

Underground Cost Analysis; Option 10 and 11 - TRTP Project


Project Segment 8A Corridor

October 21, 2012



SCE Cost Overview on Option 10 (Single Circuit XLPE 3 Cables per Phase) and Option 11 (Single Circuit XLPE 2 Cables per Phase)

- Cost to Go Estimates is overstated as follows:
 - Option 10
 - SCE overstates cost by **OVER \$160 Million**
 - Option 11
 - SCE overstates cost by **OVER \$98 Million**
- Corporate OH should not be a linear calculation
- Contingency can range from 30 to 50 percent
- SCE does not provide ANY details regarding Approved Routes Cost to Go
- Engineering Schedules is **overstated by 6-12 months**
- Construction Schedules is **overstated by 3-6 months**

1 Application No. 07-06-031
2 Exhibit No. SCE-
3 Witness: Dean Heiss
4
5
6
7
8
9
10
11  SOUTHERN CALIFORNIA
12 EDISON
13 An EDISON INTERNATIONAL Company
14
15 (U 338-E)
16
17
18 *Amendment to Cost Testimony of D. Heiss on*
19 *Behalf of Southern California Edison*
20 *Company in Response to the Assigned*
21 *Commissioner's Ruling on the Tehachapi*
22 *Renewable Transmission Project (TRTP)*
23
24 Before the
25 Public Utilities Commission of the State of California
26
27 Rosemead, California
28 February 1, 2012

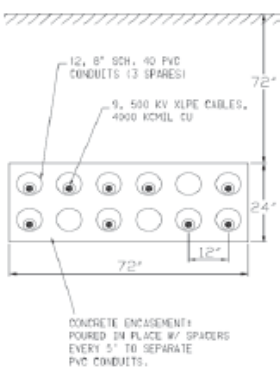
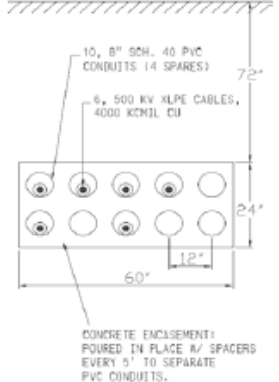


SCE Cost Analysis on Option 10 and Option 11

In our opinion SCE continues to misrepresent the underground options, in this case Option 10 and Option 11. Specifically SCE has over priced the direct and indirect cost and have overestimated the schedule duration. Key items that are in error or biased are listed below.

1. Cost to Go
2. Corporate OH
3. Contingency
4. Approved Routes Cost to Go
5. Engineering Schedule
6. Construction Schedule

Technical Overview For 500 kV Underground Alternatives

	Option 10	Option 11
	Single Circuit, Three XLPE Cables per Phase in Conduit, in ROW	Single Circuit, Two XLPE Cables per Phase in Conduit, in ROW
Summary and Highlights		
	I There are 3 known major underground 500kV systems in the area. One is under construction and is direct buried XLPE cable.	
	II There are six additional underground alternatives that are being evaluated.	
	III Configurations	
	 <p>12, 8" SCH. 40 PVC CONDUITS (13 SPARES) 9, 500 KV XLPE CABLES, 4000 KCMIL CU 72" 24" 12" CONCRETE ENCASUREMENT: POURED IN PLACE W/ SPACERS EVERY 5" TO SEPARATE PVC CONDUITS.</p>	 <p>10, 8" SCH. 40 PVC CONDUITS (14 SPARES) 6, 500 KV XLPE CABLES, 4000 KCMIL CU 72" 24" 60" 12" CONCRETE ENCASEMENT: POURED IN PLACE W/ SPACERS EVERY 5" TO SEPARATE PVC CONDUITS.</p>



1. Cost to Go

There is enough information to generate specific estimates with relative accuracy. For example the following is known; length, depth, width of the trench, conduit requirement, the amount of XLPE cable required, restraining vaults, cable splice boxes and, transition stations etc. Calculating these quantities and using standard Class V estimating practices the following estimates were derived

- Option 10
 - HFTH Estimate \$129.5M vs SCE Estimate of \$289M
 - **SCE error is approximate \$160M**
- Option 11
 - HFTH Estimate \$102.4M vs SCE Estimate of \$200M
 - **SCE error is approximate \$98M**
- Reference Attachment T, Option 10 and 11 for Engineering concepts

Underground Options Single Circuit	UG Opt. 10	44	15	59	2	191	96	289	23	102	473	5
	UG Opt. 11	44	15	59	2	131	67	200	17	102	378	5



2. Corporate OH (Overhead)

Corporate OH as calculated by SCE assumes a linear rate regardless of the scope of work. This is incorrect, generally as the price of a specific project (or option) goes up does not mean that SCE OH will go up. Case in point. The difference between Option 10 and Option 11 is the size of the trench, number of conduits, 6 cables vs 9 cables and various other miscellaneous accouterments; this would not cause SCE to have to add substantial additional resources to the project. In HFTH opinion the **OH factor should be closer to 3-5%** and SCE should disclose the details as to why 6.5% is used regardless of the project values.





3. Contingency

AACE International the Association for the Advancement of Cost Engineering, has defined contingency as "An amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs". Typically estimated using statistical analysis or judgment based on past asset or project experience. In this case many of the factors are well defined and have a level of certainty that should allow the Option 10 and 11 to use a lower contingency. **HFTH believes 30% contingency** (which is within the boundary of Class V estimates) should be used instead of 50% due to a high level of certainty on many of the detail cost items.

- **Certain outcome**

- Trenching
- Conduit installation
- Open terrain
- Restoration
- Material (Cable) cost
- ROW
- Traffic Controls

- **Uncertain outcome**

- Cable splice
- Transition Station
- Substation
- Relocation of Utilities



4. Approved Routes Costs to Go

SCE does not provide any details (technical or cost) regarding how SCE calculated these value. It simply states that SCE has added cost for additional structures from mile post (MP) 19.2 to MP 22 and from MP 25.5 to Mira Loma Substation. SCE estimated these cost to be \$102M. HFTH can not confirm or validate this value. In HFTH opinion SCE continues to bias and overstate the underground options in order to back into a desired outcome. HFTH believes the \$102M is highly suspect and can not be confirm with the data provided.



5. Engineering Schedule

Attachment W, reflect a schedule duration for engineering of approximate 25 months to . Hereto, SCE appears to bias the approach. Specifically, there are many steps that can be taken to mitigate the schedule duration. In our Opinion the **engineering effort can be completed within 14 months**. Key steps to accelerate the engineering schedules are shown below.

- Engineering
 - Advance concepts and preliminary engineering concurrently with environmental and permitting effort
 - Preliminary and detail design effort can be completed in 12months and start immediately
 - A design-build approach can also reduce the duration

GROUP BY: WBS		OPTION 10 - SINGLE CIRCUIT, 3 CABLES PER PHASE DUCT BANK IN ROW					30-Jan-12																				
SORT BY : START ASCENDING																											
Activity ID	Activity Name	Original Duration	Start	Finish																							
					2012	2013				2014				2015				2016				2017					
					Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1			
ENVIRONMENTAL PERMITS					105	19-Nov-12	12-Apr-13																				
4CMEP2000	NOTIFY - PERMIT 404 DISCHARGE OF DREDGED OR FILLED MATERIAL INTO WATERS - (USACE)	105	19-Nov-12	12-Apr-13																							
4CMEP2100	NOTIFY - PERMIT 401 WATER QUALITY CERTIFICATION ISSUED BY STATE WATER RESOURCES CONTROL BOARD (SWRCB)	105	19-Nov-12	12-Apr-13																							
4CMEP2110	PERMIT 1602 STREAMBED ALTERATION AGREEMENT (SAA) ISSUED BY CALIFOTNIA DEPT. OF FISH & GAME (CDFG)	105	19-Nov-12	12-Apr-13																							
ENGINEERING					985	02-Jul-12	08-Apr-16																				
4CMEN1000	ENGINEERING	525	02-Jul-12	04-Jul-14																							
4CMEN1010	ENGINEERING FIELD SUPPORT	460	07-Jul-14	08-Apr-16																							

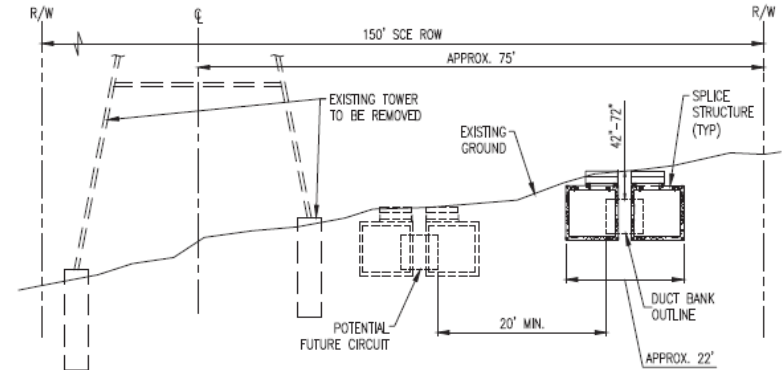


6. Construction Schedule

Attachment W, reflect a schedule duration for construction of approximate 21 months. Hereto, SCE appears to bias the approach. Specifically, there are many steps that can be taken to mitigate the schedule duration. In our Opinion the **engineering effort can be completed within 16 months**. Key steps to accelerate the construction schedules are shown below.

- Construction

- Pre-order the EXPE cable
- Multiple headings can be worked on concurrently
- HDD and cut & cover are independent of each other
- Transition facilities can be completed within 12 months
- Final commissioning can take place within 6 months assuming that each segment can be tested individually before final system test
- U/G and Transition facilities can be constructed concurrently.



ROLLING TERRAIN ACROSS ROW, 10% - 25%



SCE Cost Analysis on Option 10 and Option 11 - Summary

As shown many of the SCE key assumptions were wrong or exaggerated in order to be bias against the cost and schedule

- Estimate cost for Options 10 and 11 seems to be **overstated by \$98M – \$160M**
- Engineering and Construction schedule can be **reduced by at least 14 months**. As early as December 2014 if SCE was proactive.
- OH and contingency are **overstated by tens of million of dollars**
- Additional cost are reflected (Approved Routes Cost to Go) **with out any details or back ups to validate the cost.**

In summary, it appears that SCE has overstated both the cost and schedule in order to make Options 10 and 11 less attractive to the public.