CITY OF SANTA FE, NEW MEXICO

RESOLUTION NO. 2008-94

INTRODUCED BY:

Miguel Chavez

A RESOLUTION

ADOPTING THE ELECTRIC FACILITIES PLAN AS AN AMENDMENT TO THE CITY OF SANTA FE GENERAL PLAN.

WHEREAS, on April 14, 1999, the governing body passed Resolution No. 1999-45 adopting the city of Santa Fe general plan update pursuant to Section 3-19-10 NMSA 1978; and

WHEREAS, Section 7-5.2 of the general plan anticipated the development of an electric facilities plan; and

WHEREAS, implementing policy 7-5-I-2 of the general plan states "Work with utility providers to present a "*Facility Plan*" for adoption after adoption of the General Plan.

WHEREAS, the electric facilities plan provides siting guidance from the city of Santa Fe to the electric services provider for the on-going development of an electric system designed to provide for the delivery of safe, reliable, economical electric service to satisfy existing and new customer demand.

WHEREAS, the electric facilities plan states goals and objectives and considerations to be addressed in developing electric projects within the city of Santa Fe.

WHEREAS, on June 21, 2007, the planning commission recommended approval of the electric facilities plan, attached as Exhibit A to this resolution.

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BODY OF THE CITY OF SANTA FE that the electric facilities plan, attached as Exhibit A to this resolution, is hereby adopted as an amendment to the city of Santa Fe general plan.

PASSED, APPROVED, and ADOPTED this 29th day of November, 2008.

David Coss

DAVID COSS, MAYOR

ATTEST:

Yolanda Y. Vigil

YOLANDA Y. VIGIL, CITY CLERK

APPROVED AS TO FORM:

FRANK D. KATZ, CITY ATTORNEY

Jp/CMO/2008 res/electric facilities plan GP res

Exhibit "A"

CITY OF SANTA FE ELECTRIC FACILITIES PLAN

submitted to
the
City of Santa Fe
Planning Commission

June, 2007

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ELECTRIC FACILITIES PLAN
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ELECTRIC FACILITIES PLAN
June 2007

1.0 INTRODUCTION

Safe, reliable electric Power is a cornerstone of community growth and development. It is important to the health, welfare, and safety of its citizens. Individual users of the Electric System are connected to an electric Network in the metropolitan region and that Network is in turn connected to a wider Grid extending across the entire U.S. western region as well as into portions of Canada and Mexico. These Grid connections balance supply with Demand and assure Reliability.

The size and complexity of the Electric System serving a metropolitan area is directly related to the area's population and economic base.

The Electric Facilities Plan (Plan) provides siting guidance from the City of Santa Fe (City) to the Company for the on-going development of an Electric System designed to provide for the delivery of safe, reliable, economical electric service to satisfy existing and new customer Demand. The Plan states goals and objectives and considerations to be addressed in developing Projects. Documents directly related to the Electric Facilities Plan consist of Electric Facility revisions to the land development code, Chapter 14-6.2(F), Chapter 14-6.2 (G) and a multiyear project list. Taken together, these documents comprise the City's policies, process, and PNM's plans for the electric service needs in Santa Fe. This Plan primarily addresses that part of the Electric System that is 40 kV and above. The part of the Electric System below 40 kV consisting of more than 3 poles is addressed in Section 7.15 of this document.

Other documents and plans are also related to the provision of electric service in the City. Whereas this document generally provides the background and direction for siting Electric Facilities, the franchise agreement provides for the use of public easements and rights-of-way. The Energy Task Force, established by Res. #2005-61, investigated an overall strategy related to other energy policies noted in the *City of Santa Fe General Plan 1999*. The work of the Energy Task Force may result in an Energy Plan, which may address such topics as conservation, solar energy, and wind energy that are not addressed in this Plan.

2.0 PURPOSE

The purpose of the Electric Facilities Plan is to guide the siting of Electric Facilities. This Plan is a companion document to City of Santa Fe Chapter XIV, Land Development Article 14-6.2 (F) Electric Facilities. A clearly defined process is critical for the reliable operation and expansion of the Electric System to accommodate Load growth and specific, approved land developments. The City and the Company recognize the necessity for an Electric Facilities Plan, as stated in the *City of Santa Fe General Plan 1999*. The Electric Facilities Plan addresses and states policy for Electric Facilities in the City and provides a context for understanding the ongoing needs of the Electric System. Electric Facilities are to be chosen based on the considerations contained in this Plan, as well as economic feasibility and other operating requirements. Development of the Electric System using the considerations presented in this Electric Facilities Plan supports the long-range planning goals and policies of the City. Public Service Company of New Mexico (PNM) is the Electric Utility provider for the City and is regulated by the New Mexico Public Regulation Commission (NMPRC).

3.0 GOALS AND OBJECTIVES

The goal of this Plan is to provide the City with an Electric System to deliver electric energy in the amount and locations needed by present and future area residents, businesses, and industries. This System must be based upon sound technical design, consider environmental concerns, and be within the economic means of the customer, the City, and the Company.

The following objectives support this goal:

(a) Ensure that the Company can continue to provide safe and reliable electric service that meets both the current and future needs of the City and its residents;

(b) Promote planning and regulatory certainty;

(c) Identify and, to the extent reasonable and practicable, reduce impacts upon residents of the City due to new and expanded Electric Facilities;

(d) Ensure the highest degree of coordination between the City, its residents, and the Company to achieve the goals of this Plan;

(e) Encourage thoughtful design of Electric Facilities through careful siting, landscaping, and architectural enhancements consistent with local, state, and federal requirements, and recognize the need for the Company to operate and maintain the Electric System safely;

(f) Support the Joint Use of Electric Facilities and Distribution Facilities; and

(g) Ensure compliance with all controlling regulatory requirements under federal and state law and such other laws and regulations that may be applicable.

This Plan addresses Electric Facilities located within the City and includes both the Distribution System (below 40 kV) and the Transmission System (40 kV and above). The Distribution System provides Power directly to homes and businesses. The Transmission System moves bulk Power to various centers and consists of Transmission Lines, Switching Stations, and Substations.

4.0 PNM'S EXISTING ELECTRIC SYSTEM SERVING SANTA FE

4.1 Generation Facilities

Santa Fe's electric Power comes from several Generation sources including the Farmington area San Juan Generating Station and the Four Corners Power Plant, both of which are coal-fueled; Palo Verde Nuclear Generating Station in Arizona, the New Mexico Wind Energy Center in eastern New Mexico; and natural gas-fueled Generation plants primarily located in Albuquerque. All of these sources can be used to serve Santa Fe Loads. If needed, Power can also be purchased from other producers on the wholesale market.

4.2 Delivering Power to the Customer

From Generation plants to the customer, electricity travels over several types of facilities. Figure 1 gives an overview of how Power reaches commercial and Residential *customers in* Santa Fe. This Electric System Power delivery is very similar to a transportation network.

4.2.1 Bulk Transmission

Typically, all Power needed to serve the Santa Fe Loads travels over the 345 kV bulk Transmission System and arrives at one of the bulk Switching Stations, either the Bernalillo/Algodones (BA) Station or the Norton Station. The bulk Transmission System is designed to carry large quantities of Power from generating plants to bulk Switching Stations, in the same way the interstate highway system carries high volumes of traffic between major destinations.

At the bulk Switching Stations, lines intersect and Power is transformed or "stepped down" to a lower voltage. A Transformer, an electrical device for changing the voltage on an Electric System, is located at the Switching Station. Once transformed at either the BA or Norton Switching Station to 115 kV, the bulk Power is then transmitted over 115 kV Transmission Lines to the Zia Switching Station in Santa Fe.

Using the transportation network analogy, bulk Switching Stations would be similar to high-volume interstate exits like those on I-25. The 115 kV Transmission Lines coming into town are similar to arterials, such as St. Francis and Cerrillos Roads. A schematic of the statewide bulk Transmission System is shown in Figure 2.

4.2.2 Local Transmission

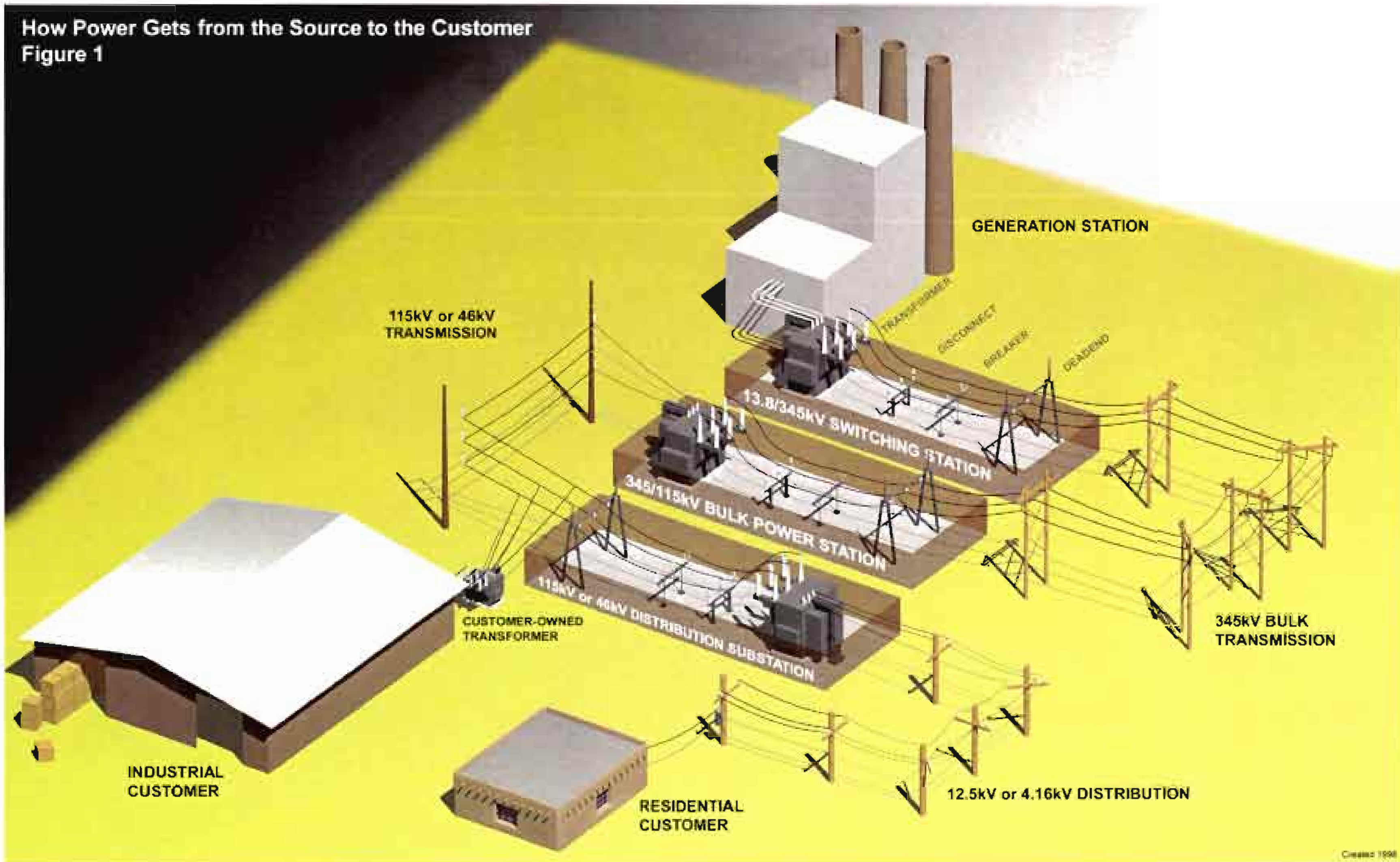
The local Transmission System that serves Santa Fe consists of both 115 kV and 46 kV Transmission Lines and Substations. The overall System for Santa Fe is shown in Figure 3. The 115 kV Transmission System primarily brings Power into Zia Switching Station and serves some outlying 115 kV Substations.

Power for a significant portion of Santa Fe is transmitted on a 46 kV System. At Zia Station, 115 kV Power is "stepped down" to 46 kV and is then sent over three 46 kV Transmission Lines to numerous Distribution Substations in Santa Fe. The three 46 kV Transmission Lines along with the 46 kV facilities at Zia Switching Station and the Power Plant 46 kV Switching Station form a "looped" Transmission System. The benefit of a looped System is that multiple lines connect key locations, in this case, Zia Station and Power Plant Station. In the event that one line or other critical piece of equipment fails, the remaining Transmission Lines can continue to provide service to the key locations, although the Load on the remaining lines is significantly increased as a result. The 46 kV Transmission Lines can be compared to secondary roads that carry a significant amount of traffic such as Siringo Road or Sandoval Street. When traffic increases, secondary roads can become congested if they are not widened or otherwise improved. The same is true with Electric Systems.

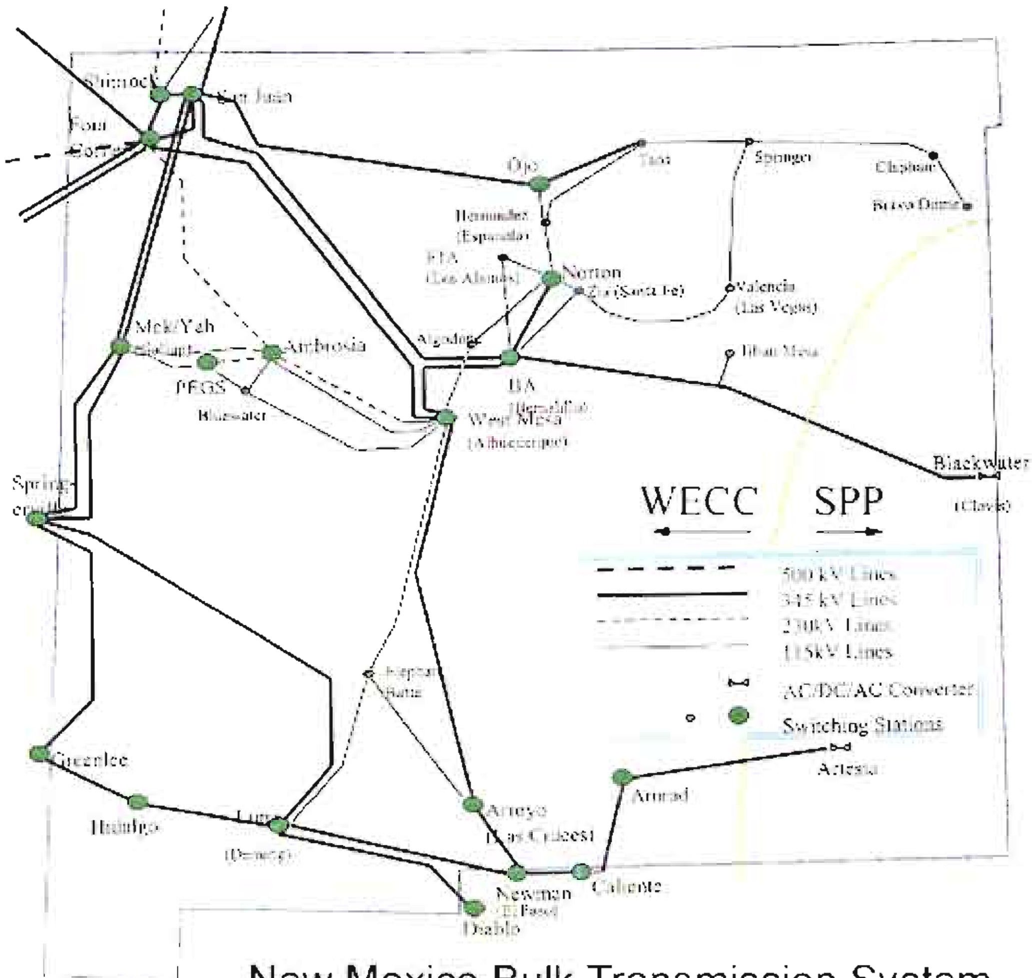
4.2.3 Distribution

At local Substations, voltage is "stepped down" from 46 kV and 115 kV to 12.47 kV or 46 kV to 4.16 kV, and Power is provided over Distribution lines called feeders to business and Residential customers. A typical 46 kV to 4.16 kV Substation, e.g., Halona, is located off Paseo de Peralta south of the PERA building.

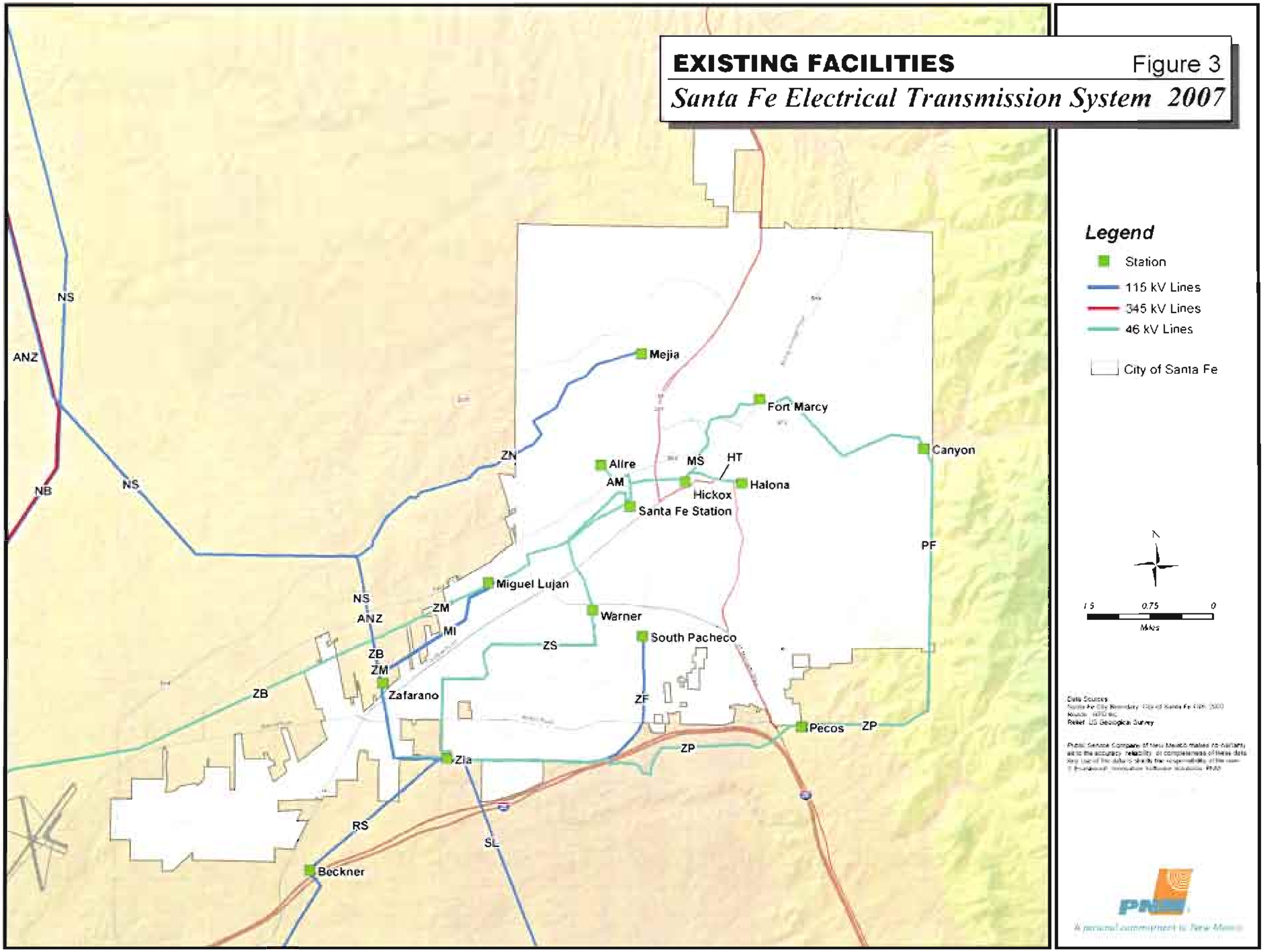
Distribution feeder lines are similar to local streets such as Early Street or Montano Street. Like local streets that provide access to every residence, Distribution lines provide service to every customer. When new Residential, commercial, and industrial development occurs, new infrastructure including new local streets and new Distribution lines are also required.



How Power Gets from the Source to the Customer
Figure 1



New Mexico Bulk Transmission System
Figure 2


EXISTING FACILITIES
Figure 3
Santa Fe Electrical Transmission System 2007
Legend
Station
115 kV Lines
345 kV Lines
46 kV Lines
City of Santa Fe
Mejia
Fort Marcy
Canyon
Alire
MS
HT
AM
Halona
Hickox
Santa Fe Station
PF
ZN
NS
ANZ
NB
Miguel Lujan
ZM
MI
Warner
South Pacheco
ZS
ZB
Zafarano
ZF
Pecos
ZP
Zia
RS
SL
Beckner
0.75
Miles
PNM

5.0 REGULATORY ENVIRONMENT

5.1 Electric Utility Regulation

PNM is an Investor-owned Utility providing electric, gas, and energy services in the State of New Mexico. Delivery of adequate and reliable electric and gas service is deemed as being in the public interest protecting the public health, safety, and public welfare.

As public utilities, Electric Utilities are regulated at the federal and state levels. Regulation obligates an Electric Utility to provide adequate, safe, reliable, and economical electric service within the area that it serves. The NMPRC regulates the utility's Power delivery System (Transmission, Station, and Distribution) development and System service (Capacity and Voltage). Local government planning commissions are provided the authority to review proposed electric facilities.

5.2 State of New Mexico Regulatory Authority

The Electric Utility serving the City is subject to the New Mexico Public Utility Act (NMPUA). The NMPRC has the authority to regulate and supervise the activities of public utilities within the state to ensure that facilities and operations conform to obligations under the NMPUA. Such regulatory authority extends to defining the Service Area within the state and supervising rates and standards of service within that area. Under the NMPUA, an Electric Utility is charged with furnishing adequate, efficient. and reliable service to customers within its service territory, that is provided pursuant to tariffs on file with the NMPRC. Utility operations are also subject to safety rules and regulations prescribed by the NMPRC. The NMPRC also has authority to approve the abandonment of service to a particular area or the removal of facilities serving an area.

The City allows the Electric Utility to place facilities within streets and other public rights-of-way of the municipality under the authority of a utility franchise granted by the municipality pursuant to NMSA 1978, § 3-42-1, and rights granted under the NMPUA. A municipality's franchise authority does not extend to regulating utility rates or standards of service. Under the NMPUA, the NMPRC has plenary authority to approve rates and service regulations for electric service to the municipality's inhabitants.

5.3 Local Government Authority

Local Government is provided limited authority over public utility facility development under NMSA 1978, § 3, Article 19. Under the guidance of:

- *NMSA 1978, § 3-19-4 "Powers of the Commission"*
- *NMSA 1978, § 3-19-9 "Master Plan; purposes"*
- *NMSA 1978, § 3-19-11 "Legal Status of Master Plan"*

The final authority for the approval of electric service and development lies with the NMPRC.

6.0 ELECTRIC SYSTEM PLANNING

The Electric System planning process includes the evaluation of the Electric System to determine the need for System improvements to meet the current and future Power requirements of the customers.

PNM provides reliable electric service to its customers. Reliability is comprised of two measures—Adequacy and security. Adequacy addresses the basic ability of the System to transmit Power, as it is needed in order to have sufficient Capability available. Security addresses the ability of the System to withstand a sudden disturbance (Contingency) while continuing to provide service.

PNM continually performs studies and monitors the actual performance of the System in order to identify the need and timing for improvements. Studies are routinely conducted to determine the performance of the System under both Normal and Contingency Operating Conditions. Normal conditions are based on all facilities being in service. Contingency operating conditions are evaluated assuming that a Transmission Line or other critical piece of equipment is out-of-service. Single Contingency operating conditions are often called N-1 (normal minus one line or normal minus one critical piece of equipment). The Electric System is designed to continue to perform satisfactorily under any single Contingency condition.

The goal of Electric System planning is to provide safe and reliable electric service within voltage and other service quality limits during normal operating conditions and in the event of any single component of the Electric System being out of service whether for maintenance or because of a failure. The Electric System is evaluated using national codes, state requirements and accepted industry standards. As a member of the western electric Grid, PNM must comply with North American Electric Reliability Council (NERC) and Western Electricity Coordinating Council (WECC) operating standards and polices.

It is an NMPRC requirement that planning criteria include maintaining acceptable voltage to customers based on the American National Standards Institute (ANSI) standard that states that voltage to the customer meter below 110 volts is considered unacceptable. Customer Service Voltages below 110 volts can damage electrical equipment such as motors, compressors, televisions, and computers.

PNM regularly reviews the development status of the community as well as the electric Load Demands on the current System. In order to continue to provide safe and reliable service to meet today's Demand and plan for long-range electric needs, PNM also considers the area's population projections; land use changes; and industrial, commercial, and institutional electric Load growth. PNM evaluates Load Forecasts and changes in electric use, such as redevelopment or other land use changes that can cause electric Demand to increase.

A detailed description of PNM Electric System planning is presented in Appendices A and B.

7.0 SITING AND DESIGN CONSIDERATIONS

The task of identifying and evaluating alternative designs and locations for new Electric Facilities is complex and requires a comprehensive evaluation of many factors. Below is a general discussion of several of these factors. Options for Projects may also include upgrading existing facilities and/or relocation of existing facilities. Each Electric Facility Project is unique. Project specific details regarding these factors will be submitted at the time of Application.

7.1 Engineering and Design

Sound engineering design and careful siting of Electric Facilities play a major part in reducing effects to the environment. Efforts to minimize effects will be incorporated into the design of these facilities, while considering economic feasibility and other factors.

7.1.1 Meeting Long-Range Service Requirements

Electric Facilities are generally in-service for decades. The Company's System planners and engineers should design Electric Facilities to:

- meet current and future electric Load supply and Demand,
- provide adequate System Reliability,
- be readily constructed,
- be easily operated and maintained during the entire life of the facility,
- use standardized materials/equipment, and
- facilitate regular inspections of the facilities.

7.1.2 Codes and Laws

All Electric Facilities shall be built subject to applicable electrical codes and laws. The State of New Mexico through the NMPRC has adopted the National Electrical Safety Code (NESC) that governs many aspects of Electric Facility design including electric structure loading criteria; clearances to the ground, buildings, and other structures; and numerous safety issues. The NESC was developed to ensure the safety of both the general public and Company personnel who maintain the Electric System.

Other codes and laws may also affect the location, design, and construction of Electric Facilities. A few of these include the Federal Aviation Administration (FAA) marking requirements when Electric Facilities are located near airports, traffic control regulations when working in public roadways, and noise regulations.

7.1.3 Transmission Facilities

Transmission Lines move Power from Generation sources to major Loads such as Santa Fe. Transmission Lines in Santa Fe operate at either 115 kV or 46 kV. New Transmission electric structures in urban areas should typically be of single-pole design that require less right-of-way or easement and are typically located parallel to roadways or other linear facilities. Where possible, self-supporting electric structures should be used to eliminate the use of Guy Wires. Above-ground electric structure heights may vary based on various considerations, including span length (pole-to-pole spacing), number of Transmission Circuits carried by the electric structure, presence of Distribution underbuild or third party communications facilities, and the need to maintain adequate clearances over other infrastructure such as traffic lights or street lights. In all instances, electric structure heights shall comply with NESC requirements. Above ground electric structure height may vary between 60 and 100 feet. Specific engineering studies document compliance with these requirements.

Electric structures are typically made of wood poles, engineered wood, or steel. Typical PNM electric structures are shown in Appendix C.

7.1.4 Switching Stations and Substations

Switching Stations and Substations contain electrical equipment that allows the Company to operate and maintain the Electric System efficiently and to deliver Power reliably. To protect equipment and to prevent the public from accessing the energized facilities, walls or fences enclose stations. Walls provide visual screening as well as meet or exceed NESC requirements. These walls or fences should not exceed 14 feet in height. Walls can have many finishes including an adobe look, anti-graffiti block, or even murals, and can have different shapes, such as curved or angular lines. Switching Stations are typically sited where Transmission Lines intersect. Substations are typically found in all zoning districts because they are sited near or within the center of the electric Load. Preference will be given to the siting of Switching Stations in zones where such uses are permitted. It is recognized that Substations must be placed in response to Demand and may need to be located in any zone. A typical Substation and Switching Station is shown in Appendix D.

7.1.5 Overhead Distribution Facilities

Distribution lines move Power from Substations to Residential and commercial customers. Distribution lines in Santa Fe operate at either 12.5 kV or 4.16 kV. Distribution lines are located in every zoning district in the City. Distribution facilities shall consider narrower, compact electric structures as well as avian-safe design where appropriate.

Overhead lines have been in use since electricity was first brought to homes and businesses, and their use is widely accepted. They are basically simple in design, and it is the simplicity that helps to ensure a high level of Reliability. Overhead lines typically affect only the immediate area surrounding the base of the poles.

- Intersection and driveway visibility and existing property lines should be considered in locating individual poles;
- Wherever possible, the height of lines and the size and number of poles should be considered, to minimize visual impact;
- Joint uses and coordination of uses within Distribution line easement rights-of-way should be encouraged where appropriate.
- All new Distribution facilities and Upgrades of existing Distribution facilities should be designed and constructed to minimize maintenance of the land within the easement. Where possible, maintenance by the public sector should be minimized as much as possible except where the corridor is identified for public uses.

Numerous Distribution projects occur daily ranging from small-scale maintenance, Replacement, and Upgrade projects to construction of new Distribution lines. Company electric structures in all areas are typically single-pole designs that require less right-of-way or easement.

Above-ground pole height is typically 40 feet but may vary between 35 and 55 feet based on several considerations such as third party communications facilities and the need to maintain adequate clearances over other infrastructure such as traffic signals and street lights. Electric structures are typically made of wood poles. Typical PNM electric structures are shown in Appendix E.

7.2 Environmental Considerations

Environmental considerations play an important part in the siting and development of future Electric Facilities within the City. Environmental components relevant to Electric Facilities may include: topography, slopes, floodplains, grading and drainage, erosion control, soils, vegetation and wildlife (including threatened and endangered species), aesthetics or visual resources, cultural resources, air quality (i.e., dust control), and noise.

The Company shall address applicable environmental concerns on all Projects and secure the appropriate federal, state, and local permits for construction that may include 404 permits, Storm Water Pollution Prevention Plans (SWPPP), and federal agency approvals.

New Transmission corridor alignments shall be located to take advantage of existing topographic features to minimize visual impacts of Transmission electric structures. Consideration shall be given to minimizing the Placement of lines and electric structures at high points in the visual plane.

Where possible in siting new Transmission Lines and Distribution Facilities, consideration shall be given to minimizing disruption to and/or alteration of the natural environment. For example, pole Placement can often be shifted to avoid discrete resource locations such as archaeological sites or prairie dog burrows.

7.3 Land Use

Linear facilities such as Transmission Lines and Distribution Facilities do not generally affect land use and are located in every zoning district. Land use is considered during Station and Transmission Line siting. In siting new Electric Facilities, consideration shall be given to minimizing disruption of existing land use patterns. Corridor alignments can parallel existing roads, fence lines, windbreaks, or other major patterns in the area or can be moved back from the road when doing so reduces land use and visual impacts. New Electric Facilities are sited in response to development or growth in an area in order to meet its present and projected electric Demand.

The City recognizes that Electric Facilities exist in every zoning district in the City. As a necessary part of the City's on-going long-range planning efforts for providing adequate infrastructure and services, technically feasible future Transmission corridor and station locations should be determined. The City long-range planning staff shall work with the Company to define and protect these corridors and to ensure that they conform with the *City of Santa Fe General Plan 1999*.

Relocation of Electric Facilities is sometimes required to accommodate new development or public improvements. Existing Electric Facilities can be relocated if the affected Company, the underlying landowners, and the City agree to such Relocation.

The application of the following considerations is intended to minimize effects when constructing new facilities or upgrading Transmission and Station facilities.

7.3.1 Overhead Transmission Lines

Overhead Transmission Lines have been in use since electricity was first brought to homes and businesses, and their use is widely accepted. They are basically simple in design, and it is the simplicity that helps to ensure a high level of Reliability. Overhead lines typically affect only the immediate area surrounding the base of the poles.

- Intersection and driveway visibility and existing property lines should be considered in locating individual poles.
- Angles in lines should be avoided or minimized where possible to avoid installing Guy Wires or larger diameter poles.
- Placement of poles directly in front of Residential zoned lots should be avoided unless no feasible alternative exists. Application of environmentally compatible concepts and attractive pole design should be considered in these cases.

- Placement of poles and Guy Wires in sidewalks or planned sidewalk locations should be avoided. Pole foundations should be at the same grade as sidewalks.
- Wherever possible, the height of lines and the size and number of poles should be considered, to minimize visual impact.
- New Transmission facilities should be designed or selected to have minimal visual impacts. The material, color, texture, and shape of Transmission electric structures should be compatible with the surrounding environment.
- Transmission Lines crossing other Transmission Lines should be minimized.
- Joint uses and coordination of uses within Transmission Line easement rights-of-way should be encouraged where appropriate.
- All new Transmission facilities and Upgrades of existing facilities should be designed and constructed to minimize maintenance of the land within the easement. Where possible, maintenance by the public sector should be minimized as much as possible except where the corridor is identified for public uses.

7.3.2 Station Facilities

Switching Stations and Substations contain electrical equipment that allows the Company to operate and maintain the System efficiently and deliver Power reliably. The bulk Transmission System is designed to carry large quantities of Power from generating plants to bulk Switching Stations. Switching Stations are typically sited where Transmission Lines intersect. Voltage is then "stepped down" at Substations from 46 kV and 115 kV to 12.47 kV or from 46 kV to 4.16 kV. To protect equipment and to prevent the public from accessing the energized facilities, walls enclose Substations and fences enclose Switching Stations. Substations are typically found in all zoning districts because they are sited near or within the center of the electric Load. Electric Switching Stations and Substations are placed on individual parcels of land, which typically range from 1 acre to 10 acres in size.

- The noise level of new Substation facilities should not exceed guidelines set by the ANSI. Electric Facilities should be so located and screened as to minimize sound impacts on the surrounding environment.
- When physically and economically feasible, new Substations should be located immediately adjacent to Transmission corridors to minimize the extension of new lines.
- Substations should be located to take advantage of available topography, vegetation, and artificial structures to minimize their visual impact. Screening should be provided by the Company.
- To the extent practicable and the given electric needs, Switching Stations should be sited in zones where allowed.
- Substation profile and size should be as unimposing as possible, and consistent with the surroundings and present and future electric service needs.
- Switching Stations and Substations shall be maintained to be safe, orderly, and in conformity with all applicable City codes.

7.4 Aesthetics

The visual appearance of Electric Facilities is affected by various components. The Company should consider:

- The height, size, and number of Electric Structures;
- Selection of materials, design, color, shape, and texture of poles or wall treatments;
- Taking advantage of topography when siting Electric Facilities to make use of existing vegetation and terrain for screening as well as visual absorption;
- Integrating imaginative art into wall design, such as murals or tile art;
- Drought-tolerant landscape design at Stations.

In addition, aesthetics and appearance should also be addressed through the use of photo simulations as part of a Transmission or Station Project submittal. Photo simulations typically compare existing condition of the setting with a photo simulation, which illustrates potential changes through representation of how the proposed facilities may appear within the setting.

7.5 Multiple Use Corridors

Multiple use corridors should be encouraged in the City. Corridors that support multiple facilities effectively limit the development of new separate alignments. An example of a multiple use corridors could be the siting of Transmission Lines and Distribution Facilities adjacent to roads or streets. This multiple use corridor also benefits from Joint Use of the facilities, especially in cases where other utilities can also locate within the same corridor, such as water, gas, and sewer lines. It also encourages Joint Use among other utilities such as telecommunications companies to co-locate on facilities like Electric Structures, when appropriate.

7.6 Land Acquisition and Right-of-Way

Transmission Lines and Distribution Facilities may be located in utility easements on private land or within public rights-of-way. The City allows PNM to place Transmission Lines and Distribution Facilities within City rights-of-way for an annual fee through its franchise agreement. Uses such as short-term parking, roads, sidewalks, and open space are compatible with Transmission Line and Distribution Facility easements and should be encouraged. Overall right-of-way width varies based on electric structure configuration, span lengths, and the need to meet NESC clearances.

7.7 Electric and Magnetic Fields

Due to continuing uncertainty regarding the association with human health effects, electric and magnetic fields (EMF) shall be considered when locating Transmission and Distribution lines. Electric power in North America is generated at 60 Hertz (or 60 cycles per second). This frequency is in the extremely low frequency range (ELF) and the EMF resulting from electric power is referred to as ELF-EMF. As presented in the City of Santa Fe General Plan 1999, ELF-EMF is a common existing circumstance, typical in urban communities. The predominant source of residential EMF exposure is a result of household appliance use. Sample EMF profiles for typical transmission and distribution lines are depicted in Appendix F.

Electric fields are produced in electrical lines, because of the amount of voltage applied to a conductor. Electric field strength falls off dramatically with distance, and many objects, including trees and houses, shield electric fields from individual exposure.

Magnetic fields are a result of the strength of the movement of electricity (current) through a conductor. As with electric fields, magnetic fields decreases dramatically with distance from the source; this is especially true with appliances. Unlike electric fields, objects such as trees, buildings, or the ground do not shield magnetic fields.

The current body of evidence is insufficient to establish a cause and effect relationship between EMF and any adverse human health effect. Whether EMF originate from appliances or transmission and distribution facilities, public and scientific interest continues regarding the potential for health effects. Although many possible effects have been studied, the segment of the general population where the greatest number of studies has focused has been children and potential effects of EMF to them. Despite 25 years of study, "the scientific evidence suggesting that extremely low frequency exposures pose any hearth risk is weak" (NIH Publication 02-4493, June 2002). Scientists to date have not found threshold exposure values, dose-response mechanisms or proven physiological causative relationships that demonstrate physical health effects from EMF.

Construction of new transmission and distribution facilities to accommodate electrical demand will change exposure to EMF. Therefore, a strategy of Prudent Avoidance shall be implemented when siting new transmission and distribution lines adjacent to schools and daycare centers and other locations where many children might be expected to gather for many hours over many days. Prudent Avoidance is defined as no-cost or low-cost steps taken to reduce exposure. Such steps might include siting decisions that minimize proximity and/or specific design considerations.

Principles for decreasing EMF from electric circuits include increasing the recipient's distance from the line by routing or structure height, and where multiple phases exist, arranging the phase configuration to have the EMF emitted from each phase reduce the overall EMF level.

The following EMF issues shall be considered when locating transmission and distribution lines:

- ELF-EMF is a common existing circumstance, typical in urban communities.
- Consider that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose an increased risk for certain diseases.
- Consider that the level and strength of evidence supporting ELF-EMF exposure as a human health hazard are insufficient to warrant aggressive regulatory action.
- Routing lines to implement the strategy of Prudent Avoidance.
- When avoidance of areas of public concern is not possible, construct lines in configurations to reduce EMF such as selecting effective phase configurations.
- Monitor EMF research as it develops.
- Support the efforts of the city to responsibly educate the public concerning EMF issues.

7.8 Underground Construction

In this Plan, Electric Facilities are planned as above ground. If underground transmission and distribution lines are desired for a particular project or area, the requesting entity should examine the funding mechanisms available to fund underground installation of transmission and distribution facilities consistent with the requirements of any applicable rules of the electrical utility on file with the New Mexico Public Regulation Commission (PRC) or successor agency. Installation of underground facilities would be contingent upon (i) the agreement of the electrical utility that undergrounding is appropriate and that any underground system will be technically and operationally equivalent to the above ground system that would otherwise be constructed;

and (*ii*) the availability of funding for the differential costs associated with underground construction.

Underground lines are regulated per Chapter 14-6.2 (G) SFCC 1987.

Underground Transmission construction is uncommon in the western United States. It is typically built in constrained large urban areas. Specialized expertise and equipment is needed for repair and maintenance of underground Transmission. Underground failures can result in the line being out of service for a much longer period than an overhead line.

Underground Transmission design and construction can be complex and, in some locations, quite difficult. Siting considerations for underground construction are distinct from overhead construction. Routes that might not be feasible with overhead construction may be acceptable for underground construction. The opposite of this also applies. The cost to underground could range from 3 to 10 times higher than overhead construction, depending on a variety of factors.

Typically, Transmission undergrounding requires excavating a continuous trench 8-10 feet in width for the entire length of line, as well as the placement of splice vaults located approximately every 2000 feet. This construction can cause various environmental impacts in the desert Southwest. For example, these impacts can include:

- exposure of different soils, increasing visual contrast;
- clearing shrubs and trees along the entire length of underground line, increasing visual contrast (certain plants such as short grasses would not affect a Transmission underground facility; however, trees and shrubs would not be allowed);
- effects to cultural resources; and
- soil loss and loss of native vegetation.

Transmission undergrounding would require certain vegetation controls. Tree roots can damage the underground Conductor and landscaping with deep roots such as trees and shrubs is not allowed. Xeriscape components are acceptable, such as rocks, railroad ties, and grasses or small plants with shallow roots; however, landscaping within the easement is subject to damage if repairs are needed to the cable.

Underground Distribution lines are subject to damage by landscaping with deep tree roots as well. Xeriscape components are acceptable, such as rocks, railroad ties, and grasses or small plants with shallow roots; however, landscaping within the easement is subject to damage if repairs are needed to the cable.

7.9 Telecommunication Facility Joint Use

The FCC requires telecommunication companies to seek Joint Use opportunities in siting their facilities; therefore, it is common for telecommunications providers to request location of antennas and instrumentation on existing electric structures or at stations. The Company should support Joint Use to reduce visual effects due to otherwise adding new corridors or structures. Joint Use shall be compliant with the NESC clearance requirements and telecommunications providers shall obtain all necessary permits and approvals before installing equipment on Electric Facilities. Joint Use does not alter the primary use of the Electric Facility.

7.10 Costs

Electric utilities are required to submit filings on projects to the NMPRC pursuant to Rule 440. The Company provides engineering and economic feasibility data consistent with NMPRC Rule 440 filings to the City at the time of Project submittals.

7.11 Public Participation

A public participation process is intended to involve the citizens of Santa Fe in the identification of locations for Electric Facilities that are technically and economically feasible, have public acceptance, and are consistent with the surroundings and present and future electric service needs. The level of public participation may depend on concerns associated with each individual Project. The Company shall follow Early Neighborhood Notification requirements for public notice, where applicable.

8.0 PROJECT SUBMITTALS

The process for Project submittals is outlined in the City's Chapter XIV, Land Development, 14-6.2(F).

Prior to a Project Application submittal, the Company will request a meeting with the Planning and Land Use Department to introduce the Project and identify issues.

9.0 INFORMATIONAL PRESENTATION ON POTENTIAL PROJECTS

Electric Facilities are located in every zoning district in the City. The Company shall provide to the Planning and Land Use Department, Planning Commission, and the City Public Utility Committee an annual informational presentation for all potential Projects within the Company's planning horizon, in accordance with Chapter XIV, 14-6.2(F). The Company, if requested will provide an informational briefing to the full City Council.

Appendix A PNM Transmission System Planning

Preface

PNM is the electric service provider for the City of Santa Fe as designated by the NMPRC. In this appendix, PNM has provided an overview of the planning process used by the Utility for the Transmission System.

Transmission System Planning

PNM plans and operates its Transmission System to provide reliable service to its customers, in accordance with NERC/WECC Planning Standards. Reliability is comprised of two measures—Adequacy and security. Adequacy addresses the basic ability of the System to transmit Power, as it is needed, i.e., to have sufficient Capability available. Security addresses the ability of the System to withstand a sudden disturbance (Contingency) while continuing to provide service.

PNM must not only plan and build its System according to these Reliability standards; it must also demonstrate that it can operate in compliance with NERC/WECC Operating Standards and Policies. WECC requires members to perform detailed screening of their Transmission Systems annually, assessing their performance and reporting any deficiencies. Utilities must respond to any violations found during the annual review. These standards are intended to prevent problems before they occur.

WECC and other regional Reliability councils have functioned for over 35 years as voluntary organizations, counting on reciprocity, peer pressure, and mutual self-interest to keep the Transmission System reliable and secure. Deregulation has brought new players into the business and transformed the roles of traditional players. The incentives and the responsibilities for investing in Reliability are not the same in a restructured and competitive market, and a voluntary System of compliance is no longer adequate. In 1997, an independent "blue ribbon panel" formed by NERC determined that standards need to be made mandatory for the regional councils and their members, as well as other participants in the electric industry.

NERC is in the process of transforming itself and its regional councils into organizations with Reliability monitoring and enforcement capabilities. It has established a program to monitor compliance with its standards and is advocating for federal legislation to ensure it has the legal authority to do so. In addition, NERC is revamping the way it develops standards to promote broader participation and consensus among industry participants.

In the West, most of the WECC members have voluntarily entered into a contract that covers a limited number of the NERC Reliability standards. Signatories to the WECC contract, known as the RMS, have agreed to make some of the most important standards mandatory and to impose sanctions, including fines, for noncompliance. Implementation of RMS is consistent with efforts of the NERC.

The national trend is to increase oversight of the Reliability standards including mandatory compliance. The Northeast Blackout of August 2003 has increased public awareness of this move to mandatory compliance. The roles of utilities and the bulk Electric System Reliability standards will evolve as lessons are learned from this

Blackout. PNM's March 18, 2000 Blackout revealed strengths, weaknesses, opportunities, and threats. While the Blackout, caused by a 500-acre fire in the Four Corners area, was unavoidable, PNM has already taken significant positive actions to reduce the possibility of a recurrence. PNM continues to further pursue reasonable expansion projects to ensure it can meet WECC Reliability criteria.

The four most critical issues that the PNM transmission business is facing today are the following:

1. Keeping operation and maintenance costs at reasonable levels, given an aging Transmission System.

2. Implementing strategies for dealing with a Transmission System that is approaching its limits in several areas.

3. Determining the appropriate tradeoffs between Generation resources and transmission expansion.

4. Dealing with transmission siting difficulties. New or expanded transmission corridor availability is limited due to competing land uses such as Indian Reservations, National Forests, Wilderness Areas, State and National Parks and Monuments. The "not in my backyard" (NIMBY) syndrome is ever present. There is also a growing problem with encroachment in cities.

The planning process can be generally summarized as follows:

Key Process Steps- Summary of the Transmission System Planning Process

1. Gather data on the operating environment, i.e., regulatory limitations, capital/operations and maintenance spending limitations, present Load and Generation levels, overload or voltage, equipment failure problems recently experienced, etc.

2. Assess the strengths and weaknesses of the existing System.

3. Gather information on future System commitments and plans, i.e., Load Forecasts, new or modified contracts, planned Projects, neighboring Systems plans, etc.

4. Coordinate with neighboring Systems plans, etc.

5. Review Operating Procedures for problems that can be solved without System expansion or that allow deferral of System expansion.

6. Assess the needs of the System for the full planning horizon.

7. Define alternative expansion solutions to address Forecasted System weaknesses.

8. Sort and rank alternatives using technical and economic measures/coordinate with Distribution Planning process as appropriate.

9. Solicit project participation as appropriate/negotiate participation terms and conditions.
10. Acquire funding approval for project.
11. Acquire Regional Planning approvals as appropriate.
12. Transition project to permitting and construction.

Transmission System Planning Methodology/Criteria

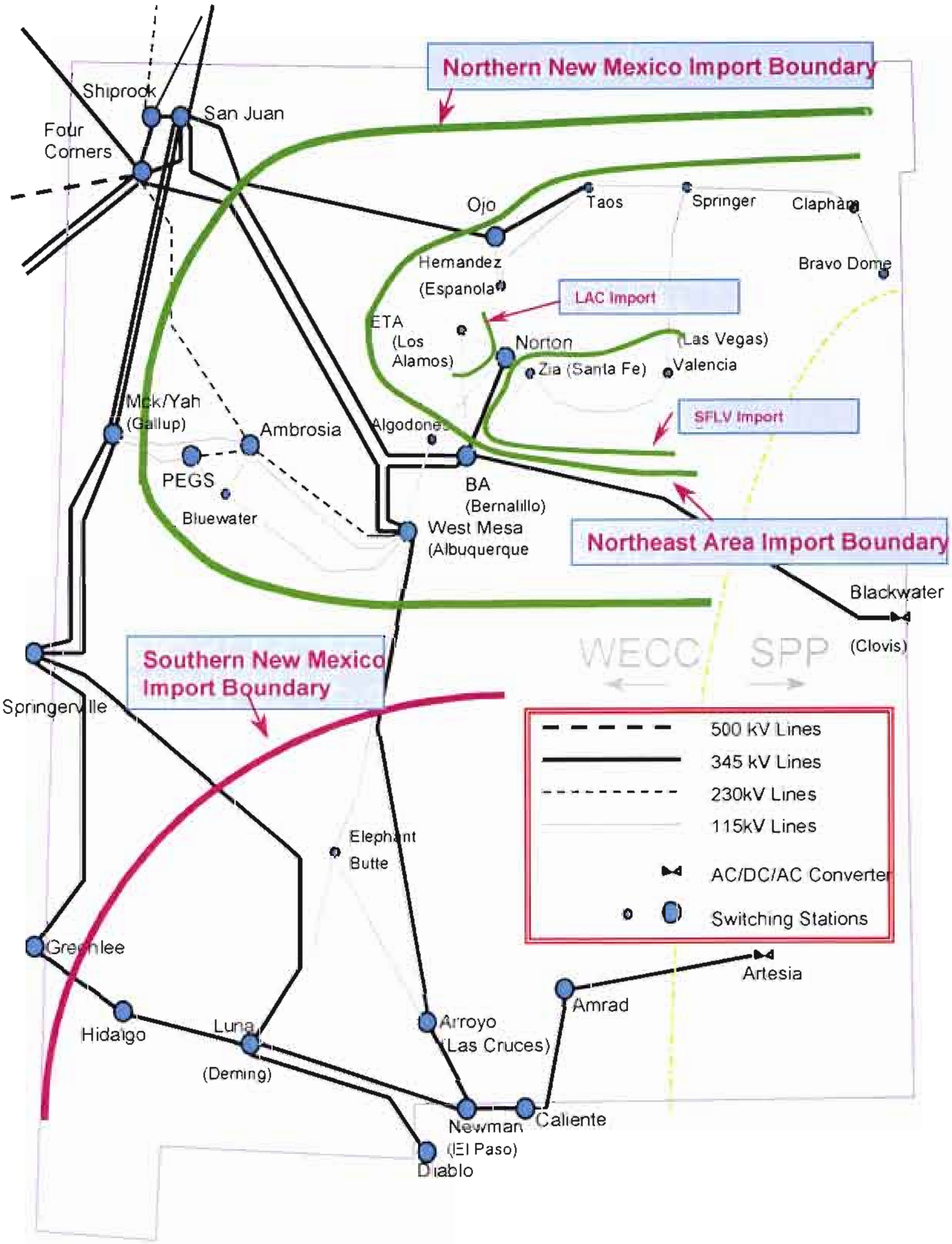
PNM uses a deterministic approach for Transmission System planning. Under this approach, System performance should meet certain specific criteria under normal conditions (all lines in service) and for any single Contingency condition (any one element out of service). In general, an adequately planned Transmission System will:

- Provide an acceptable level of service at the lowest cost for normal and single Contingency operating conditions.
- Not result in the loss of Load for any single Contingency Outage.
- Not result in Cascading Outages, overloaded equipment, or unacceptable voltage conditions for any single Contingency Outage.
- Work in complement with local Generation in Load constrained areas.

The planning methodologies and assumptions described below are used as the basis for the development of future transmission facilities. Additionally, consideration of potential alternatives to transmission facilities (such as distributed Generation or new technologies) is evaluated on a case-specific basis. As an alternative to System reinforcements for N-2 and breaker failure Outages, it may be more cost-effective to implement a redispatch protocol and/or remedial action scheme (generator tripping or Load dropping) considering the low probability of the occurrence of these types of Outages.

For Transmission System study purposes, PNM divides its System into several logical cut-sets. These cut-sets or sub-systems allow for a tiered method of analysis insuring each portion of the System is operating reliably. For each of these sub-systems, an actual flow can be monitored and then compared to the System's limits. This document is a description of the operating and planning criteria for the (1) Northern New Mexico (NNM) Transmission System, (2) Northeast Area (NEA) and (3) other sub-systems within New Mexico. The NNM System refers generally to the Transmission System between the Four Corners area and the central New Mexico Load centers. Figure 1 shows these different cut-sets.

Figure 1 Defined Transmission Cut-Sets



Transmission System Planning Criteria

PNM adheres to the following NERC/WECC Planning Standards with a few exceptions as noted below.

- Changes in bus voltages from pre- to post-Contingency must be less than 5% and 10% for single and double contingencies, respectively.
- All equipment loadings must be below their normal ratings under normal conditions.
- All line and Transformer loadings must be below their normal ratings for both single and double contingencies.
- Stability is divided into two categories, that include 1) transient or dynamic stability, and 2) steady-state voltage stability (P-V and Q-V Analysis). The operating criteria for each of the performance criteria are discussed below.
    - The transient stability criteria require that all machines remain in synchronism, all voltage swings should be damped, and voltage/frequency performance must meet the following performance criteria. Following fault clearing for single contingencies, voltage on load buses may not dip more than 25% of the prefault voltage or dip more than 20% of the prefault voltage for more than 20 cycles. For double contingencies (i.e., breaker failures), voltage on load buses may not dip more than 30% of the prefault voltage or dip more than 20% of the prefault voltage for more than 40 cycles.
    - Voltage stability criteria requires: "The most reactive deficient bus must have adequate reactive Power margin for the worst single Contingency to satisfy either of the following conditions for n-1 Outages, whichever is worse: (i) a 5% increase beyond maximum forecasted Loads or (ii) a 5% increase beyond maximum allowable interface flows. The worst single Contingency is one that causes the largest decrease in the reactive Power margin." For double contingencies (i.e., breaker failures) the reactive margin is reduced to 2.5%.

PNM's additions and exceptions to the WECC criteria are stated below:

- For voltage levels between 1 kV and 13.8 kV, the minimum and maximum are 0.91 p.u. and 1.05 p.u., respectively.
- For voltage levels between 13 kV and 345 kV, the minimum and maximum are 0.95 p.u. and 1.05 p.u., respectively, for N-1 contingencies. For N-2 and breaker failures the minimum voltage level is 0.90 p.u.
- Changes in bus voltages from pre- to post-Contingency must be less than 6% with the exception of the Deming area, which is held to El Paso Electric Company's (EPEC) criterion of 7% voltage drop for N-1 Outages. PNM allows no greater than a 10% voltage drop for N-2 and breaker failures Outages.

- The maximum steady state voltage and transient swing voltages for the BB line are 1.1 p.u. and 1.2 p.u., respectively. However, the steady state voltage level on the BA 345 kV bus and Blackwater 345 kV bus must be 1.05 p.u. or less.

Tri-State's additional criteria for contingencies are listed below:

- The minimum and maximum bus voltages for normal operation are 0.95 p.u. to 1.05 p.u., respectively.
- The minimum and maximum bus voltages for Outage conditions are 0.90 p.u. to 1.10 p.u., respectively.
- Changes in bus voltages from pre- to post-Contingency must be less than 6% for Tri-State buses served from the PNM System. For Tri-State buses served from the Tri-State System, no voltage change criterion shall apply.

Los Alamos County's (LAC) additional criteria for contingencies are listed below:

- The 115 kV voltages within Los Alamos service territory are to be greater than 0.925 p.u.. Voltage drops within the Los Alamos Service territory are not to exceed 6.0% at the 13.8 kV level.

Transmission System Assessment Planning Practices

Transmission plans are updated on a continuing basis to determine the projected facilities needs for each year over a ten-year period. Needs for specific projects are incorporated in these ten-year plans. These plans then become a basis for the transmission capital budget and future facility construction.

The ten-year plan addresses capital expenditures for System improvements to ensure Reliability compliance. However, changes in the underlying assumptions such as Load Forecasts, Generation expansion, and other Network customer plans, may substantially impact this ten-year plan and could result in changes to anticipated in-service dates or project scopes.

Regional Coordinated Planning

PNM is a member of WECC. The focus of WECC is to promote the Reliability of the interconnected bulk Electric System. WECC provides the means for:

- Developing regional planning and operations criteria;
- Coordinating future plans;
- Compiling regional data banks for use by the member Systems and the WECC in conducting technical studies;
- Assessing and coordinating Operating Procedures and solutions to regional problems; and
- Establishing an open forum with interested nonproject participants to review the plan of service for a project.

PNM also tracks the projects of neighboring utilities to ensure that our operations or plans are not adversely impacted and that coordination or combination of common interests is pursued to the extent possible.

Customer Interconnection of Generation and Transmission

New transmission facilities are also required in conjunction with Generation resources due to (1) a "merchant" request by an Independent Power Producer (IPP) for generator interconnection to the PNM Transmission System, (2) a "merchant" request for point-to-point transmission service from the generator (receipt point) to the designated delivery point, (3) designation of new resources to serve PNM Network Load, or (4) transmission interconnection request.

If a Generation interconnection or transmission service request is made by an IPP to interconnect to or deliver Power over the PNM Transmission System, PNM will perform the study work and enter into appropriate agreements pursuant to applicable Federal Energy Regulatory Commission (FERC) regulations and PNM's OATT.

New transmission facilities may also be required to serve either PNM's native Load, or Tri-State's and LAC's Network Load.

Over the last couple of years, PNM has received several requests for generator and transmission interconnection.

Depending upon the location of new Generation, the Transmission System may require expansion. PNM's bulk Transmission System was primarily designed to deliver the output of specific generating facilities in the Four Corners and central Arizona regions to PNM's Load centers in northern and central New Mexico. Integration of new Generation resources is likely to require a different set of transmission Upgrades.

The customer's desired construction lead times are not always reasonable. New Generation is being built with shorter and shorter lead times that are challenging the ability of the transmission provider to have transmission Upgrades to accommodate the generator's proposed in-service date.

Appendix B PNM Distribution System Planning

Preface

PNM is the electric service provider for the City of Santa Fe as designated by the NMPRC. In this appendix PNM has provided an overview of the planning process used by the Utility for the Distribution System.

Distribution System Planning

All Distribution System modification and improvement Projects are the result of one of three fundamental causes:

1. Legal obligations that include the need to relocate facilities in public rights-of-way, regional and federal Reliability council requirements, connection of third party generators to the Transmission or Distribution System, and new state or federal regulations concerning System operating requirements or safety.

2. Facility inadequacies that are the result of Load growth. Facility inadequacies include both lack of facilities to serve new Load as well as equipment loading or delivery voltage limits being exceeded during either normal or emergency conditions.

3. Failed equipment or facilities that have reached the end of their useful lives and for which it is no longer cost effective, or often not possible, to either repair or maintain.

Electric System planning is a continuous process of evaluation of the electrical performance of the distribution, local and bulk Power Transmission Systems for various Load growth and Generation Capacity scenarios during normal and emergency conditions. Much of the planning process involves Circuit modeling and analysis based on maximum and minimum Load information collected from substation and Switching Station Transformers and for distribution lines, local and bulk Transmission Lines, and on Forecasts of electrical Load growth. Historic data is combined with Forecasted Load growth information to project future Loads on lines and Transformers during high and low Load periods and during normal and emergency conditions.

Commercially available computer programs such as Advantica's SynerGee and GE's Power System Load Flow (PSLF) are used to analyze distribution and Transmission System performance during Peak Load and low Load periods. These analyses are updated each year following the peak and minimum Load periods to identify new System needs and to confirm the continued need and timing of projects previously identified to correct System deficiencies. PNM has also developed an extensive distribution substation and feeder Contingency software application that is used as a screening tool to identify potential System problems and assist with service restoration following an Outage.

The major projects that are identified in each year's updated System performance evaluation and Load projection are incorporated in multiyear electric distribution and Transmission System expansion plans.

PNM's planning criteria for determining the need for System improvements, Upgrades or modifications are based on prudent engineering practice and the requirements of NMPRC in Rule 17.9.560.13 A and B. Rule 17.9.560.13.A requires that, "*The electric plant of the utility shall be constructed, installed, maintained, and operated in accordance with accepted good engineering practice in the electric industry to assure, as far as reasonably possible, continuity of service, uniformity in the quality of service furnished, and the safety of persons and property.*" Rule 17.9.560.13.B includes as "standards of accepted good practice" the latest editions of the NESC, National Electrical Code, Preferred Voltage Ratings for A-C Systems (ASA C84.1) and the New Mexico State Electrical Code. PNM's planning criteria incorporate the provisions of NMPRC Rule 560 for good engineering practice as well as additional requirements promulgated by WECC, NERC, and FERC.

Each transmission and distribution line has a rating based on the maximum amount of Power that the line can carry without being weakened and damaged by overheating or that will not cause the line to sag too close to the ground when it expands when heated by carrying the rated Load. The materials used for the electrical Conductors and the design of the line determines this rating. Good engineering practice dictates that line ratings not be exceeded without fully evaluating the impact of the overload.

Voltages that are either above or below recommended ANSI ranges can cause severe damage to customer electrical equipment. By NMPRC Rules and reliability council requirements PNM is required to maintain specific voltage limits.

Substation Power Transformers have been designed to meet PNM specifications and have Load-carrying ratings that are guaranteed by the manufacturer. Transformers that are operated outside of manufacturer ratings and ANSI recommended loading values have a shortened life and run the risk of a costly premature failure and potential widespread Outages while repairs are made. Good engineering practice dictates that Transformer and other wound equipment ratings are not to be exceeded without fully evaluating the impact of the overload.

During peak Load periods with all lines and major station equipment in-service (often referred to as the N-0, or N minus Zero, case) all voltages will be within the specified range and line and equipment loadings will be within the ratings for normal operating conditions.

Due to the potential for widespread, regional Interruptions of electric service the Transmission System is planned, designed, and constructed as a multistate regional Network with lines form multiple sources always connected to each Load point. Loss of a single Transmission Line or other single major Transmission System component (N-1) will not result in the Interruption of service to any Load and all voltages and equipment loading will be maintained within specified criteria.

The local Distribution System and local Transmission Systems that impact much smaller areas and electrical Load have been planned, designed, and constructed so that there is normally only one source connected to each Load. However, distribution feeders and distribution Substations are generally planned so that an alternate source can serve the Load in an emergency or Scheduled Outage. During peak Load periods with all lines and substation Transformers in-service (N-0) all voltages will be within ANSI Range A specifications and all line and equipment loadings will be within the ratings for normal operating conditions. For the loss of a single distribution Substation Transformer or distribution feeder (N-1) some System Load will be temporarily lost until the System can be electrically reconfigured through switching and alternate sources connected to the Load. During N-1 conditions all voltages will be maintained within ANSI Range B and all line and equipment loadings will be within the specified emergency loading criteria.

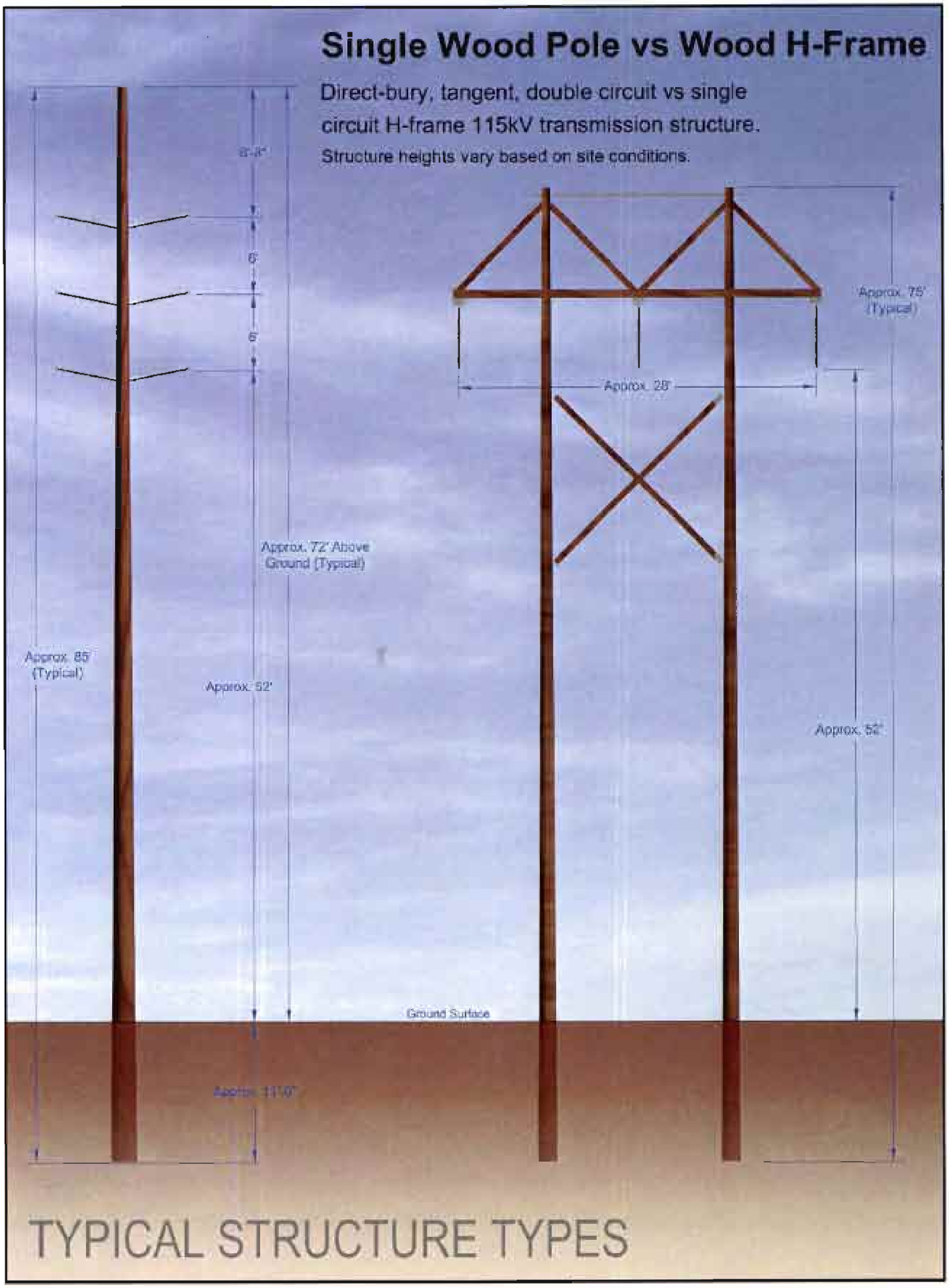
With the exception of projects that must be constructed to comply with legal obligations, all System modification and improvement projects are prioritized taking into account the magnitude of the impact of the project and the amount of risk associated with deferring the project to a later date. A list of project drivers and their current priority assignment is provided in Table A.

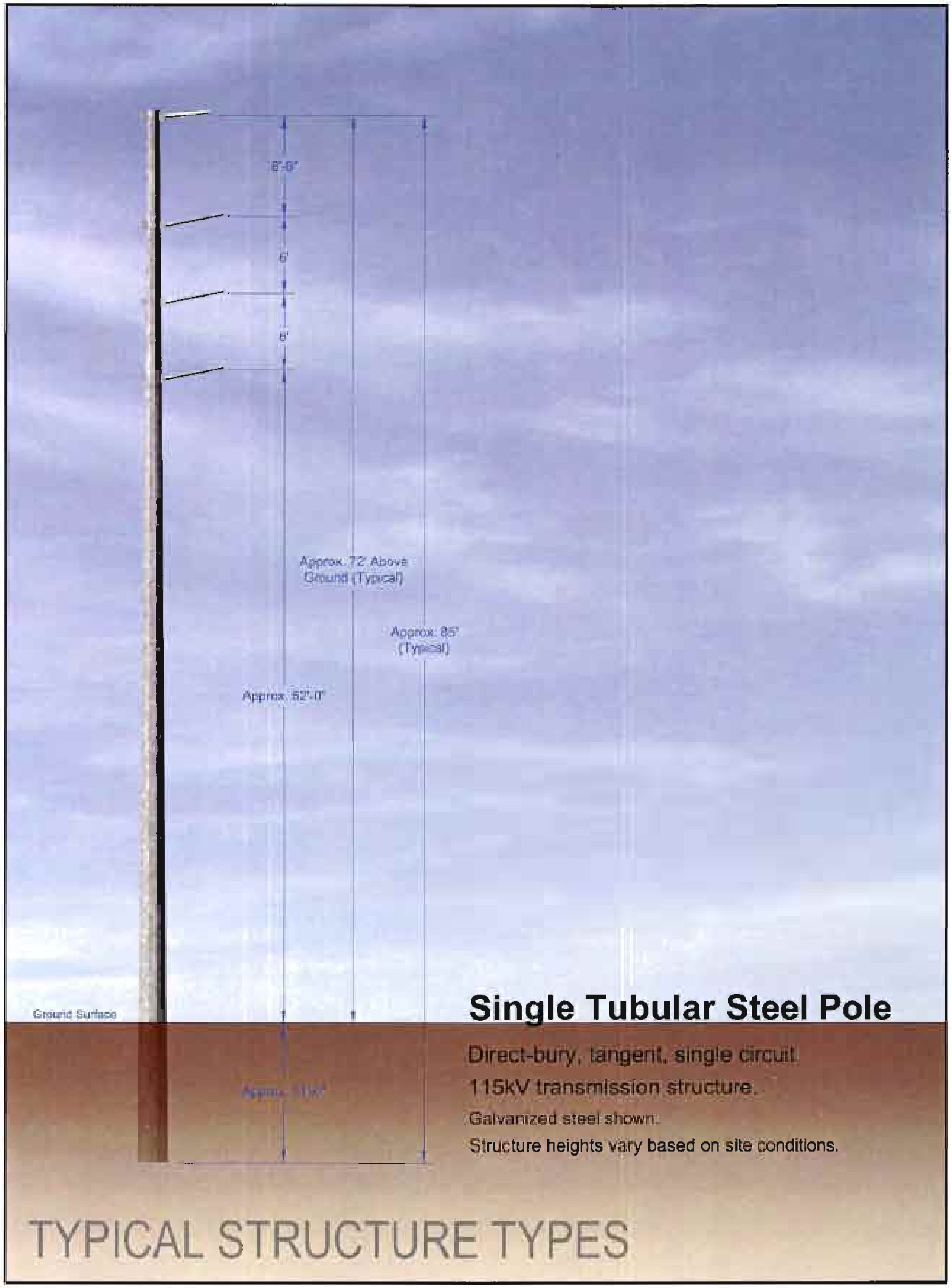
Table A

PRIORITY	PROJECT DRIVER	DRIVER DEFINITION
1a	Safety, Legal or Regulatory Requirement	Facilities to be modified or relocated to accommodate a public improvement project. Projects to meet safety, legal, regulatory or reliability council requirements.
1b	Normal Load Carrying Ability Exceeded	Project driven by the need for additional Capacity during normal peak loadLoad periods. Existing Loads or projected Loads either exceed Substation or line ratings or result in excessively low voltage during normal peak Load periods when all lines and Substations are in service.
2	Serve New Load	Project driven by the need for additional Capacity during normal peak Load periods. Existing Substations or lines cannot serve specific new Load projects without exceeding equipment ratings or excessively low voltages.
3a	Contingency Exposure	Project driven by the need for additional Capacity following an Outage during peak Load periods. Based on Load projections, additional customers will be left without service following a feeder Outage or equipment failure until repairs are made. Excessively low voltages or equipment overloads are predicted to occur when the normal source is replaced by the backup source during peak Load periods. Repairs to restore service can take 2-30 hours.
3b	Reliability	Project driven by the need to reduce the either the frequency of Outages on a Circuit that has experienced an above average number of Outages or reduce the duration of Outages.
3c	Operability	Project driven by the need to not disrupt service to existing customers when connecting new customers or to reduce the amount of time required to switch to alternate sources during maintenance or following a line or Substation equipment failure.

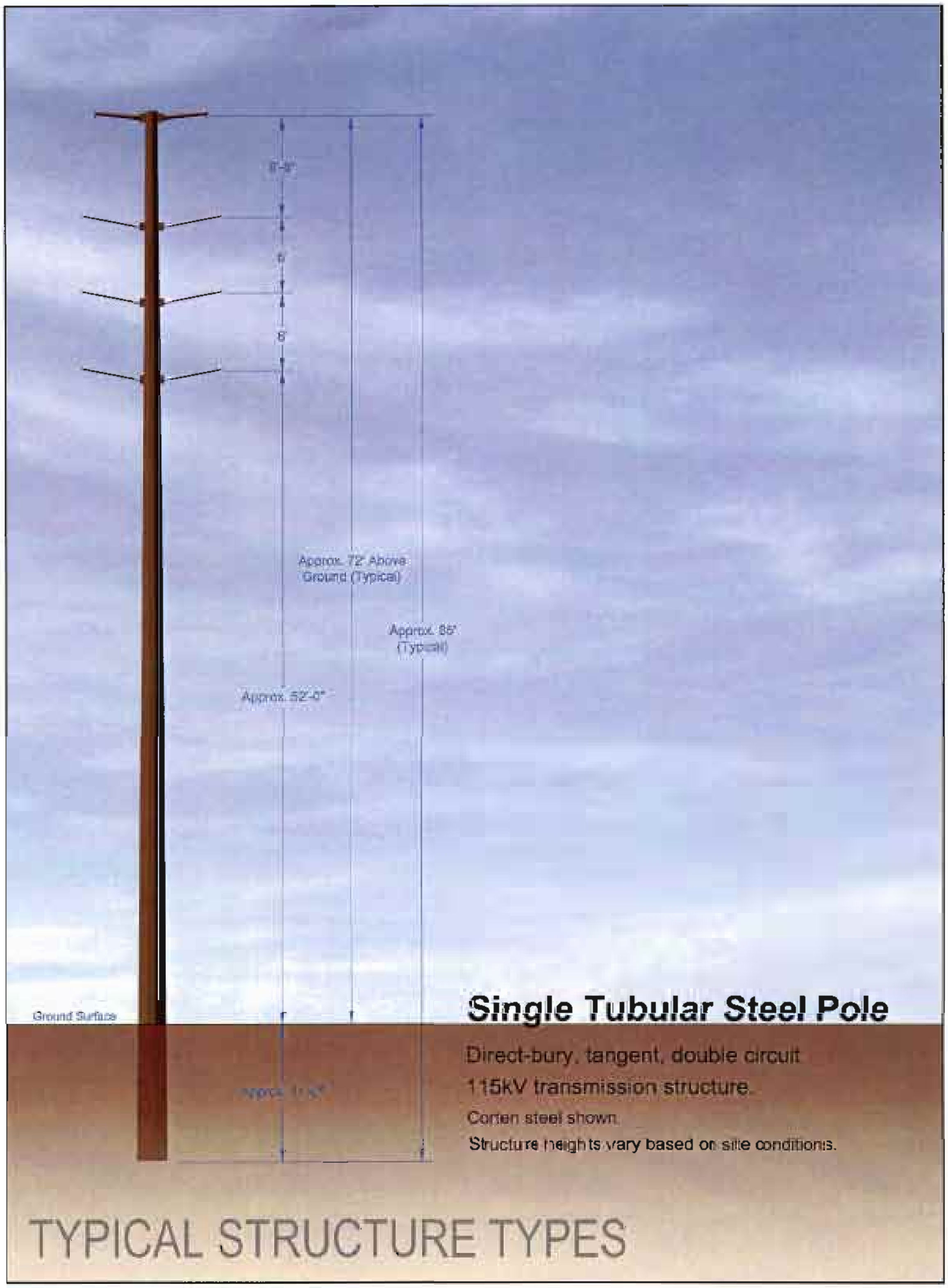
4a	Circuit Capacity Limited	Project driven by the need to Upgrade 4 kV distribution Circuit facilities to 12.47 kV for additional Capacity during normal peak Load periods and during Outages. Aging 4 kV Circuits unable to reliably support existing or new Load at 4 kV.
4b	Potential Equipment Damage	Project driven by the need to Upgrade nonstandard facilities to current design standards. Existing facilities subject to damage during faults or peak Load periods due to nonstandard design.
4c	Defer New Substation	Project will provide sufficient Load carrying Capacity during normal and Outage conditions to allow a more expensive project to be deferred for a significant amount of time.
4d	Future Excess Facility	Facilities made excess by completion of other projects.
5a	Equipment Upgrade	Project driven by the need to Upgrade 46 kV Substation and transmission facilities to 115 kV for additional Capacity during normal peak Load periods and during Outages. Substation Transformers and local Transmission Lines unable to reliably serve existing or new Load at 46 kV.
5b	Improve System Operation Processes	Projects to install or Upgrade facilities that permit more efficient operation and management of the Transmission or Distribution System. Or project required to support nonquantifiable business needs.

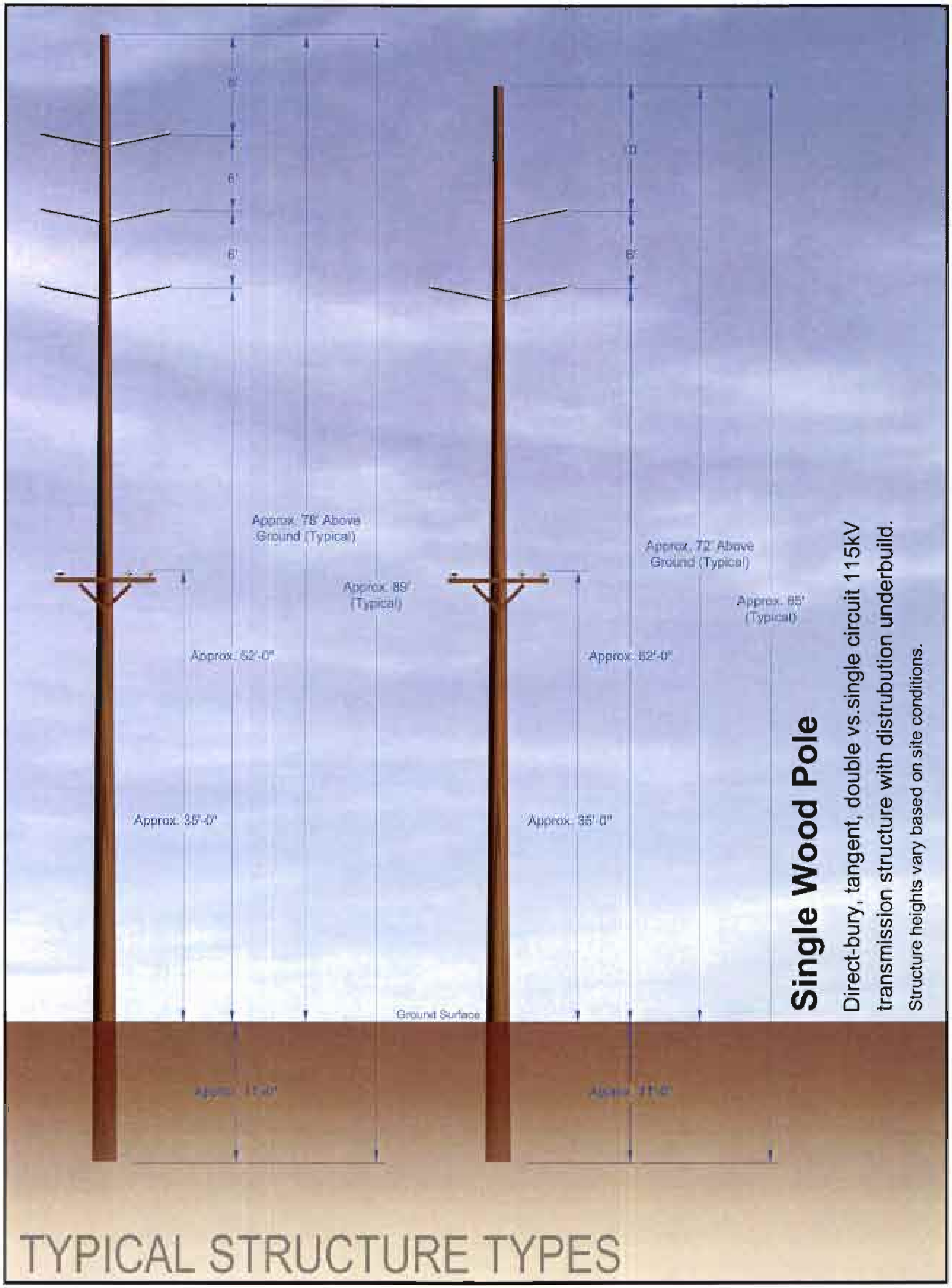
Appendix C Typical PNM Electric Structure Types


Single Wood Pole vs Wood H-Frame
Direct-bury, tangent, double circuit vs single circuit H-frame 115kV transmission structure.
Structure heights vary based on site conditions.
6'
6'
Approx. 75' (Typical)
Approx. 28'
Approx. 72' Above Ground (Typical)
Approx. 85' (Typical)
Approx. 52'
Approx. 52'
Ground Surface
TYPICAL STRUCTURE TYPES

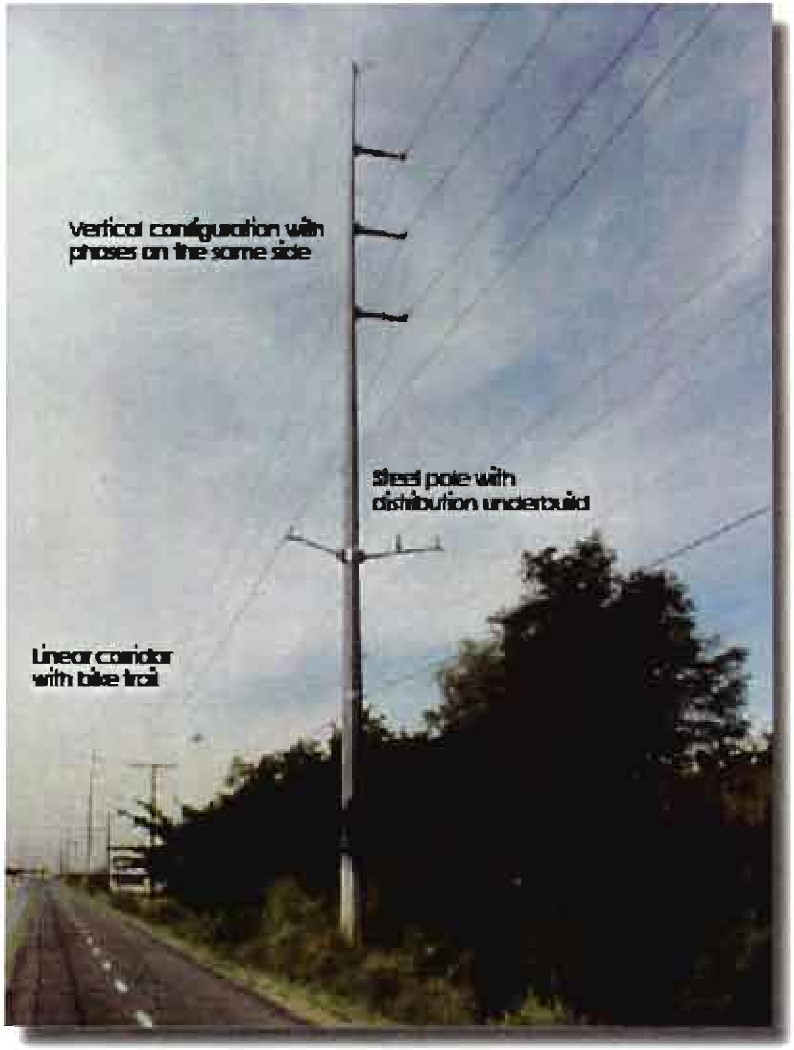


6'
6'
Approx. 72' Above Ground (Typical)
Approx. 85' (Typical)
Approx. 52'-0"
Ground Surface
Single Tubular Steel Pole
Direct-bury, tangent, single circuit
115kV transmission structure.
Galvanized steel shown.
Structure heights vary based on site conditions.
TYPICAL STRUCTURE TYPES

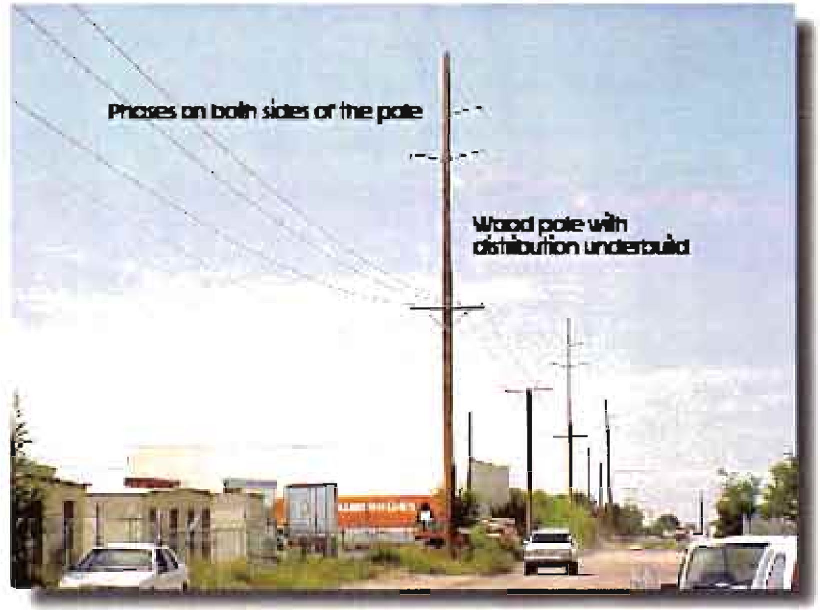

6'
6'
Approx. 72' Above Ground (Typical)
Approx. 85' (Typical)
Approx. 52'-0"
Ground Surface
Single Tubular Steel Pole
Direct-bury, tangent, double circuit
115kV transmission structure.
Corten steel shown.
Structure heights vary based on site conditions.
TYPICAL STRUCTURE TYPES



Approx. 78' Above Ground (Typical)
Approx. 89' (Typical)
Approx. 52'-0"
Approx. 35'-0"
Ground Surface
Approx. 72' Above Ground (Typical)
Approx. 85' (Typical)
Approx. 52'-0"
Approx. 35'-0"
Single Wood Pole
Direct-bury, tangent, double vs.single circuit 115kV transmission structure with distrubution underbuild.
Structure heights vary based on site conditions.
TYPICAL STRUCTURE TYPES



Near Prager Substation in Albuquerque



Near Industrial Road Substation in Santa Fe

TYPICAL 115kV SINGLE-CIRCUIT TRANSMISSION STRUCTURE WITH DISTRIBUTION UNDERBUILD CONFIGURATION

Along Airport Road in Santa Fe

Along St. Francis Drive in Santa Fe

TYPICAL 115kV SINGLE-CIRCUIT TRANSMISSION STRUCTURES

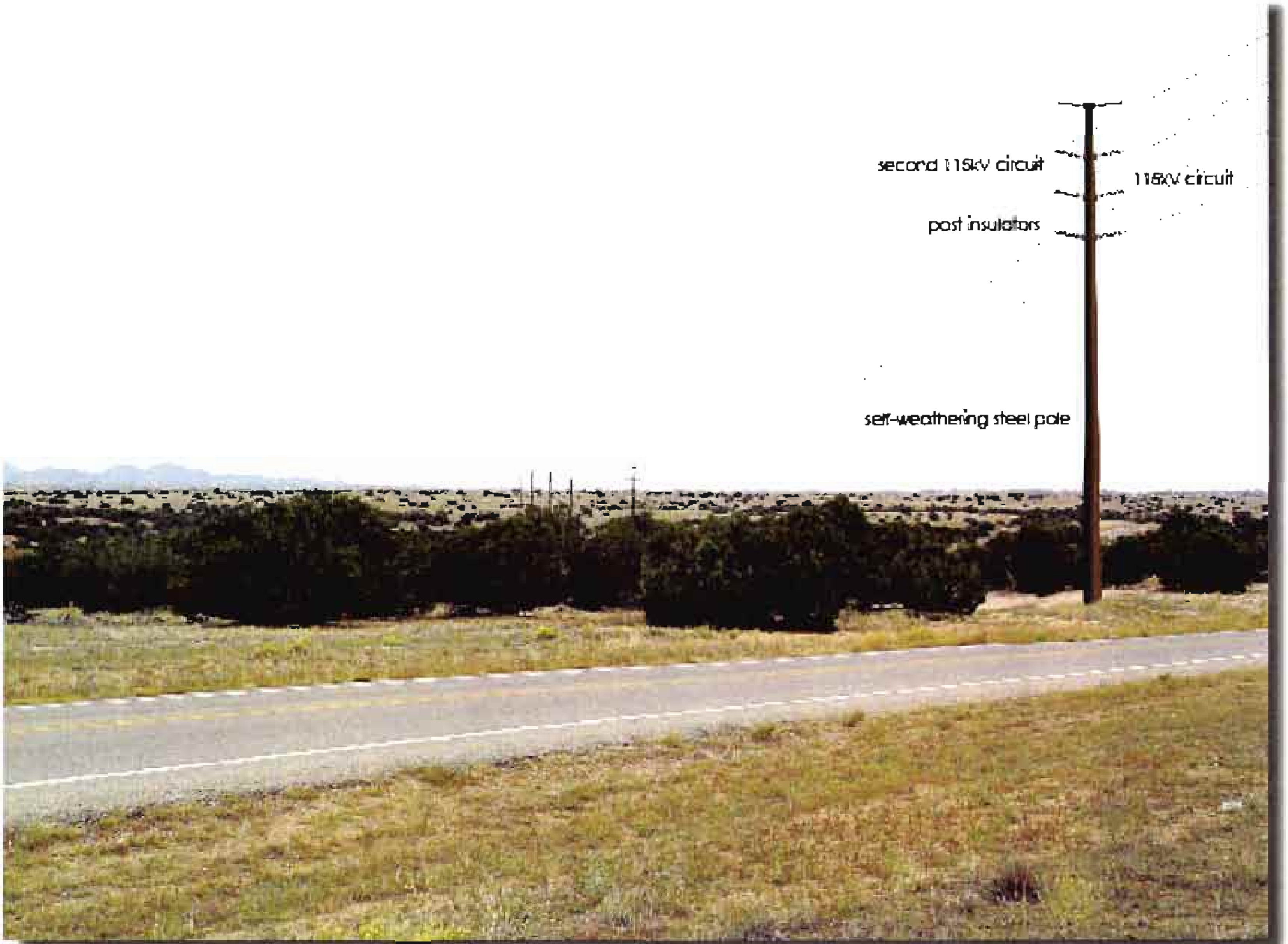
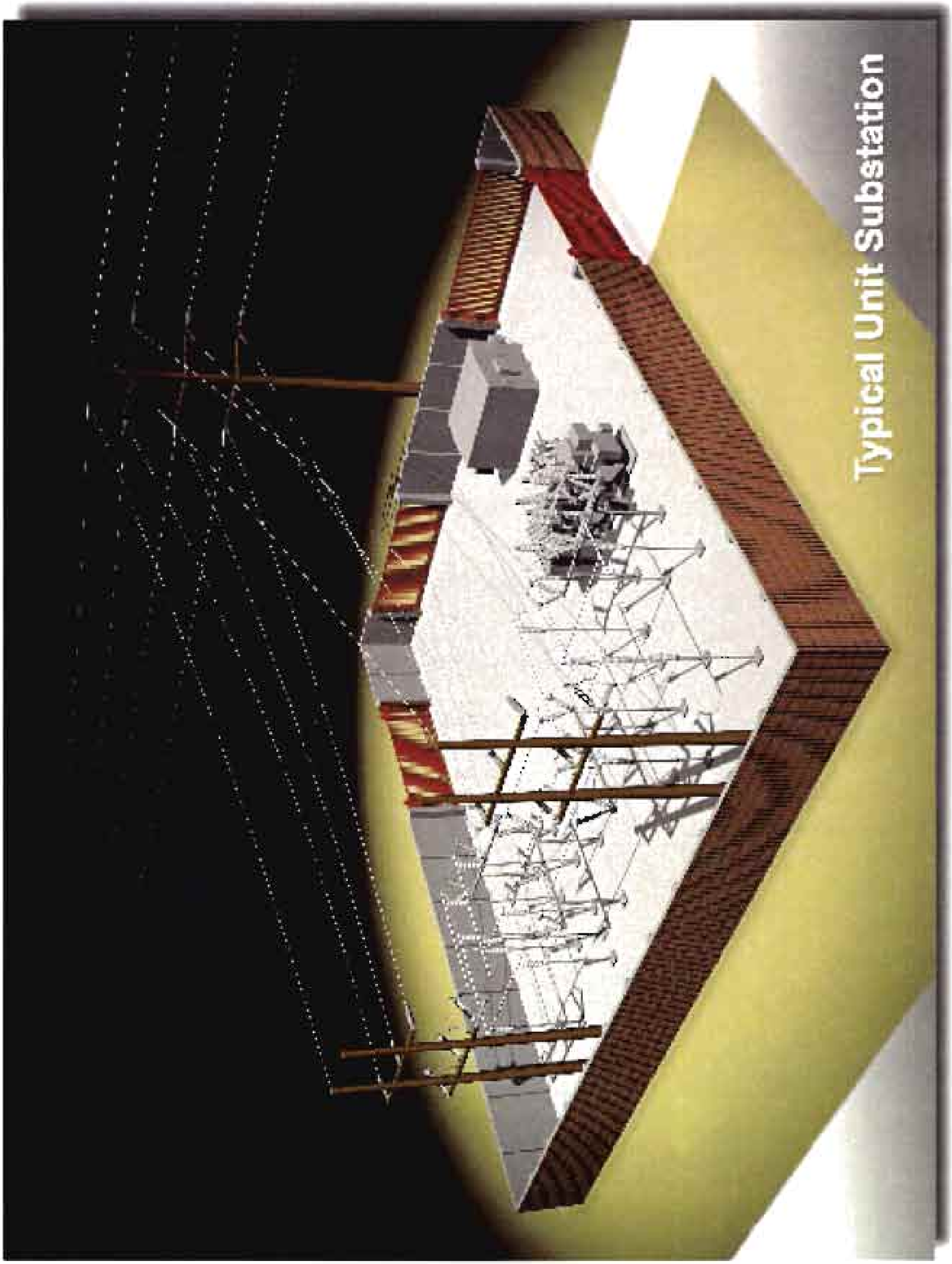


Photo simulation crossing Caja del Rio Rd. in the Santa Fe area

TYPICAL 115kV DOUBLE CIRCUIT TRANSMISSION STRUCTURE

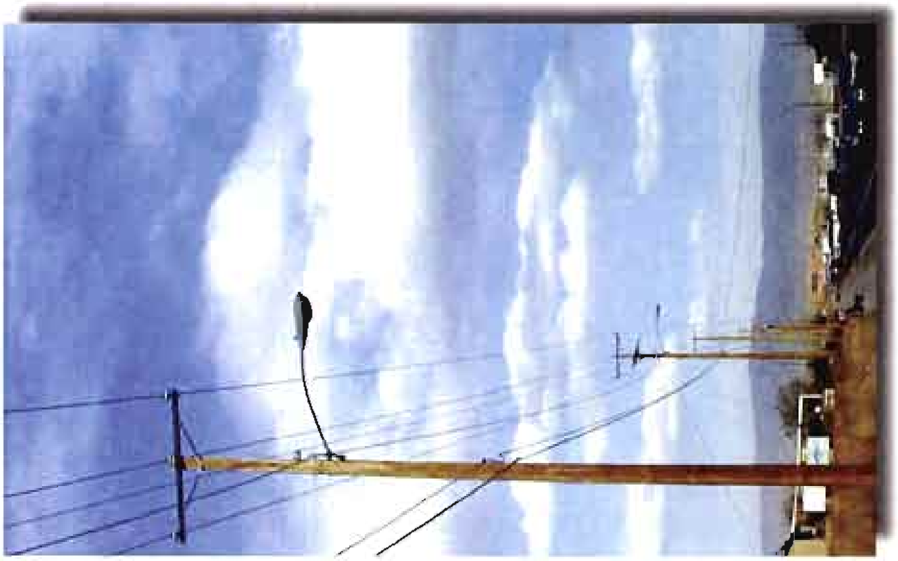
Appendix D Typical PNM Station Configuration

TYPICAL SUBSTATION CONFIGURATION



Appendix E Typical PNM Distribution Facilities

three phase triangular configuration

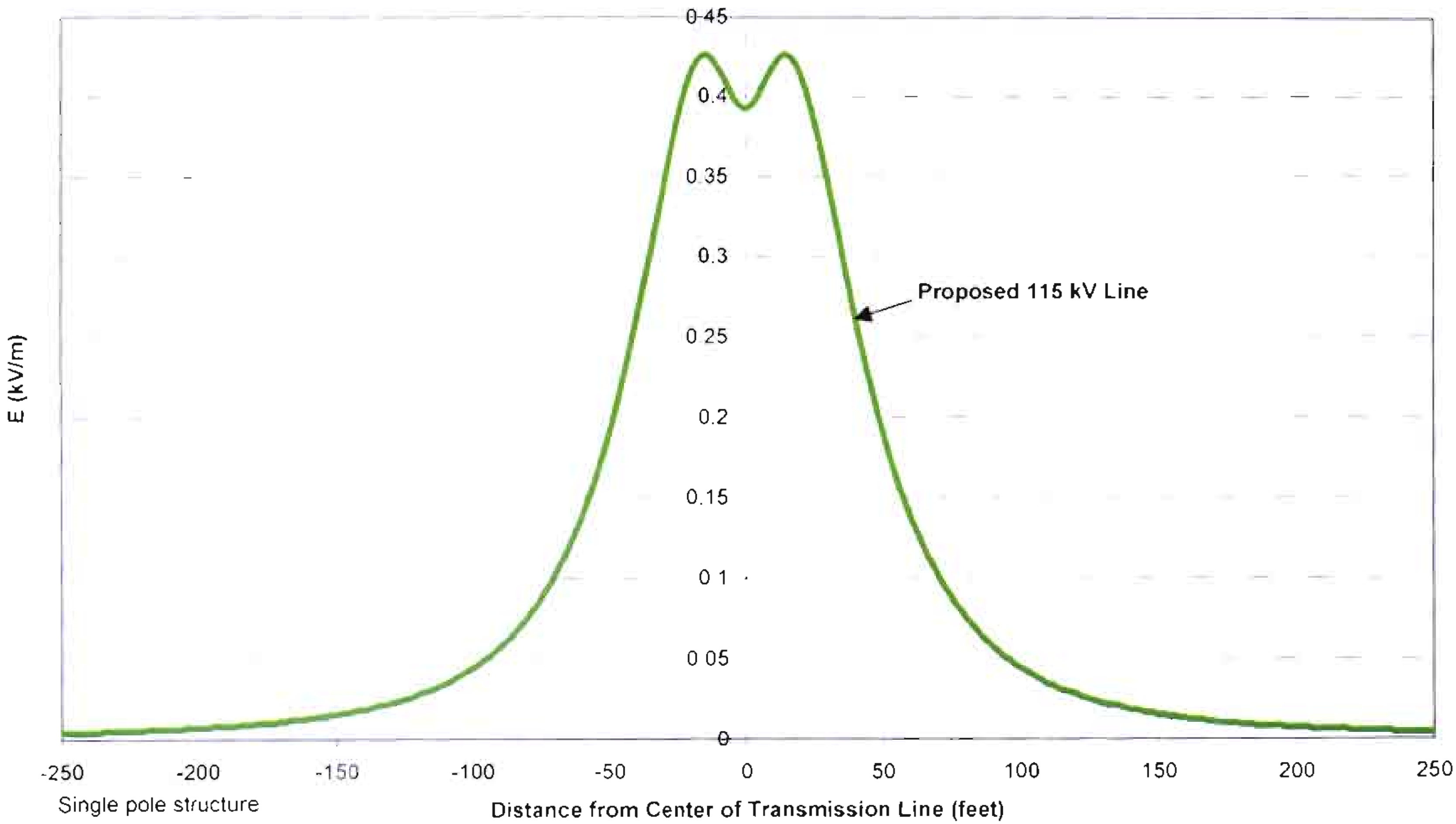


three phase with 8 ft. crossarm

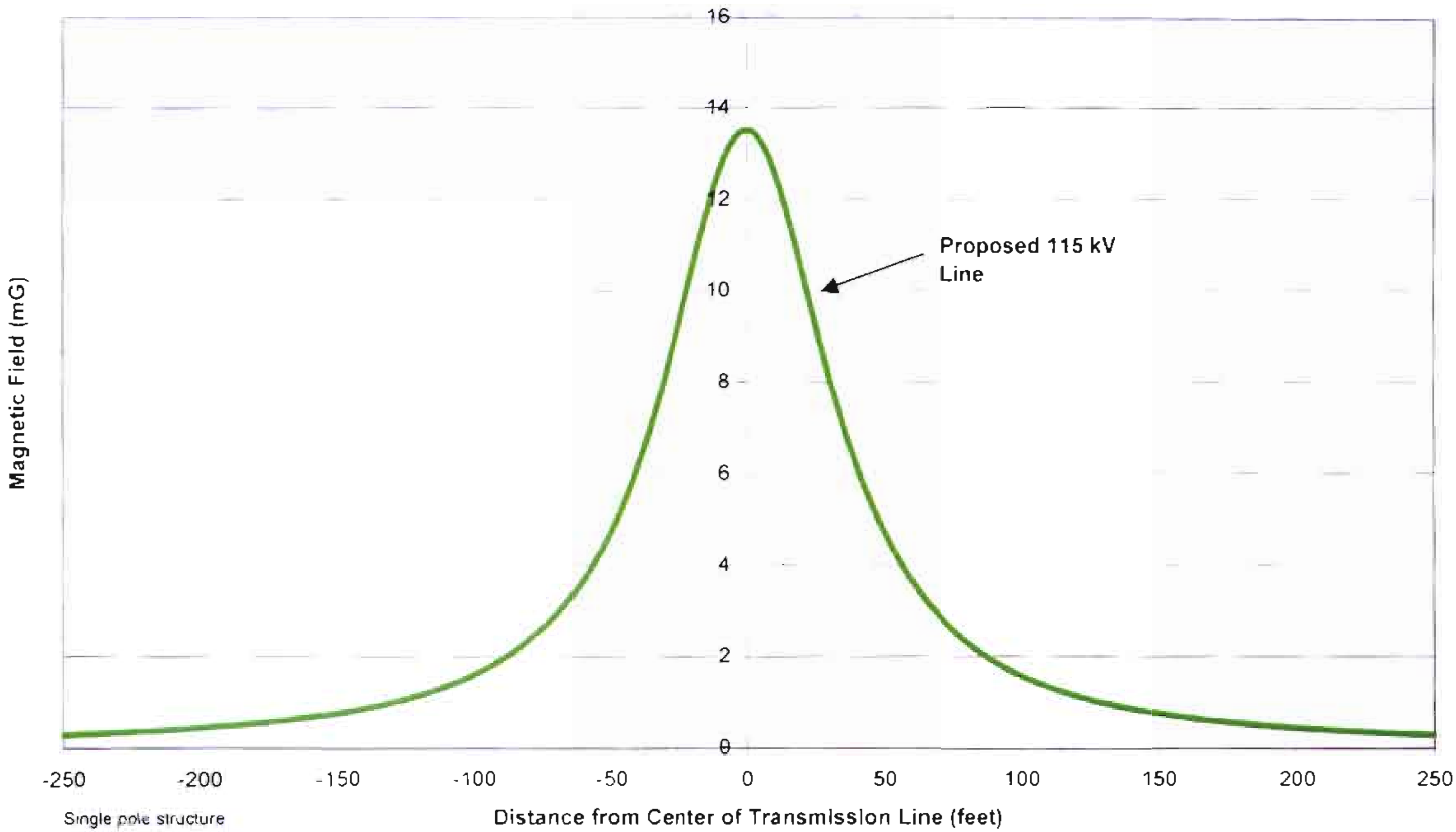
TYPICAL DISTRIBUTION FACILITY

Appendix F Sample EMF Profiles

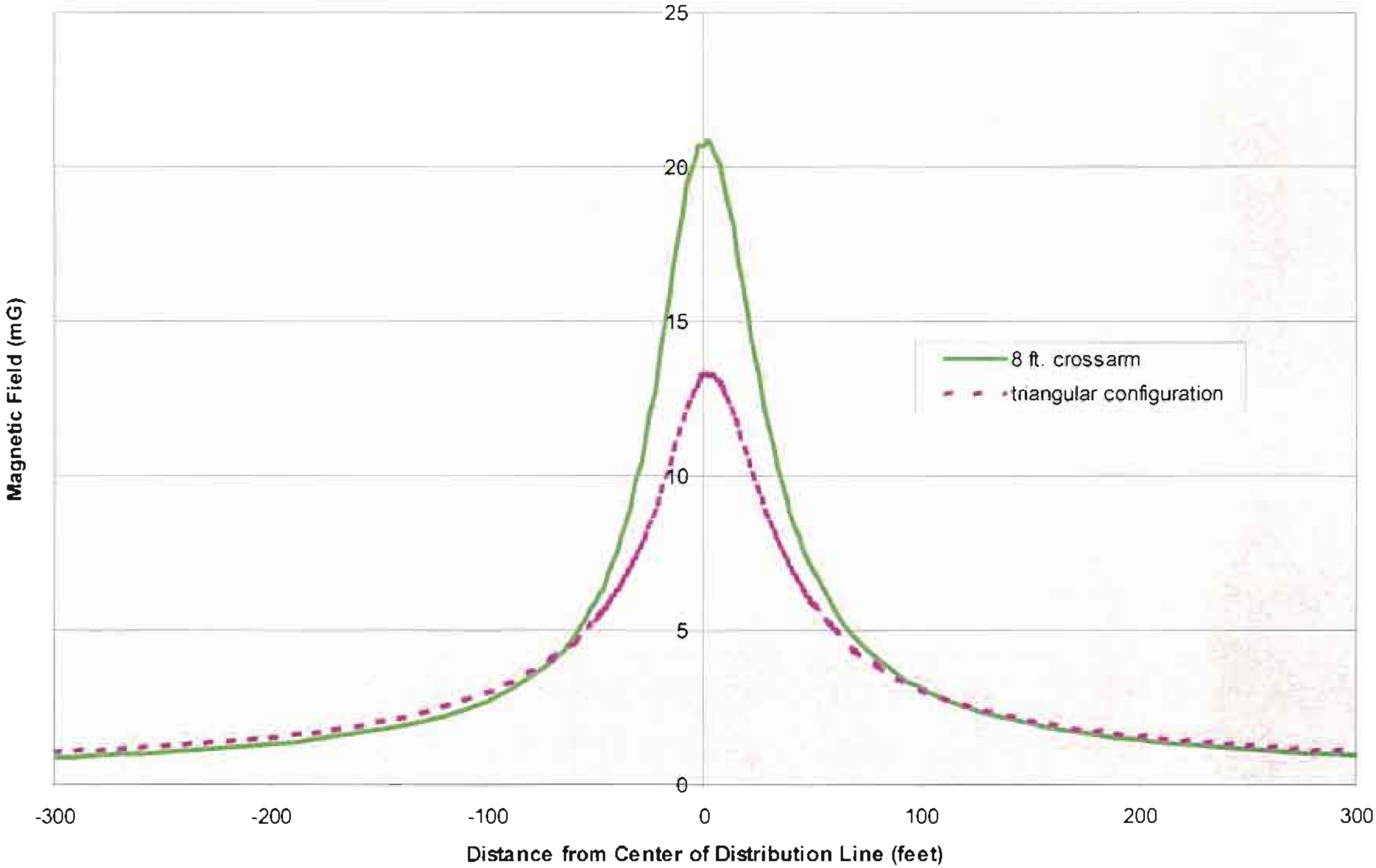
Example Electric Field Profile
115kV Single Pole Structure



Example Magnetic Field Profile
115kV Single Pole Line



Example Magnetic Field Profile
Heavily Loaded 12.5kV 3 - Phase Distribution Feeder



GLOSSARY

CITY OF SANTA FE
ELECTRIC FACILITIES PLAN

Adequacy – A Bulk Electric Power System's ability to supply the aggregate electrical demand and energy requirements of customers at all times.

American National Standards Institute (ANSI) – A private, nonprofit 501(c)(3) organization that administers and coordinates the U.S. voluntary standardization and conformity assessment system. The Institute's mission is to enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and by safeguarding their integrity.

Ampere (Amp) – The unit of measurement of electrical current produced in a circuit by 1 volt acting through resistance of 1 ohm. The measure of flow of electrons past a given point in an electric conductor such as a power line.

Application – The formal, written request, also known as proposal, by or on behalf of any Company to the Director of the Planning and Land Use Department, the Planning Commission, the Governing Body or some other decision-making body for review, approval of or other action with respect to a particular Project or Projects, such review approval or other action pursuant to and within the jurisdiction of such decision-maker or decision-making body under Chapter 14 of the City Code.

Blackout – Emergency loss of the source of electricity serving an area caused by failure of the generation, transmission, or distribution systems.

Bulk Electric Power System – The aggregate of electric generating plants, Transmission Lines, and related equipment. The term may refer to facilities within one electric utility or within a group of utilities in which the Transmission Lines are interconnected.

Capability –The maximum load that a generating unit, generating station, Transmission Line, or other electrical equipment can carry under specified conditions for a given period of time without exceeding approved limits of temperature and stress.

Capacity – The real power output of a generator or system, typically in megawatts, measured on an instantaneous basis. The amount of electric power delivered or required for which a generator, turbine, transformer, transmission circuit, station, or system is rated by the manufacturer. The maximum power that can be produced by a generating resource at specified times under specified conditions.

Cascading Outage – Successive (uncontrolled) system loss from an on-site incident that results in a widespread system collapse.

Circuit – A conductor or a system of conductors through which electric current flows.

City – City of Santa Fe.

City Code – Chapter 14, Land Development Code of the City of Santa Fe, New Mexico.

Company – Electric service provider or its contractors or other persons constructing electric facilities and distribution facilities.

Conductor – A substance or body, usually in the form of a wire, cable, or busbar, that allows a current of electricity to pass continuously along it.

Contingency – A possible event for which preparations are made, typically the loss of a critical piece of equipment causing the loss of generating capacity or a transmission element.

Current (Electric) – A flow of electrons in an electrical conductor. The rate of movement of the electricity measured in amperes.

Demand – Rate at which electric energy is delivered at given instant or averaged over a designated period, usually expressed in kilowatts or megawatts. See also Maximum Demand.

Demand Forecast – An estimate of the level of energy or capacity that is likely to be needed at some time in the future.

Distribution System – The lines, transformers, and switches that connect the transmission network and customer load. The transport of electricity to ultimate use points such as homes and businesses. The portion of an electric system that is dedicated to delivering electric energy to an end user at relatively low voltages.

Distribution Facilities – The system of lines and poles, including the transformers and switches, and related appurtenances located thereon, that connects between transmission network and customer load that operates at electrical voltages of 40 kV or below.

Distribution Voltage – The voltage in the electric system between substation and ultimate utilization. Normally recognized as power lines that supply commercial and/or residential facilities. In Santa Fe, the distribution voltages are 4.16 kV and 12.47 kV.

Electric Facilities – 40 kV and above Transmission Lines, switching stations and substations and the placement of more than 3 distribution poles and related lines.

Electric Project – The placement of all 40 kV and above Transmission Lines, switching stations and substations; the upgrade, replacement, or relocation of any 40 kV and above Transmission Lines, switching stations and substations; and the placement of more than 3 new distribution poles (not reviewed through the Development Review and Building Permit process).

Electric Structure – One or more poles connected to each other by braces, cross arms or grounding systems with insulators and other hardware and carrying electric service.

Electric System – The generation, transmission, distribution, and other facilities operated as an electric utility or a portion thereof.

Electric Utility – A corporation, person, agency, authority, or other legal entity or instrumentality that owns and/or operates facilities within the United States, its territories, or Puerto Rico for the generation, transmission, distribution, or sale of electric energy primarily for use by the public and files forms listed in the Code of Federal Regulations, Title 18, Part 141. Facilities that qualify as cogenerators or small power producers under the Public Utility Regulatory Policies Act (PURPA) are not considered electric utilities.

Electric and Magnetic Fields (EMF) – The generation, delivery, and use of electricity produce electric and magnetic fields. Electric fields are produced by voltage, the electric "pressure" that causes current to flow in a wire; magnetic fields are produced by current, the movement of electric charge. Electric and magnetic fields can be imagined as invisible lines of force diminishing in strength with distance from their source.

Energy – The capability of doing work (potential energy) or the conversion of this capability to motion (kinetic energy). Energy has several forms, some of which are easily convertible and can be changed to another form useful for work. Most of the world's convertible energy comes from fossil fuels that are burned to produce heat, which is then converted as a transfer medium to mechanical or other means in order to accomplish tasks.

Federal Energy Regulatory Commission (FERC) – A quasi-independent regulatory agency within the Department of Energy having jurisdiction over interstate electricity sales, wholesale electric rates, hydroelectric licensing, natural gas transmission, and related services pricing, oil pipeline rates, and gas pipeline certification.

Forecast – Prediction of demand for electricity.

Forecasting – The process of estimating or calculating electricity load or resource production requirements at some point in the future.

Frequency – The oscillatory rate in Hertz (Hz) (cycles per second) of the alternating current electric service. Nominally 60 Hz in the United States and 50 Hz in Europe.

Generation – The process of producing electric energy by transforming other forms of energy such as steam, heat, or falling water. Also, the amount of electric energy produced, expressed in kilowatt hours (kWh) or megawatt hours (mWh).

Grid – The layout of the electrical transmission system or a synchronized transmission network. See also **Transmission Grid.**

Guy Wires – wires that support transmission electric structures or distribution poles; they are attached to the pole or electric structure and anchored in the ground.

Hertz (Hz) – A unit of frequency equal to cycles per second.

Independent Power Producer (IPP) – A nonutility power-generating entity, defined by the 1978 Public Utility Regulatory Policies Act, that typically sells the power it generates to electric utilities at wholesale prices.

Interconnected System – A system that has two or more power systems normally operating in synchronism and having connecting tie lines.

Interruption – Power outage caused by a blown fuse, equipment failure, or scheduled maintenance. Duration can be from momentary (30 Hz to 3 seconds) to sustained (longer than 1 minute).

Investor-owned Utility (IOU) – A utility organized under state law as a publicly traded corporation for the purpose of providing electric power service and earning a profit for its stockholders.

Joint Use – The use in common of a particular facility by two or more entities, such as the attachment of a telecommunications company's antenna or other telecommunications apparatus on the electric transmission structure and/or distribution pole of an electric utility.

Kilovolts (kV) – A unit of measurement of electromotive force equal to 1000 volts.

Kilowatt (kW) – A unit of electrical power equal to 1000 watts.

Load – The amount of electric power delivered or required at any specific point or points on a system. The requirement originates at the energy-consuming equipment of the consumers. The load of an electric utility system is affected by many factors and changes on a daily, seasonal, and annual basis, typically following a pattern. Electric system load is usually measured in megawatts (MW).

Loop Feed – The connection of two transmission or distribution lines so that a loop is formed; loop feeds allow electric service to be provided from either line in the event of an outage on one of the facilities.

Megawatt (MW) – A unit of electric power equal to 1 million watts or 1000 kW.

Mega volt ampere (MVA) – Representation of the total power carried on the system; Vector resultant of real power (MW) and reactive power (mega volt ampere reactive (MVAR).

National Electrical Safety Code (NESC) – The industry-accepted safety standard for overhead and underground electric utility and communications utility installations.

Network – An interconnected system of electric Transmission Lines, transformers, switches, and other equipment connected together in such a way as to provide reliable transmission of electric power from multiple generators to multiple load centers. A network implies redundancy provided through the use of multiple parallel flow paths.

New Mexico Public Regulation Commission (NMPRC) – An elected body of officials representing districts around the State of New Mexico that regulates utilities, etc.

Normal (precontingency) Operating Conditions – Normal activities of a system operator to alleviate potential facility overloads or other potential system problems.

Normal Voltage Limits – The operating voltage range on the interconnected systems, above or below nominal voltage, that is acceptable on a sustained basis, generally expressed in kilovolts.

North American Electric Reliability Council (NERC) – In response to the 1965 New York City blackout, the electric utility industry formed a council in 1968 to promote the reliability and adequacy of bulk power supply in the electric utility systems of North America. NERC consists of ten regional councils and encompasses essentially all the power regions of the contiguous United States, Canada, and a small portion of Mexico.

Operating Procedures (contingency) – A set of written step-by-step practices or procedures that may be automatically implemented, or manually implemented by the system operator within a specified time frame, to maintain operational integrity of the interconnected electric systems when specific anticipated contingencies occur. These actions or system adjustments may be implemented in anticipation of or following a system contingency (facility outage) or system disturbance, and include, among others, opening and closing switches (or circuit breakers) to change the system configuration, the redispatch of generation, and the implementation of Direct Control Load Management or Interruptible Demand programs.

Outage – Periods, both planned and unexpected, during which power system facilities (generating unit, Transmission Line, or other facilities) cease to provide generation, transmission, or the distribution of power. See also **Cascading Outage; Planned Outage; Scheduled Outage.**

Peak Load – The maximum load consumed or produced by a unit or group of units in a stated period of time.

Placement – Installation of electric facilities where similar facilities have not previously existed.

Planned Outage – The removal of a unit from service to perform work on specific components that is scheduled well in advance and has a predetermined duration (e.g., annual overhaul, inspections, testing).

Pole – Steel, wood or other material placed in the ground to hold associated insulators, braces and other attachment hardware for electric service.

Power – A term usually meant to imply both capacity and energy. The rate at which energy is transferred, measured in watts.

Power System – See **Bulk Electric Power System.**

Protected Corridors – Rights-of-way and/or easements containing Transmission Lines that form a network within the City of Santa Fe or surrounding area. Identified and designated new corridors for the development of new Transmission Lines. Major Transmission Lines feeding bulk power into the network are also a part of this protected corridor. Because of their location and function, preservation of these corridors and protection from encroachment is particularly critical for continued reliable electric service in the City of Santa Fe. The protected corridors are preferred pathways to provide electrical capacity for current and future needs.

Prudent Avoidance – The practice of avoiding areas of public concern such as schools, residential areas and childcare centers to the greatest extent practical and feasible.

Public Service Company of New Mexico (PNM) – An investor-owned public utility providing electric, gas, and energy services in the State of New Mexico, regulated by the NMPRC.

Reconductor – To increase the capacity of a line by removing the existing conductor and replacing it with a larger size conductor that will be operated at the same voltage.

Reframing – Work on a pole or electric structure that involves replacing structural members, improving clearances, and other maintenance, replacements or retrofits on existing poles or electric structures.

Reliability – The degree to which the performance of the elements of an electric system results in power being delivered to consumers within accepted standards and in the amount desired. The degree of reliability may be measured by the frequency, duration, and magnitude of adverse effects on consumer service.

Relocation – Removal of existing electric facilities and reinstallation of those facilities or new similar facilities in a new location not more than 50 feet distant from the original location.

Replacement – Removal of existing electric facilities and installation of new similar facilities in a location as close as practicable to the original location.

Residential – The residential sector is defined as private household establishments that consume energy primarily for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and clothes drying. The classification of an individual consumer's account, where the use is both residential and commercial, is based on principal use.

Scheduled Outage – The shutdown of a generating unit, Transmission Line, or other facility, for inspection or maintenance, in accordance with an advance schedule.

Service Area – The territory in which a utility system is required or has the right to supply service to customers.

Service Voltage – The voltage level at which a customer is connected to the electric transmission and distribution system.

Siting Constraints – Resource factors or land use values that determines the suitability or compatibility of an area for transmission facilities siting and construction.

Southwest Power Pool (SPP) – A group of 48 electric utilities serving more than 4 million customers across all or parts of eight southwestern states. This membership is comprised of investor-owned utilities, municipal systems, generation and transmission cooperatives, state authorities, federal agencies, wholesale generators, and power marketers. SPP serves as a NERC regional reliability council.

Storm Water Pollution Prevention Plan (SWPPP) – A document that describes site and construction activity, including a storm water impact assessment; determines pollution control measures (BMPs); indicates certifications and notifications; implements tracking of activity; and creates termination records at the end of construction.

Substation – Facility equipment that switches, changes, or regulates electric voltage. An electric power station that serves as a control and transfer point on an electric transmission system. Substations route and control electric power flow, transform voltage levels, and serve as delivery points to industrial customers.

Switching Station – Facility equipment used to tie together two or more electric circuits through switches. The switches are selectively arranged to permit a circuit to be disconnected, or to change the electric connection between the circuits.

System – A combination of generation, transmission, and distribution components comprising an electrical utility or group of utilities. See Also **Bulk Electric Power System; Distribution System; Electric System; Interconnected System; Transmission System.**

Temporary Facilities – Electric facilities and distribution facilities used to provide service for less than 1 year.

Transformer – An electrical device for changing the voltage of alternating current.

Transmission System (Transmission Facilities) – The network of high-voltage lines, transformers, and switches used to move electric power from generators to the distribution system. Also used to interconnect different utility systems and independent power producers into a synchronized network. Transmission is considered to end when the energy is transformed for distribution to the customer.

Transmission Grid – An interconnected system of electric Transmission Lines and associated equipment for the transfer of electric energy in bulk between points of supply and points of demand.

Transmission Line(s) – The network of high-voltage lines and switches used to move electric power from generators to the Distribution System.

Transmission Voltage – Voltage levels used for bulk transmission systems; generally 46 kV to 750 kV alternating or direct current. In Santa Fe, the transmission voltages are 46 kV and 115 kV.

Underground System - A system of underground primary and/or secondary distribution cables which may have transformers, terminal boxes, switching devices and other facilities necessarily appurtenant to such a system mounted on the surface, or any portion thereof.

Upgrade – To rebuild, improve, or increase the voltage or current carrying capability of an electric Transmission Line, switching station, or substation.

Volt – The unit of measurement of electromotive force. It is equivalent to the force required to produce a current of 1 ampere through a resistance of 1 ohm. The unit of measure for electrical potential. Generally measured in kilovolts (kV). Typical transmission level voltages are 115 kV, 230 kV, and 500 kV.

Voltage – See **Distribution Voltage; Normal Voltage Limits; Service Voltage; Transmission Voltage.**

Voltage Reduction – Any intentional reduction of system voltage by 3% or greater to maintain the continuity of service of the bulk electric power supply system. See also **Normal Voltage Limits.**

Watt – A measure of real power production or usage equal to 1 Joule per second. The rate of energy transfer equivalent to 1 ampere flowing under a pressure of 1 volt at unity power factor. An electric unit of power or a rate of doing work.

Western Electricity Coordinating Council (WECC) – A group of electric power systems engaged in bulk power generation and/or transmission serving all or portions of the 14 western states and from British Columbia, Canada to the northern portion of Baja California, Mexico. WECC is responsible for coordinating and promoting electric system reliability in the region. In addition to promoting a reliable electric power system in the Western Interconnection, WECC supports efficient competitive power markets, assures open and nondiscriminatory transmission access among members, provides a forum for resolving transmission access disputes, and provides an environment for coordination of operating and planning activities.