Village of Key Biscayne
Underground Utilities
Feasibility Study

Prepared for:

Village of Key Biscayne

Prepared by:

WGI

August 2016

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1.0 INTRODUCTION

The Village of Key Biscayne contracted with Wantman Group Inc. (WGI) to deliver a Feasibility Study for the proposed underground conversion of the existing aerial utility facilities within an area of the Village. The area studied is depicted on the Location Map in Appendix A. The area being studied includes 1,143 single family homes, multifamily, government, commercial, office, institutional and recreational uses. The Village of Key Biscayne is approximately 1.3 square miles, of which approximately one half the total area is being studied.

The purpose of this study is to outline the factors in determining the feasibility, potential costs and schedule associated with converting the existing aerial facilities to underground. A conceptual underground conversion design has not been developed. Detailed system maps showing the existing aerial and underground utility facilities were not available for this study.

The study area is currently served by aerial utility facilities. The affected utilities include Florida Power and Light for power (FPL), and AT&T and Comcast for communication (collectively referred to as the utility owners). Within the study area Florida Power and Light has approximately 4.5 miles of aerial **feeder**, and approximately 9.8 miles of **primary laterals**. The underground conversion effort will be a collaboration of the Village and the utility owners, FPL, AT&T and Comcast. The underground conversion of the existing aerial facilities will significantly reduce the current service disruptions and outages caused by tree contact, wildlife, lightning, adverse environment (salt spray), vehicular accidents, weather and high winds. The benefits of undergrounding the aerial facilities are enumerated later in this report.

The timing of the proposed underground conversion effort is critical in that Florida Power and Light is currently planning a system-wide hardening project anticipated to begin in 2018. The proposed hardening project will replace the existing poles with the larger diameter Class 1 concrete poles that are 5 feet higher and would be more disruptive to rear-yard installations. The hardening project will also place additional in-line poles throughout the system. Although much less so, hardened above ground systems are still vulnerable to adverse weather, vegetation and flying debris.

Understanding of electric power delivery systems. To help understand the issues associated with burying a power delivery system, it is important to be familiar with the various components of the system from the substation (at north end of the Village) to the individual meter. Power leaves the substation along two main north/south **feeders**. The north/south **feeders** follow Harbor Drive and Fernwood Road / Crandon Boulevard (refer

to the Location Map Appendix A). Branching off the main distribution **feeders** are **primary laterals** that typically run along rear lot lines to pole mounted transformers. Secondary lines take power from the transformers to a service drop at each property, the majority of which are aerial. The service drop extends from the secondary power line to the meter. The proposed underground distribution system would be composed of **feeder** cables from the existing substation to switch cabinets located throughout the Village. **Primary** cables from the switch cabinets would then bring power to the pad mounted transformers. Each pad mounted transformer would provide underground service to approximately 6 to 8 residences, depending on the size and electrical load at each residence.

2.0 UTILITY PROVIDERS

The following Companies were identified through a Sunshine 811 Design Ticket. Inquiries were made to confirm the presence of any additional companies with a utility interest in the Village of Key Biscayne, with aerial facilities on the existing FPL or AT&T pole lines. The utility providers and companies with facilities within the Village include:

America Traffic Solutions – Supports traffic control within the Village of Key Biscayne (red light cameras). American Traffic Solutions has facilities at the following intersections: Crandon Boulevard at Harbor Drive, Crandon Boulevard at Key Colony, and Crandon Boulevard at Galen Drive. Facilities are typically in the right-of-way by Agreement with the local or county municipality.

AmeriGas DBA Siegel Gas – Provides propane gas to customers within the Village of Key Biscayne. Facilities are typically not found within public rights-of-way. Anticipate minor impacts limited to the private property service conversions.

AT&T Florida – Provides communications service to private, public and institutional customers within the Village of Key Biscayne. AT&T's services are regulated by the Public Service Commission. The majority of the existing AT&T facilities are aerial. The majority of the residential properties are feed from the rear lot lines. For this report we assume the facilities placed within public right-of-way are in the right-of-way by permit.

Comcast Cable – Provides communications service to private, public and institutional customers within the Village of Key Biscayne. Comcast's services are regulated by the Public Service Commission. The majority of the existing Comcast facilities are aerial. The majority of the residential properties are feed from the rear lot lines. For this report we assume the facilities placed within public right-of-way are in the right-of-way by permit.

Dade County Public Works and Traffic – Provides traffic control facilities within the Village of Key Biscayne. Facilities include buried and aerial interconnect cable connecting the existing traffic signals within the Village.

Florida Power and Light (Distribution) – Provides **primary** and secondary power service to private, public and institutional customers within the Village of Key Biscayne. FPL's services are regulated by the Public Service Commission. The majority of the existing FPL facilities are aerial. The majority of the residential properties are feed from the rear lot lines. For this report we assume the facilities placed within public right-of-way are in the right-of-way by permit.

Florida Power and Light (Transmission) – Provides high voltage power to the substation at the north end of the Village of Key Biscayne. These facilities will not be included or impacted by the proposed underground conversion.

Hotwire Communications – Provides communication service to The Sands within the Village of Key Biscayne. Hotwire's facilities are regulated by the Public Service Commission. Hotwire's facilities are buried within public rights-of-way. For this report we assume the facilities placed within public right-of-way are in the right-of-way by permit.

Miami-Dade Water and Sewer – Provides water and sewer service to private, public and institutional customers within the Village of Key Biscayne. For the purpose of this report we assume the facilities placed within public right-of-way are in the right-of-way by permit. The Miami-Dade Water and Sewer Department concern on this project is the protection of their existing underground facilities. A "best practices" approach would require their mains and services be mapped prior to the underground conversion design phase.

3.0 PROJECT SCOPE AND OTHER CONSIDERATIONS

This report considers the removal of all aerial facilities and poles within the subject area. These facilities will be replaced by buried conduit and cable, buried at-grade service pull-boxes and splice boxes, as well as surface mounted facilities, including; above ground pad mounted transformers, switch cabinets, fuse cabinets, capacitor banks, fiber termination cabinets and pedestals. Said surface facilities will be connected by conduit and cable within a joint utility trench. All existing aerial services to existing properties will be buried and all private property services must be converted to underground. All properties will receive connections to both of the communication providers, AT&T and Comcast.

All underground facilities, other than services, will be placed in public right-of-way. If suitable right-of-way is not available, an easement will be acquired within private property.

Early in the design process, it is critical to determine locations where easements will be required for the above ground facilities installed within private property. Acquisition of the subsequent easements will require the consent of the property owner. The Village shall record and furnish all easements necessary, including legal descriptions of such easements prior to initiating construction.

This report considers the possibility of a utilizing a joint use trench for the common installation of all utility facilities within the same trench. Joint use utility trenches are common practice currently being used in underground conversion projects in South Florida. The joint trench installation is a more efficient use of the right-of-way width and will reduce manpower costs and the overall construction duration. The result of the joint trench is an overall cost savings to the project system installation. The trenching and conduit installation will be performed by the Village to control the schedule and costs, and to minimize the duration and number of construction activities in an area. The placing, pulling and final connection of services will be performed by the respective utility owner. The assumed method of installation is open trenching. Directional bores will be used to cross Crandon Boulevard and in areas where open excavation is impractical. For this purpose it is assumed the utilities will require conduit rather than direct buried cable; conduit is preferred for maintenance purposes and will allow for future upgrades to the systems. During the design phase the Village should consider the installation of additional conduits that could be used in the future and eliminate the need for future excavations. The joint use utility trench will be constructed with the appropriate clearances to existing underground facilities (for example, water, sewer and drainage). If appropriate clearances are not available the project may require the relocation of those conflicting facilities. The joint utility trench is assumed to fall within the roadway swales to limit pavement restoration, expedite installation and reduce traffic impacts.

In addition to the joint use trench, the underground conversion project will include the installation of a number of above ground facilities. Photos and details of the typical above ground facilities can be found in the appendix. FPL will require approximately 50 switch cabinets, 200 pad mounted transformers and additional fuse cabinets and capacitor banks. AT&T and Comcast will require approximately 250 pedestals and additional termination cabinets. The actual quantities of facilities listed above will be determined during final design.

Easements will be required if public right-of-way is not available. The size of required easements may vary depending on the equipment and the availability of right-of-way and roadway clear zone requirements. A typical FPL switch cabinet will require a 20' x 20' easement. Each FPL transformer, fuse cabinet and capacitor bank will require a 10' x 10' easement. **Feeder** and **primary** splice boxes are typically located within available right-of-

way, however, if right-of-way is not available the splice box will require additional easements. Each **feeder** splice box will require a 7' x 10' easement. FPL has limitations on landscaping in front of the access panel of all above ground equipment. The proposed underground conversion project criteria should include a plan to mitigate adverse impacts to the existing landscaping and other improvements within the right-of-way or easements on private property.

The conversion will be an underground loop system which will increase reliability by creating multiple supply routes to more than one transformer. This would allow only a portion of the loop to be out of service in the event an outage, thereby reducing the extent of the outage and the restoration time.

The existing overhead roadway **street lighting** is owned by FPL and consists of typical open bottom style lighting on existing FPL poles. Since the FPL poles will be removed with the underground conversion, the Village may consider a relighting program, which will include the installation of new roadway lighting to replace the existing FPL **street lights** to be removed. The Village will have the option of using Village owned lighting (customer owned), or FPL installed lighting. The relighting is not considered in this report. Various areas within the Village are currently planning the installation of additional customer owned **street lighting**. Current **street lighting** programs should be delayed pending resolution of the undergrounding conversion. Any existing customer owned **street lights** in place at the time of the undergrounding will have to be removed or refed from the new underground service.

The potential benefits of design-build delivery were considered. In general the nature of the proposed work/design does not lead itself to design-build delivery. Each utility owner will require a direct agreement with the owner (the Village of Key Biscayne) and will not participate or contract with a design-build firm. In addition, each utility owner will set their design standards and require the connections and installations of proprietary equipment be self-performed, that is by their own crews. This is contrary to a typical design-build delivery, where the design-build firm will try to cut costs though the design and installation, neither of which is allowed by the utility.

4.0 BENEFITS OF UNDERGROUNDING

The benefits of the utility underground conversion are subjective and may be difficult to quantify. The benefits associated with utility underground conversion project include:

a. Improved utility reliability (a reduction in service outages)
b. Improved life, personal and property safety. Continuity of electric service will enhance the overall health and safety of the community, providing continued service

to critical facilities such as the sanitary sewer and storm water pump stations, traffic signals, schools, shelters, and other municipal and governmental buildings

c. Continuity of electric service will enhance the overall health and safety for individuals who require electrically powered home health equipment, and personal and property safety around the house or at work, obviously enhanced by lighting and electrically-powered equipment and facilities.
d. Improved aesthetics and community enhancement (including positive effects on quality of life)
e. Reduced risk associated with electrical hazards including downed power lines or tree trimming
f. Fewer vehicle impacts with poles
g. Promotes a more desirable community
h. Increased property values
i. Environmental benefits from an overall greater tree cover. Opportunities for rear yard landscaping not currently available with the existence of overhead facilities
j. Reduced vegetation management and costs associated with continued tree trimming
k. Eliminates extensive restoration efforts after catastrophic storm events.
l. Eliminates evacuation delays due to downed power lines across evacuation routes.
m. Eliminates preplanned outages of aerial facilities due to maintenance, new construction and installations that would otherwise require de-energizing the aerial facilities.
n. Eliminates the upcoming FPL hardening project which would add larger diameter rear-yard poles and further disrupt existing rear-yard settings

The following was taken from the Longboat Key Utility Underground Conversion Project Question and Answer website:

Q: What results have other Towns/Cities/Local governments reported relative to outages after the FPL facilities have been relocated underground.

A: The Town of Jupiter Island on the east coast of Florida reported that they had experienced no interruptions on the island since the underground conversion was completed December of 2009. They have power monitors located around the island due to pre-conversion outages and they closely monitor the new system.

The mayor of Jupiter Inlet Colony stated in a meeting with the Palm Beach Undergrounding Taskforce on Tuesday, July 7, 2015, that since the completion of their conversion in 2010, they have experienced one interruption that lasted less than a minute. Trees, animals, and salt contamination were the primary causes of outages and all have been eliminated.

The following was taken from a 2006 study by the Municipal Underground Utilities Consortium, a group of Florida Cities and Towns. Included in the study as a review of the benefits provided after completion of major underground conversion efforts on four barrier islands along the North Carolina coast. Brunswick Electric Membership Corporation (BEMS) provides power service to communities in North Carolina.

BEMC's underground conversion project was completed in 2004. Since then it has been exposed to many storms similar to those frequently encountered in Florida, and it sustained a direct hit from Tropical Strom Ernesto in 2006. In qualitative terms, BEMC senior management reported the following results:

- *Reduced number and duration of outages due to lightning, animals and other contacts*
- *Elimination of problems associated with salt spray, e.g. transformer and hardware corrosion and short circuiting due to salt accumulation*
- *Significant reduction in restoration time and costs,*
- *Elimination of nearly all right-of-way tree-trimming and clearing costs*
- *Elimination of all clearance and maintenance problems that had been associated with overhead rear lot line construction.*

Oak Island was predominantly an overhead electric system prior to the underground conversion project completed in 2004. Oak Island and the adjacent islands of Ocean Isle, Holden Beach and Sunset Beach have been hit by storms since the undergrounding project, and have all experienced reduced outages and restoration time. During Tropical Storm Ernest (2006), Oak Island experienced no outages due to its new underground facilities. BEMS experienced 4,000 outages, all on inland overhead portions of their system. BEMC reports "to this point we have not experienced any real negatives from the underground conversion philosophy. I think it is safe to say that we all agree it was the right direction to take."

5.0 POTENTIAL CHALLENGES AND LIABILITIES

The challenges associated with utility underground conversion project:

a. Requires a large initial capital expenditure and must address potential for resident's unwillingness to pay.
b. Construction duration and inconvenience to residents and businesses.
c. Physical constraints within the right-of-way and unforeseen conflicts during construction.
d. Easements may be required for the above ground equipment and residents aversion to those facilities on their property, potential litigation associated with easement acquisition.

e. Coordination with property owners for the conversion of their services, potential for damage claims and litigation related to service entrance conversions and restoration.
f. Removal of existing landscaping and improvements that conflict with the proposed underground conversion.
g. Requires new **street lighting** to replace the existing overhead FPL lighting. The new lights may be provided by FPL, or new customer owned **street lighting** may be provided. Existing customer owned lighting currently served from underground power will be either removed or refed from the new underground facility, at the discretion of the Village.

The liabilities associated with underground utility facilities installation and maintenance include:

a. Potential increase in repair time for service outages.
b. Repairs to underground facilities may require excavation within private property.
c. Services are now buried to the house.
d. Restrictions to landscaping and improvements around the improvements and within the provided easements. Transformers and switch cabinets are pad mounted above ground, and although FPL does allow some landscaping, access to these facilities cannot be infringed by landscaping or other improvements.
e. Ground mounted equipment is susceptible to severe storm surge and flooding.
f. Increased costs associated with subsequent installation or modification for future services and expansion, potential impact on competitive advantage.

The proposed underground conversion project should include a plan to mitigate adverse impacts to the existing landscaping and other residential improvements within the right-of-way or provided easement. This may include an approved "remove and restore" provision.

6.0 COORDINATION WITH CAPITAL IMPROVEMENTS

Where practicable the proposed underground conversion project will be coordinated with previously identified capital improvement projects, so as to eliminate the need to repair and restore areas that would otherwise be damaged by the undergrounding scope. Necessary projects that involve the public health and welfare should commence on schedule, regardless of the undergrounding scope or schedule. Projects that aren't deemed necessary to the public health and welfare may be delayed and/or coordinated with the underground conversion, at the discretion of the Village. The list of projects the Village may choose to delay, include those projects that do not involve underground construction, those projects that would normally commence after the underground work is completed. This would include sidewalks, pavers, resurfacing, bike lanes, crosswalks, **street lighting**,

traffic calming, landscape, streetscape, signage and pavement markings. Projects the Village may choose to coordinate with the underground conversion would include those projects with an underground component. This would include storm water, drainage, water and sewer. Water and sewer projects will be coordinated with Miami-Dade Water and Sewer Department. All the above listed projects can be accomplished concurrent with the utility conversion, but the addition of these projects are not mandatory, with the possible exception of sidewalk, resurfacing and **street lighting**. A recommendation is made to delay any sidewalk, resurfacing and **street light** improvements until after the underground conversion is completed. Areas currently planning **street light** improvements include Harbor Drive from Sunset to Mashta, Mashta Drive from harbor to Crandon, and Fernwod Road from Westwood to W. Heather.

A recommendation is made to study the existing drainage systems and coordinate the design and installation of resulting drainage improvements with the underground trench design and construction. The drainage work may be performed concurrent with the joint trench installation, either by the joint trench contractor, or in coordination with the joint trench contractor. Miami-Dade Water and Sewer Department should be contacted to address any potential coordination with planned or anticipated water and sewer work.

7.0 OPINION OF PROBABLE COSTS

One of the most challenging aspects of the project is the development of the cost estimate. Many of the project variables that will impact the ultimate project cost are difficult to quantify, including the individual property owner's cost to convert and connect to the underground system. The service entrance connections and costs are specific to that individual property. The costs associated with the acquisition of suitable easements, and the costs to mitigate the other existing utility facilities (water, sewer and drainage) are likewise difficult to quantify.

Florida Power and Light currently offers a 25% discount for a qualifying underground conversion project. The current understanding is that the Village of Key Biscayne meets all the criteria for this discount. Refer to FPL's General Rules and Regulations for Electric Service, Section 12, for the Installation of Underground Electric Distribution Facilities for the Conversion of Overhead Facilities (www.fpl.com/rates/pdf/electric-tariff-section6.pdf). This document requires an Underground Facilities Conversion Agreement and sets certain deadlines for the process and payments.

Time is of the essence and the Village should facilitate further discussions, working to expedite the decision making process in light of the upcoming hardening project, anticipated 2018. If the hardening

project advances prior to the undergrounding conversion, the Village's costs for the underground conversion will be significantly increased due to the higher net book value of new, undepreciated facilities to be removed.

There are a number of issues that could significantly impact the forecasting of costs. The majority of those issues cannot be duly explored without beginning the detailed design. Therefore, the opinion of probable costs is provided with the following assumptions:

a. The costs are founded on a high-level analysis and does not include any in-depth system design considerations.
b. The aerial to underground conversion is limited to the primary service providers for electric power and communications (for example, FPL, AT&T and Comcast).
c. The replacement of the current systems, any incremental costs associated with improvements in system characteristics (for example replacing copper wire with fiber optic cable) would be the responsibility of the utility owner and are not included.
d. The underground facilities will be installed in a joint use utility trench within unpaved areas of public rights-of-way. The joint utility trench is assumed to fall within the roadway swales to avoid pavement restoration, expedite installation and reduce traffic impacts.
e. The Village will be responsible for the construction of the trench and installation of the conduit.
f. Private easements will be obtained when suitable right-of-way is not available (may be necessary for the placement of the above ground facilities). The acquisition of the required easements and all associated costs will be borne by the Village, not the utility owners.
g. The legal fees and costs associated with the project and the acquisition of suitable easements has been estimated, the final costs will depend on the willingness of the property owners.
h. Trenching and conduit installation will be performed by the Village. Placing, pulling and connecting of services will be performed by the respective utility owner
i. A conceptual design and corridor plan has not been developed, therefor the number of potential conflicts with other existing facilities and landscape, constructability and access factors, impacts to the public and business during construction and the location of the new utility features cannot be addressed.
j. The conversion cost includes the removal of the existing aerial facilities, poles transformers, etc.
k. Specific conversion costs associated with the property service entrance connections will vary according to the specific conditions encountered at each location. For this estimate an average connection cost is used

l. The costs associated with relighting of streets currently feed by aerial service is not included
m. Costs include the "low-profile" Vista type switch cabinets.

The preliminary opinion of probable cost total is $29,691,750, including the costs for service entrance conversions. Utilizing different methodology and metrics, there is a range between $20,000,000 and $40,000,000.

8.0 PROJECT SCHEDULE

This project is anticipated to be designed and contracted as one project. The project design schedule will be largely based on the utility owners. The utility owners will propose the preliminary location of the above ground facilities. Final locations will be determined based on a review of available right-of-way and/or suitable easements. The Village will bid, award and control the installation of the facility infrastructure conduit. The utility owners will be responsible for the placement and pulling of the wire, as well as the ultimate service entrance connections. The production of the joint utility trench is dependent on soil conditions, the number of street and driveway crossings, and the associated dewatering efforts. The underground work will continue through the length of the contract. For this purpose we are assuming multiple construction and utility work crews. Phases will be energized as dictated by FPL's design. Once the underground facilities are complete, the service connections must be appropriately coordinated with the property owner. The time frame for this process will be based on the availability of the individual property owners. Once all services are connected, the utility owners will remobilize and remove their existing aerial facilities. The following time frames are estimated (refer to Appendix B for a more detailed analysis):

a. Funding consultant, study, discussion and approval: 4 months.
b. Survey, design and easement acquisition: 24 months (2 years).
c. Construction, joint trench, utility installations, service connections and restoration: 50 months (4 years and 2 months).

9.0 FUNDING SOURCES

A search was conducted of similar underground conversion projects and previously prepared studies. The following funding sources were identified within the discovered documents. This is not a legal opinion, some options may not be available to the Village of Key Biscayne. In general, costs could be (a) paid by those consumers who are directly affected by the conversion project, those that live within the project boundaries, (b) subsidized by a wider group of consumers, those that use the services or purchase goods

within the Village, or (c) some combination of the two. This can be accomplished in several ways:

a. An increase in general funds through an increase in taxes and user fees, such as sales tax, meals tax, room tax, property taxes etc.
b. Creation of a Special Assessment District to assess property owners within the subject area. The amount of the assessment can vary depending on amortization rates, methodologies used, and the opportunity provided for property owners to prepay, thereby reducing future payments.
c. General Obligation Bond funds to pay for projects for the public good. Bond amounts will vary depending on the rates and number of years. Bonds are secured by and paid from special assessments collected from the affected properties and therefore must be in place prior to the issuance of any debt.
d. Self-funding from current and future accounts dedicated to the underground conversion

In summary, the cost should be funded by the public receiving the benefits, either within the local tax structure or by a surcharge on the customer's utility bills. Ratepayers receive the benefit of reliability, taxpayers receive the benefit of aesthetics, and both parties share the public safety benefit.

Due to the size of the project and the complexity of securing public purpose funding, the Village should be prepared to spend considerable time and effort evaluating the funding sources available. This will include hiring legal and financial consultants (such as bond counsel) specialized in this area to study, to evaluate and present those options to the Village.

10.0 ALTERNATIVES TO UNDERGROUNDING

There are several alternates to the complete underground conversion and are provided here in no particular order:

a. Work with FPL on their upcoming hardening project. In addition to upgrading the wind loading requirements (which should reduce outages due to adverse weather and wind), initiate reliability-focused aerial design standards (for example, animal guards, lightning arrestors and avian framing shields).
b. Require a more aggressive tree trimming and vegetation management program.
c. Limit the underground conversion to the main **feeders.** The **feeders** along Fernwood Road and Crandon Boulevard border the public use and recreational areas and are highly visible. This feeder may be targeted first, with other feeders following.

d. Identify and focus mitigation efforts toward the aerial facilities that repeatedly experience the most significant problems. Base this on the number and duration of outages, as well as the number of out-of-service customer hours.
e. Target the underground conversion to priority areas that directly affect public health and safety, such as the sanitary sewer and storm water pump stations, traffic signals, schools, shelters, and other municipal and governmental buildings.
f. Do nothing and continue the current practice.

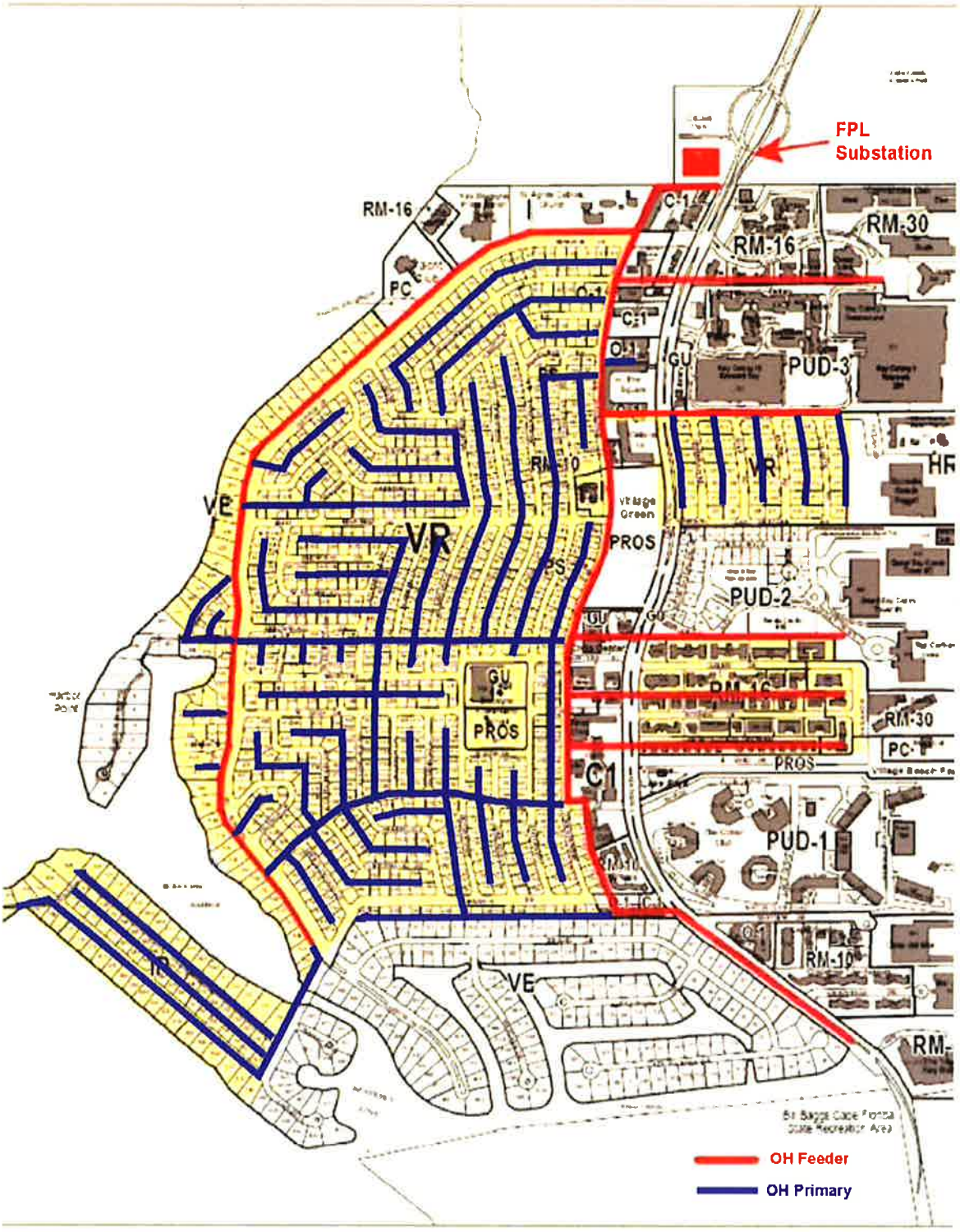
LIST OF APPENDICES

APPENDIX A

Aerial Location Map

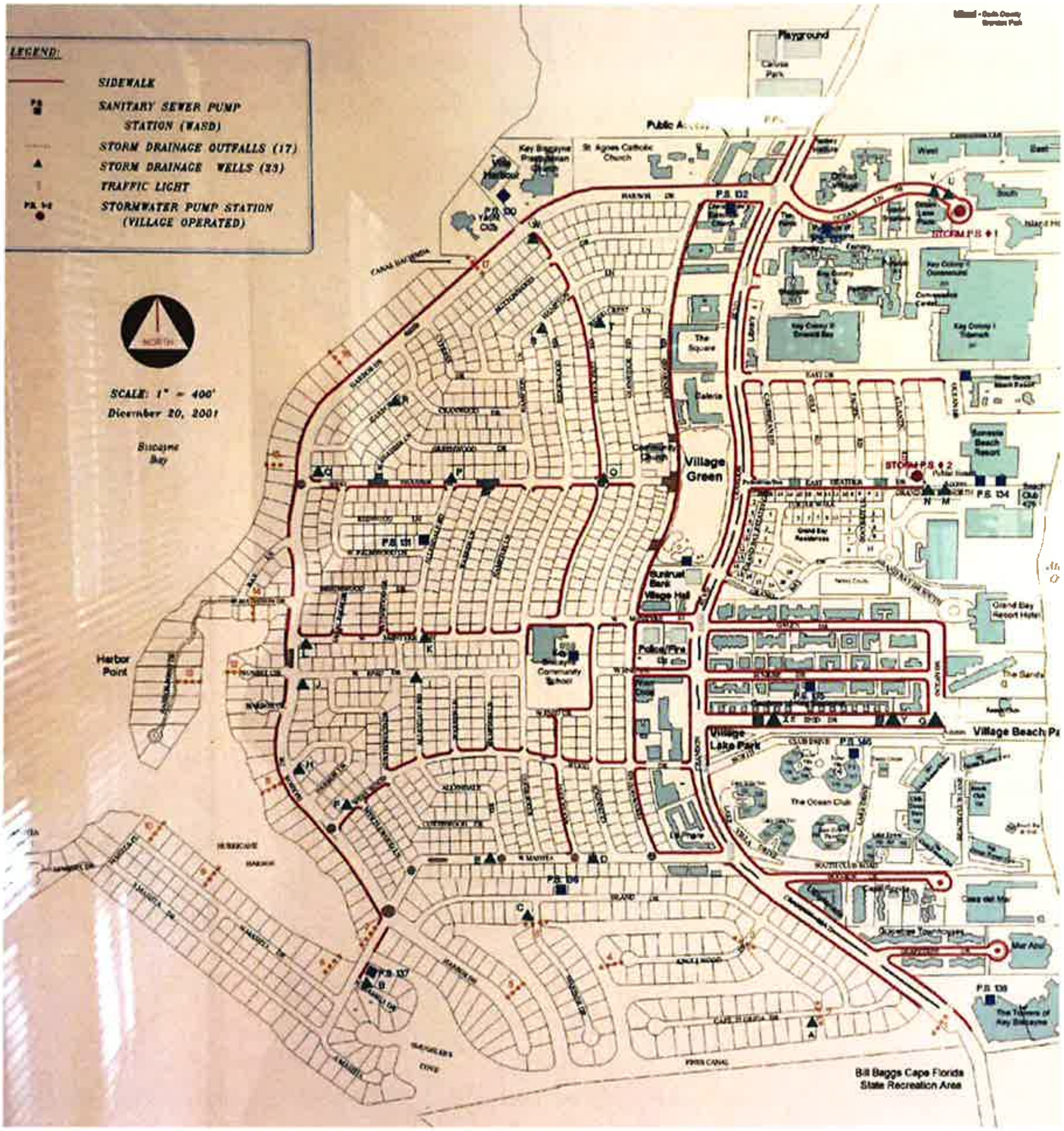
APPENDIX B

FPL Overhead Facilities Map


FPL
Substation
RM-16
RM-30
PC
C-1
PUD-3
GU
VE
VR
PROS
PUD-2
PUD-1
RM-10
OH Feeder
OH Primary

APPENDIX C

EXISTING INFRASTRUCTURE MAP


LEGEND:
SIDEWALK
SANITARY SEWER PUMP STATION (WASD)
STORM DRAINAGE OUTFALLS (17)
STORM DRAINAGE WELLS (23)
TRAFFIC LIGHT
STORMWATER PUMP STATION (VILLAGE OPERATED)
SCALE: 1" = 400'
December 20, 2001
Biscayne Bay
Harbor Point
Playground
St. Agnes Catholic Church
STORM P.S. # 1
STORM P.S. # 2
Village Green
Village Hall
Police/Fire
Village Lake Park
The Ocean Club
Village Beach Pa
Grand Bay Resort Hotel
Casa del Mar
Mar Azul
P.S. 134
P.S. 136
P.S. 137
P.S. 138
The Towers of Key Biscayne
Bill Baggs Cape Florida State Recreation Area

APPENDIX D

Project Schedule

VILLAGE OF KEY BISCAYNE UNDERGROUND UTILITIES FEASIBILITY STUDY
INITIAL ESTIMATED PROJECT SCHEDULE

Task Name	Duration	2016			2017						2018						2019						2020						2021						2022					
		J	S	N	J	M	M	J	S	N	J	M	M	J	S	N	J	M	M	J	S	N	J	M	M	J	S	N	J	M	M	J	S	N	J	M	M	J	S	N
Funding Decision	4 months																																							
Request for Proposal and Notice to Proceed	2 months																																							
Survey & Data Collection	6 months																																							
Design & Permitting	12 months																																							
Easement Acquisition	8 months																																							
Bidding and Contract Negotiation	4 months																																							
Construction (Conduit - Joint Trench)	36 months																																							
Construction (Cables - All Utility Owners)	36 months																																							
Service Connections, Removal & Restoration	12 months																																							
Project Completion & Closeout	4 months																																							
Total	74 months																																							

Assumptions

1. **Easement Acquisition, if required, will be conducted by the Village**
2. **Assumes no construction moratoriums exist**
3. **Assume multiple crews working simultaneously throughout the Village**

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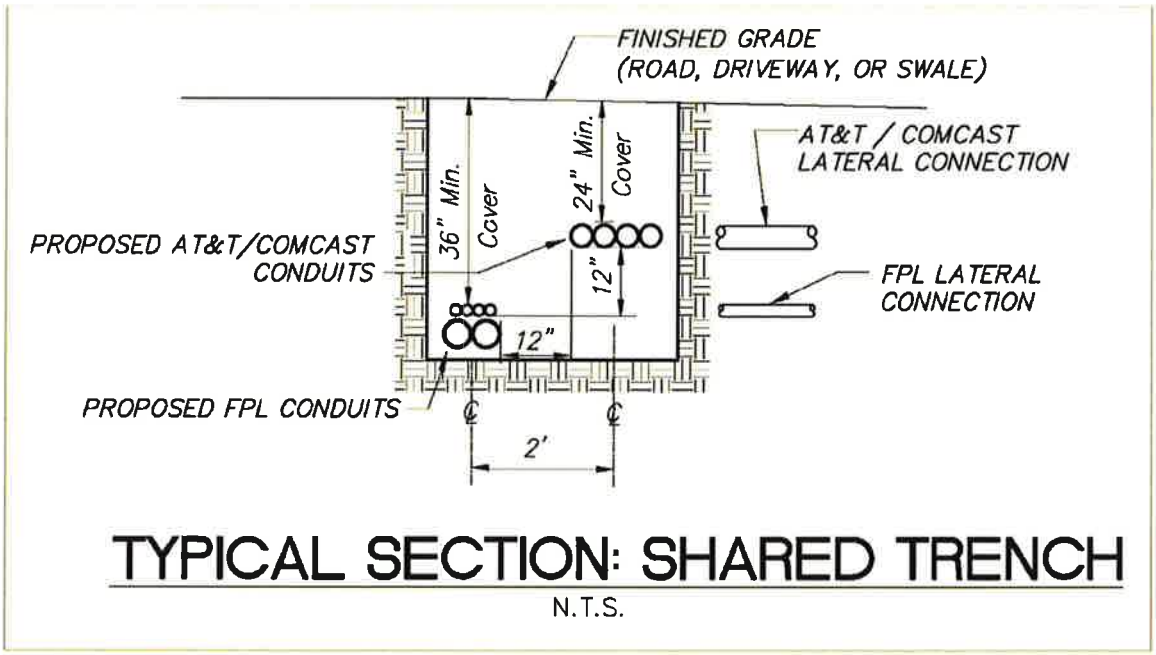
APPENDIX E

Opinion of Probable Costs Worksheet

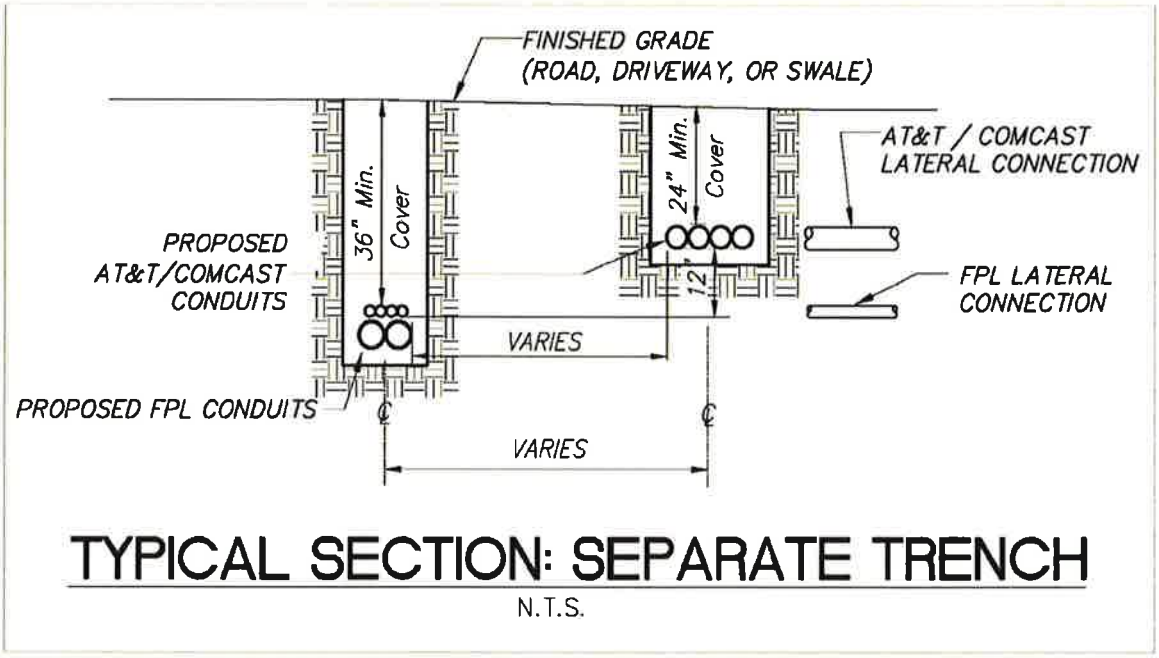
VILLAGE OF KEY BISCAYNE UTILITY UNDERGROUND CONVERSION OPINION OF PROBABLE COSTS				
ASSUMPTIONS				
24,000 LF Feeder				
52,000 LF Primary				
1,143 Units				
HARD COSTS				
MAIN FEEDER	**QTY**	**UNIT**	**COST**	**TOTAL COST**
Fernwood Road	8,000	LF	265	$ 2,120,000
Harbor Drive	7,400	LF	265	$ 1,961,000
Galen Dr / Sunrise Dr / Enid Dr	6,400	LF	265	$ 1,696,000
Key Colony	2,200	LF	265	$ 583,000
Sub Total Main Feeder	24,000	LF		$ 6,360,000
UTILITIES (FPL, ATT, Comcast, etc)	**QTY**	**UNIT**	**COST**	**TOTAL COST**
Residential North (north of Heather)	16,200	LF	190	$ 3,078,000
Residential Central (Heather to McIntyre)	12,300	LF	190	$ 2,337,000
Residential South (McIntyre to Mashta)	17,900	LF	190	$ 3,401,000
Residential Mashta Island	3,300	LF	190	$ 627,000
Residential Holiday Colony	2,300	LF	190	$ 437,000
Sub Total Utilities	52,000			$ 9,880,000
EQUIPMENT	**QTY**	**UNIT**	**COST**	**TOTAL COST**
FPL Transformers	200	EA	2,000	$ 400,000
FPL Switch Cabinets	50	EA	75,000	$ 3,750,000
Misc (Junction Boxes, manholes, etc.)	1	LS	500,000	$ 500,000
Service Entrance (Average)	1,143	EA	2,250	$ 2,571,750
Sub Total Equipment				$ 7,221,750
		SUBTOTAL HARD COSTS		$ 23,461,750
OTHER				
Contingency (10%)	1	LS	2,347,000	$ 2,347,000
			TOTAL HARD COSTS	$ 25,808,750
SOFT COSTS				
DESCRIPTION	**QTY**	**UNIT**	**COST**	**TOTAL COST**
Engineering & Permitting (7%)	1	LS	1,807,000	$ 1,807,000
Program Management	1	LS	1,776,000	$ 1,776,000
Legal Fees (Easement Acq., Contracts, etc)	1	LS	300,000	$ 300,000
			TOTAL SOFT COSTS	$ 3,883,000
			TOTAL ESTIMATED PROJECT COSTS	**$ 29,691,750**

APPENDIX F

Joint Use Trench Details



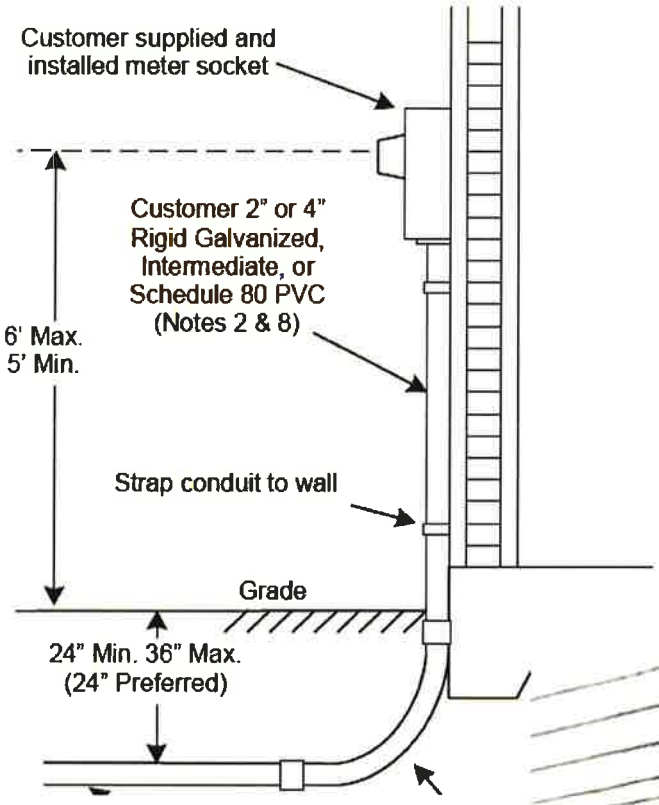
RECOMMENDED TRENCH SECTION



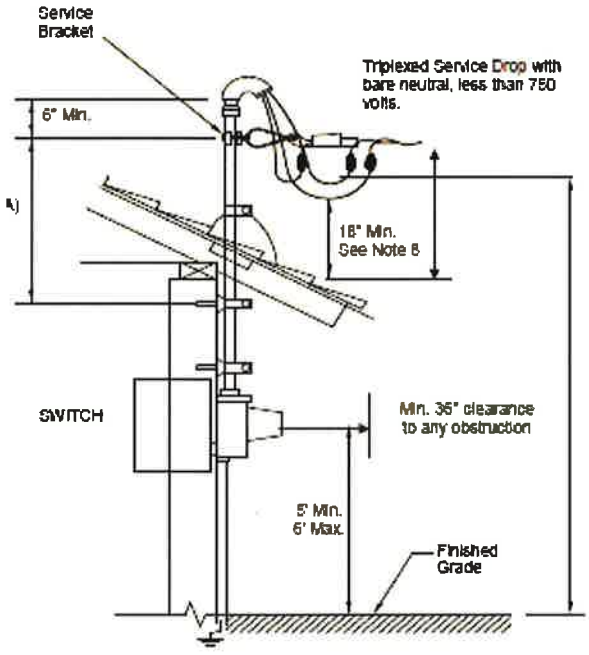
ALTERNATIVE TRENCH SECTION

APPENDIX G

Power Service Conversion



PROPOSED UNDERGROUND SERVICE

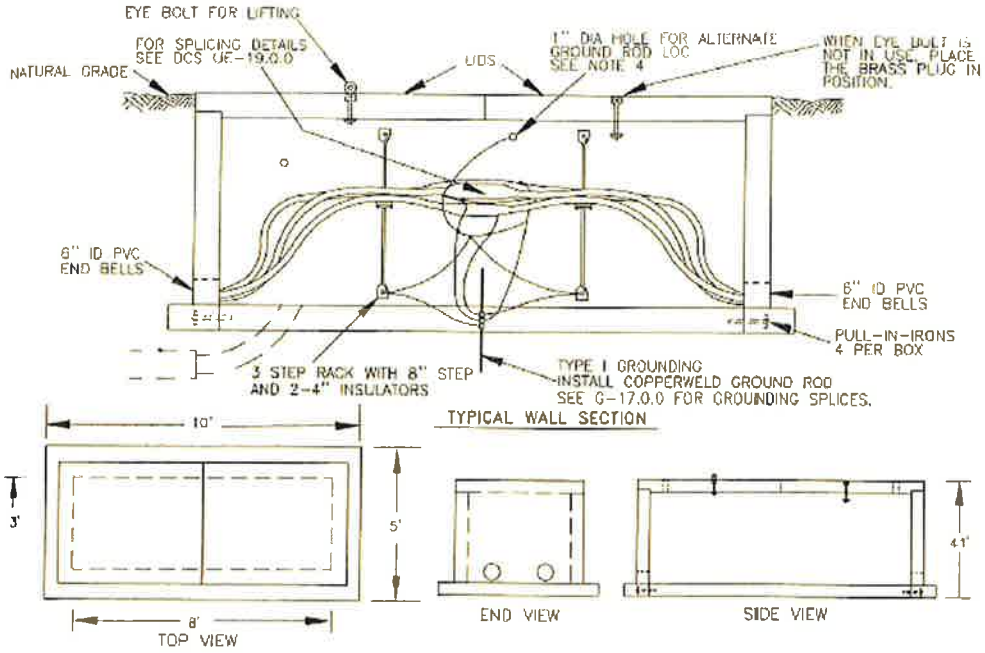


EXISTING OVERHEAD SERVICE

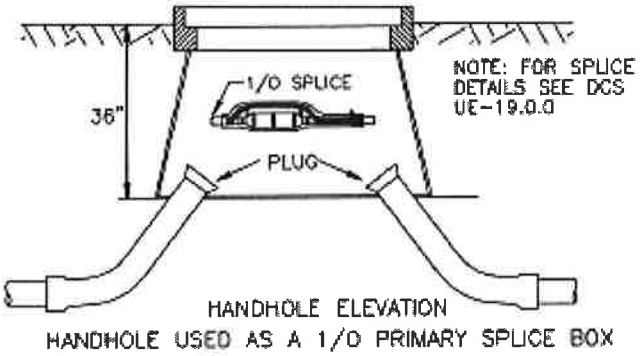
(TO BE REMOVED)

APPENDIX H

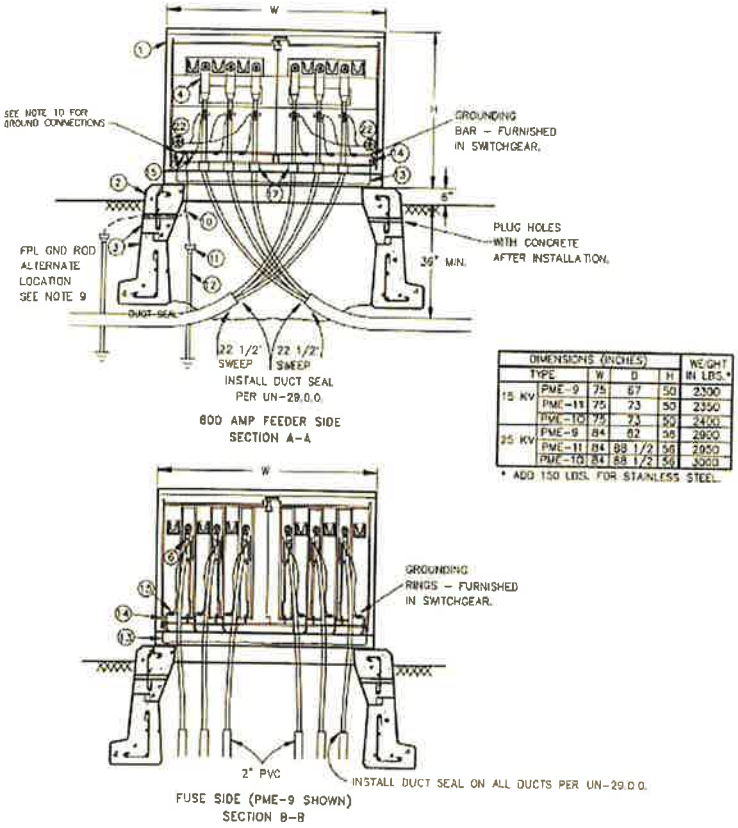
Power Details



FEEDER SPLICE BOX



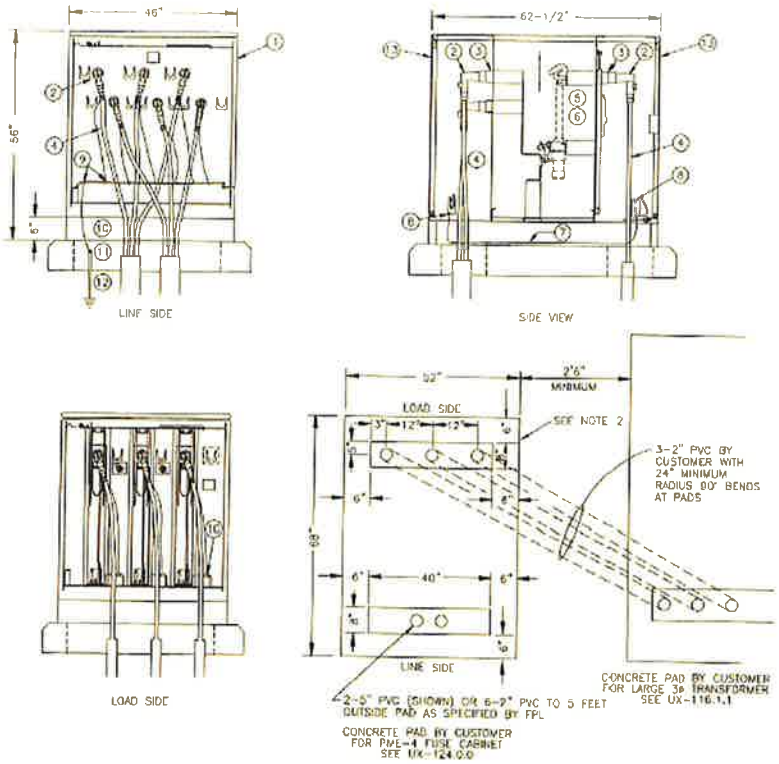
PRIMARY SPLICE BOX



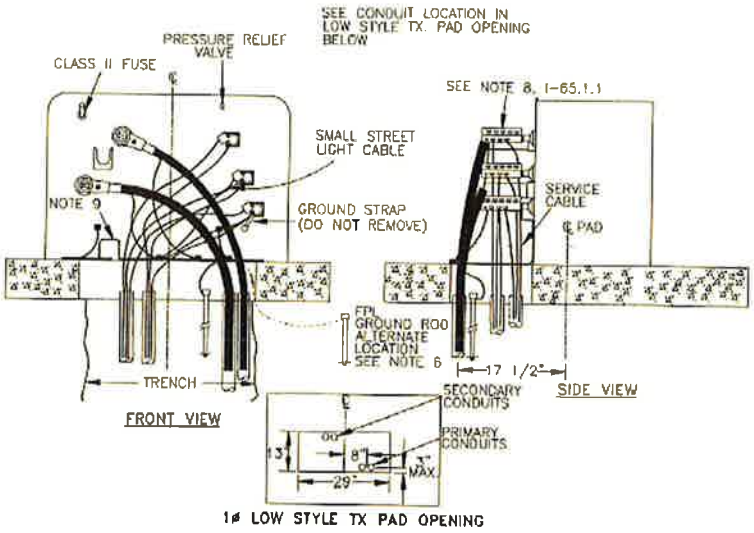
DIMENSIONS (INCHES)					WEIGHT IN LBS.*
	TYPE	W	D	H	
15 KV	PME-9	75	67	50	2300
	PME-11	75	73	50	2350
	PME-10	75	73	50	2400
25 KV	PME-9	84	82	58	2900
	PME-11	84	88 1/2	58	2950
	PME-10	84	88 1/2	58	3000

* ADD 150 LBS. FOR STAINLESS STEEL.

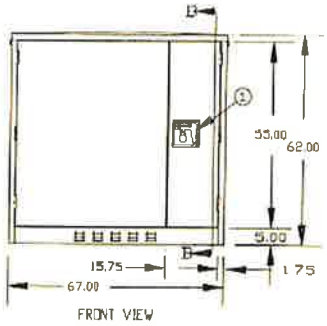
PAD MOUNTED SWITCH CABINET

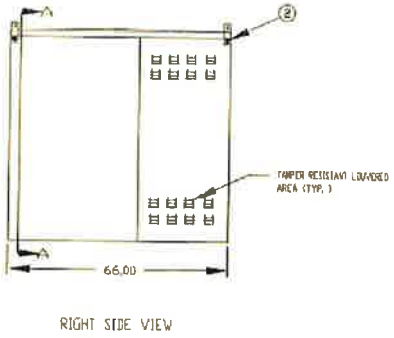


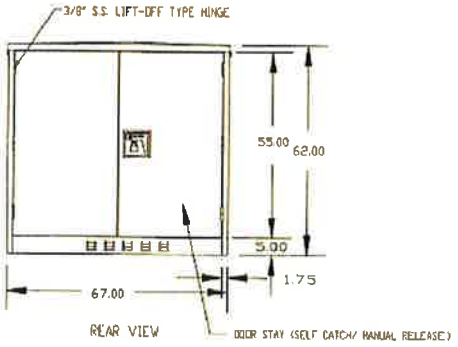
PRIMARY FUSE CABINET



SINGLE PHASE TRANSFORMER







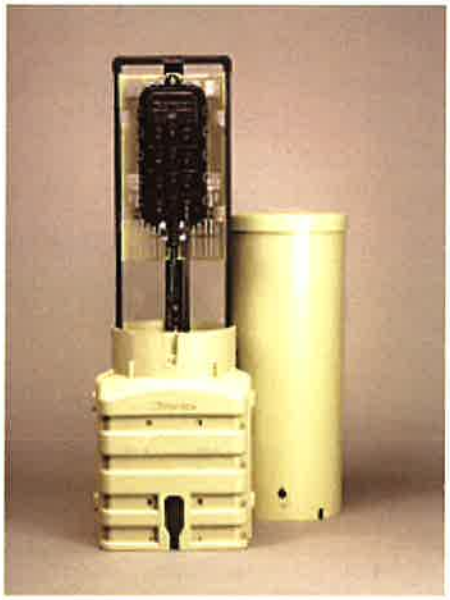
CAPACITOR BANK

APPENDIX I

Communication Details

AT&T FIBER OPTIC DISTRIBUTION CABINET

AT&T CABINET IN CONSTRAINED RIGHT OF WAY



AT&T ABOVE-GROUND FIBER SERVING TERMINAL

17 x 30 in. handhole with swingarm placed

MultiPort installed with swingarm in down position

MultiPort installed with swingarm in up position

AT&T BELOW-GROUND SERVING TERMINALS

APPENDIX J

Existing Street Lighting

FPL OPEN BOTTOM STREET LIGHT

CUSTOMER OWNED DECORATIVE STREET LIGHT

APPENDIX K

Glossary

GLOSSARY

Power

Feeder Cables – Carry high voltage from the substation to primary lateral cables.

Primary Lateral Cables – Carry medium voltage to distribution transformers.

Secondary Cables – Carry low voltage service form the transformer to the service cable.

Service Cables – Carry low voltage service form either a secondary cable or directly form a transformer to the meter.

Transformer – A device used to lower the voltage to the utilization voltage of household appliances and typically feed several customers through secondary distribution lines at this voltage.

Switch Cabinet – Electrical device for making, breaking or changing the connections in a circuit.

Capacitor Bank – Used to increase stored power and improve current capacity.

Fuse Cabinet – Used to fuse multiple underground primary cables.

Feeder Splice Box – A 5'x10' non-traffic bearing concrete box used to splice underground feeder cables together. This box is generally buried at a depth of 36" to 42" with the top of the box flush at final grade.

Primary Splice Box – A 2'x4' non-traffic bearing polymer box used to splice underground primary cables together. This box is generally buried at a depth of 36" to 42" with the top of the box flush at final grade.

Pull Box – A 12"x 13" non-traffic bearing polymer box used to connect secondary cable to service cable for both residential and commercial customers. This box is generally buried at a depth of 24" with the top of the box flush at final grade.

Communication

Fiber Optic Distribution Cabinets – Surface mounted cabinets replace the existing aerial facilities. These cabinets may be placed within the right of way or in a utility easement if available, depending on available clearances. Cabinets may vary in size from 36"x21"x14" to 49"x48"x20".

Fiber Serving Terminals – May be placed above-ground or below-ground. Generally this equipment serves 6-8 residences. This component can be placed in the right of way or in a utility easement if available, depending on available clearances. The below ground vault is non-traffic bearing.