

**NYSDEC Demolition Plan**  
*for the*  
**Tappan Zee Hudson River Crossing**

**Rev 3**  
**June 15, 2017**

*Prepared by*  
**Tappan Zee Constructors, LLC**  
555 White Plains Road, Suite 400  
Tarrytown, NY 10591



<b>Document History</b>			
<b>Issue Date</b>	<b>Description</b>	<b>By</b>	<b>Revision</b>
06/30/2016	DEC Demolition Plan for Agency Permit Review/Approval	BP	0
10/20/2016	DEC Demolition Plan for Agency Permit Review/Approval	EB	1
1/12/2017	DEC Demolition Plan for Agency Permit Review/Approval	EB	2
6/15/2017	Revised per DEC comments	EB	3

**Table of Contents**

**1.0 INTRODUCTION..... 1**

1.1 Limits of Demolition ..... 1

1.2 Limit of Demolition ..... 1

1.2.1 Existing Pier Locations and Conditions ..... 2

1.2.2 Proposed Pier Demolition ..... 2

1.2.3 Assessment of Benefits and Potential Adverse Effects..... 3

**2.0 EXISTING STRUCTURE ..... 4**

2.1 Area Map General ..... 4

2.2 Area 01: Rockland Tie-in ..... 5

2.3 Area 02: Rockland Approach ..... 5

2.4 Area 03: Rockland Truss ..... 5

2.5 Area 04: Main Span..... 5

2.6 Area 05: East Deck Truss ..... 6

2.7 Area 06: Westchester Tie-in ..... 6

**3.0 SCHEDULE AND SEQUENCING OF WORK ..... 6**

3.1 Sequence General and Milestones ..... 6

**4.0 REGULATORY REQUIREMENTS ..... 6**

**5.0 REMOVAL OF DECK SUPERSTRUCTURE..... 12**

5.1 Superstructure Deck General ..... 12

5.2 Deck Miscellaneous Sections ..... 12

5.3 Precast Panels ..... 12

5.3.1 Demo sequence Areas 2 and 3 ..... 12

5.3.2 Demo Sequence Area 4..... 13

5.4 Exodermic Panels ..... 13

5.4.1 Demo Sequence Areas 5 and 6 ..... 13

**6.0 REMOVAL OF STEEL SUPERSTRUCTURE..... 13**

6.1 Superstructure Steel General ..... 13

6.2 Underdeck Truss Removal Sequence ..... 13

6.3 Main Span – Suspended Span Removal Sequence..... 14

6.4 Main Span – Cantilever Span Removal Sequence..... 14

6.5 Main Span – Anchor Spans Removal Sequence..... 14

**7.0 REMOVAL OF SUBSTRUCTURE..... 14**

7.1 Existing Substructure General ..... 14

7.2 Area 01 and 02..... 15

7.3 Area 03, 05 and 06..... 15

7.4 Area 04 Steel Lattice Substructure ..... 15

**8.0 REMOVAL OF BRIDGE FOUNDATION AND PILES..... 15**

8.1 Foundation General ..... 15

8.2 Areas 01 and 02 – Timber Pile Caps ..... 16

8.3 Circular Caissons..... 16

8.4 Rectangular Caissons..... 16

**9.0 REMOVAL OF ICEBREAKER AND FENDER ..... 17**

9.1 Timber Pile Clusters ..... 17

9.2 Timber/Steel Fender Frame ..... 17

9.3 Triangular Concrete Icebreakers..... 17

9.4 Main Span Fender..... 17

**10.0 BARGE TRANSFER OF MATERIALS ..... 18**

**Tables**

Table 1 – Surface Area and Volume of Disturbed Sediments ..... 8

**Attachments**

Attachment A. Plans and Sections

Attachment B. Site Photos

Attachment C. Area Map and Designations

Attachment D: Bridge Structure Definitions

Attachment E. Demolition Schedule

Attachment F. Debris Removal Depiction

Attachment G. Turbidity Curtain Detail

Attachment H. Debris Containment

## 1.0 INTRODUCTION

Tappan Zee Constructors, LLC (TZC) has prepared this Demolition Plan (Plan) Rev 2 to provide the general approach and means and methods that will be utilized to demolish the existing Tappan Zee Bridge. This Plan has been prepared specifically to meet the Tappan Zee Hudson River Crossing Project (Project) demolition requirements and environmental performance commitments (EPCs) provided in the Project DB Contract Documents (Contract No. D214134) Part 3 Project Requirements, Section 3 Environmental Compliance and Section 25 Demolition as Conformed November 2012.

### 1.1 Limits of Demolition

Demolition requirements are included in the Project's Final Environmental Impact Statement (FEIS), July 2012 and Record of Decision (ROD), September 2012 and Project permits, including:

- NYSDEC Permit ID 3-9903-00043/00012-14 modified July 2014;
- NFMS Endangered Species Act Section 7 Consultation Biological Opinion (BO) NER-2015-12923 dated January 4, 2017;
- United States Coast Guard (USCG) Permit dated April 2013;
- United States Army Corps of Engineers (USACE) Permit Number NAN-2012-00090-M10; and
- NMFS Essential Fish Habitat (EFH) Assessment Conservation Recommendations (CR) dated June 2012, Appendix F of the FEIS.

As required by the FEIS and Project permits, all parts of the existing Tappan Zee Bridge across the Hudson River not utilized in the new bridge shall be removed to a minimum [REDACTED] below the river bottom, including:

- Removal of timber piles [REDACTED] below river bottom;
- Removal of caisson-supported piers [REDACTED] below river bottom; and
- Removal of fenders [REDACTED] below river bottom.

### 1.2 Limit of Demolition [REDACTED]

[REDACTED] the existing Bridge were constructed to [REDACTED] the Metro North Railroad (MNR) Right of Way (ROW), respectively. [REDACTED] Removal of the structures [REDACTED] below the river bottom may result in destabilization of the tracks or slopes in the ROW.

TZC is proposing to keep the existing Tappan Zee Bridge bents [REDACTED] to remain at or above grade and top of caisson, respectively. Please see Attachment A for drawings of the proposed removal and remaining elevations of these existing bridge bents. As described below, allowing these bridge structures to remain will reduce in-water and landward excavation and demolition activities [REDACTED] to the MNR commuter railroad, thereby reducing potential impacts to railroad operations and near-shore areas without adversely impacting other resources.

### 1.2.1 Existing Pier Locations and Conditions

Existing bent [REDACTED] is located [REDACTED] MNR ROW in Westchester County. This landside bent consists of two (one north and one south) concrete spread footings founded on rock [REDACTED] below existing grade. Each footing is approximately [REDACTED] (L x W x H) and each supports a single [REDACTED] concrete pier column (one north and one south). The southernmost corner of the south footing is approximately [REDACTED] east of the MNR Track [REDACTED] and is visible above the existing grade (Attachment B: Figures #1 and #2). The northernmost corner of the south footing is not visible and is approximately [REDACTED] below the existing steeply sloping grade. Removing the concrete columns and footings of existing bridge [REDACTED] below the existing ground line would require excavation and demolition, most likely via hydraulic hammer (e.g., hoe ram) or similar impact equipment, below grade and within very close proximity to the MNR tracks.

Existing bent [REDACTED] is located [REDACTED] MNR ROW in Westchester County. This waterside bent consists of two (one north and one south) circular, steel sheet pile encased concrete caissons founded on rock approximately [REDACTED] below the riverbed. Each caisson is approximately [REDACTED] feet in diameter and each supports a single concrete pier column (one north and one south). The north caisson is surrounded by a square-shaped sheet pile cofferdam. The top of the sheet pile is just visible above the existing shoreline (Attachment B: Figures 2, 3 and 4). The eastern edge of the circular caisson and sheet pile cofferdam is approximately [REDACTED] feet from MNR Track [REDACTED]. The circular caisson is not visible and is buried approximately [REDACTED] below the existing sloping shoreline. Demolition and removal of the north pier caisson would require excavation of the existing shoreline to within approximately [REDACTED] feet of MNR Track [REDACTED] or require significant support of excavation (e.g., temporary sheeting) be installed between the MNR tracks and the existing caisson.

The south caisson is located approximately [REDACTED] feet from the existing shoreline and [REDACTED] feet from Pier [REDACTED] Eastbound in water depths of [REDACTED] feet below mean low water (MLW). The top of the south caisson is approximately [REDACTED] below mean high water (MHW) and remains partially submerged at MHW (Attachment B: Figures 5 and 6). Removing the caisson [REDACTED] feet below the bottom of the existing waterway would require demolition of the concrete caisson, most likely via hydraulic hammer (e.g., hoe ram) or similar impact equipment, and temporary disturbance of the river bottom immediately surrounding the caisson to remove the outer steel sheet pile via cutting or hydraulic shears. The Project FEIS determined sediments within the vicinity [REDACTED] demonstrated elevated levels of metals. The proposed limits of demolition [REDACTED] would minimize disturbance of these sediments within the Hudson River.

### 1.2.2 Proposed Pier Demolition

[REDACTED] – TZC proposes to remove the existing north and south bent columns to grade via concrete wire saw, hammer or shears and leave the footings in place, thereby avoiding additional excavation and demolition below grade and in close proximity to the MNR tracks. See Attachment A for proposed conditions following pier column demolition.

[REDACTED] – TZC proposes to remove the existing north bent column to approximately elevation [REDACTED] to allow for signage and marking for navigation, thereby avoiding additional excavation and demolition

below grade and in close proximity to the MNR tracks. See Attachment A for proposed conditions following column removal. Concrete wire saw or shears would be used to remove the concrete column. Similarly, TZC proposes to remove the south bent column to [REDACTED]. The existing caisson and footing would remain in place, thereby avoiding in-water demolition in this near-shore area. Concrete wire saw or shears would be used to remove the concrete column.

As described above, Bent [REDACTED] is in close proximity to the MNR track structure and nearby slopes. Given the proximity of the north caisson of Bent [REDACTED] from the edge of [REDACTED] MNR, removal of the structures to [REDACTED] below river bottom will impose an unstable slope (1:1) extended from the limits of removal to the edge of the existing railroad track. According to existing boring logs, the top strata consist of very soft organic material with identified weight of rod properties. This material carries minimal to no shear strength and the required excavation can cause major disturbance in the natural state of the existing slope.

### 1.2.3 Assessment of Benefits and Potential Adverse Effects

Existing bents [REDACTED] are located within NYSTA property and lands underwater, and their respective footings are located under the new bridge structure, near new bridge Piers [REDACTED]. Due to their nature (i.e., existing footings mostly buried below existing grades), location and access restrictions, transportation and ecological resources were evaluated to identify the benefits and potential adverse effects of the proposed modification.

Transportation resources near bents [REDACTED] are the Hudson River and MNR. MNR passes immediately adjacent to both bents, within the existing MNR ROW. [REDACTED]; [REDACTED], leaving the pier footings in place at this location would have no effect on future navigation of the Hudson River or MNR operations. Similarly, [REDACTED], leaving the pier footing in place at this location would have no effect on MNR operations.

The north and south foundation [REDACTED] is located along the existing Hudson River shoreline well outside of the navigation channel or waterway used for navigation. The south caisson footing is located approximately [REDACTED] feet from the existing shoreline in shallow water that is well outside of the navigation channel and is not used for navigation purposes. TZC proposes to clearly mark the remaining footing using signage or similar to minimize any hazard to navigation. Given the close proximity of the existing foundations to the new bridge pier foundations, navigation through the area would be subject to security and other restrictions; therefore leaving the [REDACTED] foundation in place would not adversely impact navigation or transportation resources of the Hudson River.

There are no ecological resources identified near existing [REDACTED], which is located immediately east of the MNR in a maintained and unvegetated ROW. Ecological resources [REDACTED] are the aquatic resources, including threatened and endangered species, and habitat of the Hudson River. Near [REDACTED] the aquatic habitat is predominately intertidal and subtidal habitats of varying depths, ranging from shallow intertidal shorelines to shallow subtidal shoals. The benthic habitat is unvegetated consisting of coarse sandy to fine silty sediments.

NMFS identified this region of the Hudson as EFH for 16 federally managed species; and identified two federally endangered fish species that occur in this region of the Hudson River, the shortnose sturgeon (*Acipenser brevirostrum*) and the Atlantic sturgeon (*Acipenser oxyrinchus*). NMFS identified several EFH Conservation Recommendations to avoid, minimize and mitigate for Project impacts pursuant to Section 305(b)(4)(A) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and provided several Conservation Recommendations pursuant to Section 7(a)(1) of the Endangered Species Act (ESA), as well as reasonable and prudent measures (RPMs) to minimize and monitor impacts of incidental take of listed shortnose and Atlantic sturgeon.

Prior environmental assessments, including the FEIS and ROD, recognized the benefit of removing the existing waterside bridge piers to offset the footprint of the new bridge pier foundations. At existing bent [REDACTED], the south bent foundation occupies approximately [REDACTED] square feet of open water benthic habitat; the north bent foundation and rectangular cofferdam occupies approximately [REDACTED] square feet of intertidal and open water benthic habitat. The total in-water footprint of the new bridge is approximately [REDACTED] acres (NYSTA December 17, 2012 Supplement to the March 26, 2012 Joint Permit Application), well below the alternative replacement bridge footprints assessed in the FEIS and ROD ([REDACTED] acres for the Long Span and Short Span Options, respectively), resulting in a net gain of open water benthic habitat of [REDACTED] following demolition of the existing bridge. Leaving the [REDACTED] foundations in place would diminish this net gain by less than 2% while decreasing the disturbance of impacted sediments in the area.

Given the relatively small size of the [REDACTED] foundation footprint as compared to the available soft-sediment benthic habitat in the Tappan Zee region [REDACTED], leaving the foundations in place would result in an extremely small loss of soft-bottom benthic or foraging habitat for sturgeon. Sturgeon are only likely to be present in the shallow waters along the shoreline if suitable forage is present. Therefore effects to sturgeon are likely to be limited, insignificant and discountable.

FEIS EPCs, NMFS conservation recommendations, and environmental permits, including the NYSDEC Permit 3-9903-0043 and USACE Permit NAN-2012-00090, recognized the benefit of minimizing the disturbance of bottom sediment to minimize potential impacts to aquatic resources. Leaving the [REDACTED] column foundations in place would avoid disturbing the Hudson River bottom in the near shoreline intertidal and subtidal habitat.

## **2.0 EXISTING STRUCTURE**

### **2.1 Area Map General**

Beginning in Rockland and working east, the existing structure has been divided into six (6) distinct Demolition Areas (see Attachment C) based on structure type, location and interaction with the completion of the permanent structure. Areas 01 and 06 are unique due to the coordination necessary to complete the new structure and because they each have a land and marine portion. The Demolition Areas are as follows:

- Area 01 A/B: Rockland Tie-in
- Area 02: Rockland Approach

- Area 03: Rockland Truss
- Area 04: Main Span
- Area 05: Westchester Truss
- Area 06 A/B: Westchester Tie-in

Attachment D provides bridge structure definitions for each of the Demolition Areas.

## **2.2 Area 01: Rockland Tie-in**

The Rockland Tie-in Area is comprised of the on land existing structure terminating at the Rockland Abutment. This is designated at Area 01A, and includes Span [REDACTED] over River Road. The marine portion, Area 01B, transitions [REDACTED] and continues [REDACTED]. It shares a partial footprint with the permanent approach spans [REDACTED]. Furthermore, this section of existing structure is bordered to the north by the new bridge and shallow water to the south.

## **2.3 Area 02: Rockland Approach**

The Rockland Approach [REDACTED] consists of the long causeway between the Rockland Tie-in and Rockland Truss sections. This is the largest section by linear footage, and consists of existing structure similar to that described in Area 01. Areas 01 and 02 have been divided due to the construction coordination necessary to perform permanent new bridge work in Area 01. Due to this delineation, work in Area 02 can commence at the beginning of the demolition work window. Area 02 is confined to the north by the new structure, and access on this side decreases working west [REDACTED]. However, the area has adequate water depths to support marine equipment along the southern edge.

## **2.4 Area 03: Rockland Truss**

Working east from Rockland County, the first underdeck spans begin in the Rockland Truss section. Transitioning from the [REDACTED] causeway spans, Area 03 begins at Bent [REDACTED] and ends at Bent [REDACTED]. The spans in this section are typical [REDACTED] and consist of a steel truss supporting the precast concrete panel road surface. The concrete substructure found in Area 03 can also be considered typical at each bent. An upper, solid concrete strut connecting two (2) hollow concrete columns can be found at each location. The top elevation of each bent will vary slightly, and will contribute to the total volume of column concrete. Both circular and rectangular caissons are found in this area.

## **2.5 Area 04: Main Span**

The Main Span [REDACTED] is a unique structure over the navigable channel. This area is dominated by the steel superstructure cantilever through truss, which is divided into Anchor, Cantilever and Suspended spans. The superstructure supports the precast concrete panel wearing surface, which is a similar design found in Areas 01 – 03. The substructure in this section is unique to this area. Each bent in this area is steel lattice members making up the columns and top strut. The top elevation of each bent varies slightly, and the structure can be considered symmetrical about the centerline of span. The

foundations in Area 04 are similar to the rectangular caissons found in Area 03. Specifically, the foundations [REDACTED] are significantly larger than the anchor bents.

## **2.6 Area 05: East Deck Truss**

Area 05 [REDACTED] shares many structural details with Area 03. Both sections consist of steel underdeck trusses, supported on concrete struts and columns. Similarly, the bents in the Area consist of circular caissons. Due to the horizontal curve of this Area, the span lengths vary. This determines the specific length of the underdeck section. The Exodermic Deck specifics in this Area are similar to those found in Area 06, and substantially different to the deck details in Areas 01 – 04.

## **2.7 Area 06: Westchester Tie-in**

Area 06 [REDACTED] represents the tie-in portion to the Westchester Landing. Similar to Area 01, this section is both divided into water (06A) and land portions (06B), as well as coordinated with the final work [REDACTED] of the permanent new bridge. Area 06A is structurally identical to Area 05, sharing features for deck, superstructure truss, concrete substructure and foundations.

## **3.0 SCHEDULE AND SEQUENCING OF WORK**

### **3.1 Sequence General and Milestones**

Provided in Attachment E is an overview of the major work areas and anticipated schedule for demolition activities. Also provided is a depiction of activities occurring concurrently and their location on the river. The schedule information provided is based upon the most up to date Project schedule. [REDACTED]

[REDACTED] As each section is completed, the associated substructure work will commence. The foundation work will be the last work performed in each Area.

## **4.0 REGULATORY REQUIREMENTS**

As further described below, demolition of the existing bridge will be conducted in accordance with the Project's requirements in the FEIS, ROD and Project permits (Refer to Section 1.1 for a list of applicable permits). Specifically, means and methods proposed demonstrate conformity with the NYSDEC Permit ID 3-9903-00043/00012-14 Conditions 45-51, 54-55, 57 and 59 as further described below.

**Condition 46:** Bridge demolition must be conducted in a manner that minimizes the resuspension of sediment.

TZC has planned for demolition to be performed in a manner consistent with the means and methods described in the FEIS. During substructure and superstructure removal, the proposed demolition takes advantage of the large equipment available to TZC, allowing large pieces of the structure to be cut and removed to the extent possible, rather than demolishing the structures in-place. During foundation removal, full depth turbidity curtains will be employed in Areas 1 and 6 to minimize sediment resuspension. In addition, the rectangular caisson removal will start from the inside out, allowing

concrete material to stay within to the interior of the structure during the onset of removal. Every effort will be made to ensure that demolition debris is confined to the location of foundation removal during demolition and removal. Where applicable, side scan sonar will be used to identify all material is removed from the River during demolition. Once identified, this material will be recovered.

**Condition 47:** All debris and materials from the demolition of the existing Tappan Zee Bridge must be removed from the bed and banks of the Hudson River.

TZC will perform a pre-demolition bathymetric survey from the Westchester shore to the Rockland shore [REDACTED] north and south of existing bridge centerline to establish pre-demolition baseline conditions (i.e., identify pre-existing debris and debris fields not included in Project permits or requiring removal). Periodic side scan sonar surveys will be conducted to identify debris that may have entered the River with the potential to affect navigation.

A post-demolition bathymetric survey will be conducted and compared to the pre-demolition bathymetric survey to verify no debris is present. As depicted in Attachment F, a barge mounted excavator or crane with clam bucket attachment, material grapple or bucket will be used to remove the demolition debris. Demolition debris will be bucketed to adjacent debris barges for off-site disposal.

An additional bathymetric survey will be conducted in areas that have received debris recovery after the post-demolition bathymetric survey to verify all debris capable of being identified by the bathymetric survey has been removed from the river bed.

The proposed demolition means and methods have the potential to produce debris from hoe ramming, shearing, wire sawing and drilling. Debris size will vary and is described below:

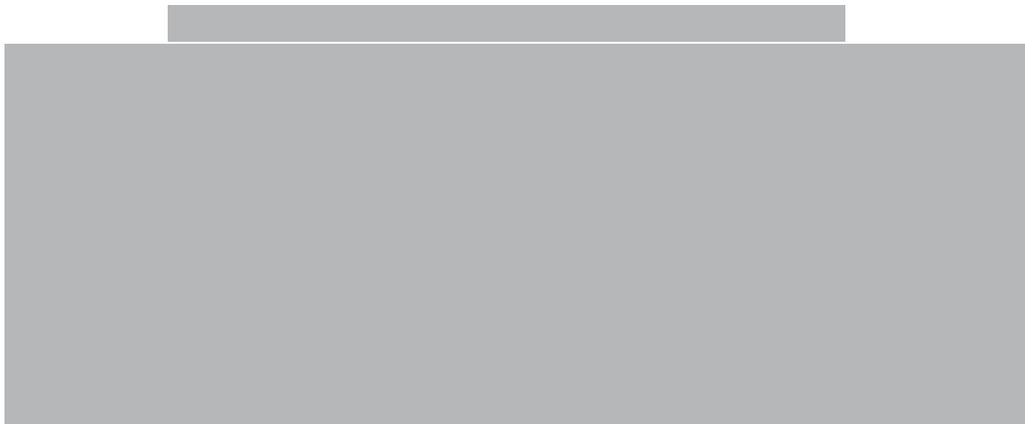
- Hoe ramming operations may generate debris ranging from dust/granular aggregates to pieces equal or larger than the smallest dimension of the structure being demolished. [REDACTED]
- Shearing operations may generate debris ranging from dust/granular aggregates to pieces equal or less than the smallest dimension of the structure being demolished. [REDACTED]
- Wire sawing operations will generate fines and may generate spalls around the size of a fist.
- Drilling operations will generate dust/granular aggregates.

As described further below, debris will be removed from the river bottom prior to the completion of demolition activities.

**Condition 48:** Piles, caissons, abutments, fenders and other in-water components of the existing Tappan Zee Bridge must be removed [REDACTED] below the mud line. Silt curtains must be deployed during this operation.

In-water components will be removed [REDACTED] below the river bottom. Full depth turbidity curtains will be used in Areas 1 and 6 during foundation removal (refer to Attachment G). Turbidity curtains, [REDACTED] and anchored to the river bottom, will be employed in Areas 2, 3, 4 and 5 to contain debris and reduce turbidity.

In order to access the foundations [REDACTED] below the river bottom, sediment would be displaced around the foundations. The proposed displacement would result in a trench [REDACTED] deep and [REDACTED] surrounding the pier. Sediment would be displaced from the area surrounding the pier to the edge of the disturbed area in a small mound. This sediment is anticipated to cover [REDACTED] previously uncovered benthic habitat surrounding the pier. The total surface area of the benthic area disturbed and the volume of sediment displaced are summarized in Table 1 for each of six Demolition Areas.



Displacement of benthic sediments, as described above, is necessary to achieve removal of the TZB in accordance with the contract and Project permits. The foundation types, including the timber piles, circular caissons and the floating caissons require external access in order to perform the necessary work. For example, the metal sheet piles wrapping the circular caissons would be cut using a shear or diver which would be accessed from outside of the footprint of the pier. Sediment displacement would allow access to these components of the existing bridge [REDACTED] below the river bottom with minimal sediment disturbance.

In order to minimize sediment resuspension, an open excavator bucket would be utilized to pull back sediment around the foundations rather than lifting sediment up into the water column. This method could result in isolated resuspension of benthic sediments; however, avoiding conventional dredging would prevent prolonged and widespread resuspension of sediment, resulting in fewer impacts.

Extensive water quality monitoring during the Project has demonstrated that resuspension of bottom sediments associated with activities such as dredging and pile driving infrequently resulted in exceedances of the Project's NYSDEC Permit conditions. Furthermore, any observed exceedances were also typically temporary in nature.

Methods to prevent resuspension of sediment during displacement include avoiding conventional dredging; specifically an open excavator bucket would be utilized to pull back sediment around the

foundations rather than lifting sediment up into the water column. These means and methods prevent prolonged and widespread resuspension of sediment during excavation which would impair water quality in the area of the TZB. Displacement may result in isolated resuspension of benthic sediments, however this resuspension and the resulting disturbance would be less than the impacts associated with conventional dredging and dredged material disposal.

**Condition 49:** A floating containment boom and/or silt curtains must be deployed around all active substructure demolition areas to control and contain debris and discharges to meet water quality standards.

TZC will utilize means and methods that will minimize the likelihood of debris entering the River. Specifically, TZC intends to remove substructure in large modular components minimizing potential for generation of small pieces of debris at risk of falling into the River. Visual observations of activities will be conducted by a barge-based or vessel-based observer during demolition activities as required per the Water Quality Monitoring Plan. If turbidity is observed that extends beyond the 500-ft mixing zone or in the vicinity of the construction activity, corrective actions will be implemented to comply with water quality standards.

**Condition 50:** A debris containment net must be deployed and maintained at all times during demolition of the bridge deck and superstructure.

TZC will remove the existing Tappan Zee Bridge deck and superstructure in modular components, minimizing risk of debris generation during superstructure removal operations. TZC will utilize access systems during the superstructure removal stage to provide access for workers to separate deck panels, stringer beams and diaphragms from the supporting bridge structure. These access systems serve a dual purpose by providing debris containment for anchor bolt, stringer beam and diaphragm separation for deck removal operations. Deck preparation in Areas 2, 3, 5 and 6 will occur while over debris containment. Deck **rigging and** removal in areas 2, 3, 5 and 6 may occur without debris containment. Area 4 deck preparation and deck removal will occur over debris containment. These areas are further described below. Containment measures are detailed in Attachment H.

#### Rockland Causeway (Areas 1 & 2):

Superstructure consists of a composite deck/superstructure element made up of deck panels precast integrally over bridge beams. Panels/beams sit directly on top of the bridge column/caps and will be removed in modular pieces by crane in the following steps:

- Separate panels with top side deck saws.
- Deck Preparation - Drill out lifting holes/attach lifting lugs at corner points of panel. Cut bolt connecting panel to pier cap.
- Rig and lift panel off pier, set onto barge.

Truss Spans (Areas 3, 5 & 6):

Superstructure consists of simple span truss elements with precast deck panels secured on top framing of truss. Deck removal will be similar to the Rockland Causeway described above, removing enough deck to rig and lift the entire truss span [REDACTED] in the following steps:

- Separate panels with top side deck saws.
- Deck Preparation - Drill out lifting holes/attach lifting lugs at corner points of panel. Cut bolt connecting panel to truss.
- Rig and lift panel off truss, set onto barge.
- Install lifting lug on truss at four points.
- Rig truss with Barge Mounted Derrick Crane.
- Lift truss off piers, set onto barge.

Main Span (Area 4)

Superstructure consists of a suspended, cantilever and anchor truss elements with precast deck panels secured on floor beam framing of truss. Deck removal will be similar to the Rockland Causeway described above, removing deck prior to truss removal.

- Separate panels with top side deck saws.
- Deck Preparation - Drill out lifting holes/attach lifting lugs at corner points of panel. Cut bolt connecting panel to truss.
- Rig and lift panel off truss, set onto barge.
- Install lifting lug on truss at four points.
- Rig truss with Barge Mounted Derrick Crane.
- Lift truss off piers, set onto barge.

Rigging and lifting of deck panels from the above described structures to barges is not anticipated to produce debris. In the event debris is generated during the lifting operation, the method will be reevaluated and updated to address the conditions of the operation.

**Condition 51:** Blasting for bridge demolition is prohibited.

Blasting is not being proposed for demolition of the existing Tappan Zee Bridge.

**Condition 54:** Within 60 days of completion of bridge demolition, a hydrographic survey of the river bottom beneath the footprint of the demolished bridge must be submitted to the Department. For comparison purposes a pre-demolition survey must be provided with the post-construction survey.

TZC will conduct a pre- and post-bathymetric survey of the riverbed from Westchester shore to Rockland shore [REDACTED] and south of the existing bridge centerline within 60 days

of completion of Bridge demolition. The bathymetric survey will be conducted on a 10ft grid and referenced to the North American Vertical Datum (NAVD88).

**Condition 55:** The Permittee must minimize disturbance to Peregrine Falcons during all phases of the bridge replacement project. All activities must maintain the maximum distance from the peregrine falcon nest on the existing bridge as practical. No less than 30 days before starting the Authorized Activity the Permittee must submit a plan for protection of the falcon nest to the department

A Peregrine Falcon Protection Plan has been prepared for the Project. The Plan will be updated, as needed, to describe demolition activities. TZC will schedule coordination meetings with the NYSDEC two (2) months prior to demolition on the existing Main Span to discuss issues related to the falcon nest. TZC will provide necessary cooperation and access to the NYSDEC to facilitate the evaluation of the peregrine falcons nesting activity during each year of demolition to determine if a pair is active on the territory, are nesting and the success of that nest.

**Condition 57:** The Permittee must evaluate Peregrine Falcon nesting activity during each year of construction and demolition to determine if a pair is active on the territory, are nesting, and the success of that nest. Any reports of impacts to the nest should be reported to the wildlife manager at the NYSDEC Region 3 Headquarters in New Paltz, NY.

A Peregrine Falcon Protection Plan has been prepared for the Project. The Plan will be updated, as needed, to describe demolition activities. TZC will provide necessary cooperation and access to the NYSDEC to facilitate the evaluation of the peregrine falcons nesting activity during each year of demolition to determine if a pair is active on the territory, are nesting and the success of that nest. Any reports of impact to the nest will be reported according to the approved Plan.

**Condition 59:** At least 45 days before starting dredging activities; decanting activities; removal of large debris fields; pile driving in zone C; channel armoring; cofferdam construction; removal of the existing bridge; or any other activity that may cause resuspension of the bottom sediments, Permittee must submit a water quality monitoring plan to the department. If activities occur concurrently in multiple locations, each activity that may cause resuspension of bottom sediments must be monitored separately. The Plan must be in effect at all times during these activities. The above activities may start when the Department has given written approval of the plan.

A Water Quality Monitoring Plan (WQMP) was previously submitted and approved by NYSDEC prior to the start of Authorized Activities as listed in the NYSDEC Permit. Following review and approval of the Demolition Plan, the NYSDEC may specify water quality monitoring requirements that differ from those listed in Conditions 59 through 67 to reflect the details of the demolition plans. If required, a revised WQMP will be submitted for NYSDEC review and approval.

## **5.0 REMOVAL OF DECK SUPERSTRUCTURE**

### **5.1 Superstructure Deck General**

The existing deck consists of three (3) structural types; Precast, Exodermic and Cast in Place. The Precast deck variety accounts for the majority of the existing span and can be found in Areas 01 – 04. Areas 05 and 6A, [REDACTED] represent the locations of the Exodermic Deck. Finally, the Area 06B Tie-in on land is constructed with a Cast in Place deck system. Each type will be removed similarly, saw cut from the supporting structure and lofted free. The unique details, and necessary steps to free the deck, will be described in this section. As these activities will require the cutting and removal of steel members, adherence to the OSHA Lead Exposure requirements for personnel protection and monitoring, OSHA 1926.62(d)(2)(iv), will be necessary. In addition to the wearing surface itself, this section outlines the necessary components to be removed prior to the deck activities. Contractual requirements for NYSTA Salvageable components will dictate individual bridge components to be removed and stored at NYSTA locations. Once panel sections are free from the structure, they will be landed on trailers or barges for processing.

### **5.2 Deck Miscellaneous Sections**

In addition to the deck itself, there exists miscellaneous items that will be disconnected and removed from the structure. As mentioned above, contractual requirements for NYSTA Salvageable components will dictate individual bridge components to be removed and stored at NYSTA locations. Utilities will be decommissioned prior to the start of all demolition activities. Outside of the bridge demolition footprint the utility source will be de-energized, locked and tagged per approved Project plans. This will allow the safe demolition and removal of all light poles, sign structures, conduit and bridge lighting. Bridge barriers will also be removed at this time. Side and mobile barriers can be removed prior to saw cutting panel joints. Barrier sections will be rigged and disconnected from the concrete deck. These sections will be loaded on trailers and later, transferred to barges.

### **5.3 Precast Panels**

Precast panels are found in Areas 01 – 04. The panels in Areas 01 and 02 [REDACTED] in length and [REDACTED] in weight. Panels in Area 03 are approximately [REDACTED] in length and [REDACTED] in weight. The precast panel stringers are connected to the main floor beam truss members, in addition to the panel to panel diaphragm channel connections. [REDACTED] Area 04 Main Span panels are longer and heavier than the Area 03 panels. These panels average [REDACTED] are supported at each end at the floor beam members. The bolted seat connection and the diaphragm connections require under deck access to facilitate full panel removal.

#### **5.3.1 Demo sequence Areas 2 and 3**

The typical sequence of work is outlined in the steps below:

1. Working underneath the deck, torch cut the diaphragms connecting the individual panels and the anchor bolts tying the panels to the substructure.

2. Separate the panels along the transverse and parallel joints with concrete deck saws. Open lifting holes with drills.
3. Rig and loft panels onto deck barges for off-site disposal.

#### 5.3.2 Demo Sequence Area 4

The typical sequence of work is outlined in the steps below:

1. Assemble and install underdeck debris and access shielding.
2. Access the precast panels from the underdeck shielding and torch cut diaphragms and anchor bolts from main floor beams.
3. Separate the panels along the transverse and parallel joints with concrete deck saws. Open lifting holes with drills.
4. Rig and loft panels onto deck barges for off-site disposal.

## 5.4 Exodermic Panels

The Exodermic Deck sections in Areas 05 and 06 have a variable width depending on lane location. [REDACTED] the typical Exodermic Deck Panels are [REDACTED] in length, with main bearing bars running the width (transverse to traffic) and distribution bars fabricated perpendicular. The steel grid is topped (precast) with concrete and paved with a [REDACTED] asphalt wearing surface.

#### 5.4.1 Demo Sequence Areas 5 and 6

The typical sequence of work is outlined in the steps below:

1. Saw cut exodermic deck into panels, drill lifting holes through deck.
2. Torch but edge connections and floor beam connections.
3. Rig and loft panels onto deck barges for off-site disposal.

## 6.0 REMOVAL OF STEEL SUPERSTRUCTURE

### 6.1 Superstructure Steel General

Existing steel superstructure includes the Main Span Truss and the Approach Underdeck Trusses in Areas 03 through 06. The removal of steel structural members will require adherence to the OSHA Lead Exposure requirements for personnel protection and monitoring, OSHA 1926.62(d)(2)(iv). The dismantling will be performed by removing large sections of existing truss, lowering to barges for off-site disposal. This will be utilized for all [REDACTED] underdeck trusses, as well as the [REDACTED] approach and [REDACTED] suspended Main Spans. Only the cantilevered portions of the Main Span will be removed incrementally.

### 6.2 Underdeck Truss Removal Sequence

The typical sequence of work is outlined in the steps below:

1. Install lifting lugs at lifting points.
2. Position Left Coast Lifter (LCL) at confirmed radius of pick.
3. Lift truss and place on barge for off-site disposal.

### **6.3 Main Span – Suspended Span Removal Sequence**

The typical sequence of work is outlined in the steps below:

1. Modify existing members and install falsework systems and access.
2. Install Strand Jacking system.
3. Close channel for a period estimated at 48 hours to allow lowering of the Suspended span, tie-down (lashing and securing) to the transport barges and towing away from the main channel. This channel closure will be coordinated with the USCG and other Regulatory agencies, as appropriate.
4. Lower span to barge and secure for transport to disposal.

### **6.4 Main Span – Cantilever Span Removal Sequence**

The typical sequence of work is outlined in the steps below:

1. Modify existing members, install falsework systems and access, and finally cut and loft members.
2. Prepare rigging locations for each pick. Take the load with the crane prior to performing the final torch cuts.
3. Cut the section free, swing and land the section on the adjacent material barge.
4. Coordinate stages that will impact or alter the navigable channel with the USCG and other Regulatory agencies, as appropriate.

### **6.5 Main Span – Anchor Spans Removal Sequence**

The typical sequence of work is outlined in the steps below:

1. Modify existing members and install falsework systems and access.
2. Install Strand Jacking system.
3. Lower span and secure to barges for off-site disposal.

## **7.0 REMOVAL OF SUBSTRUCTURE**

### **7.1 Existing Substructure General**

Existing substructure, bridge wide, is defined as a system of concrete columns tied together at the top by a concrete strut(s), also referred to as a pier cap. The Substructure is further defined as the portion of the

bridge above the foundations and below the superstructure/deck. Areas 1, 2 3, 5, and 6 are concrete while Area 4 is steel.

## **7.2 Area 01 and 02**

The typical sequence of work is outlined in the steps below:

1. Rig concrete struts and columns with crane.
2. Separate reinforced concrete connection by hammering, cutting or shearing.
3. Loft sections and land on debris barges for off-site disposal

## **7.3 Area 03, 05 and 06**

The typical sequence of work is outlined in the steps below:

1. Rig concrete struts and columns with crane.
2. Separate reinforced concrete connection with wire saw.
3. Loft sections and land on debris barges; downsize for off-site disposal.
4. The bottom [REDACTED] of the substructure will remain in place and be demolished with the foundation as described below.

## **7.4 Area 04 Steel Lattice Substructure**

The typical sequence of work is outlined in the steps below:

1. Remove Icebreaker/Fender assemblies. Prepare rigging locations for each pick section.
2. Take the load with the crane and torch cut the pier sections.
3. Land the section with the crane on the adjacent material barge; transport for off-site disposal.

## **8.0 REMOVAL OF BRIDGE FOUNDATION AND PILES**

### **8.1 Foundation General**

There are (3) major foundation types on the existing structure.

1. Timber pile supported pile cap foundations are found in Areas 01 and 02.
2. Paired solid concrete circular caissons founded on H Pile are found in Areas 03, 05 and 06, [REDACTED]. These foundations are fully or partially enclosed by steel sheet pile.
3. Hollow rectangular caissons are found at in Areas 03, 04 and 05 [REDACTED]. These foundations consist of cellular rooms separated by concrete walls and ceilings. Each of these foundations are founded on either H Pile or H Pile encapsulated inside circular piles.

## 8.2 Areas 01 and 02 – Timber Pile Caps

The typical sequence of work is as follows:

1. Cut or hammer concrete pile cap foundations into sections. The pile cap will remain in place supported on timber pile.
2. Rig the cap for removal by barge-mounted crane.
3. Separate the cap from the timber piles with excavators (Barge Mounted) using universal processors, saws or other mechanical cutting devices.
4. Loft the cap and land on an adjacent debris barge.
5. Demolish in place using hydraulic hammers and shears low water areas that cannot be accessed and rigged by barge mounted cranes. Bucket rubble material from the river bottom and place in adjacent debris barge for transport for off-site disposal.
6. Snap timber piles at the required [REDACTED] below the river bottom using barge mounted excavators equipped with a bucket and thumb or grapples.

## 8.3 Circular Caissons

The typical sequence of work is as follows:

1. Displace existing material from the river bottom with an excavator to expose sheet pile at demolition limit.
2. Mark and torch cut sheet pile at demolition limit with divers.
3. Hoe ram the remaining [REDACTED] concrete column substructure, if applicable.
4. Hammer and bucket caisson to debris barges for off-site disposal.
5. Sheet pile removal shall occur at any time during this operation.
6. If applicable, cut and remove H pile at the base of caisson.

## 8.4 Rectangular Caissons

The typical sequence of work is as follows:

1. Install temporary [REDACTED] spuds as needed around pier perimeter with vibratory pile driver/extractor. Piles are for mooring/fendering of work barges.
2. To the extent possible start demolition inside of the exterior walls, beginning with the roof of the caisson and continuing to the intermediate floors and interior walls.
3. Advance demolition and removal of the exterior walls.
4. Demolish via hoe ramming, cutting and shearing.

5. Remove debris throughout the operation via bucketing. All debris will be removed to at or below the established [REDACTED] below river bottom requirement.

## **9.0 REMOVAL OF ICEBREAKER AND FENDER**

### **9.1 Timber Pile Clusters** [REDACTED]

The typical sequence of events is as follows:

1. Install full depth turbidity curtains prior to work commencing [REDACTED].
2. Snap timber piles at the required [REDACTED] below the river bottom with excavators equipped with a bucket and thumb or grapples.
3. Any timbers that break above the required depth below the river bottom will be removed during the demolition of the pile caps.

### **9.2 Timber/Steel Fender Frame** [REDACTED]

The typical sequence of events is as follows:

1. Rig sections of the timber/steel fender with barge mounted crane or excavator.
2. Displace material to expose pile to [REDACTED] below river bottom.
3. Cut pile supports [REDACTED] below river bottom with divers or excavator mounted shear.
4. Torch cut and loft section to debris barge for off-site disposal.
5. Alternatively to cutting pile [REDACTED] below river bottom, pile may be extracted with a vibratory hammer.

### **9.3 Triangular Concrete Icebreakers**

The typical sequence of events is as follows:

1. Displace existing material from the river bottom with an excavator to expose sheet pile.
2. Mark and torch cut sheet piles at demolition limits by divers.
3. Hammer and bucket concrete to debris barges for off-site disposal.
4. Sheet pile removal shall occur at any time during this operation.
5. If applicable, cut and remove H pile and or timber pile at the base of ice breaker.

### **9.4 Main Span Fender**

The typical sequence of events is as follows:

1. Wire saw or otherwise cut fender into sections, remaining supported by [REDACTED] steel pile.
2. Drill and/or install rigging locations.

3. Rig sections with barge mounted crane.
4. Perform additional wire sawing, if applicable.
5. Separate rigged precast section from [REDACTED] pile with wire saw, shear, torch or other cutting method, if applicable.
6. Loft and land section on debris barge for off-disposal.
7. Displace existing material from the river bottom with an excavator to achieve the contractually required [REDACTED] below river bottom.
8. Torch cut or shear remaining [REDACTED] pile at required [REDACTED] below river bottom and place on debris barge for off-disposal.

## **10.0 BARGE TRANSFER OF MATERIALS**

Materials not reused or recycled will be transported to an appropriate, permitted off-site disposal facility. NYSDEC will be provided a list of final disposal locations once they are determined.

**Attachment A**

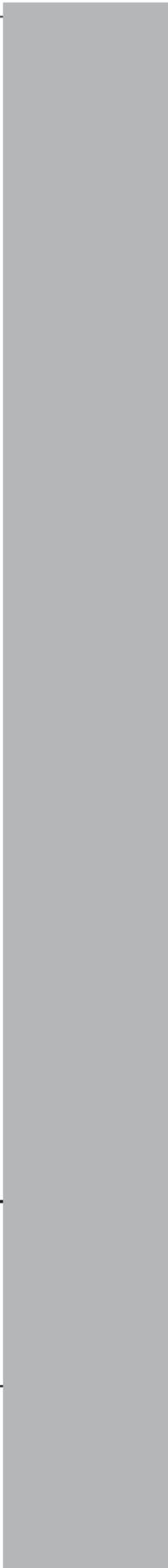
 **Plans and Sections**



1  
1



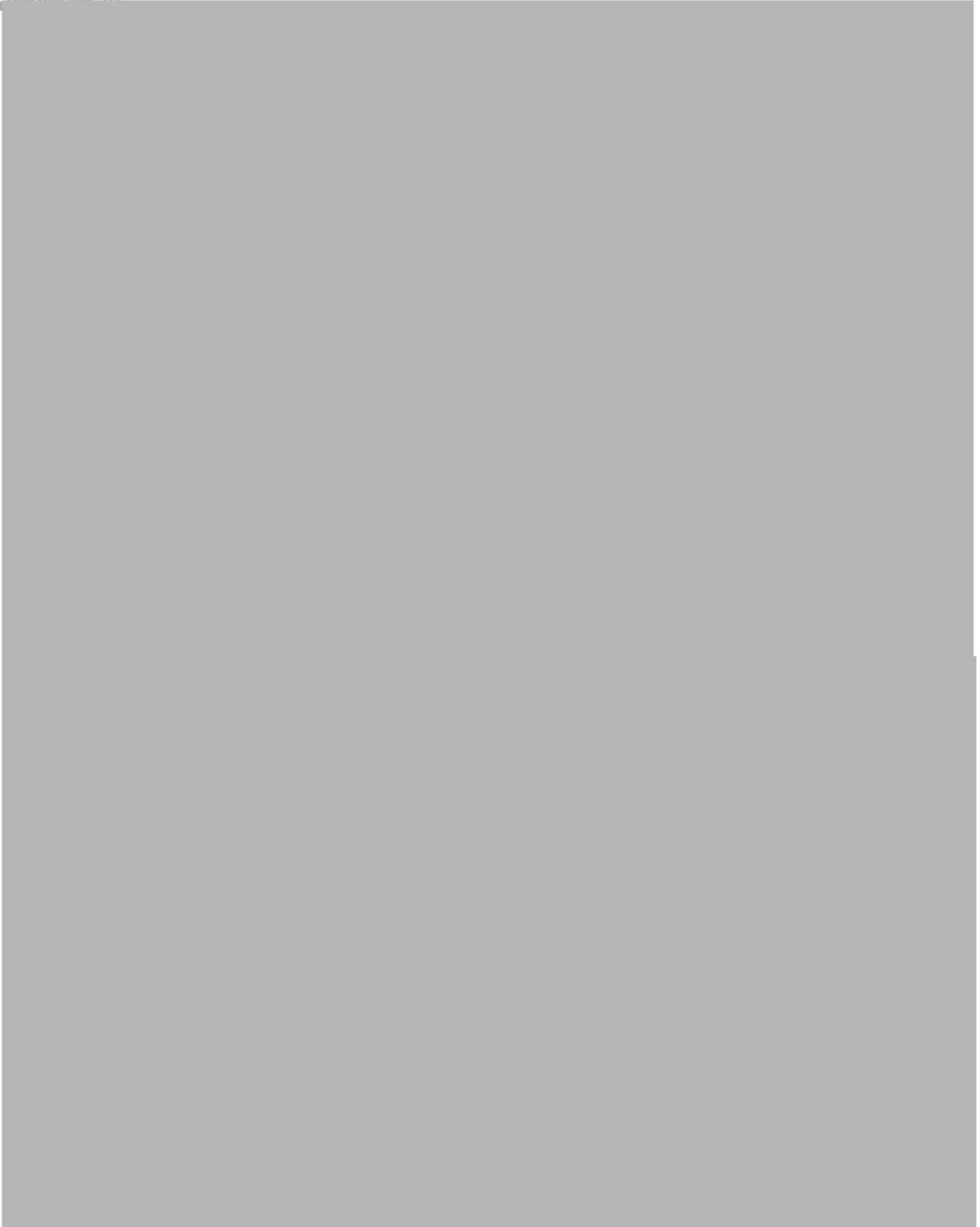
N.T.S

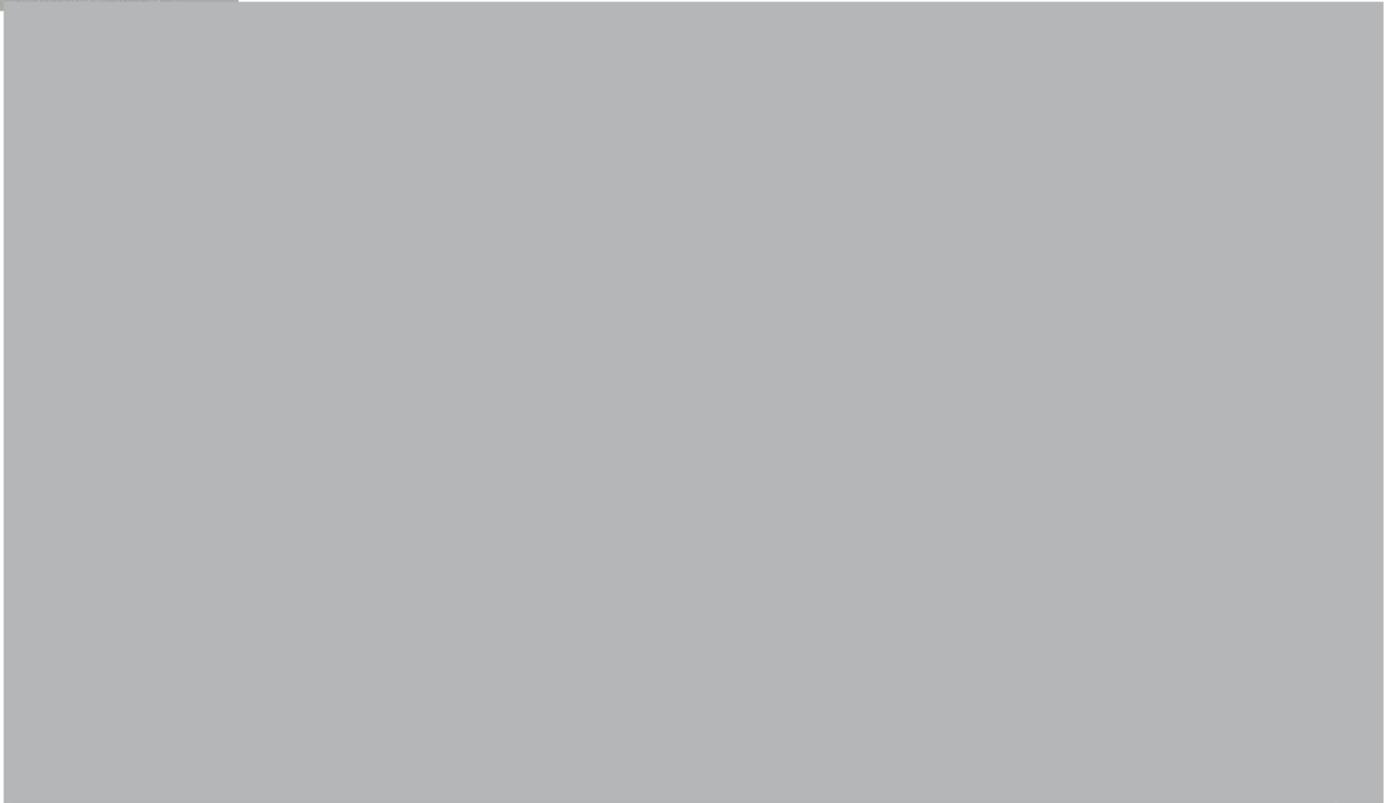


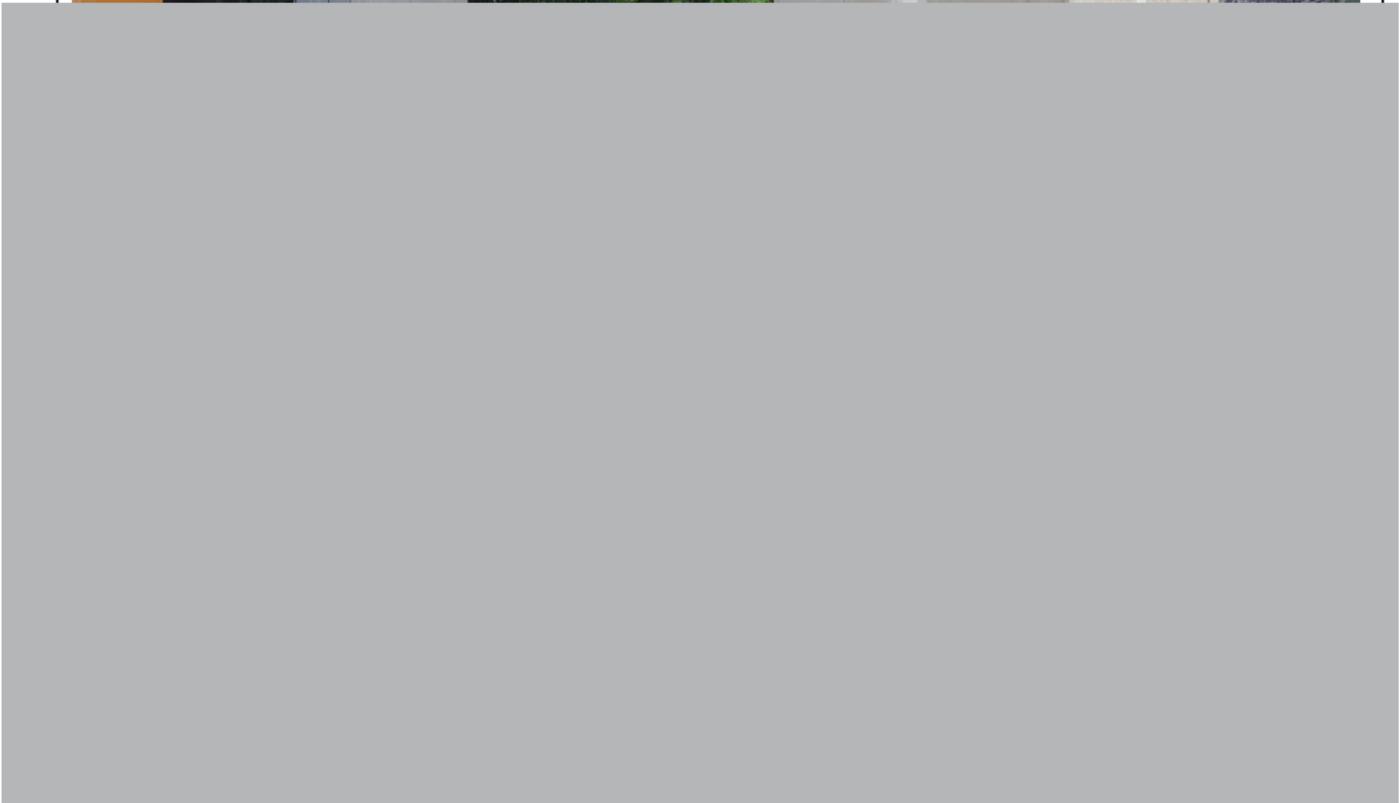


**Attachment B**

 **Site Photos**

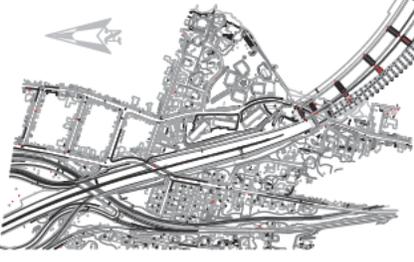






**Attachment C**  
**Area Map and Designations**

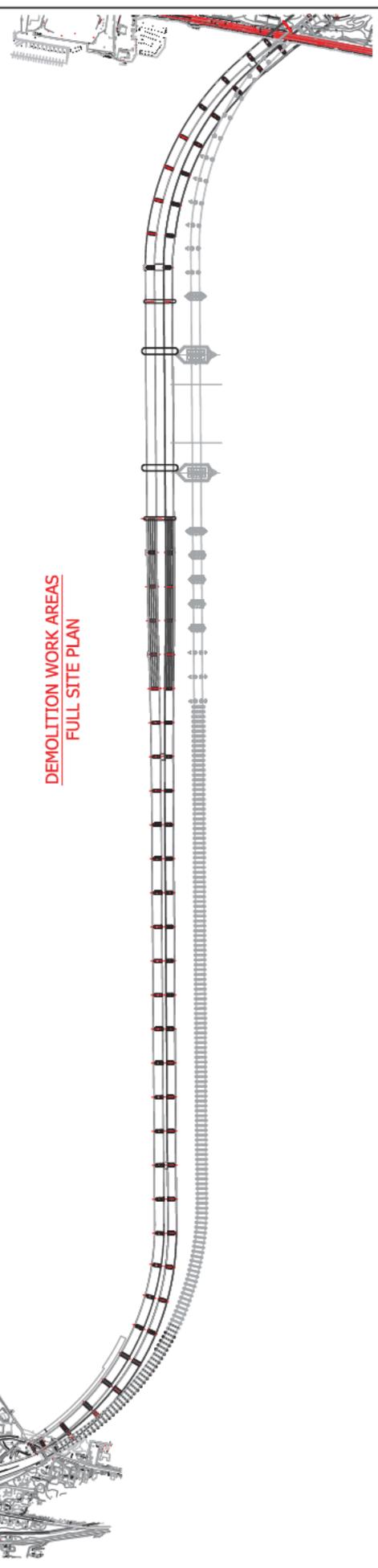
---



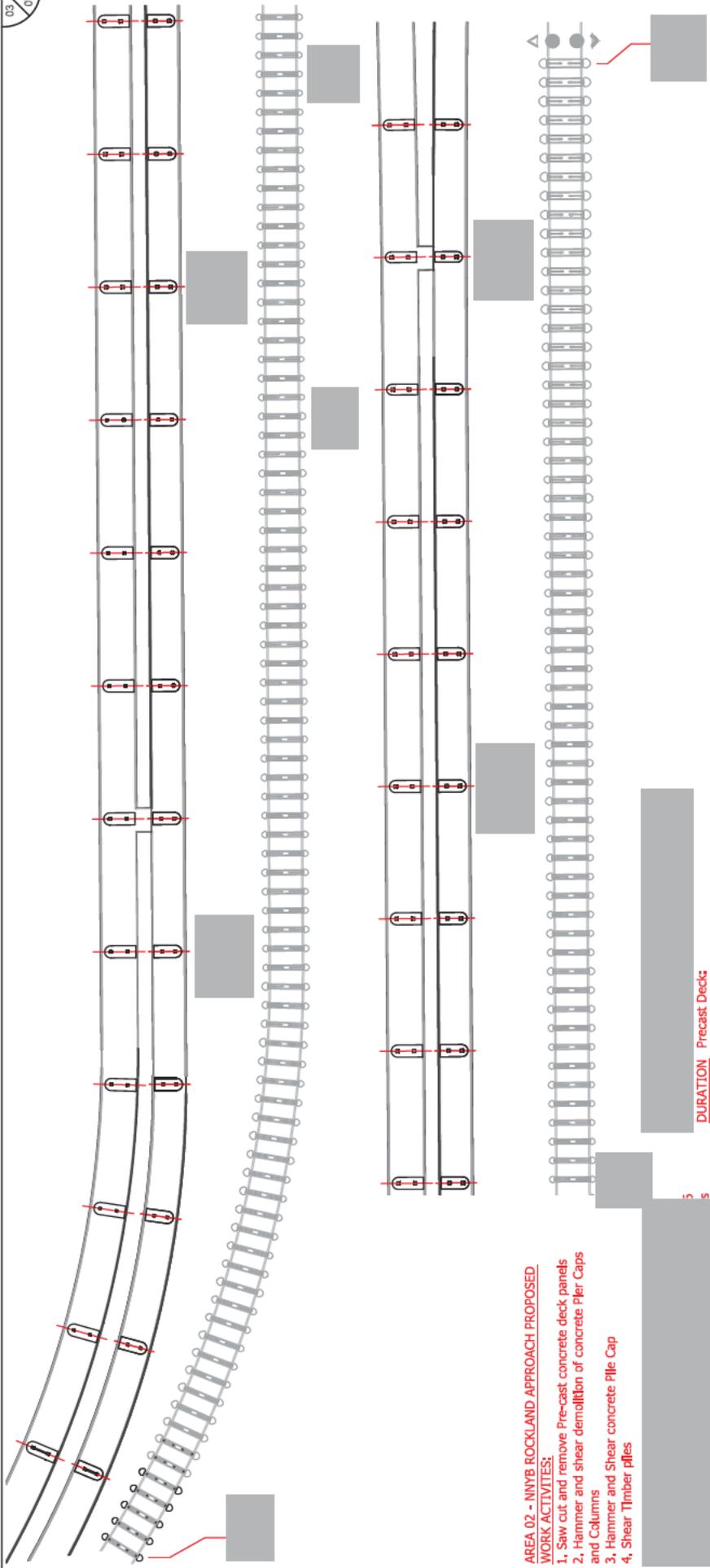
**GENERAL NOTES:**

- 1. Work is scheduled in coordination with [redacted] Approach Activities.
- 2. Each work area includes disposal or salvage of the following items:
  - a. Utilities (Decommissioned prior to removal)
  - b. Precast Deck Panels
  - c. Superstructure
  - d. Substructure
  - e. Foundation

**DEMOLITION WORK AREAS  
FULL SITE PLAN**







**AREA 02 - NINYB ROCKLAND APPROACH PROPOSED**

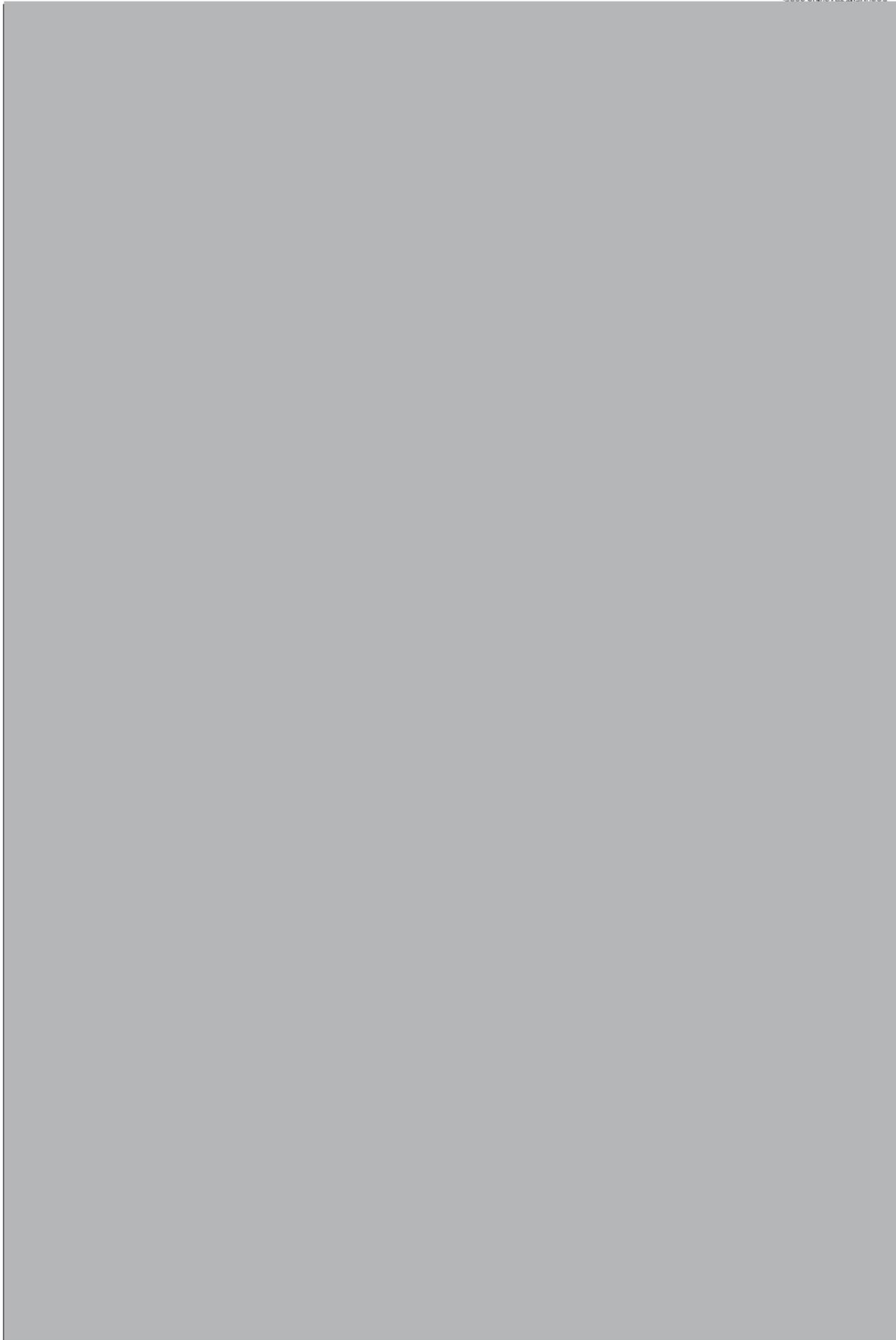
**WORK ACTIVITIES:**

1. Saw cut and remove Precast concrete deck panels
2. Hammer and shear demolition of concrete Pier Caps and Columns
3. Hammer and Shear concrete Pile Cap
4. Shear Timber piles

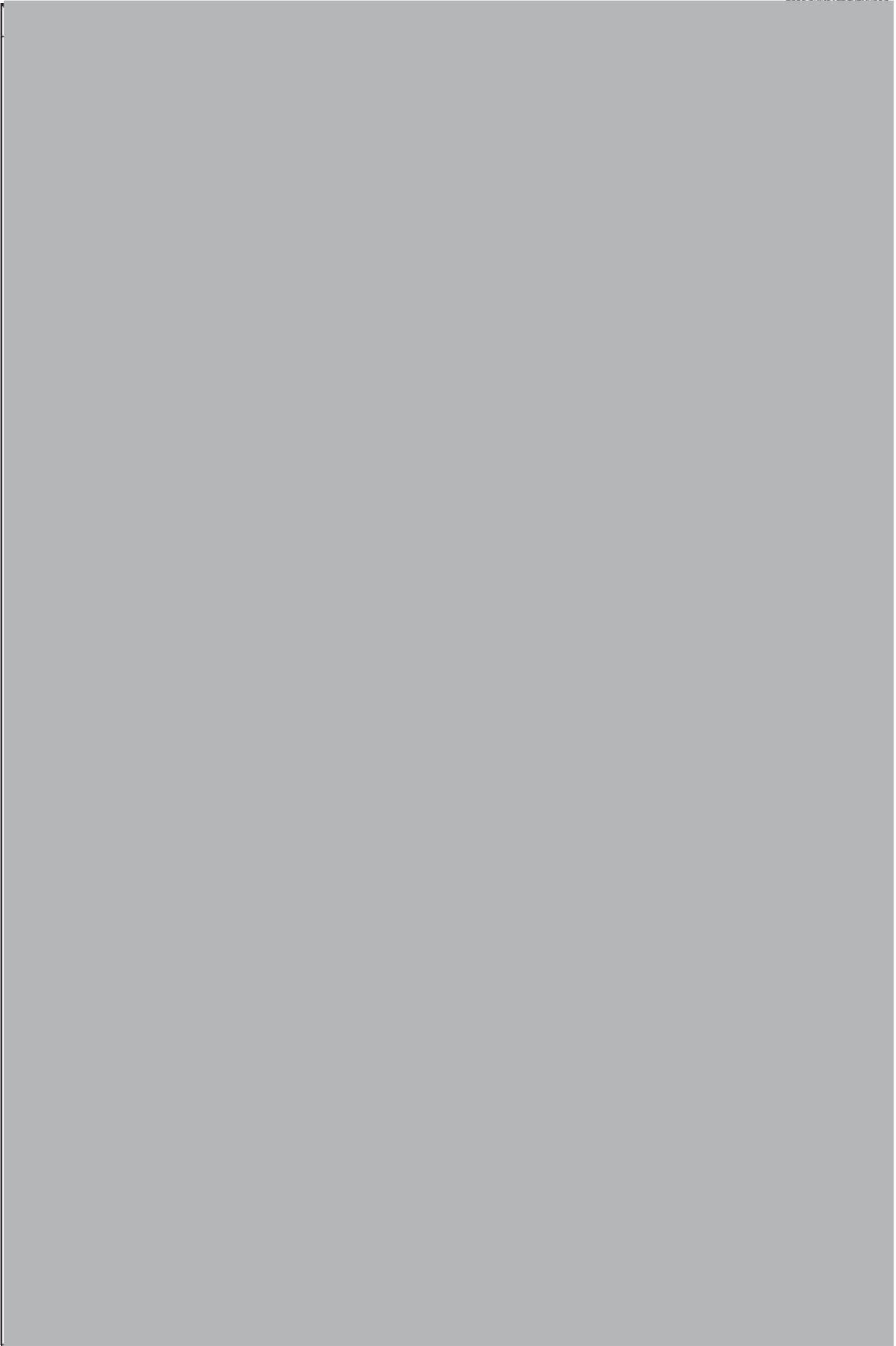
**DURATION** Precast Decks:  
Substructure:  
Foundations:

**HEADINGS:** Heading during Deck  
Heading for Substructure/Foundations

<p>APPROVED ON: _____</p> <p>SIGNATURE: _____</p> <p>STAMP: _____</p>	<p>APPROVED ON: _____</p> <p>SIGNATURE: _____</p> <p>STAMP: _____</p>
---	---









**Attachment D**  
**Bridge Structure Definitions**

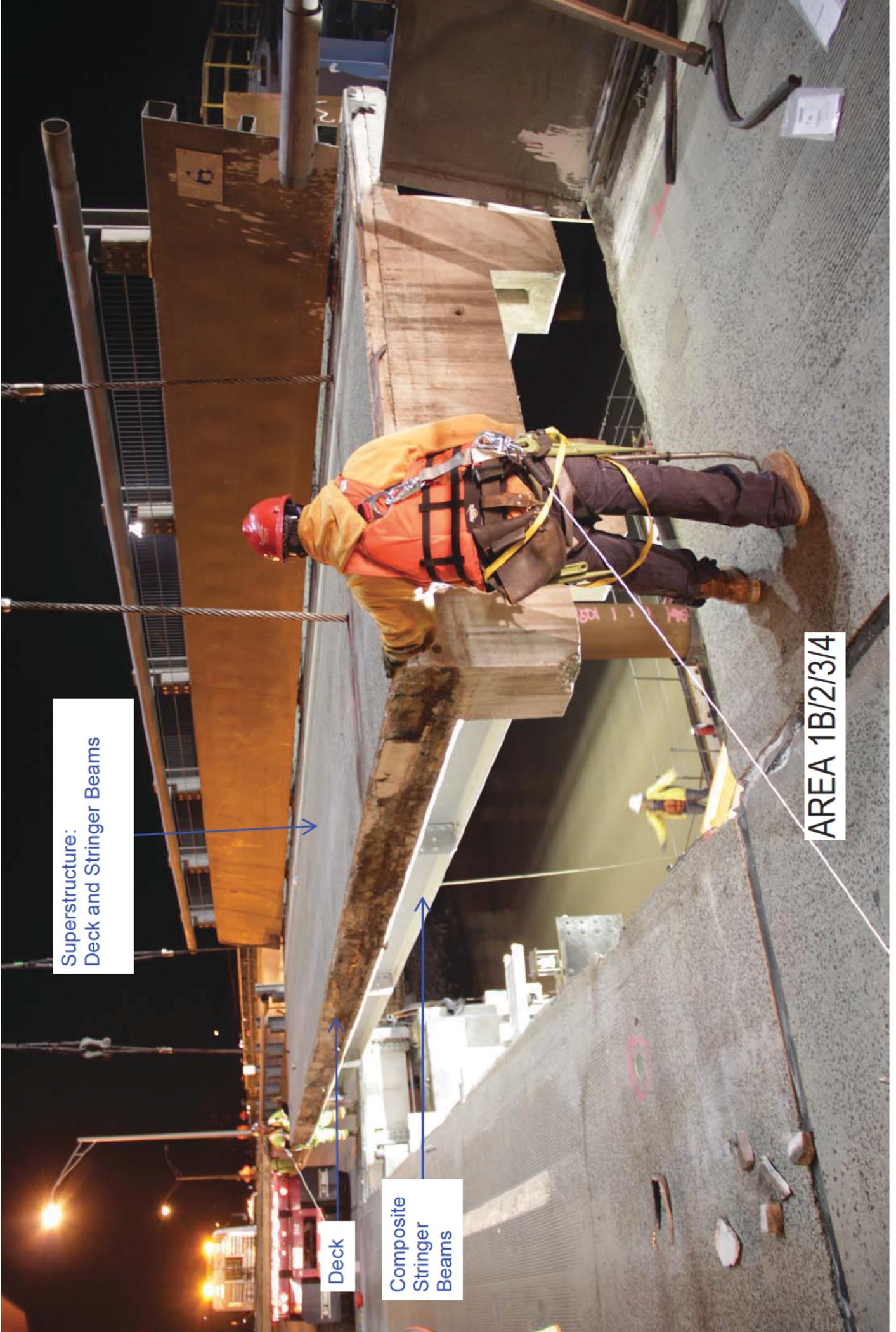
---

Superstructure:  
Deck and Stringer Beams

Deck

Composite  
Stringer  
Beams

AREA 1B/2/3/4







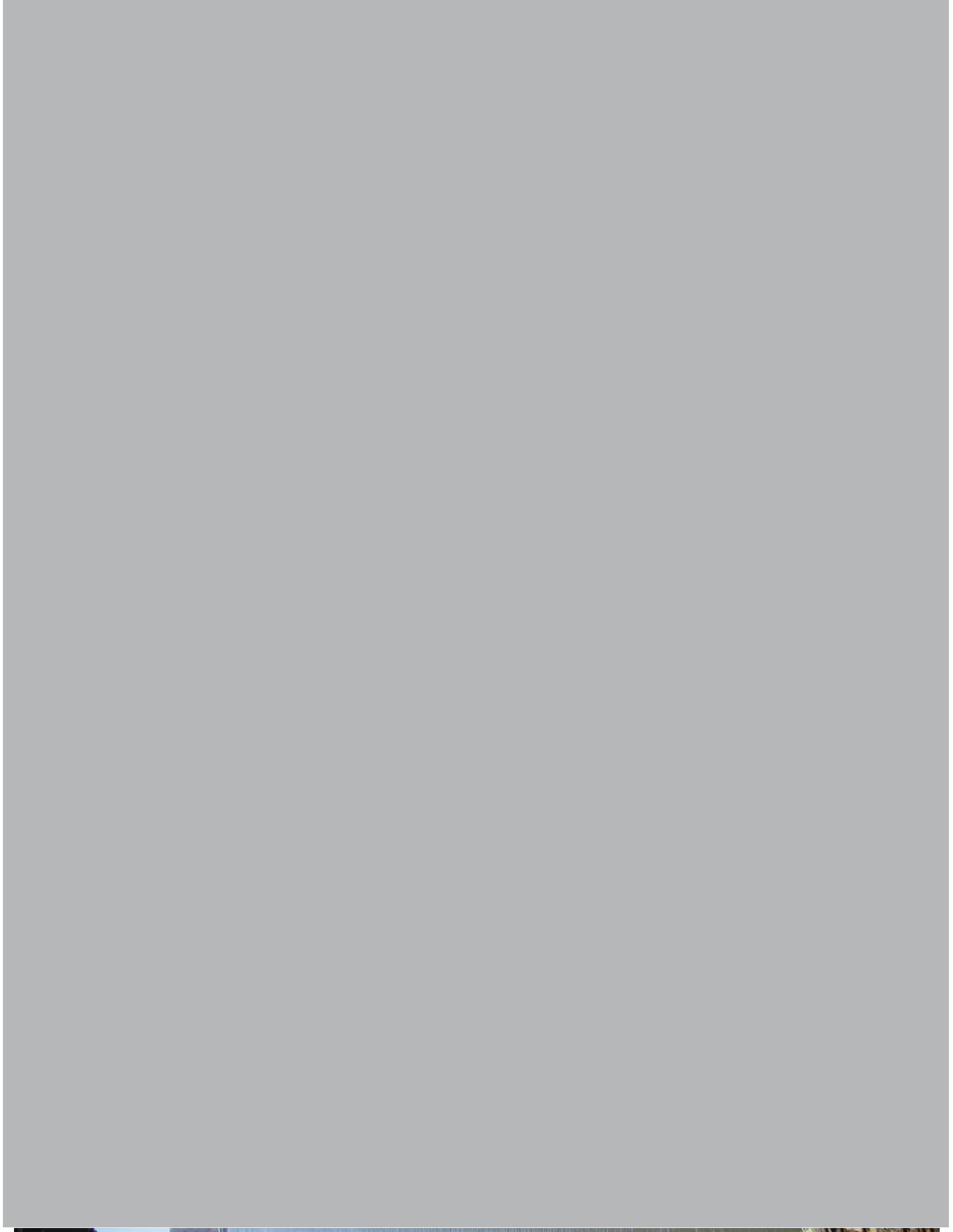


The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry, no matter how small, should be recorded to ensure the integrity of the financial data. This includes not only sales and purchases but also expenses, income, and any other financial activities. The document provides a detailed guide on how to set up a ledger and how to enter transactions correctly, including instructions on how to handle corrections and adjustments.

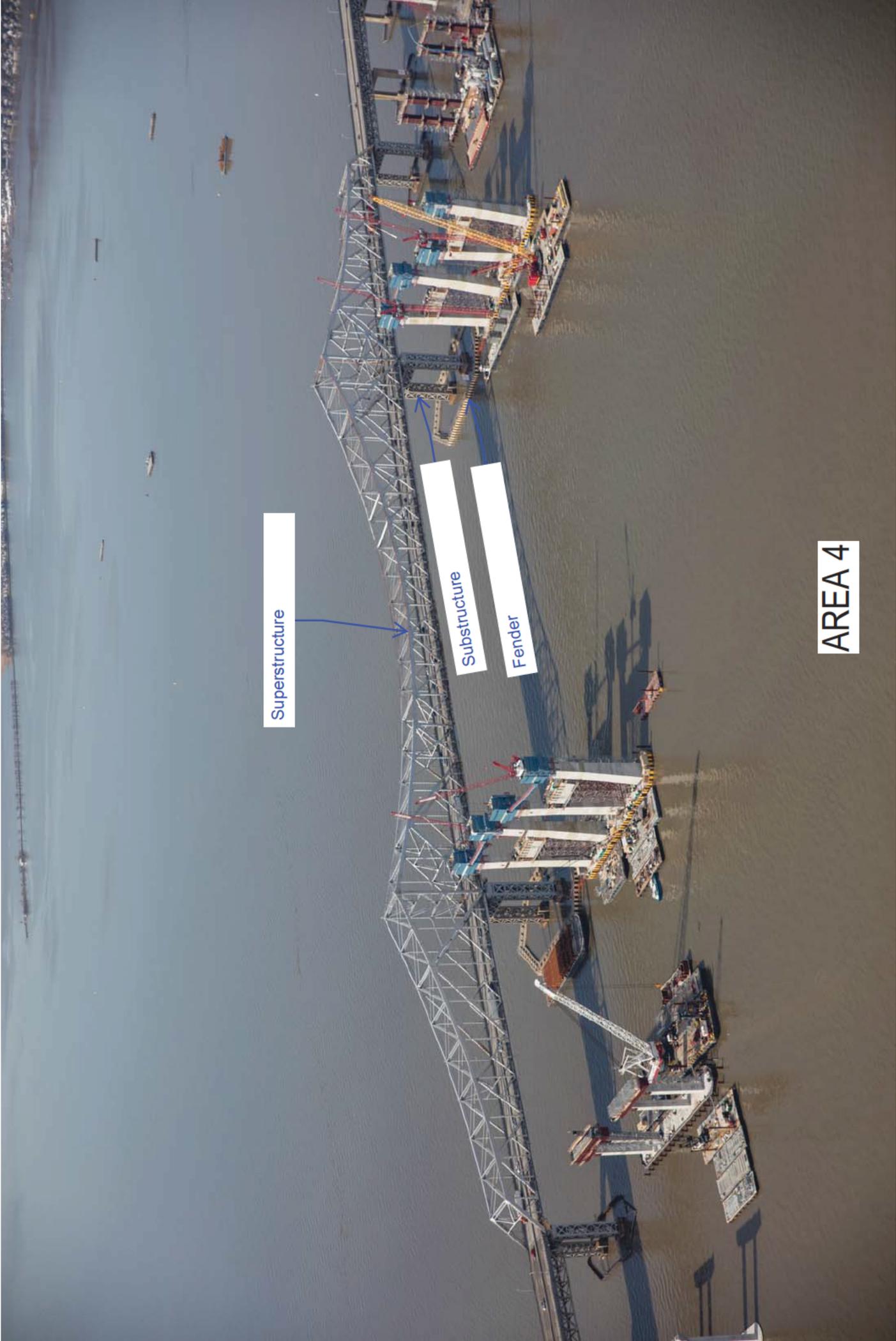
The second part of the document focuses on the reconciliation process. It explains how to compare the company's records with bank statements and other external sources to identify any discrepancies. The document provides a step-by-step guide on how to perform a reconciliation, including how to investigate and resolve any differences. It also discusses the importance of reconciling accounts regularly to prevent errors and ensure that the financial statements are accurate.

The third part of the document discusses the preparation of financial statements. It provides a detailed guide on how to calculate and prepare the income statement, balance sheet, and cash flow statement. The document includes formulas and examples to help users understand how to calculate each component of these statements. It also discusses the importance of reviewing and auditing the financial statements to ensure their accuracy and reliability.

The final part of the document provides a summary of the key points discussed throughout the document. It emphasizes the importance of maintaining accurate records, reconciling accounts regularly, and preparing financial statements to ensure the financial health of the business. The document concludes with a list of resources and references for further information on accounting and finance.







Superstructure

Substructure

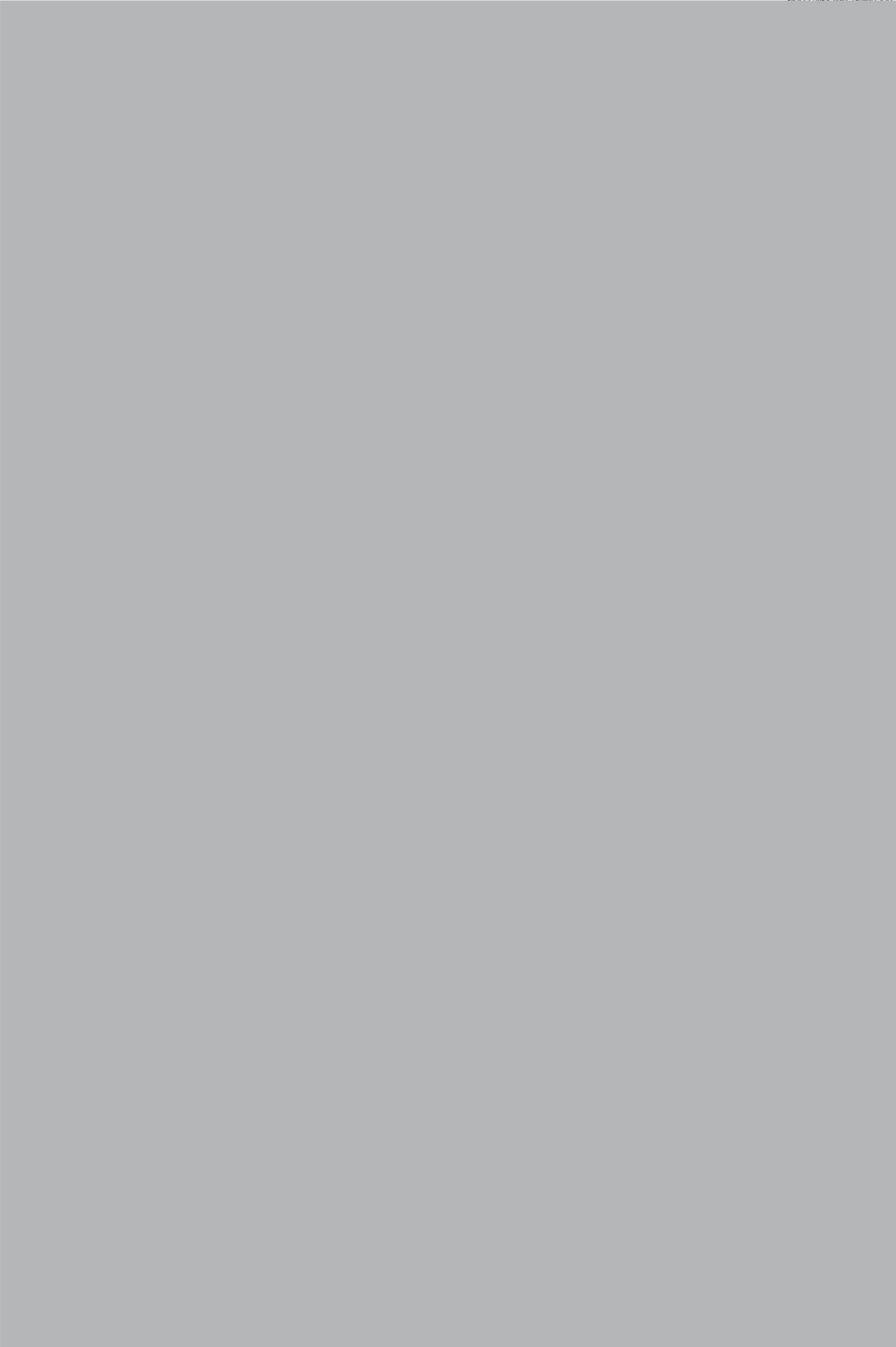
Fender

AREA 4

**Attachment E**  
**Demolition Schedule**

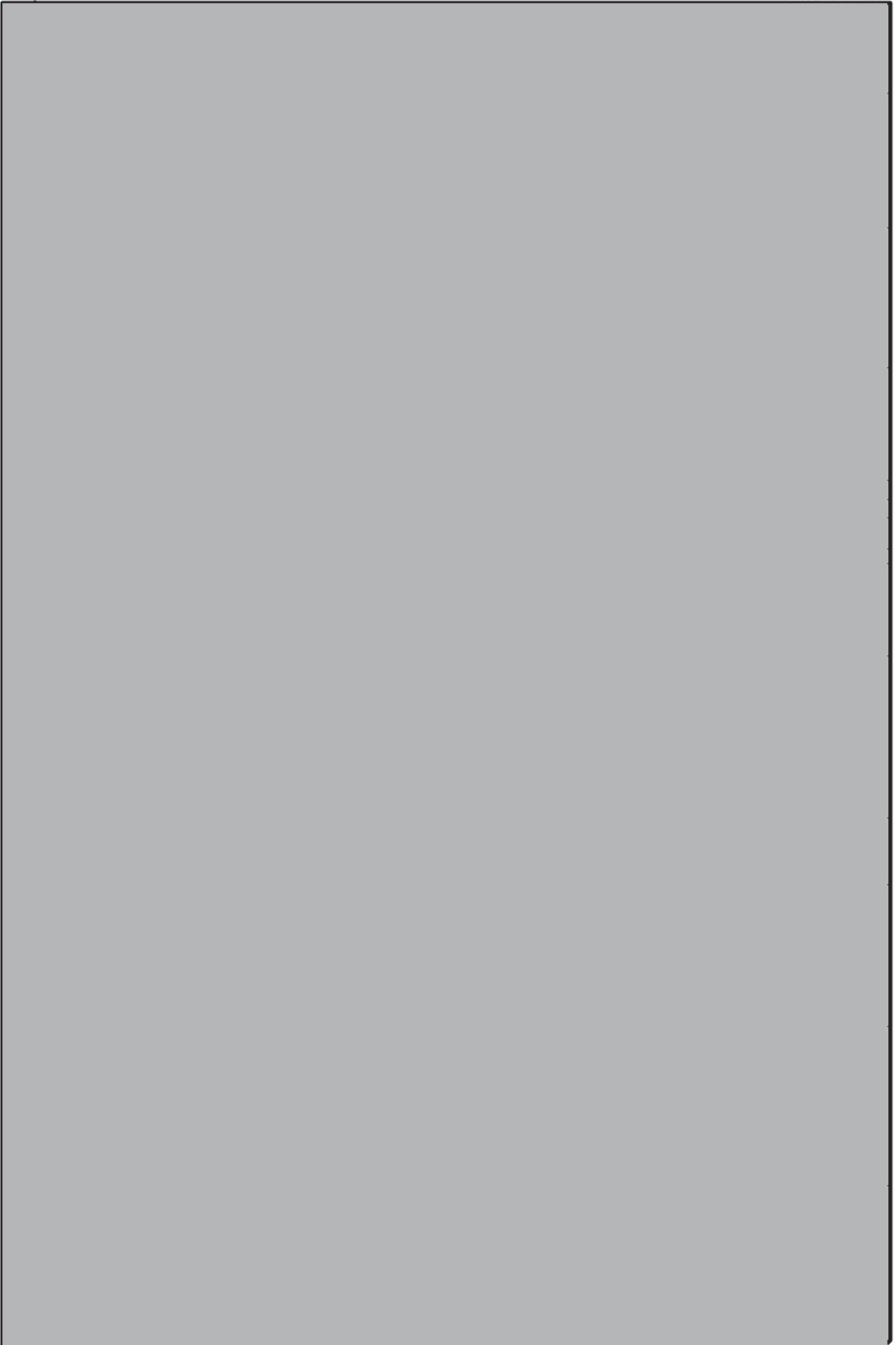
---

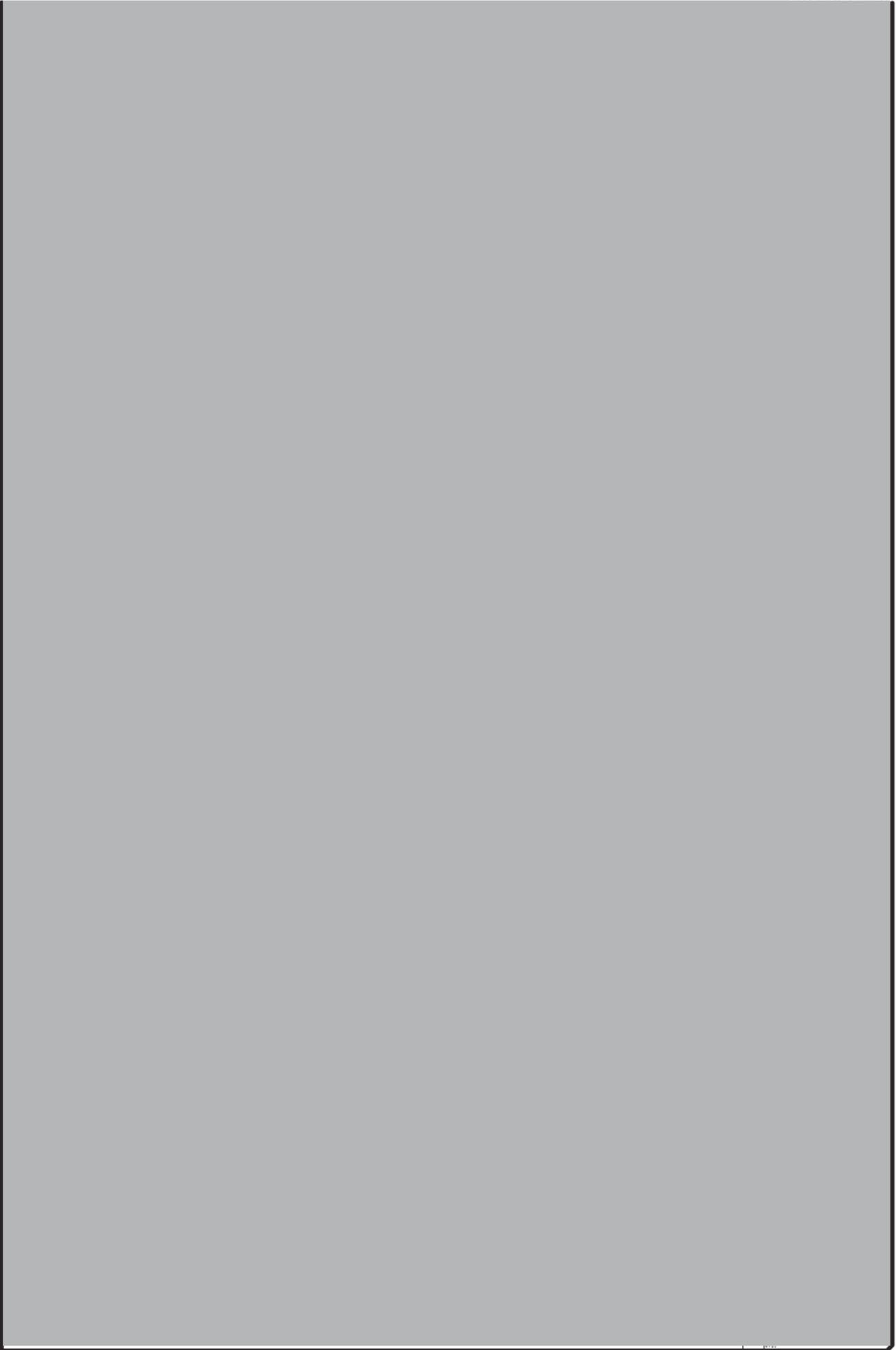




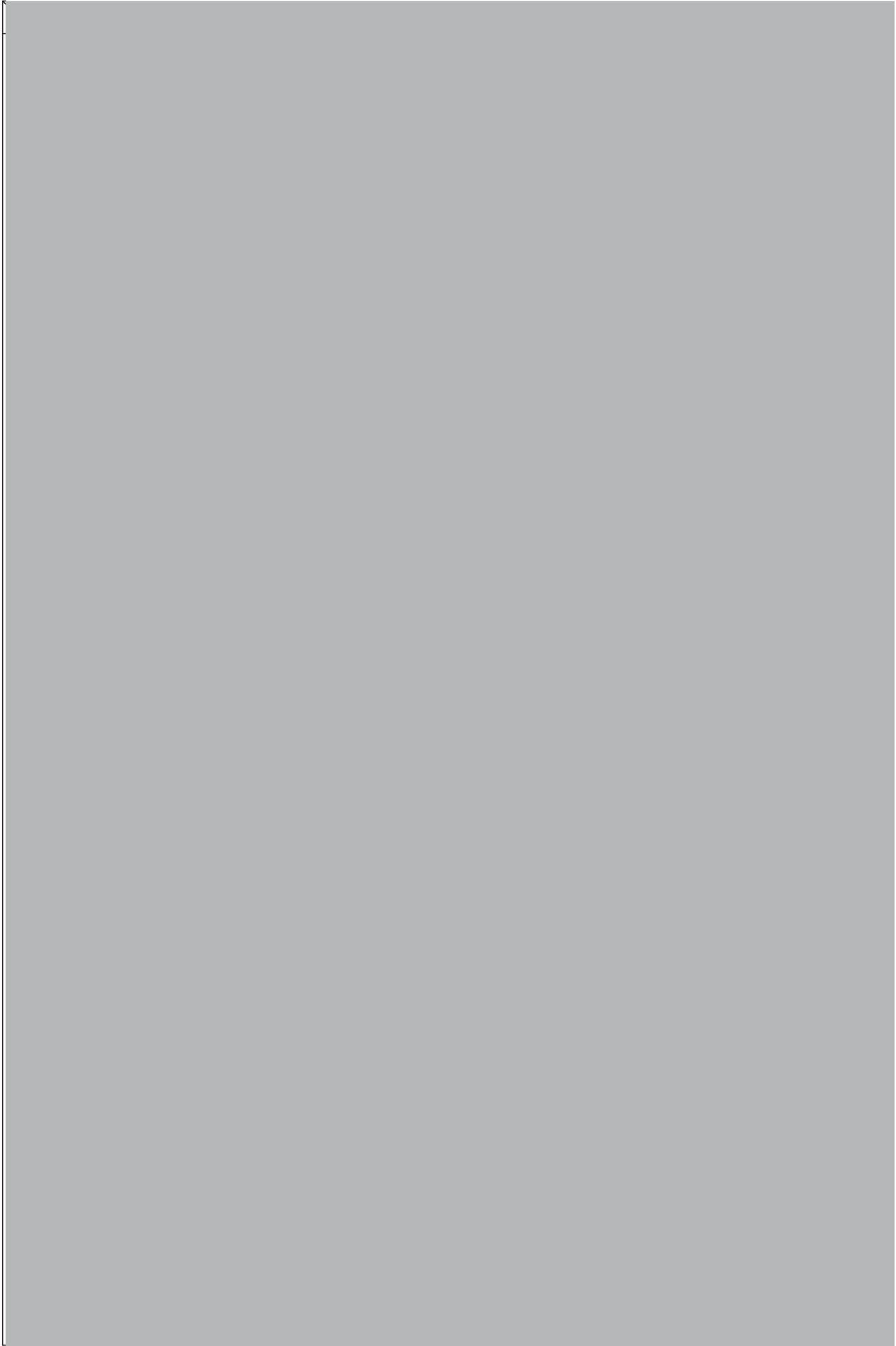








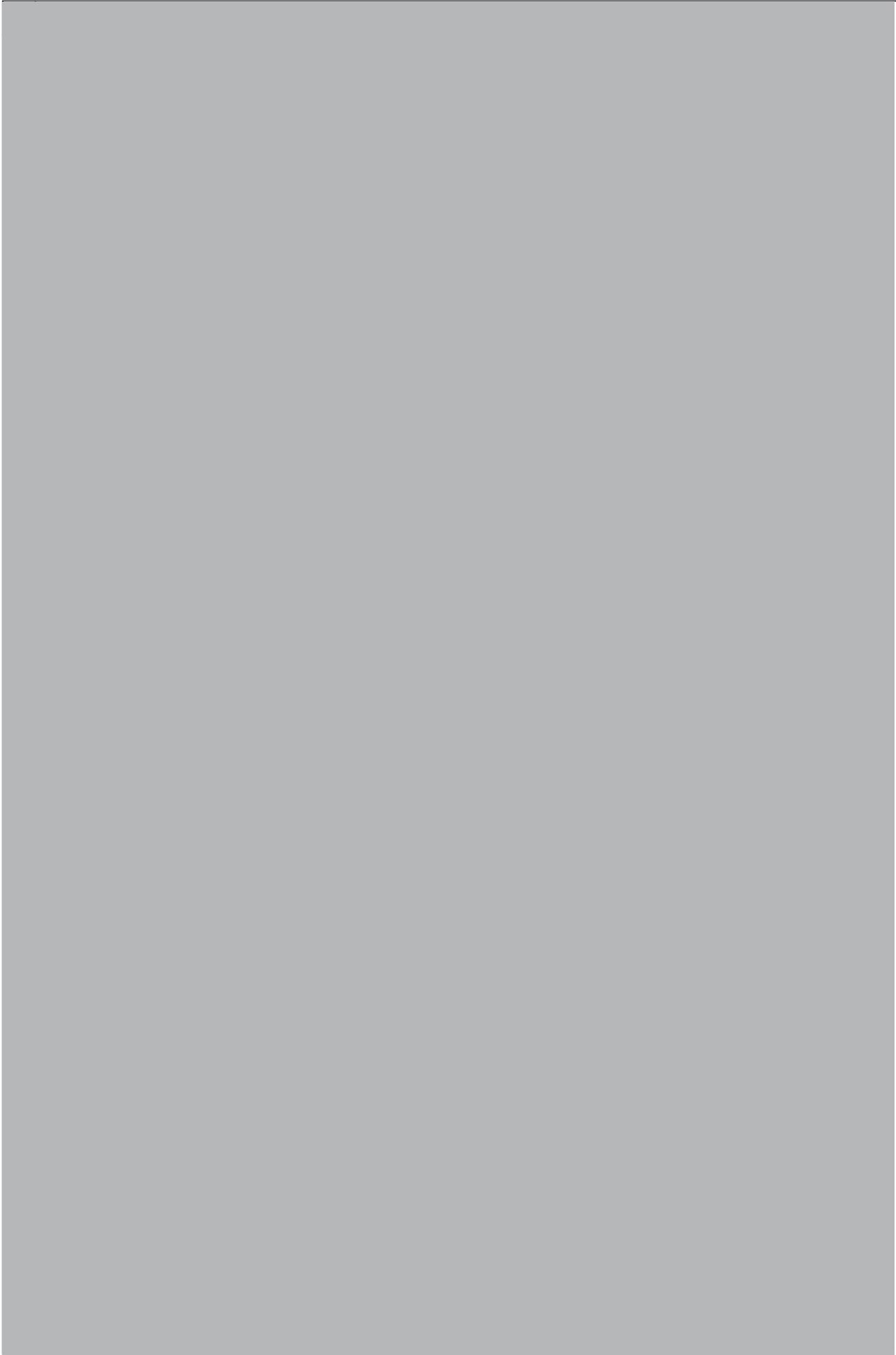


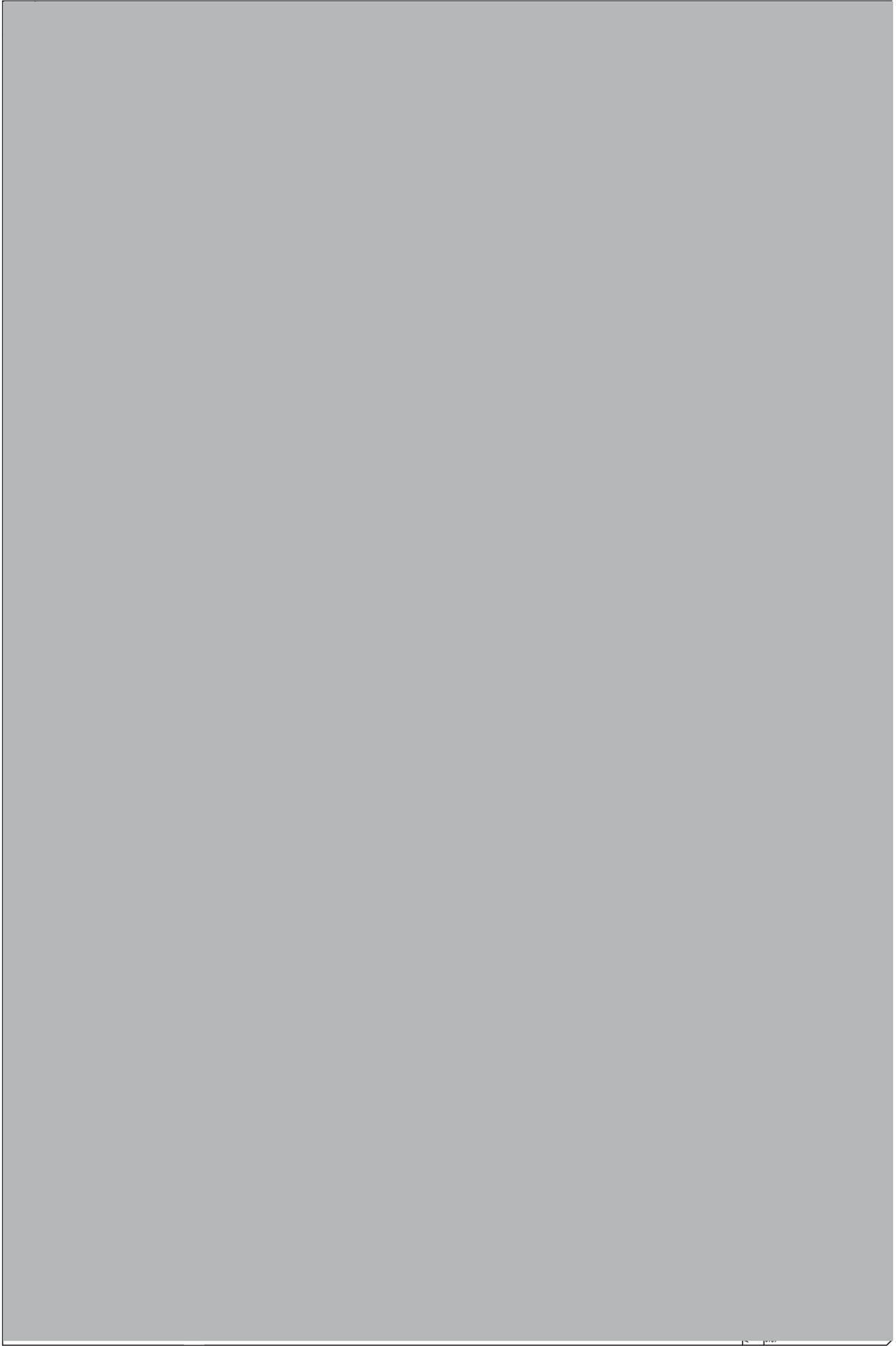


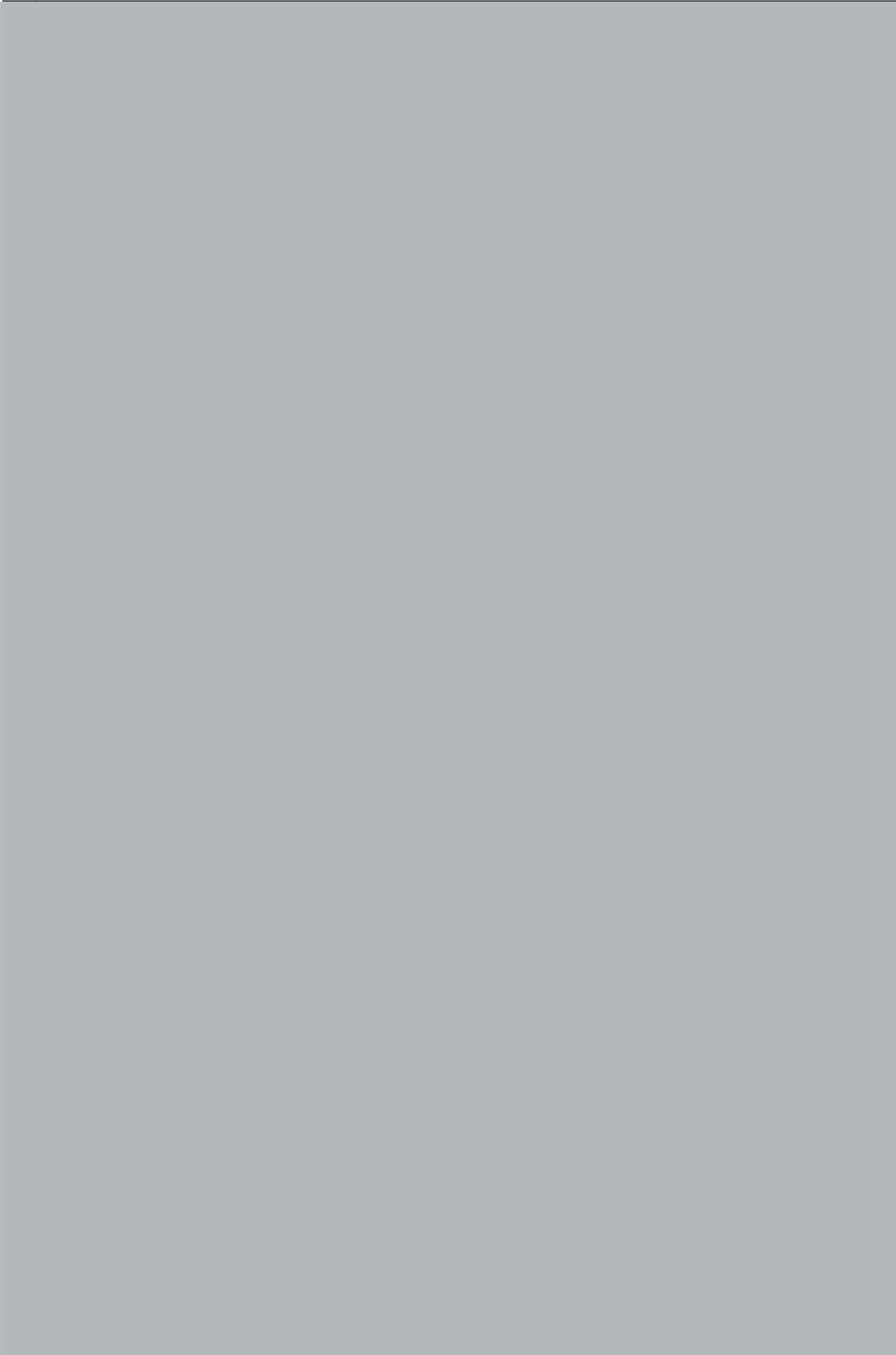


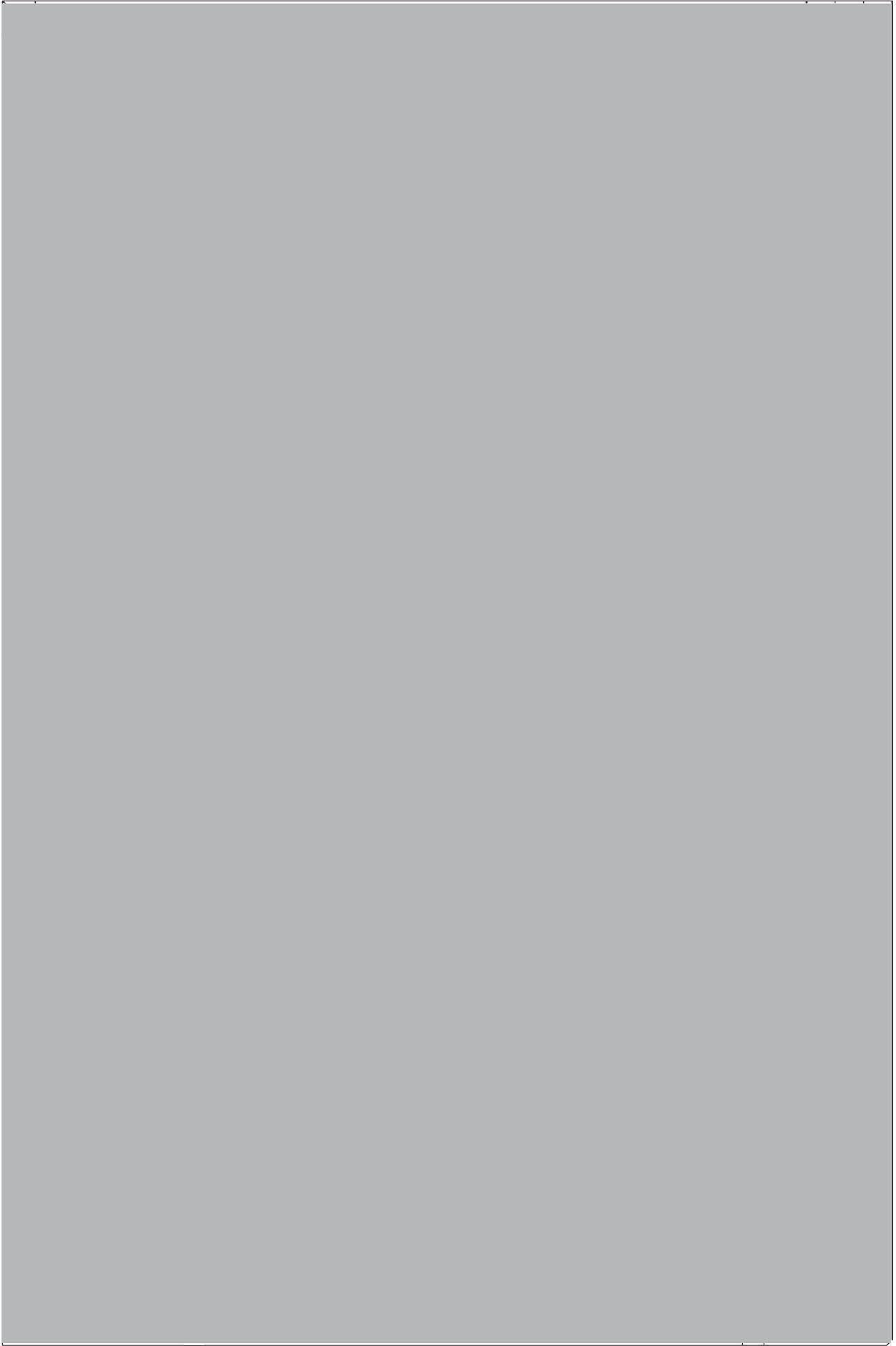


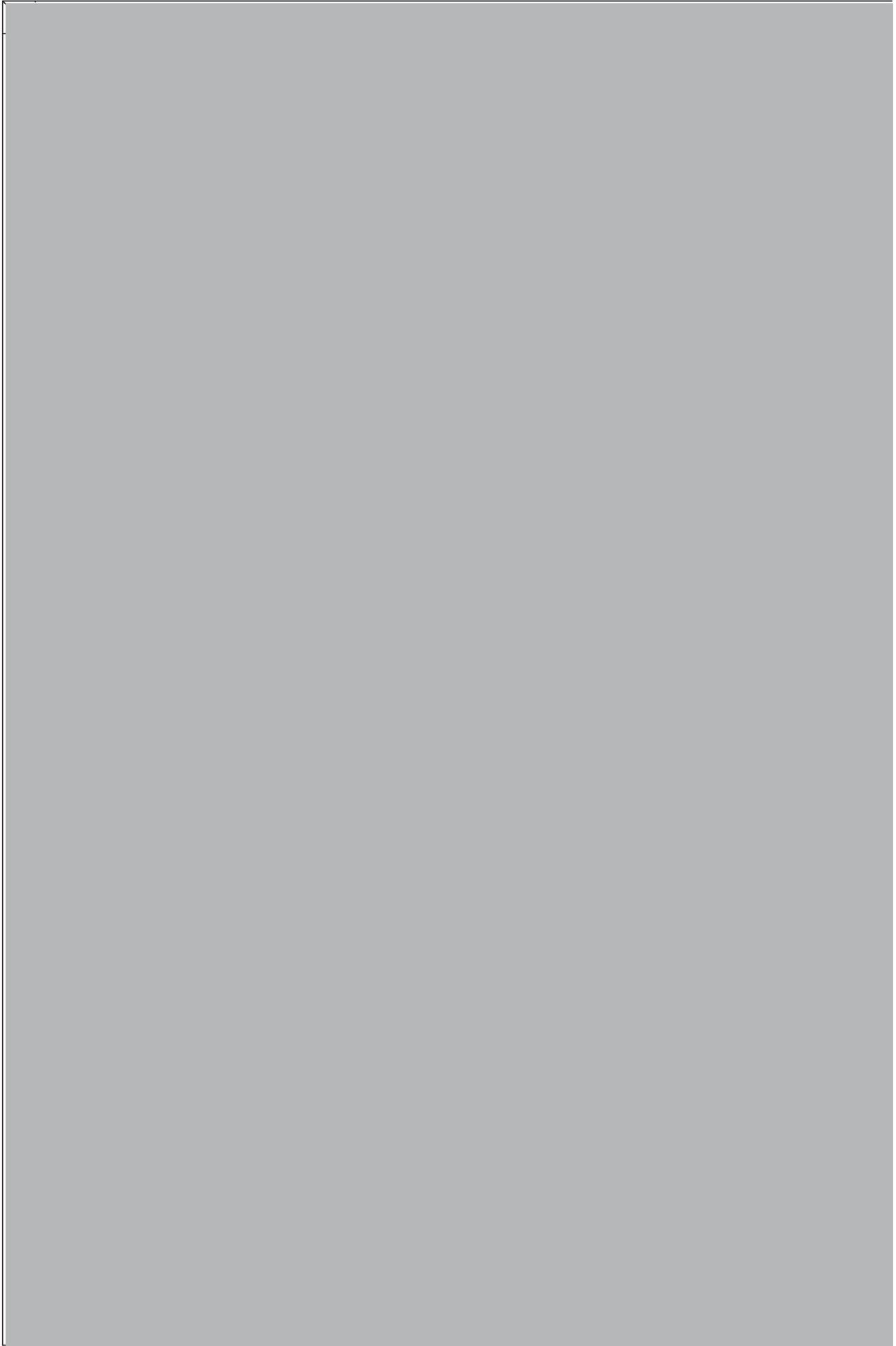


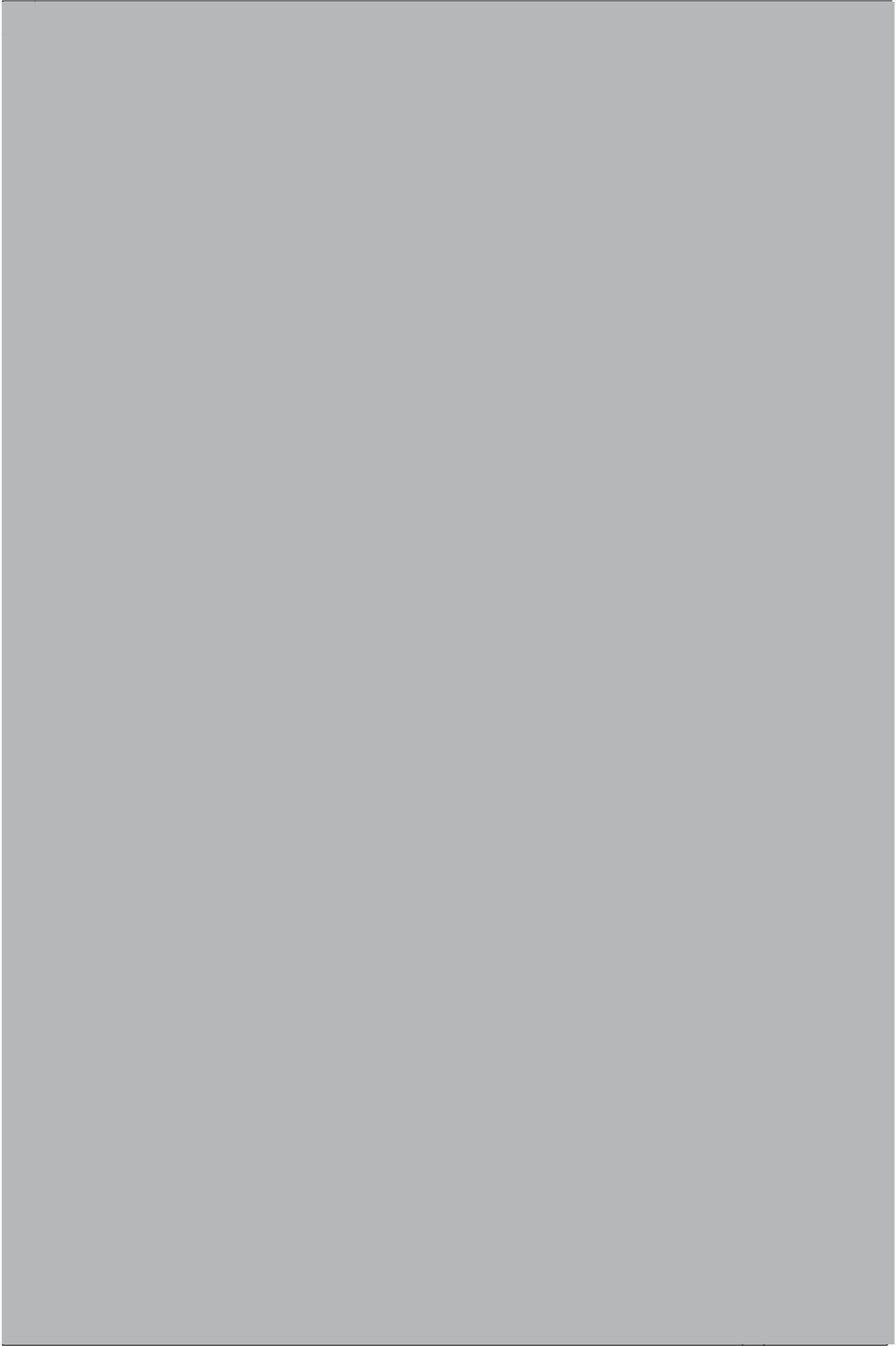


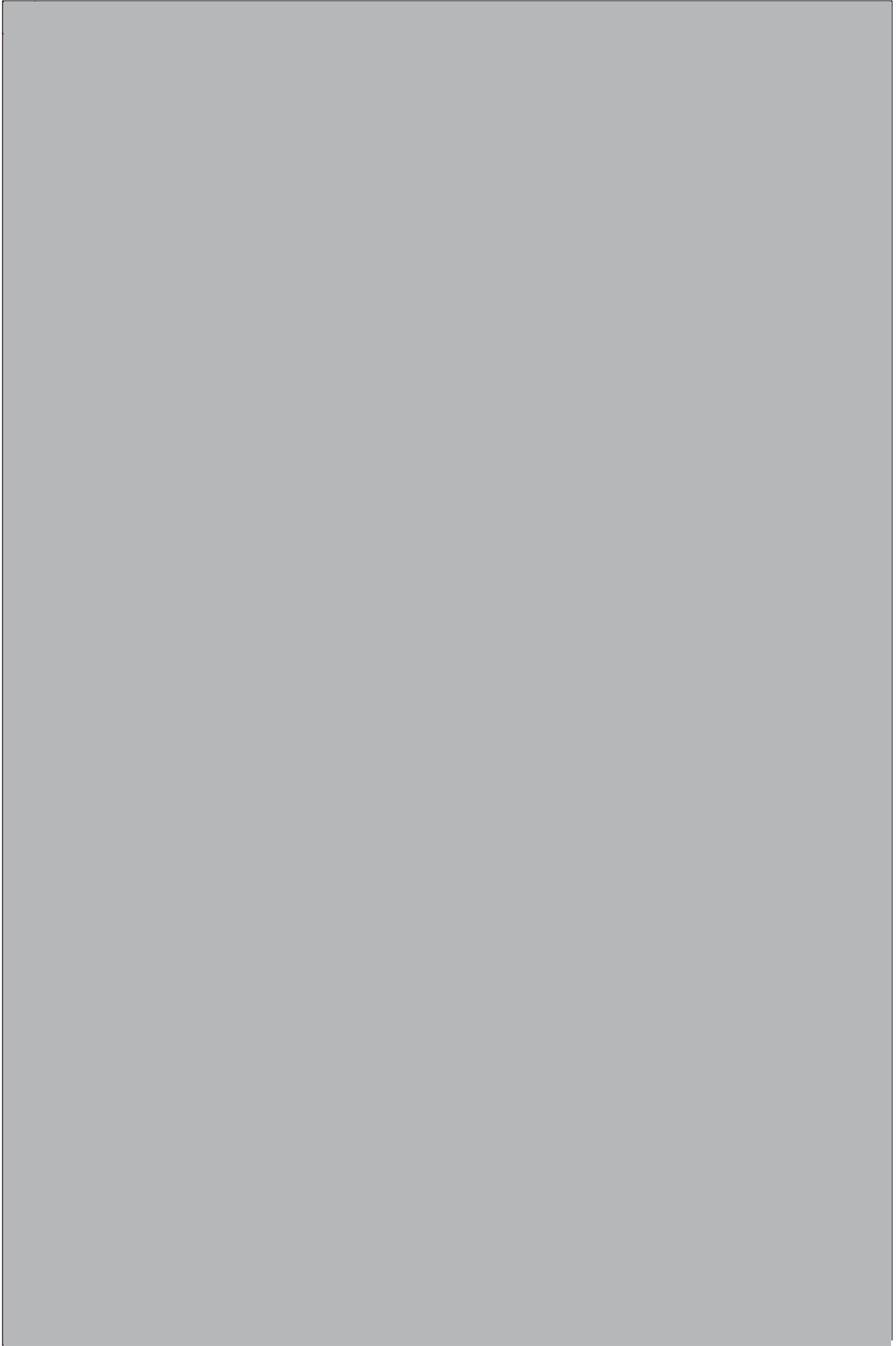




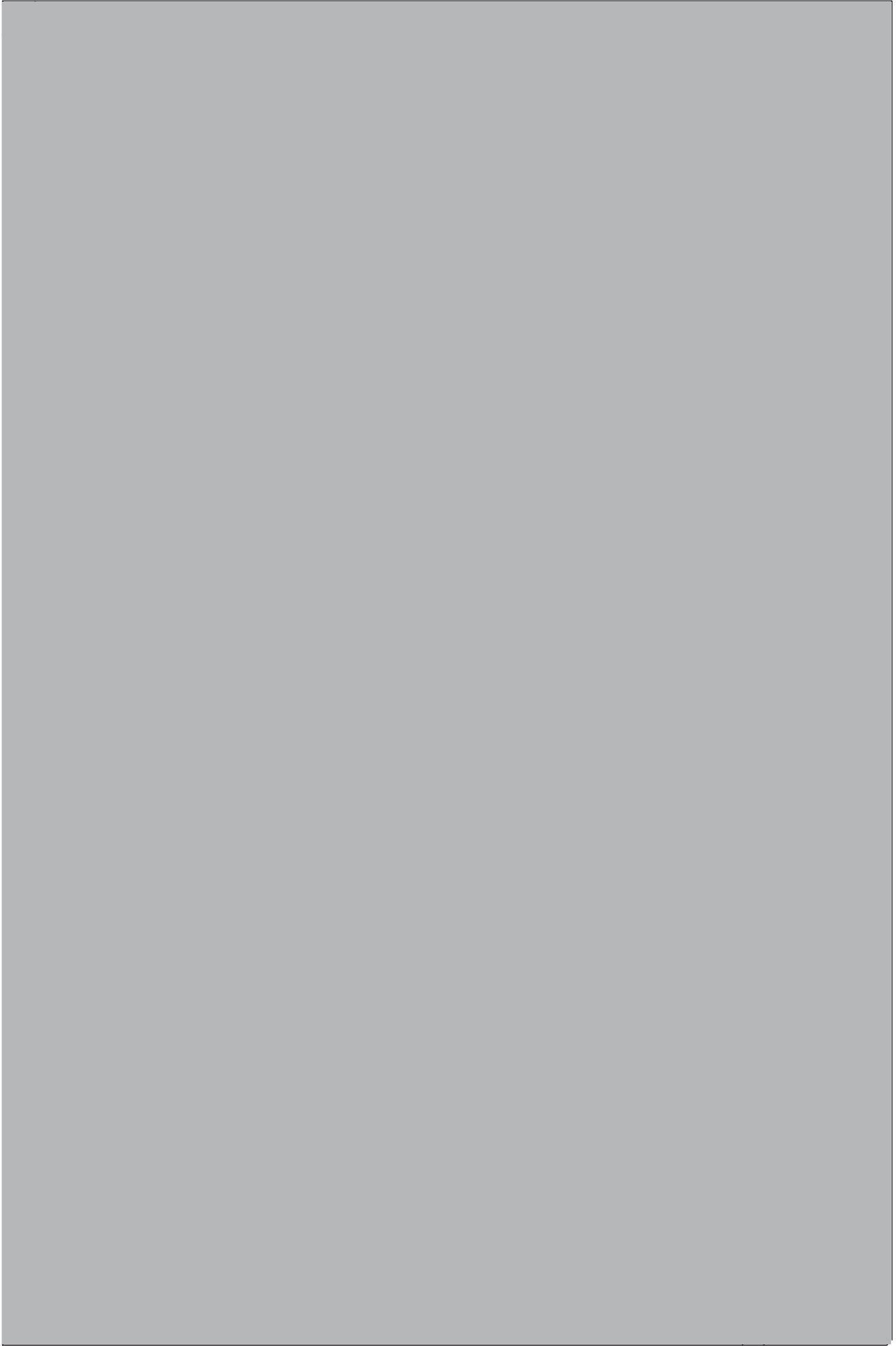


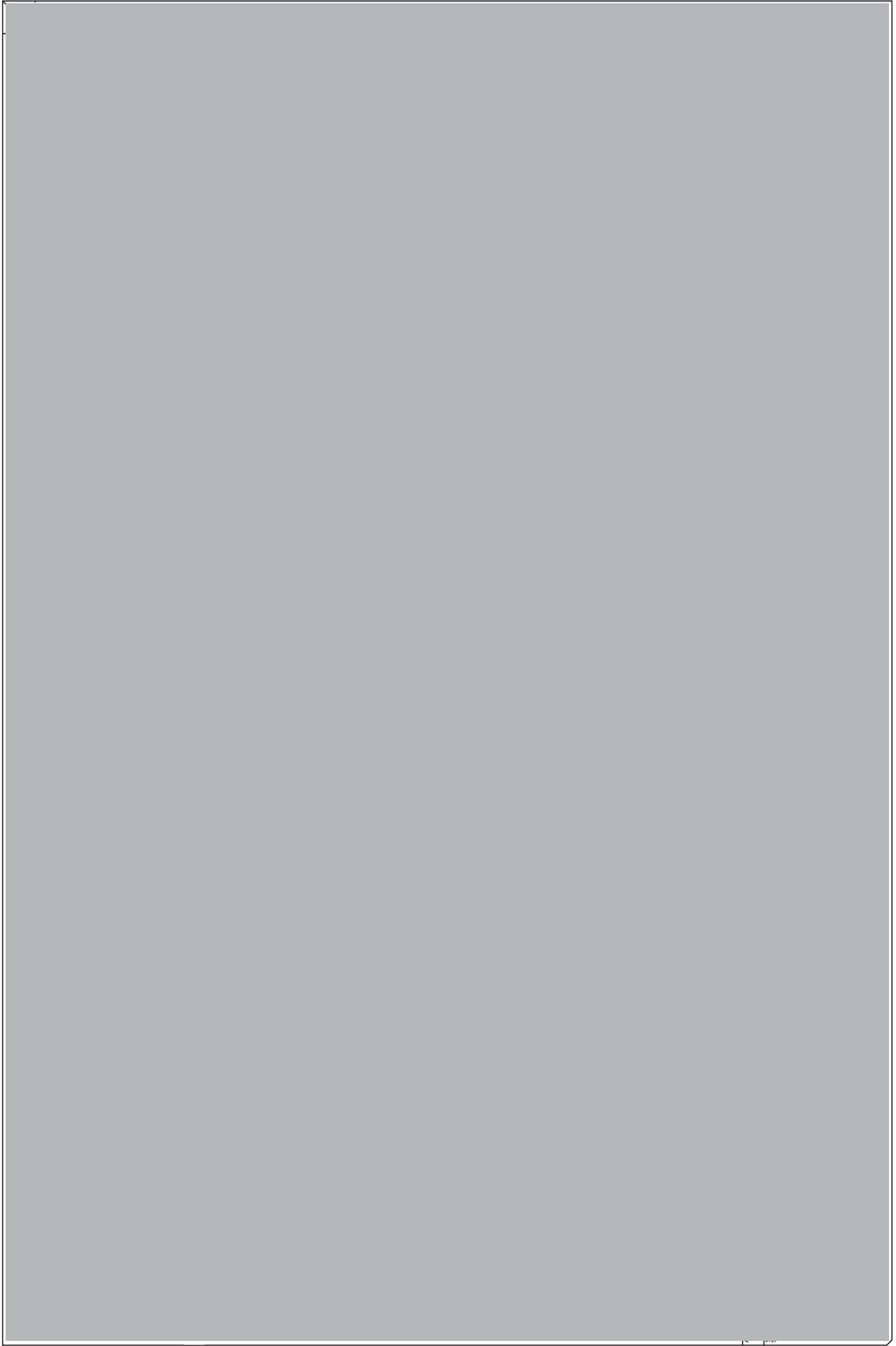


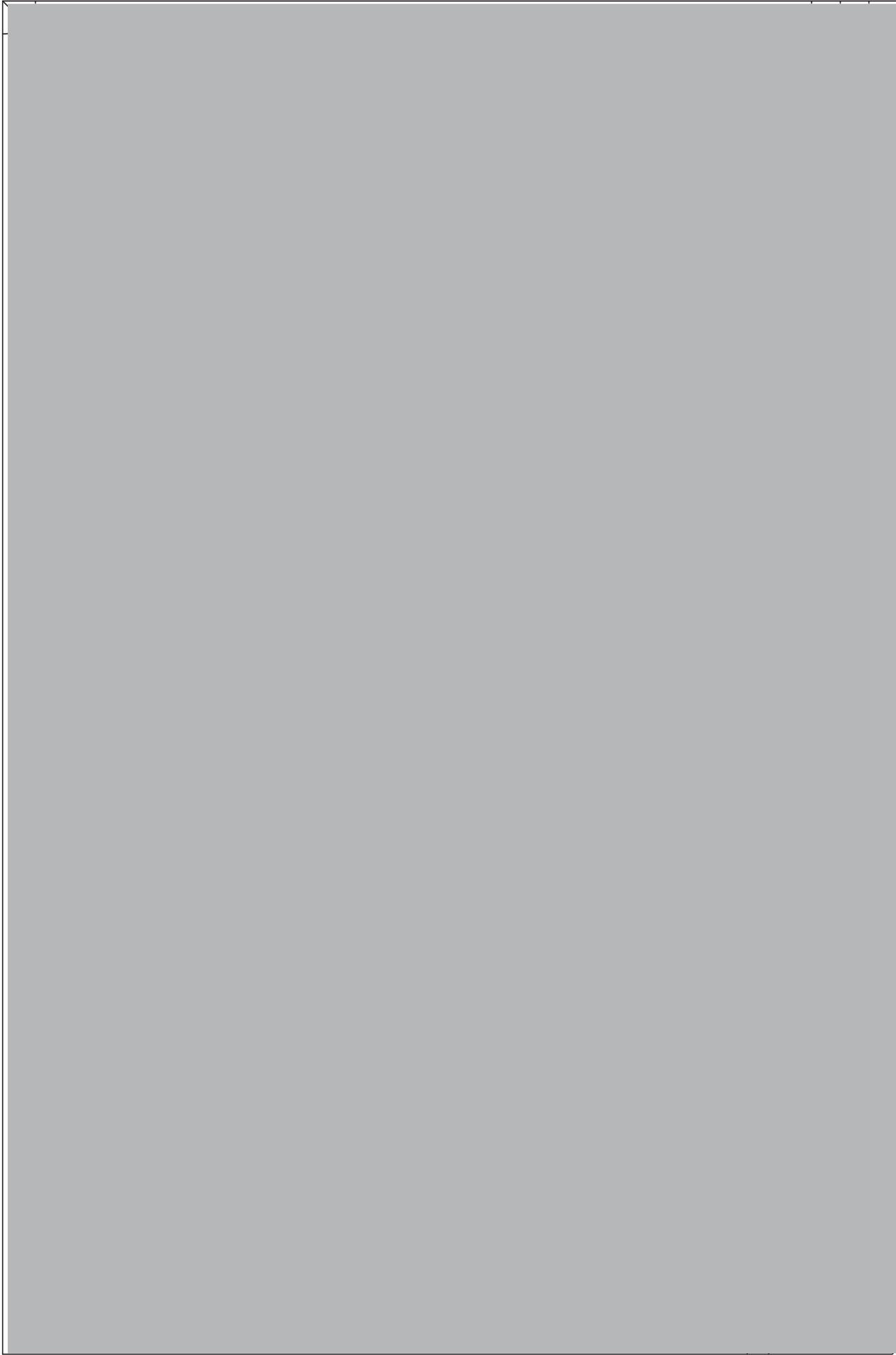


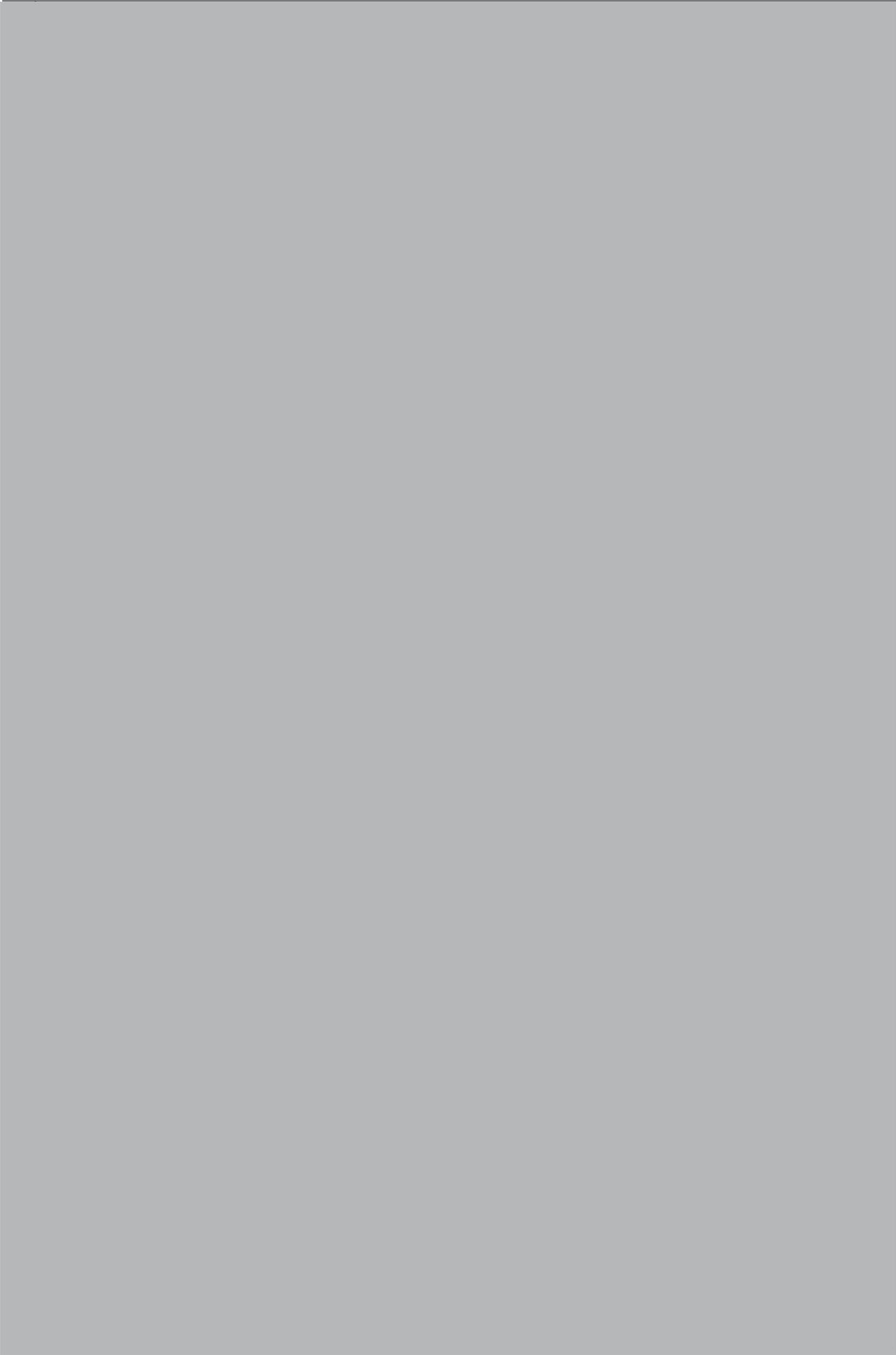


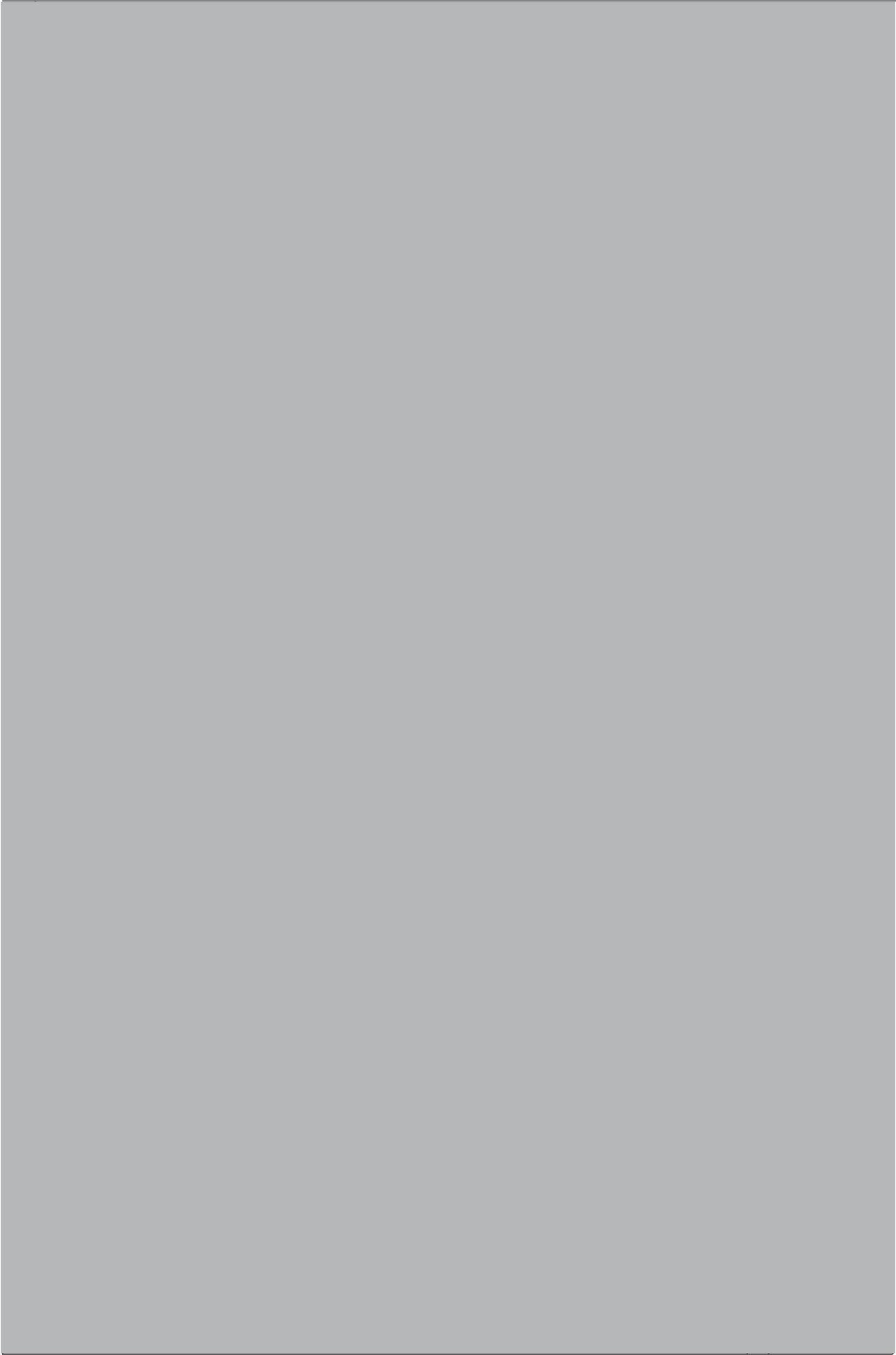


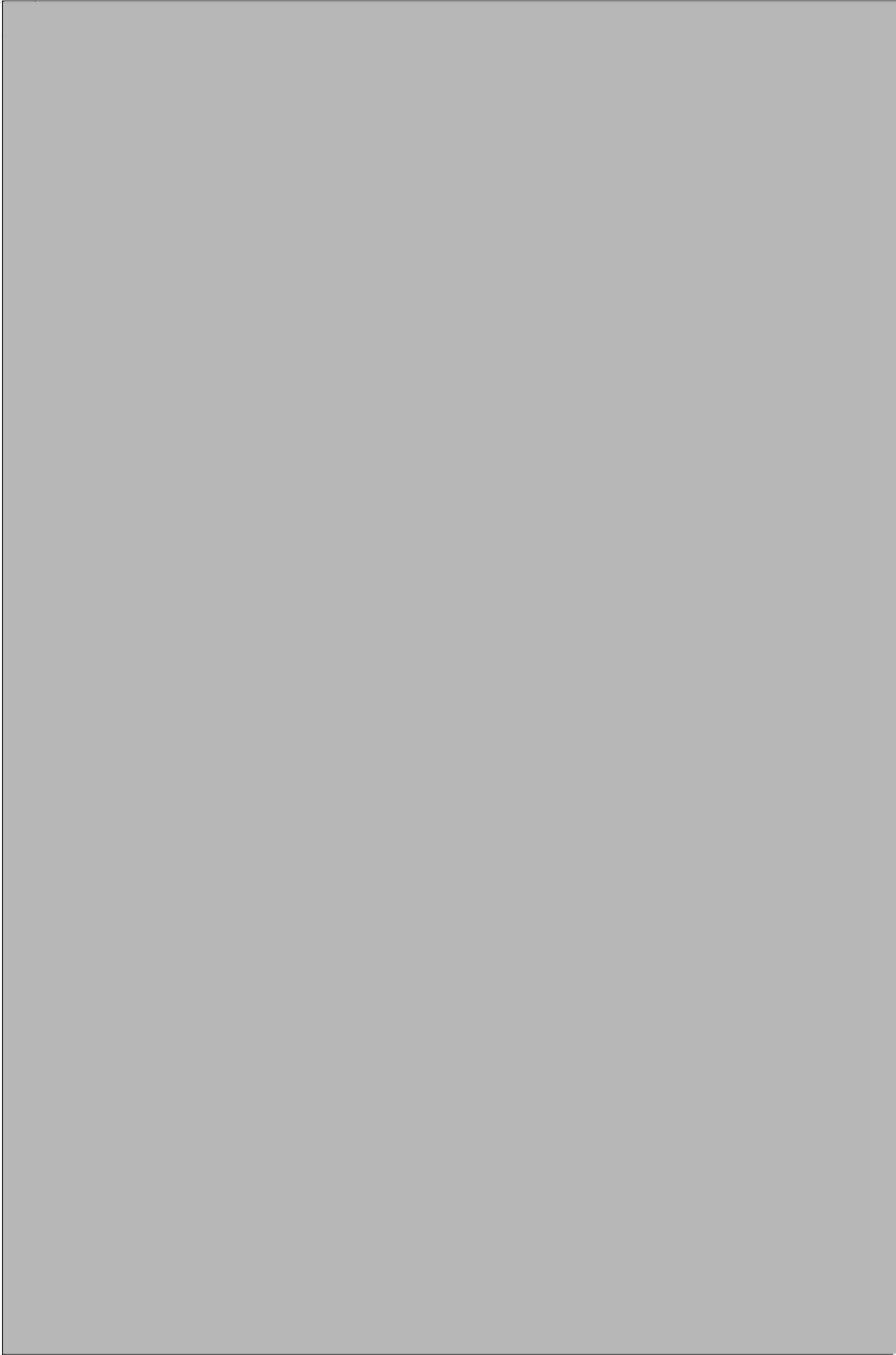


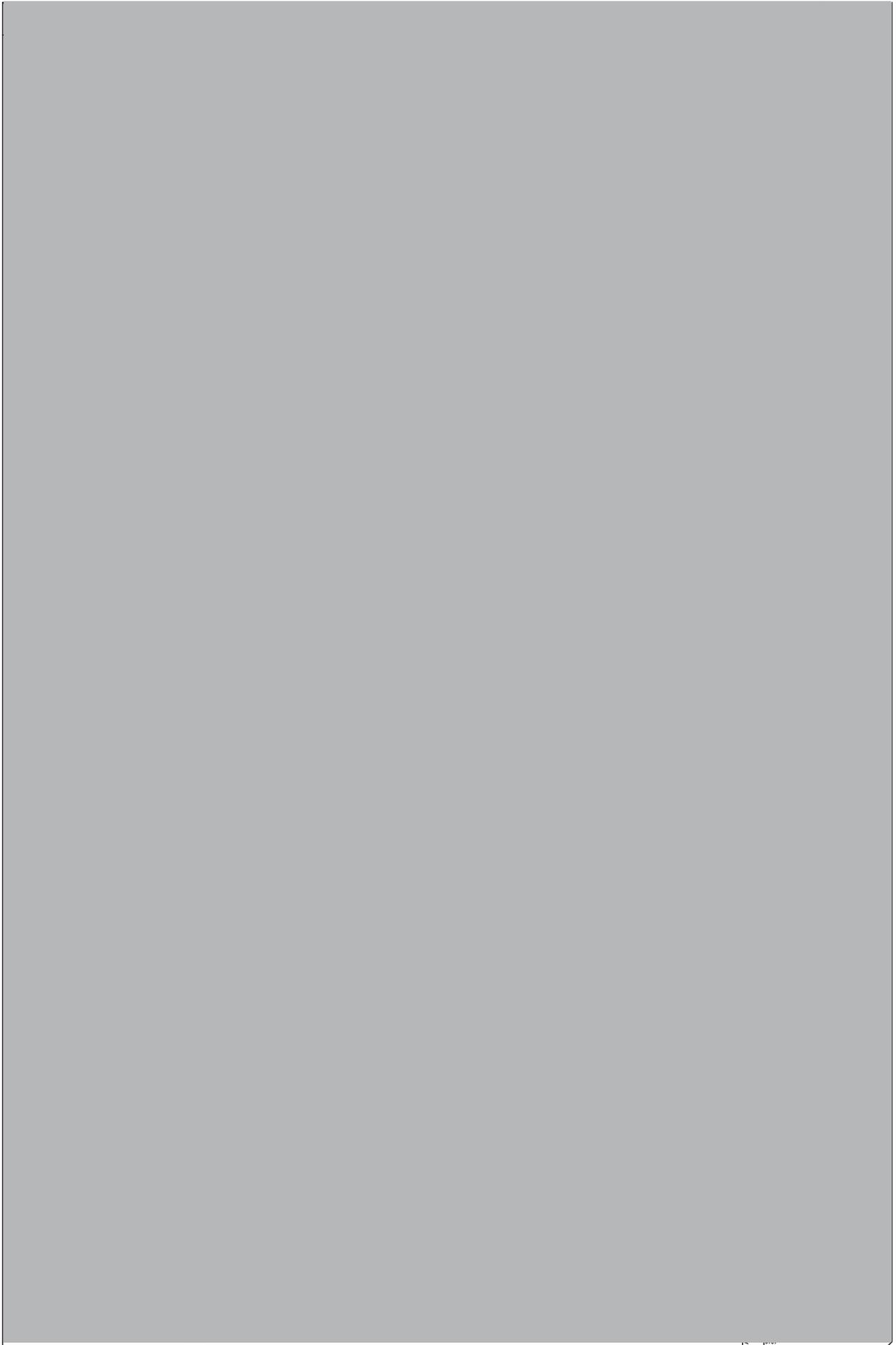


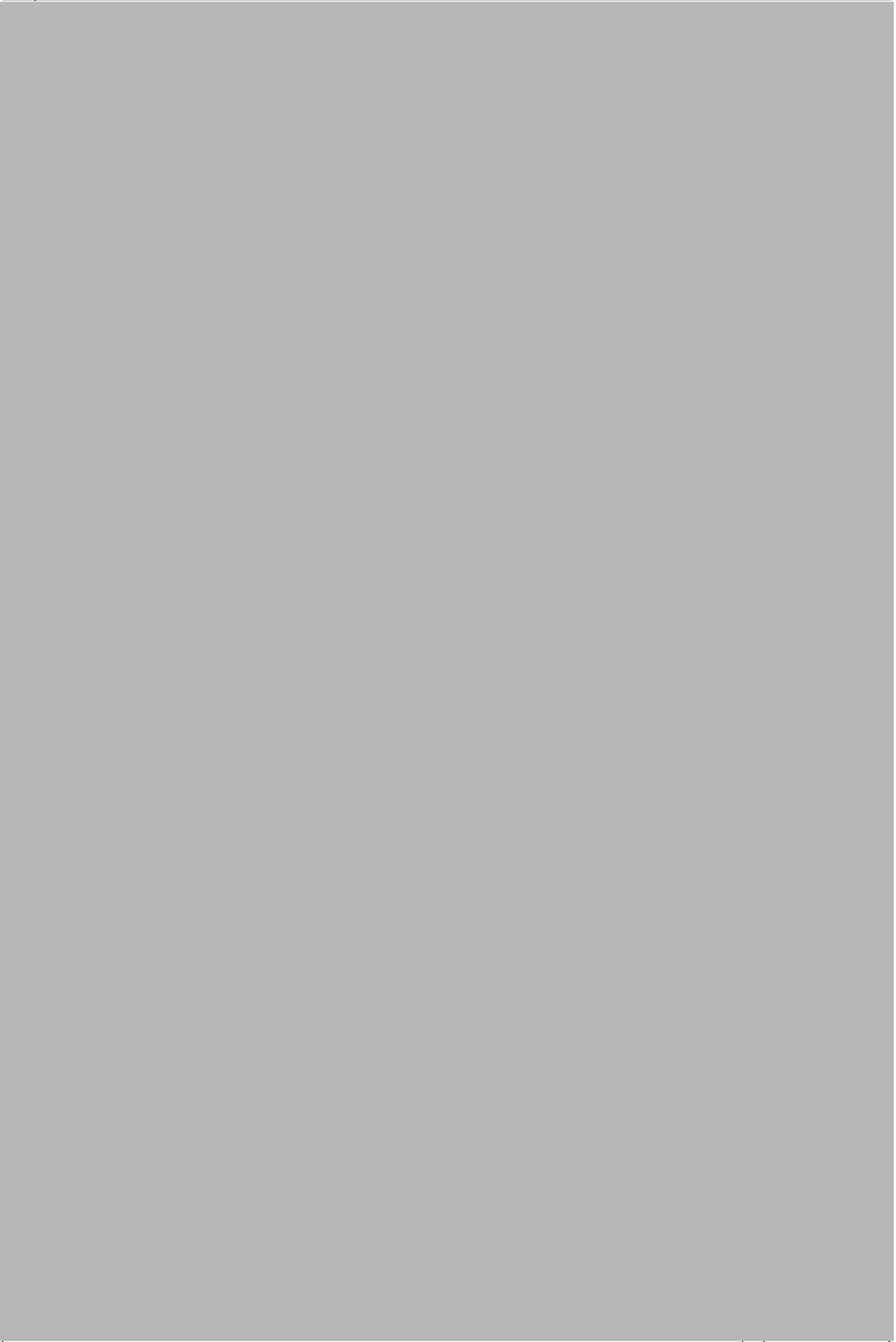






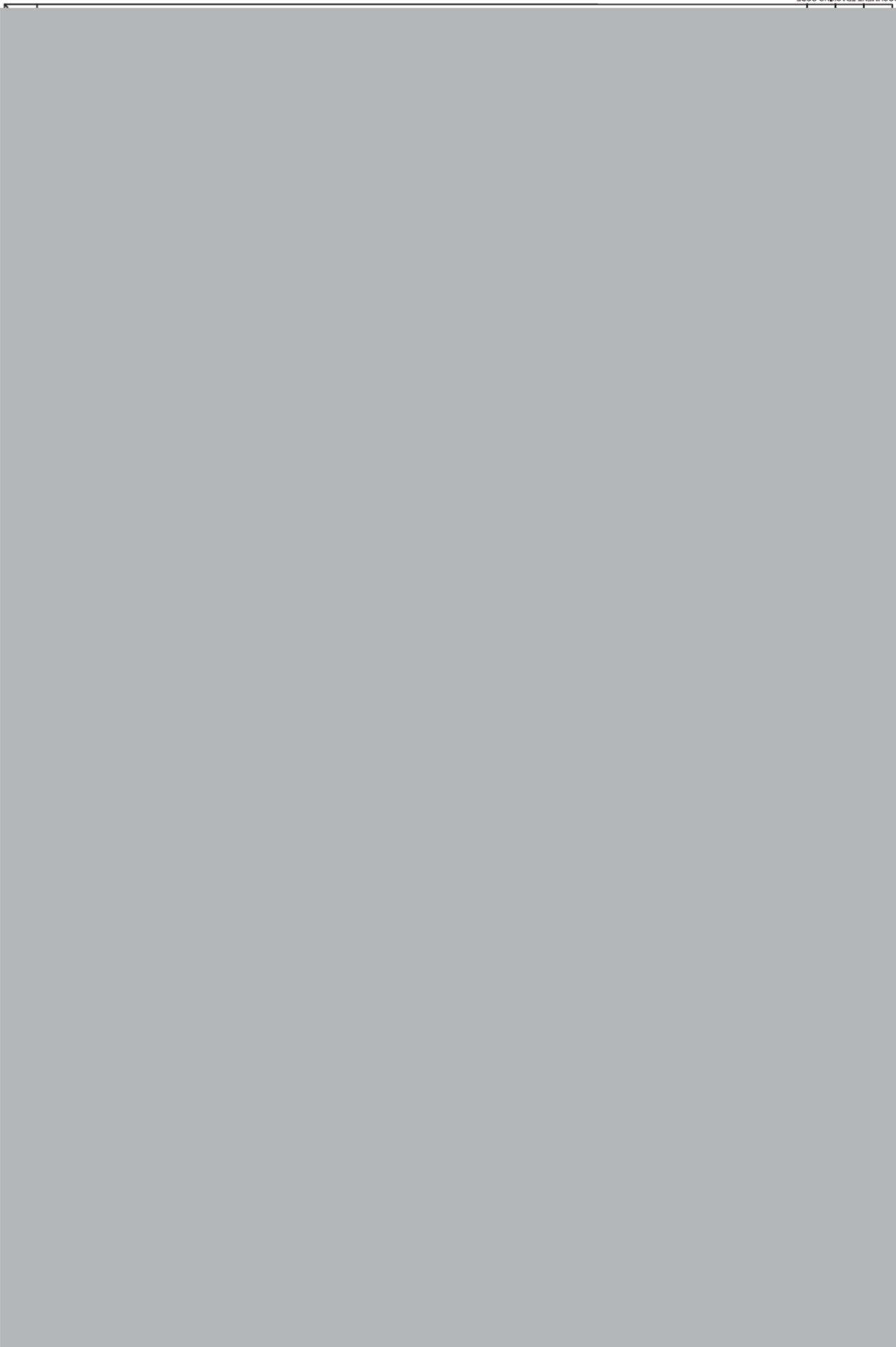






**Attachment F**  
**Debris Removal Depiction**

---



**Attachment G**  
**Turbidity Curtain Detail**

---

# AREA 01 - TIMBER PILE CAP TURBIDITY CONTROLS

1. CRANE BARGE DEPLOYS CAT 336 EXCAVATOR WITH 10' ROCK SAW ONTO EXCAVATOR WORKING PLATFORM
2. EXCAVATOR ALIGNS TO THE PILE CAP AND MAKES CUT IN DESIGNATED LOCATION



NOTES:  
1. Full Depth turbidity controls required for all in water foundation work in Area 01

APPROVED BY:	APPROVED ON:
SIGNATURE:	SIGNATURE:
STAMP:	STAMP:

# AREA 02 - TIMBER PILE CAP TURBIDITY CURTAIN

1. CRANE BARGE DEPLOYS CAT 336 EXCAVATOR WITH 10' ROCK SAW ONTO EXCAVATOR WORKING PLATFORM
2. EXCAVATOR ALIGNS TO THE PILE CAP AND MAKES CUT IN DESIGNATED LOCATION



APPROVED BY:	APPROVED ON:
SIGNATURE:	SIGNATURE:
STAMP:	STAMP:



ALTERED ON:	APPROVED ON:
SIGNATURE:	SIGNATURE:
STAMP:	STAMP:

SEQUENCE NOTES:

1. MOVE W/CAT 374 (OR EQUAL) TO 2+' MATERIAL ADJACENT TO SHEETS AT RIVER BOTTOM, TO PROVIDE TORCH CUTTING
2. DIVE CREW LAYOUT AND TORCH CUT SHEET PILE
3. HOE RAM CONCRETE AT TOP OF SHEETS FOR VIBRATOR FIT UP
4. VIBRATE OUT CUT SHEETS AND LOAD ON SCRAP BARGE



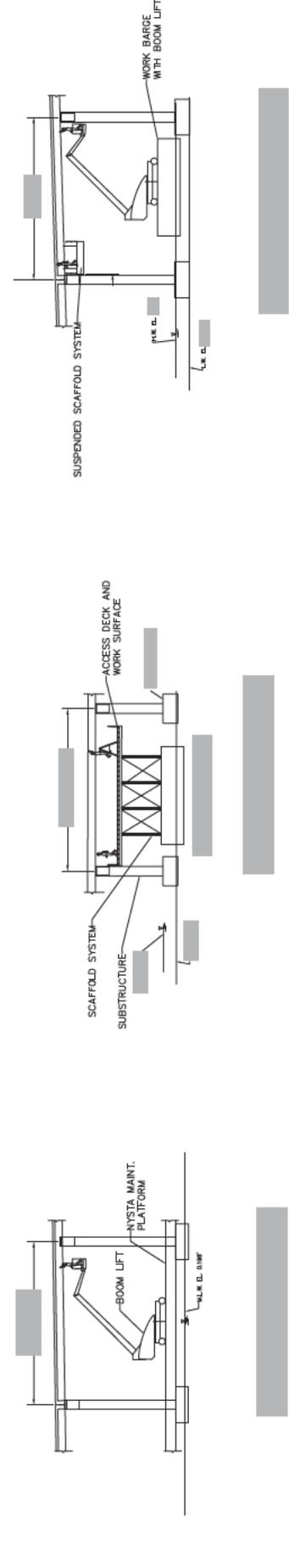
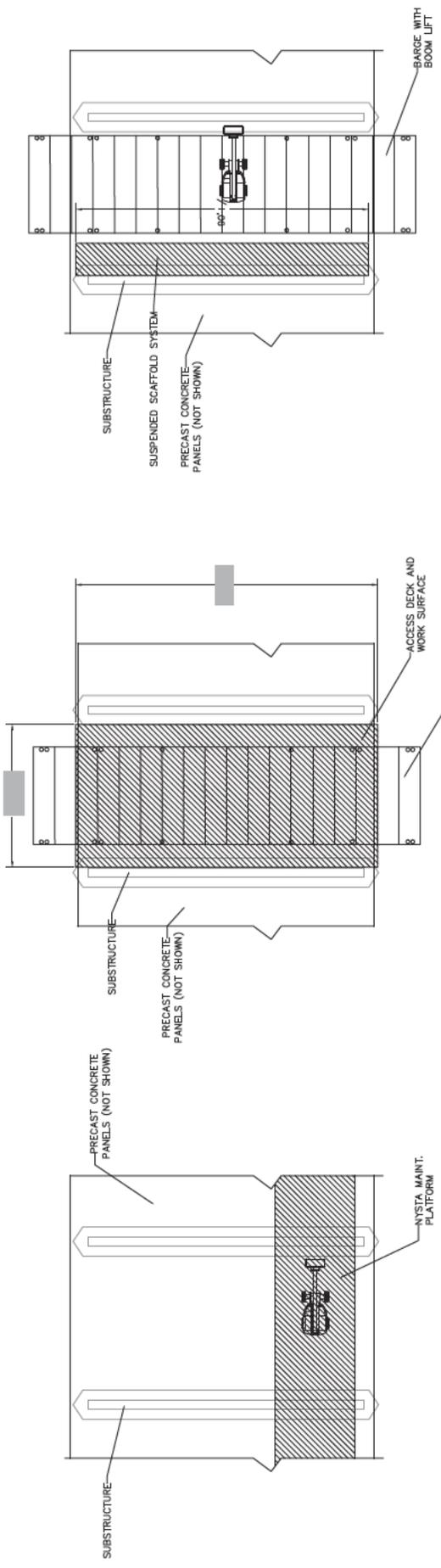
<p>ALTERED ONE</p> <p>APPLIED ONE</p>	<p>SHOW NAME</p> <p>SHOW NAME</p>
---------------------------------------	-----------------------------------

**Attachment H**  
**Debris Containment**

---

# Tappan Zee Demolition - Area 1B & 2 Deck Removal Containment

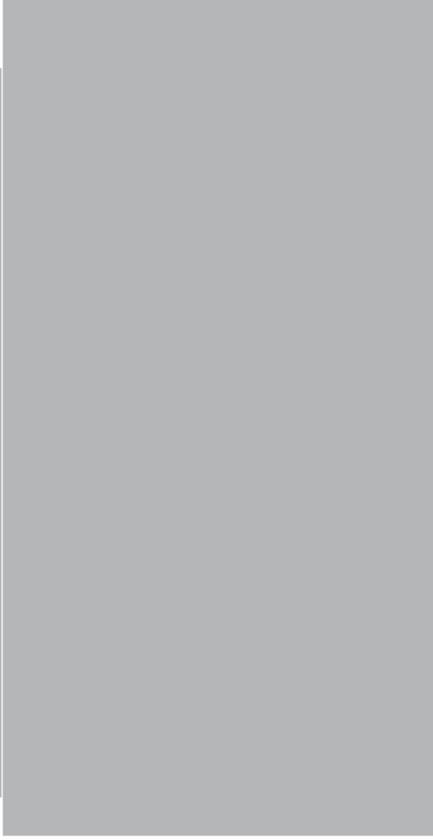
X  
000



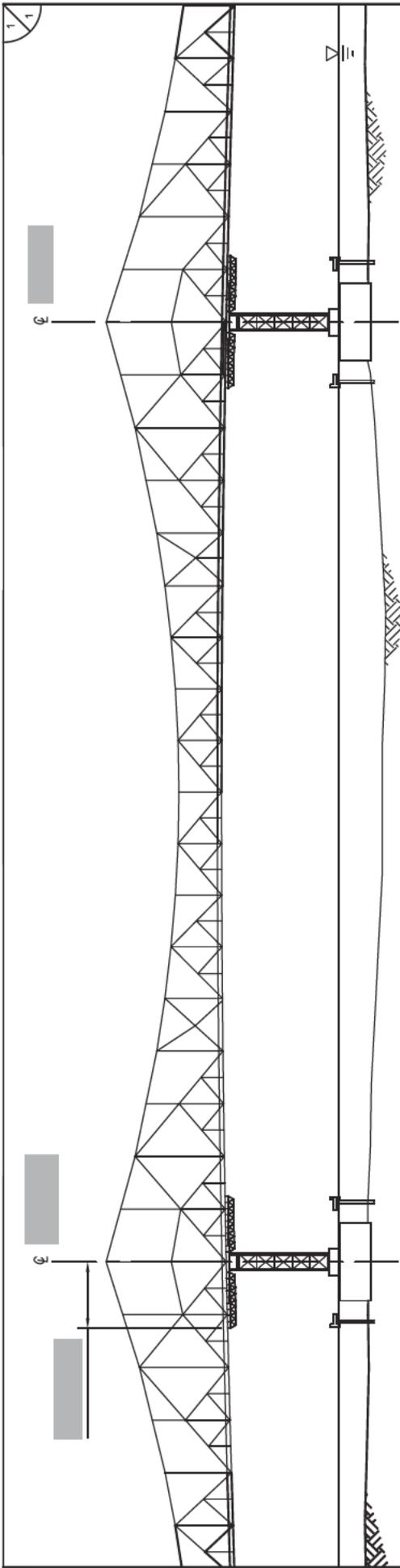
ALTERED ON:	APPROVED ON:
SIGNATURE:	SIGNATURE:
STAMP:	STAMP:

*Tappan Zee Demolition – Area 03 Deck Removal Containment*

SUBMITTED BY: TZC – LLC



FILED ON:	AFFID ON:
SIGNATURE:	SIGNATURE:
STAMP:	STAMP:



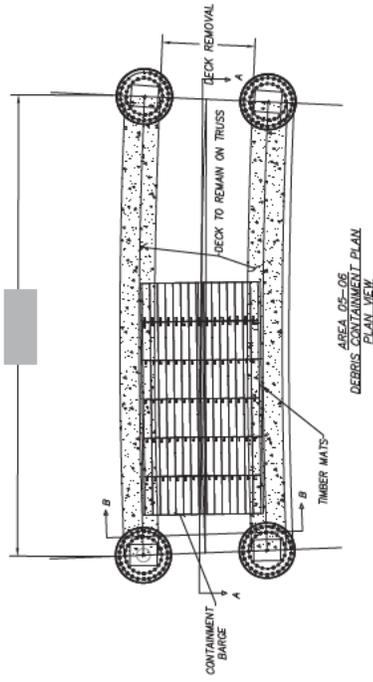
SIGNATURE: \_\_\_\_\_  
 STAMP: \_\_\_\_\_

Tappan Zee Demolition - Area 4 Deck Removal Containment



# Tappan Zee Demolition – Area 05–06 Deck Removal Containment

SUBMITTED BY: TZC – LLC



ALTERED ON:	AFFIDED ON:
REVISIONS:	SIGNATURE
STAMP:	STAMP: