Chapter 6 – References

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Appendix A – Material Testing Report Summary

CIELO STRUCTURES, INC.

Materials Testing Report
303 West 5th Street in San Bernardino, California

January 2025 (Revised)

Prepared for :
Dahl, Taylor & Associates, Inc.
2960 Daimler Street
Santa Ana, CA 92805

CIELO STRUCTURES, INC.

March 4, 2025

Mr. Stephen Vu
Project Manager
Dahl, Taylor & Associates, Inc.
2960 Daimler Street
Santa Ana, CA 92705

Cell: (949) 390-3965
E-mail: sdvu@dahltaylor.com

Subject: ***Transmittal of Report Entitled: Materials Testing Report – January 2025 Revised 303 West 5th Street, San Bernardino, CA.***

Dear Mr. Vu:

Enclosed please find one (1) electronic copy of the revised subject material testing report for the San Bernardino County regarding the subject building at 303 West 5th Street, San Bernardino, CA. The masonry rebar yield strength was revised from fy=40ksi in the December report to fy=60ksi for the current report. All other material strengths remain unchanged.

The findings contain summary data based on the recent Cielo Structures, Inc. material testing program and MTGL's field testing at the subject property. The MTGL field tests included Schmidt-Hammer tests, Ground-Penetrating Radar (GPR) scans, drilling, and concrete compression test results for the subject building. The Cielo Structures, Inc. material testing program and MTGL material testing results are included in Appendix A of this report. Appendix B includes the raw data for the various test results and the expected concrete strengths to be used for our computer modeling for the evaluation and analysis of the building.

We appreciate the opportunity to continue to work with you and the County on this project. If you should have any questions or require any further information, please do not hesitate to call us.

Sincerely yours,
Cielo Structures, Inc.

Daniel J. Dopudja, P.E., S.E.
Principal Engineer

Enclosures: *As Noted*

CIELO STRUCTURES, INC.

Materials Testing Report
303 West 5th Street in San Bernardino, California

January 2025 (Revised)

Prepared for:

Dahl, Taylor & Associates
2960 Daimler Street
Santa Ana, CA 92805

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Chapter 1 - Introduction

Dahl, Taylor & Associates, Inc. and Cielo Structures, Inc. (Cielo) provided a material testing program for the San Bernardino County building at 303 West 5th Street in San Bernardino, California. The material testing program consisted of plans and photos reflecting the location where material samples were to be taken, and various tests performed. The results of these tests served as the basis to determine the material properties of the various structural members in the building. This report includes the material testing program, and the results of the tests performed.

1.1 Scope of Work

Dahl, Taylor & Associates and Cielo were retained to provide a material testing program for the San Bernardino County building at 303 West 5th Street in San Bernardino, California. Upon completion of the material testing program, the certified testing company (MTGL, Inc.) removed concrete core cylinders and performed Schmidt Hammer tests to determine the in-situ concrete compressive strength of the structure elements of the building. Ground penetrating radar (GPR) scans were conducted to gain a better understanding of the steel reinforcing layout of the masonry block and concrete elements. X-ray scans were not conducted for any structural elements. Based on the material test results, preliminary evaluation, analysis, and seismic strengthening measures will be developed to reduce the risk of damage and potential collapse in the event of a major earthquake.

The scope of work included the following:

Task 3 Conducted Destructive and Non-Destructive Materials Testing and Prepared Final Materials Testing Report

1. Coordinated with material testing company (MTGL) for pre-contract scope for all field and laboratory testing.

2. Conducted pre-coordination services with MTGL relative to Cielo's Materials Testing Program (MTP) and field constraints.

3. Reviewed MTGL's Material Testing Report (MTR) and provided comments to report for incorporation by MTGL.

   MTGL's scope of work for the material testing and investigation services were as follows:

   - *Schmidt Hammer testing of columns and beams for compression strength: (Up to 50 total locations)*
   - *Concrete slab coring and compression testing and patching with non-shrink grout: (Up to 5 total locations)*
   - *First floor CMU wall coring and compression testing and patching with non-shrink grout: (Up to 4 total locations). Cores will be partial depth only in order to prevent disturbing the existing finishes at the back-side of CMU wall.*
   - *Compressive strength testing of the concrete cores and/or masonry face shell coupons obtained.*
   - *Pilot drilling with a 1" diameter drill of the roof deck, architectural cladding, and perimeter piers to determine thicknesses and patching with non-shrink grout: (Up to 8 locations)*
   - *Ground Penetrating Radar (GPR) scanning of slabs and footings: (Up to 6 locations)*
   - *GPR Scanning of beams and columns: (Up to 12 locations)*
   - *GPR Scanning of masonry walls to assess spacing and rebar size (within one bar size).*
   - *GPR Scanning to confirm footing size: 1 location.*
   - *Masonry block compression testing at roof level parapet: (1 total location)*

- *Removed fireproofing and gypsum board ceiling as required to assess roof level framing.*

4. Prepare a brief Materials Testing and Building Investigation Report for the non-destructive and destructive investigation services including findings.

1.2 Limitations

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers practicing in the field. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for the San Bernardino County to be used solely in their evaluation of the existing building. The report has not been prepared for use by other parties, and may not contain sufficient information for purposes of other parties or other use. Further confirmation of beam sizes, bolt sizes, etc. is required by designer, if tenant improvement work is performed for the subject building.

Chapter 2 –Material Criteria & Testing Results

This chapter presents the findings of the materials testing program conducted by MTGL, Inc. in order to verify material strengths of the subject building for further structural seismic evaluation by Dahl, Taylor & Associates and Cielo Structures, Inc. (Cielo).

As-built structural drawings were not available by the San Bernardino County for review. Cielo conducted an online drawing search within the City of San Bernardino archive records and was unable to locate any as-built structural drawings for the subject building; however, several real estate property data sheets were obtained which indicated the building was constructed circa late 1970s to early 1980s. The Couty of San Bernardino has limited architectural, mechanical, and electrical drawings from a recent interior remodel that was completed circa 2001. The remodel drawing set contains several architectural, mechanical, and electrical drawing sheets providing general building dimensions and layout information. Unfortunately, there were no structural sheets included in the 2001 remodel project; thus no information is known regarding material strength or classification of materials specified. Consequently, a material testing program was developed for in-situ and laboratory material testing in order to conduct a structural evaluation and analysis of the building. The data collection guidelines of ASCE 41-17 (Seismic Evaluation and Retrofit of Existing Buildings) was utilized as a basis for this material testing program. These guidelines have been modified due to project budgetary constraints, schedule, and in order to reduce the extent of damage to building finishes required in the destructive testing process. The number of non-destructive tests has been increased to still achieve a high degree of confidence in the information gathered and it is in Cielo's judgment that the presented values are suitable for evaluating structures at the Life Safety performance level.

2.1 Material Strength Factors for Seismic Evaluation

ASCE 41-17 utilizes several adjustment factors that are applied to concrete, steel, and masonry material strengths when as-built structural drawings are available and material strengths are indicated in the drawings. First, an expected strength factor (ie: aging factor for concrete and anticipated yield strength for steel) can be applied to account for an increase in strength. Second, a knowledge factor is applied to account for the level of confidence in the properties of the components and construction. For wide flange steel, reinforcement bar (rebar), masonry, and concrete elements, the following adjustment factors are noted in accordance with ASCE 41-17:

Table 2-1: Expected Strength & Knowledge Factors

Material	Tested	Expected Strength Factor	Knowledge Factor (κ)[1]
Steel Wide Flange	No	1.10	0.75
Rebar	No	1.25	0.75
Masonry	Yes	1.30	1.00
Concrete	Yes	1.50	1.00

Since structural as-built drawings are not available, there is no information on the strength or type of reinforcement bar and wide flange beams used in construction. Due to the County's budget, no reinforcement bar nor wide flange coupons were taken for testing during the on-site work. Instead, ASCE 41 default values are used.

2.1.1 Reinforcement Bar Material

In lieu of testing the reinforcement bar (rebar) a minimum grade of 60 ksi (kips per square inch) was used for the analysis purposes based on the historical default values indicated in ASCE 41-17 Tables 10-3 and 10-4 for masonry with rebar

[1] *Since material testing was completed for concrete and masonry, knowledge factor of* $\kappa = 1.0$ *is used per ASCE 41-17 Table 6-1 for "Usual".*

sizes of No. 5 and greater. The Grade 60 reinforcement bar has a lower-bound yield default value of 60 ksi; however, since drawings with specified properties were not available, and no testing was conducted to verify assumed default strength values, a knowledge factor of $\kappa = 0.75$ will be used. The resulting reinforcement bar tensile lower-bound default yield strength used for the analysis is Fy x κ = 45.0 ksi.

An expected strength factor of 1.25 is applied to the assumed lower-bound strength based on historical testing of Grade 60 reinforcing bar as indicated in ASCE 41-17 Table 10-1. The resulting reinforcement bar tensile expected strength used for the analysis is 1.25 x Fy x κ = 56.25 ksi.

2.1.2 Steel Wide Flange Material

In lieu of testing (ie: removing coupons from a steel wide flange web) due to budgetary issues, ASTM A36 wide flange steel was used for analysis based on the historical default values indicated in ASCE 41-17 Table 9-1.

ASTM A36 wide flange (Group 2) has a lower-bound default yield value of 41 ksi (kips per square inch); however, since drawings with specified properties were not available, and no testing was conducted to verify assumed default strength values, a knowledge factor of $\kappa = 0.75$ will be used. The resulting wide flange steel tensile lower-bound default yield strength used for the analysis is Fy x κ = 31.0 ksi.

An expected strength factor of 1.10 is applied to the assumed lower-bound strength based on historical testing of ASTM A36 steel as indicated in ASCE 41-17 Table 9-3. The resulting reinforcing steel tensile expected strength used for the analysis is 1.10 x Fy x κ = 34 ksi.

2.1.3 Concrete and Masonry

Concrete and masonry elements were field tested in accordance with the Cielo's Material Testing Program. See Section 2.2 and Appendix A.

2.2 Materials Testing Program

In order to achieve the Basic Performance Objective for Existing Buildings (BPOE) for a Life Safety performance level, a Materials Testing Program was developed to test the as-built building materials (concrete and masonry) as required by ASCE 41-17 Table 6-1 “Data Collection Requirements” for the “Usual” condition. This program consists of concrete/masonry core samples, Schmidt Hammer tests, and extraction of one masonry grouted block for the subject building. The concrete and masonry core samples were approximately 4-inch diameter by 3-inch-long cores. Core sizes were chosen to prevent coring through the entire element thickness while still complying with ASTM C39 and C42. Cored holes were repaired using high strength, non-shrink grout. It should be noted that coring at columns, beams, and piers was not performed. The testing program developed by Cielo is included with the MTGL, Inc. material report (Appendix A).

2.3 Materials Testing Results

Results from the material testing program are presented in the following sections.

2.3.1 Reinforced Concrete

A concrete core sample was taken from the second-floor slab and tested to determine the in-situ concrete compressive strength in accordance with ASTM C39. Only one concrete compressive test was completed for the second-floor slab since numerous Schmidt Hammer tests of the second-floor slab were conducted. It should be noted that coring at columns, beams, and piers was not performed.

Schmidt Hammer (SH) tests, or Rebound Hammer tests, were conducted to determine the in-situ concrete compressive strength at first level columns, piers, footing, second-floor perimeter beams, and second-floor slab. 60 SH tests were conducted at columns/piers while 10 SH tests were conducted at the perimeter beams. In addition, a total of 50 SH tests were conducted at the second-floor concrete slab on metal deck. Testing locations were distributed throughout the building. The main roof level and high roof level slabs were cored; however,

compressive tests were not completed since the slabs at these levels are composed of lightweight insulating concrete only.

The concrete columns and piers reflect an average expected compressive strength (minus one standard deviation per ASCE 41-17 Section 10.2.2.3.1) of approximately f'_c = 4,215 psi (pounds per square inch) and f'_c = 3,957 psi respectively. The concrete footing between Grid Lines E-F and Grid Line 1 reflects an average expected compressive strength (minus one standard deviation) of f'_c = 3,216 psi. The second-floor concrete perimeter beams and slab reflect an average expected compressive strength (minus one standard deviation) of approximately f'_c = 6,942 psi and f'_c = 1,982 psi respectively. See Table 2-3.

Tables 2-2 and 2-3 reflect cored and SH average compressive material test results respectively, including standard deviation, coefficient of variation, and expected compressive strength values for the various structural elements. Table 2-4 summarizes all material properties for the building for both lower-bound strength design and expected strength design as required by ASCE 41-17 for the concrete elements for use in the evaluation. Appendix B includes the expected material strengths derived for the combined core and SH tests.

2.3.2 Masonry Block

Masonry core samples were taken from the first-floor interior wall along Grid Line E to determine the in-situ masonry and grouted compressive strength. Two masonry compressive tests were completed for the masonry wall along Grid Line E (Appendix A).

Schmidt Hammer (SH) or Rebound Hammer tests were also conducted to determine the in-situ compressive block shell strength of the first level masonry wall. 10 SH tests were conducted at the masonry block wall at Grid Line E.

In addition, to more accurately determine the compressive strength of the masonry wall along Grid Line 1, a full parapet grouted masonry block was

extracted and compressive tested to better ascertain the compressive (and corresponding shear values) for the block and grout.

The interior and exterior masonry walls along Grid Lines E and 1, respectively, reflect a masonry average expected compressive strength (minus one standard deviation per ASCE 41-17 Section 10.2.2.3.1) of approximately f'_m = 1,753 psi (pounds per square inch) and f'_m = 3,303 psi, respectively. See Table 2-2 for these results as well as Appendix B for their derivation.

Tables 2-2 and 2-3 reflect cored and SH average compressive material test results, standard deviation, coefficient of variation, and expected strength values for the various structural masonry elements. Table 2-4 summarizes all material properties for the building for both lower-bound strength design and expected strength design as required by ASCE 41-17 for the masonry elements for use in the evaluation. Appendix B includes the expected material strengths derived for the combined core and SH tests.

Table 2-2

Summary of Concrete Cores & Block Compressive Test Results

Sample Type (number)[2]	No. of Samples	Average (Mean) Strength, f_{avg} (psi)	Standard Deviation, σ (psi)	Coefficient of Variation (COV) (%)	f_{avg} – 1σ (psi)
Concrete Core Samples					
Masonry Wall Cores (Grid Line E)	2	1,936	183	9	1,753
Masonry Wall Block (Grid Line 1)	1	3630	0	9[3]	3,303
2nd Floor Slab Core (Grid Lines 3/D)	1	2,778	0	0	2,778

[2] Refer to Appendix A for the material testing program, which specifies the sample numbers and locations.

[3] Single test results in no COV. Utilize COV from masonry core compressive test results.

Table 2-3

Summary of Schmidt Hammer (Rebound Hammer)

Compressive Test Results

Structural Element	No. of Samples	Average (Mean) Strength, f_{avg} (psi)	Standard Deviation, σ (psi)	Coefficient of Variation (COV) (%)	$f_{avg} - 1\sigma$ (psi)
Concrete Foundation	10	3,863	647	17	3,216
1st Floor Concrete Columns	40	5,134	918	18	4,215
1st Floor Concrete Piers	20	4,883	926	19	3,957
1st Level CMU Wall Face Shell	10	2,143	518	24	1,625
2nd Floor Concrete Slab on Metal Deck	50	2,937	955	33	1,982
2nd Floor Concrete Perimeter Beams	10	7,668	726	9	6,942

Table 2-4

Summary of Lower-Bound and Expected Compressive & Yield

Strengths for ASCE-41 Evaluation

Structural Element	Field or Laboratory Tested	Lower-Bound Evaluation Strength (psi)	Expected Evaluation Strength (psi)	Tested Strength, $f_{avg} - 1\sigma$ (psi)
Concrete Foundation	Field	2,000	3,000	3,216
1st Floor Concrete Columns	Field	2,667	4,000	4,215
1st Floor Concrete Piers	Field	2,667	4,000	3,957
1st & 2nd Level Interior CMU Walls	Field & Lab	1,150	1,500	1,753
1st & 2nd Level Exterior CMU Walls	Lab	2,500	3,250	3,303
1st and 2nd Level Steel Rebar	No Testing	45,000	56,250	N/A
2nd Floor Concrete Slab on Metal Deck	Field & Lab	1,300	1,950	1,982
2nd Floor & Roof Steel Beams (A36)	No Testing	31,000	34,000	N/A
2nd Floor Concrete Perimeter Beams	Field	4,333	6,500	6,942

3.1 Condition Assessment Results

In conjunction with the material testing plan, a field survey and condition assessment of the building was conducted. Findings from these surveys are presented in the following sections.

3.1.1 Ground Penetrating Radar

Since there are no available as-built structural drawings, Ground Penetrating Radar (GPR) scans were conducted in a variety of locations throughout the building to determine reinforcement bars in concrete and masonry elements. GPR scans were conducted to verify the following:

- Concrete column longitudinal reinforcement layout and ties
- Concrete pier longitudinal reinforcement layout
- Concrete perimeter beam reinforcement layout
- Interior masonry wall reinforcement layout
- Exterior masonry wall reinforcement layout

While GPR scanning is effective in showing the layout of less densely reinforced concrete and masonry elements, it cannot precisely measure the diameter of reinforcing. Small pilot drilling was conducted to observe the size of the reinforcement bar at the interior masonry wall.

Findings from GPR scanning are included in Appendix A.

3.1.2 Pot-Hole of Foundation

While GPR scanning is effective in showing the layout of less densely reinforced concrete elements in walls and columns, the GPR device has limitations relative to deeper concrete elements such as footings. Potholing of one exterior footing was performed near Grid Line 1 and between Grid Lines E and F.

Findings from the potholing are included in Appendi x A.

3.1.3 X-ray Procedures

X-ray of structural elements is often required for concrete moment frame connections and concrete beams in order ascertain longitudinal reinforcement bars and ties. Since the subject building does not appear to contain concrete moment-frames, x-ray procedures were not utilized for the beam-to-column interface. At the perimeter of the building, perimeter concrete beams were GPR surveyed in lieu of x-ray for budgetary purposes in order to ascertain longitudinal reinforcement bars and tie spacing.

3.1.4 Wall, Pier, and Beam Investigations

To better understand the exterior wall, pier, and beam thickness/composition and its relative influence on the lateral force resisting system of the building, a condition assessment was carried out in several locations. This assessment involved GPR scanning of the wall/pier to locate reinforcement bar prior to drilling a small 1-inch diameter pilot-hole in order to investigate the construction of the wall, pier, and perimeter beam.

One location was drilled on the north side of the building. At this location, the pier appears to be constructed of approximately 24-inch-thick reinforced concrete with a pre-cast concrete face shell used as formwork.

At the northwest shear wall, several small pilot-holes were drilled through the wall. The masonry wall appears to be full grouted at a total depth of 23 inches. It appears to consist of double-wythe 10-inch masonry blocks with a 3-inch grout joint between blocks. A single layer of architectural veneer on each side of the wall runs up the wall from the ground level.

One location was drilled at the west side of the building at the perimeter low beam. Results indicate that the low beam is a reinforced concrete beam spanning between vertical piers.

Findings from the drilling are included in Appendix A.

Appendix A

MATERIALS TESTING REPORT

SAN BERNARDINO COUNTY
CORRECTIONS DEPARTMENT REMODEL
303 WEST 5TH STREET
SAN BERNARDINO, CALIFORNIA

DAHL, TAYLOR AND ASSOCIATES
2960 DAIMLER STREET
SANTA ANA, CALIFORNIA 92705

December 9, 2024 (Revised)
MTGL Project No. 6877A04
MTGL Log No. 24-0319-R4

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December 8, 2024

MTGL Project No.: 6877A04
MTGL Log No.: 24-0319-R4
MTGL Branch: Anaheim

Quang Vu, P.E. | Principal Engineer
Dahl, Taylor and Associates
2960 Daimler Street
Santa Ana, CA 92705

Subject: MATERIALS TESTING REPORT
San Bernardino County - Corrections Department Building Remodel
303 West 5th Street, San Bernardino, California

Dear Mr. Vu,

MTGL, Inc. (MTGL) is pleased to present this report containing the structural materials testing results associated with the evaluation of the existing two-story building located at 303 West 5th Street, Street, San Bernardino, California. We conducted these services in general conformance with the scope of work presented in our proposal P-24-747, dated October 14, 2024.

We appreciate this opportunity to be of continued service and look forward to providing additional consulting services during the planning and constructing phases of the project.

Should you have any questions regarding this report, please do not hesitate to contact us.

Respectfully Submitted,
MTGL, Inc.

Jay Rowerdink
Staff Engineer

Isaac Chun, P.E., G.E.
Vice President | Engineering Manager

TABLE OF CONTENTS

ATTACHMENTS:

Figure 1 – Site Location Map
Figures 2A - 2C – Test Location Maps
Figures 3 – 28 – Geophysical Survey of Rebar Scans

Appendix A – Rebound Hammer Test Results
Appendix B – Laboratory Test Results
Appendix C – Core Photographs

1.00 INTRODUCTION

MTGL, Inc. (MTGL) is pleased to present this report containing the structural materials testing results associated with the evaluation of the existing two story building located at 303 West 5th Street, Street, San Bernardino, California. We conducted these services in general conformance with the scope of work presented in our proposal P-24-747, dated October 14, 2024.

1.01 SITE DESCRIPTION

The project consists of testing and verification of the structural materials on an existing 22,969 square feet office building that was built in the 1970's. The site is located on the northeast portion of the block that is bounded by West 5th Street to the north, North Arrowhead Avenue to the east, West 4th Street to the south, and North D Street to the west. The Assessor's Parcel Number is 0135-101-27. Figure 1 shows a site vicinity map.

1.02 PURPOSE AND SCOPE OF WORK

The purpose of our work was to test and verify the existing construction materials to provide information for structural evaluation and rehabilitation by the project structural engineer. The scope of work performed by MTGL consisted of the following. A brief description of each test along with the obtained results are presented in the following sections.

- Rebound (Schmidt) hammer testing of slabs, columns, and beams.
- Concrete coring of the existing slab and patching with non-shrink grout
- Concrete basement wall coring and patching with non-shrink grout
- Compressive strength testing of the concrete cores obtained.
- Ground Penetrating Radar (GPR) of slabs and walls to locate rebar prior to coring.
- GPR scanning of CMU walls to assess spacing and rebar size.
- GPR scanning of footings to confirm size.
- Removal of a single fully grouted CMU Block for compressive strength testing
- Drilling of ½ inch diameter holes using a rotary hammer drill to observe the thicknesses and underlying materials of the roof.
- Preparation of the final report summarizing all test results

2.00 FINDINGS

The following section presents our findings from our field investigation and laboratory testing.

2.01 REBOUND (SCHMIDT) HAMMER TESTING

On November 12, 2024 through November 15, 2024, MTGL performed rebound hammer tests were performed on slabs, columns, beams, piers, and walls in accordance with ASTM C805 – Standard Test Method for Rebound Number of Hardened Concrete. The rebound hammer test is a non-destructive testing method which provides a rapid indication of the concrete surface hardness which can be correlated to an approximate compressive strength. The test locations are shown in Figures 2A through 2C, and the test data is presented in Appendix A. The approximate compressive strengths from the rebound hammer tests are summarized below.

SUMMARY OF REBOUND HAMMER TEST RESULTS

Structural Element	Test Location	Compressive Strength (psi)	Average Strength (psi)
Beams	SH-1B-7CD	7,670	7,670
Columns	SH-1C-4B	5,990	5,130
	SH-1C-5E	4,520	
	SH-1C-6E	4,910	
	SH-1C-5C	5,110	
Footings	SH-1F-1E	3,860	3,860
Piers	SH-1P-7D	4,210	4,890
	SH-1P-6A	5,560	
Slabs	SH-2S-6D / Room 130	3,100	2,970
	SH-2S-5B / Room 144	2,010	
	SH-2S-4D / Room 155	3,980	
	SH-2S-4A / Room 163	2,180	
	SH-2S-3D / Room 168	3,560	
Walls	SH-1W-5E	2,140	2,140

2.02 CONCRETE CORING, CMU BLOCK SAMPLING, AND COMPRESSION TESTING

On November 12, 2024 through November 15, 2024, 4-inch diameter concrete cores were obtained from slabs and walls at various locations in order to perform compressive strength testing in our laboratory. In addition, one fully grouted CMU Block from the wall was sawcut and removed for compressive strength testing. GPR scanning was conducted prior to coring to avoid the rebar.

Coring of the concrete and saw-cutting of the CMU Block was performed by Skaggs Concrete Coring, Inc. Test locations are shown on Figures 2A through 2C. Laboratory test results are presented in Appendix B. Photographs of cores are presented in Appendix C.

Core and Masonry Unit samples were tested in our laboratory for compressive strength testing in accordance with ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete and ASTM C140/90 – Standard Test Methods for Sampling and Testing Concrete Masonry Units. The compressive strength test results are summarized below.

COMPRESSIVE STRENGTH AND DENSITY OF CONCRETE CORES

Structural Element	Test Location	Core Length (in)	Core Density (pcf)	Compressive Strength* (psi)
Wall	1W-3E #1	3.10	133.7	1,780
Wall	1W-4E #2	3.22	134.0	2,040
Slab	2S-3D	3.09	98.5	2,720
Roof	45-DE	------	34.8	------
High Roof	45-EF		32.4	

* - Corrected Strengths based on interpolated L/D correction factors

COMPRESSIVE STRENGTH OF CMU PRISMS

Structural Element	Sample Location	Width (in)	Height (in)	Length (in)	Compressive Strength (psi)
CMU Prism	Wall-Roof	10.25	5.75	9.10	3,630

2.03 GEOPHYSICAL SURVEY

Ground penetrating radar (GPR) was used to determine the location of the reinforcing bars within the walls, slabs, footings, and beams. GPR was also used to verify the foundation size at select locations. GPR is a non-destructive technique that utilizes radar waves generated at the surface which are reflected from subsurface boundaries separating materials of contrasting conductivity and dielectric properties. The GPR was performed by GPRS, Inc. The rebar scans are presented in Figures 3 to 27.

2.04 SECOND FLOOR SLAB THICKNESS DETERMINATION

A 3½ inch core drill was used to core through the second-floor slab to determine the thickness and underlying materials. The results of our observations are as follows:

Structural Element	Test Location	Carpet & Adhesive Thickness (in)	Slab Thickness (in)	Metal Deck Thickness (gauge)
2nd Floor Slab	2S-3D	¼	3½	16

2.05 ROOF AND MECHANICAL MEZZANINE THICKNESS DETERMINATION

A ½ inch rotary hammer drill was used to penetrate the roof in order to determine the thickness and underlying materials. The results of our observations are as follows:

Structural Element	Test Location	Insulation Thickness (in)	Slab Thickness (in)	Metal Deck Thickness (gauge)
Roof	45-DE	2½	3	18
Mechanical Mezzanine	45-EF	------	3½	18
Mechanical Mezzanine High Roof	45-EF		3	18

2.06 WALL THICKNESS DETERMINATION

A½ inch rotary hammer drill was used to penetrate several walls to determine the thickness and composition. The results of our observation s are as follows:

Structural Element	Test Location	Wall Thickness (inches)
First Floor Wall	7-AB	23
First Floor Wall	23-A	8
First Floor Wall	25-E	8
First Floor Wall	5-EF	12
First Floor Wall	17-F	10
Second Floor Wall	7-AB	23
Second Floor Wall	23-A	8
Second Floor Wall	45-E	8
Mech Mezz Wall	45-F	10

3.00 CLOSURE

The findings and test results contained in this report are based on the site conditions as they existed at the time of our investigation and further assume that the site conditions encountered during our investigation are representative of conditions throughout the site.

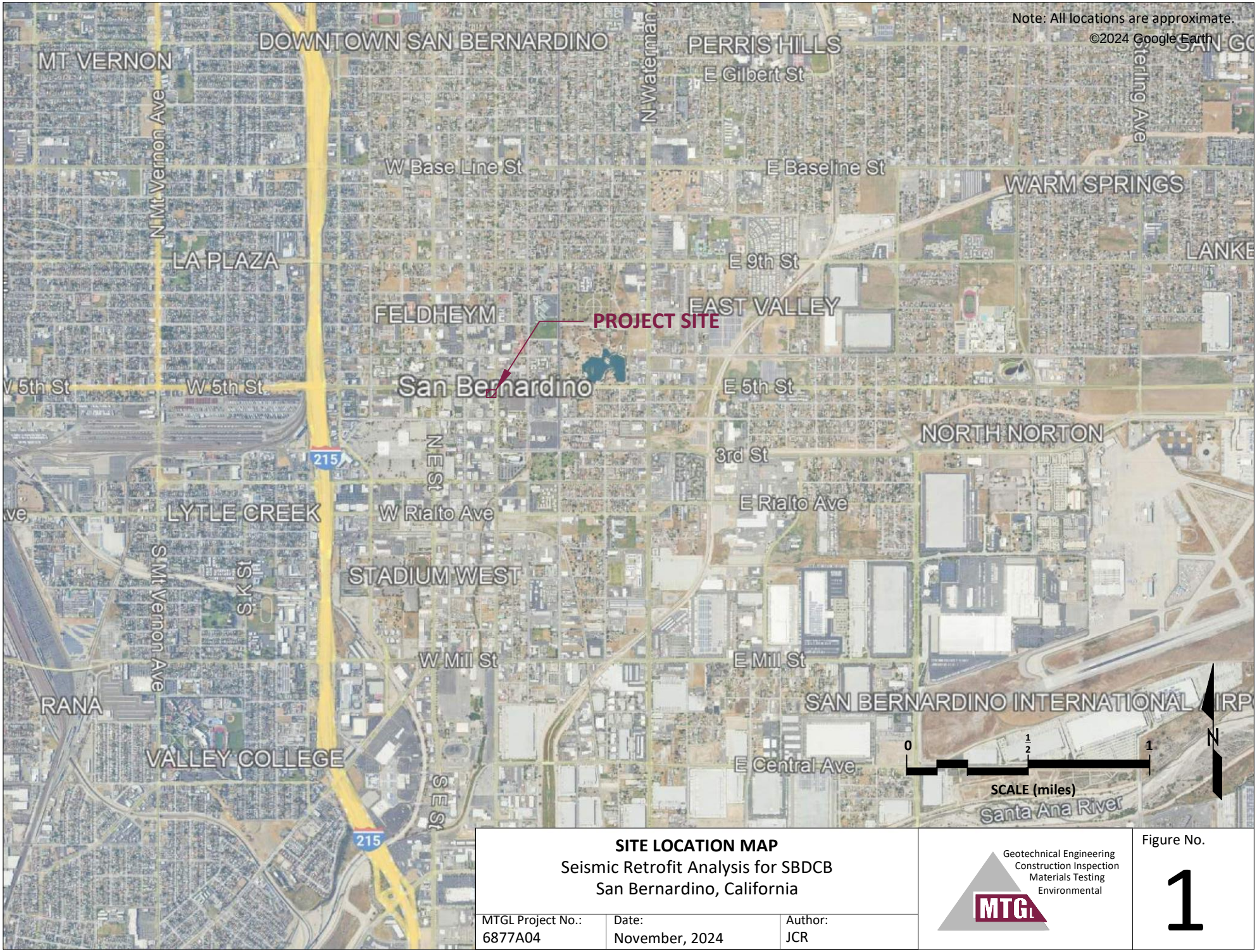
Our investigation was performed using the standard of care and level of skill ordinarily exercised under similar circumstances by reputable soil engineers and geologists currently practicing in this or similar localities. No warranty, express or implied, is made as to the conclusions and professional advice included in this report.

This firm does not practice or consult in the field of safety engineering. We do not direct the Contractor's operations, and we are not responsible for their actions. The contractor is solely and completely responsible for working conditions on the job site, including the safety of all people and property during the performance of the work. This responsibility will apply continuously and is not limited to our normal hours of operation.

The findings of this report are considered valid as of the present date. However, changes in the conditions of a site can occur with the passage of time, whether they are due to natural events or to human activities on these or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge.

Accordingly, this report may become invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

FIGURES

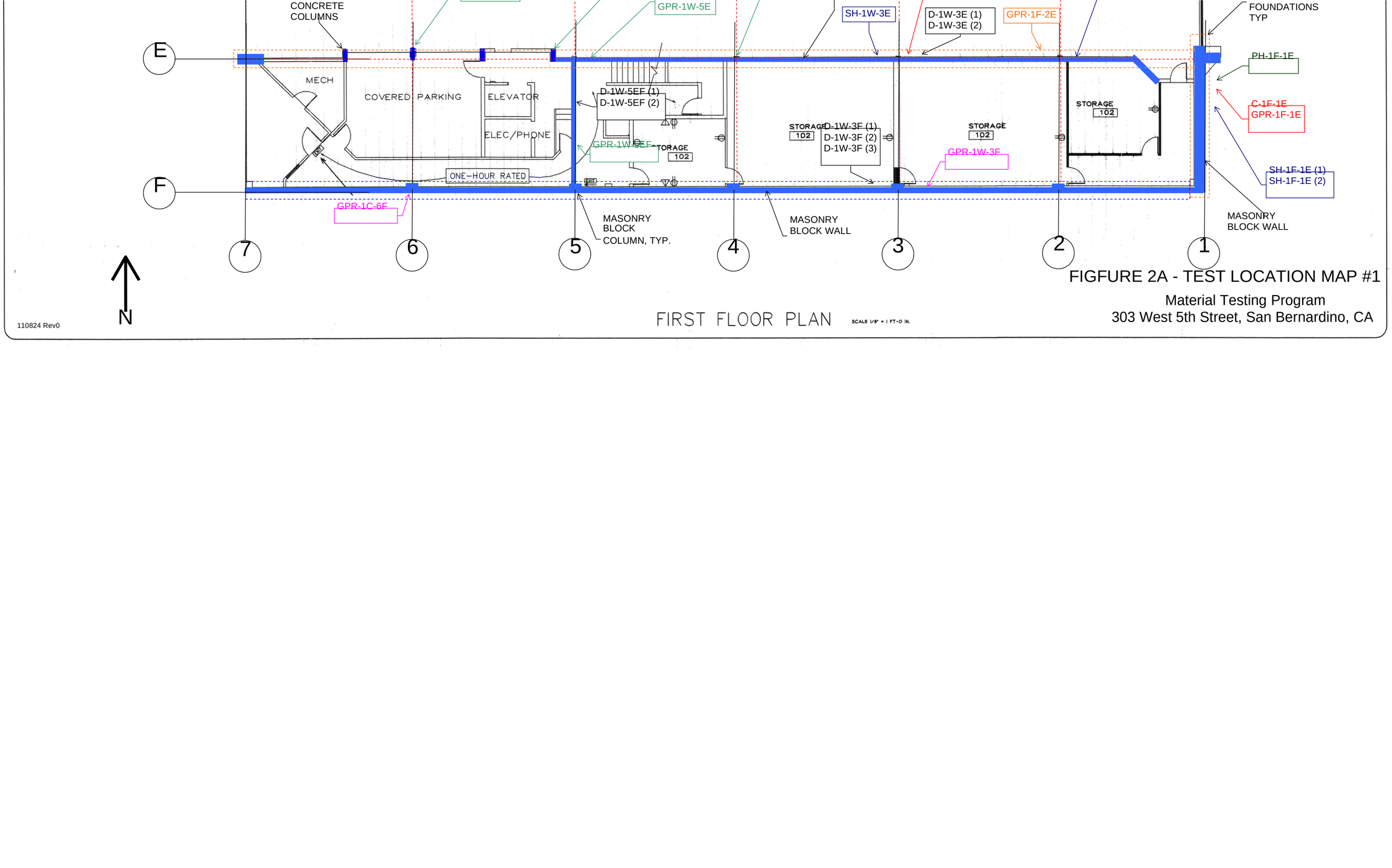


SITE LOCATION MAP
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Author:
6877A04	November, 2024	JCR

Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

Figure No.
1

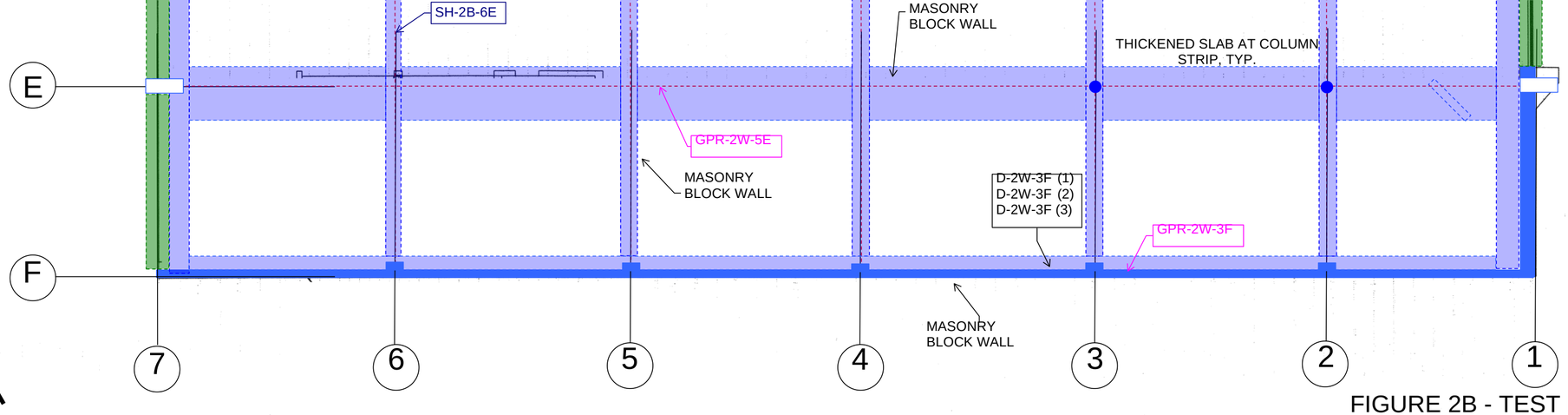


FIRST FLOOR PLAN SCALE 1/8" = 1 FT-0 IN.

110824 Rev0

FIGFURE 2A - TEST LOCATION MAP #1

Material Testing Program
303 West 5th Street, San Bernardino, CA

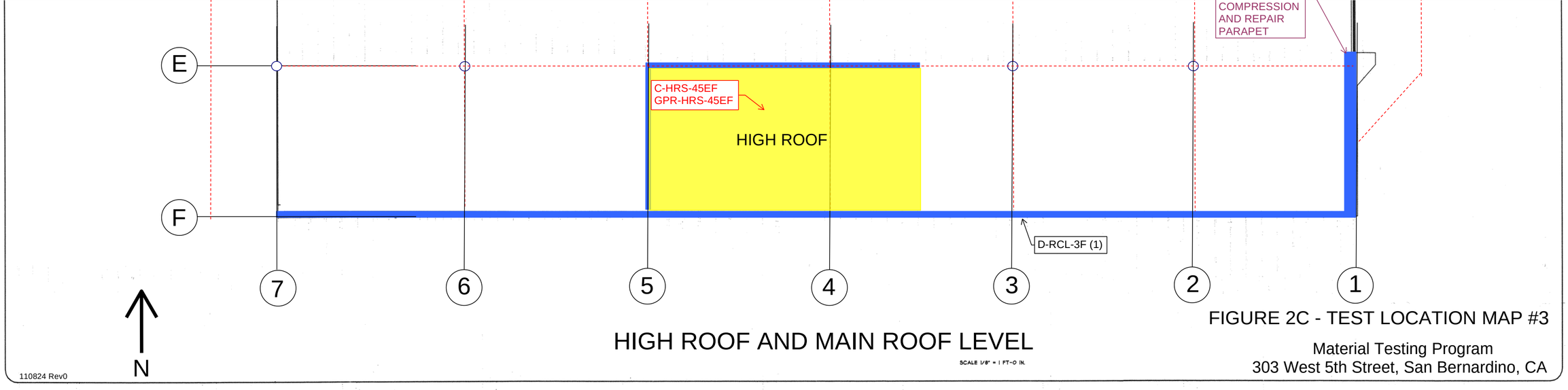


SECOND FLOOR PLAN SCALE 1/8" = 1 FT-0 IN.

FIGURE 2B - TEST LOCATION MAP #2

Material Testing Program
303 West 5th Street, San Bernardino, CA

110824 Rev0



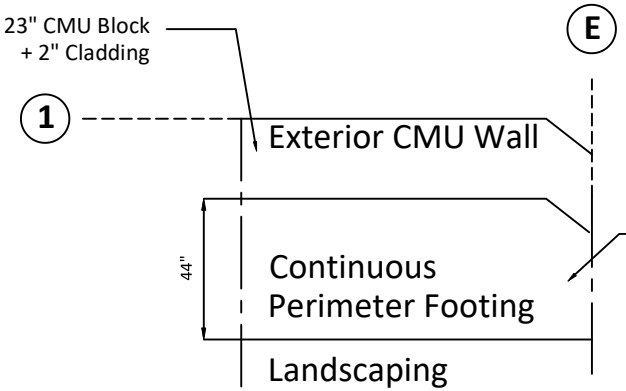
HIGH ROOF AND MAIN ROOF LEVEL

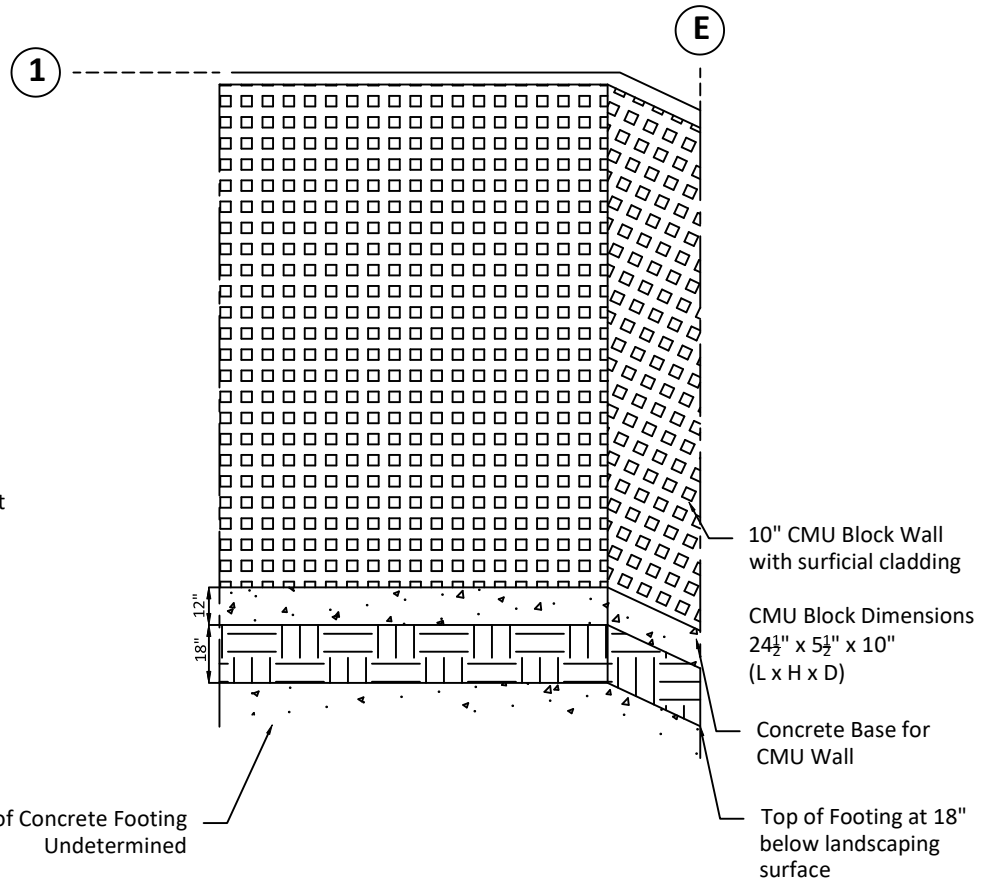
SCALE 1/8" = 1 FT-0 IN.

FIGURE 2C - TEST LOCATION MAP #3

Material Testing Program
303 West 5th Street, San Bernardino, CA

110824 Rev0





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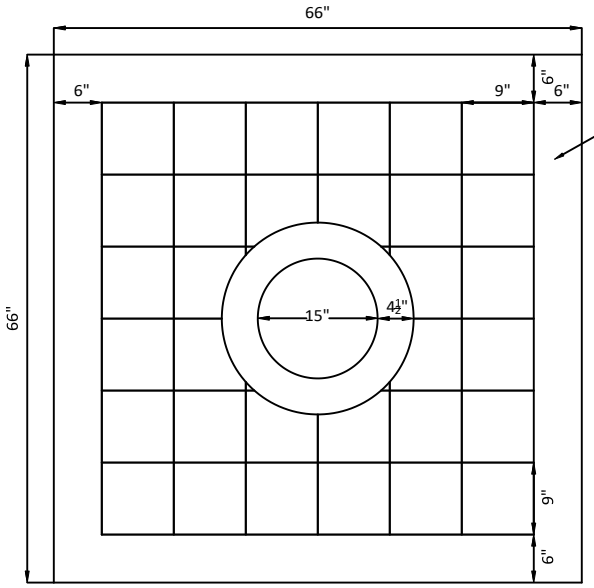
Footing 1F-1E
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=5'	3



Concrete Footing with 15" Column. Column is enveloped by 24" plaster veneer.

Reinforcement ~13" from top of footing.

Reinforcement size unknown.

Footing depth unknown.

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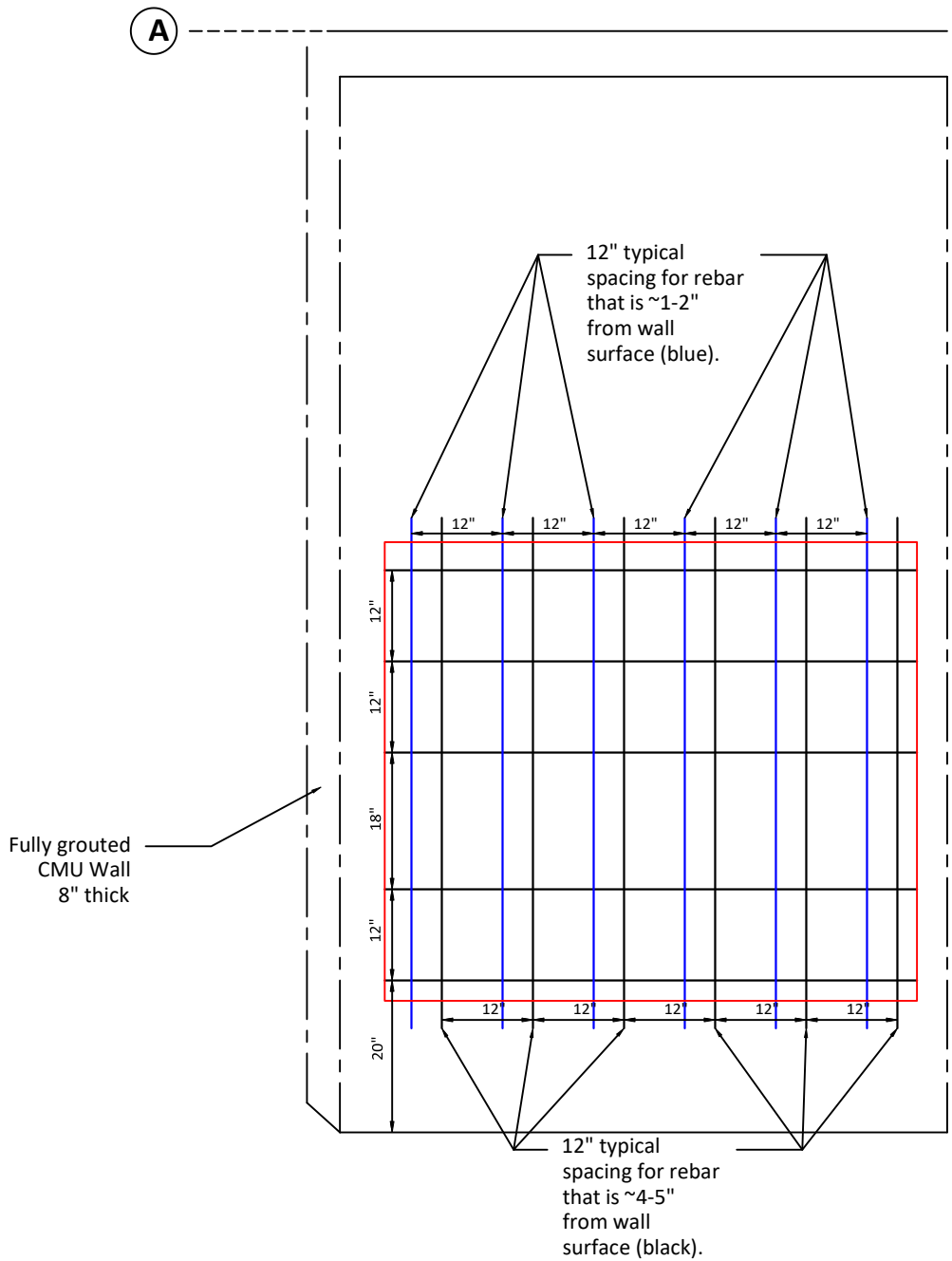
Footing 1F-5.7:C.5
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	4



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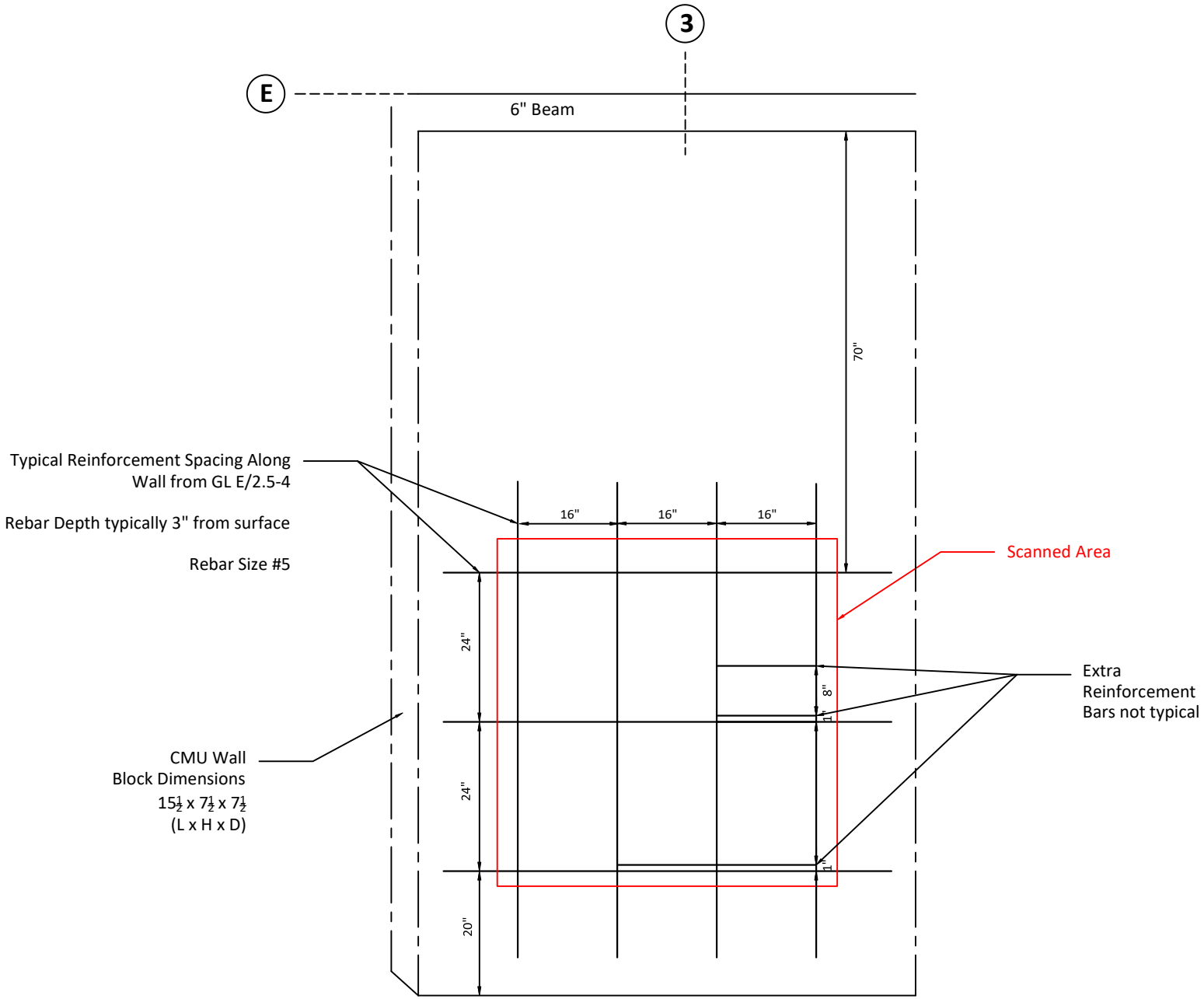
MTGI

Wall 1W-3A

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	5



Geotechnical Engineering
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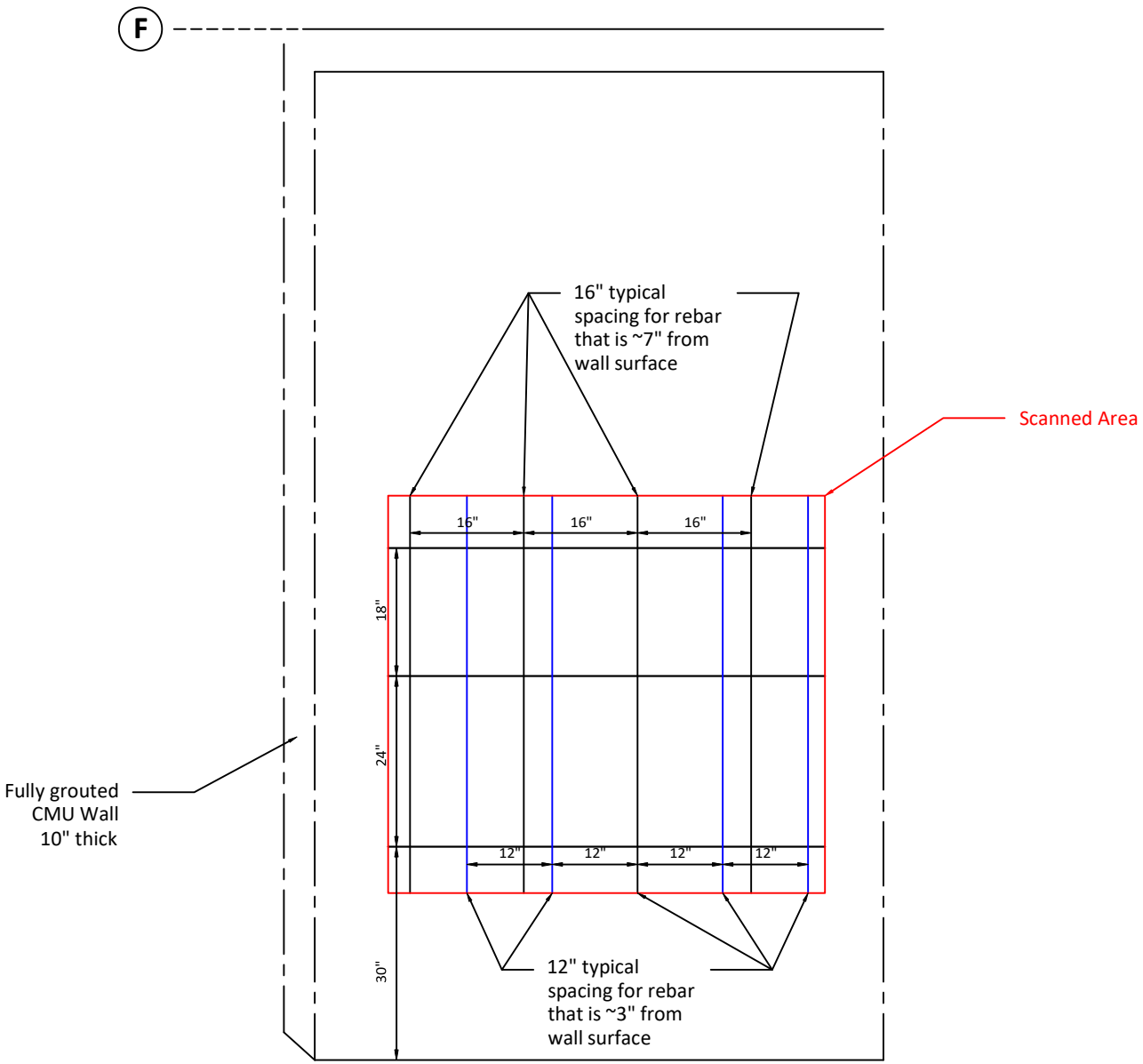
Materials Testing
Environmental

MTGL

Wall 1W-3E

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	6



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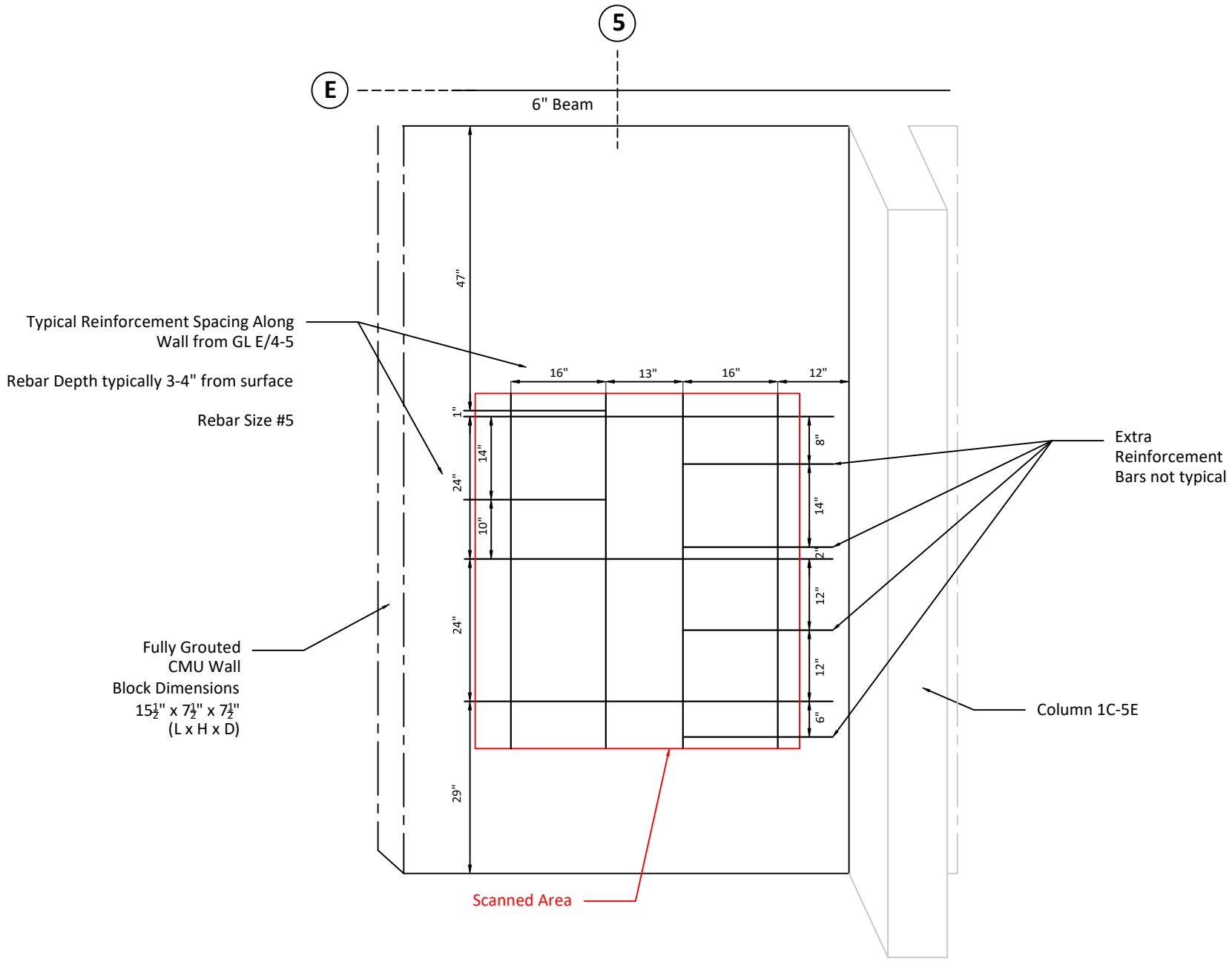
MTGL

Wall 1W-3F

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	7



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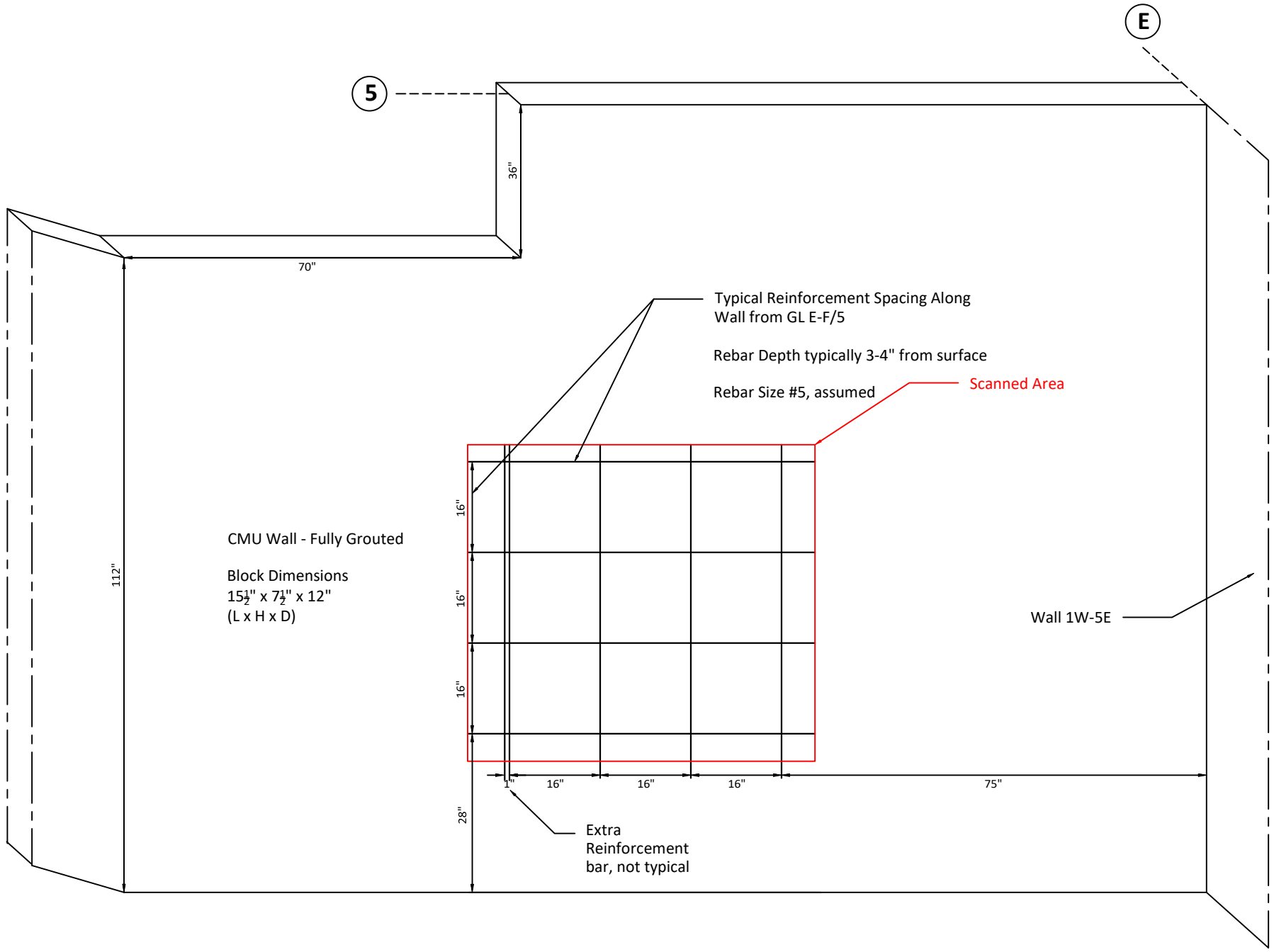
MTGL

Wall 1W-5E
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	8



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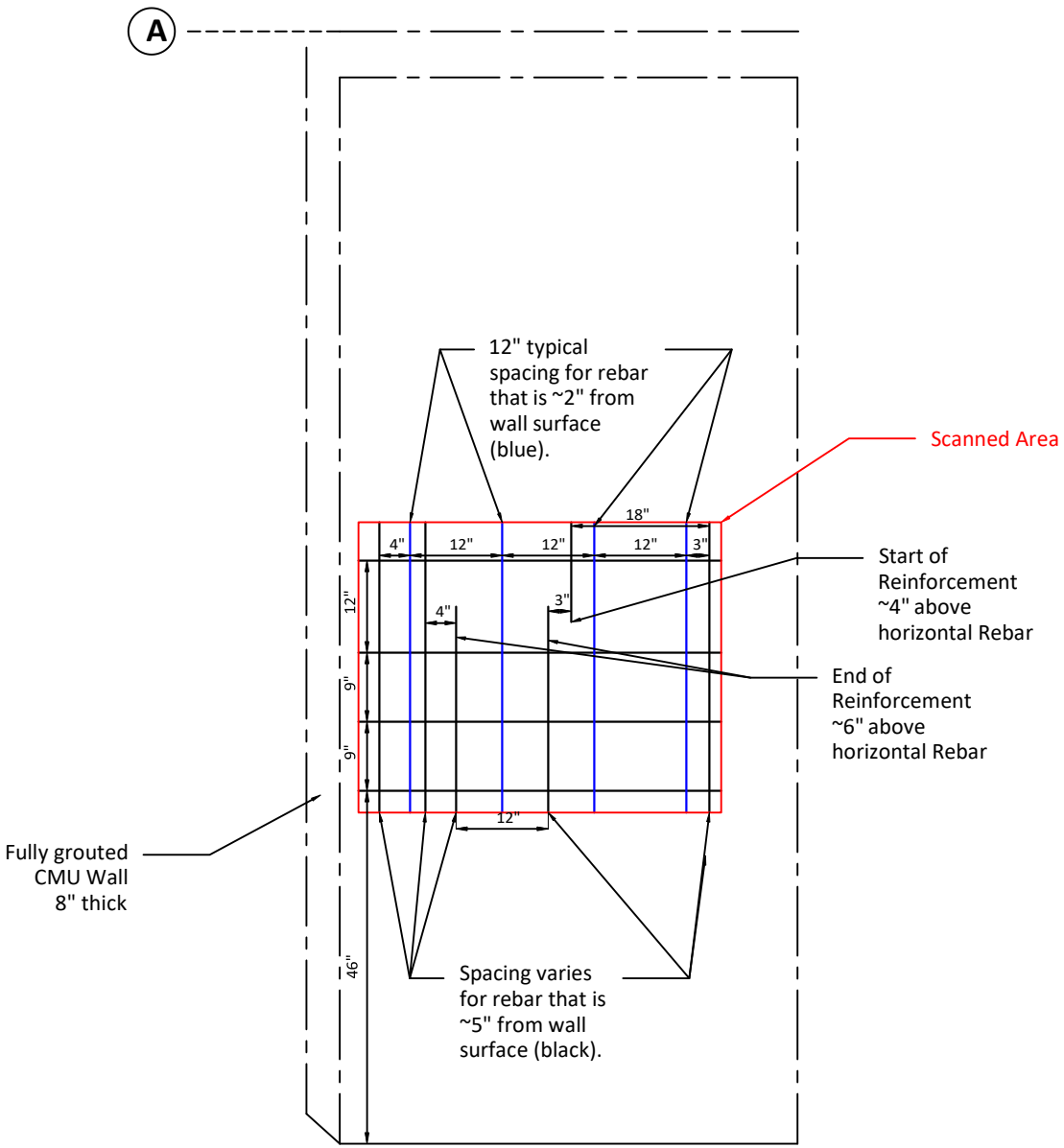
Wall 1W-5EF
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	9



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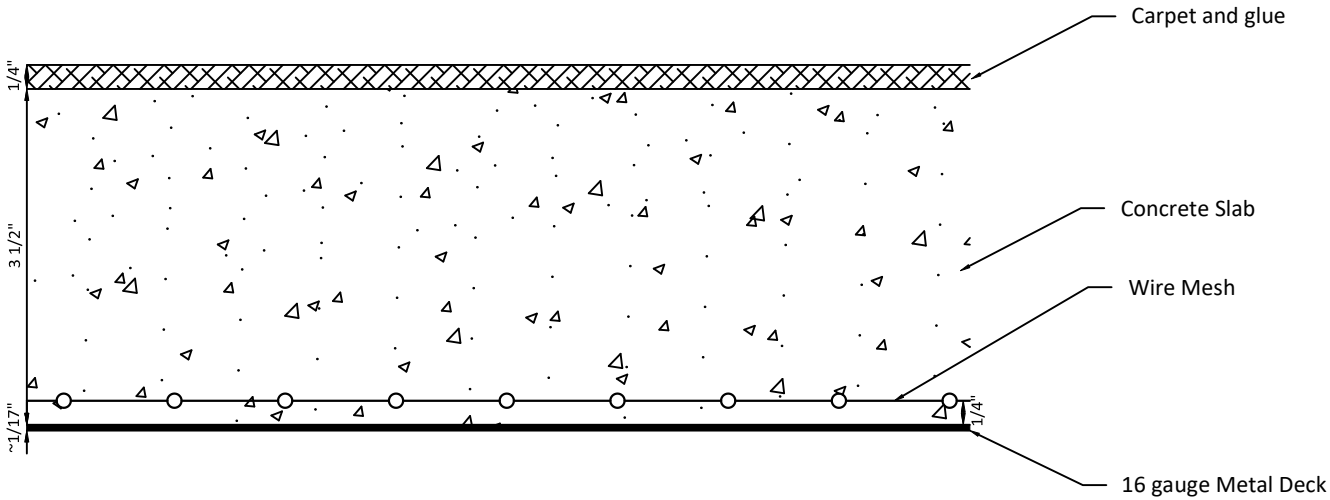
Environmental

MTGL

Wall 2W-3A

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	10



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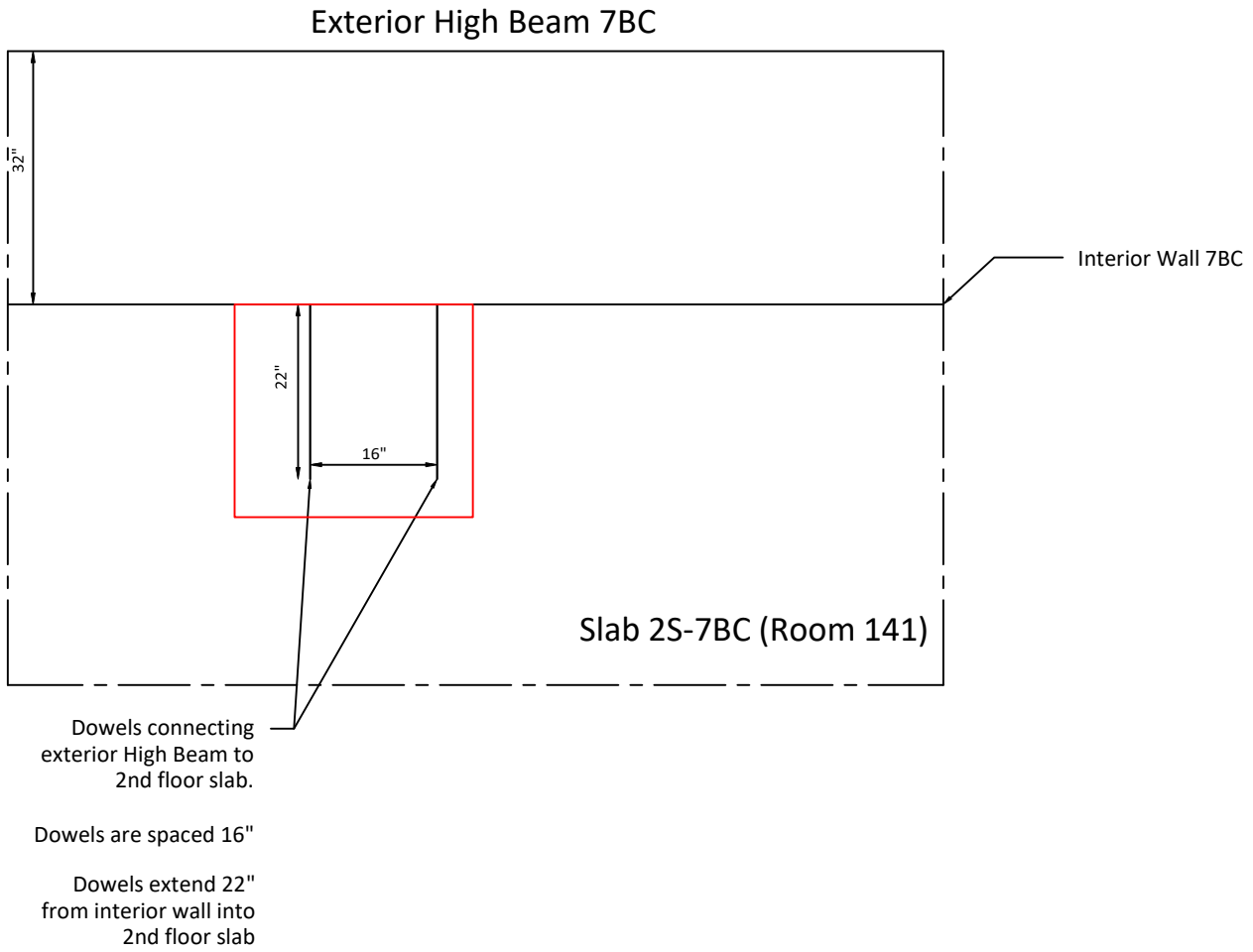
Typical 2nd Floor Slab
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"= 2"	11



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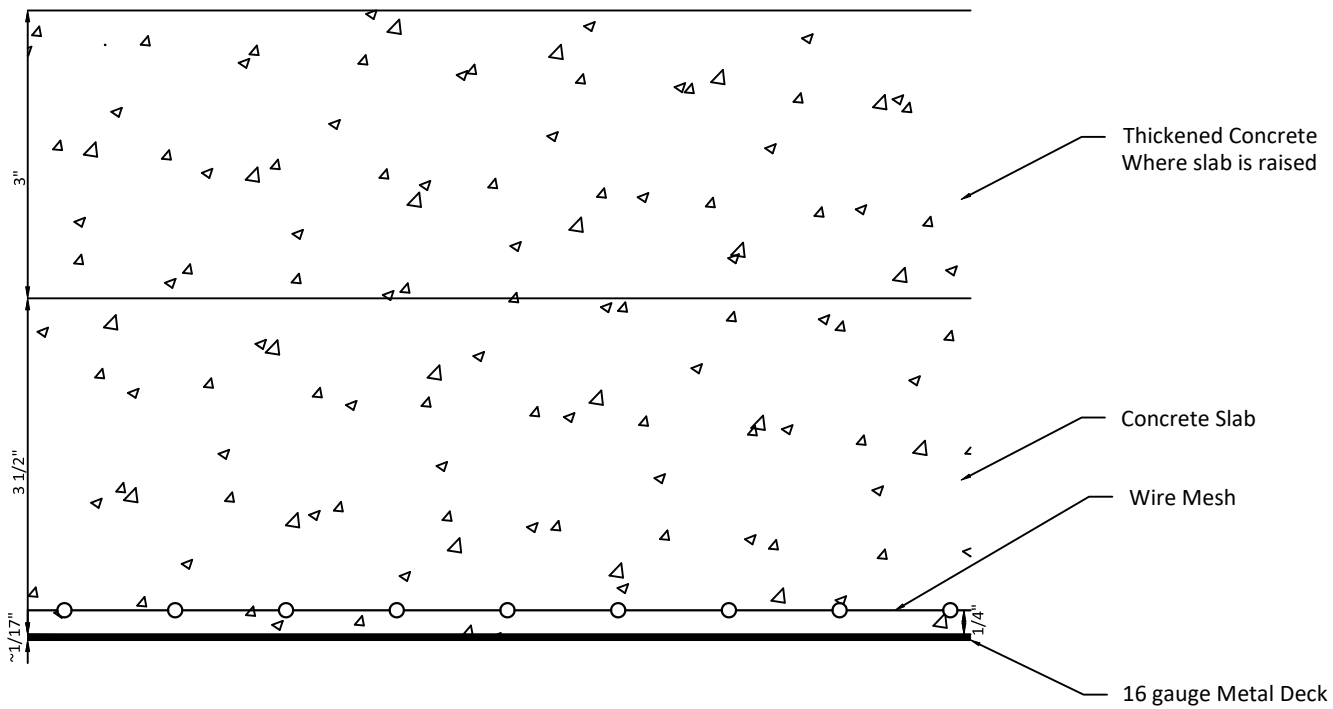
2nd Floor Slab 2S-7BC - Connection to 2HB

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	12



Geotechnical Engineering
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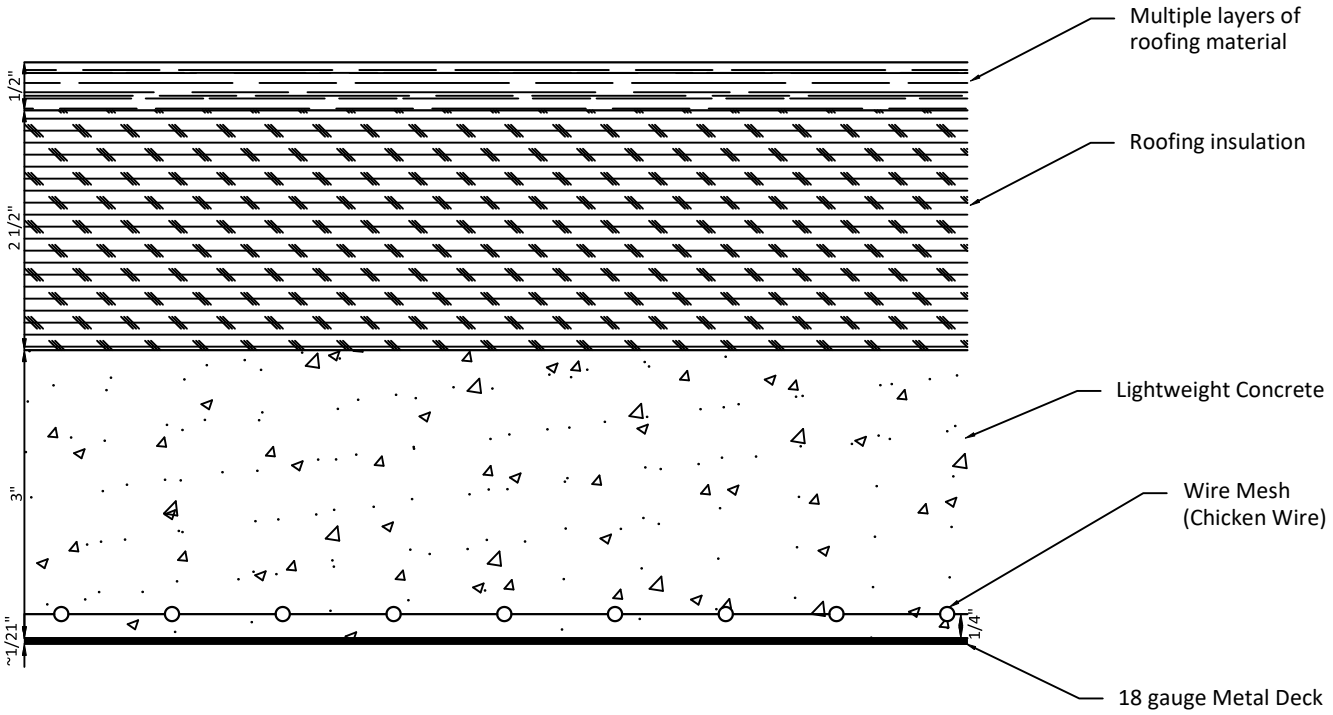
Materials Testing
Environmental

MTGI

Typical MPH Slab
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"= 2"	13



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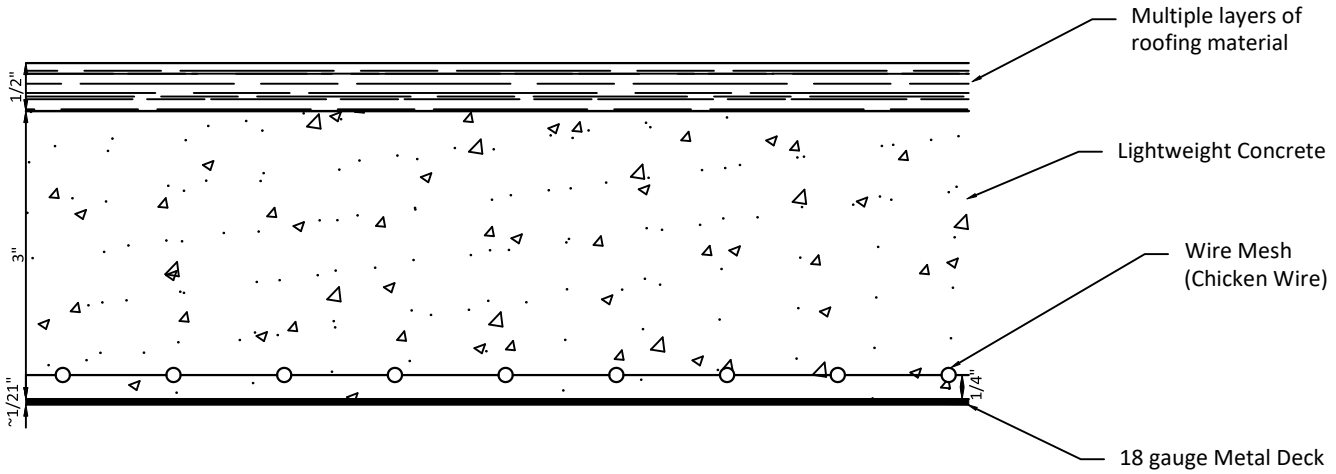
Materials Testing
Environmental

MTGI

Typical Roof Slab
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"= ½"	14



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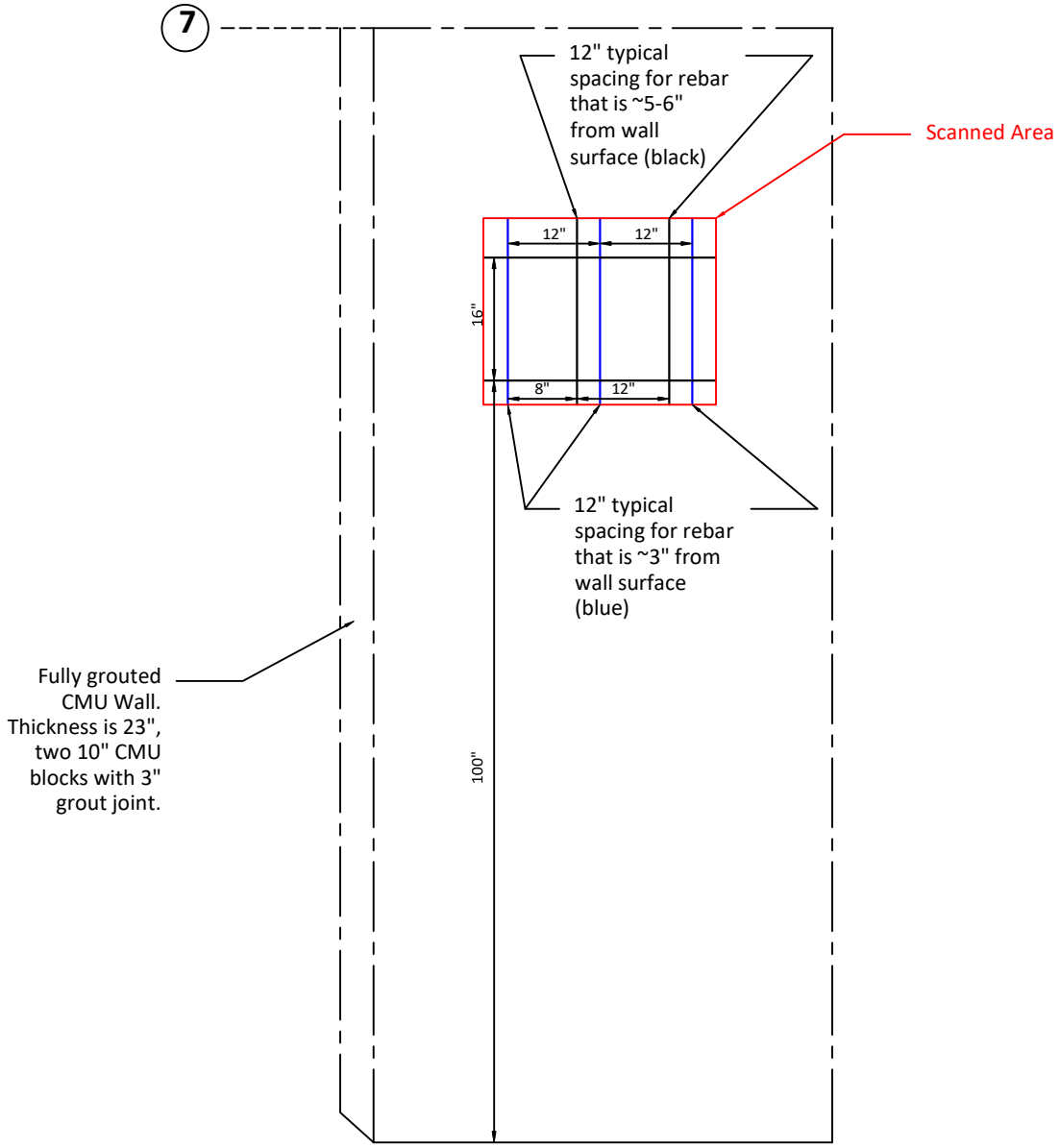
Materials Testing
Environmental

MTGI

Typical High Roof Slab
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	15



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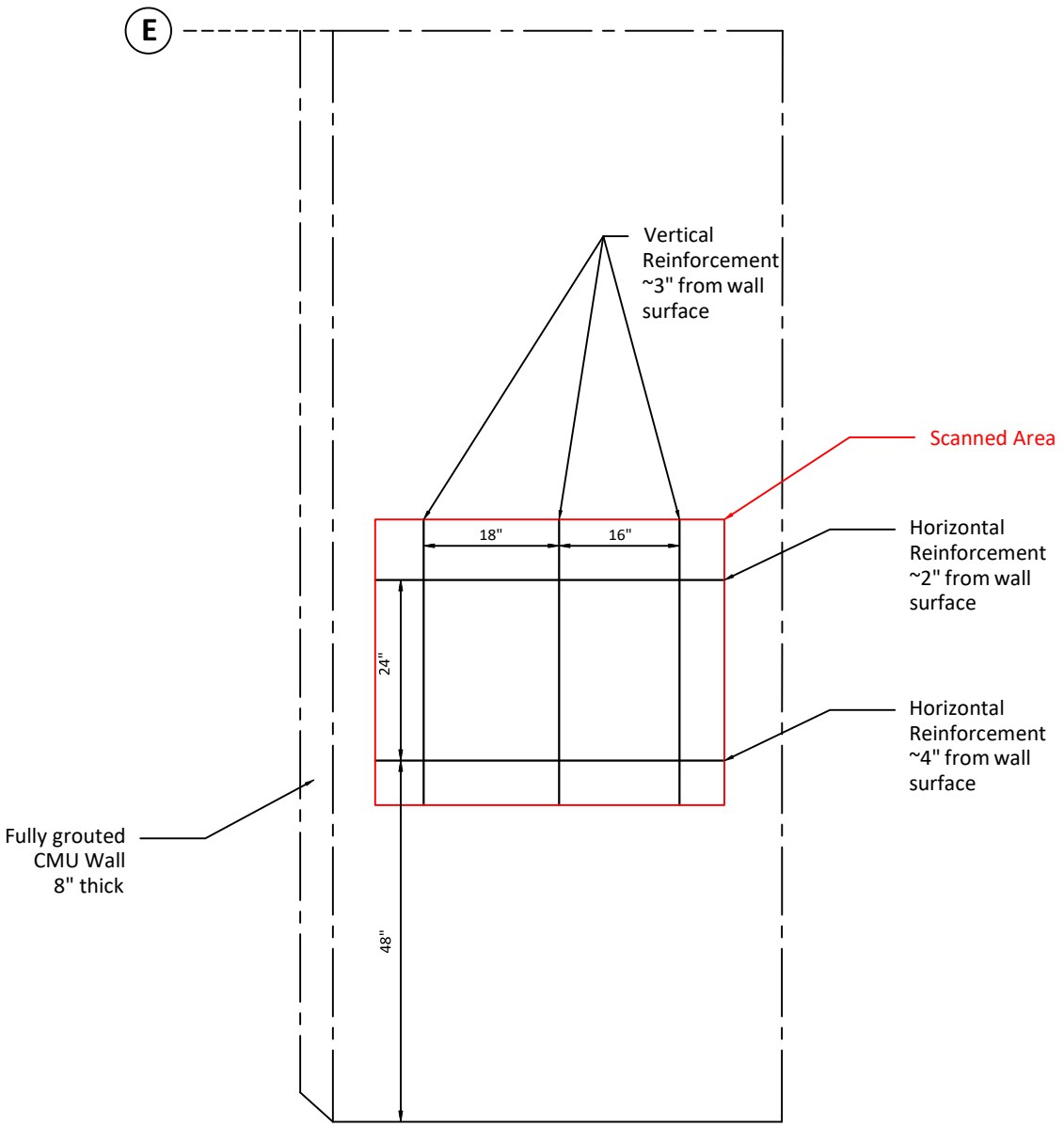
Environmental

MTGL

Wall 2W-7B

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	16



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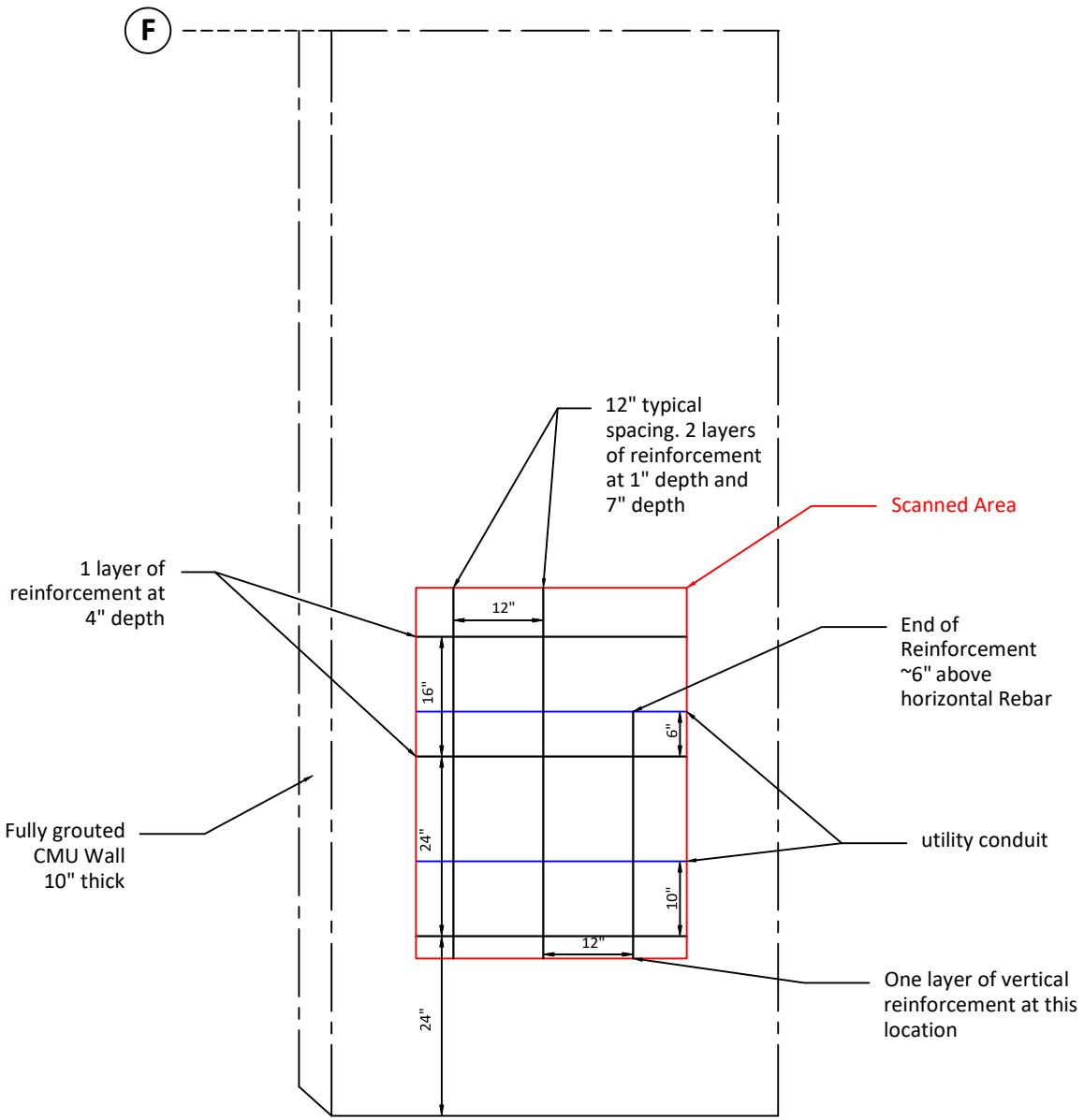
Construction Inspection
Materials Testing
Environmental

MTGI

Wall 2W-5E

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	17



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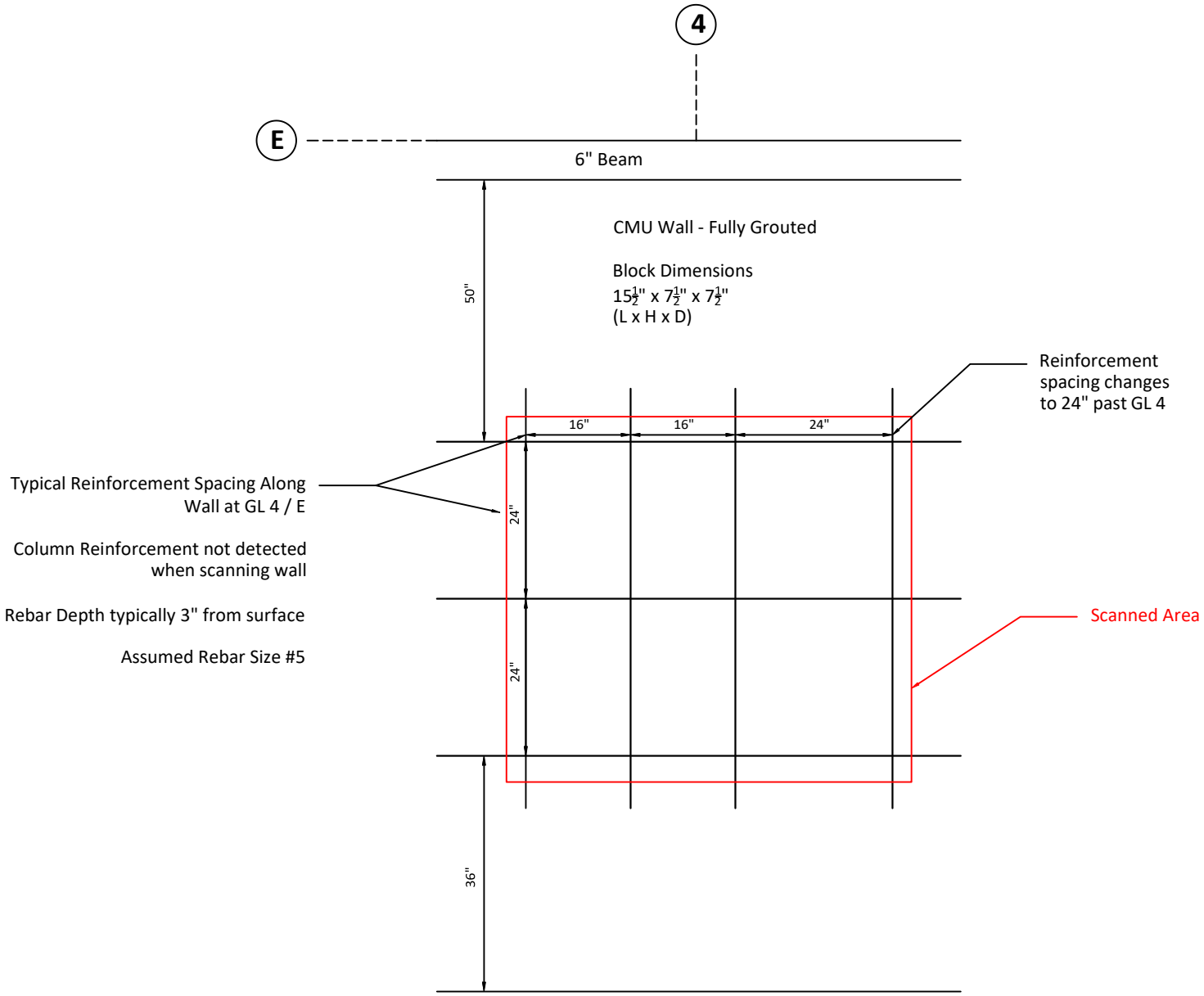
Materials Testing
Environmental

Wall MPHW-3F
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	18



Geotechnical Engineering
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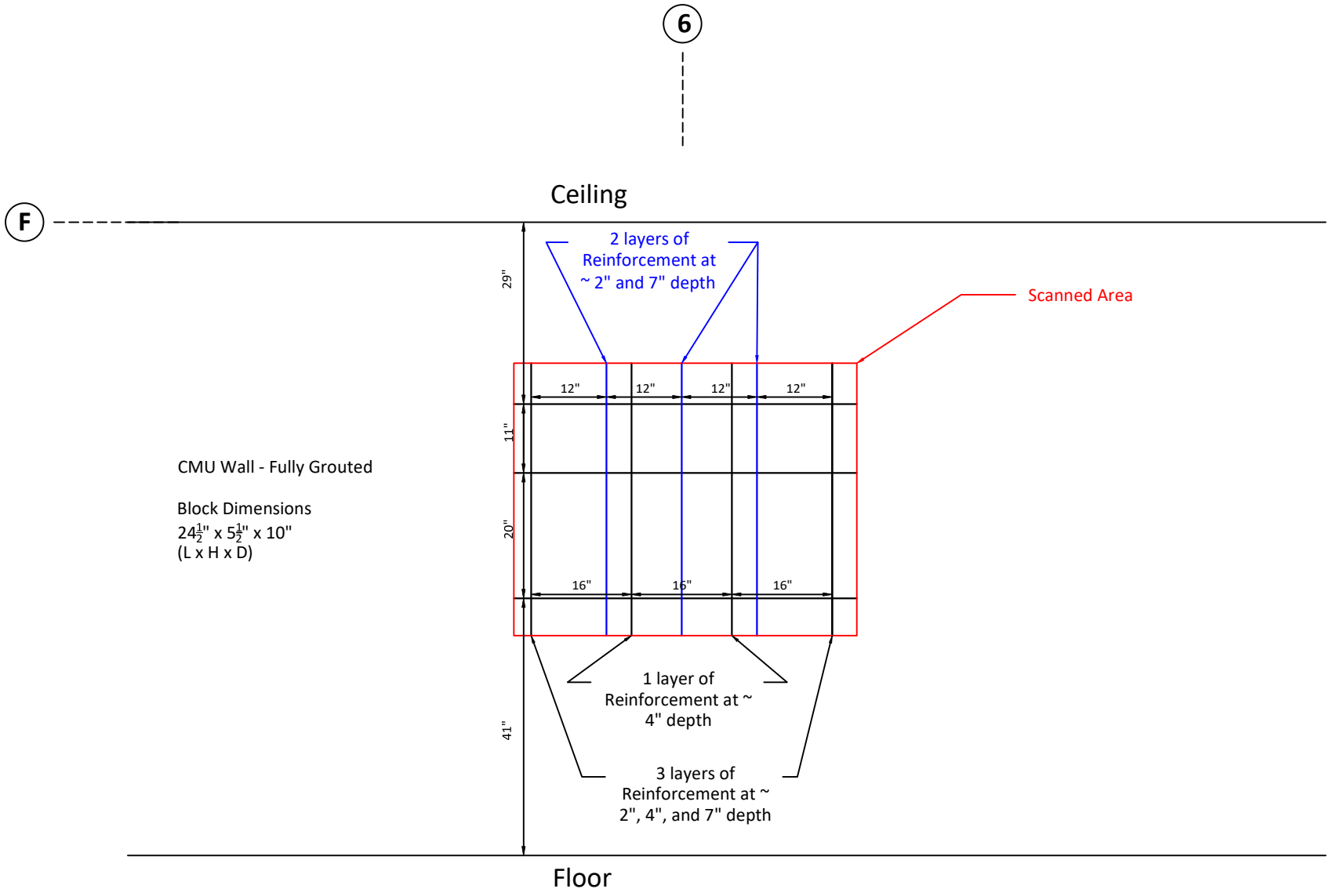
Environmental

MTGL

Column 1C-4E
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	19



CMU Wall - Fully Grouted

Block Dimensions
$24\frac{1}{2}$" x $5\frac{1}{2}$" x 10"
(L x H x D)

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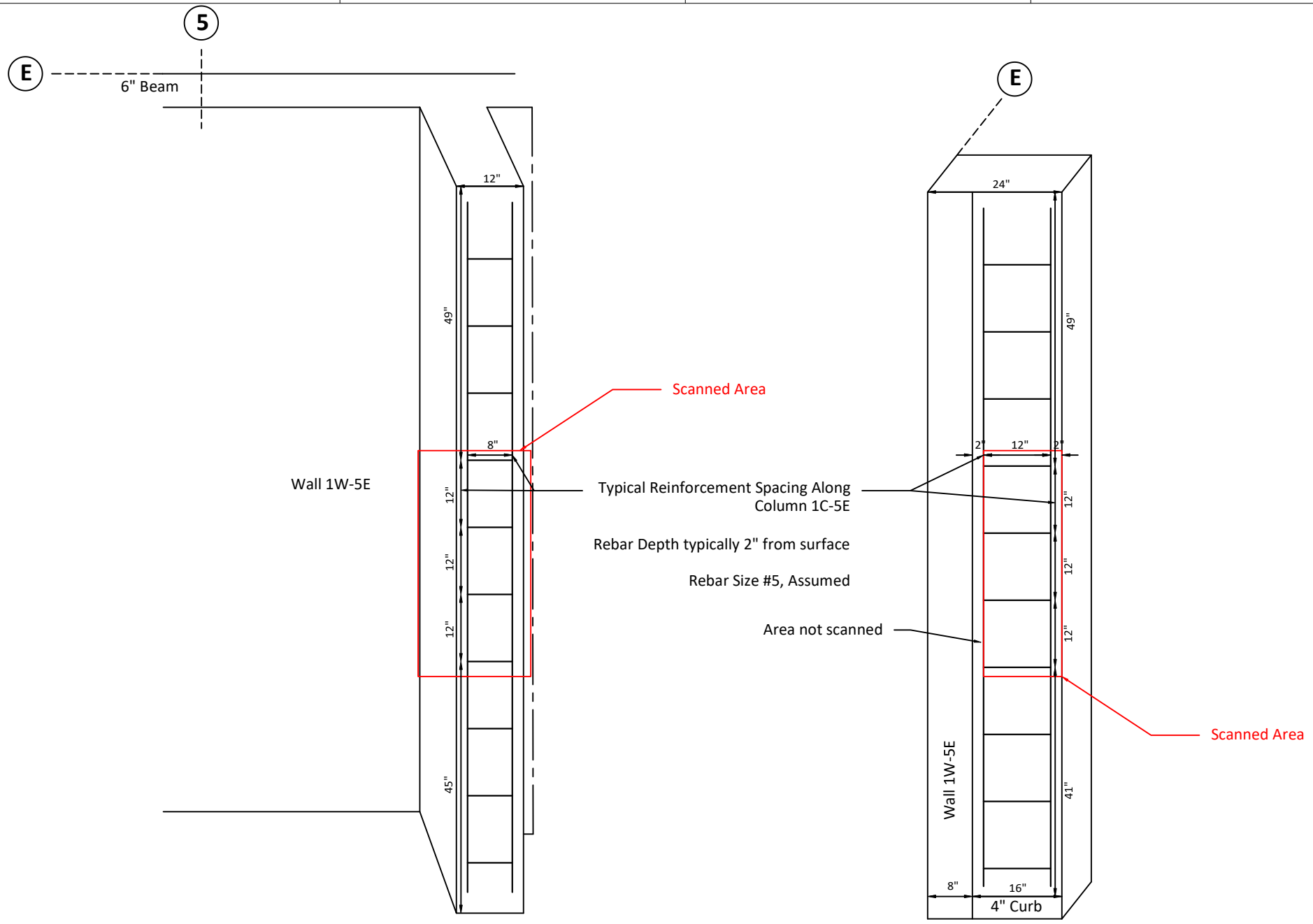
Column 1C-6F
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	20



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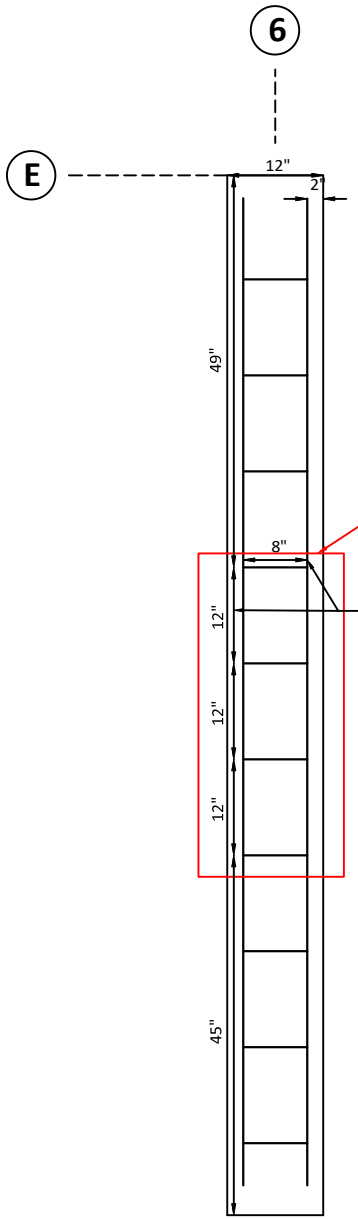
Materials Testing
Environmental

MTGL

Column 1C-5E
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	21



Scanned Area

Typical Reinforcement Spacing Along Column 1C-6E

Rebar Depth typically 2" from surface

Rebar Size #5, Assumed

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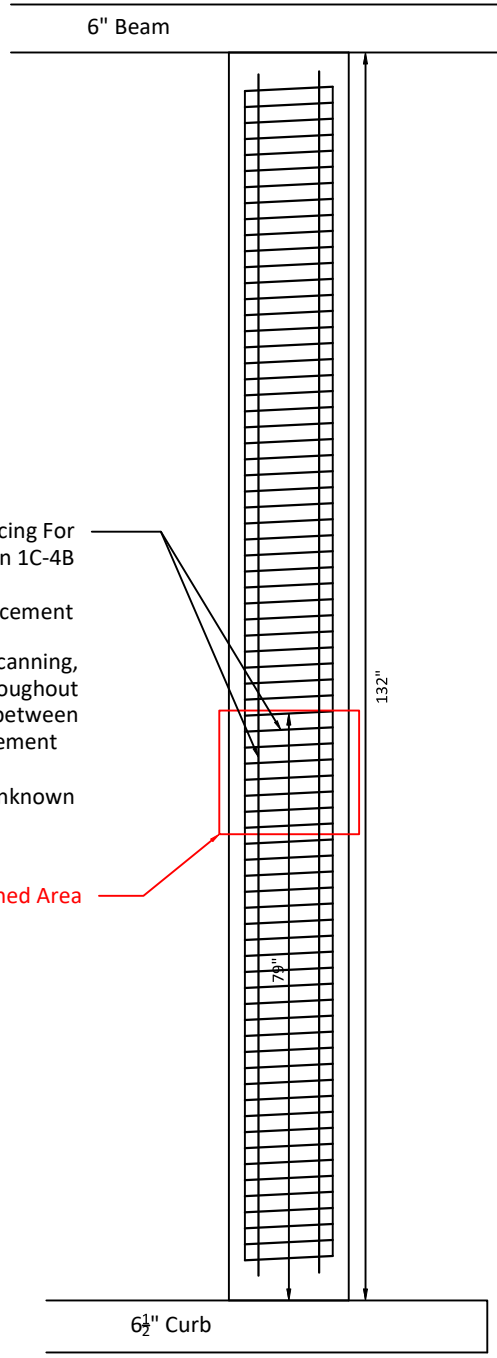
Column 1C-6E
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	22



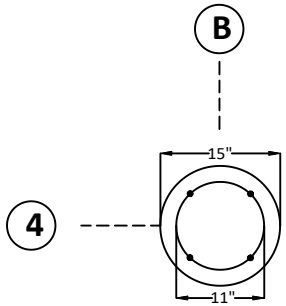
Typical Reinforcement Spacing For Concrete Column 1C-4B

2" Spacing on Spiral Reinforcement

4 Vertical Rebar Found While Scanning, assumed equal spacing throughout column, assumed 2" clear between columnsurfaceandreinforcement

Rebar Size unknown

Scanned Area



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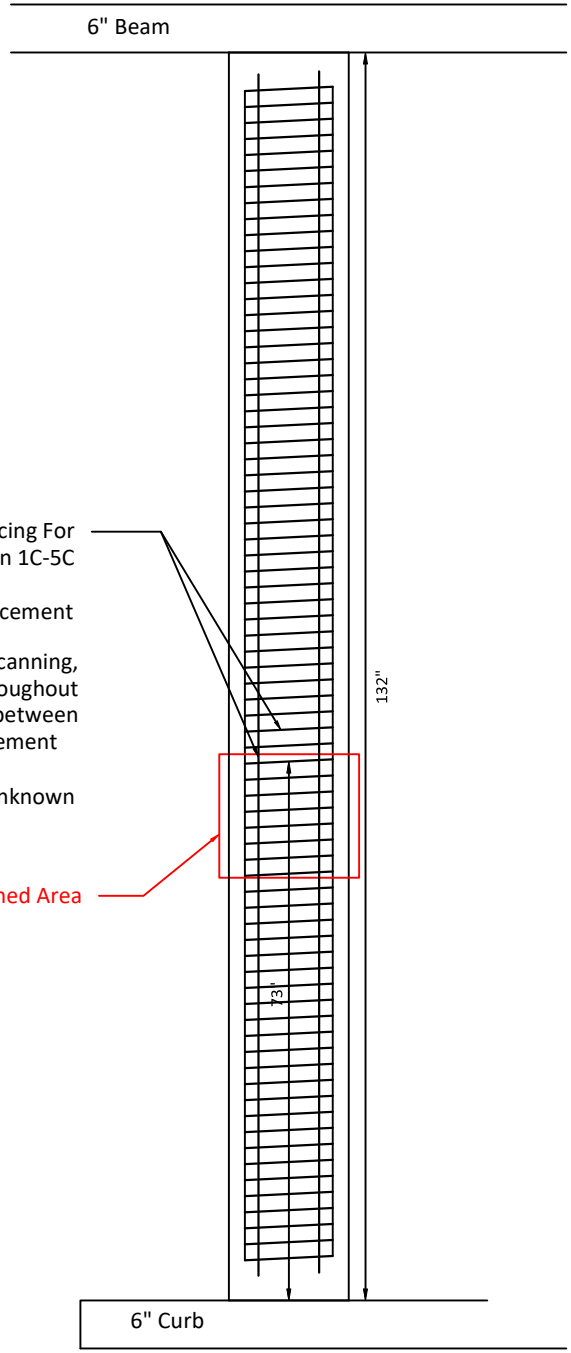
Materials Testing
Environmental

MTGL

Column 1C-4B

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	23



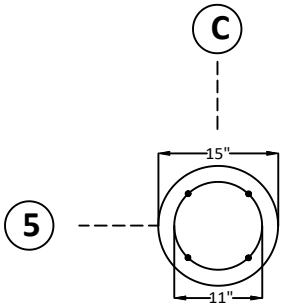
Typical Reinforcement Spacing For Concrete Column 1C-5C

2" Spacing on Spiral Reinforcement

4 Vertical Rebar Found While Scanning, assumed equal spacing throughout column, assumed 2" clear between columnsurfaceandreinforcement

Rebar Size unknown

Scanned Area



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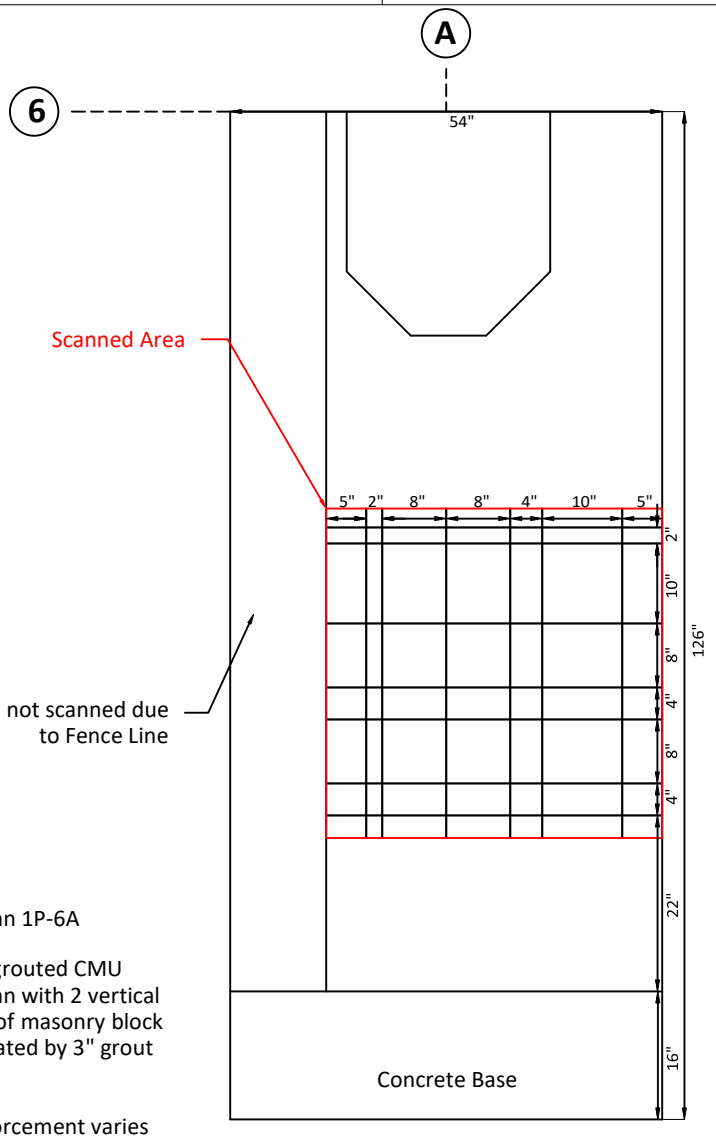
Environmental

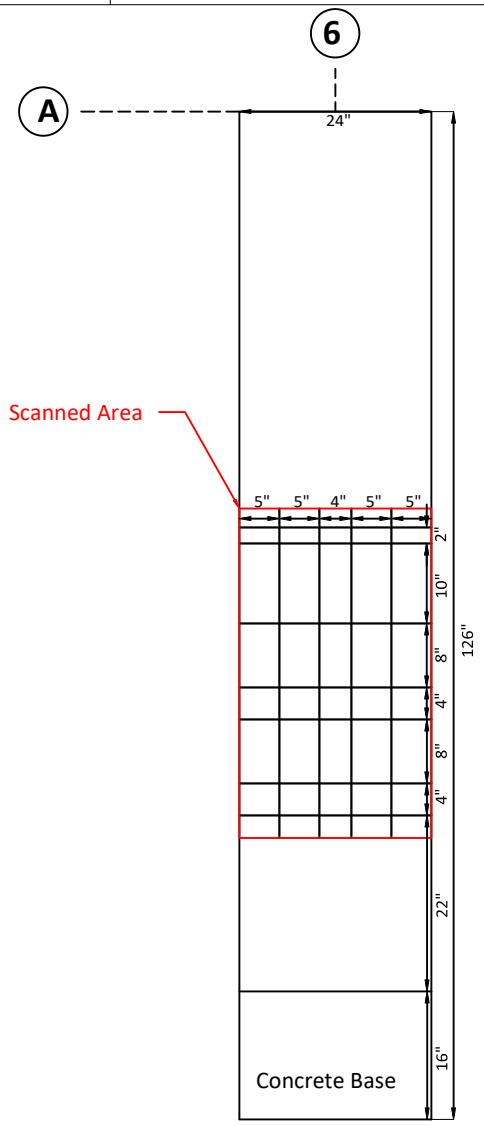
MTGL

Column 1C-5C
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

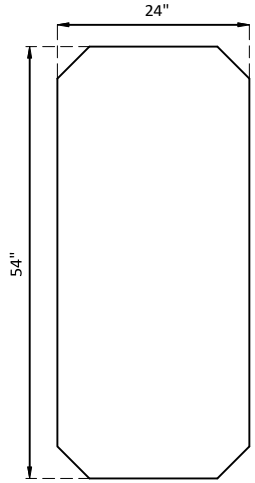
MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	24



WESTERN ELEVATION



SOUTHERN ELEVATION



TOP VIEW

Column 1P-6A

Fully grouted CMU Column with 2 vertical rows of masonry block separated by 3" grout joint.

Reinforcement varies throughout column, two layers of reinforcement 2" and 4" from surface.

Cladding is ~ $\frac{1}{8}$" thick on either side of column.

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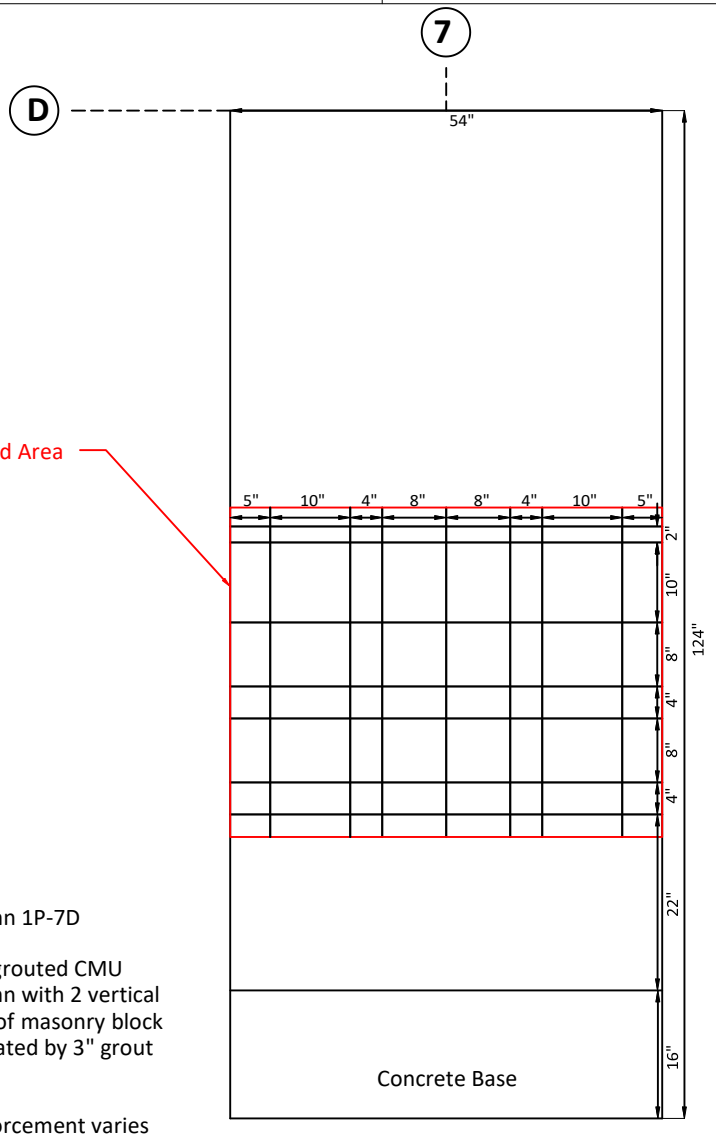
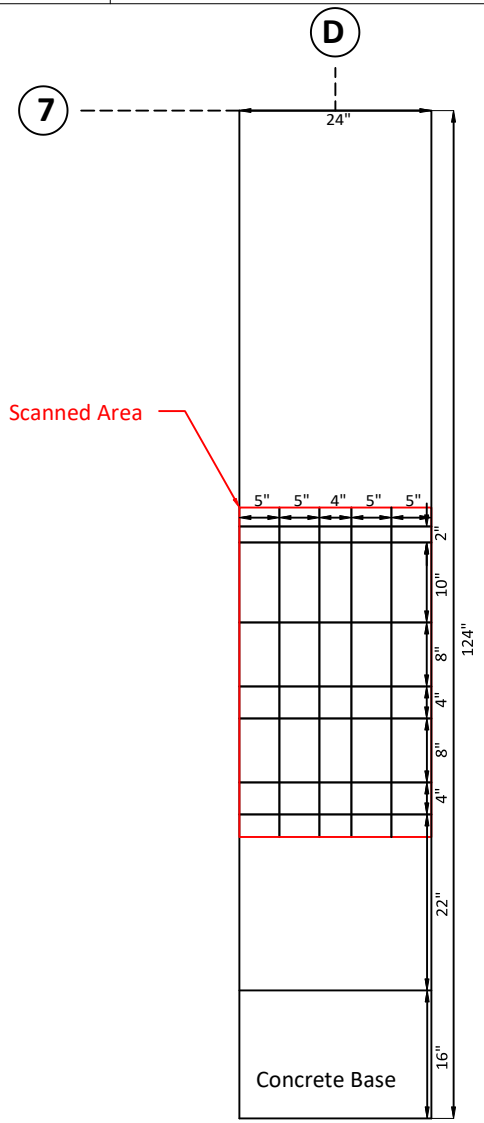
MTGL

Column 1P-6A
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

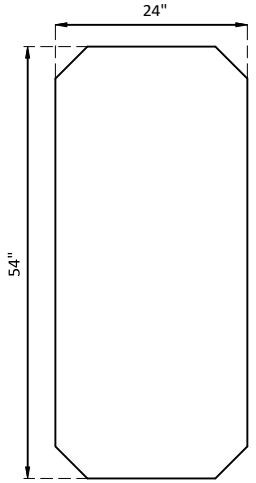
MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	25



SOUTHERN ELEVATION



EASTERN ELEVATION



TOP VIEW

Column 1P-7D

Fully grouted CMU Column with 2 vertical rows of masonry block separated by 3" grout joint.

Reinforcement varies throughout column, two layers of reinforcement 2" and 4" from surface.

Cladding is ~ $\frac{1}{8}$" thick on either side of column.

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Column 1P-7D
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

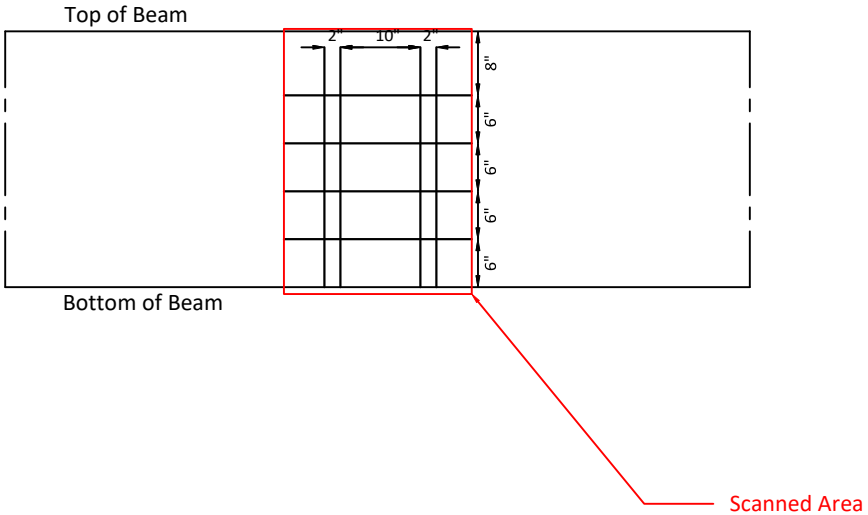
MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	26

Exterior Top Concrete Beam 1B-7BC

4 vertical rows of reinforcement evenly spaced

vertical reinforcement is typically spaced.

Cladding is ~ $\frac{1}{8}$" thick on surface of beam.



EXTERIOR ELEVATION

Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

High Beam 2HB-7BC
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

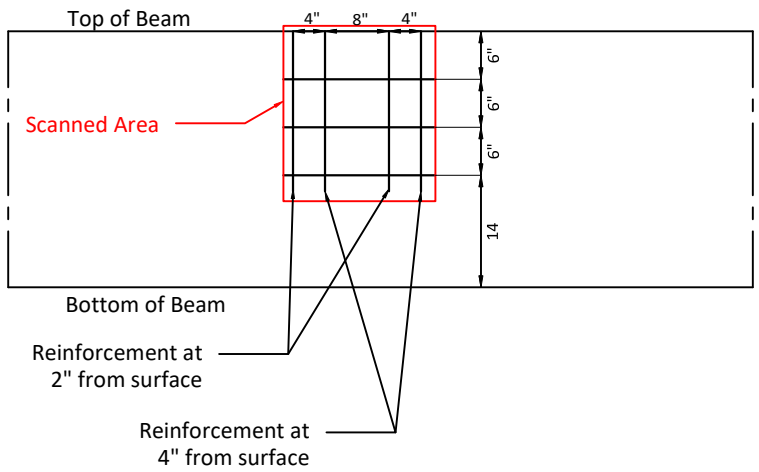
MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	27

Interior Bottom Concrete Beam 1B-7CD

3 rows of horizontal reinforcement evenly spaced

Could not get accurate scan on bottom 14" due to surface angle

Cladding is ~ $\frac{1}{8}$" thick on surface of beam.



INTERIOR ELEVATION

Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

Low Beam 2LB-7CD
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	1"=2'	28

APPENDIX A

REBOUND HAMMER TEST RESULTS

REBOUND HAMMMER (SCHMIDT HAMMER) TESTING RESULTS - ASTM C805

Location:	SH-1C-4B (Column)	
Date:	11/12/24	
Direction:	0	degrees
Test Number	Rebound Number	f'c (psi)
1	46	7,200
2	46	7,200
3	40	5,280
4	38	4,680
5	44	6,560
6	40	5,280
7	44	6,560
8	40	5,280
9	40	5,280
10	44	6,560
Average f'c (psi) =		5,990

Location:	SH-1W-5E (Wall)	
Date:	11/12/24	
Direction:	0	degrees
Test Number	Rebound Number	f'c (psi)
1	26	2,300
2	28	2,580
3	20	1,240
4	24	2,000
5	24	2,000
6	26	2,300
7	26	2,300
8	20	1,240
9	28	2,580
10	30	2,890
Average f'c (psi) =		2,140

Location:	SH-1C-5C (Column)	
Date:	11/12/24	
Direction:	0	degrees
Test Number	Rebound Number	f'c (psi)
1	40	5,280
2	40	5,280
3	38	4,680
4	42	5,910
5	40	5,280
6	36	4,140
7	40	5,280
8	40	5,280
9	38	4,680
10	40	5,280
Average f'c (psi) =		5,110

Location:	SH-1F-1E (Footing)	
Date:	11/15/24	
Direction:	-90	degrees
Test Number	Rebound Number	f'c (psi)
1	36	4,710
2	34	4,290
3	30	3,490
4	26	2,750
5	34	4,290
6	34	4,290
7	30	3,490
8	28	3,120
9	36	4,710
10	30	3,490
Average f'c (psi) =		3,860

Location:	SH-1B-7CD (Beam)	
Date:	11/15/24	
Direction:	0	degrees
Test Number	Rebound Number	f'c (psi)
1	46	7,200
2	50	8,250
3	43	6,240
4	48	7,770
5	48	7,770
6	44	6,560
7	49	8,030
8	50	8,250
9	52	8,580
10	49	8,030
Average f'c (psi) =		7,670

Location:	SH-1C-5E (Column)	
Date:	11/12/24	
Direction:	0	degrees
Test Number	Rebound Number	f'c (psi)
1	37	4,400
2	36	4,140
3	34	3,660
4	38	4,680
5	42	5,910
6	36	4,140
7	38	4,680
8	40	5,280
9	34	3,660
10	38	4,680
Average f'c (psi) =		4,520

Location:	SH-1P-7D (Pier)	
Date:	11/12/24	
Direction:	0	degrees
Test Number	Rebound Number	f'c (psi)
1	38	4,680
2	36	4,140
3	36	4,140
4	38	4,680
5	34	3,660
6	36	4,140
7	38	4,680
8	36	4,140
9	36	4,140
10	34	3,660
Average f'c (psi) =		4,210

Location:	SH-1P-6A (Pier)	
Date:	11/12/24	
Direction:	0	degrees
Test Number	Rebound Number	f'c (psi)
1	42	5,910
2	44	6,560
3	40	5,280
4	36	4,140
5	42	5,910
6	42	5,910
7	40	5,280
8	44	6,560
9	36	4,140
10	42	5,910
Average f'c (psi) =		5,560

Location:	SH-1C-6E (Column)	
Date:	11/12/24	
Direction:	0	degrees
Test Number	Rebound Number	f'c (psi)
1	36	4,140
2	42	5,910
3	42	5,910
4	36	4,140
5	42	5,910
6	34	3,660
7	36	4,140
8	40	5,280
9	42	5,910
10	36	4,140
Average f'c (psi) =		4,910

-90 degrees = Downward, +90 degrees = Upward, 0 degrees = Horizontal

REBOUND HAMMMER (SCHMIDT HAMMER) TESTING RESULTS - ASTM C805

Location:	SH-2S-5B (RM 144)	
Date:	11/13/24	
Direction:	-90	degrees
Test Number	Rebound Number	f'c (psi)
1	20	1,750
2	20	1,750
3	20	1,750
4	24	2,410
5	20	1,750
6	24	2,410
7	24	2,410
8	20	1,750
9	20	1,750
10	24	2,410
Average f'c (psi) =		2,010

Location:	SH-2S-3D (RM 168)	
Date:	11/13/24	
Direction:	-90	degrees
Test Number	Rebound Number	f'c (psi)
1	26	2,750
2	26	2,750
3	30	3,490
4	26	2,750
5	26	2,750
6	36	4,710
7	36	4,710
8	36	4,710
9	30	3,490
10	30	3,490
Average f'c (psi) =		3,560

Location:	SH-2S-6D (RM 130)	
Date:	11/13/24	
Direction:	-90	degrees
Test Number	Rebound Number	f'c (psi)
1	26	2,750
2	26	2,750
3	30	3,490
4	36	4,710
5	26	2,750
6	24	2,410
7	30	3,490
8	30	3,490
9	26	2,750
10	24	2,410
Average f'c (psi) =		3,100

Location:	SH-2S-4A (RM 163)	
Date:	11/13/24	
Direction:	-90	degrees
Test Number	Rebound Number	f'c (psi)
1	22	2,070
2	24	2,410
3	20	1,750
4	26	2,750
5	26	2,750
6	20	1,750
7	22	2,070
8	22	2,070
9	24	2,410
10	20	1,750
Average f'c (psi) =		2,180

Location:	SH-2S-4D (RM 155)	
Date:	11/13/24	
Direction:	-90	degrees
Test Number	Rebound Number	f'c (psi)
1	36	4,710
2	30	3,490
3	34	4,290
4	34	4,290
5	26	2,750
6	30	3,490
7	36	4,710
8	34	4,290
9	34	4,290
10	30	3,490
Average f'c (psi) =		3,980

-90 degrees = Downward, +90 degrees = Upward, 0 degrees = Horizontal

APPENDIX B

LABORATORY TEST RESULTS

COMPRESSIVE STRENGTH AND DENSITY
DRILLED CORES
ASTM C42

Project Name:	Seismic Retrofit Evaluation - 303 W. 5th Street San Bernardino	Tested By :	JA
Project No. :	6877A04	Date Tested:	11/20/2024
Sampled By:	J.R.	Input By:	JA
Date Sampled:	11/12/2024	Checked By:	IC
Sample Location:	Walls and Slabs	Depth(ft.):	N/A
Sample Descr:	4" Concrete Cores	Lab No.:	24-11184
Specified Strength:	N/A	Sample No.:	1-5

COMPRESSIVE STRENGTH OF CORES

SAMPLE NO.	1	2	3			
LAB NO.	24-11184-01	24-11184-02	24-11184-03			
LOCATION	1st Floor Wall (1W-3E #1)	1st Floor Wall (1W-4E #2)	2nd Floor Slab (2S-3D)			
LENGTH (in.) AS RECVD	3.10	3.22	3.09			
DIAMETER (IN.)=D	4.18	4.18	4.18			
AREA (sq. in.)	13.72	13.72	13.72			
CAPPED LENGTH (IN.)=L	3.20	3.30	3.15			
L / D RATIO	0.77	0.79	0.75			
MAX LOAD (lbs.)	31,230	35,440	48,140			
STRENGTH (PSI) - CALCULATED	2,276	2,583	3,508			
STRENGTH (PSI) - REPORTED (NEAREST 10 PSI)	2,280	2,580	3,510			
CORRECTION FACTOR**	0.78	0.79	0.77			
CORRECTED STRENGTH (psi)	1,780	2,040	2,720			
FRACTURE TYPE:	3	3	3			

Fracture Type: 1=Cone, 2=Cone & Split, 3=Columnar, 4=Diagonal Shear,5=Coner Fracturer, 6= Conical Fracture

CORE DENSITY

SAMPLE NO.	1	2	3	4	5	
LAB NO.	24-11184-01	24-11184-02	24-11184-03	24-11184-04	24-11184-05	
LOCATION	1st Floor Wall (1W-3E #1)	1st Floor Wall (1W-4E #2)	2nd Floor Slab (2S-3D)	Raised Roof Slab	Roof Slab	
CORE WEIGHT (g)	1492.30	1553.20	1095.80	367.20	39.50	
DIAMETER (IN.)=D	4.18	4.18	4.18	4.18	2.21	
LENGTH BEFORE CAPPING (in)	3.10	3.22	3.09	2.93	1.21	
CORE DENSITY (pcf)	133.7	134.0	98.5	34.8	32.4	

COMMENTS** L/D<1.00 - Correction Factor Interpolated. Results are for Info Purposes Only

Correction Factors for L / D Ratio	
1.00	0.870
1.25	0.930
1.50	0.960
1.75	0.981
1.94	1.000
2.10	1.000

COMPRESSIVE STRENGTH OF CMU PRISMS
ASTM C1314-16

Project Name:	Seismic Retrofit Analysis for SBDCB	Tested By :	J. Alvarez
Project No. :	6877A04	Date Tested:	11/20/2024
Client:	Dahl, Taylor and Associates, Inc.	Input By:	J. Alvarez
Sampled By:	Jay Rowerdink	Checked By:	I. Chun
Date Sampled:	11/12/2024	Depth(ft.):	
Sample Loc:	Roof	Lab No.:	24-11184
Sample Descrip:	Fully frouted masonry Block 24.5"x5.5"x10"	Set / Sample No.:	
		Required Strength (psi):	

AGE	DATE	LENGTH (IN) (ave of 4) (Nearest .05")	HEIGHT (IN) (ave of 4) (Nearest .05")	WIDTH (IN) (ave of 4) (Nearest .05")	NET CROSS SECT. AREA (Wx L)	PEAK LOAD	STRENGTH (NRST 10 PSI) (a)	HT to LLD (least lateral dim) RATIO (H/LLD)	CORRECTION FACTOR (b)	CORRECTED STRENGTH (a x b)	FRACTURE TYPE
	11/20/24	9.10	5.75	10.25	93.28	338,290	3630	0.63	1.00	3630	2
									AVERAGE =	3630	

Fracture Type: 1=Cone, 2=Cone & Shear, 3=Cone & Spilt, 4=Tension Break, 5=Semi Conical, 6=Shear, 7 = Face Shell Separation

COMMENTS:

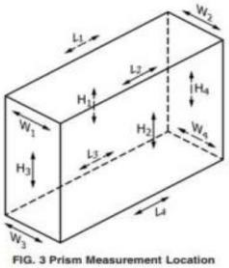


FIG. 3 Prism Measurement Location

Height to least lateral dimension is usually height/width.

TABLE 1 Height to Thickness Correction Factors for Masonry Prism Compressive Strength

h_p/t_p [A]	1.3	1.5	2.0	2.5	3.0	4.0	5.0
Correction Factor	0.75	0.86	1.0	1.04	1.07	1.15	1.22

[A] h_p/t_p—Ratio of prism height to least lateral dimension of prism.

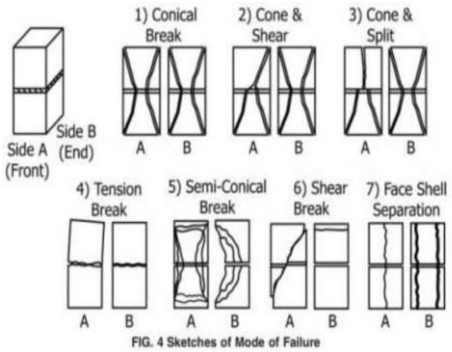


FIG. 4 Sketches of Mode of Failure

Load rate: Initial rate can be at righer rate up 50% of expexted max load. Apply remaining load at a rate where peak is reached between 1 top 2 minutes

APPENDIX C

PHOTOGRAPHS

Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

MTGL

Pictures - Column 1C-4B

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-1

Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

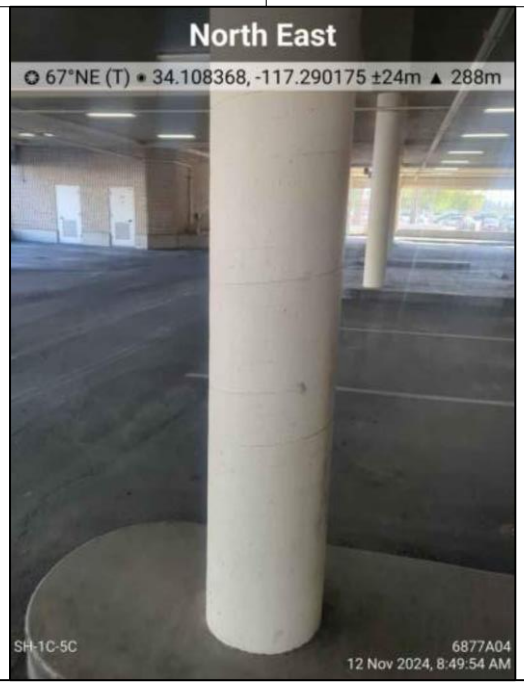
MTGL

Pictures - Column 1C-4E

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

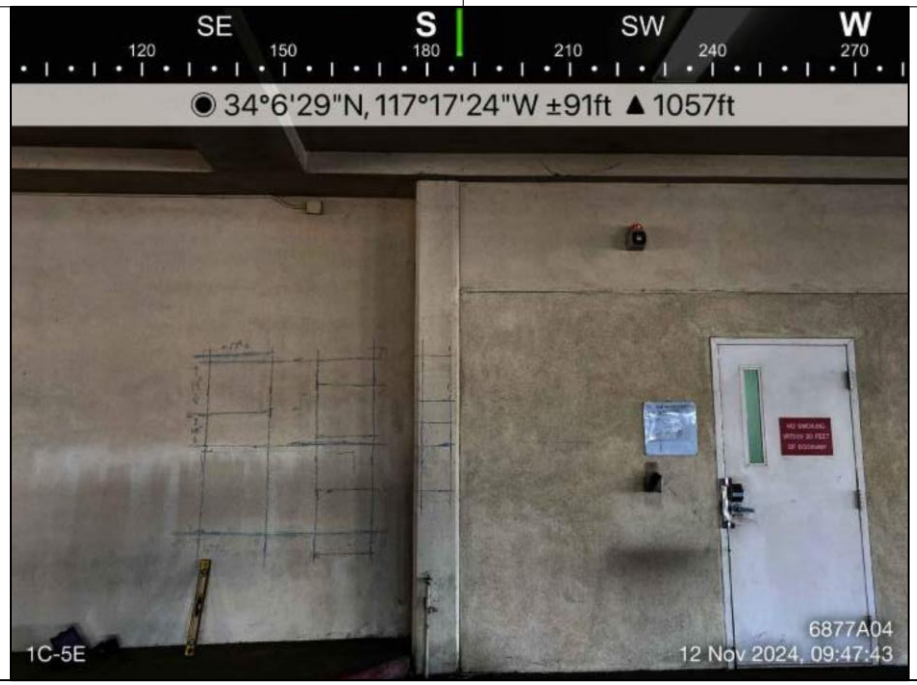
MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-2



Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

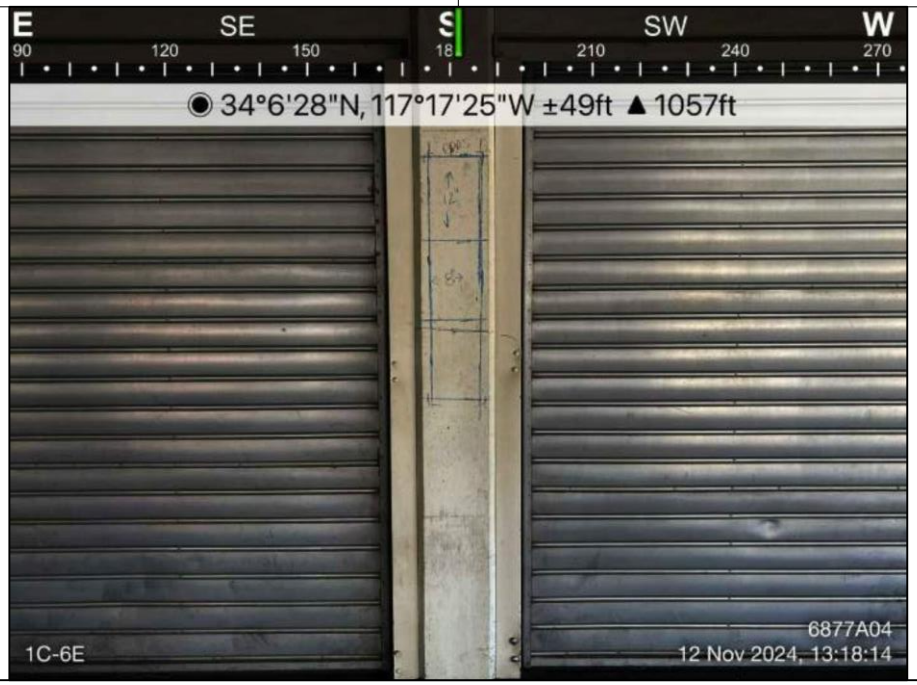
Pictures - Column 1C-5C
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-3



-5E
r SBDCB
rnia

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-4



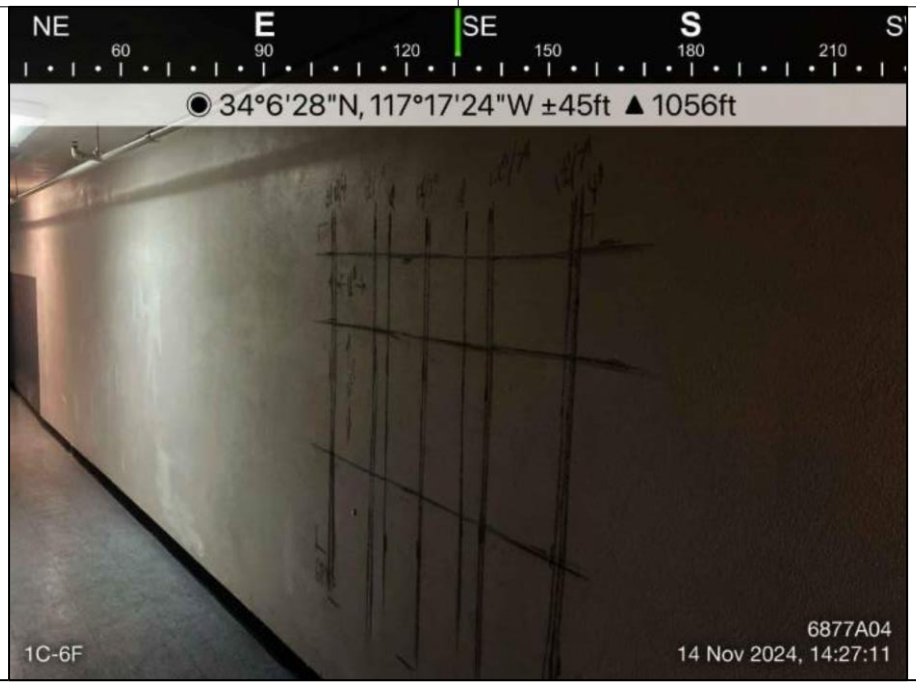
Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

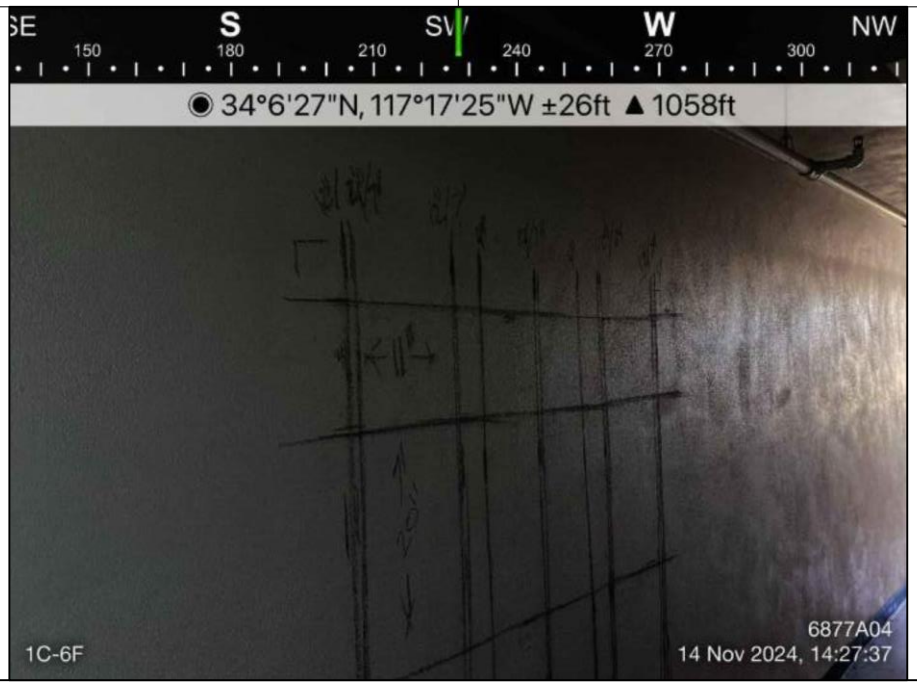
MTGL

Pictures - Column 1C-6E

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-5

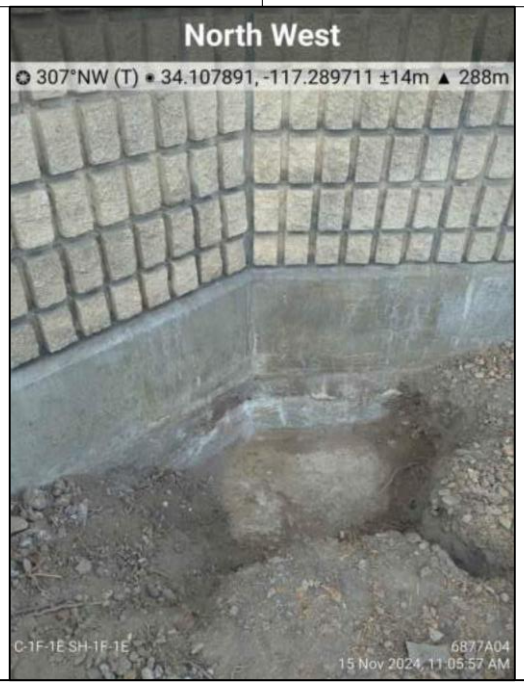




Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

Pictures - Column 1C-6F
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-6



Geotechnical Engineering
Construction Inspection
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Environmental

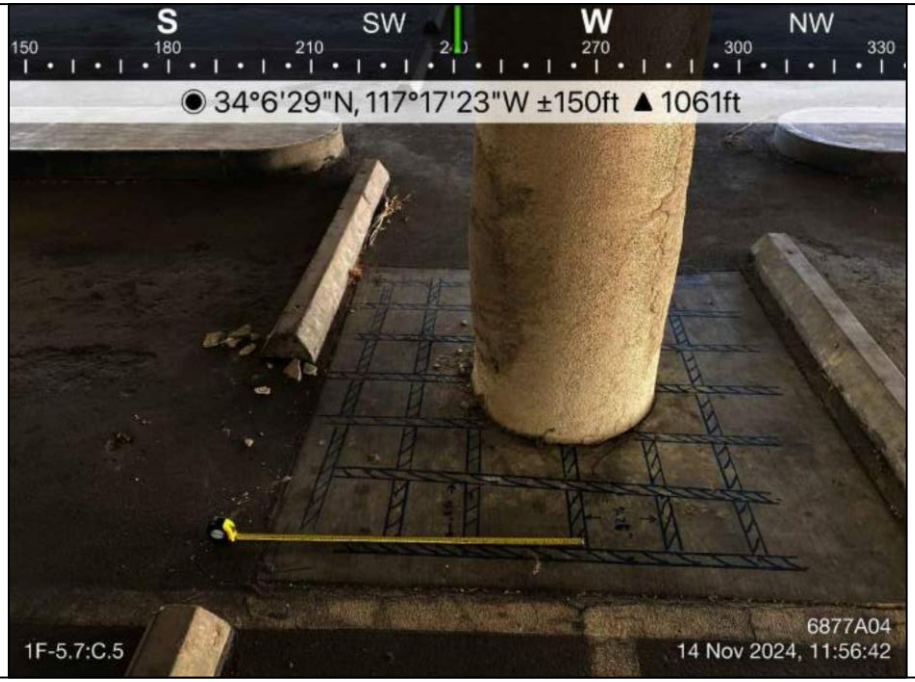
MTGL

Pictures - Footing 1F-1E

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

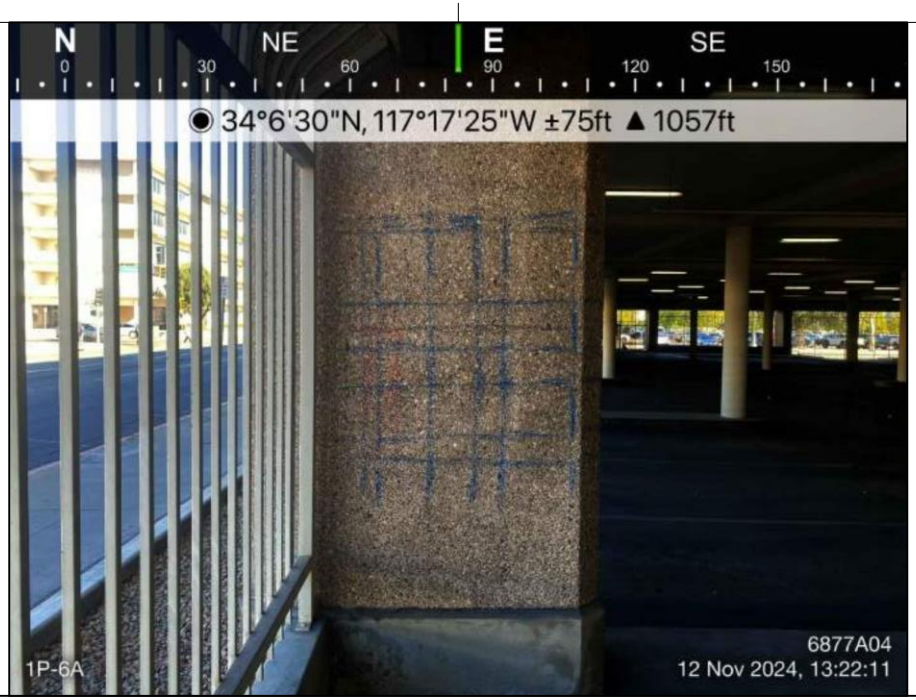
MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-7



Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

Pictures - Footing 1F-5.7:C.5
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-8



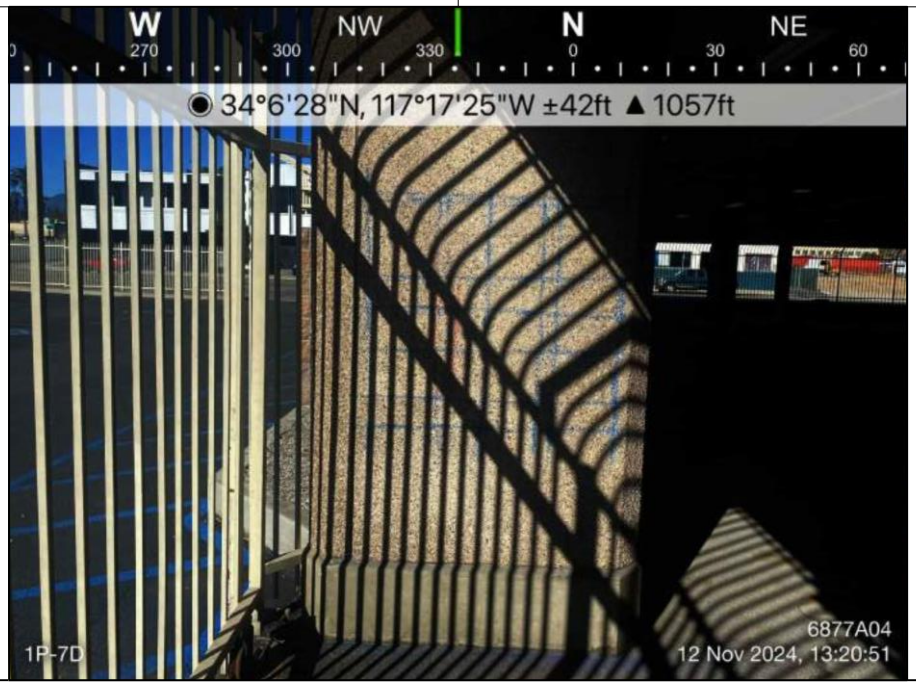
Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

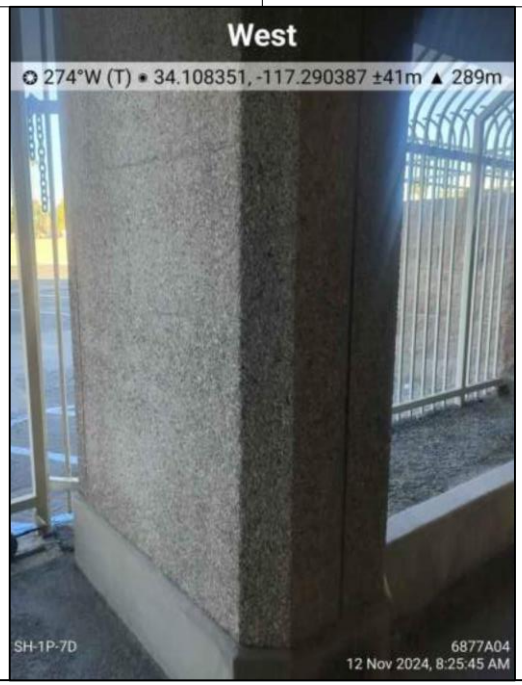
MTGL

Pictures - Pier 1P-6A

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-9





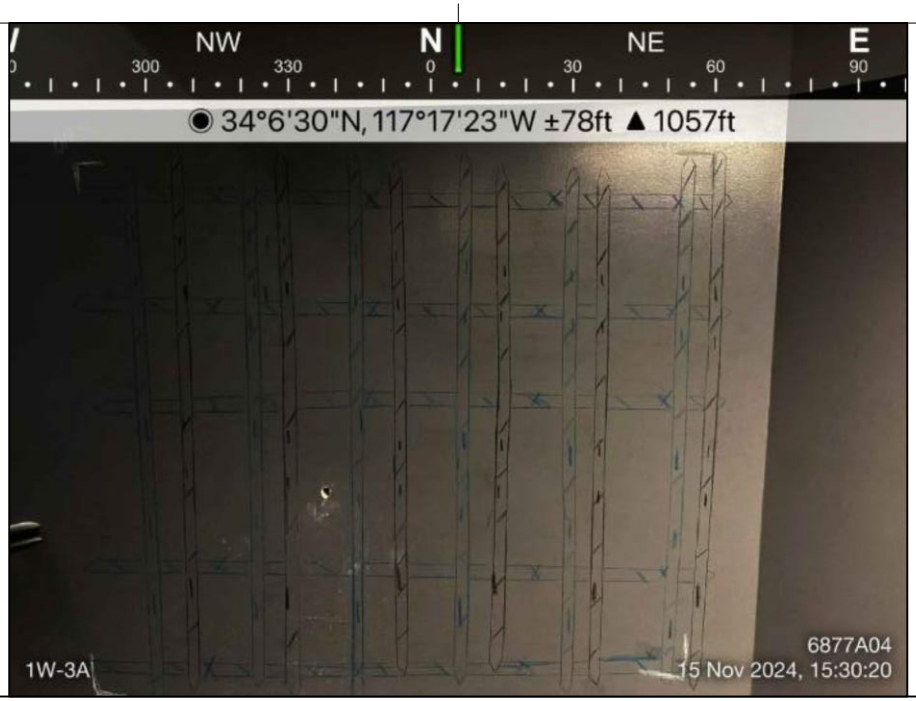
Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

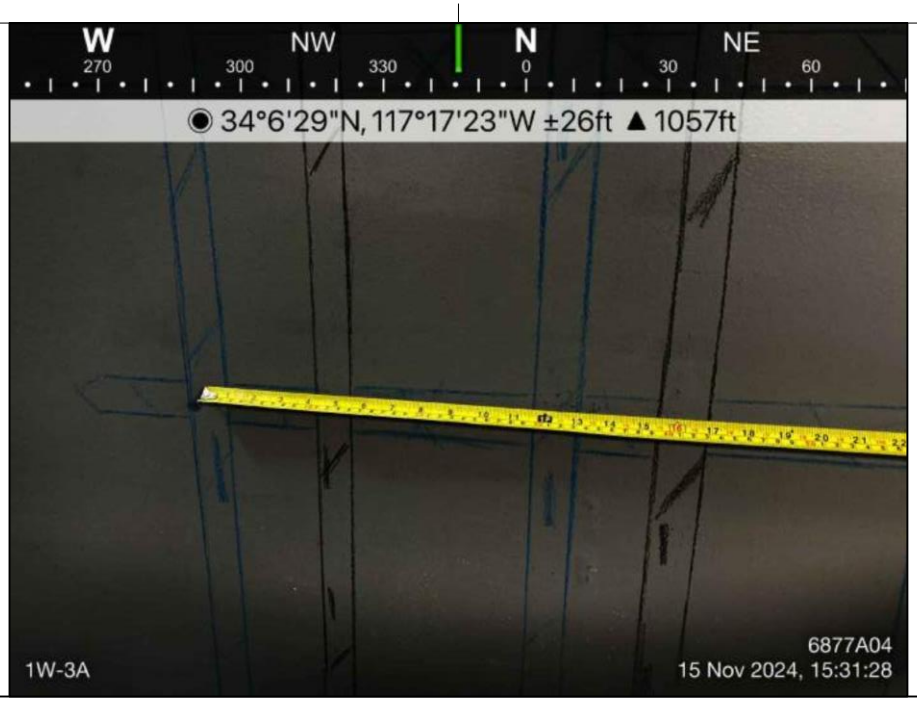
MTGL

Pictures - Pier 1P-7D

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-10





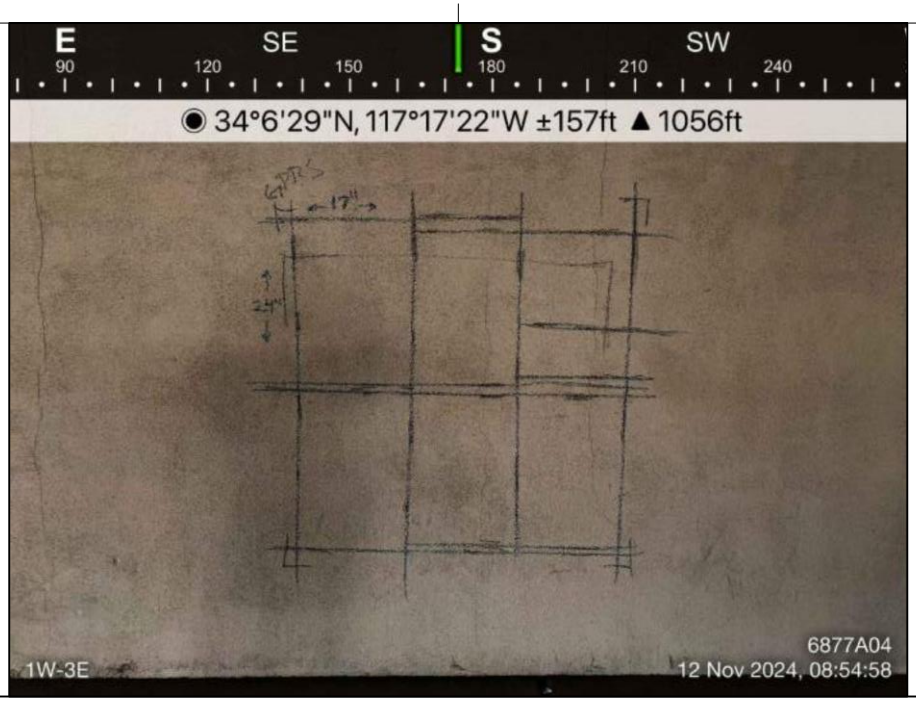
Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

MTGL

Pictures - Wall 1W-3A

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-11



Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

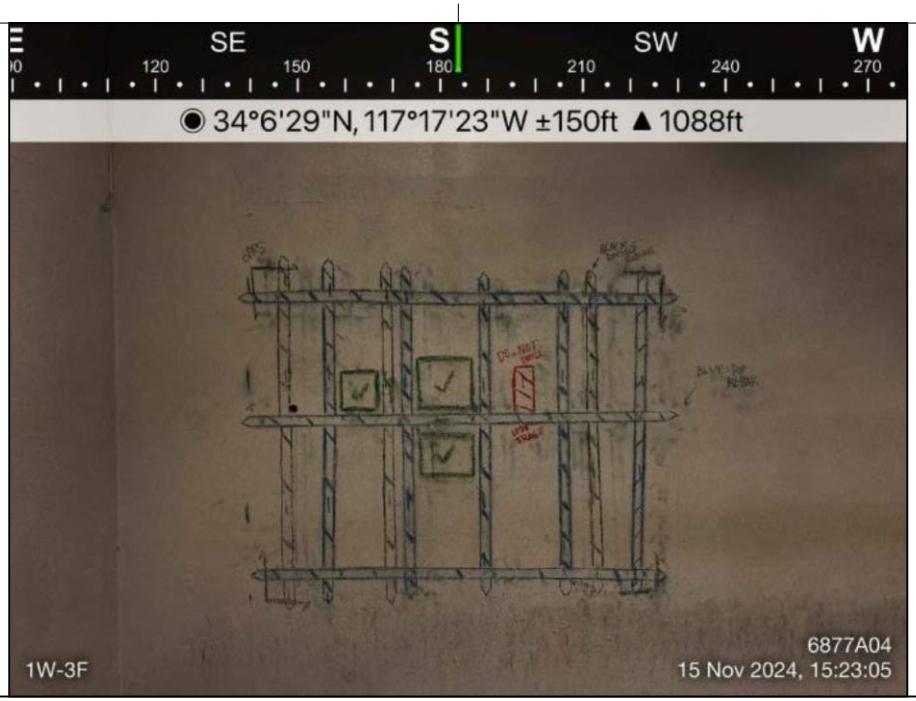
MTGI

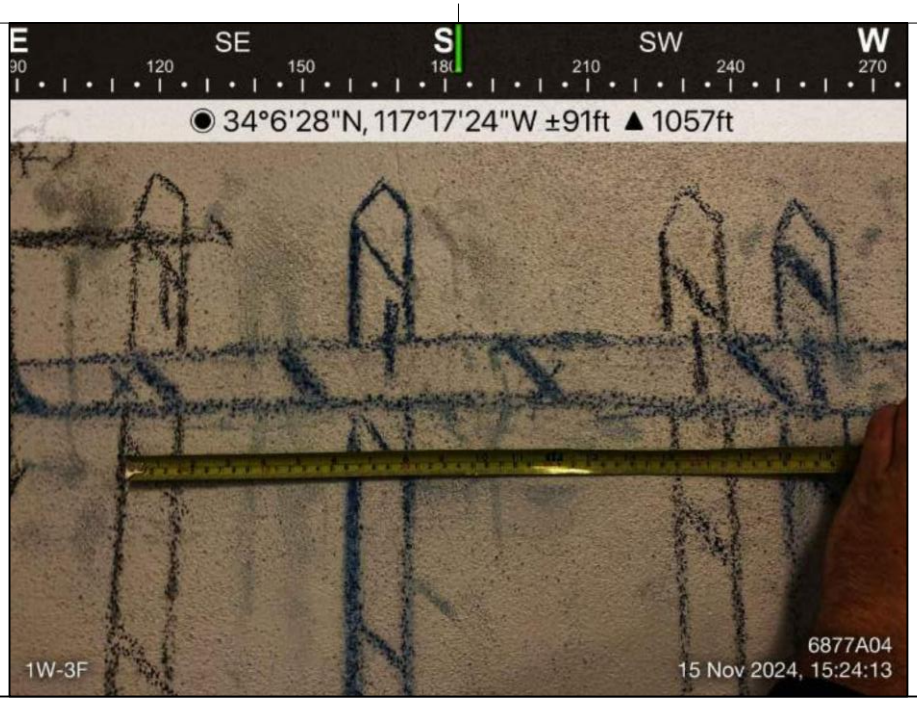
Pictures - Wall 1W-3E

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-12

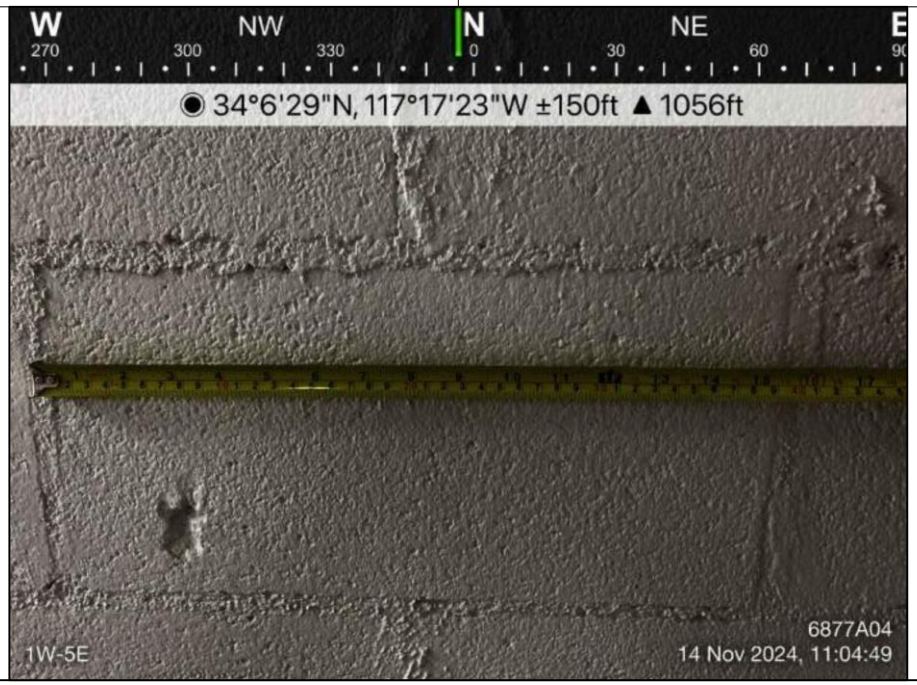




Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

Pictures - Wall 1W-3F
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-13



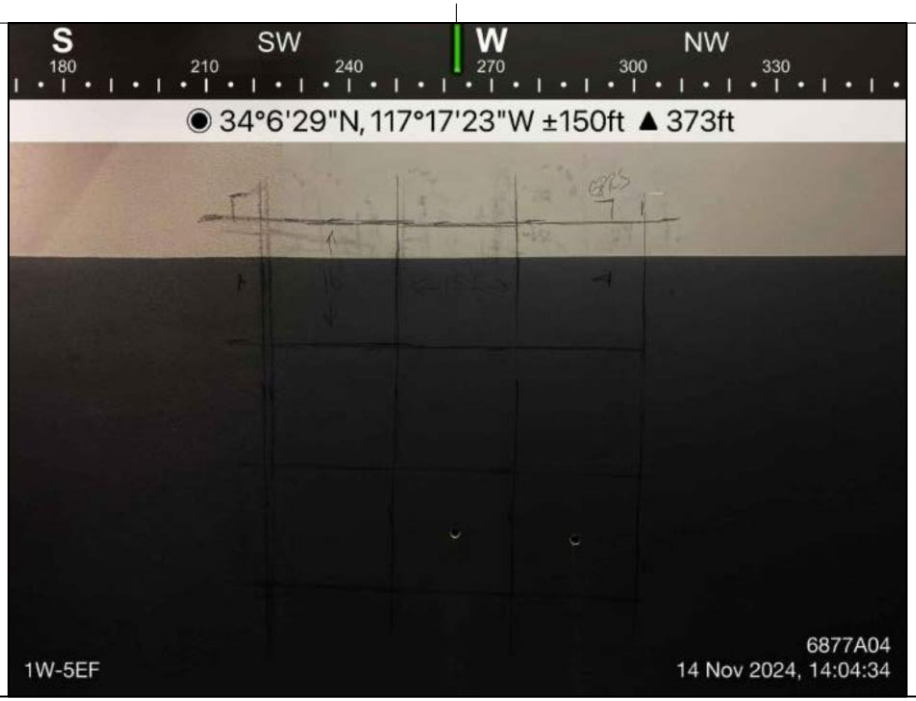
Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

MTGL

Pictures - Wall 1W-5E

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-14



Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

MTGL

Pictures - Wall 1W-5EF

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-15

Geotechnical Engineering
Construction Inspection
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Pictures - Wall 1W-7B

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-16

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MTGI

Pictures - Beam 2HB-7BC

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

MTGI Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-17

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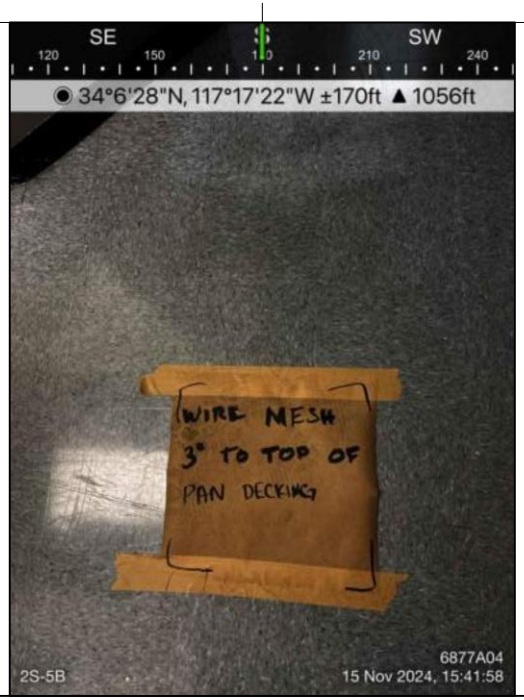
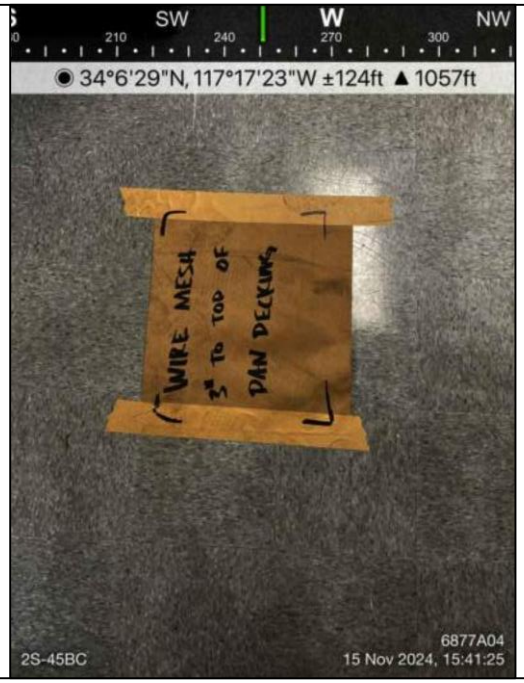
Pictures - Beam 2LB-7CD

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-18





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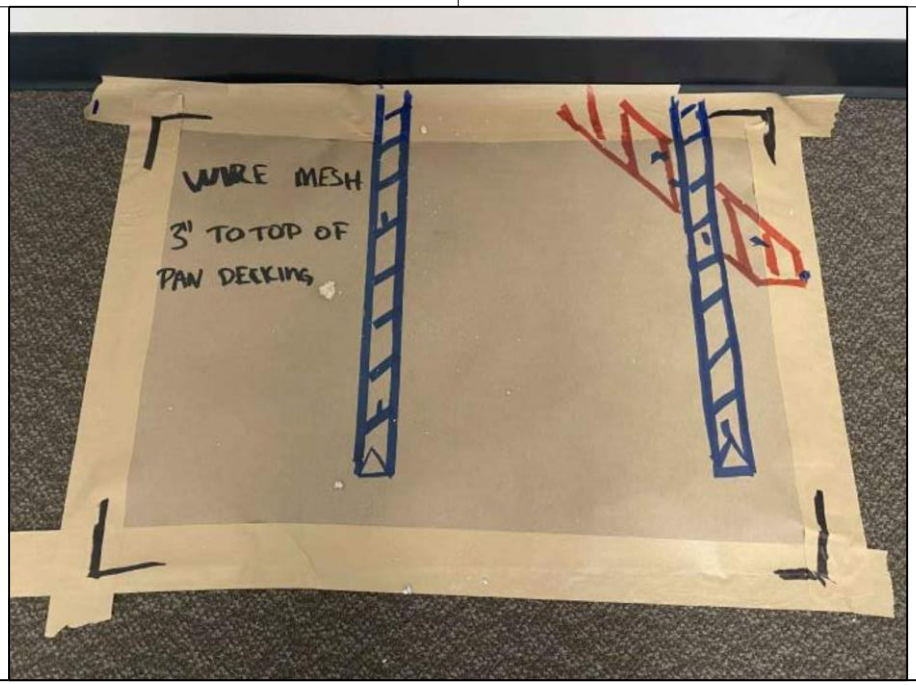
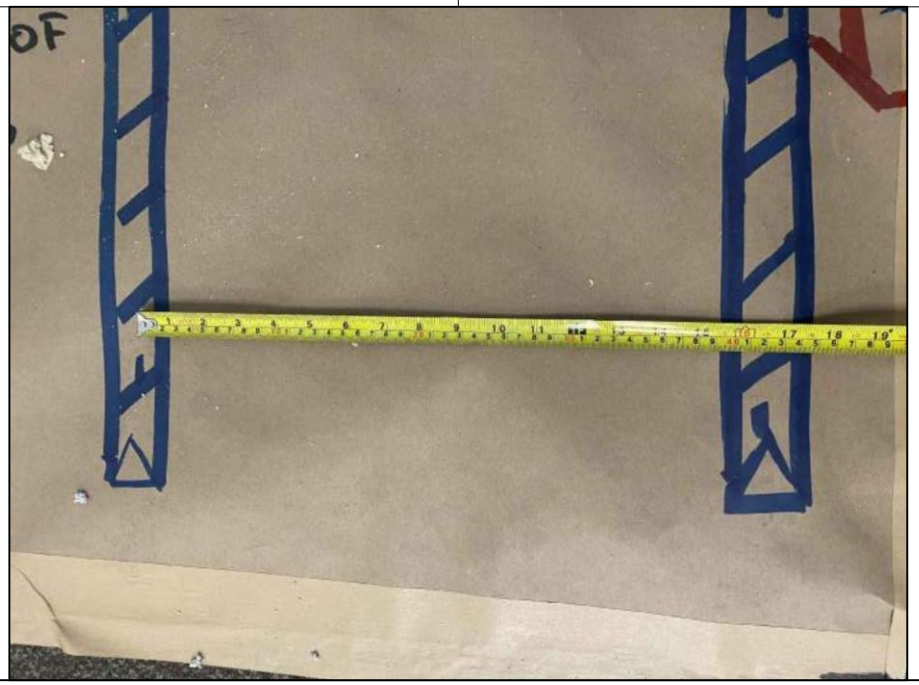
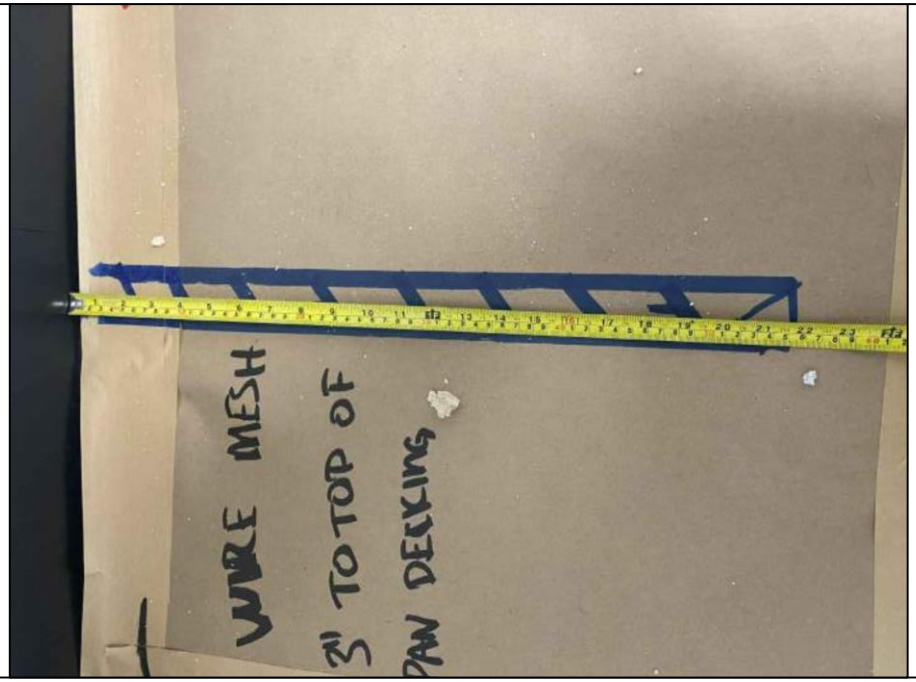
Pictures - 2nd Floor Slab

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-19







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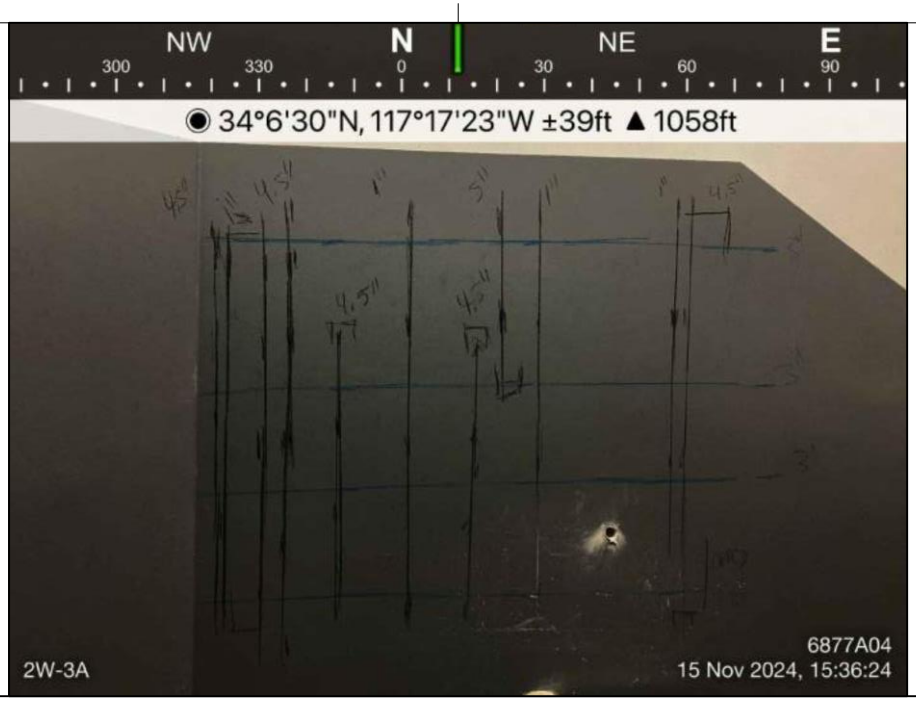
Pictures - 2nd Floor Slab Connection to 2HB
Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-20



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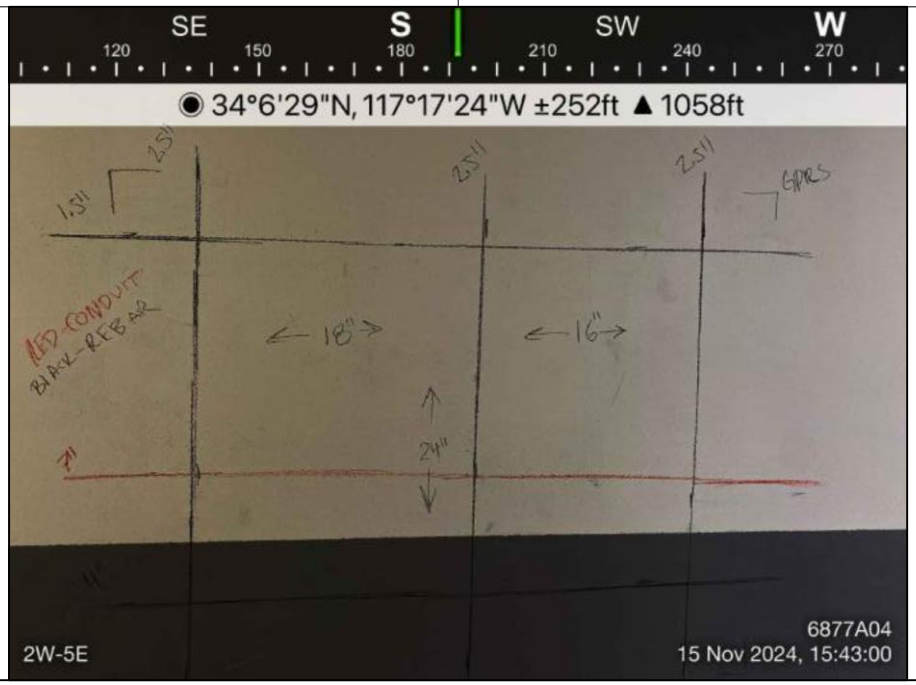
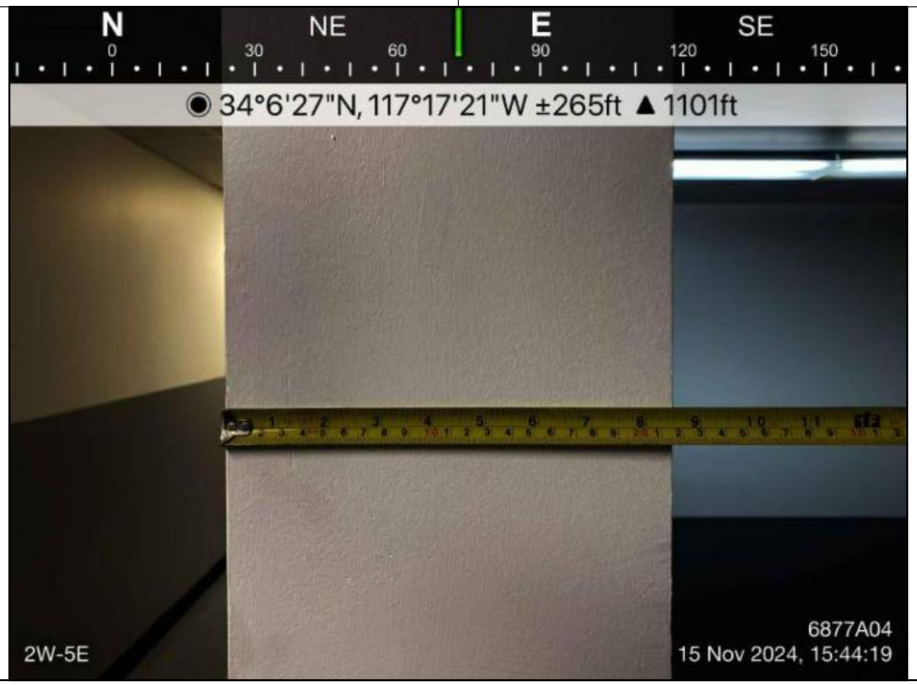
Pictures - Wall 2W-3A

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-21





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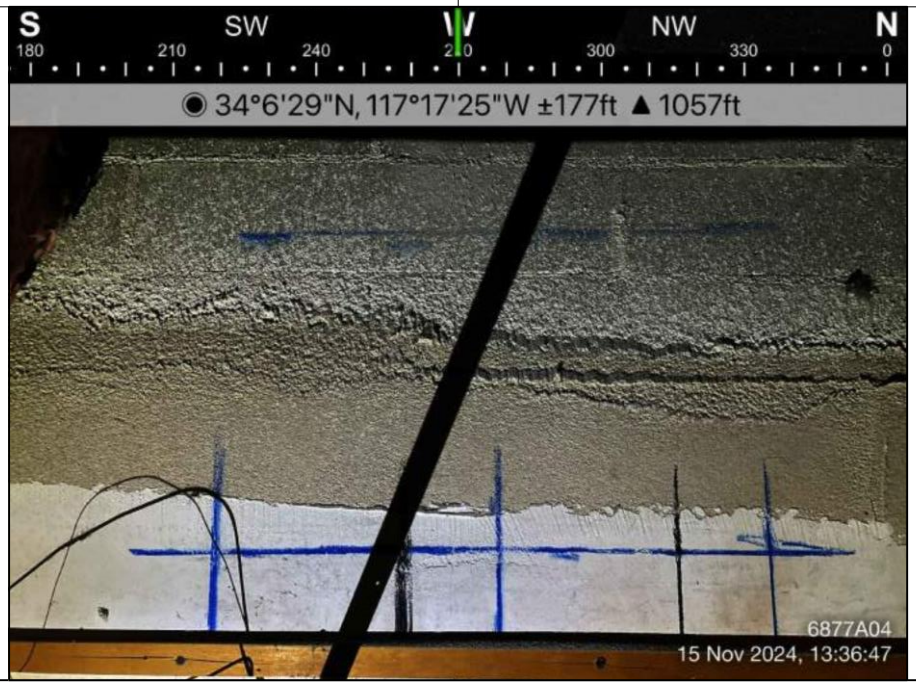
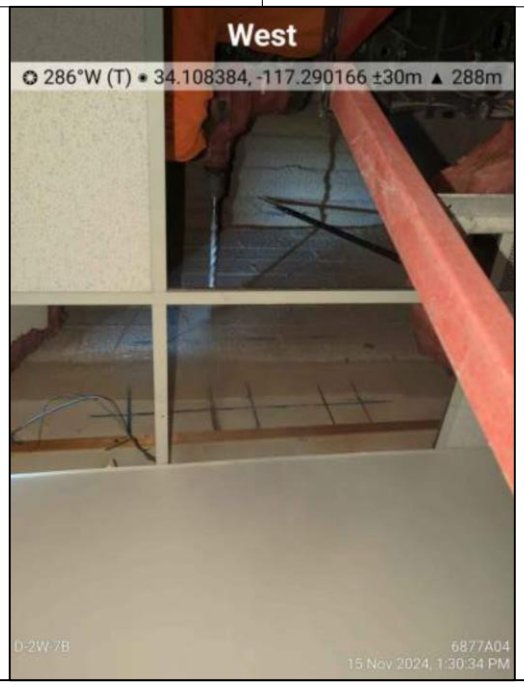
Pictures - Wall 2W-5E

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-22





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Pictures - Wall 2W-7B

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-23

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Pictures - MPH Slab

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-24

Geotechnical Engineering
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Pictures - MPH Wall 3F

Seismic Retrofit Analysis for SBDCB
San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-25

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Pictures - Roof Slab

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-26

Geotechnical Engineering
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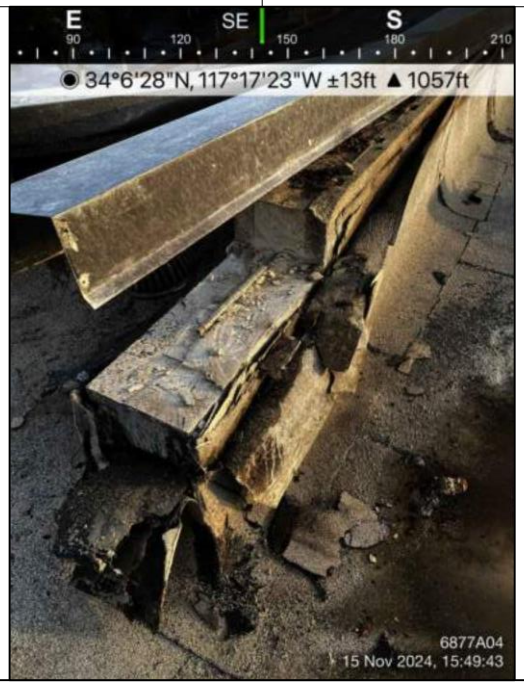
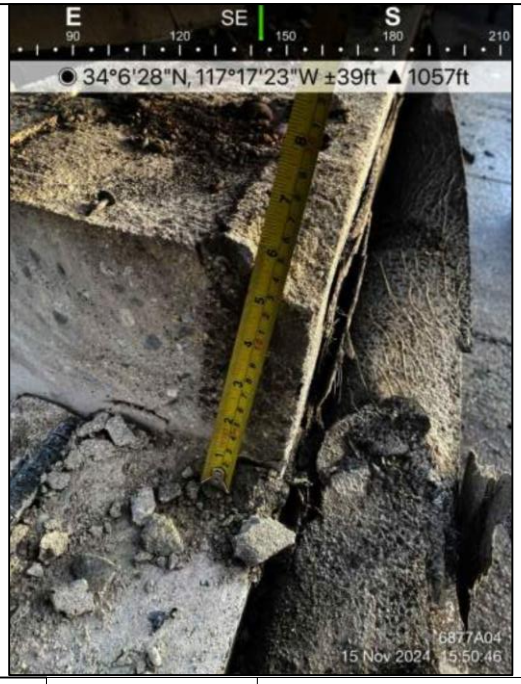
Pictures - High Roof Slab

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-27





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Pictures - Roof Masonry Block

Seismic Retrofit Analysis for SBDCB

San Bernardino, California

MTGL Project No.:	Date:	Scale:	Figure No.:
6877A04	December, 2024	NTS	C-28

Appendix B

SUMMARY OF CORE TESTS

DESCRIPTION CORE TESTS	LOCS	AVE STRN (PSI)	STD DEV (PSI)	COV	AVE-STD DEV (PSI)	SUMMARY
Interior 8"/12" Std CMU Wall Block Test	2	1,936	183	9%	1,753	USE: f'me = 1500 psi
Exterior 10"/23" CMU Wall Block Test	1	3,630	0	9%	3,303	USE: f'me = 3250 psi
2nd Floor Slab Core	1	2,778	0	0	2,778	USE: f'ce = 1950 psi

Note: Only one 10" CMU block was compression tested. No COV is developed for one test. Utilize similar COV (9%) as 8" block core that was tested in compression.

COMPRESSIVE STRENGTH OF CMU WALL CORES GRID LINE E

	CMU Block							
Sample	**1W-3E #1**	**1W-3E #2**			**MEAN**	**SD**	**COV**	**M-1SD**
Length (in)	3.10	3.22						
Diameter (in)	4.18	4.18						
Capped Length (in)	3.20	3.30						
L/D Ratio	0.77	0.79						
Breaking Load (lbs)	31,230	35,440						
Area (sq in)	13.72	13.72						
Strength (psi)	2,280	2,580						
Correction Factor	0.815	0.820						
Corr Strength (psi)	**1,860**	**2,110**						
Drilling Adj	**1.00**	**1.00**						
Diameter Adj	**1.00**	**1.00**						
FEMA 274 L/D Adj.	**0.79**	**0.80**						
Core moisture Adj	**1.00**	**1.00**						
Corrected Concrete Strength (psi) f'm for future design	**1,807**	**2,065**			**1,936**	**183**	**9.4%**	**1,753**

Use f'me=1500 psi Interior Walls

COMPRESSIVE STRENGTH OF CMU PRISMS
ASTM C1314-16

Project Name:	Seismic Retrofit Analysis for SBDCB	Tested By :	J. Alvarez
Project No. :	6877A04	Date Tested:	11/20/2024
Client:	Dahl, Taylor and Associates, Inc.	Input By:	J. Alvarez
Sampled By:	Jay Rowerdink	Checked By:	I. Chun
Date Sampled:	11/12/2024	Depth(ft.):	
Sample Loc:	Roof	Lab No.:	24-11184
Sample Descrip:	Fully frouted masonry Block 24.5"x5.5"x10"	Set / Sample No.:	
		Required Strength (psi):	

AGE	DATE	LENGTH (IN) (ave of 4) (Nearest .05")	HEIGHT (IN) (ave of 4) (Nearest .05")	WIDTH (IN) (ave of 4) (Nearest .05")	NET CROSS SECT. AREA (Wx L)	PEAK LOAD	STRENGTH (NRST 10 PSI) (a)	HT to LLD (least lateral dim) RATIO (H/LLD)	CORRECTION FACTOR (b)	CORRECTED STRENGTH (a x b)	FRACTURE TYPE
	11/20/24	9.10	5.75	10.25	93.28	338,290	3630	0.63	1.00	3630	2

AVERAGE = 3630

Use f'me=3,250 psi

Fracture Type: 1=Cone, 2=Cone & Shear, 3=Cone & Spilt, 4=Tension Break, 5=Semi Conical, 6=Shear, 7 = Face Shell Separation

COMMENTS: _____

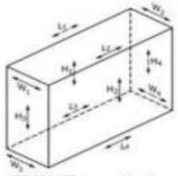

FIG. 3 Prism Measurement Location

Height to least lateral dimension is usually height/width.

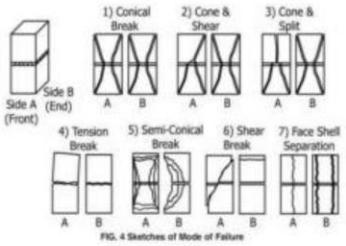

FIG. 4 Sketches of Mode of Failure

TABLE 1 Height to Thickness Correction Factors for Masonry Prism Compressive Strength

h_p/t_p [A]	1.3	1.5	2.0	2.5	3.0	4.0	5.0
Correction Factor	0.75	0.86	1.0	1.04	1.07	1.15	1.22

[A] h_p/t_p—Ratio of prism height to least lateral dimension of prism.

Load rate: Initial rate can be at righer rate up 50% of expexted max load. Apply remaining load at a rate where peak is reached between 1 top 2 minutes

COMPRESSIVE STRENGTH OF CONCRETE CORES (ASTM C42)

	2nd Floor Slabs							
Sample	**2S-3D**				**MEAN**	**SD**	**COV**	**M-1SD**
Length (in)	3.09							
Diameter (in)	4.18							
Capped Length (in)	3.15							
L/D Ratio	0.75							
Breaking Load (lbs)	48,140							
Area (sq in)	13.72							
Strength (psi)	3,510							
Correction Factor	0.810							
Corr Strength (psi)	**2,840**							
Drilling Adj	**1.00**							
Diameter Adj	**1.00**							
FEMA 274 L/D Adj.	**0.79**							
Core moisture Adj	**1.00**							
Corrected Concrete Strength (psi) fce for future design	**2,778**				**2,778**		**0.0%**	**2,778**

Note: Over 50 SH tests were done on second floor slab. This core result is averaged into SH tests.

SUMMARY OF SCHMIDT HAMMER TESTS

DESCRIPTION SCHMIDT HAMMER TESTS	LOCS	AVE STRN (PSI)	STD DEV (PSI)	COV	AVE-STD DEV (PSI)	SUMMARY
Footings	1	3,863	647	17	3,216	USE: f'ce = 3000 psi
1st Floor Columns	4	5,134	918	18	4,215	USE: f'ce = 4000 psi
Piers Face Shell	2	4,883	926	19	3,957	USE: f'ce = 4000 psi
2nd Floor Slabs	5	2,937	955	33	1,982	USE: f'ce = 1950 psi
2nd Floor Beams	1	7,668	726	9	6,942	USE: f'ce = 6500 psi
Interior CMU Walls Face Shell	1	2,143	518	24	1,625	USE: f'me = 1500 psi

COMPRESSIVE STRENGTH OF FOOTING

REBOUND (SCHMIDT) HAMMER TEST RESULTS

LEVEL 1 CONCRETE FOOTING

Test Location: SH-1F-1E

Test Location	Strength (psi)
1	4710
2	4290
3	3490
4	2750
5	4290
6	4290
7	3490
8	3120
9	4710
10	3490

MEAN:	3863	psi
STD DEV:	647	psi
COV:	17	%
M-1SD:	**3216**	psi

USE: f'ce =	3000	psi
f'c =	2000	psi

COMPRESSIVE STRENGTH OF CONCRETE COLUMNS

REBOUND (SCHMIDT) HAMMER TEST RESULTS

LEVEL 1 COLUMNS

Test Location: SH-1C-4B

Test Location	Strength (psi)
1	7200
2	7200
3	5280
4	4680
5	6560
6	5280
7	6560
8	5280
9	5280
10	6560

MEAN: 5988 psi
STD DEV: 874 psi
COV: 15 %
M-1SD: **5114** psi

LEVEL 1 COLUMNS

Test Location: SH-1C-5E

Test Location	Strength (psi)
1	4400
2	4140
3	3660
4	4680
5	5910
6	4140
7	4680
8	5280
9	3660
10	4680

MEAN: 4523 psi
STD DEV: 695 psi
COV: 15 %
M-1SD: **3828** psi

LEVEL 1 COLUMNS

Test Location: SH-1C-6E

Test Location	Strength (psi)
1	4140
2	5910
3	5910
4	4140
5	5910
6	3660
7	4140
8	5280
9	5910
10	4140

MEAN: 4914 psi
STD DEV: 898 psi
COV: 18 %
M-1SD: **4016** psi

LEVEL 1 COLUMNS

Test Location: SH-1C-5C

Test Location	Strength (psi)
1	5280
2	5280
3	4680
4	5910
5	5280
6	4140
7	5280
8	5280
9	4680
10	5280

MEAN:	5109 psi
STD DEV:	461 psi
COV:	9 %
M-1SD:	**4648** psi

MEAN:	5134 psi
STD DEV:	918 psi
COV:	18 %
M-1SD:	**4215** psi

USE: f'ce =	4000 psi
f'c =	2667 psi

COMPRESSIVE STRENGTH OF CONCRETE PIER SHELL

REBOUND (SCHMIDT) HAMMER TEST RESULTS

LEVEL 1 PIER SHELL

Test Location: SH-1P-7D

Test Location	Strength (psi)
1	4680
2	4140
3	4140
4	4680
5	3660
6	4140
7	4680
8	4140
9	4140
10	3660

MEAN: 4206 psi
STD DEV: 359 psi
COV: 9 %
M-1SD: **3847** psi

LEVEL 1 PIER SHELL

Test Location: SH-1P-6A

Test Location	Strength (psi)
1	5910
2	6560
3	5280
4	4140
5	5910
6	5910
7	5280
8	6560
9	4140
10	5910

MEAN: 5560 psi
STD DEV: 853 psi
COV: 15 %
M-1SD: **4707** psi

MEAN: 4883 psi
STD DEV: 926 psi
COV: 19 %
M-1SD: **3957** psi

USE: f'ce = 4000 psi
f'c = 2667 psi

COMPRESSIVE STRENGTH OF CONCRETE SLAB ON METAL DECK

REBOUND (SCHMIDT) HAMMER TEST RESULTS

LEVEL 2 SLAB ON METAL DECK

Test Location: SH-2S-3D (ROOM 168)

Test Location	Strength (psi)		
1	2750	MEAN:	3560 psi
2	2750	STD DEV:	813 psi
3	3490	COV:	23 %
4	2750	M-1SD:	**2747** psi
5	2750		
6	4710		
7	4710		
8	4710		
9	3490		
10	3490		

LEVEL 2 SLAB ON METAL DECK

Test Location: SH-2S-6D (ROOM 130)

Test Location	Strength (psi)		
1	2750	MEAN:	3100 psi
2	2750	STD DEV:	663 psi
3	3490	COV:	21 %
4	4710	M-1SD:	**2437** psi
5	2750		
6	2410		
7	3490		
8	3490		
9	2750		
10	2410		

LEVEL 2 SLAB ON METAL DECK

Test Location: SH-2S-4A (ROOM 163)

Test Location	Strength (psi)		
1	2070	MEAN:	2178 psi
2	2410	STD DEV:	367 psi
3	1750	COV:	17 %
4	2750	M-1SD:	**1811** psi
5	2750		
6	1750		
7	2070		
8	2070		
9	2410		
10	1750		

LEVEL 2 SLAB ON METAL DECK

Test Location: SH-2S-4D (ROOM 155)

Test Location	Strength (psi)
1	4710
2	3490
3	4290
4	4290
5	2750
6	3490
7	4710
8	4290
9	4290
10	3490

MEAN: 3980 psi
STD DEV: 607 psi
COV: 15 %
M-1SD: **3373** psi

LEVEL 2 SLAB ON METAL DECK

Test Location: SH-2S-5B (ROOM 144)

Test Location	Strength (psi)
1	1750
2	1750
3	1750
4	2410
5	1750
6	2410
7	2410
8	1750
9	1750
10	2410

MEAN: 2014 psi
STD DEV: 323 psi
COV: 16 %
M-1SD: **1691** psi

MEAN: 2937 psi
STD DEV: 955 psi
COV: 33 %
M-1SD: **1982** psi

Includes core sample for Mean
Includes core sample

USE: f'ce = 1950 psi
f'c = 1300 psi

COMPRESSIVE STRENGTH OF CONCRETE PERIMETER BEAMS FACE SHELL

REBOUND (SCHMIDT) HAMMER TEST RESULTS

LEVEL 1 CONCRETE BEAMS FACE SHELL

Test Location: SH-1B-7CD

Test Location	Strength (psi)
1	7200
2	8250
3	6240
4	7770
5	7770
6	6560
7	8030
8	8250
9	8580
10	8030

MEAN:	7668	psi
STD DEV:	726	psi
COV:	9	%
M-1SD:	**6942**	psi

USE: f'ce =	6500	psi
f'c =	4333	psi

COMPRESSIVE STRENGTH OF CMU WALL SHELL

REBOUND (SCHMIDT) HAMMER TEST RESULTS

LEVEL 1 CMU WALL FACE SHELL

Test Location: SH-1W-5E

Test Location	Strength (psi)
1	2300
2	2580
3	1240
4	2000
5	2000
6	2300
7	2300
8	1240
9	2580
10	2890

MEAN:	2143	psi
STD DEV:	518	psi
COV:	24	%
M-1SD:	**1625**	psi