

148TH AVE VISION PROJECT



March 2020

A proposal by Bellevue's citizens

The future of a prominent Bellevue boulevard can be enhanced by modern technology, citizen input, and public/private financing.

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148th Ave Vision Project

A PROPOSAL BY BELLEVUE'S CITIZENS

1. OVERVIEW

For decades, residents of Bellevue and thousands of daily commuters have enjoyed the park-like atmosphere of 148th Avenue in the Lake Hills area of East Bellevue. The design of the four-lane avenue included trees on the sides and median. All utilities were placed underground.

Today, hundreds of mature trees are being removed by our energy utility, Puget Sound Energy (PSE), to install a new overhead power line which will, in certain circumstances, prevent power outages for residents living in the Lake Hills neighborhood. The loss of the aesthetic and environmental benefits provided by the causes anguish for many of Bellevue's citizens.

PSE plans to replant smaller tree species to avoid interference with the overhead power lines. It is not clear whether tree selection and location will be coordinated with the City, or whether citizens will be involved.

300Trees, a special project of the non-profit organization 350 Eastside, proposes to modify the implementation of the project as follows:

1. Use modern directional drilling technology to place the power lines underground for 1.4 miles along 148th Ave.
2. Cover the increased cost of burying the wires by soliciting financial support from major Bellevue employers such as Microsoft, Amazon, REI, Starbucks, T-Mobile, and Kemper Freeman. The cost to ratepayers and taxpayers should be minimal.
3. Form a Citizen Advisory Committee to participate in the selection of trees that will enhance the beauty and park-like atmosphere of this important commuting corridor for generations to come.

With the enthusiastic participation of citizens and businesses, we can retain and expand the vision of this iconic avenue as a sanctuary in a car-oriented city. We see an opportunity to demonstrate environmental stewardship, good government, and public/private participation that will inspire future generations.

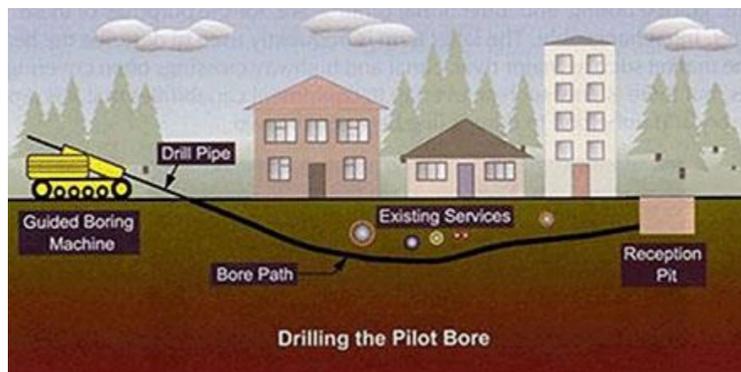
2. BACKGROUND

PSE's new power line was proposed in 2007, after the 2006 Hanukkah Eve Windstorm caused power outages lasting days in many Bellevue neighborhoods. To increase the reliability and resiliency of the electric grid, PSE proposed to connect the Lake Hills and Phantom Lake substations, forming a ring that can maintain service when an existing transmission line fails.

In the decade that followed, various routes were considered for an overhead transmission line. The option to bury the line was proposed by a licensed electrical engineer at a meeting of the Bellevue City Council. However, PSE said it would be too expensive, and the City apparently agreed.

However, as the years passed, industry discovered how natural gas could be cheaply extracted using directional drilling. Advanced drilling technologies became cheaper and feasible outside the mining industry.

Could directional drilling be employed to put transmission wires underground? Citizens contacted three local drilling companies to provide preliminary estimates for the cost of a 1.4-mile underground transmission line operating at 115,000 volts. Engineers advise using three separate bore holes. Each bore would be fitted with 6-inch conduit through which the power lines could be pulled. The conduit could be placed at any depth from 3 feet to 20 feet. An appropriate depth would avoid tree roots and existing utilities.



The companies provided cost estimates ranging from \$1.6-\$1.8 million (see Appendix A), including the conduit, labor, traffic control, pavement patching, recycling, etc. These estimates do not include the cost of the wire (which would be more expensive than overhead wire due to increased insulation requirements) and the installation of three or four underground splicing vaults. The cost of these items is unlikely to exceed the cost of the underground pipes, so the total added cost for underground wires may be less than \$3 million.

Considering the decades of aesthetic and environmental benefits offered by this solution, \$3 million is a reasonable figure. However, to avoid any increased tax burden on Bellevue residents, we propose to ask large Bellevue employers to support the project financially. If just four employers donate \$500,000 each, the cost to Bellevue residents would be reduced to \$1 million. For each resident, this is equivalent to one or two Starbucks drinks per year for a few years. The benefits of preserving our "City in a Park" far exceed the cost for individual citizens.

With the power lines underground, full-size tree species can be replanted to restore the beauty and wonder of this iconic street for future generations of Bellevue citizens to enjoy. The location and species should be selected according to a plan developed with the participation of Bellevue citizens. We recommend a Citizen Advisory Committee to ensure effective participation of the public in this process.

3. PROJECT BENEFITS

3.1 City in a Park

Trees are a critical part of the park-like character of our city. As the City states on its web page about trees, “Bellevue is proud to be a ‘city in a park.’”

Many trees have already been removed along 148th Ave, and PSE may remove the remaining trees before this proposal is accepted. However, that doesn’t have to be the end of the story. If the power lines were placed underground, taller tree species (like those being removed) could be replanted and attain their full height.

PSE’s current plan would produce a different outcome. Shorter tree species would be required maintain a safe distance from the overhead power lines. Aesthetically, shorter trees would emphasize the height of the power poles. Environmentally, shorter trees would provide less shade, sequester less carbon, and reduce habitat. Many Bellevue residents recognize the importance of trees in offsetting the threat carbon dioxide poses to our planet.

3.2 Reliability

Another consequence of climate change will be more frequent occurrences of extreme weather. Overhead power lines that are damaged by wind and ice storms cause many of the power outages endured by Bellevue residents. Utilities around the country are moving vulnerable power lines underground to improve reliability and resiliency during natural disasters.

According to a report by the Wisconsin Public Service Commission, underground power lines are very reliable:¹

For pipe-type [underground] lines, the trouble rates historically, for about 2,536 miles of line correspond to about:

- *One cable repair needed per year for every 833 miles of cable.*
- *One splice repair needed per year for every 2,439 miles of cable.*
- *One termination repair needed per year for every 359 miles of cable.*

These trouble rates indicate that there would be, at most, a 1:300 chance for the most common type of repair to be needed in any one mile of pipe-type underground line over any one year.

The proposed project will help Bellevue and PSE learn more about the cost and feasibility of underground transmission lines and directional drilling. At present, Bellevue requires installation of conduit for smaller distribution lines whenever major road work is performed. Directional drilling could be used to install conduit at times when road construction is not needed. In these cases, PSE often estimates the cost of “trenching.” Compared to directional drilling, trenching is more expensive, more time consuming, and more disruptive. Perhaps directional drilling should become the preferred alternative in the City’s land use code.

¹ <https://psc.wi.gov/Documents/Brochures/Under%20Ground%20Transmission.pdf>

3.3 Health and safety

An underground power line would offer health and safety benefits compared to an overhead line. A wire or pole damaged by extreme weather can be dangerous. High-voltage lines carrying 115,000 volts present significant risks of fire or electrocution to homes, businesses, and commuters. By contrast, underground power lines are practically immune to extreme weather. Accidents involving underground lines are nearly always caused by accidental contact while digging. Such accidents are more likely to occur when underground lines are located within 3 feet of the surface. Our proposal would locate the power lines significantly deeper, minimizing the risk of digging accidents.

Many people continue to wonder whether constant exposure to electromagnetic fields (EMFs) is detrimental to human health. Epidemiological studies have been inconclusive on this question. A possible correlation with childhood leukemia remains unresolved. Burying a power line sharply reduces EMF strength on either side of the power line. Directly on top of the power line, the field can still be strong, depending on the depth of the line. For this reason, we suggest locating the line mostly under the median of 148th Ave, separated from homes, traffic, and pedestrians. To further reduce EMF, the lines could be placed deeper, and angle upwards to connect to splicing vaults. Locating the lines under the median further minimizes the risk of accidental contact with the power lines by homeowners who dig on their properties.

3.4 Citizen involvement

Neither PSE nor the City solicited citizen input during the planning of this project. The City's notification of the crucial public hearing was so opaque that only nine citizens attended the hearing in 2014.

These shortcomings of the planning process could be offset through the formation of a Citizen Advisory Committee to provide input on tree selection and landscaping. The opportunity to participate in the final design would empower citizens and restore a measure of pride and ownership in East Bellevue.

3.5 Corporate participation

Our vision for 148th Ave provides an attractive opportunity for corporations to make positive contributions to our community. Many citizens are concerned about the effects of rapid commercial development on traffic, increased housing prices, and the destruction of Bellevue's natural resources (like trees). Corporations that contribute to the preservation of a beloved part of Bellevue would demonstrate good corporate citizenship. Many corporations are looking for ways to highlight their eco-friendly policies and social responsibility. For such companies, this would be a great opportunity.

3.6 Infrastructure planning

It is time to amend Bellevue's planning process for utility projects to better account for the true costs to the community and the environment. Currently, PSE and the City focus on just one thing: how a project improves electrical reliability. Obviously, everyone wants fewer power outages. However, there are often downsides for these projects, such as industrialization of neighborhoods, loss of trees, safety risks, and undesirable aesthetic impacts. We would prefer a more holistic planning process that produces outcomes viewed as desirable by almost every measure.

In the case of the Lake Hills transmission project, our proposal comes very late in the process. However, we see an unprecedented opportunity to begin building a different relationship with our utility. Increased trust and cooperation would be good for PSE, good for the City, and good for citizens.

4. PROJECT DETAIL

4.1 Permits

PSE's current plan calls for installation of new poles and wires by summer of this year, although virus concerns may slow progress somewhat. Our proposal is admittedly late in the process and would incur some project delays. New permits would be required to perform underground drilling. A supportive community and city can help expedite the process. Because this project will change our city for decades, we believe it is worth some time and effort to achieve a better outcome. Even if the project is delayed by a year, there is a low chance of an avoidable outage occurring during that time.

Can the City require PSE to participate in this plan? No, PSE's choice would be entirely voluntary. However, if the City and its citizens indicate their preference for this option, PSE will find it beneficial to work with the community.

4.2 Cost and financing

Although there is more work to do on a detailed plan, it appears likely that the incremental cost for a 1.4-mile underground transmission line will not be burdensome. The drilling and installation of conduit has been estimated by three local drilling companies at a cost of less than \$2 million (see Appendix A). The additional cost for insulated wires and prefabricated underground splicing vaults is expected to cost less than \$2 million. The avoided costs of poles and traffic management for a longer duration would be at least \$500,000. The total difference in cost is expected to be less than \$3 million.

By soliciting donations from Bellevue businesses, it is possible that at least 2/3 of the total cost can be covered by corporate contributions, leaving only \$1 million to be covered by the City.

For the sake of argument, let's imagine a worst-case scenario. Suppose the project costs \$6 million, twice as much as we have estimated. Suppose no corporate sponsors can be found to share the cost. If Bellevue created a ten-year bond at 3% to cover the cost, the monthly payment would be \$58,000, or about 41 cents per resident per month. The actual cost is likely to be significantly lower, and our reward would be a beautiful street for at least half a century. That is a good deal.

4.3 Citizen Advisory Committee

PSE and the City have promised attractive landscaping to compensate for large power poles and wires that would zigzag across 148th Ave in three places. Citizens have had no input regarding the landscaping plan and do not know what kinds of trees will be planted. Involvement of the community would assuage the disillusionment many feel due to shortcomings of the permitting process that led to this result.

We ask that a Citizen Advisory Committee be convened including neighborhood representatives, city staff, PSE representatives, and botanical experts. The Committee should meet regularly for several months to select tree species that are tolerant of increasing drought, compatible with city infrastructure, aesthetically pleasing during different seasons, and helpful for other plants and animals. A combination of evergreen and deciduous tree species would enhance the beauty of the avenue throughout the year.

4.4 Drilling and construction

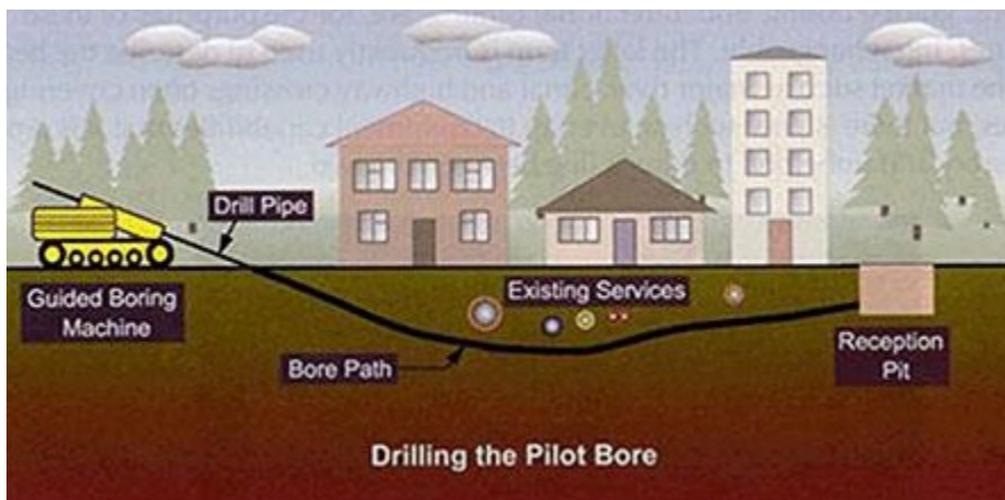
The construction process begins by locating any underground utilities that must be avoided. For the most part, buried utilities and tree roots can be avoided by drilling at a greater depth. It isn't difficult to drill 15 feet underground, but the power lines must be accessible to concrete splicing vaults along the route. The vaults are more expensive to install at greater depths. A good compromise would be to locate the wires 5-6 feet below the surface – deep enough to avoid other utilities and tree roots, but still within reach of the vaults and repair crews.

A short video explaining the drilling process can be viewed here: <https://youtu.be/mdLCD6t6C-w>

The drilling rig is positioned at one end of the bore. The machine is more compact than most people would expect, minimizing the impact on the landscape and traffic:

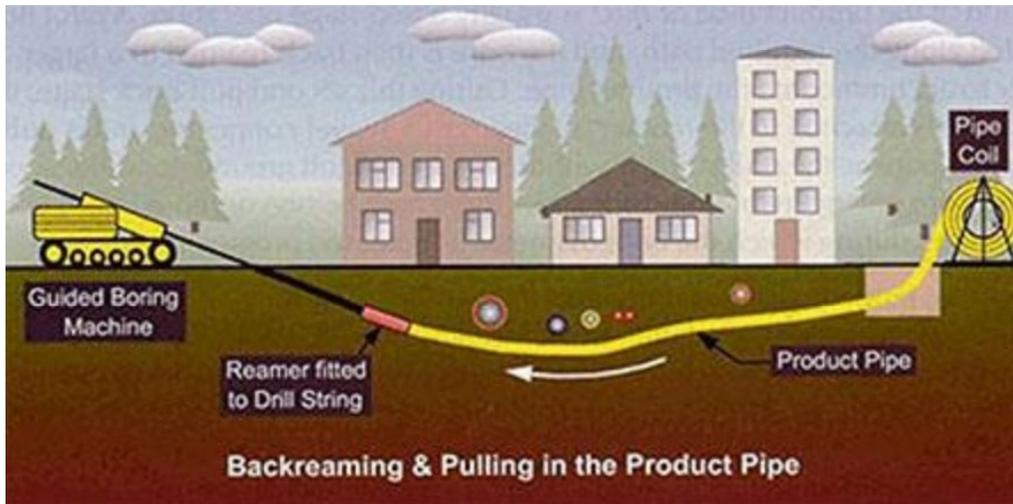


As drilling proceeds, the tip of the drill is tracked electronically. The depth and direction of the bore can be finely adjusted to avoid underground obstacles. A 1.4-mile long bore is well within the range of this technique.



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When the drill bit emerges at the other end of the project, it is fitted with a “reamer,” which is pulled back through the bore hole, enlarging it to 18 inches in diameter. At the same time, 6-inch conduit pipe would be pulled along behind the reamer. The extra space between the conduit and the enlarged bore hole is filled with a mud slurry.



For our project, three 18-inch bore holes would be needed, one for each of the three wires.

Next, construction crews would install splicing vaults at 3 or 4 locations along the path. A splicing vault is a little bigger than a pickup truck and allows the utility to replace shorter sections of the power line if there are any future failures. Here is a photo of a prefabricated splicing vault being lowered into position:



When splicing vaults are in place, power cables can be pulled through the conduit and connected in each of the vaults.



Finally, the underground cables would be connected to overhead lines at either end of the project using a transition pole like this:



5. AN EVEN BETTER OPTION

The flexibility of directional drilling offers an even better solution. The underground lines could be located underneath 156th Ave. instead of 148th. This solution offers a direct connection to the Phantom Lake substation, which PSE's plan would not connect for many years due to necessary road work on SE 16th St. that has not been scheduled yet. The Phantom Lake substation has endured more power outages during the last decade than the Lake Hills substation, so this would be a significant benefit for electrical reliability for thousands of customers served by the substation.

The underground route along 156th is almost identical to the length along 148th, so there would be no increase in cost between the two routes. If an additional half mile of power lines were buried on NE 8th St, then all the trees on that street could be replanted as well.

An underground route following 156th Ave. is one mile shorter than the overhead route proposed by PSE, it delivers improved reliability years earlier than PSE's plan, and it offers the highest benefit to Bellevue customers and taxpayers for a very reasonable cost.

**Current route:
Overhead lines
3 miles**



**Better route:
Underground lines
2 miles**

6. CONCLUSION

We have offered two alternatives that use directional drilling technology to improve electrical reliability, reduce the need for ugly poles and wires, and allow replanting of full-size trees that offer many benefits to the community and the environment.

Considering the expected lifetime of this infrastructure (possibly half a century or more), an investment of a few million dollars to place the power line underground is reasonable, especially if eco-friendly businesses would contribute some portion of the increased cost.

Involving members of the public in the beautification of 148th Ave (and 156th) would reduce concerns about the existing land use process that lacked citizen involvement. We have an opportunity to improve how citizens feel about our city government, our energy utility, and the effects of rapid development in Bellevue.

This is a chance to foster unity and celebrate diversity, core values for our “smart city” and “City in a Park.”

APPENDIX A: PRELIMINARY COST ESTIMATES

Company #1

	P.O. Number	Completion Date	Project	
		3/14/2020		
Description		Qty	Rate	Total
		1	1,628,000.00	1,628,000.00T

- Directional bore and installation of three 6" HDPE conduits
 - 6" HDPE pipe
 - Elbows, couplings, and other materials
 - Excavation for entry/exit pits
 - Water/mud clean up, haul away, recycle • Traffic Control signs, flaggers, etc.
 - Equipment
 - Private Locates of other utilities
- UP TO 7400FT PRICE INCLUDE LABOR AND

MATERIAL TO COMPLETED THIS PROJECT

*Notify the One Call Center for existing utilities prior to commencing work.

1. Pot hole to expose existing utilities on our bore path.
2. PERMIT OR ANY FEE NOT INCLUDING
3. Backfill and compact our Area, Clean an restore area of work as much as possible for a neat finish.
4. NOTE PRICE BASED IN INFO BY 300trees
ANY OTHER NEEDS WILL BE EXTRA CHARGES

*Please note this estimate does NOT include hard surface restoration (such as asphalt, concrete etc)
These costs will be in addition to this estimate.

	P.O. Number	Completion Date	Project	
		3/14/2020		
Description		Qty	Rate	Total

[Company #1] does not guarantee the survival of any landscape and/or vegetation present on the area of work

General Exclusions:

Engineering

Survey

Staking or Elevations

Soils Testing

Dewatering

Over excavation

Controlled Density Fill (CDF)

Responsibility for hazardous or contaminated material

Utility Disconnect

Waterproofing

Notes:

Changes in the project that deviate from the scope of work provided above by [Company #1] may warrant a change order.

Home Owner must sign off all changes before work will commence on the specified change.

This proposal is not applicable to any contract with terms that specify, "paid when paid."

If you have any questions, please feel free to call

SALES TAX	10.00%	162,800.00
		\$1,790,800.00

Company #2

Estimate

Date	Estimate #
3/13/2020	343

Name / Address
300 Trees

Job Address
148th Ave. SE Bellevue, WA

Description	Qty	Rate	Total
Bore to install 3-6" HDPE UL electrical conduit, approx 7,400 ft. Between NE 8th St. and SE 16th St. Price includes all Labor, Material, Utilities Pot-holing, Pot holes hot asphalt restoration, Gravel , Bore pit excavation, Water/mud clean up, Traffic Control signs, flaggers, Equipment, Private Locates, Regular locates and Haul out . Note: This Estimate does not include any permits.	1	1,480,000.00	1,480,000.00
	Subtotal		\$1,480,000.00
	Sales	Tax (10.0%)	\$148,000.00
Accepted By _____	Total		\$1,628,000.00

Company #3

ESTIMATE #	DATE	EXPIRATION DATE			
1332	03/10/2020	06/10/2020			
ACTIVITY	DESCRIPTION		QTY	RATE	AMOUNT
Directional bore	Directional bore & install Three (3) 6" sch 40 HDPE Power Conduits, for PSE project at 148th Ave. SE, Bellevue, WA, between NE 8th St. and SE 16th St.		7,600	160.00	1,216,000.00T
6" HDPE	6" HDPE pipe		23,000	12.00	276,000.00T
Elbows	Elbows & couplings, MATERIALS			19,500.00	19,500.00T
Intersept & tie in	Tie in and/or connect conduit and elbows, LABOR ONLY (Per hour)		120	160.00	19,200.00T
Excavation	Dig up entry/exit pits		15	650.00	9,750.00T
Water/mud recycle	Water/mud clean up, haul away, recycle (PER DUMP)		75	350.00	26,250.00T
Traffic Control	Traffic Control, signs, flaggers, UPO's, arrow boards, etc			45,000.00	45,000.00T
Equipment use	Steel plates, shorings, etc			5,500.00	5,500.00T
Private Locates	Private Locates, GPR scan			6,500.00	6,500.00T
	This estimate includes pot holing of existing utilities, backfilling with 5/8 gravel and cold patch				

Pay Terms: 40% advance is required.
Net 30 on each invoice after work began.

SUBTOTAL 1,623,700.00
TAX (10%) 162,370.00
TOTAL

\$1,786,070.00

Please sign and return.

- Customer will be responsible for the following:
- pipe connection/extension beyond bore shot
 - provide all necessary permits
 - organize precon and call job start
 - all hard surface restoration (asphalt/concrete)
 - provide and install all vaults