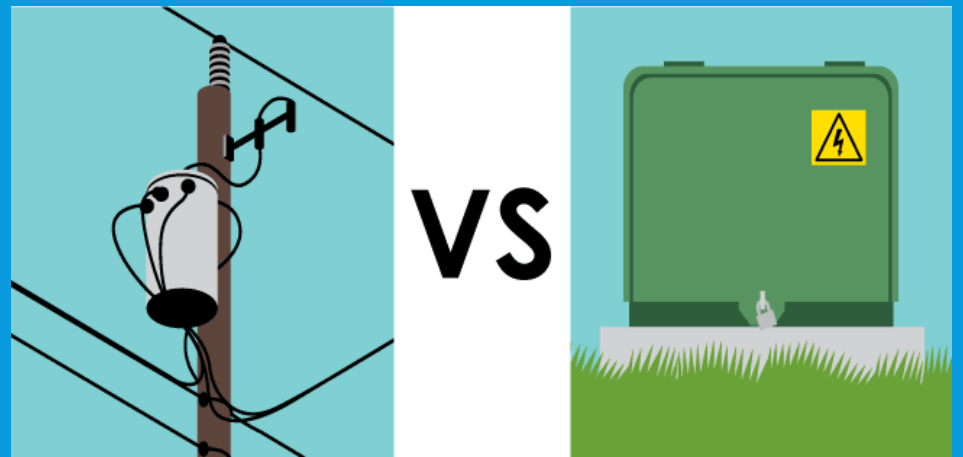
LOS ALAMOS DEPARTMENT OF PUBLIC UTILITIES

Undergrounding of Overhead Infrastructure Utilities



ELECTRIFICATION STUDY

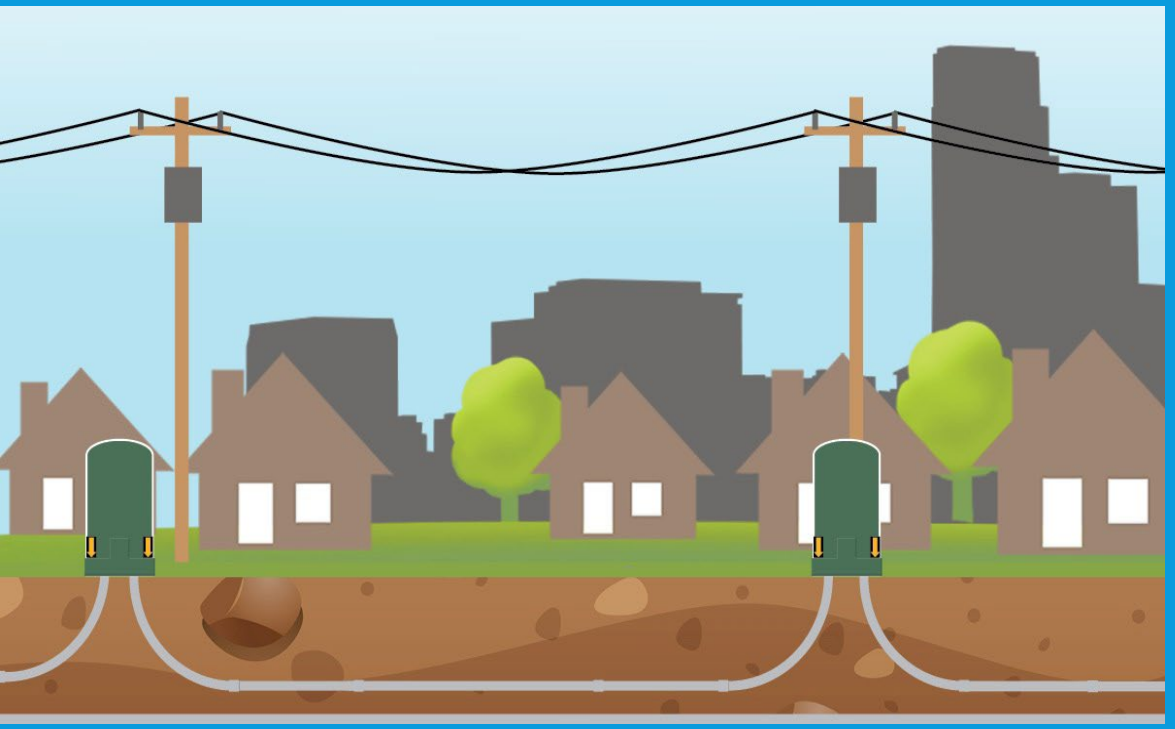
Scenario	2040 Model Year			2055 Model Year - Incremental Costs			Total Scenario Cost
	System Improvement Costs	Asset Replacement Costs	Total Financial Impact	System Improvement Costs	Asset Replacement Costs	Total Financial Impact	
Scenario 1	$53.7M	$119.8M	$173.4M	$14.1M	$94.6M	$108.7M	$282.1M
Scenario 2	$38.1M	$125.3M	$163.4M	$15.1M	$86.1M	$101.3M	$264.6M
Scenario 3	$27.6M	$125.3M	$152.9M	$8.3M	$82.9M	$91.2M	$244.1M

The asset replacement costs are for the aging infrastructure and predominately caused by the older, direct buried cable and aging padmounted switches. These costs, except for the EA4 line, are independent of the costs that would be incurred by undergrounding the lines. The required transformer replacements for additional load would be included in the System Improvement Costs.

BENEFITS OF UNDERGROUND POWER LINES

- Aesthetics
- Less susceptible to weather conditions
- Less likely to have accidental contact
- No tree trimming required
- No pole inspection required

DISADVANTAGES TO UNDERGROUND POWER LINES



- Considerably more expensive to install
- Faults are more difficult to locate
- Faults are more difficult to repair
- Outages last longer due to difficulty to locate and repair
- Excavation for installation and repair can disrupt property
- Modification of the lines is more difficult to accomplish

WHITE ROCK

- White Rock has 25.5 miles of Overhead power line
- White Rock has 8.8 miles of Overhead single phase
- White Rock has 16.7 miles of 2 or 3 phase Overhead
- White Rock has 325 overhead secondary services

TOWNSITE

- Townsite has 44.84 miles of Overhead Power Line
- Townsite has 17.1 miles of Overhead Single Phase
- Townsite has 27.7 miles of Overhead 2 or 3 phase line
- Townsite has 1,647 Overhead Services

BIXBY BID

- Mobilization $98,100
- Trenching $21/ft
- 4” conduit $13.80/ft
- Rock $56.60/ft
- This bid came to $117 per foot plus rock – excluding communications equipment
- This is only conduit installation and does not include transformers or conductor

APPLYING AVERAGE COSTS FOR WHITE ROCK

- Install Conduit - $617,760
- Rock Adder - $298,848
- Conductor Cost - $21,120
- Transformers at 23/mile - $74,290
- Labor to install conductor - $20,000
- Labor to install transformers - $50,000
- Labor to retire OH line - $15,000 (Higher for backyard line)

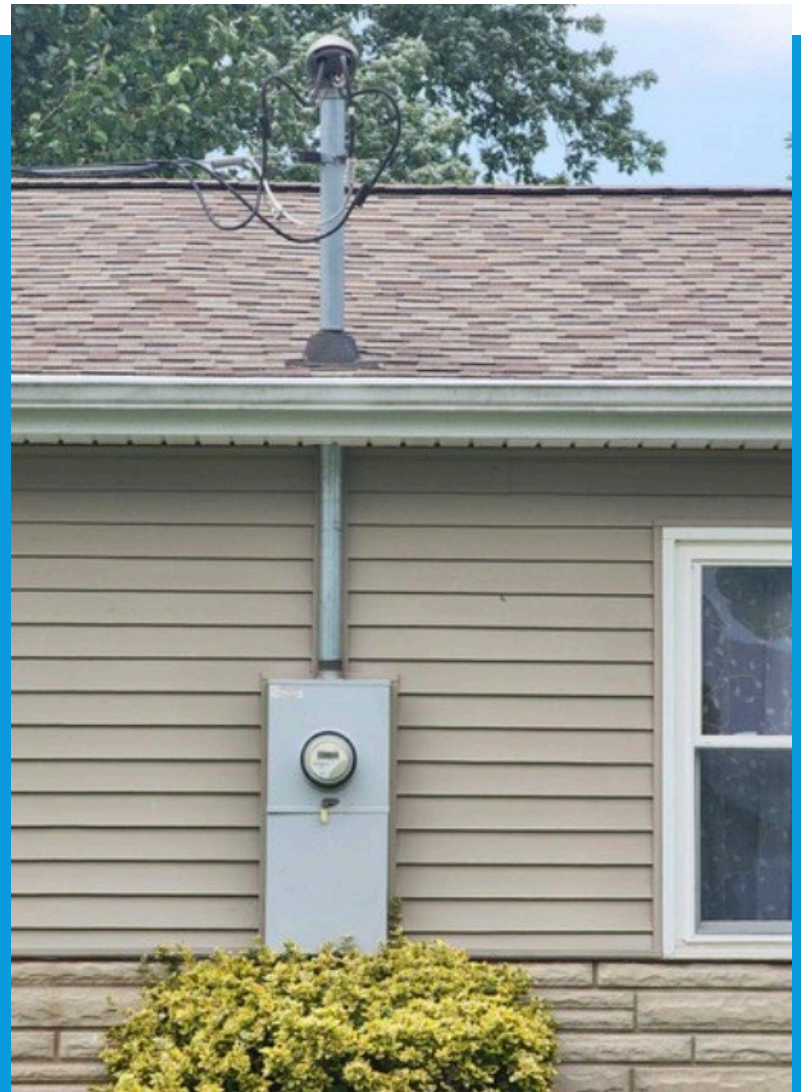
APPLYING AVERAGE COST FOR TOWNSITE

- Install Conduit - $617,760
- Conductor Cost - $21,120
- Transformers at 23/mile - $74,290
- Labor to install conductor - $20,000
- Labor to install transformers - $50,000
- Labor to retire OH line - $15,000 (Higher for backyard line)

SECONDARY SERVICES

- There are 325 overhead secondary services in White Rock
- There are 1647 overhead secondary services in Townsite
- The electrification study estimated $6,000 - $10,000 to upgrade secondary services for homes
- For many overhead services upgrades, a total electrical upgrade to 200 Amperes would be necessary

OVERHEAD AND UNDERGROUND SECONDARY



SPECIAL CASES

- This service does not have a disconnect panel outside and will require a total electrical upgrade.
- The age of this install suggests there may be many more electrical upgrades that would be called for.

ESTIMATED COSTS

- White Rock Primary - $1,097,018 per mile
- White Rock Secondary - $2,600,000
- Townsite Primary - $798,170 per mile
- Townsite Secondary - $13,176,000

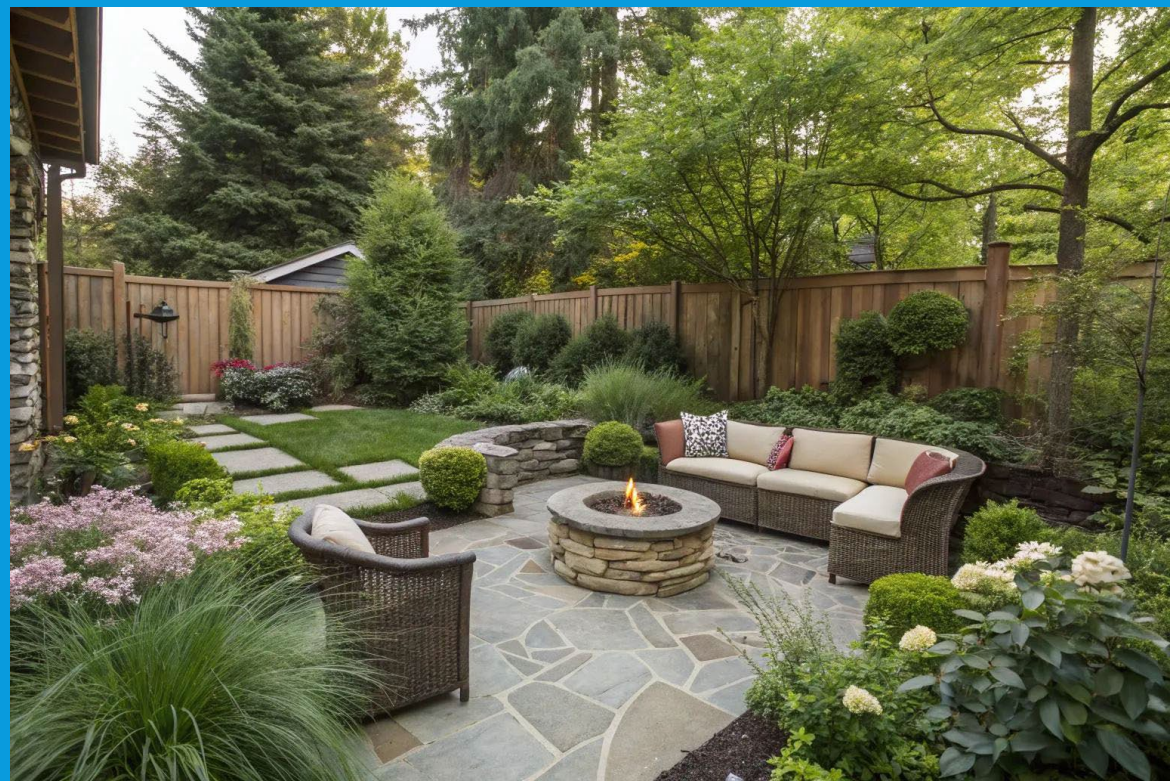
ESTIMATED COSTS

- WR Primary 1,097,018 * 25.5 = $27,973,959
- WR Secondary 325 * 8,000 = $2,600,000
- Townsite Primary 798,170 * 44.84 = $35,789,942.80
- Townsite Secondary 1,647 * 8,000 = $13,176,000

- Total Estimate $79,539,901.80

ADDITIONAL CONSIDERATION

- If we underground line that is currently in the back yards, do we put the cable in the existing easement or along the street
- If we move streetside, most of the service entrances are at the rear of the home
- If we bury along the easement, we trench or bore in the back yards with fences, gardens and sheds as obstacles



ADDITIONAL CONSIDERATION

- Will Lumen agree to bury their service wires since landline telephone is losing customers
- Will Comcast agree to bury their service wires with so much video shifting to streaming video
- County fiber to the premise will be taking broadband customers from Lumen and Comcast making their return less profitable to support the cost of undergrounding their existing service

LUMEN®

COMCAST

LUMEN AND COMCAST DID NOT BURY

EQUIPMENT FOR TRENCHING IN ROCK

COST FOR OUR OWN TRENCHING CREW

- Excavator - $200,000 for minimum 28 gal/min at 300 PSI
- Rock Head - $35,000
- Service Truck - $120,000
- Foreman
- Equipment Operator
- Crew (2)
- With benefits, the 4 person team is about $1,800/day

ESTIMATED PRODUCTIVITY PER YEAR

- With vacation, sick leave, training, holidays there will be about 9 weeks of non-productive days per year
- Assume 200 feet of conduit per day – trench, lay, and cover
- Assume 500 feet of single phase cable in conduit per day
- 37 working days to lay conduit on Piedra Loop
- The Bixby bid ($984,115) was low bid while the high bid was about $3.5 M

PIEDRA LOOP COMPARISON

Description	Unit	quantity	Bixby	Extended	LAC	Extended
Mobilization			$ 98,100.00		0	0
Trenching	LF	7235	$ 21.00	$ 151,935.00		$ 65,115.00
3 inch PVC	Ea	135	$ 10.90	$ 1,471.50	$ 0.47	$ 63.45
3 inch Elbow	Ea	6	$ 688.80	$ 4,132.80	$ 38.85	$ 233.10
4 inch PVC	LF	14623	$ 13.80	$ 201,797.40	$ 0.56	$ 8,188.88
4 " Galv 90	Ea	148	$ 1,554.90	$ 230,125.20	$ 135.00	$ 19,980.00
4" Galv 45	Ea	6	$ 614.20	$ 3,685.20	$ 400.00	$ 2,400.00
4" coupling	Ea	100	$ 336.40	$ 33,640.00	$ 6.42	$ 642.00
4" Slip to Thread	Ea	293	$ 31.90	$ 9,346.70	$ 7.92	$ 2,320.56
4" PVC Cap	Ea	14	$ 296.90	$ 4,156.60	$ 3.67	$ 51.38
4" aluminum riser	Ea	4	$ 26,270.80	$ 105,083.20	$ 800.00	$ 3,200.00
Ground Rod	Ea	26	$ 246.90	$ 6,419.40	$ 25.90	$ 673.40

LAC Material Cost is based on Home Depot costs rather than our inventory cost

DISCUSSION