ABSTRACT

Structure and Content in *Whiteout*

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Whiteout creates an atmosphere of unrest and tension through the use of Z-cells, an eight-tone constructed scale and rotating octatonic scales. Combined with a complex collection of related sets, the harmonic language creates a swirling texture of notes symmetrically placed around the perfect fifth. The motivic content woven throughout the piece generates tension between the triplet and eighth/sixteenth note figures.

In conceptualizing this piece, I wanted to create an orchestration that utilized the wide spectrum of range for each of the instruments, and in turn gave each instrument a crucial and melodic role to play in the piece. The result is a piece that is a chaotic amalgamation of many different ideas on the surface yet driven by symmetrical harmonic content and rhythmic motifs underneath. These aspects are intended to mimic the underlying stability and surface chaos of a blizzard.

Structure and Content in *Whiteout*

by

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A Thesis

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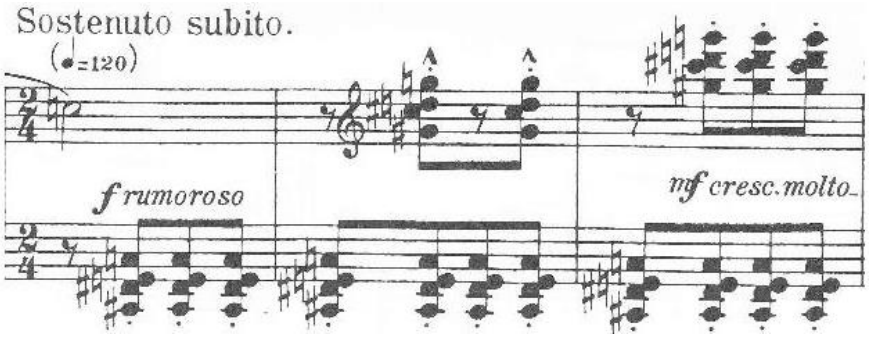
STRUCTURE AND CONTENT IN *WHITEOUT*

Introduction

Throughout the composition of *Whiteout*, the symmetrical harmonic structures in Bela Bartok's music continued to be an inspiration. While working with symmetrical self-contained units within a perfect fifth, I discovered Bartok's z-cell, which is the set [0,1,6,7]. This pitch set can be seen in the right hand in example 1 of his *Improvisations on Hungarian Peasant Songs: VIII* between the pitches of G#-C#-D-G (rearranged to G-G#-C#-D for the z-cell).[1]

Example 1: Bela Bartok's z-cell from *Improvisations on Hungarian Peasant Songs: VIII* (mm 65-67):



The balance between these symmetrical structures and disjunct rhythmic ideas contribute to the conflict between tension and release. These ideas illustrate the unpredictability of a blizzard as it slowly builds to a whiteout with swirling snow and overpowering gusts of

[1] Bela Bartok, *Improvisations on Hungarian Peasant Song*, (Mineola: Dover Publications, 1998), 14.

wind. My goal is for the listener to hear and feel the tension of the z-cells and the driving rhythmic motifs in the A and A' sections, and sense the relief from the pitch-centered and lyrical B section. Throughout this paper I will illuminate the concepts of symmetry, z-cells, pitch-set contraction and motivic repetition by exploring the harmony, rhythm and overall form of the piece.

Concept Summary

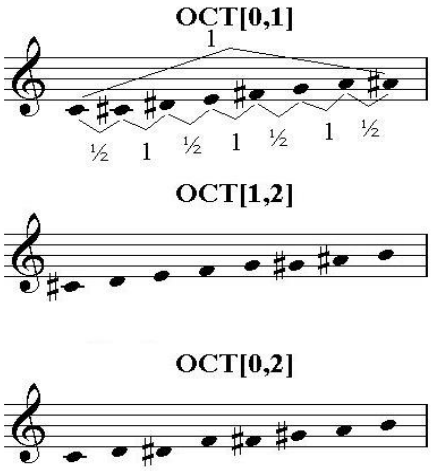
Whiteout began as a collection of piano pieces before transforming into a large orchestral work. The piece is based on the idea of a slowly expanding snowstorm that eventually makes it impossible to see. The beginning reflects a serene environment as snow begins to fall through the descending melody in the cello line continued in the oboe in measure 6. However, this melody soon becomes absorbed by the looming threat of the storm represented by the minor ninths beginning in the flutes and continuing in the brass. While the storm can be seen on the horizon the looming event is diffused by the call of the French horn which echoes elements of the opening cello line and is the warning call before the blizzard begins. At rehearsal B the flurries start with the contrasting rhythmic lines between the entire wind and string sections. The sixteenth note triplet figures in the winds and the straight sixteenth note figures in the strings begin to mix together as the snowstorm builds in fury until the release of its full power at rehearsal C. Here the unpredictable meter changes and jostling between the winds and strings eventually initiate the larger more singular gusts when the strings come together at the unison in measure 71. By rehearsal D the whiteout is complete, as the sonorities between the instruments have become extremely blurry. The next section is serene and offers an ominous calm to the piece. As everything becomes hazy, the blindness becomes so

encompassing that the inability to see anything creates an unprecedented calm. The section passes off the chorale-like gesture from the strings to the brass, where before lulling the listener into passivity the strings and winds interject at rehearsal E with tremolos. The high intensity and irregular tuplet groupings of the strings into septuplets and the powerful octatonic-based melody in the brass are accentuated by the interjections of the original pitch-sets and augmented rhythms utilized at rehearsals B and C. Elements of the opening cello line are also integrated into the powerful low brass before colliding in measure 153 where the piece barrels to the grandiose ending. The blizzard now reaches its full force and slams into everything, causing a complete whiteout.

Harmonic Analysis

Whiteout integrates elements of the octatonic scale, Bartok's z-cell [0,1,6,7] and a constructed eight-tone set or scale. Example 2 illustrates the different octatonic scales I will be referencing throughout the rest of the paper.[2]

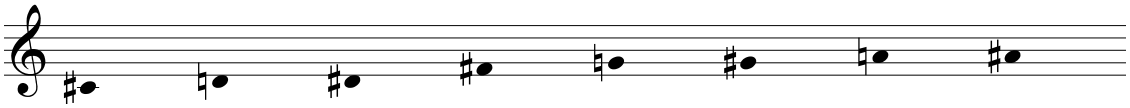
Example 2: Octatonic Scale Groupings



[2] Octavebox, "Octatonic Scale," last modified 2015, accessed January 29, 2015, http://www.octavebox.com/scales/octatonic-scale/.

The opening pitches in the vibraphone and piano in measures 3-4 are an eight-tone set constructed with three semi-tones, a minor third gap and five semi-tones followed by another minor third gap (to return to the first pitch). This constructed set or scale is shown in example 3.

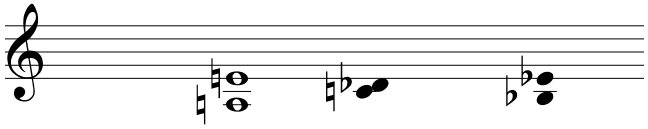
Example 3. Eight-tone set/scale:



The scale contains elements of both Bartok's z-cell and the octatonic scale making it the ideal hybrid for the piece. The interjection of the minor ninths in measure 5 in the flutes fits within octatonic scale [0,2], Bartok's z-cell and the constructed eight-tone set. These minor ninths are crucial intervals that slowly develop into the full z-cell in later segments. When the oboe enters in measure 6 at the perfect fifth above the initial pitch in the cello line (D), the all-important structural interval of the perfect fifth is established.

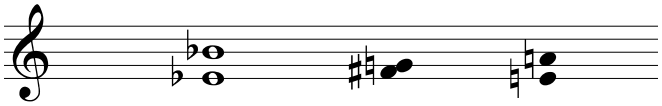
The perfect fifth serves as the main structural interval for the entire piece. Because of the frequent use of the octatonic scale, I was able to create a symmetrical balance within the perfect fifth by utilizing pitches solely from the scale. As shown in example 4a the outline of the perfect fifth or A-E is a self-contained symmetrical unit with the C-Db and the Bb-Eb also fitting within octatonic scale [0,1].

Example 4a. Perfect fifth and symmetrical interior intervals:



These inherent symmetries allowed me to utilize a split third chord along with Bartok's z-cell or set [0,1,6,7]. The Bb-Eb or the perfect fourth in the original self-contained unit can also be inverted into an Eb-Bb to form a new self-contained unit (example 4b).

Example 4b. Perfect fifth and symmetrical interior intervals (inversion):

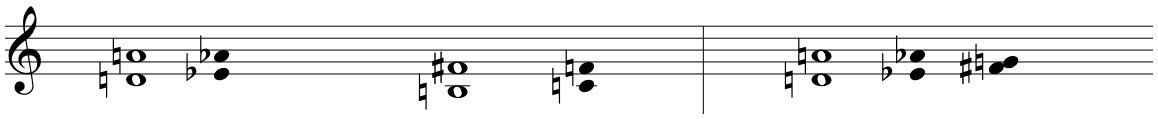


As will be shown later in the piece, these fourths respelled as fifths become an inversional symmetry that I utilize to create harmonic movement yet keep the structure of the z-cell nearly identical. However, in the beginning, fragments of these elements are used to foreshadow the later symmetry. In measures 6-7 the strings land on the pitches A-C-Db. Although these notes have migrated away from the opening 8-tone scale they form the split third between the A-E (example 4a). Building towards a more complete symmetry in measure 8, the French horns now echo the minor ninth motif instigated by the flutes several measure before; however, these pitches are still linked to the opening D-A perfect fifth. The D-Eb form part of the structure for the self-contained unit and Bartok's z-cell. While the strings initially are linked to the new A-E set, in measure 11 they reenter on harmonics that when rearranged form the z-cell D-Eb-Ab-A once again creating a link to the opening perfect fifth between the cello and oboe. The outer shell for the symmetrical unit shown previously in example 4 (transposed down a minor second) is formed here, but the interior split third of F-F# remains absent to keep the full hexachord from example 4 deconstructed. Instead the minor ninth in the clarinets in measure 13 and

the upper brass in measure 14 is D-Eb, which once again directly relates to the opening perfect fifth.

At the staggered entrances in the strings in measures 14-18, the music continues to modulate through different groupings of the z-cells as displayed in example 5.

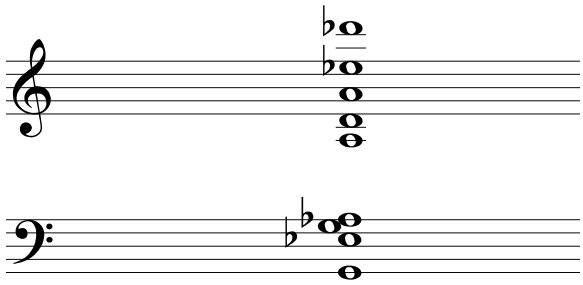
Example 5. Z-cells (mm 14-18):



The first two sets in example 5 are taken from the strings in measures 14-16 and establish two z-cells. Although I cannot use tonal terminology to describe the music, because both of these cells do not contain any overlapping pitches for the rest of the paper, I will refer to them as “distantly related z-cells”. The term “closely related z-cells” will describe those z-cells with pitches that overlap, and “inversional z-cells” will include those cells that exhibit the relationship as described in example 4 (cells whose inner perfect fourth can be respelled to create a new perfect fifth that is the basis for another z-cell). The inversional z-cell only comes into effect later in the piece when the split thirds are the difference between the initial z-cell and its inversional counterpart. The final z-cell grouping in example 5 is exactly like the first one except that two new pitches are added: F#-G. While these pitches do not create the perfect symmetry of the split third, I utilized them here to emphasize the original eight-tone scale (see example 3). Because the entire opening section is the deconstructed form of the octatonic scale, the eight-tone constructed scale and a z-cell, I created harmonies that seamlessly pass between and integrate all of these elements.

When the music reaches a climax in measure 22, all of the instrument families are lined up vertically to create the sonority shown in example 6.

Example 6. *Whiteout* piano reduction (m. 22):



Because of the heavy emphasis on the low to middle register, the simultaneity is muddy and distorted; it also contains all the pitches of the opening eight-tone scale except for Bb and Gb and two z-cells. These z-cells are Ab-A-D-Eb and the closely related z-cell Db-D-G-Ab. The juxtaposition of all these elements begins to coalesce before the French horns take over in measure 23. In the next six measures, the French horns continue to develop the opening theme in the cello (mm. 1-5) before restating the initial motif in its original form to conclude the rehearsal A section. The outline of the perfect fifth also is maintained from measures 23-28 where the G-D opens the phrase and to measure 29 where the Ab-Eb concludes it. Both of these perfect fifths are also a part of the z-cells from measure 22 and are utilized by the French horns here to deconstruct the simultaneity of that measure.

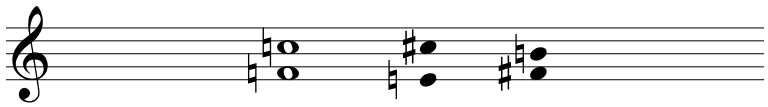
At rehearsal B the opening flurry in the violin 2 reinforces the z-cell through a new rhythmic pattern. The G-Ab-Db-D forms the initial z-cell while the opening triplet pattern in the flute (m. 32) with the pitches A-Bb-D-Eb becomes the essential set class

[0,1,5,6] for this new section. Over the course of rehearsal B, the set classes slowly compress, so that by the time the strings and winds align in measures 44-46 the new set class of [0,1,3,4] is formed. This set class is observable in these measures in the flutes, clarinets, violin 1 and viola with the pitches F-F#-G#-A and in the oboe, violin 2 and cello with the pitches B-C-D-Eb. The set classes have contracted from the opening z-cell or [0,1,6,7] to the set class [0,1,3,4].

The giant simultaneity spanning all of the instrument families at rehearsal C in measure 47 contains all the pitches of a z-cell: A-Bb-Eb-E. The triplet figure in the violin 1 and 2 and cello also includes the pitches C-C# which are the pitches needed to integrate the split third into the z-cell. The full hexachord is slowly forming across the vertical axis while constantly shifting between octatonic sonorities on the horizontal axis. For example at the end of measure 47 to the beginning of measure 48 the strings staggered entrances eventually land on pitches that create the simultaneity (from top to bottom) Bb-F#-C-E. This simultaneity is constructed from two tritones and along with fitting within octatonic scale [0,1] is a deformation of the perfect fifth that is in the woodwinds. This creates tension between the two families since they are offset from each other for most of this section and feature a call-and-response relationship.

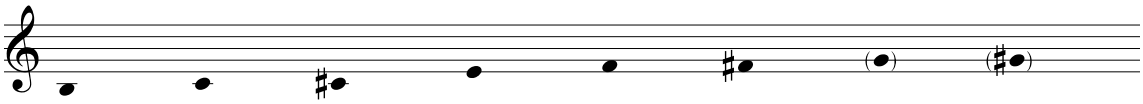
The breakdown of the perfect fifth in the strings causes conflict against the perfect fifth in the winds in measure 49. On the fourth beat of the measure, the F and C are held in the bassoon and clarinet parts respectively while the oboe and flute oscillate between E-C# and F#-B. As shown in example 7, these pitches keep the z-cell intact, but now instead of including the inward pitches of the split third both the pitches of the perfect fifth move outward stepwise to form the shell of a sixth.

Example 7. *Whiteout* woodwinds piano reduction (m. 49):



Also, although these pitches do not integrate the entire constructed eight-tone set from example 3, they do contain most of the pitches for this collection (modulated). I have included the modulated scale and placed the missing pitches in parenthesis in example 8. Since the opening of the piece the interplay between this eight-note collection and the octatonic scale has continued to create conflict and tension.

Example 8. *Whiteout* woodwinds eight-tone set modulated down a major second (mm. 49):



While the previous section featured a contraction of the sets from [0,1,6,7] to [0,1,5,6] to [0,1,3,4] the intervals around the crux of the perfect fifth are now expanding outwards. However, this also fills in the missing set from the previous section. As described previously, measure 49 begins by expanding the perfect fifth (F-C) stepwise to the major sixth (E-C#) forming the new set [0,1,4,5] with the pitches C-C#-E-F, which is the missing set for the previous sections set contraction. By measure 51 the sixth has expanded out symmetrically even further around the z-cell. In the winds on beat three the F-C are still held in the Bassoon and Clarinet while the Flute and Oboe now fluctuate between the Eb-D and Gb-B. Again the z-cell is held intact between the F-Gb-B-C, but

the pitches around the perfect fifth are encompassed by the major seventh. This is formed through symmetry around the perfect fifth axis, a major second down from the lowest pitch 'F' and up from the highest pitch 'C'. This is the furthest extent these pitches can be extended around the perfect fifth symmetrically before they begin folding onto each other, i.e. Eb-D becomes D-Eb, which recreates pitches and sets already used. However, if the z-cell is respelled and its inversional counterpart utilized, the resulting hexachord is B-C-D-Eb-F-Gb which is the self-contained perfect fifth described in example 4.

In measure 52 the strings and brass reemphasize the z-cell that has been the focal point of the previous measures, F-F#-B-C. In measure 62 a full hexachord from example 4 is completed horizontally in the winds. This first occurs in the oboe and clarinet and then in the flutes. If this six-note grouping (the first six notes in the oboe and clarinet in measure 62) is rearranged, the resulting pitches are G-G#-A#-B-C#-D. These pitches fulfill the union of octatonic scale [1,2], the z-cell and the symmetrical interior split third although the hexachord is not fully formed vertically.

When the strings reach the octaves unison in measure 71, the melodic line begins to follow octatonic scale [0,1] while the other instrument families emphasize the z-cell. The brass play an incomplete z-cell of F#-G-C# in measure 72, while the flutes play a completed hexachord from example 4 with the pitches F#-G-A-A#-C-C# in measures 73-74. In measure 78 when the winds descend with triplets and septuplets, the pitches remain within octatonic scale [0,1] and also align harmonically with the strings. However, the French horn 2 in measures 79-85 begins a chromatic descent that eventually leads to the open fifths on D and A between French horn 1 and 2, which once

again links the structure back to the beginning. The winds trade off the minor ninth motif in measures 82-84 before picking up the triplet figure that the strings opened the section with initially. Here each of the winds takes a different octatonic scale as they ascend in their motifs beginning in measure 85. The clarinet and oboe follow octatonic scale [0,2], and flutes 1 and 2 utilize octatonic scale [1,2]. In measures 87-88 the flute 2 and clarinet use octatonic scale [0,1], and the flute 1 and oboe use octatonic set [0,2]. The trumpets from measures 86-87 also utilize octatonic scale [0,2] and the French horns in measures 87-89 use octatonic scale [0,1]. The mutation from the [0,2] octatonic scale to the [0,1] scale is finally fulfilled by the strings in measures 89-90 where the hexachord spelled between all the string instruments is Eb-E-F#-G-A-Bb. This chord incorporates the z-cell with the split third (the hexachord from example 4) along with octatonic scale [0,1], which has evolved to become the most prevalent octatonic set.

The beginning of rehearsal mark D or the start of the B section integrates elements previously used in the music. The opening in the cello and bass utilizes the horn motif that occurs from measures 23-26. This motif also incorporates an incomplete z-cell with the pitches Eb-A-Bb. Because the Eb is being pedaled in the bass, this section also exhibits modal implications. While the bass and cello create an Eb Lydian sonority throughout, the upper strings incorporate the Ab and Db, creating an Eb Mixolydian sonority. The opening melodic line in the violin 1 beginning in measure 95 is developed from measure 34 in the flute 1 and measures 79-84 in the French horn 1. While the first iteration in the flute serves more as a minute gesture, the second iteration in the French horn creates the harmonic structure of the phrase and is used as a secondary line against

the tutti in the strings. Measures 79-82 in the French horn are also an exact augmentation of the violin 1 from measures 96-97.

When the horns take over in measure 108, the lingering pitches in the cello and bass combined with the first pitch of C# in the French horn 1 create the deformed z-cell C#-G-G# once again. This sets off a chorale-like gesture in the brass, which eventually leads to the return of A' in measure 119. The offbeat entrance of the winds and strings in measure 119 are an [0,1,4,5] cell with the pitches G#-A-C-C#. While this cell creates the framework for the opening of the section, the low brass now have the melody that was first seen in measure 32 in the flutes and further developed in the following sections. Now this motif has moved to the forefront of the piece, becoming a significant melodic phrase rather than just middle ground texture. Ideas from previous sections are also recycled in the woodwinds. The unison woodwind gesture in measure 124 directly relates to the opening of the unison section in the strings from measures 71-72. The first four pitches from this string gesture are A-Bb-C-Db while the first four pitches from the woodwind gesture are D-Eb-Gb-F. Although the last two pitches of the woodwind gesture are inverted from the string gesture, the transposition creates the same pitch content, and with the winds all playing in unison exactly like the strings, the listener would be able to hear a noticeable similarity between the two ideas.

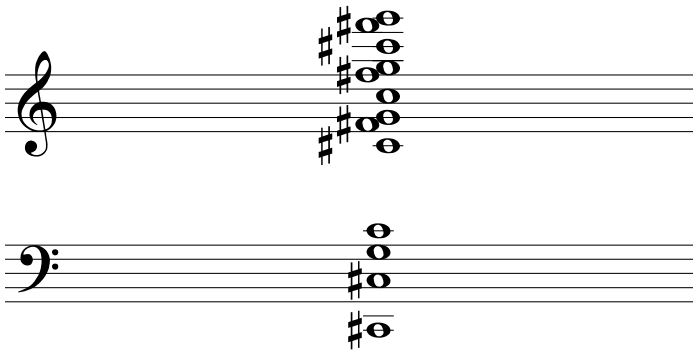
In measure 124 the horns take over the main melody that has once again contracted into the set [0,1,3,4] with the pitches D-Eb-F-Gb. As this continues for several measures while being passed between the different members of the brass family, the flutes in measure 130 provide the same minor ninth gesture that opened the piece. From measures 127-133 the strings are outlining a z-cell with part of the split third. At

the beginning (measure 127) the violins 1 and 2 are playing the pitches Bb-B-D-F. While the E is missing to make this a complete z-cell, the flutes in measure 129 are filling in the split third through the major seventh pitches D-C# to form a nearly completed hexachord from example 4. Another secondary gesture that returns under the surface occurs in the viola and cello from measures 130-133. The descending chromatic line from D-Bb comes originally from the French horn 2 in measures 79-83 (modulated) and serves as a background line that also provides harmonic stability. When the piece reaches rehearsal F in measure 135 the [0,1,3,4] set that had been following the rhythmic triplet gesture now becomes rhythmically augmented in all the low winds, brass, and strings beginning in measure 134. Once again the first four pitches, G-Ab-Bb-B, form the [0,1,3,4] set. Also, the low winds, brass and strings are all in unison for the first time in the piece, creating a new, powerful line.

At rehearsal F (m. 135) the instruments are all playing only two pitches, G and D. The isolated perfect fifth, which has been a crucial interval the entire piece removes the clashing overtones and leads to the low winds, brass and strings entering for the final melodic line that propels the piece to the ending. In measures 140-143 the upper brass reiterate the opening theme (mm 1-2) in the cello a half step lower. While the movement downward in measure 142 follows the contour of the cello in measure 3, the line has now become purely chromatic. Similarly in measures 143-145, the upper brass once again utilize a similar line although this one directly relates to the French horns in measure 29 and is also a half step lower. This six-measure phrase ultimately serves to connect the introduction with the ending of the piece.

At measure 153 the final simultaneity is played and becomes the harmonic base for the conclusion of the piece. This chord is a z-cell that contains the pitches C-C#-F#-G. However, the motivic idea that opened measure 30 in violin 2 and became a crucial part of later sections now is critical to complete the hexachord from example 4. While the rest of the orchestra is performing the z-cell, the oboe and clarinet in measures 153-155 are filling in the split third notes of D#-E. Now the completed hexachord C-C#-D#-E-F#-G both fulfills the z-cell and conforms to octatonic scale [0,1]. Because the entire piece has been moving towards the ultimate goal of completing the hexachord, the codetta on this single simultaneity lasts from measures 149-159. The last simultaneity in measure 159 is spelled out in the appropriate register in example 9. This simultaneity is extremely dense, especially in the upper registers and expands four and a half octaves for the largest range in pitches for the piece. Unlike the previous z-cells, however, this one does not include the root of the perfect fifth that makes up the outer shell (C) but rather incorporates the C#.

Example 9. *Whiteout* piano reduction (m. 159):



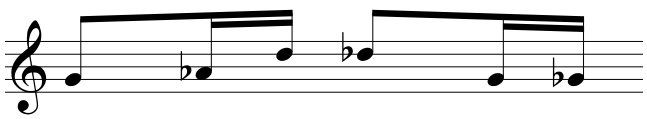
Placing the C# in the base creates a sonority that no longer emphasizes perfect fifth but rather the tritone. Therefore, the final chord creates the most tension of any chord in the piece and brings the work to an unsettling conclusion.

Rhythmic Analysis

Several rhythmic motifs and ideas are used throughout *Whiteout* to oscillate between areas of tension and release. One important rhythmic motif that develops over the piece is the septuplet figure first introduced in the piano in measure 8 and later in the cello and bass in measures 10-11. This motivic idea occurs sporadically throughout the beginning of the piece including in the violin 2 in measure 19 and in the piano in measure 53. However, after measure 119 the septuplets that provided background texture now become a crucial driving force for the piece. In measures 124-125, 135-139 and 144-145 the upper strings have this figure. In the final A section beginning in measure 119 there are a total of 16 full measures with the septuplets while in the previous 118 measures there are only five occurrences. This heightening of irregular rhythmic activity in the final fourth of the piece destabilizes the harsh intervals of the z-cell. Combined with the intensity of all the instrument families playing simultaneously and the increased activity, the irregular rhythmic figures contribute to the heightened agitation and tension at the end of the piece.

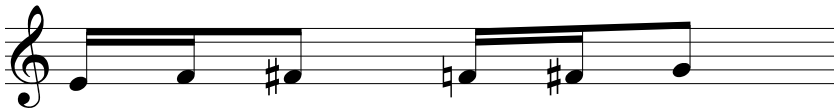
Another important rhythmic figure utilized throughout the piece occurs in measure 30 in the violin 2. This motif is shown in example 10.

Example 10. *Whiteout* violin 2 (m. 30):



The interplay between this rhythmic idea and the triplet figure as seen in measure 32 in the flutes creates a struggle for rhythmic dominance. While the triplets win out and become the dominant rhythmic figure in measure 46, the initial rhythm from example 10 (or the eighth/sixteenth note figure) begins to take back over the rhythmic activity in measure 62 in the oboe and clarinet. Although the triplet figure lingers for a time the original rhythmic figure (example 10) takes over completely by measure 65. However, by rehearsal mark D the triplet figure is once again dominating and driving the piece forward. While the triplet figure dominates again in the low brass in measure 120 both rhythmic figures become significant in measure 133. Here in the woodwinds the initial rhythmic figure is fragmented and inverted as shown in example 11, but still maintains the qualities of the rhythmic figure from example 10.

Example 11. *Whiteout* woodwinds piano reduction (mm. 133):



In the final measures from 153-155 the eighth/sixteenth note figure returns in its original form in the oboe and clarinet after being fragmented in the previous measures. In measure 155 this rhythmic figure appears offset in the violins and flutes. This is juxtaposed against the oboe and clarinet to increase the rhythmic activity and tension in the passage, and ultimately the eighth/sixteenth note figure dominates the piece over the triplet motif.

One of the most important unifying rhythmic and thematic motives in *Whiteout* is the motif first introduced in the flutes in measure 5. These minor ninths are used with

this rhythmic motif throughout the piece to drive it forward. In the entire introduction (mm. 1-29) there are several occurrences of this idea: measure 8 in the French horns, measure 16 in all the brass instruments and measure 22 in all of the brass again. In measure 14 the trumpets and horns perform this minor ninth motif, but the rhythm is altered here to both foreshadow the triplets to come and to add diversity to the rhythmic figure. In measure 37 the clarinet and bass clarinet perform the rhythmic motif beneath all of the moving lines. By measure 52 the rhythm has become augmented and is now represented by the strings and brass with the quarter note – half note – quarter note rhythmic augmentation of 2:1. Later the woodwinds bring the minor ninth idea back although the rhythm is retrograded and the first pitch is missing in measure 82. The minor ninth here is also deconstructed into individual pitches that no longer sound simultaneously. The flutes bring back the opening rhythmic figure in measure 130 in minor ninths once again. In measure 148 the rhythmic idea now becomes a figure in the lower brass, strings and winds, and by measure 155 the rhythmic figure can be seen in the upper brass while the winds and strings play a diminished version of the same rhythmic figure with sixteenth notes and eighth notes. Leading up to the final chord in measure 158 all of the brass play the original rhythmic figure (with a rest instead of the full duration quarter note) on the third beat of measure 157, so when all the instruments sound a measure later, a link is created between the ending and the beginning of the piece.

Form

While the thematic and rhythmic themes along with harmonic content have been discussed, the form of the piece reflects larger scale symmetry and development. The form of the piece is A-B-A' with an introduction as shown in figure 1. The thematic

development is shown through the rhythmic figures shifting back and forth as they tussle for dominance in the piece. Each section is color-coded and underneath the sections are the individual phrases.

The introduction features a symmetry that works on a large scale while the symmetrical z-cell is forming harmonically underneath. The opening 11 measures are completely symmetrical in terms of alternating time signatures. The first two measures are in 2/4 followed by one measure of 3/4, five measures of 4/4, one measure of 3/4 and two measures of 2/4. This design was initially intended to work throughout the entire piece, but as the piece developed, practicality dictated only the introduction could feature this symmetry. When the pattern resets in measure 12 with two measures of 2/4 followed by one measure of 3/4, it begins to diverge from the opening symmetrical design. The introduction ultimately sets up the rest of the piece by providing the unifying minor ninth motif and creating a buildup of tension on a small scale that becomes the driving force of the piece. The final minor ninth buildup in measure 22 is left incomplete by the sudden dropping out of the instruments and the entrance of the French horns. This tension is later reached by the climatic and intense ending.

Both the A and A' sections feature the two themes displayed in figure 1. However, in each A section one theme dominates the music. In the first A section the triplet idea dominates even though the eighth/sixteenth note idea opens the section. However, while the triplet section takes over at the end of A and opens the A' section, by the end of the piece the eighth/sixteenth note theme becomes the dominating force. The idea is even rhythmically offset in the flutes and violins against the original form in the oboes, clarinets and violas in measure 155.

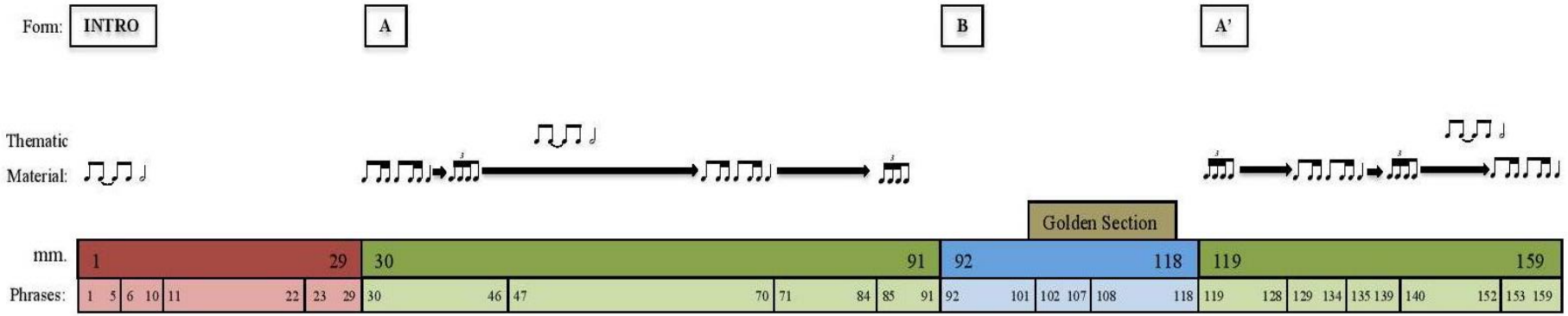


Figure 1: Large-scale form in *Whiteout*

The B section offers the greatest diversity to the piece. While the rest of the piece is tumultuous and tense, the B section offers a calm release from the A sections, which is a parallel to the French horns at the end of the introduction that offer release from the buildup at the beginning. The Eb-A-Bb opening provides enough ambivalence that the listener is unsure whether the z-cell is returning, and instead of bringing back the harsh harmonies the same initial structure of the z-cell is utilized to branch off into a theme that has tonal centricity. Another interesting aspect of this section is that it occurs during the Golden Mean of the overall structure. Since there are 159 measures this should occur exactly at measure 106 (106+53=159). Not only does this entire section create the greatest contrast in the piece and offer the antithesis of the tense z-cells and hectic A sections, but the violin 1 in measure 106, the exact location of the golden mean, reaches the zenith of its melodic line. The violin 1 has been climbing upward and reaches the high F, which is also the highest pitch in the entire section. The lush melodic line and calm, focused harmonic accompaniment combine for a serene climax in the prime golden mean section. The French horns then establish a chorale-like texture and are later joined by the rest of the brass, much like the texture that was seen at the end of the introduction.

Conclusion

By utilizing the z-cell, an eight-tone scale/set and the octatonic scale, *Whiteout* creates tense harmonic structures and symmetrical designs. From the beginning of the piece the z-cell begins forming across the vertical axis while the eight-tone set and octatonic scale are utilized interchangeably. As the z-cell is formed from the minor ninths that open the piece in the flutes, a greater sense of urgency and tension is created with the triplet and eighth/sixteenth note figure. As these two motifs battle for

dominance in the A section, the harmonic tension is left incomplete by the entrance of the B section. This part, which exists within the golden mean, provides a release of tension by utilizing part of the z-cell to create a new tonally centered texture. The B section creates a sense of serenity and beauty within the raging storm all around. The battle between tension and release is finally resolved in the A' section where the triplet theme reemerges as a long dominant melodic line in the lower instruments. While the upper instruments propel the piece forward with advanced rhythmic figures such as sextuplets and septuplets, the lower melodic line provides a stark contrast to the previous section where the violins and trumpets created the lyrical line. By the end the swirling figures of triplets, sixteenth and thirty-second notes create a texture of mass chaos still focused harmonically around the perfect fifth that was the centralized framework for the entire piece. The symmetrical hexachord featuring the z-cell and split thirds finally arrives at the end of the piece where the simultaneity that spans over four and a half octaves brings *Whiteout* to a climatic and unsettling end.

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Full Score

Whiteout

Dale Sakamoto B. 1989

Hazy Fog ♩ = 78

A

Flute 1
Flute 2
Oboe
Clarinet in B♭
Bass Clarinet
Bassoon
Contrabassoon
Horn in F 1
Horn in F 2
Trumpet in C 1
Trumpet in C 2
Trombone 1
Trombone 2
Tuba
Timpani
Vibraphone
Percussion
Harp
Piano

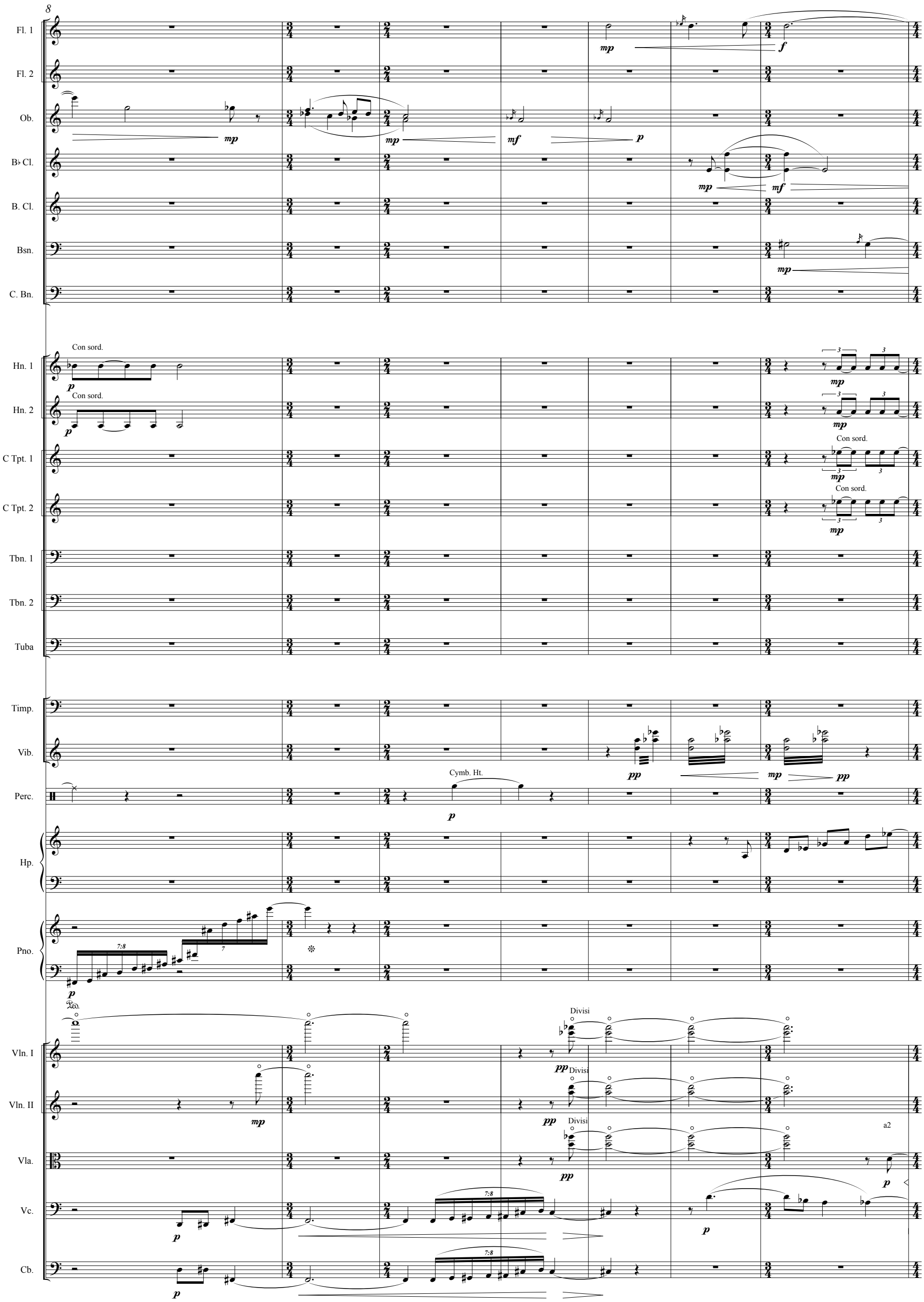
mp *mp* *mp* *f* *pp* Tri. *f* *pp* *Ped.*

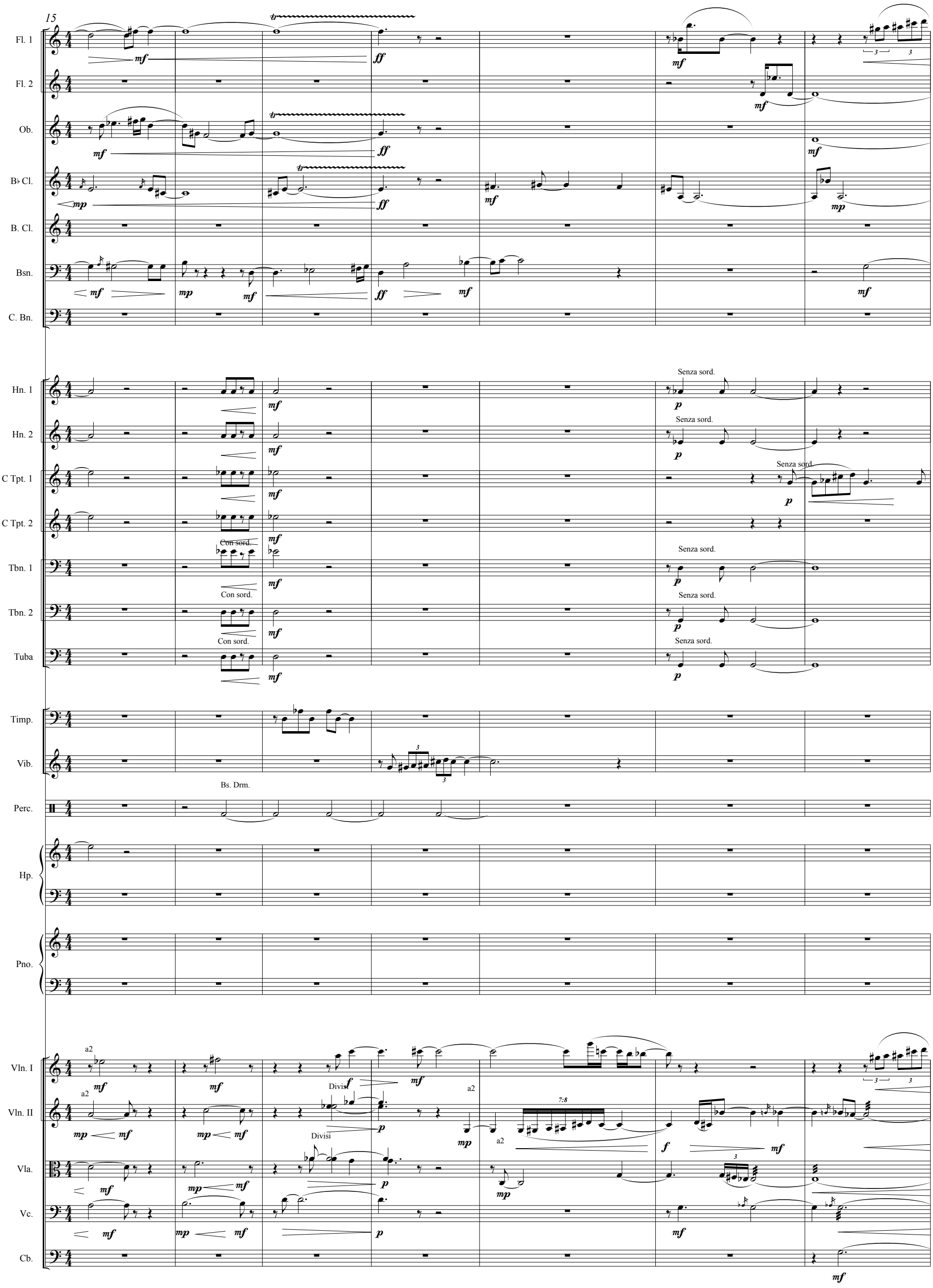
Hazy Fog ♩ = 78

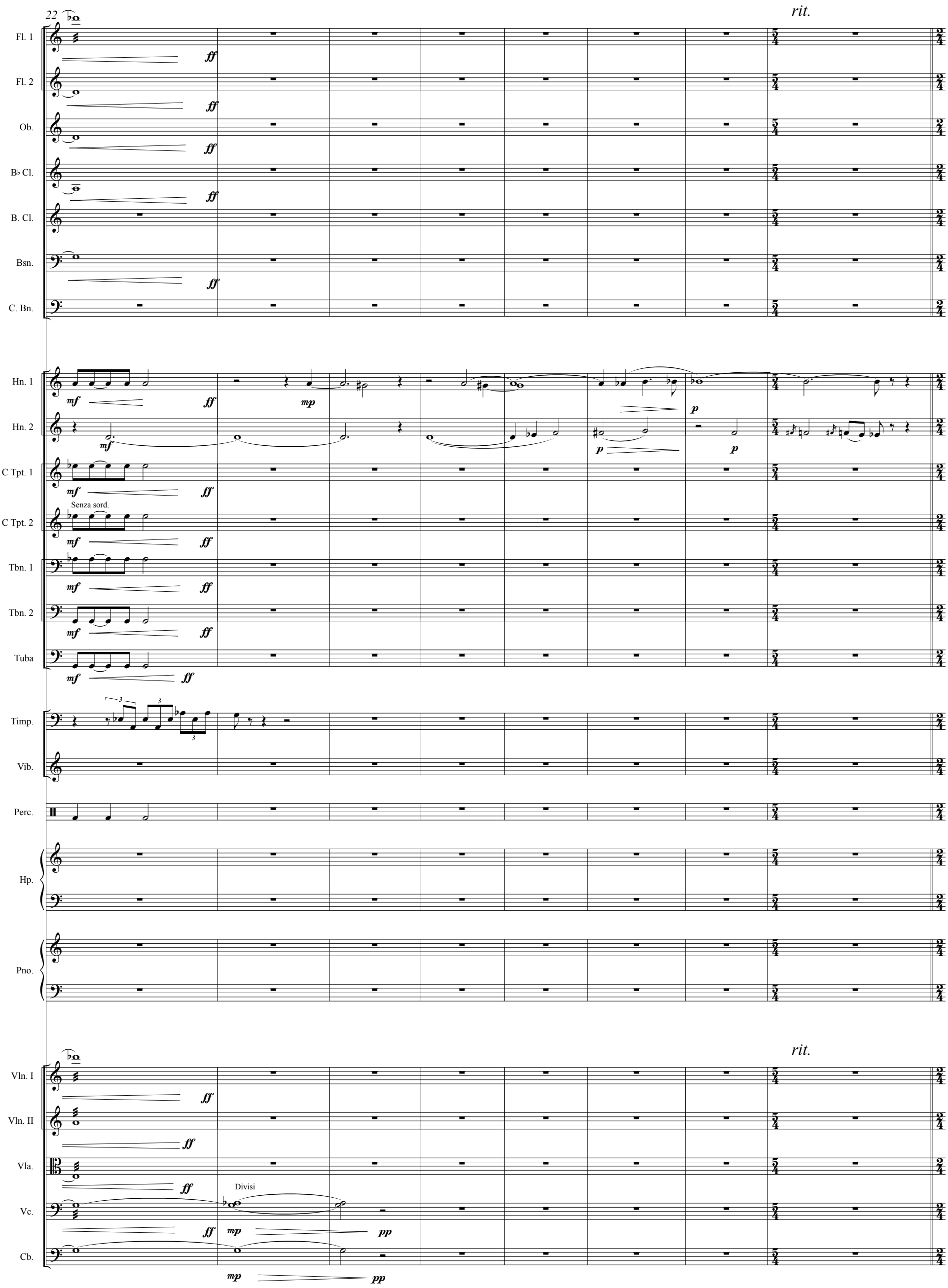
A

Violin I
Violin II
Viola
Cello
Contrabass

mf *f* *mp* *p* *p* *p* *p* *mp* *f* *f* *f* *f* *f* *mp*


8
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Con sord.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Cymb. Ht.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.
Divisi
a2


15
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.
Con sord.
Senza sord.
Bs. Drm.
Divisi
a2
7:8


22
rit.
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Senza sord.
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Hp.
Pno.
rit.
Vln. I
Vln. II
Vla.
Divisi
Vc.
Cb.

Persistent Flurries ♩ = c. 98

B

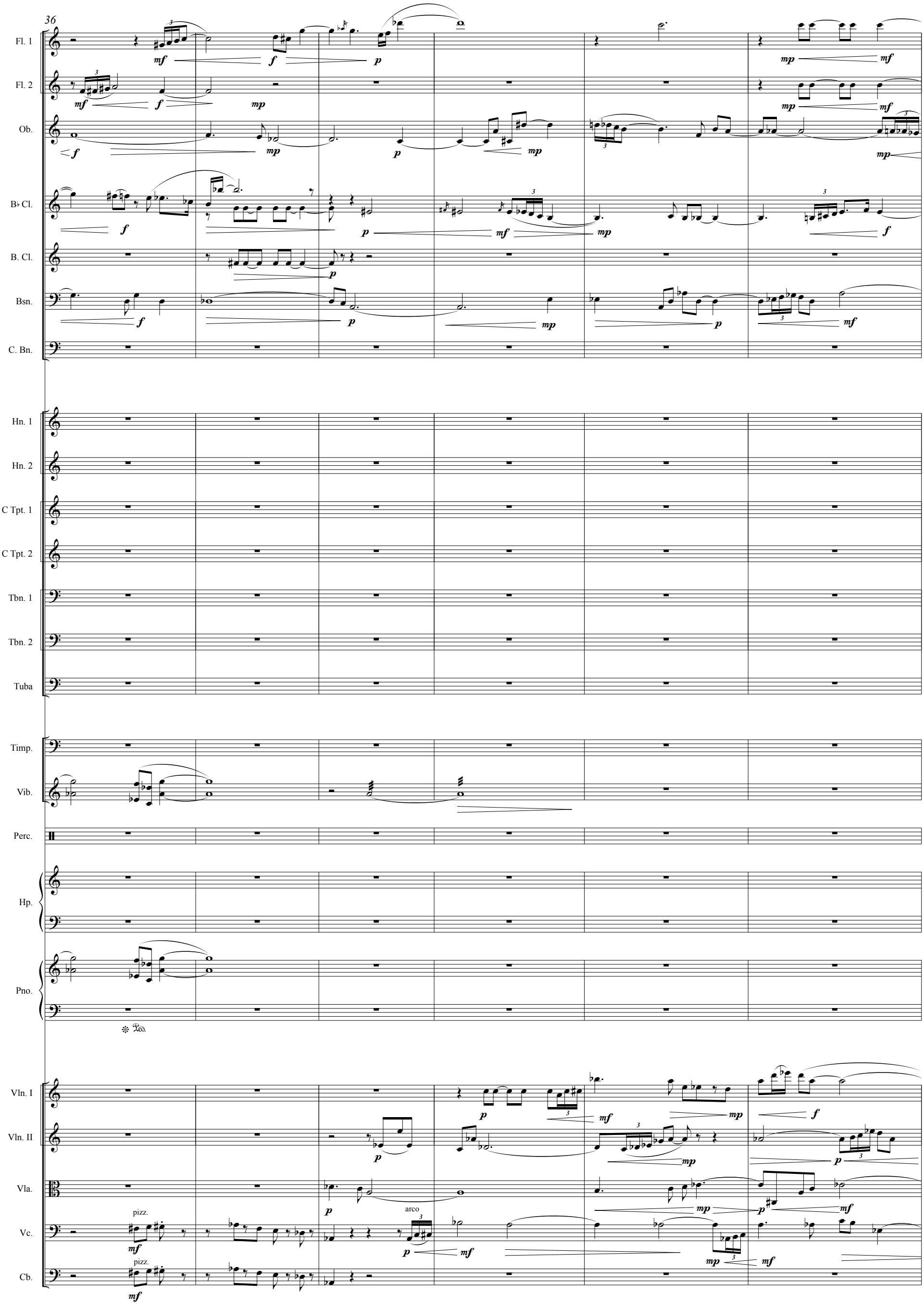
30

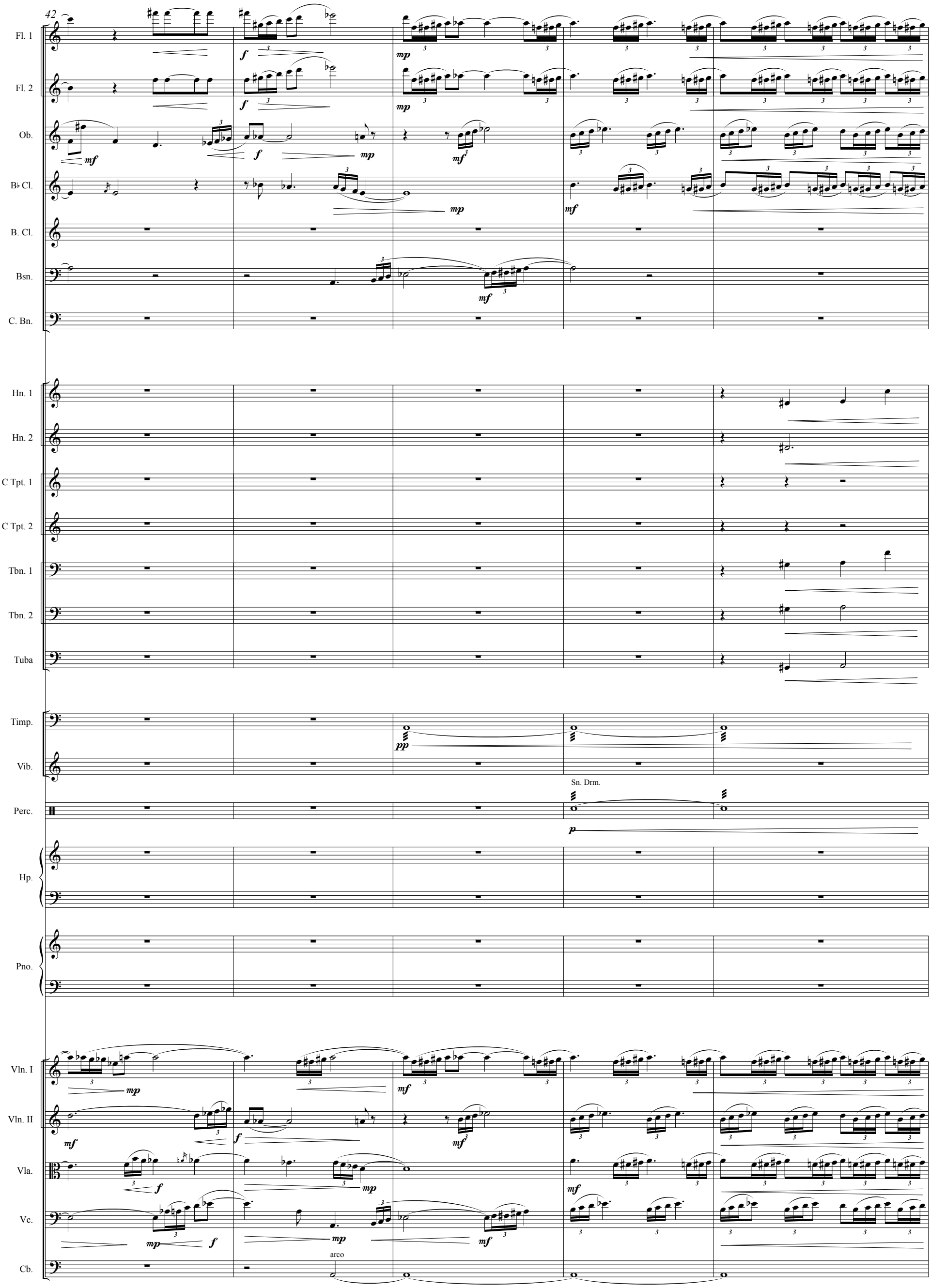
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Hp.
Pno.

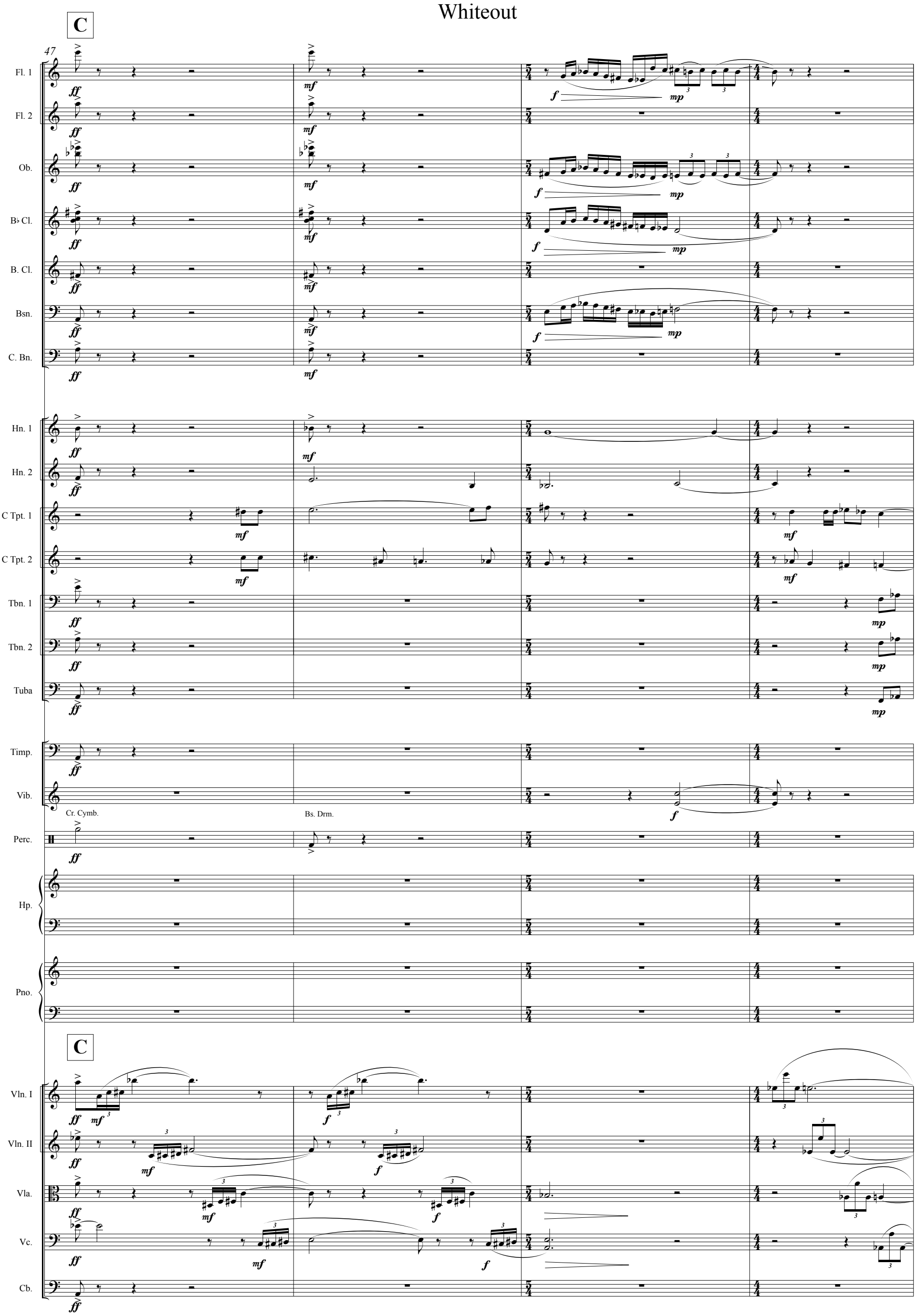
Persistent Flurries ♩ = c. 98

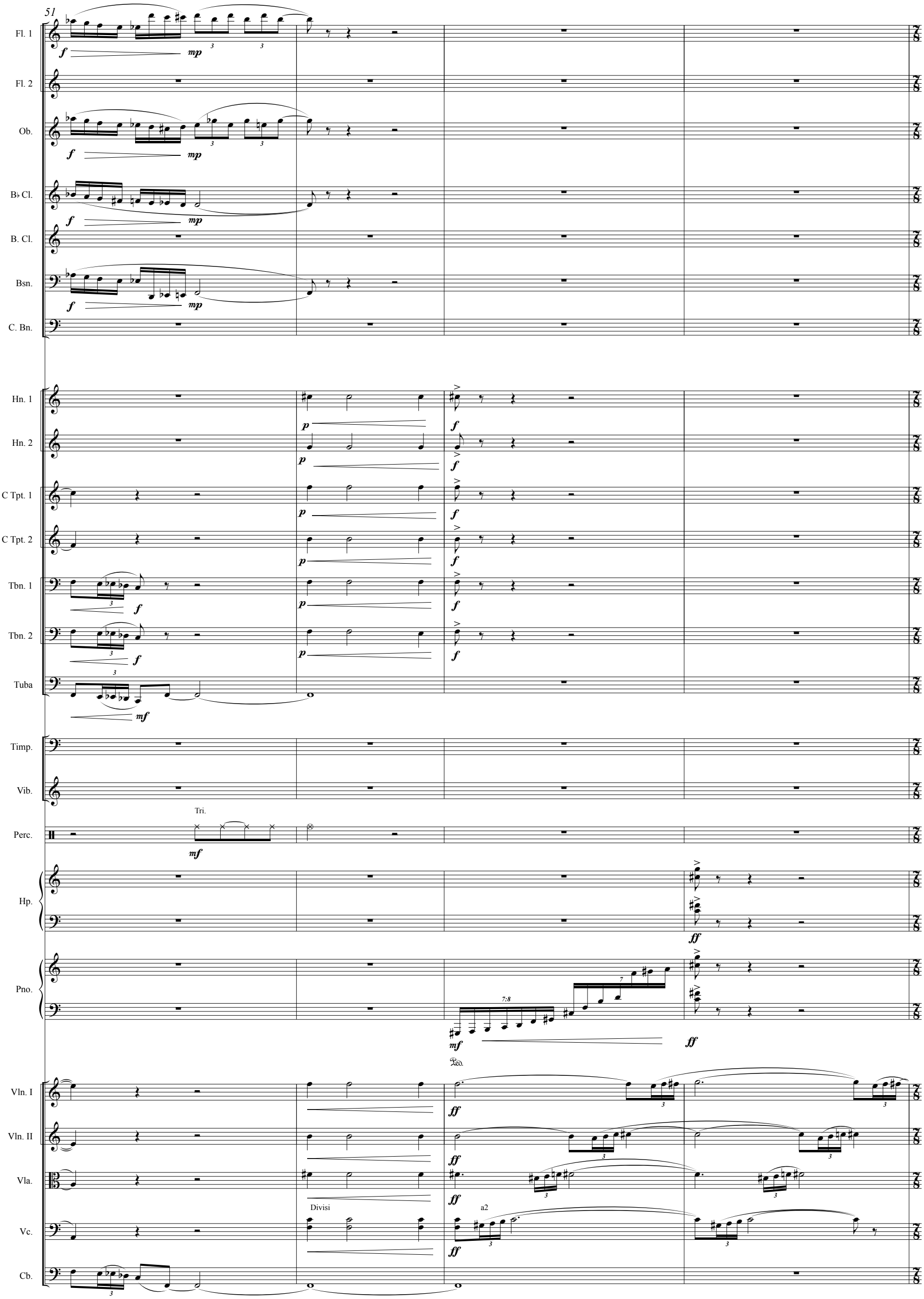
B

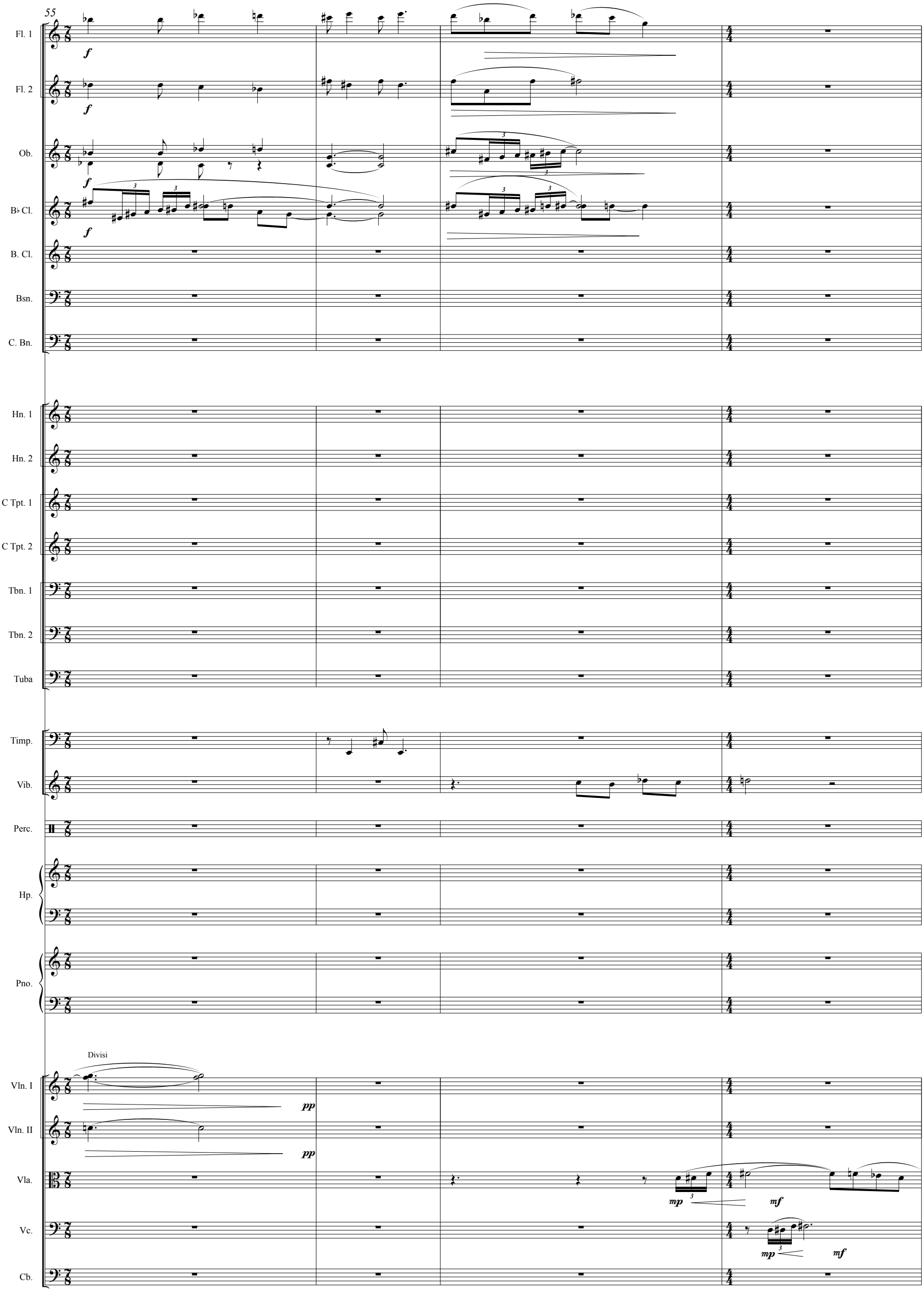
Vln. I
Vln. II
Vla.
Vc.
Cb.

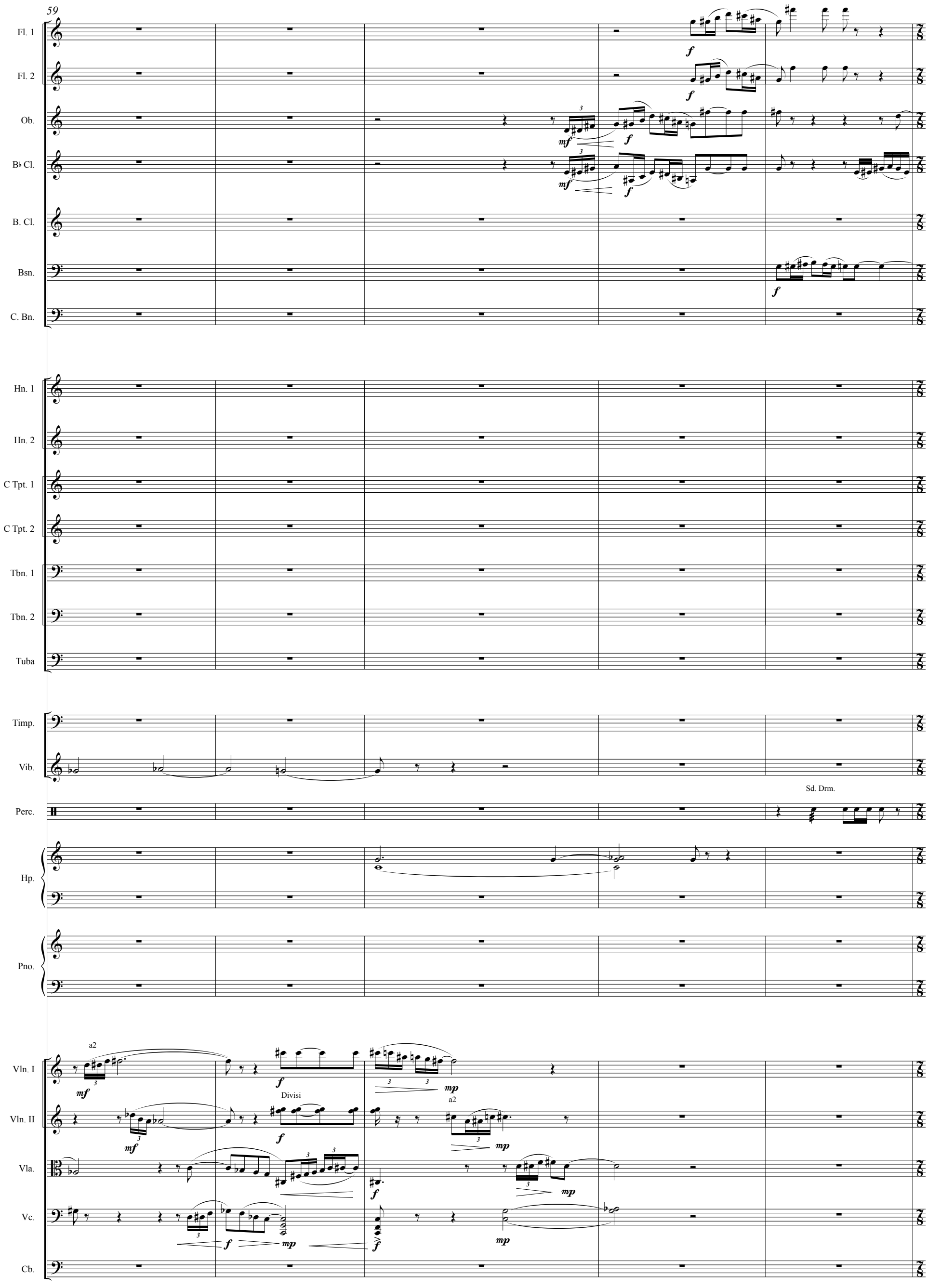

36
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Hp.
Pno.
Ped.
Vln. I
Vln. II
Vla.
Vc.
Cb.
pizz.
arco
pizz.

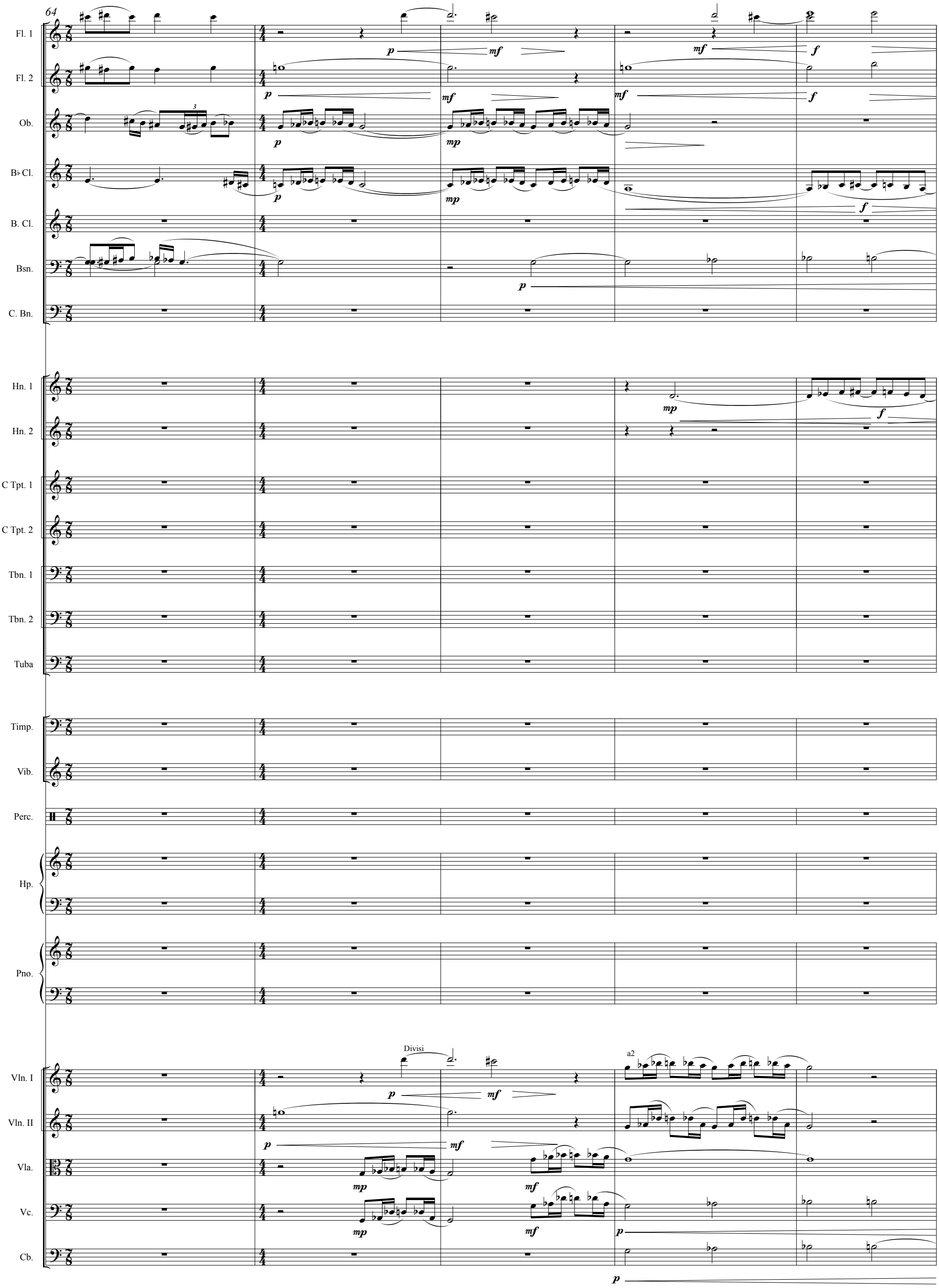

42
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Sn. Drm.
Perc.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
arco
Cb.


C
47
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Cr. Cymb.
Bs. Drm.
Perc.
Hp.
Pno.
C
Vln. I
Vln. II
Vla.
Vc.
Cb.


51
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Tri.
Perc.
Hp.
Pno.
7:8
Ped.
Vln. I
Vln. II
Vla.
Divisi
a2
Vc.
Cb.


55
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Hp.
Pno.
Divisi
Vln. I
Vln. II
Vla.
Vc.
Cb.
f
pp
mp
mf


59
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Sd. Drm.
Perc.
Hp.
Pno.
a2
Divisi
a2
Vln. I
Vln. II
Vla.
Vc.
Cb.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Fl. 2
Ob.
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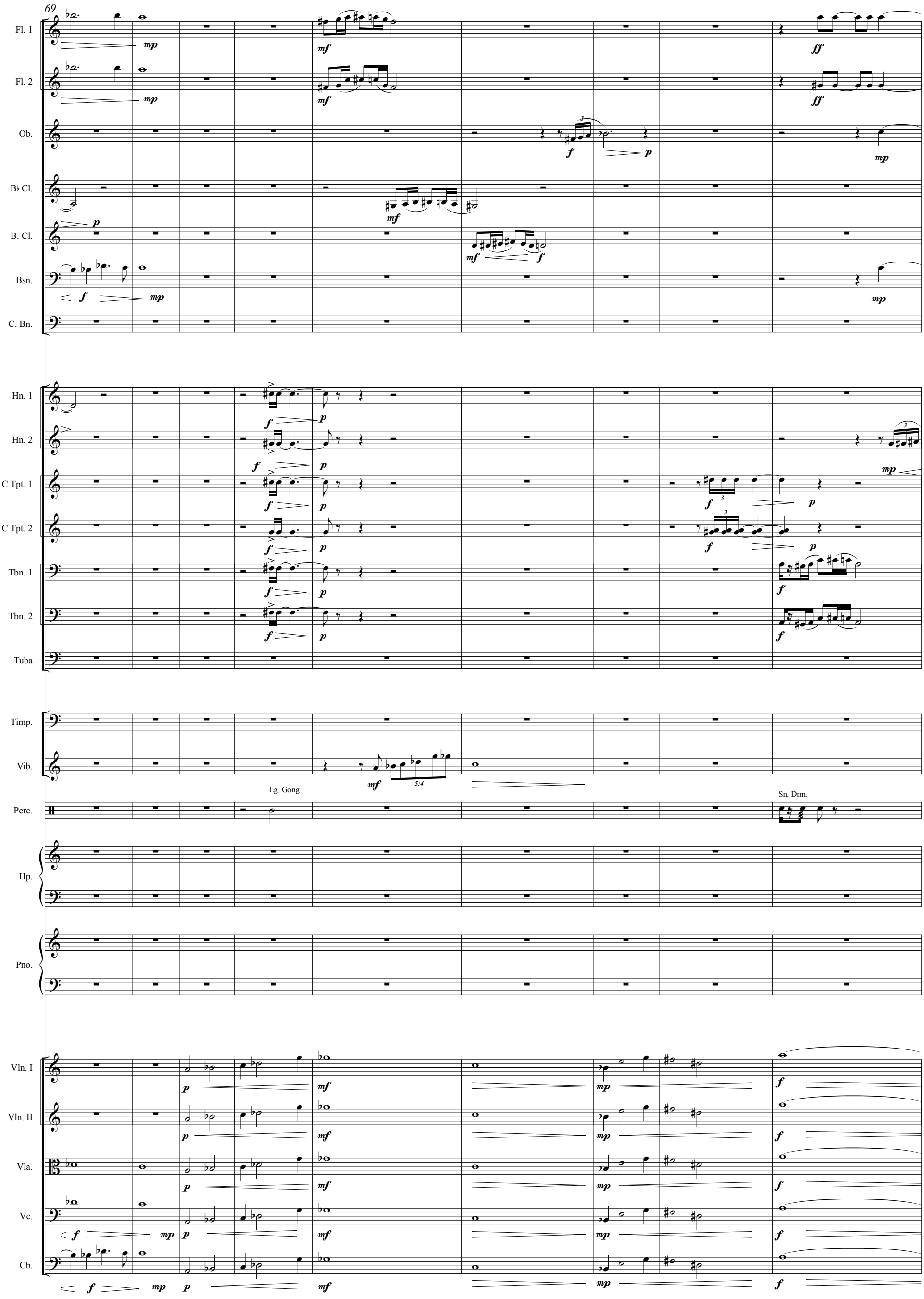
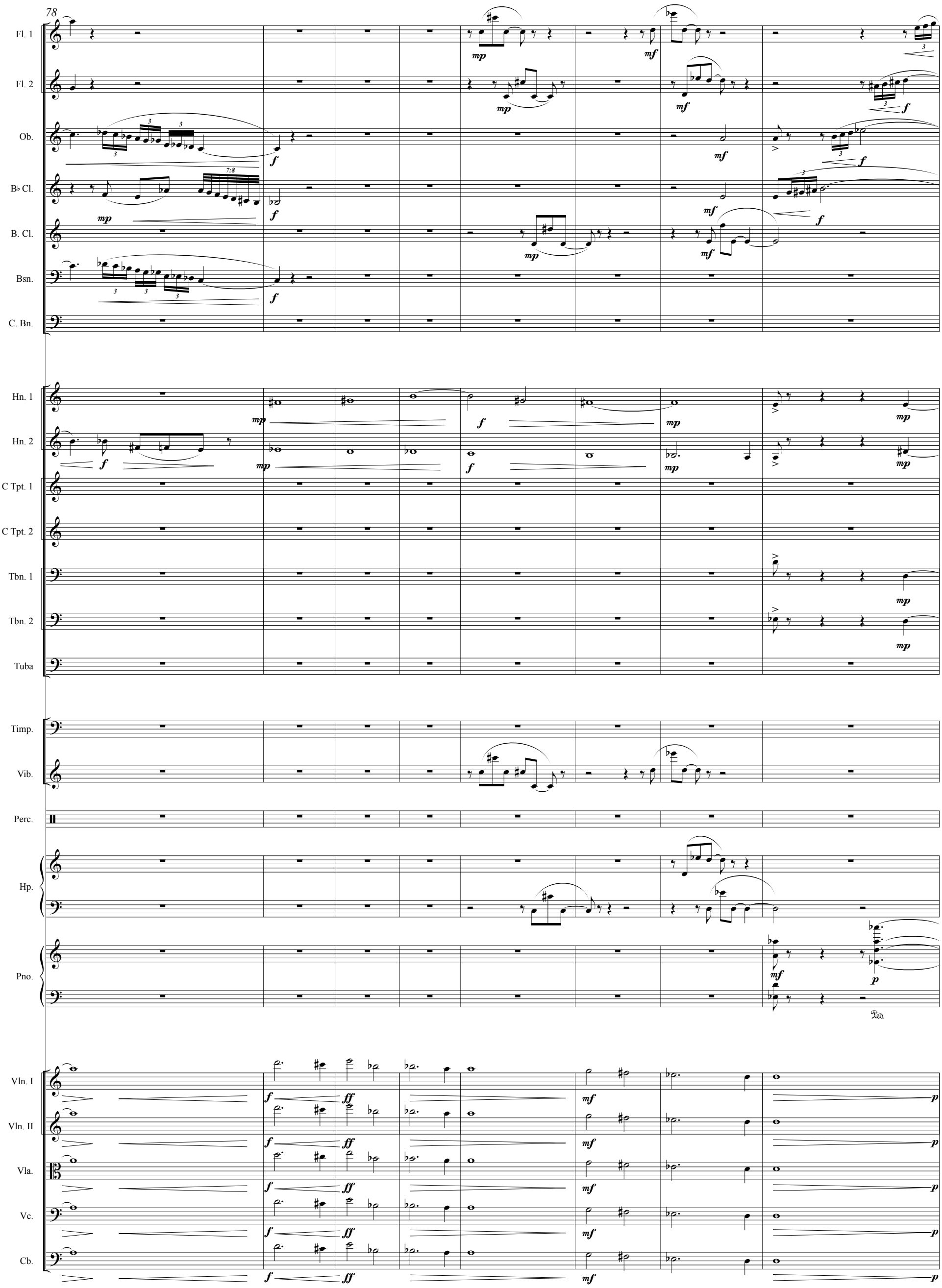
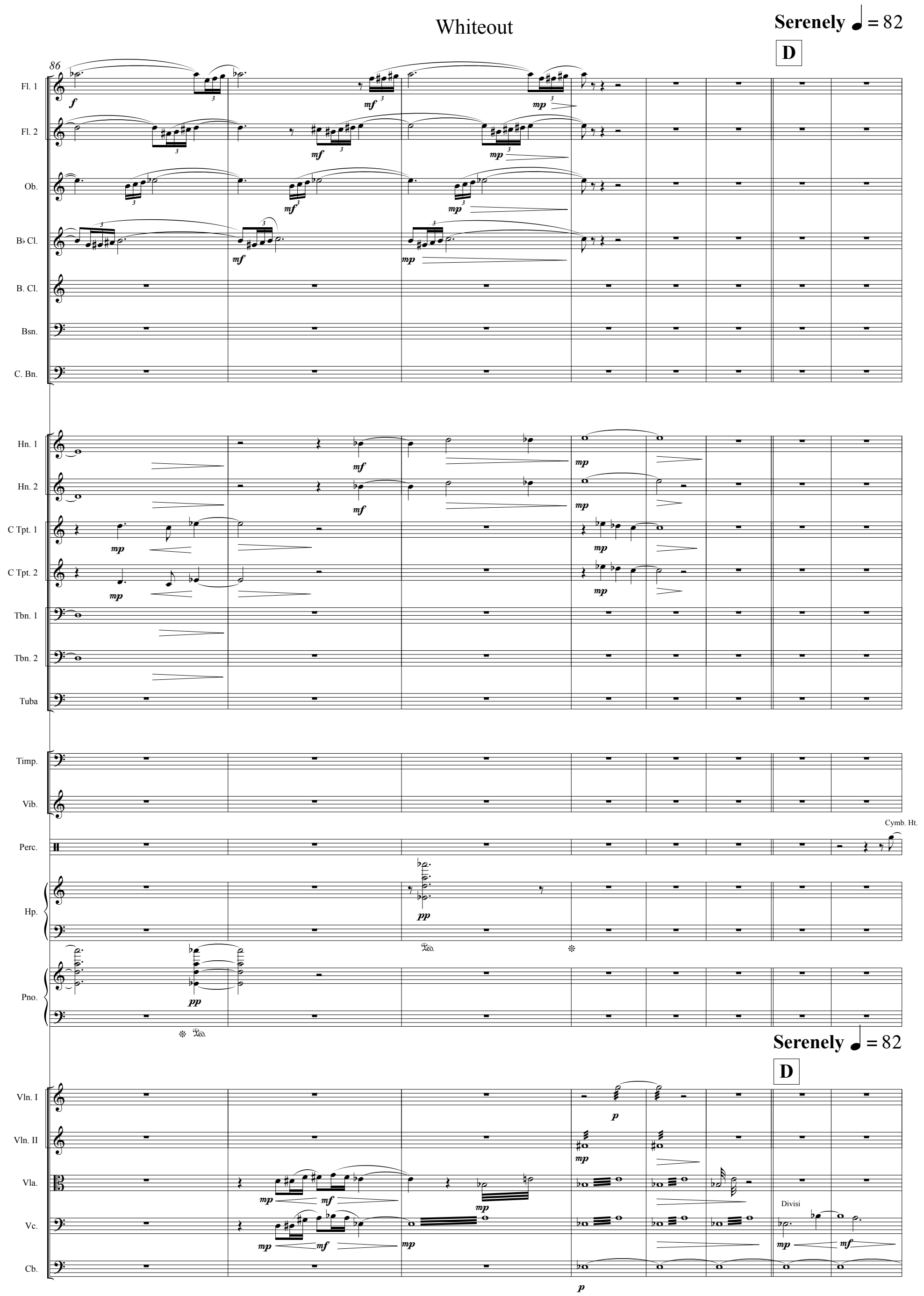
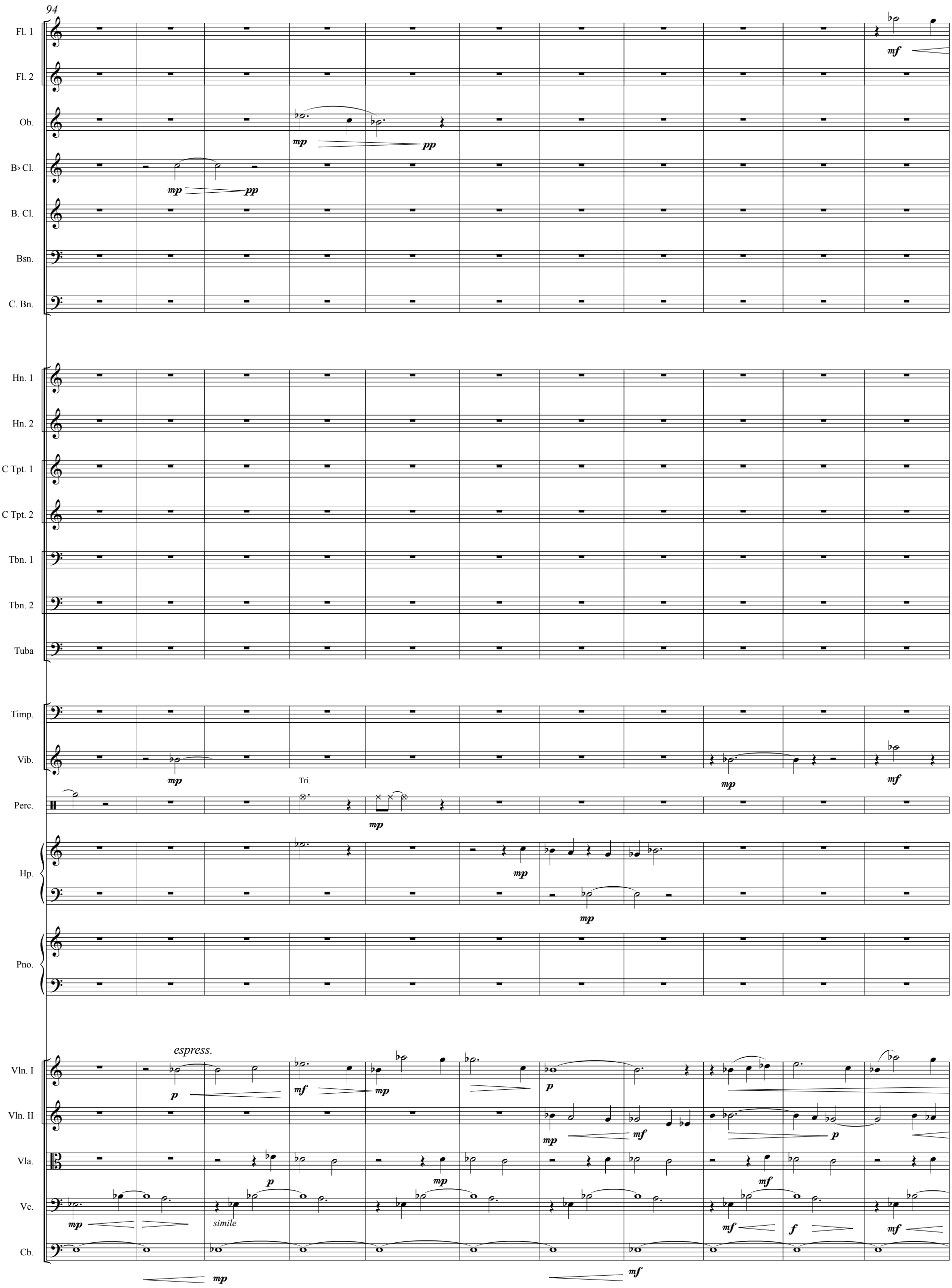
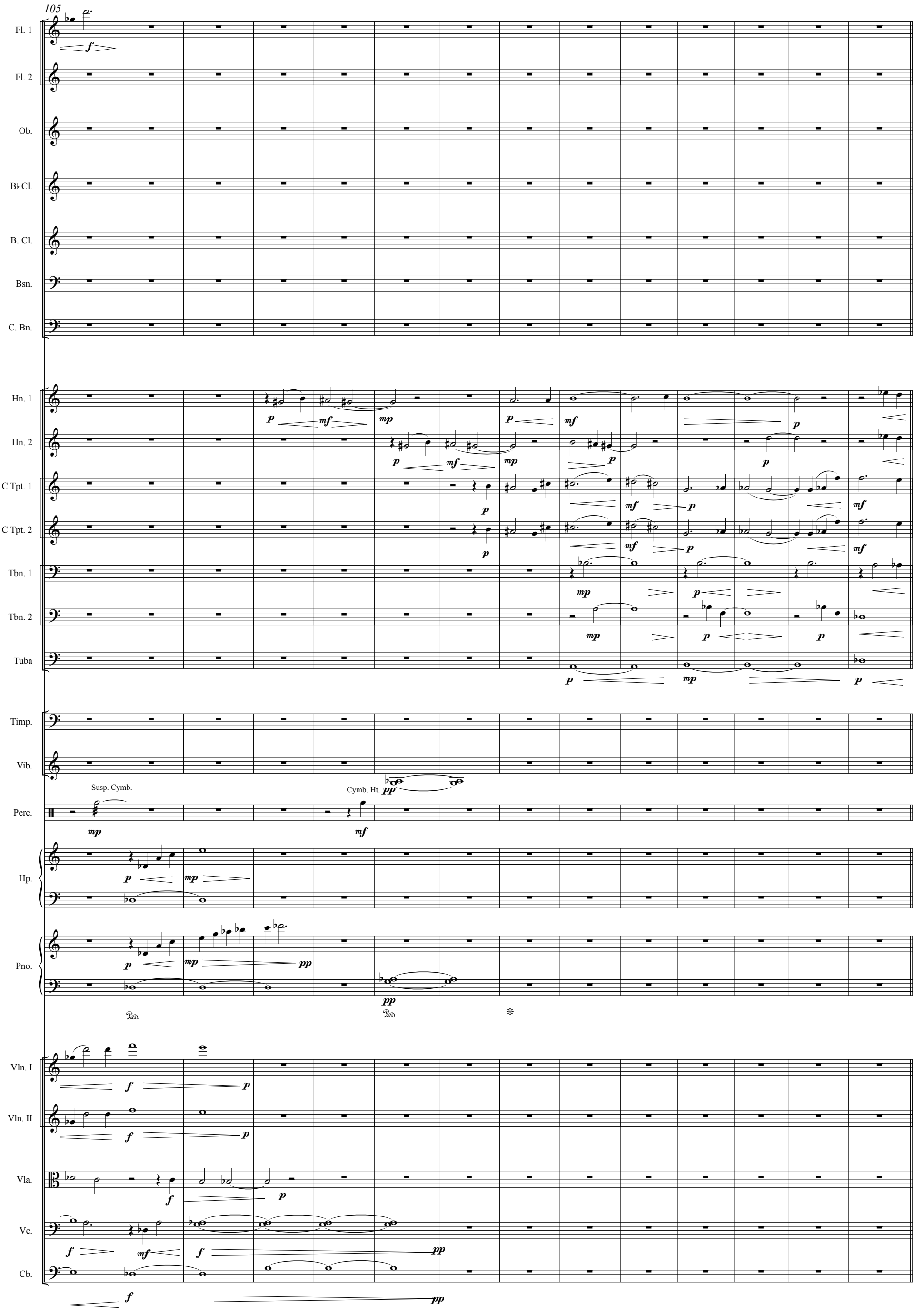
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.
Divisi
a2


69
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Lg. Gong
5:4
Perc.
Sn. Drm.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.


78
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.


Serenely ♩ = 82
D
86
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Cymb. Ht.
Hp.
Pno.
Serenely ♩ = 82
D
Vln. I
Vln. II
Vla.
Vc.
Cb.
Divisi


94
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Tri.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.
espress.
simile


105
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Susp. Cymb.
Cymb. Ht.
Perc.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.

Persistent Flurries ♩ = c. 98

E

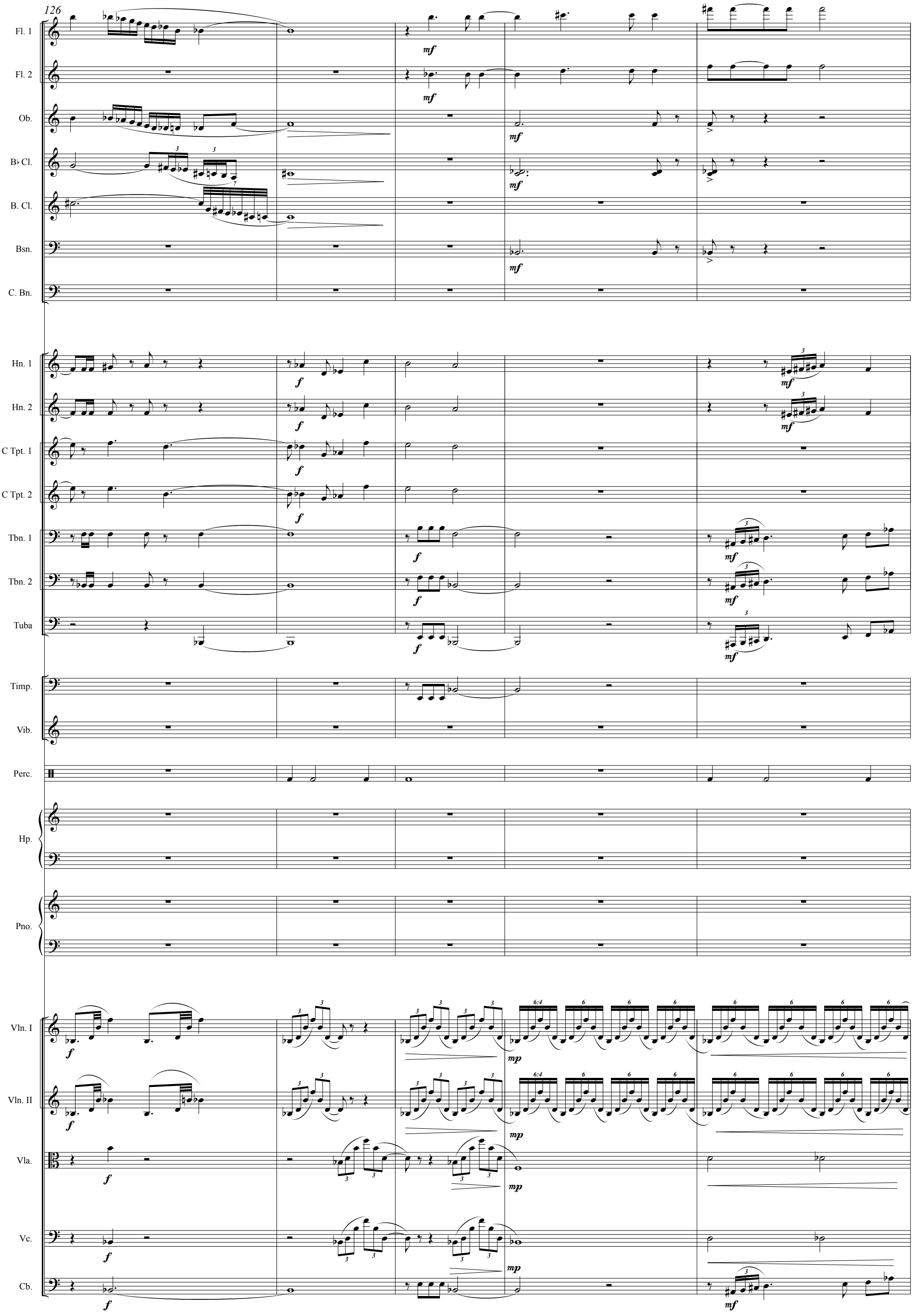
119

Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Tri.
Bs. Drm.
Perc.
Hp.
Pno.

Persistent Flurries ♩ = c. 98

E

Divisi
a2
Vln. I
Vln. II
Vla.
a2
Vc.
Cb.

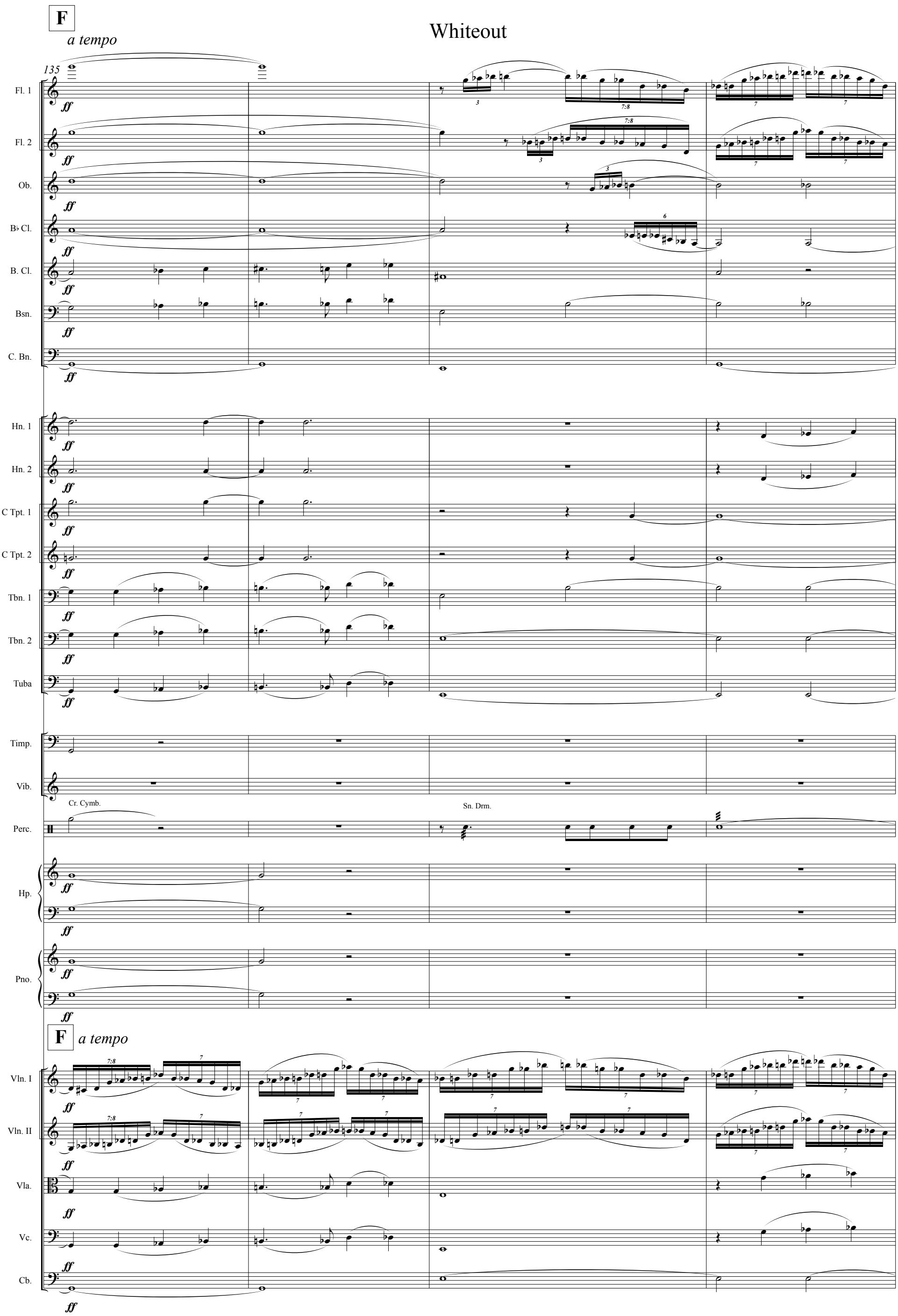

126
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.

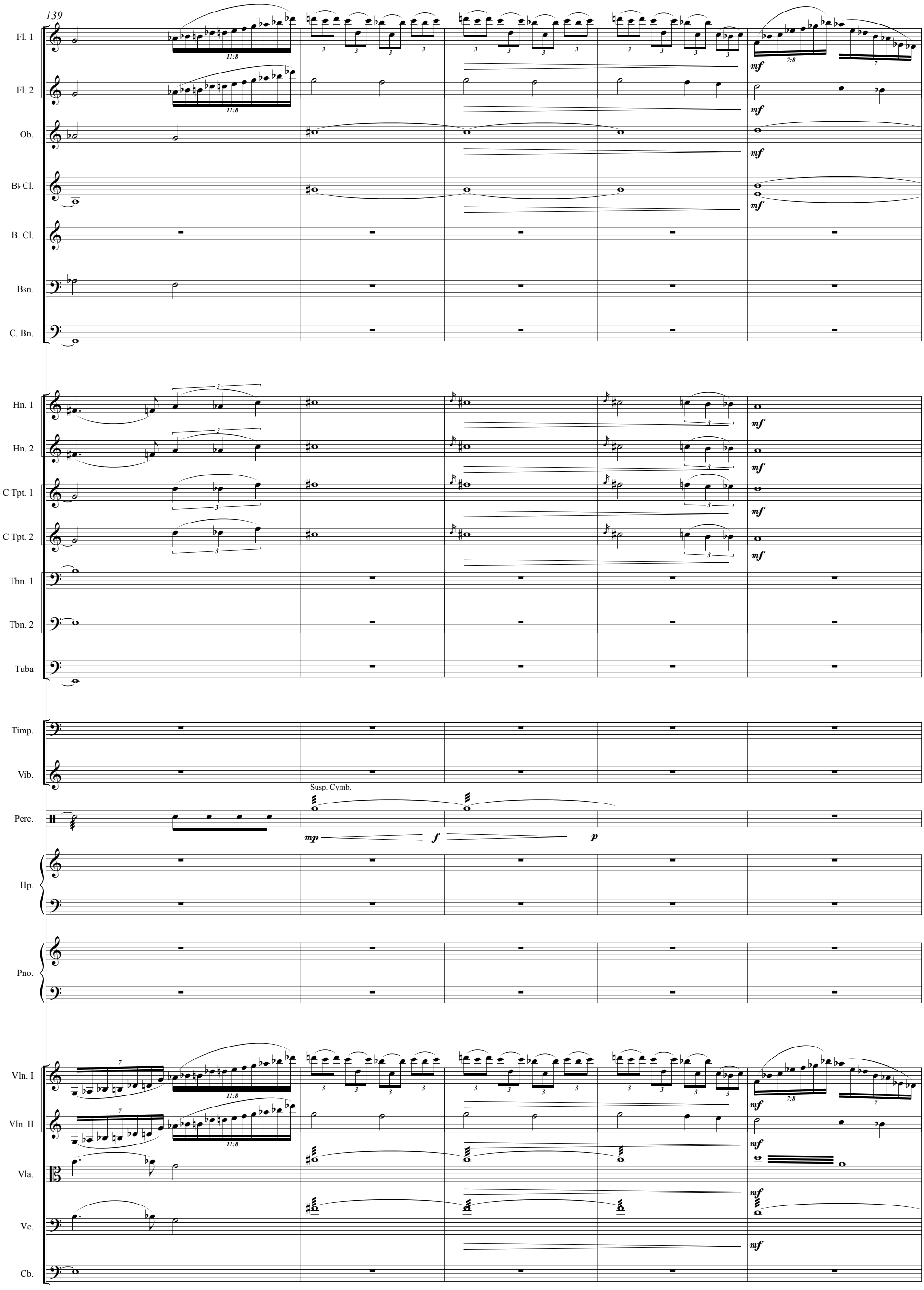
131

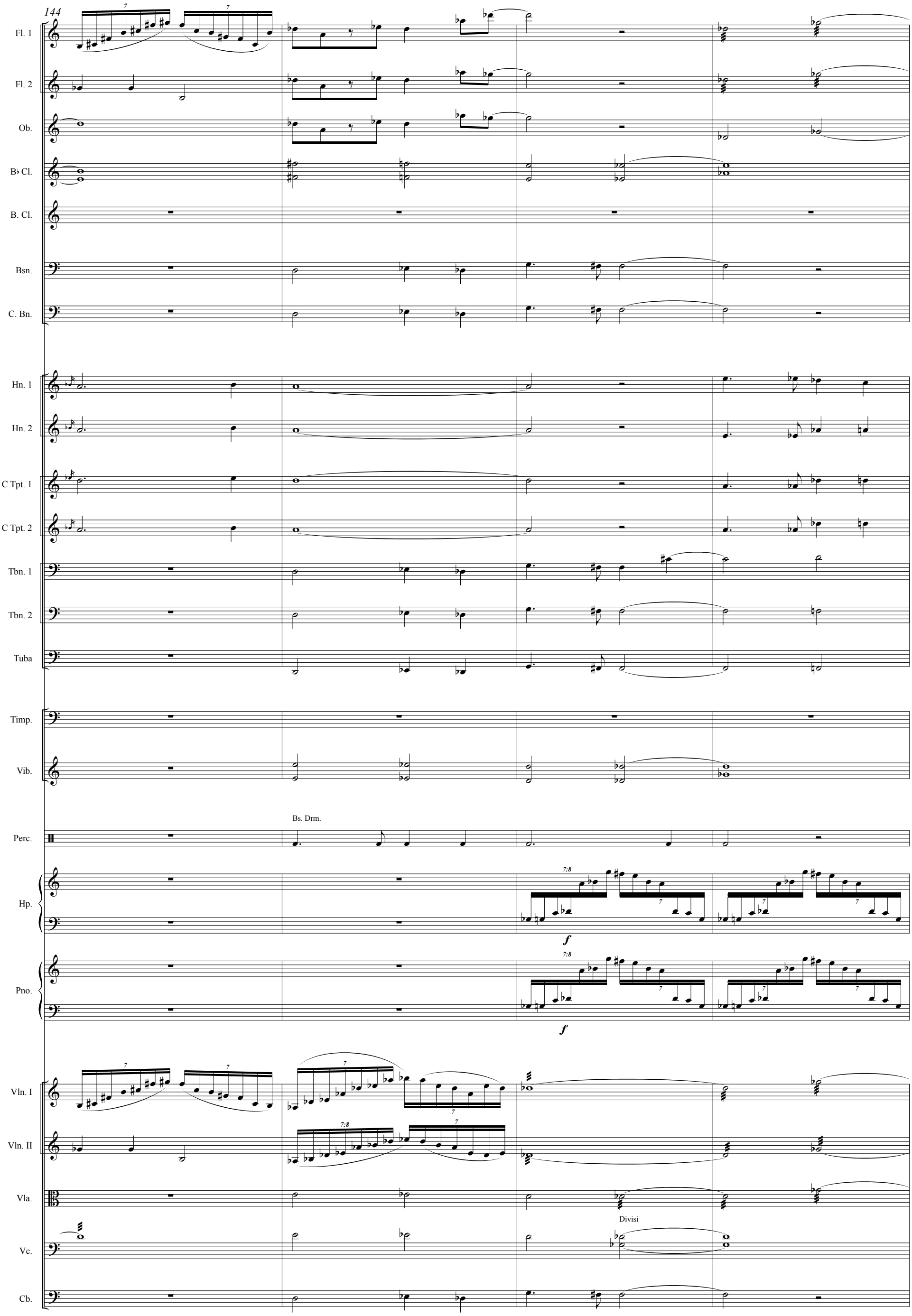
rit.

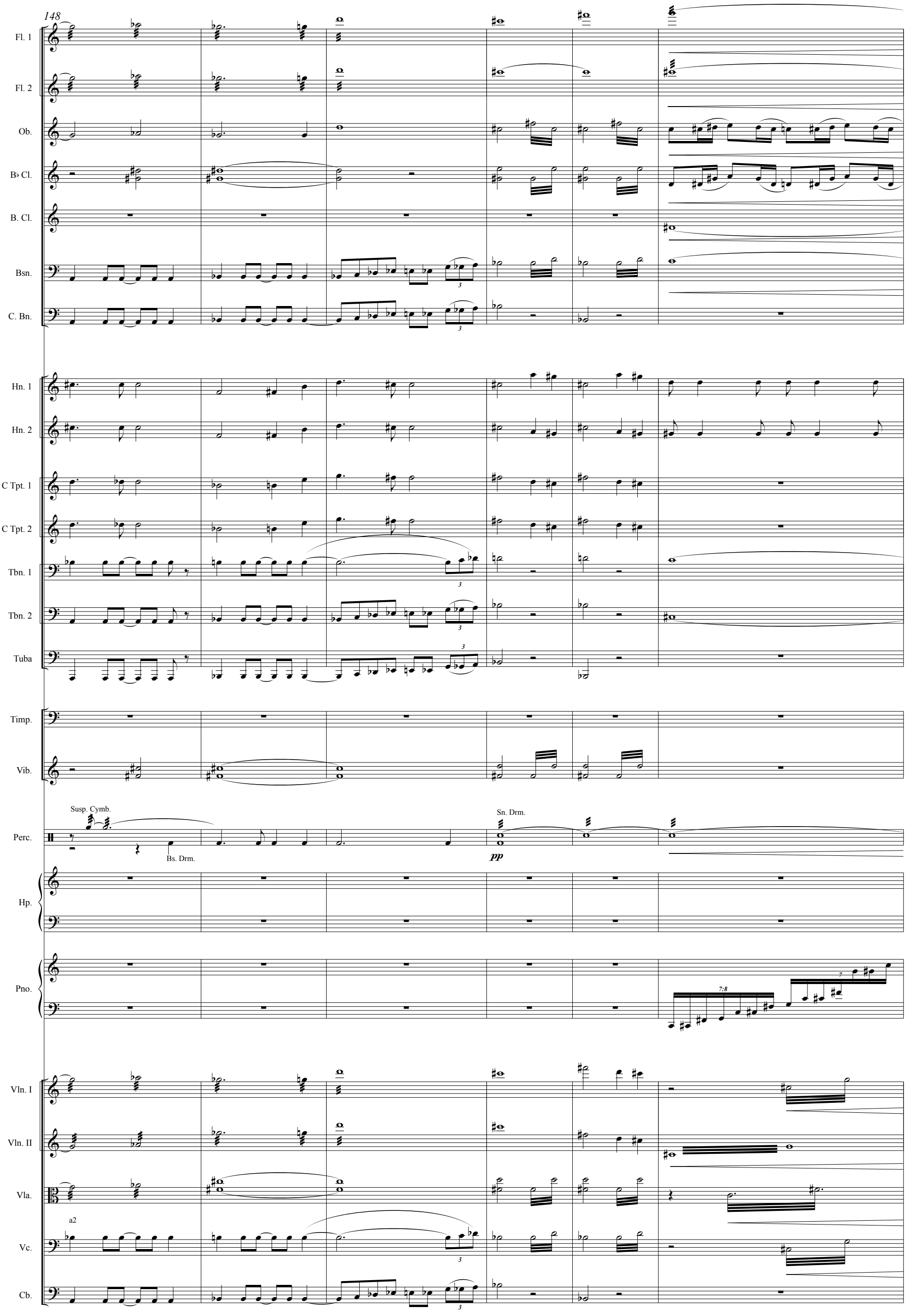
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Sn. Drm.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.

rit.


F
a tempo
135
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Cr. Cymb.
Sn. Drm.
Perc.
Hp.
Pno.
F
a tempo
Vln. I
Vln. II
Vla.
Vc.
Cb.

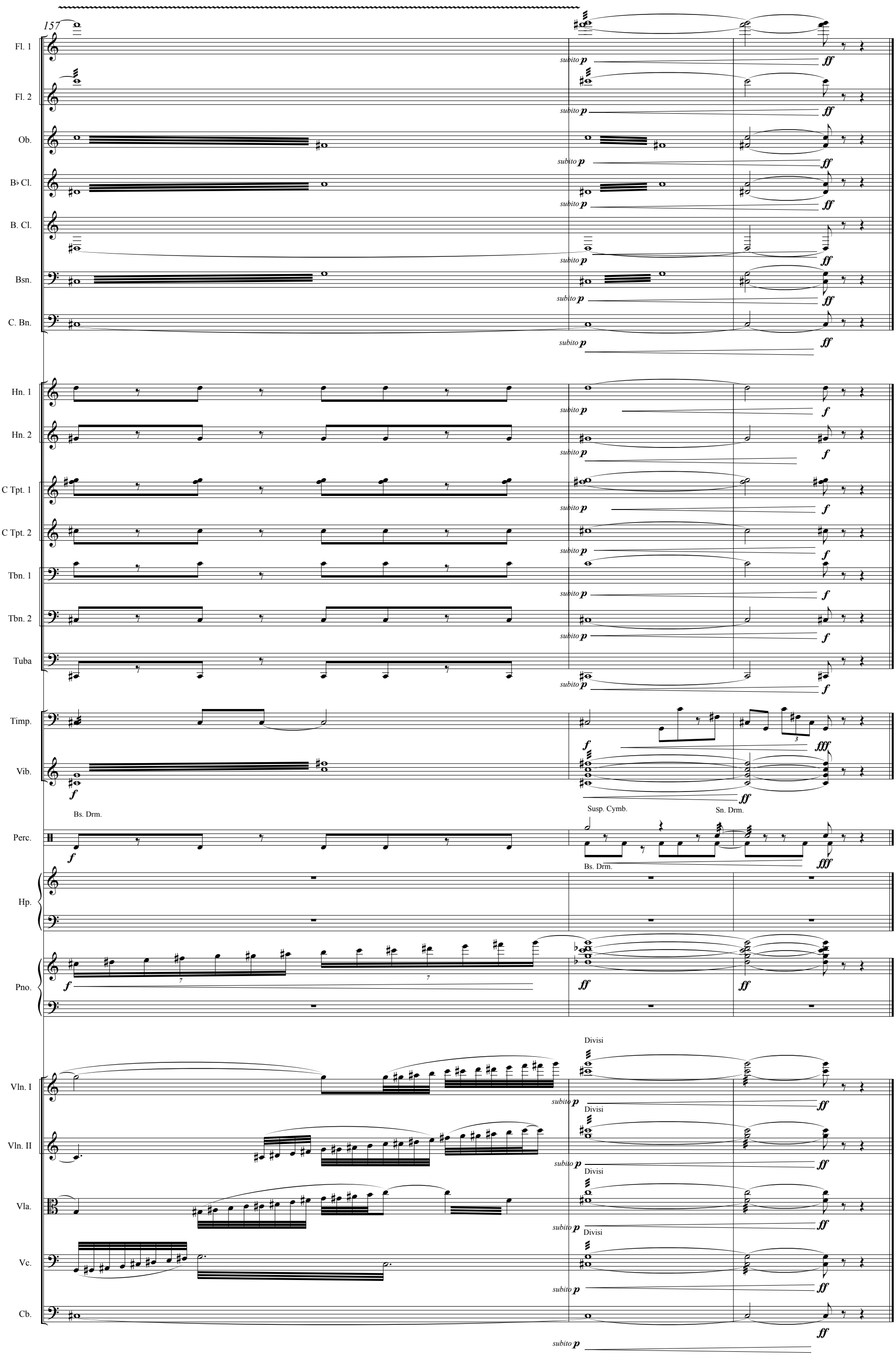

139
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Susp. Cymb.
Perc.
Hp.
Pno.
Vln. I
Vln. II
Vla.
Vc.
Cb.
11:8
7:8
mf
mp
f
p


144
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Bs. Drm.
Perc.
Hp.
Pno.
f
f
Vln. I
Vln. II
Vla.
Divisi
Vc.
Cb.


148
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Susp. Cymb.
Bs. Drm.
Sn. Drm.
pp
Perc.
Hp.
Pno.
7:8
Vln. I
Vln. II
Vla.
a2
Vc.
Cb.

154

Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Perc.
Susp. Cymb.
Hp.
Pno.
Vln. I
Divisi
a2
Vln. II
Divisi
Vla.
a2
Vc.
Cb.


157
Fl. 1
Fl. 2
Ob.
B♭ Cl.
B. Cl.
Bsn.
C. Bn.
Hn. 1
Hn. 2
C Tpt. 1
C Tpt. 2
Tbn. 1
Tbn. 2
Tuba
Timp.
Vib.
Bs. Drm.
Susp. Cymb.
Sn. Drm.
Perc.
Bs. Drm.
Hp.
Pno.
Divisi
Vln. I
Vln. II
Vla.
Vc.
Cb.
subito p
ff
f
fff