



## LINCOLN SUDBURY REGIONAL SCHOOL DISTRICT

Peter C. Rowe, Director of Finance & Operations

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October 27, 2015

To: Bella Wong

RE: Enrollment Projections

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### **Background**

For planning purposes, school systems in Massachusetts have historically used the October 1 enrollment count of each school year to assist with their annual planning and to develop forecasts for future enrollment trends. School districts typically conduct enrollment forecasting for capital planning and operational considerations. For LSRHS, the information will inform our FY17 budget development and be a good indicator of enrollment trends for the next five to ten years.

### **Methodology**

Using a cohort survival ratio is a traditional, quantitative approach used in forecasting enrollments. This method computes the historical average ratio of total students who progress from one grade to the next [i.e. first graders advancing to second grade]. If, for example, there are 100 first graders in Year 1 and in Year 2 that grade [or cohort] has 105 students, then the cohort survival ratio is 1.05.

Sometimes, in communities with rapid growth or decline, or with major housing development, the traditional cohort survival model is modified to incorporate special growth information. In Lincoln and Sudbury, we have no major development impact to factor into our current planning so the traditional cohort survival model should be valid to create projection data. The historical enrollment information used in this model was gathered from the Massachusetts Department of Elementary and Secondary Education, as each community/regional system is required to report their enrollment data annually.

### **Review Actual v. Projected for 2015-2016**

In reviewing last year's report two projections were made that were very close to one another. Both models used historical student counts, One model used trend numbers going back for a five-year period, the other used data going back ten-years. The chart below depicts the two forecasts as compared to actual. In the aggregate the forecasts are very close, with the five-year trend projection resulting in a more accurate projection than the ten-year projection. While the two models did not give significantly different results, the five-year model, because it is

weighted to reflect more recent patterns may be a more accurate projection model. Both models show attrition of grade cohorts, beginning in fourth grade and continuing through twelfth grade.

**TABLE 1**

| Projection Using 10-year CS Model | Actual 10/1/15 Enrollment | Variance | Percent Variance | Projection Using 5-year CS Model | Actual 10/1/15 Enrollment | Variance | Percent Variance |
|-----------------------------------|---------------------------|----------|------------------|----------------------------------|---------------------------|----------|------------------|
| 1623.0                            | 1602.0                    | 21.0     | 1.3%             | 1613.0                           | 1602.0                    | 11.0     | 0.7%             |

**October 1, 2015 Enrollment**

For FY16 our October 1<sup>st</sup> “in public school” enrollment count stands at 1,602, a decrease of 15 students, or .9 % overall from the prior year. The general categories of students by community is displayed below, along with the net and percent change for each group. It is important to be aware of percentage changes for Lincoln and Sudbury, as this will be one of several factors affecting the direction of overall town assessments for FY17.

**TABLE 2**

| <b>October 1, 2015 Enrollment</b> |                    |                     |               |                       |
|-----------------------------------|--------------------|---------------------|---------------|-----------------------|
|                                   | <b>Oct. 1,2014</b> | <b>Oct. 1, 2015</b> | <b>Change</b> | <b>Percent Change</b> |
| Lincoln                           | 226.0              | 195.0               | -31.0         | -13.7%                |
| Sudbury                           | 1279.0             | 1292.0              | 13.0          | 1.0%                  |
| METCO/Boston                      | 91.0               | 91.0                | 0.0           | 0.0%                  |
| Tuition-Waiver                    | 20.0               | 24.0                | 4.0           | 20.0%                 |
| <b>Total</b>                      | <b>1616.0</b>      | <b>1602.0</b>       | <b>-14.0</b>  | <b>-0.9%</b>          |

Tuition-Waiver pupils include children of L-S, Lincoln Public Schools and Sudbury Public Schools staff from multiple communities.

**Projection for 2016-2017- Fiscal Year 2017**

The projections for the 2016-2017 school year (FY17) range from 1572 to 1574 using the two models. With enrollment currently at 1602 the expected change is not large but it is indicative of the trend that LSRHS will experience over the coming years.

**Fiscal 2017-2024 Nine-Year Projection**

The table and chart below show the predicted pattern in two formats. Table (3) compares the Projections from both models for the next five years. What is additionally informative is the extension of both models to a nine year projection. (Graph 1). A nine-year projection is possible using the current (FY16) K enrollment as the expected 9<sup>th</sup> Grade class cohort in FY25. The nine-year projection shows a reduction of enrollment at LSRHS ranging between 224 and 244 students by FY25, which would be a reduction of from 14-15% over the nine-year period FY17-FY25. This is an important factor for LSRHS going forward as it has both programmatic and budgetary implications, potentially affecting class sizes, class offerings, and other school-wide planning.

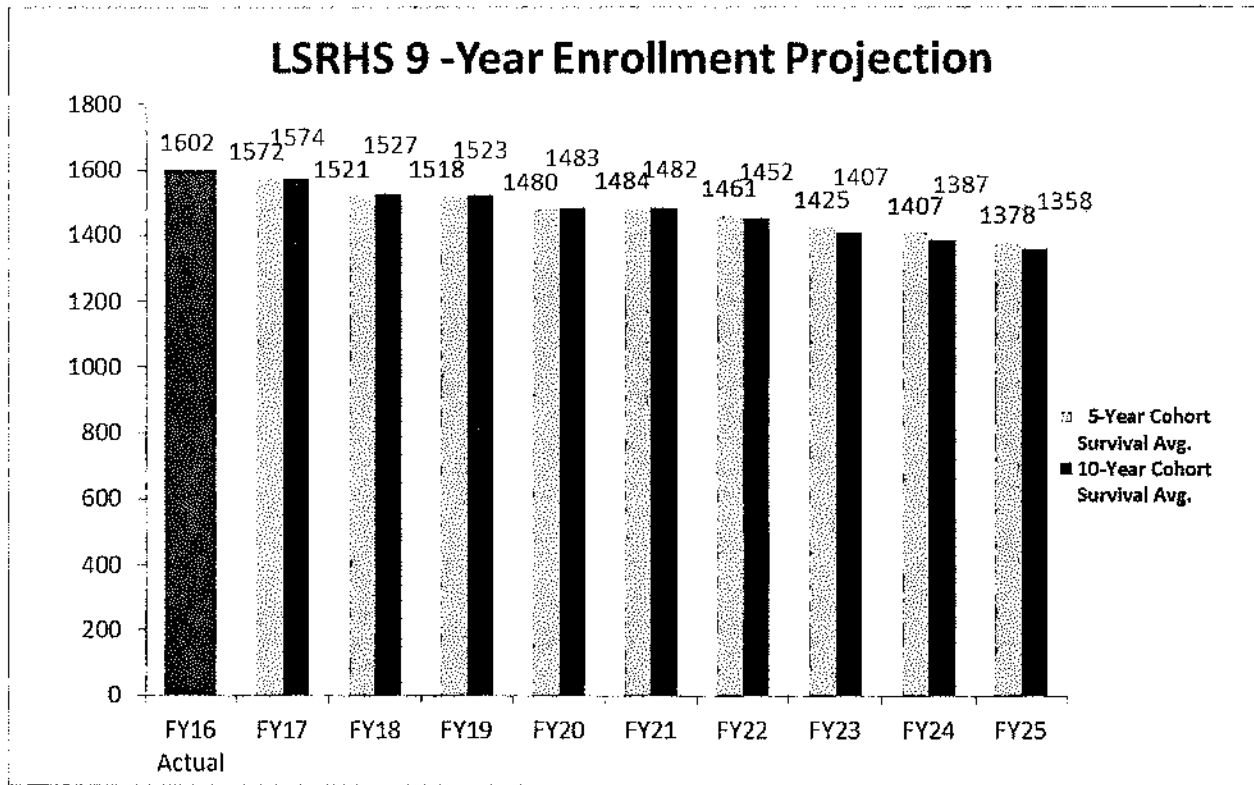
The source of the projected enrollment decline is the smaller lower grades at the elementary level which will continue to move up through the grades in cohorts of 50-60 fewer student per grade cohort, in the next few years, compared to prior periods. These enrollment projections can be seen graphically on Attachment 1 and 2.

It's interesting to note that the Class of 2017, at 450 students, is significantly larger than all other grade cohorts and has helped to mask the downward enrollment trend during the last three years. Once this class graduates, projections show continued enrollment drop during this projection period.

**TABLE 3**

|                     | Oct. 2016<br>Projected | Oct. 2017<br>Projected | Oct. 2018<br>Projected | Oct. 2019<br>Projected | Oct. 2020<br>Projected |
|---------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| 5-Year CS<br>Model  | 1572                   | 1521                   | 1518                   | 1480                   | 1484                   |
| 10-Year CS<br>Model | 1574                   | 1527                   | 1523                   | 1483                   | 1482                   |

**GRAPH 1**



One additional piece of data that I need to review further, is the impact of METCO students on this cohort projection analysis. Because LSRHS has an annual enrollment goal of 91 METCO students there are certain new enrollees annually new to the community. In theory these students are outside of this analysis to the extent that they exceed the number of 8<sup>th</sup> graders from Lincoln and Sudbury who never make the transition to LSRHS. Recent history shows that this count can be up to one-third of the LSRHS METCO population. What we can project is that with a steady METCO student count (91) the smaller resident enrollments, in both Lincoln and Sudbury, will yield lower future enrollments at LSRHS.

I hope this analysis is informative and will assist both the School Committee and the Administration in our planning during FY17 Budget Development.

Cc School Committee Members

Attachment 1: Enrollment History and Projection 5-year Cohort Survival Average Method

Attachment 2: Enrollment History and Projection 10-year Cohort Survival Average Method

LINCOLN SUBSBURY REGIONAL HIGH SCHOOL  
ENROLLMENT HISTORY AND PROJECTION  
5-YEAR COHORT SURVIVAL AVERAGE METHOD

| Grade        | Lincoln and Subsbury |     |     |     |     |     |     |     |     |      | 9-12 | FY  |     |     |      |      |
|--------------|----------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|------|------|
|              | K                    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | K-8  |      |     | 9   | 10  | 11   | 12   |
| October 2004 | 428                  | 441 | 429 | 440 | 438 | 426 | 408 | 394 | 424 | 3828 | 413  | 378 | 347 | 346 | 1484 | 2005 |
| October 2005 | 349                  | 487 | 453 | 441 | 451 | 428 | 422 | 404 | 399 | 3834 | 429  | 421 | 379 | 348 | 1577 | 2006 |
| October 2006 | 356                  | 416 | 492 | 452 | 437 | 458 | 426 | 428 | 397 | 3852 | 409  | 415 | 413 | 376 | 1613 | 2007 |
| October 2007 | 343                  | 395 | 412 | 490 | 442 | 439 | 453 | 416 | 429 | 3819 | 401  | 402 | 409 | 409 | 1621 | 2008 |
| October 2008 | 343                  | 408 | 408 | 411 | 492 | 437 | 416 | 445 | 422 | 3782 | 425  | 398 | 399 | 416 | 1638 | 2009 |
| October 2009 | 350                  | 391 | 413 | 420 | 397 | 486 | 408 | 403 | 441 | 3709 | 423  | 409 | 389 | 394 | 1615 | 2010 |
| October 2010 | 337                  | 388 | 403 | 406 | 417 | 395 | 478 | 413 | 399 | 3636 | 407  | 417 | 409 | 381 | 1614 | 2011 |
| October 2011 | 327                  | 374 | 396 | 417 | 401 | 414 | 400 | 475 | 411 | 3615 | 390  | 400 | 402 | 409 | 1601 | 2012 |
| October 2012 | 350                  | 359 | 379 | 393 | 411 | 405 | 412 | 394 | 465 | 3568 | 399  | 390 | 394 | 397 | 1580 | 2013 |
| October 2013 | 331                  | 366 | 369 | 383 | 401 | 404 | 395 | 411 | 403 | 3463 | 452  | 403 | 389 | 397 | 1641 | 2014 |
| October 2014 | 312                  | 354 | 383 | 385 | 369 | 410 | 394 | 389 | 409 | 3405 | 399  | 450 | 383 | 385 | 1617 | 2015 |
| October 2015 | 319                  | 332 | 366 | 394 | 390 | 364 | 405 | 413 | 378 | 3363 | 385  | 384 | 437 | 385 | 1602 | 2016 |

| Grade        | Lincoln and Subsbury |     |     |     |     |     |     |     |     |     | 9-12 | FY  | Gr.9-12 Change |     |      |      |      |
|--------------|----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|----------------|-----|------|------|------|
|              | K                    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | K-8 |      |     |                | 9   | 10   | 11   | 12   |
| October 2016 | 344                  | 341 | 374 | 374 | 392 | 390 | 360 | 407 | 410 | 368 | 384  | 384 | 384            | 436 | 1572 | 2017 | -30  |
| October 2017 | 0                    | 353 | 349 | 372 | 372 | 391 | 386 | 361 | 404 | 395 | 385  | 374 | 374            | 383 | 1521 | 2018 | -51  |
| October 2018 | 0                    | 0   | 361 | 347 | 347 | 371 | 387 | 386 | 359 | 392 | 395  | 356 | 356            | 373 | 1518 | 2019 | -3   |
| October 2019 | 0                    | 0   | 0   | 0   | 359 | 346 | 368 | 388 | 384 | 348 | 390  | 389 | 389            | 356 | 1480 | 2020 | -38  |
| October 2020 | 0                    | 0   | 0   | 0   | 0   | 359 | 343 | 368 | 385 | 373 | 346  | 380 | 380            | 385 | 1484 | 2021 | 4    |
| October 2021 | 0                    | 0   | 0   | 0   | 0   | 0   | 355 | 344 | 366 | 374 | 371  | 337 | 337            | 379 | 1461 | 2022 | -23  |
| October 2022 | 0                    | 0   | 0   | 0   | 0   | 0   | 0   | 356 | 341 | 355 | 372  | 361 | 361            | 337 | 1425 | 2023 | -36  |
| October 2023 | 0                    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 353 | 331 | 353  | 362 | 362            | 360 | 1407 | 2024 | -18  |
| October 2024 | 0                    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 343 | 330  | 344 | 344            | 362 | 1378 | 2025 | -29  |
| <b>Total</b> |                      |     |     |     |     |     |     |     |     |     |      |     |                |     |      |      | -224 |

Class of 2017 Class of 2018 Class of 2019 Class of 2020 Class of 2021

| SURVIVAL RATIOS         | Lincoln and Subsbury |               |               |               |               |               |               |               |               |               | 9-12          | FY            |               |               |    |    |
|-------------------------|----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----|----|
|                         | K                    | 1             | 2             | 3             | 4             | 5             | 6             | 7             | 8             | K-8           |               |               | 9             | 10            | 11 | 12 |
| 10-11                   | 1.1098               | 1.0206        | 1.0347        | 1.0347        | 0.9877        | 0.9928        | 1.0127        | 0.9937        | 0.9952        | 0.9774        | 0.9828        | 0.9640        | 0.9640        | 1.0000        |    |    |
| 11-12                   | 1.0979               | 1.0134        | 0.9924        | 0.9856        | 0.9856        | 1.0100        | 0.9952        | 0.9850        | 0.9789        | 0.9708        | 1.0000        | 0.9850        | 0.9850        | 0.9876        |    |    |
| 12-13                   | 1.0457               | 1.0279        | 1.0106        | 1.0204        | 1.0204        | 0.9830        | 0.9753        | 0.9976        | 1.0228        | 0.9720        | 1.0100        | 0.9974        | 0.9974        | 1.0076        |    |    |
| 13-14                   | 1.0695               | 1.0464        | 1.0434        | 0.9634        | 0.9634        | 1.0224        | 0.9752        | 0.9848        | 0.9951        | 0.9901        | 0.9956        | 0.9504        | 0.9504        | 0.9897        |    |    |
| 14-15                   | 1.0641               | 1.0339        | 1.0287        | 1.0130        | 1.0130        | 0.9864        | 0.9902        | 1.0482        | 0.9743        | 0.9438        | 0.9875        | 0.9711        | 0.9711        | 1.0052        |    |    |
| <b>5 - YEAR AVERAGE</b> | <b>1.0774</b>        | <b>1.0284</b> | <b>1.0220</b> | <b>0.9940</b> | <b>0.9940</b> | <b>0.9989</b> | <b>0.9897</b> | <b>1.0019</b> | <b>0.9933</b> | <b>0.9708</b> | <b>0.9952</b> | <b>0.9736</b> | <b>0.9736</b> | <b>0.9980</b> |    |    |

Sources of data: For Oct. 2004 to 2014- MA DESE  
For 10/1/2015-District Enrollment Reports

LINCOLN SUBSBURY REGIONAL HIGH SCHOOL  
 ENROLLMENT HISTORY AND PROJECTION  
 10-YEAR COHORT SURVIVAL AVERAGE METHOD

| Grade        | Lincoln and Sudbury |     |     |     |     |     |     |     |     |      |     |     | FY  |     |      |      |
|--------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|------|
|              | K                   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | K-8  | 9   | 10  |     | 11  | 12   | 9-12 |
| October 2004 | 428                 | 441 | 429 | 440 | 438 | 426 | 408 | 394 | 424 | 3828 | 413 | 378 | 347 | 346 | 1484 | 2005 |
| October 2005 | 349                 | 487 | 453 | 441 | 451 | 428 | 422 | 404 | 399 | 3834 | 429 | 421 | 379 | 348 | 1577 | 2006 |
| October 2006 | 356                 | 416 | 492 | 452 | 437 | 458 | 426 | 428 | 397 | 3862 | 409 | 415 | 413 | 376 | 1613 | 2007 |
| October 2007 | 343                 | 395 | 412 | 490 | 442 | 439 | 453 | 416 | 429 | 3819 | 401 | 402 | 409 | 409 | 1621 | 2008 |
| October 2008 | 343                 | 408 | 408 | 411 | 492 | 437 | 416 | 445 | 422 | 3782 | 425 | 398 | 399 | 416 | 1638 | 2009 |
| October 2009 | 350                 | 391 | 413 | 420 | 397 | 486 | 408 | 403 | 441 | 3709 | 423 | 409 | 389 | 394 | 1615 | 2010 |
| October 2010 | 337                 | 388 | 403 | 406 | 417 | 395 | 478 | 413 | 399 | 3636 | 407 | 417 | 409 | 381 | 1614 | 2011 |
| October 2011 | 327                 | 374 | 396 | 417 | 401 | 414 | 400 | 475 | 411 | 3615 | 390 | 400 | 402 | 409 | 1601 | 2012 |
| October 2012 | 350                 | 359 | 378 | 393 | 411 | 405 | 412 | 394 | 465 | 3568 | 398 | 390 | 394 | 397 | 1630 | 2013 |
| October 2013 | 331                 | 366 | 369 | 383 | 401 | 404 | 395 | 411 | 403 | 3463 | 452 | 403 | 389 | 397 | 1641 | 2014 |
| October 2014 | 312                 | 354 | 383 | 385 | 369 | 410 | 394 | 389 | 409 | 3405 | 399 | 450 | 383 | 385 | 1617 | 2015 |
| October 2015 | 319                 | 332 | 366 | 394 | 390 | 364 | 406 | 413 | 379 | 3363 | 388 | 394 | 437 | 385 | 1602 | 2016 |

PROJECTED ENROLLMENTS

| Grade        | Lincoln and Sudbury |     |     |     |     |     |     |     |     |   |    |    | FY | Gr.9-12<br>Change |    |      |      |
|--------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|---|----|----|----|-------------------|----|------|------|
|              | K                   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9 | 10 | 11 |    |                   | 12 | 9-12 |      |
| October 2016 | 355                 | 339 | 370 | 390 | 390 | 389 | 357 | 405 | 411 |   |    |    |    |                   |    | 1574 | 2017 |
| October 2017 | 0                   | 363 | 343 | 367 | 367 | 390 | 382 | 355 | 402 |   |    |    |    |                   |    | 1527 | 2018 |
| October 2018 | 0                   | 0   | 367 | 340 | 366 | 366 | 382 | 380 | 353 |   |    |    |    |                   |    | 1523 | 2019 |
| October 2019 | 0                   | 0   | 0   | 363 | 339 | 339 | 359 | 380 | 378 |   |    |    |    |                   |    | 1483 | 2020 |
| October 2020 | 0                   | 0   | 0   | 0   | 363 | 332 | 357 | 378 | 368 |   |    |    |    |                   |    | 1482 | 2021 |
| October 2021 | 0                   | 0   | 0   | 0   | 0   | 355 | 331 | 355 | 365 |   |    |    |    |                   |    | 1452 | 2022 |
| October 2022 | 0                   | 0   | 0   | 0   | 0   | 0   | 354 | 329 | 334 |   |    |    |    |                   |    | 1407 | 2023 |
| October 2023 | 0                   | 0   | 0   | 0   | 0   | 0   | 0   | 352 | 344 |   |    |    |    |                   |    | 1393 | 2024 |
| October 2024 | 0                   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 345 |   |    |    |    |                   |    | 1358 | 2025 |
| Total        |                     |     |     |     |     |     |     |     |     |   |    |    |    |                   |    |      |      |

Class of 2017 Class of 2018 Class of 2019 Class of 2020 Class of 2021

| SURVIVAL RATIOS   | Lincoln and Sudbury |        |        |        |        |        |        |        |        |        |        |        | 10 - YEAR AVERAGE |
|-------------------|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------------|
|                   | K                   | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11     |                   |
| 04-05             | 1.1379              | 1.0272 | 1.0280 | 1.0250 | 1.0250 | 0.9772 | 0.9906 | 0.9902 | 1.0127 | 1.0118 | 1.0194 | 1.0026 | 1.0029            |
| 05-06             | 1.1920              | 1.0103 | 0.9978 | 0.9909 | 0.9909 | 1.0155 | 0.9953 | 1.0142 | 0.9827 | 1.0251 | 0.9674 | 0.9810 | 0.9921            |
| 06-07             | 1.1096              | 0.9904 | 0.9959 | 0.9779 | 1.0046 | 0.9891 | 0.9765 | 1.0023 | 0.9827 | 1.0101 | 0.9829 | 0.9855 | 0.9903            |
| 07-08             | 1.1895              | 1.0329 | 0.9976 | 1.0041 | 0.9887 | 0.9476 | 0.9823 | 1.0144 | 0.9823 | 0.9907 | 0.9925 | 0.9925 | 1.0171            |
| 08-09             | 1.1399              | 1.0123 | 1.0294 | 0.9659 | 0.9878 | 0.9336 | 0.9688 | 0.9910 | 0.9875 | 1.0024 | 0.9624 | 0.9774 | 0.9875            |
| 09-10             | 1.1068              | 1.0307 | 0.9831 | 0.9929 | 0.9950 | 0.9835 | 1.0123 | 0.9901 | 0.9794 | 0.9279 | 0.9858 | 1.0000 | 0.9794            |
| 10-11             | 1.0938              | 1.0206 | 1.0347 | 0.9877 | 0.9928 | 1.0127 | 0.9937 | 0.9952 | 1.0000 | 0.9724 | 0.9828 | 0.9640 | 1.0000            |
| 11-12             | 1.0979              | 1.0134 | 0.9924 | 0.9856 | 1.0100 | 0.9952 | 0.9850 | 0.9789 | 0.9876 | 0.9708 | 1.0000 | 0.9850 | 0.9876            |
| 12-13             | 1.0457              | 1.0279 | 1.0106 | 1.0204 | 0.9830 | 0.9753 | 0.9976 | 1.0228 | 1.0076 | 0.9720 | 1.0100 | 0.9974 | 1.0076            |
| 13-14             | 1.0695              | 1.0464 | 1.0434 | 0.9634 | 1.0224 | 0.9752 | 0.9848 | 0.9951 | 0.9897 | 0.9901 | 0.9956 | 0.9604 | 0.9897            |
| 14-15             | 1.0641              | 1.0339 | 1.0287 | 1.0130 | 0.9864 | 0.9902 | 1.0482 | 0.9743 | 1.0052 | 0.9438 | 0.9875 | 0.9711 | 1.0052            |
| 10 - YEAR AVERAGE | 1.1126              | 1.0219 | 1.0114 | 0.9902 | 0.9986 | 0.9798 | 0.9963 | 0.9947 | 0.9957 | 0.9805 | 0.9867 | 0.9804 | 0.9957            |