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# Stormwater Management Report

for

## WHEATON FLOOD STUDY

Prairie Path Park Area

WMA Job # 44059

Prepared for:



Date: December 19, 2018



*12/19/2018*

S. Mark Richards  
License Expires 11/30/2019

Date

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## **Narrative Summary**

The following Flood Prone Area Study analyzes the causes and limits of flooding within the depressional areas located adjacent to and on both sides of the Prairie Path, south of Roosevelt Road and north of Arbor Avenue.

This purpose of this study is to provide information on existing flooding and provide conceptual remediation proposals along with corresponding estimates of cost pursuant to Wheaton City Council Strategic Goal 2C which has a target of protecting 100% of structures for a yet to be determined frequency rain event.

The results of this study show that a total of six (6) houses have openings lower than the 100yr peak flood elevation. Five of these houses are on the west side of the Prairie Path where the flooding has a short duration. One house is on the east side of the Prairie Path where the flooding remains for a much longer duration.

## **Study Methodology**

The XPSWMM model was used to study these flood prone areas. XPSWMM is a stormwater hydrology and hydraulics modeling software that dynamically balances water movement throughout both storm sewers and detention ponding areas, allowing for accurate modeling of existing and proposed conditions for a wide range of flood events. This software also allows for the modeling of the ground surface (1D/2D integrated) to accurately model the overflow of the storm sewer systems and to dynamically account for localized ponding and re-entry into the storm sewer system within the model.

## **Hydrology**

The ground surface information for this study started with the DuPage County GIS topography. This was then supplemented with detailed survey topography provided by Webster McGrath & Ahlberg, Ltd. (WMA) survey crews within the flood-prone areas. WMA survey crews also collected the storm sewer structure rim elevations and pipe invert and pipe size measurements throughout the study area and all the way down to the storm sewer outlet at the Spring Brook No. 1 creek.

The tributary area (catchment) draining to each storm inlet was delineated using the DuPage GIS topography and WMA detailed topography. Runoff curve numbers (CN values) describing the relative imperviousness of the catchment areas were calculated using the SCS methodology. Times of Concentration (T<sub>c</sub>) were then calculated for the larger catchments. The time of concentration represents the length of time that it takes for storm runoff to travel from the upstream ends of the catchment area down to the low point of each catchment area. A generally accepted assumed T<sub>c</sub> of 10 minutes was used for the smaller catchments where the catchment area was reasonably close to the storm inlet.

## Hydraulics

The physical characteristics of the existing storm sewer network from the outfall all the way to the upstream ends of this specific network, as surveyed by WMA survey crews, were imported into the XPSWMM model.

The downstream starting water elevation (tailwater) was obtained from the DuPage FIS flood profile (237P). The crown of the pipe was used for the 1yr, 5yr, and 10yr storms. The downstream 10yr peak (726.2) was used as the starting elevation for the 25yr and 50yr storms. The downstream 100yr peak (728.2) was used as the starting elevation for the 100yr and 500yr storms. Tailwater sensitivity testing was performed and it has been determined that changes to the tailwater elevation of several feet only impact the resulting flooding elevations by a tenth of a foot or so. Therefore, it was decided that these conservative tailwater estimates would not overly exaggerate the flooding results.

## Rainfall

Rainfall depths and intensity patterns were taken from ISWS Bulletin 71. The flood prone area study includes an analysis of a wide range of synthetic storm types. These storms vary both in their duration and in the statistical probability of occurring in any year. Thus, a storm with a 1% probability of occurring in a year is referred to as a 100-yr storm (likely to occur once in a hundred years). This study includes storm durations of 1hr, 2hr, 3hr, 6hr, 12hr and 24 hours. As shown in Bulletin 71, these different storm durations typically follow specific intensity patterns. The shorter duration storms, corresponding to a given storm frequency, are more intense, whereas the longer duration storms are less intense, but produce a larger overall volume of water. It should be noted that the shorter duration storms with their higher intensities typically yield the peak flooding results for areas with direct runoff or storm sewer drainage, whereas the longer duration storms typically yield the peak flooding results for areas with detention or slow draining outlets since the overall volume is higher.

Therefore, each study area has a “critical duration” which is the specific duration that yields the highest water elevations for that area.

## Model Calibration

It is helpful to be able to compare a digital model’s results to real world storm events and resulting flooding where such documentation exists. In this case, a few photos of the Prairie Path Park area have been provided to the City of Wheaton following the April 18<sup>th</sup>, 2013 storm which produced ~5.9 inches over ~19hours per City records. This rainfall would be a bit less than a 50yr 18hr storm (5.95”).

According to the XPSWMM model, this event would yield a high-water elevation of ~741.3 in the Prairie Path Park area. This picture was taken at around 2:00pm on the 18<sup>th</sup> which would be past the peak of the event but since this area drains slowly, it is reasonably close to its peak flooding elevation. When comparing the picture with the WMA detailed topography, the pictured flood elevation is approximately 741.0, which is reasonably close and, as expected, slightly lower than the calculated peak.



Photograph of Prairie Path Park – Looking easterly from Prairie Path – Taken 2:00pm April 18<sup>th</sup>, 2013

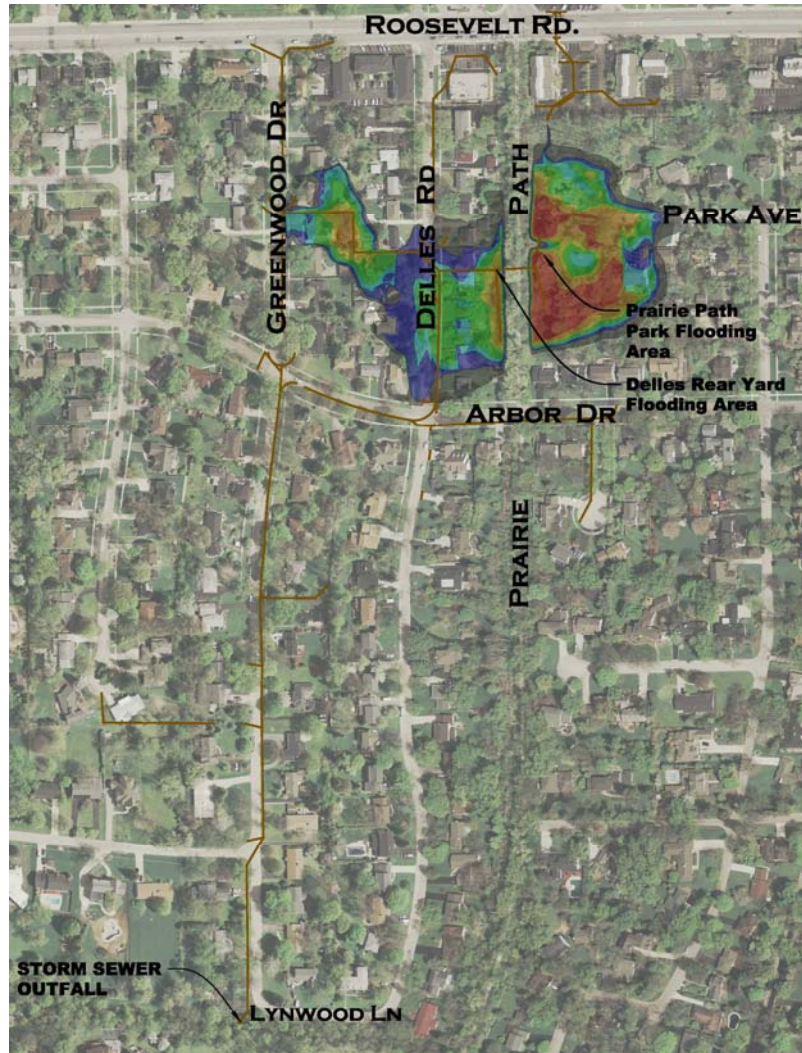


## **Existing Conditions**

The existing depressional area south of Roosevelt Road has been bifurcated by the Prairie Path which is raised substantially higher than the existing grade through this area. Approximately 14.6 acres drains to the east side of the Prairie Path. This tributary area includes approximately 1 acre of Roosevelt Road right-of-way along with the commercial properties north of the Prairie Path Park and the residential area east of the park. This park is drained by a single 4" steel storm sewer pipe running under the Prairie Path and connecting to the public storm sewer west of the Prairie Path. This 4" storm sewer restricts flow out of this low area so that the Prairie Path Park functions as a detention basin. The longer duration (24hr) storms, therefore, produce the peak ponding depths since the longer duration storms have higher cumulative runoff volumes. The 100-yr probability storm peak water elevation in Prairie Path Park is 742.04 which corresponds to a depth of 6.7 feet (Storm Inlet Rim= 735.33).

Approximately 29 acres is directly tributary to the west side of the Prairie Path at the subject depressional area. This depressional area is drained by public storm sewers throughout the roadways and rear yards of private properties primarily along Delles Road. These public storm sewers all drain to a single 36" trunk line which outlets at the Spring Brook No. 1 near the intersection of Greenwood Drive and Lynwood Lane. As shown in the ponding exhibits (X-1A and X-1B) this area is only flooded at the peak of the most intense storms and the ponding is relatively short lived when the runoff rate to the storm sewer system exceeds the capacity of the storm sewer. The critical duration storm is generally the 1hr storm through this area and ponding only lasts for a couple hours. The critical duration 100yr peak elevation is 739.81 in the rear yards of the properties between Greenwood Drive and Delles Road. The 100yr peak elevation is 738.13 along the

Delles Road pavement sag and the yards of the properties on the east side of Delles Road. For the 24hr duration storms, there is no ponding except for the 500yr probability storm. It should be noted, however, that this flood model did not consider inlet clogging which would have a significant impact on both the severity and duration of flooding. This is primarily a maintenance issue or could be addressed with upgrades to the storm inlet grates.



The area (20.8 acres) tributary to the 36" trunk storm sewer downstream of the subject area was also delineated to account for its impact on the storm sewer capacity. In this area, ponding was not allowed in the model, thereby allowing the surcharged water to exit the model simulating the overflow proceeding southerly towards the Spring Brook Tributary No. 1 instead of ponding and reentering the storm sewer system.

**Table 1 – Prairie Path Park Area**

| Frequency           | 1yr    | 5yr    | 10yr   | 25yr   | 50yr   | 100yr  | 500yr  |
|---------------------|--------|--------|--------|--------|--------|--------|--------|
| Peak Elevation (ft) | 738.83 | 739.96 | 740.42 | 741.04 | 741.51 | 742.04 | 743.51 |
| Peak Depth (ft)     | 3.5-ft | 4.6-ft | 5.1-ft | 5.7-ft | 6.2-ft | 6.7-ft | 8.2-ft |

Depth shown above is measured from storm inlet rim of 735.33 in Prairie Path Park south of the paved connection to Prairie Path.

**Table 2 – Delles Road Low Area**

| Frequency           | 1yr    | 5yr    | 10yr   | 25yr   | 50yr   | 100yr  | 500yr  |
|---------------------|--------|--------|--------|--------|--------|--------|--------|
| Peak Elevation (ft) | 734.34 | 735.08 | 735.72 | 736.83 | 737.29 | 738.13 | 739.81 |
| Peak Depth (ft)     | 0      | 0.3-ft | 0.9-ft | 2.0-ft | 2.5-ft | 3.3-ft | 5.0-ft |

Depth shown above is measured from storm inlet rim of 734.81 in the rear yard between 815 & 819 Delles Road.

**Table 3 – Rear Yards Between Greenwood Drive & Delles Road**

| Frequency           | 1yr    | 5yr    | 10yr   | 25yr   | 50yr   | 100yr  | 500yr   |
|---------------------|--------|--------|--------|--------|--------|--------|---------|
| Peak Elevation (ft) | 736.75 | 738.16 | 738.57 | 739.23 | 739.57 | 739.81 | 740.12  |
| Peak Depth (ft)     | 0      | 0      | 0.3-ft | 1.0-ft | 1.3-ft | 1.6-ft | 1.86-ft |

Depth shown above is measured from storm inlet rim of 738.26 in the rear yard between 812 & 818 Delles Road.

## **Affected Structures**

The following is a summary of the impact to each affected structure within the 100yr peak ponding limits of the subject study area. Please note that this analysis does not include ground water seepage into basements or higher flood depths due to clogging of the storm sewer inlets.

### **West of Prairie Path – Properties between Greenwood Drive & Delles Road**

**809 Greenwood Drive** (P.I.N. 05-20-203-007): The lowest water entry elevation for this property is a window sill at 739.38 which is slightly lower than the 50yr peak flooding elevation of 739.57 and the 100yr peak flooding elevation of 739.81. Given the small elevation difference and the relatively short flooding duration in this area, this property would be a good candidate for waterproofing techniques such as raising the window well/sill.

**818 Delles Road** (P.I.N. 05-20-203-016): The lowest water entry elevation for this property is the top of foundation elevation of 739.51 which is slightly lower than the 50yr peak flooding elevation of 739.57 and the 100yr peak flooding elevation of 739.81.



## West of Prairie Path – Properties on East Side of Delles Road

**819 Delles Road** (P.I.N. 05-20-204-013): The lowest water entry elevation for this property is the top of foundation elevation of 738.12 (estimated based on bottom of siding) which is slightly lower than the 100yr peak flooding elevation of 738.13 in this area.

**823 Delles Road** (P.I.N. 05-20-204-014): The lowest water entry elevation for this property is the top of foundation elevation of 737.81 (estimated based on bottom of siding) which is slightly lower than the 100yr peak flooding elevation of 738.13 in this area.

**827 Delles Road** (P.I.N. 05-20-204-015): The lowest water entry elevation for this property is the top of foundation elevation of 738.00 (estimated based on bottom of siding) which is slightly lower than the 100yr peak flooding elevation of 738.13 in this area.

## East of Prairie Path

**616 Park Avenue** (P.I.N. 05-20-206-016): The lowest water entry elevation for this property is a window well at 741.40 on the west side of the house. This is slightly lower than the 50yr peak flood elevation of 741.51 and significantly lower than the 100yr peak flood elevation of 742.04. The top of foundation (741.50) is also below the 50yr and greater flood events.

**Table 4 – Impacted Properties Summary**

|               | Depth Above Lowest Opening to Habitable Space (ft) |     |      |      |         |         |         |
|---------------|----------------------------------------------------|-----|------|------|---------|---------|---------|
|               | 1yr                                                | 5yr | 10yr | 25yr | 50yr    | 100yr   | 500yr   |
| 801 Greenwood | 0                                                  | 0   | 0    | 0    | 0       | 0       | 0       |
| 809 Greenwood | 0                                                  | 0   | 0    | 0    | 0.19-ft | 0.43-ft | 0.74-ft |
| 818 Delles Rd | 0                                                  | 0   | 0    | 0    | 0.06-ft | 0.30-ft | 0.61-ft |
| 824 Delles Rd | 0                                                  | 0   | 0    | 0    | 0       | 0       | 0.17-ft |
| 828 Delles Rd | 0                                                  | 0   | 0    | 0    | 0       | 0       | 0       |
|               |                                                    |     |      |      |         |         |         |
| 815 Delles Rd | 0                                                  | 0   | 0    | 0    | 0       | 0       | 0.93-ft |
| 819 Delles Rd | 0                                                  | 0   | 0    | 0    | 0       | 0.01-ft | 1.69-ft |
| 823 Delles Rd | 0                                                  | 0   | 0    | 0    | 0       | 0.32-ft | 2.00-ft |
| 827 Delles Rd | 0                                                  | 0   | 0    | 0    | 0       | 0.13-ft | 1.81-ft |
| 829 Delles Rd | 0                                                  | 0   | 0    | 0    | 0       | 0       | 1.37-ft |
|               |                                                    |     |      |      |         |         |         |
| 616 Park Ave  | 0                                                  | 0   | 0    | 0    | 0.11-ft | 0.64-ft | 2.11-ft |

**Table 5 – Total Number of Affected Properties**

|                      | Number of Affected Properties per Storm Frequency |     |      |      |      |       |       |
|----------------------|---------------------------------------------------|-----|------|------|------|-------|-------|
|                      | 1yr                                               | 5yr | 10yr | 25yr | 50yr | 100yr | 500yr |
| East of Prairie Path | 0                                                 | 0   | 0    | 0    | 2    | 5     | 8     |
| West of Prairie Path | 0                                                 | 0   | 0    | 0    | 1    | 1     | 1     |

## **Proposed Conditions:**

The following section provides conceptual remediation measures and corresponding estimates of cost to be studied and tabulated. Before describing the proposed alternatives, several unviable options were considered, as outlined below:

### **Unviable Alternates Considered**

One obvious consideration was to increase the storm sewer pipe sizes as needed to drain these problem areas more quickly and to keep up with the peak runoff rates. However, this option is not permissible due to the DuPage County Stormwater Ordinance requirements and Illinois Drainage Law, as this would negatively impact properties downstream of the current flooding areas by removing upstream detention volume and thereby potentially exacerbating the flooding in other areas.

### **Alternate 1: Flood-Proofing:**

Flood-proofing is the most cost-effective alternate for the properties west of the Prairie Path. At an estimated cost of \$100,000 per house, the top of foundation could be raised above the flood elevation along with any window opening modifications. The total cost of this alternate, therefore, would be ~\$600,000.

### **Alternate 2A: Prairie Path Park Re-Grading:**

As a conceptual alternate to both reduce flood damage to homes but also to significantly reduce yard and street flooding, a Detention Concept Plan has been prepared as shown in exhibit X-2. A ground surface model for this conceptual grading plan was then imported into the XPSWMM model to evaluate its impacts. Since this proposed alternate does not affect the 4" restricted outlet for the Prairie Path Park, the two detention areas are substantially independent and the conceptual improvements for either side of the Prairie Path could be implemented without improving the opposite side.

On the east side of the Prairie Path, the proposed grading plan shows the relocation of the playground equipment to the east edge of the park and the lowering of the grades for the rest of the park while still maintaining the existing 4" storm sewer and storm inlets. According to the proposed XPSWMM model, the 100yr peak flood elevation is reduced from 742.04 down to 740.56, which is roughly one (1) foot below the top of foundation and window well elevations at 616 Park Avenue. As shown in the engineer's cost estimate following this narrative summary, the cost of the improvements on the east side of the Prairie Path would be roughly \$200,000 which is substantially lower than the buyout cost of \$845,900 for 616 Park Ave. It should be noted that the top of foundation at 616 Park Avenue would still be below the proposed 500yr peak flood elevation. So, raising the foundation or a buyout would be required if it were desired to remove this structure from the 500yr flood limits.

The following table (Table 6) provides a comparison of the existing and proposed high water elevations for the various storm frequencies:

**Table 6 – Prairie Path Park – Existing vs. Conceptual Proposed High-Water Elevations**

| <b>Frequency</b>               | <b>1yr</b> | <b>5yr</b> | <b>10yr</b> | <b>25yr</b> | <b>50yr</b> | <b>100yr</b> | <b>500yr</b> |
|--------------------------------|------------|------------|-------------|-------------|-------------|--------------|--------------|
| Existing - Peak Elevation (ft) | 738.83     | 739.96     | 740.42      | 741.04      | 741.51      | 742.04       | 743.51       |
| Proposed - Peak Elevation (ft) | 736.79     | 738.32     | 738.78      | 739.45      | 739.98      | 740.56       | 742.14       |

## Alternate 2B: Delles Road Regional Detention:

In order to understand the possible benefits of adding detention volume to the west side of the Prairie Path, a new detention basin was designed in place of three residences (823, 827 & 829 Delles Rd) with a direct connection to the 36" trunk storm sewer. This basin would act as a buffer to allow for ponding when the rainfall runoff intensity exceeds the storm sewer capacity instead of ponding in yards and the street. As shown in the Concept Plan exhibit X-2, this concept would eliminate ponding in the yards for all storms except for the peak 100yr storm. This design concept would also lower the peak elevation in the Delles Roadway by approximately eight (8) inches, from 738.12 down to 737.43. However, the cost of this concept is nearly \$1M, including the cost of buying out the three lots to place the detention basin.

The following table (Table 7) provides a comparison of the existing and proposed high water elevations for the various storm frequencies:

**Table 7 – West of Prairie Path – Existing vs. Conceptual Proposed High-Water Elevations**

| Frequency                                             | 1yr | 5yr    | 10yr   | 25yr   | 50yr   | 100yr  | 500yr  |
|-------------------------------------------------------|-----|--------|--------|--------|--------|--------|--------|
| <b>Delles Rd Existing</b><br>– Peak Elevation (ft)    | -   | 735.08 | 735.72 | 736.83 | 737.29 | 738.13 | 739.81 |
| <b>Delles Rd Proposed</b><br>– Peak Elevation (ft)    | -   | -      | -      | 735.17 | 736.28 | 737.44 | 739.15 |
|                                                       |     |        |        |        |        |        |        |
| <b>Greenwood Dr Existing</b><br>– Peak Elevation (ft) | -   | 738.16 | 738.57 | 739.23 | 739.57 | 739.81 | 740.12 |
| <b>Greenwood Dr Proposed</b><br>– Peak Elevation (ft) | -   | -      | -      | -      | 736.83 | 738.57 | 739.79 |

## Alternate 3: Buy-Out:

To provide a baseline comparison between separate study areas and show a baseline “worst case scenario”, the final option considered was for the City to buy out all affected properties. The following home values were taken from the DuPage County Tax Assessor’s 2017 “Fair Cash Value” appraisals. The total 100yr buyout cost is \$2,314,500 for the 6 affected properties. The cost to demolish these 6 homes would add approximately \$200,000 to the total cost of this option. If the buyout were extended to the 500yr limits, then the total cost would be \$3,179,900.

A potential variation on this buy-out option would be to purchase the homes and sell the lots for redevelopment. If properly designed and implemented this scenario could eliminate flooding in this area. Due to the value of the resulting buildable lots, this alternate could significantly reduce the cost of the buy-out option.

**Table 8 – Summary of Costs for Alternative Remediation Measures**

|                                  | Estimated Cost | # of Houses Affected | Cost per House |
|----------------------------------|----------------|----------------------|----------------|
| 1: Flood-Proofing                | \$600,000      | 6                    | \$100,000      |
| 2A: Prairie Path Park Re-Grading | \$200,000      | 1                    | \$200,000      |
| 2B: Delles Road Detention Basin  | \$953,550      | 5                    | \$190,710      |
| 3: Buy-Out                       | \$2,314,500    | 6                    | \$385,750      |

## **Final Recommendations**

The most cost-effective means of reaching the Wheaton City Council Strategic Goal 2C is flood-proofing of existing structures by raising the foundation elevations as needed.

We recommend that serious consideration be given to the Delles Road Regional Detention Option (Alternate 2B), as this option would alleviate most of the flooding issues west of the Prairie Path and would provide an additional regional benefit by limiting the ponding in the Delles Road pavement to one (1) foot or less. A similarly beneficial option would be a buyout of the entire area along with redevelopment following proper design standards which would eliminate all structure flooding from this area.

## Affected Properties Summary - Existing Conditions

| Address                             | Lowest Entry | TF     | Critical Duration High Water Level (ft) |        |        |        |        |        |        | Property Value      |
|-------------------------------------|--------------|--------|-----------------------------------------|--------|--------|--------|--------|--------|--------|---------------------|
|                                     |              |        | 1yr                                     | 5yr    | 10yr   | 25yr   | 50yr   | 100yr  | 500yr  |                     |
| 801 Greenwood                       | 740.55       | 741.10 | 736.75                                  | 738.16 | 738.57 | 739.23 | 739.57 | 739.81 | 740.12 | \$ 230,100          |
| 05-20-203-006                       | Window       |        |                                         |        |        |        |        |        |        |                     |
| 809 Greenwood                       | 739.38       | 739.88 | 736.75                                  | 738.16 | 738.57 | 739.23 | 739.57 | 739.81 | 740.12 | \$ 281,600          |
| 05-20-203-007                       | Window       |        |                                         |        |        |        |        |        |        |                     |
| 818 Delles Rd                       | 739.51       | 739.51 | 736.75                                  | 738.16 | 738.57 | 739.23 | 739.57 | 739.81 | 740.12 | \$ 298,900          |
| 05-20-203-016                       | TF           |        |                                         |        |        |        |        |        |        |                     |
| 824 Delles Rd                       | 739.95       | 741.45 | 736.75                                  | 738.16 | 738.57 | 739.23 | 739.57 | 739.81 | 740.12 | \$ 270,000          |
| 05-20-203-017                       | Window       |        |                                         |        |        |        |        |        |        |                     |
| 828 Delles Rd                       | 740.32       | 741.77 | 736.75                                  | 738.16 | 738.57 | 739.23 | 739.57 | 739.81 | 740.12 | \$ 256,300          |
| 05-20-203-018                       | Window       |        |                                         |        |        |        |        |        |        |                     |
| 815 Delles Rd                       | 738.88       | 738.88 | 734.34                                  | 735.08 | 735.72 | 736.83 | 737.28 | 738.13 | 739.81 | \$ 289,000          |
| 05-20-204-012                       | TF           |        |                                         |        |        |        |        |        |        |                     |
| 819 Delles Rd                       | 738.12       | 738.12 | 734.34                                  | 735.08 | 735.72 | 736.83 | 737.28 | 738.13 | 739.81 | \$ 294,700          |
| 05-20-204-013                       | TF           |        |                                         |        |        |        |        |        |        |                     |
| 823 Delles Rd                       | 737.81       | 737.81 | 734.34                                  | 735.08 | 735.72 | 736.83 | 737.28 | 738.13 | 739.81 | \$ 292,200          |
| 05-20-204-014                       | TF           |        |                                         |        |        |        |        |        |        |                     |
| 827 Delles Rd                       | 738.00       | 738.00 | 734.34                                  | 735.08 | 735.72 | 736.83 | 737.28 | 738.13 | 739.81 | \$ 301,200          |
| 05-20-204-015                       | TF           |        |                                         |        |        |        |        |        |        |                     |
| 829 Delles Rd                       | 738.44       | 738.44 | 734.34                                  | 735.08 | 735.72 | 736.83 | 737.28 | 738.13 | 739.81 | \$ 306,400          |
| 05-20-204-016                       | TF           |        |                                         |        |        |        |        |        |        |                     |
| 616 Park Ave                        | 741.40       | 741.50 | 738.83                                  | 739.96 | 740.42 | 741.04 | 741.51 | 742.04 | 743.51 | \$ 845,900          |
| 05-20-206-016                       | Window       | Rear   |                                         |        |        |        |        |        |        |                     |
| Property Value of Affected Houses = |              |        |                                         |        |        |        |        |        |        | <b>\$ 3,179,900</b> |

Note: Property values shown hereon are 2017 "Fair Cash Value" per DuPage County Tax Assessor

Lowest Entry = Lowest point of possible water entry to habitable space

TF = Top of Foundation

| Total Value of Affected Properties |             |
|------------------------------------|-------------|
| 1yr                                | \$0         |
| 5yr                                | \$0         |
| 10yr                               | \$0         |
| 25yr                               | \$0         |
| 50yr                               | \$1,426,400 |
| 100yr                              | \$2,314,500 |
| 500yr                              | \$3,179,900 |



**WEBSTER, McGRATH AHLBERG, LTD.**

LAND SURVEYING - CIVIL ENGINEERING - LANDSCAPE ARCHITECTURE  
 207 S. NAPERVILLE RD, WHEATON, IL 60187

**ENGINEER'S ESTIMATE OF PROBABLE COSTS**

Date: 10/17/2018

**Delles Road Detention Concept**

| ITEM DESCRIPTION | QTY | UNIT | UNIT<br>COST | ITEM<br>COST |
|------------------|-----|------|--------------|--------------|
|------------------|-----|------|--------------|--------------|

**Alternate 1: Raising Foundations & Window Waterproofing**

|                            |   |    |            |                   |
|----------------------------|---|----|------------|-------------------|
| Raise foundation as needed | 9 | EA | \$ 100,000 | \$ 900,000        |
|                            |   |    |            | <b>\$ 900,000</b> |

**Alternate 2A: Prairie Path Park Re-Grading**

|                                             |   |    |            |                   |
|---------------------------------------------|---|----|------------|-------------------|
| Relocate Playground equipment               | 1 | LS | \$ 5,000   | \$ 5,000          |
| Tree Removal                                | 1 | LS | \$ 12,000  | \$ 12,000         |
| Mass Grading & Haul-off of ~3.25 ac-ft soil | 1 | LS | \$ 175,000 | \$ 175,000        |
| Erosion Control Measures                    | 1 | LS | \$ 3,000   | \$ 3,000          |
| Restoration and Stabilization               | 1 | LS | \$ 3,000   | \$ 3,000          |
| As-Constructed Drawings                     | 1 | EA | \$ 2,000   | \$ 2,000          |
|                                             |   |    |            | <b>\$ 200,000</b> |

**Alternate 2B: Delles Road Regional Detention**

|                                                             |     |    |            |                   |
|-------------------------------------------------------------|-----|----|------------|-------------------|
| Buyout of 823 Delles                                        | 1   | LS | \$ 292,200 | \$ 292,200        |
| Buyout of 827 Delles                                        | 1   | LS | \$ 301,200 | \$ 301,200        |
| Buyout of 829 Delles                                        | 1   | LS | \$ 306,400 | \$ 306,400        |
| Remove & Replace existing storm sewer to new detention area | 435 | LF | \$ 50      | \$ 21,750         |
| Detention Basin Grading                                     | 1   | LS | \$ 25,000  | \$ 25,000         |
| Erosion Control Measures                                    | 1   | LS | \$ 3,000   | \$ 3,000          |
| Restoration & Stabilization                                 | 1   | LS | \$ 2,000   | \$ 2,000          |
| As-Constructed Drawings                                     | 1   | EA | \$ 2,000   | \$ 2,000          |
|                                                             |     |    |            | <b>\$ 953,550</b> |

**Alternate 3: Buyout**

|                                            |   |    |    |           |
|--------------------------------------------|---|----|----|-----------|
| Buyout of all properties up to 25yr event  | 1 | LS | \$ | -         |
| Buyout of all properties up to 50yr event  | 1 | LS | \$ | 1,426,400 |
| Buyout of all properties up to 100yr event | 1 | LS | \$ | 2,314,500 |
| Buyout of all properties up to 500yr event | 1 | LS | \$ | 3,179,900 |

## CURVE NUMBER CALCULATIONS

Conversion from CN to Percent Impervious used in XPSWMM:

$$CN = 98x + 74(1 - x)$$

$$x = \frac{CN - 74}{24}$$

### Catchment 0

| Area Description     | Soil Group | Area (acre) | CN           | A x CN |
|----------------------|------------|-------------|--------------|--------|
| Open Water           | C          | 0.05        | 100          | 5      |
| Houses               | C          | 0.32        | 98           | 31     |
| Pavement             | C          | 1.05        | 98           | 103    |
| Open Pervious Area   | C          | 3.92        | 74           | 290    |
| Total                |            | <b>5.33</b> | <b>80</b>    |        |
| Percent Impervious = |            |             | <b>26.5%</b> |        |

### Catchment 1

| Area Description     | Soil Group | Area (acre) | CN          | A x CN |
|----------------------|------------|-------------|-------------|--------|
| Open Pervious Area   | C          | 0.23        | 74          | 17     |
| Total                |            | <b>0.23</b> | <b>74</b>   |        |
| Percent Impervious = |            |             | <b>0.0%</b> |        |

### Catchment 2

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 4.54        | 83           | 377    |
| Roadway R.O.W.            | C          | 1.04        | 92           | 96     |
| Open Pervious Area        | C          | 0.97        | 74           | 72     |
| Total                     |            | <b>6.55</b> | <b>83</b>    |        |
| Percent Impervious =      |            |             | <b>37.9%</b> |        |

### Catchment 3

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.62        | 83           | 51     |
| Roadway R.O.W.            | C          | 0.77        | 92           | 71     |
| Total                     |            | <b>1.38</b> | <b>88</b>    |        |
| Percent Impervious =      |            |             | <b>58.3%</b> |        |

### Catchment 4

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 1.77        | 83           | 147    |
| Roadway R.O.W.            | C          | 0.29        | 92           | 27     |
| Total                     |            | <b>2.06</b> | <b>84</b>    |        |
| Percent Impervious =      |            |             | <b>42.8%</b> |        |

## CURVE NUMBER CALCULATIONS

### Catchment 5

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 2.48        | 83           | 206    |
| Roadway R.O.W.            | C          | 0.18        | 92           | 17     |
| Total                     |            | <b>2.66</b> | <b>84</b>    |        |
| Percent Impervious =      |            |             | <b>40.1%</b> |        |

### Catchment 6

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 2.16        | 83           | 179    |
| Roadway R.O.W.            | C          | 0.52        | 92           | 48     |
| Total                     |            | <b>2.68</b> | <b>85</b>    |        |
| Percent Impervious =      |            |             | <b>44.8%</b> |        |

### Catchment 7

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.44        | 83           | 36     |
| Roadway R.O.W.            | C          | 0.34        | 92           | 31     |
| Total                     |            | <b>0.78</b> | <b>87</b>    |        |
| Percent Impervious =      |            |             | <b>53.9%</b> |        |

### Catchment 8

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.18        | 83           | 15     |
| Roadway R.O.W.            | C          | 0.26        | 92           | 23     |
| Total                     |            | <b>0.43</b> | <b>88</b>    |        |
| Percent Impervious =      |            |             | <b>59.6%</b> |        |

### Catchment 9

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 1.63        | 83           | 135    |
| Roadway R.O.W.            | C          | 0.60        | 92           | 56     |
| Total                     |            | <b>2.23</b> | <b>85</b>    |        |
| Percent Impervious =      |            |             | <b>47.7%</b> |        |

### Catchment 10

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 2.76        | 83           | 229    |
| Roadway R.O.W.            | C          | 0.66        | 92           | 61     |
| Total                     |            | <b>3.43</b> | <b>85</b>    |        |
| Percent Impervious =      |            |             | <b>44.7%</b> |        |

## CURVE NUMBER CALCULATIONS

### Catchment 11

| Area Description | Soil Group | Area (acre)          | CN            | A x CN |
|------------------|------------|----------------------|---------------|--------|
| Pavement         | C          | 0.07                 | 98            | 7      |
| Total            |            | <b>0.07</b>          | <b>98</b>     |        |
|                  |            | Percent Impervious = | <b>100.0%</b> |        |

### Catchment 12

| Area Description   | Soil Group | Area (acre)          | CN           | A x CN |
|--------------------|------------|----------------------|--------------|--------|
| Pavement           | C          | 0.12                 | 98           | 11     |
| Open Pervious Area | C          | 0.01                 | 74           | 1      |
| Total              |            | <b>0.13</b>          | <b>96</b>    |        |
|                    |            | Percent Impervious = | <b>91.9%</b> |        |

### Catchment 13

| Area Description | Soil Group | Area (acre)          | CN            | A x CN |
|------------------|------------|----------------------|---------------|--------|
| Pavement         | C          | 0.15                 | 98            | 15     |
| Total            |            | <b>0.15</b>          | <b>98</b>     |        |
|                  |            | Percent Impervious = | <b>100.0%</b> |        |

### Catchment 14

| Area Description          | Soil Group | Area (acre)          | CN           | A x CN |
|---------------------------|------------|----------------------|--------------|--------|
| Residential 1/4 acre lots | C          | 2.48                 | 83           | 206    |
| Roadway R.O.W.            | C          | 0.26                 | 92           | 24     |
| Total                     |            | <b>2.74</b>          | <b>84</b>    |        |
|                           |            | Percent Impervious = | <b>41.0%</b> |        |

### Catchment 15

| Area Description          | Soil Group | Area (acre)          | CN           | A x CN |
|---------------------------|------------|----------------------|--------------|--------|
| Residential 1/4 acre lots | C          | 1.33                 | 83           | 111    |
| Roadway R.O.W.            | C          | 0.00                 | 92           | 0      |
| Total                     |            | <b>1.33</b>          | <b>83</b>    |        |
|                           |            | Percent Impervious = | <b>37.5%</b> |        |

### Catchment 16

| Area Description          | Soil Group | Area (acre)          | CN           | A x CN |
|---------------------------|------------|----------------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.16                 | 83           | 13     |
| Roadway R.O.W.            | C          | 0.27                 | 92           | 25     |
| Total                     |            | <b>0.43</b>          | <b>89</b>    |        |
|                           |            | Percent Impervious = | <b>60.9%</b> |        |

## CURVE NUMBER CALCULATIONS

### Catchment 17

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.43        | 83           | 36     |
| Roadway R.O.W.            | C          | 0.34        | 92           | 31     |
| Total                     |            | <b>0.77</b> | <b>87</b>    |        |
| Percent Impervious =      |            |             | <b>54.0%</b> |        |

### Catchment 18

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.43        | 83           | 36     |
| Roadway R.O.W.            | C          | 0.18        | 92           | 17     |
| Total                     |            | <b>0.62</b> | <b>86</b>    |        |
| Percent Impervious =      |            |             | <b>48.6%</b> |        |

### Catchment 19

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.72        | 83           | 60     |
| Roadway R.O.W.            | C          | 0.23        | 92           | 21     |
| Total                     |            | <b>0.94</b> | <b>85</b>    |        |
| Percent Impervious =      |            |             | <b>46.5%</b> |        |

### Catchment 20

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.57        | 83           | 47     |
| Roadway R.O.W.            | C          | 0.36        | 92           | 33     |
| Total                     |            | <b>0.92</b> | <b>86</b>    |        |
| Percent Impervious =      |            |             | <b>52.0%</b> |        |

### Catchment 21

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.26        | 83           | 22     |
| Roadway R.O.W.            | C          | 0.37        | 92           | 34     |
| Total                     |            | <b>0.63</b> | <b>88</b>    |        |
| Percent Impervious =      |            |             | <b>59.3%</b> |        |

### Catchment 22

| Area Description              | Soil Group | Area (acre) | CN           | A x CN |
|-------------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots     | C          | 0.46        | 83           | 38     |
| Roadway & Prairie Path R.O.W. | C          | 0.21        | 92           | 19     |
| Total                         |            | <b>0.67</b> | <b>86</b>    |        |
| Percent Impervious =          |            |             | <b>49.2%</b> |        |

## CURVE NUMBER CALCULATIONS

### Catchment 23

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.33        | 83           | 27     |
| Roadway R.O.W.            | C          | 0.27        | 92           | 25     |
| Total                     |            | <b>0.59</b> | <b>87</b>    |        |
| Percent Impervious =      |            |             | <b>54.4%</b> |        |

### Catchment 24

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.60        | 83           | 50     |
| Roadway R.O.W.            | C          | 0.39        | 92           | 36     |
| Total                     |            | <b>0.99</b> | <b>87</b>    |        |
| Percent Impervious =      |            |             | <b>52.2%</b> |        |

### Catchment 25

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 1.10        | 83           | 91     |
| Roadway R.O.W.            | C          | 0.47        | 92           | 43     |
| Total                     |            | <b>1.57</b> | <b>86</b>    |        |
| Percent Impervious =      |            |             | <b>48.7%</b> |        |

### Catchment 26

| Area Description     | Soil Group | Area (acre) | CN          | A x CN |
|----------------------|------------|-------------|-------------|--------|
| Open Pervious Area   | C          | 0.07        | 74          | 5      |
| Total                |            | <b>0.07</b> | <b>74</b>   |        |
| Percent Impervious = |            |             | <b>0.0%</b> |        |

### Catchment 27

| Area Description     | Soil Group | Area (acre) | CN            | A x CN |
|----------------------|------------|-------------|---------------|--------|
| Roof                 | C          | 0.14        | 98            | 14     |
| Total                |            | <b>0.14</b> | <b>98</b>     |        |
| Percent Impervious = |            |             | <b>100.0%</b> |        |

### Catchment 28

| Area Description     | Soil Group | Area (acre) | CN           | A x CN |
|----------------------|------------|-------------|--------------|--------|
| Open Pervious Area   | C          | 0.03        | 74           | 3      |
| Roadway R.O.W.       | C          | 0.13        | 95           | 13     |
| Total                |            | <b>0.17</b> | <b>91</b>    |        |
| Percent Impervious = |            |             | <b>69.7%</b> |        |

## CURVE NUMBER CALCULATIONS

### Catchment 29

| Area Description   | Soil Group | Area (acre)          | CN           | A x CN |
|--------------------|------------|----------------------|--------------|--------|
| Open Pervious Area | C          | 0.01                 | 74           | 1      |
| Pavement           | C          | 0.16                 | 98           | 16     |
| Total              |            | <b>0.17</b>          | <b>97</b>    |        |
|                    |            | Percent Impervious = | <b>95.5%</b> |        |

### Catchment 30

| Area Description   | Soil Group | Area (acre)          | CN           | A x CN |
|--------------------|------------|----------------------|--------------|--------|
| Open Pervious Area | C          | 0.03                 | 74           | 2      |
| Pavement           | C          | 0.18                 | 98           | 17     |
| Total              |            | <b>0.20</b>          | <b>95</b>    |        |
|                    |            | Percent Impervious = | <b>86.2%</b> |        |

### Catchment 31

| Area Description | Soil Group | Area (acre)          | CN            | A x CN |
|------------------|------------|----------------------|---------------|--------|
| Pavement         | C          | 0.13                 | 98            | 13     |
| Total            |            | <b>0.13</b>          | <b>98</b>     |        |
|                  |            | Percent Impervious = | <b>100.0%</b> |        |

### Catchment 32

| Area Description | Soil Group | Area (acre)          | CN            | A x CN |
|------------------|------------|----------------------|---------------|--------|
| Pavement         | C          | 0.30                 | 98            | 30     |
| Total            |            | <b>0.30</b>          | <b>98</b>     |        |
|                  |            | Percent Impervious = | <b>100.0%</b> |        |

### Catchment 33

| Area Description | Soil Group | Area (acre)          | CN            | A x CN |
|------------------|------------|----------------------|---------------|--------|
| Pavement         | C          | 0.20                 | 98            | 19     |
| Total            |            | <b>0.20</b>          | <b>98</b>     |        |
|                  |            | Percent Impervious = | <b>100.0%</b> |        |

### Catchment 34

| Area Description | Soil Group | Area (acre)          | CN            | A x CN |
|------------------|------------|----------------------|---------------|--------|
| Pavement         | C          | 0.28                 | 98            | 27     |
| Total            |            | <b>0.28</b>          | <b>98</b>     |        |
|                  |            | Percent Impervious = | <b>100.0%</b> |        |



## CURVE NUMBER CALCULATIONS

### Catchment 35

| Area Description     | Soil Group | Area (acre) | CN           | A x CN |
|----------------------|------------|-------------|--------------|--------|
| Open Pervious Area   | C          | 0.12        | 74           | 9      |
| Roof                 | C          | 0.06        | 98           | 6      |
| Pavement             | C          | 0.08        | 98           | 8      |
| Total                |            | <b>0.26</b> | <b>87</b>    |        |
| Percent Impervious = |            |             | <b>53.8%</b> |        |

### Catchment 36

| Area Description     | Soil Group | Area (acre) | CN           | A x CN |
|----------------------|------------|-------------|--------------|--------|
| Open Pervious Area   | C          | 0.07        | 74           | 5      |
| Roof                 | C          | 0.06        | 98           | 6      |
| Pavement             | C          | 0.09        | 98           | 9      |
| Total                |            | <b>0.23</b> | <b>90</b>    |        |
| Percent Impervious = |            |             | <b>68.6%</b> |        |

### Catchment 37

| Area Description     | Soil Group | Area (acre) | CN           | A x CN |
|----------------------|------------|-------------|--------------|--------|
| Open Pervious Area   | C          | 0.02        | 74           | 1      |
| Pavement             | C          | 0.22        | 98           | 22     |
| Total                |            | <b>0.24</b> | <b>96</b>    |        |
| Percent Impervious = |            |             | <b>91.6%</b> |        |

### Catchment 38

| Area Description     | Soil Group | Area (acre) | CN           | A x CN |
|----------------------|------------|-------------|--------------|--------|
| Open Pervious Area   | C          | 0.04        | 74           | 3      |
| Roof                 | C          | 0.12        | 98           | 11     |
| Pavement             | C          | 0.25        | 98           | 24     |
| Total                |            | <b>0.40</b> | <b>96</b>    |        |
| Percent Impervious = |            |             | <b>91.2%</b> |        |

### Catchment 39

| Area Description     | Soil Group | Area (acre) | CN           | A x CN |
|----------------------|------------|-------------|--------------|--------|
| Open Pervious Area   | C          | 0.02        | 74           | 1      |
| Pavement             | C          | 0.08        | 98           | 8      |
| Total                |            | <b>0.10</b> | <b>94</b>    |        |
| Percent Impervious = |            |             | <b>83.3%</b> |        |

### Catchment 40

| Area Description     | Soil Group | Area (acre) | CN           | A x CN |
|----------------------|------------|-------------|--------------|--------|
| Open Pervious Area   | C          | 0.14        | 74           | 11     |
| Roof                 | C          | 0.05        | 98           | 5      |
| Pavement             | C          | 0.15        | 98           | 15     |
| Total                |            | <b>0.35</b> | <b>88</b>    |        |
| Percent Impervious = |            |             | <b>58.6%</b> |        |

## CURVE NUMBER CALCULATIONS

### Catchment 41

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 1.88        | 83           | 156    |
| Roadway R.O.W.            | C          | 0.00        | 92           | 0      |
| Total                     |            | <b>1.88</b> | <b>83</b>    |        |
| Percent Impervious =      |            |             | <b>37.5%</b> |        |

### Catchment 42

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.62        | 83           | 51     |
| Roadway R.O.W.            | C          | 0.43        | 92           | 40     |
| Total                     |            | <b>1.05</b> | <b>87</b>    |        |
| Percent Impervious =      |            |             | <b>53.0%</b> |        |

### Catchment 43

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 5.47        | 83           | 454    |
| Roadway R.O.W.            | C          | 1.56        | 92           | 143    |
| Total                     |            | <b>7.03</b> | <b>85</b>    |        |
| Percent Impervious =      |            |             | <b>45.8%</b> |        |

### Catchment 44

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.88        | 83           | 73     |
| Roadway R.O.W.            | C          | 0.37        | 92           | 34     |
| Total                     |            | <b>1.25</b> | <b>86</b>    |        |
| Percent Impervious =      |            |             | <b>48.7%</b> |        |

### Catchment 45

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.12        | 83           | 10     |
| Roadway R.O.W.            | C          | 0.00        | 92           | 0      |
| Total                     |            | <b>0.12</b> | <b>83</b>    |        |
| Percent Impervious =      |            |             | <b>37.5%</b> |        |

### Catchment 46

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 0.75        | 83           | 62     |
| Roadway R.O.W.            | C          | 0.11        | 92           | 10     |
| Total                     |            | <b>0.86</b> | <b>84</b>    |        |
| Percent Impervious =      |            |             | <b>42.4%</b> |        |

## CURVE NUMBER CALCULATIONS

### Catchment 47

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 1.86        | 83           | 154    |
| Roadway R.O.W.            | C          | 0.45        | 92           | 42     |
| Total                     |            | <b>2.31</b> | <b>85</b>    |        |
| Percent Impervious =      |            |             | <b>44.9%</b> |        |

### Catchment 48

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 2.93        | 83           | 243    |
| Roadway R.O.W.            | C          | 0.38        | 92           | 35     |
| Total                     |            | <b>3.31</b> | <b>84</b>    |        |
| Percent Impervious =      |            |             | <b>41.8%</b> |        |

### Catchment 49

| Area Description          | Soil Group | Area (acre) | CN           | A x CN |
|---------------------------|------------|-------------|--------------|--------|
| Residential 1/4 acre lots | C          | 2.44        | 83           | 203    |
| Roadway R.O.W.            | C          | 0.52        | 92           | 48     |
| Total                     |            | <b>2.96</b> | <b>85</b>    |        |
| Percent Impervious =      |            |             | <b>44.1%</b> |        |

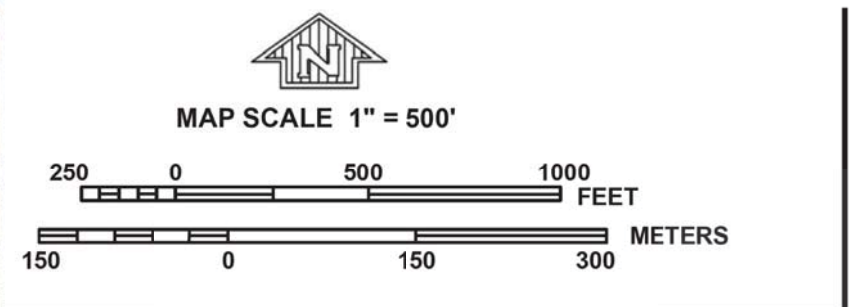
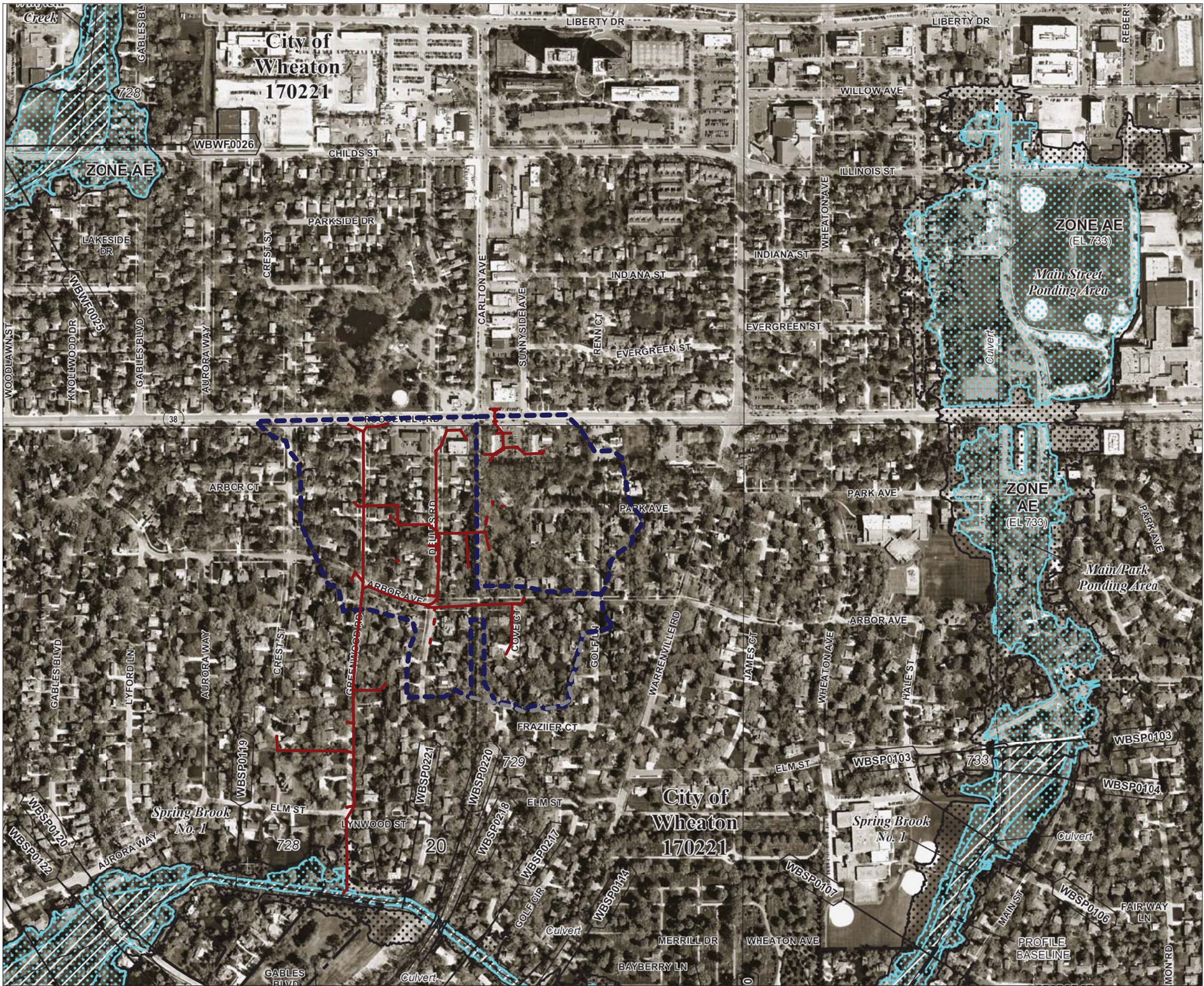
## TIME OF CONCENTRATION CALCULATIONS

|                                                                                                                                                |                                      |                 | Catch<br>0   | Catch<br>2   | Catch<br>9   | Catch<br>10  | Catch<br>14  | Catch<br>43  |
|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>SHEET FLOW</b>                                                                                                                              |                                      |                 |              |              |              |              |              |              |
| Mannings Kinematic<br>Solution:<br><br>$T = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} S^{0.4}}$                                                       | Surface Description                  |                 | Grass        | Grass        | Grass        | Grass        | Grass        | Grass        |
|                                                                                                                                                | Manning's Coeff., n                  |                 | 0.24         | 0.24         | 0.24         | 0.24         | 0.24         | 0.24         |
|                                                                                                                                                | High Elev.                           | ft              | 758.0        | 759.0        | 752.0        | 751.0        | 753.0        | 749.0        |
|                                                                                                                                                | Low Elev.                            | ft              | 756.0        | 758.0        | 749.5        | 750.0        | 749.5        | 746.0        |
|                                                                                                                                                | Flow Length, L                       | ft              | 100          | 100          | 100          | 100          | 100          | 100          |
|                                                                                                                                                | 2-yr, 24-hr Rainfall, P <sub>2</sub> | in              | 3.12         | 3.12         | 3.12         | 3.12         | 3.12         | 3.12         |
|                                                                                                                                                | Land Slope, S                        | ft/ft           | 0.020        | 0.010        | 0.025        | 0.010        | 0.035        | 0.030        |
|                                                                                                                                                | Time, T                              | hr              | <b>0.241</b> | <b>0.318</b> | <b>0.220</b> | <b>0.318</b> | <b>0.193</b> | <b>0.205</b> |
| <b>SHALLOW CONCENTRATED FLOW</b>                                                                                                               |                                      |                 |              |              |              |              |              |              |
| $V = C_{sf} \sqrt{S}$<br>C <sub>sf</sub> = 16.1345 (unpaved)<br>C <sub>sf</sub> = 20.3282 (paved)<br><br>$T = \frac{L}{V} * \frac{1hr}{3600s}$ | Surface Description                  |                 | unpaved      | unpaved      | unpaved      | unpaved      | unpaved      | unpaved      |
|                                                                                                                                                | C <sub>sf</sub>                      |                 | 16.13        | 16.13        | 16.13        | 16.13        | 16.13        | 16.13        |
|                                                                                                                                                | High Elev.                           | ft              | 756.0        | 758.0        | 749.5        | 750.0        | 749.5        | 746.0        |
|                                                                                                                                                | Low Elev.                            | ft              | 737.5        | 735.3        | 739.2        | 740.9        | 737.7        | 737.7        |
|                                                                                                                                                | Flow Length, L                       | ft              | 643          | 520          | 300          | 504          | 440          | 880          |
|                                                                                                                                                | Slope, S                             | ft/ft           | 0.029        | 0.044        | 0.034        | 0.018        | 0.027        | 0.009        |
|                                                                                                                                                | Velocity, V                          | fps             | 2.74         | 3.37         | 3.00         | 2.17         | 2.64         | 1.57         |
|                                                                                                                                                | Time, T                              | hr              | <b>0.065</b> | <b>0.043</b> | <b>0.028</b> | <b>0.065</b> | <b>0.046</b> | <b>0.156</b> |
| <b>OPEN CHANNEL FLOW</b>                                                                                                                       |                                      |                 |              |              |              |              |              |              |
| $R = \frac{A}{P_w}$<br><br>Mannings Equation:<br><br>$v = \left( \frac{1.49}{n} \right) R^{2/3} \sqrt{S}$                                      | High Elev.                           | ft              |              |              |              |              |              |              |
|                                                                                                                                                | Low Elev.                            | ft              |              |              |              |              |              |              |
|                                                                                                                                                | Flow Length, L                       | ft              |              |              |              |              |              |              |
|                                                                                                                                                | X-sec. Flow Area, A                  | ft <sup>2</sup> |              |              |              |              |              |              |
|                                                                                                                                                | Wetted Perimeter, P <sub>w</sub>     | ft              |              |              |              |              |              |              |
|                                                                                                                                                | Hydraulic Radius, R                  | ft              |              |              |              |              |              |              |
|                                                                                                                                                | Channel Slope, S                     | ft/ft           |              |              |              |              |              |              |
|                                                                                                                                                | Manning's Coeff., n                  |                 |              |              |              |              |              |              |
|                                                                                                                                                | Velocity, V                          | fps             |              |              |              |              |              |              |
|                                                                                                                                                | Time, T                              | hr              |              |              |              |              |              |              |
| <b>TOTAL</b>                                                                                                                                   | Sheet Flow                           | hr              | 0.241        | 0.318        | 0.220        | 0.318        | 0.193        | 0.205        |
|                                                                                                                                                | Shall. Conc. Flow                    | hr              | 0.065        | 0.043        | 0.028        | 0.065        | 0.046        | 0.156        |
|                                                                                                                                                | Channel Flow                         | hr              |              |              |              |              |              |              |
|                                                                                                                                                | <b>TIME OF CONC. (Tc)</b>            | <b>hr</b>       | <b>0.31</b>  | <b>0.36</b>  | <b>0.25</b>  | <b>0.38</b>  | <b>0.24</b>  | <b>0.36</b>  |

NOTE: The above calculations are based on TR55 Methods as described in:  
Soil Conservation Service, Urban Hydrology for Small Watersheds, Technical Release 55, June 1986.







NFIP  
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0151J

# FIRM

## FLOOD INSURANCE RATE MAP

### DU PAGE COUNTY, ILLINOIS

#### AND INCORPORATED AREAS

PANEL 151 OF 287  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY        | NUMBER | PANEL | SUFFIX |
|------------------|--------|-------|--------|
| DU PAGE COUNTY   | 170197 | 0151  | J      |
| WHEATON, CITY OF | 170221 | 0151  | J      |

REVISED PRELIMINARY  
6/1/2017

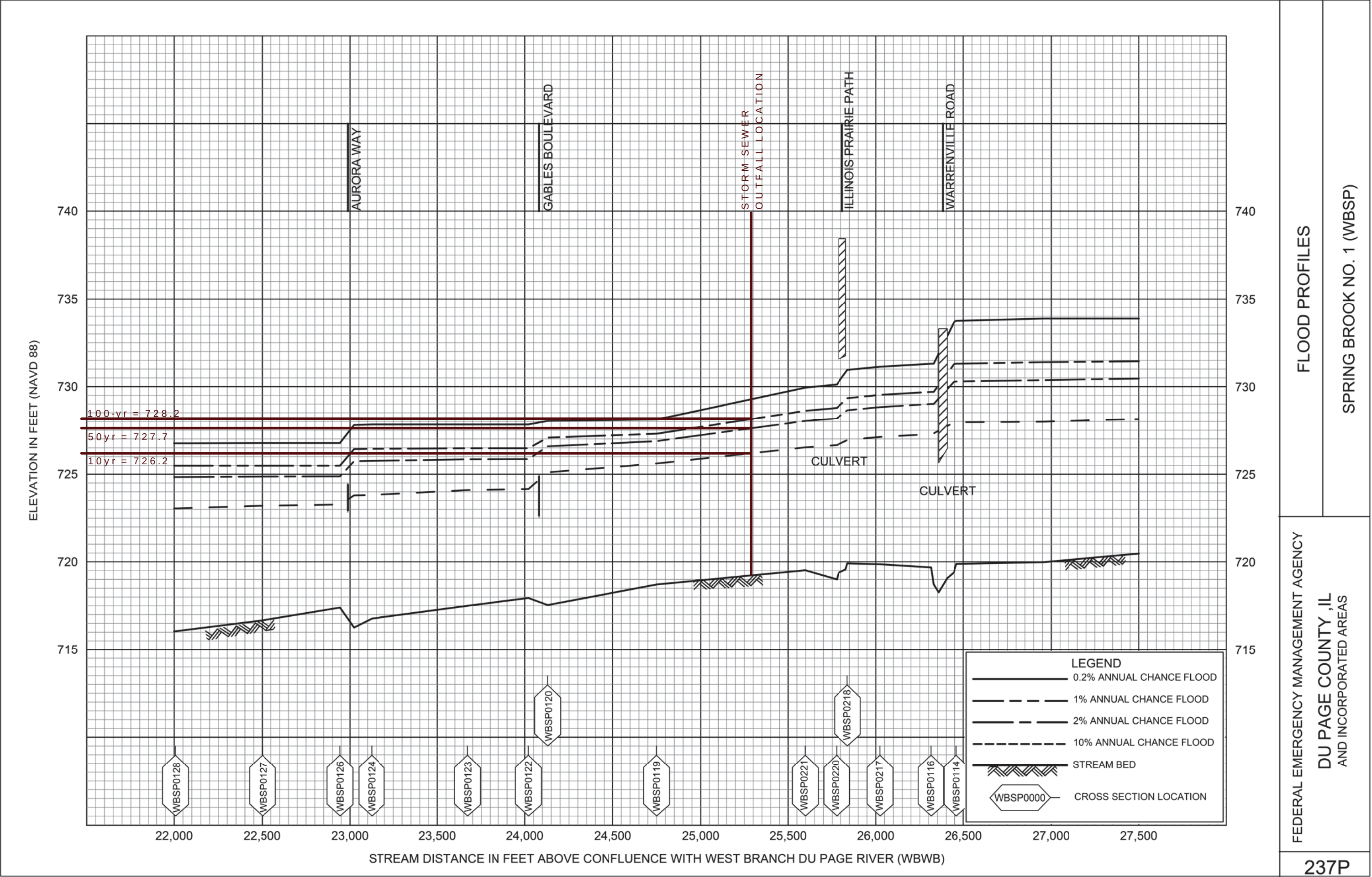
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER  
17043C0151J  
MAP REVISED  
to be determined

Federal Emergency Management Agency





## Bulletin 71 - Rainfall Table - DuPage County

| Precipitation Depth Duration (inches) |                             |      |      |      |      |      |      |       |       |
|---------------------------------------|-----------------------------|------|------|------|------|------|------|-------|-------|
| Duration<br>(hours)                   | Recurrence Interval (years) |      |      |      |      |      |      |       | 500   |
|                                       | 0.5                         | 1    | 2    | 5    | 10   | 25   | 50   | 100   |       |
| <b>240</b>                            | 3.3                         | 4.12 | 4.95 | 6.04 | 6.89 | 8.18 | 9.38 | 11.14 |       |
| <b>120</b>                            | 2.6                         | 3.25 | 3.93 | 4.91 | 5.7  | 6.93 | 8.04 | 9.96  |       |
| <b>72</b>                             | 2.34                        | 2.93 | 3.55 | 4.44 | 5.18 | 6.32 | 7.41 | 8.78  |       |
| <b>48</b>                             | 2.18                        | 2.7  | 3.3  | 4.09 | 4.81 | 5.88 | 6.84 | 8.16  |       |
| <b>24</b>                             | 2.03                        | 2.51 | 3.04 | 3.8  | 4.47 | 5.51 | 6.46 | 7.58  | 11.01 |
| <b>18</b>                             | 1.86                        | 2.3  | 2.79 | 3.5  | 4.11 | 5.06 | 5.95 | 6.97  |       |
| <b>12</b>                             | 1.77                        | 2.18 | 2.64 | 3.31 | 3.89 | 4.79 | 5.62 | 6.59  | 9.58  |
| <b>6</b>                              | 1.52                        | 1.88 | 2.28 | 2.85 | 3.35 | 4.13 | 4.85 | 5.68  |       |
| <b>3</b>                              | 1.3                         | 1.6  | 1.94 | 2.43 | 2.86 | 3.53 | 4.14 | 4.85  |       |
| <b>2</b>                              | 1.2                         | 1.48 | 1.79 | 2.24 | 2.64 | 3.25 | 3.82 | 4.47  | 6.38  |
| <b>1</b>                              | 0.96                        | 1.18 | 1.43 | 1.79 | 2.1  | 2.59 | 3.04 | 3.56  |       |
| <b>0.5</b>                            | 0.75                        | 0.93 | 1.12 | 1.41 | 1.65 | 2.04 | 2.39 | 2.8   |       |
| <b>0.25</b>                           | 0.55                        | 0.68 | 0.82 | 1.03 | 1.21 | 1.49 | 1.75 | 2.05  |       |
| <b>0.17</b>                           | 0.45                        | 0.55 | 0.67 | 0.84 | 0.98 | 1.21 | 1.42 | 1.67  |       |
| <b>0.08</b>                           | 0.24                        | 0.3  | 0.36 | 0.46 | 0.54 | 0.66 | 0.78 | 0.91  |       |

Source: Illinois State Water Survey, Bulletin 71, Table 1, Section 02 - Northeast

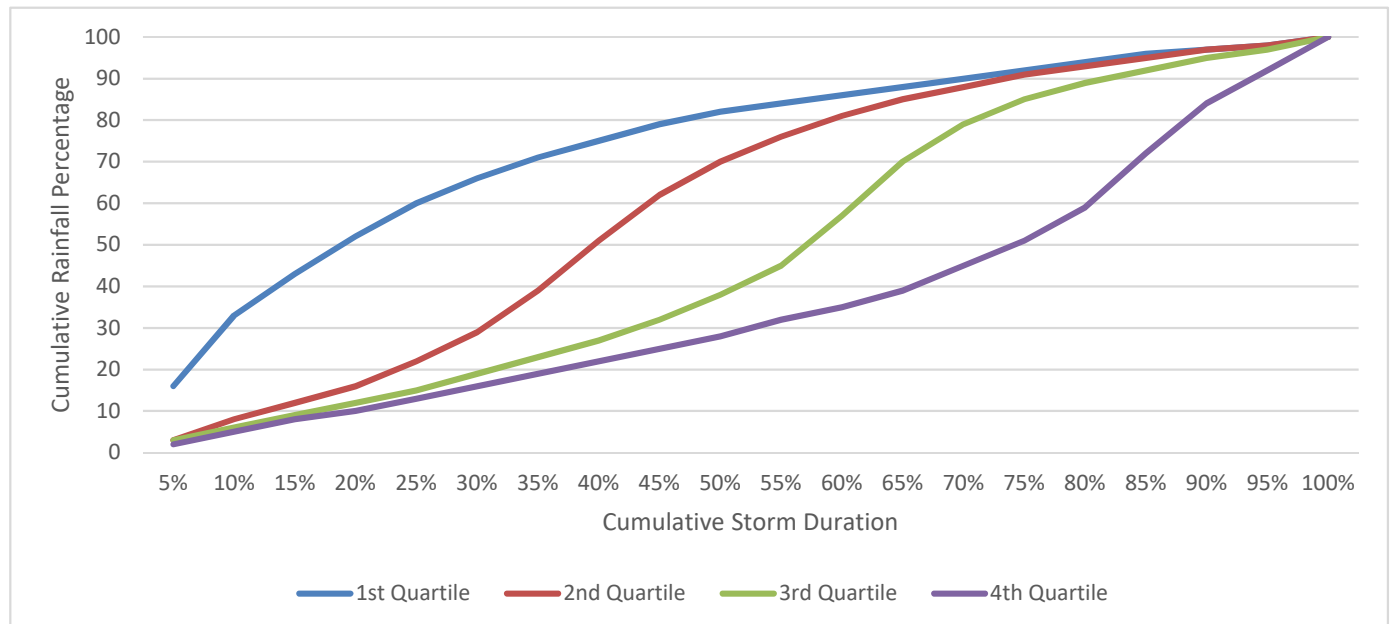
Note: 500yr values shown above are not provided within Bulletin 71. Bulletin 71 expressly warns about such extrapolations. However, in order to provide a consistent set of rainfall events with previous reports, these 500yr rainfall values are included for reference.



## Bulletin 71 - Huff Rainfall Distribution Summary

Source: Illinois State Water Survey, Bulletin 71, Table 11

| Cumulative Storm Time (%)            | 1st Quartile | 2nd Quartile | 3rd Quartile | 4th Quartile | Applicable Durations |             |
|--------------------------------------|--------------|--------------|--------------|--------------|----------------------|-------------|
| Cumulative Storm Rainfall Percentage |              |              |              |              |                      |             |
| 5%                                   | 16           | 3            | 3            | 2            | 1Q:                  | 0 - 6hr     |
| 10%                                  | 33           | 8            | 6            | 5            | 2Q:                  | 6.1 - 12hr  |
| 15%                                  | 43           | 12           | 9            | 8            | 3Q:                  | 12.1 - 24hr |
| 20%                                  | 52           | 16           | 12           | 10           | 4Q:                  | > 24hr      |
| 25%                                  | 60           | 22           | 15           | 13           |                      |             |
| 30%                                  | 66           | 29           | 19           | 16           |                      |             |
| 35%                                  | 71           | 39           | 23           | 19           |                      |             |
| 40%                                  | 75           | 51           | 27           | 22           |                      |             |
| 45%                                  | 79           | 62           | 32           | 25           |                      |             |
| 50%                                  | 82           | 70           | 38           | 28           |                      |             |
| 55%                                  | 84           | 76           | 45           | 32           |                      |             |
| 60%                                  | 86           | 81           | 57           | 35           |                      |             |
| 65%                                  | 88           | 85           | 70           | 39           |                      |             |
| 70%                                  | 90           | 88           | 79           | 45           |                      |             |
| 75%                                  | 92           | 91           | 85           | 51           |                      |             |
| 80%                                  | 94           | 93           | 89           | 59           |                      |             |
| 85%                                  | 96           | 95           | 92           | 72           |                      |             |
| 90%                                  | 97           | 97           | 95           | 84           |                      |             |
| 95%                                  | 98           | 98           | 97           | 92           |                      |             |
| 100%                                 | 100          | 100          | 100          | 100          |                      |             |



## Flood Elevation Results Table - Existing

809 Greenwood Drive Rear Yard Area (Node 6)

Rim = 738.26

| Return Period | 1hr    | 2hr    | 3hr    | 6hr    | 12hr   | 24hr   | Max Depth |
|---------------|--------|--------|--------|--------|--------|--------|-----------|
| 1yr           | 736.75 | 736.46 | 736.24 | 736.02 | 735.79 | 735.69 | 0.00      |
| 5yr           | 738.16 | 737.94 | 737.44 | 736.79 | 736.23 | 735.93 | 0.00      |
| 10yr          | 738.57 | 738.43 | 738.00 | 737.45 | 736.42 | 736.11 | 0.31      |
| 25yr          | 739.23 | 739.21 | 738.88 | 738.07 | 736.84 | 736.34 | 0.97      |
| 50yr          | 739.56 | 739.57 | 739.39 | 738.63 | 737.37 | 736.52 | 1.31      |
| 100yr         | 739.81 | 739.80 | 739.69 | 739.39 | 737.92 | 736.86 | 1.55      |
| 500yr         |        | 740.12 |        |        | 739.57 | 737.95 | 1.86      |

823 Delles Rd Front Yard Area (Node 13)

Rim = 736.00

| Return Period | 1hr    | 2hr    | 3hr    | 6hr    | 12hr   | 24hr   | Max Depth |
|---------------|--------|--------|--------|--------|--------|--------|-----------|
| 1yr           | 731.61 | 731.53 | 731.42 | 731.31 | 731.17 | 731.09 | 0.00      |
| 5yr           | 732.14 | 732.05 | 731.86 | 731.61 | 731.38 | 731.26 | 0.00      |
| 10yr          | 734.80 | 733.69 | 732.09 | 731.80 | 731.52 | 731.33 | 0.00      |
| 25yr          | 736.92 | 736.76 | 735.63 | 733.39 | 731.70 | 731.47 | 0.92      |
| 50yr          | 737.27 | 737.27 | 736.85 | 735.42 | 731.88 | 731.59 | 1.27      |
| 100yr         | 738.02 | 738.12 | 737.78 | 736.85 | 734.11 | 731.72 | 2.12      |
| 500yr         |        | 739.81 |        |        | 737.39 | 734.27 | 3.81      |

819 Delles Rd Rear Yard Area (Node 23)

Rim = 734.81

| Return Period | 1hr    | 2hr    | 3hr    | 6hr    | 12hr   | 24hr   | Max Depth |
|---------------|--------|--------|--------|--------|--------|--------|-----------|
| 1yr           | 734.34 | 734.25 | 734.19 | 734.11 | 734.04 | 734.00 | 0.00      |
| 5yr           | 735.08 | 734.95 | 734.54 | 734.33 | 734.19 | 734.12 | 0.27      |
| 10yr          | 735.72 | 735.43 | 734.96 | 734.49 | 734.26 | 734.17 | 0.91      |
| 25yr          | 736.83 | 736.78 | 736.39 | 735.13 | 734.41 | 734.25 | 2.02      |
| 50yr          | 737.28 | 737.29 | 736.97 | 736.12 | 734.65 | 734.33 | 2.48      |
| 100yr         | 738.02 | 738.13 | 737.79 | 736.98 | 735.62 | 734.46 | 3.32      |
| 500yr         |        | 739.81 |        |        | 737.40 | 735.88 | 5.00      |

616 Park Avenue Area Area (Node 24)

Rim = 735.33

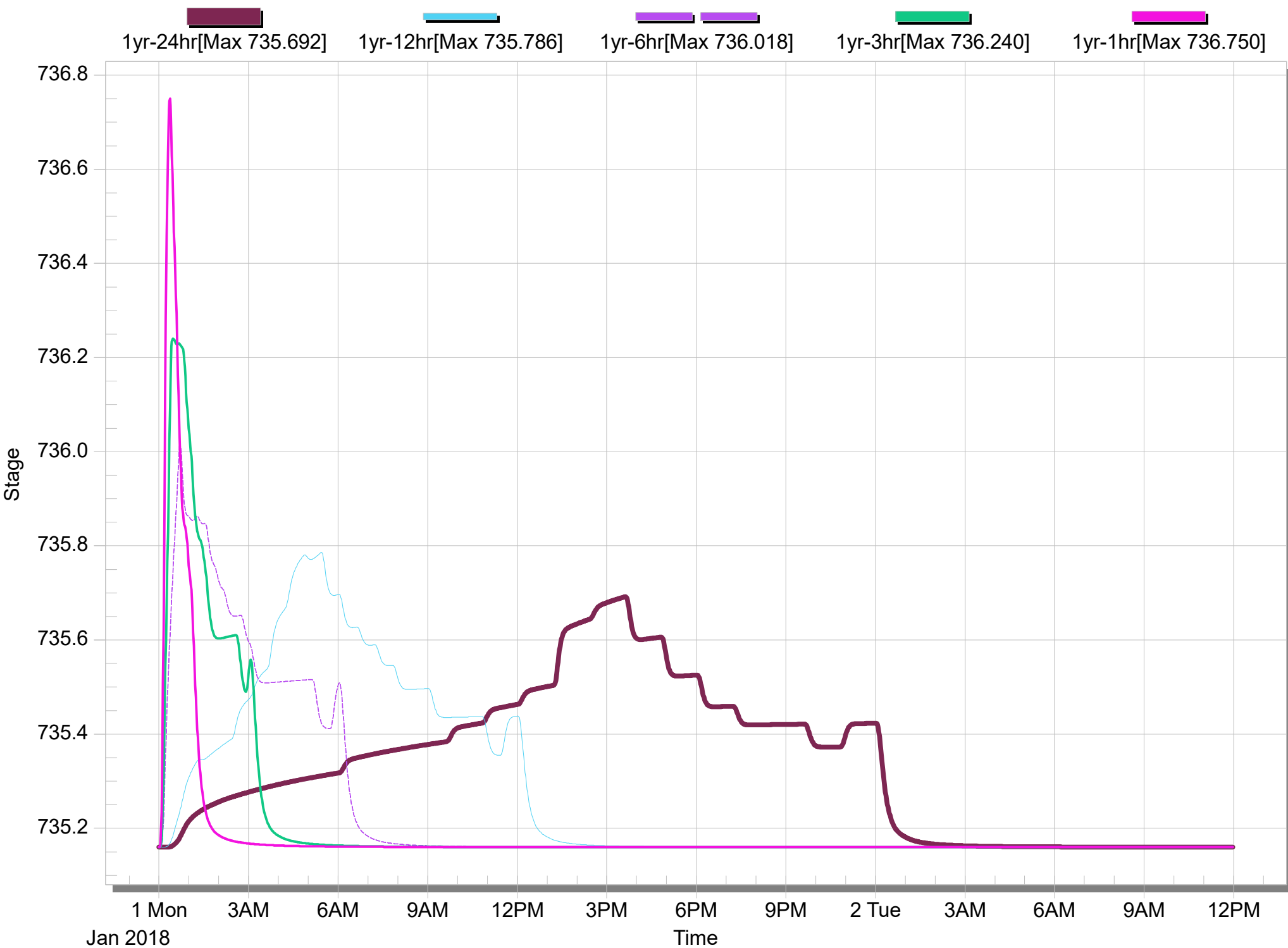
| Return Period | 1hr    | 2hr    | 3hr    | 6hr    | 12hr   | 24hr   | Max Depth |
|---------------|--------|--------|--------|--------|--------|--------|-----------|
| 1yr           | 737.61 | 738.14 | 738.31 | 738.62 | 738.80 | 738.83 | 3.50      |
| 5yr           | 738.62 | 739.16 | 739.33 | 739.61 | 739.84 | 739.96 | 4.63      |
| 10yr          | 739.02 | 739.56 | 739.71 | 740.00 | 740.27 | 740.42 | 5.09      |
| 25yr          | 739.54 | 740.04 | 740.22 | 740.54 | 740.84 | 741.04 | 5.71      |
| 50yr          | 739.92 | 740.45 | 740.63 | 740.98 | 741.28 | 741.51 | 6.18      |
| 100yr         | 740.30 | 740.87 | 741.06 | 741.42 | 741.76 | 742.04 | 6.71      |
| 500yr         |        | 741.85 |        |        | 743.10 | 743.51 | 8.18      |

**809 Greenwood Drive Rear Yard (Node 6)**  
**Existing Conditions**

**PROJECT SITE:**

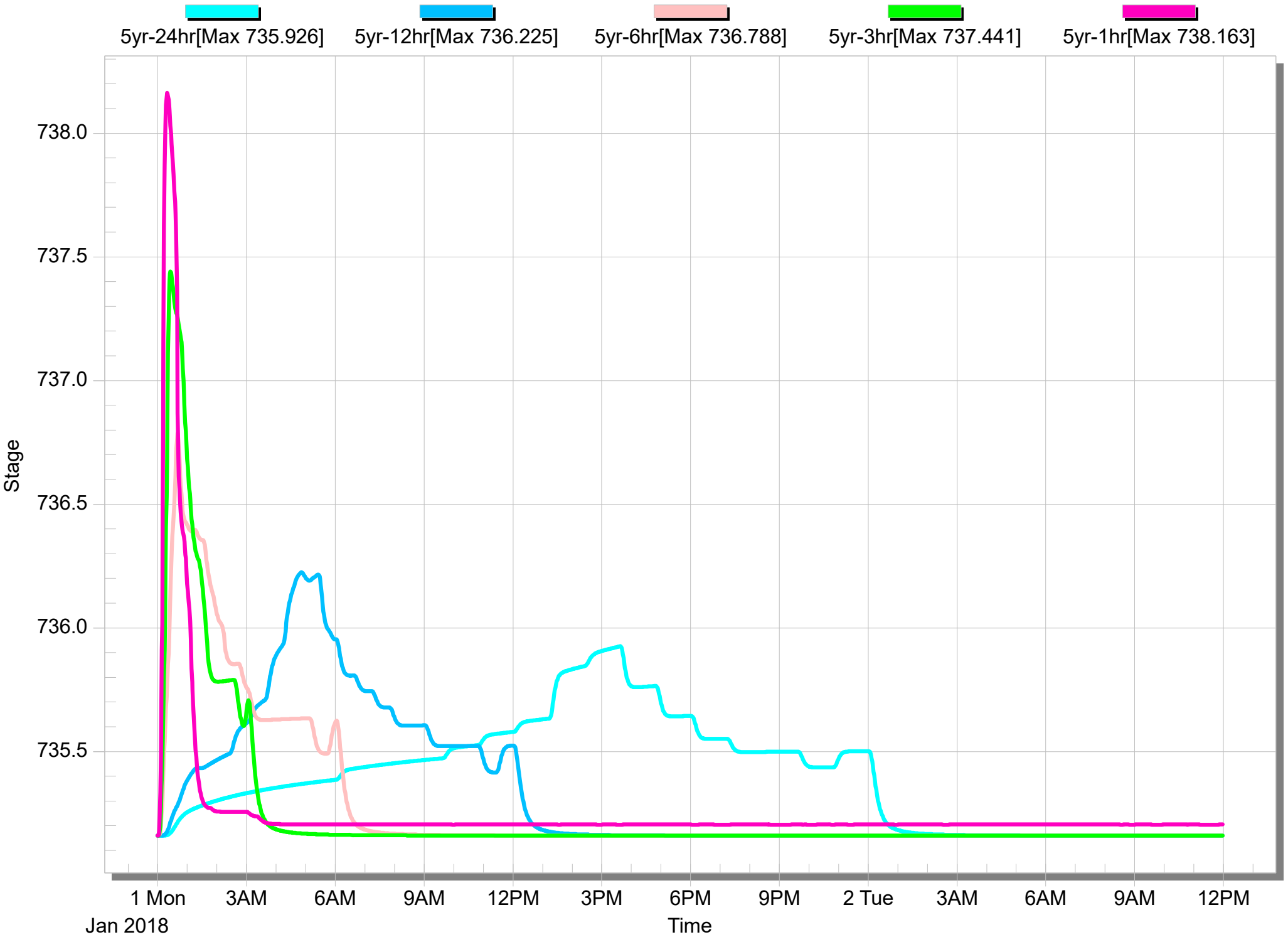
**Wheaton Flood Study**  
**616 Park Avenue Area**

# Node - Node6

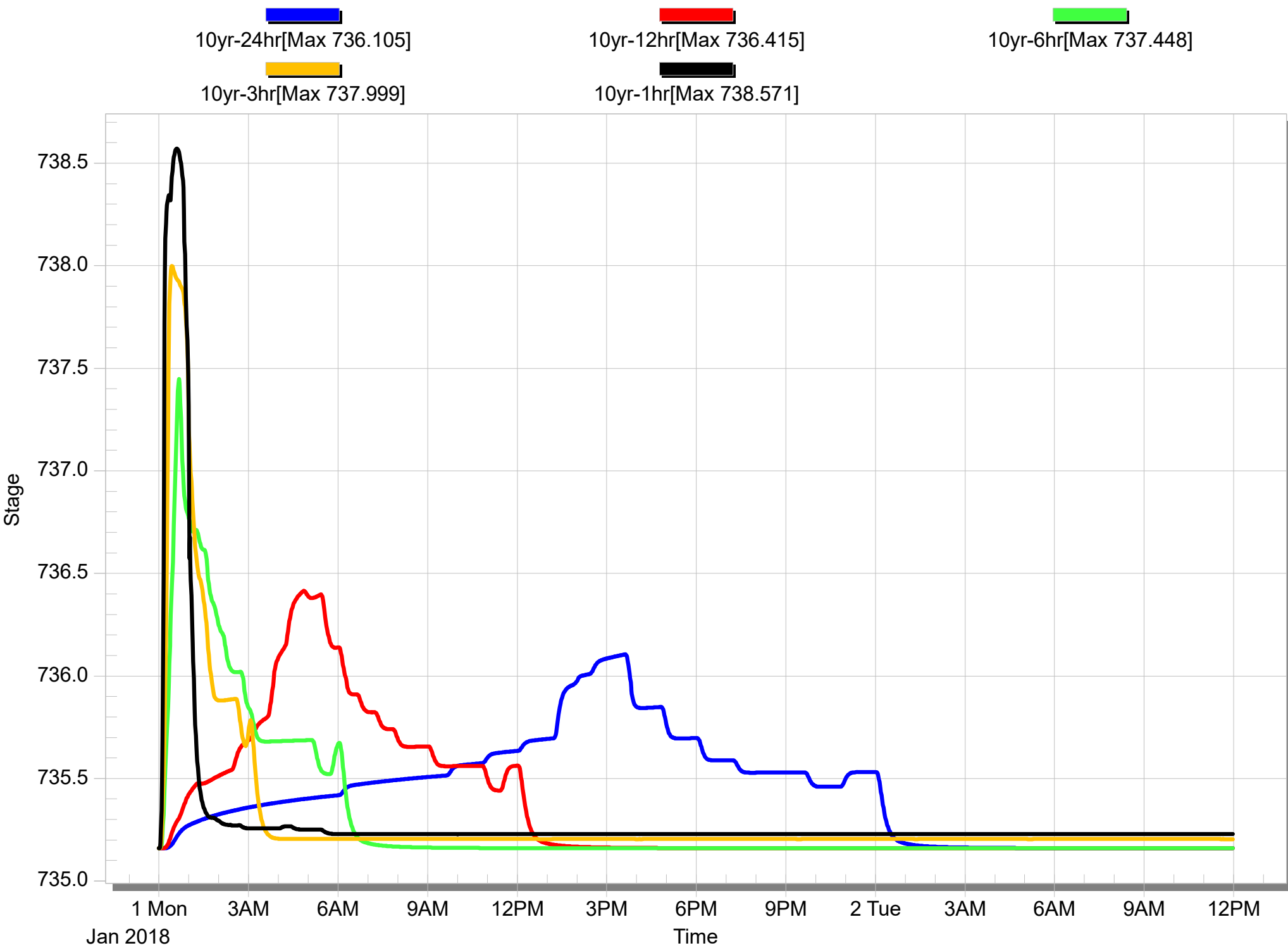




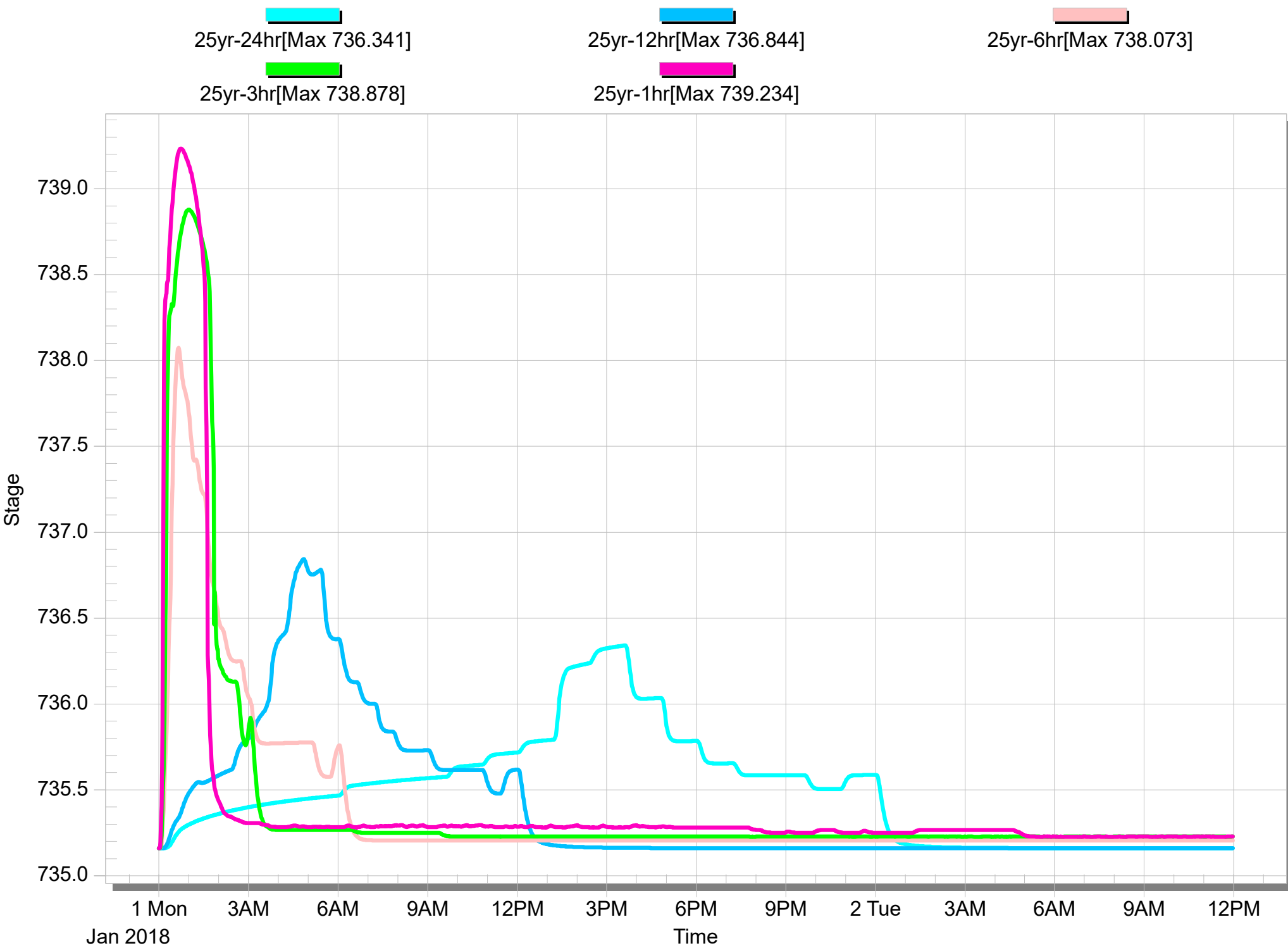
# Node - Node6



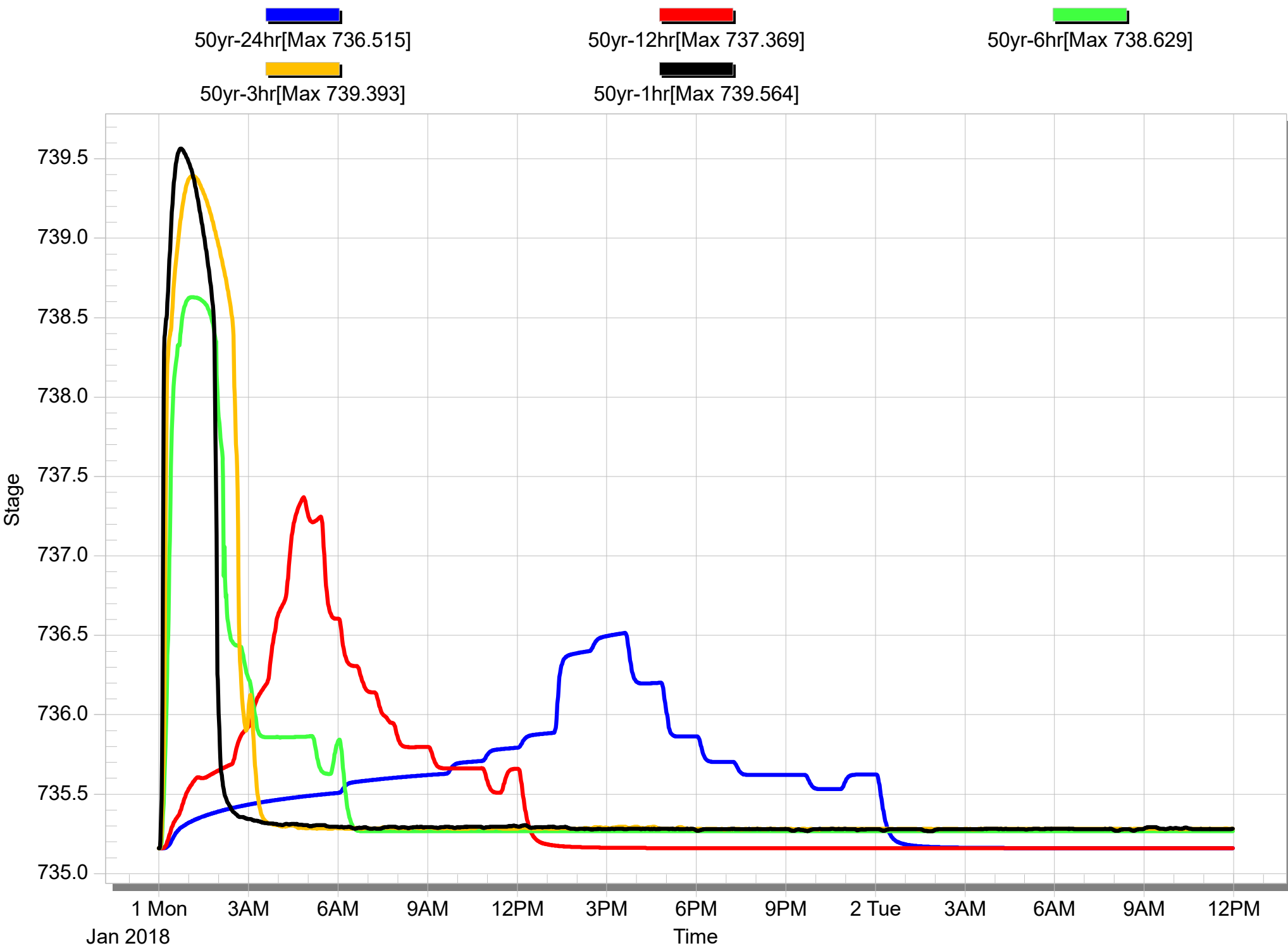
# Node - Node6



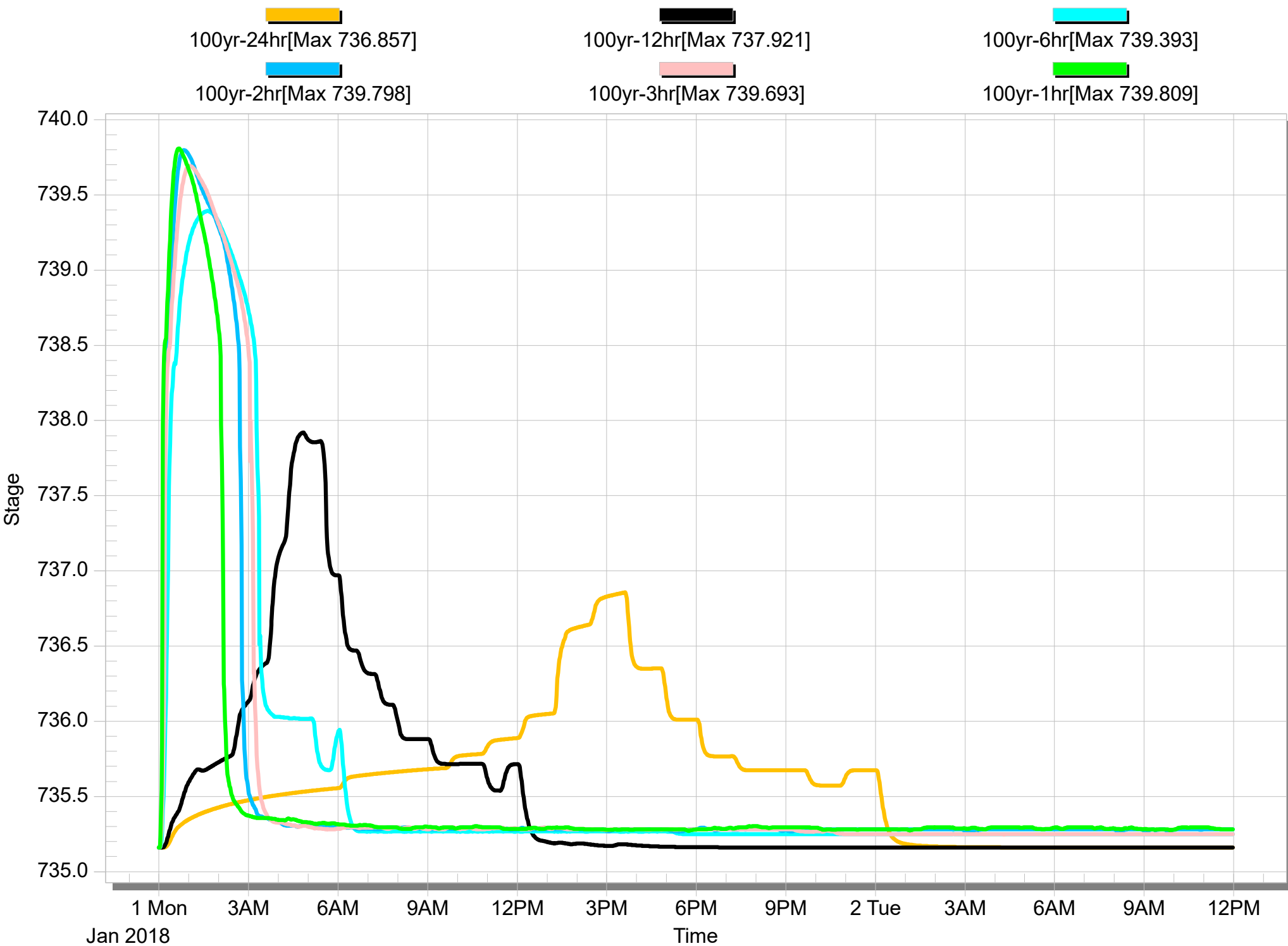
# Node - Node6



# Node - Node6

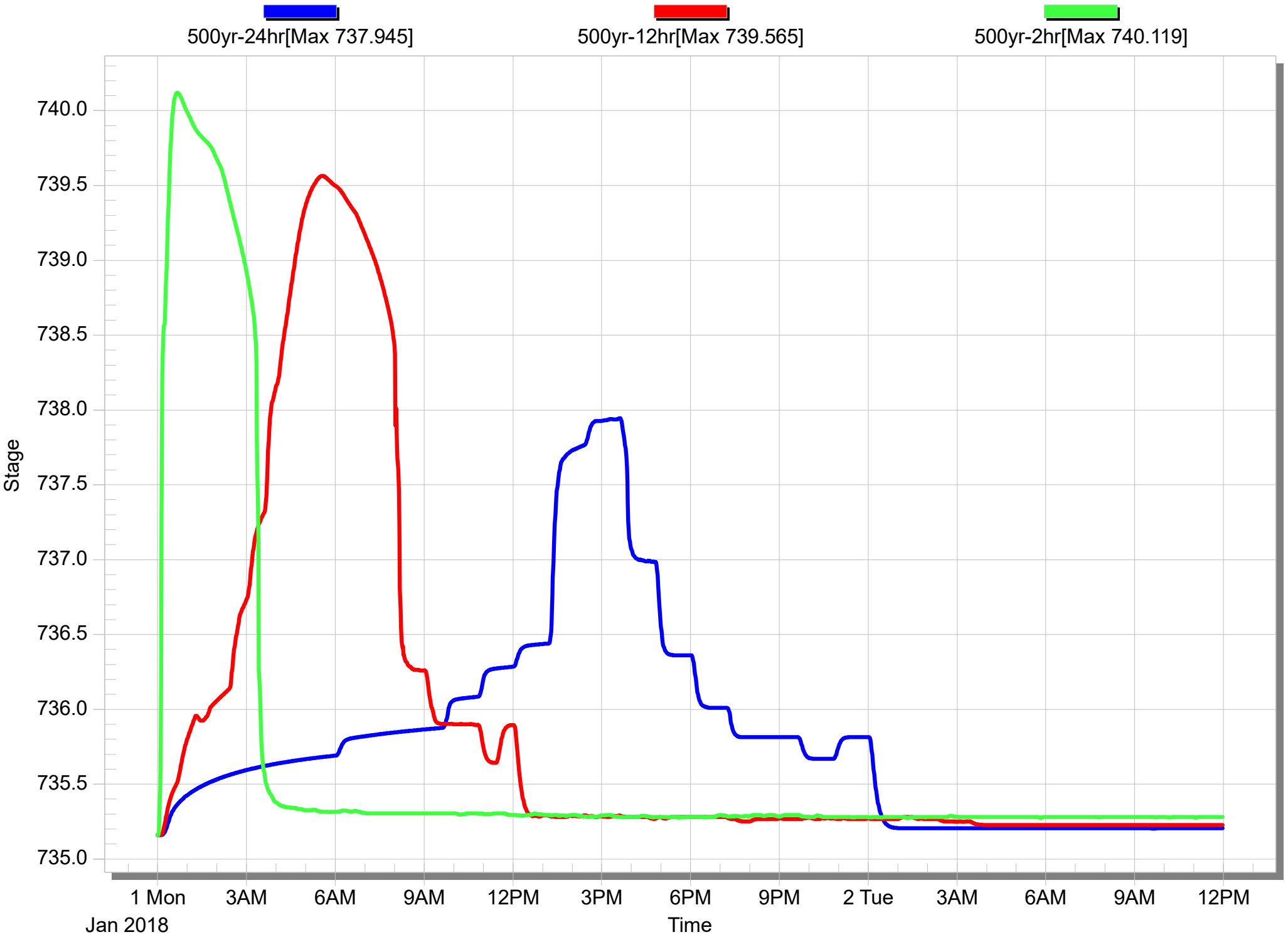


# Node - Node6





# Node - Node6

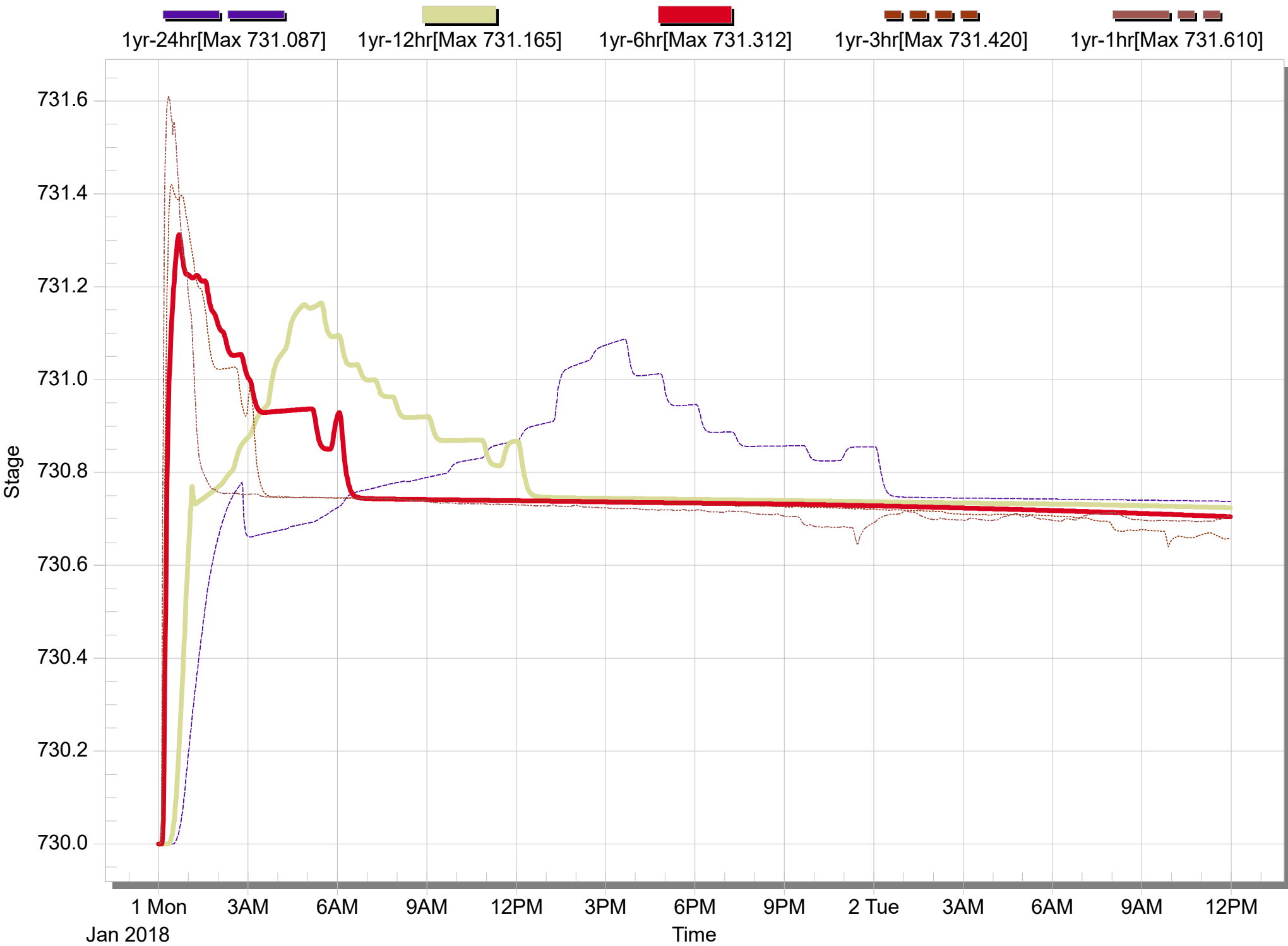


**823 Delles Rd Front Yard (Node 13)**  
**Existing Conditions**

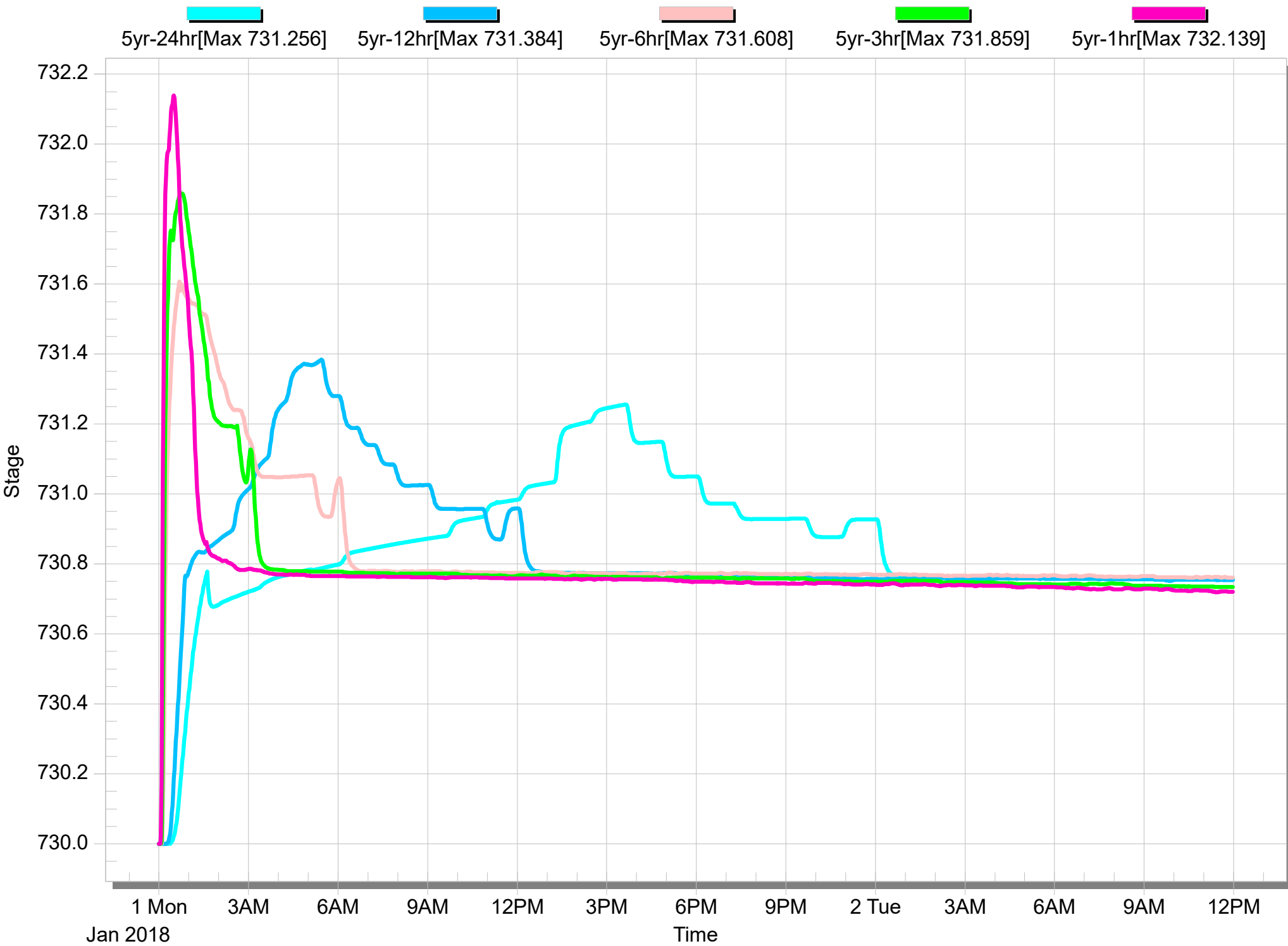
**PROJECT SITE:**

**Wheaton Flood Study**  
**616 Park Avenue Area**

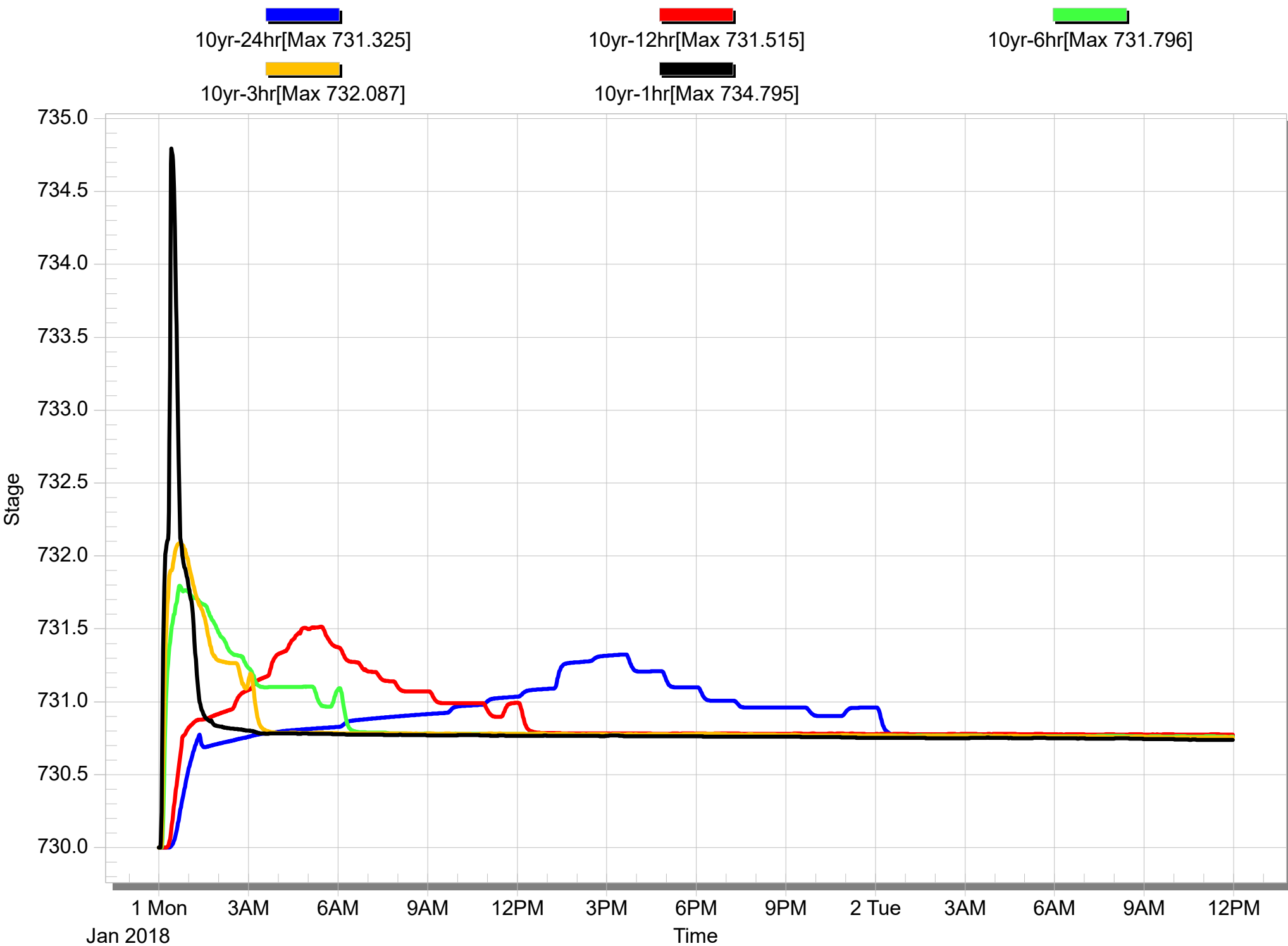
# Node - Node13



# Node - Node13

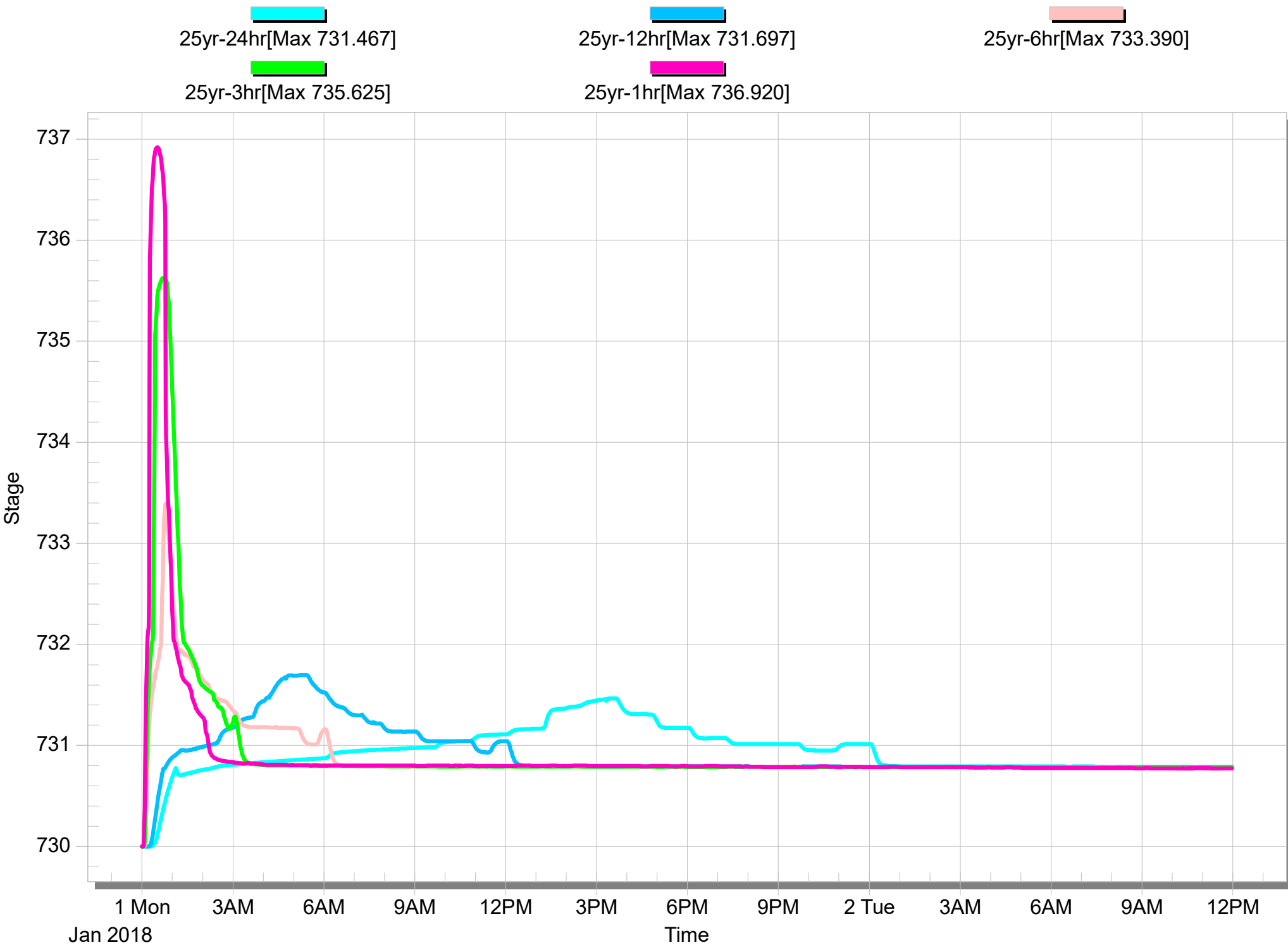


## Node - Node13

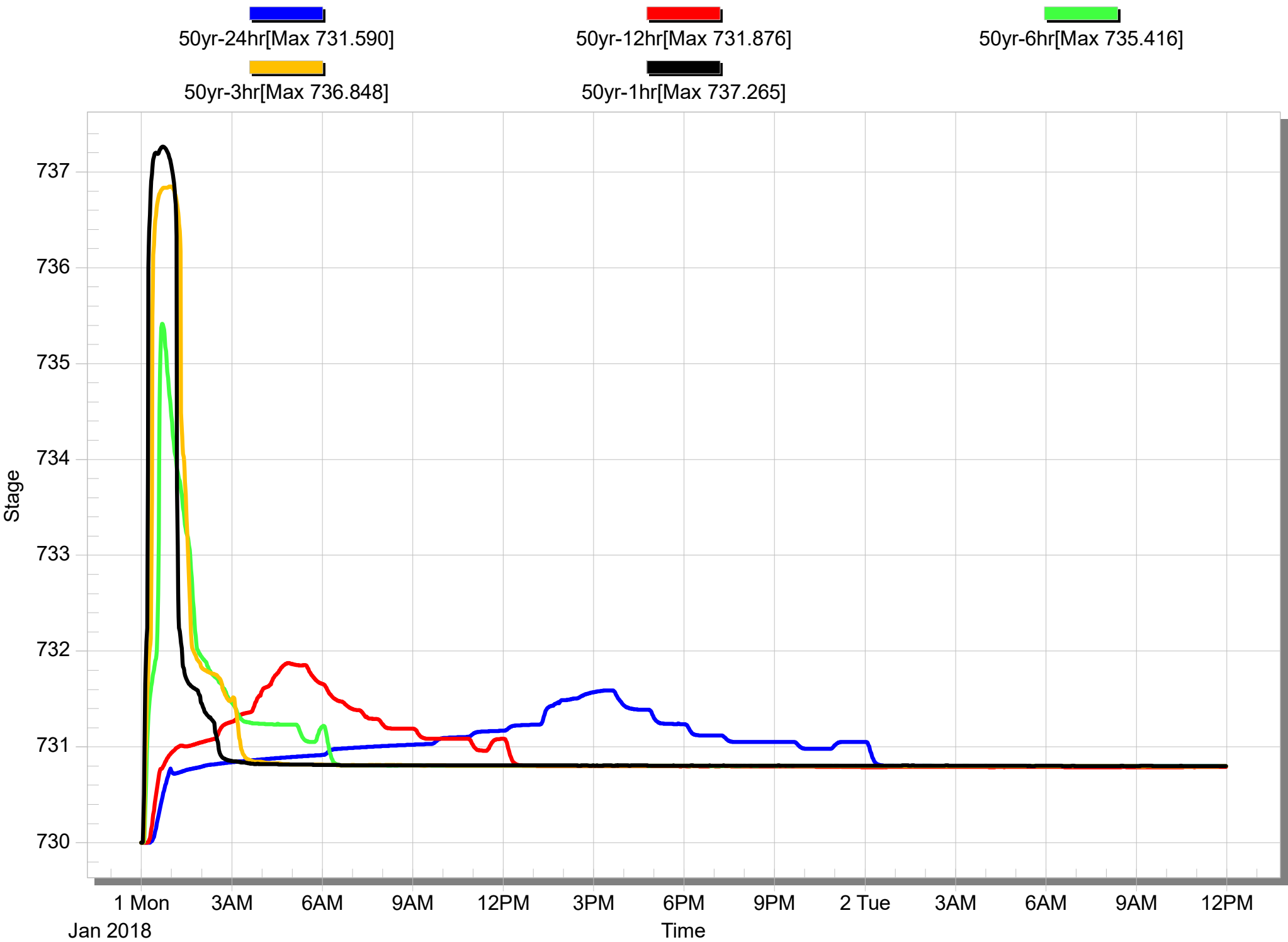




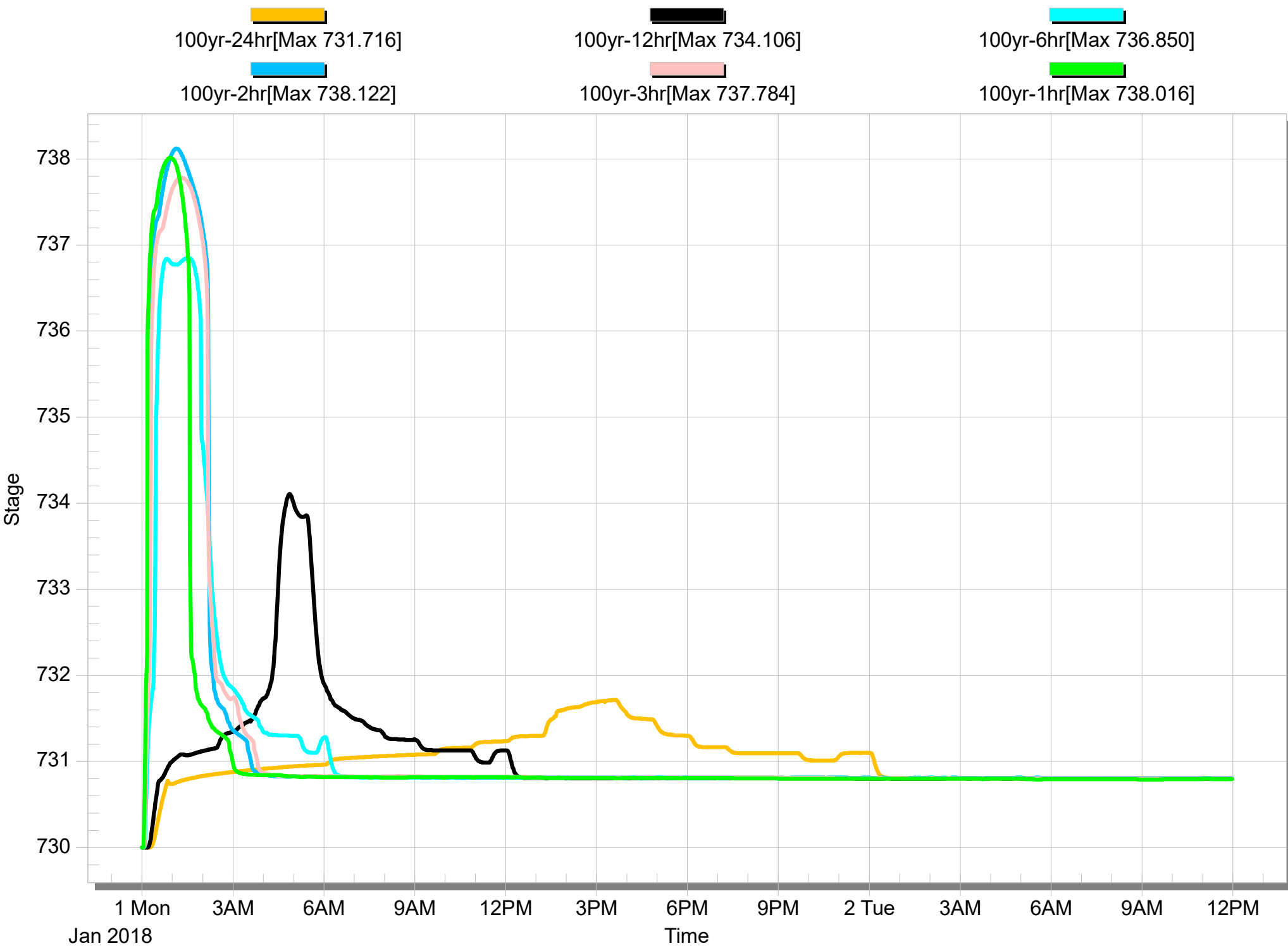
# Node - Node13



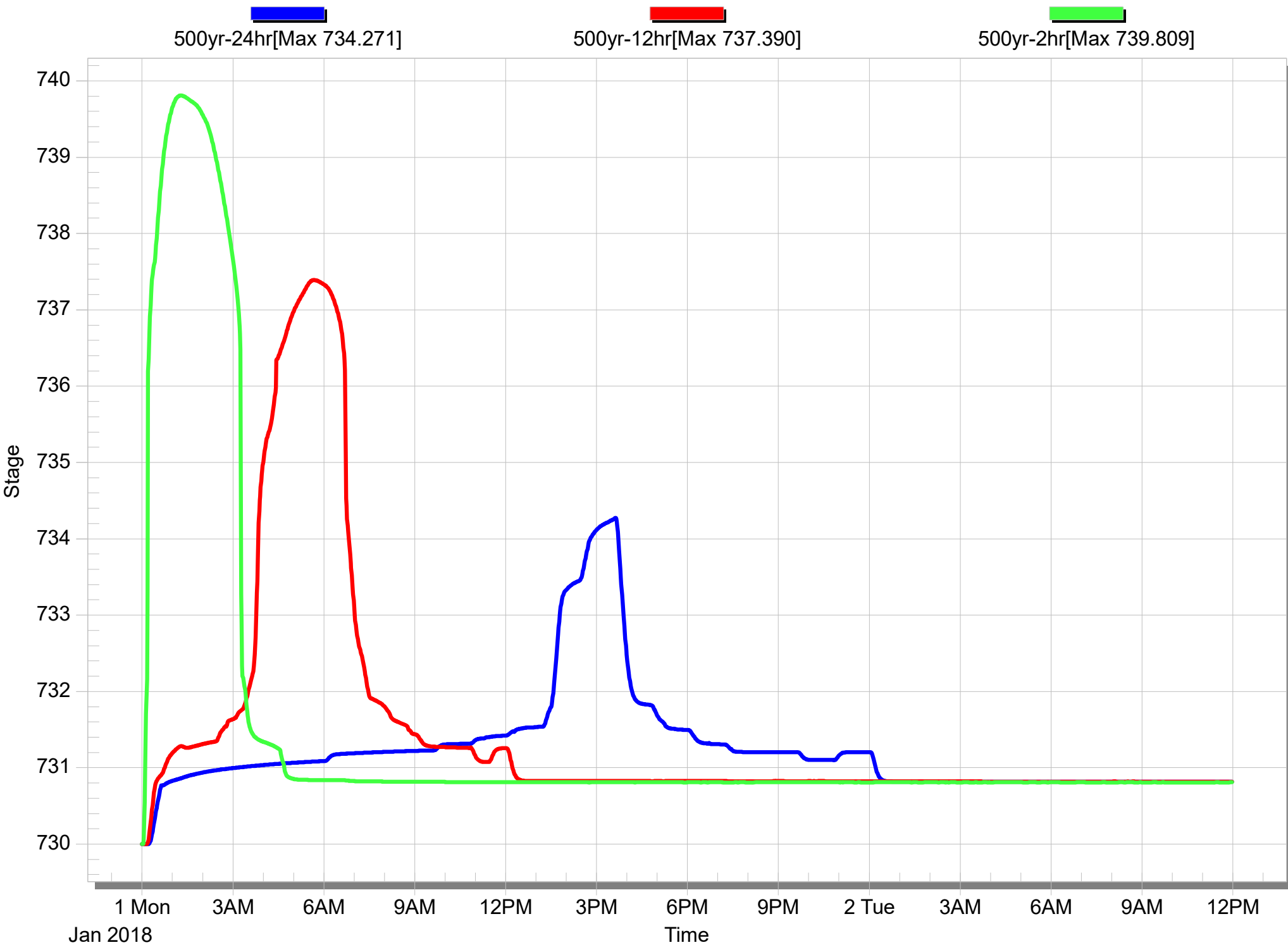
# Node - Node13



# Node - Node13



# Node - Node13

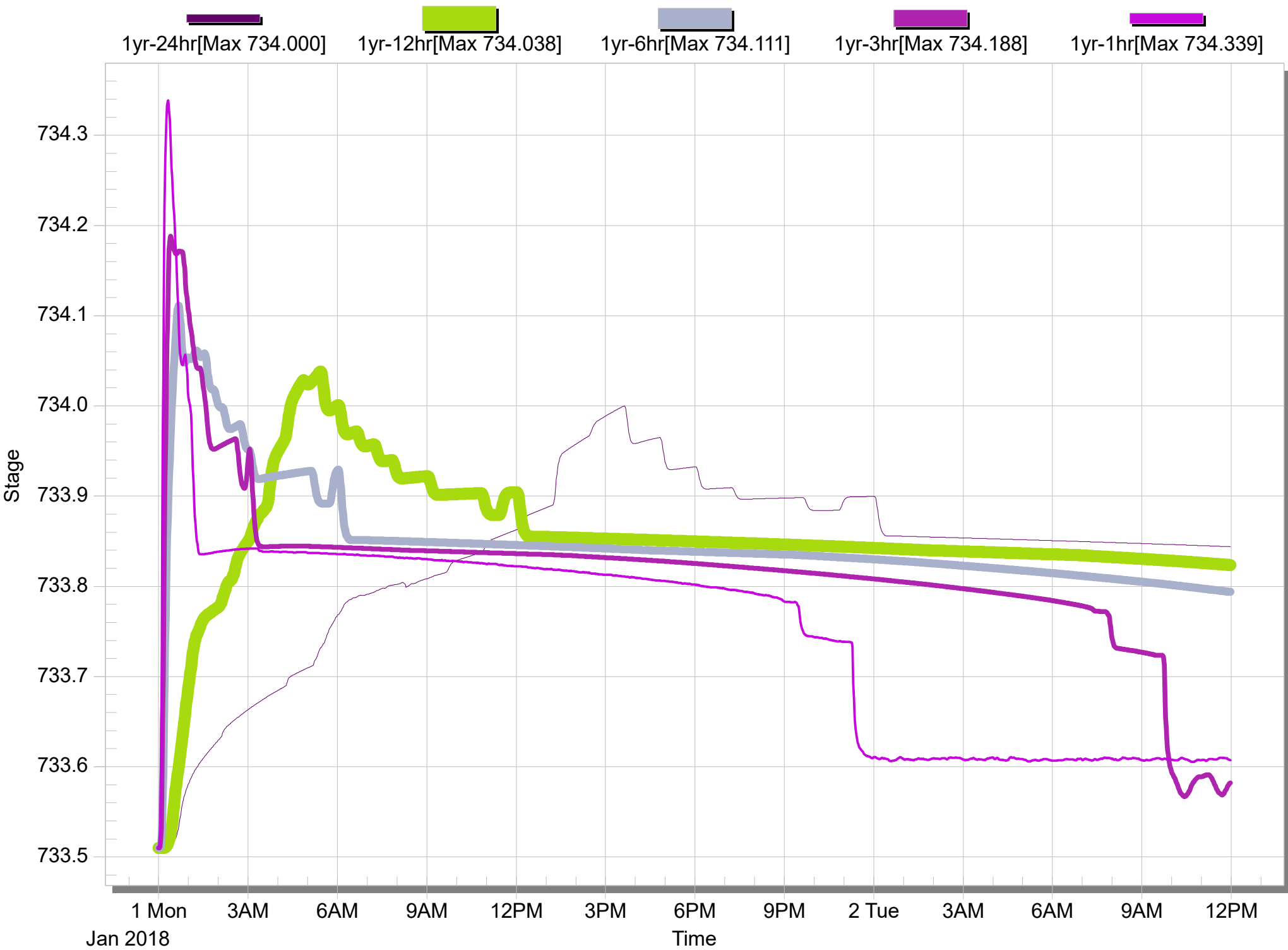


**819 Delles Rd Rear Yard (Node 23)**  
**Existing Conditions**

**PROJECT SITE:**

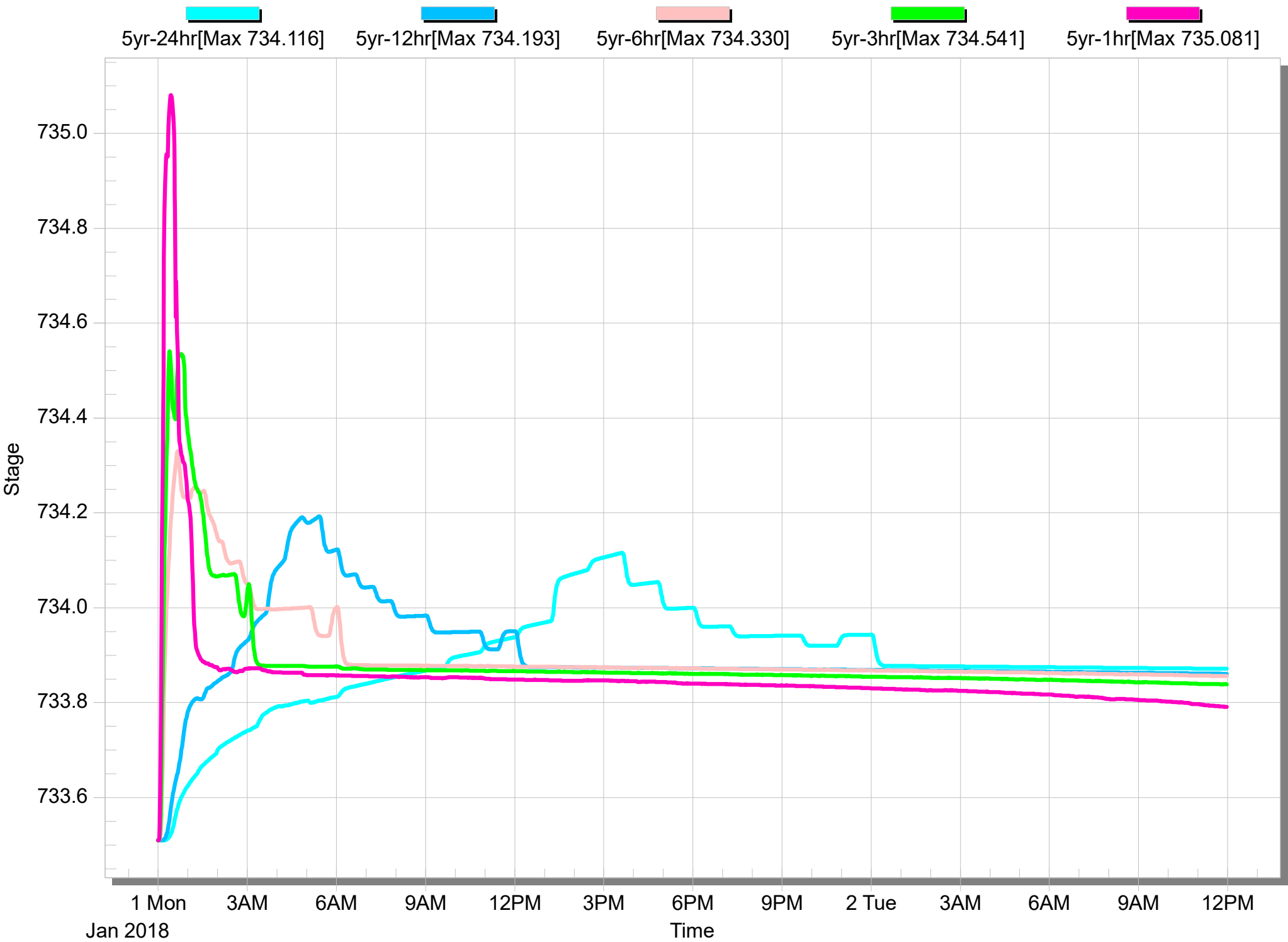
**Wheaton Flood Study**  
**616 Park Avenue Area**

# Node - Node23

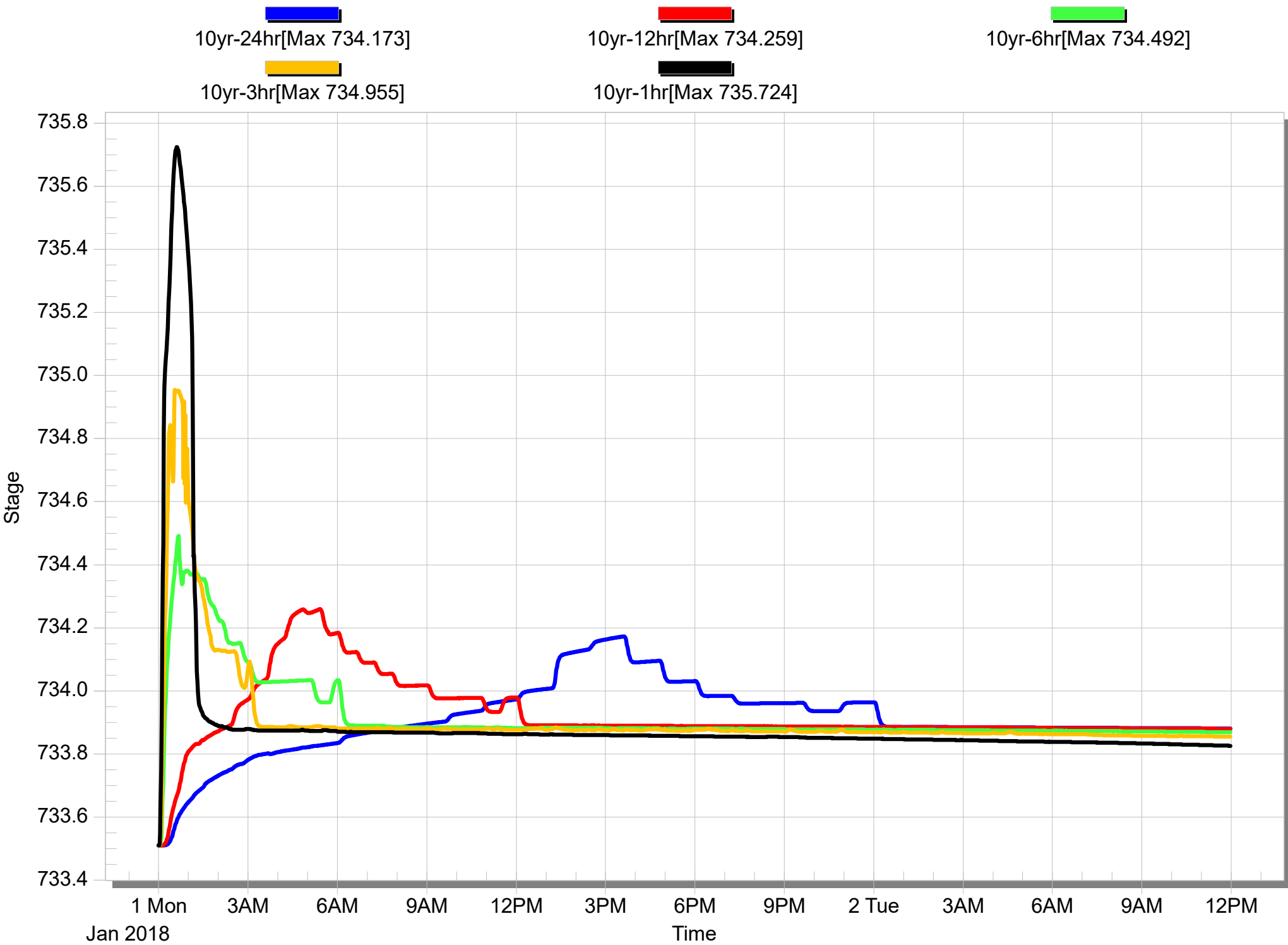




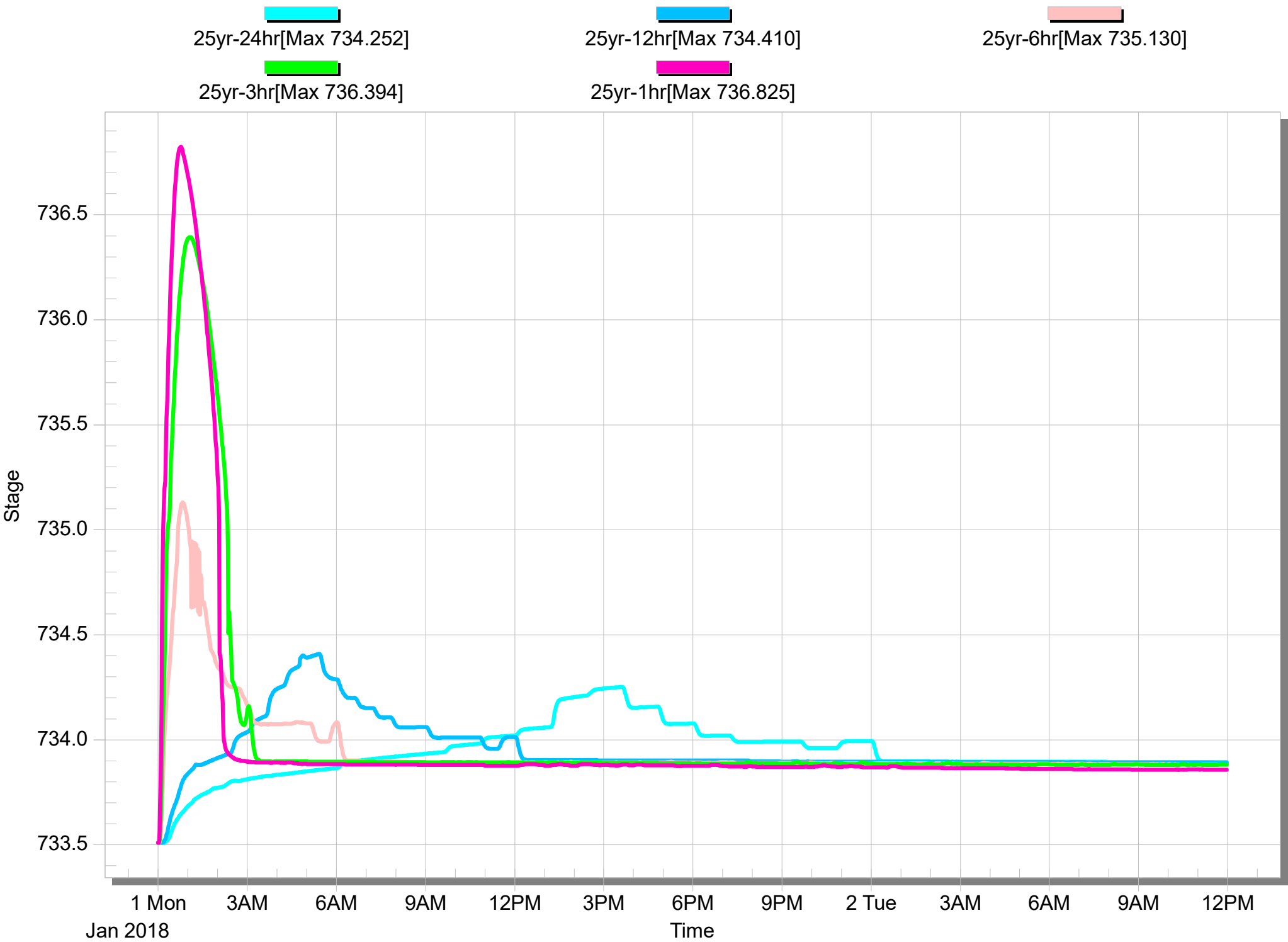
# Node - Node23



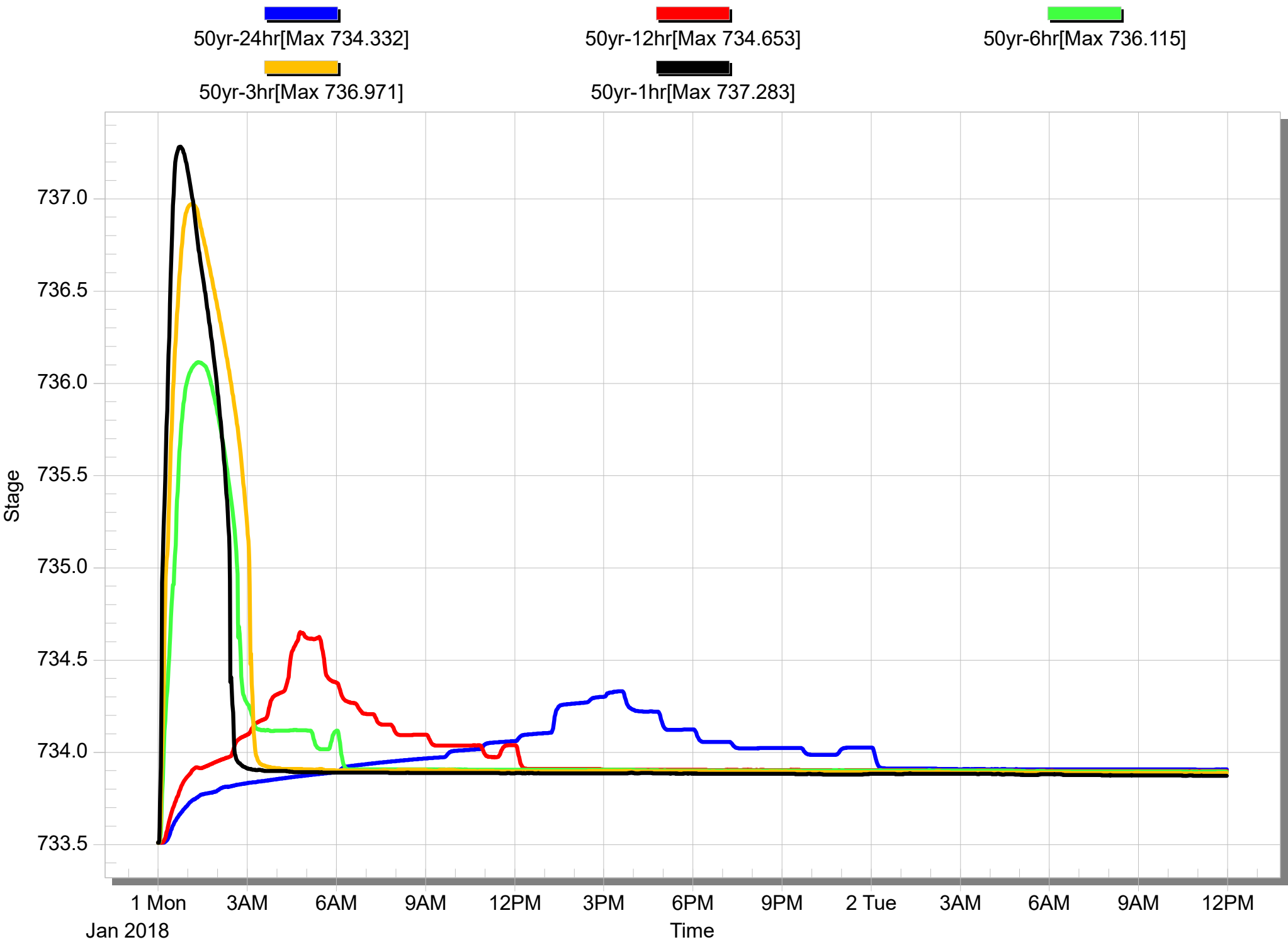
# Node - Node23



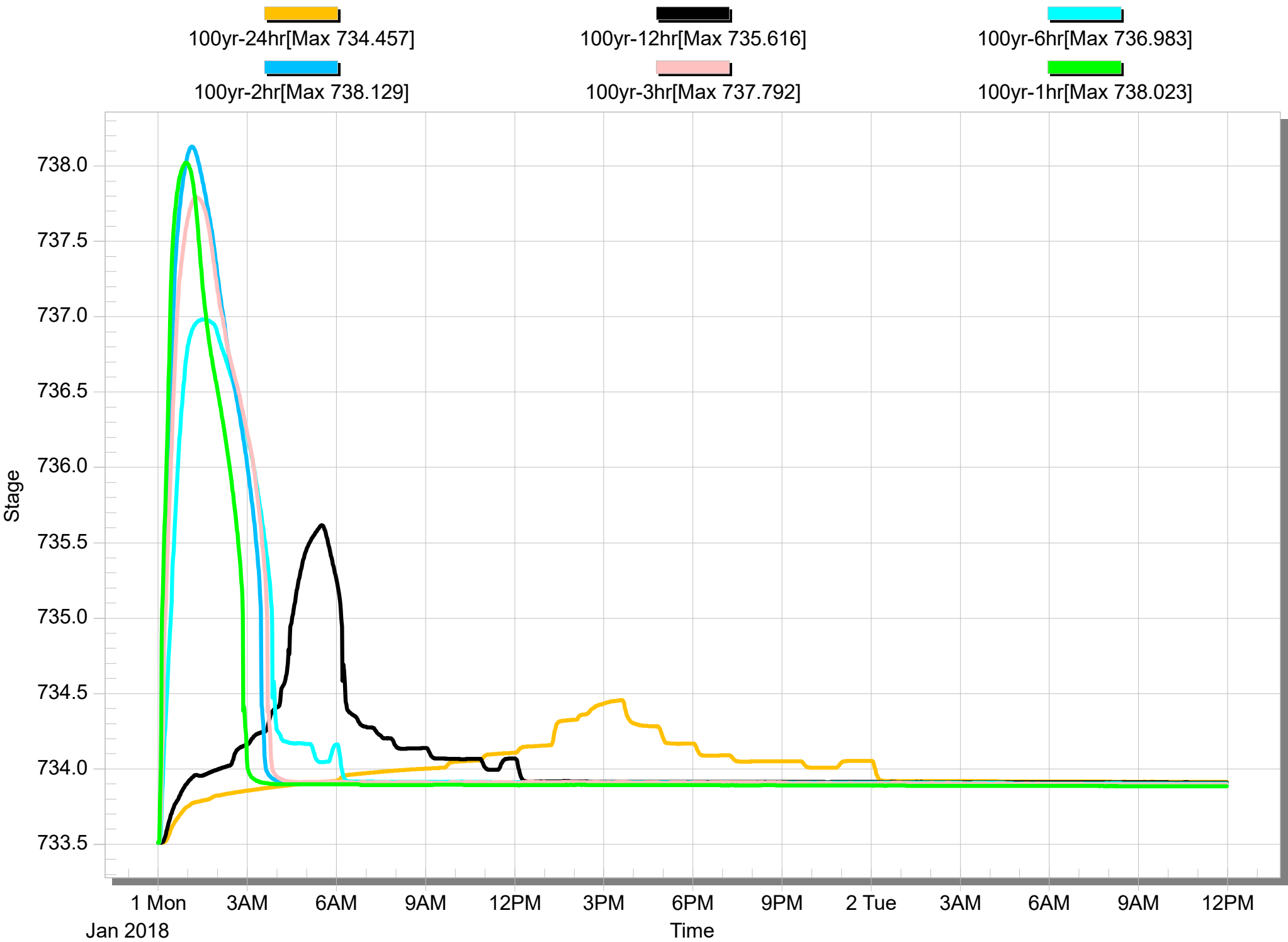
# Node - Node23



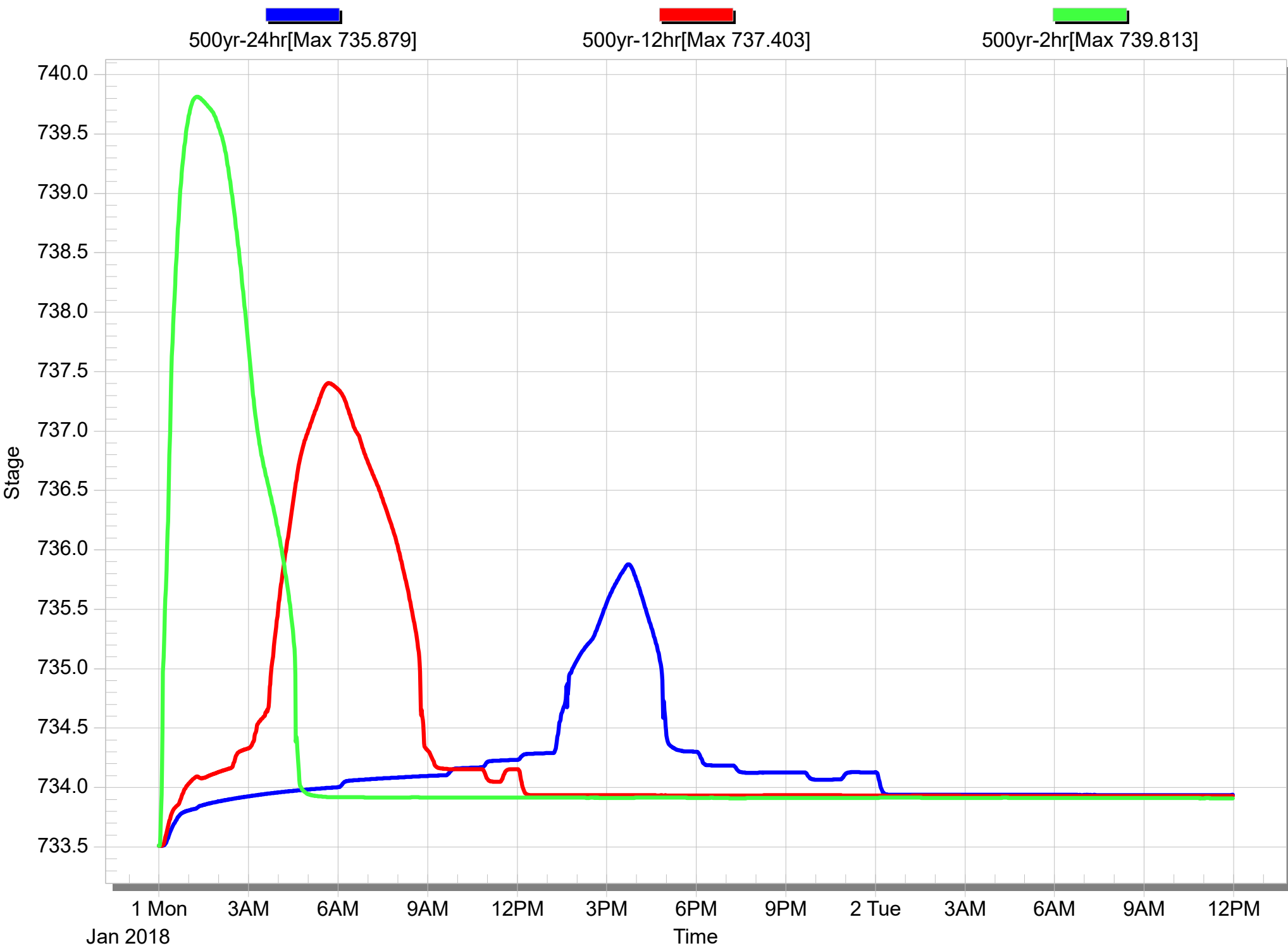
# Node - Node23



# Node - Node23



# Node - Node23



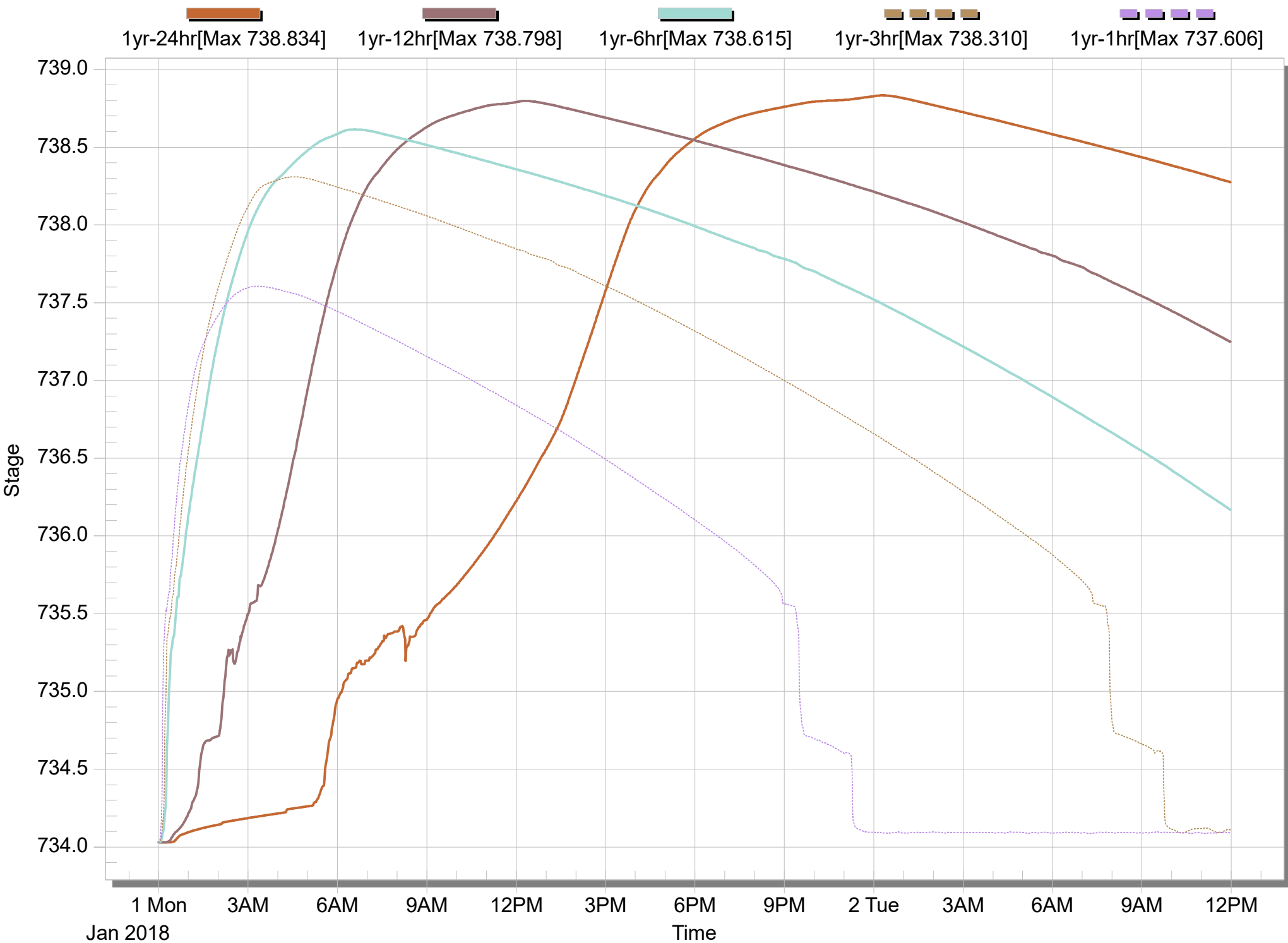
**616 Park Avenue (Node 24)**  
**Existing Conditions**

**PROJECT SITE:**

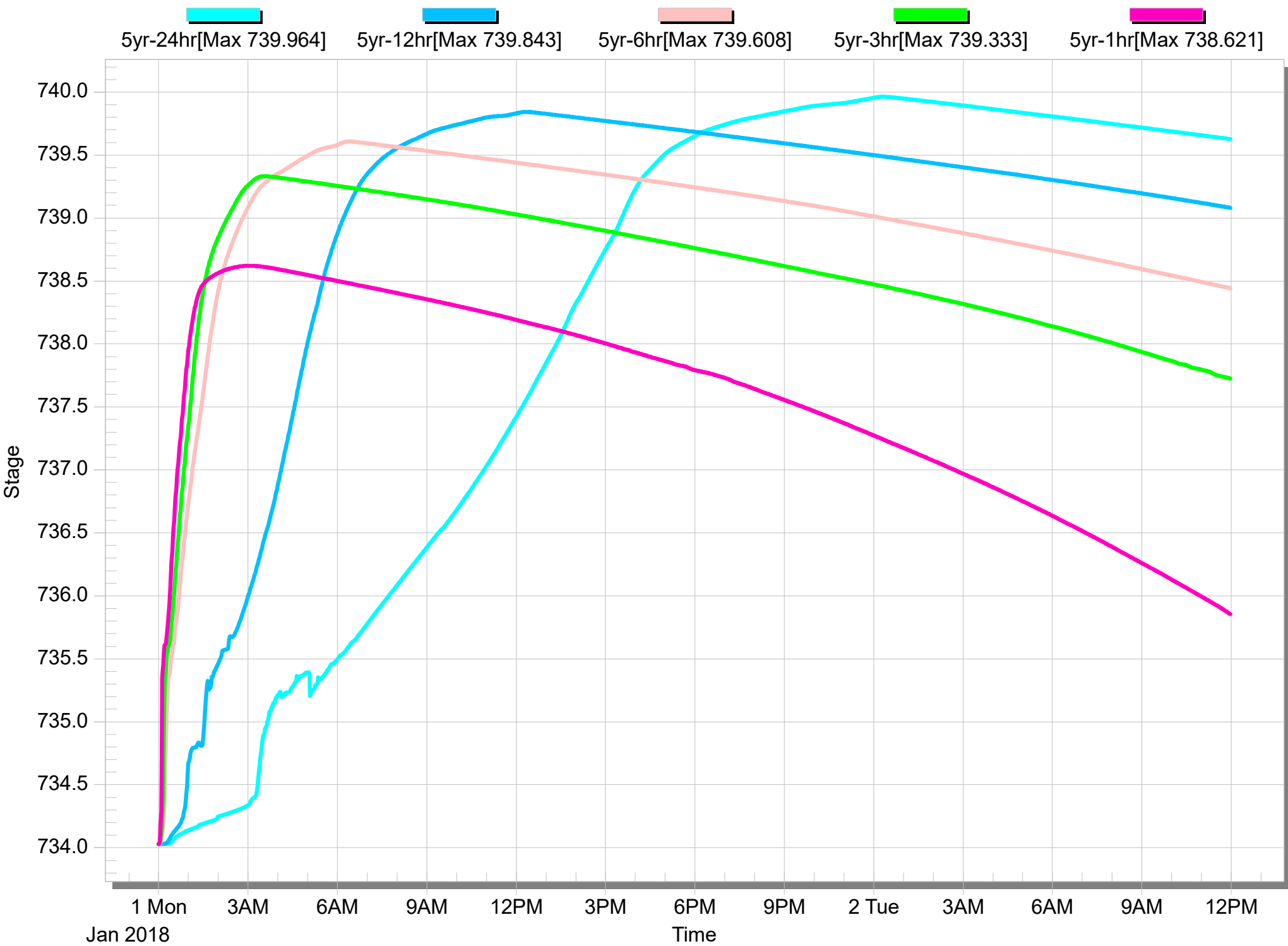
**Wheaton Flood Study**  
**616 Park Avenue Area**



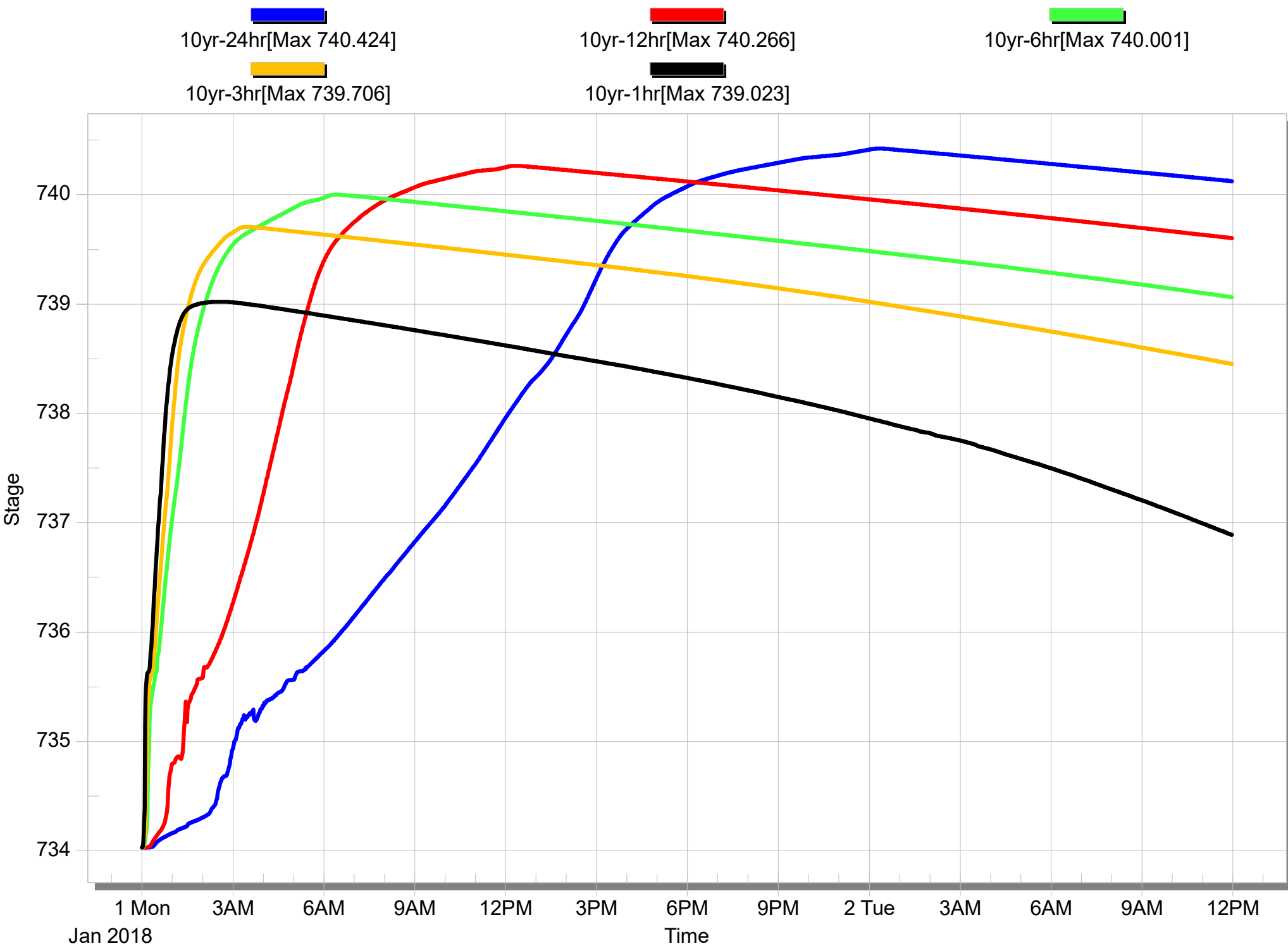
# Node - Node24



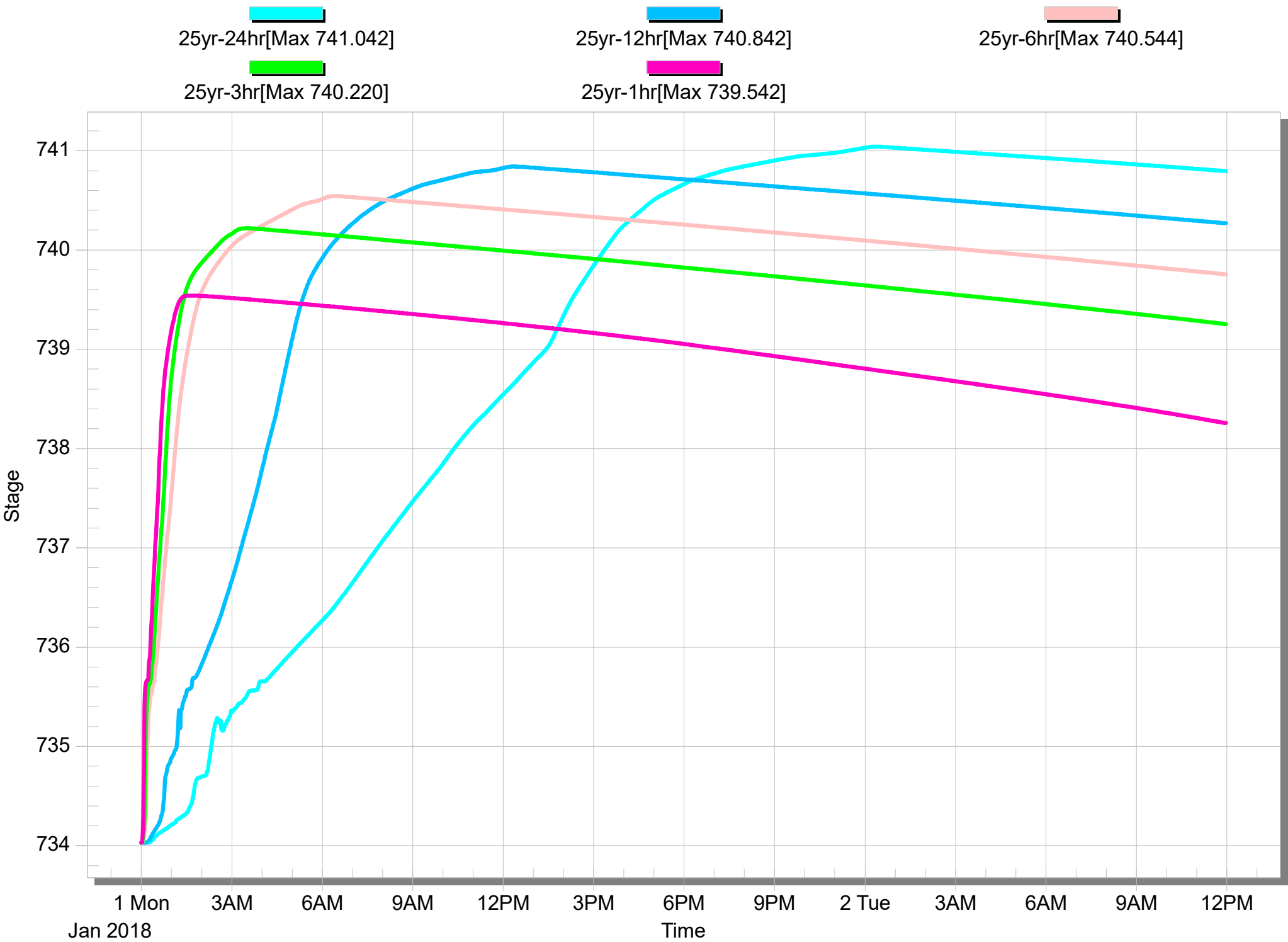
# Node - Node24



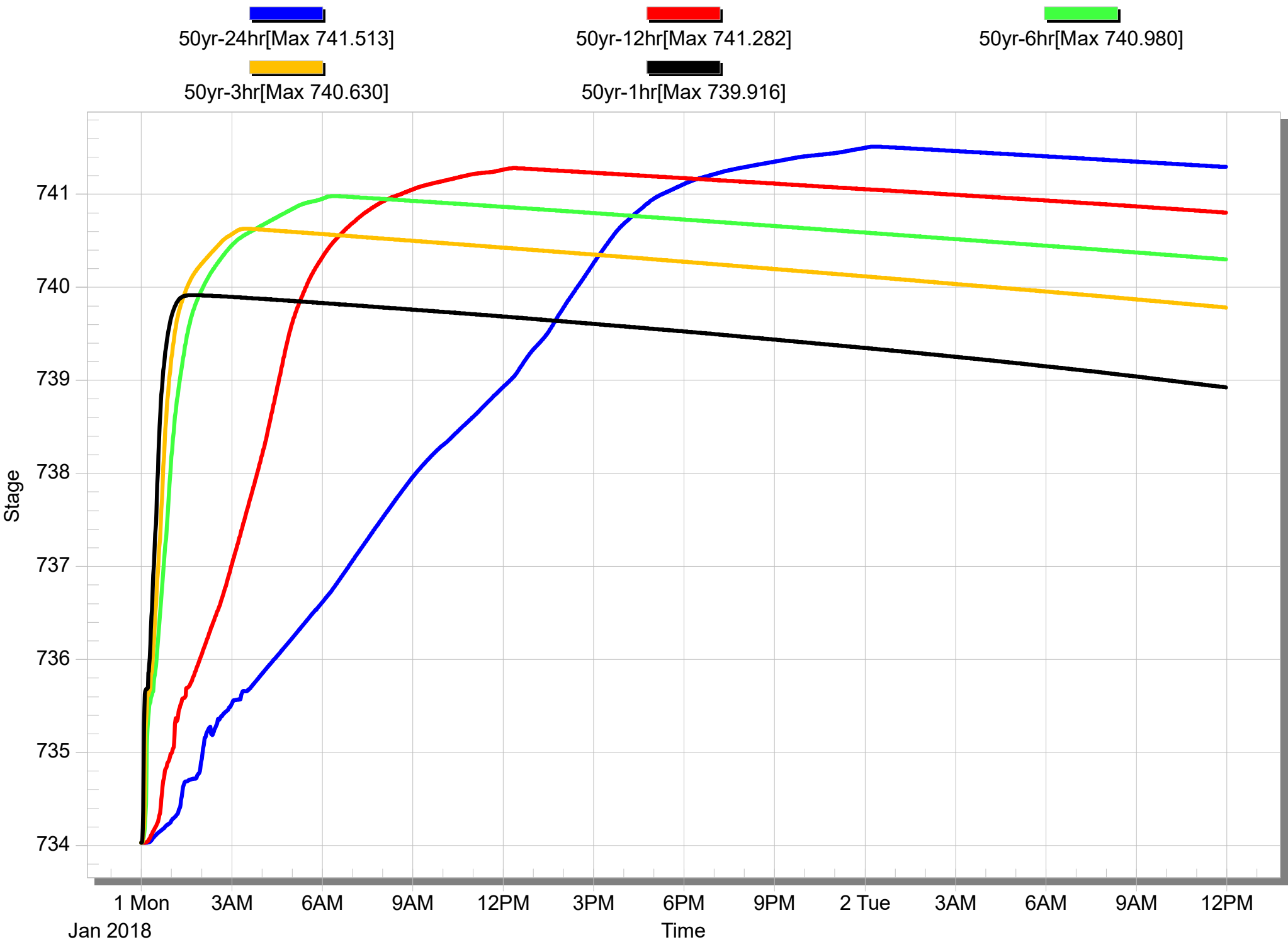
# Node - Node24



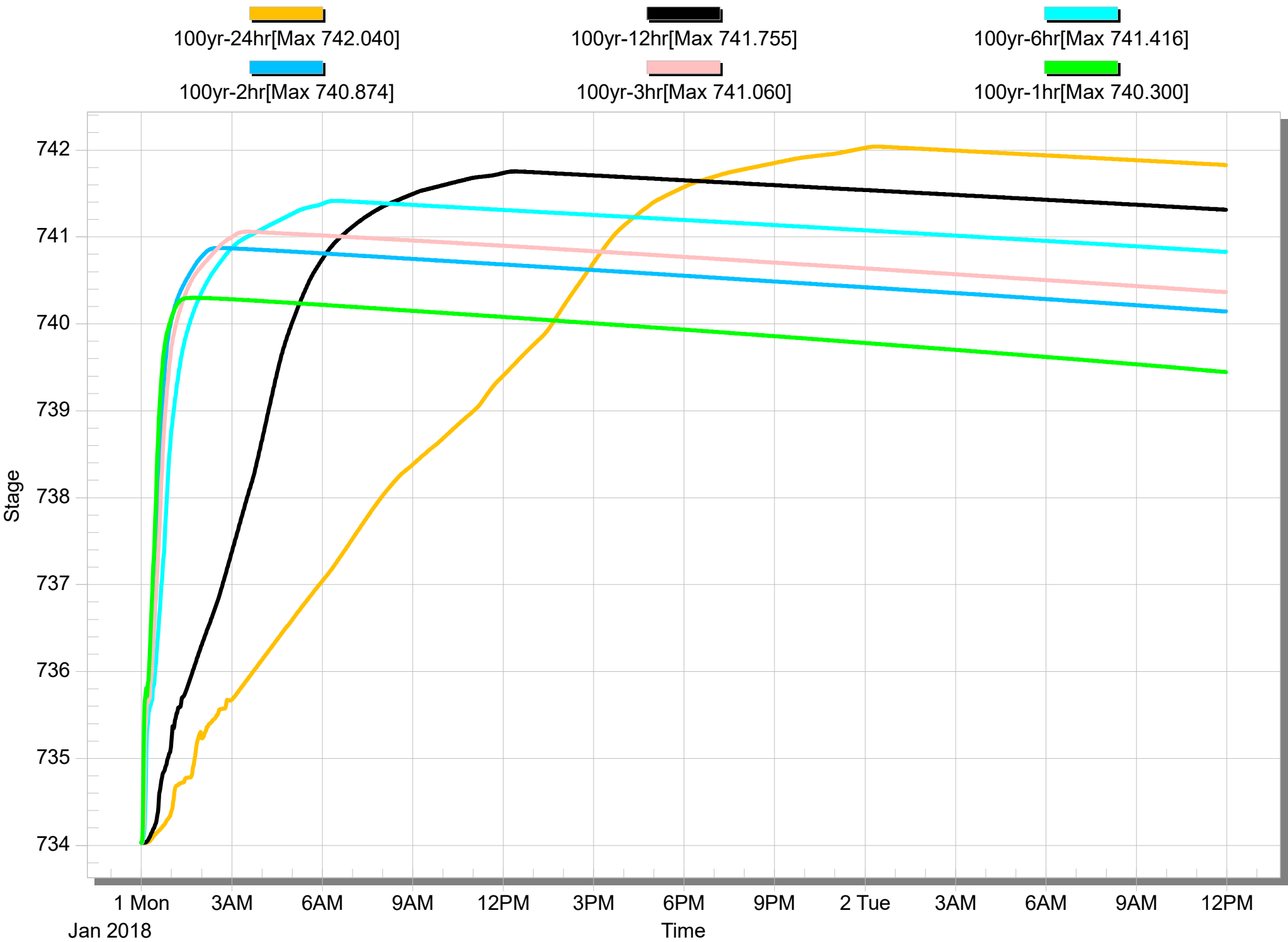
# Node - Node24



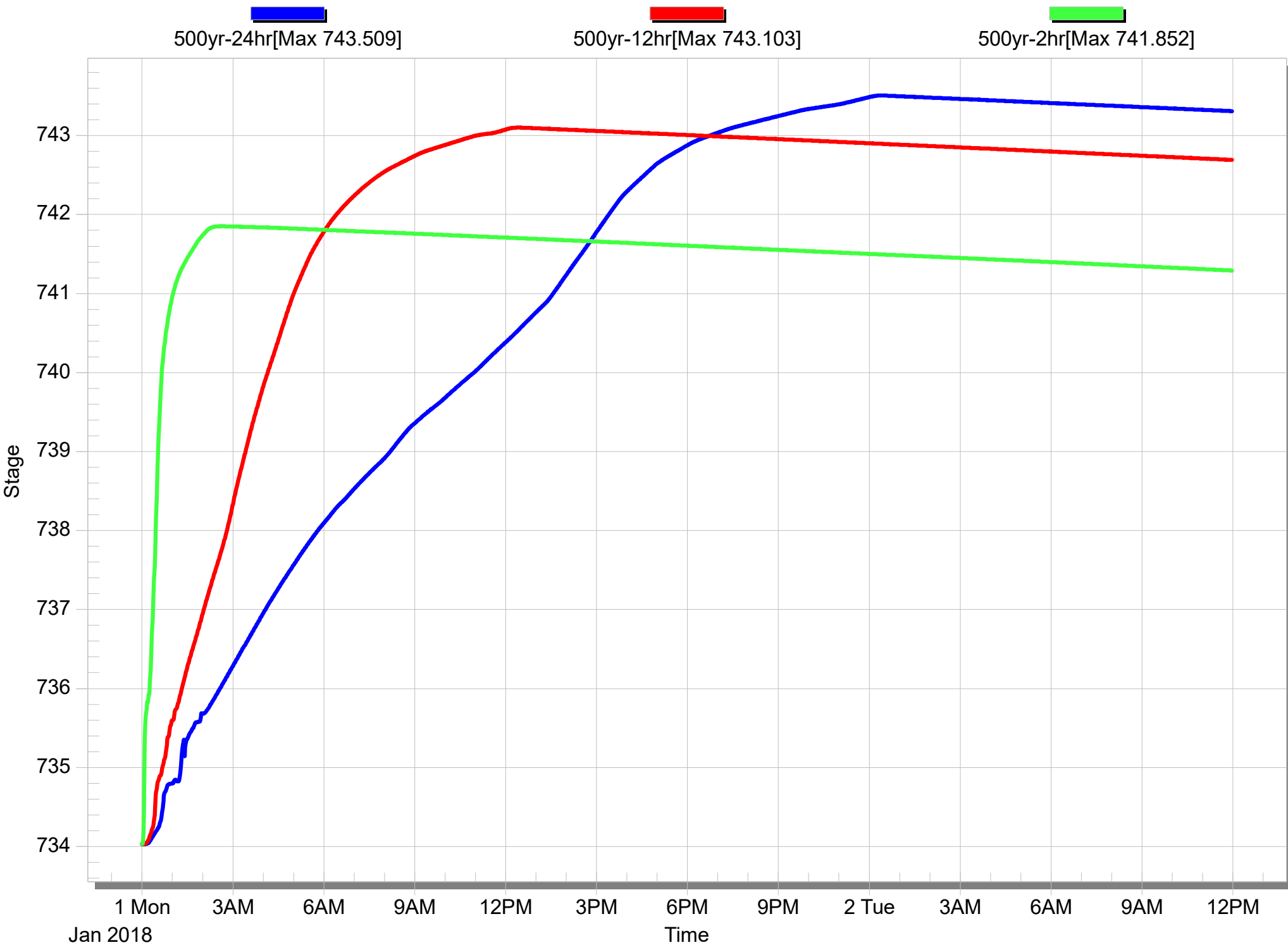
# Node - Node24



# Node - Node24



# Node - Node24



## Flood Elevation Results Table - Proposed

809 Greenwood Drive Rear Yard Area (Node 6)

Rim = 738.26

| Return Period | 1hr    | 2hr    | 3hr    | 6hr    | 12hr   | 24hr   | Max Depth |
|---------------|--------|--------|--------|--------|--------|--------|-----------|
| 1yr           | 734.02 | 733.97 | 733.91 | 733.86 | 733.80 | 733.76 | 0.00      |
| 5yr           | 734.25 | 734.16 | 734.10 | 734.02 | 733.91 | 733.85 | 0.00      |
| 10yr          | 734.37 | 734.27 | 734.19 | 734.09 | 733.96 | 733.88 | 0.00      |
| 25yr          | 735.52 | 735.26 | 734.48 | 734.21 | 734.03 | 733.94 | 0.00      |
| 50yr          | 736.83 | 736.65 | 735.94 | 734.33 | 734.09 | 733.98 | 0.00      |
| 100yr         | 738.57 | 738.22 | 737.48 | 736.18 | 734.17 | 734.03 | 0.31      |
| 500yr         |        | 739.79 |        |        | 737.12 | 734.25 | 1.53      |

823 Delles Rd Front Yard Area (Node 13)

Rim = 736.00

| Return Period | 1hr    | 2hr    | 3hr    | 6hr    | 12hr   | 24hr   | Max Depth |
|---------------|--------|--------|--------|--------|--------|--------|-----------|
| 1yr           | 731.71 | 731.60 | 731.47 | 731.35 | 731.20 | 731.10 | 0.00      |
| 5yr           | 732.38 | 732.21 | 731.98 | 731.70 | 731.43 | 731.30 | 0.00      |
| 10yr          | 733.39 | 733.00 | 732.24 | 731.91 | 731.59 | 731.36 | 0.00      |
| 25yr          | 735.14 | 735.09 | 734.37 | 732.68 | 731.78 | 731.53 | 0.00      |
| 50yr          | 736.16 | 736.27 | 735.67 | 733.91 | 731.98 | 731.67 | 0.27      |
| 100yr         | 737.26 | 737.43 | 737.07 | 735.95 | 733.55 | 731.80 | 1.43      |
| 500yr         |        | 739.15 |        |        | 736.82 | 733.99 | 3.15      |

819 Delles Rd Rear Yard Area (Node 23)

Rim = 734.81

| Return Period | 1hr    | 2hr    | 3hr    | 6hr    | 12hr   | 24hr   | Max Depth |
|---------------|--------|--------|--------|--------|--------|--------|-----------|
| 1yr           | 732.35 | 732.30 | 732.26 | 732.21 | 732.16 | 732.13 | 0.00      |
| 5yr           | 732.61 | 732.51 | 732.43 | 732.35 | 732.25 | 732.20 | 0.00      |
| 10yr          | 733.44 | 733.07 | 732.54 | 732.42 | 732.29 | 732.23 | 0.00      |
| 25yr          | 735.17 | 735.13 | 734.44 | 732.76 | 732.35 | 732.28 | 0.36      |
| 50yr          | 736.18 | 736.28 | 735.70 | 733.99 | 732.41 | 732.31 | 1.47      |
| 100yr         | 737.27 | 737.44 | 737.07 | 735.97 | 733.59 | 732.35 | 2.63      |
| 500yr         |        | 739.15 |        |        | 736.82 | 734.05 | 4.34      |

616 Park Avenue Area Area (Node 24)

Rim = 735.33

| Return Period | 1hr    | 2hr    | 3hr    | 6hr    | 12hr   | 24hr   | Max Depth |
|---------------|--------|--------|--------|--------|--------|--------|-----------|
| 1yr           | 736.32 | 736.58 | 736.64 | 736.73 | 736.79 | 736.78 | 1.46      |
| 5yr           | 736.94 | 737.33 | 737.47 | 737.85 | 738.17 | 738.32 | 2.99      |
| 10yr          | 737.24 | 737.74 | 737.96 | 738.29 | 738.59 | 738.78 | 3.45      |
| 25yr          | 737.73 | 738.28 | 738.47 | 738.83 | 739.20 | 739.45 | 4.12      |
| 50yr          | 738.16 | 738.69 | 738.87 | 739.35 | 739.70 | 739.98 | 4.65      |
| 100yr         | 738.54 | 739.20 | 739.43 | 739.83 | 740.23 | 740.56 | 5.23      |
| 500yr         |        | 740.31 |        |        | 741.68 | 742.14 | 6.81      |

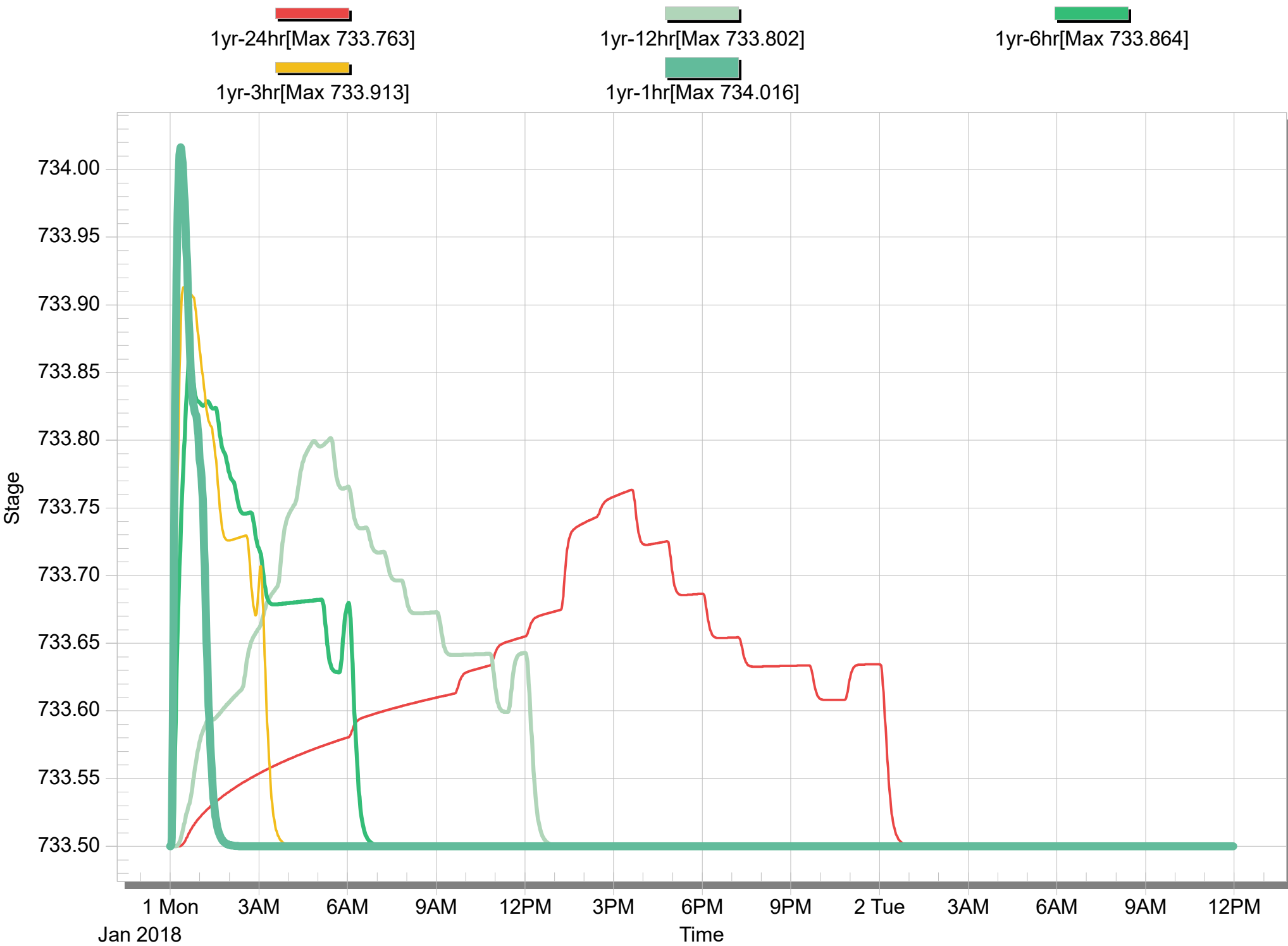


**809 Greenwood Drive Rear Yard (Node 6)**  
**Proposed Conditions**

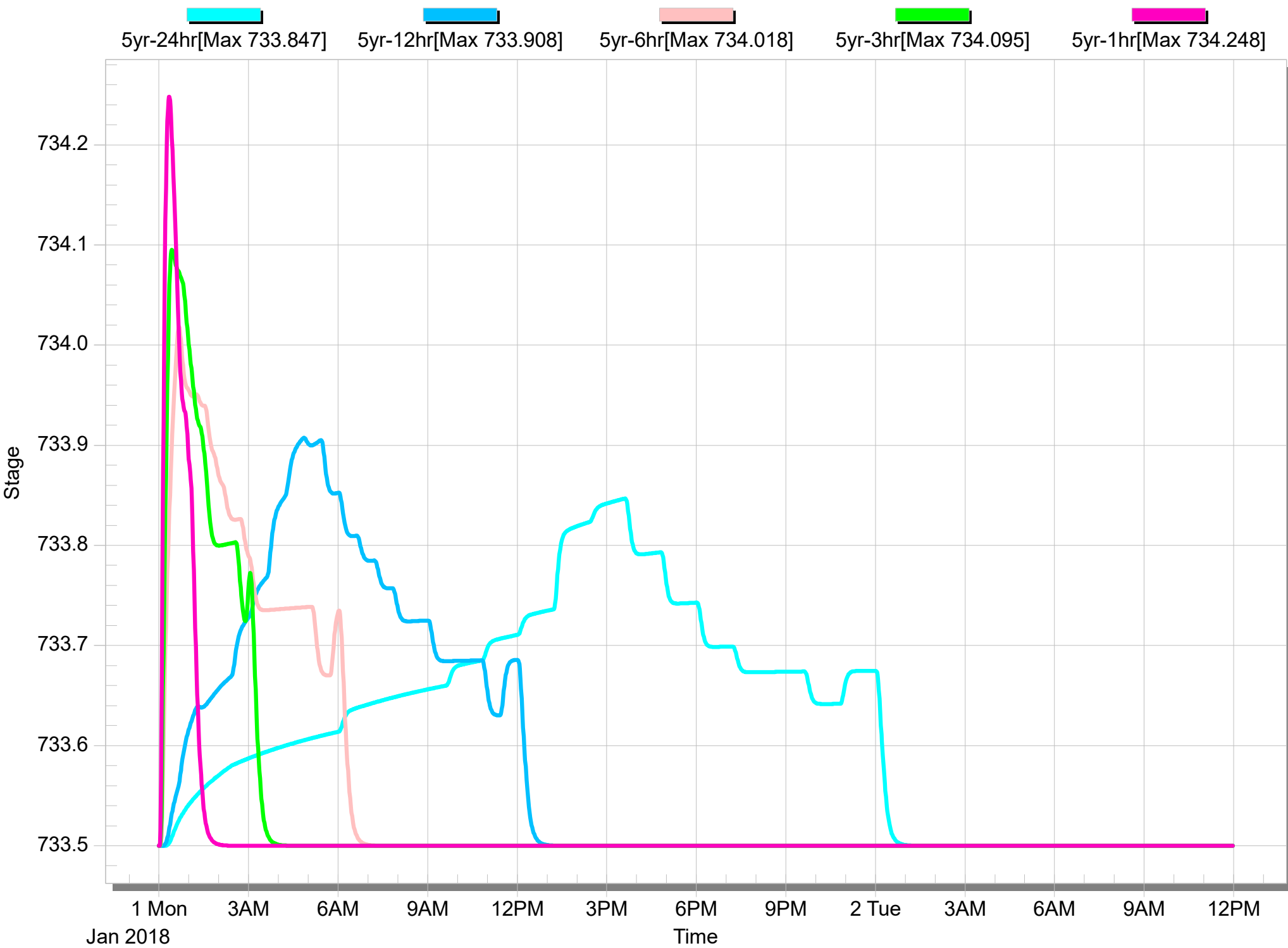
**PROJECT SITE:**

**Wheaton Flood Study**  
**616 Park Avenue Area**

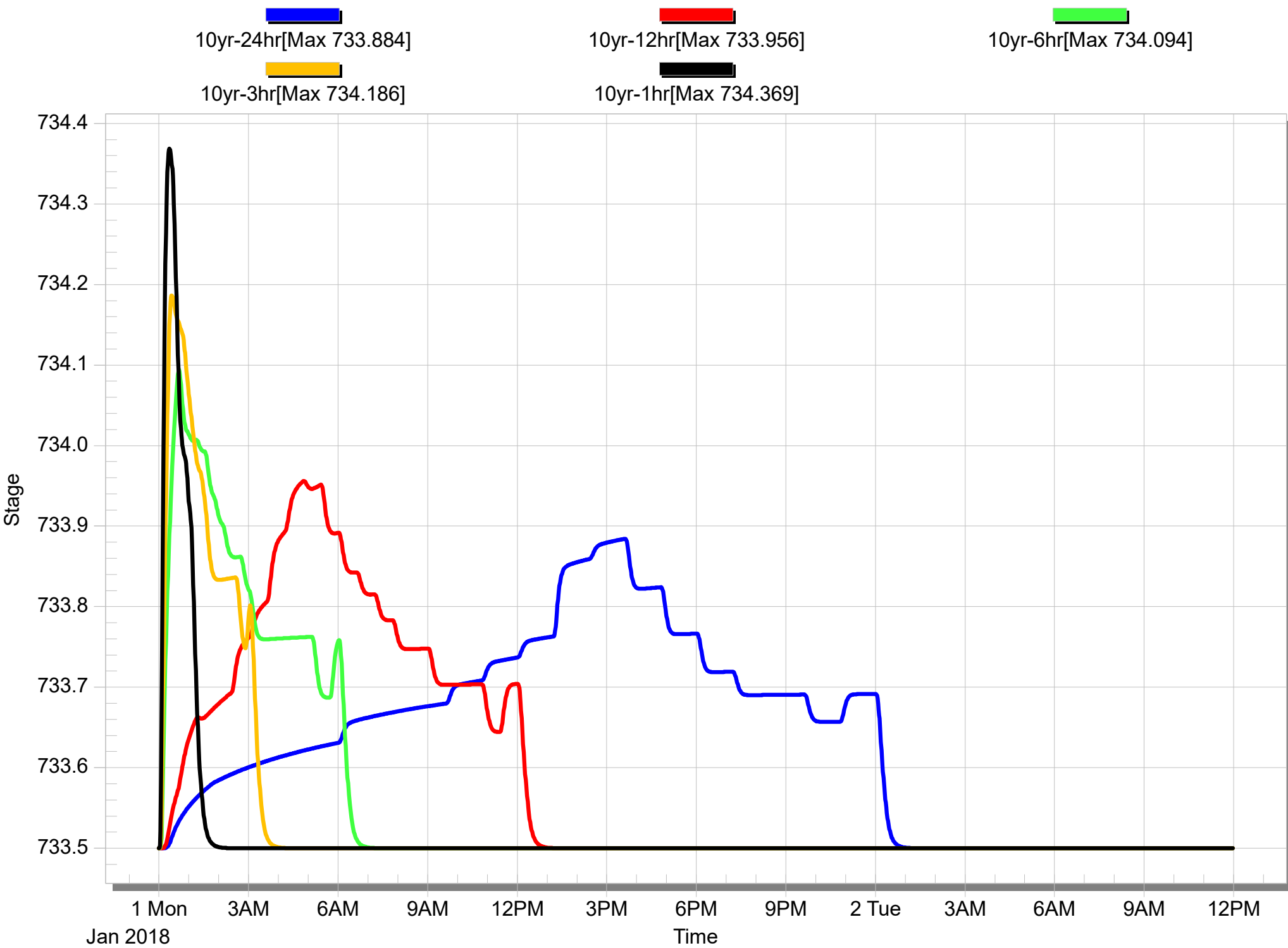
# Node - Node6



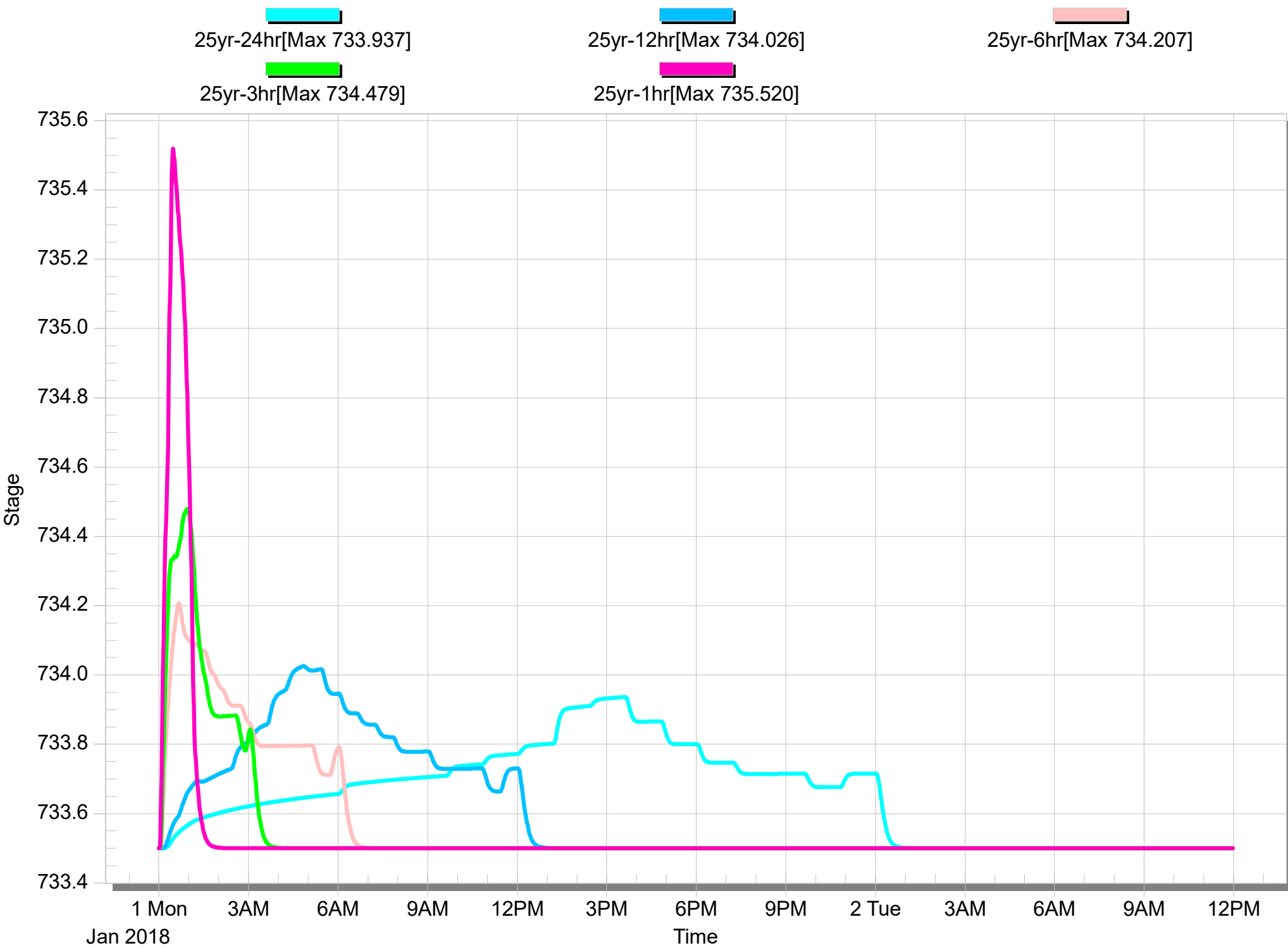
# Node - Node6



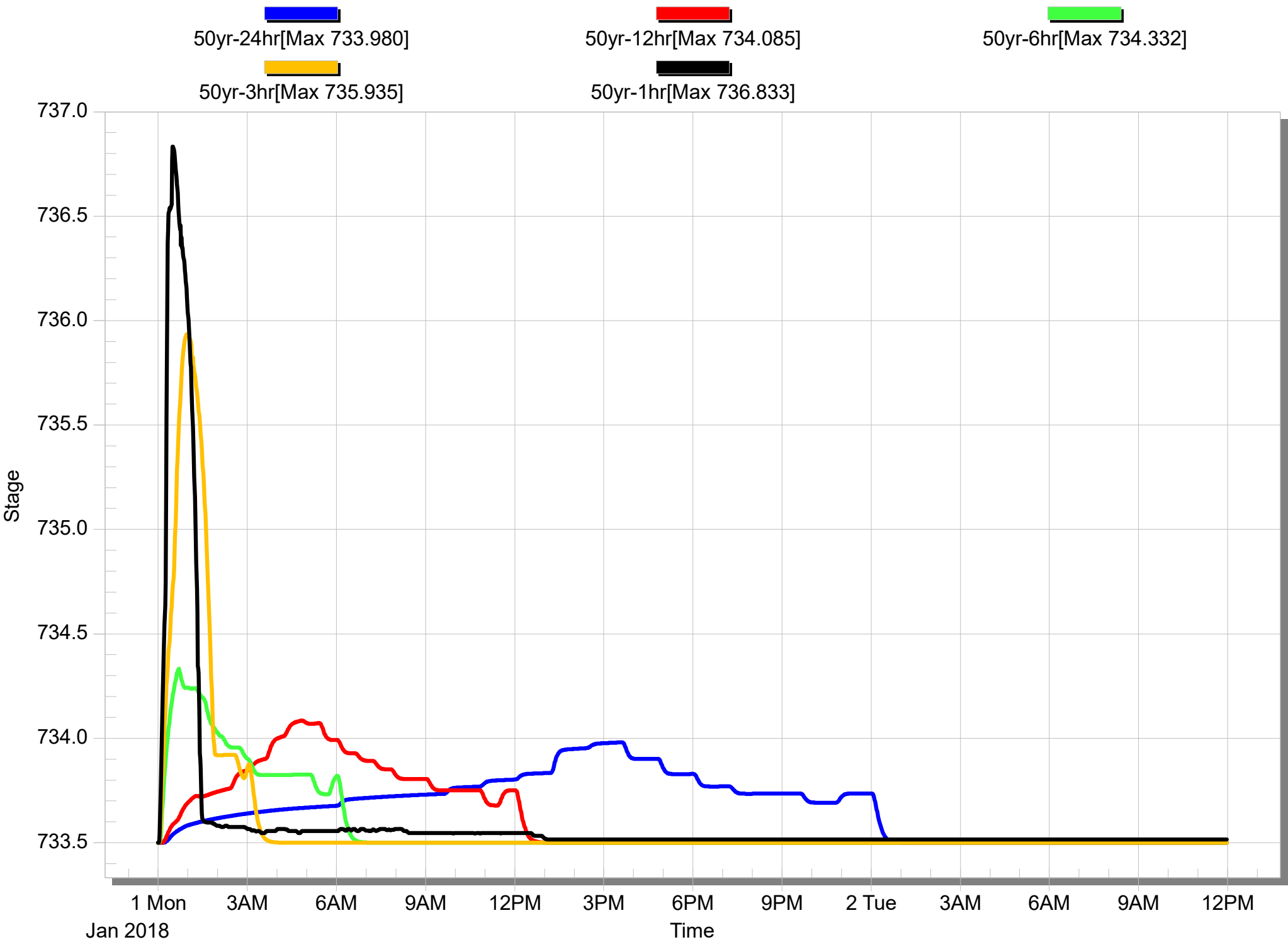
## Node - Node6



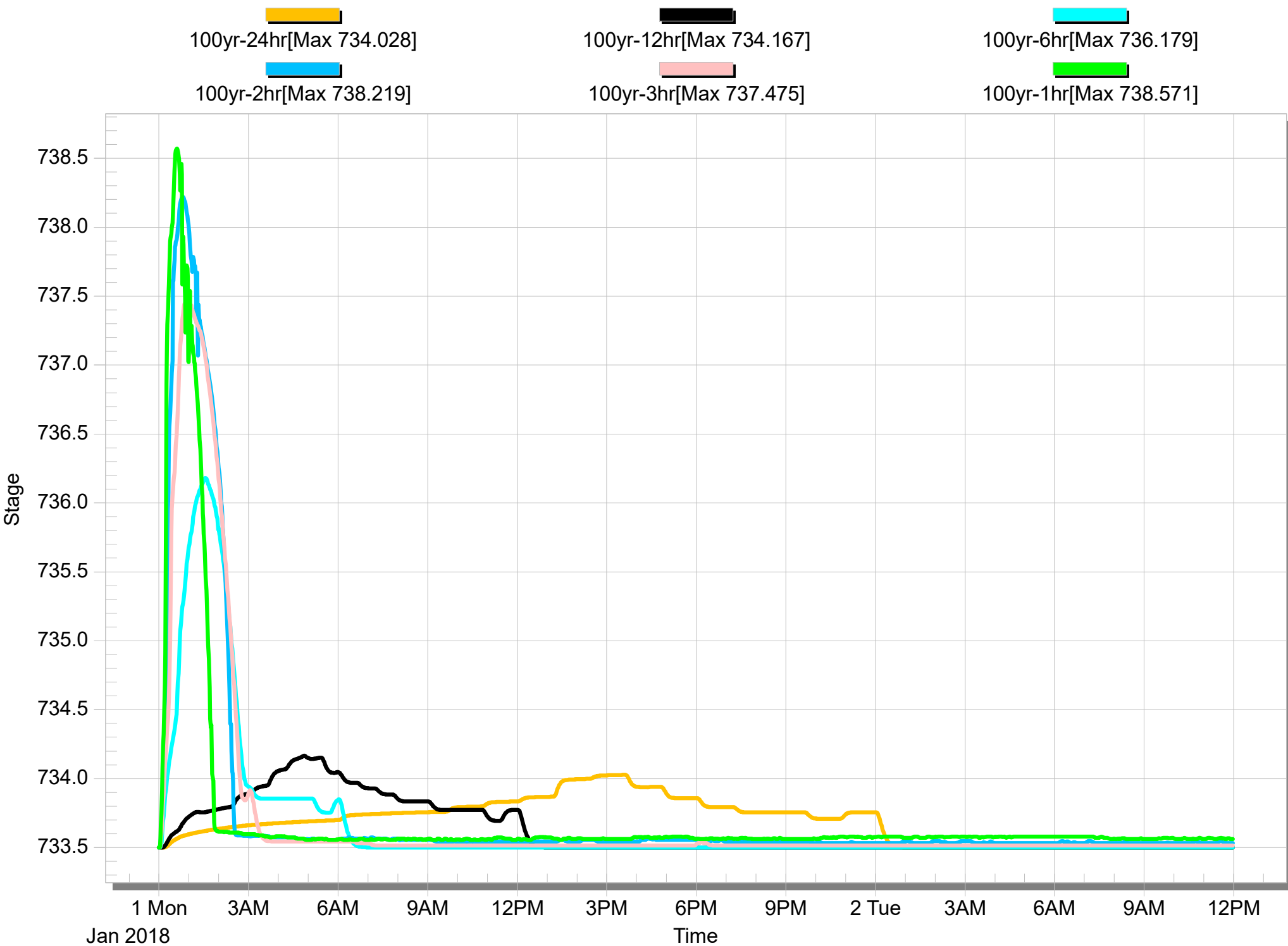
# Node - Node6



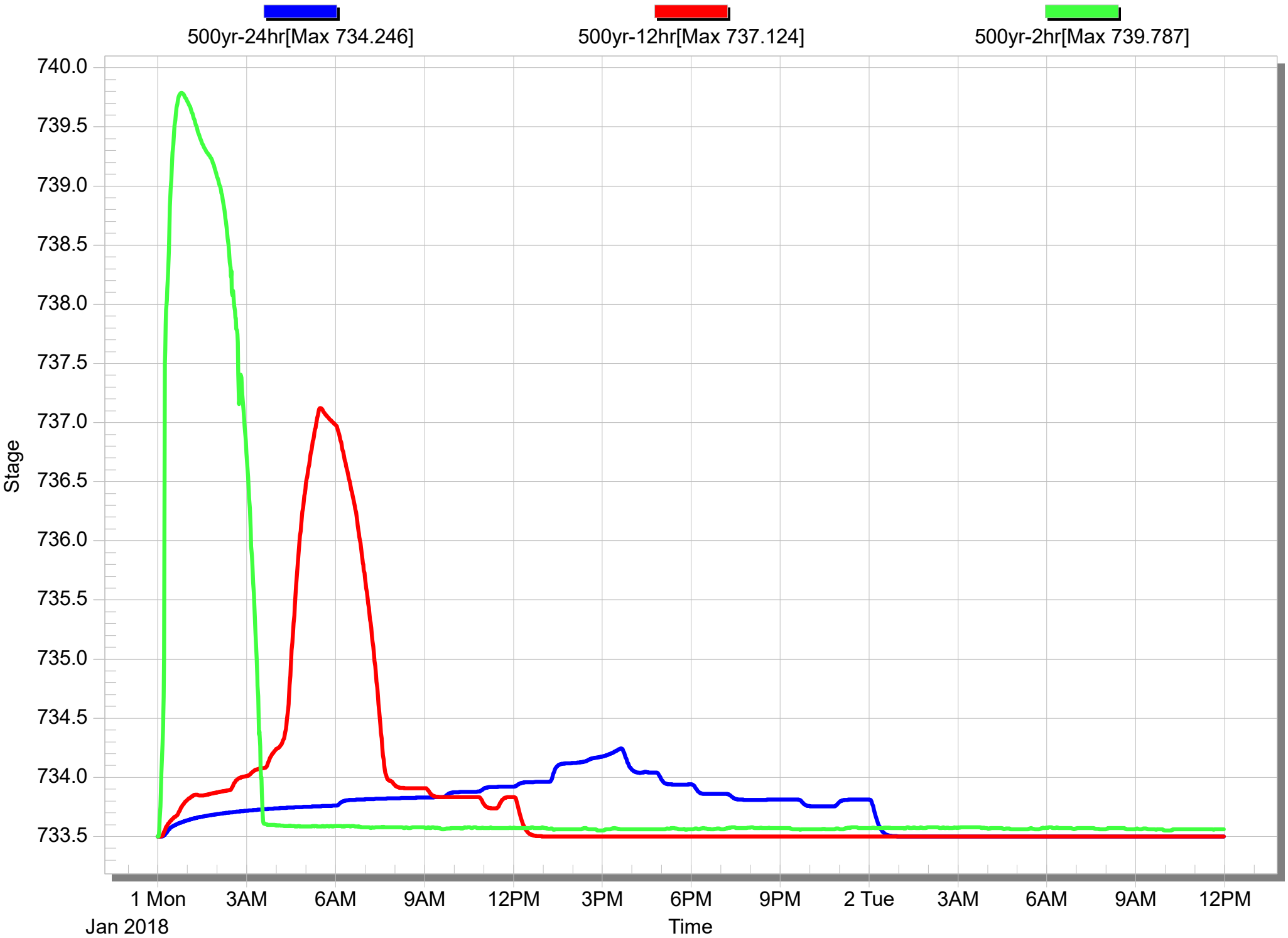
# Node - Node6



# Node - Node6



# Node - Node6



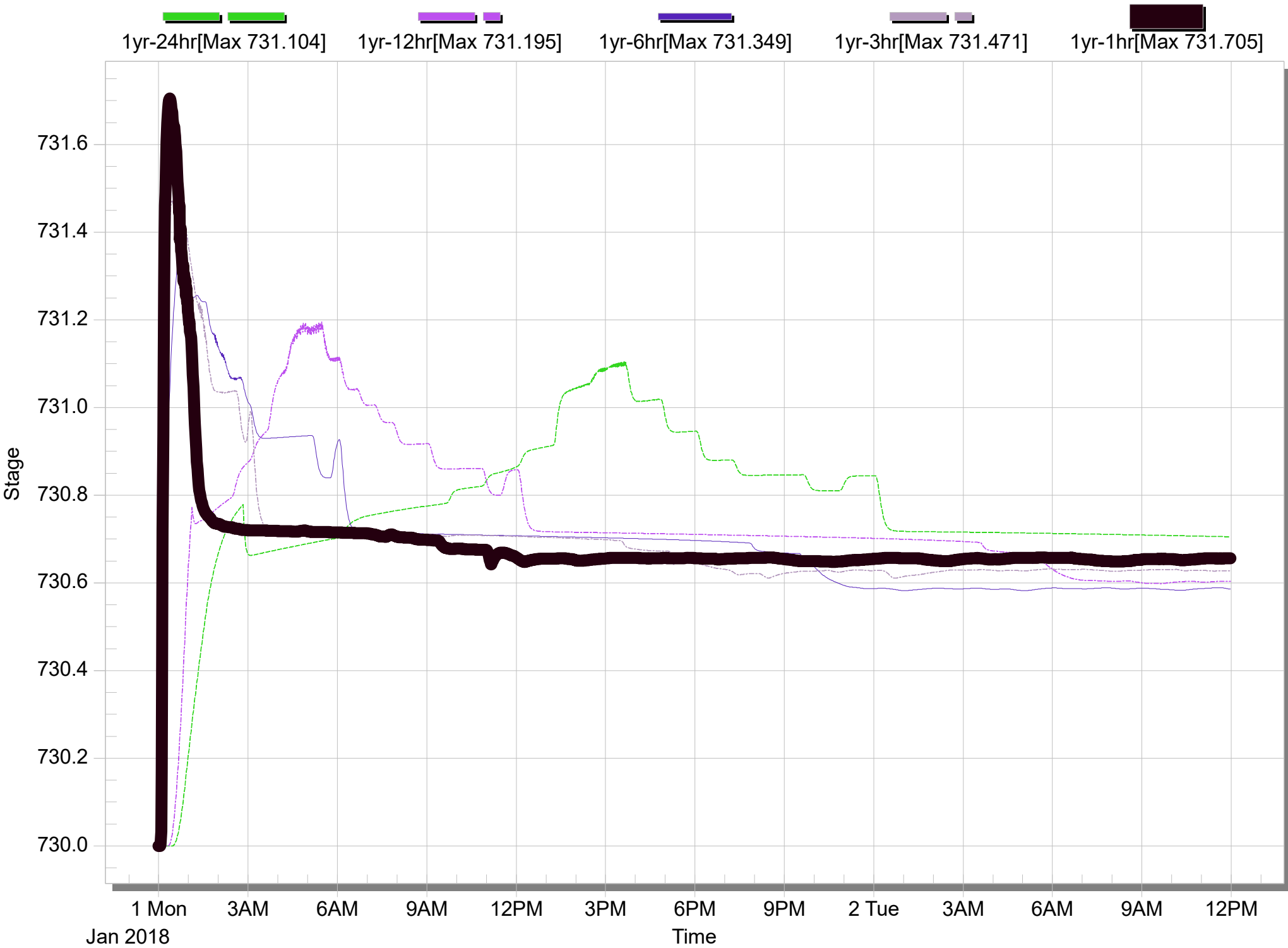


**823 Delles Rd Front Yard (Node 13)**  
**Proposed Conditions**

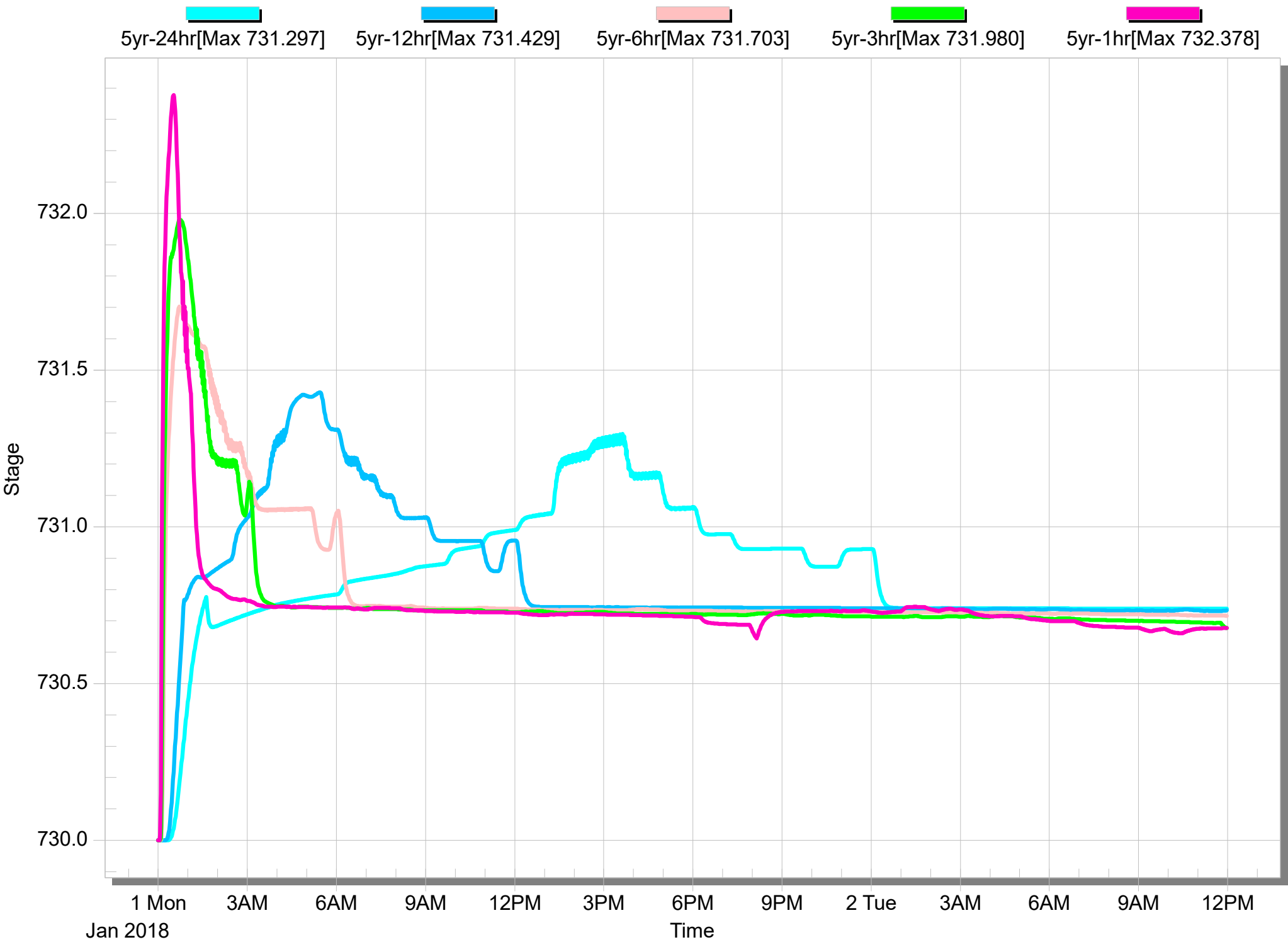
**PROJECT SITE:**

**Wheaton Flood Study**  
**616 Park Avenue Area**

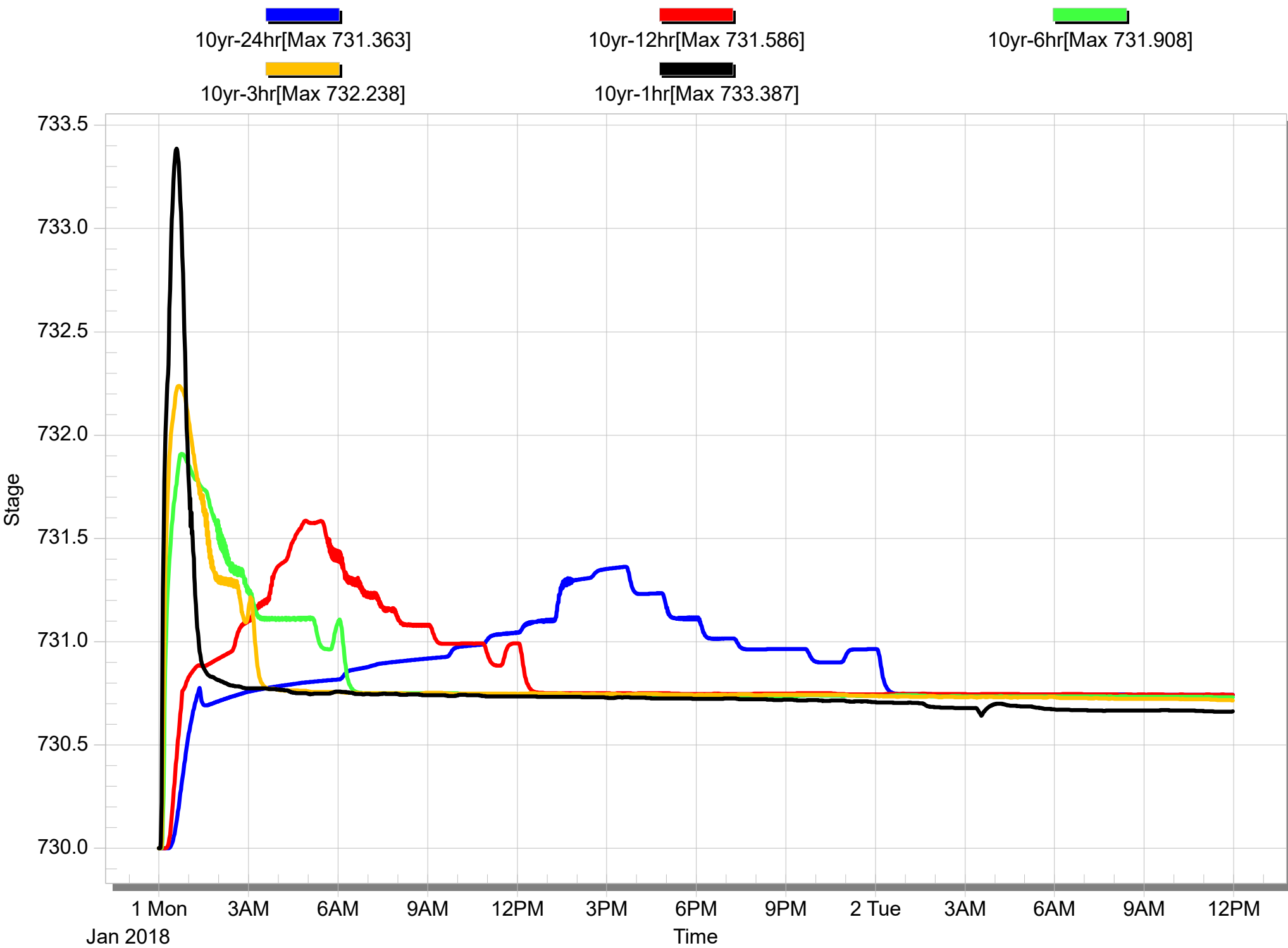
# Node - Node13



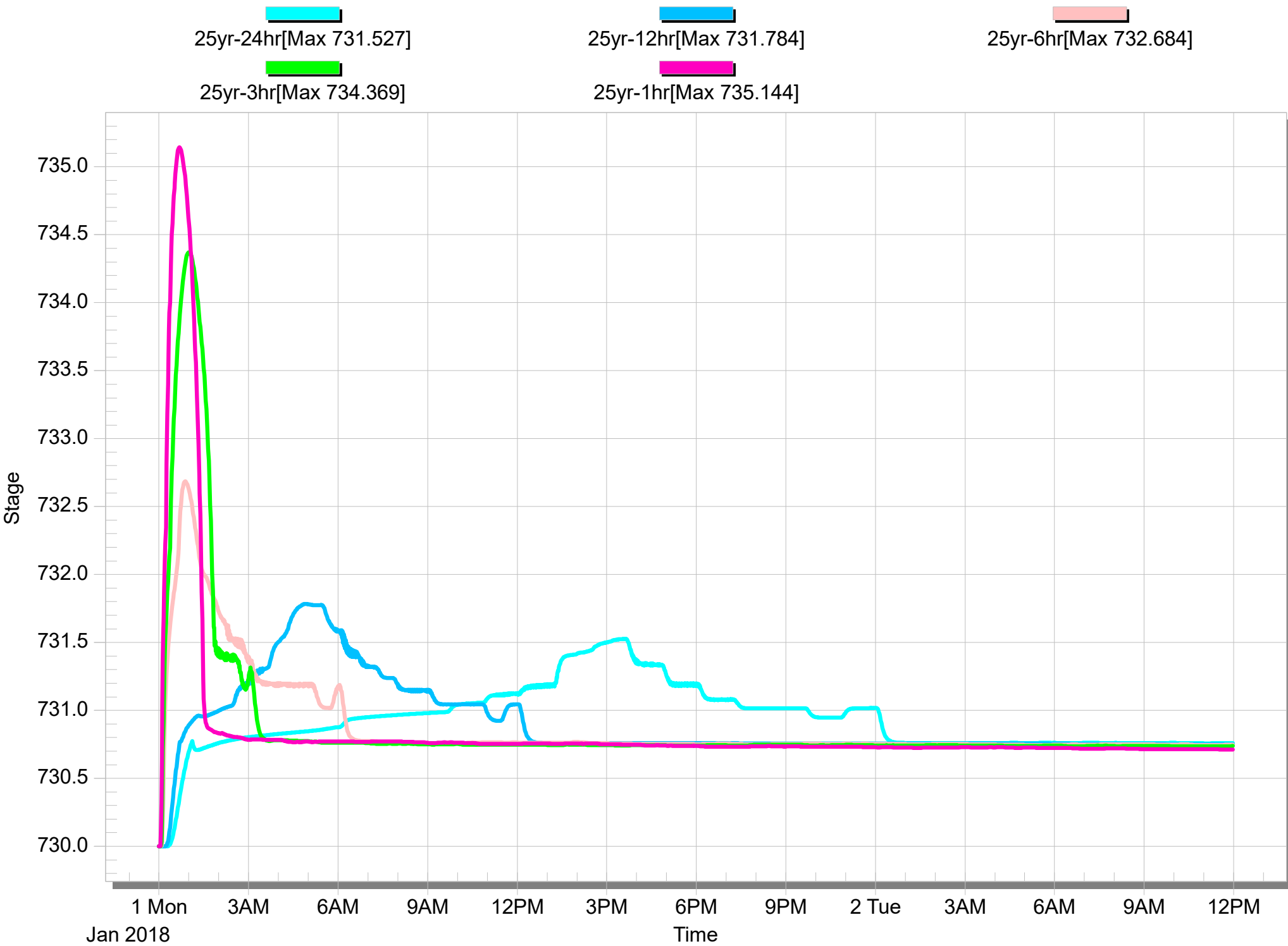
# Node - Node13



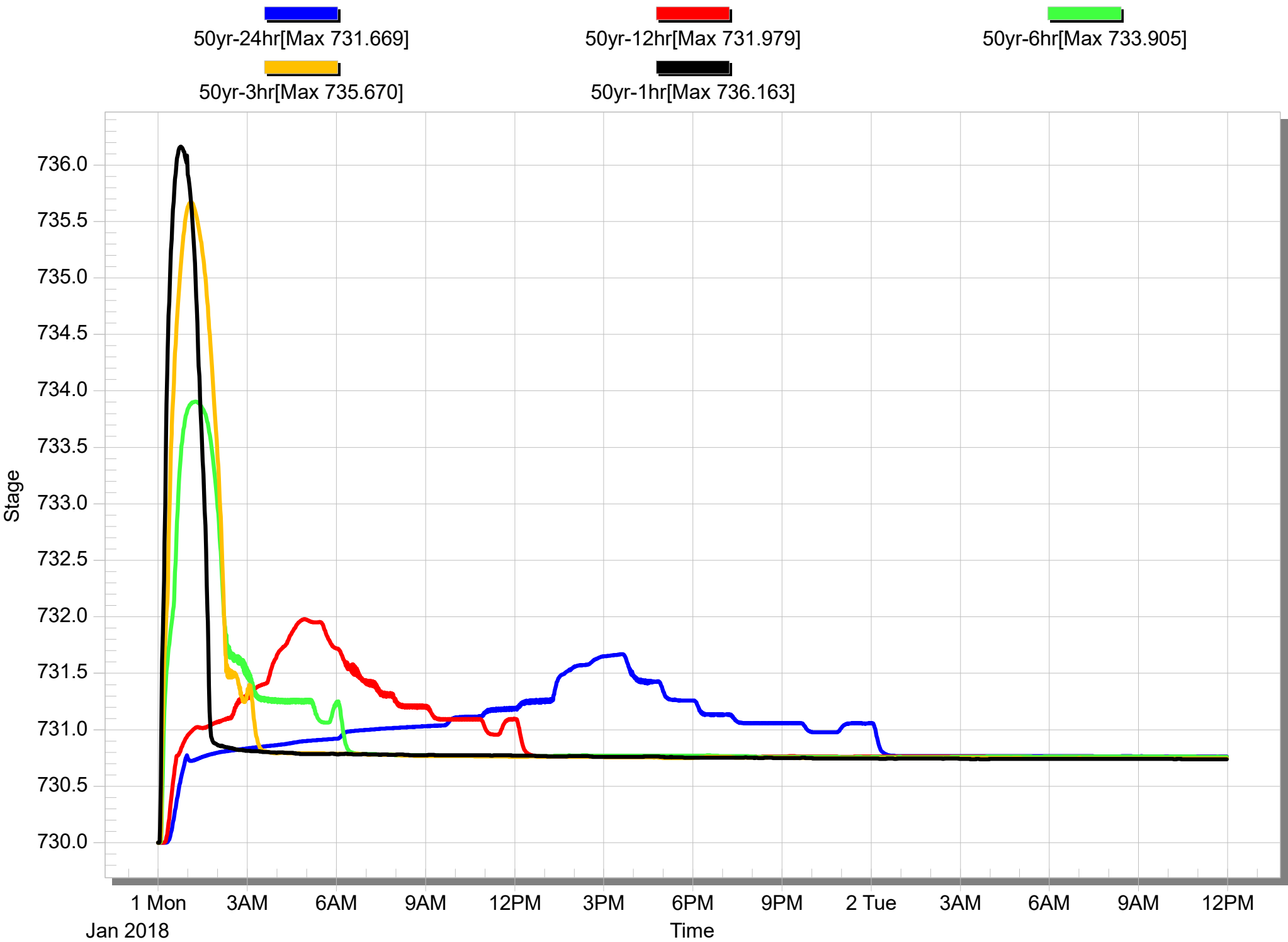
# Node - Node13



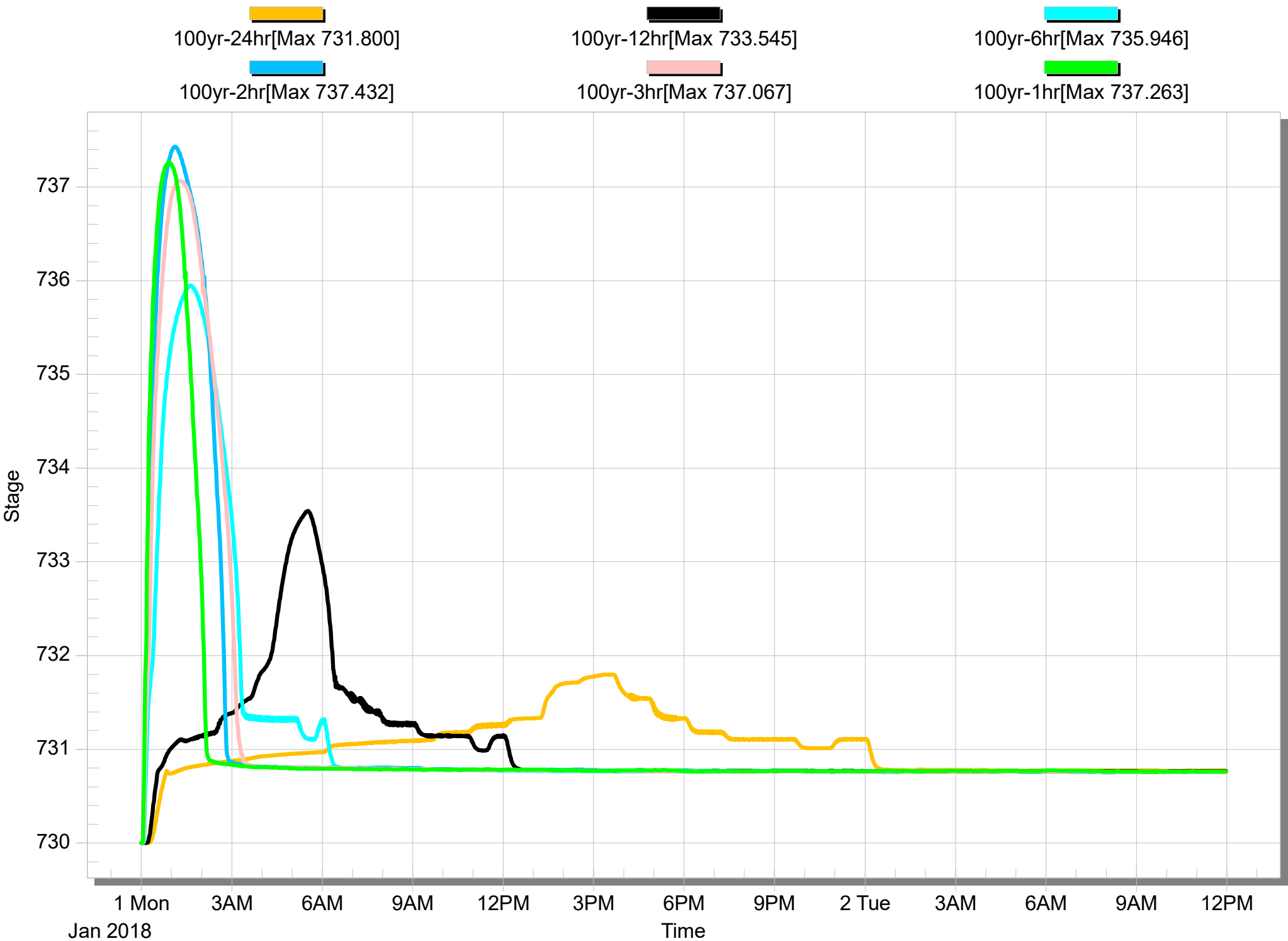
# Node - Node13



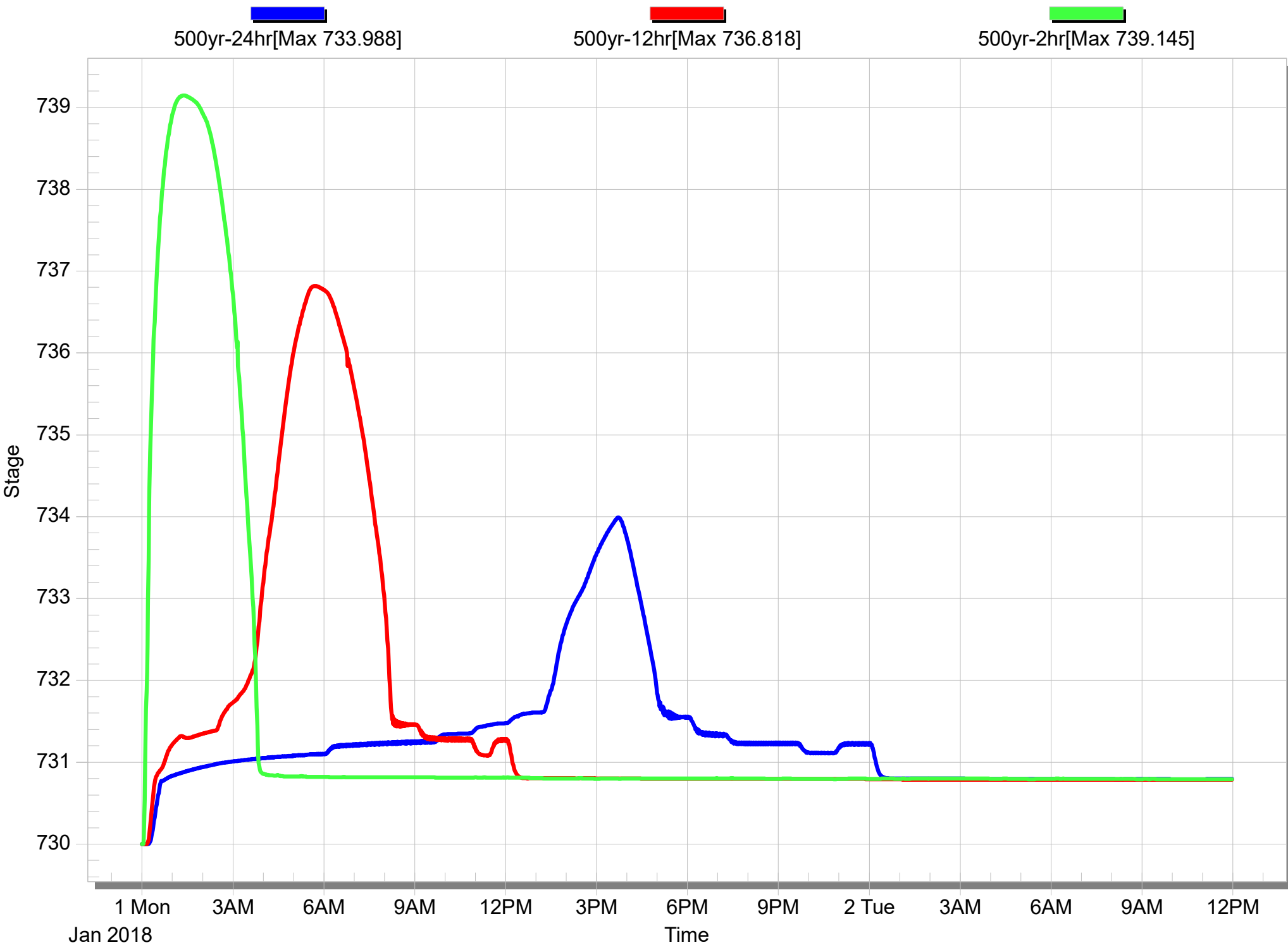
# Node - Node13



# Node - Node13



# Node - Node13



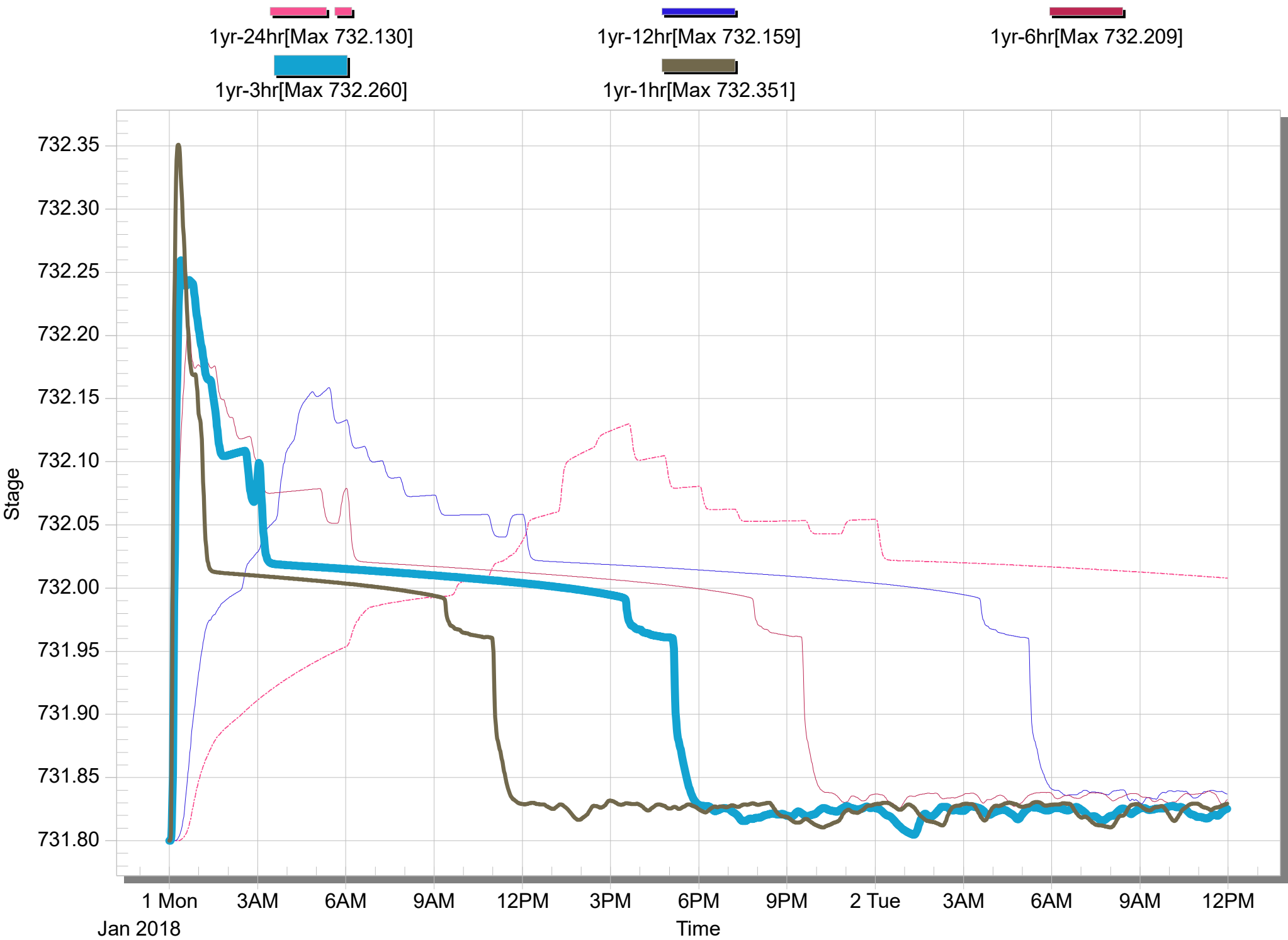


**819 Delles Rd Rear Yard (Node 23)**  
**Proposed Conditions**

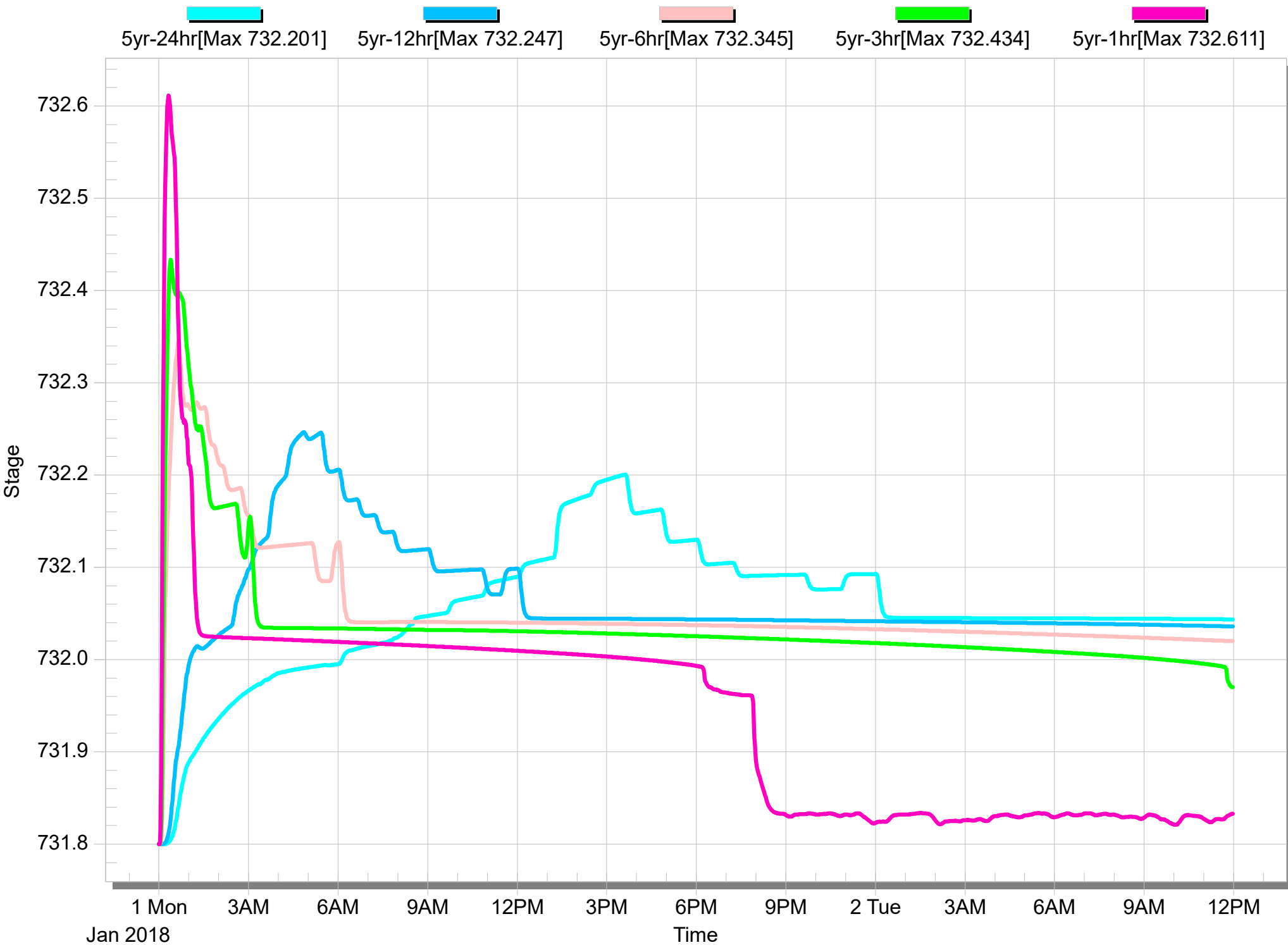
**PROJECT SITE:**

**Wheaton Flood Study**  
**616 Park Avenue Area**

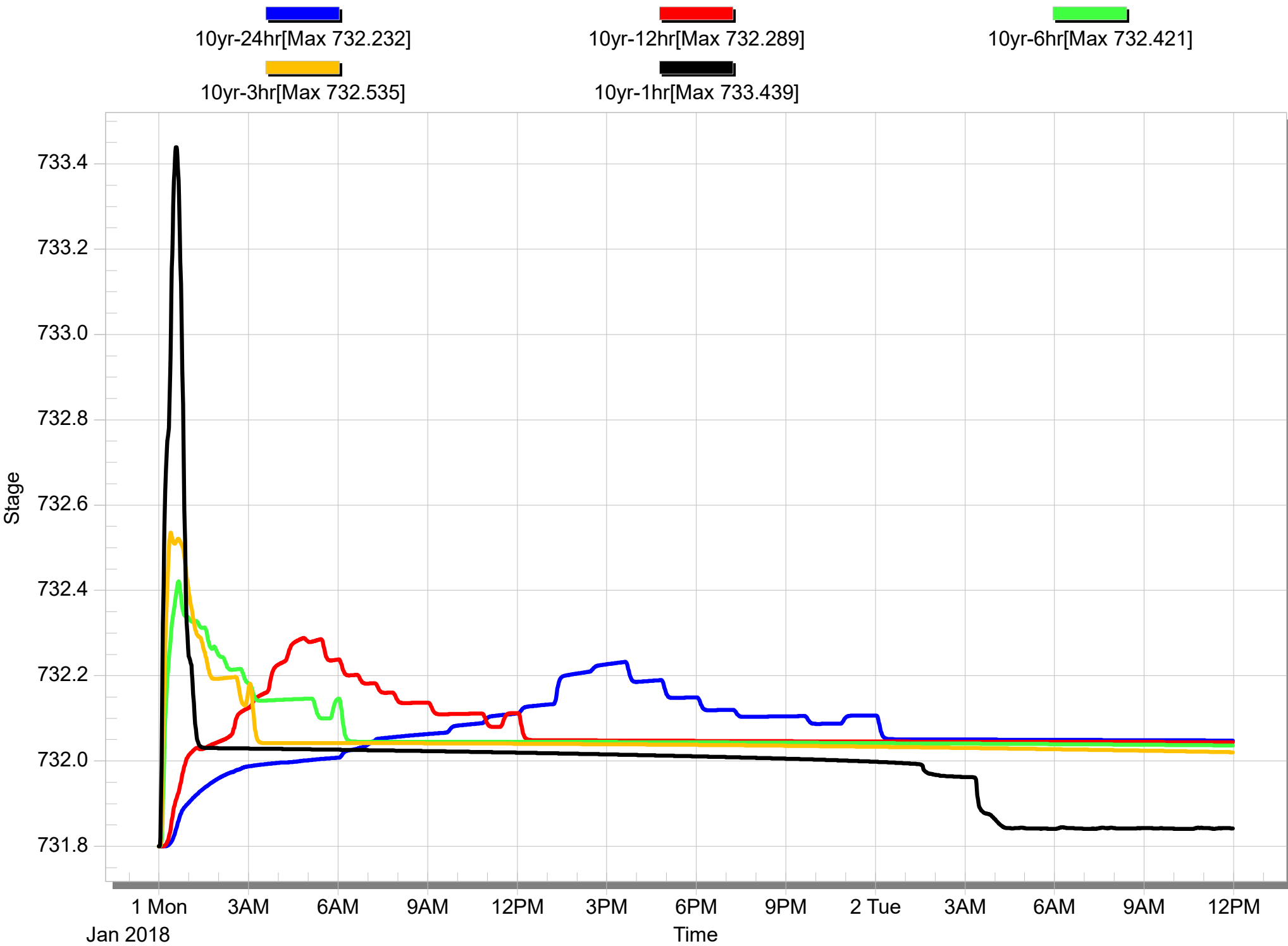
# Node - Node23



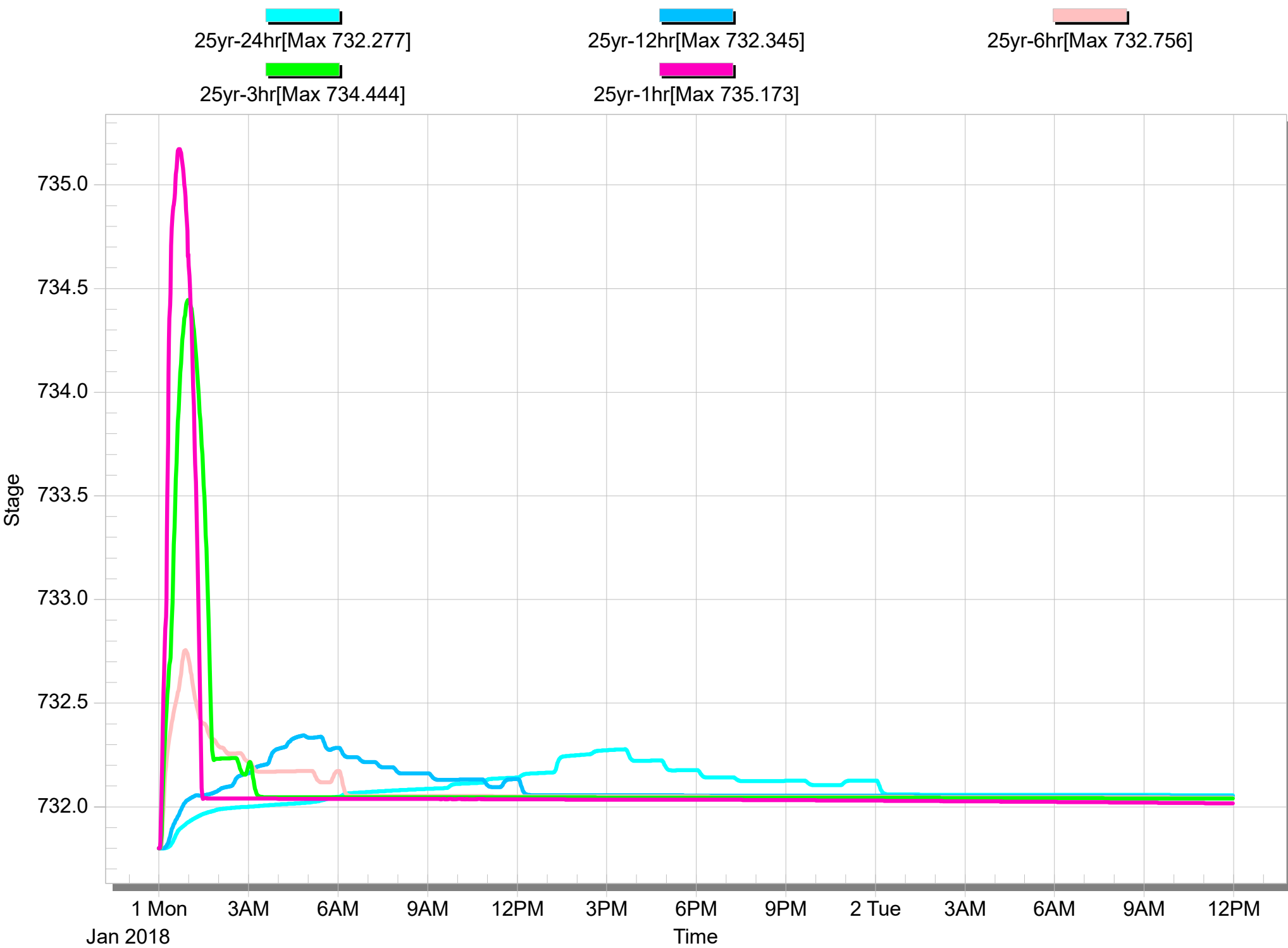
# Node - Node23



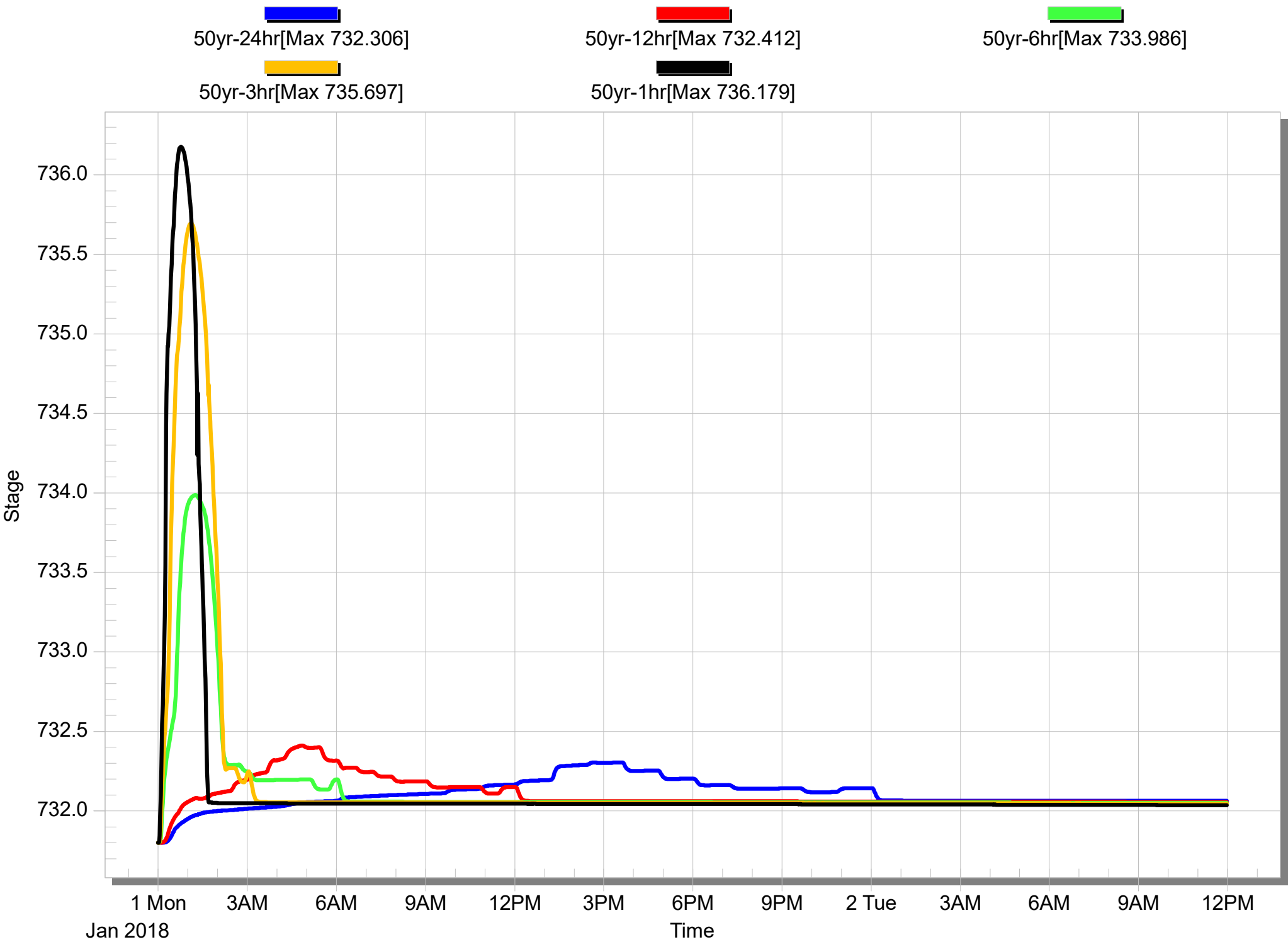
# Node - Node23



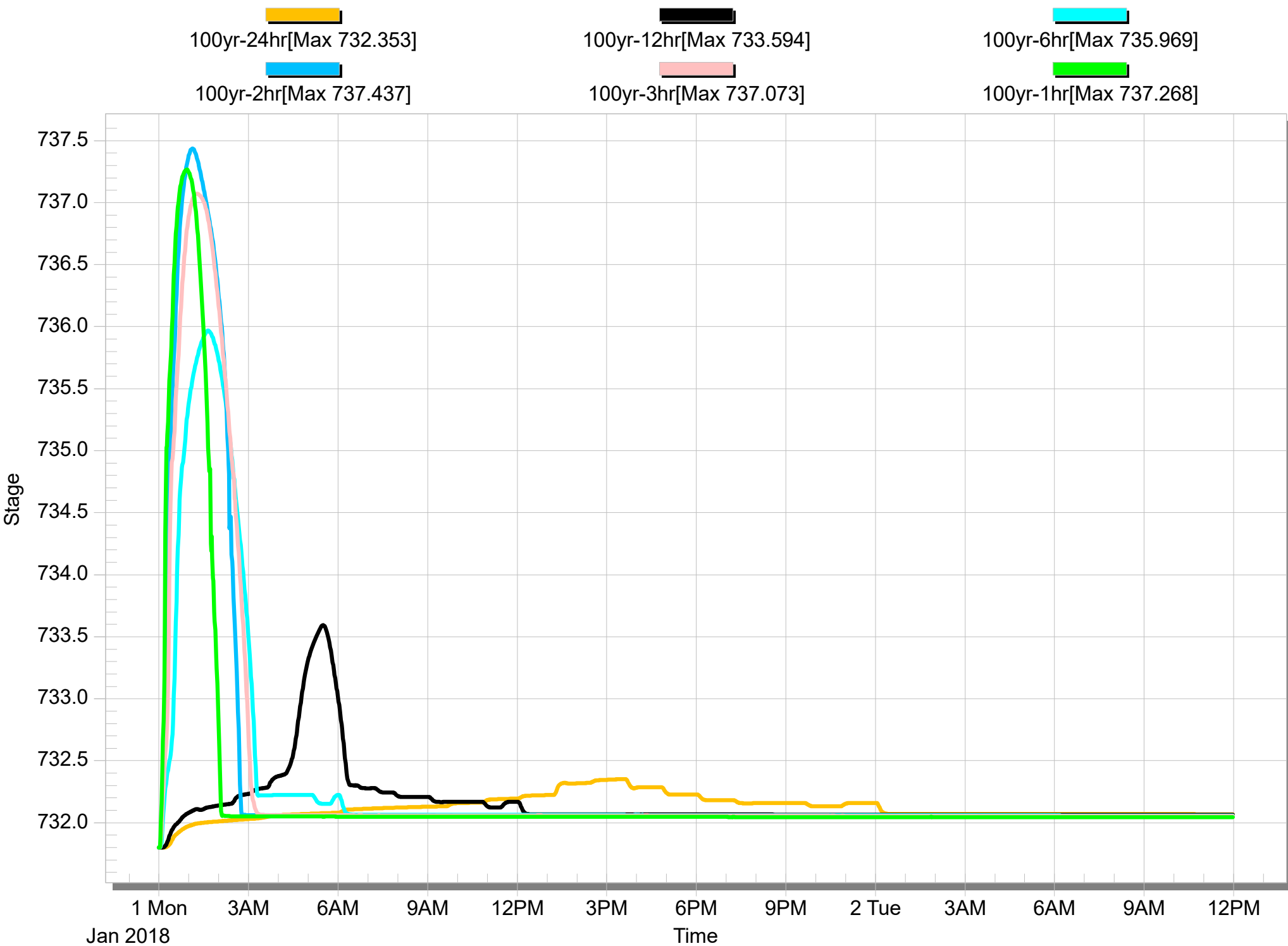
# Node - Node23



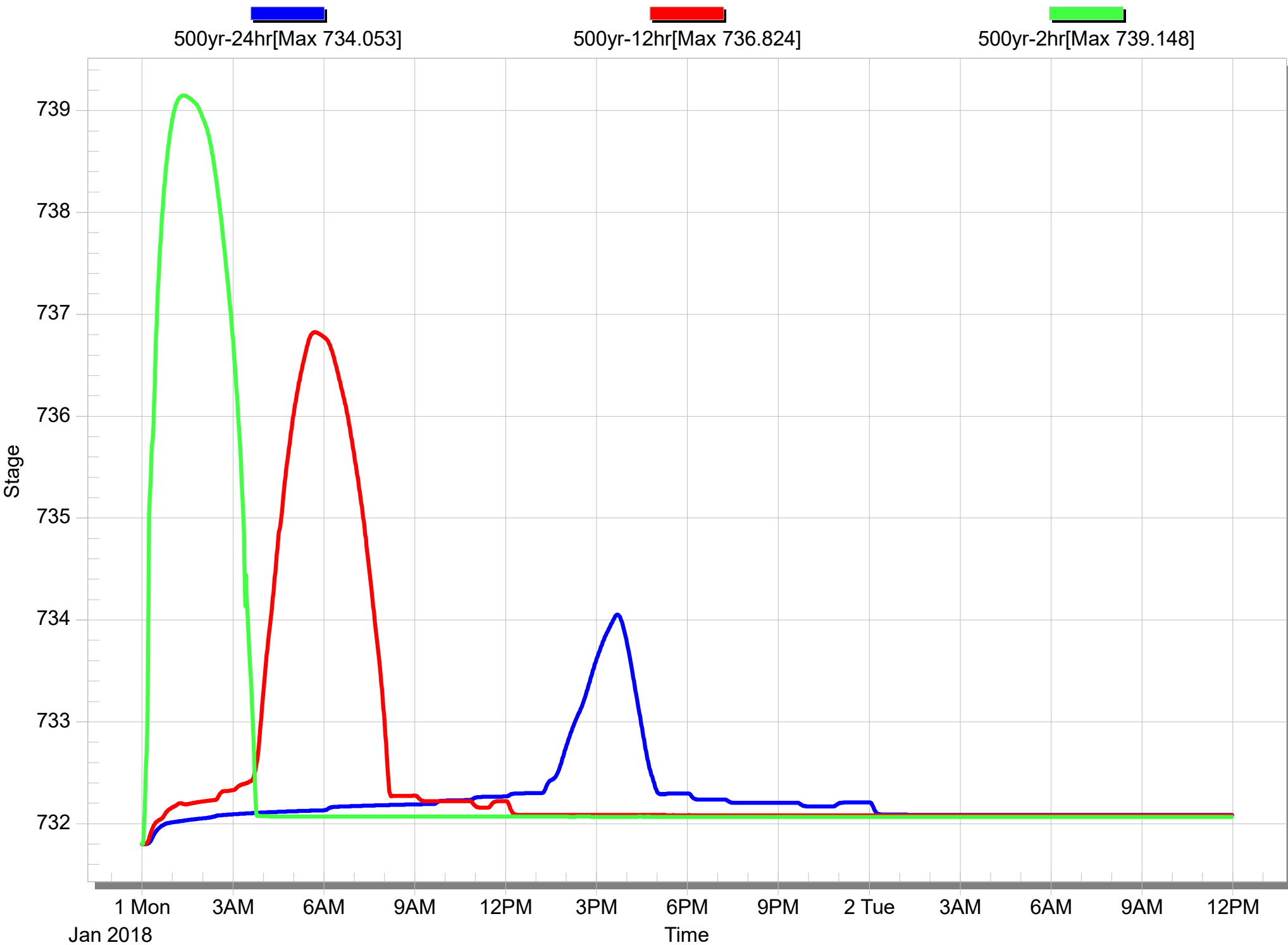
# Node - Node23



# Node - Node23



# Node - Node23



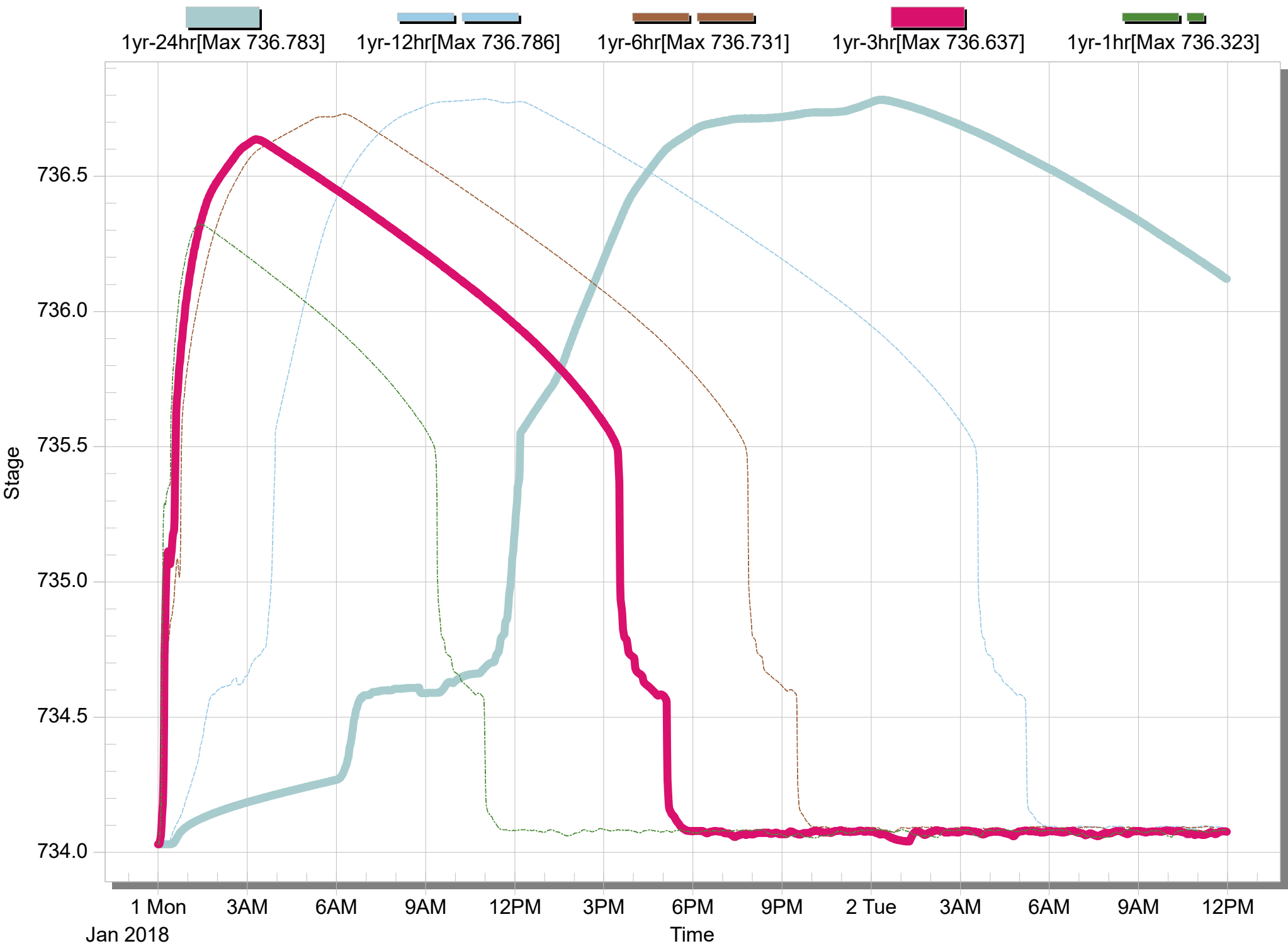


**616 Park Avenue (Node 24)**  
**Proposed Conditions**

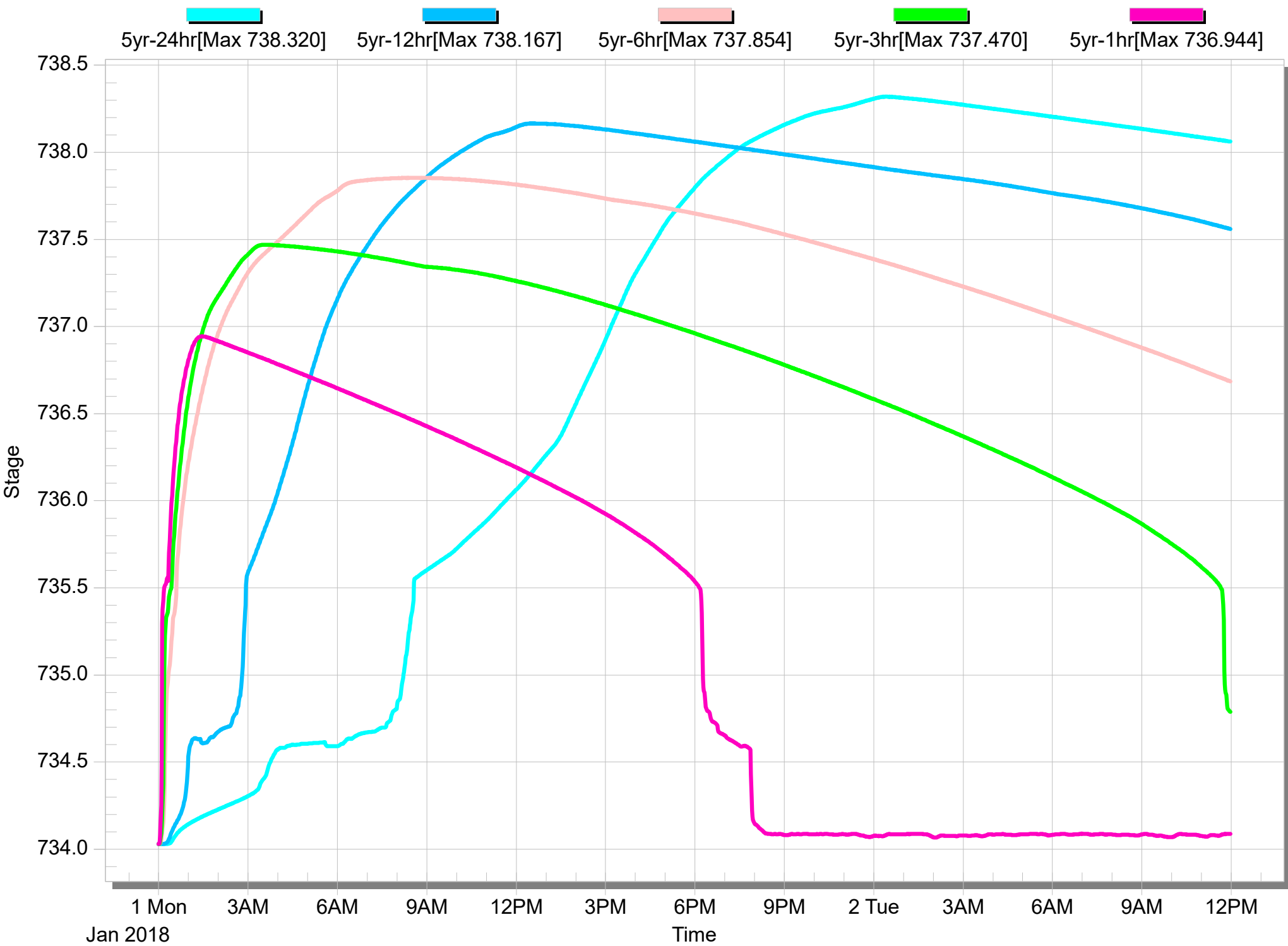
**PROJECT SITE:**

**Wheaton Flood Study**  
**616 Park Avenue Area**

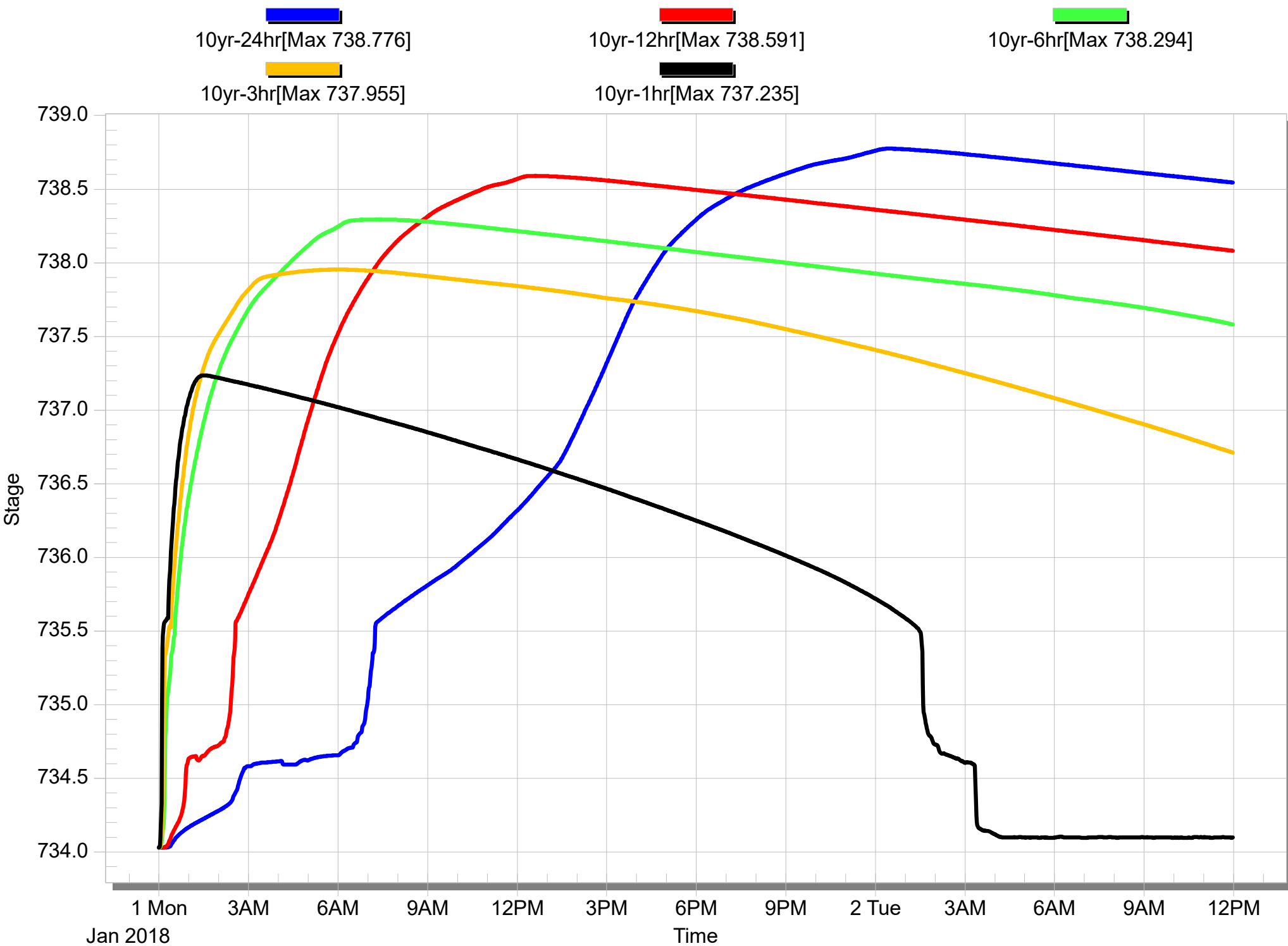
# Node - Node24



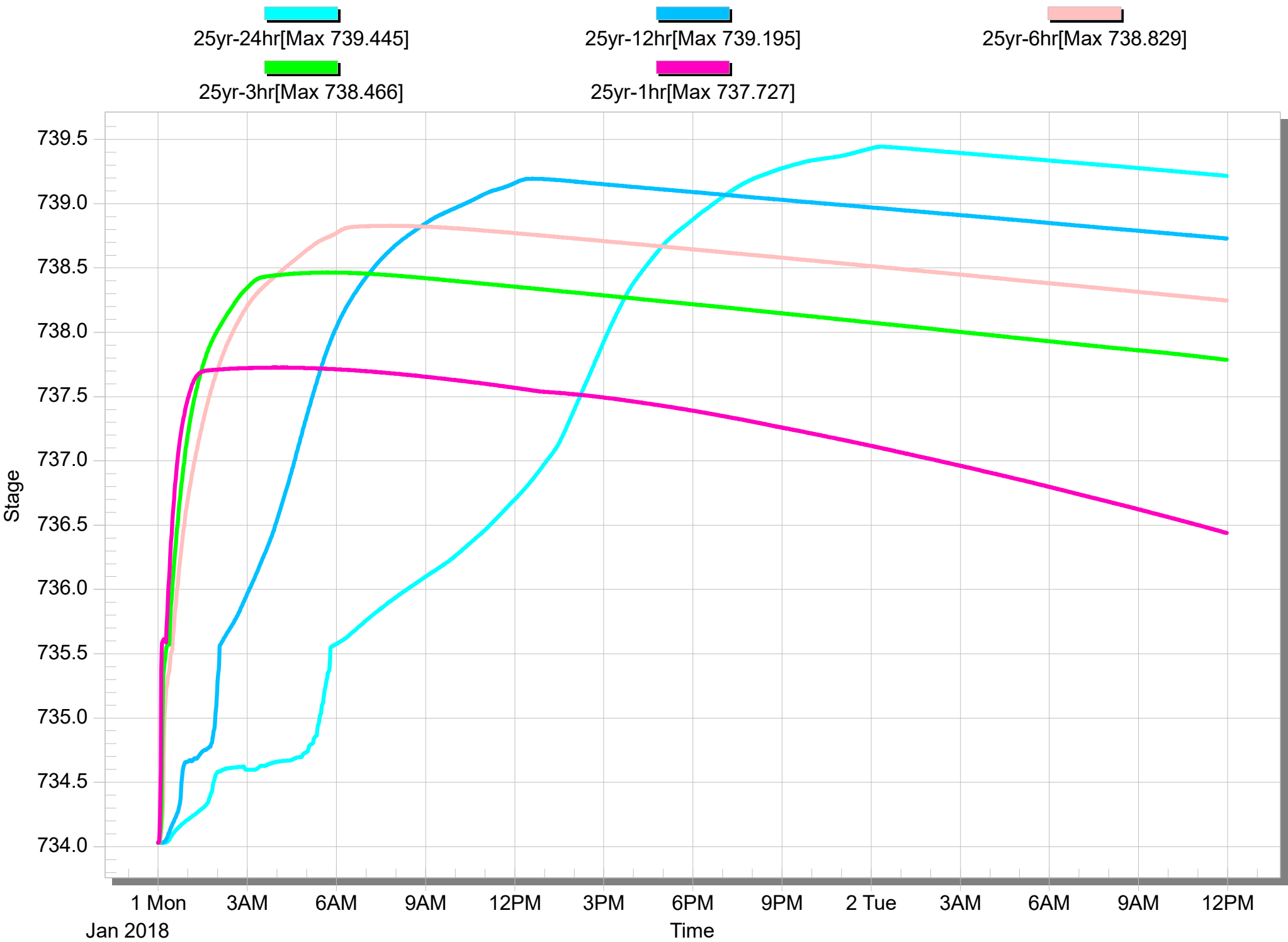
# Node - Node24



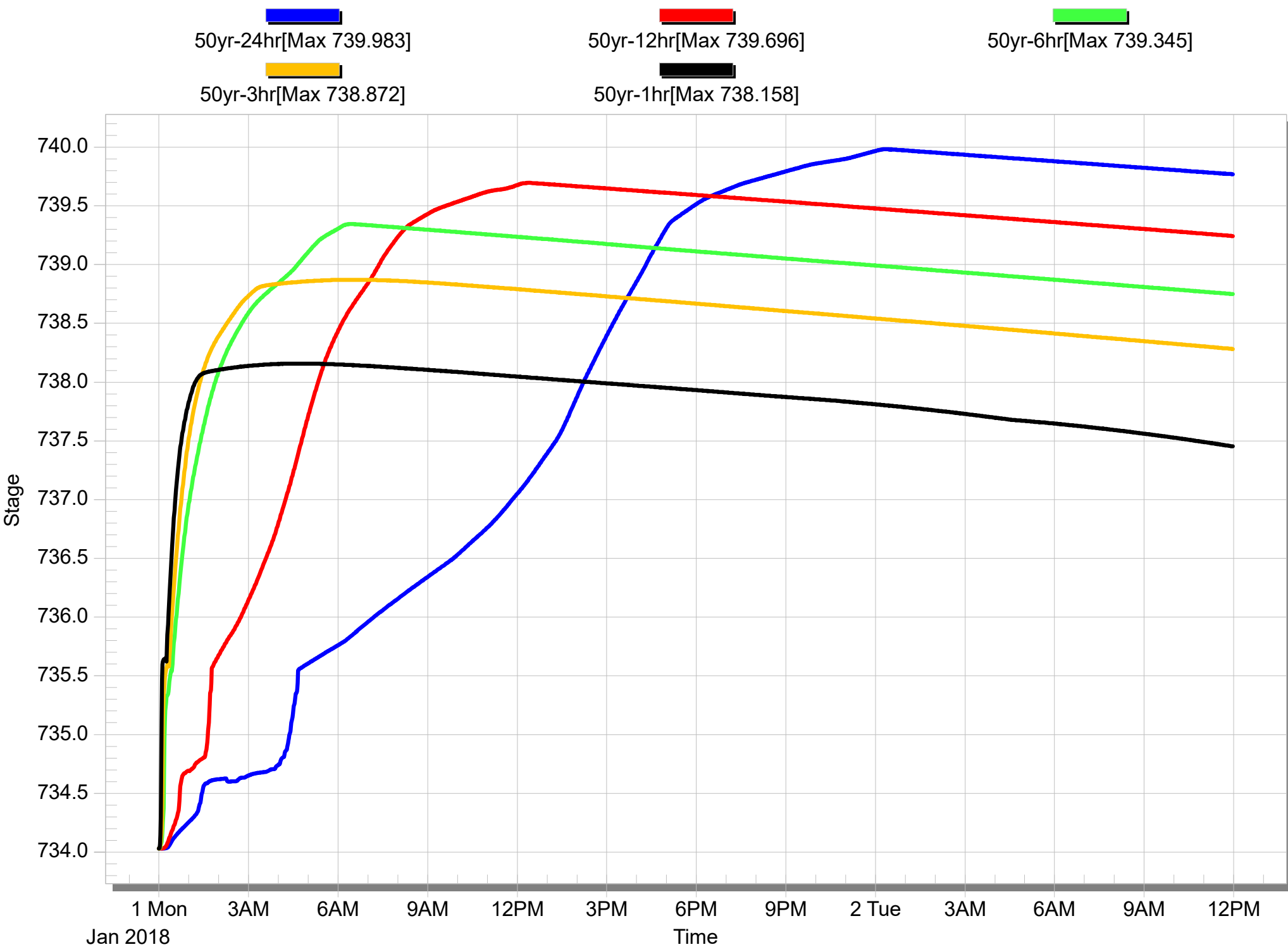
# Node - Node24



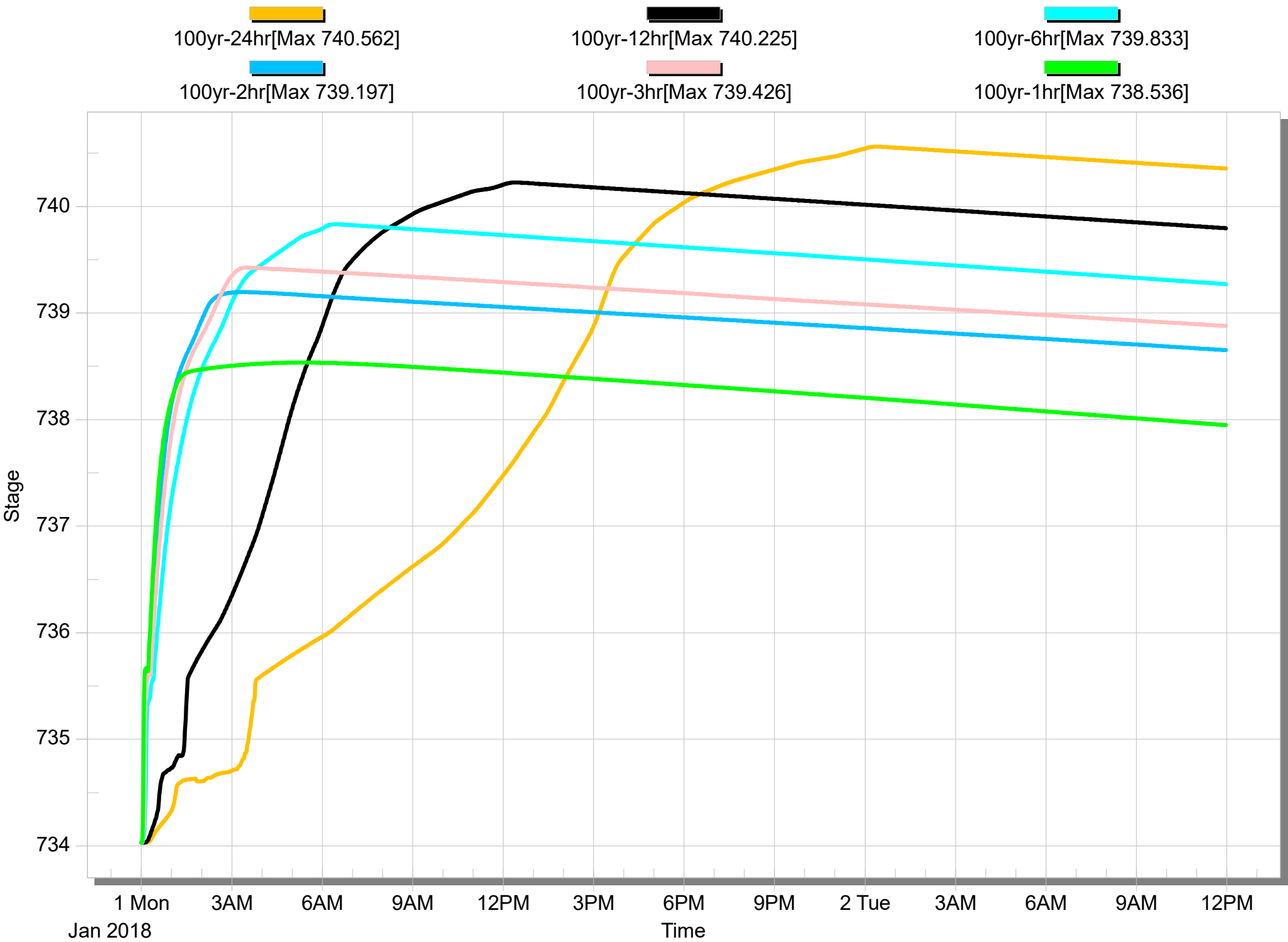
# Node - Node24



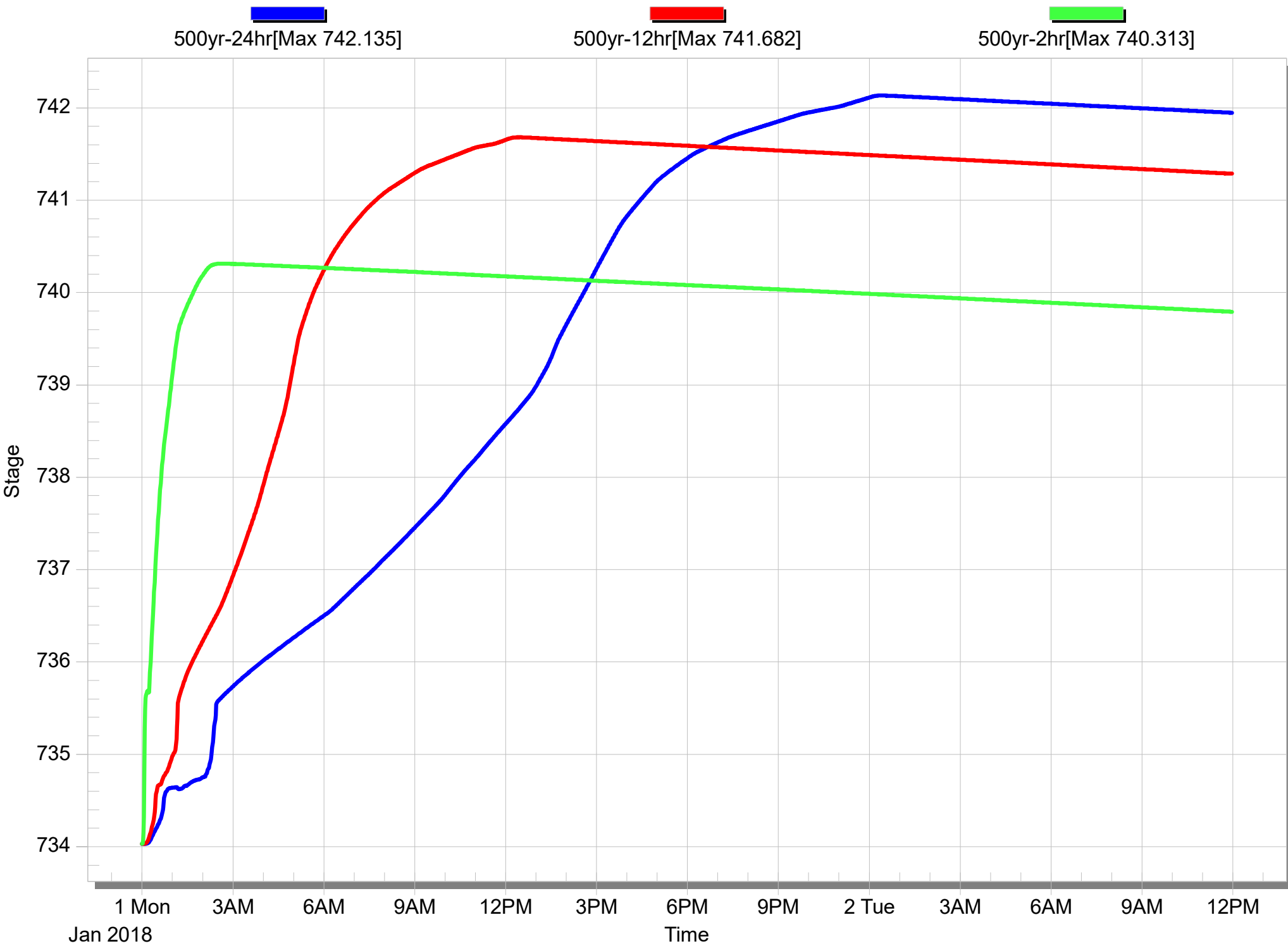
# Node - Node24



# Node - Node24



# Node - Node24







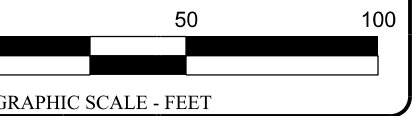
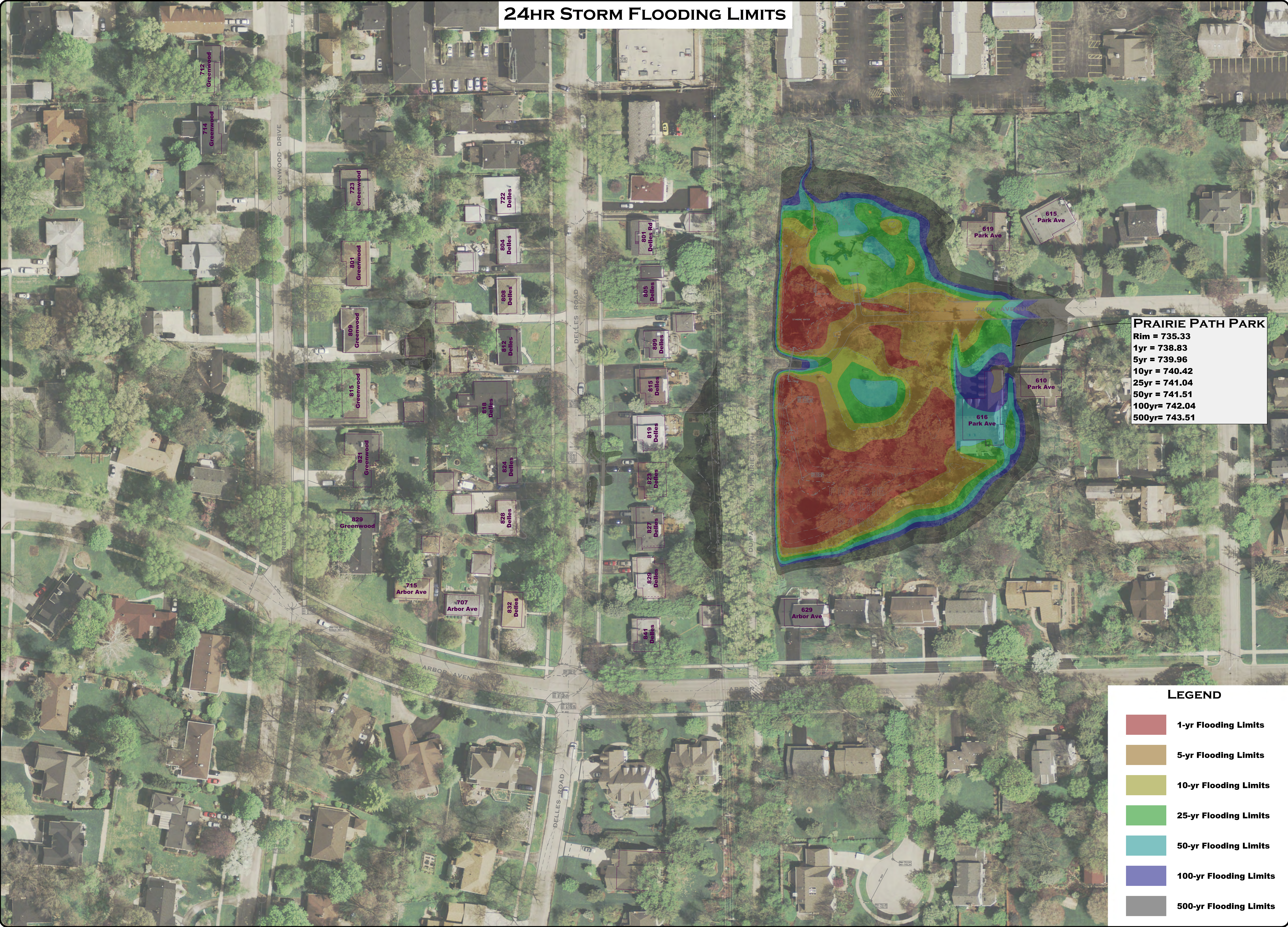


**24HR STORM FLOODING LIMITS**

**PRAIRIE PATH PARK**  
 Rim = 735.33  
 1yr = 738.83  
 5yr = 739.96  
 10yr = 740.42  
 25yr = 741.04  
 50yr = 741.51  
 100yr = 742.04  
 500yr = 743.51

**LEGEND**

- 1-yr Flooding Limits
- 5-yr Flooding Limits
- 10-yr Flooding Limits
- 25-yr Flooding Limits
- 50-yr Flooding Limits
- 100-yr Flooding Limits
- 500-yr Flooding Limits



**FLOOD PRONE AREAS STUDY  
616 PARK AVENUE AREA**

**FLOOD PRONE AREAS STUDY  
616 PARK AVENUE AREA**



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[illegible]

## 24HR FLOODING LIMITS

## 24HR FLOODING LIMITS

DATE: 5/30/2018  
FILE: E:\ACTIVE-PROJECTS\44059-173910-Dup\Page\ENGR-MR\STORMWATER\616 Park Ave\616-ParkAve-Exhibits.dgn  
MODEL: X-1B



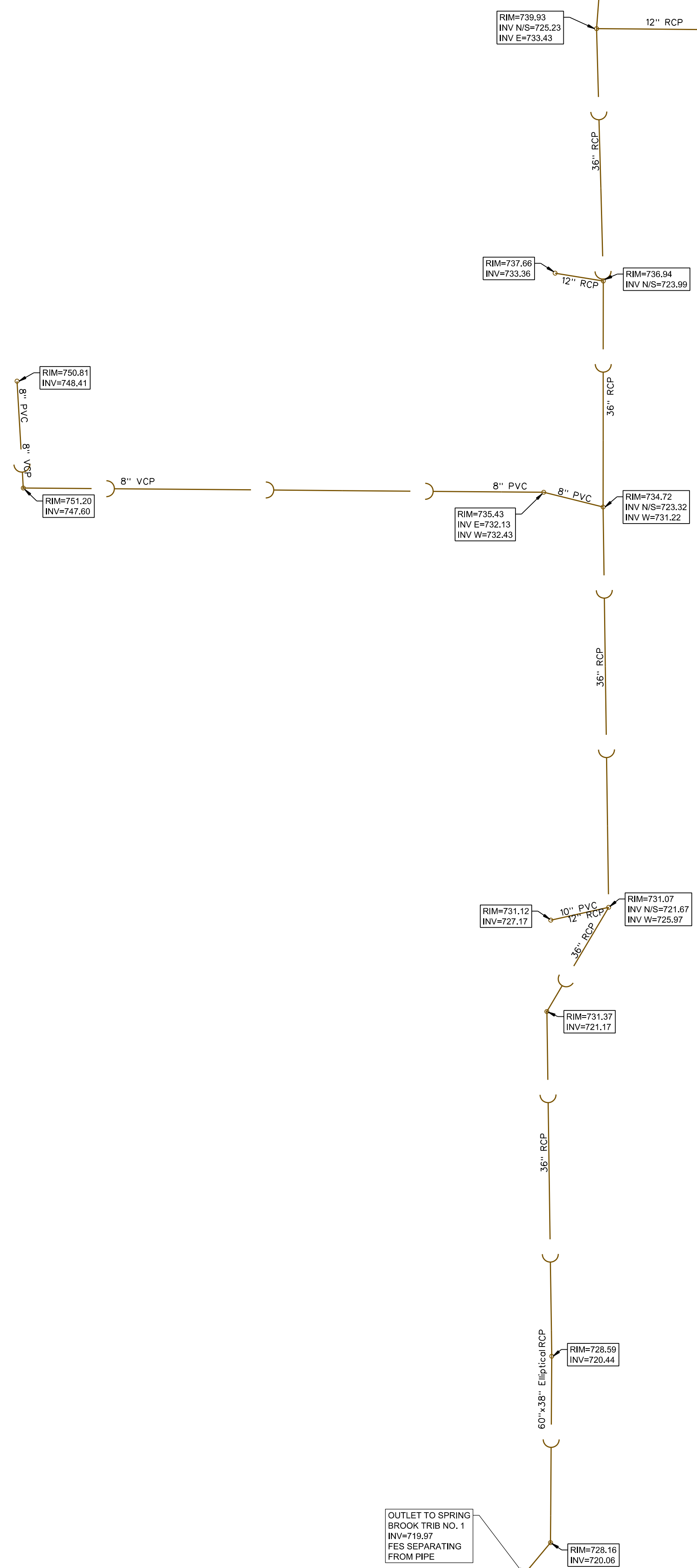




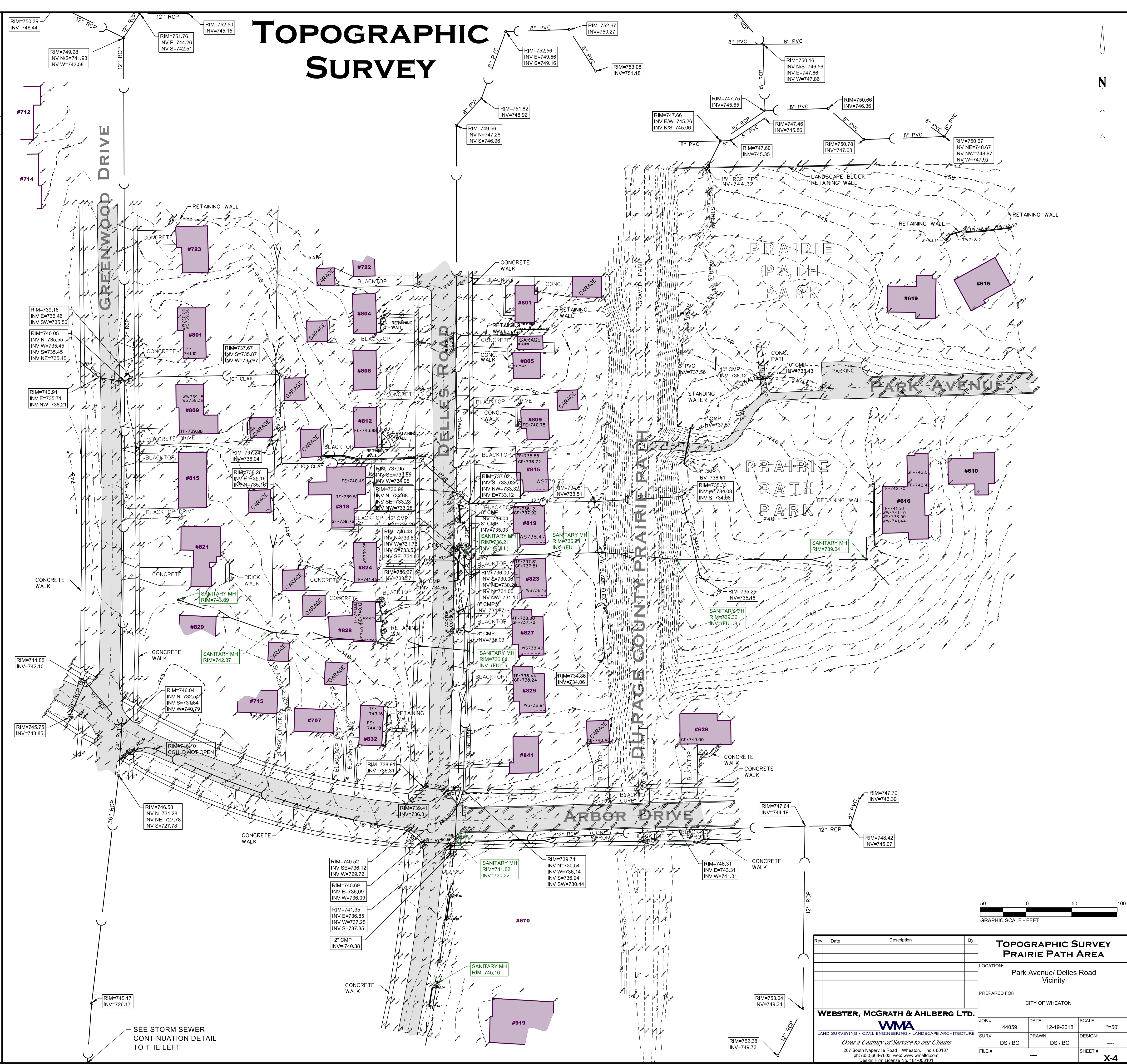




# STORM SEWER CONTINUATION



# TOPOGRAPHIC SURVEY



| Rev | Date | Description | By |
|-----|------|-------------|----|
|     |      |             |    |
|     |      |             |    |
|     |      |             |    |
|     |      |             |    |
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|     |      |             |    |
|     |      |             |    |

|                                               |            |
|-----------------------------------------------|------------|
| <b>TOPOGRAPHIC SURVEY</b>                     |            |
| <b>PRAIRIE PATH AREA</b>                      |            |
| LOCATION: Park Avenue/ Deles Road<br>Vicinity |            |
| PREPARED FOR: CITY OF WHEATON                 |            |
| JOB #:                                        | 44059      |
| DATE:                                         | 12-19-2018 |
| SCALE:                                        | 1"=50'     |
| SURV:                                         | DS / BC    |
| DRAWN:                                        | DS / BC    |
| DESIGN:                                       | ---        |
| FILE #:                                       | ---        |
| SHEET #:                                      | X-4        |

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