Load Assessment – Existing Foundation Check

4.5 The comparison of the proposed foundation loads and beam loads with 5kN/m² imposed load applied to the proposed infill and the existing slab are summarised as below.

[redacted]

4.6 There is an increase in the foundation load due to the proposed infill. However, given that our assessment is likely conservative, and the percentage load increase is relatively small at 6%. We consider this slight load increase acceptable.

**Option 2 – Precast Hollowcore Planks**

[redacted]

depth of the planks being 150mm and the requirement to place a screed on top to ensure a flush surface across all planks, an 100x100 steel angle is proposed to be bolted to the existing PFC to support the planks. The planks come in 1.2m wide panels.

Pros and Cons

4.8 The pros and cons of this option are summarised below:

**Pros**

No temporary works needed for installation of the planks as they are dropped into place and the screed poured on top, with the planks acting as formwork.

Simple reinforcement arrangement with only mesh needed in the screed.

Quick installation, all planks can be laid, and screed poured in one go (subject to access constraints for concreting)

**Cons**

Each 1.2m x 1.25m x 150mm thick plank weighs approx. 360kg. Therefore, the planks will need to be craned into place.

Minimum thickness of precast planks is 150mm thick, this combined with the requirement of screed may mean that the existing steel structure needs to be changed and additional steels required. Furthermore, there may be an implication on the head height within the pit.





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Openings through slab for services would need to avoid reinforcement in hollow core planks. If large openings are needed additional steels may be required to trim out the openings.

Load Assessment – Check capacity of 203 UC 46

4.9 The 203 UC 46 was assessed as capable of supporting the proposed infill and the existing infill with the 5kN/m² imposed loading. As such, this option may be feasible without any strengthening of the existing steel work.

Load Assessment – Existing Foundation Check

4.10 The comparison of the proposed foundation loads and beam loads with 5kN/m² imposed load applied to the proposed infill and the existing slab are summarised as below.

[redacted]

4.11 There is an increase in the foundation load due to the proposed infill. However, given that our assessment is likely conservative, and the percentage increase is relatively small at 8%, it may be feasible during detailed design to justify the foundations without having to strengthen them.

**Option 3 – Beam and Block Flooring**

[redacted]

4.12 This option proposes the infill is formed out of a 155mm thick beam and block flooring that is to be seated on new angles that are fixed to the existing steel PFC sections. Screed is needed to accommodate the possible point loads from the proposed storage racks above.

4.13 Beam and block flooring consists of precast concrete beams that span across the opening with blocks provided as infill – see Figure 9.

*Figure 9 – Photo of beam and block floor (source: Forterra.co.uk)*

### Pros and Cons

4.14 The pros and cons of this option are summarised below.

**Pros**

No temporary works required for installation of the pcc beam and block floor system as they are dropped into place and the screed poured on top, with the flooring acting as formwork.

The beams and blocks are relatively light and can be handled manually.

Beams and blocks are fabricated off site, minimising construction works on site.

Installation is simple with the pcc beams placed and the blocks slotted between the beams.

**Cons**

Minimum standard thickness of beam and block floors are 155mm. As such, some modification to the existing structure may be required to achieve the flush finished floor level.

Relatively inflexible for installing openings for services after the installation is done. Generally, all services openings should be coordinated during the beam and block design stage.

Some level of coordination with the beam and block supplier may be required to ensure the beam and block can support the point loads from the storage racks. Therefore, there may be a, possibly small, risk that if larger racks are to be used in the future, the beam and block flooring may need to be re-checked.

### Load Assessment – Check capacity of 203 UC 46

4.15 The 203 UC 46 was assessed as capable of supporting the proposed infill and the existing infill with the 5kN/m$^2$ imposed loading. As such, this option may be feasible without any strengthening of the existing steelwork.

### Load Assessment – Existing Foundation Check

4.16 The comparison of the proposed foundation loads and beam loads with 5kN/m$^2$ imposed load applied to the proposed infill and the existing slab are summarised as below.







| | Baseline ULS Forces Calculated with British Standard Load Factors | ULS forces in Proposed Condition calculated with Eurocode Load Factors | % Increase |
|---|---|---|---|
| Foundation Loads | 88kN | 92.8kN | 6% |

4.17 There is an increase in the foundation load due to the proposed infill. However, given that our assessment is likely conservative, and the percentage load increase is relatively small at 6%.

[redacted]

4.18 This option proposes the infill is formed of timber joists that are supported off the existing PFC's. The deck is then to be formed from OSB board that would be screw fixed to the joists with a layer of screed on top to accommodate the point loads from the racks.

### Pros and Cons

4.19 The pros and cons of this option are summarised below:

**Pros**

Temporary works would be minimal.

Light weight installation.

Relatively simple installation and familiar material to contractors.

Timber can be notched at supports to minimise having to modify existing structure.

Openings for services can be introduced through the OSB deck with relative ease. Larger openings may need to be trimmed out with timber joists.

**Cons**

Requirement of screed to accommodate point loads from rack.

Fire protection and fire spread measures may be required, which would be detailed by the architect.

Possible issues with flexibility in terms of applying higher loads to the infill in the future. Furthermore, timber may be less durable than other options presented in this study.

### Load Assessment – Check capacity of 203 UC 46

4.20 The 203 UC 46 was assessed as capable of supporting the proposed infill and the existing infill with the 5kN/m$^2$ imposed loading.

Load Assessment – Existing Foundation Check

4.21 The comparison of the proposed foundation loads and beam loads with 5kN/m² imposed load applied to the proposed infill and the existing slab are summarised as below.

[redacted]

4.22 There is a minor increase in foundation loading. However, given that it is 0.42%, we are of the opinion that this option would not require further justification of the foundations.

Summary Statement on Infill Options

4.23 Based on the review of the existing structure, we are of the opinion that it is possible to infill the maintenance pits openings.

4.24 In summary, the lightest option is Option 4 Timber Floor, this option may offer savings in ease and speed of construction. However, the use of timber may lead to issues with fire spread considerations and require the addition of fire protection measures that make this option less attractive, furthermore, there may be issues with flexibility if higher racking loads are to be introduced in the future (it may be feasible to strengthen joists in the future). Option 1, composite deck, therefore, appears the most robust option that works with the existing floor construction the best.

4.25 The existing 203 UC 46 steel beams have been assessed as capable of supporting all proposed infill options.

4.26 All options see an increase in foundation loads beyond what the assumed existing loading is. However, given the relatively minor increase in loadings (less than 10%), we are of the opinion that it is likely that the foundations can be justified for all options. However, we would still recommend that the original geotechnical investigation report and / or structural calculations is located to confirm the floor slab foundation bearing capacity to justify the detailed design.

## 5.0 Proposed methods of accessing void under maintenance pits

5.1 The client would like to keep the option of using the existing stairs to access the void under the suspended ground floor. The existing staircase appears to be supported at the top, via connection of the stringers to the pit wall and at the base – see figure below.

[redacted]







*Figure 10 – Photo of existing pit staircase*

5.2 We understand that a concrete finish would be required for any access cover that is provided to suit the surrounding floor finishes. Furthermore, the cover would need to be robust enough to support the proposed racking and loading from dollies.

5.3 The existing entrance to the pit is shown on Figure 12. To install the access cover / infill, the handrail may need to be removed. Furthermore, the top step of the existing staircase is approximately flush with the floor level – this may clash with the infill/cover. As such, the existing steel staircase may require modification to accommodate the infill and the access hatches. This may be in the form of either:

1) Remove the existing staircase and handrail to allow installation of infill. The new access hatch would then be provided within the new infill with the opening in the infill suitably trimmed out to receive the access cover. Temporary access arrangements would also have to be made to facilitate entry / exit from the pit with the existing stairs removed, or

2) To facilitate use of the existing staircase - remove handrail and provide access covers such as 3No. 1200 x 600 Cubis AX-S covers with support frames. The infill would then be built around the covers and adequately framed out. This option would require the support frames to be removable and so require a bespoke solution that would need to be developed in coordination with the cover supplier. The form of temporary / permanent access to be detailed by and coordinated with the architect, including accounting for the handrail removal.

[redacted]

*Figure 11 – Plan demonstrating possible access cover arrangement around existing staircase*

5.4 From the above, we are of the opinion that it is structurally workable to provide an opening within the infill to facilitate access to the pits. However, the details on where the hatch is required and what is to be done with the existing staircase would need to be confirmed by the architect at the detailed design stage, with thought as to how safe access would be provided.

*Figure 12 – Photo of entrance to maintenance pits taken during CCL site visit*

## 6.0 Proposed Full Height Partitions

6.1 It is understood that full-height studwork partitions are to be installed onto the concrete slab. The location of these partitions as well as the build-up is not available at this stage for us to undertake a load assessment. However, given the existing structural information shows that the suspended ground floor slab is designed for 7.5kN/m$^2$ imposed load, there should be sufficient capacity within the existing structure to support the full-height partition walls. In order to progress to the next stage, we would recommend that the locations and build up of the partition walls are confirmed to confirm whether any strengthening is required.

6.2 We would highlight that any proposed full-height studwork partitions within the garage should be assessed for wind loading caused by the roller shutter doors being open. As such the details of restraints of the wall to superstructure should be considered by the designer of the studwork partition walls.

## 7.0 Making good of slab after removal of fixed down items

7.1 We understand that as part of the proposed works, cast-in items and post-fixed items are proposed to be removed. Please see photos of examples of fixed items below.

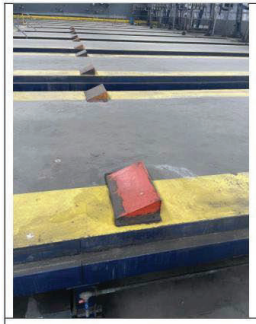

*Figure 13 – Photo of wheel stops that are to be removed taken during CCL site visit*

*Figure 14 – Photo of supports to be removed taken during CCL site visit*







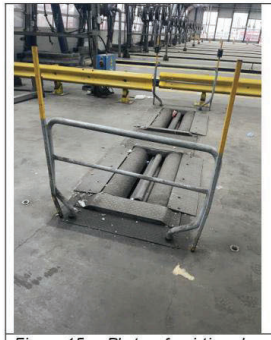

*Figure 15 – Photo of existing dyno rollers within slab taken during CCL site visit*

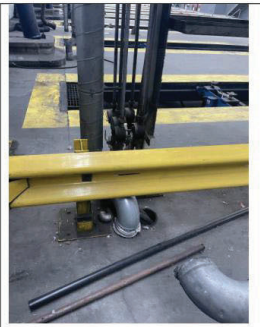

*Figure 16 – Photo of services penetrations and a baseplate with bolts taken during CCL site visit*

7.2 Where smaller holes in the slab remain after the removal, such as bolt holes and recesses in slab, these can be simply infilled with a non-shrink grout such as Conbextra GP grout by Fosroc. For larger openings such as that shown in *Figure 15*, dowel bars should be resin anchored into the surrounding existing concrete and new C32/40 concrete cast with mesh reinforcement to match the existing floor slab construction.

7.3 To progress with the detailed design of this item, we would recommend a schedule of all items to be removed is undertaken in due course, showing location, size of openings and / or type of fixings into the slab. As such, a schedule of repairs can be prepared off the back of this.

## 8.0 Integration of proposed modular units into suspended ground floor slab

8.1 We understand that the Architect (IBI Group) is considering specifying modular units to house new offices within the East Wing of the garage. Details on loading, location and composition of these modular units was not available at the time of writing this Feasibility Report. However, it is understood that the end client (TfL) would like for the finished floor level in the modular unit to be flush with the floor level of the surrounding structure – as such we will initially provide high-level commentary to this regard.

8.2 At a high-level, given the ground floor construction consists of a 200mm thick slab supported on the supporting, existing, steelwork frame structure, it may be feasible to locally remove the concrete slab and found the modular unit[s] directly off the existing steelwork frame structure (see Figure 17). However, as shown on Figure 5, the concrete slab is connected to the 203 UC 46's by shear studs and so the suspended floor slab is likely to be offering horizontal 'floor plate action' stability to the frame and therefore, some strengthening of the existing steel frame may be required. Furthermore, an element of slab making good will need to be allowed for as regards to the cutting of the floor slabs resulting in exposed reinforcement and the need to drill in additional reinforcing bars where existing design support conditions have been fundamentally changed by the cutting into the floor slab.

*Figure 17 – Section through ground floor showing 200mm thick concrete slab*

8.3 If the 200mm floor depth is insufficient to achieve the required floor level, the existing structure will have to be modified with possible cutting of existing and introduction of new steelwork framing to achieve the required levels. This process may incur design, material and construction costs.

8.4 In order to progress with this proposal we would recommend the modular units and their weights are confirmed by the architect as well as the required modular unit floor depth to achieve the existing finished floor level. Furthermore, the offices locations and proposed plan area sizes should be provided to allow us to understand the extent of the ground floor impacted. After this is confirmed, a loading assessment and an options study should be undertaken to highlight the structural implications of incorporating the modular units.







## Appendix A – Relevant Record Drawings

# 7.0 Mechanical & Electrical Proposals

# TfL – LOST PROPERTY OFFICE
# WEST HAM BUS GARAGE

## Stage 2 Design Report

Job No: 43213
Date: 14th April 2023
Revision: Rev 02

## ISSUE AND REVISION RECORD

| **Original** | | | |
|---|---|---|---|
| **Prepared by:** | **C. Hoare** | **Date** | **16.3.2023** |
| **Checked by:** | **C.Hoare** | **Date** | **17.3.2023** |
| **Description** | | | |

| **Revisions** | | | |
|---|---|---|---|
| **Revision** | **Pages Revised & Re-Issued** | **Date** | **Description** |
| **1** | **10, 12, 13** | **20 March 2023** | **Sustainability considerations updated.** |
| **2** | **Generally updated** | **14 April 2023** | **Updated following site review** |
| All revisions within the specification are in GREEN, all information no longer applicable is struck through. | | | |

| **File Ref** |
|---|
| P:/Clients/Gleeds/43213 – TfL Lost Property Office/07 Reports/43213 |

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## 1.0 INTRODUCTION

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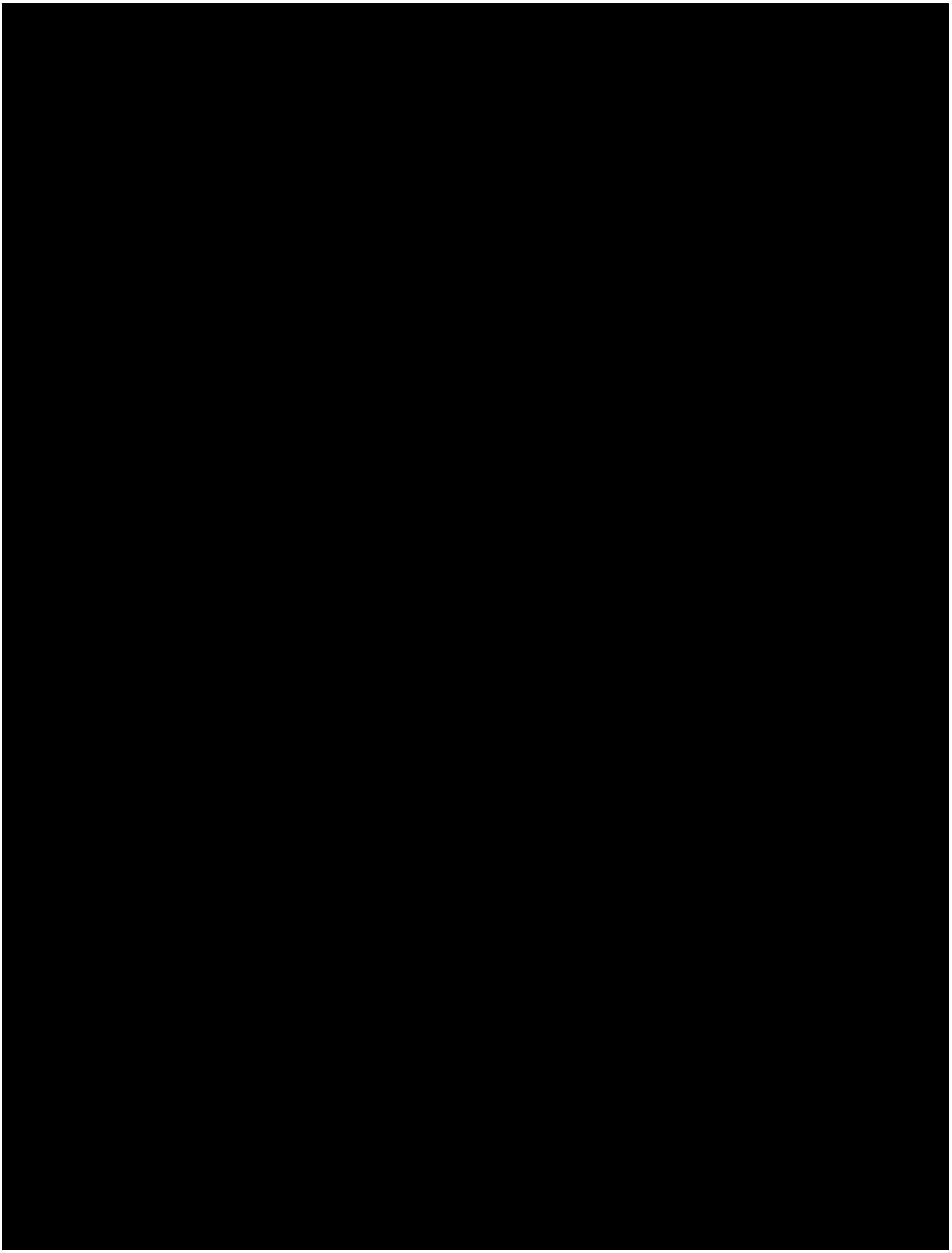

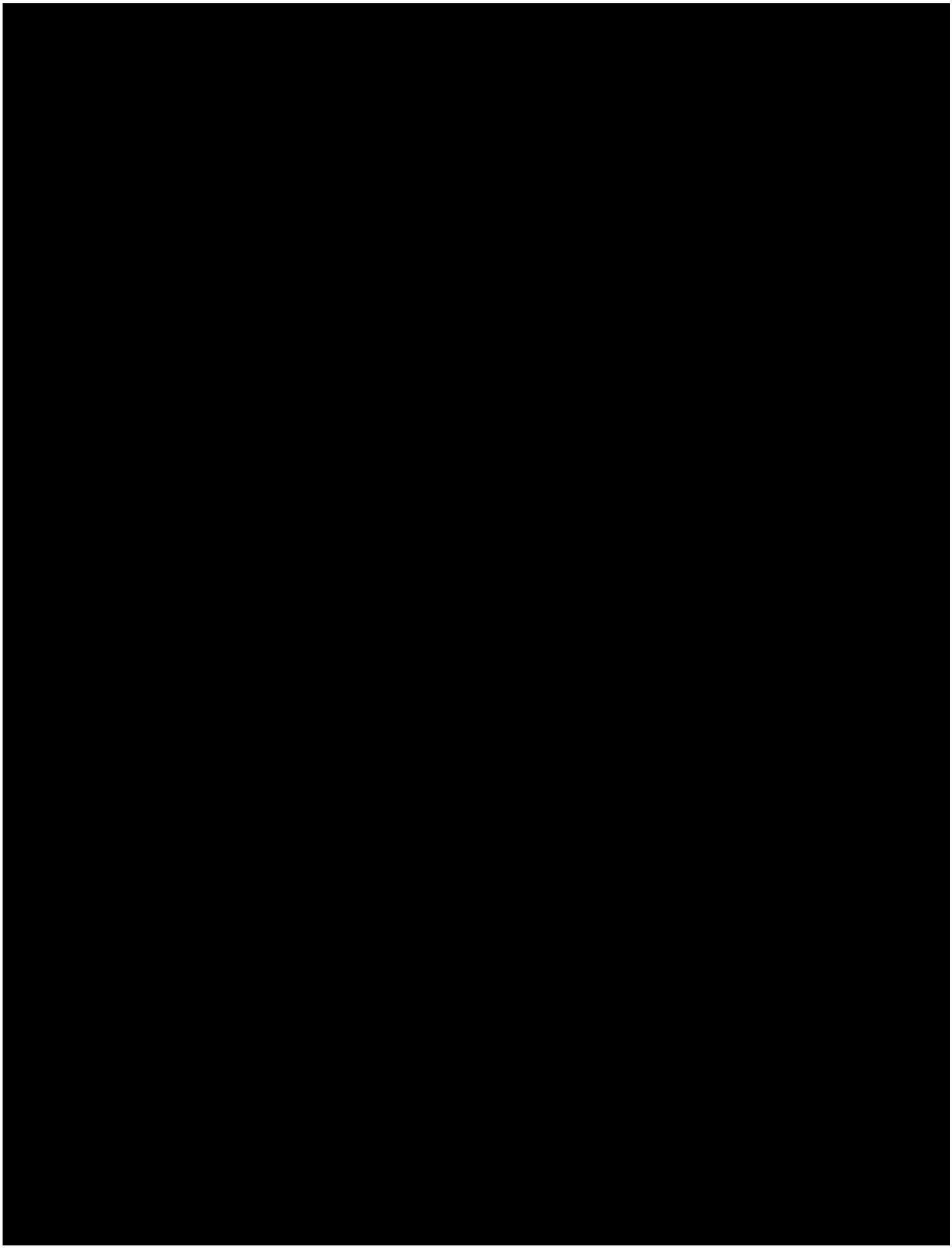

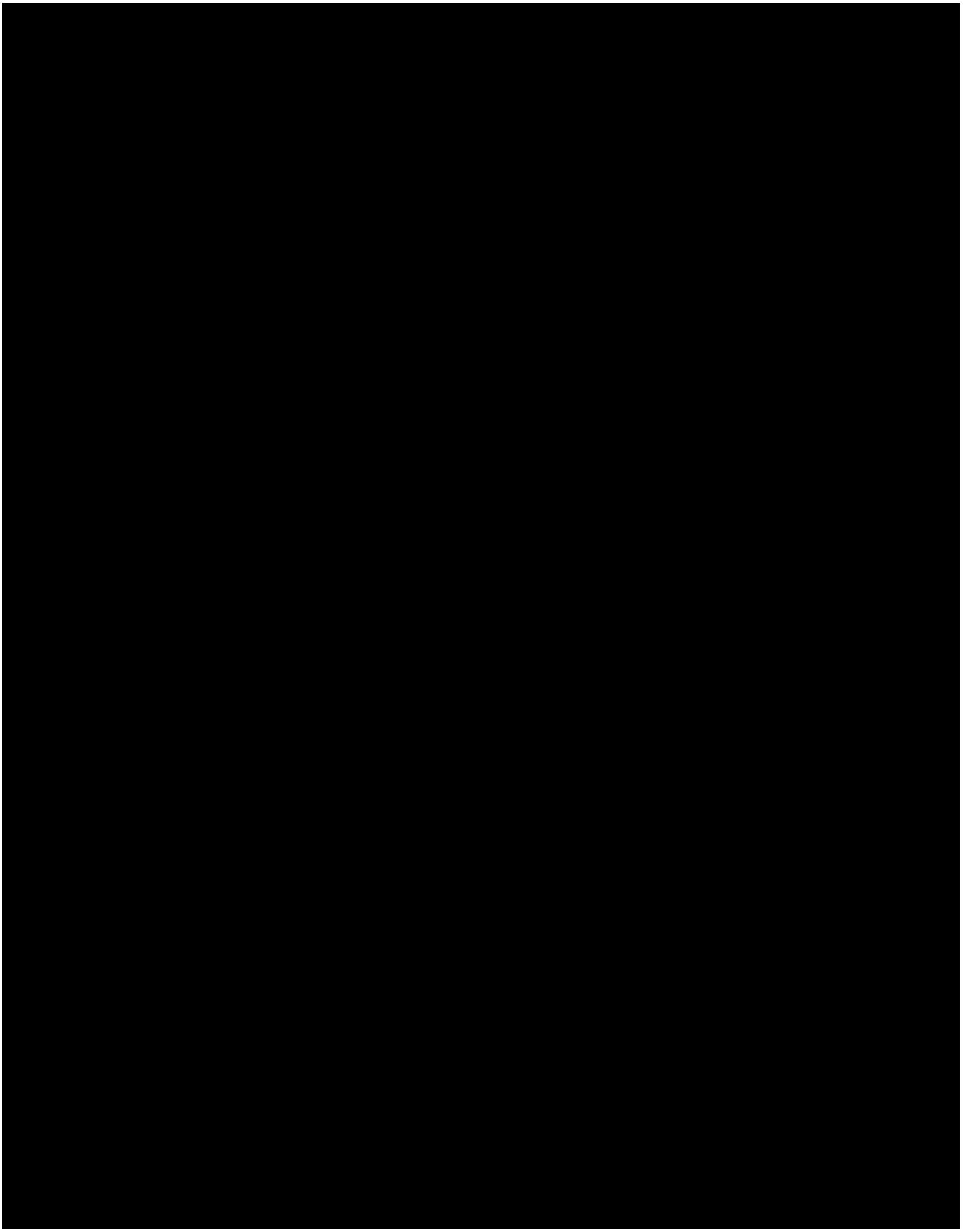

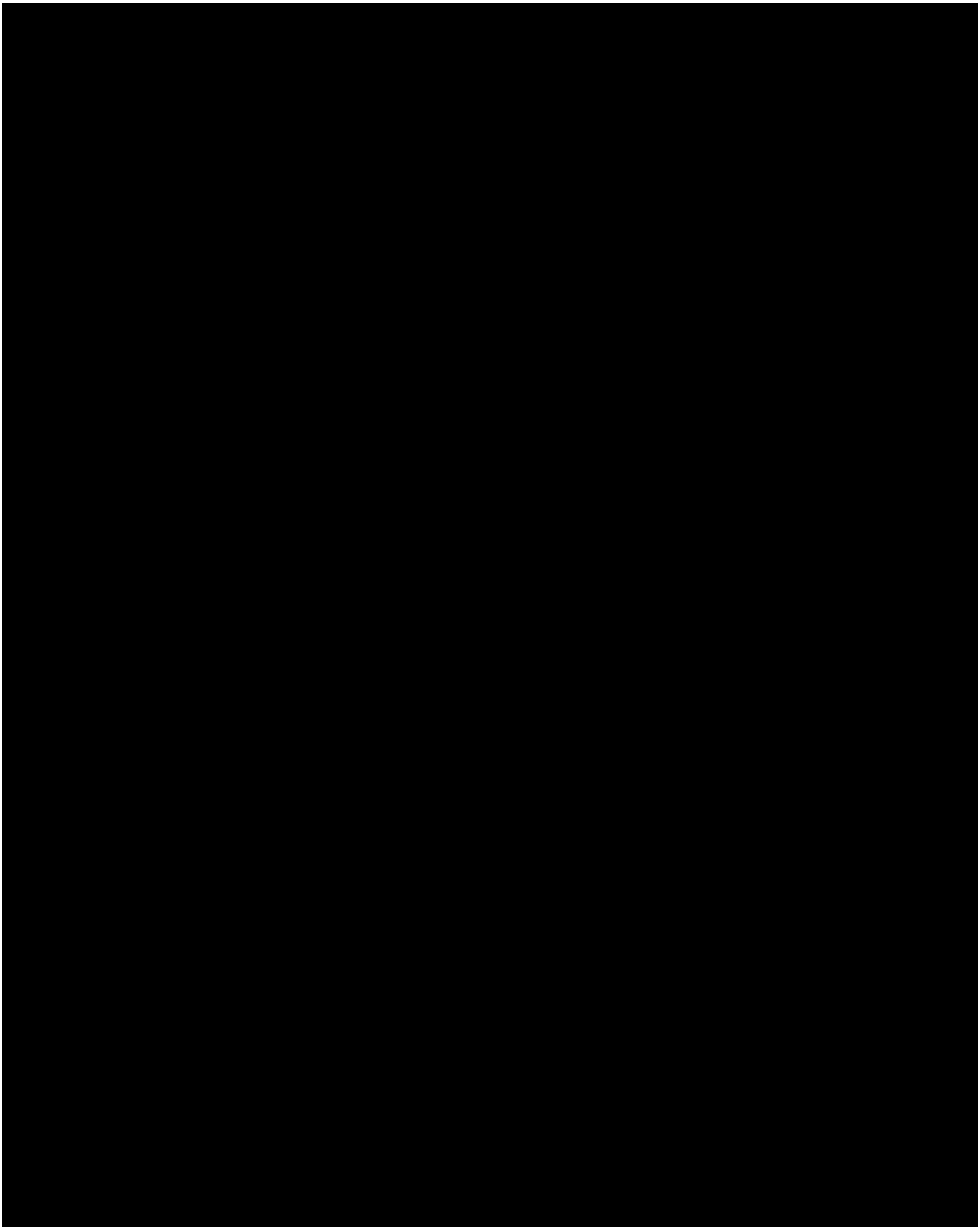

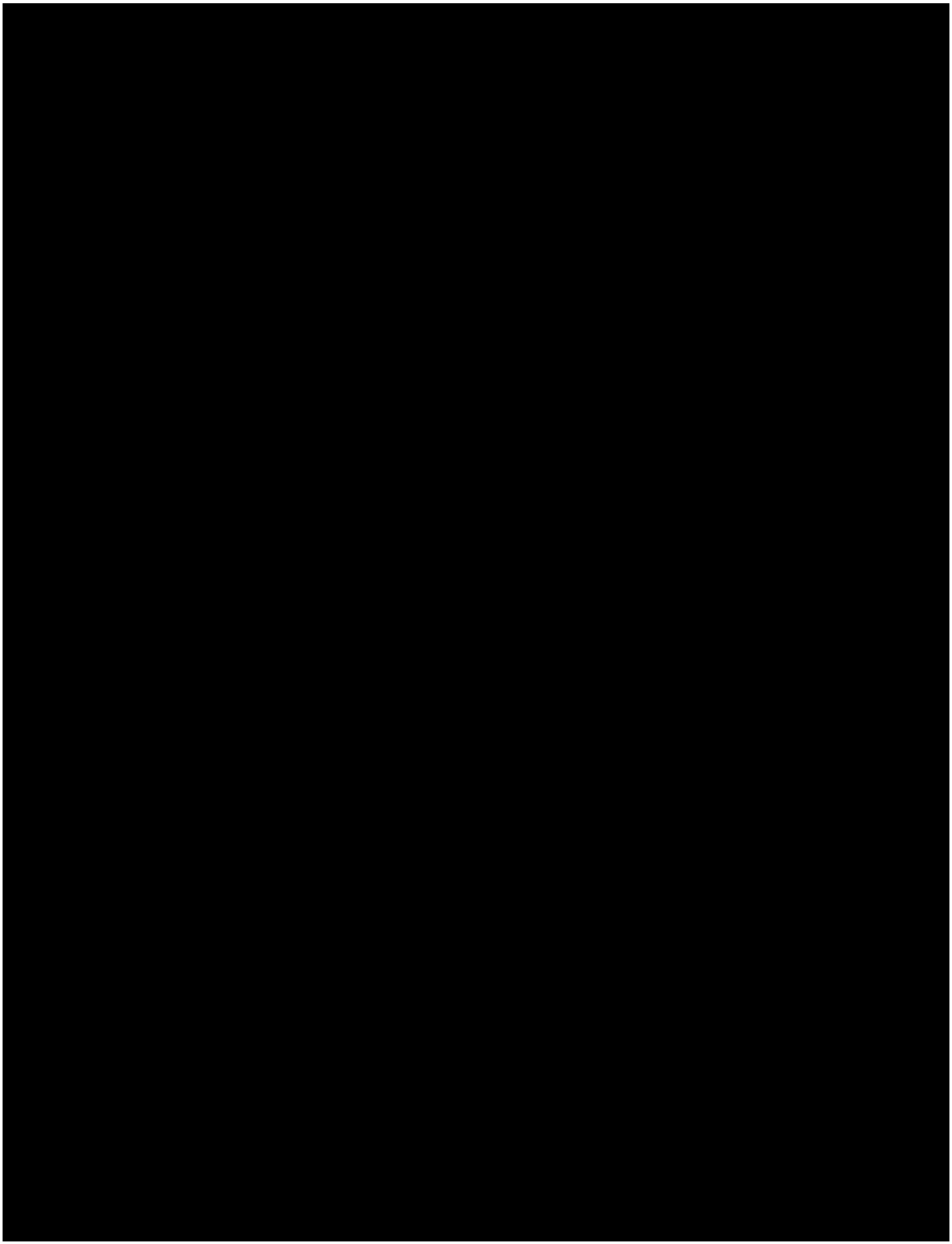

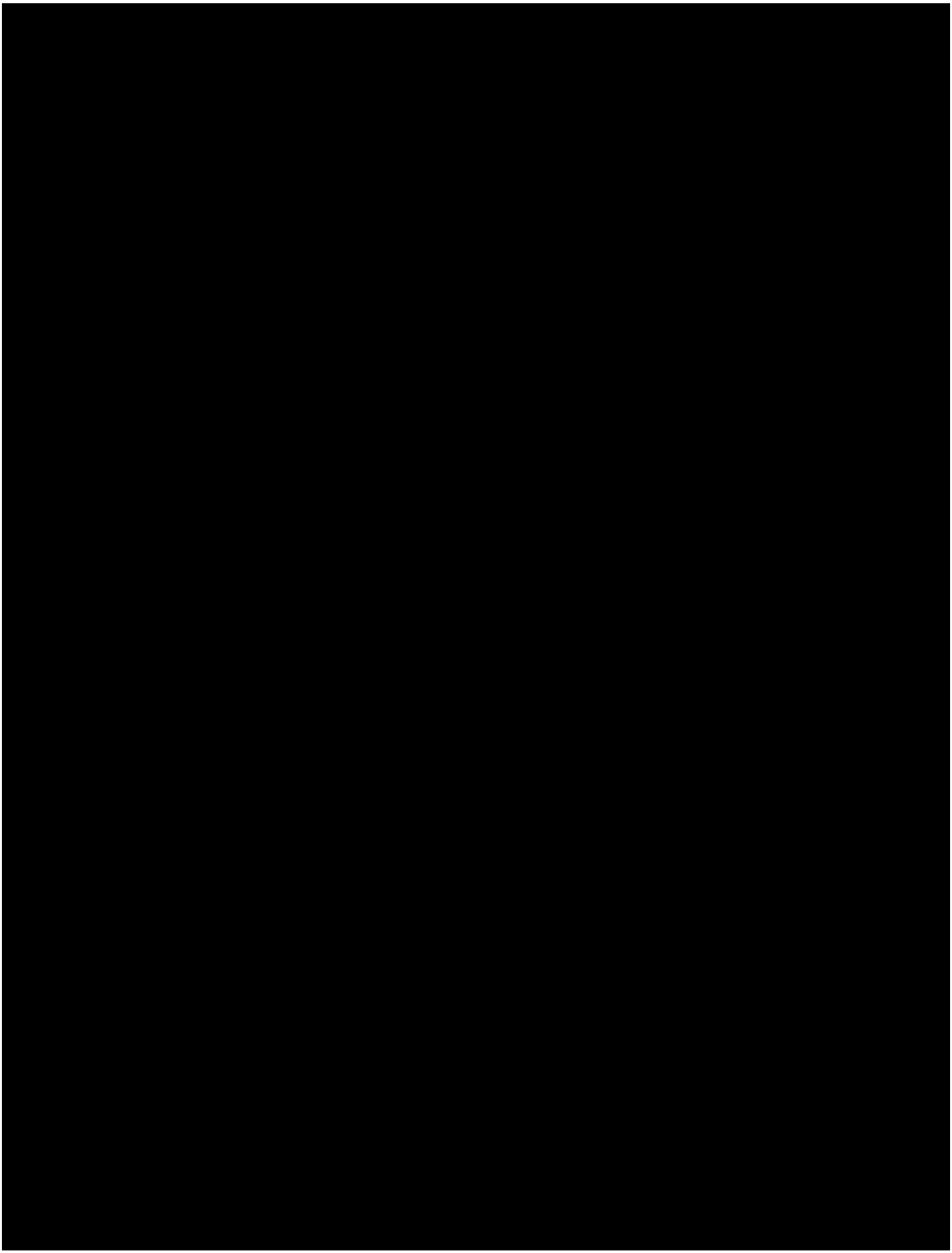

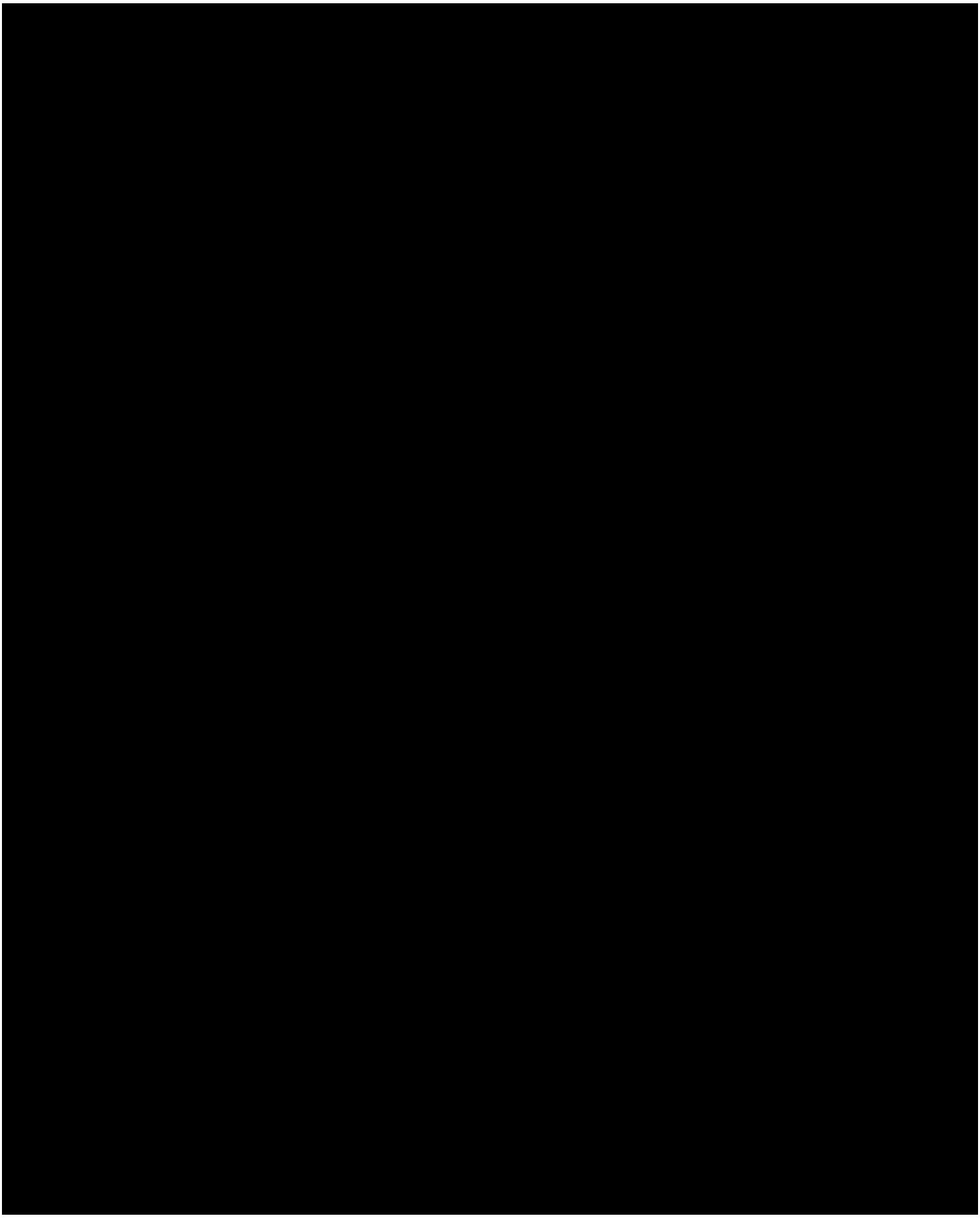

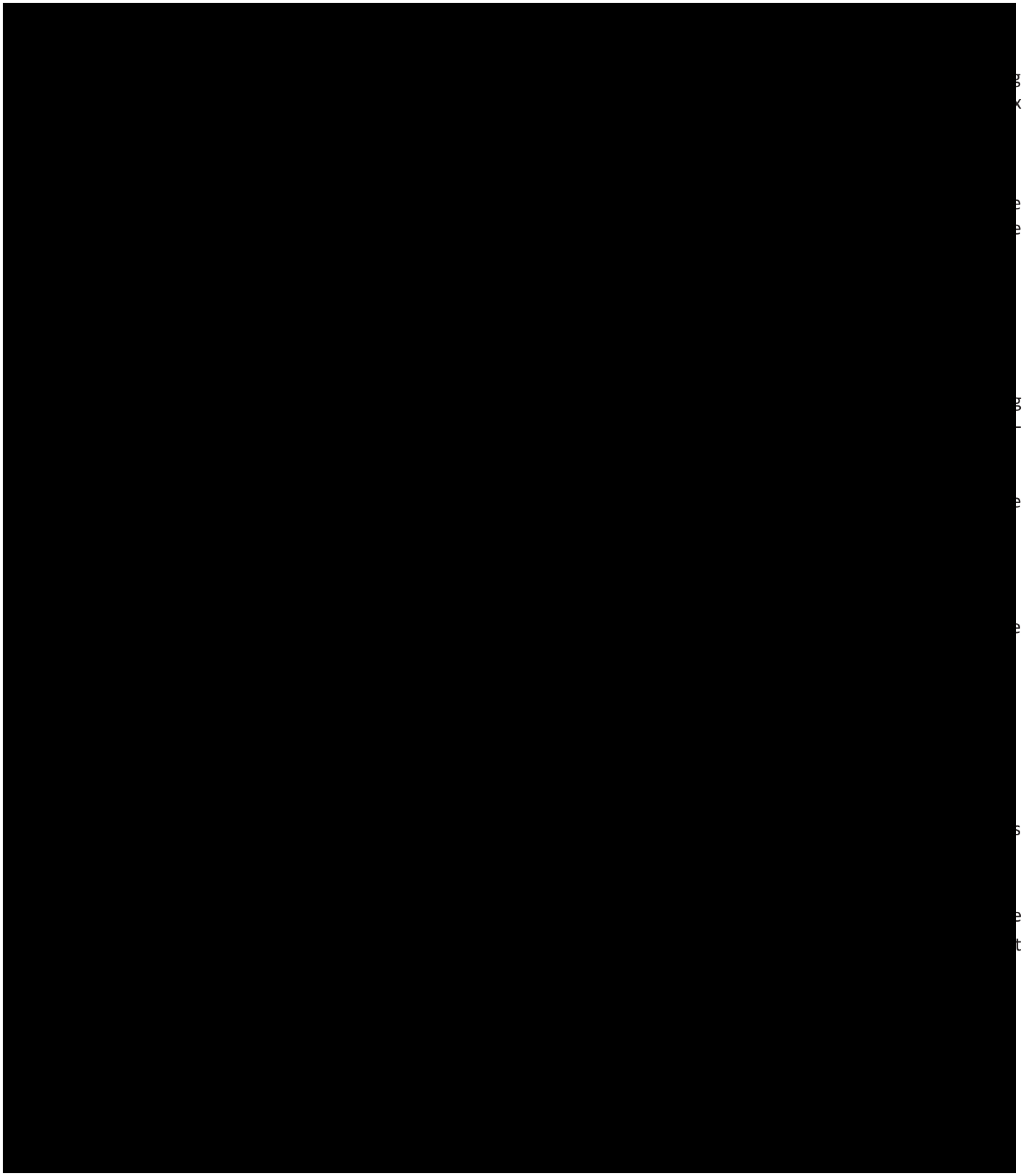

## 5.0 DRAWINGS

- Workshop LTHW Schematic
- Offices LTHW Schematic
- Workshop High level LTHW Layout
- Workshop Low level LTHW layout
- Workshop Domestic Water Services Schematic
- Offices Domestic Water Services Schematic
- Workshop Ventilation Schematic
- Offices Ventilation Schematic
- Electrical Mains/Sub-Mains Distribution Schematic