18’ - 60’ DIA. COMMERCIAL BIN CONSTRUCTION MANUAL

15K & 30K Roof

DATE	REVISION	SECTION
03/2025 –	Updated maximum height (in rings) for 36’ dia. & larger bins	Anchor Bolts
	Corrected part number for manhole cover anchor bracket	Roof
	Updated reference to sidewall color chart	Sidewall
	Corrected footnotes to tables of 30” x 60” Code U Walk-Through door parts	Doors
	Updated ladder & platform drawings as needed	Ladders
	Added guide for locating Greene sidewall stairs manual if stairs were ordered	Stairs

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Manual L13912
03/31/2025

IMPORTANT:

KEEP GALVANIZED SHEETS DRY BEFORE ERECTING!

If this material is allowed to get wet or condensation is permitted to form between sheets, discoloration may occur.

- Upon receiving material, check for moisture between sheets. Do not permit moisture from weather, condensation or other sources to remain between sheets.
- To help prevent white rust, store sheets away from moisture. Store under cover in a heated building with adequate air circulation if lengthy storage or adverse weather conditions are expected. Never allow water to stand on sheets or bundles.
- Sheets covered with tarpaulin or polyethylene should have enough space between cover and sheets to allow air to circulate.
- If bundle gets wet, dry all materials immediately. Stack sheets on edge in a dry place and force air between them. Allow for free passage of air around each sheet when practical.
- NEVER lay steel on earth. Store on timber or blocks. Always store material on a dry, solid surface in a manner that allows moisture to run off of material.
- DO NOT apply any solvents or lubricants to sidewall sheets.

Damage resulting from failure to take appropriate actions listed above will void Sukup Manufacturing Co. warranty.

IMPORTANT: Sukup Manufacturing Co. must be notified within 72 hours of pickup or delivery if any materials are rusted. Sukup is not responsible for rusted materials discovered after the 72-hour period. Sukup accepts no responsibility for stains, corrosion or other damage to sheets while stored at construction site.

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GRAIN BIN LIMITED WARRANTY

SUKUP MANUFACTURING CO. (Sukup) warrants, to original retail purchaser within 5 years from date of purchase, that grain bin shall be free from defects in material and workmanship. A part will not be considered defective if it substantially fulfills performance specifications, including, but not limited to, parts with cosmetic (appearance) issues that will not affect life of the structure. Should any part prove defective within warranty period, part will be replaced or repaired without charge F.O.B. Sukup Manufacturing Co., Sheffield, Iowa USA or Distribution Centers - Arcola, Illinois; Aurora, Nebraska; Cameron, Missouri; Defiance, Ohio; Jonesboro, Arkansas; Watertown, South Dakota. To claim warranty, a copy of original invoice is required.

WARRANTY CERTIFICATION - Warranty must be registered within one month of product delivery to certify warranty coverage. See QR code on back page of Bin Operation Manual for details.

THE FOREGOING LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. Sukup neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said part, and will not be liable for incidental or consequential damages. THE REMEDIES STATED HEREIN SHALL BE THE EXCLUSIVE REMEDIES AVAILABLE UNDER THIS LIMITED WARRANTY.

Sukup reserves the right to change specifications, add improvements or discontinue manufacture of any of its equipment without notice or obligation to purchasers of its equipment. This warranty gives you specific legal rights. You may also have other rights which vary according to state or province.

WARRANTY EXCLUSIONS - Labor, transportation, or any cost related to a service call is not provided by Sukup. This Limited Warranty does not apply to damage resulting from misuse, neglect, normal wear, accident or improper installation or maintenance. ITEMS NOT MANUFACTURED BY SUKUP ARE COVERED UNDER WARRANTIES OF THEIR RESPECTIVE MANUFACTURERS AND ARE EXCLUDED FROM COVERAGE UNDER THE SUKUP WARRANTY. SUKUP MANUFACTURING CO. MAKES NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Foundation recommendations are suggestions only and will vary according to local soil conditions. Soil bearing tests must be performed by a competent, independent engineering firm. Sukup will not assume responsibility for adverse result arising from their use. Sukup will not warrant damage or loss caused, in whole or in part, by inadequate or improper site selection, site preparation, foundation, or any other failure to provide a suitable erection or installation environment for Sukup grain bin or of any product, component, equipment, accessories, parts used in conjunction with Sukup grain bin. Sukup will not warrant damage or loss caused, in whole or in part, by use of bin in a manner other than for which it was designed, or by unauthorized attachments, modifications, alterations, improper or inadequate maintenance, misuse or abuse of the bin.

Sukup is not liable for direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. Not responsible for field modifications or erection defects which create structural or storage quality problems.

WARRANTY IS VOID - If not purchased from or constructed by an authorized dealer or a representative of Sukup Manufacturing Co.; If used for substances other than grains and/or free flowing materials.

Prior to installation, purchaser has responsibility to properly store steel bin components. Bin should be stored in dry, temperature and humidity controlled areas to eliminate condensation and other moisture that causes white rust and corrosion. Warranty does not extend to defects, damages or cosmetic (appearance) issues caused by improper storage or handling.

Sukup does not warrant any roof damage caused by excessive vacuum or internal pressure from fans or other air moving systems. Adequate ventilation and/or “make-up air” devices should be provided for all powered air handling systems. Warranty is void if grain is above eave and against roof, as this will block roof vents and cause unwanted loads on roof sheets. Area above surface of grain must allow free movement of air to vents. Sukup does not recommend use of downward flow systems (suction). Severe structural roof damage may occur if fans or other air moving devices are operated during certain high humidity/cold weather conditions. Roof ventilators may frost over and plug or restrict air flow causing excessive vacuum or internal pressures. Roof damage may occur due to improperly installed grain temperature detection cable systems.

Sukup does not warrant failures due to filling bin off-center; unloading from door or off-center floor sump; or radial cracks in foundation. If bin has a perforated floor on columns and columns fail, bin can shift sideways causing both sidewall and roof damage.

UNAPPROVED PARTS OR MODIFICATION - All obligations of Sukup under this warranty are terminated if unapproved parts are used, equipment is modified or altered in any way not approved by Sukup in writing, or is not erected or operated according to Sukup installation or operating manuals.

12/12/23

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IMPORTANT

Please read entire Bin Operation Manual and Construction Manual, paying close attention to safety sections. Failure to read these manuals is a misuse of the product and could result in death or personal injury or property damage. All personnel associated with the bin must read these manuals thoroughly as well.

Although every effort is made to ensure assembly drawings and instructions are written without errors, they may happen. Therefore, if any concerns arise regarding any instructions or assembly drawings, please contact Sukup Manufacturing Co. customer service immediately for clarification prior to proceeding with construction.

Recognizing Safety Decal Information

Read manual before installing or using product. Failure to follow instructions and safety precautions in manual can result in death or serious injury. Keep manual in a safe location for future reference.

On safety decals, this symbol and the signal words Danger, Warning, Caution and Notice draw your attention to important instructions regarding safety. They indicate potential hazards and levels of intensity.

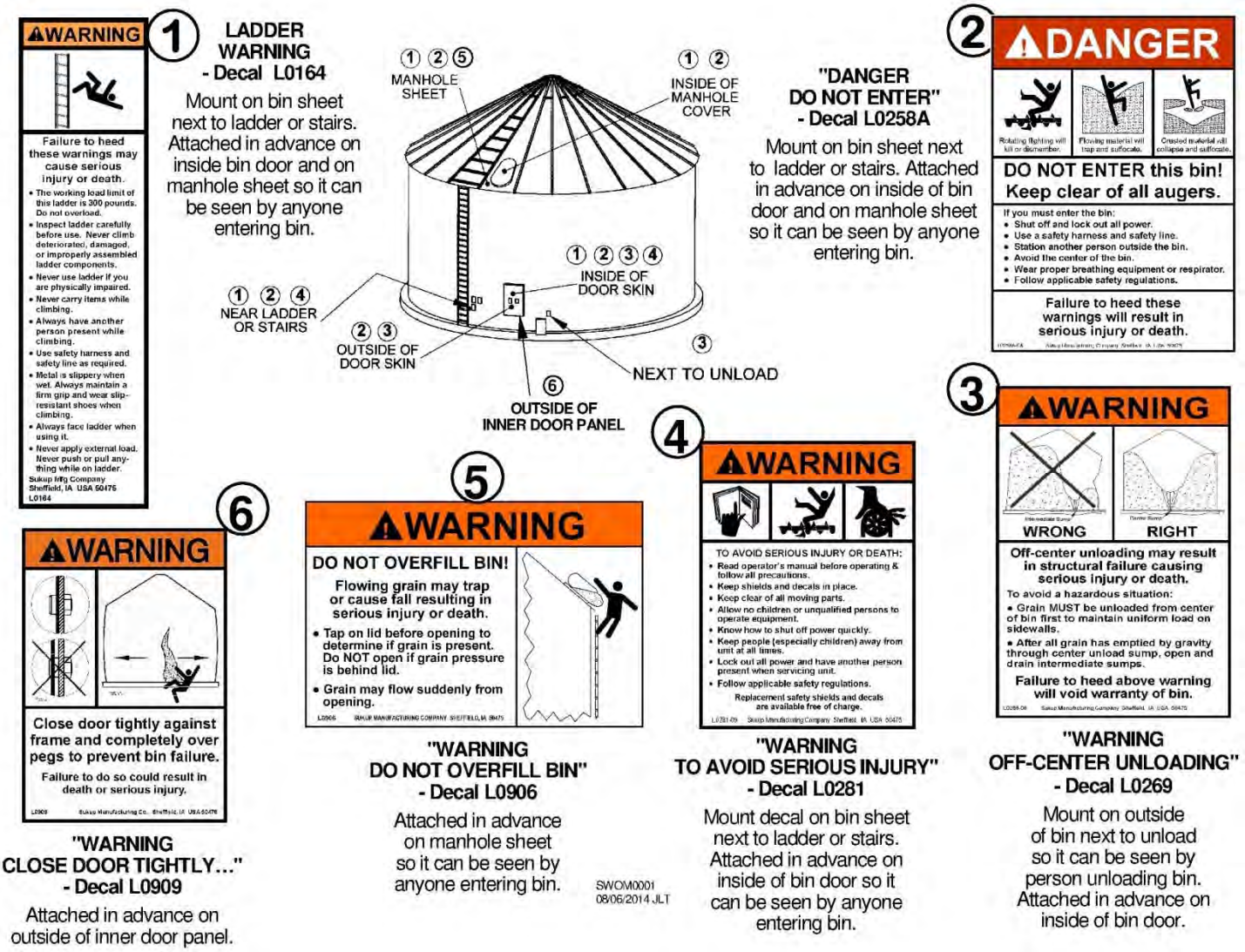
DANGER RED - **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

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

CAUTION YELLOW - **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE BLUE - **NOTICE** alerts you to practices unrelated to personal injury, such as messages related to property damage.

IMPORTANT: To prevent serious injury or death to you or your family, be certain that all decals are in place according to illustration below and are legible. If a suggested location is not clearly visible, place decal in a more suitable area. Additional safety decals are available at no charge for Sukup equipment. Please specify decal number when ordering. See contact information on cover of manual.



General Operational Safety Procedures

WARNING: Make hazards known to all personnel working in area so they can take appropriate safety precautions. Failure to follow precautions listed below may cause death or serious injury.

- Hands, feet and clothing must be kept away from moving parts. Loose clothing can become entangled in moving parts and cause serious injury.
- Be aware of danger that is present when loading and unloading bin. Flowing and crusted grain can trap and suffocate.
- Do not enter bin without having an observer outside who is in constant contact with you.
- Decals with specific messages are attached to equipment at various locations. Pay attention to messages and always be alert to the possibility of personal injury or death.
- Keep all guards and shields in place and secure while machines are in operation.
- Ladders and working surfaces should have safety cages and handrails for safe use. Use a lifeline and harness when danger of falling exists.
- Keep bystanders and children away from grain bins and grain handling equipment. **Bin sites are not playgrounds!**
- Bins must be labeled to warn of entrapment and flowing grain hazards.
- Proper operational procedures must be followed to ensure safety and well-being of all persons working near or on grain bins when inspecting grain, performing maintenance or spraying insecticides.
- Hazards associated with grain bins include engulfment in grain, falls from heights, dust and mold inhalation, pesticide exposure, electrocution, and injuries from augers. Take precautionary steps to avoid these hazards.
- Learn how to use controls and operate equipment correctly. Do not let anyone operate unit (especially youth) without thorough training of basic operating and safety procedures.
- Periodically check all mechanical and electrical components to keep them in good working condition. Make no unauthorized modifications to equipment. Doing so may endanger function and safety of unit.
- Be aware of weather-related safety hazards. Icicles and snow falling from bin eave are dangerous and can cause serious injury or death. Ice or moisture on ladders can cause slippery conditions that may result in a life-threatening fall.
- For added security and safety, attach a padlock to sidewall door latch.
- If you must enter bin, shut off equipment and lock out all power sources before entering; keep clear of all moving parts; use a safety harness and safety line, station another person outside of bin; avoid center of bin; wear proper breathing equipment or respirator; follow applicable safety regulations; ensure quick access to an ABC dry chemical fire extinguisher.

Dangers of Entering a Grain Bin



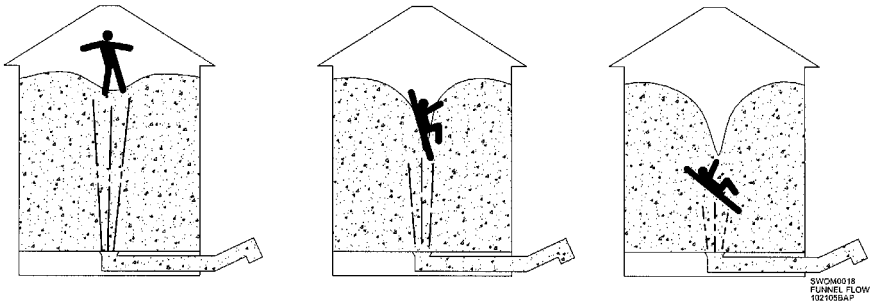
No one should enter a grain bin while it is being loaded or unloaded due to risk of being injured by moving parts such as augers or being crushed and/or suffocated by grain. Entering a bin that has bridged or crusted grain is very dangerous. Working in a grain bin without following proper safety procedures increases an individual's chance of being suffocated. If grain is peaked close to roof, do not enter bin. Crawling between roof and peak could cave grain and block exit.

Owners/operators are responsible for developing site-specific confined space entry procedures. OSHA's confined space entry procedures (29CFR 1910.146) can be found at www.osha.gov.

Flowing & Crusted Grain

People can become caught or trapped by grain in several ways: entrapment by flowing grain, collapse of bridged grain, and collapse of a vertical wall of grain. To better understand why grain flow is so dangerous, you must understand how grain flows when it is unloaded. Grain bins are first emptied through the center sump (bins erected with a sidedraw are only exception). When center sump is opened and auger is started, grain flows from top surface down a center core to center sump. This is called funnel flow and is illustrated in figures below.

Based on 8" unload auger



2 seconds	4 seconds	8 seconds
From time auger starts, you have 2 seconds to react.	In 4 seconds you are trapped	After 8 seconds, you are completely covered.

Grain across bottom and around sides of bin does not move. The speed at which grain is removed makes the funnel flow very dangerous. A person in a bin would be carried to center, quickly drawn under, and suffocated. An 8" auger can transfer 3,000 cubic feet of grain per hour (52 cubic feet per minute). A person about 6' tall displaces about 7-1/2 cubic feet, assuming an average body diameter of 15 inches. This means the entire body could be submerged in a funnel in about 8 seconds. Even more importantly, you could be up to your knees and totally helpless to free yourself in less than 4 seconds.

Grain surface may appear solid but not be. A small opening in unload gate gives entire surface the quality of quicksand. When a single kernel is removed from bottom of bin, kernels directly above it rush to fill the void. Flowing grain is fluid. Objects on surface sink and heavy objects sink faster than small ones.

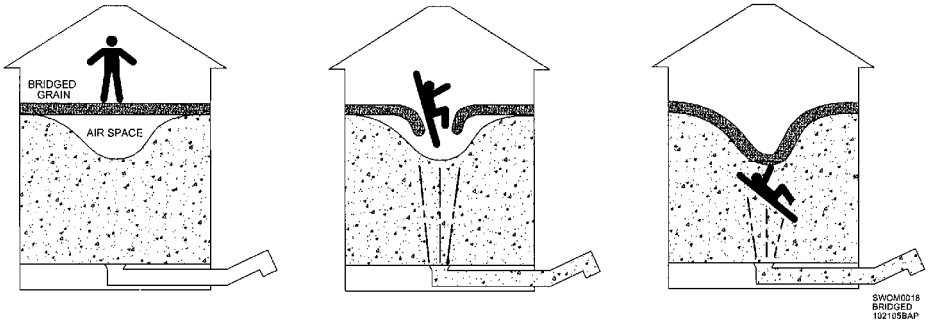
Flowing grain is like water in that it will exert pressure over entire area of any object that is submerged in it. However, the amount of force required to pull someone up through grain is much greater than in water because grain exerts no buoyant force and has much greater internal friction.

Even if grain has stopped flowing, submerged objects or people are difficult to extract. Even victims with tremendous upper-body strength cannot pull themselves out if they are buried to the chest. The force required to remove someone buried below the surface of grain can easily exceed 2,000 pounds, which is about the same as needed to lift a small car.

If you become trapped in a bin of flowing grain with nothing to hold onto but you are still able to walk, stay near outside wall. Keep walking until bin is empty or grain flow stops. If you become covered in flowing grain, cup your hands over your mouth and take short breaths. This may keep you alive until help arrives. Additional personnel should call for an emergency rescue team or fire department immediately. Ventilate bin with an aeration system but **DO NOT** activate heat source. Wait for emergency crews to arrive before attempting rescue. Offer assistance to rescuers and follow directions given by incident commander.

Bridged & Caked Grain

Spoiled grain tends to clump together and grain that is stored in cold temperatures can appear to have a solid surface while, in reality, it may collapse if walked upon. Be aware of a potential engulfment hazard when walking on surface crust. Never enter a bin unless you know the nature of previous grain removal, especially if any crusting is evident. Proper safety precautions must be taken. **After grain has been removed, look for a funnel shape at surface of grain mass. If grain appears to be undisturbed, then it has bridged and created a cavity.**



Bridged grain may create air spaces in a partially unloaded bin (see above). As grain is removed from bin, a cavity develops under crusted surface. This situation presents several dangers. First, the person may break through the surface and be trapped instantly in flowing grain. Another danger is that a large void may be created under the bridge by previous unloading so that a person who breaks through crust may be buried under grain and suffocate, even without auger running. The third hazard is that if grain is wet enough to mold and bridge across bin, there may be little oxygen present in cavity due to microbial gases. A person falling into a cavity will be forced to breathe toxic gases, even though his head is above surrounding grain. From outside of bin, use a pole or other object to break bridge, causing it to collapse.

Grain can also cake in a large mass against wall when it has been stored improperly or in poor condition. Mass of grain can cause engulfment or crushing hazards to workers who attempt to break grain loose with shovels or other objects.

This risk increases as capacity of bin increases. A person lying prone and covered by 1 foot of grain will be subjected to a force of over 300 lbs. Be alert while working with grain that has gone out of condition. Entering a bin when there may be molds, blocked flow, cavities, crusting, and possible cave-ins can cost you your life. When you are breaking up large masses of vertically crusted grain, do so with a long wooden pole from manhole above grain.

Moving Parts

When bin is nearly empty, sweep (floor) auger travels at a faster speed around bin. If caught in rotating auger, a body part can be pulled along with grain, cutting and tearing flesh. Also, an exposed auger in a sump can cause serious injury if sump is stepped into or fallen into. All shields should be in place to prevent body parts from getting caught.

To help prevent tragedy, **SAFETY SHOULD BE THE TOP PRIORITY.** Preparation is the first and most important step. Failure to follow precautions listed below may cause death or serious injury.

- Keep hands, feet and clothing away from moving parts. Loose clothing can become entangled in rotating parts and cause serious injury or death.

- Guards and shields are provided for your protection. Make sure all are secure and in place while machine is in operation.

- Replace safety shields that have been damaged or were removed for servicing equipment. Fasten shields securely.

- Be sure to wear tight-fitting clothing when working near a grain auger. Loose, floppy clothing, long shoestrings and drawstrings on hooded jackets can easily become entangled in rotating parts. Entangled clothing will pull the body into moving machinery and severe injury will result.

- Limit number of people around augers when in use. Only those who are essential to job should be there.

- Watch children closely. Never leave them unattended. Keep them away from vehicles, flowing grain and moving parts. Small hands and feet can penetrate even properly shielded augers, belts and PTOs. Teach children which areas are safe and which are not.

- Be certain all machinery is in good working condition.

Lockout/Tagout

Lockout/Tagout refers to specific practices and procedures to safeguard against unexpected energization or startup of machinery and equipment or release of hazardous energy during service or maintenance activities. This requires, in part, that an authorized individual isolate machinery or equipment from its energy source(s) before performing service or maintenance. It also requires authorized individual(s) to either lock or tag energy-isolating device(s) to prevent release of hazardous energy, and take steps to verify energy has been isolated effectively.

Grain storage structures and handling equipment may create hazardous work areas. Individuals should make sure they take proper steps to prevent injuries, illness or death. Be certain proper lockout/tagout procedures are followed before performing any service on equipment or entering bin.

Lockout refers to a device that uses a lock -- either key or combination type -- to hold an energy-isolating device in a safe position and prevent energizing of a machine or equipment. This device ensures that equipment being controlled cannot be operated until lockout device is removed. Tags must be used with all locking devices. Tags should be affixed in a manner that clearly identifies the individual servicing the equipment

Tagout refers to placement of a tag on a device that is not capable of being locked out, to indicate equipment may not be operated until tag device is removed. These tags are singularly identified with the individual applying the device and servicing the equipment. These tags **do not** provide physical restraint on those devices that require a restraint.

Owners/Operators are responsible for developing site-specific Lockout/Tagout procedures based on equipment, conditions and situations at their individual locations. OSHA's Lockout/Tagout procedures (29CFR 1910.147) can be obtained at www.osha.gov.

Ventilation

When entering an inadequately ventilated area, individuals may be at risk of being overcome by respiratory hazards (gases, fumes and dust) that can cause permanent lung damage or even death. Working in grain bins without proper respiratory protection increases a person's chance of developing a respiratory disease.

Owners/Operators are responsible for developing site-specific personal protective equipment standards. OSHA's personal protective equipment standards (29CFR 1910.134) can be obtained at www.osha.gov.

Sharp Edges & Obstacles

When working in, on or near a bin, remember that metal edges are sharp. To avoid injuries, wear protective clothing and handle equipment and parts with care. An excellent safety practice is to keep bin site clear of scrap iron and other foreign materials that may get covered up by snow or tall grass. Items or debris left near bin site may interfere with safe, unobstructed movement around bin.

Be aware of trucks, tractors, wagons, augers, hoppers and pits, etc. Never allow anyone to ride on trucks equipped with grain beds or gravity dump wagons. Keep children off grain vehicles and out of bins while loading and unloading. Always know where all family members are (especially children) at all times when grain is being loaded, unloaded, moved or otherwise handled.

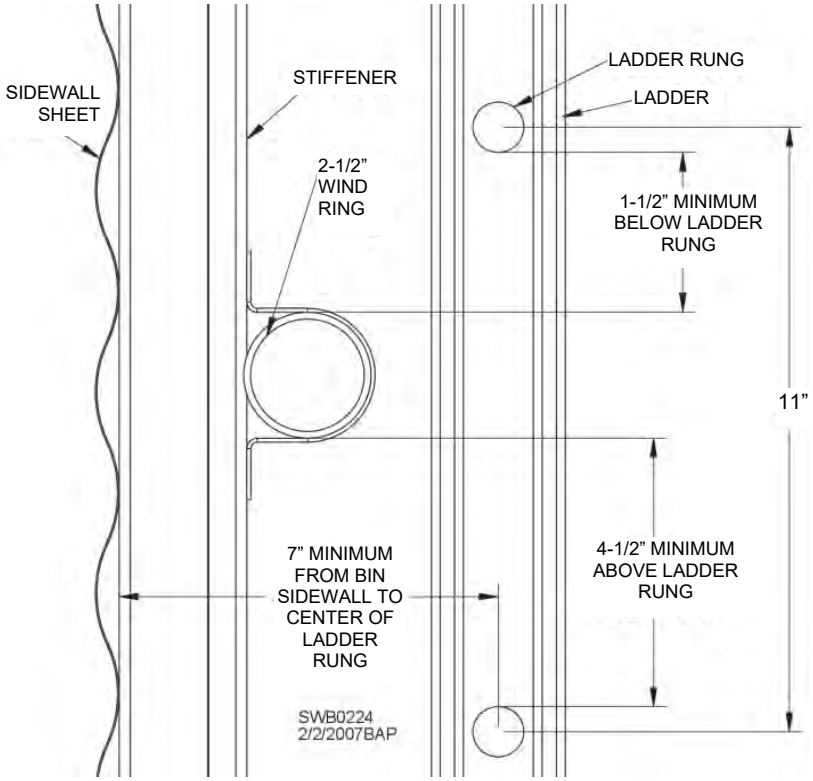
Falls & Obstructions

Falls from grain bins at any height can cause injury. Ladders on bins can become very slippery or icy in inclement weather. Maintain a secure handhold and foothold when climbing on bin. Metal is slippery when wet. Never carry items while climbing on bins. Also, be certain no obstacles are in front of ladder.

Slippery metal, broken or loose ladder rungs and loose handholds can be very dangerous. Repair loose ladder rungs and handholds as soon as they are discovered. Follow maintenance guidelines listed at back of operation manual to prevent serious injury.

Make sure there are no obstructions near ladder rungs. Be certain wind rings (usually on taller commercial bins) are installed according to illustration at right so adequate clearances for hands and feet are provided. Wind rings must be a minimum of 1-1/2" below and 4-1/2" above any ladder rung. A wind ring assembled within 4-1/2" above a ladder rung can interfere with foothold and cause you to fall. Center of outside ladder must be at least 7" from sidewall.

NOTE: Failure to install ladder and safety cages correctly and to use fall restraint or arrest systems correctly may cause death or serious injury. Contact your dealer if proper ladder and accessories are not installed.



Ladder Safety

- Working load of ladder is 300 pounds. Do not overload.
- Inspect ladder carefully before use. Never climb deteriorated, damaged or improperly assembled ladder components.
- Never use ladder if you are physically impaired.
- Never carry items while climbing.
- Always have another person present while climbing.
- Use safety harness and safety line as required.
- Metal is slippery when wet. Always maintain a firm grip and wear slip-resistant shoes when climbing.
- Always face ladder when using it.
- Never apply external load. Never push or pull anything while on ladder.

WARNING: Failure to follow precautions above may result in death or serious injury.

Fall Restraints & Arrest Systems

When working at a height where fall hazards exist, always use a fall restraint or fall arrest system. Inspect components before each use for wear, damage and other deterioration. Remove defective components from service according to manufacturer's instructions. Failure to heed this warning may cause death or serious injury.

A **fall restraint system** consists of a body belt or harness, lanyard and anchor. The system is arranged so the individual is prevented from falling. Fall restraint systems should be used in accordance with manufacturer's recommendations and instructions.

A **fall arrest system** consists of a harness, lanyard and anchor. The system stops a fall within specified parameters. Fall arrest systems should be used in accordance with manufacturer's recommendations and instructions.

Lifelines and safety harnesses are used with both systems. A **lifeline** is a component consisting of a flexible line (rope or cable) for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline). Lifelines also serve as a means for connecting other components of a fall protection system. A **safety harness** has straps that wrap around an individual in a manner that will distribute the fall arrest forces over thighs, pelvis, waist, chest, and shoulders with a means of attaching it to other components of a fall protection system. Follow manufacturer's instructions when using a lifeline and safety harness.

Individuals who enter a grain storage structure from a level at or above stored grain should be equipped with a lifeline and harness. When entering any bin or storage unit, have multiple people outside and one inside. A single person cannot go for help and give first aid simultaneously.

Connections outside bin on roof should be made to peak ring. Lifelines should not let individual extend past eave of roof. If work needs to be done on portions of sidewall, proper equipment such as lifts or cranes should be used. When working inside bin, appropriate connections should be made to rafters, peak ring or sidewall.

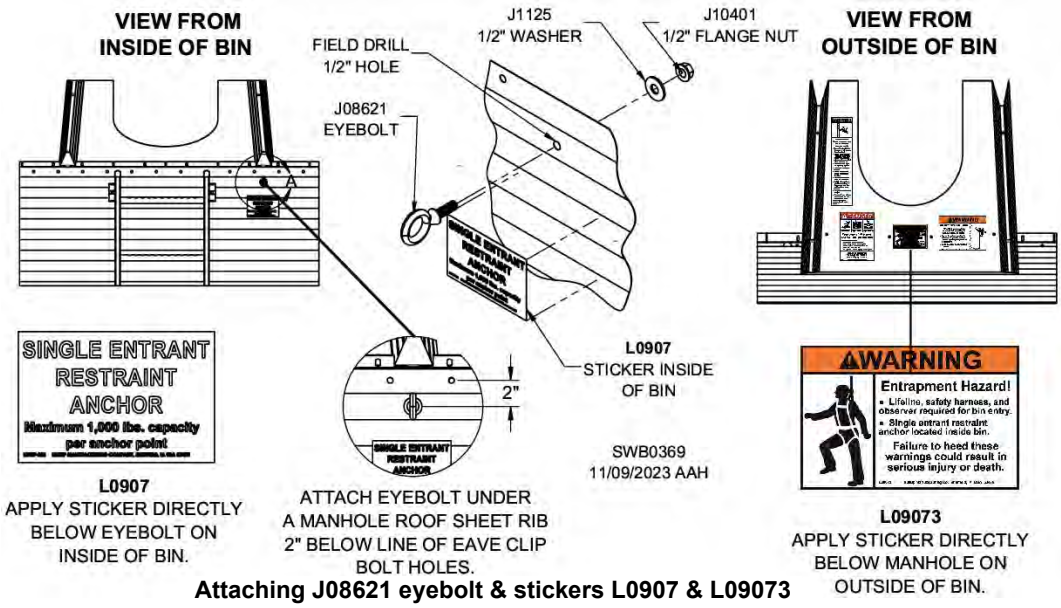
NOTE: Fall-protection equipment used with bin ladder(s) will depend on whether federal Occupational Safety and Health Administration rules apply to bin site. If ladder is 24' tall or taller and bin is on an OSHA-defined commercial site (11 or more full-time employees), fall-arrest cable system or B-Option ladders, safety cages & platforms package must be used. On sites where OSHA rules do not apply, standard (S-Option) Sukup ladders package can be used. See Ladders, Safety Cages & Platforms section in bin erection manual. Maximum distance between platforms in B-Option package is 22'. Maximum distance between platforms in S-Option package is 30'.

DISCLAIMER: It shall be the sole responsibility of the customer to determine applicability of OSHA fall protection rules at bin site. Sukup Manufacturing Co. will not be responsible for any personal injury or loss resulting from failure to comply or from incorrect installation or use of fall protection equipment.

Restraint Anchor & Knot-Passing Pulley

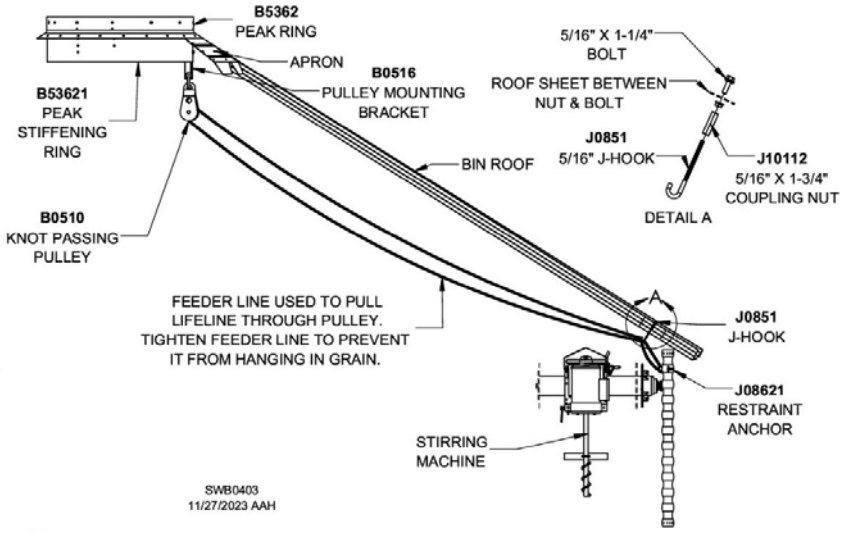
A Restraint anchor eyebolt capable of supporting 1,000 lbs. and a **knot-passing pulley** are provided for use in ALL Sukup bins. Restraint anchor, pulley, feeder line and decals must be field-installed. See instructions in Bin Construction Manual.

Pulley is intended to be used with a lifeline and safety harness (neither supplied by Sukup Manufacturing Co.). A feeder line should pass through pulley and through restraint anchor at eave of bin near manhole. Feeder line is used to pull lifeline through knot-passing pulley for safety harness attachment. Do not attach safety harness to feeder line. Use safety equipment according to manufacturers' instructions. Refer to Fall Restraints & Arrest Systems section and to www.osha.gov for additional safety information.

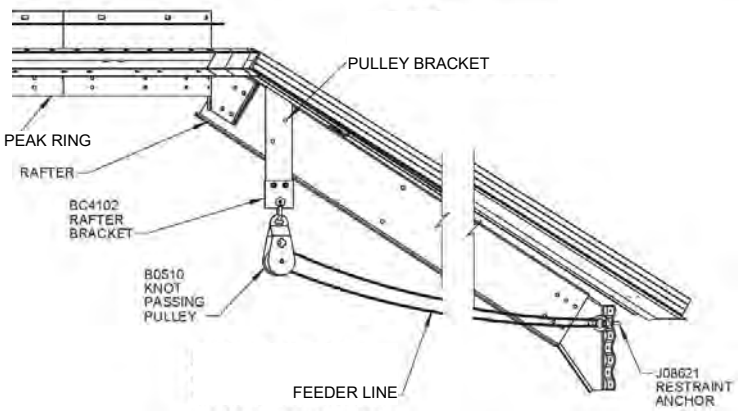


Attaching J08621 eyebolt & stickers L0907 & L09073

Drawing above shows eyebolt and sticker locations. Drawings below show pulley installation depending on roof type/rating.



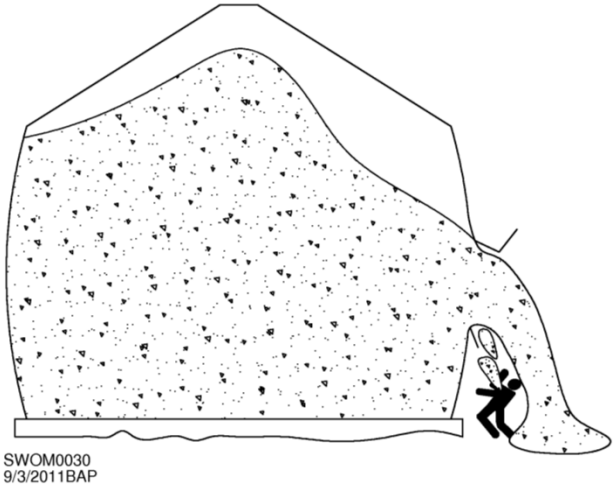
Pulley in bin with roof rating of 5,000 to 8,000 lbs.



Pulley in bin with roof rating of 15,000 lbs. or more

Top Causes of Bin Failure

- **OFF-CENTER (ECCENTRIC) UNLOADING AND/OR LOADING**
- Grain that does not flow freely (spoiled, frozen, crusted etc.)
- Inner door panels not tightly secured to inner door frame
- Augers, spouts or conveyors improperly attached to roof
- Sidedraw improperly installed or operated
- Rusted wall sheets
- Simultaneous loading and unloading
- Settling of foundation (uneven pad)
- Improper usage (storage and aeration)
- Storing wet and dry grain in the same bin without stirring
- Neglect of bin maintenance
- Modifications made during installation or assembly
- Incorrectly installed sidewall sheets and/or stiffeners
- Blocked roof vents causing excessive pressures on roof (overfilling, frosted vents, etc.)
- Improper temperature cable support and/or placement



WARNING: Damage from issues listed above may cause sudden structural failure and collapse, which may result in death or serious injury. Frequently monitor and inspect bin and foundation for any deflections, cracks or deviations that may occur. Follow operation and maintenance instructions described in this manual.

Determining an Existing Bin's Fitness for Duty

Farm and commercial bins are built to last for many years. However, factors such as weather, usage, accidents and seismic activity can put stresses on a bin that compromise its structural fitness. Following are issues to consider in determining whether a bin should be taken out of service and/or replaced.

- Extensive rust on inside or outside of roof and/or sidewall sheets, or on stiffeners
- Rust holes or significant wearing and/or tearing of roof and/or sidewall sheets
- Damaged stiffeners or sidewall sheets (kinked or bent from off-center loading or unloading, etc.)
- Leaking roof or sidewalls
- Missing connections between wall and roof structure
- Missing or sheared bolts
- Loose, broken or shifted anchors
- Damaged foundation or bin floor (cracks in concrete foundation, uneven settlement)

Minor levels of any of these issues should be repaired promptly. If levels are moderate to high, bin should be taken out of service or replaced. If unsure, take pictures of the issues and contact an independent consulting engineer.

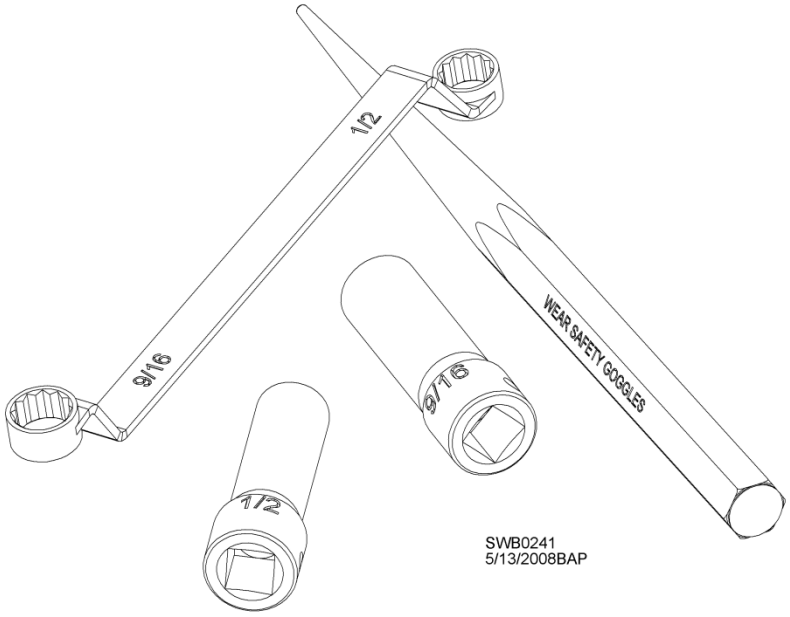
Besides condition of bin, other factors to consider in determining whether to decommission it include age of bin, insurability, capacity, compatibility with modern grain handling and moving equipment, and future plans for bin site.

Construction Safety

On grain bin construction sites, carelessness and/or operator error may result in serious injury or death. Hazard control and accident prevention depend on awareness, cautiousness, and proper training of personnel involved in construction of bin. Be certain all crew members are properly trained and thoroughly familiar with all aspects of grain bin construction.

Listed below are items construction crew members should be knowledgeable of to minimize risk of injury to personnel and damage to equipment. **NOTE:** Following items are examples taken from a broad list of OSHA's Safety and Health Regulations for Construction. Generally, these are common requirements/items necessary on grain bin construction sites.

- **Personal Protective**
  - Head Protection
  - Hearing Protection
  - Eye and Face Protection
  - Steel Toed Boots/Shoes
  - Gloves
- **Concrete Construction**
- **Material Handling & Storage**
- **Tools – Hand and Power**
- **Welding and Cutting**
- **Electrical**
- **Ladders**
- **Scaffolds and Working Platforms**
- **Fall Protection**
- **Steel Erection**
  - Center Pole (Roof) Jack*
  - Sidewall Jacks**
- **Motorized Equipment**
  - Trenchers
  - Forklifts
  - Skidsteers
  - Telehandlers
  - Boom Lifts
- **Cranes and Hoists**
- **Signs and Signals for Use of Motorized Equipment**



***NOTE:** Be certain to read and fully understand correct operating procedures for bin jacking equipment. Bin jack users must be thoroughly familiar with proper usage techniques. Jack manufacturers will assume no responsibility for damage to equipment or any injury resulting from operation of their equipment.

Erectors/contractors are responsible for developing site-specific construction guidelines and procedures based on equipment, conditions and situations at their individual location. OSHA's Safety and Health Regulations for Construction (29CFR1926) can be obtained at www.osha.gov.

Foundation Recommendations for Sukup Grain Bins

Site Selection

When selecting a site for grain storage and handling, many factors need to be considered. Site must allow convenient access for loading, unloading and related work if site is to become a grain system center.

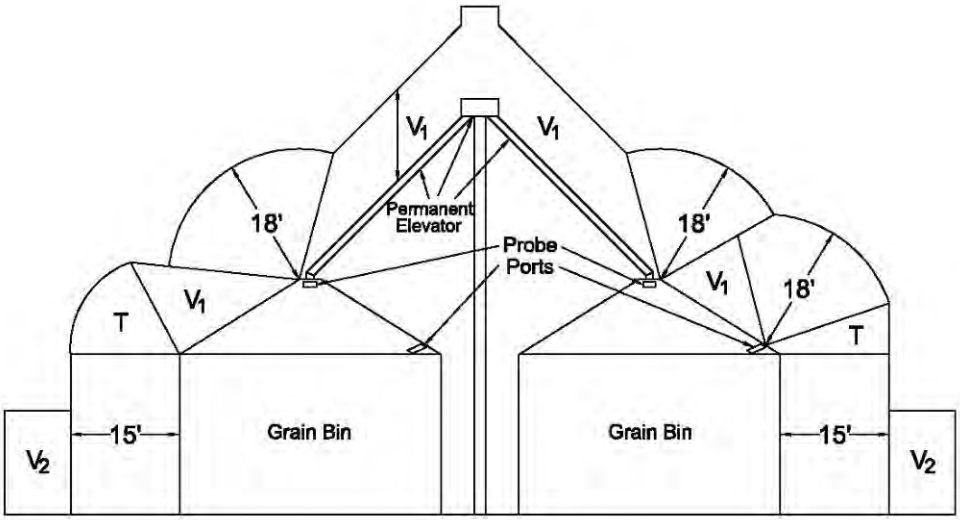
Site should have soil that is firm, level and free of vegetation and underlying debris. Any added fill should be thoroughly compacted to prevent uneven settlement from bin weight.

Locations of handling equipment, fans, heaters, ladders and stairways, etc., must be predetermined. Future expansion should be factored into site selection process, and careful consideration must be paid to access to electrical and gas lines, and to maintaining safe distances from power supply sources.

Electrical Clearances

Check with local electric utility for assistance in planning a safe grain storage and handling site. State codes may vary on clearances. To prevent overhead electrical safety issues, bury electrical lines.

American National Standards Institute (ANSI) provides safety recommendations for grain bins in ANSI C2 2017 “National Electric Safety Code” Rule 234F. Figs. 1 and 2 show clearances for bins and grain handling equipment.

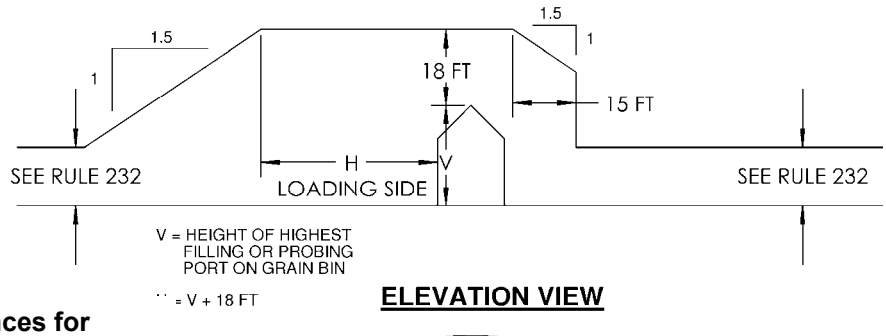


V_1 = Vertical clearance above a building

V_2 = Vertical clearance above land

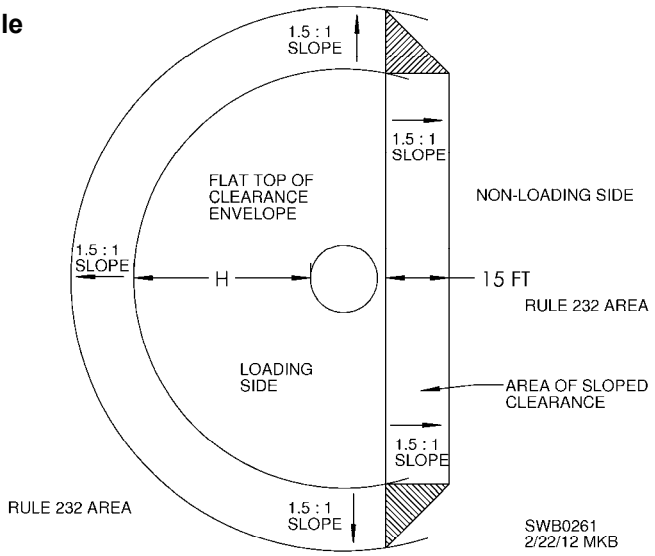
T = Transition clearance

Fig. 1 – Clearances for grain bins filled by permanently installed augers, conveyers or elevators. (ANSI C2 2017)



ELEVATION VIEW

Fig. 2 -- Clearances for grain bins filled by portable augers, conveyors or elevators. (ANSI C2 2017)



TOP VIEW

Accessory Location

It is important that all components of grain bin be located properly to maximize efficiency and effectiveness of equipment. Most factors should be considered before foundation is poured. Double-check desired location of roof manhole, sidewall and roof ladders, eave and safety platform(s), conveyors, roof exhausters and walkway(s). Fig. 3 shows a typical layout for a farm-duty bin.

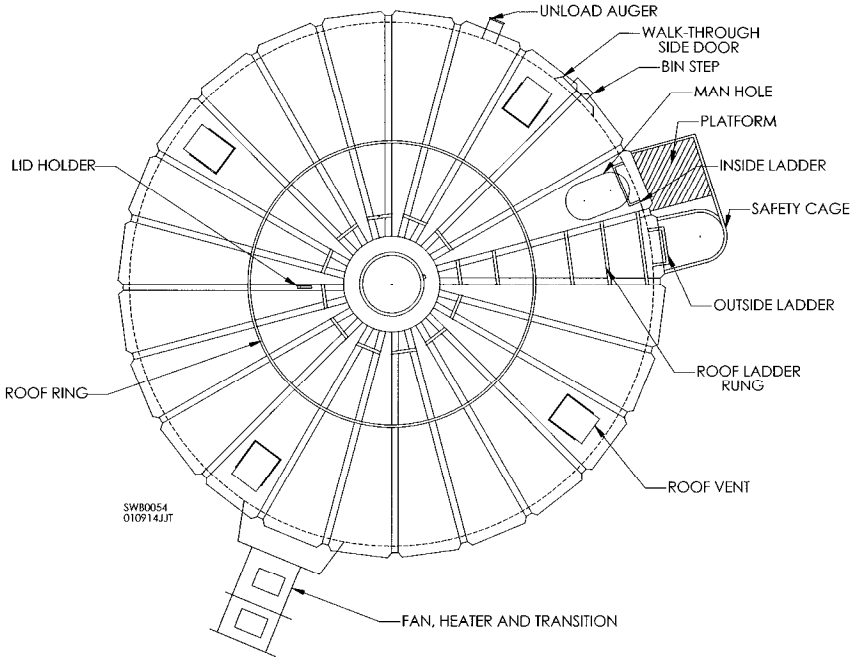


Fig. 3 – Suggested layout of bin components

Foundation Preparation Recommendations

DISCLAIMER: Sukup Manufacturing Co. assumes no responsibility regarding the foundation specifications. This is not an engineered foundation and shall not be constructed as such. The specifications given are intended for quoting and estimating purposes only. It shall be the sole responsibility of the customer to obtain actual foundation drawings designed by and constructed to the specifications of a licensed professional structural engineer with knowledge of the actual soil and load specific to the project and location. Consideration should also include, but not be limited to, live loads, dead loads, wind loads, soil bearing loads, seismic zone, proper moisture run-off on top of base, and types of aeration applied for the project.

Sukup Manufacturing Co. will not be responsible for any damage to a product, including, but not limited to, any damage that results from poor soil conditions or inadequate concrete type, grade, bearing strength, and construction method. Soil bearing tests must be performed by a competent, independent, engineering firm. Concrete foundation construction must be done by a competent concrete contractor.

Check local and/or regional building codes and regulations to ensure compliance.

All backfill material used in foundation preparations should be clean, crushed stone or sand/gravel mixture of a highly compactable material. Backfill should be layered up in 6” lifts and well compacted.

Concrete Specifications

Cement is to be Type 1 Portland Cement that conforms to ASTM C150.

Maximum aggregate size is to be 3/4 of minimum clear spacing between reinforcing bars and/or wire mesh.

Concrete must be 3,000 psi compressive strength at 28 days cured minimum.

Concrete is to be cured at 50°F or above and kept moist for a minimum of seven (7) days.

Foundation surface should not vary from level by more than 1/4” in 10 feet or more than 1/4” from specified elevation. Uneven surface may cause bin failure.

Elevation of surface above grade should not exceed 6”.

A beveled edge around foundation allows water to run off of surface.

Reinforcing Steel

Steel reinforcing bar (rebar) should conform to ASTM A615 or ASTM A617 and be Grade 60 or better.

To properly size diameter of rebar for specific bin size, consult bin specifications chart.

All circumferential bar laps should be 35 bar diameters and staggered by 3’ minimum.

All laps of circumferential bar (rebar) must be continuous, connected by wire tie or weld. If tunnel is present, additional rebar must be used above and below tunnel.

Number 6 (6” x 6”) wire mesh may be used. Overlap of wire mesh should be 6 inches minimum.

Anchor Bolts

Follow specifications on subsequent pages for appropriate size foundation and number of anchor bolts.

Placing Anchor Bolts for 18’ to 90’ Diameter Bins

Use coordinates provided and GPS device to determine anchor locations. If unavailable, follow steps below.

STEP 1: Find anchor radius based on diameter of bin being built (Anchor radius is noted to left of Anchor Placement drawing).

STEP 2: Scribe anchor radius into concrete.

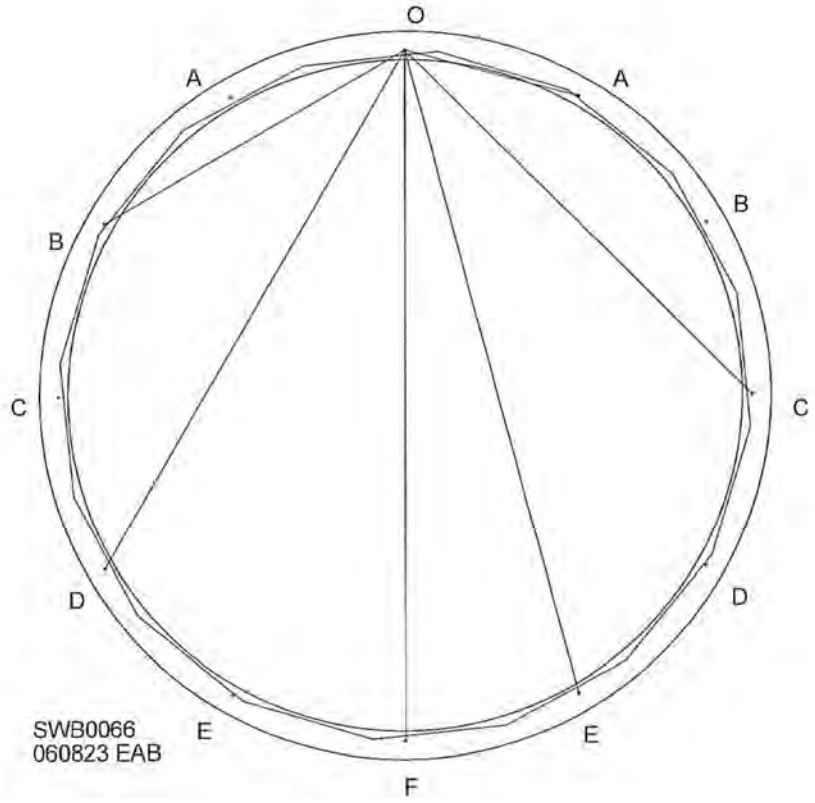
STEP 3: Determine where origin point will be. Have one person hold tape measure there. Have other person hold tape measure at distances shown at left of Anchor Placement drawing. Mark spots on radius – A, B, C, etc. – for anchor points. Repeat this step on other side until all anchor points are marked on radius.

STEP 4: Place an anchor at every marked point. These will be at stiffener locations.

18' DIAMETER
ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 9 3/16"
B	9' 2 1/2"
C	13' 1/4"
D	15' 11 3/8"
E	17' 9 1/2"
F	18' 5"

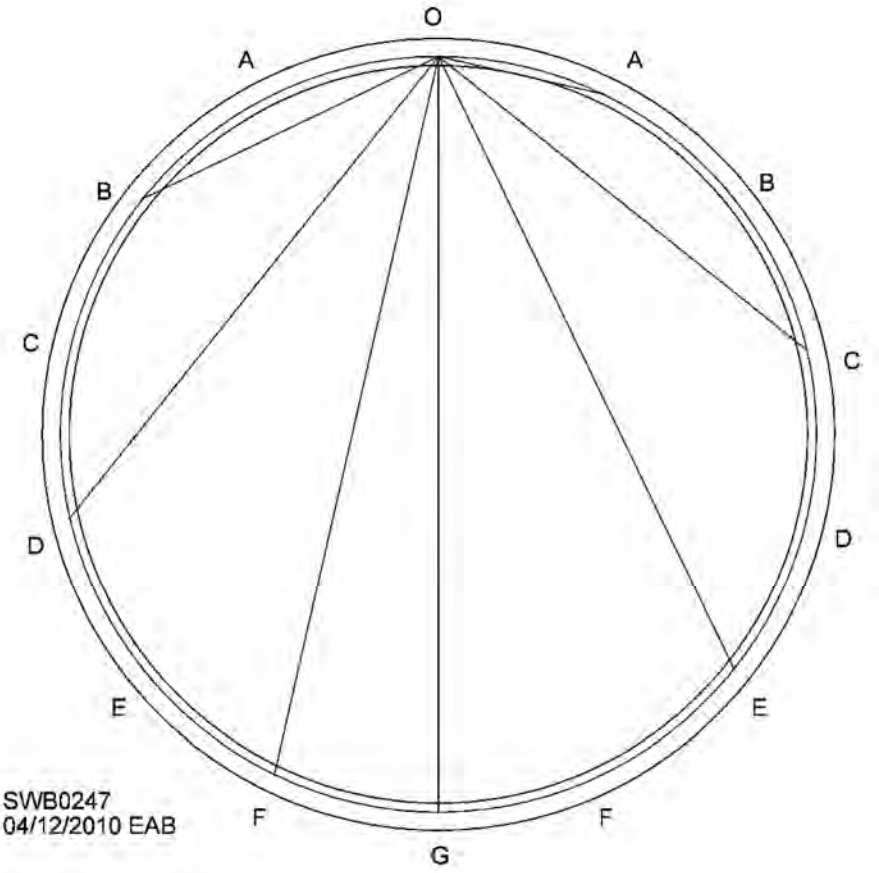
ANCHOR RADIUS: 9' 2 1/2"
BIN RADIUS: 8' 11 7/16"



21' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 9 1/8"
B	9' 3 3/8"
C	13' 4 1/16"
D	16' 8 3/4"
E	19' 3 5/16"
F	20' 10 5/16"
G	21' 4 3/4"

ANCHOR RADIUS: 10' 8 3/8"
BIN RADIUS: 10' 5 5/16"

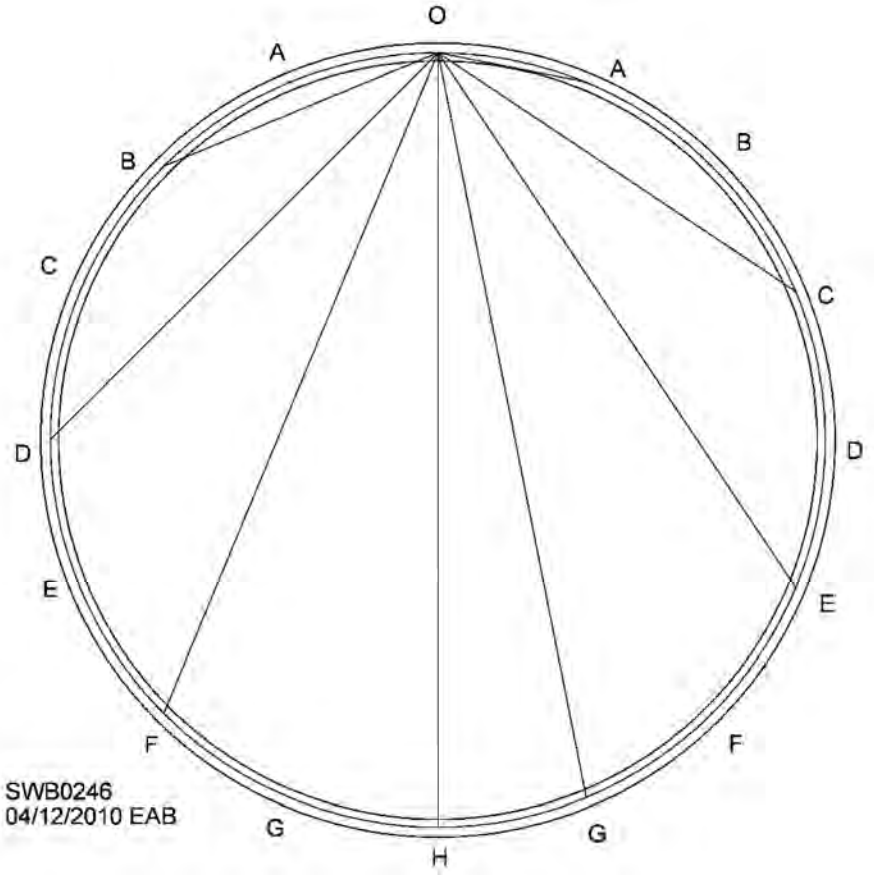


SWB0247
04/12/2010 EAB

24' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 9 1/16"
B	9' 4"
C	13' 6 9/16"
D	17' 2 15/16"
E	20' 3 5/16"
F	22' 6 3/8"
G	23' 11"
H	24' 4 5/8"

ANCHOR RADIUS: 12' 2 5/16"
BIN RADIUS: 11' 11 1/4"

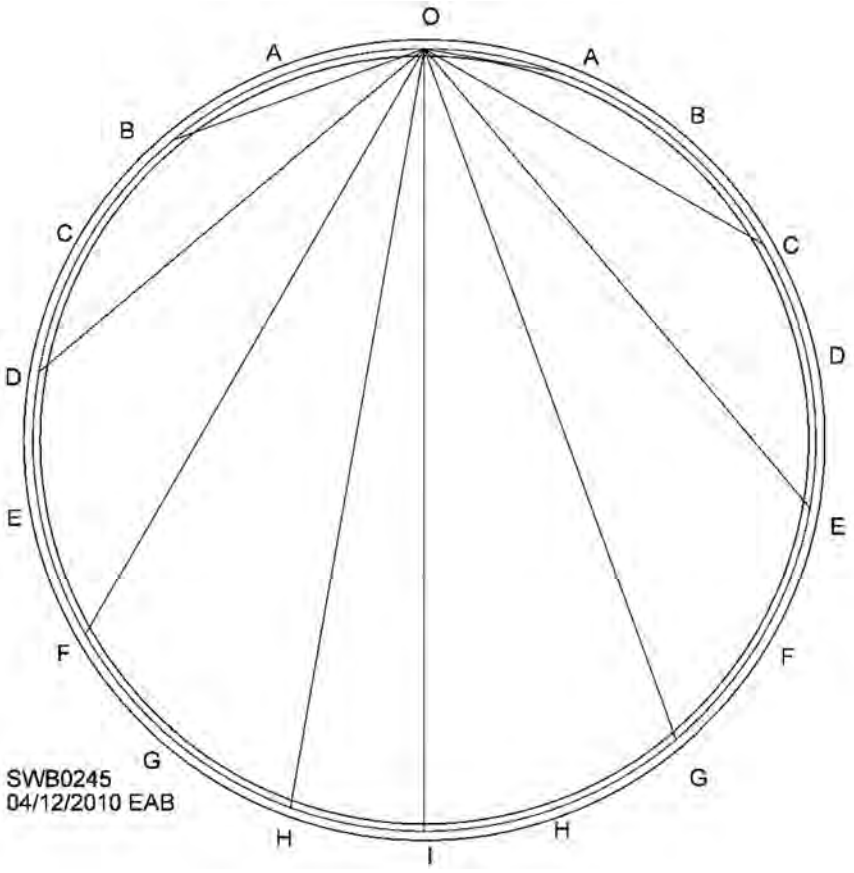


SWB0246
04/12/2010 EAB

27' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 9 1/16"
B	9' 4 5/16"
C	13' 8 3/16"
D	17' 7 1/8"
E	20' 11 5/8"
F	23' 8 7/16"
G	25' 8 5/8"
H	26' 11 7/16"
I	27' 4 7/16"

ANCHOR RADIUS: 13' 8 3/16"
BIN RADIUS: 13' 5 1/8"

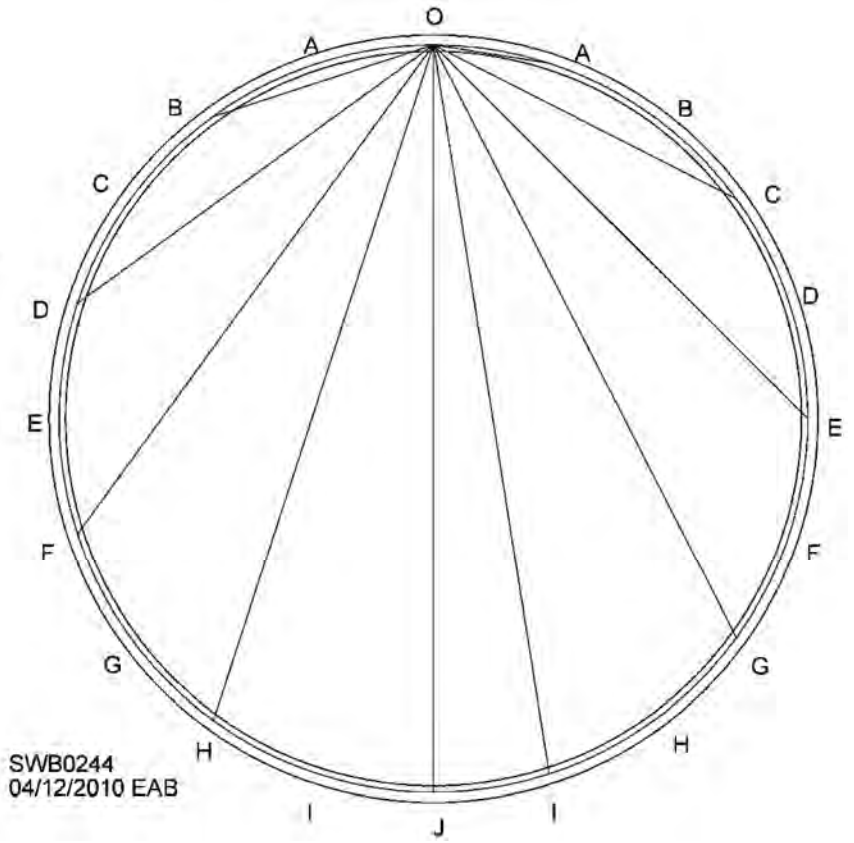


SWB0245
04/12/2010 EAB

30' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 9"
B	9' 4 9/16"
C	13' 9 3/8"
D	17' 10 1/8"
E	21' 5 9/16"
F	24' 6 11/16"
G	27' 9/16"
H	28' 10 7/16"
I	29' 11 3/4"
J	30' 4 1/4"

ANCHOR RADIUS: 15' 2 1/8"
BIN RADIUS: 14' 11 1/32"

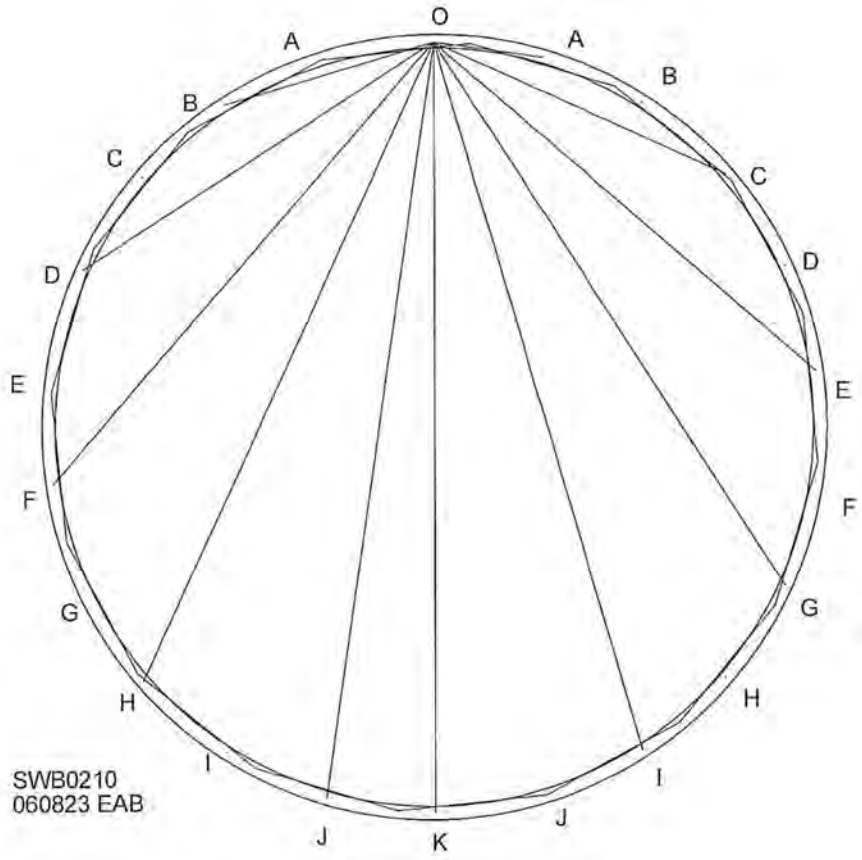


SWB0244
04/12/2010 EAB

33' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 15/16"
B	9' 4 11/16"
C	13' 10 3/16"
D	18' 5/16"
E	21' 10"
F	25' 2 3/8"
G	28' 9/16"
H	30' 3 15/16"
I	31' 11 7/8"
J	33'
K	33' 4 1/16"

ANCHOR RADIUS: 16' 8"
BIN RADIUS: 16' 4 15/16"

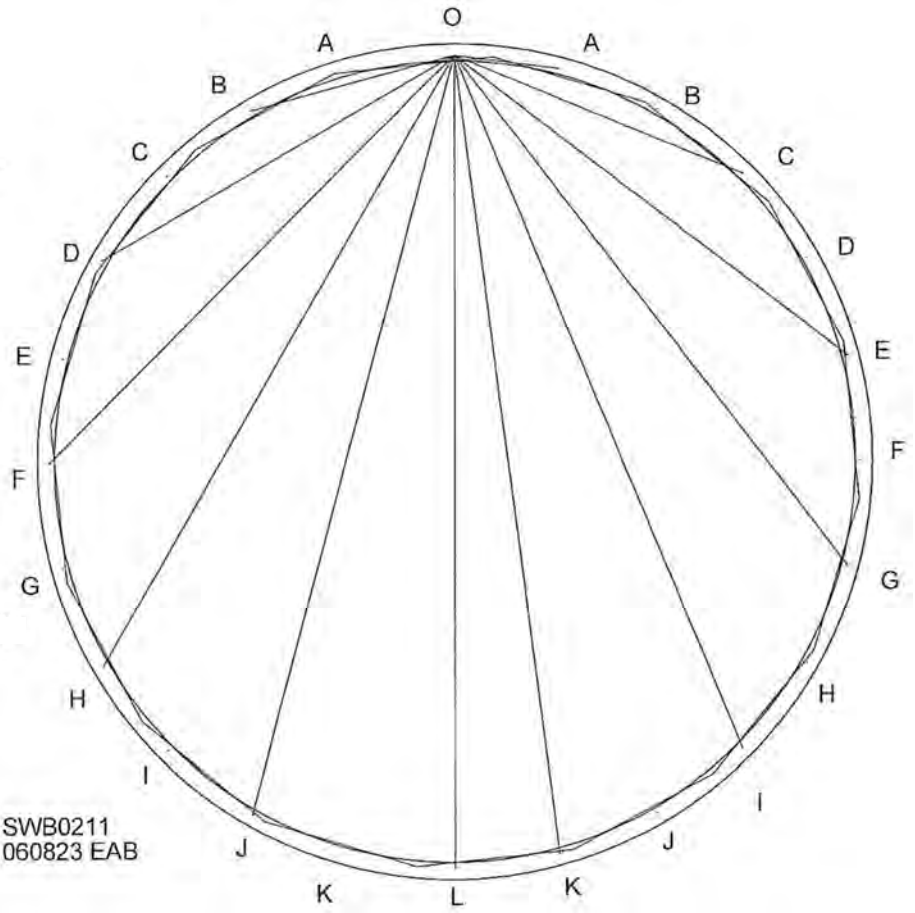


SWB0210
060823 EAB

36' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 7/8"
B	9' 4 13/16"
C	13' 10 13/16"
D	18' 1 15/16"
E	22' 1 3/8"
F	25' 8 3/16"
G	28' 9 13/16"
H	31' 5 1/2"
I	33' 6 11/16"
J	35' 1"
K	36' 1/8"
L	36' 3 7/8"

ANCHOR RADIUS: 18' 1 15/16"
BIN RADIUS: 17' 10 7/8"

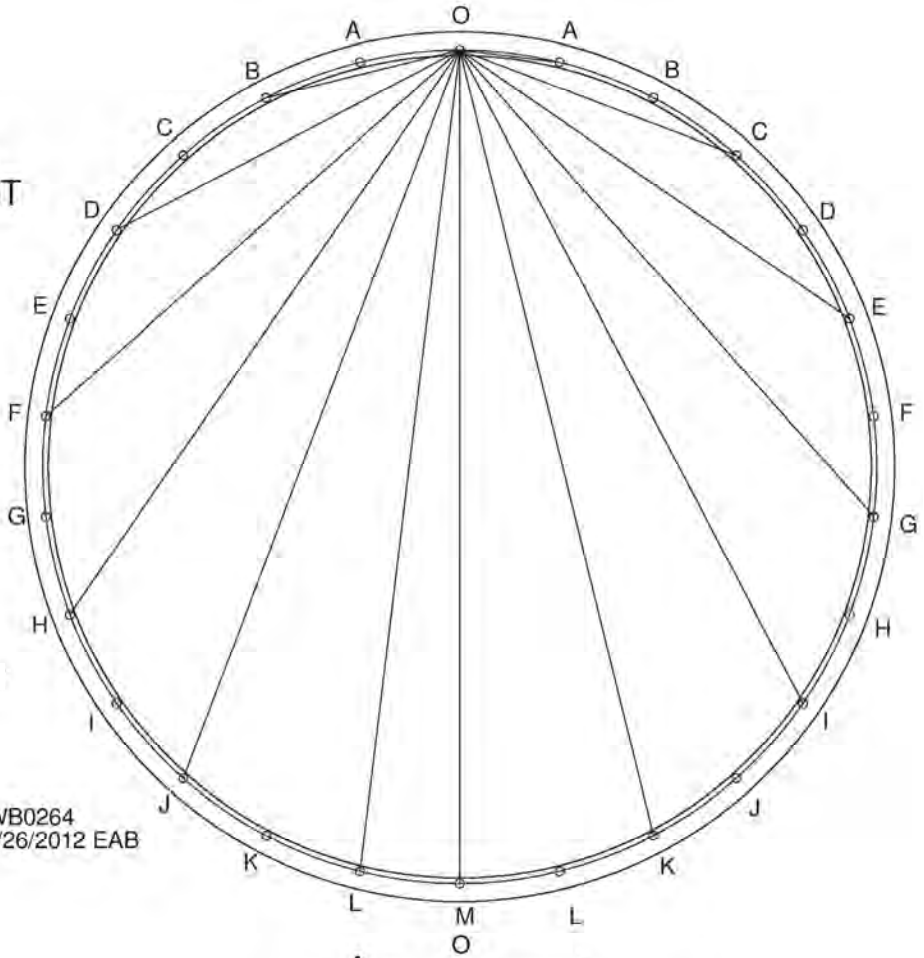


SWB0211
060823 EAB

39' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 7/8"
B	9' 4 7/8"
C	13' 11 1/4"
D	18' 3 3/16"
E	22' 3 15/16"
F	26' 13/16"
G	29' 5 1/16"
H	32' 4 3/16"
I	34' 9 11/16"
J	36' 9 1/16"
K	38' 2"
L	39' 1/4"
M	39' 3 11/16"

ANCHOR RADIUS: 19' 7 7/8"
BIN RADIUS: 19' 4 3/4"

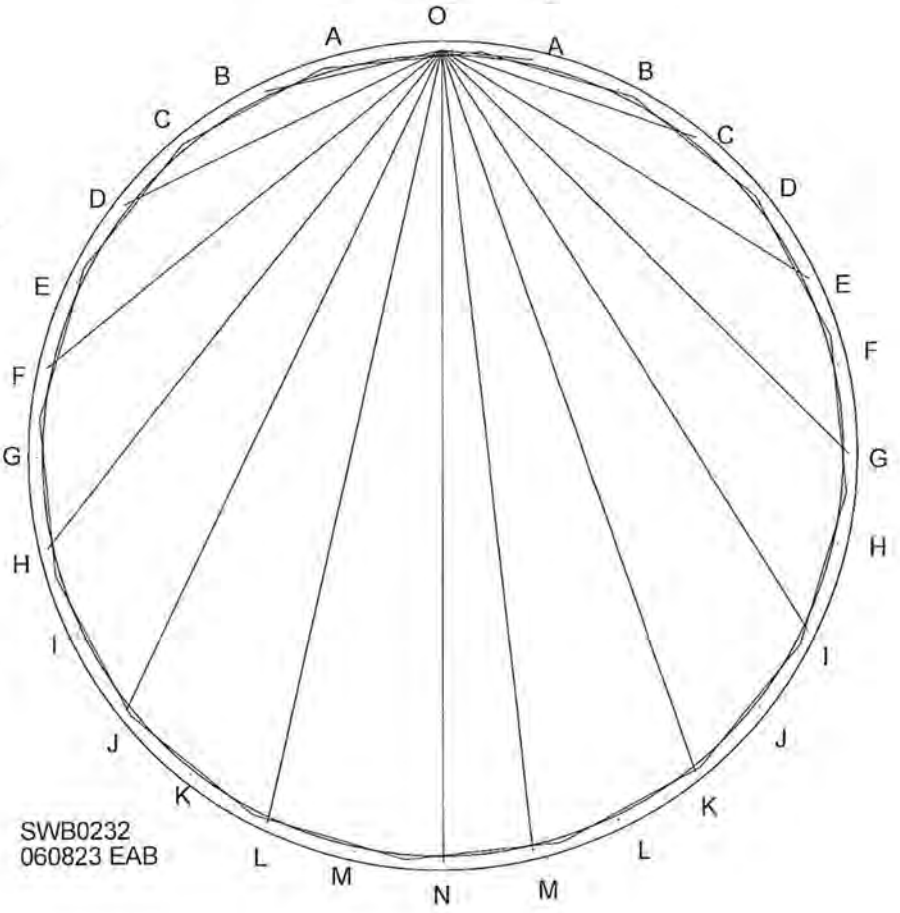


SWB0264
03/26/2012 EAB

42' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 13/16"
B	9' 4 15/16"
C	13' 11 5/8"
D	18' 4 3/16"
E	22' 6"
F	26' 4 7/16"
G	29' 10 7/8"
H	33' 3/4"
I	35' 9 11/16"
J	38' 1 1/4"
K	39' 11"
L	41' 2 3/4"
M	42' 5/16"
N	42' 3 1/2"

ANCHOR RADIUS: 21' 1 3/4"
BIN RADIUS: 20' 10 11/16"

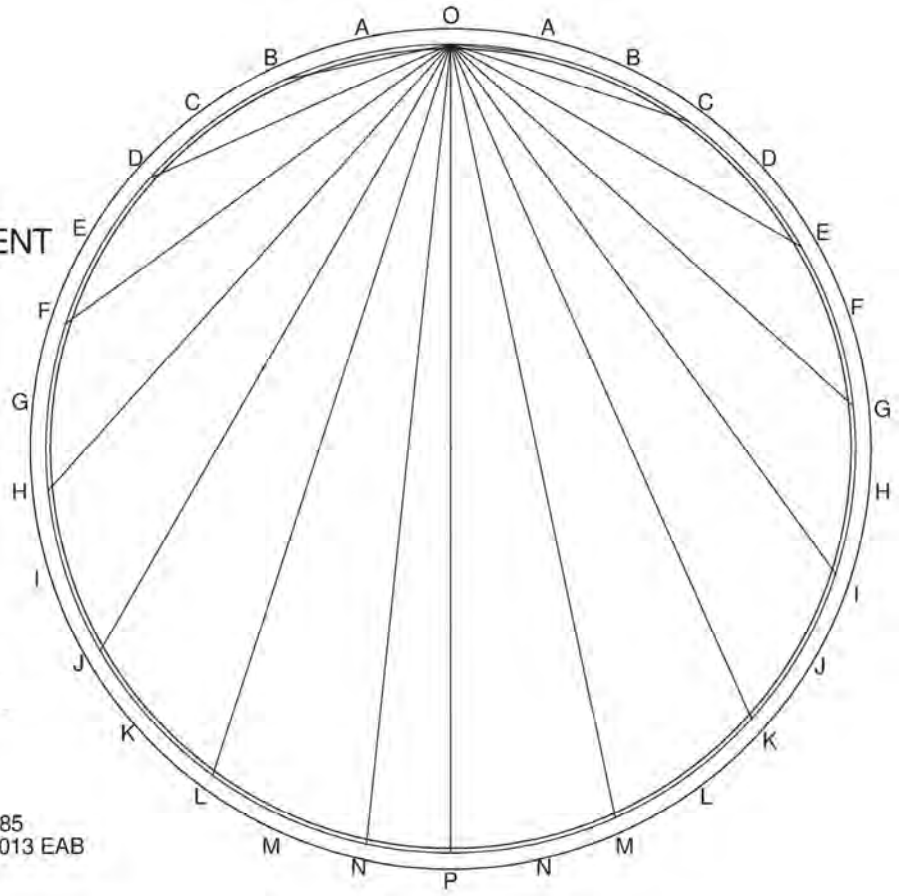


SWB0232
060823 EAB

45' DIAMETER ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 13/16"
B	9' 4 15/16"
C	13' 11 7/8"
D	18' 5"
E	22' 7 5/8"
F	26' 7 5/16"
G	30' 3 1/2"
H	33' 7 3/4"
I	36' 7 1/2"
J	39' 2 1/2"
K	41' 4 5/16"
L	43' 11/16"
M	44' 3 3/8"
N	45' 5/16"
P	45' 3 1/4"

ANCHOR RADIUS: 22' 7 5/8"
BIN RADIUS: 22' 4 9/16"

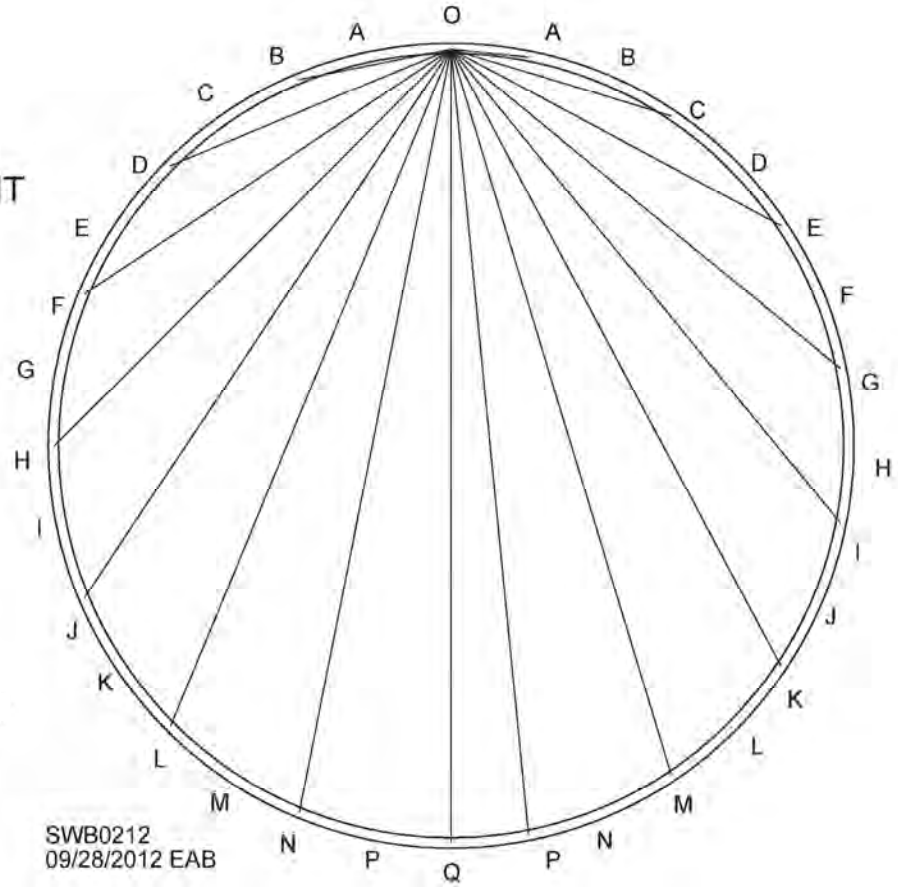


SWB0285
03/26/2013 EAB

48' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 3/4"
B	9' 5"
C	14' 1/16"
D	18' 5 5/8"
E	22' 8 15/16"
F	26' 9 11/16"
G	30' 7 3/8"
H	34' 1 7/16"
I	37' 3 5/8"
J	40' 1 1/2"
K	42' 6 11/16"
L	44' 7"
M	46' 2 1/8"
N	47' 3 15/16"
P	48' 1/4"
Q	48' 3 1/16"

ANCHOR RADIUS: 24' 1 1/2"
BIN RADIUS: 23' 10 1/2"

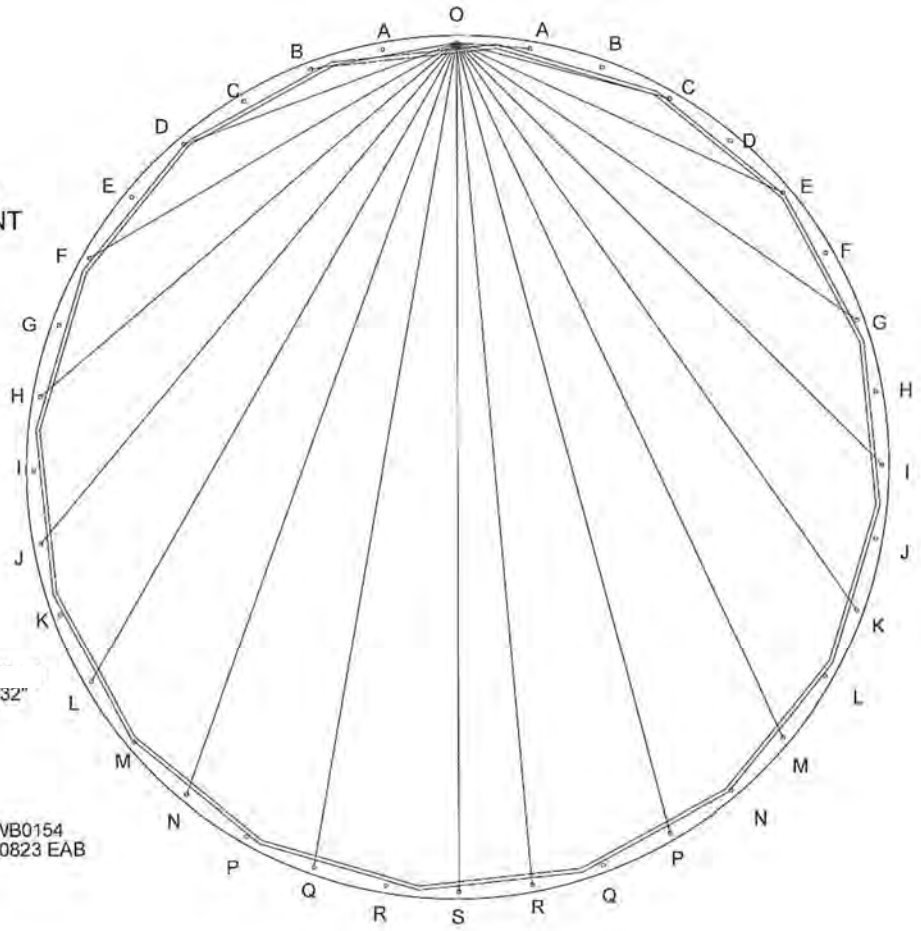


SWB0212
09/28/2012 EAB

54' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 23/32"
B	9' 5"
C	14' 13/32"
D	18' 6 9/16"
E	22' 11"
F	27' 1 11/32"
G	31' 1 7/32"
H	34' 10 1/4"
I	38' 4 3/32"
J	41' 6 15/32"
K	44' 5"
L	46' 11 1/2"
M	49' 1 23/32"
N	50' 11 7/16"
P	52' 4 17/32"
Q	53' 4 13/16"
R	54' 7/32"
S	54' 2 11/16"

ANCHOR RADIUS: 27' 1 11/32"
BIN RADIUS: 26' 10 5/16"

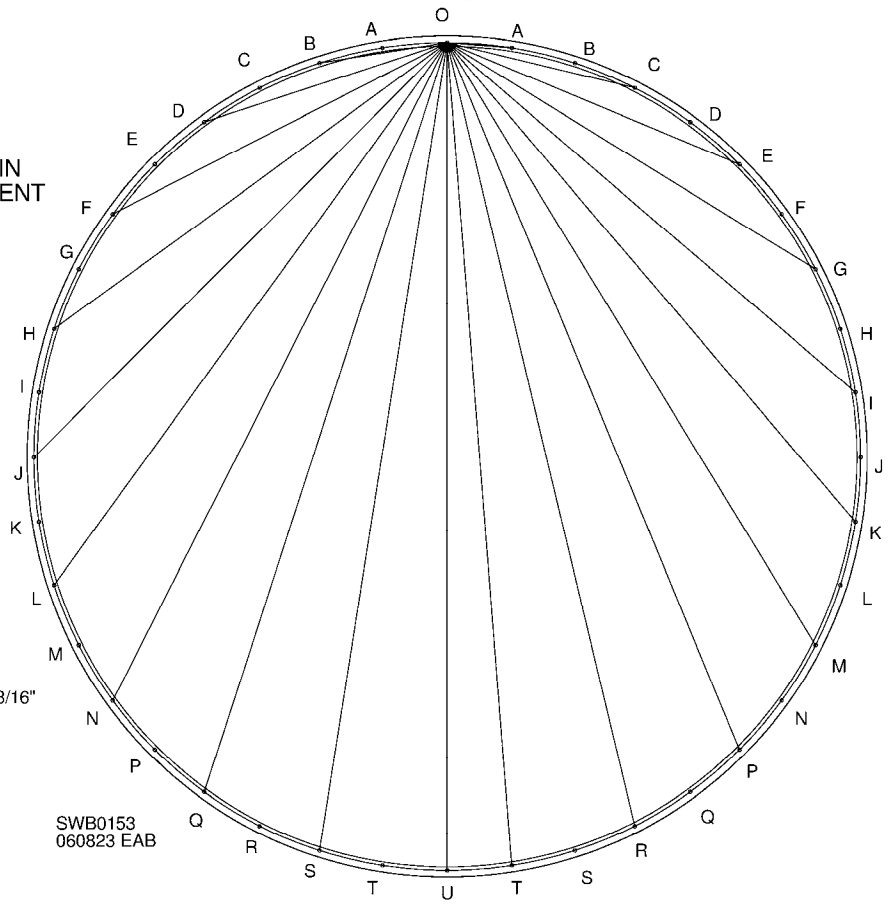


SWB0154
060823 EAB

60' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 11/16"
B	9' 5"
C	14' 5/8"
D	18' 7 3/16"
E	23' 7/16"
F	27' 3 15/16"
G	31' 5 7/16"
H	35' 4 9/16"
I	39' 1 1/8"
J	42' 6 3/4"
K	45' 9 1/4"
L	48' 8 3/8"
M	51' 3 7/8"
N	53' 7 5/8"
P	55' 7 5/16"
Q	57' 3"
R	58' 6 3/8"
S	59' 5 7/16"
T	60' 1/8"
U	60' 2 5/16"

ANCHOR RADIUS: 30' 1 3/16"
BIN RADIUS: 29' 10 1/8"

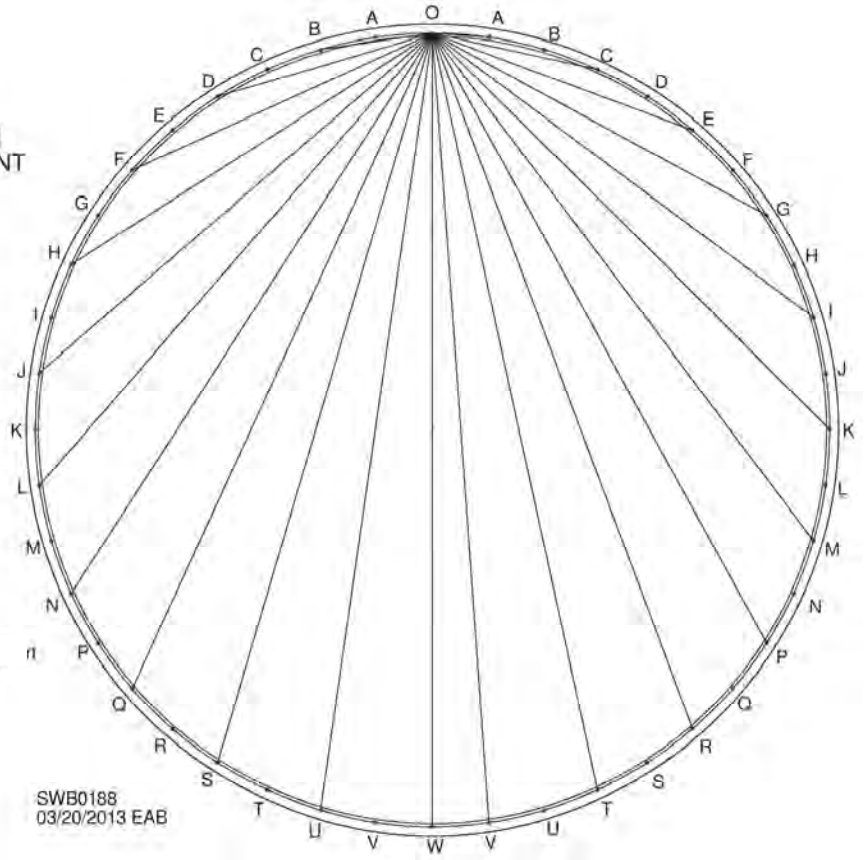


SWB0153
060823 EAB

66' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 5/8"
B	9' 5"
C	14' 3/4"
D	18' 7 11/16"
E	23' 1 7/16"
F	27' 5 13/16"
G	31' 8 1/2"
H	35' 9 1/4"
I	39' 7 13/16"
J	43' 3 15/16"
K	46' 9 7/16"
L	50'
M	52' 11 9/16"
N	55' 7 15/16"
P	58' 13/16"
Q	60' 2 3/16"
R	61' 11 7/8"
S	63' 5 13/16"
T	64' 7 13/16"
U	65' 5 7/8"
V	65' 11 15/16"
W	66' 1 5/16"

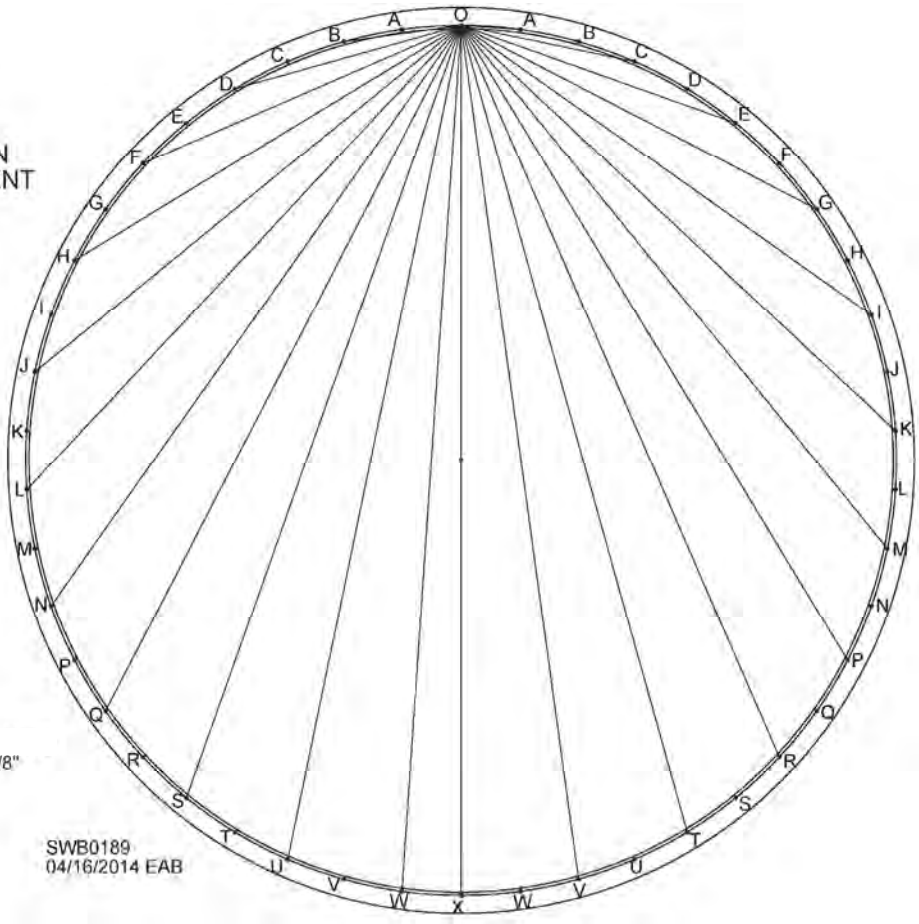
ANCHOR RADIUS: 33' 1"
BIN RADIUS: 32' 9 15/16"



69' DIAMETER COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
A	4' 8 5/8"
B	9' 5"
C	14' 13/16"
D	18' 7 7/8"
E	23' 1 7/8"
F	27' 6 9/16"
G	31' 9 3/4"
H	35' 11 1/8"
I	39' 10 1/2"
J	43' 7 5/8"
K	47' 2 3/8"
L	50' 6 7/16"
M	53' 7 5/8"
N	56' 5 7/8"
P	59' 15/16"
Q	61' 4 3/4"
R	63' 5 1/16"
S	65' 1 7/8"
T	66' 7"
U	67' 8 7/16"
V	68' 6 1/16"
W	68' 11 13/16"
X	69' 1 3/4"

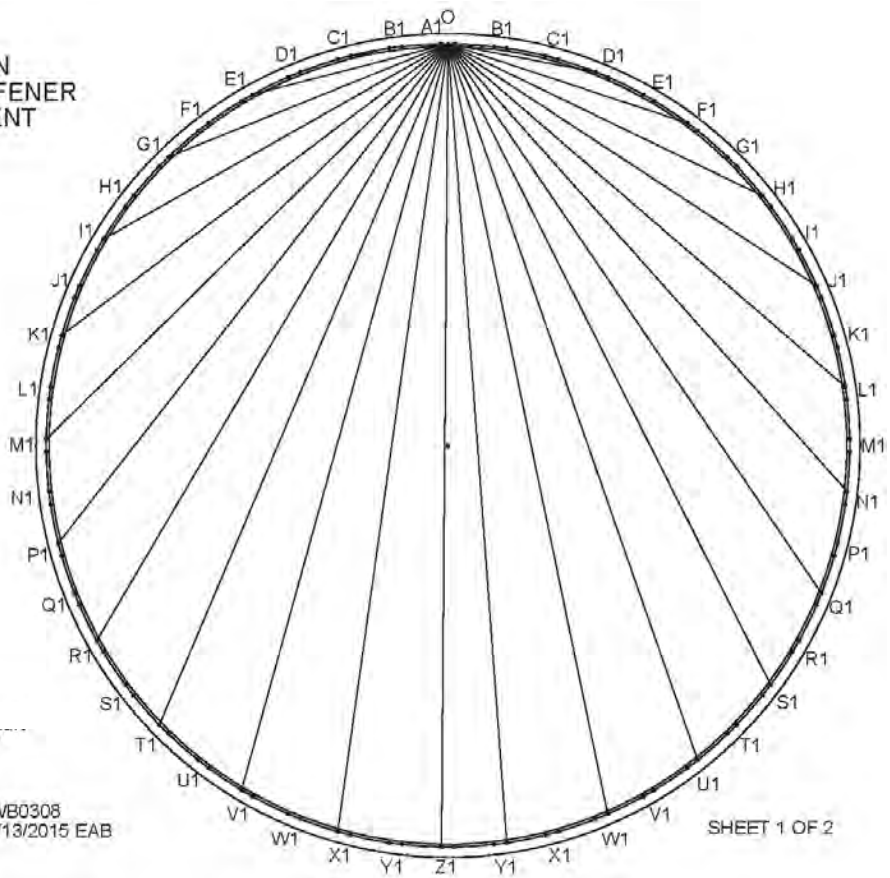
ANCHOR RADIUS: 34' 6 7/8"
BIN RADIUS: 34' 3 13/16"



72' DIAMETER COMMERCIAL BIN 2 ANCHORS PER STIFFENER ANCHOR PLACEMENT

POINT	DISTANCE
A1	7"
B1	4' 1 5/8"
C1	8' 10 1/32"
D1	13' 5 31/32"
E1	18' 1 1/4"
F1	22' 7 9/16"
G1	27' 3/4"
H1	31' 4 1/2"
I1	35' 6 11/16"
J1	39' 7"
K1	43' 5 5/16"
L1	47' 1 3/8"
M1	50' 7 1/32"
N1	53' 10 3/32"
P1	56' 10 3/8"
Q1	59' 7 23/32"
R1	62' 2 1/32"
S1	64' 5 1/8"
T1	66' 4 29/32"
U1	68' 1 9/32"
V1	69' 6 3/16"
W1	70' 7 15/32"
X1	71' 5 5/32"
Y1	71' 11 5/32"
Z1	72' 1 15/32"

ANCHOR RADIUS: 36' 25/32"
BIN RADIUS: 35' 9 3/4"



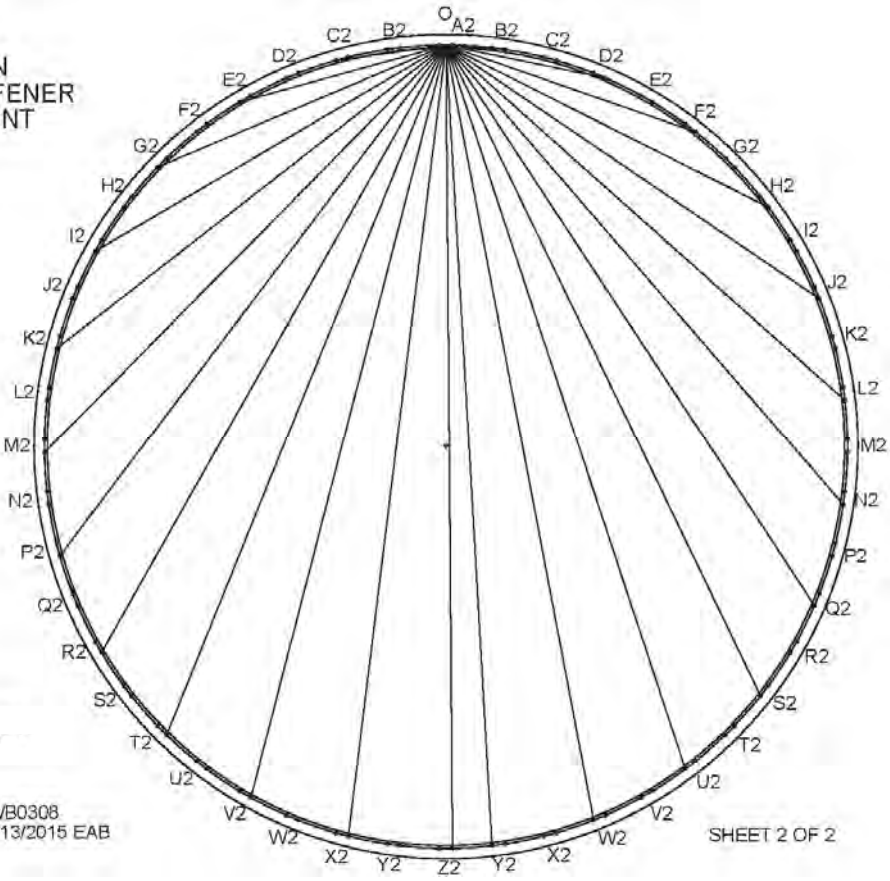
SWB0308
01/13/2015 EAB

SHEET 1 OF 2

72' DIAMETER COMMERCIAL BIN 2 ANCHORS PER STIFFENER ANCHOR PLACEMENT

POINT	DISTANCE
A2	7"
B2	5' 3 19/32"
C2	9' 11 29/32"
D2	14' 7 23/32"
E2	19' 2 3/4"
F2	23' 8 13/16"
G2	28' 1 21/32"
H2	32' 5 1/16"
I2	36' 6 13/16"
J2	40' 6 21/32"
K2	44' 4 7/16"
L2	47' 11 29/32"
M2	51' 4 15/16"
N2	54' 7 5/16"
P2	57' 6 29/32"
Q2	60' 3 1/2"
R2	62' 9 1/32"
S2	64' 11 5/16"
T2	66' 10 9/32"
U2	68' 5 25/32"
V2	69' 9 13/16"
W2	70' 10 7/32"
X2	71' 7"
Y2	72' 3/32"
Z2	72' 1 15/32"

ANCHOR RADIUS: 36' 25/32"
BIN RADIUS: 35' 9 3/4"



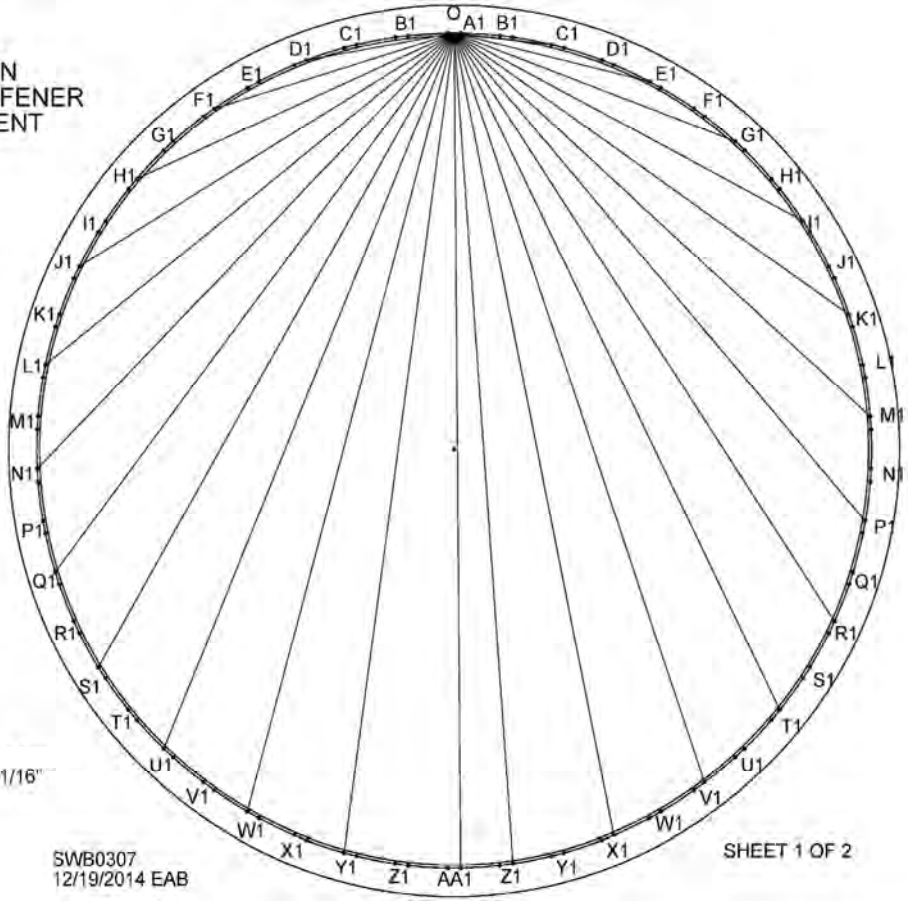
SWB0308
01/13/2015 EAB

SHEET 2 OF 2

75' DIAMETER COMMERCIAL BIN 2 ANCHORS PER STIFFENER ANCHOR PLACEMENT

POINT	DISTANCE
A1	7"
B1	4' 1 5/8"
C1	8' 10 1/32"
D1	13' 6 1/32"
E1	18' 1 3/8"
F1	22' 7 7/8"
G1	27' 1 5/16"
H1	31' 5 7/16"
I1	35' 8 3/32"
J1	39' 9 1/16"
K1	43' 8 1/8"
L1	47' 5 5/32"
M1	50' 11 29/32"
N1	54' 4 1/4"
P1	57' 6 1/32"
Q1	60' 5 3/32"
R1	63' 1 9/32"
S1	65' 6 1/2"
T1	67' 8 19/32"
U1	69' 7 15/32"
V1	71' 3 1/16"
W1	72' 7 9/32"
X1	73' 8 1/16"
Y1	74' 5 3/8"
Z1	74' 11 1/8"
AA1	75' 1 11/32"

ANCHOR RADIUS: 37' 6 11/16"
BIN RADIUS: 37' 3 5/8"



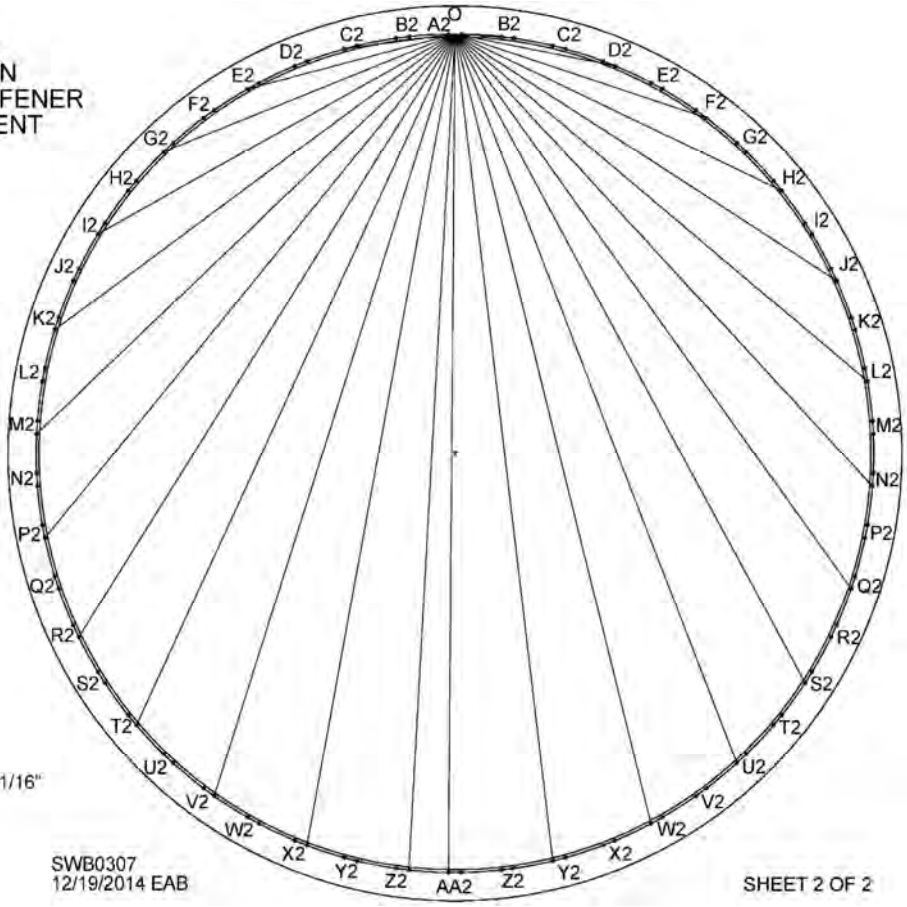
SWB0307
12/19/2014 EAB

SHEET 1 OF 2

75' DIAMETER COMMERCIAL BIN 2 ANCHORS PER STIFFENER ANCHOR PLACEMENT

POINT	DISTANCE
A2	7"
B2	5' 3 19/32"
C2	9' 11 29/32"
D2	14' 7 25/32"
E2	19' 2 15/16"
F2	23' 9 3/16"
G2	28' 2 5/16"
H2	32' 6 3/32"
I2	36' 8 3/8"
J2	40' 8 7/8"
K2	44' 7 15/32"
L2	48' 3 15/16"
M2	51' 10 1/8"
N2	55' 1 27/32"
P2	58' 2 31/32"
Q2	61' 1 5/16"
R2	63' 8 25/32"
S2	66' 1 7/32"
T2	68' 2 17/32"
U2	70' 5/8"
V2	71' 7 13/32"
W2	72' 10 25/32"
X2	73' 10 11/16"
Y2	74' 7 1/8"
Z2	75'
AA2	75' 1 11/32"

ANCHOR RADIUS: 37' 6 11/16"
BIN RADIUS: 37' 3 5/8"



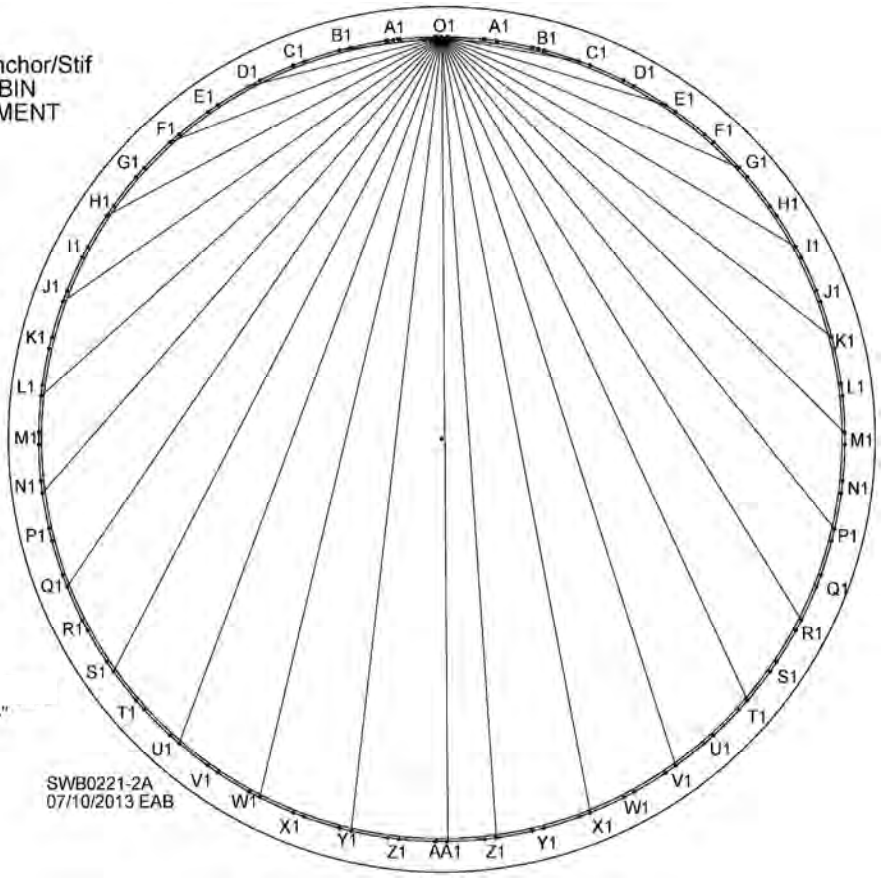
SWB0307
12/19/2014 EAB

SHEET 2 OF 2

78' DIAMETER - 2 Anchor/Stif COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
O1	7"
A1	4' 1 5/8"
B1	9' 11 15/16"
C1	13' 6 3/32"
D1	19' 3 1/8"
E1	22' 8 7/32"
F1	28' 2 31/32"
G1	31' 6 11/32"
H1	36' 9 27/32"
I1	39' 10 31/32"
J1	44' 10 9/32"
K1	47' 8 5/8"
L1	52' 2 7/8"
M1	54' 9 29/32"
N1	58' 10 5/16"
P1	61' 1 19/32"
Q1	64' 7 15/32"
R1	66' 6 19/32"
S1	69' 5 5/16"
T1	70' 11 31/32"
U1	73' 3"
V1	74' 4 29/32"
W1	75' 11 27/32"
X1	76' 8 13/16"
Y1	77' 7 7/16"
Z1	77' 11 9/32"
AA1	78' 1 13/32"

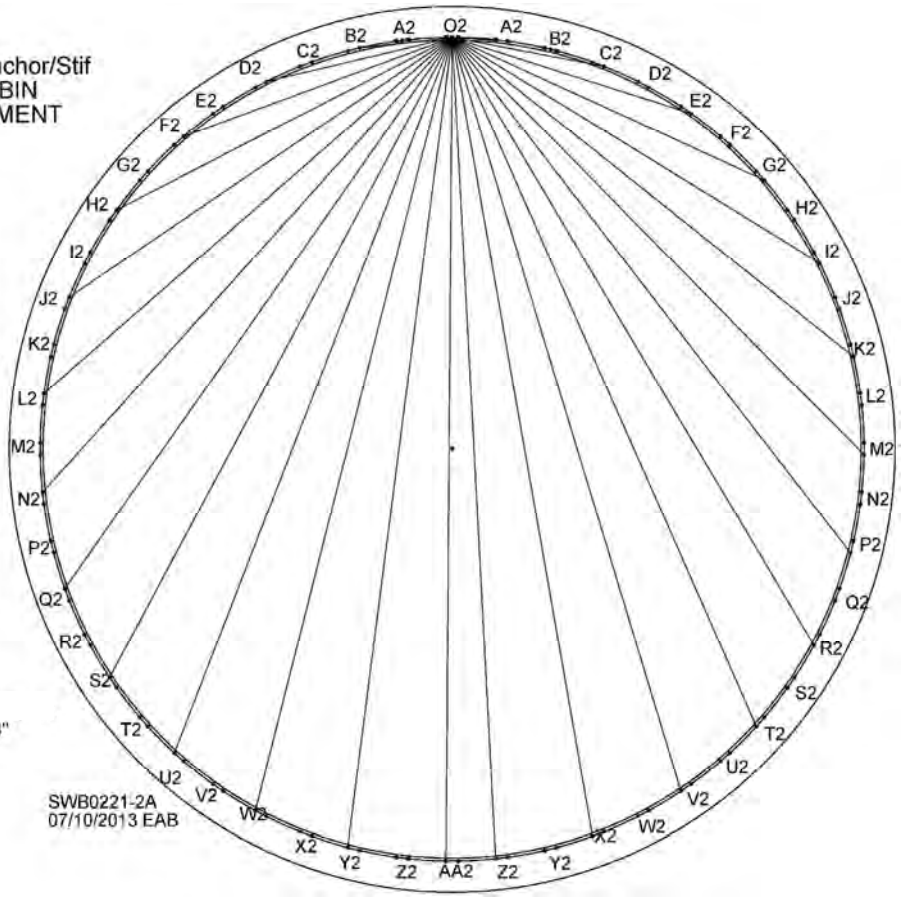
ANCHOR RADIUS: 39' 3/4"
BIN RADIUS: 38' 9 1/2"



78' DIAMETER- 2 Anchor/Stif COMMERCIAL BIN ANCHOR PLACEMENT

POINT	DISTANCE
O2	7"
A2	5' 3 19/32"
B2	8' 10 1/32"
C2	14' 7 7/8"
D2	16' 1 17/32"
E2	23' 9 9/16"
F2	27' 1 7/8"
G2	32' 7 1/8"
H2	35' 9 7/16"
I2	40' 10 31/32"
J2	43' 10 3/4"
K2	48' 7 5/8"
L2	51' 4 3/8"
M2	55' 7 13/16"
N2	58' 1 1/32"
P2	61' 10 1/4"
Q2	63' 11 1/2"
R2	67' 1 27/32"
S2	68' 10 25/32"
T2	71' 5 23/32"
U2	72' 10 1/32"
V2	74' 9 1/16"
W2	75' 8 1/2"
X2	76' 11 11/32"
Y2	77' 5 3/4"
Z2	78' 1/8"
AA2	78' 1 13/32"

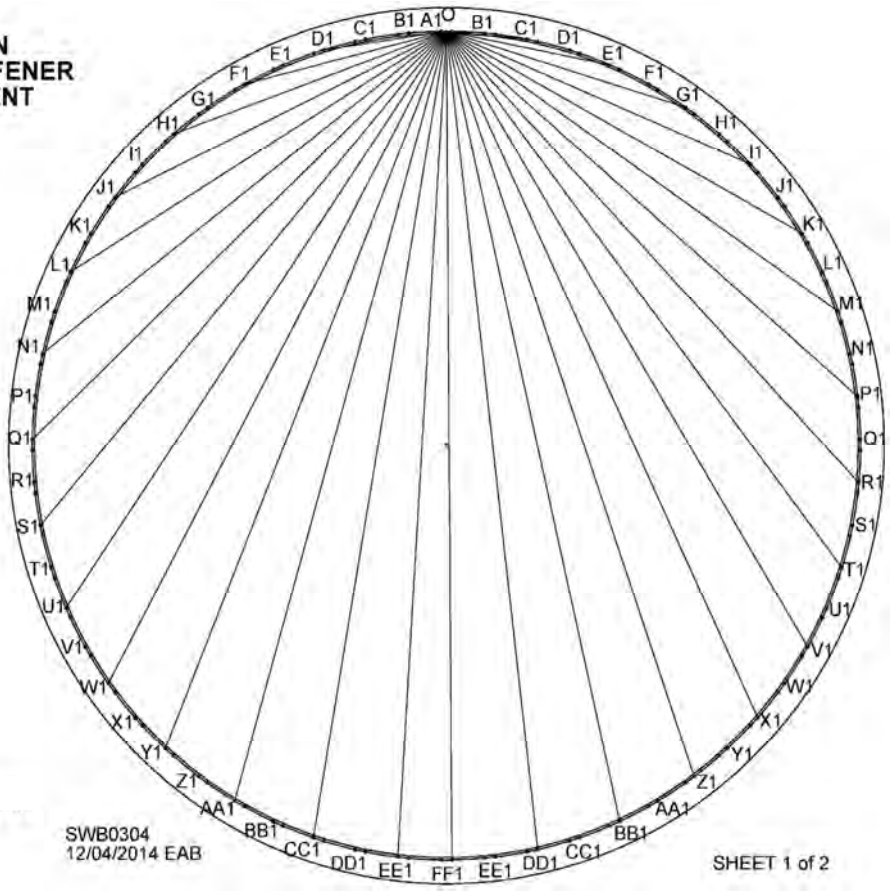
ANCHOR RADIUS: 39' 3/4"
BIN RADIUS: 38' 9 1/2"



90' DIAMETER
COMMERCIAL BIN
2 ANCHORS PER STIFFENER
ANCHOR PLACEMENT

POINT	DISTANCE
A1	7"
B1	4' 1 9/16"
C1	8' 9 31/32"
D1	13' 6 3/32"
E1	18' 1 25/32"
F1	22' 8 7/8"
G1	27' 3 3/16"
H1	31' 8 5/8"
I1	36' 1 1/32"
J1	40' 4 1/4"
K1	44' 6 1/8"
L1	48' 6 9/16"
M1	52' 5 3/8"
N1	56' 2 15/32"
P1	59' 9 23/32"
Q1	63' 3"
R1	66' 6 3/16"
S1	69' 7 7/32
T1	72' 5 15/16"
U1	75' 2 9/32"
V1	77' 8 1/8"
W1	79' 11 7/16"
X1	82' 1/8"
Y1	83' 10 1/8"
Z1	85' 5 11/32"
AA1	86' 9 3/4"
BB1	87' 11 5/16"
CC1	88' 10"
DD1	89' 5 23/32"
EE1	89' 10 17/32"
FF1	90' 3/8"

ANCHOR RADIUS: 45' 7/32"
BIN RADIUS: 44' 9 1/8"



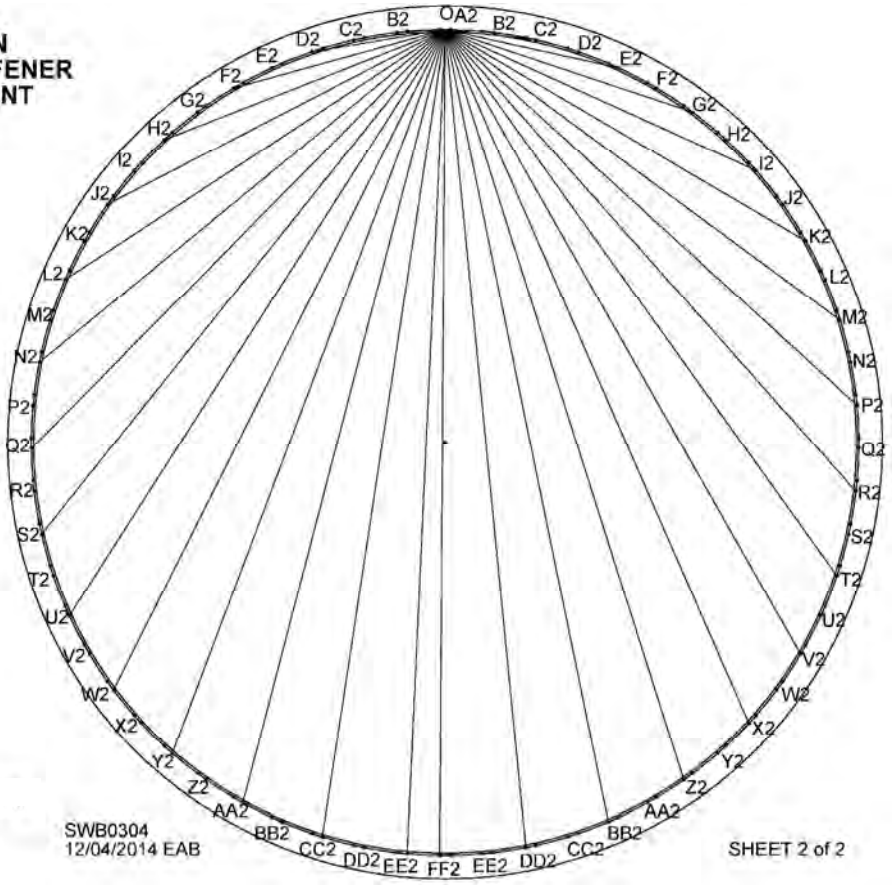
SWB0304
12/04/2014 EAB

SHEET 1 of 2

90' DIAMETER
COMMERCIAL BIN
2 ANCHORS PER STIFFENER
ANCHOR PLACEMENT

POINT	DISTANCE
A2	7"
B2	5' 3 17/32"
C2	9' 11 29/32"
D2	14' 7 15/16"
E2	19' 3 15/32"
F2	23' 10 3/8"
G2	28' 4 1/2"
H2	32' 9 23/32"
I2	37' 1 13/16"
J2	41' 4 23/32"
K2	45' 6 1/4"
L2	49' 6 9/32"
M2	53' 4 11/16"
N2	57' 1 11/32"
P2	60' 8 1/8"
Q2	64' 29/32"
R2	67' 3 9/16"
S2	70' 4 1/32"
T2	73' 2 5/32"
U2	75' 9 29/32"
V2	78' 3 1/8"
W2	80' 5 13/16"
X2	82' 5 13/16"
Y2	84' 3 1/8"
Z2	85' 9 21/32"
AA2	87' 1 3/8"
BB2	88' 2 7/32"
CC2	89' 3/16"
DD2	89' 7 3/16"
FE2	89' 11 9/32"
FF2	90' 3/8"

ANCHOR RADIUS: 45' 7/32"
BIN RADIUS: 44' 9 1/8"



SWB0304
12/04/2014 EAB

SHEET 2 of 2

Placing Anchor Bolts for 105’ to 165’ Diameter Bins

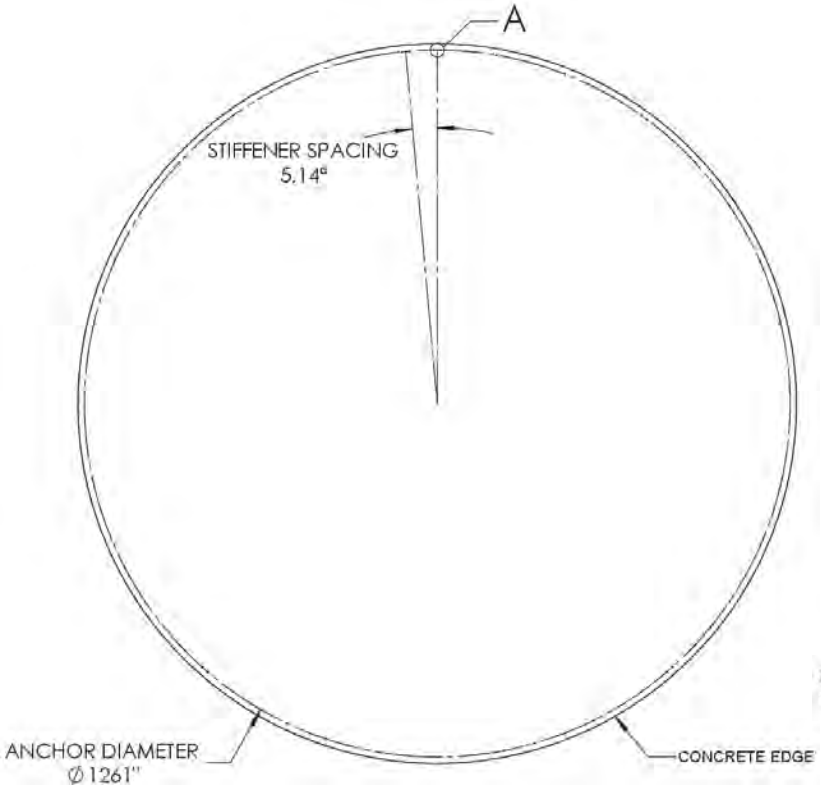
Use coordinates provided and GPS device to determine anchor locations. If unavailable, follow steps below.

STEP 1: Find exact center of bin.

STEP 2: Mark centerline of stiffener on concrete at half of distance shown for anchor diameter. Place anchor at that location or place two anchors at spacing shown, depending on number of anchors required per stiffener.

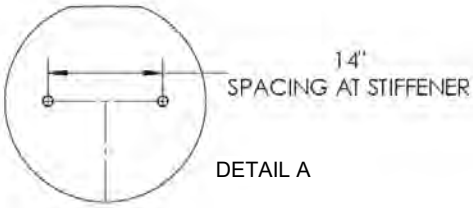
STEP 3: Use stiffener spacing or anchor spacing to place next anchor(s).

STEP 4: Repeat Steps 1-3 until all anchors are in place.

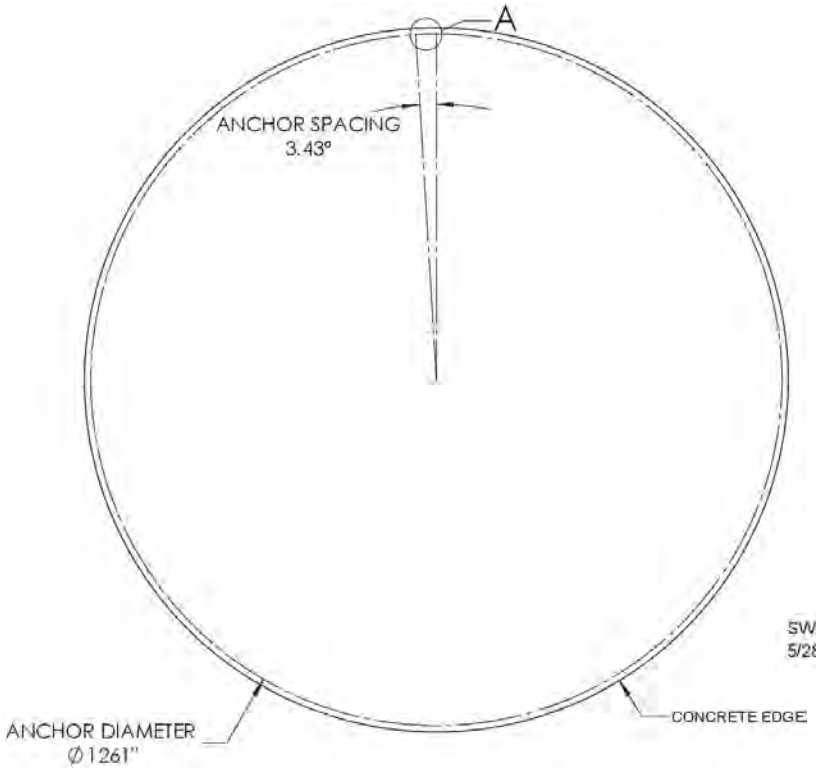


ANCHOR LAYOUT
105' 2 STIFFENED
(2 ANCHORS/STIFFENER)

70 STIFFENERS
140 ANCHORS

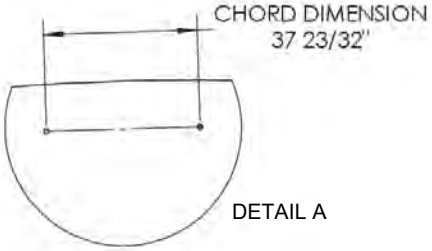


SWB0380
11/19/20 AJS



ANCHOR LAYOUT
105' 3 STIFFENED
(1 ANCHOR/STIFFENER)

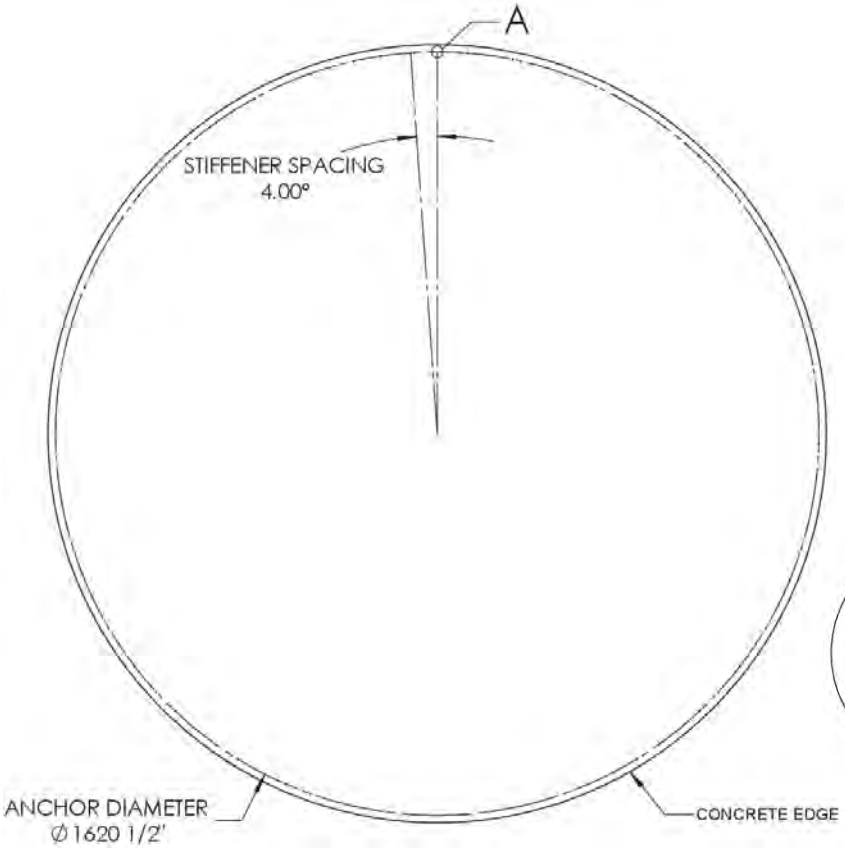
105 STIFFENERS
105 ANCHORS

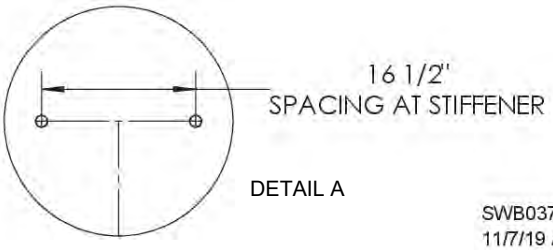


SWB0382
5/28/2020 AJS

ANCHOR LAYOUT
135' 2 STIFFENED
(2 ANCHORS/STIFFENER)

90 STIFFENERS
180 ANCHORS



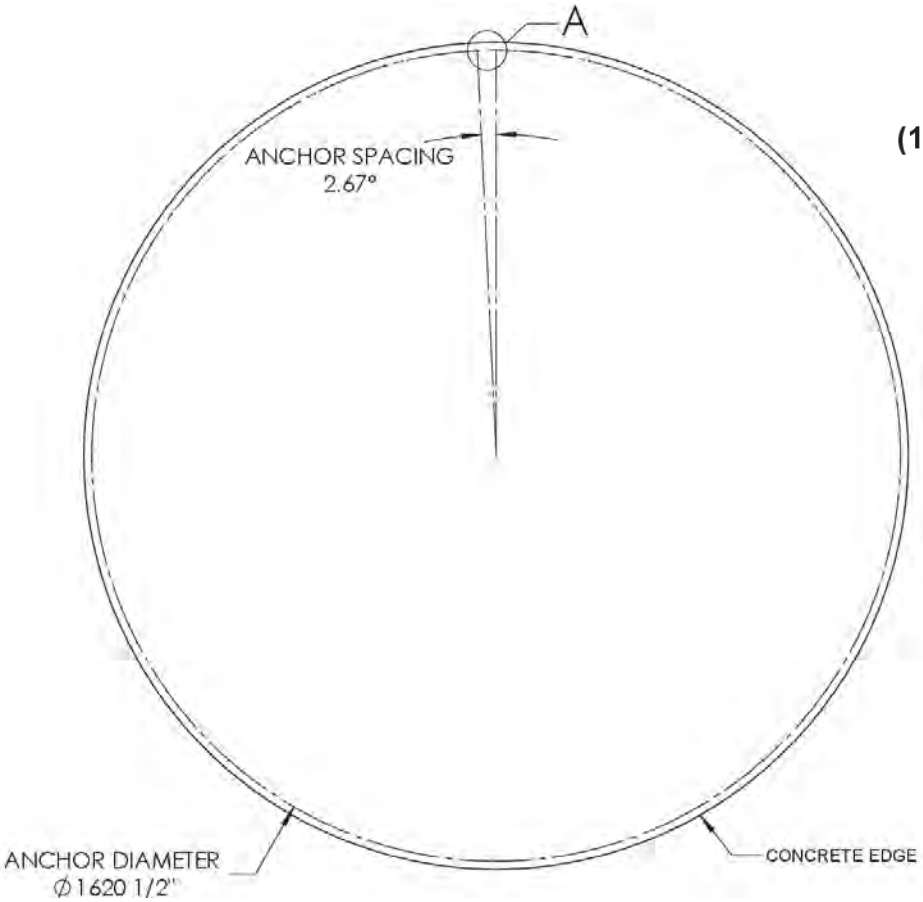


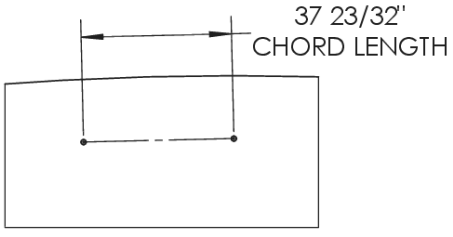
DETAIL A

SWB0374
11/7/19 AJS

ANCHOR LAYOUT
135' 3 STIFFENED
(1 ANCHOR/STIFFENER)

135 STIFFENERS
135 ANCHORS



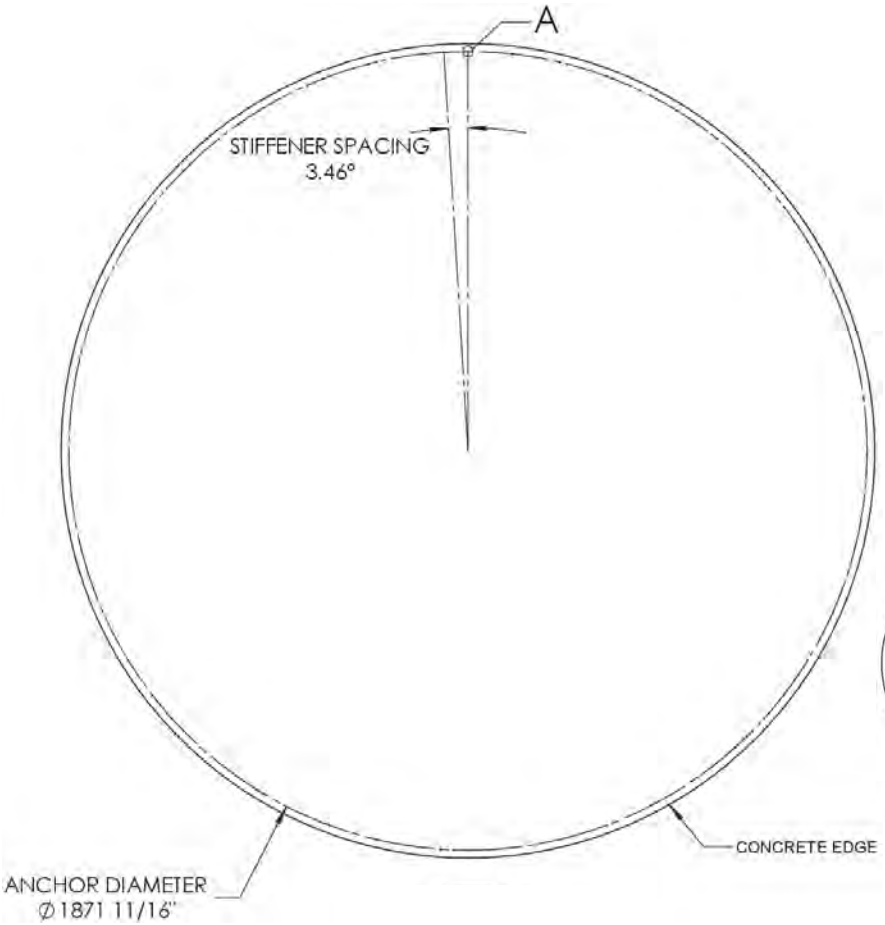


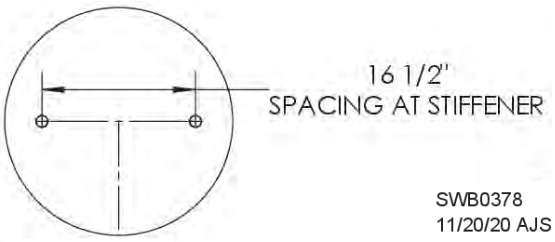
DETAIL A

SWB0377
5/26/2020 AJS

ANCHOR LAYOUT
156' 2 STIFFENED
(2 ANCHORS/STIFFENER)

104 STIFFENERS
208 ANCHORS



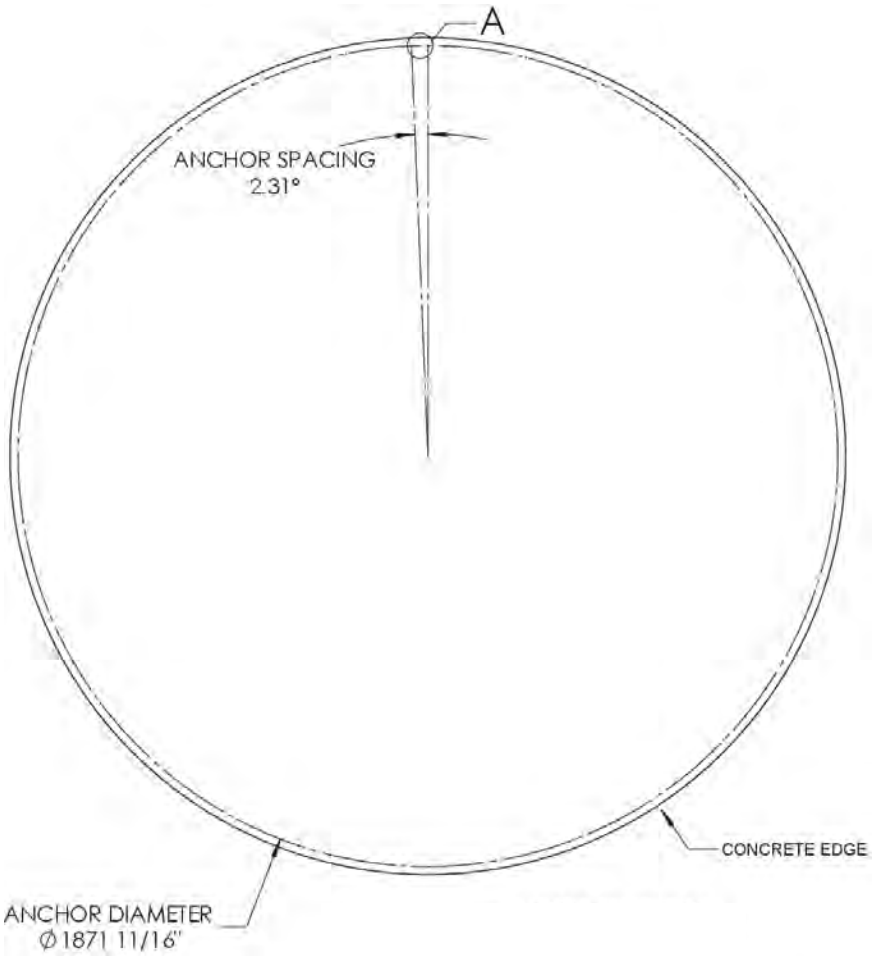


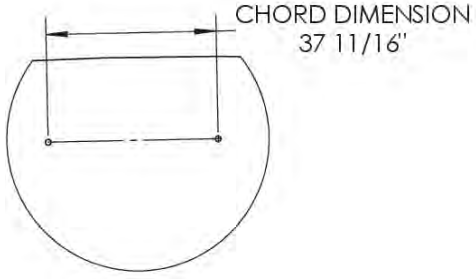
DETAIL A

SWB0378
11/20/20 AJS

ANCHOR LAYOUT
156' 3 STIFFENED
(1 ANCHOR/STIFFENER)

156 STIFFENERS
156 ANCHORS

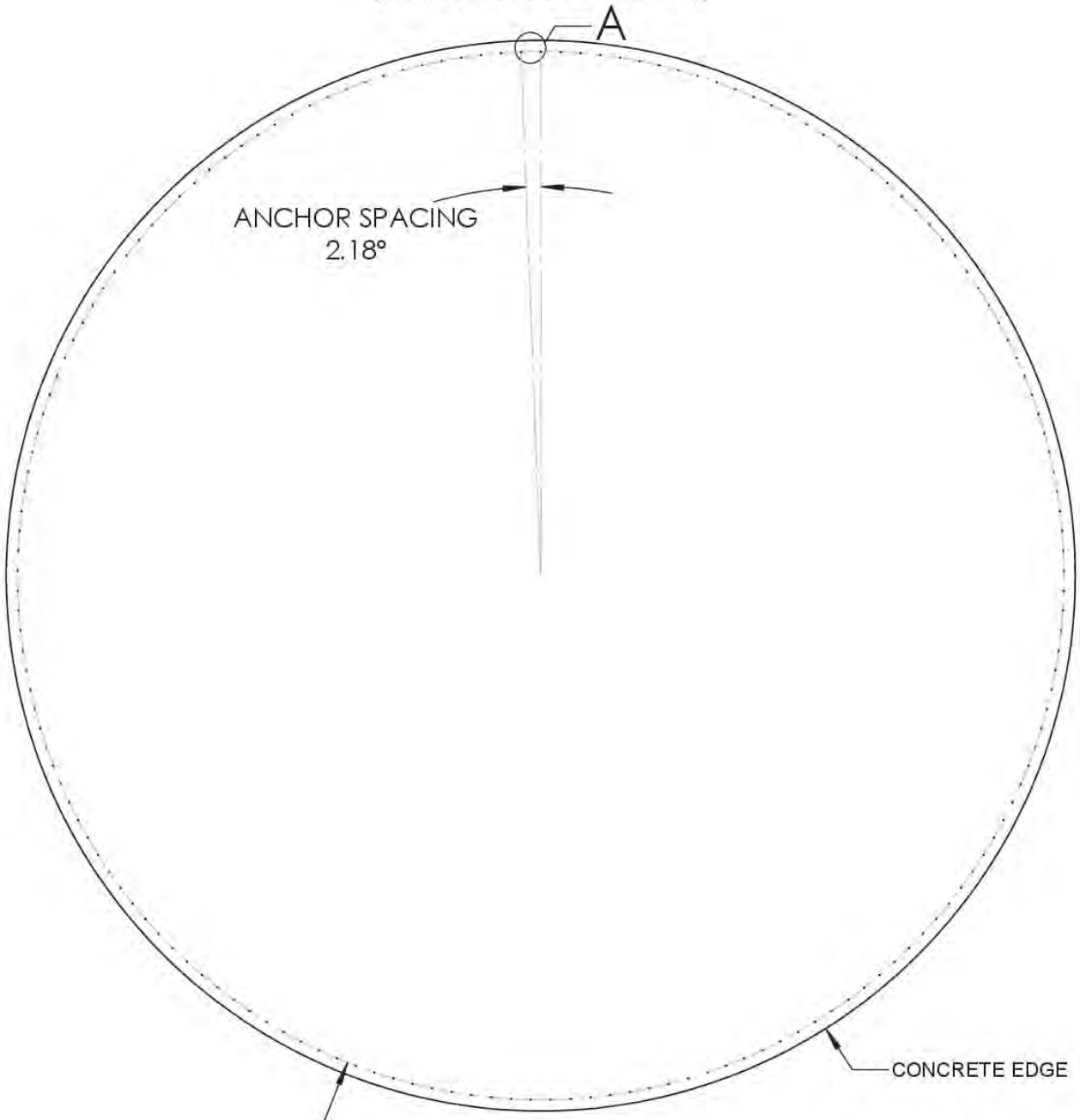


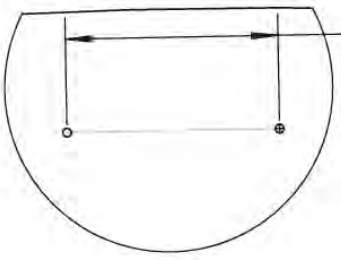


DETAIL A

SWB0379
5/27/2020 AJS

ANCHOR LAYOUT
165' 3 STIFFENED
(1 ANCHOR/STIFFENER)





DETAIL A

165 STIFFENERS
165 ANCHOR LOCATIONS
TRUE BIN RADIUS: 984 25/32"
ANCHOR RADIUS: 989 5/8"

SWB0384
7/23/2020 AJS

Commercial Bin Anchor Bolt Guidelines

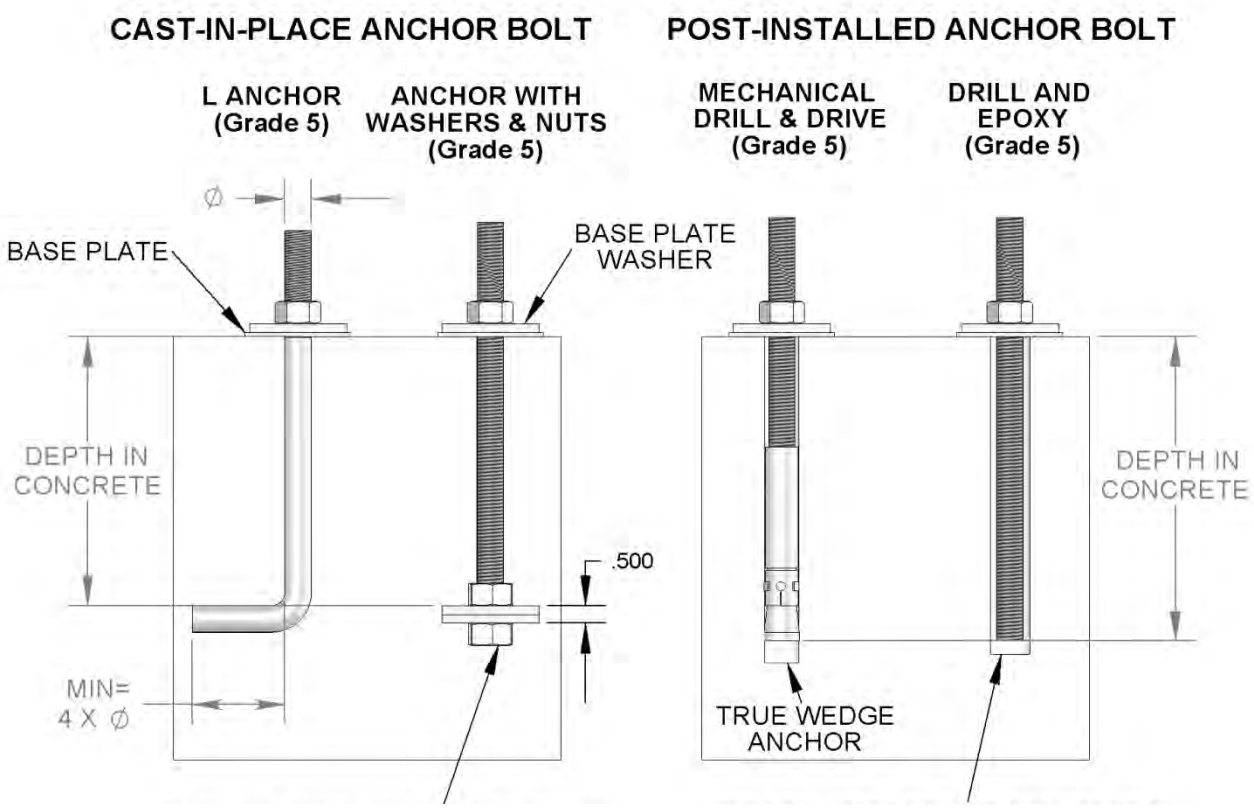
- Based on ASCE 7-16 Code, 105 mph wind zone -

A qualified geotechnical engineer should review all foundation specifications, including anchor bolt layout, to ensure foundation design is compatible with maximum load-bearing capacity of soil and with any other environmental factors at bin location.

Table on next page is provided as general guidance for minimum anchor bolt requirements (diameter and depth in concrete). Pullout force depends on diameter of anchor. Mechanical drill and drive anchors require ultimate pullout strength of 7,500 lbs. for 5/8" anchor bolts and 10,000 lbs. for 3/4" anchor bolts. Be certain to follow anchor bolt manufacturer's detailed installation instructions to prevent any uplift. Also, it is important these guidelines be followed to ensure proper anchoring:

- Concrete pad must be allowed to cure for a minimum of 28 days prior to anchoring of bin.
- Unless otherwise noted by anchor bolt manufacturer, holes must be cleaned by using a wire brush and air to blow out dust. Cleaning hole will minimize slippage after wedge/epoxy anchor is set.
- Nuts on anchors must be tightened to manufacturer's specifications to withstand uplift.

Drawing below shows types of anchors used. At left are two different types of cast-in-place anchor: an "L" style and a "W & N" (washer and nut) style. At right are two different post-installed anchors: a mechanical drill and drive style and a drill and epoxy style.



ANCHOR BOLT WITH TWO (2) NUTS AND TWO (2) 1/4 X 2-3/4" SQUARE WASHERS (BC5205)

INSTALL WITH EPOXY ACCORDING TO MANUFACTURER'S SPECIFICATIONS. HOLE SIZE/DEPTH MAY VARY ACCORDING TO TYPE OF EPOXY USED.

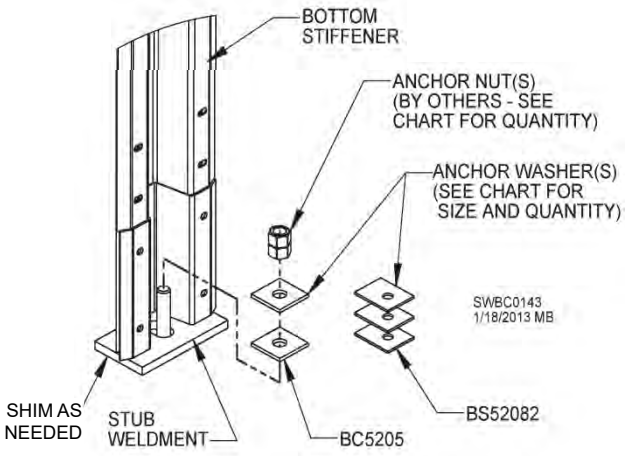
NOTE: If base plate is more than 5/8" thick, anchor bolt must extend 5" above concrete.

Commercial Bin Anchors

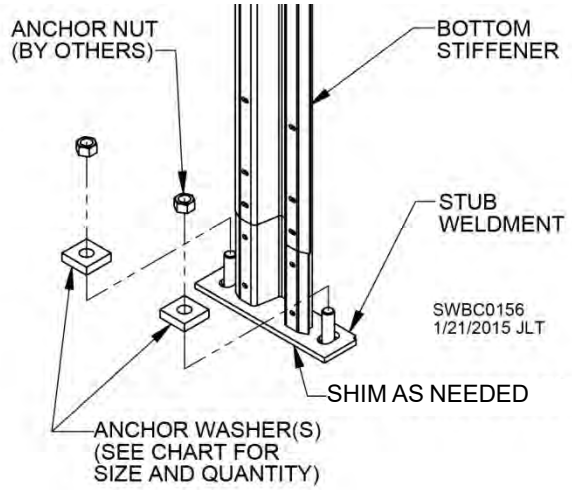
Bin Dia.	Bin Height (Rings)	Type of Anchor*		Depth In Concrete	Washer Qty. Per Anchor (in bin box)				Nut Qty.
		Cast In Place	Drill & Epoxy		2-3/4" x 3-1/2" BS52082	2-3/4" Sq. BC5206	3" Sq. BC5205	3-1/2" Sq. BC5209	
18'	5-7	3/4" L	3/4"	8"	2	-	-	-	1
	8-9	3/4" W & N	3/4"	8"	3	-	-	-	1
21'	5-8	3/4" L	3/4"	8"	2	-	-	-	1
	9-10	3/4" L	3/4"	8"	3	-	-	-	1
24'	5-8	3/4" L	3/4"	8"	2	-	-	-	1
	9-10	3/4" L	3/4"	8"	3	-	-	-	1
27'	5-8	3/4" L	3/4"	8"	2	-	-	-	1
	9-10	3/4" L	3/4"	8"	3	-	-	-	1
30'	5-8	3/4" L	3/4"	8"	2	-	-	-	1
	9-11	3/4" L	3/4"	8"	3	-	-	-	1
33'	5-8	3/4" L	3/4"	8"	2	-	-	-	1
	9-12	3/4" L	3/4"	8"	3	-	-	-	1
36'	3-10	3/4" L	3/4"	8"	2	-	-	-	1
	11-12	3/4" L	3/4"	8"	2	-	-	-	1
	13-30	3/4" W & N	3/4"	13"	3	-	-	-	2
42'	3-13	3/4" L	3/4"	8"	2	-	-	-	1
	14-30	3/4" W & N	3/4"	13"	3	-	-	-	2
48'	3-14	3/4" L	3/4"	8"	2	-	-	-	1
	15-30	3/4" W & N	3/4"	13"	3	-	-	-	2
54'	3-18	1" W & N	1"	17"	-	2	-	-	1
	19-30	1" W & N	1"	17"	-	2	-	-	2
60'	3-18	1" W & N	1"	17"	-	1	-	-	1
	19-30	1" W & N	1"	17"	-	2	-	-	2
66'	3-18	1" W & N	1"	17"	-	2	-	-	2
	19-30	1" W & N	1"	17"	-	2	-	-	2
69'	3-18	1" W & N	1"	17"	-	3	-	-	2
	19-30	1" W & N	1"	17"	-	4	-	-	2
72'	10-30	1" W & N	1"	17"	-	1	-	-	1
75'	10-30	1" W & N	1"	17"	-	1	-	-	1
78'	10-30	1" W & N	1"	17"	-	1	-	-	1
90'	10-30	1" W & N	1"	17"	-	1	-	-	1
105'	10-30	1" W & N	1"	17"	-	1	-	-	1
135'	10-30	1-1/4" W & N	1-1/4"	24"	-	-	1	-	1
156'	10-30	1-1/2" W & N	1-1/2"	36"	-	-	-	1	1
165'	10-30	1-1/2" W & N	1-1/2"	36"	-	-	-	1	1

*See previous page for anchor types ("L" refers to shape of anchor; "W & N" refers to washer and nut).
Mechanical drill & drive anchors **NOT RECOMMENDED** by Sukup Manufacturing Co.

Commercial Anchor Boots



Single-Anchor Boot
69' Dia. and smaller (2 Stiffeners/Sidewall Sheet)
72' Dia. and larger (3 Stiffeners/Sidewall Sheet)



Double-Anchor Boot
72' Dia. and larger (2 Stiffeners/Sidewall Sheet)

IMPORTANT: After bin has been filled and allowed to settle for 30 days, fully tighten anchor bolt nuts.

18’ - 60’ Dia. 15K & 30K Roof Assembly

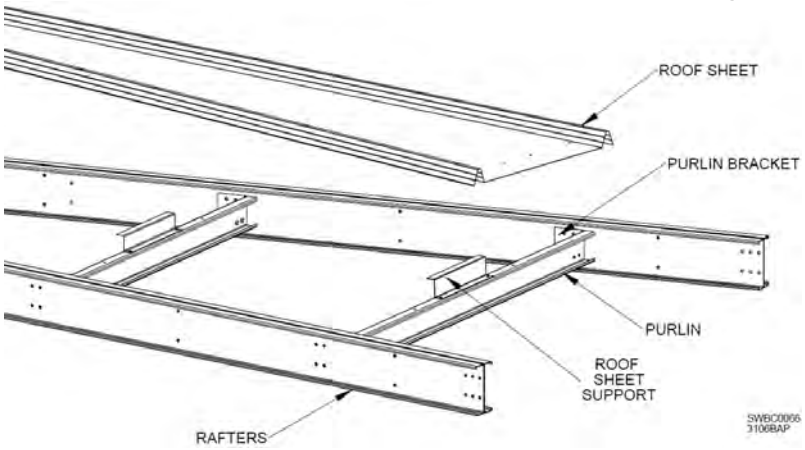


Fig. 1

Table 1

	Number of Structural Components					
Bin Diameter	**Rafters**	**Purlin Rings**	**Purlins at each ring**	**Roof Sheet**	**Roof Sheet Supports**	**External Roof Rings**
18’	12	1	12	18	12	1
21'	7	2	7	21	14	1
24’	8	2	8	24	16	1
27'	9	2	9	27	18	1
30'	10	1	10	30	10	1
33’	11	2	11	33	22	1
36'	12	2	12	36	24	1
39’	13	2	13	39	26	2
42'	14	2	14	42	28	2
48'	16	2	16	48	32	2
54'	18	3	18	54	54	1
60'	20	3	20	60	60	2

Fig. 1 and Table 1 identify components used in construction of roof. Roofs designed to support 15,000 lbs. use only one C-shaped rafter, while those for 30,000 lbs. use back-to-back C-shaped rafters. Both types use A-frame rafter construction as shown in Fig. 1. Review notes below before beginning bin erection.

NOTE: Leave all bolts loose to finger-tight unless otherwise specified. When tightening, follow torque guidelines in Table 2.

Table 2

BOLT	GRADE	FT-LBS
5/16”	8	15-20
3/8”	8	25-35
7/16”	8	45-55
1/2"	8	65-80

IMPORTANT: At no time should any bolts be substituted for those supplied by Sukup Manufacturing Co.

NOTES: Center support jack must be capable of supporting a 12,000 lb. dead load and be adjustable + or – 12”.

Careful planning before starting first ring will simplify erection of bin. If design specifies a flush-floor aeration system, install flush-floor planking and supports prior to beginning erection of bin. This will provide a safer work environment and prevent parts from falling into tunnels. If heavy equipment such as center-pivot staircase or forklifts will be rolled or driven over flush-floor system, cover it with plywood or steel to prevent damage to planks.

Place sidewall sheet bundles, appropriate components, and hardware on foundation where they will not interfere with assembly work. If rolling center-pivot staircase is used, be certain sidewall sheet bundles do not interfere with staircase travel.

Assemble starter (first) ring of bin sidewall on concrete foundation; leave loose. Consult sidewall assembly section of this manual. **NOTE:** For ease of anchoring bin to foundation, sidewall sheets must be placed so stiffener bolt holes are aligned with anchor bolts. Also, distance from sidewall ring to anchor bolt should be equal around entire circumference of bin. Establishing uniform distance will simplify setting and anchoring of bin. Due to size and weight of bin, adjustments later will likely be more difficult.

Stiffener Attaching Brackets

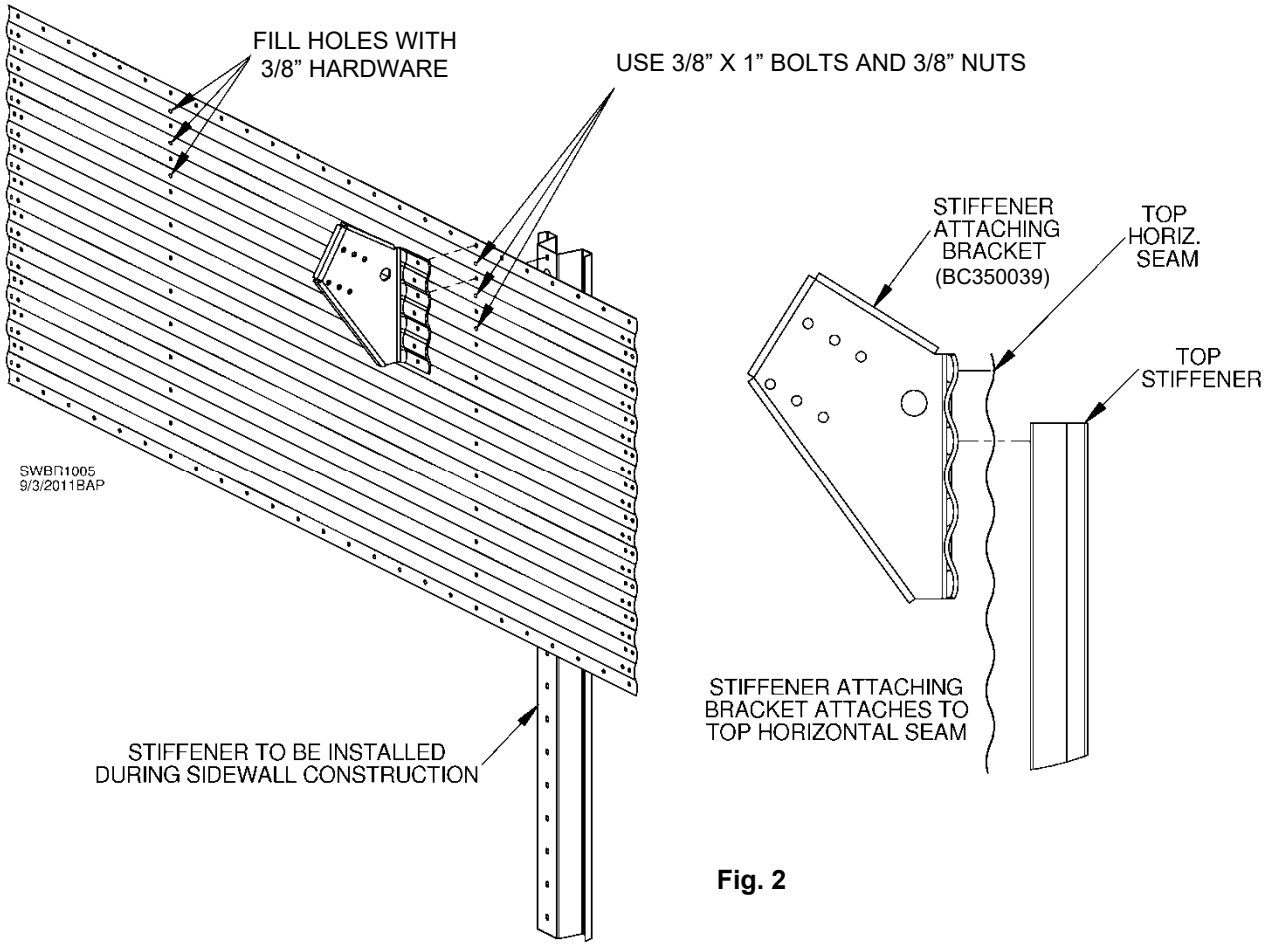


Fig. 2

Rafters will attach to every other stiffener using a stiffener attaching bracket. Top of stiffener attaching bracket attaches to top of sidewall sheet as shown in Fig. 2.

NOTE: Stiffener attaching brackets should not be bolted to sidewall at this time. However, 39" top ring stiffeners used on bins with odd number of rings can be attached at this time. Refer to sidewall assembly section of this manual for proper location of stiffener. It is critical that these stiffeners be positioned correctly. Failure to do so will result in difficulty installing remaining sidewall stiffeners and splices.

Continuous Eave Clip for Two-Stiffener Panel

See Fig. 3A for attachment of continuous eave clip to top of starter ring on bin with two stiffeners per sidewall sheet. **Align first hole of eave clip with vertical seam.** Attach using hardware specified on color chart.

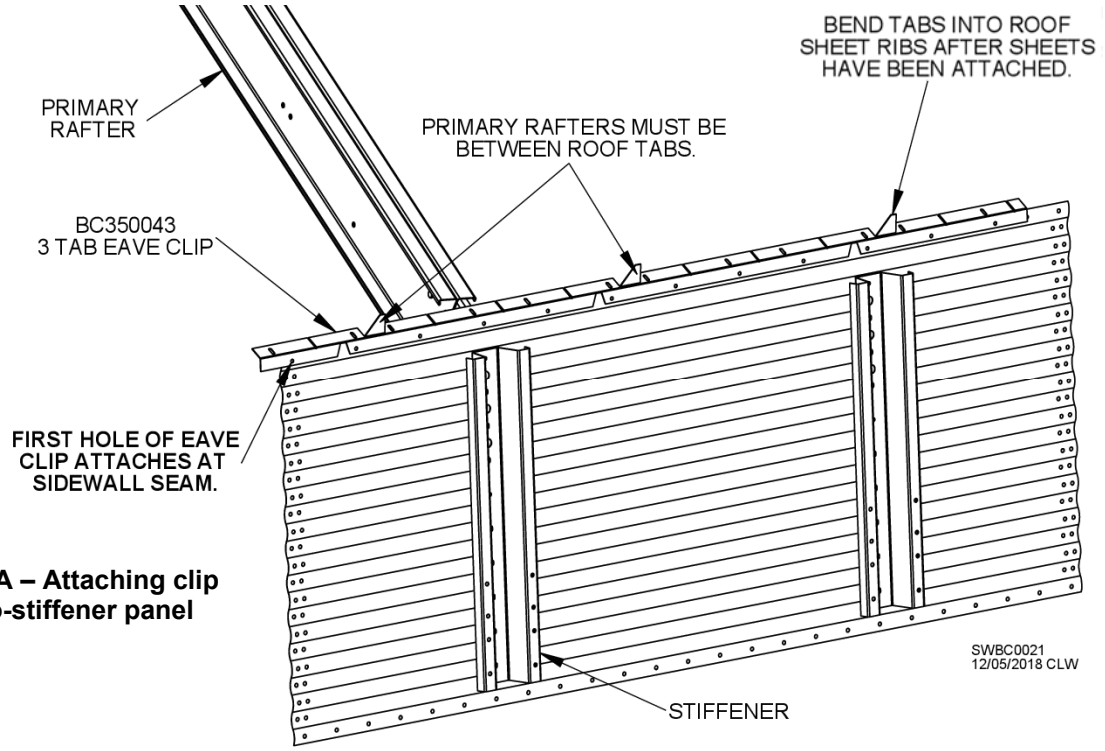


Fig. 3A – Attaching clip to two-stiffener panel

Continuous Eave Clip for Three-Stiffener Panel

See Fig. 3B for attachment of continuous eave clip to top of starter ring on bin with three stiffeners per sidewall sheet**. Align second hole of eave clip with vertical seam**. Attach using hardware specified on color chart.

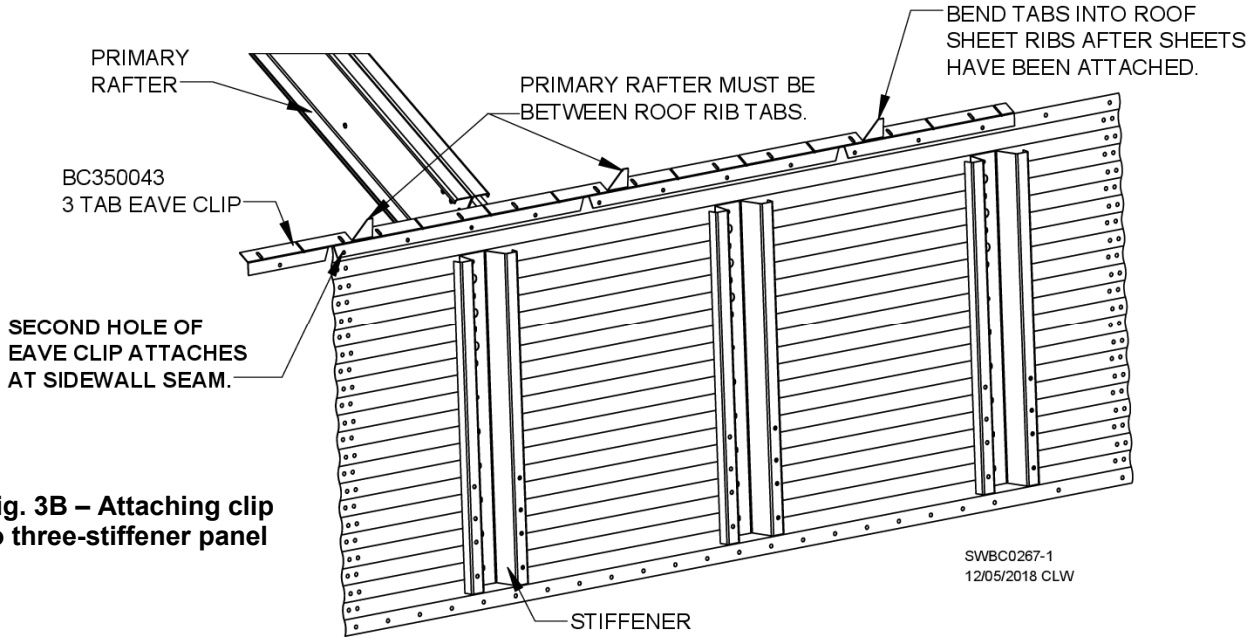


Fig. 3B – Attaching clip to three-stiffener panel

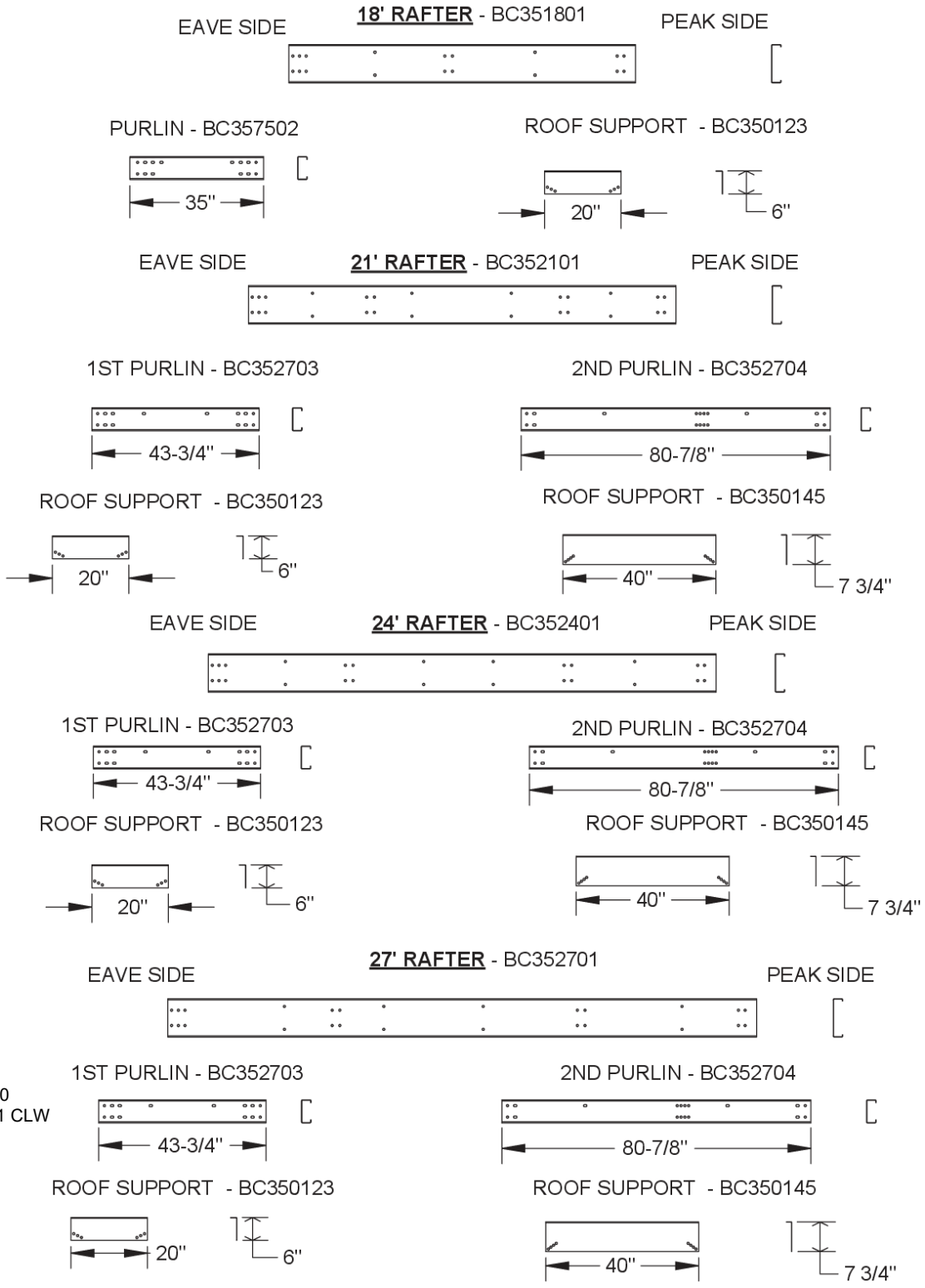
For both installations, bend eave clip tabs into roof sheet ribs after roof has been completely assembled.

NOTE: Notches on bottom side of continuous eave clip are for production purposes only. They do not affect structural integrity or function of clip.

Rafter Subassembly

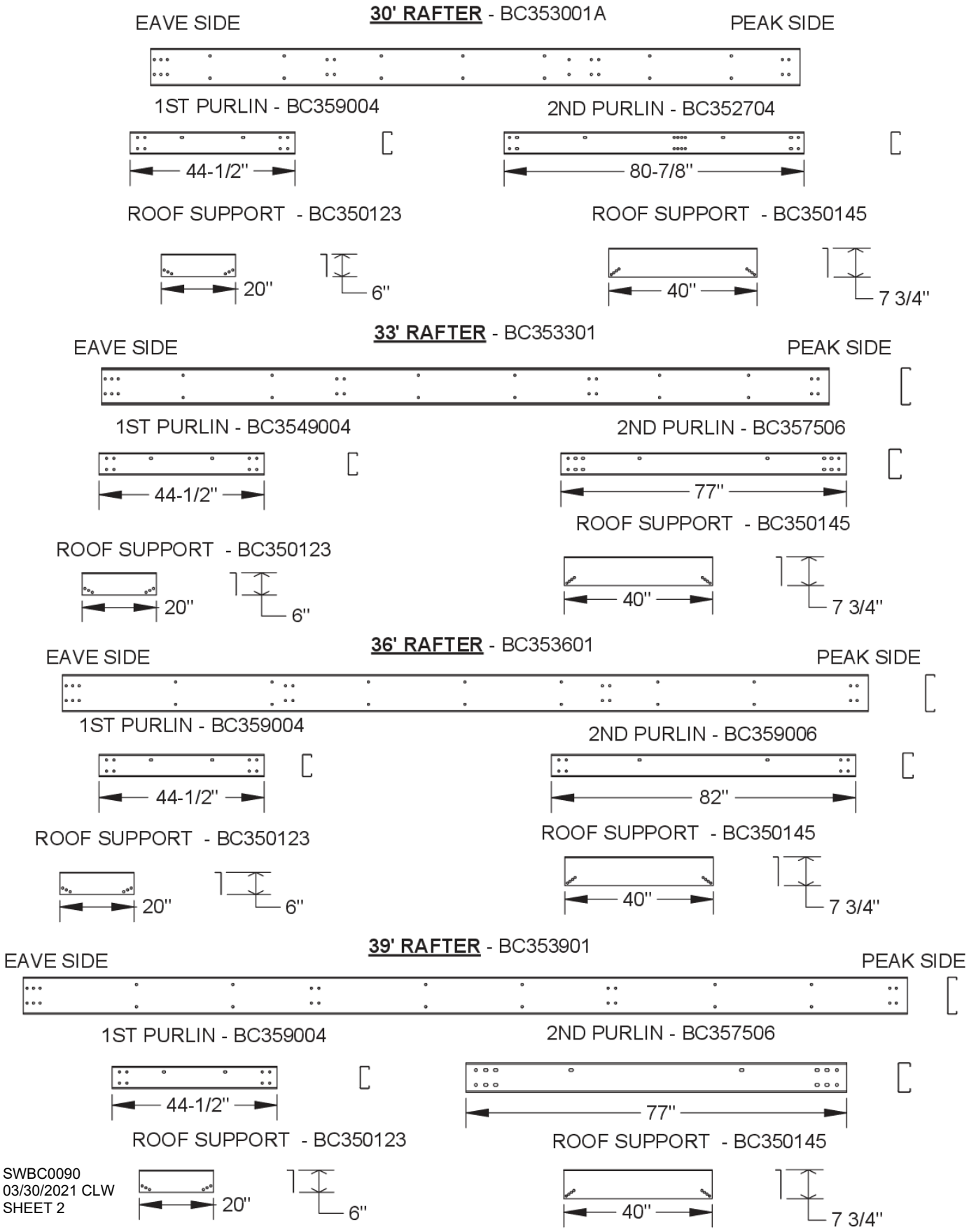
Purlin bracket locations are indicated by groups of bolt holes along rafter. Each group consists of four (4) 9/16" bolt holes. See Fig. 4A, 4B or 4C. The 9/16" holes at ends of rafters are for peak ring and sidewall/stiffener attaching brackets. Remaining double pairs of holes along rafter are for 30,000 lb. roof. When assembling a 30,000 lb. roof, bolt rafter sections back-to-back using 1/2 x 1-1/4" bolts and 1/2" flange nuts at double-hole locations. Leave all other holes empty unless otherwise specified.

NOTE: If using temperature cables, consider placement of cable brackets. Refer to instructions near end of this section for proper installation. Refer to temperature cable manufacturer's instructions for proper placement.



SWBC0090
03/30/2021 CLW
SHEET 1

Fig. 4A – 18' to 27' dia. bin rafters, purlins & supports



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03/30/2021 CLW
SHEET 2

Fig. 4B – 30’ to 39’ dia. bin rafters, purlins & supports

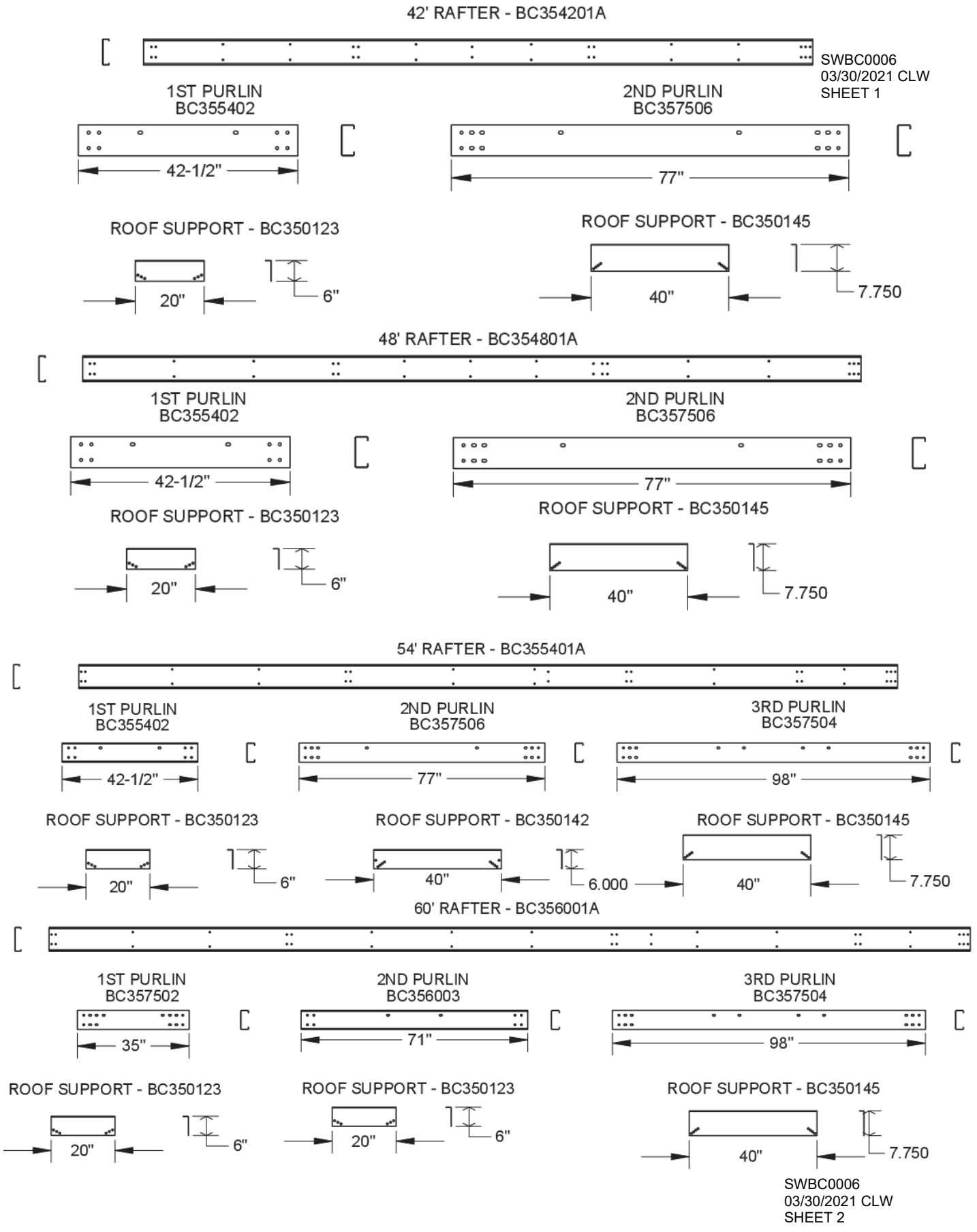


Fig. 4C – 42’ to 60’ dia. bin rafters, purlins & supports

15,000 lb. Roof Rafter Attachments

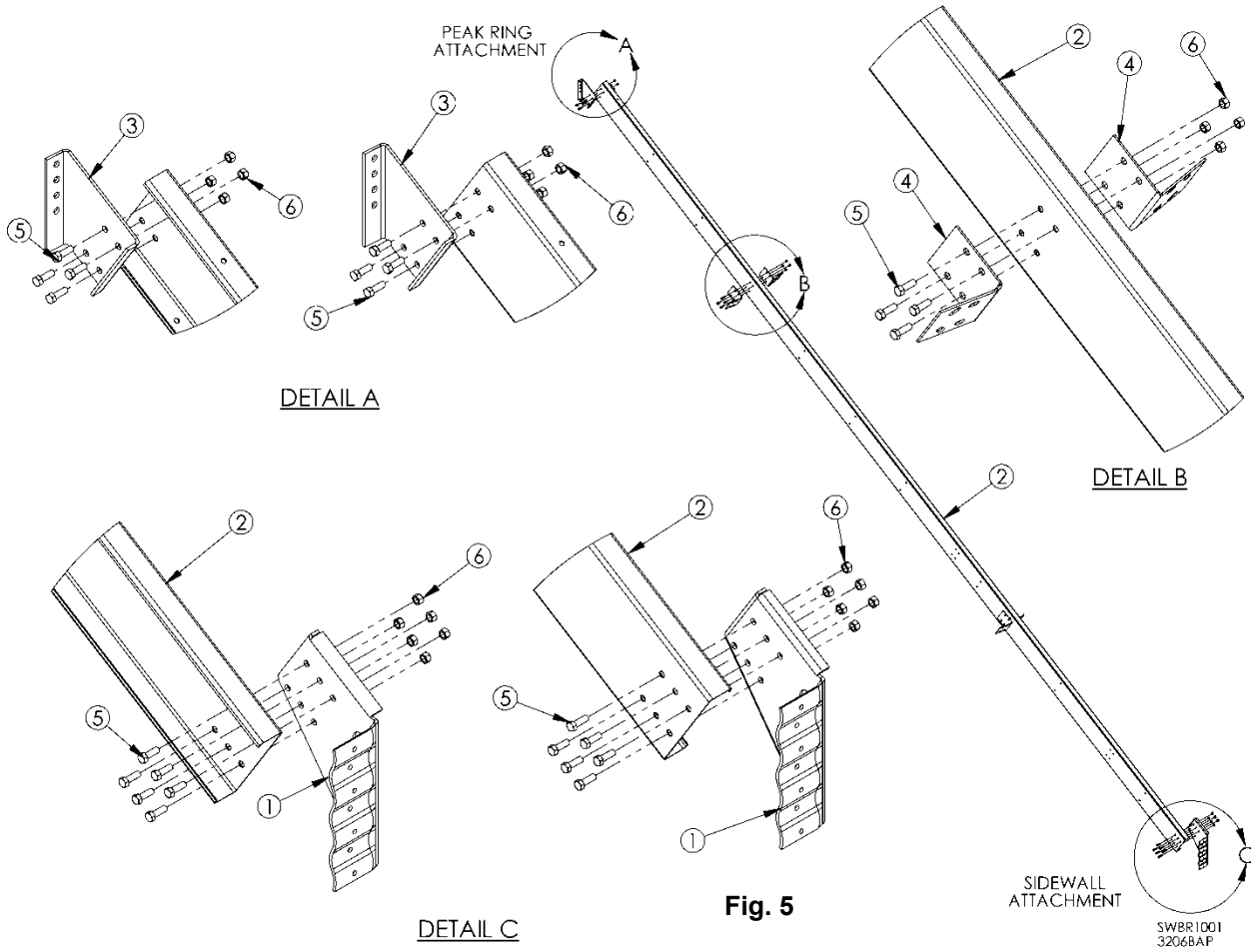


Fig. 5

15,000 lb. roof rafters consist of one (1) C-shaped channel. See Fig 5. Item descriptions and part numbers are identical to those of 30,000 lb. roof rafter attachments shown on next page. Attach peak ring rafter brackets and sidewall rafter attachment brackets to rafter using 1/2 x 1-1/4” bolts and 1/2” flange nuts as shown in Details A and C of Fig. 5. Details A and C each show two orientations of C-shaped rafter. Assemble an equal number of rafters each way. This is done so that during pre-assembly of rafters, C channels will align back-to-back from each other to strengthen rafter substructure. See Fig. 6 to help understand assembly shown in Details A and C of Fig. 5.

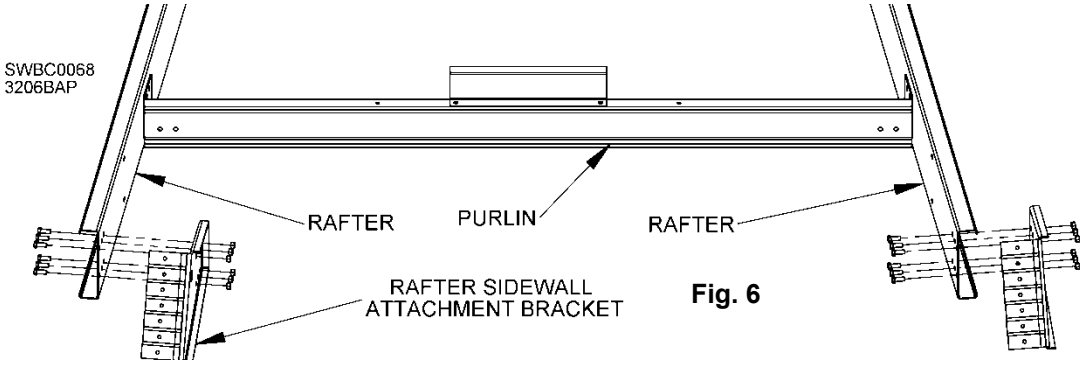


Fig. 6

Bolt purlin brackets to each side of rafter at specified locations using 1/2 x 1-1/4” bolts and 1/2” flange nuts as shown in Detail B of Fig. 5. Tighten all purlin brackets. Do not tighten peak ring or sidewall attachment brackets.

30,000 lb. Roof Rafter Attachments

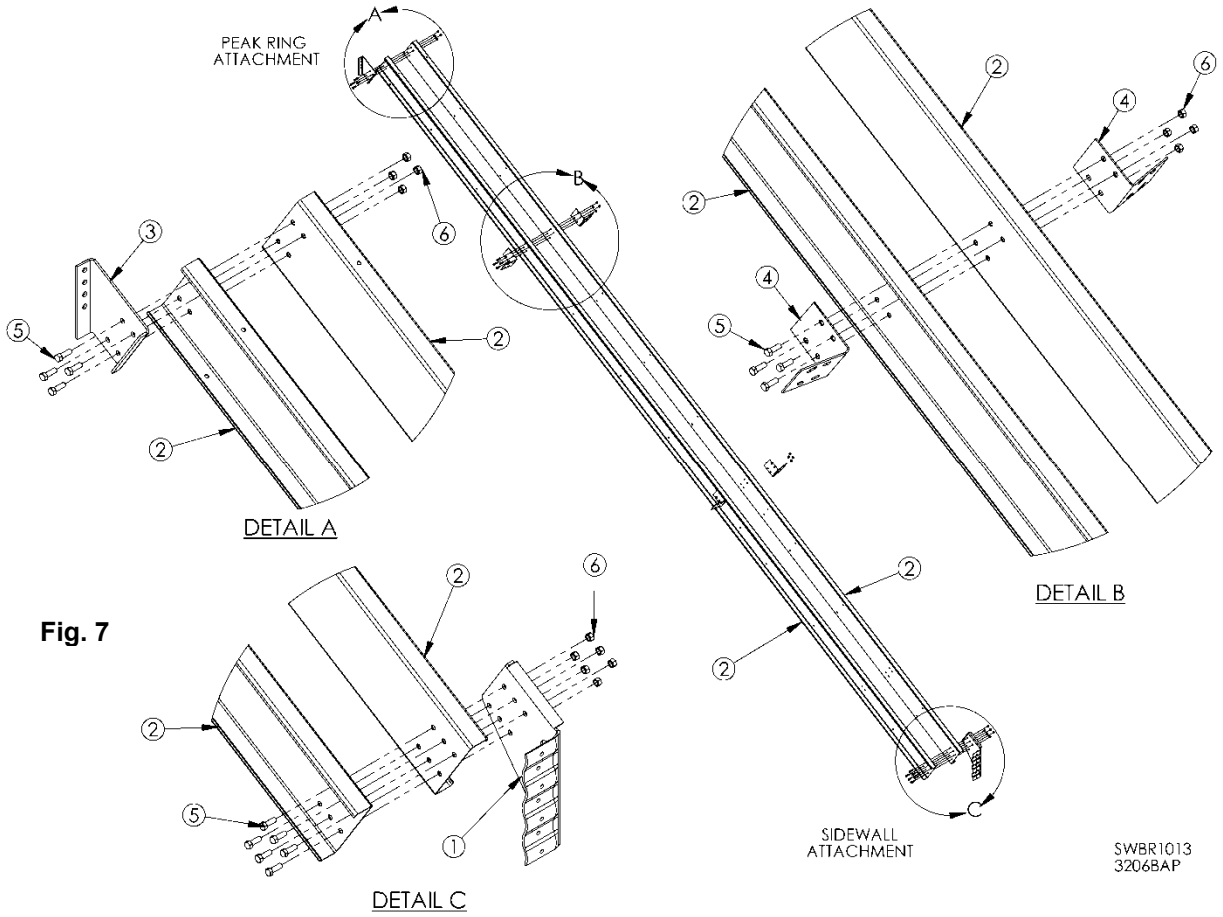


Fig. 7

Table 3

ITEM #	DESCRIPTION	PART #	ITEM #	DESCRIPTION	PART #
1	Sidewall rafter attachment bracket	BC350039	4	Comm. purlin bracket, 18' Dia.	BC353605
2	Rafter, C 10 x 2-1/2" x 12ga, 18'Dia.	BC351801	4	Comm. purlin bracket, 21' Dia.	BC352105
2	Rafter, C 10 x 2-1/2" x 12ga, 21' Dia.	BC352101	4	Comm. purlin bracket, 24' Dia.	BC352405
2	Rafter, C 10 x 2-1/2" x 12ga, 24' Dia.	BC352401	4	Comm. purlin bracket, 27' Dia.	BC352705
2	Rafter, C 10 x 2-1/2" x 12ga, 27' Dia.	BC352701	4	Comm. purlin bracket, 30' Dia.	BC3530051
2	Rafter, C 10 x 2-1/2" x 12ga, 30' Dia.	BC353001A	4	Comm. purlin bracket, 33' Dia.	BC353305
2	Rafter, C 10 x 2-1/2" x 12ga, 33' Dia.	BC353301	4	Comm. purlin bracket, 36' Dia.	BC356005
2	Rafter, C 10 x 2-1/2" x 12ga, 36' Dia.	BC353601	4	Comm. purlin bracket, 39' Dia.	BC353905
2	Rafter, C 10 x 2-1/2" x 12ga, 39' Dia.	BC353901	4	Comm. purlin bracket, 42' Dia.	BC356005
2	Rafter, C 10 x 2-1/2" x 12ga, 42' Dia.	BC354201A	4	Comm. purlin bracket, 48' Dia.	BC356005
2	Rafter, C 10 x 2-1/2" x 12ga, 48' Dia.	BC354801A	4	Comm. purlin bracket, 54' Dia.	BC356005
2	Rafter, C 10 x 2-1/2" x 12ga, 54' Dia.	BC355401A	4	Comm. purlin bracket, 60' Dia.	BC356005
2	Rafter, C 10 x 2-1/2" x 12ga, 60' Dia.	BC356001A	5	Bolt, 1/2 x 1-1/4"	J0728
3	Peak rafter attachment bracket, 30' Dia.	BC353009	6	Flange nut, 1/2"	BC5952
3	Peak rafter attachment bracket	BC350008			

30,000 lb. roof rafters consist of two (2) C-shaped channels. See Fig. 7. Channels have bolt hole patterns allowing them to be joined back-to-back. Bolt purlin brackets to each side of rafter at specified locations using 1/2 x 1-1/4" bolts and 1/2" flange nuts as shown in Detail B of Fig. 7. When attaching brackets to rafters, bolts must pass through both rafter sections. **NOTE:** If temperature cable brackets are used, they must be attached at this time. Refer to temperature cable bracket assembly instructions near end of this section.

Attach peak rafter attachment brackets and sidewall rafter attachment brackets to rafter using 1/2 x 1-1/4" bolts and 1/2" flange nuts as shown in Details A and C of Fig. 7.

Tighten all purlin brackets and fasteners connecting two (2) C channels together. Do not tighten peak ring or sidewall attachment brackets.

Intermediate Rafter Support (21', 24', 27', 30', 36' & 39' diameter bins)

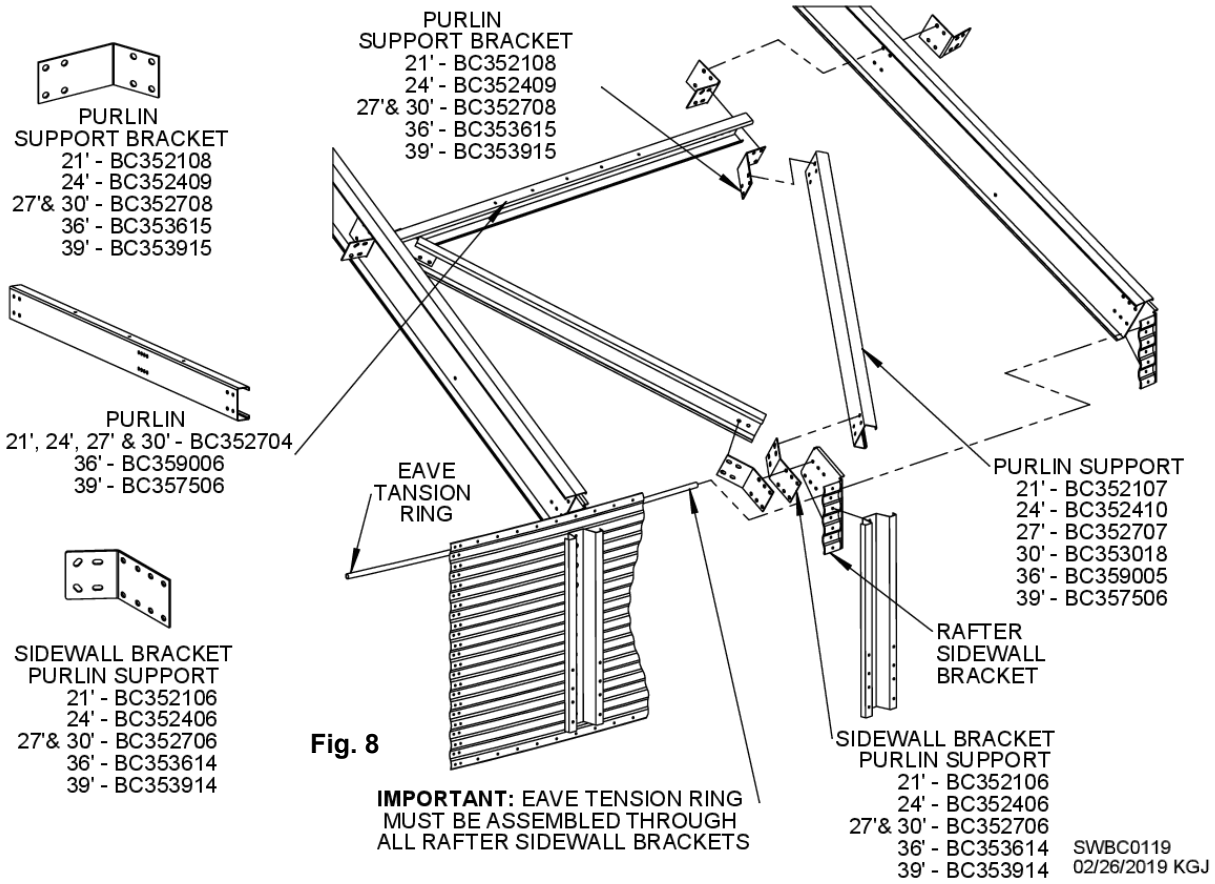


Fig. 8

IMPORTANT: Intermediate rafter support purlin brackets should be attached to purlins when rafter A-frames are assembled. **NOTE:** Rafter sidewall brackets need to be installed at every location. This means eave tension ring must be assembled and fed through as rafter sidewall brackets are attached. Assemble components with 1/2 x 1-1/4" bolts, 1/2" flat washers and 1/2" flange nuts. After rafter substructure is complete, intermediate rafter supports can be attached as shown in Fig. 8. Tighten only after all components are assembled. See Details A and B of Fig. 9 for locations of purlin supports and brackets at manhole.

Intermediate Rafter Support at Manhole (21', 24', 27' & 39' diameter bins)

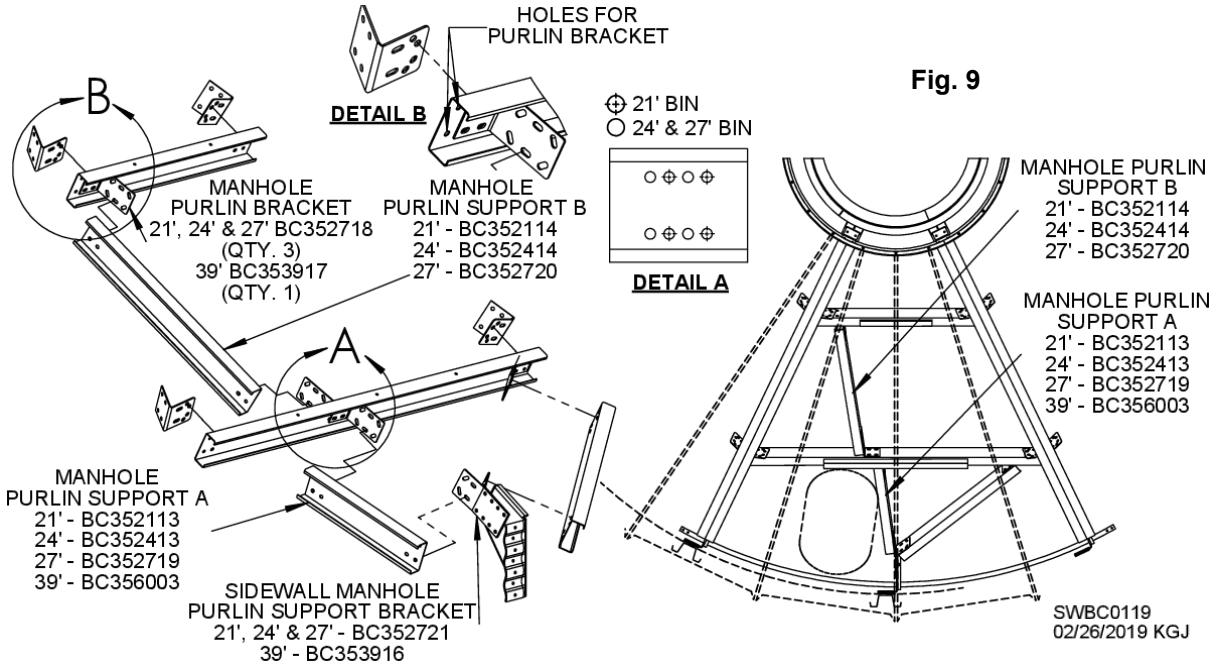


Fig. 9

Purlin & Roof Sheet Support Bracket Attachment

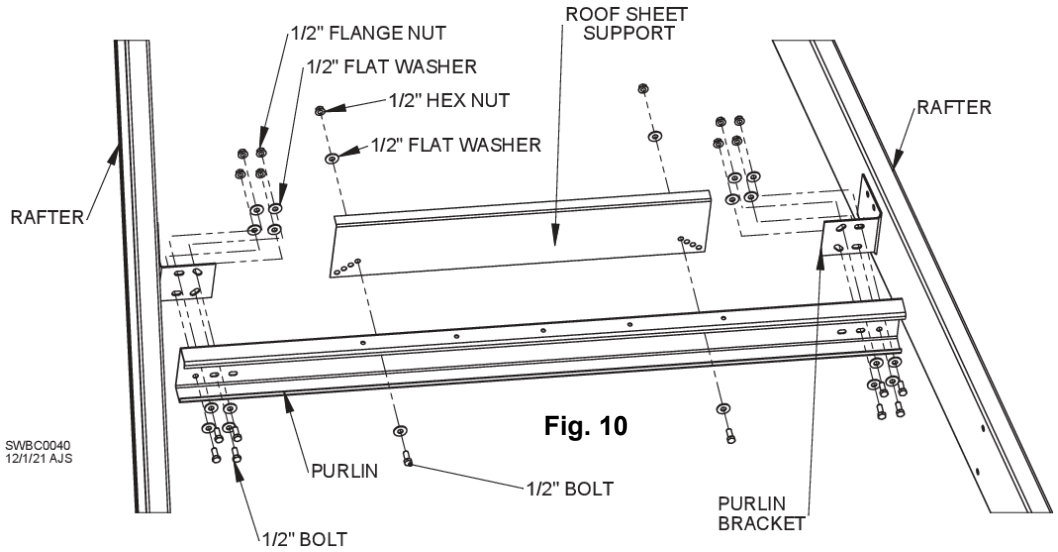


Fig. 10

Bolt purlins to purlin brackets using 1/2 x 1-1/4” bolts, 1/2” flat washers and 1/2” flange nuts as shown in Fig. 10. Purlins are attached to eave side of purlin brackets. Leave bolts connecting purlins loose.

See Table 4 or 5 for roof sheet support used with purlin based on bin diameter. All apply to 15K & 30K roofs.

Attach roof sheet support to purlin using 1/2 bolts, 1/2" flat washers and 1/2” nuts as shown in Fig. 10. Same hardware is used for all roof sheet supports. Use holes in support that match up with support mounting holes in purlin. **NOTE**: If rafter assemblies will be stacked before attachment to peak ring and sidewall, attach roof sheet supports during rafter attachment.

Table 4 – Roof support used w/ purlin, 18’ - 48’ dia. bin			
BIN DIA.	**PART**	**TOP PURLIN**	**BOTTOM PURLIN**
18'	Roof Support	BC350123	-
	Purlin	BC357502	-
21'	Roof Support	BC350123	BC350145
	Purlin	BC352703	BC352704
24'	Roof Support	BC350123	BC350145
	Purlin	BC352703	BC352704
27'	Roof Support	BC350123	BC350145
	Purlin	BC352703	BC352704
30'	Roof Support	BC350123	BC350145
	Purlin	BC359004	BC352704
33'	Roof Support	BC350123	BC350145
	Purlin	BC359004	BC357506
36'	Roof Support	BC350123	BC350145
	Purlin	BC359004	BC359006
39'	Roof Support	BC350123	BC350145
	Purlin	BC359004	BC357506
42'	Roof Support	BC350123	BC350145
	Purlin	BC355402	BC357506
45'	Roof Support	BC350123	BC350145
	Purlin	BC359004	BC357506
48'	Roof Support	BC350123	BC350145
	Purlin	BC355402	BC357506

Table 5 – Roof support used w/ purlin, 54’ - 60’ dia. bin				
BIN DIA.	**PART**	**TOP PURLIN**	**2ND PURLIN**	**3RD PURLIN**
54'	Roof Support	BC350123	BC350142	BC350145
	Purlin	BC355402	BC357506	BC357504
57'	Roof Support	BC350123	BC350123	BC350145
	Purlin	BC355402	BC356003	BC357504
60'	Roof Support	BC350123	BC350123	BC350145
	Purlin	BC357502	BC356003	BC357504

Rafter Substructure Assembly

Set peak ring weldment on center support jack. Center support jack must be capable of supporting a 12,000 lb. dead load and be adjustable + or - 12”. Jack should be set at a beginning height as stated below. This height should be at mid-stroke of jack, allowing for adjustment of peak ring height.

Dimensions below are only starting points for building roof on one or two sidewall rings. Depending on type of bin jack used, adjustments up or down may be required. **HINT**: To ease assembly, add 1” to dimension below. It is easier to take pressure off of center jack than to lift a raftered substructure.

NOTE: All dimensions are from bottom of peak ring.

18’	**One Ring**	**91” (7’ 7”)**	**36’**	**One Ring**	**158” (13’ 2”)**
18’	**Two Rings**	**135” (11’ 3”)**	**36’**	**Two Rings**	**202” (16’ 10”)**
21’	**One Ring**	**102” (8’ 6”)**	**39’**	**One Ring**	**169” (14’ 1”)**
21’	**Two Rings**	**146” (12’ 2”)**	**39’**	**Two Rings**	**213” (17’ 9”)**
24’	**One Ring**	**113” (9’ 5”)**	**42’**	**One Ring**	**178” (14’ 10”)**
24’	**Two Rings**	**157” (13’ 1”)**	**42’**	**Two Rings**	**222” (18’ 6”)**
27’	**One Ring**	**124-1/2” (10’ 4-1/2”)**	**48’**	**One Ring**	**202” (16’ 10”)**
27’	**Two Rings**	**168-1/2” (14’ 1/2”)**	**48’**	**Two Rings**	**246” (20’ 6”)**
30’	**One Ring**	**135-1/2” (11’ 3-1/2”)**	**54’**	**One Ring**	**225” (18’ 9”)**
30’	**Two Rings**	**179-1/2” (14’ 11-1/2”)**	**54’**	**Two Rings**	**269” (22’ 5”)**
33’	**One Ring**	**146-1/2” (12’ 2-1/2”)**	**60’**	**One Ring**	**247” (20’ 7”)**
33’	**Two Rings**	**190-1/2” (15’ 10-1/2”)**	**60’**	**Two Rings**	**291” (24’ 3”)**

NOTE: Balance load on peak ring when attaching rafter A-frames. Section into quarters. Once balanced, substructure will become somewhat self-supporting. Remaining A-frame rafters should be installed on alternating sides to balance load.

WARNING: Always wear personal protective equipment including a hard hat and always use proper lifting equipment and methods when lifting any structural element of a bin. Failure to follow these precautions may result in death or serious injury.

Attaching Rafters to Peak Ring & Sidewalls

Attachment of rafters to peak ring will depend on bin diameter and peak ring weldment. Instructions on this page are for 21’ to 30’ diameter bins with 15,000 lb. or 30,000 lb. roof. See Table 6 for peak ring used. Rafters attach at every other set of holes as shown in Fig. 11.

For larger-diameter bins, see next page for instructions to attach rafters to peak ring for 15,000 lb. roof, or see Figs. 14-15 and related instructions to attach rafters to peak ring for 30,000 lb. roof.

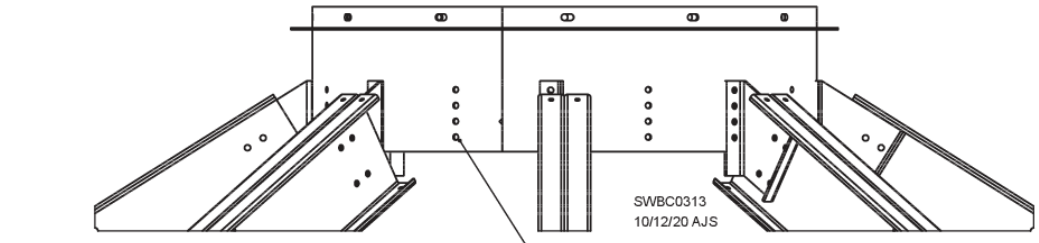


Fig. 11 & Table 6

Diameter	Peak Ring	Description
21'	BC354211	42' Peak Ring Weldment
24'	BC354811	48' Peak Ring Weldment
27'	BC355411	54' Peak Ring Weldment
30'	BC356011	60' Peak Ring Weldment

Position first rafter subassembly inside starter sidewall ring so stiffener attaching brackets are slightly below attachment locations. Attach peak rafter attachment brackets to peak ring weldment with 1/2 x 1-1/4" bolts and 1/2” flange nuts as shown in Fig. 11. Tighten these bolts at each location.

Lift stiffener attaching brackets to attachment locations (top of brackets flush with sidewall sheet) and secure each bracket using three (3) 3/8 x 1” bolts and 3/8” flange nuts. Insert bolts from outside of bin sheet. See Fig. 12. Tighten these bolts at each location.

Repeat processes above until all rafter subassemblies are attached to peak ring and sidewalls.

Attach remaining purlins and roof sheet supports between rafter subassemblies. See Fig. 10. All 1/2” bolts used to assemble rafters should be tightened after rafters are completely assembled.

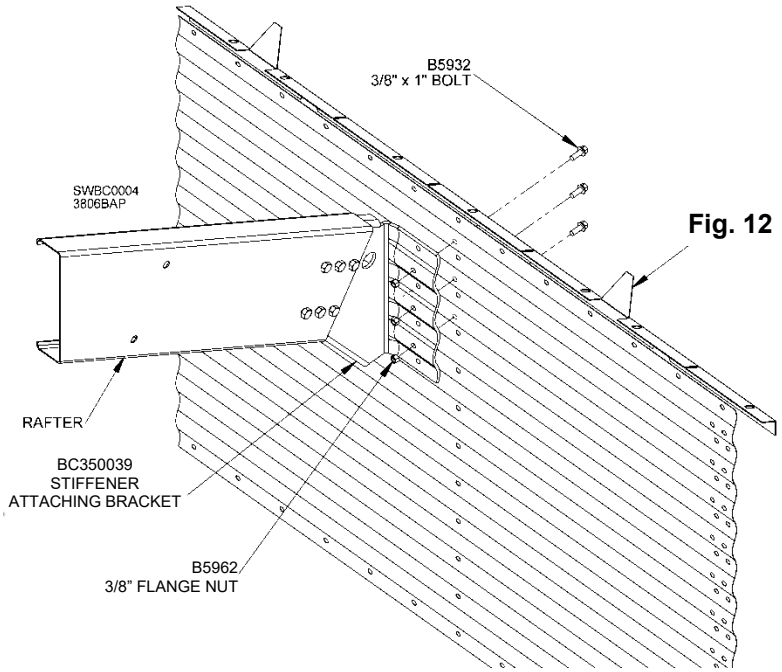


Fig. 12

Attaching Rafters to Peak Ring & Sidewalls of 15,000 lb. Roof

Position first rafter subassembly inside starter sidewall ring so stiffener attaching brackets are slightly below attachment locations. Attach peak rafter attachment brackets to peak ring weldment with 1/2 x 1-1/4" bolts and 1/2” flange nuts as shown in Fig. 13. Tighten these bolts at each location.

Lift stiffener attaching brackets to attachment locations (top of brackets flush with sidewall sheet) and secure each bracket using three (3) 3/8 x 1” bolts and 3/8” flange nuts. Insert bolts from outside of bin sheet. See Fig. 12. Tighten these bolts at each location.

Repeat processes above until all rafter subassemblies are attached to peak ring and sidewalls.

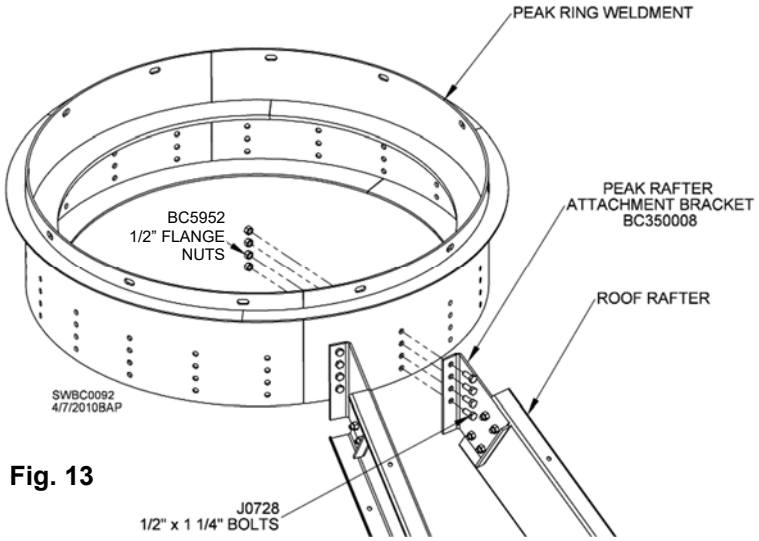


Fig. 13

Attach remaining purlins and roof sheet supports between rafter subassemblies. See Fig. 10. All 1/2” bolts used to assemble rafters should be tightened after rafters are completely assembled.

Attaching Rafters to Peak Ring & Sidewalls of 30,000 lb. Roof

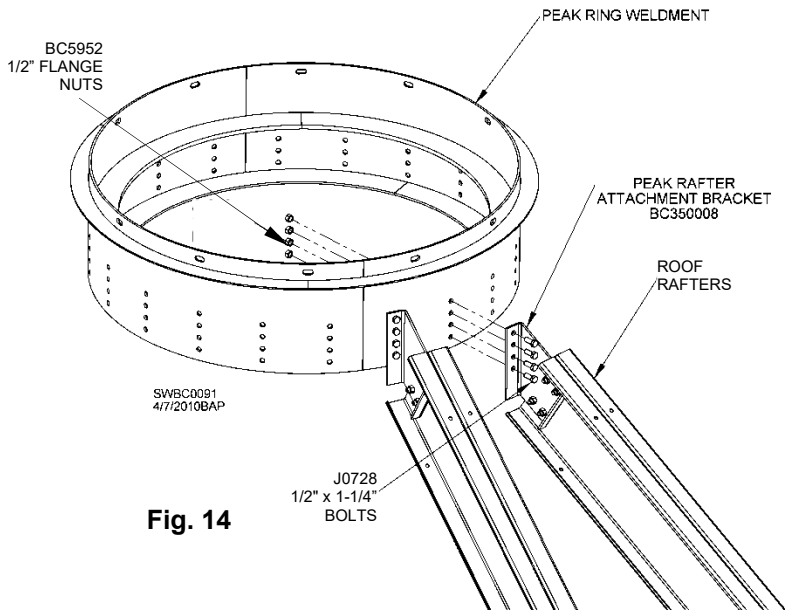


Fig. 14

Position first rafter subassembly inside starter sidewall ring so stiffener attaching brackets are slightly below attachment locations. Attach peak rafter attachment brackets to peak ring weldment with 1/2 x 1-1/4" bolts and 1/2” flange nuts as shown in Fig. 14. Tighten these bolts at each location.

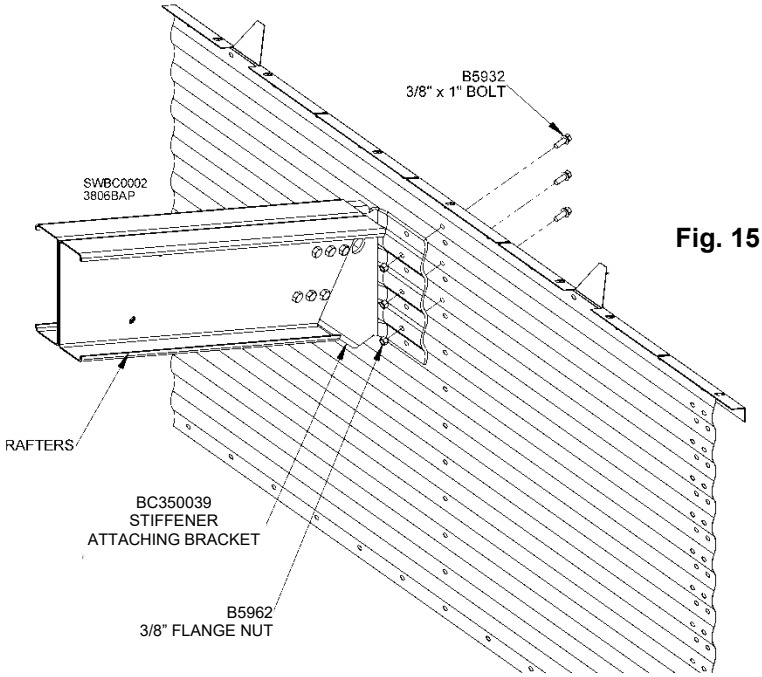


Fig. 15

Lift stiffener attaching brackets to attachment locations (top of brackets flush with sidewall sheet) and secure each bracket using three (3) 3/8 x 1” bolts and 3/8” flange nuts. Insert bolts from outside of bin sheet. See Fig. 15. Tighten these bolts at each location.

Repeat processes above until all rafter subassemblies are attached to peak ring and sidewalls.

Attach remaining purlins and roof sheet supports between rafter subassemblies. See Fig. 10. All 1/2" bolts used to assemble rafters should be tightened after rafters are completely assembled.

Eave Tension Ring Assembly

Table 7

Eave Tension Ring Components			
Bin Dia.	**Turnbuckles**	**Splices**	**Ring Sections***
18'	3	2	5
21'	3	3	6
24'	3	4	7
27'	4	4	8
30'	4	5	9
33'	5	5	10
36'	3	3	6
39'	3	3	6
42'	3	3	6
48'	3	4	7
54'	3	5	8
60'	3	6	9

***Sections for 18' to 33' bins are 126" (10' 6");**
Sections for 36' to 60' bins are 252" (21')

Table 7 shows main components used in eave tension ring assembly. Before assembly, loosen turnbuckles (threaded connectors away from center). They will be tightened inward later.

- Insert eave tension ring sections through sidewall rafter attachment brackets. Install splices and turnbuckles using 3/8 x 2-1/2" bolts and 3/8" flange nuts. See Fig. 16 Details A and B.
- Turnbuckles should be spaced evenly around bin.
- Final section of tension ring will have to be cut to proper length and drilled with a 7/16" drill bit to attach properly. Drill holes to match up with connecting turnbuckle or splice. Attach final section with 3/8 x 2-1/2" bolts and 3/8" nuts. Tighten all 3/8" hardware.
- To ensure starter ring roundness, tighten turnbuckles inward with punch or pipe wrench until snug.

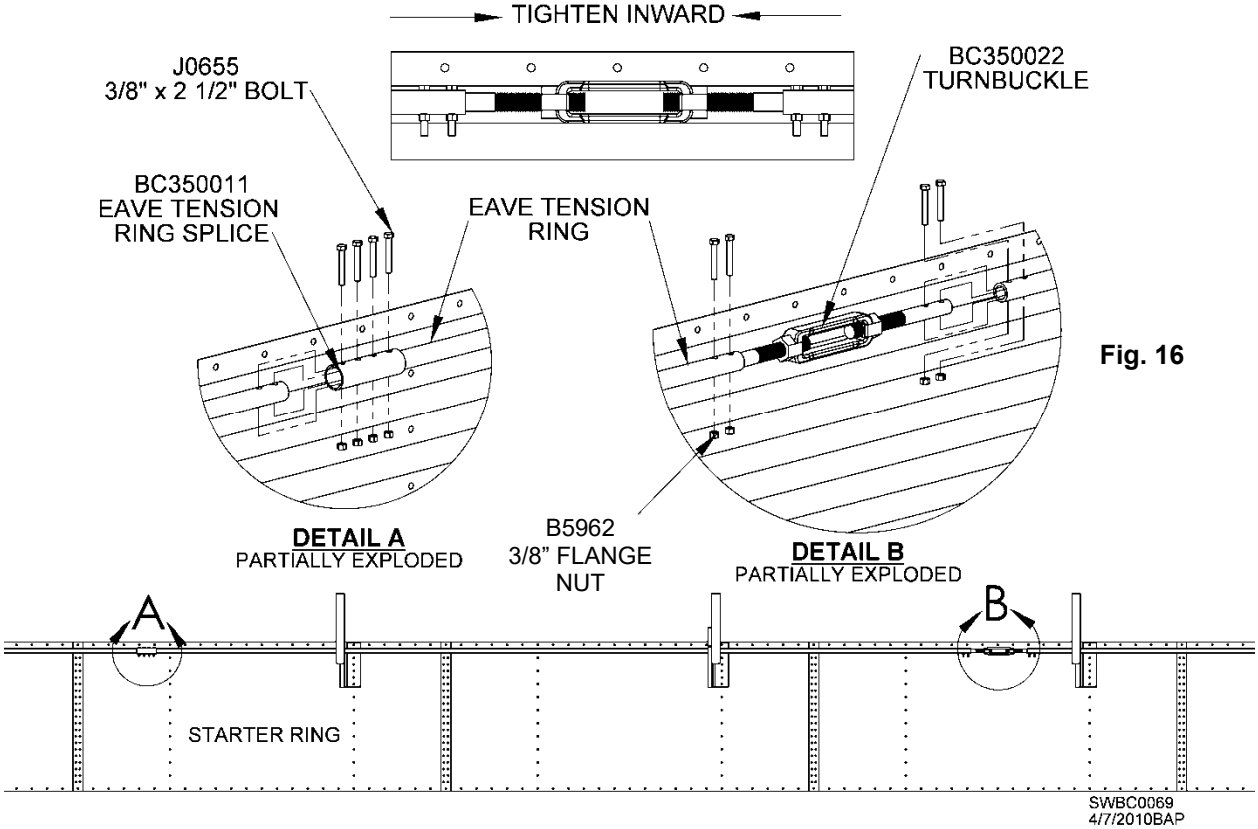


Fig. 16

Peak Z-Ring Assemblies

Pre-assemble peak Z-ring using 3/8 x 1” carriage bolts and 3/8” flange nuts. **NOTE:** Peak Z-ring sections must butt tightly together. See Fig. 17A-17K, as applicable. **NOTE:** Assemble peak rings for both 18’ and 36’ bins as shown in Fig. 17F. Tighten all bolts. Attach peak Z-ring to top of rafters. Align one top Z ring bracket (BC350004) at a splice with primary rafter.

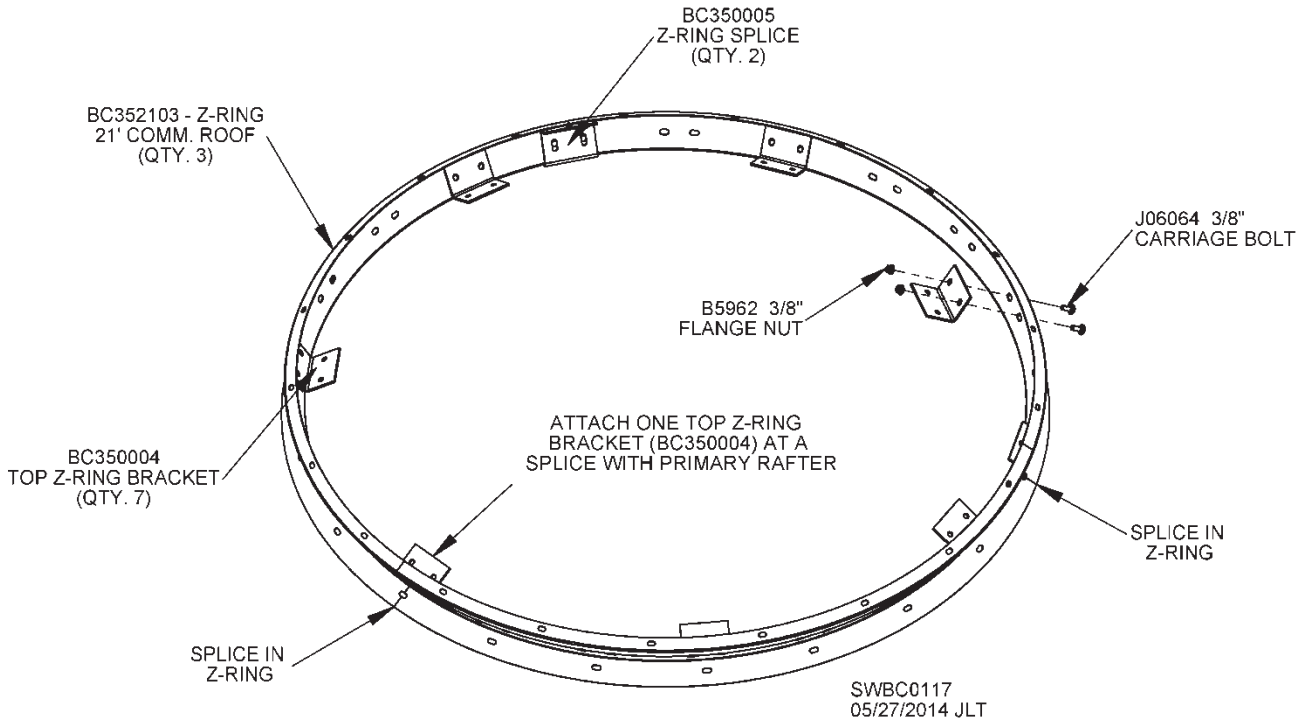


Fig. 17A – 21’ Dia. peak ring

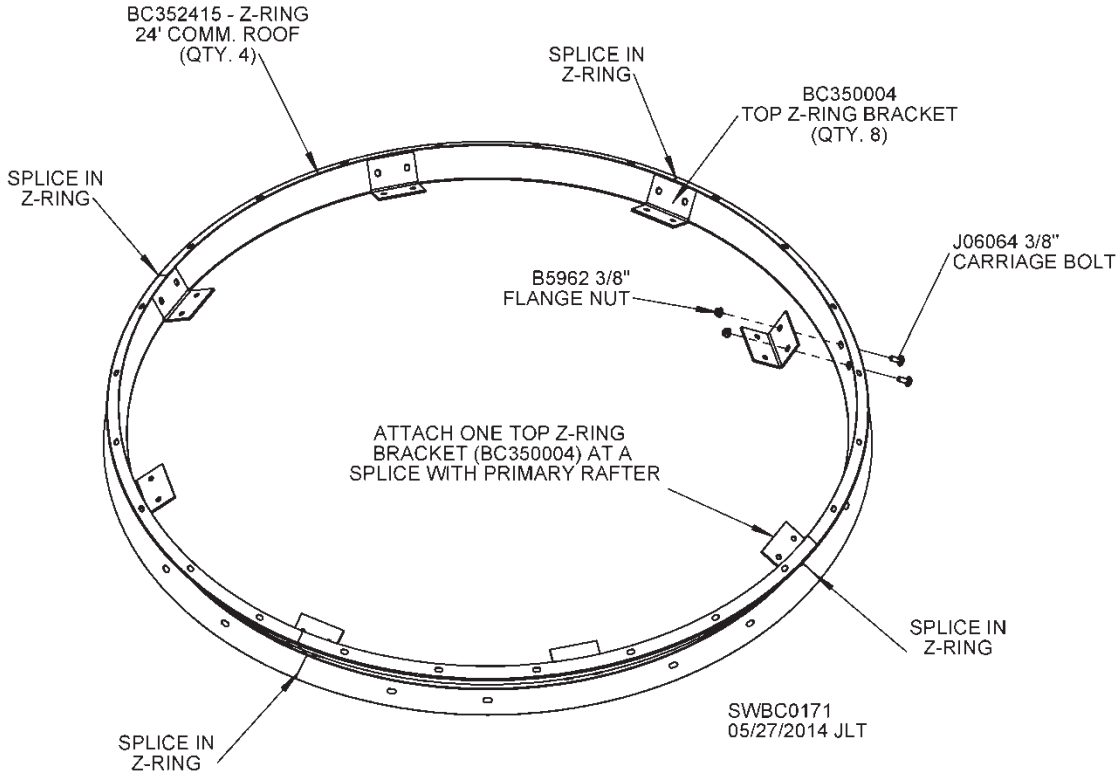


Fig. 17B – 24’ Dia. peak ring

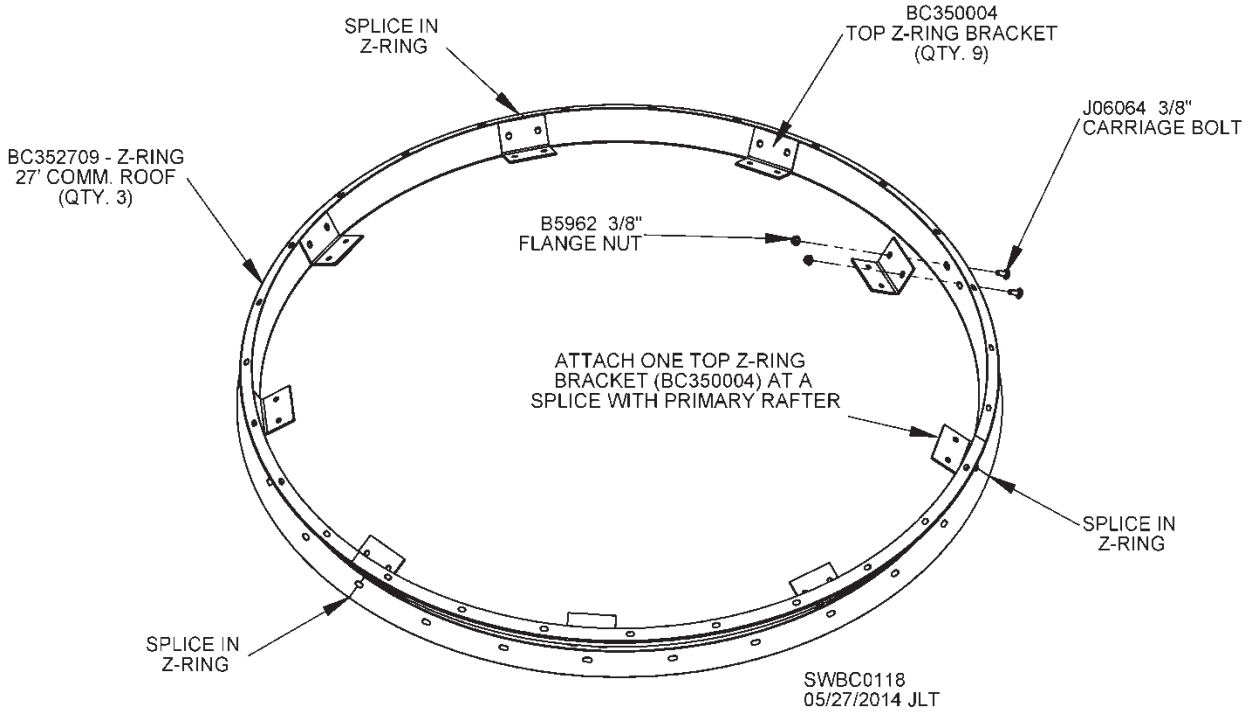


Fig. 17C – 27' Dia. peak ring

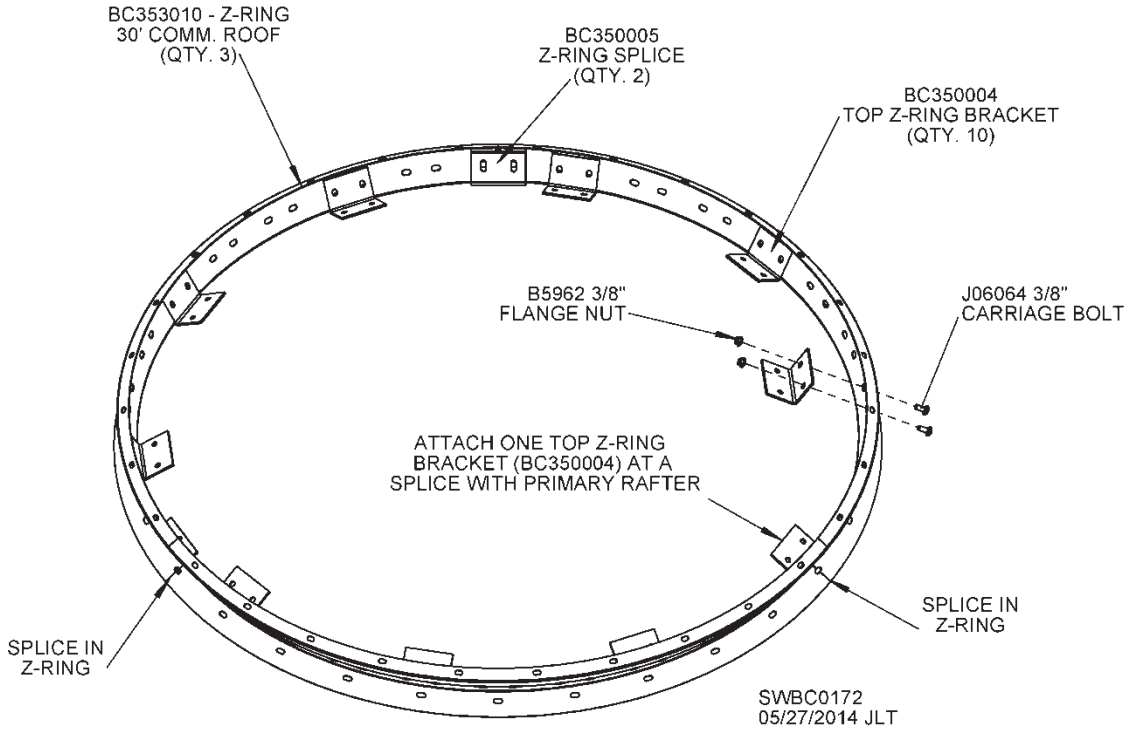


Fig. 17D – 30' Dia. peak ring

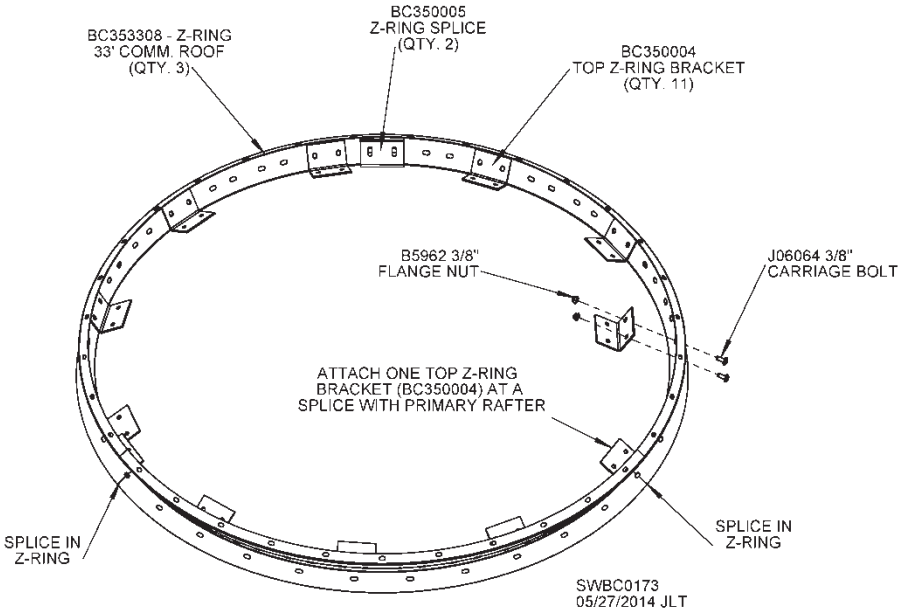


Fig. 17E – 33' Dia. peak ring

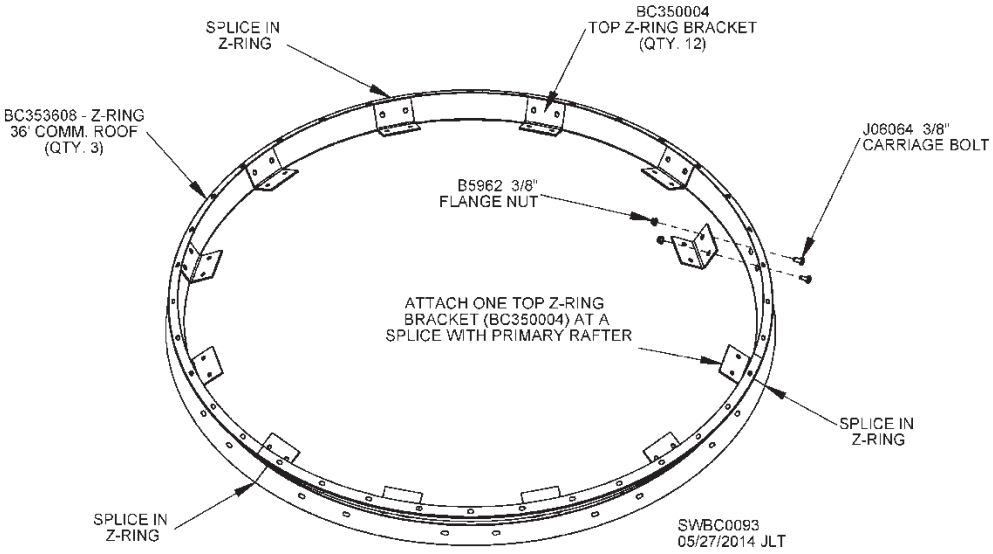


Fig. 17F – 18' & 36' Dia. peak ring

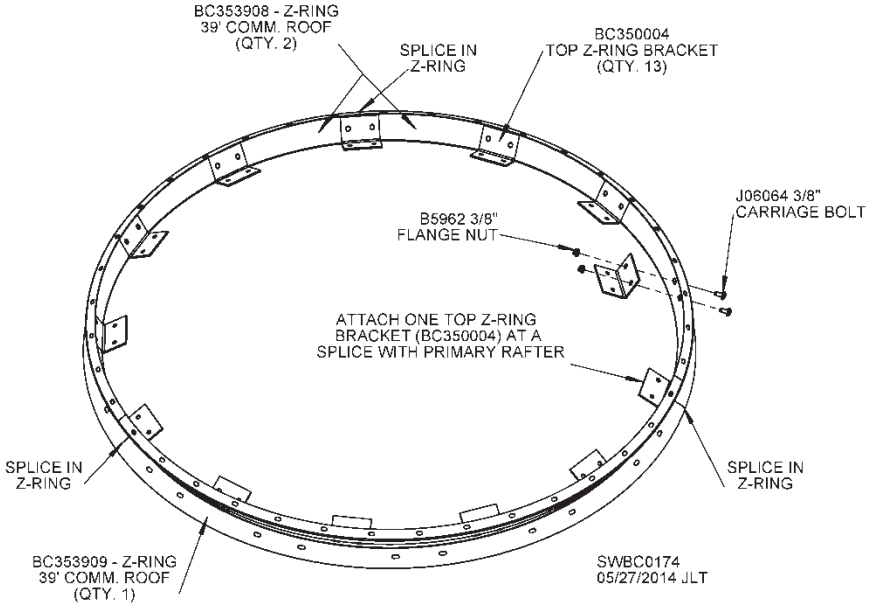


Fig. 17G – 39' Dia. peak ring

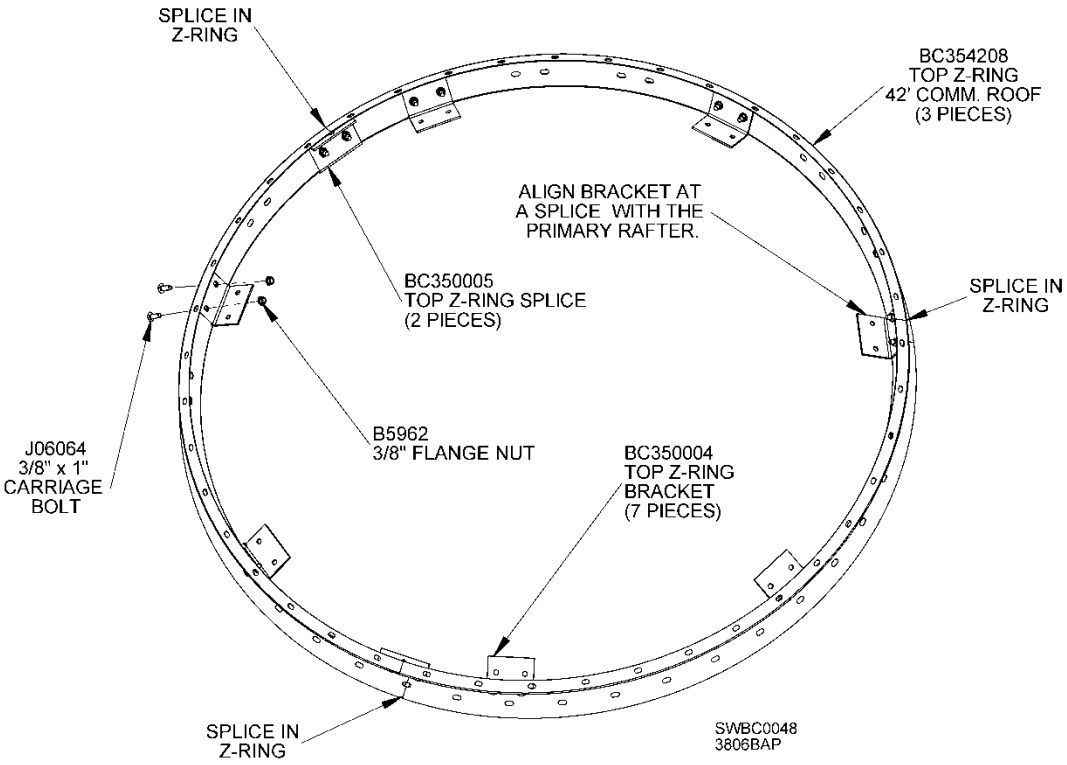


Fig. 17H – 42' Dia.

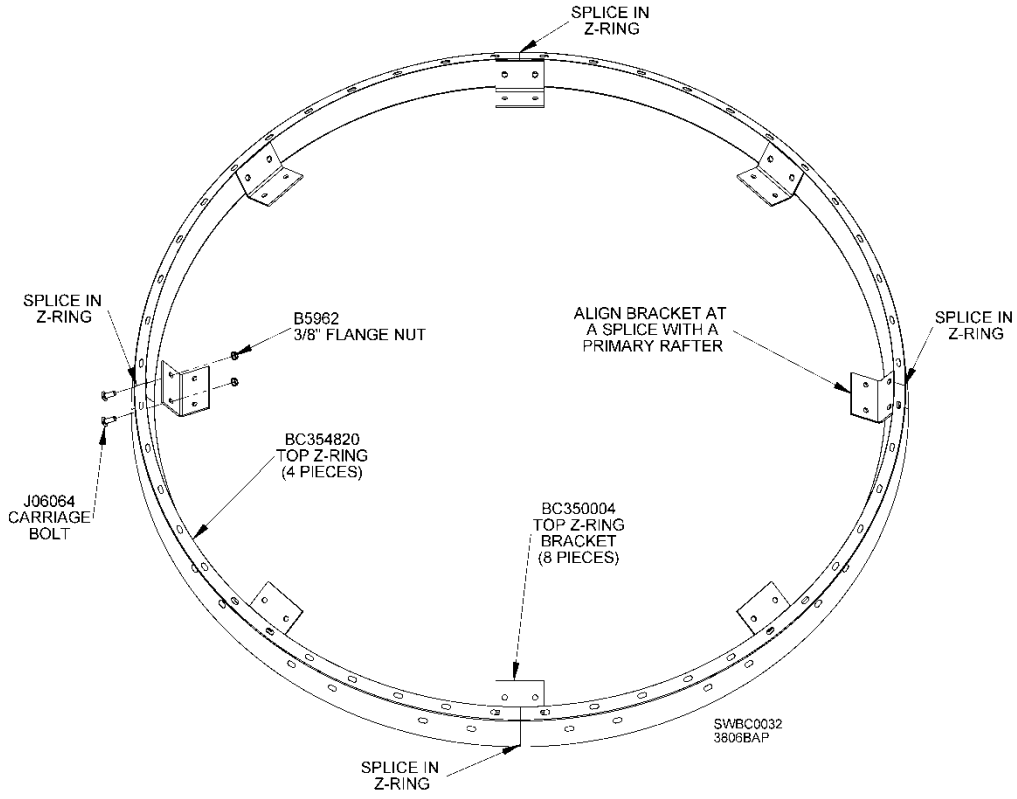


Fig. 17I – 48' Dia.

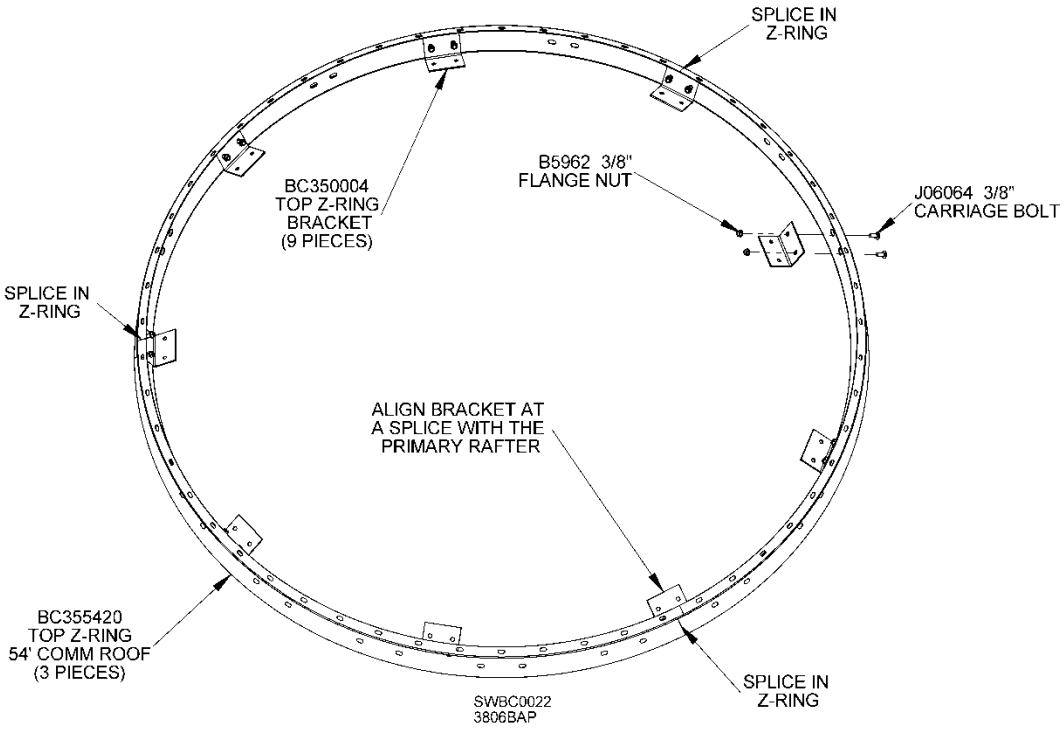


Fig. 17J – 54' Dia.

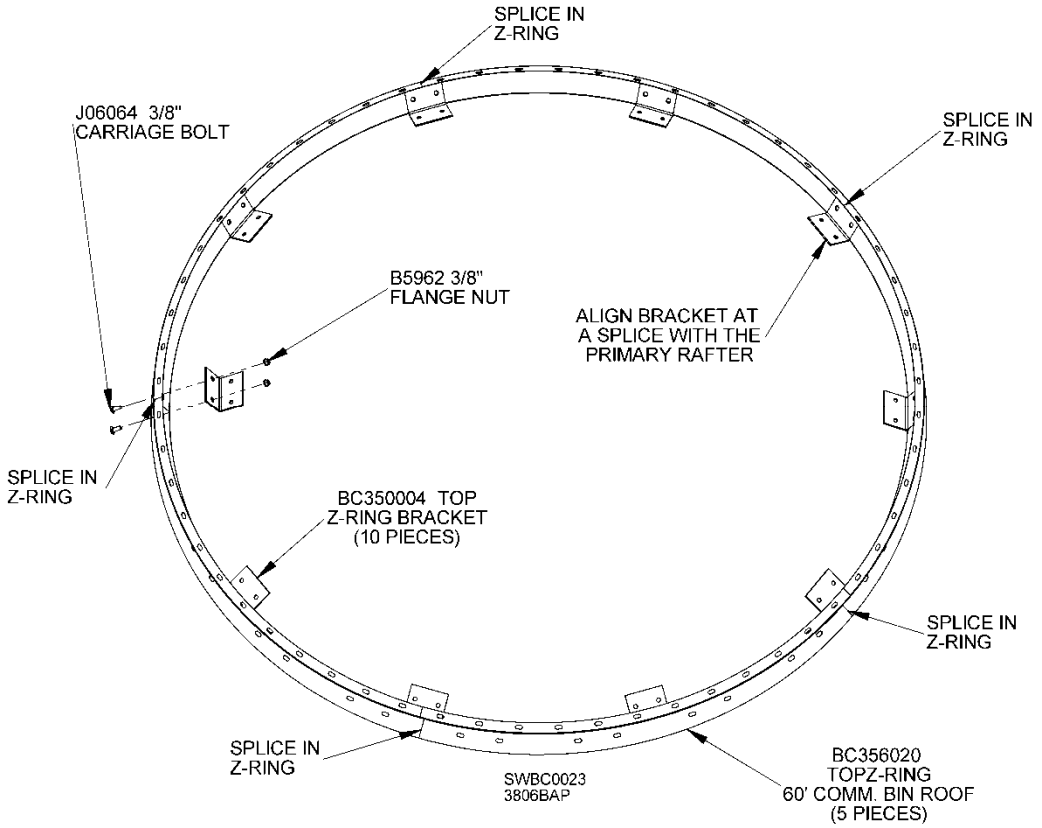


Fig. 17K – 60' Dia.

Peak Z-Ring Brackets

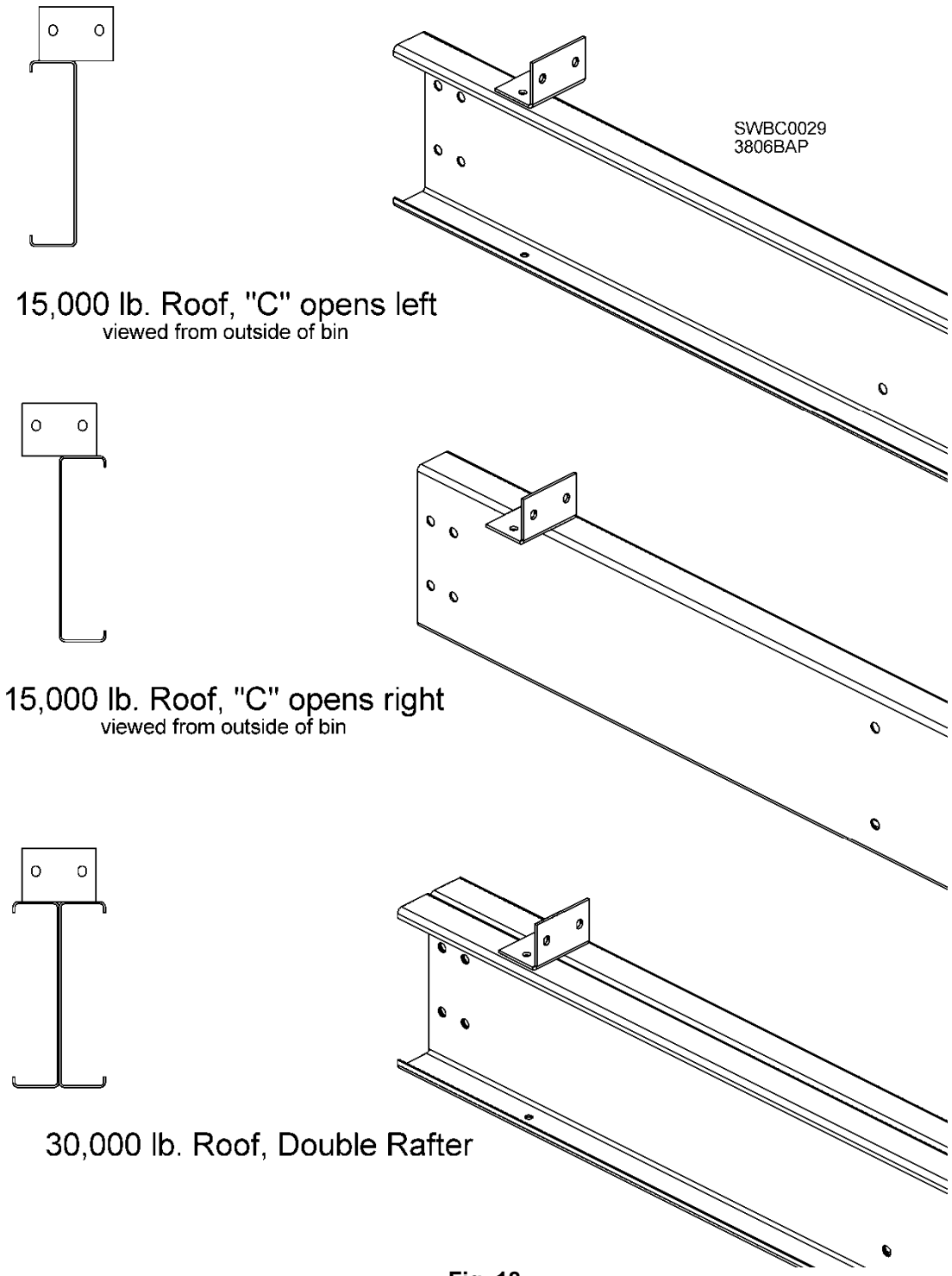


Fig. 18

For proper roof sheet alignment, attach peak Z-ring brackets as shown in Fig. 18. Peak Z-ring brackets attach to rafters using 3/8 x 1” bolt(s) and 3/8” flange nut(s). For 15,000 lb. roof, if C-shaped rafter opens to left, then left hole in Z-ring bracket is used. If C opens to right, then right hole in Z-ring bracket is used. For 30,000 lb. roof, attach bracket to both rafters.

Installation of Roof Sheets

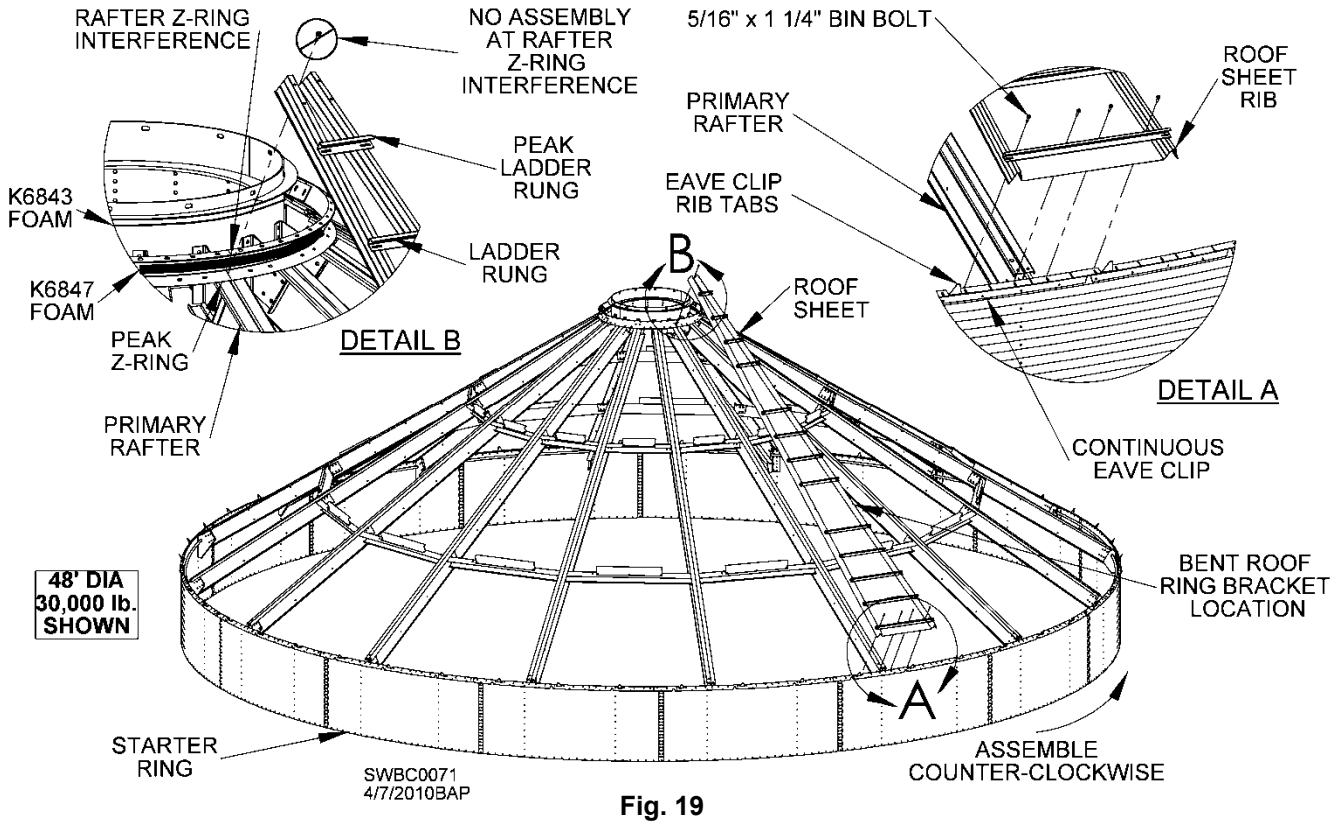


Fig. 19

Attach 1/2 x 1-1/2" foam (K6843) to peak ring weldment under outer lip. Attach 1/2 x 3” foam (K6847) to face of Z-ring. Peel off protective film and place foam as shown in Detail B of Fig. 19.

Align roof sheet ribs with eave clip rib tabs as shown in Detail A of Fig. 19. First roof sheet will attach directly over primary rafter and is the roof sheet to which roof ladder rungs will be attached. Primary rafter will be centered directly under roof ladder sheet. Insert 5/16 x 1-1/4" bolts through bottom of roof sheet into continuous eave clip. Fasten with 5/16” flange nuts. **HINT:** Leave bolts out near left-hand rib. This rib will be above rib of last sheet installed. See Detail A of Fig. 19.

Insert 5/16 x 1-1/4” bin bolt through top of roof sheet and peak Z-ring. Fasten with 5/16” flange nuts. **NOTE:** Do not assemble hardware where rafter interferes with Z-ring; there is no need to drill through rafter. Do not fasten top four (4) holes on roof sheets or interference will occur with peak aprons. See Detail B. Be certain top of roof sheets are secured to Z-ring on either side of a rafter. Continue installing roof sheets counterclockwise.

Attach roof ladder rungs to roof sheet located directly over primary rafter as next sheet is put into place. This will allow positioning of manhole sheet on either side of roof ladder sheet and avoid rafter-manhole interference.

Attach peak ladder rungs to every other roof sheet near peak during roof sheet assembly.

NOTE: Attach rungs to roof sheet ribs using 5/16 x 1-1/4" bin bolts, steel-backed washers and 5/16” flange nuts (under roof sheet rib). See Fig. 20. Ensure rounded edge of each rung faces top of bin. Washers must be tight against roof sheet ribs to ensure watertight seal.

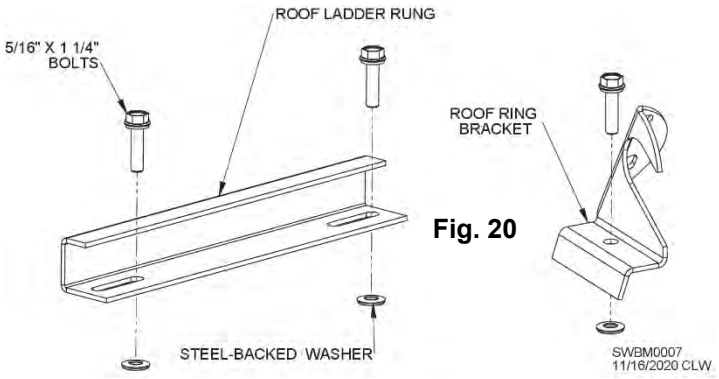


Fig. 20

Install bent roof ring mounting brackets in roof ribs using 5/16 x 1-1/4” bin bolts, steel-backed washers and 5/16” flange nuts. See Fig. 20. See Table 8 and Figs. 22-24 for roof ring assembly instructions.

Tighten all roof sheet bolts.

Peak Ring Apron Assembly

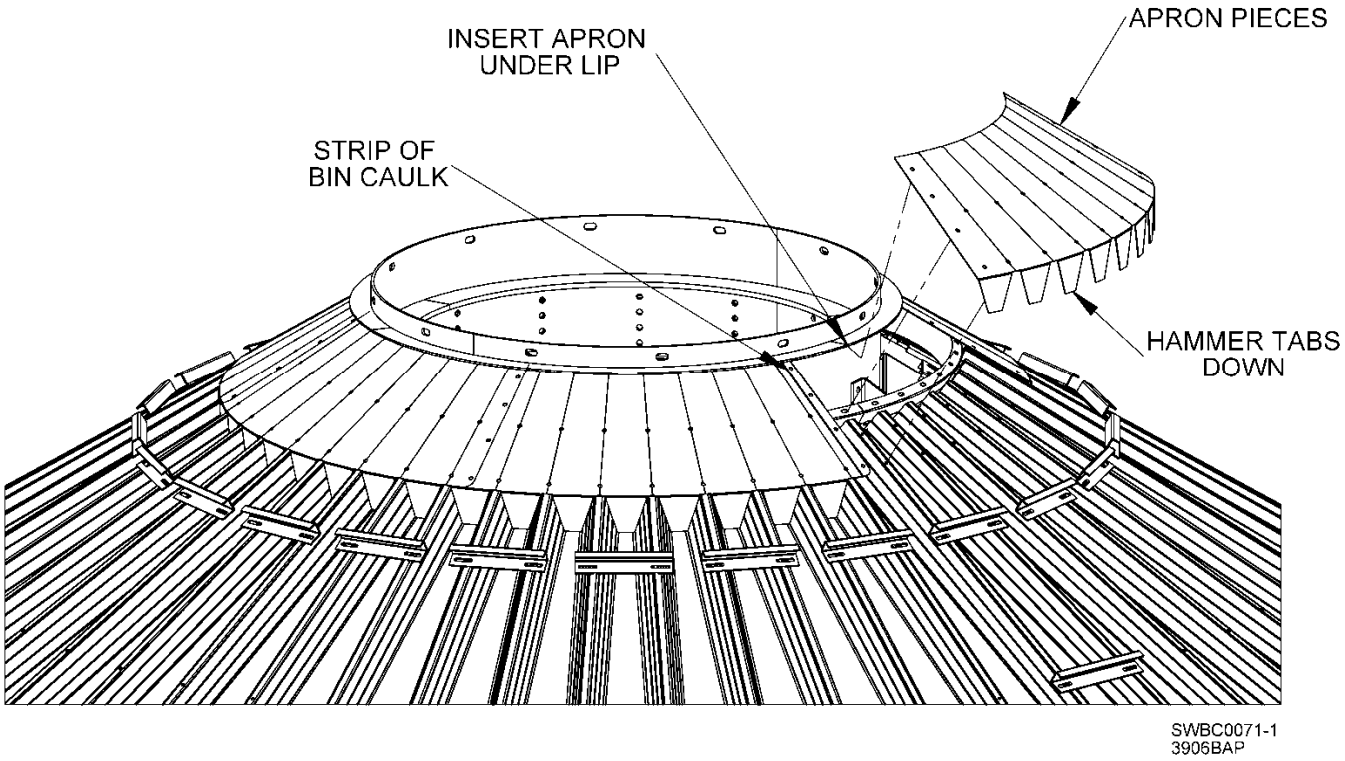


Fig. 21

Assemble first apron piece by sliding top edge under peak ring lip and inserting 5/16 x 1-1/4" bin bolt through apron piece and Z-ring. Insert another 5/16 x 1-1/4" bin bolt through apron piece and roof sheet rib. Fasten both with 5/16” flange nuts. Fill all holes. See Fig. 21.

NOTE: If difficulty occurs when aligning apron holes, it may be necessary to field-drill through roof sheet ribs. Fasten apron to Z-ring and use apron roof sheet rib holes as pilot holes to ream or drill through roof sheet rib. Misalignment may be caused by adjustments made during roof assembly or by settling of roof sheets. When all roof sheet components are bolted in place and misalignment of apron holes occurs, it is very difficult to move assembled roof sheets to align holes. It consumes less time to field-drill holes than try to align them. Use existing 5/16 x 1-1/4” bolts and 5/16” flange nuts. Ensure there is a watertight seal on all field-drilled holes.

Apply bin caulk to edge of apron where two pieces overlap. Continue attaching apron pieces and applying caulk until fully assembled. Tighten all bolts.

Hammer down all tabs on aprons with a rubber mallet. Bend them down between roof sheet ribs until there is a small gap between all tabs and ribs.

Tighten all hardware not previously tightened.

External Roof Ring Attachment

See Table 8 for quantities of roof ring components based on bin diameter. Bent roof ring brackets should have been fastened at locations specified in Table 8 during assembly of roof panels.

Table 8 – Quantities of roof ring components

Bin Dia.	Bent Bracket, Roof Ring Location*	Internal Tube Splices	Expanders	10' Pieces **	U-Bolts	External Splice Tubes
18'	3	1	2	4	18	1
21'	3	2	2	5	21	1
24'	4	2	2	5	24	1
27'	4	2	3	6	27	1
30'	5	2	3	6	30	1
33'	5	3	3	7	33	1
36'	5	3	4	8	36	1
39'	5	4	4	9	39	1
	7	3	3	7	39	1
42'	5	4	5	10	42	1
	10***	2	3	6	42	1
48'	6	5	5	11	48	1
	11	2	3	6	48	1
54'	5	6	7	14	54	1
	11	3	4	8	54	1
60'	5	7	8	16	60	1
	11	5	5	11	60	1

*** Location determined by counting holes from bottom edge (eave) of roof sheet.**
**** Roof ring pieces are factory-rolled for intended location.**
***** If using tapered roof vent on 42' bin, upper ring must be at 9th hole from eave instead of 10th.**

Pre-assemble expander assemblies (1 x 10" threaded rod, 1" nuts and 1" washers) before installing ring. Run all four (4) 1" nuts to center of each threaded expansion rod. Position washers outside of nuts. Nuts and washers will later be run outward after all sections of ring have been assembled. See Fig. 22.

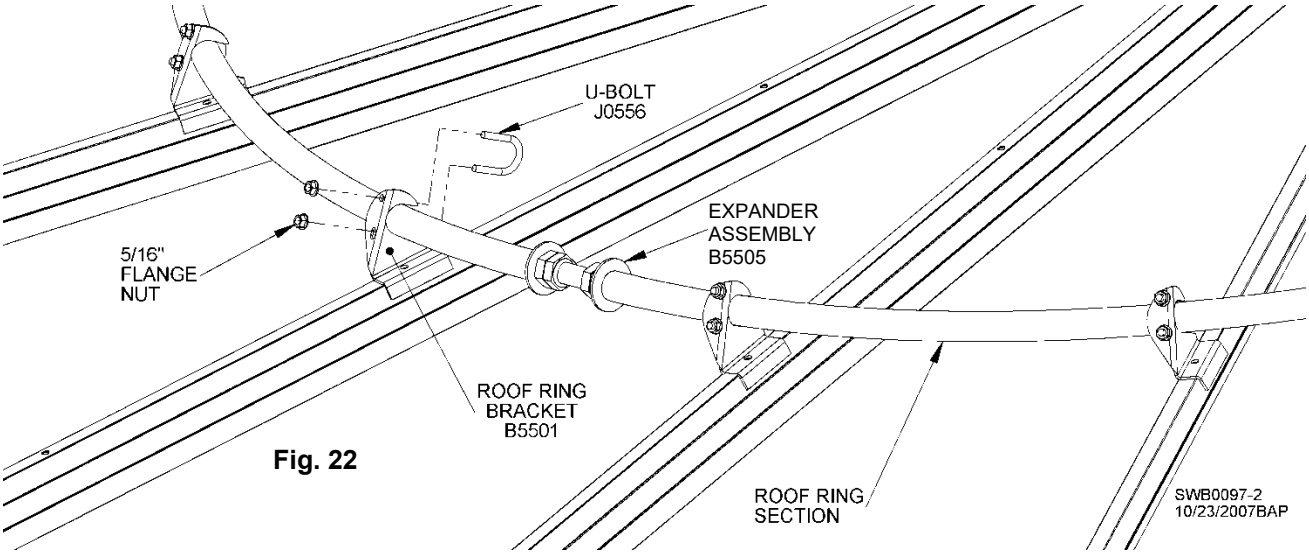


Fig. 22

Place first expander assembly near roof ladder. Center first ring section on roof ladder sheet. Evenly space remaining expanders around roof ring as ring sections are placed into bent roof ring brackets. Install internal tube splices (B5511) at all other locations except last one, where an external splice tube will be used. Fig. 23 shows 8" internal tube splice using a 5/16 x 1-1/4" bin bolt as a stopper. Fig. 24 shows 8" external splice tube (B5512) using 5/16 x 2" bolt. Place 5/16" U-bolts on all roof ring mounting brackets. See Figs. 22 and 23. Do not tighten U-bolt flange nuts until later after roof has been crowned.

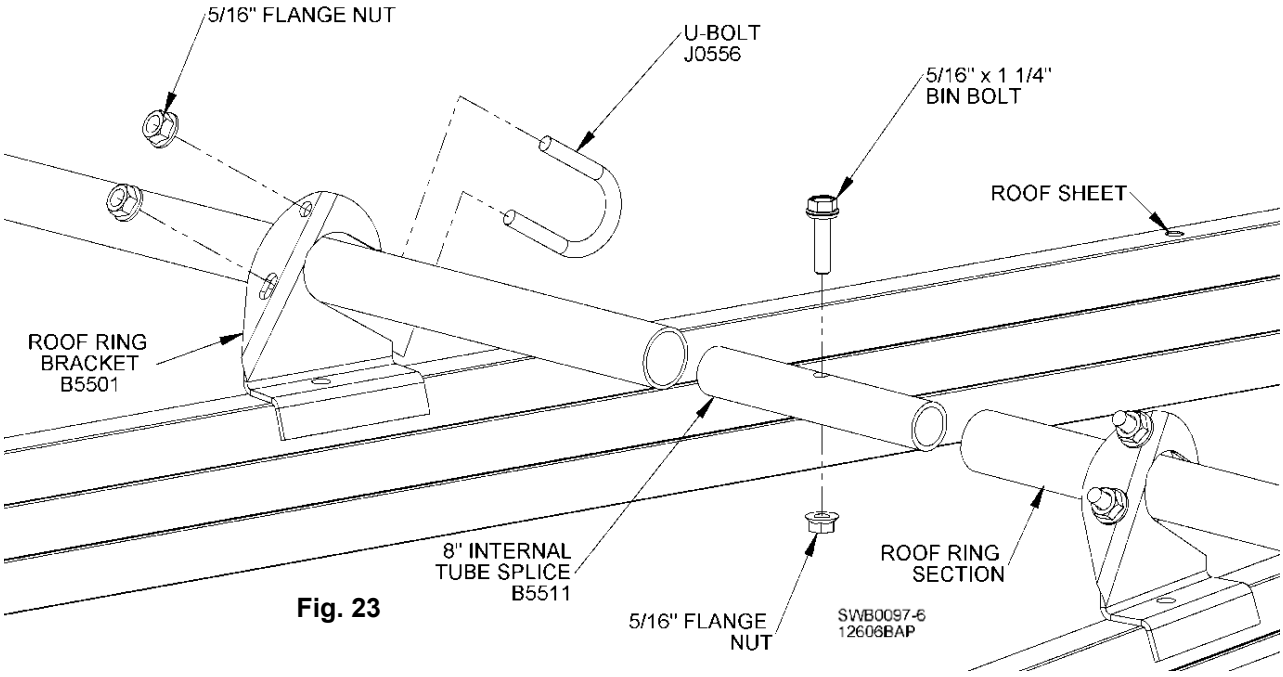


Fig. 23

External splice tube will be installed after all other splices and expanders are in place and ring sections are trimmed. If final section of roof ring will be less than 24” long, split the difference with previously assembled roof ring section and create two sections of equal length. See Fig. 24. Ensure there is a 3/8” gap between ring sections for bolt that will be inserted. It may be necessary to deburr cut edges.

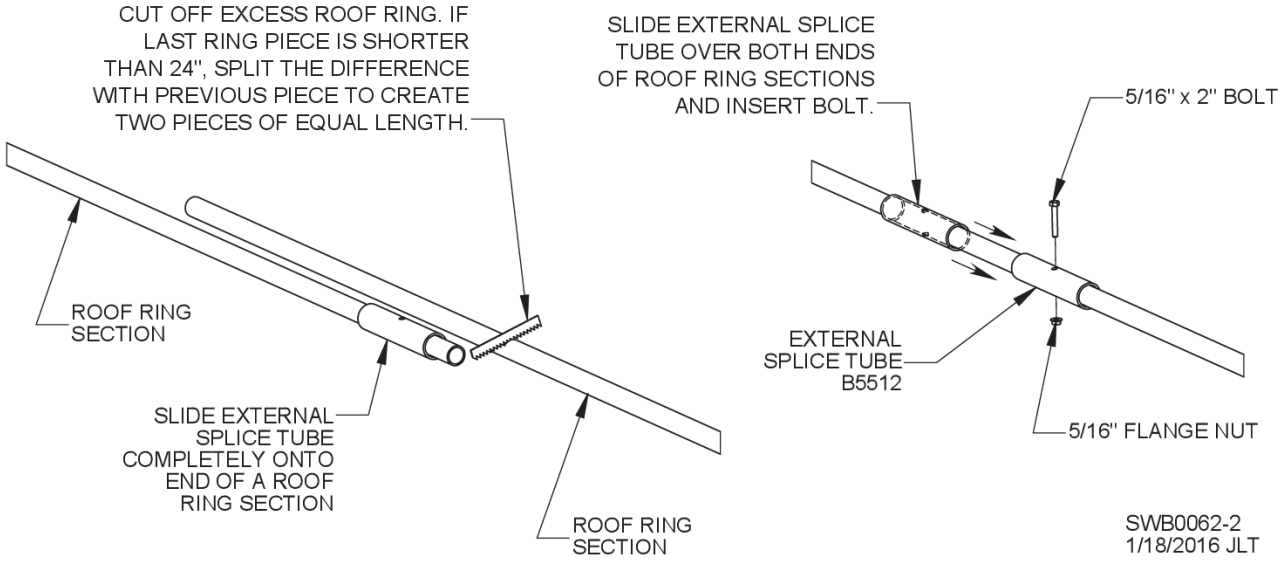


Fig. 24

Slide external splice tube (B5512) over one end of roof ring. Align ring sections and position splice over both. Insert 5/16 x 2” bolt into splice tube and lock in place with 5/16” flange nut.

Adjust expander assembly nuts until a slight crown appears in middle of roof sheets. Tighten second set of nuts (jam nuts) against expander nuts to help prevent loosening. Tighten 5/16” flange nuts on 5/16” U-bolts at all bent roof ring brackets.

IMPORTANT: Roof ring will fail if expander assemblies become loose due to high winds or excessive pressures. To guard against failure, be sure to follow procedures on these pages when installing ring.

Manhole Cover Assembly (B5380)

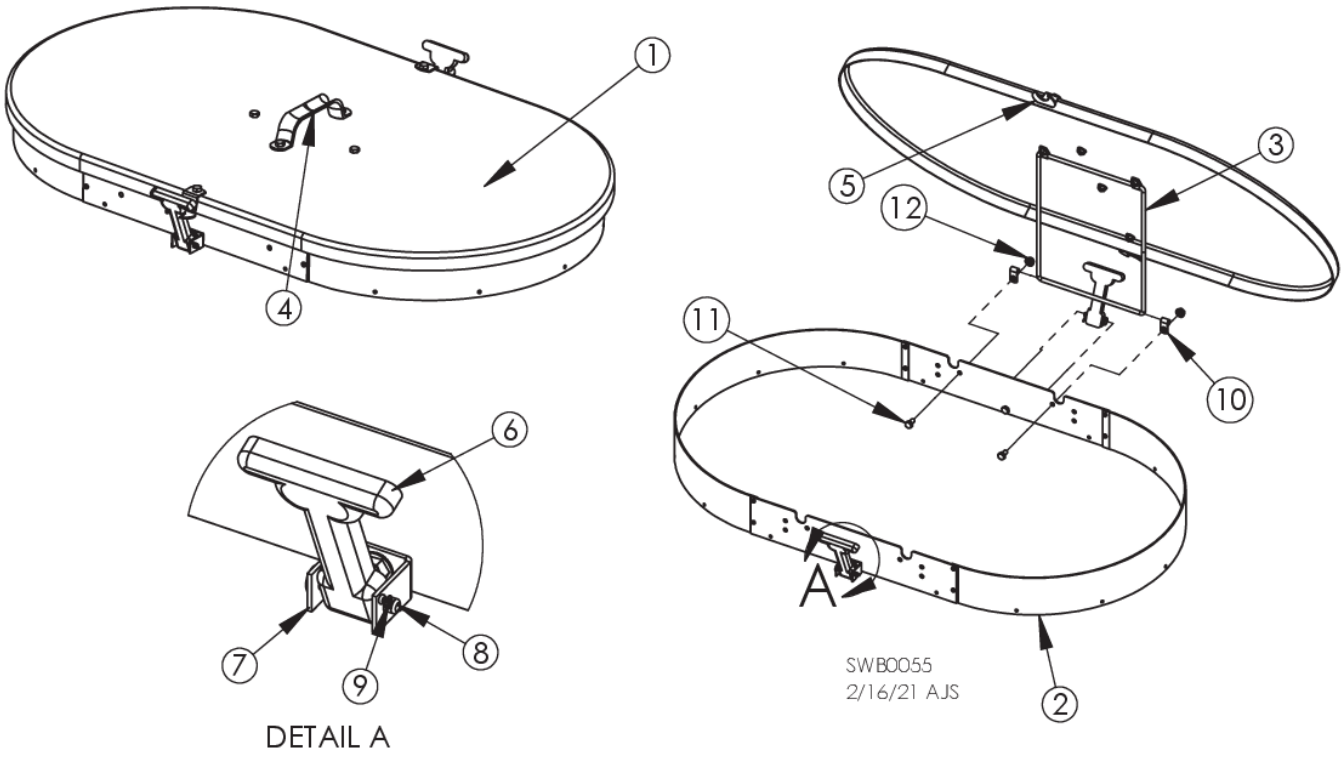


Fig. 25 & Table 9

ITEM	PART #	DESCRIPTION	QTY.
1	B5381	Cover	1
2	B5384	Riser assembly	1
3	B5387	Hinge	1
4	J3232	Handle	1
5	B5388	Lid bracket	2
6	J23073	Rubber latch strap	2
7	B23074	Anchor bracket	2
8	J15443	Picker pin, 1/4 x 1-1/2”	2
9	J1419	Cotter pin, 1/16 x 3/4”	2
10	J5666	Clamp, 5/16”	4
11	J0504	Bolt, 1/4 - 20 x 1/2”	10
12	J09923	Flange nut, 1/4”	10
13	J70955	Vinyl edge guard (Not shown)	1

Attach two clamps (Item 10) to hinge (Item 3) that was factory-attached to lid and then attach them to outside of pre-assembled manhole riser (Item 2) using 1/4 – 20 x 1/2” bolts (Item 11) and 1/4” flange nuts (Item 12). Ensure lid will open away from sidewall ladder/platform for ease of access into bin through manhole. Insert bolts from inside of riser as shown. Tighten 1/4" hardware after ensuring lid will open and close with ease. **NOTE:** Notches in top of riser eliminate interference between hinge and riser as lid is closed.

Attach vinyl edge guard (Item 13) to top edge of riser. Cut vinyl edge guard over notches on hinge side of riser to avoid interference with hinge.

Attach rubber latch straps (Item 6) to factory-attached anchor brackets (Item 7) and secure each with a picker pin (Item 8) and cotter pin (Item 9).

Ensure rubber straps secure lid by locking it down on riser.

Poly Roof Vent Assembly

Follow instructions on this and next page to install Poly Roof Vent. If using optional snow guard, attach as shown in Fig. 28 before screen is attached to vent. See Fig. 29 and related instructions for attaching braces to vents on bins in ASCE 7-16 Code, 136 mph or higher wind zone.

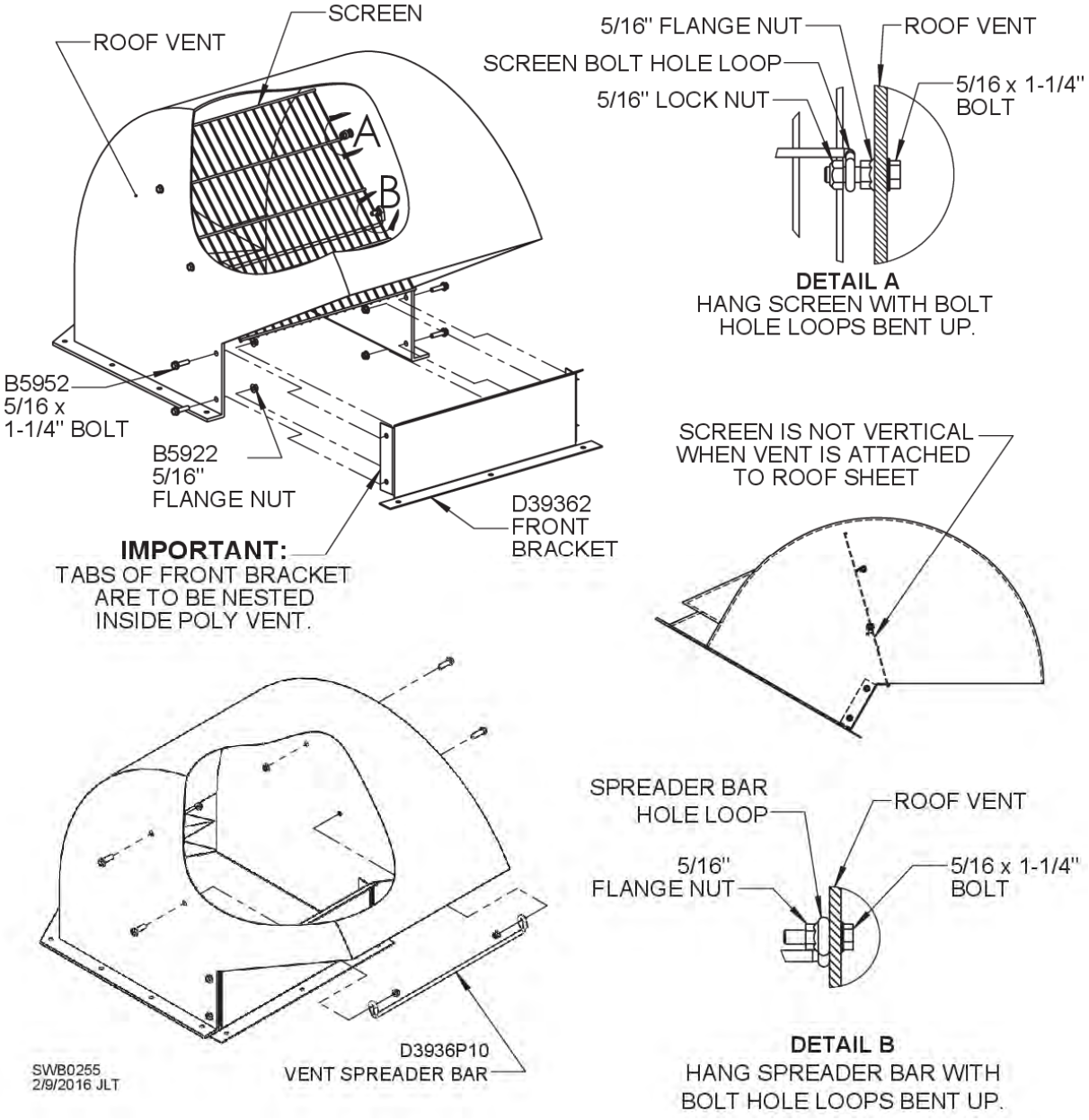


Fig. 26

Insert 5/16 x 1-1/4” bolts into pivoting screen holes from outside in as shown above. Tighten to poly vent with 5/16” flange nuts. Work the pivoting screen bolt hole loops over the 5/16 x 1-1/4” bolts with loops bent up as shown in Detail A. Screen should be attached so it will be at a slight angle when vent is attached to roof. Screen should not be vertical. Fasten 5/16” lock nuts to ends of 5/16” bolts as shown above to ensure screen stays in place and can pivot freely on bolts. Attach vent spreader bar as shown above using 5/16” bolt and flange nut. Ensure loops are bent upward.

Tabs of front bracket should be nested inside of poly vent. Apply butyl caulk to front edges of roof vent to ensure a watertight seal when front bracket is fastened.

Attach front bracket to poly roof vent using 5/16 x 1-1/4” bolts and 5/16” flange nuts. Tighten all hardware.

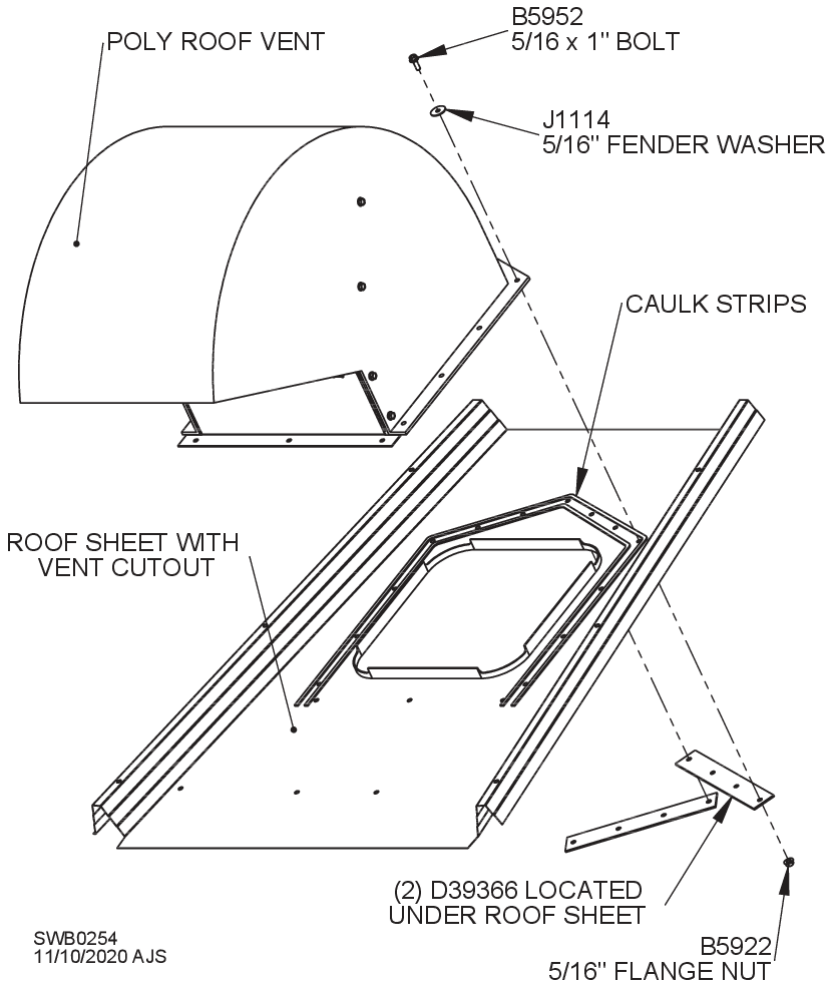


Fig. 27

Apply two strips of butyl caulk around cutout, one on each side of mounting holes, as shown in Fig. 27. Additional butyl caulk is provided to apply a double stack on top side of roof vent cutout. Apply butyl caulk close to mounting holes, leaving a 1” gap around outside strip.

Attach roof vent and two inside support brackets (D39366) to roof sheet using 5/16 x 1-1/4” bolts, 5/16” fender washers and 5/16” flange nuts as shown in Fig. 27. Use 5/16” fender washers on top side of poly flange. **NOTE**: To prevent damage to poly roof vent flanges, secure vent to roof by tightening nuts on underside of roof sheet instead of tightening bolts on top side. To prevent puckering of vent flanges, do not over-tighten nuts.

Check sealant along top side of roof vent base for any gaps or pockets. Apply a bead of tube caulk (not provided) along top side of base to ensure a watertight seal.

IMPORTANT: Check caulk along top side of base yearly and re-apply as needed to prevent leakage.

Attaching Optional Snow Guard & Vent Braces

Attach optional snow guard to vent screen as shown in Fig. 28 using 5/16” hardware.

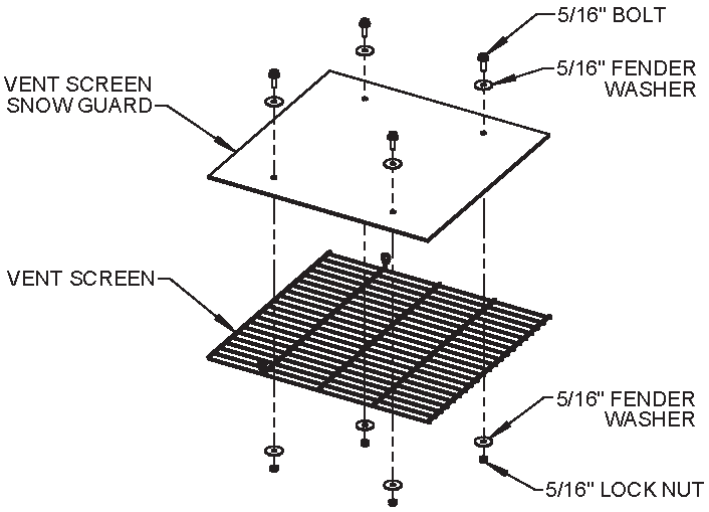


Fig. 28

Braces for Vents in 136 mph or Higher Wind Zones

Add braces to poly roof vents to provide greater stability on bins in ASCE 7-16 Code, 136 mph or higher wind zone.

Adjust braces so that holes on flat ends will attach to sides of roof vent and to top of roof sheet ribs as shown in Fig. 29. Position braces so they are spaced out as much as possible.

After ensuring vent brace alignment, drill holes in sides of roof vent and top of roof ribs.

Use 5/16” hardware to attach D3936P7 braces to all four (4) corners of roof vent.

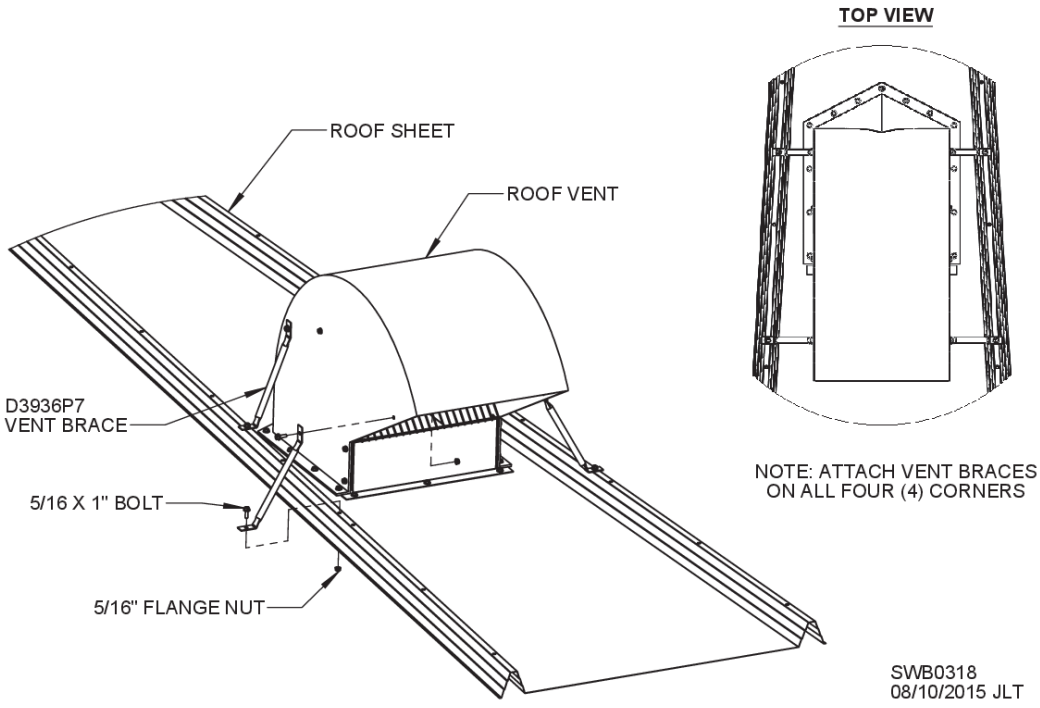


Fig. 29

Tapered Poly Roof Vent Assembly

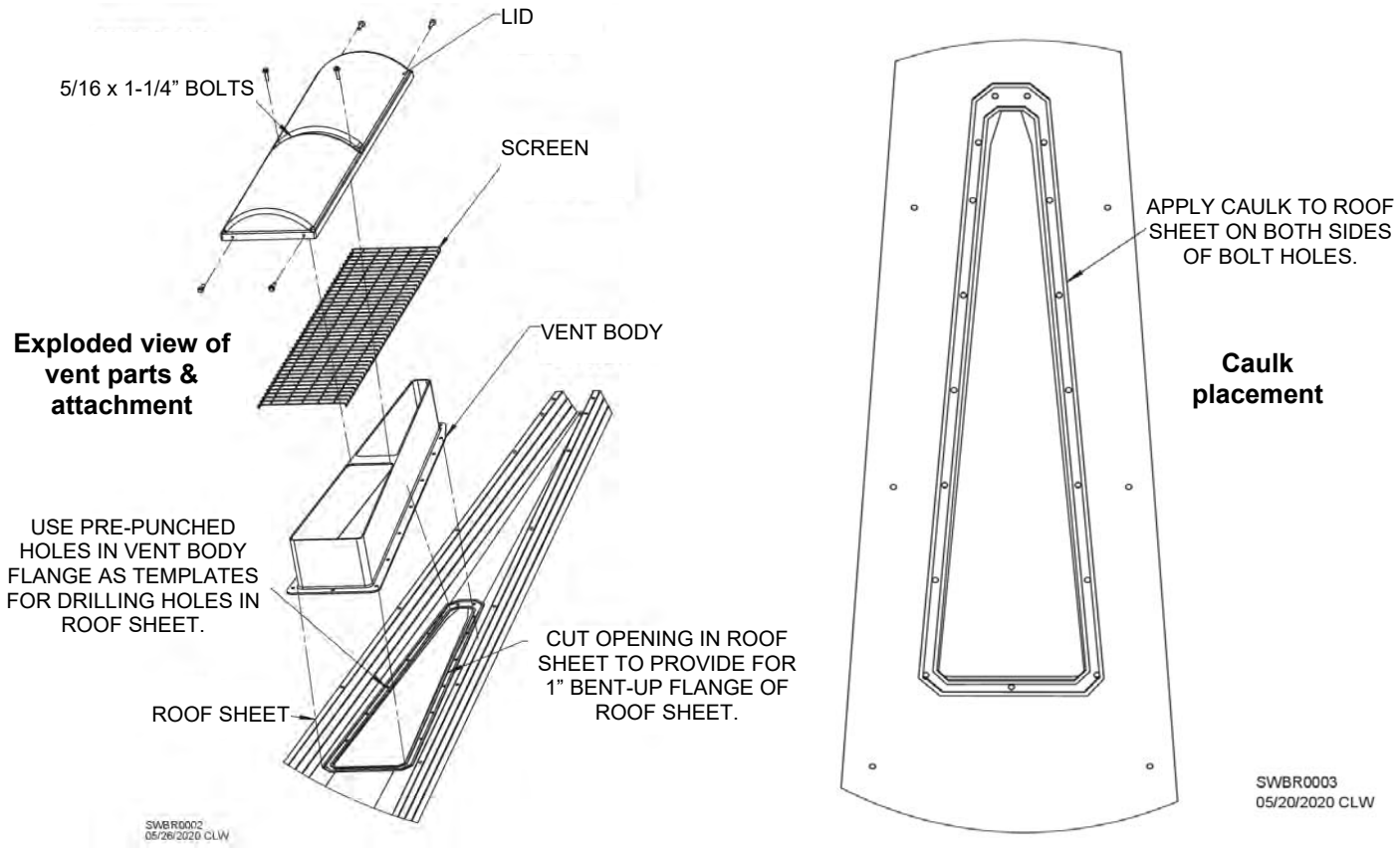


Fig. 30

Position pre-assembled vent close to peak of bin, leaving enough room to attach vent to flat area of roof sheet and allow for drainage around vent. Remove lid and screen by unscrewing six (6) 5/16 x 1-1/4" bolts from nut inserts in body of vent. Use inside of vent wall as a guide for marking roof sheet cutout opening. Draw lines for cutout 1" inside of vent sides. Set vent body aside. Cut vent hole in roof sheet, bending edges upward to create a flange that will help prevent water from leaking in. Position vent body over cutout. Use pre-punched holes in vent flanges as templates for drilling attachment holes in roof sheet. Set vent body aside.

Apply two strips of butyl caulk around cutout, with one strip on each side of mounting holes.

Attach body of vent to roof using 5/16 x 1-1/4" bolts, 5/16" fender washers and 5/16" flange nuts.

NOTE: To prevent damage to poly roof vent flanges, secure vent to roof by tightening nuts on underside of roof sheet instead of tightening bolts on outside.

Check sealant along top end and sides of vent body for any gaps or pockets. Apply a bead of tube caulk (not provided) along top end and sides of body to ensure a watertight seal.

Re-attach lid and screen to body of vent using hardware previously removed.

IMPORTANT: Check caulk around vent yearly and re-apply as needed to prevent leakage.

Single Temperature Cable Support Brackets

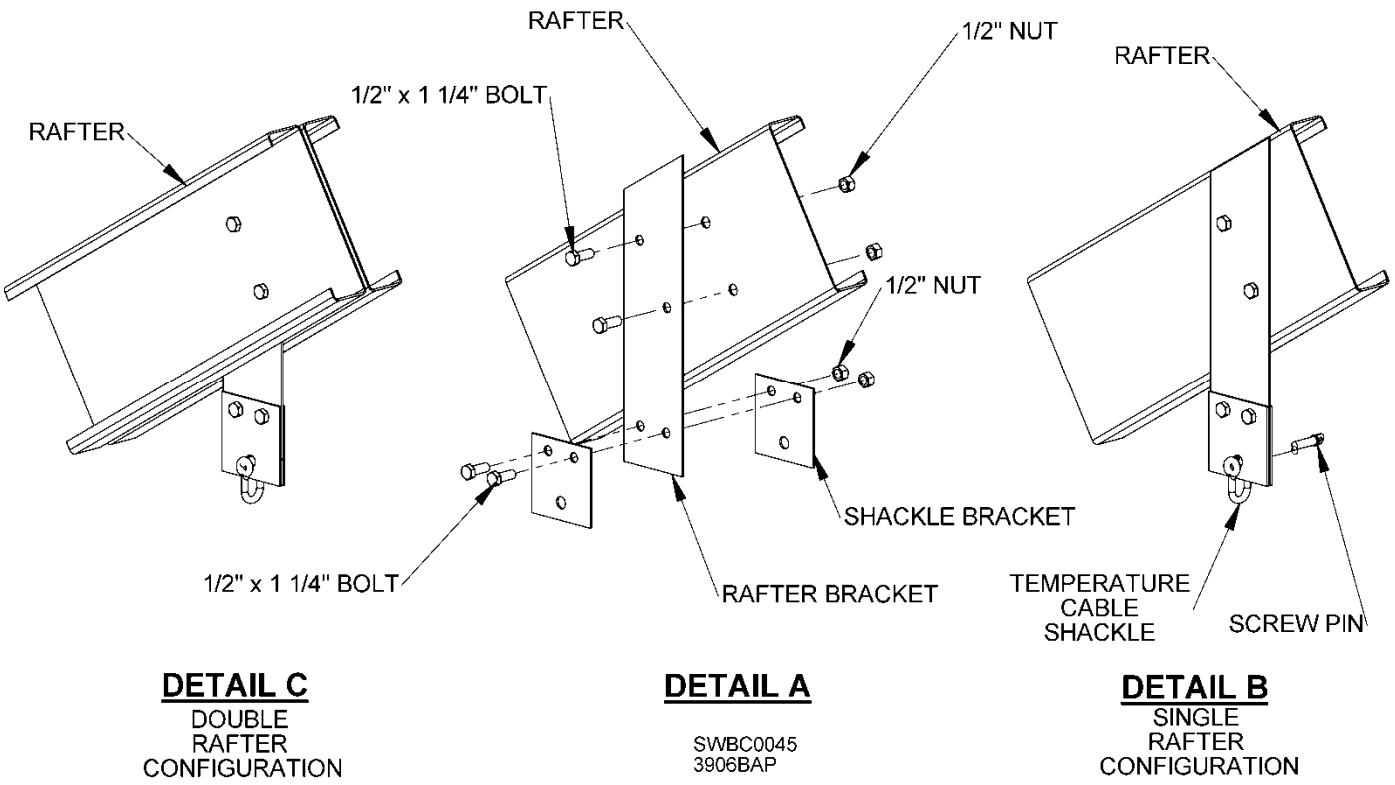


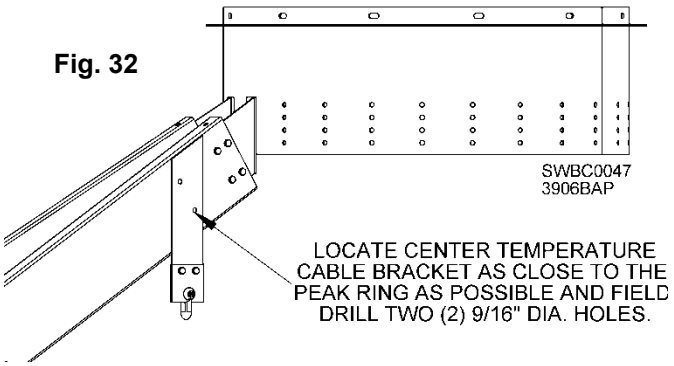
Fig. 31

Single temperature cable support brackets can be attached to a single or double C-channel rafter. See Figs. 35-38 for cable locations based on bin diameter. Attach each bracket to rafter using 1/2 x 1-1/4" bolts and 1/2" flange nuts and attach two shackle brackets to each rafter bracket with 1/2 x 1-1/4" bolts and 1/2" flange nuts. See Detail A of Fig. 31. Tighten all hardware. Detail B shows a single C-channel rafter. Detail C shows a rafter bracket placed between back-to-back C-channel rafter sections. After attaching temperature cable to shackle, attach shackle to shackle brackets with screw pin. See Detail B.

IMPORTANT: Install only one temperature cable bracket per rafter. Do not attach more temperature cable hangers than specified. See operation instructions from temperature cable provider.

If a center temperature cable bracket is required, it must be placed as close to peak ring as possible. Field-drill two (2) holes in rafter (single or double) using rafter bracket as drill guide. See Fig. 32. Attach rafter bracket, shackle brackets, temp cable and shackle as described above.

Fig. 32



Double Temperature Cable Support Brackets

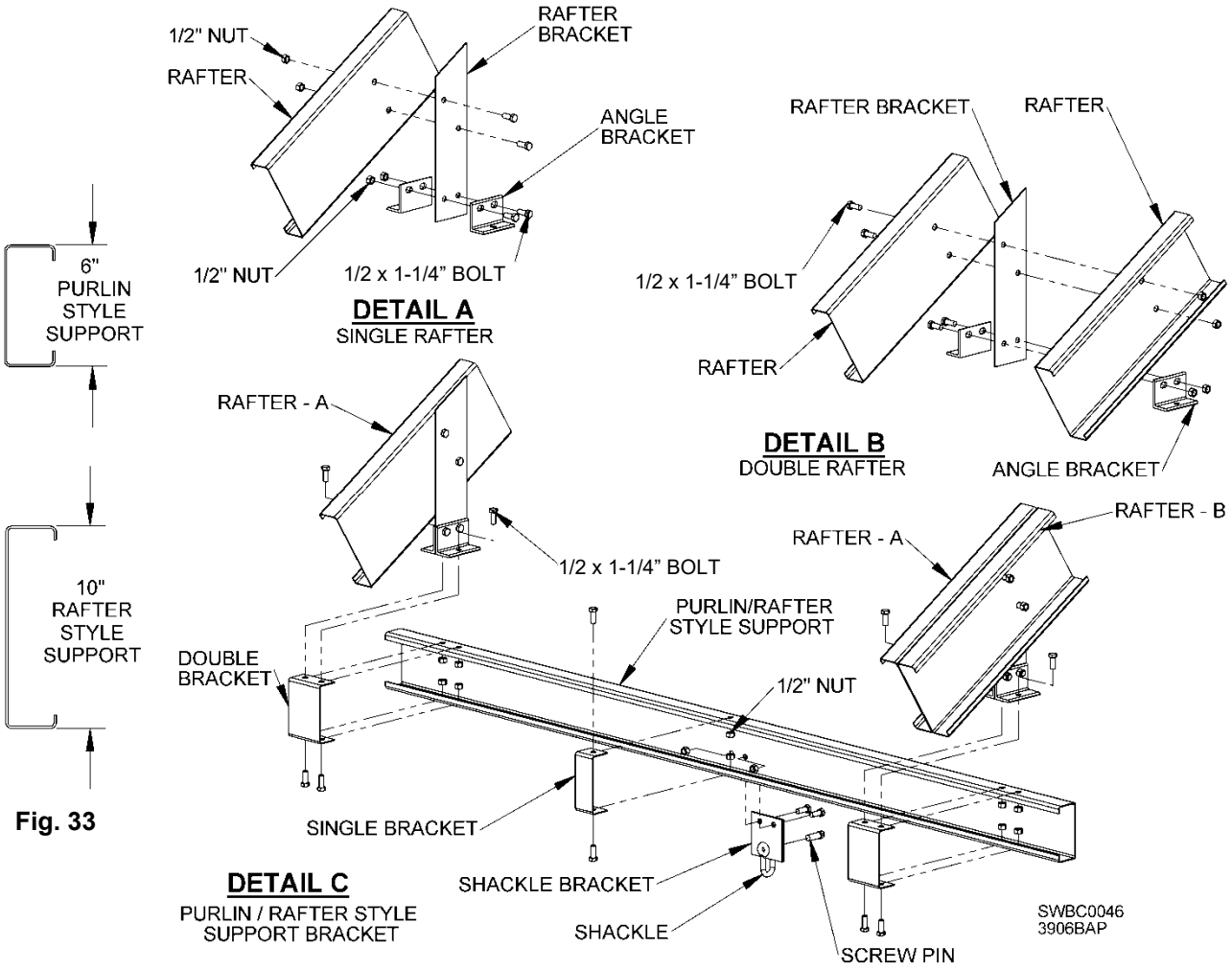


Fig. 33

Fig. 34

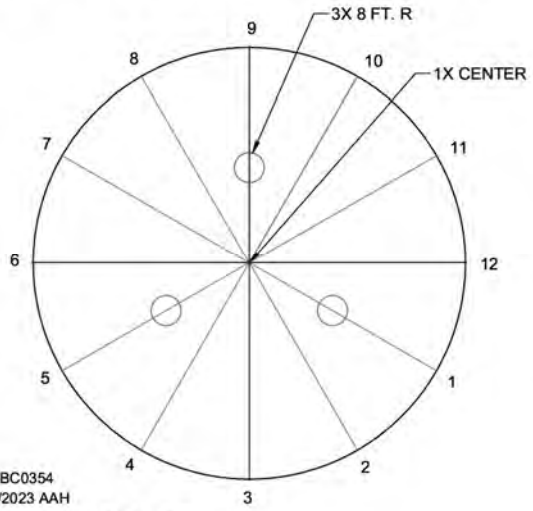
Double temperature cable support brackets can be attached to a single or double C-channel rafter. See Fig. 39 or Fig. 40 for cable locations based on bin diameter. Attach each rafter bracket to rafter using 1/2 x 1-1/4" bolts and 1/2" flange nuts. Attach two angle brackets to each rafter bracket using 1/2 x 1-1/4" bolts and 1/2" flange nuts. See Details A and B of Fig. 34. Tighten all hardware. Detail A shows a single C-Channel rafter. Detail B shows a rafter bracket between back-to-back C-channels of a double rafter.

Attach double brackets, single bracket and shackle bracket to purlin/rafter style support with 1/2 x 1-1/4" bolts and 1/2" flange nuts as shown in Detail C of Fig. 34. Depending on diameter and height of bin, two different supports are used: a 6” purlin-style support or a 10” rafter-style support. See Fig. 33. Attach purlin/rafter-style support assembly to angle brackets using 1/2 x 1-1/4" bolts and 1/2" flange nuts. Tighten all hardware. After attaching temperature cable to shackle, attach shackle to shackle brackets with screw pin. See Fig. 34 Detail C.

IMPORTANT: Install only one temperature cable hanger per rafter bay. Do not attach more temperature cable hangers than specified. See operating instructions from temperature cable provider.

Figs. 35-40 show temperature cable layouts for 36’ to 60’ diameter bins.

36' TEMP CABLE LAYOUT -- 4 CABLES



1 CABLE ON CENTER
3 CABLES ON 8 FT. RADIUS

Fig. 35

39' TEMP CABLE LAYOUT -- 5 CABLES

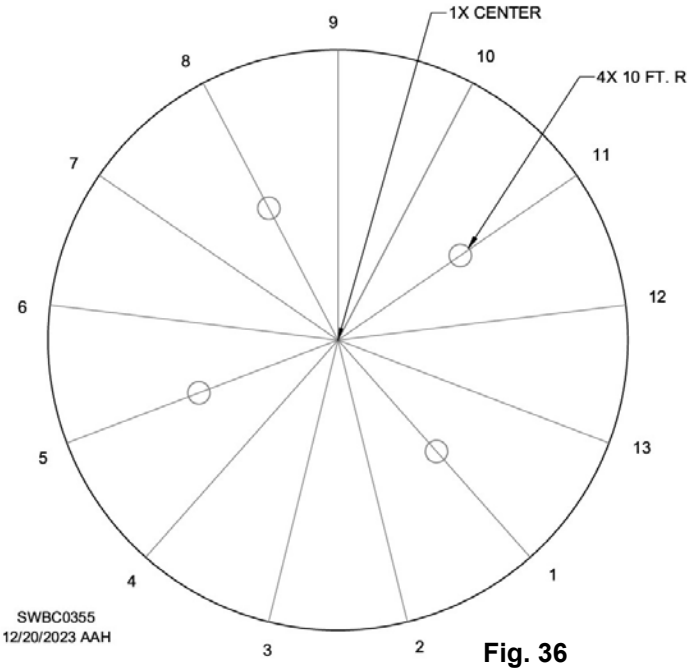


Fig. 36

1 CABLE ON CENTER
4 CABLES ON 10 FT. RADIUS

42' TEMP CABLE LAYOUT -- 5 CABLES

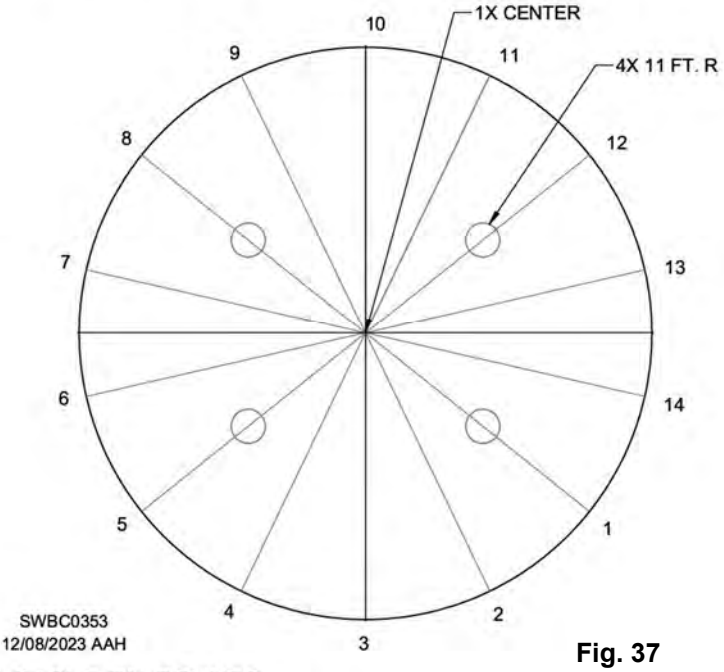
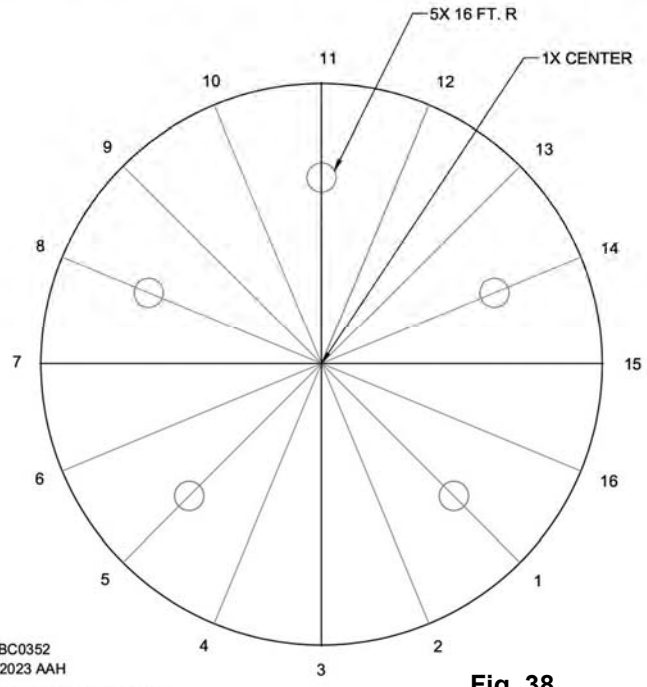


Fig. 37

1 CABLE ON CENTER
10 CABLES ON 11 FT. RADUS

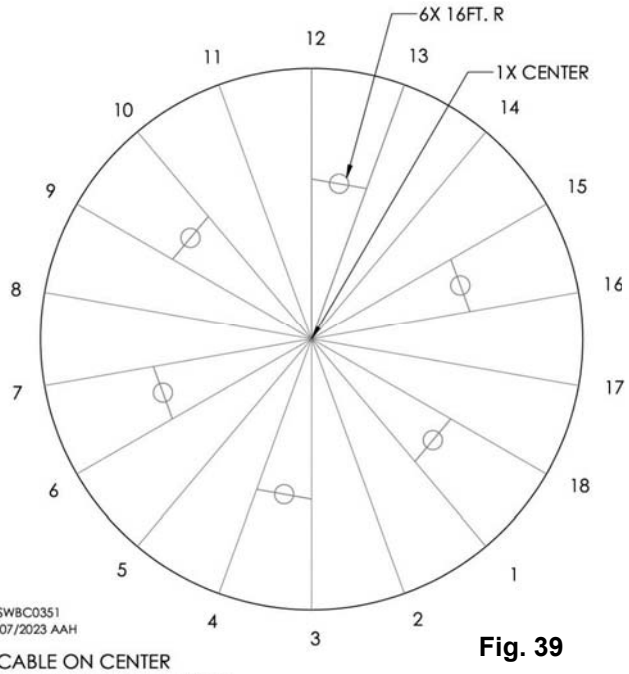
48' TEMP CABLE LAYOUT -- 6 CABLES



1 CABLE ON CENTER
5 CABLES ON 16 FT. RADIUS

Fig. 38

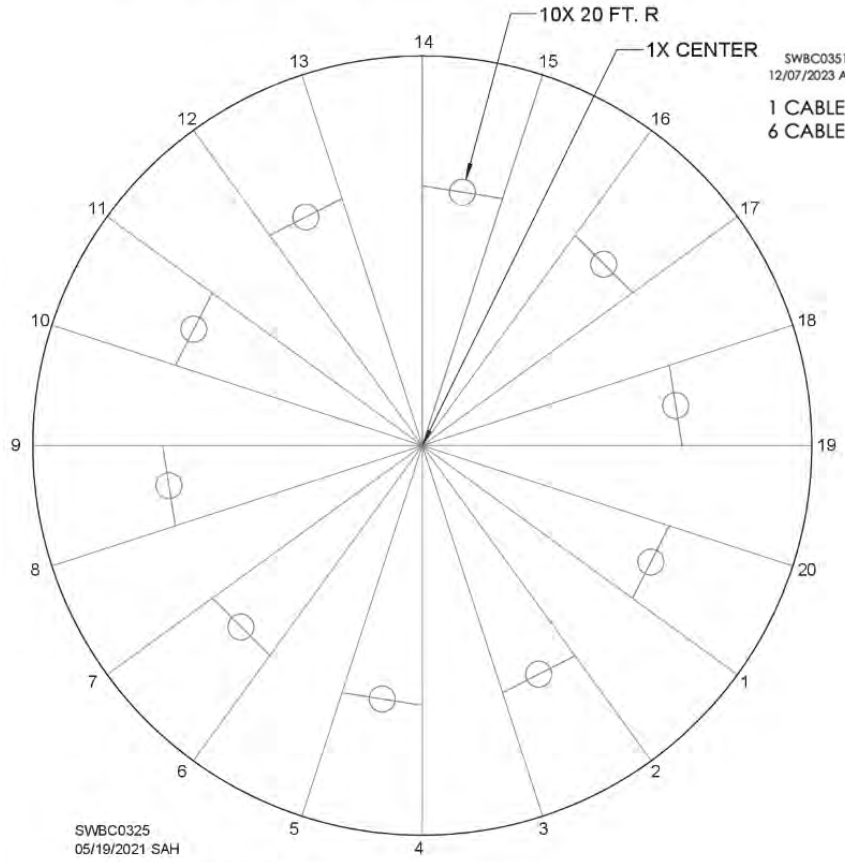
54' TEMP CABLE LAYOUT -- 7 CABLES



1 CABLE ON CENTER
6 CABLES ON 16 FT. RADIUS

Fig. 39

60' TEMP CABLE LAYOUT -- 11 CABLES



1 CABLE ON CENTER
10 CABLES ON 20 FT. RADIUS

Fig. 40

Attaching Octagon Lid Weldment

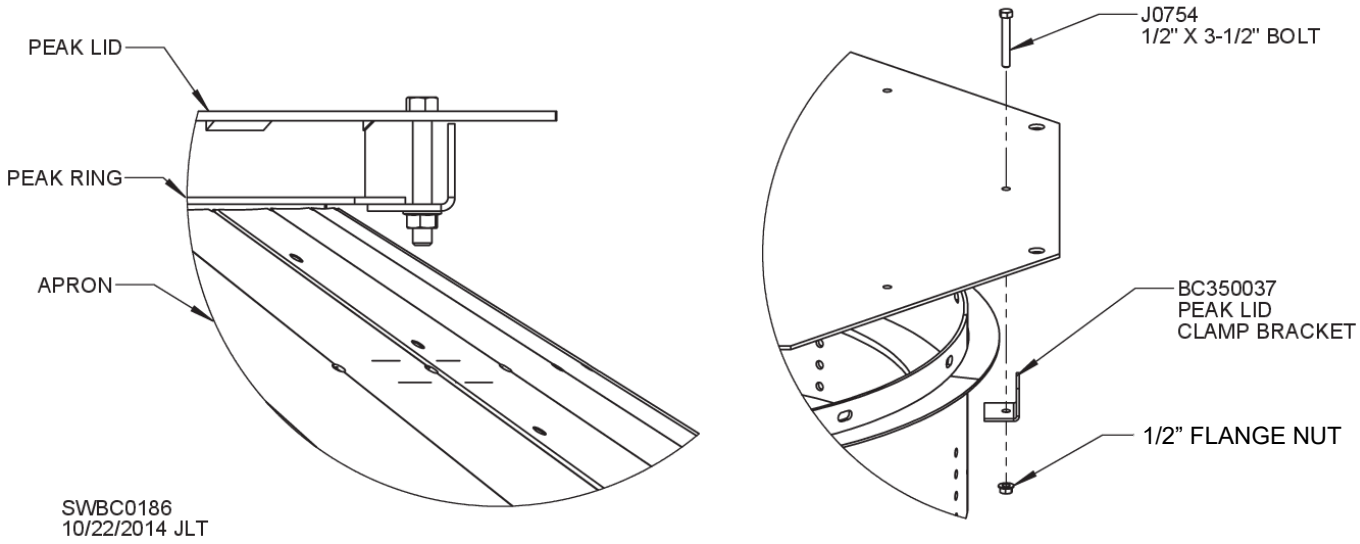


Fig. 41

Attach octagon lid weldment to top of peak ring weldment. See Fig. 41. Top of peak ring weldment will fit between inner and outer rings of lid weldment. Insert 1/2 x 3-1/2" bolt through lid and clamp bracket as shown in Fig. 41 and secure with 1/2" flange nut. A total of four clamp brackets are provided. They should be positioned equidistantly from one another. Ensure all four brackets are tight against flange of peak ring as shown.

DISCLAIMER: If catwalk or other accessories will be attached to lid, lid must be welded to peak ring. Number and type of welds must be determined by customer (or its retained engineer or construction supervisor). Factors to consider include, but are not limited to, live loads, dead loads and wind loads. Weight of catwalk or other accessories must be supported by a structure other than bin. Support structure must be designed by a professional engineer. Sukup Manufacturing Co. will not be responsible for any damage to a product, including, but not limited to, any damage that results from inadequate or improper bracing or welding methods and materials.

Cut appropriately sized hole into top of lid weldment with a torch or plasma cutter to allow for downspout. To ensure watertight seal, caulk all around after material cools. Apply touch-up paint if needed.

Knot-Passing Pulley & Restraint Anchor Installation

For added safety, a knot-passing pulley is mounted to rafter near peak of roof rated for 15,000 pounds or more. Pulley is intended to be used with a lifeline and safety harness (neither supplied by Sukup Manufacturing Co.). A feeder line should pass through knot-passing pulley and through restraint anchor at eave of bin near manhole. See Fig. 42. Feeder line is used to pull lifeline through knot-passing pulley for safety harness attachment. Do not attach safety harness to feeder line. Use safety equipment according to manufacturers' instructions. Refer to Sukup Grain Bin Operation Manual Safety Section and www.osha.gov for additional safety information.

NOTE: For ease of installation, it is best to install knot-passing pulley during assembly of roof substructure and restraint anchor during assembly of first (top) ring of bin.

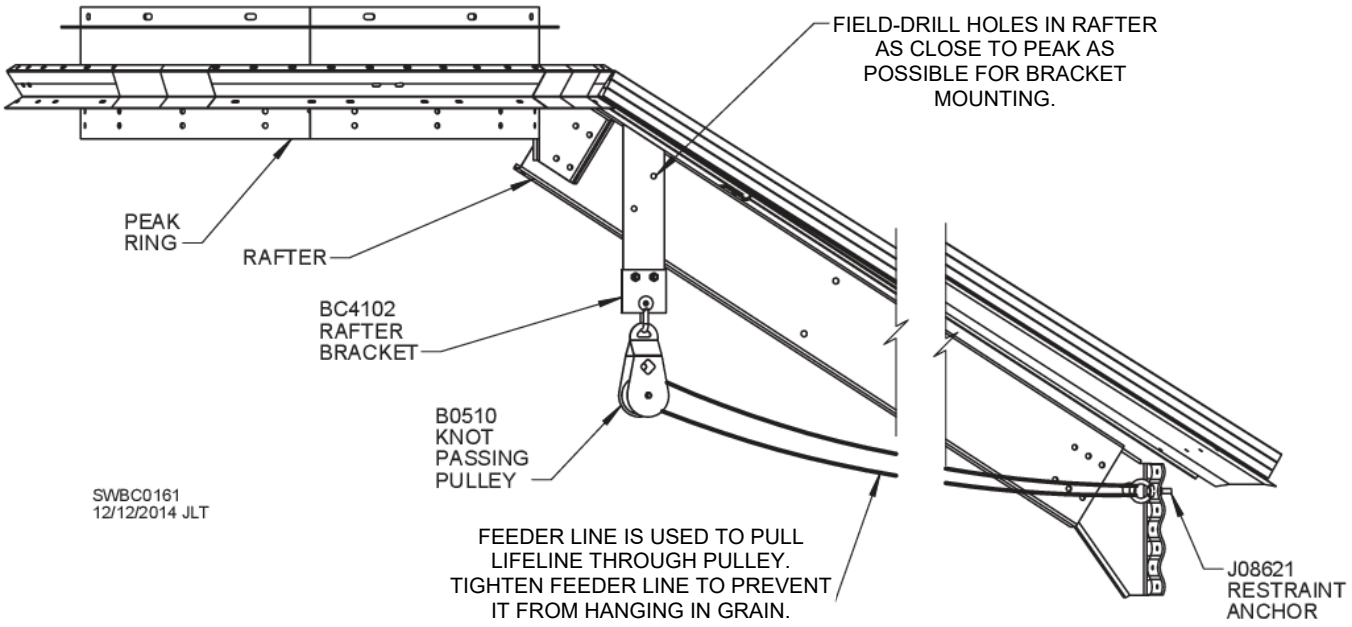


Fig. 42 – Mount knot-passing pulley close to peak ring (single rafter shown)

Each kit contains knot-passing pulley, restraint anchor, rope for feeder line, brackets, decals and hardware needed for mounting pulley and restraint anchor.

Table 10

KIT #	BIN DIAMETER, ROOF RATING	ROPE (FT.)
B0584	18'-24', 15K & 30K	24
B0579	27'-39', 15K, 30K & 50K	40
B0546	42'-60', 15K, 30K & 50K	66

IMPORTANT: Attach knot-passing pulley near peak so pulley will align with restraint anchor on sidewall near manhole. Ensure that any temperature cables in bin will not interfere with feeder line.

Knot-passing Pulley Installation: Attach knot-passing pulley to rafter bracket as shown in Fig. 42. Bracket should be mounted to rafter as close to peak ring as possible. Mounting of bracket will depend on type of rafter. For single C-channel rafter, field-drill two (2) 9/16” holes using rafter bracket as drill guide. See Fig. 43. A double rafter (Fig. 44) requires field-drilling two (2) 9/16” holes in back-to-back C-channels, with bracket mounted between channels. For I-beam roof rafter, drill four (4) 9/16” holes and mount angle brackets as shown in Fig. 45, with pulley bracket mounted between angle brackets. In all cases, 1/2” bolts and nuts are used to attach brackets, and a shackle is used to hang knot-passing pulley from rafter bracket.

Fig. 43 - Mounted to single rafter

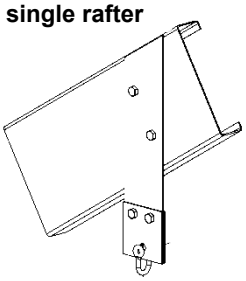


Fig. 44 - Mounted to double rafter

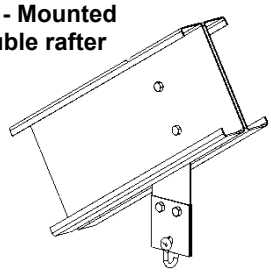
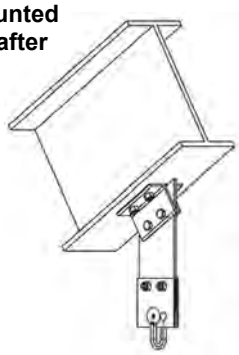


Fig. 45 - Mounted to I-beam rafter



Restraint Anchor Installation: Install J08621 restraint anchor eyebolt 2” below horizontal line of eave clip bolt holes on inside wall of bin. See Fig. 46. Drill a 1/2” hole below manhole roof sheet rib. Insert eyebolt as shown, making sure ring is perpendicular to ground, and secure with 1/2" washer and 1/2" flange nut.

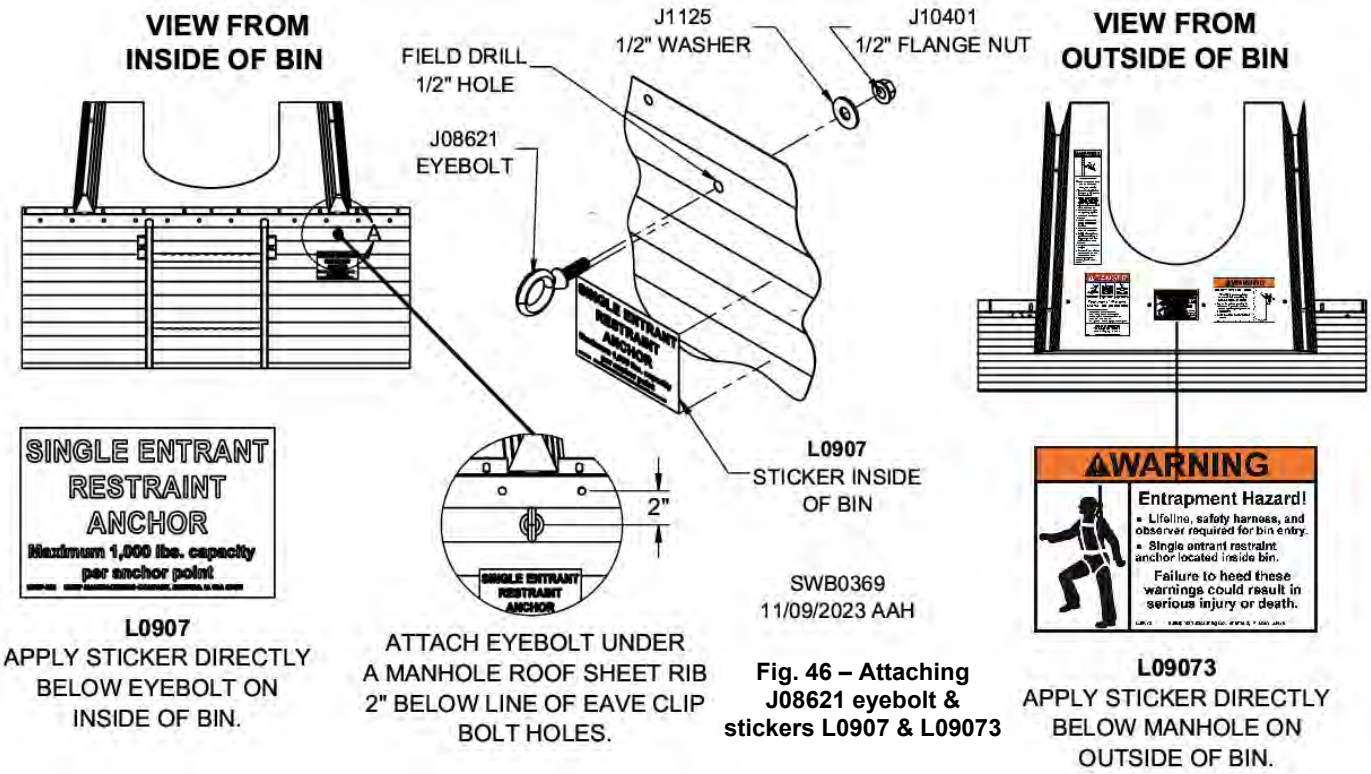


Fig. 46 – Attaching J08621 eyebolt & stickers L0907 & L09073

Loop feeder line through pulley and restraint anchor, trim as needed, and tie ends together so there is minimal sag. See Fig. 42.

Place decal L0907 on inside of bin just under eyebolt. See Fig. 46. Place decal L09073 below manhole on outside of bin. **NOTE:** Factory-applied safety decals on manhole sheet also shown.

Commercial Stiffened Sidewall Assembly

Each Sukup commercial bin is shipped with a sidewall color chart similar to chart shown below. This chart contains all information about sidewall gauges, stiffener gauges and bolt sizes. Builder must refer to this information. Some bins have two stiffeners per sidewall sheet and others have three. Assembly instructions in this section are the same for both except where noted.

RING #	WALL GA	WALL COLOR	WALL PUNCH	BOLT SIZE	STIF GA	PART #	BOLT SIZE	SPL GA	PART #	BOLT SIZE	WIND RING
1	15	WHITE	2	3/8 x 1	14	BC5072	3/8 x 1				@
2	17	BLUE	2	3/8 x 1				14	BC5077	3/8 x 1 1/4	
3	17	BLUE	2	3/8 x 1	15	BC5087	3/8 x 1				@
4	15	WHITE	2	3/8 x 1				15	BC5097	3/8 x 1 1/4	
5	14	PINK	2	3/8 x 1	15	BC5087	3/8 x 1				@
6	14	PINK	2	3/8 x 1					0057	3/8 x 1 1/4	
7	13	YELLOW	2	3/8 x 1	12	BC5047	3/8				@
8	13	YELLOW	2	3/8 x 1					057	3/8 x 1 1/4	
9	12	BLK/PRPL	2	3/8 x 1	12	BC5047					@
10	11	PURPLE	2	7/16 x 1 1/4			7/16		BC50371	3/8 x 1 1/4	
11	11	PURPLE	2	7/16 x 1 1/4	10	BC50272	7/16 x				@
12	10	GREEN	2	7/16				12I+A	BC50481	3/8 x 1 1/4	
13	10	GREEN	2	7/16	12	BC50473	7/16 x 1 1/4		BC51405		+
14	10	GREEN	2	7/16				12I+A	BC50481	3/8 x 1 1/4	
15	9	BROWN	2	7/16 x 1 1/4		BC50473	7/16 x 1 1/4		BC51405		+
16	9	BROWN	2	7/16 x 1 1/4				10I+A	BC50281	3/8 x 1 1/4	
17	8	ORANGE	3	7/16 x 1 1/4	10	BC50272	7/16 x 1 1/2		BC51405		
18	8	ORANGE	3	7/16 x 1 1/4				10I+A	BC50281	3/8 x 1 1/4	
19	8	ORANGE	2	7/16 x 1 1/4	6	BC5107	7/16 x 1 1/2		BC51405		
20	13-13	YELLOW / Y	3	7/16 x 1 1/4			7/16 Dbl Stud	10I+A	BC50281	3/8 x 1 1/4	
21	13-13	YELLOW / YELLOW	3	7/16 x 1 1/4	2	BC5127	7/16 Dbl Stud		BC51405		
22	13-13	YELLOW / YELLOW	3	7/16 x 1 1/4				8I+A	BC50031	3/8 x 1 1/4	
23	13-12	YELLOW / BLACK	3	7/16 x 1 1/4	2	BC5122-01	7/16 Dbl Stud		BC51405		
24	13-12	YELLOW / BLACK	3	7/16 x 1 1/4		BC51221DA					

@ = Standard Sidewall Ring Location + = Extra Sidewall Ring for Sidedraw System
I = Full Length Insert A = Stiffener Splice Backing Angle **Dbl Stud=DOUBLE END STUD BOLT™**

Table at right shows colors used to indicate sidewall and stiffener gauges.

SIDEWALL GAUGE	COLOR	STIFFENER GAUGE
20	RED	
18	GRAY	
17	BLUE	2
15	WHITE	15
14	PINK	14
13	YELLOW	6
12	BLACK	12
11	PURPLE	
10	GREEN	10
9	BROWN	
8	ORANGE	8

IMPORTANT: Sukup grain bins require a snug fit connection. A snug fit is when steel sheets are fully drawn together, allowing for a thin layer of caulk and compressing rubber washers to seal bolt holes. A snug fit is usually attained with a few impacts of an impact wrench. Use table below as a guideline for gauging impact wrench effectiveness. Wrench should be able to achieve stated torque on a dry fit connection (no caulk between sheets).

BOLT	GRADE	FT-LBS
3/8	8	25-35
7/16	8	45-55
1/2	8	65-80

IMPORTANT: At no time should any bolts be substituted for those supplied by Sukup Manufacturing Co.

IMPORTANT: If bin door and unload system will be in same sidewall sheet, ensure that sheet is reinforced around cutout for unload system. See Figs. 21 and 22 and related instructions for cutout reinforcement.

Fastener Usage

Two types of nut – flange and hex – are used on Sukup commercial bin bolts, depending on size of bolt and connection for which bolt is used. Flange nuts are used on all bolts connecting stiffeners to sidewall sheets and on all bolts connecting laminated stiffeners (These bolts are inserted from inside of bin). See table below for nuts to use on bolts connecting sidewall sheets together (These bolts are inserted from outside of bin).

	3/8”	7/16”	1/2"
Stiffener	Flange	Flange	Flange
Sidewall	Flange	Hex	Hex

NOTICE: To prevent washer damage and moisture leakage, hold **BOLT** stationary while tightening. Spin **NUT** only! See Fig. 1.

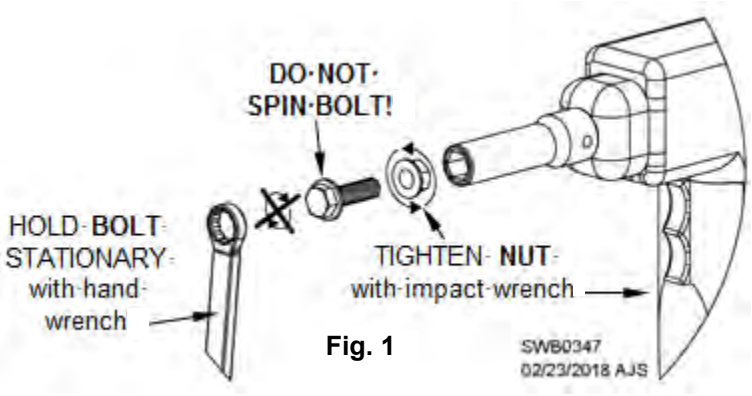


Fig. 1

Jack Bolt Usage

Please read information on jack bolts carefully to understand quantity supplied. Quantity depends on diameter and height of bin. Quantity is based on jacks having four (4) bolt holes in their attaching brackets. Number of jacks per ring is based on diameter of bin bolt used in that particular ring. Quantity of jack bolts is determined by multiplying number of jacks used in each ring by four (4) bolts.

Listed below are three (3) diameters of jack bolts used on Sukup bins. Diameter of jack bolt is based on diameter of bin bolt. Longer jack bolts are needed as thickness of sidewall increases. **NOTE**: Number of jacks per sidewall sheet is based on weight of structure being lifted. Generally, more jacks will be used as more rings are added.

3/8” Bin Bolt	**1 Bin Jack per 1.5 Sidewall Sheets**	**3/8” x 2” Jack Bolts**
7/16” Bin Bolt	**1 Bin Jack per 1 Sidewall Sheet**	**7/16” x 2” Jack Bolts**
1/2” Bin Bolt	**1 Bin Jack per 1 Sidewall Sheet**	**1/2” x 2-3/4” Jack Bolts**

Jack bolts are supplied without reducing quantity of standard-size bolts. Be sure to use bolts sized for heavier sidewall sheets as rings are added during construction.

Special Sidewall Sheets

Up to three special sheets are used on Sukup commercial bins to transition from smaller bolts in upper rings to larger bolts in lower rings. These sheets contain different size holes and/or horizontal row punch patterns and are distinguished by paint schemes as follows: Purple/Black (shown below); Brown/Green; Purple/Orange.

Special 12ga (Purple/Black) Sheets

These sheets are used to transition from a 12ga (upper) and 11ga (lower) ring of sheets. Two sizes of holes are punched in the 12ga Purple/Black sheet. As shown in Fig. 2, 13/32” holes are punched in top horizontal row and vertical columns, while 15/32” holes are punched in bottom horizontal row. This is done so 15/32" holes and 4-11/16” hole spacing on bottom of 12ga sheets will match top of attaching 11ga sheets with no additional drilling or reaming required.

NOTE: There is a specific top and a bottom to Purple/Black sheets and they are painted on top edge only, as shown in Fig. 2. Be sure to use 3/8” bolts in 13/32” holes and 7/16” bolts in 15/32” holes.

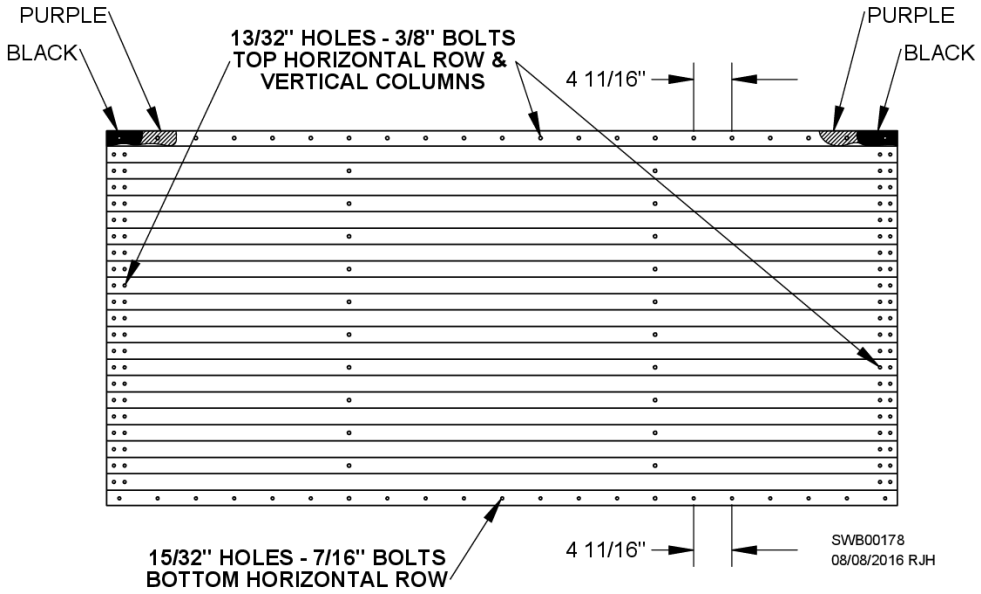


Fig. 2

Special 10ga Brown/Green Sheets

These sheets are used for horizontal seam spacing transition from 4-11/16” spacing (top of sheet) to 2-11/32” spacing (bottom).

Special 8ga Laminated Purple/Orange Sheets

These laminated sheets are used for going from 7/16” bolts (top of sheet) to 1/2" bolts (bottom). Holes in top horizontal row are 15/32”, while those in bottom horizontal row are 9/16”.

Sukup Logo Sheet

Type of Sukup logo sheet used on bin depends on number of stiffeners per sidewall sheet. Fig. 3 shows placement of logo sheet on bin with two stiffeners per sidewall sheet. Fig. 4 shows attachment of logo sheet on bin with three stiffeners per sidewall sheet.

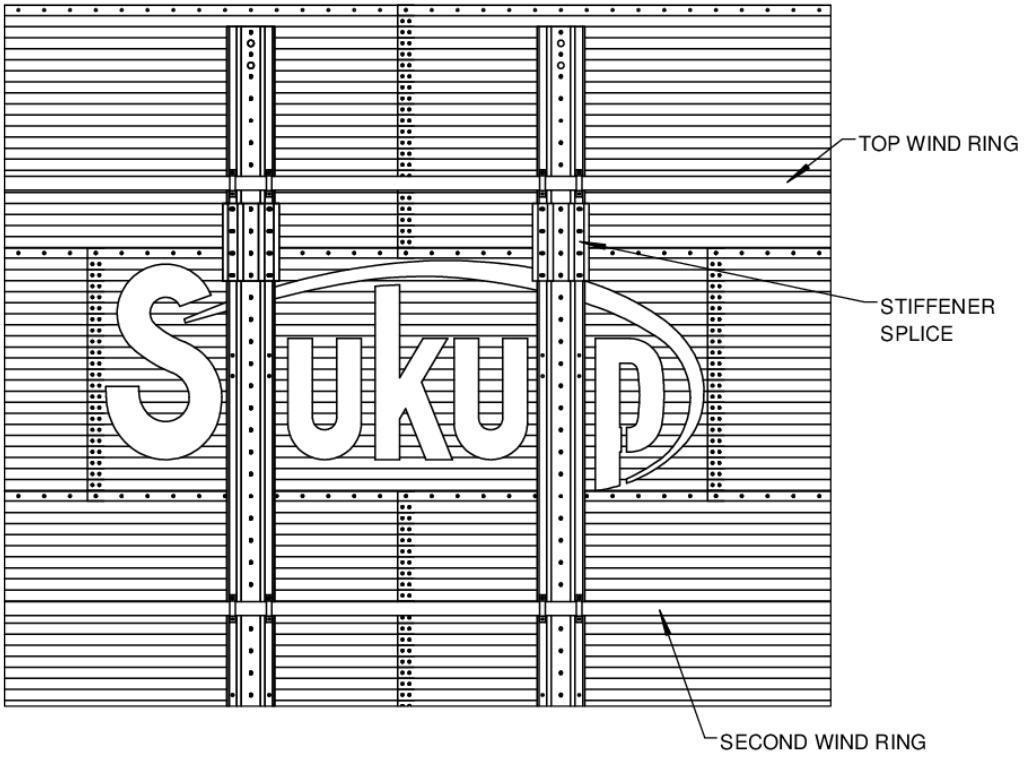


Fig. 3 – Attaching Sukup logo sheet to bin with two stiffeners per sidewall sheet

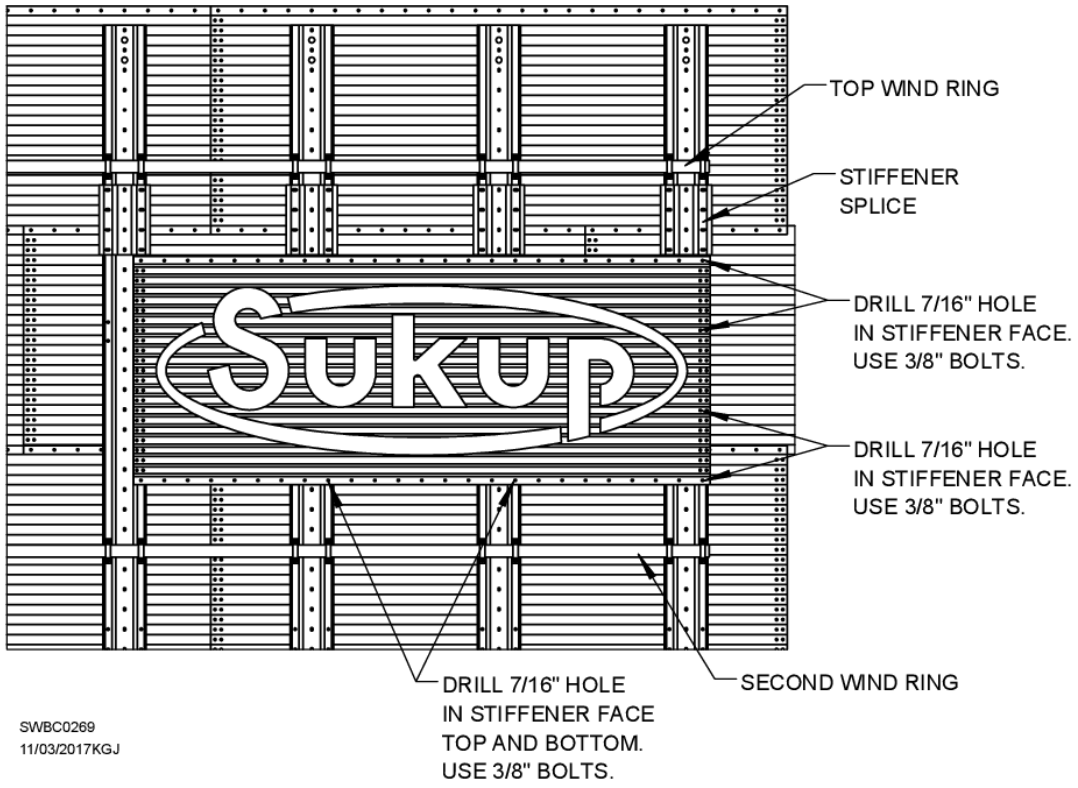


Fig. 4 – Attaching Sukup logo sheet to bin with three stiffeners per sidewall sheet

Assembly Instructions

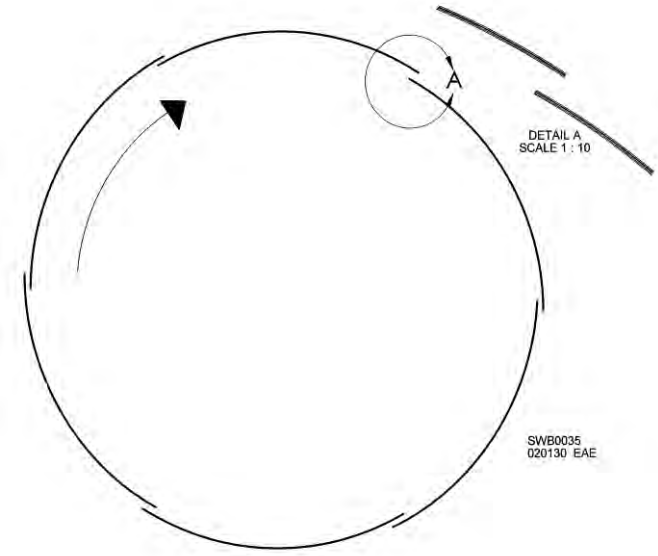


Fig. 5

Place sidewall panels around perimeter of foundation. Except for triple- and quadruple-laminated sheets, each sidewall panel will slightly lap inside of previous panel as shown in Fig. 5.

NOTES: Instructions show assembly proceeding clockwise. If working counterclockwise, ensure proper placement of caulk. Note that drawings below show view from inside of bin.

Wipe off vertical panel edges and apply caulk as shown in Fig. 6. Attach panels as shown using bolts listed on color gauge chart. Drawing also shows where caulk will be placed later when attaching panels for second ring.

Leave all bolts loose to finger-tight until first sidewall ring and roof are completely assembled.

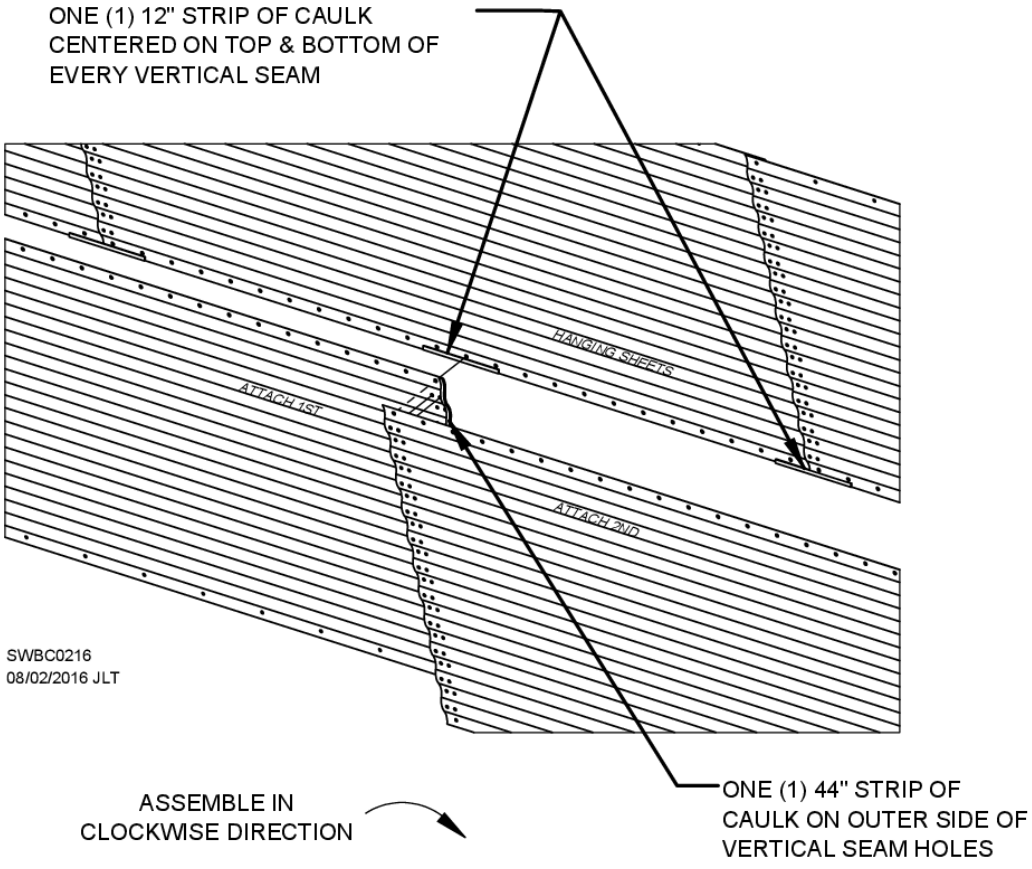


Fig. 6 – Applying caulk to single sidewall sheets

Align sidewall panels so stiffeners will align with anchor locations. Bins with even number of sidewall rings require two rings and an 83” starter stiffener. Bins with odd number of sidewall rings use 39” starter stiffener and require one ring be assembled.

Attach starter stiffeners to sidewall 4" below top of sidewall sheet as shown in Fig. 7. Use bolts and nuts specified by color chart. Roof rafters will attach at every other stiffener location on bins with two stiffeners per sidewall sheet, and at every third stiffener on bins with three stiffeners per sidewall sheet. For bins up to 105’ with even number of rings, install 83” stiffeners after roof is built.

NOTE: Top stiffener on a 135’ or 156’ dia. bin is always 39” regardless of number of rings. The next stiffener on a 135’ or 156’ dia. bin **with odd number of rings** is 88”. The next stiffener on a 135’ or 156’ dia. bin **with even number of rings** is 44”, followed by 88” stiffeners. See color chart.

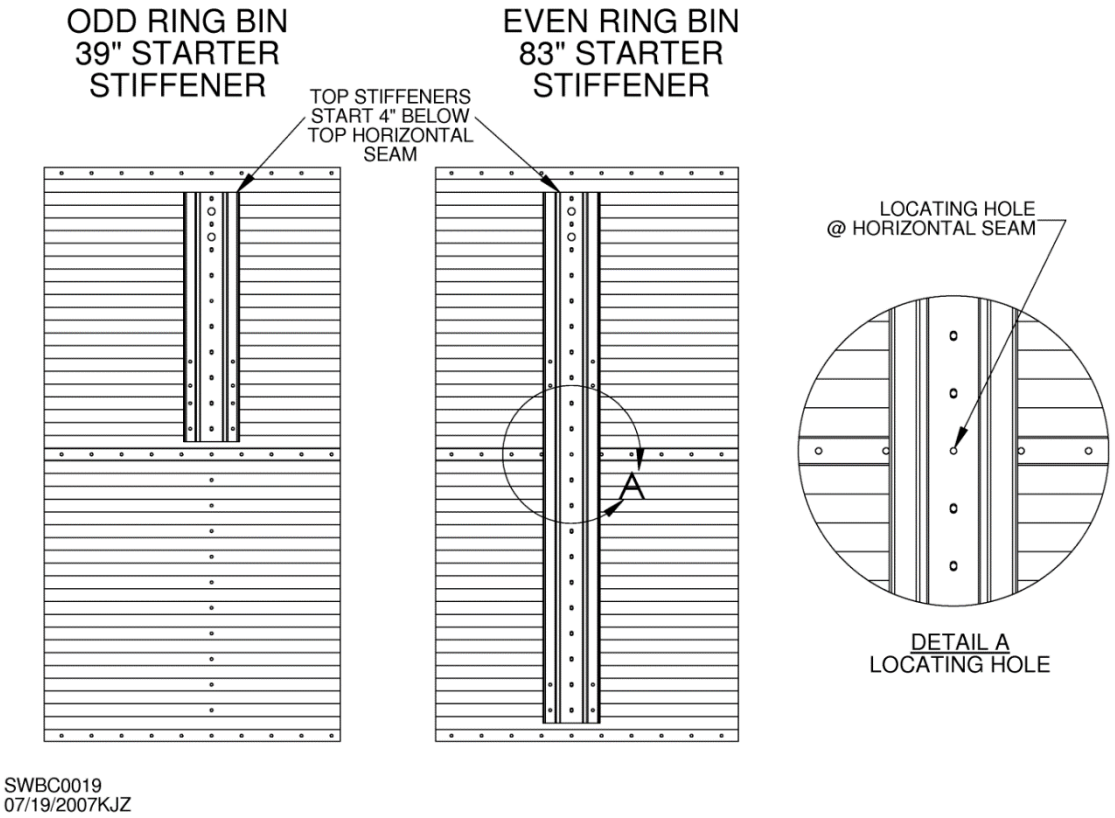


Fig. 7

NOTE: Top stiffener position is same for bins with odd or even number of sidewall rings.

After first (top) ring is complete, assemble roof as outlined in Roof Assembly section.

When roof assembly is complete, tighten all roof and sidewall bolts. See Ladders, Safety Cages and Platforms section for directions on attaching brackets for inside and outside ladders and/or safety cages and platforms. Install eave safety rails if so equipped.

Prepare next ring of panels by wiping clean and applying caulk as shown in Fig. 6. Ensure caulk for horizontal seams is between bottom bolt holes and edge of panel, and that caulk for vertical seams is at edge of panel as shown in Fig. 6.

NOTE: Sidewall sheets are painted on one edge only and correspond with color chart. For ease of erection, always hang sheets with painted edges up.

Attach lift brackets for jacks as recommended by jack manufacturer's specifications. Using appropriately rated erection jacks, raise bin.

WARNING: Never exceed jack manufacturer's stated capacities. Doing so could result in collapse causing death or serious injury.

Attach a second-ring panel to inside of two panels in first ring, inserting bolts in all but first and last holes in horizontal seam. **NOTE:** Bolts that mate into sidewall sheets must be inserted correctly to ensure precise erection of bin. Use tapered punches to properly align bolt holes in sidewall sheets. Do not leave top and bottom bolt holes of vertical seams for last. Each sidewall sheet – and entire bin -- will fit together better if bolts are inserted in proper sequence. See Fig. 8 Details A and B. Drilling or reaming out bolt holes when sheets are not properly aligned is not recommended unless otherwise specified.

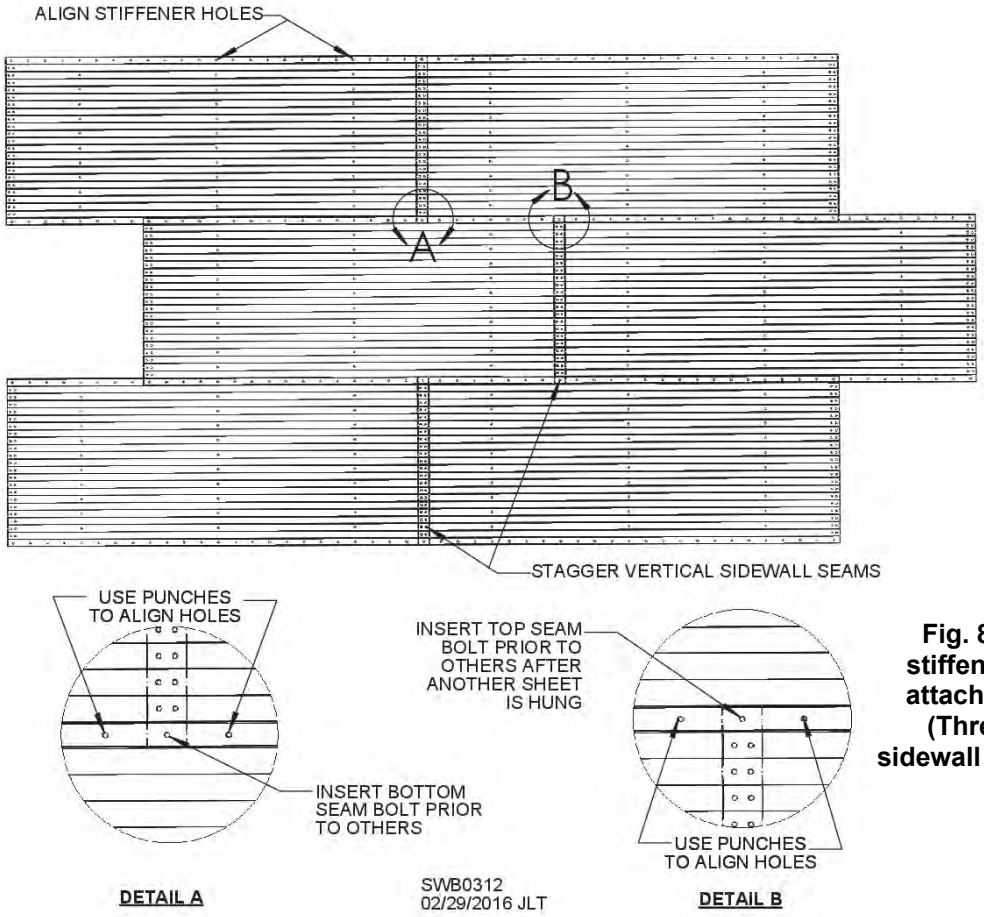


Fig. 8 – Aligning stiffener holes and attaching next ring (Three-stiffener sidewall sheets shown)

Continue installing second-ring panels until ring is complete. Bolts may be tightened at this time.

IMPORTANT: After each ring has been added and bin jacks are lowered, jack bolts should be removed and replaced with bin bolts of appropriate length.

Before each subsequent ring is attached, consult color chart for specific location of gauges and bolt sizes. Stagger vertical seams from one ring to next, making sure to line up stiffener holes. See Fig. 8 for alignment on bins with three stiffeners per sheet. When there are two stiffeners per sheet, vertical seams will stagger between stiffeners.

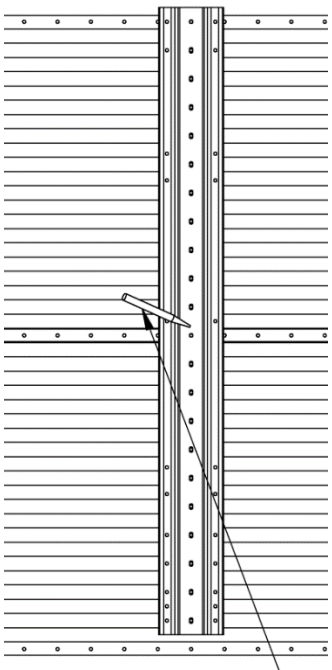


Fig. 9

Ensure proper vertical alignment of stiffeners to sidewall by using punch as shown in Fig. 9. Bolt 88" stiffener through hole (not slot) to horizontal sidewall seam. Do not allow stiffener to sag or it will make assembly difficult.

Tighten sidewall hardware after each ring is assembled. Tighten stiffener and splice hardware after each set has been attached to sidewall.

After a ring has been added and bin jacks are lowered, jack bolts should be removed and replaced with bin bolts of appropriate length.

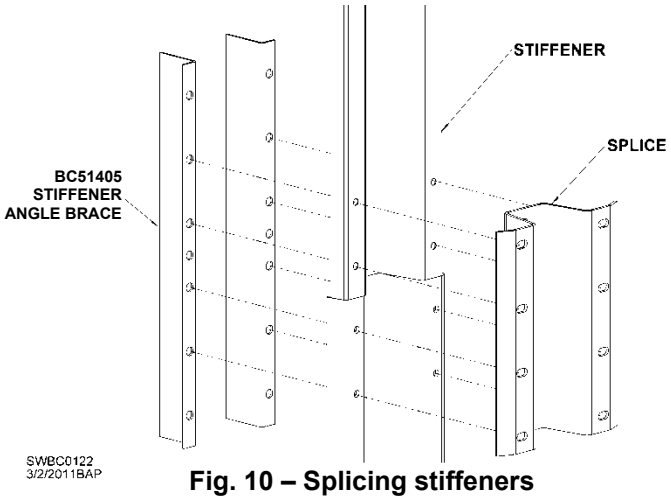


Fig. 10 – Splicing stiffeners

Assemble stiffeners and stiffener splices as shown in Fig. 10. Consult color gauge chart for appropriate schedule of gauges. **NOTE:** Correctly sized bolts must be used in all holes as indicated in color chart unless otherwise specified. All bolts must be fastened with correctly sized nuts. Stiffener angle braces (BC51405) are noted on color chart as “A” (Example: 10 I + A). They attach behind stiffener flange at top of specified stiffener inserts. See Fig. 10. If there is no “A” in splice column on color chart, bin does not require stiffener angle braces.

Laminating & Caulking Sidewall Sheets

Depending on size and diameter of bin, sidewall rings may need to be laminated. See color chart.

Apply caulk as shown in Fig. 11 if sheets will be double-laminated and lapped, or as shown in Fig. 12, 13 or 14 if sheets will be double-, triple- or quadruple-laminated and attached end-to-end using splice plates.

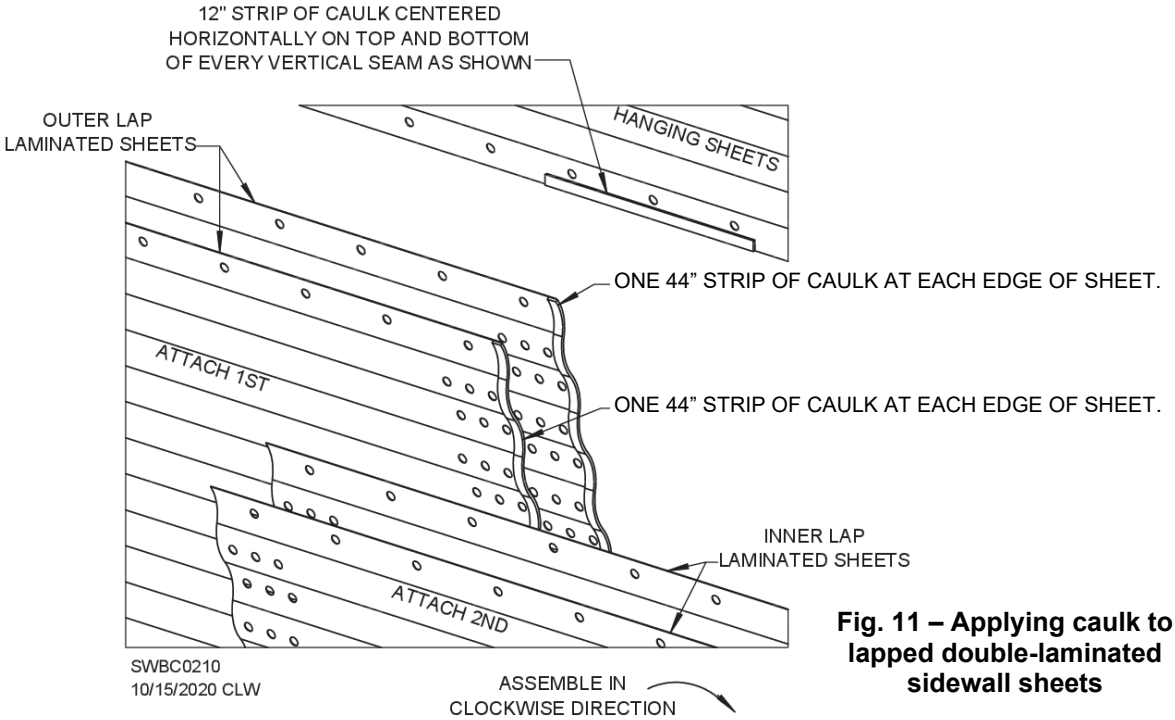


Fig. 11 – Applying caulk to lapped double-laminated sidewall sheets

See Wall Punch column of color chart for identification of splice plates used for each ring of bin. Apply caulk to inside of outer splice plates as shown in Fig. 12 and attach after all double-laminated sheets are hung.

IMPORTANT: Insert splice flashing between two outermost sidewall sheets as shown in Fig. 12.

Inside and outside splice plates attach with same hardware. Consult color chart for proper size of bolts. Tighten bolts on ring after all connections have been made.

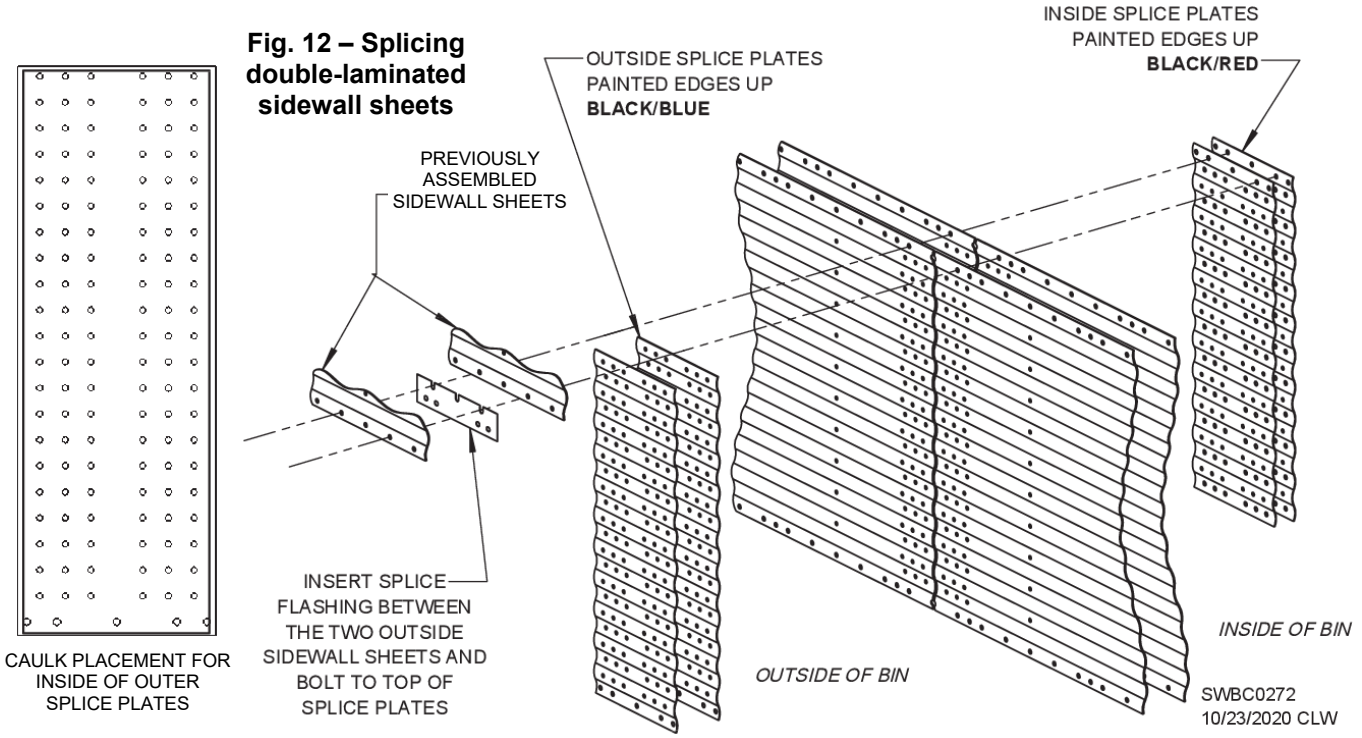


Fig. 12 – Splicing double-laminated sidewall sheets

Triple- & Quadruple-Laminated Sidewall Sheets

There are no vertical-seam overlaps for triple- or quadruple-laminated sheets. They butt up against each other. See Wall Punch column of color chart for identification of splice plates used for each ring of bin. See Fig. 13 to attach plates on triple-laminated sheets. See Fig. 14 to attach plates to quadruple-laminated sheets.

As shown in Fig. 13, splice plates are used both inside and outside of triple-laminated sidewall sheets. Inside splice plates are color-coded red, painted on one edge only. **IMPORTANT:** Always keep painted edges up. **NOTE:** Tops of inside splice plates attach at a horizontal seam; tops of outside splice plates attach just below horizontal seam. Apply caulk to inside of outer splice plates and attach after all triple-laminated sheets are hung.

IMPORTANT: Insert splice flashing between two outermost sidewall sheets as shown in Fig. 13.

Inside and outside splice plates attach with same hardware. Consult color chart for proper size of bolts.

Tighten bolts on ring after all connections have been made.

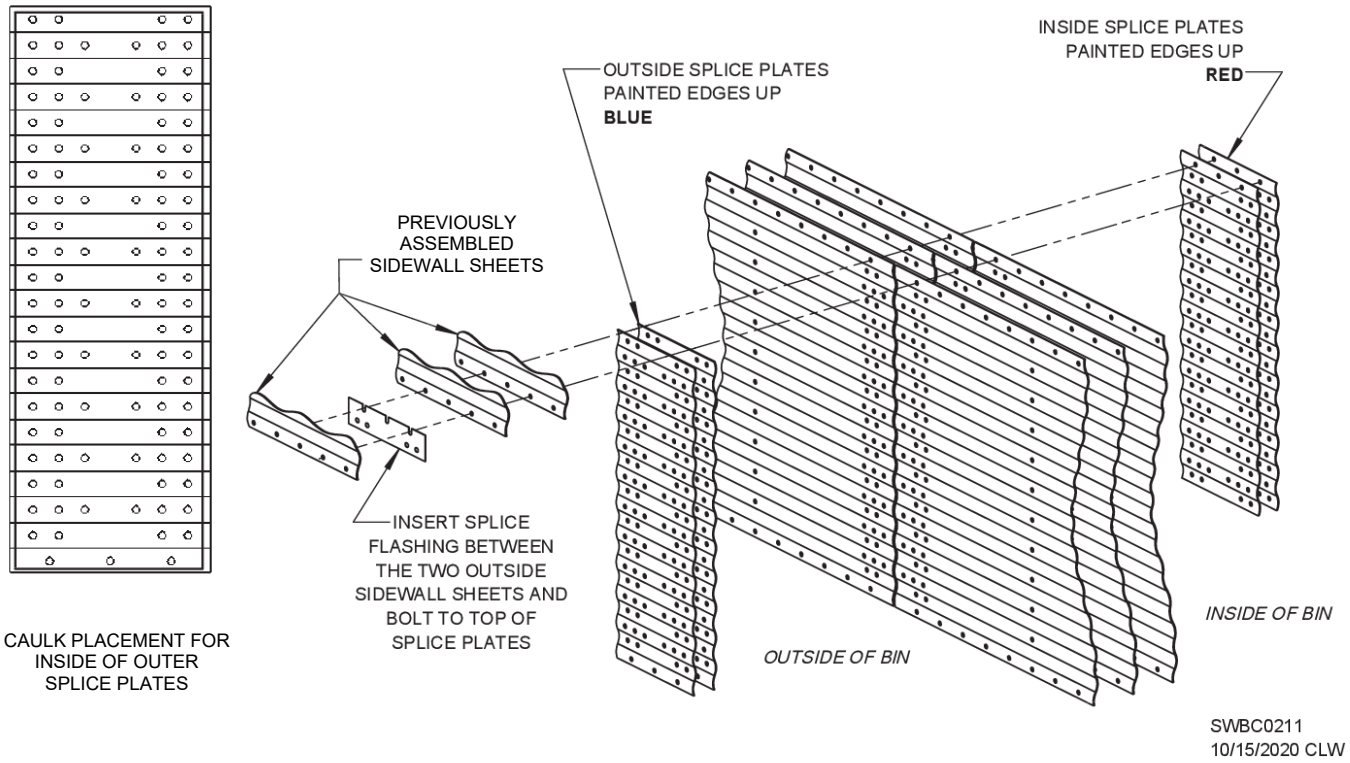


Fig. 13 – Splicing triple-laminated sidewall sheets

Installation Splice Plates on Quadruple-Laminated Sidewall Sheets

Splice plates are used both inside and outside of quadruple-laminated sidewall sheets. Inside splice plates are color-coded red, painted on one edge only. **IMPORTANT:** Always keep painted edges up. **NOTE:** Tops of inside splice plates attach at a horizontal seam; tops of outside splice plates attach just below horizontal seam. Apply caulk to inside of outer splice plates and attach after all quadruple-laminated sheets are hung.

IMPORTANT: Insert splice flashing between two outermost sidewall sheets as shown in Fig. 14.

Inside and outside splice plates attach with same hardware. Consult color chart for proper size of bolts.

Tighten bolts on ring after all connections have been made.

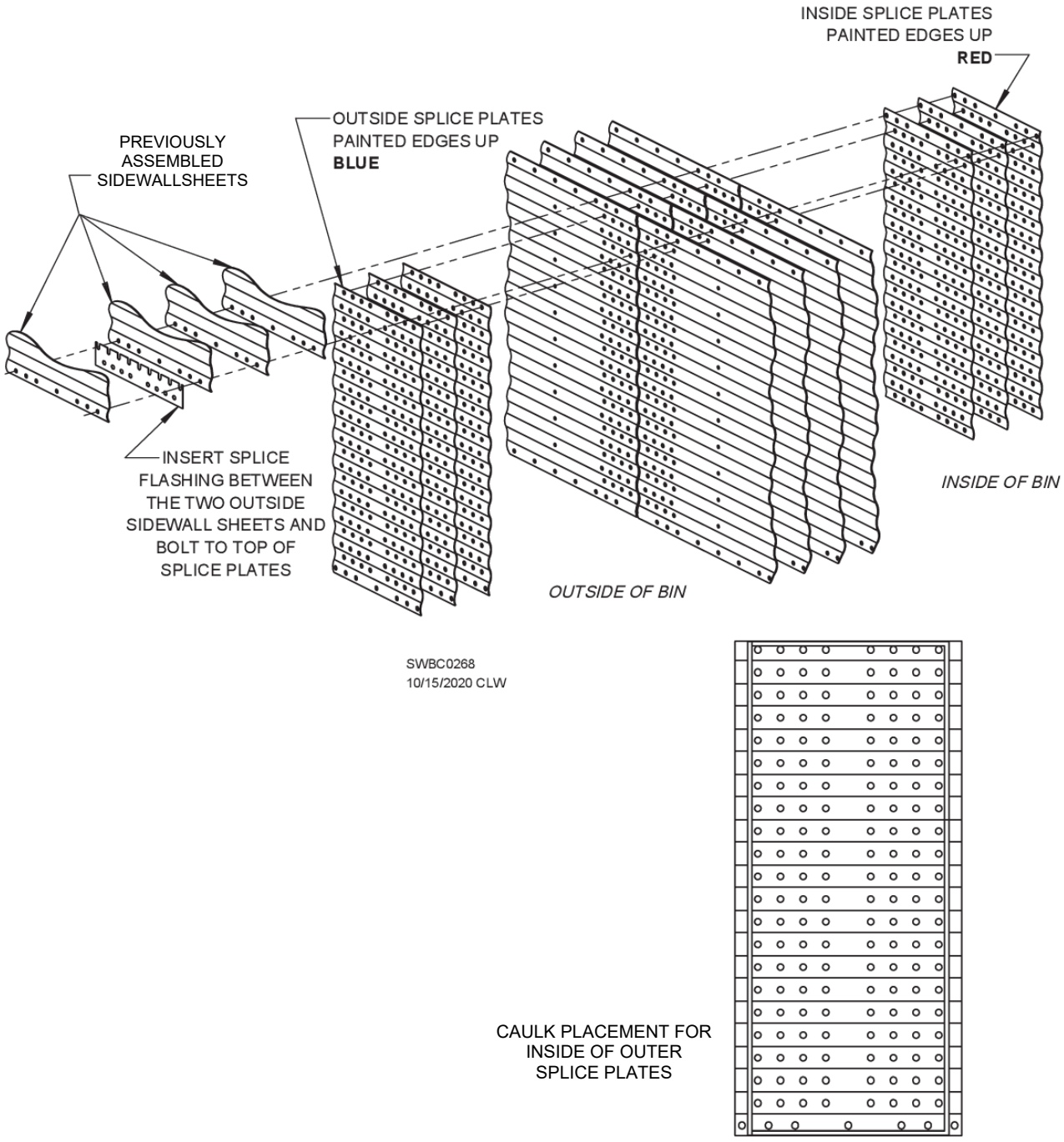


Fig. 14 – Splicing quadruple-laminated sidewall sheets

Attaching Stiffeners to Laminated Sidewall Sheets

Due to thickness of laminated sidewall sheets, gaps will occur between stiffener and sidewall just below horizontal seams. Gap will be larger for triple- or quadruple-laminated sheets than for double-laminated.

Use 7/16” Double End Stud Bolts if sidewall sheets are double-laminated, or 1/2” Double End Stud Bolts if sidewall sheets are triple- or quadruple-laminated. In each case, steel-backed rubber washers are used between stiffener and sidewall sheet, with rubber tight against sidewall sheet to guard against moisture entering bin. See Fig. 15.

NOTE: Quantity of Double End Stud Bolts shipped is specific to bin size, with only a few extras supplied.

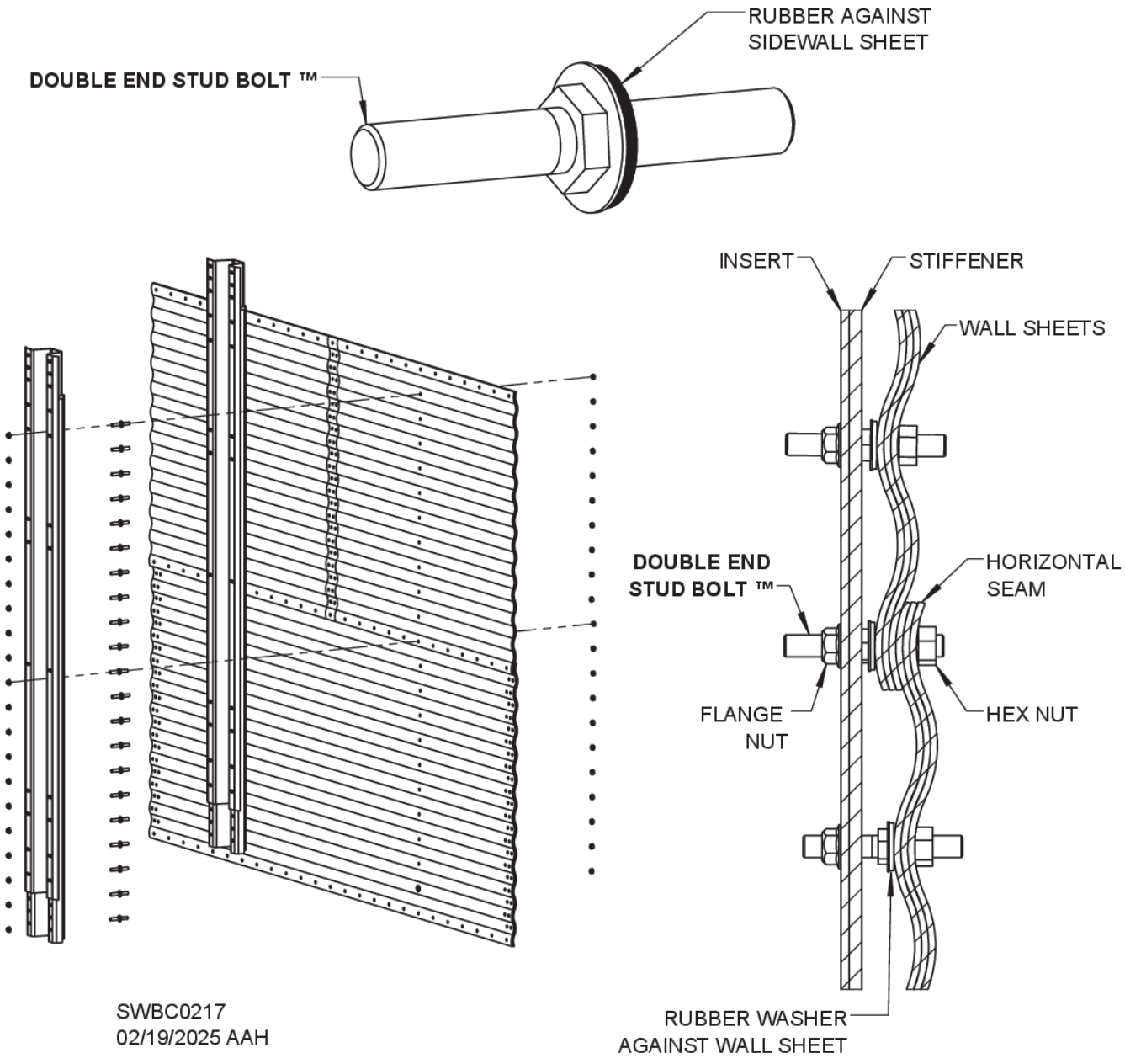


Fig. 15 – Attaching stiffener to laminated sidewall sheets (Triple-laminated sheets shown)

Laminating Commercial Insert Stiffeners

Depending on size and diameter of bin, stiffeners may need to be laminated. Stiffeners will have staggered seams and no splice plates. See Fig. 16. Consult color gauge chart.

Assemble and install wind rings as required. Consult wind ring assembly section for instructions. Consult color gauge chart for location and number of wind rings.

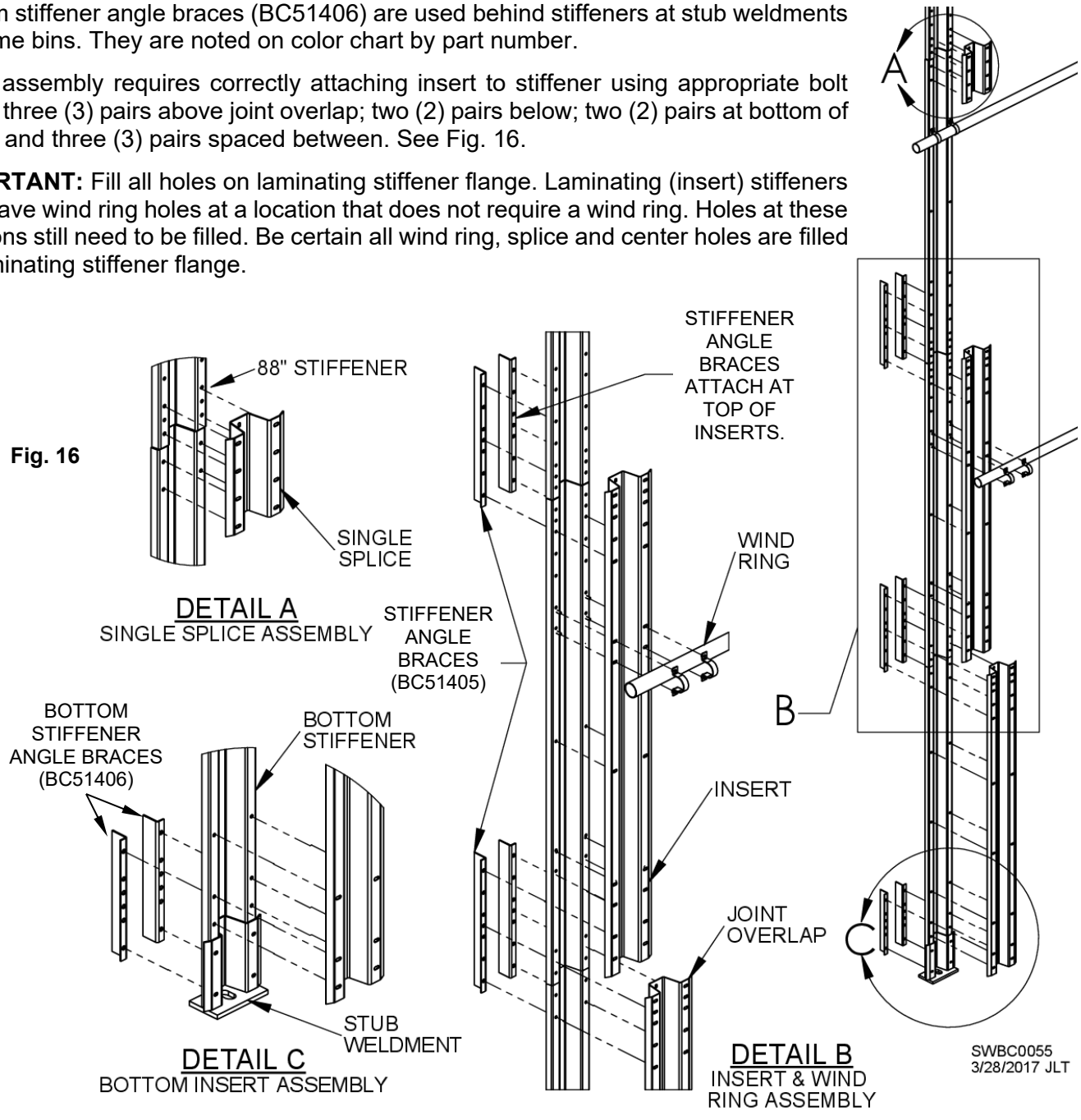
Attach sidedraw chutes as needed. Consult sidedraw assembly section for instructions.

Insert stiffeners are offset to act as splices. Only two (2) pieces can be laminated at a time. NEVER laminate three (3) pieces together. **NOTE:** Insert stiffeners are noted in splice gauge (SPL GA) column of color chart as "I" if required.
Unless sidewall sheets are laminated, stiffeners should be attached directly to sidewalls. Stiffener angle braces are noted on color chart as "A" (Example: 10 I + A). They attach behind stiffener flange at top of specified stiffener inserts. If there is no "A" in splice column on color chart, bin does not require stiffener angle braces. **NOTE:** Bottom stiffener angle braces (BC51406) are used behind stiffeners at stub weldments on some bins. They are noted on color chart by part number.

Insert assembly requires correctly attaching insert to stiffener using appropriate bolt holes: three (3) pairs above joint overlap; two (2) pairs below; two (2) pairs at bottom of insert; and three (3) pairs spaced between. See Fig. 16.

IMPORTANT: Fill all holes on laminating stiffener flange. Laminating (insert) stiffeners may have wind ring holes at a location that does not require a wind ring. Holes at these locations still need to be filled. Be certain all wind ring, splice and center holes are filled on laminating stiffener flange.

Fig. 16



Apply caulk **underneath bolt holes** as shown in Fig. 17 and bolt to bottom of sidewall sheets. **NOTE:** Ensure base angle pieces overlap by one bolt hole.

If foundation sealant is used, apply to bottom of base angle as shown in Fig. 18 before lowering bin onto concrete or hopper bottom. Do not leave gaps between lengths of sealant. One of two types of sealant will be used, depending on diameter of bin. For bins 15’ to 33’ dia., use 3/8” x 3/4” sealant (J23313). For bins 36’ dia. or larger, use 1/2” x 1-1/2” sealant (J23312).

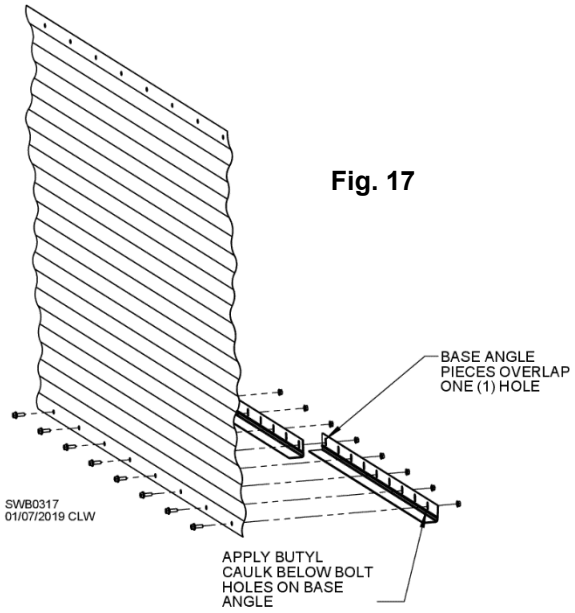


Fig. 17

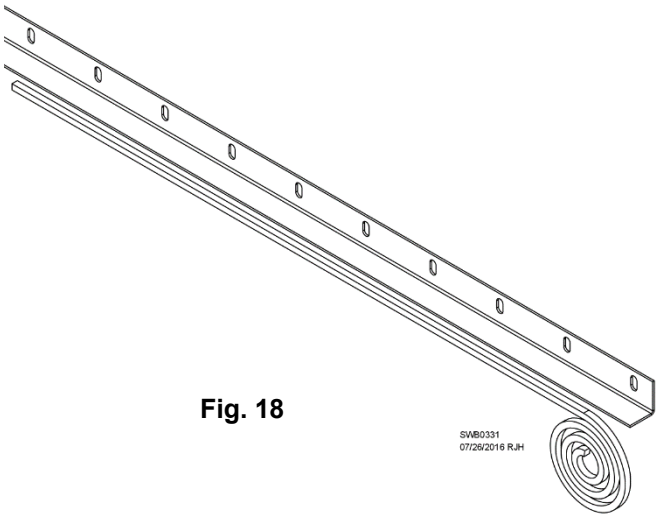


Fig. 18

NOTE: All weight should be taken of off bin jacks before base angle bolts are tightened.

Shim gaps between stub weldment and concrete. Full-size 7ga and 11ga shims are provided, as are narrow 11ga shims (to avoid interference with base angle). **IMPORTANT:** Do not force shims.

Assemble square washer(s) and anchor nut on anchor bolt and snug-tighten. See chart in Anchor Bolt section of this manual for size and quantity of square or rectangular washers and anchor nuts. See Fig. 19 or Fig. 20 depending on bin diameter and number of stiffeners per sidewall sheet. **IMPORTANT:** After bin has been filled and allowed to settle for 30 days, fully tighten anchor bolt nuts.

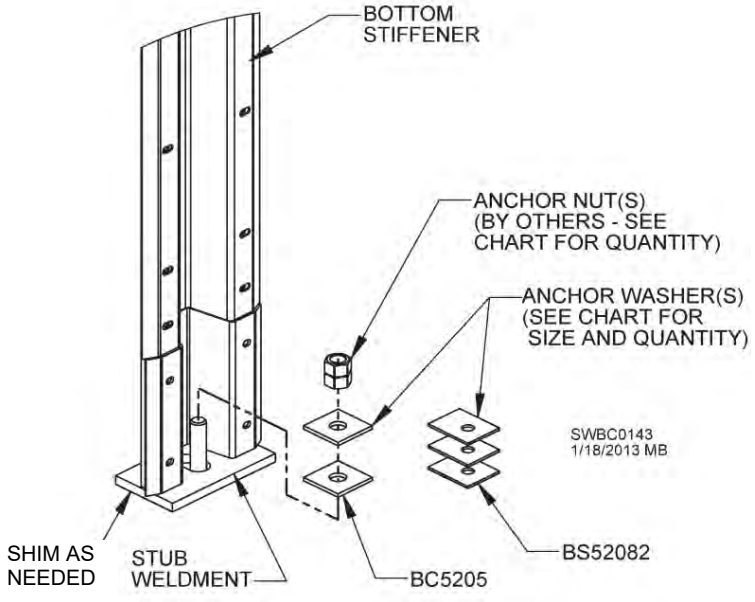


Fig. 19 – Single-anchor boot
69’ Dia. and smaller (2 stiffeners/sidewall sheet)
72’ Dia. and larger (3 stiffeners/sidewall sheet)

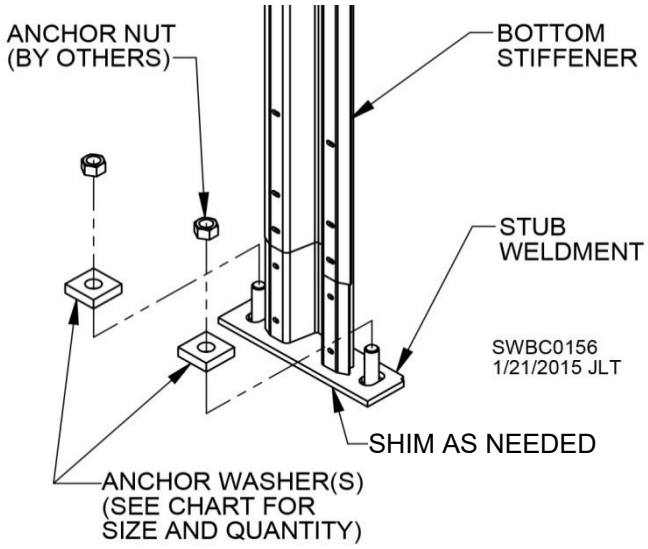


Fig. 20 – Double-anchor boot
72’ Dia. and larger (2 stiffeners/sidewall sheet)

Reinforcing Sidewall Cutouts

See Assembly Instructions document L18765 for using Sukup kits to support bin wall around a conveyor. Otherwise, see general instructions below and applicable unload system manual.

Bin sidewall should be reinforced around any cutout wider than 13” (e.g., conveyors). Use 22” anchor brackets or similar supports for cutouts up to 30” wide. See Fig. 21. Attach a base plate (B5701) to each 22” anchor bracket using two (2) 3/8 x 1” bolts and two (2) 3/8” flange nuts. Attach 22” anchor brackets to sidewall using 3/8” bolts.

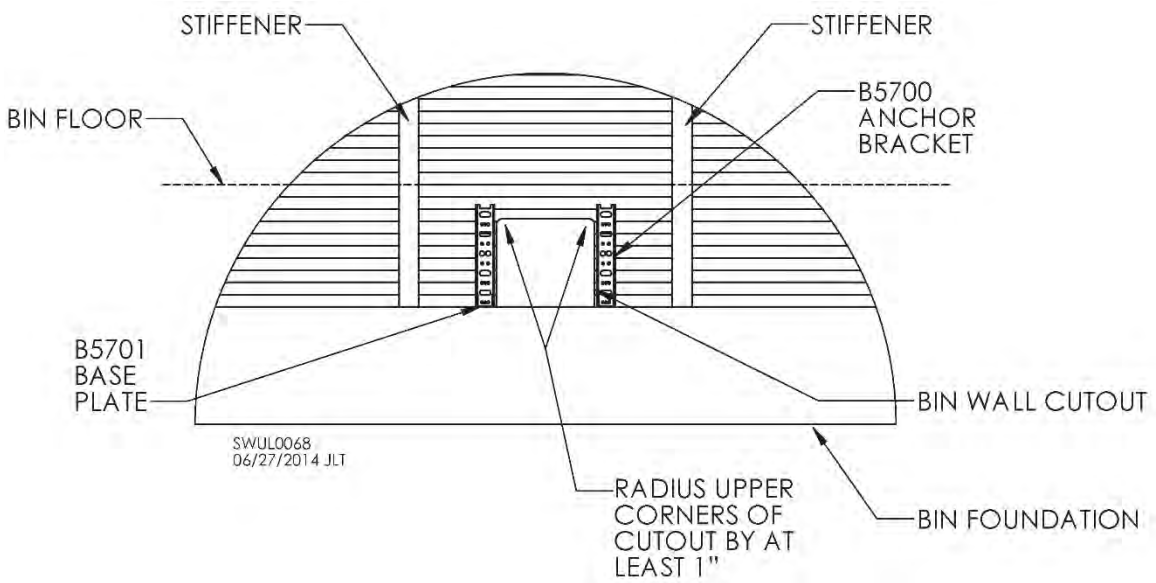


Fig. 21 – 20” cutout reinforced by 22” anchor brackets (B5700) and base plates (B5701)

For a cutout larger than 30” wide, field-weld C-shaped channel pieces together and attach to sidewall as shown in Fig. 22 using 3/8” bolts.

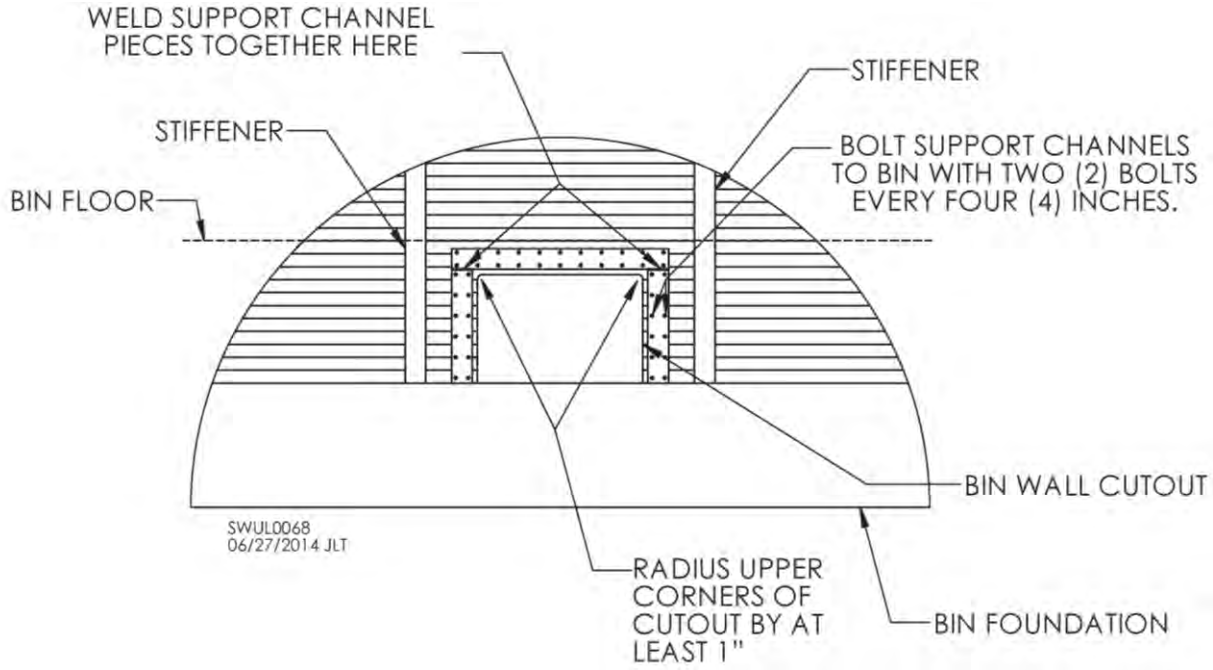


Fig. 22 – 30” cutout reinforced by C-channel

Anchoring over Transition Insert or Service Tunnel (≥1/2” Plate Enclosures w/ ≥1/2" Welds)

Figs. 23 and 24 show methods of supporting stiffener boot over transition insert or service tunnel, depending on type of boot (single-anchor or double-anchor). **NOTE:** Depending on bin, either style of boot may be present over transition insert or tunnel. Box(es) over anchor plate must be made of at least 1/2" thick steel regardless of anchor plate thickness.

- For single-anchor boot, weld a box around front and sides of anchor plate as shown in Fig. 23.
- For double-anchor boot, weld boxes around front and ends of anchor plate as shown in Fig. 24.

IMPORTANT: Anchoring method should allow expansion and contraction of bin and minimal uplift of stiffener boot. **DO NOT** weld stiffener anchor boots directly to transition insert or tunnel I-beam.

Supporting Through Transition Insert

If stiffener boot (single or double) is not directly above a vertical support in a transition insert, additional support is needed directly under stiffener boot. This will ensure that stiffener load is transferred through insert and into bin pad. Additional support needs to be welded in place. Use at minimum 4" round tubing or 3-1/2" square tubing. In either case, tube walls must be at least 1/4" thick.

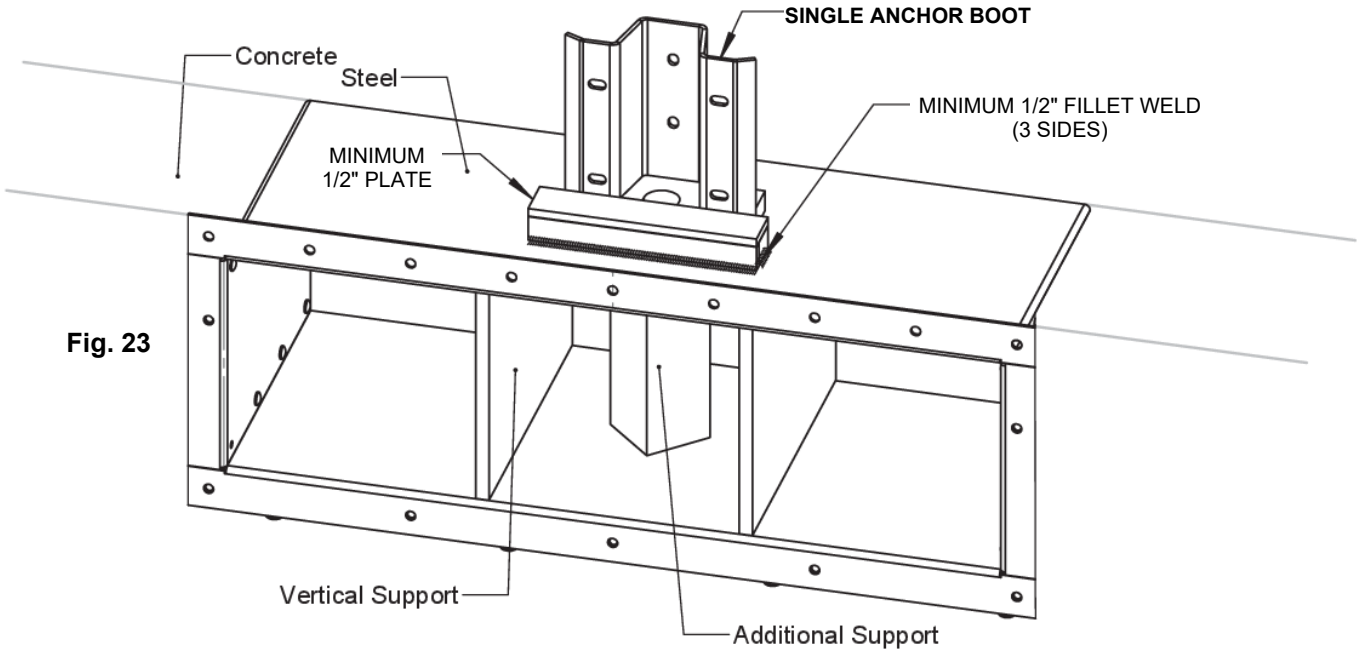


Fig. 23

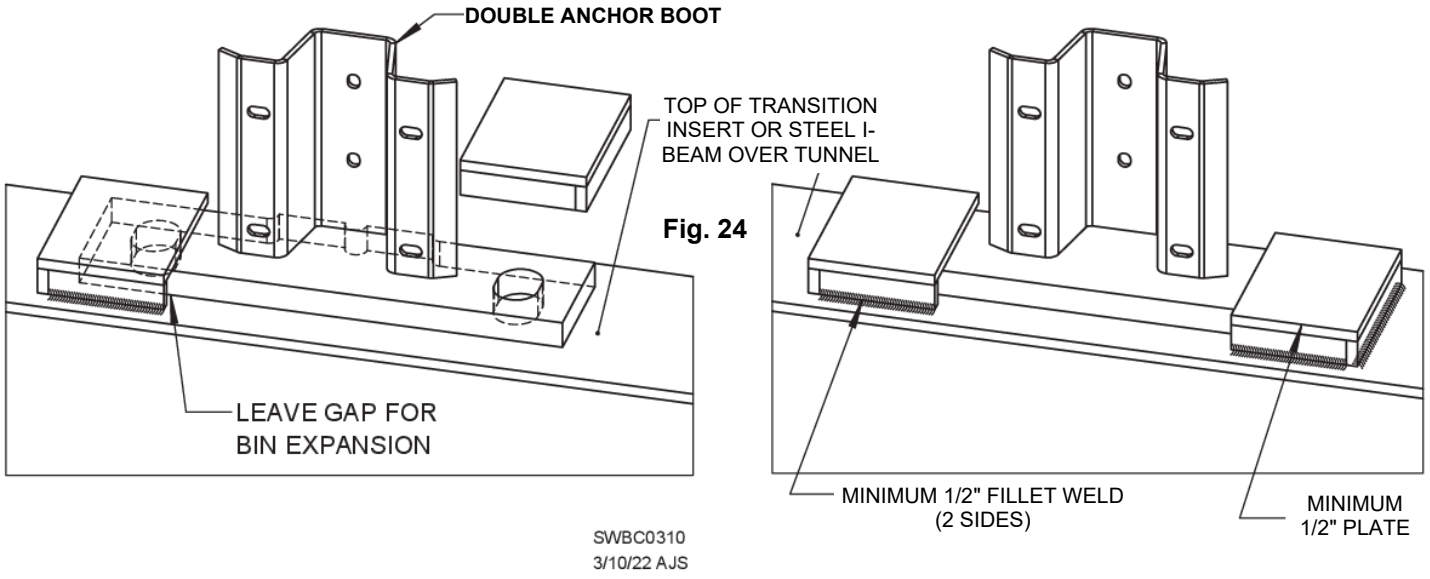


Fig. 24

Narrowing Aeration Tunnel to Transition Insert

Fig. 25 shows example of aeration tunnel narrowed to width of transition insert.

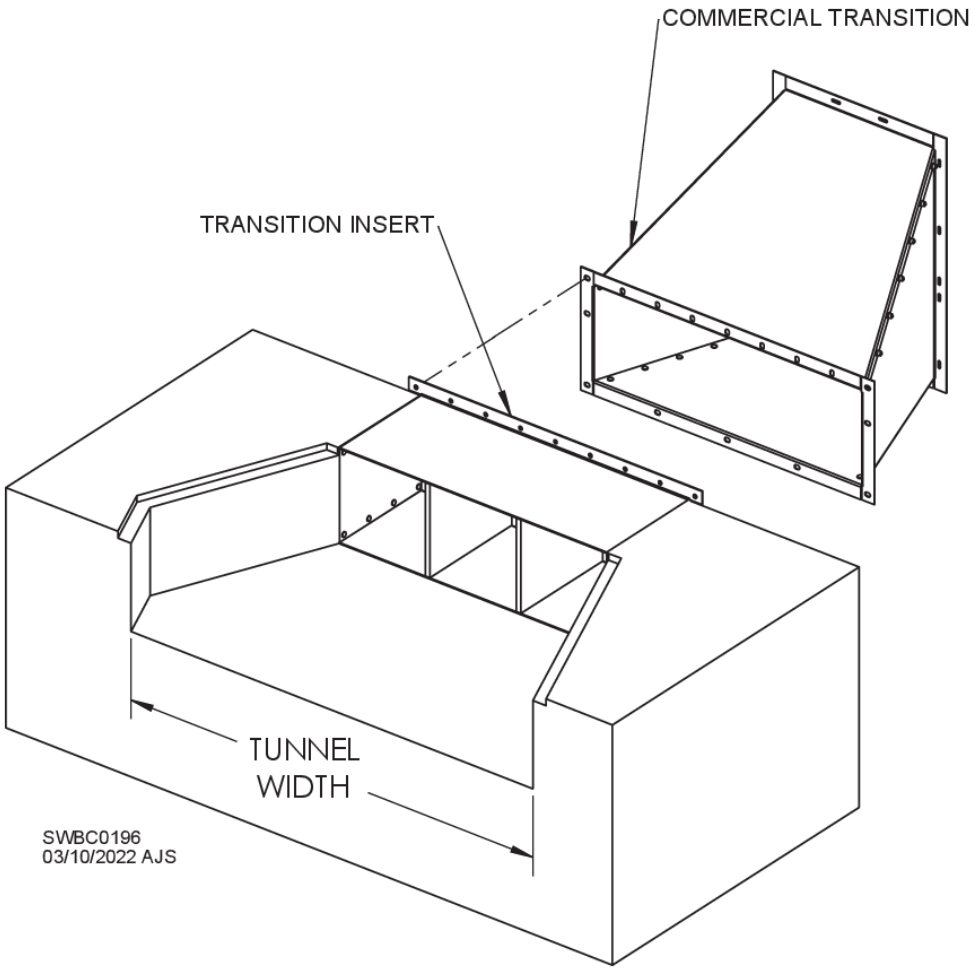


Fig. 25 – Tunnel narrowed to width of transition insert

Use single-anchor boot on each side of transition if needed for clearance. See Fig. 26.

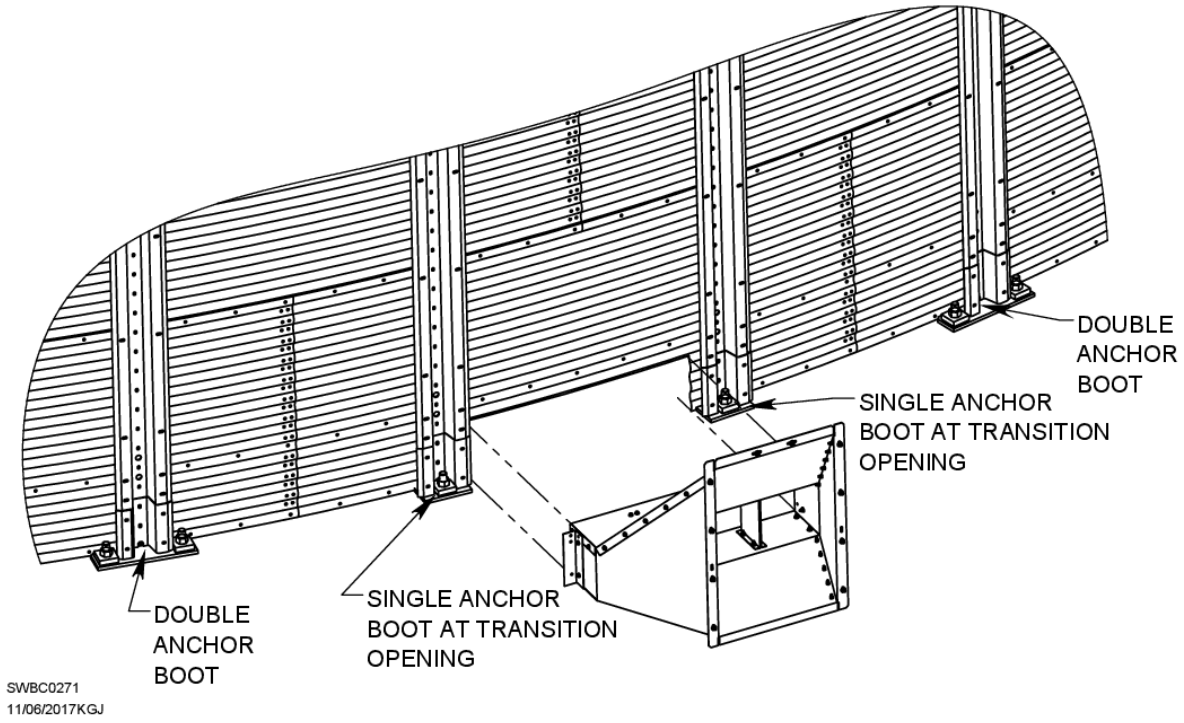


Fig. 26 – Single anchor boots at transition opening

Wind Ring Assembly

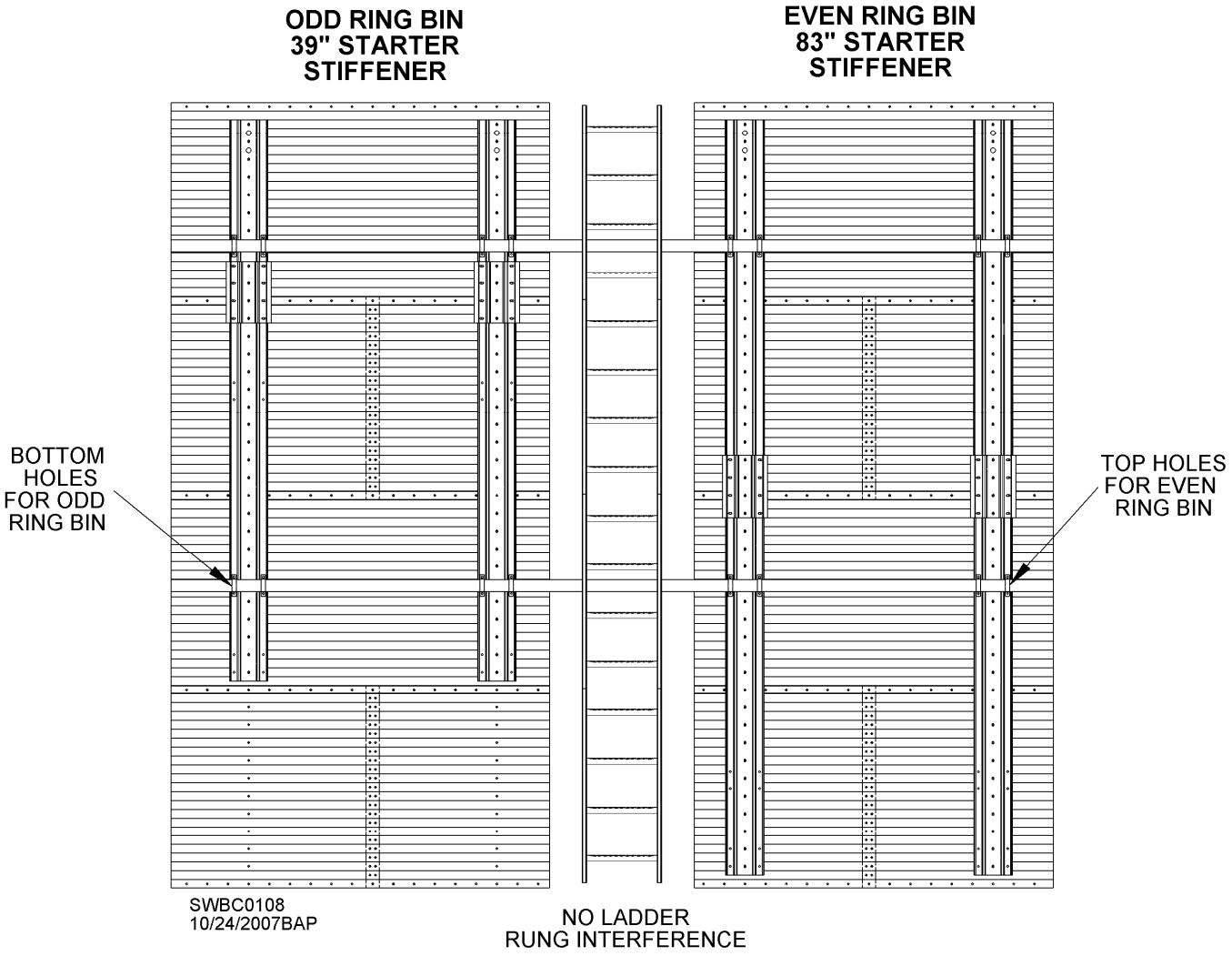


Fig. 1

Consult color/gauge chart located either in manual or with sidewall sheets for number of wind rings necessary for bin. Standard wind ring locations are indicated on chart by an “@” symbol. Additional wind rings needed on bin with a sidedraw are indicated by a “+” symbol.

Top stiffeners, 39” & 83”, have only one set of holes for wind ring brackets, located two-thirds from top of top ring. The 88” stiffeners are punched with two sets of holes so that wind ring brackets can be attached in middle of sidewall ring. Use bottom holes on bins with odd number of rings. Use top holes on bins with even number of sidewall rings. See Fig. 1.

Unless otherwise stated on color chart, wind rings are located in top ring, third ring, fifth ring and so on (every other ring starting at top). These wind ring locations meet ASAE Standard S412.1 which leaves at least 1-1/2” below the rung and 4-1/2” above the rung where an obstruction (wind ring) is located.

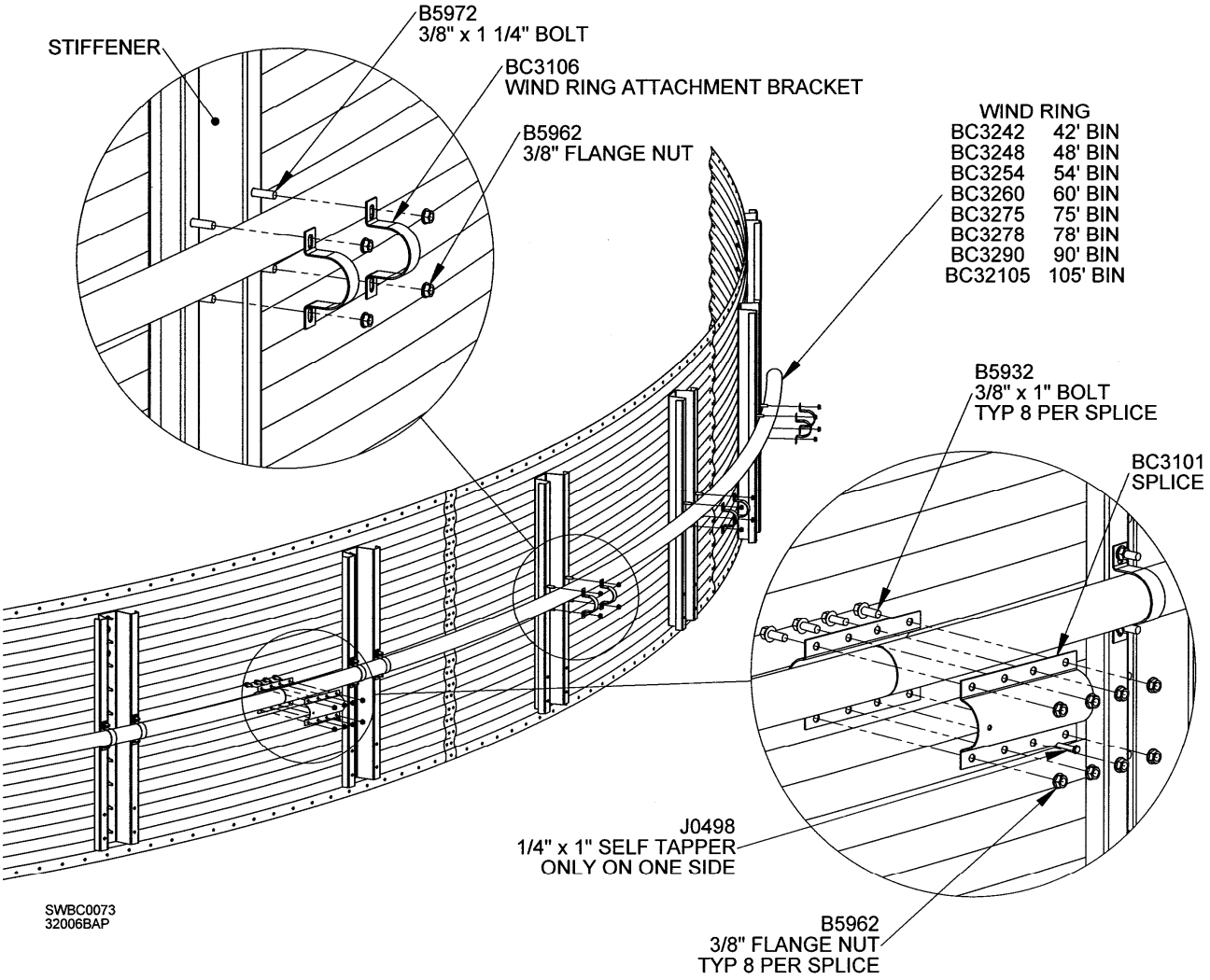


Fig. 2

Loosely attach two wind ring brackets (BC3106) to each stiffener as shown in Fig. 2 using 3/8 x 1-1/4" bolts (B5972) and 3/8" flange nuts (B5962). Insert wind ring sections through brackets.

Butt wind ring sections against each other as shown in Fig. 2. Position splice clamps (BC3101) over ends of wind ring sections. Attach clamps with 3/8 x 1” bolts (B5932) and 3/8” flange nuts (B5962), leaving bolts loose to finger tight. **IMPORTANT:** Splices must be located between stiffeners. Staggering of splices is recommended.

Total length of wind ring sections will be too long for circumference of bin. Last section will need to be cut to butt against first section assembled. Final wind ring section should span at least two sidewall stiffeners.

NOTE: Some wind ring assemblies require that a trimmed piece from a previously assembled ring be used. All leftover sections that are longer than 9’ should be saved for possible future use.

Once all wind ring sections have been fastened to stiffeners and spliced, tighten hardware.

Further secure each splice to wind ring using 1/4 x 1” self-drilling screw (J0498) as shown in Fig. 2.

Farm Duty Doors Section

44” & 66” Sidewall Door Installation (D, W, & W1)

NOTE: Use 3/8 x 1” bin bolts for installation of door frames. See Fig. 9 as needed for reference.

Remove inner door panels from frame.

Determine top of frame from bottom. Bottom of frame has sloped sill to direct rain away.

Apply double row of rope caulk to frame flanges. Top flange will receive caulk on outside of flange. Side and bottom flanges will receive caulk on inside, or backside, of flange. See Fig. 1.

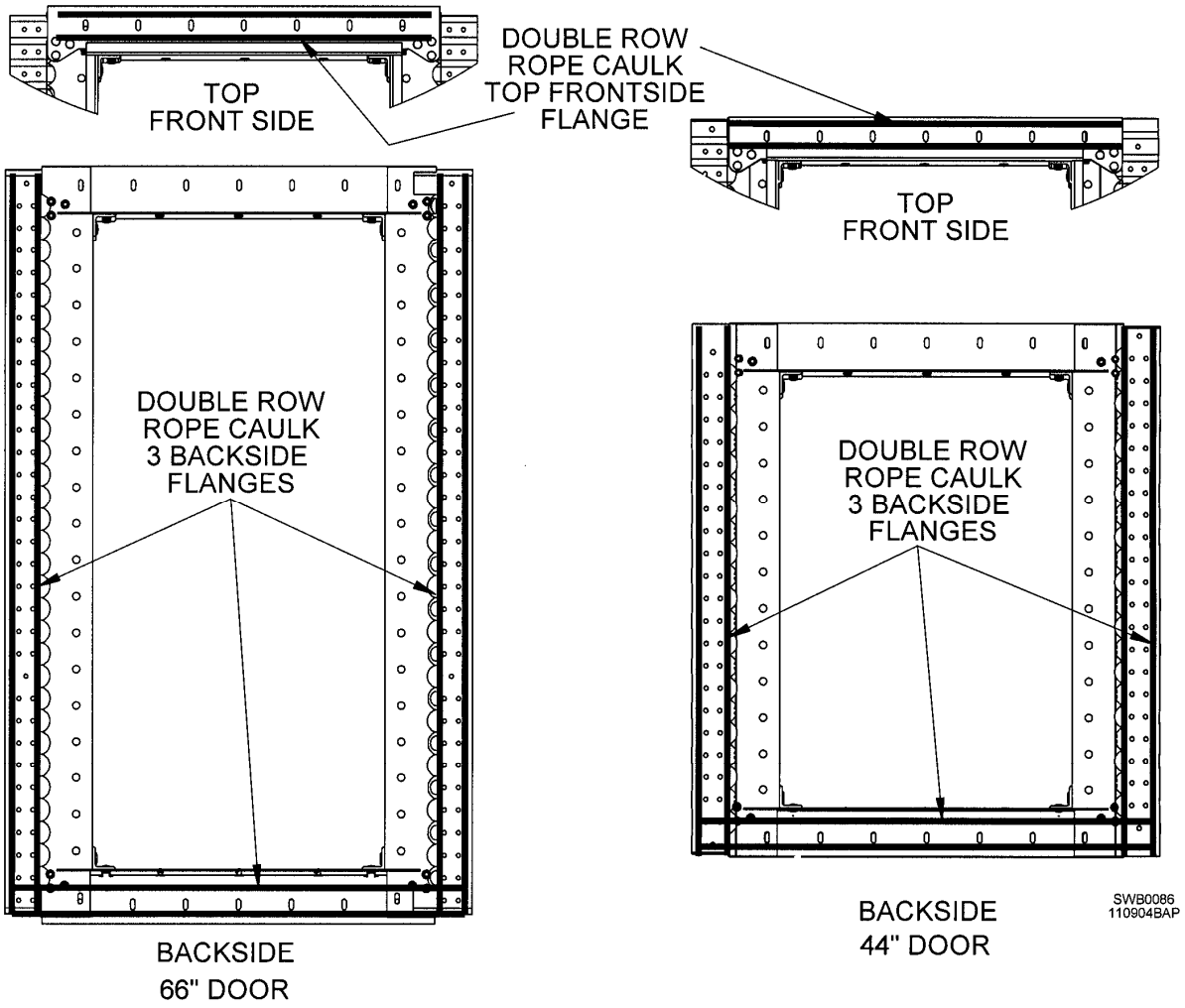


Fig. 1

Place door frame into door opening. Top flange of frame will mount inside of sidewall. Side and bottom flanges will mount outside of sidewall panels. Insert 3/8 x 1” bin bolts from outside of bin, leaving nuts loose. Leave bolts out of door hinge support locations. See next page.

NOTE: Second sidewall ring from bottom will have short panels, one on each side of door. 44” door will overlap bottom ring. 66” door overlaps cutout in bottom ring. **NOTE:** See Fig. 7 if installing 44” door on 36’ to 48’ dia. bin.

Place door panels back into door frame. Make sure they close completely over pegs. Lock hammer-head latches. See Fig. 2. (View is from outside of bin.)

Tighten door frame bolts in sequence shown in Fig. 2. Complete by working around door frame until all bolts are tightened. No particular sequence is required for rest of bolts.

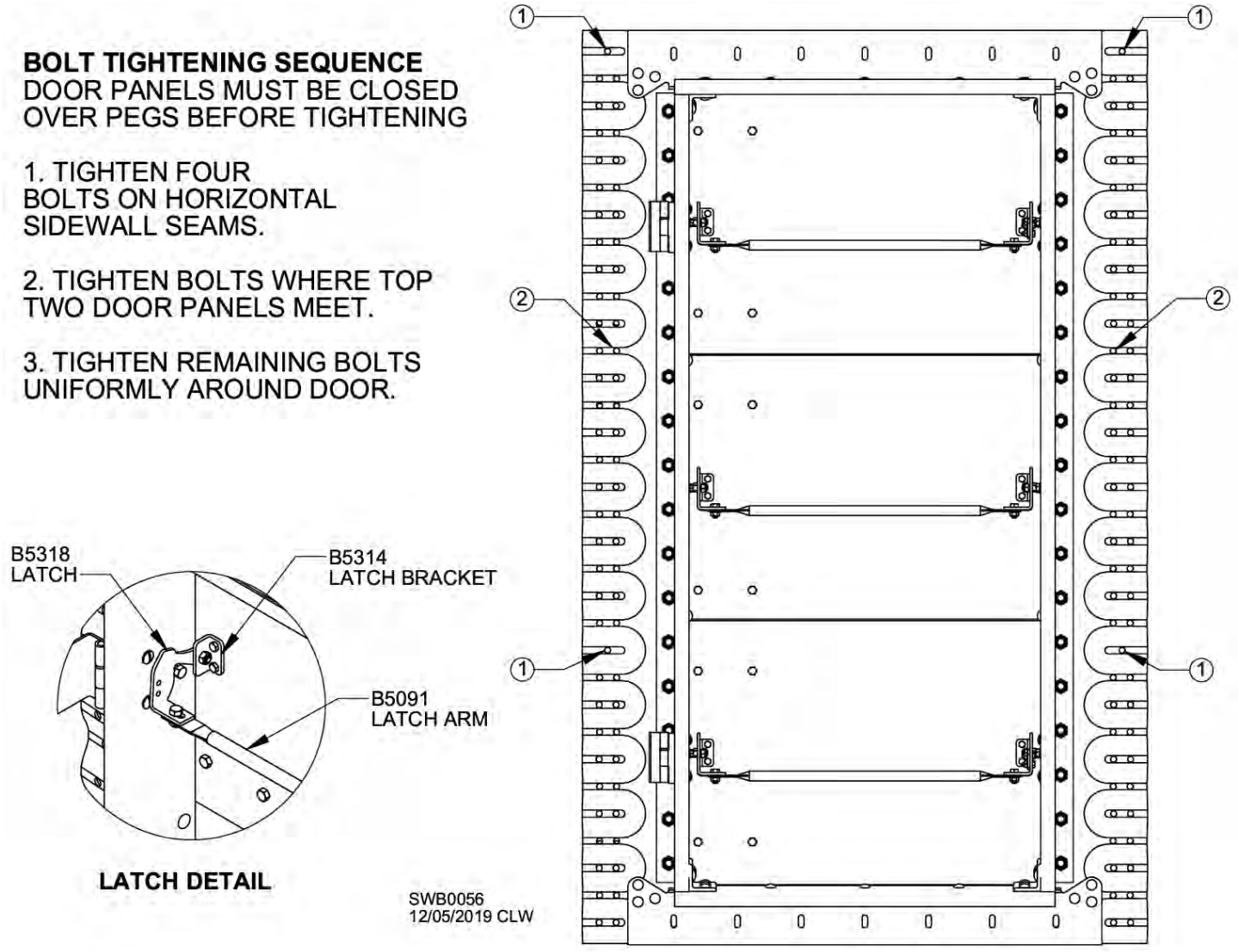


Fig. 2

Loosely bolt hinge support pieces (B53421) to bin wall and door frame as shown in Fig. 3. Hinge support pieces are shown in relation to door pegs.

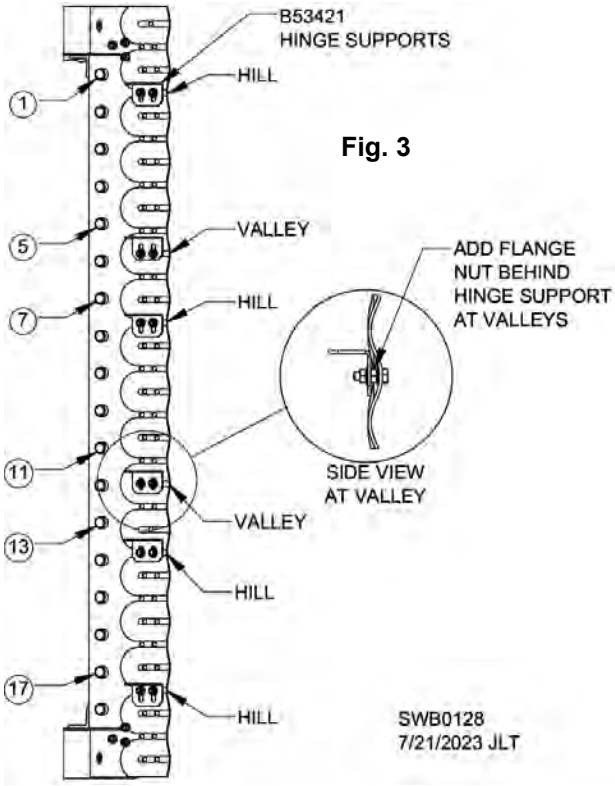
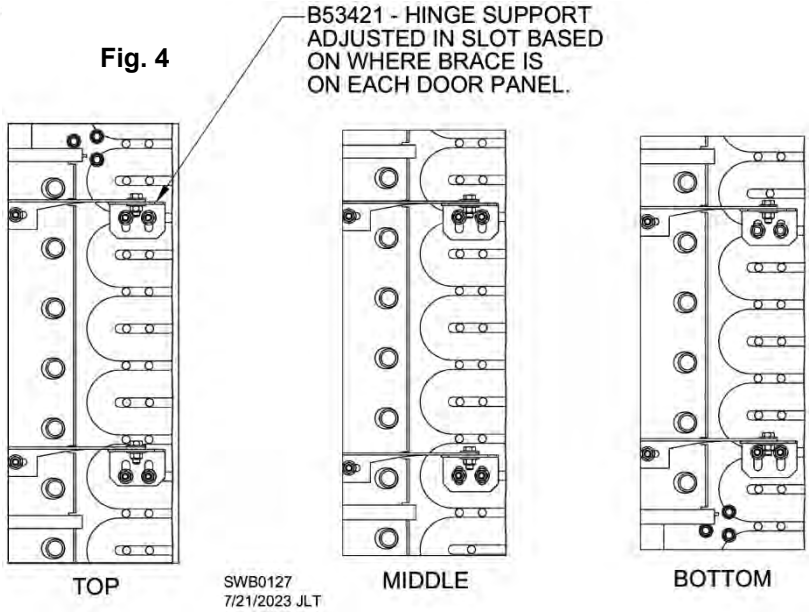


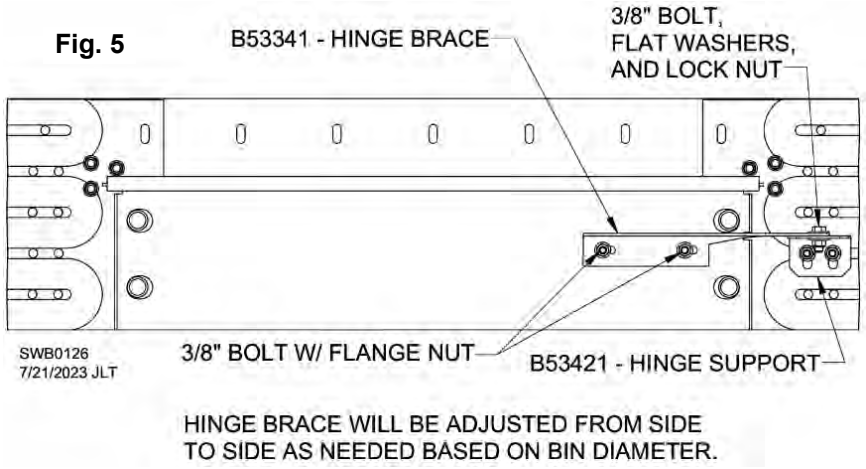
Fig. 3

Fig. 4



Slide hinge supports up until they touch hinge braces (B53341). Fig. 4 shows that all hinge braces are above hinge supports.

Fig. 5



Loosen 3/8” bolts and slide hinge braces over until hinge holes line up with holes in hinge supports. See Fig. 5. Insert a 3/8” bolt through each hole and turn nut on loosely.

Tighten nuts connecting hinge braces to door and hinge supports to door frame.

Use 3/8 x 1” hex-head bolts, flat washers, and lock nuts to attach hinge braces to hinge supports. Turn lock nuts all the way onto hinge bolts, then back them off until door panels swing freely. Ensure door panels close securely over pegs.

Install outer door with hinges in desired direction. Adjust hinges as needed.

Install door catch. See Fig. 6. Remove and use existing bolt for mounting catch, or field-drill hole into bin sidewall if an existing bolt is not in correct spot.

Attach doorstep below door. It may be possible to align some bolt holes with those in bin sidewall. If not, field-drill four (4) mounting holes. Use 3/8" hardware to attach doorstep to bin.

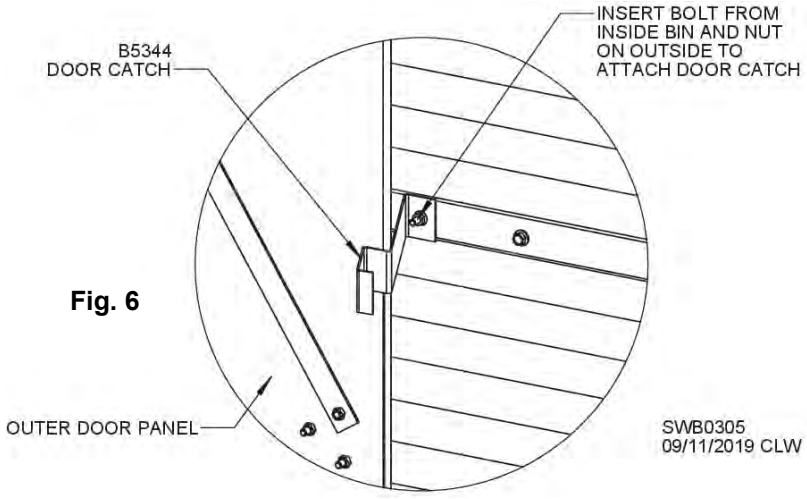


Fig. 6

NOTE: Bolt splice bracket B5461 to corners of 44” doors on 36’ diameter and larger bins to help strengthen door corners. Attach as shown in Fig. 7 using 3/8 x 1” bolts that are used for connecting sidewall sheets to frame. Make sure bracket attaches to two holes of each sidewall sheet.

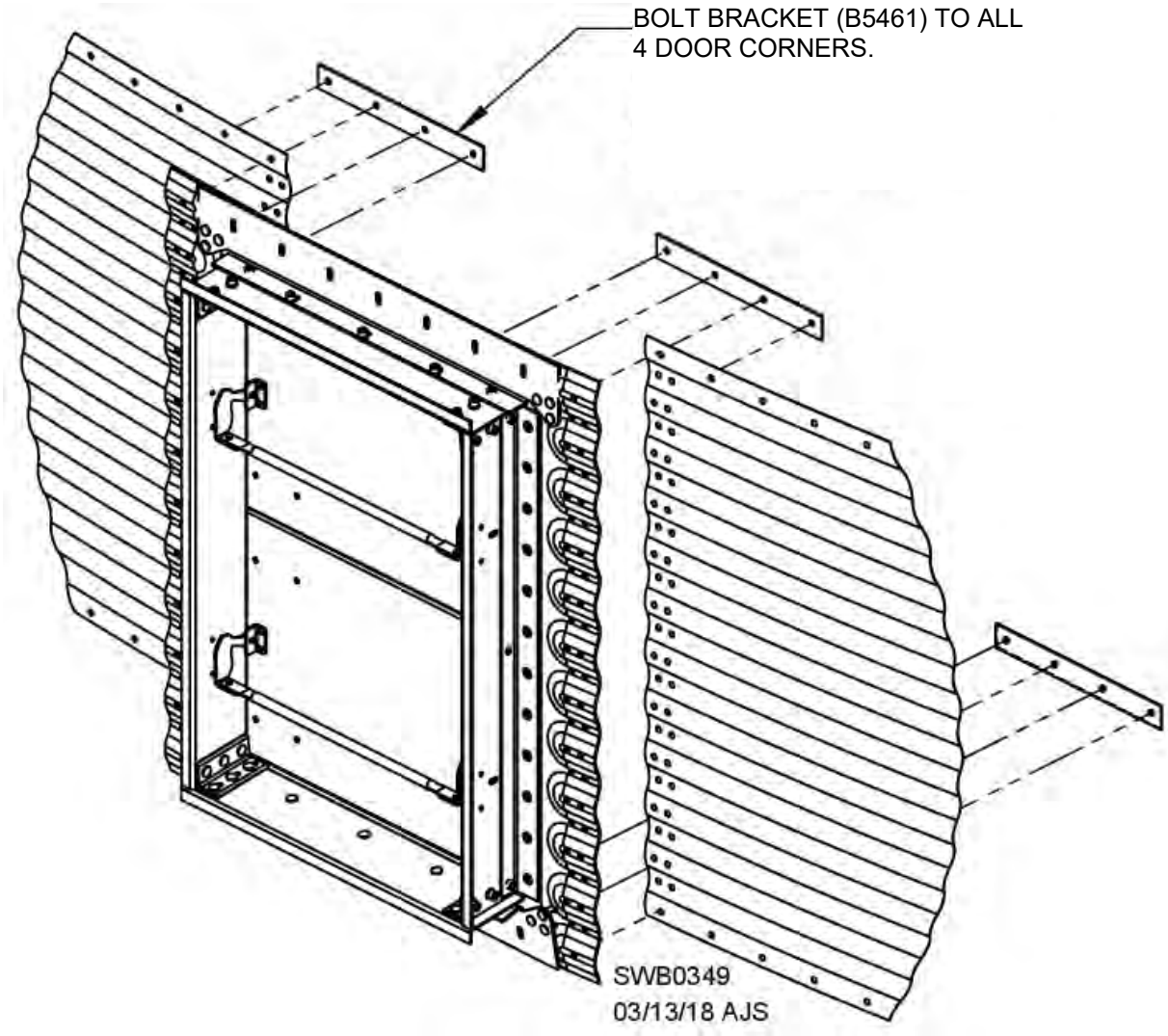


Fig. 7

Safety Catch prevents latching of outer door unless inner panels are securely closed. After installation of door as shown on previous pages, final adjustment is required to ensure latches on outer door skin fit securely in catches on hammer-head latches of inner door panels.

Fig. 8 provides overview (66” door is shown; 44” installs similarly).

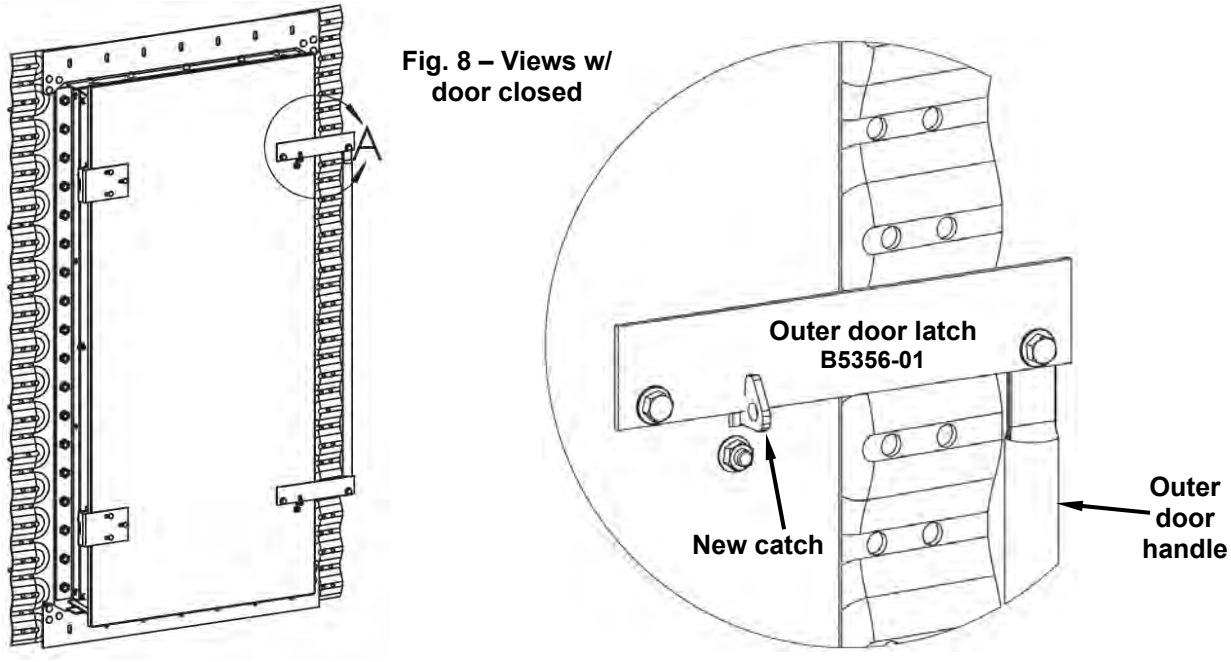


Fig. 8 – Views w/ door closed

Ensure catch (B5494) that was factory-attached to hammer-head latch will protrude through factory-cut rectangular hole in door skin when inner door panels are closed. Image 1 shows catch.

Attach foam (K6843) to inside of door around slot as shown in Image 2 to provide watertight seal.

Close outer door (skin) and pull down its handle so that latch fits securely into catch as shown in Fig. 8.

If need be, loosen bolts attaching catch to hammer-head latch. See Image 1. Slots in catch and hammer-head latch allow for adjustment. Position catch for proper fit and retighten hardware.

Double-check fit by opening outer and inner doors and then closing inner panels and outer door.

Adjust again as needed.

Repeat process above for lower catch.

NOTE: If door will be installed to open from left to right, attach B5494 catches to hammer-head latches (B5319) on left side of inner door panels and follow steps above to ensure fit.

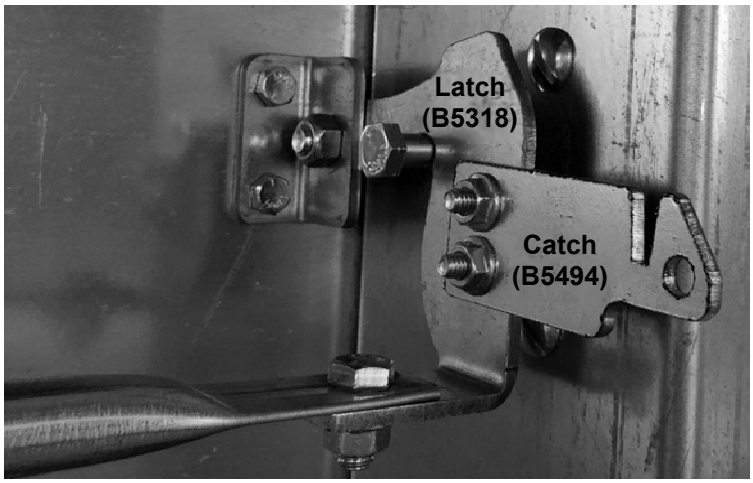


Image 1 – Catch bolted to hammer-head latch

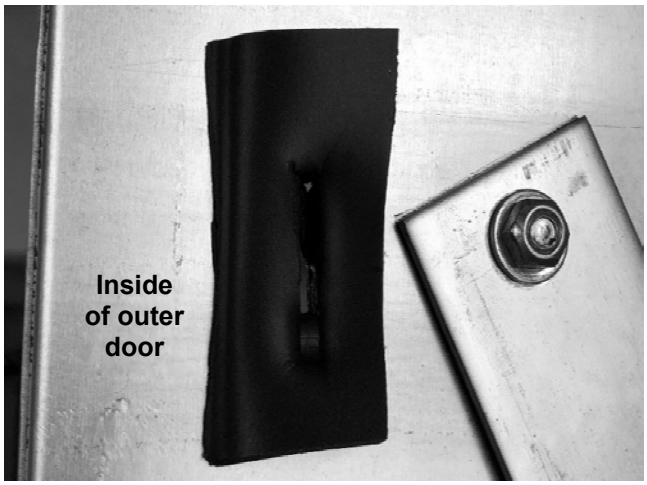


Image 2 – Foam sealant (K6843) on inside of door

Components of 66” Door

Fig.9 and Table 1 show components of 66” door. Components of 44” door are similar, with only two inner door panels.

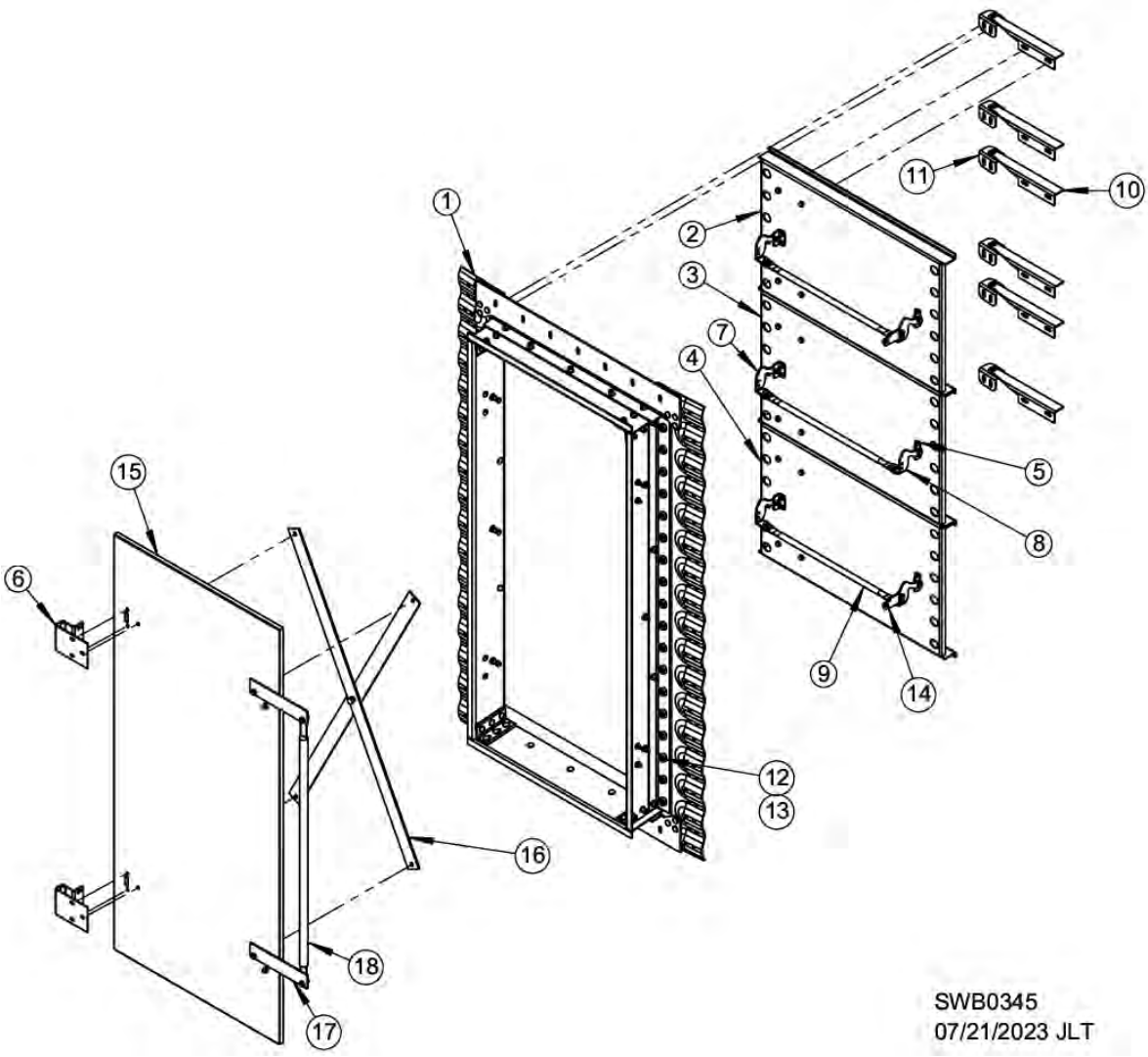


Fig. 9 & Table 1

ITEM #	DESCRIPTION	PART #	QTY.
1	Door assy., 66”, 36-48’ dia. bin	B5323	1
2	Top inner door	B53321	1
3	Middle inner door	B5332	1
4	Bottom inner door	B5333	1
5	Inner door latch bracket	B5314	6
6	Outer door hinge	J2274	2
7	Inner door latch, left	B5318	3
8	Inner door latch, right	B5319	3
9	Inner door latch arm	B5091	3
10	Inner door hinge brace	B53341	6
11	Inner door hinge support	B53421	6
12	Bin door peg, HD	B53432	36
13	Jam nut, 5/8” – 11	J1048	36
14	Catch	B5494	2
15	Outer door, 66”	B5331	1
16	Outer door cross bar	B5328	2
17	Outer door handle bracket	B5356-01	2
18	Outer door handle	B5356-02	1

Commercial Doors Section

This section provides instructions for installation of doors on bins with two stiffeners per sidewall sheet, followed by instructions for installation of doors on bins with three stiffeners per sidewall sheet.

IMPORTANT: When assembling door, be sure to add door frame sealant as shown in Figs. 15-17 at end of this section.

26” x 28” Code N Door

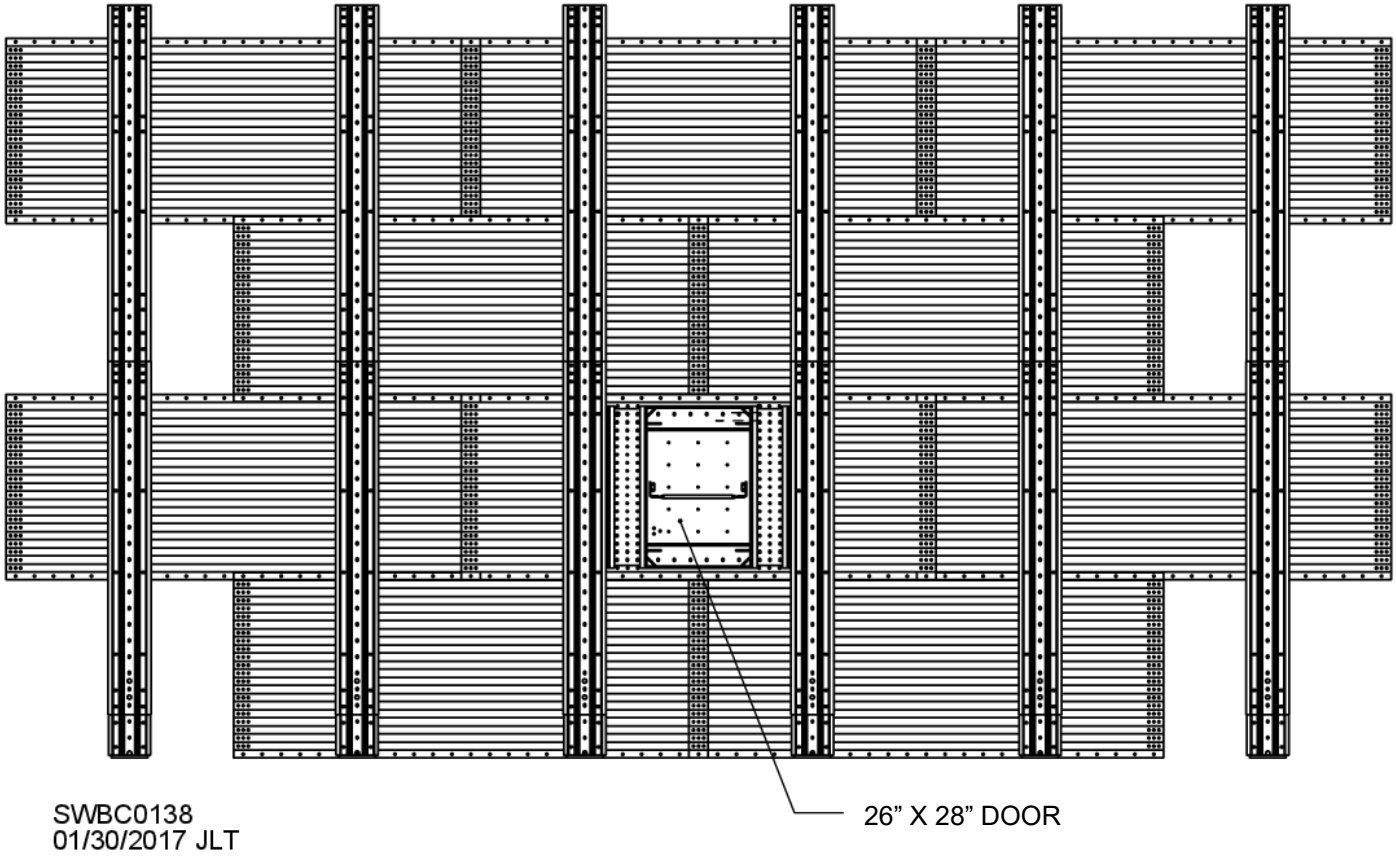


Fig. 1

Fig. 1 shows fully assembled 26” x 28” Code N Door. Note that door is centered between two stiffeners. Sidewall sheet for door will have square opening and bolt holes for attachment of door frame.

IMPORTANT: Fill all holes in sidewall sheet above and below vertical members of frame.

Components & Installation of 26” x 28” Code N Door

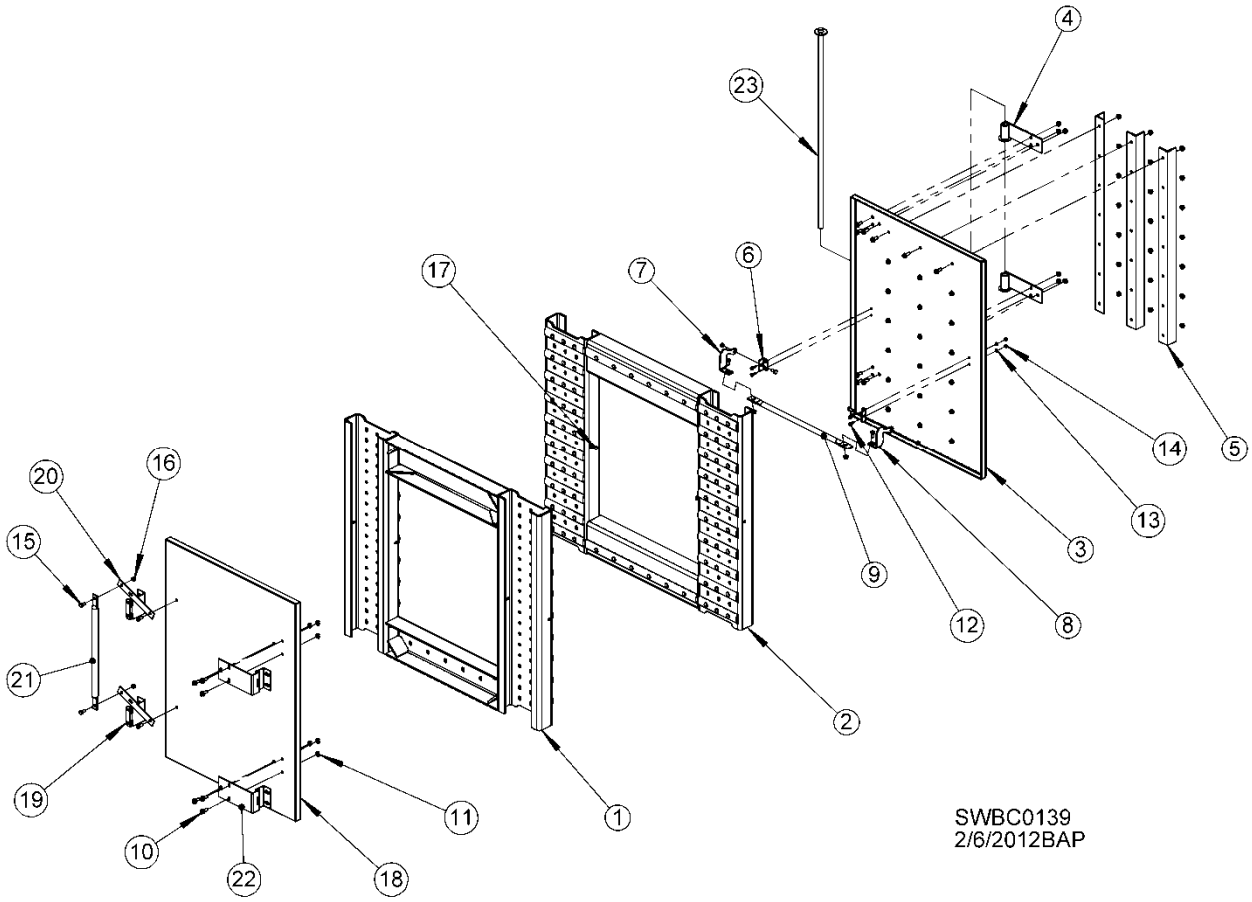


Fig. 2 & Table 1

ITEM #	DESCRIPTION	PART #	QTY.	ITEM #	DESCRIPTION	PART #	QTY.
1	Outer door frame	BC5501	1	13	Lock washer, 1/4”	J1195	4
2	Inner door frame	BC5502	1	14	Hex nut, 1/4”	J0990	4
3	Inner door	BC5503	1	15	Screw, 3/8 – 16 x 3/4"	J0605	8
4	Inner door hinge	BC5504	2	16	Lock nut, 3/8”	J1025	6
5	Angle brace, 36”	BC5508	3	17	Screw, 3/8 – 16 x 1-3/4”	J0645	2
6	Hanger bracket	B5314	2	18	Outer door	BC5505	1
7	Door latch, left	B5318	1	19	Door lock catch	BC5506	2
8	Door latch, right	B5319	1	20	Door handle bar	BC5507	2
9	Inner door handle	BC5509	1	21	Door handle	B5356-03	1
10	Bolt, 3/8 – 16 x 1”	B5932	33	22	Outside door hinge	BC5510	2
11	Flange nut, 3/8”	B5962	39	23	Inside door hinge	BC5511	1
12	Bolt, 1/4 – 20 x 3/4"	J0505	4				

Fig. 2 and Table 1 show components of 26” x 28” Code N Door. Note differences between outer and inner door frames (Items 1 & 2). Outer frame has half-moons welded to it to match outside corrugation. Inner frame has half-moons welded to it to match inside corrugation and inner door panel hinges. If looking at inner door frame from inside of bin, hinges must be on right-hand side. Frames bolt to sidewall sheets using 7/16” hardware. See Fig. 15 and related instructions for applying door frame sealant.

After inner and outer frames are connected, attach inner door panel assembly with hinge to inner door frame. Attach outer door assembly to outer door frame.

30” x 60” Code W2 Walk-Through Door

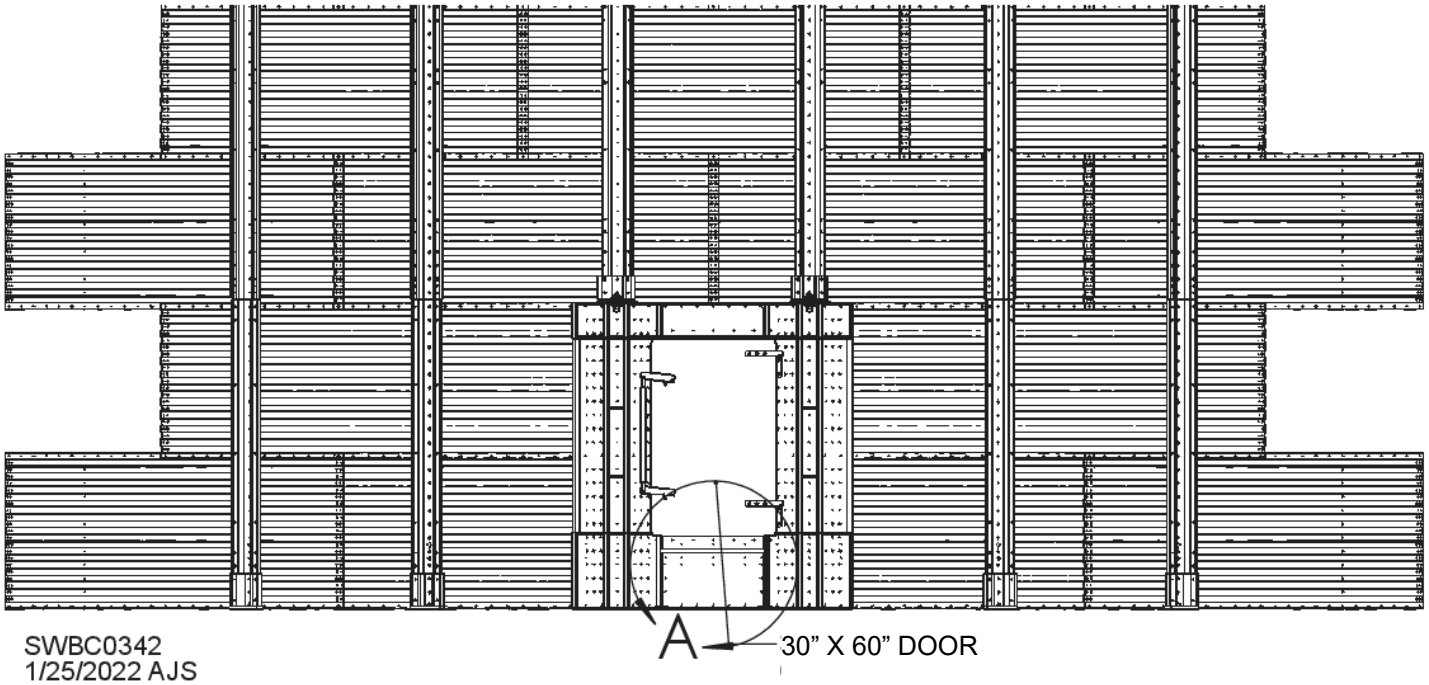
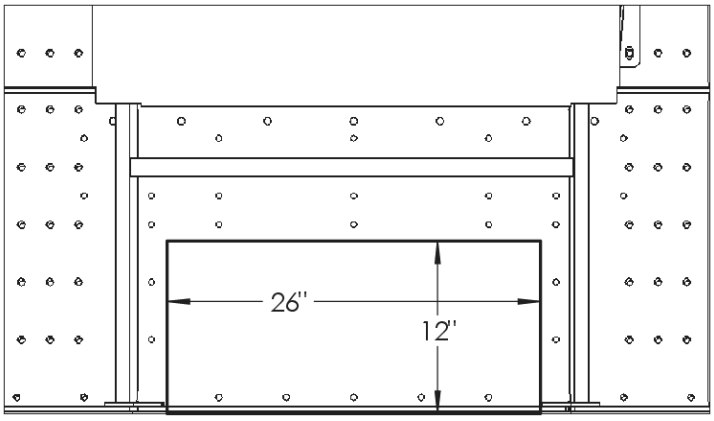


Fig. 3



DETAIL A

Fig. 3 shows fully assembled 30” x 60” Code W2 Walk-Through Door. Note locations of long and short sidewall sheets next to door. Each is tagged to aid in identification and placement.

NOTE: A hole of up to 26” x 12” may be cut into middle of door frame bottom if needed for unload system. See Detail A. See unload system manual for flashing installation instructions.

See Fig. 4 and Table 2 on next page for component identification.

Components & Installation of 30” x 60” Code W2 Walk-Through Door

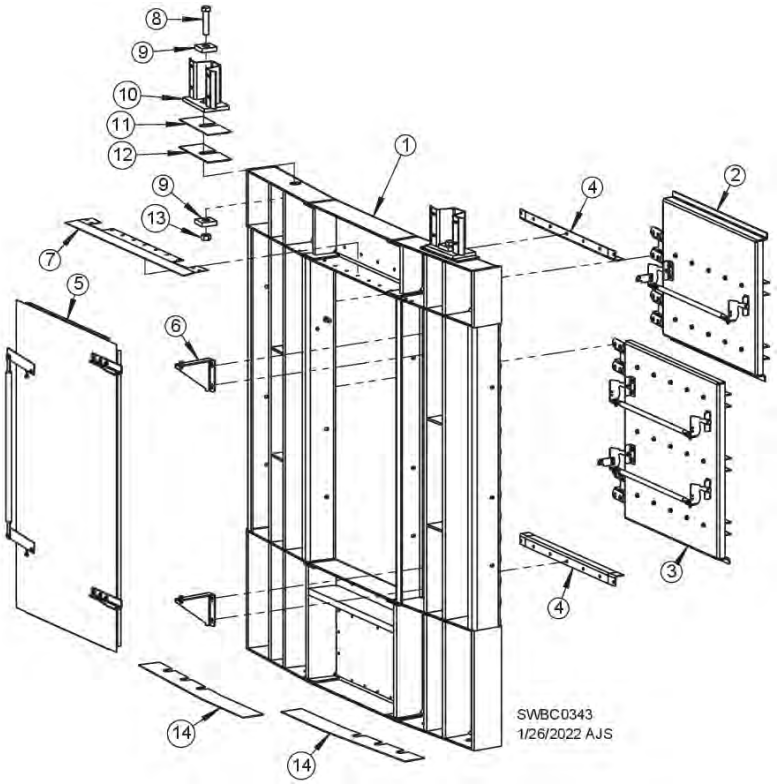


Fig. 4 & Table 2

ITEM #	DESCRIPTION	PART #	QTY.
1	Outer door frame	BCD5810	1
2	Inner door panel assy., top	BCD5830	1
3	Inner door panel assy., bottom	BCD5840	1
4	Door panel seal angle	BCD5838	2
5	Outer door assy., 36 x 58”	BCD5850	1
6	Outer door hinge bracket	BCD5852	2
7	Rain shield	BCD5827	1
8	Screw, 1 - 8 x 4-1/2”	J0913	2
9	Square washer, 3 x 3/4"	BC52062	4
10	Stiffener boot	BCD5860	2
11	Stiffener shim, 11ga	BC5250	2
12	Stiffener shim, 7ga	BC52507	2
13	Hex nut, 1” - 8	J1060	2
14	Door frame shim	BCD5828	2

Fig. 4 and Table 2 show components of 30” x 60” Code W2 Walk-Through Door.

Use provided sealant (shown adjacent to Fig. 17) to seal top and sides of door frame to sidewall sheets.

Bolt frame assembly (Item 1) to bin sheets using 7/16” hardware. Insert door frame shims (Item 14) as needed.

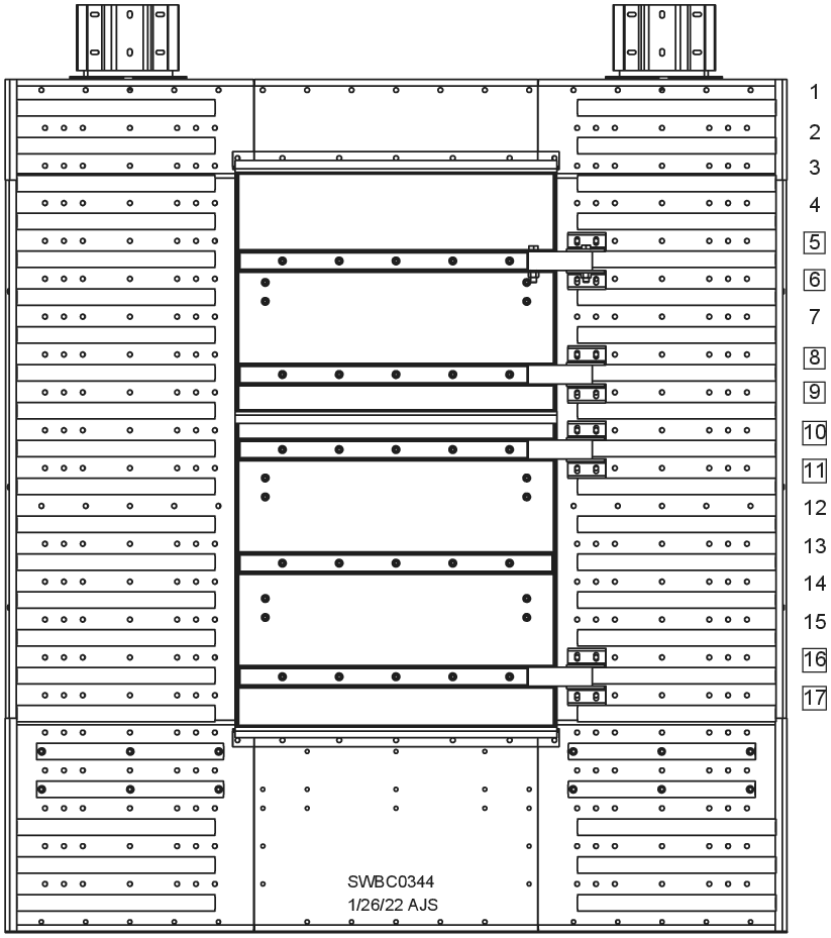
Attach inner door assemblies (Items 2 & 3) to inside of door frame as shown on next page.

Attach outer door assembly (Item 5) to outside of door frame as shown in Fig. 4 using hinge brackets (Item 6).

Attach stiffener boots (Item 10) to frame with 1” screws (Item 8), square washers (Item 9), 1” nuts (Item 13), and shims (Items 11 & 12) as needed.

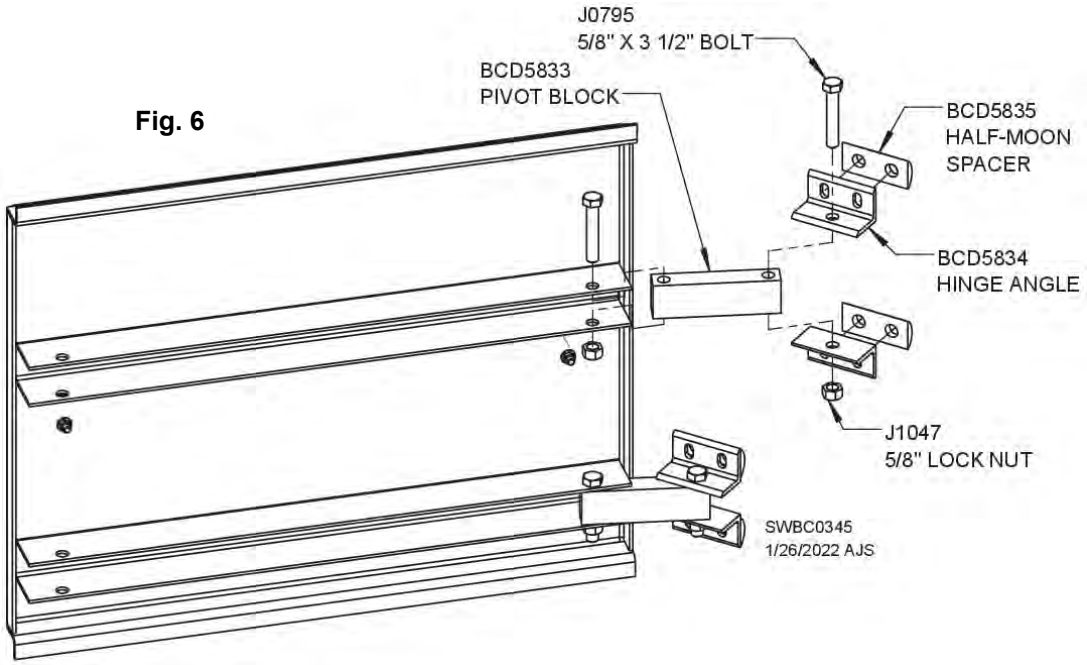
See Figs. 5 & 6 for attaching hinge brackets to Code W2 Walk-Through Door frames and for assembling hinges and attaching to inner door panels. Fig. 5 shows locations for mounting hinge brackets (bolt hole rows 5 & 6, 8-11, 16 & 17). **NOTE:** Door panels are built for mounting hinges on right side of door frame. However, parts are reversible, so hinges can be switched to left side if desired.

Fig. 5



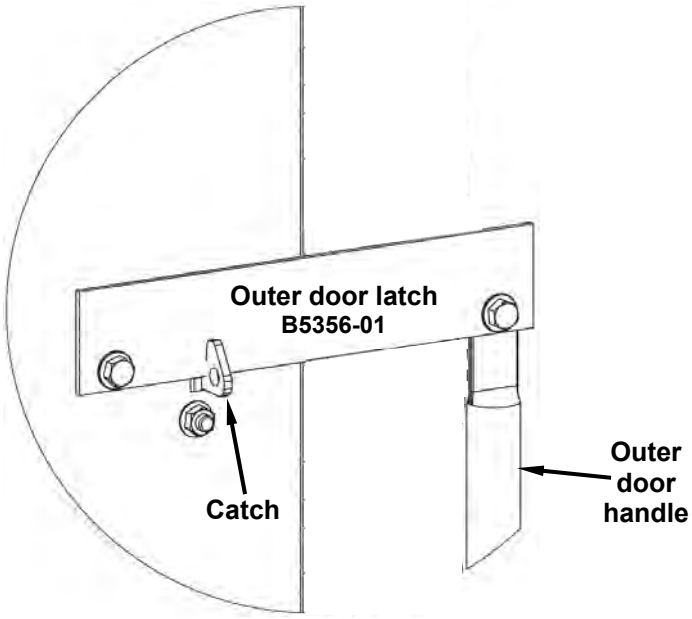
Attach hinge pieces to door panels as shown in Fig. 6.

Fig. 6



Safety Catch on Code W2 walk-through door prevents latching of outer door unless inner panels are securely closed. After installation of door as shown on previous pages, final adjustment is required to ensure latches on outer door skin fit securely in catches on hammer-head latches of inner door panels. Fig. 7 provides overview.

Fig. 7 – View w/ door closed



Ensure catch (B5494) that was factory-attached to hammer-head latch will protrude through factory-cut rectangular hole in door skin when inner door panels are closed. Image 1 shows catch.

Attach foam (K6843) to inside of door around slot as shown in Image 2 to provide watertight seal.

Close outer door (skin) and pull down its handle so that latch fits securely into catch as shown in Fig. 7.

If need be, loosen bolts attaching catch to hammer-head latch. See Image 1. Slots in catch and hammer-head latch allow for adjustment. Position catch for proper fit and retighten hardware.

Double-check fit by opening outer and inner doors and then closing inner panels and outer door.

Adjust again as needed.

Repeat process above for lower catch.

NOTE: If door will be installed to open from left to right, attach B5494 catches to hammer-head latches (B5319) on left side of inner door panels and follow steps above to ensure fit.

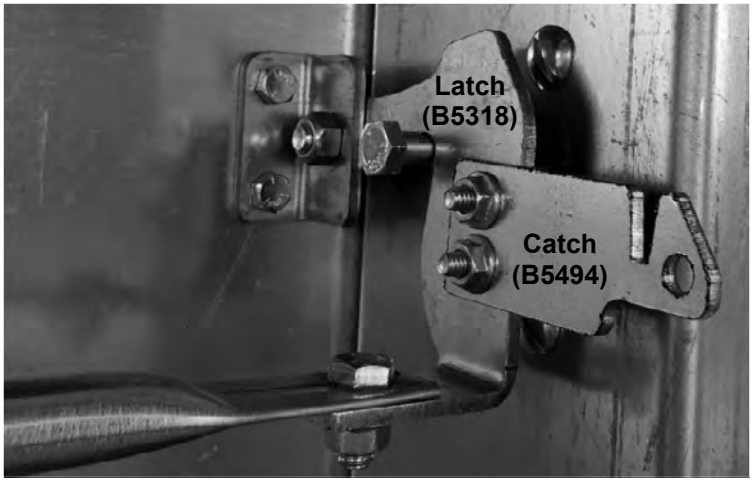


Image 1 – Catch bolted to hammer-head latch

Image 2 – Foam sealant (K6843) on inside of door

30” x 60” Code U Walk-Through Door

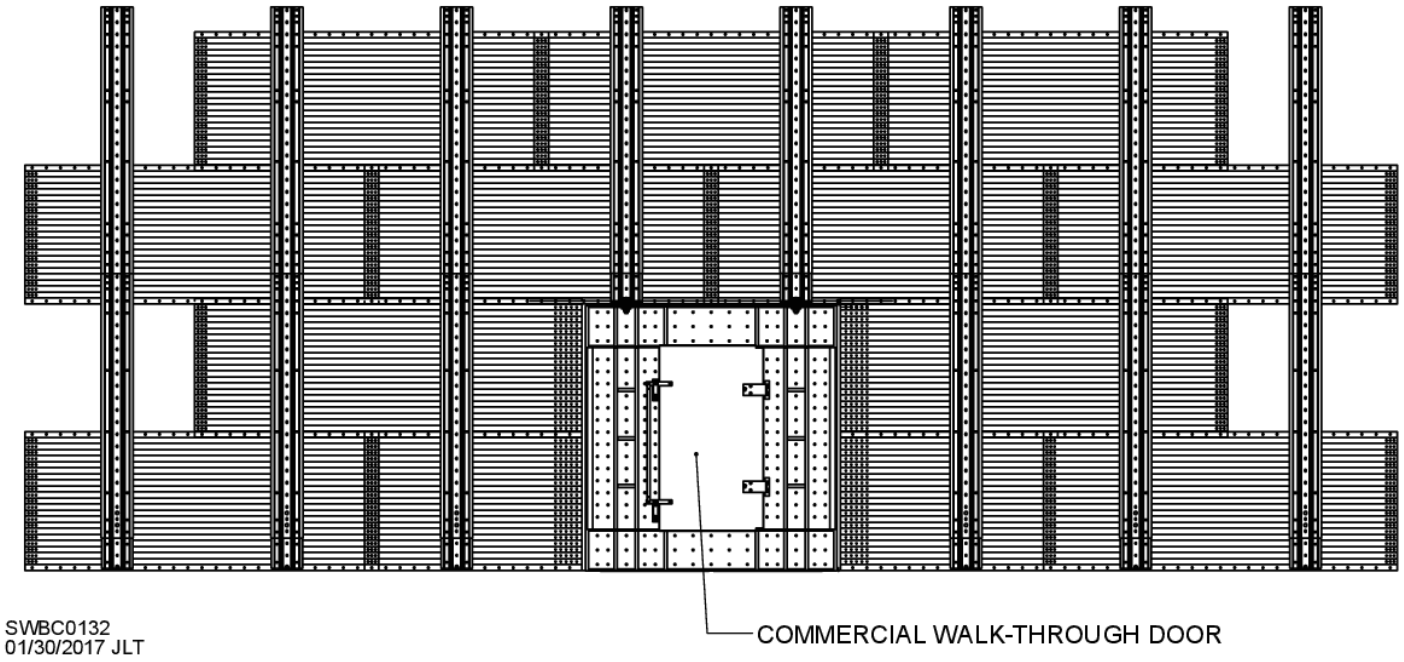


Fig. 8

Fig. 8 shows fully assembled 30” x 60” Code U Walk-Through Door. Note locations of long and short sidewall sheets next to door. Each is tagged to aid in identification and placement.

Depending on size of bin, door will have one frame or two. See Fig. 9 and Table 3 for identification of components used to install one-frame door in bin from 48’ to 78’ dia. See Fig. 10 and Table 4 for identification of components used to install two-frame door in bin from 75’ to 135’ dia.

Components & Installation of 30” x 60” Code U Walk-Through Door for 48’ to 78’ dia. Bin

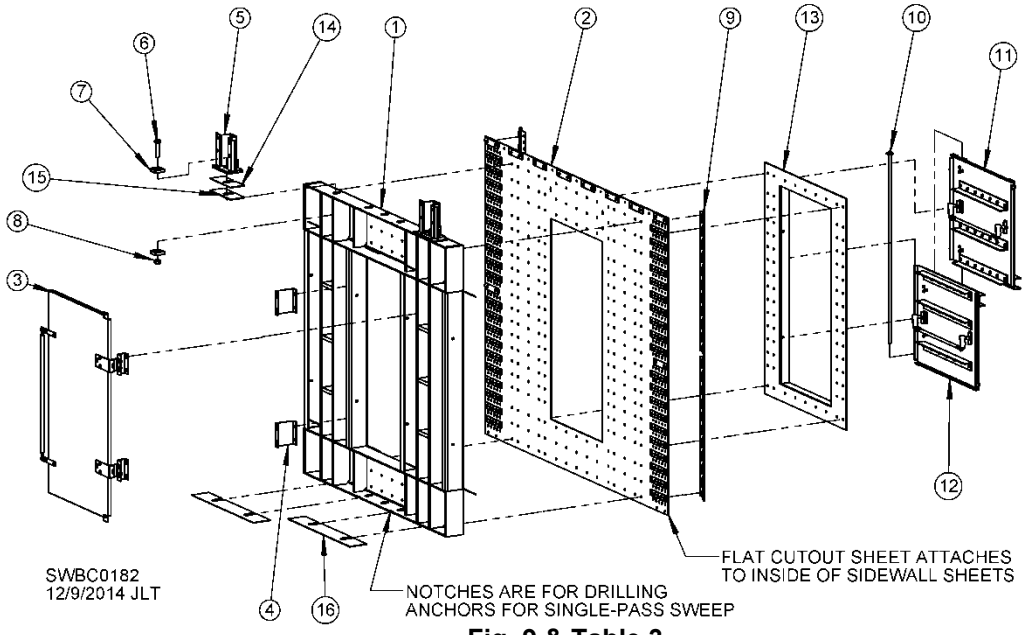


Fig. 9 & Table 3

ITEM #	DESCRIPTION	PART #	QTY.	BIN DIA.
1	Outside frame	BCD5075	1	48-78
2	Flat cut-out weldment	BCD5051W	1	48-60
		BCD5052W		72-78
3	Outside door assembly	BCD5080	1	48-78
4	Lock catch	BCD5082	2	48-78
5	Stiffener boot	BCD5022	2	48-78
6	Screw, 1 - 8 x 4-1/2”	J0913	2	48-78
7	Square washer, 3 x 3/4"	BC52062	4	48-78
8	Hex nut, 1”	J1060	2	48-78
9	Corrugated end plate	BCD5015	4	48-78
10	Inside door hinge	BCD5025	1	48-78
11	Inner door assembly, top	BCD5035	1	48-78
12	Inner door assembly, bottom	BCD5037	1	48-78
		BCD5037P*		
13	Inside frame	BCD5140	1	48-78
		BCD5140P*		
14	Stiffener shim, 11ga	BC5250	2	48-78
15	Stiffener shim, 7ga	BC52507	2	48-78
16	Frame shim	BCD5046	6	48-78

***For plenum-punched 72’ to 78’ dia. bin**

Fig. 9 and Table 3 show components of 30” x 60” Code U Walk-Through Door for 48’ to 78’ dia. bin. Flat cutout sheet (Item 2) needs to be installed on inside of bin first. Flat sheet has half-moons welded onto it to match inside corrugations. Attach flat cutout sheet using same hardware as used on sidewall ring to which it is attached. See color chart. **NOTE:** Leave out outside column of bolts until attachment of corrugated end plates (Item 9).

Bolt corrugated end plates to outside edges of flat cutout sheet (Item 2). See Fig. 17 and related instructions for applying door frame sealant. Attach outside and inside frames (Items 1 & 13) to flat cutout sheet. Frames bolt to flat sheets using 1/2” hardware. Insert door frame shims (Item 16) as needed.

Use hinge pin weldment (Item 10) to attach inner door assemblies (Items 11 & 12) to inside door frame. Attach outer door assembly (Item 3) and door catches (Item 4) to outside door frame.

Attach stiffener boots (Item 5) to outside frame with 1” bolts, square washers, 1” nuts, and shims (Items 14 and 15) as needed.

Components & Installation of 30” x 60” Code U Walk-Through Door for 72’ to 135’ dia. Bin

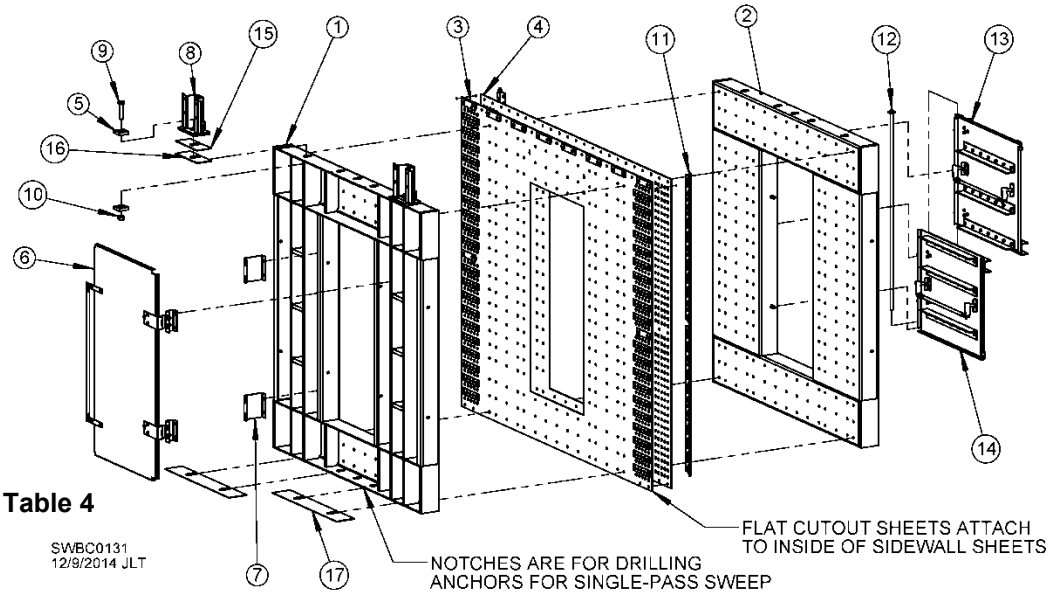


Fig. 10 & Table 4

ITEM #	DESCRIPTION	PART #	QTY.	BIN DIA.
1	Outside frame	BCD5075	1	72-105
2	Inside frame	BCD5070	1	72-135
		BCD5070P*		
3	Flat cutout weldment	BCD5050W	1	135
		BCD5051W		90-105
		BCD5052W		72-78
4	Flat cutout sheet	BCD50501	1	135
		BCD50511		90-105
5	Square washer, 3 x 3/4"	BC52062	4	72-105
6	Outside door assembly	BCD5080	1	72-105
7	Lock catch	BCD5082	2	72-105
8	Stiffener boot	BCD5022	2	72-105
9	Screw, 1 - 8 x 4-1/2”	J0913	2	72-105
10	Hex nut, 1”	J1060	2	72-105
11	Corrugated end plate	BCD5015	4	72-105
12	Inside door hinge	BCD5025	1	72-105
13	Inner door assembly, top	BCD5035	1	72-105
14	Inner door assembly, bottom	BCD5037	1	72-105
		BCD5037P*		
15	Stiffener shim, 11ga	BC5250	2	72-105
16	Stiffener shim, 7ga	BC52507	2	72-105
17	Frame shim	BCD5046	6	72-105

***For plenum-punched 72’ to 78’ dia. bin**

Fig. 10 and Table 4 show components of 30” x 60” Code U Walk-Through Door for 72’ to 135’ dia. bin. Flat cutout sheets (Items 3 & 4) need to be installed on inside of bin first. **NOTE:** One flat sheet (Item 3) has half-moons welded onto it to match inside corrugations. Attach flat cutout sheets using same hardware as used on sidewall ring to which they are attached. See color chart. **NOTE:** Leave out outside column of bolts until attachment of corrugated end plates (Item 11).

Bolt corrugated end plates to outside edges of inside flat sheet (Item 4). See Fig. 17 and related instructions for applying door frame sealant. Attach outside and inside frames (Items 1 & 2) to flat cutout sheets. Frames bolt to flat sheets using 1/2” hardware. Insert door frame shims (Item 17) as needed.

Use hinge pin weldment (Item 12) to attach inner door assemblies (Items 13 & 14) to inside door frame. Attach outer door assembly (Item 6) and door catches (Item 7) to outside door frame.

Attach stiffener boots (Item 8) to outside frame with 1” bolts, square washers, 1” nuts, and shims (Items 15 and 16) as needed.

29” x 31” Code N Door for Bin w/ 3 Stiffeners per Sidewall Sheet

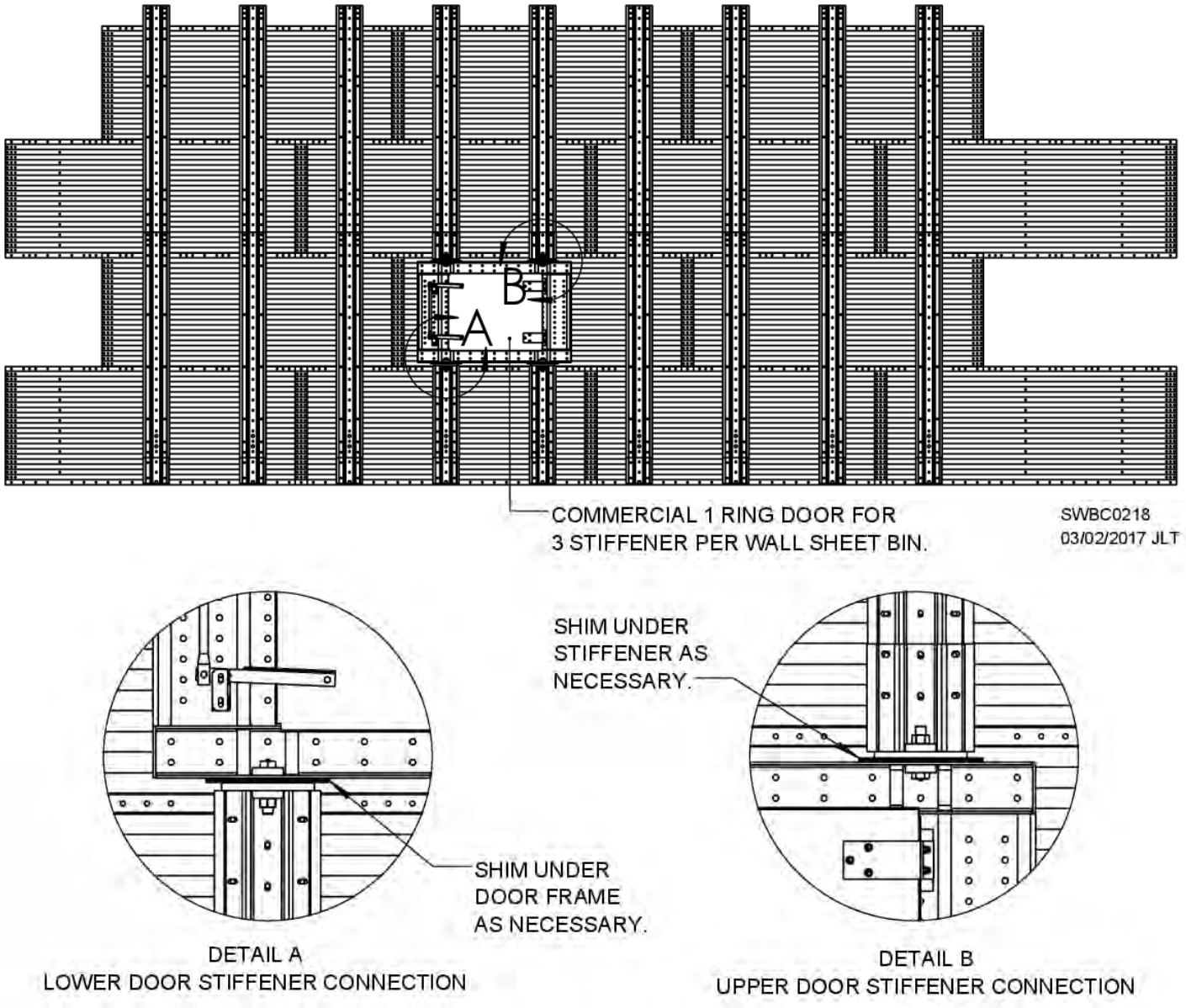


Fig. 11

Fig. 11 shows fully assembled 29” x 31” Code N Door. Note that door assembly intersects two stiffeners. Sidewall sheet for door will have rectangular opening and bolt holes for attachment of door frame.

IMPORTANT: Fill all holes in sidewall sheet above and below vertical members of frame.

Installation instructions are on next page.

Components & Installation of 29” x 31” Code N Door for Bin w/ 3 Stiffeners per Sidewall Sheet

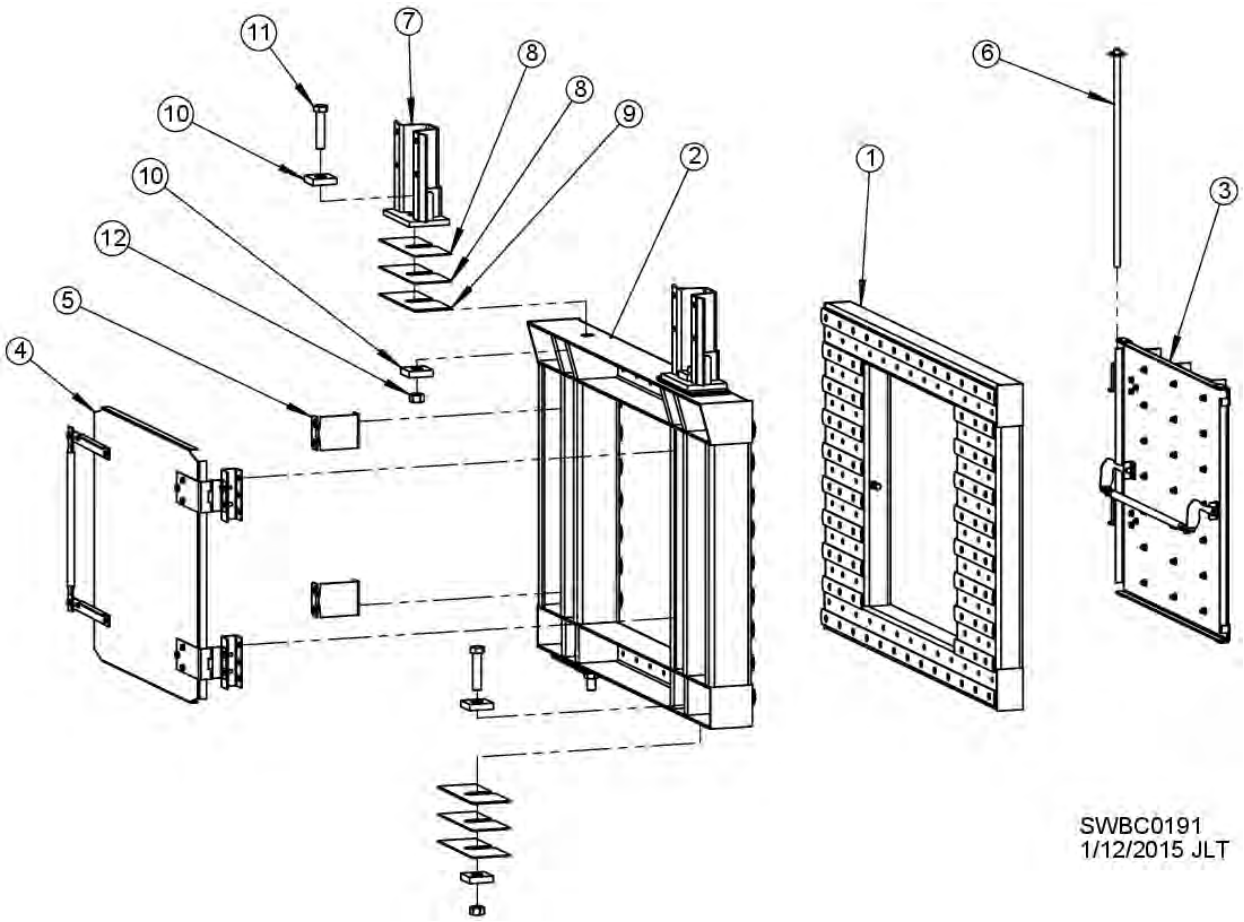


Fig. 12 & Table 5

ITEM #	DESCRIPTION	PART #	QTY.
1	Inner door frame	BCD7520	1
2	Outer door frame	BCD7510	1
3	Inner door assy.	BCD7540	1
4	Outer door assy.	BCD7530	1
5	Door catch	BCD7534	2
6	Hinge pin	BC5524	1
7	Stiffener boot	BCD51228	2
8	Stiffener shim, 11ga	BC5250	8
9	Stiffener shim, 7ga	BC52507	4
10	Square washer, 3 x 3/4"	BC52062	8
11	Screw, 1 - 8 x 4-1/2”	J0913	4
12	Hex nut, 1”	J1060	4

Fig. 12 and Table 5 show components of 29” x 31” Code N Door for bin with three stiffeners per sidewall sheet. Note differences between inner and outer door frames (Items 1 & 2). Outer frame has half-moons welded to it to match outside corrugation. Inner frame has half-moons welded to it to match inside corrugation and inner door panel hinges. If looking at inner door frame from inside of bin, hinge must be on right-hand side. Frames bolt to sidewall sheets using 7/16” hardware. See Fig. 16 and related instructions for applying door frame sealant.

After inner and outer frames are assembled, attach inner door panel assembly with hinge to outer door frame. Attach outer door assembly to outer door frame.

30” x 60” Code U Walk-Through Door for Bin w/ 3 Stiffeners per Sidewall Sheet

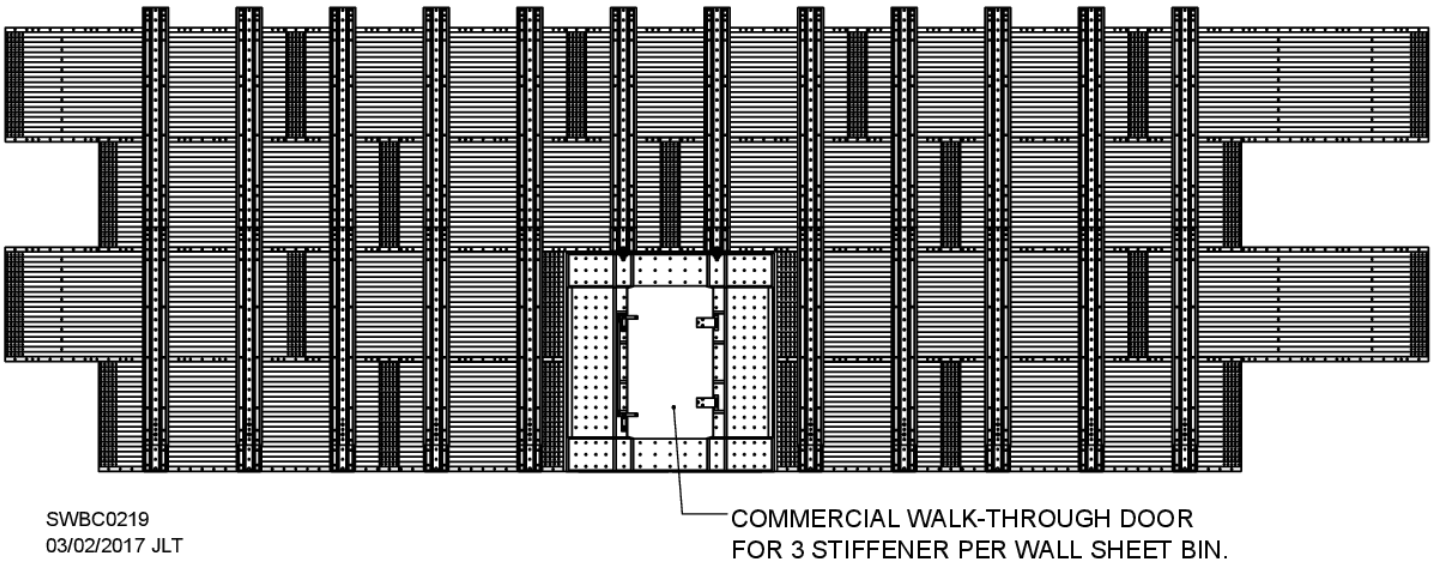


Fig. 13

Fig. 13 shows fully assembled 30” x 60” Code U Walk-Through Door for bin with three stiffeners per sidewall sheet. Note locations of long and short sidewall sheets next to door. Each is tagged to aid in identification and placement.

See Fig. 14 and Table 6 for component identification.

Components & Installation of 30” x 60” Code U Door for Bin w/ 3 Stiffeners per Sidewall Sheet

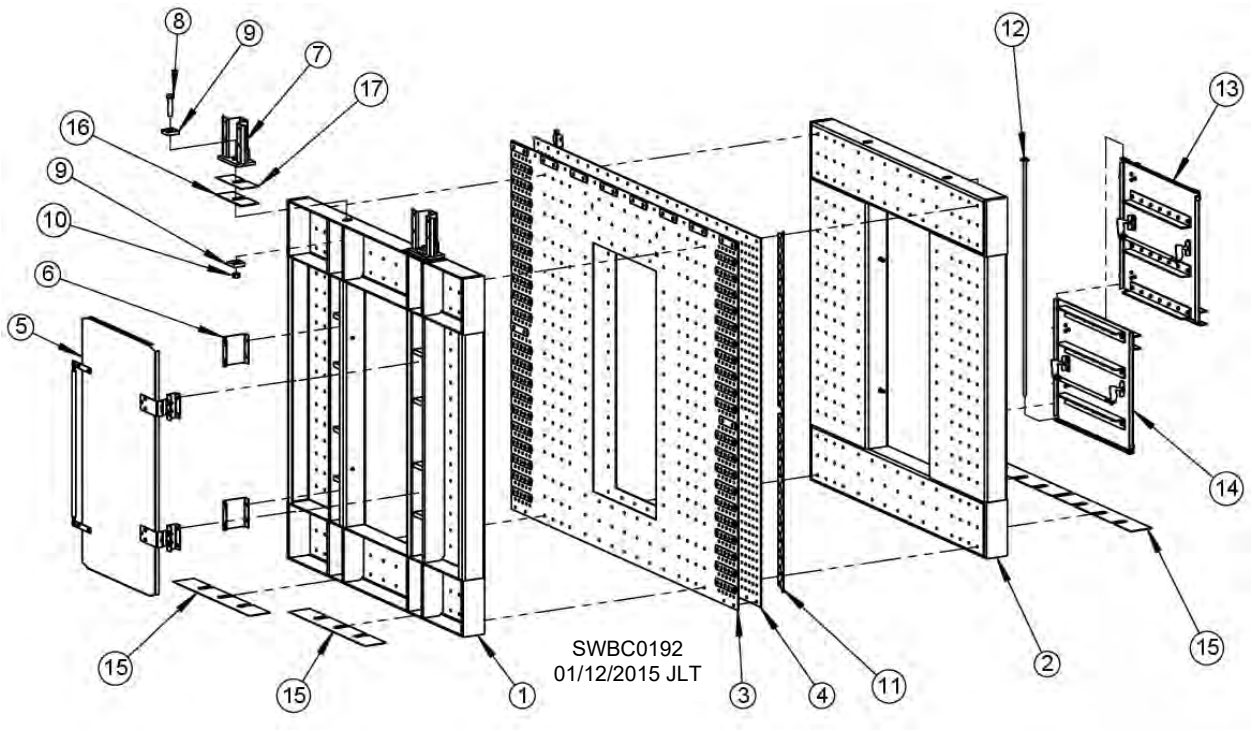


Fig. 14 & Table 6

ITEM #	DESCRIPTION	PART #	QTY.
1	Outside door frame	BCD7010	1
2	Inside door frame	BCD7015	1
3	Flat cutout weldment	BCD7025	1
4	Flat cutout sheet	BCD7026	1
5	Outer door assy.	BCD7020	1
6	Lock catch	BCD5082	2
7	Stiffener boot	BCD5022	2
8	Screw, 1 - 8 x 4-1/2”	J0913	2
9	Square washer, 3 x 3/4"	BC52062	4
10	Hex nut, 1”	J1060	2
11	Corrugated end plate	BCD5015	4
12	Inside door hinge	BCD5025	1
13	Inner door assembly, top	BCD5035	1
14	Inner door assembly, bottom	BCD5037	1
15	Frame shim	BCD5046	4
16	Stiffener shim, 7ga	BC52507	2
17	Stiffener shim, 11ga	BC5250	2

Fig. 14 and Table 6 show components of 30” x 60” Code U Walk-Through Door for bin with three stiffeners per sidewall sheet. Flat cutout sheets (Items 3 & 4) need to be installed on inside of bin first. **NOTE:** One flat sheet (Item 3) has half-moons welded onto it to match inside corrugations. Attach flat cutout sheets using same hardware as used on sidewall ring to which they are attached. See color chart. **NOTE:** Leave out outside column of bolts until attachment of corrugated end plates (Item 11).

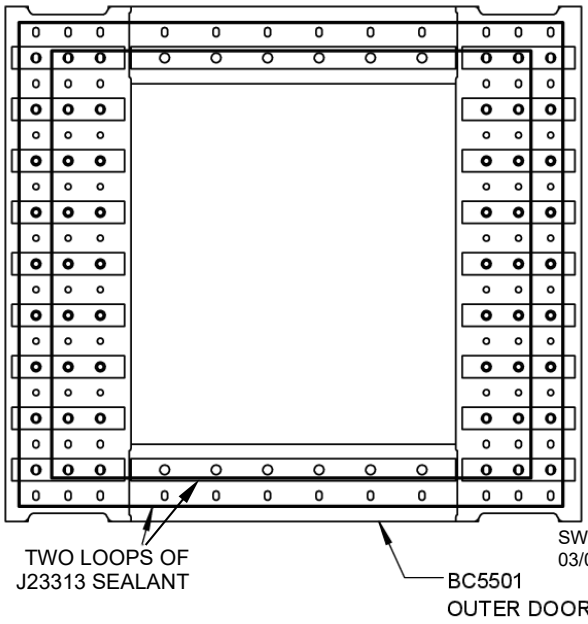
Bolt corrugated end plates to outside edges of inside flat sheet (Item 4). See Fig. 15 and related instructions for applying door frame sealant. Attach outside and inside frames (Items 1 & 2) to flat cutout sheets. Frames bolt to flat sheets using 1/2” hardware. Insert door frame shims (Item 15) as needed.

Use inside door hinge (Item 12) to attach inner door assemblies (Items 13 & 14) to inside door frame. Attach outer door assembly (Item 5) and door catches (Item 6) to outside door frame.

Attach stiffener boots (Item 7) to outside frame with 1” bolts, square washers, 1” nuts, and shims (Items 16 and 17) as needed.

Applying Sealant to Door Frames

When assembling 26” x 28” door or 29” x 31” door, apply two loops of provided sealant (J23313); one around each side of outermost holes on back side of outer door frame. See Fig. 15 or Fig. 16.



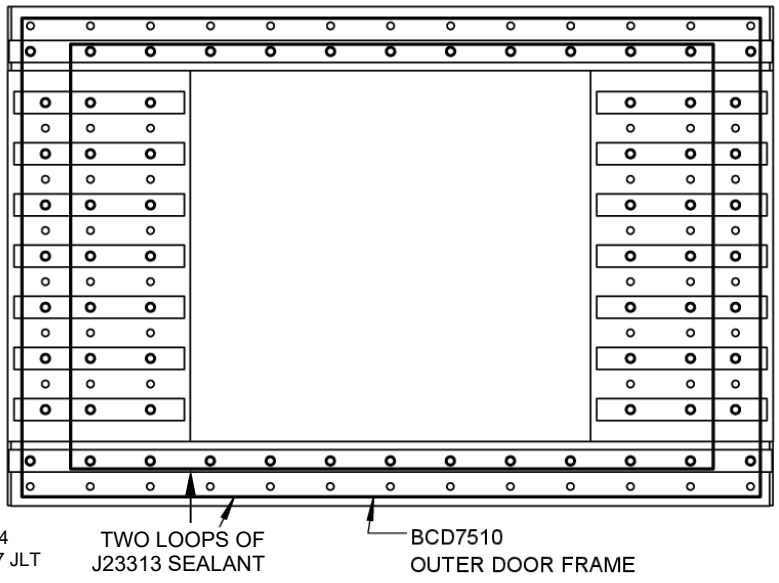
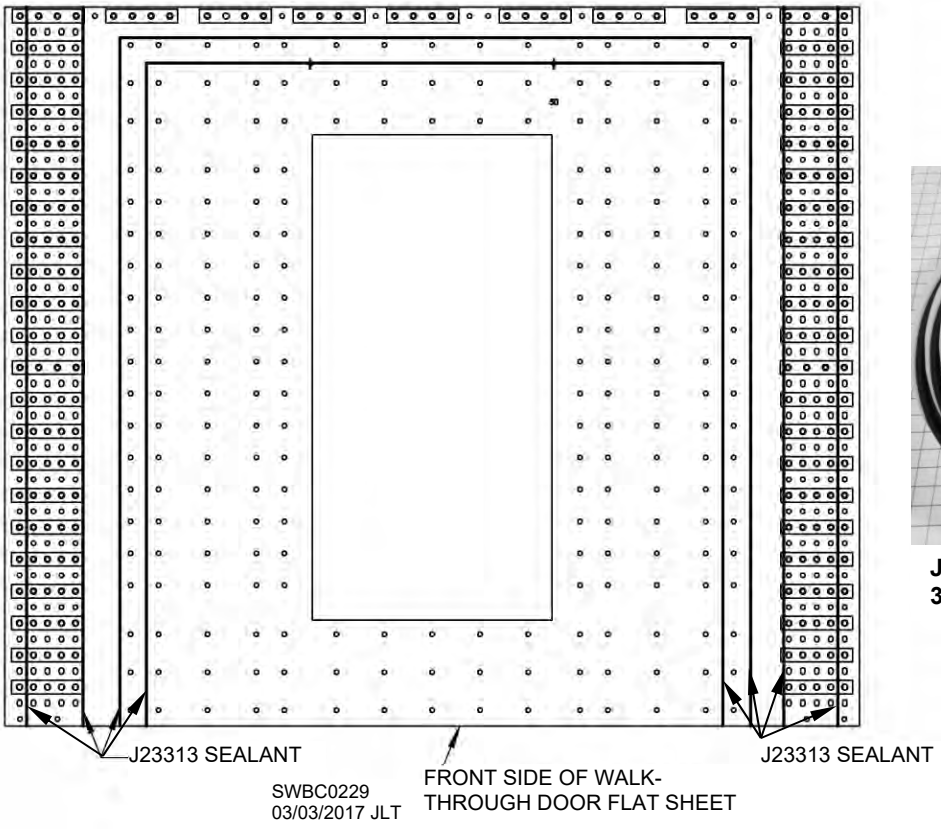
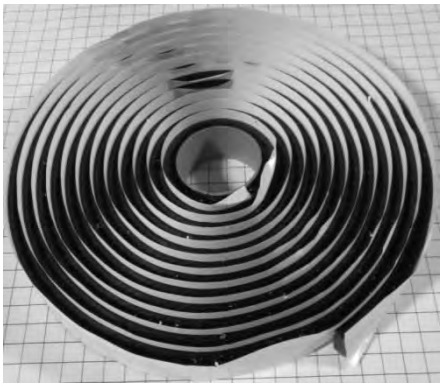


Fig. 15 – Outer frame of 26” x 28” door

Fig. 16 – Outer frame of 29” x 31” door

When assembling 30” x 60” walk-through door, apply provided sealant (J23313) inside and outside of outermost bolt holes used to attach flat sheet to outside door frame. See Fig. 17. Also apply to vertical seams on left and right side as shown. **NOTE:** Actual hole layout may vary depending on door being installed.





J23313 – TAR SEALANT, 3/8” x 3/8” x 20’

Fig. 17 – Flat sheet for 30” x 60” door (Not applicable to Code W2 door)

Sidedraw Assembly

NOTICE: **Use only Sukup-designed sidedraw discharge units and interior baffles with Sukup bins**. Baffles help channel grain to discharge chute as grain flows from above. Never change function of a bin's intended use. Sukup bins are designed for specific amounts of grain and weight and to be loaded and unloaded in a certain manner. If bin was not intended for a sidedraw, unloading pressures may cause bin failure. See Fig. 1. Know the purpose for which bin was constructed.

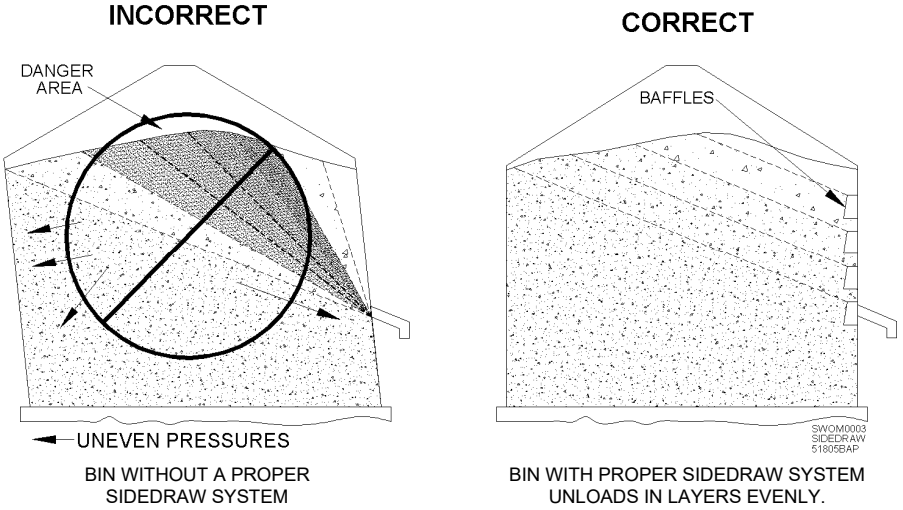


Fig. 1

NOTICE: Do not unload bin from sidewall without proper installation of a sidedraw system. Follow special guidelines below for bins with sidedraw(s). Failure to do so will result in excessive pressures that can result in sidewall leaning, buckling or other bin failure.

IMPORTANT GUIDELINES FOR SIDEDRAW USE

- Never add sidedraw to existing bin without consulting an independent engineer or obtaining written approval from Sukup Manufacturing Co. Bin may not be designed to accommodate a sidedraw.
- Intended for use with dry grain only. Do not use sidedraw with poorly flowing grain products.
- Do not use sidedraw until 90 days after first complete filling.
- Sidedraw must be at least 90° from any door that uses pegs to help secure inner door.
- If two sidedraws are installed, they must be placed at least 90° from one another in same ring. On a 105' bin, they must be placed 180° from each other in same ring.
- Only one sidedraw may be used at a time.
- Sidedraws are not to be used as primary outlets. Standard center sumps and conveyors should be installed. After sidedraw use, unload from center sump, then intermediate sumps, and then sweep bin.
- Do not unload from sidedraw and center sump at same time.
- Do not simultaneously fill and discharge.
- Sidedraw will leave grain in sloped position, creating off-center load. **IMPORTANT**: Before refilling, unload through center sump so grain reaches equal wall heights around entire bin. Grain must be level or in cone-down position before adding more grain. See next page.
- Sidedraw must be installed in center of a sidewall sheet that is no lower than fifth ring from bottom.
- Top discharge baffle must straddle horizontal seam between first and second rings from top of bin.
- Alternate usage of sidedraws in bins 105' in diameter to reduce stress on bin. It is best to unload no more than four (4) rings of grain before switching to other sidedraw. See Fig. 2 as a guide.

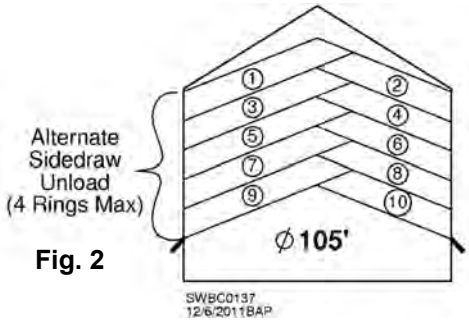


Fig. 2

Baffle Assembly

It is important that all components of grain bin be positioned properly to maximize efficiency and effectiveness of equipment. Most planning should be done before foundation is poured, including location of sidedraw. Concrete stemwall height will affect discharge chute height and extension length. Discharge chute should be centered between stiffeners and no lower than five (5) rings from bottom. **DO NOT** assemble discharge chute on a vertical seam.

Discharge chute weldment is at a 45° angle. Extensions should be at the same angle. Sidewall sheet buckling and/or bin sidewall failure may occur if discharge angle is modified.

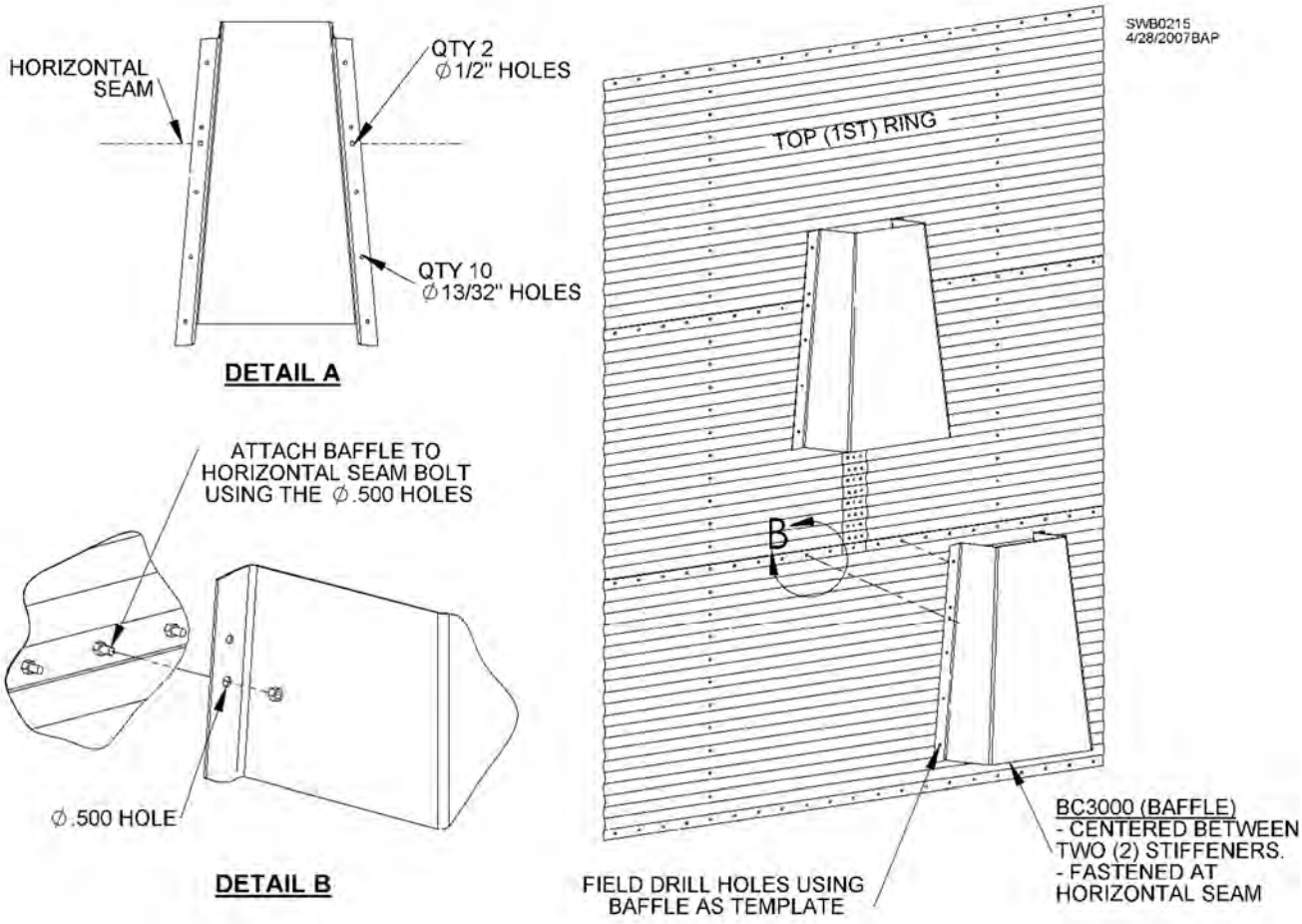


Fig. 3

It is important that baffle assembly begins at correct location. Always center baffle column between two stiffeners. First baffle must straddle first and second rings from top of bin. See Fig. 3. Fasten baffle to horizontal seam bolts using 1/2" diameter holes as shown in Fig. 3. After baffle is attached to horizontal seam, field-drill holes through sidewall using baffle as a template. Attach baffle to sidewall using 3/8” hardware. Continue attaching baffles at every horizontal seam until reaching discharge chute weldment located no lower than fifth (5th) ring from bottom of bin.

Discharge Chute & Slide Gate Assembly

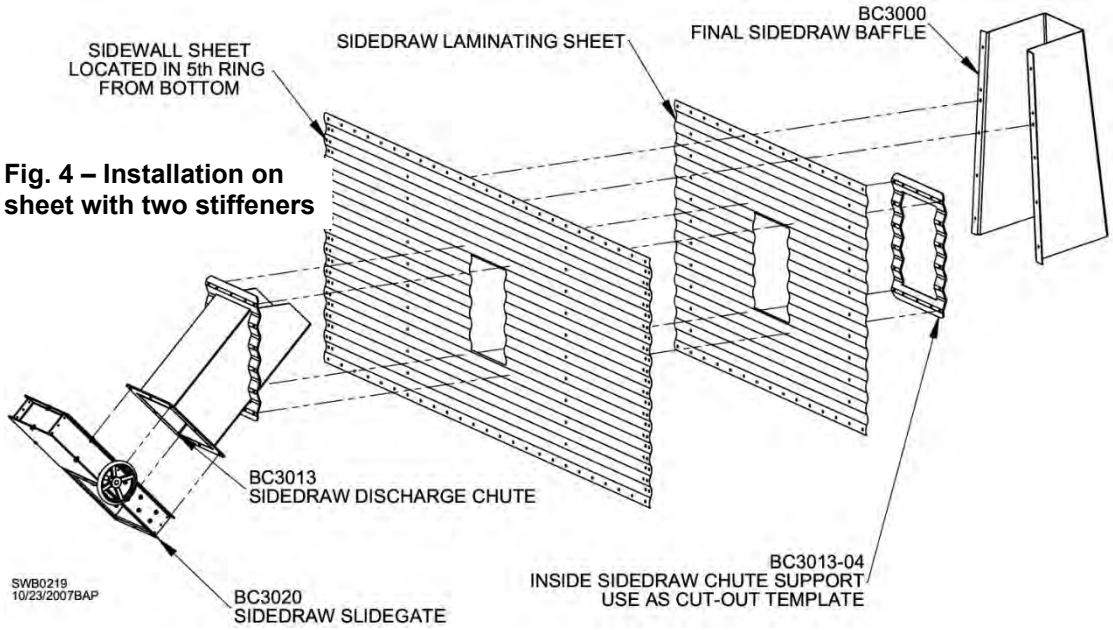


Fig. 4 – Installation on sheet with two stiffeners

Using inside sidedraw discharge chute support as a template, drill holes and cut openings in sidewall and laminating sheets as shown in Fig. 4 or Fig. 5, depending on number of stiffeners. Remember that discharge chute must be installed no lower than fifth (5th) ring from bottom of bin, centered both horizontally and vertically between stiffeners on sidewall sheet. Laminating sheet (shorter sidewall sheet) will be attached to inside of sidewall sheet. Ends of laminating sheet will be attached using same bolts as sidewall stiffeners.

Attach discharge chute to sidewall sheet, laminating sheet and inside chute support using same bolt size that is designated for that sidewall sheet gauge. Consult color chart sent with manual to determine which size bolt to use. Apply bin caulk around discharge chute bolt plate (on both sides of bolt holes) for a watertight seal. See Fig. 5.

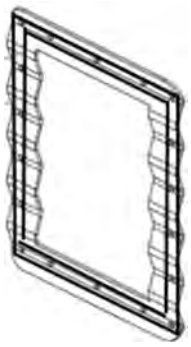


Fig. 5 – Caulk on inside of bolt plate (Chute not shown for clarity)

Attach final baffle to horizontal seam directly above discharge chute. Final baffle is fastened to sidewall sheet in same manner previously stated. Also, fasten rack and pinion gate to end of discharge chute using 3/8” bolts, 3/8” flat washers, and 3/8” hex nuts supplied. **NOTE:** Extra hardware is supplied in case an extension chute will be installed.

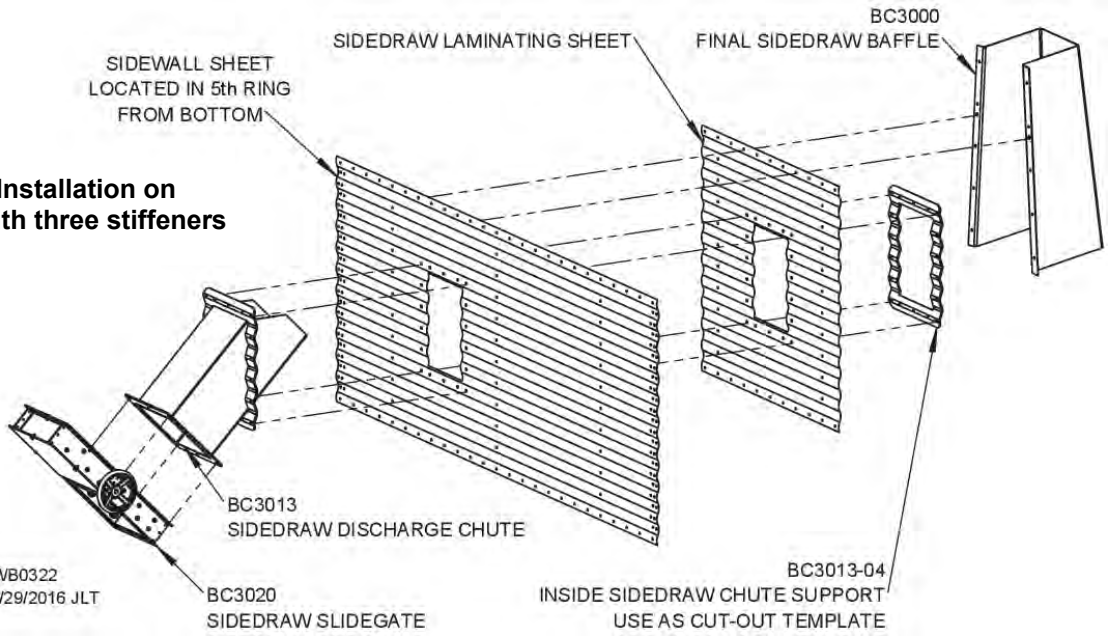


Fig. 6 – Installation on sheet with three stiffeners

Baffle Layout

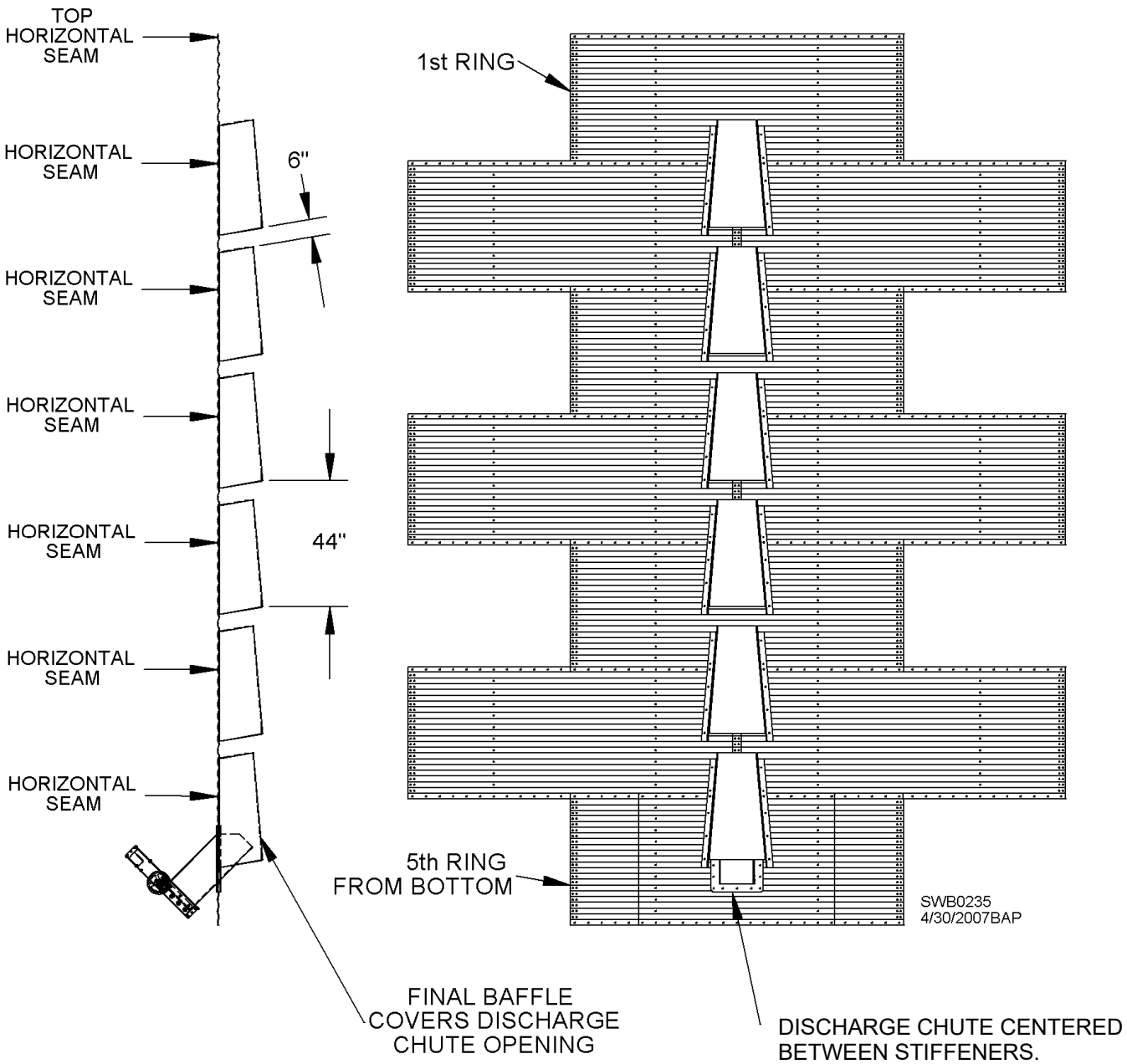


Fig. 7

It is important that all baffles are centered between two stiffeners to maintain a continuous column all the way down to discharge chute. Remember that baffles straddle two sidewall sheets and attach at horizontal seams. Top baffle must be connected to both first and second sidewall rings.

Final baffle must cover discharge chute as shown in Fig. 7.

Chain Guide Wheel Assembly (BC3001)

Fasteners are placed in same box as sprocket wheel. Follow steps below for proper assembly.

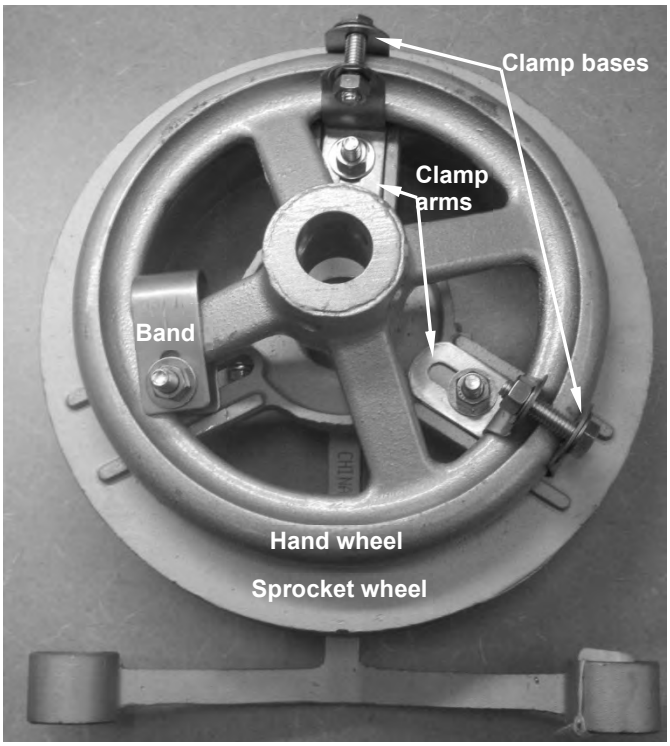


Image 1

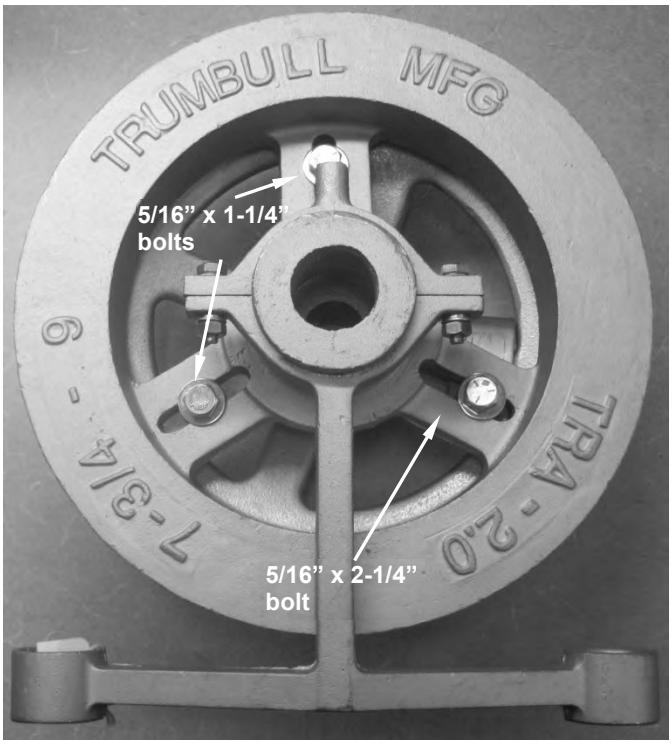


Image 2

1. Place clamp bases and arms around hand wheel as shown in Image 1. Loosely attach with 5/16" x 1-1/4” bolts, washers and nuts provided.
2. Align sprocket wheel with hand wheel so slots and holes in clamps are aligned with slots in sprocket wheel spokes.
3. Push bolts in from outside and secure with nuts as shown in Image 2, going first through slots in sprocket wheel and then through holes in clamp bases and slots in clamp arms. Fasten loosely with washers and nuts provided.
4. Wrap band around spoke of hand wheel as shown in Image 1. Insert 5/16” x 2-1/4” bolt through slot in sprocket wheel and through both slots of band. Fasten with washers and nut provided.
5. Tighten all hardware.
6. Loop chain around sprocket wheel and drop through chain guides so equal lengths are hanging down on each side.
7. Connect ends of chain together to form a continuous loop.

NOTICE: Sidedraws require chute extensions (NOT supplied by Sukup Manufacturing Co.). Chute extension must be supported by cables tied to stiffeners. Sidewall sheet buckling and/or bin sidewall failure may occur if extension is not supported properly.

Ladders, Safety Cages & Platforms

Locations of roof stairs, sidewall ladder and platforms are critical factors in constructing a grain bin. Consider positions in relation to overall layout of site and auxiliary equipment. Location of manhole and roof stairs will establish locations of sidewall ladder, manhole platform and roof stairs platform.

Instructions in this section are for standard (S-Option) ladders package. Maximum distance between platforms is 30'. If B-Option package (22' max distance between platforms) was ordered, see instructions in L13916. See L13915 if fall-arrest cable system was ordered for bin.

DISCLAIMER: It shall be the sole responsibility of the customer to determine applicability of federal Occupational Safety and Health Administration (OSHA) fall protection rules at bin site. Sukup Manufacturing Co. will not be responsible for any personal injury or loss resulting from failure to comply or from incorrect installation or use of fall protection equipment.

WARNING: When installing ladder sections, rung treads must face upward. Failure to heed this warning may cause death or serious injury.

Inside Ladder & Angled Standoff Brackets (Sukup Farm-Duty Bins)

Ladder should be centered under manhole. Attach to sidewall with angled inside ladder splice brackets (B50791) at every horizontal seam. The only exception will be at top of each ladder, where brackets must be moved down 4" to avoid interference with roof sheet and ladder caps. Bins with stirring machine will be shipped with a 33" ladder that attaches below stirring machine track. See Fig. 1. Every sidewall ring except bottom one will have ladder attached to it.

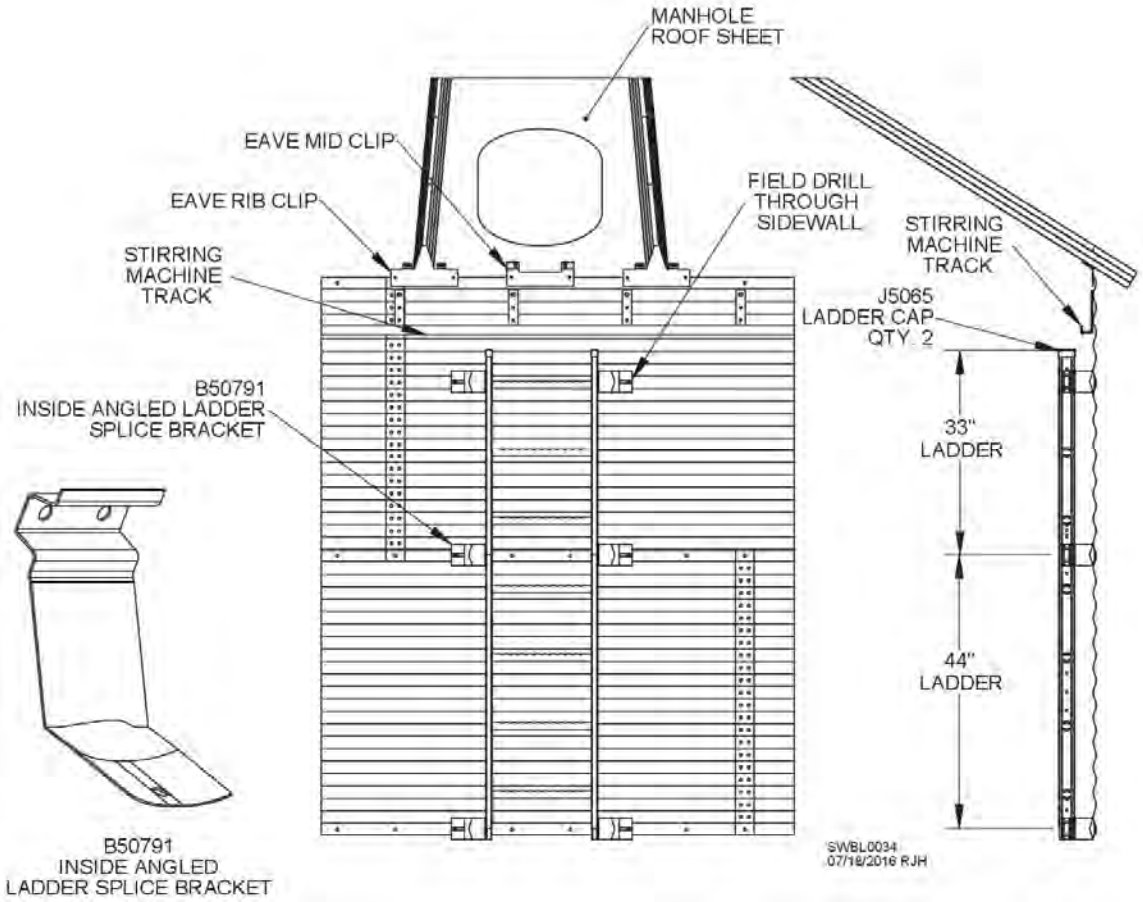


Fig. 1

Use 3/8" hardware to attach inside ladder. Insert bolts from outside of bin to create a watertight seal. If outside ladder brackets will be used at exact same location, remove washer and place between outside bracket and sidewall.

Inside Ladder & 90° Standoff Brackets (Sukup Commercial Bins)

Ladder should be centered under manhole. Attach to sidewall with 90° inside ladder splice brackets (B5079) at every horizontal seam. See Fig. 2. The only exception will be at top of each ladder, where brackets must be moved down 4” to avoid interference with roof sheet and ladder caps. Every sidewall ring except bottom one will have ladder attached to it.

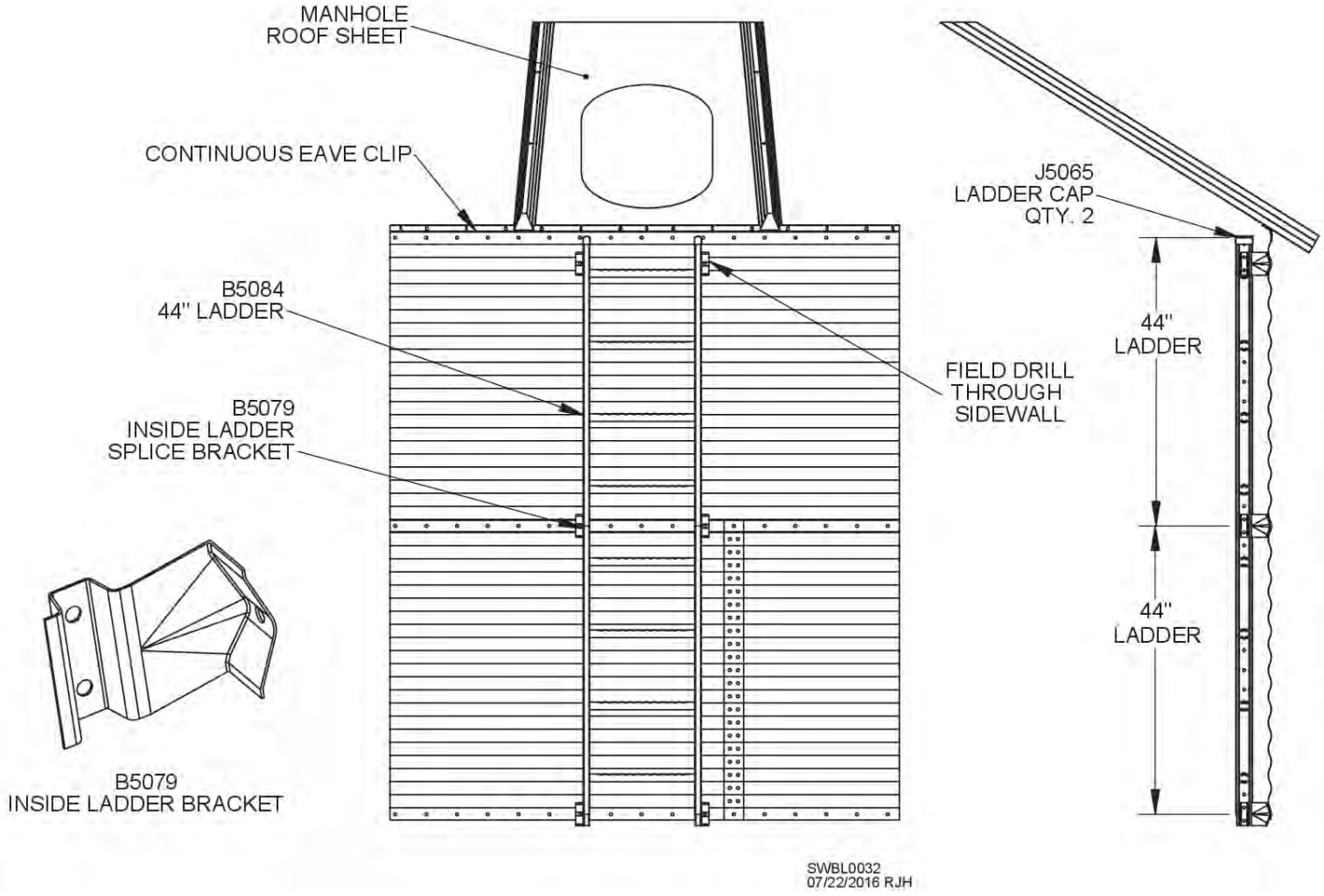


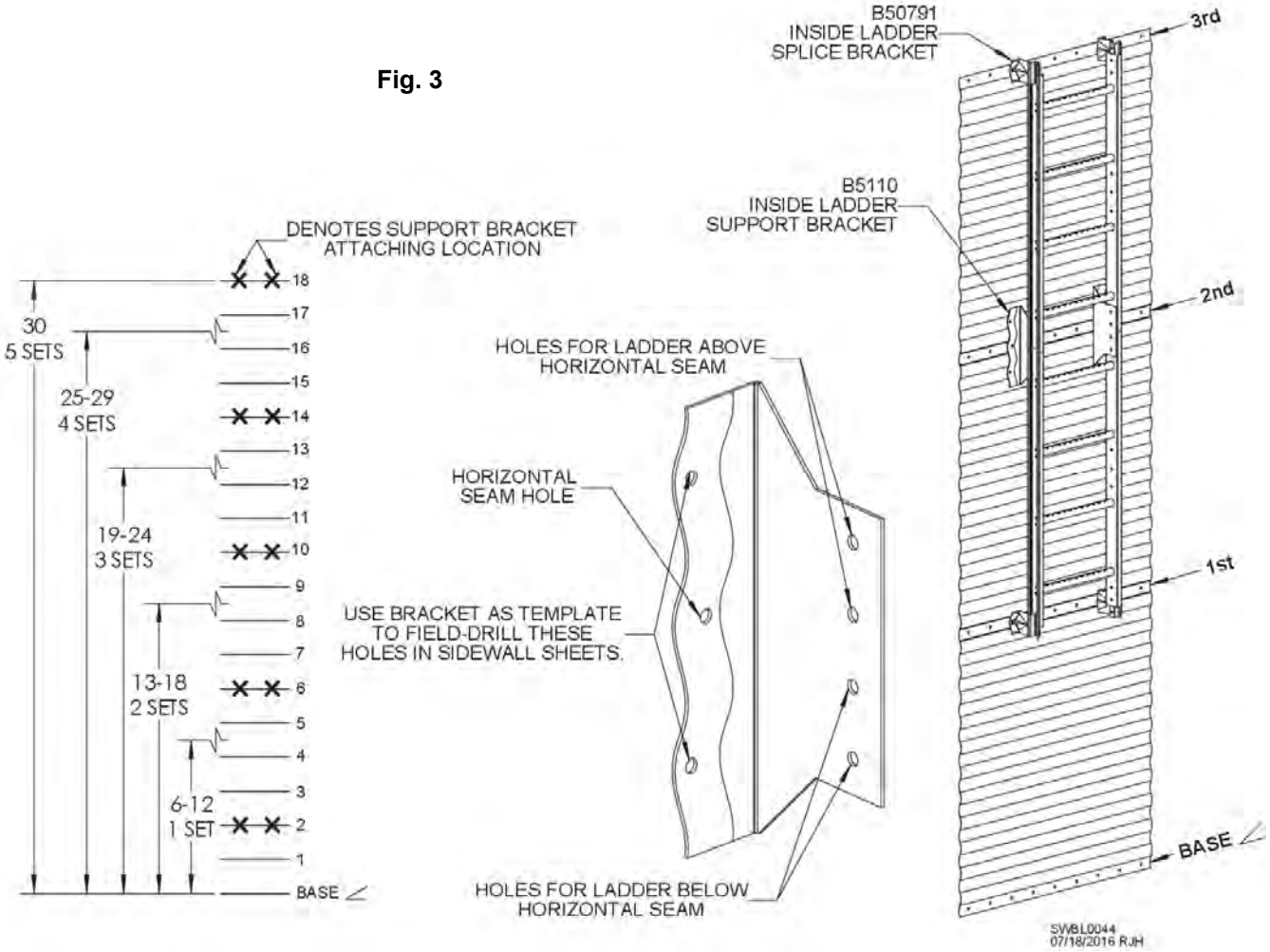
Fig. 2

Use 3/8” hardware to attach inside ladder. Insert bolts from outside of bin to create a watertight seal. If outside ladder brackets will be used at exact same location, remove washer and place between outside bracket and sidewall.

Additional Inside Ladder Support Brackets

Bin Height	Set(s) of Support Brackets	Horizontal Seam Used for Bracket Attachment*
6-12	1	2nd
13-18	2	2nd, 6th
19-24	3	2nd, 6th, 10th
25-29	4	2nd, 6th, 10th, 14th
30	5	2nd, 6th, 10th, 14th, 18th
***Location determined by counting seams from bottom as shown in Fig. 3. Do not count base angle seam.**		

Fig. 3



To provide added stability to inside bin ladders, one to five pairs of support brackets (B5110) are provided, depending on height of bin. One pair should be installed in bins with 6 to 12 rings; two pairs in bins with 13 to 18 rings; three pairs in bins with 19 to 24 rings; four pairs in bins with 25 to 29 rings, and five pairs in bins with 30 rings. See guidelines above for attaching locations. Some examples: A 10-ring bin requires one (1) set of ladder support brackets attached at 2nd horizontal seam; a 14-ring bin requires two (2) sets of ladder support brackets, attached at 2nd and 6th horizontal seams; a 22-ring bin requires three (3) sets of ladder support brackets, attached at 2nd, 6th, & 10th horizontal seams.

Install brackets at ladder splice, using existing horizontal seam bolt in middle hole of support bracket. Field-drill one hole above and one hole below horizontal seam as shown in Fig. 3 and secure with 3/8" hardware. Bolts should be inserted from outside of bin. Attach brackets to inside of ladder rails as shown, using holes provided and 3/8" hardware. **TIP:** It may help to mark on supplied color chart the locations of these additional ladder support brackets.

NOTE: Horizontal seams are at top of specified ring. Do NOT count base angle seam.

Outside 44” Ladders

44” ladder sections attach at each sidewall ring. Attach ladders to sidewall with outside ladder splice brackets (B5078) at every horizontal seam. The only exception will be at top and bottom of each ladder assembly. Splice brackets must be moved up or down 4” to avoid interference with roof sheets, platform brackets, concrete and ladder caps. See Fig. 4.

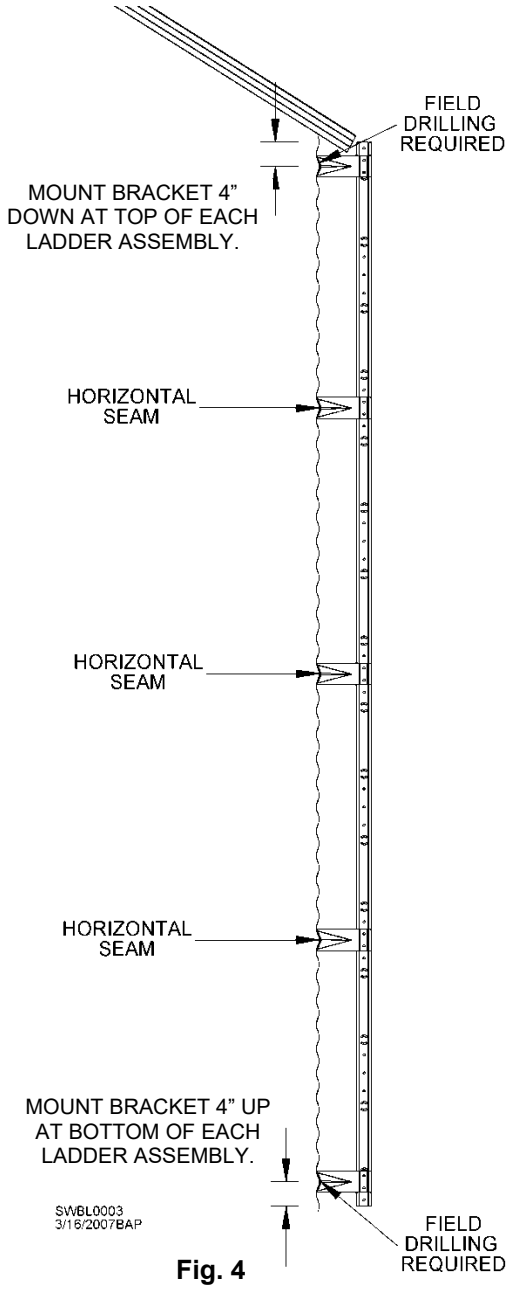


Fig. 4

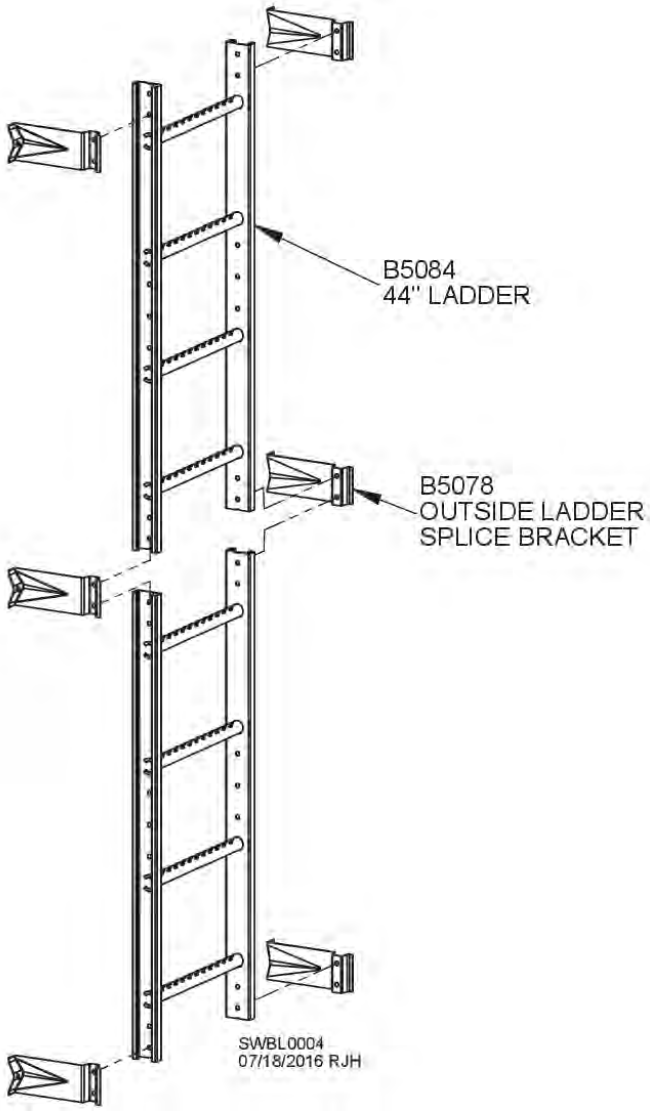


Fig. 5

NOTE: 3/8” hardware is used to assemble all ladders, platforms and cages.

Insert splice bracket bolts from inside of bin to create a watertight seal. If inside ladder brackets are used at exact same location, remove washer and place between outside bracket and sidewall. See Fig. 5.

Ladder Extension (B5020)

Ladder extensions (B5080) are provided with cage and platform packages. Extensions are an option for 3-5 ring ladder packages.

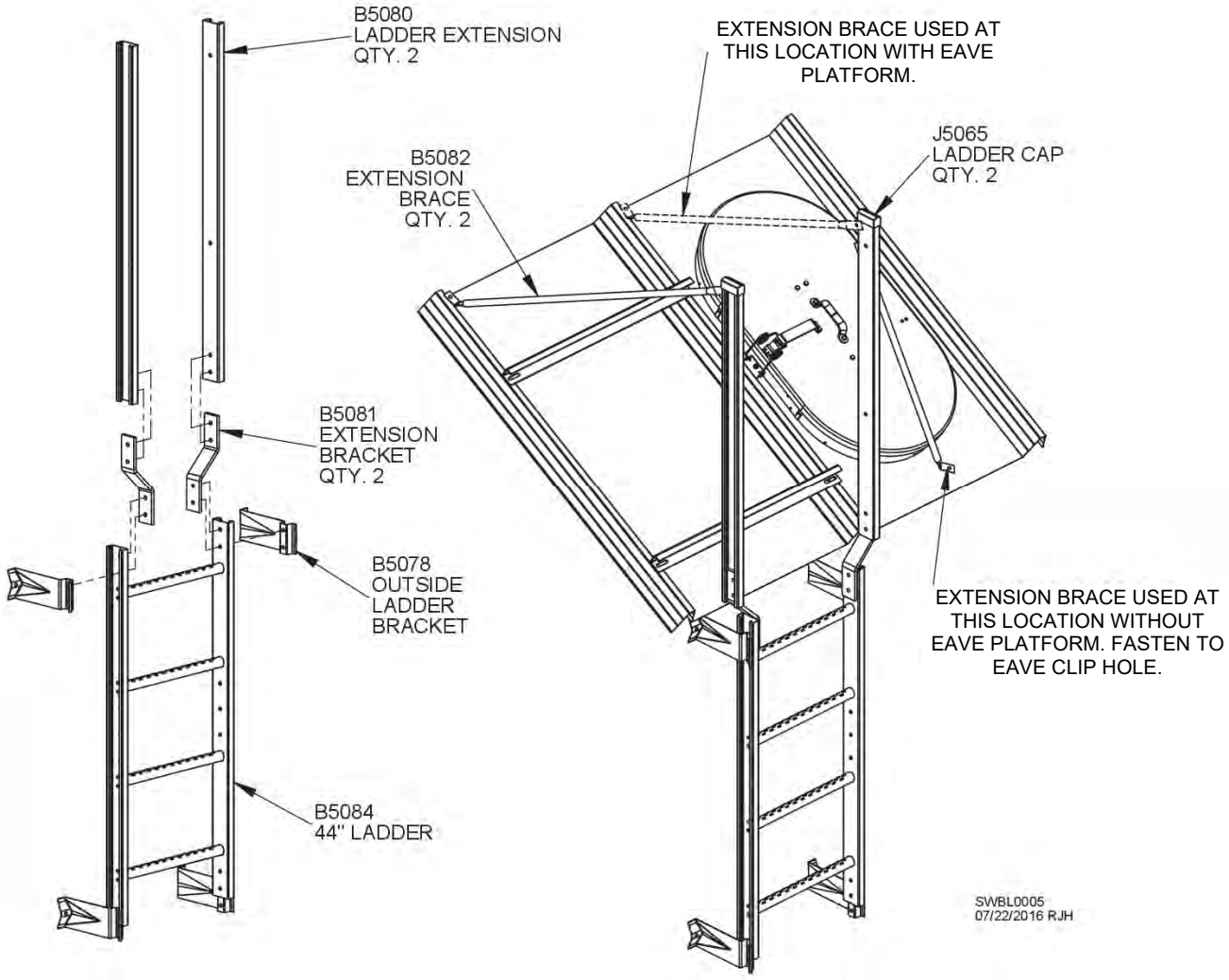


Fig. 6

Ladder extensions (B5080) are provided as a means to walk “through” ladder onto roof steps. Extensions are connected to ladder rails using offset extension brackets (B5081). When attaching extension bracket to ladder, hardware will be inserted through three (3) pieces (extension bracket, ladder siderail and ladder bracket). Align extension bracket with top holes on ladder siderail as shown in Fig. 6, then attach ladder bracket to siderail and extension bracket. Attach other end of ladder bracket to sidewall. Attach ladder extensions to extension brackets and stabilize to roof ribs using extension braces. See Fig. 6. Attach with 3/8” hardware. Slide plastic ladder caps over tops of extensions. **NOTE:** Field drilling may be required when attaching extension braces. Extension braces (B5082) may need to be attached by a different means to avoid interference with manhole.

Extension and Standard D-ring

Fig. 7 shows differences between an extension D-ring (B5089) and a standard D-ring (B5085). Extension D-rings are used only with ladder extensions. Standard D-rings are used only on ladders. Both D-rings have same outside dimensions. Differences are at connection points. See Details A & B of Fig. 7.

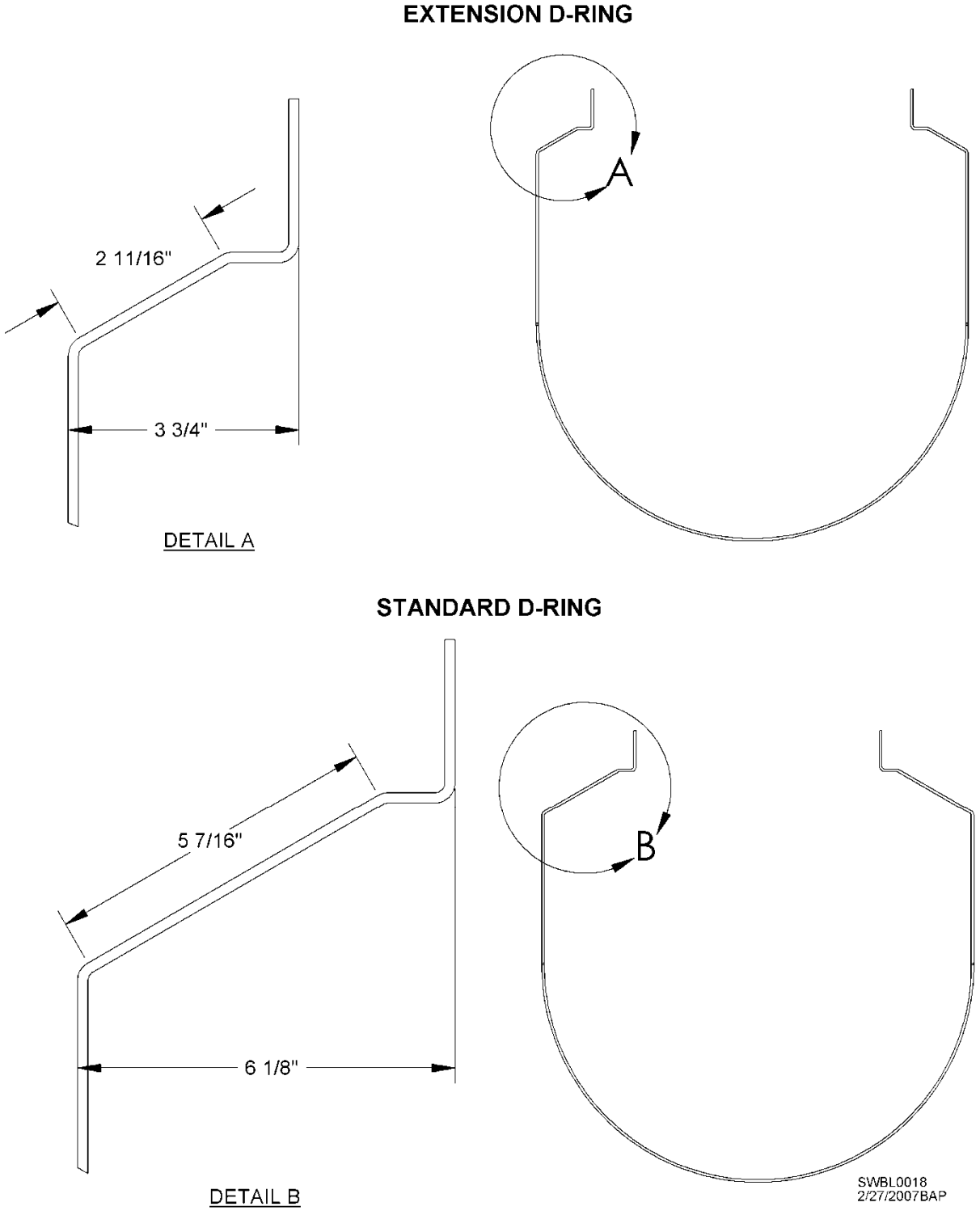


Fig. 7

Ladder Cage/No Platform

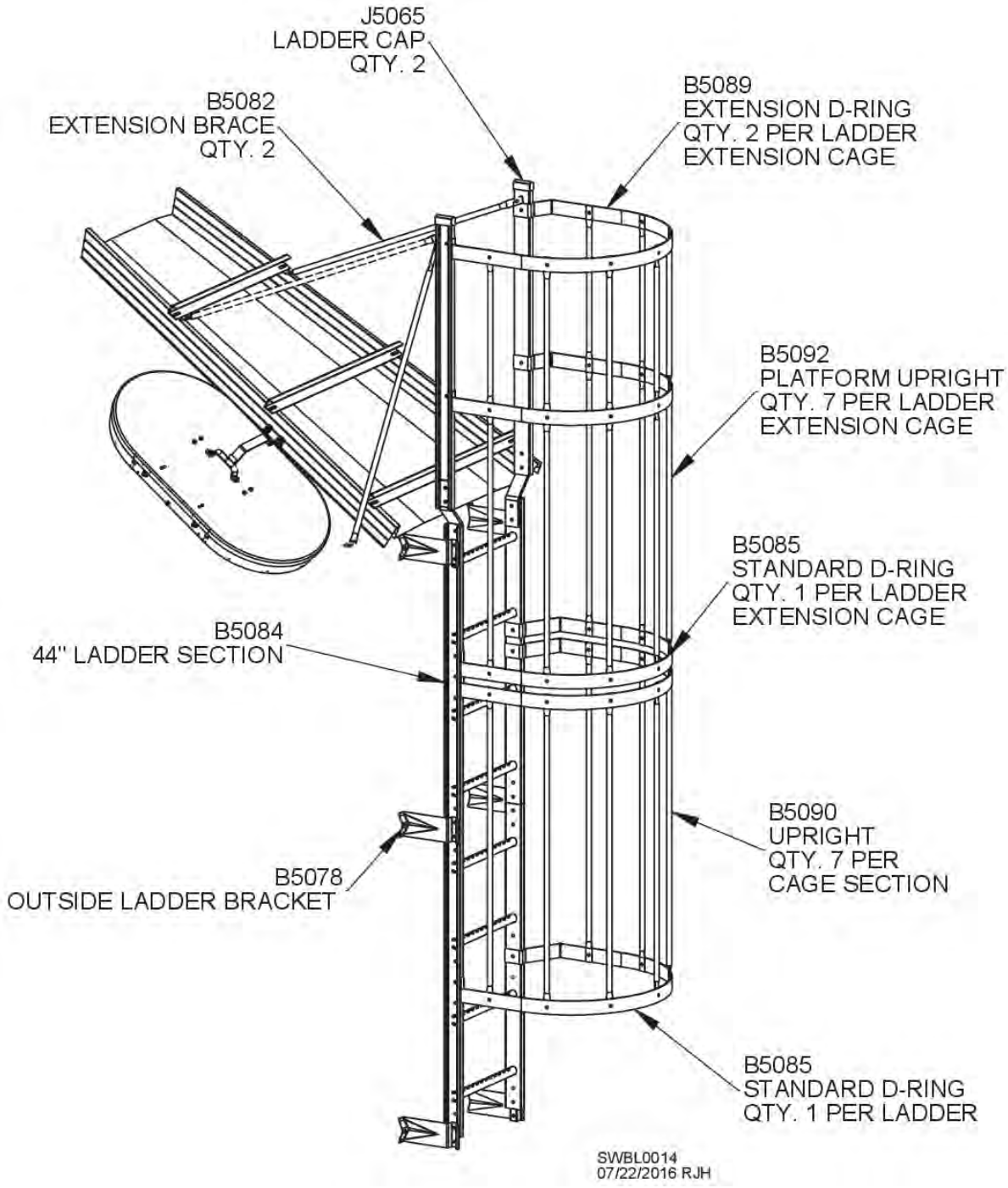


Fig. 8

Some ladder and cage assemblies do not require use of platforms. For these, an extension package is available as an option to access roof steps. If safety cage is used on these ladders, extension D-rings (B5089) are required. They attach to ladder extensions as shown in Fig. 8. Connect platform uprights (B5092) to D-rings with 3/8" hardware and tighten. See Fig. 8. Attach extension braces (B5082) as shown to avoid interference with manhole. If no manhole is present, both braces can be attached at same height on roof ladder.

44” Cages with 22” Flared Bottoms

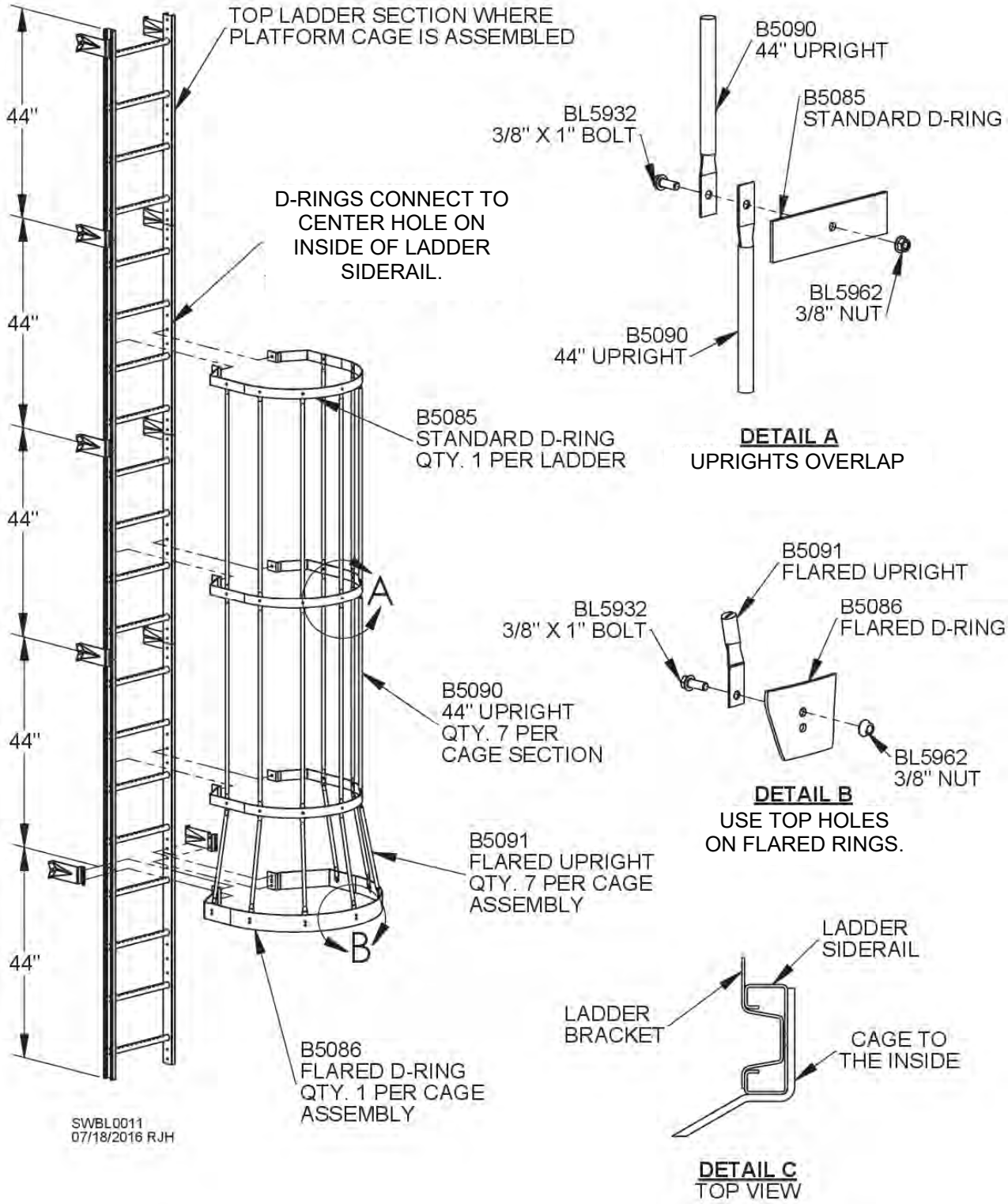


Fig. 9

As bin is built, continue to add appropriate ladder and cage sections. Refer to following pages for specific ladder and cage layouts. Cage sections consist of standard D-rings (B5085) and seven (7) 44” uprights (B5090). Standard D-rings attach to inside of ladder siderails. A flared D-ring is always used at bottom of each cage assembly. Top D-ring must be connected to center of top ladder. This allows bottom flared D-ring to be at proper height above the next surface (concrete or platform). Attach standard D-rings and uprights to ladder sections with 3/8” hardware. See Fig. 9.

36” Platform Locations

Fig. 10 shows the four (4) positions where platform can be located. **NOTE:** Each location is at same level as a ladder rung in first ring. For 1st & 2nd positions, 44” sidewall bracket mounts to sidewall at horizontal seams and in middle of sidewall sheet. For 3rd & 4th positions, middle hole of 44” sidewall bracket mounts at horizontal seam and top and bottom of bracket are attached in middle of sidewall sheets. Field drilling is required.

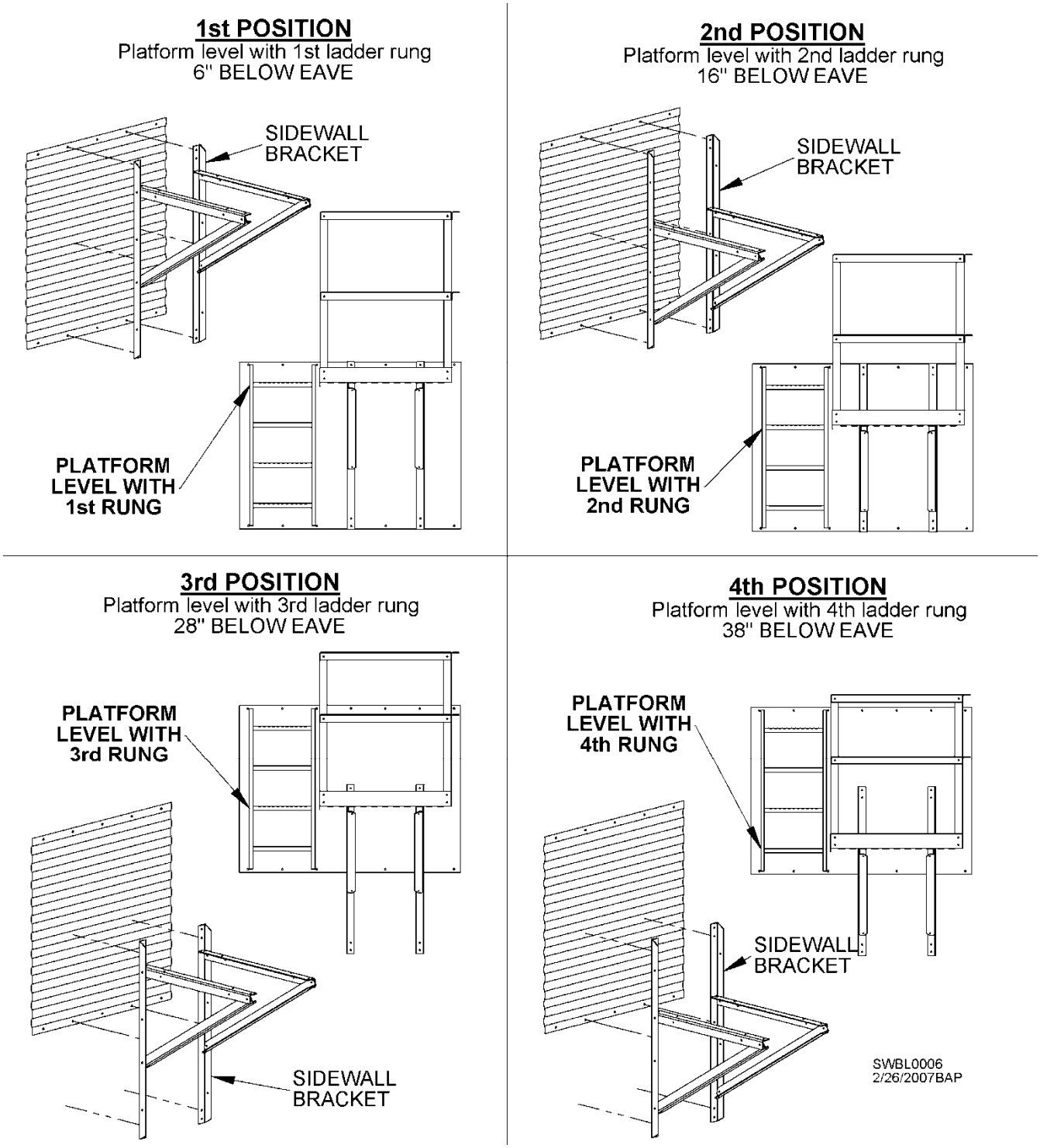


Fig.10

36” Platform Starting Location

Location of ladder is a critical factor in constructing a grain bin. Careful thought must be given to position of sidewall and roof ladders in relationship to overall layout of site and auxiliary equipment. Location of roof ladder and manhole during bin construction will establish location of sidewall ladder. Sidewall ladder and eave platform must be in line with roof ladder and manhole. Fig. 11 shows eave platform starting location on a sidewall sheet with 9-3/8” bolt hole spacing. Lower drawing shows ladder centered between stiffeners.

IMPORTANT: When attaching ladder and safety cages to a stiffened bin, locate ladder between two (2) stiffeners. When constructing bin with raftered substructure, be certain manhole is not aligned over a rafter. Suggestion: Locate roof ladder on roof sheet to right of primary rafter. Manhole can then be placed on sheet to right of roof ladder. This ensures that eave platform will be centered over a stiffener. Platforms are designed to ensure that when additional ladder columns are offset, they are not centered over a stiffener.

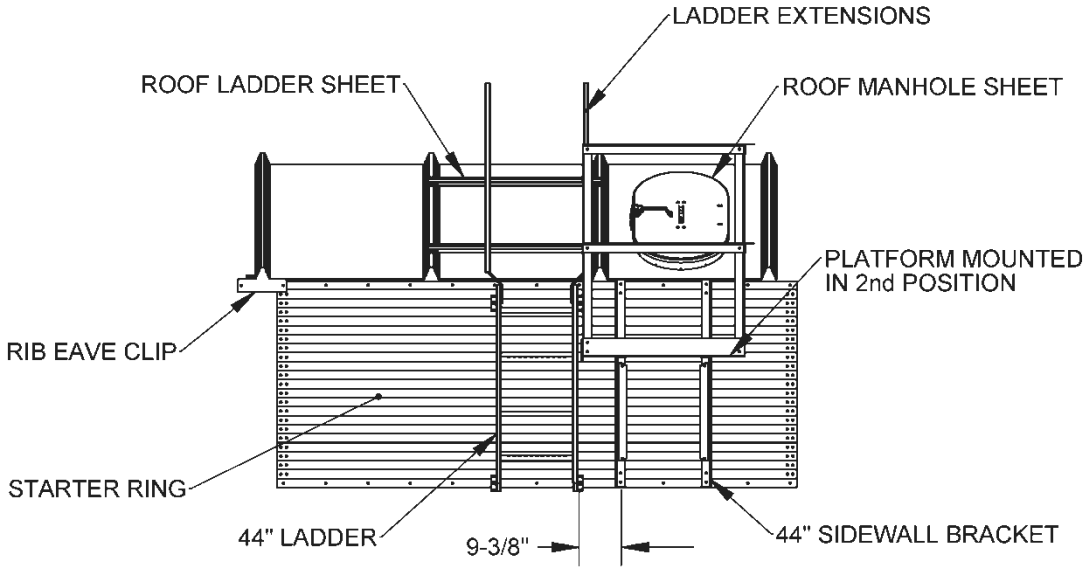
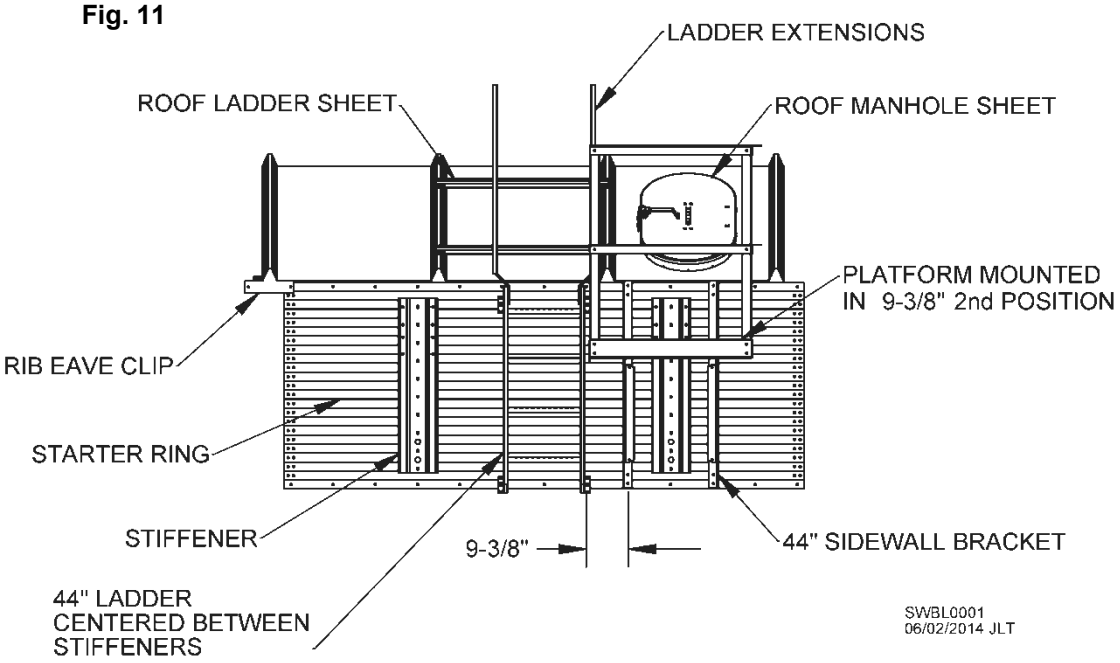


Fig. 11



36” Platform Assembly

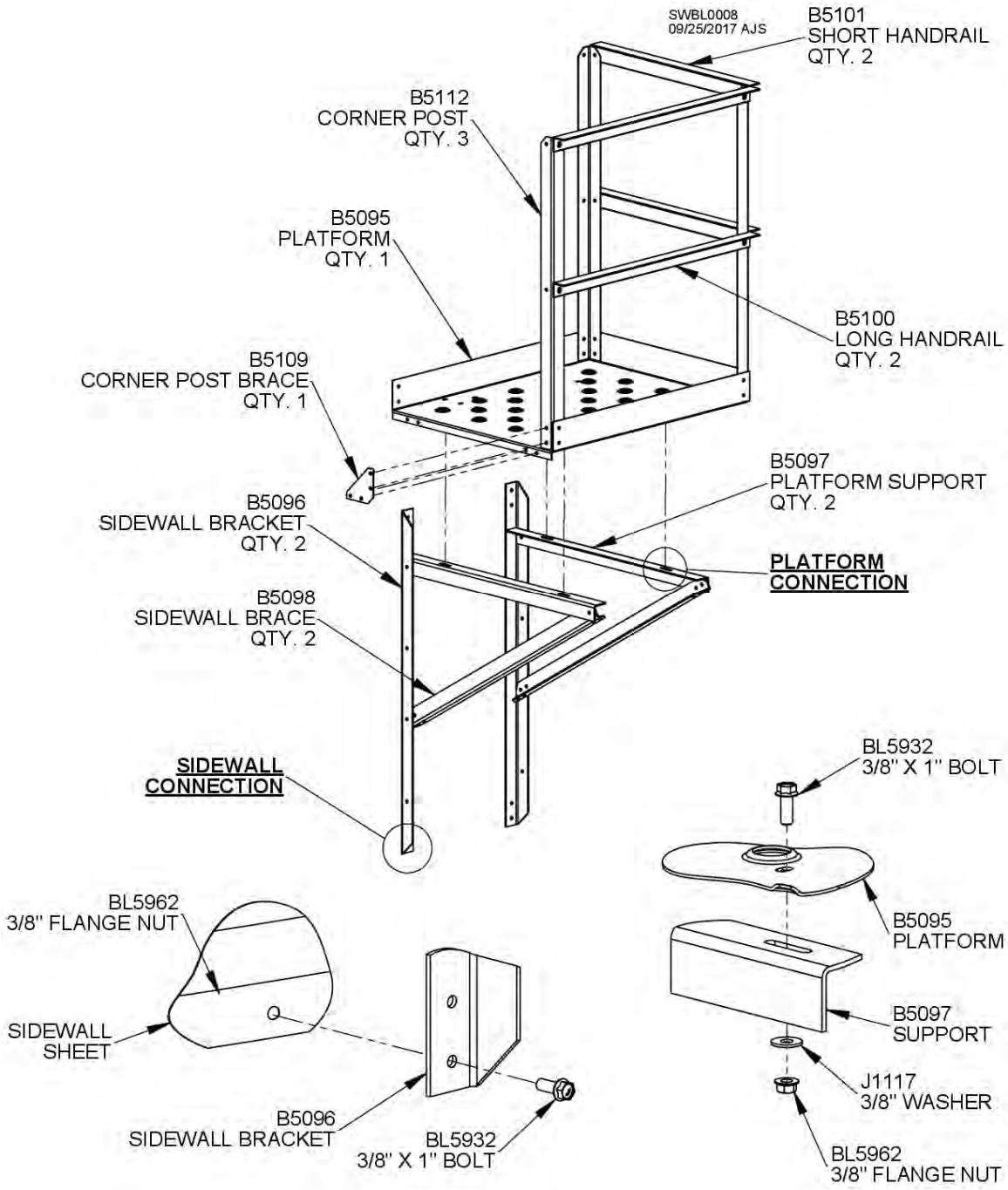


Fig. 12

Entire platform assembly is constructed with 3/8” hardware. Begin by attaching sidewall brackets (B5096) to sidewall. Some holes may need to be field-drilled in sidewall depending on which position was chosen for platform. Attach platform supports (B5097) and sidewall braces (B5098) to sidewall brackets as shown in Fig. 12. **NOTE:** Leave all bolts loose until assembly is complete.

Attach platform (B5095) to platform supports and fasten corner posts (B5112) to 4” toeboard. Fasten long and short platform handrails to corner posts. See Fig. 12. Tighten platform assembly. **HINT:** If assembling platform with safety cages, corner post brace (B5109) and post that it braces can be left off of platform assembly at this time.

Top & Bottom Corner Posts, 36” Platform

Fig. 13 shows the four locations platform can be positioned. Top and bottom corner posts will not be moved vertically. Only the platform assembly itself will be able to move up or down on corner posts. **NOTE:** Top half D-ring fastens to top hole in top corner post and bottom half D-ring fastens to bottom hole of bottom corner post.

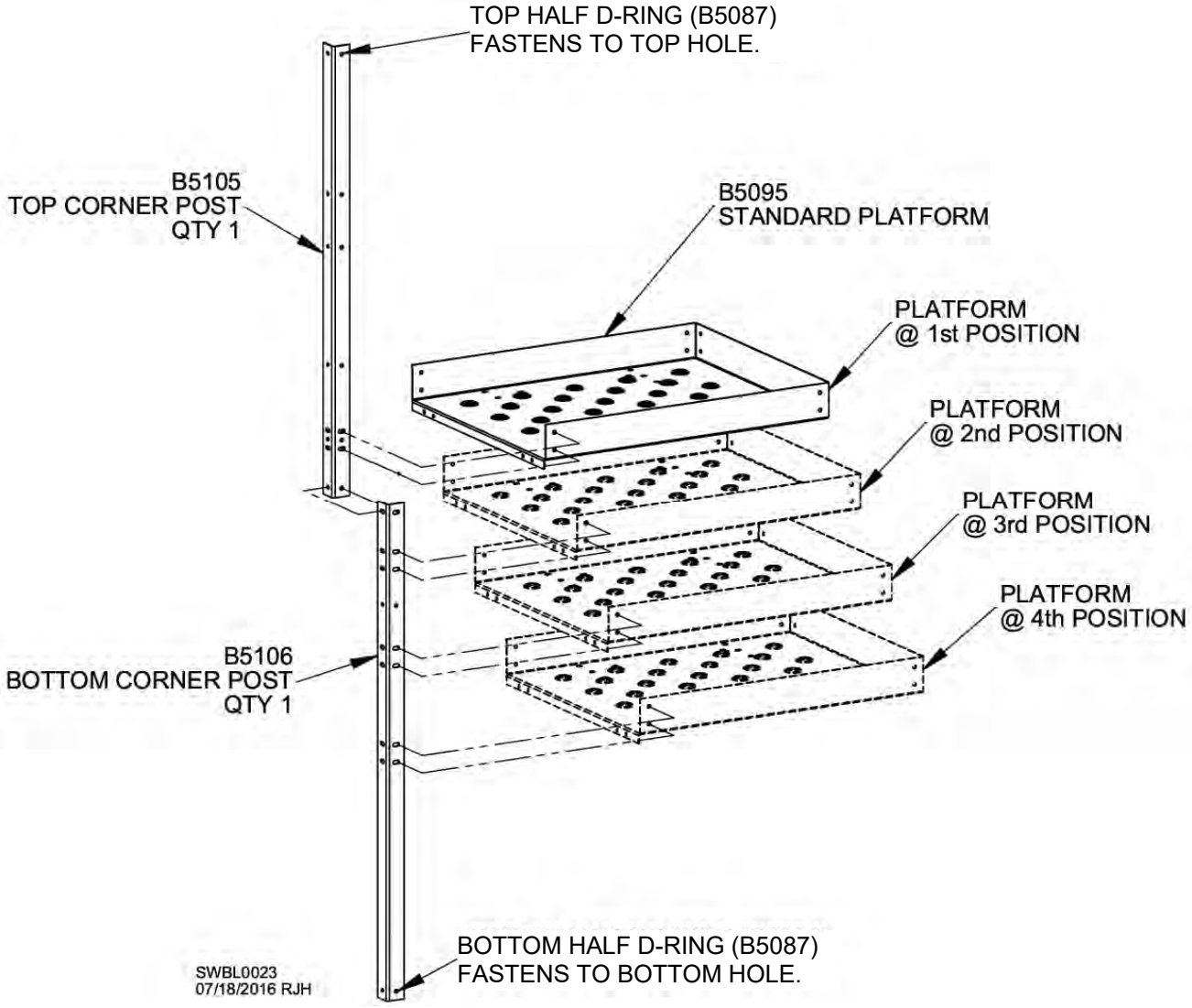


Fig. 13

Eave Platform Cage, 36” Platform

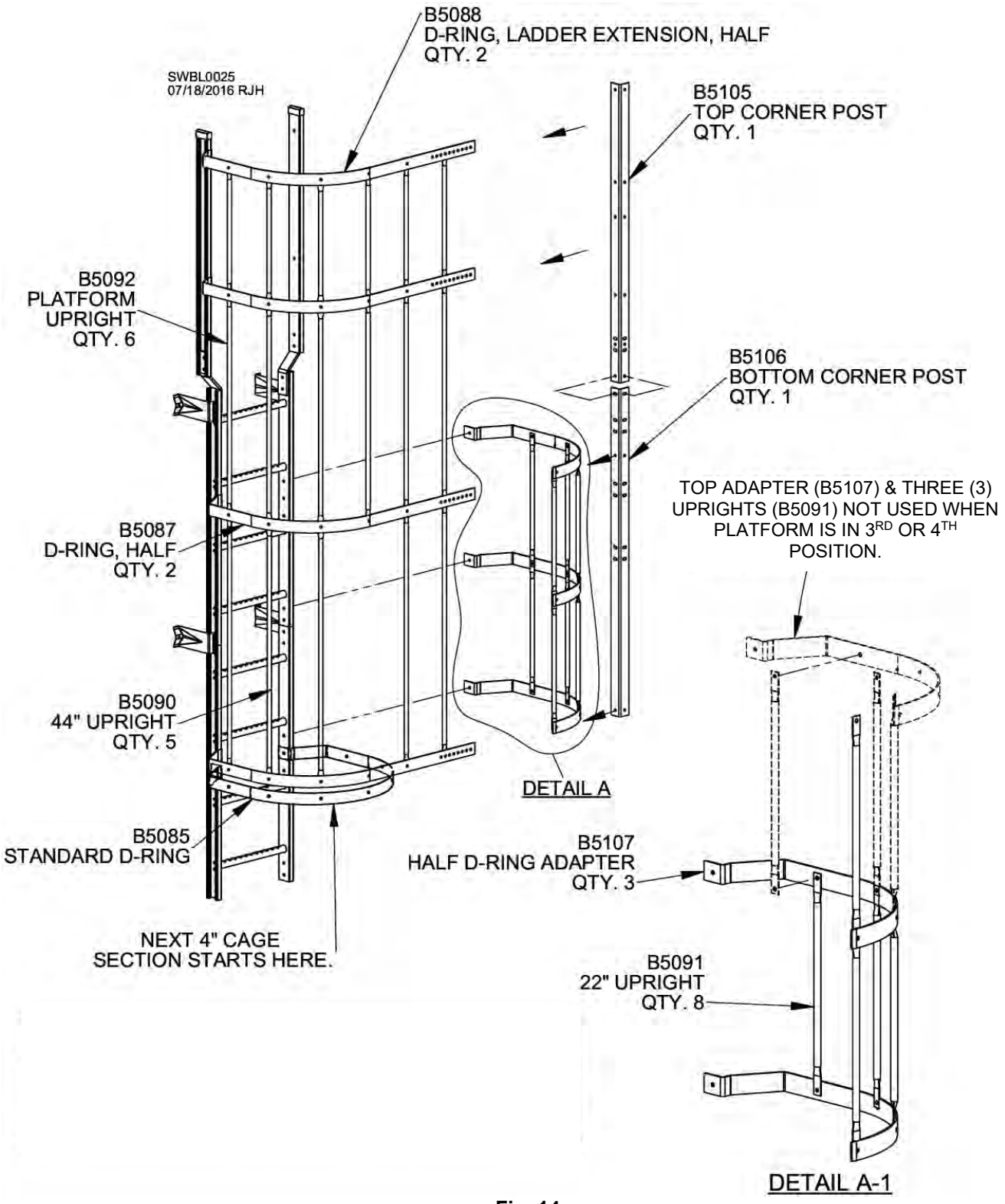


Fig. 14

When attaching cage to platform, half D-rings (B5087 & B5088) must attach to corner posts (B5105 & B5106) as shown in Fig. 14. **NOTE:** If platform is mounted in 1st or 2nd position, attach cage extension as shown in Detail A. If platform is mounted in 3rd or 4th position, top half D-ring adapter (B5107) and three uprights are not used. See Detail A-1. Attach remaining upright to half D-ring B5087.

Eave Platform Cage Assembly, 36” Platform

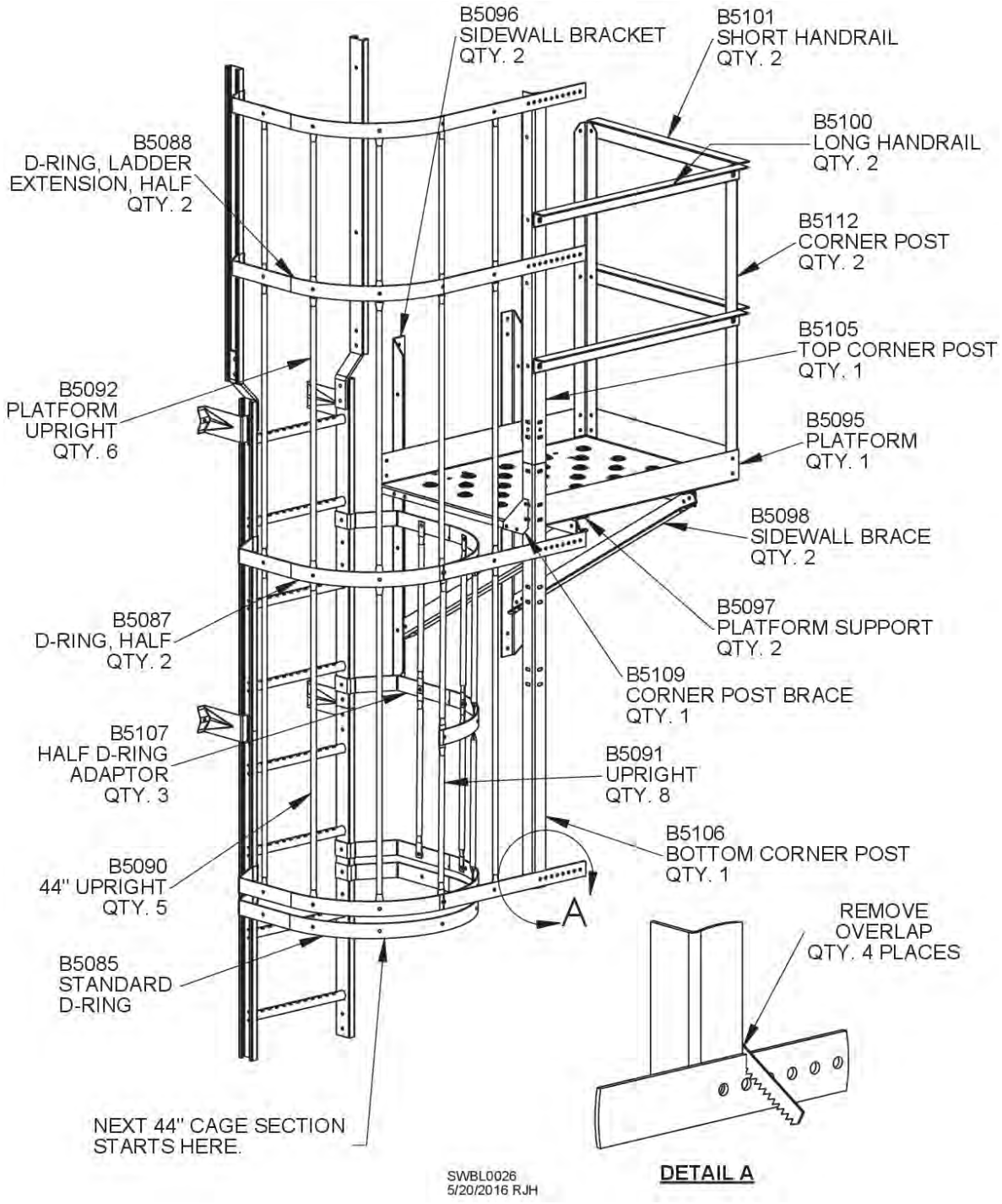


Fig. 15

Final attachment of cage to extensions and platform is shown in Fig. 15. Platform is shown in 2nd position. All cage and platform assemblies are connected with 3/8” hardware. Remove D-ring overlaps as shown in Detail A to ensure smooth, snag-free edges.

NOTE: Six (6) platform uprights and five (5) 44” uprights are sent with this assembly. Depending on diameter of bin, one upright may be discarded at each location where half D-rings connect to corner post. Be certain that gap is no more than 9”.

See Fig. 9 and related instructions for adding ladder and cage sections.

54” Landing Platform Layout for Non-Stiffened Bin

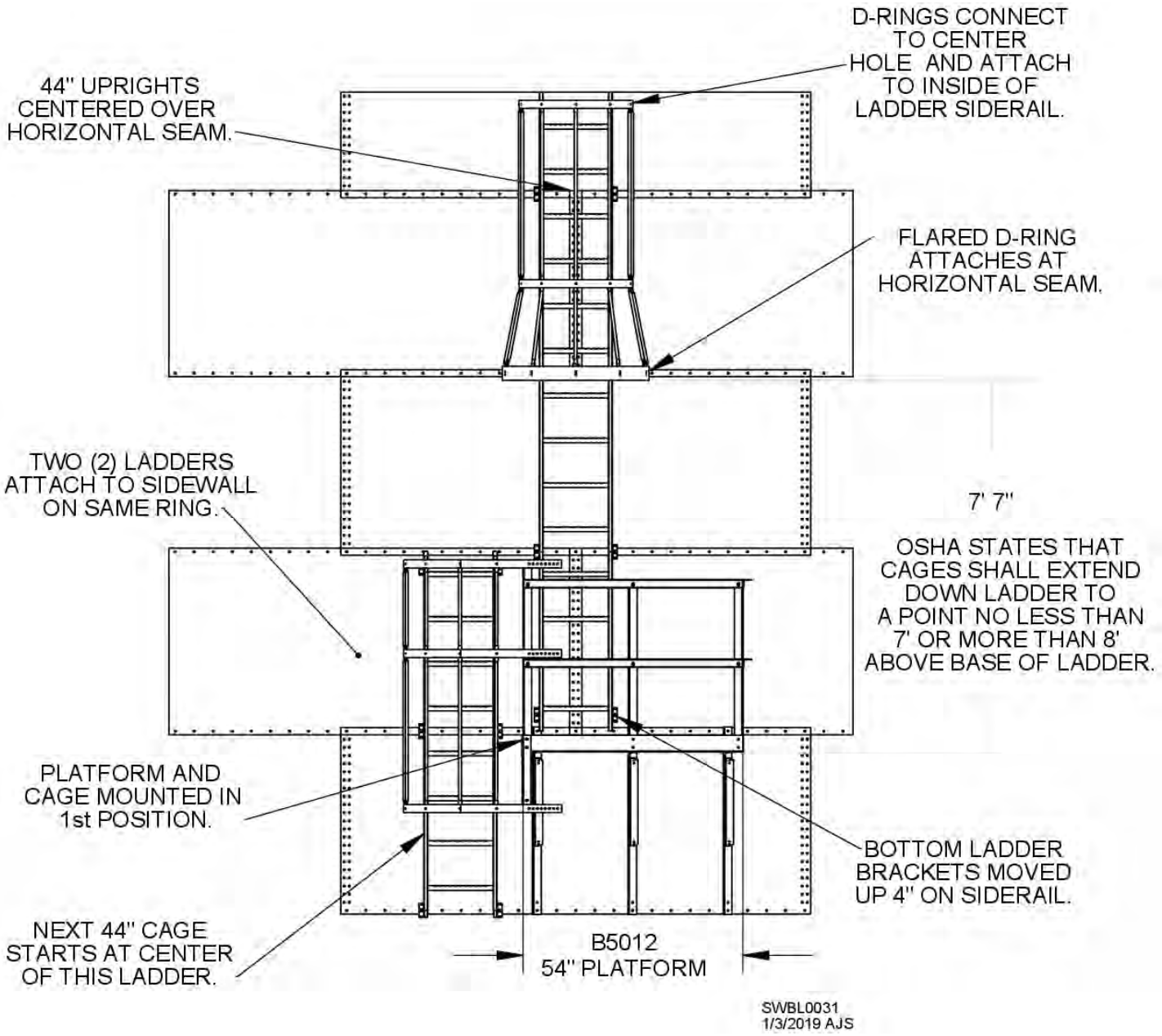


Fig. 16

Fig. 16 shows where flared D-ring should be attached in relation to 54” landing platform on a non-stiffened bin. Flared D-ring should be two (2) sidewall rings above platform. **Platform must be attached to sidewall in 1st position.** This will ensure that federal Occupational Safety and Health Administration (OSHA) standards are met, as well as ease erection of ladder and cages. Two ladders attach to sidewall on same ring at platform location. At top and bottom of each ladder assembly, sidewall brackets need to be moved either up or down 4” to avoid interference with roof sheets, platform brackets, concrete and ladder caps.

54” Landing Platform with Caged Ladder

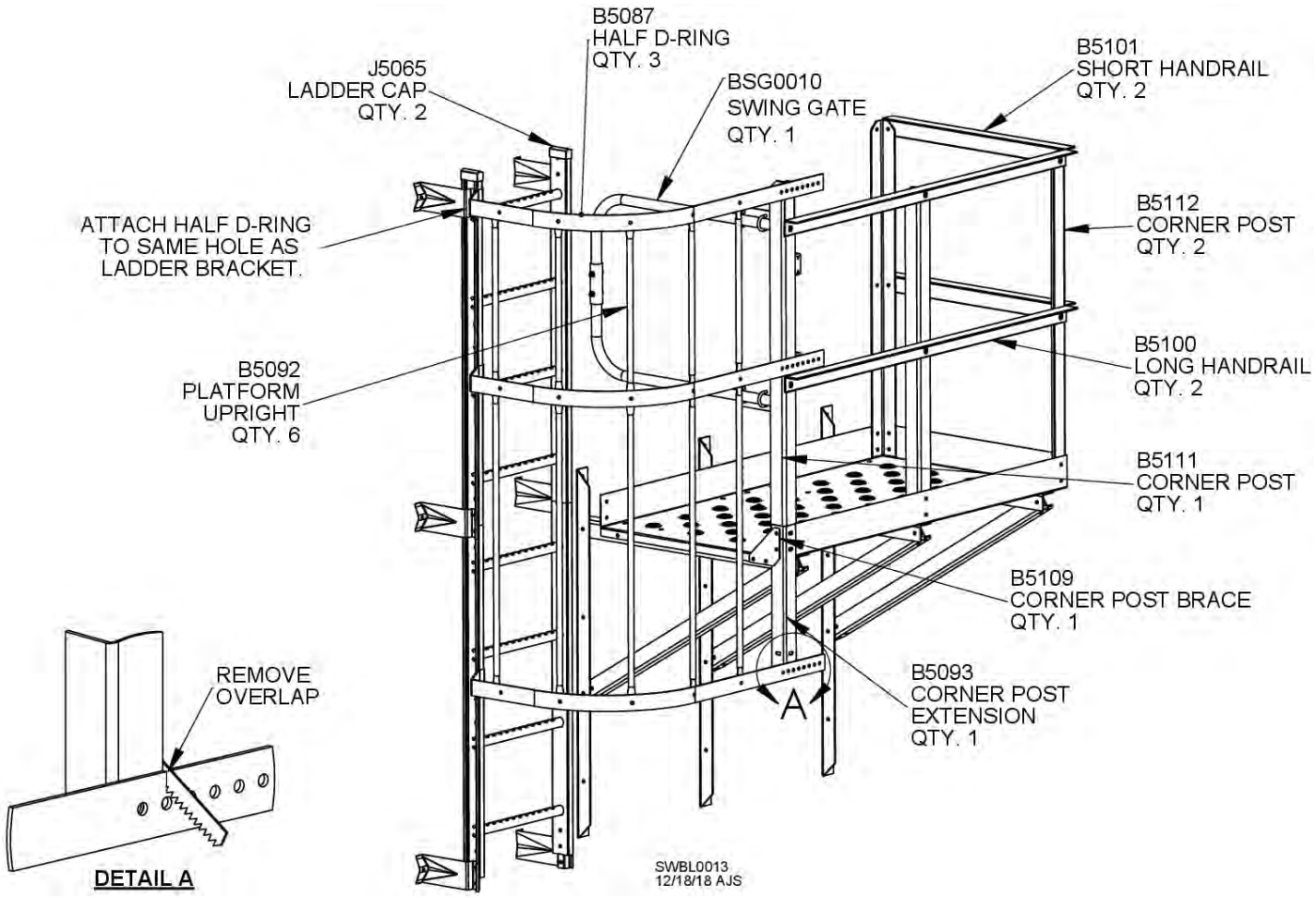


Fig. 17

Attach 54” landing platform to sidewall under upper ladder as shown in Fig. 16. Attach 44” ladder section to sidewall ring above platform. Fasten corner post extension, B5093, to bottom of open-faced corner post B5111 as shown in Fig. 17. Note that corner post B5111 is slightly longer than B5112 posts. Placement is critical.

Attach half D-rings to inside of ladder siderail and fasten them to corner post B5111 and corner post extension, B5093. Connect safety cage uprights to half D-rings with 3/8” hardware and tighten. Slide ladder caps over siderails of top ladder section. See Fig. 17. Also, remove half D-ring overlaps as shown in Detail A to ensure smooth, snag-free edges.

Manhole & Roof Platform Locations

Deck of manhole platform should be even with second ladder rung below eave. Deck of roof stairs platform should be even with first ladder rung above eave. See Fig. 18. Sidewall brackets for both platforms mount at horizontal seams and at middle of sidewall sheet. Field-drilling is required. Detailed assembly instructions for platforms can be found elsewhere in this section.

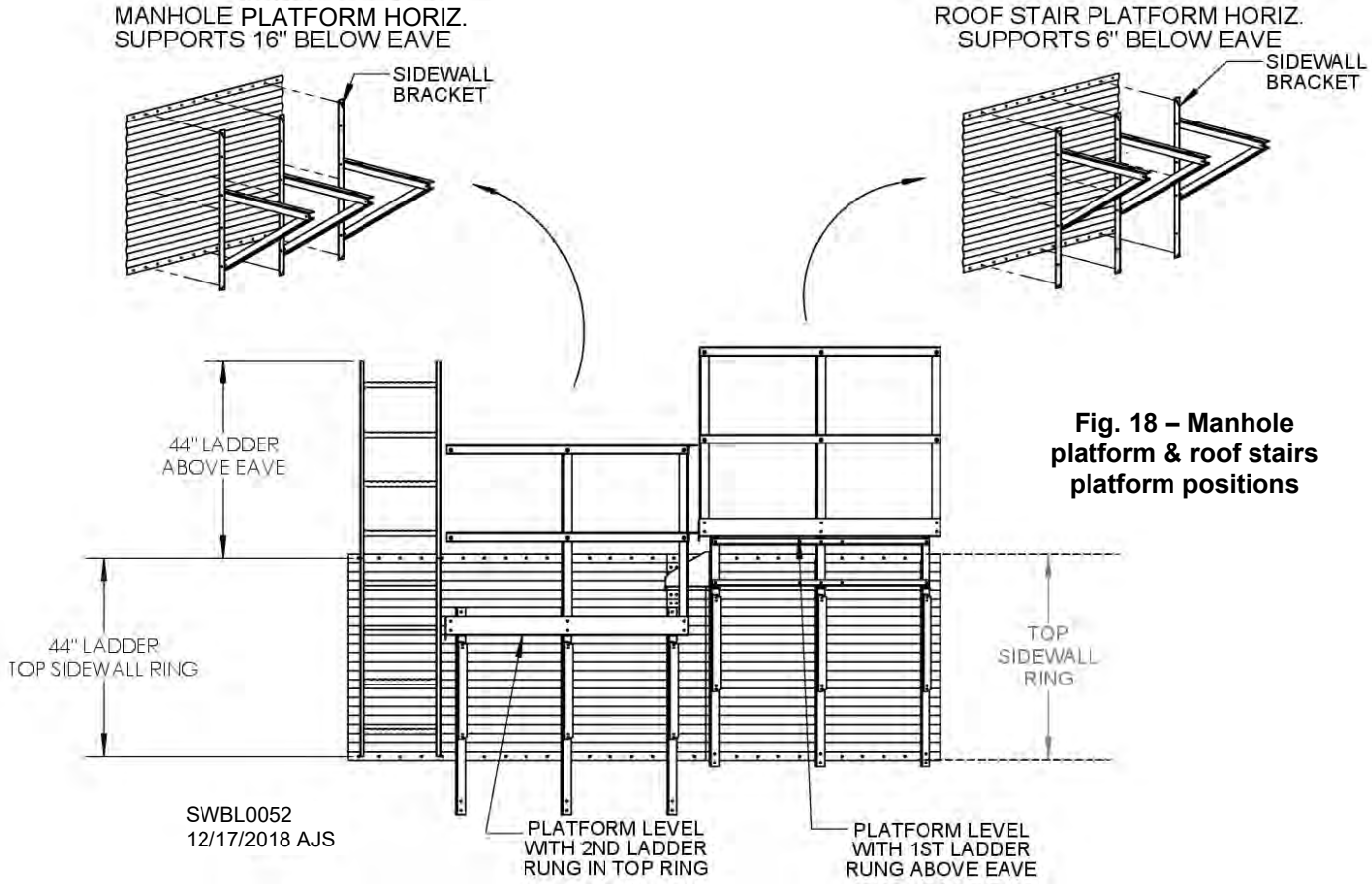


Fig. 18 – Manhole platform & roof stairs platform positions

NOTE: Roof stairs platform is also known as a lifted platform. It sits on a riser.

Positioning Ladder & Platforms on Bin with 2 Stiffeners per Sidewall Sheet

See Figs. 19 and 20 for positioning of ladder and platforms on bin with two stiffeners per sidewall sheet. Fig. 19 shows positioning when three roof sheets attach per sidewall sheet. Fig. 20 shows positioning when four roof sheets attach per sidewall sheet. In both cases, ladder must be centered between stiffeners.

IMPORTANT: If bin has raftered substructure, ensure manhole is not positioned over a rafter. An intermediate rafter under a manhole can be removed.

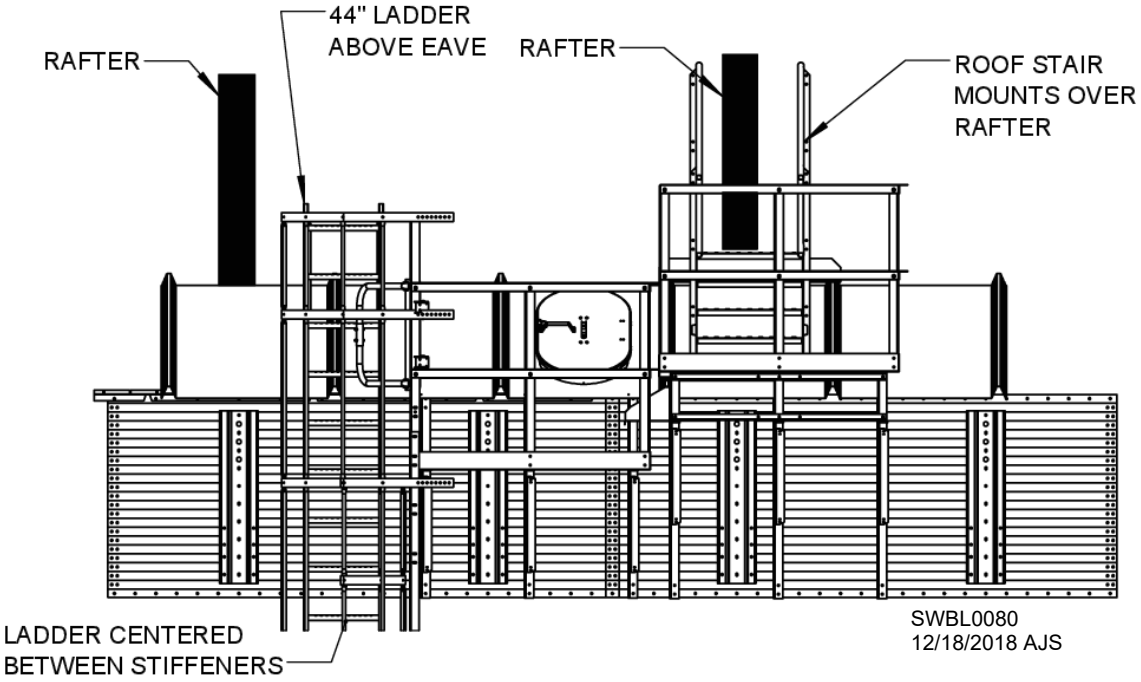


Fig. 19 – Ladder & platform locations with 2 stiffeners & 3 roof sheets per sidewall sheet

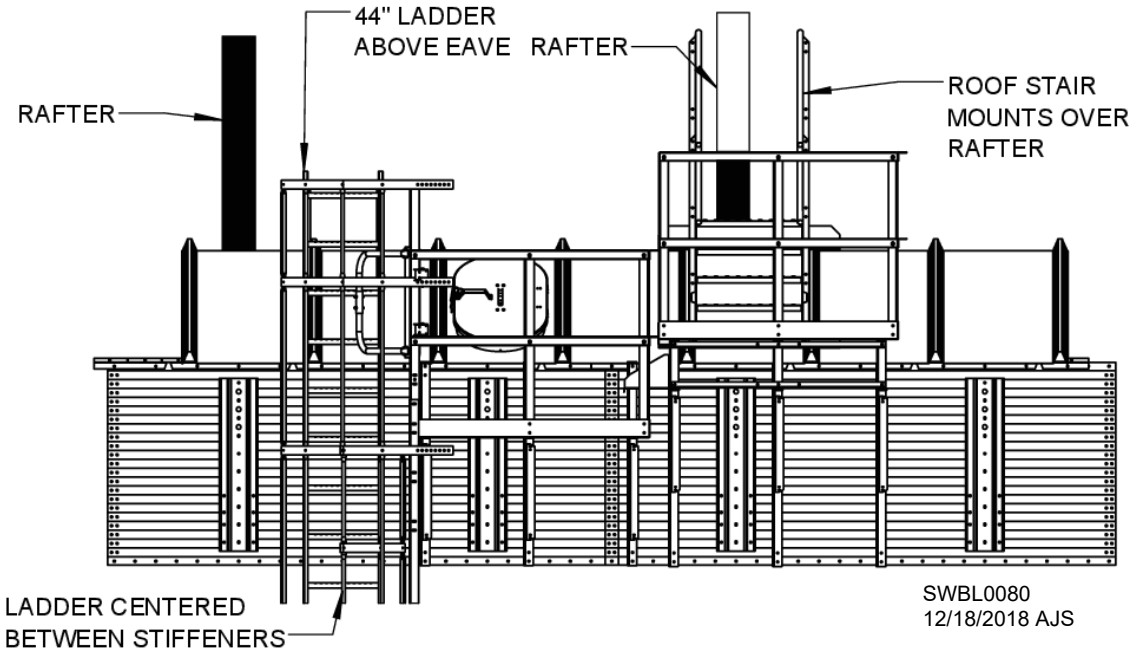


Fig. 20 – Ladder & platform locations with 2 stiffeners & 4 roof sheets per sidewall sheet

Positioning Ladder & Platforms on Bin with 3 Stiffeners per Sidewall Sheet

See Figs. 21 and 22 for positioning of ladder and platforms on bin with three stiffeners per sidewall sheet. Fig. 22 shows positioning when three roof sheets attach per sidewall sheet. Fig. 23 shows positioning when four roof sheets attach per sidewall sheet. In both cases, ladder must be centered between stiffeners.

IMPORTANT: If bin has raftered substructure, ensure manhole is not positioned over a rafter. An intermediate rafter under a manhole can be removed.

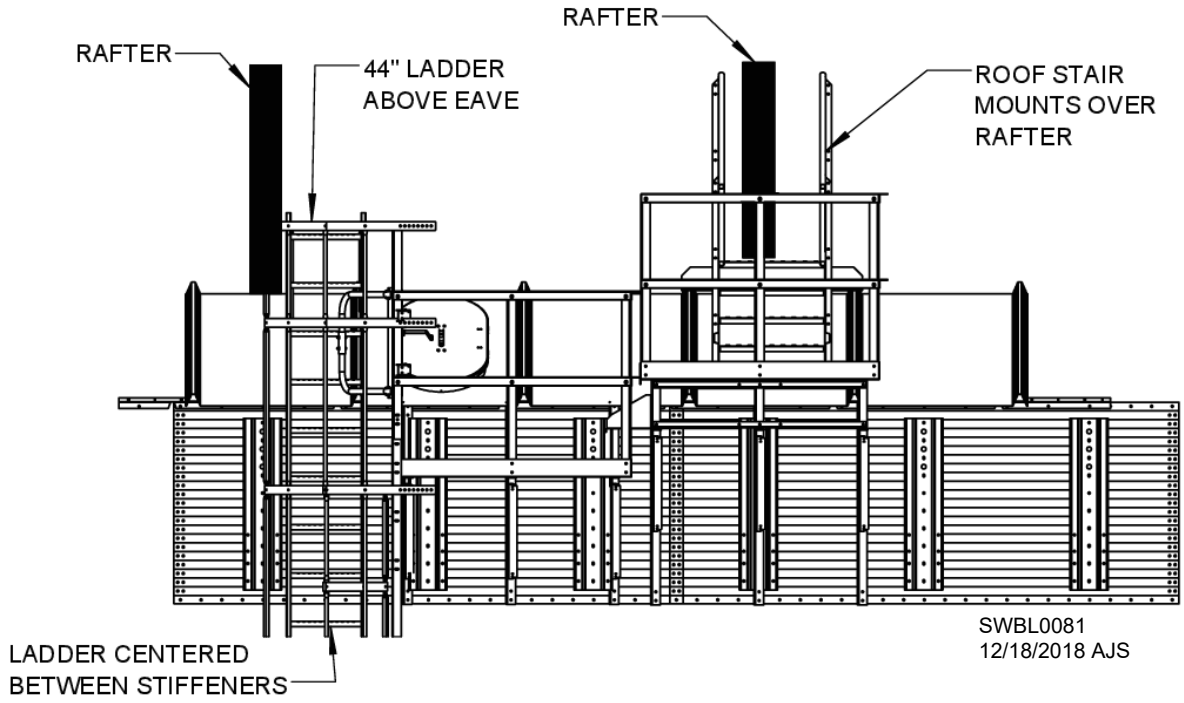


Fig. 22 – Ladder & platform locations with 3 stiffeners & 3 roof sheets per sidewall sheet

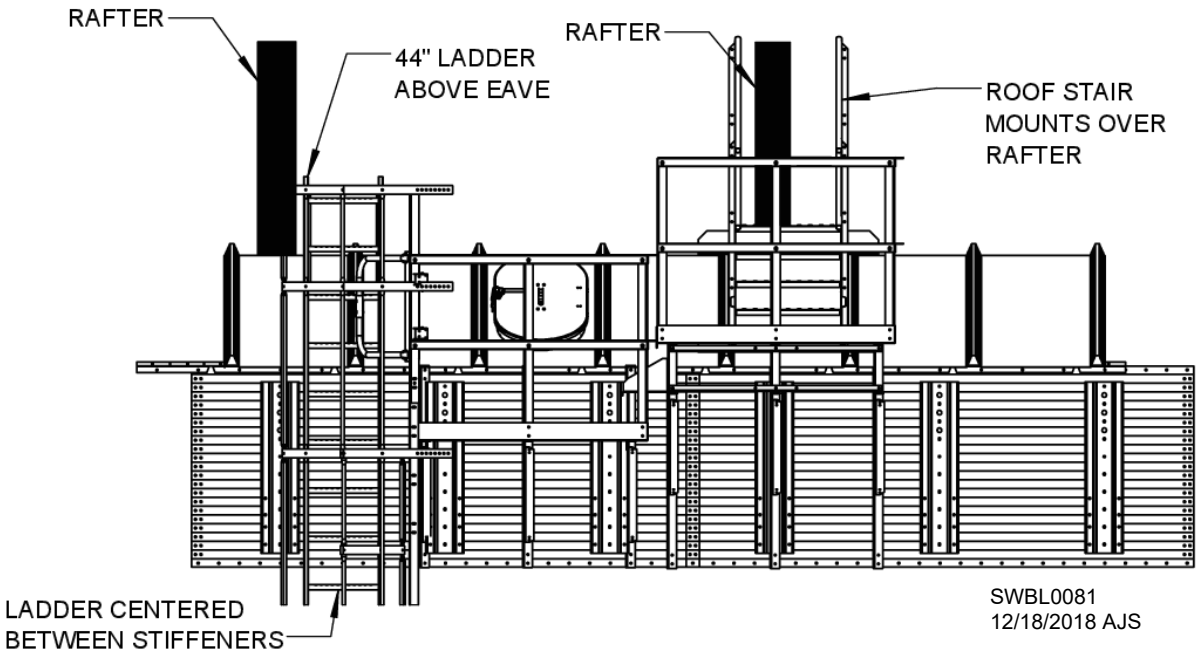


Fig. 23 – Ladder & platform locations with 3 stiffeners & 4 roof sheets per sidewall sheet

54” Manhole & Landing Platform

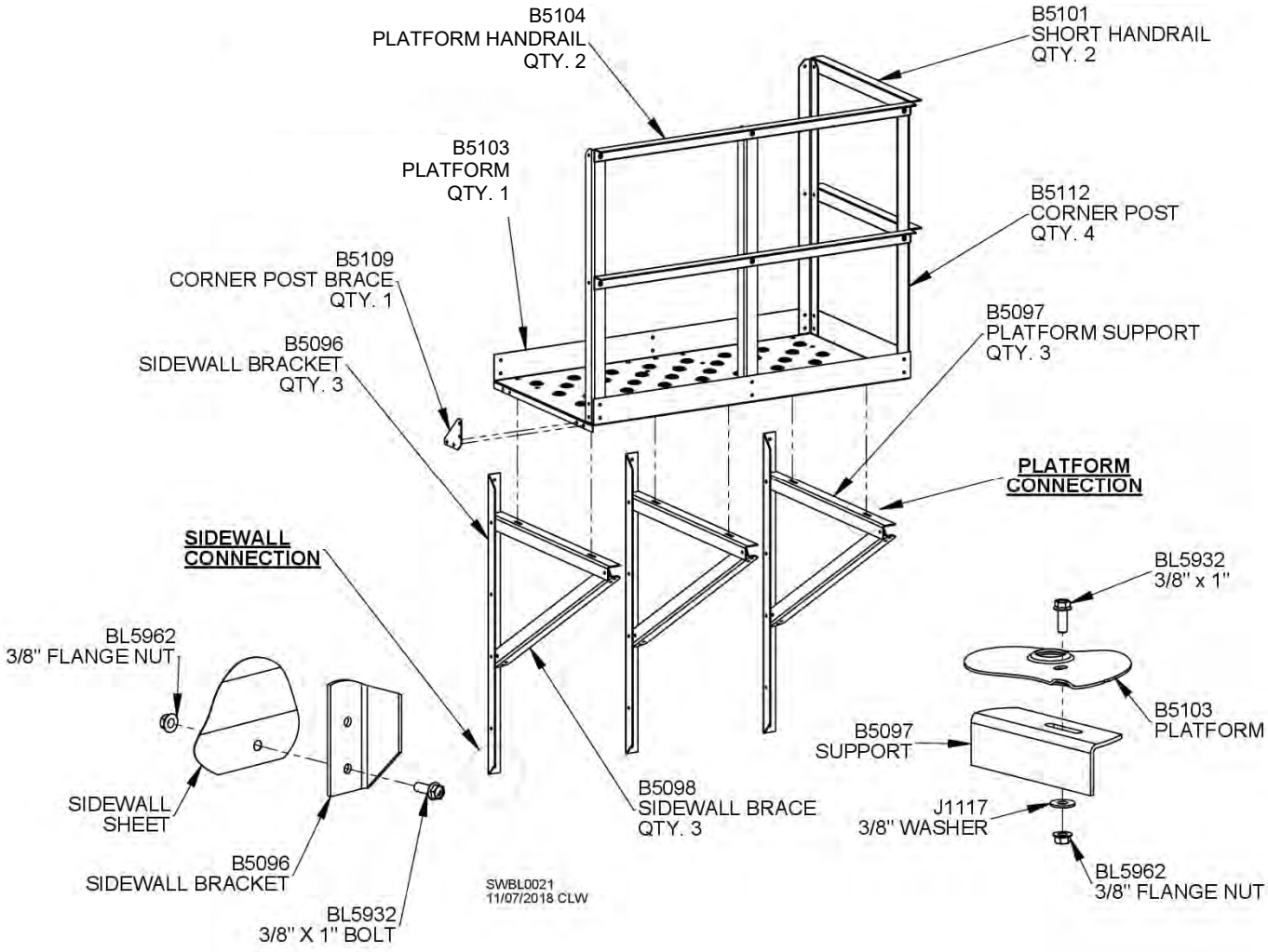


Fig. 24

Assemble 54" manhole or landing platform as shown in Fig. 24 using 3/8” hardware. Begin by attaching sidewall brackets (B5096) to sidewall. Some holes may need to be field-drilled in sidewall. Attach platform supports (B5097) and brace angles (B5098) to sidewall brackets as shown in Fig. 24. **NOTE:** Leave all bolts loose until assembly is complete.

Attach platform (B5120) to platform supports and fasten corner posts (B5112) to 4” toeboard. Fasten long and short platform handrails to corner posts. See Fig. 24. Also attach corner post brace (B5109) as shown.

NOTE: If platform will be attached to roof stairs (lifted) platform, omit attachment of short handrails.

Roof Stairs (Lifted) 54” Platform

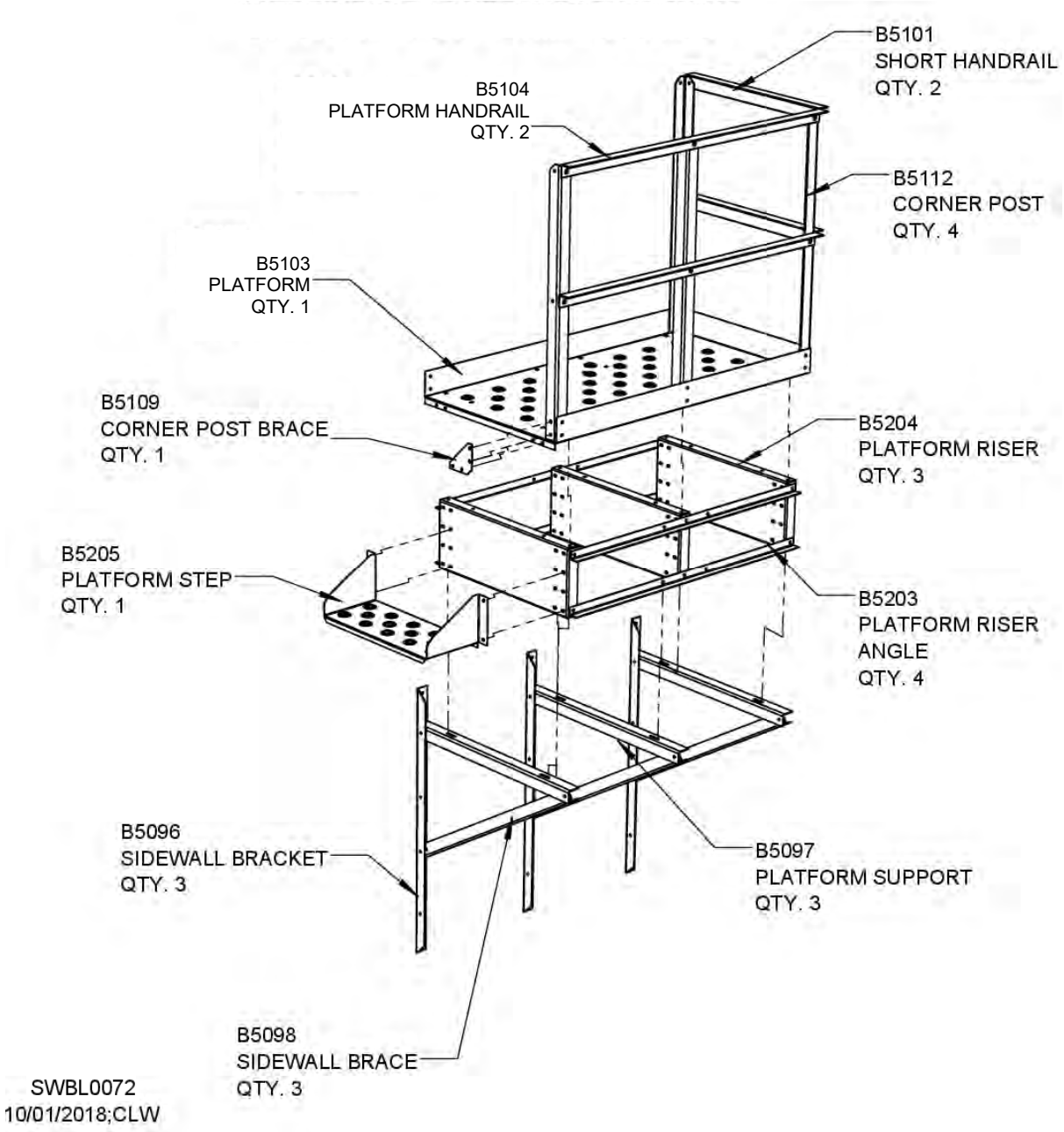


Fig. 25

Assemble roof stairs (lifted) 54” platform as shown in Fig. 25 using 3/8” hardware. Begin by attaching sidewall brackets (B5096) to sidewall. Some holes may need to be field-drilled in sidewall. Attach platform supports (B5097) and brace angles (B5098) to sidewall brackets as shown. **NOTE:** Leave all bolts loose until assembly is complete.

Assemble platform riser and step as shown in Fig. 25. Attach to platform supports as shown.

Attach platform (B5103) to platform riser and fasten corner posts (B5112) to 4” toeboard. Fasten platform handrails to corner posts as shown. Also attach corner post brace (B5109) as shown.

Eave Platform Cage, 54” Platform

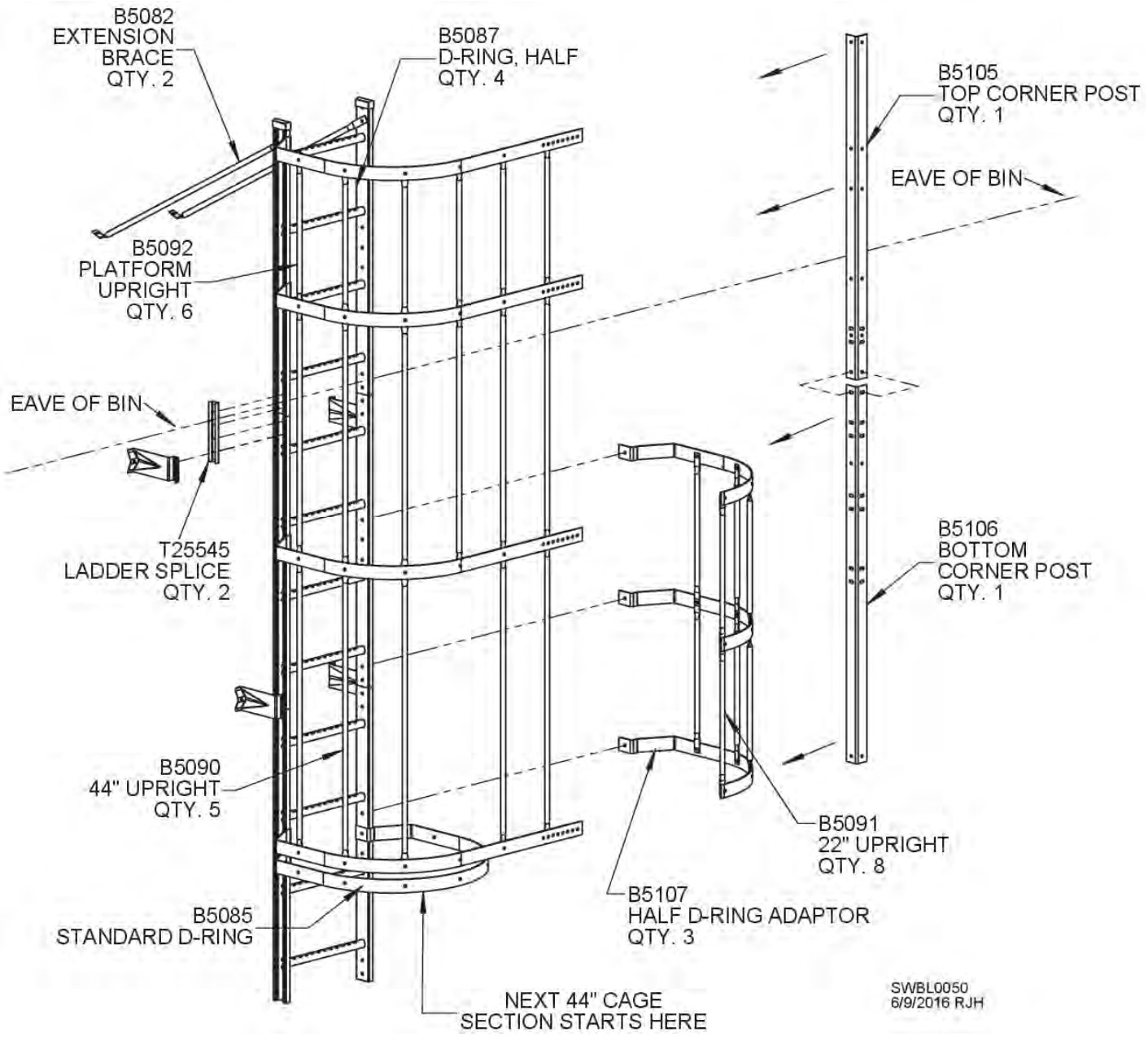


Fig. 26

When attaching cage to platform, half D-rings (B5087) must attach to top and bottom corner posts (B5105 & B5106) as shown in Fig. 26. Attach half D-ring adapters (B5107) to ladder as shown.

Connection of 54” Manhole & Roof Stairs Platforms

Connection of platforms is shown in Fig 27. Manhole platform (lower) is shown in 2nd position. Roof stairs (lifted) platform is shown in 1st position. Platforms are connected with 3/8” hardware.

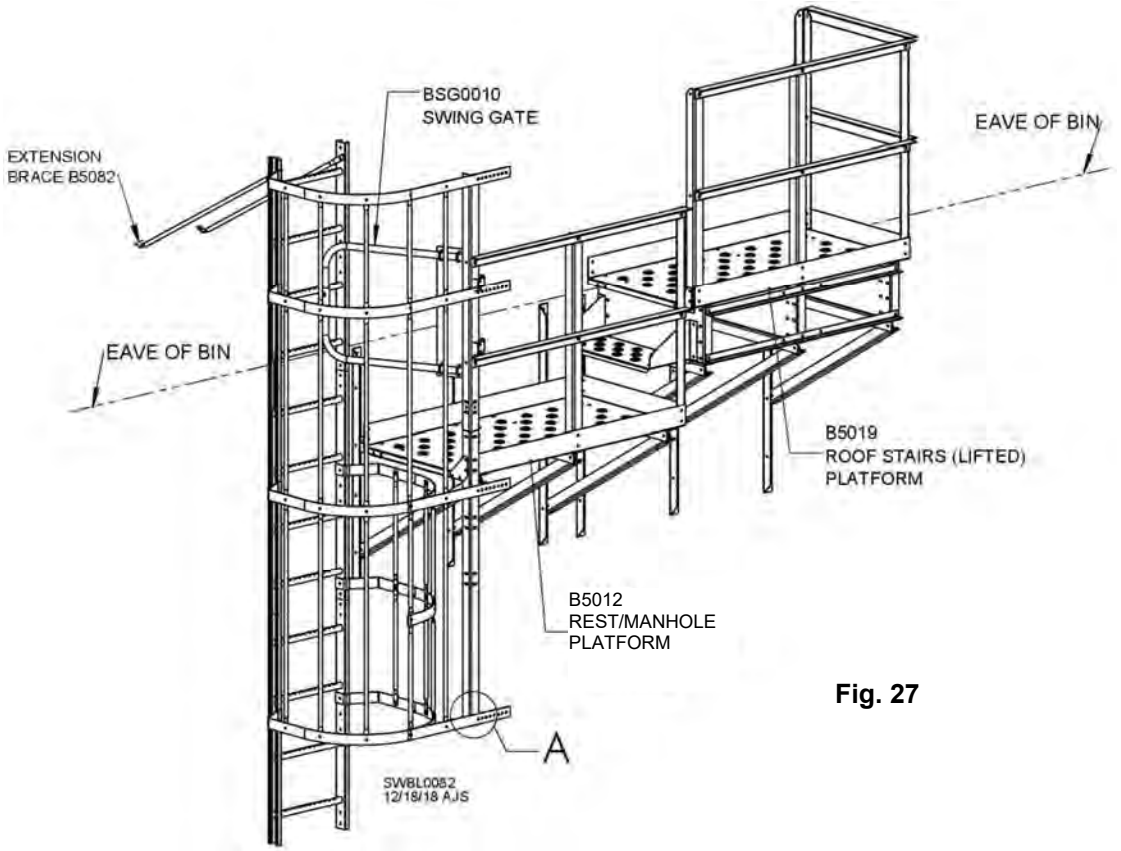


Fig. 27

Use step handrail post (B5206) and short handrails (B5101) to close gap between platforms. See Fig. 28. **NOTE:** Gap will depend on radius of bin.

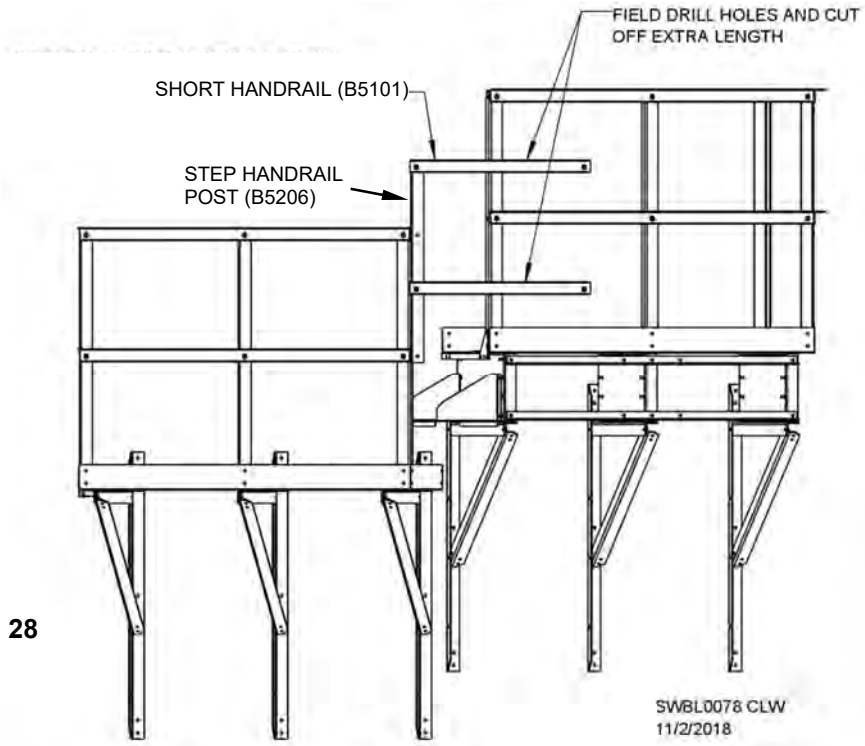


Fig. 28

See Fig. 9 and related instructions for adding ladder and cage sections.

54” Landing Platform Layout for Stiffened Bin

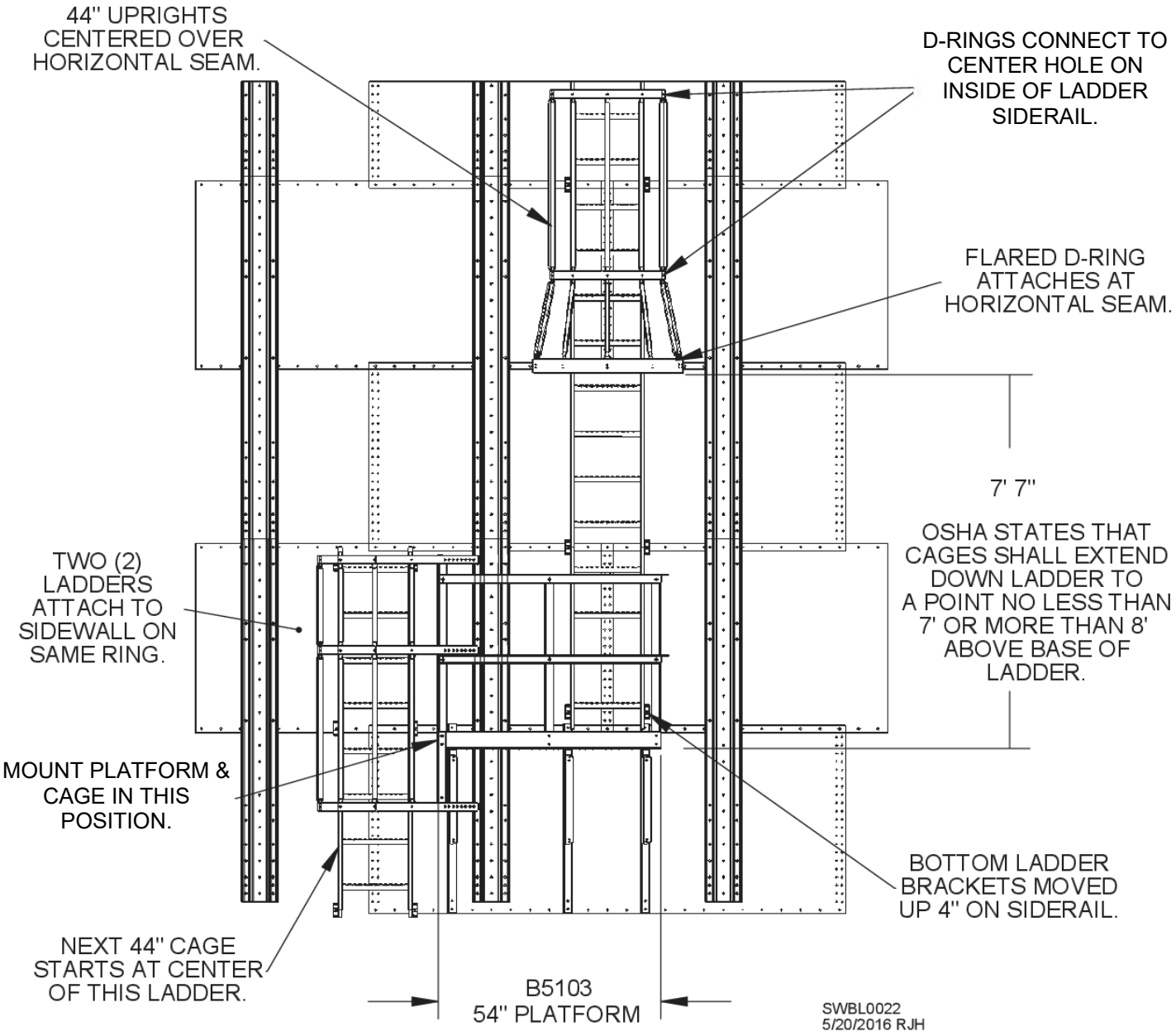


Fig. 29

Fig. 29 shows where flared D-ring should be attached in relation to 54” landing platform on a stiffened bin. Flared D-ring should be two (2) sidewall rings above platform. **Platform must be attached to sidewall in 1st position.** This will ensure that OSHA standards are met, as well as ease erection of ladder and cages. Two ladders attach to sidewall on same ring at platform location. At top and bottom of each ladder assembly, sidewall brackets need to be moved either up or down 4” to avoid interference with roof sheets, platform brackets, concrete and ladder caps.

To ensure that additional ladder columns will be centered between two stiffeners, attach platform to sidewall as shown in Fig. 29. Top ladder column should have already been centered between two stiffeners.

54” Landing Platform with Cage

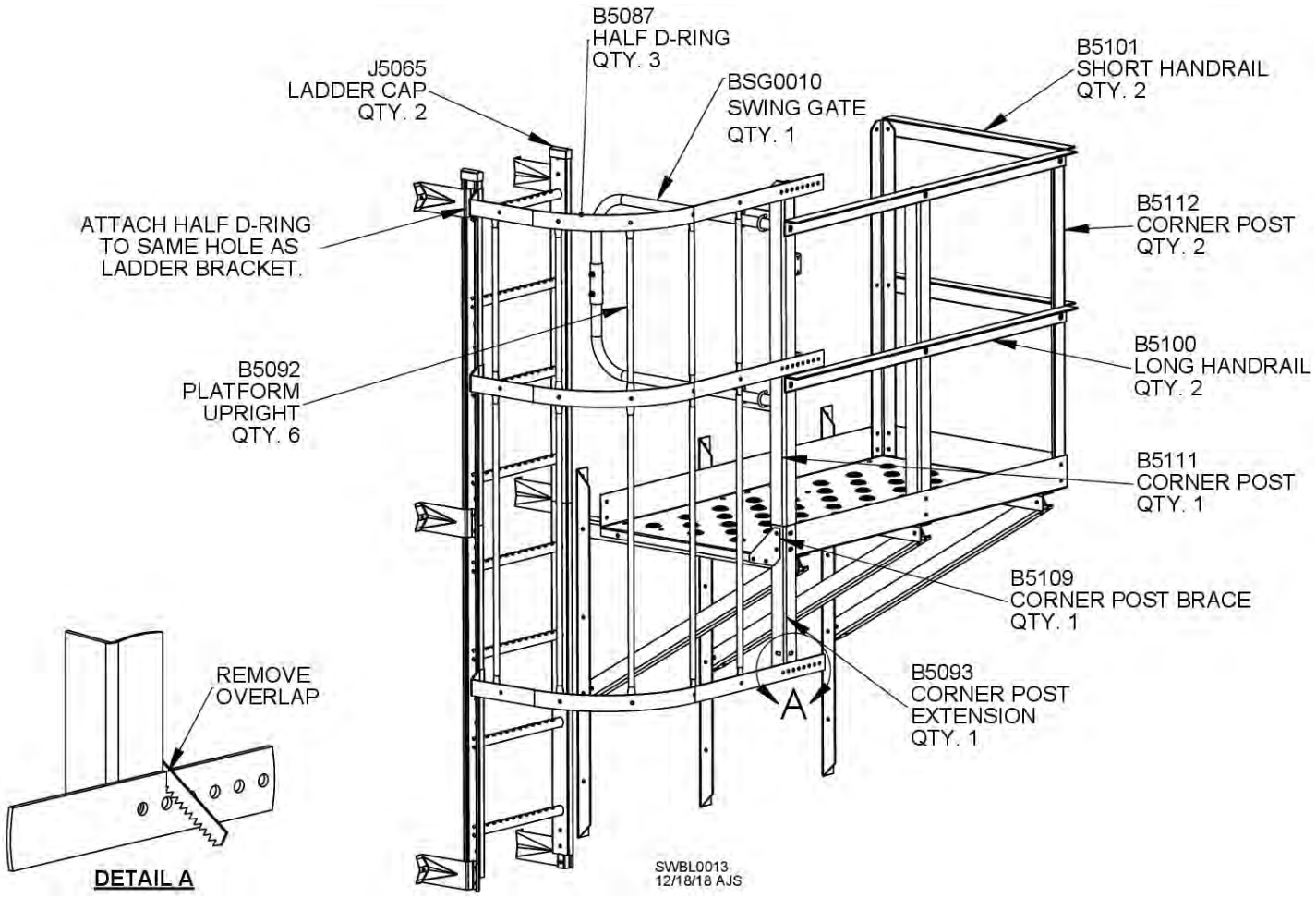


Fig. 30

Attach 54” landing platform to sidewall under upper ladder as shown in Fig. 29. Attach 44” ladder section to sidewall ring above platform, centered between two stiffeners. Fasten corner post extension, B5093, to bottom of open-faced corner post B5111 as shown in Fig. 30. Note that corner post B5111 is slightly longer than B5112 posts. Placement is critical.

Attach half D-rings to inside of ladder siderail and fasten them to corner post B5111 and corner post extension, B5093. Connect safety cage uprights to half D-rings with 3/8” hardware and tighten. Slide ladder caps over siderails of top ladder section. See Fig. 30. Also, remove half D-ring overlaps as shown in Detail A to ensure smooth, snag-free edges.

Ladder Layout, 3-Ring to 5-Ring Bin

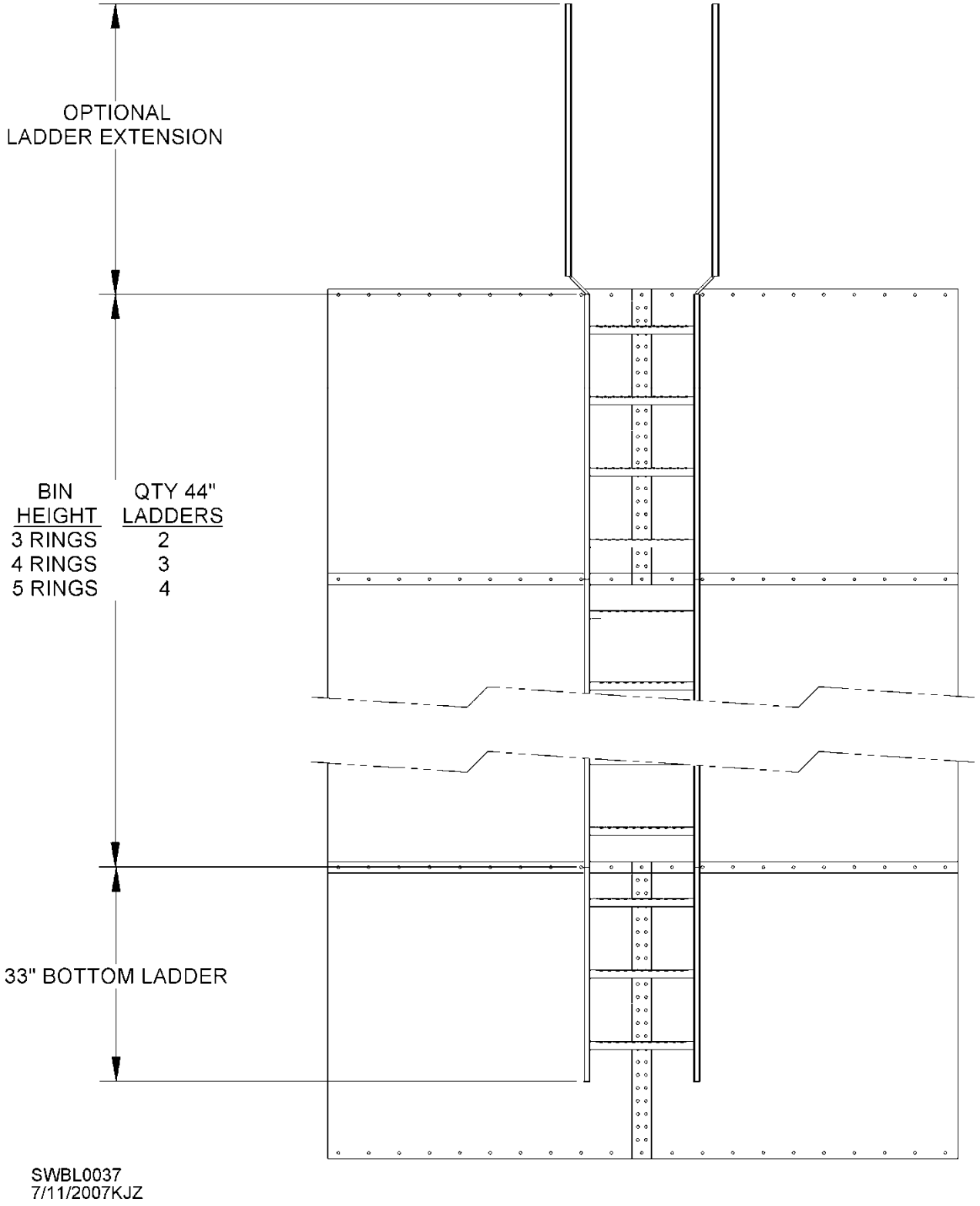


Fig. 31

Ladder & Cage Layout, 6-Ring to 8-Ring Bin

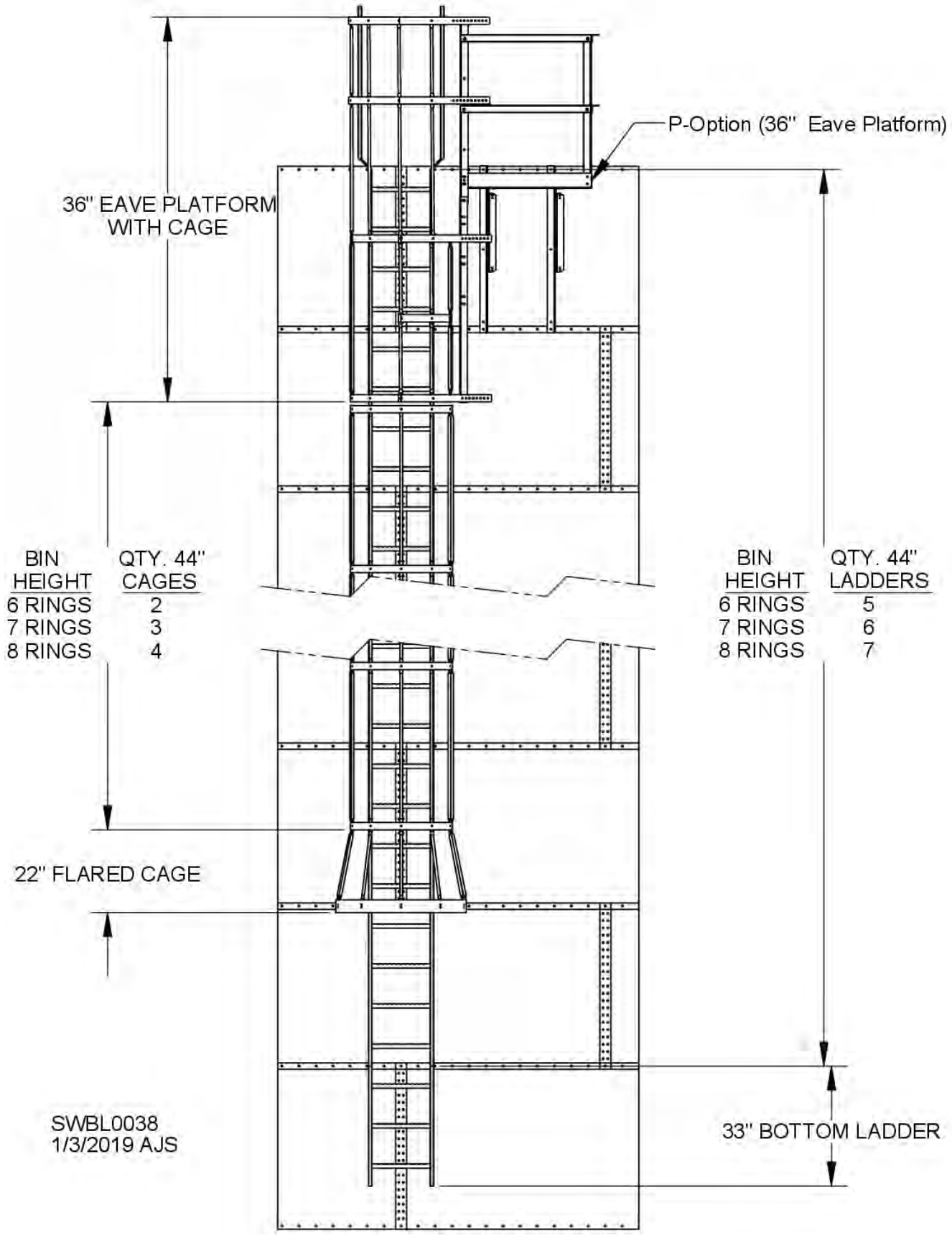


Fig. 32

Ladder & Cage Layout, 9-Ring to 12-Ring Bin

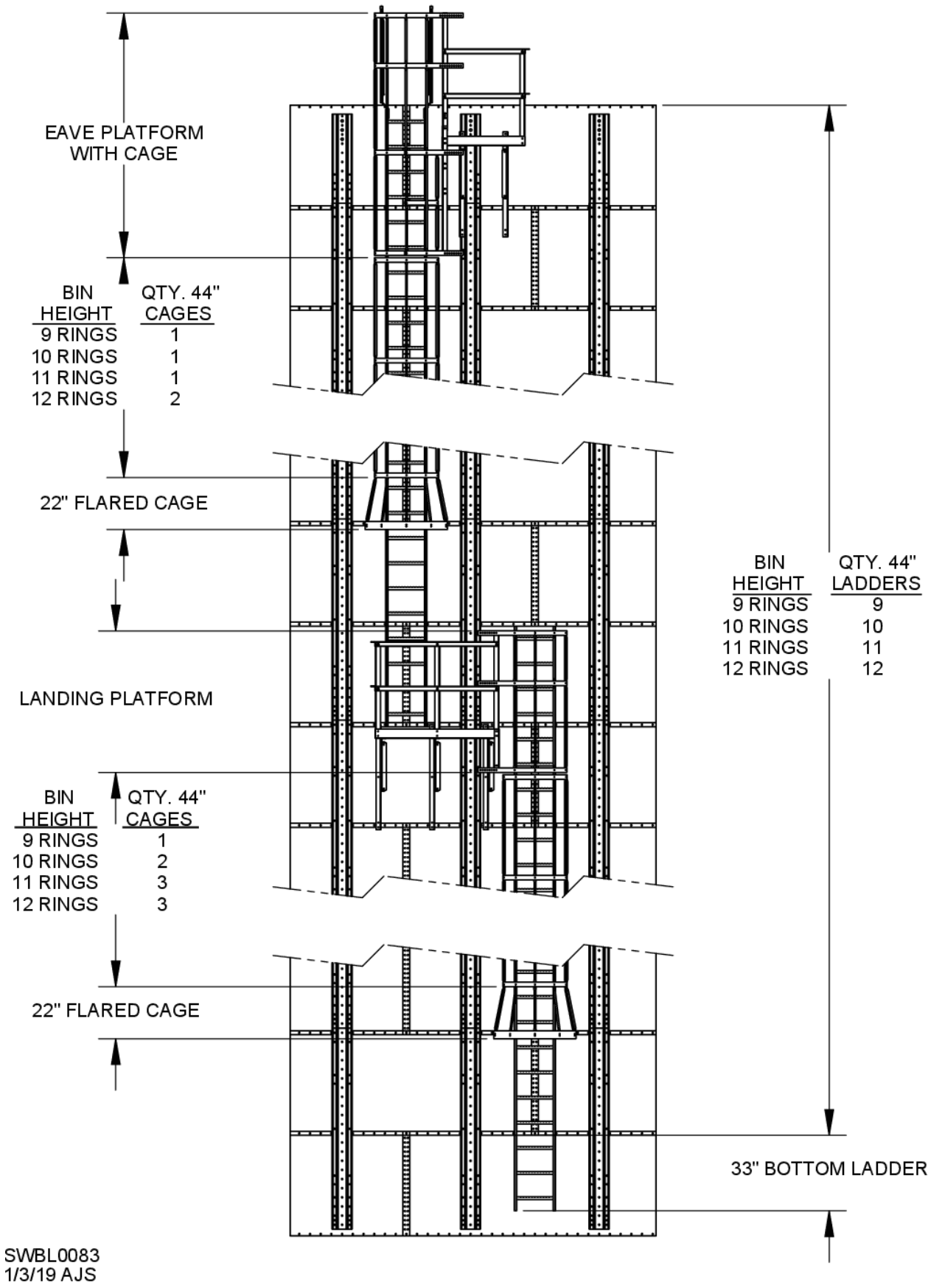


Fig. 33

Ladder & Cage Layout, 9-Ring to 16-Ring Bin

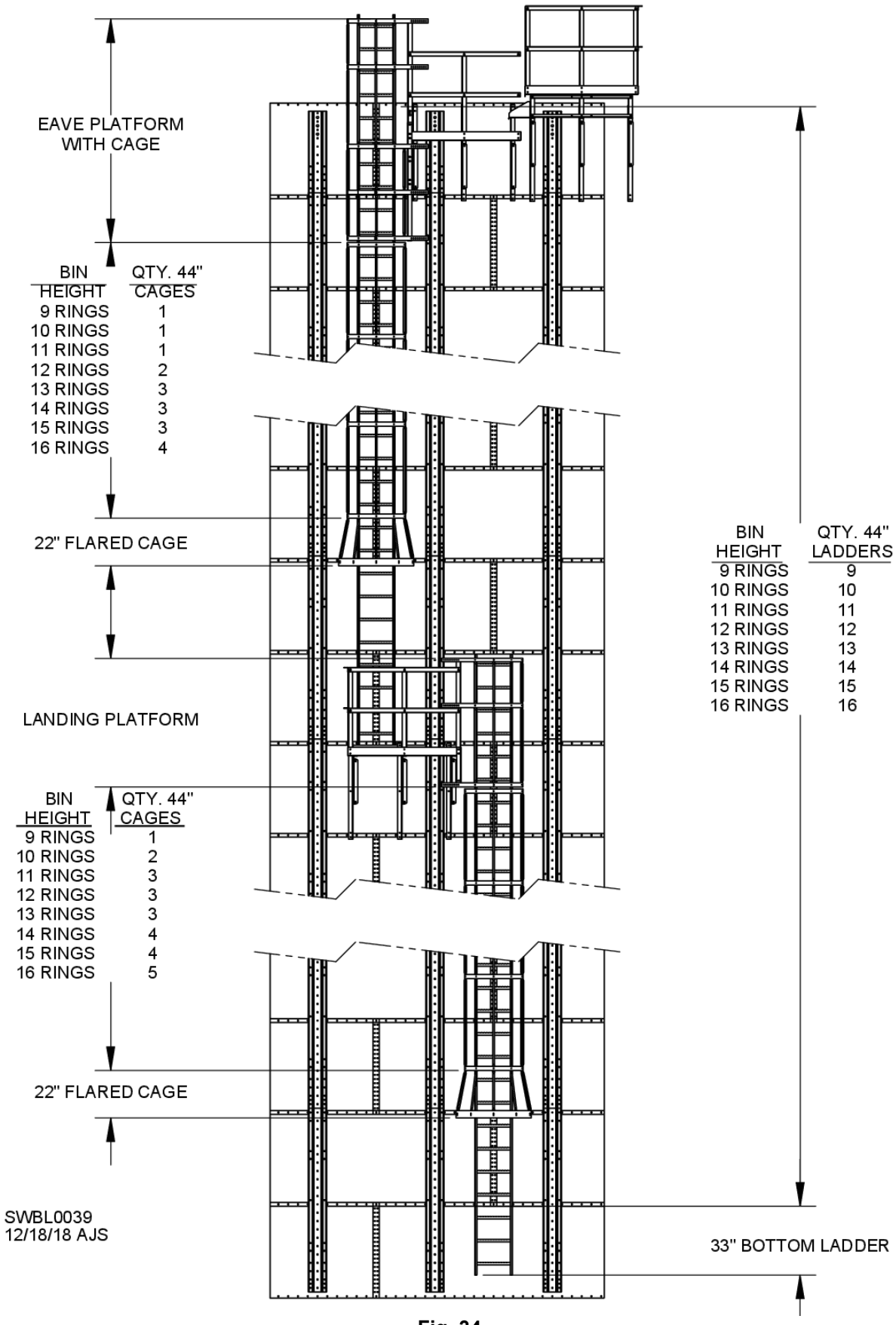


Fig. 34

Ladder & Cage Layout, 17-Ring to 24-Ring Bin

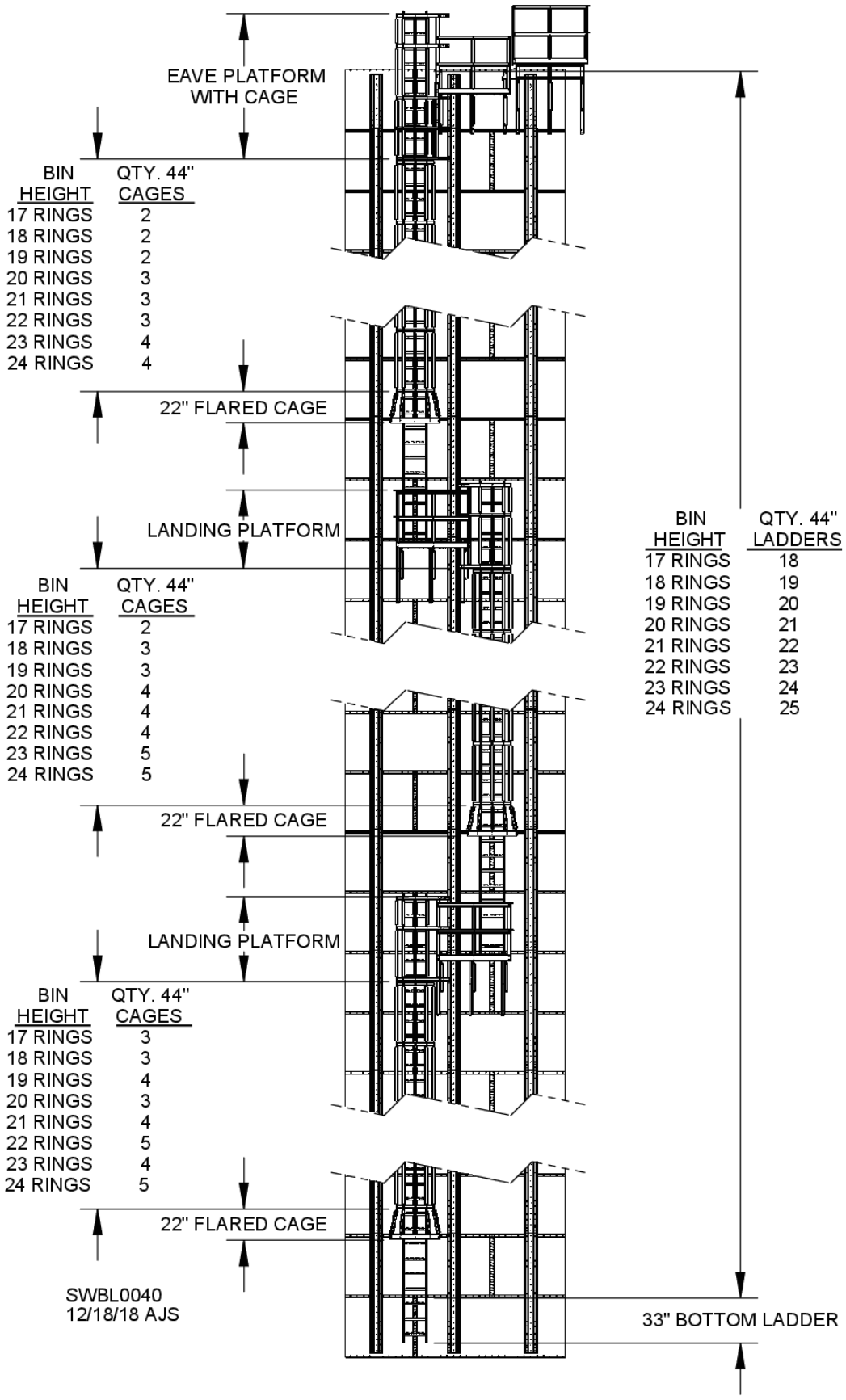


Fig. 35

Ladder & Cage Layout, 25-Ring to 30-Ring Bin

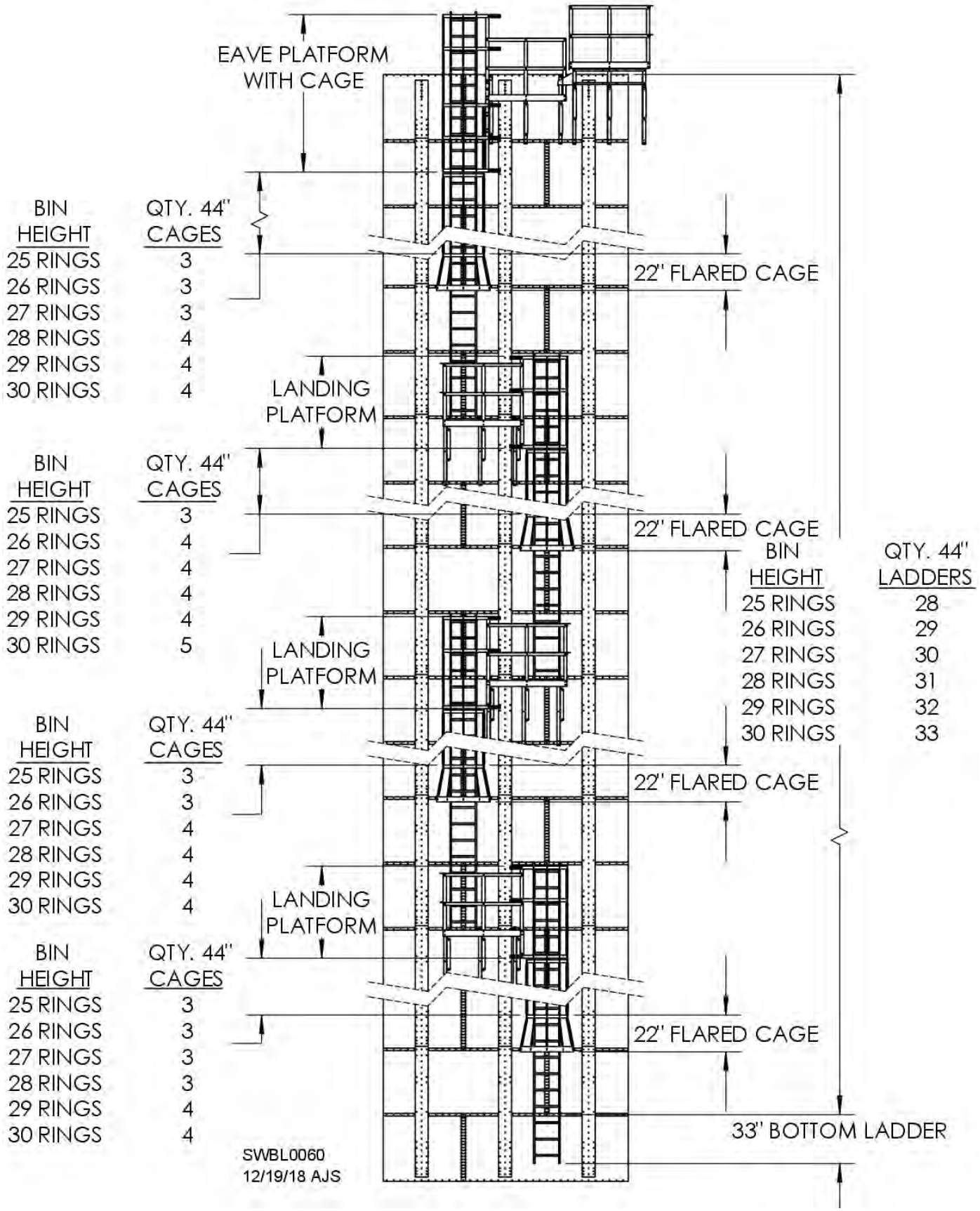


Fig. 36

Ladder Platform Swing Gate

Use drawings and parts list below to assemble ladder platform swing gate.

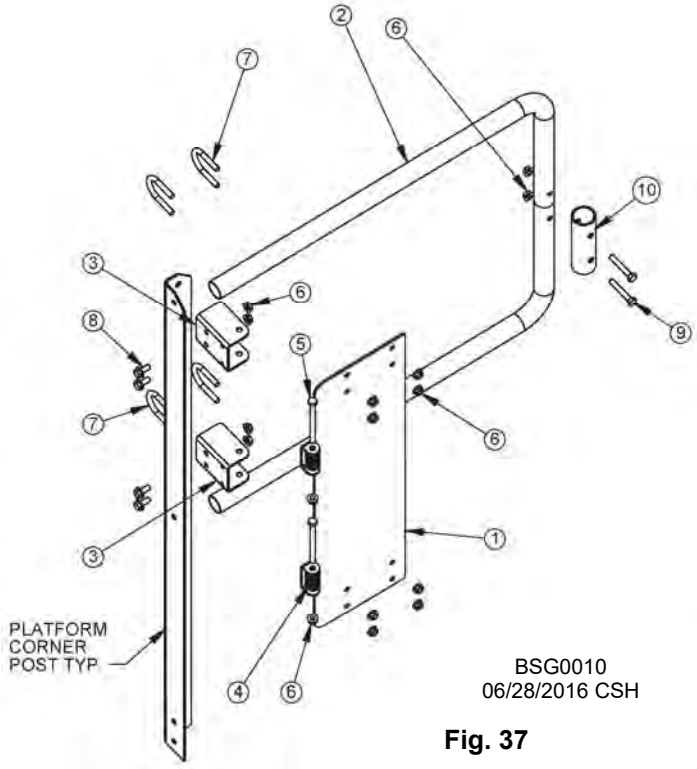


Fig. 37

ITEM #	DESCRIPTION	QTY.	PART #
1	Hinge plate	1	BSG0003
2	Rail tubing	2	BSG0001
3	Hinge bracket	2	BSG0004
4	Torsion spring	2	J23832
5	Screw, 5/16 – 18 x 4”	2	J0598
6	Flange nut, 5/16”	16	B5922
7	U-bolt, 5/16 – 18 x 2”, 1-1/4” ID	4	J0556
8	Screw, 5/16 – 18 x 3/4"	4	J0522
9	Screw, 5/16 – 18 x 2”	2	J0584
10	Rail splice	1	BSR1015

Assemble swing gate and attach to hinge plate using U-bolts (J0556) and 5/16” flange nuts (B5922).

Field-drill holes in upright for attachment of hinge brackets (BSG0004). Top of upper bracket should be 4-1/2” from top of handrail as shown in Fig. 38.

Fasten hinge brackets to upright with 5/16 – 18 x 3/4" screws (J0522) and 5/16” flange nuts (B5922).

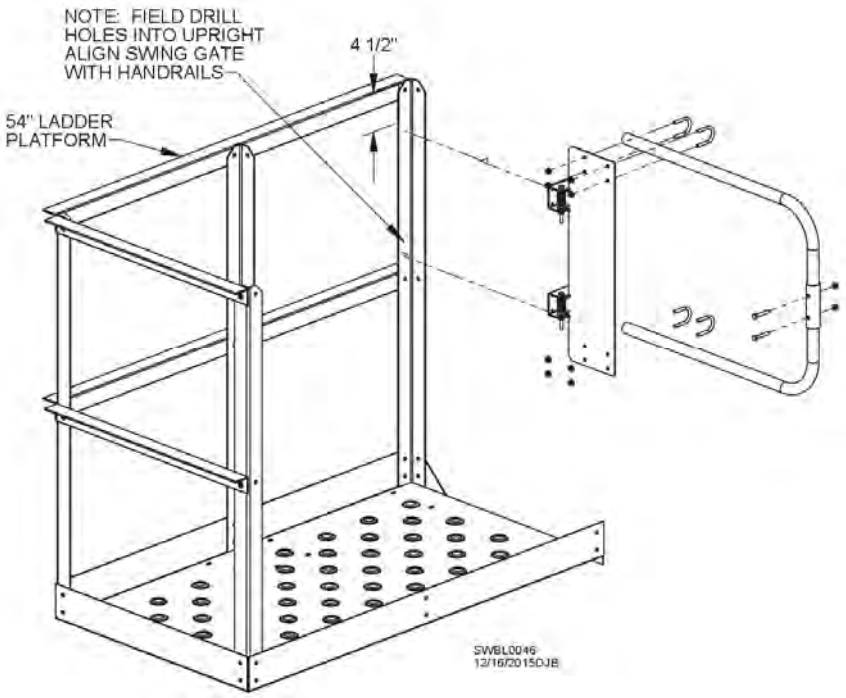


Fig. 38

Note: Assembly Instructions for Greene Sidewall Stairs are located in one of the platform bundles sent with the sidewall stair packages, see below

Easy Step

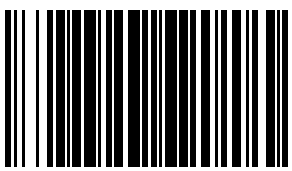
Assembly Instruction Location **(B)ES3544** PLATFORM,STAIR&TOP SECT,44"RG

C-Farm Series

Assembly Instruction Location **(B)CF3544L** PLATFORM,STAIR,LONG,CF-SERIES

C-Commercial Series

Assembly Instruction Location (**B)CC3544L** PLATFORM,STAIR,LONG,CC-SERIES


L13912