Linac Chase Definitions											
G. Johnson -3-23-00			Document No. - DOC-GAJ-032300-01 Rev. 0								
Chase No.	Chase Type	Chase Size	WG	Beam Compon-ent Length (Note 1) (m)	Beam Line Axial Position (Note 2) (m)	Beam Line Axial Position (Note 3) (ft)	Vertical Height at Tunnel (in)	Comment	check	check	check
				0	-7.49402	-24.5866		Start of ion source coordinate system.			
				0.16667	-7.32735	-24.0398		Start of RFQ coordinate system.			
				3.72235	-3.605	-11.8274		Start of MEBT coordinate system			
				3.605	0	0		End of MEBT. Front end interface with DTL (valve face). Location of inside surface of lexan wall.			Physical Ref.
				0.0525	0.0525	0.172244		Center of first DTL quad (physics end of DTL)		Physics Ref.	
				9.1805	9.233	30.29193		Beginning of linac tunnel (30' 3.5" from end of MEBT)		ft	m+0.0525
1	Spare	1@12"	0	5.075	14.308	46.94216	Note 8,9				
2	DTL-3	1@36"	WR-2100	7.075	16.3084	53.50524	Note 4,9			53.333	16.30843
3	DTL-4	1@36"	WR-2100	1.219	17.5276	57.50524	Note 4,9			57.333	17.52763
4	Ref. Coax	1@24"	0	6.858	24.3856	80.00524	Note 4,9			79.833	24.38565
5	DTL-5	1@36"	WR-2100	6.553	30.9389	101.5052	Note 4,9			101.333	30.93886
6	DTL-6	1@36"	WR-2100	1.219	32.1581	105.5052	Note 4,9			105.333	32.15806
7	Spare	1@12"	0	2.000	34.1581	112.0669	Note 8,9				
				36.54	36.5925	120.0539		Center of last DTL quad (physics end of DTL) (DTL Physics Length -36.54 m)			
				0.227	36.8195	120.7986		Space between DTL and CCL (physics start of CCL)			
8	Ref. Coax	1@24"	0	2.197	39.0161	128.0052	Note 4,9			127.833	39.01608
9	CCL-1	1@24"	WR-1150	7.315	46.3313	152.0052	Note 4,9			151.833	46.33129
10	CCL-2	1@24"	WR-1150	0.914	47.2457	155.0052	Note 4,9			154.833	47.24569
11	Spare	1@12"	0	2.000	49.2457	161.5669	Note 8,9				
12	Ref. Coax	1@24"	0	5.029	54.275	178.0669	Note 4,9			171.333	52.2749
13	CCL-3	1@24"	WR-1150	5.315	59.5901	195.5052	Note 4,9			195.333	59.59012
14	CCL-4	1@24"	WR-1150	0.914	60.5045	198.5052	Note 4,9			198.333	60.50452
15	Spare	1@12"	0	2.000	62.5045	205.0669	Note 8,9				
16	Ref. Coax	1@24"	0	5.029	67.534	221.5669	Note 4,9			214.833	65.53373
17	CCL-5	1@24"	WR-1150	5.315	72.8489	239.0052	Note 4,9			238.833	72.84894
18	CCL-6	1@24"	WR-1150	0.914	73.7633	242.0052	Note 4,9			241.833	73.76335
19	Spare	1@12"	0	2.000	75.7633	248.5669	Note 8,9				
20	Ref. Coax	1@24"	0	5.029	80.793	265.0669	Note 4,9			258.333	78.79256
21	CCL-7	1@24"	WR-1150	5.315	86.1078	282.5052	Note 4,9			282.333	86.10777
22	CCL-8	1@24"	WR-1150	0.914	87.0222	285.5052	Note 4,9			285.333	87.02217
				55.1215	91.941	301.6431		Physics end of CCL - 55.1215 m. Start of DP-1			
23	Ref. Coax	1@24"	0	2.092	94.0326	308.5052	Note 4,9			308.333	94.03259
				0.504	94.5366	310.1588		End of DP-1. Start of WS-1.			
24	Spare	1@12"	0	0.800	95.337	312.7835	Note 8,9				
				0.8	96.137	315.4081		End of WS-1. Start of SC (MB) -1			4.195586
25	SC (MB)-1-1&2	1@30"	WR-975	1.516	97.6526	320.3819	Note 5,9				
26	SC (MB)-1-3	1@24"	WR-975	1.377	99.0296	324.8996	Note 5,9				
				1.346	100.376	329.3156		End of SC(MB)-1. Start of WS-2	4.239		5.839
				1.6	101.976	334.5649		End of WS-2. Start of SC (MB) -2			
27	SC (MB)-2-1&2	1@30"	WR-975	1.516	103.492	339.5386	Note 5,9				
28	SC (MB)-2-3	1@24"	WR-975	1.377	104.869	344.0564	Note 5,9				
				1.346	106.215	348.4724		End of SC(MB)-2. Start of WS-3	4.239		5.839
29	Ref. Coax/Water	1@24"	0	0.8	107.015	351.097	Note 5,9				
				0.8	107.815	353.7217		End of WS-3. Start of SC (MB) -3			
30	SC (MB)-3-1&2	1@30"	WR-975	1.516	109.331	358.6954	Note 5,9				
31	SC (MB)-3-3	1@24"	WR-975	1.377	110.708	363.2131	Note 5,9				
				1.346	112.054	367.6291		End of SC(MB)-3. Start of WS-4	4.239		
32	Spare	1@12"	0	0.800	112.854	370.2538	Note 8,9				
				0.8	113.654	372.8785		End of WS-4. Start of SC (MB) -4			
33	SC (MB)-4-1&2	1@30"	WR-975	1.516	115.17	377.8522	Note 5,9				
34	SC (MB)-4-3	1@24"	WR-975	1.377	116.547	382.3699	Note 5,9				
				1.346	117.893	386.7859		End of SC(MB)-4. Start of WS-5	4.239		
				1.6	119.493	392.0353		End of WS-5. Start of SC (MB) -5			
35	SC (MB)-5-1&2	1@30"	WR-975	1.516	121.009	397.009	Note 5,9				
36	SC (MB)-5-3	1@24"	WR-975	1.377	122.386	401.5267	Note 5,9				
				1.346	123.732	405.9427		End of SC(MB)-5. Start of WS-6	4.239		
37	Spare	1@12"	0	0.800	124.532	408.5674	Note 8,9				
				0.8	125.332	411.192		End of WS-6. Start of SC (MB) -6			
38	SC (MB)-6-1&2	1@30"	WR-975	1.516	126.848	416.1658	Note 5,9				
39	SC (MB)-6-3	1@24"	WR-975	1.377	128.225	420.6835	Note 5,9				
				1.346	129.571	425.0995		End of SC(MB)-6. Start of WS-7	4.239		
40	Ref. Coax/Water	1@24"	0	0.8	130.371	427.7242	Note 5,9				
				0.8	131.171	430.3488		End of WS-7. Start of SC (MB) -7			
41	SC (MB)-7-1&2	1@30"	WR-975	1.516	132.687	435.3226	Note 5,9				
42	SC (MB)-7-3	1@24"	WR-975	1.377	134.064	439.8403	Note 5,9				
				1.346	135.41	444.2563		End of SC(MB)-7. Start of WS-8	4.239		
				1.6	137.01	449.5056		End of WS-4. Start of SC (MB) -8			
43	SC (MB)-8-1&2	1@30"	WR-975	1.516	138.526	454.4794	Note 5,9				
44	SC (MB)-8-3	1@24"	WR-975	1.377	139.903	458.9971	Note 5,9				
				1.346	141.249	463.4131		End of SC(MB)-8. Start of HB-WS-1.	4.239		
45	Spare	1@12"	0	0.800	142.049	466.0377	Note 8,9				
				0.8	142.849	468.6624		End of WS-1. Start of SC (HB) -1			
46	SC (HB)-1-1&2	1@30"	WR-975	1.683	144.532	474.184	Note 5,9				
47	SC (HB)-1-3&4	1@30"	WR-975	2.718	147.25	483.1014	Note 5,9				
				1.699	148.949	488.6755		End of SC(HB)-1. Start of WS-2.	6.1		1
				1.6	150.549	493.9248		End of WS-2. Start of SC (HB) -2			
48	SC (HB)-2-1&2	1@30"	WR-975	1.683	152.232	499.4465	Note 5,9				
49	SC (HB)-2-3&4	1@30"	WR-975	2.718	154.95	508.3638	Note 5,9				
				1.699	156.649	513.9379		End of SC(HB)-2. Start of WS-3.	6.1		2
50	Spare	1@12"	0	0.800	157.449	516.5626	Note 8,9				
				0.8	158.249	519.1872		End of WS-3. Start of SC (HB) -3			
51	SC (HB)-3-1&2	1@30"	WR-975	1.683	159.932	524.7089	Note 5,9				
52	SC (HB)-3-3&4	1@30"	WR-975	2.718	162.65	533.6262	Note 5,9				
				1.699	164.349	539.2003		End of SC(HB)-3. Start of WS-4.	6.1		3
53	Ref. Coax/Water	1@24"	0	0.8	165.149	541.825	Note 5,9				
				0.8	165.949	544.4497		End of WS-4. Start of SC (HB) -4			
54	SC (HB)-4-1&2	1@30"	WR-975	1.683	167.632	549.9713	Note 5,9				
55	SC (HB)-4-3&4	1@30"	WR-975	2.718	170.35	558.8886	Note 5,9				
				1.699	172.049	564.4627		End of SC(HB)-4. Start of WS-5.	6.1		4
				1.6	173.649	569.7121		End of WS-5. Start of SC (HB) -5			
56	SC (HB)-5-1&2	1@30"	WR-975	1.683	175.332	575.2337	Note 5,9				
57	SC (HB)-5-3&4	1@30"	WR-975	2.718	178.05	584.151	Note 5,9				
				1.699	179.749	589.7252		End of SC(HB)-5. Start of WS-6.	6.1		5
58	Spare	1@12"	0	0.800	180.549	592.3498	Note 8,9				
				0.8	181.349	594.9745		End of WS-6. Start of SC (HB) -6			
59	SC (HB)-6-1&2	1@30"	WR-975	1.683	183.032	600.4961	Note 5,9				
60	SC (HB)-6-3&4	1@30"	WR-975	2.718	185.75	609.4134	Note 5,9				
				1.699	187.449	614.9876		End of SC(HB)-6. Start of WS-7.	6.1		6
61	Ref. Coax/Water	1@24"	0	0.8	188.249	617.6122	Note 5,9				
				0.8	189.049	620.2369		End of WS-7. Start of SC (HB) -7			
62	SC (HB)-7-1&2	1@30"	WR-975	1.683	190.732	625.7585	Note 5,9				
63	SC (HB)-7-3&4	1@30"	WR-975	2.718	193.45	634.6759	Note 5,9				
64	Transfer Line-Spare	1@12"	0	0.925	194.375	637.7106	Note 6,10				
65	Transfer Line-Gas	1@12"	0	0.697	195.072	639.9974	Note 6,10				
				0.077	195.149	640.25		End of SC(HB)-7. Start of WS-8.	6.1		7
66	Transfer Line-Supply	1@12"	0	0.619	195.768	642.2808	Note 7,10				
				0.981	196.749	645.4993		End of WS-8. Start of SC (HB) -8			

67	Transfer Line-Return	1@24"	0	0.238	196.987	646.2802	Note 8,10			
68	SC (HB)-8-1&2	1@30"	WR-975	1.445	198.432	651.021	Note 5,9			
69	SC (HB)-8-3&4	1@30"	WR-975	2.718	201.15	659.9383	Note 5,9			
				1.699	202.849	665.5124		End of SC(HB)-8. Start of WS-9.	6.1	8
70	Spare	1@12"	0	0.800	203.649	668.1371	Note 8,9			
				0.8	204.449	670.7617		End of WS-9. Start of SC (HB) -9		
71	SC (HB)-9-1&2	1@30"	WR-975	1.683	206.132	676.2834	Note 5,9			
72	SC (HB)-9-3&4	1@30"	WR-975	2.718	208.85	685.2007	Note 5,9			
				1.699	210.549	690.7748		End of SC(HB)-9. Start of WS-10.	6.1	9
73	Ref. Coax/Water	1@24"	0	0.8	211.349	693.3995	Note 5,9			
				0.8	212.149	696.0242		End of WS-10. Start of SC (HB) -10		
74	SC (HB)-10-1&2	1@30"	WR-975	1.683	213.832	701.5458	Note 5,9			
75	SC (HB)-10-3&4	1@30"	WR-975	2.718	216.55	710.4631	Note 5,9			
				1.699	218.249	716.0372		End of SC(HB)-10. Start of WS-11.	6.1	10
				1.6	219.849	721.2866		End of WS-11. Start of SC (HB) -11		
76	SC (HB)-11-1&2	1@30"	WR-975	1.683	221.532	726.8082	Note 5,9			
77	SC (HB)-11-3&4	1@30"	WR-975	2.718	224.25	735.7255	Note 5,9			
				1.699	225.949	741.2997		End of SC(HB)-11. Start of WS-12.	6.1	11
78	Spare	1@12"	0	0.800	226.749	743.9243	Note 8,9			
				0.8	227.549	746.549		End of WS-12. Start of SC (HB) -12		
79	SC (HB)-12-1&2	1@30"	WR-975	1.683	229.232	752.0706	Note 5,9			
80	SC (HB)-12-3&4	1@30"	WR-975	2.718	231.95	760.9879	Note 5,9			
				1.699	233.649	766.5621		End of SC(HB)-12. Start of WS-13.	6.1	12
				1.6	235.249	771.8114		End of WS-13. Start of SC (HB) -13		
81	SC (HB)-13-1&2	1@30"	WR-975	1.683	236.932	777.333	Note 5,9			
82	SC (HB)-13-3&4	1@30"	WR-975	2.718	239.65	786.2504	Note 5,9			
				1.699	241.349	791.8245		End of SC(HB)-13. Start of WS-14.	6.1	13
83	Ref. Coax	1@24"	0	0.8	242.149	794.4492	Note 5,9			
				0.8	242.949	797.0738		End of WS-14. Start of SC (HB) -14		
84	SC (HB)-14-1&2	1@30"	WR-975	1.683	244.632	802.5955	Note 5,9			
85	SC (HB)-14-3&4	1@30"	WR-975	2.718	247.35	811.5128	Note 5,9			
				1.699	249.049	817.0869		End of SC(HB)-14. Start of WS-15.	6.1	14
				1.6	250.649	822.3362		End of WS-15. Start of SC (HB) -15		
86	SC (HB)-15-1&2	1@30"	WR-975	1.683	252.332	827.8579	Note 5,9			
87	SC (HB)-15-3&4	1@30"	WR-975	2.718	255.05	836.7752	Note 5,9			
				1.699	256.749	842.3493		End of SC(HB)-15. Start of WS-16.	6.1	15
88	Spare	1@12"	0	0.800	257.549	844.974	Note 8,9			
				0.8	258.349	847.5987		End of WS-16. Start of SC (HB) -16		
89	SC (HB)-16-1&2	1@30"	WR-975	1.683	260.032	853.1203	Note 5,9			
90	SC (HB)-16-3&4	1@30"	WR-975	2.718	262.75	862.0376	Note 5,9			
				1.699	264.449	867.6117		End of SC(HB)-16. Start of WS-17.	6.1	16
91	Ref. Coax	1@24"	0	0.8	265.249	870.2364	Note 5,9			
				0.8	266.049	872.8611		End of WS-17. Start of SC (HB) -17		
92	SC (HB)-17-1&2	1@30"	WR-975	1.683	267.732	878.3827	Note 5,9			
93	SC (HB)-17-3&4	1@30"	WR-975	2.718	270.45	887.3	Note 5,9			
				1.699	272.149	892.8742		End of SC(HB)-17. Start of WS-18.	6.1	17
				1.6	273.749	898.1235		End of WS-18. Start of SC (HB) -18		
94	SC (HB)-18-1&2	1@30"	WR-975	1.683	275.432	903.6451	Note 5,9			
95	SC (HB)-18-3&4	1@30"	WR-975	2.718	278.15	912.5624	Note 5,9			
				1.699	279.849	918.1366		End of SC(HB)-18. Start of WS-19.	6.1	18
96	Spare	1@12"	0	0.800	280.649	920.7612	Note 8,9			
				0.8	281.449	923.3859		End of WS-19. Start of SC (HB) -19		
97	SC (HB)-19-1&2	1@30"	WR-975	1.683	283.132	928.9075	Note 5,9			
98	SC (HB)-19-3&4	1@30"	WR-975	2.718	285.85	937.8249	Note 5,9			
				1.699	287.549	943.399		End of SC(HB)-19. Start of WS-20.	6.1	19
99	Ref. Coax	1@24"	0	0.8	288.349	946.0237	Note 5,9			
				0.8	289.149	948.6483		End of WS-20. Start of SC (HB) -20		
100	SC (HB)-20-1&2	1@30"	WR-975	1.683	290.832	954.17	Note 5,9			
101	SC (HB)-20-3&4	1@30"	WR-975	2.718	293.55	963.0873	Note 5,9			
				1.699	295.249	968.6614		End of SC(HB)-20. Start of WS-21.	6.1	20
				1.6	296.849	973.9107		End of WS-21. Start of SC (HB) -21		
102	SC (HB)-21-1&2	1@30"	WR-975	1.683	298.532	979.4324	Note 5,9			
103	SC (HB)-21-3&4	1@30"	WR-975	2.718	301.25	988.3497	Note 5,9			
				1.699	302.949	993.9238		End of SC(HB)-21. Start of WS-22.	6.1	21
104	Spare	1@12"	0	0.800	303.749	996.5485	Note 8,9			
				0.8	304.549	999.1732		End of WS-22. Start of SC (HB) -22		
105	SC (HB)-22-1&2	1@30"	WR-975	1.683	306.232	1004.695	Note 5,9			
106	SC (HB)-22-3&4	1@30"	WR-975	2.718	308.95	1013.612	Note 5,9			
				1.699	310.649	1019.186		End of SC(HB)-22. Start of WS-23.	6.1	22
107	Ref. Coax	1@24"	0	0.8	311.449	1021.811	Note 5,9			
				0.8	312.249	1024.436		End of WS-23. Start of SC (HB) -23		
108	SC (HB)-23-1&2	1@30"	WR-975	1.683	313.932	1029.957	Note 5,9			
109	SC (HB)-23-3&4	1@30"	WR-975	2.718	316.65	1038.875	Note 5,9			
				1.699	318.349	1044.449		End of SC(HB)-23. Start of WS-24.	6.1	23
110	Spare	1@12"	0	0.800	319.149	1047.073	Note 8,9			
				0.8	319.949	1049.698		End of WS-24. Start of DP-2.		
				2.8	322.749	1058.884		End of DP-2.		230.8076
				1.784	324.533	1064.737		Current Delta. End of Linac. Beginning of HEBT.		
111	Ref. Coax	1@24"	0	1	325.533	1068.018				
112	HEBT -1	1@24"	WR-1150	2	327.533	1074.58				
113	HEBT-2	1@24"	WR-1150	2	329.533	1081.141				
	Totals	4@36"								
	Totals	54@30"								
	Totals	35@24"								
	Totals	20@12"								

Notes:
1. This is the difference in length from one location in the tunnel to the next.
2. This is the axial position along the length of the tunnel in meters, form the end of the MEBT.
3. This is the axial position along the length of the tunnel in feet, form the end of the MEE
4. This chase is positioned at the bottom of the linac tunnel.
The inside bottom of the chase intersects the tunnel at floor level (the floor is 50" below the beam line).
5. The horizontal centerline of this chase is positioned ~22.34" above the floor of the linac tunnel (the floor is 50" below the beam line).
6. The horizontal centerline of this chase is positioned ~24" above the floor of the linac tunnel (the floor is 50" below the beam line).
7. The horizontal centerline of this chase is positioned ~11" above the floor of the linac tunnel (the floor is 50" below the beam line).
8. The horizontal centerline of this chase is positioned ~12" above the floor of the linac tunnel (the floor is 50" below the beam line).
9. These chases angle upward from the linac tunnel to the klystron building. The intersection point in the klystron building is near floor level.
The "heel" at the base of the klystron building retaining wall, must not constrain the desired geometry of the waveguide chase.
10. These chase are angled slightly upward from the linac tunnel to the cryo building. The intersection point in the cryo building is in the basement.