinforced masonry shear walls should have a calculated shear stress of less than 30 psi for brick masonry. In most locations the walls have adequate shear stress capacity. The 2nd floor wall supporting the tower is close to the limit and requires localized reinforcement (see Figure 35).

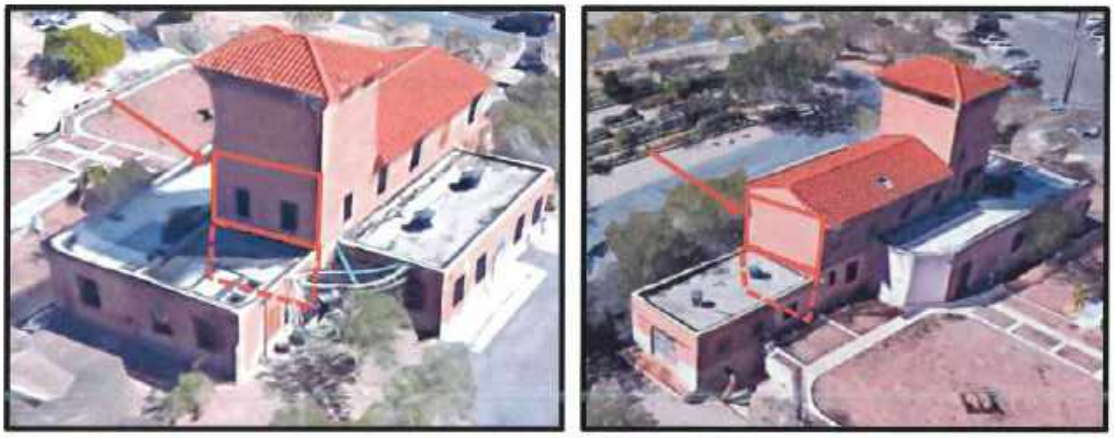


Figure 35 –Vulnerable wall piers in the Northwest Elevation (left) and Southwest Elevation (right)

Deficient wall piers can be strengthened by the addition of a concrete overlay, or by the addition of a fiber reinforced composite overlay (see Figure 36).

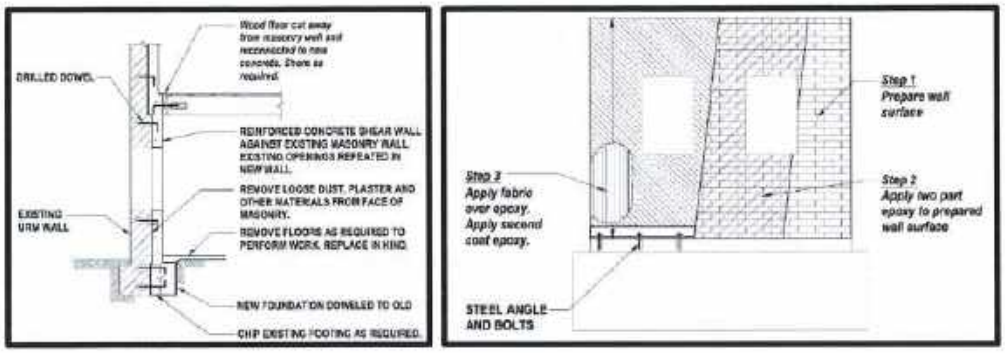


Figure 36 – Conceptual retrofit detail with a concrete overlay (left) and a fiber reinforced composite overlay (right)

The current out of plane detailing is not adequate for an improved seismic performance. Improved seismic detailing of the out of plane masonry attachments can supplement the capacity of the existing anchors. New tension anchors can be added to the floor level as shown conceptually in Figure 37.

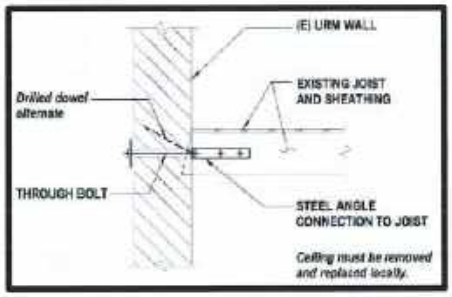
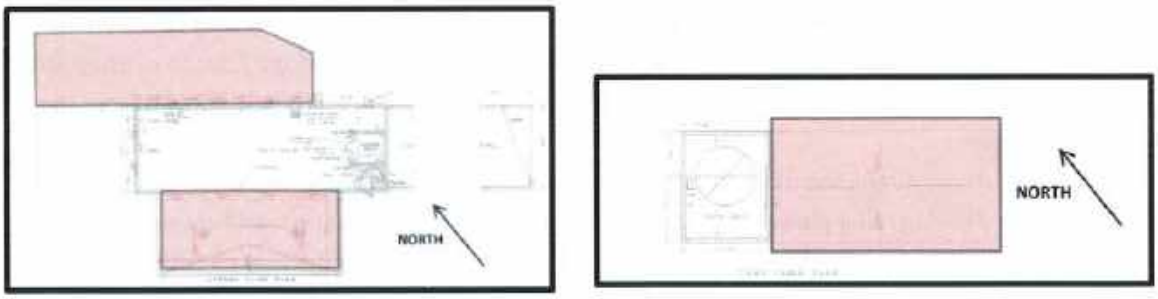


Figure 37 – Conceptual retrofit detail to supplement out of plane anchorage capacity

Straight-sheathed diaphragms have less lateral capacity as compared with plywood or even diagonally sheathed diaphragms. The ASCE 41-17 Tier 1 checklist identifies any diaphragm with a length-to-width ratio greater than 2-to-1 as a potential vulnerability. Further evaluation is necessary, but it appears a plywood overlay may be required at some of the wood framed floors and roofs.



a) b)

Figure 38 - Schematic plan showing diaphragms with a vulnerable aspect ratio a) storage floor, and b) tank floor levels

STRUCTURAL WORK RECOMMENDATIONS

The recommendations related to structural observations and analysis is still being developed. Below is a preliminary bullet point list of structural work that is anticipated:

- Masonry Repairs – A deep repointing should be assumed over much of the exterior brick masonry walls. For cost estimating purposes it should be assumed that about 35% of the surface area of exterior walls will require repointing.
- Concrete Repairs – Concrete repairs will be required for first floor slabs and concrete foundation walls. Attention should be focused on the condition of the concrete walls around the Clarifier Tanks and the concrete elements at the Pipe Gallery. Crack repairs are likely to take the form of an epoxy injection. Spall repairs will involve removing loose concrete, cleaning/coating exposed reinforcement, and providing a patching mortar to restore the section.
    - *Assume 30 sf of higher priority concrete spall repairs (2" thickness) using a patching mortar and 30 linear feet of crack repairs using epoxy injection repair*
- Seismic Repairs – Based on the preliminary assessment additional anchorage of floor and roof diaphragms to masonry walls will be required. In addition, it is recommended that a plywood overlay be installed over existing wood sheathed floors/roofs to strengthen the diaphragms for seismic. Finally, some localized reinforcement should be anticipated at one or two wall lines to address shear issues. The reinforcement could take several forms – FRP added to the inside face, shotcrete, or at the tower potentially adding in new bracing to the existing steel frame that is already integral with the wall.
    - *Assume 3200 sf of ½" plywood overlay at certain roof/floor diaphragms at original building. Note that this would be added with the existing straight sheathing to avoid impact on historic fabric/appearance. As discussed, perhaps some (or all) this work gets shifted to a later phase if the city is resistant to replacing the new roofs.*
    - *Assume L3x3 steel ledger angle around perimeter with anchors at 2' on-center into masonry to strengthen connection. This would be applied over a total of about 400 linear feet. Actual detail likely to vary but this should get us a good estimate of costs.*
    - New shotcrete wall at (2) wall lines identified as vulnerable. Wall should be assumed as 4" thick and with a combined total surface area of about 1000 sf.
- Floor Strengthening – This will need to be coordinated with future occupancies, but some amount of floor strengthening, and infill should be assumed. The wood framed floors might require some sistering in order to increase their capacity and meet live loading requirements.
    - *Assume 1000 sf of new 2x wood framing sisters added at storage floor to existing joists*
- Chimney Removal – The remnants of the original chimney will need to be removed from the Pipe Gallery.
    - *Assume removal of about 10 sf of loose masonry in basement*
- Piping – Existing hung piping and equipment may require additional lateral bracing.
- Further Investigations – The ceiling should be removed from the Northwest addition to better understand the quantity of wood repairs/replacement that is required. In addition, a probe is recommended at the second floor to verify the wood framing as it is currently hidden by a ceiling.

3 MEP Report

Prepared by TJK Consulting Engineers

February 23, 2022

City of Boulder City Historic Water Filtration Plant

MECHANICAL, PLUMBING, ELECTRICAL

FINAL ASSESSMENT REPORT

PREPARED FOR:

LGA Architecture

PREPARED BY:

TJK CONSULTING ENGINEERS, INC.

MECHANICAL

Existing Conditions:

The building does not have any existing HVAC equipment except for one window mounted AC unit. The unit appears to not be in functioning condition and should be removed.

Adding Equipment:

If there is a desire to add heating and cooling to the building as part of the refurbishment, HVAC equipment will need to be added. The type of system will depend on the proposed occupancy.

It is anticipated that the existing building structure will not be able to support significantly heavy equipment. As such, if any equipment is added, it is recommended that the equipment be mounted on the ground outside with smaller fans inside. This could be split system units or a VRF system. The fan coils may be ductless or ducted if space allows.

Occupied spaces will require ventilation per code. Outside air may be provided either through an HVAC system or a dedicated outside air system.

Some rooms such as restrooms and janitor rooms will require exhaust per code. Small restroom ceiling fans may be provided in these spaces.

END OF MECHANICAL REPORT

PLUMBING

Existing Conditions:

The existing waste system looks to be abandoned. The entire system within the building footprint shall be demolished and removed. The service is located South side of the building.

The existing below grade piping outside the building will need to be field evaluated for damage. Any parts of the piping that can be repaired with a Cured In Place Pipe repair sleeve shall be repaired. Any portions of the pipe that have damage beyond the repair that a CIPP system can sleeve, then these portions shall be excavated and replaced with new pipe.

It is anticipated that any portions of the interior piping, in particular, some portions of the cast iron hub and spigot piping, may be retained in a nonfunctional manner to illustrate the historical significance of the piping that was used in the past during the time frame that the building was originally built.

The existing water system looks to be abandoned. The entire system within the building footprint shall be demolished and removed. The service is located on North side of the building. There are two existing abandoned water services. The original service looks to be a hot tapped pipe intercepting the original large pipe water main entering the building for water processing. The newer service is an existing meter in a yard box with an inlet into the building, also located on the North side of the building.

The existing large pipe hot tap shall be demolished and removed completely. The existing meter in the yard box shall be evaluated for size and condition. If the size is inadequate for the building's future needs, or the meter is non repairable, then this meter shall be demolished and removed. The yard hydrant located next to the meter box shall be demolished and removed.

The plumbing fixtures inside the building, including but not limited to, the flush valve toilet, the lavatory, and the emergency shower shall be demolished and removed.

The existing gas service to the building looks to be abandoned. The meter has been removed previously. There is a gas pressure regulator at this location. The existing gas pressure regulator shall be removed.

Adding Fixtures and Equipment:

If there is a desire to add new plumbing fixtures or equipment in any future refurbishment then the systems (water, waste, and gas) will need to be evaluated and designed for the new needs and requirements of the building. If required, plumbing equipment such as water heaters shall also be planned for any future refurbishment.

All new fixtures and equipment will need to meet the latest codes and regulations. All future piping systems shall meet all new codes and regulations.

Photo 1 - Existing Water Entrance

Photo 2 - Existing Fixture

Photo 3 - Existing Water Hot Tap

Photo 4 – Existing Water Meter & Yard Hydrant

Photo 5 - Existing Gas Regulator

Photo 6 - Existing Hub and Spigot Waste

END OF PLUMBING REPORT

ELECTRICAL

Service

The original electrical service entrance was located on the Northeast side of the property stubbed to a weather head approximately 20' high on the water tank tower. The service has been disconnected and removed to the weather head with cables inside the building being cut at the nearest accessible point in the building. Refer to Photo 1 & 2 for disconnected service locations.

Photo 1 - Interior Service Entrance Conduit and Cut Conductors

Photo 2 - Exterior Service Entrance Weather Head, looking South

A new electrical service will be required, size to be determined based on new building use. The existing service location can be reused however new conduit, conductors, weather proofing, and weather heads will need to be installed.

Existing building grounding electrodes were not able to be found during our site visit. In Clark County, our soil is very corrosive to copper grounding electrodes and the installed electrodes are likely gone. We recommend that the new service entrance receive a supplementary grounding electrode system complying with 250.52 to connect to cold water piping, building steel and a new concrete encased electrode.

Distribution Equipment

Existing distribution equipment is Square-D manufactured, installed with the original building and modified throughout the buildings history to incorporate various equipment updates. The existing distribution equipment is well beyond its usable life expectancy and

has degraded past repair. Additionally, the distribution topology used was suitable for a water treatment facility with many motors, pumps, and controllers. The new space will likely require different power consumption and layout characteristics and should be replaced accordingly. Furthermore, to comply with current building codes, there will need to be revisions to the accessibility of the branch circuit fuses, circuit breakers, and controls. Depending on the space occupancy, the electrical equipment may need to be accessible "only to qualified personnel" and will need various safety labels installed for arc-flash and approach boundary requirements.

New internal breakers, fuses, switches, contactors, and conductors will need to be installed to recommission any equipment. There is a possibility, with Square-D's approval, that the existing enclosures can be restored to keep the same aesthetic as the original space. Otherwise, new enclosures should be installed and painted/labeled to match the original finish.

Existing conduit and raceway throughout the building is all surface mounted and recommended to be disconnected and replaced. The conduits installed are not in good condition and pulling new wires through them could damage the conductor's insulation. Any replaced conduit is recommenced to remain surface mounted and be painted to match the new finishes. Conduit and raceway stubbed out from concrete above or below should be sealed and capped level with the concrete. Outlet boxes for switches, receptacles, and miscellaneous devices appear to be made of stainless steel or cast iron. The stainless-steel boxes are in relatively good condition and can be cleaned and reused.

Lighting

Existing lighting is a combination of fluorescent T12 tubing, and incandescent light bulbs in pendant fixtures. Exterior façade light fixtures are similar in appearance to the interior pendant mounted fixtures, except wall mounted. Refer to Photo 3 for typical fixtures. The fixture housing can remain or be replaced with a new fixture matching the original form-factor. No additional exterior lighting was found on the property for the adjacent community gardens or the parking area. Additional fixtures are recommended to comply with IES recommended light levels. New LED light sources will need to be installed throughout to comply with IEC recommended lighting levels, egress lighting, and energy consumption compliance.

Photo 3 - Typical Existing Light Fixtures

Egress lighting and exit signage will need to be installed throughout. Recommend providing battery back-up on board new fixtures and exit signs in case of normal power loss.

Existing lighting controls are single pole, 20A rated switches. New lighting controls will need to be incorporated in the renovated space to comply with current IECC regulations. Depending on space type, there will need to be occupancy sensing, timers, and/or light reductions controls installed as a part of this project. New manual lighting controls are available to match the form factor of the existing switches.

Elevator

Existing elevator will need to be modified to comply with current building code. Existing elevator equipment, shaft lighting, shaft receptacles and sump pump provisions will need to be replaced.

Telephone/Data Systems

Existing telephone and data systems service entrance is at grade on the Northwest corner of the property, refer to Photo 4. There are exterior rated enclosures and a metering pedestal however it appears that the service is disconnected at this time. Inside of the building the existing telephone backboard board and all equipment will need to be replaced to be compatible with modern tele-data infrastructure. This is not recommended to be in view of the public as it will not be able to match the historic aesthetic of the space.

Photo 4 - Telephone Service Entrance

Fire Alarm System

Fire alarm devices were not found during our investigation. New systems will need to be installed to meet current building codes with pull stations, strobes, and horns. Conduit, raceway and boxes can be surface mounted.

END OF ELECTRICAL REPORT

4 Life Safety Report

Prepared by TERPconsulting

TERPconsulting
fire + life safety

Boulder City Water Filtration
300 Railroad Avenue
Fire Protection Assessment Report
TERPconsulting Project #21.0078

INTRODUCTION

A survey was performed on the Boulder City Water Filtration facility on 9 November 2021. All areas were included in the survey; our role was to assess building fire protection + life safety systems and consider the building for reuse. The building has not been in use since circa 1982. It is desired to renovate the building for reuse.

The building is approximately 4,300 ft^2 and includes multiple elevations as it previously accommodated water filtration tanks & equipment; building height is approximately 40'. The building has a basement level (pipe gallery), main level at or slightly above grade plane, a second level, and third level/equipment platform that is accessible via ladder only and accommodates a water tank.

BUILDING CONSTRUCTION

The building includes a mixture of materials including but not limited to: concrete and wood floors, steel columns and beams, brick, and wood & built-up roofing. The structure is not provided with fireproofing. Based upon building materials, the construction type in accordance with the 2018 International Building Code (IBC) is either Type IIIB or VB.

Renovation Impacts:

- The required building construction type and maximum allowable area is dependent upon the building's occupancies. As the building is relatively small (4,300 ft^2), classification as a Type VB structure would not prohibit most uses, including assembly (Group A). However, the maximum allowable number of stories above grade plane for an unsprinklered Group A occupancy is one (1).
- Due to the low building area, separated building use provisions would not be necessary (i.e., fire-resistive occupancy separations).
- Overall, building construction type does not prohibit renovation to new occupancies and the building may remain nonrated.

FIRE PROTECTION AND STANDPIPE SYSTEMS

SPRINKLERS

The building is unsprinklered. Present code requires an automatic sprinkler system for any building greater than 5,000 ft², or dependent upon the occupancy type and associated calculated occupant load. As a renovation to an existing building, the 2018 International Existing Building Code should be utilized as adopted by Boulder City, and the retrofit of an automatic sprinkler system would be dependent upon the level of remodel. The 2018 International Building Code (new construction) may be utilized for reference or alternate method purposes.

Renovation Impacts:

- Retrofit of an automatic sprinkler system is dependent on the remodel, including the following factors:
    - Level of remodel (i.e., project area and extent of renovations)
    - Occupancy classification (e.g. Two-story Group A occupancies require sprinklers)
    - Occupant load
    - Coordination with local authorities, who may be open to alternative methods of protection.
- Automatic sprinkler system will require new water connection with backflow prevention system. Riser may be located within building interior; wet-pipe system would be required if the building is conditioned.

FIRE PUMP

As the building is unsprinklered, a fire pump is not provided. A fire pump would only be required if city water pressure is inadequate to support an automatic sprinkler system.

STANDPIPE SYSTEMS

A standpipe system is not provided. Standpipes are required in new structures where the highest occupiable floor level is greater than 30' above the lowest level of fire department access. All portions of the building are below 30' from the lowest level of fire department access except for the high-level tank area. Presuming this area will not be occupied, a standpipe system should not be code required.

ALTERNATIVE FIRE EXTINGUISHING SYSTEMS

The building has no alternative fire extinguishing systems, and there are no code requirements for such system with renovations; however, an alternative system may be desired in lieu of an automatic sprinkler system.

NFPA 914, *Code for the Protection of Historic Structures*, may be suggested to the Authority Having Jurisdiction for use with the renovation. NFPA 914 allows a performance-based approach to protecting historic structures. If an automatic sprinkler system is undesired due to potential water damage should sprinklers operate, the use of an alternative fire extinguishing system may be suggested.

PORTABLE FIRE EXTINGUISHERS

As an unoccupied building, we did not identify portable fire extinguishers. A building remodel will require the inclusion of ABC-type fire extinguishers upon occupancy.

FIRE HYDRANTS

Fire hydrants are provided within the building vicinity and appear to provide adequate building coverage.

FIRE ALARM SYSTEM

The building does not have a fire alarm & detection system. Present code requires a fire alarm system dependent upon several factors: occupancy type, calculated occupant load, and number of stories. As a renovation to an existing building, the International Existing Building Code may be utilized, and the retrofit of a fire alarm system would be dependent upon the level of remodel.

***Renovation Impacts*:**

- Retrofit of a fire alarm system is dependent on remodel, including the following factors:
    - Level of remodel (i.e., project area and extent of renovations)
    - Occupancy classification & load (e.g. Group A occupancies with 100 occupants above level of exit discharge, or 300 total occupants requires fire alarm system).

LIFE SAFETY

Egress was generally found to be noncompliant for a traditional building under current code. The building was designed as a water filtration facility and as such is designed for limited use by trained personnel, as well as multiple equipment-only areas not designed for regular access. The facility is served by a single spiral stairway connecting Basement through Second Level, and the Third Level tank floor is served by a

ladder; neither spiral stairways nor ladders are acceptable means of egress components for public occupied spaces. The IBC only allows ladders as a means of egress for equipment platforms that are dedicated solely to housing equipment.

A renovation of any kind that is intended for public use will require substantial egress updates. Most importantly, any story above grade will require two (2) means of egress that are separated by at least one-half the maximum diagonal of the story.

The following noncompliant egress conditions were identified:

- Single spiral stairway serves Basement through Second Level
- Third Level accessible by ladder only
- Multiple elevation changes without accessible ingress/egress
- Grated floors
- Stairs without solid risers
- No exit signage
- No emergency lighting
- Elevator not functional.

Figure 1: *Spiral Stairway*

Figure 2: *Ladder access to Level 3 tank*

Figure 3: *Open grate floor and stairs*

CONCLUSION

The facility was designed for a specific function as a water utility site, and therefore is not built to current standards for a normally occupied building. Significant fire protection + life safety system upgrades are required to meet present code, should the building be renovated for public use. Most importantly, egress must be upgraded. The inclusion of fire suppression will be dependent upon the new occupancy and direct coordination with Boulder City officials. It is our opinion that NFPA 914, *Code for the Protection of Historic Structures*, should be utilized as a reference guide for any retrofit of fire suppression or alarm systems.

If you have any specific questions, please do not hesitate to contact our office.

Regards,

TERPconsulting

Prepared by:

Bryan L. Douglass, PE
principal fire protection engineer

2/23/22

5 Hazardous Materials Report

Prepared by Ninyo & Moore

Pre-Demolition Asbestos and Lead Based Paint Survey

Boulder City Historic Water Filtration Plant

300 Railroad Avenue

Boulder City, Nevada

LGA

241 West Charleston Boulevard, Suite 107 | Las Vegas, Nevada 89102

February 23, 2022 | Project No. 304852001

Geotechnical | Environmental | Construction Inspection & Testing | Forensic Engineering & Expert Witness

Geophysics | Engineering Geology | Laboratory Testing | Industrial Hygiene | Occupational Safety | Air Quality | GIS

Ninyo & Moore

Geotechnical & Environmental Sciences Consultants

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

Pre-Demolition Asbestos and Lead Based Paint Survey
Boulder City Water Filtration Plant
300 Railroad Avenue
Boulder City, Nevada

Mr. Kirk Lance
Architect
LGA
241 West Charleston Boulevard, Suite 107 | Las Vegas, Nevada 89102

February 23, 2022 | Project No. 304852001

Amir Bajramovic, EI
Staff Engineer
Certified AHERA Building Inspector

Courtney J. Brooks, PG, CEM
Principal Hydrogeologist

AB/CJB/cas

CONTENTS

1 INTRODUCTION

Ninyo & Moore has performed an asbestos and lead based paint survey in support of upcoming renovation activities as part of the Boulder City Water Filtration building, in Boulder City, Nevada (Site; Figure 1 and Figure 2). This report has been prepared in accordance with generally accepted environmental science and engineering practices. This report is based on conditions at the site at the time of the sampling activities and provides documentation of our findings and recommendations.

2 PURPOSE AND SCOPE OF SERVICES

The objective of the survey is to provide renovation recommendations based on the materials encountered at the time of this survey and regarding the potential presence of asbestos containing materials (ACMs) and lead containing surfaces (LCS) that are present within the Site structures, which may require removal prior to the planned renovation activities. For the purposes of this assessment, LCS refers to lead-based paint (LBP), as defined by the United States Department of Housing and Urban Development (HUD).

The scope of services performed by Ninyo & Moore for the study is identified below.

- Performed a visual reconnaissance of the property to evaluate for the possible presence of ACMs and LCSs.
- Collected bulk samples of suspect asbestos containing building materials for submittal to an independent laboratory for analysis of asbestos content via United States Environmental Protection Agency (EPA) Test Method 600.
- Collected bulk samples of suspect LBP for submittal to an independent laboratory for analysis of lead content via EPA SW-846 Test Method 7000B: Flame Atomic Absorption Spectrophotometry.
- Prepared this ACM and LCS report, which presents our data and summarizes field activities. This report includes a photograph log showing the site and vicinity, general structure descriptions, laboratory testing information, field collected data, laboratory test results, and conclusions and recommendations.

3 SITE DESCRIPTIONS

The site consists of a former water treatment filtration plant at 300 Railroad Avenue in Boulder City, Nevada. Construction of the plant includes concrete floor and walls, as well as brick walls. Different colored paints coated the interior walls and floors of the building, as well as equipment. The tanks and piping found in the plant were for use in the plant's prior water filtration activities. The plant was built in 1932 to provide potable water for Boulder City. Padlocked access is located on the western side of the building.

4 FIELD LIMITATIONS

Underground utilities, such as suspect cementitious water lines or suspect insulated/coated gas or electrical lines were not assessed during the survey activities. If additional suspect materials and/or surfaces are encountered during the site building demolition/renovations that have not been assessed, they should be assumed to be asbestos-containing and/or lead-containing and handled accordingly, or they should be sampled and analyzed to assess whether they are asbestos-containing and/or lead-containing.

5 SAMPLE COLLECTION AND ANALYSES

On November 9, 2021, the site enclosure and equipment were assessed and analyzed by Mr. Amir Bajramovic, of Ninyo & Moore, for the presence of ACMs and LCS. The ACM and LCS surveys followed United States Environmental Protection Agency (EPA) guidelines, or industry standards, within the limitations of the scope of this assessment. Survey activities are discussed below. Consultant certificates are presented in Appendix A.

5.1 Asbestos Survey

Representative samples of suspect ACMs were collected after identification of homogeneous sampling areas (areas in which the materials are consistent in color, texture, construction or application date, and general appearance). Several homogenous areas were observed for material type, location, condition, and friability. Representative samples were collected from the accessible homogenous area without causing significant or structural damage to building materials. Samples were collected using EPA-recommended sampling procedures.

Building materials suspected to contain asbestos included the concrete floor of the structure, concrete wall, brick wall, office drywall, ceiling insulation, and tile and mastic. A total of 14 bulk samples of the were collected and submitted for analysis.

The suspect asbestos samples were analyzed by EMSL Laboratory, which is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP), for the presence and quantification of asbestos fibers using polarized light microscopy with dispersion staining (PLM/ds), in general accordance with EPA Method 600/R-93/116. The lower limit of reliable detection for asbestos using the PLM method is approximately 1 percent by volume. Currently, the EPA and the State of Nevada stipulate that materials containing more than 1 percent asbestos constitute an ACM. Building materials that were sampled and analyzed for the presence of asbestos are presented in the attached Table 1. Materials sampled for asbestos fibers were determined to be "ND" (for "None Detected") within the asbestos laboratory report except for the

office tile and mastic, which had a concentration of 2% chrysotile. A copy of the laboratory analytical report and chain-of-custody record for suspect ACMs is presented in Appendix B.

5.2 Lead-Containing Materials Survey

In-situ analysis of total lead content was conducted by sampling suspect lead-containing paint and submitted to a lab for analysis. The suspect lead-containing paint were analyzed by ESML Laboratory, which is accredited by NVLAP, for the presence and quantification of lead using flame atomic absorption, in general accordance with EPA Method SW 846-7000B. The EPA stipulates that paint containing an amount equal to or in excess of 1 milligram per square centimeter ($\geq$1.0 mg/cm^2), or more than half of one percent (0.5%) by weight (or 5,000 milligrams per kilogram [mg/kg]), constitute a lead-based paint (LBP). Coatings with any detectable amount of reported lead would be considered lead-containing surfaces (LCS).

The surfaces of 7 accessible components were sampled. The survey results are summarized in Table 2.

6 SURVEY RESULTS

The following sections describe the survey results.

6.1 Asbestos Results Summary

Based on field observations and the analytical results of bulk samples collected during the survey, several potential homogenous areas of suspect ACMs were detected within the compound.

The laboratory analysis of the 14 bulk samples did not detect asbestos except for the sample containing the office tile and mastic, which consisted of 2% chrysotile. A copy of the laboratory analytical report and chain-of-custody records are presented in Appendix B.

6.2 Lead-Containing Surfaces Summary

A total of 7 surfaces were sampled and tested for lead content . Three of the samples analyzed had detected lead concentrations at a reported concentration of less than 0.5 percent by weight (or 5,000 mg/kg) and are considered lead-containing paints (LCP). The rest of the samples had lead concentrations greater than 0.5 percent by weight and are considered lead-based paints (LBP). Occupational Health and Safety Administration (OSHA) regulations apply whenever materials with any detectable amounts of lead are disturbed. A copy of the laboratory analytical report and chain-of-custody records are presented in Appendix B.

7 RECOMMENDATIONS

7.1 Asbestos

The office tile and mastic were found to have asbestos concentrations of 2% chrysotile. If this material is to be disturbed, licensed asbestos contractors are required for appropriate handling and disposal.

- If any suspect ACMs not analyzed and described within this survey are observed to be present during demolition activities, the material should be sampled and analyzed for asbestos content in order to determine the appropriate handling and disposal requirements.
- Alternatively, any building materials not analyzed for this survey and encountered during demolition activities may be presumed to contain asbestos. These materials must then be treated, handled, and disposed of accordingly.

7.2 Lead

Since LCS and LBP was detected on all paint surface analyzed in the laboratory, the following recommendations and precautions are provided:

- The lead-containing surface should not be disturbed. All planned disturbances and removal activities should be performed by a licensed abatement contractor with certified lead personnel.
- Based on the results of the soluble and leachable analyses, the waste material may require disposal as a RCRA-Hazardous waste or non-RCRA Hazardous waste.
- Lead abatement monitoring consulting services should be performed by a third party environmental consultant, to include oversight of abatement contractor activities to be performed in accordance with the abatement specifications, daily air monitoring, clearances, verification of complete removal of hazardous materials, and preparation of a closeout report summarizing the abatement activities.
- There is a possibility that additional suspect LCSs may be discovered during demolition activities. Therefore, Ninyo & Moore recommends that, should additional suspect materials not sampled or assessed in this report be uncovered during demolition/renovation activities, (a) samples of suspect materials should be collected for laboratory analysis and activities that may impact the materials should cease until laboratory analytical results are reviewed or (b) the materials should be assumed to be hazardous and handled as such.

8 LIMITATIONS

Ninyo & Moore's opinions and recommendations regarding environmental conditions, as presented in this report, are based on limited sampling and chemical analysis. Further assessment of potential adverse environmental impacts may be accomplished by a more comprehensive assessment. The samples collected and used for testing, and the observations made, are believed to be representative of the area(s) evaluated. However, if additional suspect ACMs or LCSs are encountered during demolition activities, these materials should be sampled

by a qualified personnel, and analyzed for content prior to further disturbance. These numbers should be confirmed prior to removal or repair activities.

The environmental services described in this report have been conducted in general accordance with current regulatory guidelines and the standard-of-care exercised by environmental consultants performing similar work in the project area. No warranty, expressed or implied, is made regarding the professional opinions presented in this report. Variations in site conditions may exist and conditions not observed or described in this report may be encountered during subsequent activities.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information, or has questions regarding content, interpretations presented, or completeness of this document.

The environmental interpretations and opinions contained in this report are based on the results of laboratory tests and field analyses intended to detect the presence and concentration of specific chemical or physical constituents in samples collected from the subject site. The testing and analyses for ACM has been conducted by an independent laboratory which is certified by the State of Nevada to conduct such tests. The testing and analyses for LCS has been conducted by a representative of Ninyo & Moore, operating X-Ray Fluorescence equipment capable of determining the content of lead within the required parameters for an in-situ screened sample. Ninyo & Moore has no involvement in, or control over, such testing and analysis. Ninyo & Moore, therefore, disclaims responsibility for any inaccuracy in such field screening results. Ninyo & Moore used the X-Ray Fluorescence manufacturer's recommended procedures.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. It should be understood that the conditions of a site can change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

TABLE

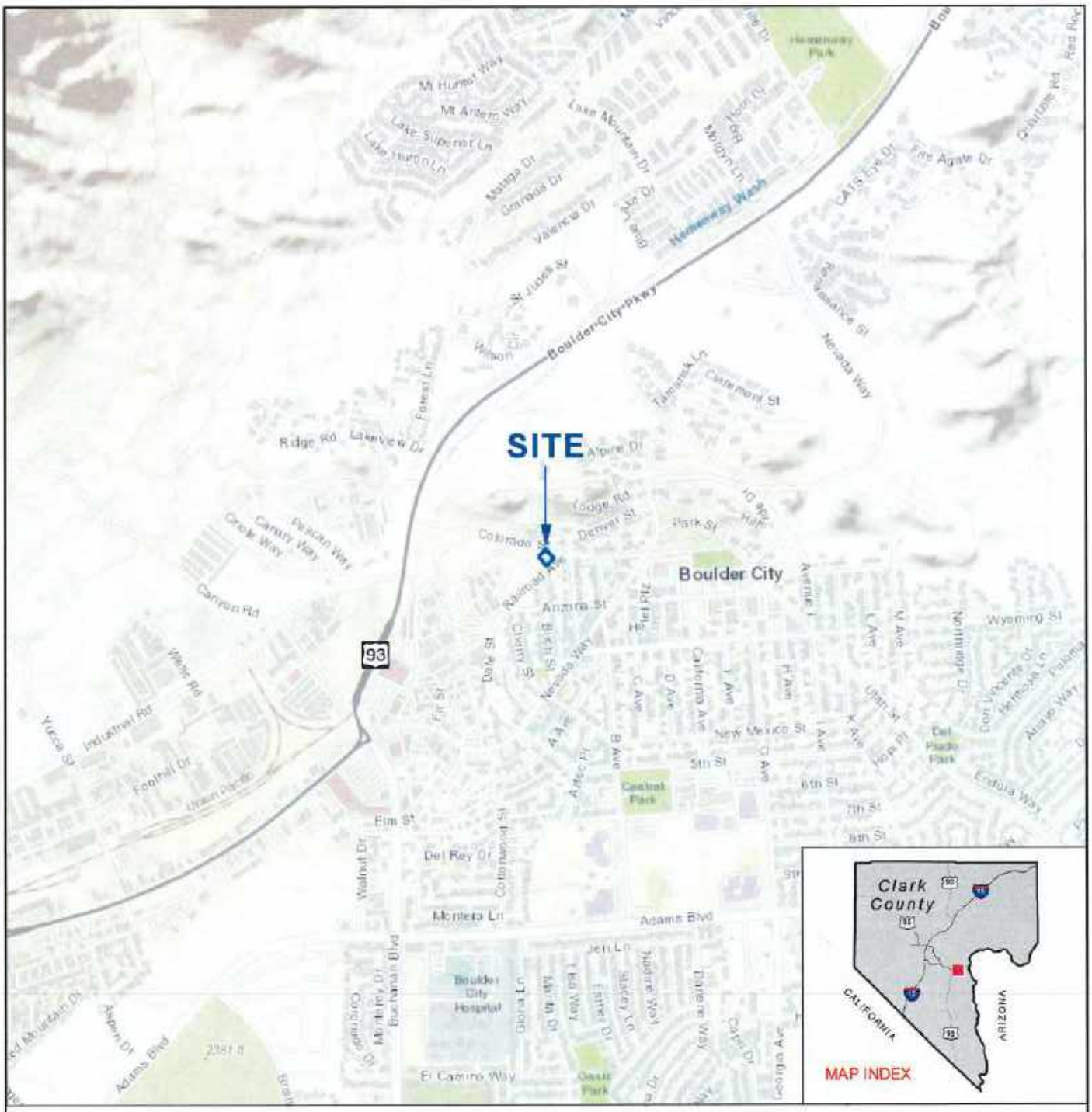
Table 1 - Lead Containing Material Analytical Results		
Sample	Description	Lead Concentration (% weight)[1,2]
P-1	Blue Paint (wall)	4.5
P-2	White paint (wall)	0.91
P-3	Red apint (wall)	0.26
P-4	Floor paint	1.1
P-5	Tank paint	0.025
P-6	Floor paint	0.68
P-7	Office paint	0.11

Notes:

1 - Coatings with any detectable amount of reported lead would be considered lead-containing surfaces (LCS)

2 - The EPA stipulates that paint containing an amount equal to or in excess of 1 milligram per square centimeter (≥1.0 mg/cm2), or more than half of one percent (0.5%) by weight (or 5,000 milligrams per kilogram [mg/kg]), constitute a lead-based paint (LBP)

FIGURES



NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE. | SOURCE: ESRI WORLD TOPO, 2021

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FIGURE 1

SITE LOCATION

BOULDER CITY WATER FILTRATION ACM/LBP SURVEY
300 RAILROAD AVENUE
BOULDER CITY, NEVADA
304852001 | 1/22

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

LEGEND

SITE BOUNDARY

N

FEET

0 120 240

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE. | SOURCE: GOOGLE EARTH, 2021

FIGURE 2

SITE AND VICINITY

BOULDER CITY WATER FILTRATION ACM/LBP SURVEY
300 RAILROAD AVENUE
BOULDER CITY, NEVADA

304852001 | 1/22

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

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APPENDIX A

Consultant Certificates

Amir Bajramovic, EIT

Staff Engineer

EDUCATION

M.S., Civil Engineering, 2017, South Dakota School of Mines & Technology

B.S., Civil Engineering, 2016, South Dakota School of Mines & Technology

REGISTRATIONS

Engineer-in-Training Certification (E.I.T.)

Amir has developed a wide professional profile during his brief career. His professional experience includes environmental site assessments, hydrogeologic testing and analysis, geotechnical field explorations, construction materials testing, soils analysis, shallow and deep foundation design, shoring and underpinning, geophysical testing and analysis, liquefaction and lateral spread assessment, and contractor coordination for development projects in the commercial, industrial, transportation, residential, and military sectors. Amir is skilled in the coordination of field activities, management of contractors, liaising with clients, and data management. He emphasizes the submission of accurate, on-time quality project deliverables; as well as identifying and addressing problematic issues and impediments in accordance with federal, state, and local statues and regulations.

EXPERIENCE

Former Fleet Fueling Facility Phase II, Las Vegas, Nevada: Staff Engineer for a Phase II Environmental Site Assessment (ESA) at an abandoned facility in Las Vegas, Nevada. The site previously operated as a commercial fleet fuel station. The 40-year old underground storage and distribution system remained in place. Duties included overseeing field duties, which included advancing multiple exploratory borings for geotechnical, environmental and hydrogeological assessment. Soil samples were field screened using a calibrated photo-ionization device. Samples were containerized and submitted under standard chain-of-custody protocol to a state certified laboratory for confirmation analysis. The expedited timeline for completing the project was in place, necessitating regular project updates to client and lender groups. All project deliverables were completed on time and to the client's satisfaction.

Flamingo Wash Improvements, Las Vegas, Nevada: Staff Engineer for a geotechnical evaluation and hydrogeologic testing and analyses needed to obtain a National Pollutant Discharge Elimination System permit through NDEP. Responsibilities included overseeing and coordinating field work, logging and sampling soils for the geotechnical study, constructing and testing of monitoring wells for the hydrogeologic study, testing and sampling of the monitoring wells to characterize groundwater quality and hydraulic conditions present at two non-contiguous drainage channels. The output of the geochemical and hydrogeologic data was entered into a three-dimensional groundwater model to estimate the number and configuration of wells and their combined flow rates that would be expected to dewater construction excavations for the project improvements.

Moapa Valley Lewis Lift Station and Force Main Rehabilitation Groundwater Quality Aquifer Testing, Las Vegas, Nevada: Project Geologist during a preliminary hydrogeologic assessment of the alluvial aquifer conditions for a proposed sewer force main, which included a river crossing. Ninyo & Moore oversaw the installation of two shallow groundwater monitoring wells collocated in a geotechnical boring. Ninyo & Moore collected groundwater samples for laboratory analysis. Ninyo & Moore also performed multiple recovery tests on the wells to obtain statistically comparable data, which was then analyzed to estimate the hydraulic conductivity of the saturated media within the project footprint. The hydraulic conductivity value was then entered into site-specific groundwater models to estimate the flow rate and number of wells expected to dewater the jack and bore pits for the river crossing, and the excavation for the lift station. The assessment results were used by the client to obtain the

Amir Bajramovic
Staff Engineer

necessary discharge permit and establish a construction schedule. Duties included overseeing and coordinating field activities; logging and sampling soils for the geotechnical study and hydrogeologic study; installing monitoring wells used to characterize groundwater conditions; performing field testing and sampling; completing data analysis; and writing portions of the geotechnical and hydrogeologic study reports.

Wagon Trail Channel, Las Vegas, Nevada: Staff Engineer for a Phase I Environmental Site Assessment (ESA) of a section of roadway through which an ephemeral wash passed. This project involved drainage from and to BLM land via developed county land. Duties included performing the Phase I field assessment, researching and reviewing historical resources, and writing the Phase I assessment and providing deliverables in a timely fashion.

Courtney J. Brooks, CEM
Hydrogeologist

EDUCATION

B.S., Geology, 1989, Illinois State University

M.S., Geohydrology, 2000, Illinois State University

REGISTRATIONS / CERTIFICATIONS

CEM 2128 (Nevada)

Courtney has over 28 years of consulting experience overseeing hydrogeologic and environmental investigations, managing hazardous materials and wastes, and providing EHS training programs. His professional experience includes groundwater resources exploration and development, surface hydrology, groundwater compliance and modeling, environmental impact assessment, environmental auditing, and soil and groundwater assessment and remediation in various regions of the United States, Europe, Asia and Sub-Saharan Africa.

EXPERIENCE

CCWRD 19003 Flamingo Water Resource Center Membrane and Ozone Chemical Facility, Clark County, Nevada: Hydrogeologist performed a hydrogeologic evaluation in support of the design and construction of a new 10,000 square foot chemical storage and feed facility at the FWRC East Campus. The project included installation, testing and sampling of multiple groundwater test wells to ascertain the groundwater quality and estimate the discharge rate and well configuration expected to achieve dewatering targets during construction. The deliverable provided the information needed to apply for a discharge permit through NDEP.

Sewer Collection System Capacity Additions, Clark County, Nevada: Hydrogeologist performing aquifer testing for the preparation of discharge permit applications for multiple dewatering operations located throughout Las Vegas Valley. Duties included collecting groundwater samples for detection of perchlorate and other potential organic and inorganic contaminants, aquifer testing, and groundwater modeling to estimate the flow rate and volume of discharge water necessary to achieve dewatering target elevations.

Project LINQ Observation Wheel Dewatering, Las Vegas, Nevada: Hydrogeologist responsible for preliminary hydrogeologic and geochemical assessment in support of obtaining a NPDES permit for the construction of the High Roller observation wheel along the Las Vegas Strip. Additional responsibilities included preliminary design of dewatering system, including identifying discharge points, and permit compliance during operation.

BLM Red Rock Fire Station and Campground – Siting, Design, and Testing of Two water supply wells: Provided hydrogeologic consulting to the United States Bureau of Land Development to site, design, and test two water supply wells located in Red Rock National Recreation Area. The siting study involved correlating fault locations with existing water supply wells, analysis of aerial imagery, mineralogical conditions due to scattered gypsum formations in the area, and factoring the costs associated with water conveyance from the points of diversion to the points of use.

Mt. Hope Molybdenum Mine, Eureka, Nevada: Hydrogeologist performing drilling supervision for water development of the Mt. Hope molybdenum mine. Courtney was tasked with restarting the groundwater exploration program, which had stalled due to staffing issues and compliance violations. The drilling program involved as many as six drilling crews working consecutive 12-hour shifts over a 10-month period. Tasks included drilling supervision; mud logging; lithologic logging; collection of assay samples; testing and analysis of groundwater; coordinating with geophysical logging

contractors; and aquifer performance tests at pilot test wells prior to drilling; and constructing the final production water wells.

Nevada Division of Environmental Protection (NDEP) Source Water Protection Studies, Clark County, Nevada: Hydrogeologist responsible for updating the technical component of the wellhead protection guidance documents, preparing analytical groundwater simulations to predict the time of travel capture zones for municipal water supply systems located throughout the state. Duties included data validation; model preparation; and support to NDEP Bureau of Water Pollution Control staff.

Third Party Review of Rapid Infiltration Basin Designs, Barrick Cortez Gold Mines, Crescent Valley, Nevada: Hydrogeologist responsible for reviewing existing reports and other hydrological studies pertaining to the location, geology, and water infiltration rates estimated for rapid infiltration basin (RIB) sites proposed for Barrick's Cortez Gold Mines. The review identified inconsistent testing procedures (improper depths, methods) that resulted in RIB designs of excessive size. Courtney recommended cost effective solutions that included a staged approach to placing the new RIBs online so as to minimize land use exceedances and down basin flooding.

Craig Ranch Park Well Rehabilitation and Replacement, Las Vegas, Nevada Hydrogeologist responsible for inspection, testing and evaluation of existing irrigation wells, design and drilling oversight of replacement irrigation well. Courtney was responsible for evaluating the cause of a collapsed drilling borehole, which he attributed to inappropriate drilling methods for the subsurface conditions. He provided a revised drilling plan and oversaw the operation to completion. In addition, he recommended rehabilitation measures for damaged irrigation wells to extend production until replacement wells could be constructed.

Nuclear Waste Repository Project Office, Nye County, Nevada: Hydrogeologist and Environmental Scientist during the UIC permit application and compliance oversight for short and long term tracer and chemical injection tests, as part of a joint project involving Nye County, Department of Energy, and multiple national laboratories to study the potential groundwater flow patterns down gradient of the proposed Yucca Mountain High Level Radioactive Waste Repository. Duties included preparing predictive groundwater models, performing compliance sampling and monitoring, and preparing quarterly discharge monitoring reports to the NDEP

Buffalo Thunder Casino, Santa Fe, New Mexico: Hydrogeologist performing a post-earthquake condition assessment pertaining to the Towa Golf Course Well No. 2 (an irrigation supply well) at the Buffalo Thunder Resort and Casino. A site visit was performed to observe and document the general site conditions and to evaluate wellhead accessibility for downhole video equipment. Ninyo & Moore coordinated through Tribal Works and Buffalo Thunder staff to obtain written authorization to modify the wellhead in order that the downhole video camera could access the inside of the well casing. Ninyo & Moore contracted with a licensed drilling contractor to install a threaded port in the wellhead assembly and perform the video survey utilizing a narrow, one-directional camera with a wide-angle lens. The down-well video survey identified that the submersible pump plus approximately 30 feet of drop pipe were buried in silt that had settled into the bottom 240 feet of well casing.

APPENDIX B

Asbestos and Lead Laboratory Analytical Report and Chain-of-Custody Records

EMSL Analytical, Inc
464 McCormick Street, San Leandro, CA 94577
Phone/Fax: (510) 895-3675 / (510) 895-3680
http://www.EMSL.com sanleandrolab@emsl.com

EMSL Order:	092118059
CustomerID:	NINY63
CustomerPO:	
ProjectID:	

Attn: **Amir Bajramovic**
Ninyo & Moore
6700 Paradise Road
Suite E
Las Vegas, NV 89119

Phone:	(702) 433-0330
Fax:	(702) 433-0707
Received:	11/15/21 9:15 AM
Collected:	

Project: **LGA-BOULDER WATER FILTRATION LBP-304852001**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
P-1	*092118059-0001*		11/15/2021	0.1157 g	4.5 % wt
	Site: BLUE PAINT				
P-2	*092118059-0002*		11/15/2021	0.2078 g	0.91 % wt
	Site: WHITE PAINT				
P-3	*092118059-0003*		11/15/2021	0.0741 g	0.26 % wt
	Site: RED PAINT				
P-4	*092118059-0004*		11/15/2021	0.2619 g	1.1 % wt
	Site: FLOOR PAINT				
P-5	*092118059-0005*		11/15/2021	0.1008 g	0.025 % wt
	Site: TANK PAINT				
P-6	*092118059-0006*		11/15/2021	0.1767 g	0.68 % wt
	Site: FLOOR PAINT				
P-7	*092118059-0007*		11/15/2021	0.2553 g	0.11 % wt
	Site: OFFICE PAINT				

Julian Neagu, Lead Laboratory Manager
or other approved signatory

Initial report from 11/15/2021 17:34:05

OrderID: 092118059

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Lead Chain of Custody

EMSL Order Number / Lab Use Only

092118059

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
PHONE: 1-800-220-3675
EMAIL: c@emsl.com

Customer Information		Billing Information	
Customer ID:		Billing ID:	
Company Name:	Ninyo & Moore	Company Name:	Ninyo & Moore
Contact Name:	Amir Bajramovic	Billing Contact:	Courtney Brooks
Street Address:	6700 Paradise Road, Suite E	Street Address:	6700 Paradise Road, Suite E
City, State, Zip:	Las Vegas NV 89119	City, State, Zip:	Las Vegas NV 89119
Country:	US	Country:	US
Phone:	702.433.0330	Phone:	702.433.0330
Email(s) for Report:	abajramovic@ninyoandmoore.com	Email(s) for Invoice:	

Project Information

Project Name/No: LGA - Boulder Water Filtration LBP- 304852001

Purchase Order:

EMSL LIMS Project ID: (if applicable, EMSL will provide)

US State where samples collected: NV

State of Connecticut (CT) must select project location: ☐ Commercial (Taxable) ☐ Residential (Non-Taxable)

Sampled By Name: Amir Bajramovic

Sampled By Signature:

No. of Samples in Shipment:

Turn-Around-Time (TAT)

☐ 3 Hour ☐ 6 Hour ☑ 24 Hour ☐ 32 Hour ☐ 48 Hour ☑ ~~72 Hour~~ AB ☐ 96 Hour ☐ 1 Week ☐ 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:59pm.

MATRIX	METHOD	INSTRUMENT	REPORTING LIMIT	SELECTION
CHIPS ☑ % by wt. ☐ ppm (mg/kg) ☐ mg/cm²	SW 846-7000B	Flame Atomic Absorption	0.008% (80ppm)	☑
*Reporting Limit based on a minimum 0.25g sample weight	SW 846-6010D*	ICP-OES	0.0004% (4ppm)	☐
AIR	NIOSH 7082	Flame Atomic Absorption	4µg/filter	☐
	NIOSH 7300M / NIOSH 7303M	ICP-OES	0.5µg/filter	☐
	NIOSH 7300M / NIOSH 7303M	ICP-MS	0.05µg/filter	☐
WIPE ☐ ASTM ☐ non-ASTM	SW 846-7000B	Flame Atomic Absorption	10µg/wipe	☐
*If no box is checked, non-ASTM Wipe is assumed	SW 846-6010D*	ICP-OES	1.0µg/wipe	☐
TCLP	SW 846-1311 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW 846-1311 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
SPLP	SW 846-1312 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW 846-1312 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
TTLC	22 CCR App. II, 7000B	Flame Atomic Absorption	40mg/kg (ppm)	☐
	22 CCR App. II, SW 846-6010D*	ICP-OES	2mg/kg (ppm)	☐
STLC	22 CCR App. II, 7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	22 CCR App. II, SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
Soil	SW 846-7000B	Flame Atomic Absorption	40mg/kg (ppm)	☐
	SW 846-6010D*	ICP-OES	2mg/kg (ppm)	☐
Wastewater	SM 3111B / SW 846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
Unpreserved ☐ / Preserved with HNO3 ☐ pH<2	EPA 200.7	ICP-OES	0.020 mg/L (ppm)	☐
Drinking Water	EPA 200.5	ICP-OES	0.003 mg/L (ppm)	☐
Unpreserved ☐ / Preserved with HNO3 ☐ pH<2	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	☐
TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	☐
Other:				☐

Sample Number	Sample Location	Volume / Area	Date / Time Sampled
P-1	Blue paint		
P-2	White paint		
P-3	Red paint		
P-4	Floor paint		
P-5	Tank paint		

Method of Shipment:

Sample Condition Upon Receipt:

Relinquished by:	Date/Time:	Received by:	Date/Time
[signature]	2021-11-12 / 9:34	[signature]	11/12/21 0945
Relinquished by:	Date/Time:	Received by:	Date/Time
		[signature]	11-15-21 9:15AM

Controlled Document – COC-25 Lead (04/08/2020)

*6010C Available Upon Request

☐ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

OrderID: 092118059

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Lead Chain of Custody

EMSL Order Number / Lab Use Only

092118059

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
PHONE: 1-800-220-3675
EMAIL: c@emsl.com

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Sample Number	Sample Location	Volume / Area	Date / Time Sampled
P-6	Floor paint		
P-7	Office paint		

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by:	Date/Time:	Received by: EBX (1)	Date/Time: 11-15-21 9:15AM
Relinquished by:	Date/Time:	Received by:	Date/Time:

Controlled Document - COC-25 Lead Rev. 4 (10/2021)

☐ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.
6325 Harrison Dr. Suites 3 and 4 Las Vegas, NV 89120
Tel/Fax: (702) 931-3532 / (702) 931-3533
http://www.EMSL.com / lasvegaslab@EMSL.com

EMSL Order: 312103570
Customer ID: NINY63
Customer PO: 304852001
Project ID:

Attention: Amir Bajramovic
Ninyo & Moore
6700 Paradise Road
Suite E
Las Vegas, NV 89119
Project: LGA-Boulder Water Filtration-304852001

Phone: (702) 433-0330
Fax: (702) 433-0707
Received Date: 11/12/2021 9:45 AM
Analysis Date: 11/12/2021
Collected Date:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
S-1 *312103570-0001*	Wall Concrete	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
S-2 *312103570-0002*	Wall Concrete	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
S-3 *312103570-0003*	Wall Concrete	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
S-4 *312103570-0004*	Brick	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
S-5 *312103570-0005*	Brick	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
S-6 *312103570-0006*	Brick	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
S-7 *312103570-0007*	Floor Concrete	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
S-8 *312103570-0008*	Floor Concrete	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
S-9 *312103570-0009*	Floor Concrete	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
S-12 *312103570-0010*	Office Drywall	Tan/White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
Drywall not present. Composite analysis of plaster base coat and skim coat upon client request.					
S-13 *312103570-0011*	Office Tile And Mastic	Tan/Black Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
Composite analysis of floor tile and mastic upon client request.					
S-14 *312103570-0012*	Insulation-Office	Gray Fibrous Homogeneous	90% Min. Wool	10% Non-fibrous (Other)	None Detected

Initial report from: 11/12/2021 17:52:40

EMSL Analytical, Inc.
6325 Harrison Dr. Suites 3 and 4 Las Vegas, NV 89120
Tel/Fax: (702) 931-3532 / (702) 931-3533
http://www.EMSL.com / lasvegaslab@EMSL.com

EMSL Order:	312103570
Customer ID:	NINY63
Customer PO:	304852001
Project ID:	

Analyst(s)
Liliveth Escamilla (12)

Shannon Ferguson, Laboratory Manager
or Other Approved Signatory

Initial report from: 11/12/2021 17:52:40

OrderID: 312103570

EMSL ANALYTICAL, INC.

Asbestos Bulk Building Materials - Chain of Custody

EMSL Order Number / Lab Use Only: 312103570

EMSL Analytical, Inc.
6325 Harrison Drive
Suite 3
Las Vegas, NV 89120
PHONE (702) 931-3532
EMAIL: lasvegaslab@emsl.com

Customer Information		Billing Information	
Customer ID:		Billing ID:	
Company Name:	Ninyo & Moore	Company Name:	Ninyo & Moore
Contact Name:	Amir Bajramovic	Billing Contact:	Courtney Brooks
Street Address:	6700 Paradise Road, Suite E	Street Address:	6700 Paradise Road, Suite E
City, State, Zip:	Las Vegas NV 89119	City, State, Zip:	Las Vegas NV
Country:	US	Country:	US
Phone:	702.433.0330	Phone:	702.433.0330
Email(s) for Report:	abajramovic@ninyoandmoore.com	Email(s) for Invoice:	

Project Information

Project Name/No:	LGA - Boulder Water Filtration - 304852001	Purchase Order:	
EMSL LIMS Project ID: (If applicable, EMSL will provide)		US State where samples collected: NV	State of Connecticut (CT) must select project location: ☐ Commercial (Taxable) ☐ Residential (Non-Taxable)
Sampled By Name:		Sampled By Signature:	Date Sampled: / No. of Samples in Shipment:

Turn-Around-Time (TAT)

☐ 3 Hour ☐ 6 Hour ☑ 24 Hour ☐ 32 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only, samples must be submitted by 11:00am

Test Selection

PLM - Bulk (reporting limit)

- ☑ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)
- ☐ POINT COUNT
  - ☐ 400 (<0.25%) ☐ 1,000 (<0.1%)
- ☐ POINT COUNT w/ GRAVIMETRIC
  - ☐ 400 (<0.25%) ☐ 1,000 (<0.1%)
- ☐ NIOSH 9002 (<1%)
- ☐ NYS 198.1 (Friable - NY)
- ☐ NYS 198.6 NOB (Non-Friable - NY)
- ☐ NYS 198.8 (Vermiculite SM-V)

TEM - Bulk

- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (Non-Friable - NY)
- ☐ TEM EPA 600/R-93/116 w Milling Prep (0.1%)

Other Tests (please specify)

☐ Positive Stop - Clearly Identified Homogeneous Areas (HA)

Sample Number	HA Number	Sample Location	Material Description
S-1		Wall concrete	
S-2		Wall concrete	
S-3		Wall concrete	
S-4		Brick	
S-5		Brick	
S-6		Brick	
S-7		Floor concrete	
S-8		Floor concrete	
S-9		Floor concrete	
AB ~~S-10~~		~~Floor mastic~~	

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Treat all samples as composites. Do not separate into layers.

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by:	Date/Time: 11-21-21 1930	Received by:	Date/Time: 11/22/21 0945
Relinquished by:	Date/Time:	Received by:	Date/Time:

Controlled Document - Asbestos Bulk R7 9/14/2021

☐ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

OrderID: 312103570

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Bulk Building Materials - Chain of Custody

EMSL Order Number / Lab Use Only

312103570

EMSL Analytical, Inc.
6325 Harrison Drive
Suite 3
Las Vegas, NV 89120
PHONE: (702) 931-3532
EMAIL: lasvegaslab@emsl.com

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Sample Number	HA Number	Sample Location	Material Description
~~S-11~~		~~Pipe - black sealant~~	
S-12		Office drywall	
S-13		Office tile and mastic	
S-14		Insulation - office	

Method of Shipment		Sample Condition Upon Receipt:	
Relinquished by:	Date/Time	Received by:	Date/Time
Relinquished by:	Date/Time	Received by:	Date/Time

Controlled Document - Asbestos Bulk 07/01/2021

☐ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

Page of

APPENDIX C

Photographic Log

1. **Plant Exterior**

2. **Plant Rear with Equipment**

FIGURE B-1

PHOTOGRAPHS

Boulder City Former Water Filtration Plant
Boulder City, Clark County, NV

304852001 | 1/2022

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

6700 Paradise Road, Suite E | Las Vegas, Nevada 89119 | p. 702.433.0330

ARIZONA | CALIFORNIA | COLORADO | NEVADA | TEXAS | UTAH

ninyoandmoore.com

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

6 Cost Consultant Report

Prepared by OCMI

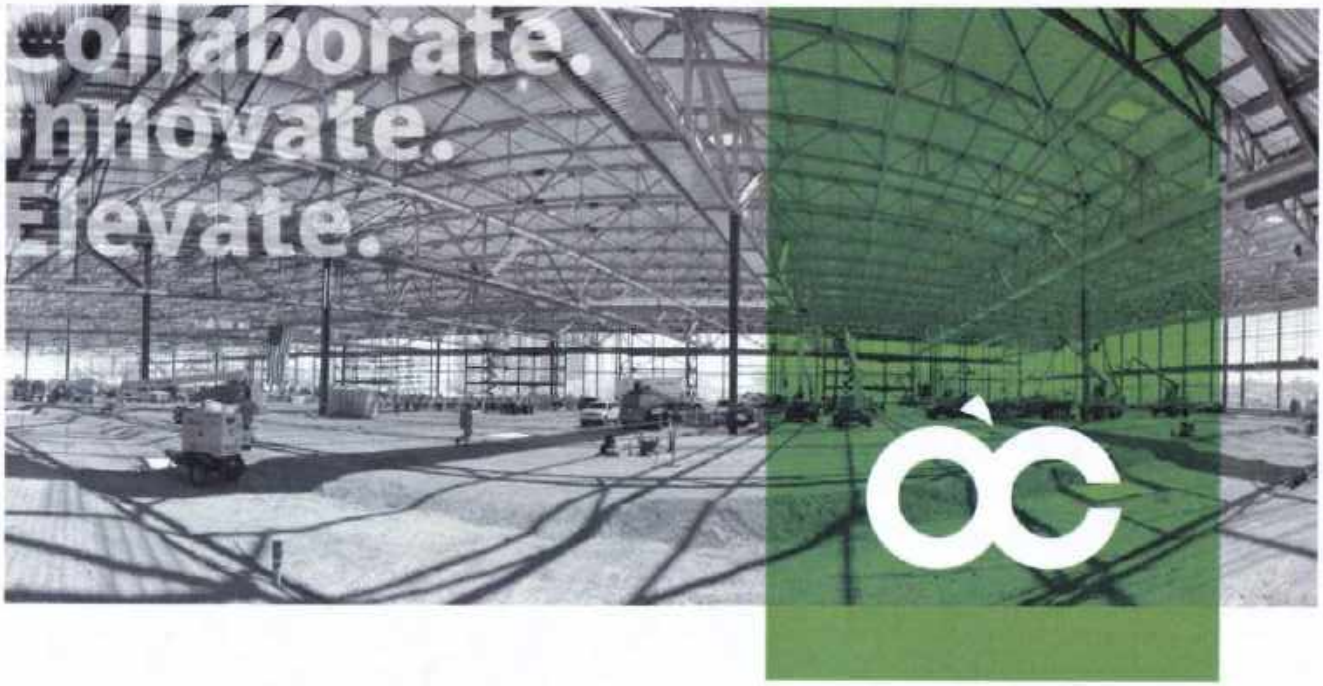
LGA

ROUGH ORDER OF MAGNITUDE

COST ESTIMATE R1

Job No. 210455.000

23 February 2022



Boulder City

Water Filtration Plant Building

Boulder City, NV

Prepared by

O'Connor Construction Management, Inc.

COST ESTIMATE

INTRODUCTORY NOTES

This estimate is based on verbal direction from the client and the following items, received 15 February 2022 and 17 February 2022 and phone call on 23 February 2022:

Sharp Copier_20220217_093653	(01 sheet)
RE: Boulder City	EMAIL
BC	EMAIL

The following items are excluded from this estimate:

- Professional fees.
- Building permits and fees.
- Inspections and tests.
- Furniture, fixtures & equipment, except as noted.
- Installation of owner furnished equipment.
- Construction change order contingency.
- Overtime.
- ~~Hazardous material abatement/removal.~~
- Items referenced as NOT INCLUDED or NIC in estimate.

The midpoint of construction of August 2023 is based on:

- Construction start date of March 2023
- Estimated construction duration of 10 months

- This estimate is based on a Design-Bid-Build delivery method.
- This estimate is based on prevailing wage labor rates.
- This estimate is based on a detailed measurement of quantities. We have made allowances for items that were not clearly defined in the drawings. The client should verify these allowances.
- This estimate is based on a minimum of four competitive bids and a stable bidding market.
- This estimate should be updated if more definitive information becomes available, or if there is any change in scope.
- We strongly advise the client to review this estimate in detail. If any interpretations in this estimate appear to differ from those intended by the design documents, they should be addressed immediately.

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

PROJECT SUMMARY

BASE BID	TOTAL COST	GFA	$/SF AREA
01. BUILDING	$452,200	3,300	$137.03
02. HAZARDOUS MATERIAL ABATEMENT	$47,500	7,600	$6.25
TOTAL BASE BID CONSTRUCTION COST	**$499,700**		

ALTERNATES	TOTAL COST
01. ALTERNATE: TUCK POINTING AT AREAS AFFECTED	$43,931
TOTAL BASE BID CONSTRUCTION COST INCLUDING ALTERNATE	**$543,631**

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

BUILDING SUMMARY

ELEMENT		TOTAL COST	$/SF AREA
01 GENERAL REQUIREMENTS		$3,795	$1.15
02 EXISTING CONDITIONS		$31,594	$9.57
03 CONCRETE		$77,451	$23.47
04 MASONRY		$2,300	$0.70
05 METALS		$16,194	$4.91
06 WOOD, PLASTICS, AND COMPOSITES		$42,005	$12.73
07 THERMAL AND MOISTURE PROTECTION		$7,879	$2.39
08 OPENINGS		$56,261	$17.05
09 FINISHES		$2,369	$0.72
10 SPECIALTIES			
11 EQUIPMENT			
12 FURNISHINGS			
13 SPECIAL CONSTRUCTION			
14 CONVEYING EQUIPMENT			
21 FIRE SUPPRESSION			
22 PLUMBING			
23 HEATING, VENTILATING, AND AIR CONDITIONING			
26 ELECTRICAL			
27 COMMUNICATIONS			
28 ELECTRONIC SAFETY AND SECURITY			
31 EARTHWORK			
32 EXTERIOR IMPROVEMENTS			
33 UTILITIES			
NET DIRECT BUILDING COST		$239,848	$72.68
DESIGN CONTINGENCY, PER CLIENT	15.00%	$35,977	$10.90
SUBTOTAL		$275,825	$83.58
ESCALATION TO MIDPOINT 08/2023	12.00%	$33,099	$10.03
SUBTOTAL		$308,924	$93.61
GENERAL CONDITIONS/REQUIREMENTS	10.00%	$30,892	$9.36
SUBTOTAL		$339,817	$102.97
CONTRACTOR OVERHEAD AND PROFIT	6.50%	$22,088	$6.69
SUBTOTAL		$361,905	$109.67
INSURANCE AND BONDS	2.00%	$7,238	$2.19
SUBTOTAL		$369,143	$111.86
HISTORICAL PRESERVATION, PARTIAL TO PARTICULAR TRADES, ALLOWANCE	22.50%	$83,057	$25.17
TOTAL BUILDING COST		**$452,200**	**$137.03**

GROSS FLOOR AREA: 3,300 SF

DETAILED PROJECT SUMMARY

BASE BID	TOTAL COST	GFA	$/SF AREA
01. BUILDING	$239,848	3,300	$72.68
02. HAZARDOUS MATERIAL ABATEMENT	$30,863	7,600	$4.06

TOTAL BASE BID NET DIRECT COST	$270,711

GENERAL MARKUPS

DESIGN CONTINGENCY, PER CLIENT	15.00%	$40,607
ESCALATION TO MIDPOINT 08/2023	12.00%	$37,358
GENERAL CONDITIONS/REQUIREMENTS	10.00%	$34,868
CONTRACTOR OVERHEAD AND PROFIT	6.50%	$24,930
INSURANCE AND BONDS	2.00%	$8,169
HISTORICAL PRESERVATION, PARTIAL TO PARTICULAR TRADES, ALLOWANCE	19.93%	$83,057

TOTAL BASE BID CONSTRUCTION COST	$499,700

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

DESCRIPTION	QUANTITY	UNIT	UNIT RATE	ESTIMATED COST
01 GENERAL REQUIREMENTS				
Protect in place	3,300	GSF	1.15	$3,795
TOTAL - 01 GENERAL REQUIREMENTS				**$3,795**
02 EXISTING CONDITIONS				
Demolition				
Architectural				
Chimney	10	SF	10.32	$103
Glazing	336	SF	11.64	$3,910
Incidental demolition	1	LS	575.00	$575
Haul and dispose	15%	PCT	4,588.00	$688
Patch and Repair, moderate work anticipated	3,300	GSF	0.29	$949
Sand and prepare window trim for paint	784	LF	3.02	$2,369
Unforeseen conditions minimal work anticipated per client, Allowance	1	LS	23,000.00	$23,000
TOTAL - 02 EXISTING CONDITIONS				**$31,594**
03 CONCRETE				
Foundation System				
Continuous footing	3	CY	749.07	$2,286
Shotcrete				
4" thick	1,000	SF	17.23	$17,228
Rebar	3,000	LB	1.58	$4,748
Connections, ties, dowels, etc.	25%	PCT	21,976.00	$5,494
Concrete fill				
Concrete crack repairs with epoxy injection	30	LF	1,298.27	$38,948
Spall repairs, 2" thick	30	SF	8.57	$257
Miscellaneous concrete, pad, curbs etc	1	LS	8,489.80	$8,490
TOTAL - 03 CONCRETE				**$77,451**
04 MASONRY				
Masonry reinforcement, moderate work anticipated, Allowance	1	LS	2,300.00	$2,300

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

DESCRIPTION	QUANTITY	UNIT	UNIT RATE	ESTIMATED COST
TOTAL - 04 MASONRY				**$2,300**
05 METALS				
Structural Steel Framing				
Structural reinforcement				
Steel angles and channels	2,719	LB	5.41	$14,722
Miscellaneous metal fabrications	1	LS	1,472.20	$1,472
TOTAL - 05 METALS				**$16,194**
06 WOOD, PLASTICS, AND COMPOSITES				
Rough Carpentry				
Sheathing, 1/2", including ancillary work	3,200	SF	8.36	$26,743
Floor reinforcement at second floor	434	LF	8.94	$3,877
Miscellaneous rough carpentry	3,300	GSF	3.45	$11,385
TOTAL - 06 WOOD, PLASTICS, AND COMPOSITES				**$42,005**
07 THERMAL AND MOISTURE PROTECTION				
Roofing				
Single ply membrane	1,000	SF	6.40	$6,397
Leak test	1	LS	977.50	$978
Miscellaneous roofing work	1	LS	319.85	$320
Firestopping, Joint Sealants, Caulking				
Caulking				
Exterior , at exterior enclosure and glazing	400	GSF	0.46	$184
TOTAL - 07 THERMAL AND MOISTURE PROTECTION				**$7,879**
08 OPENINGS				
Doors, Frames and Hardware				
Exterior				
Solid core including frame and hardware, single	1	EA	1,685.11	$1,685
Supplementary hardware	15%	PCT	4,868.00	$730
Specialty door				
Solid core including frame and hardware, double	1	PR	3,183.33	$3,183

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

DESCRIPTION	QUANTITY	UNIT	UNIT RATE	ESTIMATED COST
Glass and Glazing				
Exterior				
New glazing at existing windows	336	SF	143.75	$48,300
Water testing	1	LS	2,363.02	$2,363
TOTAL - 08 OPENINGS				**$56,261**
09 FINISHES				
Paint and Coating				
Exterior				
Window trim at existing widows with new glazing	784	LF	3.02	$2,369
TOTAL - 09 FINISHES				**$2,369**
21 FIRE SUPPRESSION				
No work anticipated		NA		
TOTAL - 21 FIRE SUPPRESSION				
22 PLUMBING				
No work anticipated		NA		
TOTAL - 22 PLUMBING				
23 HEATING, VENTILATING, AND AIR CONDITIONING				
No work anticipated		NA		
TOTAL - 23 HEATING, VENTILATING, AND AIR CONDITIONING				
26 ELECTRICAL				
No work anticipated		NA		
TOTAL - 26 ELECTRICAL				
27 COMMUNICATIONS				
No work anticipated		NA		
TOTAL - 27 COMMUNICATIONS				
28 ELECTRONIC SAFETY AND SECURITY				

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

DESCRIPTION	QUANTITY	UNIT	UNIT RATE	ESTIMATED COST
No work anticipated		NA		
TOTAL - 28 ELECTRONIC SAFETY AND SECURITY				
31 EARTHWORK				
No work anticipated		NA		
TOTAL - 31 EARTHWORK				
32 EXTERIOR IMPROVEMENTS				
No work anticipated		NA		
TOTAL - 32 EXTERIOR IMPROVEMENTS				
33 UTILITIES				
No work anticipated		NA		
TOTAL - 33 UTILITIES				

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

BUILDING SUMMARY

ELEMENT		TOTAL COST	$/SF AREA
01 GENERAL REQUIREMENTS			
02 EXISTING CONDITIONS		$30,863	$4.06
03 CONCRETE			
04 MASONRY			
05 METALS			
06 WOOD, PLASTICS, AND COMPOSITES			
07 THERMAL AND MOISTURE PROTECTION			
08 OPENINGS			
09 FINISHES			
10 SPECIALTIES			
11 EQUIPMENT			
12 FURNISHINGS			
13 SPECIAL CONSTRUCTION			
14 CONVEYING EQUIPMENT			
21 FIRE SUPPRESSION			
22 PLUMBING			
23 HEATING, VENTILATING, AND AIR CONDITIONING			
26 ELECTRICAL			
27 COMMUNICATIONS			
28 ELECTRONIC SAFETY AND SECURITY			
31 EARTHWORK			
32 EXTERIOR IMPROVEMENTS			
33 UTILITIES			
NET DIRECT BUILDING COST		$30,863	$4.06
DESIGN CONTINGENCY, PER CLIENT	15.00%	$4,629	$0.61
SUBTOTAL		$35,492	$4.67
ESCALATION TO MIDPOINT 08/2023	12.00%	$4,259	$0.56
SUBTOTAL		$39,752	$5.23
GENERAL CONDITIONS/REQUIREMENTS	10.00%	$3,975	$0.52
SUBTOTAL		$43,727	$5.75
CONTRACTOR OVERHEAD AND PROFIT	6.50%	$2,842	$0.37
SUBTOTAL		$46,569	$6.13
INSURANCE AND BONDS	2.00%	$931	$0.12
SUBTOTAL		$47,500	$6.25
HISTORICAL PRESERVATION, PARTIAL TO PARTICULAR TRADES, ALLOWANCE	NA		
TOTAL BUILDING COST		**$47,500**	**$6.25**

GROSS FLOOR AREA: 7,600 SF

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

DESCRIPTION	QUANTITY	UNIT	UNIT RATE	ESTIMATED COST
02 EXISTING CONDITIONS				
Hazardous Abatement, Allowance per client	7,600	SF	4.06	$30,863
TOTAL - 02 EXISTING CONDITIONS				$30,863

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

BUILDING SUMMARY

ELEMENT		TOTAL COST
01 GENERAL REQUIREMENTS		
02 EXISTING CONDITIONS		$1,236
03 CONCRETE		
04 MASONRY		$22,065
05 METALS		
06 WOOD, PLASTICS, AND COMPOSITES		
07 THERMAL AND MOISTURE PROTECTION		
08 OPENINGS		
09 FINISHES		
10 SPECIALTIES		
11 EQUIPMENT		
12 FURNISHINGS		
13 SPECIAL CONSTRUCTION		
14 CONVEYING EQUIPMENT		
21 FIRE SUPPRESSION		
22 PLUMBING		
23 HEATING, VENTILATING, AND AIR CONDITIONING		
26 ELECTRICAL		
27 COMMUNICATIONS		
28 ELECTRONIC SAFETY AND SECURITY		
31 EARTHWORK		
32 EXTERIOR IMPROVEMENTS		
33 UTILITIES		
NET DIRECT BUILDING COST		$23,301
DESIGN CONTINGENCY, PER CLIENT	15.00%	$3,495
SUBTOTAL		$26,796
ESCALATION TO MIDPOINT 08/2023	12.00%	$3,216
SUBTOTAL		$30,012
GENERAL CONDITIONS/REQUIREMENTS	10.00%	$3,001
SUBTOTAL		$33,013
CONTRACTOR OVERHEAD AND PROFIT	6.50%	$2,146
SUBTOTAL		$35,159
INSURANCE AND BONDS	2.00%	$703
SUBTOTAL		$35,862
HISTORICAL PRESERVATION, PARTIAL TO PARTICULAR TRADES, ALLOWANCE	22.50%	$8,069
TOTAL BUILDING COST		**$43,931**

ROUGH ORDER OF MAGNITUDE COST ESTIMATE R1

OCMI JOB #: 210455.000 | 23 February 2022

DESCRIPTION	QUANTITY	UNIT	UNIT RATE	ESTIMATED COST
02 EXISTING CONDITIONS				
Demolition				
Incidental demolition	1	LS	575.00	$575
Haul and dispose	15%	PCT	575.00	$86
Patch and Repair, moderate work anticipated	1	LS	575.00	$575
TOTAL - 02 EXISTING CONDITIONS				**$1,236**
04 MASONRY				
Masonry reinforcement				
Tuck pointing	1,300	SF	16.97	$22,065
TOTAL - 04 MASONRY				**$22,065**

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702.263.7111

LGAarchitecture.com

241 W. Charleston Blvd., Suite 107
Las Vegas, NV 89102