The New York Times

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Tech Report 2

Ted Dannerth
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Lighting/Electrical

This Report was created during the pilot of BIM Thesis. This pilot program is focused on Building Information Modeling and Integrated Project Delivery. Due to the nuances of piloting a new program, certain information has been withheld as of the date of this submission. As information comes in, the report will be updated accordingly. Also, there are multiple sets of construction documents with varying degrees of completion. Due to the complexity of referring to multiple drawings, the printed set of drawings is assumed to be "complete." If it was not found in this set, it is assumed to be non-existent. Should it become necessary in the future to find certain information, a review of all materials could be completed.

Executive Summary

The following report provides a comprehensive diagnosis of the electrical systems in the New York Times Building in New York City. The building rises fifty-two stories and has a total of 1.6 million square feet. The office tower's main occupants are The New York Times and Forest City Ratner Companies. Due to the fact that this technical report was a submission for the Pilot BIM/IPD Thesis, some information was withheld from the drawings provided for the program. All efforts were taken to provide a thorough report; however, sections of the document were noted as incomplete and unattainable. To compensate for this lack of information, most of the document focused on the electrical systems on the eighth floor. This decision was also made to reduce the amount of work that a building of this size would require to complete a full evaluation.

This document describes the characteristics of the electrical systems provided for this building. The size of the New York Times Building and preferences of the clients required the implementation of a complex electrical distribution system. Five transformers, a Co-Gen system, and an emergency generator provide power to the building. A summary of the electrical loads including lighting, mechanical, and receptacle is provided. A single-line diagram of the electrical distribution system servicing the eighth floor is illustrated for further understanding of the distribution layout. Other systems such as fire safety, telecommunications, and security are also briefly described.

The service entrance was sized with the combination of determined electrical loads and also some assumed loads. The calculated results were very close to the existing service entrance size. The New York Times Building has the capability to function with only three out of the five transformers operating. The calculated values for the service entrance provide a solution that adheres to this fact.

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System Description

The New York Times building is comprised of two main tenants; The New York Times and the Forest City Ratner Companies (FCRC). These two tenants have two different distribution methods throughout the building. The New York Times tenants use conduit for all feeders throughout their part of the building, whereas the FCRC tenants run bus-duct throughout their part of the building.

A commonality between them is the shared incoming service. Though the system is metered for every tenant, including the per floor fit-out of the FCRC floors, Consolidated Edison provides a main utility entrance to the entire building. The service entrance is located in the cellar and distributed from there to each of the floors above. The New York Times tenants also have a co-generation plant, 1.4 Megawatts, to supplement the utility need. Due to the importance of servers in the New York Times spaces, a UPS system is also located in the cellar and distributed accordingly. The entire building has a main diesel generator for emergency use. The building has the ability to have remote generators connected at street level, should the generator need to be serviced.

While the lighting, appliance, and mechanical panels are on a floor-by-floor design, the emergency panels are located every third floor. In addition, the UPS system has panels spaced out in a similar design. Each floor contains an east and west electrical room. The loads are ran to the nearest electrical room. Each floor also houses a mechanical room and a server room. The mechanical is believed to contain certain mechanical panels, though no information is available.

Utility Company Information

Electric Utility Company- Consolidated Edison Company of New York, INC.

Address- 32 West 125th Street, New York, NY 10027

Website- http://www.coned.com/

Utility Rate Schedule-Not available. Multiple phone calls were made to the utility in determining the proper schedule, but no response was given.

Service Entrance

The service entrance is located at the south side of the building on the cellar floor. There are six compartments housing 5 transformers with a future compartment. These 6 compartments are connected to the main electrical room. There is no information on the drawings as to the equipment located in these areas. In addition to the utility service entrance, there is a 1.4 Megawatt co-generation plant owned and operated by the New York Times (NYT) tenant. Each tenant is metered separately for utility usage, and the NYT is paid by each tenant for their usage from the co-generation plant.

Voltage Systems

Voltages	Description
480Y/277	Secondary Service from Utility Distributed to each floor Lighting Loads Mechanical Loads
208Y/120	Receptacle Loads

Emergency Power System

There are three ways the emergency loads could be powered. The primary emergency power is a redundant feed from the utility company, ConEdison. The building also has the capability to connect street generators, should this become necessary. The NYT tenants have a 1.4 Megawatt co-generation plant that can provide power to the entire emergency system. This combination of power sources allows for complete redundancy within the emergency system. There is an automatic transfer switch, within the cellar floor, responsible for switching between sources. In addition to these emergency systems, the NYT tenants have a complex Uninterrupted Power Source (UPS) system. This system is strictly for server backups. There is a "Tech Room" on each floor which has dedicated receptacles fed from the UPS system.

Location of Switchgear

[redacted]

Equipment Tag	Type of Equipment	Floor Level	Room Number	Drawing Number
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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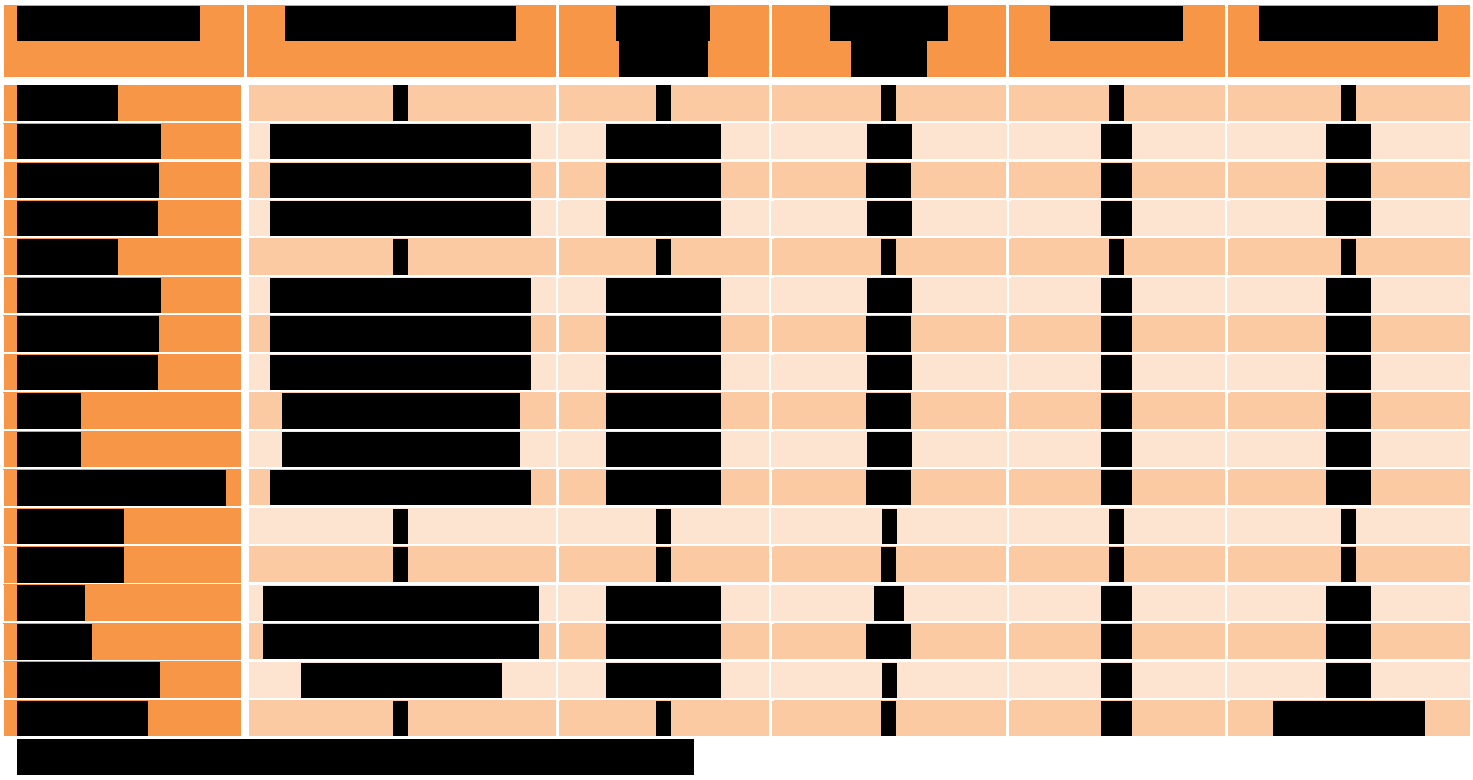
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]



Over-current Devices

Main Switchgear-

Information not available

Distribution Panelboards-

Information not available

Branch Circuit Panelboard-

The over-current devices used in these panelboards are circuit breakers. These branch circuit breakers range from 15 to 100 amp breakers, varying from one to three poles. Most of the panels contain main circuit breakers (MCB), though some are main lug only. The MCBs range from 60 to 150 Amps with the information available.

Transformers

Equipment Tag	Primary Voltage	Secondary Voltage	Size (KVA)	Type	Temp. Rise	Taps	Mounting	Remarks
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	3	*	*	*	*	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	6	*	*	*	*	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	9	*	*	*	*	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	15	*	*	*	Ceiling	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	30	*	*	*	*	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	45	*	*	*	Ceiling	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	75	*	*	*	Ceiling	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	112.5	*	*	*	*	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	150	*	*	*	*	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	225	*	*	*	*	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	300	*	*	*	*	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	500	*	*	*	*	IE.510
* No Tags	480V, 3PH, 3W	208Y/120V, 3PH, 4W	750	*	*	*	*	IE.510

*Denotes information that is not available in drawings set

**No specs were provided for this project. Also, there are no designations on the drawings as to the designation of the transformers.

Grounding

There were no grounding drawings provided, but a few drawings contain random grounding symbols. There was one note on drawing IE.1308 that says “Raised floor pedestal system grounding.”

Details:

IE.6101 #3 Detail of pedestal grounding (typical)

Special Equipment

Power Factor Correction

Power factor equipment is not in use within the building as far as the drawings available show.

Power Generation

As discussed previously, the NYT tenants operate their own Co-Generation plant. This plant uses natural gas to produce electricity on site. The bi-product of producing this electricity is heat. The building uses the waste heat to make up part of the building heating load. This is a great way to not only minimize the electric load required from the utility, on a normal basis, but also a great way to decrease the heating load demand. By keeping this process in house, they are able to gain maximum benefit from the production of electricity that is wasted at most power plants. This also keeps efficiency up when taking into account transmission loss. The Co-generation plant is comprised of two 700kW natural gas generators.

In addition to the Co-generation plant, the building has five diesel generators. The size of these generators is not available in the documentation obtained for this report. These generators are responsible for the life safety.

Power Quality Equipment

[redacted]

Lighting Loads

The building is outfitted with luminaires that use halogen and fluorescent sources. The majority of the building generally uses linear fluorescents throughout the office floors. Most hallways and lobbies use a mixture of halogen downlights and wallwashers. Special purpose spaces such as the cafeteria and main lobby utilize custom fixtures along with general luminaires to provide interesting displays throughout the room. The exterior of the building uses HID sources to accent the facade.

HID sources operate at 277 volts. Most fluorescent and halogen sources are 277 volts. Two of the halogen sources and one fluorescent source operate at 120 volts. Most luminaires are controlled by a DALI system. Occupancy sensors and photosensors are located throughout the building to provide an energy efficient lighting solution. Further explanation of the lighting controls is highlighted later in this document.

*Catalog cuts for all HID sources are provided in the Appendix of this document.

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Lighting Control

The NYT Building is in accordance with the ASHRAE/IESNA Standard 90.1-2007. Though they meet this standard, the building was designed under a previous version. The building will be compared to the current standard.

Since the building area is greater than 5,000 square feet, the interior lighting must be controlled with an automatic control device. There are multiple ways to be in compliance with this standard. The NYT Building uses an array of occupancy sensors throughout the building, as well as time of day schedules.

In addition to the occupancy sensors, the building uses a myriad of other control devices. Daylight is harvested throughout all areas of the building. In order to control this daylight and the use of electric light, the building is outfitted with 30 closed loop photosensors per floor and 18 open loop photosensors per floor. Though this is a complicated system to understand due to the floors only being divided into 16 zones, there were no drawings with the sensor and controls diagram.

The closed loop photosensors are responsible for the electric light levels within the open office spaces. The closed loop photosensors send a signal to the control panel, which in turn dims the electric light accordingly. Along with occupancy sensors, the building has an extremely low Lighting Power Density (LPD) at only .3 Watts per square foot. The open loop photosensors are designed to control the direct daylight component of the building. The building contains Mecoshades with five preset height levels. Depending on the signal from the open loop photosensors or the manual override panels, the shades will move accordingly. The issue with this design is in the manual override. The building can only operate as well as the occupants in the space want the building to perform.

Mechanical and Other Loads

The mechanical system is a combination of air, steam and water. The building gets fresh air from the 28th and 52nd floors. This air is heated, humidified (humidification only for NYT tenant) and then distributed to each floor. The 28th floor services all floors below. The 52nd floor services all floors below until the 28th floor. The 28th floor and 52nd floor are the mechanical mezzanines.

One the air has arrived at each floor, the Air Handling Unit (AHU) cools the air to the desired temperature. The AHU is also responsible for mixing the return air with the fresh air. The perimeter of the building contains fan box units, which are responsible for make-up heat. Most office towers, such as this one, contain perimeter heating. The building is usually always in cooling at the core, but heating is necessary in the winter at the perimeter.

The humidification and heating of the outside air is done by steam from the utility. The make-up heat is produced by the co-generation plant, with supplementary heat from the utility as necessary. This loop, when not needed for heating is used for the absorption chiller system. The waste heat from the generation of electricity is used to cool the building.

The cooling tower is located on top of the building and is responsible for the cooling needs of the entire building. This cooling is sent to the outside air units and the AHUs on every floor. The air from the AHUs is then distributed to the rest of the floor through an under floor air distribution system (UFAD).

The mechanical system, being that it is heated by either the co-generation plant or the utility steam line, only uses electricity for pumps and fans. There are no resistive heat units present in the building. The list of pumps and fans can be found below.

Equipment Tag	Description	Load	Motor Amps	Voltage/Phase	Power Factor	KVA	KW
TX-8-1	Toilet Exhaust	10HP	*	460/3	.95	*	*
GX-28-1	2F-28F General Exhaust	20HP	*	460/3	.95	*	*
SX-28-1	Smoke Exhaust (NYT)	100HP	*	460/3	.95	*	*
EF-8-2	Elec. Closet Transfer Fan	84W	*	120/1	.75	*	*
AHU-8-1	2F-13F Typical Tower AHU	50HP	*	460/3	.95	*	*
FSD-8-1	Fire Smoke Damper	*	*	*	*	*	*
FSD-8-2	Fire Smoke Damper	*	*	*	*	*	*
FSD-8-3	Fire Smoke Damper	*	*	*	*	*	*
FSD-8-4	Fire Smoke Damper	*	*	*	*	*	*
SD-8-1	Smoke Damper	*	*	*	*	*	*
SD-8-1	Smoke Damper	*	*	*	*	*	*
FS-8-1	Fire Shutter	*	*	*	*	*	*
FS-8-2	Fire Shutter	*	*	*	*	*	*
P1	Elevator 1	*	*	*	*	*	*
P2	Elevator 2	*	*	*	*	*	*
P3	Elevator 3	*	*	*	*	*	*
P4	Elevator 4	*	*	*	*	*	*
P5	Elevator 5	*	*	*	*	*	*
P6	Elevator 6	*	*	*	*	*	*
P7	Elevator 7	*	*	*	*	*	*
P8	Elevator 8	*	*	*	*	*	*
P9	Elevator 9	*	*	*	*	*	*
P10	Elevator 10	*	*	*	*	*	*
P11	Elevator 11	*	*	*	*	*	*
P12	Elevator 12	*	*	*	*	*	*
P13	Elevator 13	*	*	*	*	*	*
P14	Elevator 14	*	*	*	*	*	*
P15	Elevator 15	*	*	*	*	*	*
P16	Elevator 16	*	*	*	*	*	*
P17	Elevator 17	*	*	*	*	*	*
P18	Elevator 18	*	*	*	*	*	*
P19	Elevator 19	*	*	*	*	*	*
P20	Elevator 20	*	*	*	*	*	*
P21	Elevator 21	*	*	*	*	*	*
P22	Elevator 22	*	*	*	*	*	*
P23	Elevator 23	*	*	*	*	*	*
P24	Elevator 24	*	*	*	*	*	*
P25	Elevator 25	*	*	*	*	*	*
P26	Elevator 26	*	*	*	*	*	*

Equipment Tag	Description	Load	Motor Amps	Voltage/Phase	Power Factor	KVA	KW
S27	Service Elevator 27	*	*	*	*	*	*
S28	Service Elevator 28	*	*	*	*	*	*
T8-1	Motorized Shading Device	*	*	*	*	*	*
T8-2	Motorized Shading Device	*	*	*	*	*	*
T8-3	Motorized Shading Device	*	*	*	*	*	*
T8-4	Motorized Shading Device	*	*	*	*	*	*
T8-5	Motorized Shading Device	*	*	*	*	*	*
T8-6	Motorized Shading Device	*	*	*	*	*	*
T8-7	Motorized Shading Device	*	*	*	*	*	*
T8-8	Motorized Shading Device	*	*	*	*	*	*
T8-9	Motorized Shading Device	*	*	*	*	*	*
T8-10	Motorized Shading Device	*	*	*	*	*	*
T8-11	Motorized Shading Device	*	*	*	*	*	*
T8-12	Motorized Shading Device	*	*	*	*	*	*
T8-13	Motorized Shading Device	*	*	*	*	*	*
T8-14	Motorized Shading Device	*	*	*	*	*	*
T8-15	Motorized Shading Device	*	*	*	*	*	*
T8-16	Motorized Shading Device	*	*	*	*	*	*
T8-17	Motorized Shading Device	*	*	*	*	*	*
T8-18	Motorized Shading Device	*	*	*	*	*	*
T8-19	Motorized Shading Device	*	*	*	*	*	*
T8-20	Motorized Shading Device	*	*	*	*	*	*
T8-21	Motorized Shading Device	*	*	*	*	*	*
T8-22	Motorized Shading Device	*	*	*	*	*	*
T8-23	Motorized Shading Device	*	*	*	*	*	*
T8-24	Motorized Shading Device	*	*	*	*	*	*
T8-25	Motorized Shading Device	*	*	*	*	*	*
T8-26	Motorized Shading Device	*	*	*	*	*	*
T8-27	Motorized Shading Device	*	*	*	*	*	*
T8-28	Motorized Shading Device	*	*	*	*	*	*
T8-29	Motorized Shading Device	*	*	*	*	*	*
T8-30	Motorized Shading Device	*	*	*	*	*	*
T8-31	Motorized Shading Device	*	*	*	*	*	*
T8-32	Motorized Shading Device	*	*	*	*	*	*
T8-33	Motorized Shading Device	*	*	*	*	*	*
T8-34	Motorized Shading Device	*	*	*	*	*	*
T8-35	Motorized Shading Device	*	*	*	*	*	*
T8-36	Motorized Shading Device	*	*	*	*	*	*

*Denotes information that is not available in drawing set

Service Entrance Size

Method (A)				Service Entrance	
Building Type	VA/ft^2	Area	Amps	Quantity	Size (amperes)
Office	12	1,600,000	23,094.01	(4)	6,000

Method (B)					Service Entrance	
Load Type		VA/ft^2	Area (ft^2)	Amps	Quantity	Size
Lighting	Auditorium	1	20,000	24.06		
	Office Space	3.5	1,363,446.15	5,739.9		
	Stores	3	7,692.31	27.76		
	Restaurants	2	38,461.54	92.52		
	Halls/Corridors/ Closets/Stairways	.5	160,000	96.23		
	Storage Space	.25	10,400	3.13		
Receptacles		.5	1,600,000	962.25		
HVAC Equipment	Fans	2	1,600,000	3,849.00		
	Cooling	8	1,600,000	15,396.01		
Plumbing	Fire Pumps	-	-	-		
	Circulating Pumps	-	-	-		
Architectural Equipment	Elevators	50kW/ per elevator	28 elevators	1683.94		
Data Centers	PC	200	5,600	1,347.15		
			Total	29,221.95	(5)	6,000

After reviewing the drawings, it was determined that “method c” for calculating the service entrance size would not produce a meaningful result. There are too many values that are absent from the data. The best approximation of this building is from “method b.” The existing service entrance size is five sets of 5,000 amp switchboards. The approximation done in “method b” got a result of five 6,000 amp switchboards.

Environmental Stewardship Design

Energy Efficient Lighting Equipment

As was described within the lighting controls section, the NYT building uses an array of sensors for their lighting system. The controls vary from photosensors, to occupancy sensors, to programmable clocks. In addition, each ballast is individually addressable, because of this, the light levels can be tuned for the specific occupant under the fixture. With all of these systems employed, the building runs at .3 W/ft^2, though the code requirement of the time was 1.1 W/ft^2.

Energy Efficient Transformers

The transformers are not specifically called out in the drawings, so this information cannot be commented on with any confidence.

Special Electrical Materials

The specifications of these products are not available.

On Site Power Generation

This topic of on site power generation has been discussed previously in this report. The conclusion is that by producing electricity on site and using the waste energy, it is a much more efficient system. This is true when compared to normal transmission loss and the benefit of "free" heating.

LEED

When on a tour of the building, the topic of LEED was discussed. The designers said that LEED was not a part of the design goals. They made it sound like LEED was not existent at the time the design began. Though this was stated, research finds that LEED was started in 1998. Though it was started in 1998, it was not known as to the acceptance of LEED at that time.

Design Issues

The construction of the electrical system was complicated by the distribution method. The NYT tenant wanted power distributed through conduit, while the FCRC part wanted the power distributed by bus-duct. For a project as large as the NYT building, bus-duct is the typical way to distribute power from floor to floor.

Drawings

Communication Systems

Fire Alarm System

[redacted]

Telephone/Data System

[redacted]

Security System

[redacted]

Works Cited

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ERCO Lichtbericht. (2008). New York Times Building. (M. Krautter, Ed.) *ERCO Lichtbericht 87* , pp. 6-15.

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Appendix

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