Libby Larsen

OCEAN SUITE

For Piano and Human Intervention

Commissioned by Liza Stepanova with funds from the University of Georgia

KENWOOD EDITIONS

Libby Larsen

OCEAN SUITE

for Piano and Assistant Performer

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I. Gyre
II. Bleaching
III. Twaites Glacier
IV. Calving

For more information about this piece and other music by Libby Larsen visit www.libbylarsen.com.

Ocean Suite - Program Notes

I. Gyre

"Gyres are large systems of circulating ocean currents, kind of like slow-moving whirlpools. There are five gyres to be exact—the North Atlantic Gyre, the South Atlantic Gyre, the North Pacific Gyre, the South Pacific Gyre, and the Indian Ocean Gyre—that have a significant impact on the ocean. The big five help drive the so-called oceanic conveyor belt that helps circulate ocean waters around the globe. While they circulate ocean waters, they also draw in the pollution that we release in coastal areas, known as marine debris.

The most famous example of a gyre's tendency to take out our trash is the Great Pacific Garbage Patch located in the North Pacific Gyre. The patch is an area of concentrated (and mostly plastic) marine debris. While this is certainly the most talked about garbage patch, it is not the only garbage patch in the ocean. In the last five years, researchers have discovered two more areas where a "soup" of concentrated marine debris collects – one in the South Pacific Ocean, the other in the North Atlantic. As with the North Pacific Garbage Patch, plastic can circulate in this part of the ocean for years, posing health risks to marine animals, fish, and seabirds."

Paraphrased from **Garbage Pathes: How Gyres Take Our Trash Out to Sea**
NOOA Ocean Podcast: Episode 14
https://oceanservice.noaa.gov/podcast/mar18/nop14-ocean-garbage-patches.html

II. Bleaching

The sound of a healthy coral reef is filled with lovely, tiny pings, filagrees and blips created as currents of saltwater flow in and around the myriad microscopic algae living there. These sounds attract abundant marine life to the reefs to feed on the algae which, in turn, create symbiotic, healthy, sustainable, and vital marine environments.

When the ocean heats beyond temperatures that can support life in the reefs, they fall prey to marine heat waves in a phenomenon called Coral Bleaching. When the water is too warm, corals will expel their life-sustaining microscopic algae which causes the coral to lose their color, leaving them white (bleached). The sound of a bleached coral reef is dry and filled with pops and crackles. Marine life disappears in search of healthy environs.

Earth's coral reefs are in danger. Coral reefs provide a buffer, protecting our coasts from waves, storms, and floods. When reefs are damaged or destroyed, the absence of thiis natural barrier can increase the damage to coastal communites from normal wave action and violent storms.

The Intergovernmental Panel on Climate Change, an intergovernmental body of the United Nations with the job of advancing scientific knowledge about climate change caused by human activities, has observed that since the 1970's marine heatwaves have doubled in frequency becoming

longer-lasting, more intense, and extensive. Since 2006 there has been widespread coral bleaching and reef degradation. In 2021, nearly 60 percent of the world's ocean surface experienced at least one spell of marine heatwaves. The UN Environment Programme says that if the water continues to warm every one of the world's coral reefs could bleach by the end of this century.

Paraphrased from the Linnean Society's video: **What do coral reefs sound like?**
https://www.youtube.com/watch?v=Q2BzlqyCTgg

III. Thwaites Glacier

Antarctica is draped in a kaleidoscope of glaciers, a constantly moving community of ice which shrink and grow in rhythm with each other. Thwaites Glacier, located in West Antarctica in the Amundson Sea, stands out because of its size. At 80 miles across, it is the widest glacier in the world—roughly the size of Florida or Britain. Thwaites functions like a cork, a dam, holding back the mass of the West Antarctic Ice Sheet, which has the square footage of two Alaskas. Warm ocean water from the Amundsen Sea circulates under the ice, causing it to melt. Melting loosens the ice from the bedrock below, causing it to flow faster and eventually to retreat into the deeper and thicker ice areas where it is likely to speed up still more.

Sometimes called "the Doomsday Glacier," Thwaites is disintegrating fast relative to other Antarctic glaciers. Every year, it loses 50 billion tons of ice, which contributes around 4 percent of annual global sea level rise. If its entire body were to melt, it would raise the ocean by 25 inches. The collaps of Thwaites would cause seawater levels to rise by around 2 feet (65 centimeters). This could, in turn, destabilize neighboring glaciers, potentially increasing future sea levels by almost an additional 10 feet (3 meters).

Paraphrased from **Thwaites Glacier**
The International Thwaites Glacier Collaboration
https://thwaitesglacier.org/about/itgc

IV. Calving

The interface of glaciers and ocean water is dynamic and complex. Compared to glacial ice, seawater is warm and highly erosive. As waves and tides undermine some ice fronts, great blocks of ice of up to 200 feet may break off or "calve" and crash into the sea, creating icebergs. Spectacular and awe-inspiring sights and sounds of calving events fill us with the wonder of Nature's power. We must take this power seriously.

Calving diminishes the edges of the parent ice sheet, allowing warm water to seep under it, undermining and melting the ice sheet itself causing the water level to rise. Changes to calving rates and the dynamics of calving glaciers represent a significant uncertainty in projections of future sea level rise. A growing body of observational evidence suggests that calving glaciers respond rapidly to regional environmental

change. For instance, iceberg calving accounts for between 30 % and 60 % of net mass loss from the Greenland Ice Sheet, which has intensified, losing an average of 30m tonnes of ice an hour due to the climate crisis, and is now the single largest contributor to global sea level rise in the cryosphere. Between 1961and 2024 there have been numerous, significant, instances of calving including:

The Filchner-Ronne Ice Shelf - in October 1988, the A-38 iceberg broke away from the Filchner-Ronne Ice Shelf. It was about 150 km x 50 km. A second calving occurred in May 2000 and created an iceberg 167 km x 32 km.

The Amery Ice Shelf - A major calving event occurred in 1962 to 1963. Currently, there is a section at the front of the shelf referred to as the 'loose tooth'. This section, about 30 km by 30 km is moving at about 12 metres (39 ft) per day and is expected to eventually calve away.

Ward Hunt Ice Shelf - The largest observed calving of an ice island happened at Ward Hunt Ice Shelf. Sometime between August 1961 and April 1962 almost 600 km2 (230 sq mi) of ice broke away.

Ayles Ice Shelf - In 2005, nearly the entire shelf calved from the northern edge of Ellesmere Island. This event was the biggest of its kind for at least the past 25 years. A total of 87.1 km2 (33+5⁄8 sq mi) of ice was lost in this event. The largest piece was 66.4 km2 (25+5⁄8 sq mi) in area, (slightly larger than the City of Manhattan)

Larsen Ice Shelf - This large ice shelf, located in the Weddell Sea, extending along the east coast of the Antarctic Peninsula, consists of three segments, two of which have calved. In January 1995, the Larsen A Ice Shelf containing 3,250 km2 (1,250 sq mi) of ice 200 m (660 ft) thick calved and disintegrated. Then the Larsen B Ice Shelf calved and disintegrated in February 2002. A large section of the Larsen C Ice Shelf broke away in July 2017 producing an iceberg the size of Luxembourg.

Paraphrased from:

What is Calving? In Glacier Bay
https://www.nps.gov/places/what-is-calving-in-glacier-bay.htm

What is iceberg calving, and why does it matter?
https://cpom.org.uk/what-is-iceberg-calving-and-why-does-it-matter

An introduction to the Greenland Ice Sheet
https://www.antarcticglaciers.org/glaciers-and-climate/changing-greenland-ice-sheet/greenland-ice-sheet/

Calving of Freshwater glaciers
https://www.antarcticglaciers.org/glacier-processes/glacial-lakes/calving-of-freshwater-glaciers/

Larsen C Ice Shelf
https://www.bas.ac.uk/data/our-data/publication/larsen-c-ice-shelf/

Performance Notes

Five notes of the piano need to be prepared with picture hanging putty. Yarn mallets are used on the lower strings in movement 3 and 4. These requirements have been vetted by a registered piano technician who has assured us that they will do no harm to the instrument. As an extra precaution, it is suggested that you wear gloves when working with the strings on the piano. An assistant is needed for movements 3 and 4. It could be a percussionist, (ie a friend, a student, or a page turner).

I. Gyre – Piano and Plastic Bottle

One empty plastic water bottle (like the provided photo) is required for this movement. Keep the cap on the bottle. The plastic bottle is to be played by the pianist as indicated by the notation and instructions in the score. When performing on the bottle, the pianist should use their best discretion as to dynamics and aleatoric sound.

II. Bleaching – Piano with 5 Prepared Notes

Create grape-sized balls of picture mounting putty. Using these, prepare the following five pitches: B6, C#7, D#7, G#7, and A#7 as shown in the provided picture, making certain that each ball dampens all three strings of each pitch.

III. Thwaites Glacier – Piano with Yarn Mallets

An assistant is needed for movements 3 and 4 to perform with mallets inside the piano on the lowest range of notes (low A to B-flat 7). Two medium yarn mallets are required to perform the part. The mallet part is noted on a separate staff in the score.

IV. Calving- Piano with Yarn Mallets

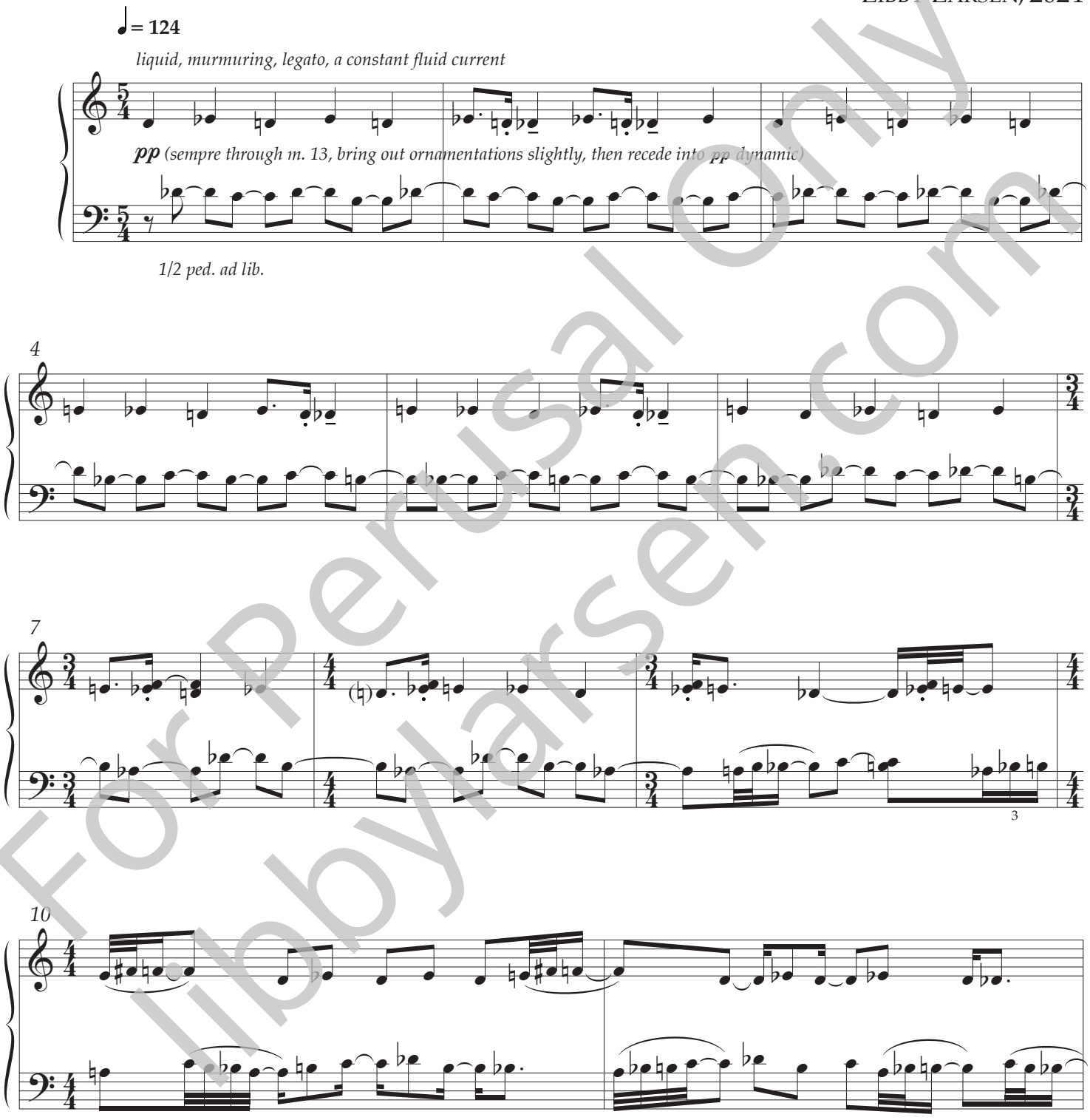
Pedal markings in this movement are indicated as follows:
damper ped = damper pedal
ped ad lib = use damper pedal at your discression
sost ped = sostenuto pedal
½ ped = depress the pedal halfway

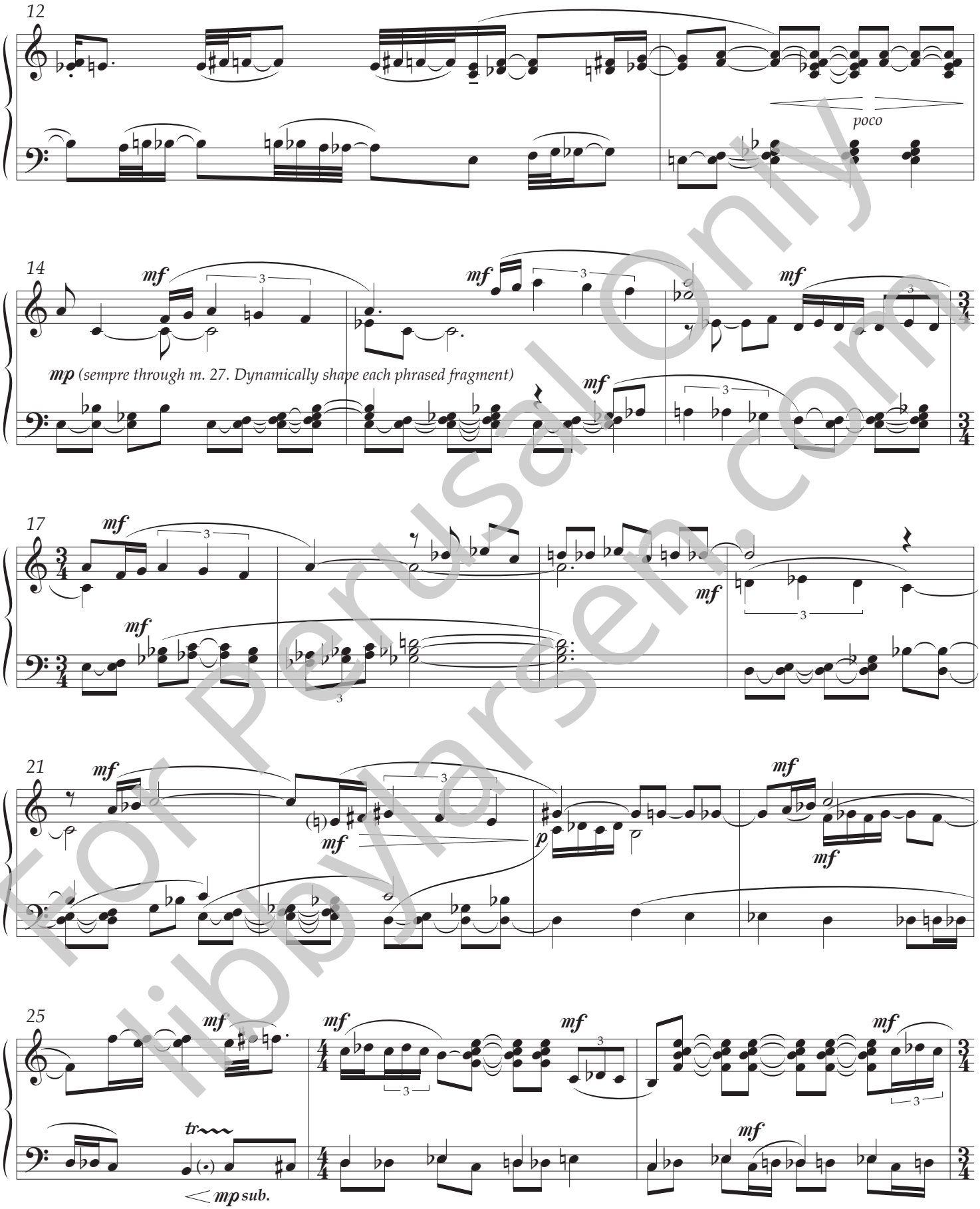
Ocean Suite

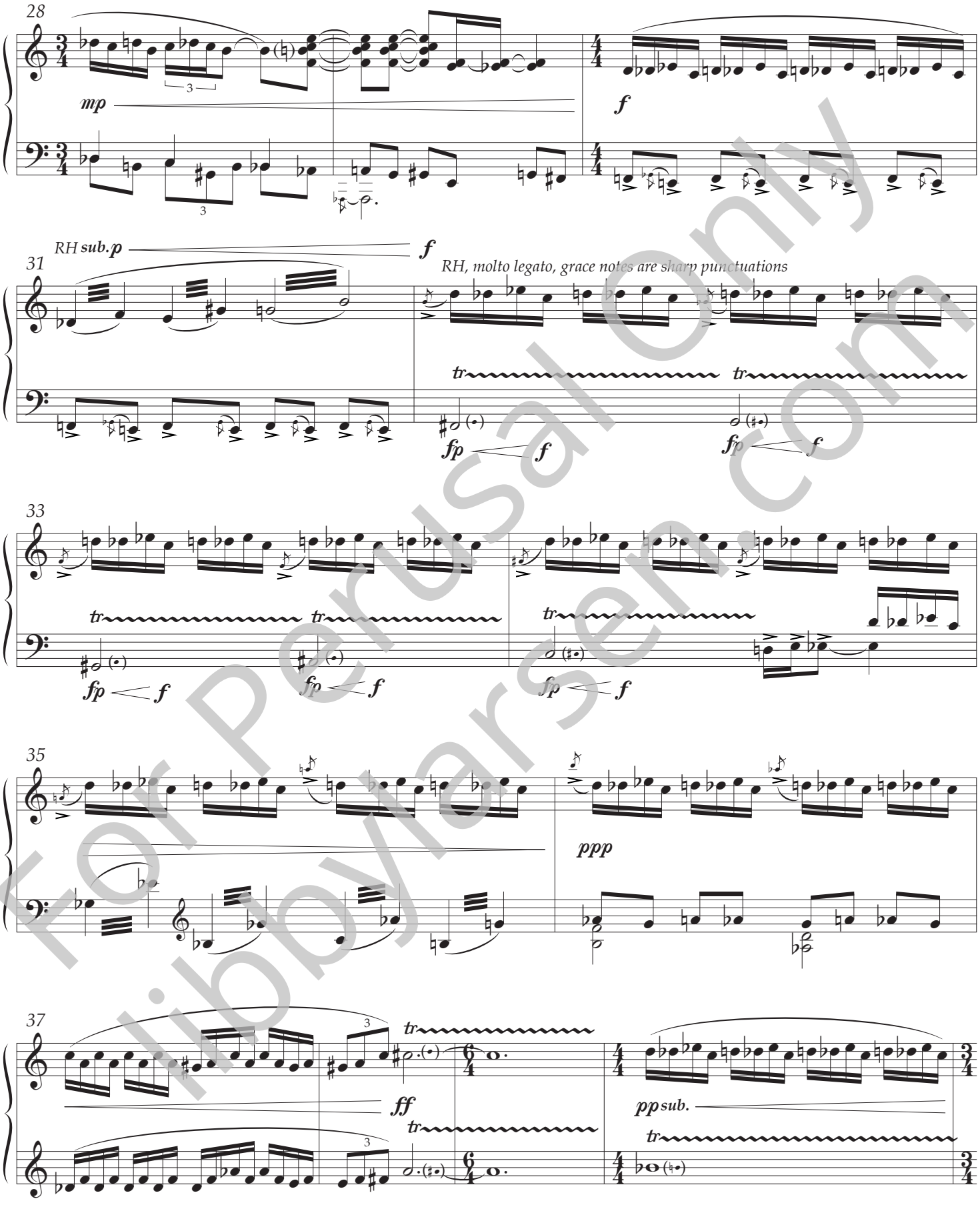
I. Gyre

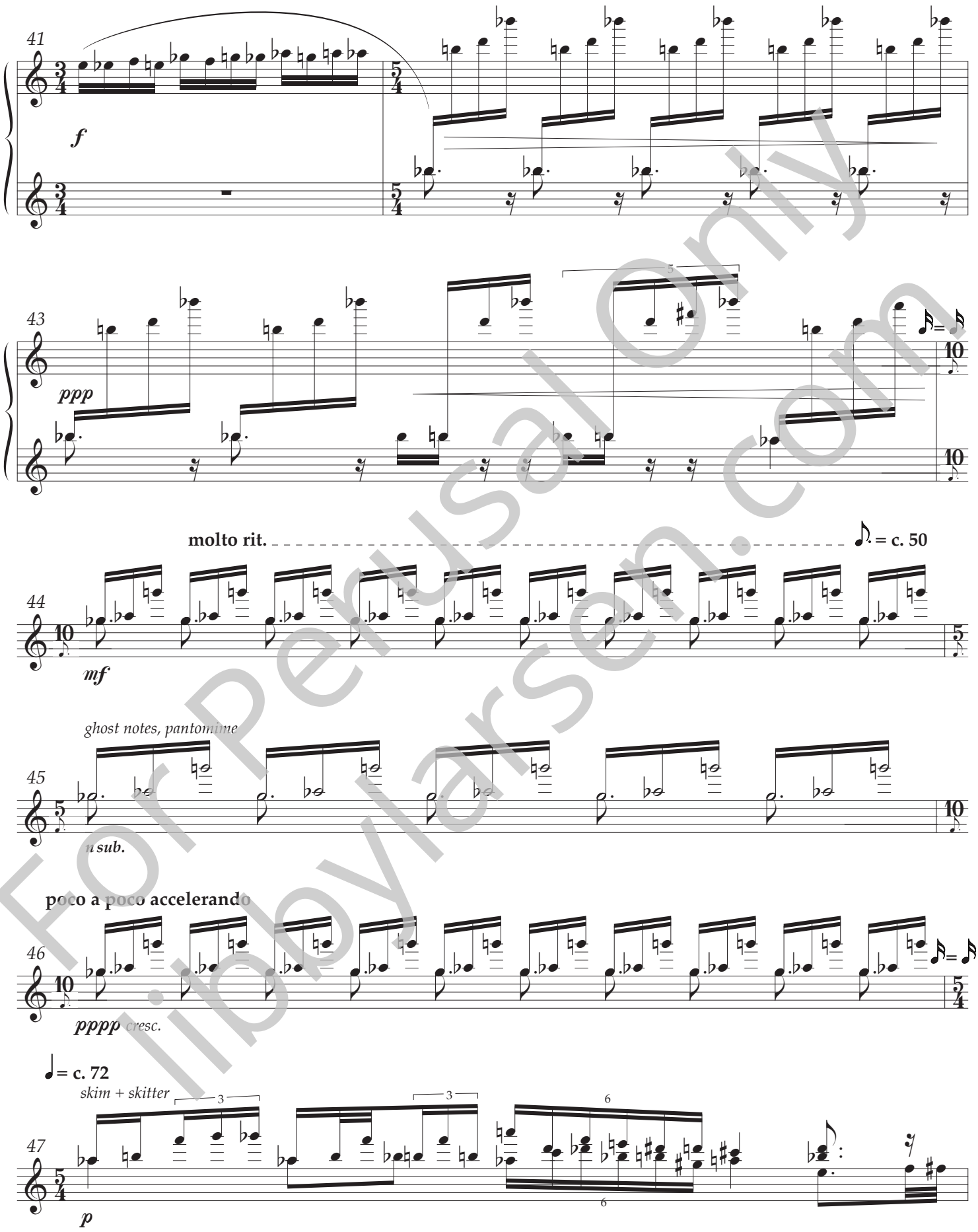
Piano and 16.9 oz empty, plastic water bottle

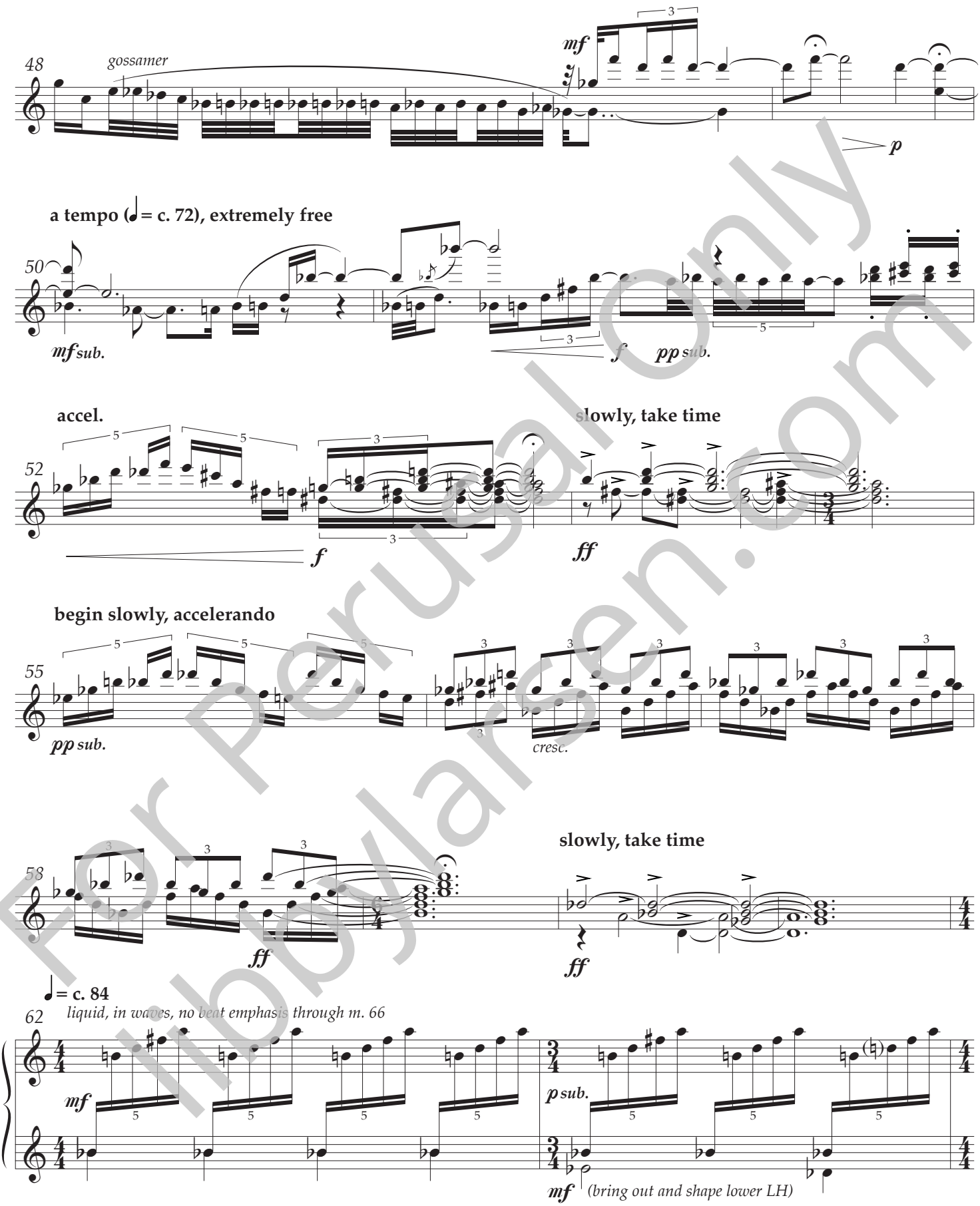
Libby Larsen, 2024

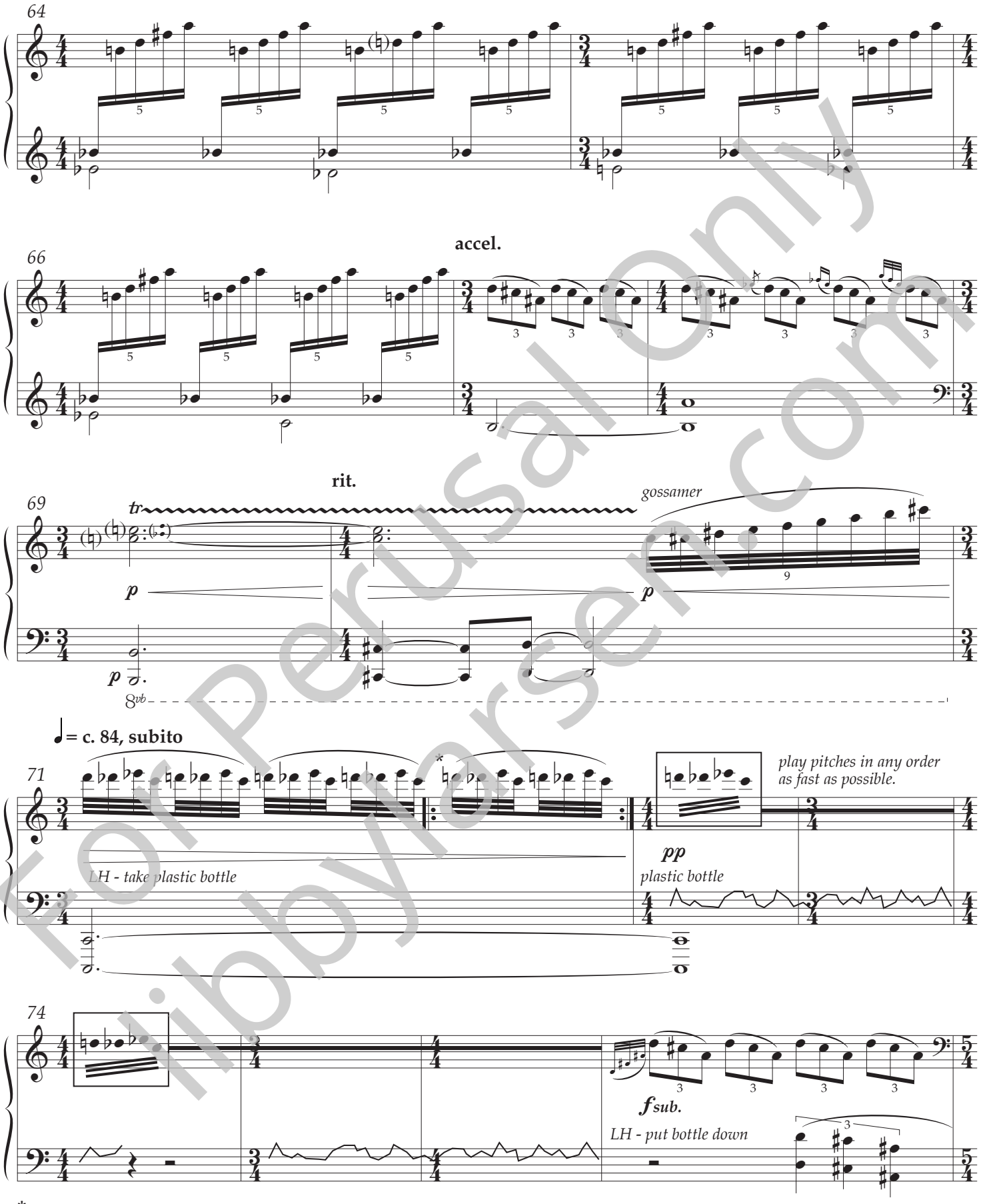












*repeat until plastic bottle is confidently under control

78

mp sub.

moil

79

mf

80

long

f

a tempo **rit.** **slowly** **begin slowly, accelerando**

82

tr

pp

long

RH - plastic bottle

f

ped.

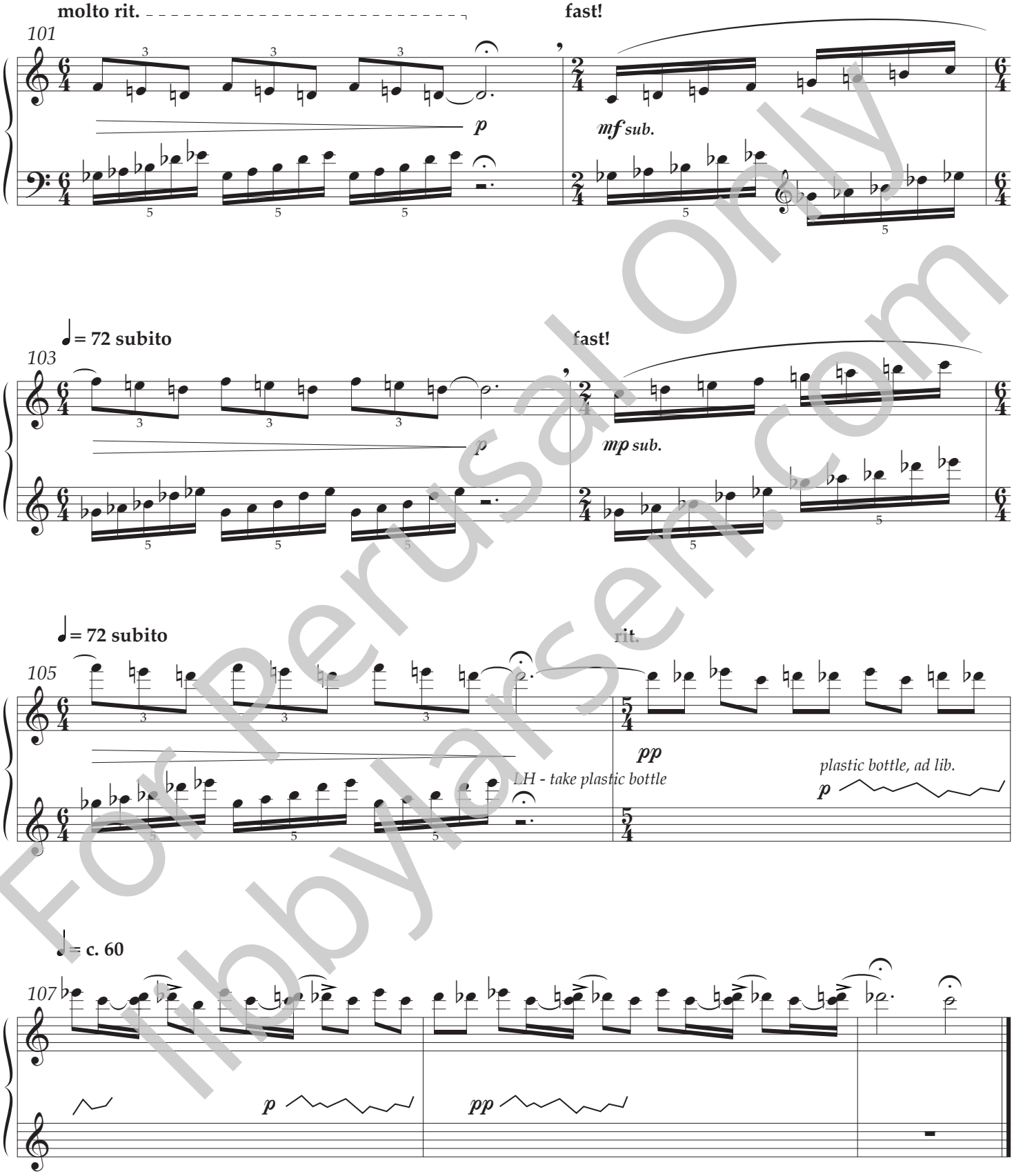
86

♩ = 124

long

long

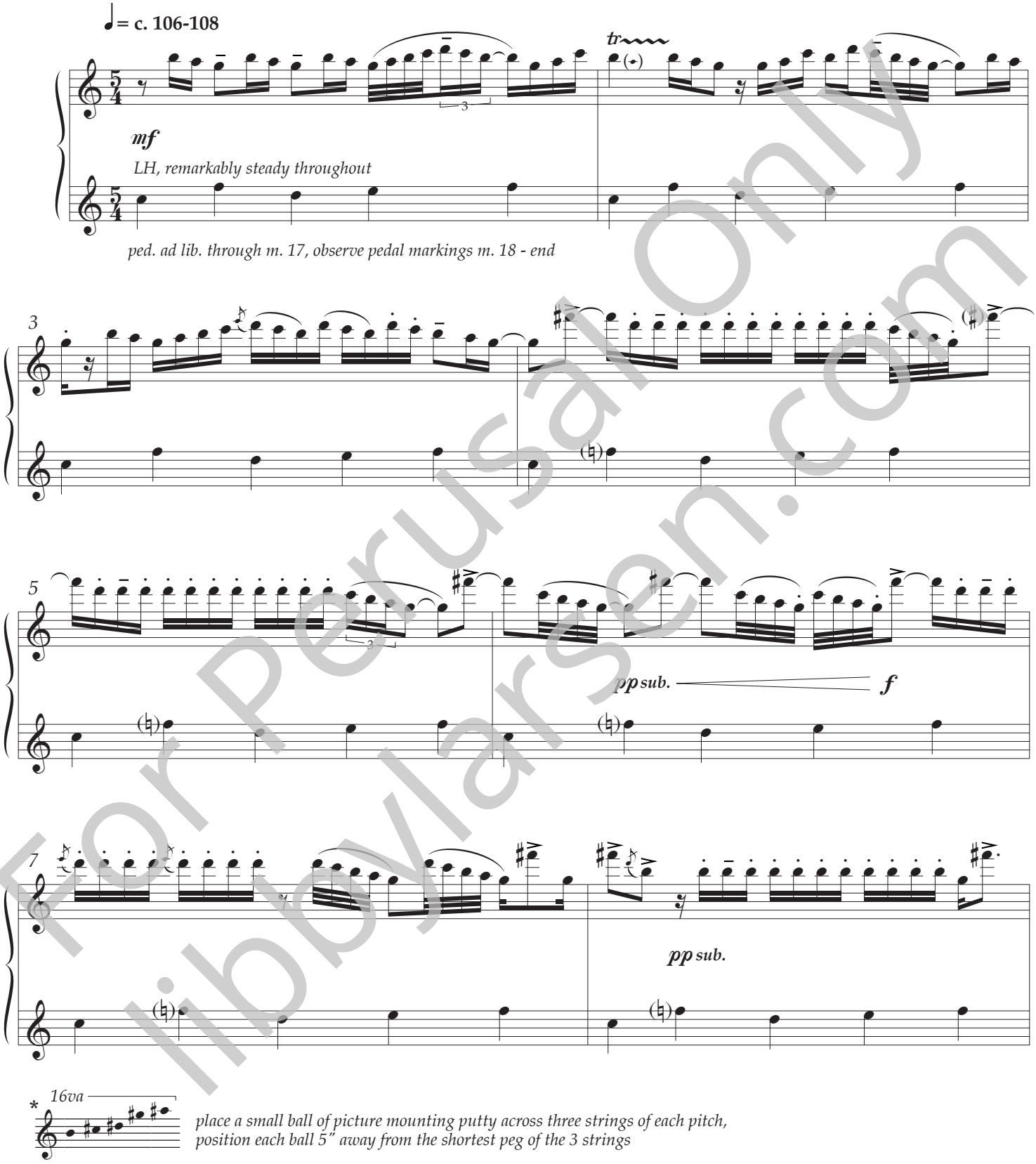
ped.

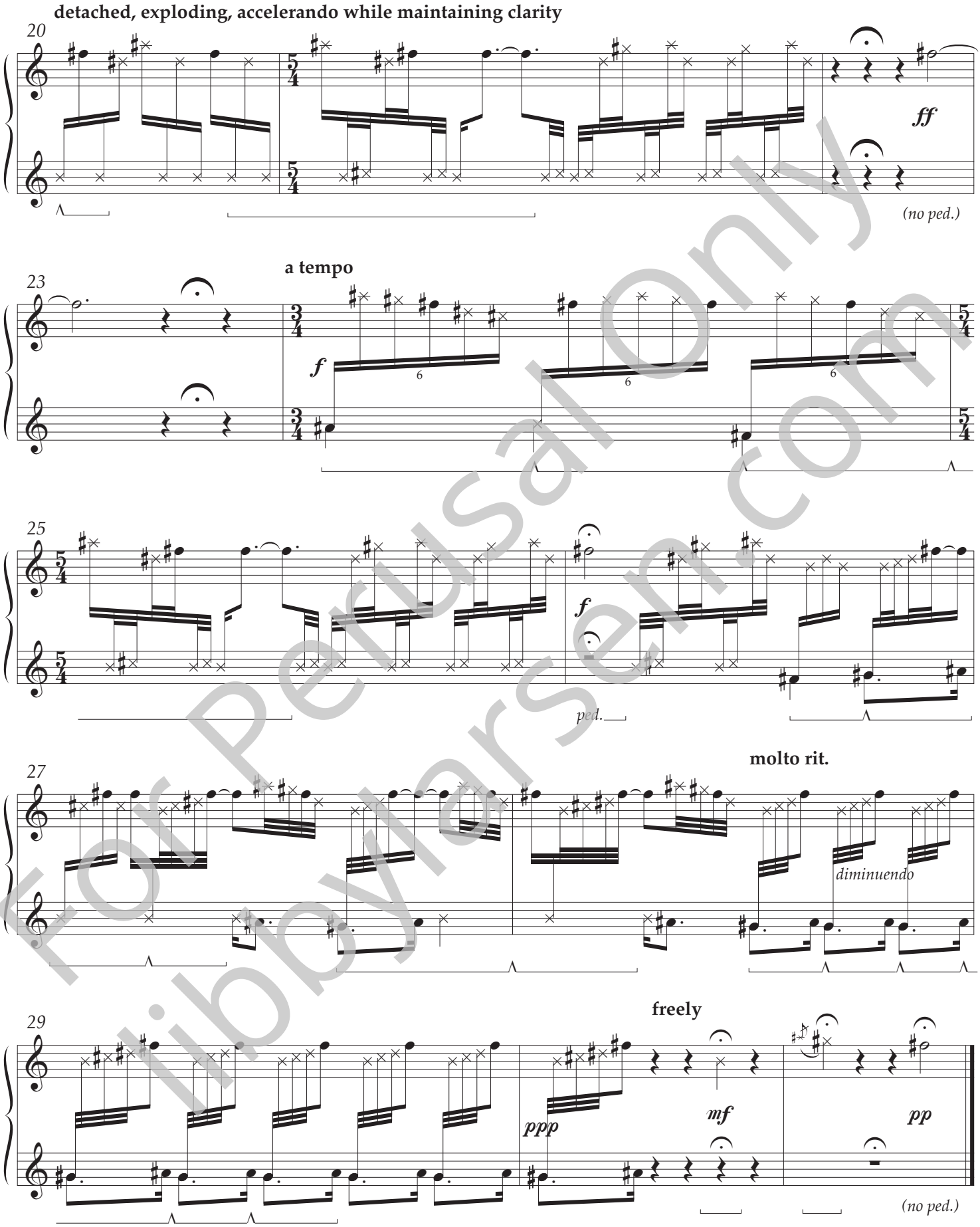


II. Bleaching

Piano with five prepared notes*

Libby Larsen, 2024

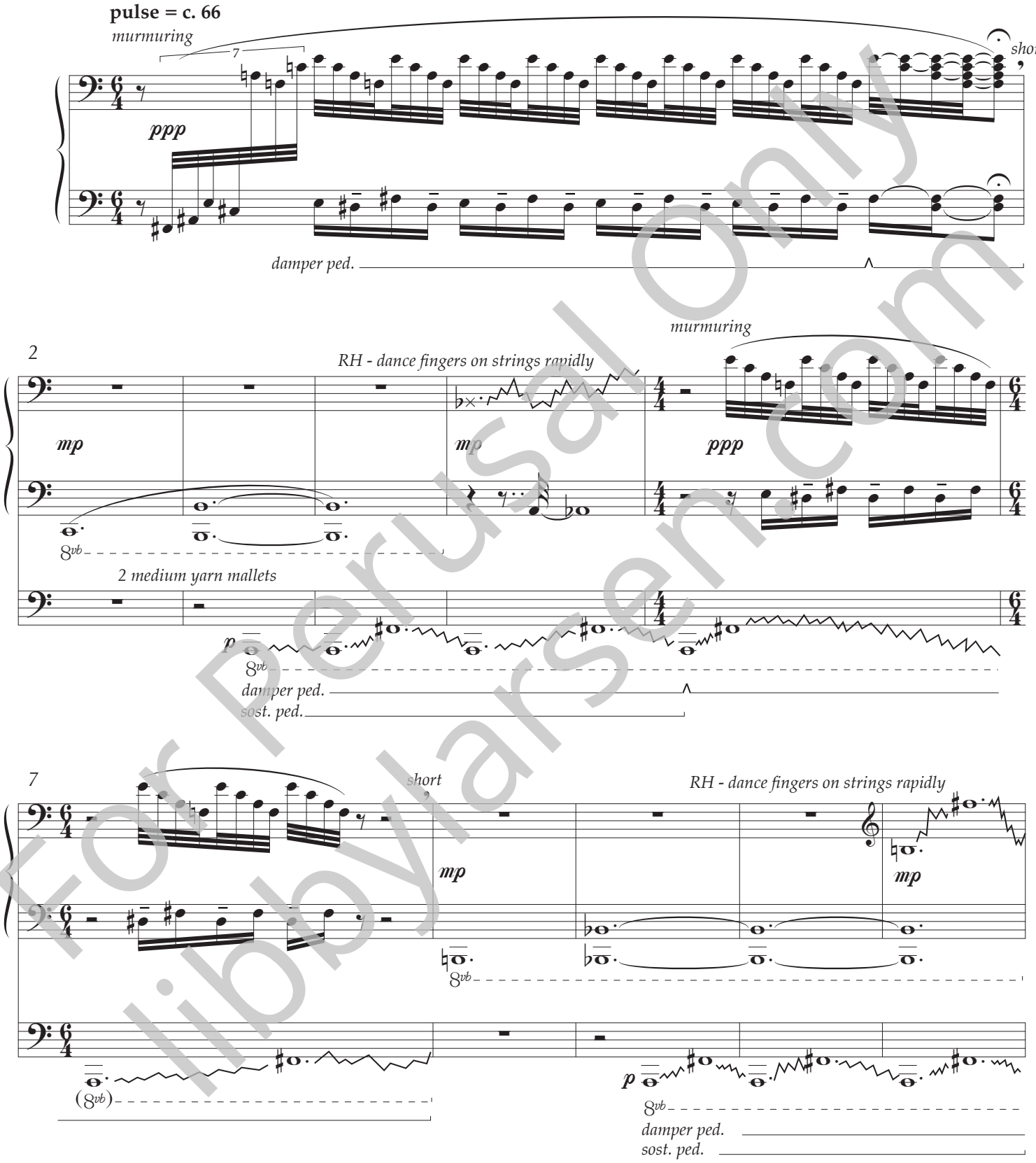


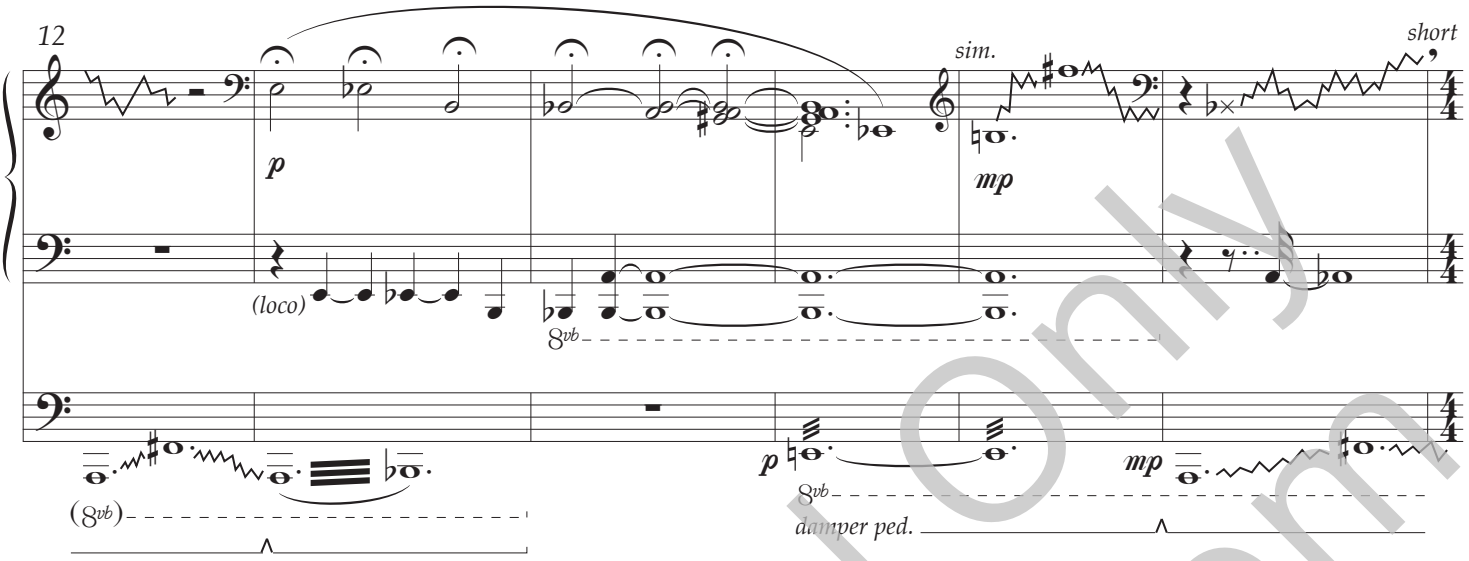


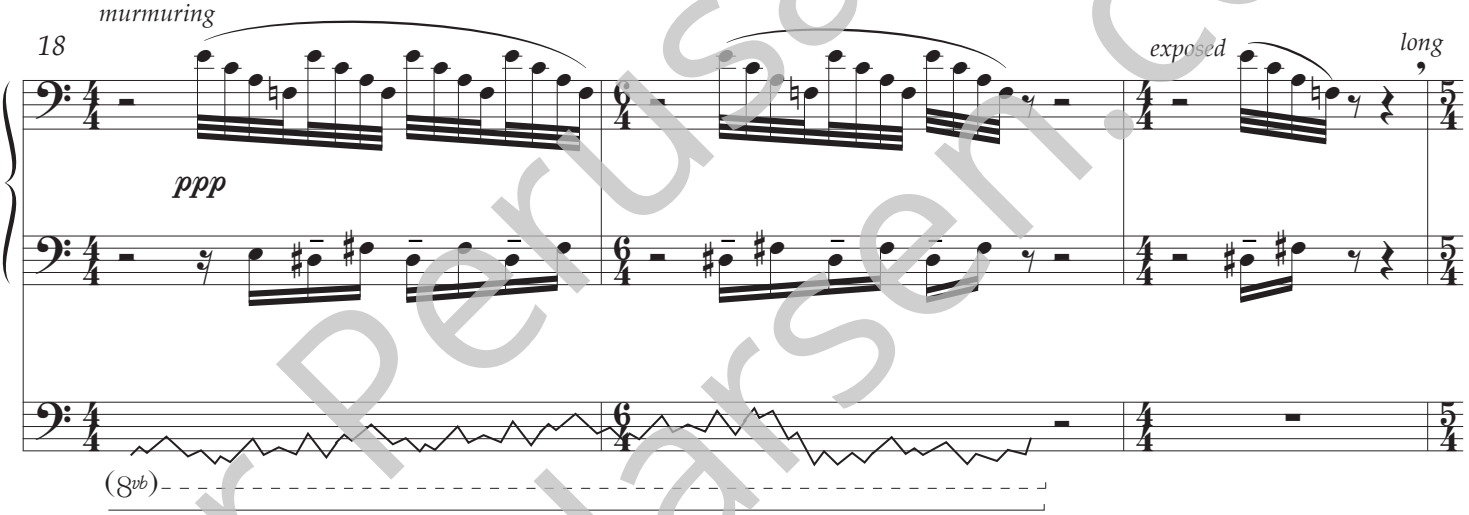
III. Thwaite's Glacier

Piano and yarn mallets

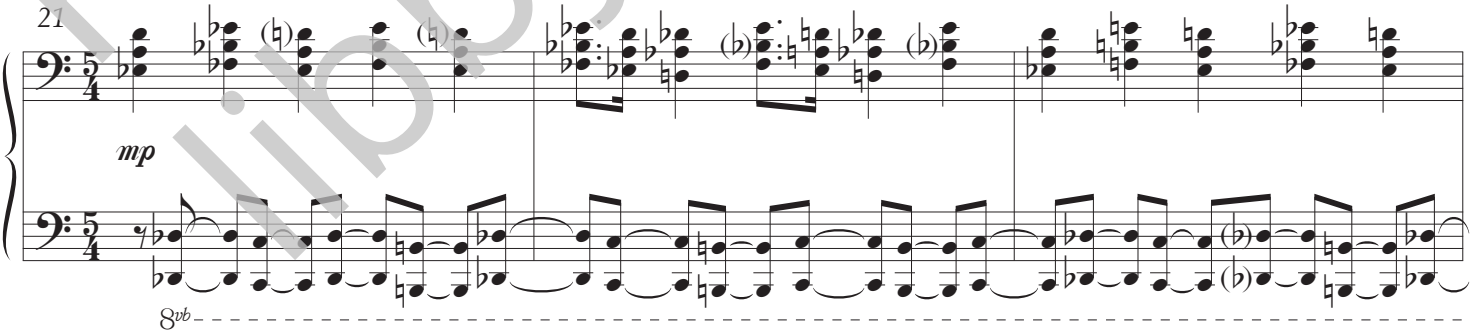
Libby Larsen, 2024



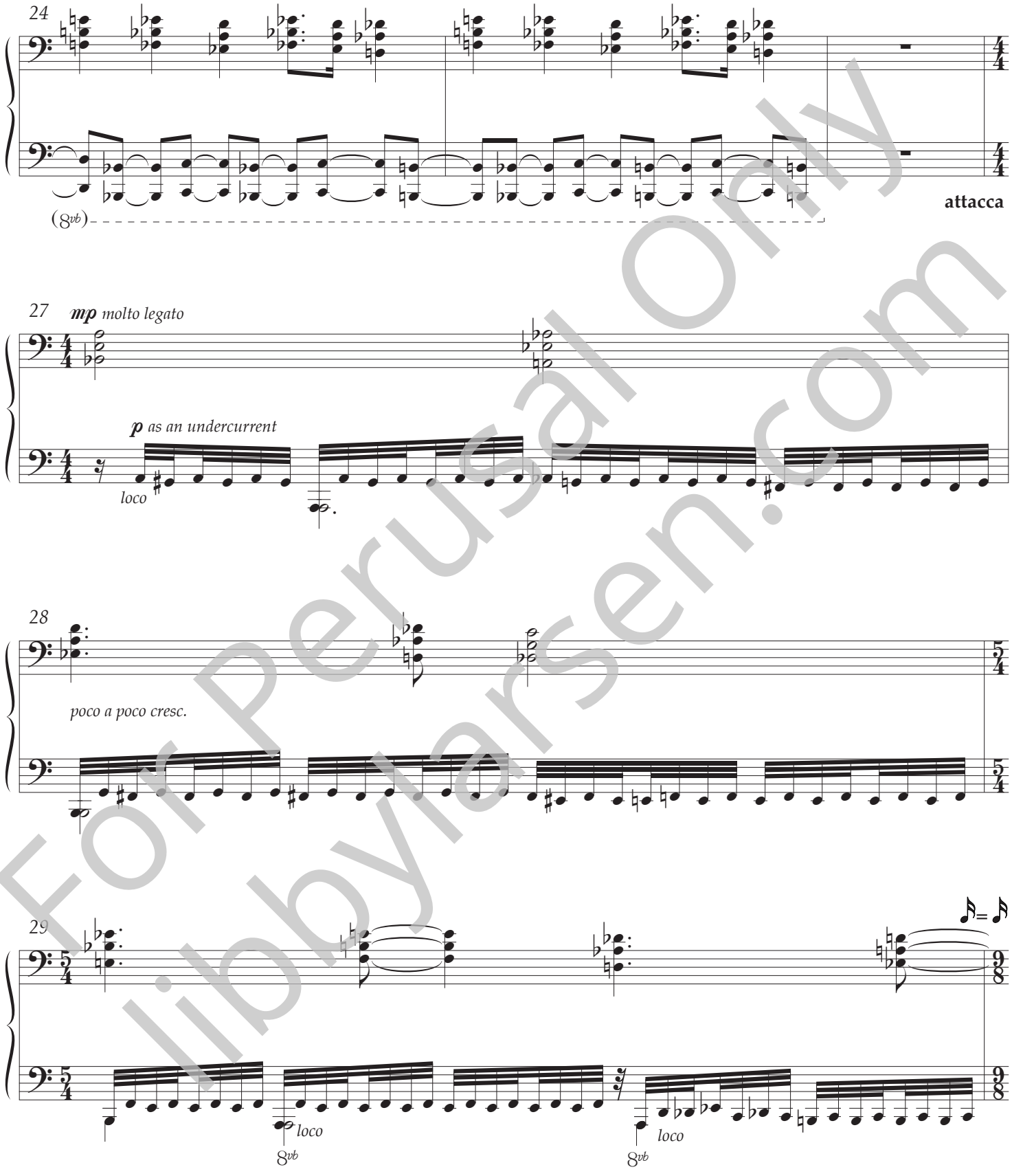


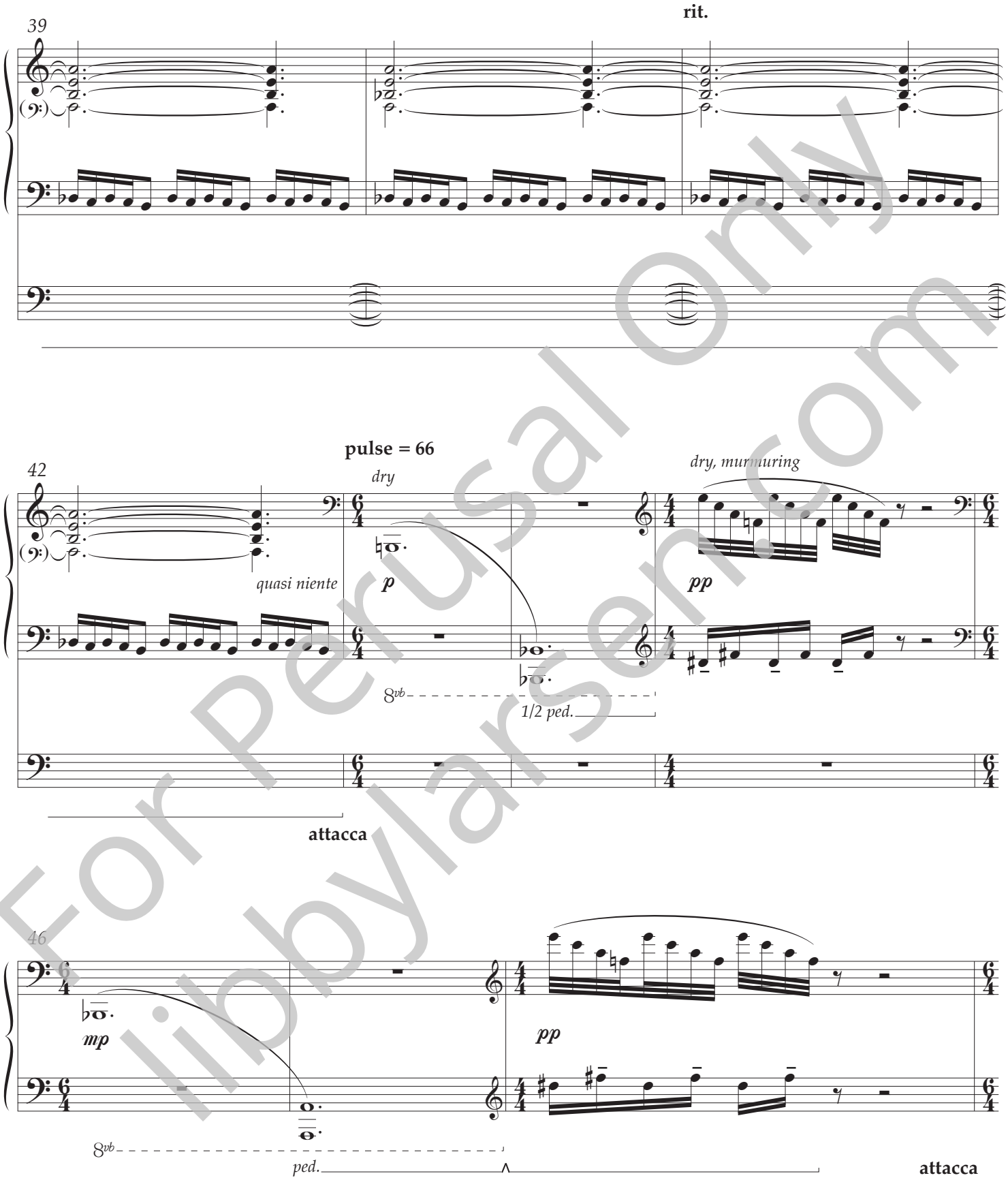


Slower, with glacial deliberation



damper ped. ad lib. through m. 28, add soft ped. and sostenuto pedal mm. 27-29

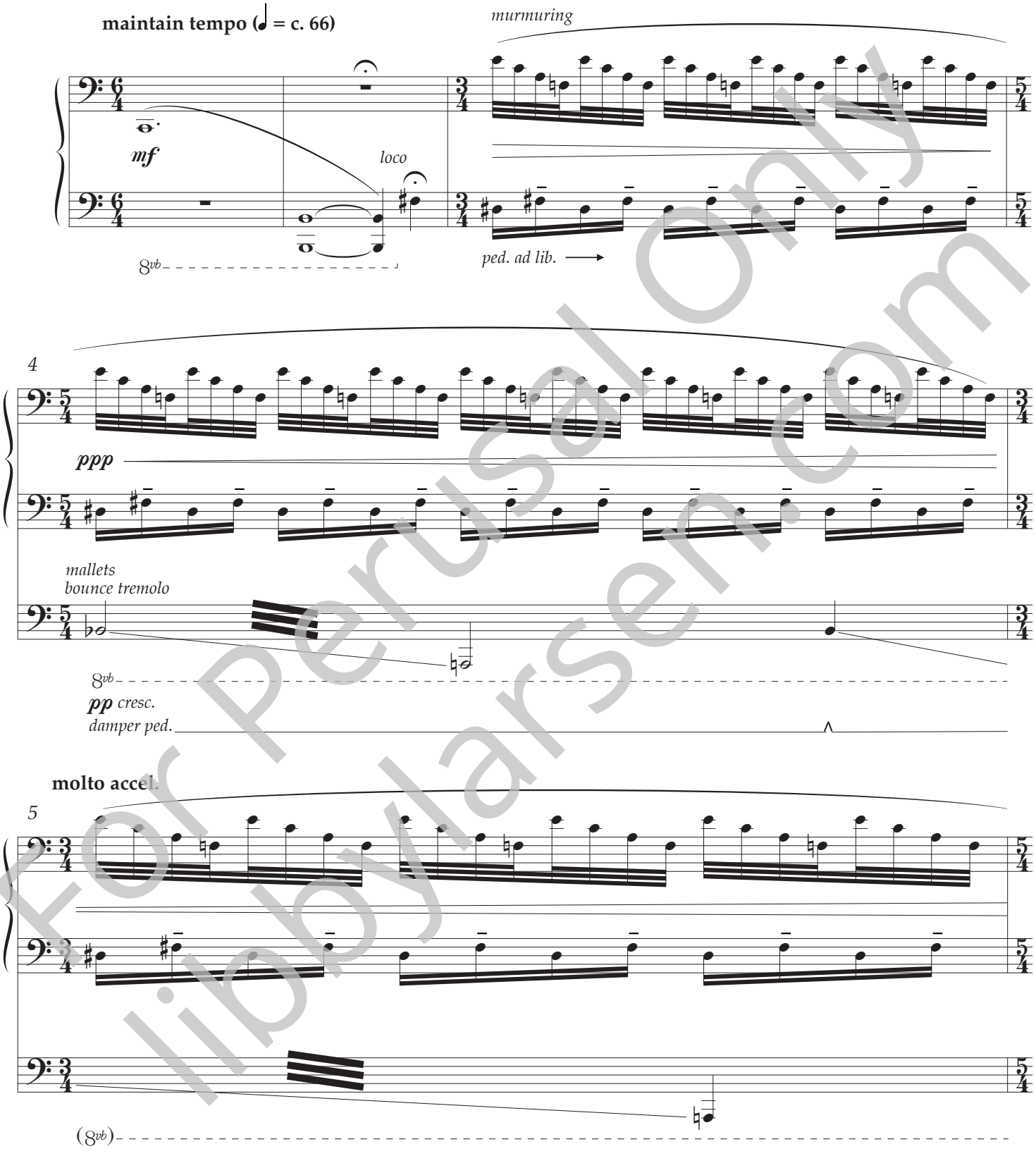


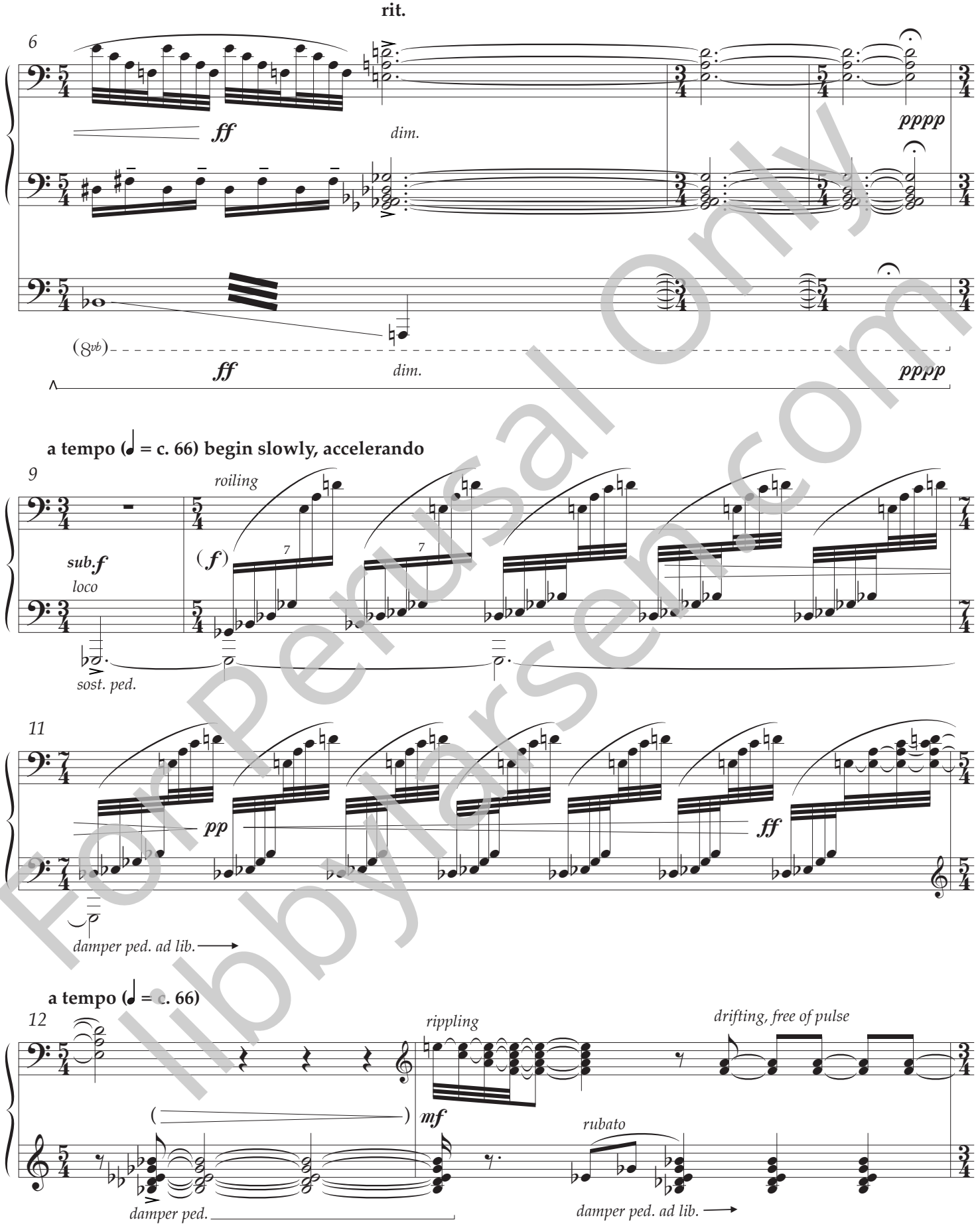


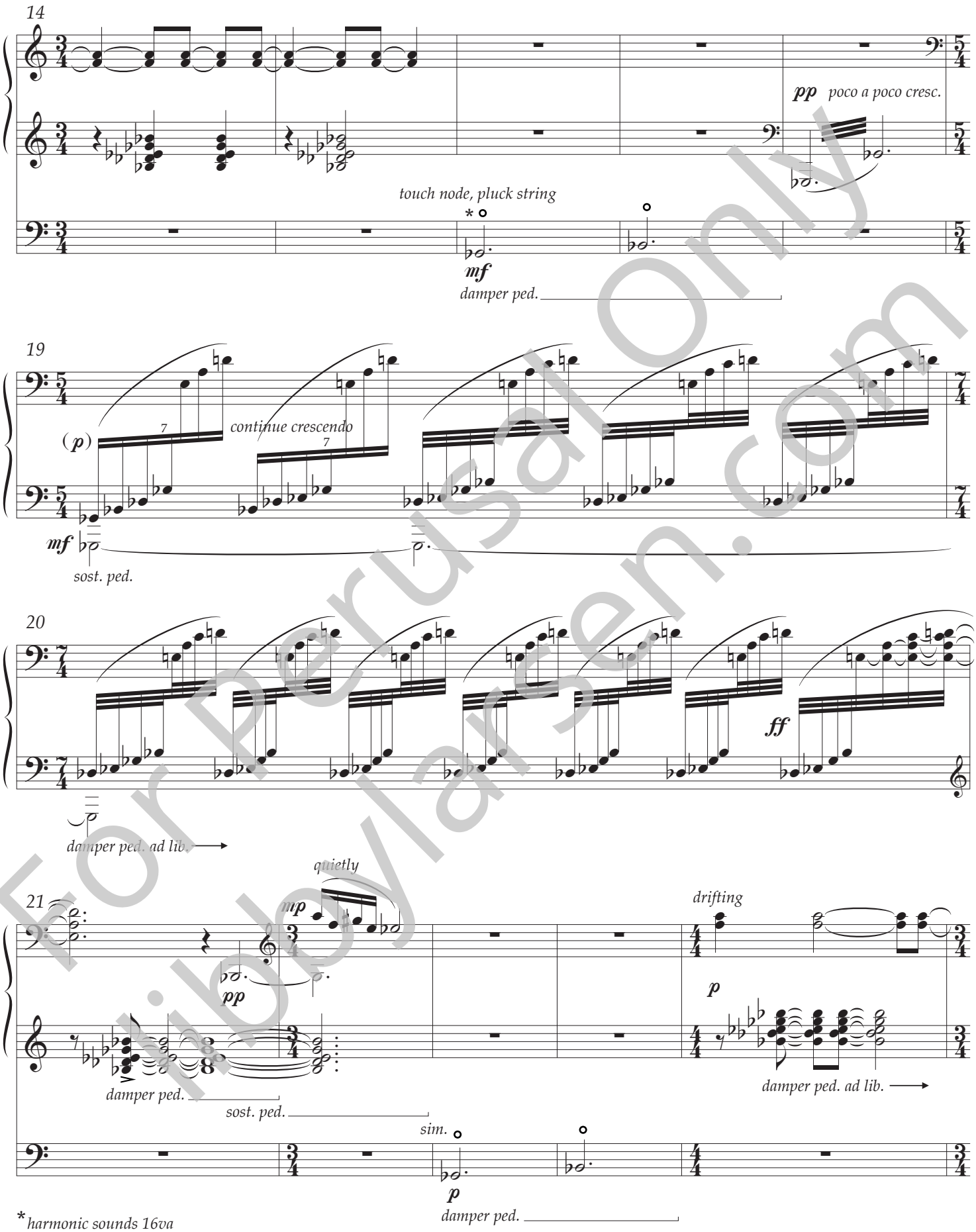
IV. Calving

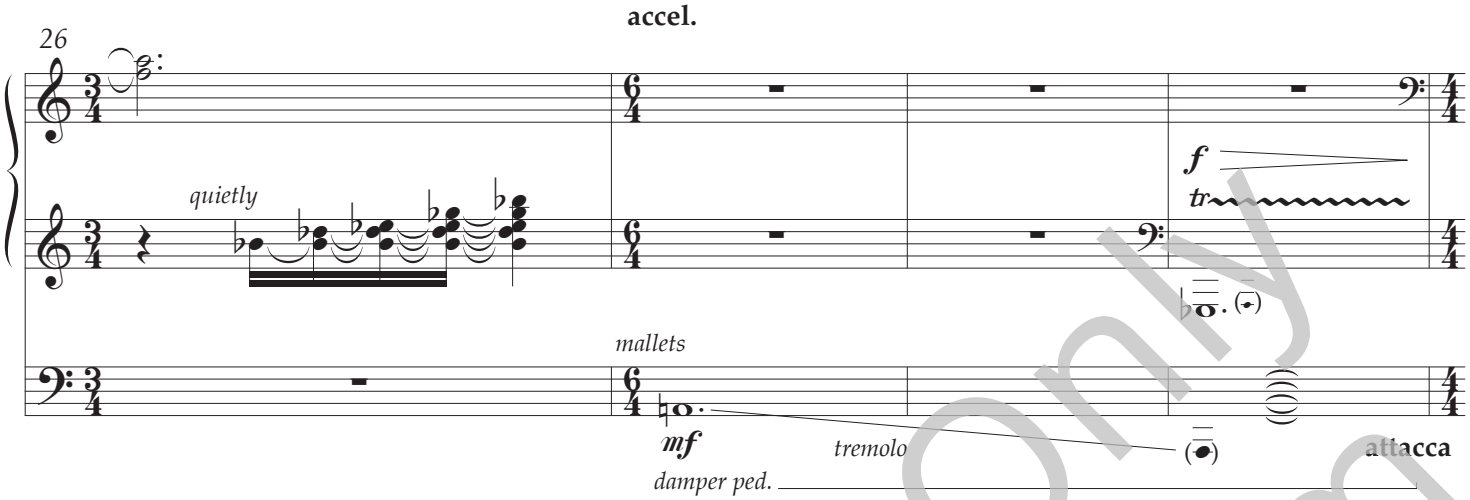
Piano and yarn mallets

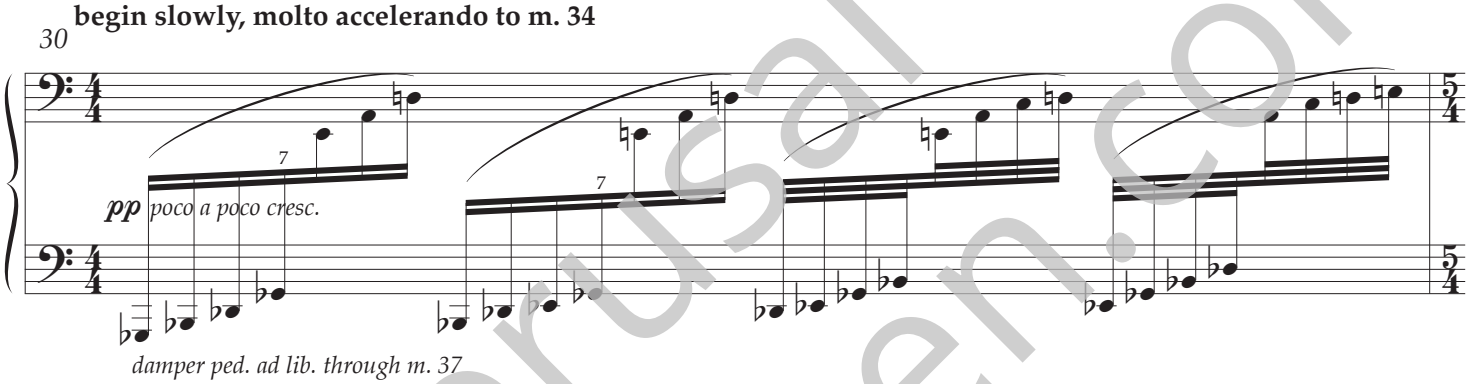
Libby Larsen, 2024

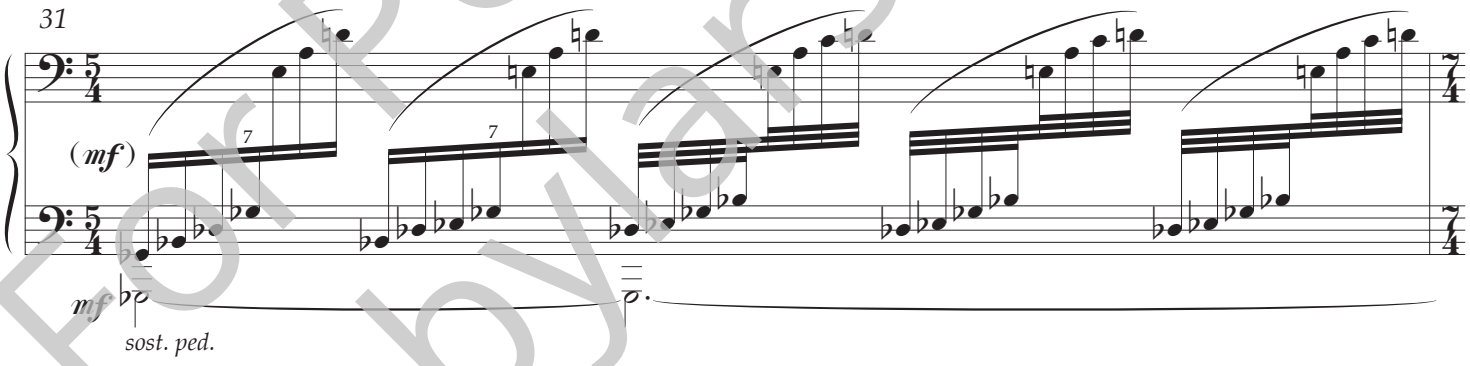


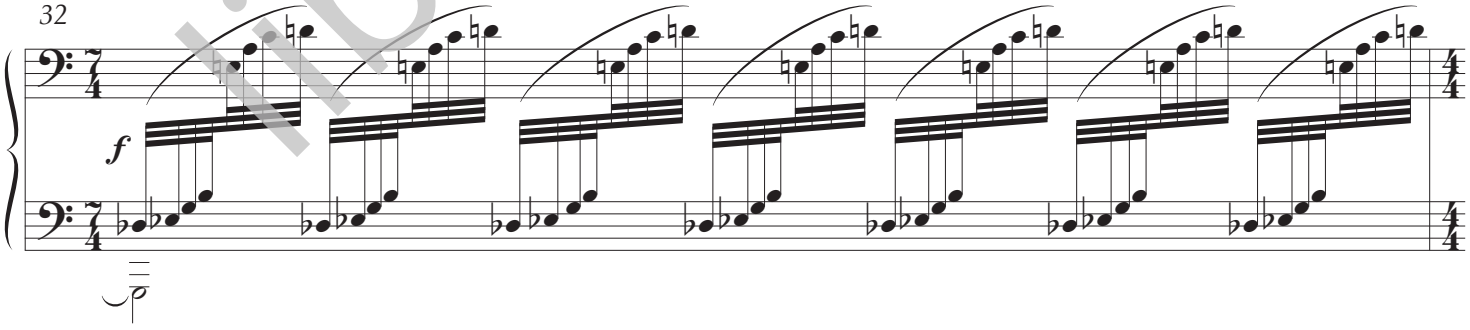












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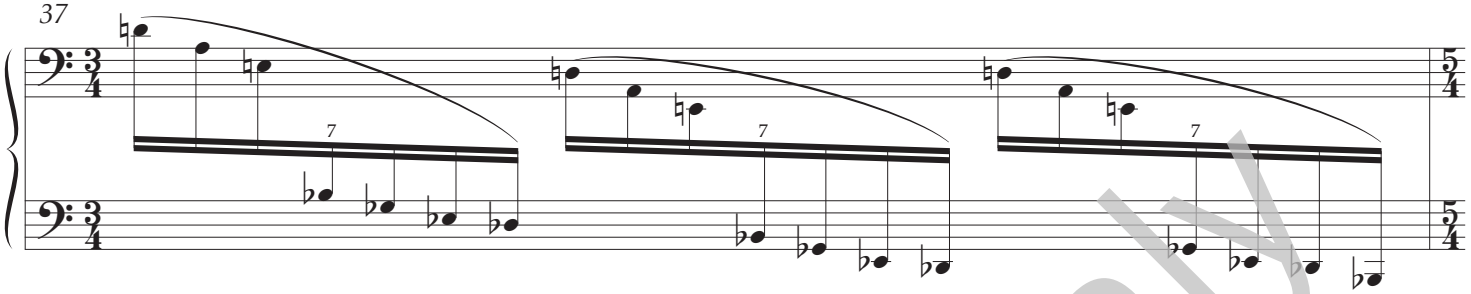
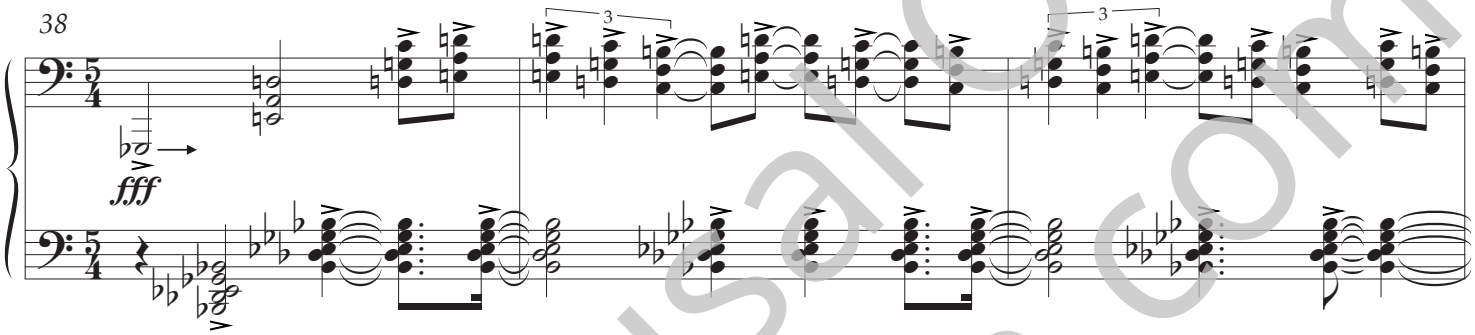


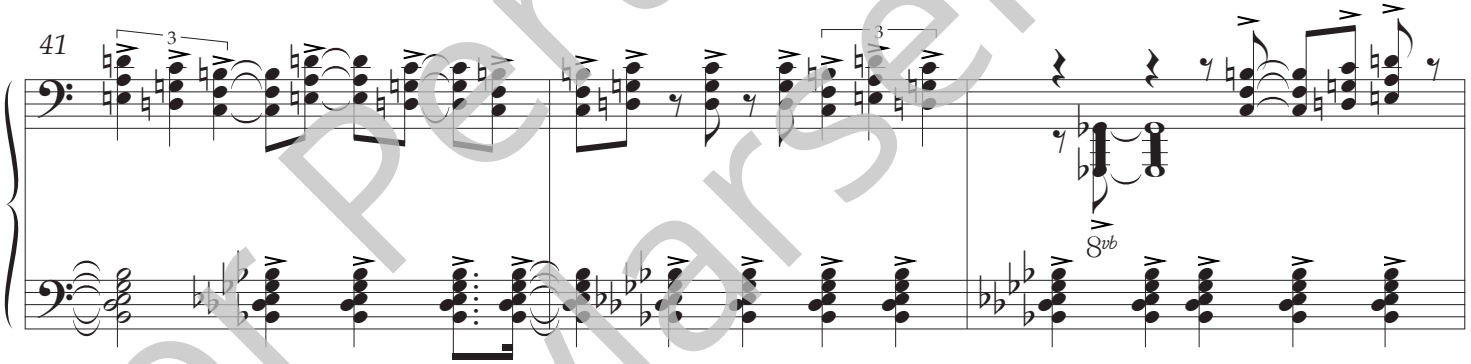
slightly slower, exploding fissures of sound, deafening

38



damper ped. ad lib. asymmetrical through m. 47

41



44