BURIED DROP WIRE PLACEMENT COSTS

The text and charts taken from the Inputs Portfolio show that the default values were derived from contractor "price quotes." This is supported by a worksheet included in the Fassett material. A copy of this worksheet is printed on the following page.[4]

The bar chart that appears on this worksheet is duplicated in the Inputs Portfolio, making it clear that this worksheet was used to derive the input values for the then current version, HM 3.1's buried drop placement costs.

Upon reviewing the source material produced by the engineering team, GTE found several significant inconsistences between the inputs used in the HAI models [both 3.1 and 5.0], the worksheet supporting those inputs, and what the source material actually shows. Specifically, GTE found that the worksheet [see copy on the following page] purporting to capture the "price quotes" from various contractors does not reflect all of the price quotations actually received. More importantly, all of those price quotations not included in the worksheet are higher than what was computed as the worksheet "average." Moreover, the lowest price quotations included in the worksheet are provided significantly greater weight than any other price quotation. Finally, the source documentation shows that the worksheet contains selectively chosen price quotations from vendors whereby some quotations from a vendor are included, but other quotations from that same vendor are disregarded.

For example, the worksheet indicates that only six outside plant contractors provided the HAI engineering team with price quotations for buried drop wire placement. However, the source material contains price quotations from ten contractors. All of the quotations left off of the worksheet contained bids for rural and suburban drop placement that were higher than the "average" price the engineering team ultimately calculated. Moreover, the price quotation from Contractor E, which is one of the lowest quotations provided, was used three times in deriving the worksheet "average." This has the obvious effect of artificially lowering the average price quotation.

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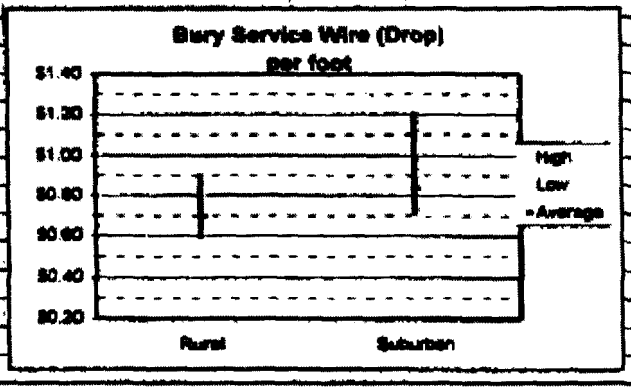
[4] The worksheet is numbered Fasset 7.

Buried Service Drop Chart

	Rural	Suburban	
	Drop	Drop or Plowed Cable	
Bury Service Wire (Drop)	$/ft.		
Contractor A	$0.90		
Contractor B	$0.75	$0.65	(Plow Suburban Cable 24")
Contractor C	$0.74	$0.72	(Plow Suburban Cable 24")
Contractor D	$0.70	$1.20	
Contractor E	$0.60	$0.75	
Contractor E	$0.60	$0.75	
Contractor E	$0.60	$0.75	
Contractor F	$0.60	$1.06	(Average of landscaped suburban)
	Rural	Suburban	
High	$0.90	$1.20	
Low	$0.60	$0.72	
Average	$0.70	$0.84	



Finally, the worksheet indicates that Contractor A provided a price quotation for rural drop placement, but not for suburban drop placement. The source material from Contractor A, however, does contain a price quotation for suburban drop placement, $1.50 per foot, which is significantly higher than the average cost computed on the worksheet.

In other words, the relatively low price for rural drop placement was considered, but the relatively higher price for suburban drop placement was not. By selectively using price quotations, even quotations that came from the same vendor, the HAI proponents are able to artificially lower the average placement cost for buried drop wire.

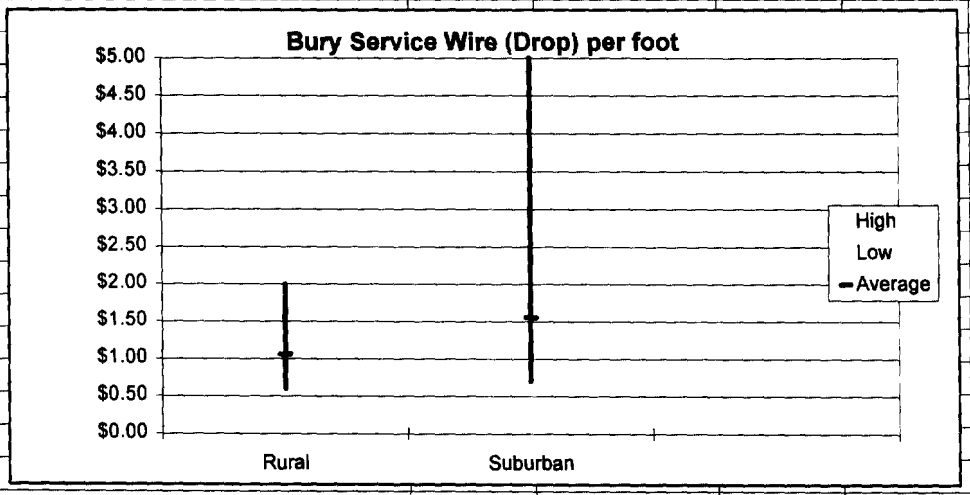
If all of the price quotations supplied to the HAI engineering team had been properly utilized in developing the model's default input for buried drop placement, that default input would have been significantly higher than the value used in the HAI model. GTE produced the table on the following page using all of the price quotations that were available to the HAI engineering team at the time the Inputs Portfolio was prepared. As the table shows, the inclusion of all of the vendor quotations provided to the HAI engineering team raises the average cost of placing buried drop wire to $1.06 per foot for rural placement, and to $1.56 per foot for suburban placement. This represents about a 50% increase in the worksheet averages.

Copies of Section 2.2.2 of both the HM 3.1 and HM 5.0 Inputs Portfolio that present the default placement values for aerial and buried drop wire are on the following pages. These charts show that initially the default placement cost for buried wire was $.75 per foot and that during the "updating" to version HM 5.0 the HAI developers decided to reduce this default cost for buried drop wire to $0.60 per foot (the very lowest contractor quote) and misrepresented the contractor quotes in a line graph contained in the documentation. Using the actual "price quotes for contractor placement of buried drop wire" correctly, described above, the HAI team should have used default costs of $1.06 per foot for rural placement, and $1.56 per foot for suburban placement. This represents a 77% and 160% error in the respective default cost inputs.

Table

GTE Computation of HAI Buried Service Drop

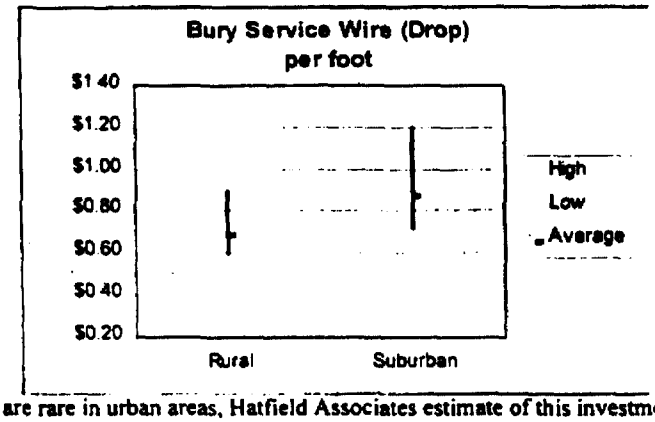
	Rural	Suburban			
	Drop	Drop ~~or Plowed Cable~~			
Bury Service Wire (Drop)	$/ft.				
Contractor A	$0.90	**$1.50**			
Contractor B	$0.75	**$0.75**			
Contractor C	$0.74	$0.72			
Contractor E	$0.60	$0.75			
Contractor F	$0.60	$1.05	(Average of landscaped suburban		
Contractor D	**$0.70**	**$0.70**			
Contractor G	**$1.31**	**$1.31**			
Contractor H	**$1.13**	**$1.68**			
Contractor I	**$1.83**	**$2.10**			
Contractor J	**$2.00**	**$5.00**			
	Rural	Suburban			
High	**$2.00**	**$5.00**			
Low	**$0.60**	**$0.70**			
Average	**$1.06**	**$1.56**			



The suburban value for Contractor F is an average of the range quoted in the referenced document.
The values for Contractor G represent an average of the range quoted in the referenced document.
The values for Contractor H for rural and suburban values represent an average of the range quoted in the referenced document.
The values for Contractor I are an average of the range quoted in the referenced document.

Buried Drop Placement

The contract labor estimate assumes a crew installing buried drop wires throughout a neighborhood or CBG (in coordination with the installation of NIDs, terminals, and distribution cables).
Price quotes for contractor placement of buried drop wire were as follows:



Because buried drops are rare in urban areas, Hatfield Associates estimate of this investment was used in lieu of verifiable forward looking alternatives from public sources or ILECs.

2.2.2. Drop Placement, Aerial and Buried

Definition: The total placement cost by density zone of an aerial drop wire, and the cost per foot for buried distribution cable placement, respectively.

Default Values:

Drop Placement, Aerial & Buried		
Density Zone	Aerial, total	Buried, per foot
0-5	$58.33	$0.75
5-100	$58.33	$0.75
100-200	$46.67	$0.75
200-650	$35.00	$0.75
650-850	$23.33	$0.75
850-2,550	$11.67	$0.75
2,550-5,000	$11.67	$1.13
5,000-10,000	$11.67	$1.50
10,000+	$11.67	$5.00

2.2.2. Drop Placement, Aerial and Buried

Definition: The total placement cost by density zone of an aerial drop wire, and the cost per foot for buried drop cable placement, respectively.

Default Values:

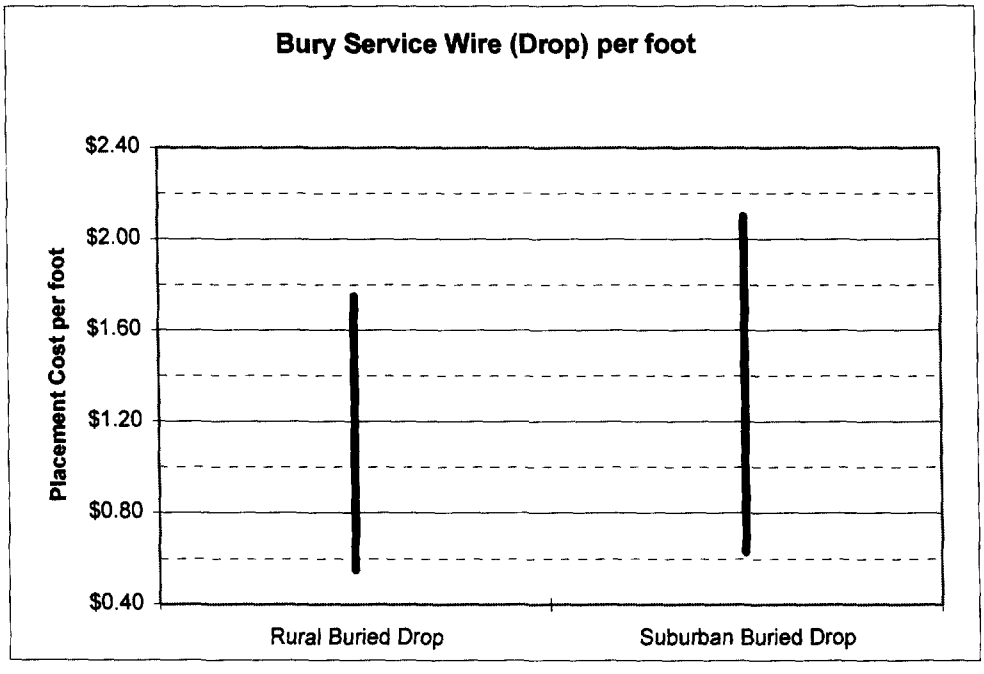
Drop Placement, Aerial & Buried		
Density Zone	Aerial, total	Buried, per foot
0-5	$23.33	$0.60
5-100	$23.33	$0.60
100-200	$17.50	$0.60
200-650	$17.50	$0.60
650-850	$11.67	$0.60
850-2,550	$11.67	$0.60
2,550-5,000	$11.67	$0.75
5,000-10,000	$11.67	$1.50
10,000+	$11.67	$5.00

Support:

Buried Drop Placement

The labor estimate is based on a crew installing buried drop wires throughout a neighborhood (in coordination with the installation of NIDs, terminals, and distribution cables).

Of the quotes that were received for suburban and rural buried drop placement, several of them price buried drop placement at the HM 5.0a default values. Because buried drops are rare in urban areas, the expert opinion of outside plant experts was used in lieu of verifiable forward looking alternatives from public sources or ILECs. Price quotes for contractor placement of buried drop wire were as follows:



AERIAL DROP PLACEMENT COSTS

Reproduced below are copies of the "Aerial Drop Placement" charts contained in section 2.2.2 of both the HM 3.1 and HM 5.0 Inputs Portfolios. These charts from the Inputs Portfolios do not break down the cost of aerial placement on a per foot basis. Because most of the source material provides price quotations for aerial cable placement on a per foot basis, we have added an additional column to the Inputs Portfolio charts (the last column entitled "Cost per Foot") that shows the HM 3.1 and HM 5.0 cost for placing aerial cable on a per foot basis.[5]

HM 3.1

Aerial Drop Placement [illegible]					
Density Zone	Aerial Drop Length (ft.)	Installation Box Time (min.)	Direct Loaded Placed Cost	Aerial Total	
0-5	150	150	$35	$58.33	$ 0.39
5-100	150	150	$35	$58.33	$ 0.39
100-200	100	80	$35	$46.67	$ 0.47
200-650	100	60	$35	$35.00	$ 0.35
650-850	50	40	$35	$23.33	$ 0.47
850-2,550	50	20	$35	$11.67	$ 0.23
2,550-5,000	50	20	$35	$11.67	$ 0.23
5,000-10,000	50	20	$35	$11.67	$ 0.23
10,000+	50	20	$35	$11.67	$ 0.23

[5] GTE computed the per foot cost for placing aerial cable by dividing the figure in the "Aerial Total" column by the figures in the corresponding Aerial Drop Length column to obtain the per foot placement cost.

HM 5.0

[illegible]					Cost per foot
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
0-5	150	40	$35	$23.33	$.155
5-100	150	40	$35	$23.33	↓
100-200	100	30	$35	$17.50	$.175
200-650	100	30	$35	$17.50	
650-850	50	20	$35	$11.67	
850-2,550	50	20	$35	$11.67	$.233
2,550-5,000	50	20	$35	$11.67	
5,000-10,000	50	20	$35	$11.67	
10,000+	50	20	$35	$11.67	

Using the Inputs Portfolio to calculate the per foot placement costs shows that in HM 3.1, prices ranged from a high of $.47 to a low of $.35 per foot for placing aerial drops in rural and suburban areas. Using the HM 5.0 Inputs Portfolio to calculate the per foot placement costs, prices range from a high of $.23 per foot for placing aerial drops in suburban areas to a low of $0.16 per foot for placing aerial drops in rural areas.

A close review of the Inputs Portfolio and HM 3.1's default inputs showed that the "Aerial Total" column for the two lowest density areas in the Inputs Portfolio contained a significant error. Properly multiplying HAI's assumed labor rate of $35 per hour by the assumed installation time of 150 minutes (2.5 hours) resulted in a "total" cost of $87.50 for the two lowest density zones. The HM 3.1 Inputs Portfolio chart used a "total" of $58.33, nearly a $30.00 understatement. This error was carried into HM 3.1 itself, generating significantly understated aerial drop placement costs as compared to HAI's own assumptions.

In a recent deposition, Mr. Fassett indicated that he believed the 150 minute

installation time contained in the table to be excessive.[6] In testimony filed in Washington State, he indicated that there was a typographical error in the HIPs "Draft" and that the installation time should have been 100 minutes, not 150 minutes.[7] Now in the HM 5.0 Inputs Portfolio, the installation time is shown as only 40 minutes and the resulting costs per foot are again reduced significantly. As shown later in this document, the analysis of the aerial drop placement quotes and the average drop length quotes contained in the Fassett material fail to validate his claims regarding the installation time for aerial drop placement in rural areas.

The review of the source material produced by AT&T again shows that the HM 5.0 default inputs for the cost per foot for aerial drop placement is wholly unsupported by the price quotations provided to the HAI engineering team.

The documentation produced by AT&T did not contain a worksheet detailing the solicited vendor price quotations similar to the worksheet that was found relative to the buried drop placement costs. Nevertheless, GTE was able to create a table detailing each price quotation received by the HAI engineering team. This table is printed on the following page.

As the table indicates, the engineering team received six price quotations relative to aerial drop placement. The quotations range from $0.40 per foot to $1.00 per foot for aerial drop placement in rural areas, and from $0.38 per foot to $2.00 per foot for aerial drop placement in suburban areas. The average price quotation received by the engineering team for aerial drop placement, on a per foot basis for rural and suburban areas, is $0.62 and $0.89 respectively. Comparing these average prices with the HAI default input shows that the Model's inputs are significantly lower than the price quotations solicited by the HAI engineering team.

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[6] Deposition of Dean Fassett before the Washington Utilities and Transportation Commission, Docket Nos. UT - 960369,-70,-71, June 12, 1997, at 123.

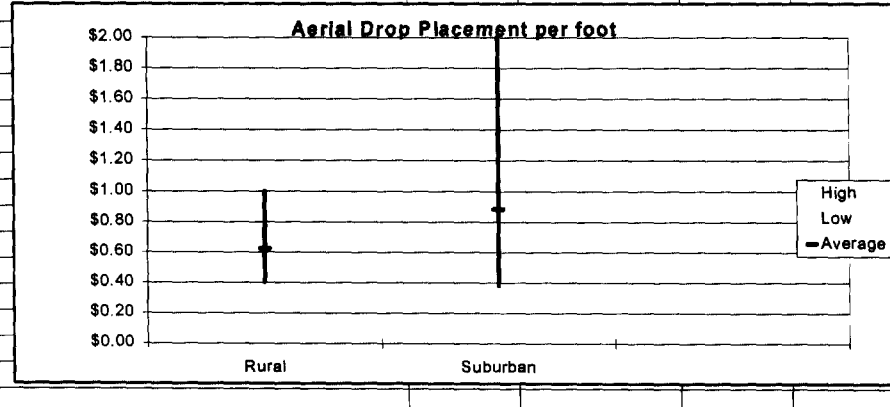
[7] Supplemental Testimony of Dean Fassett before the Washington Utilities and Transportation Commission, Docket Nos. UT - 960369,-70,-71, June 20, 1997, at 9.

Aerial Drop Placement

Table of Price Quotations

	Rural	Suburban
Aerial Drop Placement	$/ft.	$/ft.
Contractor C	**$0.41**	**$0.38**
Contractor E	**$0.60**	**$0.70**
Contractor F	**$0.40**	**$0.40**
Contractor H	**$0.88**	**$1.38**
Contractor J	**$1.00**	**$2.00**
Contractor K	**0.45**	**0.45**

	Rural	Suburban
High	**$1.00**	**$2.00**
Low	**$0.40**	**$0.38**
Average	**$0.62**	**$0.89**



The values for Contractor F and Contractor H represent averages drawn from the price quotes provided in the referenced documents.

As previously discussed, HM 5.0 uses a cost for placing aerial drop wire in rural areas of $0.16 per foot. The average price on a per foot basis for placing aerial drops as provided by the vendors solicited by the HAI engineering team, is $0.62 -- significantly greater than the costs HM 5.0 uses. HAI's default inputs for placing aerial drop wire in suburban areas range from $0.18 to $0.23 per foot. The engineering team source material shows that the average price per foot for placing aerial drop wire in suburban areas is $0.89 per foot -- a price that is more than triple the HM 5.0 default input. As with buried drop placement, HM 5.0's low, unsubstantiated default inputs generates significantly understated cost estimates.

DROP WIRE DISTANCES

The chart below, according to Section 2.2.1 of the Inputs Portfolio, represents "the average length of a drop in each of the nine density zones" used in both HM 3.1 and HM 5.0.

This chart indicates that HAI uses an average drop distance in rural and suburban areas ranging from 150 to 50 feet.

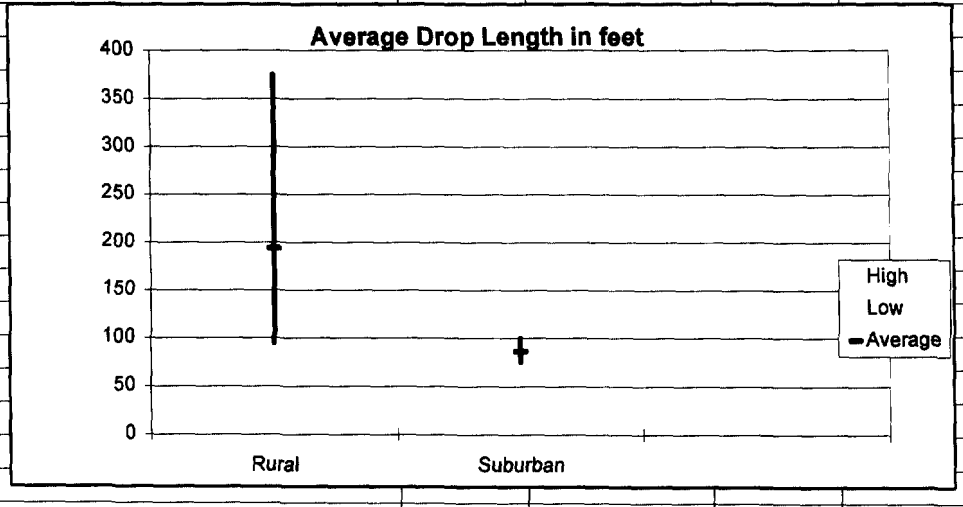
The Fassett material did not contain any worksheets pertaining to drop distances. GTE did, however, discover source material relative to drop distances. We have compiled a chart based on all of the source material available to the engineering team.

0-5	150
5-100	150
100-200	100
200-650	100
650-850	50
850-2,550	50
2,550-5,000	50
5,000-10,000	50
10,000+	50

This chart appears on the following page.

Drop Wire Distance Source Material

	Rural	Suburban
Drop Wire Average Length	ft.	ft.
Contractor C	**250**	**75**
Contractor F	**150**	**88**
Contractor G	**94**	**94**
Contractor I	**100**	**100**
Contractor J	**375**	**75**
	Rural	Suburban
High	**375**	**100**
Low	**94**	**75**
Average	**194**	**86**



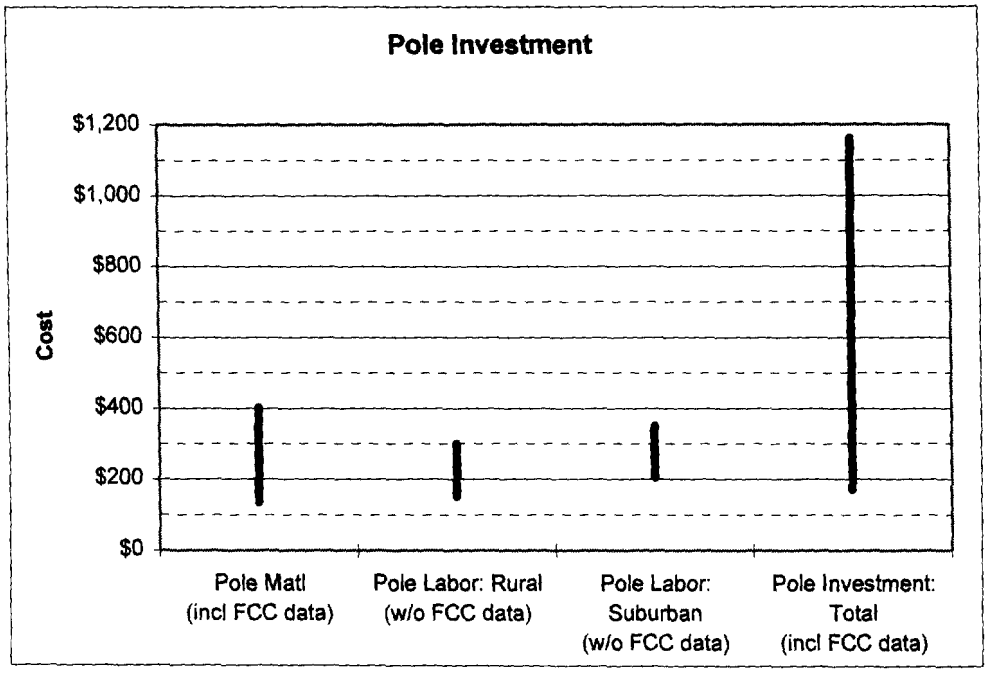
The suburban value for Contractor F is an average drawn from the quotations provided in the referenced document and the Contractor G values reflect an average of both the suburban and rural quotes provided.

In keeping with the same pattern, the source material available to the engineering team shows that the HAI default inputs for drop distances are not supported by the information the engineering team solicited. As this chart shows, the HAI engineering team received information from five different sources relative to drop distances in rural and suburban areas. These five sources, when averaged, generate a drop distance in rural areas of 194 feet. However, HAI uses a default input ranging from only 150 to 100 feet for these drops. The chart also shows that the average drop distance in suburban areas is 86 feet. This is 36 feet longer than the vast majority of drop lengths HM 5.0 uses for suburban areas. By ignoring the source material that was solicited by the HAI engineering team, HM 5.0 utilizes artificially shorter drop lengths than what reality dictates. Doing so enables HM 5.0 to generate artificially low cost estimates.

POLE INVESTMENT

Reproduced on the following page is a copy of Section 2.4.1 of the Inputs Portfolio which purports to reflect the installed cost of a 40 foot Class 4 treated southern pine utility pole.

The Inputs Portfolio notes that pole investment "is a function of the material and labor costs of placing a pole." The HAI Model uses $417 as the default input for pole investment. While the following is taken from HM 5.0, it is basically the same as the 3.1 version.



2.4.1. Pole Investment

Definition: The installed cost of a 40-foot Class 4 treated southern pine utility pole.

Default Values:

Pole Investment	
Materials	$201
Labor	$216
Total	*$417*

Support: Pole investment is a function of the material and labor costs of placing a pole. Costs include periodic down-guys and anchors. Utility poles can be purchased and installed by employees of ILECs, but are frequently placed by contractors. Several sources revealed the following information on prices.

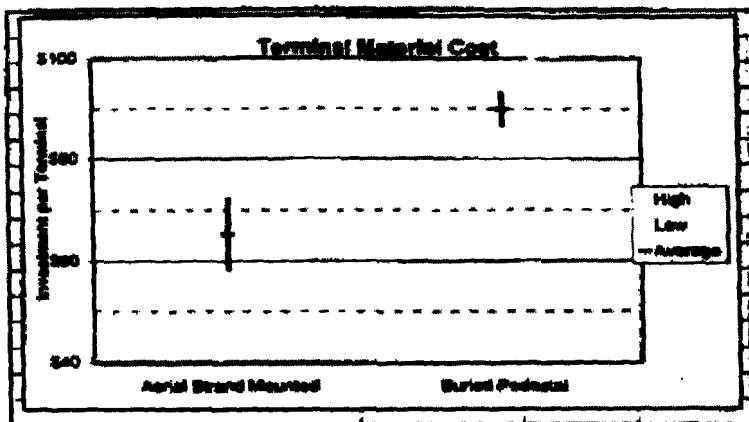
GTE was able to review both the Fassett engineering team worksheet and the source material that supported the worksheet. A copy of that portion of the worksheet that relates to pole investment[8] is on the following page.

The bar graph at the bottom of the Fassett worksheet is duplicated in the Inputs Portfolio, indicating that this worksheet was used to generate the HAI default input for pole investment.

Upon reviewing the source material which purports to support both the pole investment worksheet and the corresponding HM 5.0 default input, several inconsistences were discovered.

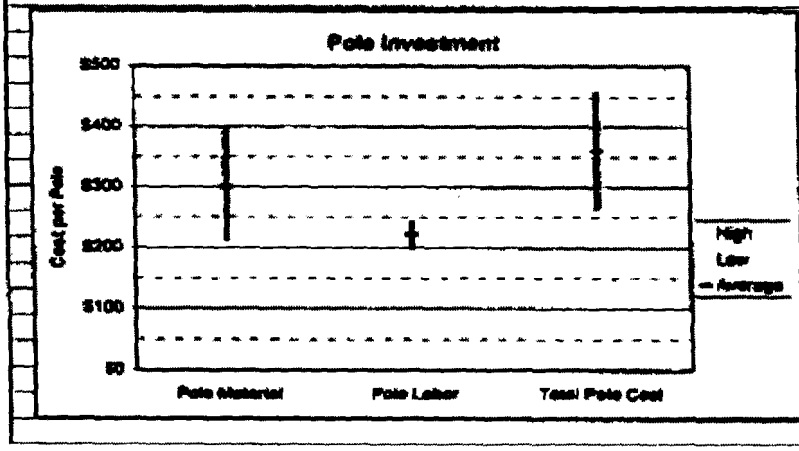
[8] The worksheet is numbered FASSET 2.

Pole Investment Source Material



Poles				
30' Class 5	each	$	125.00	Contractor L
	each	$	114.30	Contractor M
35' Class 4	each	$	160.00	Contractor L
	each	$	141.33	Contractor M
40' Class 4	each	$	240.00	Contractor L
	each	$	201.17	Contractor M
40' Class 2	each	$	214.20	Contractor M
45' Class 3	each	$	325.00	Contractor L
45' Class 2	each	$	298.48	Contractor M
50' Class 3	each	$	400.00	Contractor L
	each	$	329.670	Contractor M

	High	Low	Average
Pole Material	$392	$216	$301
Pole Labor	$240	$201	$221
Total Pole Cost	$456	$288	$361



While the methodology used by the engineering team to arrive at a default value of $417 for total pole investment is somewhat difficult to determine, a careful review of the source material offers valuable insight. For instance, despite the clear inference drawn from the inclusion of "average" costs on the bar chart that appears both in the Inputs Portfolio and the worksheet, the $417 default input reflects anything but an average. As the Fassett worksheet clearly indicates, the average pole material cost is $301; HM 5.0 uses a cost of $201. The average labor cost for installing a pole is $221; HM 5.0 uses $216. Thus, the total average pole investment would, according to the calculations contained on the engineering team's own worksheet, be $522; however, HM 5.0 inexplicably uses a default input of $417. Neither the Fassett worksheet nor the Inputs Portfolio describe how the $417 default input value was derived. The source material, however, provides some description. The material cost of a pole is based upon a cost quotation of $201 drawn from Contractor M, and the labor cost of $216 is drawn from a price quotation provided by Contractor L. The $201 and $216 price quotations, however, do not comport with the entirety of the source documentation.

For example, the $201 price quotation for the material cost of a pole is drawn from another source apparently provided by Contractor M. Nothing in that piece of source material indicates that the $201 includes the costs of down guys or anchors -- costs that are independently broken out in most of the other source material available to the HAI engineering team. Section 2.4.1 of the Inputs Portfolio states, however, that the "costs include periodic down-guys and anchors." Down-guys and anchors are not inexpensive -- quotations provided by Contractor L indicate that these items would <u>cost</u> an additional $292 per pole. Moreover, the $201 material quotation HAI relies upon does not include delivery charges; again, this is a charge that is independently provided by other vendors solicited by the engineering team, but is disregarded in HM 5.0's final input.

The $216 labor cost relied upon by HM 5.0 is also unsupported. HM 5.0 relies on the $216 labor quotation by selectively removing this figure from a portion of an estimated total cost quotation provided by Contractor L. The $216 figure is part of Contractor L's estimated <u>cost</u> of furnishing and installing a 40 foot Class 4 pole. The

engineering team disregards the fact that the quotation provided by Contractor L, upon which this $216 labor cost is based, does not include Contractor L's ten and fifteen percent overhead and profit factors. The HAI engineering team blatantly disregards the overhead and profit portion of the labor cost despite the fact that the correspondence from Contractor L specifically states that overhead and profit ("O&P") should be added to the cost estimates provided. These ten and fifteen percent overhead and profit factors are a cost that any ILEC would have to pay Contractor L to install a pole. The engineering team, however, simply ignores it.

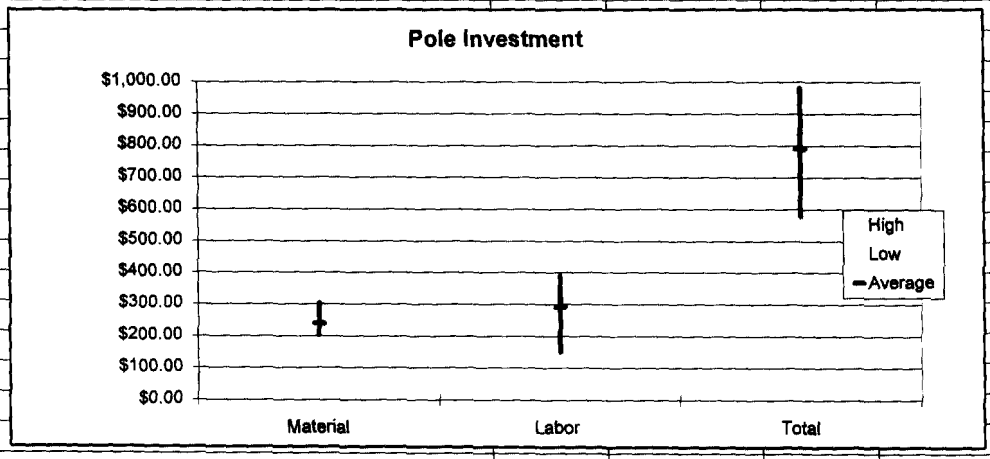
Finally, HM 5.0's practice of using the labor quotation from one source, and a material quotation from another source, plainly violates standard bidding practices. Bids for installing a pole are based on the practice that the total project -- materials and labor -- will be provided by the same firm. HM 5.0 disregards this standard practice. If the HAI engineering team wanted to use Contractor L as the lowest cost provider of poles, it should have used the actual installed price of a pole that was quoted by this contractor: $577.

GTE was able to compute the total pole investment using all of the price quotations provided to the engineering team by various vendors (including properly adding overhead and profit costs to the Contractor L quotations). The chart reflecting this information is on the next page.

GTE Computation of HAI Total Pole Investment

	Material	Labor	Total
40 foot Class 4 Pole	$	$	$
Contractor L	**$303.60**	**$273.24**	**$576.84**
Contractor N			**$815.00**
Contractor M	**$201.17**		
Contractor P			**$980.00**
Contractor Q	**$211.31**	(plus $8.50 per pole - shipping)	
Contractor J (Rural)		**$150.00**	
Contractor J (Suburban)		**$360.00**	
Contractor C (Rural)		**$294.00**	
Contractor C (Suburban)		**$392.00**	

	Material	Labor	Total
High	**$303.60**	**$392.00**	**$980.00**
Low	**$201.17**	**$150.00**	**$576.84**
Average	**$238.69**	**$291.85**	**$790.61**



The Contractor L values are equal to the cost quotes plus the markup specified by the contractor.
The values for Contractor Q reflect the average of the price quotations provided.

Seven vendors provided price quotations relative to pole investment. GTE computed the average pole material investment of these quotations to be $239 (as opposed to HM 5.0's default value of $201), and the average pole labor investment of $292 (as opposed to HM 5.0's default value of $216), providing a total pole investment average of $531 without anchors and down-guys (as opposed to HM 5.0's default value of $417 which HAI claims includes anchors and down-guys). The HAI engineering team's practice of selectively choosing costs from different and inconsistent sources results in a substantial underestimation of pole investment costs.

The review of the source material indicates that the Model's use of 40 foot poles is not supported by pole attachment agreements contained in the Fassett materials. For instance, a Company R agreement for Joint Use of Poles reveals that the type of pole large enough to permit sharing between power companies and telephone companies is a 45 foot pole -- not the 40 foot pole assumed by HAI[9]. However, the HAI modelers did not solicit quotations for 45 foot poles. Had they done so, the pole investment costs included in the Model would have been correspondingly higher.

In addition, an agreement between Company S and New York Telephone, also found within the Fassett material, contains a stricter clearance requirement than seen in other source material. Section 9.09 C.2 specifies that New York Telephone's strand must be at least 12 inches below the lowest part of drip loops feeding street lights.[10] This increases the power company's area of ownership by an additional foot, thereby decreasing the space available to the telephone company and other communications users by one foot. The solution is obvious - increase pole height. This lends additional credence to the argument that the default pole size in HAI is actually a minimum requirement under the FCC's specification of a forward looking network.

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9 See document number FASSET 46.

10 See document number DF-5-002654.

MANHOLE INVESTMENT

The manhole investment inputs are set forth in Section 3.6 of the Inputs Portfolio and reproduced below.

3.6. MANHOLE INVESTMENT – COPPER FEEDER

Definition: The installed cost of a prefabricated concrete manhole, including backfill and restoration. All the non-italicized costs in the following table are separately adjustable.

Default Values:

Copper Feeder Manhole Investment						
Density Zone	Manhole	Frame & Cover	Site Delivery	Total Material	Excavation & Backfill	Total Installed Manhole
0-5	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
5-100	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
100-200	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
200-650	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
650-850	$1,865	$350	$125	*$2,340*	$3,200	*$5,540*
850-2,550	$1,865	$350	$125	*$2,340*	$3,500	*$5,840*
2,550-5,000	$1,865	$350	$125	*$2,340*	$3,500	*$5,840*
5,000-10,000	$1,865	$350	$125	*$2,340*	$5,000	*$7,340*
10,000+	$1,865	$350	$125	*$2,340*	$5,000	*$7,340*

Support: Costs for various excavation methods were estimated by a team of experienced outside plant experts. Additional information was obtained from printed resources. Still other information was provided by several contractors who routinely perform excavation, conduit, and manhole placement work for telephone companies. Results of those inquiries validated the opinions of outside plant experts and are revealed in the following charts.

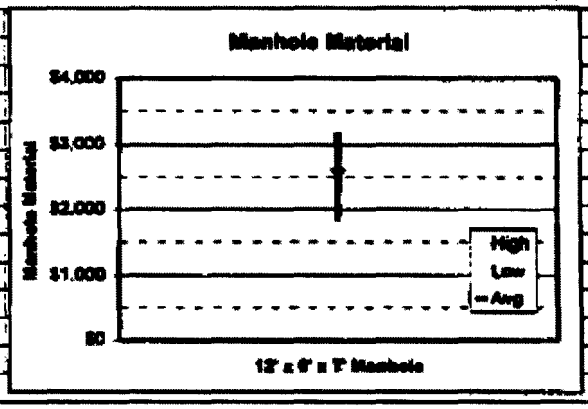
As this section of the Inputs Portfolio indicates, HM 5.0 uses a "material" cost of $1,865 for its manhole investment in all density zones.

Within the Fassett materials we discovered one worksheet relative to manhole investment costs which is reproduced below. The worksheet shows that such investment costs are not supported by the engineering team's own calculations.[11]

The bar chart at the bottom of this worksheet is duplicated in the Inputs Portfolio, indicating that the calculations on this worksheet were used to derive HM 5.0's default inputs.

The bar chart at the bottom of the Fassett worksheet, which is the same bar chart that appears in the Inputs Portfolio, shows that the "average" figure contained in the bar chart reflects the average cost for manhole materials without the addition of frame, cover, and delivery. As is apparent, the engineering team's calculation for the average material cost of a manhole is $2,605. HM 5.0, however, uses a material cost for manholes of

Manhole				w/o del & cvr			
12' X 6' X each	1,865.00	Contractor I	+ $125 Delivery	$1,865.00			
12' X 6' X each	3,150.00	Contractor U	+ $230 Del	$2,800.00			
12' X 6' X each	3,800.00	Contractor Y		$3,150.00			
10' X 8' X each	2,380.00	1997 Natl Const. Estimator		$2,030.00			
	2,838.33	Average		$2,805.00			
					High	Low	Avg
					$3,150	$1,865	$2,805



$1,865. This $1,865 cost is the lowest price quotation received by the engineering team.

[11] The worksheet is numbered as FASSET 8.

The Fassett worksheet also indicates that only four price quotations were received by the engineering team (in fact, only three were used to calculate their average). However, a review of the source material indicates that five price quotations regarding material costs were actually received, and that the price quotation missing from the Fassett worksheet is the highest of all the quotations.

GTE was able to compute an average total installed manhole investment figure based solely on the information available to the engineering team at the time the Inputs Portfolio was written. The results are contained in the worksheet on the next page.

As this work product shows, we developed material costs generic to all locales and excavation cost estimates for rural, suburban and metropolitan areas. The Fassett materials show that the average manhole material cost, including cover and delivery, is $4,408. Using this figure as the "Total Material" cost, and adding it to the average excavation & backfill costs based solely on the quotations received, we arrived at total installed manhole costs of $6,830, $7,182, and $8,276 for rural, suburban and urban environments, respectively. These estimates are 33%, 30%, and 13% higher than the default inputs used in the HAI Model.