Concrete Batch Plant Control Plan

For the

Tappan Zee Hudson River Crossing

Revision 2
April 11, 2014

Prepared by
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Document History

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1.0 Introduction

This Concrete Batch Plant Control Plan (CBPCP) serves to establish the means and methods to minimize and/or mitigate potential adverse effects related to concrete production, delivery & placement, associated with the Tappan Zee Hudson River Crossing Project (Project). The CBPCP was prepared specifically to meet:

- the Project permit condition #18 detailed in the Project New York State Department of Environmental Conservation (NYSDEC) Permit for Construction (Facility DEC ID 3-9903-00043/00012 through 00014); and

The CBPCP will be implemented from commencement through the duration of construction of the Project.

2.0 Project Concrete Requirements

2.1 Project NYSDEC Permit for Construction – Permit Condition #18

At least 45 days before concrete is used for the Authorized Activity the Permittee must submit plans and descriptions of the means of concrete production, delivery and placement. Discharge of concrete and concrete leachate is prohibited. In-water concrete production, delivery and placement, and actions preliminary to same, may start when the Department has given written approval of these plans. The Permit authorizes no withdrawal of water from the Hudson River than may require a permit from the Department pursuant to 6NYCRR Part 601.

This CBPCP has been prepared to provide to the NYSDEC the plans and description of the means of concrete production, delivery and placement. Please see Section 3.0 for further details.

2.2 Project DB Contract Documents Concrete EPCs

2.2.1 Exhibit B Item 1. Air Quality Control

F. The use of concrete batch plant controls. The concrete batch plant will vent the cement weigh hopper, gathering hopper, and mix loading operations to a baghouse or filter sock. Venting storage silo chutes to a baghouse shall have a control efficiency of at least 99.9 percent. Roadways at the concrete batch plant, and all unloading and loading material handling operations, shall have a dust control plan providing at least a 50 percent reduction in PM10 and PM2.5 emissions from fugitive dust through wet suppression.

- Two concrete batch plants will be positioned on separate barges. Along with the concrete batch plants, there will be two sets of barges that will deliver the aggregate, cement and water supply. Per the DB Contract Document requirements, the concrete batch plants will consist of the following material transfer points that are enclosed and vented to a Dust Collection system with a baghouse or filter sock:
  - the cement weigh hopper (gathering hopper for cementitious materials);
  - mix loading operations to a baghouse or filter sock; and
In addition, the storage silos on the concrete batch plant barges and the supply barges will also vent to a Dust Collection system with a baghouse or filter sock. The silos on the concrete batch plant barges each have a separate Dust Collection system. The supply barge has one centrally located Dust Collection system for the three silos on the supply barge. Venting storage silo chutes to a baghouse shall have a control efficiency of at least 99.9 percent. Therefore, based on NYSDEC Regulations: Subpart 201-3:Item 37, the Project is exempt from obtaining a permit for the concrete batch plants. Subpart 201-3:Item 37 states that “Concrete batch plants where the cement weigh hopper and all bulk storage silos are exhausted through fabric filters, and the batch drop point is controlled by a shroud or other emission control device” are exempt from permitting activities.

The Control Data Sheet for the Dust Collection system, including the efficiency of the baghouse, is provided as Appendix A.

In addition, an airflow diagram of the dust collection system for the concrete batch plant and supply barges is provided in Drawing GA102 in Appendix B.

2.2.2 Exhibit B Item 10. Energy Conservation and Renewable Energy

D. Efforts and measures to reduce concrete waste, such as pouring leftover concrete as blocks or sidewalk slabs for later use where practicable.

Where leftover concrete can be cast into blocks or sidewalk slabs, this option will be evaluated. However, the concrete batch plant barge will be located near the concrete pour location and the concrete batch size can range from 1-6 cubic yards (CY). Therefore, the primary method of reducing the concrete waste will be control of the concrete pour. The ability to place the concrete batch plant barge near the concrete pour location results in better management and drastic reductions of the concrete waste stream as compared to typical construction projects.

2.2.3 Exhibit B Item 12. Concrete

A. Submit to the Authority plans and descriptions of the means of concrete production, delivery and placement at least 60 days before concrete is to be used. These plans shall to the maximum extent practicable prevent the discharge of cement into the River.

This CBPCP has been prepared to provide to the Authority the plans and description of the means of concrete production, delivery and placement. Please see Section 3.0 for further details.

B. Water from piling and cofferdam dewatering operations shall be discharged into a silt curtain or similar containment. The discharge shall not cause a substantial visible contrast to natural conditions in the Hudson River outside the containment. Comply with Exhibit B Item 6 herein as appropriate.

As stated in the January 21, 2014 NYSDEC email correspondence to the New York State Thruway Authority (NYSTA), the NYSDEC recommends that this requirement be reconsidered. The use of silt curtains is not a requirement of the NYSDEC Project permit condition #18. Furthermore, the NYSDEC questions the necessity and efficacy of silt curtains for these operations. Therefore, as acknowledged in NYSTA Letter TA_TZC_04510_COR_ENV in response to TZC Letter LT_TZC_NYSTA_00411, TZC will not be discharging water from piling and cofferdam dewatering operations into a silt curtain. TZC has committed to monitoring the discharge from pile dewatering activities to confirm compliance with NYSDEC Project permit condition #16, which states “Water
from pile and cofferdam dewatering installations may cause no increase in turbidity that results in a substantial visible contrast to the Hudson River outside the piling or cofferdam. As described in the Final Environmental Impact Statement the discharge must be treated if necessary to prevent such substantial visible contrast.”

C. **Ensure that no water containing fresh concrete or concrete leachate shall be discharged into the Hudson River.**

Water within the formwork, if any, will be pumped out of the formwork prior to the placement of concrete and placed directly back into the Hudson River.

Water containing fresh concrete or concrete leachate will not be discharged in the Hudson River. At the end of the last pour of each day, when batching is completed and before the crew leaves, the Plant mixing unit, re-mixer, pump and placing boom system will be washed down. The process will start at the top with the mixer then on down to the pump. The wash water will be contained within the mixer, re-mixer and pump. Once the wash water has made it to the pump it will be diverted and pumped across the deck to waste bins that will collect the waste water. All excess material and water on the deck of the barge from washing down the equipment will be pushed into two sump areas near the plant to be pumped into waste bins. This area of the barge has the containment curb. (See Drawing GA100 in Appendix B for approximate location of containment curb.) The containment area capacity of the concrete batch plant barge is approximately 9,510 gallons. On an as needed basis, a crane will pick the waste bins off the concrete batch plant barge and place them on a shuttle barge which will take them to land, where the water will be pumped into a vacuum truck for proper off-site disposal.

**D. Water withdrawals from New York State waters for the purpose of manufacturing concrete are prohibited.**

At no time will water be withdrawn from the Hudson River for the purpose of manufacturing concrete. Water will be delivered by barge from shore in tanks on the supply barge.

**E. Wastewater discharge into waters of New York State from the manufacturing of concrete is prohibited.**

Wastewater from the manufacturing of concrete will not be discharged into the Hudson River. At the end of the last pour each day, when batching is completed and before the crew leaves, the Plant mixing unit, re-mixer, pump and placing boom system will be washed down. The process will start at the top with the mixer then on down to the pump. The wash water will be contained within the mixer, re-mixer and pump. Once the wash water has made it to the pump it will be diverted and pumped across the deck to waste bins that will collect the waste water. All excess material and water on the deck of the barge from washing down the equipment will be pushed into two sump areas near the plant to be pumped into waste bins. This area of the barge has the containment curb. (See Drawing GA100 in Appendix B for approximate location of containment curb.) The containment area capacity of the concrete batch plant barge is approximately 9,510 gallons. On an as needed basis, a crane will pick the waste bins off the concrete batch plant barge and place them on a shuttle barge which will take them to land, where the water will be pumped into a vacuum truck for proper off-site disposal.

**3.0 Concrete Production, Delivery & Placement.**

As discussed above, two X-Tec Twin Shaft concrete batch plants will be positioned on separate barges and will be pushed near that day’s desired pour location for concrete production. Along with the concrete batch plants, there will be two sets of barges that will deliver the aggregate, cement and water supply. These
barges will be positioned next to the concrete batch plants for production. (See Drawing GA103 in Appendix B for the barge layout in production.

Barges will be fleeted next to each other when transferring material. The maximum distance between barges will vary but will not exceed the length of hose that will be used to transfer material. The intended and best practice distance is 2 to 3 feet to eliminate supporting the hoses between barges.

3.1 Production Measures

Below is a description of the contents, containment measures and transfer operations for the aggregate, cement and water supply barges.

- **Aggregate Barge (See Drawing GA105-106 in Appendix B)**
  - TZC aggregate barges have an approximately 3 to 5 feet tall containment curb that will encompass the aggregate barge but will have slits for rain drainage. The aggregate containment curb keeps the aggregate material (i.e., rock or sand) on the barge during delivery and also throughout the unloading process.
  - The aggregate barge will be located next to a concrete batch plant barge and the aggregate will be unloaded onto partially covered conveyor belts on the concrete batch plant barge using a Caterpillar (CAT) 345 Material Handler with a Peirce Pacific Clamshell Bucket designed for small aggregate handling. The clamshell bucket has a tight sealing bucket design and is ideal for over the water use.
  - Periodically the aggregate barges will be wetted down, as needed, to provide and address dust control and as required for aggregate moisture control to insure concrete quality control measures.

- **Supply Barge (See Drawing GA104 in Appendix B)**
  - The supply barge will have three cementitious silos, a fresh water tank, admixture tanks and a Dust Collection system. The Dust Collection system on the supply barge is centrally located for collection of dust from the three silos. An airflow diagram of the dust collection system on the supply barge is provided in Appendix B.
  - The three silos will either hold cement, slag, or flyash or a preblended ration of these materials. The silos will not be used to hold concrete.
  - When transferring cementitious material to and from the supply barge, the vented air will be captured in a Dust Collection system connected to the silos. The Dust Collection system has a 99.9 percent efficiency rating (see Appendix A).
  - When transferring cement, slag or fly ash from the supply barge to the silos on the concrete plant barge, black softwall 50-75 Psi WP hoses will be used. The connection or hook will be over the barge not the water. This will allow any product, if a leak were to occur, to be contained to the barge.
  - The hose couplings are (cam lock) type (see detail in Appendix C). They are an industry standard transfer hose connection and incorporate a rubber gasket to create an air tight seal.
- Water will be delivered by barge from shore in tanks on the supply barge to a water tank on the concrete plant barge and will not be withdrawn from the Hudson River. Water will be transferred from the supply barge to the concrete batch plant using steel lined hoses.
- TZC will install an approximately 4 to 6 inches tall containment curb with a capacity of approximately 6,480 gallons that will encompass the entire area where concrete admixture liquids are stored on the supply barge.

- **Concrete Batch Plant Barge (See Drawing GA100, 101 & 103 in Appendix B)**
  - Material transfer on the concrete batch plant barge from material storage location (i.e., silos, water tanks) will occur through transfer hoses or material augers in a closed system to continuously contain the material.
  - The transferring of cementitious material is a closed system starting at the storage silos on the supply barge and continuing to an enclosed cement weigh hopper and mixer on the concrete batch plant barges. The silos on the concrete batch plant barge will all have separate Dust Collection systems. In addition, there will be a Dust Collection system on the cement weigh hopper right before the material enters the mixer. The Dust Collection systems have a 99.9 percent efficient rating (see Appendix A)
  - Batched concrete prepared on the concrete batch plant barge will be discharged from the twin shaft mixer into an 18 CY Maxon Re-mixer holding vessel underneath the concrete batch plant to be agitated until it’s ready to be placed.
  - At the end of the last pour of each day, when batching is completed and before the crew leaves, the Plant mixing unit, re-mixer, pump and placing boom system will be washed down. The process will start at the top with the mixer then on down to the pump. The wash water will be contained within the mixer, re-mixer and pump. Once the wash water has made it to the pump it will be diverted and pumped across the deck to waste bins that will collect the waste water. All excess material and water on the deck of the barge from washing down the equipment will be pushed into two sump areas near the plant to be pumped to waste bins. This area of the barge has a containment curb. (See Drawing GA100 in Appendix B for approximate location of containment curb.) On an as needed basis, a crane will pick the waste bins off the concrete batch plant barge and place them on a shuttle barge which will take them to land, the water will be pumped into a vacuum truck for proper off-site disposal.
  - TZC will install an approximately 4 to 6 inches tall containment curb that will encompass the entire area where concrete admixture liquids and concrete wash water are stored on the barge. The containment area capacity of the concrete batch plant barge is approximately 9,510 gallons.

3.2 **Delivery Measures**
Concrete will be delivered from the concrete batch plant barge to the final placement location through the use of either a placing boom system that will include a hose or a bucket. Each of these delivery methods are explained below.

- **Hose:** Each of the concrete batch plant barges is equipped with Putzmeister MX 43 Meter (138’1”) Placing Boom and Pumping System. The concrete is pumped from the re-mixer through steel pipe continuously as it travels across the deck of the barge and up the placing boom. Once the concrete reaches the end of the placing boom line it exits to the pour location through the manufacturers recommended flexible rubber hose. At the start of each shift, the hose and couplings will be visually inspected for leaks. The placing boom systems have a pneumatic valve (Air Cuff) integrated in the end hose that allows TZC to close off the flow of concrete completely once the pump is turned off. This valve is located at the end of the pump line for the best control in shutting off the concrete. See Appendix D for pneumatic valve (Air Cuff) information.

- **Bucket:** When a concrete bucket is used to deliver concrete to a pour location, the bucket will be placed next to the re-mixer so that the chute on the re-mixer can be swung and divert concrete from the pump to the bucket. Before the bucket is swung over the water, the bucket will be visually inspected for concrete outside of the bucket. Bucket types vary but all buckets will have a manual lever with clamshell jaws that will be opened to discharge the concrete. With proper maintenance and care the bucket’s clamshell type jaws can remain nearly leak proof. See Appendix D for bucket details.

- Cleaning of all concrete equipment is within the containment curb area of the barge. The placing boom system will be cleaned with a sponge ball that is sucked back through the line to the pump to remove all concrete. The concrete buckets will be washed off inside the containment curb area. The concrete waste will be collected in the sump areas of the barge then placed on roll of containers for disposal.

### 3.3 Placement Measures

When placing concrete, controlled methods will be used in cofferdams, pipe piles and other formwork to avoid spillage and leakage into the water. Sealants, gaskets and/or other industry proven methods will be used to seal the formwork to prevent concrete leakage. See Appendix E for monotube jacket with neoprene cut sheet for sealing around pipe pile. Once formwork is sealed, water within the formwork, if any, will be pumped out of prior to the placement of concrete and placed directly back into the Hudson River. When the placement of concrete in the formwork is nearing the end, concrete placement will be closely monitored and concrete will be added in small increments to prevent spillage.
APPENDICES
APPENDIX A

Dust Collection System
Round Dust Collectors with Elements Replaceable through Front Door

Rundfilter mit rohgasseitig austauschbaren elementen
Filtres ronds avec des éléments extractibles de front
Filti tondi con elementi estraibili frontalmente
The WAMECO™ Front Dust Collector range having elements that can be unscrewed from the dirty side is used where access to the filter elements from the clean air side is not possible either because of limited headroom or a top-mounted fan.

**Description**

Die WAMECO™ Front Filter-Baureihe mit rohgasgegenseitig eingeschraubten Filtereinsätzen findet dort Verwendung, wo ein reingasgegenseitiger Zugang zu den Einsätzen entweder aufgrund geringer Deckenhöhen oder wegen eines Aufsatz-Absaugventilators nicht möglich ist.

Beschreibung

Die WAMECO™ Front Filter-Baureihe mit rohgasgegenseitig eingeschraubten Filtereinsätzen findet dort Verwendung, wo ein reingasgegenseitiger Zugang zu den Einsätzen entweder aufgrund geringer Deckenhöhen oder wegen eines Aufsatz-Absaugventilators nicht möglich ist.

**Description**

La gamme des filtres WAMECO™ Front à éléments dévissables a été conçue pour répondre aux exigences d’installations dans lesquelles l’espace en hauteur est trop exigu ou bien pour les filtres avec aspirateur dans le but de simplifier les opérations d’entretien.

**Description**

La gamma dei filtri WAMECO™ Front ad elementi svitabili è stata studiata per soddisfare le esigenze di impianti in cui vi sia spazio ridotto in altezza o per filtri con aspiratore per semplificare le operazioni di manutenzione.

Robust body, 304 stainless steel, 1.5 mm thickness

Robustes Gehäuse aus Edelstahl 1.4301, 1,5 mm stark

Corps intermédiaire robuste, inox 304 épaisseur 1,5 mm

Corpo intermedio robusto, AISI 304 spessore 1,5 mm

Easy door locking.

Vereinfachte Türverriegelung.

Simplificazione del serraggio della porta.

Schweißverriegelung leicht zu öffnen.

**Description**

Fermeture portillon simplifiée.

Charnières flottantes en inox 304.

Cerniere flottanti (AISI 304).

Floating 304 stainless steel hinges.

Stabile Tür aus Edelstahl 1.4301, 2 mm stark

Portillon résistant, inox 304, épaisseur 2 mm

Portello resistente, AISI 304 spessore 2 mm

**Description**

Fermeture portillon simplifiée.

Charnières flottantes en inox 304.

Cerniere flottanti (AISI 304).
Features
- Robust design
- 304 stainless steel inspection door insert + 15mm (0.6 in) EPDM door gasket
- Large inspection door
- Floating stainless steel hinges on side of door, high-quality fasteners on opposite side

Function
- No deformation
- Perfect door sealing; no dust deposits inside the dust collector
- Easy access to filter elements for removal and reassembly
- Door remains always attached to dust collector body; easy door locking

Benefits
- Reduced operating costs due to longer durability
- Safe and dustproof operation
- Hygienic operation
- Easy money-saving maintenance
- Easier and safer maintenance

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<tr>
<td>FSU</td>
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<td>186</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>172</td>
</tr>
</tbody>
</table>
INFORMATION ABOUT DUST PROTECTION

In general we want to inform you that all technical possible protections to avoid dust and outflow of material are included so that a perfect production in relation of environmental protection is included. Please have following detailed information:

**Dust <20 mg/Nm3**

Cement silos:

- pinch valve for cement loading pipe
- over pressure protection
- over fill protection
- cement dust filter with 23 m²

The cement silos are connected totally to the control of the batching plant. The silo is equipped with a over pressure protection and an overfill protection as well as a dust filter with a surface of 23 m². Also there is a pinch valve included in the inlet pipe which gets automatically closed in case of over pressure or reaching the maximum level so that an out blowing of cement into the air is not possible.

Additional to all these dust protection systems all outlets of the cement silo where dust can reach into the air a plastic pipe is connected which let the material flow to the ground where the material can be additional collected.

Weighing platform:

- cement weighing air filter
- aggregate waiting hopper closing
- housing of weighing platform

the dust areas of the weighing platform are protected by housing. Especially the cement weighing are protected with an additional filter to avoid dust.
Mixing platform:

- mixer dust filter with ventilation
- housing of complete platform

The mixer has a dust filter with ventilation which gets automatically switched on by the control during loading the mixer.

Inclined belt conveyor:

- under belt cover
- upper belt cover

The belt is totally equipped with an under and with an upper cover on the belt conveyor.

Aggregate storage bins:

- complete housing

The aggregate storage is totally housed by panels so that the dust which can be made during loading is not able to go out of the bins.

NOISE PROTECTION:

Full housing of the complete plant with 60 mm insulation panels

<table>
<thead>
<tr>
<th>operation</th>
<th>plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>noise emission in dB (A) based on a distance of</td>
<td>50 m</td>
</tr>
<tr>
<td>plant</td>
<td>48,0</td>
</tr>
</tbody>
</table>
MANUFACTURER: __________WAM USA INC ________
MODEL: ______FS.4J.39____________________________

SPECIFY       _____ BAGHOUSE
              ___X__ CARTRIDGE
              _____ OTHER __________________________________________

NUMBER OF BAGS OR CARTRIDGES: ___28____
SIZE OF BAG OR CARTRIDGE: _____6” X 30” __________________
TOTAL BAG OR CARTRIDGE AREA (FT2) ______400________
MAXIMUM CAPACITY (ACFM) ____________2400________
BAG OR CARTRIDGE FABRIC ______POLYESTER____________________
FABRIC WEIGHT (oz) _____________8oz____________________________
WEAVE _______________10 MICRON____________________
FINISH ______COATED____________________________________
MAXIMUM FABRIC TEMPERATURE _____165 DEGREES F ________________
EFFICIENCY (%) ______99.9%________
AIR TO CLOTH RATIO ______6:1 ______________
METHOD OF CLEANING: _____ REVERSE AIR
              ___X_ PULSE JET
              _____ SHAKER
OPERATING PRESSURE DROP: MIN _5_  MAX __8__ (INCHES OF WATER)
PARTICULATE GRAIN LOADING: INLET __30_ OUTLET _.01_
FAN REQUIREMENTS  HP ______
                      SCFM ______
                      VENTING _X_
APPENDIX B

Barge Drawings and Airflow Diagrams

- Drawing GA100  Batch Plant Plan view
- Drawing GA101  Batch Plant Profile view
- Drawing GA102  Airflow Diagram
- Drawing GA103  Barge Layout in Production
- Drawing GA104  Supply Barge Plan & Profile view
- Drawing GA105  Aggregate Barge Plan view
- Drawing GA106  Aggregate Barge Type
Legend:

The Green transfer line is the flow of material from the supply barge silo’s to the plant plant barge silo’s when unloading. Once material is in the plant barge silo’s it will be conveyed to the plant through augers shown in yellow.

The Green transfer line on the supply barge double as the fill lines when taken to land.

The Red line are the vent lines used to vent air pressure when loading or unloading to capture the dust in the vented air.

Items labeled dust collector in RED are points where vented pressure will capture dust from the either end of this closed system.
Barge Layout in Production.

AGGREGATE BARGE

ROCK

3-5' CONTAINMENT CURB

SAND

BATQ-1 PLANT

DUST COLLECTOR ON TOP OF BARGE

Pay Tank

SUPPLY BARGE

SLAG SILO

TRANSFER LINE TO PLANT OR REFILL

FLY ASH SILO

TRANSFER SILO LINE TO DUST COLLECTOR

CEMENT SILO

DUST COLLECTION

GENSET

WATER TANK

ADDITIONS CONE WITH CONTAINMENT CURB
AGGREGATE BARGE PLAN VIEW

ROCK

3-5' CONTAINMENT CURB

SAND
AGGREGATE BARGE
APPENDIX C

Material Transfer Hose Information
Black Softwall

APPLICATION:
For the discharge of dry bulk cement from tank truck and in-plant service.

CONSTRUCTION


COVER: Black Plioflex® synthetic rubber with white spiral stripe (wrapped impression)

REINFORCEMENT: Spiral-plied synthetic fabric

TEMPERATURE: -25°F to 180°F (-32°C to 82°C)

PACKAGING: 100’ lengths, coiled and polywrapped

BRANDING (SPIRAL): Example: Goodyear® Black Softwall

COUPLINGS: Contact fitting manufacturer for proper fitting recommendation and coupling procedure. Use Goodyear Engineered Products Insta-Lock™ Cam & Groove Fittings with this product. See the “Couplings Systems” section of this website for available Insta-Lock products.

NON-STOCK/SIZES: For special production run minimum requirements, contact customer service.

ORDER CODES: 549-152 (1/8” tube gauge 50psi) / 549-149 (3/16” tube gauge) / 549-148 (1/4” tube gauge) / 549-795 (with Survivor Compound: 4X100 - 1/4”) / 549-790 (with Survivor Compound: 4X100 - 1/8”) / 549-804 (with Survivor Compound: 4X 00 - 3/16”)

ID | NOM. OD | MAX. WP | WEIGHT
---|---------|---------|------
4  | 101.6   | 0.34    | 1.38 | 2.05
5  | 127.0   | 0.34    | 1.82 | 2.71
6  | 152.4   | 0.34    | 2.25 | 3.35

The GOODYEAR (and Winged Foot Design) trademark is used by Veyance Technologies, Inc. under license from The Goodyear Tire & Rubber Company.

Goodyear Engineered Products are manufactured and sourced exclusively by Veyance Technologies, Inc. or its affiliates.

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Insta-lock™ Coupling System

The innovative Insta-Lock™ cam and groove coupling system is the culmination of years of laboratory research and in-the-field experience. The result is an amazingly durable, reliable and secure coupling system suitable for numerous industrial hose applications. Insta-Lock™ has 10 unique features that make it the preferred coupling system for operators looking for greater convenience, security and productivity.

**Insta-lock™ Type A**
Type A fitting is commonly threaded onto a pipe, threaded hose end or manifold system, which is connected and disconnected on a regular basis.

**Insta-lock™ Type B**
Type B fitting is normally threaded onto a pipe or manifold which joins to a rubber hose assembly which is connected and disconnected regularly.

**Insta-lock™ Type C**
Type C fitting can be attached to a rubber hose with the use of interlocking ferrules, crimp sleeves, or bands.

**Insta-lock™ Type D**
Type D fitting is commonly threaded onto a pipe, threaded hose end, or manifold system, which is connected and disconnected on a regular basis.

**Insta-lock™ Type E**
Type E fitting can be attached to a rubber hose with the use of interlocking ferrules, crimp sleeve and bands.

**Insta-lock™ Type F**
Type F fitting is normally threaded into pipe or manifold connections and mated with Part C, Part B, or Part D.

**Insta-lock™ Interlocking Stainless Steel Male NPT Hose Stem**
Our Interlocking Stainless Steel Male NPT Hose Stem fitting are designed to be attached to a rubber hose with the use of a Insta-Lock Ferrule.
**Insta-lock™ Dust Cap**
Dust Cap is used to seal the pipe system and hose assemblies during nonuse or transfer of assembly.

**Insta-lock™ Dust Plug**
Dust plug is used to seal the pipe system and hose assemblies during nonuse or transfer of assembly.

**Insta-lock™ Interlocking Ferrule**
304# Stainless Steel.

**Insta-lock™ Repair Kits**
316# Stainless Steel and Brass.

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APPENDIX D

Concrete Placement Pneumatic Valve (Air Cuff)

And

Concrete Bucket

Information
AIR CUFF™

Manual or Remote-Operated Valve. Controls the Flow of Concrete

KEY PRODUCT SPECIFICATIONS AT A GLANCE

- **Length:** 15"
- **Diameter:** 9.5"
- **Weight:** 21 lbs
- **Max. Air Pressure:** 90 PSI
- **Cycle Time:** 4 seconds

KEY PRODUCT CHARACTERISTICS

- Cycle time of 4 seconds, eliminates spill and waste
- Fits all 3" through 5" diameter discharge hose
- Eliminates the need to kink and wire hose at the tip
- Operates from truck's air supply
- Can be operated by hand held remote control or integrated into pumps control box. Consult factory for details.
- Includes Air Cuff™, remote and fittings for complete installation
- Safe alternative to the double 90°

AIR CUFF™ SHUT-OFF VALVE

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Part No.</th>
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<tbody>
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<td>Manual Air Cuff™ Kit</td>
<td>V50ASC-MAN</td>
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<tr>
<td>Remote Control Kits</td>
<td></td>
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<tr>
<td>Universal Kits</td>
<td></td>
</tr>
<tr>
<td>12-Volt Air Cuff™ Kit</td>
<td>V50ASC-12R</td>
</tr>
<tr>
<td>24-Volt Air Cuff™ Kit</td>
<td>V50ASC-24R</td>
</tr>
<tr>
<td>Replacement Cuff</td>
<td>V50ASC-ACA</td>
</tr>
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</table>
Accessories

Hose

NEW

Boom
Discharge
Reducing
Accessories
When ordering parts, specify:

1. This drawing no: 01-55
2. Part number
3. Quantity
4. Description

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<tr>
<td>3000</td>
<td>&quot;C&quot; gate repair kit</td>
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<tr>
<td>2289</td>
<td>&quot;C&quot; gate complete</td>
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<tr>
<td>2288</td>
<td>Gate lever</td>
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<tr>
<td>1834</td>
<td>Gate plate / r. arm Assy</td>
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<tr>
<td>1815</td>
<td>Pivot Bushing</td>
</tr>
<tr>
<td>1814</td>
<td>Spring spacer</td>
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<tr>
<td>1475</td>
<td>Pivot bolt</td>
</tr>
<tr>
<td>0359</td>
<td>Gate spring</td>
</tr>
<tr>
<td>0169</td>
<td>Hex nut</td>
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<tr>
<td>0118</td>
<td>Gate spring bolt</td>
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<tr>
<td>0114</td>
<td>Handle bolt</td>
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<tr>
<td>0019</td>
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<td>3000</td>
<td>Included in PN 3000 repair kit</td>
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Item 446-L thru. 4156-L "L" Series Lightweight Laydown bucket with new style bail parts list

For buckets manufactured as follows:

- Item 446-L built after November 1998 S.O. 10569
- Item 466-L built after September 1992 S.O. 6579
- Item 496-L built after October 1991 S.O. 6071
- Item 4126-L built after February 1993 S.O. 6815
- Item 4156-L built after May 1996 S.O. 8779

For all other "L" series buckets, see drawing 74-49

Gar-Bro Manufacturing Co.
104 Bolton Sullivan Drive P.O. Drawer 1077
Heber Springs, Arkansas - 72543-1077
Round Concrete Buckets

GAR-BRO

Equipment Engineering Service

Round Concrete Buckets
General Purpose Concrete Buckets

Gar-Bro General Purpose or ‘G’ Series Concrete Buckets are built for modern concrete requirements and general concrete work. Sturdy design and construction provides long life expectancy. All ‘G’ Series buckets feature the Gar-Bro Double Clamshell Gate with vertical center discharge. Standard gate size is 15 inches x 22 inches. Additional details and parts information available at WWW.GARBRO.COM/G-SERIES.HTM

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Rated Capacity Cubic Yards</th>
<th>Level Capacity Cubic Feet</th>
<th>Outside Diameter Inches</th>
<th>Loading Height Inches</th>
<th>Weight Pounds</th>
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<tbody>
<tr>
<td>411-G</td>
<td>½</td>
<td>10</td>
<td>39</td>
<td>35</td>
<td>355</td>
</tr>
<tr>
<td>413-G</td>
<td>½</td>
<td>15</td>
<td>45</td>
<td>38</td>
<td>420</td>
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<tr>
<td>423-G</td>
<td>¾</td>
<td>24</td>
<td>51</td>
<td>46</td>
<td>565</td>
</tr>
<tr>
<td>433-G</td>
<td>1</td>
<td>30</td>
<td>57</td>
<td>51</td>
<td>615</td>
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<tr>
<td>442-G</td>
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<td>42</td>
<td>64</td>
<td>55</td>
<td>795</td>
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<tr>
<td>462-G</td>
<td>2</td>
<td>58</td>
<td>72</td>
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<td>1,045</td>
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<td>3</td>
<td>87</td>
<td>76</td>
<td>72</td>
<td>1,445</td>
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<tr>
<td>4123-G</td>
<td>4</td>
<td>112</td>
<td>77</td>
<td>85</td>
<td>1,825</td>
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</table>

- **Plate-type lifting bail (423G to 4123G)**
- **Bar-type lifting bail (411G to 413G)**
- **Steep cone side slopes for efficient cleanout**
- **Sturdy design and construction for long life expectancy**
- **Variety of attachments available: Rubber accordion hoppers, steel sub-hoppers, air or hydraulic gate operation, side chutes**
- **Low Loading heights**
- **Bail-type operating handle (rope-pull) control possible**
- **Double Clamshell Gate 15" X 22" gate standard on 413G and larger - optional 22" x 32" gate available on 442G, 462G, 493G and 4123G**
Lightweight Round-Gate Concrete Buckets

The Gar-Bro Round Gate or ‘R’ Series Concrete Bucket is 30% to 50% lighter than most standard steel buckets of the same capacity. The double clamshell 16-inch diameter gate features the Gar-Bro venturi throat and is non-jamming, grout tight and self-closing. A variety of attachments are available for all ‘R’ series buckets, including rubber accordion hoppers, side chutes, air operated gate systems, and extension collars. Additional details and parts information available at WWW.GARBRO.COM/R-SERIES.HTM

<table>
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<th>Item No.</th>
<th>Capacity Cubic Yards</th>
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<th>Loading Height Inches</th>
<th>Weight Pounds</th>
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</thead>
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<tr>
<td>410-R</td>
<td>1/3</td>
<td>10</td>
<td>38</td>
<td>34</td>
<td>237</td>
</tr>
<tr>
<td>413-R</td>
<td>1/2</td>
<td>13.5</td>
<td>38</td>
<td>41</td>
<td>257</td>
</tr>
<tr>
<td>420-R</td>
<td>3/4</td>
<td>20.3</td>
<td>47</td>
<td>44</td>
<td>330</td>
</tr>
<tr>
<td>427-R</td>
<td>1</td>
<td>27.5</td>
<td>56</td>
<td>46</td>
<td>400</td>
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<td>440-R</td>
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<td>40.5</td>
<td>63</td>
<td>53</td>
<td>500</td>
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<tr>
<td>454-R</td>
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<td>70</td>
<td>59</td>
<td>675</td>
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<td>3</td>
<td>83</td>
<td>70</td>
<td>72</td>
<td>760</td>
</tr>
</tbody>
</table>

30% to 40% lighter weight than standard buckets of same rated capacity

Venturi Throat for rapid discharge and thorough clean-out

Non-jamming, grout-tight, self-closing 16" diameter double-clamshell gates

Bucket frame is made to accommodate optional side discharge chute. Note opening on base ring to accommodate chute when bucket is resting on the ground. Side discharge is essential when bucket cannot be positioned directly over forms. The optional side chute is easy to install and remove.

Exclusive one-piece lifting bail design reduces obstructions in bucket top opening area, making charging operation easier and faster

Easily controlled by fast-acting bail-type operating handle

Wide variety of attachments available: Rubber accordion hoppers, steel subhoppers, automatic gate powering and underwater placing attachments.
Rubber Accordion Hoppers

These hoppers confine concrete when pouring into narrow forms and minimizes segregation due to free-fall. Attached to the bucket gate, the hopper opens and closes with the gate itself to control spillage and ensure proper flow control. When grounded, it folds under the bucket without damage. Sizes to fit all Gar-Bro buckets. See our website at WWW.GARBRO.COM for more details.

Optional 90 Degree Gate Lever

Optional modification to rotate the bucket gate lever (handle) 90 degrees to standard and allow gate operation with the gate lever directly over a wall or form. Also allows gate operation over or opposite to the optional bucket mounted side chute. Available at extra cost on all “R” and “G” series buckets. Call the factory for more details.

Optional Low Profile “Precast” Lifting Bail

Optional low profile bail, installed at extra cost and in lieu of standard lifting bail on “G” series buckets ¾ cubic yard and larger, allows direct connection of crane hook to bucket for hoisting without use of any intermediate lifting devices (such as an anchor shackle). Low profile design further reduces bucket suspended height on the crane. Call the factory for more details.

Optional Fork Pockets

Optional fork pockets installed on almost any Gar-Bro bucket will allow use of a forklift to safely move the bucket. Available at extra cost in many sizes and locations to suit almost any application. Call the factory for more details.

Optional Extension Collars

Available in 1/4 and 1/2 cubic yard sizes. Call the factory for more details.

“G” Series Specifications

Optional modification to rotate the bucket gate lever (handle) 90 degrees to standard and allow gate operation with the gate lever directly over a wall or form. Also allows gate operation over or opposite to the optional bucket mounted side chute. Available at extra cost on all “R” and “G” series buckets. Call the factory for more details.

Round Specifications

Available in 1/4 and 1/2 cubic yard sizes. Call the factory for more details.

Gar-Bro Manufacturing Company
P.O. Drawer 1077 • 104 Bolton Sullivan Drive • Heber Springs, Arkansas 72543-1077
Phone: (501) 362-8171 • Internet Address: http://www.garbro.com • E-Mail: GARBROCO@GARBRO.COM
Orders Toll Free Number: (800) 643-8192 • 24 HR Toll Free Fax: (888) 643-8192 • Fax: (501) 362-7123

MAY 2010 MOD
NOTE:
RADIUS ARMS AND GATE PLATES MAY BE ORDERED SEPARATELY USING CORRESPONDING PART NUMBERS AS SHOWN. HOWEVER, IT IS RECOMMENDED THAT THE "GATE PLATE ASSEMBLY" REF A, BE ORDERED. THE "GATE PLATE ASSEMBLY" IS FURNISHED COMPLETE WITH RADIUS ARMS ATTACHED AT EACH END TWO GATE PLATE ASSEMBLIES ARE REQUIRED PER GATE.

WHEN ORDERING PARTS, SPECIFY:
1. THIS DRAWING NO: 77-46
2. PART NUMBER
3. QUANTITY
4. DESCRIPTION

PARTS LIST
"R" SERIES
LIGHTWEIGHT ROUND-GATE BUCKETS
STANDARD 16" DIAMETER GATE

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<td>&quot;A&quot; LEG ASSEMBLY</td>
<td>0114</td>
<td>GATE LEVER BOLT</td>
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<td>A1018</td>
<td>&quot;V&quot; LEG ASSEMBLY</td>
<td>0118</td>
<td>GATE SPRING BOLT</td>
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<td>C2022</td>
<td>RING SECTOR, PIPE</td>
<td>0154</td>
<td>GATE LEVER SPINDLE</td>
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<td>COMPLETE FRAME</td>
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<td>RADIUS ARM, 5 TEETH</td>
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<td>R GATE COMPLETE</td>
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<td></td>
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<td>3283</td>
<td>THREAD LOCKING CMPD</td>
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1. INCLUDED IN PN 3002 REPAIR KIT

GAR-BRO MANUFACTURING CO.
HIGHWAY 110 EAST P.O DRAWER 1077
HEBER SPRINGS, ARKANSAS 72543-1077

PARTS LIST
"R" SERIES
LIGHTWEIGHT ROUND-GATE BUCKETS
STANDARD 16" DIAMETER GATE

SCALE: NONE
DATE: 10-24-95
REVISED: 6-25-02
MADE BY: DCG
CHANGED TO/FROM
SUPERSEDES: 77-46
DRAWING NO. 77-46
SHOP NO. PARTS

A OF
CAR-BRO MANUFACTURING CO.
104 BOLTON SULLIVAN DRIVE P.O DRAWER 1077
HEBER SPRINGS, ARKANSAS - 72633-1077

"R" SERIES - ROUND GATE LIGHTWEIGHT BUCKET

SPECIFICATIONS

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<tbody>
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<td>34</td>
<td>42</td>
<td>43 1/4</td>
<td>36</td>
<td>38</td>
<td>3</td>
<td>1 1/4</td>
<td>237</td>
</tr>
<tr>
<td>413-R</td>
<td>1/2</td>
<td>41</td>
<td>50</td>
<td>51 1/4</td>
<td>36</td>
<td>38</td>
<td>3</td>
<td>1 1/4</td>
<td>257</td>
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<tr>
<td>420-R</td>
<td>3/4</td>
<td>45</td>
<td>65</td>
<td>56 1/4</td>
<td>45</td>
<td>47</td>
<td>4 1/2</td>
<td>1 1/4</td>
<td>330</td>
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<td>60</td>
<td>61 1/2</td>
<td>54</td>
<td>56</td>
<td>8</td>
<td>1 1/2</td>
<td>400</td>
</tr>
<tr>
<td>440-R</td>
<td>1 1/2</td>
<td>53</td>
<td>68</td>
<td>69 1/2</td>
<td>60</td>
<td>63</td>
<td>8 1/2</td>
<td>1 1/2</td>
<td>500</td>
</tr>
<tr>
<td>454-R</td>
<td>2</td>
<td>59</td>
<td>73</td>
<td>75</td>
<td>66</td>
<td>70</td>
<td>7 1/2</td>
<td>2.0</td>
<td>675</td>
</tr>
<tr>
<td>483-R</td>
<td>3</td>
<td>72</td>
<td>87</td>
<td>89</td>
<td>68</td>
<td>70</td>
<td>9 1/2</td>
<td>2.0</td>
<td>760</td>
</tr>
</tbody>
</table>
APPENDIX E

Pipe Pile Seals
Footing Precast Panel Annual Seal around Piles

Section A-A
NOTE:
48" PILE = 49.5" I.D. + 20" FLANGE
72" PILE = 73.5" I.D. + 15" FLANGE

47" or 71" I.D.

1' - 11" or 0' - 0 1/4"

SEE TABLE IN NOTE

49.5" or 73.5" I.D. @ TUBE

MONOTUBE FIBERGLASS JACKET,
1/4" WALL THICKNESS

FIVE STAR MARINE
500 Commerce Drive
Fairfield, CT. 06825
203.336.7919
www.5Star-Marine.com

New York State
Thruway Authority
TAPPAN ZEE BRIDGE:
HUDSON RIVER CROSSING

47" & 71" MONOTUBE JACKET WITH NEOPRENE CONNECTION, OPTION 2

AL Project # 051 REVISITED
Date 10.08.13
Customer Approval:

Drawn by ASL