

7/19/19  
Finance  
LEWIS EXCO  
R/pt

ESTIMATE DETAIL

UNI NUM.	BUILDING COMPONENT	QTY	UNITS	UNIT COST	TOTAL COST	COST/ SF	DIVISION SUBTOTAL
<b>07 HVAC DISTRIBUTION SYSTEMS SMOKE EVACUATION - Scope Option 1</b>							
<b>A1010</b>	<b>Standard Foundations</b>					<b>\$0.21</b>	<b>\$13,500</b>
1j	Foundation wall - allowance	1	LS	13500	\$13,500.00		
<b>B1020</b>	<b>Roof Construction</b>					<b>\$6.53</b>	<b>\$424,350</b>
1k	Roof structure, conc., 12"	8200	SF	42.25	\$346,450.00		
1k	premium for phased work	8200	SF	9.50	\$77,900.00		
<b>B2010</b>	<b>Exterior Walls</b>					<b>\$3.67</b>	<b>\$238,500</b>
1c	Cut openings, exterior wall, 24"x48" <i>includes scaffold, sawcut, ledger, demo &amp; removal</i>	32	EA	750.00	\$24,000.00		
1i	Shotcrete, 4"-6" thick - allowance	9,750	SF	22.00	\$214,500.00		
<b>B3010</b>	<b>Roof Coverings</b>					<b>\$2.05</b>	<b>\$133,000</b>
1k	New roofing	8,200	SF	11.75	\$96,350.00		
1k	New roof insulation	8,200	SF	3.25	\$26,650.00		
1k	Patch and Repair	1	LS	10000	\$10,000.00		
<b>C1010</b>	<b>Partitions</b>					<b>\$1.61</b>	<b>\$104,906</b>
1d	Pipe chase modifications	1	LS	30000	\$30,000.00		
1e	Draft curtain, premium ceiling	45	EA	1500	\$67,500.00		
1b	Duct chase, soffit, gypsum	230	LF	32.20	\$7,406.00		
<b>D3040</b>	<b>Distribution Systems</b>					<b>\$4.57</b>	<b>\$296,870</b>
1b	Duct, 48x18, ceiling	230	LF	350.00	\$80,500.00		
1c	Grilles, 48"x24", detention, isolation damper	32	EA	820.00	\$26,240.00		
1d	Intake penthouse, 34x34, curb	16	EA	1800.00	\$28,800.00		
1d	Isolation damper, 34x34	16	EA	480.00	\$7,680.00		
1d	Exhaust hoods, 34"x34"	16	EA	750.00	\$12,000.00		
1d	Grilles, 24"x24", detention	16	EA	365.00	\$5,840.00		
1d	Balancing damper, 24"	16	EA	240.00	\$3,840.00		
1b	Grilles, 18"x15", detention	142	EA	335.00	\$47,570.00		
1a	Exhaust fans, 7.5 HP. 42"	12	EA	6600	\$79,200.00		
1d	Motorized dampers, 20"	16	EA	325.00	\$5,200.00		
<b>D3060</b>	<b>Controls &amp; Instrumentation</b>					<b>\$0.15</b>	<b>\$10,000</b>
	HVAC controls modifications - allowance	1	LS	10000	\$10,000.00		
<b>D3070</b>	<b>Systems Testing &amp; Balancing</b>					<b>\$0.23</b>	<b>\$15,000</b>
	Balancing - allowance	1	LS	15000	\$15,000.00		

**ESTIMATE DETAIL**

UNI NUM.	BUILDING COMPONENT	QTY	UNITS	UNIT COST	TOTAL COST	COST/ SF	DIVISION SUBTOTAL
<b>D5010</b>	<b>Electrical</b>					<b>\$1.09</b>	<b>\$70,770</b>
1f	Equipment connections - allowance	1	LS	20000	\$20,000.00		
1o	Emergency lighting panel	1	EA	2970	\$2,970.00		
1o	New circuit breaker	1	EA	4800	\$4,800.00		
1o	Panel, 600A, new	1	EA	15000	\$15,000.00		
1o	Panelboard feeders - allowance	1	LS	12000	\$12,000.00		
1o	Conduit, wire - allowance	1	LS	16000	\$16,000.00		
<b>D5030</b>	<b>Communication and Security</b>					<b>\$0.55</b>	<b>\$36,000</b>
1g	Fire Alarm System modifications - allowance	1	LS	36000	\$36,000.00		
<b>D5040</b>	<b>Other Electrical Services</b>					<b>\$1.63</b>	<b>\$106,000</b>
1m & n	Emergency generator, ATS, 300kW, feeders	1	LS	106000	\$106,000.00		
<b>F1050</b>	<b>Special Controls and Instrumentation</b>					<b>\$0.15</b>	<b>\$9,500</b>
1h	Modifications, intertace with security controls - allowance	1	LS	9500	\$9,500.00		
<b>F2010</b>	<b>Building Element Demolition</b>					<b>\$2.97</b>	<b>\$193,000</b>
	Selective Building Demolition						
1j	Demo misc. @ foundation	1	LS	5000	\$5,000.00		
1i	Demo ext. wall finish - allowance	1	LS	20000	\$20,000.00		
1k	Demo roof structure, premium - allowance	8200	SF	17.50	\$143,500.00		
	Demo Misc. interior structure/ wall - allowance	1	LS	10000	\$10,000.00		
	Demo Misc. piping/ duct - allowance	1	LS	10000	\$10,000.00		
1l	Demo generator	1	LS	4500	\$4,500.00		
				<b>S/T</b>	<b>\$1,651,396</b>		
				<b>Contingency 30%</b>	<b>\$495,419</b>		
				<b>GC Mark-ups, OH&amp;P 20%</b>	<b>\$429,363</b>		
				<b>Total</b>	<b>\$2,576,178</b>		
				<b>Total with Softcosts 59%</b>	<b>\$4,096,123</b>		

## Task 7- Smoke Control System

### SUMMARY:

At the time of the facility's design in 1981, the State of Washington adopted the 1976 Uniform Building Code (UBC) and 1976 Uniform Fire Code (UFC). Neither of these codes have a requirement for a smoke control system in an I-occupancy building. The requirement for smoke control came after the building was designed (1981) and constructed (1982) in the 1985 building code. Our team has been designing jails since the 80's and has typically included smoke control as part of best design practices. Current codes prescribe a combination of fire detection, fire control/suppression, smoke compartmentation, smoke control, and inmate movement/egress to provide an adequate level of fire/life safety protection. This task addresses only the smoke control portion of the current code requirements.

The facility does not have a smoke control system complying with current code for the two-story housing units on the west side of the building. If the jail was built today, and fell under the 2015 IBC section 408.9 requirements for a group I-3 occupancy and a windowless building, a smoke control system would be required in each smoke compartment (each housing unit is considered a smoke compartment). The jail is considered a windowless building because there are no windows in the smoke compartment, they are not operable and they are not readily breakable.

The facility has a limited-coverage automatic deluge fire sprinkler system in the housing units as described under Task 5. The jail also has a procedure in place for moving/evacuating inmates in the event of a smoke or fire incident. We typically recommend a mechanical exhaust smoke control system for an existing building in order to maintain a tenable environment for exiting from the smoke compartment in the area of fire origin. The requirements of the mechanical exhaust smoke control system are to maintain a smoke layer 6 feet above a walking surface that forms a portion of a required egress system within the smoke zone (Section 909.8.1). The requirements for the size of the intake opening is defined as the greater of 200fpm where the makeup air can come into contact with the smoke plume, or as required to limit the pressure drop across egress doors below the required door-opening or closing forces. All make-up openings need to be below the bottom of the smoke layer. Further investigate of existing wall construction and size of openings in the smoke barrier walls of the housing unit will be required to establish the exact airflow requirements to maintain the minimum door opening force.

The current fire alarm system sequence shuts down the existing HVAC equipment so that smoke is not moved from the area of the building where smoke is present to any other area of the building through the building's ductwork system. The existing HVAC system and equipment is not rated to exhaust smoke. Integrating a new HVAC smoke control system into an existing operational jail facility poses many challenges. Structural improvements, security upgrades, floorplan modifications, roof modifications while maintaining operations are all made more difficult and more expensive.

The team reviewed several possible scenarios for installing a new smoke evacuation system. To make the new system functional requires major demolition to the roof areas, with major structural improvements at the roof and the exterior walls. New openings would need to be cut into existing exterior walls to be used for new grille openings to exhaust smoke in the event of a fire. This poses a security problem in each inmate cell. While security bars can be installed, there are still issues with passing of contraband through an operable grille. Installing the grill above the existing windows in the wall poses a structural problem as it would interfere with the structural integrity of the window header. Removing the windows located within the cells to

install grilles, renders them non-compliant with the American Correctional Association's requirements for natural light provided in each cell.

The amount of openings needed in the west wall adds significant reconstruction to the exterior wall to meet current building codes. That wall was built using hollowcore wall panels. The new 24"x48" openings will compromise the integrity of the vertical and lateral load carrying ability of the panels. The gunite and insulation on the outside face would need to be removed, and an estimated new 4"-6" +/- thick reinforced shotcrete layer added to compensate. This additional shotcrete load would need to be carried down to foundation, requiring a new foundation wall adjacent to the existing foundation wall.

Similar conditions will occur at the roof. The roof is also constructed using hollowcore panels. Hollowcore slab by design is not conducive to large openings being cut into it after it has been designed and installed. Hollowcore slab designs typically require all openings be known and located on the design drawings. The slab manufacturer then adjusts the prestressed strand layout and adds mild reinforcing and/or steel embeds to address the loss of strength and stress concentrations that result from the opening. Openings are limited in size, and quite often located so that the opening straddles two adjacent panels. This is true whether the hollowcore slab is used in the horizontal orientation such as a floor or roof slab, or the vertical orientation such as a bearing/shear wall.

The size of the penetrations through the roof hollowcore slab required for the smoke evacuation system, 36x36 and 48x48, would compromise the structural integrity of the existing hollowcore slab. Therefore, the existing hollowcore roof slab would need to be removed and a new cast-in-place system added back in with the smoke evacuation system penetrations cast in. This would allow the additional reinforcing necessary to address the penetrations in the new conventionally reinforced slab.

The team also reviewed possible options to utilize a single cell in each housing area for the smoke control system. Structurally the same problems exist but are slightly less severe. The smoke control would then be minimized to a central area. This is an improvement but not feasible. The biggest drawback would be the elimination of one cell in each unit, for a total of 6 cells.

All of the new work can be performed but at a high construction cost and significant disruption to operations. Unforeseen conditions found during construction may also impede the new system from being completely code compliant upon its installation. Maintaining security in this active jail facility during this major renovation appears to be a non-starter, and funding may be better saved for the new construction.

The options described below assume the existing walls and doors of the housing units are, or can be made to be, code compliant smoke barriers with door openings protected by fire door assemblies complying with Section 716.5.3. The openings through the smoke barriers for pipes and ducts will be resealed as part of the option.

In order to support a new smoke evacuation system, upgrades will be required to the electrical power distribution, emergency/standby power and fire alarm systems. Based on review of the available record documents and non-invasive field observation, the existing building emergency generator is operating at capacity. A power monitoring study could be conducted to confirm the actual operating load on the existing generator and associated power distribution system, but is not necessary. A new, second diesel engine generator – to replace the existing abandoned generator in the basement – would be provided, as would a new automatic transfer switch (ATS), panelboard and branch circuits for the smoke control fans and

associated controls. The fire alarm system would be expanded to provide required detection, activation and smoke management controls.

**GENERAL FINDINGS:**

- 1) The two-story tall housing units in the facility do not have a smoke control system.
  - a) The approach to providing smoke control in the housing units would be to use independent mechanical exhaust smoke control systems in each of the housing units.
    - i) The exhaust equipment will be located on the roof above the housing unit they serve to exhaust smoke directly outside.
      - (1) The size and quantity of exhaust openings is determined to prevent "plugholing". This is when the make-up air moves at too high a velocity and is pulled through the smoke layer without exhausting the smoke.
    - ii) Makeup air for the exhaust fan will be drawn directly through the exterior wall and from the roof through the existing pipe chases of each housing unit.
      - (1) The make-up air openings will be through new wall openings in the lower level cells of the housing unit. This is to ensure the openings are below the bottom of the smoke layer assumed in the design calculations. The existing windows will remain as natural daylight is required in the cells and day rooms.
      - (2) The size of the openings needs to be large enough to not cause an issue in opening doors to the space and shall not be any faster than 200fpm if it will come into direct contact with the smoke plume.
        - (a) All make-up air openings will be on the lower cell level as the bottom of the smoke layer is targeted to be at or above the upper cell floor depending on the option chosen in the next section.
        - (b) The designs listed below as projects 1 and 2 assume the inlet velocity of the make-up air openings are above 200fpm, but should not come into contact with the smoke plume at that velocity. If a cell on the lower level contains a fire, the make-up openings in that cell need to remain closed.
        - (c) Opening sizes will be driven based on acceptable opening forces at the sally port door. Exact dimensions to be further investigated depending on air leakage rates of the housing unit walls.
    - iii) The fire alarm system currently shuts down the HVAC equipment so any smoke in the system will not transfer to other spaces through the buildings ductwork system. This sequence will remain unchanged.
    - iv) In order for the make-up air to get to the exhaust fan, the lower level cell doors will need to be opened.
    - v) The existing facility emergency/standby power system (described below) would not support the new smoke control system.
      - (1) There is one emergency/standby diesel engine generator, located in the basement generator room rated 250kW.
      - (2) A second diesel engine generator is installed within the same room. This engine generator appears to be original to the building, and has been decommissioned. It is abandoned in place.
      - (3) A single ATS, rated 600 Amps at 480Y/277 Volts, 3 phase, 4 wire provides emergency power to the building emergency power distribution system.

**Smoke Control System**

- (4) There is no additional capacity available within the existing generator system. The system is maxed out with load shedding. To accommodate new loads, a new generator would need to be added. The building fire alarm system is a Simplex 4100 system, which has been installed fairly recently along with an automatic deluge system.

**OPTIONS FOR IMPROVEMENTS AND UPGRADES:**

The following summarizes the general requirements for two smoke control system options. While two scope options have been identified, it is the design team's recommendation to not move forward with these projects due to cost and logistical issues of major construction projects in an occupied jail facility. The first option is if the system installed is up to code requirements. The second is a system that would provide a level of protection below code recommendations, but aligns with the facilities current procedures around inmate movements during a smoke/fire event. Both projects assume linens are set on fire in one of the lower cells and the smoke moves out of the cell and into the two-story tall housing unit to be exhausted through the roof. The final design for the smoke exhaust system is to be determined using CFD analysis and verifications of acceptable door opening forces based on field conditions. The calculations performed and sketches generated during this phase of the project are for cost estimating purposes only.

- 1) Scope Option 7-1 –Provide a code-compliant smoke control system in each of the two-story housing units to maintain the smoke layer 6 feet above the floor level of the upper cell. Refer to attached sketch M7.01.01 through M7.01.05.
- a) Two 7.5hp upblast type exhaust fans (similar to Greenheck TAUB 42H) will be installed on the roof of each housing unit centered between the upper cell wall and the duct enclosure on the east wall. Fans will provide independent smoke exhaust systems for each housing unit.
  - b) 48x18 exhaust ductwork will be routed just below the ceiling of the housing units, outside the cells, between the two exhaust fans and on the outside of each exhaust fan (refer to sketches). The ductwork shall have multiple 18x13 exhaust grilles installed in the side of the ductwork (refer to sketches for quantity). Each grille shall have a balancing damper with an access door for field modulation of each pair of balancing dampers. Exhaust grilles shall be similar to Kruger series 1310. Ductwork will be enclosed in protective gyp cover like the existing sprinkler piping.
  - c) 48x24 make-up air openings will be required in the walls of the lower cells. Each opening will require a thermally insulated isolation damper. Openings will receive security bars similar to the existing ones at the cell windows.
  - d) The existing pipe chases will be used as a pathway for make-up air drawn from the roof. A 24x24 security type grille similar to Kruger series 1310 will be installed per pipe chases at the lower cell level. An intake penthouse will be installed on the roof for each pipe chase at approximately 34x34 in size, installed on a roof curb, and provided with a motorized isolation damper. The make-up grille will have a balancing damper. Refer to attached sketches for quantity.
  - e) Draft curtains will be installed 4 feet apart on either side of the lower cell doors. Refer to attached sketches.
  - f) Install a new generator and connect the new equipment to the new emergency power system. The new equipment will connect to the fire alarm system.
  - g) The cell doors will connect to the fire alarm system or be manually opened by the deputies in order for the make-up air to get to the exhaust fan.
  - h) The gunite and insulation on the outside of the west wall will be removed and an estimated new 4"-6" +/- thick reinforced shotcrete layer added to carry the roof load.

**Smoke Control System**

- i) A new foundation wall will be added to the outside of the existing foundation wall in this location.
  - j) The roof openings would be placed in each 8' wide hollowcore slab, which will require the removal of the entire 27'-4" spanning hollowcore roof slab over the housing units. Removal of the hollowcore slab will require a crane to lift the individual hollowcore slabs as they are sawcut free. The existing concrete at each end of the hollowcore will need to be carefully chipped away to free the panel from the wall dowels and embed connections. Each roof panel will be replaced by an approximately 12" thick conventionally reinforced concrete slab. This process will need to be phased, with replacement work occurring simultaneously with the removal work, so that the bearing walls are not left unbraced due to a missing roof diaphragm for long periods of time.
  - k) Remove the existing abandoned generator.
  - l) Provide new emergency/standby diesel engine generator to be installed in the basement generator room where the abandoned generator was removed. Conceptual generator system size is 300kW/375 kVA.
  - m) Provide new 600 Amp ATS and output distribution panelboard and associated normal and emergency feeders.
  - n) Provide branch panelboard(s), motor controllers and branch circuits to supply smoke management fans, dampers and associated controls.
  - o) Provide fire alarm detection, signaling and smoke management system controls.
- 2) Scope Option 7-2 – Provide a smoke control system in each of the two-story housing units to maintain the smoke layer 3 feet above the floor of the upper cells. Refer to attached sketch M7.02.01 through M7.02.05.
- a) Provide three 7.5hp upblast type exhaust fans (similar to Greenheck TAUB 42H) on the roof of each housing unit centered between the upper cell wall and the duct enclosure on the east wall. Each fan will exhaust air directly from the space through a ceiling grille. Refer to attached sketches for size of the ceiling grilles. The groups of three fans will provide independent smoke exhaust systems for each housing unit. Refer to attached sketches.
  - b) 48x24 make-up air openings will be required in the walls of the lower cells. Each opening will require a thermally insulated isolation damper. Openings will receive security bars similar to the existing ones at the cell windows.
  - c) The existing pipe chases will be used as a pathway for make-up air drawn from the roof. A 24x24 security type grille similar to Kruger series 1310 will be installed per pipe chase at the lower cell level. An intake penthouse will be installed on the roof for each pipe chase at approximately 20x20 in size, installed on a roof curb, and provided with a motorized isolation damper. The make-up grille will have a balancing damper. Refer to attached sketches for quantity.
  - d) The new equipment will connect to emergency power.
  - e) The new equipment will connect to the fire alarm system.
  - f) The cell doors will connect to the fire alarm system or be manually opened by the deputies in order for the make-up air to get to the exhaust fan.
  - g) The gunite and insulation on the outside of the wall will be removed and an estimated new 4"-6" +/- thick reinforced shotcrete layer added to carry the roof load.
  - h) A new foundation wall will be added to the outside of the existing foundation wall in this location.
  - i) The roof penetrations would occur in approximately 35% of the roof hollowcore slabs. The affected slabs would be sawcut free of the adjacent hollowcore slab, then carefully chipped free of their supports at each end, then lifted by crane and removed. A new cast-in place roof slab with the new openings designed and located, would be cast.

**Smoke Control System**

- j) Remove the existing abandoned generator.
- k) Provide new emergency/standby diesel engine generator to be installed in the basement generator room where the abandoned generator was removed. Conceptual generator system size is 300kW/375 kVA.
- l) Provide new ATS and output distribution panelboard and associated normal and emergency feeders.
- m) Provide branch panelboard(s), motor controllers and branch circuits to supply smoke management fans, dampers and associated controls.
- n) Provide fire alarm detection, signaling and smoke management system controls.

**ATTACHED DOCUMENTS:**

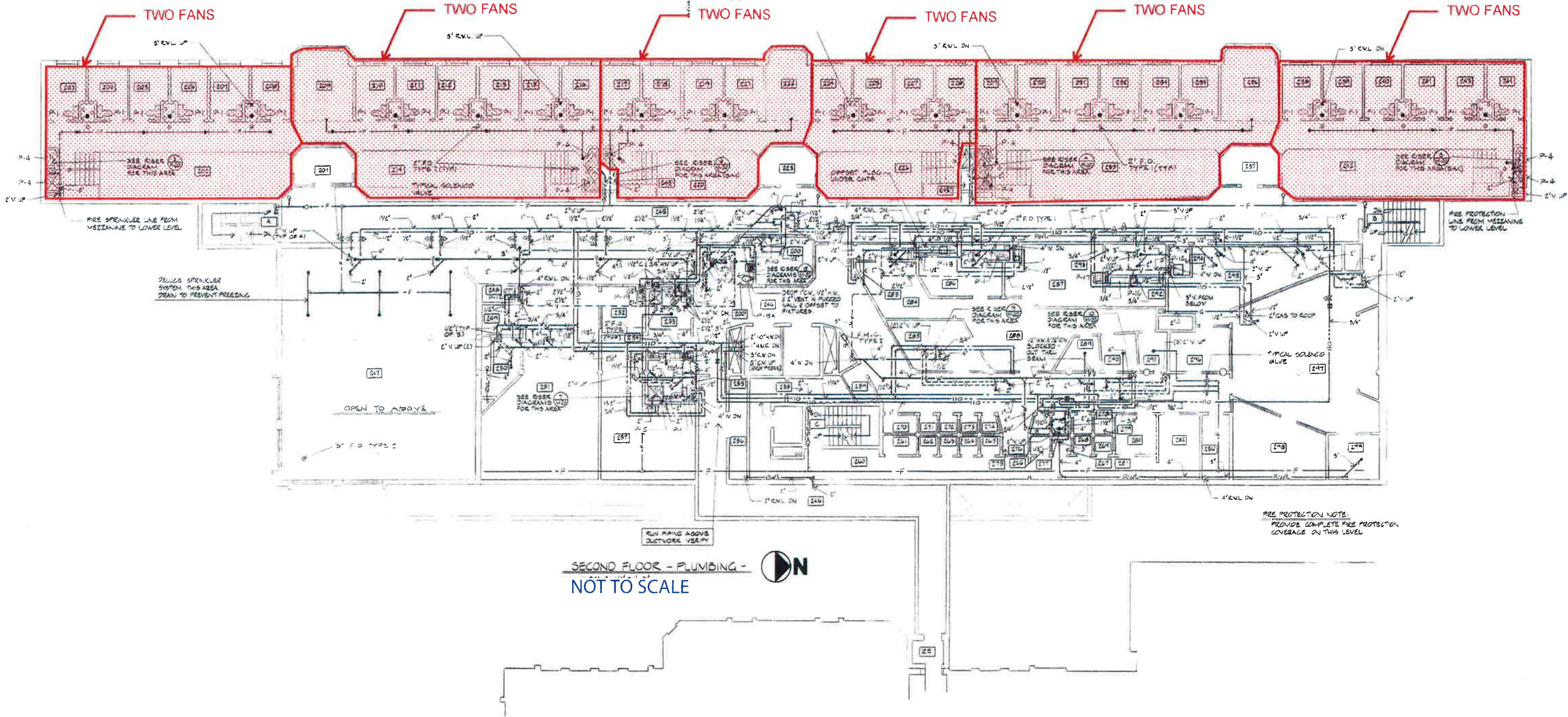
Scope Option 7-1

- M7.01.01 – Overall Quantity of Fans
- M7.01.02 – Third Floor
- M7.01.03 – Second Floor
- M7.01.04 – Section Looking North
- M7.01.05 – Section Looking West

Scope Option 7-2

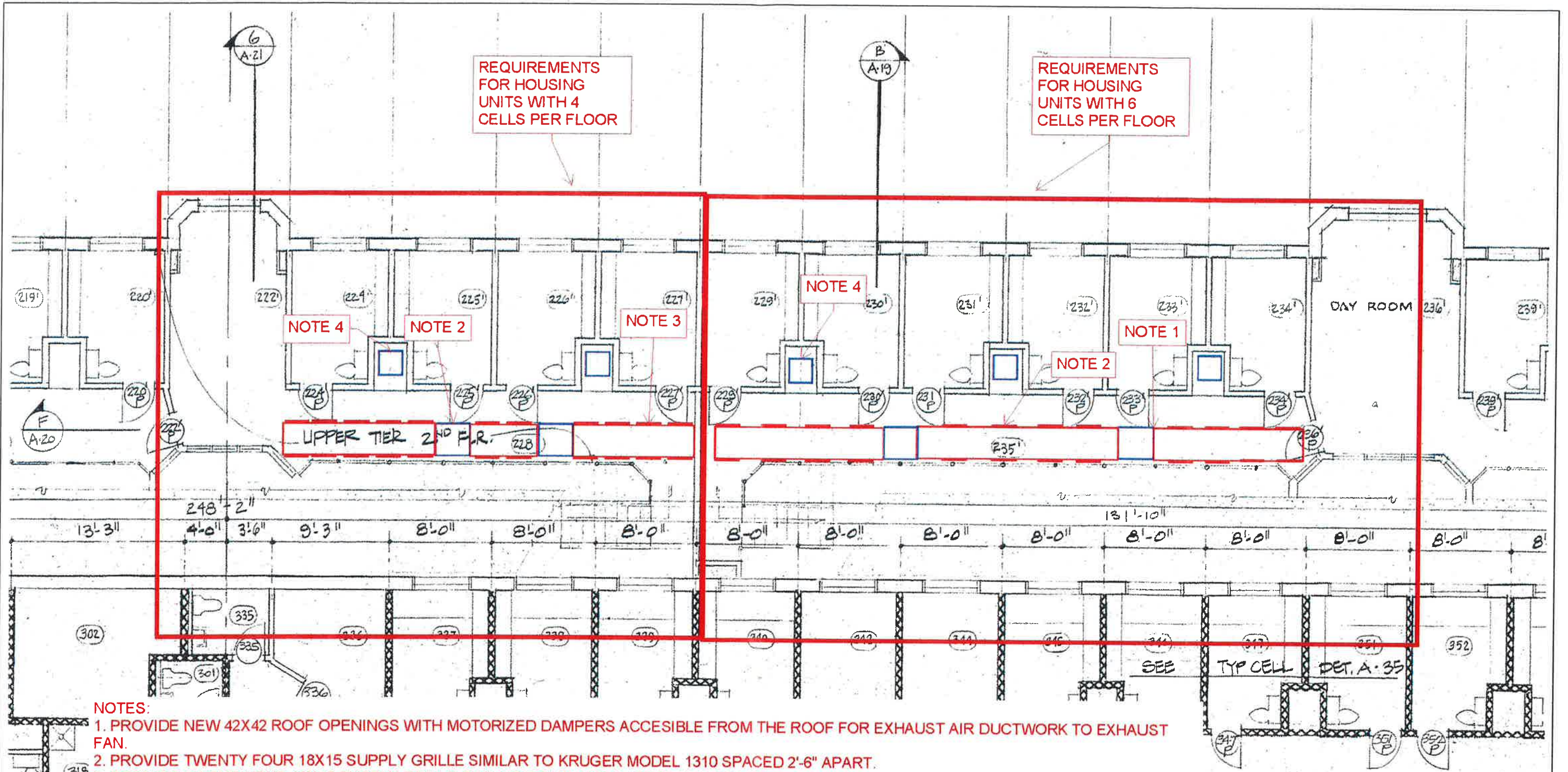
- M7.02.01 – Overall Quantity of Fans
- M7.02.02 – Third Floor
- M7.02.03 – Second Floor
- M7.02.04 – Section Looking North
- M7.02.05 – Section Looking West





SCOPE OPTION 7-1: Install a code-compliant smoke control system in each of the two-story housing units to maintain the smoke layer 6 feet above the floor level of the upper cell.

PHASE 1B - JAIL ASSESSMENT  
 WHATCOM COUNTY  
 BELLINGHAM, WA

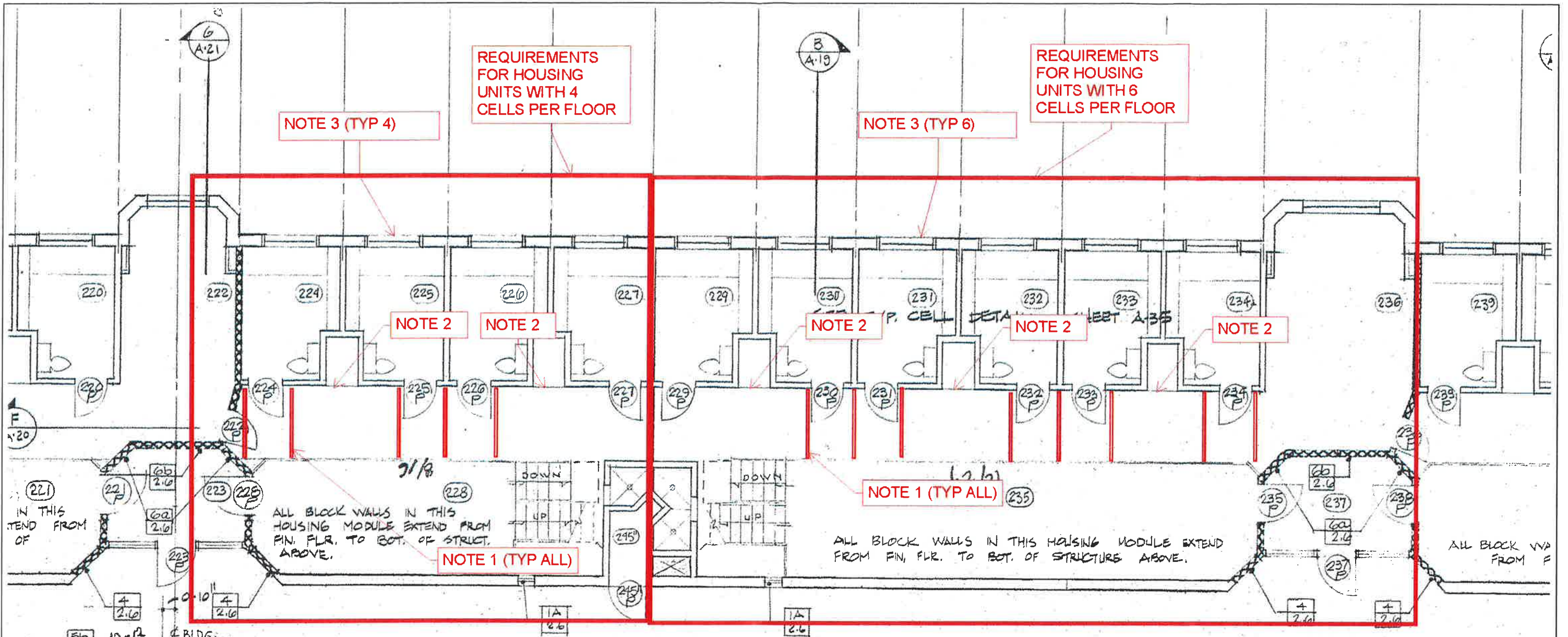


**NOTES:**

- 1. PROVIDE NEW 42X42 ROOF OPENINGS WITH MOTORIZED DAMPERS ACCESSIBLE FROM THE ROOF FOR EXHAUST AIR DUCTWORK TO EXHAUST FAN.
- 2. PROVIDE TWENTY FOUR 18X15 SUPPLY GRILLE SIMILAR TO KRUGER MODEL 1310 SPACED 2'-6" APART.
- 3. PROVIDE TWENTY TWO 18X15 SUPPLY GRILLE SIMILAR TO KRUGER MODEL 1310 SPACED 2'-6" APART.
- 4. PROVIDE NEW 20X20 ROOF OPENINGS WITH MOTORIZED DAMPERS ACCESSIBLE FROM THE ROOF FOR MAKEUP AIR INTAKE HOODS. HOODS SIZED AT 34X34 EACH.

SCOPE OPTION 7-1: Install a code-compliant smoke control system in each of the two-story housing units to maintain the smoke layer 6 feet above the floor level of the upper cell.

PHASE 1B - JAIL ASSESSMENT  
 WHATCOM COUNTY  
 BELLINGHAM, WA



**NOTES:**

1. PROVIDE NON COMBUSTIBLE DRAFT CURTAINS THAT EXTEND BELOW THE UPPER FLOOR LEVEL OF PLATFORM ABOVE TO JUST ABOVE THE DOOR SWING. DRAFT CURTAINS SHALL BE 4 FEET APART. DRAFT CURTAIN FINAL DESIGN BY OTHERS. DRAFT CURTAIN WILL CAUSE REWORK TO EXISTING SPRINKLER PIPE ENCLOSURE AND LIGHT LOCATIONS.
2. PROVIDE A 24X24 SUPPLY GRILLE SIMILAR TO KRUGER MODEL 1310. PIPE CHASE SHALL BE USED AS A PLENUM WITH A ROOF MOUNTED INTAKE HOOD WITH ISLATION DAMPER INSTALLED ON TOP OF THE SHAFT.
3. PROVIDE NEW 48X24 WALL OPENING ABOVE CELL WINDOW. PROVIDE SECURITY BARS ACROSS DAMPER SIMILAR TO WINDOW.

SCOPE OPTION 7-1: Install a code-compliant smoke control system in each of the two-story housing units to maintain the smoke layer 6 feet above the floor level of the upper cell.

PHASE 1B - JAIL ASSESSMENT  
WHATCOM COUNTY  
BELLINGHAM, WA

APPROX LOCATION OF MAKE-UP AIR WALL OPENING

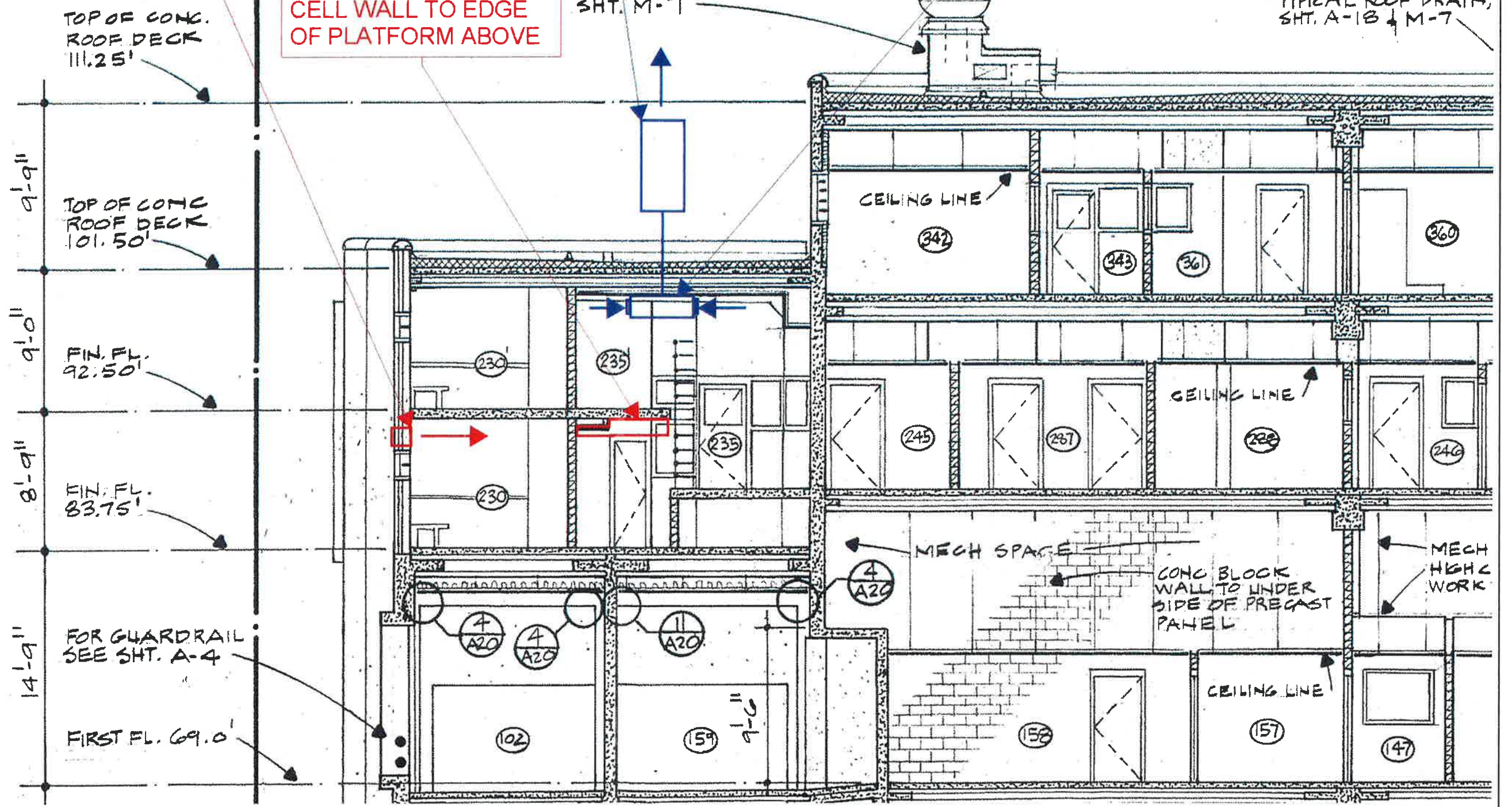
EXHAUST FAN (TYP 2 PER HOUSING UNIT)

48X18 EXHAUST DUCT BETWEEN ROOF PENETRATIONS WITH PROTECTIVE GYP ENCLOSURE.

DRAFT CURTAIN FROM CELL WALL TO EDGE OF PLATFORM ABOVE

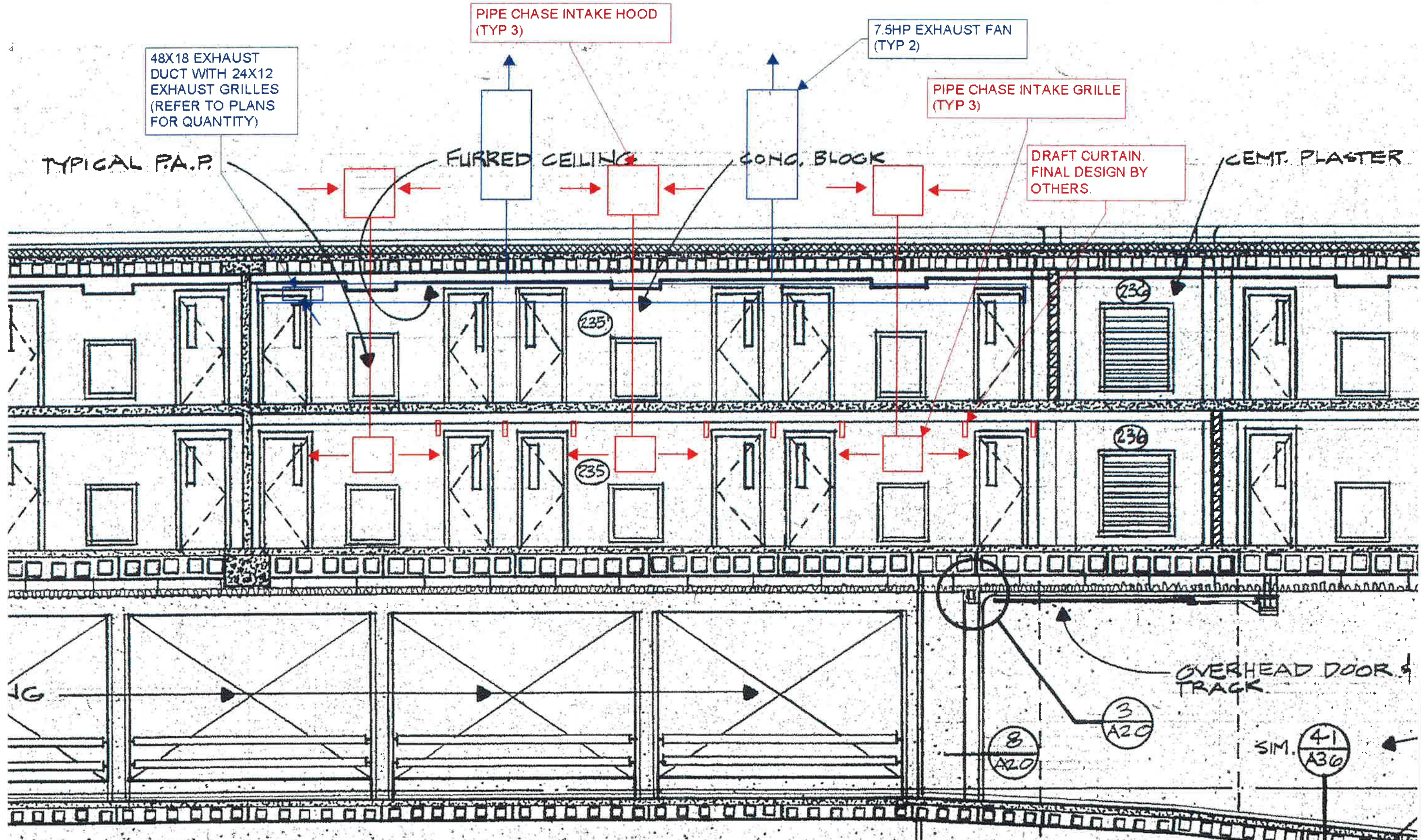
MECH. EQUIP ON RAISED CONG. BLOCK SHAFT, SEE SHT. M-7

TYPICAL ROOF DRAIN, SHT. A-18 & M-7



SCOPE OPTION 7-1: Install a code-compliant smoke control system in each of the two-story housing units to maintain the smoke layer 6 feet above the floor level of the upper cell.

PHASE 1B - JAIL ASSESSMENT  
WHATCOM COUNTY  
BELLINGHAM, WA



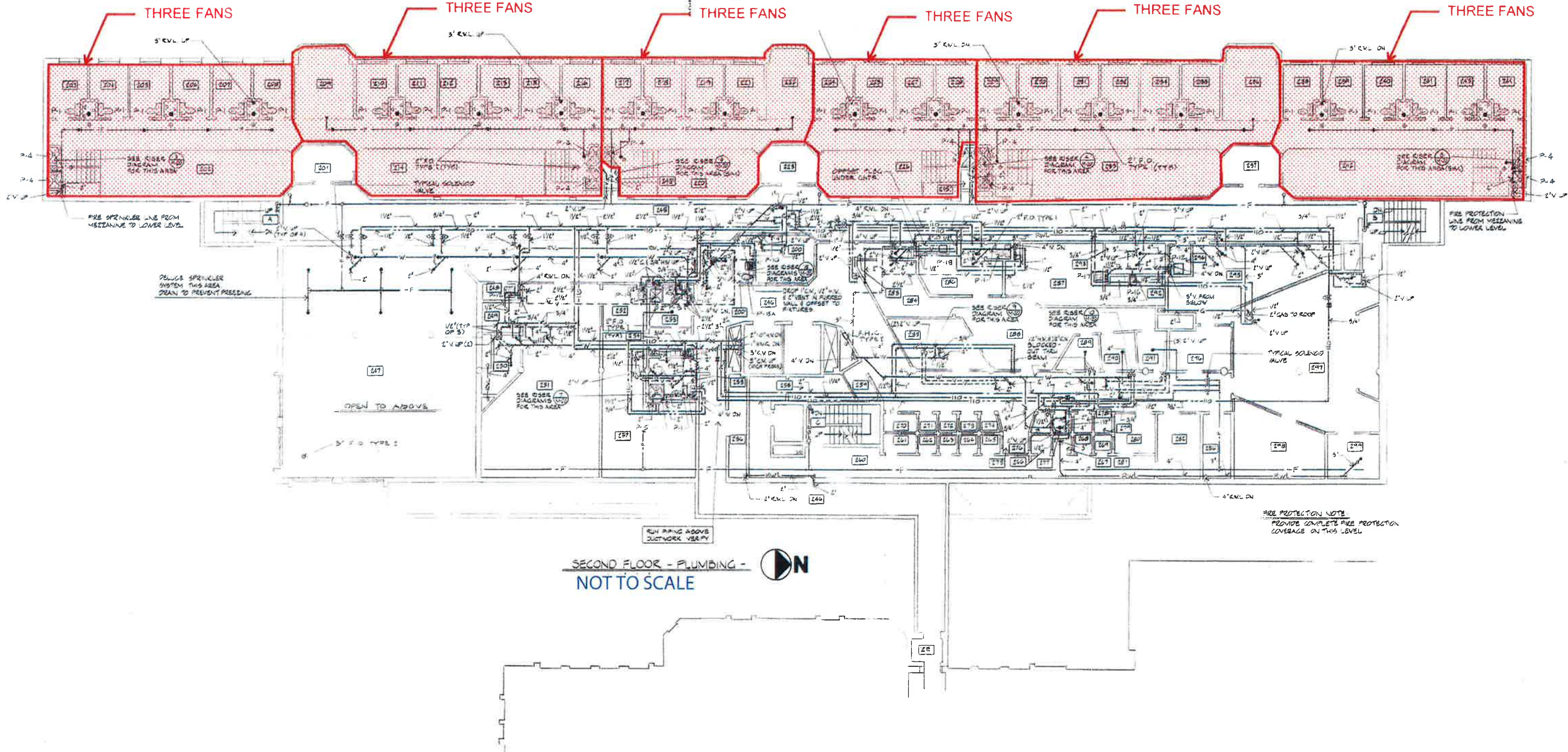
SCOPE OPTION 7-1: Install a code-compliant smoke control system in each of the two-story housing units to maintain the smoke layer 6 feet above the floor level of the upper cell.

PHASE 1B - JAIL ASSESSMENT  
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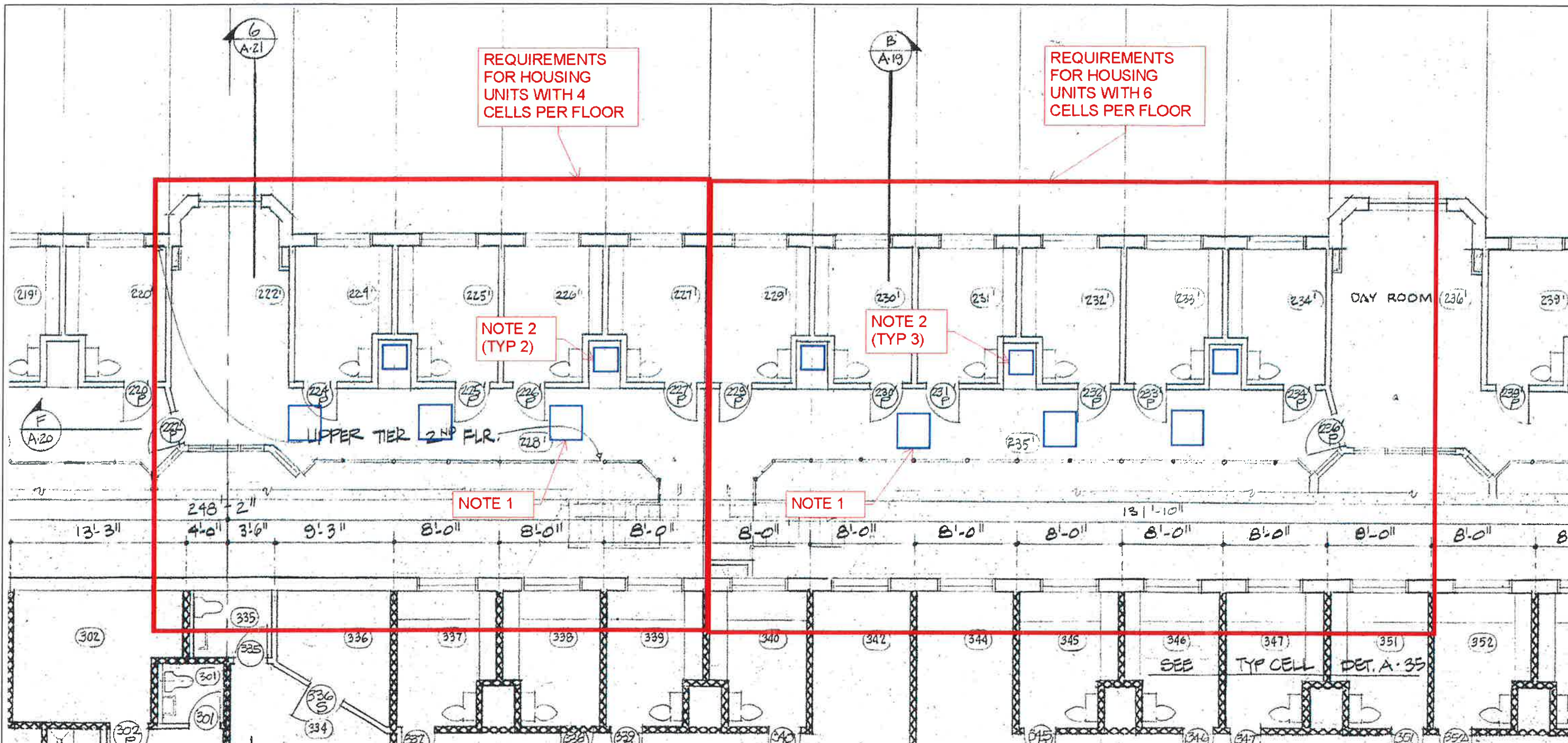
SHEET NAME  
TASK 7 PROJECT 1  
SECTION LOOKING WEST  
SHEET NO  
M7.01.05



SECOND FLOOR - PLUMBING -  
NOT TO SCALE

SCOPE OPTION 7-2: Install a smoke control system in each of the two-story housing units to maintain the smoke layer 3 feet above the floor of the upper cells.

PHASE 1B - JAIL ASSESSMENT  
WHATCOM COUNTY  
BELLINGHAM, WA



REQUIREMENTS FOR HOUSING UNITS WITH 4 CELLS PER FLOOR

REQUIREMENTS FOR HOUSING UNITS WITH 6 CELLS PER FLOOR

NOTE 2 (TYP 2)

NOTE 2 (TYP 3)

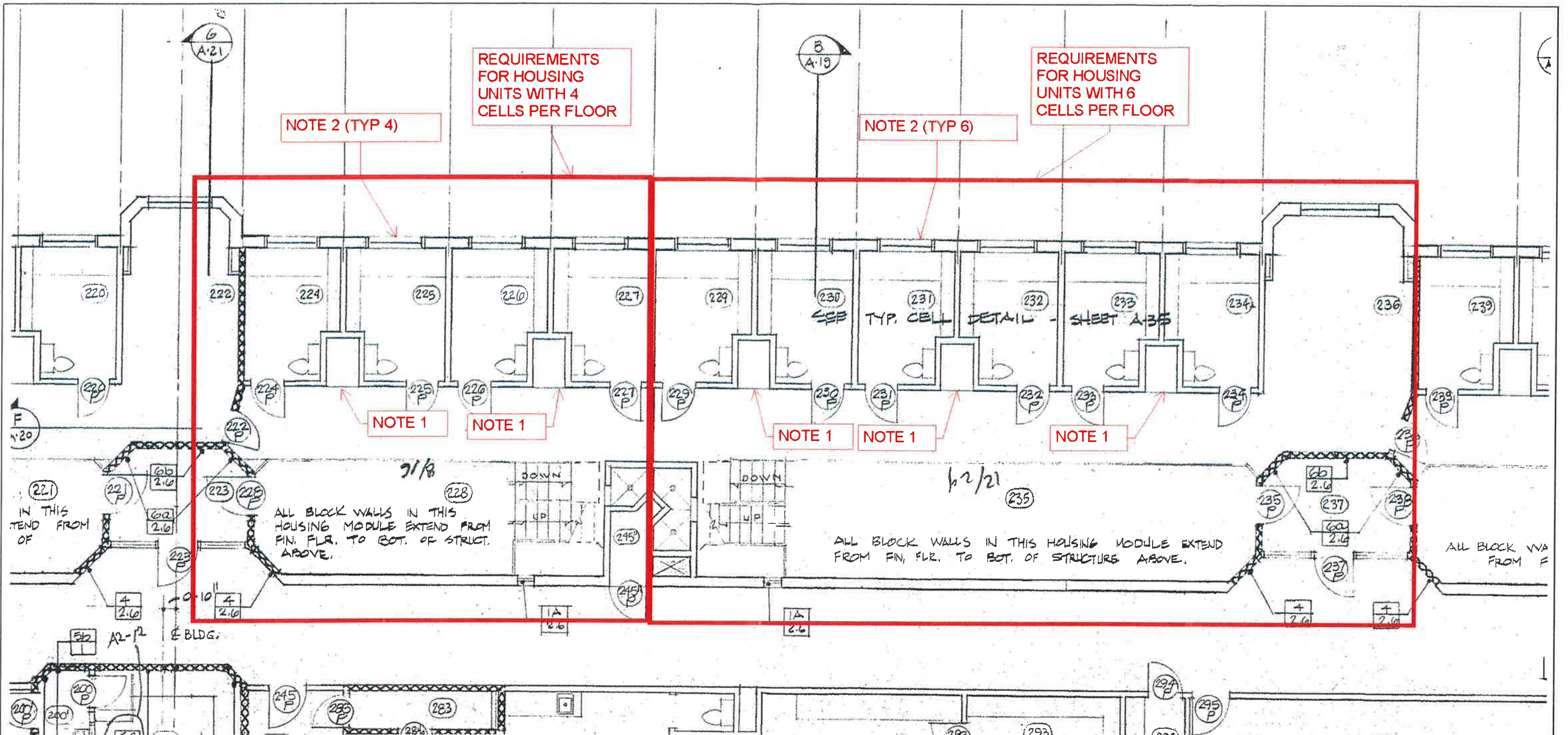
NOTE 1

NOTE 1

- NOTES:**
1. PROVIDE NEW 42X42 ROOF OPENINGS WITH MOTORIZED DAMPERS ACCESSIBLE FROM THE ROOF FOR EXHAUST AIR DUCTWORK TO EXHAUST FAN.
  2. PROVIDE NEW 20X20 ROOF OPENINGS WITH MOTORIZED DAMPERS ACCESSIBLE FROM THE ROOF FOR MAKEUP AIR INTAKE HOODS. HOODS SIZED AT 34X34 EACH.

SCOPE OPTION 7-2: Install a smoke control system in each of the two-story housing units to maintain the smoke layer 3 feet above the floor of the upper cells.

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REQUIREMENTS FOR HOUSING UNITS WITH 4 CELLS PER FLOOR

REQUIREMENTS FOR HOUSING UNITS WITH 6 CELLS PER FLOOR

NOTE 2 (TYP 4)

NOTE 2 (TYP 6)

NOTE 1

NOTE 1

NOTE 1

NOTE 1

NOTE 1

ALL BLOCK WALLS IN THIS HOUSING MODULE EXTEND FROM FIN. FLR. TO BOT. OF STRUCT. ABOVE.

ALL BLOCK WALLS IN THIS HOUSING MODULE EXTEND FROM FIN. FLR. TO BOT. OF STRUCTURE ABOVE.

**NOTES:**

1. PROVIDE A 24X24 SUPPLY GRILLE SIMILAR TO KRUGER MODEL 1310. PIPE CHASE SHALL BE USED AS A PLENUM WITH A ROOF MOUNTED INTAKE HOOD WITH ISLATION DAMPER INSTALLED ON TOP OF THE SHAFT.
2. PROVIDE NEW 48X24 WALL OPENING ABOVE CELL WINDOW. PROVIDE SECURITY BARS ACROSS DAMPER SIMILAR TO WINDOW.

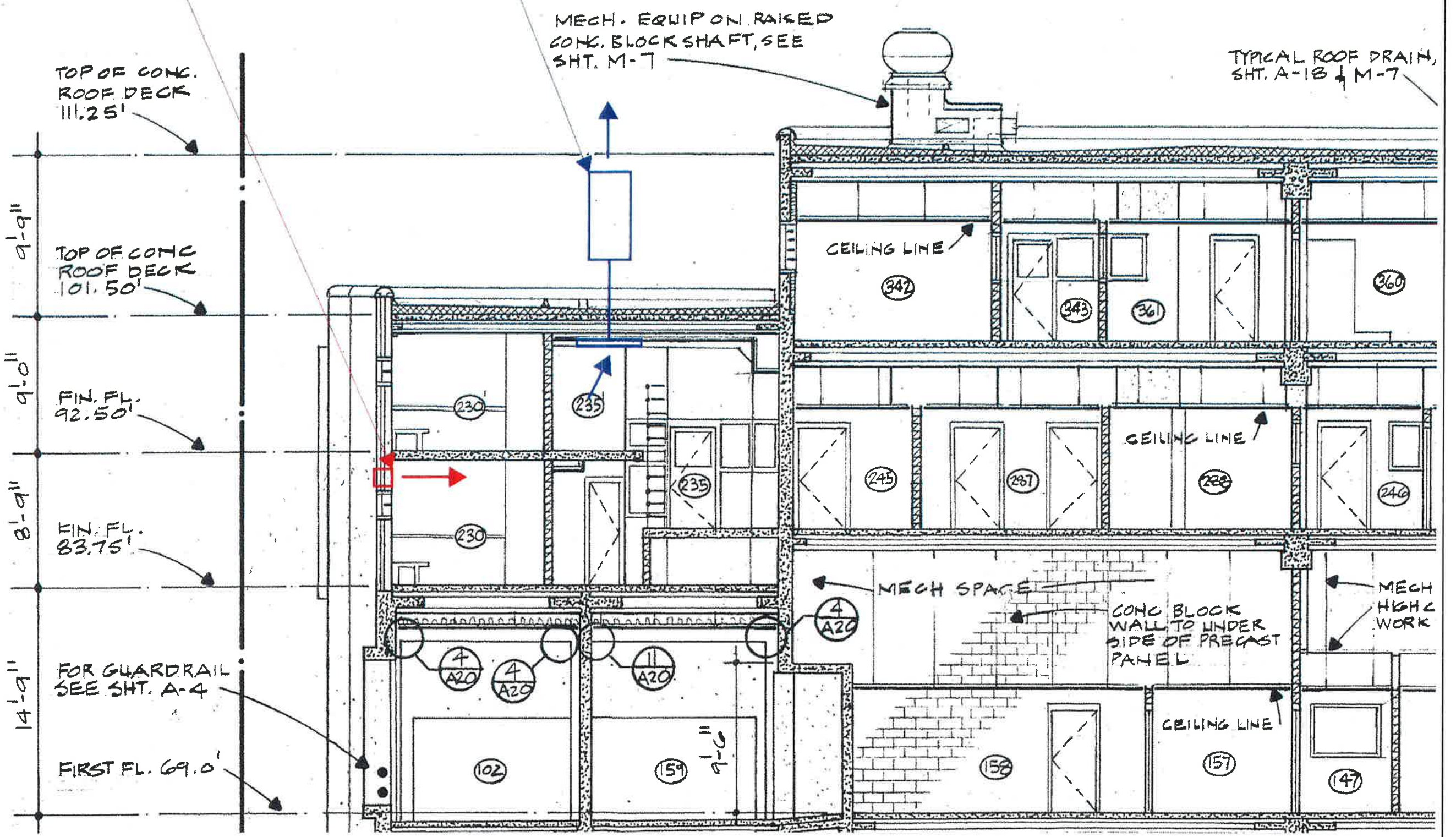
SCOPE OPTION 7-2: Install a smoke control system in each of the two-story housing units to maintain the smoke layer 3 feet above the floor of the upper cells.

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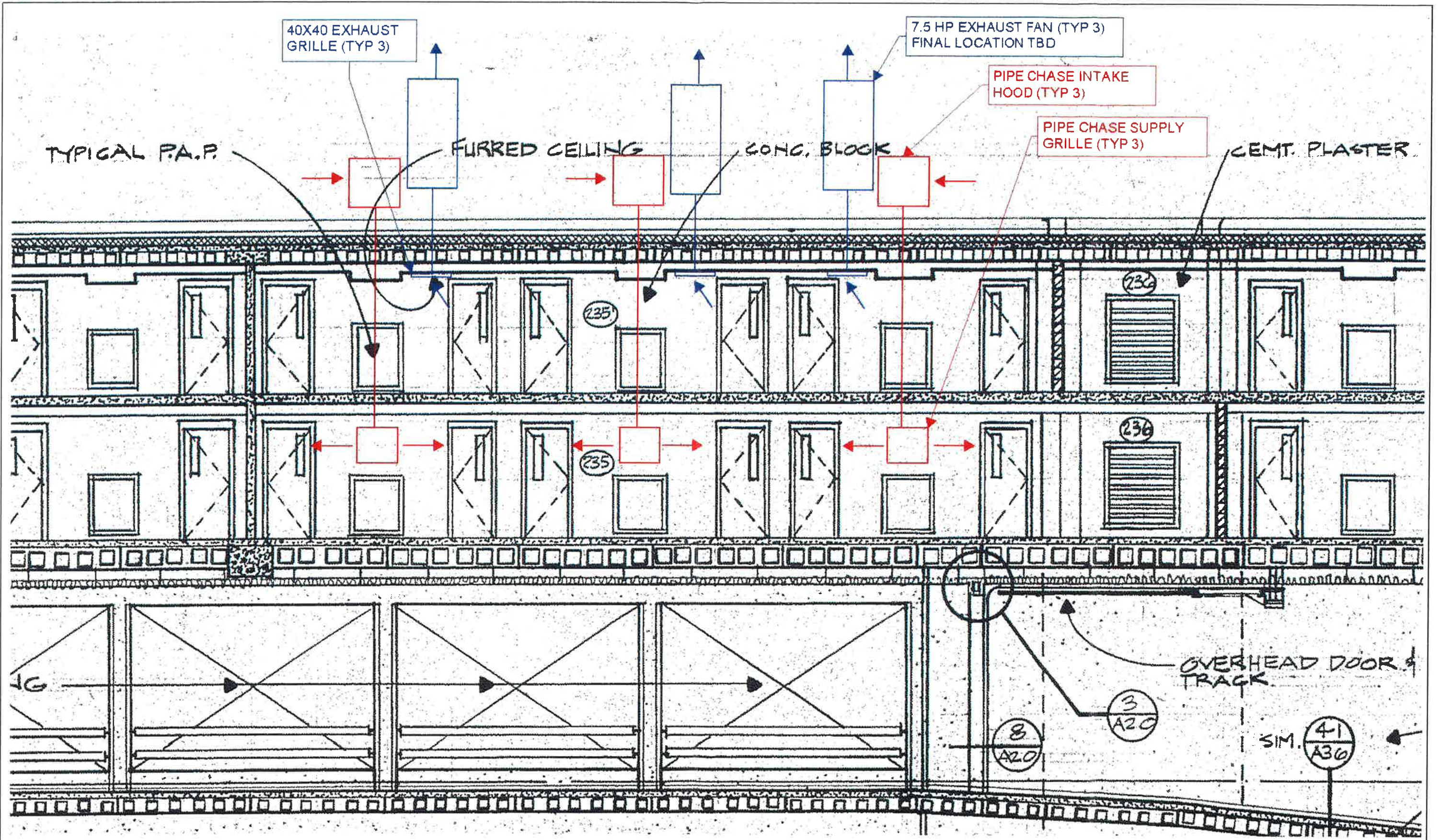
APPROX LOCATION OF MAKE-UP AIR WALL OPENING

EXHAUST FAN (TYP 3 PER HOUSING UNIT)



SCOPE OPTION 7-2: Install a smoke control system in each of the two-story housing units to maintain the smoke layer 3 feet above the floor of the upper cells.

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SCOPE OPTION 7-2: Install a smoke control system in each of the two-story housing units to maintain the smoke layer 3 feet above the floor of the upper cells.

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