Truckee Donner Public Utility District

Business Office (530) 587-3896 FAX (530) 587-5056

March 21, 2006

Mr. Darren Shaw
General Manager
Tahoe Donner Association
11509 Northwoods Blvd.
Truckee, CA 96161

Dear Mr. Shaw:

Subject: **Draft Undergrounding Feasibility Study**

We are in receipt of the draft report, dated January 16, 2006 for the subject project. We appreciate the opportunity to review this report for the Tahoe Donner Association. Note that if we comment about a particular item, our comments apply to all instances where this item or topic occurs in the report and supporting documents. The District offers the following comments for your consideration:

1. *Each service provider would provide and install its cables and pad-mounted equipment, enclosures and ancillary termination equipment, and all above grade facilities. - Executive Summary, page ES-2*
   The District does not have the staff to take on a construction project the size and scope of the entire Tahoe Donner area. This work must be done by contract crews. We anticipate that District crews will be required to electrically connect completed underground sections to our existing system as they are finished in the staged construction process. The increased cost of using contract crews for the majority of the construction must be reflected in the cost estimates included in the final report. In addition, an allowance should be made for District crew labor work, much of which may be on an overtime schedule.

2. *Individual customers will need to arrange directly with each service provider for the installation of the service drops and any necessary modifications of existing customer interconnection equipment, if required. - Executive Summary, page ES-4*
   This seems, at best, to present a scheduling and logistical nightmare. I am unclear on how several thousand homeowners can individually arrange to contract for trenching and overhead to underground conversion work in a timely and organized fashion to keep pace with the main undergrounding work. What happens when contractors cannot keep their schedule commitments to a homeowner? What happens when homeowners do not comply with arranging for the work in a timely manner? What, if any, should be the penalties for non-compliance? At the risk of stating the obvious, we note that existing overhead facilities cannot be removed until <u>all</u> customers served by that facility have converted their services.

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3. *Table ES-4 "Total Project Cost Estimate" – Executive Summary, page ES-6*
This table should be modified to include the estimated overhead to underground service conversion cost per customer. These costs can range from $4,000 to $12,000 per lot with an average cost of approximately $7,000 per lot. See also our comments in Item No. 14.

4. *The conceptual [electric] underground design was configured to provide nearly identical service as the existing overhead system. – Design Criteria, page 2-3.*
This is, in general, a good operating assumption. However, there are areas where we have or plan to construct full capacity circuit ties to other substations. For instance, the District has a full capacity tie between Tahoe Donner Circuit 3 and Truckee Substation Circuit 5 via Alder Hill. In addition, one of our future capital improvement projects will establish a feeder tie to Tahoe Donner Circuit 1 from our Donner Lake Substation. The District will almost certainly revise the electrical configuration (looping, phase balancing, etc.) of certain streets or areas of Tahoe Donner during the detailed design process so as to more reliably serve our customers.

5. *Typically, primary 600 amp three-phase circuit conduits are sized 6-inch, 200 amp three-phase circuit conduits sized 4-inch, single-phase lateral taps sized 2-inch, and secondary conduits are sized 3-inch. - Design Criteria, page 2-3.*
Single-phase lateral taps are sized either 3 or 4 inch, and secondary conduits are sized either 3 or 4 inch also. Service conduits (from the secondary box to the meter panel) may be 2, 3 or 4 inch in size.

6. *The District has an overhead design for its broadband system. For this study, the inclusion of the broadband system is considered as part of the underground infrastructure and conduits, vaults, and hand-holes have been included. ... While including the District's broadband system introduces additional conduit, for the most part it does not require trench expansion. However it does introduce another cost sharing element. - Design Criteria, page 2-3.*

   It should also be noted that TDPUD's proposed FTTU broadband system does not now exist. Its inclusion in the project might well provide TDPUD with a cost savings compared with a standalone installation. This suggests that the TDPUD system bear a somewhat greater portion of the costs than those that result from a normal trench space allocation approach... – Special Approach to Conversion, page 5-5

   The District's plans to build a broadband system are based on using an overhead design approach for a majority of our service area, including the Tahoe Donner area. The existing wood poles have sufficient space, in general, for the District to attach fiber optic cables. This resource (space on poles) which the District currently owns and has access to now must be taken into consideration with regards to undergrounding the overhead utilities. It would be incorrect to assume that the District would be responsible for the entire cost, or even a majority of the costs associated with including broadband conduit and boxes in this project. It may be that the District's costs to deploy an underground broadband system (minus trenching, conduit, boxes, etc.) are less than for an equivalent overhead system. To the extent that these costs are less, some cost sharing arrangement

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may be in order with regards to installing conduit and boxes. We believe this issue will require considerable further discussion and study. It should also be noted that the District's Board of Directors have not made a final decision on providing broadband services to District customers.

7. *Generally, the water replacement trenches are in the roadway, rather than the right-of-way outside the edge of roadway. - Design Criteria, page 2-3.*
The exact opposite of this statement is true. To the maximum extent possible, replacement water pipelines have been installed in the roadway shoulder. The roadway was used for those areas where it was not possible to utilize the shoulder due to narrowness of the shoulder, slopes, existing structures such as garbage enclosures, driveway bridges and utility poles or the fact that construction in the shoulder would require wholesale tree removal that was deemed unacceptable.

   Attached are photographs of water pipeline construction by the District during the summer of 2005. The centerline of the pipeline trench was located in the roadway shoulder, completely out of the pavement. Due to the number of large boulders encountered during trenching, undermining of the pavement occurred and it was necessary to replace a 2-3 feet strip of asphalt along the entire pipeline route. This is very typical of construction in the Tahoe Donner area.

   Given the issues that have impacted water pipeline construction as noted above, it will be very difficult to construct new trench in the road shoulders except along Northwoods Blvd. which has a wide, paved shoulder. We believe that the report should assume that a majority of trenches must be placed in pavement areas. Therefore, the amount of AC replacement has also been significantly underestimated. Current AC costs are approximately $8-$10 a square foot.

8. *We suggest conversion construction begin near the source of the service providers' systems to the TD area. This is along Northwoods Boulevard near the entrance to TD for the communication services and in this general area for the electric system. - Design Criteria, page 2-6.*
The source for electric service is the District's Tahoe Donner Substation, located near the intersection of Bermgarten Road and Skislope Way. Underground circuit feeder getaway conduits terminate near Skislope Way/Bermgarten and Skislope Way/Northwoods areas. Conversion construction must incorporate this existing configuration.

9. *The spacing between conduits of different communication franchises or communication and supply duct systems can be reduced when concurrently installed and mutually agreeable between the providers. - Design Criteria, page 2-7.*
The District's Electric department requires a minimum 12-inch separation to all other utilities. The only exception is that PUD Broadband system conduits may be installed immediately adjacent to secondary or primary supply conduits.

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10. *The actual routing and placement of ductbanks, either in the rights-of-ways or in the PUEs will be determined by the TDPUD. - Design Criteria, page 2-7.*
The District will not be performing the detailed engineering design for this project if it proceeds to construction. Detailed engineering design, including field engineering during construction, must be performed by a qualified consultant. The District will supply the consultant with our requirements, mapping, standards, and other help as necessary. The District will review, modify as necessary, and approve the design during the design process. The District may also choose to hire our own consultant to review the design and make recommendations to the District and/or the project consultant. In addition, we may have to hire additional staff to keep up with the paperwork and construction inspectors to verify adherence to District standards. The costs borne by the District for these efforts, including consultant fees, will be paid for by the project.

11. *Both padmount and subsurface or grade level equipment were considered and evaluated for installation. - Design Criteria, page 2-7.*
The District's standard is to install padmounted, not subsurface equipment. This equipment would generally include switchgear and transformers. Finding and operating subsurface equipment is problematic in our climate and therefore we avoid its use. One exception is that the District installs load break primary junctions and elbows in vault structures. Sectionalizing of circuits is performed at padmounted equipment first, and vaults where necessary.

    When the term "Undergrounding Study" is used there may be perception by the public that all utility facilities will underground and out of sight. As noted above, this is not the case. We believe it is important to prominently convey in the report, perhaps in the executive summary, that padmounted equipment (big green boxes) will be part of the new landscape.

12. *Electric System Map, Figure 2-1. - Design Criteria Section*
We believe this map is meant to depict the location, using distinct colors, of the District's three electric circuits serving the Tahoe Donner area. We will supply a new drawing to CVO Electrical Systems (CVO) with the individual circuits and the substation clearly depicted.

13. *The TDPUD provided Electrical System, Construction Standards, Materials and Details support data has been very helpful in assembling the cost data. – Cost Estimates, page 4-4.*
The District provided this data to CVO over one year ago. We will supply our latest cost information to CVO for their use in preparing the final report. We note that prices for raw materials used in electrical equipment manufacturing, including steel, copper, aluminum, and oil have risen dramatically, along with transportation costs in recent times. We would suggest that CVO revisit all the cost data as the electrical construction costs appear to be on the low side. For instance, the current material cost for a 600 Amp primary vault is about $8,000. The Appendix lists materials and labor to install this vault at $8,500 per vault. We estimate materials and labor to total about $15,000 per vault.

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In addition, trench costs appear to be low side. In our experience, trenches can not be constructed for anything less than about $75 per linear foot. With multiple conduits from different utilities in the same trench, the average cost will be much higher for the majority of the project.

14. *Table 4-2, Service Drop OH/UG Conversion Connection Fee Cost Estimates.*
– Cost Estimates Section
Table 4-2 and the accompanying notes convey much detailed information which may be glossed over or perhaps misunderstood by the reading public. When all the utilities have been place underground, it is still the individual lot owner's responsibility to convert their service drops to an underground configuration. These costs could easily range from $4,000 to $12,000 per lot. As noted above in Item No. 3, these costs should be reflected in the Total Project Cost Tables to more accurately convey to the public the total cost of conversion to an underground system.

The typical service trench section must be revised to reflect the District standard of a 36 inch depth for secondary conduits. Note that communication conduits are installed at a depth of 24 inches. Therefore, trench costs as noted in appear to be low. We estimate trench costs to be in the range of $40 to $60 per foot for the service trench.

It would be very helpful to provide an example of a typical conversion cost either in a new table or in the report. A typical conversion might include the following: overhead service drops for electric, telephone and catv, 200A meter panel (not convertible to UG service) located approximately 80 feet from the nearest service box, 20 feet of which crosses driveway pavement, etc. Each cost item should be listed with an overall total to the example. We have attached such an example for your consideration. Note that Town of Truckee, SBC, and CATV costs are not included in our example.

15. *It is beyond the scope of this study to resolve the utility benefit and contribution issues.*
– Special Approach to Conversion, page 5-5

It is the District's position that the entire cost to underground electric facilities will be paid for by the project, including costs which impact us directly or indirectly, as previously mentioned.

In addition, the replacement of the District's overhead system with a new underground system (paid for by others) will have a real financial impact to the District. This impact is the contributed capital cost of the electric portion of the underground system which must be depreciated for accounting purposes. For example, if the value of the electric system portion of the undergrounding project was $80,000,000, and the useful life was approximately 40 years, the District would have to depreciate $2,000,000 per year from our books. The impact of this increased depreciation rate may eventually put the District in a net loss position on our income statement. This net loss position could have a negative impact on our ability to raise money for capital projects. The District would

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probably have to raise electric rates to cover this net loss so that our ability to raise money for capital improvement projects would not be hindered. We believe this issue will require considerable further discussion and study.

16. *Conceptual Roadway Infrastructure Detail, Detail3, Sheet 5. – Appendix E*
We believe that this detail does not accurately represent the land area available for the construction. We suggest that at least two cross-sections of actual streets be created. Perhaps one depicting a street that is rather flat and another that has significant side slopes. Other utilities and features should be shown on the cross-section, including water mains, gas mains, sewer, overhead poles, and drainage ditches. The cross section should also depict the proposed location of vaults and transformers.

17. *Facility PUE Placement Detail, Detail5, Sheet 5. – Appendix E*
This detail depicts trenches installed parallel with the roadways about 20 feet from the edge of pavement in the PUE easement area. Construction of trenches along this alignment will require wholesale cutting of trees. It is our understanding that TDA has historically been very protective of trees and has restricted their removal. This concept also presents significant constructability issues due to the presence of trash enclosures, garages, driveway bridges, water meter boxes, sewer cleanouts and other improvements in the PUE area. A majority of these trenches may have to be located back in the road right of way.

Finally, we note that there are several instances in the report where Truckee Donner PUD is referred to as "Tahoe Donner PUD". We would appreciate if the appropriate corrections could be made to the final report.

Please let us know if we may be of further assistance. Call me at 582-3969 if you have questions or concerns about our review.

Sincerely,

Joe Horvath, P.E.
District Electrical Engineer

cc Steve Hollabaugh
Sanna Schlosser
Jerry Witkowski, CVO Electrical Systems

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Estimated Overhead to Underground Meter Conversion Costs for Tahoe Donner

General Numbers	low estimate		high estimate
Electrician (note 1)	$500		$1,200
100A Panel (note 2)	$0	Note 4	$70
200A Panel (note 2)	$0	Note 4	$175
400A Panel (note 2)	$0	Note 4	$1,100
Connection Fees (200A panel or less) (note 3)	$1,212		$1,212
Connection Fees (greater than 200A panel) (note 3)	$2,295		$2,295
trench cost (note 5)	$40		$60
Estimate for Town of Truckee Building Permit	$100		$100

Total Costs		low estimate (note 6)	high estimate (note 7)
100A panel (50' of secondary)	50	$3,812	$5,582
100A panel (75' of seconadary)	75	$4,812	$7,082
100A panel (100' of secondary)	100	$5,812	$8,582
100A panel (125' of secondary)	125	$6,812	$10,082
200A panel (50' of secondary)	50	$3,812	$5,687
200A panel (75' of seconadary)	75	$4,812	$7,187
200A panel (100' of secondary)	100	$5,812	$8,687
200A panel (125' of secondary)	125	$6,812	$10,187
400A panel (50' of secondary)	50	$4,895	$7,695
400A panel (75' of seconadary)	75	$5,895	$9,195
400A panel (100' of secondary)	100	$6,895	$10,695
400A panel (125' of secondary)	125	$7,895	$12,195

These estimates do not include SBC or Cebridge conversion costs.

Notes:

1: The District estimates 6-8 hrs time to replace panel at $80-$100/hr. Contact local contractors for more accurate estimate.
2: Panel costs are for materials only. District received information from only one vendor, actual costs will vary by manufacturer.
3: Connection Fees are 2006 fees, and may change in the future. This fee includes up to 125' cable. Longer pulls will be at an additional cost.
4: In the case the panel can be used for both underground and overhead service, a new panel will not be required.
5: Trench cost is per foot, based off District experience and includes 3" or 4" PVC conduit materials and installation.
6: Low estimate includes low values for all applicable items and no panel.
7: High estimate includes high values for all applicable items.

TDPUD Electric

DRAFT REPORT

Undergrounding Feasibility Study

for

Tahoe Donner Association
Truckee, California

TAHOE DONNER®

January 2006

CVO Electrical Systems

CVO
Electrical
Systems, LLC

January 16, 2006

Mr. Darren Shaw
General Manager
Tahoe Donner Association
11509 Northwoods Blvd.
Truckee, CA 96161

Subject: Tahoe Donner Association Undergrounding Feasibility Study
DRAFT Report Submittal

Dear Mr. Shaw:

We are pleased to submit this Undergrounding Feasibility Study Report in draft form to the Tahoe Donner Association (TDA).

We are confident this report will be a valuable tool to the Association Board members and management in reaching a decision on whether or not to move ahead with converting some or all of the existing overhead utility infrastructure to underground.

The report includes an evaluation of the general construction and individual utility conversion requirements to provide the TDA development with underground utilities.

The report identifies a practical underground construction sequence, suggests a schedule of work, includes costs for each phase of the work arranged by year including cost summaries, and identifies general contractor and service provider work.

The report is divided into the following sections:

- Executive Summary
- Data Collection and Research
- Design Criteria
- Construction Schedules
- Cost Estimates
- Special District Approach

In addition, a separately assembled Appendix is provided that contains support data including related correspondence, construction unit tabulations, cost estimating details, and conceptual design drawings.

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Our conclusions are presented in the Executive Summary of the report. A summary of the cost estimates and suggested methods for approaching the system underground conversions are also provided in this section.

We look forward to the Association review comments and meeting to discuss the results presented in this report.

We are grateful for the assistance that you and your staff have given us throughout this project and we appreciate the opportunity to be of service to the Association.

Respectfully Submitted,

CVO Electrical Systems

Jerry Witkowski, P.E.
Project Manager

Enclosures: REPORT
APPENDIX

C: Curtis L. Bagnall, P.E./CH2M HILL

DRAFT REPORT

Undergrounding Feasibility Study

for

Tahoe Donner Association
Truckee, California

TAHOE DONNER®

January 2006

CVO Electrical Systems

Prepared By: Jerry Witkowski, P.E.
Curtis Bagnall, P.E./CH2M HILL

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APPENDIX

Executive Summary

Introduction

In January 2005 the Tahoe Donner Association (TDA) authorized this effort to perform an Undergrounding Feasibility Study to evaluate conversion of the existing overhead infrastructure utilities to underground systems within the entire TDA development. The study consists of various tasks as described in the March 2004 Proposal to the Association.

This report contains the results of the Study. The area considered for conversion is presented in Figure ES-1.

Purpose of Study

This study evaluates and develops a plan for the placement of existing overhead infrastructure underground within the TDA subdivision. The study is a guide to assist TDA with decisions regarding moving forward with undergrounding some or all of the existing overhead utilities within the subdivision.

The Study also provides TDA with an order of magnitude cost estimate to underground four utility systems and identifies the efforts necessary to pursue construction. The infrastructure to be placed underground includes three existing overhead systems:

- electric facilities owned by the ~~Tahoe~~ Truckee Donner Public Utility District (TDPUD)
- telephone facilities owned by SBC Communications
- cable television facilities owned by Cebridge Connections.

The fourth utility facility is a fiber-to-the-user (FTTU) broadband system proposed by TDPUD.

The study is organized into sections that address each component of the work performed and describe the data collection and research, design criteria, construction scheduling, cost estimating, the formation of a Special District and options for financing the underground conversion.

The conclusions and recommendations presented in this report should be used as a guide by TDA in planning the implementation of system conversion. The study was conducted based on the best available information at the time. Some assumptions were necessary and are noted in the report. This study evaluated the systems as configured at the time the study was performed. Any changes in equipment or system configuration from those assumed may result in changes in the recommendations and cost estimates.

With the passage of time, conditions generally change, and these changes can affect the feasibility or practicality of making certain system improvements. This report should be reviewed and updated, as appropriate, since changed system conditions may affect the economics or integrity of the recommended plans.

Project Approach

A variety of information was gathered from existing service providers that included the existing overhead facilities considered for conversion, and locations of existing subsurface facilities that should be avoided during construction. This information included system drawings, maps and

CAD files, construction constraints and requirements, and agency design and construction specifications and standards. Agencies contacted included the following:

- ✓ Tahoe Donner Public Utility District
- ✓ Town of Truckee
- ✓ Truckee Sanitary District
- ✓ Southwest Gas Company
- ✓ SBC communications
- ✓ Cebridge Connections.

In addition to accumulating system data, interviews were held and questionnaires submitted to the service providers and area contractors in an attempt to obtain specific information related to construction methods and experiences in the TDA vicinity.

The responses and materials from the Town of Truckee and TDPUD representatives were very helpful. However, SBC and Cebridge provided very little information. In addition, only one contractor, Lorang Brothers Construction, was responsive and willing to discuss construction experiences in the area.

Considerable research was also performed to:

- ➢ Investigate the California Public Utilities Commission (CPUC) Programs, Rules and Tariffs to determine if any policies are applicable for this potential conversion project.
- ➢ Investigate the history and trends in California regarding the formation of Special Districts related to undergrounding projects.
- ➢ Identify funding opportunities that might be available finance this type of project.
- ➢ Prepare a suggested outline of the necessary steps to proceed with the formation of a Special District for the construction of an undergrounding project
- ➢ Contact various material suppliers to determine current material costs

Conceptual System Design

The conceptual system design is based on the assumption that a general contractor will do all of the necessary trench excavation and restoration, and the installation of subsurface conduit, manholes, vaults and infrastructure typically installed to the property lot-lines or curbside pedestal equipment.

Each service provider would provide and install its cables and pad-mount equipment, enclosures and ancillary termination equipment, and all above grade facilities. This is the normal approach for underground development and conversion projects.

Our conceptual design conforms to individual service provider's construction standards, the state of California Public Utilities Commission (CPUC) construction standards, and the National Electric Safety Code (NESC).

Construction Schedule

Various construction strategies have been evaluated. Regardless of the construction approach used, the entire planning and construction process can be expected to take 8 to 10 years to fully implement. This assumes the entire TDA subdivision is converted to underground, with the exception of the high voltage power lines that cross the area.

Should TDA decide to underground only a portion of the area, such as the Northwoods Boulevard Loop, this work could be completed much sooner. However, the combined planning and construction process is still expected to require about 5-years to form a special district, negotiate and coordinate with the service providers, obtain financing, accomplish final engineering, and then construction.

To convert the entire area, the phased construction is expected to occur over a period of 5 to 7 years. Phased construction is necessary because:

- ✓ The general contractor construction must be performed prior to service providers installing their systems.
- ✓ Traffic congestion and construction delays would result from the multi-agency construction activities.
- ✓ Removal of the overhead systems cannot occur until after customers have been converted to the new underground systems.
- ✓ The short construction season in the Truckee area (May 1 to October 15).

We project construction beginning in 3 years with completion in 5 to 7 years after starting construction.

It is unreasonable to assume that establishing a special district, obtaining financing, planning and design, and the contractor selection process could occur sooner than three years. Being ready to take advantage of the 2008 construction season (two years from now) appears unlikely; we anticipate the start of construction in 2009 with completion in 2015.

A schedule of major activities is presented in Figure ES-2. A more detailed schedule is in the report.

Cost Estimating

The order-of-magnitude cost estimates presented in this report (2006 dollars) are based on the assumptions, system configurations and conceptual design arrangements discussed in the report.

The construction cost estimates are based on trench footage and component quantities determined using TDPUD's region grid map system, field surveys, and conceptual design arrangements.

A summation of the construction cost estimate is shown in the Table ES-1 below:

Table ES-1

Description	Order-of-Magnitude Cost in Millions (2006 $)
General Contractor	$ 76.8
Electric	11.2
Telephone	11.9
Cable TV	9.7
Broadband	7.3
Total	$ 116.9
Total Miles of Trench	102
Cost per Total Trench Mile	$ 1.15

The total trench excavation length for the entire conversion, not including the service drops from the property lot lines to customer interface, is approximately 102 miles. This includes approximately 62 miles of main trench (primary trunks lines and lateral cables) and approximately 40-miles of distribution trench (cables from the main trench to the property lot lines).

If evaluated on a cost per-mile including all utilities and all trench excavation miles, this results in an approximate cost of $1.15M/mile

These costs have not been shared with the various service providers.

Also, the costs for the formation of a special district, legal, financing and other costs listed below are not included in the above estimate.

- Start-up administrative and organizational costs.
- Consulting assistance costs for formation of a District, meetings, and to secure financing.
- Additional funding to cover interest costs as it accumulates on borrowed loan(s).
- Engineering design, survey and management services during construction costs.
- Cost of individual service drops

Individual customers will need to arrange directly with each service provider for the installation of the service drops and any necessary modifications of existing customer interconnection equipment, if required. The cost for a typical service drop is listed below:

Table ES-2

Typical Service Drop Connection Fees [1,2,3]		
Service Provider	**Account Type**	**Basic Cost Range**
TDPUD Electric[4]	Residential Commercial 1f Commercial 3f Conversion OH to UG	$1,260 - $2,620 $1,260 - $2,620 $1,890 - $7,830 $ 750 (T&M deposit)
SBC Communications[5]	Residential Commercial Network Interface (new) Network Interface (replace)	$1/ft $2/ft $35 $200
Cebridge Connections	Residential/Commercial	$59.95
TDPUD Broadband		N/A

1. Expanded service drop descriptions and estimates provided in report.
2. Trench work and conduit costs not included, add $25-$30/ft.
3. All costs are limited to specific cable distances; cost adders apply for longer service drops.
4. If electrician services are required add $750-$1,250.
5. Assume 25% of all installations will require network interface replacement.

Service Drop implies OH construction

This would only apply to new const. For conversions from OH to UG a different table should be developed.

Table ES-3 indicates an approximate construction expenditure schedule over the life of the project.

Table ES-3

Spending Schedule Summary Cost in Millions									
Construction Description	**Year 1-3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Totals**
General Contractor		$ 5.3	$ 8.4	$ 23.2	$ 18.5	$ 21.3			$ 76.8
Electrical			1.1	1.4	3.1	2.6	$ 3.0		11.2
Telephone				1.5	1.1	3.3	2.6	$ 3.2	11.9
Cable TV				.94	.80	2.9	2.2	2.8	9.7
Broadband			.45	.51	2.3	1.8	2.3		7.3
Totals	$ 0	$ 5.3	$ 10.0	$ 27.6	$ 25.8	$ 31.9	$ 10.1	$ 6.1	$ 116.8

Approach to Accomplish

Before any underground conversion becomes a reality considerable work must be performed. The establishment of administrative framework for the development of a Special District must be accomplished.

This report identifies and outlines suggestions on various options TDA may want to pursue toward beginning the process for undergrounding the utility systems. However, financial advice, including legal advice regarding financing approaches and a specific determination on how to proceed with financing, contracts, etc., must be performed.

It may be best to manage the formation of a Special District through the Town of Truckee because the framework and capability to govern and manage such a task may already exist. There is a considerable amount of work associated with special district formation. The report discusses many of the steps that would be required as listed below:

- TDA and property owner review
- Informational meetings
- Development of petitions to establish a Special District
- Submit the property owner petition to the Town Council
- Development of an Engineer's Report
- Develop cost sharing agreements
- Explore and propose funding options
- Adoption of the resolution by the Town Council
- Complete the project design and estimates
- Review and analyze financing instruments
- Determine the ability to permit
- Organize public informational meetings
- Organize public hearing
- Town Council action to form Special District

This would be followed by the preparation of construction contract documents, competitive bids and contract award, in addition to securing long term financing, and obtaining the necessary permits. At that point, actual construction could begin.

Based on the year to year expenditures shown in Table ES-3 above and assuming an annual escalation rate at 4% of construction cost results in a total cost to construct of $148.4M.

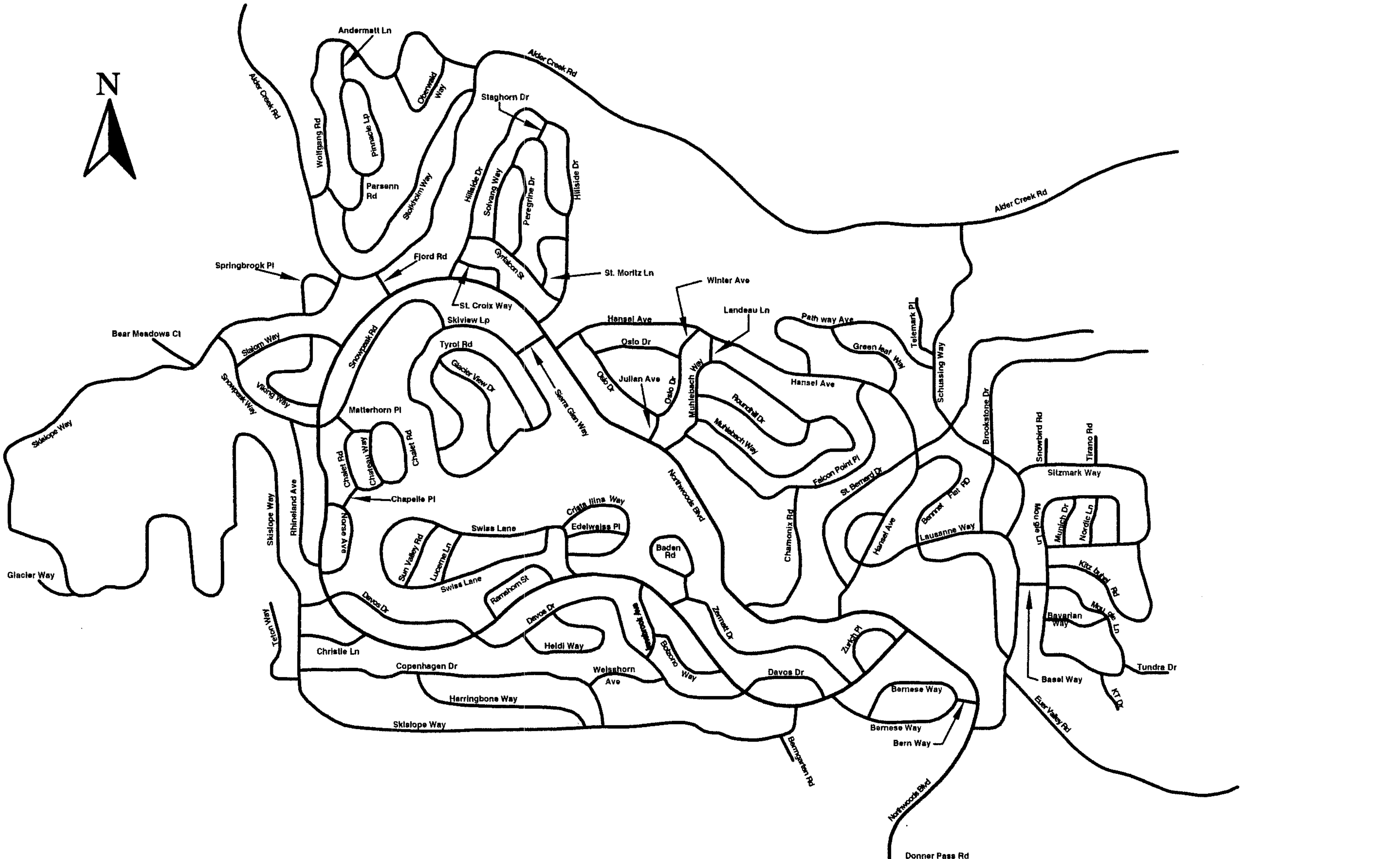
If all other expenditures as itemized above in the approach to accomplish are assumed to equal 10% ($14.8M) of the construction cost, the entire project cost from inception through completion will be $163.2M.

This is equivalent to approximately $1.6M per mile based on the assumed 102 trench excavation miles. Assuming 6500 customers this equates to approximately $25,000 per customer, or an approximate $2,600 per year for 15 years with an assumed 6% interest rate. These results are presented in Total Project Cost Table ES-4 below.

Table ES-4

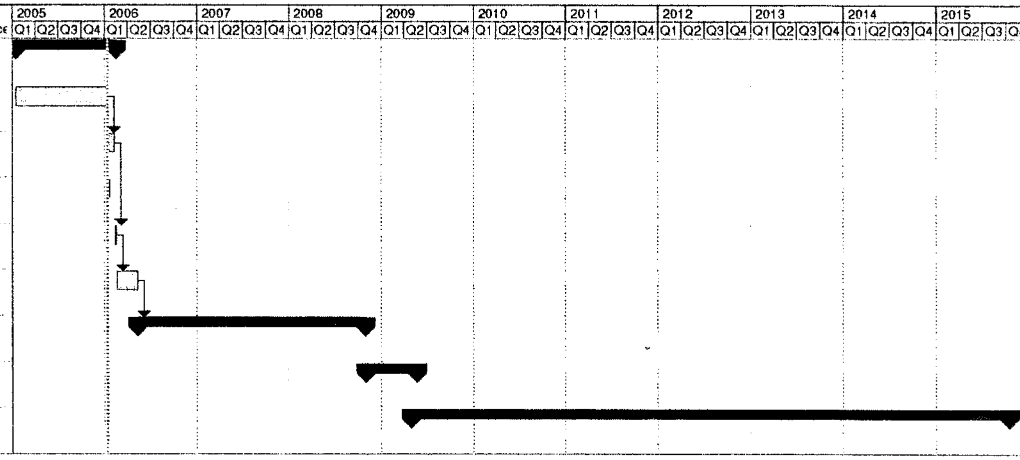
Total Project Cost Estimate
Cost in Millions

Year		0	1	2	3	4	5	6	7	8	9	Total
Construction $		$ -	$ -	$ -	$ 5.3	$ 1.0	$ 27.6	$ 25.8	$ 31.9	$ 10.1	$ 6.1	$ 116.8
Escalation	4%	1.00	1.04	1.08	1.12	1.17	1.22	1.27	1.32	1.37	1.42	
Annual Sum		$ -	$ -	$ -	$ 6.0	$ 11.7	$ 33.6	$ 32.6	$ 42.0	$ 13.8	$ 8.7	$ 148.4
Organization $	10%											$ 14.8
Rounding Factor	5											
TOTAL												$ 163.2
										Miles		102
										Per Mile		1,600,392
										Properties		6,500
										Cost Per Customer		25,114
									Interest Rate		6%	
									Customer Cost Per Year		15	$ 2,586

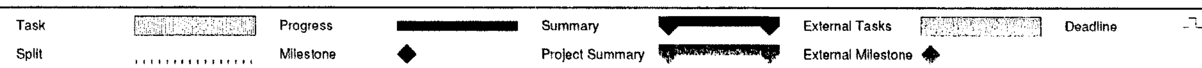


PROJECT AREA
FIGURE ES-1

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Undergrounding Feasibility Study**	**285 days?**	**Mon 1/17/05**	**Fri 2/17/06**	
2	Conduct Study	260 days?	Mon 1/17/05	Fri 1/13/06	
3	Draft Review to TDA	20 days	Mon 1/16/06	Fri 2/10/06	2
4	Presentation of Draft Report	1 day?	Mon 1/23/06	Mon 1/23/06	
5	Final Report	5 days	Mon 2/13/06	Fri 2/17/06	3
6	Town Council Decision on Whether to Take Next Step	60 days	Mon 2/20/06	Fri 5/12/06	5
7	**Decision on Whether to Form Special District**	**645 days**	**Mon 5/15/06**	**Fri 10/31/08**	6
36	**Construction Documents and Contractor Selection**	**145 days**	**Mon 11/3/08**	**Fri 5/22/09**	
43	**Construction Effort**	**1685 days?**	**Fri 5/1/09**	**Thu 10/15/15**	



Project: Tahoe-Donner Underground
Date: Wed 1/11/06



CONSTRUCTION SCHEDULE OF MAJOR ACTIVITIES FIGURE ES-2

1. Data Collection and Research

A. Data Requests

The project started with a kick-off meeting with the Tahoe Donner Association staff and a data gathering process, which included phone calls, issuing data requests and face-to-face meetings with the existing service providers to discuss their installations, access to maps and other information, and access to the utilities' design and construction standards. The following service providers were approached:

TDPUD – electric, water and broadband
Cebridge Connections – cable TV
SBC Communications – telephone
Southwest Gas Corp. – natural gas
Town of Truckee – storm drains/roadways/restoration
Truckee Sanitary District – sewerage

In addition, the following excavation companies were contacted to inquire about trench excavation in the TDA vicinity:

Al Pombo Inc.
Burdick Excavating Co,
Hall's Excavating Inc.
S&R Excavating Co.

During this study, the Donner Crest Development underground excavation and ductbank construction project took place. The excavation work crosses Northwoods Boulevard and the development is located on the west side of Northwoods Boulevard, just south of the entrance to the TDA area. The construction contractor, Lorang Brothers Construction of Colfax, CA, allowed an on-site interview during construction and some excavation photographs. The photographs, representative of typical trench excavation conditions, are included in Appendix F.

The excavation in this particular area showed no rock outcroppings although it did require the removal of large cobble rock. These conditions are expected to be similar to the majority of excavation in the TDA area.

B. Data Received

The results of the data request are summarized below:

- TDPUD - We received a construction standards document for the electric and water facilities. We also received a CAD map file showing the area roadways and property lines and depicting routing of existing electric, telephone and CATV service providers facilities, and existing underground placement of water, sewer, gas and some storm drainage facilities.

  In addition, the files identify physical characteristics such as roadway edge-of-pavements, roadway centerlines, right-of way widths, property identification and lot lines. The Construction Standards manual also included typical TDPUD electrical component and installation charges. We have accessed the latest connection fee schedule from the TDPUD website.

- TDPUD – The FTTU broadband CAD map files of the proposed overhead system were provided to allow us to identify the intended system. Monthly broadband service rates are available from the TDPUD website but connection fees have not been established.

- Cebridge Connections – We received no CATV system infrastructure maps from Cebridge other than a typical trench section detail example, nor did we receive the Cebridge cost schedule as expected. This schedule would have identified typical installation materials and labor costs. The routing of some Cebridge facilities appears on the TDPUD map files. We were able to acquire a verbal description of connection fee charges from local Cebridge staff.

- SBC Communications – We received no telephone system infrastructure maps from SBC other than an example installation plan sheet. The routing of some the SBC facilities appear on the TDPUD map files. We were able to acquire a verbal description of connection fee charges from local SBC staff

- Southwest Gas Corporation – We received natural gas hard copy map drawings for the TDA subdivision from SW Gas. The routing of gas facilities also appear on the TDPUD map files, however there are facility location inconsistencies between the TDPUD CAD files and the SW Gas maps. After consulting with SW Gas, we have concluded the SW Gas drawings are more accurate.

- Town of Truckee storm drains/roadways – Many of the storm drains and drainage culvert facilities appear on TDPUD maps. Pavement cut-and-patch standards for trench-work including shoulder and aggregate requirements were obtained.

  Town of Truckee staff pointed out that any work in the right-of-way will require landscape restoration consisting of one-for-one replacement of trees or shrubbery, and seeding or mulch, including winterization requirements. Storm water pollution requirements also exist for erosion and sedimentation control, as governed by the California Regional Quality Water Control Board for the Lahonton region. There will be a Town of Truckee Encroachment Permit required with a fee equal to 1% of the estimated construction cost.

- Truckee Sanitary District sewer – We received map CAD file from the Sanitary District: the routing of these facilities also appear on the TDPUD map files.

The maps were used to identify existing subsurface infrastructure positions and determine possible routing locations for the placement of underground facilities. The service provider design and construction standards have been used to establish general trench arrangements and right-of-way or easement placement locations. Preliminary design configurations were used for discussions with the various service providers to review the proposed approach and were revised as needed. All support data is included in the Appendices.

For the most part our inquiries were well received and the response and materials from the Town of Truckee and TDPUD representatives were very helpful. SBC and Cebridge furnished little information. The Donner Crest contractor, Lorang Brothers Construction, was responsive and willing to discuss construction experiences in the area.

In addition to the inquiries listed above considerable research was performed to:

- Investigate the California Public Utilities Commission (CPUC) Programs, Rules and Tariffs to determine if any policies are applicable for this potential conversion project.
- Investigate the history and trends in California regarding the formation of Special Districts related to conversion projects.
- Identify funding opportunities that might be available to finance this type of project.
- Prepare a suggested outline of the necessary steps to proceed with the formation of a Special District for the construction of a conversion project
- Contact various material suppliers to determine current material costs

2. Design Criteria

A. Design Considerations

The infrastructure services included for conversion from overhead to underground in this study comprise electric (TDPUD), communication (SBC Communication) and cable television (Cebridge Connections). In addition, because TDPUD intends to soon offer broadband services, provision for the District's broadband facility was also included. Other existing underground utilities within the TDA subdivision include water, sewer, storm drain and natural gas.

The study assumes that a general contractor will do all of the necessary trench excavation and restoration, and the installation of subsurface conduit, manholes, vaults and substructures to the property lot-lines or curbside pedestal equipment locations. We have prepared conceptual design drawings representative of activities to be performed by the general contractor that are included in Appendix E.

The installation of electrical cables and pad-mount equipment, communication cables, enclosures and ancillary termination equipment, and all above grade facilities are to be performed by the individual service providers. This is the normal approach for new underground and conversion projects.

The study includes the typical costs for various types of service drops and line extensions to the end user. Individual customers will need to arrange directly with each service provider for the installation of the service drop and to determine if specific modifications to the customer's existing interface equipment is required. Customers may want to approach the service providers as a group to evaluate service connection costs for joint conversions.

An important objective in the underground conversion was to determine the placement of new underground facilities in locations to avoid conflicts with gas, sewer and water line, where possible. Existing sewer lines are placed in the roadways and should be relatively easy to avoid except for crossings, although generally sewer lines are installed much deeper than the facilities to be converted, and as a result conflicts with sewer lines should be minimal.

In most instances the water lines are placed in the roadway, so avoiding them should be easy to accomplish, particularly for those lines that have been 'upgraded'. However, older water lines that have not yet been replaced appear to be located both in the roadway and adjacent to the roadside in the rights-of-way. Careful planning must be done during detail design to avoid these older lines, water line service taps and hydrant taps.

The vast majority of gas lines are placed along the roadside. As a result, the avoidance of these facilities will not be as easily accomplished. Our preliminary suggested route selections attempt to avoid the gas lines by placing new underground facilities on the opposite side of the roadway.

During the evaluation of acquired data we discovered there are discrepancies between various service provider maps regarding facility location or routing. The Southwest Gas Corporation gas line location information, as shown on the SWG hard copy drawings, and the TDPUC CAD maps are different in many instances.

We did not find discrepancies on the other systems between the TDPUD CAD maps and other data sources. We have based the selected routing assuming accuracy of the TDPUD information (excluding gas lines) and the SWG drawing data. However, no existing buried facilities have been physically pot-holed or site tested to confirm field locations.

The study is based on individual service provider specific construction standards, the state of California Public Utilities Commission (CPUC) construction standards, the National Electric Safety Code (NESC) where applicable, and the Best Practices as suggested by the Common Ground Alliance for the coordination of planning and design.

B. Design Configuration

We have determined that existing underground electric secondary and service facilities will likely remain intact and that some existing underground primary facility will be re-usable, although this includes a small portion of the system. This assumption is not made regarding the communication systems and we propose that by the time of the scheduled conversion the communication systems will be constructed of fiber optic networks.

The underground conversion process will require a variety of trench configurations. These arrangements are presented in concept-level configurations based on the types of facilities to be included and the following criteria:

- whether the system consists of backbone trunks, main lines
- whether the system includes distribution, lateral lines
- whether the system includes secondary or service lines
- the arrangement of various service provider facilities within the trench ductbank
- the proximity of infrastructure placement with regard to the right-of-ways
- the proximity of infrastructure placement with regard to public utility easements
- the proximity of infrastructure placement with regard to the roadways
- the trench excavation terrain types likely to be encountered during construction

Representative plan view arrangements for equipment and ductbank placement are shown on the conceptual drawings included in Appendix E. Various trench infrastructure section arrangements are also included. The ductbank locations and trench configurations will vary depending upon the infrastructure facilities to be constructed and each service providers' installation requirements.

The service providers' existing infrastructure facilities and general requirements are briefly described as follow:

TDPUD Electric System The vast majority of the TDPUD electric distribution system within the TDA subdivision consists of overhead wood pole facilities located within the roadway rights-of-way. The TDPUD poles also support the telephone and cable television communication systems and are intended to support the future broadband communication system.

The District's electric distribution system consists of approximately 20.5-miles of three-phase circuits (800-poles), and approximately 40.5-miles of single-phase circuits (1,600 poles) that serve 5,525 secondary service meters of which only 6% are placed underground. The three-phase main backbone system is routed along Northwoods Boulevard and around the Northwoods Boulevard loop. Other three-phase circuit loops are routed along Lausanne Way to Sitzmark to Schussing ← backbone Way and to Hansel Avenue, and Bernese Way. There are other three-phase circuit taps throughout

Sub to Ski slope would be another backbone the area that are extended to serve specific facilities (commercial accounts and pump or lift stations), but no other three-phase circuits are completely looped.

The conceptual underground design was configured to provide nearly identical service as the existing overhead system. A circuit map indicating single-phase, two-phase and three-phase configurations throughout the TDA area is presented in Figure 2-1.

The design concepts in general are intended to the same circuit configurations as exist now. New padmount equipment will be installed to accommodate circuit taps, protection, sectionalizing and customer secondary facilities to the property lot-line service pedestals. Typically, primary 600-amp three-phase circuit conduits are sized 6-inch, 200-amp three-phase circuit conduits sized 4-inch, single-phase lateral taps sized 2-inch, and secondary conduits are sized 3-inch. Primary conduits are to be installed at 48-inch depths and secondary conduits installed at 36-inch depths. These concepts are in compliance with TDPUD standards.

<u>TDPUD Broadband System</u> The District has an overhead design for its broadband system. For this study, the inclusion of the broadband system is considered as part of the underground infrastructure and conduits, vaults, and hand-holes have been included. The mainline conduit is sized at 4-inch and 3-inch, and lateral distribution conduits are sized at 2-inches; all to be buried at a depth of 36-inches. The broadband conduits are placed adjacent to the electrical facilities as directed by TDPUD.

The TDPUD planned overhead system includes three locations within the TDA subdivision for major above-grade shelter hubs to house network equipment. These backbone facilities are to be located near Northwoods and Slalom Way, Northwoods and Skislope Way, and Sitzmark Way and Triano Road. Although an underground system will undoubtedly require different components from overhead, we assumed these hub facilities to be placed at the same locations. While including the District's broadband system introduces additional conduit, for the most part it does not require trench expansion. However it does introduce another cost sharing element.

<u>TDPUD Water System</u> With regard to the TDPUD water system lines, TDPUD is in the process of replacing approximately 1-mile of old mainline piping (sizes 6" to 10") per year, with approximately 30-miles of replacement construction completed to date and another 36-miles yet to be constructed. The water line depths vary between 42" and 48" to the top of pipe. The new water lines are being installed at the 48" depth, and the replaced piping is being abandoned in place.

It should be mentioned that the resurfacing of the roadways in the TDA subdivision region is complete and this water line replacement requires cutting and patching of the recently resurfaced roadways.

Since the PUD is abandoning the old water lines in place, one option for the water line replacement project is for trench sharing with the other facilities to be undergrounded along with the remaining 36 miles of water lines. Although this would require trench configuration expansion it does introduce another potential cost sharing element. Generally the water replacement trenches are in the roadway, rather than the right-of-way outside the edge of the roadway. Placing other service provider utilities in the water line replacement trench was evaluated during this study and determined to be impractical because of the in-roadway location.

<u>SBC Communications</u> The present telephone communication system consists of a fiber trunk routed to five huts located around the Northwoods Boulevard loop, and then a combination of

plain-old-telephone (POT) copper wire and newer digital subscriber line (DSL) for a total of approximately 54-miles of overhead and 6-miles of underground facilities.

The existing system includes approximately 6-miles of fiber optic cable extending from outside the TDA subdivision south along Northwoods Boulevard, which is tapped and wyes at the Northwoods loop intersection and continues to Fiord Road. The fiber system contains 5 termination huts positioned at Northwoods Boulevard and the intersections of Davos, Hansel, Sierra Glenn, Innsbruck and Fiord.

SBC conduits are to be installed at the same depth as CATV, 24-inches, and require approximately 4-inch horizontal separation from other CATV infrastructure conduits. In addition, a 12-inch vertical separation shall be maintained between telephone communication conduits and electrical or other facility conduits. The main trunk lines and main laterals lines are to be constructed with 4-inch conduits. Distribution and lateral cable tap runs shall be placed in 2-inch conduits.

In evaluating the construction possibility of a new telephone communication system, which may not take place for five years or more, we have assumed a new system will not be constructed similar to the existing hybrid facilities. Therefore, our communication design is based on the installation of a modern technology high-speed fiber system network. This assumption was made to reflect the advancement of the telecommunication technology and the method the system will most likely be configured.

SBC has told us that it agrees a new system would be a fiber network and it would be based on a ring design around Northwoods Boulevard. SBC indicated that it would insist on grade level vaults and service pedestals and would not accept above grade equipment installations.

Cebridge Connections CATV The present cable television system is configured with a hybrid combination of 550-Mhz fiber-optic and coaxial cable, consisting of approximately 76-miles of overhead and 1,000-feet of underground facilities.

Cebridge conduits are to be installed at the same depth as telephone, 24-inches, and require 4-inch horizontal separation for both fiber and coaxial cable conduits from other infrastructure conduits. In addition, 12-inch vertical separation shall be maintained between CATV and electrical or other facility conduits. The main trunk lines are to be constructed with 4-inch conduits and construction will include a spare empty conduit along main routes. Distribution and lateral cables shall be placed in 2-inch conduits.

In evaluating the construction possibility of a new CATV system, which may not take place for five to six years, we have assumed a new system will not be constructed similar to the existing hybrid facilities. Therefore, our CATV design is based on the installation of a modern technology high-speed fiber system network. This assumption was made to reflect the advancement of the telecommunication technology and the method the system will most likely be configured.

Cebridge has told us that it agrees that a new system would be an 860-Mhz fiber system and it would contain a ring design around Northwoods Boulevard.

Southwest Gas Company The SWG construction in the TDA subdivision started in 1996 and is now complete in all practical terms and SWG sees no additional main line or distribution line construction in the foreseeable future, with only service line extension work necessary in some instances.

SWG construction standards require a 30-inch cover to the top of pipe. Main lines are typically constructed with 4-inch polyethylene pipe and distribution lines are made up of 2-inch polyethylene pipe.

Our approach to the underground conversion design is to avoid all gas lines and install new infrastructure on the opposite side of the roadway were at all possible.

<u>Truckee Sanitary District</u> The TSD sewer line system is primarily in the roadways. Construction standards require a 5-foot horizontal separation from other infrastructure facilities and 1-foot vertical separation; however sewer lines are usually placed much deeper than other facilities resulting in much greater separation.

<u>Town of Truckee Roadway</u> The Town of Truckee maintains approximately 62-miles of roadway within the TDA subdivision. We have been informed that the resurfacing of the roadways in the TDA subdivision region is essentially complete for the time being and any water line replacement will require cutting and repair of the newly resurfaced roadways. It is our understanding that the Town would prefer to avoid any unnecessary re-surfacing.

C. Design Standards

Although the study has based the TDA conceptual design features on individual service provider criteria, it may be possible that less expensive construction would result from a combined or coordinated construction approach. For example, providers offering competing services could combine construction of some trench duct and termination facilities, eliminating trench space and possibly combining some termination structures.

In addition, the CPUC and NESC allow less stringent overall trench spacing requirements. If providers concur, further reductions in infrastructure clearances may be achieved for construction that is 'concurrently' installed rather than 'independently' installed.

The companies that will be providing services within the TDA subdivision have suggested that conceptual design arrangements should comply with their individual installation standards. We have therefore considered preliminary trench configurations that are in agreement with their standard criteria.

In addition, construction methods such as the use of Controlled Density Fill (CDF) concrete slurry backfill materials have not been considered because they are not typically part of the existing providers criteria. However, construction methods that may prove cost effective in the TDA area that can reduce trench size, ductbank size, shoring and other requirements should be considered and further evaluated since they may result in labor and material cost savings.

Also, if fiber telecommunication networks are installed in the future, interference and resulting increased spacing concerns are not usually a design issue. This suggests that conduit separation to the minimum CPUC and NESC criteria could be accommodated.

D. Design Approach

GENERAL DESIGN CRITERIA

The project is sufficiently large and the allowable construction season sufficiently short (May 1 through October 15), so that it will require several years to accomplish complete construction. We have estimated that up to 7 construction seasons may be required to accomplish the installation, cutover and demolition of the existing systems. The schedule needs to include time for the service providers to cutover customers to the new system at the appropriate times and minimize customer service interruptions.

The assumption is that major construction will be performed by a general contractor that will install all below grade facilities consisting of trench excavation and restoration, ductbank (conduit) installations, manholes, vaults, equipment mounting pads, and interconnecting pedestals or splice boxes placed in the public utility easement at property lines. The service provider components including cables, operating equipment and terminations will be installed by each individual provider after the general contractor construction is complete. The service provider construction can be performed year-round, weather permitting.

The proposed trench excavation descriptions used in the conceptual design and for cost purposes include work in soil, gravel, rock, and pavement conditions as defined in the unit details. As explained in the cost estimate section, approximately 5% of excavation quantities are assumed to include solid rock excavation.

Since the potential to encounter solid rock is an unknown quantity we suggest that any bid solicitation include a specific clause to deal with the unknown quantities of rock excavation.

The design might also be performed in phases, prior to each construction phase or the design could be completed at the beginning and updated as construction proceeds. An important aspect of the design and construction will be to select an approach that minimizes, to the extent possible, any impact on service continuity.

CONSTRUCTION ROUTE SELECTION

We suggest the conversion construction begin near the source of the service providers' systems to the TDA area. This is along Northwoods Boulevard near the entrance to TDA for the communication services and in this general area for the electrical system.

A reasonable construction sequence is to complete the conversion of facilities along the entire Northwoods Boulevard loop in the first two construction seasons (Phases I and II). Although the total distance involved is only approximately 34,500 feet, this area will present the most difficult construction because of the complexity and because it includes the largest trench excavation and ductbank work, major underground feeder taps and distribution lateral extensions, and traffic congestion.

The Phase I and II construction will accomplish installation of each service provider's backbone cable or trunk system, loop the electric system, create a ring configuration for each telecommunication system, and simplify subsequent phases of work. Once construction work for Phase I and II is completed, each additional TDA area can be organized into future construction phases. Our approach to organizing the remaining TDA area and sequencing construction is described in Section 3.

Evaluation of the TDA road system indicates that a 60-foot right-of-way is prominent throughout. Although the roadway surfacing varies between 21-feet to 34-feet wide, the remaining distance, from edge-of-pavement to edge of right-of-way, varies between 13.5-feet to 18-feet. This space is available for infrastructure placement assuming other utility infrastructure (water, gas, sewer, etc.) main lines are not present (other than crossings) and that infrastructure to be undergrounded can be installed in accordance to each service providers' spacing requirements. There appears to be limited infrastructure placed in the Public Utility Easement (PUE), which is outside the 60-foot right of way, and consists of 10-foot widths along the property lot frontages adjacent to rights-of-way and 5-foot widths along lot side and rear properties.

A variety of detail design configurations and equipment arrangements are presented in the conceptual drawings. The configurations comply with a mix of conduit placement requirements, some of which result in greater ductbank overall dimensions than might otherwise be necessary.

For example, the conduit spacing in some details, which include service provider preferences, could be reduced and still comply with CPUC and NESC criteria. This is true for new construction in which conduits are placed '*concurrent*' with other franchise utility conduits. The spacing between conduits of different communication franchises or communication and supply duct systems can be reduced when *concurrently installed* and *mutually agreeable* between the providers.

Trench excavation, backfill and restoration will be the greatest construction cost component and any possibility to reduce trench size should be considered. The CPUC separation requirement of communication and supply duct systems for '*independent*' construction is 12-inches (earth), when facilities are constructed independently. An insert of an Illustrative Diagram and Clearance Requirements Table with descriptions taken from the CPUC General Order No. 128 is included in Appendix B.

Adequate right-of-way space is available for the installation of ductbanks in either the roadway right-of-way or the PUE, regardless of any reduction in trench width. For the most part, installation of the ductbanks and vaults should be in the right-of-way but away from the edge-of-pavement (the roadway shoulder). The actual routing and placement of ductbanks either in the right-of-ways or in the PUEs will be determined by TDPUD. Major equipment to be mounted on or in vaults should be positioned away from roadways and in locations that accommodate maintenance access. If necessary, additional physical equipment protection can be provided through the use of bollards or barriers.

Based on the high costs of trench excavation, backfill and restoration, it is not practical to include the facilities to be converted in joint trenches with water and/or gas facilities and maintain required separations. We therefore suggest not using a common trench with water and/or gas lines. Detailed cross sections of various ductbank arrangements and associated cost allocation percentages for each service provider are presented in the Section 4, Cost Estimates. All trench and ductbank construction includes only those service providers directly involved. If this were new development construction with all new service installations this conclusion may be different.

COMPONENT SELECTION

A variety of equipment is available for each type of service consisting of both padmount and subsurface or grade level components. Both padmount and subsurface or grade level equipment were considered and evaluated for installation. Traditionally, subsurface equipment has been noticeably more expensive for both equipment and installation. However, recent design improvements have resulted in some cost reductions, and for specific applications in the TDA area subsurface components may prove beneficial.

For example, two of the more expensive components for the electrical system involve both primary three-way or four-way switching modules, and primary sectionalizing switchgear that allows dual source trunk line disconnects and electronically protected taps for multiple distribution circuits. These devices are available in both padmounted gear (above grade) and subsurface arrangements (undercover). Both styles of equipment should be vault mounted; the cost difference for going from the padmount to undercover (vault inserted) is approximately 20% greater for undercover for both the switch modules and the sectionalizing switchgear.

In addition to the above electrical equipment example, once the circuits leave the sectionalizing devices, they are distributed to loads in various directions through junction devices. These can be either above grade enclosure devices mounted on pads or vaults, or below grade junction blocks mounted inside vaults. The common advantage for below grade installations with respect to exposure is obvious, the disadvantage is that they are less accessible and the exposure to moisture and contamination is greater, although the equipment assembly's are corrosion resistant and waterproof. Conceptual design details of some below grade equipment are provided in Appendix E.

There are many installation considerations involved when making a decision for locating equipment in either a padmount or subsurface configuration, such as cost, operation and maintenance, access, vehicle and snow removal vulnerability, water ingress, etc. One argument for subsurface equipment is to minimize vulnerability because these types of major components will most likely be located in the right-of-way.

Central telecommunication hubs will remain as currently located or added as planned for the broadband system, and located at the edge of the right-of-ways and away from roadways.
The electrical distribution transformers and service pedestals, and communication enclosures and splice boxes or service pedestals are expected to be located outside the right-of-ways and in the PUE, as shown on the conceptual design drawings. The enclosures and service pedestals can either be above grade devices or grade level devices. To minimize intrusion, we suggest consideration be given to grade level subsurface enclosures.

The above descriptions address some issues related with snow removal or the concern of accidental physical contact. Because of expected heavy snowfall and accumulation during roadway snow removal, the matter of locating facilities during the winter months is a real concern. The installation of bollards or other barriers and the installation of equipment mounted antenna flagging can be used to assist with protecting and locating plant facility. As an example, Truckee currently uses whip antenna type indicators on fire hydrants throughout the Town.

The installation of subsurface equipment that will be located within the right-of-ways is certainly one approach to assist with equipment protection. An obvious method that can be used to assist with locating equipment is to identify each installation with GPS coordinates that are database accessible and on franchise maps that can be field referenced.

Electric primary facilities typically include fault indicators on underground cabling that can provide signals to assist with locating equipment during outage conditions. Because TDPUD intends to install a supervisory monitor and control system, this system can be utilized for remote switching to sectionalize and restore service until field repairs can take place, in addition to lending assistance to trouble-shoot outage locations.

ELECTRIC SYSTEM
As mentioned above, the general basis for the electrical system underground arrangements is to duplicate the existing overhead configuration by extending backbone circuits from the substation feeders to loop around Northwoods Boulevard. Other major distribution circuits and lateral tap extensions will be improved to some extent by providing additional backup capability where practical. New switching and sectionalizing equipment will also be incorporated to isolate and minimize disturbances to areas during outage conditions and to improve service restoration.

To accomplish these objectives, some underground system configurations will be different from present overhead system configurations, resulting in considerably more plant and more cost. In contrast to an underground system, an overhead system can easily accommodate many single-phase lateral taps and protection along its route directly tapped from the three-phase overhead circuit. As a consequence, to maintain three-phase service to critical loads (commercial facilities and pump or lift stations), the underground system does not easily lend itself to tap access without the use of sectionalizing equipment.

As an example, for major three-phase underground trunk and other backbone circuits, that have single-phase loads along their route, the integrity of the three-phase circuit is maintained by leaving it intact and installing separate single-phase circuitry to serve local loads. This results in noticeably more circuitry for an underground system than an overhead system because one conduit system is used for the major trunk circuits and additional parallel conduits are used for the single-phase circuits. This allows the single-phase taps to be served only through switching equipment while the integrity of the three-phase backbone circuits is maintained.

In addition, part of the underground design will in most instances allow for all single-phase loads (transformers) to be looped. This is common in underground designs where practical and allows transformers to be fed from two directions through junction box sources. This should increase reliability and decrease restoration time.

To save trenching expense in areas where the main ductbank trunk or backbone circuits may be installed in the right-of-ways or roadway shoulders, consideration should be given to placing the service conduits in the same main trench rather than in a separate (paralleling) trench in the PUE. However, where roadway crossings are necessary to extend services to the opposite roadside properties, the trench systems of interconnecting ductbanks and circuits on this opposite side of the roadway should be placed in the PUEs. As mentioned previously, transformers and service drop equipment are expected to be located at property lot lines in the PUE in accordance with TDPUD standards.

COMMUNICATION SYSTEMS

If the underground conversion project moves forward it is expected that communication system construction may not begin until year 2009, and that actual communication conversion could possibly begin one to two years afterward. Based on this assumption, we expect all communication systems will be configured with the current technology at that time; our assumption is that these systems will implement fiber optic network systems.

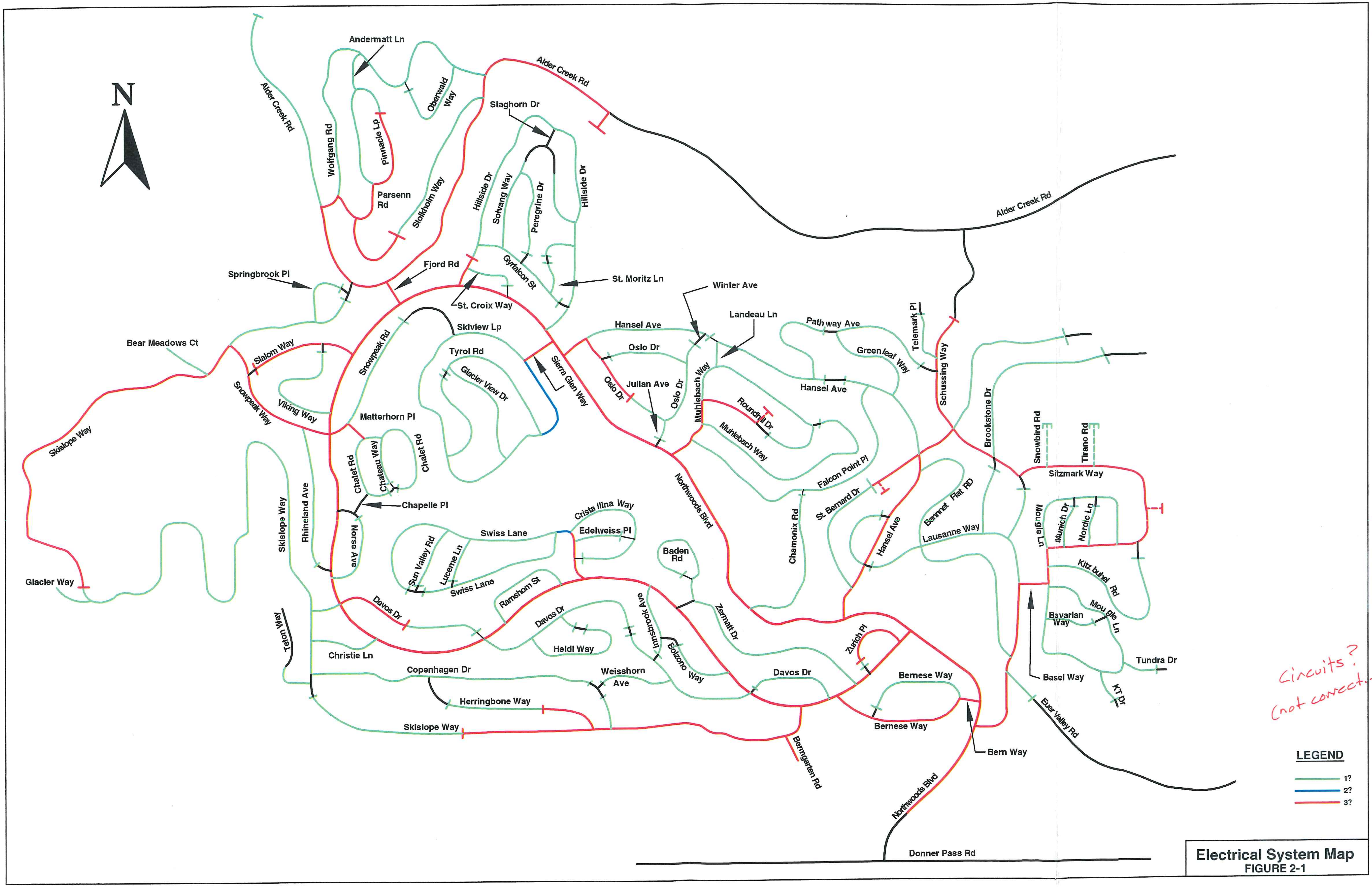
The design concepts used are based on the current fiber optic technology. Since actual construction is likely to take place over a five-year period, we expect the systems will capitalize on market trends and the inter-operability of networking equipment popular at that time.

The design, scheduling and cost estimates presented in this study are based on the assumption that three separate fiber communication systems will be installed. This conclusion complies with the Request for Proposal scope-of-work, and is also based on discussions with the telecommunication service providers, SBC Communications, Cebridge Connections, and TDPUD-Broadband.
In order to provide a conservative estimate, we assume the three systems will be essentially identical and will be capable of providing similar and competing telecommunication services. It is likely that each system will have capacity that could be made available to others. In this study, each system differs only in the share of customer counts.

The assumptions that support the choice of technology and architecture for an all fiber network and the cost estimates provided are based on market trends, growth potential and current reliability. The basis for the anticipated system configuration and infrastructure components is presented in the discussion on Communication Industry Market Trends in Appendix B.

The communication cables will be installed in the same trench ductbank and conduit systems as the electrical facilities with placement and separation as required by the service providers. These systems will be placed in the right-of-way roadway shoulders and PUEs. All service drop equipment should be positioned at property lot lines in the PUE in accordance with TDPUD standards.

The equipment necessary to operate the type of selected network (active), hub sites, backbone-to-distribution splice points, service area-to-splice points, for branching off the backbone fiber to laterals and customers are included in the detailed descriptions and cost estimates.



Electrical System Map
FIGURE 2-1

3. Construction Schedules

A. Scheduling Considerations

A variety of construction strategies have been evaluated during the course of this study. Regardless of the construction approach used, it is reasonable to expect the entire planning and construction process to take 8 to 10 years to fully implement. This time would be spent organizing management and startup activities, establishing a special district, pursuing financing, planning design and construction activities, negotiations and coordination with the various franchise utility service providers, and contracting services.

The actual construction is expected to occur over a period of time that could span 5 to 7 years. A phased construction sequence is necessary for the following reasons:

- ✓ The general contractor construction must be performed prior to any service provider installation activities.
- ✓ The congestion that could result from the multi-agency system construction activities.
- ✓ The need to remove the old overhead system after customers have been converted to the new underground system.
- ✓ The short construction season in the TDA area.

Activity durations could be shorter or longer, with construction possibly beginning within 3 years and/or final implementation not completed for 15 years.

It seems unreasonable to assume establishing a special district, obtaining financing, and planning and design could occur sooner than three years, particularly given a construction season of May 1 to October 15. Therefor, being ready to take advantage of the 2008 construction season appears unlikely.

Each phase of work must represent an amount of construction that can be accomplished in a given construction season and that will allow customers to be converted to the new system. Multiple crews could perform more work; however, the need to minimize traffic congestion limits the amount of work that can be accomplished in a given season. A more aggressive construction approach could be pursued; the tradeoff is cost, traffic congestion, and resident acceptance of significant disruption. It is possible that individual service provider work could take place in various areas concurrently once the underground infrastructure is in place.

Other construction considerations are to perform conversion based on existing arrangements, such as system loops and roadside configurations, circuit configurations, three-phase circuitry of the electric utility, and major trunk line placement for communication utilities. While one approach may be satisfactory to a particular utility, it may not be satisfactory for other service providers. For the electrical system, it may be advantageous to start work at the source to avoid future multiple service outages. For the communication systems there may be advantages to begin work at the remote end of the system and work back toward the source.

Our objectives in planning construction sequences include:

- Develop a cost effective method with reasonably constant cash flow spending each year.

- Identify strategic start/stop locations between construction phases allowing subsequent phases of construction to begin at simple interface locations.

- To the extent possible maintain service continuity during each cutover to the new facilities.

- Minimize customer inconvenience during each construction stage through well-planned sequenced construction.

- Sequence work best suited for the overall community and reasonable for all service providers involved.

Since we consider the electrical utility an '*essential*' service and communication utilities '*non-essential*' services we assumed construction begins near the electric system source and proceed away from this origin.

The conversion of existing systems in a congested community area of nearly 6,500 properties needs careful planning. Working in staggered construction phases, with reasonably sized areas selected for conversion each year is the most realistic conversion approach.

A sequence of construction phased activities and type of work is presented in Figure 3-1. The construction activities align with a comprehensive planning schedule presented in Figure 3-2.

With regard to the existing electrical system plant, it appears to be in good operating condition and has considerable remaining service life, suitable to serve the TDA subdivision into the long-term future. Whereas, although the telephone and cable television plant are presently providing acceptable service, the existing systems may not be capable of providing high-speed technically competitive services desired into the long term future.

B. Schedule Options

The recommended construction schedule takes into account several features and constraints unique to the TDA subdivision. These include:

- The conversion of the electric, cable television, and telephone, plus the installation of a new broadband system.
- Begin construction near the TDA subdivision entrance.
- After Phase I and II construction organize the underground work to convert approximately 1,500 properties per year based on logical areas that can be converted each year.
- Organize the underground development based on a strategic approach toward facility build-out at convenient interfaces with subsequent construction phases.
- Because the general contractor will perform the subsurface construction and individual service providers will install their infrastructure, it is assumed the subsurface construction and possibly the installation of one utility (electric) could be performed in the first year of construction, with this pattern continued during subsequent phases.
- Because the general contractor will perform the subsurface construction and individual service agencies will install their infrastructure, it is possible the subsurface construction

may occur 1 to 2 years prior to actual customer conversions taking place, and/or prior to any removal and demolition of the old system.

- The construction should be planned to eliminate outages and minimize inconveniences to consumers during construction and cutovers.
- Minimize expensive temporary interconnection construction such as three-phase electrical and trunk line communication splicing, and if possible reuse temporary components in subsequent construction phases.

C. Proposed Scheduling

The schedule below is a construction approach for the subsurface facilities to be completed by a general contractor and the conversion process to underground existing overhead infrastructure by each service provider. All subsurface construction, less actual service drops to customers, are assumed to be performed by the general contractor with facility installation in accordance to each service providers' design criteria:

The schedule is based on arranging the TDA subdivision into 5 major work areas as shown on Figure 3-1 and assigns construction activities each year as follows:

- Year 1 – Phase I general contractor subsurface construction.

  This area starts at the TDA subdivision entrance and includes all trench excavation, ductbank installation, backfill and trench restoration along Northwoods Boulevard from the beginning point to the Fjord Road intersection as shown on the Construction Sequence Map. This work will include underground conduit construction to riser pole interface locations for each franchise utility agency at all roadway intersections.

Year 2 – Phase II general contractor subsurface construction: Phase I service provider construction.

  This work begins at the end of Phase I and includes all trench excavation, ductbank installation, backfill and trench restoration along Northwoods Boulevard to the Northwoods Boulevard looped intersection as shown on the Construction Sequence Map. This work will include underground conduit construction to riser pole interface locations for each franchise agency at all roadway intersections.

  The electrical infrastructure installation and conversion can be performed in the Phase I area this year. This work may or may not include wreck-out of the electrical pole-top facilities for this area.

  It is assumed the TDPUD broadband facilities will be installed in each area at the same time as the TDPUD electrical infrastructure. This assumption is based on the common utility ownership although the installation of the TDPUD broadband could occur during any later construction phases.

- Year 3 – Phase III general contractor subsurface construction: Phase I and II service provider construction.

  This phase consists of all areas east of Northwoods Boulevard between and including

Lausanne Way and the north Hansel Avenue access as shown on the Construction Sequence Map, and includes all trench excavation, ductbank installation, backfill and trench restoration as required. This work also includes underground construction to the interface riser locations for each franchise agency at roadway intersections as established during Phase I and Phase II.

The electrical and broadband infrastructure installation and conversion can be performed in the Phase II area this year. This work may or may not include wreck-out of the electrical pole-top facilities for this area. If completion of this work in a single season is not practical the electrical work will be scheduled to continue in Phase II during year 4.

During year 3 the installation of the telephone and CATV facilities can be performed in the Phase I area. This is to be followed by wreck-out of the remaining overhead facilities in this area. If the electrical work is not constructed as scheduled this work may be postponed one year.

- Year 4 – Phase IV general contractor subsurface construction: Phase II and III service provider construction.

  This phase consists of all areas north of Northwoods Boulevard between and including the south Hillside Drive access and Fjord Road, and the area contained between Phase I and Phase II south of Northwoods Boulevard as shown on the Construction Sequence Map. It includes all trench excavation, ductbank installation, backfill and trench restoration as required. This work also includes underground conduit construction to the interface riser locations for each franchise agency at roadway intersections as established during Phase I and Phase II.

  The electrical and broadband infrastructure installation can be performed in the Phase III area this year. This may or may not include wreck-out of the electrical pole-top facilities for this area. If completion of this work in a single season is not practical the electrical work will be scheduled to continue in Phase III during year 5.

  During year 4 the installation of the telephone and CATV facilities can be performed in the Phase II area. This is to be followed by wreck-out of the remaining overhead facilities in this area. If the electrical work is not constructed as scheduled this work may be postponed one year.

- Year 5 – Phase V general contractor subsurface construction: Phase III and IV service provider construction

  This phase consists of all areas west of Northwoods Boulevard between and including the northern Skislope access and the east Bernese Way access, and the area contained between Phase I and Phase II along Northwoods Boulevard as shown on the Construction Sequence Map, and includes all trench excavation, ductbank installation, backfill and trench restoration as required. This work also includes underground conduit construction to the interface riser locations for each franchise utility agency at roadway intersections as established during Phase I and Phase II.

  The electrical and broadband infrastructure installation can be performed in the Phase IV area this year. This may or may not include wreck-out of the electrical pole-top facilities for this area. If completion of this work in a single season is not practical the electrical work will be scheduled to continue in Phase IV during year 6.

During year 5 the installation of the telephone and CATV facilities can be performed in the Phase III area. This is to be followed by wreck-out of the remaining overhead facilities in this area. If the electrical work is not constructed as scheduled this work may be postponed one year.

- Year 6 –Phase IV and V service provider construction.

  The electrical and broadband infrastructure installation can be performed in the Phase V area this year. This may or may not include wreck-out of the electrical pole-top facilities for this area. If completion of this work in a single season is not practical, the electrical work will be scheduled to continue in the Phase V area during year 7.

  During year 6, the installation of the telephone and CATV facilities can be performed in the Phase IV area. This is to be followed by wreck-out of the remaining overhead facilities in this area. If the electrical work is not constructed as scheduled this work may be postponed one year

- Year 7 – Phase V service provider construction.

  During year 7 the installation of the telephone and CATV facilities can be performed in the Phase V area. This is to be followed by wreck-out of the remaining overhead facilities in this area

If the TDPUD water system upgrade construction work were included in the above schedule, it is unlikely the conversion work could be achieved at this construction rate.

The construction sequence has been discussed with contractors and we have been given general concurrence that the amount of progress planned for each year can be accomplished, baring unforeseen and unusual subsurface constraints. However, some phases will require that multiple excavation crews work simultaneously. Typically, with conversion project planning the first and second years of construction will determine if and how subsequent construction phases should be adjusted with more or less aggressively planned activities.

We believe that the schedule discussed above is a realistic approach to this underground conversion project.

D. Construction Organization

The proposed construction plan is to contract with a general contractor to perform all trench work, install all vaults and equipment pads, and all underground ductbank (conduit) facilities in each phase prior to the service providers installing their equipment. Or to at least to have the general contractor construction completed to the extent that if a service provider begins its equipment installation there is no overlap or work delays caused by either's construction crews.

When the general contractor has sufficient segments of underground facility in place, then the first service provider can begin its installation. We suggest the electric utility be the first to install equipment. Once the electrical facilities are installed and cutover, the retired electric facilities can be wrecked-out or at least de-energized, thereby allowing other franchise utilities to work on de-energized overhead facilities.

With the progression of phased construction, once each phase is built-out to tap points, construction can be extended from the tap points without further interruption impacts on the remaining system. This can be accomplished through sectionalizing equipment and should occur with only momentary service interruptions in the area under construction.

We are assuming the TDPUD will install its broadband system concurrently with the electrical system facilities.

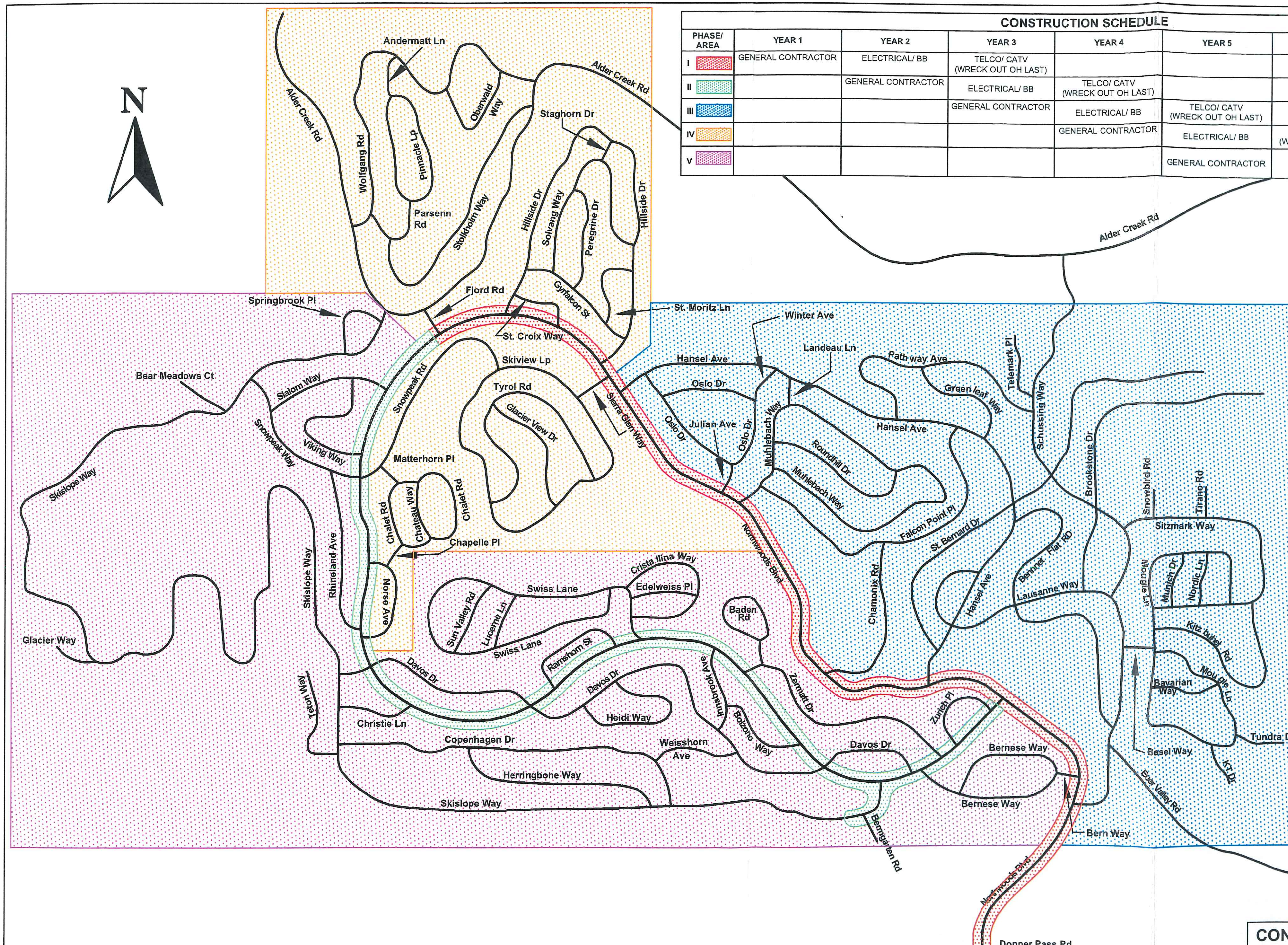
It should be possible for service providers to install their equipment the same year, we have assumed this will be the case for the telephone and cable television systems, which are expected to be installed the year following electrical and broadband installation. These service providers can stagger their installations or can work simultaneously starting at different locations of each phase. This process will take careful coordination between the service providers.

Construction maps that reference route selection and photographs have been assembled for each suggested construction phase. These maps are presented in Appendix G with the associated photographs for construction Phase I and Phase II inserted after the respective maps. Photographs that portray route selection options for all construction phases are included with the project documentation CD.

Should the Association determine that only a portion of the subdivision area is applicable or practical for conversion consideration, such as the Northwoods loop, this construction could be completed much sooner. However, the combined planning and construction activities would still be expected to span an approximate 5-year process.

If less then the entire TDA development is considered for conversion only the Northwoods loop seems a reasonable area for selection. This conclusion is based on the following reasoning:

- Northwoods Boulevard comprises the backbone system loop or ring arrangement of the overhead facilities of each service provider and is therefore the most important plant as far as maintaining service integrity.
- Undergrounding this portion of the system will improve system reliability benefiting all customers.
- The Northwoods loop is the most noticeably congested area of the system and its placement underground will contribute to the greatest aesthetic improvement.
- There are no other individual areas in the development that by undergrounding appear to provide any particular advantage or benefit to all customers.



CONSTRUCTION SCHEDULE

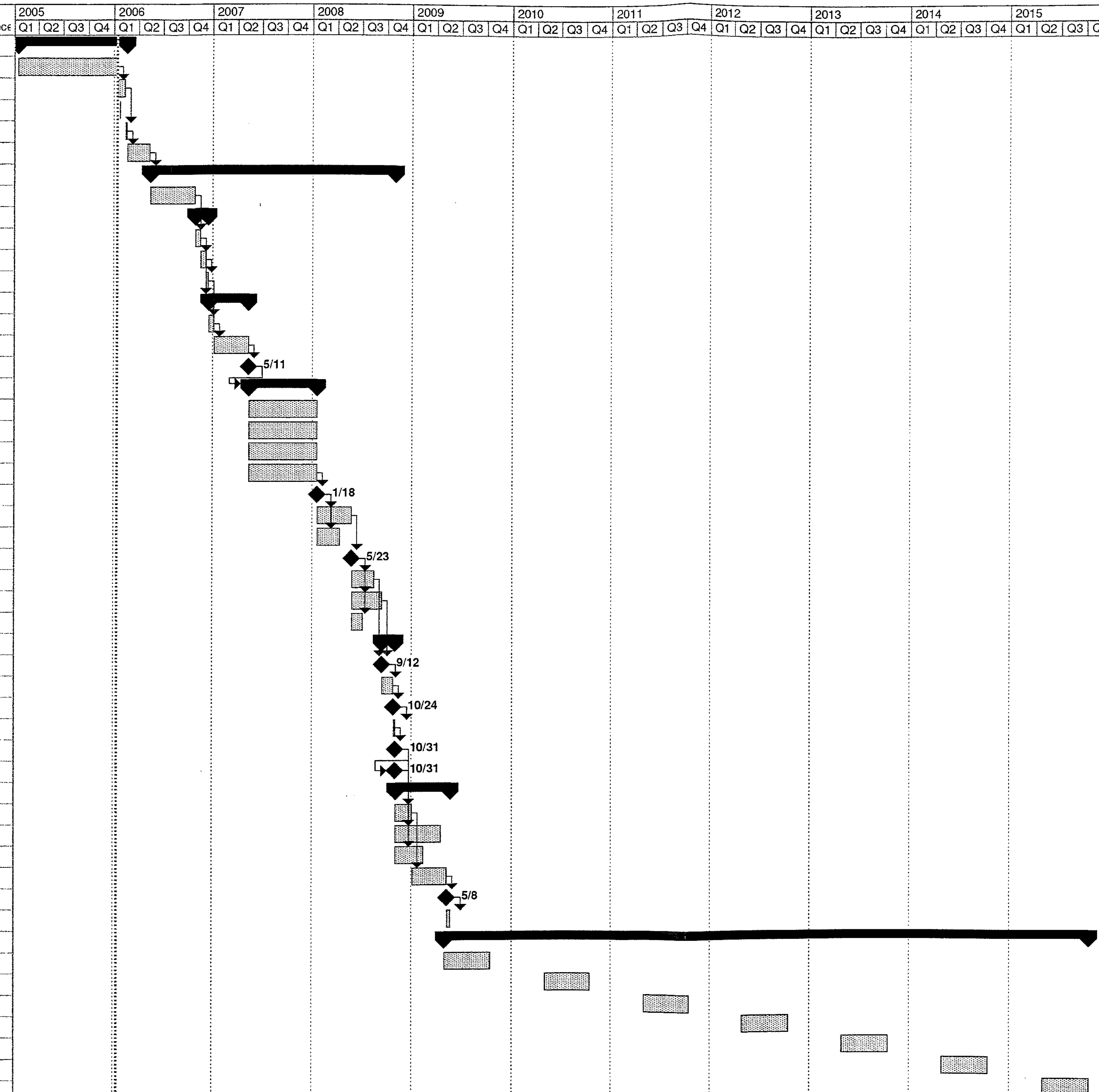
PHASE/ AREA	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7
I	GENERAL CONTRACTOR	ELECTRICAL/ BB	TELCO/ CATV (WRECK OUT OH LAST)				
II		GENERAL CONTRACTOR	ELECTRICAL/ BB	TELCO/ CATV (WRECK OUT OH LAST)			
III			GENERAL CONTRACTOR	ELECTRICAL/ BB	TELCO/ CATV (WRECK OUT OH LAST)		
IV				GENERAL CONTRACTOR	ELECTRICAL/ BB	TELCO/ CATV (WRECK OUT OH LAST)	
V					GENERAL CONTRACTOR	ELECTRICAL/ BB	TELCO/ CATV (WRECK OUT OH LAST)

NOTES

1. THE CONSTRUCTION SCHEDULE IDENTIFIES PROPOSED TIMING OF EVENTS. THE ACTUAL SCHEDULE WILL BE DEPENDENT ON FUNDING, DESIGN, CONTRACTOR SELECTION/ BIDS, AND FRANCHISE UTILITY NEGOTIATIONS.
2. INFRASTRUCTURE INSTALLATION SCHEDULES MAY BE IMPROVED SINCE INSTALLATION CAN OCCUR YEAR-ROUND DEPENDENT ON WEATHER, AND CAN TAKE PLACE SIMULTANEOUSLY BY DIFFERENT AGENCIES IN THE SAME PHASE.

CONSTRUCTION SEQUENCE
FIGURE 3-1

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Undergrounding Feasibility Study**	**285 days?**	**Mon 1/17/05**	**Fri 2/17/06**	
2	Conduct Study	260 days?	Mon 1/17/05	Fri 1/13/06	
3	Draft Review to TDA	20 days	Mon 1/16/06	Fri 2/10/06	2
4	Presentation of Draft Report	1 day?	Mon 1/23/06	Mon 1/23/06	
5	Final Report	5 days	Mon 2/13/06	Fri 2/17/06	3
6	Town Council Decision on Whether to Take Next Step	60 days	Mon 2/20/06	Fri 5/12/06	5
7	**Decision on Whether to Form Special District**	**645 days**	**Mon 5/15/06**	**Fri 10/31/08**	**6**
8	TDA and Property Owner Review	120 days	Mon 5/15/06	Fri 10/27/06	
9	**Informational Meetings**	**35 days**	**Mon 10/30/06**	**Fri 12/15/06**	
10	Advertise	14 days	Mon 10/30/06	Thu 11/16/06	8
11	Information distribution	14 days	Fri 11/17/06	Wed 12/6/06	10
12	Meetings	7 days	Thu 12/7/06	Fri 12/15/06	11
13	**Develop and Circulate Petition to Establish Spec. District**	**105 days**	**Mon 12/18/06**	**Fri 5/11/07**	**10**
14	Draft Petition	15 days	Mon 12/18/06	Fri 1/5/07	12
15	Circulate Petition	90 days	Mon 1/8/07	Fri 5/11/07	14
16	Submit Property Owner Petition to Town Council	0 days	Fri 5/11/07	Fri 5/11/07	15
17	**Develop Engineer's Report**	**180 days**	**Mon 5/14/07**	**Fri 1/18/08**	**16**
18	Define Work to be Accomplished	180 days	Mon 5/14/07	Fri 1/18/08	
19	Estimate of Costs	180 days	Mon 5/14/07	Fri 1/18/08	
20	Detailed Plans and Specifications for Construction	180 days	Mon 5/14/07	Fri 1/18/08	
21	Assessment Diagram of Properties to be Assessed	180 days	Mon 5/14/07	Fri 1/18/08	
22	Present Engineer's Report	0 days	Fri 1/18/08	Fri 1/18/08	21
23	Cost Sharing Agreements	90 days	Mon 1/21/08	Fri 5/23/08	22
24	Explore and Propose Funding Options	60 days	Mon 1/21/08	Fri 4/11/08	22
25	Town Council Adopts Resolutions	0 days	Fri 5/23/08	Fri 5/23/08	23
26	Complete Project Design and Estimate	60 days	Mon 5/26/08	Fri 8/15/08	25
27	Receive, Analyze Financing Instruments	80 days	Mon 5/26/08	Fri 9/12/08	25
28	Determine Ability to Permit	30 days	Mon 5/26/08	Fri 7/4/08	25
29	**Informational Meeting**	**35 days**	**Fri 9/12/08**	**Fri 10/31/08**	
30	Advertise	0 days	Fri 9/12/08	Fri 9/12/08	26,27
31	Information Available	30 days	Mon 9/15/08	Fri 10/24/08	30
32	Informational Meeting	0 days	Fri 10/24/08	Fri 10/24/08	31
33	Interval to Public Hearing	5 days	Mon 10/27/08	Fri 10/31/08	32
34	Public Hearing	0 days	Fri 10/31/08	Fri 10/31/08	33
35	Town Council Action to Form Special District	0 days	Fri 10/31/08	Fri 10/31/08	34
36	**Construction Documents and Contractor Selection**	**145 days**	**Mon 11/3/08**	**Fri 5/22/09**	
37	Finalize Undergrounding Design	45 days	Mon 11/3/08	Fri 1/2/09	34
38	Sell Financing Instrument(s)	120 days	Mon 11/3/08	Fri 4/17/09	35
39	Obtain Permits	75 days	Mon 11/3/08	Fri 2/13/09	35
40	Advertise, Bid and Award	90 days	Mon 1/5/09	Fri 5/8/09	37
41	Approve Construction Contracts	0 days	Fri 5/8/09	Fri 5/8/09	40
42	Contractor Mobilization	10 days	Mon 5/11/09	Fri 5/22/09	41
43	**Construction Effort**	**1685 days?**	**Fri 5/1/09**	**Thu 10/15/15**	
44	Phase I	120 days?	Fri 5/1/09	Thu 10/15/09	
45	Phase I-II	120 days?	Mon 5/3/10	Fri 10/15/10	
46	Phase I-III	120 days?	Mon 5/2/11	Fri 10/14/11	
47	Phase II-IV	120 days?	Tue 5/1/12	Mon 10/15/12	
48	Phase III-V	120 days?	Wed 5/1/13	Tue 10/15/13	
49	Phase IV-V	120 days?	Thu 5/1/14	Wed 10/15/14	
50	Phase V	120 days?	Fri 5/1/15	Thu 10/15/15	



Project: Tahoe-Donner Underground
Date: Wed 1/11/06

Task	Progress	Summary
Split	Milestone	Project Summary
External Tasks	Deadline	
External Milestone		

PROJECT ACTIVITY PLANNING SCHEDULE FIGURE 3-2

4. Cost Estimates

A. Typical Costs of Overhead to Underground Conversion

Underground infrastructure construction costs around the country have been researched through trade journal articles and other readily available sources. This information indicates that the cost for new underground infrastructure (2005$) is approximately $1 million (M) per mile. This per mile cost is generally based on an electric circuit mile and includes system infrastructure installation to property lot lines. It does not normally include service drops, meters or their interface.

It is reasonable to conclude that *conversion* costs will be greater, although conversion costs are not well documented. We suggest caution be exercised when evaluating any cost data since the type of excavation terrain encountered is the major contributor to undergrounding cost. Some of the underground construction cost information reviewed is listed below:

- The California Public Utilities Commission (CPUC) suggests the cost for underground construction can range between $.5M and $3M depending on terrain, with the average cost of approximately $1M.
- The Virginia State Corporation Commission (SCC) study released in 2005 indicates the average cost for placing utilities underground is $1.03M/mile.
- An Edison Electric Institute (EEI) study released in March 2004 indicates underground construction costs can range from $0.7M/mile to well over $1.5M/mile.
- The Riverside Public Utilities has a set-aside conversion program funded by a surcharge of 2% and Riverside estimates costs in 2005 at $1.4M/mile.
- The SCE Manhattan Beach conversion project cost property owners $3,254 to $15,463 per lot.

Other research indicates that some local government-sponsored underground conversion projects employ cost sharing by agreement between the local government, communication and cable TV companies. Also, the cost of joint trenching may be determined by using a space/cost allocation method to evaluate the trench area required by each occupant.

We have included a method to determine the trench space occupancy area per service provider, discussed later in this Section and in Appendix D.

B. Cost Considerations

The TDA subdivision is a residential community extending over 4,000 acres in the Sierra-Nevada Mountains with elevations reaching near 8,000-feet. As a result, this area does not lend itself well to rule-of-thumb underground cost estimating techniques.

To develop the conversion project cost estimate, we identified the types of construction and infrastructure components required. The cost estimates are for facilities installed to the curb or property lot lines.

The approach to define construction activity responsibility uses a method common for new developments and is familiar to the existing service providers; a general contractor does the subsurface construction and the individual service providers install their cable and equipment. This approach is used for larger conversion work and requires all trench excavation and substructure facilities (conduits, manholes, etc.) to be installed in accordance with the service provider standards by a general contractor, followed by the independent installation of service provider infrastructure.

The construction to be performed by a general contractor will involve excavation in a variety of terrain, including soil, gravel, rock, and pavement surroundings. Therefore, costs have been estimated for each type of underground and surface material condition. The TDA area is assumed to include considerable quantities of large cobble and possible solid rock and the excavation cost and quantities have been increased to reflect these conditions.

In addition, due to the dramatic changes in elevation, there are a considerable number of drainage culverts. As a result, during some trench work it will be necessary to cut and repair culverts. Past experience has shown that work on culverts ranging in size from 12" to 48" can cost from $500-$5,000 per culvert. We have included an allowance for this effort in the excavation pricing.

Also the TDA region is heavily wooded and construction work that results in the removal of trees or shrubbery will require a one-for-one replacement. If TDPUD determines that significant portions of the trench are to be placed in the PUEs, this cost could be significant. Assuming most major ductbank work will be placed in the rights-of-way, we have included an allowance. The combined allowance for culverts and landscaping is $20,000 a mile.

Typical costs for some items such as sand, gravel, water, and debris disposal were increased to reflect the following construction constraints in the TDA area:

- ✓ The required route to get some materials to the work sites will be via Alder Creek Road. This is necessary to avoid the steep roadway along Northwoods Boulevard as it slopes toward Donner Pass Road.
- ✓ There may be a requirement to import construction water if not available from TDA facilities.
- ✓ The required route to remove some waste materials and debris will be via Alder Creek Road. This is for safety reasons to avoid the steep roadway along Northwoods Boulevard as it slopes to Donner Pass Road.
- ✓ The heavy traffic in certain areas, especially along Northwoods Boulevard, requires a high degree of traffic control effort.

Since the underground facilities include the conversion of the existing electric, telephone, and cable television infrastructure, and the installation of a new broadband system, the resulting trench-work cost attributed to each type of service has been evaluated on a proportional space-occupancy basis. This information is presented and summarized later in this section.

Detailed tabulations have been assembled on a construction phase basis with summaries that identify costs for general construction and each service providers' system, including total cost summations. These tabulations are presented in Appendix D. A cost summary table is included at the end of this section in Table 4-1. The costs are based on the following criteria:

- ➢ Identify various underground trench excavation, ductbank installation, and trench restoration types and configurations by unit numbers, associated descriptions, and develop a cost for each unit.

- With input from TDPUD, identify the electric infrastructure necessary for conversion to underground and associated material and labor costs, based on installation by TDPUD.

- With limited input from TDPUD, review the proposed overhead broadband system. An independent assessment of infrastructure necessary for an underground system and associated material and labor costs was developed with installation by TDPUD.

- With limited input from SBC, evaluate the telephone infrastructure necessary for conversion to underground. An independent assessment of the infrastructure necessary for an underground system and associated material and labor costs was developed with installation assumed by SBC.

- With limited input from Cebridge, evaluate the cable television infrastructure necessary for conversion to underground. An independent assessment of the infrastructure necessary for an underground system and associated material and labor costs was developed with installation assumed by Cebridge.

The basic charges and descriptions for the service extension from the property line to the service entrance are presented in Table 4-2 at the end of this section. Individual customers will need to arrange directly with each service provider for the installation of the service drop and inquire if modification to the customer's existing equipment is required. It may be beneficial for customers to approach the service providers as a group to evaluate service drop costs for joint conversions. Additional information is included in Appendix D.

C. Cost Analysis Method

The underground construction components and quantities are based on information from the service providers and on-site investigations.

Material descriptions and quantity take-off tabulations have been developed for each construction phase and organized by the TDA map numbering system. The take-offs are based on the specific construction units and quantities required during each construction phase on a per map basis. Written descriptions have been created of the construction units for the work to be done by the general contractor and the work to be done by each service provider.

Additional tables have been developed to determine material and labor costing for the various construction units, and an associated descriptive statement of each unit has been prepared to accompany the cost tables. These tables have been organized into Contractor Schedules and Service Provider Schedules and tabulate the costs for each construction phase.

The tables identifying the various unit quantities per map and construction phase are linked to cost schedules to produce construction costs on a construction phase basis. The map unit take-off tables and unit cost and description schedules are presented in Appendix C along with the summary tabulations. The cost per construction phase, cost per system type, cost spending schedule and total cost summary is provided in Table 4-1 at the end of this section.

The TDPUD-provided Electrical System, Construction Standards, Materials and Details support data has been very helpful in assembling the cost data.

The communication network cost estimates are presented in Appendix D. These costs have been established independent of the service providers. The system cost summaries are arranged by utility type and are based on an assumed number of customer accounts. The Appendix also includes a discussion on the equipment selection. Costs are provided for hub and electronic equipment, network cables and installation, fiber splicing, and subscriber equipment.

In addition, cost estimates for the assumed fiber network communications installation of the cable between the property lot pedestal or handhole equipment and the home interface box are provided. This information is not shown in Table 4-2 since it is not applicable to the existing service providers. Our estimate for the connection fee for the drop cable and home interface box material and installation is approximately $200 per connection. This connection fee does not include trench work or trench material.

D. Proposed Costing

The underground construction cost estimates are based on information from the following sources:

- Contractor experience performing trench excavation work near the TDA area (2005).
- Contractor experiences with trench excavation work in the greater Truckee region.
- Contractor proposal bid costs for similar trench excavation, ductbank installation, and backfill and trench restoration assembly units (2005).
- Contractor bid costs for similar construction and equipment installation units (2005).
- Material costs furnished by equipment manufacturer representatives.
- Material and labor costs for installation of individual franchise utility infrastructure.
- Reed Construction Data, Inc, RS Means construction cost estimating guide.

All available information has been taken into consideration when developing the costs estimates. In general, costs have been rounded up to provide some conservatism. To account for unknowns, such as rock excavation, an estimated 5% of all major trench work is expected to encounter rock and has been allocated to rock excavation construction units. Other conditions such as gravel, bike path, and pavement excavation and restoration quantities and material quantities have been conservatively estimated. The take-off construction type and material quantity tables include descriptive notes identifying adjustments to the total unit quantities.

The costs estimates should be considered preliminary until complete detailed designs have been prepared, at which time more refined estimating can be performed. In addition, overall construction costs can vary relative to general economic conditions and price fluctuations within each industry. Therefore, costs shown should be considered to have order of magnitude accuracy (+50%, -30%) of the estimated costs.

E. Construction Cost Allocation

We have attempted to identify potential methods to offset construction costs. One possible method is to consider taking advantage of the fact that TDPUD is in the process of repairing and replacing the water system in the TDA area. It was thought that it might be advantageous to use a joint trench construction approach for the remaining water line replacement work. Our evaluation concluded that this would not be cost effective.

Consideration was also given to the fact that the existing telephone and cable television systems are likely to require upgrades to allow them to offer improved technology services. Because construction is not expected to occur for 3 years and would be completed over a 5 to 7-year time frame, we have assumed any new construction would not be a one-for-one replacement of the existing systems. Instead the underground systems would be based on current technology, fiber optics. This assumption is reflected in the communication system cost estimating. Refer to the Communication Industry Market Trend and cost estimate discussion presented in Appendix B.

An approach to allocate general construction costs to each service provider has been developed based on the trench cross-sectional area required for each service. An example of a typical trench with electrical and communication services and the resulting allocation (electrical 60%, broadband 15% and communication 30%) is presented in Figure 4-1 below. This approach is straightforward, defensible and is used by others. Refer to Appendix D for additional trench allocation descriptions.

The trench space allocation diagrams in the Appendix are essentially duplications of the ductbank arrangements shown in the conceptual drawings. This approach considers each service provider's requirements for:

- Trench cross sectional area
- Facilities depth
- Equipment/facility quantities

This approach to cost allocation has not been utilized to establish a cost allocation per service provider. This is because it is not practical to conclude which providers will participate toward the general contractor construction work that is not provider driven.

	Width	Height	Area 1	Total Area	Percent of Total Area	Actual Trench Area
Electric	36	58	2,088	2,088	45%	932
Elec/Broadband	36	42	1,512	1,512	32%	675
Communication	36	30	1,080	1,080	23%	482
				4,680	100%	2,088
Total Area	36	58	2088			

Figure 4-1

F. Cost Estimate Results

The costs presented in this report (2006 dollars) are order-of-magnitude estimates based on the assumptions, system configurations and conceptual design arrangements shown. An insert discussion on Cost Estimating Background is presented in Appendix D, which provides a description of order-of-magnitude and budget cost estimates.

A summation of the construction cost estimate is shown in Table 4-3 below:

Table 4-3

Description	**Order-of Magnitude Cost in Millions (2006 $)**
General Contractor	$ 76.8
Electric	11.2
Telephone	11.9
Cable TV	9.7
Broadband	7.3
Total	$ 116.8

The total trench excavation distance necessary to complete the entire conversion, less the service drops from the property lot lines to customer interface, is approximately 102 miles. This includes approximately 62 miles of main trench (primary trunks lines and lateral cables) and approximately 40-miles of distribution trench (cables from the main trench to the property lot lines).

If evaluated on a cost per-mile including <u>all</u> utilities and all trench excavation miles this results in an approximate cost of $1.15M/mile, and if evaluated to only include main trench excavation this results in an approximate cost of $1.9M/mile.

The costs shown above have <u>not</u> been shared with the various service providers. Also, not included in this table are the costs for the formation of a Special District or the cost of securing funding which is assumed to include but not be limited the following items:

- Related start-up administrative and organizational costs.
- Consulting assistance costs for formation of a District, meetings, and to secure financing.
- Cost to issue financing instruments
- Additional funding to cover interest costs as it accumulates on borrowed loan(s).
- Engineering design, survey, and services during construction, record drawings and other related costs.

Based on the year to year expenditures shown in Table 4-1 and assuming an annual escalation rate at 4% of construction cost results in an estimated total cost to construct of $148.4M.

If other expenditures for the efforts listed above are assumed to equal 10% ($14.8M) of the construction cost the entire project cost from inception through completion will be $163.2M.

This is equivalent to approximately $1.6M per mile based on the assumed 102 trench excavation miles. Assuming 6500 customers this equates to approximately $25,000 per customer, or an approximate $2,600 per year over 15 years with an assumed 6% interest rate. These results are presented in Table 4-4 below.

TABLE 4-2 SERVICE DROP OH/UG CONVERSION CONNECTION FEE COST ESTIMATES				
Service Provider	Account Description	Basic Cost 1-Phase	Basic Cost 3-Phase	Comments
TDPUD Electric	Residential 200A	$1,260	NA	See notes 3-6
	Residential 400A	$2,520	NA	See notes 3-6
	Commercial - 120/240V, 200A	$1,260	$2,182	See notes 3-6
	Commercial - 120/240V, 400A	$2,520	$4,365	See notes 3-6
	Commercial - 120/240V, 600A	$3,780	$6,547	See notes 3-6
	Commercial - 120/208V, 200A	$1,092	$1,891	See notes 3-6
	Commercial - 120/208V, 400A	$2,184	$3,783	See notes 3-6
	Commercial - 120/208V, 600A	$3,276	$5,674	See notes 3-6
	Commercial - 277/480V, 400A	$5,040	$7,830	See notes 3-6
	Commercial - 277/480V, 600A	$7,560	$13,095	See notes 3-6
	Commercial - 277/480V, 800A	$10,080	$17,459	See notes 3-6
	Conversion OH to UG	$750		time & material deposit, see notes 3-6
	Line Extension			proportional share of actual cost
	Service Relocation Fee	$50	$50	minimum charge, based on actual cost
	OH/UG Meter Base Conversion	$400	$600	electrician services required
SBC Communications	Residential - < 200-ft		$1/ft	cable only, requires 1" conduit, see note 7
	Residential - > 200-ft		$1/ft	cable only, requires 2" conduit, see note 7
	Commercial		$2/ft	cable only, requires 4" conduit, see note 7
	Special - Service Network Interface (SNI)		$35	new installation
	Special - SNI replacement		$200	if replacement required
Cebridge Connections	Account - <150-ft		$59.95	requires 1" conduit, see note 8
	Account - >150-ft <250-ft		$0.25/ft	plus $59.95, requires 1" conduit, see note 8
	Special - >250-ft			cost adder per cable type, see note 8
TDPUD Broadband	Residential		NA	Connection fee not available at this time
	Commercial		NA	Connection fee not available at this time

Notes:
1. Special account types exist and are not listed herein. The franchise agencies can provide additional account types and connection costs.
2. It may be possible to reduce costs through joint service drop trenching and reduced separation.
3. Fee includes 125' cable length maximum, additional distance at actual cost.
4. The electric customer is required to install the conduit between the PUE service drop and the meter/main service interface.
5. TDPUD conduit size depends on service requirement: 2" for 200A, 3" for 400A, 3-phase accounts depend on service rating.
6. If necessary to change out electric meter base, independent electrician services are required, typical cost range is $750-$1250
7. The telephone customer is required to install the conduit between the PUE service drop and the interface service cabinet.
8. The CATV customer is required to install the conduit between the PUE service drop and the interface service cabinet.
9. All trench backfill and compaction shall be performed in compliance with TDPUD standards.
10. Typical trenching and conduit installation cost for joint service drops is $20-$30/ft, unless solid rock is encountered.

To Tim Wilson – Is this reasonable?

$30-$50

Example (Electric only)

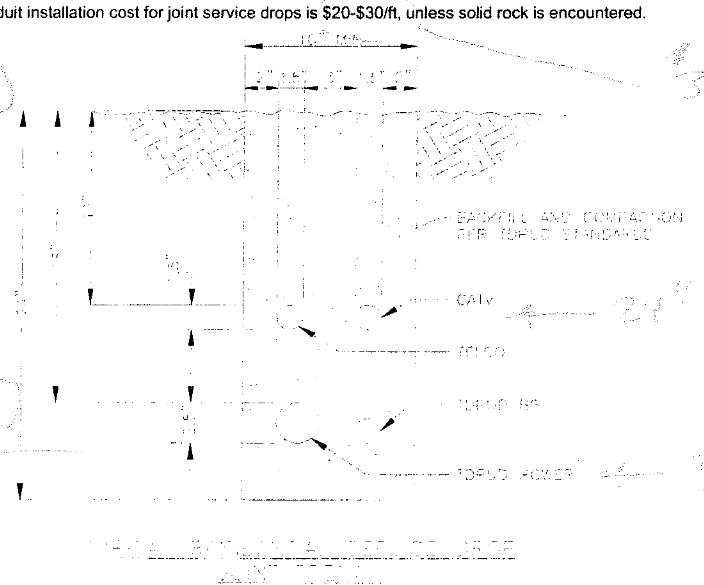


Table 4-4

Total Project Cost Estimate Cost in Millions												
Year		0	1	2	3	4	5	6	7	8	9	Total
Construction $		$ -	$ -	$ -	$ 5.3	$ 1.0	$ 27.6	$ 25.8	$ 31.9	$ 10.1	$ 6.1	$ 116.8
Escalation	4%	1.00	1.04	1.08	1.12	1.17	1.22	1.27	1.32	1.37	1.42	
Annual Sum		$ -	$ -	$ -	$ 6.0	$ 11.7	$ 33.6	$ 32.6	$ 42.0	$ 13.8	$ 8.7	$ 148.4
Organization $	10%											$ 14.8
Rounding Factor	5											
TOTAL												$ 163.2
											Miles	102
											Per Mile	1,600,392
											Properties	6,500
											Cost Per Customer	25,114
									Interest Rate		6%	
									Customer Cost Per Year		15	$ 2,586

TABLE 4-1

TDA UNDERGROUNDING FEASIBILITY STUDY
COST SUMMARY and SPENDING SCHEDULE

CONSTRUCTION DESCRIPTION	Year 1-3 (start-up admin/engr)	Year 4 Phase I (gc)	Year 5 Phase I-II (gc/e/b)	Year 6 Phase I-III (gc/e/b/t/c)	Year 7 Phase II-IV (gc/e/b/t/c)	Year 8 Phase III-V (gc/e/b/t/c)	Year 9 Phase IV-V (e/b/t/c)	Year 10 Phase V (t/c)	TOTALS
General Contractor		5,302,044	8,430,641	23,228,851	18,469,205	21,346,352			76,777,094
Electrical			1,117,349	1,416,711	3,074,385	2,560,329	3,039,053		11,207,828
Telephone				1,541,619	1,122,146	3,332,706	2,580,711	3,281,434	11,858,615
Cable TV				939,236	801,813	2,883,717	2,233,032	2,839,352	9,697,150
Broadband			448,276	509,252	2,290,409	1,773,599	2,255,172		7,276,709
TOTALS	$0	$5,302,044	$9,996,266	$27,635,670	$25,757,959	$31,896,703	$10,107,969	$6,120,785	$116,817,396

Notes:
1. The costs shown are 2006 dollars and include a 15% contingency.
2. Start-up administrative and organizational costs, Special District formation and funding costs, and the cost of borrowing money are <u>not</u> included.
3. Engineering design, survey and project management services during construction costs are <u>not</u> included.
4. The timing and cost of work shown for years nine and ten is dependent on construction conditions and may occur earlier.
5. Construction activities identified as: General Contractor (gc), Electric (e), Telephone (t), Cable TV (c), Broadband (b).
6. Excavation footage per construction phase shown below, total excavation = 102 trench miles, cost per trench mile = $1.15M.

Total Excavation Footage	27,082	45,512	173,560	135,800	157,800	539,754

5. Special District Approach to Underground Conversion

The following section on special districts is intended to provide background to allow discussion of the approaches to forming and financing the proposed undergrounding project but should not be considered a definitive discussion of all the issues.

The proposed undergrounding project is to be accomplished independently of the TDA. As a result, project financing needs to be accomplished without TDA's involvement. This will require the formation of an entity that can issue debt to finance the project. In California, many undergrounding projects are completed by establishing a special district, which are formed to provide a particular service in a specified area.

The following discussion is intended to generally describe the use of a special district to accomplish underground utility conversions but should not be regarded as comprehensive or complete. If the proposed project moves ahead, considerably more work is required to determine the appropriate organizational path forward.

Independent versus Dependent Special Districts

A special district can be independent or dependent; single function or multi-function; and either an enterprise or a non-enterprise district.

About two-thirds of the existing special districts in California are independent districts, governed by their own separate boards of directors. Directors are elected by the District's voters or directors are appointed for fixed terms. Most districts have five-member governing boards, but this number can vary.

Dependent districts are governed by other, existing legislative bodies, such as a City Council.

For the proposed project, it appears that a special district would be a dependent district administered by the Town of Truckee.

Single Function or Multi-Function

For the purposes of this review, it is assumed that if a special district is formed to underground the TDA area utilities, it will be a single function district, that is, for undergrounding only.

Enterprise or Non-Enterprise

Enterprise districts deliver services for which they can charge, for example, hospital districts. Virtually all water, waste and hospital districts are enterprise districts.

Non-enterprise districts provide services that to do not easily lend themselves to user fees, such as a park district or a fire district. Non-enterprise districts typically rely on property taxes or assessments to provide the necessary revenues.

It appears that for this project, the most appropriate approach would be formation of a non-enterprise district. User fees would most likely not be regarded as providing sufficiently certain revenues to satisfy a lender's need for a high level of assurance that it will be repaid.

Special Undergrounding Districts

In California, "special undergrounding districts" have been used extensively to finance utility undergrounding efforts because California law specifically provides for the formation of special undergrounding districts to underground utilities.

The steps for the formation of a special undergrounding district are:

1. Develop a cost estimate – To start the process, a preliminary cost estimate (± 20 percent) must be established. This is normally done by the affected utilities and requires an advance deposit from the property owners to pay the utilities for developing the estimate. The formula or method of assigning the costs to property needs to be developed. A map showing the project boundaries must be developed. If the decision is made to proceed, Petition 1 must be prepared. [This report does not meet this requirement because the service providers have not reviewed and accepted the estimated costs.]

2. Submit Petition No. 1 – Property owners representing at least 60 percent of the land area (in square feet) in the special district must sign a petition in support of the proposed district. An engineer should prepare a "certificate of sufficiency" stating the percentage of land ownership represented by the signatures meets the 60 percent requirement. The petition is then submitted to the Truckee Town Council.

3. Preparation of an Engineer's Report – The Town would then commission an Engineer's Report which would include:
   - A description of the work to be accomplished
   - A description of the method of assessing the costs among the benefited properties
   - An estimate of the costs including all incidental costs
   - Detailed plans and specifications for the construction, a district boundary map
   - An assessment diagram showing the dimensions of all properties to be assessed.

4. Present the Engineer's Report to the Town Council

5. Cost Sharing Agreements - Establish cost sharing agreements, as appropriate, among TDPUD, SBC and Cebridge. A major consideration in this cost sharing approach could be the TDPUD's need to replace the old water system, its ongoing replacement efforts and the economies that can be obtained by including water line replacement in the overall undergrounding effort.

6. Explore and Propose Funding Options for the Work – If a special district is formed to accomplish the undergrounding, the next logical step is to form an Assessment District as a means of paying the special districts costs. In effect, the property owners, by agreeing to the formation of a special district and an assessment district, impose an assessment upon themselves. Bonds or certificates of participation could then be sold, backed by the Assessment District revenues. Typically these bonds or certificates would be repaid over a 20 to 30 year period, at the prevailing interest rate available when the bonds/certificates are sold.

   Because the proposed area to be undergrounded is within the TDPUD service area and the PUD is not subject to the requirements of the California Public Utility Commissions (CPUC) Rule 20 set-aside requirements, there are no Rule 20A or 20B funds available for electric system undergrounding. Rule 32, a comparable rule that applies to communication utilities, SBC and Cebridge, could provide some limited funding; the amounts of funds available would be very small (perhaps 1 or 2% of their annual revenues in the TDA area).

Before construction begins, the entire project costs for each utility must be on deposit with that utility. [Note that the "project" for the utilities does not include the service drops to each customer's service panel (trenching, backfilling, conduit, boxes, meter modifications, etc.).]

Possible options for funding the work include:

- Contributions from the property owners
- Sale of bonds or certificates of participation by the special district, supported by property assessments

It seems unrealistic to expect property owners to agree to up-front contributions in the amounts required, which leaves the sale of either bonds or certificates of participation to finance the project.

7. Town Council action to:
   a. Approve the Engineer's Report
   b. Adopt a Resolution of Intention setting a date for a public hearing on the formation of the special undergrounding district
   c. Adopt a Resolution calling for bids on the construction work
   d. Adopt a Resolution calling for bids on the bonds or certificates of participation

8. Complete the project design along with an Engineer's Estimate.

9. Receive and analyze construction and financing instrument (bonds, certificates of participation) bids approximately 2 weeks before a public hearing to allow for adjustment to the assessment amounts.

10. Establish the ability to obtain the necessary permits.

11. Hold an informational meeting approximately 1 week before the public hearing.

12. Hold a public hearing at which the Town Council receives reports(s) on costs, assessments, schedules and accepts testimony. At the conclusion of testimony, the Council would make a decision on the formation of the special undergrounding district. If the district is formed, the property owners within the district are notified of their participation requirements.

13. Sell financing instruments.

14. Obtain permits.

15. Approve construction contracts and commence work. Note that the work will need to be done in phases over the course of five to seven years. Construction bids and financing might be separately obtained for each phase or the work and financing might be done with a single contract. [It seems that periodic financings would be much more appropriate than a single large financing at the beginning. This determination is well beyond the scope of this effort.]

16. Monitor and administer construction, including progress on service conversions and costs.

17. Convert individual customers to the new underground system by replacing their existing overhead services.

18. Removal of the overhead systems.

The Nevada County Local Agency Formation Commission may need to be involved in the effort to form the special district.

A. Methods of Financing

If the revenue stream is an obligation of the property owners, and is independent of taking service (a property assessment), lenders will perceive a lower level of risk, implying lower interest rates.

Methods that might be used to finance the project include:

General Obligation Bonds

One possibility for a special district to finance the undergrounding project would be the issuance of general obligation (GO) bonds, supported by property tax assessments on the real property within the district.

GO bonds may be sold by a public entity that has the authority to impose ad valorem taxes, which is a tax based on assessed value of the real property. Voter approval to issue a GO bond must pass by a two-thirds majority of the people living within the affected area.

Following passage of Proposition 13 in 1978, many governments in California found it difficult to obtain the needed two-thirds majority vote to issue GO bonds.

Because of the two-thirds requirement, the use of GO bonds to finance the undergrounding is considered unlikely.

Revenue Bonds

Revenue bonds are dependent on the identified revenue stream to provide sufficient funds to repay the bonds. The quality of the revenue stream determines the marketability of the bonds. If the revenue stream is dependent on customers taking service from the underground systems, and by taking service they are subject to higher user fees, many customers may choose not to take service. This would have the effect of increasing the charges to those customers taking service, who would have the option to discontinue service. Because of this, revenue bonds do not appear to be a viable option.

Certificates of Participation

The difficulty in obtaining voter approval has led to the increased use of Certificates of Participation (COPs), which do not require voter approval. COPs have a lease-type repayment structure, for periods of up to 20 years or more. Under California State law, COPs do not constitute a public debt, and as a result, do not require voter approval. However, under Federal tax laws this type of lease obligation is regarded as debt, which allows for tax-exempt interest to the underwriting agency.

From The Bond Market Association Glossary of Bond Terms, "COPs are a structure where investors buy certificates that entitle them to receive a participation, or share, in the lease payment from a particular project. The lease payments are passed through the lessor to the certificate holders with the tax advantages intact. The lessor typically assigns the lease and lease payments to a trustee, who then distributes the lease payments to the certificate holders."

City Councils and Special District Boards of Directors have statutory authority to issue COPs.

COPs may constitute an obligation of the issuing entity's general fund and encumber the facility and the land or Governing Boards may, by resolution, create Enterprise Funds, which are meant to be self supporting through user charges. Our research did not find any instances where an Enterprise Fund approach with COPs has been used for undergrounding districts.

Other Potential Opportunities for Cost Sharing

TDPUD has a need to replace the remaining older water system piping in TDA. This involves creating trenches that could also be used for the underground project. However, these trenches will largely be in the roadway, which is an undesirable location for underground utilities. That being said, there might be some opportunities to share costs with the TDPUD water system replacement program. However, this could adversely affect the conversion construction staging discussed elsewhere in this report.

It should also be noted that TDPUD's proposed FTTU broadband system does not now exist. It inclusion in the project might well provide TDPUD with a cost savings compared with a standalone installation. This suggests that the TDPUD system bear a somewhat greater portion of the costs than those that result from a normal trench space allocation approach. This would result in lower costs for the electric and other communication systems. This issue requires additional discussion with TDPUD.

Another cost sharing issue is the improved systems that will result from the conversion, particularly for the existing communications systems. A new fiber system will be a much better system and be capable of offering significantly improved services to customers. This benefit suggests that perhaps the benefiting systems should bear some additional portion of the project costs.

It is beyond the scope of this study to resolve the utility benefit and contribution issues. We observe, however, that the service providers have no incentive to contribute to the project, particularly if the project increases the level of competition for communications (broadband) services.

Conclusion

Based on our review of the financing options, it appears that annual property assessments for the life of the bonds sold to finance the project, after any utility contributions are subtracted, is the most likely method to pay for the project.

These assessments could be administered by the special district (independent district) or the Town of Truckee (dependent district).

We identified the following possible payment alternatives

Service provider payments to fund all or a portion of the work
Property owner assessments
Charges for utility use

It now appears that the service providers would not be eager to contribute to the costs of the project without the ability to recover the costs directly from the area benefiting. The amounts of Rule 32 monies available are limited. As a result, revenues to pay for the project will need to come from the customers or properties benefiting from the conversion project.