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TO: Borough of Stone Harbor

FROM: Atlantic City Electric Underground Transmission Department

DATE: October 21, 2016

Please find attached the report analyzing options to replace the existing overhead 69kV feeder with a new underground 69kV feeder within the Stone Harbor jurisdiction.

The enclosed report outlines two (2) options which were analyzed using a route matrix. The matrix ranks each potential option based on the impact to properties, existing utilities, traffic, environment, public transportation facilities, and engineering considerations. The preferred option outlined within the report provides a route that presents the least impact to residential areas and outlines a three (3) year construction window to complete the work.

This task was also sent out to three (3) civil and two (2) electrical consultants, to provide proposals to complete the design and construction support for this task.

The scope of the estimates does not include: the design, engineering and construction costs associated with the replacement of the 12kV distribution lines and equipment currently mounted on the overhead 69kV feeder; the costs associated with the removal of the overhead 69kV feeder; the costs to design and construct riser pole(s) to transition the 69kV line from overhead to underground.

We want to emphasize that the attached report represents a preliminary, high level estimate. Further refinement, requiring additional engineering studies would be necessary if the Borough chooses to proceed with this project. The Borough will be responsible for the actual cost of design and construction of the project.

This report is broken down into the following components:

- Section 1 – Executive Summary and Evaluation Criteria/Sources
- Section 2 – Route 1
- Section 3 – Route 2
- Section 4 – Route Summary
- Section 5 – RFP Results
- Appendix
    - Conceptual 69kV Underground Transmission Route 1 and 2 Exhibit
    - Conceptual 69kV Underground Transmission Route 1 Exhibits
    - Conceptual 69kV Underground Transmission Route 2 Exhibits
    - Route Matrix Results

SECTION 1 - EXECUTIVE SUMMARY AND EVALUATION CRITERIA/SOURCES

Atlantic City Electric (ACE) has been tasked by the Borough of Stone Harbor to provide a study to replace the existing overhead 69kV feeder within the Borough of Stone Harbor with a new underground 69kV concrete-encased duct bank. More specifically, the route is within the public road Right-of-Way from 95th Street within the Stone Harbor jurisdiction to the intersection of 80th Street and Ocean Drive within the Borough of Avalon jurisdiction. The feeder will travel approximately 1.0 mile connecting the existing underground transmission line on 95th Street (from the end of the existing underground duct bank approximately 200 feet east of the intersection of Third Avenue and 95th Street) to an existing transmission pole located in Avalon (located approximately 40 feet north of the intersection of 80th Street and Ocean Drive).

ROUTE EVALUATION METHODOLOGY

Route evaluation and recommendation is premised on a holistic look at property rights, impacts to the community, and engineering considerations. Below is a list of categories used during the evaluation process:

- Property impacts
    - Residential Impact
    - Public Facilities
        - Schools, Churches, Hospitals, Hotels, Police and Fire Stations, Playgrounds, Museums, Parks, Athletic Facilities etc.
    - Sensitive Resources
        - Day Cares, Funeral Homes, Municipal Buildings, etc.
    - Historic Facilities
- Existing Utilities
    - Number of utilities within Right-of-Way
    - Relocations required
    - Number of heat sources
- Traffic impact
    - Traffic volumes within selected routes
    - Alternate traffic routes during construction
    - Density of businesses relying on on-street parking
    - Parking Facilities
    - Other construction activities
- Environmental
    - Soil type
    - Known soil contaminations
    - Crossing of water bodies
    - Street Tree impacts
- Engineering
    - Route Length
    - Type of construction, i.e. open cut, or trenchless methods (Horizontal Directional Drill, Jack & Bore, or tunneling)
    - Proximity to tidal waters
    - Dewatering

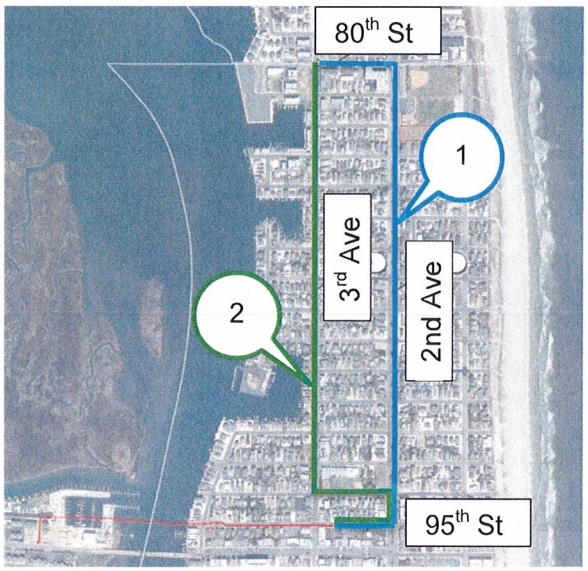
- Permitting
- Public Transportation Facilities
  - Bus and Trolley stops

DATA SOURCES

- Given the accelerated time constraints of this route evaluation, the majority of information has been collected from survey work along 95th Street, and visual inspections of utilities along Second and Third Avenues.
- Data was obtained from the following:
  - Survey & As-built information along 95th Street Stone Harbor
  - Visual Inspection of utilities along Second Avenue, Third Avenue, and 80th Street
  - Aerial Imagery
  - Dewatering analysis completed during civil portion of the 95th Street transmission line installation
  - Construction processes observed during civil portion of the 95th Street transmission line installation
  - Geotechnical data acquired during civil portion of the 95th Street transmission line installation

ROUTE SELECTION

STONE HARBOR TO AVALON



SECTION 2 – ROUTE 1

Route 1 Matrix Score – 14 (Preferred Route)

Geometry

From the end of the existing underground transmission line on 95th Street opposite the Municipal parking lot (approximately 200 feet east of the intersection of Third Avenue and 95th Street), the route will travel East on 95th Street to Second Avenue, then North along Second Avenue to 80th Street, then West on 80th Street where it will terminate at the first existing transmission pole on Ocean Drive in Avalon (located approximately 40 feet north of the intersection of 80th Street and Ocean Drive).

Route 1 Approximate Length: 5,460 Feet

An average trench depth of approximately 6 feet +/- is expected along the majority of the route, with a maximum depth of 8 feet +/- anticipated at congested intersections.

Existing Constraints

This route passes by several commercial businesses along 95th Street and the first block of Second Avenue before traveling north through a primarily residential zone. The route passes one (1) athletic complex located on Second Avenue consisting of tennis and basketball courts, baseball and multi-purpose turf fields and then goes through a mixed residential-commercial area on 80th Street.

There are no railroad crossings, water body crossings or bridges along this route. All construction is proposed within the public Right-of-Way of each street.

The duct bank (feeder) along this route has been sited on the northbound lane(s) (ocean side) of Second Avenue (which is a divided roadway) to avoid conflict with existing linear utilities running along the southbound lane(s) of Second Avenue (farther side of the street from the ocean) with the proposed duct bank. See Conceptual 69kV Underground Transmission Route 1 Exhibit – Section B for more details.

Based on available Right-of-Way information and utility records, this alignment provides adequate room to construct an underground duct bank without compromising spacing between other utilities, or requiring significant utility relocation. A more detailed subsurface investigation (typically completed during an underground transmission project design) will be conducted and will provide more specific detail regarding surrounding utilities and potential subsurface impacts.

During the first segment of this route, primarily along 95th Street and the first block of Second Avenue, the alignment goes through a commercial district where businesses utilize the on-street parking during business hours. On-street parking also exists along 80th Street. Some of these spaces may be affected as a bi-product of this work. As a part of this task, a full traffic control plan will be provided to safely and efficiently move traffic through the proposed construction area of disturbance.

Dewatering

Dewatering projection for this route was based on existing data obtained during a dewatering test as well as data collected during excavation and dewatering on 95th Street. Dewatering permits for this proposed work will be coordinated directly with NJDEP.

Traffic Control

Based on the route analysis and matrix, this route can be installed using temporary lane closures as the primary means of traffic control.

Open trenches would be covered with steel plates to facilitate vehicular access through intersections, as well as full-time access for emergency vehicles.

On-street parking spaces and a designated bicycle lane would be utilized for vehicle movement. As discussed within the Existing Constraints section, a full traffic control plan will be provided outlining the impacts to the immediate area of construction and any impacts to traffic arteries adjacent to the site.

Approximate Construction Duration: * 3 years

Year 1 – Civil work
Year 2 – Civil, electrical work
Year 3 – Removal of existing transmission poles

*The actual working duration is approximately 16-18 months but due to the timing constraints of tourist season, work will need to be split across three (3) years.


ROUTE 1
2ND AVE
OCEAN DRIVE
95TH ST
ROUTE 1 SUMMARY
TOTAL LENGTH NEW UNDERGROUND ±5,460 LF
TOTAL NUMBER OF NEW MANHOLES 3
(5) 80' STREET POLES
(1) 85' SECOND AVE POLES
(8) 95' STREET POLES

SECTION 3 – Route 2

Route 2 Matrix Score - 17

Geometry

From the end of the existing underground transmission line on 95th Street opposite the Municipal parking lot (approximately 200 feet east of the intersection of Third Avenue and 95th Street), the route will travel East on 95th Street to Second Avenue, then North along Second Avenue to 94th Street, then West on 94th Street to Third Avenue, then North on Third Avenue where it will terminate at the first existing transmission pole on Ocean Drive in Avalon (located approximately 40 feet north of the intersection of 80th Street and Ocean Drive).

Route 2 Approximate Length: 5,535 Feet

An average trench depth of approximately 6 feet +/- is expected along the majority of the route, with a maximum depth of 8 feet +/- anticipated at congested intersections.

Existing Constraints

This route passes several commercial businesses along 95th Street and the first block of Second Avenue, and an elementary school and a museum on 94th Street. While we do not anticipate that these factors affect constructability, there could be additional permits and permissions required for construction.

There are no railroad crossings, water body crossings or bridges along this route, however this route passes three marinas; Snug Harbor, South Basin and Smugglers Cove. All construction is proposed within the public right-of-way of each street.

The duct bank (feeder) along this route has been sited to avoid major conflict with existing linear utilities running parallel with the proposed duct bank.

Based on available Right-of-Way information and utility records, this alignment provides adequate room to construct an underground duct bank without compromising spacing between other utilities, or requiring significant utility relocation. Given the reduced corridor (in relation to Option 1), there may be some potential for some utility relocation. A more detailed subsurface investigation (typically completed during an underground transmission project design) will be conducted and will provide more specific detail regarding surrounding utilities and potential subsurface impacts.

During the first segment of this route, primarily along 95th Street and the first block of Second Avenue, the alignment goes through a commercial district where businesses utilize the on-street parking during business hours. Along 94th Street and a portion of Third Avenue on the block containing the elementary school, school bus parking zones in the mornings and afternoons cannot be disrupted.

Dewatering

Dewatering projection for this route was based on existing data obtained during a dewatering test as well as data collected during excavation and dewatering on 95th Street. The dewatering for this route projects to exceed that of Route 1, as it is closer in proximity to the water. Dewatering permits for this proposed work will be coordinated directly with NJDEP.


ROUTE 2
3RD AVE
OCEAN DRIVE
95TH ST
ROUTE 2
ROUTE 2 SUMMARY
TOTAL LENGTH NEW UNDERGROUND ±5,535 LF
TOTAL NUMBER OF NEW MANHOLES 3
(5) 80' STREET POLES
(1) SECONDARY POLES
(6) 95' STREET POLES

SECTION 4 - Route Summary

After analyzing two (2) routes to allow ACE to advance the underground transmission up to the Stone Harbor Borough line, the following factors played a significant role in the rating process:

- Lower impacts to adjacent properties
- Less dewatering
- Shorter length of underground transmission
- Less disruption to existing underground utilities
- Less disruptive traffic control measures.

Alternative Description	Overall Length	Cost (Normalized)	ROUTE SCORE
	Feet		
Option 1	5,460	1.00	
			14 Score
			14 Weighted Score
Option 2	5,535	1.02	
			17 Score
			17 Weighted Score

*See appendix for a more detailed breakdown of the matrix results

Preferred Route Selection

Based on the route matrix, Route 1 has been deemed as the preferred route because it is the most direct route to the existing transmission pole located on Ocean Drive. This route has the fewest property impacts, the least amount of utility obstructions, and lower dewatering volumes will accelerate construction operations. The full matrix utilized for this study is included within the Appendix. Route 1 utilizes Second Ave. which is in Borough of Stone Harbor jurisdiction therefore permitting is expected to be less difficult in comparison to Route 2 which utilizes a County road.

SECTION 5 – RFP Results

In regards to the design, this project will be broken into two (2) components:

- Civil – Site survey and sub-surface utility investigation, design of duct bank plan and profiles, construction phasing and traffic control, erosion and sediment control and permitting
- Electrical – Cable selection, bonding schematics and cable pull layouts/installation

Civil Engineering Pricing and Selection Recommendation

ACE has sent request for proposal packages to three (3) civil design consultants to complete this work; Gannett Fleming, Adams Rehman and Heggan (ARH) and Maser Consulting. Based on the content of the proposal, pricing and familiarity with the original project (as the design consultants), ACE recommends that ARH with proposed fee of $350,200 be selected for the design and construction support services required to complete this project.

Electrical Engineering Pricing and Selection Recommendation

ACE has sent request for proposal packages to two (2) electrical design consultants to complete this work; Power Engineers and Electrical Consulting Engineers (ECE). Based on the content of the proposal, pricing and familiarity with the original project (as the design consultants), ACE recommends that ECE with proposed fee of $115,540 be selected for the electrical design and cable selection services required to complete this project.

ACE Internal Engineering Cost

The cost of ACE's internal engineering endeavors for this project is estimated to be approximately $400,000. About two third (67%) of this cost is expected to be upfront (during the design phase) and the rest during the construction phase

APPENDIX

CONCEPTUAL 69 KV UNDERGROUND TRANSMISSION
95TH STREET TO OCEAN DRIVE
ROUTES 1 & 2

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CONCEPTUAL 69 KV UNDERGROUND TRANSMISSION
95TH STREET TO OCEAN DRIVE
ROUTE 1

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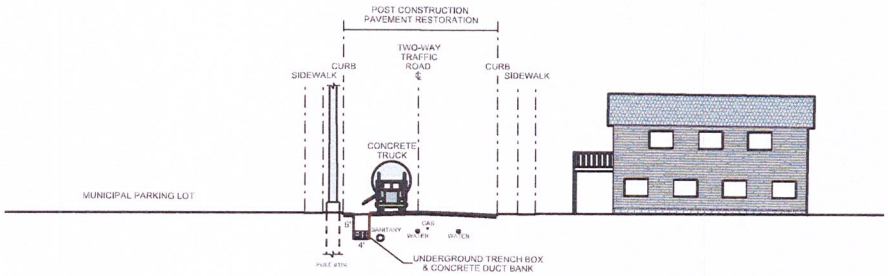
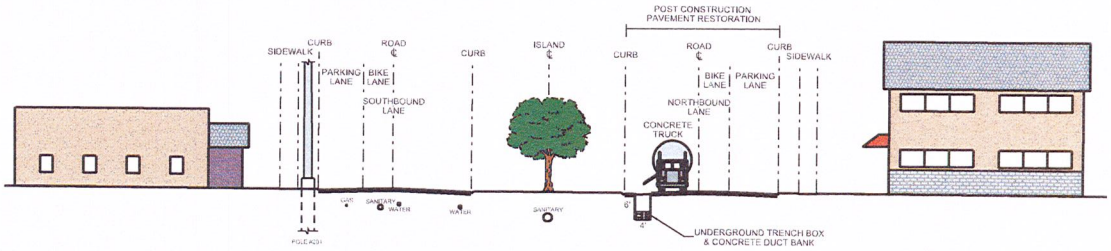
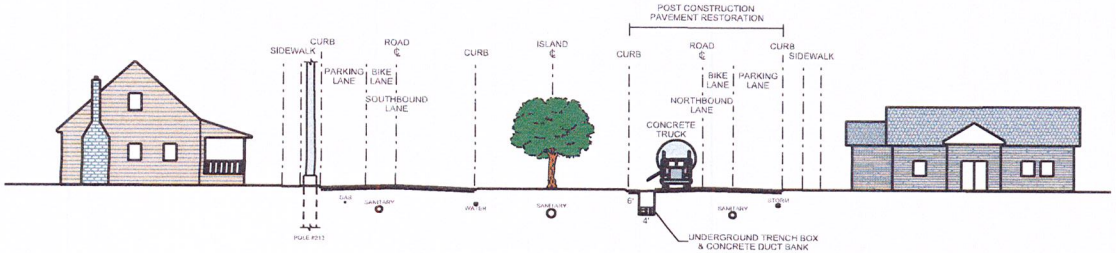
CONCEPTUAL 69 KV UNDERGROUND TRANSMISSION
95TH STREET TO OCEAN DRIVE
ROUTE 1



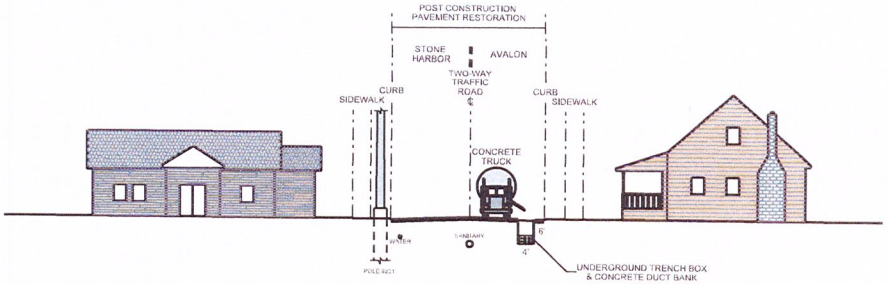
TYPICAL SECTION THROUGH 95 STREET
FACING WEST
SECTION A



TYPICAL SECTION THROUGH 2ND AVENUE
COMMERCIAL DISTRICT - FACING NORTH
SECTION B



TYPICAL SECTION THROUGH 2ND AVENUE
RESIDENTIAL DISTRICT - FACING NORTH
SECTION C



TYPICAL SECTION THROUGH 80TH STREET
FACING WEST
SECTION D

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CONCEPTUAL 69 KV UNDERGROUND TRANSMISSION
95TH STREET TO OCEAN DRIVE
ROUTE 2

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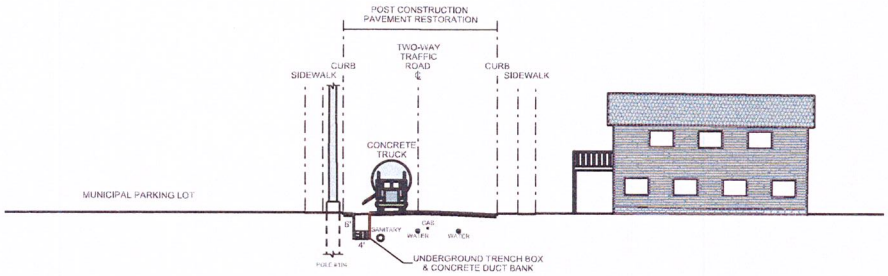
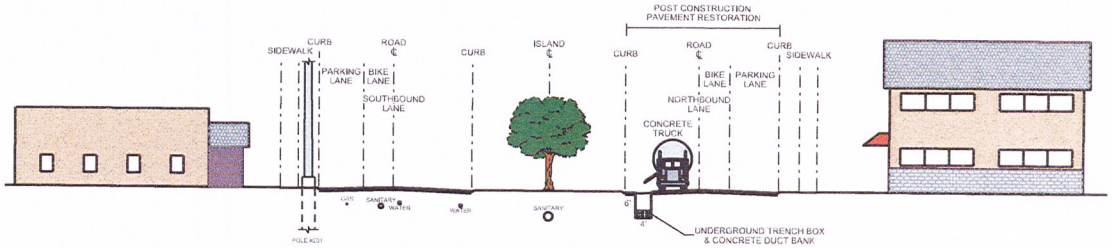
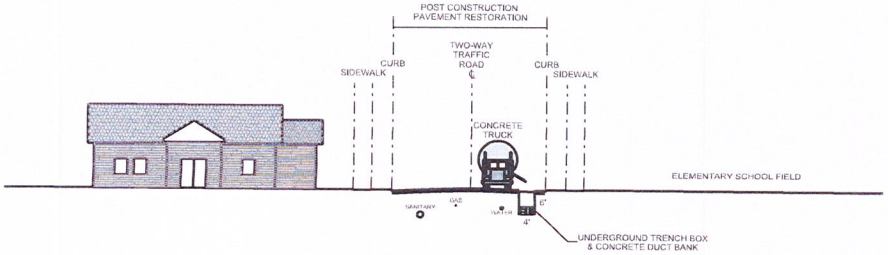
CONCEPTUAL 69 KV UNDERGROUND TRANSMISSION
95TH STREET TO OCEAN DRIVE
ROUTE 2



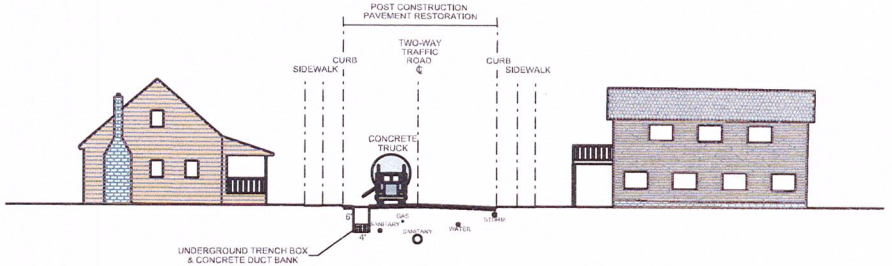
TYPICAL SECTION THROUGH 95th STREET
FACING WEST
SECTION E



TYPICAL SECTION THROUGH 2nd AVENUE
COMMERCIAL DISTRICT - FACING NORTH
SECTION F



TYPICAL SECTION THROUGH 94th STREET
FACING WEST
SECTION G



TYPICAL SECTION THROUGH 3rd AVENUE
FACING NORTH
SECTION H

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		Overall Length		Open Cut		Soil Contamination	Utility Density			Traffic Control Impact	ENVIROMENTAL							PROPERTY		Costs (Normalized	ROUTE SCORE
Alternative Description		Feet	Miles	Length	% of Total Length	Amount of contamination	Number of Utilities	Relocation Required	Number of Heat Sources	Traffic Volume	Water Bodies	Street Tree Impact	Public Facilities	Sensitive Resources	Historic Sites	Public Transportation	Property Easements	Residential vs. Commercial Land			
											Number	Street Volume	Number of Properties	Number of Properties	Percent of Route	Number of Facilities	Number of Easements	Length of Residential Land	% of Total Route Length		
Option 1	From 95th St municipal parking lot, East on 95th St to 2nd Ave, then North along 2nd Ave to 80th St, then West on 80th St to Ocean Dr. (first pole on Ocean Drive)	5,460	1.0	5,460	100%	1: Light	2: Medium	None	0	2: Medium	0	1: Light	1 to 5	1 to 5	None	0 to 4	0	3,400	62%	1.00	
		1			0	1	2	0	0	2	0	1	1	1	0	0	0		5		14 Score
		1			1	1	1	1	1.0	1	1	1	1	0.5	1	1	1		1		
		1			0	1	2	0	0	2	0	1	1	1	0	0	0		5		14 Weighted Score
Option 2	From 95th St parking lot, East on 95th St to 2nd Ave, then North on 2nd Ave to 94th St, then West on 94th to 3rd Ave, then North on 3rd Ave to Ocean Dr. (first pole on Ocean Drive)	5,535	1.0	5,535	100%	1: Light	2: Medium	Gas	0	2: Medium	0	1: Light	1 to 5	1 to 5	None	0 to 4	0	4,900	89%	1.02	
		1			0	1	2	3	0	2	0	1	1	1	0	0	0		5		17 Score
		1			1	1	1	1	1.5	1	1	1	1	0.5	1	1	1		1		
		1			0	1	2	3	0	2	0	1	1	1	0	0	0		5		17 Weighted Score

PEPCO HOLDINGS

UNDERGROUND TRANSMISSION LINE HI-LEVEL COST ESTIMATION TEMPLATE

Project Name:	Peermont - SH Extension Option 1	**Voltage**	69kV	**Solid Dielectric Accessories**	
Date Created:	10/21/2016	**Number of Feeders**	1	Manholes*	3
Created By:	Afshin Avvali	**Distance (mile)**	1.03	Splices/terminations	15
Year of I/S Date	2020	**Conduit**		**Pipe-Type Accessories**	
Cost Estimate Based on (Year)	2015	**No. of Duct Bank**	N/A	Manholes	N/A
		No. of Pipe(s)	N/A	Splices/terminations	N/A

Assumptions:

* Based on 4 manholes /mile/feeder

Note: Following is a hi-level cost estimation worksheet intended for preliminary planning cost estimation. Unit costs used in this cost estimate are derived from past Underground Transmission project costs and/or received quotes. Actual cost of a project can differ based on project specific conditions, project location, time of construction, availability of resources, labor and material demand, etc. Therefore, the accuracy of these estimated costs cannot be guaranteed.

ITEM#	ITEM DESCRIPTION	UNIT	QUANTITY	COST/UNIT	TOTAL
Material, Cable & Accessories					
	2500 kcmil Solid Dielec	Mile/Feeder	1.03	$ 900,000	$ 927,000
				Cable Subtotal	$ 927,000
Material, Other					
	Splices/Terminations Solid Dielec	Each	15	$ 30,000	$ 450,000
	Concrete	Mile/Feeder	1.03	$ 500,000	$ 515,000
	PVC Conduit	Mile/Feeder	1.03	$ 215,000	$ 221,450
	Manhole	Each	3	$ 26,000	$ 78,000
				Other Material Subtotal	$ 1,264,450
Construction, Electrical					
	Cable Installation, Solid (Each Feeder)	Mile	1.03	$ 500,000	$ 515,000
				Electrical Construction Subtotal	$ 515,000
Construction, Civil					
	Ductbank Installation	Mile	1.03	$ 8,900,000	$ 9,167,000
				Civil Construction Subtotal	$ 9,167,000
Environmental					
	Erosion and Sediment Control	**0.5% of Construction & Cost**	1	**$ 45,835.00**	$ 45,835
	Dewatering	**1.0% of Construction & Cost**	1	**$ 91,670.00**	$ 91,670
				Environmental Subtotal	$ 137,505
Engineering					
	New Install	**5% of Construction & Environmental Cost**	**1**	**$ 490,975.25**	**$ 490,975**
				Engineering Subtotal	$ 490,975
Overhead and Other Costs					
	Administrative & other Miscellaneous Costs (E+S)	**20% of Construction Cost**	**1**	**$ 1,936,400.00**	**$ 1,936,400**
				Subtotal	**$ 14,438,330**
				50% Contingency**	**$ 7,219,165**
				Total Cost (Present)	**$ 21,657,495**
				3% Annual Escalation	**$ 3,449,478**
				Total Cost (Future)	**$ 25,106,973**

Last Revised : 10/21/2016

**: This hi-level preliminary cost estimate was prepared with very limited information and no engineering design. Therefore, 50% contingency has been added to mitigate risks of unforseen and unknown conditions that may impact the project final cost.

Note: The customer will be responsible for the actual cost of design and construction of the project.