BENCHMARKING

In order to gauge the appropriateness of the program and the design options, HMFH provided benchmarking data from similar local high school renovation and new construction projects that have been completed recently. This analysis was completed for school size and cost as well as building size and functionality for performing arts and athletics. Additional data was provided by Jane Ezbicki for Music and Auditorium benchmarking and by Martha Jamieson for athletic benchmarking. We proposed benchmarking in order to complete a logical review of data from other local projects that is often available to the public but is often misused due to the lack of rigorous analysis. This is due to the fact that the cost data available on completed projects is rarely adjusted to relate to the size of another project, the number of students, or escalated to relate construction costs of years gone by to expected future construction costs that include escalation.

Each of the renovation projects listed below includes renovation of a majority of an existing facility. In comparison, the WHS project includes only renovation of 37,870 square feet of the field house compared to new construction of 196,343 square feet. Due to this high percentage of new construction it is more appropriate to compare the project to other similar new construction projects although information on renovations has also been provided since it can be seen from this data that renovations tend to have larger facilities per student due to inefficiency or some type of oversized facility such as the field house that would not typically be built in an all new school today.

HMFH prepared Table 6.1 to review 11 other similar projects and provide the basic project metrics as well as some calculated data so that the gross project metrics could be appropriate compared per square foot or per student with the proposed Wayland High School. Project costs were escalated from the year of the midpoint of construction on the projects to 2007 based on actual construction escalation for previous years and the same projected escalation by which the 2004 WHS construction costs are being escalated.

High School Benchmarking
Wayland High School Study

18-Nov-04

HMFH Architects, Inc.

School	Year of latest Constuct./Renov.	Project Cost	Escalated Cost to 2007	Building S.F.	Cost/ S.F.	Escalated Cost/ S.F.	Design Gross S.F./ Student	Net S.F./ Stud.
Groton Dunstable H.S.	2003 New H.S.	$36,275,000	$46,287,584	164,750	$220	$281	990	166
Hopkinton H.S.	2001 New H.S.	$34,700,000	$44,081,849	190,000	$183	$232	1,050	181
Hudson H.S.	2003 New H.S.	$41,500,000	$50,962,905	200,000	$208	$255	1,200	167
Lincoln Sudbury H.S.	2003 New H.S.	$73,900,000	$90,750,812	347,000	$213	$262	1,850	188
Marblehead H.S.	2002 New H.S.	$43,000,000	$53,565,329	215,000	$200	$249	1,000	215
Acton Boxboro H.S	2004 Ren.& Exp.	$52,460,000	$61,248,991	328,000	$160	$187	2,050	160
Dover Sherborn H.S.	2004 Ren.& Exp.	$34,000,000	$38,517,480	218,500	$156	$176	875	250
Lexington H.S.	2002 Ren.& Exp.	$30,000,000	$37,371,160	328,468	$91	$114	2,100	156
Newton South H.S.	2004 Ren.& Exp.	$55,868,039	$66,392,322	352,000	$159	$189	1,950	181
Westborough H.S.	2002 Ren.& Exp.	$42,167,000	$52,527,656	273,000	$154	$192	1,100	248
Weston H.S.	1998 Ren & Exp	$16,180,000	$21,752,423	161,231	$100	$135	722	223
Median for Renovation & Expansion [1]		$38,083,500	$45,522,568	245,750	$155	$184	988	202
Median for New Construction		$41,500,000	$50,962,905	200,000	$208	$255	1,050	181
Average for Renovation & Expansion		$38,445,840	$46,301,672	276,867	$137	$165	1,466	203
Average for New Construction		$45,875,000	$57,129,696	223,350	$205	$256	1,218	183
Wayland H.S.-Proposed	2009 New H.S. [2]	$57,300,000	$57,300,000	234,213	$245	$245	1,100	213

Notes
1. Median cost calculated from average of middle two projects since 6 Ren. & Exp. Projects shown
2. WHS considered new construction since only 7% of cost attributed to renovations
3. Historical Escalation used in calculations: '98(0.53%), '99(2.56%), '00(1.98%), '01(1.44%), '02(3.336%), '03(1.785%), '04(9%)
4. Projected Escalation used in calculations: '05(3%), '06(4%), '07(4%)

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TABLE 6.1 HIGH SCHOOL BENCHMARKING

GENERAL BENCHMARKING CONCLUSIONS

WHS escalated cost per s.f. for new construction is within the range of projects and $10/s.f. under the median for new construction. Compared to the renovation projects the Wayland cost was high which would be expected due to the relatively minimal amount of renovation (renovation costs account for only 7% of the base construction costs in the final cost estimate). WHS square feet per student at 213 is above both the new and renovation median although still below three of the renovation projects and one new construction project. This can be explained by the square footage of the field house that most schools do not have. When the field house is removed from the total, the new WHS s.f./student is 179 which is below the median for new construction and 23 s.f./student below the renovation median. The escalated new construction project costs ranged from $44,081,849 to $90,750,812 for Lincoln Sudbury High School with a median cost of $50,962,905.

HMFH also completed a benchmarking comparison of the entire Groton Dunstable Regional High School we recently completed with the proposed WHS. One important issue this review made clear was that various high school programs have significant differences beyond the simple number of students and this can drive significant changes in program area. For example, at GDHS the students are programmed throughout the day except for their one lunch period. This means that there is no need for study space and the Library can be much smaller since it is only used as part of class time research. At WHS students typically have several free periods per week during which they study, work collaboratively with their classmates. This is why Reference Centers are programmed within several departments and the Library is considerably larger and is still fully utilized most of the day. These changes in program have increased the space / student required. There are also many other examples that are driven by increased student participation at WHS compared to other schools like GDHS in areas such as music, performing arts, or athletics.

This data convinced the HSBC that although the proposed size of the facility is large due to the existing field house, it is not out of the range of similar eastern Massachusetts schools. In a separate analysis the Committee asked Turner and HMFH to analyze the cost of providing similar athletic facilities in one new, combined field house. This demonstrated that the low cost renovation on the field house is a great benefit to the town, allowing significant athletic space to be maintained at a fraction of the cost of building new even if significantly less total square footage was included in the new combined facility. The project is also under the median cost for new construction which would be expected with 7% renovation. The added costs of phasing, demolition and hazardous material abatement may make up for some of the renovations savings over a typical new green field school which brings the cost/s.f. close to the new construction median.

MUSIC BENCHMARKING

The Committee requested HMFH to review benchmarking data for the Band, and shared Orchestra/Choral rooms, both of which are programmed at 2,300 s.f. The size of these rooms has no correlation to the size of the school. Their size should be determined based on the number of students who participate in school music programs. So for example, at Groton Dunstable High School where there is no orchestra program, there is obviously no need for a dedicated orchestra room. The student music participation at WHS is currently high for the size of the student population and the children coming through the elementary schools are swelling those numbers. For this benchmarking information we have only compared schools that had music programs and ones that Jane Ezbicki received data on. See Table 6.2 for Music Benchmarking data.

School	Year of latest Constr./Renov.	Design Stud'ts	# Students Band	Chor.	Orch.**	Total Students	Student Participat'n	Band Room	Band s.f./ Stud't	Choral/ Orch Room	Orch. s.f./ Stud't	Total Music s.f.	Music s.f./ stud't
Groton Dunstable H.S.	2003 New H.S.	990	40	78	0	118	12%	2,032	50.8	0	0.0	2,032	17.2
Acton Boxboro H.S	2005 Ren.&Exp.	2,050	132	92	0	224	11%	2,297	17.4	1,745	19.0	4,042	18.0
Lexington H.S.	2002 Ren.&Exp.	2,100	200	140	158	498	24%	1,907	9.5	1,711	5.7	3,618	7.3
Weston H.S.	1998 Ren & Exp	722	90	152	47	289	40%	2,095	23.3	1,050	5.3	3,145	10.9
Concord Carlisle H.S.*	2009 Ren & Exp.	1,350	190	225	35	450	33%	2,600	13.7	3,310	12.7	5,910	13.1
Average (of schools that had them at all)		1,442	130	137	80	348	24%	2,186	22.9	1,954	11	3,749	10.8
Wayland H.S.-Proposed	2009 New H.S.	1,100	100	85	80	265	24%	2,300	23.0	2,300	13.9	4,600	17.4
Notes:													
* Has separate choral (1,820 s.f.) and orchestra (1,490 s.f.) rooms. This school renovation & addition is proposed													
**Two of the schools have no orchestra program.													
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TABLE 6.2 MUSIC BENCHMARKING

The conclusions drawn from this data is that the Wayland program is near the top of the range for total music space per participating students but 2 of the other five schools are above or near the Wayland metrics/student. It is well above the mean which may be explained by Lexington High School's tremendously high participation numbers and very low s.f./student. Clearly larger schools like Lexington manage with less s.f. of total music space per student by breaking down the performing groups like the Band and the Orchestra into smaller groups. In any case, the Committee felt that the square footage and associated costs to be saved in any music room reductions are minimal as they only make up less than 2% of the WHS total s.f. These spaces will be reviewed in more detail in the next phase of design when room layouts may be completed to demonstrate more precisely the capacity of each of the rooms for band, chorus and orchestra.

AUDITORIUM BENCHMARKING

At WHS large assemblies are held in the field house on wood bleacher seating. For comfortable seating with a high quality sound system the Little Theater with seating for 300 is the largest space. The High School has numerous theater and musical performances throughout the year and there is rarely adequate seating. The school also has need for a larger comfortable assembly space for multi-class meetings. Community theater and music groups would also use the high school auditorium to a greater extent if it was larger. For these reasons the Art Department and the Administration have proposed an 850 seat auditorium for the new high school. We proposed to review benchmarking data to test whether this was unusual.

We reviewed data on 17 Massachusetts high schools related to Auditorium size. In most towns and cities High Schools are the largest public facilities and usually have significant assembly spaces for both school use and community use. Some high schools do not have a large auditorium because there was already another large auditorium some where in town when the High School was built. For example, HMFH designed a new regional High School for Groton and Dunstable and there is only a black box theater that seats 250. However, there is another auditorium at the nearby Middle School that seats 900 and the town of Groton is smaller than Wayland as is the High School. See Table 6.3 Auditorium Benchmarking.

The proposed Auditorium of 850 seats is the same as the average auditorium size for seven schools in our study that had comparable music and theater programs to WHS. It is 57 seats above the average size theater for all of the schools reviewed. It is also the same as the average ratio across all the schools in terms of size of the school enrollment compared with the size of the auditorium. This analysis demonstrated that according to the benchmarking data 850 seats is the ideal auditorium size if the goal is to be comparable with WHS's peer institutions.

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TABLE 6.3 AUDITORIUM BENCHMARKING

ATHLETICS BENCHMARKING

HMFH prepared Table 6.4 Athletic Benchmarking from data on athletic programs provided by Martha Jamieson, the Wayland Athletic Director, and facility square foot data from HMFH and Turner projects. This table compares both interior athletic court space and exterior field athletic space at 10 local high schools that have completed construction projects since 1998. The current bottlenecks in high school athletic facilities are in the after school program. It is assumed that whatever space is adequate for the after school sports programs will be adequate for the school-day physical education programs since the school-day programs now spend a significant portion of their time in the classroom studying health and wellness issues.

We have reviewed the number of students participating in after school sports and the built athletic space per athlete. We have also reviewed the number of freshman, Junior Varsity and Varsity teams in comparison with the number of fields available on site. Many of the schools already have or are planning to shortly install artificial turf fields in order to double or triple the utilization of a field. Schools with larger sites like Hopkinton with its 16 grass fields do not need to resort to artificial turf due to the large number of fields whose use can be rotated. The only schools with lower field/team metrics are schools like Newton South High School that is located in a very constricted dense suburban area, or schools like Lexington High School that already have three turf fields that allow them to use fewer fields more intensively with at least two teams practicing per field per day, often under lights. This high field utilization is one of the major reasons the wetness of the fields near the river, particularly the soccer/lacrosse field behind the tennis courts, has a significant impact. These wet fields are often unusable until mid May which cuts them from service for the 1st half of the spring season. The current scope includes building up the wettest field with gravel to allow the field to dry out earlier in the season. An alternative that may be considered is to provide an artificial turf field to replace the stadium field or perhaps the Bennett field which cannot be irrigated due to its location over the well head aquifer protection zone 1.

Similar to our review of classroom utilization, we reviewed in detail the court and field use schedules throughout various seasons. See Athletic Field/Court Use 2002/2003 dated April 2004. The WHS athletic facilities are very intensively used throughout the day and throughout the entire school year by both the school and the community. For example, the two practice basketball courts are used by the two freshman teams from 2:30 – 4:00. Two Junior Varsity teams and the two Varsity teams alternate using them from 4:00 – 6:00 or 6:00 – 8:00 each day. After 8:00 PM the community 12 year old basketball league uses them. In addition the Wrestling team uses the wood court for matches on Wednesday evening. This is an example of both the very high participation in athletics at WHS for the size of the student body, as well as the intensive use of the facility. The average participation in the 10 schools reviewed is 26% compared to Wayland's 33%. Even with the current high rate, many more students at WHS would gladly participate in various after school team sports if they were offered. The Athletics Department would like to offer more after school athletic opportunities but there is not adequate gymnasium or field space to do so.

In conclusion, with the addition of the new gym, athletic indoor space at WHS is above the average by 13% due to the field house, although it is still half of Lexington, 58% of Newton South, and 4,300 s.f. less than Acton Boxboro. More importantly, it is also well under those larger schools in terms of space per student athlete, although it is 10 s.f./student above the average. The number of courts is currently under the average by 0.9 and will be over the average by 0.8 with the addition of the gym. Regarding field space the average school reviewed has 3 more fields than WHS. In addition 3 towns already have multiple artificial turf fields and two more are planning them. Compared to WHS cohorts field space is significantly under the average

High School Benchmarking - Athletics 18-Nov-04

Wayland High School Study

HMFH Architects, Inc.

School	Year of latest Constuct./Ren.	Field House S.F.	Gym S.F.	Total Athletic S.F.	After School Athletes Per Season (average)	Stud't Partici-pation	s.f. athletic space per student athlete	# of varsity Teams	# of teams V/JV/ Fresh.	# of B'ball Courts	Indoor Track Length	Indoor Track Lanes	Turf Fields	Base-ball	Soft-ball	Grass Fields	Total Fields	Fields/ team	Field Comments
Groton Dunstable H.S.	2003 New H.S.	0	11,550	11,550	230	23%	50	20	35	2	none		No	2	2	4	8	0.11	
Hopkinton H.S.	2001 New H.S.	20,000		20,000	370	35%	54	25	51	2	yes?		No	3	3	10	16	0.20	
Hudson H.S.	2003 New H.S.	NA	29,000	29,000	350	29%	83			3	10 lap/mi	4	0	1	2	7	10		
Lincoln Sudbury H.S.	2003 New H.S.	0	24,800	24,800	380	21%	65	32	66	5	none		2	2	1	5	10	0.08	turf fields in the works
Marblehead H.S.	2002 New H.S.	NA	28,600	28,600	341	34%	84	27	53	4	10 lap/mi	4	No	2	3	7	12	0.13	
Acton Boxboro H.S	2005 Ren.&Exp.	29,612	10,400	40,012	383	19%	104	28	60	3	none		In '05	2	1	7	10	0.12	being planned
Lexington H.S.	2002 Ren.&Exp.	30,711	39,918	70,629	420	20%	168	27	53	3	1/11 mile	3	3	2	3	2	10	0.04	
Newton South H.S.	2004 Ren.&Exp	20,000	41,825	61,825	400	21%	155	30	62	4	1/11 mile	4	No	1	1	4	6	0.06	Turf being planned for 08-09
Westborough H.S.	2002 Ren.&Exp.	9,400	10,180	19,580	380	35%	52	26	53	2	none		2	1	1	2	6	0.04	1 fh team uses baseball field for practice / soccer, FH, football, lacrosse on turf
Weston H.S.	1998 Ren.&Exp	0	8,370	8,370	273	38%	31	22	44	1	none								M.S. adjacent with 4 courts, pool
Average		NA	NA	31,437	353	28%	89	24	48	2.9				1.8	1.9	5.3	9.8	0.10	
Average for New Constr.		NA	NA	22,790	330	27%	69	26	51	3.2								0.13	
Wayland H.S.-Proposed	2009 New H.S.	22,726	12,965	35,691	360	33%	99	28	62	4	Yes	3	0	1	2	4	7	0.06	May want to double count turf fields since can use twice as much

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TABLE 6.4 ATHLETICS BENCHMARKING