

## ENGINEERING CHANGE NOTICE

1 ECN 657602

Page 1 of 2Proj  
ECN

2 ECN Category (mark one)		3 Originator's Name Organization MSIN and Telephone No <b>N H Dehkordi, 15510, T4-20, 376 6702</b>	4 USQ Required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5 Date <b>01/12/00</b>
Supplemental Direct Revision Change ECN Temporary Standby Supersedure Cancel/Void		6 Project Title/No /Work Order No <b>Emergency Lighting Study</b> <i>1/12/00</i> <b>Update/100712 110793</b>	7 Bldg /Sys /Fac No <b>234-5Z/12N</b>	8 Approval Designator <b>S</b>
		9 Document Numbers Changed by this ECN (includes sheet no. and rev) <b>HNF-3178, Rev 2</b>	10 Related ECN No(s)	11 Related PO No
12a Modification Work  <input type="checkbox"/> Yes (fill out Blk 12b)  <input checked="" type="checkbox"/> No (NA Blks 12b 12c 12d)		12b Work Package No <b>N/A</b>	12c Modification Work Complete  <b>N/A</b> Design Authority/Cog Engineer Signature & Date	12d Restored to Original Condition (Temp or Standby ECN only)  <b>N/A</b> Design Authority/Cog Engineer Signature & Date
13a Description of Change		13b Design Baseline Document? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  Complete revision update of PFP Emergency Lighting Study, HNF-3178 No physical modification done to the facility, so no USQ required per PFP FSP 5-8, section 2 23		
14a Justification (mark one) Criteria Change <input type="checkbox"/> Design Improvement <input type="checkbox"/> Environmental <input type="checkbox"/> Facility Deactivation <input type="checkbox"/> As Found <input checked="" type="checkbox"/> Facilitate Const <input type="checkbox"/> Const Error/Omission <input type="checkbox"/> Design Error/Omission <input type="checkbox"/>				
14b Justification Details Backup and emergency lights in buildings 236 Z, 270 Z 2701 ZD, and 2705-Z were upgraded by ECNs 649762 and 649761 This ECN documents those changes in this document				
15 Distribution (include name MSIN and no of copies)				
R D Keck T4-20      LE Edvalson T5-48 GA Glover T4-20      OP Dhiman T4-20 <i>1/12/00</i> CA Scheuerman T5-21      JM Isdell T4-39 <i>1/12/00</i> DR Groth T4-15      AO Anderson T4-19 K M Irish CT Sadanaga T5-11      NH Dehkordi T4-20 LJ Anderson T4-20 <i>1/12/00</i> MS Busch T4-20 Central Files B1-07				

RELEASE STAMP

FEB 02 2000

DATE STA 5

HANFORD RELEASE

ID: **12**

## ENGINEERING CHANGE NOTICE

1 ECN (use no from pg 1)

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65-7602

16 Design  
Verification  
Required

17 Cost Impact

18 Schedule Impact (days)

1/12/00

[ ] Yes  
[ X ] No

## ENGINEERING

## CONSTRUCTION

Additional

[ ] \$

Additional

[ ] \$

Improvement

[ ]

Savings

[ ] \$ N/A

Savings

[ ] \$ N/A

Delay

[ ] N/A

19 Change Impact Review Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13 Enter the affected document number in Block 20

SDD/DD	[ ]	Seismic/Stress Analysis	[ ]	Tank Calibration Manual	[ ]
Functional Design Criteria	[ ]	Stress/Design Report	[ ]	Health Physics Procedure	[ ]
Operating Specification	[ ]	Interface Control Drawing	[ ]	Spares Multiple Unit Listing	[ ]
Criticality Specification	[ ]	Calibration Procedure	[ ]	Test Procedures/Specification	[ ]
Conceptual Design Report	[ ]	Installation Procedure	[ ]	Component Index	[ ]
Equipment Spec	[ ]	Maintenance Procedure	[ ]	ASME Coded Item	[ ]
Const. Spec	[ ]	Engineering Procedure	[ ]	Human Factor Consideration	[ ]
Procurement Spec	[ ]	Operating Instruction	[ ]	Computer Software	[ ]
Vendor Information	[ ]	Operating Procedure	[ ]	Electro Circuit Schedule	[ ]
OM Manual	[ ]	Operational Safety Requirement	[ ]	ICRS Procedure	[ ]
FSAR/SAR	[ ]	IEFD Drawing	[ ]	Process Control Manual/Plan	[ ]
Safety Equipment List	[ ]	Cell Arrangement Drawing	[ ]	Process Flow Chart	[ ]
Radiation Work Permit	[ ]	Essential Material Specification	[ ]	Purchase Requisition	[ ]
Environmental Impact Statement	[ ]	Fac. Proc. Samp. Schedule	[ ]	Tickler File	[ ]
Environmental Report	[ ]	Inspection Plan	[ ]	None	[ X ]
Environmental Permit	[ ]	Inventory Adjustment Request	[ ]		[ ]

20 Other Affected Documents (NOTE Documents listed below will not be revised by this ECN) Signatures below  
Indicate that the signing organization has been notified of other affected documents listed below

Document Number/Revision

Document Number/Revision

Document Number Revision

None.

## 21 Approvals

	Signature	Date	Signature	Date
Design Authority			Design Agent	
Cog Eng MS Busch		1/12/00	PE	
Cog Mgr GA Glover		2/1/00	QA	
QA			Safety	
Safety		1/12/00	Design	
Environ			Environ	
Other			Other	
Ind. Reviewer				
			DEPARTMENT OF ENERGY	
			Signature or a Control Number that tracks the Approval	
			Signature	
			ADDITIONAL	

S

# PFP EMERGENCY LIGHTING STUDY

**M. S. Busch**

B&W Hanford Company, Richland, WA 99352

U S Department of Energy Contract DE-AC06-96RL13200

EDT/ECN	657602	UC	506
Org Code	15510	CACN	110793
B&R Code	EW7002000	Total Pages	31

Key Words PFP Emergency Lights, Backup Lights

Abstract This engineering study documents PFP's current emergency light configuration and light levels, identifies deficiencies in the emergency lighting system and proposes lighting upgrades to more closely comply with NFPA 101 Section 5 9 requirements

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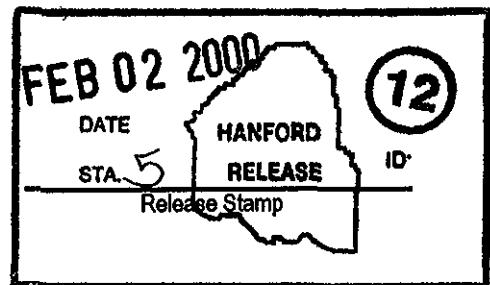
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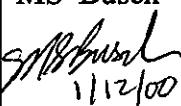
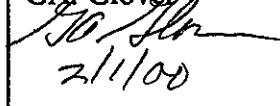


Release Approval

2/2/00  
Date



**Approved for Public Release**

RECORD OF REVISION		(1) Document Number HNF-3178	Page 2
(2) Title PFP Emergency Lighting Study			
CHANGE CONTROL RECORD			
(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog Engr	(6) Cog Mgr Date
0	HNF-3178, Rev 0, EDT 621589, 9/3/98		
1	ECN 650859, (12/1/98)		
2	ECN 651372 Documents new emergency light installations in Building 234-5Z, Stairs 1, 2, 12, and 13 (page 8) In addition, corrections are made to the light labels at the PRF building (Appendix A, pages 13-14) to match the current field conditions Labeling of the emergency lights in stair 6 is documented on page 8 A discussion of the NFPA 101 area classification for 234-5Z Tunnels and the Duct level is added to page 11 as item 16 Modifications to the emergency egress routes in building 2736-ZB are made (Appendix A page 6) per ECN 651367 Building 2721-Z is a EPS equipment location per Section 5-3 1 of NFPA 110 and is classified separately (pages 5&6)		
RS 3	ECN 657602 Documents emergency/backup light upgrade of buildings 236 Z 270 Z 2705 Z 2701 ZD (pages 10 11) Updates the number of the lights to be removed from 70 to 30 lights (page 12)	MS Busch  11/12/00	GA Glover  11/12/00

**1 0     OBJECTIVE****1 1     BACKGROUND AND SCOPE**

NFPA 101, section 5-9 mandates that, where required by building classification, all designated emergency egress routes be provided with adequate emergency lighting in the event of a normal lighting outage. Emergency lighting is to be arranged so that egress routes are illuminated to an average of 1 0 footcandle with a minimum at any point of 0 1 footcandle, as measured at floor level. These levels are permitted to drop to 60% of their original value over the required 90 minute emergency lighting duration after a power outage.

The Plutonium Finishing Plant (PFP) has two designations for battery powered egress lights. "Emergency Lights" are those battery powered lights required by NFPA 101 to provide lighting along officially designated egress routes in those buildings meeting the correct occupancy requirements. Emergency Lights are maintained on a monthly basis by procedure ZSR-12N-001. "Backup Lights" are battery powered lights not required by NFPA, but installed in areas where additional light may be needed. The Backup Light locations were identified by PFP Safety and Engineering based on several factors.

- 1 General occupancy and type of work in the area. Areas occupied briefly during a shiftly surveillance do not require backup lighting while a room occupied fairly frequently or for significant lengths of time will need one or two Backup Lights to provide general illumination of the egress points.
- 2 Complexity of the egress routes. Office spaces with a standard hallway/room configuration will not require Backup Lights while a large room with several subdivisions or irregularly placed rooms, doors, and equipment will require Backup Lights to make egress safer.
- 3 Reasonable balance between the safety benefits of additional lighting and the man-hours/exposure required for periodic light maintenance. In some plant areas such as building 236-Z, the additional maintenance time and risk of contamination do not warrant having Backup Lights installed in all rooms. Sufficient light for egress is provided by existing lights located in the hallways.

Backup Lights are not subject to the same light intensity requirements as Emergency Lights and are maintained on a quarterly basis by procedure ZSR-12N-002. The reduced maintenance for Backup Lights ensures light operability while allowing significant manpower savings and application of ALARA principles. Battery powered lights not designated as Emergency or Backup Lights are not required and will be removed from the facility and the maintenance procedures.

PFP has buildings with three different NFPA occupancy classifications, Business Use, Industrial Use (both General and Special Purpose), and Storage Use. Additionally, several buildings are Mixed Use facilities with both Business and Industrial uses. The buildings' classification and frequency of habitation determine the need for emergency lighting as follows.

According to section 27-2 9 1, buildings classified as "Business Use" are required to maintain an emergency light system if one of the following is true:

- (1) The building is two or more stories in height above the level of exit discharge, or
- (2) The occupancy is subject to 100 or more occupants above or below the level of exit discharge, or
- (3) The occupancy is subject to 1,000 or more total occupants

Section 28-2 9 1 requires buildings classified as "Industrial Use" to maintain an emergency light system unless one of the following Exceptions are met:

Exception No 1 Special Purpose Industrial occupancies where routine human habitation is not the case

Exception No 2 Structures occupied only during daylight hours with skylights or windows arranged to provide the required level of illumination on all portions of the means of egress during these hours

Section 29-2 9 1 requires buildings classified as "Storage Use" to maintain an emergency light system unless one of the following Exceptions are met:

Exception No 1 Storage occupancies do not require emergency lighting when not normally occupied

Exception No 2 Structures occupied only during daylight hours with skylights or windows arranged to provide the required level of illumination on all portions of the means of egress during these hours

PFP Safety has classified the plant buildings per NFPA occupancy requirements as follows:

#### Building 234-5Z Complex (First & Second Floor)

Classification Mixed use, Business and Industrial, both General and Special Purpose Requirements Emergency lighting is required along egress routes. Areas along egress routes with very low lighting levels will be upgraded. Designated Backup Lights will remain in some additional areas. The remaining battery powered lights will be removed.

#### Building 234-5Z Complex (Duct Level & Tunnels)

Classification Industrial, Special Purpose

Requirements These areas are not routinely occupied. Under Section 28-2 9 1, Exception No 1, they do not require emergency lighting. Existing lights in these areas will be maintained as backup lights.

**Building 236-Z**

Classification Industrial, both General and Special Purpose

Requirements Under Section 28-2 9 1 Exception No 1, Building 236-Z is not routinely occupied so emergency lighting is not required Backup Lights will be maintained in the corridors while lights in individual rooms will be removed

**Building 2736-ZB**

Classification Business and Industrial, both General and Special Purpose

Requirements Emergency lighting is required The power source of existing Emergency and Backup Lights will be changed to the local lighting circuit to ensure proper lighting levels in the event of a loss of only normal lighting power

**Building 2736-Z**

Classification Storage

Requirements Emergency lighting is required Battery powered lights located in the individual vaults will be removed as they are not on the building egress route

**Building 2736-ZA**

Classification Industrial, Special Purpose

Requirements Under Section 28-2 9 1 Exception No 1, Building 2736-ZA is not routinely occupied so does not require emergency lighting

**Building 291-Z**

Classification Industrial, Special Purpose

Requirements Under Section 28-2 9 1 Exception No 1, Building 291-Z is not routinely occupied so does not require emergency lighting Several Backup Lights will be installed to provide safer building egress

**Buildings 232-Z, 241-Z, 242-Z, 243-Z, and Z9 Crib**

Classification Industrial, Special Purpose

Requirements These buildings are not routinely occupied Under Section 28-2 9 1 Exception No 1 they do not require emergency lighting A few lights in these buildings will be left in place as Backup Lights while the remainder will be removed

**Building 2721-Z**

Classification Industrial, Special Purpose

Requirements This building is not routinely occupied Under Section 28-2 9 1 Exception No 1 it does not require emergency lighting However, Section 5-3 1 of NFPA 110 classifies this building as an Emergency Power System (EPS) Equipment Location and requires for this type of location to be provided with battery powered emergency lighting

Therefore, the 2 lights in this location will be kept in place

**Buildings 270-Z, 2701-ZA, 2701-ZD, 2704-Z, 2705-Z, and all trailers**

Classification Business (these buildings are the Badgehouse, AMS, OCF, Admin, etc )

Requirements All of these buildings are single story with fewer than 1,000 occupants so they do not require emergency lighting per section 27-2 9 1 Some lights in several of these buildings will be left in place as Backup Lights while the remainder will be removed

The above occupancy designations determine which buildings require emergency lighting as defined by section 5-9 of NFPA 101 Backup Lights installed in other areas are not subject to the light level and maintenance requirements associated with the NFPA

## **1 2 SUMMARY**

This study establishes the baseline data from which improvements to the plant's emergency lighting system will be made. These improvements are designed to provide emergency egress routes that are adequately lighted by Emergency Lights in all PFP buildings required by NFPA 101. In support of this goal, a plant-wide emergency escape light level survey was performed under Work Package 2Z-95-959. The survey documented numerous plant emergency lighting deficiencies including low light levels, missing or relocated lights, and lights powered by the incorrect normal lighting circuit. These light level measurements and deficiencies are shown in Appendix A. Correction of these deficiencies will need to address several considerations

- 1 Drawing changes to cover the updated emergency light configuration and resolution of the existing out-of-date emergency lighting drawings
- 2 Prioritized resolution of the light level deficiencies identified by WP 2Z-95-959
- 3 Resolution of all wiring and labeling discrepancies
- 4 Removal of the lights not designated as Emergency or Backup Lights
- 5 Correction of power source problems identified in WP 2Z-95-959
- 6 Verification of maintenance procedure and drawing consistency in designation of Emergency and Backup Lights

## **2 0 RECOMMENDATIONS**

### **2 1 DRAWING CHANGES**

Currently, Emergency Lights are included on the buildings' general lighting drawings. These non-essential drawings do not reflect recent changes in the emergency light configuration. It is necessary to keep the emergency light configuration up to date to ensure compliance with NFPA requirements and complete coverage of Emergency Lights by the appropriate ZSR procedures. This will be accomplished by the development of a new essential drawing showing the location,

power source, and number of each Emergency or Backup Light superimposed on the building egress routes. A building layout format similar to the Room and Door Numbers drawing (H-2-80249) is well suited to this application.

A note will be added to the existing general lighting drawings referring to the new essential drawings for all emergency lighting information. New general lighting drawings will not be issued.

## **2.2 WORK PACKAGE 2Z-95-959 LIGHT LEVEL DEFICIENCIES**

Based on the emergency light survey results of Work Package 2Z-95-959, a prioritized list of areas needing additional lights to meet minimum NFPA requirements was developed. The general priorities were

- 1 Emergency egress routes with inadequate light levels
- 2 Areas with Backup Lights that have power source problems or lights to be removed
- 3 Areas only requiring removal of existing lights

During the light level measurements of Work Package 2Z-95-959, the majority of the egress routes in buildings 234-5Z and 2736-ZB fell below the average light level requirement of 1.0 footcandle but not below the 0.1 footcandle minimum. The average emergency light level for these egress routes was approximately 0.5 footcandle. Due to the limited life expectancy of the facility and the fact that there are no areas below 0.1 footcandle along these egress routes, these particular areas will not be upgraded. All issues such as incorrect power sources or labeling errors will still be fixed. Egress routes in buildings 234-5Z and 2736-ZB with areas below the 0.1 footcandle minimum will be fully upgraded to NFPA requirements.

The facility was divided into 20 groups (A through T) based on degree of upgrade required, radiological boundaries, and maintaining a manageable scope of work for an individual work package. Appendix A shows each group's boundaries and required improvements. The groups were prioritized as follows:

### **1 Group I Building 234-5Z, Second floor, Room 321**

This area had no emergency light coverage and was completely dark during a normal lighting outage. Room 321 provides the only egress for the Control Room, which is manned 24 hours per day, 7 days a week. No other area had this high of an occupancy with such low emergency light levels. Additionally, Room 321 contains many safety hazards, including rotating machinery, bump and trip hazards, and a non-standard room configuration with smaller adjoining rooms and offices.

As shown in Appendix A, 10 Emergency Lights were added along the egress routes in this room under work package 97-1694. Light levels along the egress routes now measure about 0.5 footcandles. No further upgrades will be made to this room. The west roof emergency lighting was previously upgraded under Work Package 2Z-96-2410 to provide lighting from the Room 321 exit onto the west roof to the two ladders down the south walls.

## 2 Group D Building 234-5Z, First floor, Southwest corner (Lab Annex)

These corridors provide access to the three main exterior exits from the southwest corner of the building. Although this area is a fairly standard office configuration, it had no emergency lighting at the time of the survey. As such, it was listed as priority two.

These corridors were upgraded with 11 new lights installed as shown in Appendix A under Work Package 2Z-97-1992. All light levels now meet or exceed the NFPA requirements.

## 3 Group J Building 234-5Z, Stairs 1, 2, 6, 12, and 13

The stairs in building 234-5Z did not meet the NFPA requirements. Most had areas of low light levels, and some had flights with no emergency light coverage. These deficiencies represented significant trip and fall hazards during a lighting outage, especially during a building evacuation. The stairs are the only emergency egress routes available from the second floor and duct level. Since most stairs had at least some levels of emergency lighting, they were assigned a priority of three.

As shown in appendix A, 16 additional lights were installed in stairs under Work Package 2Z-98-1374 to raise the stair emergency light levels to NFPA requirements. The lighting level average for all the stairs now meet or exceed the NFPA requirements. Stair 6 was upgraded under a previous package and did not require any additional lighting.

## 4 Group C Building 234-5Z, First floor, RADTU area

The egress routes in this backside area provide two of the three exterior exits for the northwest part of the building through large open areas with non-standard room and hallway configurations. This RADTU area has numerous areas well below the 1.0 footcandle average requirement coupled with several dark spots also below the 0.1 footcandle minimum. Due to the level of existing emergency light coverage and the absence of the trip and fall hazards associated with stairs, this area was placed fourth on the prioritized list.

Upgrading the emergency lighting will require 5 additional lights as shown in Appendix A. There are also 3 lights to be removed and 1 light on an incorrect power source.

#### 5 Group E Building 234-5Z, Backside RMA/RMC areas

Due to the complex layout of the RMA/RMC rooms and the industrial nature of the equipment, this area will be upgraded to meet the NFPA requirements. Since there are no dark areas below the 0.1 footcandle minimum, this area was placed below the other areas receiving new light installations. Nine new lights will be installed as shown in Appendix A. There is one light to be removed from this area.

#### 6 Group O Buildings 2736-Z and 2736-ZB

Although these buildings already have installed Emergency Lights, the lights are connected to the emergency lighting panels instead of the normal lighting panels. All lights in these buildings will be rewired to the normal lighting circuit in that area. Since the existing lights will illuminate if power is lost to the emergency panels and the existing light levels are approximately 0.5 footcandle average, this group was placed sixth on the priority list.

One new Emergency Light will be added as shown in Appendix A to correct a low intensity area in the entry corridor. For the remainder of the building, even though the current light levels do not quite meet the NFPA requirements, new Emergency Lights will not be added due to the reasonable existing coverage. Two Backup Lights will be added to the change room exits for added personnel safety during normal egress during a lighting outage. The 8 lights in the 2736-Z and ZB vaults will be removed since the vault doors remain open if people are inside. In an egress situation, illumination will be provided from the corridor Emergency Lights. This represents a significant exposure and manhour reduction.

#### 7 Groups G & H Building 234-5Z, Second floor frontside offices

This is a standard hallway/office area with a few dark spots along the egress route. These low intensity spots below the 0.1 footcandle minimum will be upgraded with 3 additional lights as shown in Appendix A. The remainder of the egress routes will not be upgraded as explained above due to the limited life expectancy of the facility and the existing light levels. There are 2 lights to be removed and 2 lights with incorrect power sources.

#### 8 Group A Building 234-5Z, First floor frontside offices and change room addition

As in Groups G & H above, only the areas below 0.1 footcandle will be upgraded. This will require one light positioned as shown in Appendix A. Additionally, 13 lights will be removed, 6 lights have incorrect power sources, and 2 lights require relabeling.

#### 9 Group B Building 234-5Z, First floor maintenance areas

No upgrade will be made to this group since there are no areas below the 0.1 footcandle minimum. There is, however, one light to be removed and one light on an incorrect power source.

#### 10 Group N Building 291-Z

Due to the industrial nature of the building and lack of natural light, approximately 7 Backup Lights will be installed as shown in Appendix A. As Backup Lights, they are not required by NFPA, and will be placed on the quarterly maintenance cycle. This is the highest non-egress route priority.

#### 11 Group R Building 234-5Z Mezzanine

The Mezzanine level does not contain any designated emergency egress routes, so all battery powered lights in that area are Backup Lights. Additionally, 6 lights are slated for removal and 2 lights are powered from the incorrect lighting circuit. The lights remaining on the Mezzanine will provide adequate light for normal exit paths from that area. The area will also receive a fair amount of background lighting from the first floor lights in those rooms.

#### 12 Groups K & L PRF

As a Special Purpose Industrial Occupancy, PRF falls under Exception No 1 for non-routine habitation and does not require any emergency lighting. As a prudent safety measure, the existing lights in the corridors remained as Backup Lights to provide coverage during a normal lighting outage. As shown on Appendix A, all other lights in maintenance shop, the control room, glovebox or filter rooms, etc (24 total) were removed. This saved a great deal of maintenance time while still maintaining safely lit exits for the building.

#### 13 Group M Building 243-Z

As a Special Purpose Industrial Occupancy, building 243-Z falls under Exception No 1 for non-routine habitation and does not require any emergency lighting. There are 6 lights

currently located in 243-Z. Two of these existing lights will be removed and the remainder classified as Backup Lights

**14 Group P Buildings 270-Z, 2701-ZD, and 2705-Z**

These buildings are all Business Occupancies without requirements for any emergency lighting. The existing lights in 2705-Z remained as Backup Lights due to the large number of personnel transiting that building. As shown in Appendix A, three of the 7 lights in 2701-ZD were removed, leaving four Backup Lights in Patrol's high occupancy and transit areas. The existing lights in 270-Z are connected to a different transformer from the normal lighting power. After comparing the benefit of keeping those lights in service to the cost of regular maintenance and relocating all of their power sources, and considering that 270-Z is a building with substantial natural light and very simple corridors and floor plans. Therefore, all the lights were removed from the building. The changes are shown in Appendix A

**15 Group S Building 216-Z9 (The Z9 Crib)**

As a Special Purpose Industrial Occupancy, the Z9 Crib falls under Exception No 1 for non-routine habitation and does not require any emergency lighting. All battery powered lights will be removed from this building. Group S is not shown in Appendix A

**16 Group T Building 234-5Z (Duct Level and the Tunnels)**

As Special Purpose Industrial Occupancies, the Duct Level and the Tunnels (basement) in Building 234-5Z fall under Exception No 1 for non-routine habitation and do not require any emergency lighting. The existing Backup Lights in these areas will continue to be maintained. Group T is not shown in Appendix A

**17 Groups F and Q (234-5Z, SE corner by HPT office, and 241-Z complex)**

No changes are necessary for these areas. Some of the SE corridor areas of 234-5Z do not fully meet the NFPA requirements but, as discussed previously, there are no low light intensity areas below the 0.1 footcandle minimum, so no additional Emergency Lights will be added. The existing Emergency and Backup Lights in these areas will continue to be maintained

**2.3 WIRING AND LABELING DISCREPANCIES**

Numerous problems were found with the battery powered lights during the lighting survey, including

- 1 Lights powered by different sources than the local general lighting This results in Emergency Lights that remain on charge when the local lights go out, but turn on when the lights in a different room or corridor lose power
- 2 Lights that have been moved or deleted and have not been updated on the general lighting drawings This will be corrected by the drawing changes in section 2 1
- 3 Improperly labeled lights Several duplicate light numbers exist which cause confusion when comparing the Emergency and Backup Light lists These lights must be relabeled Additionally, prior to development of the new Emergency/Backup Light drawing, all battery powered lights will be relabeled to differentiate between Emergency and Backup Lights

These discrepancies will be corrected during the performance of the work packages for each of the 19 areas described in section 2 2

#### **2 4 LIGHT REMOVAL**

Currently, there are approximately 30 lights that are not required for emergency or backup lighting and should be removed Removing these lights from service represents a significant savings in both personnel exposure and maintenance resources After removal, these lights may then be installed in those areas noted in section 2 2 as requiring additional emergency or backup lighting Light removal will be accomplished by the same work packages as the light additions and deficiency corrections

#### **2 5 LIGHT DESIGNATION**

The two maintenance procedures, ZSR-12N-001 and -002, must be compared with the new drawings, lists of Emergency and Backup Lights, and actual field conditions to ensure complete and accurate maintenance coverage of all lights

#### **3 0 CONCLUSIONS**

As described above, there are several improvements to the emergency lighting system that are required to meet the NFPA 101 requirements and ensure that future changes are incorporated into the system drawings The proposed plan represents a balance of plant safety improvements in the form of light upgrades, man-hour savings through maintenance reduction, and ALARA considerations by removing lights not required in contamination or radiation areas The actual

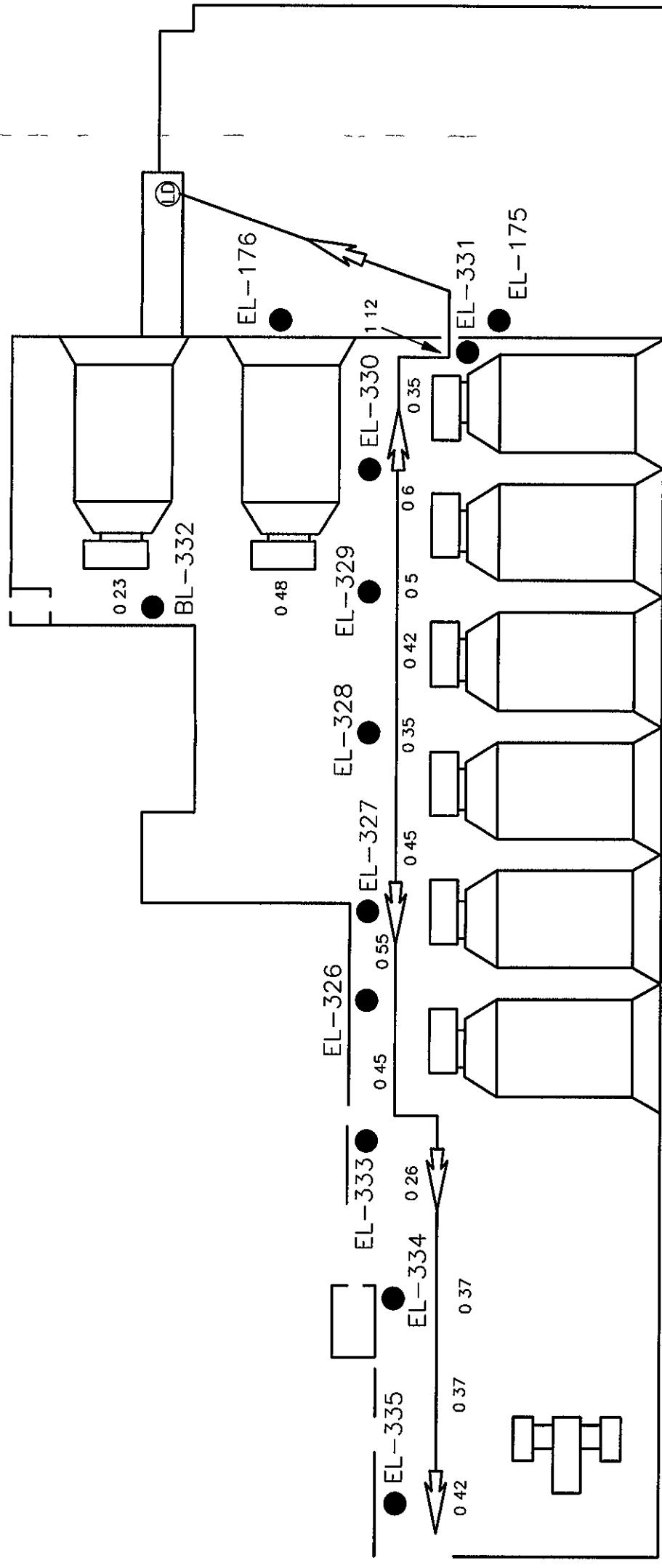
lighting upgrade will be accomplished by several work packages, each one covering an area of different priority. The other concerns, such as power source and labeling changes, will also be addressed in these work packages. Additionally, updates will be made to the emergency lighting and egress route drawings and the monthly/quarterly maintenance procedures. These changes encompass a significant amount of work and reorganization of the emergency lighting system, but are necessary to ensure compliance with NFPA regulations and personnel safety.

#### **4 0 REFERENCES**

- A NFPA 101
- B Work Package 2Z-95-959
- C Work Package 2Z-96-2410
- D Work Package 2Z-97-1992
- E Procedure ZSR-12N-001, "Emergency Lights Monthly Inspection and Annual Testing"
- F Procedure ZSR-12N-002, "Backup Lights Quarterly Inspection and Biannual Testing"

#### **5 0 APPENDICES**

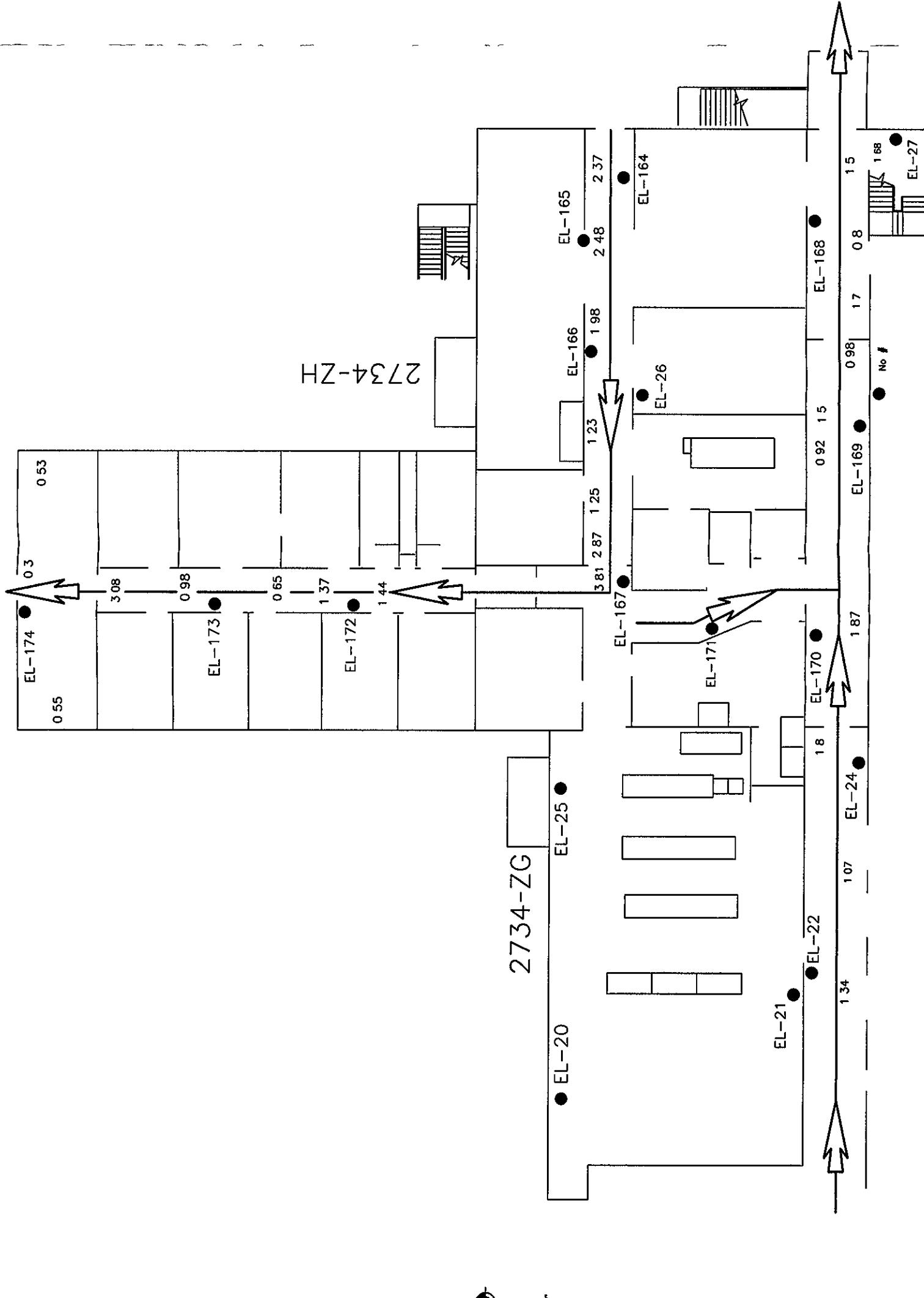
- A Groups A through R Plant Sketches



THIS AREA WAS UPGRADED IN 11/98 BY  
WORK PKG 97-1694 NO FURTHER ACTION  
IS NECESSARY

● Existing Emergency Lights

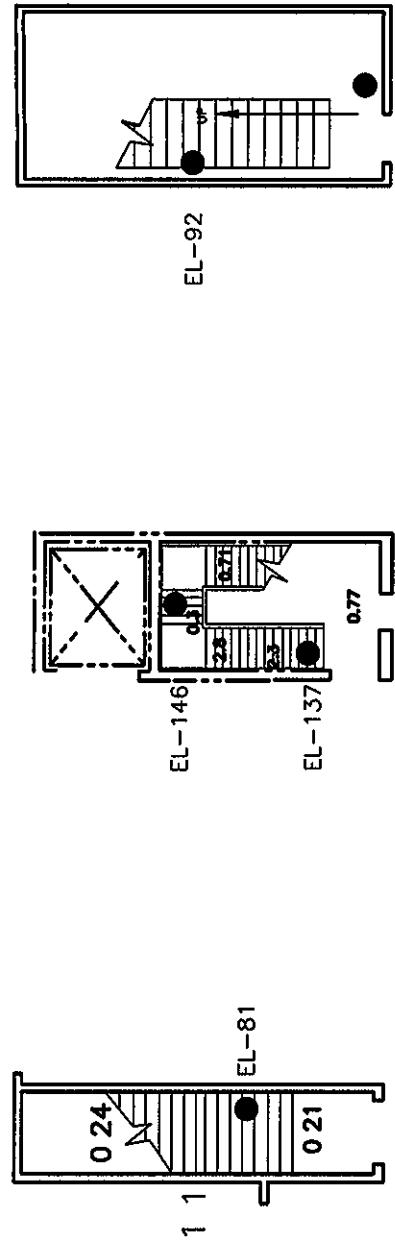
GROUP	1
BUILDING	234-5Z
LOCATION	Room 321
PRIORITY	1



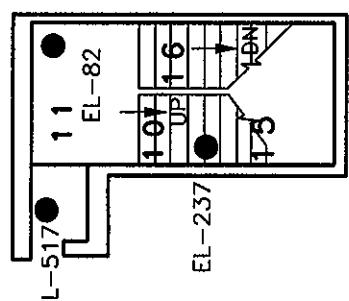
NOTE NO ACTION IS  
REQUIRED

GROUP	D
BUILDING	234-5Z
LOCATION	LAB ANNEX
PRIORITY	2

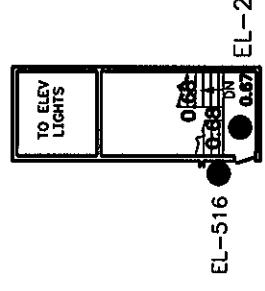
NOTE STAIRS 12 & 13 ARE ON THE EXTERIOR OF 234-52 FROM THE DUCT LEVEL DOWN TO THE GROUND



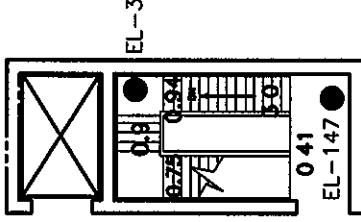
STAIR #1 FIRST FLOOR



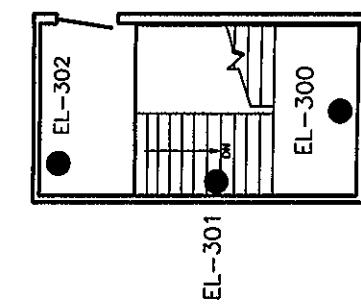
STAIR 4 2 FIRST ELOOR



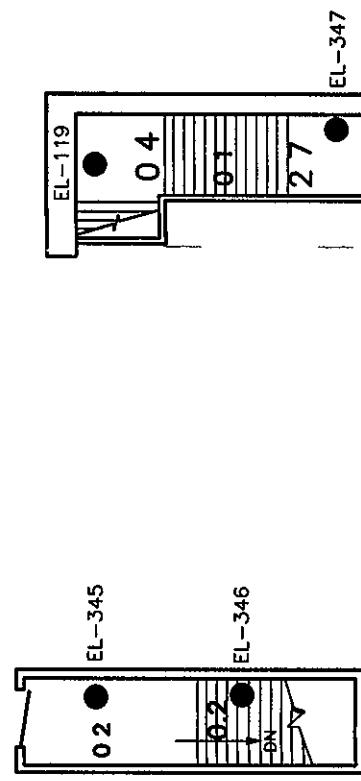
**STAIR # 2 DUCT LEVEL**



STAIR #2 SECOND FLOOR



STAR #6 SECOND FLOOR

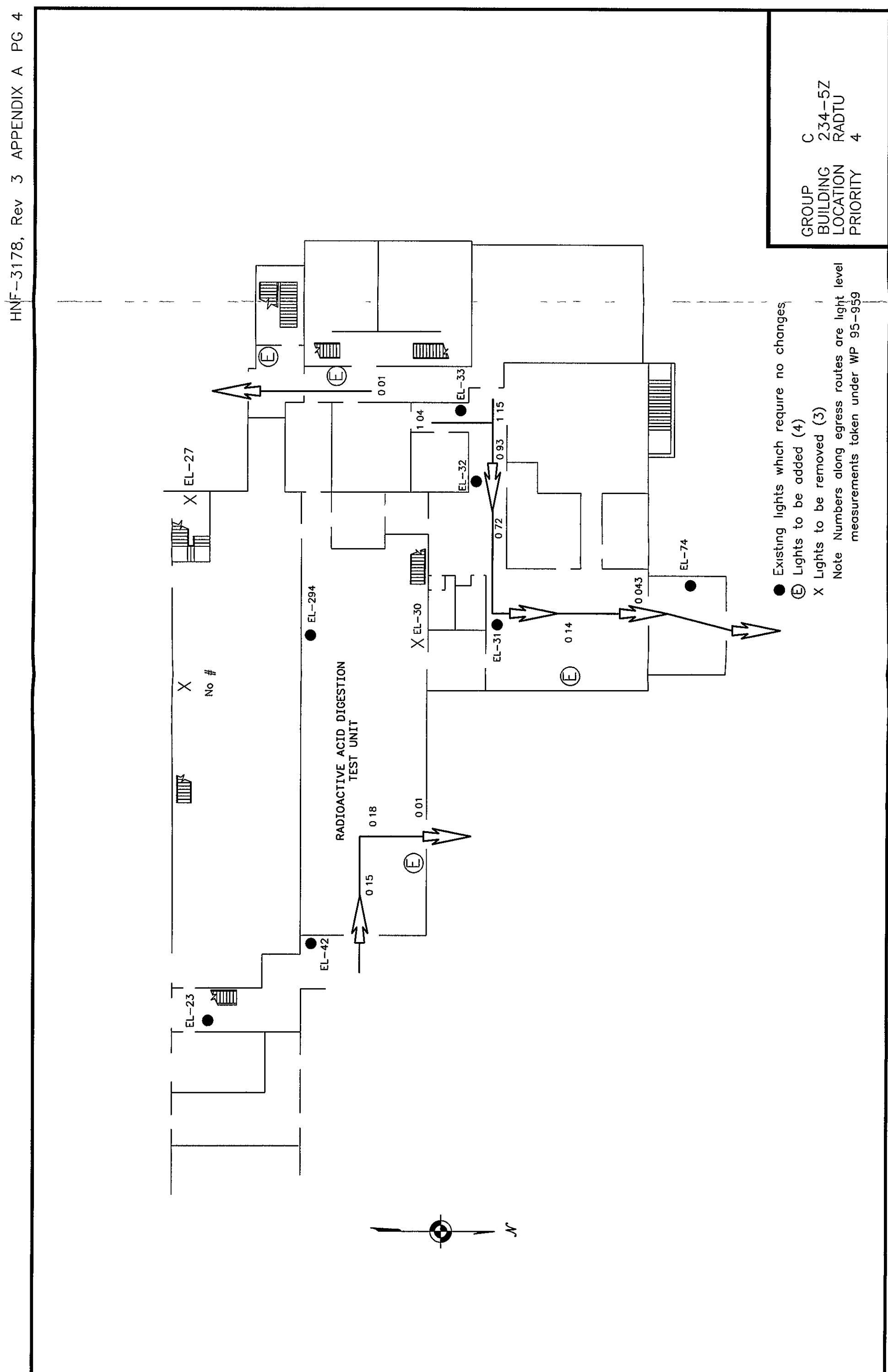


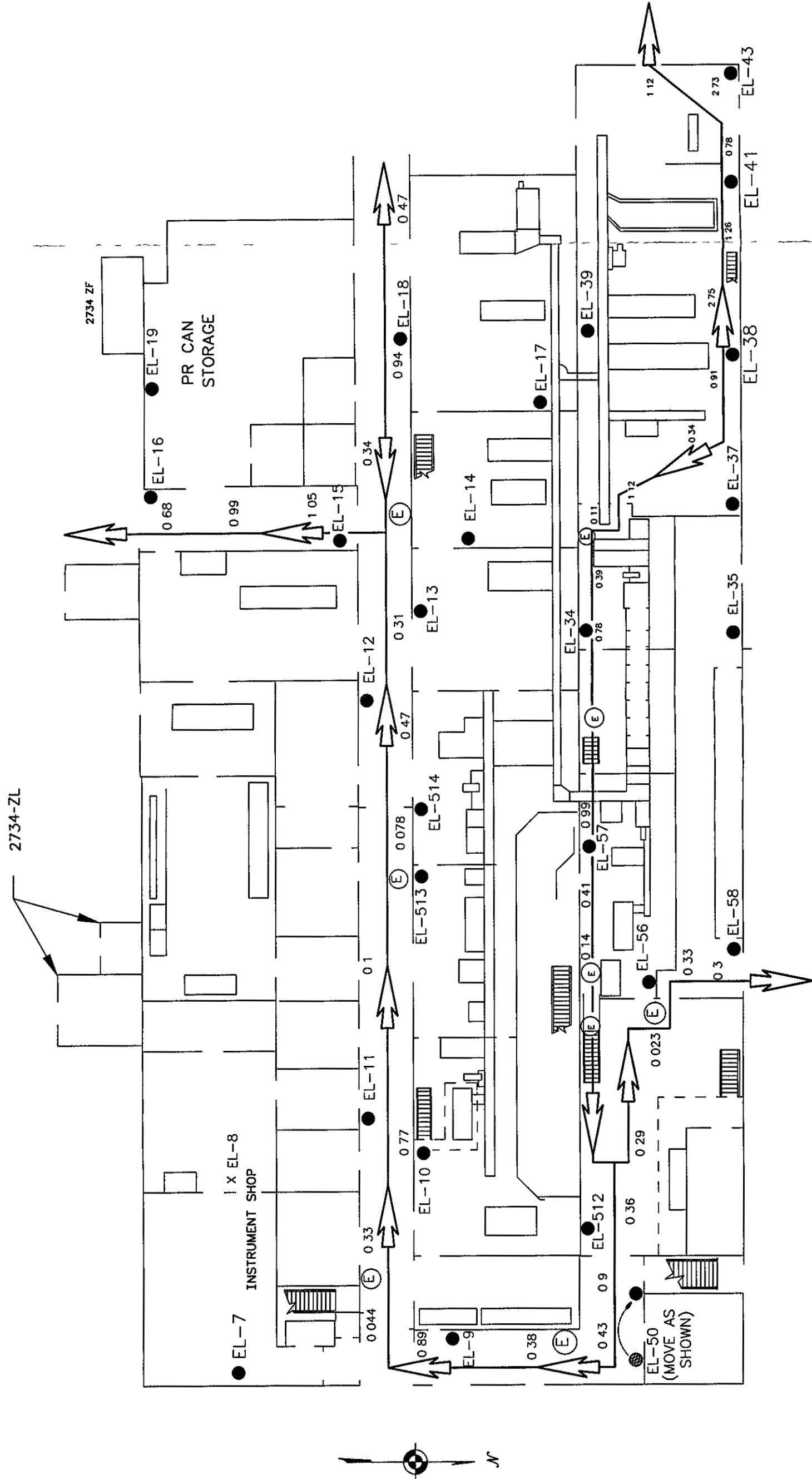
**STAIR #12 SECOND FLOOR**  **STAIR #13 SECOND FLOOR** 

THIS AREA WAS UPGRADED IN 1/99 BY  
WORK PKG 98-1374 NO FURTHER ACTION IS NECESSARY

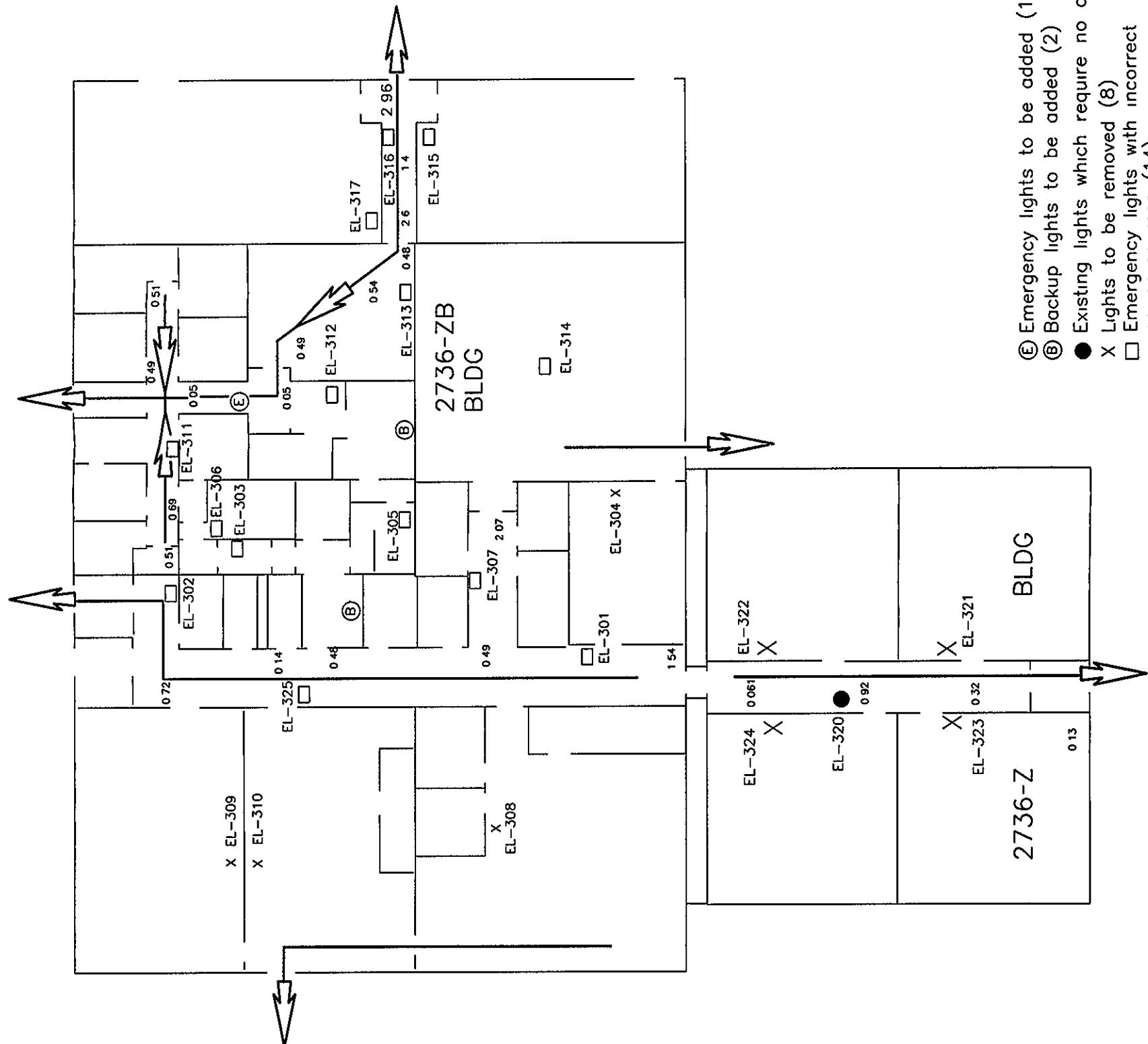
GROUP	J
BUILDING	234-5Z
LOCATION	Stairs
PRIORITY	3

### • Existing emergency lights



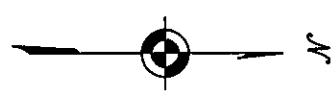


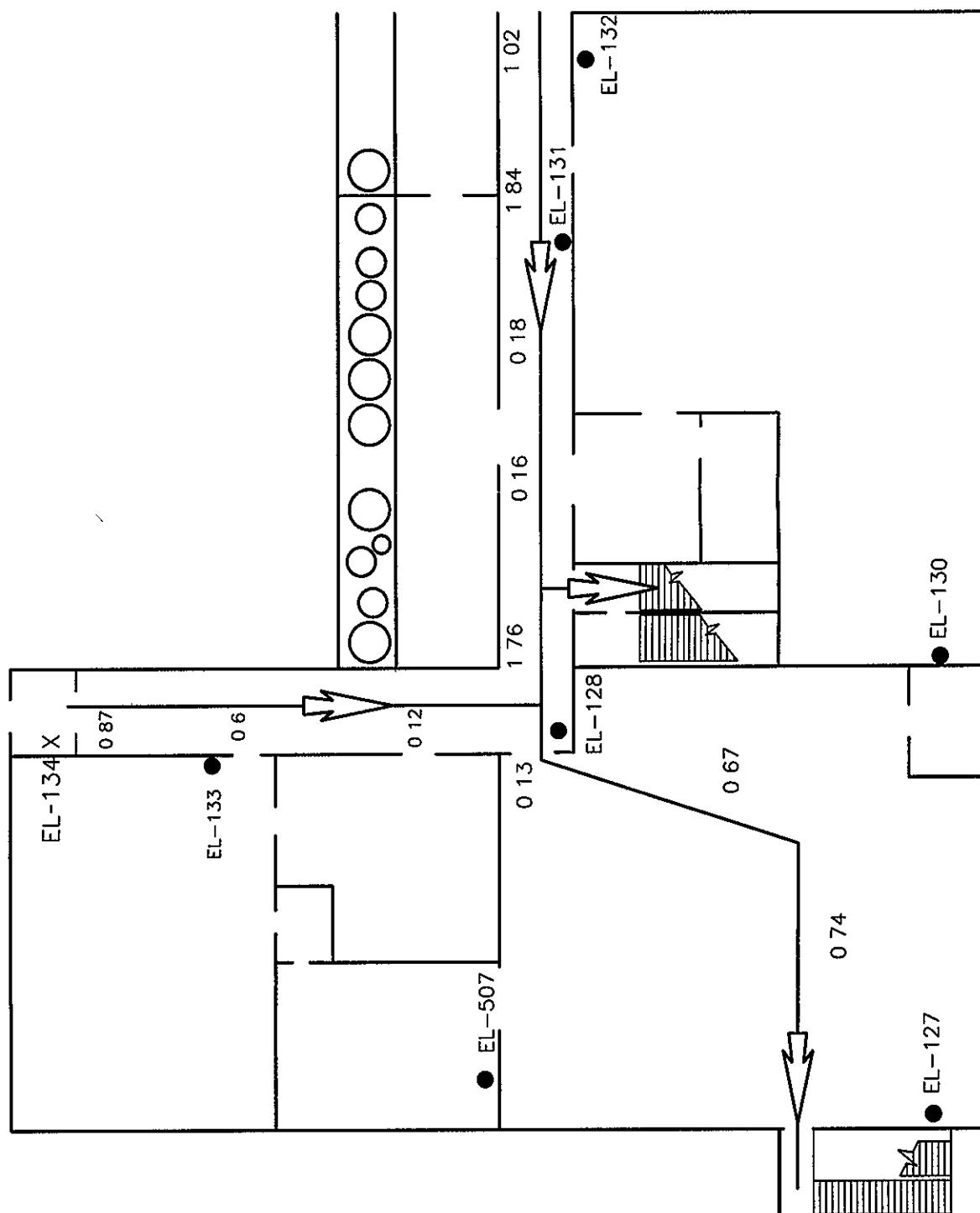
- Existing lights which require no changes
- ⑤ Lights to be added (9)
- ✗ Lights to be removed (1)
- Note Numbers along egress routes are light levels measured under WP 95-959



GROUP  
BUILDING  
LOCATION  
PRIORITY

O  
2736-Z & ZB  
All  
6

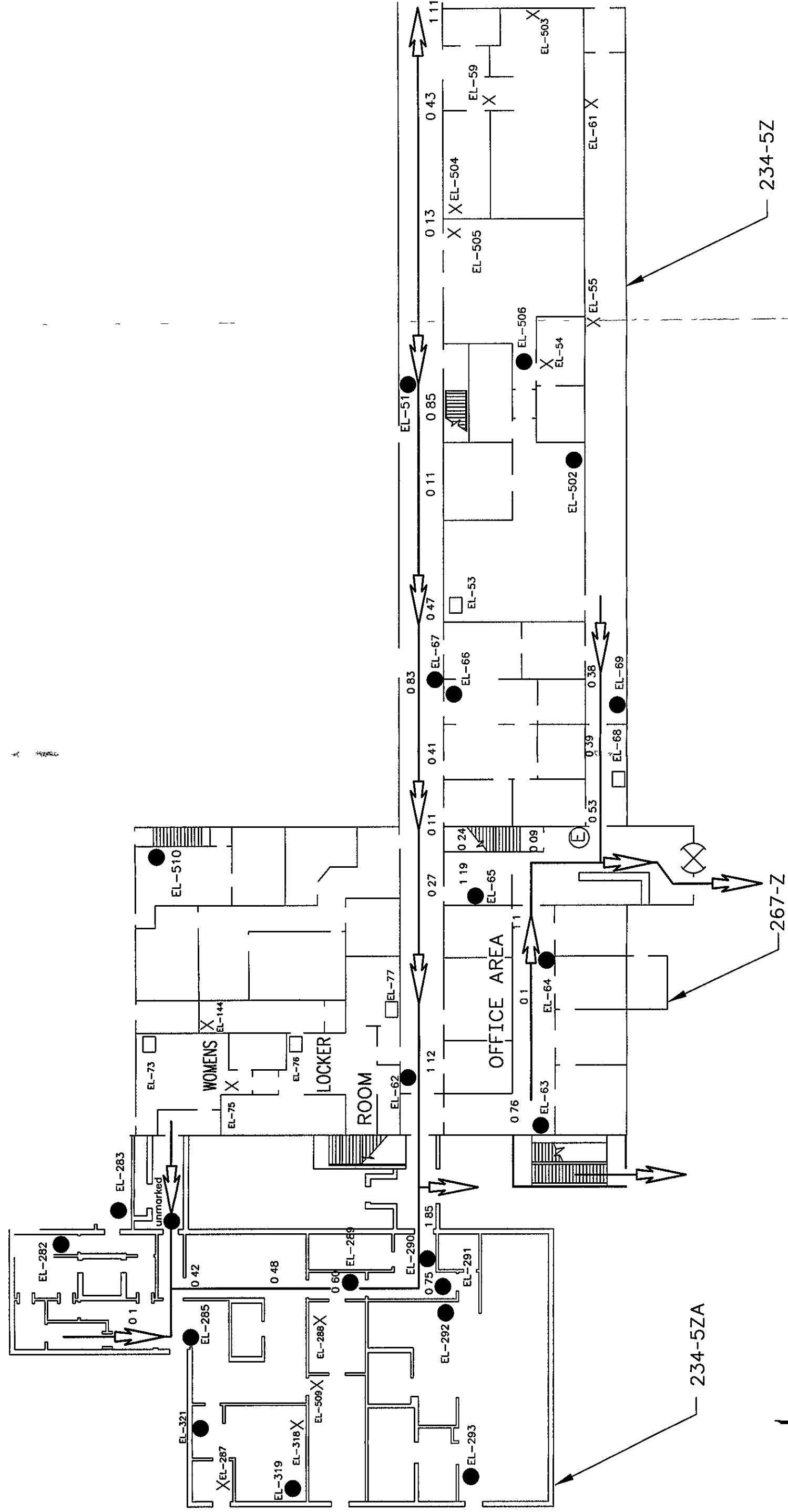




GROUP	G
BUILDING	234-5Z
LOCATION	2nd floor east
PRIORITY	7

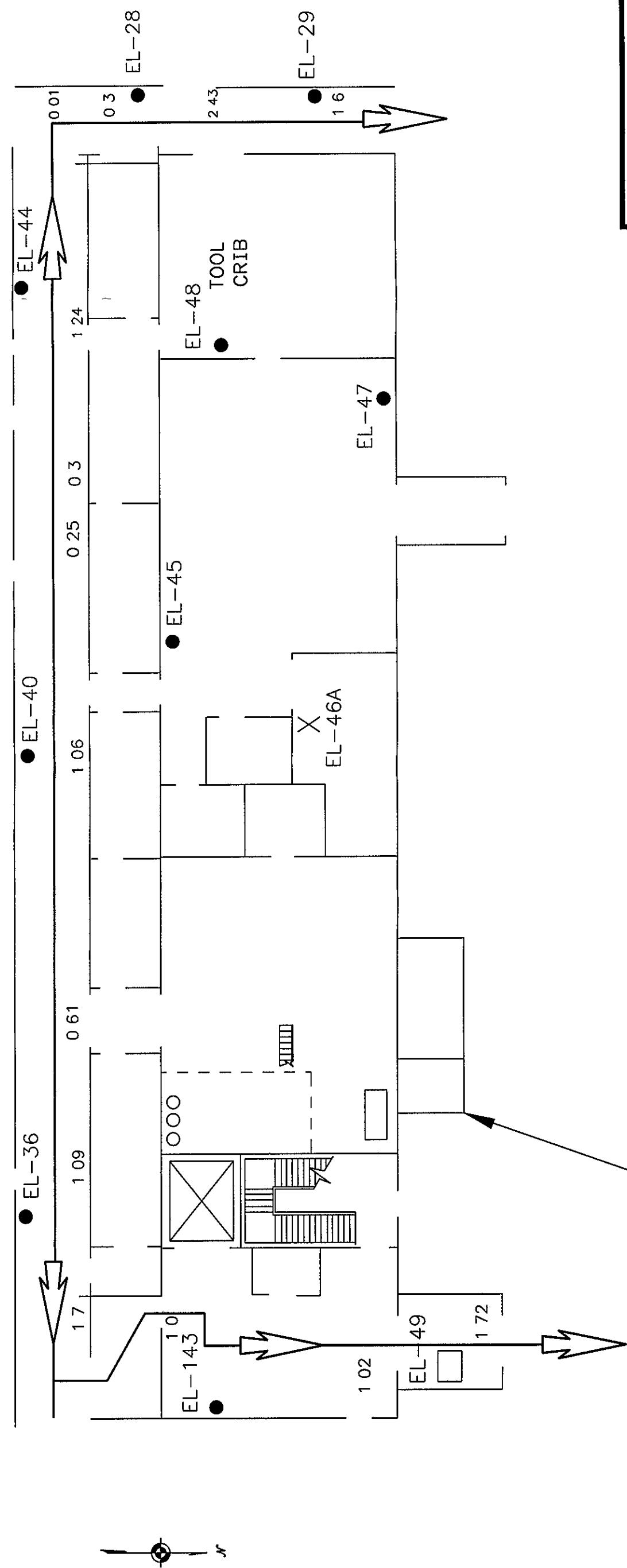
● Existing lights which require no changes  
 ✗ Lights to be removed (1)  
 Note: Numbers along egress routes are light level  
 measurements taken under WP 95-959





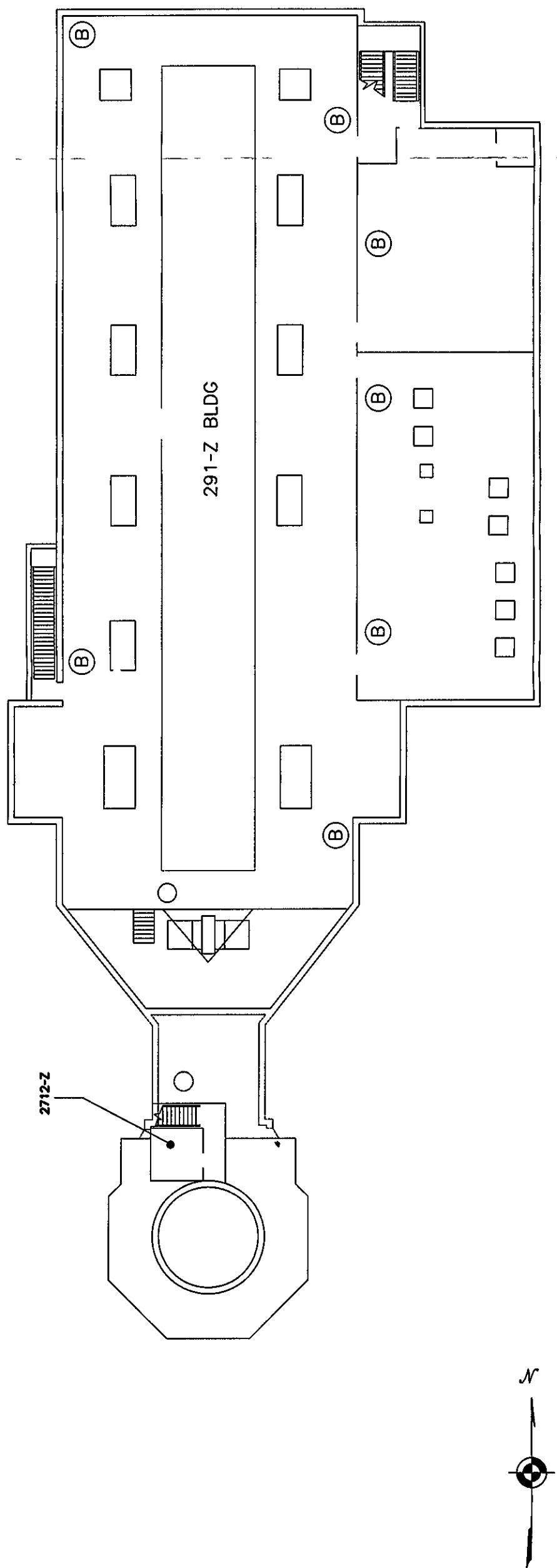
- Existing lights which require no changes
- (E) Lights to be added (1)
- ×
- Emergency lights with wrong power sources (5)
- Note: Numbers along egress routes are light level measurements taken under WP 95-959

GROUP	BUILDING	LOCATION	PRIORITY
A	234-5Z	Front side offices & change room	8



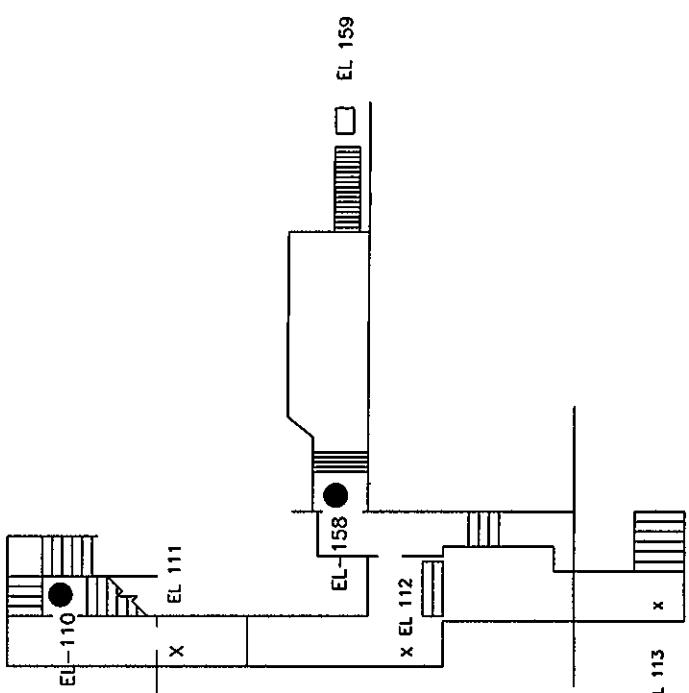
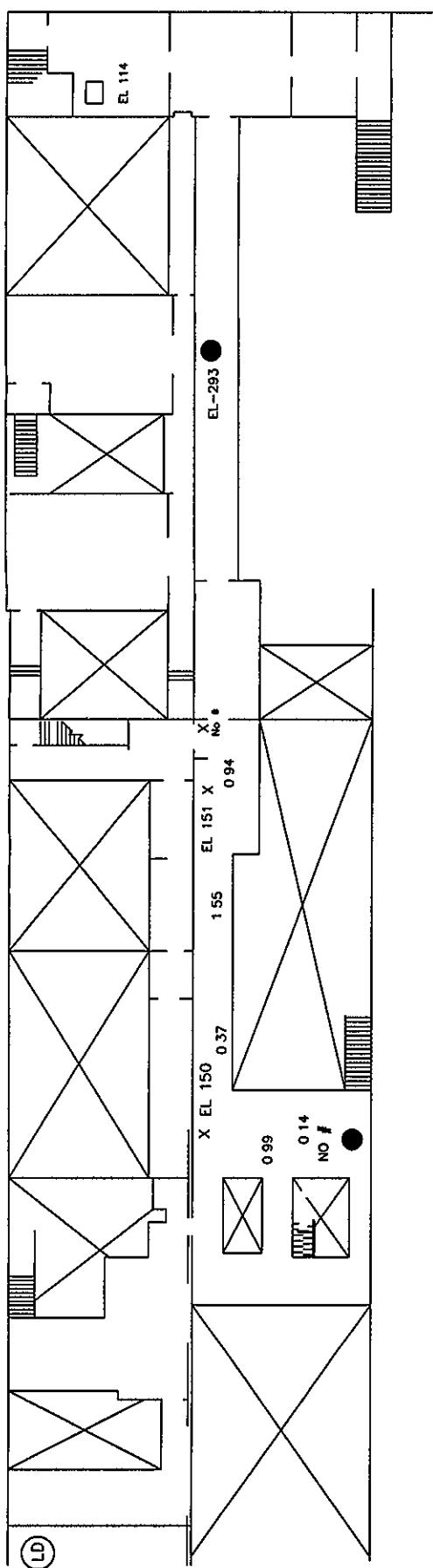
GROUP	B
BUILDING	234-5Z
LOCATION	Maintenance area
PRIORITY	9

- Existing lights which require no changes
- ✗ Lights to be removed (1)
- Emergency lights with wrong power sources (1)
- Note Numbers along egress routes are light level measurements taken under WP 95-959



④ Backup Lights to be added (7)

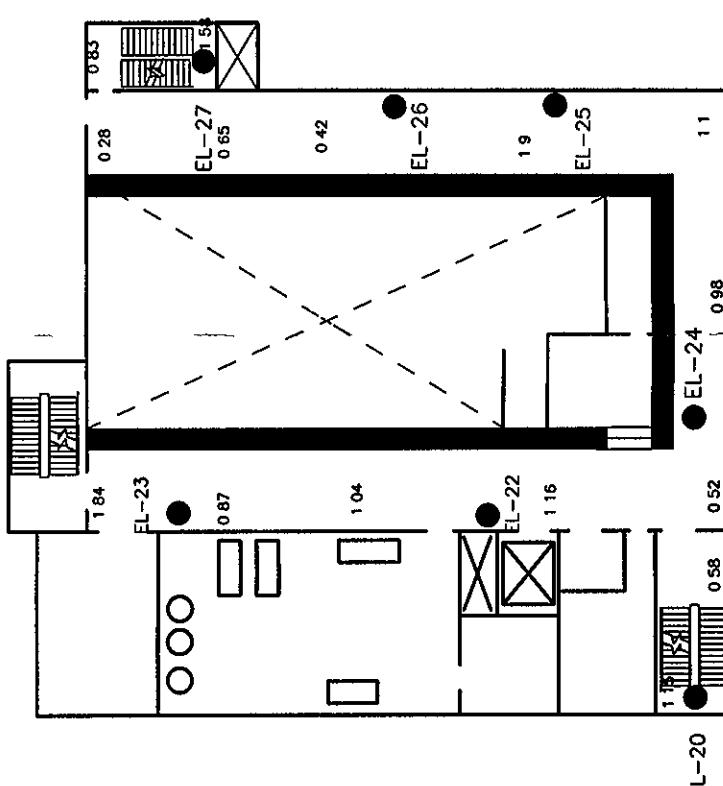
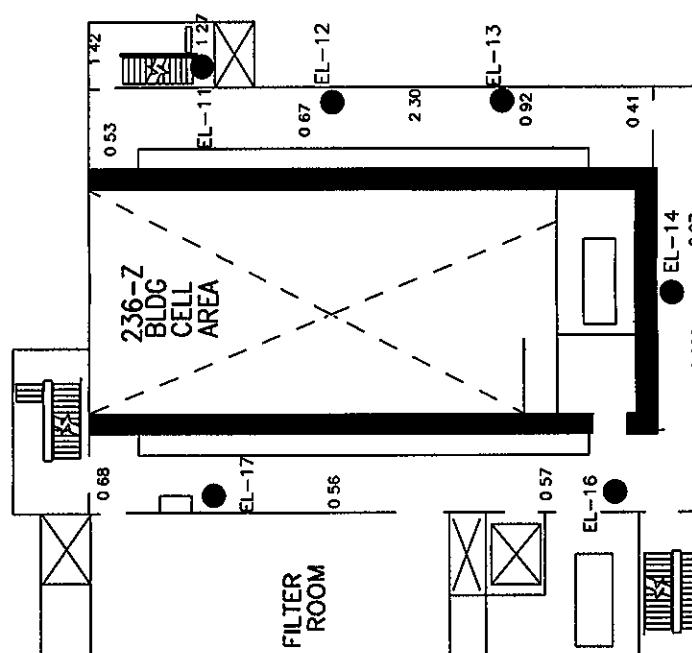
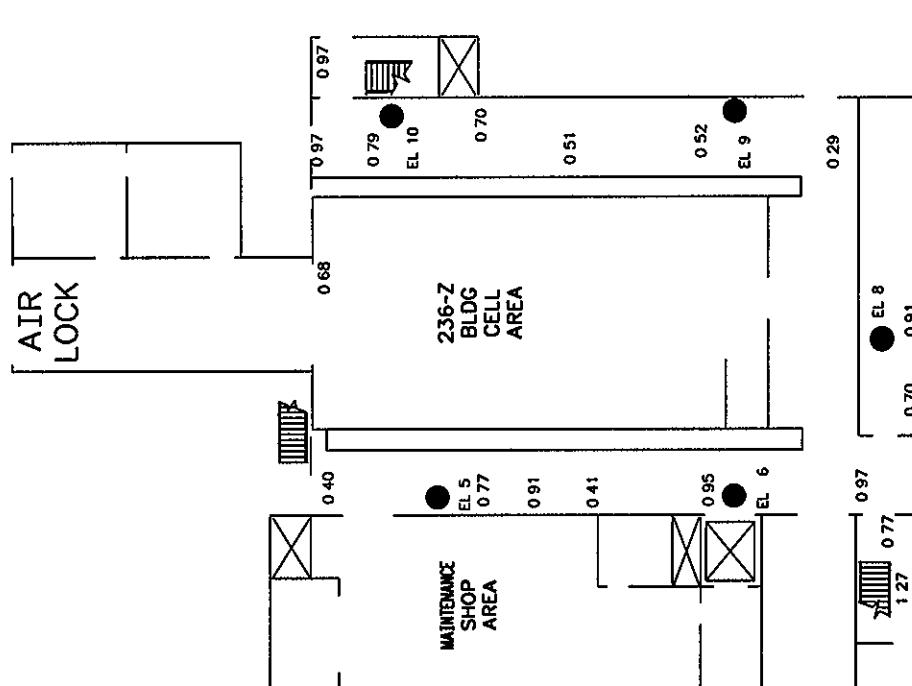
GROUP N  
BUILDING 291-Z  
LOCATION General  
PRIORITY 10



- Existing lights which require no changes
- ✗ Lights to be removed (6)
- Emergency lights with wrong power sources (2)
- Note Light level measurements taken under WP 95-959

GROUP	R
BUILDING	234-5Z
LOCATION	Mezzanine level
PRIORITY	11

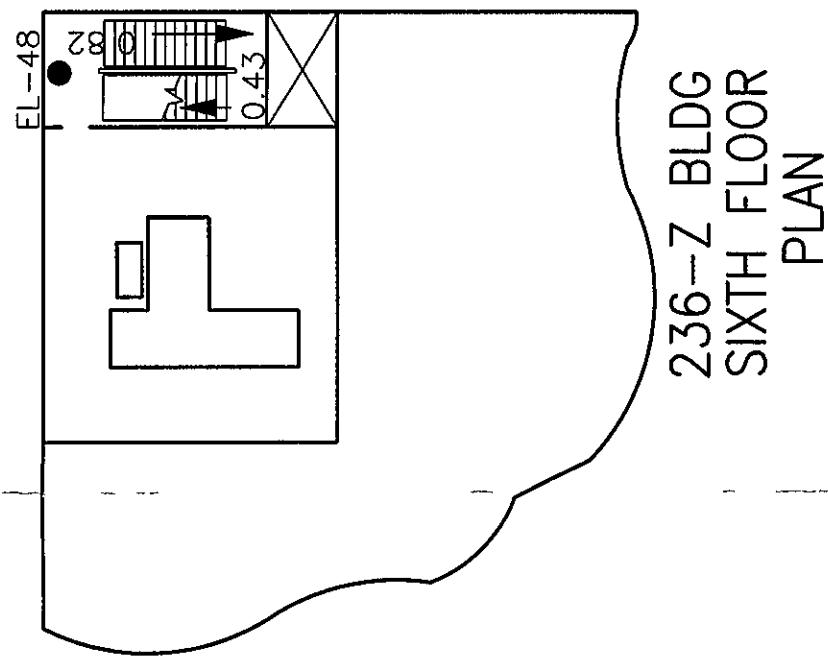
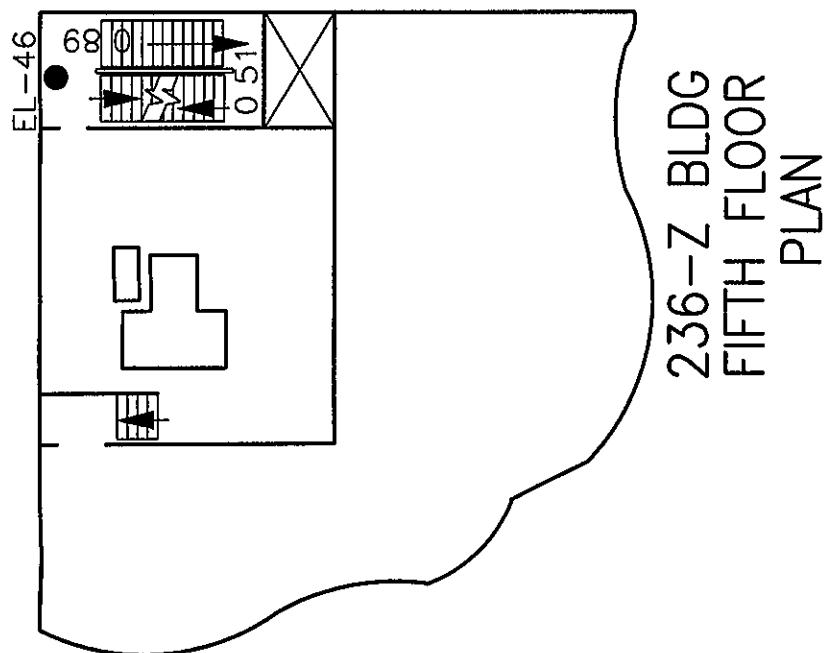
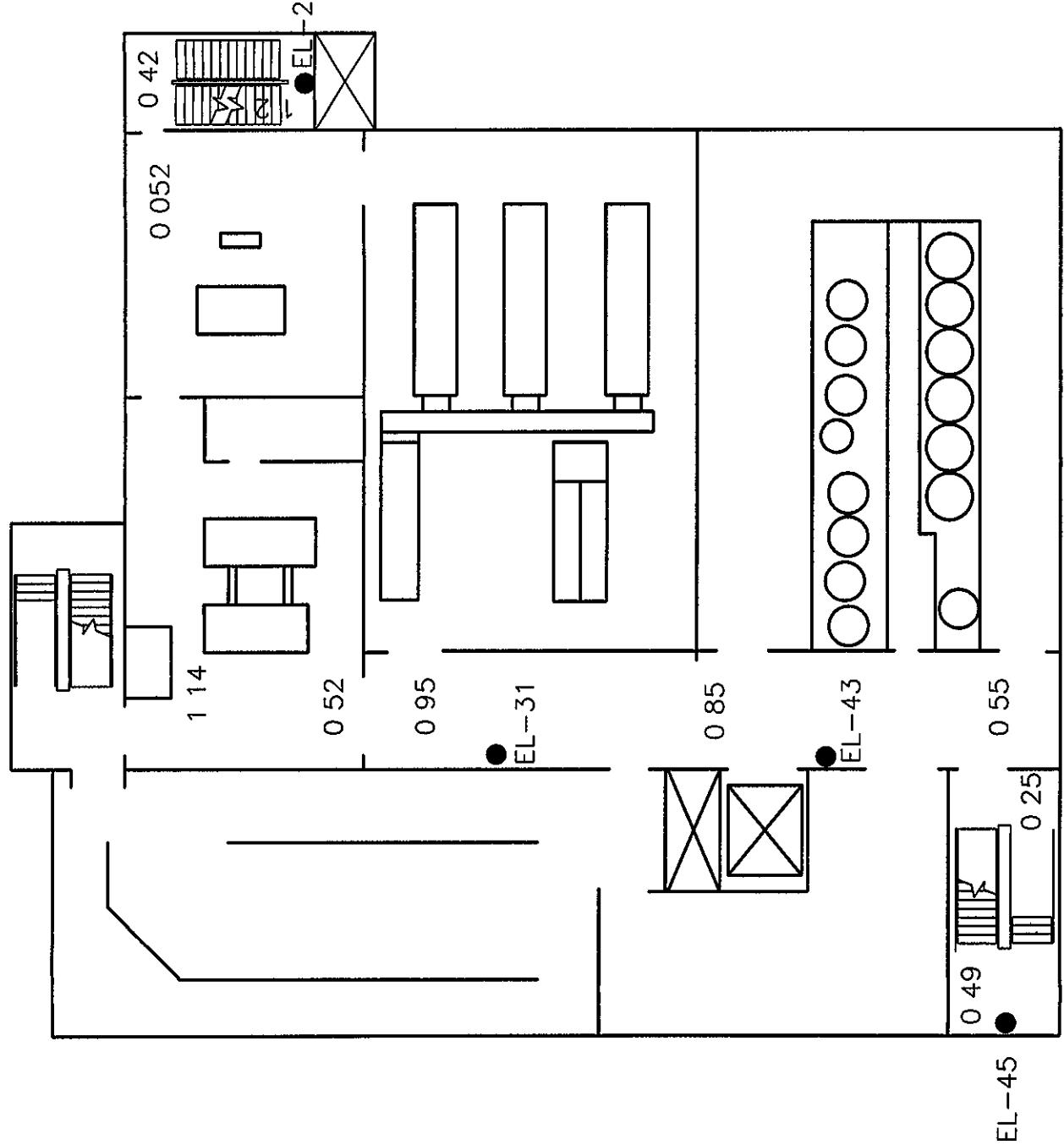
AIR  
LOCK



THIS AREA WAS UPGRADED IN 9/99 BY  
WORK PKG 98-1759 NO FURTHER ACTION  
IS NECESSARY

- Existing lights which require no changes
- Note Light levels measured under WP 95-959

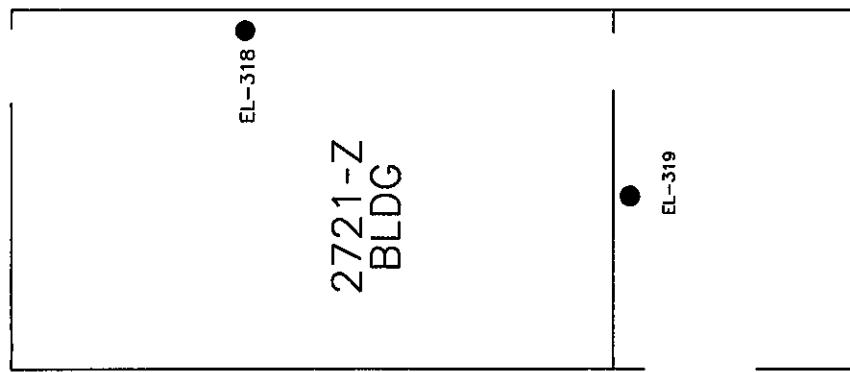
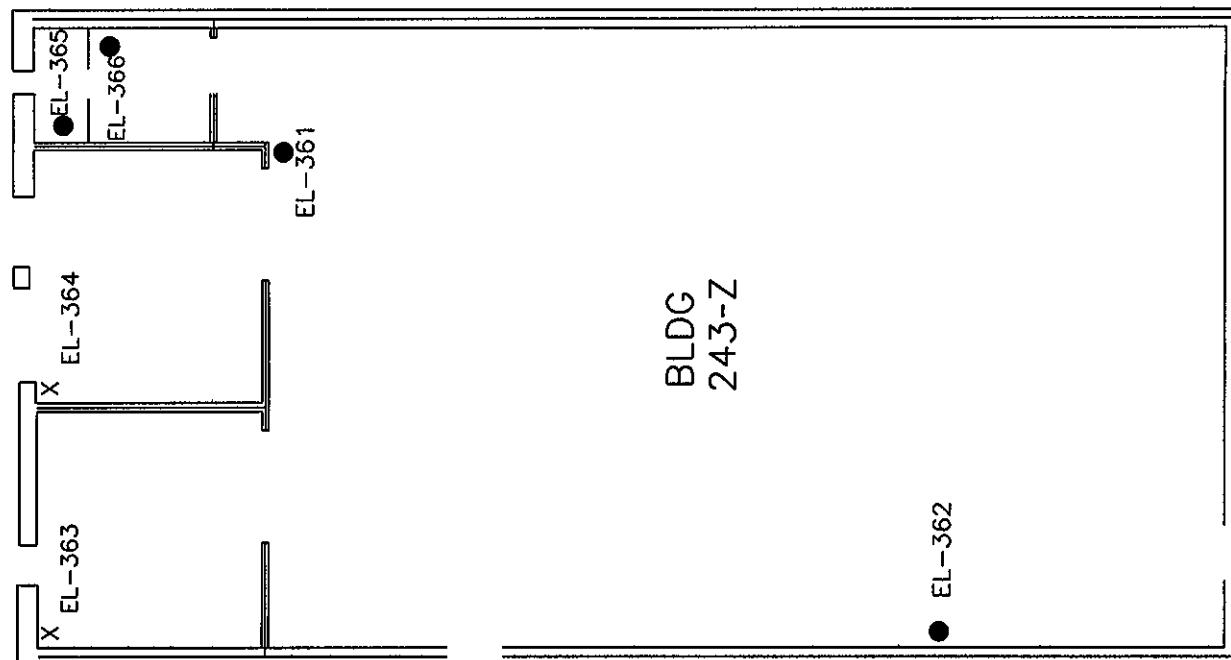
GROUP	K
BUILDING	236-Z
LOCATION	1st 2nd, and 3rd floors
PRIORITY	12



THIS AREA WAS UPGRADED IN 9/99 BY  
WORK PKG 98-1759 NO FURTHER ACTION  
IS NECESSARY

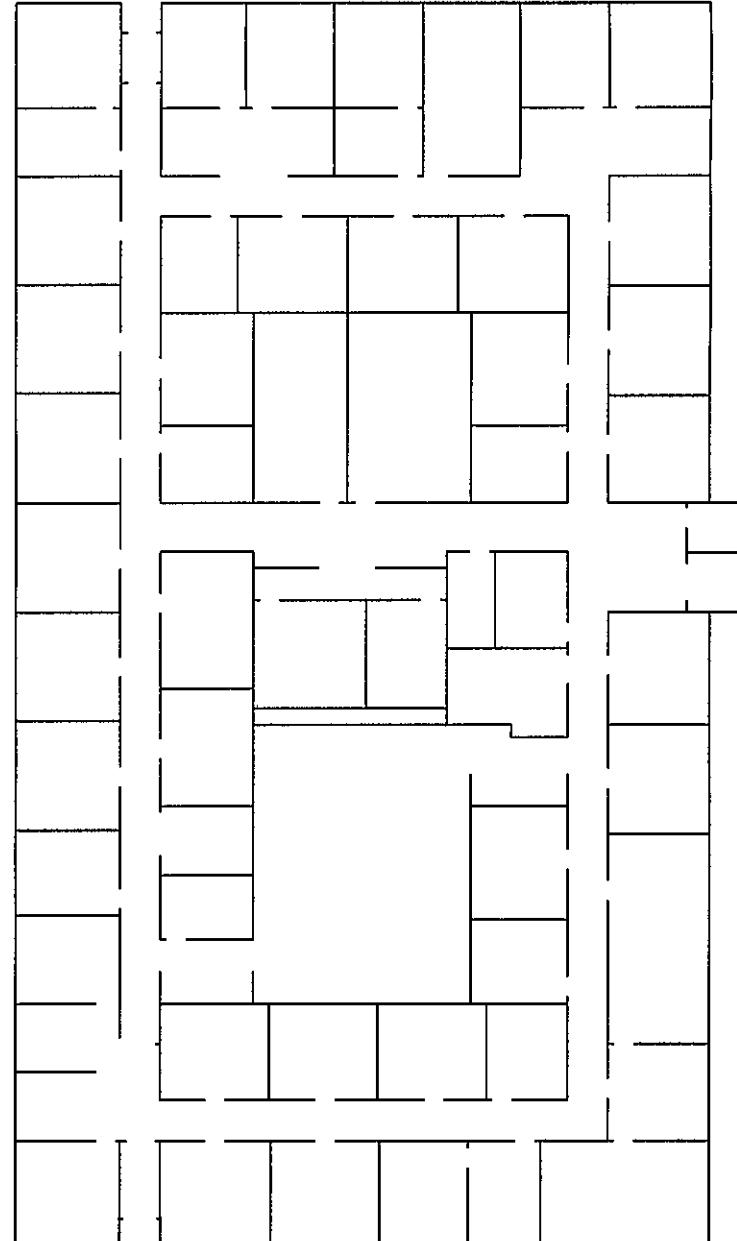
- Existing lights which require no changes
- Note Light levels measured under WP 95-959

GROUP L  
BUILDING 236-Z  
LOCATION 4th, 5th, and  
6th floors  
PRIORITY 12

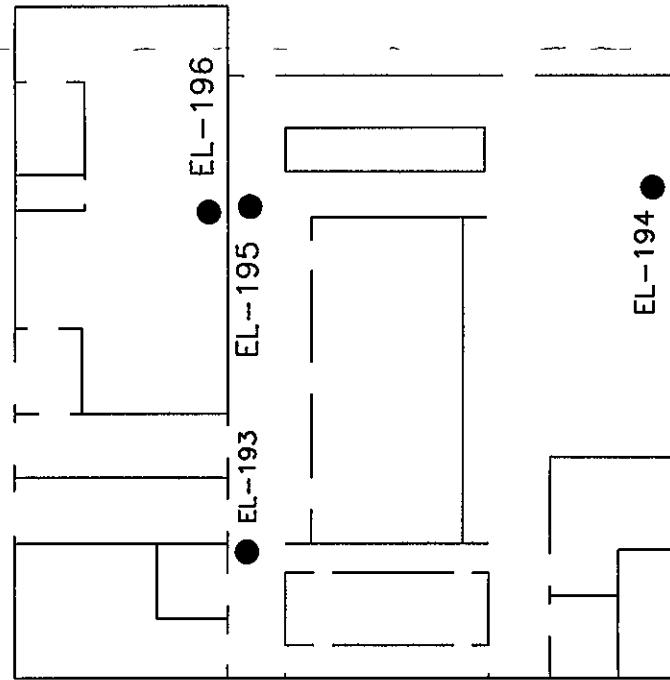


- Existing lights which require no changes
- X Lights to be removed (2)

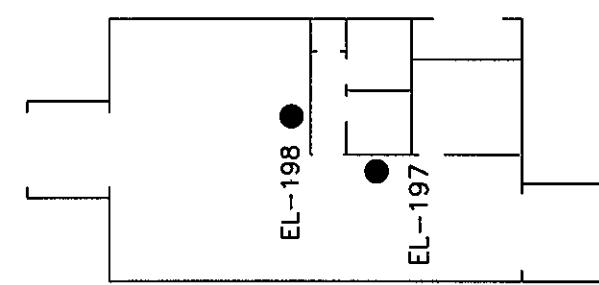
GROUP	M
BUILDING	243-Z, 2721-Z
LOCATION	All
PRIORITY	13



BLDG 270-Z



BLDG 2701-ZD



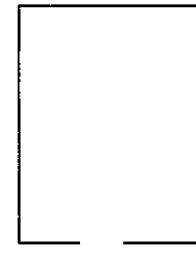
BLDG 2705-Z

- Existing lights which require no changes

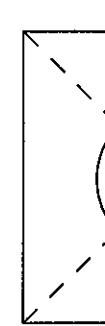
THIS AREA WAS UPGRADED IN 8/99 BY  
WORK PKG 99-890 NO FURTHER ACTION IS NECESSARY

GROUP	P
BUILDING	270-Z 2701-ZD, and 2705-Z
LOCATION	All
PRIORITY	14

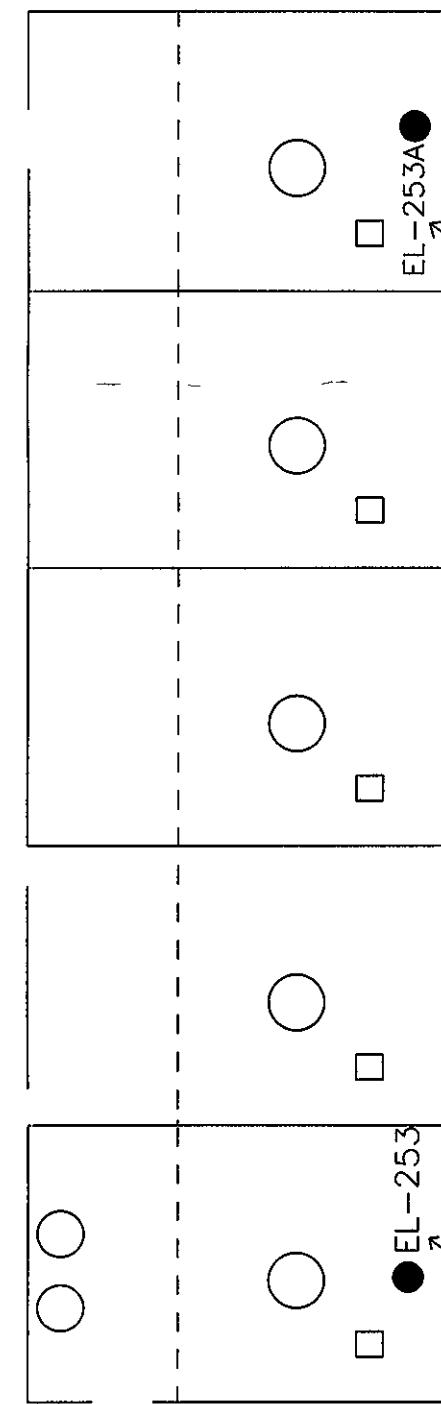
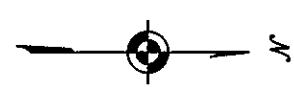
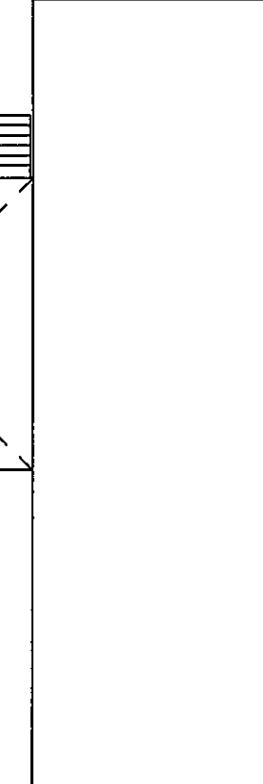
BLDG 241-ZC



241-ZA  
SAMPLE  
BLDG



241-ZB  
BUILDING



Labeled as EL-53A

241-Z  
SUMPS

Labeled as EL-53

- Existing lights which require no changes
- Note No action is required

GROUP	Q
BUILDING	241-Z
LOCATION	All
PRIORITY	15

