Central High School
Fireproofing of 1909 Concrete Slab at Central High School
5/29/2025

Alex,

My understanding is that we are looking to see if we need to replace the fireproofing that has fallen from the underside of the original building slab in the 1909 portion of the building above the Administration area.

Pages 2 and 3 show the most recent code summary that we have for the building, from 2017.

The Construction Type is 1B
Floor / Ceiling Assembly is 2 hours
Also, note that the building is fully sprinklered

Page 3 also has a plan diagram showing the location of the current problem.

Page 4 shows the floor thickness and reinforcement for the 1909 slab above this area – it's either 8" or 9" thick. Probably 9", as I think this is a longer span floor slab. But we can assume 8" as a more conservative assumption.

Page 5 shows the required thickness for a reinforced concrete slab to meet a 2-hour fire-resistance rating for different concrete types. It varies from 3.6" to 5".

I looked around to see what type of concrete may have been used in a 1909 reinforced slab, but am not sure – most likely I'd say it's not the lightweight options.

Given that the maximum slab thickness for 2-hour fire-resistance in Table 722.2.2.1Minimum Slab Thickness (page 5) is 5", and we can assume given the construction drawings and specifications for the 1909 building (page 4) has a minimum of an 8" reinforced concrete slab – the existing 1909, 8" reinforced concrete slab, is adequate to satisfy the 2-hour fire resistance for the floor / ceiling assembly, without fireproofing.

Let me know how this works, or if you need further clarifications or explanations.

Best,
Darryl Pratte

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Code Summary info from 2017

REVISIONS	
Date:	Description:
CD	4-17-17

This sheet may be a reduced copy. the bar above is 1" long on a full size sheet. Drawing scales apply to full size sheets.

Date: 4-17-17
Drawn: LARS
Checked: LARS

SHEET TITLE

BASEMENT CODE PLAN

Scale:

Sheet Number:

CO100

Project Number:
17.009.00

CODE SUMMARY

Revised 12-12-2016

PROJECT DESCRIPTION

FIRE ALARM SYSTEM AND MECHANICAL DAMPER UPGRADES

GENERAL TYPE OF PROJECT	YES	NO
NEW BUILDING		●
ADDITION		●
REMODEL	●	

AUTHORITIES HAVING JURISDICTION & APPLICABLE REGULATIONS	YES	NO
CITY OF ST PAUL, MN	●	
STATE OF MINNESOTA	●	
1305-2015 Minnesota State Building Code 2012 IBC (plus amendments) 1307-2015 Minnesota State Elevator Code ASME A17.1-2010, ASME A17.3-2011, ASME A17.4-1999, ASME A17.5-2011, ASME A18.1-2011, ASME A90.1-2009, ASME B20.1-2009 1311-2015 Conservation Code for Existing Buildings 2012-IEBC (plus amendments) 1315-2014 National Electrical Code 1323-2015 Minnesota Commercial Energy Code ASHRAE 90.1-2010 7878-Energy Code; other buildings 1341-2015 Minnesota Accessibility Code 2012 IBC (chapter 11) 2009 ICC/ANSI A117.1 (plus amendments) 1346-2015 Minnesota Mechanical Code and Fuel Gas Codes 2012 IMC (plus amendments) 4714-2012 Minnesota State Plumbing Code 2012 Uniform Plumbing Code (plus amendments) 7511-2015 Minnesota State Fire Code 2012 IFC (plus amendments)		
DEPARTMENT OF HEALTH (DOH)		●
2010 FGI Guidelines		●
THE JOINT COMMISSION (TJC)		●
CENTER FOR MEDICARE/MEDICAID SERVICES (CMS)		●
Applicable NFPA Standards for TJC or CMS accreditation: NFPA 101-2012, NFPA 99-2012, NFPA 10-2010, NFPA 13-2010, NFPA 25-2011, NFPA 45-2011, NFPA 70-2011, NFPA 72-2010, NFPA 80-2010, NFPA 82-2009, NFPA 90A-2012, NFPA 90B-2012, NFPA 96-2011, NFPA 110-2010, NFPA 111-2010		

OTHER APPLICABLE REGULATIONS	YES	NO
ADAAG	●	
MN STATE RULES		●

OCCUPANCY CLASSIFICATION(S)

OCCUPANCIES (IBC CH 3 & 4) (LSC CH 12-42)	E & A	YES	NO
CHANGE OF OCCUPANCY? (If Remodeling)			●
SEPARATED OCCUPANCIES? (IBC Section 508)			●
FIRE BARRIER RATING(S) (Section 707)	SEE CODE PLANS		

TYPE(S) OF CONSTRUCTION

CONSTRUCTION TYPE(S)	IBC (Chapter 6) I-B & LSC (Chapter ???) IIB
AREA SEPARATIONS / FIRE WALLS	SEE CODE PLANS

ALLOWABLE AREA PER FLOOR (Section 506)

BASIC ALLOWABLE AREA (from table 503)	UNLIMITED	
FRONTAGE INCREASE $I_f = 100 \left(\frac{F}{P} - 0.25\right) \frac{W}{30}$ (If Used)	NA	+
$\left(\left(\frac{\text{Perimeter with > 30'-0" open}}{\text{Total perimeter}}\right) - 0.25\right) \times$ BASIC ALLOWABLE		
SPRINKLER INCREASE (Choose One)	YES / NO	+
BASIC ALLOWABLE AREA x 0 (1 HOUR CONSTRUCTION SUIST)	●	NA
BASIC ALLOWABLE AREA x 2 (MULTIPLE STORY BULDING)	●	
BASIC ALLOWABLE AREA x 3 (SINGLE STORY BULDING)	●	=
TOTAL ALLOWABLE AREA/FLOOR		UL

FIRE-RESISTIVE REQUIREMENTS (TABLE 601)

	RATING (HRS)	TEST
STRUCTURAL FRAME		
COLUMNS	2	EXG
GIRDERS	2	EXG
TRUSSES	2	EXG
BEARING WALLS		
EXTERIOR BEARING WALLS	N/A	EXG
INTERIOR BEARING WALLS	N/A	EXG
NON-BEARING WALLS AND PARTITIONS (IBC Table 602 and Section 602.4.6)		
EXTERIOR	0	EXG
INTERIOR	See Code Plans, RC Plans, & Spec	
FLOOR CONSTRUCTION		
FLOOR/CEILING ASSEMBLY	2	EXG
PRIME & SEC. FLOOR BEAMS, JOISTS	2	EXG
ROOF CONSTRUCTION		
ROOF/CEILING ASSEMBLY	1	EXG
PRIME & SEC. ROOF BEAMS, JOISTS	1	EXG
OTHER		
SHAFTS AND EXIT PASSAGEWAYS (707.3)	SEE CODE PLAN	EXG
EXTERIOR DOORS AND WINDOWS (Table 602 and Table 705.8)	0	EXG

MISCELLANEOUS

	YES	NO
FIRE RESISTIVE CORRIDORS? (IBC Table 1018.1)		●
SMOKE TIGHT CORRIDORS (SMOKE PARTITIONS) (IBC 407.3)		●
INCIDENTAL USE AREA RATING(S) (IBC Table 509) (others in LSC (1)-2 Occupancy)	SEE PLANS	

Code Summary info from 2017 and location plan

ADDITIONAL NOTES

LEVEL ONE HAS EXIT DISCHARGE FROM EXIT STAIR ENCLOSURES. THIS ARRANGEMENT IS FROM ORIGINAL DESIGN IN 1977. CORRIDOR RESEMBLES AND HAS CONSTRUCTION SIMILAR TO EXIT PASSAGEWAYS WITH RATED WALLS, DOOR, AND DAMPERS.

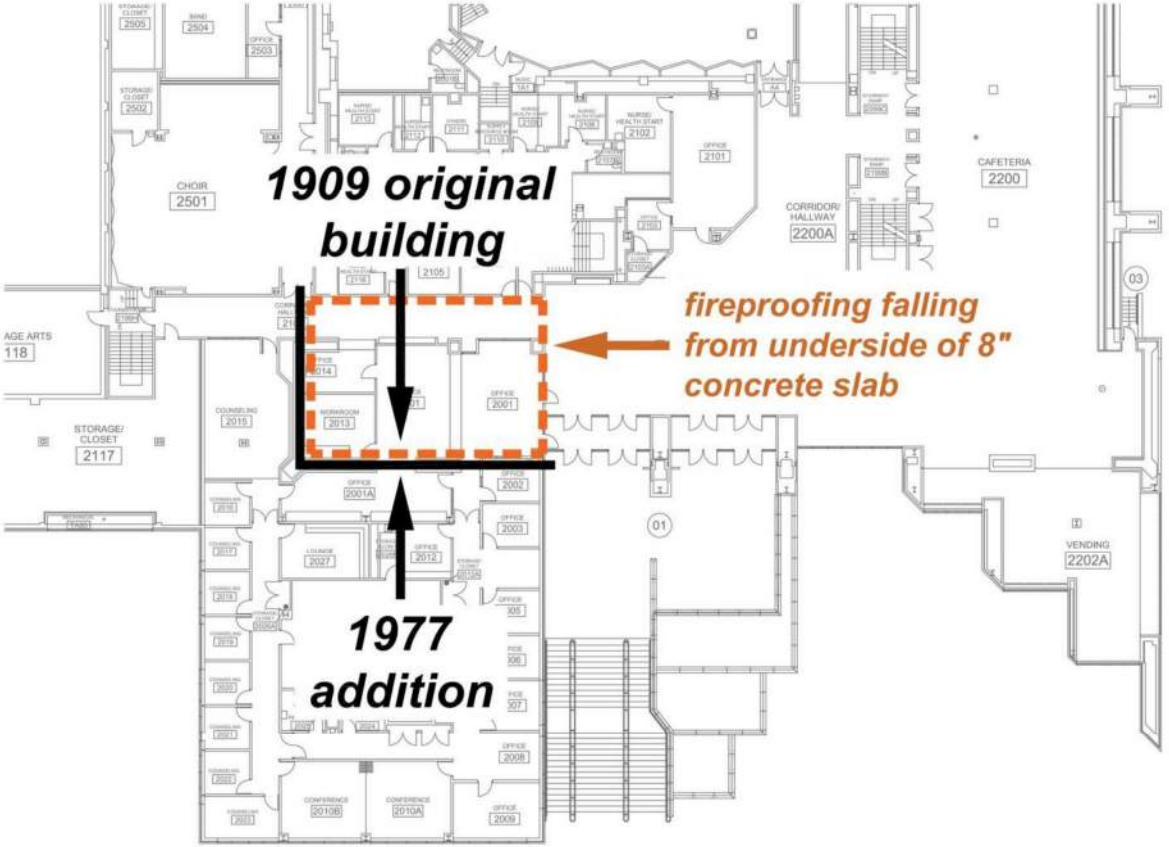
PROJECTS THAT AFFECT WALLS, DOORS, AND DAMPERS SHOULD VERIFY AND UPGRADE AS REQUIRED TO MEET SHOWN REQ'S.

BUILDING HAS HAD NUMEROUS REMODELINGS AND ADDITIONS. PARTS OF BUILDING WAS CONSTRUCTED IN 1920S AND 1950S. A MAJOR REMODELING AND ADDITION IN 1977 UPGRADED THE STRUCTURE. THE PROJECT INCLUDED UPGRADES TO FIRE PROOFING, ETC.

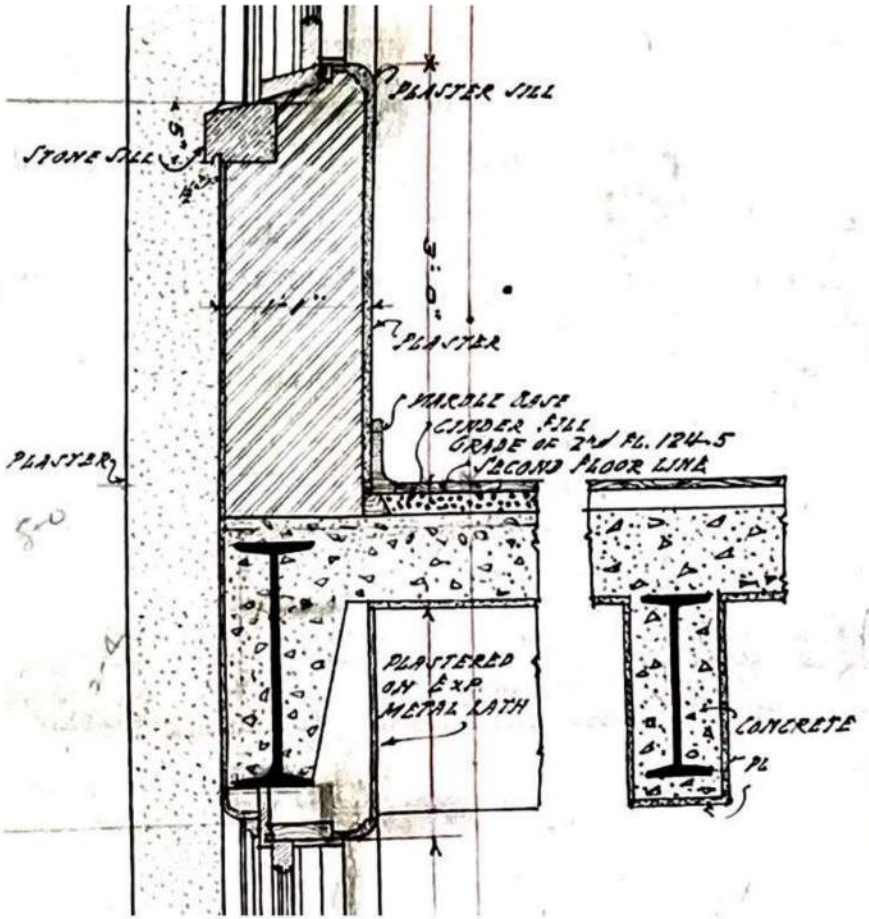
BUILDING WAS CLASSIFIED PER 1973 UBC AS TYPE I (TYPE IA PER 2012 IBC) AND TYPE IV (TYPE II-B PER 2012 IBC). CONSTRUCTION TYPE IS BEING DOWNGRADED TO I-B AS IT ALLOWS 6 STORIES (W/SPRINKLER) AND EXG BUILDING HAS 4 STORIES WITH A PENTHOUSE AND BASEMENT.

LOWERING CONSTRUCTION TYPE ALLOWS FOR FUTURE WORK TO PROVIDE 2 HOUR COLUMNS AND BEAMS RATHER THAN 3 HOUR AS WELL AS 1 HOUR ROOF STRUCTURE INSTEAD OF 1-1/2 HOUR WHILE STILL ALLOWING UNLIMITED AREA.

II-B PORTIONS OF THE EXISTING STRUCTURE MUST MEET APPLICABLE AREA AND HEIGHT REQUIREMENTS IF ADDITIONAL SQUARE FOOTAGE IS ADDED.



Construction drawing for 1909 original building



Slab reinforcement and thickness for 1909 original building

SLAB REINFORCEMENT

REINFORCEMENT OF CORRIDOR FLOOR SLABS TO BE ONE WAY SYSTEM – REINFORCING BARS TO RUN AT RIGHT ANGLES TO BEAMS ACROSS CORRIDOR

FOR ALL SPANS 16 FT OR LESS USE ½" BARS 4½" O.C. CROSS BARS OR TEMPERATURE BARS ABOUT 18" O.C. DEPENDENT UPON WIDTH OF CORRIDOR – ROUGH SLAB TO BE 7" THICK. FOR ALL PANELS WHERE MARKED 2 W ON PLANS USE 2 WAY SYSTEM TO CORRESPOND WITH BALANCE OF FLOOR SLABS.

SMALL UNIT FLOOR SLABS OR THOSE ABOUT 25 x 28' SHALL HAVE A TOTAL ROUGH THICKNESS OF 8" REINFORCEMENT SHORT WAY OF SLAB ½" BARS 4" O.C. REINFORCEMENT LONG WAY OF SLAB ½" BARS 5" O.C. LARGE UNIT FLOOR SLABS OR THOSE ABOUT 25 x 33' SHALL HAVE TOTAL ROUGH THICKNESS OF 9" REINFORCEMENT SHORT WAY OF SLAB ⅝" BARS - 5¼" O.C. REINFORCEMENT LONG WAY OF SLAB ½" BARS 7½" O.C.

ASSEMBLY ROOM AND AUDITORIUM FLOOR SLABS BE 6" THICK IN THE ROUGH SLAB AND TO BE REINFORCED BY ½" BARS 5½" O.C. PARALLEL WITH LARGE GIRDER BEAMS - TEMPERATE BARS ⅜" 18" O.C. REINFORCEMENT FOR ROOF SLABS TO BE AS FOLLOWS - OVER ASSEMBLY ROOM ROUGH SLAB TO BE 4" THICK ⅝" BARS 6½ O.C. PARALLEL WITH TRUSSES AND ⅜" TEMPERATURE BARS 18" O.C.

OVER LARGE PANELS 25 x 32' ROUGH SLAB 7½" THICK ½" BARS 4" O.C. SHORT WAY OF SLAB SPAN ½" BARS 6" O.C. LONG WAY OF SPAN. OVER SMALL PANELS 25 x 28' ROUGH SLAB 6½" THICK ½" BARS [illegible] WAY OF SLAB SPAN. ½" BARS 5½" O.C. LONG WAY OF SPAN OVER CORRIDOR ROUGH SLAB 6" THICK ½" BARS 5½" O.C.

CONCRETE MIXTURE THROUGHOUT TO BE 1 PART CEMENT 1½" PART SAND 3 PARTS ROCK TO PASS THRO. ¾" RING

ICC Fire-Resistance Rating for Reinforced Concrete Floor Slabs

Menu | ICC DIGITAL CODES | Search Digital Codes

722.2.2Concrete floor and roof slabs.

Reinforced and prestressed floors and roofs shall comply with Section 722.2.2.1. Multicourse floors and roofs shall comply with Sections 722.2.2.2 and 722.2.2.3, respectively.

722.2.2.1Reinforced and prestressed floors and roofs.

The minimum thicknesses of reinforced and prestressed concrete floor or roof slabs for *fire-resistance ratings* of 1 hour to 4 hours are shown in Table 722.2.2.1.

Exception: Minimum thickness shall not be required for floors and *ramps* within parking garages constructed in accordance with Sections 406.5 and 406.6.

TABLE 722.2.2.1MINIMUM SLAB THICKNESS (inches)

CONCRETE TYPE	FIRE-RESISTANCE RATING (hours)				
	1	1 1/2	2	3	4
Siliceous	3.5	4.3	5	6.2	7
Carbonate	3.2	4	4.6	5.7	6.6
Sand-lightweight	2.7	3.3	3.8	4.6	5.4
Lightweight	2.5	3.1	3.6	4.4	5.1

For SI: 1 inch = 25.4 mm.