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DATE: March 16, 2003
TO: Followers of Sound Transit
FROM: Jim MacIsaac
SUBJECT: Central Link Costs and Funding of Extension to the U-District

Sound Transit has recently announced some preliminary construction cost estimates for extending the Link Initial Segment (IS) from downtown Seattle (CPS) to the U-District and to Northgate. According to the March 12 article by Mike Lindblom in the Seattle Times:

Depending on the number of stations, \$850 million to \$1.3 billion would be required to dig a tunnel from downtown to the University District, plus another \$400 million to \$500 million to reach Northgate on a combination of surface, elevated and underground tracks. Those figures, plus the soft costs, would bring the project close to \$2 billion.

Yesterday's figures include construction costs only, and are based on "5 percent engineering." They do not include trains or so-called soft costs such as administrative overhead, engineering and inflation, which might add 25 to 30 percent, said Ahmad Fazel, Link light-rail director. Staffers said more work needs to be done, including test drilling west of Portage Bay to determine whether there are underground boulders that would hinder tunnel work.

Some members of the Sound Transit Board criticized rail critics for publicizing cost estimates of \$2.5 billion to extend Link to the U-District and up to an additional \$1 billion to further extend Link to Northgate. But hold the phone folks. Fazel has disclosed less than half of the cost numbers. You will quickly see that below.

Past versus Current Cost Estimates

In December 2000 Sound Transit issued cost estimates for what it then called MOS-1, a minimum operational segment of the Phase I rail promise. MOS-1 would construct a 7.1-mile segment of Central Link from South Lander Street in Seattle to NE 45th Street in the U-District. The estimated cost of this segment was \$2.6 billion. A breakdown of these cost estimates is shown on the first table attached.

Note that the cost estimates with a 10% contingency showed \$1,035 million to construct the Capital Hill tunnel and to complete four stations – the two on First/Capitol Hills and the two in the U-District (see the bolded numbers on lines 2, 3 and 4). These estimates were in year of expenditure (YOE) dollars. It is likely that the \$850 million to \$1.3 billion (in 2003 dollars) construction cost estimates recently released by ST reflect only these elements of the northward extension. Fazel should have said: *They do not include trains or so-called soft costs such as administrative overhead, engineering and inflation, which might add **100 percent or more**.*

Basis of MacIsaac Cost Estimates

So the MOS-1 cost estimates formed the basis of my \$2.5 billion estimate to extend Link from CPS to the U-District. My estimates are only as accurate as were the Sound Transit Estimates for the former MOS-1 project as submitted to the FTA.

My estimates are shown on the right half of the table. I had to separate the costs of the 4.5-mile segment north of the CPS from the 7.1-mile MOS-1 cost estimates. The first column shows my estimate of the percentage of each MOS-1 cost item that would apply to the segment north of CPS. Of course the major items 2, 3 and 4 were 100% associated with the CPS to U-District extension. I then applied judgement as to what proportion of the other cost lines applied to the 4.5-mile segment north of CPS.

My findings for the 4.5-mile segment north of CPS were \$1,035 million for the base construction costs – and these are in terms of YOES\$ based upon a construction midpoint of 2006. That is right in the range of the construction estimates recently released by ST, which were in 2002-3 dollars. But note that the costs of trains, other finishing costs and so-called “soft costs” result in more than a 100% increase over the base construction costs – not 25 to 30 percent as suggested by Fazel. What will likely become a major element of the soft costs is financing costs (line 27).

Sound Transit claims it could complete the extension to the U-District by 2012. The middle column of the MacIsaac estimates uses the ST cost indices to expand the 2006 YOES\$ estimates to 2009 YOES\$ estimates – presumed midpoint year of construction. This is where my estimates approach **\$2.5 billion**. And this is for extension to the U-District, not to Northgate.

But as you will see below, I cannot foresee any possible way to fund and complete this extension to the U-District until 2015 unless ST finds some major new source of funding in addition to local taxes, bonding and federal grants. If this becomes the case, the final column of MacIsaac estimates further indexes the costs to a 2012 midpoint of construction.

So my estimate of total cost ranges from \$2.45 billion to \$2.75 billion to extend Link from CPS to the U-District. The cost per mile will be in excess of \$500 million per mile.

Ahmad Fazel suggested an additional \$400 to \$500 million (2002/3 dollars) in base construction costs to extend Link the remaining **3.2 miles to Northgate**. That would expand to \$500 to \$600 million in 2009 YOES\$. Add 115% for trains and equipment and soft costs, and we reach **\$1 billion or more**.

Link IS Will Drain North King Funding Resources

The U-District extension segment falls totally within the responsibility of the North King subarea. The upper table on the second attachment hereto shows Sound Transit’s current 2003 financial plan for the North King subarea. It reflects completion of Link IS only by 2009 plus about \$100 million spent in planning costs for extensions.

The column about midpoint in the table provides a summary of all revenues and uses from 1997 thru 2009 – the now targeted end of the truncated Phase I Link program. The revenue to complete Link IS breaks down as follows: Local taxes - \$1,023 million (42%), Bond obligations - \$1,122 million (46%), federal grants - \$310 million (12%). The 2009 Ending cash will be less than \$1 million.

There may be up to \$298 million remaining for “Possible Program Enhancements”. However, with Sound Transit’s history of cost overruns, that will likely be used up in bringing Link IS into operation, and/or for completing deferred stations.

Note the heavy use of bond financing. As of 2009, North King will have virtually used up all its bonding capacity. The bottom line of the table provides the year by year calculation of maximum allowable debt service. By 2012 and 2013 as the full costs of debt service begin to kick in, North debt service will be at the maximum allowable per the 1.3 revenue/debt ratio policy.

So as of 2009 North King would likely have no cash or bonding capacity to apply to a northward extension from downtown Seattle. Even if we stretch the financing of a northward extension out to 2016, unrestricted cash accumulation would reach only \$107 million. ST estimates available bond capacity by 2016 at \$108 million. The huge debt service commitment for Link IS plus its O&M and replacement reserve commitments after beginning of operation will eat up nearly all ongoing subarea revenues.

A Funding Scenario for Link North

So I still maintain that when all costs are tallied up, including financing costs, Link will cost \$2.5 billion to extend to the U-District plus \$1 billion more to extend to Northgate. But let us assume that the North King subarea must generate sufficient revenue to cover \$2.5 billion of the costs of extending Link northward.

The lower table on the second attachment shows one possible funding scenario that could cover up to \$2.5 billion of the costs of Link extension – call it Phase IB. It incorporates all of the Phase I cost data from the upper table. It reflects start of Phase IB in 2007 **with a doubling of the local tax levies**. The Line “Taxes – Phase IB” shows these added revenues. It next assumes approval of an FFGA-2 that provides another \$400 million for Link North (plus perhaps another \$200 million for Link South), paid for North in \$60 million installments from 2009 thru 2015.

The \$2.5 billion of added capital commitment shows up under “Uses of Funds” on the line “Light Rail – Extend to Northgate”. It shows a ramp-up of construction costs in 2008 and 2009 to a maximum production rate of \$400-\$450 million per year for four years and a final two-year ramp down to completion by mid-2015. Even with the doubling of local taxes and continuing federal aid, revenues cannot cover this pace of construction costs – we must resort to more bonding as needed.

So this adds the “Net Bond Revenue – Phase IB” line under Sources in the table. Bonds are sold year by year to keep the “Ending unrestricted cash” line at the bottom of the table above zero. The bond sales begin a new stream of Phase IB Debt Service and Phase IB Bond Reserve costs as shown on those added lines in the table. By 2016 North will have issued an additional nearly \$1.5 billion in bonds, but \$500 million will have been eaten up in bond costs.

By 2016 this scenario leaves ending cash of \$65 million and a bonding capacity buffer of \$117 million. There is little slack for less than a 100% increase in local tax generation.

I don’t believe that an additional \$2.5 billion will get Link to Northgate. Whether or not it does, this scenario illustrates that a doubling of North King tax levies for Sound Transit is needed UNLESS Executive Sims and the ST Board find some other LARGE source of funding.

MOS-1 - 7.1 miles: Baseline Cost Estimate with Revisions as of December 22, 2000 ¹							CPS to U-District Segment - 4.5 miles ²									
Slightly reordered to achieve subtotals by Category.							YOE \$millions - Est midpoint 2006; Est End 2009					YOE \$millions - Est midpoint 2009; Est End 2012				
FTA Unit	Description	Capital Category	Cost ¹ Index	YOE\$ w/o Contingency	% Contin-gency	YOE\$ with Contingency	% MOS-1 to Include	2006 YOES w/Contincy	Index ¹ 2006-09	2009 YOES w/Contincy	Index ¹ 2006-12	2012 YOES w/Contincy				
						<u>1,035.45</u>		<u>1,035.45</u>		<u>1,137.96</u>		<u>1,260.15</u>				
2	Design/Build for tunnel and subway stations	Construction	BCI	806.00	10%	886.60	100%	886.60	1.099	974.37	1.217	1,078.99				
3	Station finishes at 45th and Pacific	Construction	BCI	71.19	10%	78.31	100%	78.31	1.099	86.06	1.217	95.30				
4	Station finishes at Cap Hill and 1st Hill	Construction	BCI	<u>64.13</u>	10%	<u>70.54</u>	100%	<u>70.54</u>	1.099	<u>77.53</u>	1.217	<u>85.85</u>				
	Subtotal - Base Construction Costs			941.32		1,035.45		1,035.45		1,137.96		1,260.15				
5	DSTT (excl tunnel transfer) ²	Construction	BCI	20.70	10%	22.77	0%	0.00	1.099	0.00	1.217	0.00				
6	S.Royal Brougham to Airport Way S.	Construction	BCI	47.77	10%	52.55	0%	0.00	1.099	0.00	1.217	0.00				
7	LRT Vehicles	Construction	CPI	143.17	11%	158.91	50%	79.46	1.099	87.32	1.217	96.70				
8	Train Signals	Construction	BCI	17.69	2%	18.04	33%	5.95	1.099	6.54	1.217	7.25				
9	Communications	Construction	BCI	12.99	4%	13.51	33%	4.46	1.099	4.90	1.217	5.43				
10	Scada and Ops Control Center	Construction	BCI	13.72	4%	14.27	10%	1.43	1.099	1.57	1.217	1.74				
11	Tunnel Radio	Construction	BCI	9.88	3%	10.18	10%	1.02	1.099	1.12	1.217	1.24				
12	Portable Radios	Construction	BCI	1.72	4%	1.79	33%	0.59	1.099	0.65	1.217	0.72				
13	Traction Power System	Construction	BCI	22.46	5%	23.58	33%	7.78	1.099	8.55	1.217	9.47				
14	26kv Distribution System	Construction	BCI	16.90	3%	17.41	50%	8.70	1.099	9.57	1.217	10.59				
15	Fare Collection	Construction	BCI	6.35	5%	6.67	50%	3.33	1.099	3.66	1.217	4.06				
16	O&M Facility	Construction	BCI	69.46	4%	72.24	10%	7.22	1.099	7.94	1.217	8.79				
17	Maintenance Equipment Shop	Construction	BCI	5.18	2%	5.28	10%	0.53	1.099	0.58	1.217	0.64				
18	Non-Revenue Vehicles	Construction	BCI	<u>3.54</u>	<u>2%</u>	<u>3.61</u>	33%	<u>1.19</u>	1.099	<u>1.31</u>	1.217	<u>1.45</u>				
	Subtotal - Construction Finishing Costs			391.53		420.80		121.67		133.71		148.07				
19	Right of Way	ROW	ROW	162.50	15%	187.27	90%	168.54	1.115	187.93	1.207	203.43				
1	PE/EIS	Other Cap	CPI	42.00	0%	42.00	50%	21.00	1.091	22.91	1.186	24.91				
20	Project Start-Up	Other Cap	CPI	14.90	5%	15.65	50%	7.82	1.091	8.53	1.186	9.28				
21	Contracted Final Design	Other Cap	CPI	63.92	7%	68.23	67%	45.71	1.091	49.87	1.186	54.22				
22	Contracted Construction Management	Other Cap	CPI	73.28	9%	80.03	67%	53.62	1.091	58.50	1.186	63.59				
23	Other Contracted Services	Other Cap	CPI	25.78	2%	26.29	67%	17.61	1.091	19.22	1.186	20.89				
24	Intergovt Agreements	Other Cap	CPI	82.49	2%	84.42	67%	56.56	1.091	61.71	1.186	67.08				
25	Project Management	Other Cap	CPI	48.93	3%	50.44	67%	33.79	1.091	36.87	1.186	40.08				
26	Other Misc Costs	Other Cap	CPI	232.52	3%	239.72	67%	160.61	1.091	175.23	1.186	190.49				
27	Financing Costs / Bonds	Other Cap	CPI	<u>195.00</u>	<u>0%</u>	<u>195.00</u>		<u>300.00</u>		<u>400.00</u>		<u>500.00</u>				
	Subtotals - Other Capital			778.82		801.78		696.74		832.84		970.53				
	Estimated Total Costs w/o Reserves			2,274.17		2,445.30		2,022.40		2,292.44		2,582.18				
	Project Reserve	Construction	BCI	157.30		157.30		138.85	1.099	152.60	1.217	168.99				
	Estimated Total Costs with Reserves			2,431.47		2,602.60		2,161.25		2,445.04		2,751.16				
	Cost per mile					366.56		480.28		543.34		611.37				
	Total Cost / Base Construction Costs			2.58		2.51		2.09		2.15		2.18				

¹ These are Sound Transit estimates.

² These are MacIsaac estimates.

NORTH KING NOMINAL \$000s	ST Scenario: 2003 Baseline v4									ST Scenario: 2003 Baseline v4											
	1997-01	2002	2003	2004	2005	2006	2007	2008	2009	1997-2009	2010	2011	2012	2013	2014	2015	2016	1997-2016	2017		
Sources of Funds																					
Taxes	334,741	72,179	74,322	77,723	82,212	87,556	93,272	98,381	103,095	1,023,481	107,748	112,749	118,076	123,767	130,290	136,627	143,320	1,896,058	150,472		
Federal Grants - Capital	24,864	29,719	-	45,000	48,000	48,000	48,000	42,000	14,417	300,000	-	-	-	-	-	-	-	300,000	-		
Federal Grants - Operating	-	-	-	-	-	-	-	-	10,420	10,420	11,492	13,208	15,271	15,503	15,860	15,881	15,881	113,516	15,880		
Bond Revenue (less issuance costs)	191,479	-	-	-	33,290	334,122	315,051	138,416	110,025	1,122,383	-	-	-	-	-	-	-	1,122,383	-		
Fares & Other Revenue ¹	(6,341)	(6,460)	(1,616)	(2,289)	(370)	9,400	1,000	1,000	9,082	3,406	10,539	13,234	7,870	8,309	8,787	9,294	9,815	71,254	10,496		
Intersubarea (Loans) Borrowed/Int ²	606	-	(17,698)	(99,805)	121,058	-	19,143	30,592	(51,778)	2,118	-	-	-	-	-	-	-	2,118	-		
Reg Fund Contributions & Rebates ³	24,906	2,312	(2,749)	(8,853)	(13,273)	(15,912)	(6,474)	(4,855)	(4,164)	(29,062)	(2,782)	(2,149)	(1,346)	(544)	313	1,380	2,643	(31,547)	4,060		
Total Sources	570,255	97,750	52,259	11,776	270,917	463,166	469,992	305,534	191,097	2,432,746	126,997	137,042	139,871	147,035	155,250	163,182	171,659	3,473,782	180,908		
Uses of Funds																					
Light Rail (Link IS)	196,834	112,978	188,240	161,673	255,407	412,387	403,475	236,662	87,603	2,055,259	2,304	2,305	2,304	2,301	2,304	2,301	7,611	2,076,689	7,609		
Operating Costs ⁴	5,348	2,155	2,095	2,191	2,367	2,525	2,609	2,704	14,756	36,750	30,379	31,248	34,860	36,406	38,412	40,213	42,371	290,639	44,653		
Debt Service ⁵	25,368	9,513	9,513	9,513	10,666	23,460	42,814	56,334	63,719	250,900	67,284	71,788	78,148	82,401	84,107	85,323	85,319	805,270	85,315		
Contributions to reserve funds ⁶	5,394	146	441	638	2,477	24,794	21,094	9,834	24,277	89,095	17,001	14,542	14,999	14,654	14,733	14,700	14,760	194,484	14,781		
Total Uses	232,944	124,792	200,289	174,015	270,917	463,166	469,992	305,534	190,355	2,432,004	116,968	119,883	130,311	135,762	139,556	142,537	150,061	3,367,082	152,358		
Increase (decrease) in cash	337,311	(27,042)	(148,030)	(162,239)	-	-	-	-	742	742	10,029	17,159	9,560	11,273	15,694	20,645	21,598	106,700	28,550		
Ending unrestricted cash	337,311	310,269	162,239	-	-	-	-	-	742	742	10,771	27,930	37,490	48,763	64,457	85,102	106,700	106,700	135,250		
Maximum Allowable Debt Service										52,875	65,447	70,354	74,821	68,953	75,217	78,792	82,422	86,453	90,258	94,057	98,231

¹ Prior to 2009 this includes "Other Sources" less Operating Subsidies supporting interim REX operations to be replaced by light rail.

² Intersubarea loans are repaid with "Interest" based on the CPI Index.

³ This reflects Regional Fund Contributions offset by refunds of excess interest accumulations in that Fund. Allocations both ways are made in proportion to tax revenues for each subarea.

⁴ Operating Costs presumably include ST administrative overhead allocatable to each project account. That is what appears alone before rail becomes operational.

⁵ Proposed bonds are assumed as 30-year bonds at 5.85% annual interest with first 5 years interest only followed by a 25-year amortization period. Also includes a half year initial interest payment upon sales.

⁶ Includes bond reserve deposits of 7.5% of the bond par amount at time of sales. Capital and operating contributions are based upon timing of replacement needs.

NORTH KING NOMINAL \$000s	New Scenario: Northgate by 2016 or Bust ⁷ Phase IB = +\$2.5 billion									Bold numbers show changes from Scenario: 2003 Baseline v4.											
	1997-01	2002	2003	2004	2005	2006	2007	2008	2009	thru 2009	2010	2011	2012	2013	2014	2015	2016	thru 2016	2017		
Sources of Funds																					
Taxes - Phase I	334,741	72,179	74,322	77,723	82,212	87,556	93,272	98,381	103,095	1,023,481	107,748	112,749	118,076	123,767	130,290	136,627	143,320	1,896,058	150,472		
Taxes - Phase IB⁸							93,272	98,381	103,095	294,748	107,748	112,749	118,076	123,767	130,290	136,627	143,320	1,167,325	150,472		
Federal Grants - Capital ⁹	24,864	29,719	-	45,000	48,000	48,000	48,000	42,000	64,417	350,000	60,000	60,000	60,000	60,000	60,000	50,000	-	700,000	-		
Fed Grants - Link IS Operating	-	-	-	-	-	-	-	-	10,420	10,420	11,492	13,208	15,271	15,503	15,860	15,881	15,881	113,516	15,880		
Bond Revenue (less issuance costs)	191,479	-	-	-	33,290	334,122	315,051	138,416	110,025	1,122,383	-	-	-	-	-	-	-	1,122,383	-		
Net Bond Revenue - Phase IB							-	-	69,800	69,800	251,600	310,200	332,800	290,700	186,200	-	-	1,441,300	-		
Fares & Other Revenue	(6,341)	(6,460)	(1,616)	(2,289)	(370)	9,400	1,000	1,000	9,082	3,406	10,539	13,234	7,870	8,309	8,787	9,294	9,815	71,254	10,496		
Intersubarea (Loans) Borrowed/Int ²	606	-	(17,698)	(99,805)	121,058	-	19,143	44,604	(66,238)	1,670	-	-	-	-	-	-	-	1,670	-		
Reg Fund Contributions & Rebates ³	24,906	2,312	(2,749)	(8,853)	(13,273)	(15,912)	(9,711)	(7,283)	(6,246)	(36,809)	(2,782)	(2,149)	(1,346)	(544)	313	1,380	2,643	(39,294)	4,060		
Total Sources	570,255	97,750	52,259	11,776	270,917	463,166	560,027	415,500	397,450	2,839,099	546,345	619,991	650,747	621,502	531,740	349,809	314,979	6,474,212	331,380		
Uses of Funds																					
Light Rail (Link IS)	196,834	112,978	188,240	161,673	255,407	412,387	403,475	236,662	87,603	2,055,259	2,304	2,305	2,304	2,301	2,304	2,301	7,611	2,076,689	7,609		
Light Rail - Extend to Northgate							-	150,000	250,000	400,000	400,000	450,000	450,000	400,000	300,000	100,000	-	2,500,000	-		
Operating Costs (Link IS)	5,348	2,155	2,095	2,191	2,367	2,525	2,609	2,704	14,756	36,750	30,379	31,248	34,860	36,406	38,412	40,213	42,371	321,878	66,980		
Debt Service ⁵	25,368	9,513	9,513	9,513	10,666	23,460	42,814	56,334	63,719	250,900	67,284	71,788	78,148	82,401	84,107	85,323	85,319	805,270	85,315		
Phase IB Debt Service							-	-	2,042	2,042	11,443	27,875	46,683	64,920	78,870	85,616	90,299	407,747	96,073		
Phase IB Bond Reserve							-	-	4,991	4,991	17,989	22,179	23,795	20,785	13,313	-	-	103,053	-		
Contributions to reserve funds ⁶	5,394	146	441	638	2,477	24,794	21,094	9,834	24,277	89,095	17,001	14,542	14,999	14,654	14,733	14,700	14,760	194,484	14,781		
Total Uses	232,944	124,792	200,289	174,015	270,917	463,166	469,992	455,534	447,388	2,839,037	546,400	619,938	650,789	621,467	531,739	338,206	261,546	6,409,121	270,758		
Increase (decrease) in cash	337,311	(27,042)	(148,030)	(162,239)	-	-	90,035	(40,035)	(49,938)	63	(55)	53	(42)	35	1	11,603	53,433	65,091	60,622		
Ending unrestricted cash	337,311	310,269	162,239	-	-	-	90,035	50,001	63	63	8	61	19	53	54	11,657	65,091	65,091	125,713		
Maximum Allowable Debt Service (with a 1.3 Revenue to Debt Ratio)										52,875	132,901	142,788	151,331	148,967	159,002	166,599	174,531	183,495	184,351	184,644	193,347
Unused Debt Service -->										90,087	86,454	85,571	70,240	59,338	41,768	27,209	20,518	13,413	9,026	= \$117m	11,958

⁷ Assumes that Link IS uses up the Phase I estimate of \$298 million of "Possible Enhancements".

⁸ Assumes that the Phase I tax levies will be doubled beginning 2007.

⁹ Assumes an FFGA2 that provides \$50m per year for Link North from 2009 thru 2016 - \$400 million.