

Massachusetts School Building Authority

Deborah B. Goldberg, State Treasurer and Receiver-General

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Chief Executive Officer

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Deputy CEO/ Executive Director

MSBA Enrollment Methodology

October 26, 2017



AGENDA

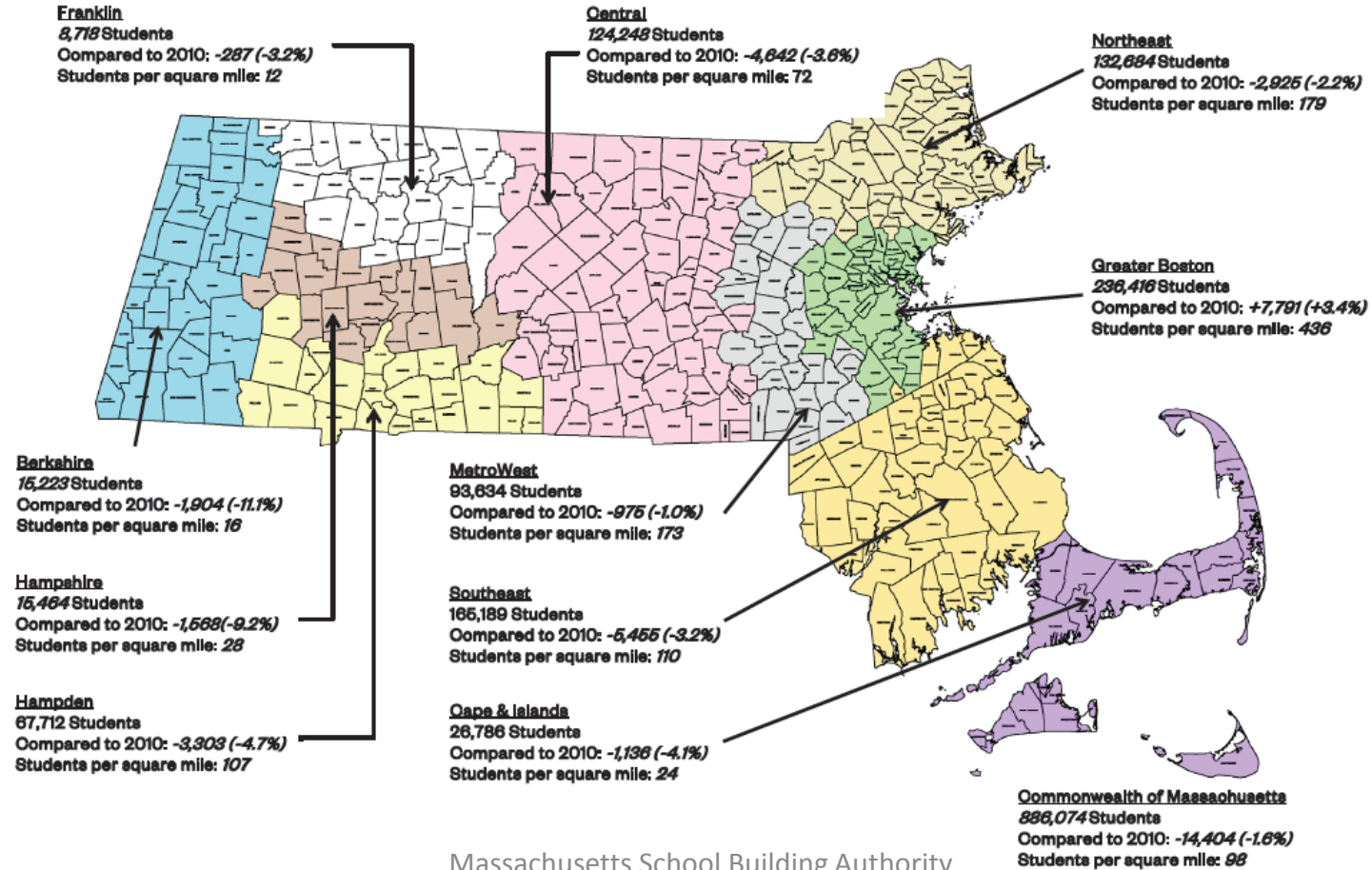
- **Enrollment Trends**
- **Enrollment Projection Methodology**
- **Enrollment Process**
- **Expectations Regarding Projects that include Consolidation and Grade Reconfiguration**
- **Questions & Answers/ Open Discussion**



Enrollment Trends

K-12 Public School Enrollment Changes Between 2010 and 2016

Based on DESE Public School Enrollment Data





Methodology



Modified Cohort Survival Method

- Assumes that the rate of progression from one grade to the next will be consistent with rates of progression in previous years.
- Establishes ratios by comparing the number of students in a particular grade to the number of students in the previous grade during the previous year.



Birth Projections

Historic Birth Data (DPH)

Maternal Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
10-14 Yrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-19 Yrs	19	15	23	11	8	12	10	12	13	10	12	10	10	11	6	6	5	12	5	12	14	0	5	0	5	0
20-24 Yrs	62	52	38	52	40	32	34	39	28	28	30	32	32	47	25	38	30	35	41	39	39	19	35	26	25	14
25-29 Yrs	138	172	130	126	117	134	103	111	89	85	114	88	87	76	105	82	76	99	98	67	82	83	93	86	86	90
30-34 Yrs	113	144	135	131	157	148	148	195	169	172	168	191	145	180	157	147	141	157	158	170	163	161	158	178	168	152
35-39 Yrs	55	50	69	51	62	51	82	83	75	75	112	85	107	95	104	92	101	87	96	75	104	84	92	87	105	101
40-44 Yrs	5	0	5	6	6	9	9	11	10	16	11	11	19	27	13	10	20	19	21	22	20	23	19	20	19	15
Total Births	394	435	400	377	391	386	386	451	386	386	447	417	402	437	410	375	374	409	419	385	424	373	406	401	410	379

Female Population Data

Maternal Age	US Census Data			U Mass Donohue Institute				2012-2014 Avg Fertility Rate
	1990	2000	2010	2015	2020	2025	2030	
10-14 Yrs	879	1,039	1,144	1,277	1,218	1,126	1,295	0.00%
15-19 Yrs	1,039	926	963	1,060	1,192	1,134	992	0.16%
20-24 Yrs	1,296	774	879	886	1,021	1,145	1,071	2.48%
25-29 Yrs	1,475	980	1,082	1,279	1,316	1,505	1,673	7.36%
30-34 Yrs	1,295	1,254	1,148	1,484	1,691	1,703	1,919	12.49%
35-39 Yrs	1,236	1,468	1,214	1,040	1,305	1,436	1,428	8.92%
40-44 Yrs	1,169	1,390	1,421	1,100	987	1,211	1,311	1.48%
Total Females	17,896	17,893	18,870	19,370	20,166	20,980	21,793	2.07%



Birth Projections

Historic Birth Data (DPH)

Maternal Age	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
10-14 Yrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-19 Yrs	19	15	23	11	8	12	10	12	13	10	12	10	10	11	6	6	5	12	5	12	14	0	5	0	5	0
20-24 Yrs	62	52	38	52	40	32	34	39	28	30	32	32	47	25	38	30	35	41	39	39	10	35	26	25	14	
25-29 Yrs	138	172	130	126	117	134	103	111	89	85	114	88	87	76	105	82	76	99	98	67	82	83	93	86	86	90
30-34 Yrs	113	144	135	131	157	148	148	195	169	172	168	191	145	180	157	147	141	157	158	170	163	161	158	178	168	152
35-39 Yrs	55	50	69	51	62	51	82	83	75	75	112	85	107	95	104	92	101	87	96	75	104	84	92	87	105	101
40-44 Yrs	5	0	5	6	6	9	9	11	10	16	11	11	19	27	13	10	20	19	21	22	20	23	19	20	19	15
Total Births	394	435	400	377	391	386	386	451	386	386	447	417	402	437	410	375	374	409	419	385	424	373	406	401	410	379

Fertility Rate =
 $83 / 1,082 = 0.0767$

Female Population Data

Maternal Age	US Census Data			U Mass Donohue Institute			
	1990	2000	2010	2015	2020	2025	2030
10-14 Yrs	879	1,039	1,144	1,277	1,218	1,126	1,295
15-19 Yrs	1,039	926	963	1,060	1,192	1,134	992
20-24 Yrs	1,296	773	879	886	1,021	1,145	1,071
25-29 Yrs	1,475	986	1,082	1,279	1,316	1,505	1,673
30-34 Yrs	1,295	1,254	1,148	1,484	1,691	1,703	1,919
35-39 Yrs	1,236	1,468	1,214	1,040	1,305	1,436	1,428
40-44 Yrs	1,169	1,390	1,421	1,100	987	1,211	1,311
Total Females	17,896	17,893	18,870	19,370	20,166	20,980	21,793

2012-2014 Avg Fertility Rate
0.00%
0.16%
2.48%
7.36%
12.49%
8.92%
1.48%
2.07%



Birth Projections

Birth Projections

Maternal Age	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
10-14 Yrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-19 Yrs	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
20-24 Yrs	22	23	23	24	25	25	26	27	27	28	28	28	28	27	27	27
25-29 Yrs	94	95	95	96	96	97	100	102	105	108	111	113	116	118	121	123
30-34 Yrs	185	190	196	201	206	211	211	212	212	212	213	218	223	229	234	240
35-39 Yrs	93	98	102	107	112	116	119	121	123	126	128	128	128	128	128	127
40-44 Yrs	16	16	16	15	15	15	15	16	17	17	18	18	18	19	19	19
Totals	412	423	434	445	455	466	473	480	486	493	500	507	515	522	530	538



Kindergarten

- Children born today attend kindergarten in 5 years
- Birth to Kindergarten Ratios applied to actual and projected births



Grade-to-Grade Survival Ratios

Births from DPH and Historic Enrollment Data from DESE

YEAR	Births	K	1	2	3	4	5	6	7	8	9	10	11	12	Total K-12
1993-94	394	414	380	366	404	406	379	361	344	332	340	286	299	254	4,565
1994-95	435	346	430	381	377	401	411	381	370	357	299	319	285	286	4,643
1995-96	400	353	399	425	379	380	396	414	389	373	309	277	318	270	4,682
1996-97	377	393	399	393	439	377	378	400	419	392	344	324	288	319	4,865
1997-98	391	334	429	392	375	427	373	376	407	421	336	341	323	271	4,805
1998-99	386	339	388	437	387	375	431	371	380	412	375	341	322	308	4,866
1999-00	386	329	387	384	413	411	377	413	370	376	356	341	334	324	4,815
2000-01	451	339	393	389	390	416	416	382	428	385	328	352	346	312	4,876
2001-02	386	319	413	382	377	395	417	403	383	417	333	329	336	329	4,833
2002-03	386	299	396	408	394	395	381	414	425	387	375	335	333	317	4,859
2003-04	447	313	363	406	425	384	399	392	421	419	338	380	341	316	4,897
2004-05	417	348	399	359	412	428	396	412	396	415	383	342	371	330	4,991
2005-06	402	382	416	400	381	410	438	382	419	404	371	384	339	359	5,085
2006-07	437	329	464	404	396	375	416	435	386	411	350	377	386	324	5,053
2007-08	410	349	402	455	415	409	387	421	442	390	365	362	365	369	5,131
2008-09	375	352	435	409	454	435	413	395	414	449	360	373	368	372	5,229
2009-10	374	354	434	443	423	458	434	418	403	420	375	357	383	349	5,251
2010-11	409	373	445	424	458	434	461	446	417	415	372	381	361	379	5,366
2011-12	419	351	439	435	441	464	436	460	437	423	366	380	377	362	5,371
2012-13	385	383	405	429	438	445	471	448	462	439	381	392	373	389	5,455
2013-14	424	390	460	395	446	444	455	486	446	468	387	397	401	367	5,542
2014-15	373	364	444	461	399	451	463	467	481	449	415	382	397	401	5,574
2015-16	406	400	422	449	477	422	464	473	471	493	383	415	382	393	5,644
2016-17		383	448	426	472	488	427	467	467	476	425	380	429	390	5,678



Grade-to-Grade Survival Ratios

Grade 1-2 Survival Ratio = $393 / 399 = 0.9850$

YEAR	Births	K	1	2	3	4	5	6	7	8	9	10	11	12	Total K-12
1993-94	394	414	380	366	404	406	379	361	344	332	340	286	299	254	4,565
1994-95	435	346	430	381	377	401	411	381	370	357	299	319	285	286	4,643
1995-96	400	353	399	425	379	380	396	414	389	373	309	277	318	270	4,682
1996-97	377	393	399	393	439	377	378	400	419	392	344	324	288	319	4,865
1997-98	391	334	429	392	375	427	373	376	407	421	336	341	323	271	4,805
1998-99	386	339	388	437	387	375	431	371	380	412	375	341	322	308	4,866
1999-00	386	329	387	384	413	411	377	413	370	376	356	341	334	324	4,815
2000-01	451	339	393	389	390	416	416	382	428	385	328	352	346	312	4,876
2001-02	386	319	413	382	377	395	417	403	383	417	333	329	336	329	4,833
2002-03	386	299	396	408	394	395	381	414	425	387	375	335	333	317	4,859
2003-04	447	313	363	406	425	384	399	392	421	419	338	380	341	316	4,897
2004-05	417	348	399	359	412	428	396	412	396	415	383	342	371	330	4,991
2005-06	402	382	416	400	381	410	438	382	419	404	371	384	339	359	5,085
2006-07	437	329	464	404	396	375	416	435	386	411	350	377	386	324	5,053
2007-08	410	349	402	455	415	409	387	421	442	390	365	362	365	369	5,131
2008-09	375	352	435	409	454	435	413	395	414	449	360	373	368	372	5,229
2009-10	374	354	434	443	423	458	434	418	403	420	375	357	383	349	5,251
2010-11	409	373	445	424	458	434	461	446	417	415	372	381	361	379	5,366
2011-12	419	351	439	435	441	464	436	460	437	423	366	380	377	362	5,371
2012-13	385	383	405	429	438	445	471	448	462	439	381	392	373	389	5,455
2013-14	424	390	460	395	446	444	455	486	446	468	387	397	401	367	5,542
2014-15	373	364	444	461	399	451	463	467	481	449	415	382	397	401	5,574
2015-16	406	400	422	449	477	422	464	473	471	493	383	415	382	393	5,644
2016-17		383	448	426	472	488	427	467	467	476	425	380	429	390	5,678



Grade-to-Grade Survival Ratios

	Births	B-K	K-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12
1994	394	0.8782	1.0386	1.0026	1.0301	0.9926	1.0123	1.0053	1.0249	1.0378	0.9006	0.9382	0.9965	0.9565
1995	435	0.8115	1.1532	0.9884	0.9948	1.0080	0.9875	1.0073	1.0210	1.0081	0.8655	0.9264	0.9969	0.9474
1996	400	0.9825	1.1303	0.9850	1.0329	0.9947	0.9947	1.0101	1.0121	1.0077	0.9223	1.0485	1.0397	1.0031
1997	377	0.8859	1.0916	0.9825	0.9542	0.9727	0.9894	0.9947	1.0175	1.0048	0.8571	0.9913	0.9969	0.9410
1998	391	0.8670	1.1617	1.0186	0.9872	1.0000	1.0094	0.9946	1.0106	1.0123	0.8907	1.0149	0.9443	0.9536
1999	386	0.8523	1.1416	0.9897	0.9451	1.0620	1.0053	0.9582	0.9973	0.9895	0.8641	0.9093	0.9795	1.0062
2000	386	0.8782	1.1945	1.0052	1.0156	1.0073	1.0122	1.0133	1.0363	1.0405	0.8723	0.9888	1.0147	0.9341
2001	451	0.7073	1.2183	0.9720	0.9692	1.0128	1.0024	0.9688	1.0026	0.9743	0.8649	1.0030	0.9545	0.9509
2002	386	0.7746	1.2414	0.9879	1.0314	1.0477	0.9646	0.9928	1.0546	1.0104	0.8993	1.0060	1.0122	0.9435
2003	386	0.8109	1.2140	1.0253	1.0417	0.9746	1.0101	1.0289	1.0169	0.9859	0.8734	1.0133	1.0179	0.9489
2004	447	0.7785	1.2748	0.9890	1.0148	1.0071	1.0313	1.0326	1.0102	0.9857	0.9141	1.0118	0.9763	0.9677
2005	417	0.9161	1.1954	1.0025	1.0613	0.9951	1.0234	0.9646	1.0170	1.0202	0.8940	1.0026	0.9912	0.9677
2006	402	0.8184	1.2147	0.9712	0.9900	0.9843	1.0146	0.9932	1.0105	0.9809	0.8663	1.0162	1.0052	0.9558
2007	437	0.7986	1.2219	0.9806	1.0272	1.0328	1.0320	1.0120	1.0161	1.0104	0.8881	1.0343	0.9682	0.9560
2008	410	0.8585	1.2464	1.0174	0.9978	1.0482	1.0098	1.0207	0.9834	1.0158	0.9231	1.0219	1.0166	1.0192
2009	375	0.9440	1.2330	1.0184	1.0342	1.0088	0.9977	1.0121	1.0203	1.0145	0.8352	0.9917	1.0268	0.9484
2010	374	0.9973	1.2571	0.9770	1.0339	1.0260	1.0066	1.0276	0.9976	1.0298	0.8857	1.0160	1.0112	0.9896
2011	409	0.8582	1.1769	0.9775	1.0401	1.0131	1.0046	0.9978	0.9798	1.0144	0.8819	1.0215	0.9895	1.0028
2012	419	0.9141	1.1538	0.9772	1.0069	1.0091	1.0151	1.0275	1.0043	1.0046	0.9007	1.0710	0.9816	1.0318
2013	385	1.0130	1.2010	0.9753	1.0396	1.0137	1.0225	1.0318	0.9955	1.0130	0.8815	1.0420	1.0230	0.9839
2014	424	0.8585	1.1385	1.0022	1.0101	1.0112	1.0428	1.0264	0.9897	1.0067	0.8868	0.9871	1.0000	1.0000
2015	373	1.0724	1.1593	1.0113	1.0347	1.0576	1.0288	1.0216	1.0086	1.0249	0.8530	1.0000	1.0000	0.9899
2016	406	0.9433	1.1200	1.0095	1.0512	1.0231	1.0118	1.0065	0.9873	1.0106	0.8621	0.9922	1.0337	1.0209

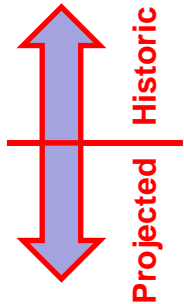
5 yr avg		0.9603	1.1545	0.9951	1.0285	1.0229	1.0242	1.0228	0.9971	1.0120	0.8768	1.0185	1.0077	1.0053
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Base Enrollment Projections

YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1993	414	380	366	404	406	379	361	344	332	340	286	299	254	4,565
1994	346	430	381	377	401	411	381	370	357	299	319	285	286	4,643
1995	353	399	425	379	380	396	414	389	373	309	277	318	270	4,682
1996	393	399	393	439	377	378	400	419	392	344	324	288	319	4,865
1997	334	429	392	375	427	373	376	407	421	336	341	323	271	4,805
1998	339	388	437	387	375	431	371	380	412	375	341	322	308	4,866
1999	329	387	384	413	411	377	413	370	376	356	341	334	324	4,815
2000	339	393	389	390	416	416	382	428	385	328	352	346	312	4,876
2001	319	413	382	377	395	417	403	383	417	333	329	336	329	4,833
2002	299	396	408	394	395	381	414	425	387	375	335	333	317	4,859
2003	313	363	406	425	384	399	392	421	419	338	380	341	316	4,897
2004	348	399	359	412	428	396	412	396	415	383	342	371	330	4,991
2005	382	416	400	381	410	438	382	419	404	371	384	339	359	5,085
2006	329	464	404	396	375	416	435	386	411	350	377	386	324	5,053
2007	349	402	455	415	409	387	421	442	390	365	362	365	369	5,131
2008	352	435	409	454	435	413	395	414	449	360	373	368	372	5,229
2009	354	434	443	423	458	434	418	403	420	375	357	383	349	5,251
2010	373	445	424	458	434	461	446	417	415	372	381	361	379	5,366
2011	351	439	435	441	464	436	460	437	423	366	380	377	362	5,371
2012	383	405	429	438	445	471	448	462	439	381	392	373	389	5,455
2013	390	460	395	446	444	455	486	446	468	387	397	401	367	5,542
2014	364	444	461	399	451	463	467	481	449	415	382	397	401	5,574
2015	400	422	449	477	422	464	473	471	493	383	415	382	393	5,644
2016	383	448	426	472	488	427	467	467	476	425	380	429	390	5,678
2017	385	442	446	438	483	500	437	466	473	417	433	383	431	5,733
2018	394	445	440	459	448	495	511	435	471	414	425	436	385	5,758
2019	364	455	442	453	469	459	506	510	441	413	422	428	438	5,800
2020	396	420	452	455	463	480	469	504	516	386	421	425	431	5,819
2021	406	457	418	465	465	474	491	468	510	452	394	424	428	5,853
2022	417	469	455	430	476	477	485	490	474	447	461	397	426	5,902
2023	427	481	467	468	440	487	488	484	496	415	456	464	399	5,970
2024	437	493	479	480	478	451	498	486	489	435	423	459	467	6,075
2025	448	505	491	492	491	490	461	497	492	429	443	426	462	6,126
2025	454	517	502	504	504	503	501	459	503	431	437	446	429	6,191

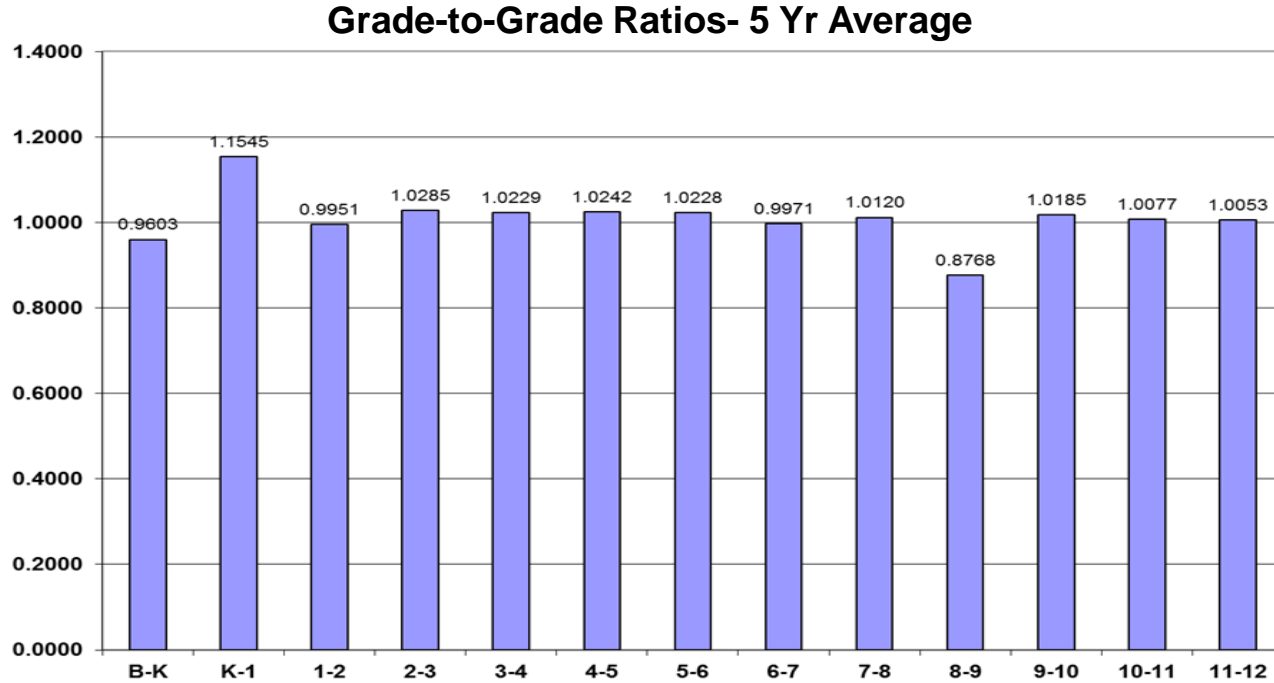
K-4	5-8	9-12
1,970	1,416	1,179
1,935	1,519	1,189
1,936	1,572	1,174
2,001	1,589	1,275
1,957	1,577	1,271
1,926	1,594	1,346
1,924	1,536	1,355
1,927	1,611	1,338
1,886	1,620	1,327
1,892	1,607	1,360
1,891	1,631	1,375
1,946	1,619	1,426
1,989	1,643	1,453
1,968	1,648	1,437
2,030	1,640	1,461
2,085	1,671	1,473
2,112	1,675	1,464
2,134	1,739	1,493
2,130	1,756	1,485
2,100	1,820	1,535
2,135	1,855	1,552
2,119	1,860	1,595
2,170	1,901	1,573
2,217	1,837	1,624
2,194	1,876	1,664
2,186	1,912	1,660
2,183	1,916	1,701
2,186	1,969	1,663
2,211	1,943	1,698
2,247	1,926	1,731
2,283	1,955	1,734
2,367	1,924	1,784
2,427	1,940	1,760
2,481	1,966	1,743



10 yr avg	370	433	433	442	445	441	448	444	442	383	382	384	377	5,424	2,123	1,775	1,526
5 yr avg	384	436	432	446	450	456	468	465	465	398	393	396	388	5,579	2,145	1,838	1,561
2 yr avg	392	435	438	475	455	446	470	469	485	404	398	406	392	5,661	2,194	1,869	1,599
5 yr proj	399	444	446	454	466	489	489	477	489	447	449	499	499	5,799	2,199	1,939	1,677
10 yr proj	413	468	459	464	472	482	485	480	486	424	431	429	429	5,923	2,277	1,933	1,714

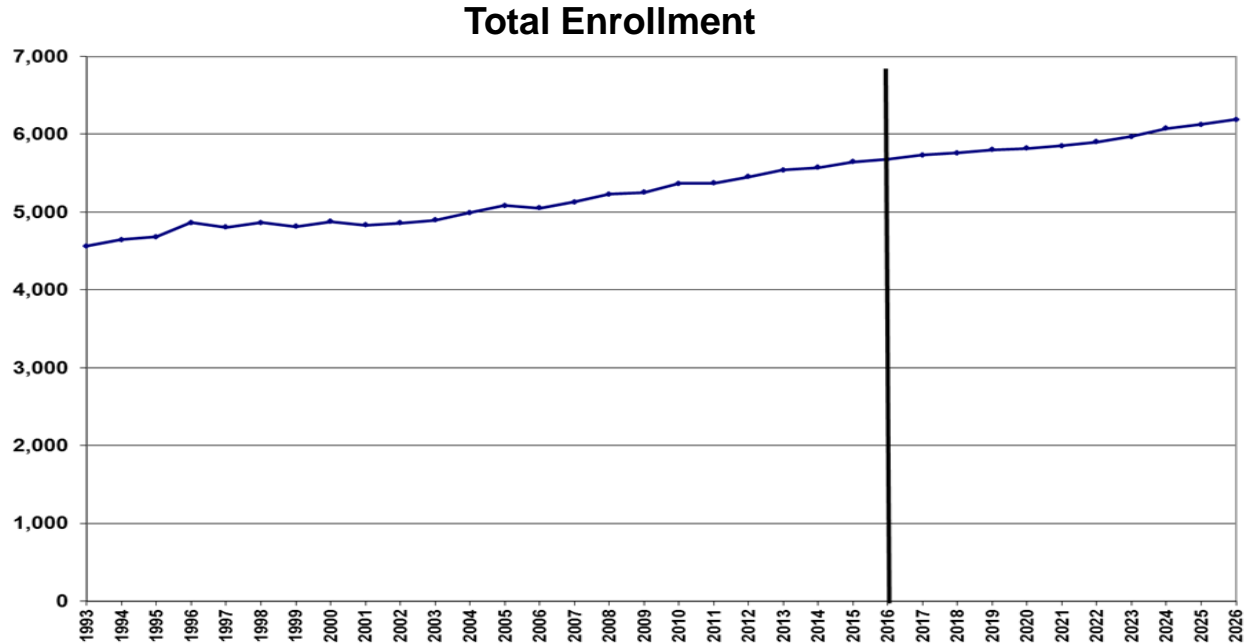


Base Enrollment Projections



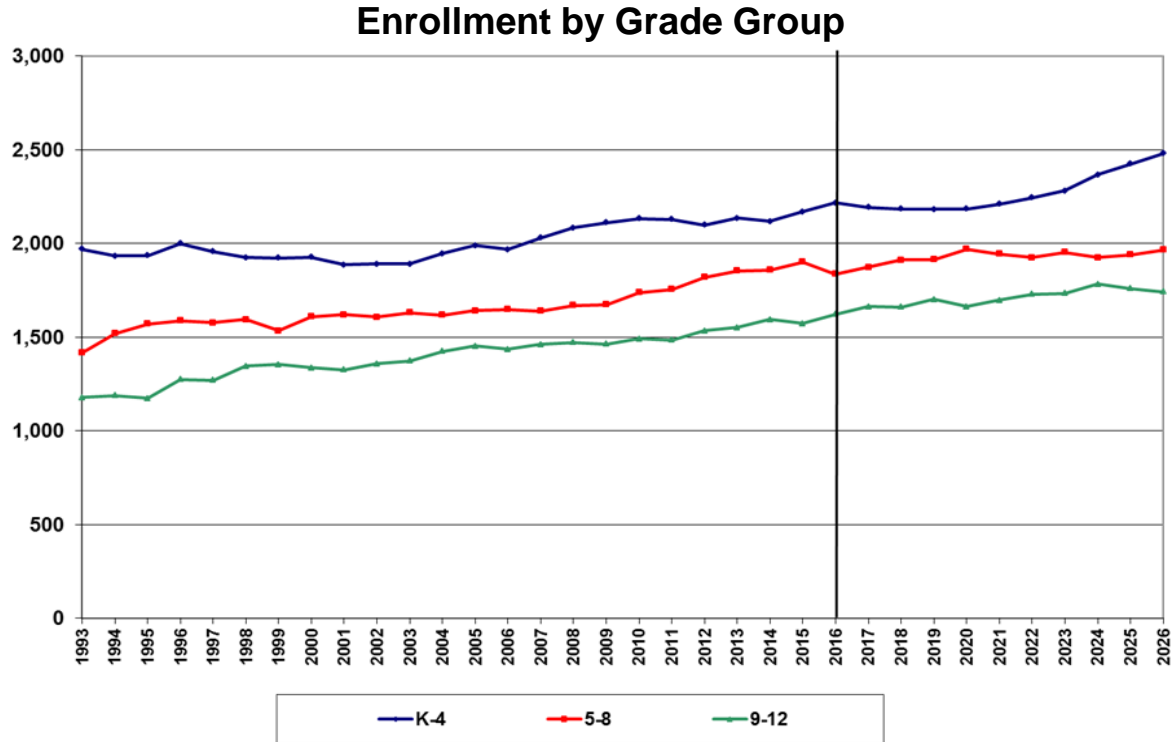


Base Enrollment Projections





Base Enrollment Projections





Potential Adjustments

- **Construction Adjustment**
To adjust for choice-out students who might choose to return as a result of the construction project

- **Development Adjustment**
To adjust for changes in housing development patterns from those historically experienced by the district

- **Sustained Enrollment Growth Adjustment**
To account for continuous enrollment growth other over and beyond the forecast period.



Enrollment Process



Capacity Analysis



Typical of a Study Enrollment that includes consolidation or redistricting:

“The MSBA’s study enrollment recommendations assume full utilization of the [REDACTED] Elementary School and the [REDACTED] Middle School should it be determined through the Feasibility Study that reconfiguration is the most educationally appropriate and fiscally responsible option. Accordingly, as part of the Feasibility Study, the District will be required to determine the enrollment capacity of each existing facility anticipated to remain in service. If a configuration other than the current grade K-4 enrollment configuration at the [REDACTED] Elementary School has been determined to be the Preferred Solution, the District will also be required to demonstrate in the Preferred Schematic Report that any consolidation and/or reconfiguration proposed as the District’s Preferred Solution has been approved by the School Committee and any other necessary local officials. Further, the MSBA will also require a written plan from the District describing the process for determining local support for any potential grade reconfiguration.”



For a larger school district with a number of elementary schools with potential for consolidation:



“Based on the MSBA enrollment forecast and discussions with the District described above, the MSBA recommends a study enrollment of 395 students for the [REDACTED] Elementary School project. However, in discussions with the District, the MSBA understands that there may be opportunities to consider a long-term district-wide consolidation for the elementary schools and still meet the District’s educational vision for smaller, neighborhood schools. As the MSBA’s study enrollment recommendation assumes full utilization of all remaining school facilities, as part of its Feasibility Study, the District will be required to determine the enrollment capacity and building condition of each existing elementary school to examine the possibility for long-term consolidations of elementary schools as part of its forecasted capital plan. This outcome of this analysis will be required to inform the MSBA’s recommended study enrollment.”



Q&A

Thank you!