



Bucket Elevator

600, 800 and 1200 Series Models



Owner/Operator's Manual and Installation/Maintenance Guide

NORSTAR INDUSTRIES LIMITED WARRANTY

Norstar Industries expressly warrants each new Bucket Elevator to be free from defects in material and workmanship under normal use and service for a period of one year after delivery to the original retail purchaser or first user of the product.

Norstar Industries Bucket Elevators are designed for free flowing materials and are not warranted for other distribution or substances. Other use will void the warranty.

Our obligation under this warranty is limited to repairing and/or replacing, at our option, any part or parts within the applicable one year period, as set out above, which shall be returned by the owner to any authorized dealer or to the factory and which upon examination shall prove to be defective. Labour costs associated with the replacement or repair of the Bucket Elevator is not covered by the Manufacturer.

We may, as an option, elect to grant adjustments in the field through an authorized representative and may thereby elect to waive the requirement that parts be returned to our factory.

A new warranty period is not established for replacements. Replacements are warranted for the remaining portion of the one-year original warranty period.

The provisions of this warranty do not apply to any product or parts, which have been subject to misuse, negligence or accident, or which have been repaired or altered outside of the manufacturer. Neither does this warranty apply to normal maintenance service and parts, or to normal deterioration due to wear and exposure.

The Manufacturer shall not be liable for any consequential or special damage which any purchaser may suffer or claim to suffer as a result of any defect in the product. "Consequential" or "special damages" as used herein include, but are not limited to, lost or damaged products or goods, costs of transportation, lost sales, lost orders, lost income, increased overhead, labour and incidental costs and operational inefficiencies.

The foregoing is in lieu of all other warranties, expressed or implied, including any warranty of merchantability is expressly excluded.

**WARRANTY VOID IF NOT REGISTERED
WITHIN 30 DAYS OF PURCHASE DATE**

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Support Information

Norstar Industries products are designed for **free flowing** materials. **Using this equipment for any other purpose or in a way not within the operating recommendations specified in this Manual will void the Warranty and may cause injury or death.** This Manual is designed to provide comprehensive planning and construction information for the Norstar Industries product. The Table of Contents provides a convenient overview of the information in this Manual.

Please keep this Manual in a clean, dry place for future reference.

NORSTAR INDUSTRIES BUCKET ELEVATOR

WARRANTY REGISTRATION FORM & INSPECTION REPORT

WARRANTY REGISTRATION

This form must be filled out by the dealer and signed by, both, the dealer and the customer at the time of delivery.

Customer's Name _____ Dealer's Name _____

Address _____ Address _____

City, Prov/State, Code _____ City, Prov/State, Code _____

Phone Number (____) _____

Elevator Model _____

Delivery Date _____

DEALER INSPECTION REPORT

SAFETY REPORT

- All Sections/Fasteners Tightened
- Oil in Gearbox(s)
- Lubricate Machine
- Belting Tight and Secure

- Belt Guard Installed
- All Decals Installed
- Review Operating and Safety Instructions

Form must be completed with dealer inspection and signature as well as owner's signature. By not completing the form, you may be voiding the warranty.

I have thoroughly instructed the buyer on the above described equipment which review included the Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date _____ Dealer's Rep. Signature _____

The above equipment and Operator's Manual have been received by me and I have been thoroughly instructed as to care, adjustments, safe operation and applicable warranty policy.

Date _____ Owner's Signature _____

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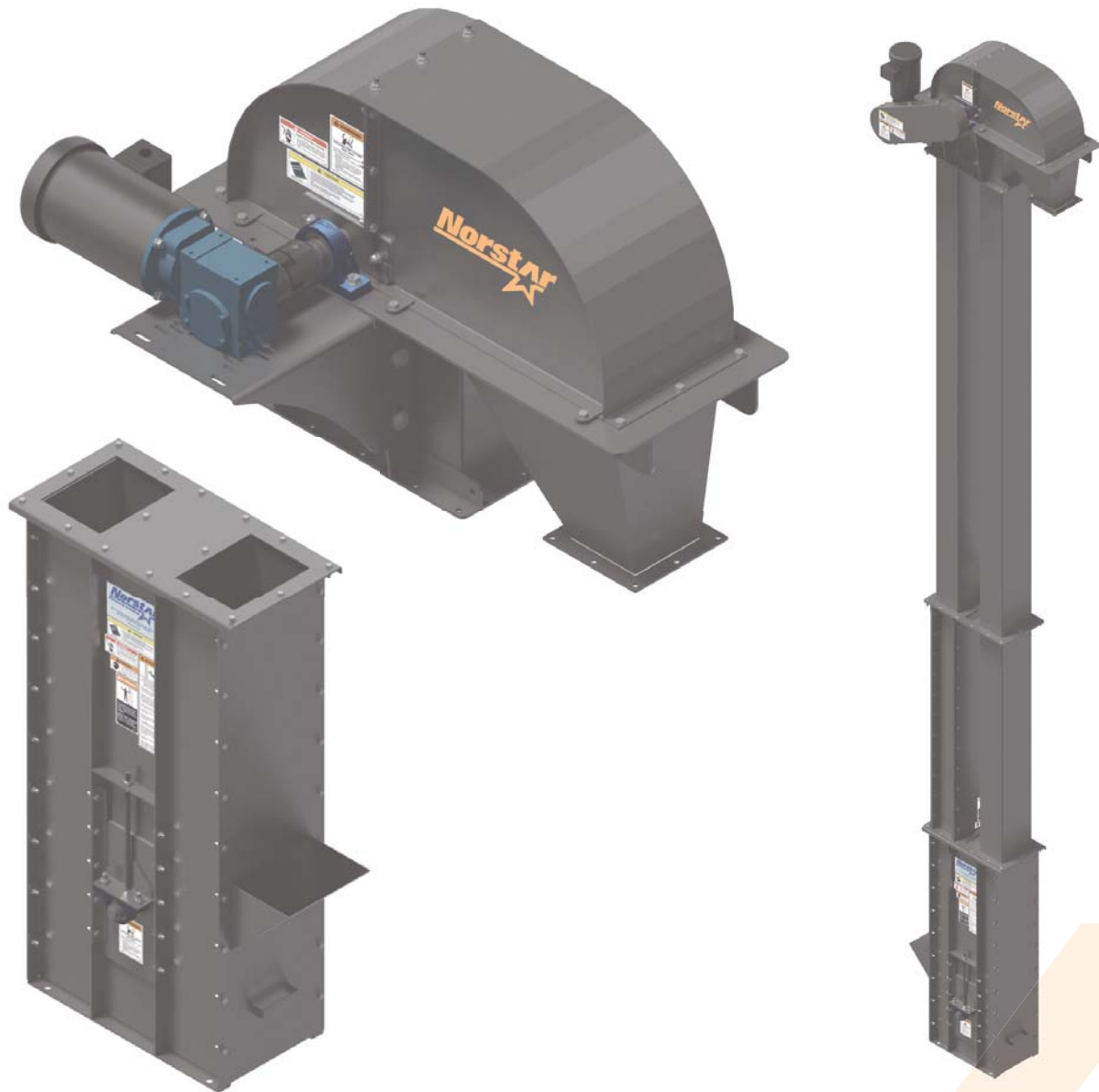
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Introduction

Congratulations on your purchase of a Norstar Industries Bucket Elevator to complement your grain handling and storage system. This equipment has been designed and manufactured to meet the needs of the farm and commercial users for the efficient cleaning out of grain bins.

Safe, efficient and trouble free operation of your Bucket Elevator requires that you and anyone else who will be operating or maintaining the Bucket Elevator, read and understand the Safety, Operation, Maintenance and Troubleshooting information contained within the Operator's Manual.



This manual covers the 6, 8 and 12 inch Bucket Elevators distributed by Norstar Industries. Use the Table of Contents to find specific information.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Norstar dealer or distributor if you need assistance, information or additional copies of the manual.

OPERATOR ORIENTATION - The directions left and right, as mentioned throughout the manual, are as seen when standing facing the Bucket Elevator Head discharge.

About This Manual and Your Shipment

The purpose of this manual is to help in the following areas regarding your Norstar Industries Bucket Elevator.

- Instructions for safe installation, operation and maintenance
- Step-by-step installation procedures
- Easy reference if you have questions in a particular area
- Parts identification



It is important to read all instructions in this Manual, carefully, BEFORE starting the installation. Particularly, pay attention to all safety information on pages 10-20 of this Manual

Unsafe practices could result in equipment damage and serious injury or death. Failure to read this Manual is considered a misuse of the equipment.

Warranty information is included on the inside front cover of this Manual.

Definition of Terms and Pictures

- “Front,” “rear/back,” and “top” refer to the Bucket Elevator as it is standing.
- The directions left and right, as mentioned throughout the manual, are as seen when standing facing the Bucket Elevator Head discharge.
- Names of components and parts have been capitalized throughout the Manual (i.e. Trunking, 1/2” Nylon Locknut) to call attention to them in the installation.
- Some Guards have been removed from the pictures for illustrative purposes only. Figures/Illustrations may vary slightly from actual models.
- An asterisk (*) and arrow/line may be used in an image to reference a particular hole or position mentioned in the accompanying text.

Identification of Parts and Hardware

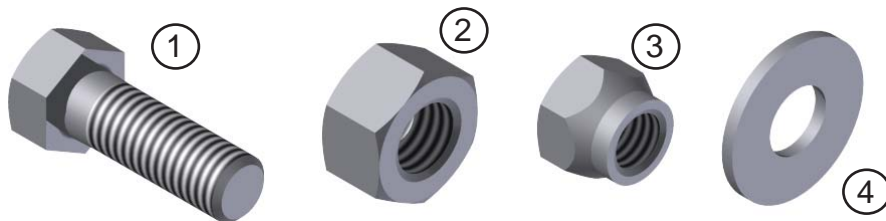


IMPORTANT! No hardware substitutions are permitted unless noted.

Diagrams are provided throughout the Manual to identify Parts and Hardware used in that application. Parts and basic components are identified in Figures and their accompanying Tables as “Items” with a black number in a white circle. A Description field will accompany the item number to aid in identifying a component. When necessary, quantities of items may be listed in the instructions. When this occurs, quantity will be listed as a word followed by a bracketed letter or number (i.e. A, B, two (2), three (3)).



IMPORTANT! ALL NUTS & BOLTS USED ARE GRADE 5 UNLESS OTHERWISE STATED!



Item	Description
1	1/2" x 1 1/2" Bolt
2	5/8" Hex Nut
3	1/2" Nylon Locknut
4	1/2" Flatwasher

**Figure 1
Hardware Identification**

Measurements

The symbol (") equals inches and (') equals feet in English measurements. Metric measurements, in millimeters, may be shown in italics and square brackets following.

For example: 15' [4 572] 90' [27 542]

Metric equivalents are not always repeated throughout the Manual.

Inspect Your Bucket Elevator Shipment

Be sure to check all components and assemblies to your packing slip, ensuring that all components are present. Any discrepancies should be taken care of immediately. If any components are missing or damaged in transit, a claim should be filed or the issue reported to the carrier as soon as possible. Norstar Industries' responsibility for damaged equipment ends with your acceptance of the delivery. It is recommended to save all paperwork and documentation with any of the elevator components.

Your Bucket Elevator shipment should include all the assemblies in **Figure 2**:

1. Head Assembly
2. Trunking (quantity varies according to elevator height)
3. Boot Assembly
4. Service Trunking
5. Parts Box
6. other



IMPORTANT! The Serial Number Sticker is located below and to the right of the Gearbox Shaft the Head Section.

PICTURE COMING SOON

Figure 2
Shipment Parts Identification

If your Bucket Elevator requires a Ladder Package, the following items from **Figure 3** will/may be included:

1. Head Platform Assembly
2. Ladder Section (quantity varies according to elevator height)
3. Platform Trunking
4. Rest Platform
5. Head Platform Ladder
6. Bottom Ladder
7. Parts Box/Bolt Package Box

PICTURE COMING SOON

Figure 3
Ladder Shipment Parts Identification

Tools and Equipment Needed for Installation

- Safety Glasses
- Steel-toe safety shoes
- Gloves
- Hard Hat
- Forklift truck (to lift components)
- Crane/Hoist (to lift/raise components)
- Wrench Set
- Ratchet Set
- Air Ratchet
- Impact Wrench
- Deepwell Sockets
- Shallow-well Sockets



CAUTION! *Inventory all tools and pieces of hardware near the Construction Site during installation or servicing. Tools lost in the Bucket Elevator may cause damage or injury at a later time. Use the proper tools to prevent injury.*

Safety

Recognize SAFETY Information



This is the Safety-Alert Symbol. When you see this symbol on your equipment or in this Manual, be alert to the potential for personal injury.

Signal words **DANGER**, **WARNING**, or **CAUTION**, are used with the Safety-Alert Symbol.

Be sure to follow **all** National and Local SAFETY Standards governing each installation site.



This is the Attention-Alert Symbol. When you see this symbol in this Manual, be alert to information that could be pertinent to the Safety of personnel or the Operation of the Equipment.

Signal words **IMPORTANT** or **ATTENTION** are used with the Attention-Alert Symbol.

Be sure to follow all notices during the installation and operation of your equipment.

Understand Signal Words



DANGER indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.



CAUTION indicates a general hazardous situation which, if not avoided, **MAY** result in minor or moderate injury.



ATTENTION or **IMPORTANT** indicates vital information or instructions, highly recommended and/or pertinent, for the safe installation or operation of your equipment.



ATTENTION! Work Site Contractor, Installer, Owners, Operators: Read and Follow This Manual - Especially This SAFETY Section!

Do NOT operate this equipment before reading and understanding this Operations Manual. For operation, maintenance and servicing of your Bucket Elevator, read and understand this Manual. Untrained operators subject themselves and others to serious risks. Read and follow all precautions and recommended SAFETY practices. Failure to read this Manual by owners, operators and supervisors is a misuse of the equipment and could result in death, serious injury, and/or equipment damage.

Read this Manual carefully before servicing or repairing! This Manual is supplementary to any law or code covering fire or health regulations.

It is the **responsibility** of the Contractors, Installers, Operators, Owners and Supervisors to:

- Read this Manual, SAFETY Instructions, and SAFETY Decals herein
- **Know** proper operating precautions, practices and requirements to comply with all federal, state/provincial and local laws and ordinances and applicable safety codes
- **Make the above known** to all who may work with the equipment or be in the working area.

Keep this Manual in a safe, dry place where the Bucket Elevator Operator can easily obtain it. Contact your Norstar Industries Dealer or Norstar Industries to replace this Manual should it become lost or damaged.

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Safety

Introduction to Safety

YOU are responsible for the **SAFE** operation and maintenance of your Norstar Industries Bucket Elevator. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Bucket Elevator be familiar with the operation and maintenance procedures and related **SAFETY** information contained in this Manual. This Manual will take you step-by-step through your working day and alert you to good safety practices that should be adhered to while operating the Elevator.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this equipment is familiar with the recommended operating and maintenance procedures and follows all the safety precautions. Most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Bucket Elevator owners must give operating instructions to operators or employees before allowing them to operate the machine, and at least annually thereafter per OSHA (Occupational Safety and Health Administration) regulation 1928.57.
- The most important safety device on this equipment is a **SAFE** operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the Manual and to follow them. All accidents can be avoided.
- A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to possible serious injury or death.
- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety, could affect the life of the equipment, and will void the warranty.
- Think **SAFETY!** Work **SAFELY!**

General Safety

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, adjusting or unplugging the Bucket Elevator.
2. Only trained, competent persons shall operate the Elevator. An untrained operator is not qualified to operate the machine.
3. Wear appropriate protective gear. This list includes but is not limited to:



Hard Hat



Protective Eye-wear



Protective Foot-wear



Hearing Protection



Work/Heavy Gloves



Respirator or Filter Mask

4. Have a first-aid kit available for use should the need arise and know how to use it.
5. Do not allow children, spectators or bystanders within the hazard area of the machine.
6. Stop the motor, turn off all controls and wait for all moving parts to stop before servicing, adjusting, repairing, or unplugging the machine.
7. Establish a **Lock-out Tag-out** policy for the work site. Be sure all personnel are trained in and follow all procedures.
8. Review safety related items annually with all personnel who will be operating or maintaining the Elevator.

Safety

9. Feed/Grain openings for shovel, front loaders or other manual/mechanical equipment should be covered by a grating. In the case that a grating cannot be used, the exposed section of the Bucket Elevator should be guarded by a railing or fence with a warning sign posted.
10. Do not place hands, feet, or any part of your body into the Bucket Elevator while it is running. Long hair should be tied back and loose clothing should not be worn in close proximity to any moving components on the Bucket Elevator.
11. Do not walk on Bucket Elevator covers or guards.
12. Do not poke or prod material in the Bucket Elevator with a bar or stick inserted through the openings.

Operation Safety

Refer also to the Operation section on Page 79 of this Manual.

Norstar Industries Bucket Elevators are built with your Safety in mind. However, accidents can happen with improper installation or use.

Anyone who will be operating or working around this equipment should be trained in the proper operational and safety procedures required. It is recommended to read and understand the Operator's Manual and all safety signs before using the equipment. Only Operators completely familiar with both the Bucket Elevator and this Manual and its Safety/Operational practices should be permitted to operate this Bucket Elevator. Always operate the Bucket Elevator in accordance with the instructions in this Manual and Bucket Elevator Safety Decals.

Always ensure that all covers and guards are in place and secured on the Bucket Elevator before operation.



WARNING! Do NOT attempt to clear a Bucket Elevator jam until power has been LOCKED OUT.



DANGER! If the Bucket Elevator is to be opened for inspection, cleaning, servicing, adjusting or observation, all Bucket Elevator motors are to be LOCKED OUT electrically in such a way that they CANNOT be restarted by anyone remote from the area. If applicable, eliminate all sources of stored power to ensure that no components will move while being without main power.

Never operate the Bucket Elevator if intoxicated or under the influence of alcohol or drugs.

Any worker who is tired and/or under pressure is more apt to have an accident. Give extra breaks and/or varied jobs to all workers. If necessary, delay operation of this equipment until the Operator is adequately rested.

Never start the Bucket Elevator until all persons are clear of the equipment.

Make certain a **qualified operator** is in attendance at all time while the Bucket Elevator is operating. Never leave the Bucket Elevator running unattended.



CAUTION! Under no circumstances should horseplay be permitted near the Bucket Elevator. Do not run around or climb on the Bucket Elevator. To do so may cause injury.

Schedule and maintain a Safety training and operations program for all Bucket Elevator Operators. All Operators should perform periodic reviews of those procedures. Initially, and periodically thereafter, insist that all operating personnel review the Safety sections of this Manual.

Do not adjust, service, lubricate, clean, unclog or move this equipment while in operation.

The Norstar Industries Bucket Elevator is not manufactured or designed to handle materials that are hazardous. Hazardous materials are those that are explosive, flammable, toxic or otherwise dangerous to personnel if they are not completely and thoroughly contained in the Bucket Elevator. Do not overload the Bucket Elevator or use it for anything except its intended use. The Bucket Elevator is designed for free flowing, dry materials. Using the machine for any other purpose may break or damage the Bucket Elevator.

Bucket Elevator equipment shall be used to convey only the specified commodities or materials within the rated capacity and the rated speed. Where special use is not indicated, or ratings are not available, good industry practice shall be used.



WARNING! Using this equipment for any other purpose or in a way not within the operating recommendations specified in this Manual will void the Warranty and could cause injury or death.

Safety

Maintenance Safety



DANGER! Use extreme **CAUTION** around electrical components. Always shut off, disconnect and **LOCK OUT** and **TAG OUT** all power before adjusting, servicing, cleaning, repairing or doing any maintenance on the Bucket Elevator. If applicable, eliminate all sources of stored power. Failure to follow these instructions will result in death or serious injury.

Review the Operator's Manual and all safety items before working with, maintaining or operating the Elevator.

Follow good shop practices. Keep the service area clean and dry. Be sure electrical outlets and tools are properly grounded. Use adequate light for the job at hand.

Visually inspect the Elevator prior to operation. Correct any hazardous situation. Repair any faulty equipment.

Use suitable precautionary measures when repairing or replacing equipment parts to prevent injury.

Ensure that motors are operating at the proper speed.

Mount controls for any electric motor at a convenient place, at a safe distance from the machine. Make sure controls are readily accessible in the event of an emergency.

Schedule and keep a Maintenance Checklist to ensure optimum Bucket Elevator operation.

Before resuming work, install and secure all guards when maintenance work is completed.



IMPORTANT! Refer to the more detailed Maintenance section in Pages 80-82 of this Manual.

Bucket Elevator Area Safety

Entrance to **enclosed areas** may expose persons to operational or environmental hazards and should only be entered by authorized personnel with proper safety equipment. Provide adequate fencing and security of restricted areas. Prohibit untrained personnel, visitors, and children from entering the Bucket Elevator area. Designate a **SAFETY Zone** for unauthorized personnel or visitors.

Bucket Elevator Ladders should be closed off/locked to prevent unauthorized access.

Keep children and other unqualified personnel out of the working area at **all times**.

Post signs, clearly, in areas where there are points of **access**.

Be sure the designated area is clear before turning power on to the Bucket Elevator.

Proper Wiring by Qualified Electricians

DANGER! All electrical wiring should be done by a Qualified Electrician.



Use extreme Caution around electrical components. Your Installer should have your electric company check the transformer and lead wires. Be sure the wires are an adequate gauge to carry the load of your Bucket Elevator's Motor, including starting and full load operating conditions. Failure to follow these instructions will result in death or serious injury.

Norstar Industries assumes no responsibility for the electrical wiring used with this Bucket Elevator. Norstar Industries will not be liable for failure of the Bucket Elevator because of improper electrical installation or use.

Motor overload protection, electrical disconnects and over-current protection are not supplied with the equipment.

IMPORTANT! In selecting Electrical Control Equipment to be used with any installation, the purchaser must use equipment conforming to applicable Local and National codes or regulations.



A **LOCK-OUT/TAG-OUT DEVICE** must be installed on Control enclosures containing hazardous voltage. This should be done at the time of the Bucket Elevator installation to prevent the machine from starting during a Safety check, maintenance, etc.

All electrical equipment must be **grounded**.

Safety

Install Emergency Start and Shut-off Devices

All Safety devices, including wiring of electrical devices, shall be arranged to operate such that a power failure or failure of the device itself will not result in a hazardous condition.

An **emergency shut-off** switch with power **LOCK OUT / TAG OUT provisions** must be provided at the Bucket Elevator Access points such as the Head Section viewports, the Service Trunking section, the Boot Section inlets, etc.



WARNING! *To prevent a hazardous condition, the machine **MUST** be prevented from restarting on its own after a power failure when power returns. Failure to follow this instruction could cause death or serious injury.*

Bucket Elevator controls shall be so arranged that, in case of Emergency Stop, manual reset or start at the location where the Emergency Stop initiated shall be required for the Bucket Elevator(s) and associated equipment to resume operation.



IMPORTANT! *It is the responsibility of the Contractor, Installer, Owner and Operator to supplement the Bucket Elevator furnished by Norstar Industries with any necessary electrical or structural items to make the Bucket Elevator installation comply with Local and Federal codes, laws and ordinances.*

Disconnect electrical power, LOCK OUT and TAG OUT power, BEFORE inspecting or servicing the Bucket Elevator.

Components supplied for the system but not manufactured by Norstar Industries, and added as a part of the Bucket Elevator system, are not the responsibility of Norstar Industries.

Determine the cause of stoppage before restarting the Bucket Elevator. The starting device shall be LOCKED OUT and TAGGED OUT before any attempt is made to remove the cause of the stoppage, unless operation is necessary to determine the cause or to safely remove the stoppage.

To ensure positive performance and minimum maintenance, it is the Manufacturer's recommendation that this equipment be observed by an operator during the complete unloading operation.

Routine inspections and corrective maintenance measures shall be conducted to ensure that all Guards and safety features are retained and function properly.

Personnel should be alerted to the potential hazard of entanglement in Bucket Elevators cause by items such as long hair, loose clothing, and jewelry.

Bucket Elevators shall not be maintained or serviced while in operation unless proper maintenance or service requires the Bucket Elevator to be in motion. In which case, personnel shall be made aware of the hazards and how the task may be safely accomplished.

Safety

Sign-off Form

Norstar Industries follows the general Safety Standards specified by the American Society of Agricultural Engineers (ASAE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or maintaining the Bucket Elevator must read and clearly understand ALL Safety, Operating and Maintenance information presented in this Manual.

Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information before the season start-up.

Make these periodic reviews of Safety and Operation a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

DATE	EMPLOYER'S SIGNATURE	EMPLOYEE'S SIGNATURE

Safety

Safety Decals



IMPORTANT! Along with your shipment will be DANGER, WARNING and CAUTION Decals which will be placed on the Bucket Elevator. Read and follow all Safety Decal information in this Manual. Confirm that all Safety Decals are in place and secure before operating the Bucket Elevator. To replace lost or missing Decals, contact your local dealer or Norstar Industries.

Safety information has been provided by the Manufacturer to help ensure the safe and proper use of this product. This Safety information has been placed on components throughout the structure to provide proper access and instruction to the user.

Ensure that Safety Decals are clean and legible at all times. Replace damaged or missing Decals immediately.

The following Safety Decals are located on the Bucket Elevator as shown in the Manual drawings.

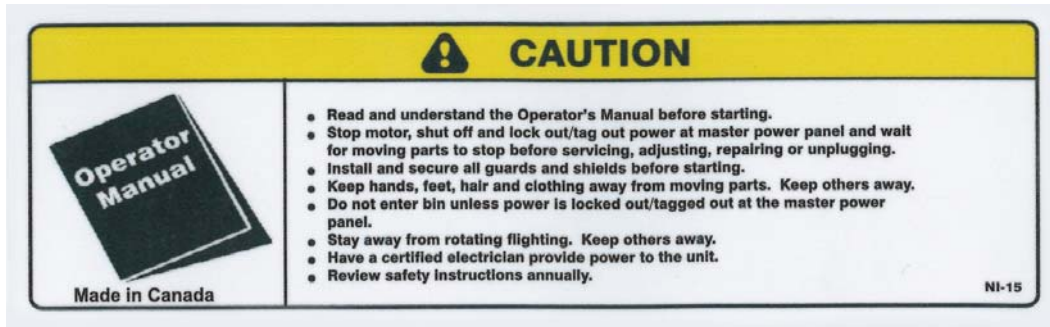


Figure 4
Operator's Manual
Decal NI-15

Operator's Manual

The Operator's Manual Decal NI-15 in **Figure 4** is located on the Top of the Belt Guard, the inspection side of the Head Section as well as on both sides of the Bucket Elevator Boot Section. It states some information found within this Manual, but, otherwise recommends to read and understand the information and instructions within the Manual before operating the machine.

Electrocution Hazard



DANGER! Use extreme Caution around electrical components. SHUT OFF, LOCK OUT and TAG OUT electrical power BEFORE inspecting or servicing the Bucket Elevator. Failure to do so will result in death or serious injury.

The Electrocution Hazard Decal NI-20 in **Figure 5** is located on the Top of the Belt Guard as well as on both sides of the Bucket Elevator Boot Section. In addition, this decal should be placed at any and all locations where there is potential exposure to electric power for the Bucket Elevator.



Figure 5
Electrocution Hazard Decal NI-20

Missing Guard Hazard



DANGER! Before starting or operating the machine, ensure that all guards or covers are in place and secure.

The Missing Guard Hazard Decal NI-17 in **Figure 6** is located inside the Belt Guard. Operation of the Bucket Elevator with Guards off exposes parts that could cause severe personal injury. DO NOT operate the equipment without these Guards properly secured.



Figure 6
Missing Guard Hazard Decal NI-17



IMPORTANT! If Safety Decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer

Safety

Exposed Buckets and Rotating Part Hazard



WARNING! DO NOT allow the Bucket Elevator to run while and adjustments are being made. SHUT OFF, LOCK OUT and TAG OUT all electrical power BEFORE working on or near the Bucket Elevator. Keep hands, feet, hair and clothing away from buckets and other moving parts. Failure to shut off, LOCK OUT and TAG OUT power to the Bucket Elevator could lead to personal injury or death.

The Exposed Bucket Decal NI-50 in **Figure 7** is located on both Bucket Elevator Head Section Access Panels, on both sides of the Bucket Elevator Boot Section, and on the bottom right corner of each Bucket Elevator Service Trunking Access Doors. This Decal should be placed at any location where Bucket Elevator buckets are exposed. A Decal should also be placed at feed/grain openings for shovel,

front loaders or other manual/mechanical equipment. Additionally, these areas should be covered by a grating. In the case that a grating cannot be used, the exposed section of the Bucket Elevator should be guarded by a railing or fence with a warning sign posted.



Figure 7
Exposed Buckets
Decal NI-50



Figure 8
Rotating Part Hazard
Decal NI-16

The Rotating Part Hazard Decal NI-16 in **Figure 8** is located on both sides of the Bucket Elevator Boot Section, above the two (2) bearings holding the Head Shaft, and on the top of the Belt Guard. This decal should, additionally, be placed at any location where there is a rotating or moving part that could cause injury or death.

Avoid contact with moving parts while the Bucket Elevator is in operation.

Never wear loose-fitting clothing or flowing scarves/jewelry around moving parts or equipment.

Flying Material Hazard



WARNING! Eye protection should be worn at all times when in proximity to the Bucket Elevator. Failure to wear protective equipment could result in serious injury.

The Flying Material Hazard Decal NI-28 in **Figure 9** is located on the inspection side of the Bucket Elevator Head Section, the bottom right corner of each Bucket Elevator Service Trunking Access Doors, as well as on both sides of the Bucket Elevator Boot Section. In addition, this decal should be placed at any and all locations where there is potential for flying material to make human contact.



Figure 9
Flying Material Hazard Decal NI-28



IMPORTANT! If Safety Decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer

Safety



Figure 11
Ladder Safety
Decal NI-27

Platform Safety

The Platform Safety Decal NI-26 in **Figure 10** is located on the inspection side of the Bucket Elevator Head Section. It is important not to exceed the weight restrictions. Failure to comply will result in serious injury or death. Additionally, this decal should be placed on the Bucket Elevator Trunking Sections at a Distributor Platform, if applicable.

Ladder Safety

The Ladder Safety Decal NI-27 in **Figure 11** is located on both sides of the Bucket Elevator Boot Section. It is important not to exceed the weight restriction. Failure to comply will result in serious injury or death.

Bucket Elevator Height Safety

The Height Safety Decal NI-25 in **Figure 12** Should be located on the inspection side of the Bucket Elevator Head Section. It is important to follow the instructions on this decal. Failure to comply will result in serious injury or death.



Figure 10
Platform Safety Decal NI-26



Figure 12
Falling From Heights
Decal NI-25



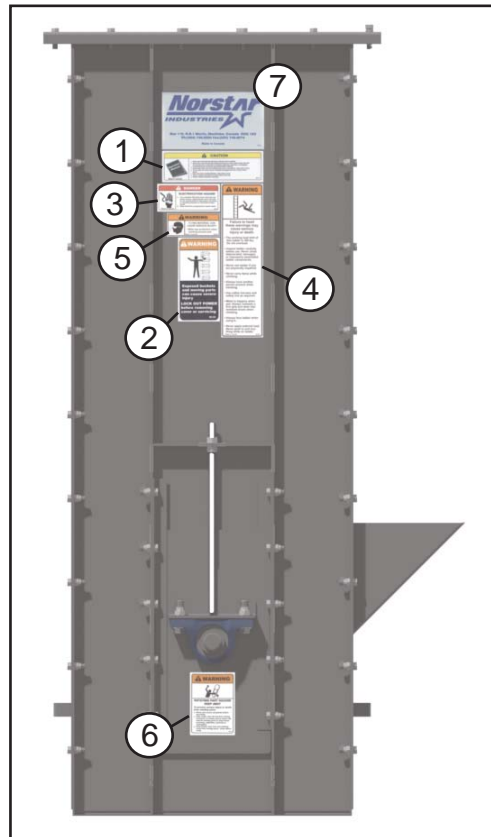
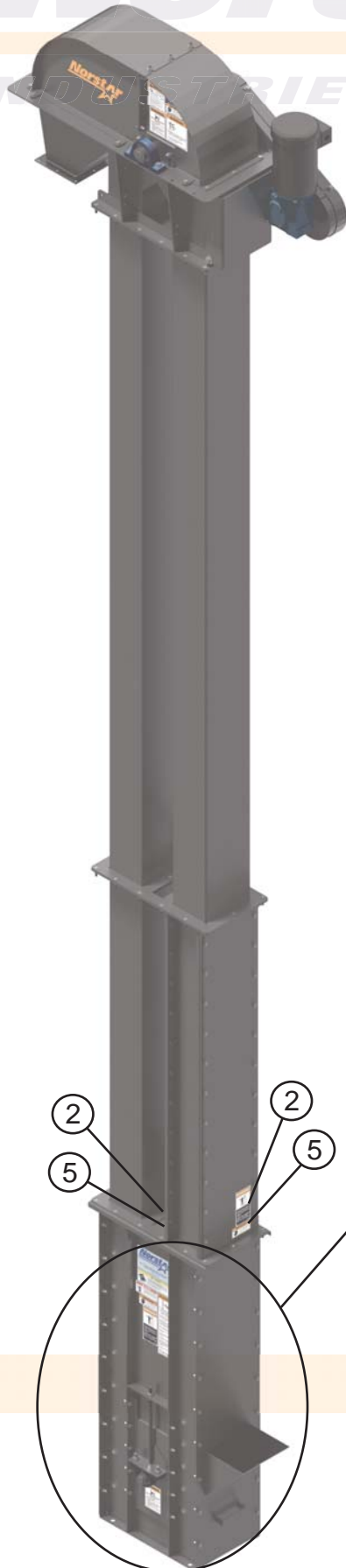
IMPORTANT! If Safety Decals have been damaged, removed, become illegible or parts replaced with-out decals, new decals must be applied. New decals are available from your authorized dealer

Safety

Safety Decal Placement



IMPORTANT! Check equipment for **WARNING, DANGER and CAUTION** decals and their proper placement, **BEFORE** equipment is operated. **NEVER** use equipment if signs are missing, hidden, improperly placed, damaged or altered. Keep them clean and grease-free. Contact your Norstar Dealer for replacements.



**Bucket Elevators without Ladder Packages will not have Decals pertaining to Ladders.*

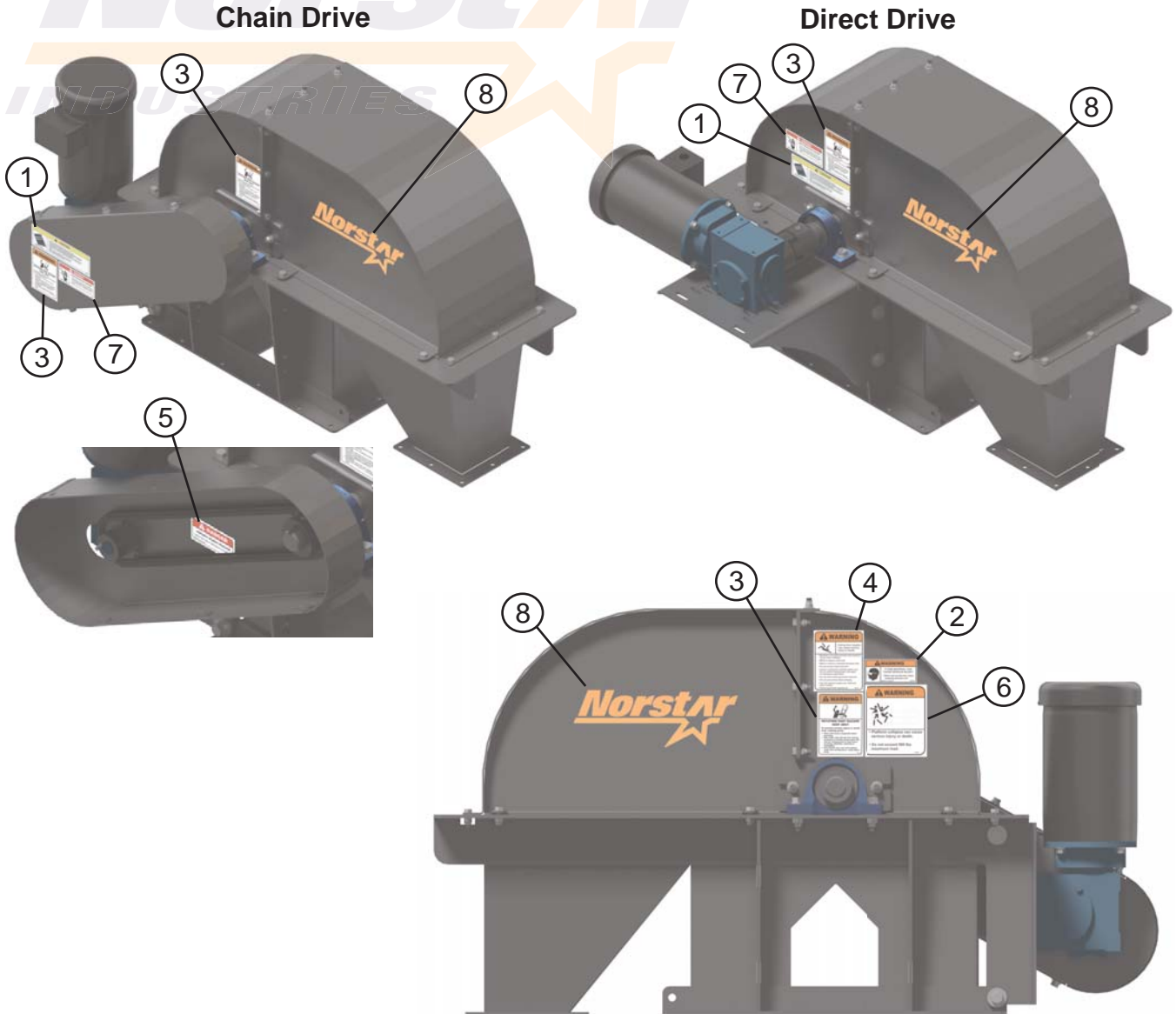
Item	Decal Description
1	CAUTION Read Operator's Manual NI-15
2	WARNING Exposed Buckets NI-50
3	DANGER Electrocutation Hazard NI-20
4	WARNING Ladder Safety NI-27
5	WARNING Flying Material Hazard NI-28
6	WARNING Rotating Part Hazard NI-16
7	Norstar Information Decal NI-30

Figure 13
Boot and Trunking Decal Locations



IMPORTANT! If Safety Decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer

Safety



**Bucket Elevators without Ladder Packages will not have Decals pertaining to Ladders or Platforms.*

Item	Decal Description
1	CAUTION Read Operator's Manual NI-15
2	WARNING Flying Material Hazard NI-28
3	WARNING Rotating Part Hazard NI-16
4	WARNING Falling from Heights NI-25
5	DANGER Missing Guard Hazard NI-17

Item	Decal Description
6	WARNING Platform Safety NI-26
7	DANGER Electrocutation Hazard NI-20
8	Norstar Decal NI-01


 8" Head Section is pictured.
Actual decal orientation may differ.

Figure 14
Head Decal Locations



IMPORTANT! If Safety Decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer

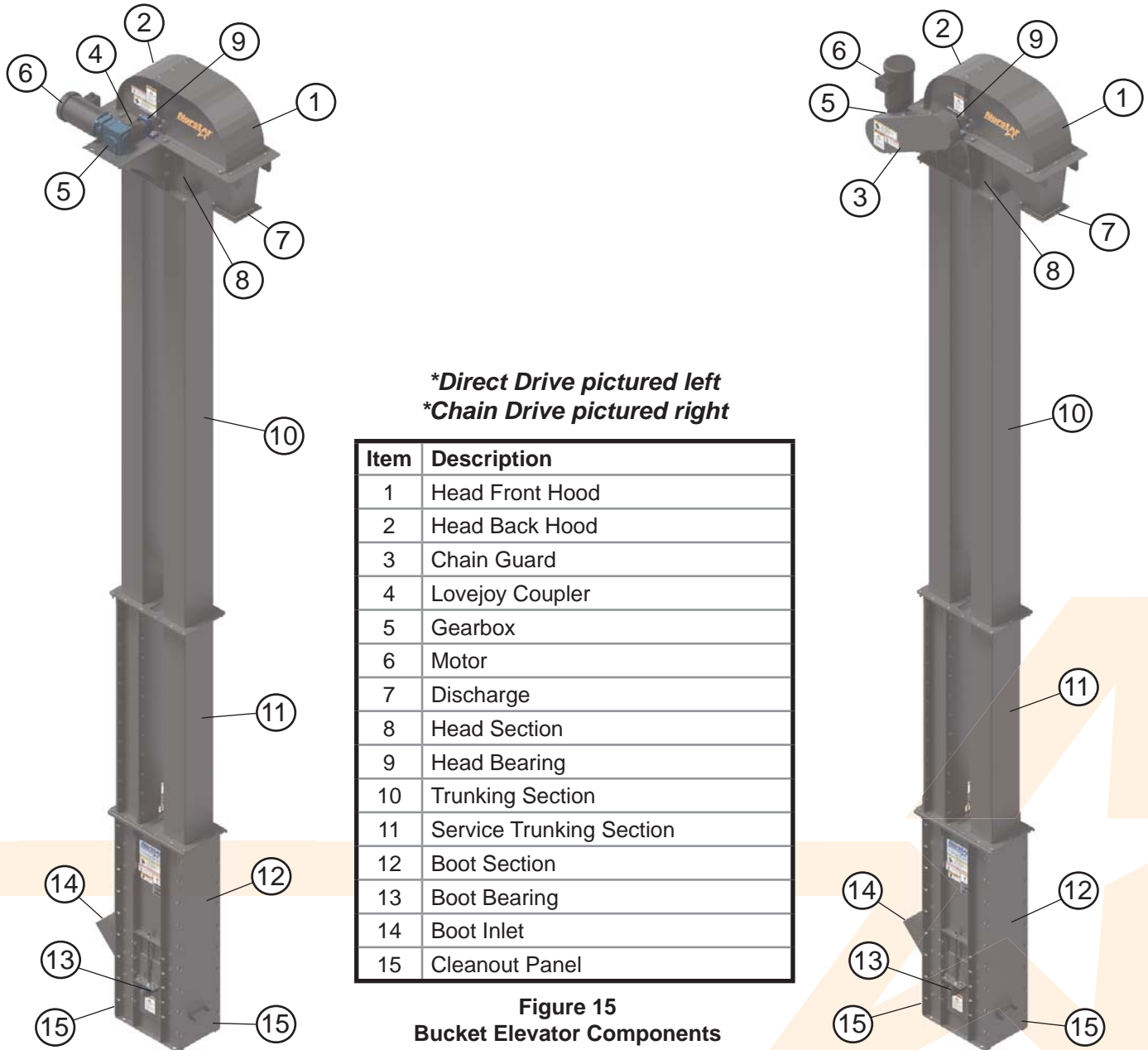
Bucket Elevator Overview

Bucket Elevator Features

- Twin Trunking
- Low impact design
- Laser Aligned flanges and jiggig
- Ladders, cages and platforms as per OSHA standards
- Heavy gauge steel design
- Easy to clean Boot

Standard Specifications

Items	600 Series	800 Series	1200 Series
Drum Size	6" Crowned	8" Crowned	12" Crowned
Capacity Range	100-400 BPH	500-1000 BPH	1000-2000 BPH
Trunking Size	6" x 6"	8" x 7"	10 1/4" x 8"
Head Shaft RPM	115 RPM / 175 RPM	115 RPM / 175 RPM	175 RPM / 192 RPM
Gearbox Ratio	10:1 / 15:1	10:1 / 15:1	10:1
Belt Size(s)	5" 2-ply	7" 2-ply	8" 2-ply



Bucket Elevator Planning



IMPORTANT! *Norstar Industries Bucket Elevators are designed to be vertically self-supporting when erected but are required, in all situations, to be supported or guyed for additional loads such as wind, distributors, cleaners, spouting, etc. Separate structures or adequate support must be provided for any accessory equipment.*

Norstar Industries does not assume responsibility for installation by any other vendor than ours. The installation recommendations within this manual are for consideration only. The owner should consult a qualified civil or structural engineer regarding the design, construction and supervision of the installation, including the foundation and bracing systems. The most important part of the installation is retaining qualified personnel to plan, and erect the elevator as well as its accompanying equipment.

Consult a qualified engineer or contractor for recommendations on concrete reinforcing for the elevator foundation.

The design must take consideration into dead loads, live loads, wind loads, and soil bearing capacity. The boot should be installed on a foundation that provides for adequate drainage to ensure that it stays dry.

Pictured, to the right, is a Boot foundation mock-up.

Due to various situations, this drawing should NOT be used without further insight to your specific application by a qualified engineer.

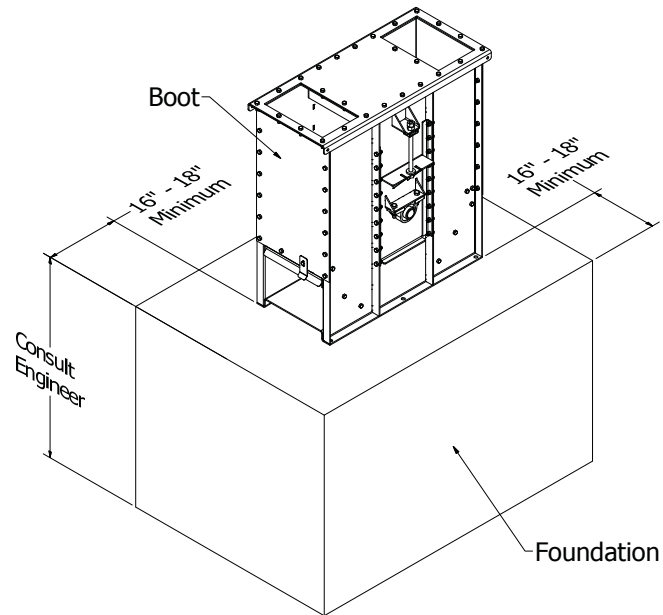


Figure 16
Bucket Elevator Foundation

A concrete foundation is required to house a guy wire anchor which will support the cable tension. Guy cables should run from each corner of the elevator at equal angles to the guy anchors on the ground. The guy cables are adjusted to plumb the Bucket Elevator. Due to various elevator sizes, geographical locations and conditions in which our elevators are erected, Norstar industries cannot take any liability for results arising from these recommendations. It is the installer's responsibility to ensure that proper guying or bracing is installed for their specific application. **It is highly recommended that a qualified civil or structural engineer be consulted for this part of the installation.** It is also recommended that guy wire anchor locations are pre-determined before installation.

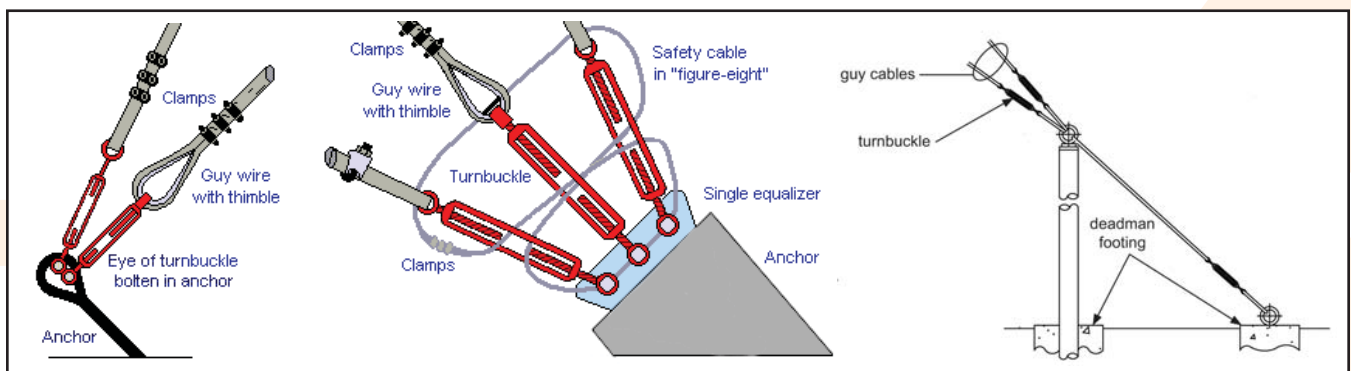


Figure 17
Guy Wire Anchors

Bucket Elevator Installation/Assembly

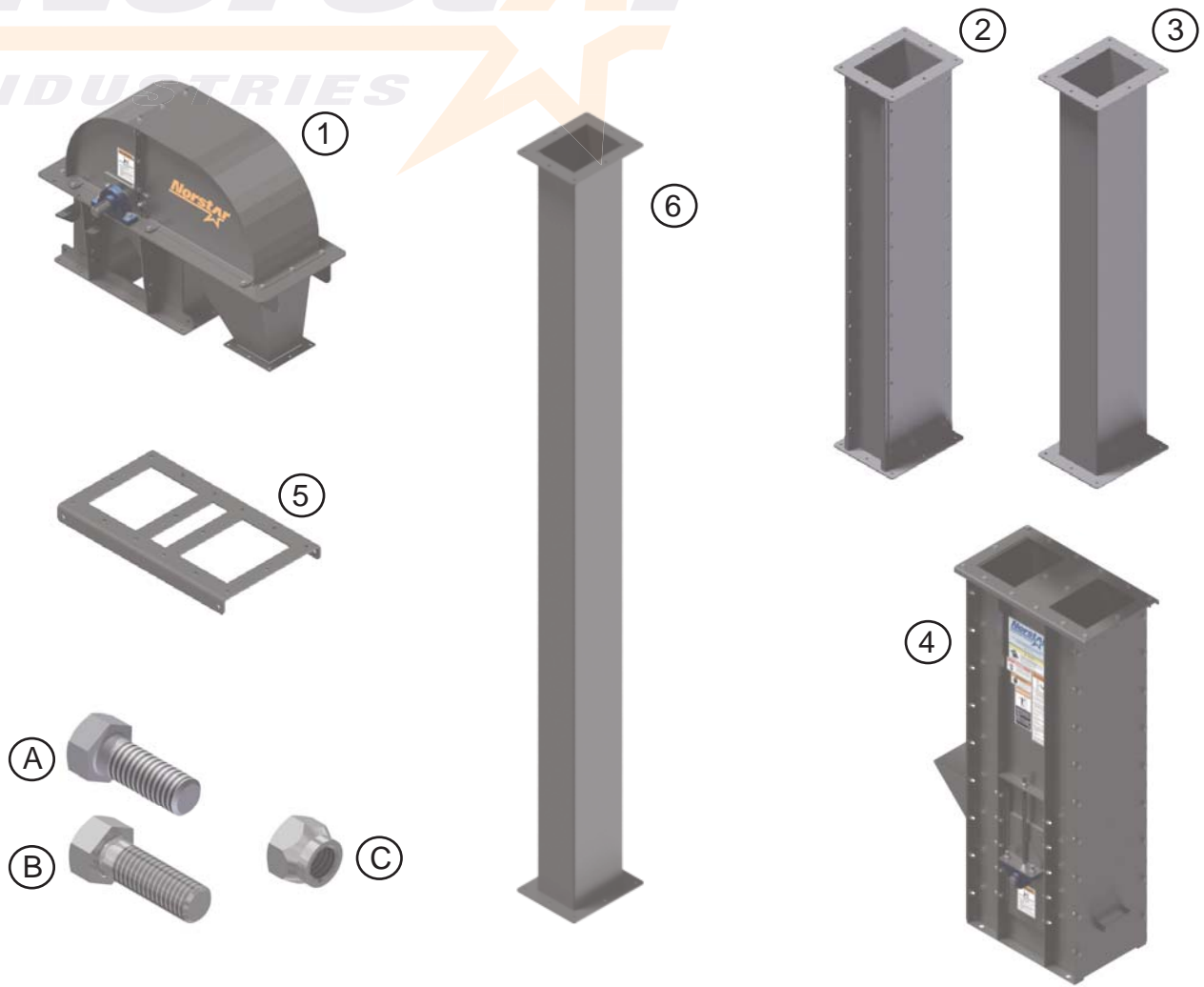


Figure 18
Bucket Elevator Components

Locate the items that will be joined together.

Item	Description	Qty
1	Head Assembly	1
2	Service Trunking Section	1
3	5ft Trunking Section	n/a
4	Boot Assembly	1
5	Trunking Connector Flange	n/a
6	Trunking Section	n/a
A	3/8" x 1 1/2" Bolt	n/a
B	3/8" x 1 1/4" Bolt	n/a
C	3/8" Nylon Locknut	n/a

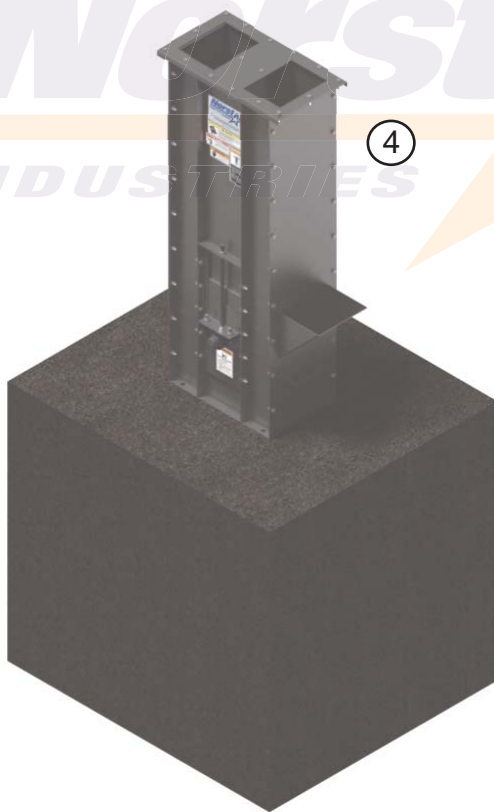


Figure 19
Boot Anchoring



IMPORTANT! *The Boot must be set on a firm and level foundation. If the Boot is not level, it is very difficult for the Bucket Elevator to be plumb.*

Before the Boot is secured to the foundation is the best time to decide which sides of the Boot will be the 'up leg' and 'down leg'.

Once the Boot has been positioned and levelled, it will need to be anchored to the foundation to prevent shifting or movement. The holes on the base plate of the Boot can be used to anchor the Boot. Metal shims should be used if the Boot is not level. Using Hilti bolts, secure the Boot to the foundation.

Once the Boot has been anchored, the Boot should be checked again to make sure that it is still level. If the Boot is not level, make the appropriate adjustments so that it is.

Before installing the trunking sections, the bolts need to be removed from around the rectangular holes on the top of the Boot. Once the bolts are removed, locate the Service Trunking section, a 5 ft Trunking section and a Trunking Connector Flange. The Service Trunking **MUST BE INSTALLED ON THE UP LEG SIDE**. When the Trunking Section is positioned, re-attach the bolts to secure the Trunking section to the Boot section.

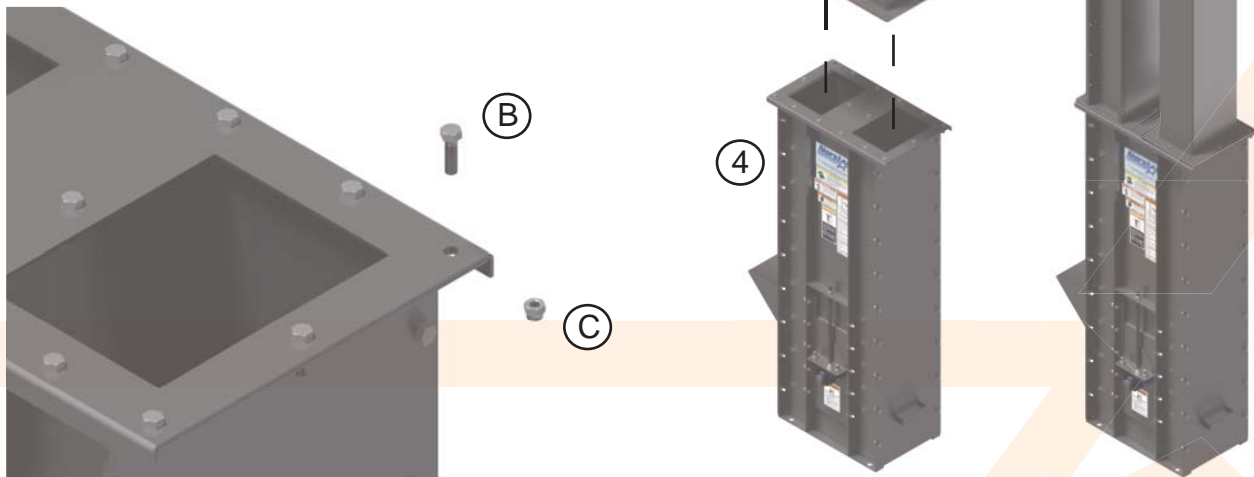


Figure 20
Service Trunking Installation

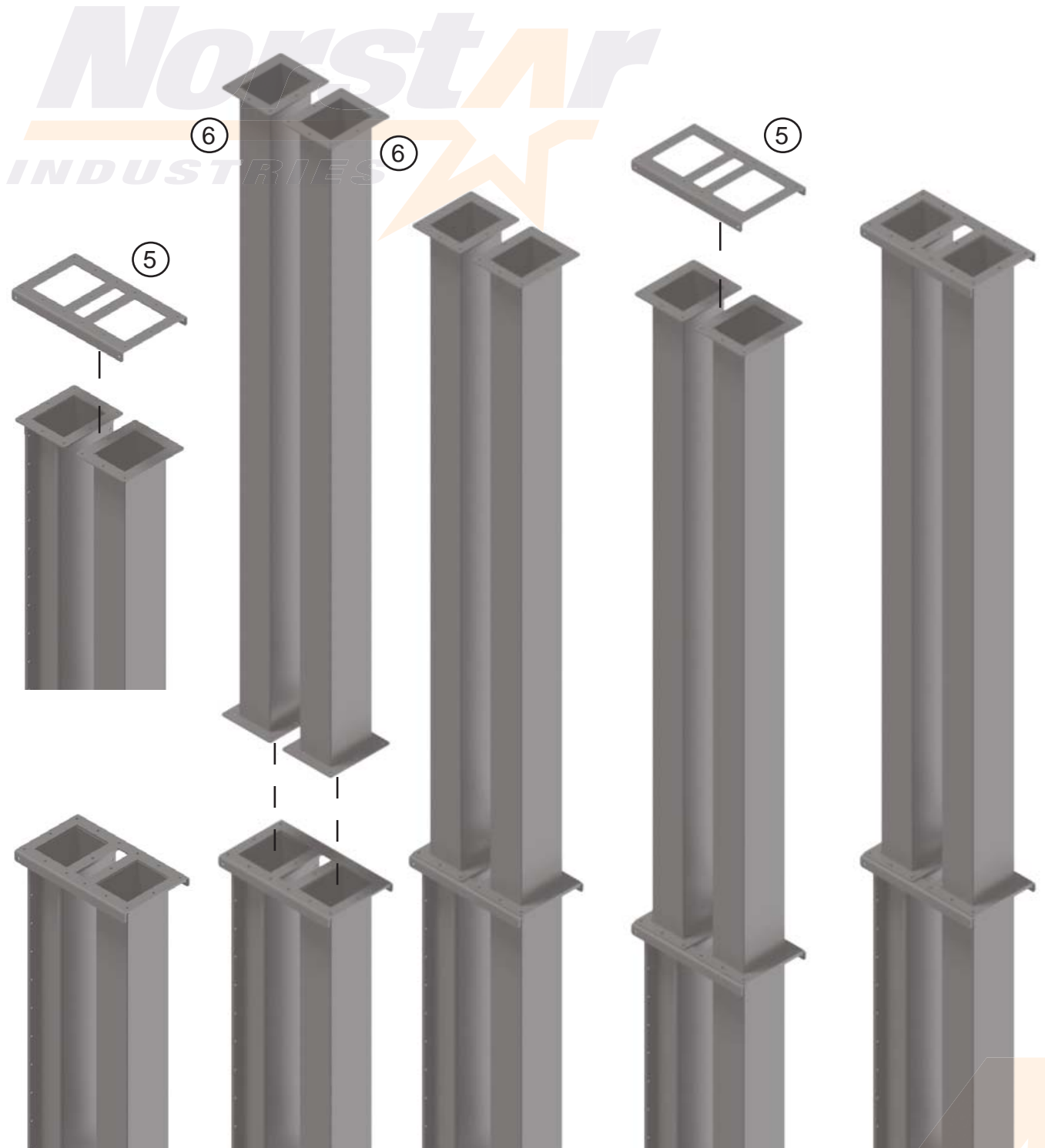


Figure 21
Trunking Installation

Locate a Trunking Connector Flange and plate it on top of the pair of Trunking sections. Locate the next pair of Trunking Sections and place them onto the top of the Trunking Connector Flange. Place another Trunking Connector Flange onto the top of the pair of Trunking Sections.

See **Pages 26-27** for bolted connections.

Continue this process until the required height has been reached.



ATTENTION! *The following instructions are valid if attaching an Offset Platform and Ladder system to your Bucket Elevator.*

INDUSTRIES

When securing Trunking together, it is important to plan ahead where Ladder sections are going to be installed.

For a Rest Platform, all six (6) holes should remain open as they will be used later when attaching the Rest Platform.

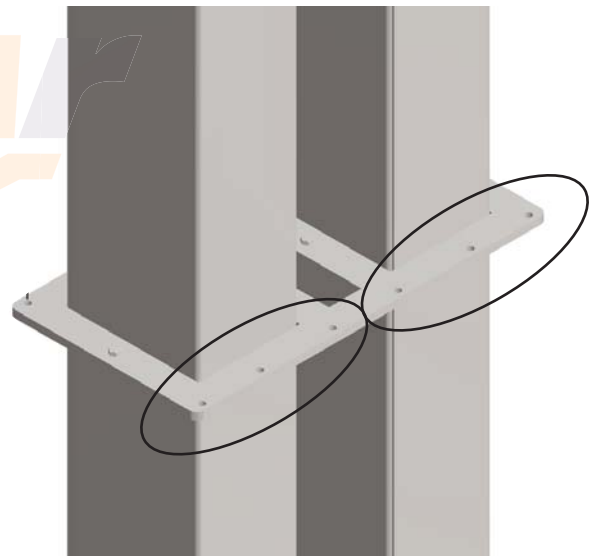


Figure 22
Rest Platform Bolting

For a Centered Ladder, centered meaning running vertically in line with the entrance of the Head Platform, the back right holes should be left open as they will be used later when attaching a Ladder Section.

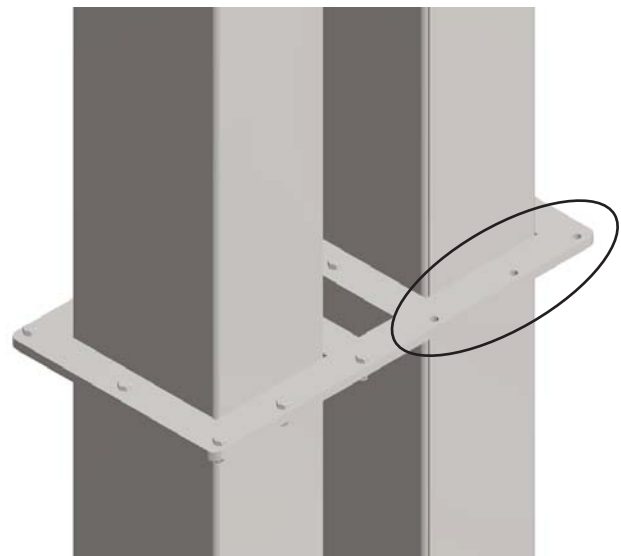


Figure 23
Centered Ladder Bolting

For an Offset Ladder, offset meaning running parallel but not in line with the entrance of the Head Platform, the front right holes should be left open as they will be used later when attaching a Ladder Section.

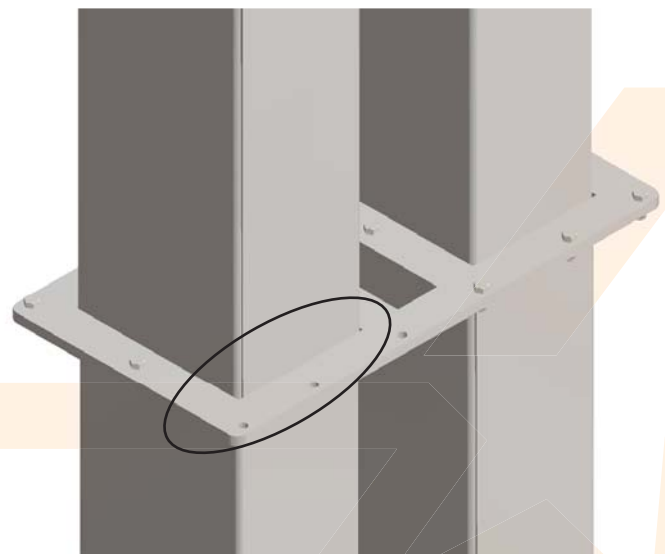


Figure 24
Offset Ladder Bolting

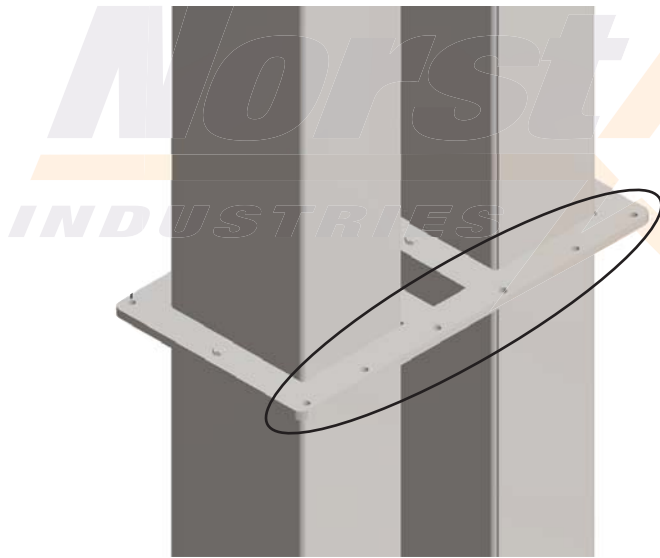


Figure 25
600 and 800 Series Center Ladder Bolting



ATTENTION! *The following instructions are valid if attaching a Centered Platform and Ladder system to your Bucket Elevator.*

When securing Trunking together, it is important to plan ahead where Ladder sections are going to be installed.

On a 6" or 8" Bucket Elevator, all six (6) holes, on the ladder side, should remain open as they will be used later when attaching the Ladder Sections.

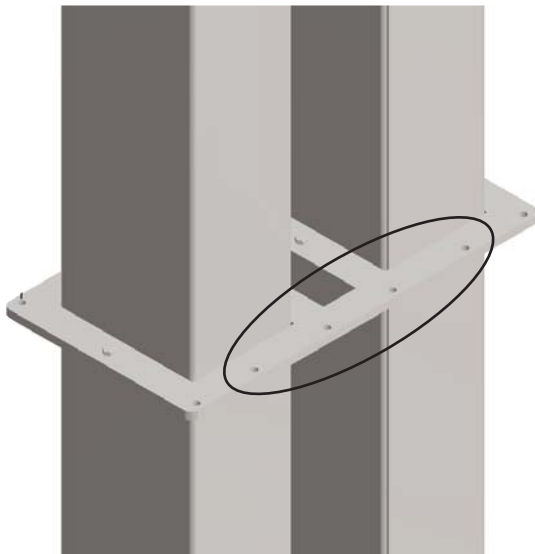


Figure 26
1200 Series Center Ladder Bolting

On a 12" Bucket Elevator, the center four (4) holes, on the ladder side, should remain open as they will be used later when attaching the Ladder Sections.



ATTENTION! *The following instructions are valid for all Bucket Elevator models.*

Using 3/8" x 1 1/2" Bolts and 3/8" Nylon Lock-nuts, connect the trunking sections together.

Make sure that the noted holes are left empty to ensure an easier Ladder installation.

If there is no Ladder Package to install, connect the trunking sections together using every hole.

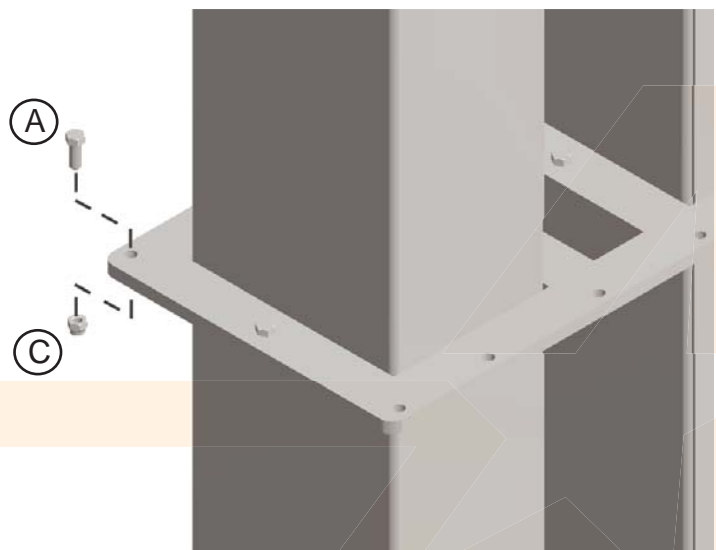


Figure 27
Trunking Bolting

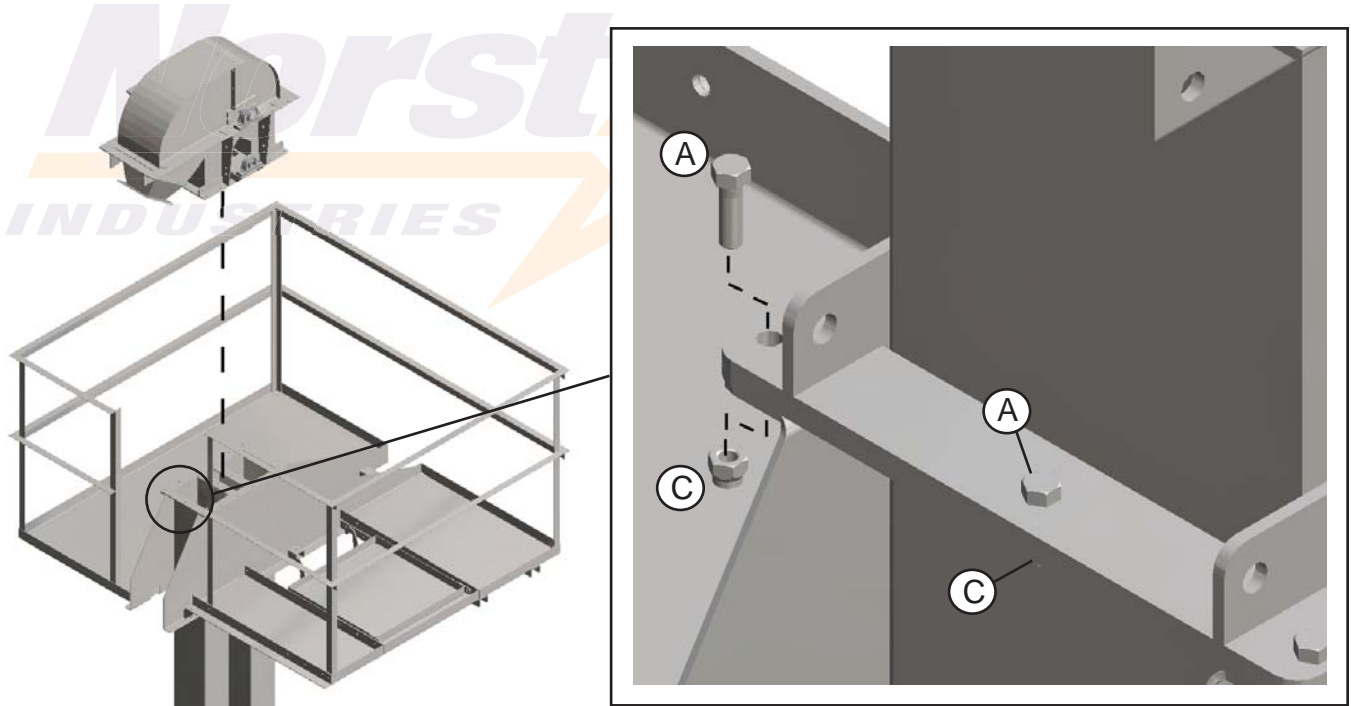


Figure 28
Platform Head Installation

On Bucket Elevators with a Ladder package, the Head section should be attached **WITH** the Head Platform (see page 29 for Head Platform assembly). Lower the Head section onto the Platform Trunking section.

Using the 3/8 x 1 1/2" Bolts and 3/8" Nylon Locknuts pre-attached to the Head Platform as well as four (4) additional 3/8" x 1 1/2 Bolts and 3/8" Nylon Locknuts, secure the Head section to the Trunking.

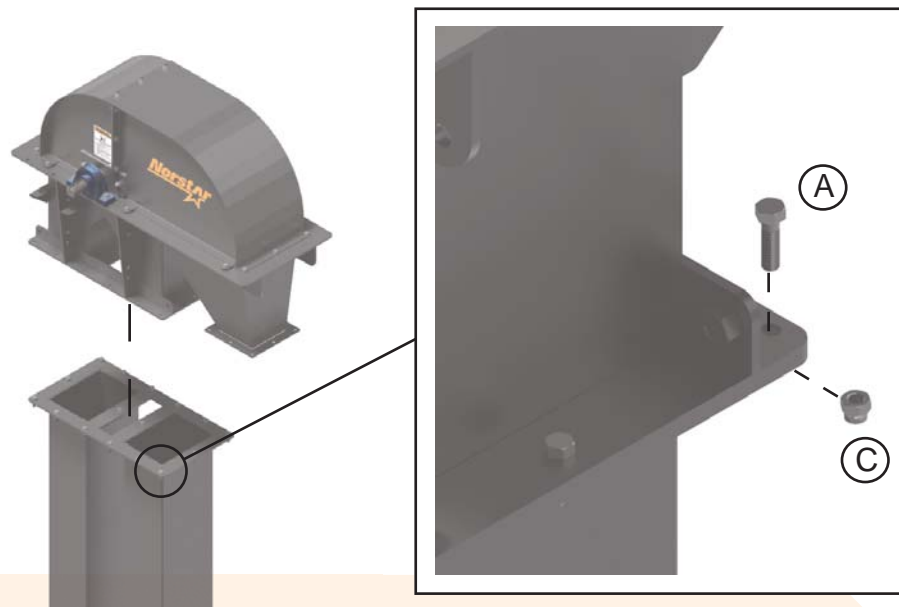


Figure 29
Head Installation

On Bucket Elevators without a Ladder package, lower the Head section onto the Trunking section. With 3/8 x 1 1/2" Bolt and 3/8" Nylon Locknuts, secure the Head section to the Trunking.

Head Platform Assembly and Installation

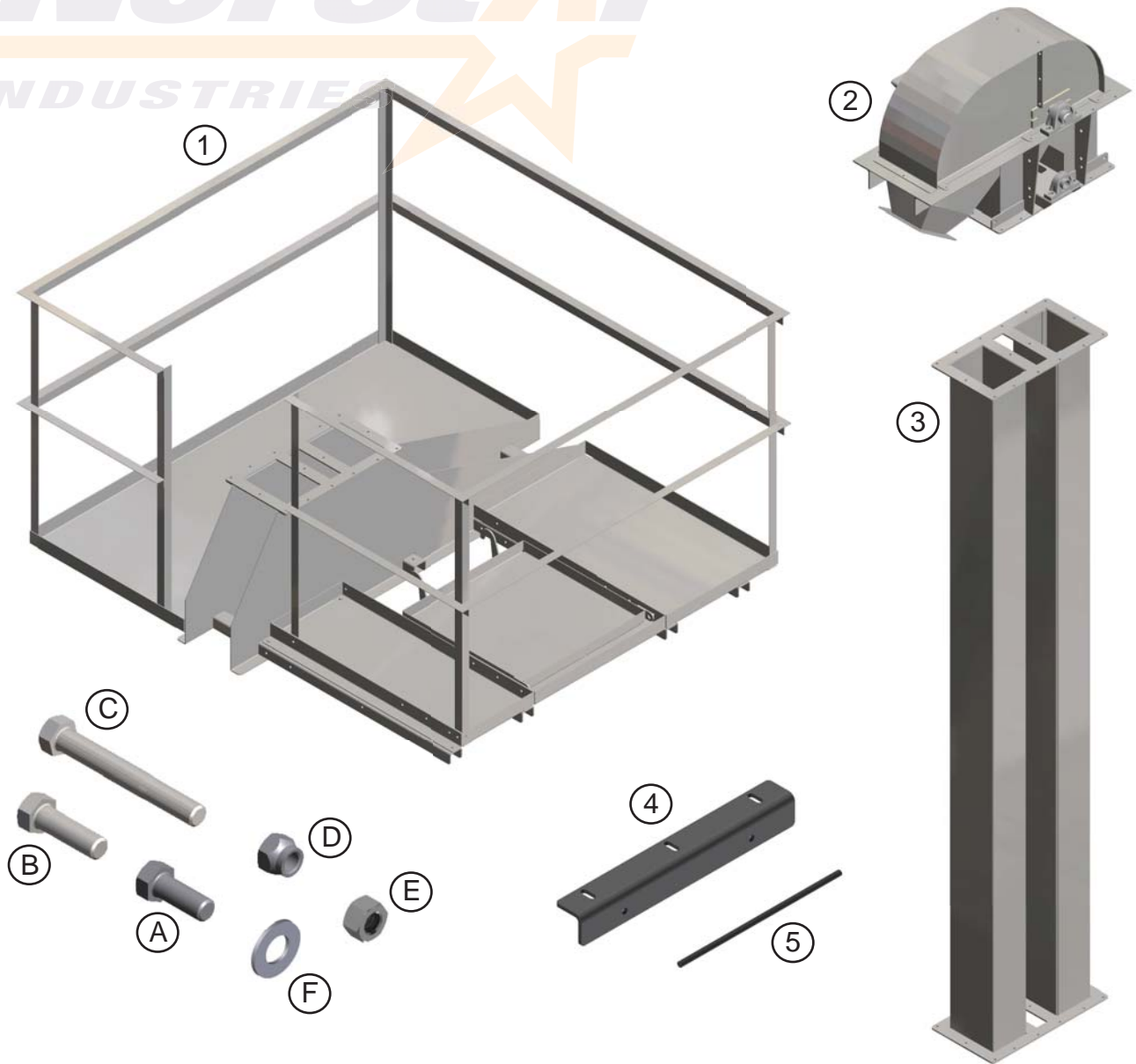


Figure 30
Head Platform Components

Locate the items that will be joined together.

Item	Description	Qty
1	Head Platform Assembly	1
2	Head Section	1
3	Trunking Section	1
4	Platform Clamp Plate	2
5	Platform Clamp Threaded Rod	2

Item	Description	Qty
A	3/8" x 1" Bolt	4
B	3/8" x 1 1/2" Bolt	4
C	3/8" x 3" Bolt	0
D	3/8" Nylon Locknut	8
E	3/8" Hex Nut	8
F	3/8" Flatwasher	4

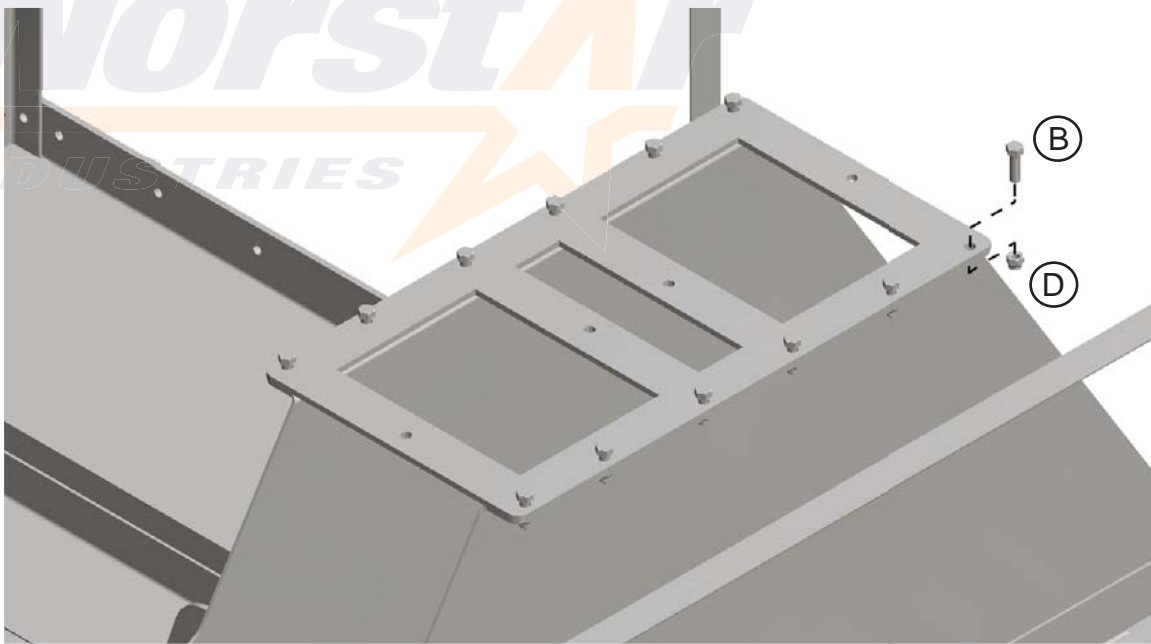


Figure 31
Spacer Flange Removal

Locate the Head Platform Assembly and remove the twelve (12) 3/8" X 1 1/2" Bolts and 3/8" Nylon Lock-nuts holding the Flange in place. Set these aside.

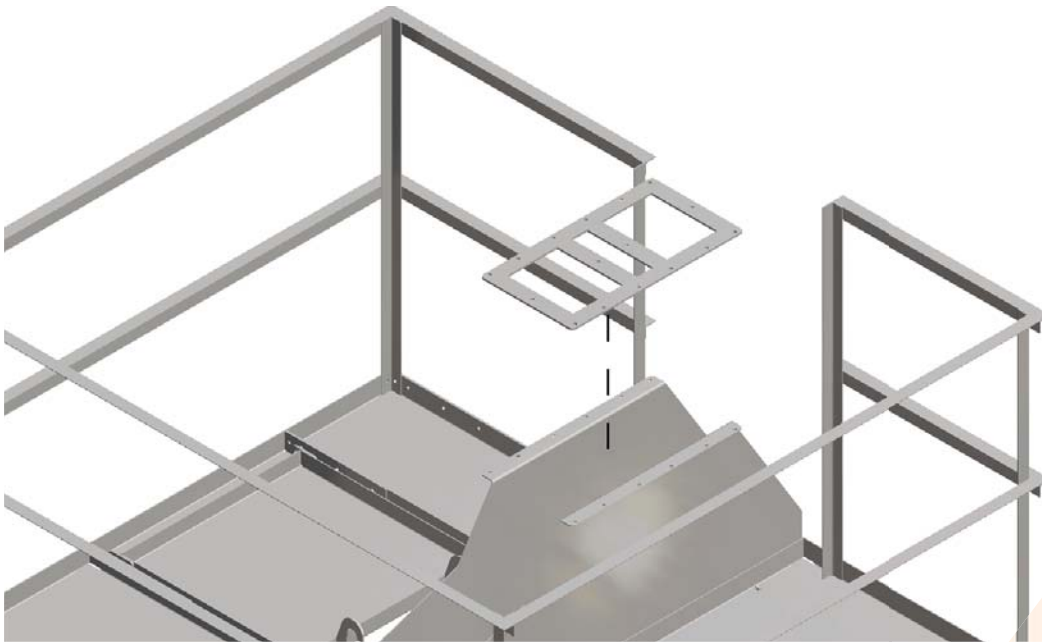


Figure 32
Spacer Flange Removal

Remove and discard the Flange from the Head Platform Assembly.

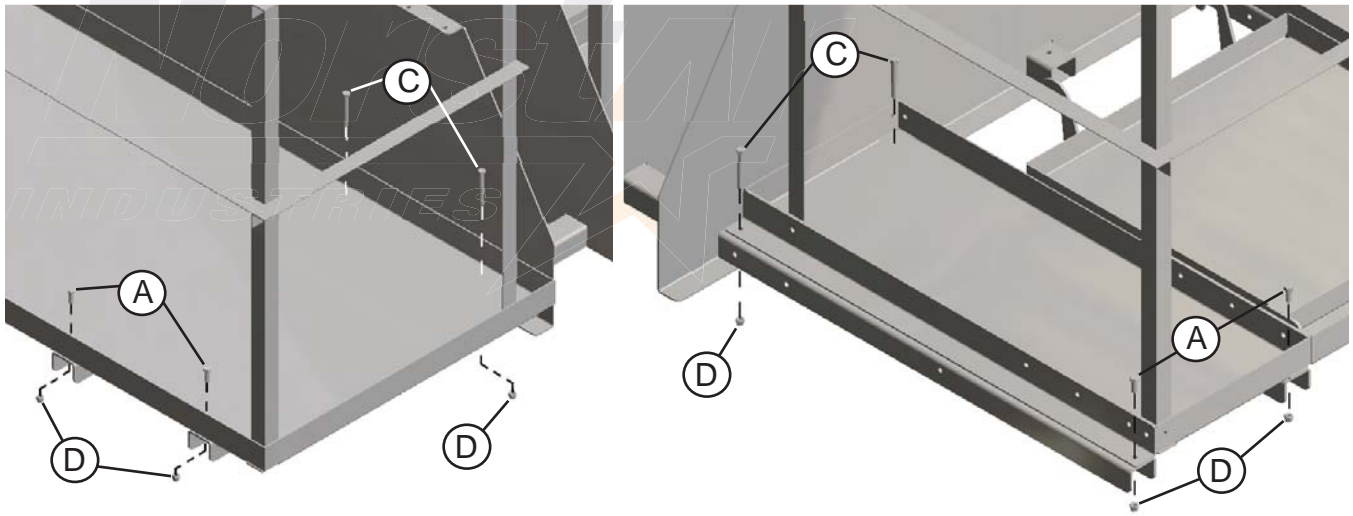


Figure 33
Platform Channel Removal

There are two (2) beams located on the front end of the Head Platform Assembly. Holding these beams in place are four (4) 3/8" x 1" Bolts, four (4) 3/8" x 3" Bolts and eight (8) 3/8" Nylon Locknuts. Remove these nuts and bolts and set them aside.

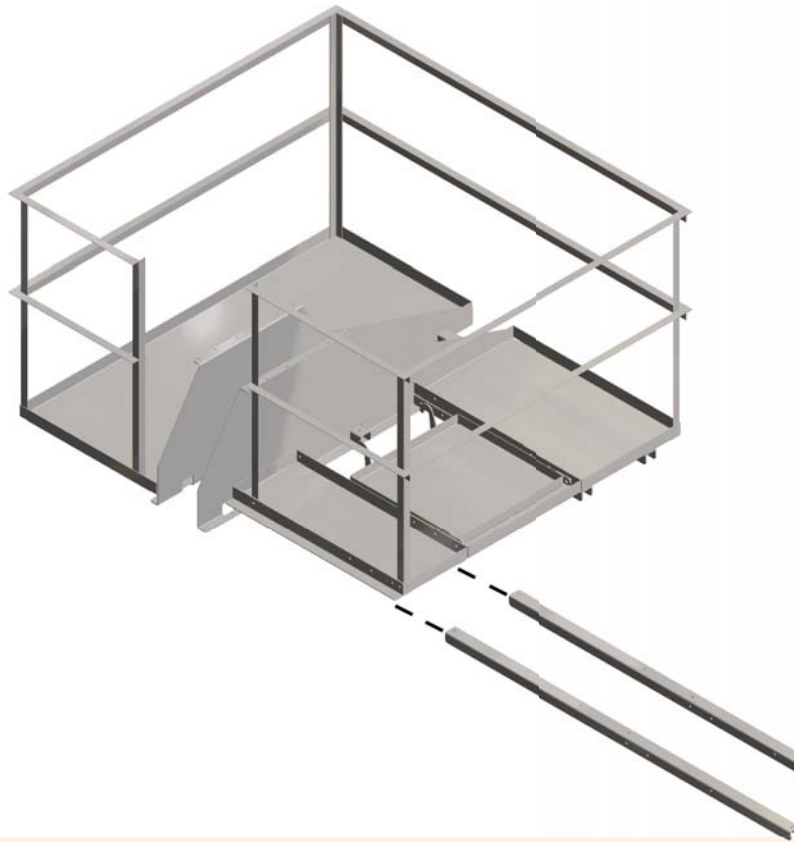


Figure 34
Platform Channel Removal

Slide the two (2) beams out from the Head Platform Assembly and set them aside.

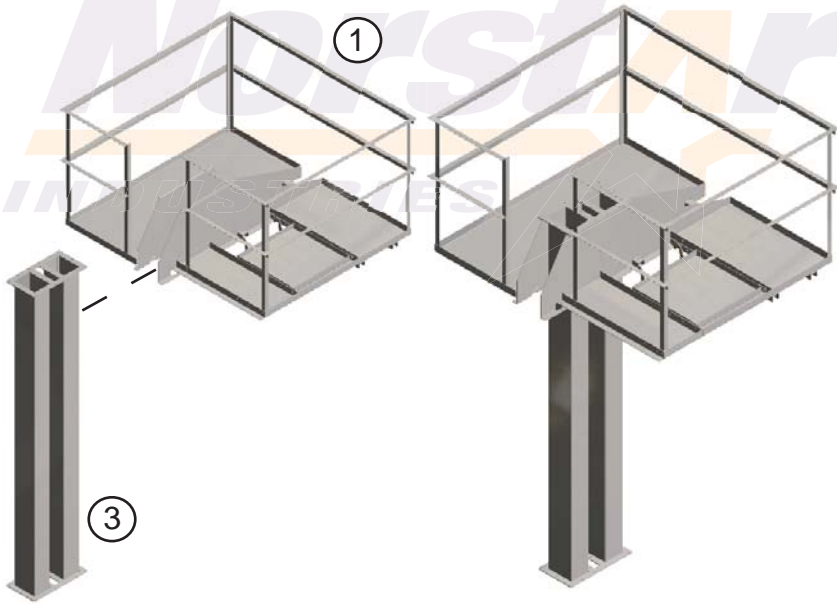


Figure 35
Platform Installation

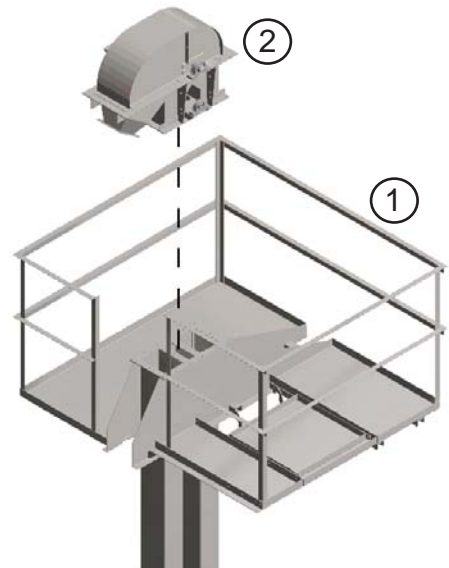


Figure 36
Head Installation

Locate the 10' Trunking Assembly. Slide the 10' Trunking Assembly into the gap in the Head Platform Assembly. Align the holes on the Flange to the holes on the Head Platform Assembly. (See **Figure 35**) Locate the Bucket Elevator Head Assembly and lower it onto the 10' Trunking Assembly Flange. (See **Figure 36**)

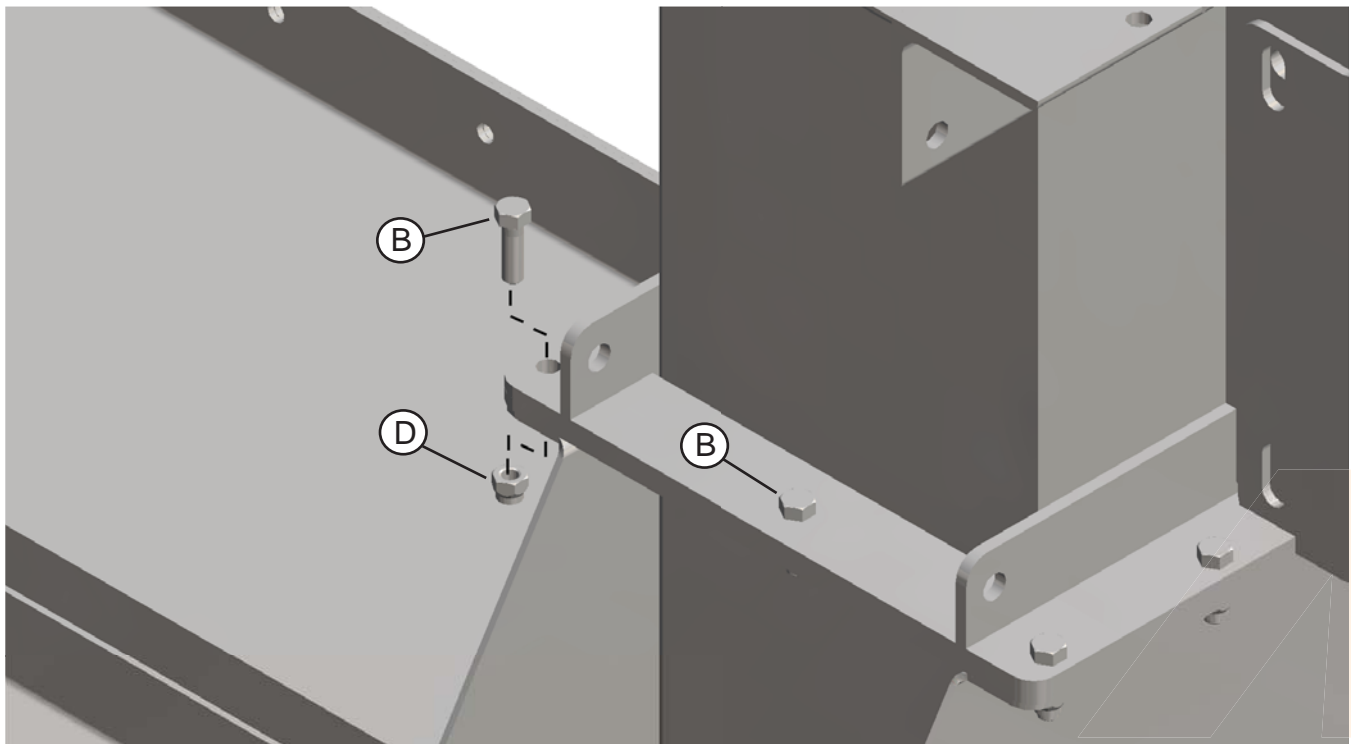


Figure 37
Head Attachment

Align the holes and replace the twelve (12) 3/8" x 1 1/2" Bolts and twelve (12) 3/8" Nylon Locknuts (see **Figure 37**). Additionally, locate four (4) 3/8" x 1 1/2" Bolts and four (4) 3/8" Nylon Locknuts and attach them to the four central holes on the Connector Flanges.

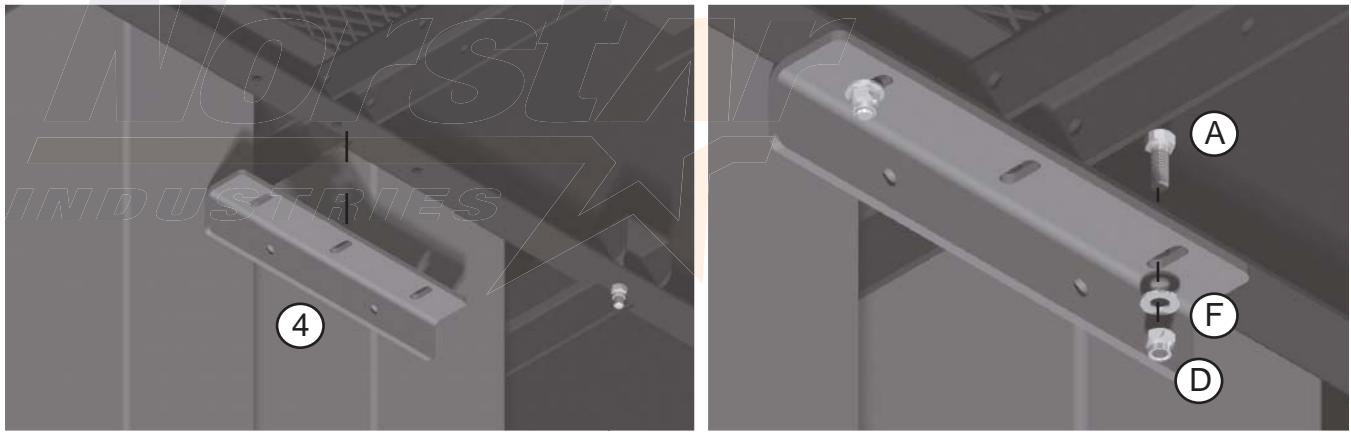


Figure 38
Attaching the Platform Clamps

Locate two (2) Platform Clamp Plates and place them, on opposite sides of the Trunking, against the Trunking and Platform (see **Figure 38, left**). Align the slots on the Platform Clamping Plates with the holes on the Platform Assembly. Using two (2) 3/8" x 1" Bolts, 3/8" Flatwashers and 3/8" Nylon locknuts (per side), secure the Platform Clamping Plates to the Platform (see **Figure 38, right**).

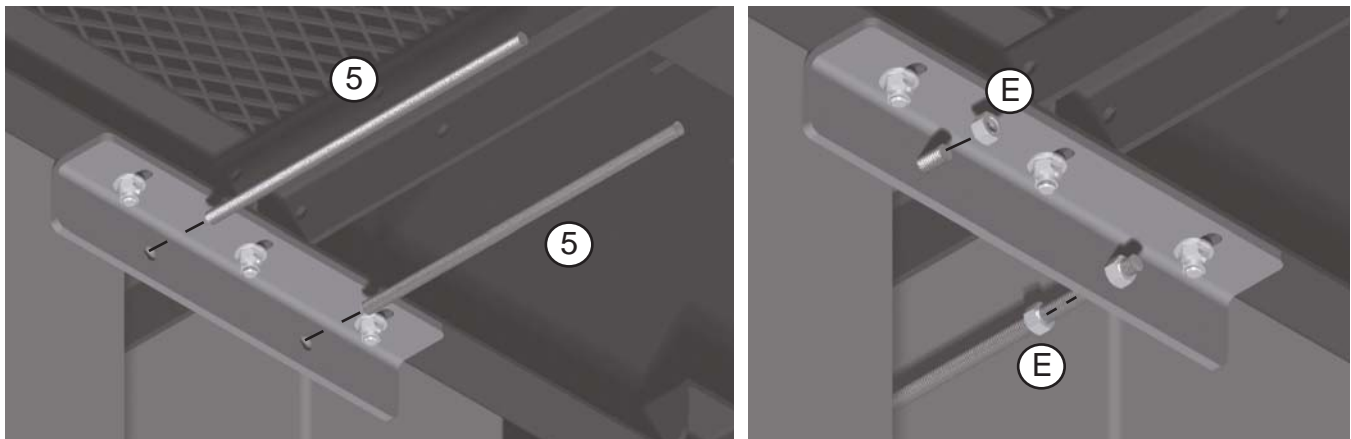
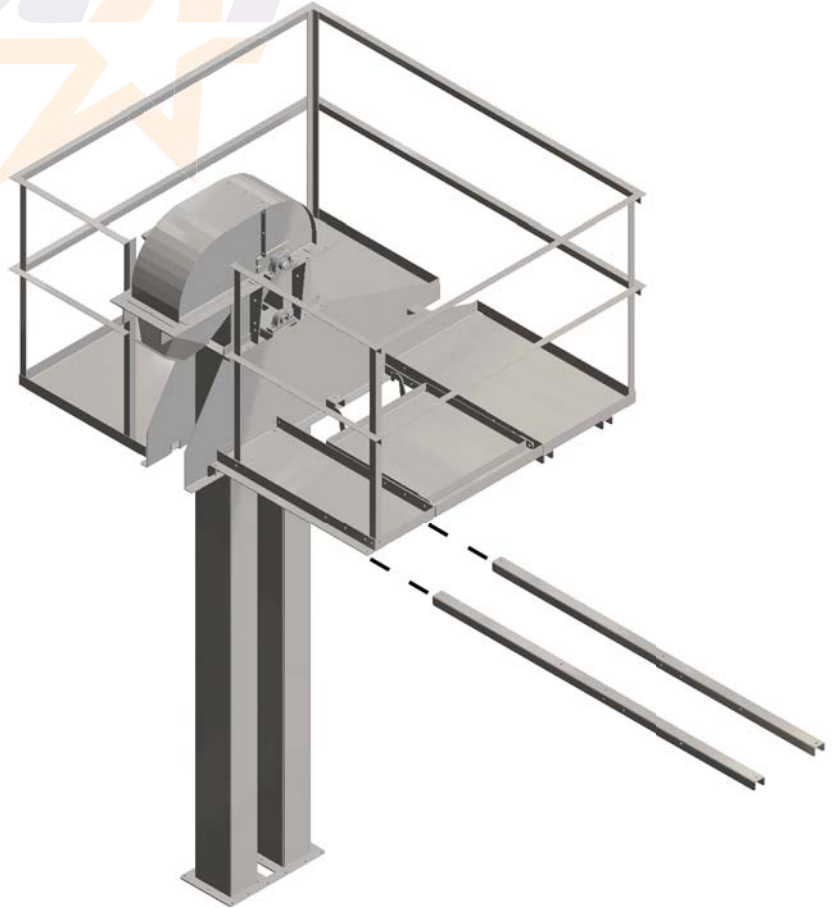


Figure 39
Securing the Platform Clamps

Locate the Platform Clamp Threaded Rods and slide them through the holes on the Platform Clamping Plates (see **Figure 39, left**). Locate eight (8) 3/8" Hex Nuts. Thread four (4) Hex Nuts onto the Threaded Rod in between the two (2) Clamp Plates. Thread the other four (4) onto the Threaded Rod on the outside of the Clamp Plates. Tighten the outside nuts together to secure the Clamp Plates. Tighten the inside nuts together to jam them against the Clamp Plates to prevent the Clamp Plates from loosening (see **Figure 39, right**).



Figure 40
Platform Clamp assembly



Slide the two (2) beams back into their locations on the Head Platform Assembly.

Figure 41
Platform Channel Replacement

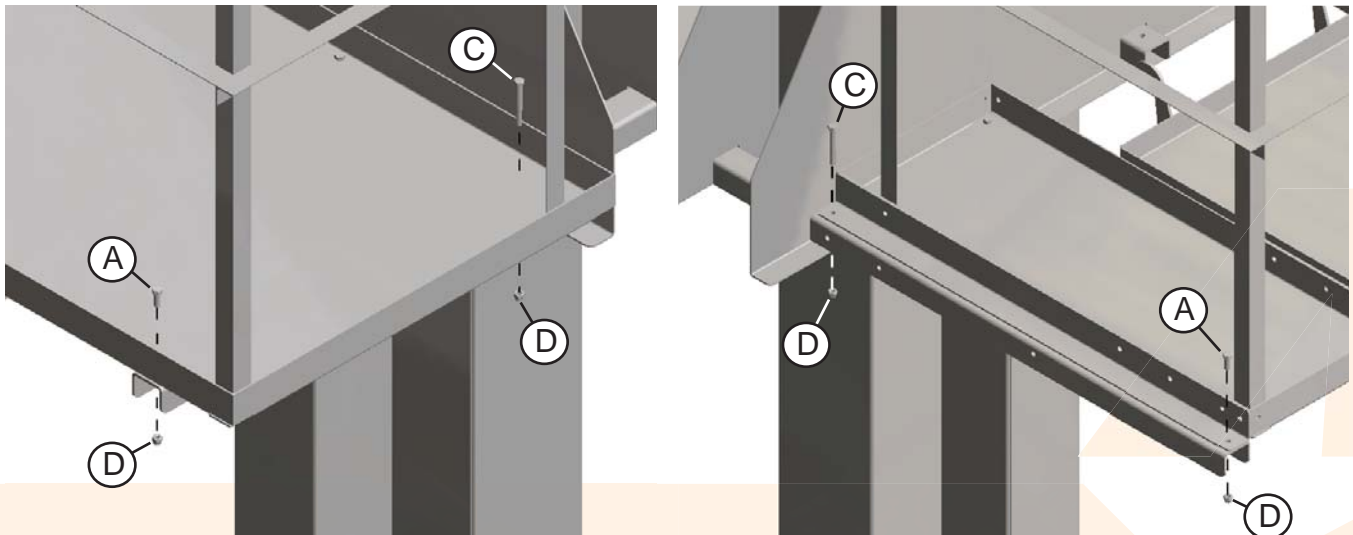


Figure 42
Platform Channel Replacement

Replace the four (4) 3/8" x 1" Bolts, four (4) 3/8" x 3" Bolts and eight (8) 3/8" Nylon Locknuts. Tighten them to secure the beams in place.

Distributor Platform Assembly and Installation

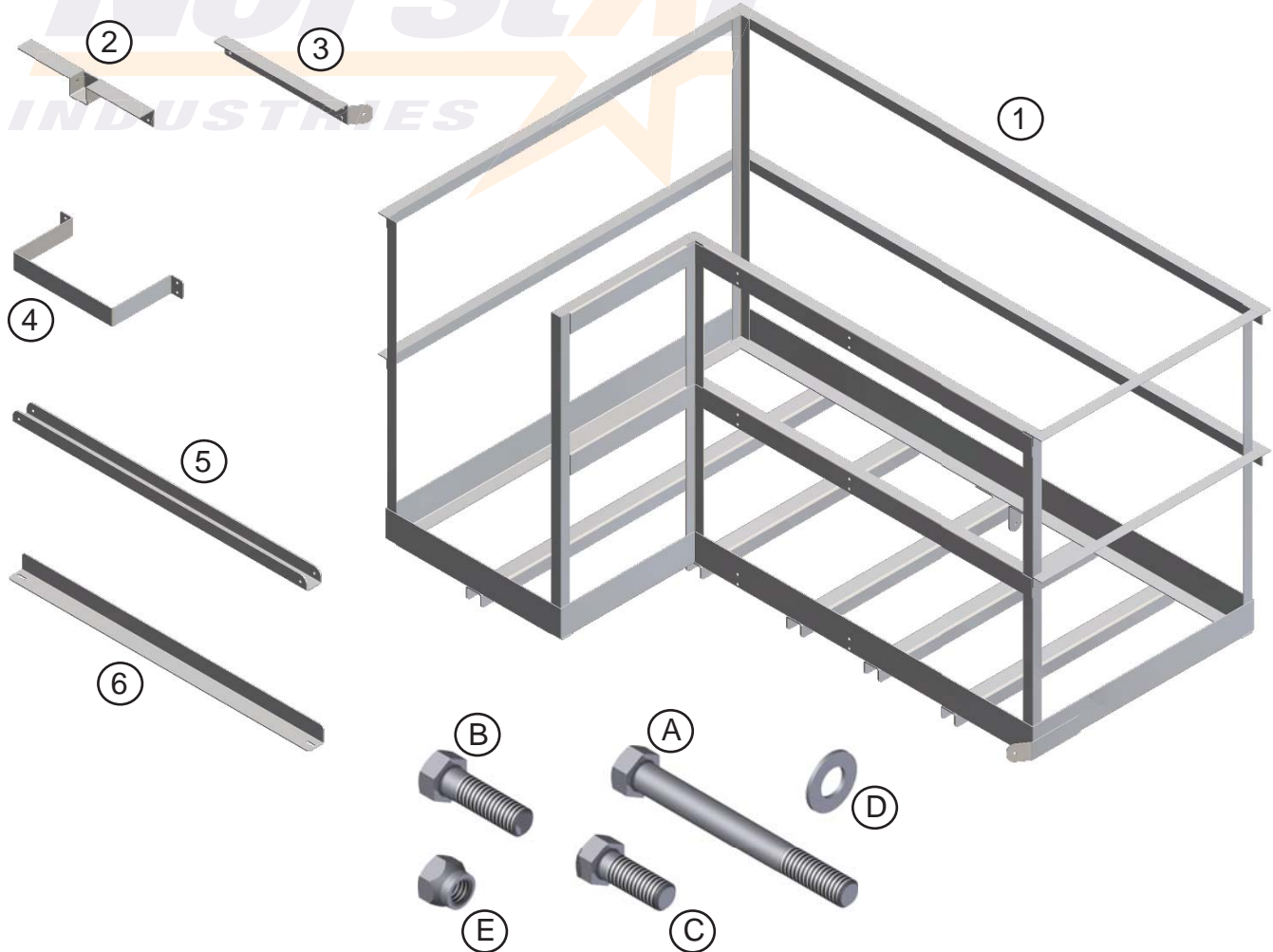


Figure 43
Distributor Platform Components

Locate the items that will be joined together.

Item	Description	Qty
1	Distributor Platform Base	1
2	Bottom Brace Clamp	1
3	Stabilizer Clamp	1
4	Trunk Clamp	5
5	Bottom Brace Beam	1
6	Stabilizer Angle	1
A	3/8" x 3 1/2" Bolt	2
B	3/8" x 1 1/4" Bolt	20
C	3/8" x 1" Bolt	2
D	3/8" Flatwasher	22
E	3/8" Nylon Locknut	24

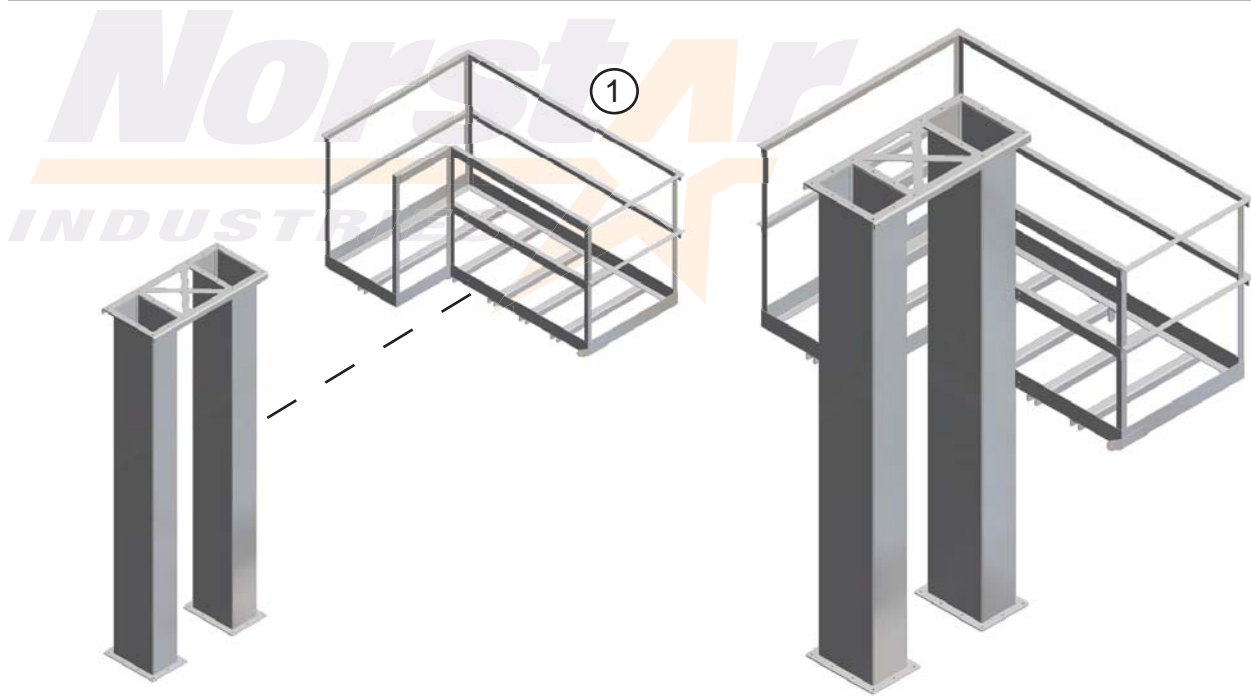
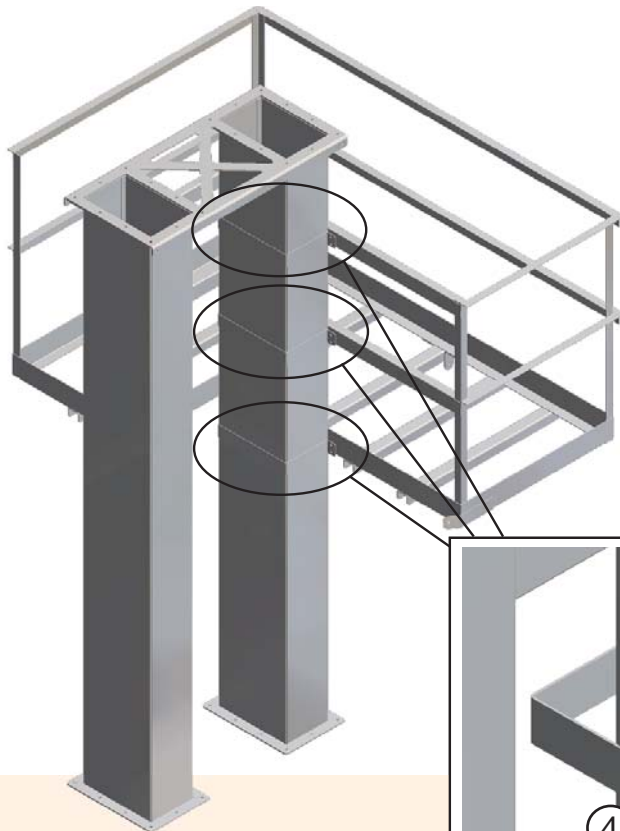


Figure 44
Distributor Platform Placement

Locate the Distributor Platform Base and place it against the Bucket Elevator Trunking section in the desired location.



Three connections are required to secure the Distributor Platform Base to the Trunking. Per connection, use one (1) Trunking Clamp, four (4) 3/8" x 1 1/4" Bolts, four (4) 3/8" Flatwashers and four (4) 3/8" Nylon Locknuts. **The trunking clamps are wider than they are long.** Tighten the nuts and bolts to secure the Distributor Platform Base.

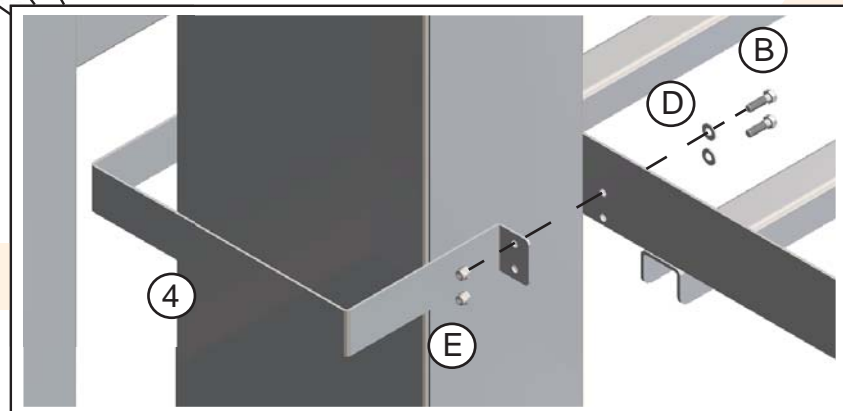


Figure 45
Distributor Platform Clamps



Locate the Bottom Brace Beam, the Bottom Brace Clamp, one (1) 3/8" x 3 1/2" Bolt and one (1) 3/8" Nylon Locknut. Place the Beam into the Cradle of the Clamp, making sure that the flat of the Beam is facing downward. Attach the two (2) items with the 3/8" x 3 1/2" Bolt and 3/8" Nylon Locknut. **DO NOT** tighten, yet, to ensure flexibility.



Figure 46
Bottom Brace Assembly

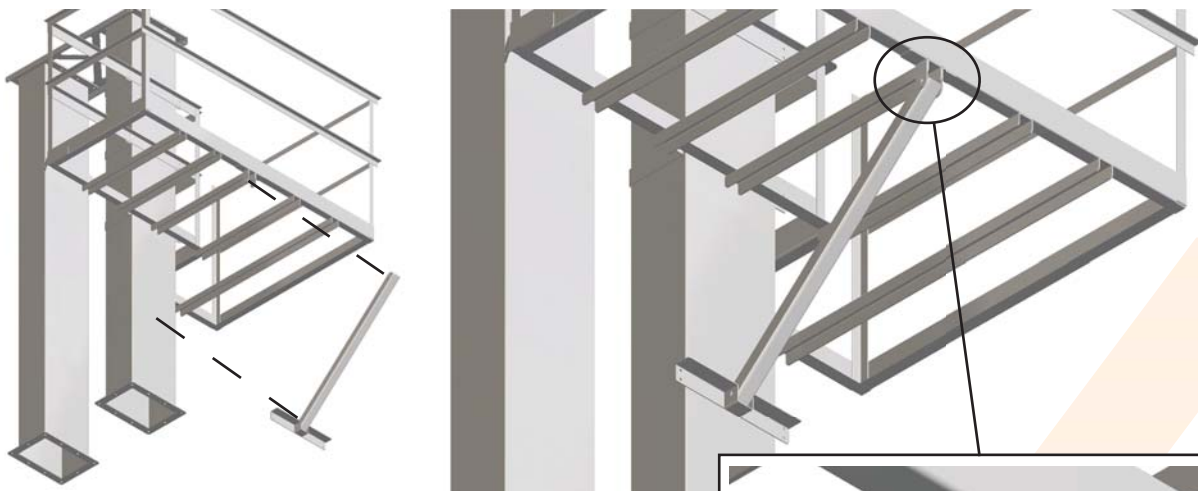
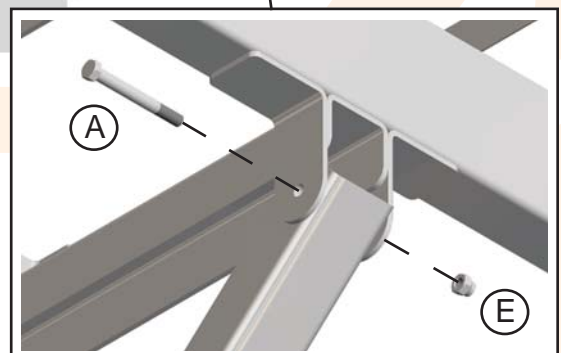


Figure 47
Bottom Brace Installation

Place the Bottom Brace Assembly *underneath* the Distributor Base. Using one (1) 3/8" x 3 1/2" Bolt and one (1) 3/8" Nylon Locknut, attach the Bottom Brace to the Distributor Base. **DO NOT** tighten to ensure flexibility.



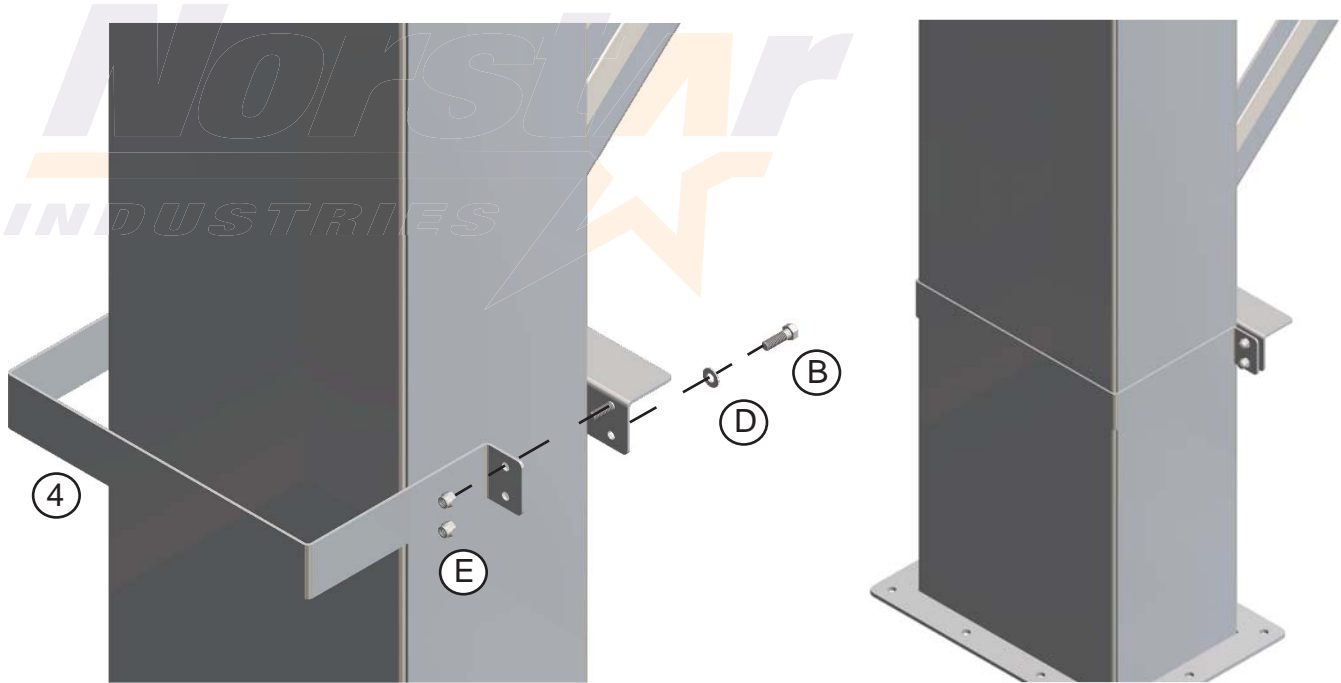


Figure 48
Bottom Brace Clamp

Locate one (1) Trunking Clamp, four (4) 3/8" x 1 1/4" Bolts, four (4) 3/8" Flatwashers, and four (4) 3/8" Nylon Locknuts. **The trunking clamps are wider than they are long.** Place the Trunking Clamp around the Bucket Elevator Trunk and, with the nuts and bolts, secure it to the Bottom Brace Clamp.

Completely tighten the bolts on the Bottom Brace Assembly.

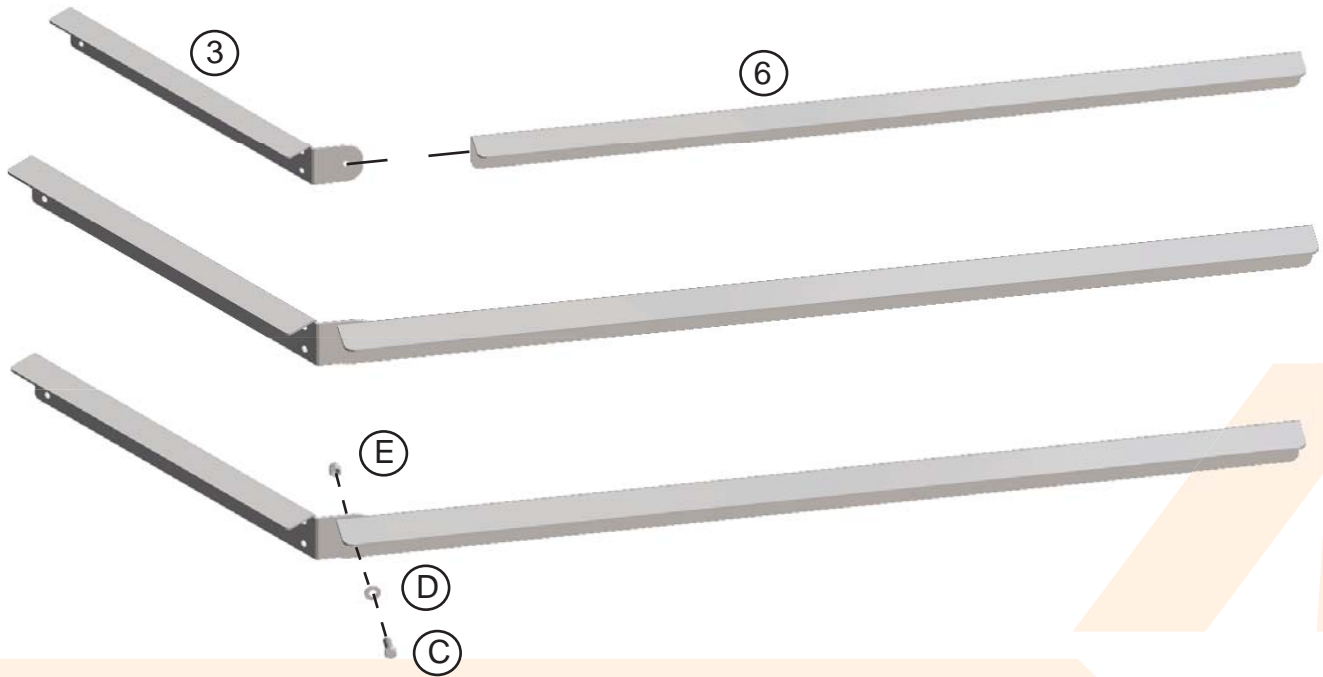
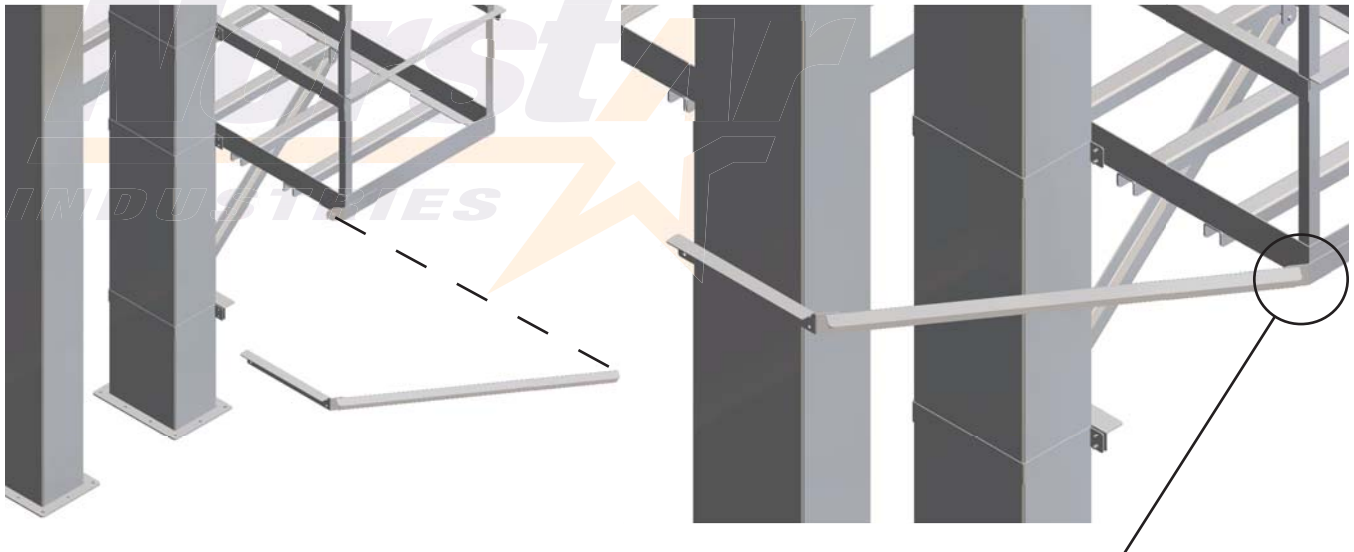


Figure 49
Stabilizer Assembly

Locate the Stabilizer Clamp, the Stabilizer Angle, one (1) 3/8" x 1" Bolt, one (1) 3/8" Flatwasher, and one (1) 3/8" Nylon Locknut. Place the Angle onto the outside of the Clamp tab and attach with the nuts and bolts. **DO NOT** tighten to ensure flexibility.



Place the Stabilizer Assembly into place on the Bucket Elevator. Using one (1) 3/8" x 1" Bolt, one (1) 3/8" Nylon Locknut and one (1) 3/8" Flatwasher, secure the Stabilizer to the tab on the Distributor Platform Base. **DO NOT** tighten to ensure flexibility.

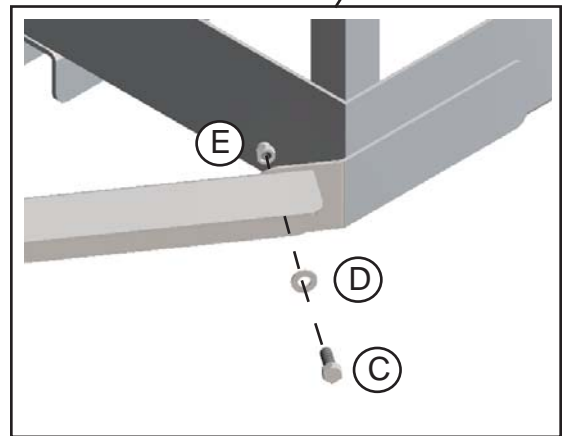


Figure 50
Stabilizer Installation

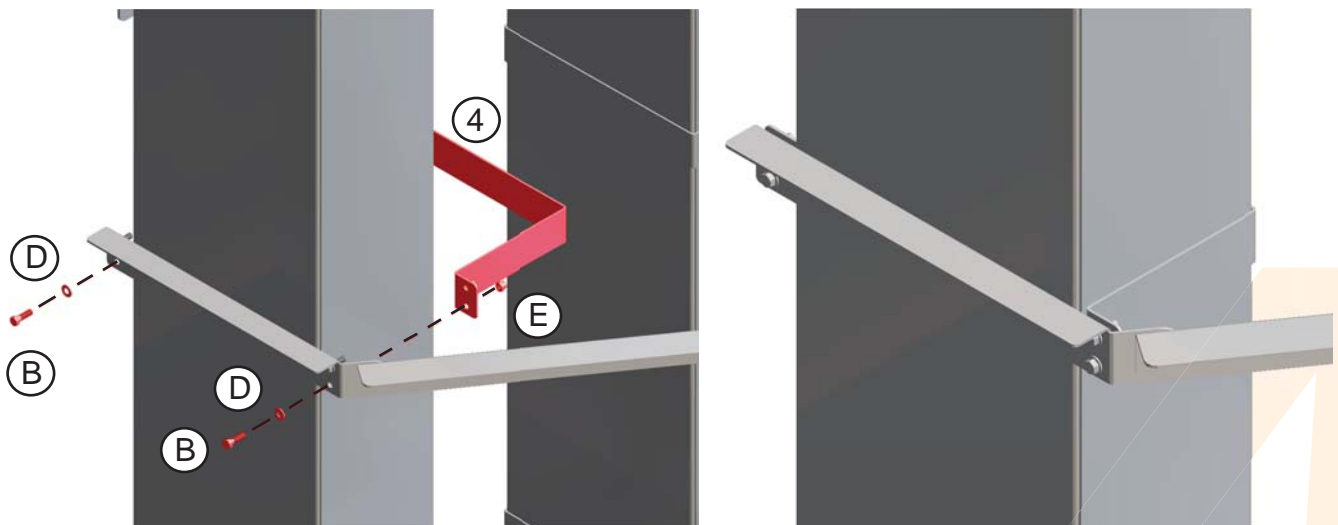


Figure 51
Stabilizer Clamp

Locate one (1) Trunking Clamp, four (4) 3/8" x 1 1/4" Bolts, four (4) 3/8" Flatwashers, and four (4) 3/8" Nylon Locknuts. **The trunking clamps are wider than they are long.** Place the Trunking Clamp around the Bucket Elevator Trunk and, with the nuts and bolts, secure it to the Stabilizer Clamp.

Completely tighten the bolts for the Stabilizer Assembly.



Completely assembled Distributor Platform Assembly.

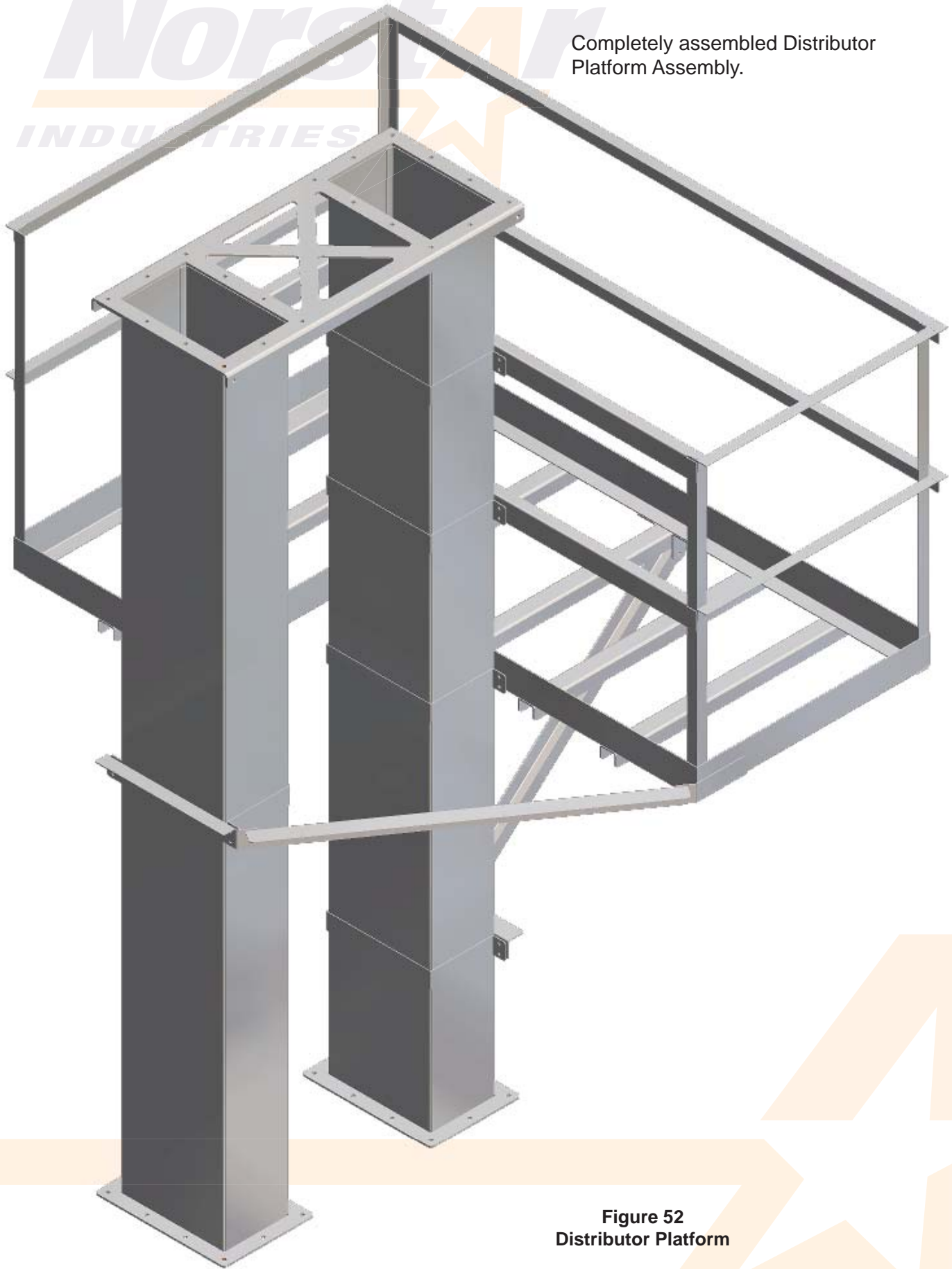


Figure 52
Distributor Platform

Top Ladder Assembly

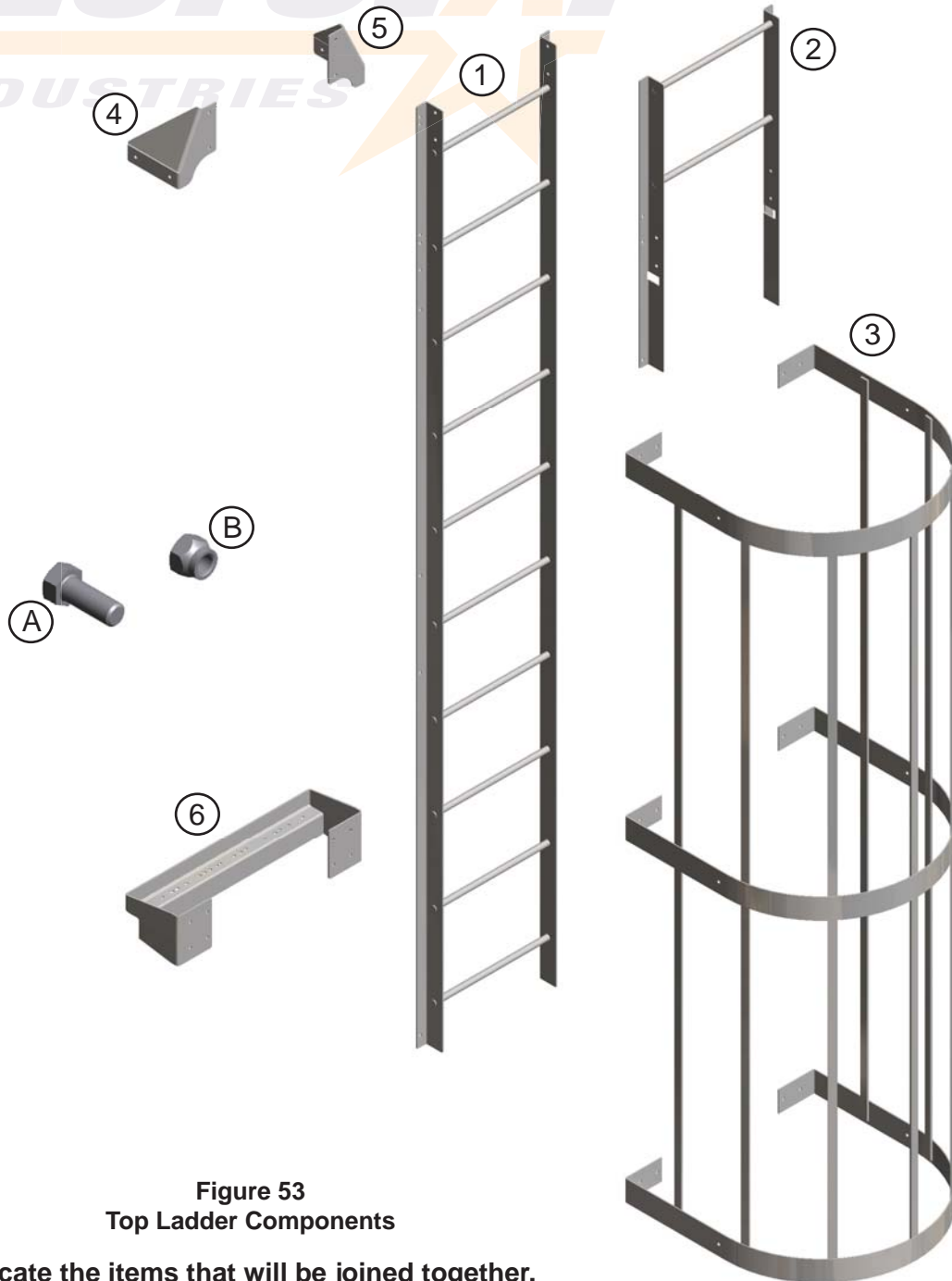


Figure 53
Top Ladder Components

Locate the items that will be joined together.

Item	Description	Qty
1	Top Ladder Section	1
2	Top Ladder Stub	1
3	Top Ladder Cage Weldment	1
4	Right Top Ladder Support	1
5	Left Top Ladder Support	1
6	Mounting Bracket	1
A	3/8" x 1" Bolt	18
B	3/8" Nylon Locknut	18

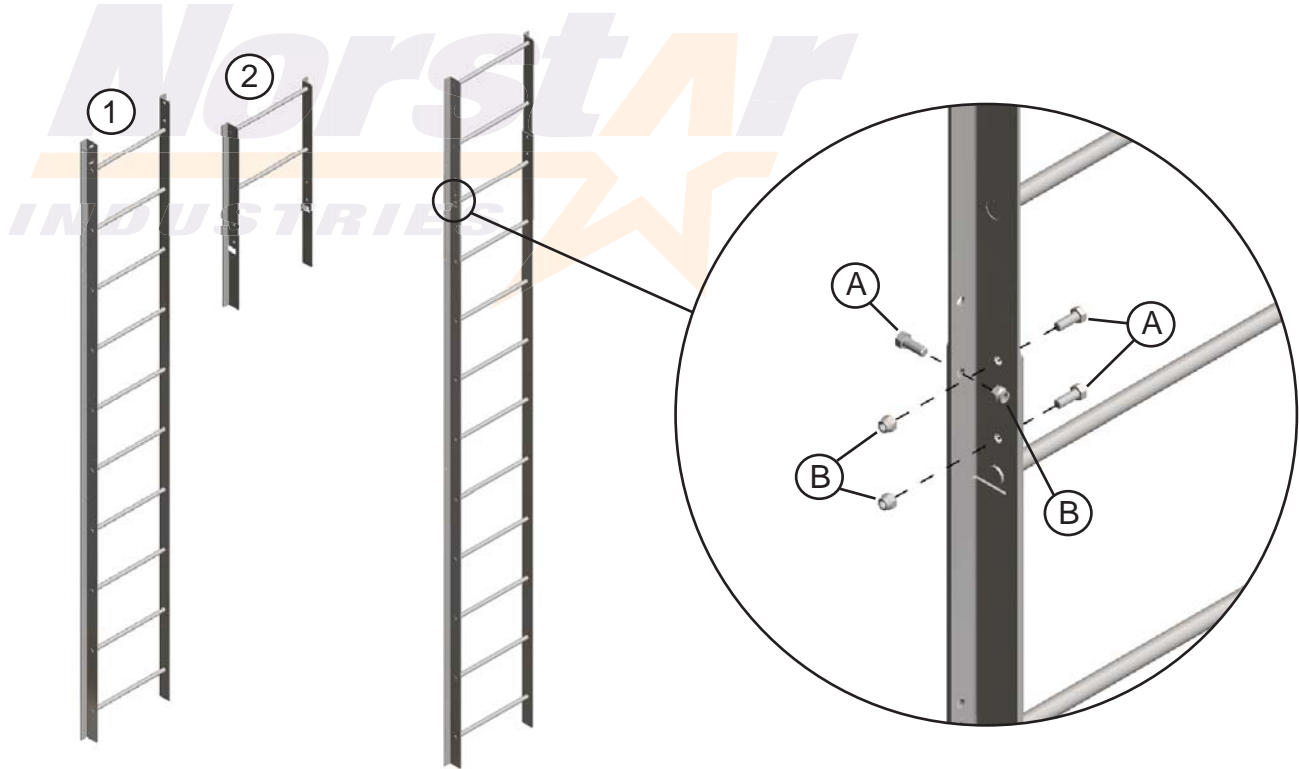


Figure 54
Ladder Assembly

Locate the Top Ladder Section and the Top Ladder Stub. Place the Ladder Stub at the top of the ladder. Align the holes and attach using six (6) 3/8" x 1" Bolts and six (6) 3/8" Nylon Locknuts.

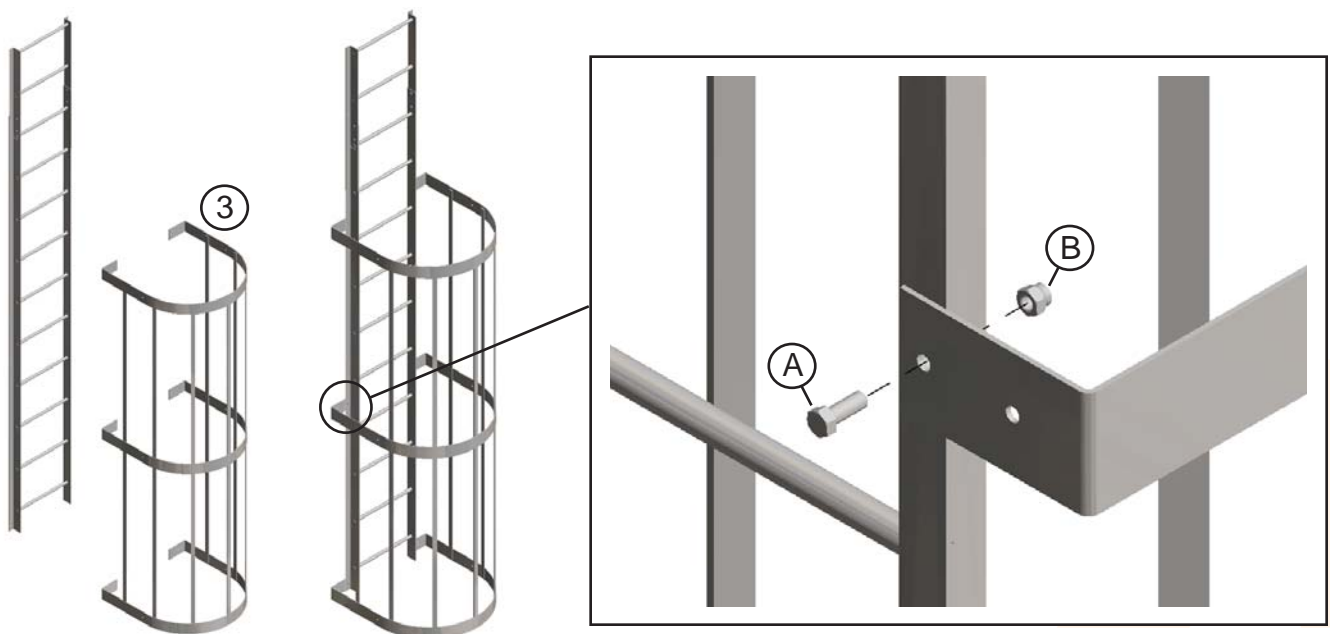


Figure 55
Cage Installation

Locate Top Ladder Cage Weldment and the Ladder Assembly. Place the Ladder on the **INSIDE** of the Cage Weldment flanges. Attach the two pieces using four (4) 3/8" x 1" Bolts and four (4) 3/8" Nylon Locknuts.

DO NOT ATTACH AT THE BOTTOM OF THE LADDER AS THESE HOLES WILL BE USED LATER.

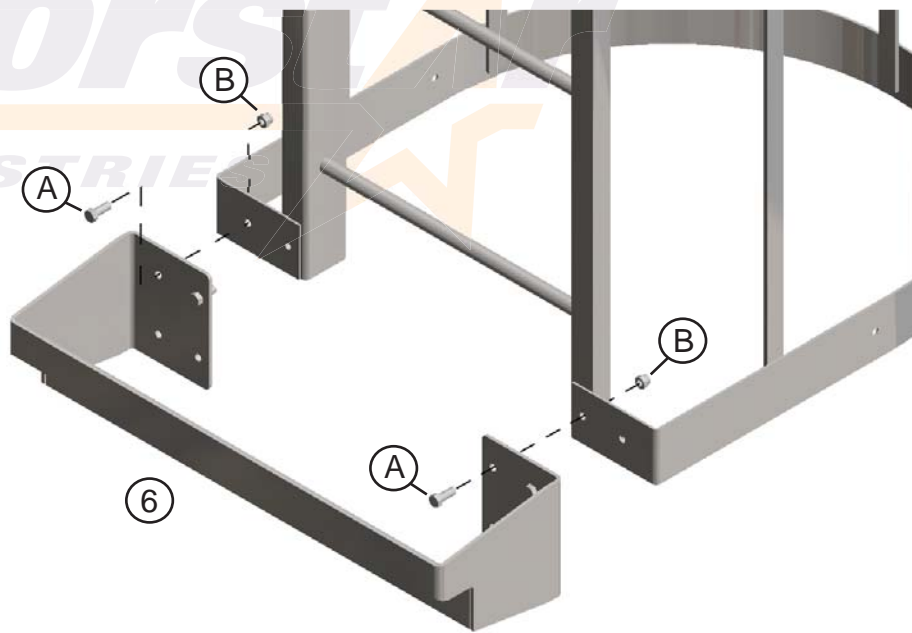
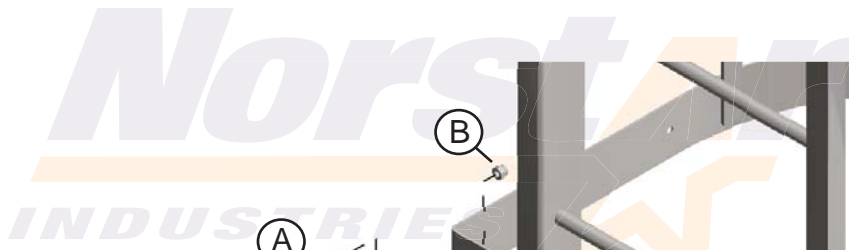


Figure 56
Ladder Mounting Bracket

Locate the Mounting Bracket and attach it to the bottom of the Ladder Assembly using four (4) 3/8" x 1" Bolts and four (4) 3/8" Nylon Locknuts.

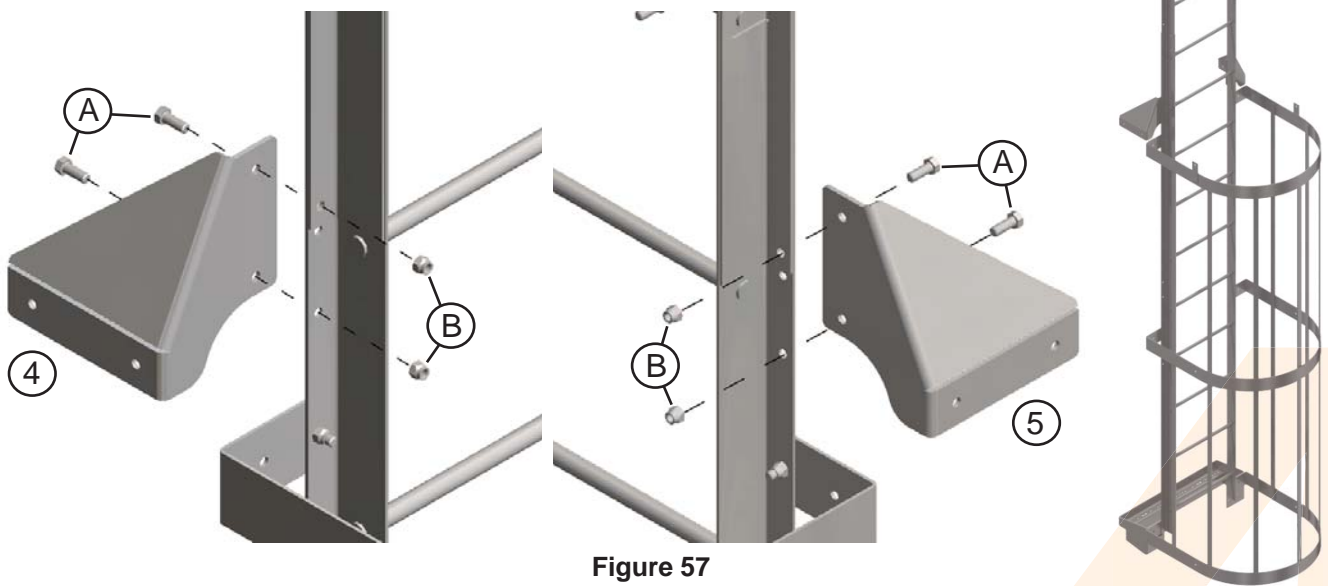


Figure 57
Top Ladder Supports

Locate the Right and Left Top Ladder Supports. Attach each of them to their respective sides using two (2) 3/8" X 1" Bolts and two (2) 3/8" Nylon Locknuts per support.

Rest Platform Assembly



Locate the items that will be joined together.

Item	Description	Qty
1	10' Ladder Section	1
2	Rest Platform Ladder Section	1
3	Rest Platform Weldment	1
4	Cage Flare	1
5	Warp Cage	1
6	Trunking Clamp Bar	1
7	Mounting Bracket	2
A	3/8" x 1" Bolt	20
B	3/8" Nylon Locknut	20
C	3/8" Flatwasher	2

Figure 58
Rest Platform Components



Locate the Rest Platform, 10' Standard Ladder Section and the Rest Platform Ladder Section



Figure 59
Ladder Placement



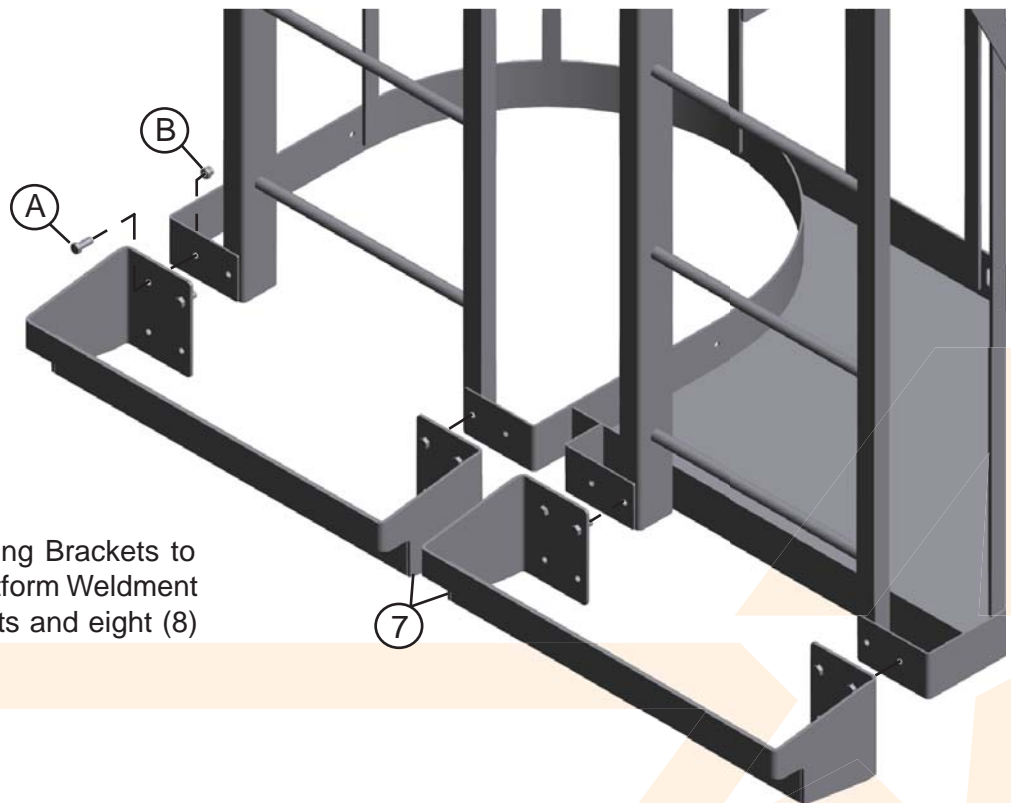
Figure 60
Ladder Placement

Place the Ladder sections **ON THE INSIDE** of the rest platform flanges.



Figure 61
Trunking Clamp Bar Installation

Attach the Trunking Clamp Bar to the Rest Platform Weldment and the Ladder Sections with six (6) 3/8 x 1" Bolts and six (6) 3/8" Nylon Locknuts.



Attach both of the Mounting Brackets to the bottom of the Rest Platform Weldment with eight (8) 3/8 x 1" Bolts and eight (8) 3/8" Nylon Locknuts.

Figure 62
Mounting Bracket Installation

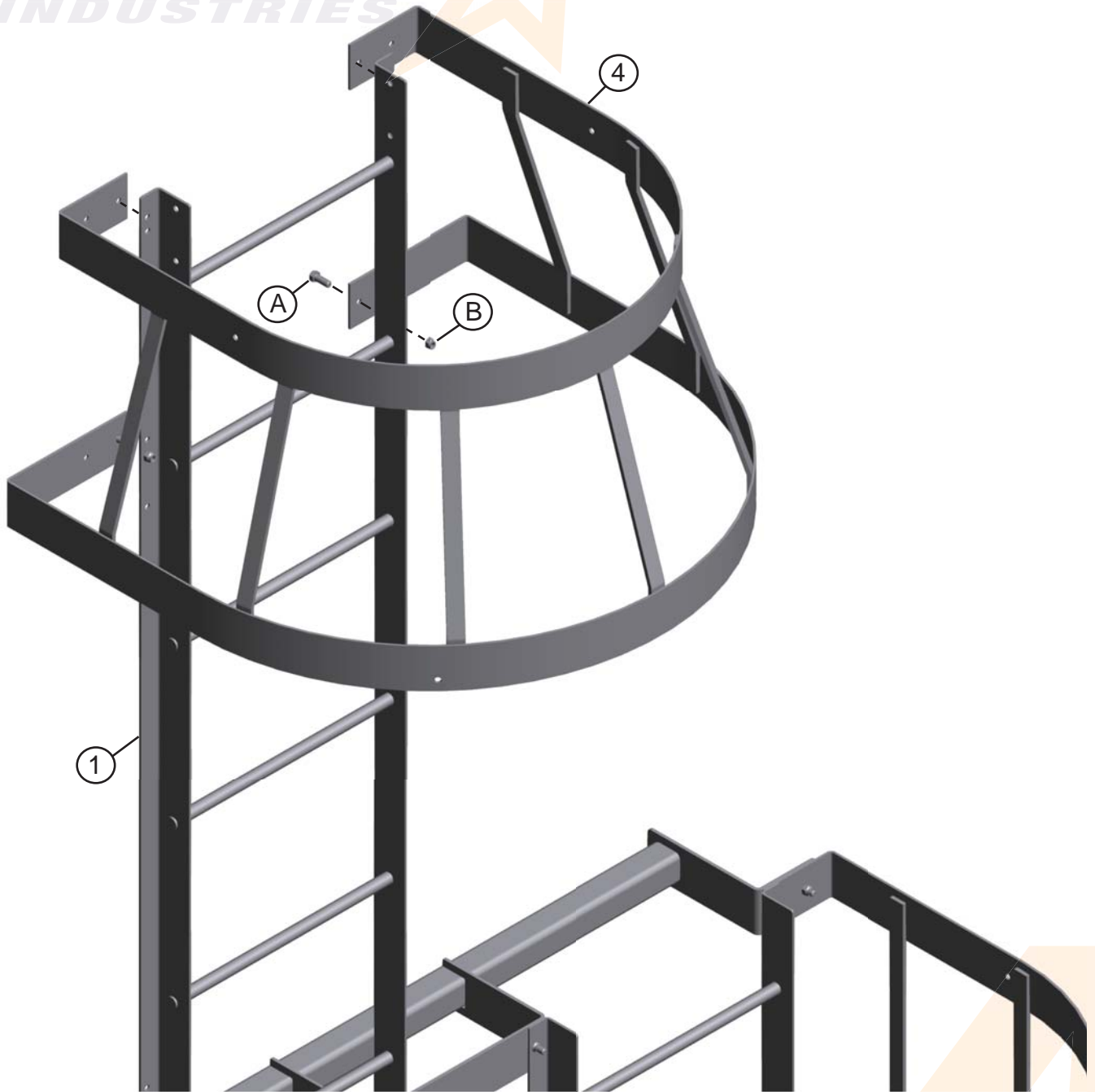
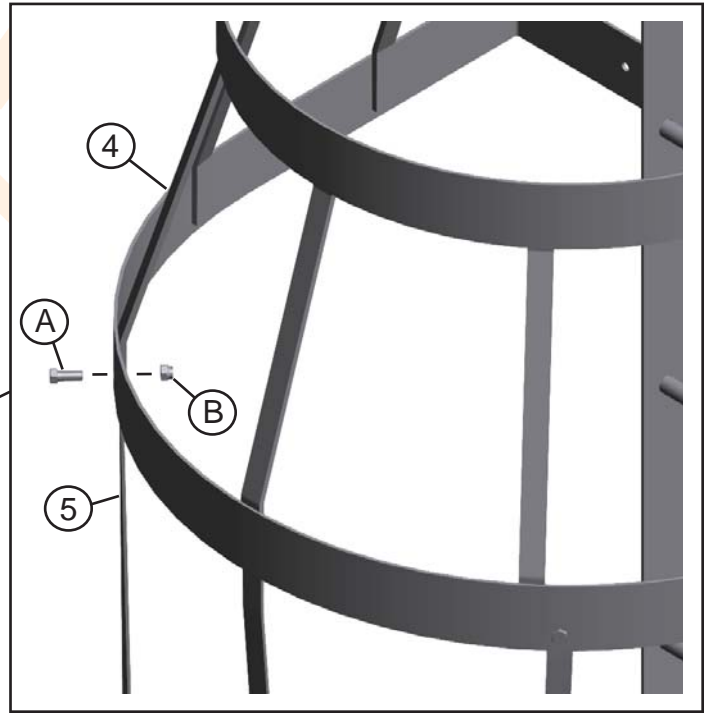


Figure 63
Cage Flare Installation

Place the Cage Flare against the outside of the 10' Ladder Section and **only attach the bottom holes** with two (2) 3/8 x 1" Bolts and two (2) 3/8" Nylon Locknuts

With two (2) 3/8 x 1" Bolts and two (2) 3/8" Nylon Locknuts, attach the wide section of the Warp Cage to the bottom ring of the Cage Flare.

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Attach the thin section of the Warp Cage to the slotted holes on the Rest Platform Weldment with two (2) 3/8 x 1" Bolts, two (2) 3/8" Flatwashers and two (2) 3/8" Nylon Locknuts.

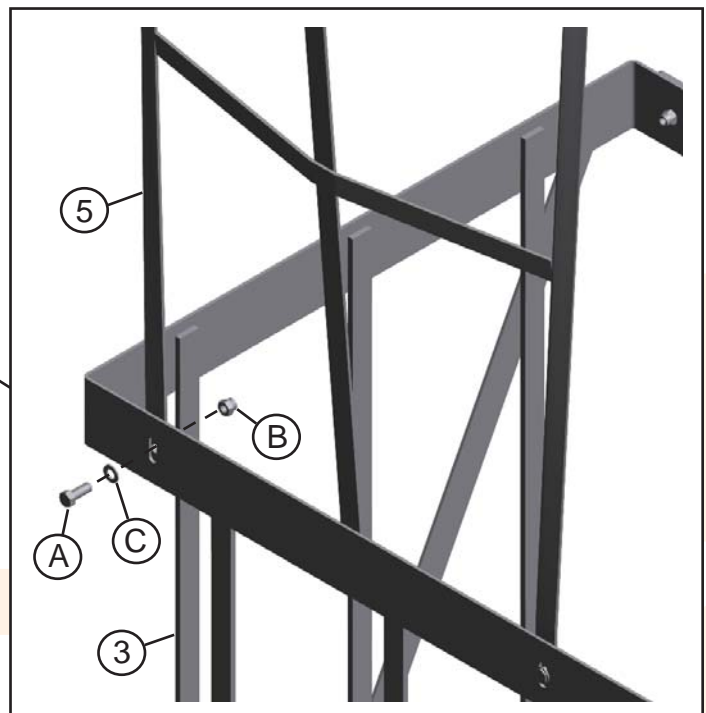
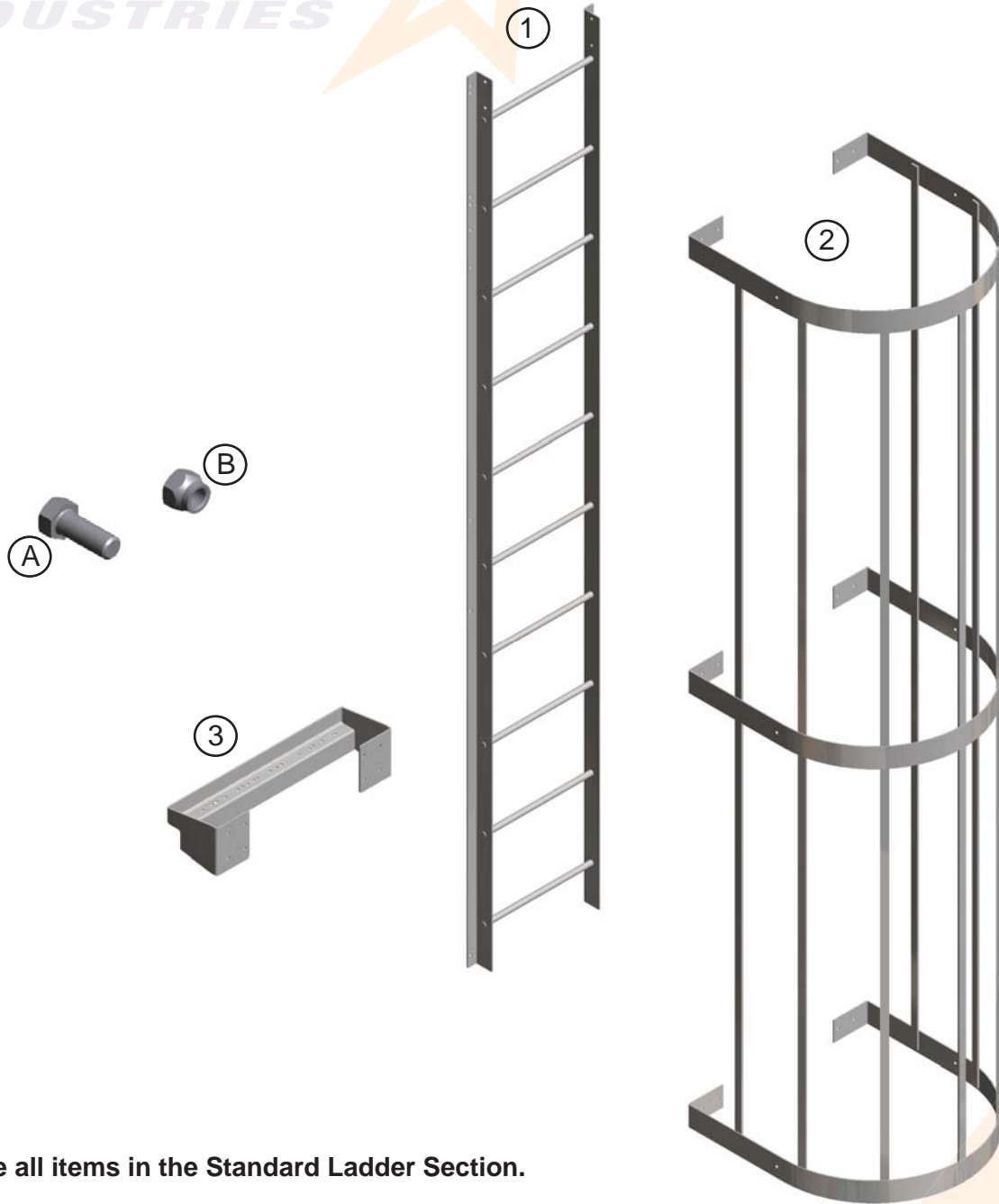


Figure 64
Warp Cage Installation

Standard Ladder Assembly



Locate all items in the Standard Ladder Section.

Item	Description	Qty
1	10' Ladder Section	1
2	10' Cage Weldment	1
3	Mounting Bracket	1
A	3/8" x 1" Bolt	6
B	3/8" Nylon Locknut	6

Figure 65
Standard Ladder Components

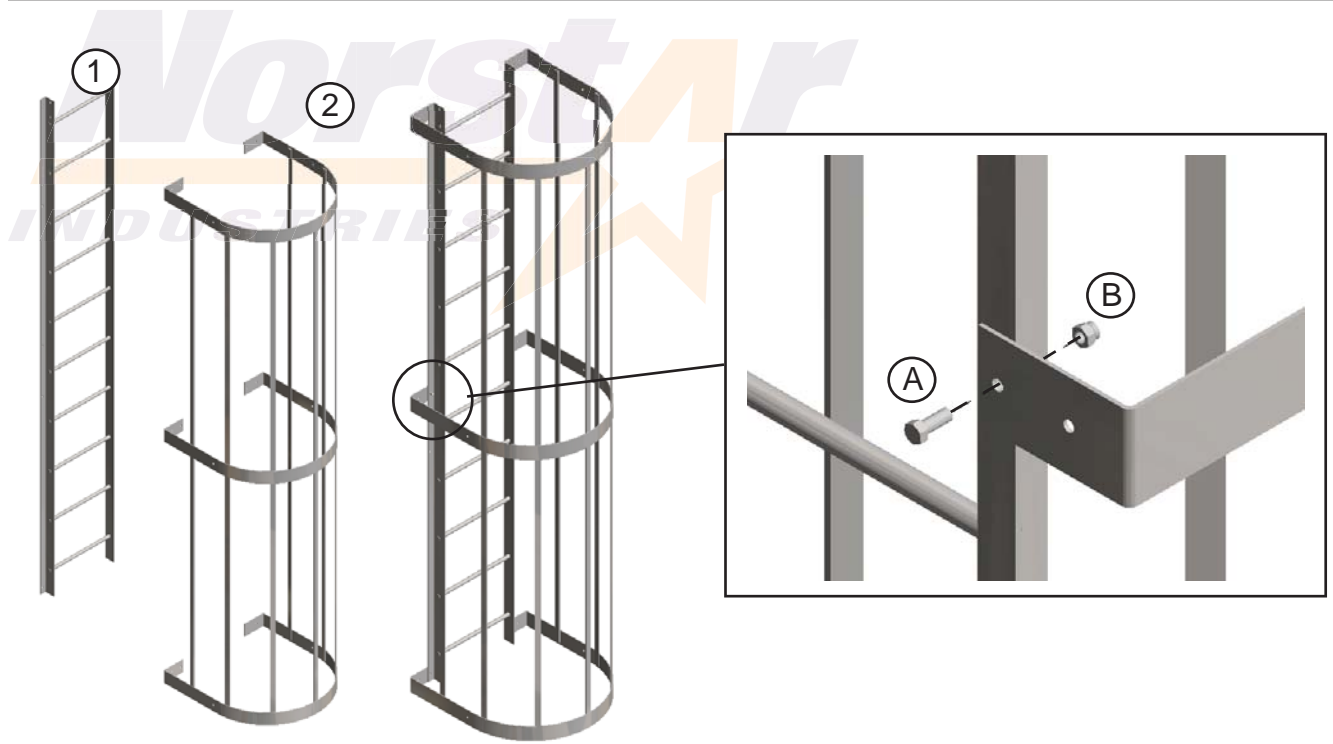


Figure 66
Ladder Installation

Locate the 10' Cage Weldment and the 10' Ladder Weldment. Place the Ladder on the **INSIDE** of the Cage Weldment flanges. Attach the two pieces using two (2) 3/8 x 1" Bolts and two (2) 3/8" Nylon Lock-nuts.

DO NOT attach at the bottom or top of the ladder as these holes will be used later.

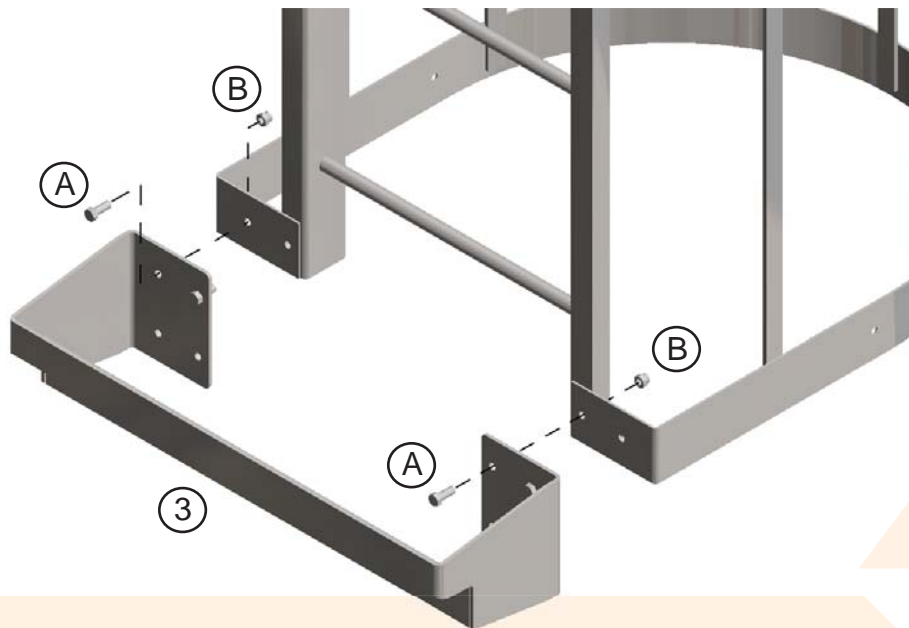


Figure 67
Mounting Bracket Installation

Locate the Mounting Bracket and attach it to the bottom of the Ladder Assembly using four (4) 3/8" x 1" Bolts and four (4) 3/8" Nylon Locknuts.

Bottom Ladder Assembly

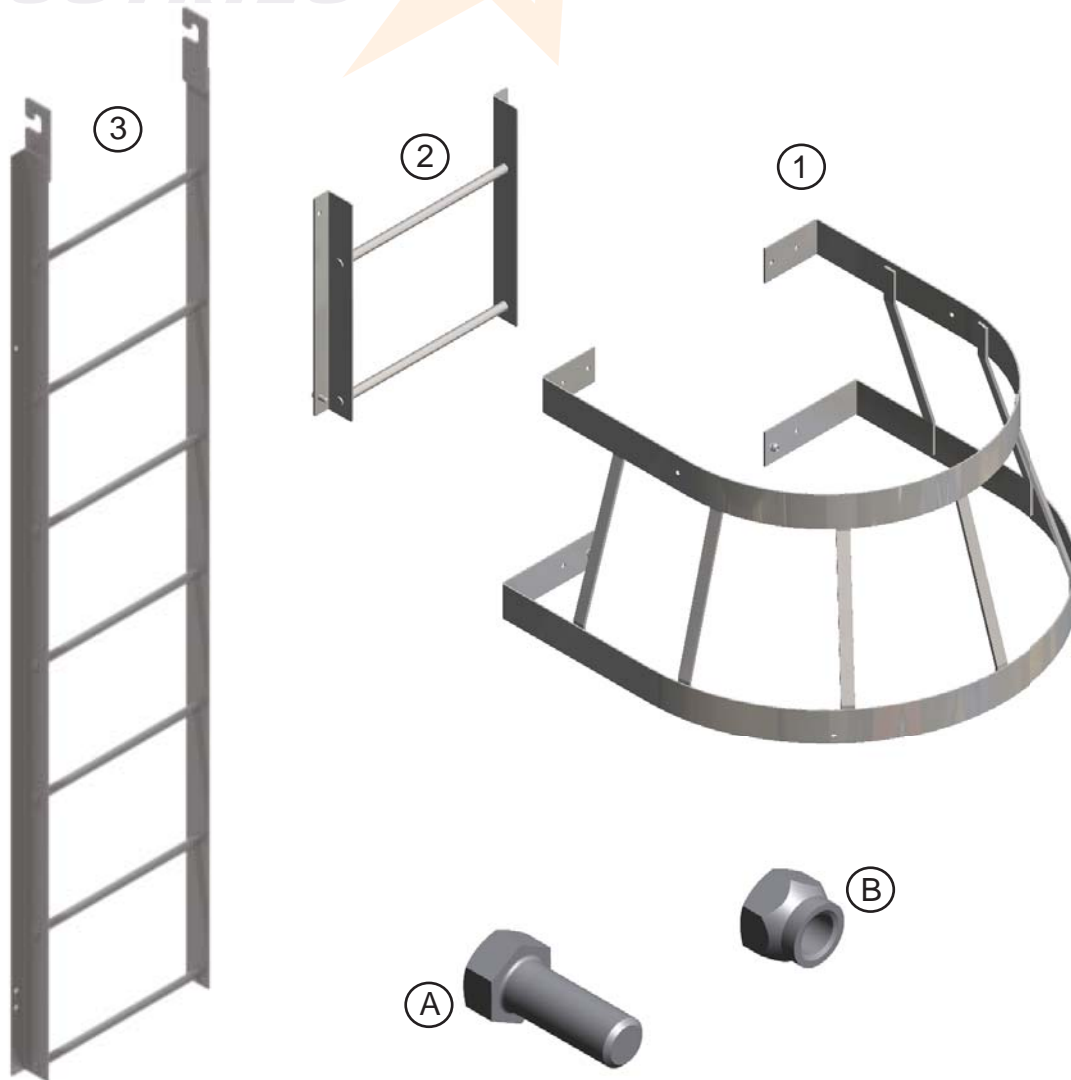


Figure 68
Bottom Ladder Components

Locate the items that will be joined together.

Item	Description	Qty
1	Bottom Ladder Stub	1
2	Cage Flare	1
3	Hanging Ladder Section	1
A	3/8" x 1" Bolt	2
B	3/8" Nylon Locknut	2

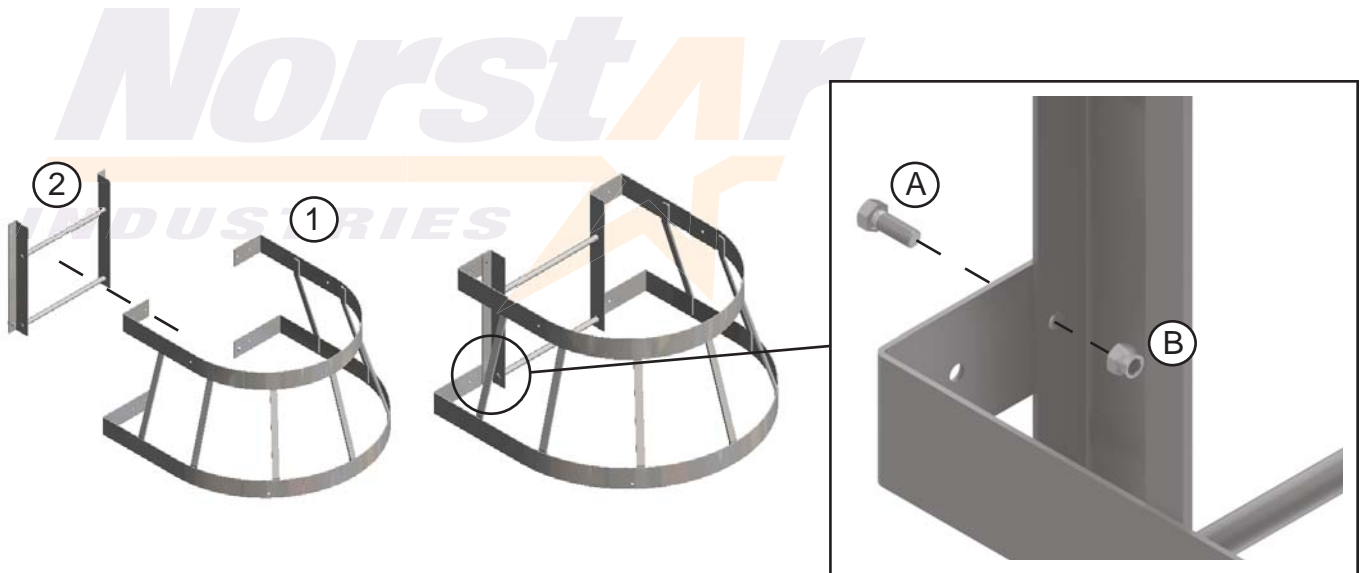


Figure 69
Ladder Installation

Locate the Bottom Ladder Stub and place it on the **INSIDE** of the Cage Flare. Then, using two (2) 3/8 x 1" Bolts and 3/8" Nylon Locknuts, secure the sections together at the Cage's bottom holes. **DO NOT USE THE TOP HOLES, THEY WILL BE USED LATER.**

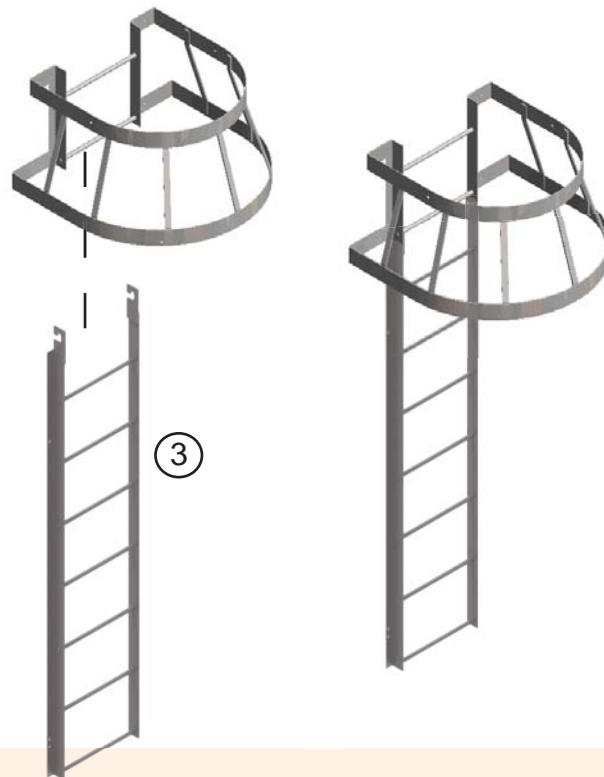


Figure 70
Hanging Ladder

Locate the Hanging Ladder Section and hook it onto the bottom of the Bottom Ladder Assembly.

Top Ladder Installation

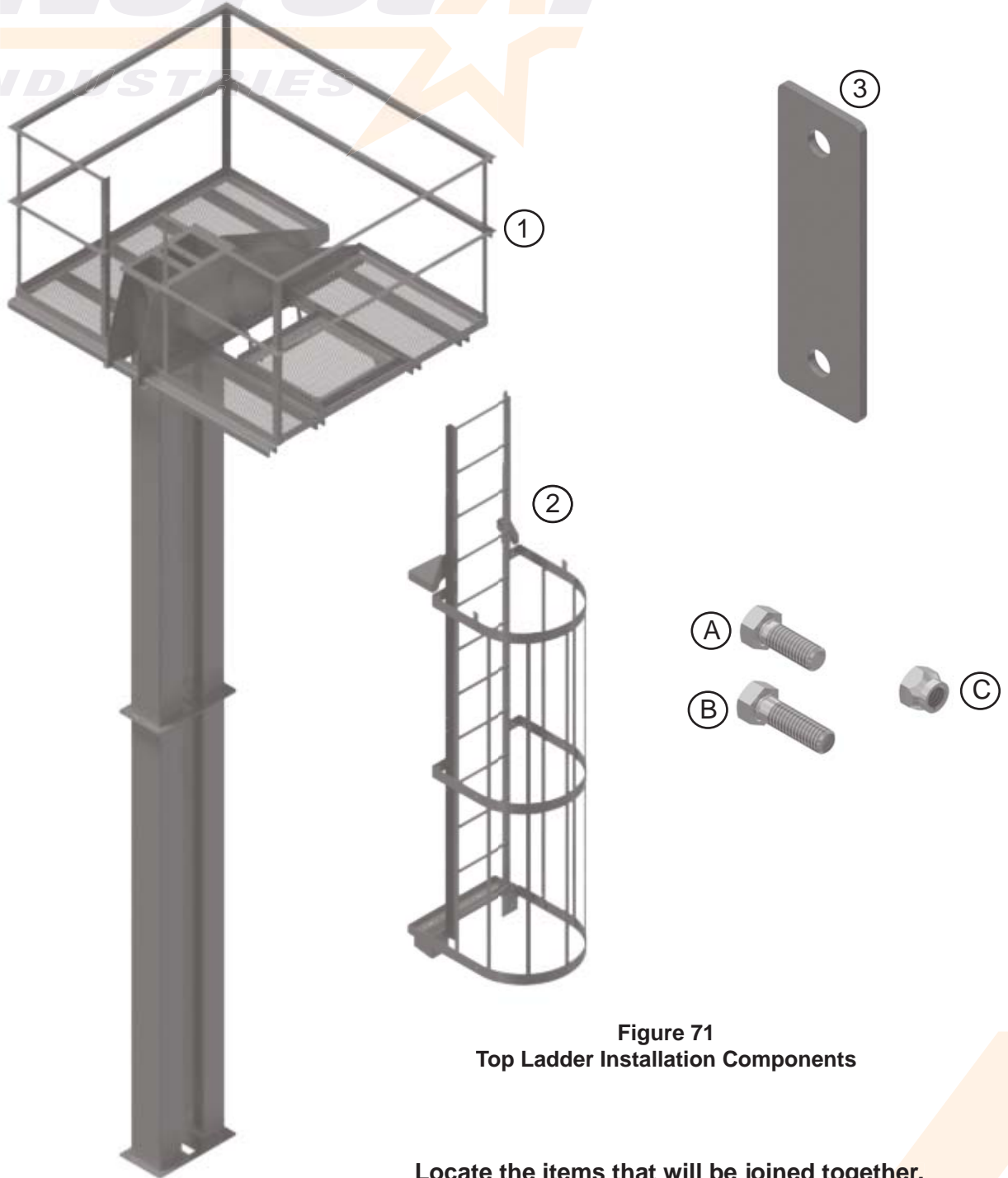


Figure 71
Top Ladder Installation Components

Locate the items that will be joined together.

Item	Description	Qty
1	Head Platform/Trunking	1
2	Top Ladder Assembly	1
3	Ladder Connector Plate	2
A	3/8" x 1" Bolt	8
B	3/8" x 1 1/2" Bolt	n/a
C	3/8" Nylon Locknut	n/a



***NOTE* TRAPDOOR HAS BEEN REMOVED FOR CLARITY.**



Figure 72
Top Ladder Placement

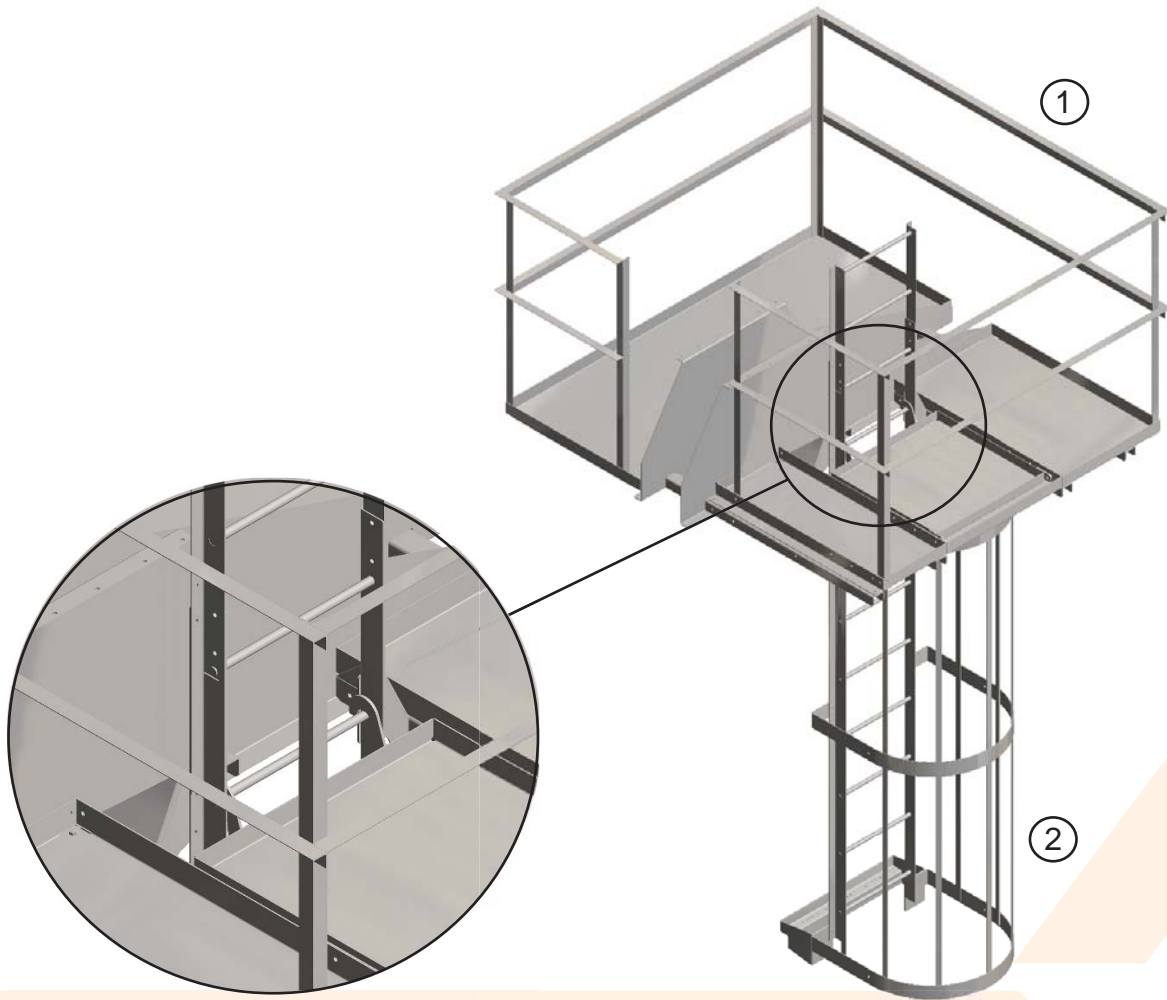


Figure 73
Top Ladder Placement

Locate the Head Platform Assembly and the Top Ladder Assembly. Move the Top Ladder Assembly into the opening on the Head Platform Assembly. Align the holes from the Top Ladder Left and Right Supports with the holes (**Figure 69**) on the Head Platform Assembly.

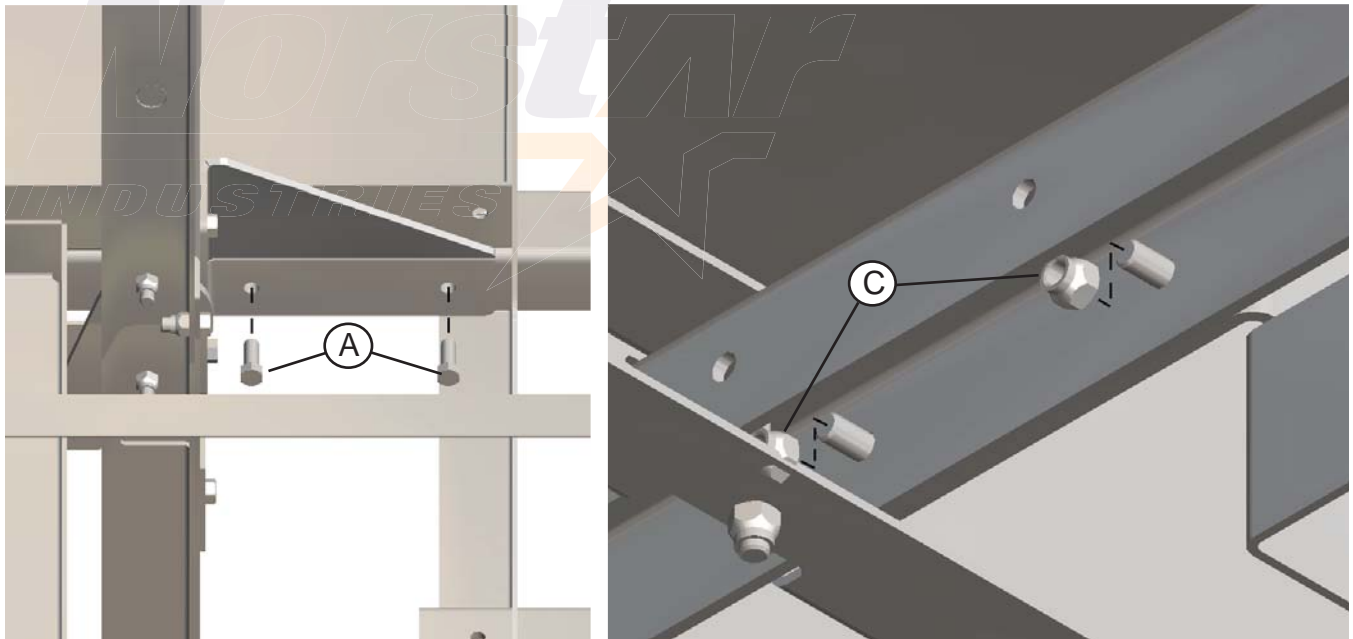


Figure 74
Top Ladder Top Mounting

Attach the Top Ladder Assembly to the Head Platform Assembly using four (4) 3/8" x 1" Bolts and four (4) 3/8" Nylon Locknuts. (2 per side)

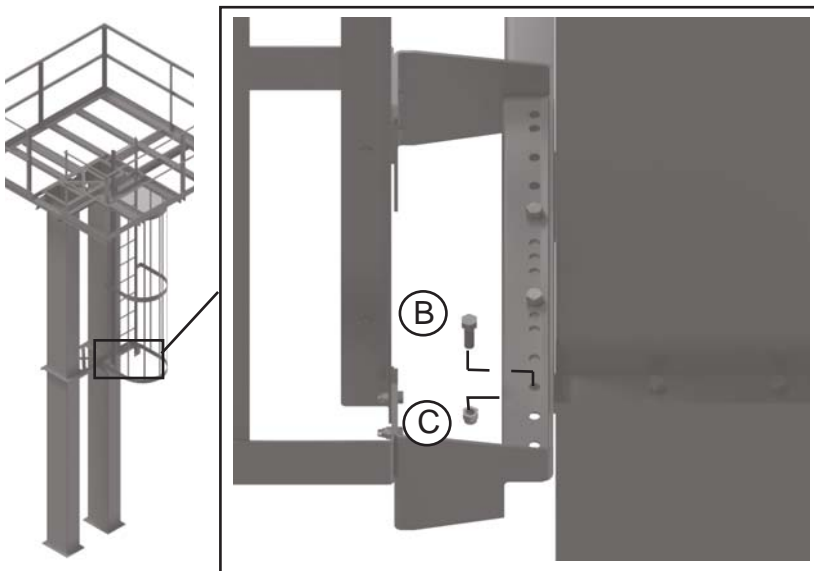


Figure 75
Top Ladder Bottom Mounting

Ensure the Top Ladder Assembly is vertically level. Using 3/8 x 1 1/2" Bolts and 3/8" Nylon Locknuts, secure the base of the Top Ladder to the Trunking Assembly.

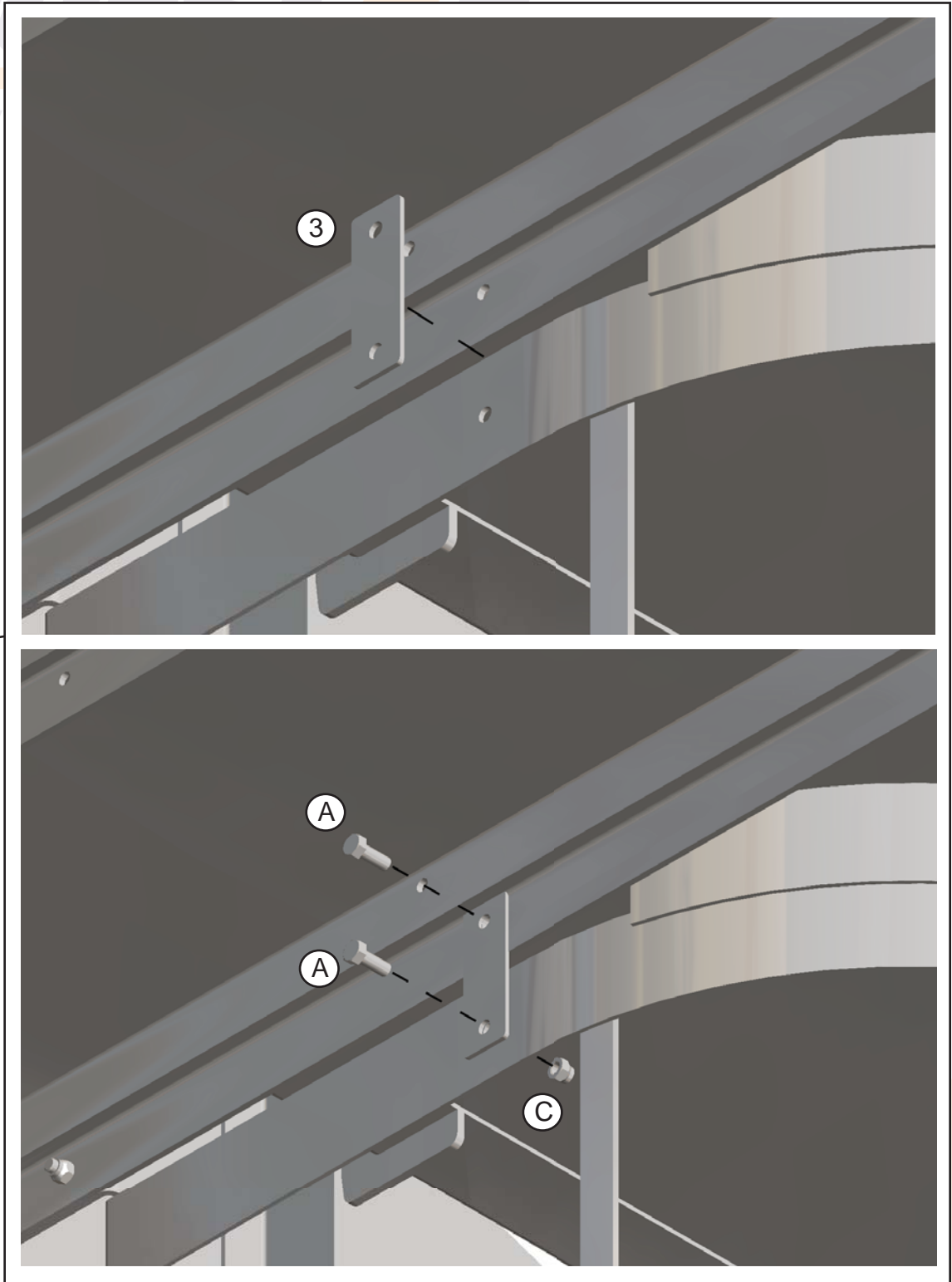
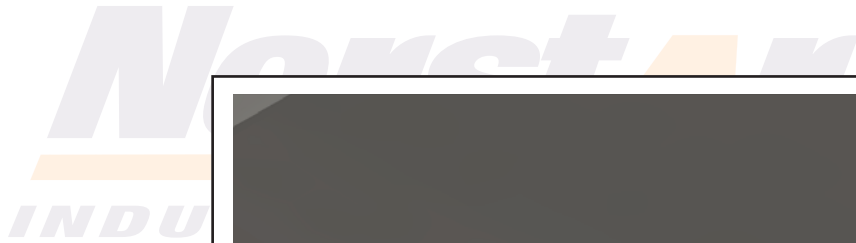


Figure 76
Connector Plate

Locate the Ladder Connector Plates and align them with the holes on both sides of the Ladder's connection points. Using two (2) 3/8 x 1" Bolts and 3/8" Nylon Locknuts, per side, secure the plates to the Ladder and the Platform.

Rest Platform Installation

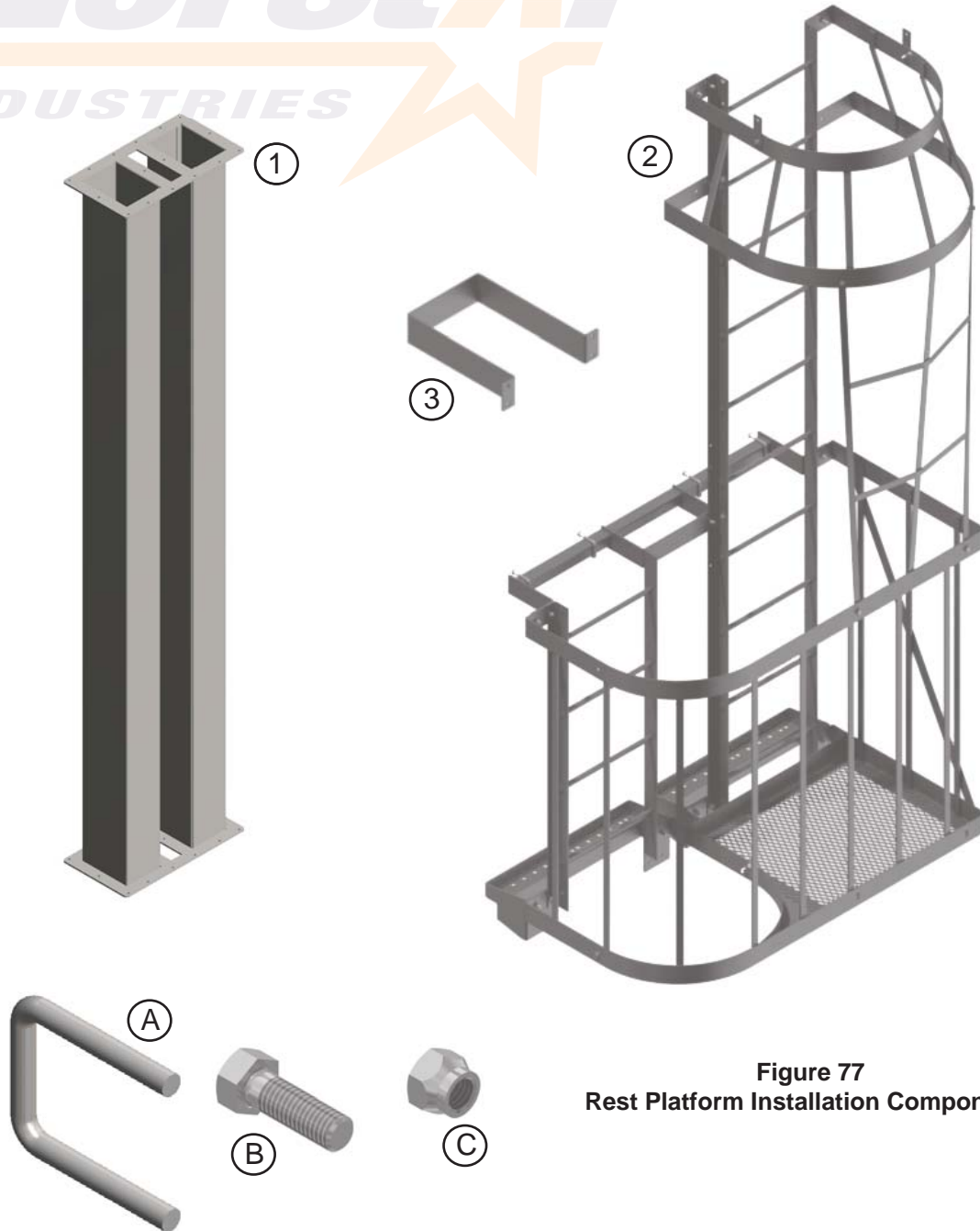


Figure 77
Rest Platform Installation Components

Locate the items that will be joined together.

Item	Description	Qty
1	Trunking Assembly	1
2	Rest Platform Assembly	1
3	Trunking Clamp	2
A	3/8" x 2" x 2 3/4" U-Bolt	4
B	3/8" x 1 1/2" Bolt	n/a
C	3/8" Nylon Locknut	n/a

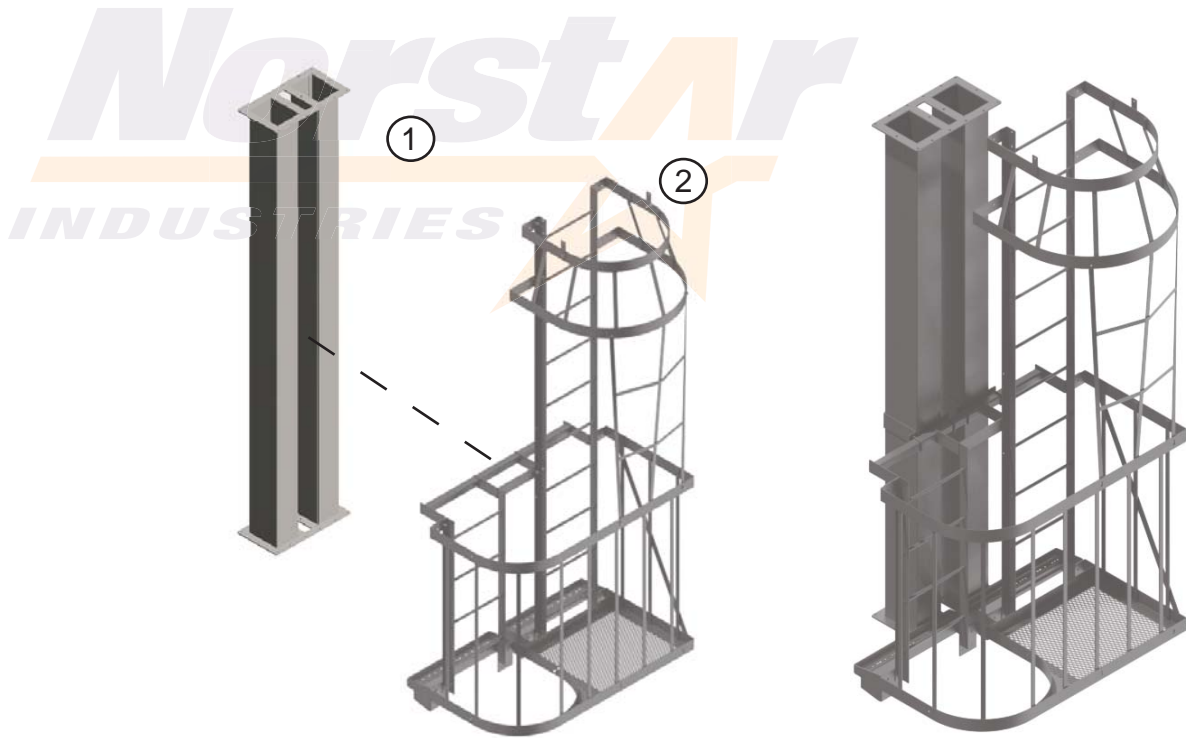


Figure 78
Rest Platform Placement

Locate the Rest Platform Assembly to be installed and place it on the Trunking Assembly.

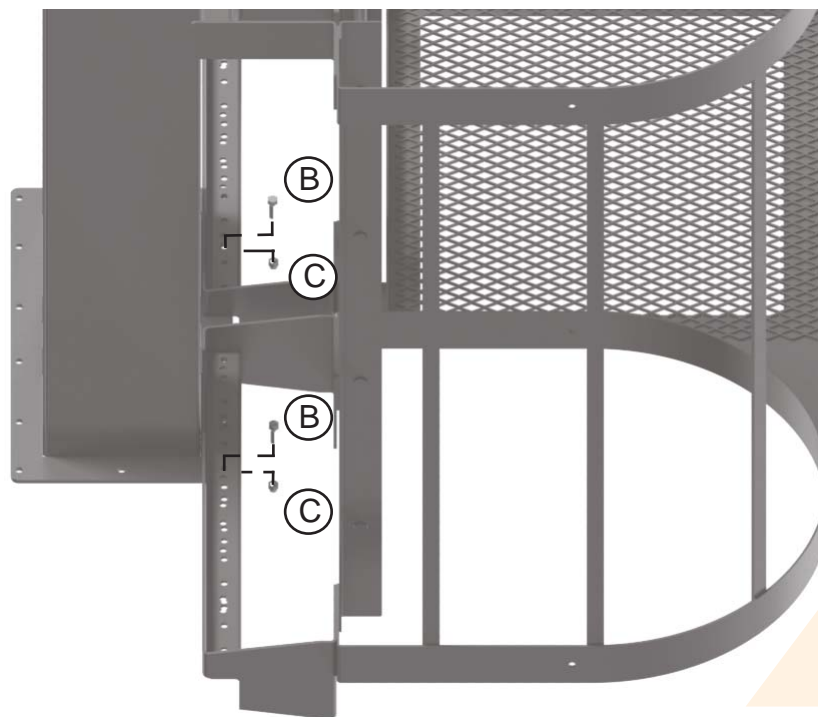


Figure 79
Rest Platform Mounting

Center the Rest Platform Assembly on the Trunking Assembly and align the holes on the Trunking Flanges and the Ladder Mounting Brackets. Using four (4) 3/8 x 1 1/2" Bolts and 3/8" Nylon Locknuts on 6" models or six (6) 3/8 x 1 1/2" Bolts and 3/8" Nylon Locknuts on 8" and 12" models, secure the base of the Rest Platform to the Trunking.

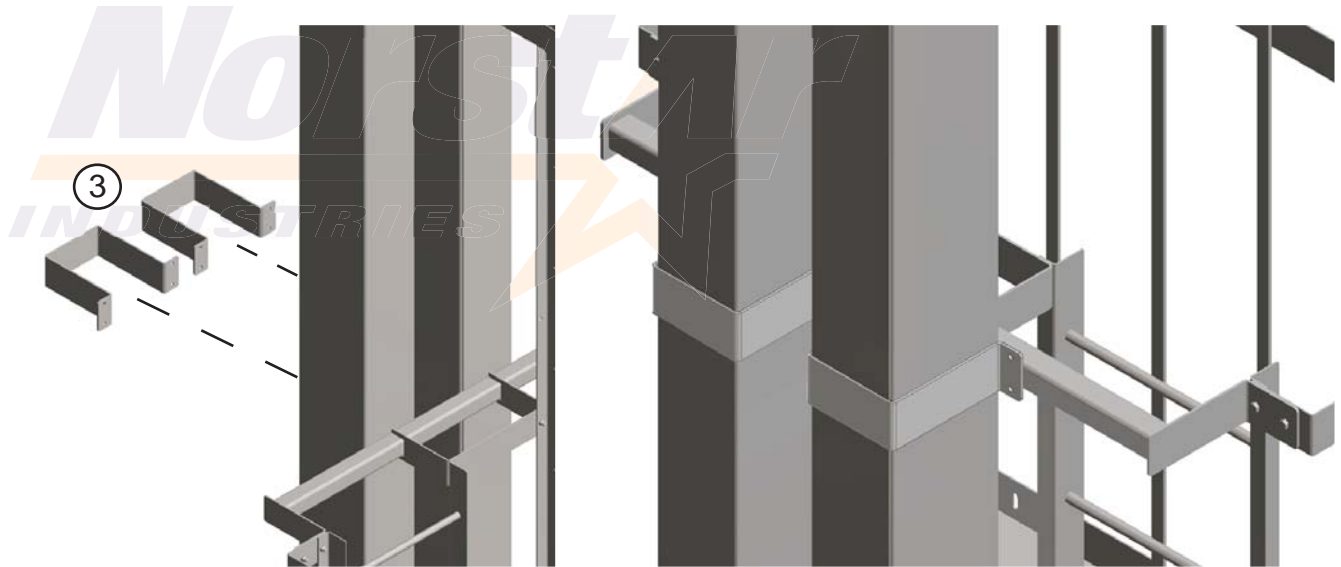


Figure 80
Rest Platform Clamps

Locate the Trunking Clamps for the Rest Platform. **The trunking clamps are longer than they are wide.** Place them against the Elevator Trunking, aligned with the Clamp Bar on the Rest Platform.

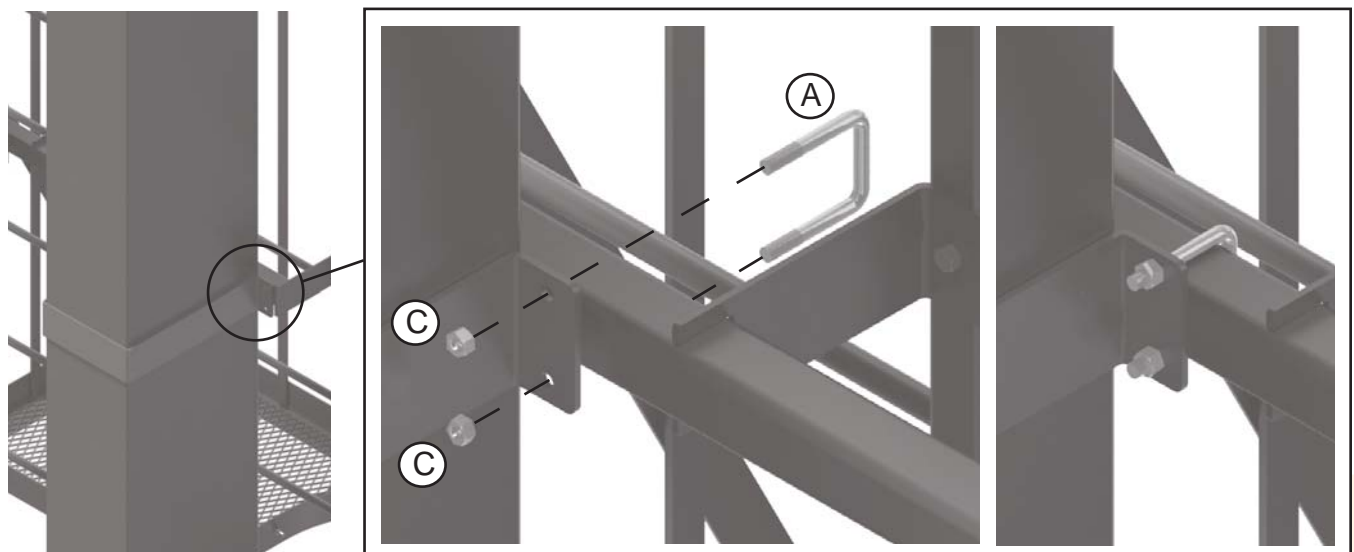


Figure 81
Clamp Security

Using two (2) 3/8" U-Bolts and four (4) 3/8" Nylon Locknuts, per Trunking Clamp, secure the middle of the Rest Platform to the Trunking.

Straight Ladder Installation

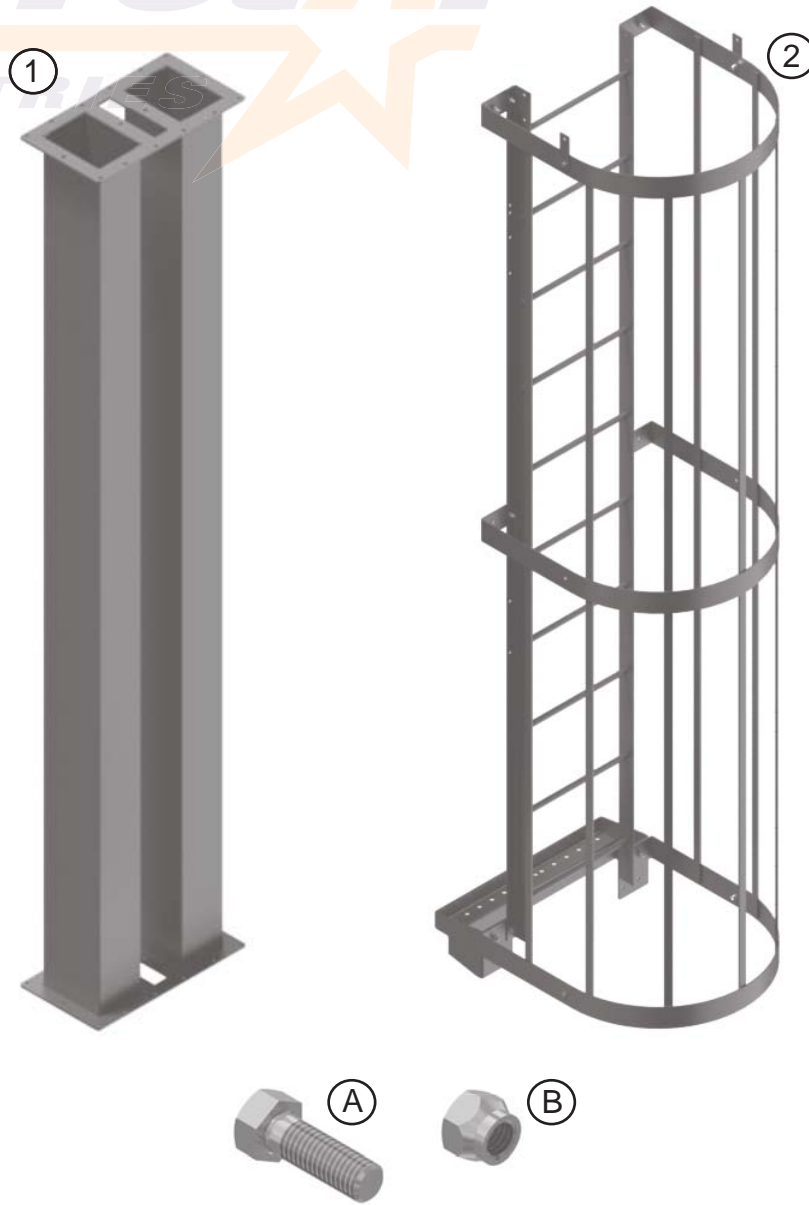


Figure 82
Ladder Installation Components

Locate the items that will be joined together.

Item	Description	Qty
1	Trunking Assembly	1
2	Ladder Assembly	1
A	3/8" x 1 1/2" Bolt	n/a
B	3/8" Nylon Locknut	n/a

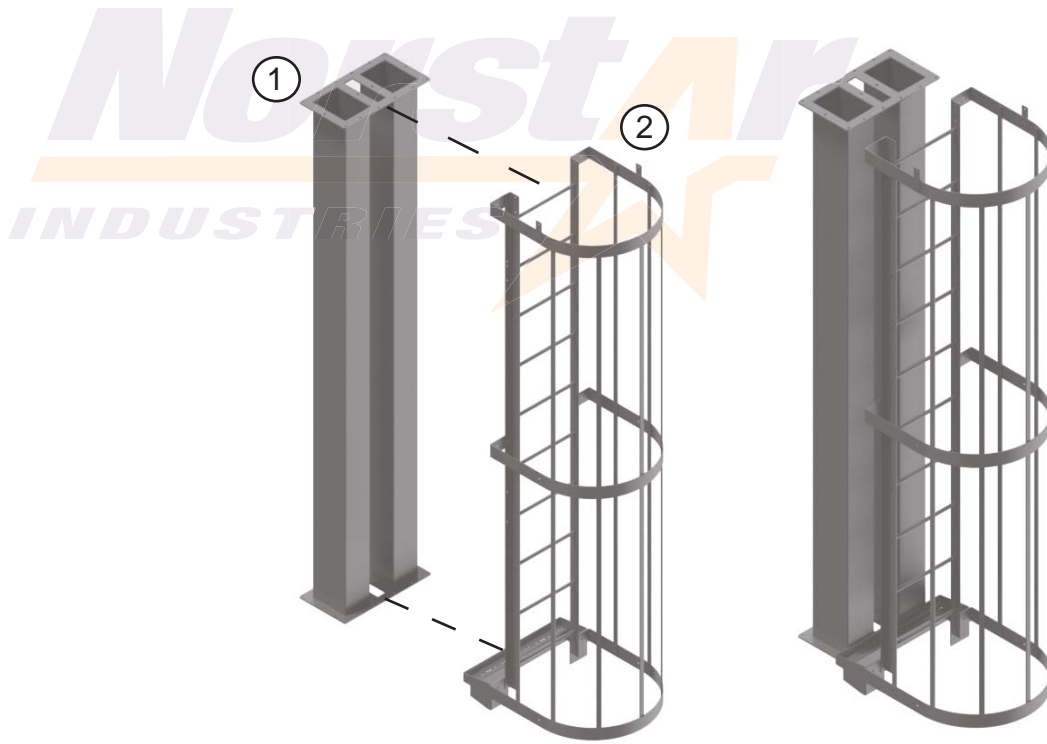


Figure 83
Ladder Placement

Locate the Ladder to be attached to the Bucket Elevator Trunking. Place the Ladder, centered, against the trunking and align the holes on the Ladder Mounting Bracket to the Trunking Flange.

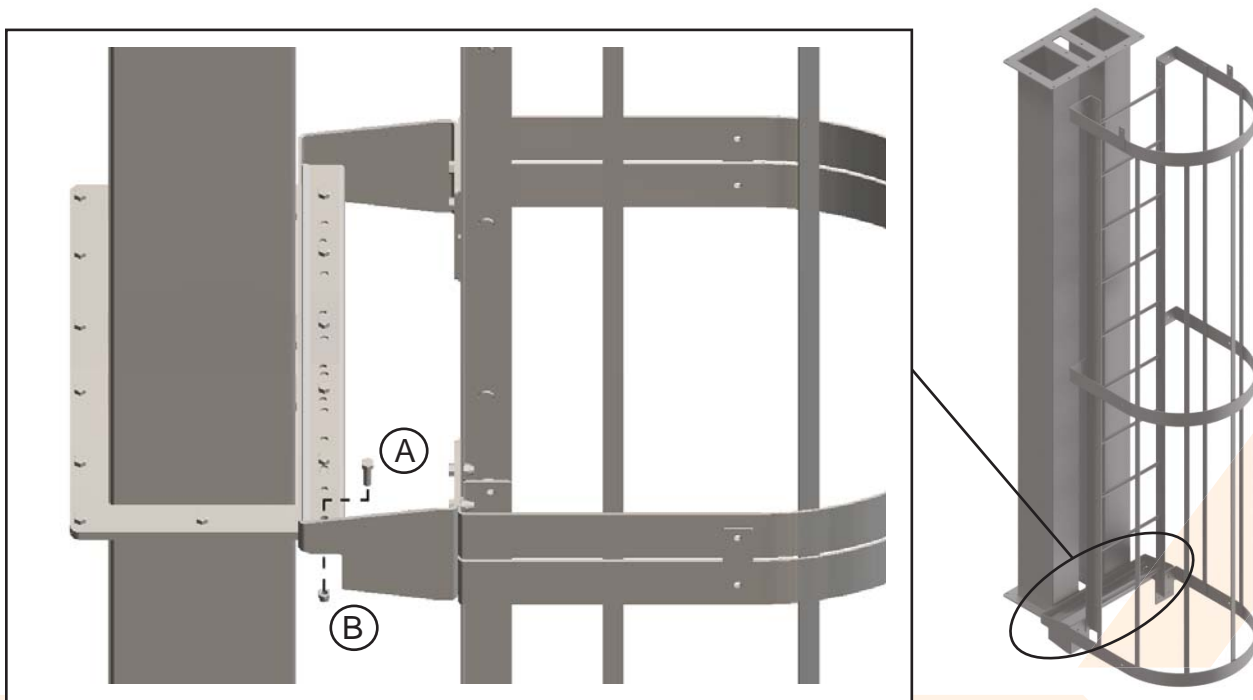


Figure 84
Ladder Mounting

Using six (6) 3/8 x 1 1/2" Bolts and 3/8" Nylon Locknuts on 6" and 8" models or four (4) 3/8 x 1 1/2" Bolts and 3/8" Nylon Locknuts on 12" models, secure the Ladder Section to the Bucket Elevator Trunking.

Offset Ladder Installation

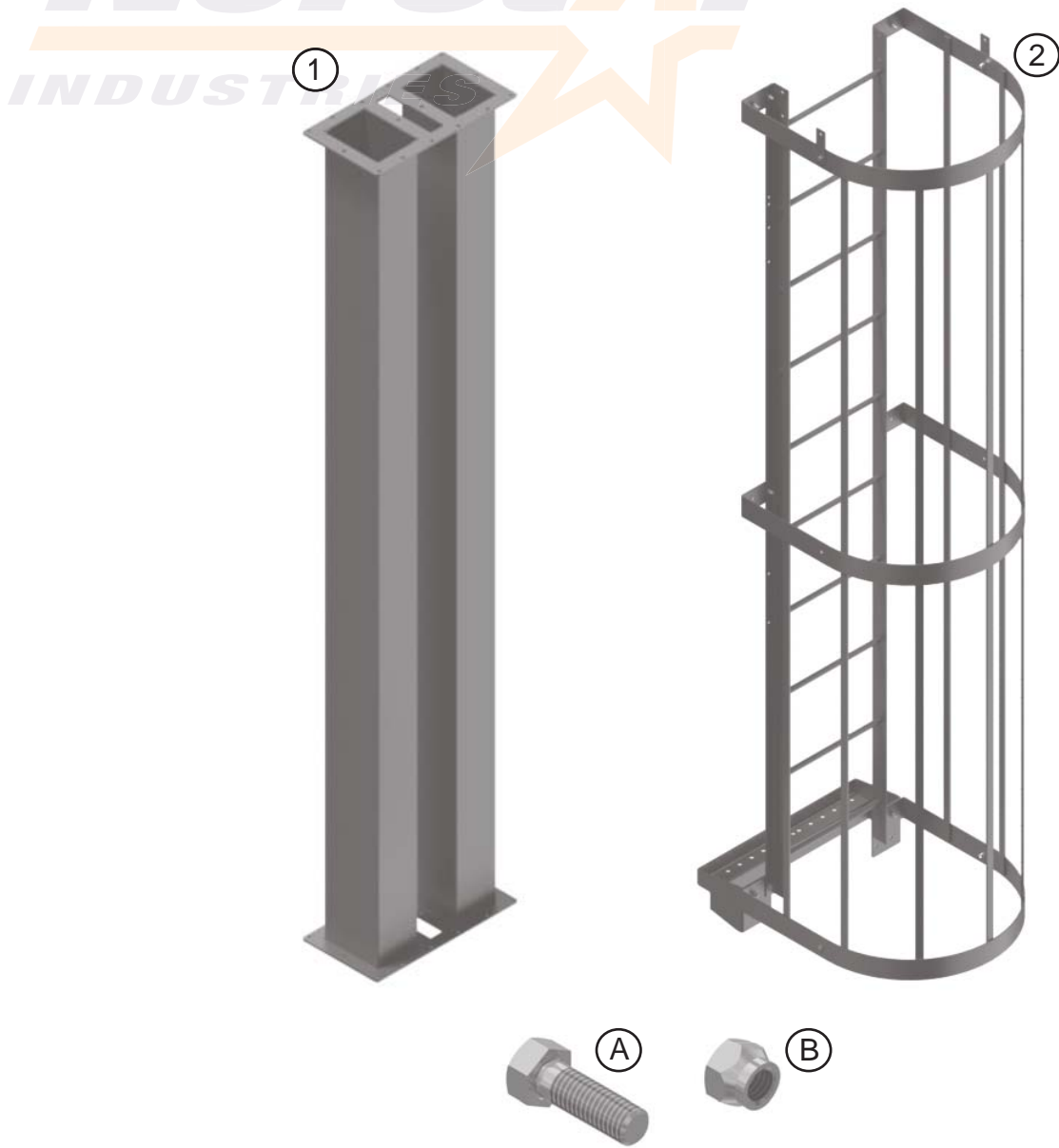


Figure 85
Ladder Installation Components

Locate the items that will be joined together.

Item	Description	Qty
1	Trunking Assembly	1
2	Ladder Assembly	1
A	3/8" x 1 1/2" Bolt	3
B	3/8" Nylon Locknut	3

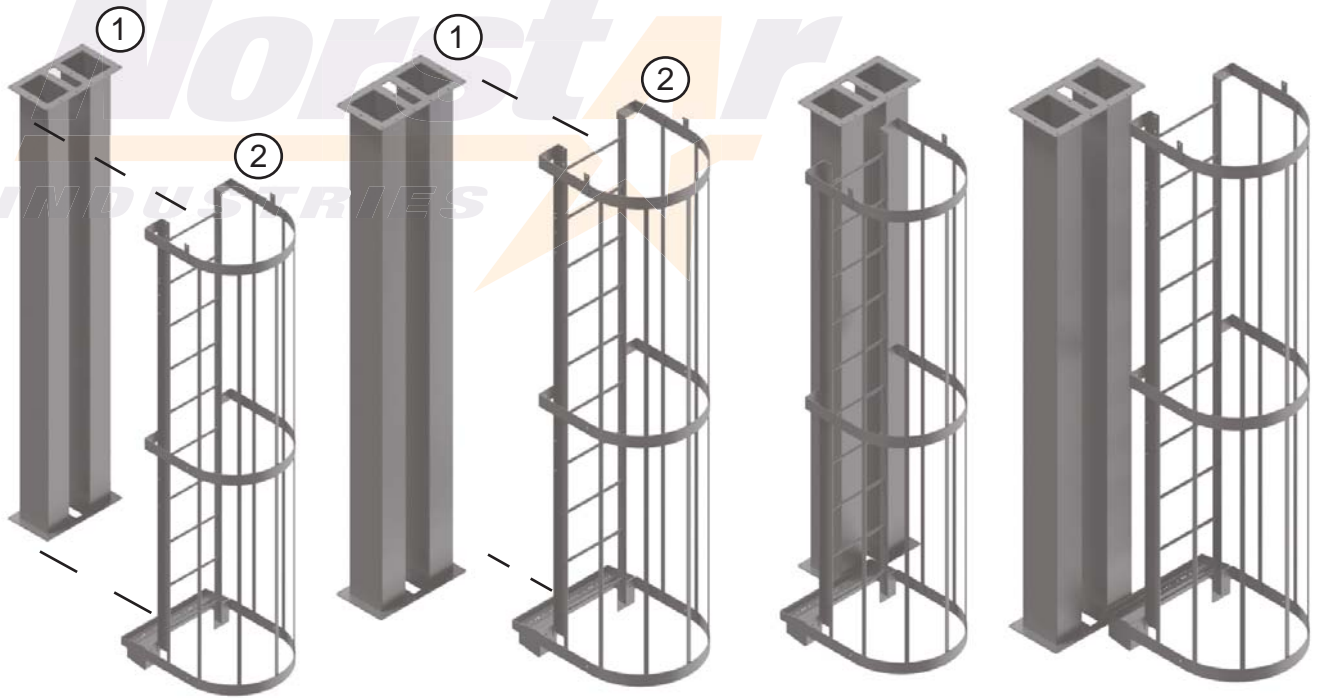


Figure 86
Ladder Placement

Locate the Ladder to be attached to the Bucket Elevator Trunking. Place the Ladder, offset, against the trunking and align the holes on the Ladder Mounting Bracket to the Trunking Flange.

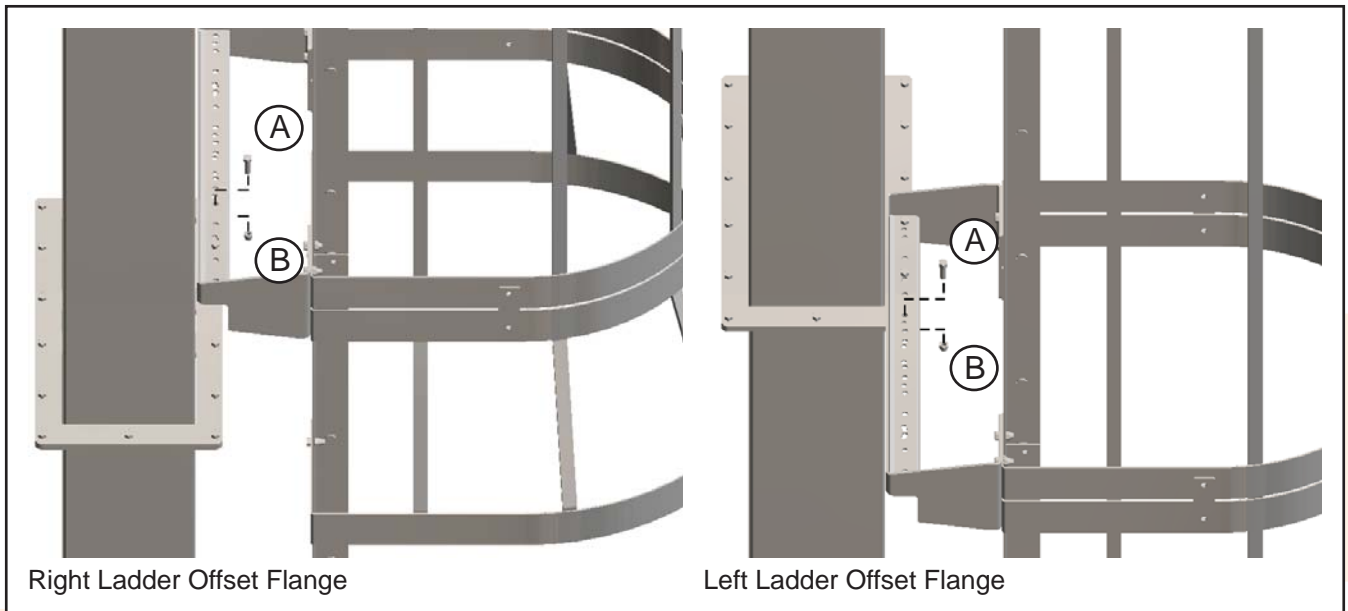


Figure 87
Ladder Mounting

Using three (3) 3/8 x 1 1/2" Bolts and 3/8" Nylon Locknuts, secure the Ladder Section to the Bucket Elevator Trunking.

Ladder to Ladder Installation

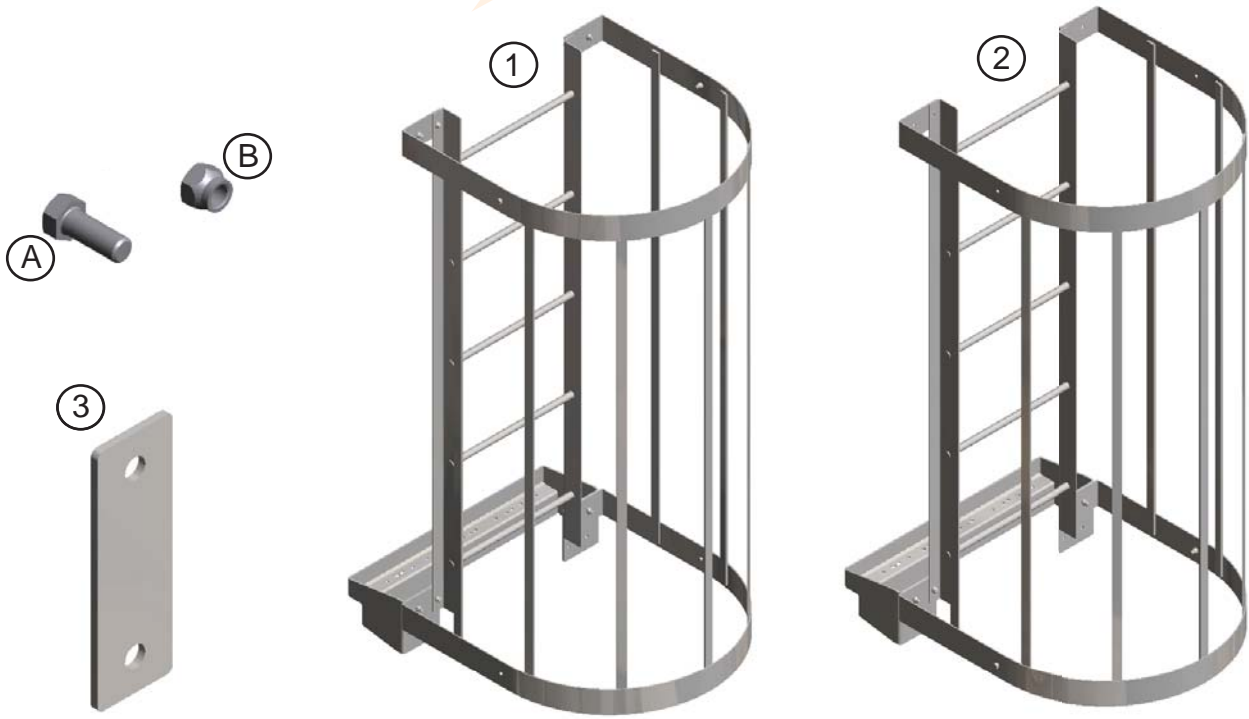


Figure 88
Ladder to Ladder Components

Locate the items that will be joined together. Items may not appear as shown.

Item	Description	Qty
1	First Ladder Section	1
2	Second Ladder Section	1
3	Ladder Connector Plate	2
A	3/8" x 1" Bolt	4
B	3/8" Nylon Locknut	4

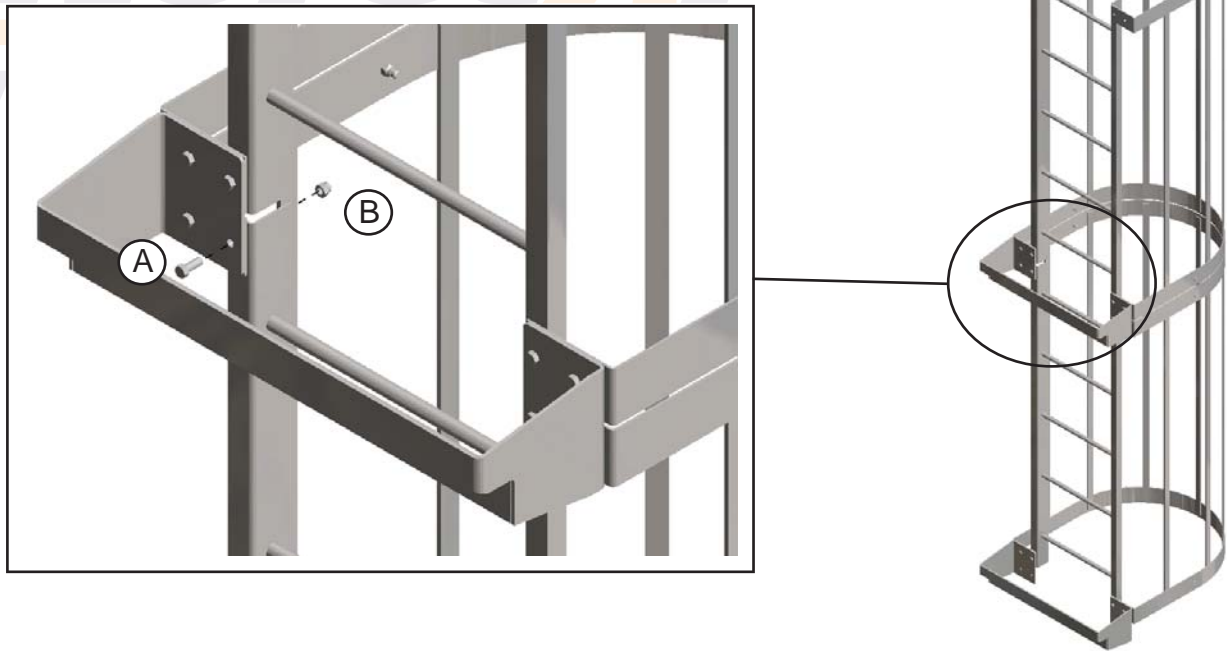


Figure 89
Ladder Tethering

Locate the two ladder sections that will be joined together. Align the holes on the top of the Bottom Ladder Section and the bottom holes on the Top Ladder Mounting Bracket. Attach the two Ladder Sections using four (4) 3/8" x 1" Bolts and four (4) 3/8" Nylon Locknuts.

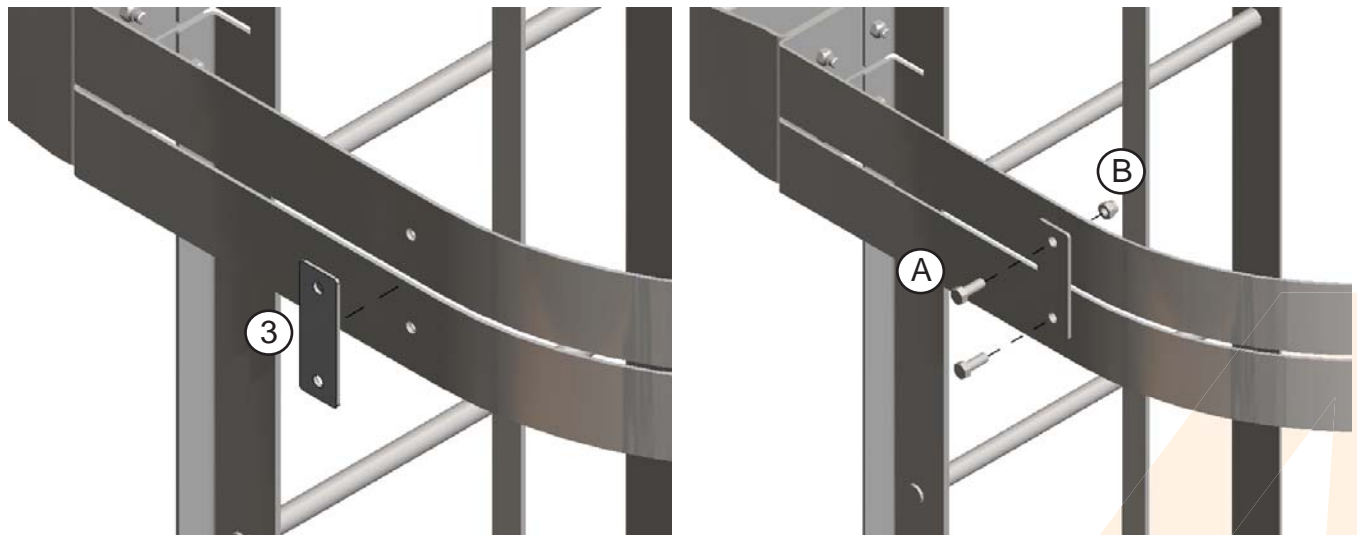


Figure 90
Connector Plates

Locate the Ladder Connector Plates and align them with the holes on both sides of the Ladder's connection points. Per Connector Plate, attach the Ladder Connector Plates to the Ladder Section using two (2) 3/8" x 1" Bolts and two (2) 3/8" Nylon Locknuts.

Chain Drive Assembly

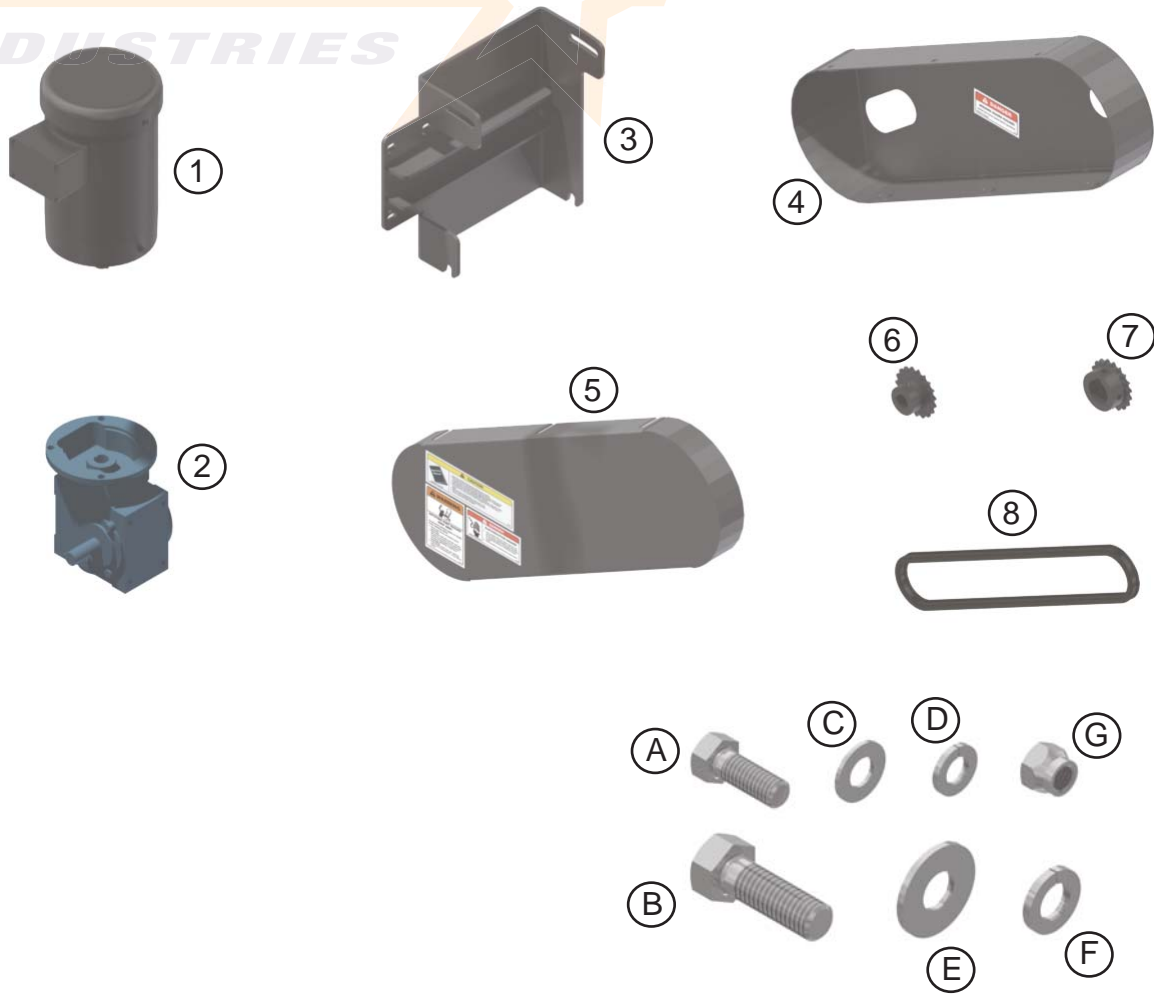


Figure 91
Chain Drive Head Components

Locate the items that will be joined together. Items may not appear as shown.

Item	Description	Qty
1	Motor	1
2	Gearbox	1
3	Gearbox Mount	1
4	Belt Guard Base	1
5	Belt Guard Cover	1
6	Gearbox Sprocket	1
7	Driveshaft Sprocket	1
8	Chain	1

Item	Description	Qty
A	3/8 x 1" Bolt	8
B	1/2 x 1 1/2" Bolt	4
C	3/8" Flatwasher	8
D	3/8" Lockwasher	6
E	1/2" Flatwasher	4
F	1/2" Lockwasher	4
G	3/8" Nylon Locknut	2

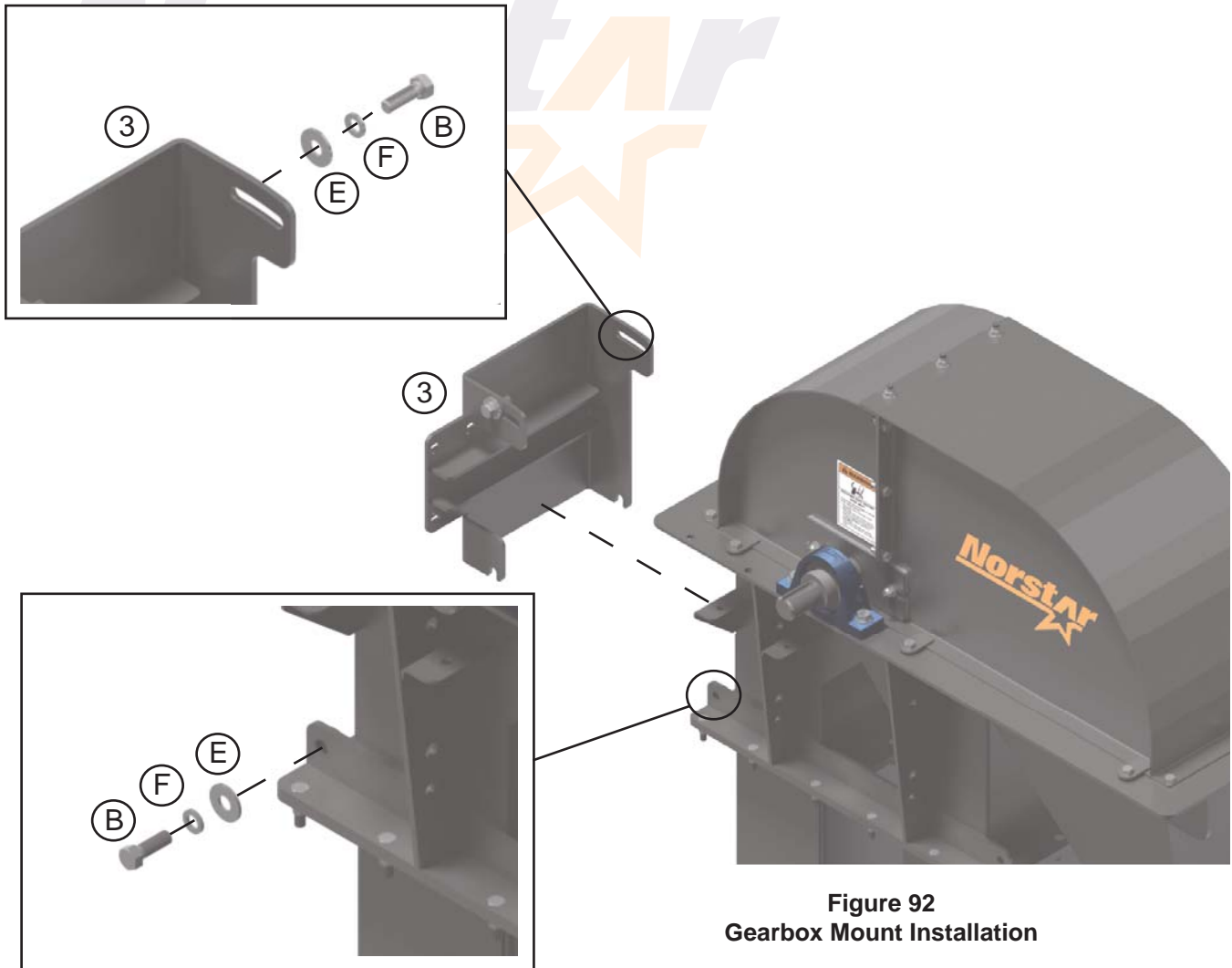
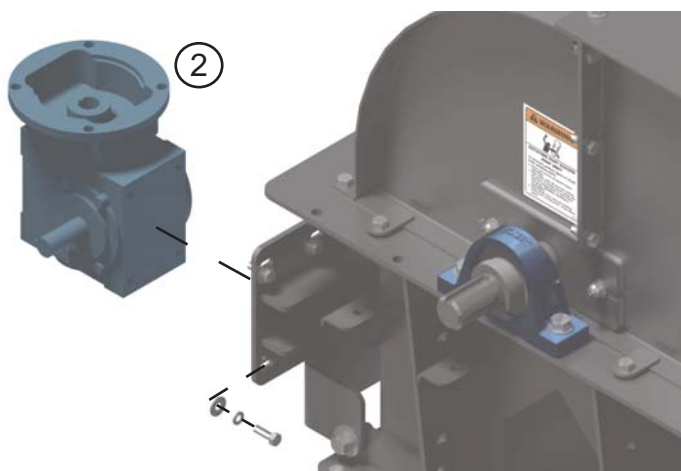


Figure 92
Gearbox Mount Installation

Locate the Gearbox Mount weldment and place it on the outsides of the rear gussets on the Bucket Elevator Head section. Using four (4) 1/2 x 1 1/2" Bolts, 1/2" Lockwasher and 1/2" Flatwashers, secure the weldment to the Head.



Gearbox	Bolt	Locknut	Washer
17Q10L140TC	5/16" x 1"	5/16"	5/16"
20Q10L140TC	3/8" x 1"	3/8"	3/8"
23Q10L140TC	3/8" x 1"	3/8"	3/8"
26Q10L180TC	3/8" x 1"	3/8"	3/8"
30Q10L180TC	7/16" x 1"	7/16"	7/16"
30Q15L180TC	7/16" x 1"	7/16"	7/16"
35Q10L210TC	7/16" x 1"	7/16"	7/16"

Figure 93
Gearbox Installation

Using the associated Bolts and Washers (as shown in the above table) secure the Gearbox to the Gearbox Mount.

To determine what Bolts and Washers to use, determine what Model of Gearbox is on the Bucket Elevator and cross-reference with the chart.



Locate the Motor and lower it onto the Gearbox. Secure the motor to the Gearbox with the correct key, bolts, and washers.

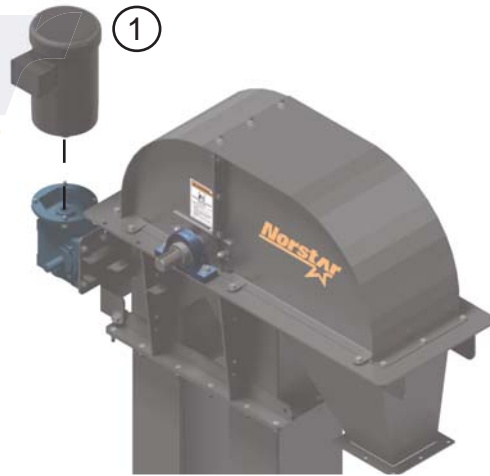


Figure 94
Motor Installation

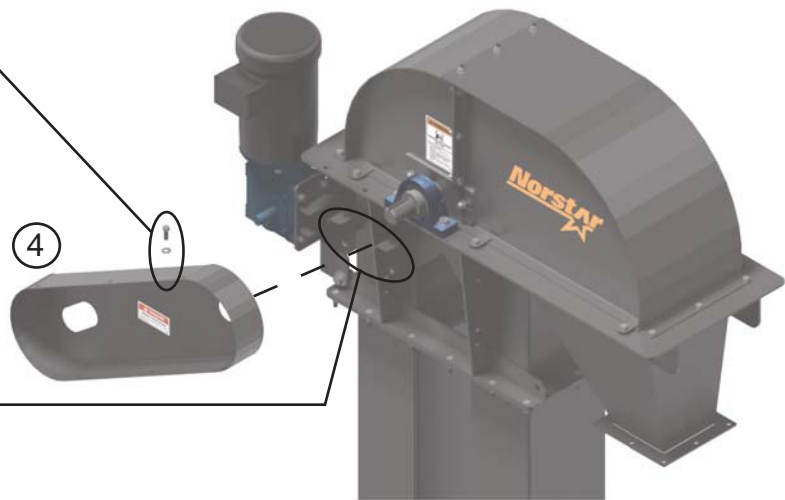
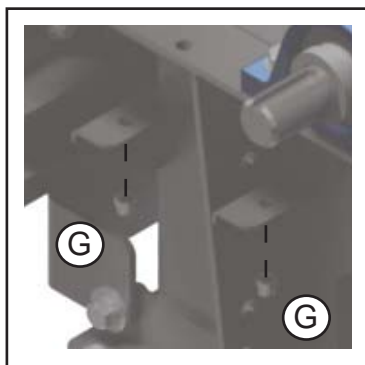
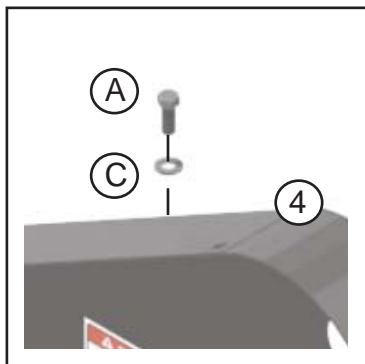


Figure 95
Belt Guard Base Installation

Locate the Belt Guard Base and position it onto the Bucket Elevator Head section. Using two (2) 3/8" x 1" Bolts, 3/8" Flatwashers and 3/8" Nylon Locknuts, secure the Belt Guard Base to the Head section.

Locate the Gearbox and Driveshaft Sprockets. Using the Key and Setscrews that come with the Sprockets, secure each Sprocket to their respective shaft.



IMPORTANT! *It is important to check with the Parts List to ensure the right Sprockets are being used.*

Locate the Chain and place it onto the Sprockets. Keep the Motor and Gearbox as rocked forward as possible to allow for more slack on the chain.

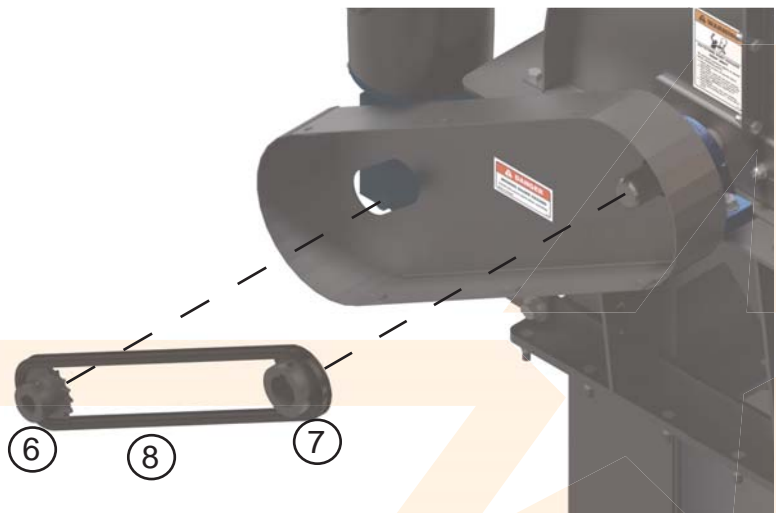
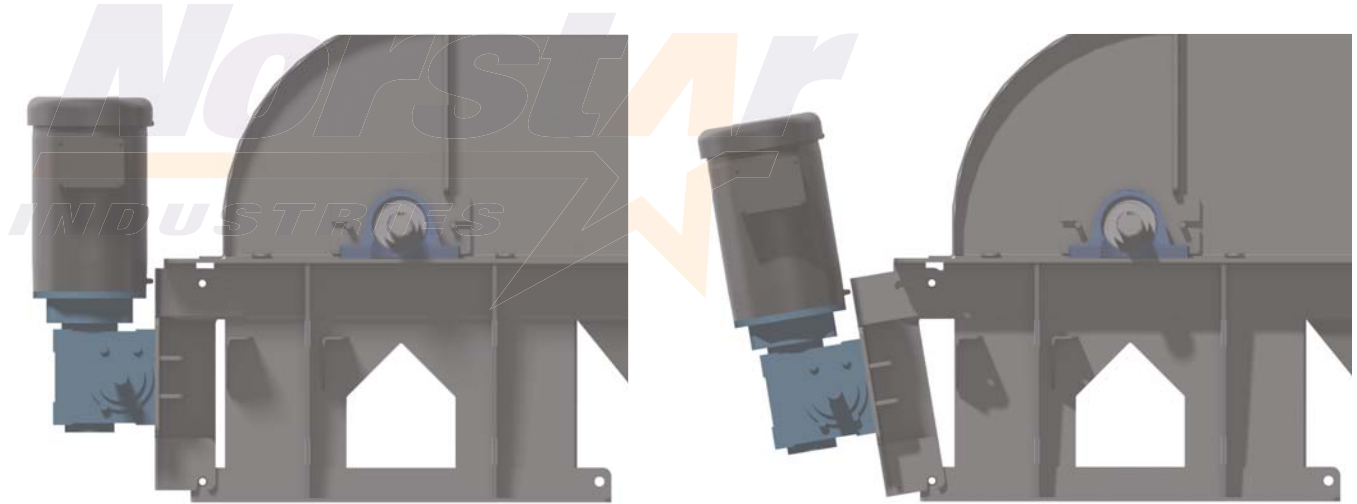


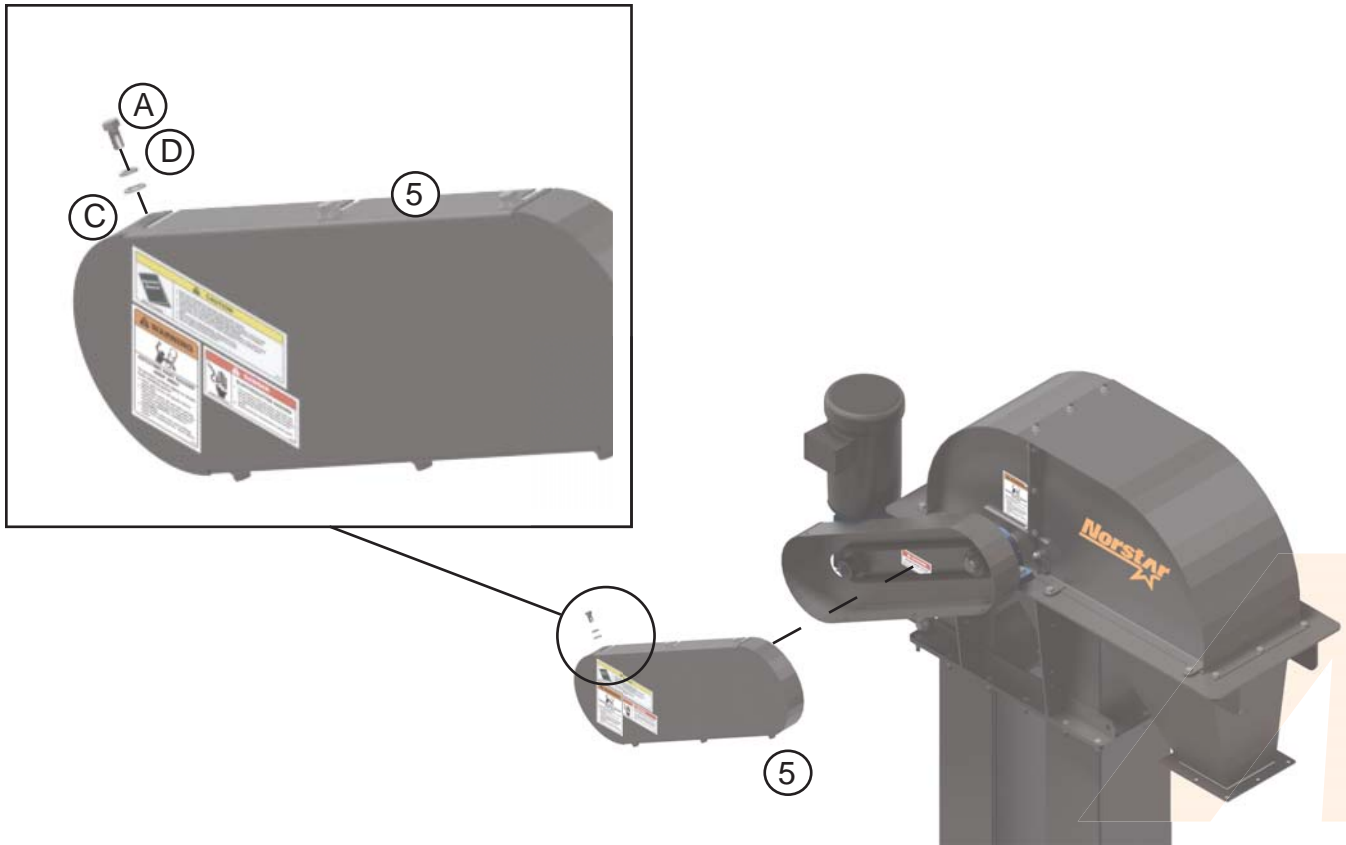
Figure 96
Sprocket and Chain Installation



***NOTE* CHAIN AND CHAIN GUARD HAVE BEEN REMOVED FOR CLARITY,**

**Figure 97
Chain Tensioning**

Once the Chain has been attached to the Bucket Elevator, loosen the bolts securing the Gearbox Mount. Rock the Motor and Gearbox backwards, allowing gravity to tension the Chain. Once the Chain has been tensioned, retighten the bolts to resecure the Gearbox Mount in place.



**Figure 98
Belt Guard Cover Installation**

Once the Chain has been tensioned, locate the Belt Guard Cover. Using six (6) 3/8" x 1" Bolts, 3/8" Lockwashers and 3/8" Flatwashers, secure the Belt Guard Cover to the Belt Guard Base.

Direct Drive Assembly

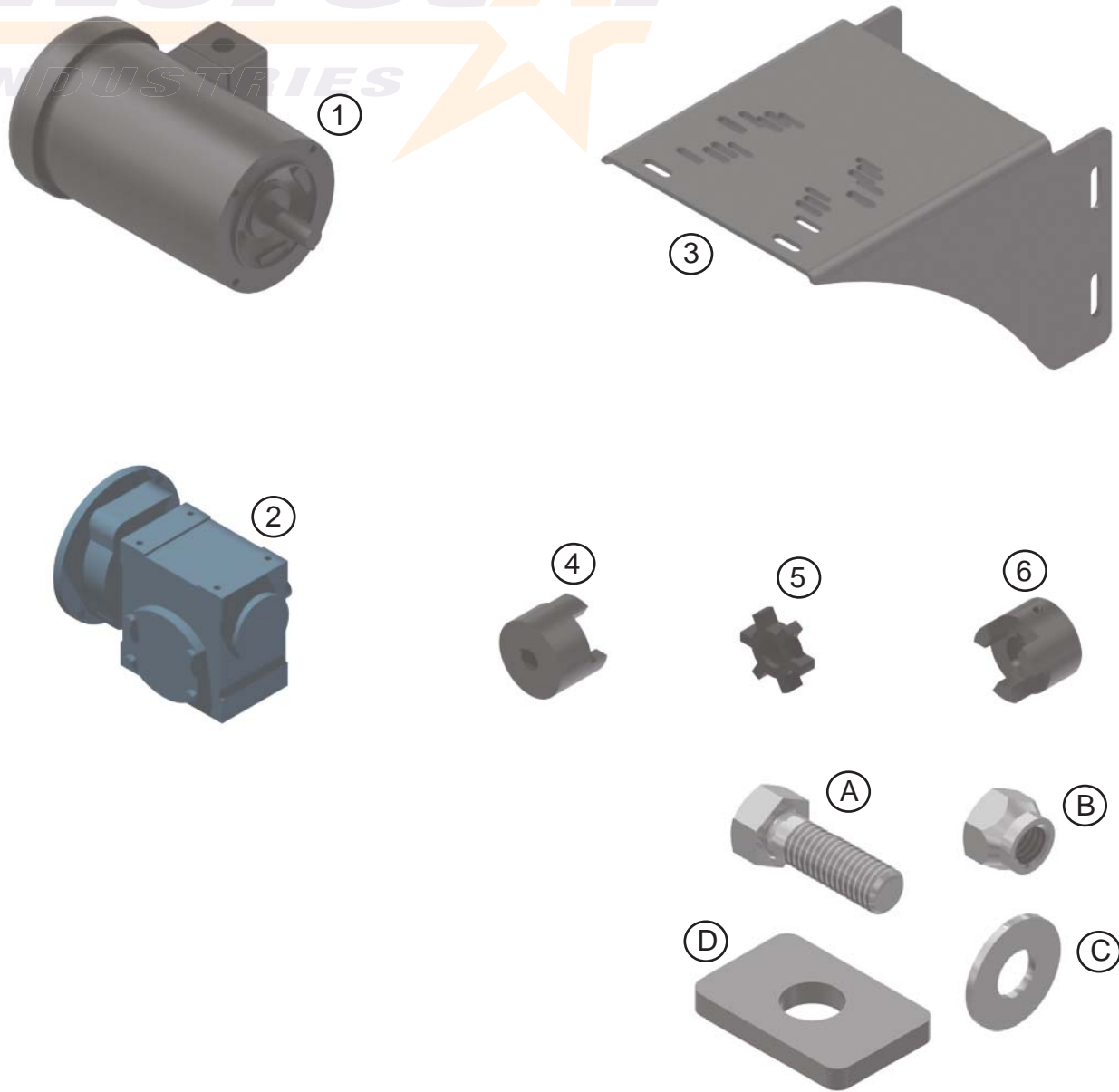


Figure 99
Direct Drive Head Components

Locate the items that will be joined together. Items may not appear as shown.

Item	Description	Qty
1	Motor	1
2	Gearbox	1
3	Gearbox Mount	1
4	Gearbox Lovejoy Coupler	1
5	Lovejoy Spider	1
6	Driveshaft Lovejoy Coupler	1

Item	Description	Qty
A	1/2 x 1 1/2" Bolt	4
B	1/2" Nylon Locknut	4
C	1/2" Flatwasher	4
D	Square Washer	4

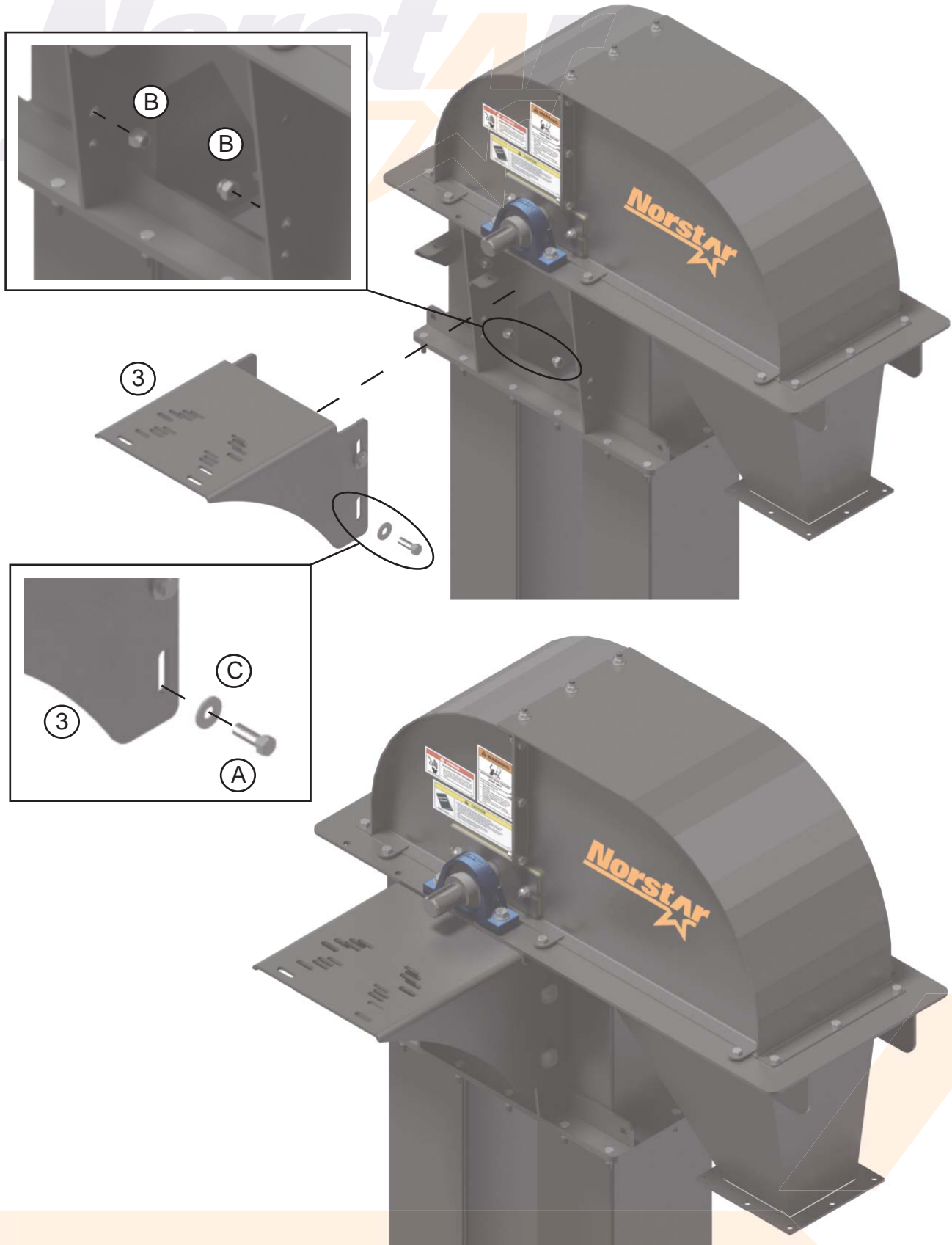


Figure 100
Gearbox Mount Installation

Locate the Gearbox Mount weldment and place it on the outsides of the vertical side gussets on the Bucket Elevator Head section. Using four (4) 1/2 x 1 1/2" Bolts, 1/2" Flatwashers and 1/2" Nylon Lock-nuts, secure the weldment to the Head.

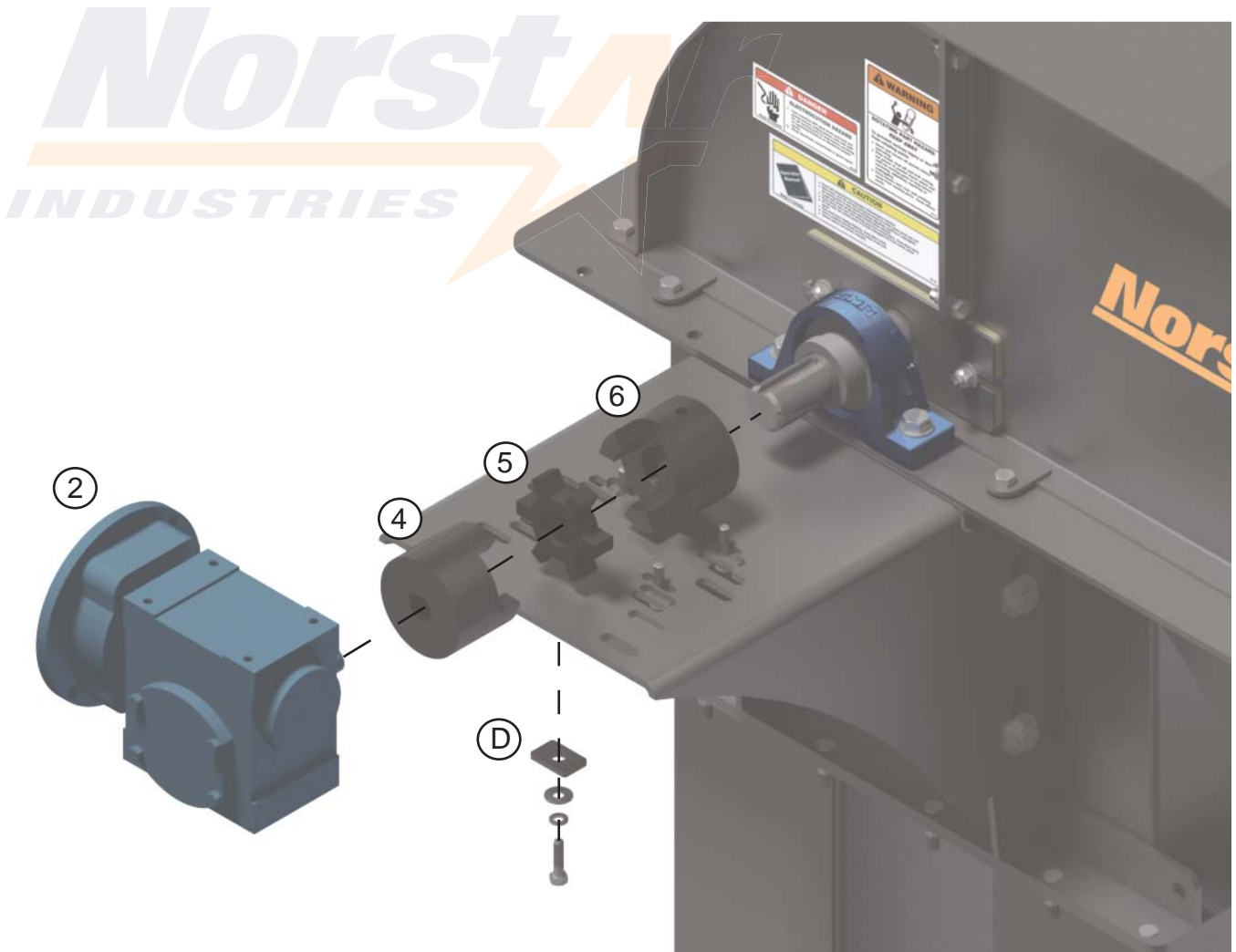


Figure 101
Gearbox/Lovejoy Installation

Locate the Gearbox, Gearbox Lovejoy Coupler, Driveshaft Lovejoy Coupler and Lovejoy Spider. Attach the Lovejoy Couplers onto their respective shafts. Place the Gearbox onto the Gearbox Mount Weldment and place the Lovejoy Spider in between the Lovejoy Couplers.

Once the Gearbox is in the correct position, locate four (4) Square Washers. Using the associated Bolts and Washers (as shown in the right table) as well as the Square Washers, secure the Gearbox to the Gearbox Mount.

Gearbox	Bolt	Locknut	Washer
17Q10L140TC	5/16" x 1 1/4"	5/16"	5/16"
20Q10L140TC	3/8" x 1 1/4"	3/8"	3/8"
23Q10L140TC	3/8" x 1 1/4"	3/8"	3/8"
26Q10L180TC	3/8" x 1 1/4"	3/8"	3/8"
30Q10L180TC	7/16" x 1 1/4"	7/16"	7/16"
30Q15L180TC	7/16" x 1 1/4"	7/16"	7/16"
35Q10L210TC	7/16" x 1 1/4"	7/16"	7/16"

To determine what Bolts to use, determine what Model of Gearbox is on the Bucket Elevator and cross-reference with the chart.



IMPORTANT! It is important to check with the Parts List to ensure the right Lovejoy Couplers are being used.

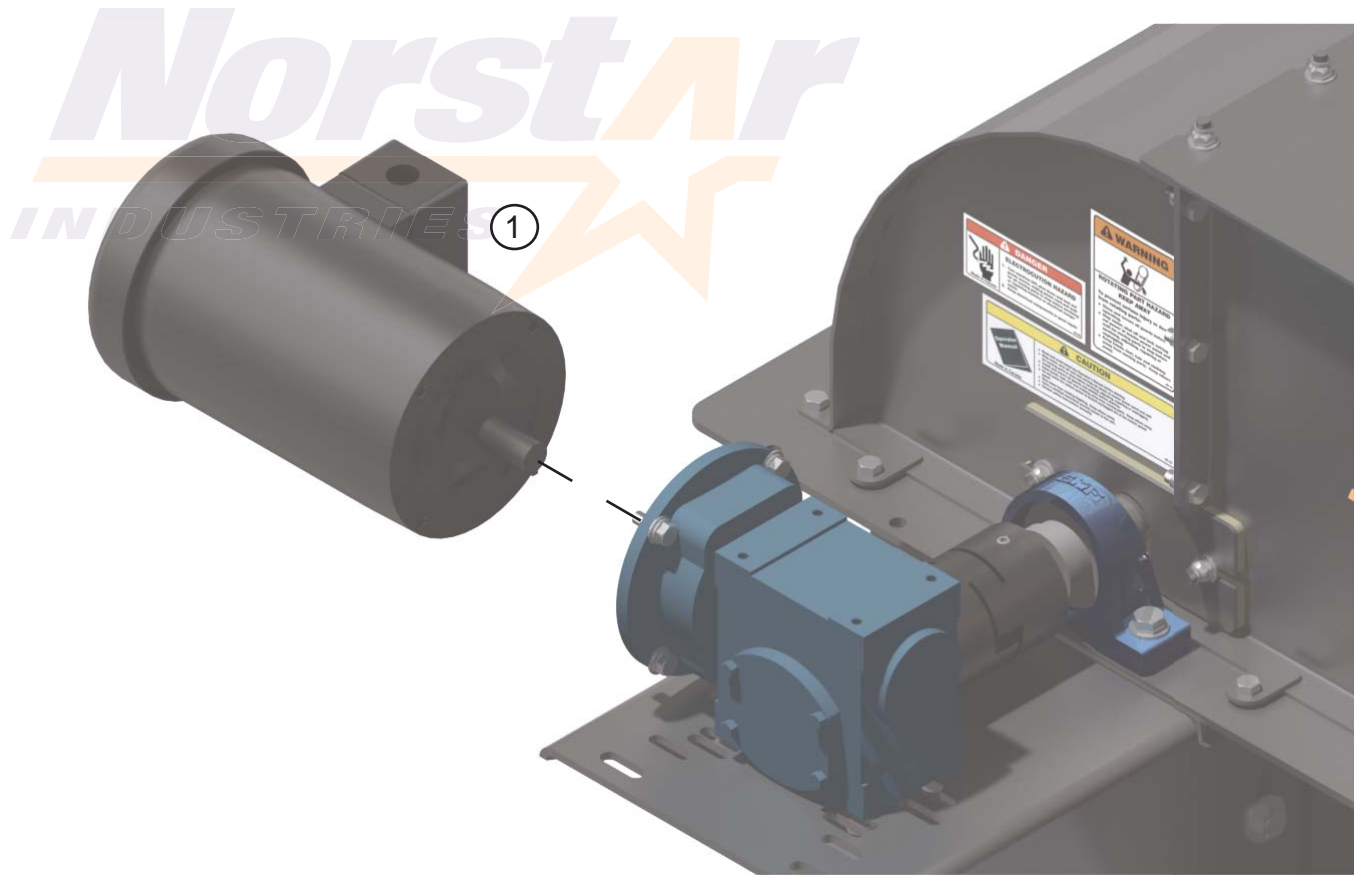


Figure 102
Motor Installation

Locate the Motor and place it onto the Gearbox. Secure the motor to the Gearbox with the correct key, bolts, and washers.

Bucket Elevator Belt Installation

The Bucket Elevator Belt can be installed with or without buckets already attached to it, though it is advised to attach the buckets later.



IMPORTANT! Before installing the Belting, the **Boot Pulley** should be at the highest position so that the Belt can be tensioned once installed.

To install the belt, remove the Head Hoods and drop a thick rope or cable down the up leg. Taking the rope or cable through the Boot section or Service Trunking section, secure it to the end of the Belt. Pull the Belt up the Elevator, curve over the Head Pulley and lower the Belt down the Elevator through the down leg (see **Figure 100**). Once the Length of the Belting has been fed through the Elevator, the Belting needs to be spliced together. There are two (2) main methods (see **Figure 104**):

- **Lap Method:** Belting is overlapped and secured together.
- **Butt Method:** Belting is butted together and a smaller section of Belting is placed over top and secured together.

It is important that as much slack is removed as possible before splicing the Belting.

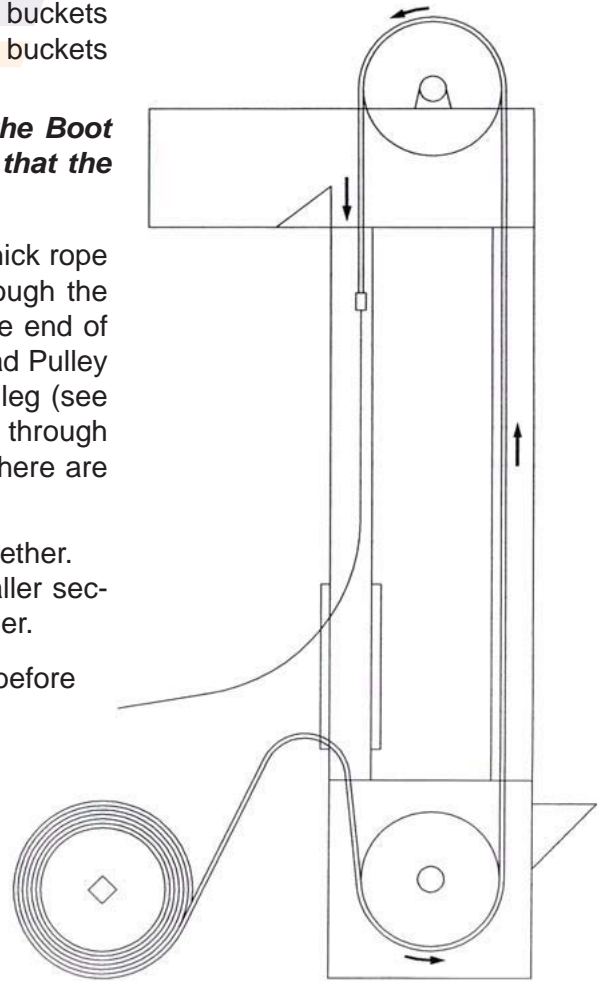


Figure 103
Belt Feed

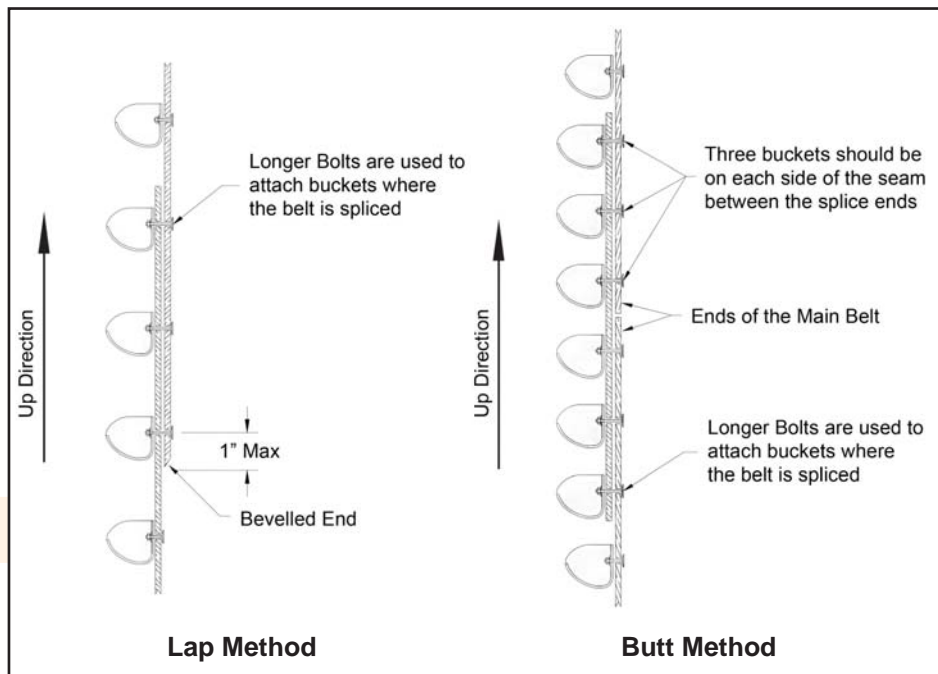


Figure 104
Belt Splicing

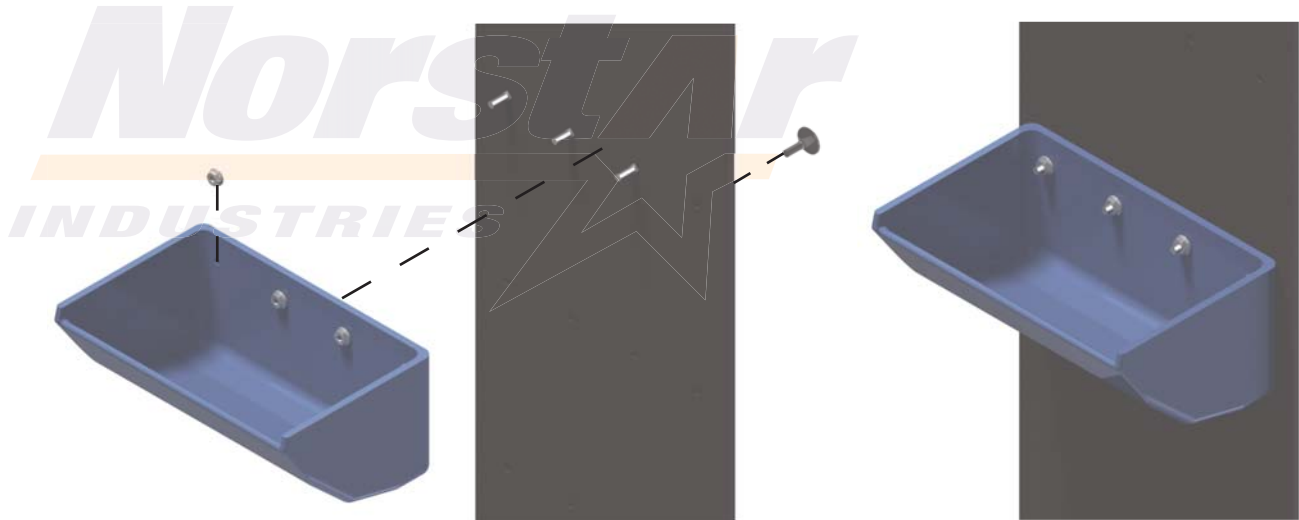


Figure 105
Bucket Installation

Using Elevator Bolts and Flanged Nuts, secure the Buckets to the Belting. It is **HIGHLY** recommended that the buckets are not, initially, attached at consecutive mounting holes in order to keep each leg of the Belt more nearly in balance and making it easier to move. Attach one bucket at ten (10) to twenty (20) bolt row intervals for the first complete Belt revolution. On the second revolution, cut the interval in half. Repeat this process on each revolution until all the Buckets have been attached. This procedure helps balance the weight load during Bucket installation, especially on taller Elevators.

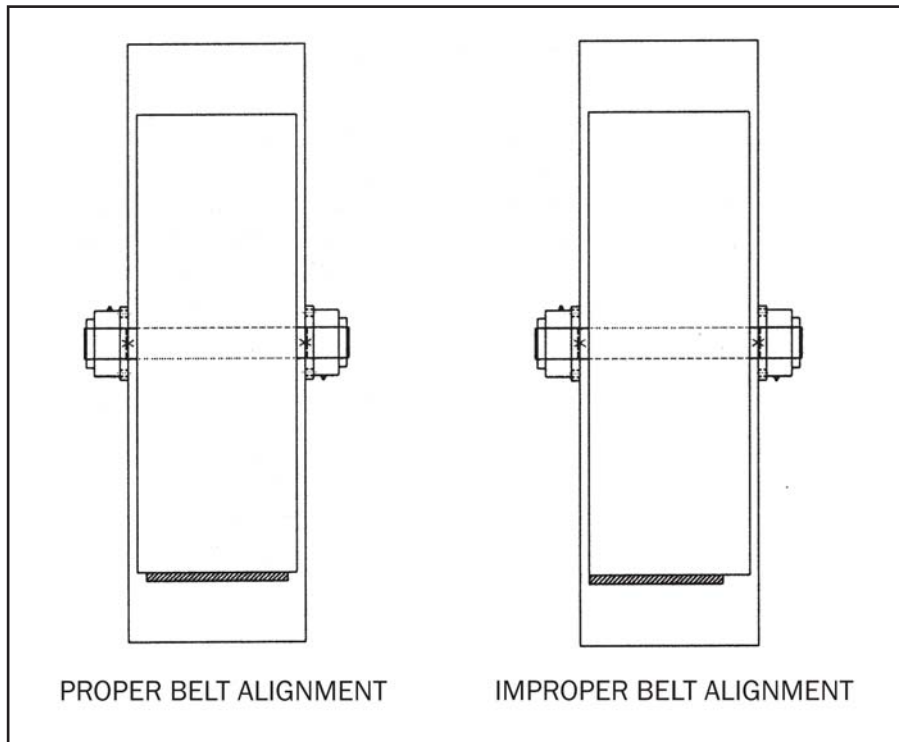


Figure 106
Belt Alignment

Once the Belting has been spliced together and the Buckets installed, it needs to be tensioned. Tensioning the Belting is obtained by lowering the Boot Pulley. Once the Belting has been installed into the Bucket Elevator and tensioned, it is important to make sure that the Belting is running in the center of the Elevator. If the Belting is running to one side of the Boot or Head Pulley, that side of the Pulley Shaft needs to be adjusted to properly align the Belting.

Bucket Elevator Adjustment

Gearbox Adjustment

On Chain Drive models, the Gearbox will need to be adjusted in order to tension or replace the Chain.

To adjust or rock the Gearbox, the top bolts (a) securing the Gearbox Mounting Plate need to be loosened. The bottom bolts (b) may, also, need to be loosened to allow rocking (see **Figure 107**). Once the bolts are loose, the plate should be allowed to rock back and forth to reach the desired Chain tension. Once the Chain is at the correct tension, the bolts should be tightened again.

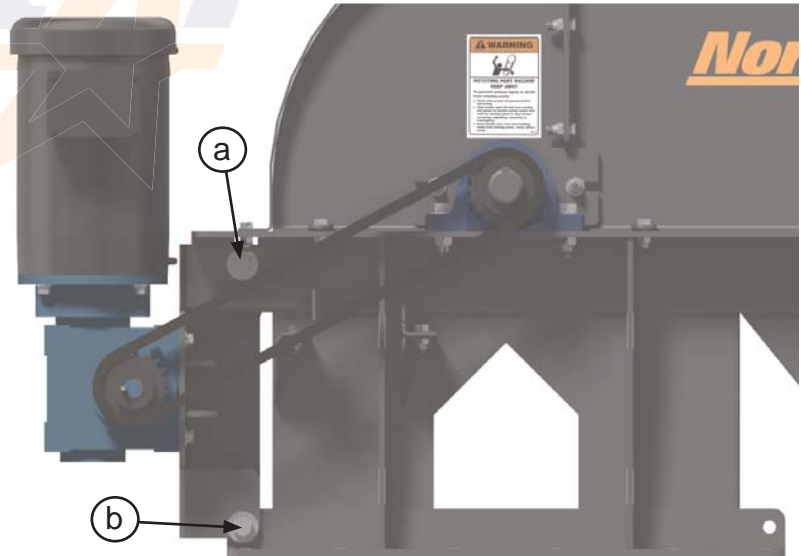


Figure 107
Drive Belt Tensioning

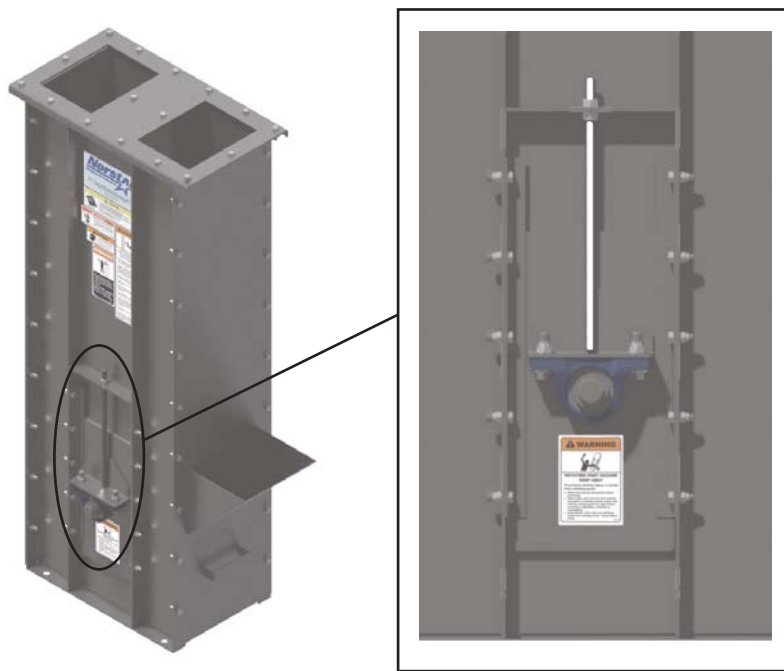


Figure 108
Elevator Belt Tensioning

Boot Pulley Adjustment

The Boot Pulley may need to be adjusted to either keep the belting aligned to the center of the pulley or to tension the belting.

At the top of the threaded rod on the sides of the Boot are two (2) Hex Nuts. Loosen or remove the top nut to allow the bottom nut to move. By turning the bottom nut, the Side Bearing Assembly will either rise or lower. Once the Pulley is in the correct position, replace and/or tighten the top Jam Nut to secure the Bearing Assembly.

Discharge Wear Plate Adjustment

The Discharge Wear Plate provides additional protection from downlegging as well as providing a layer of protection from steel wear in the discharge throat.

To adjust the plate, crack the bolts holding it tight. This should allow the plate to slide up and down the throat. Adjust the plate so that it is approximately 1/4" from the buckets. Tighten the bolts to secure the plate in place.



IMPORTANT! *It is extremely important that the Throat Plate is set to the Buckets at the Belt Splice. Failure to do this will result in equipment damage.*

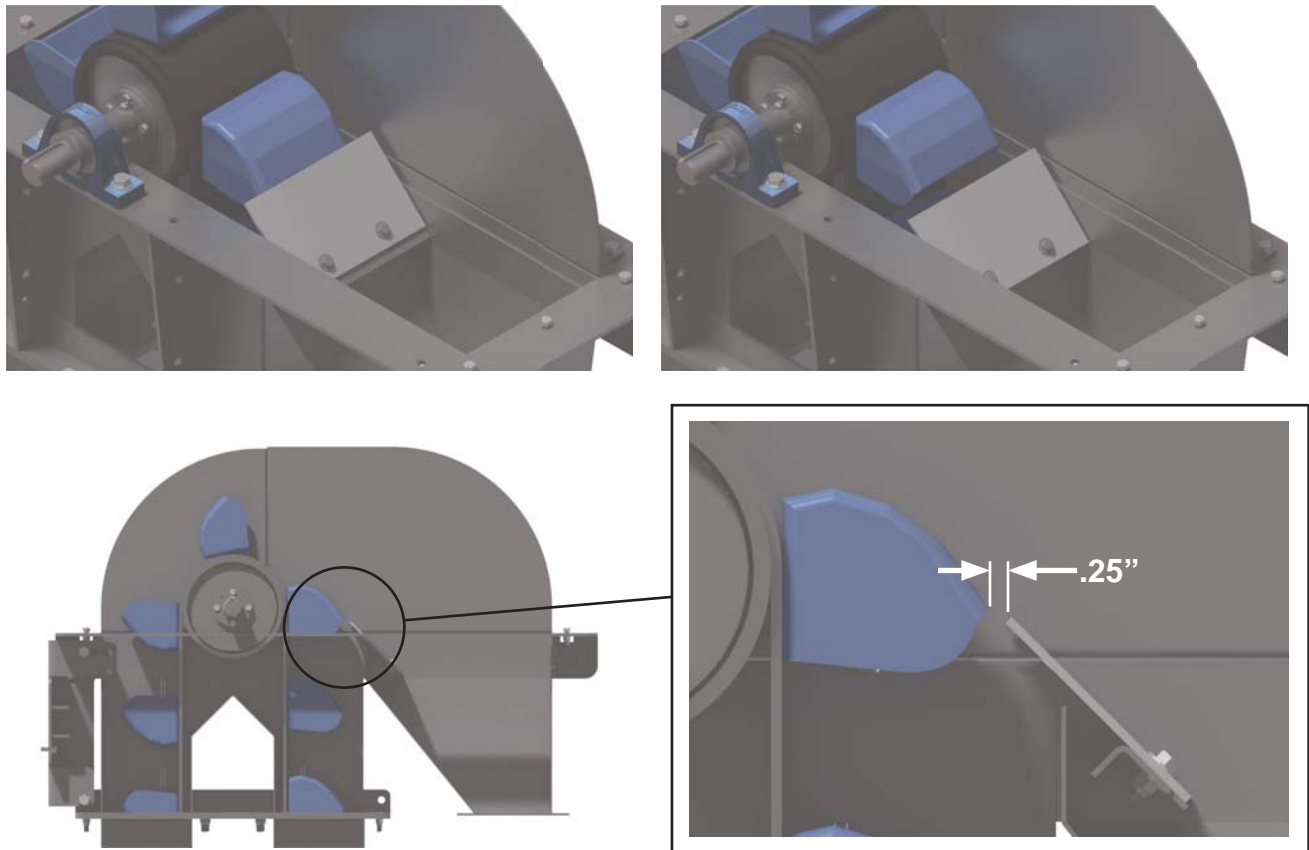


Figure 109
Discharge Wear Plate

Electrical Installation



IMPORTANT! *Inclusion of these electrical procedures is a precaution by the Manufacturer to help ensure that safety requirements are met both for the country of manufacture and the countries of usage. Inclusion of these procedures, outside the normal OPERATION of this equipment by a trained USER, does NOT in any way imply that these procedures are to be used BY unqualified personnel or in substitution FOR qualified electrical or service personnel.*



DANGER! *Electricity can KILL! Use extreme CAUTION around electrical components. Have the providing electric company check the transformer and lead wires to be sure they are an adequate gauge to carry the starting requirements and full load of your Bucket Elevator Motor.*

Controls

The Owner must provide for appropriate electrical controls (ex. motor controller, etc.) that meet all specifications of the Norstar Industries Bucket elevator. The Manufacturer does not provide or take any responsibility for electrical controls or safety devices.

Wiring

All electrical wiring must be installed by a qualified and/or certified electrician in accordance with all applicable local and national electrical codes.



IMPORTANT! *To guard against electrical shock, all Bucket Elevators shall have a GROUND connection. Make sure electrical equipment and the Bucket Elevator are properly installed and grounded by a qualified and/or certified electrician according to the National Electrical Code and all other applicable codes and regulations. Parts should be purchased locally.*



IMPORTANT! *Norstar Industries will not be liable for the electrical wiring used with this Bucket Elevator or failure of equipment due to improper electrical installation.*

All electrical devices used with this Bucket Elevator shall be arranged to operate in a "FAIL SAFE" manner; that is, if power failure or failure of device occurs, a hazardous condition must not result. The machine must not restart by itself after a power failure, etc., when power returns, or the jam is cleared.

Switch Box (not supplied by Norstar Industries)

This should be located with stop button and lock-out and/or tag-out features to supply power to the Motor that drives the Bucket Elevator. The Switch Box should be kept away from livestock, but placed at a location as convenient as possible for the operator. The operator should be able to view the entire Bucket Elevator from the Switch Box location. The Switch Box area must remain unobstructed. The Switch Box must be clearly marked as to its function.

Operation

Operator Instruction

Operator training must include:

- The reading of this Manual, with particular emphasis on the section “**Safety**” on pages 10-14 of this Manual.
- The reading and following of all SAFETY notices in this Manual and any other applicable local, regional or national regulations.
- Instruction in Bucket Elevator operation under normal conditions.
- Instruction in Bucket Elevator stopping / location in emergency situations.

Personnel should be alerted to the potential hazard of entanglement in the Bucket Elevator caused by items such as long hair, loose clothing and jewelry.



IMPORTANT! Make sure applicable SAFETY Signs are posted in all conspicuous areas. If SAFETY Signs become damaged or unreadable, contact the manufacturer immediately for replacements.

Start-up



DANGER! Make certain power is OFF, LOCKED OUT and TAGGED OUT before working on or inside the Bucket Elevator. Failure to heed this warning will result in serious injury or death.

It is advisable to have two (2) trained persons (one to operate the Bucket Elevator and one for Safety) present during each start-up of the Bucket Elevator.

Operation Requirements

To ensure positive performance and minimum maintenance, it is the Manufacturer’s recommendation that this equipment be observed by one (1) Operator during the Bucket Elevator operation.

Use the Bucket Elevator only for loads it is designed to handle safely. Bucket Elevator equipment shall be used to convey only the specified commodities or materials within the rated capacity and the rated speed. Where special use is not indicated, or ratings are not available, consult the Manufacturer.

- Do **NOT** leave the Bucket Elevator running unattended.
- Should any damage to the Bucket Elevator occur, shut off, lock out and tag out power immediately.
- Do **NOT** restart the Bucket Elevator until necessary inspections and repairs have been made.
- Shut off, lock out and tag out all power after using the Bucket Elevator.

Operation Procedure

1. Start the Bucket Elevator.
2. Start grain/material flow into the Bucket Elevator inlet.
3. Run the Bucket Elevator until the desired amount of grain/material has been moved.
4. Stop grain/material flow.
5. Allow all grain/material to run through the Bucket Elevator until no more grain/material exits through the discharge.
6. Stop the Bucket Elevator.



IMPORTANT! If the Bucket Elevator is to be inoperative for a prolonged period of time, before shutting down, operate the Bucket Elevator until material no longer discharges. This is very important as the conveyed material may become hard over a period of time.

Maintenance

Cleanliness is essential. Material build-up causes tracking problems and edge damage. Routine inspections and corrective maintenance measures shall be conducted to ensure that all Guards and safety features are retained and function properly.

Establish a MAINTENANCE SCHEDULE to prolong the life and SAFETY of your Bucket Elevator. Practice safe maintenance.

Check for dirt around the Head and Boot Pulleys at least biweekly. Dirt/material build-up is one of the biggest reason that Bucket Elevator Belts, chains/sprockets and buckets become worn and need replacement.

Instruction of Personnel

Only qualified and trained personnel should service the Bucket Elevator. Maintenance training must include:

- The reading of the Manual, with particular emphasis on the section “**Safety**” on pages 10-14 of this Manual.
- The reading and following of all SAFETY notices in this Manual and any other applicable local, regional or national regulations.

It is a requirement to be properly trained and to have read and understand this Installation/Operator’s Manual before operating, servicing, or otherwise handling this Bucket Elevator.

Bucket Elevators shall not be maintained or serviced while in operation unless proper maintenance or service requires the Bucket Elevator to be in motion. In either case, personnel shall be made aware of the hazards and how the task may be safely accomplished.

Basic Maintenance Rules



DANGER! *Disconnect, LOCK OUT and TAG OUT electrical power before inspecting, adjusting, or servicing equipment unless maintenance instructions specifically state otherwise. Failure to heed this warning will result in serious injury or death.*



IMPORTANT! *Comply with all applicable SAFETY WARNINGS discussed in this Manual.*



WARNING! *The Motor and all moving parts must stop BEFORE any adjustments are made to the equipment or before it is left unattended. Failure to follow this warning may lead to personal injury or death, particularly at the Head, Service Trunking and Inlet.*



IMPORTANT! *DO NOT attempt to remove adhering material manually unless the Bucket Elevator has been STOPPED and the power LOCKED OUT and TAGGED OUT. Wear safety glasses when cleaning or servicing the Bucket Elevator. Debris and dust associated with grain transport can damage sight or cause blindness.*

Electrical Wear



IMPORTANT! *Make sure any electrical wiring is not frayed or cracked and meets proper codes and requirements. Check the Power Cord lead for any twisting. Replace it if any damage is apparent. Make sure to check wear at the Bucket Elevator Head Motor.*



DANGER! *Electricity can kill.*

Material Build-up, Wear and Damage

Make sure to check for wear at these various points. Maintain proper adjustments on Chains or Belts. Replace the Chain/Belt Guards after adjustments or maintenance. Tighten hardware. Guards and Covers must be secured before the Bucket Elevator is restarted for normal operation. See **Figure 110**.

The belting will stretch after installation and may need further adjustment. Some stretching is expected within the first few weeks of operation. Belt tension should be maintained by adjusting the belt tensioner on the Boot Section. Once the belt tensioners have been fully used, the belt will need to be re-spliced. Good belt tension is critical for proper traction on the pulleys and optimum performance.

Make sure all material has been removed from the Boot prior to winter freezing or severe damage could occur.

Before finishing, make sure all SAFETY signs are readable and tightly attached.



DANGER! Electricity can kill! Disconnect, LOCK OUT and TAG OUT electrical power BEFORE inspecting, adjusting or servicing equipment unless maintenance instructions specifically state otherwise. Comply with all applicable SAFETY warning discussed in this Manual. Failure to heed this warning will result in serious injury or death.

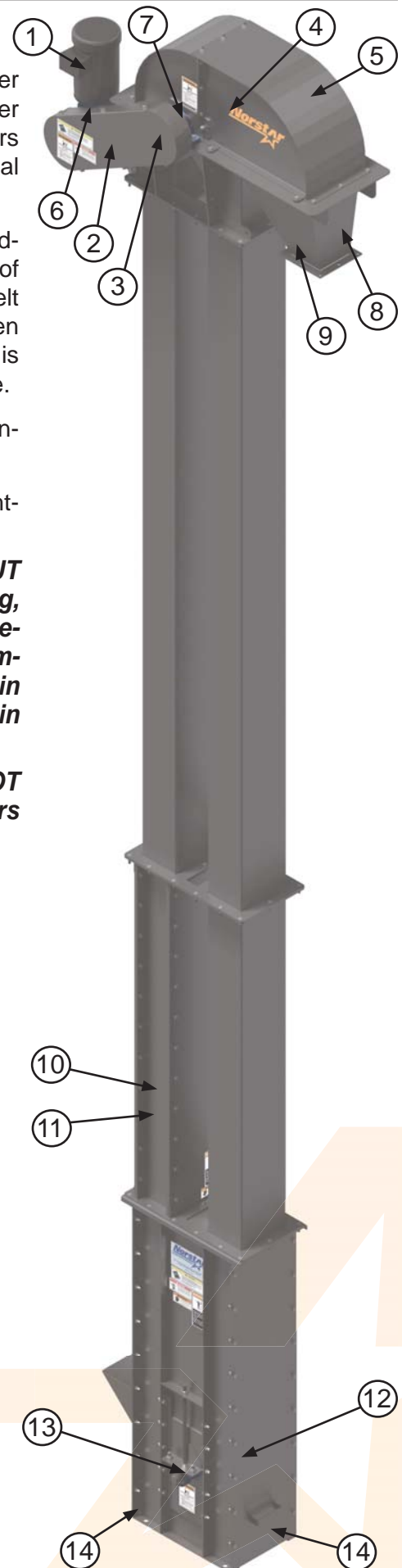


IMPORTANT! Replace all Guards and Covers. Do NOT run the Bucket Elevator with any Guards or Covers off.

**Pictured is the Chain Drive model. Direct Drive models have a Lovejoy instead of chains and chain guard, other components are the same.*

Item	Description	Inspect For:
1	Motor	good wiring, tight bolts
2	Drive Chain (CD Models)	wear and damage
3	Lovejoy (DD Models)	wear and damage
4	Head Pulley	material buildup, belt tracking
5	Head Hood Cover	wear and damage
6	Gearbox/Torque Arm	wear and damage, tight bolts
7	Head Bearing	wear and damage, tight bolts
8	Discharge Wear Plate	wear and damage
9	Throat Wear Plate	wear and damage
10	Elevator Belting	wear, damage, belt tracking
11	Buckets	material buildup, wear and damage, tight bolts
12	Boot Pulley	material buildup, belt tracking
13	Boot Bearing	wear and damage, tight bolts
14	Boot Clean-out	material buildup

Figure 110
Inspection Locations



Tigear-2 Gearbox Overview

The Dodge Tigear-2 reducer design has a totally enclosed, ventless sealing system that contains a factory-filled synthetic lubricant that actually runs cooler, as well as eliminates the need for routine oil changes.

Tigear-2 Gearbox Pre-Operation

The TIGEAR-2 reducer will require a break-in period before reaching maximum operating efficiency and may run hot during the initial operation of the reducer. This is normal. It is also possible for a few drops of oil to be purged from the lip seals during the break-in period. The user can recognize this start-up seepage by its small volume and short duration. **New reducers should be checked periodically during the first few days of use for any signs of severe overheating, continuous lubricant leakage or unusual noises.**



Figure 111
Tigear 2 Gearbox

Tigear-2 Gearbox Maintenance

The TIGEAR-2 reducer is factory filled with a synthetic lubricant which eliminates costly preparation time normally required to put a reducer into service. The lubricant supplied is a high performance, H1 grade lubricant, suitable for all approved mounting positions. Do not add or remove any oil during installation or after the break-in period. When reducer selections are properly service factored to account for the thermal limitations of the reducer, the standard lubricant covers an operating ambient temperature range of -10°F to 130°F. No other lubricant available on the market provides the outstanding wear protection and thermal abilities of the factory-filled lubricant. Other lubricants must not be mixed with the factory supplied lubricant. The use of another lubricant may compromise the performance of the reducer and void the warranty.



WARNING! Other lubricants must NOT be mixed with the factory supplied lubricant. The use of another lubricant may compromise the performance of the reducer and void the warranty.

Lubricants

Check these points weekly or every fifty (50) hours of operation. To avoid equipment damage, lubricate all Bearings according to the instructions in this Manual. When anti-friction bearings are used, check for proper lubrication. Too much or too little lubricant will cause high operating temperatures that may damage the Bucket Elevator.

Grease all bearings every 800 - 1000 hours. See **Figure 112**.

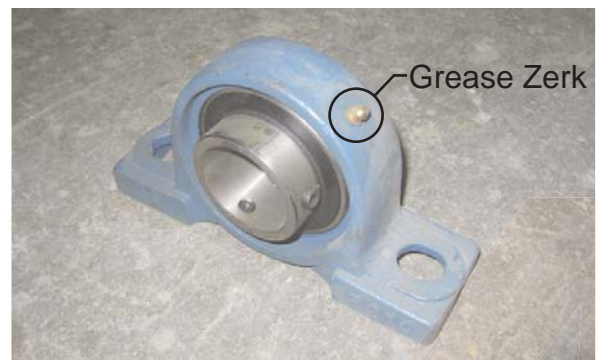


Figure 112
Bearing Grease Zerk

Additional Maintenance Tips

- Check for deterioration or looseness of any bolts or fasteners and continued secure attachment of all ladders and platforms.
- Check the Pulley hub bolts and set screws after the first 8 - 10 hours of operation.
- Check for wear in the spouting.
- Make sure no tools get left in the Bucket Elevator after maintenance.

Troubleshooting

General Troubleshooting

Trouble	Possible Cause	Solution
Backlegging <i>Material falling down the 'up' or 'down' leg</i>	Obstruction in discharge, spouting or distributor	Inspect the head for any foreign material that may be blocking grain flow. Also check for missing buckets. If one is missing, it could be found in the discharge transition or in the distributor turnspout.
	Head Throat Wear Plate is out of place	Remove the head cover and adjust the wear plate.
	Buckets are being overfilled	Check to see if the buckets are being overfilled. Buckets should be NEAR full, but not overflowing. Make adjustments at inlet.
	Head shaft running too fast or too slow	Check packing list and/or exploded view parts list to be sure the correct gears are installed. Also check to see if gears are reversed.
	Spouting size too small for leg capability Spouting installed at too shallow of an angle Spouting has a sharp bend, restricting flow	Correct by using a proper spouting size and good design engineering.
	Pressure build-up in bins/spouting	Add vents
	Loose buckets	Tighten all bucket bolts, securely.
	Full bin or tank	Monitor bin levels carefully.
Belt Rub <i>Not tracking in the center of the pulley and/or rubbing side of head, trunking or boot.</i>	Loose belt	Adjust the belt take-up or shorten the belt.
	Boot pulley improperly adjusted	Adjust tensioning screws on boot to level pulley and align belt to the center of the pulley.
	Head pulley not level	Adjust the jacking bolts to level the head pulley.
	Leg out of plumb or twisted	Check to see if the Bucket Elevator is plumb. Adjust the turnbuckles on the guy lines to straighten.
	Material build-up on pulleys	Inspect the Head and Boot pulleys to see if any material has built up. Remove any built-up material.
Belt Slip <i>Excessive belt slippage or burning</i>	Worn bearing	Replace bearing.
	Head pulley lagging worn or loose	Replace with factory recommended lagging.
	Drive motor too large	Use the proper horse power motor.
	Loose belt	Re-tension belt or shorten the belt.
	Ice/moisture on head pulley	Remove significant build-up. Run elevator until its dry.

Belt Looseness <i>Excessive belt slack</i>	Belt has stretched	Adjust the boot pulley tensioner to tighten the belt.
		Shorten and/or re-splice the belt.
Elevator Overload <i>Bucket Elevator is being overloaded</i>	Inlet conveyor/auger running too fast	Check/reduce conveyor/auger speed
	Head Pulley running too slow	Check the pulley speed and/or the reducer speed for correct gear ratio.
	Charging inlet from several sources at once	Check conveyor/auger capacities and cross reference with Bucket Elevator capacities.
	Drive Motor too small	Use the proper horse power motor.
	Low motor voltage	Check voltage
	Under size wiring	Use the correct wire gauge on motor.
Low Capacity <i>Material not unloading at full capacity</i>	Head shaft speed too slow	Check gear speed. Check gears, speed reducer and motor to determine cause of slow speed. Correct as required.
		Inlet conveyor/auger too slow
	Loose belt	Check to see if belt is slipping. Tighten if necessary.
		Check Head Pulley lagging. Replace if necessary.
	Buckets caked or damaged	Visually inspect and clean and/or replace buckets as necessary.
	Obstruction in discharge, spouting or distributor	Inspect the head for any foreign material that may be blocking grain flow. Also check for missing buckets. If one is missing, it could be found in the discharge transition or in the distributor turnspout.

Electrical Troubleshooting

Trouble	Possible Cause	Solution
Low Capacity <i>Material not unloading at full capacity</i>	Low voltage in power source	Check voltage at the motor input. Voltage in power lines may be low. Consult an electrician and/or power company.
Slow Speed <i>Bucket Elevator and/or conveyor/auger are operating below normal speed</i>	Blown fuse on three phase circuit	Check and replace fuses.
High Amperage	Defective motor	Check the motor for short or open circuited condition. Repair or replace motor.

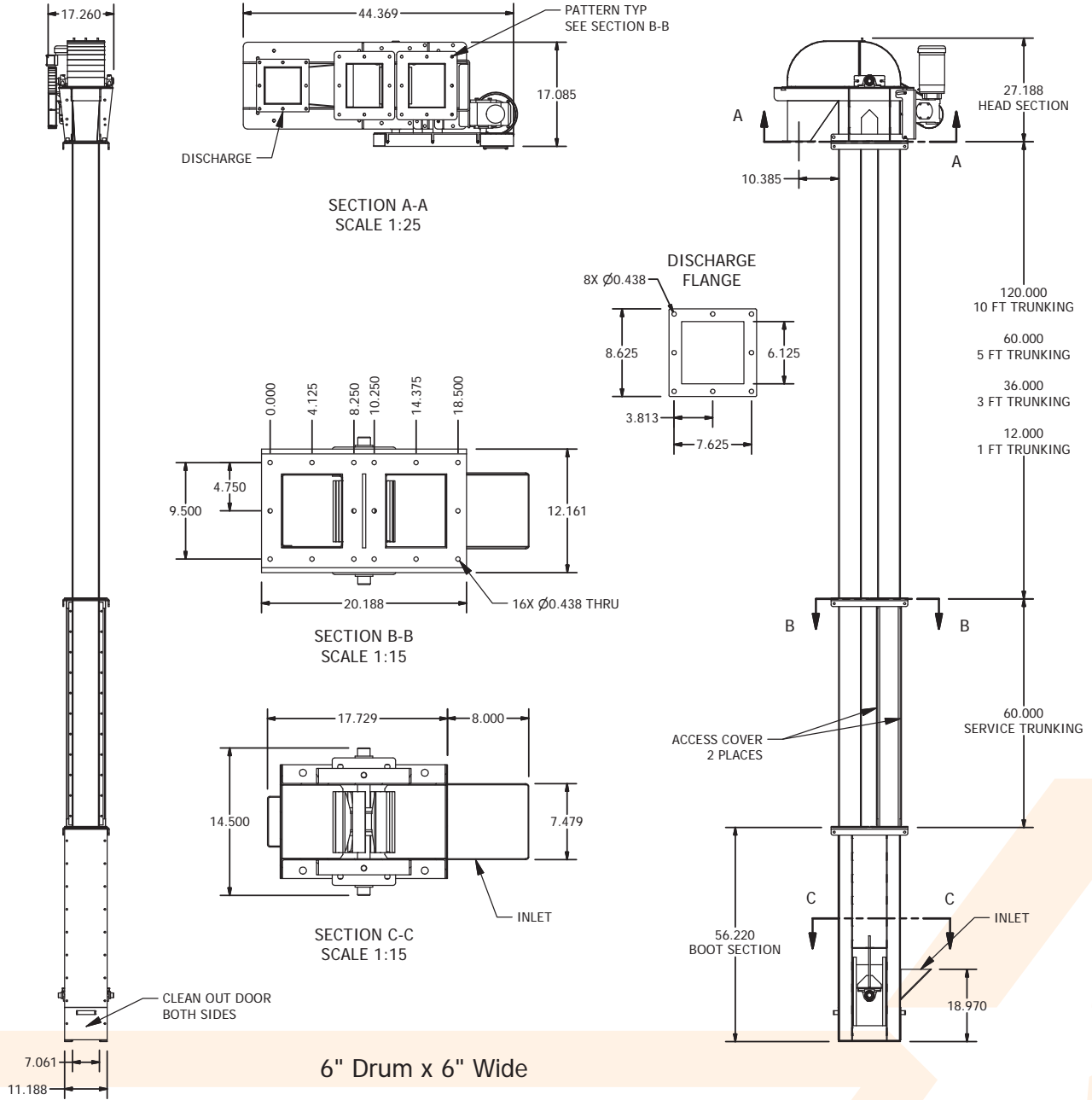
Speed Reducer Troubleshooting

Trouble	Possible Cause	Solution
Overheating	Load exceeds drive capacity	Check the rated capacity of drive. Replace with drive of sufficient capacity or reduce load.
	Insufficient oil	Check the oil level and increase as needed.
	Too much oil in the drive caused churning and excessive heat is generated by the fluid friction of the churning oil	Check the oil level and remove as needed.
	Wrong grade of oil	Flush and refill to the indicated oil level with the grade specified.
Noise and Vibration	Improper torque arm installation	Check mounting bolts and tighten.
	Failing/worn out bearings	Replace worn bearings.
	Excessively worn gears	Determine if the load exceeds name plate rating. If overloaded, reduce load or replace with reducer of sufficient capacity. Replace gearbox.
	A low oil level reduces the muffling effect of the oil	Check the oil level and increase as needed.
	Loose parts	Inspect drive for broken parts, loose bolts, nuts and screws. Check all keys for proper size and fit. Replace parts as necessary.
Oil leakage	Excessive oil	Check oil level and drain to the indicated oil level
	Clogged breather	Clean or replace breather. Clean breather hole with pipe cleaner and a suitable non-flammable solvent.
	Worn seals	Replace seals.
Shaft Slippage	Missing key or loose bushing	Replace key and/or tighten bushing.
Excessive Shaft End Play	Worn bearings	Worn bearing balls and raceways have a dulled appearance. Replace worn bearings. Clean and flush drive and replace oil.
Excessive Backlash	Worn gears or loose parts	Replace worn gears and keys. Tighten loose screws.

Spec Sheet

Bucket Elevator Spec Sheet 600 Series Chain Drive

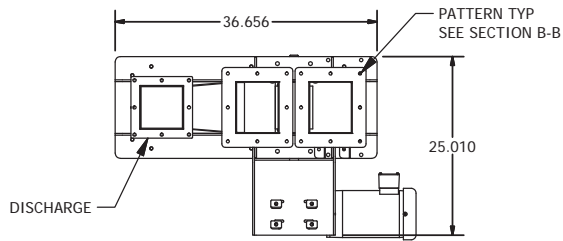
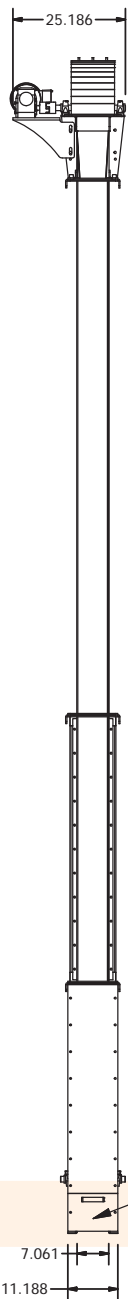
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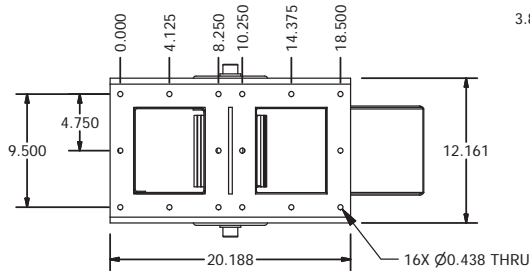
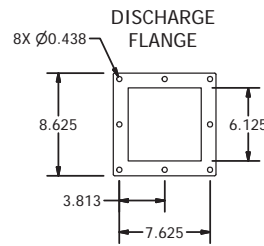
Spec Sheet

Bucket Elevator Spec Sheet 600 Series Direct Drive

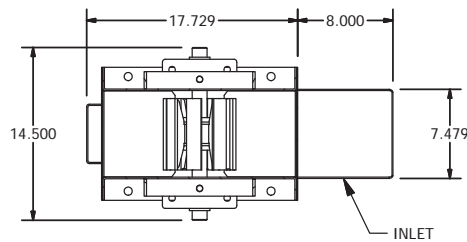
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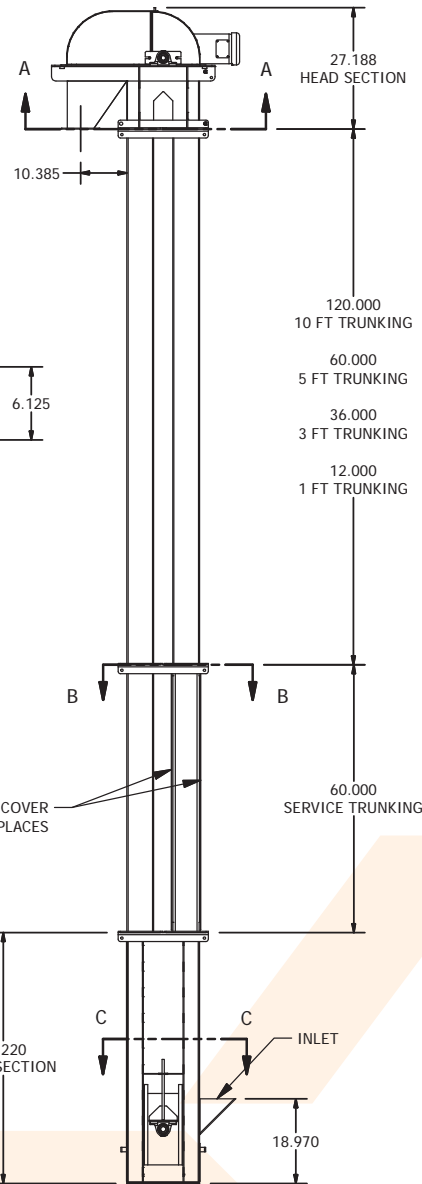
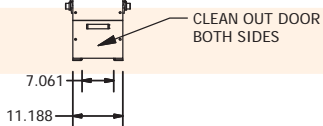
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SECTION B-B
SCALE 1:15



SECTION C-C
SCALE 1:15

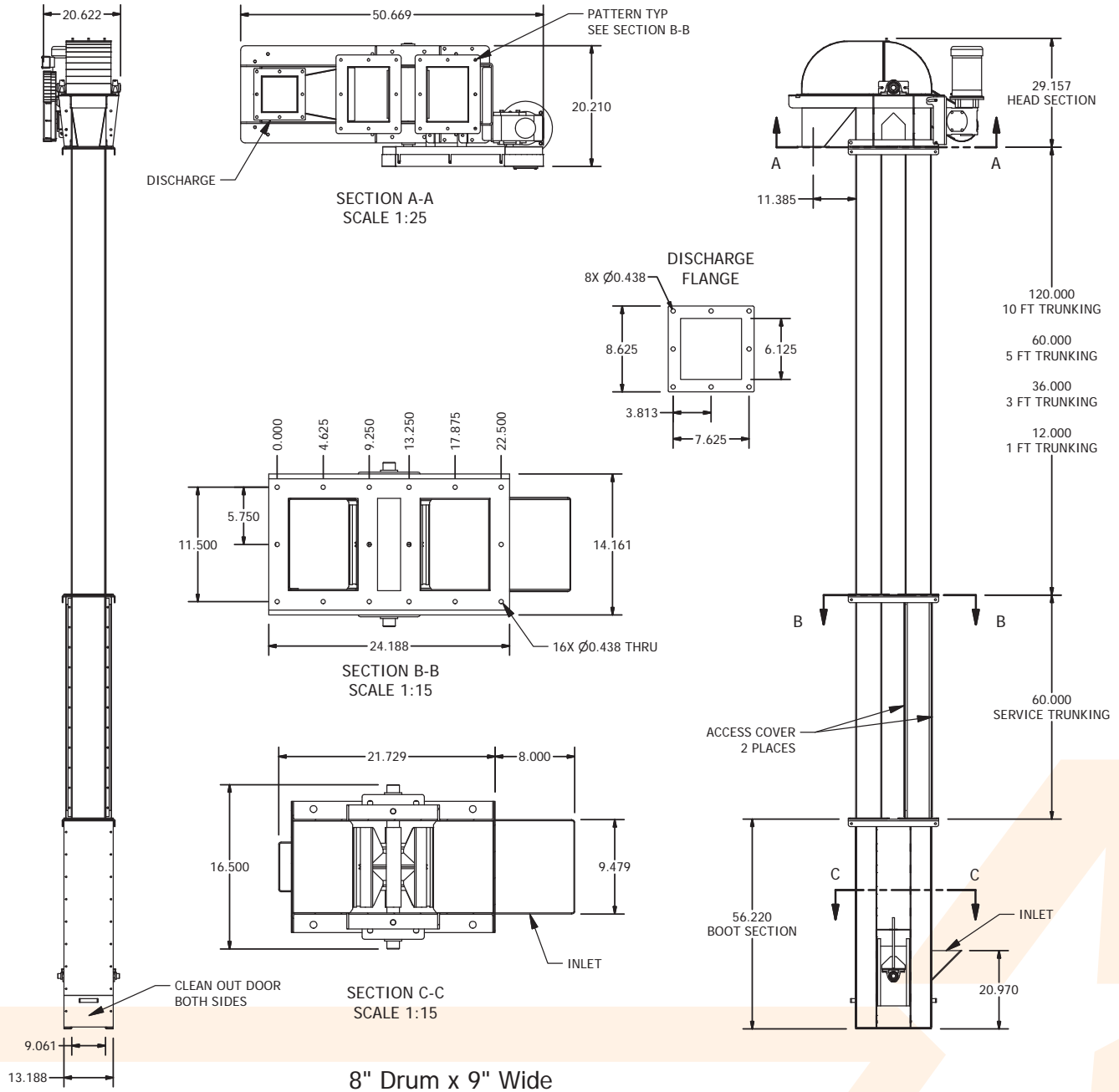


6" Drum x 6" Wide

Spec Sheet

Bucket Elevator Spec Sheet 800 Series Chain Drive

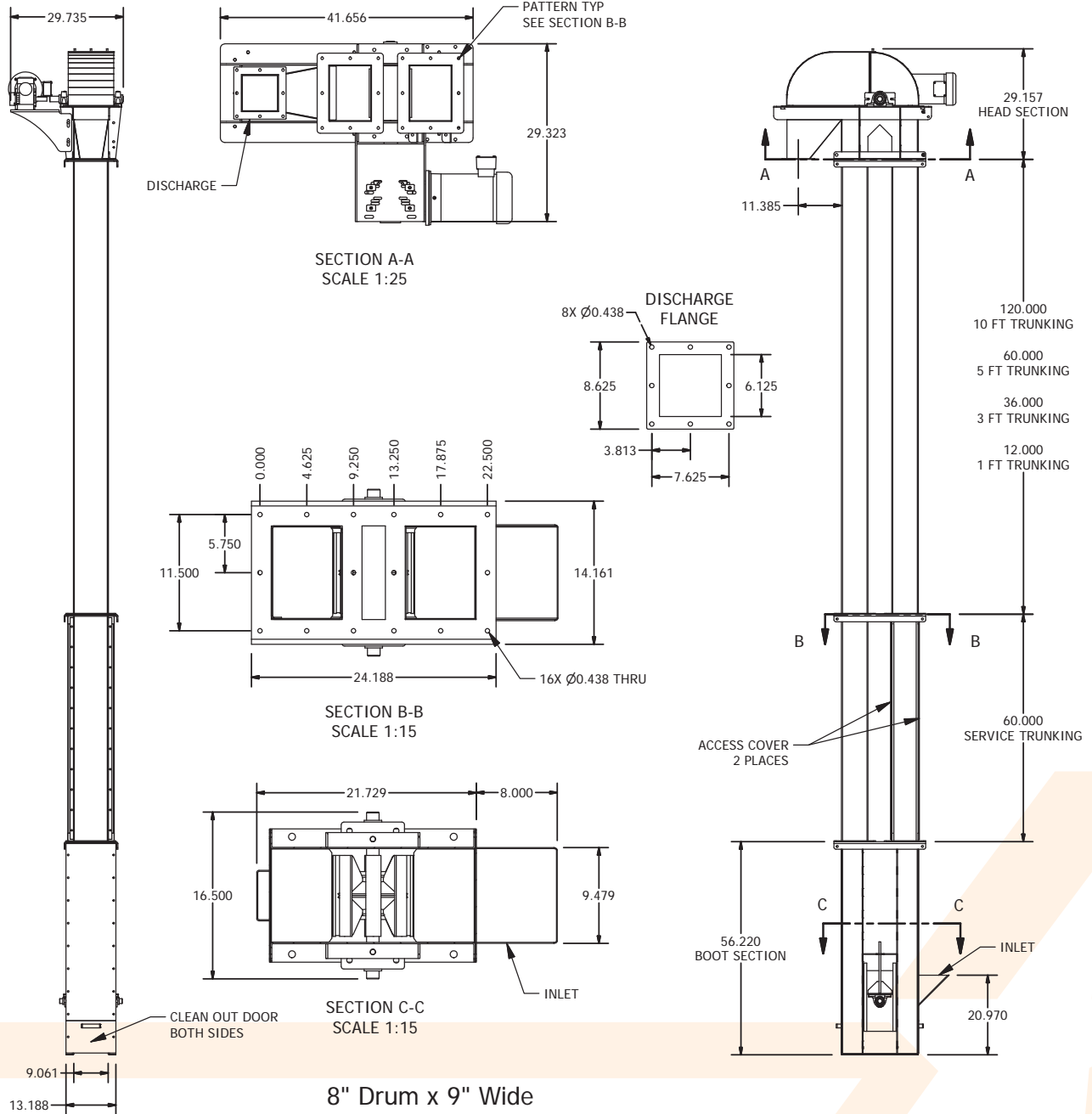
INDUSTRIES



Spec Sheet

Bucket Elevator Spec Sheet 800 Series Direct Drive

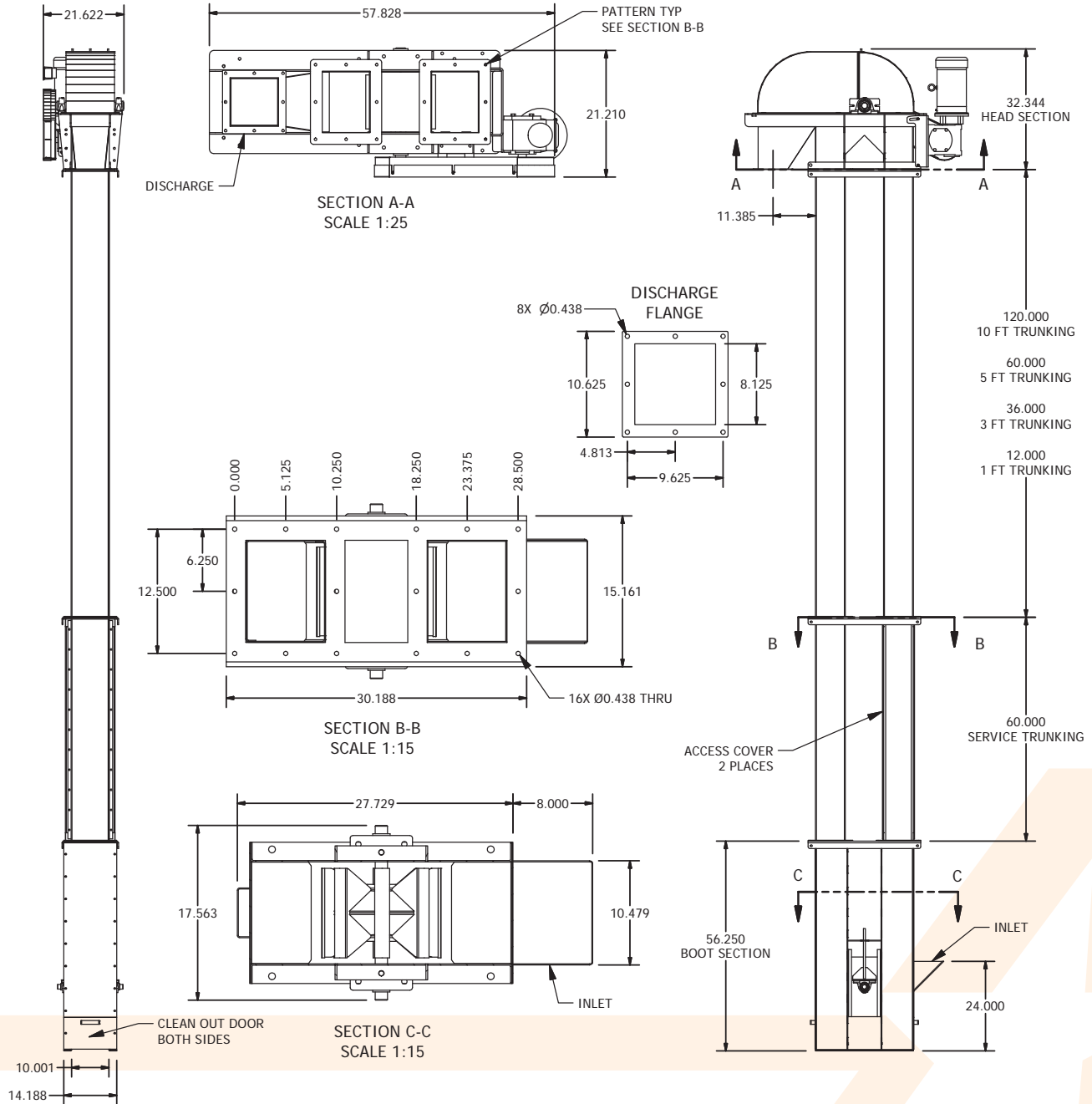
INDUSTRIES



Spec Sheet

Bucket Elevator Spec Sheet 1200 Series Chain Drive

INDUSTRIES

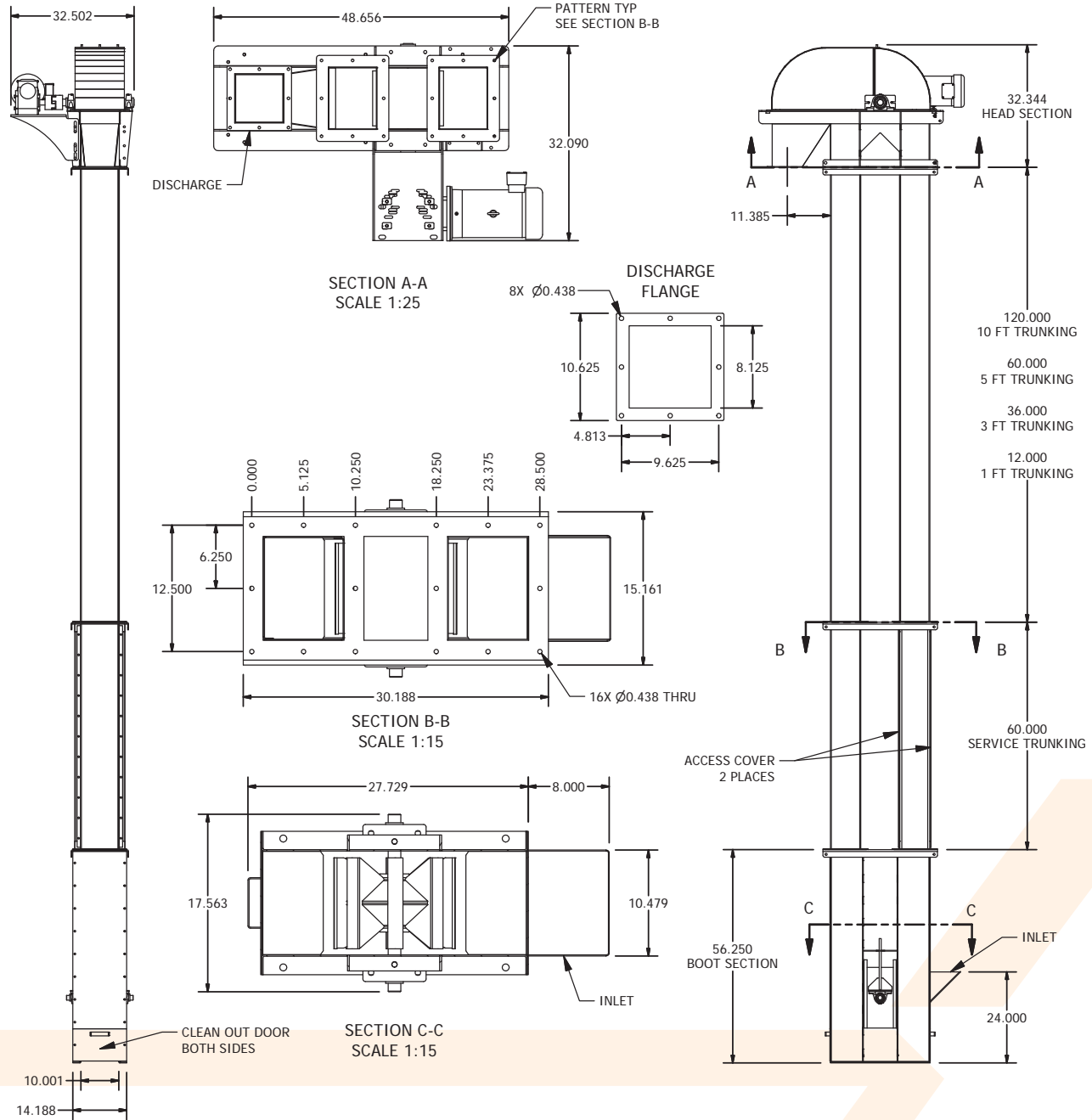


12" Drum x 9" Wide

Spec Sheet

Bucket Elevator Spec Sheet 1200 Series Direct Drive

INDUSTRIES



12" Drum x 9" Wide

Bolt Torque

CHECKING BOLT TORQUE

The tables shown below give correct torque values for various bolts and capscrews. Tighten all bolts to the torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

ENGLISH TORQUE SPECIFICATION

Bolt Diameter	Bolt Torque*					
	SAE 2		SAE 5		SAE 8	
	N.m.	(lb-ft)	N.m.	(lb-ft)	N.m.	(lb-ft)
1/4"	8	(6)	12	(9)	17	(12)
5/16"	13	(10)	25	(19)	36	(27)
3/8"	27	(20)	45	(33)	63	(45)
7/16"	41	(30)	72	(53)	100	(75)
1/2"	61	(45)	110	(80)	155	(115)
9/16"	95	(70)	155	(115)	220	(165)
5/8"	128	(95)	215	(160)	305	(220)
3/4"	225	(165)	390	(290)	540	(400)
7/8"	230	(170)	570	(420)	880	(650)
1"	345	(225)	850	(630)	1320	(970)



Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

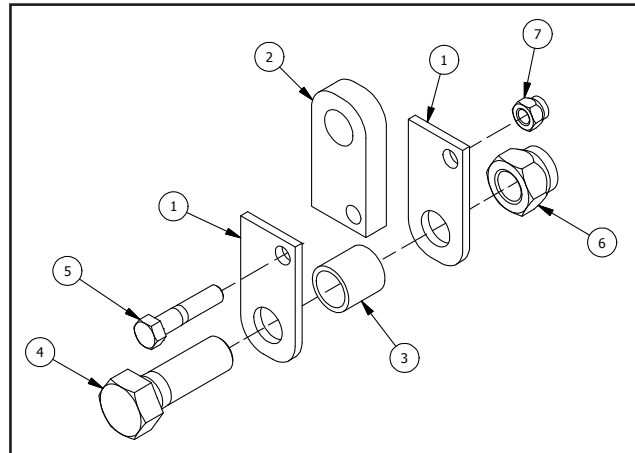
*Torque value for bolts and capscrews are identified by their head markings.

Exploded Views and Parts Lists

The manual contains a parts list and exploded view for your machine. It is separated into major sections which correspond to the groups shown in the Table of Contents and the accompanying illustrations.

The first page of each major section lists the contents of that section, each of which consists of exploded views and related tabular listings.

#s	DESCRIPTION	PART #	QTY
1	Bracket	00001	2
2	Pivot Bracket	00002	1
3	Spacer	00003	1
4	3/4 x 2 1/4" Bolt	00004	1
5	3/8 x 1 3/4" Bolt	00005	1
6	3/4" Nylon Locknut	00006	1
7	3/8" Nylon Locknut	00007	1



WHEN ORDERING PARTS

Always give your dealer the model and Serial Number of your machine to assist him in ordering and obtaining the correct parts. Use the exploded view and tabular listing of the area of interest to exactly identify the required part.

USING THE MANUAL

Parts data consists of exploded view illustrations and associated parts list tables which are read as follows:

ITEM

The item number is the identifier number from the illustration. For example, number 3 on an illustration points to a component which is item 3 on the accompanying table.

DESCRIPTION

This column contains the name or description of the part.

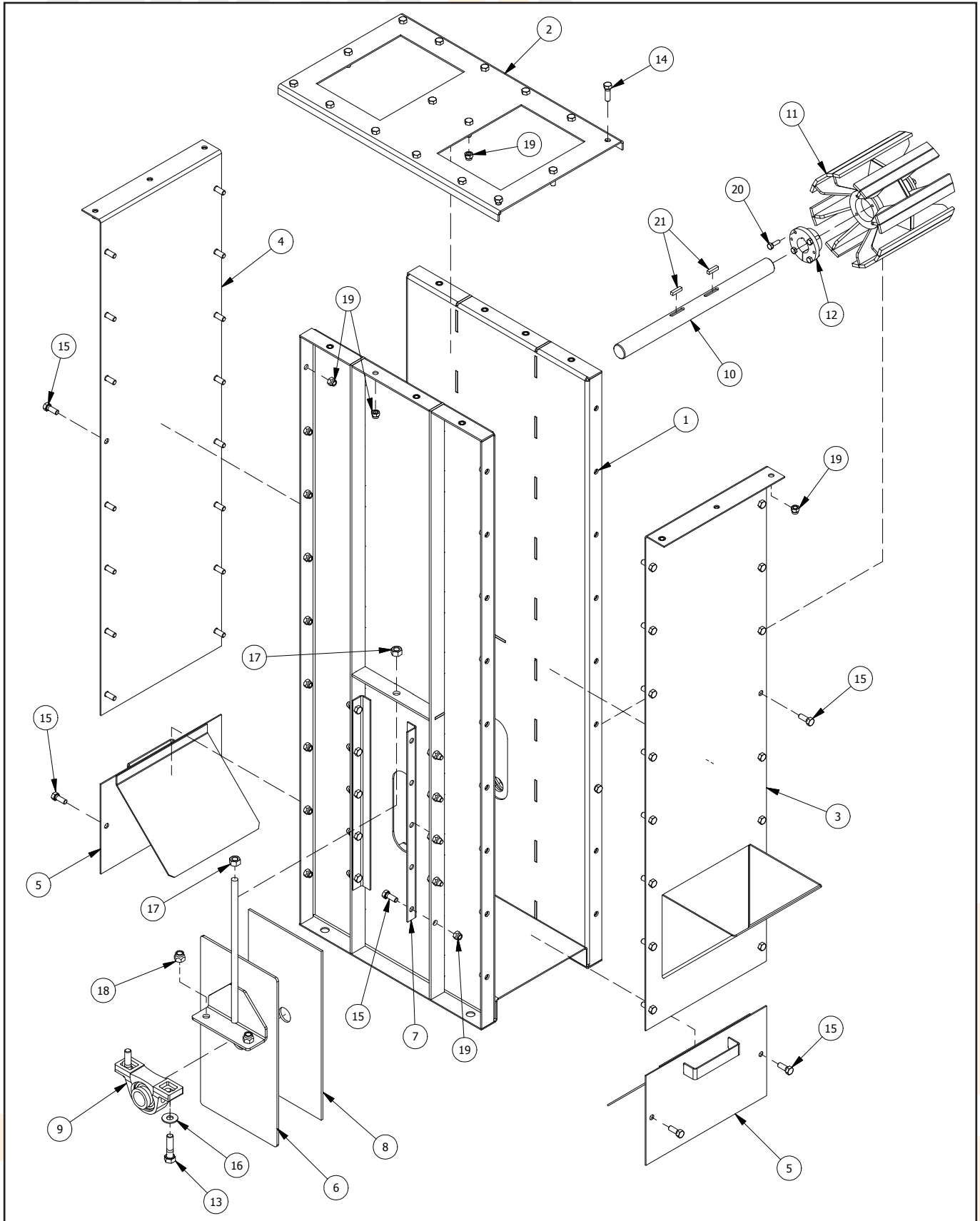
PART NUMBER

The part number is the number by which the component may be identified and ordered from your dealer.

QUANTITY

This column contains the quantity of the items in the assembly.

#s	DESCRIPTION	600 SERIES	QTY	800 SERIES	QTY	1200 SERIES	QTY
1	Body Weldment	27391	1	27392	1	27393	1
2	Cap	27455	1	27456	1	27457	1
3	Inlet Panel	27401	1	27402	1	27403	1
4	Blank Panel	27407	1	27408	1	27409	1
5	Cleanout Weldment	27413	2	27414	2	27415	2
6	Belt Tensioner	27422	2	27422	2	27422	2
7	Tensioner Retainer Angle	12045	4	12045	4	12045	4
8	Tensioner Seal Plate	27424	2	27424	2	27424	2
9	Bearing	20380	2	20380	2	20380	2
10	Driveshaft	36782	1	36783	1	36784	1
11	Wing Pulley	36007	1	36008	1	36009	1
12	Bushing	13995	2	13995	2	13395	2
13	1/2 x 2" Bolt	10359	4	10359	4	10359	4
14	3/8 x 1 1/4" Bolt	10311	16	10311	16	10311	16
15	3/8 x 1" Bolt	10277	56	10277	56	10277	56
16	1/2" Flatwasher SM OD	20181	4	20181	4	20181	4
17	1/2" Hexnut	10289	4	10289	4	10289	4
18	1/2" Nylon Locknut	10318	4	10318	4	10318	4
19	3/8" Nylon Locknut	10274	84	10274	84	10274	84
20	1/4 x 3/4" Bolt	c/w bushing	8	c/w bushing	8	c/w bushing	8
21	1/4" x 1" Key	10281	2	10281	2	10281	2



10' SECTION

#s	DESCRIPTION	600 SERIES	QTY	800 SERIES	QTY	1200 SERIES	QTY
1	Trunk Weldment	27367	2	27371	2	27375	2
2	Connector Plate	27385	1	27386	1	27387	1
3	3/8 x 1 1/2" Bolt	10293	16	10293	16	10293	16
4	3/8" Nylon Locknut	10274	16	10274	16	10274	16

5' SECTION

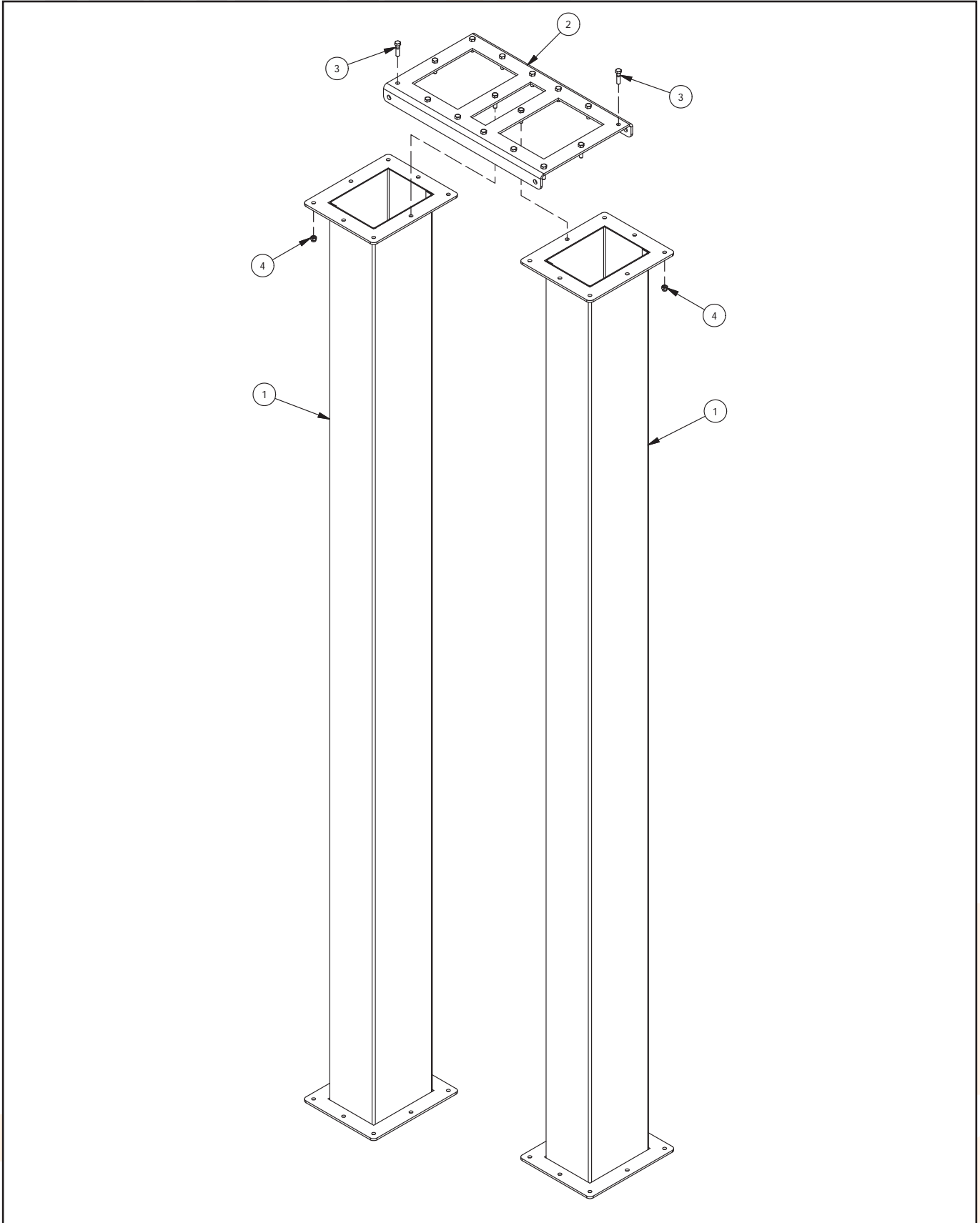
#s	DESCRIPTION	600 SERIES	QTY	800 SERIES	QTY	1200 SERIES	QTY
1	Trunk Weldment	27366	2	27370	2	27374	2
2	Connector Plate	27385	1	27386	1	27387	1
3	3/8 x 1 1/2" Bolt	10293	16	10293	16	10293	16
4	3/8" Nylon Locknut	10274	16	10274	16	10274	16

3' SECTION

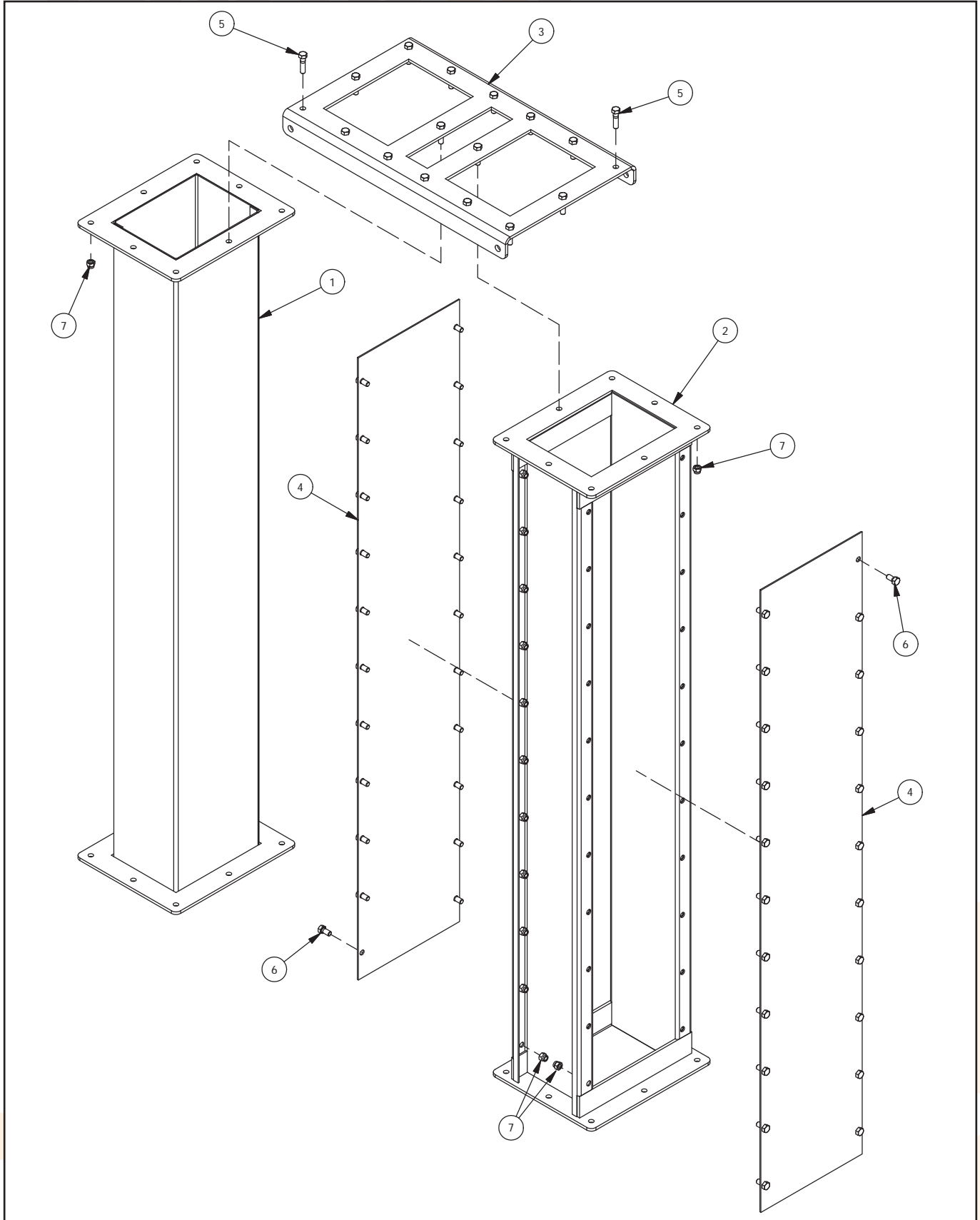
#s	DESCRIPTION	600 SERIES	QTY	800 SERIES	QTY	1200 SERIES	QTY
1	Trunk Weldment	27365	2	27369	2	27373	2
2	Connector Plate	27385	1	27386	1	27387	1
3	3/8 x 1 1/2" Bolt	10293	16	10293	16	10293	16
4	3/8" Nylon Locknut	10274	16	10274	16	10274	16

1' SECTION

#s	DESCRIPTION	600 SERIES	QTY	800 SERIES	QTY	1200 SERIES	QTY
1	Trunk Weldment	27364	2	27368	2	27372	2
2	Connector Plate	27385	1	27386	1	27387	1
3	3/8 x 1 1/2" Bolt	10293	16	10293	16	10293	16
4	3/8" Nylon Locknut	10274	16	10274	16	10274	16

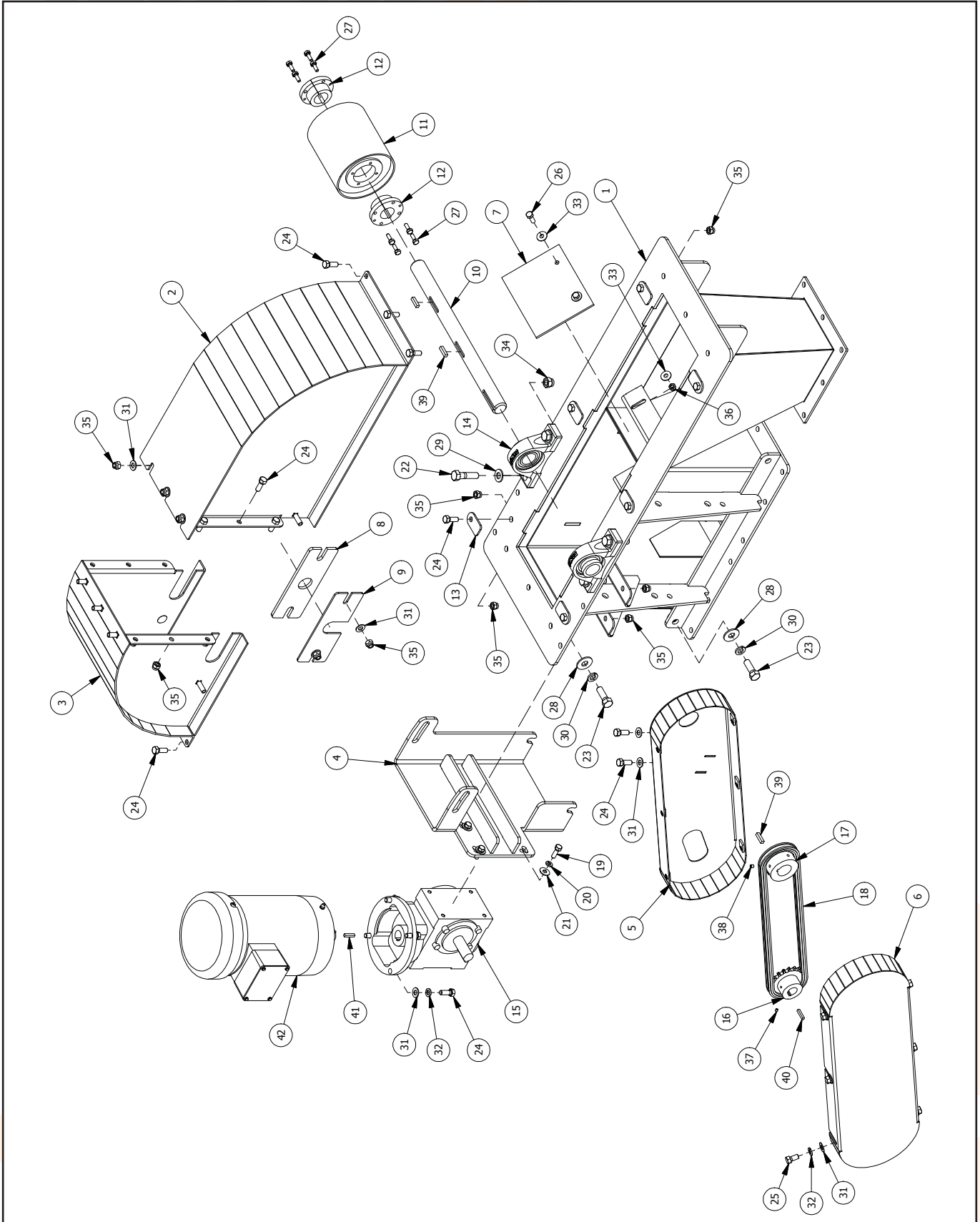


#s	DESCRIPTION	600 SERIES	QTY	800 SERIES	QTY	1200 SERIES	QTY
1	Trunk Weldment	27367	1	27371	1	27375	1
2	Service Trunk Weldment	27379	2	27380	2	27381	2
3	Connector Plate	27385	2	27386	2	27387	2
4	Service Trunk Panel	12093	2	12092	2	12091	2
5	3/8 x 1 1/2" Bolt	10293	16	10293	16	10293	16
6	3/8 x 3/4" Bolt	10369	44	10369	44	10369	44
7	3/8" Nylon Locknut	10274	60	10274	60	10274	60



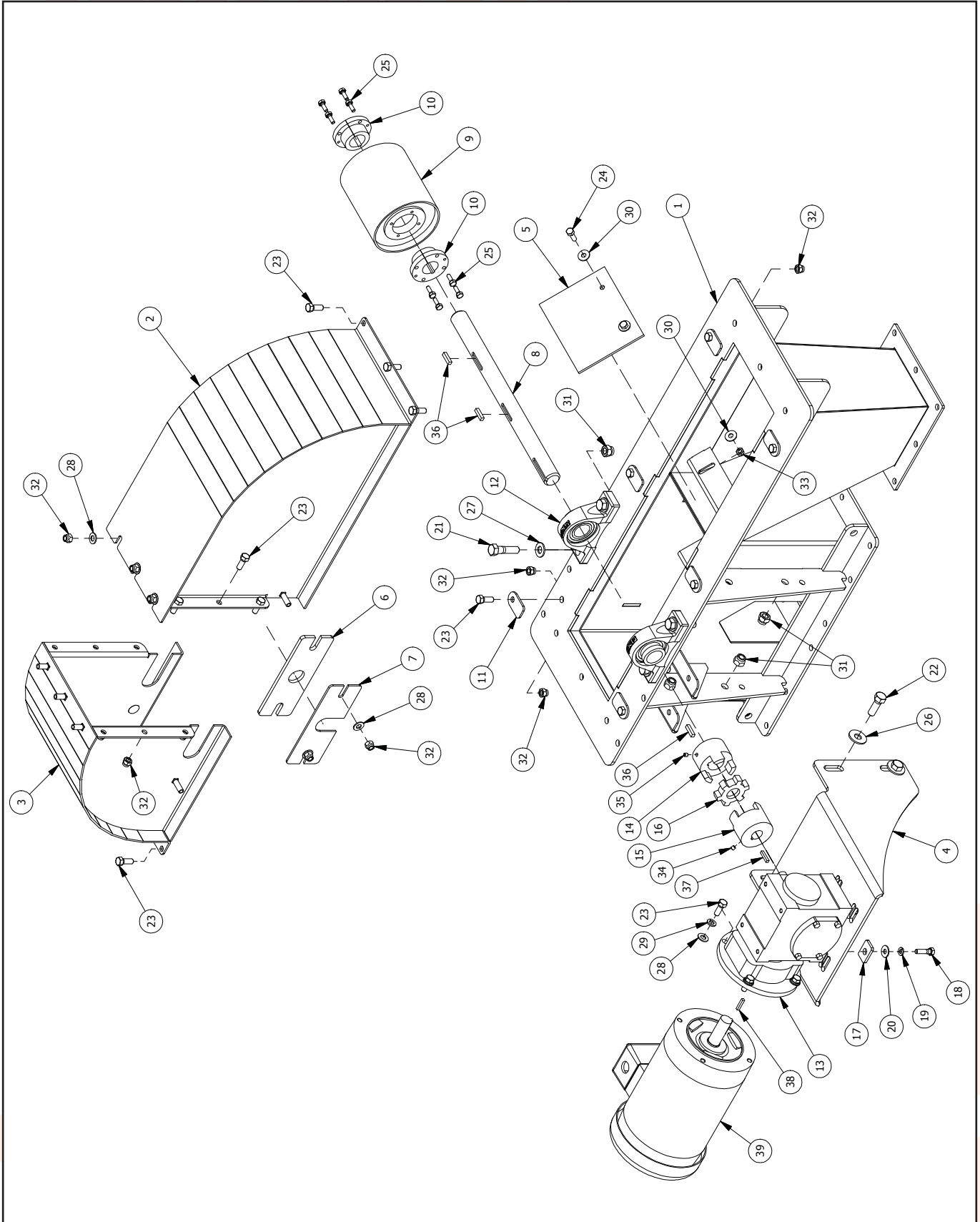
#s	DESCRIPTION	PART #	QTY
1	Head Discharge Weldment	27349	1
2	Front Hood Weldment	12246	1
3	Rear Hood Weldment	12220	1
4	Gearbox Mount Weldment	20182	1
5	Rear Chain Guard	20210	1
6	Front Chain Guard	20234	1
7	Throat Wear Plate	12219	1
8	Shaft Seal Plate	11992	2
9	Shaft Seal Clamp Plate	11986	2
10	Driveshaft	12204	1
11	Head Pulley	15091	1
12	Head Pulley Bushing	13995	2
13	Hood Clamp	12112	6
14	Bearing	20380	2
Gearbox			
	Heads: 20262	20348	1
	Heads: 20263	20349	1
15	Heads: 20264	20350	1
	Heads: 22976	22992	1
	Heads: 22977	22993	1
	Heads: 22978	22994	1
Gearbox Sprocket			
16	Heads: 20262, 22976	20317	1
	Heads: 20263, 22977	20322	1
	Heads: 20264, 22978	20323	1
Sprocket			
17	Heads: 20262, 22976	20320	1
	Heads: 20263, 20264, 22977, 22978	20327	1
	#40 Chain - 84 Links	20382	1
	Heads: 20262, 22976		
18	#50 Chain - 72 Links	20386	1
	Heads: 20263, 22977		
	#50 Chain - 73 Links	20387	1
	Heads: 20264, 22978		

#s	DESCRIPTION	PART #	QTY
	5/16 x 1" Bolt	10287	4
	Heads: 20262, 22976		
19	3/8 x 1" Bolt	10277	4
	Heads: 20263, 20264, 22977, 22978		
	5/16" Lockwasher	10286	4
	Heads: 20262, 22976		
20	3/8" Lockwasher	10276	4
	Heads: 20263, 20264, 22977, 22978		
	5/16" Flatwasher	10285	4
	Heads: 20262, 22976		
21	3/8" Flatwasher	10276	4
	Heads: 20263, 20264, 22977, 22978		
22	1/2 x 2" Bolt	10359	4
23	1/2 x 1 1/2" Bolt	10294	4
24	3/8 x 1" Bolt	10277	24
25	3/8 x 3/4" Bolt	10369	6
26	5/16 x 1" Bolt	10287	2
27	1/4 x 3/4" Bolt	c/w bushing	8
28	1/2" Flatwasher	10297	4
29	1/2" Flatwasher SM OD	20181	4
30	1/2" Lockwasher	14490	4
31	3/8" Flatwasher SM OD	10304	19
32	3/8" Lockwasher	10276	10
33	5/16" Flatwasher	10285	4
34	1/2" Nylon Locknut	10324	4
35	3/8" Nylon Locknut	10274	27
36	5/16" Nylon Locknut	10290	2
37	Setscrew	c/w grbx sprocket	1
38	Setscrew	c/w sprocket	1
39	Key	10281	3
40	Key	c/w gearbox	1
41	Key	c/w motor	1
42	Motor	customer supplied	1



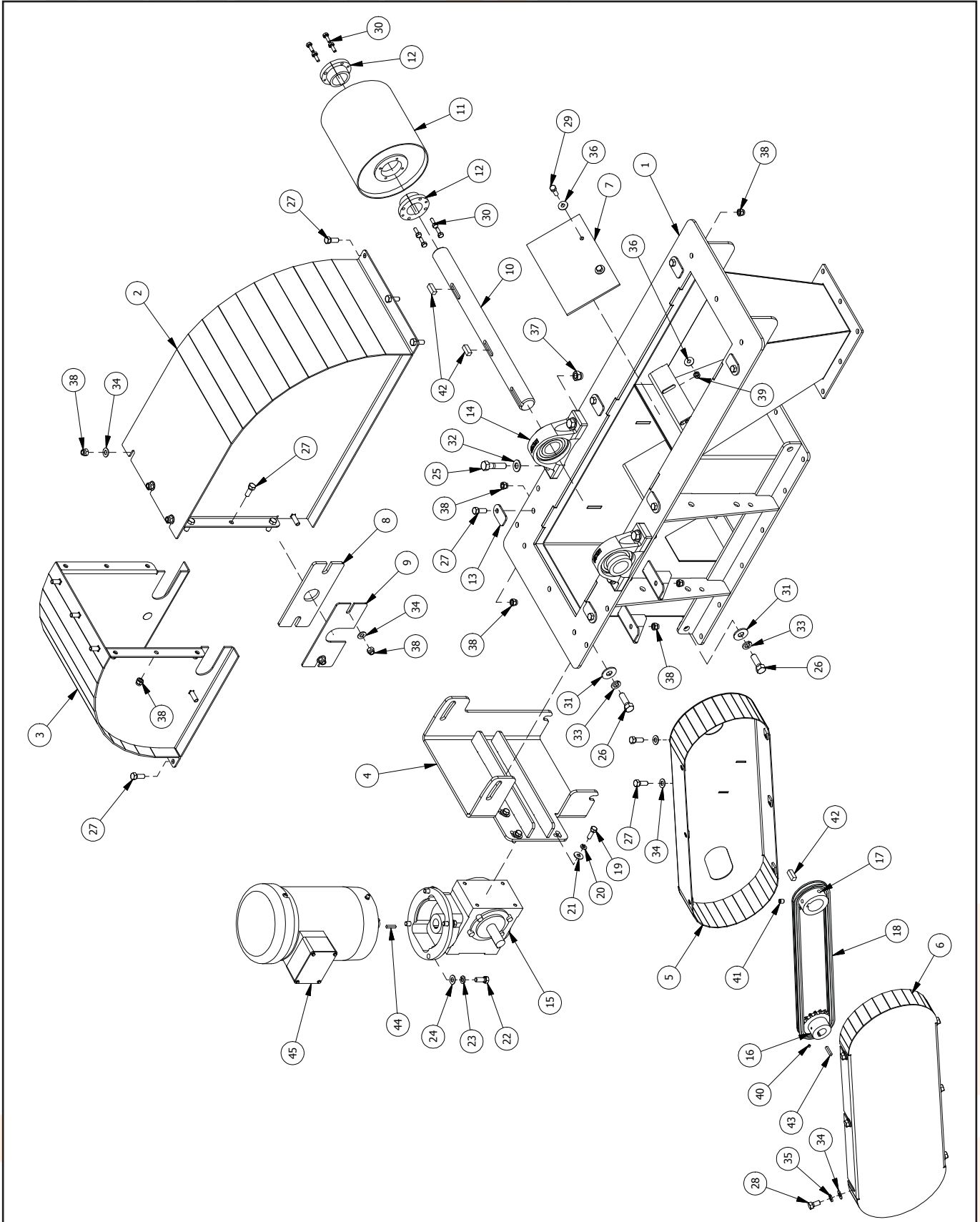
#s	DESCRIPTION	PART #	QTY
1	Head Discharge Weldment	27349	1
2	Front Hood Weldment	12246	1
3	Rear Hood Weldment	12220	1
4	Gearbox Mount Weldment	20242	1
5	Throat Wear Plate	12219	1
6	Shaft Seal Plate	11992	2
7	Shaft Seal Clamp Plate	11986	2
8	Driveshaft	12204	1
9	Head Pulley	15091	1
10	Head Pulley Bushing	13995	2
11	Hood Clamp	12112	6
12	Bearing	20380	2
Gearbox			
	Heads: 20277	20348	1
	Heads: 20278	20349	1
13	Heads: 20279	20350	1
	Heads: 22984	22992	1
	Heads: 22985	22993	1
	Heads: 22986	22994	1
14	Driveshaft Lovejoy	20146	1
Gearbox Lovejoy			
	Heads: 20277, 22984	20143	1
15	Heads: 20278, 22985	20144	1
	Heads: 20279, 22986	20145	1
16	Lovejoy Spider	20137	1
17	Gearbox Square Washer	20243	4
	5/16 x 1 1/4" Bolt	20401	4
	Heads: 20277, 22984		
18	3/8 x 1 1/4" Bolt	10311	4
	Heads: 20278, 20279, 22985, 22986		

#s	DESCRIPTION	PART #	QTY
	5/16" Lockwasher	10286	4
	Heads: 20277, 22984		
19	3/8" Lockwasher	10276	4
	Heads: 20278, 20279, 22985, 22986		
	5/16" Flatwasher	10285	4
	Heads: 20277, 22984		
20	3/8" Flatwasher	10276	4
	Heads: 20278, 20279, 22985, 22986		
21	1/2 x 2" Bolt	10359	4
22	1/2 x 1 1/2" Bolt	10294	4
23	3/8 x 1" Bolt	10277	22
24	5/16 x 1" Bolt	10287	2
25	1/4 x 3/4" Bolt	c/w bushing	8
26	1/2" Flatwasher	10297	4
27	1/2" Flatwasher SM OD	20181	4
28	3/8" Flatwasher SM OD	10304	11
29	3/8" Lockwasher	10276	4
30	5/16" Flatwasher	10285	4
31	1/2" Nylon Locknut	10318	8
32	3/8" Nylon Locknut	10274	25
33	5/16" Nylon Locknut	10290	2
34	Setscrew	c/w grbx lovejoy	1
35	Setscrew	c/w shft lovejoy	1
36	Key	10281	3
37	Key	c/w gearbox	1
38	Key	c/w motor	1
39	Motor	customer supplied	1



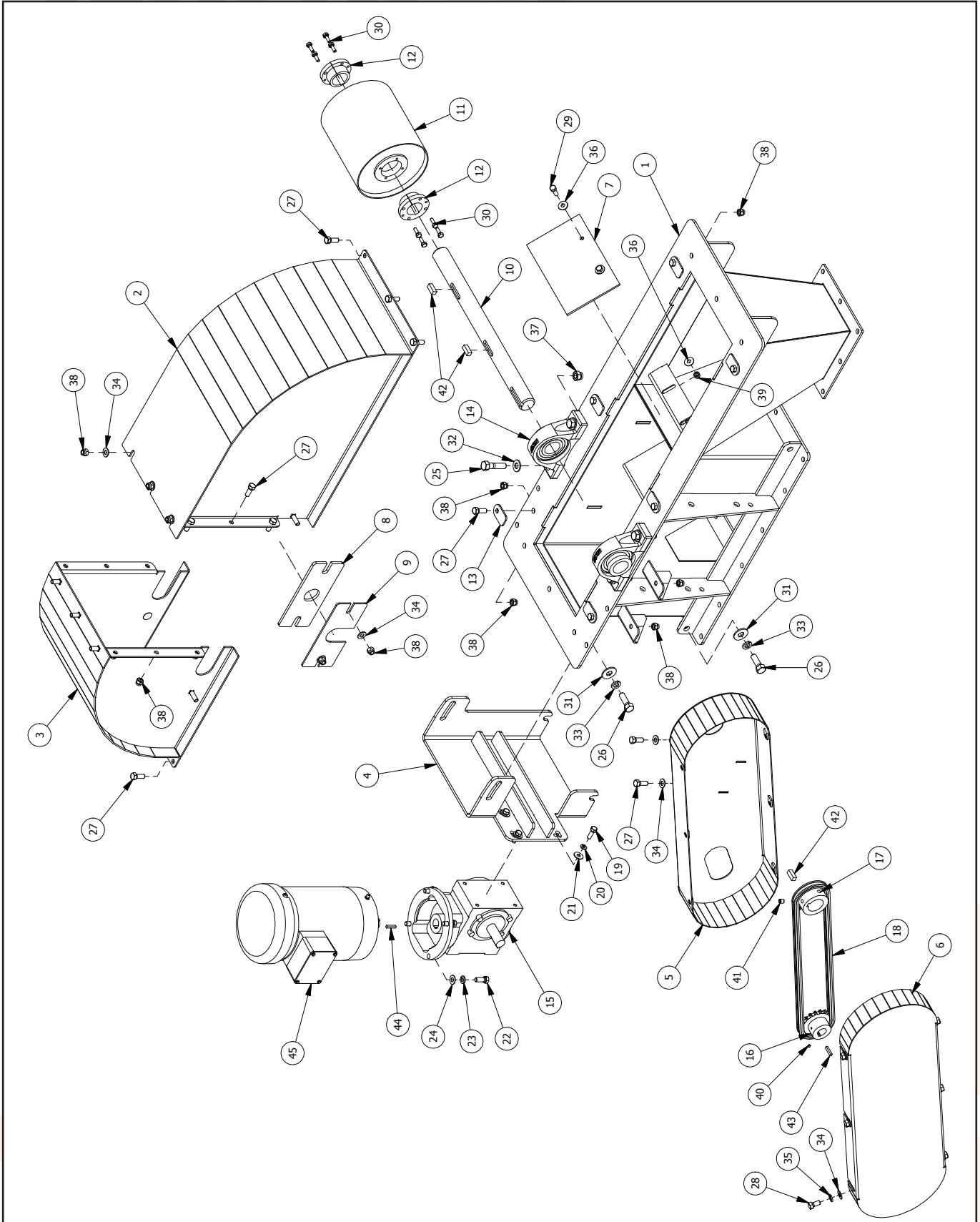
#s	DESCRIPTION	PART #	QTY
1	Head Discharge Weldment	27350	1
2	Front Hood Weldment	12247	1
3	Rear Hood Weldment	12221	1
Gearbox Mount Weldment			
4	Heads: 20265, 20266, 20267, 22979, 22980, 22981	20184	1
	Heads: 20268, 20269, 22982, 22983	20183	1
5	Rear Chain Guard	20209	1
6	Front Chain Guard	20233	1
7	Throat Wear Plate	12218	1
8	Shaft Seal Plate	11991	2
9	Shaft Seal Clamp Plate	11984	2
10	Driveshaft	12203	1
11	Head Pulley	15090	1
12	Head Pulley Bushing	20291	2
13	Hood Clamp	12112	6
14	Bearing	20381	2
Gearbox			
	Heads: 20265	20348	1
	Heads: 20266	20349	1
	Heads: 20267	20350	1
	Heads: 20268	20351	1
15	Heads: 20269	20352	1
	Heads: 22979	22992	1
	Heads: 22980	22993	1
	Heads: 22981	22994	1
	Heads: 22982	22995	1
	Heads: 22983	20353	1
Gearbox Sprocket			
	Heads: 20265, 22979	20317	1
	Heads: 20266, 22980	20322	1
16	Heads: 20267, 22981	20323	1
	Heads: 20268, 22982	20329	1
	Heads: 20269, 22983	20334	1

#s	DESCRIPTION	PART #	QTY
Sprocket			
	Heads: 20265, 22979	20319	1
	Heads: 20266, 20267, 22980, 22981	20326	1
17	Heads: 20268, 22982	20331	1
	Heads: 20269, 22983	20333	1
	#40 Chain - 93 Links	20383	1
	Heads: 20265, 22979		
	#50 Chain - 79 Links	20388	1
	Heads: 20266, 22980		
18	#50 Chain - 80 Links	20389	1
	Heads: 20267, 22981		
	#60 Chain - 71 Links	20393	1
	Heads: 20268, 22982		
	#80 Chain - 59 Links	20396	1
	Heads: 20269, 22983		
	5/16 x 1" Bolt	10287	4
	Heads: 20265, 22979		
19	3/8 x 1" Bolt	10277	4
	Heads: 20266, 20267, 20268, 22980, 22981, 22982		
	7/16 x 1" Bolt	20402	4
	Heads: 20269, 22983		
	5/16" Lockwasher	10286	4
	Heads: 20265, 22979		
20	3/8" Lockwasher	10276	4
	Heads: 20266, 20267, 20268, 22980, 22981, 22982		
	7/16" Lockwasher	20403	4
	Heads: 20269, 22983		



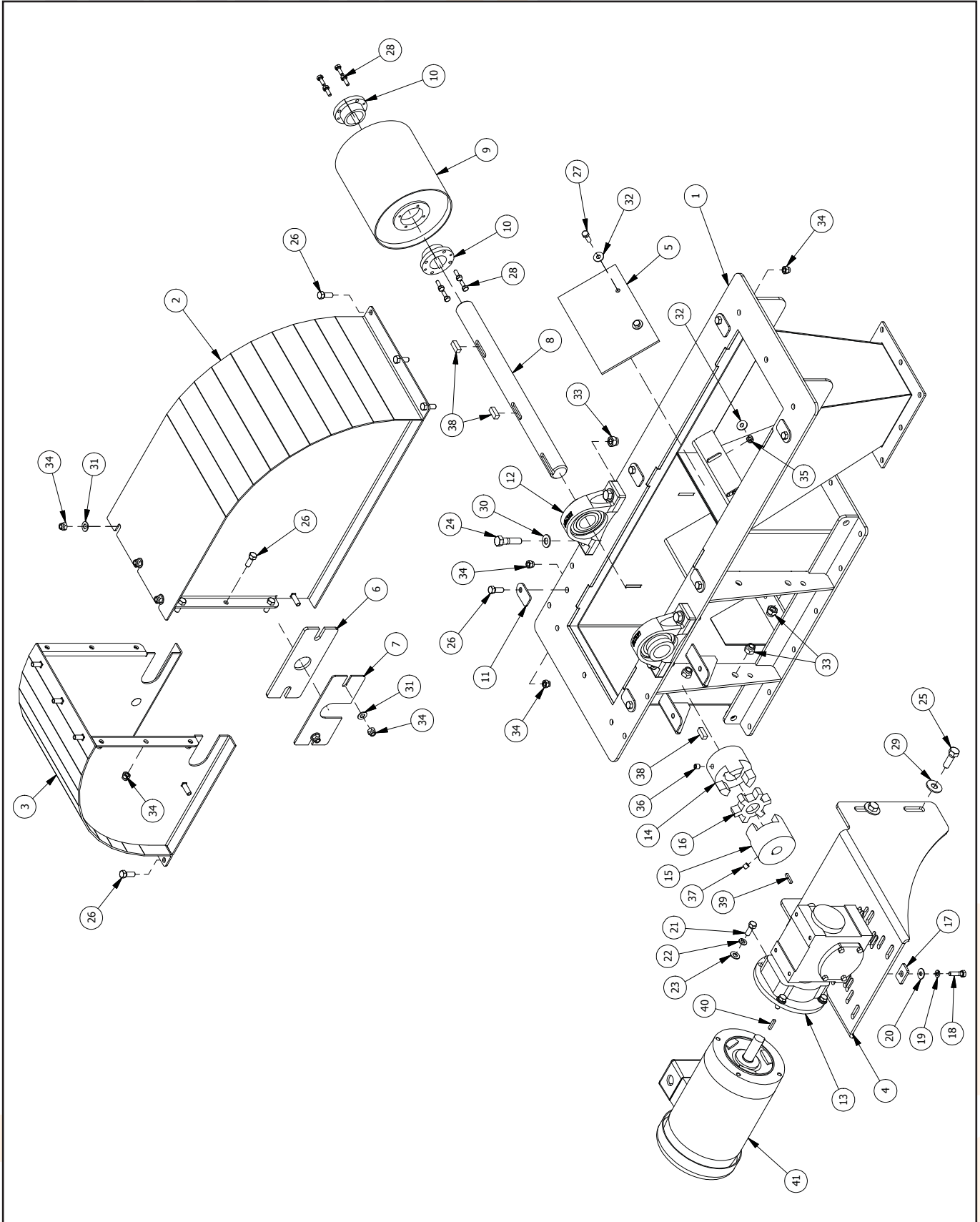


#s	DESCRIPTION	PART #	QTY
	5/16" Flatwasher	10285	4
	Heads: 20265, 22979		
	3/8" Flatwasher	10276	4
21	Heads: 20266, 20267, 20268, 22980, 22981, 22982		
	7/16" Flatwasher	19756	4
	Heads: 20269, 22983		
	3/8 x 1" Bolt	10277	4
	Heads: 20265, 20266, 20267, 22979, 22980, 22981		
22	1/2 x 1" Bolt	10302	4
	Heads: 20268, 20269, 22982, 22983		
	3/8" Lockwasher	10276	4
	Heads: 20265, 20266, 20267, 22979, 22980, 22981		
23	1/2" Lockwasher	14490	4
	Heads: 20268, 20269, 22982, 22983		
	3/8" Flatwasher SM OD	10304	4
	Heads: 20265, 20266, 20267, 22979, 22980, 22981		
24	1/2" Flatwasher SM OD	20181	4
	Heads: 20268, 20269, 22982, 22983		
25	1/2 x 2" Bolt	10359	4
26	1/2 x 1 1/2" Bolt	10294	4
27	3/8 x 1" Bolt	10277	20
28	3/8 x 3/4" Bolt	10369	6
29	5/16 x 1" Bolt	10287	2
30	1/4 x 3/4" Bolt	c/w bushing	8
31	1/2" Flatwasher	10297	4
32	1/2" Flatwasher SM OD	20181	4
33	1/2" Lockwasher	14490	4
34	3/8" Flatwasher SM OD	10304	15
35	3/8" Lockwasher	10276	6
36	5/16" Flatwasher	10285	4
37	1/2" Nylon Locknut	10324	4
38	3/8" Nylon Locknut	10274	27
39	5/16" Nylon Locknut	10290	2
40	Setscrew	c/w grbx sprocket	1
41	Setscrew	c/w sprocket	1
42	Key	12125	3
43	Key	c/w gearbox	1
44	Key	c/w motor	1
45	Motor	customer supplied	1



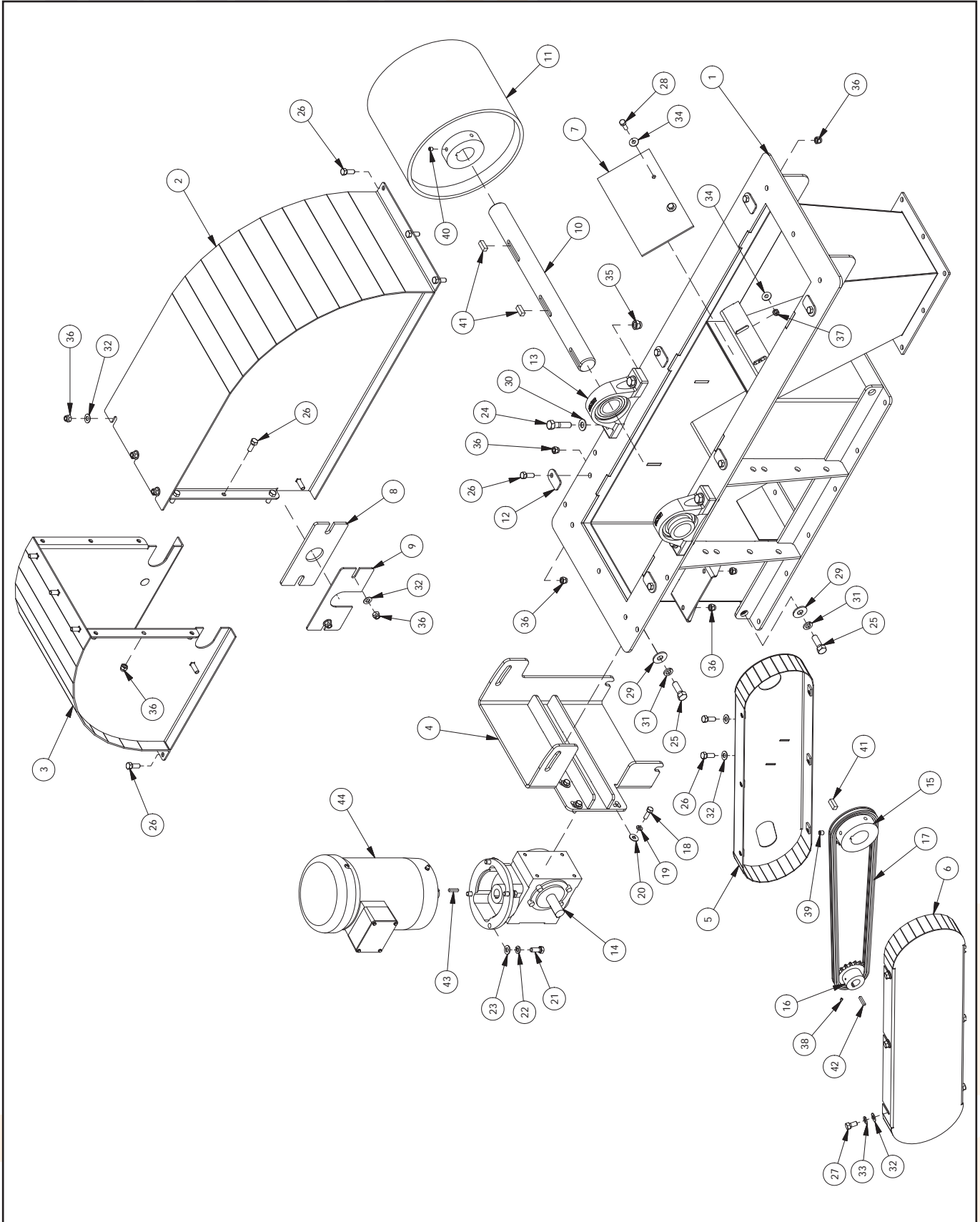
#s	DESCRIPTION	PART #	QTY
1	Head Discharge Weldment	27350	1
2	Front Hood Weldment	12247	1
3	Rear Hood Weldment	12221	1
4	Gearbox Mount Weldment	20241	1
5	Throat Wear Plate	12218	1
6	Shaft Seal Plate	11991	2
7	Shaft Seal Clamp Plate	11984	2
8	Driveshaft	12203	1
9	Head Pulley	15090	1
10	Head Pulley Bushing	20291	2
11	Hood Clamp	12112	6
12	Bearing	20381	2
Gearbox			
	Heads: 20280	20348	1
13	Heads: 20281	20349	1
	Heads: 20282	20350	1
	Heads: 20283	20351	1
	Heads: 20284	20352	1
	Heads: 22987	22992	1
	Heads: 22988	22993	1
	Heads: 22989	22994	1
	Heads: 22990	22995	1
	Heads: 22991	20353	1
14	Driveshaft Lovejoy	20153	1
Gearbox Lovejoy			
	Heads: 20280, 22987	20148	1
15	Heads: 20281, 22988	20149	1
	Heads: 20282, 22989	20150	1
	Heads: 20283, 22990	20151	1
	Heads: 20284, 22991	20152	1
16	Lovejoy Spider	20138	1
17	Gearbox Square Washer	20243	4
	5/16 x 1 1/4" Bolt	20401	4
	Heads: 20280, 22987		
	3/8 x 1 1/4" Bolt	10311	4
18	Heads: 20281, 20282, 20283, 22988, 22989, 22990		
	7/16 x 1 1/4" Bolt	23519	4
	Heads: 20284, 22991		
	5/16" Lockwasher	10286	4
	Heads: 20280, 22987		
	3/8" Lockwasher	10276	4
19	Heads: 20281, 20282, 20283, 22988, 22989, 22990		
	7/16" Lockwasher	20403	4
	Heads: 20284, 22991		

#s	DESCRIPTION	PART #	QTY
	5/16" Flatwasher	10285	4
	Heads: 20280, 22987		
	3/8" Flatwasher	10276	4
20	Heads: 20281, 20282, 20283, 22988, 22989, 22990		
	7/16" Flatwasher	19756	4
	Heads: 20284, 22991		
	3/8 x 1" Bolt	10277	4
	Heads: 20280, 20281, 20282, 22987, 22988, 22989		
21	1/2 x 1" Bolt	10302	4
	Heads: 20283, 20284, 22990, 22991		
	3/8" Lockwasher	10276	4
	Heads: 20280, 20281, 20282, 22987, 22988, 22989		
22	1/2" Lockwasher	14490	4
	Heads: 20283, 20284, 22990, 22991		
	3/8" Flatwasher SM OD	10304	4
	Heads: 20280, 20281, 20282, 22987, 22988, 22989		
23	1/2" Flatwasher SM OD	20181	4
	Heads: 20283, 20284, 22990, 22991		
24	1/2 x 2" Bolt	10359	4
25	1/2 x 1 1/2" Bolt	10294	4
26	3/8 x 1" Bolt	10277	18
27	5/16 x 1" Bolt	10287	2
28	1/4 x 3/4" Bolt	c/w bushing	8
29	1/2" Flatwasher	10297	4
30	1/2" Flatwasher SM OD	20181	4
31	3/8" Flatwasher SM OD	10304	7
32	5/16" Flatwasher	10285	4
33	1/2" Nylon Locknut	10318	8
34	3/8" Nylon Locknut	10274	25
35	5/16" Nylon Locknut	10290	2
36	Setscrew	c/w grbx lovejoy	1
37	Setscrew	c/w shft lovejoy	1
38	Key	12125	3
39	Key	c/w gearbox	1
40	Key	c/w motor	1
41	Motor	customer supplied	1



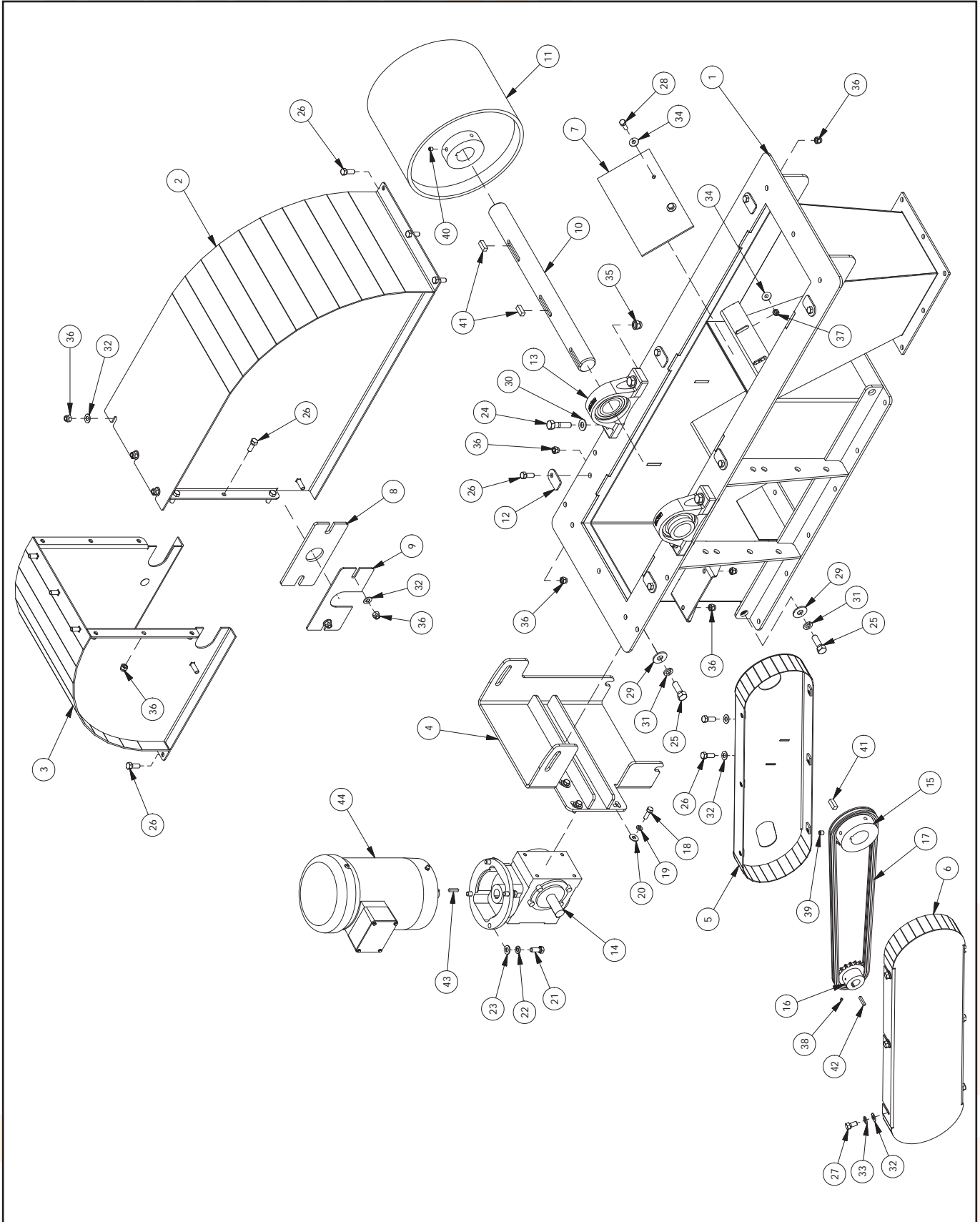
#s	DESCRIPTION	PART #	QTY
1	Head Discharge Weldment	27351	1
2	Front Hood Weldment	12248	1
3	Rear Hood Weldment	12222	1
	Gearbox Mount Weldment		
	Heads: 20270, 20271, 20272, 20370, 20371, 20372	20186	1
4	Heads: 20273, 20274, 20373, 20374	20185	1
	Heads: 20275, 20375, 27227, 27228	20187	1
	Rear Chain Guard		
	Heads: 20270, 20271, 20272, 20370, 20371, 20372	20207	1
5	Heads: 20273, 20274, 20373, 20374	20208	1
	Heads: 20275, 20375, 27227, 27228	20206	1
	Front Chain Guard		
	Heads: 20270, 20271, 20272, 20370, 20371, 20372	20231	1
6	Heads: 20273, 20274, 20373, 20374	20232	1
	Heads: 20275, 20375, 27227, 27228	20230	1
7	Throat Wear Plate	12217	1
8	Shaft Seal Plate	11990	2
9	Shaft Seal Clamp Plate	11985	2
10	Driveshaft	12202	1
11	Head Pulley	15089	1
12	Hood Clamp	12112	6
13	Bearing	17193	2
	Gearbox		
	Heads: 20270, 20370	20348	1
	Heads: 20271, 20371	20349	1
	Heads: 20272, 20372	20350	1
14	Heads: 20273, 20373	20351	1
	Heads: 20274, 20374	20352	1
	Heads: 20275, 20375	20354	1
	Heads: 27227, 27228	27234	1
	Sprocket		
	Heads: 20270, 20370	20321	1
	Heads: 20271, 20272, 20371, 20372	20328	1
15	Heads: 20273, 20373	20332	1
	Heads: 20274, 20374	20336	1
	Heads: 20275, 20375, 27227, 27228	20339	1

#s	DESCRIPTION	PART #	QTY
	Gearbox Sprocket		
	Heads: 20270	20317	1
	Heads: 20271	20322	1
	Heads: 20272	20323	1
	Heads: 20273	20329	1
	Heads: 20274	20334	1
	Heads: 20275	20337	1
16	Heads: 20370	20318	1
	Heads: 20371	20324	1
	Heads: 20372	20325	1
	Heads: 20373	20330	1
	Heads: 20374	20335	1
	Heads: 20375	20338	1
	Heads: 27227	27230	1
	Heads: 27228	27231	1
	#40 Chain - 104 Links	20384	1
	Heads: 20270		
	#50 Chain - 88 Links	20390	1
	Heads: 20271		
	#50 Chain - 89 Links	20391	1
	Heads: 20272, 20371		
	#60 Chain - 78 Links	20394	1
	Heads: 20273		
	#80 Chain - 64 Links	20397	1
	Heads: 20274		
	#100 Chain - 57 Links	20399	1
	Heads: 20275		
	#40 Chain - 105 Links	20385	1
17	Heads: 20370		
	#50 Chain - 90 Links	20392	1
	Heads: 20372		
	#60 Chain - 79 Links	20395	1
	Heads: 20373		
	#80 Chain - 65 Links	20398	1
	Heads: 20374		
	#100 Chain - 58 Links	20400	1
	Heads: 20375		
	#100 Chain - 59 Links	27235	1
	Heads: 27227		
	#100 Chain - 60 Links	27236	1
	Heads: 27228		



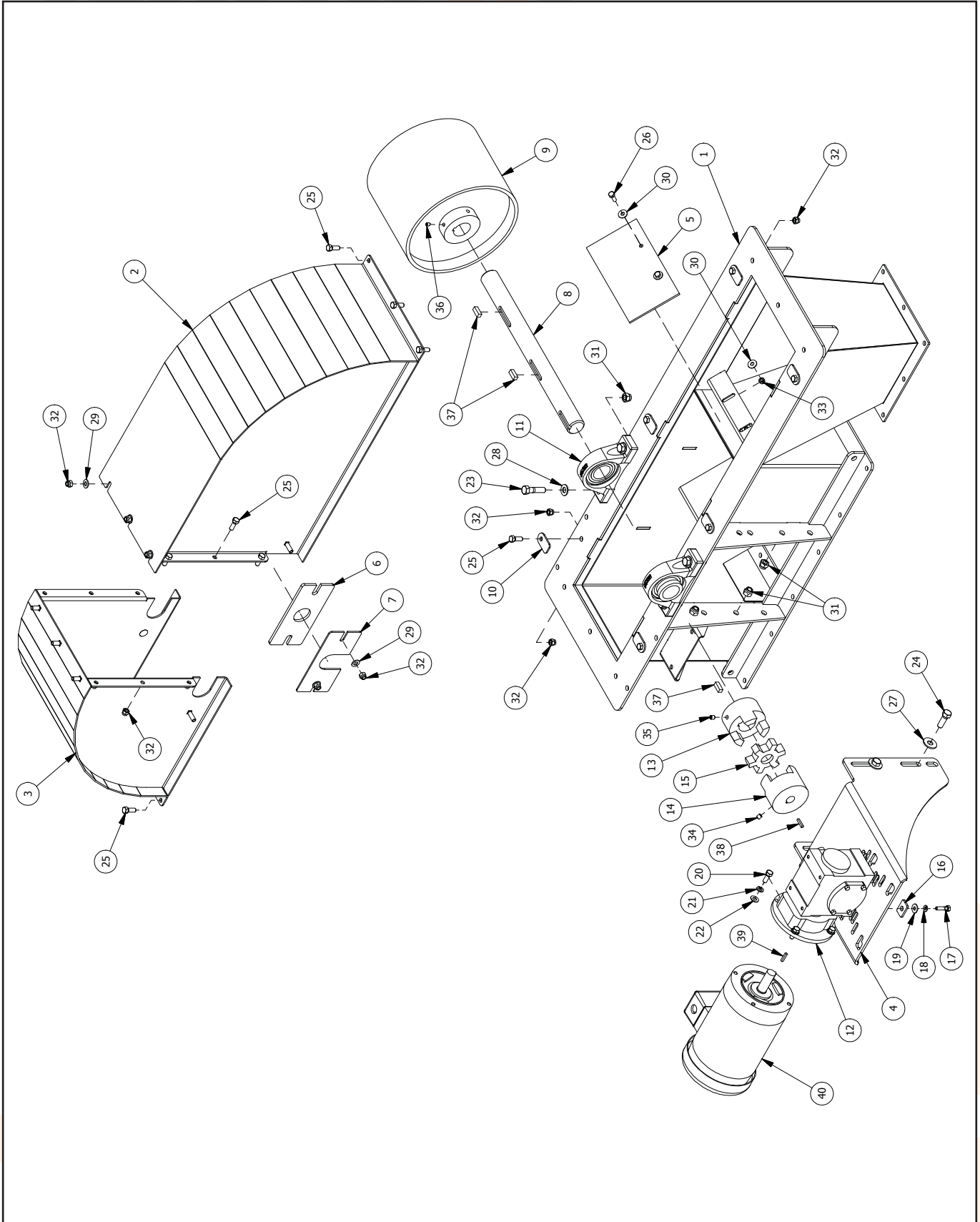
#s	DESCRIPTION	PART #	QTY
18	5/16 x 1" Bolt	10287	4
	Heads: 20270, 20370		
	3/8 x 1" Bolt	10277	4
	Heads: 20271, 20272, 20273, 20371, 20372, 20373		
19	7/16 x 1" Bolt	20402	4
	Heads: 20274, 20275, 20374, 20375		
	5/8 x 1 1/4" Bolt	20504	4
Heads: 27227, 27228			
20	5/16" Lockwasher	10286	4
	Heads: 20270, 20370		
	3/8" Lockwasher	10276	4
	Heads: 20271, 20272, 20273, 20371, 20372, 20373		
	7/16" Lockwasher	20403	4
	Heads: 20274, 20275, 20374, 20375		
	5/8" Lockwasher	15027	4
	Heads: 27227, 27228		
21	5/16" Flatwasher	10285	4
	Heads: 20270, 20370		
	3/8" Flatwasher	10276	4
	Heads: 20271, 20272, 20273, 20371, 20372, 20373		
	7/16" Flatwasher	19756	4
	Heads: 20274, 20275, 20374, 20375		
22	5/8" Flatwasher	10314	4
	Heads: 27227, 27228		
23	3/8 x 1" Bolt	10277	4
	Heads: 20270, 20271, 20272, 20370, 20371, 20372		
24	1/2 x 1" Bolt	10302	4
	Heads: 20273, 20274, 20275, 20373, 20374, 20375, 27227, 27228		

#s	DESCRIPTION	PART #	QTY
25	3/8" Lockwasher	10276	4
	Heads: 20270, 20271, 20272, 20370, 20371, 20372		
26	1/2" Lockwasher	14490	4
	Heads: 20273, 20274, 20275, 20373, 20374, 20375, 27227, 27228		
27	3/8" Flatwasher SM OD	10304	4
	Heads: 20270, 20271, 20272, 20370, 20371, 20372		
28	1/2" Flatwasher SM OD	20181	4
	Heads: 20273, 20274, 20275, 20373, 20374, 20375, 27227, 27228		
29	1/2 x 2" Bolt	10359	4
30	1/2 x 1 1/2" Bolt	10294	4
31	3/8 x 1" Bolt	10277	20
32	3/8 x 3/4" Bolt	10369	6
33	5/16 x 1" Bolt	10287	2
34	1/2" Flatwasher	10297	4
35	1/2" Flatwasher SM OD	20181	4
36	1/2" Lockwasher	14490	4
37	3/8" Flatwasher SM OD	10304	15
38	3/8" Lockwasher	10276	6
39	5/16" Flatwasher	10285	4
40	1/2" Nylon Locknut	10318	4
41	3/8" Nylon Locknut	10274	27
42	5/16" Nylon Locknut	10290	2
43	Setscrew	c/w grbx sprocket	1
44	Setscrew	c/w sprocket	1
45	Setscrew	c/w pulley hub	2
46	Key	12125	3
47	Key	c/w gearbox	1
48	Key	c/w motor	1
49	Motor	customer supplied	1

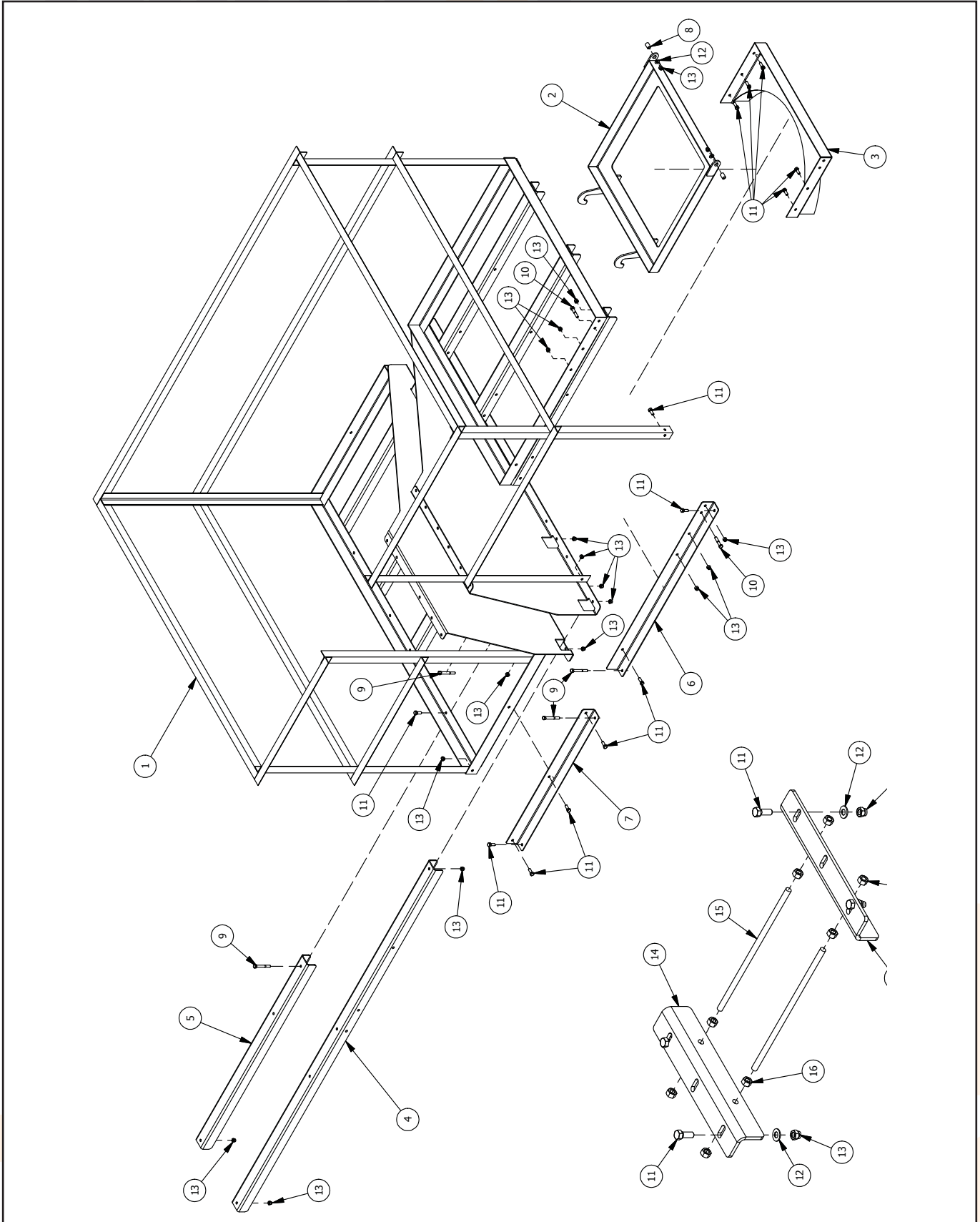


#s	DESCRIPTION	PART #	QTY
1	Head Discharge Weldment	27351	1
2	Front Hood Weldment	12248	1
3	Rear Hood Weldment	12222	1
4	Gearbox Mount Weldment	20240	1
5	Throat Wear Plate	12217	1
6	Shaft Seal Plate	11990	2
7	Shaft Seal Clamp Plate	11985	2
8	Driveshaft	12202	1
9	Head Pulley	15089	1
10	Hood Clamp	12112	6
11	Bearing	17193	2
	Gearbox		
	Heads: 20285	20348	1
	Heads: 20286	20349	1
12	Heads: 20287	20350	1
	Heads: 20288	20351	1
	Heads: 20289	20352	1
	Heads: 20290	20354	1
	Heads: 27229	27234	1
13	Driveshaft Lovejoy	20160	1
	Gearbox Lovejoy		
	Heads: 20285	20154	1
	Heads: 20286	20155	1
14	Heads: 20287, 20288	20156	1
	Heads: 20289	20158	1
	Heads: 20290	20159	1
	Heads: 27229	20161	1
15	Lovejoy Spider	20139	1
16	Gearbox Square Washer	20243	4
	5/16 x 1 1/4" Bolt	20401	4
	Heads: 20285		
	3/8 x 1 1/4" Bolt	10311	4
	Heads: 20286, 20287, 20288		
17	7/16 x 1 1/4" Bolt	23519	4
	Heads: 20289, 20290		
	5/8 x 1 1/2" Bolt	10355	4
	Heads: 27229		
	5/16" Lockwasher	10286	4
	Heads: 20285		
	3/8" Lockwasher	10276	4
	Heads: 20286, 20287, 20288		
18	7/16" Lockwasher	20403	4
	Heads: 20289, 20290		
	5/8" Lockwasher	15027	4
	Heads: 27229		

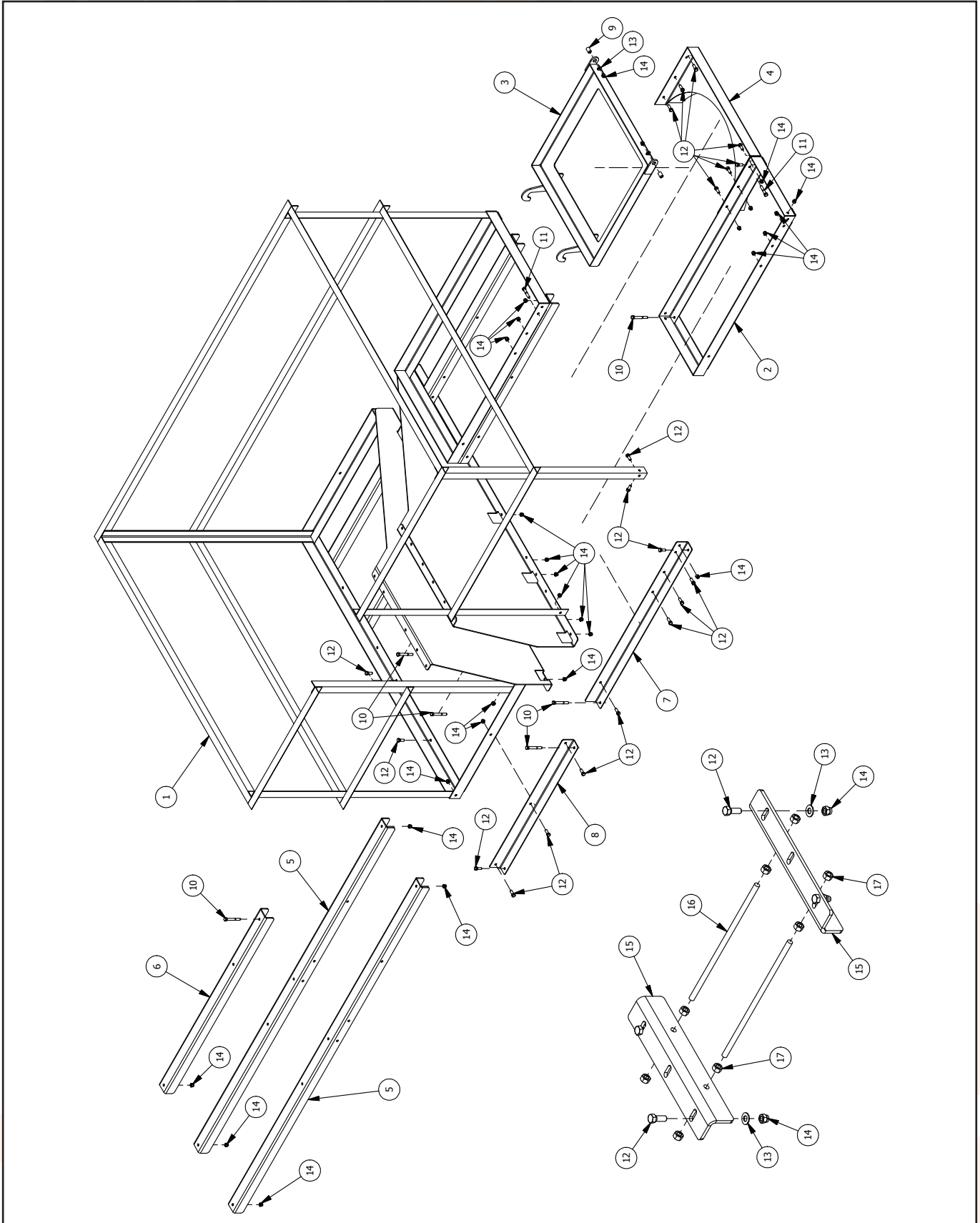
#s	DESCRIPTION	PART #	QTY
	5/16" Flatwasher	10285	4
	Heads: 20285		
	3/8" Flatwasher	10276	4
	Heads: 20286, 20287, 20288		
19	7/16" Flatwasher	19756	4
	Heads: 20289, 20290		
	5/8" Flatwasher	10314	4
	Heads: 27229		
	3/8 x 1" Bolt	10277	4
	Heads: 20285, 20286, 20287		
20	1/2 x 1" Bolt	10302	4
	Heads: 20288, 20289, 20290, 27229		
	3/8" Lockwasher	10276	4
	Heads: 20285, 20286, 20287		
21	1/2" Lockwasher	14490	4
	Heads: 20288, 20289, 20290, 27229		
	3/8" Flatwasher SM OD	10304	4
	Heads: 20285, 20286, 20287		
22	1/2" Flatwasher SM OD	20181	4
	Heads: 20288, 20289, 20290, 27229		
23	1/2 x 2" Bolt	10359	4
24	1/2 x 1 1/2" Bolt	10294	4
25	3/8 x 1" Bolt	10277	18
26	5/16 x 1" Bolt	10287	2
27	1/2" Flatwasher	10297	4
28	1/2" Flatwasher SM OD	20181	4
29	3/8" Flatwasher SM OD	10304	7
30	5/16" Flatwasher	10285	4
31	1/2" Nylon Locknut	10318	8
32	3/8" Nylon Locknut	10274	25
33	5/16" Nylon Locknut	10290	2
34	Setscrew	c/w grbx lovejoy	1
35	Setscrew	c/w shft lovejoy	1
36	Setscrew	c/w pulley hub	2
37	Key	12125	3
38	Key	c/w gearbox	1
39	Key	c/w motor	1
40	Motor	customer supplied	1



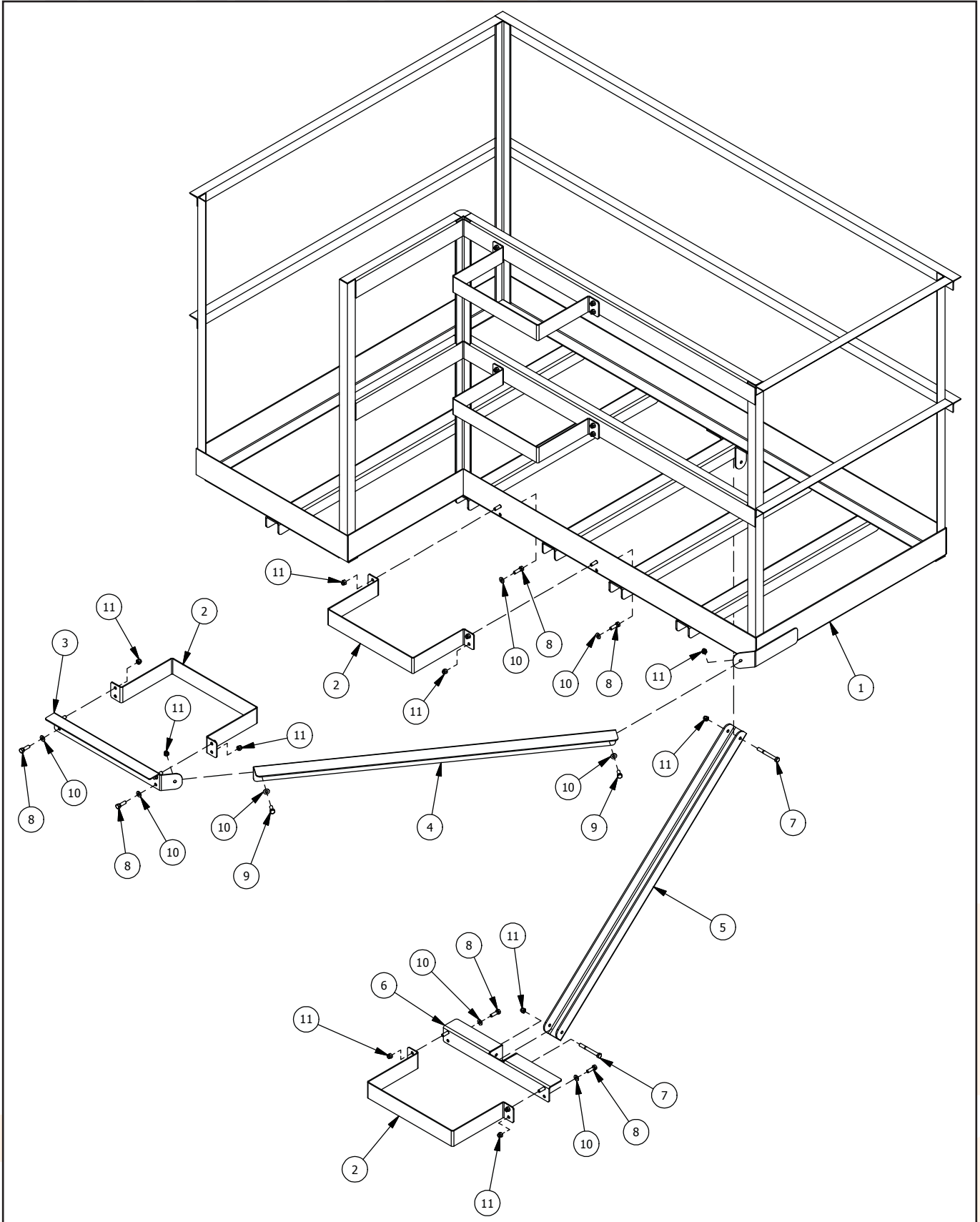
#s	DESCRIPTION	600 SERIES	800 SERIES	1200 SERIES	QTY
1	Platform Frame Weldment	27444	27442	27440	1
2	Trapdoor Weldment	12624	12624	12624	1
3	Entrance Weldment	12696	12696	12696	1
4	Bottom Long Rail	12608	12605	12602	1
5	Bottom Short Rail	12609	12606	12603	1
6	Ladder Attachment Angle	12622	12622	12622	1
7	Platform Attachment Angle	20347	20347	20347	1
8	Trapdoor Pivot Tube	12623	12623	12623	2
9	3/8 x 3" Bolt	10346	10346	10346	4
10	3/8 x 2" Bolt	10305	10305	10305	2
11	3/8 x 1" Bolt	10277	10277	10277	17
12	3/8" Flatwasher SM OD	10275	10275	10275	6
13	3/8" Nylon Locknut	10274	10274	10274	23
14	Platform Clamp Plate	20421	20422	20423	2
15	Platform Clamp Threaded Rod	20427	20428	20429	2
16	3/8" Hex Nut	10301	10301	10301	8



#s	DESCRIPTION	600 SERIES	800 SERIES	1200 SERIES	QTY
1	Platform Frame Weldment	27445	27443	27441	1
2	Secondary Platform Weldment	12613	12613	12613	1
3	Trapdoor Weldment	12624	12624	12624	1
4	Entrance Weldment	12696	12696	12696	1
5	Bottom Long Rail	12608	12605	12602	2
6	Bottom Short Rail	12609	12606	12603	1
7	Ladder Attachment Angle	12622	12622	12622	1
8	Platform Attachment Angle	20347	20347	20347	1
9	Trapdoor Pivot Tube	12623	12623	12623	2
10	3/8 x 3" Bolt	10346	10346	10346	6
11	3/8 x 2" Bolt	10305	10305	10305	2
12	3/8 x 1" Bolt	10277	10277	10277	24
13	3/8" Flatwasher SM OD	10275	10275	10275	6
14	3/8" Nylon Locknut	10274	10274	10274	32
15	Platform Clamp Plate	20421	20422	20423	2
16	Platform Clamp Threaded Rod	20427	20428	20429	2
17	3/8" Hex Nut	10301	10301	10301	8



#s	DESCRIPTION	600 SERIES	800 SERIES	1200 SERIES	QTY
1	Platform Base	18182	18181	15076	1
2	Trunk Clamp	18350	18349	15077	5
3	Stabilizer Clamp	18356	18355	15078	1
4	Stabilizer Angle	18860	18859	15079	1
5	Bottom Brace	15080	15080	15080	1
6	Brace Clamp	15081	15081	15081	1
7	3/8 x 3 1/2" Bolt	10280	10280	10280	2
8	3/8 x 1 1/4" Bolt	10311	10311	10311	20
9	3/8 x 1" Bolt	10277	10277	10277	2
10	3/8" Flatwasher SM OD	10275	10275	10275	22
11	3/8" Nylon Locknut	10274	10274	10274	24

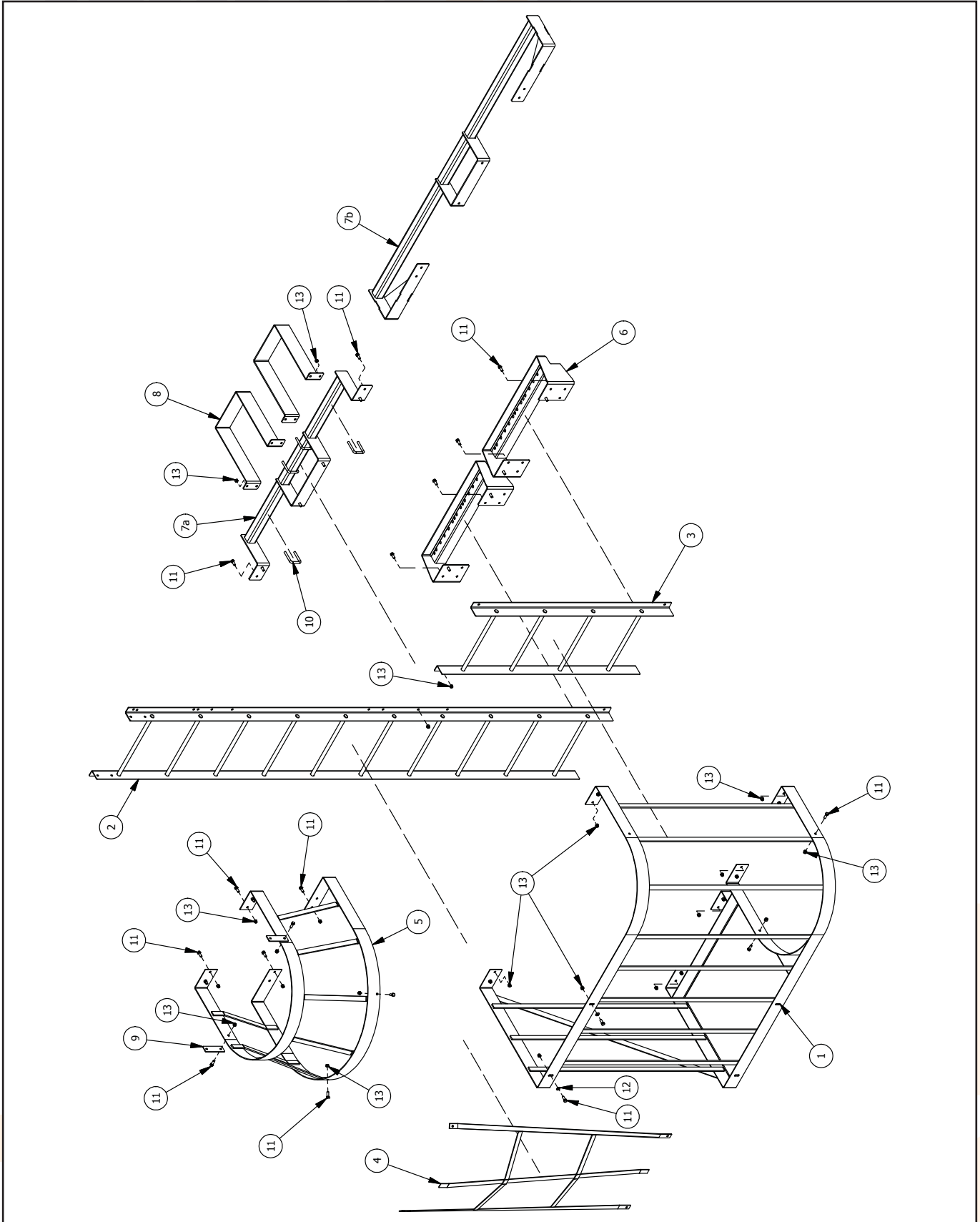


RIGHT HAND REST PLATFORM

#s	DESCRIPTION	600 SERIES	800 SERIES	1200 SERIES	QTY
1	Rest Platform Base	12669	12669	12669	1
2	Tall Ladder Section	12630	12630	12630	1
3	Short Ladder Section	12632	12632	12632	1
4	Warp Cage	12699	12699	12699	1
5	Cage Flare	12666	12666	12666	1
6	Ladder Mount Bracket	27452	27452	27452	2
7a	Trunk Clamp Weldment	12677	12677	12677	1
7b	Trunk Clamp Weldment	n/a	n/a	n/a	0
8	Trunk Clamp Wrap	12682	12681	12680	2
9	Ladder Connector Tab	12649	12649	12649	2
10	U-Bolt	12683	12683	12683	4
11	3/8 x 1" Bolt	10277	10277	10277	28
12	3/8" Flatwasher SM OD	10275	10275	10275	2
13	3/8" Nylon Locknut	10274	10274	10274	36

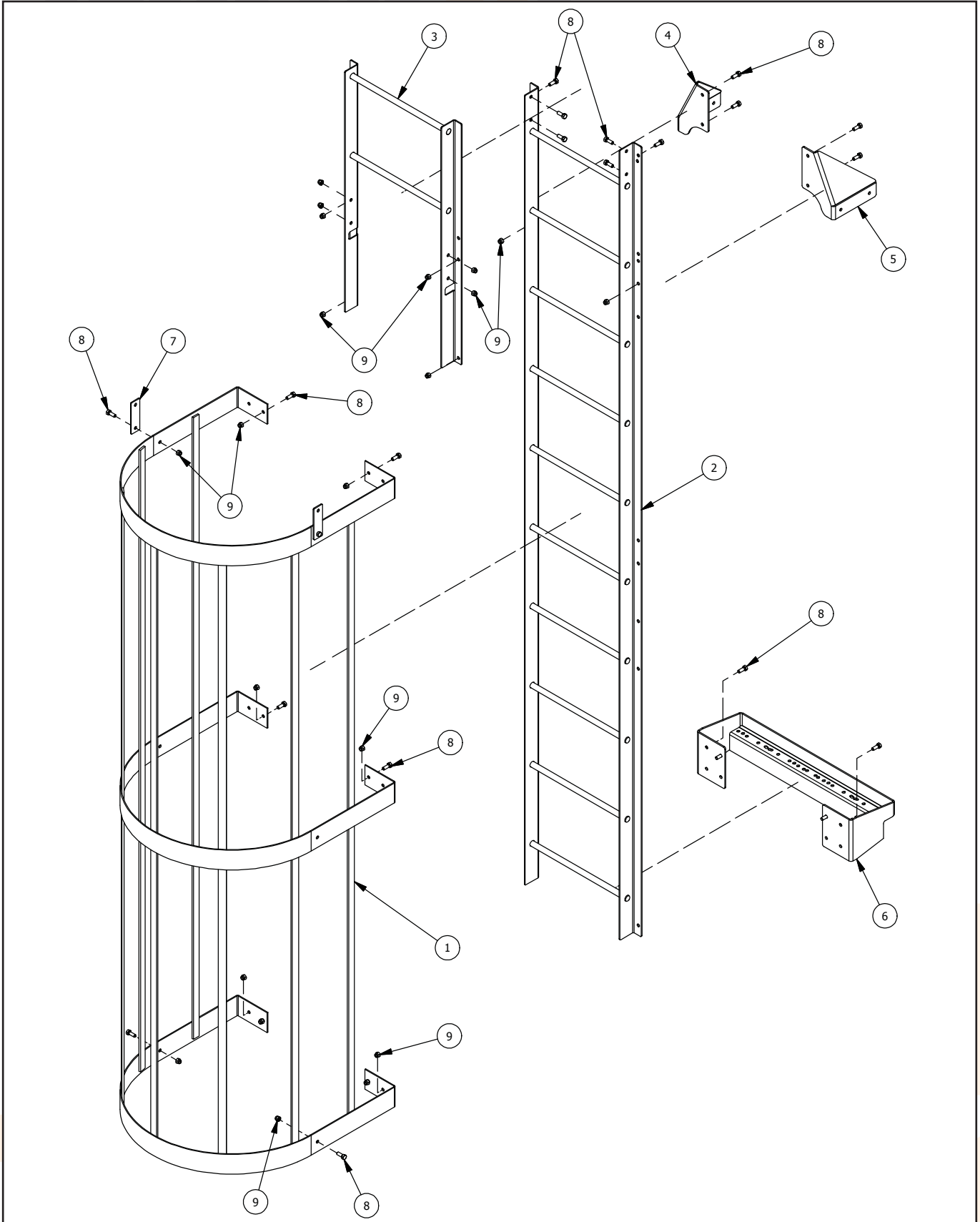
LEFT HAND REST PLATFORM

#s	DESCRIPTION	600 SERIES	800 SERIES	1200 SERIES	QTY
1	Rest Platform Base	12668	12668	12668	1
2	Tall Ladder Section	12630	12630	12630	1
3	Short Ladder Section	12632	12632	12632	1
4	Warp Cage	12699	12699	12699	1
5	Cage Flare	12666	12666	12666	1
6	Ladder Mount Bracket	27452	27452	27452	2
7a	Trunk Clamp Weldment	12677	12677	12677	1
7b	Trunk Clamp Weldment	n/a	n/a	n/a	0
8	Trunk Clamp Wrap	12682	12681	12680	2
9	Ladder Connector Tab	12649	12649	12649	2
10	U-Bolt	12683	12683	12683	4
11	3/8 x 1" Bolt	10277	10277	10277	28
12	3/8" Flatwasher SM OD	10275	10275	10275	2
13	3/8" Nylon Locknut	10274	10274	10274	36



No
INDUST

#s	DESCRIPTION	PART #	QTY
1	Ladder Cage Weldment	12717	1
2	Ladder Section	12630	1
3	Top Ladder Stub	12652	1
4	Right Mounting Bracket	12650	1
5	Left Mounting Bracket	12651	1
6	Trunking Mount Weldment	27452	1
7	Ladder Connector Plate	12649	2
8	3/8 x 1" Bolt	10277	22
9	3/8" Nylon Locknut	10274	22





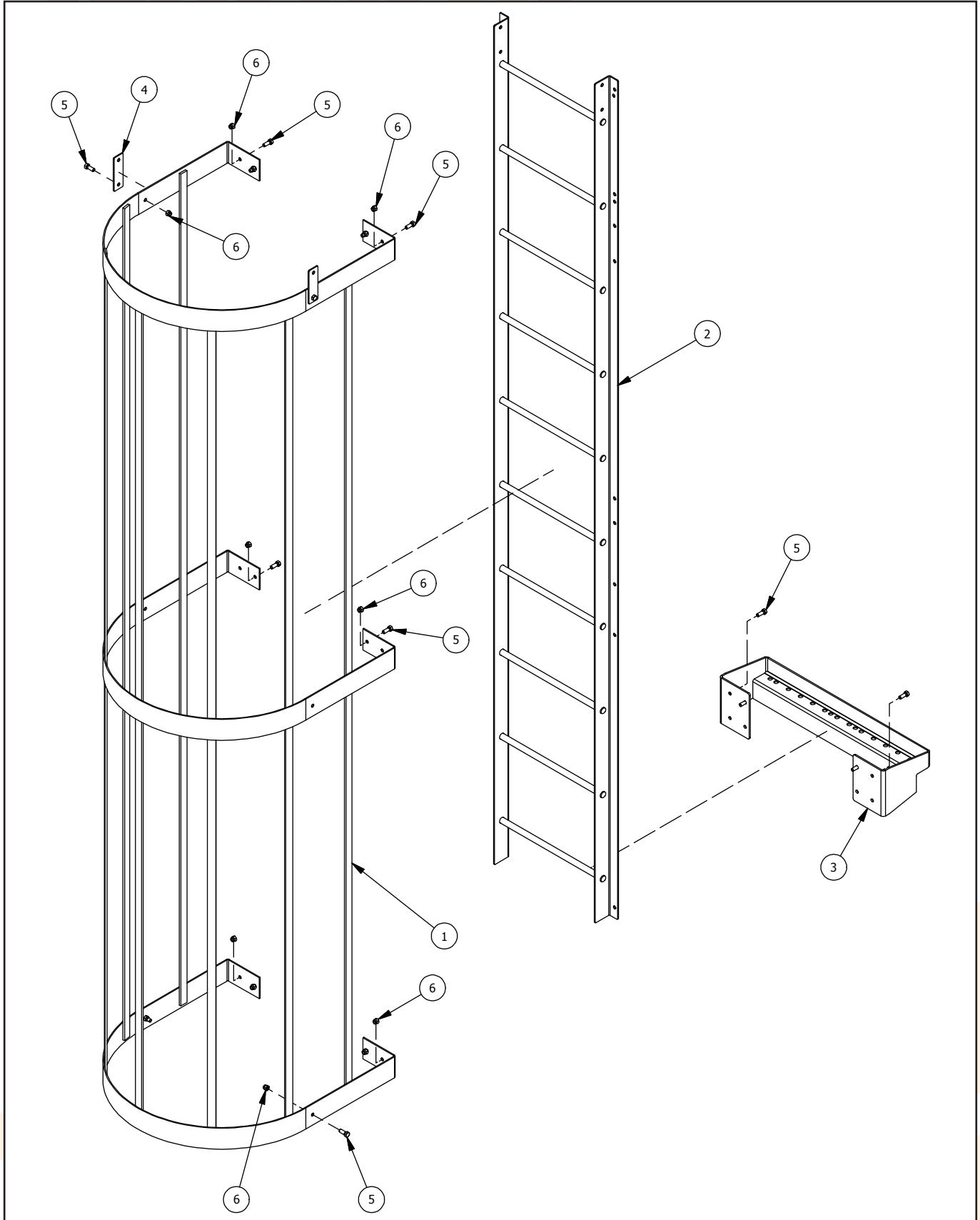
10' LADDER SECTION


#s	DESCRIPTION	600-1200 SERIES	QTY
1	Ladder Cage Weldment	12716	1
2	Ladder Section	12630	1
3	Trunking Mount Weldment	27452	1
4	Ladder Connector Plate	12649	2
5	3/8 x 1" Bolt	10277	14
6	3/8" Nylon Locknut	10274	14

5' LADDER SECTION

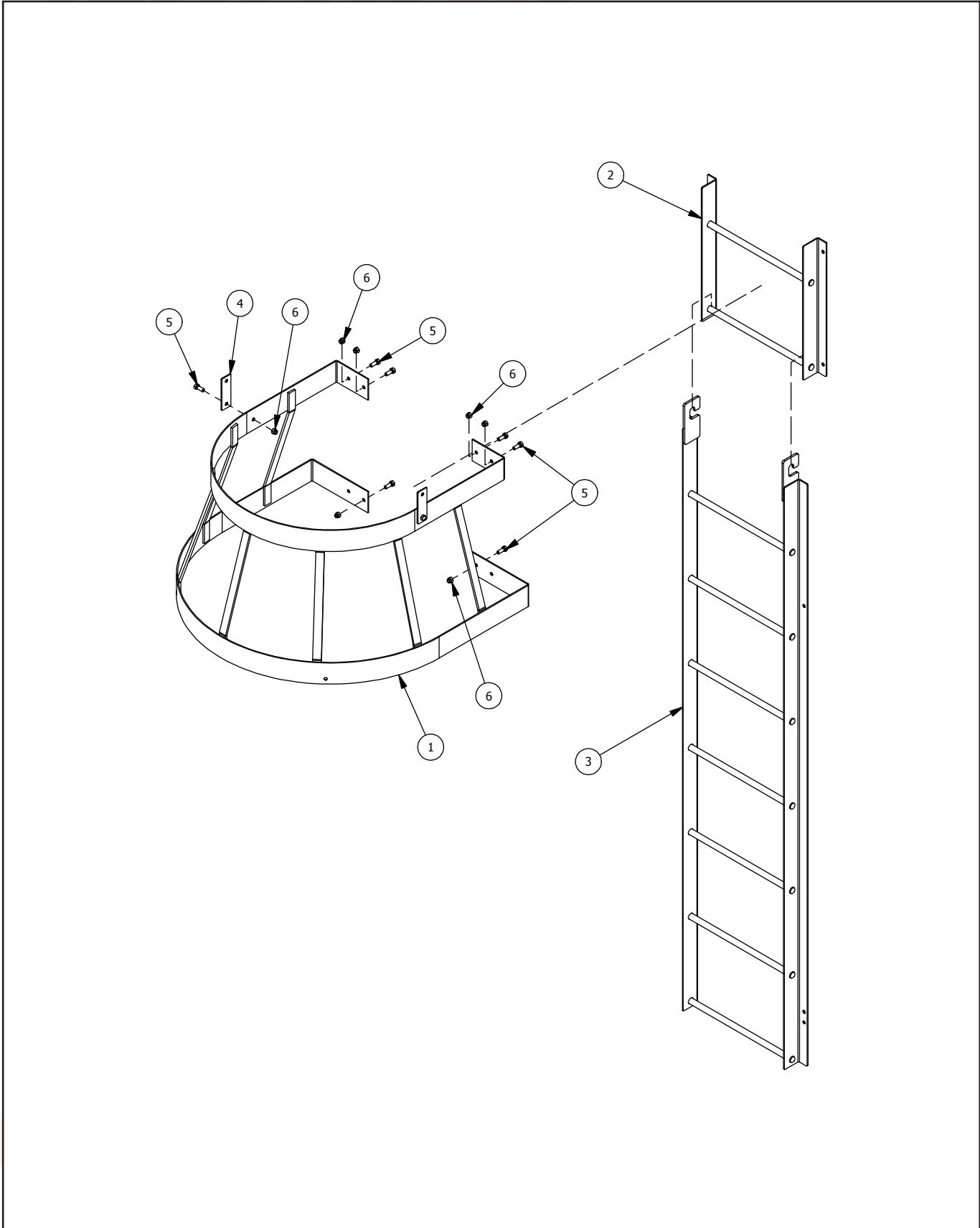
#s	DESCRIPTION	600-1200 SERIES	QTY
1	Ladder Cage Weldment	12755	1
2	Ladder Section	12751	1
3	Trunking Mount Weldment	27452	1
4	Ladder Connector Plate	12649	2
5	3/8 x 1" Bolt	10277	12
6	3/8" Nylon Locknut	10274	12







#s	DESCRIPTION	PART #	QTY
1	Cage Flare Weldment	12666	1
2	Ladder Stub Section	12701	1
3	Hanging Ladder Section	12631	1
4	Ladder Connector Plate	12649	2
5	3/8 x 1" Bolt	10277	8
6	3/8" Nylon Locknut	10274	8





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