

EVALUATION OF SELECTED FIRE DOOR AND DOOR FRAME ASSEMBLIES
(SUPPLEMENT 1)

By

Samuel M. Knight

Prepared for:

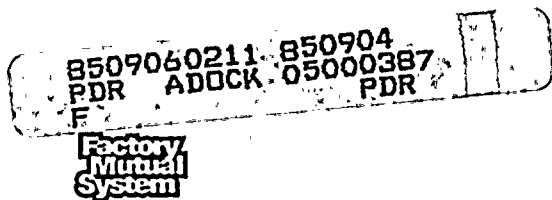
Pennsylvania Power and Light Company
"Susquehanna Steam Electric Station"
Route 11
Salem Township, Pennsylvania 15635

August 1985

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PURPOSE

An evaluation of selected fire doors protecting safety related areas was conducted for the Pennsylvania Power and Light Co. (PP&L) at Susquehanna Steam Electric Station, Units 1 & 2. The purpose of the evaluation was to examine certain unlabeled doors and compare them with labeled door constructions to render an opinion on their expected fire resistance.

This evaluation was requested by PP&L as a supplement to the original evaluation in a Factory Mutual report dated January 1985.

11-11-11



SUMMARY AND CONCLUSIONS

1. Door No. 279 on Level 676, had a 3 hour label attached. The door may be expected to provide that level of protection.
2. Door No. 421 on Level 719, had a 3 hour label attached. The door may be expected to provide that level of protection.
3. Door Nos. 111 and 201, were compared to Door No. 279 and found to be of the same construction and of the same materials, and were judged to be equivalent, hence, may be expected to provide up to 3 hours of fire resistance.
4. Door No. 515 on Level 749, was compared to Door No. 421 and found to be of the same construction and of the same materials and was judged to be equivalent, hence, may be expected to provide up to 3 hours of fire resistance.
5. To meet FM recommendations, the louver in Door No. 606 on Elevation 779, should be removed and the opening protected. The door was compared to Door No. 421, and if protected as noted in paragraph 2.3, may be expected to provide up to 1-1/2 hour's fire resistance.
6. Should it be necessary to have additional doors at this site analyzed as to their expected fire resistance rating, this may be accomplished by one of the following procedures:
 - a. For doors needing up to a 1-1/2 hour equivalency; contact the manufacturer and obtain written confirmation that the doors in question and at least one similar door previously examined by the writer and qualified for 1-1/2 hour rating were fabricated to the appropriate PP&L specification. This should be corroborated by determining that sizes, face sheet thickness and hinge reinforcement thickness are the same. Installation shall conform to the requirements of NFPA Standard 80, "Fire Doors and Windows."
 - b. For doors needing up to a 3 hour equivalency; request an additional visit by the writer to determine that peripheral channel framing and latch reinforcements are the same and that internal stiffener quantity and locations are the same.

I

INTRODUCTION

The plant was visited on May 7, 1985. The writer was accompanied by Mr. D. Kohn of PP&L. Four doors and frames were examined during this visit. The assemblies were located in Unit 1 and 2 Reactor Buildings.

The writer is a Project Engineer with 20 years' experience at the Factory Mutual Research Corporation (FMRC). The writer has served on the National Fire Protection Association "Fire Doors and Windows" Committee (NFPA 80) for 18 years. His primary responsibilities are: 1) Testing and determination of fire ratings for fire doors; and 2) Examination of installed unlabeled doors to determine their fire resistance rating for building authorities.

II

FIRE DOOR AND FRAME EVALUATION

Two labeled fire doors and frames, and two unlabeled fire doors and frames, were examined during this visit to the Susquehanna Steam Electric Station at the request of the Pennsylvania Power and Light Company (PP&L).

2.1 Door Frame Assemblies

All frames were found to be fabricated in accordance with the American National Standards Institute, Standard A155.1, and may be expected to provide up to 3 hours fire resistance.

2.2 Fire Doors

Unlabeled fire doors were examined by comparing their construction features with labeled fire doors.

2.2.1 Door Nos. 111 and 201

Door Nos. 111 and 201 were re-evaluated during this visit. They were previously covered in the FMRC report dated January 1985. At that time, those doors were compared against a 1-1/2 hour labeled door (No. 110 at Level 670) and our opinion was that these doors could be expected to provide at least a 1-1/2 hour fire resistance. Door No. 279 on Level 676 bears a label indicating a 3 hour fire resistance.

The construction details of Door No. 279 were compared to Door No. 110 with the following results:

- 1) All doors had the same dimensions (height, width and thickness).
- 2) Internal stiffeners were determined to be approximately 6 in. to 8 in. on center. This was done by means of a stethoscope.
- 3) Face sheet, hinge reinforcement and peripheral channel framing were found to be essentially the same. This was done by means of a specially adapted micrometer.



2.2.2 Door No. 515

Door No. 515, on Level 749, was not labeled and was examined to compare its construction details against Door No. 421 using the criteria outlined in Paragraph 2.2.1. Door 421 has a 3 hour label. Both doors have essentially the same construction details.

2.2.3 Door No 606

Door No. 606, on Level 779, was examined to compare its construction against Door No. 421. Door No. 606 contained a louver (6 in. x 8 in.) which precludes the door frame having any fire resistance, unless modified. All other details as outlined in Paragraph 2.2.1 were essentially the same between these two doors. Door No. 421 is a 3 hour rated fire door. If Door No. 606 is modified, it can provide at least 1-1/2 hour's fire resistance. The modification should consist of attaching one 18 gage steel plate to each door face. The plate should be large enough to overlap the louver by 2 in. on all sides. Fasteners should be sheet metal screws, spaced no more than 6 in. on center.



III

RECOMMENDATIONS

1. If a fire resistance rating of up to 1-1/2 hours for Door No. 606, on Level 779, is desired, the louver should be covered on both faces by 18 gage steel plates, overlapping all sides by 2 in., fastened by sheet metal screws spaced no more than 6 in. on center.



APPENDIX R EXEMPTION REQUEST

WRAPAROUND AREA

REQUEST NO. 4

REASON FOR EXEMPTION REQUEST:

A 66 foot wide Wraparound Area is provided between redundant safe shutdown paths on the north and south sides of the Reactor Building on three specific elevations. This Wraparound Area functions to separate the north and south portions of the fire zones on these elevations by providing spatial separation. Within the Wraparound Area both division are protected. In addition, due to the fire protection features or lack of significant combustibles in these areas, it is assumed that fire spread is confined to a 50' distance.

FIRE ZONES AFFECTED:

All fire zones are provided with fire detection. The Wraparound Area is a subset of a fire zone and is located east of the containment within the fire zone (see Figures 3.0, 4.0 and 5.0 in Appendix B). The Table below provides a description of fire protection features and combustible loading in the affected fire zones.

Fire Zone	Protection Provided Essential Raceway	Combustible Loading
1-3B	1 hour/AS	20 min
1-3C	3 hours	9 min
1-4A	1 hour/AS	15 min
1-5A	3 hours	19 min
2-3B	1 hour/AS	16 min
2-3C	3 hours	11 min
2-4A	1 hour/AS	15 min
2-5A	1 hour/AS	18 min

Notes: The 1 hour or 3 hour refers to the fire rating of the raceway wrap for essential safe shutdown cables. "AS" indicates automatic sprinkler protection is provided.

Zone 1-3C and 2-3C have a calculated in-situ combustible loading of 9 and 11 minutes, and due to the congestion and high radiation, transient combustible loading is expected to be very low. Therefore automatic sprinkler protection has not been provided.

The areas north and south of these wraparound areas have different safe shutdown path available. (i.e. Div. I vs. Div. II). Within the wraparound area, both paths are available since a) either components of both paths do not exist or b) components of both paths are protected with

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either a 3 hour fire rated wrap or a 1 hour fire rated wrap with automatic sprinklers.

To ensure a 50 foot wide separation a 66 foot wide area was chosen since conduit locations have a ± 8 foot tolerance from the location shown on the drawing.

JUSTIFICATION:

In order to damage redundant shutdown paths fire damage must spread over a distance greater than 50 foot wide. Such damage is not considered feasible, considering the general arrangement, fire protection, fire detection, and low combustible loadings in these areas.

EXEMPTIONS REQUEST:

A 66 foot wide Wraparound Area provided in Fire Zones 1-3B, 1-3C, 1-4A, 1-5A, 2-3B, 2-3C, 2-4A, and 2-5A provide sufficient protection to separate redundant safe shutdown paths, and, therefore, fire rated barriers are not required.

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(c) The following information shall be submitted by the contractor:

(d)

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1. 1990年12月，在“中国—东盟”合作中，中国首次提出“中国—东盟”合作。

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APPENDIX R EXEMPTION REQUEST

PARTIAL RATING OF WALLS AND FLOOR/CEILING

REQUEST NO. 5

REASON FOR EXEMPTION REQUEST:

Classical fire protection practice provides complete walls, or floor/ceiling assemblies that are fire rated as barriers between adjacent fire areas. The Reactor Building Fire Areas vary in size and shape from those typically found in normal practice, and the need for fire rated fire area boundaries is based on the need to separate redundant paths. When fire rating is required, only the portion of the boundary common to the fire areas with different safe shutdown paths is fire rated (reference Figures 1.0 through 11.0 in Appendix B).

FIRE ZONES AFFECTED:

For the effected fire zones see Table 5-1.

JUSTIFICATION:

Our Fire Barrier Analysis uses a combination of fire rated barriers and spatial separation (wraparound areas) to form fire rated fire area boundaries. The use of partial rating of walls and floor/ceilings is consistent with our use of spatial separation and explained in Appendix B.

EXEMPTION:

Fire boundaries when analyzed to be required between fire areas need be protected only for the portions of the wall or floor/ceilings common to the two areas.

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1. The first part of the text discusses the importance of maintaining accurate records of all transactions, including sales, purchases, and expenses. It emphasizes the need for consistency and transparency in financial reporting.

2. The second part of the text focuses on the role of the accounting department in providing accurate and timely financial information to management. It highlights the importance of effective communication and collaboration between the accounting department and other departments.

3. The third part of the text discusses the importance of maintaining accurate records of all transactions, including sales, purchases, and expenses. It emphasizes the need for consistency and transparency in financial reporting.

4. The fourth part of the text focuses on the role of the accounting department in providing accurate and timely financial information to management. It highlights the importance of effective communication and collaboration between the accounting department and other departments.

5. The fifth part of the text discusses the importance of maintaining accurate records of all transactions, including sales, purchases, and expenses. It emphasizes the need for consistency and transparency in financial reporting.

6. The sixth part of the text focuses on the role of the accounting department in providing accurate and timely financial information to management. It highlights the importance of effective communication and collaboration between the accounting department and other departments.

7. The seventh part of the text discusses the importance of maintaining accurate records of all transactions, including sales, purchases, and expenses. It emphasizes the need for consistency and transparency in financial reporting.

8. The eighth part of the text focuses on the role of the accounting department in providing accurate and timely financial information to management. It highlights the importance of effective communication and collaboration between the accounting department and other departments.

9. The ninth part of the text discusses the importance of maintaining accurate records of all transactions, including sales, purchases, and expenses. It emphasizes the need for consistency and transparency in financial reporting.

10. The tenth part of the text focuses on the role of the accounting department in providing accurate and timely financial information to management. It highlights the importance of effective communication and collaboration between the accounting department and other departments.

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LIST OF PARTIAL RATING OF WALLS AND FLOOR/CEILING
BARRIER SEPARATING FIRE ZONES

Reactor Building Unit #1

| <u>FIRE ZONE/FIRE ZONE</u> | <u>REF. FIG. IN APPENDIX B</u> |
|----------------------------|--------------------------------|
| 1-1E/1-3B-W | 2, 3 & 9 |
| 1-1F/1-3B-W | 2, 3 & 9 |
| 1-1E/1-3C-W | 2, 3 & 10 |
| 1-1F/1-3C-W | 2, 3 & 10 |
| 1-3A/1-4B | 3, 4 & 11 |
| 1-3A/ 1-4G | 3, 4 & 11 |
| 1-4A-W/1-5A-S | 4, 5 & 10 |
| 1-4A-W/1-5A-W | 4, 5 & 9 |
| 1-4A-N/1-5A-W | 4, 5 & 10 |
| 1-5A-S/1-6A | 5, 6 & 11 |
| 1-5A-S/1-6I | 5, 6 & 11 |
| 1-5A-W/1-5E | 5 & 10 |

TABLE 5-1

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UNITED STATES DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF STAFF
WASHINGTON, D. C.

1. SUMMARY OF THE PROBLEM

2. STATEMENT OF THE PROBLEM

3. ANALYSIS OF THE PROBLEM

4. CONCLUSIONS

5. RECOMMENDATIONS

6. REFERENCES

7. APPENDICES

8. GLOSSARY

9. INDEX

10. BIBLIOGRAPHY

11. LIST OF ILLUSTRATIONS

12. LIST OF TABLES

13. LIST OF FIGURES

14. LIST OF ABBREVIATIONS

15. LIST OF SYMBOLS

16. LIST OF REFERENCES

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LIST OF PARTIAL RATING OF WALLS AND FLOOR/CEILING
BARRIER SEPARATING FIRE ZONES

Reactor Building Unit #2

FIRE ZONE/FIRE ZONE

REF. FIG. IN APPENDIX B

| | |
|---------------|--------------|
| 2-1E/2-3B-W | 2, 3 & 9 |
| 2-1F/2-3B-W | 2, 3 & 9 |
| 2-1E/2-3C-W | 2, 3 & 9 |
| 2-1F/2-3C-W | 2, 3 & 9 |
| 2-3B-N/2-4A-S | 3, 4 & 11 |
| 2-3B-N/2-4G | 3, 4 & 11 |
| 2-4A-W/2-5A-N | 4, 5, 9 & 10 |
| 2-4A-W/2-5A-W | 4, 5 & 9 |
| 2-4A-S/2-5A-W | 4, 5 & 9 |
| 2-6A/2-4G | 7 & 11 |
| 2-5A-S/2-6A | 5, 6 & 11 |
| 2-5C/2-6A | 5, 6 & 11 |
| 2-5A-W/2-5E | 5 & 10 |

TABLE 5-1

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THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 309

PHYSICS 309

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PHYSICS 309

APPENDIX R EXEMPTION REQUEST

NON FIREPROOFED STRUCTURAL STEEL

REQUEST NO. 6

REASON FOR EXEMPTION REQUEST:

Within the Unit 1 and 2 Reactor Buildings and Control Structure a few floor/ceiling assemblies are to be upgraded to a 3 hour fire rating, to separate redundant safe shutdown equipment. The structural steel supporting these floors is not protected.

FIRE ZONES AFFECTED:

The table below provides a list of the affected fire zones. For details on the extent of the required fire protection, see Figures 1.0 through 11.0 in Appendix B.

| <u>FIRE ZONE BELOW/
FIRE ZONE ABOVE</u> | <u>SPRINKLER
PROTECTION BELOW
STRUCTURAL STEEL</u> | <u>COMBUSTIBLE LOADING
FOR FIRE ZONE BELOW
STRUCTURAL STEEL</u> |
|---|--|---|
| Unit #1 Reactor Building | | |
| 1-1E/1-3C-W | No | 12 min |
| 1-1E/1-3B-W | No | 12 min |
| 1-1F/1-3B-W | No | 18 min |
| 1-1F/1-3C-W | No | 18 min |
| 1-3A/1-4B | Yes | 25 min |
| 1-3A/1-4G | Yes | 25 min |
| 1-3B-W/1-4C | Yes | 20 min |
| 1-3B-W/1-4D | Yes | 20 min |
| 1-4A-N/1-5A-W | Yes | 15 min |
| 1-4A-W/1-5A-S | Yes | 15 min |
| 1-4A-W/1-5A-W | Yes | 15 min |
| 1-4A-W/1-5E | Yes | 15 min |
| 1-4A-W/1-5F | Yes | 15 min |
| 1-4A-W/1-5G | Yes | 15 min |
| 1-5A-S/1-6A | Yes | 19 min |
| 1-5A-S/1-6I | Yes | 19 min |
| Unit #2 - Reactor Building | | |
| 2-1E/2-3B-W | No | 13 min |
| 2-1E/2-3C-W | No | 13 min |
| 2-1F/2-3B-W | No | 18 min |
| 2-1F/2-3C-W | No | 18 min |

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and the role of the accounting department in ensuring the integrity of the financial data. It also highlights the need for regular audits and the importance of transparency in financial reporting.

2. The second part of the document focuses on the implementation of internal controls to prevent fraud and ensure the accuracy of financial statements. It outlines the key components of a robust internal control system, including segregation of duties, authorization procedures, and regular monitoring and evaluation.

3. The third part of the document addresses the challenges of managing financial risk and the importance of developing a comprehensive risk management strategy. It discusses the various types of financial risks, such as credit risk, market risk, and liquidity risk, and provides guidance on how to identify, assess, and mitigate these risks.

4. The fourth part of the document explores the role of technology in modern accounting and the impact of digital transformation on the accounting profession. It discusses the benefits of using accounting software and the importance of staying up-to-date with the latest technological advancements.

5. The fifth part of the document discusses the importance of ethical considerations in accounting and the role of the accounting profession in promoting ethical behavior. It outlines the key principles of accounting ethics and provides guidance on how to handle ethical dilemmas and conflicts of interest.

6. The sixth part of the document discusses the importance of communication and collaboration in the accounting department and the role of the accounting manager in fostering a positive work environment. It outlines the key components of effective communication and provides guidance on how to build strong relationships with colleagues and clients.

7. The seventh part of the document discusses the importance of continuous learning and professional development in the accounting profession and the role of the accounting manager in supporting their team's growth. It outlines the key components of a continuous learning program and provides guidance on how to encourage and support ongoing education and training.

8. The eighth part of the document discusses the importance of staying up-to-date with the latest accounting standards and regulations and the role of the accounting manager in ensuring compliance. It outlines the key components of a compliance program and provides guidance on how to monitor and evaluate compliance with relevant standards and regulations.

9. The ninth part of the document discusses the importance of maintaining accurate records of all transactions and the role of the accounting department in ensuring the integrity of the financial data. It also highlights the need for regular audits and the importance of transparency in financial reporting.

10. The tenth part of the document discusses the importance of maintaining accurate records of all transactions and the role of the accounting department in ensuring the integrity of the financial data. It also highlights the need for regular audits and the importance of transparency in financial reporting.

FIRE ZONE BELOW/
FIRE ZONE ABOVE

SPRINKLER
PROTECTION BELOW
STRUCTURAL STEEL

COMBUSTIBLE LOADING

Unit #2 - Reactor Building (Cont.)

| | | |
|---------------|-----|--------|
| 2-3B-N/2-4A-S | Yes | 16 min |
| 2-3B-N/2-4G | Yes | 16 min |
| 2-3B-W/2-4C | Yes | 16 min |
| 2-3B-W/2-4D | Yes | 16 min |
| 2-4A-S/2-5A-W | Yes | 15 min |
| 2-4A-W/2-5A-N | Yes | 15 min |
| 2-4A-W/2-5A-W | Yes | 15 min |
| 2-4G/2-5B | No | 4 min |
| 2-4A-W/2-5E | Yes | 15 min |
| 2-4A-W/2-5F | Yes | 15 min |
| 2-4A-W/2-5G | Yes | 15 min |
| 2-5A-S/2-6A | Yes | 6 min |
| 2-5C/2-6A | No | 6 min |
| 2-6A/2-4G | No | 6 min |

| | | |
|-------------------|-----|--------|
| Control Structure | | |
| Elevation 754'-0 | Yes | 62 min |
| Support Steel | | |

JUSTIFICATION:

Unit #1 and #2 Reactor Buildings:

All fire zones have sprinkler protection below the exposed structural steel except for Fire Zones 1-1E, 1-1F, 2-1E, 2-1F, 2-4G, 2-5C and 2-6A. In these fire zones the maximum combustible rating is 18 minutes, and minimal transient combustibles are expected. Finally, the in-situ combustibles in these fire zones are generally located near the floor at a distance from where the structural steel forming the fire area barrier is located.

CONTROL STRUCTURE:

Automatic detection and protection is provided below the exposed structural steel. The majority of the combustibles in the area below the exposed structural steel are cables. The majority of the cables are located either below the raised computer floor in the Control Room or in 2 hour fire rated cable chases on the north and south walls of the control structure where only one structural member is effected. There is approximately 20 feet between the raised computer floor and the exposed structural steel supporting elevation 754'-0. Finally, the Control Room comprises the majority of the area beneath this steel and it is continually staffed.

EXEMPTION REQUEST:

Exposed structural steel supporting the identified fire area barriers is acceptable and does not require fire proofing.

djk/h188c3:del

APPENDIX R EXEMPTION REQUEST

FIRE SPREAD LIMITATIONS

REQUEST NO. 7

REASON FOR EXEMPTION REQUEST:

The analysis which determined which fire zone boundaries required fire rating assumed that a fire starting in a given fire zone could damage equipment in the next adjacent fire zones (horizontally and vertically) unless fire rated boundaries were provided. Damage beyond the adjacent zones via a second non-rated boundary was not considered.

FIRE ZONE AFFECTED:

This assumption was used generally throughout the Fire Barrier Analysis.

JUSTIFICATION:

The non-rated fire zone boundaries have some non-fire rated components such as structural steel, doors, HVAC penetrations, pipe penetrations, and seismic gaps seals. The boundaries themselves, however, are constructed of reinforced concrete in excess of 8 inches, and use 3 hour fire rated cable penetrations. The nature of the fire zone boundaries are such that they would be expected to contain minor fires.

The NRC provided the following guidance in an April 18, 1985 letter to PP&L:

"The reassessment of non-rated construction should be in accordance with guidance presented at the site audit. That is, to provide reasonable assurance that fire propagation will not occur beyond non-fire-rated zone boundaries, the boundaries should be upgraded to be continuous barriers with a fire rating sufficient to withstand the effects of a fire involving in-situ and transient combustibles, with conservative margin. If boundary construction is not upgraded, your reassessment should assume that fire spread will occur into the next most immediate fire zone (horizontally and/or vertically)."

EXEMPTION REQUEST:

It may be assumed in the case of non-rated fire boundaries that fire spread will only occur into the next most immediate fire zone (horizontally and vertically), and that damage beyond the adjacent zones via a second non-rated boundary need not be considered.

djk/h188c3:del

DECLASSIFICATION AUTHORITY

DATE OF REVIEW

EXEMPT NO.

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SUSQUEHANNA STEAM ELECTRIC STATION - UNITS 1 & 2

FIRE PROTECTION PROGRAM - CONCERN #1

DOCKETS NO. 50-387

50-388

APPENDIX B - SAMPLE DOCUMENTATION

APPENDIX B

Unrated Fire Zone Boundaries in all safety related structures were reviewed to determine whether they functioned as a fire area barrier and as such were required to be upgraded to fire rated status in accordance with Appendix R.

For Purposes of this Analysis a fire area was defined as a three dimensional volume bounded on all sides either by floors, walls or ceilings using fire rated construction or by a "buffer" fire zone which precludes the spread of a fire. A "buffer" fire zone was defined as a fire zone which acts as a subdivision of two adjacent fire areas and which, due to the protection provided to the essential cables in the fire zone or the lack of any essential cables in the fire zone, can satisfy the criteria for separating one safe shutdown path in one fire area from another in the adjacent fire area.

A sample set of documentation is provided in Attachment #1, Figures 1.0 through 11.0, for the Unit #1 and Unit #2 Reactor Buildings.

The Figures in Attachment #1 show those walls which are currently rated and required to be rated to support our Appendix R Analysis, those walls and floor/ceilings which must be upgraded to support our Appendix R analysis, the Wraparound Areas, and for each fire zone, the paths available for achieving safe shutdown and the in-situ combustible loading. In reviewing these drawings it can readily be seen how the fire areas in Attachment #2 are formed and that the fire area boundaries meet the criteria described above.

There were two types of "Buffer" fire zones used throughout the analysis. The first type is the Wraparound Area. The Wraparound Areas are shown on Figures 3.0, 4.0 & 5.0. In Unit #1 these Wraparound Areas function to separate Fire Area R-1A (Unit #1) from Fire Area R-1B (Unit #1). Exemption Request No. 4 in Appendix A provides the justification for the use of these Wraparound Areas. The second type is best depicted by the use of an example. Refer to Figure 6.0. On this Figure it can be seen how Fire Zone 1-6D. Which contains no essential cables and, therefore, has all paths available, functions as a "buffer" fire zone in separating Fire Zone 1-6C in Fire Area R-1B from Fire Zones 1-6E and 1-2C in Fire Area R-1A. Other "buffer" fire zones are described in Attachment 2.

As described above spatial separation is used in two ways throughout the analysis. This use of spatial separation dictates that only portions of some fire area boundaries common to two fire areas need to be fire rated. One such case is shown on Figure 9.0, where the slab on Elevation 683'-0 is protected only in the area of Wraparound Area 1-3B-W. Protection on this portion of the slab is required because the spatial separation between Fire Zone 1-1F in Fire Area R-1A and Fire Zone 1-3B-N in Fire Area R-1B is less than 50 feet. The use of partial rating is justified in Exemption Request No. 5 in Appendix B.

Our reanalysis was based upon the concept of using valid fire areas to assure the availability of a safe shutdown path to cold shutdown in the event of a fire in any given fire area. A listing of the fire areas in each safety related building is contained in Attachment #2.

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The first part of the report deals with the general situation of the country and the progress of the work during the year.

The second part of the report deals with the results of the work during the year and the progress of the work during the year.

The third part of the report deals with the results of the work during the year and the progress of the work during the year.

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The sixth part of the report deals with the results of the work during the year and the progress of the work during the year.

The seventh part of the report deals with the results of the work during the year and the progress of the work during the year.

SUSQUEHANNA STEAM ELECTRIC STATION - UNITS 1 & 2

FIRE PROTECTION PROGRAM - CONCERN #1

DOCKETS NO. 50-387

50-388

APPENDIX B - SAMPLE DOCUMENTATION

ATTACHMENT NO. 1

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF THE HISTORY OF ARTS

AND ARCHITECTURE

1955

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF THE HISTORY OF ARTS

SUSQUEHANNA STEAM ELECTRIC STATION - UNITS 1 & 2

FIRE PROTECTION PROGRAM - CONCERN #1

DOCKETS NO. 50-387

50-388

APPENDIX B - SAMPLE DOCUMENTATION

ATTACHMENT NO. 2

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF CHEMISTRY

CHICAGO, ILL.

1954

1

2

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF CHEMISTRY

LISTING OF FIRE ZONES IN EACH FIRE AREA

REACTOR BUILDING UNIT #1

| <u>FIRE AREA R-1A</u> | <u>FIRE AREA R-1B</u> | <u>FIRE AREA R-1C</u> |
|-----------------------|-----------------------|-----------------------|
| 1-1A | 1-1B | 1-1H *** |
| 1-1F | 1-1C | |
| 1-1G | 1-1D | 1-4F *** |
| 1-2A | 1-1E | |
| 1-2C | 1-1I | |
| | 1-1J | |
| | 1-2B | |
| 1-3A | 1-2D | |
| 1-3B-S | 1-3B-N | |
| 1-3B-W * | 1-3B-W * | |
| 1-3C-S | 1-3C-N | |
| 1-3C-W * | 1-3C-W * | |
| 1-4A-S | 1-4A-N | |
| 1-4A-W * | 1-4A-W * | |
| 1-4D | 1-4B | |
| 1-4E | 1-4C | |
| 1-5A-S | 1-4G | |
| 1-5A-W * | 1-5A-N | |
| 1-5E | 1-5A-W * | |
| 1-5G | 1-5B | |
| 1-5H | 1-5C | |
| 1-6D ** | 1-5D | |
| 1-6E | 1-5F | |
| 1-6F ** | 1-6A | |
| 0-6H ** | 1-6B ** | |
| 1-7A ** | 1-6C | |
| 1-7B ** | 1-6D ** | |
| 0-8A ** | 1-6F ** | |
| | 1-6I | |
| | 0-6G ** | |
| | 0-8A ** | |

* These fire zone sub-divisions, known as Wraparound Areas, function as a fire rated barrier separating fire area R-1A from R-1B.

** These fire zones contain no safe shutdown cables and function as a "buffer" fire zone.

*** These fire zones are the primary containment and have an inerted atmosphere.

REACTOR BUILDING UNIT #2

FIRE AREA R-2A

FIRE AREA R-2B

FIRE AREA R-2C

| | | |
|----------|----------|----------|
| 2-1B | 2-1A | 2-1H *** |
| 2-1F | 2-1C | 2-4F *** |
| 2-1G | 2-1D | |
| 2-1I | 2-1E | |
| | 2-1J | |
| 2-2A | 2-3B-N | |
| 2-2C | 2-3B-W * | |
| 2-3A | 2-3C-N | |
| 2-3B-W * | 2-3C-W * | |
| 2-3B-S | 2-4A-N | |
| 2-3C-W * | 2-4A-W * | |
| 2-3C-S | 2-4B | |
| 2-4A-W * | 2-4C | |
| 2-4A-S | 2-5A-N | |
| 2-4D | 2-5A-W * | |
| 2-4E | 2-5B | |
| 2-4G | 2-5E | |
| 2-5A-W * | 2-5F | |
| 2-5A-S | 2-6A | |
| 2-5C | 2-6C | |
| 2-5D | 2-6D ** | |
| 2-5G | 2-6F ** | |
| 2-5H | | |
| 2-6B | | |
| 2-6D ** | 2-7A ** | |
| 2-6E | 0-8A ** | |
| 2-6F ** | 2-2B | |
| 2-7A ** | | |
| 0-8A ** | | |

* These fire zone sub-divisions, known as Wraparound Areas, function as a fire rated barrier separating fire area R-2A from R-2B.

** These fire zones contain no safe shutdown cables and function as a "buffer" fire zone.

*** These fire zones are the primary containment and have an inerted atmosphere.

CONTROL STRUCTURE

| <u>FIRE AREA</u> | <u>FIRE ZONE(S)</u> |
|------------------|--|
| CS-1 | 0-21B, 0-29A |
| CS-2 | 0-22B, 0-29C,D |
| CS-3 | 0-21A, 0-22A, 0-22C, 0-23, 0-24A-G, 0-25A,E |
| CS-4 | 0-24I,L |
| CS-5 | 0-24K |
| CS-6 | 0-24J, 0-25B, 0-26B,S, 0-27F, 0-28P |
| CS-7 | 0-24L,M, 0-25C,D, 0-26C,D, 0-26T,V, 0-27G,H, 0-28Q,R |
| CS-8 | 0-28S |
| CS-9 | 0-26A,E-N,P,R |
| CS-10 | 0-27A-E |
| CS-11 | 0-28A Subzone I (Room C-613) |
| CS-12 | 0-28C |
| CS-13 | 0-28E |
| CS-14 | 0-28G |
| CS-15 | 0-28H |
| CS-16 | 0-28J |
| CS-17 | 0-28B Subzone I (Room C-604) |
| CS-18 | 0-28M |
| CS-19 | 0-28N |
| CS-20 | 0-28A Subzone II (Rooms C-611, C-612) |
| CS-21 | 0-28T |
| CS-22 | 0-28D |
| CS-23 | 0-28F |
| CS-24 | 0-28B Subzone II (Rooms C-605, C-606) |
| CS-25 | 0-28I |
| CS-26 | 0-28K |
| CS-27 | 0-28L |
| CS-28 | 0-29B, 0-30A,B |



DIESEL GENERATOR

| <u>FIRE AREA</u> | <u>FIRE ZONE(S)</u> |
|------------------|---------------------|
| D-1 | 0-41A |
| D-2 | 0-41B |
| D-3 | 0-41C |
| D-4 | 0-41D |

ESSW PUMPHOUSE

| | |
|-----|------|
| E-1 | 0-51 |
| E-2 | 0-52 |

SUSQUEHANNA STEAM ELECTRIC STATION - UNITS 1 & 2

FIRE PROTECTION PROGRAM - CONCERN #1

DOCKETS NO. 50-387

50-388

APPENDIX C - FIRE BARRIERS TO BE UPGRADED

APPENDIX C

LISTING OF FIRE ZONE BOUNDARIES REQUIRING UPGRADE

UNIT #1 - REACTOR BUILDING

| BARRIER BETWEEN
FIRE ZONE/FIRE ZONE | TYPE | COMBUSTIBLE LOADING
FIRE ZONE/FIRE ZONE |
|--|------|--|
| 1-1A/1-1B | Wall | 10/10 |
| 1-1E/1-3B-W | Slab | 12/20 |
| 1-1E/1-3C-W | Slab | 12/9 |
| 1-1E/1-1F | Wall | 12/18 |
| 1-1F/1-3B-W | Slab | 18/20 |
| 1-1F/1-3C-W | Slab | 18/9 |
| 1-2A/1-2B | Wall | 10/5 |
| 1-3A/1-3B-N | Wall | 25/20 |
| 1-3A/1-4B | Slab | 25/16 |
| 1-3A/1-4G | Slab | 25/4 |
| 1-4A-W/1-5A-W | Slab | 15/19 |
| 1-4A-W/1-5E | Slab | 15/10 |
| 1-4A-W/1-5A-S | Slab | 15/19 |
| 1-4A-S/1-4G | Wall | 15/4 |
| 1-4G/1-5A-S | Wall | 4/19 |
| 1-5A-W/1-5E | Wall | 19/10 |
| 1-5A-S/1-5B | Wall | 19/3 |
| 1-5A-S/1-6A | Slab | 19/6 |
| 1-5A-S/1-6I | Slab | 19/5 |
| 1-5D/1-5E | Wall | None/10 |
| 1-3B-W/1-4D | Slab | 20/18* |
| 1-3B-W/1-4C | Slab | 20/20* |
| 1-4A-N/1-5A-W | Slab | 15/19 |
| 1-4A-W/1-5F | Slab | 15/16* |
| 1-4A-W/1-5G | Slab | 15/10* |

* Structural Steel only (Exemption Request filed).



APPENDIX C - Cont.

UNIT #2 - REACTOR BUILDING

| BARRIER BETWEEN
FIRE ZONE/FIRE ZONE | TYPE | COMBUSTIBLE LOADING
FIRE ZONE/FIRE ZONE |
|--|-----------|--|
| 2-1A/2-1B | Wall | 7/12 |
| 2-1E/2-1F | Wall | 13/18 |
| 2-1E/2-3B-W | Slab | 13/16 |
| 2-1E/2-3C-W | Slab | 13/11 |
| 2-1F/2-3B-W | Slab | 18/16 |
| 2-1F/2-3C-W | Slab | 18/11 |
| 2-2A/2-2B | Wall | 13/5 |
| 2-3A/2-3B-N | Wall | 30/16 |
| 2-3B-N/2-4A-S | Slab | 16/15 |
| 2-3B-N/2-4G | Slab | 16/4 |
| 2-3B-W/2-4C | Slab | 16/29* |
| 2-3B-W/2-4D | Slab | 16/24* |
| 2-4A-W/2-5A-N | Slab | 15/18 |
| 2-4A-W/2-5A-W | Slab | 15/18 |
| 2-4A-W/2-5E | Slab | 15/9 |
| 2-4A-W/2-5F | Slab | 15/16* |
| 2-4A-W/2-5G | Slab | 15/10* |
| 2-4A-N/2-4G | Wall | 15/4 |
| 2-4A-S/2-5A-W | Slab | 15/18 |
| 2-4G/2-4B | Wall | 4/16 |
| 2-4G/2-5A-N | Wall | 4/18 |
| 2-4G/2-5B | Wall/Slab | 4/3 |
| 2-4G/2-6A | Wall/Slab | 4/6 |
| 2-5A-W/2-5E | Wall | 18/9 |
| 2-5A-S/2-5B | Wall | 18/3 |
| 2-5A-S/2-6A | Slab | 18/6 |
| 2-5C/2-6A | Slab | 6/6 |
| 2-5D/2-5E | Wall | 1/9 |

*Structural Steel only (Exemption Request filed)

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1. The first part of the document is a list of names and addresses of the members of the committee.

2. The second part of the document is a list of names and addresses of the members of the committee.

3. The third part of the document is a list of names and addresses of the members of the committee.

SUSQUEHANNA STEAM ELECTRIC STATION - UNITS 1 & 2

FIRE PROTECTION PROGRAM - CONCERN #1

DOCKETS NO. 50-387

50-388

APPENDIX D - CONDUIT & RACEWAY REQUIRING PROTECTION

APPENDIX D

To support the Fire Barrier Analysis, in some cases, existing fire zones were reanalyzed because of conflicts with adjacent fire zones. This reanalysis resulted in adjacent fire zones which contained the same shutdown path.

In the process of performing this reanalysis, however, it was determined that certain raceways required additional protection in order to support the reanalysis. Table D.1 provides a listing of these raceways in those fire zones which were reanalyzed. These raceways will be wrapped per Appendix R criteria unless additional systems analysis can prove that these raceways are acceptable as is.

In addition, three additional raceways were identified as requiring protection in order to provide a 66 foot wide Wraparound Area in Fire Zone 1-5A. These raceways will be wrapped per Appendix R criteria and are listed below:

D1K010
B1K009
D1P025

Figure 6

2. 在 1980 年 12 月 31 日以前，凡在本市范围内从事生产、经营活动的个体工商户，其应纳税额按以下规定计算：

[illegible][illegible]

1. *Phragmites australis* (Cav.) Trin. ex Steud.

APPENDIX D (Cont.)

| <u>FIRE ZONE</u> | <u>EXISTING PATH</u> | <u>NEW PATH
ANALYZED
FOR</u> | <u>ADDITIONAL RACEWAY
REQUIRING PROTECTION
TO SUPPORT
THE AVAILABILITY
OF THE NEW PATH</u> |
|------------------|-------------------------------|--------------------------------------|--|
| 1-1D | Div. II ADS/CS | Div. I ADS/CS | None |
| 1-3A | Div. II HPCI | Div. II ADS/CS | F1KL12,13,14,15
F1KH14,15
F1M321
F1K036 |
| 1-4A-S | Div. II HPCI | Div. II ADS/CS | F1KR21
F1KJ01,02,03
F1K118 |
| 1-4A-W | Div. I ADS/CS
Div. II HPCI | Div. II ADS/CS | None |
| 1-3B-N | Div. I RCIC | Div. I ADS/CS | A1P019,E1K954
C1P023, C1K057 |
| 1-3B-W | Div. I RCIC | Div. I ADS/CS
Div. II ADS/CS | E1F137, C1F056 |
| 1-3B-S | Div. I RCIC | Div. II ADS/CS | None |
| 1-6A | Div. I RCIC | Div. I ADS/CS | None |
| 2-1D | Div. II ADS/CS | Div. I ADS/CS | None |
| 2-3B-W | Div. I ADS/CS | Div. II ADS/CS | F2KH29,30,31,32
F2PH29,30,31,32 |
| 2-3B-S | Div. I ADS/CS | Div. II ADS/CS | None |
| 2-6D | Div. I ADS/CS | Div. II ADS/CS | None |

TABLE D-1

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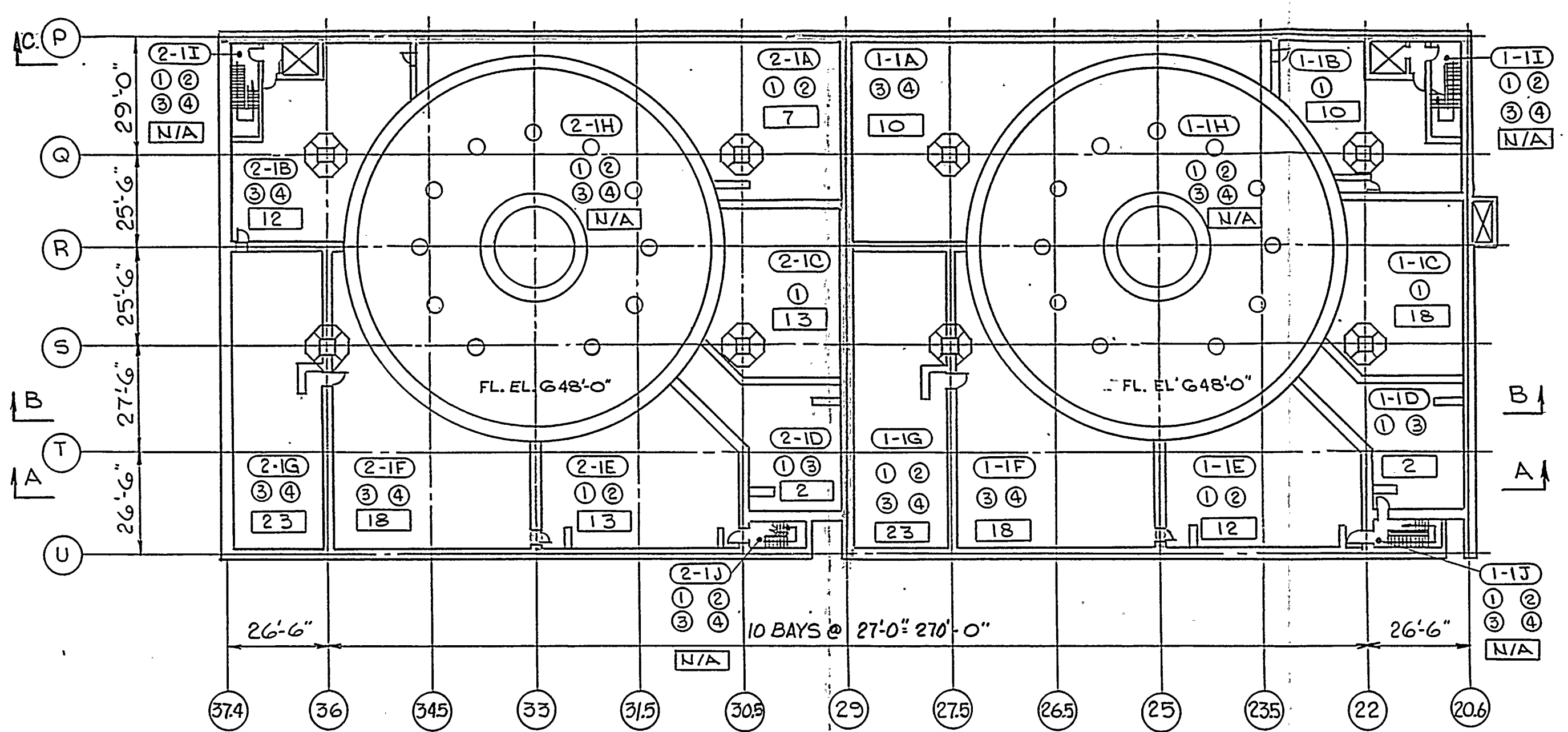
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PP&L Letter-Height Drafting Standard: Dwg. No. 3/8"; Title - 3/16"; Subtitle - 5/32"; Letter Figures - 1/8" Min.



FLOOR PLAN @ EL. G45'-0"

FIGURE 11.0

Also Available On
Aperture Card

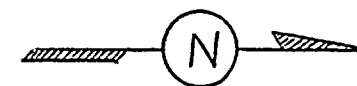
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SECRET



MEZZANINE FLOOR PLAN @ EL. 683'-0

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| DECIMAL | | | FRACTIONAL | | | | | | | | | | LOCATION CODE | | | | | | DESCRIPTION | | | | | | | | | | SORT | |

ADDITIONAL
6780 x 1000 1/4"

PT
3217-178A



FLOOR PLAN @ EL 719'-1"

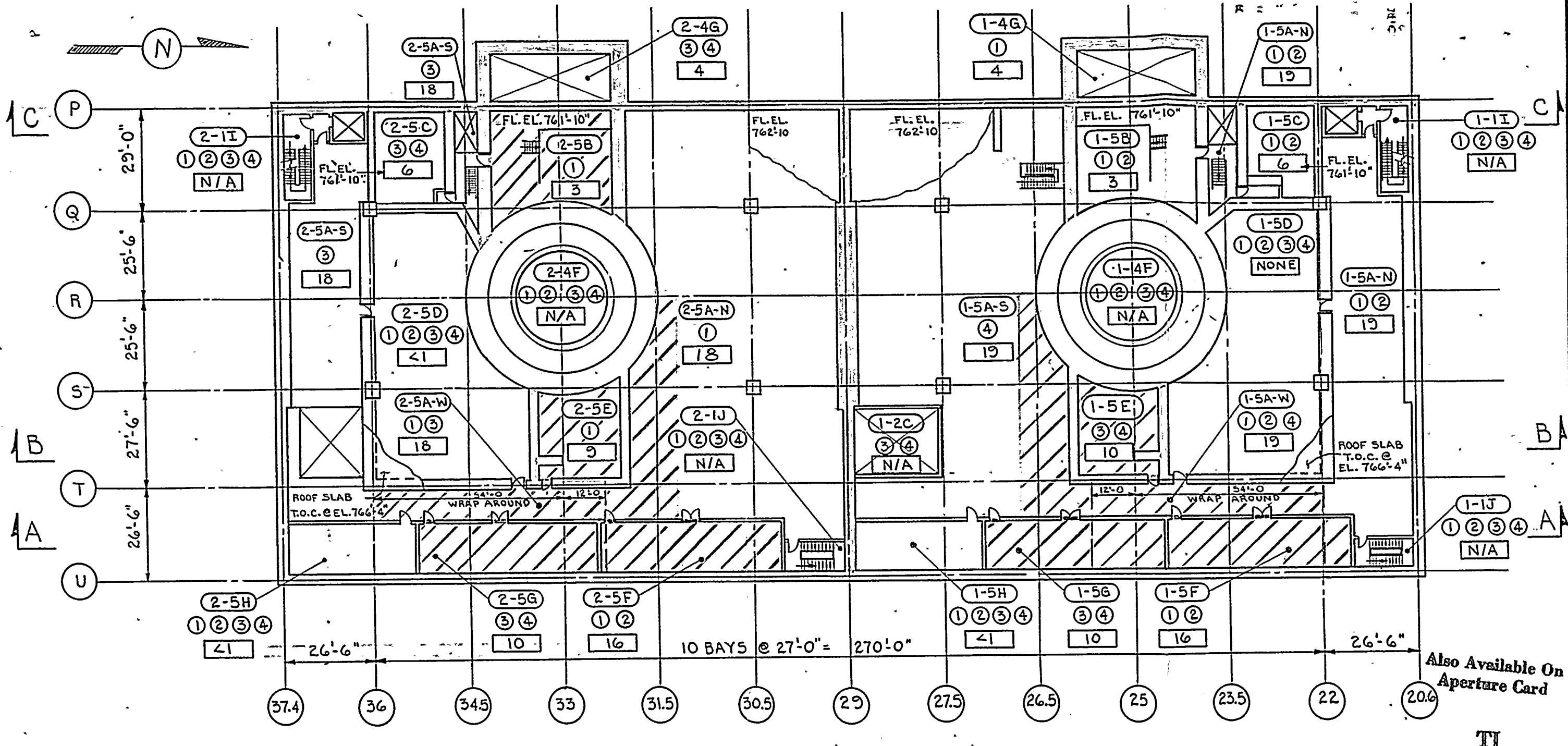
7705-

| NO. | DATE | ER. | REVISION | CH. | BY | APPROVED | APPR'D. | D |
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| 0 1 2 | | DECIMAL | | 2 1 0 | | FRACTIONAL | | LOCATION CODE |
| | | | | | | | | DESCRIPTION |
| | | | | | | | | SORT |

[illegible]

100

PP&L FORM 695-B (11" X 17")
PP&L Letter-Height Drafting Standard: Dwg. No. - 3/8"; Title - 3/16"; Subtitle - 5/32"; Letter Figures - 1/8" Min.



FLOOR PLAN @ EL. 749'-1"

TI
APERTURE
CARD
FIGURE 5.0

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| NO. | | DATE | | ER. | | REVISION | | CH. | | BY | | APPROVED | | APPR'D. | | DRAWN- | | CHECKED- | | LEADER- | | APPR'D. | | APPR'D. | | APPROVED | | B | |
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| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 0 | | 1 | | 2 | | 3 | | 4 | |
| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 0 | | 1 | | 2 | | 3 | | 4 | |
| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 0 | | 1 | | 2 | | 3 | | 4 | |
| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 0 | | 1 | | 2 | | 3 | | 4 | |
| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 0 | | 1 | | 2 | | 3 | | 4 | |
| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 0 | | 1 | | 2 | | 3 | | 4 | |
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| 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 0 | | 1 | | 2 | | 3 | | 4 | |
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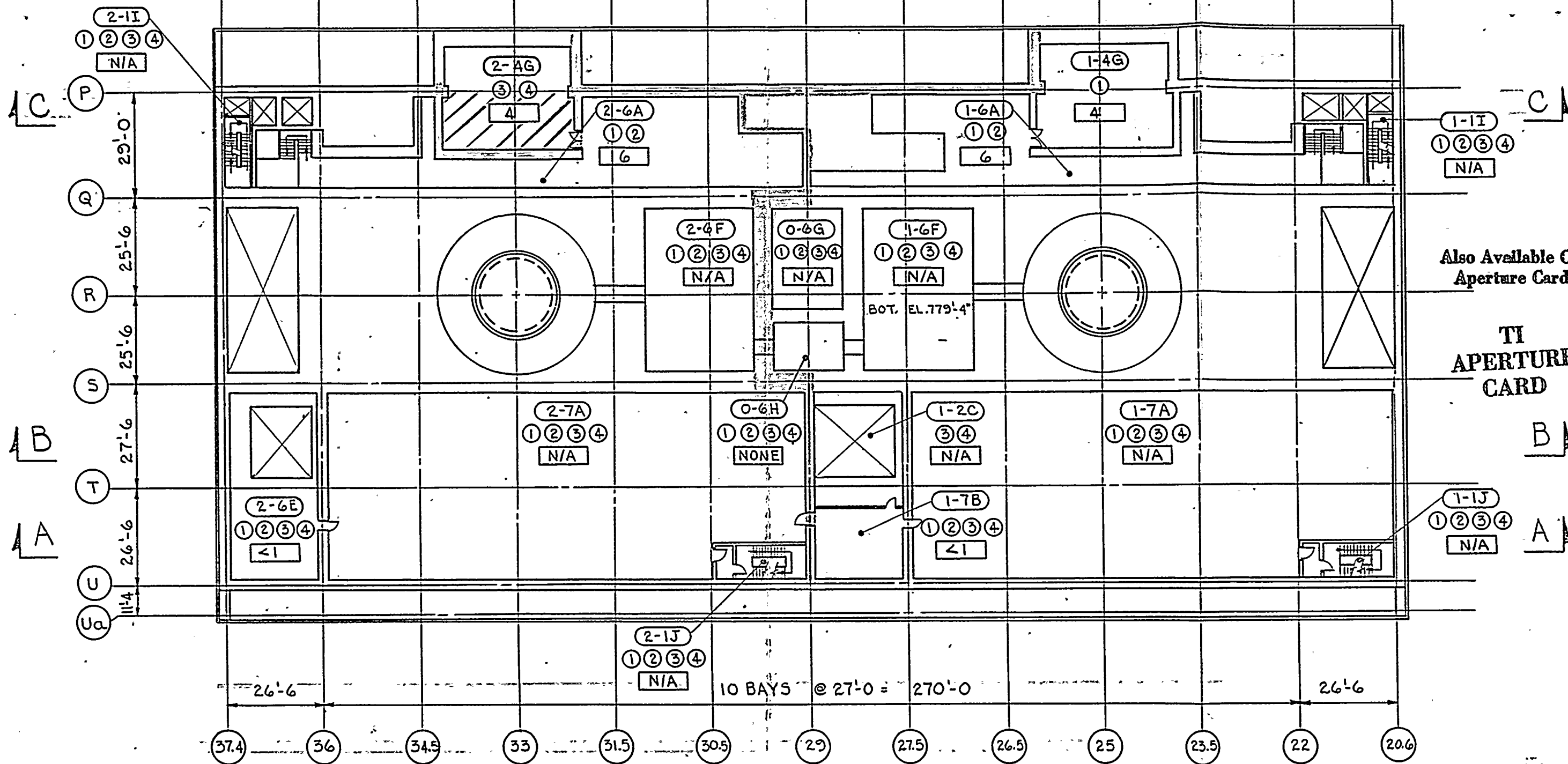
1944

1944

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Also Available On
Aperture Card

TI
APERTURE
CARD

FLOOR PLAN @ EL. 799'-1"

FIGURE 7.0

| | |
|----------|--|
| ER- | 8509060211-08 |
| ER- | |
| SCALE- | |
| DATE- | |
| DRAWN- | PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN, PA. |
| CHECKED- | |
| LEADER- | |
| APPR'D. | |
| APPR'D. | APPROVED |
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| NO. | DATE | ER. | REVISION | CH. | BY | APPROVED | DESCRIPTION | SORT |
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WASHINGTON, D.C.

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BOT. EL.
779'-4"

BOT. EL.
713'-1"

NO. DATE

ER.

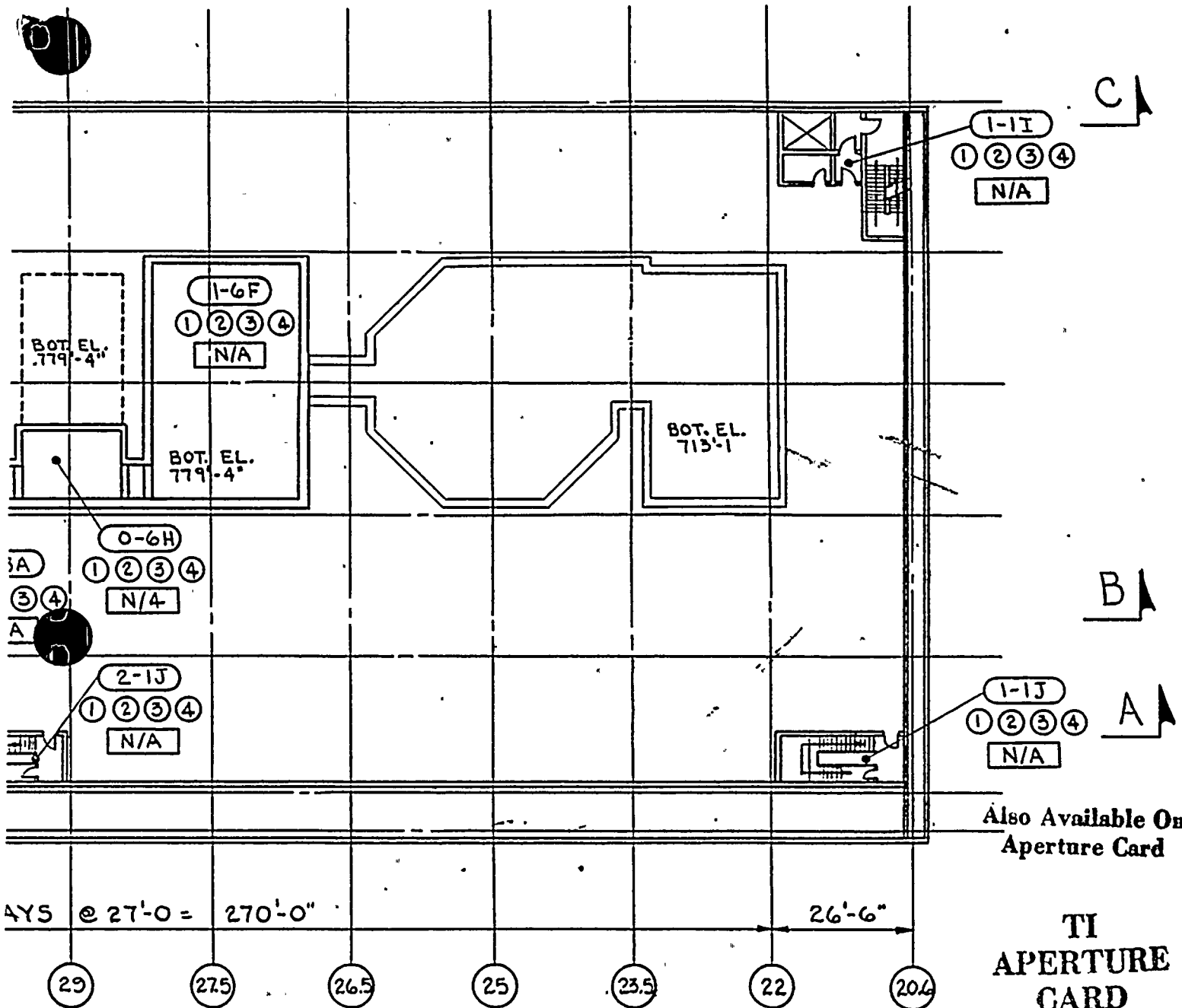
REVISION

DECIMAL

FRACTIONAL

LOCATION CODE





AN @ EL. 818'-1"

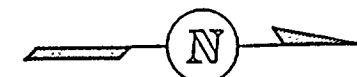
FIGURE 8.0

| | | | | |
|---|--|--|--|--|
| ER-
ER-
SCALE-
DATE-
DRAWN- | | | 8509060211-09 | |
| CHECKED-
LEADER-
APPR'D.
APPR'D. | | | PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN, PA. | |
| CH. BY APPROVED | | | APPROVED
B | |
| DESCRIPTION | | | SORT | |



EL. 872'-6"

REACTOR BUILDING



EL. 818'-1"

EL. 799'-1"

EL. 779'-1"

EL. 749'-1"

EL. 739'-7"

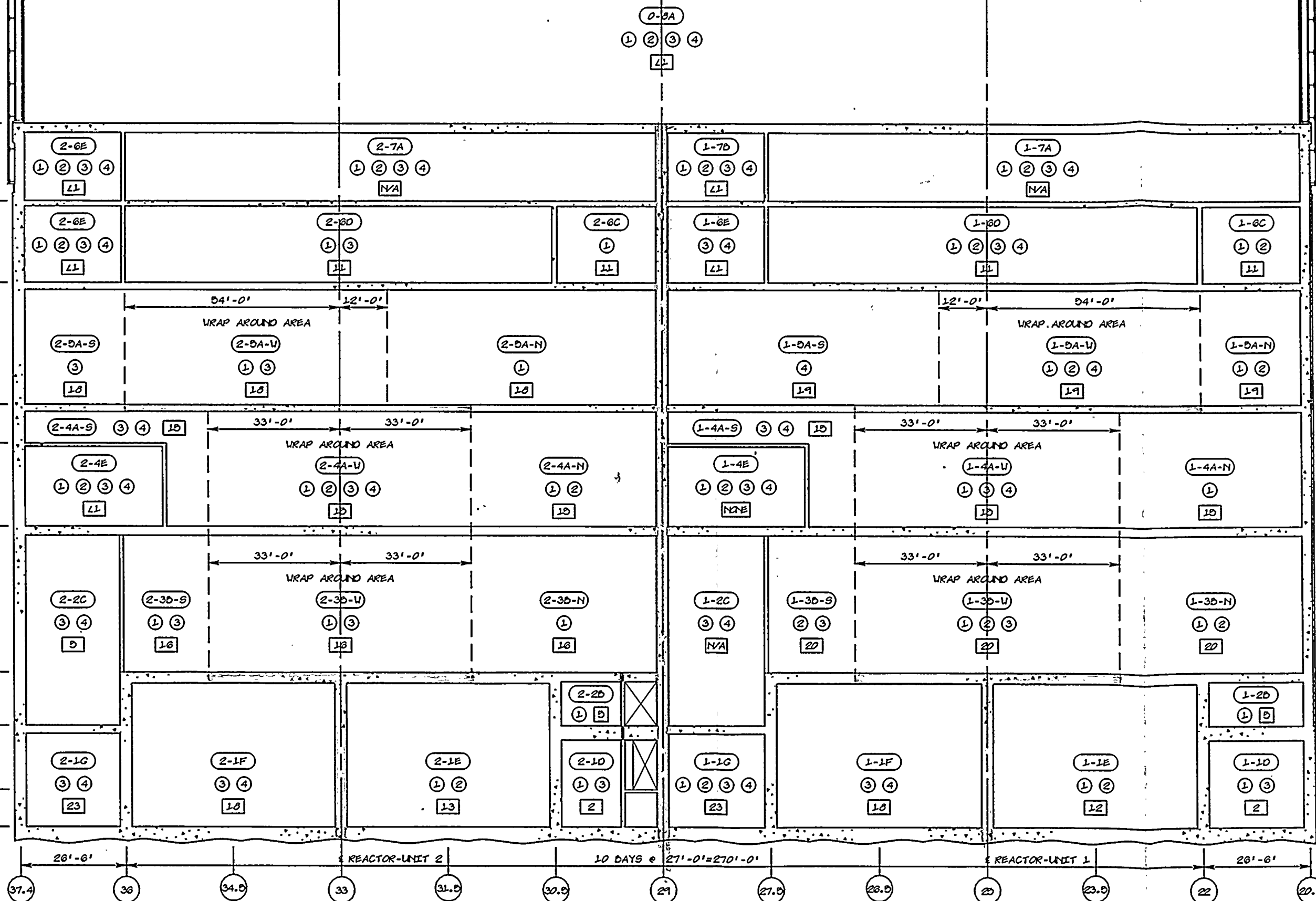
EL. 719'-1"

EL. 683'-0"

EL. 670'-0"

EL. 654'-2"

EL. 645'-0"



SECTION A-A

8509060211-10

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APERTURE
CARD



SCALE: NONE

FIGURE 9.0



1

APPR'D.

| 0 1 2 | | 2 1 0 | | LOCATION CODE | | DESCRIPTION | | SORT | |
|---------|--|------------|--|---------------|--|-------------|--|------|--|
| DECIMAL | | FRACTIONAL | | | | | | | |

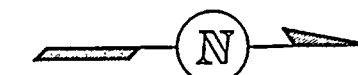
OFFICE OF THE
ATTORNEY GENERAL
STATE OF NEW YORK

100-100000



EL. 872'-6"

REACTOR BUILDING



EL. 818'-1"

EL. 799'-1"

EL. 779'-1"

EL. 768'-4"

EL. 749'-1"

STEEL PLATE

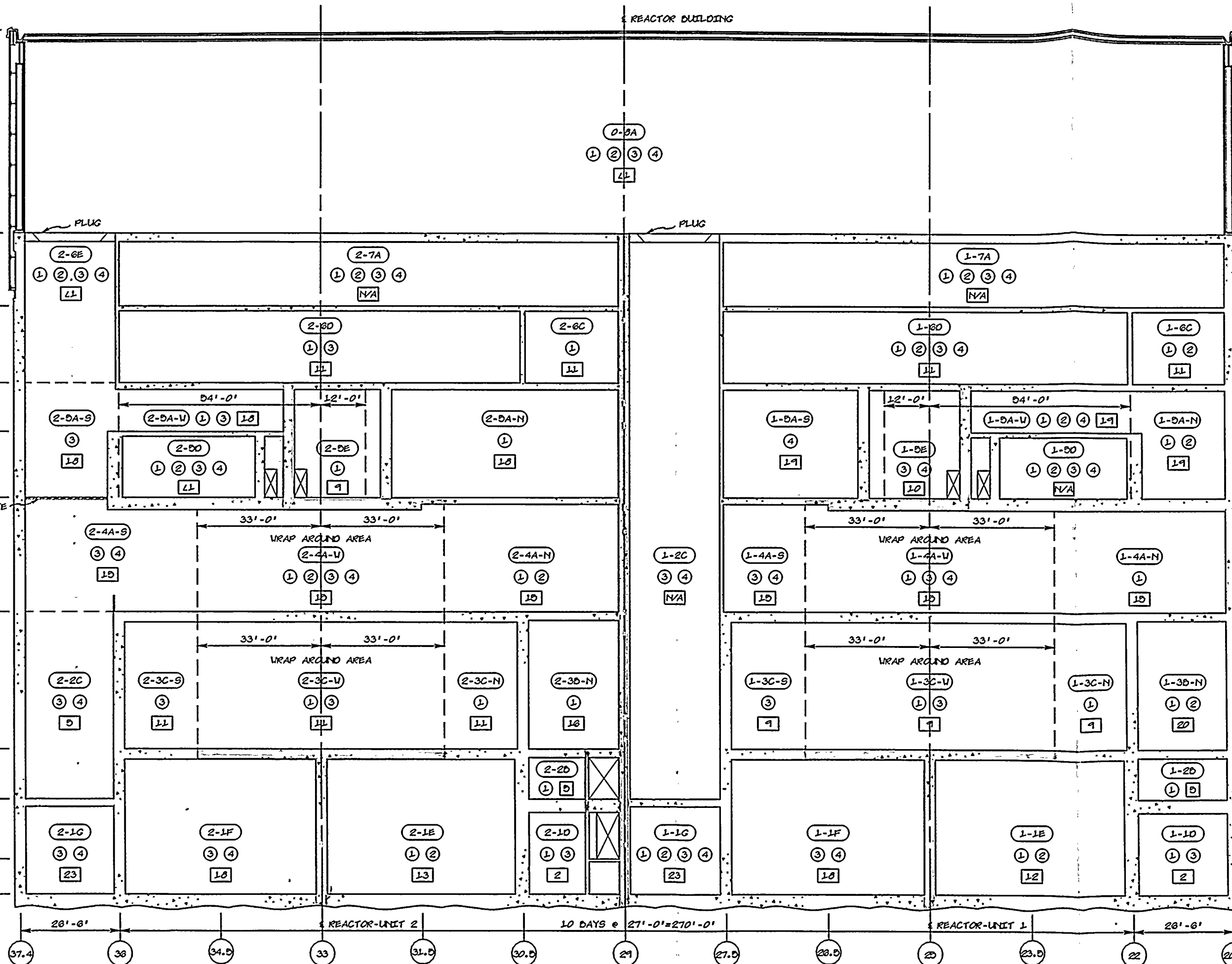
EL. 719'-1"

EL. 683'-0"

EL. 670'-0"

EL. 654'-2"

EL. 645'-0"



Also Available On
Aperture Card

TI
APERTURE
CARD

SECTION B-B

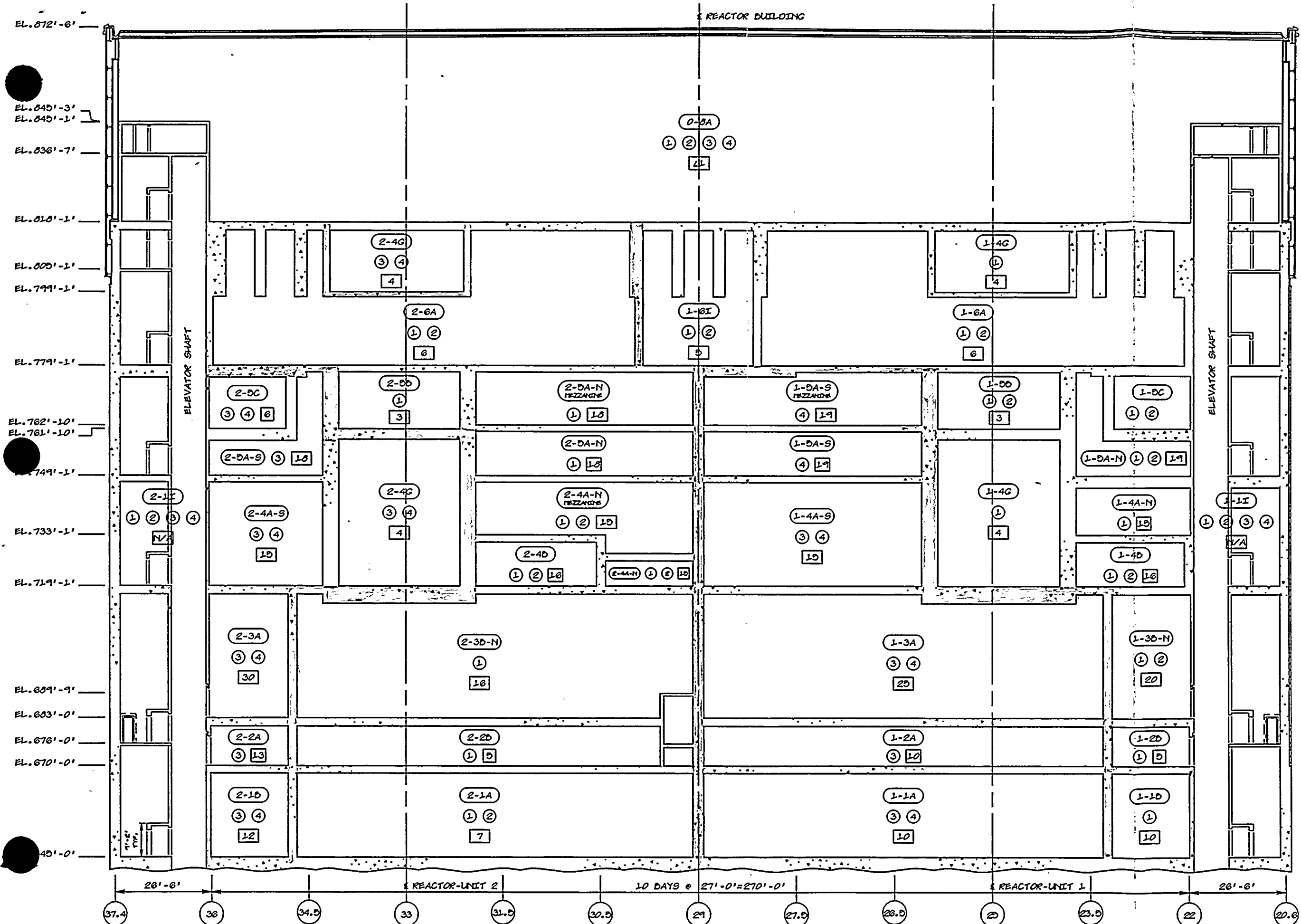
8509060211-11



SCALE: NONE

FIGURE 10.0

33



Also Available On
Aperture Card

TI
APERTURE
CARD

SECTION C-C

8509060211-12

ED. LELIVÁ OSLA
BOLESTI STOMAKA.

1