

Stillwater Building Inspection Summary

Prepared by the City of Billings – Facilities Division

8/11/2021



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Executive Summary

With Council approval on July 12th, 2021 the Facilities Division began the due diligence phase of the Stillwater Building purchase. The first action was to conduct a suite of special inspections of the building and its various components. The firms and inspectors that were contracted by the City have prior experience or knowledge of the space and are considered experts in their respective field. The investigations found that overall, the building is in good condition for its age. However, the building is 60 years old with aging components that have reached the end of their useful lives or will in the near future. Additionally, there were areas and materials found to contain asbestos that were not disclosed by the building owner. This document includes a summary of the findings with the reports following.

Discipline: Structural Engineering

Date of Inspection: 7/20 and 7/21/2021

Vendor: Whitten & Borges, PC

Condition: Good – clean and well maintained throughout.

Findings: Structurally the building is performing as intended and no indication of foundation movement or settlement. Foundation and slabs have cracks, concrete shows signs of efflorescence, one area of concrete spalling on basement column, surface corrosion of steel decking. Findings indicate that deficiencies are normal for the age and type of construction, no major structural damage, and no signs of overload.

Cost to City: Repairs to cost \$30,000.

Discipline: Mechanical Engineering

Date of Inspection: 7/22/2021

Vendor: IMEG Corp.

Condition: Good – boilers, Good – chillers, Poor – cooling towers, Good – duct system, Fair – air handlers, Good – duct system.

Findings: Recommendations: replace steam heating system with a high-efficiency hydronic heating system, refurbish or replace cooling towers, existing air handler systems do not meet energy code requirements and should be replaced.

Cost to City: Repair cost varies. Breakdown of costs – \$460,000 to replace steam heating; \$65,000 to clean and refurbish cooling towers or \$285,000 to replace; \$615,000 to replace existing air handlers for perimeter, \$900,000 to replace air handlers for interior, \$192,000 to install of access panels at all air mixing valves, \$25,000 to reseal duct work, \$28,000 to replace air handler drain pans.

Discipline: Electrical Engineering

Date of Inspection: 7/22/2021

Vendor: IMEG Corp.

Condition: Good but are original vintage and past useful life – electrical distribution, Poor – generator, Poor – disconnect switches and step-down transformers, Acceptable – lighting with code violations, Acceptable – fire alarm system.

Findings: Recommendations: replace the existing panel boards, disconnect switches, and step-down transformers with new throughout the building to have a more reliable electrical distribution system; all existing electrical feeders and bus duct be replaced with new; replace existing wiring devices that do not meet current codes; lighting controls will need to be installed in the 4th floor remodel area, basement levels lighting system should have controls updated to meet current energy codes, stairwell lighting was not functioning during the site investigation and should be replaced with new fixtures with integral occupancy sensors, canopies located at the exterior main doors will need to be provided with new permanent lighting and controls, some of the exterior lighting will need to be circuited to generator-backed panels for emergency egress on the exterior.

Cost to City: Repairs to cost \$1,617,500. Breakdown of costs – \$65,000 for new generator, \$275,000 for switch gear, \$425,000 for new branch distribution panel boards, \$165,00 for new disconnect switches and step-down transformers, \$40,000 for electrical feeders, \$600,000 for electrical bus duct, \$12,500 for wiring devices; \$35,000 for lighting repairs.

Discipline: Plumbing

Date of Inspection: 7/22/2021

Vendor: IMEG Corp.

Condition: Good

Findings: Domestic cold and hot water piping in good condition. Recommend replacing steam water heat exchanger with gas fired water unit, replace PVC piping in return air plenum with cast iron piping, install overflow roof drains.

Cost to City: Repairs to cost \$170,000

Discipline: Asbestos

Date of Inspection: 7/26 and 7/27/2021

Vendor: Tetra Tech, Inc.

Condition: Present

Findings: The investigation found additional locations and materials that contain asbestos than was previously disclosed by the building owner.

Cost to City: Costs for abating all the existing asbestos is unknown, however, any construction that could potentially disturb asbestos-containing materials will cost more due to the added measures needed for safe removal and disposal of such materials.

Discipline: Civil Engineering

Date of Inspection: 7/27/2021

Vendor: IMEG Corp.

Condition: Good

Findings: No improvements needed at this time for concrete, sidewalks, site grading. Recommend alley reconstruction for proper stormwater management, and cleaning of stormwater inlet.

Cost to City: Repairs to cost \$16,000

Discipline: Radon

Date of Inspection: 7/26 and 7/28/2021

Vendor: Tetra Tech, Inc.

Condition: Good

Findings: Radon levels in building do not exceed EPA and CDC continuous exposure levels.

Cost to City: No action required

Discipline: Building Envelope and Glazing

Date of Inspection: 7/28/2021

Vendor: Terracon Consultants, Inc.

Condition: Good – precast panels; Good – granite fenestration system; Good – windows; Good – storefront; Fair – precast panel joint sealant; Poor – granite panel joint sealant.

Findings: Precast panels have minor areas of deterioration and separation – repair where needed, remove and replace all existing compound joint sealant for panels and windows; original compound glazing of windows needs replacing, seal window sash crack to limit water intrusion, install of rubber gasket on interior of insulated glass. Exterior wall assemblies, precast panels, granite, glass and aluminum systems have a long life, sealant has a short life and needs to be replaced and serviced regularly to ensure water-tightness.

Cost to City: Repairs to cost \$454,500.

Discipline: Elevators

Date of Inspection: 7/29/2021

Vendor: KONE Inc.

Condition: Good

Findings: Elevators are operational and have no mechanical issues but are 25 years old - recommend modernization. Need cartop cab rails, some components are obsolete and can be difficult to replace.

Cost to City: \$780,000 to modernize three elevator controls.

Discipline: Roof

Date of Inspection: 7/29/2021

Vendor: Bradford Roof Management, Inc.

Condition: Good

Findings: Patch and seal all holes/pipes, secure flashing, repair exposed membrane, replace fasteners, and tighten drain ring bolts.

Cost to City: \$15,500 to repair immediate needs – reroof in 2027 for \$700,000.

Discipline: SFRM – Fire Proofing

Date of Inspection: 8/2/2021

Vendor: Tetra Tech, Inc.

Condition: Good

Findings: Multiple locations of issues pertaining to adhesion and thickness application. Recommendation is to have current building owner repair.

Cost to City: TBD

Structural Condition Assessment Report

Stillwater Building, Billings, Montana

Prepared for
City of Billings

William Freese, PE, SE
Whitten & Borges, PC
Structural Engineers

Friday, July 30, 2021

July 30, 2021

City of Billings
PO Box 117
Billings, MT 59101

Subject: Stillwater Building Preliminary Condition Assessment

Dear John Caterino:

Following our site visit conducted on July 21, 2021, please find our preliminary condition assessment report for the Stillwater Building per your request and authorization.

In the report you will find that we recommend few repairs. These are mild structural repairs; it does not appear that existing deficiencies are currently limiting the buildings structural serviceability. However, we do recommend repairs be done to minimize further degradation or damage and increase the longevity of the building.

The repairs include some crack injection repair found under that east sidewalk bay in the parking garage. Also, the spall on the column along the same bay will need remediation to cover the exposed rebar. The deck corrosion that we encountered during our site visit appeared to be surface rust and as long as the cause of moisture has been minimized or eliminated, the surface rusting should not advance.

Repair details are beyond the scope of this preliminary condition assessment and would be included in a more detailed assessment.

Please let us know if you have any questions. Thank you for contacting Whitten & Borges.

Sincerely,



William Freese, PE, SE
Structural Engineer

Enc:

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EXECUTIVE SUMMARY OF PRELIMINARY ASSESSMENT

Background Information and Introduction

The City of Billings contacted Whitten & Borges to perform a structural condition assessment and provide a professional opinion on the Stillwater building located at 316 N 26th Street. Originally constructed in 1964, the building has five floors and a three-level basement. The five floors were designed for office use and courtrooms. The top level of the basement is a parking garage; middle level basement houses electrical generators; lowest level of basement houses large boilers with multiple pumps to remove groundwater. In 2017 a parking garage was constructed East of the building and a skybridge was erected connecting at the third floor. This assessment is limited to the Stillwater Building.

Structure Description

The building is a steel framed skeleton and utilizes steel members to distribute gravity loads down to footings. The majority of beams, girders, and columns are wide flange steel. Two concrete stair towers and elevator shafts brace the building against wind and seismic loads. Precast concrete panels clad the exterior of the structure. A vehicle drive ramp allows access from the ground level to the parking garage on the west end of the building. This ramp is located above the lower-level boiler room.

Methods

To evaluate the building a structural observations site trip was performed first. We started by walking the building rather quickly to get familiar with the building. A slower walkthrough of each floor was then performed to investigate problem areas and identify probable causes. We then performed limited computational analyses for multiple structural components to check if they were performing adequately. A short summary of our findings can be seen in the section below. Further detail into these findings can be found in the following sections of this report.

Summary of Findings and Recommendations

In summary, our findings are as follows:

- Building appears sufficiently maintained. Cosmetic issues appear normal for a building of this age.
- Limited concrete cracking with efflorescence located in parking garage remediation recommended.
- Recommend the spall located in parking garage be repaired in a timely fashion.
- Monitor groundwater infiltration in the boiler room especially at the locations where previous crack repairs have been made. Currently, existing cracks are not leaking but cracks may develop and existing repairs may begin to leak in the future.
- Closely monitor significant and problematic cracks with dedicated crack gages.
- Interior girders and infill beams appear to meet current ASCE 7-16 and IBC 2018 live load requirements for offices, corridors, and courtroom occupancy.

INTRODUCTION

Purpose of Preliminary Assessment

The intent of this report is to provide the City of Billings with a preliminary structural assessment for the Stillwater Building located in downtown Billings. We understand building occupancy and category will remain unchanged.

In a cursory review, the structural systems and ability to meet current IBC 2018 and ASCE 7-16 code was reviewed and documented in this report.

A more detailed assessment may be necessary to further validate components and develop specific repair details.

Scope of Investigation

The preliminary investigation consisted of making visual observations of accessible portions of the building and commenting on the general structural condition. No special measures were taken to expose structural members not available for review. A limited structural analysis of typical structural members, for the purpose of determining structural adequacy, were performed. These typical structural members were: a typical interior and exterior girder, typical interior beam, typical interior and exterior column, and a typical footing. Structural adequacy of the building or any element of the building is not warranted or guaranteed.

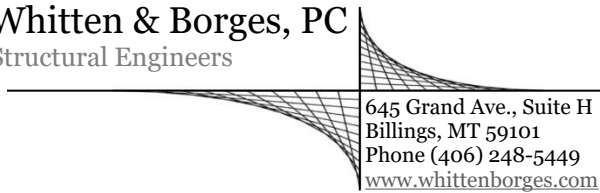
Specific material testing is beyond the scope of the preliminary assessment.

Preliminary Assessment

The assessment began with the preliminary walkthrough of the building. We walked the exterior and interior of the building to gain an initial opinion about how it was performing. A more in-depth walkthrough was then performed to allow us to slow down and think about individual structural elements and how they appear to be performing.

In-depth material sampling and instrument level surveys is beyond the scope of this assessment.

Material strengths were assumed for components unless specified on the drawings.



DESCRIPTION OF THE STRUCTURE

General

The Stillwater Building is a rectangular footprint 139' x 300' consisting of five floors and a multi-level basement. Heavy precast concrete panels cover the exterior. The upper level of the basement is a parking garage and the lower level is a boiler room; about 26 feet below ground surface. 13'-6" story height typical. Building roof height: 67'-6".

The foundation consists of spread footings beneath interior and exterior columns bearing on native gravel or native shale. A concrete foundation wall surrounds the perimeter and is capped by exterior slab at grade.

Three concrete stair towers, one including the elevator core, are likely the lateral force resisting system. The lateral force resisting system layout appears adequately proportioned for office type occupancy. Further analysis is beyond the scope of this preliminary assessment.

The building is steel framed with wide flange columns. Simple shear connections. Lightweight concrete slab on metal deck floor and roof diaphragms. Roof is bituminous with gravel covering. Specific floor deck material is not indicated on the reviewed drawings.

Dates of Construction, Alteration, and Repair

- Drawings dated 1962
- Original building construction ended in 1964
- Skybridge was finished in 2017. Constructed with two steel columns placed in front of the east entryway (minimizing additional weight on the building). The skybridge columns were inserted thru the existing concrete canopy.
- Building has recently been gutted
- Elevator lobby renovated and newly finished
- Third floor remains partially occupied and newly finished

History

Formerly the James F. Battin US Courthouse & Federal Building, the Stillwater building is now privately owned and leases office space to Yellowstone County. After private purchase, work began to renovate the building to more modern commercial office space. The building has changed ownership multiple times.

Due to the depth of the basement elevation, it is likely the basement has experienced some flooding during high groundwater levels. The current owner stated that moisture mitigation has been done in the basement with added floor surface sealer. The top of slab in the basement is roughly 26 ft below the surface of the ground and the water table likely hovers around 16ft. When speaking with the current owner it was revealed that some flooding had occurred in the lower boiler room.

A file storage records room has been added to third floor. Library type floor loading may exceed floor design capacity and may result in unusual loading condition for this building.

Collected Data

Data collected:

- Walkthrough field investigation notes on July 21, 2021
- Scanned images of plan drawings provided in PDF
- Locations of problem areas noted on plans
- Photographs

DISCUSSION OF SITE VISIT

Overview

On July 21, 2021, William Freese, PE and John Ransone, EIT, meet with Jessica Iverson and John Caterino with the City of Billings. Together we walked the exterior and interior of the building. Beginning with a quick overview to develop general concepts and thoughts on the building and how it was performing. Later and into the next morning, a slower and more involved walkthrough was performed. This allowed us to gather information either missed from the previous cycle, or to further identify potential deficiencies and overall, gage the structure condition. Assumptions and speculations were made to determine the underlying cause of potential deficiencies.

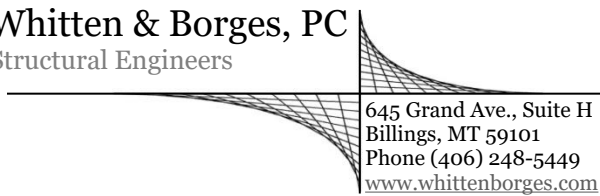
Overall, the building looked clean and well maintained. At some locations around the building, it was difficult to tell if finishes had been re-applied in the recent renovation. This may have impacted the investigation if, for example, cracks had been painted over.

Observations and Their Significance

During the preliminary investigation the building was in the process of renovation, most finishes and electrical wiring was removed. It was convenient to see the underside of the deck without removal of ceiling tiles. The floor slabs were visible with no overlay or grout covering the top.

Basement and Foundation: We discussed with the owner in the boiler room about some prior flooding that has occurred in the building. From what can be observed in the boiler room, the flooding appeared to have been minimal due to the lack of water marks and damage on the floor and walls. Some cracks could be seen along the interior walls of the boiler room and the ceiling. Limited cracks were identified along the exterior foundation wall, which is structurally encouraging. The foundation walls and footings appear to be performing as intended. Signs of foundation movement or settlement were not evident.

The parking garage is in relatively good condition with some limited concerning areas. The bays under the exterior sidewalk have cracks at each column line with efflorescence appearing at each crack (see photo P19). One major spalling area was noted (see photo P20); rebar could be seen where the column joins the spanning beam. It is difficult to discern the exact cause of the spall. Possibly there could have been a mishap during construction at this location. While this spall is large it doesn't appear to be impacting the structure significantly. It is however, recommended the spall be repaired in a timely manner. The exposed rebar is susceptible to corrosion and further spalling and delamination could expose the wide flange column encased in the concrete.



Upper Floors: Consistently throughout the upper five floors, corrosion appeared in some bays of steel deck. Most, if not all, of the corrosion appeared to apply to the surface of the deck. It's possible that the old fire-protection is the cause of this corrosion. The fire-protection may have been applied incorrectly or with a questionable mixture, but we don't know. We surmise the fire-protection entrapped moisture to the metal deck. We think that as long as the cause of moisture entrapment has been eliminated, the metal deck corrosion should not advance.

Various types of metal decking were identified during inspection. Floors were determined to have 2.5" concrete topping slabs; except in special cases noted. The first floor had multiple slab thickness's and it's important to see the drawings to reference locations. The most common decking type was a 3" cellular steel deck with a 2.5" concrete slab. Steel form deck occurs when the slab is called out to be 5-1/2" total thickness.

Cracks were common in all elevated slabs on each floor. It appeared the slab cracked over the top of girder beams and some infill beams. This is not worrisome and should be considered normal cracking for a structure this age and with this type of construction.

On the roof we noted an area just outside of the door, at the south west corner of the penthouse, where the cladding had spalled and broken off. This should be repaired to prevent moisture infiltration behind the cladding.

PRELIMINARY OFFICE ANALYSIS

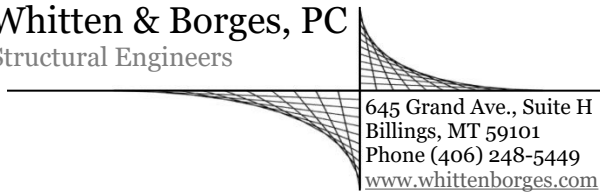
Computational Analysis

We performed limited computational checks on select structural elements to determine code compliance. This approach helps to determine if the building can perform it's intended function. The items analyzed for conformance are as follows: A typical W24x76 interior girder found on the second floor and above, a W18x70 exterior girder, the 16x40 beams supporting the decking, a single W12x99 column located at H-5, and the exterior 10x66 column located at I-1. Not all members in the building were checked for conformance. See the appendices for each calculation.

Assumptions: Due to the age of the building and lack of information for various structural elements, some assumptions had to be made. Based on ASTM and AISC A7 Building standard adopted in 1960, the yield strength (F_y) of steel members was assumed to be 33 ksi.

A dead load of 48 psf likely applies to each structural level; assuming lightweight concrete. We determined that lightweight concrete was likely utilized based on the size of the aggregate seen from the surface and the aggregates light whitish grey color.

Loads: ASCE 7-16 requires a 50 psf live load be used for offices on floors above the first floor. Public assembly for the courthouse is 100 psf. Corridors are 80 psf above the first floor, and partitions can be estimated to be about 20 psf. The PDF drawings, provided by the City of Billings, indicate the Stillwater Building was designed based on an 80 psf live load with 20 psf partitions. Therefore, a total of 100 psf live load was most likely used for most calculations. These loads theoretically encompass current ASCE7-16 requirements.



Code and regulations have changed since the 1960's however, and tend to be slightly more restrictive.

A check on an interior W24x76 girder shows that current code places this girder at 97% unity. This covers the current ASCE 7-16 upper-level corridors and the offices live load requirements, as well as the assembly area occupancy.

The exterior W18x70 girder size shows a unity of 93% for current codes and practices. If using the assumed 48 psf dead load and weight of the exterior cladding. This covers the current ASCE 7-16 upper-level corridors and the offices live load requirements, as well as the assembly area occupancy. This girder transfers cladding load to columns.

The interior w16x40 beams under current codes and practices, are experiencing a unity of 92%, if using the assumed 48 psf dead load. This encompasses all requirements including live load for courtroom occupancy.

An interior W12x99 column located at H-2 was checked using the 48 psf dead load and a 100 psf live load per floor. We determined 85% of the column was being utilized. This unity is not uncharacteristic for a column.

An exterior W10x66 located at grid I-1 was checked using the 48 psf dead load and a 100 psf live load per floor. Additional weight from cladding was included. It was determined 77% of the column was being utilized. This unity is not uncharacteristic for a column.

Decking: There were multiple deck profiles used throughout the building. The most common was a 3" cellular deck with a 2.5" concrete topping. We determined in the field that the cellular decking was most likely 2 pieces of non-composite decking placed to create cells. No other information about the deck was available. For a comparison, using 50 ksi steel a 20-gage steel non-composite deck allows 102 psf over a 10' span. An 18-gage steel deck allows 152 psf. It is difficult to determine how well the deck is performing without a more in-depth analysis. We did not measure the gage of the deck or the deck profile. The specifics for the deck are not indicated on the drawings.

Code Conformance

After review, it is determined that the upper floors conform with ASCE 7-16 and IBC 2018's live load requirements. The 50 psf office live load and 20 psf partition load requirements are met. The 100 psf assembly area live load requirements are also met by the interior girder and beams. This indicates that the members analyzed in this report meet current codes and standards for the intended occupancy.

SUMMARY OF STUDY

Based on a preliminary field and office analysis, the building is in good condition for its intended use. The field investigation did not reveal major structural damage. The field investigation found no signs of structure being overloaded in the past.

CONCLUSIONS AND RECOMMENDATIONS

The preliminary walkthrough of the building showed no signs of major structural deficiencies, but some medium to minor ones should be corrected.

The cracking with efflorescence under the sidewalk slabs in the parking garage should be remediated. If allowed time, the cracking could get larger allowing spalling and loss of section to occur.

The large spall located on the column G-6 in the parking garage should be repaired as soon as possible. With some rebar exposed, correction is required to reduce the possibility of corrosion or larger loss of section.

The metal deck corrosion observed on every floor appeared to be limited to surface rust. However, we advise to be vigilant for rust going through the decking. If any is encountered it should be mitigated immediately.

With regards to the outer shell of the building, any loose spalling on the exterior cladding, like observed on the roof should be repaired.

Structural members appear to be performing their role at service level.

The building was clean and appeared well maintained throughout.

The preliminary office analysis showed nothing out of the ordinary, no members that were studied were seeing excess amounts of demand. All upper floor members appear to be capable of meeting the required demands per current ASCE7-16 and IBC 2018 standards. Be wary of stack rooms or libraries on the upper floors. These items will place the building under loads greater than designed for and should be reviewed on case-by-case basis.

COST ANALYSIS

Rough order of magnitude cost estimate.

Repair Item:	ROM Cost Estimation (USD)
Slab cracking in basement	\$10,000
Interior concrete spalling in basement	\$15,000
Exterior panel spalling	\$30,000
Steel deck corrosion	\$5,000

APPENDICES

Photo Exhibit.

Field Survey notes.

Calculations.

References.

Drawings. See attached PDF for field notes.



P1: south entrance canopy



P2: east entrance canopy



P3: fifth floor courtroom



P4: east entrance canopy



P5: weathered façade



P6: weathered façade



P7: typical interior



P8: basement garage



P9: vehicle drive ramp



P10: vehicle drive ramp



P11: slab on metal deck core holes



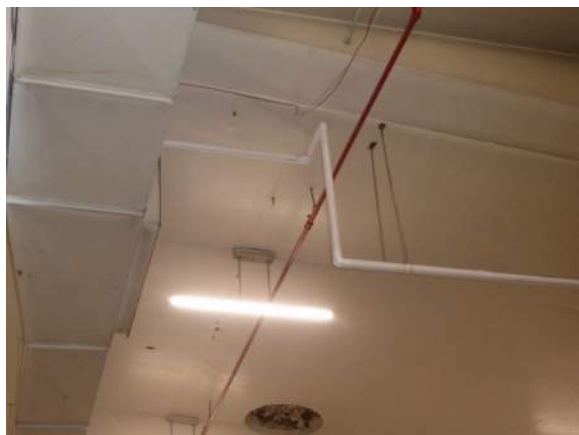
P12: typical slab on metal deck



P13: sub basement



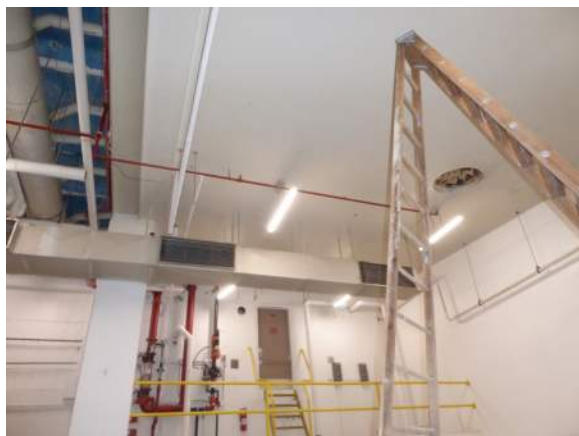
P14: basement



P15: sub basement bottom of vehicle drive ramp slab; concrete crack transverse is possibly a normal cold joint/construction joint or thermal crack



P16: sub basement wall cracks have been sealed



P17: sub basement



P18: sub basement



P19: Concrete cracks & stains with efflorescence



P20: Spalling concrete & delamination with stains



P21: Metal form deck



P22: Concrete cracking with delamination near top of wall at north side of the parking garage



P23: Concrete cracking with stains near top of wall



P24: floor spall and leaking fluids



P25: ceiling concrete cracks



P26: masonry wall crack



P27: concrete wall crack



P28: concrete crack



P29: concrete wall crack



P30: floor stain; possibly moisture intrusion



P31: concrete slab ceiling crack



P32: concrete slab ceiling crack



P33: Fifth floor



P34: blue fire protection with deck corrosion



P35: blue fire protection with metal deck corrosion



P36: Significant deck corrosion in the masonry room



P37: Masonry room with deck corrosion



P38: Courtroom clerestory masonry infill with tight cracks likely from normal shrinkage



P39: Exterior façade at the roof penthouse



P40: Roof top mech equipment enclosure; precast concrete panels and steel frame



P41: Roof top mech equipment enclosure; precast concrete panels and steel frame



P42: Roof top mech equipment enclosure; precast concrete panels and steel frame



P43: Precast concrete panel joint with minor spalling concrete



P44: Roof top mech equipment enclosure; precast concrete panels and steel frame; panel joint connection to column

Whitten & Borges P.C.
Structural Engineers

645 Grand Avenue, Suite H
Billings, Montana 59101
406-248-5449
www.whittenborges.com

Stillwater - BLD

Typical Panel Selfweight

SWR

7/26/21

Cladding SW

5' Long per panel panels

Panels are roughly 3" thick
Wall height approx 13'-6"

ASSUMING DENSITY OF PANEL IS CONCRETE OR NEAR CONC DENSITY

$$150 \text{ lb/ft}^3 \cdot \frac{3}{12} \cdot 13'-6" = \underline{\underline{507 \text{ lb/ft}}}$$

Typical Beam 16x10

Beams likely support non-composite decking
30' into 3 equal spaces. $\therefore$ TRIZ = 10'

LOADS: DEAD LOAD = 48 psf - FROM TABULATION ESTIMATE

LIVE LOAD = 100 psf

$$LLR: L = 100 \left(25 + \frac{15}{2.25} \right) = 92 \text{ psf} \quad DL = 92 + 48 = 140 (10') = 1400$$

$$M = wL^2/8 = 1400 \text{ PLF} (25')^2/8 = \underline{110 \text{ K}\cdot\text{ft}}$$

Allowable load for W16x10

CONTINUOUSLY BRACED COMPRESSION FLANGE [LTB] DOESNT APPLY

YIELDING:

$$M_n = F_y Z_x \quad F_y = 33 \text{ ksi} \quad \text{USING A9 OR A36 BUILDING STEEL}$$

$$Z_x = 57 \text{ in}^3$$

$$M_n = 33 \text{ ksi} (57 \text{ in}^3) = 8409 \text{ K}\cdot\text{in} = 800.75 \text{ K}\cdot\text{ft}$$

$$M_n/\phi = 120.2 \text{ K}\cdot\text{ft} \quad \phi = 0.92 \quad \% 92\%$$

Maximum allowable load (w):

$$120 \text{ K}\cdot\text{ft} = wL^2/8 \rightarrow w = 120 (8)/(25')^2 = 1536 \text{ lb/ft}$$

$$\text{Max allowable load} = \underline{153 \text{ psf}} \quad \text{For current codes and practices}$$

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Stillwater BLD

Typical B.M. LAFD Method

JWR

7/30/21

Typical Beam 16x40

48 psf DEAD LOAD + 20 psf partition

80 psf Live load

$$LLR: L = 80 \left(.25 + \frac{15}{\sqrt{2} \cdot 250} \right) = 74 \text{ psf}$$

$$1.2(48 \text{ psf}) + 1.6(74 \text{ psf}) = 200 \text{ psf} \cdot 10' = 2000 \text{ plf}$$

$$M = WL^2/8 = 2000 \text{ plf} (25')^2 / 8 = 156.34 \text{ ft}$$

LAFD For 16x40

YIELDING:

$$M_n = F_y Z_x \quad F_y = 33 \text{ ksi} \quad \text{Using A7 or A36 Building Standard} \\ Z_x = 72 \text{ in}^3$$

$$M_n = 33 \text{ ksi} (72 \text{ in}^3) = 2376 \text{ k-in} = 198 \text{ ft}$$

$$\phi M_n = 0.9(198) \text{ ft} = \underline{178 \text{ ft}}$$

$$p/c = 10.88 \text{ or } 88\%$$

Maximum allowable W

$$178 = WL^2/8 \quad W = 178(8)/25^2 = 22.78 \text{ ft}$$

$$\text{Max allowable} = \underline{22.7 \text{ psf}}$$

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www.whittenborges.com

Stillwater BLD

Typical (2) sides - Exterior

JWR

7/28/21

W18x70 w/ 30' Spans

Top flange fully braced

LOADS:

$$TW = 12.5 \text{ feet}$$

$$DL = 48 \text{ PSF} - \text{estimate}$$

$$LL = 80 \text{ PSF}$$

$$Pavement = 20 \text{ PSF}$$

Live load reduction:

$$L = 100 \left(25 + \frac{15}{\sqrt{2 \cdot 375}} \right)$$

$$= 80 \text{ psf}$$

$$DL = 48 + 80 \text{ PSF} = 128 \text{ PSF}$$

$$128 \text{ PSF} (12.5 \text{ Tr. b}) = 1600 + 507 \text{ lb/ft}$$

$$M_u = wL^2/8 = 2107 \text{ PL} (30')^2/8 = \underline{237.0 \text{ k-ft}}$$

Yielding: [LTB does not apply]

$$M_n = F_y Z_x \quad Z_x \approx 143 \text{ in}^3 \text{ From historic data}$$

Assuming Yield Stress Complies w/ 17 of AISC Building Standards
 $F_y = 33 \text{ ksi}$

$$\frac{M_n}{R} = 33(143 \text{ in}^3) = 393 \text{ k-ft} / 1.67 = \underline{235 \text{ k-ft (capacity)}}$$

$$D/C = .101 \text{ or } 10.1 \%$$

Maximum allowable load (w):

$$235 \text{ k-ft} = wL^2/8 \rightarrow 235 (8) / (30')^2 = w = 2089 \text{ PL}$$

$$w = 2089 / 12.5 \text{ TW} = 167 \text{ PSF}$$

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Stillwater BLD

Typical glider Exterior LAFD
JWR

7/26/21

W18x70

$$1.2(68 \text{ psf}) + 1.6(64) = 184 \text{ psf} \cdot 12.5' = 2300 \text{ plf}$$

$$2300 \text{ plf} + 1.2(507) = 2908.4 \text{ plf}$$

$$M_u = 2908.4 \cdot 30'^2 / 8 = 3272 \text{ k-ft}$$

yielding:

$$M_n = F_y Z_x$$

$$\phi M_n = 0.9(113)(33) = 353 \text{ k-ft capacity}$$

$$D/C = 0.93 \text{ or } 93\%$$

W24 X 76 w/ 30' Spans

Top FLANGE FULLY BRACED

Loads:

TRIBUTARY WIDTH = 25 feet

DEAD LOAD = 48 PSF

LIVE LOAD = 80 PSF

PARTITION LOAD = 20 PSF

LIVE LOAD REDUCTION:

$$L = L_0 \left(0.25 + \frac{15}{\sqrt{A_{TL}}} \right)$$

$$= 100 \left(0.25 + \frac{15}{\sqrt{2.750}} \right) = 64 \text{ psf}$$

$$D+L = 48 \text{ PSF} + 64 \text{ PSF} = 112 \text{ PSF}$$

$$112 \text{ PSF} (25' \text{ Trib}) = 2800 \text{ PL}$$

$$M_u = wL^2/8 = 2800 \text{ PL} (30')^2/8 = \underline{\underline{315 \text{ k-ft Required}}}$$

LTD DOES NOT APPLY

YIELDING:

$$M_n = F_y Z_x$$

Assuming The yield stress for hot rolled steel is $F_y = 33 \text{ ksi}$
For W24 X 76 $Z_x = 198 \text{ in}^3$

$$\frac{M_n}{\phi} = \frac{33 \text{ ksi} (198 \text{ in}^3)}{1.67} = 3860 \text{ k-ft} / 1.67 = \underline{\underline{326 \text{ k-ft Capacity}}}$$

$$D/C = 0.97 \%$$

Maximum allowable load (w):

$$326 \text{ k-ft} = wL^2/8 \rightarrow 3260(8)/30^2 = w = 2927.1 \text{ PL}/25' \text{ TW}$$

W = 117 PSF allowable for current codes and practices

Our load 102 psf < 117 psf ✓ good for all loading
Scenarios.

W12x99

Floor to Floor height 13'-6"

Section E3 AISI chapter E

Typical Tributary Area for Interior Column: $A_T = 30' \times 25' = 750 \text{ ft}^2$

loads: 100 PSF live

dead load Tabulation:

Lightweight Conc = 40 psf

Decking = 3 psf

Ceiling = 1

m/f = 2

Floor = 1

Misc = 1
48 psf

Total = 48 psf dead load

D+L = 34 psf + 100L = 148 PSF Floors 2, 3, 4, 5

Roof: D+S = 48 psf + 30 psf = 78 psf

$\sigma = \frac{P}{A} \rightarrow P = \text{PSF} \cdot A(\text{ft}^2)$

KLL = 4 Interior Column $KLLA_T = (4) \cdot 750 \text{ ft}^2 > 400 \text{ ft}^2$

$L = L_o(0.25 + \frac{15}{\sqrt{KLLA_T}}) = 100 \text{ psf}(0.25 + \frac{15}{54.8}) = \underline{\underline{53 \text{ psf}}}$

D+L Floor 2-5 = 48 + 53 = 101 PSF

Roof: AT 78 psf = 58.5 k

5th: AT 101 psf = 75.8 k

4th: AT 101 psf = 75.8 k

3rd: AT 101 psf = 75.8 k

2nd: AT 101 psf = 75.8 k

Total: 361.3 kips

load @ 1st Floor

In Basement Floor

1st: AT 101 psf = 75.8 k

Total: 437.3 kips

for an unbraced length of 11'

Table G-2

W12x96 $P_n/P_c = \underline{\underline{739 \text{ kips}}}$

$P/C = \underline{\underline{0.53\%}}$

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Typical Column - Interior

JWR

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W12x49 using $F_y = 33 \text{ ksi}$

$$r = 3.37$$

$$A = 29.1$$

$$\frac{L_c}{r} = \frac{13.5 \cdot 12}{3.37} = 48.1 \leq 139.6$$

$$\therefore F_{cr} = (0.658^{F_y/F_c}) F_y$$

$$F_c = \frac{\pi^2 E}{(\frac{L_c}{r})^2} = \frac{\pi^2 (29,000)}{(48.1)^2} = 123.7 \text{ ksi}$$

$$F_{cr} = (0.658^{(33/123.7)}) (33) = 29.5 \text{ ksi}$$

$$P_n = 29.5 \text{ ksi} (29.1) \text{ in}^2 = 859 \text{ kips}$$

$$P_n/\Omega = 514 \text{ kips} > 437 \text{ kips} \quad \text{unity} = 0.85 \text{ or } 85\%$$

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Typical Column exterior

SWR

7/26/21

W10X66 I-1

Floor to Floor Heights: 10'-6" BSM to 1st
12'-6" 1st to 2nd

$$AT = 30' \times 12.5' = 375 \text{ ft}^2$$

Loads: 100 psf live; 38 psf Dead; 30 psf Snow

Live Load Reduction:

$$KLL AT = 4(375) = 1500 > 400$$

$$L = L_o \left(0.25 + \frac{15}{\sqrt{KLL AT}} \right) = 63.8 = 6' \text{ psf}$$

Loads working down:

$$5^{th} = 78 \cdot 375 = 29.3 \text{ k}$$

$$4^{th} = 112 \cdot 375 = 42 \text{ k}$$

$$3^{rd} = 112 \cdot 375 = 42 \text{ k}$$

$$2^{nd} = 112 \cdot 375 = 42 \text{ k}$$

$$1^{st} = 112 \cdot 375 = 42 \text{ k}$$

$$\text{Total: } 197.3 \text{ kips}$$

To Basement FRG

From table AISI G-2 w/ 10'-6" increased length

$$\text{For W10X60 } P_n/A = 452 \text{ kips}$$

Unity = 0.39 without cladding load applied

$$\text{Cladding: Assuming } 150 \text{ lb/ft} \cdot \frac{3}{12} \cdot 13'-6" \cdot 30' = 15.2 \text{ k per floor}$$

$$15.2 \text{ k/floor} = 15.2/2 + 15.2 + 15.2 + 15.2 = 53.2 \text{ kips}$$

To Basement FRG w/
cladding

$$197.3 \text{ kips} + 53.2 = 250.3 \text{ kips}$$

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Typical Column - Exterior

JWA

7/26/21

USING 33ksi = F_y W10x66 I-1

$r = 2.80$ in for 10x60 $A = 19.41$

$$\frac{L_c}{r} = \frac{13.5 \cdot 12}{2.80} = 57.8 \leq 4.71 \sqrt{\frac{29,000}{33}} = 139.6$$

$$\therefore F_{cr} = (0.658^{F_y/E_c}) F_y$$

$$F_c = \frac{\pi^2 E}{\left(\frac{L_c}{r}\right)^2} = \frac{\pi^2 (29,000)}{(57.87)^2} = 85.6 \text{ ksi}$$

$$F_{cr} = (0.658^{(33/85.6)}) 33 \text{ ksi} = 28.1 \text{ ksi}$$

$$P_n = 28.1 \text{ ksi} (19.41 \text{ in}^2) = 544.1 \text{ kips}$$

$$P_n / \Omega = 326 \text{ kips} > 197 \text{ kips} \quad \text{unity} = 0.60 \text{ or } 60\%$$

$$\text{using cladding: } \underline{326 > 250 \text{ kips} \quad \text{unity } 0.77 \text{ or } 77\%}$$

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Typical ftg
SWR

7/30/21

8'-4" Square ftg 25" thick

Typical Interior Column Load = 437 kips

$$\sigma = \frac{P}{A} = \frac{437 \text{ kips}}{69.4 \text{ sf}} = 6.29 \text{ ksi} < 8000 \text{ psi design Specified}$$
$$F.S. = \frac{8000}{6290} = 1.27$$

- Lintel schedule
- a. All 8" concrete block lintels to be made with lintel block, reinf. w/ 2-#5 bars extending 2'-0" beyond opening unless shown. Reinforce jombs w/ 2-#5 bars vertical.
- b. All other masonry walls to have one steel angle per 4" nominal wall thickness. Thus, extend angle 8" beyond sides of openings.
- Spans to 4'-0" = $1 - 3\frac{1}{8} \times 3\frac{1}{8} \times \frac{1}{4} \times L$
Spans 4'-0" to 6'-0" = $1 - 4 \times 3\frac{1}{8} \times \frac{1}{4} \times L$
Spans 6'-0" to 8'-0" = $1 - 4 \times 3\frac{1}{8} \times \frac{1}{6} \times L$

- Design loads:
a. Wind = 30 p.s.f. on vertical projection.
b. Seismic zone II
c. Dead load as indicated by construction
d. Live loads:
Offices & Courtroom = 80 p.s.f. + 20 p.s.f. for partitions.
Roof = 30 p.s.f.
Corridors, lobby, stairways, ramps garage = 100 p.s.f.
Mechanical equipment space = 150 p.s.f.

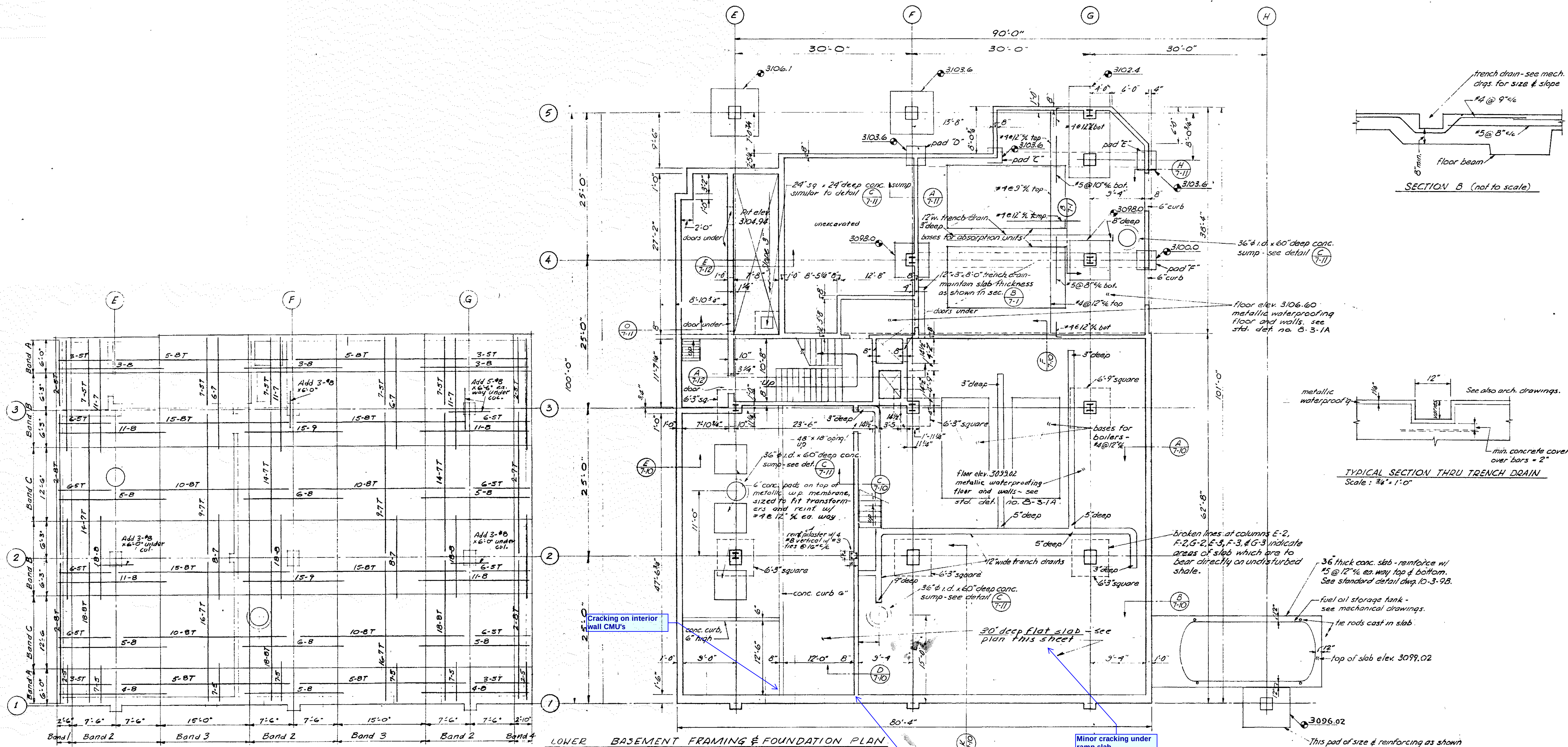
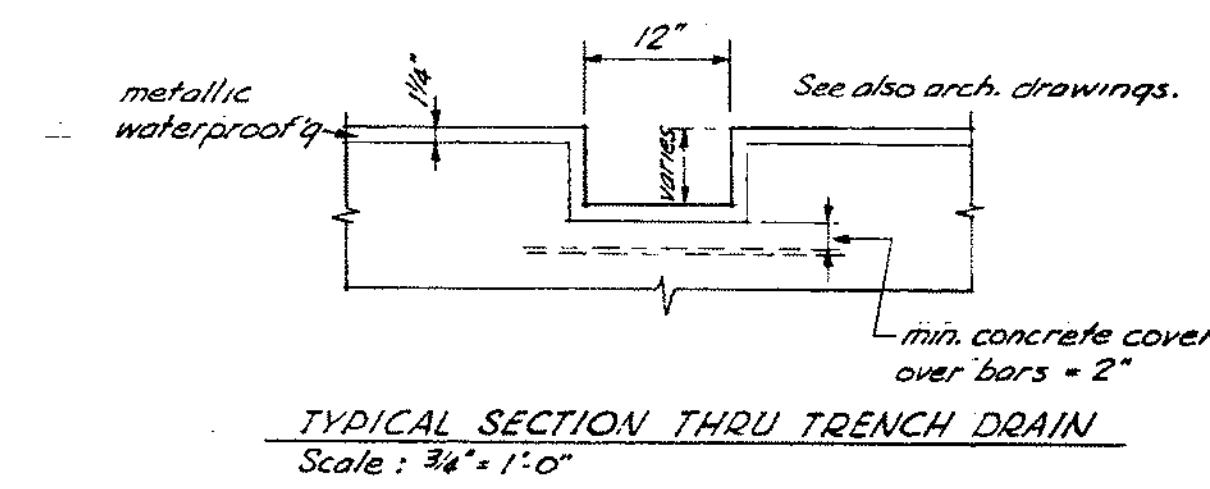
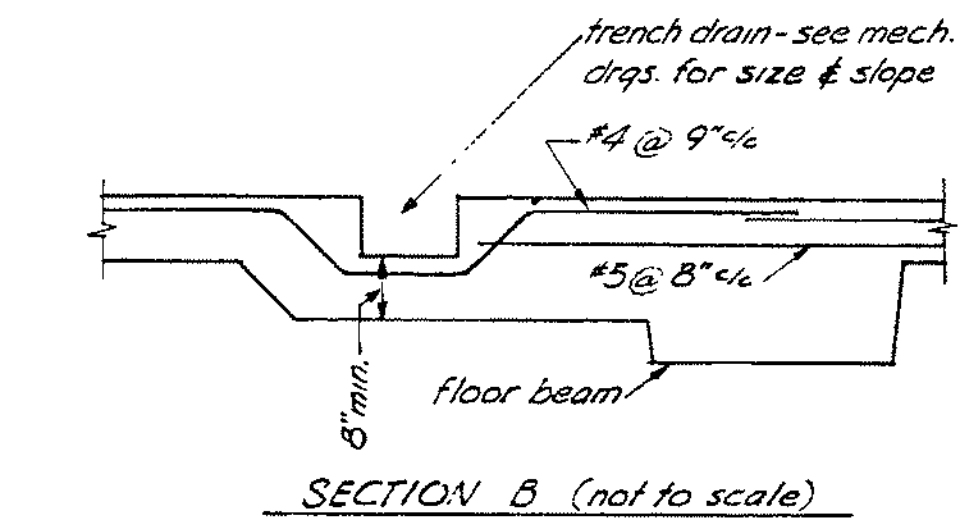
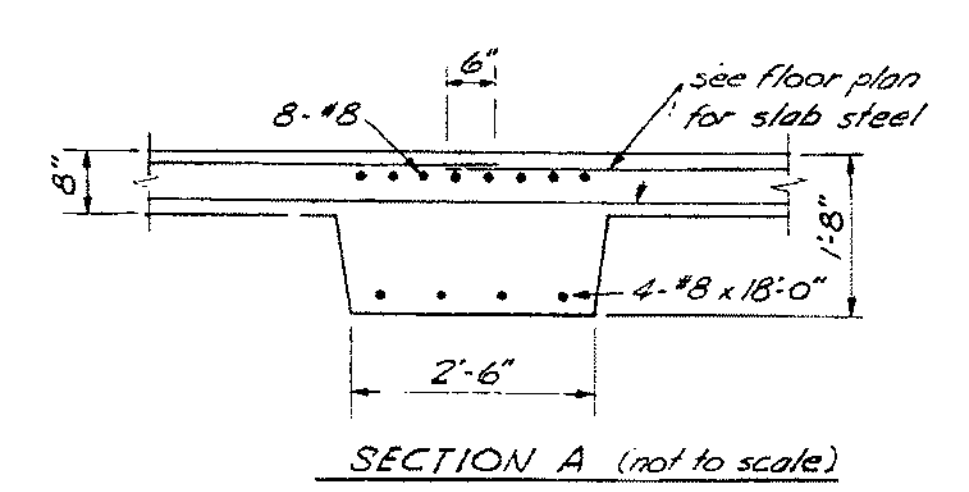
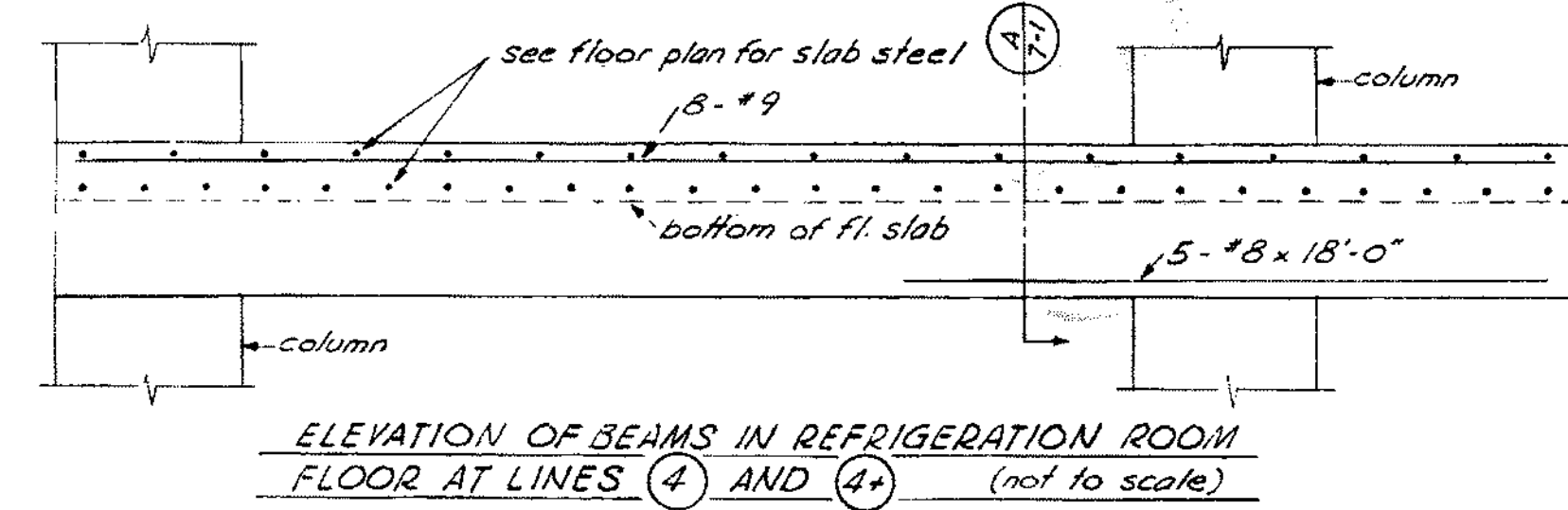
- Soil bearing pressure used in design.
- a. footing bearing on shale = 16,000 ps
 - b. All other footings above shale = 8,000 p

- Minimum 28 day concrete strengths-
 - a. Reinforced columns & piers = 4,000 p.s.i.
 - b. Structural slabs, beams = 3,000 p.s.i.
 - c. Topping slabs on membrane = 2,500 p.s.i.
 - d. Footings = 3,000 p.s.i.
 - e. Conc. fireproofing = 2,500 p.s.i.
 - f. Slabs on grade = 3,000 p.s.i.
 - g. Topping slabs on steel deck = 3,000 p.s.i.
- All structural connections to be made with A-325 high strength bolts with threads outside of shear planes.

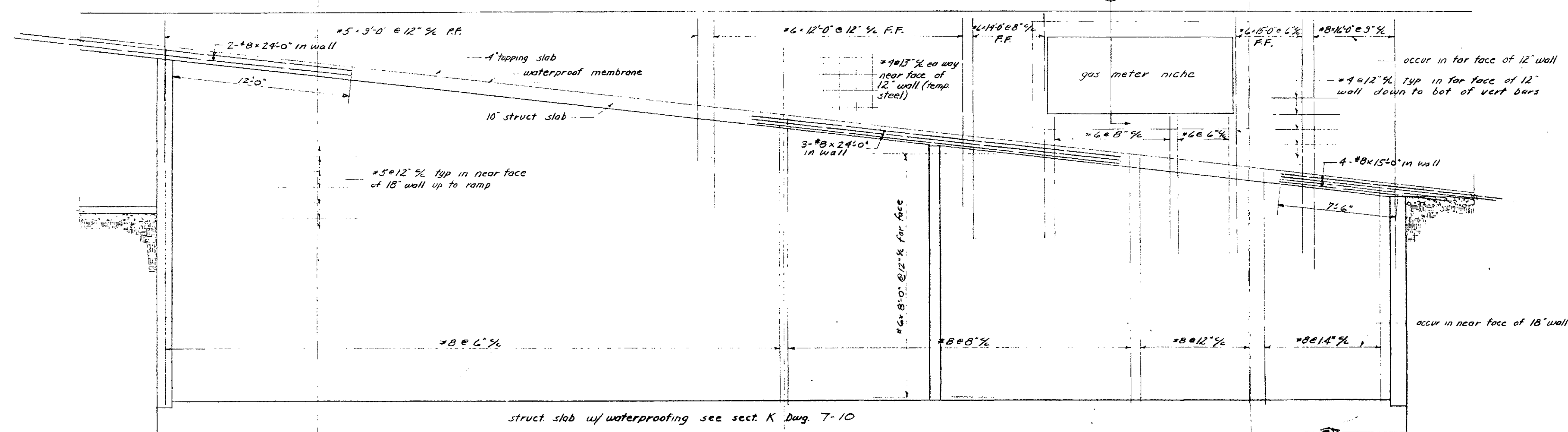
5. See Standard Detail Drawing No. 8-7-1A for structural steel except that beams are stressed to 22,000 p.s.i.

- See standard Detail Drawing No. 8-6-1A for reinforced concrete.

3. Provide 6" x 6" x 10/10 ga. welded wire fabric at all new concrete sidewalks and driveway entrance.



LOWER BASEMENT FLAT SLAB PLAN see Std. Det. Sh. No. 8-60B.
Slab thickness is 30 in. except for drain trenches.
Top bars to be placed as high as trenches permit.

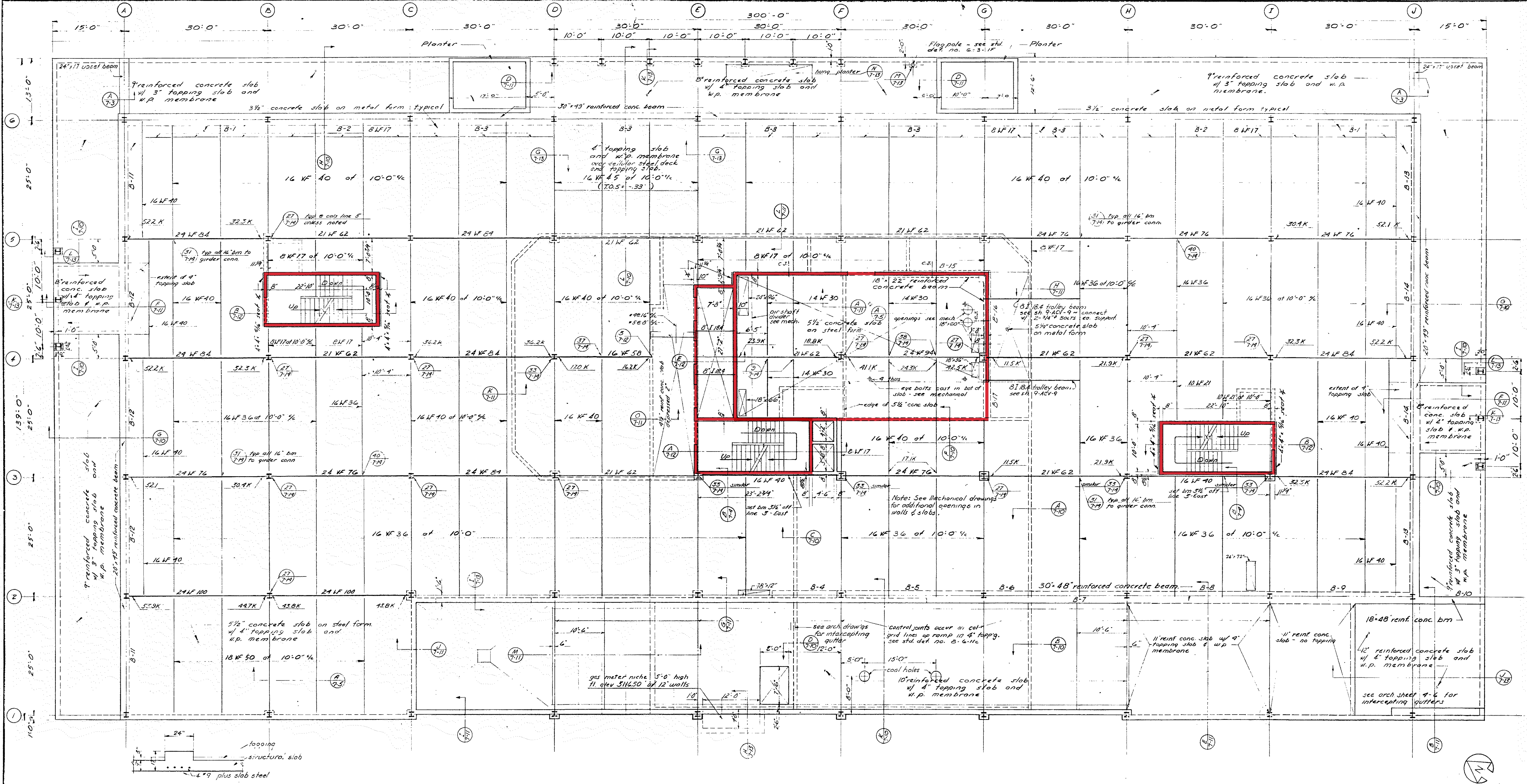


For connection of concrete columns to footings see std detail no. 8-1-1A.
For sections see sheets 7-10, 7-11, 7-12, 7-13.
For column sizes see column schedule - sheet 7-9

Inserts or bond blocks for attachment of elevator guide rails shall be furnished and placed in forms for concrete as indicated on approved elevator shop drawings.

3108.85 elevation shown is to bottom of footing.

For concrete footing size and rebar see schedule on sheet T-2



SECTION 'A' (7-3)
Scale: 3/8" = 1'-0"

FIRST FLOOR FRAMING PLAN
Scale: 1/8" = 1'-0"

Note: 5" cellular steel deck with 2 1/2" topping slab and w.p. membrane. Also mesh typical unless otherwise noted. Fin. Fl. elevation = 3124.10. Give top of steel floor framing unless noted = 3123.64.

C.J. symbol for control joint in conc. walls - see std. det. B-5-4B & B-5-3A

BEAM SCHEDULE

MARK	SIZE		REINFORCING				MARK	SIZE		REINFORCING				MARK	SIZE		REINFORCING			
	W	D	NO. SIZE	REMARKS	NO. SIZE	STIRRUPS SPACING FROM FACE OF SUPPORT		W	D	NO. SIZE	REMARKS	NO. SIZE	STIRRUPS SPACING FROM FACE OF SUPPORT		W	D	NO. SIZE	REMARKS	NO. SIZE	STIRRUPS SPACING FROM FACE OF SUPPORT
B-1	30	48	9 - #9	Bottom straight	#3	All @ 12" %	B-9	30	48	6 - #9	Bottom straight	#3	All @ 12" %	B-17	18	22	1 - #9	Bottom straight	#3	All @ 10" %
			4 - #9	Top bent at col. A-G & J-G													1 - #8	Bottom straight		
			9 - #9	Top at col. B-6 & I-6													2 - #8	Top bent at wall		
			7 - #9	Bottom straight													4 - #8	Bottom straight		
B-2	30	48	7 - #9	Top at col. C-6 & H-6	#3	All @ 12" %	B-10	18	48	6 - #9	Top bent - extend 10'-0" North of J-2	#3	All @ 12" %	B-18	18	22	2 - #8	Top bent at Col. G-3	#3	All @ 10" %
																	5 - #9	Top straight at Col. G-4.		
B-3	30	48	7 - #9	Bottom straight	#3	All @ 12" %.	B-11	20	48	5 - #9	Bottom straight	#3	All @ 12" %							
			7 - #9	Top at col. D-6, E-6, F-6, G-6						3 - #8	Top bent at col. A-1 & A-6									
B-4	30	48	5 - #8	Bottom straight	#3	All @ 12" %	B-12	20	48	5 - #9	Bottom straight	#3	All @ 12" %	See std. det. no. B-6-3B						
			4 - #9 x 25'	Top straight - extend 10'-0" beyond line F						5 - #9	Top at col. A-3 & A-4									
			3 - #9	Top straight - at col. F-6																
			6 - #9	Bottom straight																
B-5	30	48			#3	All @ 12" %	B-13	20	48	5 - #9	Bottom straight	#3	All @ 12" %							
										3 - #8	Top bent at col. J-2 & J-6									
B-6	30	48	6 - #8	Bottom straight	#3	All @ 12" %	B-14	20	48	6 - #9	Top at col. J-3 & J-5	#3	All @ 12" %							
			4 - #9 x 27'-0"	Top straight - start 10'-0" North of G-2						5 - #9	Bottom straight									
B-7	30	48	6 - #8	Bottom straight	#3	All @ 12" %	B-15	18	22	6 - #9	Top at col. J-4	#3	All @ 12" %							
			6 - #9	Top straight -						3 - #9	Bottom straight -									
B-8	30	48	6 - #9	Bottom straight	#3	All @ 12" %	B-16	18	22	5 - #9	Top straight - 12'-0" long - G-8 in conc. wall	#3	All @ 9" %							
			6 - #9	Top straight -						2 - #8	Top bent at col. G-4									
B-9	30	48	6 - #9	Bottom straight	#3	All @ 12" %	B-16	18	22	3 - #9	Bottom straight	#3	All @ 10" %							
			9 - #9	Top at col. I-2						4 - #9	Top straight at col. C-4									
B-10	30	48	6 - #9	Bottom straight	#3	All @ 12" %	B-16	18	22	2 - #8	Top bent at col. G-4	#3	All @ 10" %							
			9 - #9	Top at col. I-2						2 - #8	Top bent at col. G-4									

NOTES

For column sizes see column schedule - sheet 7-9

For structural connections see sheet 7-14

For steel beam connections see standard detail B-7-2A

For sections see sheets 7-10, 7-11, 7-12, & 7-13

For top neg. reinf. on 5 1/2" conc. slab on steel form see sheet 7-5

For top neg. reinf. around openings in air shaft block wall in fan room, see sheet 7-4

For details of conc. beam & arrangement of reinforcing bars see std. det. no. B-6-2D

For minimum reinforcing of beam faces see beam sections on sheets 7-10 & 7-11

For cold bar fire proofing see std. det. B-7-7

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PROJECT COURTHOUSE AND FEDERAL OFFICE BUILDING

LOCATION BILLINGS, MONTANA

STREET NO. 26TH ST. & 3RD AVE. NO.

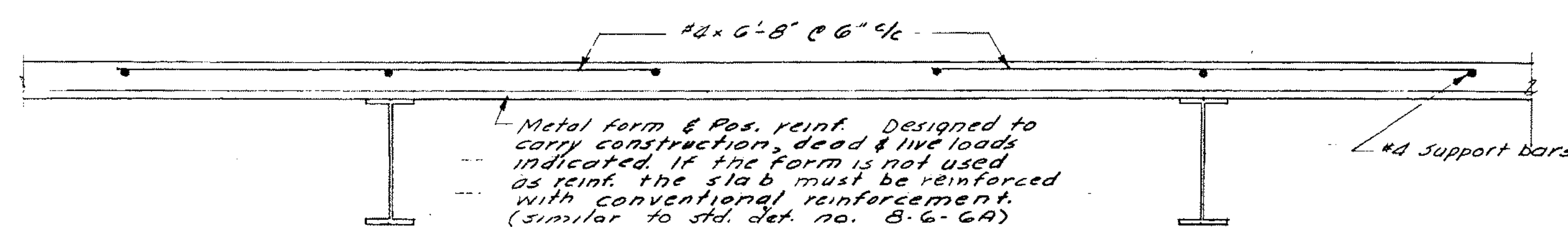
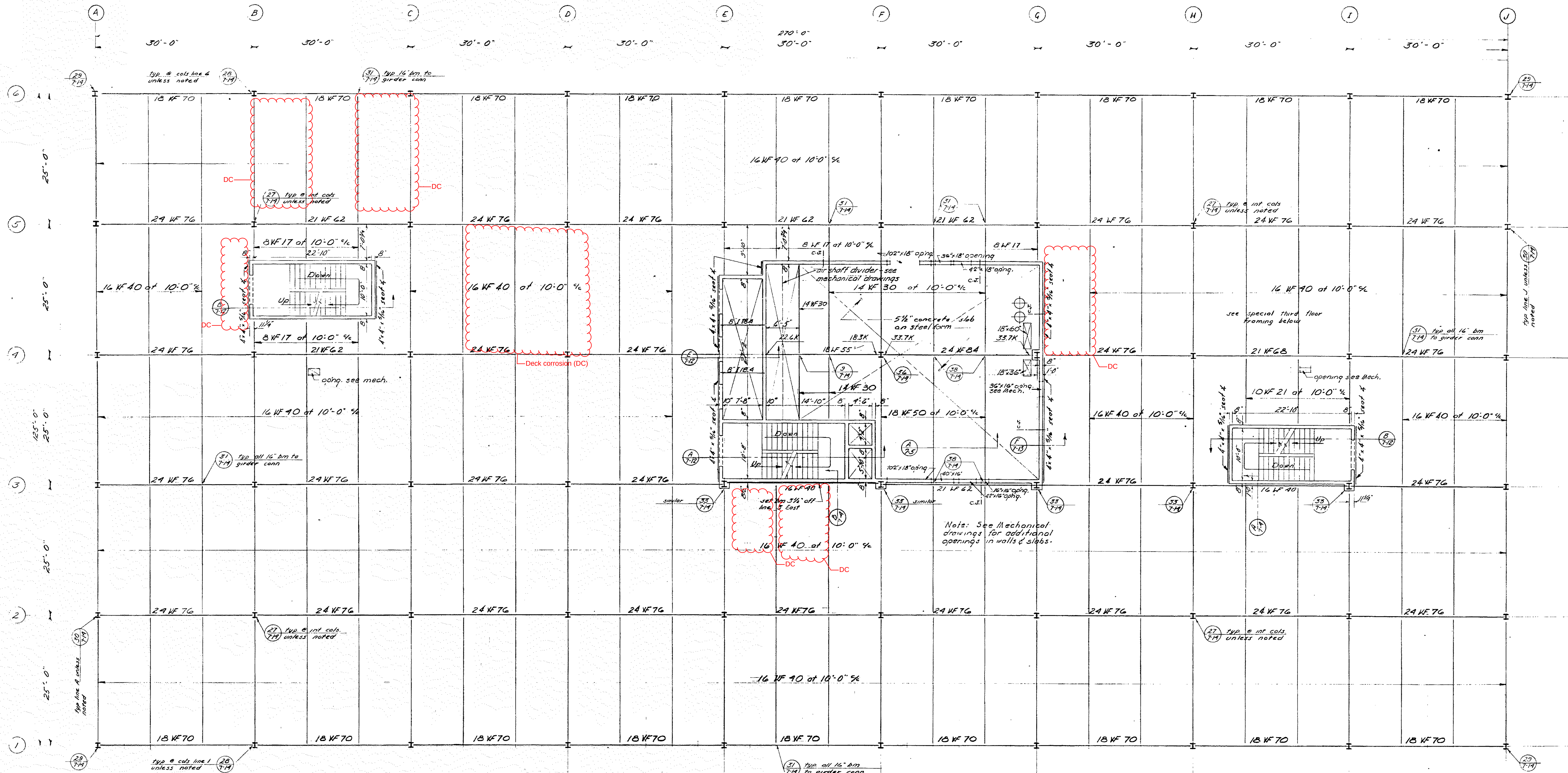
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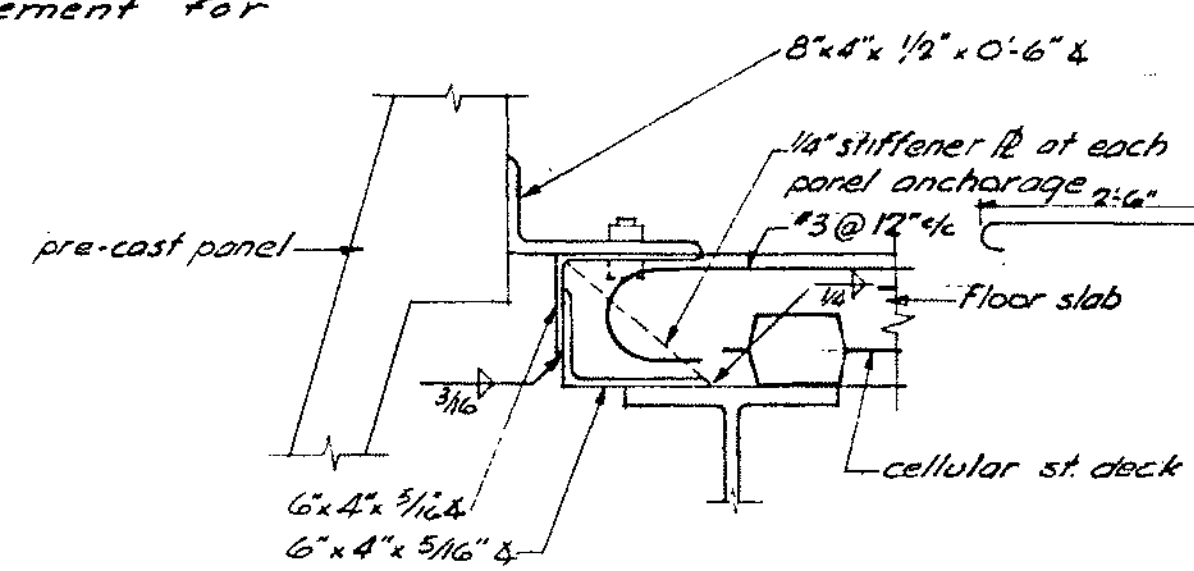
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STRUCTURAL

DRAWING NO. 7-3



SECTION A
(Typ. interior negative reinforcement for 5/8\"/>

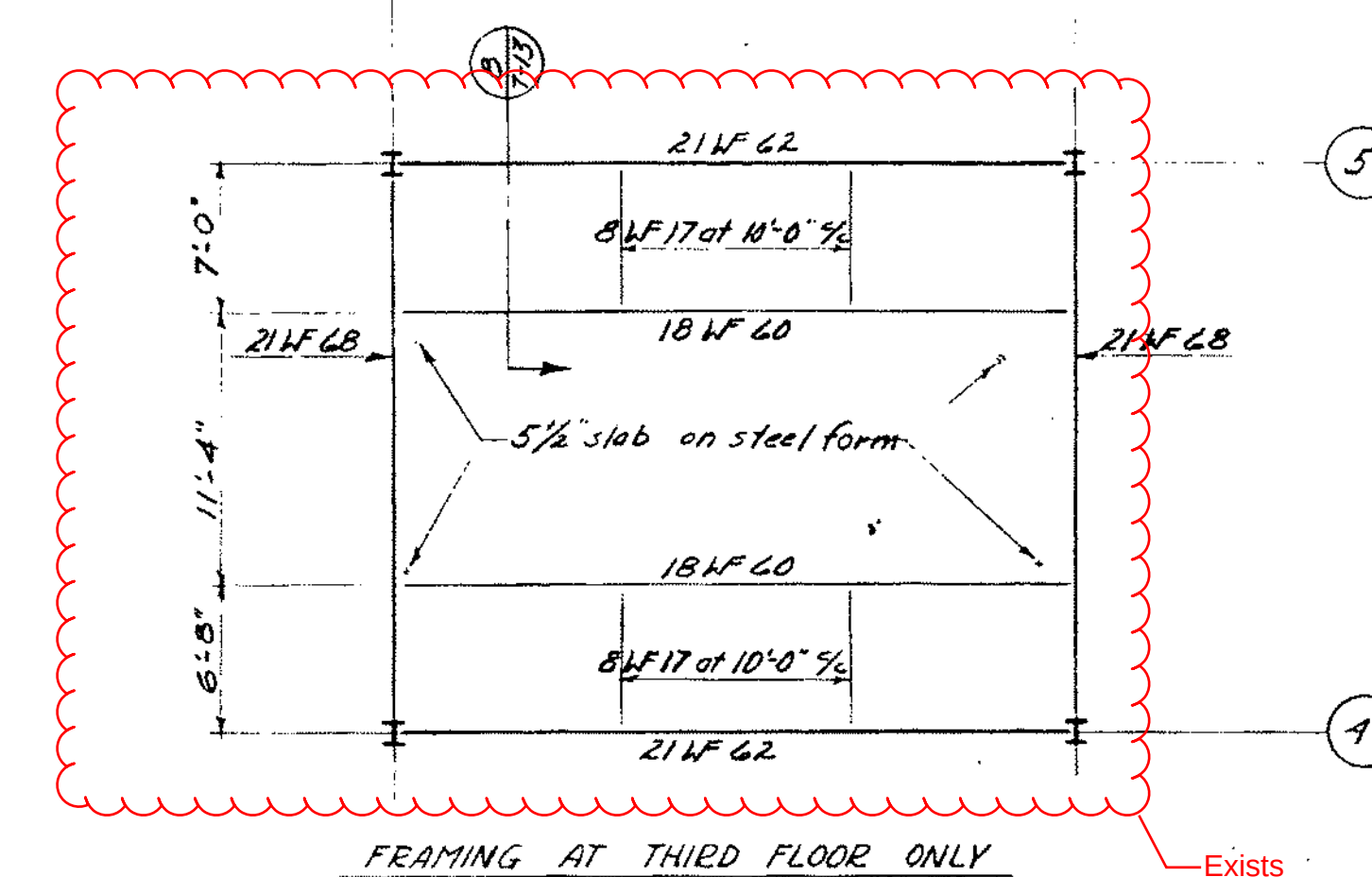


BOTTOM ANCHORAGE —
PRE-CAST PANELS TO EXTERIOR BEAMS
1/2\"/>

THIRD AND FOURTH FLOOR FRAMING PLAN

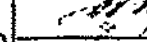
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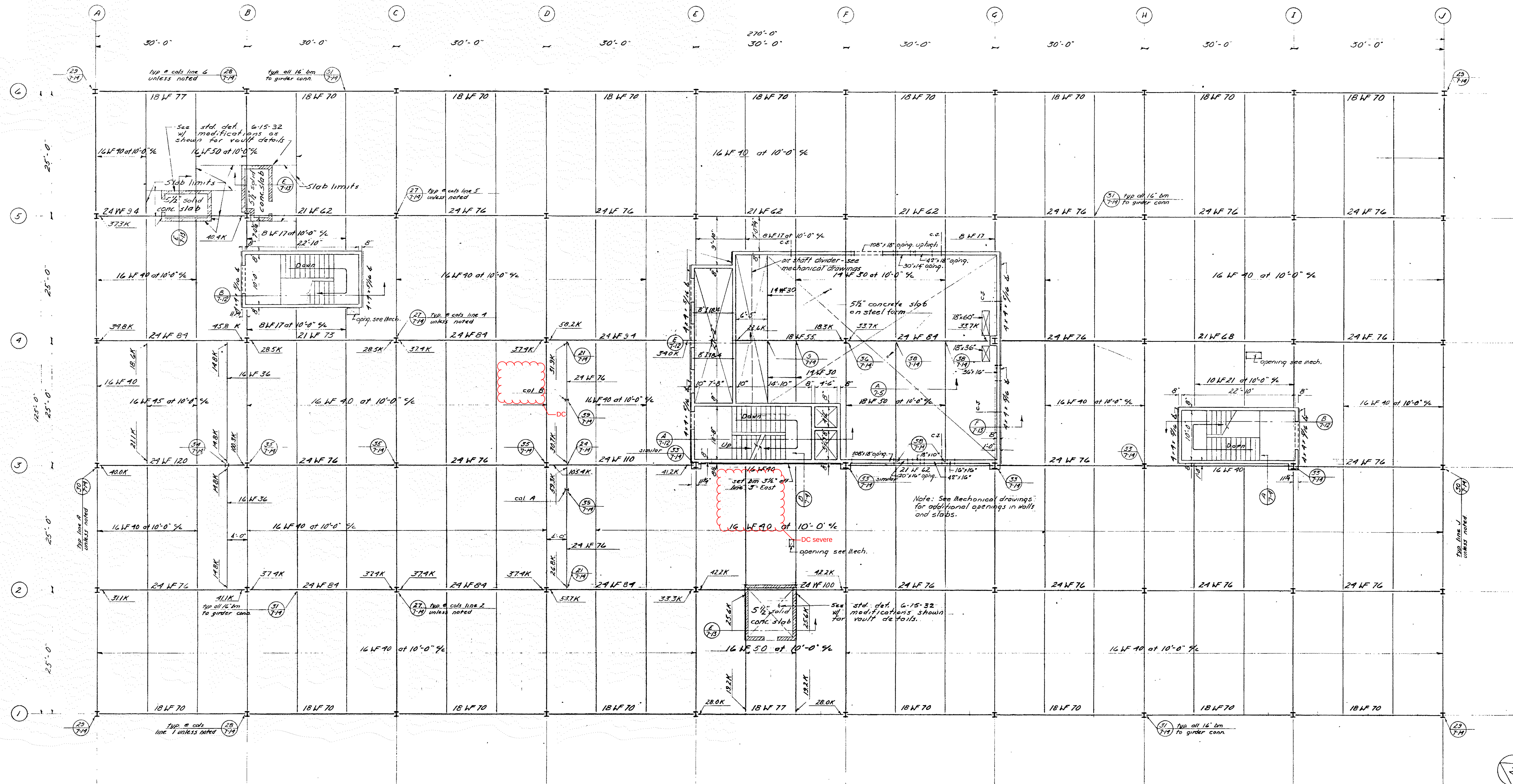
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NOTES

For column sizes see column schedule - sheet 7-3
For structural connections see sheet 7-14
For misc. brn. connections see standard detail B-7-2A
For sections see sheets 7-10, 7-11, 7-12 & 7-13
For typ. neg. reinf. on 5/8\"/>

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STRUCTURAL				
DRAWING NO.	7-5			



FIFTH FLOOR FRAMING PLAN

Scale - 1/8" = 1'-0"

Note: 3" cellular steel deck w/ 2 1/2" topping slab and 6 1/2" mesh typical unless otherwise noted
 finish floor elev. 5178.10
 slab top of steel floor framing unless noted = 5177.64
 C.S. symbol for control joint in conc. walls - see std. det. B-5-4B & B-5-3A

NOTES

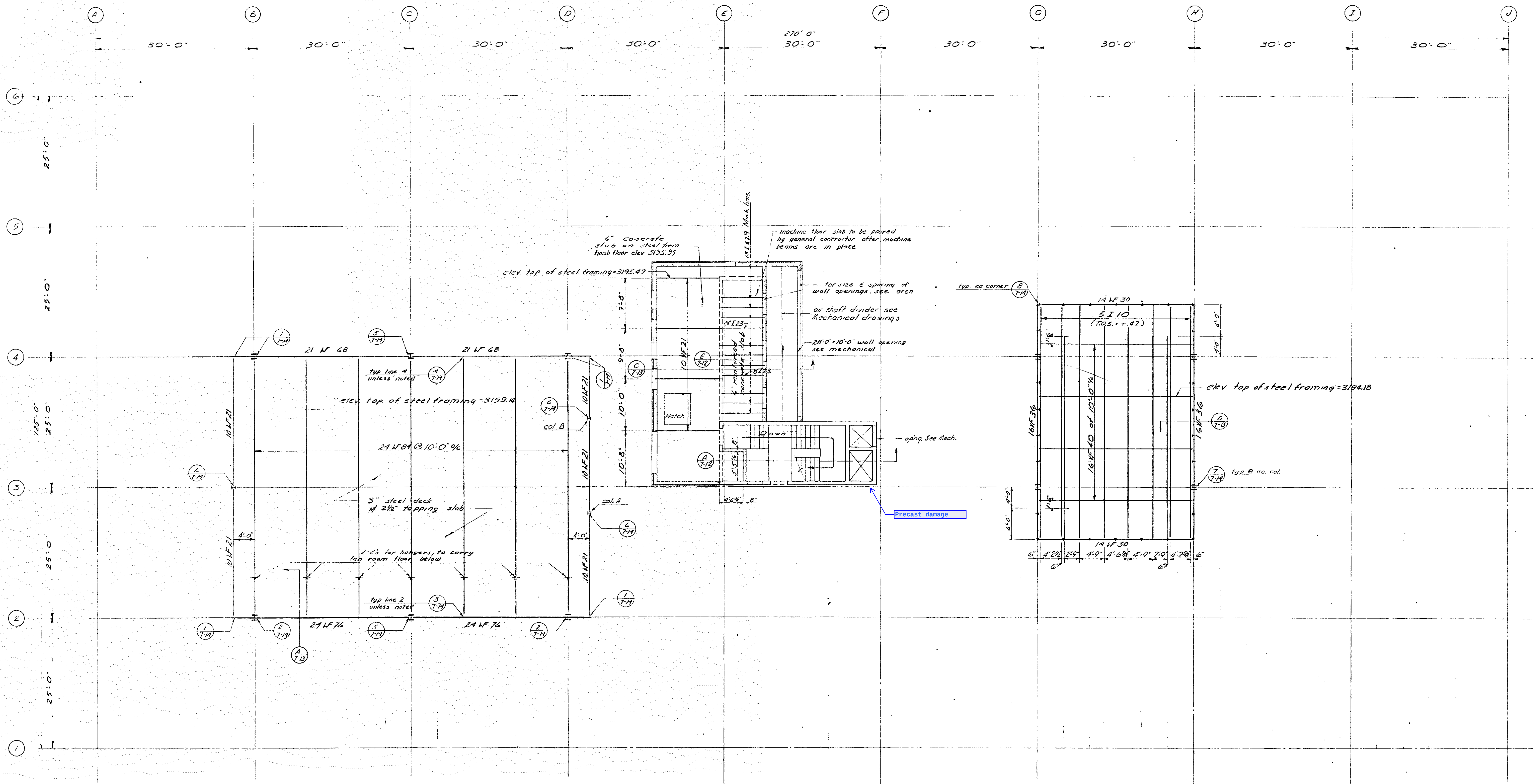
For suspended ceiling see std. det. B-5-4F
 For column sizes see column schedule - sheet 7-3
 For structural connections see sheet 7-14
 For misc. beam connections see standard detail 6-7-2A
 For sections see sheets 7-10, 7-11, 7-12, & 7-13.
 For typ. req. ramp on 3 1/2" conc. slab on steel form, see sheet 7-5
 For typ. req. around openings w/ air shaft black wall in fan room, see sheet 7-4
 For bottom anchorage of precast panels to exterior beam section, on sheet 7-5
 For col. & beam fireproofing, see std. det. no. B-7-7D

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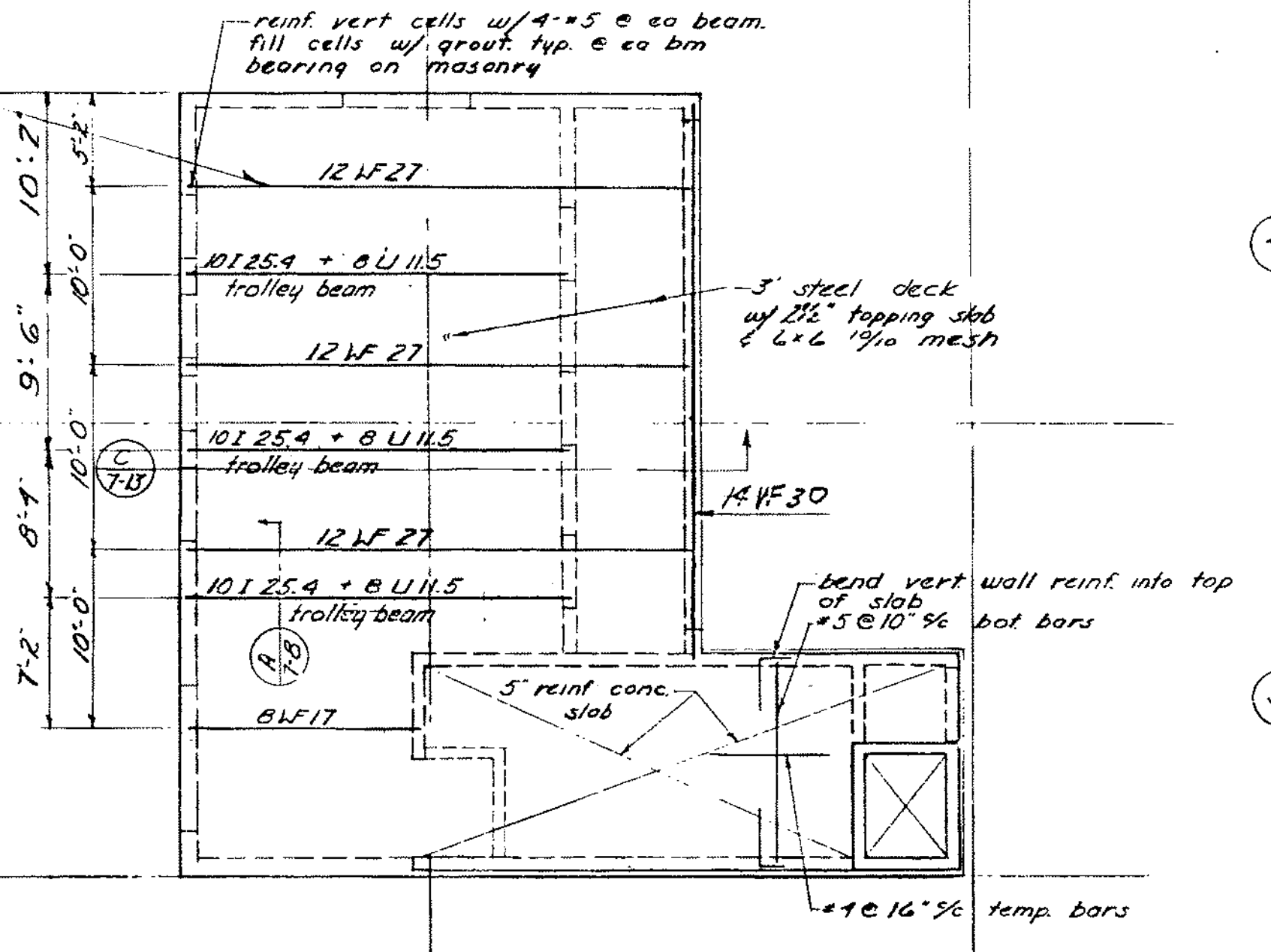
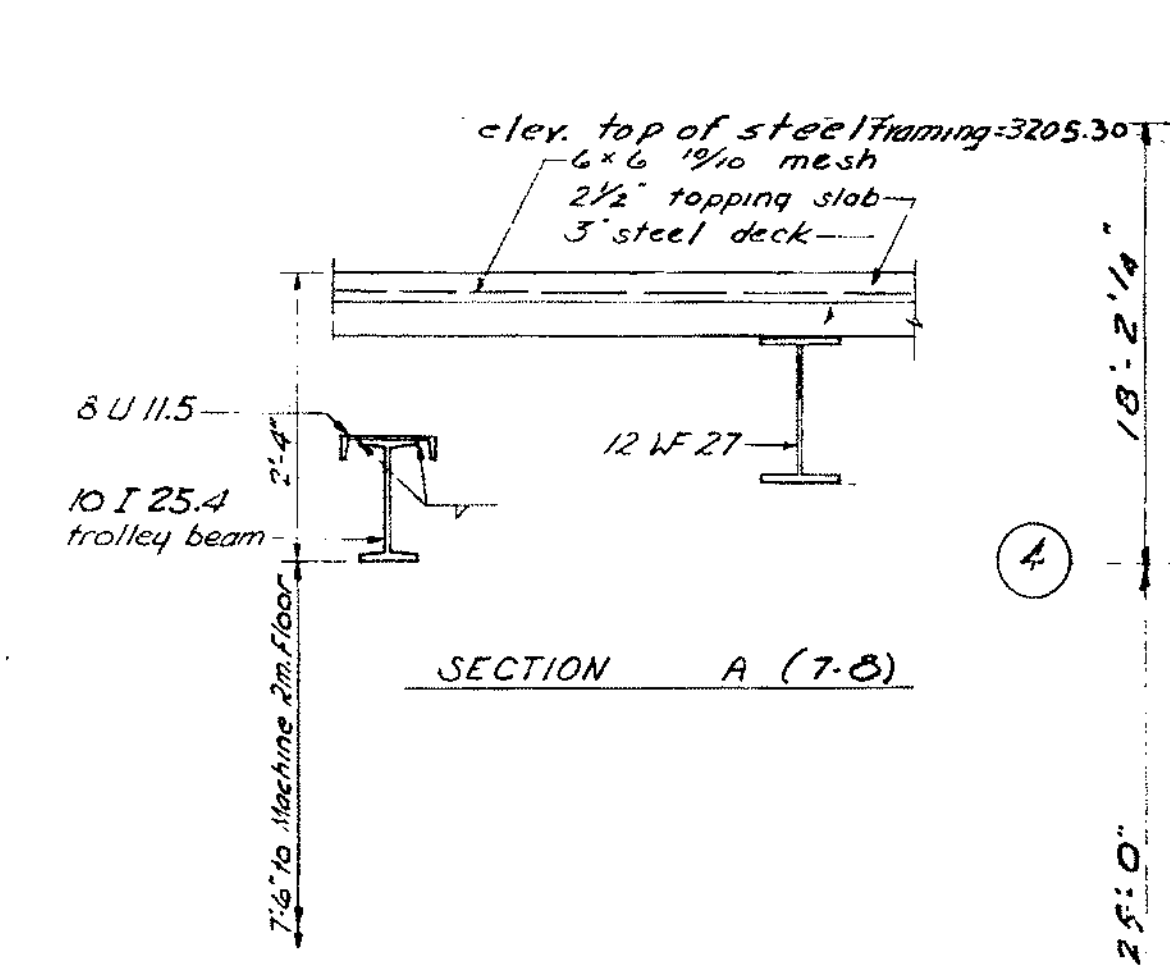
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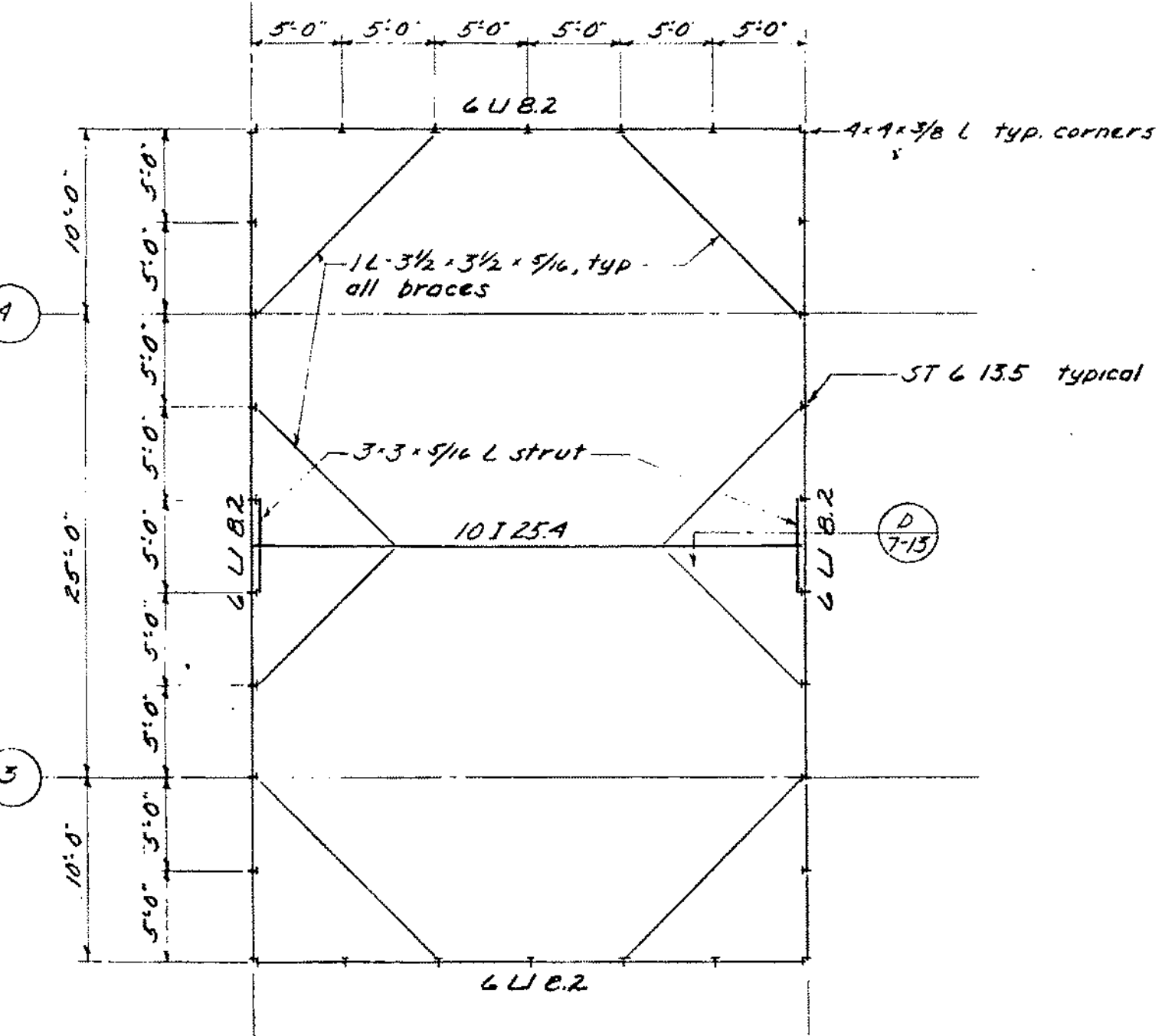


PENTHOUSE ROOF AND MACHINE ROOM FLOOR FRAMING PLAN

Scale - 1/8" = 1'-0"



MACHINE ROOM FLOOR FRAMING PLAN
Scale - 1/8" = 1'-0"



FRAMING PLAN COOLING TOWER SCREEN - ELEV 3205.18
Scale - 1/8" = 1'-0"

NOTES

For column sizes see column schedule - sheet 7-9
 For structural connections see sheet 7-14
 For sections see sheets 7-10, 7-11, 7-12, 7-13
 For misc beam connections see standard detail 8-7-2A
 For fireproofing of cols. & bms. see std. det. no. 8-7-10
 For suspended ceiling see std. det. no. 8-8-1F

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PROJ. NO.	24901	FILE NO.	
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TITLE: UPPER ROOF FRAMING PLANS		STRUCTURAL	
DATE: 7-18-62	7-8		



City of Billings

The Stillwater Building

IMEG #21005063.00

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MEP Assessment
for
The Stillwater Building
Billings, MT

IMEG #21005063.00
August 11, 2021

A. Objectives

1. Assess the existing mechanical and electrical systems at the Stillwater Building in downtown Billings Montana, to identify deferred maintenance and system infrastructure deficiencies that may require a capital cost investment to remedy, now or in the near future.
2. Provide a summary report describing the existing conditions and recommendations for upgrades.
3. Provide an opinion of cost probability for each recommendation.

B. Existing Conditions / Recommendations

1. Plumbing Systems

a. Domestic Cold Water

The domestic water and fire services are in the main boiler room. The 3" domestic water service (meter and required reduced pressure backflow preventors) are in a riser room within the main boiler room. The 6" fire service piping is located on the mezzanine level above the riser room. Most of the cold-water distribution piping throughout the building appears to be copper and in good condition. Pex piping has been installed to serve the remodeled restrooms and rough-ins for future restrooms.

b. Domestic Hot Water

Hot water is generated by a steam to water (tank type) heat exchanger located in the main boiler room. The equipment is original and has exceeded its projected service life. Small electric water heaters have been installed near the newly remodeled, main restrooms on the occupied floors. These water heaters are new and in good condition.

Recommendations: Replace the existing steam to water heat exchanger with a gas fired water heater.

Estimated Cost = \$65,000

c. Drain, Waste and Vent (DWV) Piping

Cast iron piping was utilized in the original DWV piping system. The piping that was visible showed no signs for deterioration or failure. The new restrooms on the occupied floors utilize PVC piping. In some locations, the PVC piping will be exposed in the return air plenum when the spaces are finished, and ceilings are installed. Exposed PVC piping in a return air plenum is a code violation and will need to be addressed at that time.

Recommendations: Replace the PVC piping in the return air plenum with cast iron piping.

Estimated Cost = \$8,000

d. Roof Drainage

The building roof drainage system consists of roof drains connected to an internal roof drain piping system. Cast iron piping was utilized for the original roof drainage piping system. The horizontal roof drain piping on the 5th floor has been replaced with PVC piping. Again, much of this piping will be exposed in the return air plenum when the spaces are finished. The building does not have code required overflow roof drains.

Recommendations: Replace the PVC piping in the return air plenum with cast iron piping.

Estimated Cost = \$12,000

Recommendations: Install overflow roof drainage system.

Estimated Cost = \$85,000

2. Heating, Ventilation, and Air Conditioning Systems (HVAC)

a. Heating System

The existing heating system is comprised of two 4,000 MBH output, steam boilers. The boilers were installed in 1992 and have outlived their projected service life. The boilers have been well maintained and are in good condition for



their age. However, even with good maintenance the boilers, and associated steam equipment, have a finite life and will most likely require significant maintenance or replacement within the next 5-10 years. The steam distribution piping is original and has also outlived its projected service life. Steam systems are less efficient and require more maintenance than heating water systems. Steam systems are quickly becoming obsolete with limited expertise available from design engineers, mechanical contractors, and temperature control contractors to keep the systems operating optimally long term.

Recommendations: Replace steam heating system with a high-efficiency hydronic heating system.

Estimated Cost = \$460,000

b. Cooling System

The chilled water system is comprised of two (2), 290-ton, water cooled centrifugal chillers, two (2) remote cooling towers located on the roof, and associated pumps and appurtenances to comprise a complete system. The chillers and pumps were replaced in 2000. The system has been well maintained, and other than the cooling towers, appears to be in good condition. The cooling towers were not replaced as part of the chiller replacement project in 2000. Based on the serial numbers, we believe the towers were replaced in 1989. The towers show signs of white rust and have outlived their estimated service life.

Recommendations: Replace cooling towers.

Estimated Cost = \$285,000

Recommendations: Clean and refurbish cooling towers.

Estimated Cost = \$65,000

c. Air Handling Units (AHU)

HVAC air distribution is accomplished by two types of air handling systems. The perimeter of the building, on floors 1-5, is conditioned by a high velocity dual duct system, with a dedicated air handler serving each floor. The air handlers generate and distribute heating airflow through a hot-duct distribution system, and cooling air flow through a cold-duct distribution system. The air is heated by steam heating coils in the air handlers and cooled by chilled water coils. The hot and cold duct distribution systems feed high-velocity mixing boxes around the



perimeter of each floor. The mixing boxes have modulating dampers to supply hot, cold, or mixed air temperatures to the zone, as required to satisfy the zone thermostat. Sheetrock has been installed on the half-height wall around the perimeter of the building, making the high-velocity mixing boxes inaccessible. Each mixing box has a damper actuator controlling the modulating dampers. These are moving parts that will require access and maintenance over time and access doors should be installed at each unit. The air handling units and the mixing boxes are original equipment and have outlived their estimated service life.

The interior of the building on floors 1-5, is conditioned by multizone air handling units. The multizone units have steam heating coils to heat the air in the hot deck, and chilled water coils to cool the air in the cold deck. Each zone receives hot, cold, or mixed air temperatures as required to satisfy the zone thermostat. The multizone units are original equipment and have outlived their estimated service life.

The two (2) air distribution systems are similar in that the air handlers generate both hot and cold air, and the air is mixed to meet the conditioning needs of the space. Both systems are constant volume airflow systems. The systems were state of the art for the era in which they were installed but are energy inefficient compared to modern day system options. The existing systems do not meet current energy code requirements. The existing duct distribution for both the perimeter and interior systems appear to be in good condition and appropriate for reuse. However, over time the duct sealant becomes brittle and less effective. Due to the age of the system, the duct sealant should be reapplied. Several of the air handling units have leaky drain pans, if the units are not replaced, new drain pans should be installed.

Recommendations: Replace existing air handling units (perimeter system)

Estimated Cost = \$615,000

Recommendations: Replace existing air handling units (interior system)

Estimated Cost = \$900,000

Recommendations: Install access doors at high velocity mixing boxes.

Estimated Cost = \$192,000

Recommendations: Reseal ductwork



Estimated Cost = \$25,000

Recommendations: Replace AHU drain pans

Estimated Cost = \$28,000

If the units are to be replaced, we would recommend alternate system options that would reuse much of the distribution ductwork, provide much better energy efficiency and reduce equipment costs.

3. Electrical Systems

a. Electrical Service Entrance:

The building is served by bringing in two (2) primary feeds, from two (2) separate substations from the utility (NorthWestern Energy), into a piece of paralleling switchgear in the basement level. The paralleling switchgear contains an automatic throw-over switch that will switch the primary feed from one to the other, if, there was a utility power failure on one of the incoming lines. This type of set up is typically reserved for critical facilities such as healthcare, or financial institutions. The paralleling switchgear then feeds three (3) utility transformers (one (1) per phase). The utility transformers step down the utility voltage of 4,160 volts into a "standard" building voltage of 277/480-volts. The utility transformers feed the main distribution switchboard (MDS), are located on the basement level.

Recommendation: After discussing the existing installation with NorthWestern Energy, it is recommended that the existing electrical service entrance remain. NorthWestern Energy stated that they inspect the service entrance on an annual basis, and that the paralleling switchgear is in good operating condition.

Estimated Cost = \$0.00

b. Electrical Distribution:

- 1) Basement Level: There are two (2) switchboards located in the basement that are used as main electrical distribution throughout the building. The main distribution switchboard (MDS) is a 4-section switchboard rated for 3000-amps at 277/480-volt, 3-phase, 4-wire. Section 1 contains a 1350-amp circuit breaker that serves an electrical bus duct that routes vertically through the middle of the building. Section 2 contains (2) 800-amp circuit breakers. One of these circuit breakers feeds an electrical bus duct that routes vertically through the north end



of the building, and the other circuit breaker feeds an electrical bus duct that routes vertically through the south end of the building. Section 3 contains the 3000-amp, main service circuit breaker and main fuse rollout. Section 4 houses voltage and amperage meters, as well as the main circuit breaker test and reset. There does not appear to be any space to add any additional circuit breakers. The other distribution switchboard is a 4-section switchboard rated for 1200-amps at 277/480-volt, 3-phase, 4-wire. Section 1 of this switchboard contains a 1200-amp main circuit breaker for the switchboard. Section 2 contains nine (9) circuit breakers that serve the elevators, chillers, and automatic transfer switch. It appears there are three (3) spare circuit breakers in this section with the ability to add one (1) more 3-pole circuit breaker. Section 3 contains the automatic transfer switch with isolation bypass and is rated for 200-amps. Section 4 contains the emergency distribution panelboard which has thirteen 3-pole breakers that feed emergency loads throughout the building. There is room to add one (1) additional 3-pole circuit breaker. Both switchboards are original vintage and were manufactured by Industrial Electric Manufacturing, who is not represented locally, but is still in business today.

Also, located on the basement level is a 600-amp, 480-volt motor control center located in the boiler room. This motor control center was manufactured by Siemens, who is a major electrical manufacturer still today. Adjacent to the parking area is the existing 100 kW/125 kVA, diesel powered, standby emergency generator. The generator was manufactured by Katolight and is past its useful life. Located in a closet next to the dock on the basement level is a 400A3P disconnect switch that taps off an electrical bus duct, 600-amp, 277/480-volt panel, 400-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 30 kVA transformer, and two (2) 100-amp, 120/208-volt panels.

- 2) First Floor: There are two (2) 200A3P disconnect switches and one (1) 400A3P disconnect switch that connects to the vertical bus duct risers that are used to establish electrical rooms on each floor at the north-end of the building, at the central core of the building, and on the south-end of the building. The 400A3P disconnect switch is utilized for the central electrical room on each floor. The north electrical room on this floor contains a 225-amp, 277/480-volt panel, two (2) 100-amp, 277/480-volt panels, 25 kVA transformer, 225-amp, 120/208-volt panel, and 100-amp, 120/208-volt panel. The central electrical room on this floor contains a 400-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 200A3P



disconnect switch, 25 kVA transformer, and two (2) 225-amp, 120/208-volt panels. The south electrical room on this floor contains a 225-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 25 kVA transformer, 225-amp, 120/208-volt panel, and a 100-amp, 120/208-volt panel.

- 3) Second Floor: The north electrical room on this floor contains a 225-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 45 kVA transformer, 225-amp, 120/208-volt panel, and 100-amp, 120/208-volt panel. The central electrical room on this floor contains a 400-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 45 kVA transformer, and two (2) 225-amp, 120/208-volt panels. The south electrical room on this floor contains a 400-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 45 kVA transformer, 225-amp, 120/208-volt panel, and a 100-amp, 120/208-volt panel.
- 4) Third Floor: The remodeled area on this floor contains a 400-amp, 277/480 panel, (2) 225-amp, 277/480-volt panels, 45 kVA transformer (newer GE), 7.5 kVA transformer, two (2) 225-amp, 120/208-volt panels, and a 100-amp, 120/208 volt, 1-phase panel. The north electrical room on the unfinished side of the floor contains a 225-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 45 kVA transformer, 225-amp, 120/208-volt panel, and a 100-amp, 120/208-volt panel.
- 5) Fourth Floor: The partially finished, north side of this floor contains a 100-amp, 120/208-volt panel (newer GE). The unfinished north side electrical room contains a 400-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 45 kVA transformer, 225-amp, 120/208-volt panel, and a 100-amp, 120/208-volt panel. The central electrical room on this floor contains a 400-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 45 kVA transformer, and two (2) 225-amp, 120/208-volt panels. The south electrical room on this floor contains a 225-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 45 kVA transformer, 225-amp, 120/208-volt panel, and a 100-amp, 120/208-volt panel.
- 6) Fifth Floor: The north electrical room on this floor contains a 400-amp, 277/480-volt panel, 125-amp, 277/480-volt panel (newer), 200-amp, 120/208 volt disconnect switch (transformer is located on the penthouse level), 225-amp, 120/208-volt panel, and 100-amp, 120/208-volt panel. The central electrical room on this floor contains a 400-amp, 277/480-volt panel, 100-amp, 277/480-volt panel, 45 kVA transformer, and two (2) 225-amp, 120/208-volt panels. The south side electrical room on this



floor contains a 225-amp, 277/480-volt panel, 45 kVA transformer, two (2) 225-amp, 120/208-volt panels, and a 100-amp, 120/208-volt panel.

- 7) Penthouse/Roof: The rooftop contains disconnect switches on each cooling tower. The disconnect switch housings are rusted and past their useful lives. In the north penthouse, there is a 45 kVA transformer and associated 100-amp disconnect switch. The elevator penthouse has been updated with new elevator equipment and controllers.

Recommendation: Most of the distribution panelboards were manufactured by Industrial Electric Manufacturing, who is not represented locally. Almost every existing panel has been retrofitted with newer General Electric (GE) circuit breakers. The panels are in very good condition, but are original vintage to the building, meaning almost 60 years old. Expected life of this electrical equipment is roughly 45-50 years. Unless one could re-use a minimum of 75% of the existing circuit breakers for the tenant build-out, it would be more cost effective to replace the existing panels then try to keep retrofitting circuit breakers within the panels. It is our recommendation to replace the existing panelboards with new throughout the building to have a more reliable electrical distribution system. For cost estimating purposes, we have accounted for a 1-for-1 replacement of the existing panels. The existing generator is past its expected life, is in poor condition, and should be replaced with new. For cost estimating purposes, we have accounted for a 1-for-1 replacement of the existing generator.

Estimated Cost = \$275,000 for new switchgear

Estimated Cost = \$65,000 for new 125 kVA diesel generator

Estimated Cost = \$425,000 for new branch distribution panelboards

Almost all the existing disconnect switches and step-down transformers were manufactured by Federal Pacific, who no longer manufactures electrical equipment, are in poor condition, and are past their expected life. It is recommended to replace the existing transformers and disconnect switches with new, throughout the building. For cost estimating purposes, we have accounted for a 1-for-1 replacement of the existing disconnect switches and transformers as noted above.

Estimated Cost = \$165,000 for new transformers and disconnect switches



c. Power and Wiring Devices:

The south-side of the 3rd floor and lobby, partially finished north-side of the 4th floor, main floor lobby, basement level, and building exterior are the only areas that contain installed wiring devices. The remainder of the floors currently have rough-ins installed with conduit stubs to above anticipated drop ceiling heights. There was visible evidence of non-GFCI protected receptacles installed on the building exterior and on the roof. This is a code violation and should be replaced with GFCI protected receptacles in weatherproof enclosures. The devices installed in the remodeled lobbies and portions of the 3rd and 4th floors are in acceptable condition and satisfy current codes. It is assumed that all branch wiring in the remodeled areas is new and up to current codes. The condition of existing electrical feeders was not visible for inspection.

Recommendation: Due to the age of the existing distribution equipment, and feeders not being visible during inspections, it is recommended that all existing electrical feeders and bus duct be replaced with new. Replace existing wiring devices that do not meet current codes, i.e. – GFCI receptacles where required. Bus duct may not be the preferred installation if designing as new, but for cost estimating purposes we will account for replacement of all bus duct and feeders on a 1-for-1 replacement.

Estimated Cost = \$40,000 for electrical feeders

Estimated Cost = \$600,000 for electrical bus duct

Estimated Cost = \$12,500 for replacement of wiring devices where applicable

d. Interior and Exterior Lighting:

The basement levels contain linear, industrial, fluorescent fixtures that have been retrofitted with LED lamps. Lighting is controlled via standard toggle switches on these levels, which does not meet current energy code requirements. The remodeled lobbies on the main floor and 3rd floor utilize LED sourced, recessed downlights. The lobby lighting is assumed to be controlled via timeclock, as no local controls were visible. The remodeled areas on the 3rd and 4th floors utilize LED sourced, recessed downlights and LED sourced, recessed 2'x2' volumetric troffers. The lighting located in the 4th floor remodel is controlled via circuit breakers in the space, which does not meet current energy code requirements. The lighting located in the 3rd floor remodel is controlled via a combination of wall switches, wall dimmers, and occupancy sensors. The stairwells utilize wall mounted, linear, LED sourced fixtures with polycarbonate



lenses. Some of the stairwell fixtures were failing during the investigation. Stairwell fixtures are controlled via standard toggle switches. Stairwells should be "on" 24/7 but can be dimmed down when unoccupied. The unfinished floors throughout the building contain Edison base lamp holders hard wired to junction boxes with screw-in type LED retrofit lamps. This is a temporary solution, and all new lighting will need to be provided throughout the unfinished areas with controls to meet current energy code requirements. The remodeled lobbies utilize LED, edge-lit exit signage with red lettering. The remodeled areas on the 3rd and 4th floors utilize LED, die cast aluminum exit signs with red lettering. Emergency egress lighting is achieved by utilizing regular light fixtures circuited to generator-backed panelboards. The exterior lighting under the entry canopies utilizes LED sourced, recessed downlights. The canopies located at the main doors appear to be temporary solutions and should be updated with a permanent solution. Exterior lighting was not "on" during the site investigation, and it is assumed to be controlled via timeclock, as no local controls were identified.

Recommendation: The lighting in remodeled areas on the 3rd and 4th floors and lobbies is in good condition and is recommended to remain. Lighting controls will need to be installed in the 4th floor remodel area. The basement levels lighting system is in acceptable condition but should have controls updated to meet current energy codes. The stairwell lighting was not functioning during the site investigation and should be replaced with new fixtures with integral occupancy sensors to reduce light levels when the stairwell is unoccupied. The remainder of the unfinished floors will need to have new light fixtures and controls to meet the requirements of the tenant finish and satisfy current energy codes. The lighting at the parking garage canopy is in acceptable condition, but the canopies located at the exterior main doors will need to be provided with new permanent lighting and controls. Some of the exterior lighting will need to be circuited to generator-backed panels for emergency egress on the exterior also. For cost estimating purposes, we will include replacement of existing stairwell lighting and controls, new controls added to basement and 4th floor remodel area, and replacement of existing exterior lighting and controls.

Estimated Cost = \$35,000

e. Fire Alarm:

The building contains a digital, addressable fire alarm system. The fire alarm control panel (FACP) is in the central electrical room on the 1st floor and is an EST model serviced by High Tech Solutions, who is a local fire alarm installer. The FACP appears to utilize a cellular dialer for connecting to a third-party monitoring



system. There are network extender (NAC) panels located on the other floors of the building. The fire alarm system currently consists of detectors (smoke and heat), manual pull stations, and annunciation devices (horns, strobes, and combination horn/strobes). The system is in acceptable condition and meets current codes with the current building layout. If the building remains a Type B occupancy, the existing fire alarm should be able to be expanded upon to meet current codes for the tenant buildout. If occupancy type changes for the tenant buildout, then further analysis will need to happen to determine how to incorporate into the existing system.

Recommendation: Our recommendation at this time would be to keep the existing fire alarm system already present in the building and expand upon it to meet current codes for the tenant buildout of the space as required.

Estimated Cost = \$0.00

C. Conclusions

1. In its current state the MEP systems appear to be fully functional and able to support full occupancy. The MEP systems and infrastructure were state of the art for the era in which the building was constructed. In addition, the MEP systems have been well maintained and are in good condition for their age. However, despite good design and maintenance, much of the MEP infrastructure is original and has a finite service life. The above recommendations, and associated costs, identify the system and equipment that might require significant maintenance, or capital costs, for replacement in the coming years. If equipment is replaced, more energy efficient approaches could be implemented to reduce ongoing energy costs, improve thermal comfort, and reduce maintenance effort.

Prepared by: Clint E. Laferriere

CEL/eap

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August 11, 2021

Mr. John Caterino
Facilities Supervisor
City of Billings
P.O. Box 1178
Billings, Montana 59101

Delivered via email CaterinoJ@billingsmt.gov

SUBJECT: Supplemental Asbestos Inspection Report
Stillwater Building
316 North 26th Street
Billings, Montana
Tetra Tech Project Number: 117-8034008.100

Dear Mr. Caterino:

On July 26 and 27, 2021, Tetra Tech, Inc. (Tetra Tech) conducted a supplemental asbestos inspection at the above referenced site. This inspection was conducted to supplement the previous findings generated by The Department of Health and Human Service of Denver, Colorado, as identified within the *Asbestos Reinspection*, dated June 2004 and Tetra Tech of Billings Montana as identified within the *Report of Supplemental Asbestos Inspection*, dated October 4, 2016. Details of our inspection are provided below.

ASBESTOS INSPECTION

The supplemental asbestos inspection was conducted in accordance with the Administrative Rules of Montana 17.74.354, using the currently recognized standard protocol developed under the National Emission Standards for Hazardous Air Pollutants (NESHAP) and the Asbestos Hazard Emergency Response Act (AHERA), as administered by the State of Montana Department of Environmental Quality (MDEQ).

This inspection was conducted in addition to the findings presented in the *Asbestos Reinspection*, dated June 2004, completed by The Department of Health and Human Service and in the *Report of Supplemental Asbestos Inspection*, dated October 4, 2016, completed by Tetra Tech. Unless specifically noted, the findings generated in these documents were considered accurate, and are incorporated in the findings generated within this report. The Tetra Tech 2016 report which includes the Department of Health and Human Service 2004 report are provided in Attachment A

Mr. Jay Harper and Mr. Connor McHugh of Tetra Tech, MDEQ Accredited Asbestos Inspectors, assessed previously identified ACM and collected samples of exterior and newly identified interior suspect ACM. Their Inspector Accreditation Certifications are presented in Attachment B.

The bulk samples of exterior and newly identified interior suspect ACM were shipped, along with completed chain-of-custody documentation, to Crisp Analytical of Carrollton, Texas for the analysis of asbestos fibers by polarized light microscopy (PLM) using U.S. Environmental Protection Agency (EPA) Methods described in 40 CFR Part 763 Appendix E Subpart E (Interim and EPA 600/R-93 / 116 (Improved)). Only one of the samples from each homogenous material was tested if the initial sample tested positive for asbestos. A copy of the bulk asbestos laboratory analysis report is contained in Attachment C.

A summary of the ACMs identified to contain greater than 1% asbestos are provided in Table 1. Approximate sample collection locations of exterior and newly identified interior suspect ACM are presented on Figures 1 through 8 and approximate ACM locations are presented on Figures 9 through 16.

Table 1 Summary of Greater Than 1% Asbestos-Containing Materials				
HA Number	Material Description	Percent Asbestos	Material Type	NESHAP Category
The Department of Health and Human Service 2004 Inspection				
BS	Brake shoes on elevator hoist system	Assumed	Miscellaneous	Category II-Non-Friable
CTA	Ceramic tile adhesive	1-3% Chrysotile	Miscellaneous	Category I Non-Friable
CTA5	Adhesive under ceramic wall tile	1-3% Chrysotile	Miscellaneous	Category I Non-Friable
FDww	Fire Door – weldwood “mag” filled	25-30% Chrysotile	Miscellaneous	RACM
FDwd	Fire Door – wood No label	Assumed	Miscellaneous	RACM
FDst	Fire Door – steel doors, filled with air - cell	65% Chrysotile	Miscellaneous	RACM
FDsd	Steel doors, no label	Assumed	Miscellaneous	RACM
MM	Miscellaneous mastic	5-7% Chrysotile	Miscellaneous	Category I Non-Friable
SO	Spray-on insulation and associated over-spray on surrounding building materials	5-10% Chrysotile	Surfacing	RACM
SOd	Spray-on insulation debris on deck vents and beams beneath non-asbestos containing spray applied insulation	Assumed	Surfacing	RACM

Table 1 Summary of Greater Than 1% Asbestos-Containing Materials				
HA Number	Material Description	Percent Asbestos	Material Type	NESHAP Category
OSO	Overspray-on insulation on CMU, concrete walls, lathe plaster, and other various building substrates	Assumed	Surfacing	RACM
WB1/JC1	Joint compound associated with wallboard system remnants	1-2% Chrysotile	Miscellaneous	Category II Non-Friable
Tetra Tech 2021 Supplemental Inspection				
BF-S1.1 (PL)	Plaster walls contaminated with SO overspray	2% Chrysotile	Surfacing	RACM
BF-S5.1 (SO)	SO spray on fireproofing on walls and old joists not demolished	8% Chrysotile	Surfacing	RACM
BF-T4.1 (VC/VD)	Old vibration collar painted green	2% Chrysotile	Miscellaneous	Category II Non-Friable
BF-T14.1 (DS)	Dark gold duct sealant	2% Chrysotile	Miscellaneous	Category II Non-Friable
HA Number: Homogeneous Area Number NESHAP: National Emission Standard for Hazardous Air Pollutants RACM: Regulated Asbestos Containing Material TSI: Thermal System Insulation				

In accordance with state and federal regulations pertaining to asbestos, the ACMs identified in Table 1 are required to be abated prior to disturbance. The ACMs are required to be removed by a licensed asbestos abatement contractor using appropriate asbestos abatement methods and procedures in accordance with applicable state and federal regulations. Following the completion of asbestos abatement, a visual inspection and asbestos air clearance need to be conducted as required by ARM 17.74.357. Any contractor preparing to bid or perform work on the site should be informed of the potential presence of ACMs. Contractors should also be informed of compliance requirements under current state and federal regulations.

The following materials sampled from the site were suspected to contain asbestos but were found not to contain asbestos by laboratory analysis:

The Department of Health and Human Service 2004 Inspection

- Acoustical wall tile, 12-inch by 12-inch, white, large holes, and mastic (AT2/AM2)
- Cork flooring mastic (CK-3)
- Ceiling tile, 2-foot by 4-foot, white, parallel wavy fissures (CT2)
- Ceiling tile, 2-foot by 5-foot, white, sub circular cuts (CT3)
- Ceiling tile, 2-foot by 5-foot, white, parallel cuts (CT4)
- Ceiling tile, 2-foot by 5-foot, white, random cuts (CT5)

- Ceiling tile, 2-foot by 5-foot, white, irregular pits (CT6)
- Ceiling tile, 2-foot by 5-foot, white, pits, random cuts (CT7)
- Ceiling tile, 2-foot by 2-foot, white, rough fissures (CT8)
- Ceiling tile, 2-foot by 4-foot, white, vinyl cover, orange peel texture (CT9)
- Ceiling tile, 2-foot by 4-foot, white, holes (CT10)
- Ceiling tile, 2-foot by 4-foot, white, weave (CT11)
- Ceiling tile, 2-foot by 4-foot, white, holes and furrows (CT12)
- Ceiling tiles, 2-foot by 5-foot, white, dense parallel, wavy fissures (CT13)
- Duct sealant, grey (DS1)
- Duct sealant, white (DS2)
- Resilient floor tile, 9-inch by 9-inch, gray with blue streaks, associated with asbestos-containing black mastic (FT5)
- Resilient floor tile, 12-inch by 12-inch, gray with bluish-gray mottling (FT11)
- Door gasket associated with door to air fan filters (G)
- Penetration caulk (PC)
- Penetration caulk, red (PC2)
- Lath plaster, skim and scratch coats, asbestos contaminated (PL)
- Pipe sealant, new (PS1)
- Pipe sealant, old (PS)
- Roofing felt (RF)
- Roofing sealant, black (FS1)
- Stanchion mastic, dull black, under raised floor (SM1)
- Stanchion mastic, brown, under raised floor, CH#1 (SM2)
- Stanchion mastic, shiny black, under raised floor (SM3)
- Spray-on fireproofing, cellulose (SOC)
- Spray-on fireproofing, blue stained (SO2)
- Spray-on fireproofing, off white (SO3)
- Sheet vinyl and associated mastic (SV4)
- Heavy ribbed texturing on concrete walls (TX1)
- Sandy texturing on ceilings in electrical and telephone closets (TX2)
- Vibration dampeners (VD)
- Wallboard (WB1)
- Wallboard and joint compound, 1st level (WB2/JC2)
- Wallboard and joint compound, 2nd level (WB3/JC3)
- Wallboard and joint compound, 3rd level (WB4/JC4)
- Wallboard and joint compound, 4th level (WB5/JC5)
- Wallboard and joint compound, 5th level (WB6/JC6)
- Wallboard and joint compound, 2nd level (WB7/JC7)
- Wall cove, 4" light-medium brown, and mastic (WC1/WM1)
- Wall cove, 4" dark brown, and mastic (WC2/WM2)
- Wall cove, 4" blue, and mastic (WC3/WM3)
- Wall cove, 4" grey, and mastic (WC4/WM4)
- Wall cove, 4" black, and mastic (WC5/WM5)
- Wall cove, 4" reddish brown, and mastic (WC6/WM6)
- Wall cove, 4" dark grey, and mastic (WC7/WM7)
- Wall cove, 4" off white-light yellowish white, and mastic (WC8/WM8)
- Wall cove, 4" light grey, and mastic (WC9/WM9)
- Wall cove, 4" dark blue, and mastic (WC10/WM10)

Tetra Tech 2016 Interior Inspection

- Orange low profile carpet backing and associated mastic (BF-F6.1A, B, C)
- Dark blue carpet backing and associated mastic (BF-F6.2A, B, C)
- Light blue carpet backing and associated mastic (BF-F6.3A, B, C)
- Blue 18-inch carpet square backing and associated mastic (BF-F6.4A, B, C)
- Light blue multicolored carpet backing and associated mastic (BF-F6.5A, B, C)
- Dark blue multicolored carpet backing and associated mastic (BF-F6.6A, B, C)
- Green 18-inch carpet square backing and associated mastic (BF-F6.7A, B, C)
- Brown carpet backing and associated mastic (BF-F6.8A, B, C)
- Red carpet backing and associated mastic (BF-F6.9A, B, C)
- Tan square pattern carpet backing and associated mastic (BF-F6.11A, B, C)
- Brown carpet with red dot pattern backing and associated mastic (BF-F6.12A, B, C)
- Tan loop carpet backing and associated mastic (BF-F6.13A, B, C)
- Light blue solid carpet backing and associated mastic (BF-F6.14A, B, C)
- 24-inch by 48-inch ceiling panel with pinhole pattern (BF-M5.1A, B, C)
- Blue cove base and associated mastic (BF-M12.1A, B, C)
- Tan cove base and associated mastic (BF-M12.2A, B, C)
- Red brick and mortar (BF-M13.1A, B, C)
- White 4-inch ceramic wall tile and associated grout (BF-M16.2A, B, C)
- Yellow 4-inch ceramic base tile and associated grout (BF-M16.4A, B, C)
- Red 6-inch ceramic floor tile and associated grout (BF-M16.5A, B, C)
- Polished yellow ceramic wall block and associated grout (BF-M16.6A, B, C)
- Dull Yellow ceramic wall block and associated grout (BF-M16.7A, B, C)
- White 1 and 2-inch ceramic floor tile and associated grout (BF-M16.8A, B, C)
- Grey 1-inch ceramic wall tile and associated grout (BF-M16.9A, B, C)
- Yellow 1-inch ceramic floor tile and associated grout (BF-M16.10A, B, C)
- White 1-inch ceramic wall tile and associated grout (BF-M16.12A, B, C)
- Structural concrete (BF-M18.1A, B, C)
- CMU block and associated mortar (BF-M22.1A, B, C)
- Diamond pattern wallpaper and associated mastic (BF-M30.1A, B, C)
- White wallpaper and associated mastic (BF-M30.2A, B, C)
- Tan wallpaper and associated mastic (BF-M30.3A, B, C)
- Tan square pattern wallpaper and associated mastic (BF-M30.4A, B, C)
- Tan spray-apply fireproofing (BF-S5.1A, B, C, D, E, F, G)
- Blue painted spray-apply fireproofing (BF-S5.2A, B, C, D, E, F, G)
- Grey 12-inch by 12-inch vinyl floor tile (BF-F2.1A, B, C)
- Blue 18-inch carpet square with black backing and associated mastic (BF-F6.15A, B, C)
- Grey low-profile carpet backing and associated mastic (BF-F6.16A, B, C)
- Dark blue multicolored carpet backing and associated mastic (BF-F6.17A, B, C)
- Purple multicolored carpet backing and associated mastic (BF-F6.18A, B, C)
- Blue 18-inch carpet square with grey backing and associated mastic (BF-F6.19A, B, C)
- Dark purple multicolored carpet square backing and associated mastic (BF-F6.20A, B, C)
- Teal carpet backing and associated mastic (BF-F6.21A, B, C)
- Brown multicolored carpet backing and associated mastic (BF-F6.22A, B, C)
- Blue carpet with black backing and associated mastic (BF-F6.23A, B, C)
- Brown weave carpet backing and associated mastic (BF-F6.24A, B, C)

- Blue and grey carpet backing and associated mastic (BF-F6.25A, B, C)
- Grey carpet with grey backing and associated mastic (BF-F6.26A, B, C)
- Grey and maroon carpet backing and associated mastic (BF-F6.27A, B, C)
- Brown carpet backing and associated mastic (BF-F6.28A, B, C)
- Red and grey carpet backing and associated mastic (BF-F6.29A, B, C)
- Purple multicolored carpet with black backing and associated mastic (BF-F6.30A, B, C)
- Blue multicolored carpet with felt backing and associated mastic (BF-F6.31A, B, C)
- Smooth wallboard system (BF-M3.1A, B, C)
- Unfinished smooth wallboard (BF-M3.2A, B, C)
- 24-inch by 48-inch ceiling panel with small fissure and pinhole pattern (BF-M5.2A, B, C)
- 24-inch by 48-inch ceiling panel with orange-peel texture pattern (BF-M5.3A, B, C)
- Old brown cove base and associated mastic (BF-M12.3A, B, C)
- New brown cove base and associated mastic (BF-M12.4A, B, C)
- Tan cove base and associated mastic (BF-M12.5A, B, C)
- Tan / brown 1-inch ceramic floor tile and associated grout (BF-M16.3A, B, C)
- Mastic associated with corkboard (BF-M26.1A, B, C)
- Tan stripe wallpaper mastic (BF-M30.5A, B, C)
- Tan floral pattern wallpaper mastic (BF-M30.6A, B, C)
- Light tan mosaic wallpaper mastic (BF-M30.7A, B, C)
- Tan mosaic wallpaper mastic (BF-M30.8A, B, C)
- Blue wallpaper (BF-M30.9A, B, C)
- Light blue wallpaper (BF-M30.10A, B, C)
- White weave wallpaper (BF-M30.11A, B, C)
- Light green wallpaper mastic (BF-M30.12A, B, C)
- Wood panel mastic (BF-M31.1A, B, C)
- Yellow wood panel mastic (BF-M31.2A, B, C)
- Green tinted spray-apply fireproofing (BF-S5.3A, B, C, D, E, F, G)
- Blue painted spray applies fireproofing (BF-S5.4A, B, C, D, E, F, G)
- Boiler insulation (T6.1A, B, C)
- Boiler hatch refractory (T7.1A, B, C)
- Boiler hatch gasket rope (T14.1A, B, C)
- Boiler hatch gasket flat weave (T14.2A, B, C)

Tetra Tech 2021 Supplemental Inspection

- Gray caulking (exterior columns) (BF-M8.1A, B, C)
- Gray window caulking (BF-M8.2A, B, C)
- Black caulking – exterior quartz siding (BF-M8.3A, B, C)
- Black tar sidewalk expansion joint material (BF-M8.4A, B, C)
- White caulking – pre-cast columns and building panels (BF-M8.5A, B, C)
- Concrete sidewalk (BF-M18.2A, B, C)
- Concrete slab – basement and first floor (BF-M18.3A, B, C)
- Concrete slab – second through fifth floors (BF-M18.4A, B, C)
- Gray window glazing (BF-M29.1A, B, C)
- White mortar associated with pre-cast columns and building panels (BF-M30.1A, B, C)
- Plaster ceilings (BF-S1.2A, B, C, D, E, F, G)
- Spray on fireproofing on roof deck and beams in room 4144 (BF-S5.2A, B, C)

LIMITATIONS

Based on our July 27, 2021 onsite meeting with you, Tetra Tech was instructed to inspect all interior and exterior portions of the building excluding the Third Floor build out of the Yellowstone County space and any newly installed building materials throughout.

Our opinions are intended exclusively for use by the City of Billings. The scope of services performed by Tetra Tech may not be appropriate to satisfy the needs of other users, and any use or re-use of this document, or the findings presented herein is prohibited and at the sole risk of the user. No additions or deletions are permitted without the express written consent of Tetra Tech. Furthermore, the opinions presented herein are limited by the requested scope of services and the site conditions existing at the time of our investigation. Therefore, our opinions and recommendations may not apply to future site conditions which we have not had the opportunity to evaluate.

It has been a pleasure assisting you with this project. If you should have any questions or need any additional information please contact me in our Tetra Tech Billings, Montana office at (406) 248-9161.

Respectfully submitted,

Tetra Tech, Inc.

Roger W. Herman, Jr.

Roger W. Herman, Jr.
Asbestos, Lead & IH Services Manager

I:\A-G\Billings City of Engineers Office\117-8034008 - Stillwater Bldg ASB Radon\05-Deliverables\Final\City of Billings-Stillwater Bldg-316 North 26th St-Supplemental Asbestos Insp Rpt.docx

Figures

Attachment A – Tetra Tech, Inc.

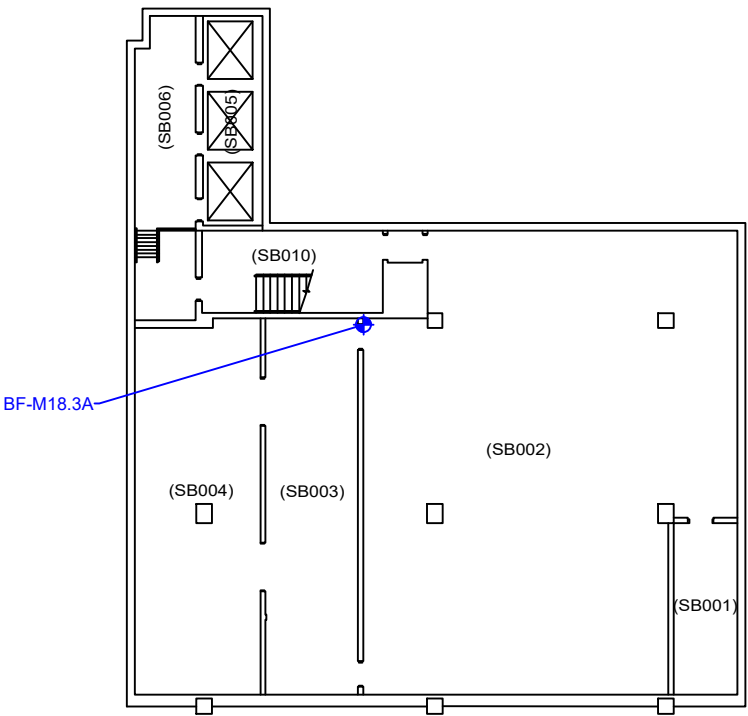
Report of Supplemental Asbestos Inspection, dated October 4, 2016

Attachment B – Inspector Accreditation Certifications

Attachment C – Bulk Asbestos Laboratory Analysis Report



FIGURES

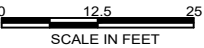
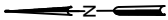


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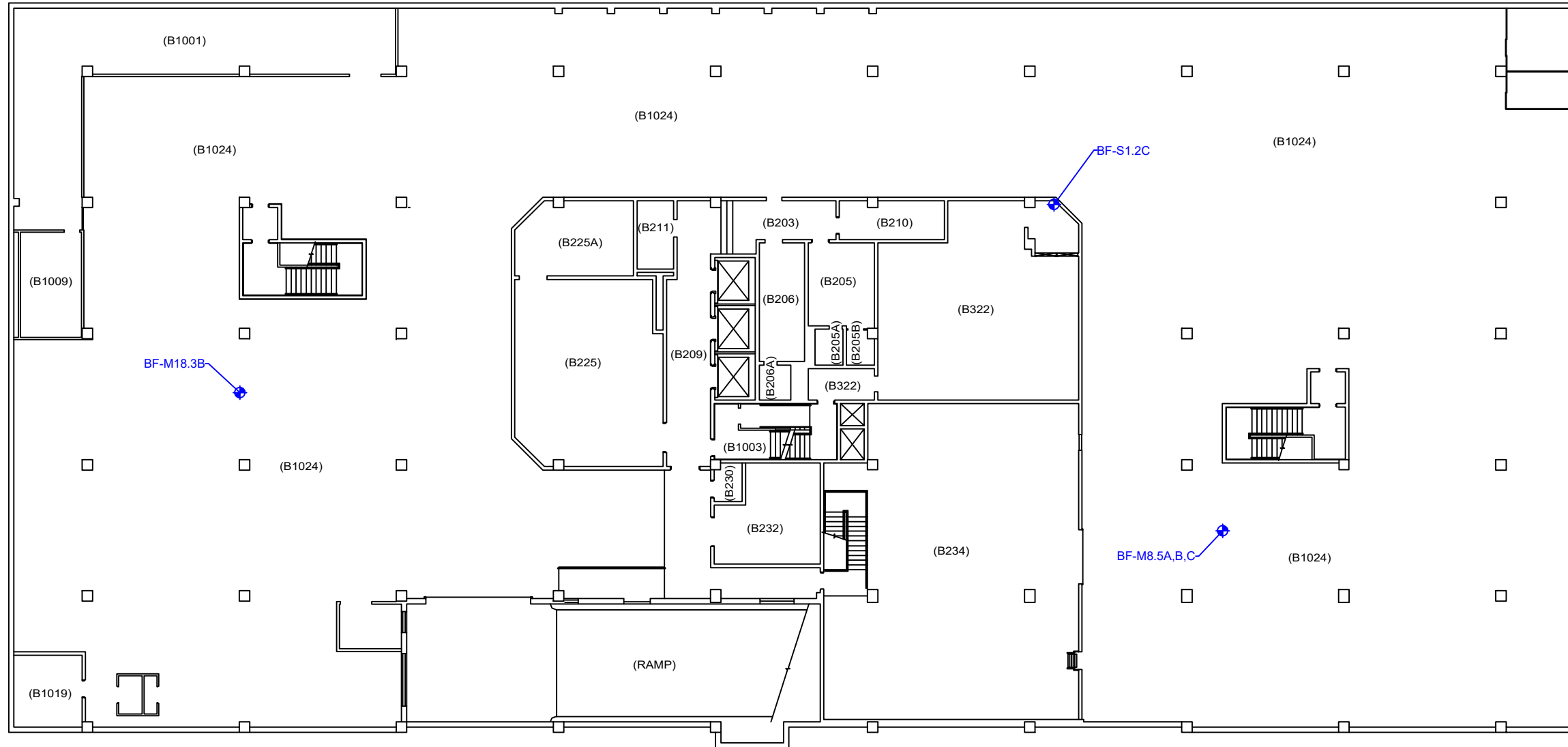
Sample Location

()

 Room Number

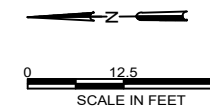


Supplemental Asbestos Inspection Sample Collection Locations City of Billings Stillwater Building - Sub-Basement 316 North 26 th Street Billings, Montana		
TETRA TECH www.tetrattech.com		
DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 1
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



Legend

-  Sample Location
() Room Number

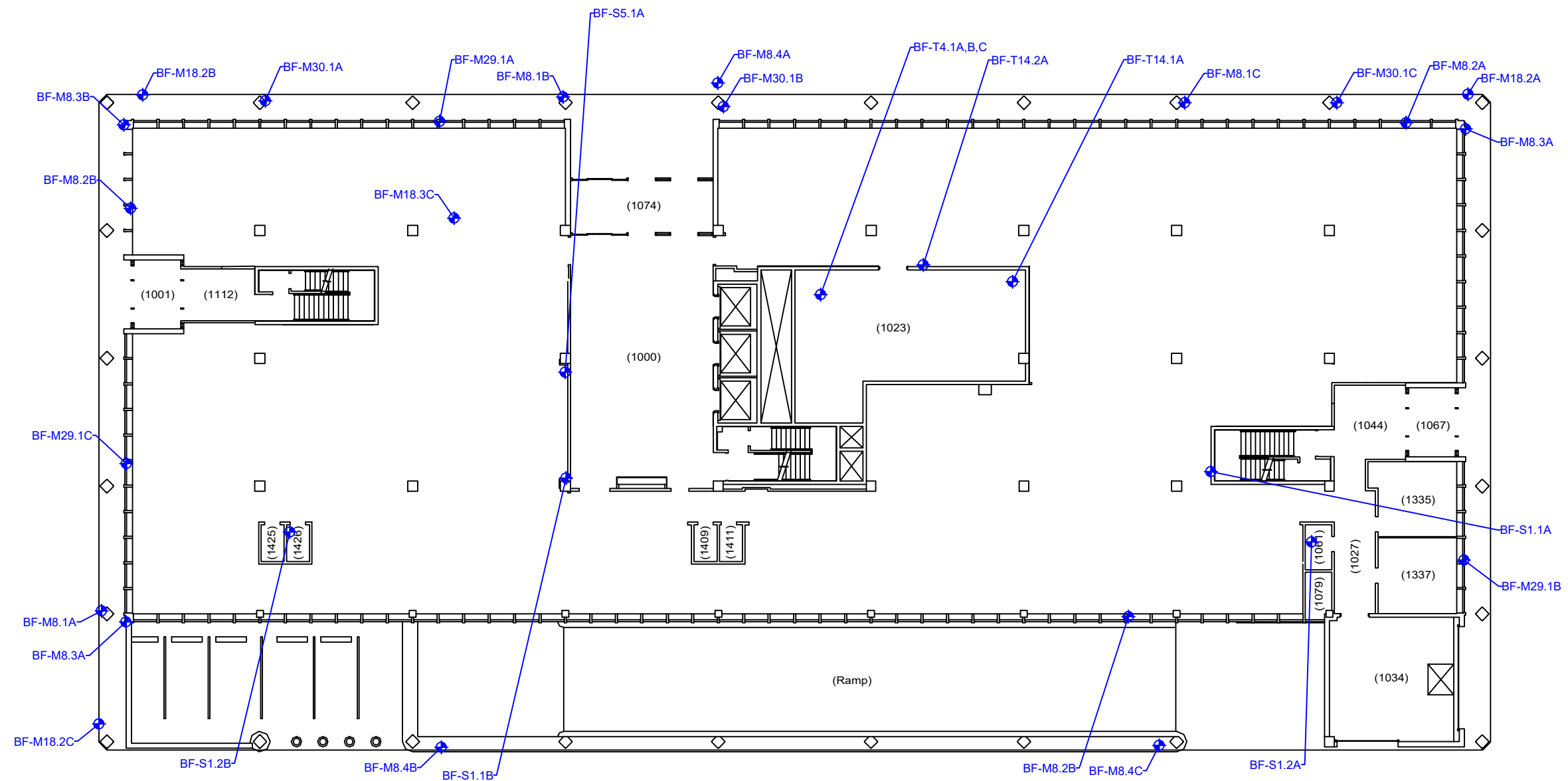


Supplemental Asbestos Inspection
Sample Collection Locations
City of Billings
Stillwater Building - Basement
316 North 26th Street
Billings, Montana



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REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008

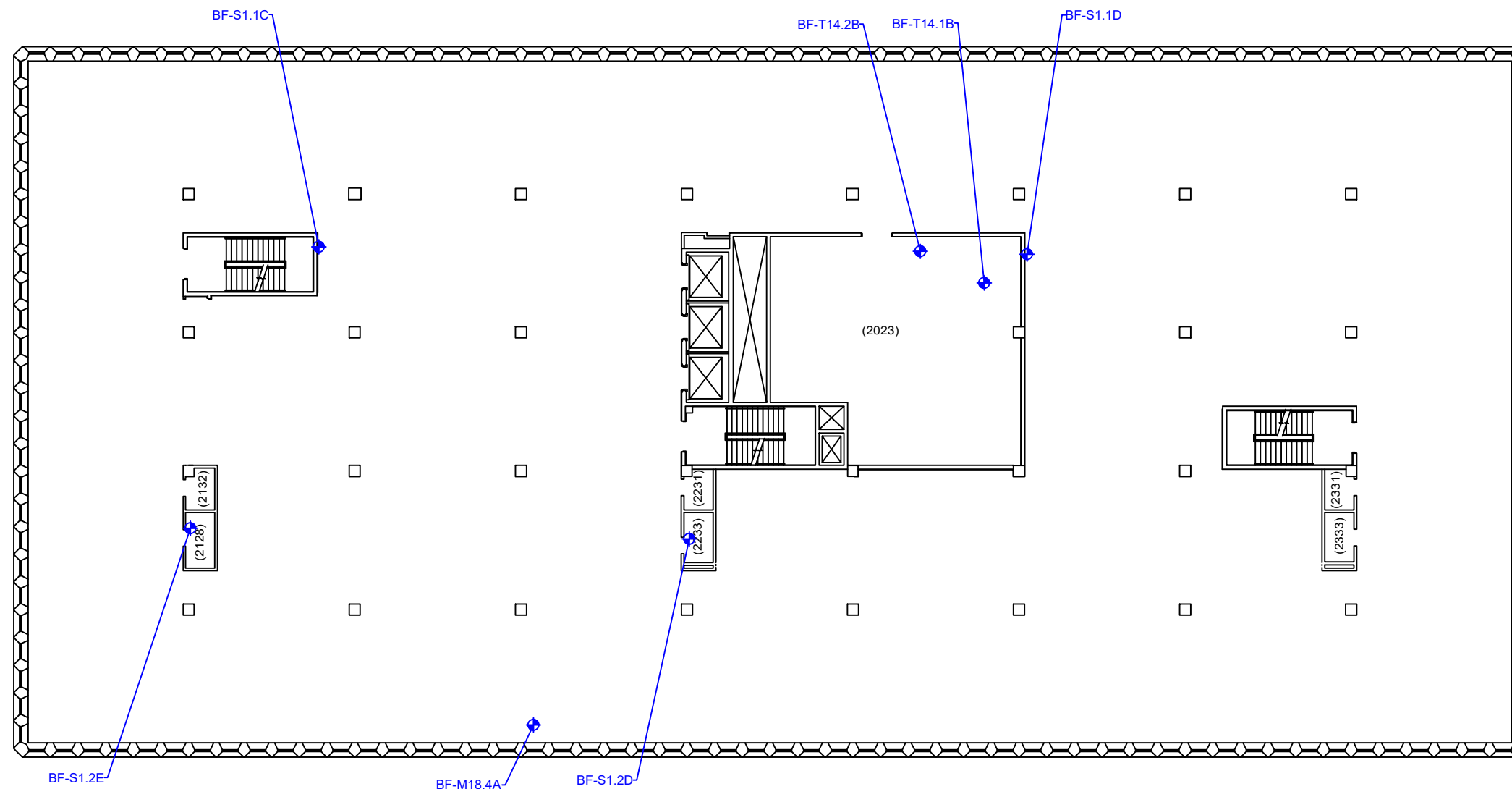


Supplemental Asbestos Inspection
Sample Collection Locations
City of Billings
Stillwater Building - First Floor
316 North 26th Street
Billings, Montana



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DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 3
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



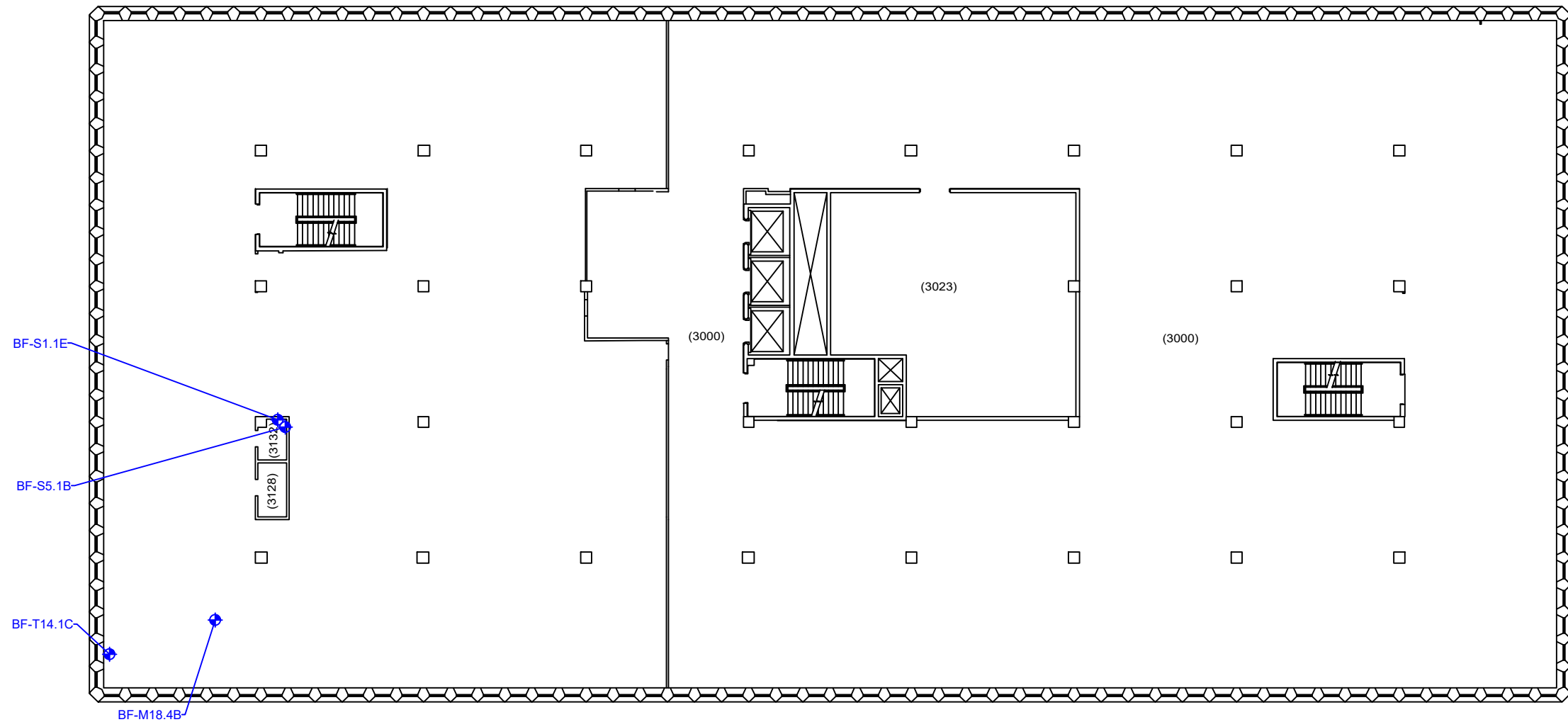
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 Sample Location

 Room Number



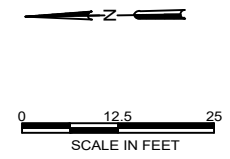
Supplemental Asbestos Inspection Sample Collection Locations City of Billings Stillwater Building - Second Floor 316 North 26 th Street Billings, Montana		
 TETRA TECH www.tetrattech.com		
DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 4
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



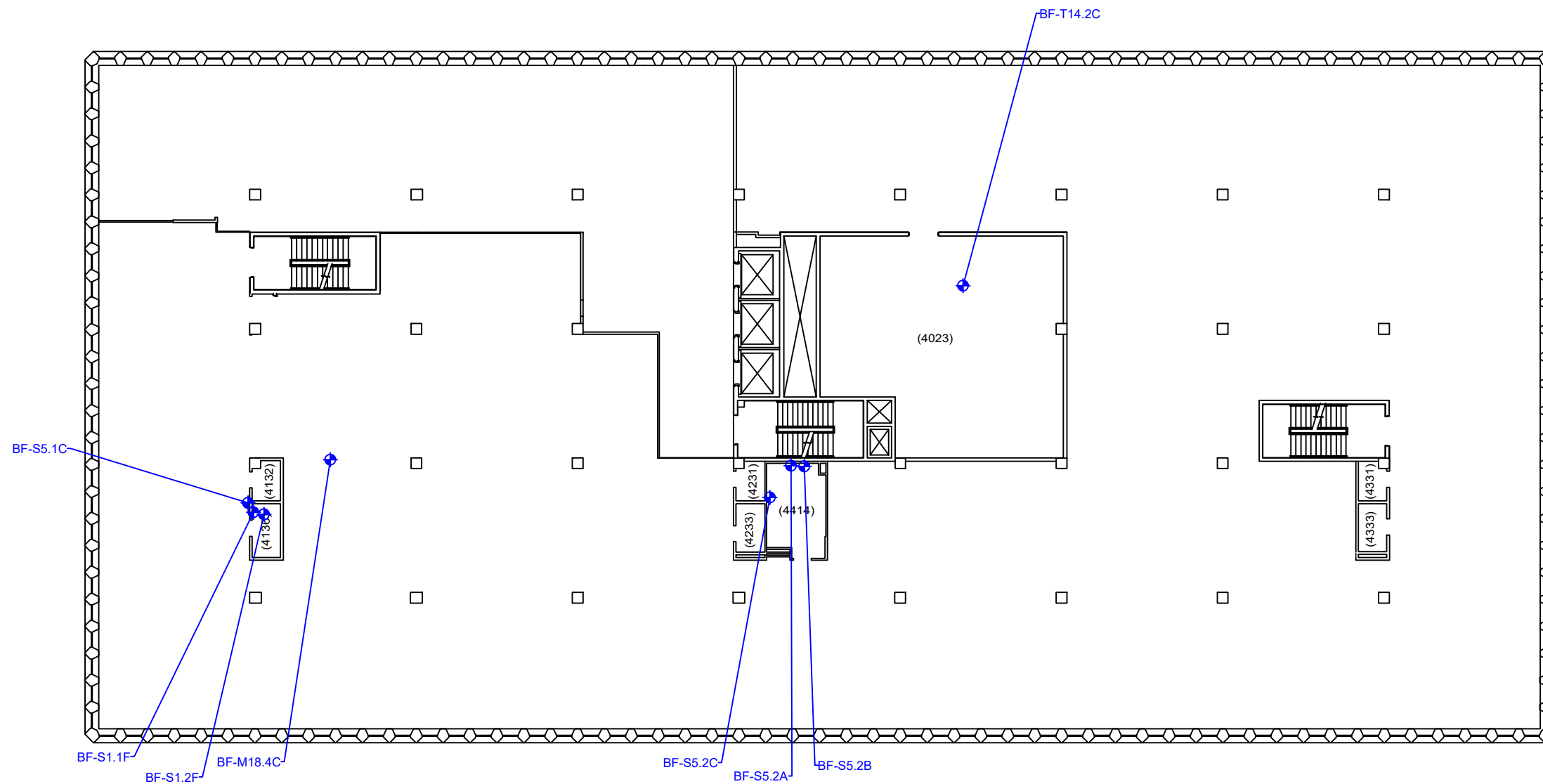
Legend

 Sample Location

 Room Number



Supplemental Asbestos Inspection Sample Collection Locations City of Billings Stillwater Building - Third Floor 316 North 26 th Street Billings, Montana		
 TETRA TECH www.tetrattech.com		
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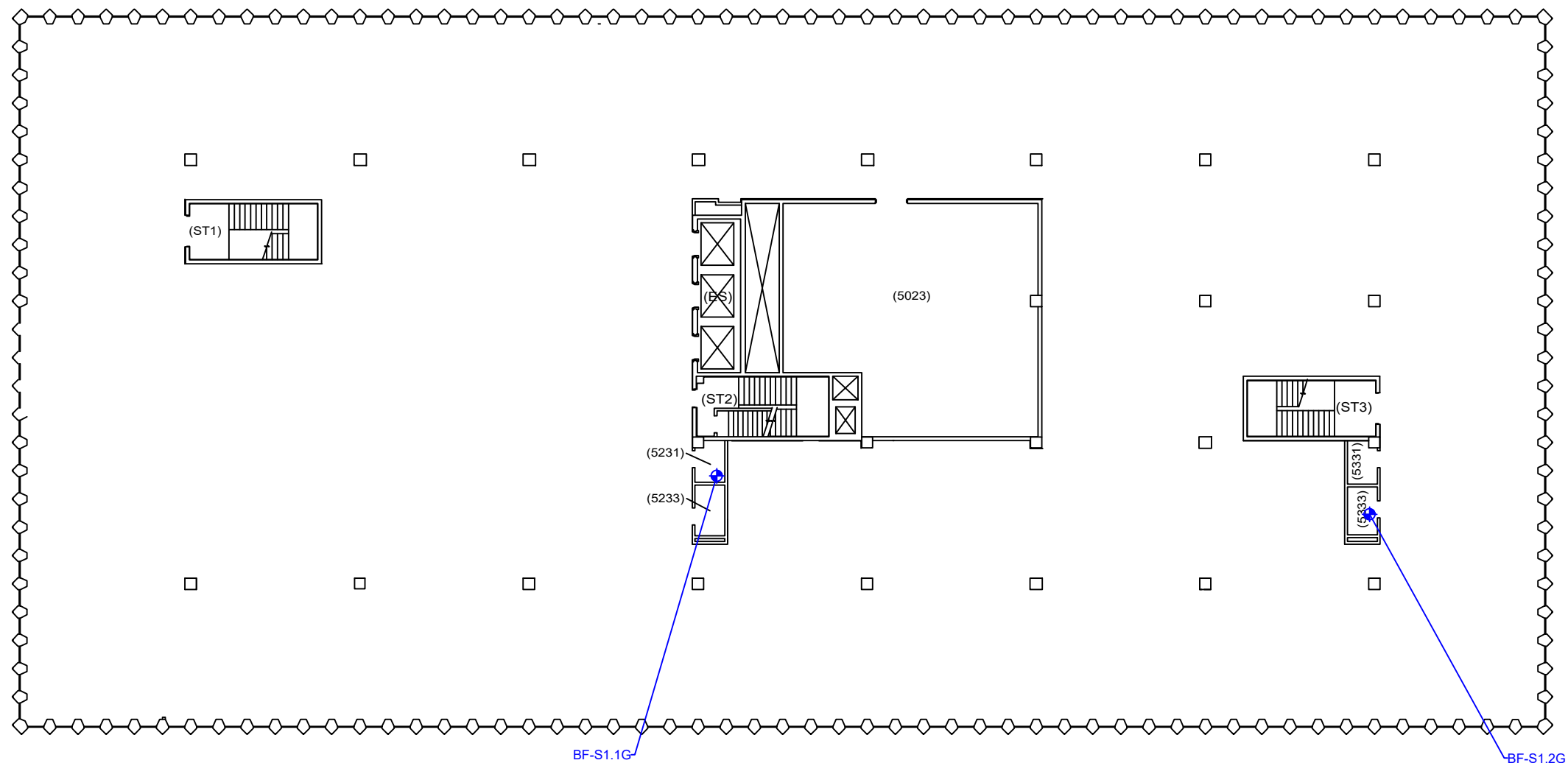


Legend

 Sample Location

 Room Number

Supplemental Asbestos Inspection Sample Collection Locations City of Billings Stillwater Building - Fourth Floor 316 North 26 th Street Billings, Montana		
 TETRA TECH www.tetrattech.com		
DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 6
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



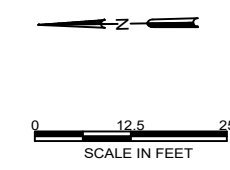
BF-S1.1G

BF-S1.2G

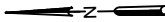
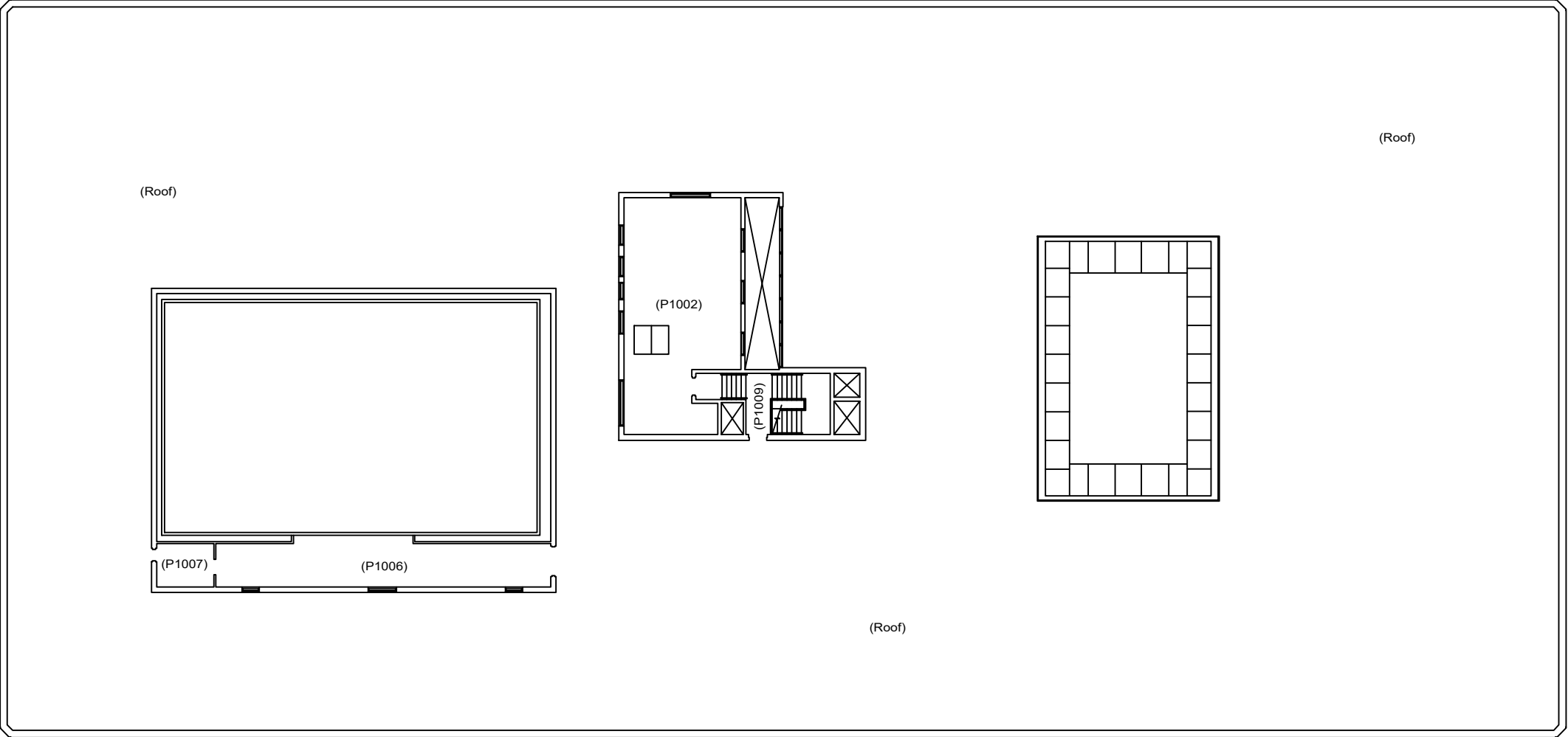
Legend

 Sample Location

 Room Number



Supplemental Asbestos Inspection Sample Collection Locations City of Billings Stillwater Building - Fifth Floor 316 North 26 th Street Billings, Montana		
 TETRA TECH www.tetrattech.com		
DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 7
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



0 12.5 25
SCALE IN FEET

Supplemental Asbestos Inspection
Sample Collection Locations
City of Billings
Stillwater Building - Penthouse
316 North 26th Street
Billings, Montana



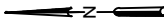
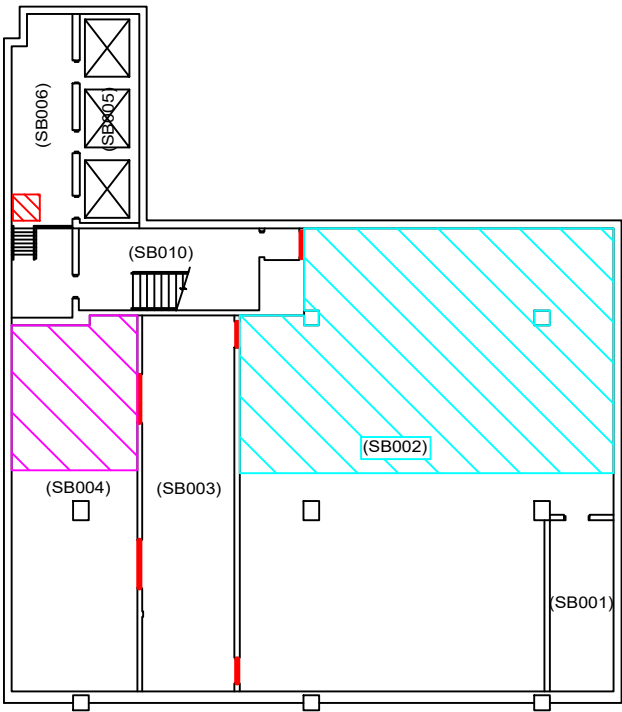
www.tetrattech.com

DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 8
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008

Legend

Note: No new suspect materials identified

() Room Number



0 12.5 25
SCALE IN FEET

Legend

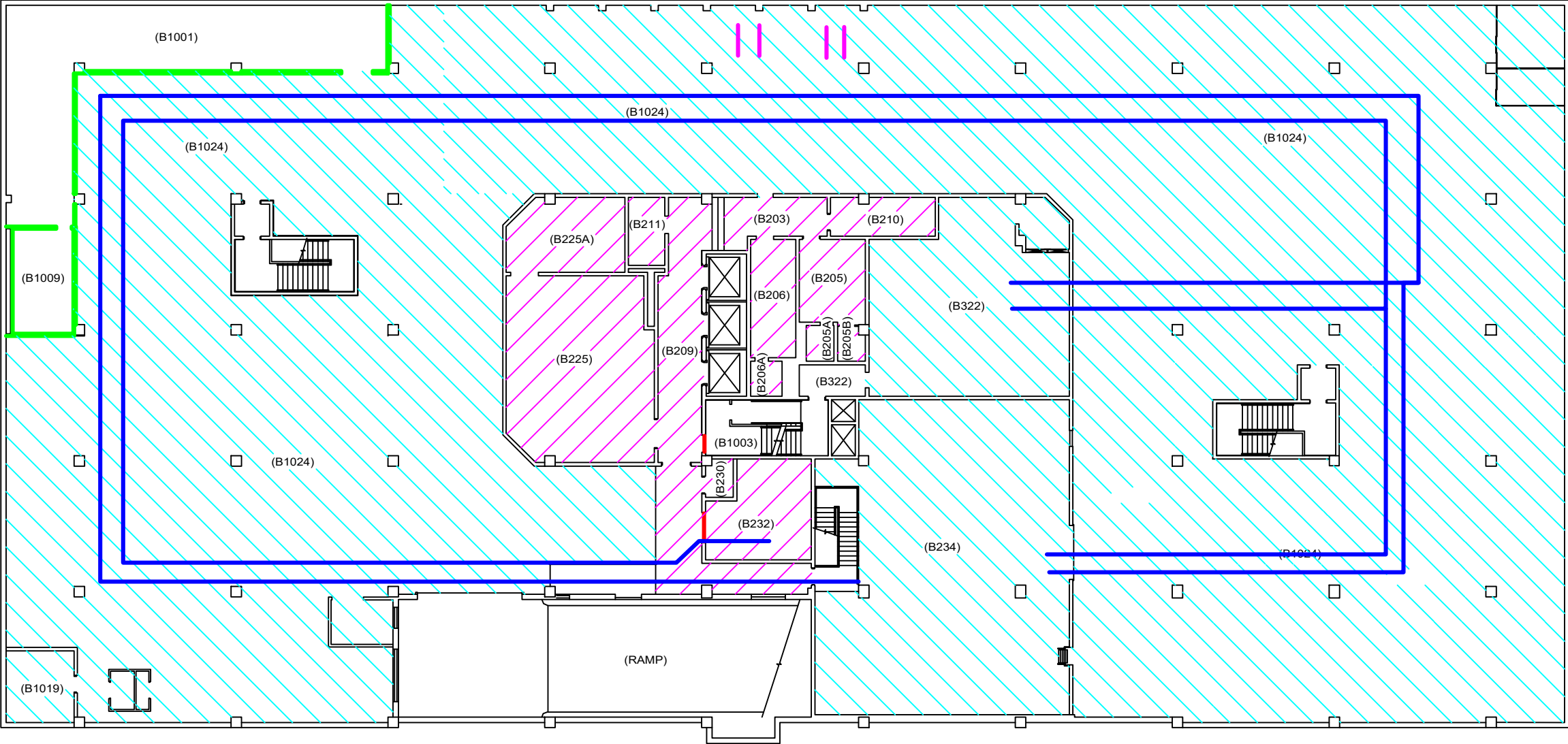
-  FDst - Fire Door - Steel
-  SO / OSO - Spray-on insulation and associated over-spray
-  MM - Miscellaneous mastic
-  SOd - Spray-on insulation debris on deck vents and beams beneath non-asbestos containing spray applied insulation
-  () Room Number

Supplemental Asbestos Inspection
ACM Locations
City of Billings
Stillwater Building - Sub-Basement
316 North 26th Street
Billings, Montana



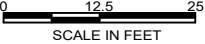
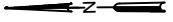
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DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 9
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



Legend

-  SO / OSO - Spray-on insulation and associated over-spray(overspray located on cmu, concrete walls, lathe plaster, and other various substrates throughout)
-  SOd - Spray-on insulation debris on deck vents and beams beneath non-asbestos containing spray applied insulation
-  WB1 / JC1 - Joint compound associated with wallboard system remnants
-  FDst - Fire Door - Steel
-  BF-T4.1 (VC/VD) - Old vibration collar painted green
-  BF-T14.1 (DS) - Dark gold duct sealant on spiral seam ducting
-  () Room Number

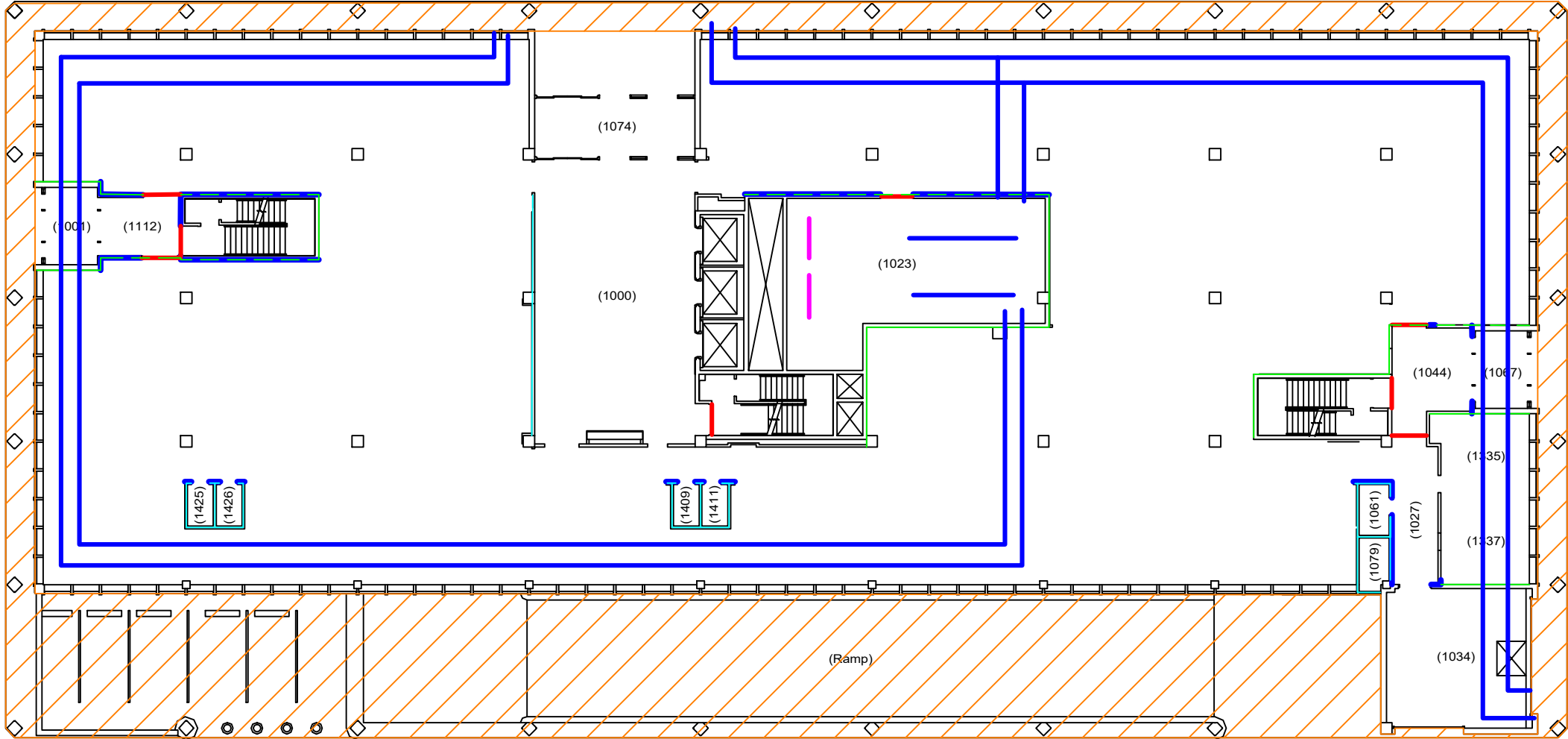


Supplemental Asbestos Inspection
ACM Locations
City of Billings
Stillwater Building - Basement
316 North 26th Street
Billings, Montana



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DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 10
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



0 12.5 25

SCALE IN FEET

Supplemental Asbestos Inspection
ACM Locations
City of Billings
Stillwater Building - First Floor
316 North 26th Street
Billings, Montana

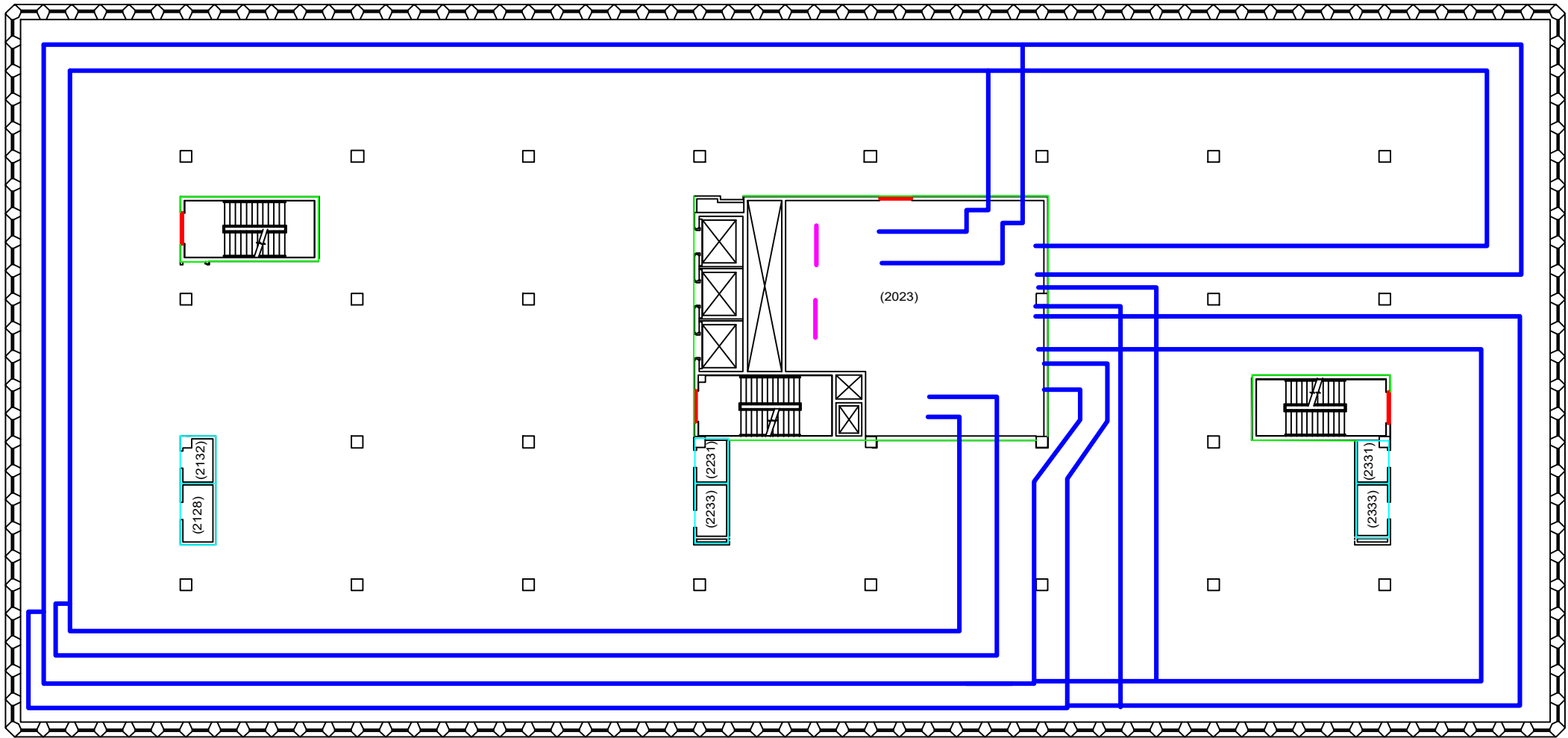


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DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 11
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008

Legend

- CTA / CTA5 - Ceramic tile adhesive
- FDst - Fire Door (includes original and newly installed)
- SO / OSO - Spray-on insulation and associated over-spray located in soffit areas between 1st and 2nd floors not abated and encapsulated
- BF-S5.1 (SO) SO spray on fireproofing on walls and old joists not demolished and associated overspray contaminated plaster walls and ceilings
- BF-S1.1 (PL) Plaster walls contaminated with SO overspray
- BF-T4.1 (VC/VD) - Old vibration collar painted green
- BF-T14.1 (DS) - Dark gold duct sealant on spiral seem ducting
- () Room Number



Legend

- FDst - Fire Door (includes original and newly installed)
- BF-S5.1 (SO) SO spray on fireproofing on walls and old joists not demolished and associated overspray contaminated plaster walls and ceilings
- BF-S1.1 (PL) Plaster walls contaminated with SO overspray
- BF-T4.1 (VC/VD) - Old vibration collar painted green
- BF-T14.1 (DS) - Dark gold duct sealant on spiral seem ducting

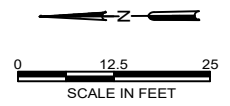
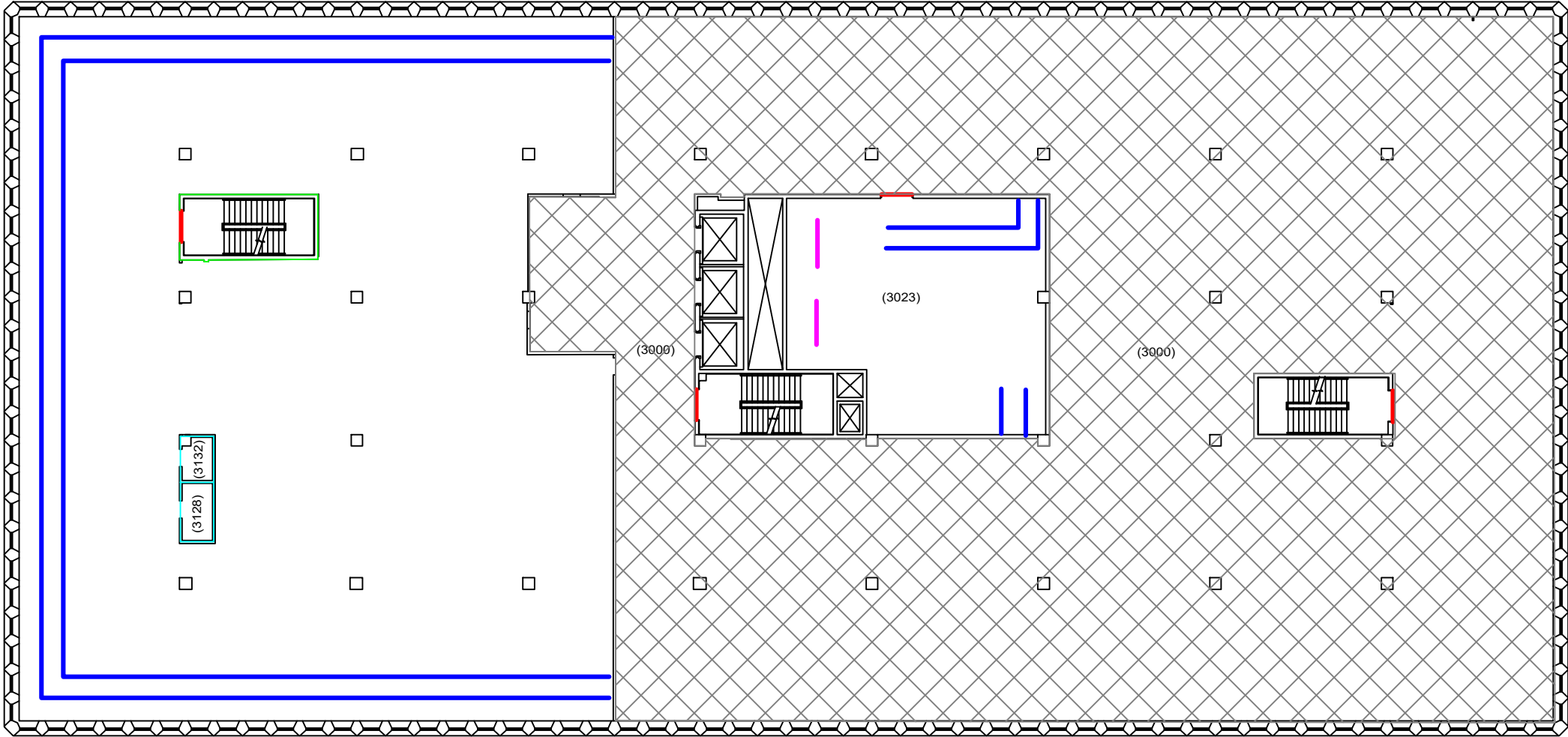
() Room Number

Supplemental Asbestos Inspection
ACM Locations
City of Billings
Stillwater Building - Second Floor
316 North 26th Street
Billings, Montana



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DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 12
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



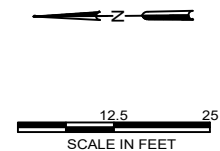
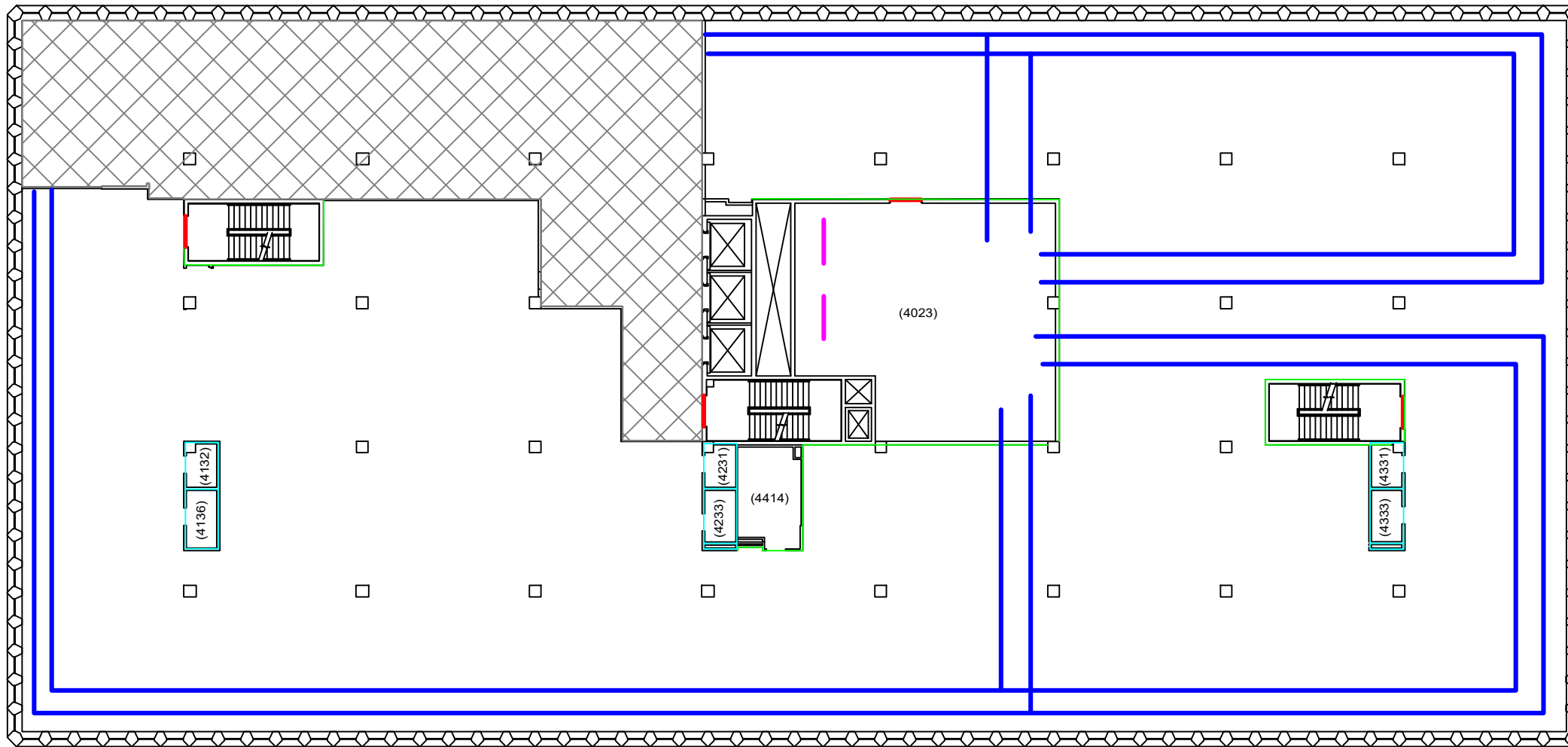
Legend

- FDst - Fire Door (includes original and newly installed)
- BF-S5.1 (SO) SO spray on fireproofing on walls and old joists not demolished and associated overspray contaminated plaster walls and ceilings
- BF-S1.1 (PL) Plaster walls contaminated with SO overspray
- BF-T4.1 (VC/VD) - Old vibration collar painted green
- BF-T14.1 (DS) - Dark gold duct sealant on spiral seem ducting
- Area excluded from the scope of this inspection
- () Room Number

Supplemental Asbestos Inspection
ACM Locations
City of Billings
Stillwater Building - Third Floor
316 North 26th Street
Billings, Montana



DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 13
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



Legend

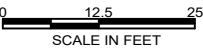
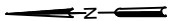
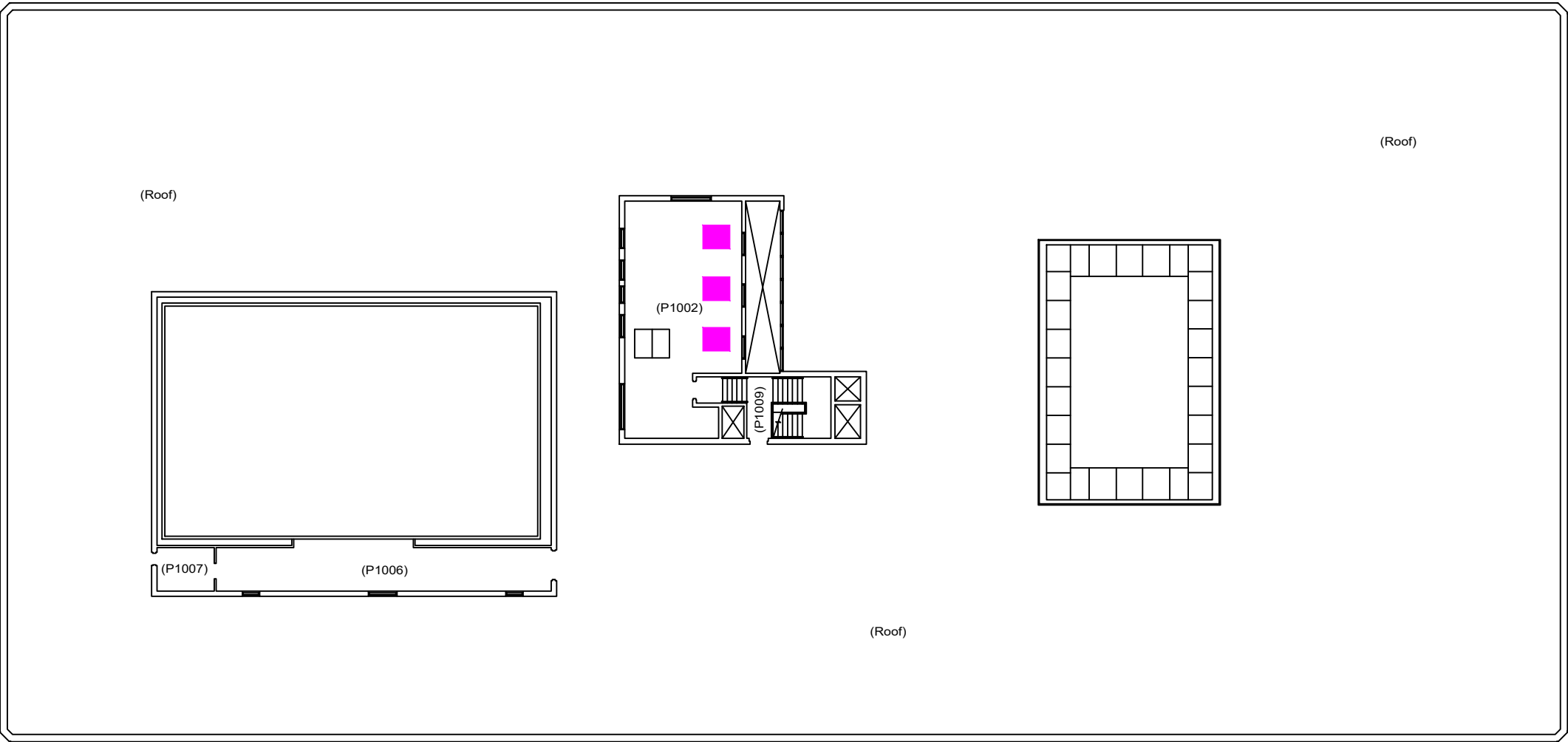
- FDst - Fire Door (includes original and newly installed)
- BF-S5.1 (SO) SO spray on fireproofing on walls and old joists not demolished and associated overspray contaminated plaster walls and ceilings
- BF-S1.1 (PL) Plaster walls contaminated with SO overspray
- BF-T4.1 (VC/VD) - Old vibration collar painted green
- BF-T14.1 (DS) - Dark gold duct sealant on spiral seem ducting
- X Area excluded from the scope of this inspection
- () Room Number

Supplemental Asbestos Inspection
ACM Locations
City of Billings
Stillwater Building - Fourth Floor
316 North 26th Street
Billings, Montana



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DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 14
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008



Supplemental Asbestos Inspection
ACM Locations
City of Billings
Stillwater Building - Penthouse
316 North 26th Street
Billings, Montana



TETRA TECH

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DRAWN BY: CJM	APPROX. SCALE: 1" = 25'	FIGURE NO. 16
REVIEWED: RH	DATE: 8/10/2021	PROJ. NO. 117-8034008

Legend

■ BS - Brake shoes on elevator hoist system

() Room Number

Inspection Report

FOR THE

Stillwater Building Billings, MT

Section 33, T01N, R26E
Yellowstone County, Montana

Prepared for:
City of Billings
PO Box 1178
Billings, MT 59103

Prepared by:
IMEG, Corp.
175 N. 27th Street, Suite 1312
Billings, MT 59101
(406) 248-9000

August 4, 2021

IMEG Project #21005063.00

TABLE OF CONTENTS

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Appendix A.	-----	Concrete Cracking
Appendix B.	-----	Stormwater Inlets
Appendix C.	-----	Grading
Appendix D.	-----	Alley
Appendix E.	-----	Water & Sewer Lines Map

INSPECTION REPORT

for

Stillwater Building, Billings, MT – Site Infrastructure and Stormwater Inspection

Located at
Billings Original Townsite Subdivision
In Section 33, T01N, R26E, Block 43, Lot 1-12
Yellowstone County, Montana

Prepared For:
City of Billings
PO Box 1178
Billings, MT 59103

Prepared By:
IMEG, Corp.
175 N. 27th Street, Suite 1312
Billings, MT 59101

Background

This report discusses the inspection of the Stillwater Building's existing condition of site infrastructure and storm water inlets. The existing building is located at 316 N 26th Street Billings, MT. The first and only walk through was done on July 27th, 2021.

Scope

The Stillwater Building is an existing five story building located in Yellowstone County. Paved streets and a paved alley are used as access points to this building. The storm sewer plans were designed in 1920 by the Office of City Engineer. IMEG inspected the stormwater inlets, water line surface valves, and the site infrastructure to the best of their ability.

Inspection

Alley Improvements: The alley is located on the West (back) side of the Stillwater Building. The whole alley has potholes and insufficient grading for stormwater. Grading of the asphalt does not slope towards the stormwater inlet that is located in the alley. The stormwater inlet also appears to be silted in and no longer receiving stormwater. The concrete located between the alley and the building was still grading away from building, which meets requirements, but the alley itself is in disrepair and has no consistent flow direction. All pictures of the alley and its stormwater inlet can be found in Appendix D.

Concrete & Sidewalk Improvements: Minimal cracking in concrete is located around the building. The East (front) side of the building is where you can find the most cracking and missing concrete localities. There is also curb deterioration on the front side of the building. Overall, the sidewalks are walkable, but may need improvements in the future. See pictures in Appendix A.

Stormwater Inlet Improvements: Stormwater inlets on the North, East, and South sides of the building are sufficient. See pictures from Appendix B. Grading around the building goes towards the stormwater inlets, except for the West (or back) side of the building, where the alley is located. A picture of the stormwater inlet in the alley is also found in Appendix B but is described above in "Alley Improvements".

Site Grading Improvements: Grading around the property is sloped away from the building, adequately meeting requirements. However, on the East (front) side of the building there was discoloration representing pooling from stormwater due in insufficient grading. On the same side, off the curb, on the street, there was a 0.3% grade recording, which could potentially cause pooling in that area. On the West (back) side of the building, potential pooling may occur at the start of the driveway. The driveway leads to the basement garage, located inside the Stillwater Building. At the end of the driveway, grading is

sufficient, and water drains into the stormwater inlet. On the North side of the building, a ramp can be located, and the cross slope was measured at 3%. This measurement for the ramp is over the maximum cross slope limit per requirements. All pictures representing these probable improvements are found in Appendix C.

Water and Sewer Line Improvements: Water and sewer lines did not undergo an underground investigation. Sewer lines were not marked physically but drawn in the water and sewer map. Water lines were marked in blue and were located in the correct mapped areas. The map of the water and sewer lines used can be located in Appendix E. The water caps were found horizontally and on the side of the Stillwater Building. The water cap in N 26th Street is cracked and could be repaired. Pictures of water caps and blue paint lines are found in Appendix B.

Overall Recommendations: Concrete, sidewalks, and site grading have some small issues as described above that could be repaired if desired but these conditions do not affect the functionality of the building or create a safety issue. However, the alley and the alley's stormwater inlet are recommended for reconstruction as this area is not functioning as designed and could cause stormwater issues in a large rainfall event. IMEG advises the silted stormwater inlet to be cleaned out and then verified that it still functions and drains properly. It is also recommended that the entirety of the asphalt in the alley be removed and replaced with new asphalt that adequately drains to an existing storm inlet.

Opinion on Probable Construction Cost:

- Mobilization and Bonding = \$5,000 lump sum
 - Stormwater Inlet Cleaning and Investigation = \$1,000 lump sum
 - Alley Asphalt Removal (550 SY) = \$5 per SY = \$2,750
 - Asphalt Pavement (550 SY) = \$21.15 per SY = \$11,632.50
- *quantities are estimated and bid prices based on recent bid data.*

Prepared By:



Mariah Anderson

7/30/2021

Date

Reviewed By:



Kolten Knatterud, P.E.

7/30/2021

Date

\\\\files\\Active\\Projects\\2021\\21005063.00\\Construction\\FieldIssues\\construction.summary.swr.doc



August 2, 2021

Mr. John Caterino
Facilities Supervisor
City of Billings
P.O. Box 1178
Billings, Montana 59101

Delivered via email CaterinoJ@billingsmt.gov

**SUBJECT: Radon Assessment Report
Stillwater Building
316 North 26th Street
Billings, Montana
Tetra Tech Project No. 117-8034008.100**

Dear Mr. Caterino:

Tetra Tech, Inc. (Tetra Tech) is pleased to provide this report for the recently completed radon assessment at the above referenced site. Based on correspondence with you prior to commencement of the project, Tetra Tech was instructed to conduct radon assessment for information purposes. Details of our inspection is provided below.

RADON ASSESSMENT

Project Background

Radon is a naturally occurring, odorless, colorless gas which is generated from the natural radioactive decay of radium and uranium. The uranium concentration of underlying geologic materials is a fundamental variable that determines the rate of underground radon production. Geologic materials that contain greater amounts of uranium, such as granites and shales, produce greater amounts of radon.

The U.S. Environmental Protection Agency (EPA) and the U.S. Geological Survey conducted radon sampling of buildings and homes in Montana and Wyoming. Published as the Montana-EPA Map of Radon Zone, the survey found Yellowstone County, Montana has a moderate potential for elevated radon concentrations. The U.S. Environmental Protection Agency has classified these counties as Radon Zone 2, which indicates a moderate potential for indoor radon concentrations to exceed the EPA action level. No enforceable regulations exist to control indoor radon levels.

Radon Results

The radon sampling at the Stillwater Building was conducted from July 26 to 28, 2021 to determine current radon concentrations.

Mr. Connor McHugh of Tetra Tech placed activated charcoal radon test canisters in 19 locations on July 26, 2021 and collected the canisters on July 28, 2021. The canisters were submitted with completed chain-of-custody documentation to Energy Laboratories of Billings, Montana for the analysis of radon in air. Individual results are provided in Table 1 and copies of the laboratory analytical reports are contained in Attachment A. Approximate sample collection locations are presented on Figures 1 through 7.

Table 1
Summary of Radon

Sample ID	Sample Location	Results (pCi/L)
B21072322-001	Basement maintenance office	<0.5
B21072322-002	Basement in south area of garage	0.6
B21072322-003	Basement office space north of elevator bay	0.8
B21072322-004	Basement boiler room	<0.5
B21072322-005	1 st floor main lobby	<0.5
B21072322-006	Sub-basement outside elevator hoist door	<0.5
B21072322-007	1 st floor north side	<0.5
B21072322-008	1 st floor south side	<0.5
B21072322-009	1st floor southwest corner office space	<0.5
B21072322-010	2 nd floor north of service elevator	<0.5
B21072322-011	2 nd floor south side, south of electrical room	<0.5
B21072322-012	3 rd floor south side of Room 3507	<0.5
B21072322-013	3 rd floor in southwest corner of records room	<0.5
B21072322-014	3 rd floor in Commissioner's meeting room	<0.5
B21072322-015	3 rd floor north of elevator	<0.5
B21072322-016	4 th floor north side	<0.5
B21072322-017	4 th floor south side	<0.5
B21072322-018	5 th floor north side	<0.5
B21072322-019	5 th floor south side	<0.5
pCi/L = picocuries per liter		

Laboratory analyses indicated that the radon levels for all areas tested in the Stillwater Building were between <0.5 picocuries per liter (pCi/L) and 0.8 pCi/L. The EPA and Centers for Disease Control (CDC) have used a continuous exposure level of 4.0 pCi/L as a guidance level at which further testing and/or remedial actions are indicated.

CONCLUSIONS AND RECOMMENDATIONS

Laboratory analysis of radon test canisters placed in the Stillwater Building showed that radon level did not exceed EPA and CDC continuous exposure levels of 4.0 pCi/L at the time of Tetra Tech's site visit. No further testing is recommended at this time.

LIMITATIONS

Our opinions are intended exclusively for use by the City of Billings. The scope of services performed by Tetra Tech may not be appropriate to satisfy the needs of other users, and any use or re-use of this document, or the findings presented herein is prohibited and at the sole risk of the user. No additions or deletions are permitted without the express written consent of Tetra Tech. Furthermore, the opinions presented herein are limited by the requested scope of services and the site conditions existing at the time of our investigation. Therefore, our opinions and recommendations may not apply to future site conditions which we have not had the opportunity to evaluate.

Tetra Tech would sincerely appreciate the opportunity to work with you on this project. If you have any questions about our intended work plan or would like any additional information, please feel free to contact me in our Billings, Montana office at (406) 248-9161.

Respectfully Submitted,

Tetra Tech, Inc.

Roger W. Herman, Jr.

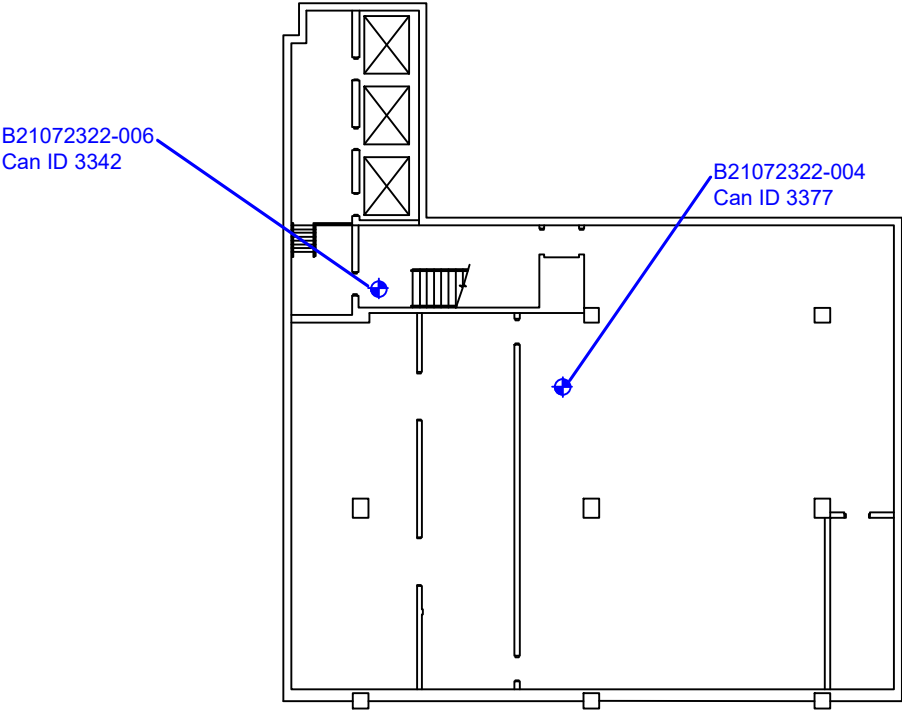
Roger W. Herman, Jr.
Asbestos, Lead & IH Services Manager

I:\A-G\Billings City of Engineers Office\117-8034008 - Stillwater Bldg ASB Radon\05-Deliverables\Final\Radon\City of Billings-Stillwater Bldg-Radon Assessment Report.docx

Figures

Attachment A – Laboratory Analytical Report

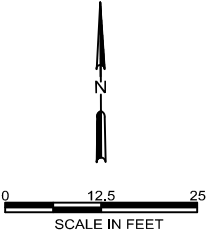
FIGURES



Legend

 Sample Location

 Room Number



Radon Assessment Sample Collection Locations City of Billings Sub-Basement Stillwater Building 316 North 26th Street Billings, Montana		
 TETRA TECH www.tetratech.com		
DRAWN BY: RH	APPROX. SCALE: 1" = 25'	FIGURE NO. 1
REVIEWED: RH	DATE: 08/02/2021	PROJ. NO. 117-8034008

B21072322-001
(Can ID 3415)

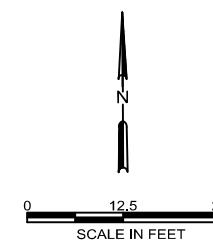
B21072322-003
(Can ID 3394)

B21072322-002
Can ID 3403

(RAMP)

Legend

- Sample Location
() Room Number



Radon Assessment
Sample Collection Locations
City of Billings
Basement
Stillwater Building
316 North 26th Street
Billings, Montana



TETRA TECH

www.tetrattech.com

DRAWN BY: RH	APPROX. SCALE: 1" = 25'	FIGURE NO. 2
REVIEWED: RH	DATE: 08/02/2021	PROJ. NO. 117-8034008

B21072322-007
Can ID 3384

B21072322-005
Can ID 3408

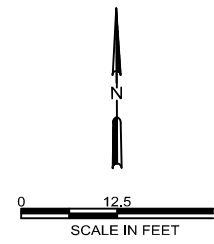
B21072322-008
Can ID 3567

B21072322-009
Can ID 3432

(Ramp)

Legend

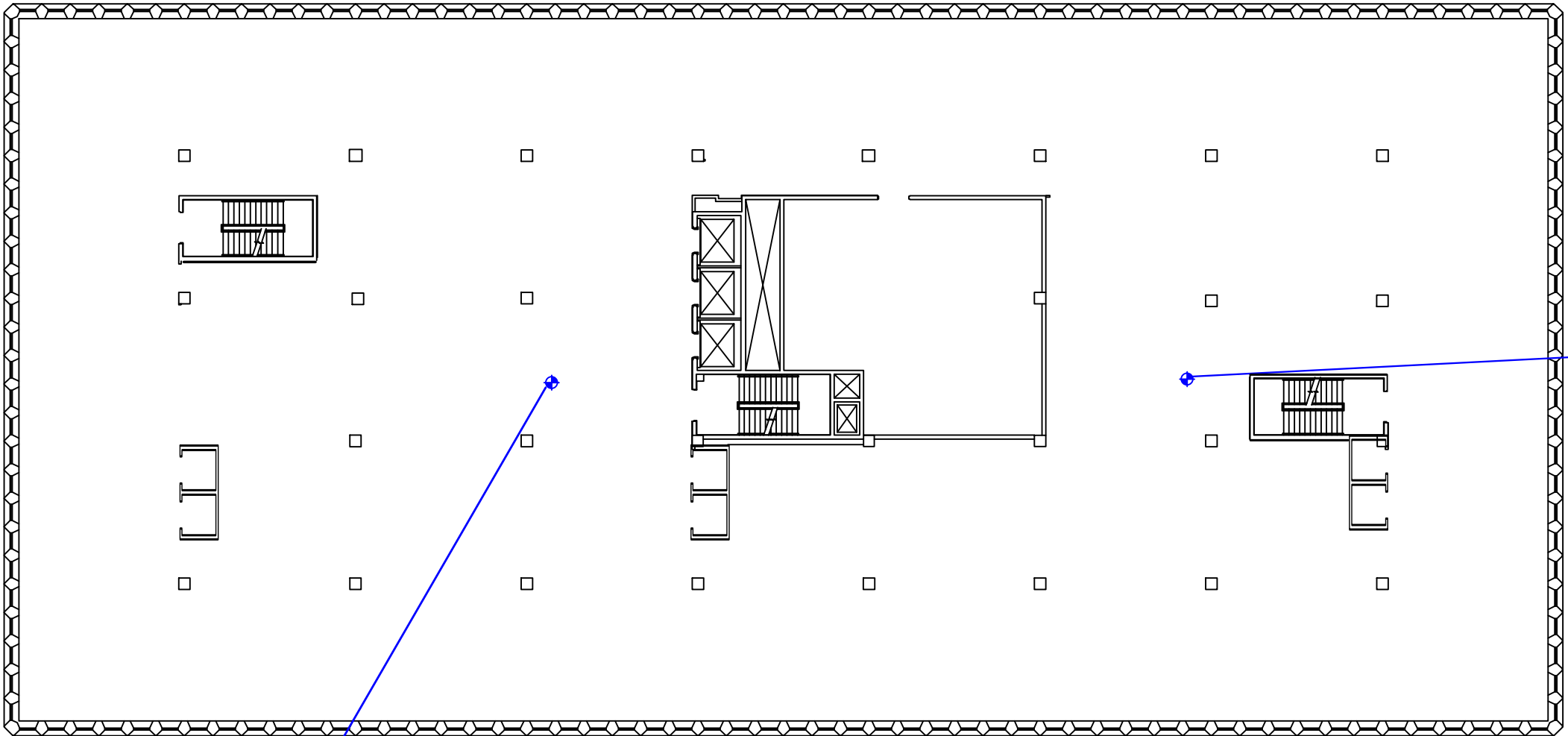
- Sample Location
- () Room Number



Radon Assessment
Sample Collection Locations
City of Billings
First Floor
Stillwater Building
316 North 26th Street
Billings, Montana



DRAWN BY: RH	APPROX. SCALE: 1" = 25'	FIGURE NO. 3
REVIEWED: RH	DATE: 08/02/2021	PROJ. NO. 117-8034008



B21072322-010
Can ID 3409

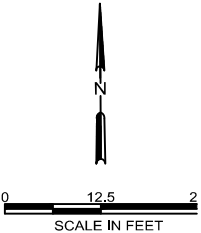
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Can ID 3283

Legend

Sample Location

()

 Room Number

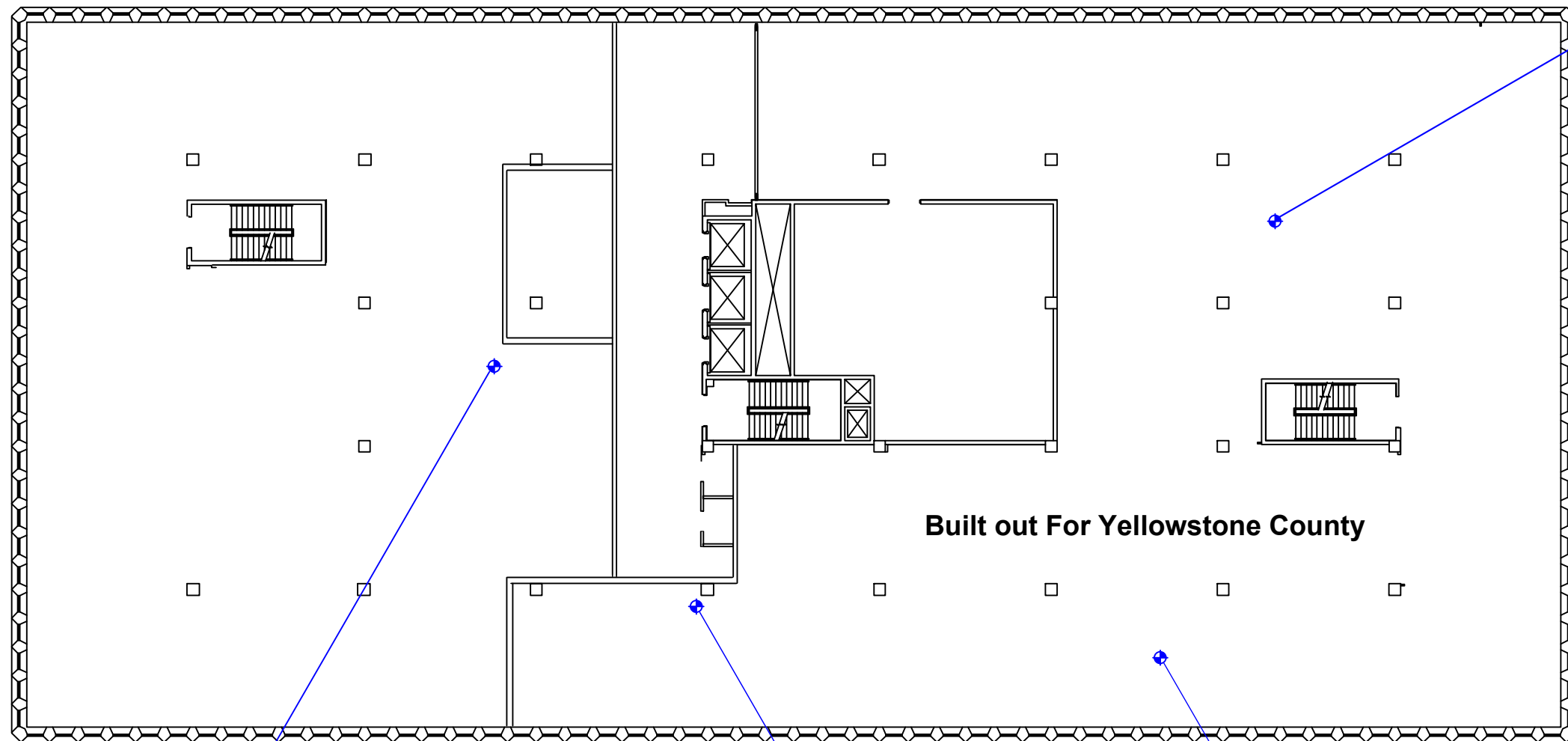


Radon Assessment
Sample Collection Locations
City of Billings
Second Floor
Stillwater Building
316 North 26th Street
Billings, Montana

TETRA TECH

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DRAWN BY: RH	APPROX. SCALE: 1" = 25'	FIGURE NO. 4
REVIEWED: RH	DATE: 08/02/2021	PROJ. NO. 117-8034008



B21072322-015
Can ID 3326

B21072322-012
Can ID 3303

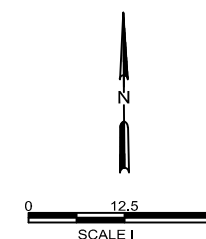
B21072322-013
Can ID 3449

B21072322-014
Can ID 3430

Built out For Yellowstone County

Legend

- Sample Location
() Room Number



Radon Assessment
Sample Collection Locations
City of Billings
Third Floor
Stillwater Building
316 North 26th Street
Billings, Montana



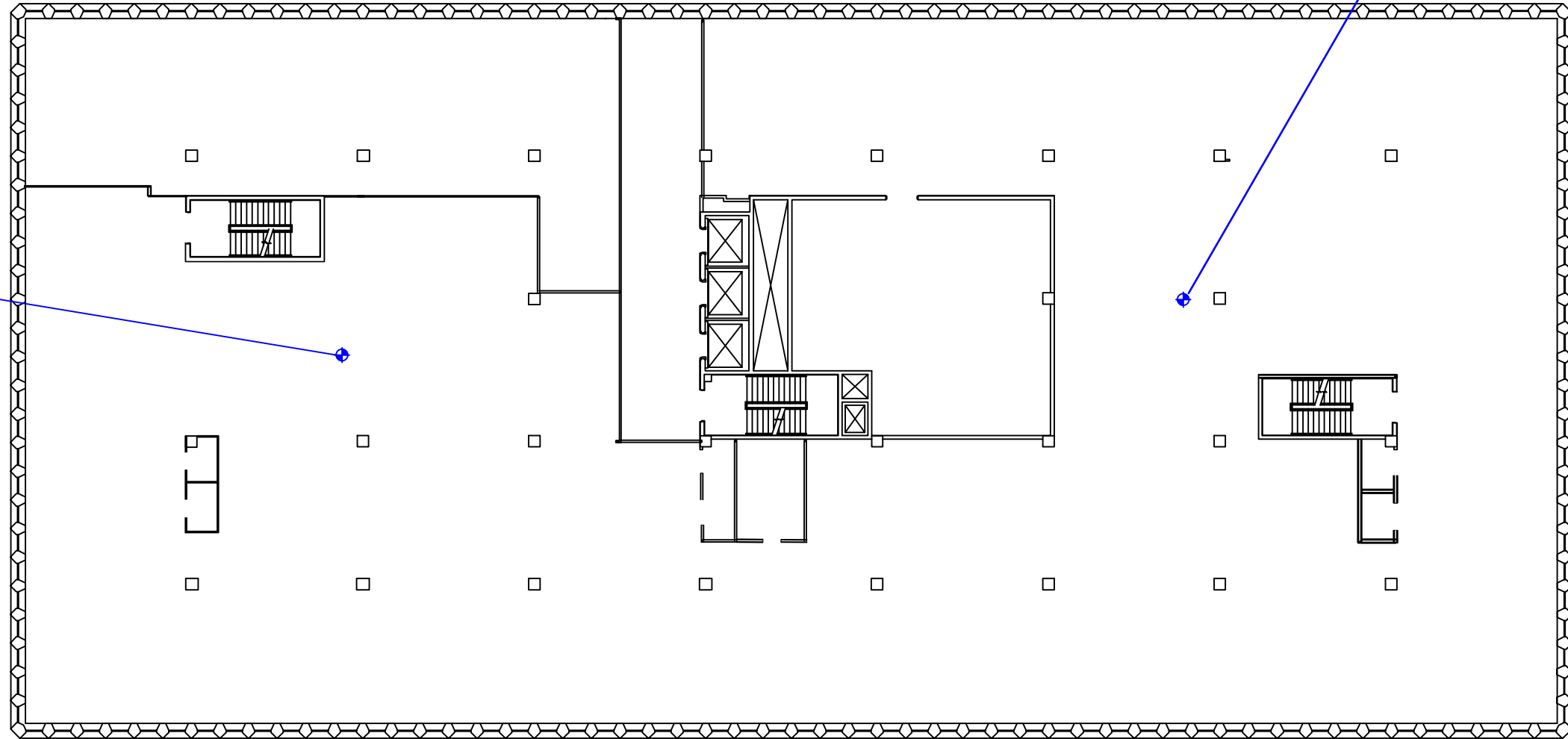
TETRA TECH

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DRAWN BY: RH	APPROX. SCALE: 1" = 25'	FIGURE NO. 5
REVIEWED: RH	DATE: 08/02/2021	PROJ. NO. 117-8034008

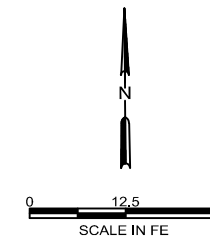
B21072322-016
Can ID 3293

B21072322-017
Can D 3568



Legend

- Sample Location
() Room Number

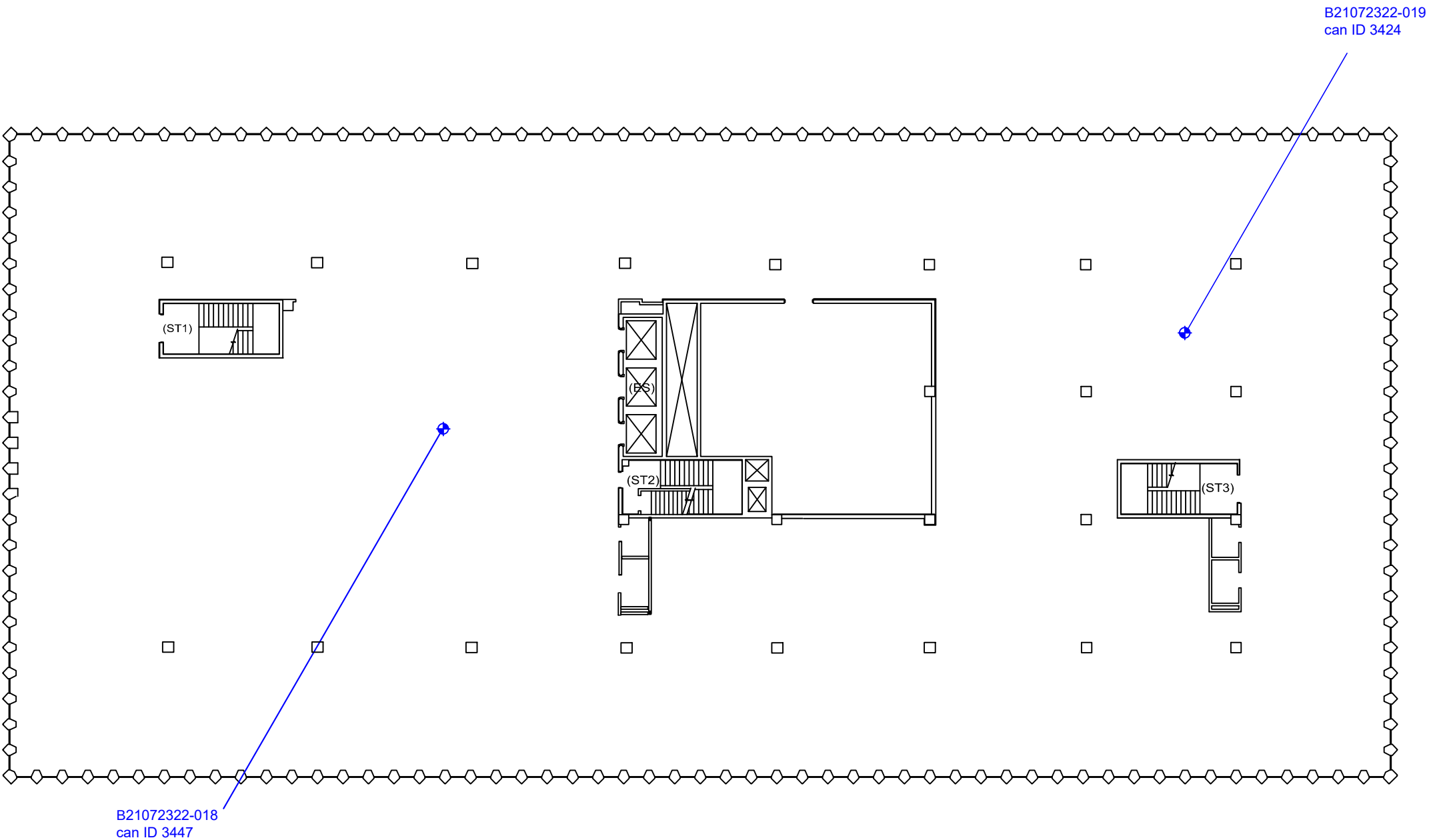


Radon Assessment
Sample Collection Locations
City of Billings
Fourth Floor
Stillwater Building
316 North 26th Street
Billings, Montana



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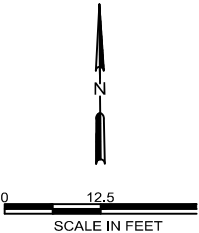
DRAWN BY: RH	APPROX. SCALE: 1" = 25'	FIGURE NO. 6
REVIEWED: RH	DATE: 08/02/2021	PROJ. NO. 117-8034008



Legend

● Sample Location

() Room Number



Radon Assessment Sample Collection Locations City of Billings Fifth Floor Stillwater Building 316 North 26th Street Billings, Montana		
TtTETRA TECH www.tetrattech.com		
DRAWN BY: RH	APPROX. SCALE: 1" = 25'	FIGURE NO. 7
REVIEWED: RH	DATE: 08/02/2021	PROJ. NO. 117-8034008



August 10, 2021

Attn: Mr. John Caterino
Facilities Superintendent
City of Billings
PO Box 1178
Billings, Montana 59101
Phone: 406-855-8454
E-mail: caterinoj@billingsmt.gov

Subject: Revised Report on Exterior Wall and Window Assessment
Stillwater Building
316 North 26th Street
Billings, Montana 59101
Terracon Project No. F6216115

Dear Mr. Caterino:

In accordance with our proposal dated July 22, 2021, Terracon has performed a limited visual assessment of the exterior wall assemblies and window installations for the Stillwater Building, located at 316 North 26th Street in Billings, Montana. The purpose of our assessment was to determine the present condition of the visible and readily accessible portions of the exterior walls and window systems, including joint sealants located at the exterior surfaces of these systems, to provide general recommendations to address deficient or deteriorated conditions observed in these systems that are likely to require remediation within the next 10 years. Our assessment included discussions with you regarding the past maintenance for the exterior walls and windows as well as known leak locations; visual observations of the exterior walls and windows from the building interior at the first, fourth, and fifth floors; visual observations of exterior walls and windows from grade and building roof; and use of a high-resolution digital camera with a telephoto lens to document the exterior walls and window.

The following is a brief report on our assessment and includes a general description of the included building enclosure elements, a general description of deficiencies or deterioration observed within the included elements, general recommendations for corrective actions to address the observed deficient or deteriorated conditions, and our opinion of probable repair costs for the recommended corrective actions.

1.0 PROJECT BACKGROUND

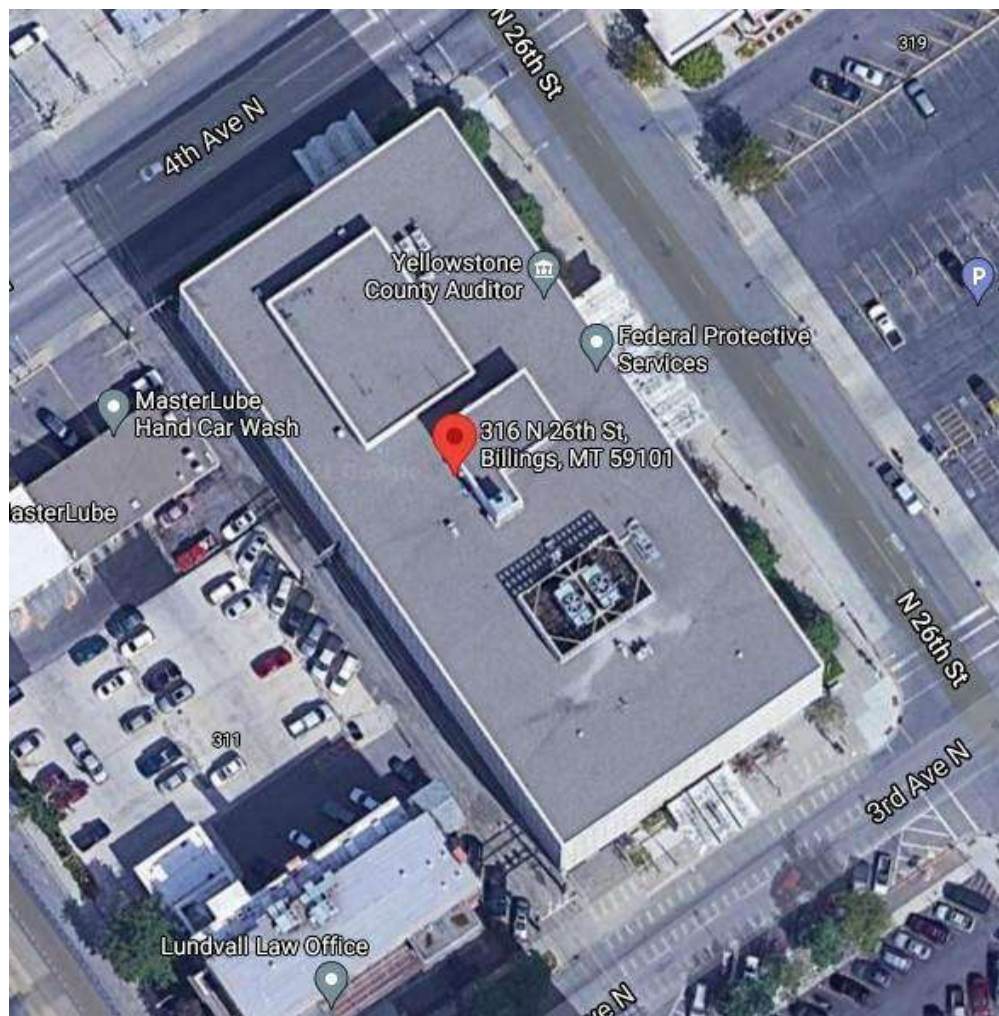
Terracon understands that the five-story, steel frame structure was constructed as a federal courthouse and was completed circa 1965. The exterior walls at the first floor of the building are clad with black granite and fenestrated with aluminum frame, fixed windows. The fenestration at the three pedestrian entrances was replaced with aluminum frame storefronts. Floors two thru five are clad with precast concrete panels, and the windows within the precast panels are aluminum frame, operable units. **(Photos #1 and #2)** As part of a recently completed abatement project, the building mechanical systems and interior finishes were completely removed to the structure, and the building is currently unoccupied other than a portion of the third floor. We also understand that window-related water leakage is known to be an ongoing issue at several locations throughout floors two thru five. An aerial photo with the subject building is included for reference.



Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

August 10, 2021 ■ Terracon Project No. F6216115



Aerial image of property.

2.0 VISUAL OBSERVATIONS AND ANALYSIS

Terracon performed our visual assessment of the Stillwater Building on July 28, 2021. The following are a summary of the conditions observed at the building.

General

The exterior walls at the first floor of the Stillwater Building are clad with polished black granite panels with fixed aluminum frame windows with insulating glass (IG) units. The exterior walls at the first floor steps back from the plane of the exterior wall at the upper floors, and the soffit has recently been covered with aluminum panels. Above the first floor, the exterior walls are constructed of quartz chip, exposed aggregate precast concrete panels. One window opening is located at the center of each wall panel, and the windows at floors two thru five are aluminum frame, vertical pivot windows with IG units. The operable windows have been sealed shut from the building interior.

The primary pedestrian entrance is located at the center of the east elevation. Secondary entrances are located at the north and south elevations, with a precast concrete canopy at each entrance. The vehicular

entry and ramp to the basement level parking garage are located on the west elevation. Two additional, overhead doors are located at grade, near the west end of the south elevation and the south end of the west elevation. **(Photos #3 and #4)** A pedestrian bridge was constructed across North 26th Street to a neighboring parking garage. Two precast wall panels were removed during the bridge construction and were available for our examination. **(Photo #5)** The removed window units were also stored but were wrapped and not readily accessible for our examination.

Exterior Wall Systems

The exterior walls at the first floor of the Stillwater Building are clad with black granite and are constructed of white, exposed quartz aggregate precast concrete panels at floors two thru five. **(Photos #6 and #7)** Photos At the time of our examined, gypsum wall board had been installed up to the level of the finish ceiling at the exterior walls and columns on the fourth and fifth floors. **(Photos #8 and #9)** As part of the work, the exterior walls were insulated using a combination of batt insulation with a polyethylene vapor barrier and polyurethane spray foam (SPF) insulation. The interior gypsum had not yet been installed at one window surround on the fourth floor and one on the fifth floor. **(Photo #10)** At these locations we observed that batt insulation and SPF had been used to fill the gap between the window frames and the precast concrete wall panels.

Precast Wall Panels

The precast concrete wall panels were observed to be in a generally good and serviceable overall condition. We observed a very limited number of small spalls/cracks throughout the façade. **(Photos #11 and #12)** In addition, areas of minor deterioration were noted at the second-floor level eyebrow. **(Photos #13 and #14)** Finally, one large area of deterioration was observed at the southwest corner of the penthouse. **(Photo #15)** One area of concrete repair was observed above the south elevation, grade-level overhead door and appeared to have been necessitated by impact from a vehicle that was too tall for the door. **(Photo #16)**

The small spalls and cracking occurring at random locations throughout the façade appeared to have been caused by insufficient cover over the steel elements embedded within the panels. A lack of sufficient cover increases the potential for localized cracking of the concrete and exposes the embedded steel to moisture which causes the steel to corrode. As the steel corrodes, it expands and, over time, cracks the concrete. This exposes the embedded steel to more moisture and accelerates the rate of deterioration.

The precast panel damage at the penthouse and the second-floor eyebrow appeared to be freeze-thaw related deterioration. At the second floor, the typical damage location is in an area where the panel geometry concentrates the runoff. Concrete is typically resistant to freeze thaw damage; however, insufficient levels of air entrainment or the use of excessive water in the mix can increase the susceptibility to freeze-thaw damage.

Discoloration of the precast panels was noted adjacent to the panel joints at the penthouse wall panels. **(Photo #17)** The discoloration was not observed at the wall panels. This type of staining in porous materials such as precast concrete is typically caused by plasticizer from the adjacent joint sealants migrating into material. Unfortunately, staining due to plasticizer migration is often permanent.

The precast column cover located at the south side of the east pedestrian entrance appears to have moved slightly based on separations within the joint sealants. **(Photos #18 and #19)** The column cover was

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

August 10, 2021 ■ Terracon Project No. F6216115



modified to allow for the installation of a steel beam; however, the cause of the apparent movement was not readily apparent.

The two wall panels that were removed during the pedestrian bridge construction were stored in the basement and examined as part of our assessment. **(Photos #20 and #21)** The panels have overall dimensions of approximately 13 feet by five (5) feet. The average panel thickness is approximately five (5) inches, and the overall panel depth is approximately 16 inches.

Granite Cladding

The granite cladding at the first floor was observed to be in generally good and serviceable condition. **(Photos #22 and #23)** Evidence of deterioration or distress was not observed within the areas of granite cladding during our assessment. Other than the wall areas adjacent to the overhead doors, the exterior walls at the first floor are protected from the weather by the overhanging the upper floors. Granite is an extremely durable material and unlikely to require maintenance over the life of the building.

Fenestration Systems

Operable Windows

The windows at floors two thru five are aluminum frame, vertical pivot windows with insulating glass (IG) units. **(Photos #24 and #25)** The approximately overall dimensions of the operable windows are 31 inches by 75 inches. The sashes are glazed from the building interior. At the building interior, the handles have been removed and the sash latch key holes have been filled with sealant. **(Photos #26 and #27)** The handles remain at the exterior and the latch strike plates are visible at approximately the third points of each jamb. **(Photo #28)** The joint between the operable sash and the frame is typically located behind the new interior finishes and therefore we were not able to observe its condition. **(refer to Photos #24 and #25)**

Three predominate types of exterior glazing materials were observed at the operable windows. The most prevalent was the original material, which appeared to be compound glazing. The compound glazing materials were typically cracked and in very poor condition. **(Photos #29 and #30)** Glazing materials used at the replacement IG units included sealant and butyl tape. **(Photos #31 and #32)** In addition, a number of other materials were used at random locations, likely in an attempt to address localized water leakage. Other than the compound glazing, the materials at the metal-to-glass glazing joint appeared to be in fair condition from the vantage of the building interior. The exterior glazing materials will be discussed in further detail below in the *Fixed Window* and *Insulating Glass Units* sections

At one location on the fourth floor and one location of the fifth floor, the interior finishes had not yet been installed around the window frames. At this fourth-floor location, the sash was locked in the open position and could be pivoted allowing for examination of the frame and the exterior wall and window components. **(Photo #33)** (It should be noted that a Google image of the building from November 2019 shows the same window (4th floor, 8th window from west corner) as being open.) At these locations, the frames are anchored to the interior face of the precast wall panels with small angles, and the space between the frame and the precast panel was filled with either batt insulation or SPF insulation. **(Photos #34)** Water leakage at the frame perimeter was not reported. Further, we did not observe visual indications of water leakage at the frame perimeter. However, there is a space between the new wall framing and the interior surface of the precast wall panels, so water from leakage at the frame perimeter, other than at the window head, is likely to run down the interior face of the precast wall panels and onto the floor without damaging the drywall.

At the location where the sash could be pivoted, we examined concealed portions of the frame and sash as well as the joint sealants and precast wall panels in the area. The frame section appeared to have been assembled from two pieces of aluminum, connected at the corners with small plates. **(Photo #35)** The frames are not thermally broken, and weep holes are located at the underside of the sills near the jambs. **(Photo #36)** The corners of the frames and sashes are mitered. One strip of fin-type weather stripping was provided at the sash crack, the joint between the operable sash and the frame. The exterior glazing materials were in very poor condition.

During our assessment, staining consistent with ongoing water leakage was apparent on the interior of the sash at numerous locations throughout the operable windows examined. **(Photos #37 and #38)** The staining typically originated at the joint between the interior glazing stop and the sash but was observed at the sash corner joint at one window location. **(Photo #39)** At the locations of apparent water leakage, the exterior exterior glazing materials were observed to be very deteriorated. **(Photo #40 and refer to Photos #29 and #30)** The deteriorated glazing allows water to enter the glazing pocket when it leaks into the building interior through the unsealed joint between the glazing stop and the sash. At the location where the staining was located at the sash joint, the internal seals at the sash joinery have likely failed, allowing water to enter the sash and leak out through the unsealed corner joint.

Fixed Windows

The windows on the first floor are aluminum frame, fixed windows with IG units. The approximate overall dimensions of the fixed windows are 4'-6" by 6'-4". The windows are glazed from the building interior. A method for weeping the glazing pocket and window frames was not observed at the fixed units.

As at the operable windows, the most prevalent exterior glazing materials was compound glazing that appears to be original to the building. The compound glazing materials were typically observed to be severely weathered, brittle, and failed or in unserviceable condition. In addition, the original glazing materials had been "overcaulked" at several locations. **(Photo #41)** As at the windows above, the glazing materials used at replacement IG units included both sealant and butyl tape. The condition of the glazing joint sealant materials at replacement IG units varied from good to failed. **(Photo #42)**

In addition to the glazing joints, metal-to-metal joints are located at the corners of the frames. These joints were typically appeared to be tight; however, some locations were open and susceptible to water penetration. **(Photo #43)** As we did not observe weeps for the glazing pocket or frame, it is important that the exterior face of the units be maintained in a watertight condition.

Storefronts

The original fenestration at each of the three pedestrian entrances was replaced with Kawneer storefront systems. **(Photos #44 and #45)** The storefronts and related components were observed to be in serviceable condition.

Insulating Glass Units

A large number of the IG units, perhaps as high as 20 percent of the total, have been replaced throughout the building. In addition to replacement IG units, we observed several broken or damaged IG units during our assessment. **(Photos #46 and #47)** The replacements appear to have been performed in two phases

as three distinct types of IG units were observed. The original IG units have an aluminum channel spacer with a desiccant-filled tube mounted to the jamb spacer. **(Photo #48)** The original exterior glazing material appeared to be compound glazing and, as noted above, was observed to typically be in very poor condition. The original interior glazing material was a continuous gasket, and the original IG units have "Thermopane" etched in the lower right corner. **(Photo #49)**

The first replacement program is believed to have occurred around 1991 as the Insulating Glass Certification Council (IGCC) spacer stamp is dated from 1991. **(refer to Photo #31)** The 1991 replacement IG units were "wet" glazed at the exterior, and the original interior gaskets were typically reinstalled but were often damaged. **(refer to Photo #31)** It was reported that as many as 80 additional IG units were recently replaced, and stickers were present on the interior of a few recently replaced units. **(Photo #50)** These recent replacements do not have IGCC spacer stamps, and the spacer is cut at the corners. **(Photo #51)** The recent replacements used butyl tape as the exterior glazing material, but rubber shims were used in lieu of continuous gaskets at the interior of the units. The shims were typically installed at two locations along the head and sill and at three locations along each jamb. At many locations, the head shims had fallen out. At the sill, we observed the butyl glazing materials pushing out of the glazing joint at the shim locations indicating a high level of IG unit edge pressure at the shim locations. **(Photos #52 and #53)**

If the edge pressure is too low, the potential for water penetration into the window system at the glazing joint is increased. If the edge pressure is too high, the IG unit edge seal will be damaged and, in extreme cases, glass breaking can occur. Edge pressure should be constant along the perimeter of the IG unit and not occur only at isolated points. Edge pressure should be sufficient to reduce the potential for water penetration into the window system but not so great as to damage the IG unit edge seal. Edge pressure of four (4) to ten (10) pounds per linear inch is typical.

Joint Sealants

In addition to the glazing and metal-to-metal joint sealants that are components of the window systems, sealants are also used between the cladding materials as well as as well as between the cladding materials and the window frames. Close up examination of the panel-to-panel joint sealants within the precast elements at floors two thru five was not possible other than around the operable fourth floor window as our assessment was performed from grade and the roof. However, the sealants at the first-floor column covers and penthouse walls were examined and high-resolution digital photographs of the joint sealants were taken with a telephoto lens from grade. Based on the joint sealants observed and the high-resolution photographs, the precast wall panel joint sealants and window frame perimeter joint sealants appeared to be in fair overall condition. **(Photos #54, #55, and #56)** We believe that the original sealants to have been "overcaulked" with what appeared to be a siliconized sealant (the type of material available as "silicone sealant" at home improvement stores). Water leakage into the building interior due to the wall panel joint sealants or window perimeter joint sealants was not reported or observed during our assessment.

First floor joint sealants:

At the first floor, joint sealants are also used between the granite panels and between the granite and at the window frame perimeters. The sealants between the stone panels were typically not tooled but were otherwise observed to be in serviceable condition. **(Photo #57)** The window perimeter joint sealants were observed to be in poor condition with widespread adhesive and cohesive failures observed. **(Photos #58 and #59)**

3.0 CONCLUSIONS AND RECOMMENDATIONS

The materials comprising the basic components of the Stillwater Building exterior wall assemblies, precast concrete, granite, aluminum and glass, are all very durable materials with long anticipated service lives. However, anticipated service life of the joint sealants between these components is relatively short and can vary greatly with the configuration of the joint and the quality of the workmanship during sealant installation. Other than the operable window frames, the exterior wall systems are barrier systems in that their design does not provide a means to manage water that penetrates beyond the exterior face of the system. Therefore, maintaining the watertight integrity of the joint sealants is critical to maintaining a watertight building enclosure.

Precast Wall Panels

The precast concrete wall panels were observed to be in a generally good and serviceable condition. Repair of decorative precast concrete is difficult, and the results are often not aesthetically satisfactory. Rather than initiate a concrete façade repair program to address the small spalls and cracks located throughout the façade, we recommend that the areas be sealed to reduce the potential for moisture entry and periodically monitored for evidence of continued deterioration such as additional cracking. The areas of apparent freeze-thaw damage at the second-floor level eyebrow should also be monitored. If further deterioration is observed, a petrographic analysis of the concrete should be performed to determine the underlying cause of the deterioration prior to initiating repairs.

The large area of deterioration at the southwest corner of the penthouse should be repaired. The work should include the removal of all deteriorated concrete to sound and solid material. All exposed reinforcing should be thoroughly cleaned and coated to reduce the potential for further corrosion. After the patch preparation work has been completed, the new concrete materials should be placed. As this location is not visible to the public, we recommend that it be used as a trial repair to establish the repair material and methods necessary to produce aesthetically satisfactory repair should concrete repairs be necessary at floors two thru five.

We recommend that the joint sealants at the precast column cover located at the south side of the east pedestrian entrance be replaced and the panels be monitored for signs of further movement. The sealant replacement should include the complete removal of the existing sealant materials, thorough cleaning of the substrate, and installation of new backer rod and silyl terminated polyether (STPE) sealant. All sealant materials should be tooled after placement to improve adhesion and achieve the proper joint configuration. If additional movement is noted, an investigation to determine the cause of the movement should be performed.

Operable Windows

In order to address the ongoing water leakage at the operable sashes, the glazing joints should be resealed. This is typically accomplished by the application of a cap bead of sealant between the surface of the IG unit and the aluminum sash or frame. To achieve the required bond surface for the sealant, the sealant materials will extend ¼ inch onto the surface of the glass, and this portion of the sealant will be visible from the building interior. Although the glazing sealants at some replacement IG units was observed to be in fair to good condition, we recommend that all glazing joints be cap beaded to minimize the potential for future leakage at a unit that was not included as part of the repairs. The recommended work includes cutting

back the existing sealant materials, thoroughly cleaning the joint substrate, and installation of a commercial grade silicone sealant. As part of this work, we recommend that consideration be given to sealing the metal-to-metal joints at the corners of the sashes.

As discussed above, the sash cracks at the operable windows are sealed at the interior face of the windows and these joints are no longer accessible due to the position of the wall finishes. The exterior of the sash crack is unsealed which may permit large volumes of water into the frame. If the volume of water entering the frame exceeds the capacity of the weeps or if the weeps become plugged, water may accumulate in the frame. This would expose the internal frame seals to hydrostatic pressure and increase the potential for water leakage into the building interior at the joints between the sill and the jambs. It is our understanding that the windows at floors two thru five are not to be opened going forward and sealing the operable sashes in a closed position is acceptable. Based on this understanding, we recommend consideration be given to installing sealant in the sash crack at the exterior face of the frame/sash. The recommended work should include thoroughly cleaning the joint substrate and installation of a backer rod/bond breaker and commercial grade silicone sealant. As part of this work, we recommend that consideration be given to sealant the metal-to-metal joints at the corners of the frames.

Fixed Windows

The condition of the glazing at the first floor was observed to be similar to that at the upper floors but widespread evidence of water leakage was not noted at the first floor. We believe that due to the first floor windows being sheltered from rain by the upper floors. Should they be exposed to water during a severe storm water, we believe that water leakage into the building interior at the glazing stops is likely. We therefore recommend that consideration be given to cap beading the glazing joints at the first-floor fixed windows as well. This could be performed as a separate project; however, it would be most economical to perform it in conjunction with the cap beading repairs at the upper floors. As part of this work, we recommend that consideration be given to sealant the metal-to-metal joints at the corners of the frames.

Insulating Glass Units

The observed bulging of the butyl glazing materials at the shim locations is an indication of high levels of IG unit edge pressure at the shim. It is our opinion that the use of shims rather than continuous gaskets at the interior glazing joint is an improper installation and may result in water leakage or damage to the IG unit. We recommend that the shims be removed, and a continuous rubber gasket be installed. The gasket should be of appropriate hardness to provide edge pressure of four (4) to ten (10) pounds per linear inch. Construction variances may necessitate that gaskets of various thickness be available to provide the desired edge pressure.

Joint Sealants

Although evidence water leakage through the precast panel joints and window perimeter joints was not observed or reported during our assessment, it is our opinion that the joint sealants installed at these locations are reaching the end of their effective service life. We recommend that consideration be given to replacing the precast panel joints sealants as well as the window perimeter joint sealants as part of the glazing sealant replacement program. This would allow for the greatest efficiencies in the work and minimize the disruption to the building occupants. The sealant replacement work should include the complete removal of the existing sealant materials, thorough cleaning of the substrate, and installation of

new backer rod/bond breaker and STPE sealant. Care must be taken during the work so that the window frame weep holes at floors two thru five are not sealed.

4.0 OPINION OF PROBABLE CONSTRUCTION COSTS

Opinions of probable construction costs have been developed for the various repair activities discussed above. The construction costs provided within this report are based on unit prices provided by a national commercial renovation cost database and are adjusted for Billings, Montana. It should be noted that construction costs can vary substantially from those provided herein due to phasing, changes in labor rates, and material costs, site constraints as perceived by the contractor, and other factors within the construction industry. The opinions of probable construction costs prepared by Terracon are intended to be used for initial budget purposes only and are not guaranteed maximum costs. We recommend that a twenty-five percent contingency be included to address unforeseen and presently hidden conditions. It should also be noted that, as recommended repairs are postponed, the extent of deterioration may increase exponentially, thereby requiring greater financial commitments. The cost estimates provided are based on the work being performed as a single project and are in 2021 dollars.

The construction costs provided do not include fees for consulting services relative to the preparation of repair documents and contract administration services. Consulting fees for these services can vary significantly (generally between 5 and 25 percent of the project cost) depending on the complexity of the work and the level of involvement required by the Owner. In general, the greater the scale of the repair project, the lower the percentage of the consultant's fees.

Repair Cost Summary

Precast Concrete Wall Panels

- | | |
|---|---------|
| • Apply zinc-rich primer to exposed steel at minor areas of deterioration | \$1,500 |
| • Seal cracks in wall panels to minimize moisture entry | \$1,500 |
| • Repair large area of deterioration at the SW corner of the penthouse | \$4,500 |

Operable Windows

- | | |
|--|----------|
| • Remove and replace glazing joint sealants | \$65,000 |
| • Seal sash cracks and metal-to-metal frame joints | \$48,000 |

Fixed Windows

- | | |
|---|----------|
| • Remove and replace glazing joint sealants | \$16,000 |
|---|----------|

Joint Sealants

- | | |
|---|-----------------|
| • Remove and replace precast wall panel joint sealants | \$80,000 |
| • Remove and replace operable window perimeter joint sealants | \$78,000 |
| • Remove and replace fixed window perimeter joint sealants | <u>\$19,000</u> |

<i>Repair Subtotal</i>	\$313,500
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<i>General Conditions and Increase for Elevated Work Areas</i>	\$63,000
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<i>Contingency (25%)</i>	<u>\$78,000</u>
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<i>Project Total</i>	<u>\$454,500</u>
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5.0 LIMITATIONS

The services Terracon performed were general in scope and in nature. This report is intended to provide a general overview of the building systems with respect to the conditions reported to us and our opinion of their overall condition based solely on our visual assessment. It has been performed using that degree of skill and care normally exercised by reputable consultants performing similar work. The activities of this work included observations of visible and readily accessible areas. The observations were performed without removing or damaging components of the existing building systems. Consequently, certain assumptions have been made regarding conditions and operating performance. Comprehensive studies to identify, document, and evaluate every existing defect or deficiency, were not conducted. In some cases, additional studies may be warranted to fully evaluate concerns noted.

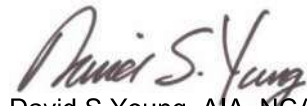
The observations, findings, and conclusions within this report are based on our professional judgment and information obtained during the course of this assessment based on the scope of work authorized. The opinions and recommendations presented herein are based on our observations, evaluation of the information provided, and interviews with personnel familiar with the property. No calculations have been performed to determine the adequacy of the facility's original design. It is possible that defects and/or deficiencies exist that were not readily accessible or visible. Problems may develop with time, which were not evident at the time of this assessment. The opinions and recommendations in this Report should not be construed in any way to constitute a warranty or guarantee regarding the current or future performance of any system identified.

We appreciate the opportunity to be of service to you on this project. In addition to Facilities Services, our professionals provide geotechnical, environmental, construction materials consulting on a wide variety of projects locally, regionally, and nationally. For more detailed information on all of Terracon's services please visit our web site at www.terracon.com.

If you have any questions regarding the information presented in this report or if we can be of further assistance to you, please feel free to contact us.

Sincerely,

Terracon Consultants, Inc.



David S Young, AIA, NCARB, LEED AP
Senior Facilities Professional
Facilities Services

Dustin T. Smoot, RRC, RRO, LEED AP, CDT
Department Manager
Facilities Services

Attachments: 1. Photographic Documentation (59 Photos)

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

Date Photos Taken: July 28, 2021 ■ Terracon Project No. F6216115

Terracon



Photo #1 Overall view of the Stillwater Building looking southwest.



Photo #2 Overall view of the Stillwater Building looking northwest.



Photo #3 West elevation entry to the vehicular ramp to the basement garage.



Photo #4 West elevation overhead door.



Photo #5 Precast panels removed as part of the pedestrian bridge construction.

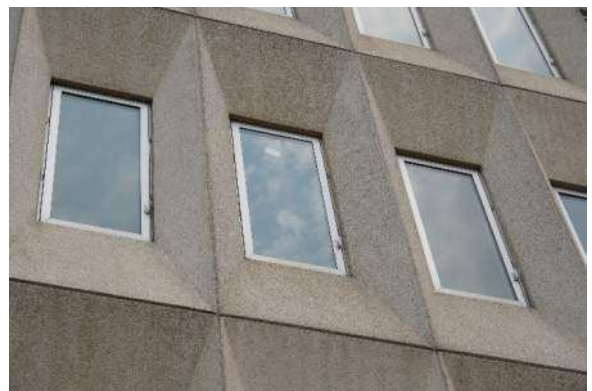


Photo #6 Exposed quartz aggregate precast concrete wall panels at floors two thru five.

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

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Terracon



Photo #7 Polished black granite cladding at the first floor.



Photo #8 Overall view of the fifth floor at the time of our assessment.



Photo #9 Overall view of the first floor at the time of our assessment.



Photo #10 Gypsum board had not been installed at one window on the fourth and fifth floors indicated by the red rectangle.



Photo #11 Minor spalling of the precast wall panels indicated with red arrows.



Photo #12 Small crack in precast concrete wall panel indicated by red oval.

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

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Photo #13 Small area of apparent freeze-thaw damage at the second-floor eyebrow indicated by the red oval.



Photo #14 Small area of apparent freeze-thaw damage at the second-floor eyebrow indicated by the red oval.



Photo #15 Area of concrete deterioration at the southwest corner of the penthouse.



Photo #16 Area of concrete repair at the south elevation overhead door indicated by the red oval.



Photo #17 Discoloration of the penthouse precast wall panels adjacent to the sealant joints.



Photo #18 Column cover at the east entrance. Note the cover was modified to accommodate a beam indicated by red oval.

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

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Terracon



Photo #19 Separations within the joint sealant suggest that the column cover has moved.



Photo #20 Wall panels removed from the façade and stored in the basement.



Photo #21 Wall panels removed from the façade and stored in the basement.



Photo #22 Typical view of the granite cladding installed at the first floor.



Photo #23 View showing the granite cladding at the top of the vehicular ramp.



Photo #24 Typical exterior view of the operable window units installed at floors two thru five.

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

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Terracon



Photo #25 Typical interior view of the operable window units installed at floors two thru five.

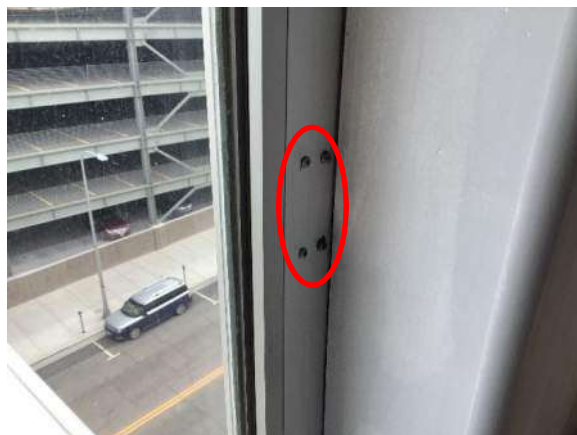


Photo #26 Interior handle has been removed from the operable sash indicated by the red oval. Note the sash crack is not visible.



Photo #27 Sash latch key holes have been filled with sealant. Sash crack is visible behind drywall indicated by red arrow.



Photo #28 Exterior handle indicated by red oval and latch strike plates indicated by red arrows.



Photo #29 Original compound glazing was observed to be in very poor condition from the building interior indicated by red arrow.



Photo #30 Original compound glazing was observed to be in very poor condition from the building interior indicated by red arrow.

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

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Photo #31 Exterior glazing sealant at circa 1991 IG unit replacement (red arrow). Note "91" IGCC spacer stamp (red oval).



Photo #32 Butyl tape exterior glazing at recent IG unit replacement indicated by red arrow. Shim location indicated by red oval.

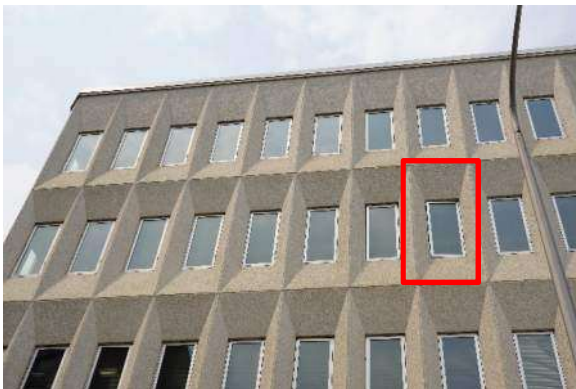


Photo #33 Location of the open sash at the fourth floor on the south elevation indicated by the red rectangle.



Photo #34 Batt & SPF insulation indicated by red arrows. Window anchor indicated by red oval.



Photo #35 Exterior window frame piece indicated by red arrow attached to main frame by plate at the corner indicated by red oval.



Photo #36 Approximate location of the weep hole is indicated by red arrow.

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

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Photo #37 Staining consistent with water leakage originating between the glazing stop and the sash indicated by red oval.



Photo #38 Staining consistent with water leakage originating between the glazing stop and the sash indicated by red oval.



Photo #39 Staining consistent with water leakage originating at the corner of the sash indicated by red oval



Photo #40 Condition of the exterior compound glazing at the open sash indicated by the red arrow.



Photo #41 Original compound glazing overcaulked with polyurethane sealant at the first floor.



Photo #42 Failed glazing sealant at the first floor fixed windows indicated by red arrow.

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

Date Photos Taken: July 28, 2021 ■ Terracon Project No. F6216115

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Photo #43 Open metal-to-metal joint at first floor window frame corner indicated by red arrow.



Photo #44 North elevation entry storefront. The south elevation entry storefront is similar.



Photo #45 East elevation entry storefront.



Photo #46 Broken IG unit at the east elevation on the fourth floor.



Photo #47 Broken IG unit at the west elevation on the first floor.



Photo #48 Desiccant-filled tube (red arrow) typical of original IG units.

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

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Photo #49 Original IG units have “Thermopane” etched in the lower right corner (red oval) and interior glazing gaskets (red arrow).

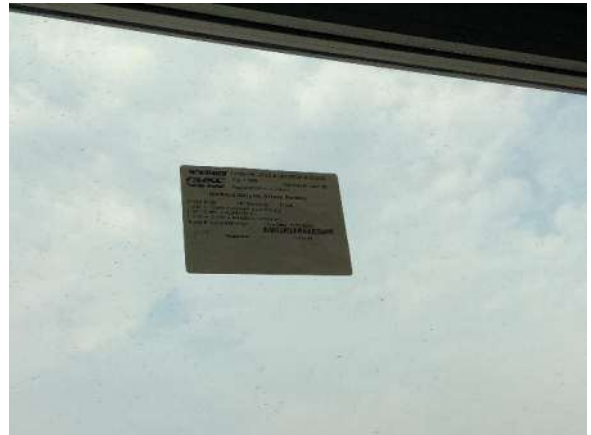


Photo #50 Fabricator sticker found on a number of recently replaced IG units.



Photo #51 Recently replaced IG units typically have no spacer stamp and the spacers have cut corners (red arrow).



Photo #52 Butyl glazing tape bulging from the exterior glazing joint at the shim locations indicated by the red arrows.



Photo #53 Butyl glazing tape bulging from the exterior glazing joint (red oval) at the shim (red arrow).



Photo #54 Window perimeter sealant at the fourth floor. Two colors of sealant indicate that the sealant has been overcaulked.

Exterior Wall and Window Assessment

Stillwater Building ■ Billings, Montana

Date Photos Taken: July 28, 2021 ■ Terracon Project No. F6216115



Photo #55 Overcaulked window perimeter sealant at the fourth floor. Note that the frame corner joint is open (red arrow).

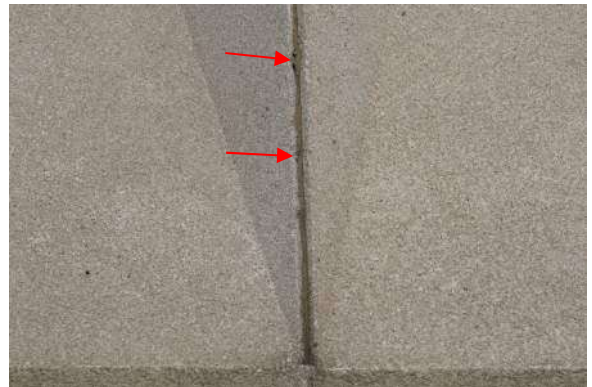


Photo #56 Precast panel joint sealants. Note apparent voids in the sealant identified by red arrows.



Photo #57 Sealant at the granite panels was typically not tooled but otherwise in serviceable condition.

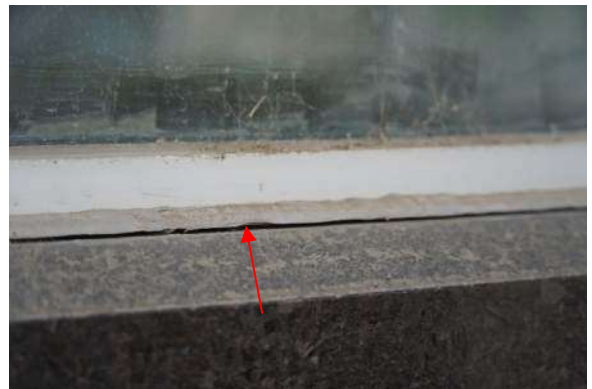


Photo #58 Adhesive failure at first floor window perimeter sealant indicated by red arrow.



Photo #59 Cohesive failure at first floor window perimeter sealant indicated by red arrow.

Montana Branch Office
Blain Bermingham- Senior Sales Executive



8/5/2021

City of Billings
PO Box 1178
Billings, MT 59101

KONE Inc.
3157 Bozeman Ave
Helena, MT 59601
Telephone 406-449-1399
Cell 406-531-3700
blain.bermingham@kone.com

Regarding: Elevator Report for Stillwater Building

John,

KONE completed an inspection of all three elevators the week of July 26, 2021 at the Stillwater Building located at 316 N 26th Street Billings, MT. The inspection lasted a few hours which here are our findings, notes, recommendations, etc:

- Elevators were installed in 1996
- Make/Model- Dover Traflomatic IV / T4
- 3500 lb Capacity, 6 Landings
- Annual tests are due this September
- 5-year tests were last completed in 2018 (due in 2023)
- Overall, the elevators are functionally sound with no immediate issues during the inspection
- Ropes are original, but in good shape
- The following basic component items were visually inspected and in good shape; cables, governor, lubrication of cables and rails, door operator & belts, traveling cable, proper illumination and function of car fixture buttons, proper illumination and function of hall call buttons and directional arrows, lighting (cab ceiling, machine room, pit & hoistway) and elevator phones
- Walk-in elevator pits are clean, has adequate lighting, properly screened with dividers and code required contacts pit doors
- Machine room was clean, has adequate lighting and the temperature was within proper range. Machine room had some spare parts (boards of some sort).
- Cab interiors (walls, jambs, ceilings, doors, etc.). are in decent shape with the Freight Elevator showing more wear. Would recommend performing cab interior upgrades along with car doors and potentially hall doors. This could be done as a standalone or incorporated with a future modernization
- No Cartop Handrails (this could be written up as a code violation)
- #2 & #3 elevators had a transfer station to the generator. No further testing could be completed during our inspection
- Major Obsolete Parts- Drive, CPU boards and minor parts

- Recommendation- When time allows, modernize each elevator (Controller, machine, motor?, governor, cables, fixtures, wiring, door operator, cab upgrades, door detector, cartop handrail, cartop inspection station, etc.). In the event of modernization takes place then work by others would consist of; electrical (pit & machine room), pit sump pump, smokes?, sprinklers?, etc.
- Minor Recommendations- rope gripper, rope lubricator, cartop handrail, cab upgrades, wireless phone module, door operator, etc.

Overall, the elevators are operationally sound with no current issues. We would recommend the elevators be serviced by-monthly on an Oil & Grease (OG) Service Agreement. The OG Agreement would not cover parts, repairs and callbacks. The reason we would recommend the OG Agreement is due to the obsolete components which would not be covered under any type of Agreement. Basically, there's no sense paying a premium price on an Agreement if obsolete components are not covered.

As previously stated, the elevators are in sound condition. However, the elevators are 25 years of age which the average traction elevator is roughly 30 years. If funding is available, we would recommend modernizing the elevators especially if the building will be empty soon. A budget number to modernize each elevator would be roughly \$260K.

Below are some pictures with explanations:



Machine, motor, cables, etc. All in good condition and functionally sound



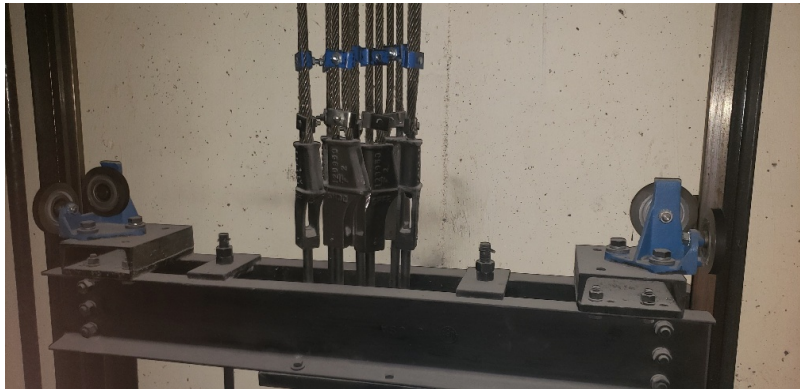
Electrical disconnect.



Governor Rope. No presence of rogue (rust) and not worn.



Elevator Cables. Original, but in good shape with minimal wear and no rogue (rust).



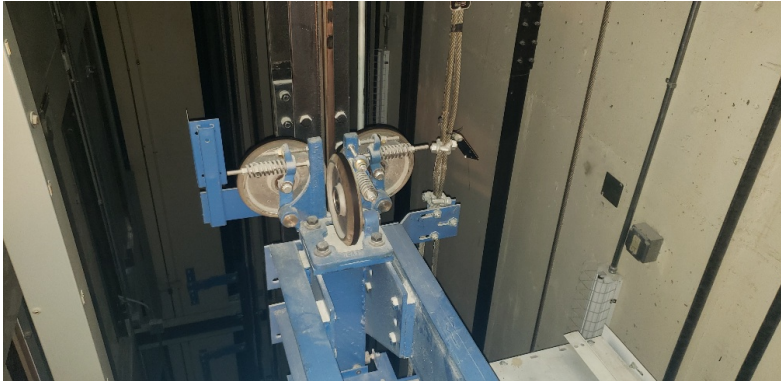
Shackles in good condition and code compliant.



Door operator belts in good condition. Cartop Inspection Station functionally sound.



Counterweight rollers and rails are in good shape.



Car rollers and rails are in good shape.



Traveling cables are in good shape with no visible wear.



Oil buffers are code compliant



lighting, properly barricaded and door entrances are code compliant

Elevator pits are clean, have adequate

Please let me know if you have any questions.

Thank you,

Blain Bermingham,
Senior Sales Executive

ROOF SURVEY REPORT

STILLWATER BUILDING

316 North 26th Street
Billings, MT 59101
July, 2021



Prepared By: Travis Kennedy
Phone: 406.698.4846
Email: travis@bradfordroof.com

EXECUTIVE SUMMARY

SURVEY SCOPE

Survey Date July 29, 2021

Surveyor Travis Kennedy

Surveyed Property Stillwater Building, Billings MT

Work Performed An in-depth visual survey of all roof sections was performed to detect damage, deterioration, and other defects.

.....

SURVEY FINDINGS

Estimated Roof Area 33,750 square feet over 3 separate roof sections

Estimated Roof Age 15-17 years

Estimated Roof Asset Value \$690,000.00

General Roof Conditions The general condition of the roof sections are good. Problems observed include open baseflashing side laps, loose parapet cap fasteners, wind scouring to the membrane, loose/exposed baseflashings, counterflashing fasteners failing, loose drain ring bolts, top of plumbing pipes open and failed sealants.

Other non-roof related items:

The top two rungs of the access ladder to section C are broken. This is a major safety concern. There are two antenna's attached to the side rails of the ladder that are swaying causing the ladder to pull apart. These two antenna's need to be removed if not used or remounted to a structural part of the building such as a wall. Once removed, the two rungs need to be welded back in place.

There are large gaps around the three access door frames that need to be resealed.

.....

RECOMMENDATIONS

Maintenance/Repair We recommend that maintenance and repairs continue in 2021 and on an annual basis. Work recommended for 2021 includes patching holes in baseflashing, three-coursing the open baseflashing side laps, sealing the tops of plumbing pipes, installing new oversized fasteners in parapet cap, repairing exposed membrane where there is wind scouring, fastening and sealing tops of open baseflashings and a pitch pan that needs to be topped off with pourable sealer.

The majority of the galvanized surface mounted counterflashings (CF) are coming loose from the walls. This is due to the old style masonry pin driven anchors with plastic "washers" are rotten or missing due to UV exposure. This leaves a hole with no "head" to hold the CF to the wall. We recommend installing all new metal pin driven anchors, 1 per 2' o.c. throughout all counterflashings. Once this work is complete, resealing the top of the caulk lip will be required.

There are 10 abandoned plumbing pipes that have been filled with spray foam. Each one of these has a lead jack that are open at the top. Rather than yearly maintenance of resealing each of these, we'd recommend installing a "cap" as a long-term repair. All other functioning plumb pipes will need to be sealed and monitored yearly.

All drain ring bolts on all sections need to be tightened. These need to maintain constant pressure to keep the roof system between the drain clamping rings and bowl tight in the event water backs up due to a blockage. The drains on all three sections are primary drains and there are no additional overflows. We recommend monthly drain inspections to make sure there are no blockages within the primary drains.

The PVC condensation line from the cooling towers is directly on the deck where it penetrates the roof. As it's installed, it is not tall enough to get a proper flashing around. There is a large gap that goes into the building at the base of the elbow.

There is a 4' piece of counterflashing that has fallen off the wall on section C due to the masonry fasteners failing. This piece of counterflashing has been blowing back and forth for some time now allowing the corner to wear the gravel off the membrane and will eventually cut through the membrane.

There are four sheet metal boxes around the I-beams supports for the cooling tower. All of these need to be sealed either at the vertical joint in the box and/or at the top where they are wide open.

Maintenance and repairs beyond 2022 should be based on results of a re-survey, allowing work to reflect changes in roof condition. Once major problems are addressed, the scope of annual maintenance will likely be substantially reduced.

Re-roofing As long as all the repairs are completed in this report, annual inspections and maintenance are performed and no unforeseen issues occur, reroofing could be held off until 2027.

Re-Survey It is recommended that surveys be conducted on an annual basis or at minimum every two years. Recommendations and budgets for maintenance, repairs, and re-roofing can then be updated to reflect current conditions and priorities

PREFACE

This survey report is a tool for managing the cost and performance of your roofing systems. In the report, we summarize what your roofing assets are, what condition they are in, and what you can do --when and at what cost -- to protect them. Detailed and summary budgets outline work and costs for maintenance and reroofing. With this information, you can plan, budget, organize, and prioritize to keep roofs on the asset side of your balance sheet.

Before you look at the detailed information included here, we suggest that you review the "Executive Summary," "Building Drawings," and "Contents" pages following the preface. The Executive Summary is a brief summary of survey information -- what we did, what we found, and what action we recommend that you take. The building drawings show the outline of each building, with major roof sections labeled. *The contents describes the information you'll find behind the major report tabs.

To help you make the best possible decisions about roofing work, we recommend that you contract with Bradford Roof Management for an annual roof survey. With annual reports on your roof assets, you can respond with timely maintenance and repair to extend roof life, preventing roofing crises and costly premature reroofing. Your informed spending, guided by our annual recommendations, will extend your roofing dollar, providing maximum roof life at minimum cost.

Following review of this report, you may wish to contract with Bradford Roof Management for additional services to carry out our recommendations. Upon request, for example, we can print work orders to guide roofing work in the field. Also, we can represent you in the construction process by pre-qualifying contractors, reviewing bids, and observing field work.

NOTE: All information in this report is based upon the findings of our roofing survey. Our survey methods conform to current practices in the roofing industry. If latent or hidden conditions within the roofing system or building structure are not apparent based upon our survey methods -- and thus are not detected -- we disclaim responsibility to you or other parties for any and all damages, liability, and costs that arise out of reliance upon the report contents.

* Different roof sections have different management needs, based on roofing materials, age, elevation, and other factors that affect wear and care. The section labels shown on the building drawings are used throughout the report to identify findings and recommendations specific to each section.

CONTENTS

Preface

Executive Summary

Building Drawings

(NOTE: See "Preface" for a description of the "Executive Summary" and "Building Drawings" contents).

The body of this report contains these three sections for each building surveyed, with information on multiple buildings separated by full-length tabs:

Three-Year Roof Section Budgets/Inventories

For each roof section inventoried -- with small tabs identifying multiple sections -- the three-year roof section budget details maintenance and reroofing costs over three years. Included are the locations, descriptions, and costs of recommended work. Following the budget is an inventory of your roof assets for the section. The inventory gives a detailed accounting of section features -- age, materials, penetrations, quantities -- and includes color photographs of general roof areas and significant problems.

Three-Year Building Budget

The three-year building budget gives a whole-building perspective, totaling all the three-year section budgets for the building.

Building Ten-Year Budget

The building ten-year budget gives an overview of estimated roofing costs over ten years. The estimated costs are broken down by each individual section. The costs associated with this budget are -- reroof, maintenance, emergency repairs, projected maintenance after the first three years, and reinspection costs.

NOTE: All budget figures are given in replacement "in kind" in today's dollars.

If more than one building was surveyed, this report section is also included:

Site 10-Year Summary Budgets

The three-year site summary budget totals the three-year building budgets for all buildings surveyed. These site summaries give you the big picture on estimated roofing costs for the short- and long-term. For purposes of these summaries, a site can include multiple buildings at a single location, or any group of buildings you specify for survey.

BUILDING NAME: STILLWATER BUILDING

ADDRESS: 316 N. 26th Street

CITY/ STATE / ZIP: Billings, MT

MANAGED BY: _____

CONTACT: John Caterino

PHONE NUMBER: 406.855.8454

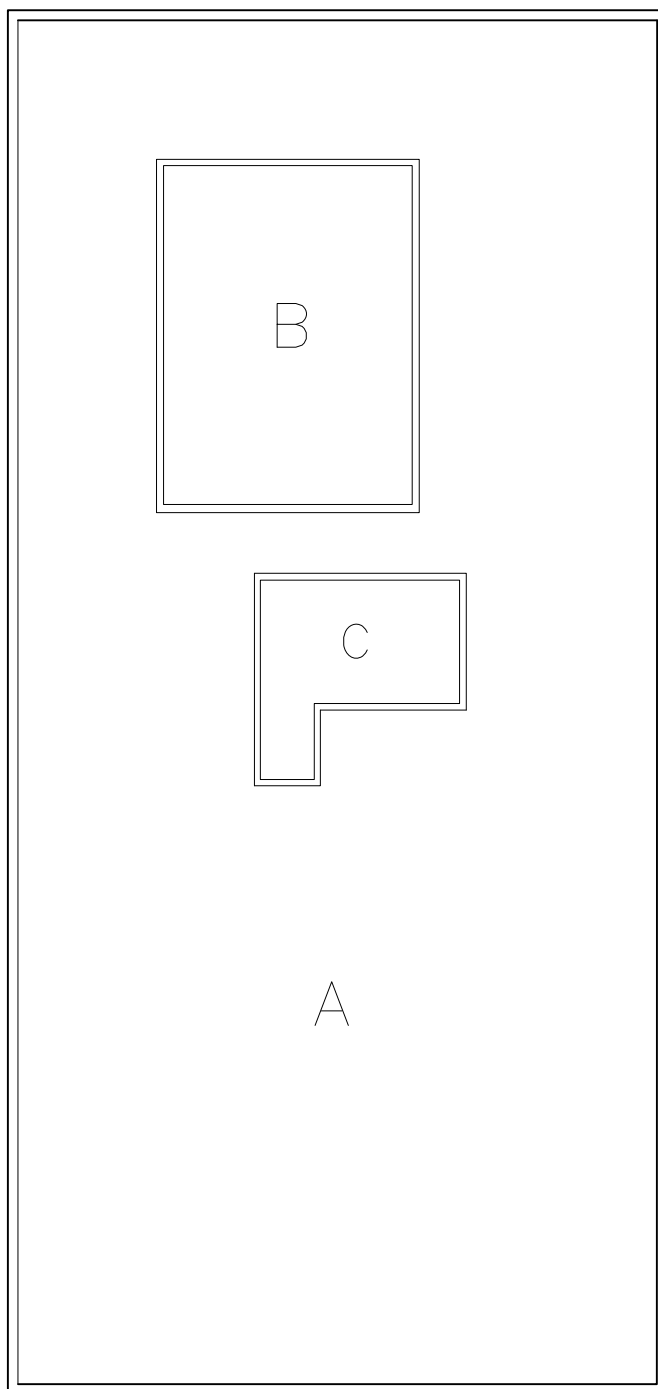
TOTAL SECTIONS: 3

TOTAL ROOF AREA: 33,750

FAX NUMBER: _____



Scale: Not To Scale



ROOF INSPECTION WORK SHEET

DATE : 07/29/2021



BUILDING NAME : Stillwater Building

INSPECTOR : TJK

ADDRESS : 316 N 26th Street

SECTION : A

BUILDING NUMBER : 1

AREA : 28,781

BF - BASEFLASHING
CF - COUNTERFLASHING
DR - DRAINS
EJ - EXPANSION JOINTS
EJC - EXPAN. JT. CURBS
EM - EDGE METAL

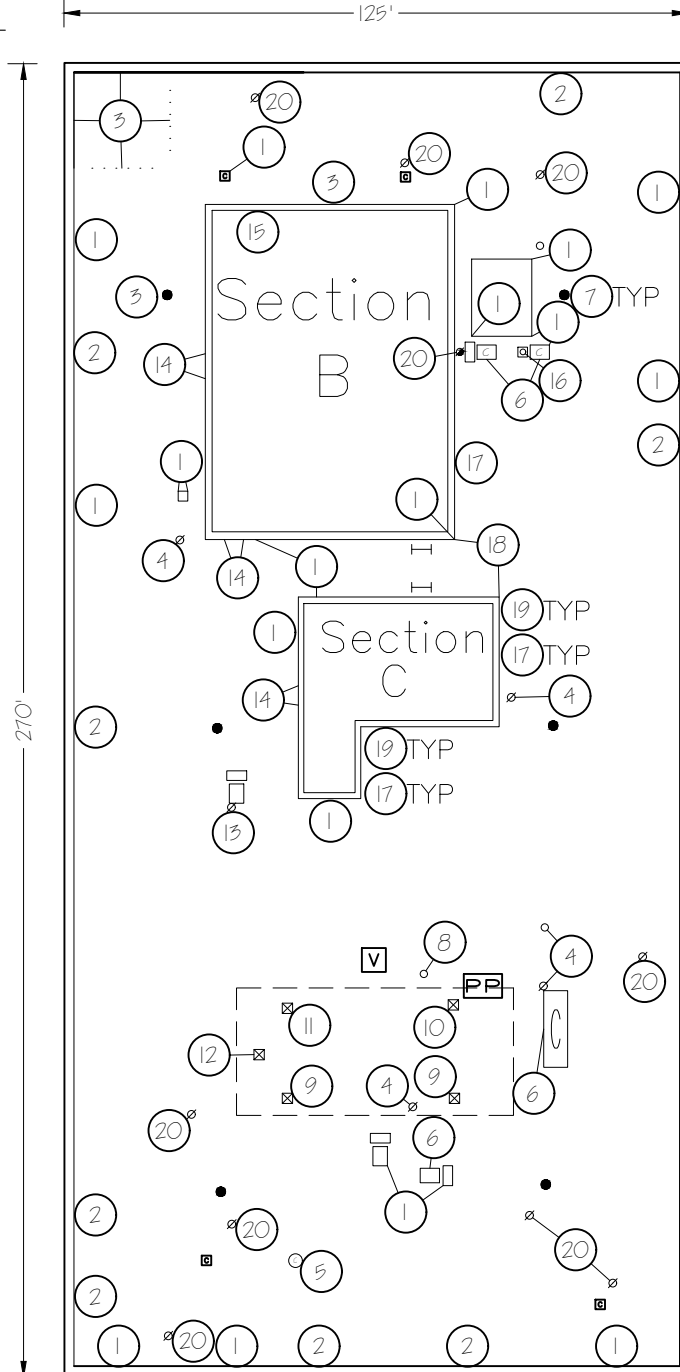
EQ - EQUIPMENT
GN - GENERAL CODES
GT - GUTTERS & DOWNSPOUTS
MB - MEMBRANE
MC - METAL CAP
MS - MASONRY

PN - PITCH PANS
PP - PIPE PENETRATIONS
PT - PAINTING
RG - REGLET
SC - SCUPPERS
SF - ROOF SURFACING

SL - SKYLIGHTS
SM - SEAMS
VP - SHEET METAL VENTS

IDENT #	PHASE TYPE	PHASE #	QUANTITY OF WORK
1	BF	3	22
2	GN	3	2
3	SF	1	400
4	PP	1	4
5	GN	1	2
6	BF	5	46
7	DR	4	6
8	GN	3	3
9	GN	4	2
10	GN	3	2
11	GN	2	1
12	PN	1	1
13	GN	3	2
14	GN	3	2
15	GN	2	3
16	GN	2	4
17	GN	3	8
18	GN	2	2
19	GN	2	80
20	GN	3	5

SCALE : 1" = 55'



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Bradford Roof Management



NORTH



August 10th, 2021

City of Billings
PO Box 1178
Billings, MT 59101

Attn. John Caterino
Facilities Superintendent
406-855-8454

SUBJECT: Spray Applied Fire Resistive Materials (SFRM) Observation

At your request, Tetra Tech conducted a site visit to the Former Battin Courthouse located at 316 N 26th St., Billings, Montana on August 3rd, 2021. The purpose of the site visit was to observe the SFRM installed throughout the building. The general coverage and current condition of the SFRM was observed for conformance to project specifications. The site visit was led by John Caterino from the City of Billings.

Project documents were sent to Tetra Tech for review by the City of Billings on 7/26/2021. These included a set of stamped structural drawings completed by EGGART Engineering Company issued on 12/7/2016 and a SFRM inspection report completed by SK Geotechnical on 5/4/2021. The SFRM inspection completed by SK Geotechnical included thickness, cohesion/adhesion, and density testing on SFRM on all 6 levels of the building and is industry standard for SFRM installation testing methods.

During the site visit, a few locations were identified that did not appear to have sufficient SFRM coverage per EGGART Engineering specification. Photos and descriptions details of these locations are provided below. Application of SFRM in these locations should be properly applied per manufacturer and EGGART Engineering specifications. Based on the specific areas presented to Tetra Tech by client during the site observation visit and the testing report by SK Geotechnical the SFRM applied appeared to be in overall good condition.

Tetra Tech completed no testing for this project and as a result can only provide an observational report of the areas seen during the site visit. Based on a review of the areas presented to Tetra Tech personnel during the site visit, areas found deficient in SFRM depth, density or cohesion/adhesion should receive SFRM coverage in accordance with EGGART Engineering drawings and specifications.

Chuck Goodman
Geoscientist
Construction Materials Engineering | Field & Lab Supervisor

A handwritten signature in blue ink, appearing to read 'Chuck Goodman', enclosed within a blue oval.

Tetra Tech

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