



M-663-00017A

Attachment G5

**Fire Protection Evaluation For
HAZ Assessment of Structural Steel Integral to Fire Boundary**

Rev. No.	Prepared By	Date	Reviewed By	Date
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1.0 Purpose

1.1 The purpose of this document is to evaluate the Heat Affected Zone (HAZ) impact of 10 CFR 50 Appendix R fire barriers containing integral structural steel where either of the following is present:

- Steel is provided with fireproofing on only one barrier side.
- Fireproofing is provided on both steel sides and an unprotected thermal short attachment larger than Unistrut is present.

This evaluation was conducted in accordance with the guidance of NRC Generic Letter 86-10.

2.0 Scope

2.1 This evaluation is applicable to the Rooms identified in Table II.

3.0 References

- 3.1 NRC Generic Letter 86-10, Implementation of Fire Protection Requirements, dated April 24, 1986
- 3.2 10 CFR 50 Appendix R, Fire Protection Program For Nuclear Power Facilities Operating Prior To January 1, 1979
- 3.3 ASTM E-119, Standard Test Methods for Fire Tests of Building Construction and Materials
- 3.4 UL N-711, (A-126-00001), Fire Test Report Of Loaded Restrained Beams Protected By Cementitious Mixture, Dated August 11, 1976
- 3.5 UL N-712, (A-126-00002), Fire Test Report Of Loaded Restrained Beams Protected By Cementitious Mixture, Dated May 13, 1977
- 3.6 A-126, Technical Specification For Cementitious Fireproofing Of Structural Steel For The Standardized Nuclear Unit Power Plant Unit (SNUPPS)
- 3.7 PIR 2002-2287, Structural Steel Fireproofing With Unprotected Attachments
- 3.8 FP-M-012, Rev 0, Structural Steel Fireproofing Thermal Shorts and Omissions Evaluation
- 3.9 CNT-MC-600, Rev. 2, Fireproofing of Structural Steel
- 3.10 E-15000, Electrical Cable And Raceway List, Rev. 65
- 3.11 A-126, Cementitious Fireproofing of Structural Steel, Rev. 7
- 3.12 Updated Safety Analysis Report (USAR) Section 9.5.1.2.2.3.a, Rev. 19

- 3.13 Change Package 012323, M-663-00017A Revision to incorporate Structural Steel Fireproofing Evaluation and Analysis, Rev. 0
- 3.14 IEEE 383, Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations

4.0 Assumptions

- 4.1 It is assumed that fireproofing material used to protect building steel is applied to a thickness as required by CNT-MC-600. This is an acceptable assumption based on a review of the Quality Control documentation maintained during initial fireproofing installation activities and subsequent inspections during ongoing plant repairs witnessed by Fire Protection personnel and inspections performed during the this evaluation process.

5.0 Assessment of Condition to Design Requirements

5.1 Requirements

USAR Section 9.5.1.2.2.3.a identifies that the design, construction, test method, and acceptance criteria for fire rated barriers is per applicable sections (determined by construction type) of ASTM E-119, UL standards, and state building codes.

5.2 Assessment

Fire testing does not directly bound the use of protected steel as part of a fire barrier assembly. Such a configuration presents the potential to transmit detrimental temperatures from the fire side through the steel element of the fire barrier to insitu combustibles and/or post-fire safe shutdown (PFSSD) circuits located in close proximity to the unexposed side of the steel fire barrier segment. Attachment G1, Section 7.1, evaluated that steel with fireproofing on both barrier sides containing unprotected thermal short attachments no larger than Unistrut in size and mass provides an equivalent 3-hour F and T rated configuration. Therefore, HAZ review, similar to that discussed in Section 7.2.3 of M-663-00017A for non-T rated penetration seals, is only necessary for structural steel integral to a fire barrier assembly where either of the following is present:

- Steel is provided with fireproofing on only one barrier side.
- Fireproofing is provided on both steel sides and an unprotected thermal short attachment larger than Unistrut is present.

6.0 Methodology

Where a HAZ review was necessary for steel that is integral to a fire barrier assembly, a review similar to M-663-00017A Section 7.2.3 was conducted with the exception that a review distance of two feet from the unexposed steel surface was utilized. This is an acceptable distance considering the air gap temperature drop discussion provided in M-663-00017A Section 7.2.3. This two-foot distance from the structural steel member on the unexposed side is the area that encompasses the HAZ. Assuming an ASTM E-119 three-hour fire duration, a temperature of either 1925°F or 1100°F was assigned to the unexposed barrier side based on the fireproofing configuration provided, including consideration for unprotected thermal short attachments larger than Unistrut.

A 1925°F temperature was utilized for the following configurations:

- Fireproofing is single sided with an unprotected attachment on either barrier side.
- Fireproofing is provided on both barrier sides and an unprotected attachment larger than Unistrut is located on the fire side such that it is in proximity (within two feet) to an unexposed side attachment that supports a raceway within the HAZ.

An unexposed side temperature assignment of 1925°F for the above configurations is a conservative approach, as it utilizes the maximum temperature attained during ASTM E-119 fire testing, with no credit given for concrete barrier heat sink or recognition that the hot spot created by the unprotected thermal short on the exposed barrier side will be localized.

An 1100°F temperature was utilized for the following configurations:

- Fireproofing is single sided and no unprotected attachments larger than Unistrut are present on either barrier side.
- Fireproofing is provided on both barrier sides and an unprotected attachment larger than Unistrut is not in close proximity (within two feet) of an unprotected attachment on the opposing barrier side.

An unexposed side temperature assignment of 1100°F for the above configurations is an acceptable approach based on subtraction of ASTM E-119 furnace temperature (1925°F) from Reference 3.4 and 3.5 thermocouple data (1,100°F). This yields an approximate 825°F temperature drop across the exposed fireproofing during ASTM E-119 fire endurance testing.

For PFSSD circuits and IEEE-383 cable, an insult temperature limitation of 700°F was utilized. A temperature limitation of 400°F was utilized for other Class A combustibles. These temperature limitations are consistent with M-663-00017A, Section 7.2.3.

Figure 6-1 reflects the review process utilized to assess HAZ impact.

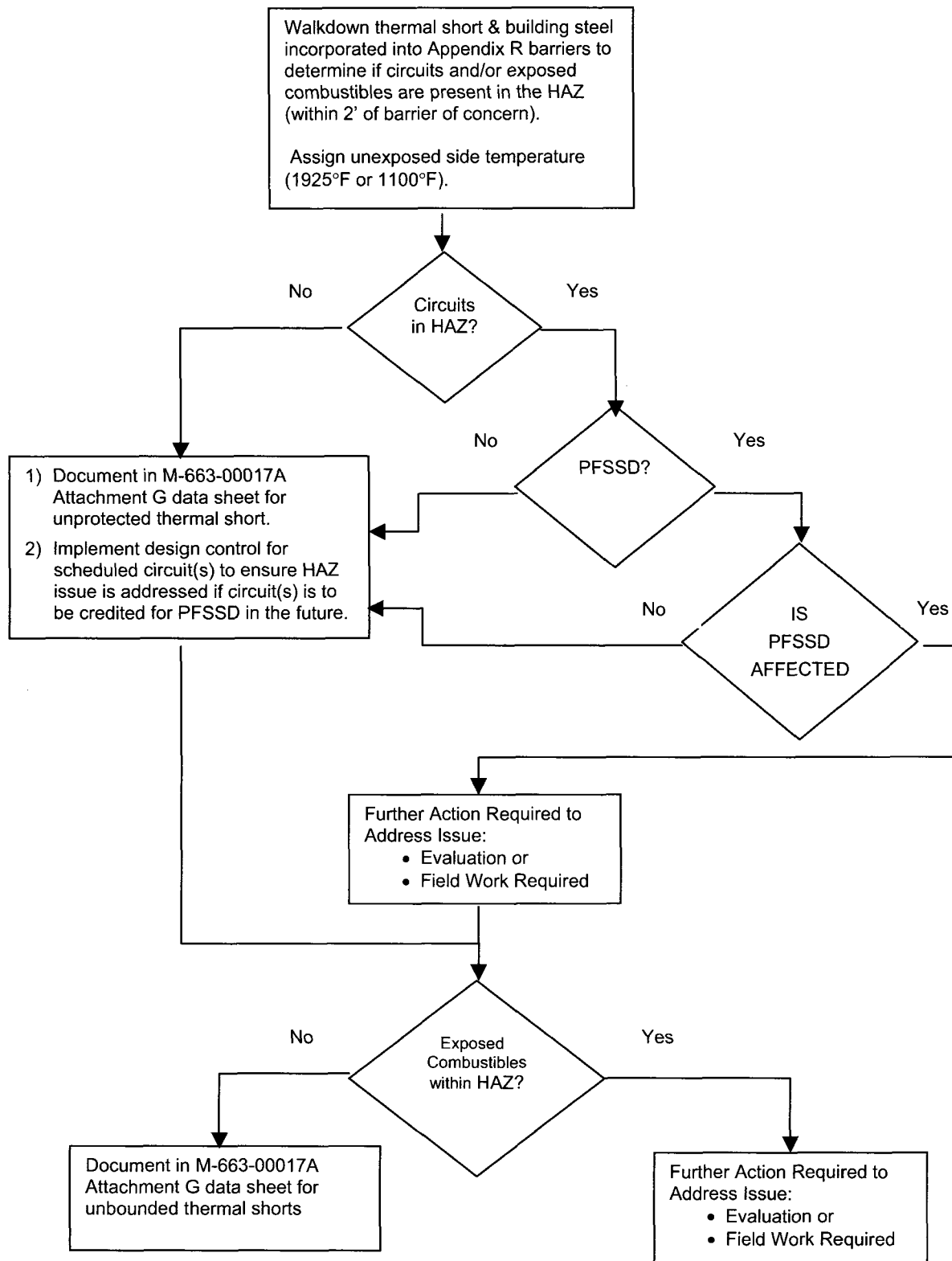


Figure 6-1, Heat Affected Zone Review Process

7.0 Evaluation

- 7.1 Where structural steel is incorporated into a 10 CFR 50 Appendix R barrier, one-sided protection does not satisfy cold side temperatures, when considering an ASTM E-119 3-hour design basis fire. The one-sided protection configuration will not allow flame passage through the barrier. However, it could result in temperatures up to 1100°F or 1925°F on the unexposed steel surface of the barrier. Each room was reviewed for HAZ impact in effort to document each raceway and insitu combustibles within two (2) feet of the barrier segment containing steel protected with cementitious fireproofing to ensure PFFSD is not impacted. In addition, two-side protection with unprotected attachments can also produce localized high temperatures. Therefore, protected steel with unprotected attachments was also reviewed for HAZ impact at barriers separating fire areas. No credit was given to area suppression systems, in effort to achieve a level of conservatism in the analysis process.

One sided structural steel fireproofing is determined to be "F" rated only and does not satisfy "T" rating requirements when exposed to a design basis fire. Specification A-126, Section 7.1 states in part, "stair towers and elevator construction shall be protected from external hazards", thus in these cases structural steel fireproofing was not required on both sides of the barrier. Where these barriers provide 10 CFR 50 Appendix R separation, this configuration does not satisfy maximum cold side temperature limitations required by the WCNOF Fire Protection Program (250°F plus ambient for fire barrier construction and 325°F plus ambient for fire barrier penetration seals). Therefore, each location where one-sided fireproofing or significant attachments are present was evaluated for HAZ impact to ensure PFSSD is not affected. As such, any raceway/circuit or component within 2 feet of the one-sided protected barrier steel and/or two-sided protected steel with large thermal shorts will be considered within the HAZ and will be evaluated for PFSSD impact utilizing the Figure 6-1 methodology. Thermal shorts attached to stairwell steel will not impact the structural integrity of the steel or induce steel failure due to the corbel support afforded by the under supporting walls.

Table II defines the review scope and identifies the communicating rooms and fire areas along with the raceways that are potentially subject to thermal insult, based on proximity to the barriers evaluated. Each room and raceway (where applicable) is dispositioned in the "Comments/Disposition" Section of Table II, with reference provided to the appropriate evaluation paragraph section below. Area walkdown reviews revealed that no insitu combustibles (other than IEEE-383 cable) were located within the HAZ for each of the Table II areas.

Appendix G5A documents the result of the Fire Protection reviews and assessments for each room and area listed in Table II, below. The data sheets contain relevant information for each location reviewed for HAZ impact.

TABLE II
HAZ Barrier Review

Fire Area	Room	Bldg	Elev.	Room Description:	Communicating Rooms/ Fire Areas		Air Gap ¹ (Temp°F) (Inches)	Comments/Disposition:
A-1	1201	Aux	1988-0	Vestibule	1201 A-1	1119 A-5	1925°F N/A	1). No HAZ review required, no items in close proximity.
A-3	1116	Aux	1974-0	Boric Acid Tank Room B	1116 A-3	1301 A-8	Bounded N/A	1.) No HAZ review required, embedded steel (Concrete) on backside.
	1117			Boric Acid Tank Room A	1117 A-3	1320 A-8	Bounded N/A	1.) No HAZ review required, embedded steel (Concrete) on backside.
	1407	Aux	2026-0	Boric Acid Batching Tank Area	1407 A-3	1408 A-16	Bounded N/A	1.) No HAZ review required, embedded steel (Concrete) on backside.
A-5	1119	Aux	1988-0	Aux. Stair A-1	1119 A-5	1201 A-1	1100°F N/A	1). No HAZ review required, no items in close proximity.
		Aux	2000-0			1321 A-8	1925°F N/A	1). No HAZ review required, no items in close proximity.
						Aux	2047-6	1502 A-20
		4" (R) ¹	1). Conduit 5U4B8R, See Section 7.1.3, NO Set Route Control Required					
		4" (R) ¹	2). Conduit 6U1214, See Section 7.1.3, NO Set Route Control Required					
		4" (R) ¹	3). Conduit 5C1014, See Section 7.1.3, NO Set Route Control Required					
A-6	1127	Aux	1974-0	Aux. Stair A-2	1127 A-6	1120 A-1	1925°F N/A	1). No HAZ review required, no items in close proximity.
		Aux	2000-0			1320 A-8	1925°F-C 1100°F-R	Items 1 and 2 are NOT PFSSD. Item 3 IS PFSSD:
						¾" (C) ¹	1). Conduits 1J1E1D, Set Route Control Required See Section 7.1.2	
						1½" (C) ¹	2). Conduit 1U1F2G, Set Route Control Required See Section 7.1.2	
						4" (C) ¹	3). Conduit 4U3D5H, Set Route Control Required See Section 7.1.6	
A-8	1320	Aux	2000-0	Aux. Corridor No. 4	1320 A-8	1127 A-6	1100°F-R 14½" (R) ¹	Item 1 is NOT PFSSD: 1). Conduit 4J3C1E, See Section 7.1.3, NO Set Route Control Required
						1321	Aux	2000-0
	A-26	1405	Aux	2026-0	Chemical Storage Area	1405 A-26	1401 A-16	Bounded N/A

Fire Area	Room	Bldg	Elev.	Room Description:	Communicating Rooms/ Fire Areas		Air Gap ¹	Comments/Disposition:
							(Temp°F) (Inches)	
C-2	3106	Cntrl	1974-0	Electrical Chase	3106 C-2	3101 C-1	1100°F-R	Items 1, 2 & 3 are <u>NOT</u> PFSSD:
							6" (C) ¹ 3" (R) ¹	1). Cable Tray 5J1A90, See Section 7.1.3, NO Set Route Control Required
							6" (C) ¹ 3" (R) ¹	2). Cable Tray 5U4A90, See Section 7.1.3, NO Set Route Control Required
							6" (C) ¹ 3" (R) ¹	3). Cable Tray 5U1B90, See Section 7.1.3, NO Set Route Control Required
C-3	3105	Cntrl	1974-0	Electrical Chase	3105 C-3	3101 C-1	1100°F-R	Items 1 & 2 are <u>NOT</u> PFSSD:
							9" (C) ¹ 7" (R) ¹	1). Cable Tray 6U1B90, See Section 7.1.3, NO Set Route Control Required
							6" (C) ¹ 2" (R) ¹	2). Cable Tray 6U3G90, See Section 7.1.3, NO Set Route Control Required
C-6	3201	Cntrl	1984-0	Control Building, Stair C-1	3201 C-6	0SAC C-6	1100°F-R	1). N/A lighting conduit, Same Fire Area, No HAZ review required, See Section 7.1.1, no items in close proximity.
		N/A						
		Cntrl	2000-0		3201 C-6	3302 C-10	1925°F-R	1). N/A lighting and communications conduit No HAZ review required, See Section 7.1.1, no items in close proximity.
		N/A						
		Cntrl	2016-0		3201 C-6	3403 C-15	1925°F-R	Items 1 is <u>NOT</u> PFSSD and Item 2 <u>IS</u> PFSSD:
							23" (C) ¹ 15" (R) ¹	1). Cable Tray 6J8D22, See Section 7.1.3, NO Set Route Control Required
							23" (C) ¹ 3" (R) ¹	2). Cable Tray 6U3E21, Set Route Control Required See Section 7.1.5
		Cntrl	2032-0		3201 C-6	3501 C-21	1100°F-C	1). Lighting conduit, Same Fire Area, No HAZ review required, See Section 7.1.1, no items in close proximity.
		N/A						
		Cntrl	2047-6		3201 C-6	3605 C-17	1100°F-R	Item 1 is <u>NOT</u> PFSSD:
							14" (R) ¹	1). Conduit 6J1T1A, See Section 7.1.3, NO Set Route Control Required
							1925°F-C	Items 2 & 3 are <u>NOT</u> PFSSD:
							21" (C) ¹ 7" (C) ¹	2). Conduit 4J3006, Set Route Control Required See Section 7.1.2 3). Conduit 4J3007, Set Route Control Required See Section 7.1.2
Cntrl	2073-0	3201 C-6	3801 C-22	1100°F-R	1). No HAZ review required, items noted were Lighting and Detection conduits no other items in close proximity, See Section 7.1.1.			
				N/A				
C-8	3229	Cntrl	1984-0	Electrical Chase	3229 C-8	3204 C-6	1100°F-R	Item 1 is <u>NOT</u> PFSSD:
							7" (R) ¹	1). Cable Tray 6U3G90, See Section 7.1.3, NO Set Route Control Required

Fire Area	Room	Bldg	Elev.	Room Description:	Communicating Rooms/ Fire Areas		Air Gap ¹ (Temp°F) (Inches)	Comments/Disposition:
C-9	3301	Cntrl	2000-0	ESF Switchgear Room No. 1	3301 C-9	3306 C-12	1100°F-R	Item 1 IS PFSSD & Item 2 is NOT PFSSD:
							6" (C) ¹ 4" (R) ¹	1). Cable Tray 5C8Q81, See Section 7.1.4, NO Set Route Control Required
							6" (C) ¹ 2" (R) ¹	2). Cable Tray 5C8A81, See Section 7.1.3, NO Set Route Control Required
C-11	3305	Cntrl	2000-0	Electrical Chase	3305 C-11	3302 C-10	1100°F-R	Items 1 & 2 are NOT PFSSD:
							5" (R) ¹	1). Cable Trays 6J1S70, See Section 7.1.3, NO Set Route Control Required
							23" (R) ¹	2). Cable Trays 6U3H70, See Section 7.1.3, NO Set Route Control Required
C-13	3415	Cntrl	2016-0	Access Ctrl & Elec Equip A/C Units No. 1	3415 C-13	3416 C-14	1100°F-C	Items 1 & 2 are NOT PFSSD:
							1½" (C) ¹	1). Conduit 4U3061, Set Route Control Required See Section 7.1.2
							1925°F-C	Item 2 is NOT PFSSD:
C-15	3403	Cntrl	2016-0	Non-Vital Swgr & Xfmr Rm No. 1	3403 C-15	3404 C-15	Bounded	1). No HAZ Issue, Lighting Conduit Only, See Room 3201-2016, No HAZ review required
							N/A	
	3404	Cntrl	2016-0	Switchboard Rm No. 4	3404 C-15	3403 C-15	Bounded	1). Same Fire Area, No HAZ review required
							N/A	
	3405	Cntrl	2016-0	Battery Rm No. 4	3405 C-15	3406 C-35	Bounded	1). Same Fire Area, No HAZ review required
C-16	3409	Cntrl	2016-0	Non-Vital Swgr & Xfmr Rm No. 2	3409 C-16	3401 C-35	1100°F-R	1). No HAZ review required, no items in close proximity.
							N/A	
C-17	3418	Cntrl	2016-0	Electrical Chase	3418 C17	3410 C-15	1100°F-R	Items 1 and 2 ARE PFSSD and Item 3 is NOT PFSSD:
							8" (R) ¹	1). Cable Tray 6C8A60, See Section 7.1.4, NO Set Route Control Required
							8" (R) ¹	2). Cable Tray 6U3H60 See Section 7.1.4, NO Set Route Control Required
							8" (R) ¹	3). Cable Tray 6J1A60, See Section 7.1.3, NO Set Route Control Required
C-18	3419	Cntrl	2016-0	Electrical Chase	3419 C-18	3414 C-16	1100°F-R	Item 1 is NOT PFSSD and Item 2 IS PFSSD:
							8" (C) ¹ 3" (R) ¹	1). Cable Tray 5C8A70, See Section 7.1.3, NO Set Route Control Required
							8" (C) ¹ 3" (R) ¹	2). Cable Tray 5C8Q70, See Section 7.1.4, NO Set Route Control Required
C-21	3501	Cntrl	2032-0	Lower Cable Spreading Room	3501 C-21	3505 C-23	1100°F-R	1). See Room 3505, Item 1. No HAZ review required, no items in close proximity.
							N/A	

Fire Area	Room	Bldg	Elev.	Room Description:	Communicating Rooms/ Fire Areas		Air Gap ¹ (Temp°F) (Inches)	Comments/Disposition:
C-22	3801	Cntrl	2073-0	Upper Cable Spreading Room	3801	3201	1100°F-R	1). No HAZ Issue, Gatrionics Conduit Only, See Section 7.1.1
					C-22	C-6	N/A	
C-23	3505	Cntrl	2032-0	Electrical Chase	3505	3501	1100°F-R	Item 1 is NOT PFSSD: 1). Cable Tray 6J1A56, See Section 7.1.3, NO Set Route Control Required
							7" (R) ¹	
C-27	3605	Cntrl	2047-6	Equipment Cabinet Area	3605	3617	N/A	1). See Room 3617, Duplicate HAZ
C-30	3617	Cntrl	2047-6	Electrical Chase	3617	3605	1100°F-R	Items 1, 2 & 3 are NOT PFSSD: 1). Conduit 4J1032, Set Route Control Required See Section 7.1.2 2). Cable Tray 6J1A40, See Section 7.1.3, NO Set Route Control Required 3). Cable Tray 6C8A40, See Section 7.1.3, NO Set Route Control Required
							18" (C) ¹	
							½" (R) ¹	
							8" (R) ¹	
C-35	3406	Cntrl	2016-0	Corridor No. 2	3406	3405	1100°F-R	1). Grid Plug Mounting, No HAZ review required. No HAZ Issues
					C-35	C-15	N/A	
	3412	Cntrl	2016-0	Emergency Shower & Eyewash Area	3412	3101	1100°F-R	Items 1, 2 and 3 are NOT PFSSD: 1). Conduit 4U1E2N, Set Route Control Required See Section 7.1.2 2). Conduit to JB 4U3045, Set Route Control Required See Section 7.1.2 3). Conduit to JB 4U3046, Set Route Control Required See Section 7.1.2
							2" (C) ¹	
							2" (C) ¹	
							2" (C) ¹	
	3412	Cntrl	2016-0	Emergency Shower & Eyewash Area	3412	3411	1100°F-R	Item 1 is NOT PFSSD: 1). Conduit 4U1E2N, See Section 7.1.3, NO Set Route Control Required
					C-35	C-15	8" (C) ¹ 2" (R) ¹	
C-36	C36	Cntrl	2000-0	Cable Chase @ CA-C6, 2000-0 to 2016-0,	C36	3302	1100°F-R	1). Conduits in close proximity enter adjacent FA, No HAZ Issue
					C-36	C-10	N/A	
C-37	C37	Cntrl	2000-0	Cable Chase @ CA-C3, 2000-0 to 2016-0	Elec. Chase	3301	Bounded	Item 1 is NOT PFSSD: 1). Conduit 2U1034, See Section 7.1.3, NO Set Route Control Required Unistrut only, no thermal impact
							1½" (R) ¹	
F-4	6203	Fuel	2026-0	Air Handling Equipment Room	6203	6202	1925°F-C	Item 1 is NOT PFSSD: 1). Conduit 6J6014, Assumed failed, see Room 6202
					F-4	F-5	N/A	
F-5	6202	Fuel	2026-0	Electrical Equipment Room	6202	6203	1925°F-C	Item 1 is NOT PFSSD: 1). Conduit 6J6014, Set Route Control Required See Section 7.1.2
					F-5	F-4	14" (C) ¹	

Table Notes:

1. To determine acceptable air gap distance, conductive pathways, estimated exposure temperature is based on existing steel protection configuration and whether the exposure is C-Conduction or R-Radiant. In each case, the worse case Conductive and Radiant distance is used, either cumulative or a single thermal pathway exposure were reviewed as applicable.

- 7.1.1 Unscheduled conduit such as communication, fire detection and general plant lighting are not considered relevant to PFSSD and are not evaluated for PFSSD impact. Cabling contained within conduit cannot support combustion, propagate flame or hot gases. Therefore, fire propagation is not credible.
- 7.1.2 Scheduled Non-PFSSD conduits referring to this section are located within the HAZ and cable within the conduits have the potential to sustain damage from heat transmission through the barrier segment fabricated from building steel protected with cementitious fireproofing, as postulated temperature exposure exceeds 700°F for the respective raceway. However, fire propagation will not occur, as cabling contained within conduit cannot support combustion, propagate flame or hot gases; therefore, fire propagation is not credible. Future use of these raceways shall be restricted or may require field modification if they are credited for PFSSD in the future. E-15000 set-route control is required for these raceways to ensure future raceway use continue to satisfy the conclusions of this evaluation. Referenced E-15000 set-route changes were completed by change package 012323.
- 7.1.3 Scheduled Non-PFSSD conduit and cable tray raceways referring to this section have been determined to have sufficient distance from the point of thermal insult and will not be thermally affected by conductive or radiant heat on the unexposed barrier side. This determination is supported by use of the air gap methodology described in M-663-00017A, Section 7.2.3, which credits air space to reduce exposure temperatures to cabling and combustibles within or adjacent to the HAZ. Each HAZ issue was reviewed to ensure combustibles on the unexposed side of the barrier would not be affected by radiant energy and/or auto-ignition. Air gaps and thermal short distances were measured to permit use of the 222°F temperature drop rule for every 1" of air gap. After considering the air gap distance, each of the HAZ issues would have to meet acceptable cable exposures of <700°F. Maintaining exposure temperatures below this limitation will ensure that fire propagation cannot occur, and the raceway will not be affected through conduction or radiant heat.
- 7.1.4 PFSSD credited conduit or cable tray raceways referring to this section have been determined to have sufficient distance from the point of thermal insult and will not be thermally affected by conductive or radiant heat on the unexposed barrier side. This determination is supported by use of the air gap methodology described in M-663-00017A, Section 7.2.3, which credits air space to reduce exposure temperatures to cabling and combustibles within or adjacent to the HAZ. Each HAZ issue was reviewed to ensure combustibles on the unexposed side of the barrier would not be affected by radiant energy and/or auto-ignition. Air gaps and thermal short distances were measured to permit use of the 222°F temperature drop rule for every 1" of air gap. After considering the air gap distance, each of the HAZ issues would have to meet acceptable cable exposures of <700°F. Maintaining exposure temperatures below this limitation will ensure that fire propagation cannot occur, and the raceway will not be affected through conduction or radiant heat.

- 7.1.5 PFSSD credited cable tray 6U3E21, located in Room 3403, is a 12" X 4" open cable tray in close proximity to a 6" x .375 thick I beam that is attached to the building steel. The building steel separates 10 CFR 50 Appendix R fire areas and is protected on the cable tray side with cementitious fireproofing (one-sided protection). The exposed side of the barrier is Room 3201, North Control Building Stairwell.

The cable tray is 23" away from the postulated exposure temperature of 1925°F as determined by the steel configuration and one-side fireproofing. Conservatively applying the M-663-00017A, Table 7.2.3-2B review distance for a 12" diameter pipe, in relation to the 6" beam, reveals that at 24" the thermal exposure would be approximately 1209°F. Application of the air gap methodology of 222°F drop per 1" air gap reveals an approximate temperature of 543°F for the cables within the tray of concern. This is less than the 700°F insult temperature limitation for the IEEE-383 cable. However, this raceway requires E-15000 set route control to ensure future cable additions consider impact to this evaluation. This E-15000 set-route change was completed by change package 012323.

- 7.1.6 PFSSD credited conduit 4U3D5H, located in Room 1320 is a 3" rigid steel conduit supported by a 4" tube steel and Unistrut design mounted to the vertical column separating fire areas. The conduit contains PFSSD cabling associated with BIT injection. The building steel separates 10 CFR 50 Appendix R fire areas and is protected on the conduit side with cementitious fireproofing (one-sided protection). The exposed side of the barrier is Room 1127, North Auxiliary Building Stairwell.

The conduit is 4" away and mounted directly on to the conductive path to the postulated exposure temperature of 1925°F, as determined by the steel configuration and one-side fireproofing. The thermal path is conductive and thermal failure is expected due to the close proximity of the conduit to the exposure temperature of 1925°F. A fire in A-6 does not require BIT injection. Seal injection is available with no inventory loss through letdown. Therefore, PFSSD capability is not affected if a fire would occur in Fire Area A-6. However, this raceway requires E-15000 set route control to ensure future cable additions consider impact to this evaluation. This E-15000 set-route change was completed by change package 012323.

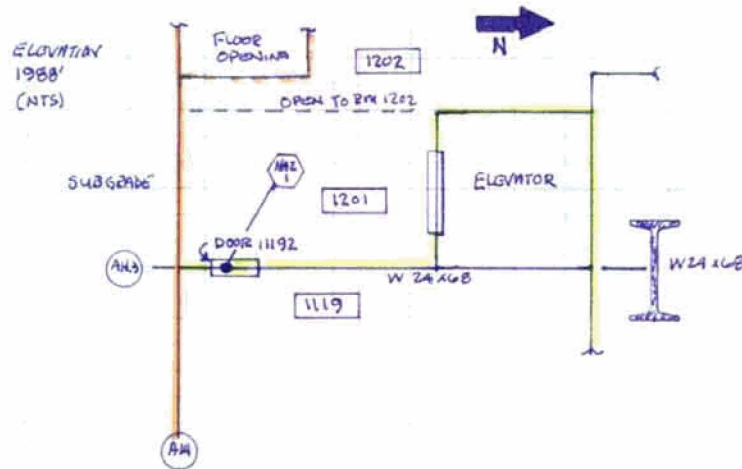
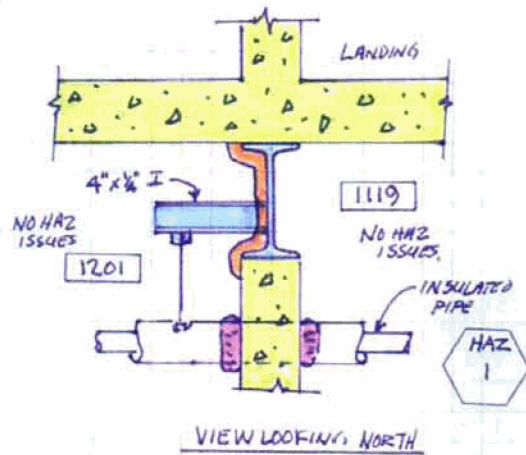
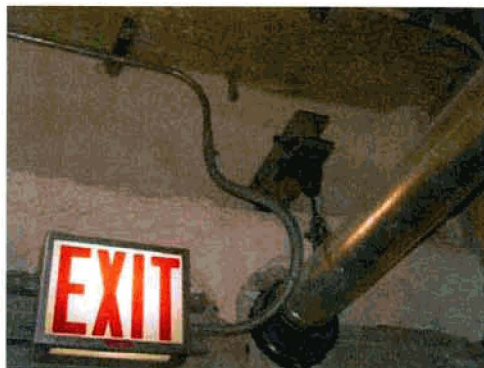
7.2 Post Fire Safe Shutdown Impact

There is no impact to PFSSD capability, as the evaluation demonstrates that steel integral to 10 CFR 50 Appendix R fire barriers will prevent fire propagation. The comprehensive walkdown review for each of the areas revealed that no exposed insitu combustibles or PFSSD capability is negatively affected by the steel fire barrier segments.

8.0 Conclusions

Based on physical plant walk downs, reviews and assessments performed by Fire Protection the room and areas identified in Table II above, contain protected structural steel that separate 10 CFR 50 Appendix R fire areas. Each of these barriers vary in configuration, some with one-sided protection and others with two-sided protection with unprotected attachments that could induce heat through the barrier beyond WCNOG cold side temperature limitations, if an ASTM E-119 three hour fire were to occur in the adjacent fire area. Therefore, each raceway that was located within the HAZ was reviewed for potential impact to PFSSD. All raceways listed in Table II above have been determined to be acceptable and do not affect PFSSD considering the protective coating or thermal short configurations that are present.

It is reasonable to conclude that the building steel integral to a fire barrier will satisfy regulatory expectations and commitments as well as WCNOG Fire Protection Program requirements, to prevent fire propagation and unacceptable thermal insult to raceways on the unexposed side of the fire barrier.

Structural Steel Fireproofing Data**Appendix G5A****Room-Elevation:** 1201-1988**Building:** Auxiliary**Fire Area:** A-01**Description:** Vestibule**Room Sketch:****HAZ #1 Sketch****HAZ #1 Photo**

Structural Steel Fireproofing Data

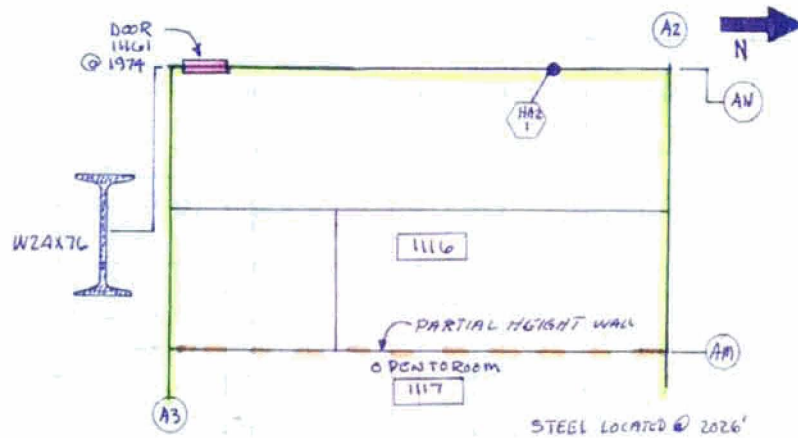
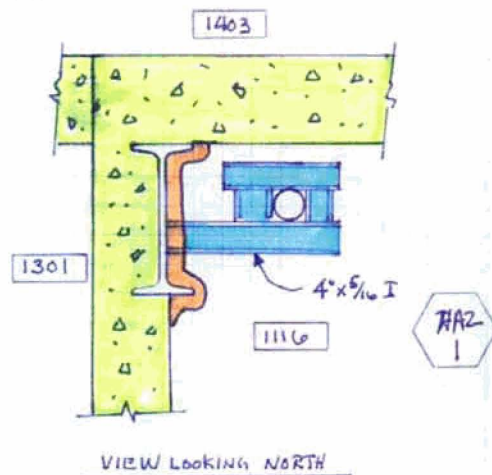
Appendix G5A

Room-Elevation: 1116-1974

Building: Auxiliary

Fire Area: A-03

Description: Boric Acid Tank Room B

Room Sketch:**HAZ #1 Sketch****HAZ #1 Photo**

Structural Steel Fireproofing Data

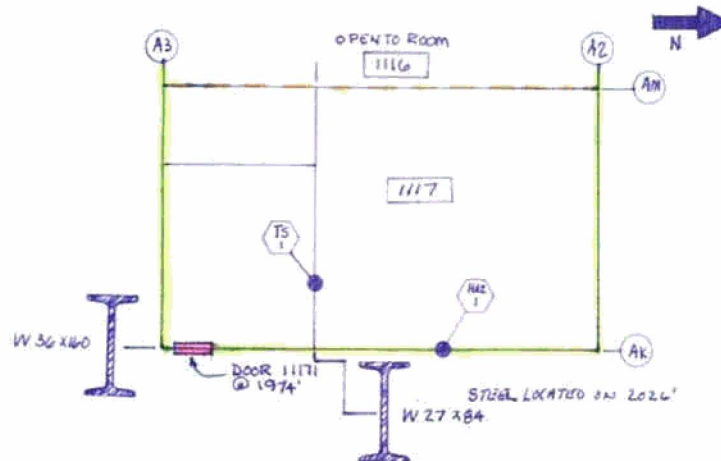
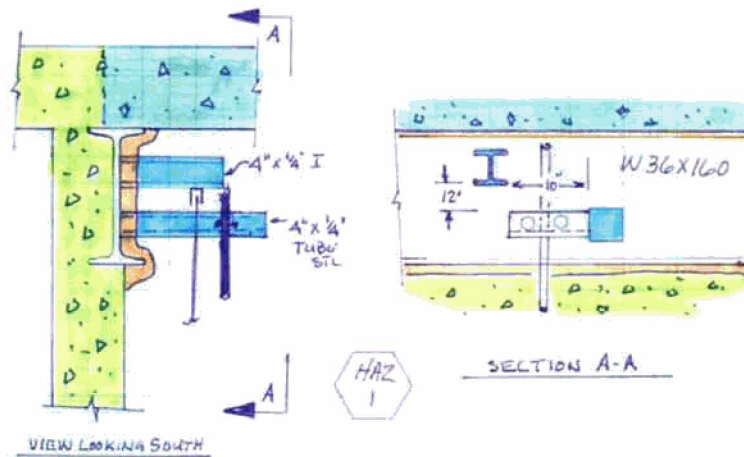
Appendix G5A

Room-Elevation: 1117-1974

Building: Auxiliary

Fire Area: A-03

Description: Boric Acid Tank Room A

Room Sketch:**HAZ #1 Sketch****HAZ #1 Photo**

Structural Steel Fireproofing Data

Appendix G5A

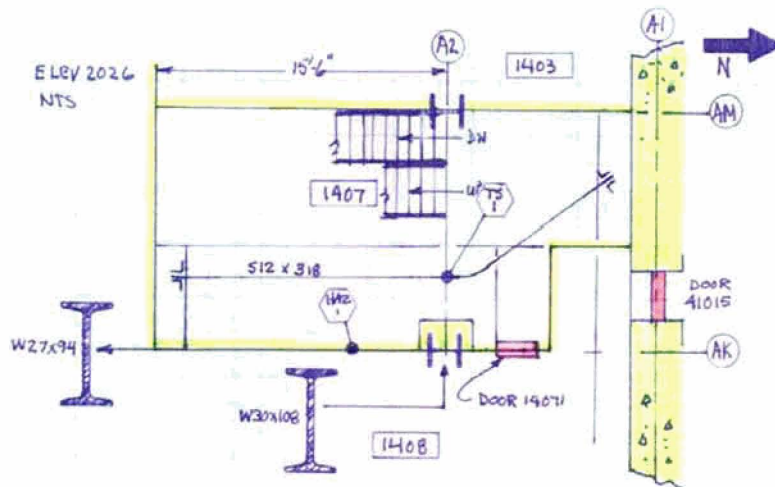
Room-Elevation: 1407-2026

Building: Auxiliary

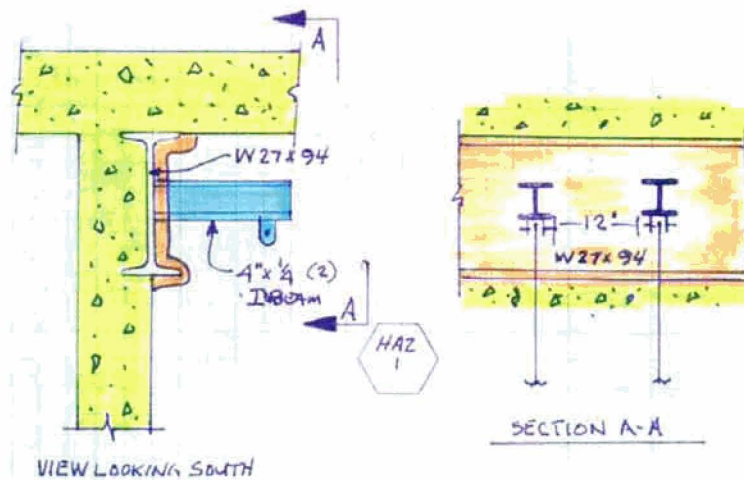
Fire Area: A-03

Description: Boric Acid Batching Tank Area

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

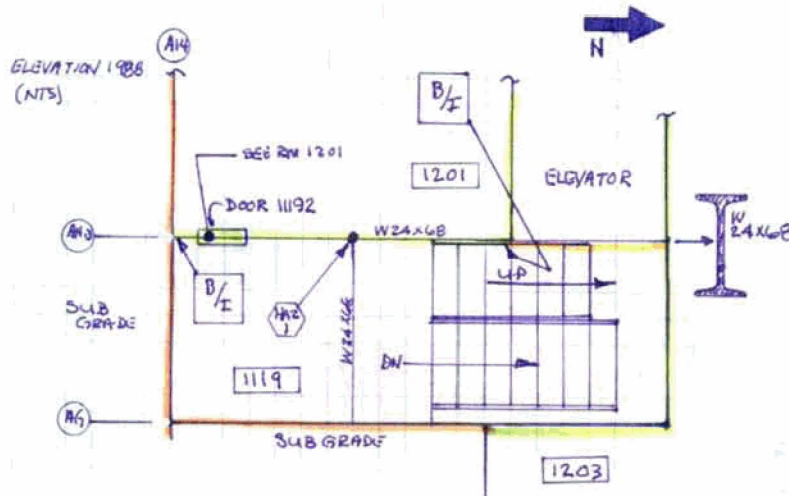
Room-Elevation: 1119-1988

Building: Auxiliary

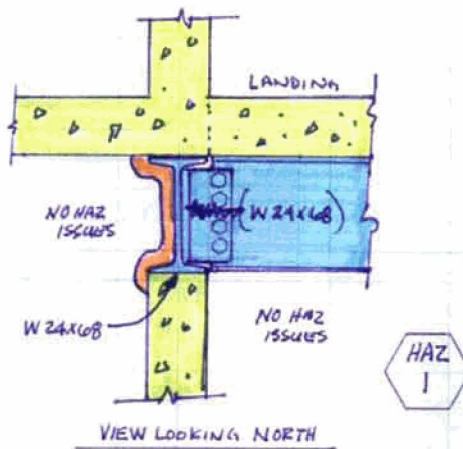
Fire Area: A-05

Description: Aux. Stair A-1 & A-1A

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

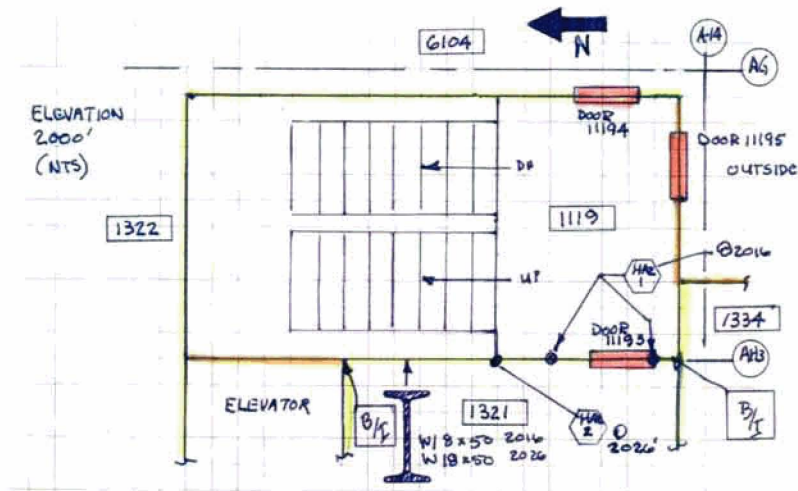
Room-Elevation: 1119-2000

Building: Auxiliary

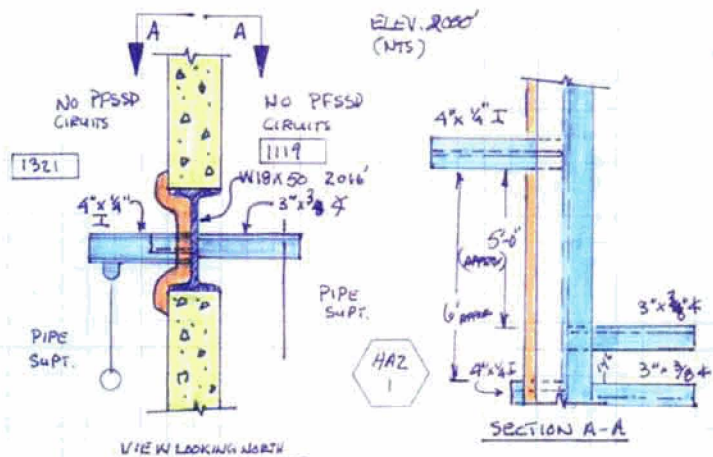
Fire Area: A-05

Description: Aux. Stair A-1 & A-1A

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

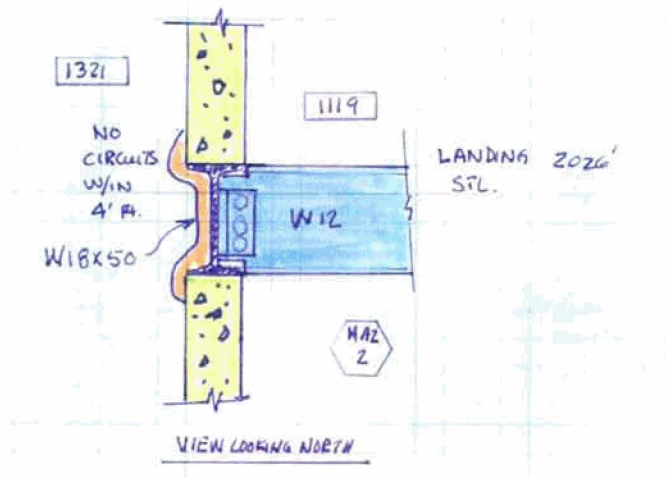
No photo required.

Structural Steel Fireproofing Data

Appendix G5A

1119-2000

HAZ #2 Sketch



HAZ #2 Photo



Structural Steel Fireproofing Data

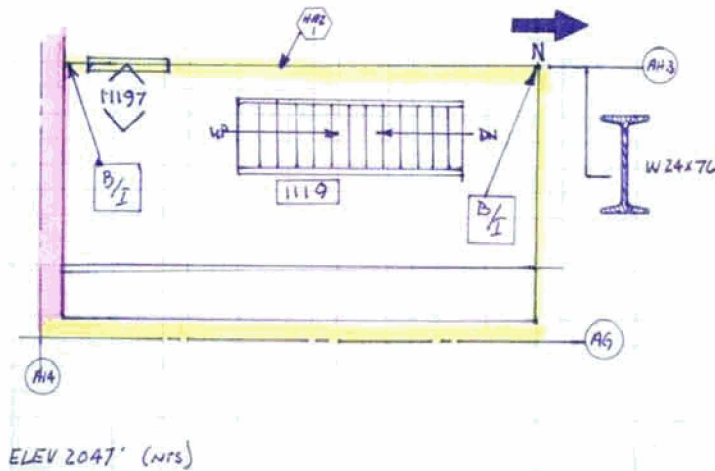
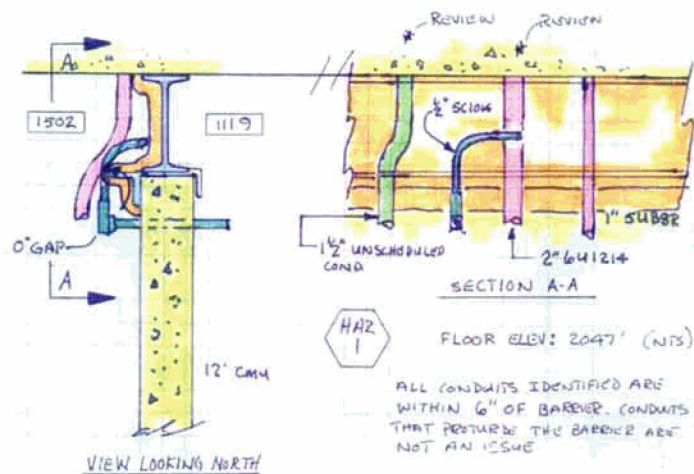
Appendix G5A

Room-Elevation: 1119-2047

Building: Auxiliary

Fire Area: A-05

Description: Aux. Stair A-1 & A-1A

Room Sketch:**HAZ #1 Sketch****HAZ #1 Photo**

Structural Steel Fireproofing Data

Appendix G5A

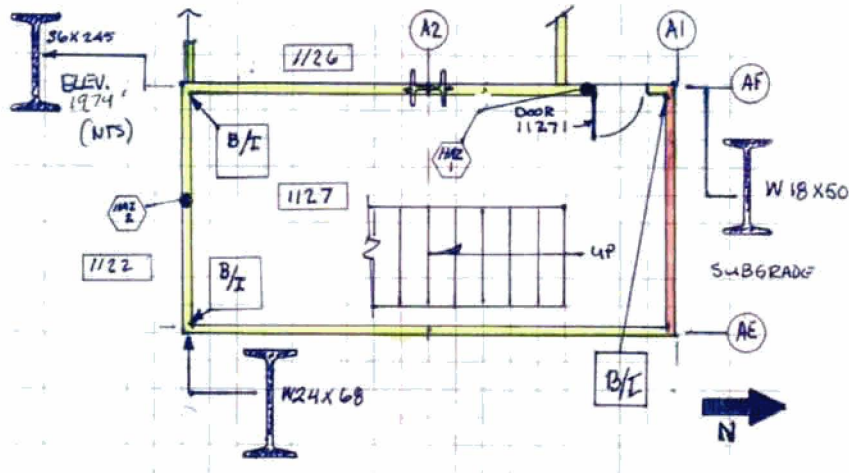
Room-Elevation: 1127-1974

Building: Auxiliary

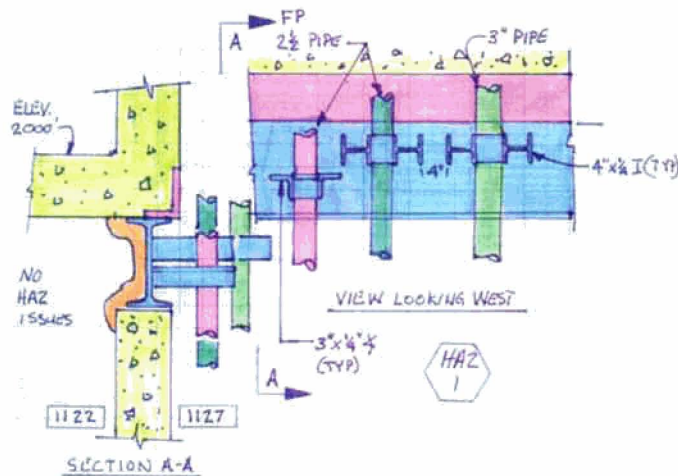
Fire Area: A-06

Description: Aux. Stair A-2

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

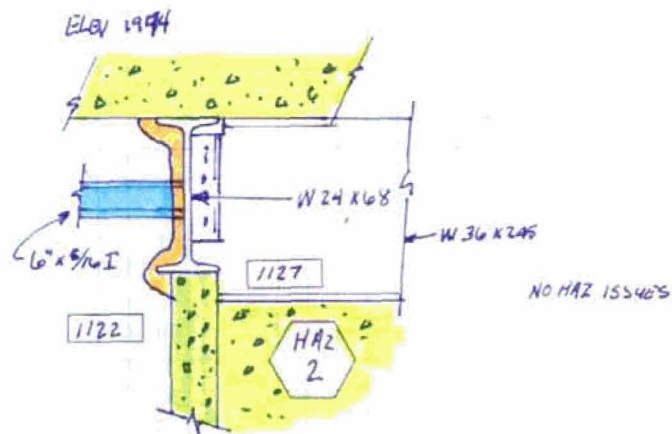


Structural Steel Fireproofing Data

Appendix G5A

1127-1974

HAZ #2 Sketch



HAZ #2 Photo



Structural Steel Fireproofing Data

Appendix G5A

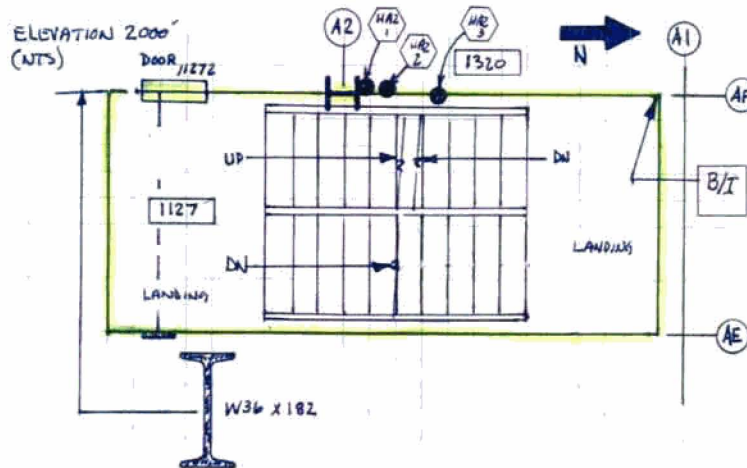
Room-Elevation: 1127-2000

Building: Auxiliary

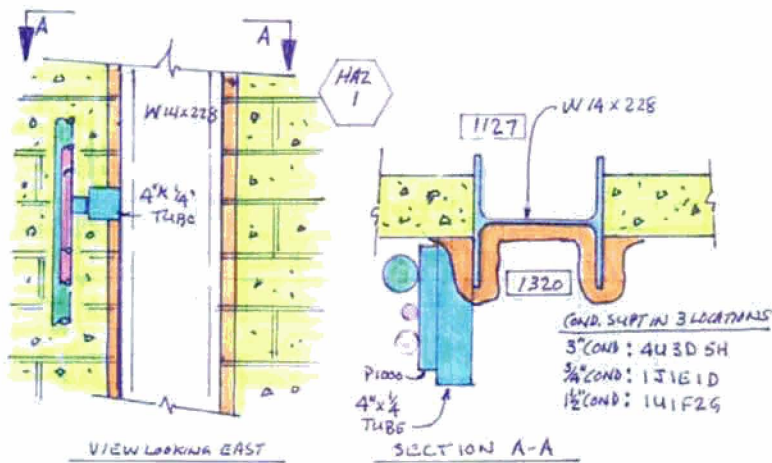
Fire Area: A-06

Description: Aux. Stair A-2

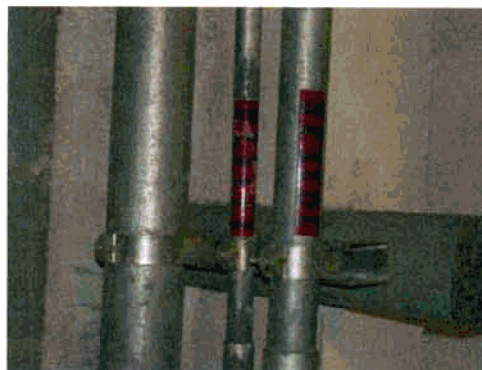
Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

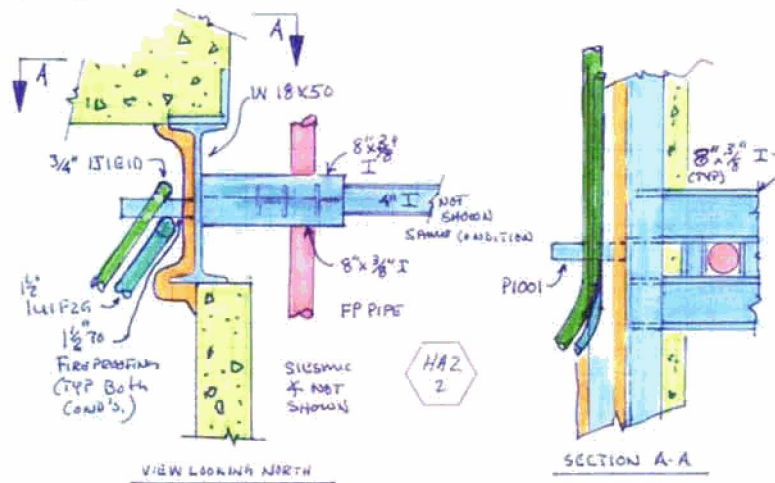


Structural Steel Fireproofing Data

Appendix G5A

1127-2000

HAZ #2 Sketch

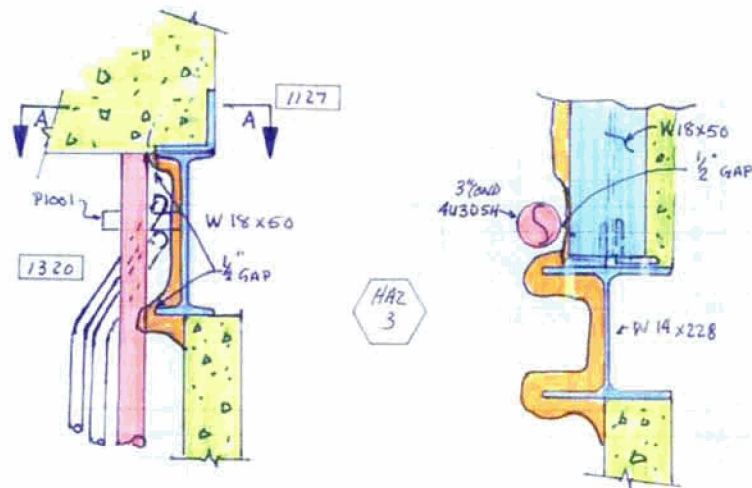


HAZ #2 Photo



Structural Steel Fireproofing Data**Appendix G5A**

1127-2000

HAZ #3 Sketch**HAZ #3 Photo**

Structural Steel Fireproofing Data

Appendix G5A

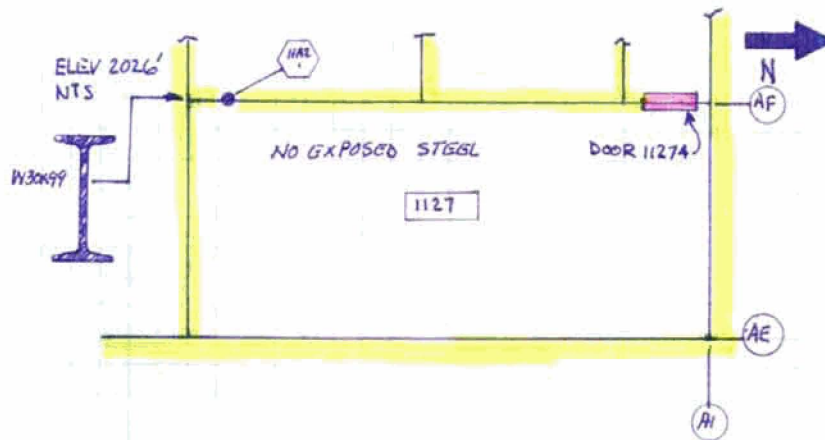
Room-Elevation: 1127-2026

Building: Auxiliary

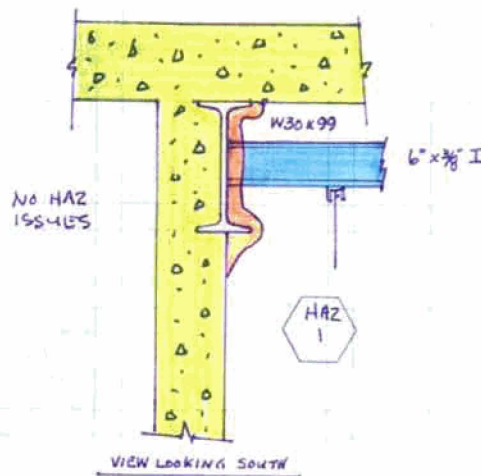
Fire Area: A-06

Description: Aux. Stair A-2

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

No photo required.

Structural Steel Fireproofing Data

Appendix G5A

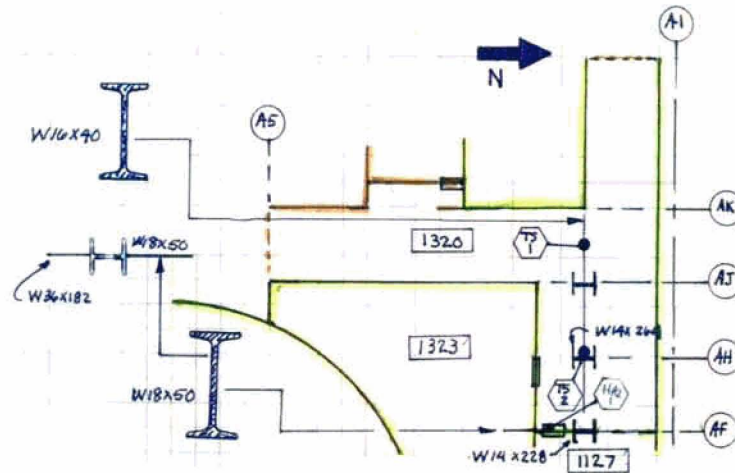
Room-Elevation: 1320-2000

Building: Auxiliary

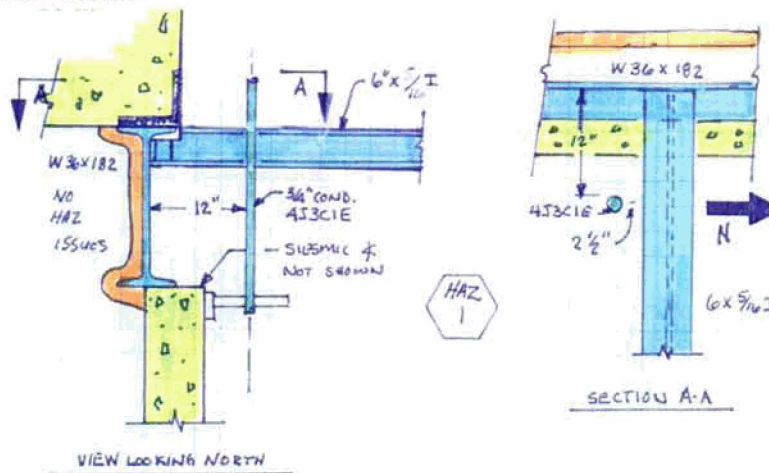
Fire Area: A-08

Description: Corridor No. 4

Room Sketch:

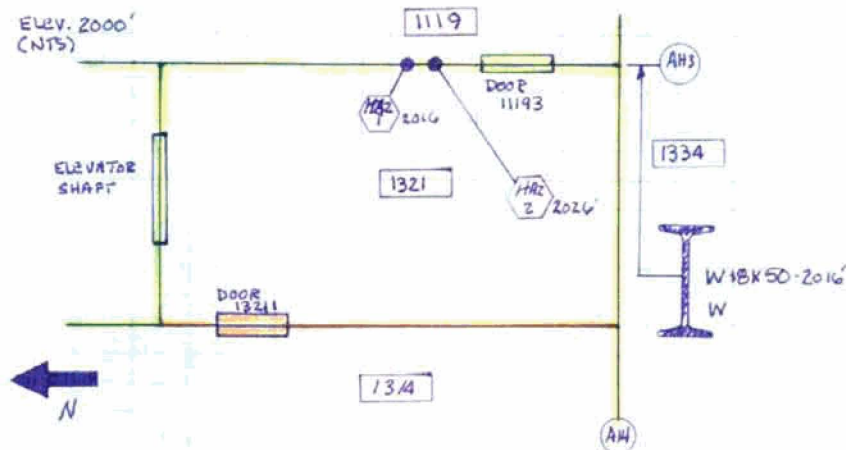
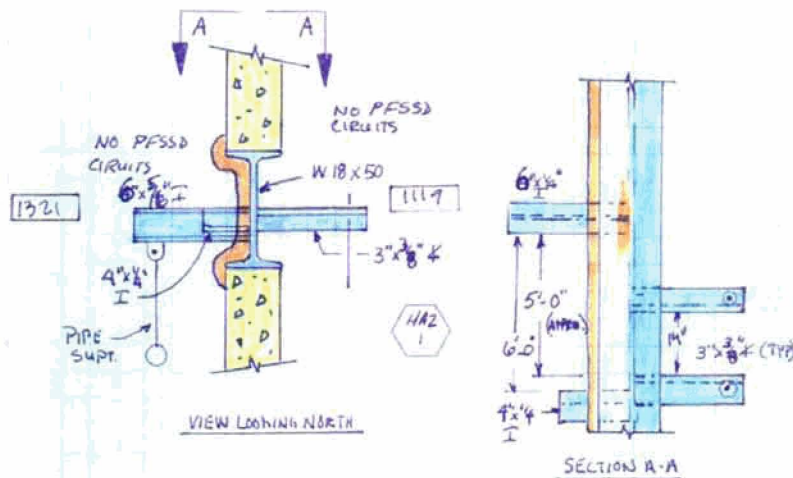


HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data**Appendix G5A****Room-Elevation:** 1321-2000**Building:** Auxiliary**Fire Area:** A-08**Description:** Exit Vestibule**Room Sketch:****HAZ #1 Sketch****HAZ #1 Photo**

No photo required.

Structural Steel Fireproofing Data

Appendix G5A

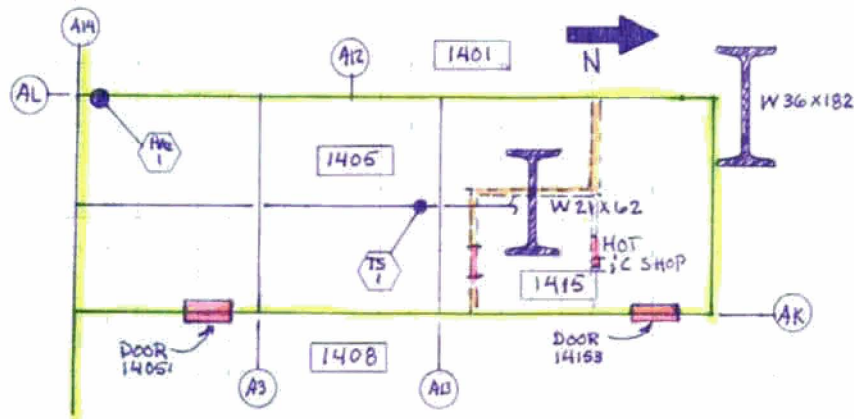
Room-Elevation: 1405-2026

Building: Auxiliary

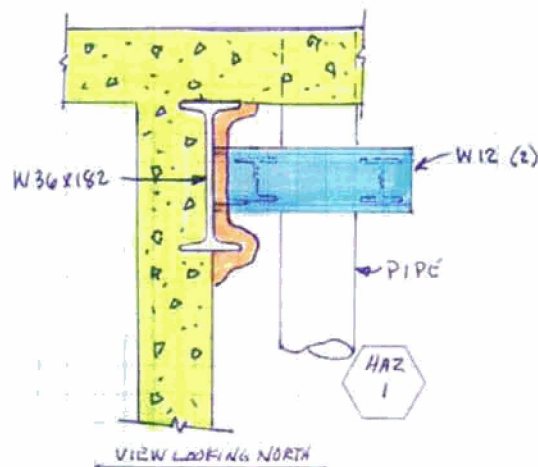
Fire Area: A-26

Description: Chemical Storage Area

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

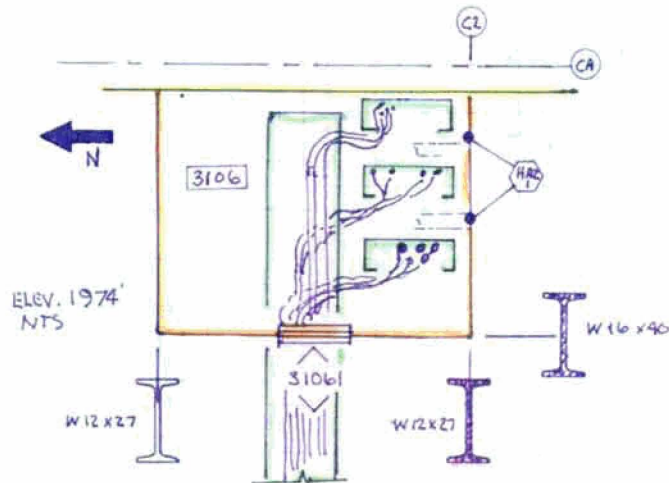
Room-Elevation: 3106-1974

Building: Control

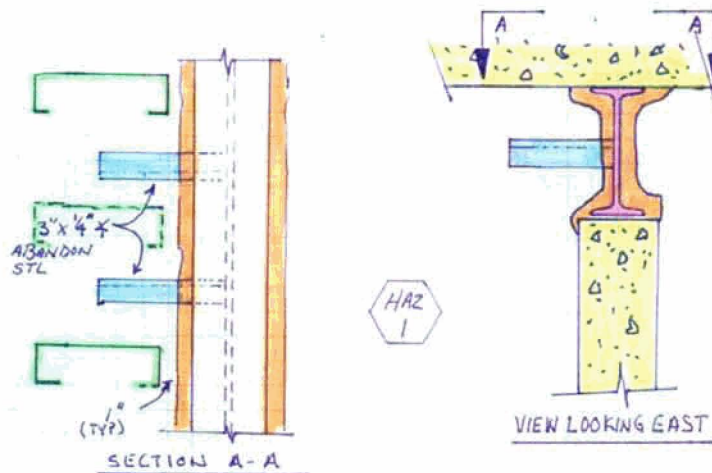
Fire Area: C-02

Description: Electrical Chase

Room Sketch:

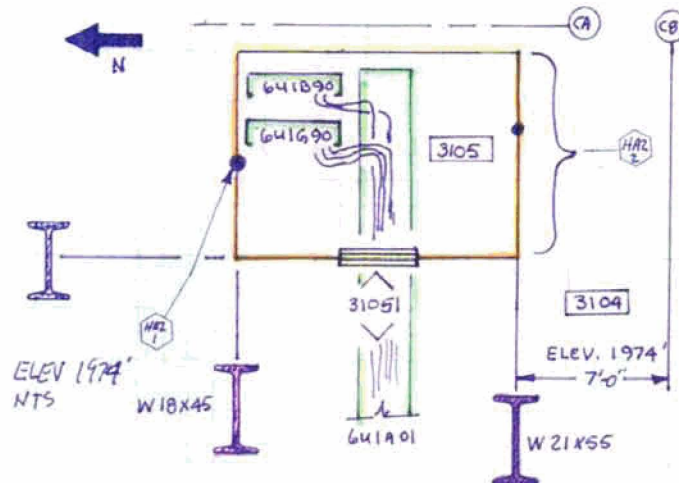
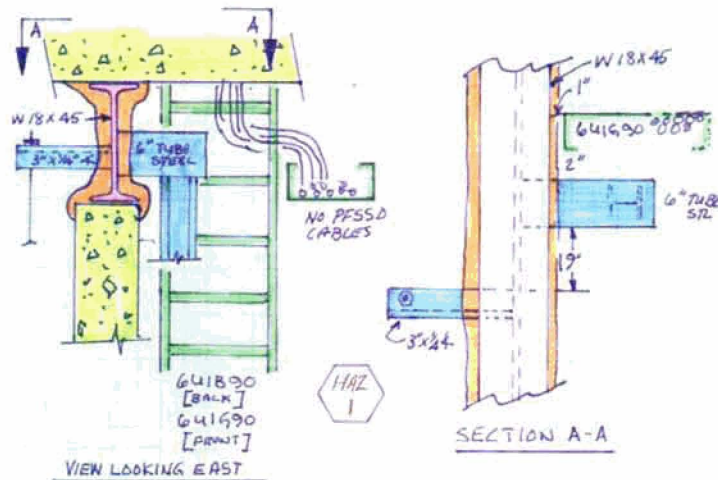


HAZ #1 Sketch



HAZ #1 Photo



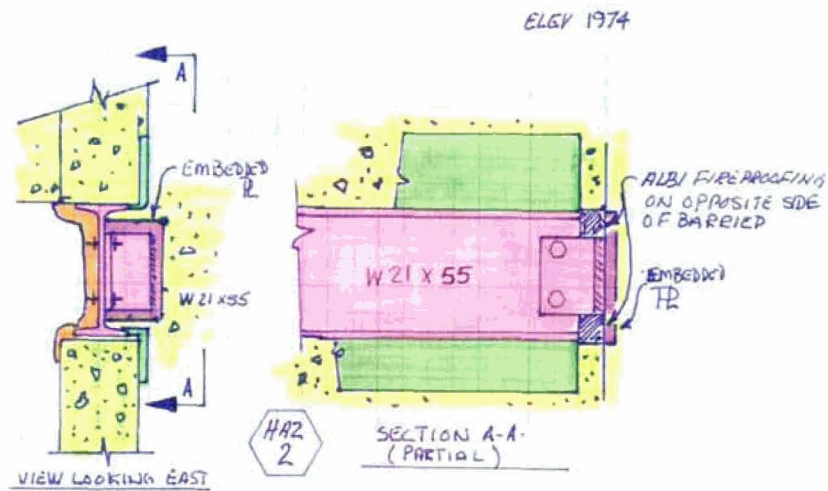
Structural Steel Fireproofing Data**Appendix G5A****Room-Elevation:** 3105-1974**Building:** Control**Fire Area:** C-03**Description:** Electrical Chase**Room Sketch:****HAZ #1 Sketch****HAZ #1 Photo**

Structural Steel Fireproofing Data

Appendix G5A

3105-1974

HAZ #2 Sketch



HAZ #2 Photo



Structural Steel Fireproofing Data

Appendix G5A

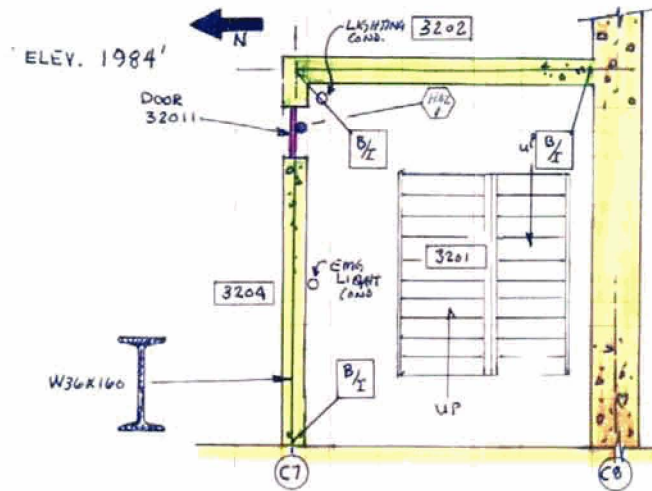
Room-Elevation: 3201-1984

Building: Control

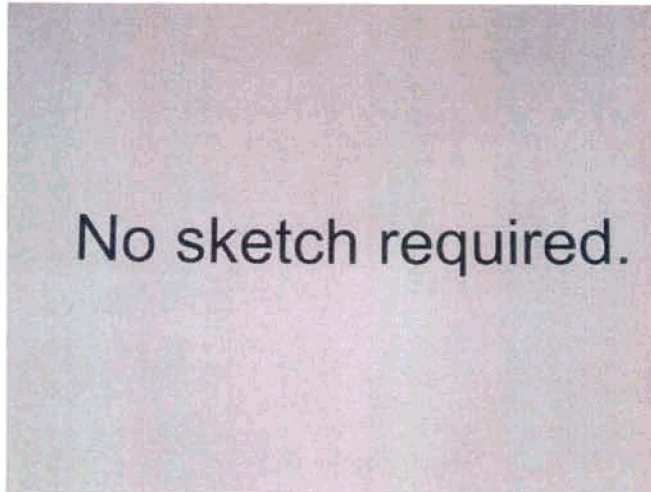
Fire Area: C-06

Description: Control, Stair C-1

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

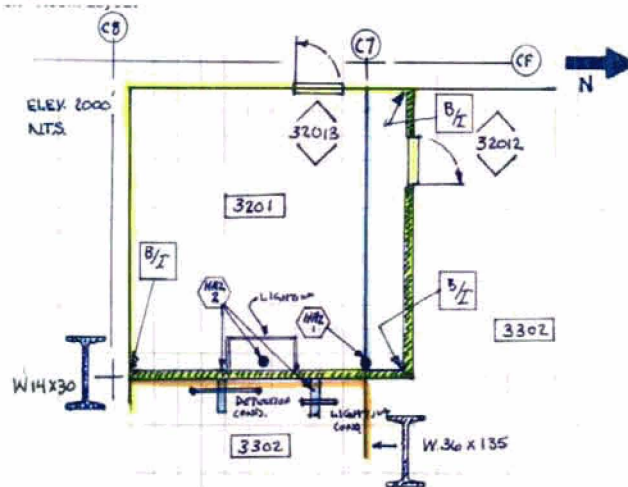
Room-Elevation: 3201-2000

Building: Control

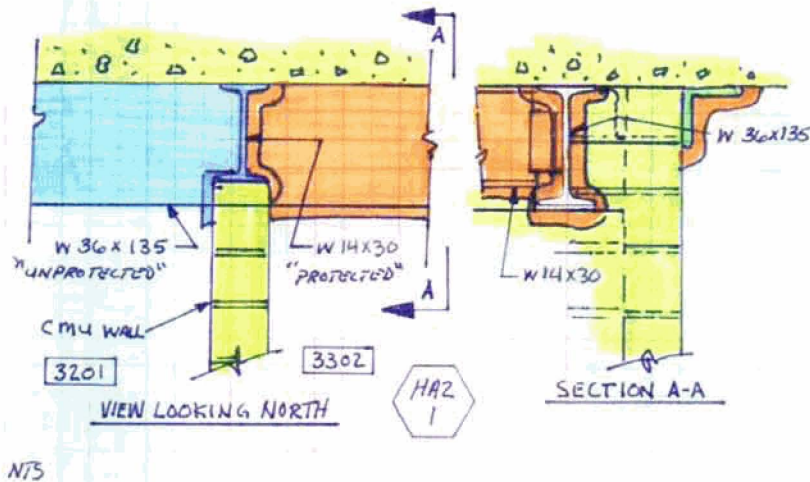
Fire Area: C-06

Description: Control, Stair C-1

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

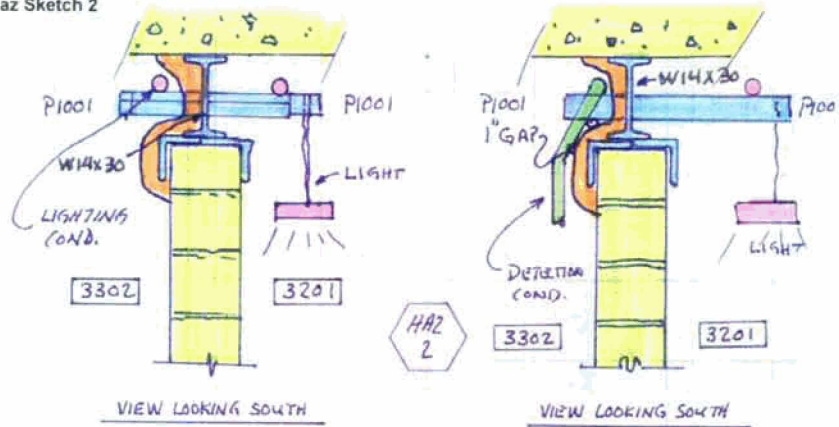


Structural Steel Fireproofing Data**Appendix G5A**

3201-2000

HAZ #2 Sketch

Haz Sketch 2

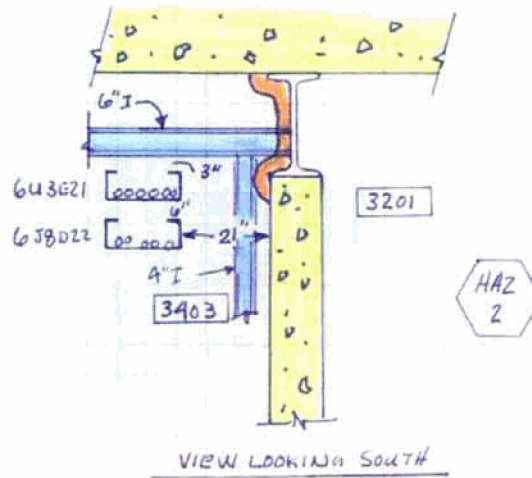
**HAZ #2 Photo**

Structural Steel Fireproofing Data

Appendix G5A

3201-2016

HAZ #2 Sketch



HAZ #2 Photo



Structural Steel Fireproofing Data

Appendix G5A

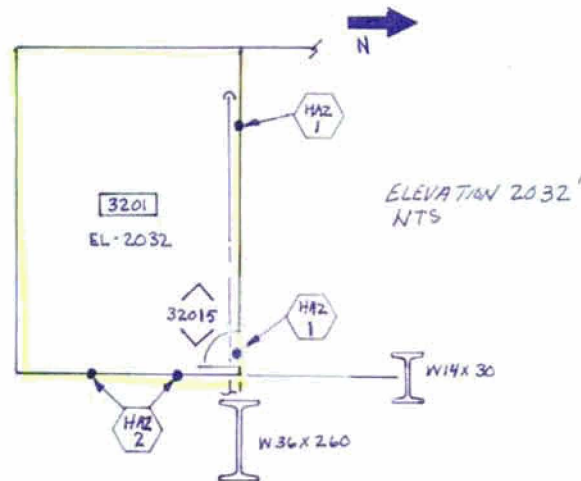
Room-Elevation: 3201-2032

Building: Control

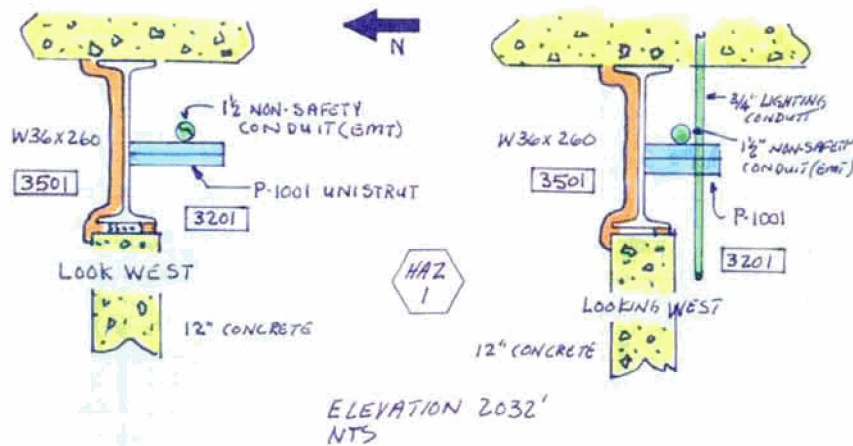
Fire Area: C-06

Description: Control, Stair C-1

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

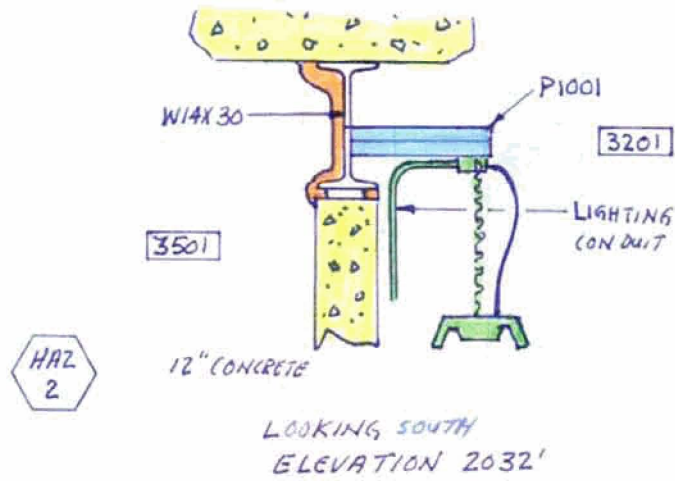


Structural Steel Fireproofing Data

Appendix G5A

3201-2032

HAZ #2 Sketch



HAZ #2 Photo



Structural Steel Fireproofing Data

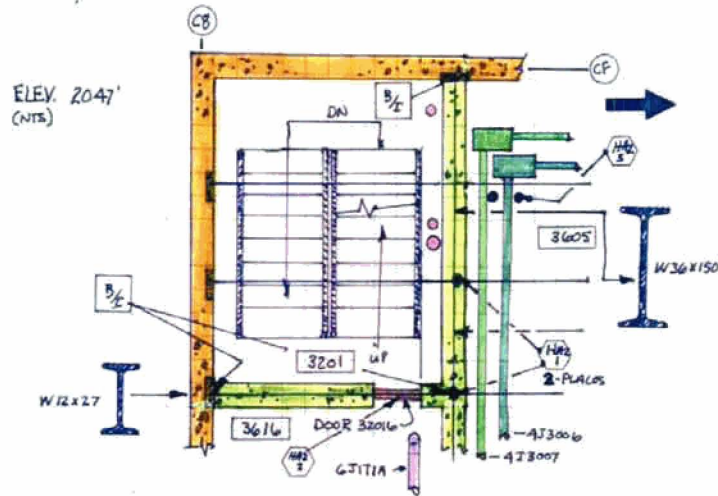
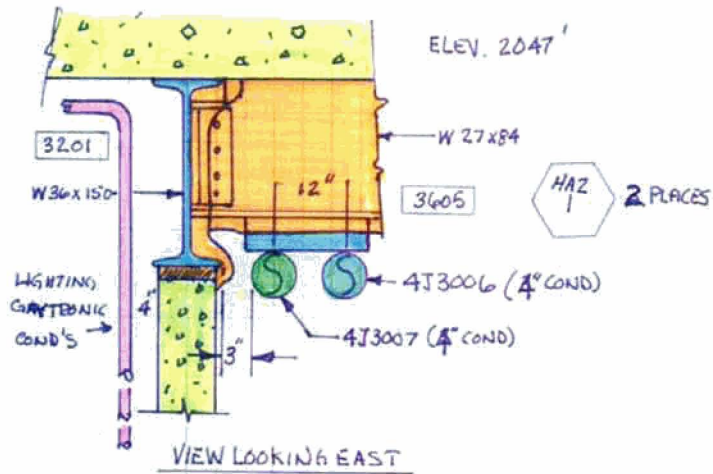
Appendix G5A

Room-Elevation: 3201-2047

Building: Control

Fire Area: C-06

Description: Control, Stair C-1

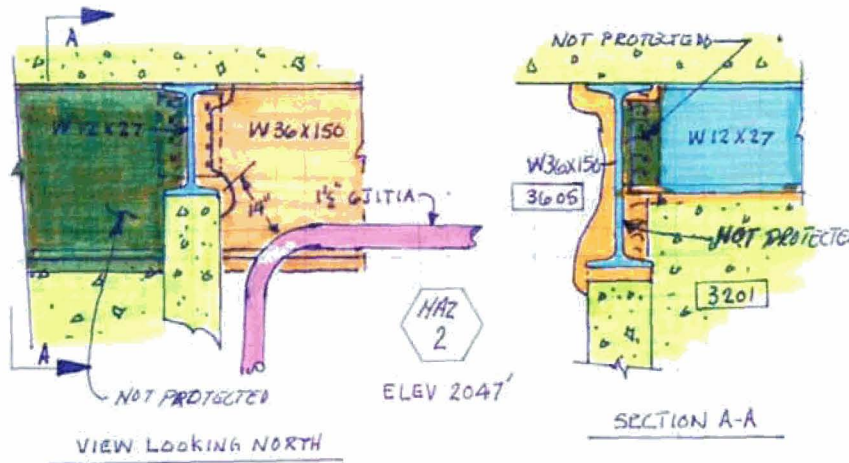
Room Sketch:**HAZ #1 Sketch****HAZ #1 Photo**

Structural Steel Fireproofing Data

Appendix G5A

3201-2047

HAZ #2 Sketch



HAZ #2 Photo

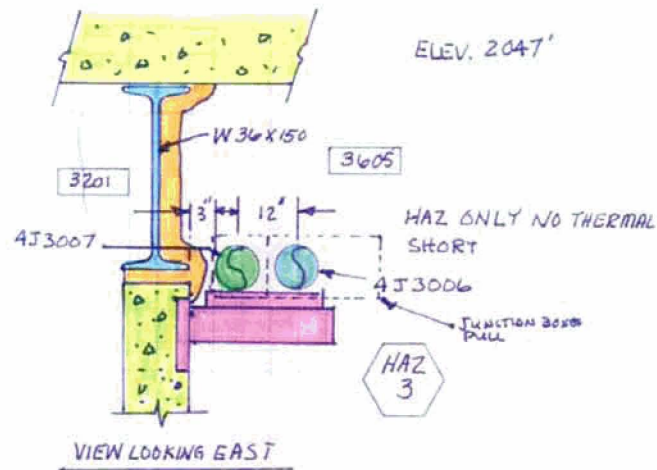


Structural Steel Fireproofing Data

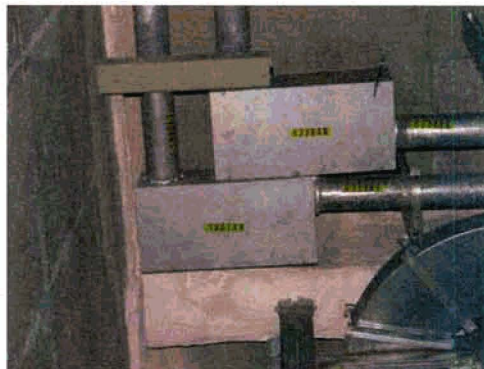
Appendix G5A

3201-2047

HAZ #3 Sketch



HAZ #3 Photo



Structural Steel Fireproofing Data

Appendix G5A

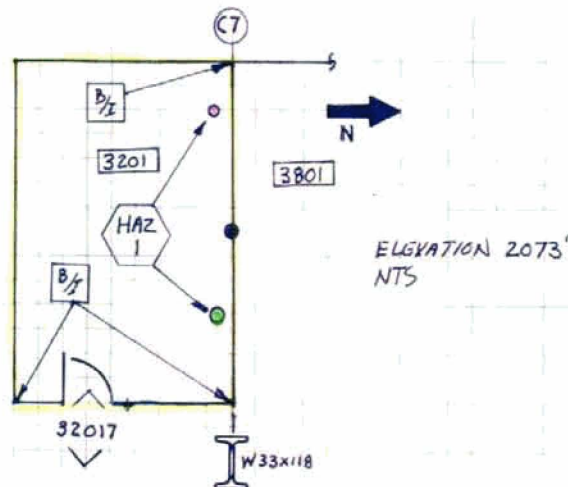
Room-Elevation: 3201-2073

Building: Control

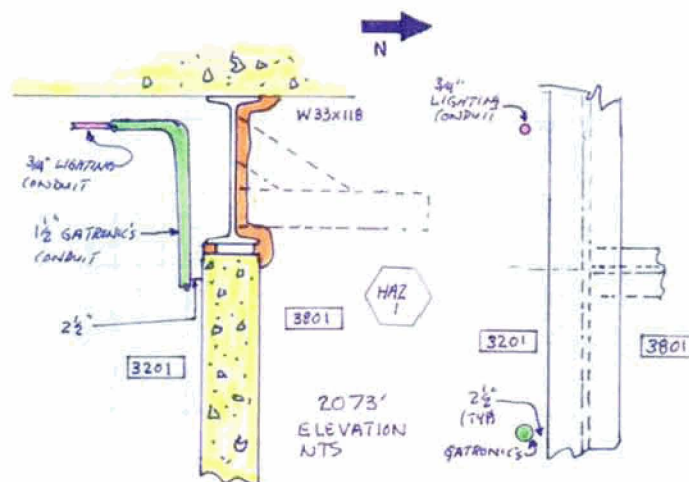
Fire Area: C-06

Description: Control, Stair C-1

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

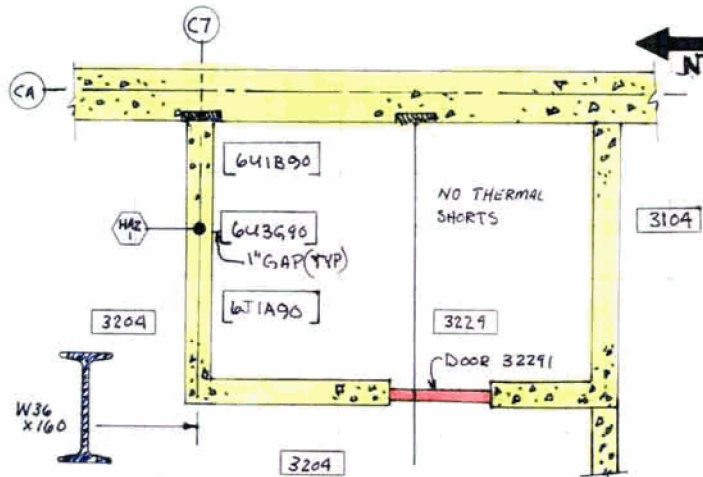
Room-Elevation: 3229-1984

Building: Control

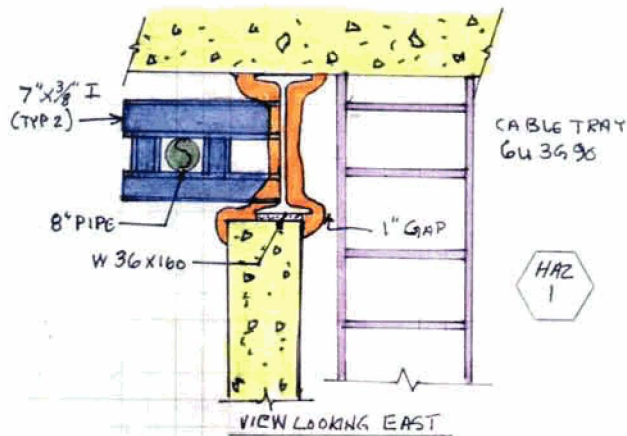
Fire Area: C-08

Description: Electrical Chase

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

Room-Elevation: 3301-2000

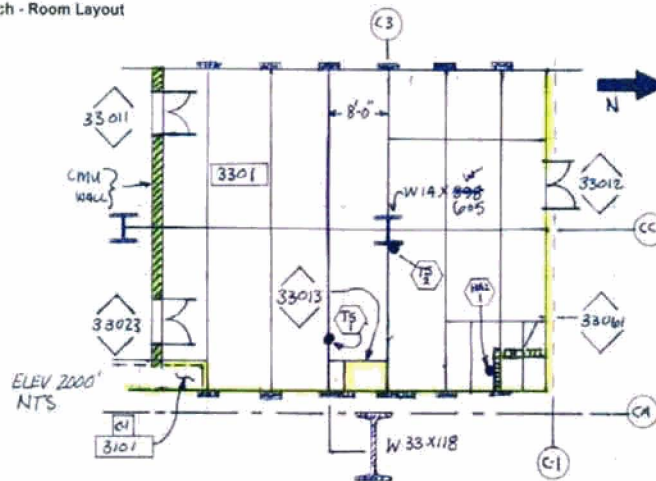
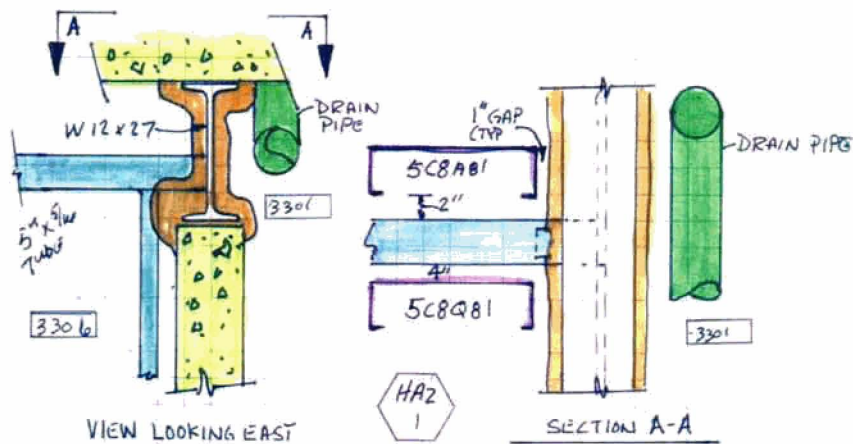
Building: Control

Fire Area: C-09

Description: ESF Switchgear Room No. 1

Room Sketch:

ch - Room Layout

**HAZ #1 Sketch****HAZ #1 Photo**

No photo required.

Structural Steel Fireproofing Data

Appendix G5A

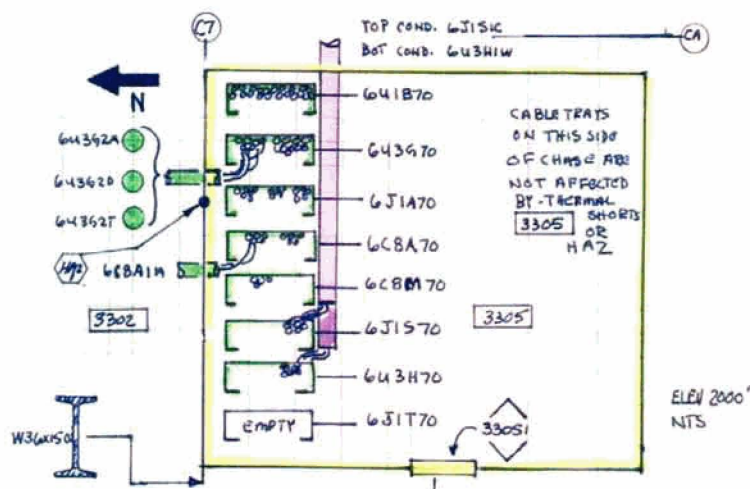
Room-Elevation: 3305-2000

Building: Control

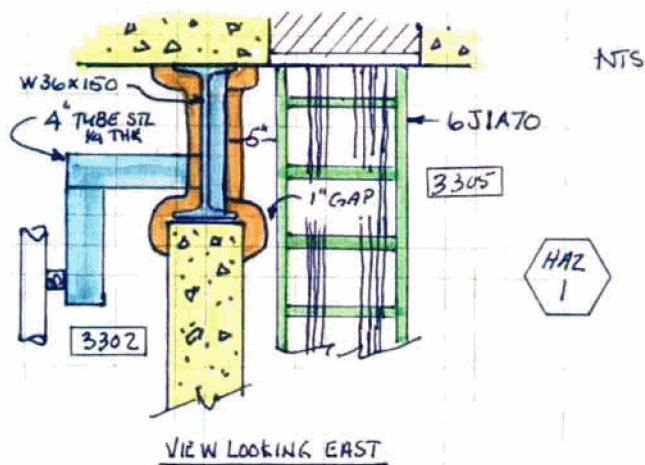
Fire Area: C-11

Description:	Electrical Chase
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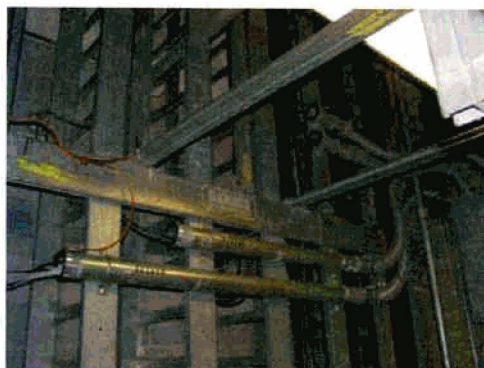
Room Sketch:



HAZ #1 Sketch



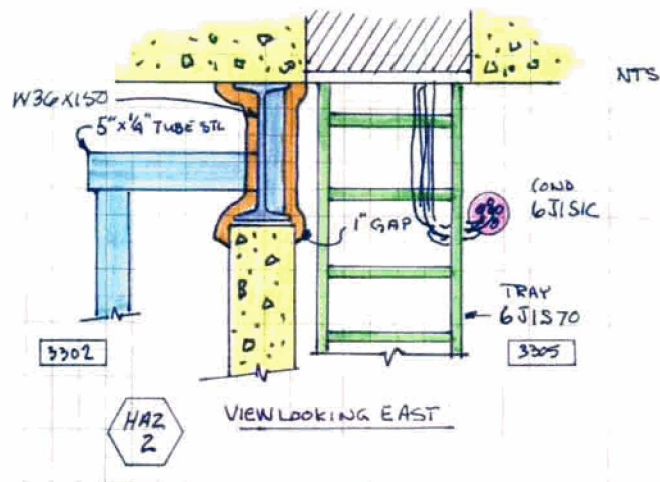
HAZ #1 Photo



Structural Steel Fireproofing Data**Appendix G5A**

3305-2000

HAZ #2 Sketch



HAZ #2 Photo



Structural Steel Fireproofing Data

Appendix G5A

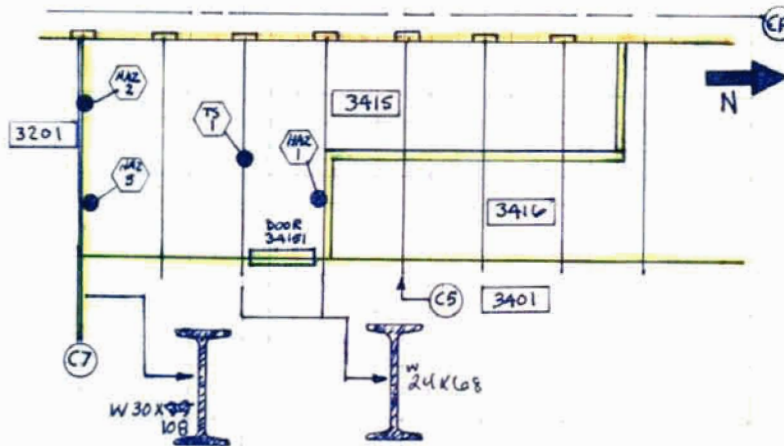
Room-Elevation: 3415-2016

Building: Control

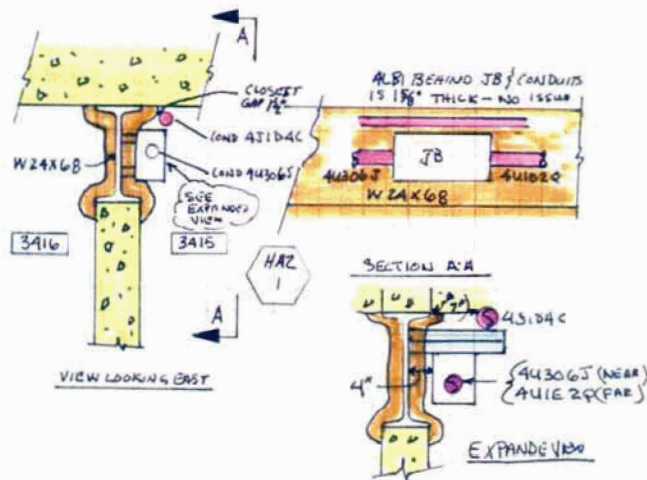
Fire Area: C-13

Description: Access Ctrl & Elec Equip A/C Units No. 1

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

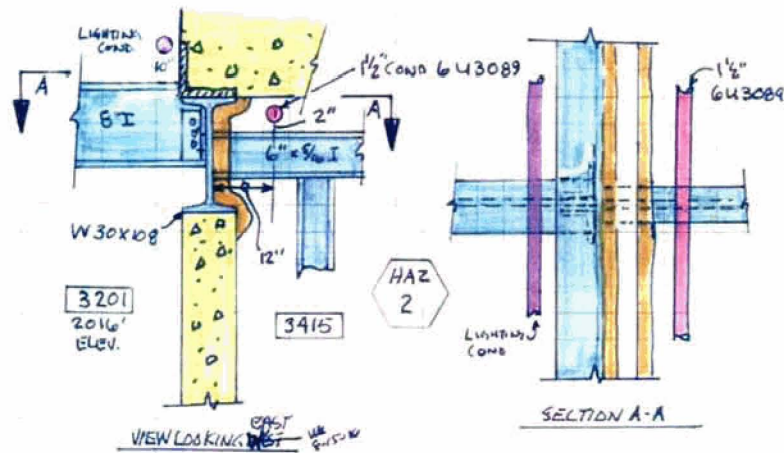


Structural Steel Fireproofing Data

Appendix G5A

3415-2016

HAZ #2 Sketch

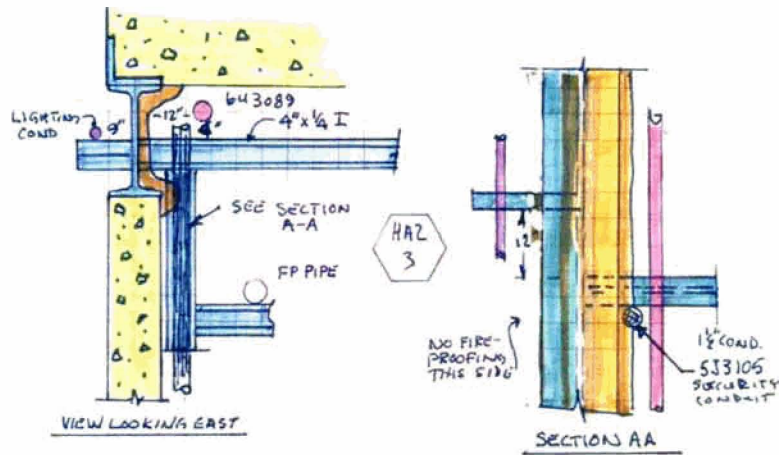


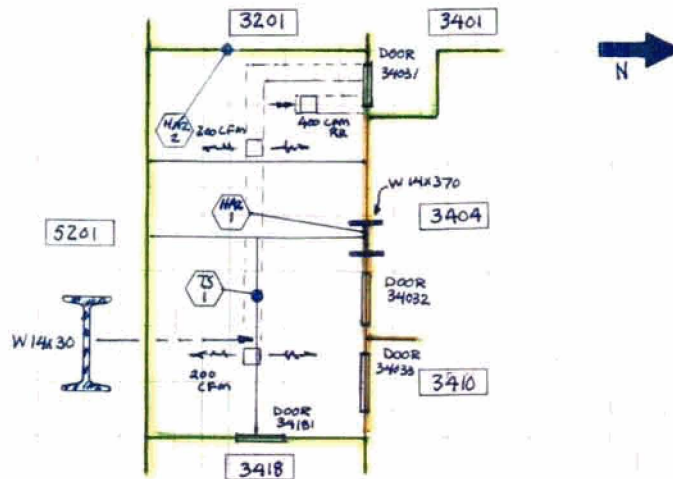
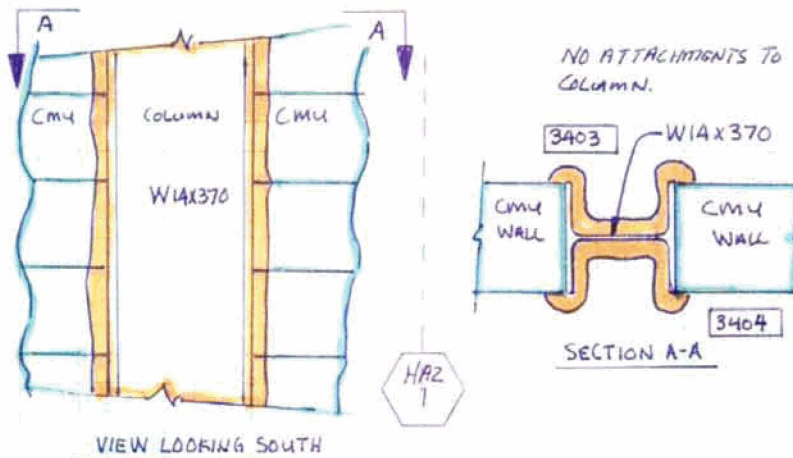
HAZ #2 Photo



Structural Steel Fireproofing Data**Appendix G5A**

3415-2016

HAZ #3 Sketch**HAZ #3 Photo**

Structural Steel Fireproofing Data**Appendix G5A****Room-Elevation:** 3403-2016**Building:** Control**Fire Area:** C-15**Description:** Non-Vital Swgr & Xfmr Rm No. 1**Room Sketch:****HAZ #1 Sketch****HAZ #1 Photo**

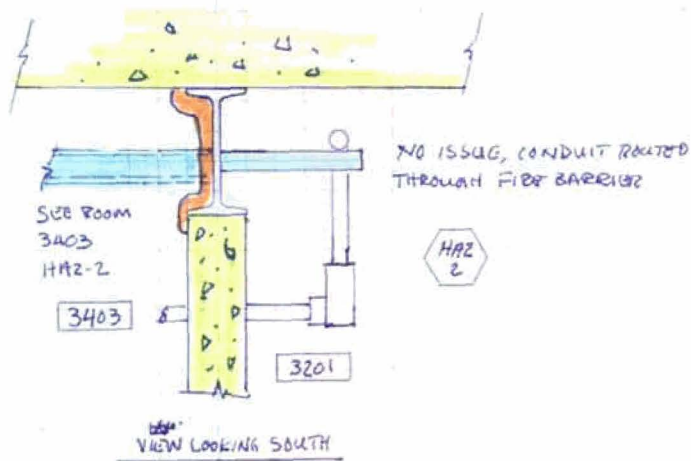
No photo required.

Structural Steel Fireproofing Data

Appendix G5A

3403-2016

HAZ #2 Sketch



HAZ #2 Photo



Structural Steel Fireproofing Data

Appendix G5A

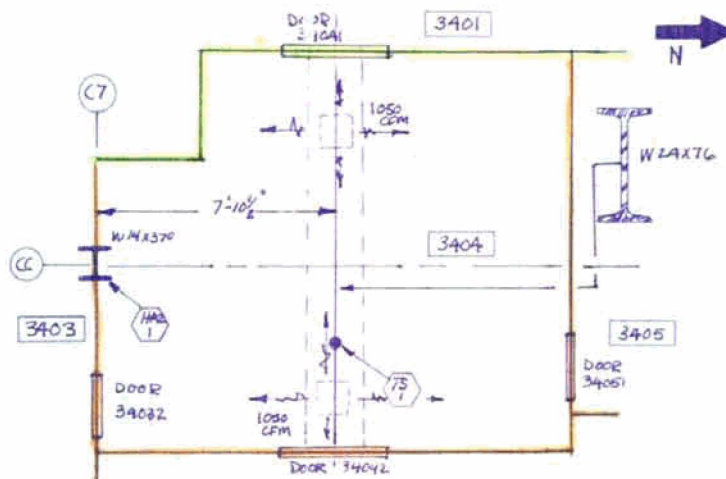
Room-Elevation: 3404-2016

Building: Control

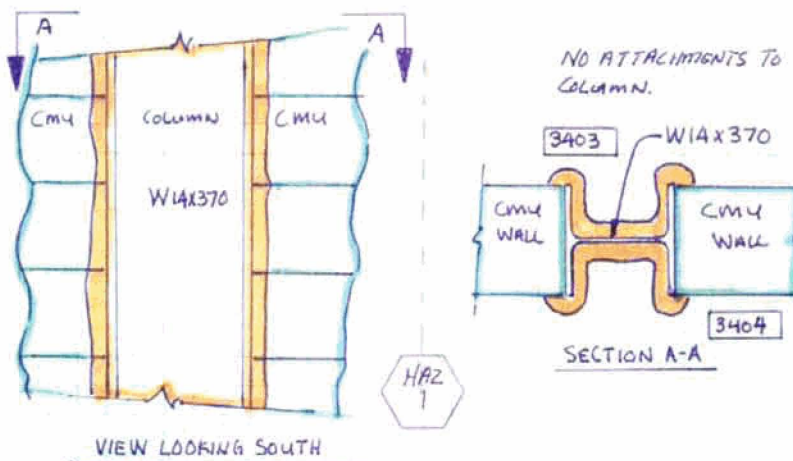
Fire Area: C-15

Description: Switchboard Rm No. 4

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

No photo required.

Structural Steel Fireproofing Data

Appendix G5A

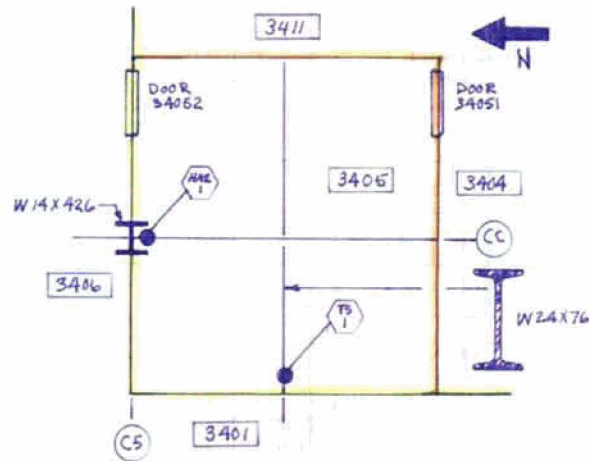
Room-Elevation: 3405-2016

Building: Control

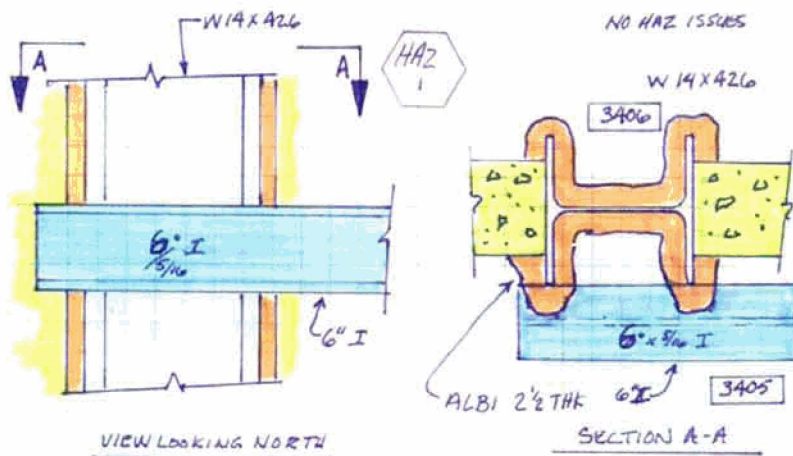
Fire Area: C-15

Description: Battery Rm No. 4

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

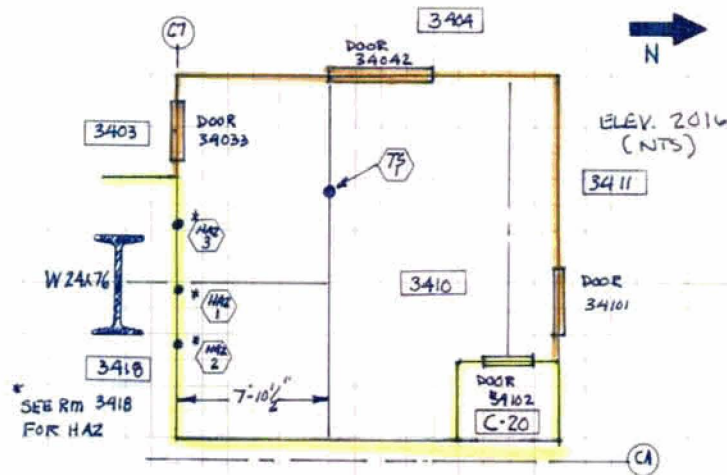
Room-Elevation: 3410-2016

Building: Control

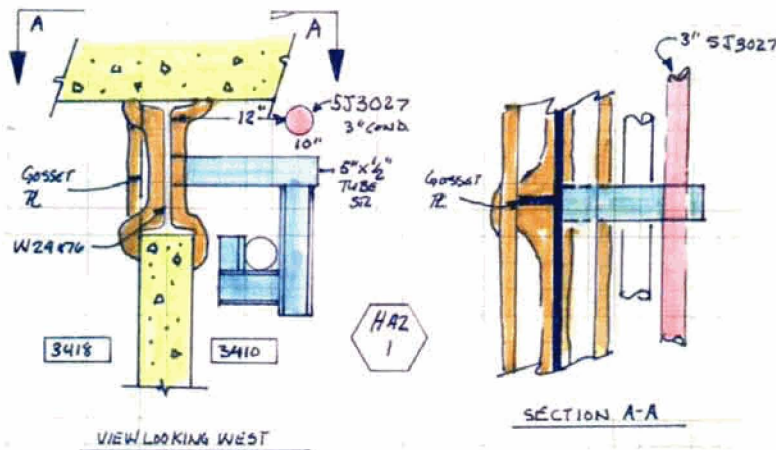
Fire Area: C-15

Description: Switchboard Rm No. 2

Room Sketch:



HAZ #1 Sketch



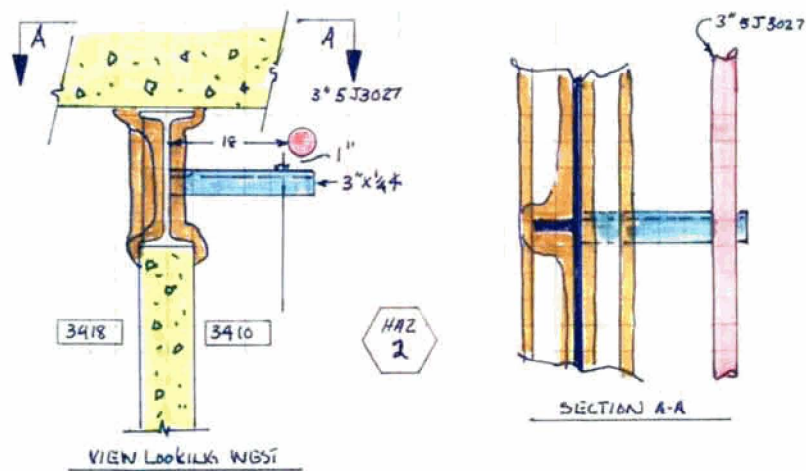
HAZ #1 Photo



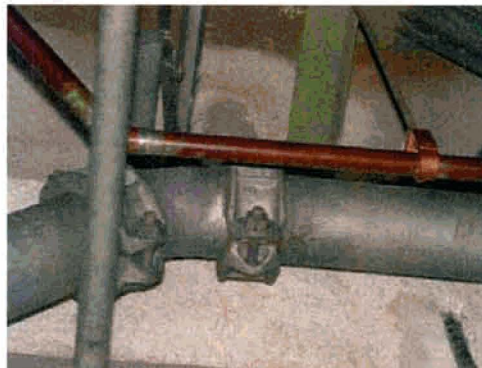
Structural Steel Fireproofing Data**Appendix G5A**

3410-2016

HAZ #2 Sketch



HAZ #2 Photo

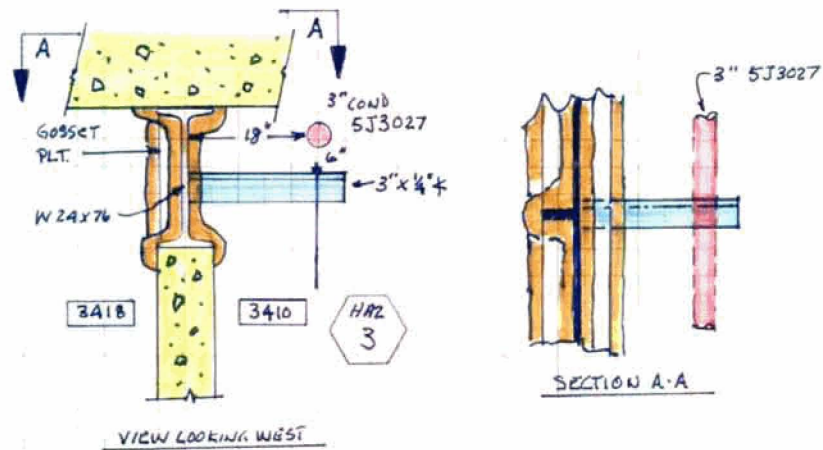


Structural Steel Fireproofing Data

Appendix G5A

3410-2016

HAZ #3 Sketch



HAZ #3 Photo



Structural Steel Fireproofing Data

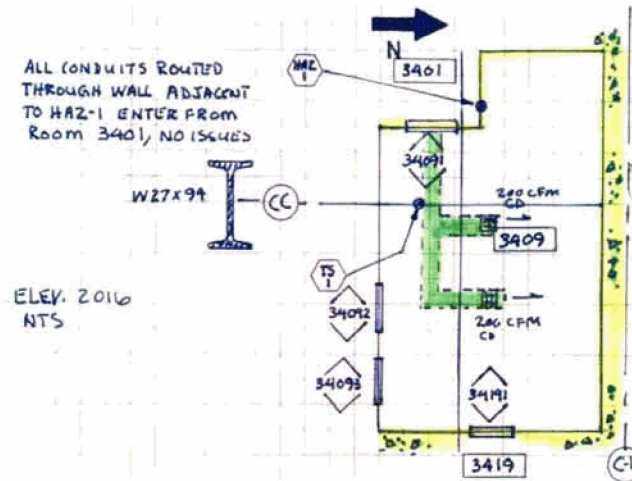
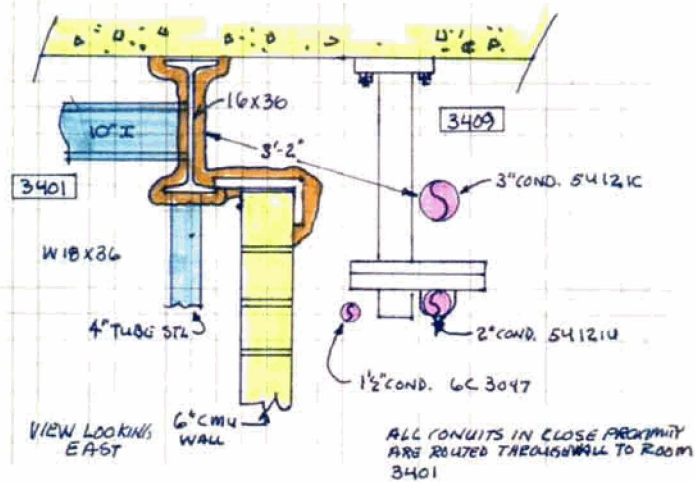
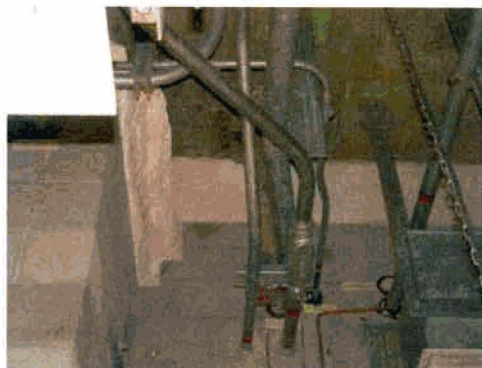
Appendix G5A

Room-Elevation: 3409-2016

Building: Control

Fire Area: C-16

Description: Non-Vital Swgr & Xfmr Rm No. 2

Room Sketch:**HAZ #1 Sketch****HAZ #1 Photo**

Structural Steel Fireproofing Data

Appendix G5A

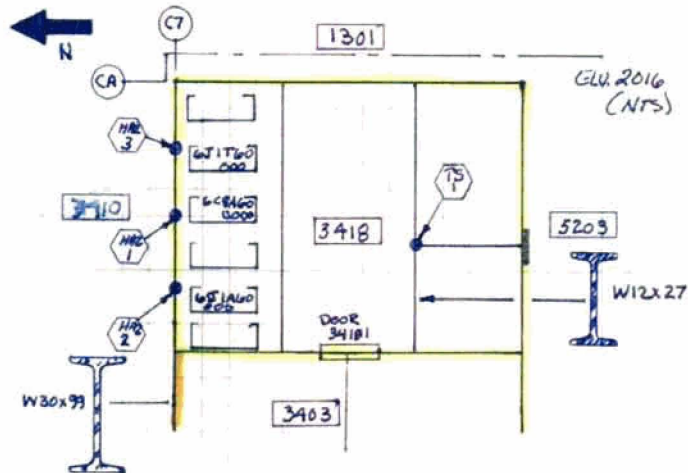
Room-Elevation: 3418-2016

Building: Control

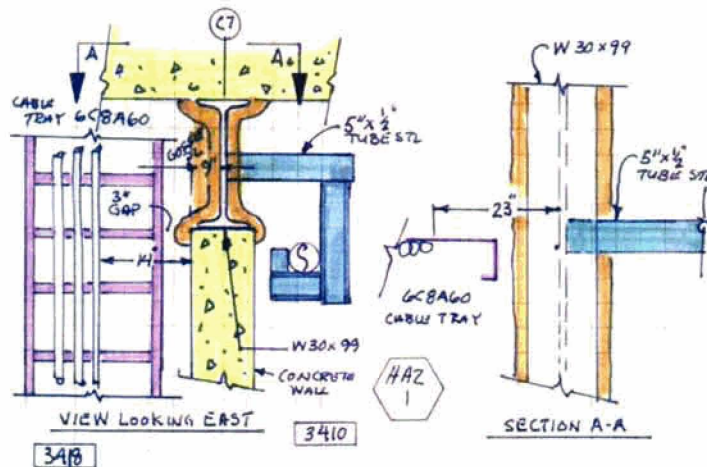
Fire Area: C-17

Description: Electrical Chase

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

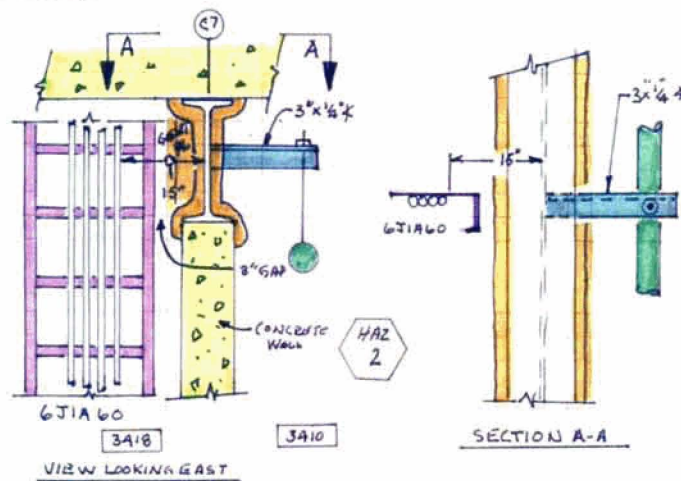


Structural Steel Fireproofing Data

Appendix G5A

3418-2016

HAZ #2 Sketch



HAZ #2 Photo

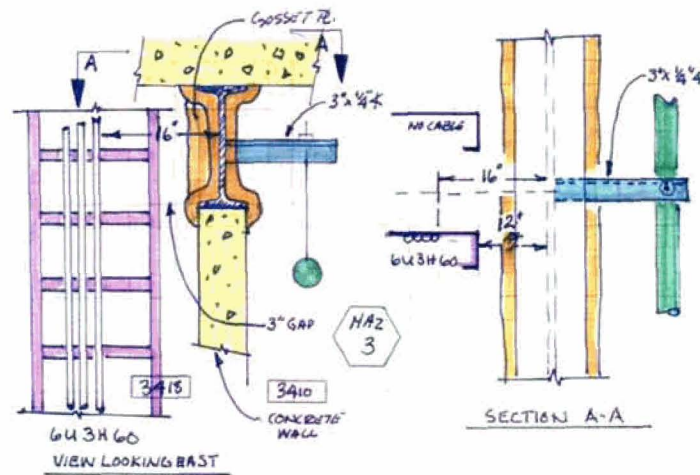
No photo required.

Structural Steel Fireproofing Data

Appendix G5A

3418-2016

HAZ #3 Sketch



HAZ #3 Photo

No photo required.

Structural Steel Fireproofing Data**Appendix G5A**

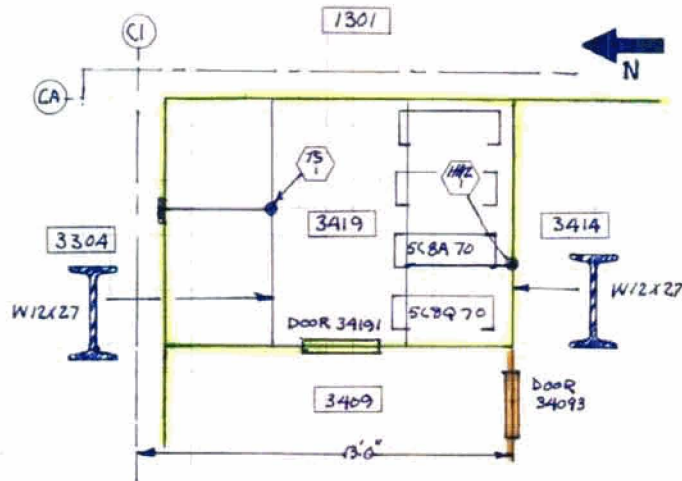
Room-Elevation: 3419-2016

Building: Control

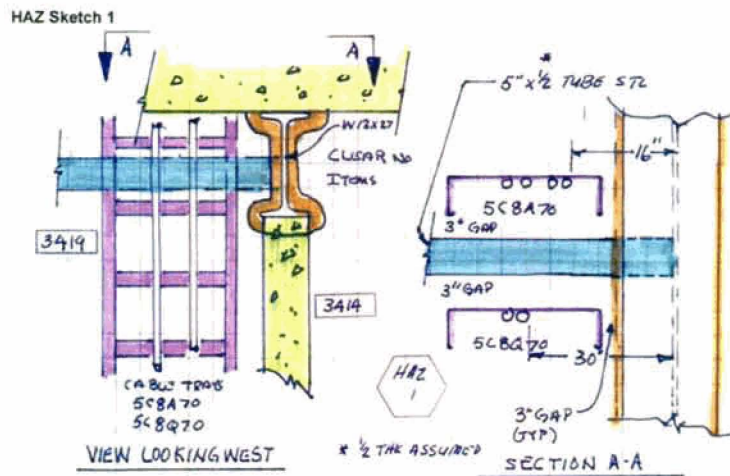
Fire Area: C-18

Description: Electrical Chase

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

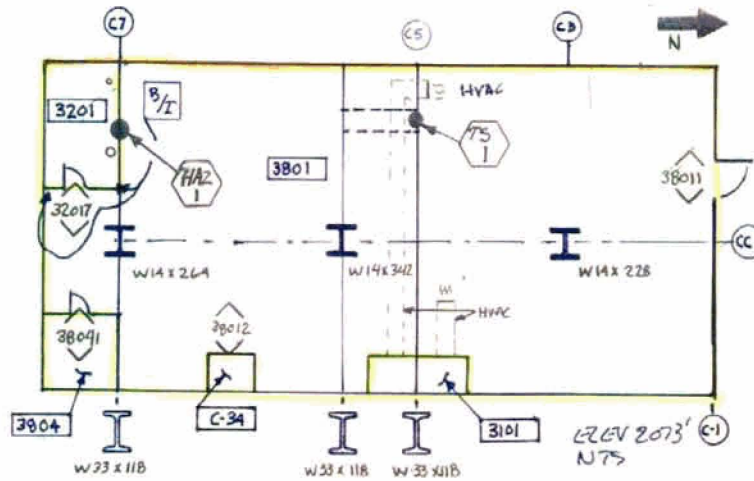
Room-Elevation: 3801-2073

Building: Control

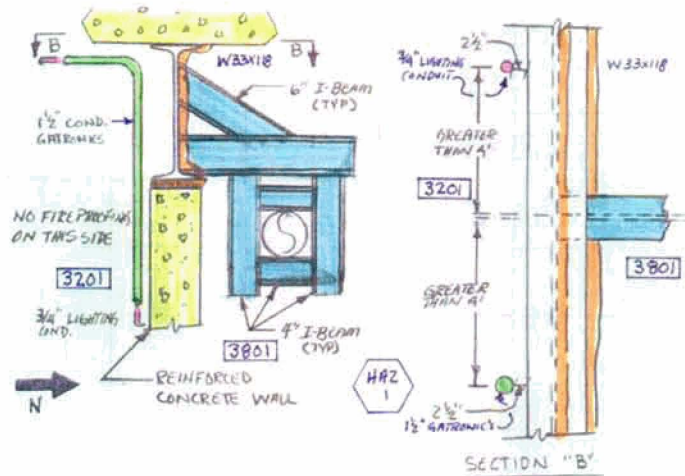
Fire Area: C-22

Description: Upper Cable Spreading Room

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

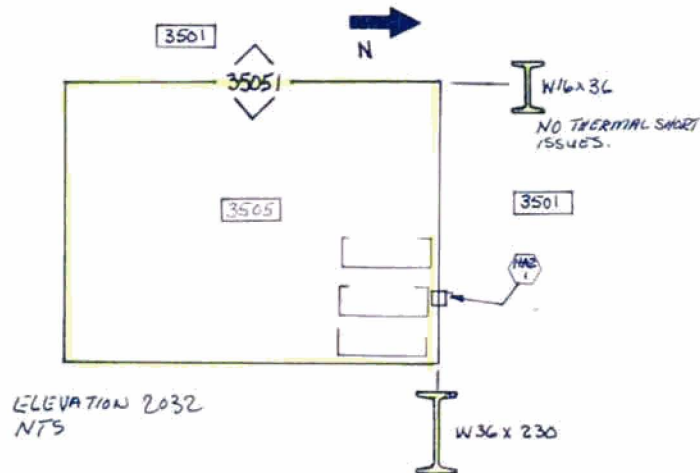
Room-Elevation: 3505-2032

Building: Control

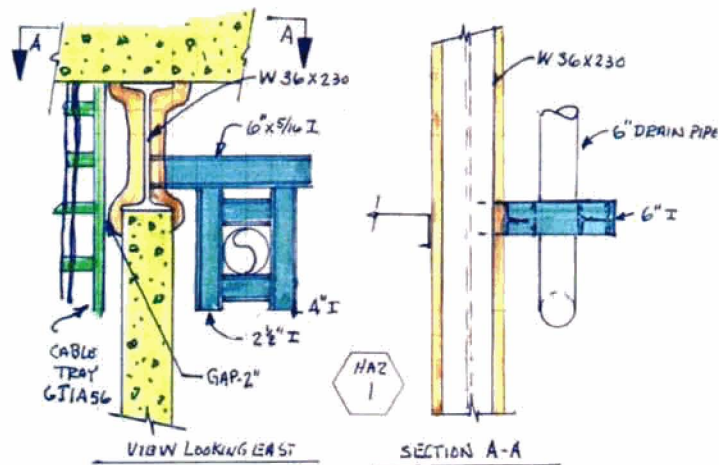
Fire Area: C-23

Description: Electrical Chase

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

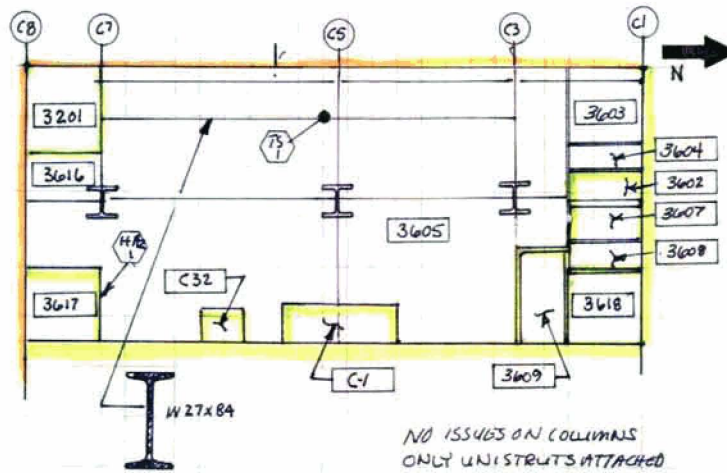
Room-Elevation: 3605-2047

Building: Control

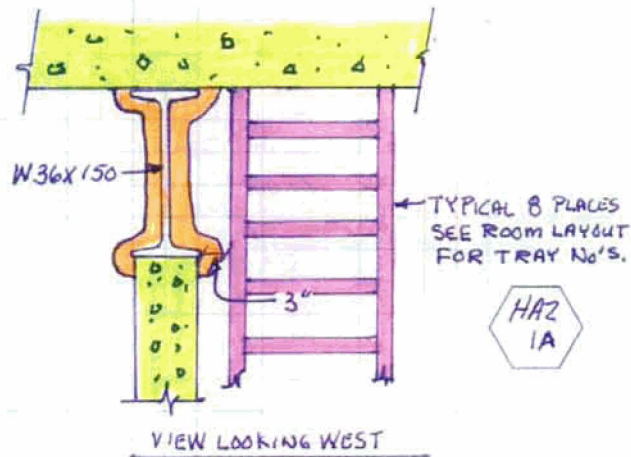
Fire Area: C-27

Description: Equipment Cabinet Area

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo

No photo required.

Structural Steel Fireproofing Data

Appendix G5A

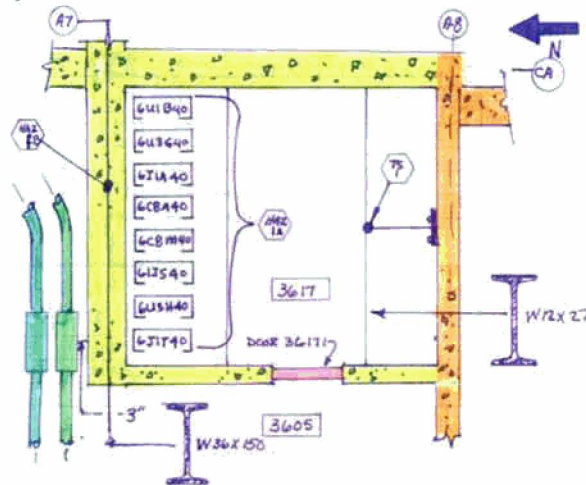
Room-Elevation: 3617-2047

Building: Control

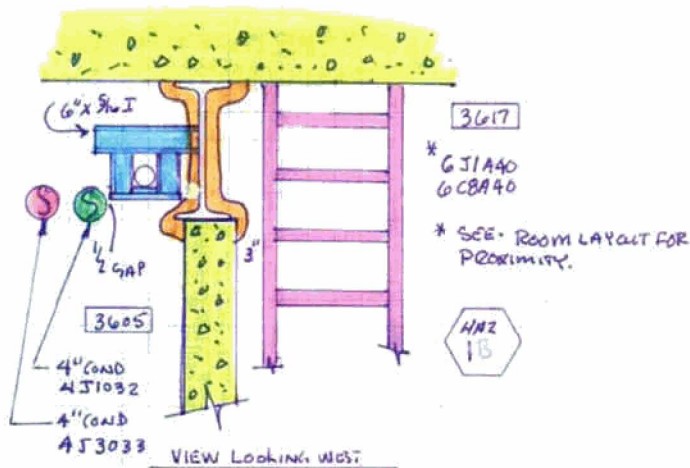
Fire Area: C-30

Description:	Electrical Chase
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Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

Appendix G5A

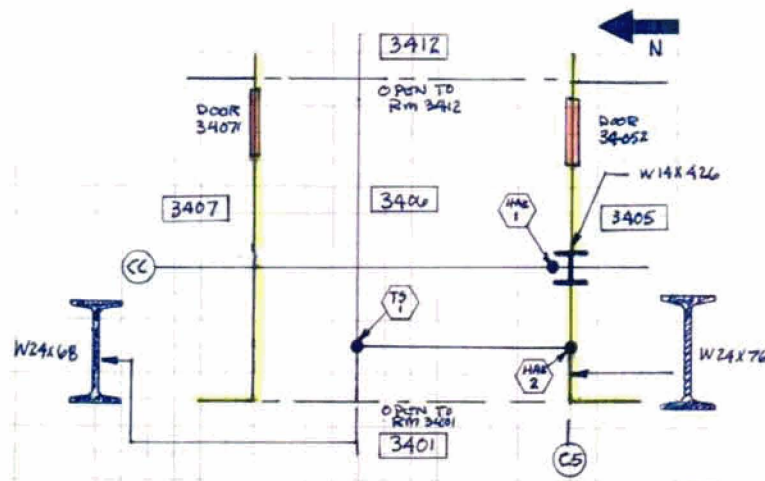
Room-Elevation: 3406-2016

Building: Control

Fire Area: C-35

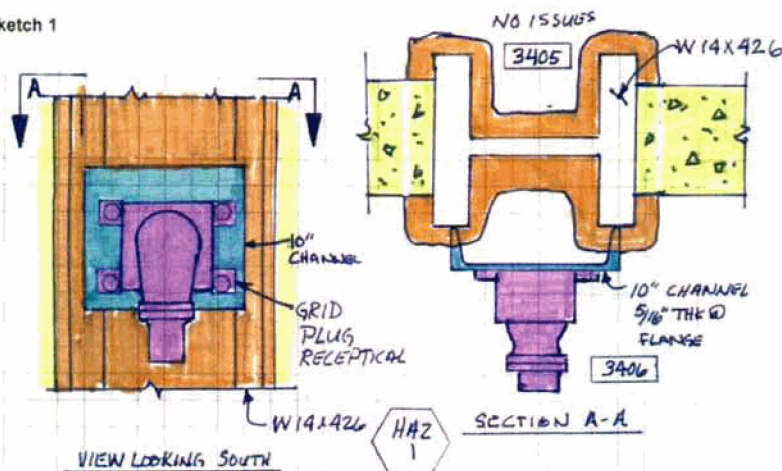
Description: Corridor No. 2

Room Sketch:



HAZ #1 Sketch

HAZ Sketch 1

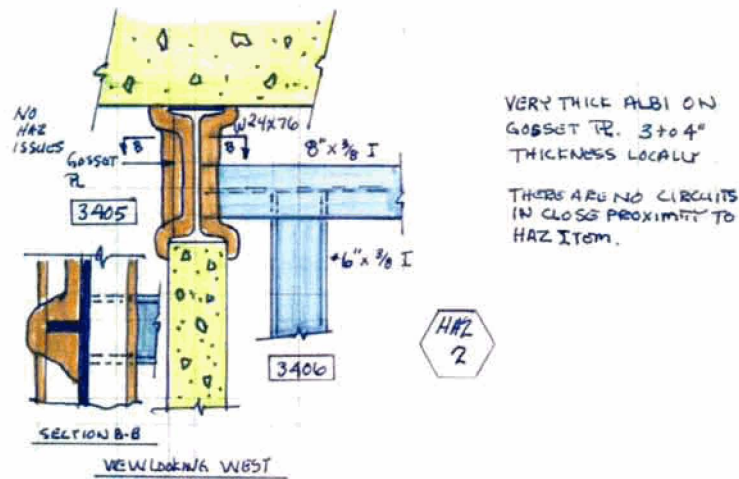


HAZ #1 Photo



Structural Steel Fireproofing Data**Appendix G5A**

3406-2016

HAZ #2 Sketch**HAZ #2 Photo**

Structural Steel Fireproofing Data

Appendix G5A

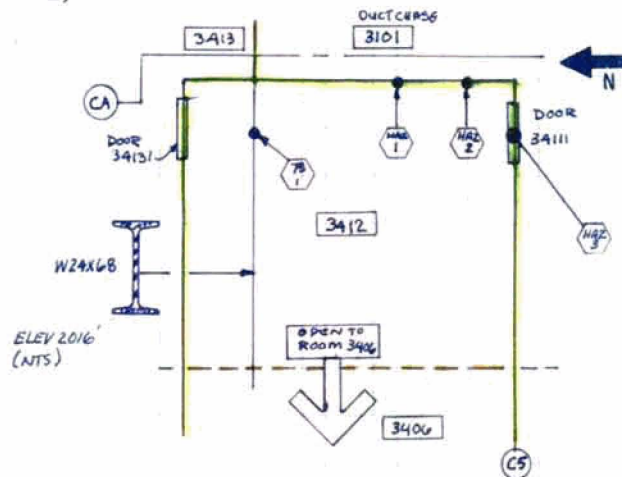
Room-Elevation: 3412-2016

Building: Control

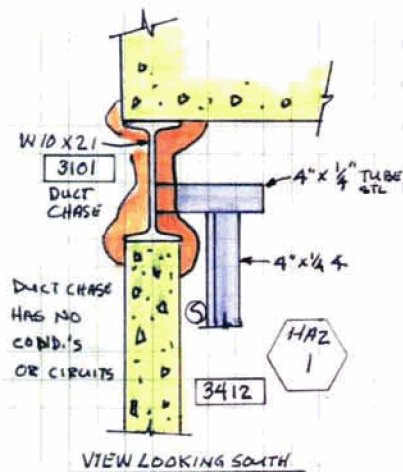
Fire Area: C-35

Description: Emergency Shower & Eyewash Area

Room Sketch:



HAZ #1 Sketch



ALBI DURASPRAY APPEARS
TO BE VERY THICK AT THE
LOCATION.

HAZ #1 Photo

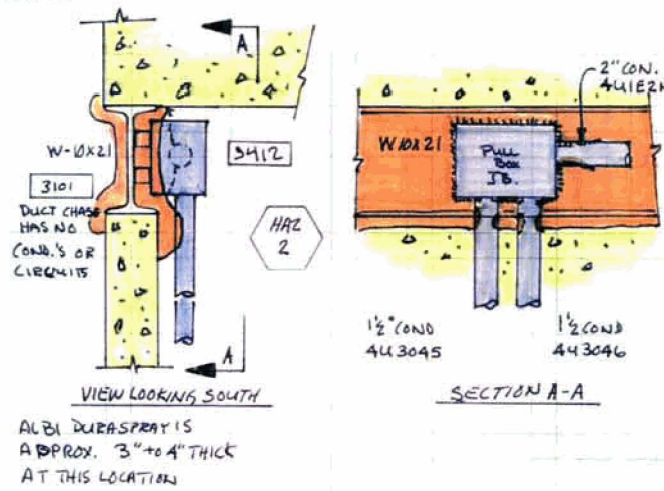


Structural Steel Fireproofing Data

Appendix G5A

3412-2016

HAZ #2 Sketch



HAZ #2 Photo

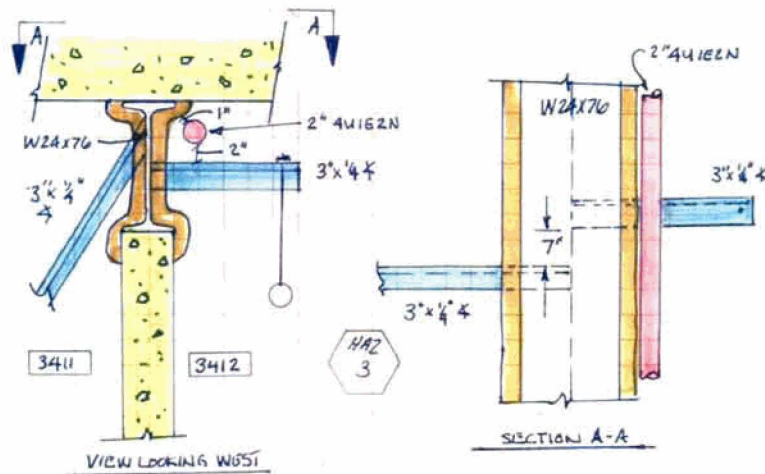


Structural Steel Fireproofing Data

Appendix G5A

3412-2016

HAZ #3 Sketch



HAZ #3 Photo



Structural Steel Fireproofing Data

Appendix G5A

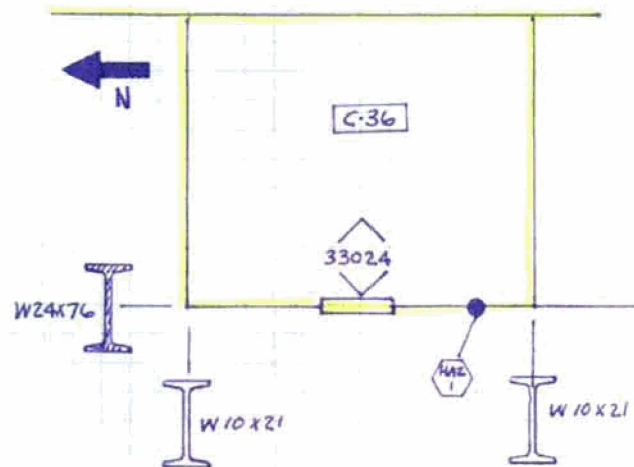
Room-Elevation: C036-2000

Building: Control

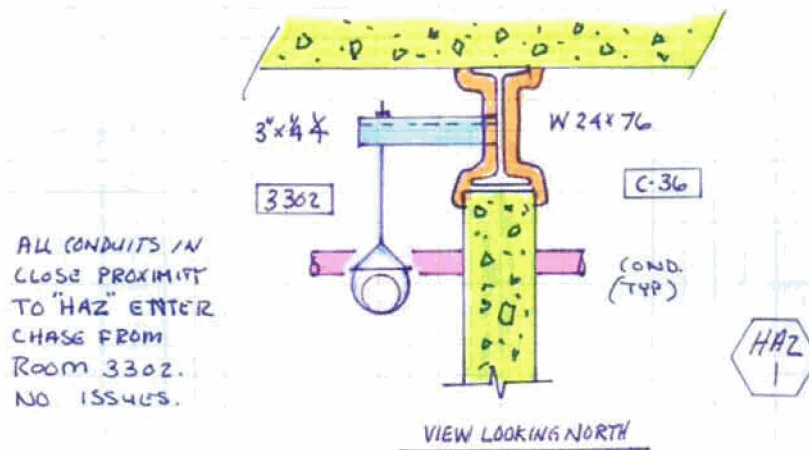
Fire Area: C-36

Description: Cable Chase @ CA-C6, 2000-0 to 2016-0,

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Structural Steel Fireproofing Data

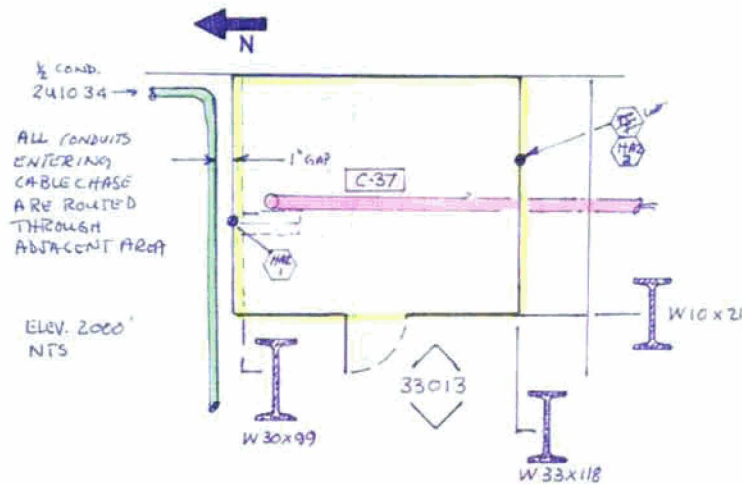
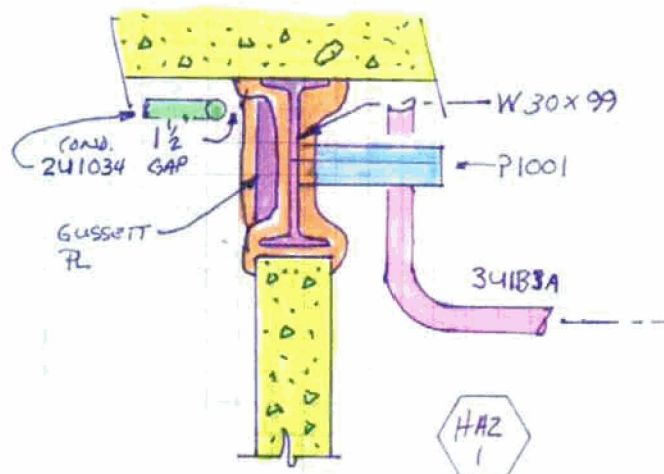
Appendix G5A

Room-Elevation: C037-2000

Building: Control

Fire Area: C-37

Description: Cable Chase @ CA-C3, 2000-0 to 2016-0

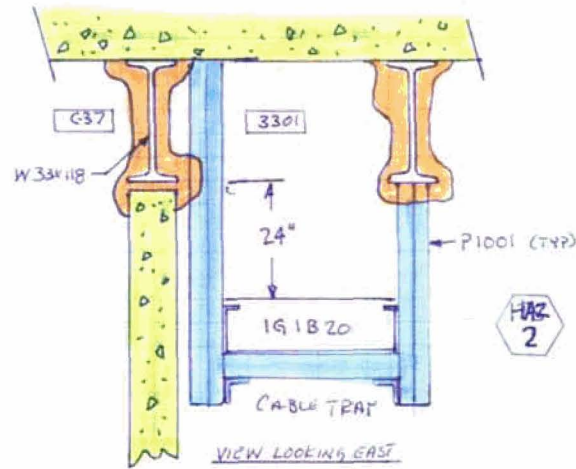
Room Sketch:**HAZ #1 Sketch****HAZ #1 Photo**

Structural Steel Fireproofing Data

Appendix G5A

C037-2000

HAZ #2 Sketch



HAZ #2 Photo



Structural Steel Fireproofing Data

Appendix G5A

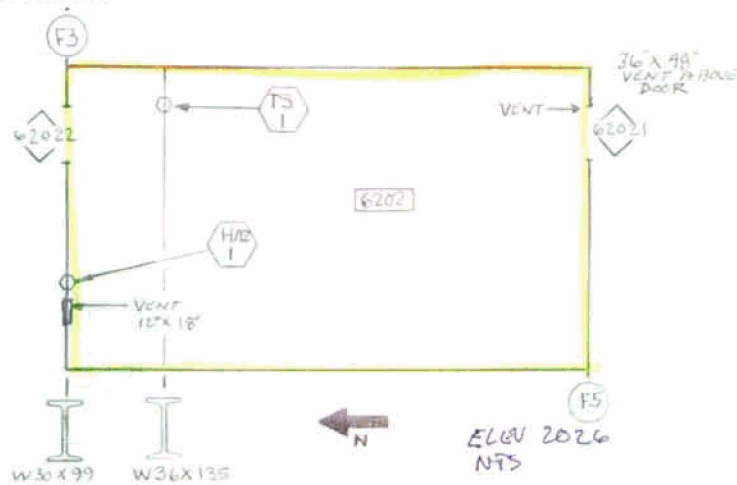
Room-Elevation: 6202-2026

Building: Fuel

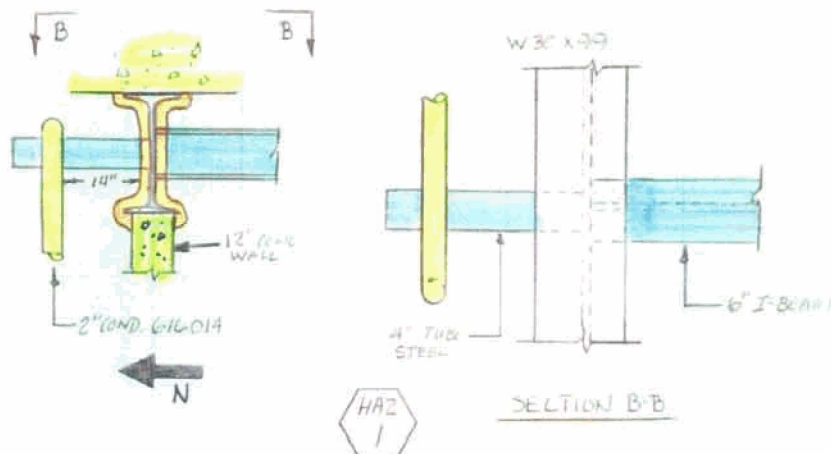
Fire Area: F-05

Description: Electrical Equipment Room

Room Sketch:



HAZ #1 Sketch



HAZ #1 Photo



Attachment H

Fire Protection Evaluations for Unique or
Unbounded Firestop and Cable Tray Cover Configurations

(There are currently no evaluations in this attachment)