

Highway & Airport
Paving Equipment

Concrete Batching
& Mixing Plants

**Canal Construction
Equipment**

Trenching
Equipment



Canal Paving Equipment

Trimmers, Liners, and Finish & Cure Jumbos



Introduction



GUNTERT & ZIMMERMAN HAS BEEN THE MOST TRUSTED NAME IN MECHANIZED CANAL EQUIPMENT SINCE 1947.

No two canals are alike. Canals can range in size from small concrete lined irrigation ditches to massive main canals where the top width is as wide as a football field. Consequently, canal equipment is custom designed to fit your present and anticipated future needs.

Where there are long lengths of canals to be built or where there will be an ongoing program of canal construction in your market area, high production, mechanized canal equipment make economic sense for the following reasons:

- Minimize costly concrete losses
- Insure the quality of the concrete lining and the integrity of the subgrade under the lining
- Reduce the number of people required to build the canal.
- Dramatically reduce the time required to trim and concrete line the canal as compared to any other method.

Once it is determined that mechanized canal construction machinery makes sense for your project, the project

constraints will dictate what type of specialized canal equipment should be selected and the best method of concrete feed and trimmer spoils disposal. Consideration must be given to the following:

- The maximum concrete production rate and number of concrete delivery trucks available
- The type of soil to be encountered along the canal alignment and whether it is suitable for trimming or if it must be over-excavated, backfilled, and compacted prior to trimming and lining.
- The available room next to the canal available for the canal equipment as well as trimmer spoils and concrete delivery trucks

Guntert and Zimmerman has been providing mechanized canal construction equipment solutions to contractors since 1947. This brochure is intended to illustrate the many mechanized canal construction options that G&Z can make available for your project.



G&Z History

tG&Z pioneered the use of mechanized canal construction equipment by supplying their first set of canal machines in 1947. These early canal machines that travelled on rails were invented by Clyde Wood who was a contractor in California. L.R. Zimmerman, one of the founders of G&Z, was Wood's head equipment man and a master mechanic / self-taught engineer. Zimmerman was responsible for building these first prototype canal machines conceptualized by Wood in the late 1930s.

Beginning in 1956, G&Z pioneered the use of canal trimming and lining equipment mounted on crawler tracks equipped with automatic line and grade control. G&Z also pioneered sectionalizing the machine frames to allow them to be reconfigured to fit a wide variety of canal sizes. The equipment is designed so it can be reconfigured to build smaller canals in a single pass and larger canals in two or more passes. It can also be converted for use on highway and airfield paving. These features have kept G&Z canal equipment owners in an enviable competitive bidding position for decades. There are several cases around the world where G&Z canal equipment built in the early 1970s is still in use today.

In regions of the world that rely heavily on irrigation for their water needs such as the southwestern United States, Southern Europe, the Middle East, and Southern Africa, G&Z canal equipment has been used to construct more than 70% of the existing concrete lined canals.



Rail mounted G&Z Canal Trimmer (top of page) and Canal Liner (above) (1947) working on the Delta Mendota Canal Project in California, USA.



G&Z Canal Liner traveling on rails paving a canal bottom in Los Angeles, CA USA (1957).



A G&Z Trapezoidal Trencher working in Peru (1957).

G&Z Capabilities



Contractors worldwide depend on G&Z to tackle complex canal equipment challenges. G&Z's in house canal construction experts are available to work with your team during the design or bidding stages of a project to advise on feasibility of the proposed canal design and to suggest changes to better lend the canal design to mechanization. With your complete information on the canal project scope and cross sections, G&Z can provide estimated costs and production rates on complete mechanized canal construction equipment solutions.

G&Z's worldwide experience, multi-disciplined engineering staff and factory flexibility ensures the highest quality custom machinery. Once the canal equipment is completed, G&Z's experienced service team is available to commission your equipment in the field and train your people in the proper maintenance and operation of the equipment as well as how to achieve the highest and best use.

In 1996, G&Z was hired by a consortium of international contractors to design and build a set of canal construction machines for the huge Ghazi Barotha Power Channel Project on the Indus River in Northwestern Pakistan. The power channel was over 104m (341 ft.) across the top and 11m (36 ft.) deep. The project was made even more challenging because there was a structure almost every kilometer along the 52 km (31 mile) long power channel. This equipment was the largest of its kind built anywhere in the world and because of its size and the number of structures each piece was designed to be self-moving.

Half Span Canal equipment spread operating in the Ghazi Barotha Power Channel in North Western Pakistan.

G&Z Canal Liner being fed concrete by an agitator in North Western Pakistan.



Each of these custom pieces of the equipment borrowed heavily on G&Z's extensive canal construction experience and technology and required many innovative new ideas to achieve the design goals. This project won the Engineering News Record (ENR) Top Project Designation in December 1999. G&Z offers a full range of canal excavators/trimmers, liners and finishing / curing jumbos.



Large Canal Equipment

Generally large canals cover everything from large power channels and main canals to small distributary and secondary canals that run as small as approx. 2.5m (8 ft.) deep and 2.5m (8 ft.) bottom width. Depending on the size of the canal, the canal can be trimmed and lined in a single pass (Full Span) or in one or more passes (Half Span or a combination of Half Span and Flat Configuration). Whether a canal should be paved Full Span or Half Span depends on many factors such as canal bottom width, ground conditions, schedule, embankment width available at the top of the canal, etc. G&Z can help guide you on the best way to build the canal depending on your jobsite situation.

Depending on your maximum present and future maximum anticipated canal sizes, the canal equipment power requirements, frame size and undercarriage components are specified and selected. Versatility is incorporated in all G&Z canal equipment designs to allow the equipment to be reconfigured to fit a wide variety of canal sections you may encounter in the future.

There are several major reasons why G&Z Canal Construction Equipment is so highly versatile, reliable and capable of producing high quality trimmed surfaces and concrete linings at the lowest cost per square yard (meter) even after many years of use:

- G&Z's proven canal trimming and lining technology such as the bucket line and concrete conveying system designs have been time tested under a wide variety of configurations and adverse field conditions over many decades.
- G&Z's canal equipment uses the same state of the art elevation and alignment control systems used on G&Z's world famous highway and airfield paving equipment which requires very exacting tolerances.
- G&Z canal equipment utilizes proven components from G&Z's broad range of popular highway, airfield paving, and trenching equipment such as power units, hydraulic circuits, jacking columns, crawler tracks and operator controls.



Canal Trimmer

The G&Z canal trimmer is available in a two, three, or four track configuration. The hydraulic jacking columns, crawler tracks, truss frame, power unit, and conveyor widths can be designed and sized to handle a wide range of canal sizes and / or target production rates in keeping with the type of soils to be encountered and to stay ahead of the concrete lining operation.

Since 1947, G&Z has built both bucketline and auger trimmers. Through this long experience, G&Z has determined that the bucketline system, although initially more expensive to purchase, is the least costly to operate, can handle a wider variety of soil conditions, and allows the trimmer to be reconfigured for almost any conceivable canal cross section. Thus the trimmer can be reconfigured to handle trapezoidal shaped canals in the half span and full span or varying slope angles or flat configuration as well as parabolic and half round canal cross sections. So no matter what canal you run into in the future your trimmer can be reconfigured to handle it.

The other key feature of a G&Z bucketline trimmer and why it is the most efficient / productive trimming system in the world is that once the material is trimmed, it is carried to the top of the canal and deposited directly onto a conveying system. This conveying system can be designed to handle any number of canal construction scenarios:

- Depositing the trimmer spoils in a windrow away from the side of the canal that can be used for fill to avoid rehandling.
- Depositing the trimmer spoils directly into hauling trucks to haul away from cuts and to avoid rehandling.
- Depositing the trimmer spoils into other conveyors to discharge spoils on the opposite side of the canal or further away from the edge of the canal.

Consult with the Guntert & Zimmerman factory about your project's specific challenges.

Trimming Applications



Configuration	Full Span—1 1/2:1 Slope
Location	Southern California, USA
Project	Coachella Canal



Configuration	Half Span—2:1 Slope
Location	Pakistan
Project	Ghazi Barotha Power Channel



Configuration	Parabolic
Location	Spain
Project	Fuensenta Canal



Configuration	Half Round
Location	Spain
Project	Unknown



Configuration	Half Span—1 1/2:1 Slope
Location	Tucson, Arizona, USA
Project	Tuscon Aqueduct



Configuration	Flat Configuration
Location	Pakistan
Project	Ghazi Barotha Power Channel

Trimmer Features



▲ Buckets shown trimming up the slope. An average of 9" (228mm) on the canal slope and 6" (150mm) on the bottom should be left for the trimmer to remove with no high spots over 18" (457mm).

Individual buckets are supported at all four corners by time tested bucket support roller design that runs in the trimmer frame track. Replaceable digging teeth are found on the front of the bucket and adjustable smoothing cutting edge on the rear.

▼



Continuous bucketline system depositing trimmed material directly on to a conveyor system located at the top of the canal.

Different conveyor system configurations / schemes may be employed to put trimmed material where you want it the first time.

▼



▲ The trimmer is provided with an adjustable moldboard with reversible and adjustable cutting edge to help leave a clean, trimmed surface and to minimize hand shoveling prior to concrete lining.



▲ Proven and durable crawler track rail / chain is used to connect the buckets into a continuous bucketline. For higher production rates more buckets can easily added. The continuous bucketline design allows the trimmer to be reconfigured for different canal sections and slopes.

Canal Liner

The ingenuity and success of the G&Z Canal Liner over the years is its ability to be adapted to a wide variety of concrete paving and base laying applications. This versatile machine can be used for reservoir lining, large and small canals, power channels, drainage canals, highways and airfield paving, and even concrete racetracks.

The Liner is available in a two, three, or four track configuration. The hydraulic jacking columns, crawler tracks, truss frame with slipform pan, power unit, and conveyor widths can be designed and sized to handle a wide range of canal sizes and / or target concrete or base production rates.

Concrete can be distributed along the front of the liner in a number of ways. Historically, G&Z has used concrete dump skips, drag chains, and wiper conveyors. The best method is typically determined by your intended concrete production rate or intended type of hauling trucks. Concrete production rates from 60 to 600 cyh (45 to 470m³/hr) are achievable with the limitation typically being:

- Concrete plant's practical productive output
- Type and number of concrete delivery trucks
- Joint forming and the concrete finishing operation.

Of all the different means of distributing concrete, experience has shown that the most flexible and productive of the different solutions is the wiper conveyor especially on canals with long slopes.

To keep the concrete or base material on the slopes, the Liner is provided with a liquification hopper located just ahead of the slipform pan. The hopper is divided into compartments approximately 36" (1M) wide. The concrete (or in some cases base) in the hopper is vibrated by a high frequency vibrating bar or individual poker vibrators located along the front of the slipform pan.

Consult with the Guntert & Zimmerman factory about your project's specific challenges.



Lining Applications



Configuration	Full Span—1 1/2:1 Slope
Location	Southern California, USA
Project	Coachella Canal



Configuration	Half Span—2:1 Slope
Location	Pakistan
Project	Ghazi Barotha Power Channel



Configuration	Parabolic
Location	Spain
Project	Fuensenta Canal



Configuration	Full Span—1:1 Slope
Location	Spain
Project	Unknown



Configuration	Half Span—Variable Slope
Location	Germany
Project	Isar Canal



Configuration	Flat Configuration
Location	Pakistan
Project	Ghazi Barotha Power Channel

Special Lining Applications



Special Application	Relining with Compactor Beams
Configuration	Full Span—1 1/2:1 Slope
Location	Algeria
Project	Mina Project



Special Application	Slope Lining in Two Passes
Configuration	Half Span—4.5:1 Slope
Location	Southern California USA
Project	Quail Canal



Special Application	Gravel Blanket Lining
Configuration	Half Span—2:1 Slope
Location	Oroville, California USA
Project	Oroville Dam



Special Application	Placing Select Backfill
Configuration	Half Span—2 1/2:1 Slope
Location	Kirkuk, Iraq
Project	Kirkuk Dam Canal



Special Application	Concrete Lining Old Canal
Configuration	Half Span—Variable Slope
Location	Germany
Project	Isar Canal



Special Application	Racetrack Base Laying
Configuration	Slope Liner
Location	Nashville, Tennessee USA
Project	Nashville International Speedway

Liner Features



Concrete Belt with Wiper Car

G&Z's concrete distributing belt system with wiper car and winch allows the liner operator to put the concrete precisely where it is needed along the liner periphery. This conveyor can be reconfigured for flat configurations. With modification, the conveyor system can also be converted to a full span configuration.



Concrete Liquification Hopper

The liquification hopper is mounted off the front of the Liner slipform pan. Baffles are provided on approx. 36" (1M) centers to keep the concrete from running down the slope. The liquification hopper is arranged for good visibility and so it allows the operator uniformly run out of concrete at the end of the day.



Concrete Vibration

Although a tube vibrators can work effectively, individual high frequency poker vibrators are the preferred vibration solution. One poker vibrator is provided in each liquification hopper compartment between baffles.



Transverse and Longitudinal Joint Cutting

The rear of the Liner is equipped with a rear access walkway and as an option a "guillotine" for cutting transverse contraction joints in the concrete lining. To form the longitudinal contraction joint the Liner can be equipped with "keel bars" which mount to the underside of the slipform pan. Hand finishing of the joint is required.

Liner Material Feeding Schemes



Two trucks discharge in a wiper conveyor.



Single truck discharging into a concrete distributing car.



Agitator truck discharging into a charging conveyor.



Semi Belly Dump Trailer discharging into a crawler track mounted Drive Over Unloader.



Tandem Belly Dump Trailers discharging from a crawler track mounted Drive Over Unloader.



Semi-end Dump Trailer feeding a Concrete Placer.

Liner Accessories



Subgrade guidance ski for elevation and steering control.



Self-propelled / self-moving auxiliary downhill feed conveyor to convey concrete into the canal bottom.



Automatic longitudinal joint inserters for inserting PVC cruciform shaped water stop (blue material on reels).



Back spreading device so bottom crawler track does not need to walk on the previously poured lining.



Night lighting system illuminates not only the G&Z Canal Liner but much of the surrounding area.



Hydraulically controlled curb forming module is available in any curb configuration needed.

Canal Finish & Cure Jumbo



As long as Canal lining has been around, there has been a need for a separate workbridge (or Jumbo) for finishing concrete and applying curing compound on the concrete surface. In addition to this, separate Jumbos are used for inserting preformed PVC transverse contraction joints and to assist in laying prefabricated reinforcing steel mats.

Although Jumbos are available with rubber tires, they are typically furnished with two, three, or four crawler tracks. Jumbos typically are not required to have automatic elevation control, but manual hydraulic jacking columns are available to help maintain the working platform or cure spray hood at a fixed height above the canal lining and to adjust for varying canal depths.

The crawler tracks, truss frame, and power unit are designed and sized to match your minimum and maximum anticipated canal cross sections. The Jumbo frame and access walkway / stairs easily reconfigure to full span, half span of varying slope angles, or flat configuration and can be adapted to parabolic and half round canal sections.

G&Z provides a heavy duty truss frame to handle repeated moving and handling of the Jumbo over its life. G&Z also provides a wide access walkway, typically off the front and rear of the Jumbo truss frame for workers to easily and safely access the concrete surface for hand finishing and applying cure to the concrete surface

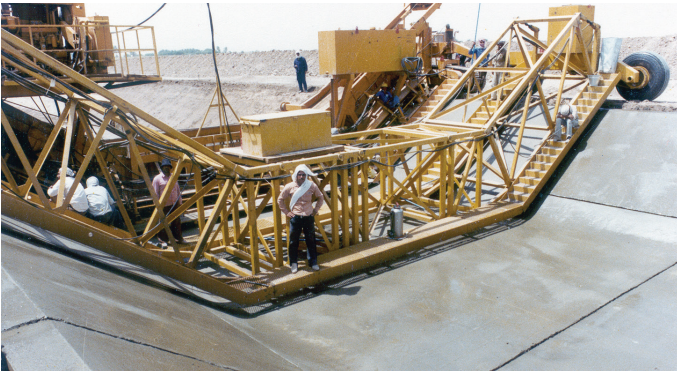
In most cases, only one Jumbo is required behind the concrete Liner. Concrete finishing is done off the front of the Jumbo and application of curing compound is done off the rear.

In high production concrete lining operations, a separate curing jumbo is required in order to keep up with the lining operation. In high production, unreinforced concrete lining operations, automation of the transverse jointing operation is also required to keep up with the concrete lining operation.

Consult with the Guntert & Zimmerman factory about your project's specific challenges.



Finisher & Cure Jumbo Applications



Configuration	Full Span—1 1/2:1 Slope
Location	Iraq
Project	Diyala Project



Configuration	Half Span—2:1 Slope
Location	Pakistan
Project	Ghazi Barotha Power Channel



Configuration	Half Span—2:1 Slope
Location	Pakistan
Project	Ghazi Barotha Power Channel



Configuration	Half Span—1 1/2:1 Slope
Location	Tucson, AZ
Project	Tucson Aqueduct



Configuration	Half Span—Variable Slope
Location	Germany
Project	Isar Canal



Configuration	Parabolic
Location	Spain
Project	Unknown



Transverse Joint Inserter Jumbo

Over the last 40 years, G&Z has been involved in working with contractors on the development and improvement of the techniques used today for high production installation of both preformed, cruciform shaped PVC transverse and longitudinal waterstops.

On large, high production, non-reinforced concrete lining projects, the Transverse Joint Inserter Jumbo makes economic sense to automate the transverse jointing and finishing operation for several reasons:

- The joint forming operation in the plastic concrete and subsequent finishing operation become the constraint in the Liner's forward progress
- Due to the difficulty in controlling the transverse joint cross section during forming operation in the plastic concrete, joint sealant losses become high.
- Modern, preformed, polyvinyl chloride (PVC) transverse joint material (combination crack inducer / waterstop) have performed exceedingly well over many decades in preventing canal water seepage.

Transverse Joint Inserter Jumbos (TJIJ) include a vibrating transverse joint inserter mechanism (mounted on the front) and a separate roller finisher tube (clay finisher) mechanism (mounted on the rear) to finish over the top of the inserted transverse joint. In the half span and flat configuration, one joint inserter and one clay finisher mechanism is required. In the full span configuration, one joint inserter mechanism and one clay finishing mechanism is required for each slope.

Transverse Joint Inserter Jumbos are typically furnished with two or four crawler tracks. The TJIJ requires manual hydraulic jacking columns to help maintain the inserter and clay mechanism at a fixed height above the concrete surface and to accommodate canals which vary in depth. A TJIJ can be designed and built for just about any size canal.

Consult with the Guntert & Zimmerman factory about your project's specific challenges.

Transverse Joint Inserter Jumbo

Half Span

Joint inserter cart vibrates the PVC joint material into the concrete lining while traveling up the slope.

The Clary Mechanism finishes the concrete over the transverse joint at the rear of the jumbo



Full Span



In a full span lining operation, one inserter cart mechanism is required on each slope for inserting PVC joint material. Joint material must be inserted up the slope.

One Clary Finishing Mechanism is required for each joint inserter in a full span lining operation.

Moving Considerations



If your project has numerous structures or siphons which require large mobile cranes to be present, moving canal machines with these cranes is the quickest method and requires less hand paving and special earth works for moving compared with canal machines equipped with self-moving features.

Other considerations in the crane vs. self-moving equipment debate is the width of the canal bottom and whether you are working full span or half span, the size of the equipment and whether the canal section is in cut or fill. Consult with Guntert & Zimmerman on your application.

Crane Applications



Full Span Trimmer being lifted by a 250T crawler track mounted crane around a structure.



Two large cranes moving a full span canal liner over a structure in the canal alignment.



Special heavy load trailer modified for moving trimmer and liner long distances.



Trimmer is built in module fashion so components can be removed to reduce the weight of the trimmer and liner for lifting and transport in keeping with the available cranes and trailers available.

Self-Moving Applications

Depending on the canal configuration, an experienced crew can relocate the entire spread of canal equipment with self-moving features from one side of the canal to the other in less than one shift needing only a small crane to remove relatively light weight attachments such as the Trimmer stacker conveyor and the Liner charging conveyor. Consultation with the canal experts at G&Z will help you determine which method of moving is most suitable for your present and future needs.



Half Span Liner walking up the slope under its own power.



Approximately 12m (39 ft) of room must be left on either side of a structure for the canal equipment to walk up or down the slope.



Half Span Liner in the canal bottom after counter-rotation. Patented Anti-torsion control protects the Liner latticework frame for potentially destructive torsional forces while walking over uneven ground.



Half Span Liner in 90 degree steering mode walking and steering along the canal bottom passing a structure under construction.



Half Span Trimmer walking up the slope under its own power if traction is available. In soft ground conditions a dozer may be required to assist.



Half Span Trimmer walking and steering in along the canal bottom in the 90 degree steering mode under its own power.

Small Canal Equipment



Generally, small canals cover everything from concrete lined irrigation ditches with bottom widths (BW) as narrow as 30cm (12 in.) up to branch / distributary or even small main canals up to a maximum size of approximately 2.43m (8 ft.) deep and 2.0m (7 ft.) bottom width. Typically canals of this size range are built on a prepared and compacted fill (berm) built with conventional earth moving equipment. Canals of this size are built full section / span in a single pass and typically have side slopes of 1:1, 1 ¼:1 and 1 ½:1.



Small canal cross sections are excavated / trimmed in one of three ways:

- Using a conventional excavator / backhoe with a trapezoidal bucket matching the canal cross section and carefully digging the canal cross section with laser guidance. The fine grading is done by a digging chain attachment to the front of the concrete lining machine. This is a low production solution.
- The most efficient / high production means to excavate and trim a canal cross section is by using a special trapezoidal trencher where the canal cross section can be excavated and trimmed in a single pass.
- On the upper end of the small canal sizes it may be possible to use a bucketline trimmer configured into a small cross section.



Small canals up to 1.2m (4 ft. deep) are machine lined using one of two means:

- A subgrade guided, “towed boat” concrete liner: Generally the smaller “towed boats” are towed by a grader or front end loader required on the site anyway. They are light enough that they can be easily moved and quickly lifted out of the canal using towing equipment such as a front end loader. No automatic line or grade control is required as the towed boat is subgrade guided.
- A small self-propelled canal liner equipped with a canal mold: Depending on the canal size the liner will either be mounted on three or four crawler tracks. The separate canal mold is typically removed for moving and transport. It is also equipped with an automatic line and grade control system in reference to a single grade wire. A single charge conveyor is used to feed concrete to the concrete mold.

Small canals ranging 1.2m to 2.4m (4 ft. to 8 ft.) deep are machine lined using one of two means:

- A subgrade guided, “towed boat” concrete liner: Generally the larger “towed boats” have their own power unit and winch rather than being towed by a grader or front end loader. Larger towed boats are heavy enough where a crane is needed to lift it out of the canal and around structures. A larger towed boat liner is typically supplied with a concrete distribution system including a charging conveyor to evenly distribute concrete across the front of the machine.
- A larger self-propelled canal liner: This full span canal liner is mounted on either two crawler tracks or four. It is also equipped with an automatic line and grade control system in reference to a single grade wire. A larger canal liner is typically supplied with a concrete distribution system including a charging conveyor to evenly distribute concrete across the front of the liner.





Trapezoidal Trenchers

G&Z built its first trapezoidal trencher more than 60 years ago and from trial and error determined that trapezoidal trenchers are the most suitable equipment for excavating and trimming smaller canals and will build them in the most efficient and productive manner.

Trapezoidal trenchers work on a prepared and compacted earthen fill or embankment. The G&Z Trapezoidal Trencher excavates and trims the specified cross section in a single pass behind its two crawler tracks. The advantage of having this combination excavator and trimmer is that you eliminate the need to use a conventional excavator for the initial rough excavation in preparation for trimming. The rate at which it can progress forward is limited by the canal cross section to be removed, the horsepower on the digging wheel, and the toughness of the soil. Based on your soil conditions, your maximum canal cross section, and your intended forward

production rates, the trencher's engine, undercarriage components, and drives are sized accordingly.

To vary the canal cross section cut by the Trapezoidal Trencher, spacers can be added or removed from the crumbshoe or the moldboard, buckets, and rotaries changed.

In tangent sections, the Trapezoidal Trencher can take its grade and alignment reference off a single string line or from a laser reference. In limited radius curves, string line must be used.

Consult with the Guntert & Zimmerman factory about your project's specific challenges.

Trapezoidal Trencher Applications



Configuration	Full Section — 1:1 Slope
Location	Southern California USA
Project	Imperial Valley



Configuration	Full Section — 1:1 Slope
Location	Southern California USA
Project	Imperial Valley



Configuration	Full Section — 1 1/2:1 Slope
Location	Iraq
Project	Suwaira Project



Configuration	Full Section — 1 1/2:1 Slope
Location	Iraq
Project	Suwaira Project



Configuration	Full Section — 1 1/2:1 Slope
Location	Southern California USA
Project	Unknown



Configuration	Full Section — 1:1 Slope
Location	Southern California USA
Project	Unknown



Towed Boat Liner

As a low cost and practical option for concrete lining watercourse size canals a Subgrade Guided Towed Boat Liner can be used. The towed boat takes its grade and alignment (steering) reference from the trimmed canal subgrade prepared by trapezoidal trencher. Because the towed boat traces the trimmed grade a towed boat liner is very effective for keeping concrete losses to the absolute minimum.

Small Towed Boat Liners for canals under approximately 1.1m (42") deep are typically towed by a front end loader or motor grader. They are small and light enough to be lifted by a boom truck crane or a front end loader in and out of the canal. Generally, the higher concrete slump used on canals does not require vibration; however, if vibration is required a separate power unit can be provided on the towed boat liner. On a smaller towed boat liner, a concrete distribution system is not required. Ideally on one side of the canal, the embankment / fill should be wide enough for truck mixers to pass the towed boat and discharge directly into its hopper.

Larger Towed Boat Liners for canals ranging 1.1m (42") to 2.13m (7 ft.) deep require a diesel engine powered, cable winch which is mounted low and in the front of the towed boat liner to supply the towing power required to move

the unit. A 'dead man' needs to be supplied (typically a tractor or front end loader required on site) for the winch to pull against. The diesel power unit is also required for the concrete distribution system on larger towed boats. And like the smaller towed boat, if vibration is required the power unit supplies power for the vibrators.

If the embankment is too small for the concrete trucks to discharge concrete directly into the hopper of the towed boat then an optional concrete charging conveyor can be supplied to deliver the concrete to the towed boat.



Self Propelled Canal Liner



G&Z offers full span Canal Liners for small canals such as watercourses, distributary, and small main canals. These liners are made of the same proven components as G&Z's highway and airport slipform paver models. A tractor includes the main structure or tractor frame (sometimes telescopic), the supporting end bolsters, power unit and controls, jacking columns, and two or four crawler tracks.

The Canal Liner comes equipped with vibration either by tube vibrators or as an option poker vibrators and a concrete distribution system. For larger sized small canals a charging conveyor along with a drag chain or wiper conveyor is used to evenly distribute concrete across the front of the liner in the liquification hopper. These small liners can be fed with either truck mixers or if a concrete placer is used by end dump trucks.

To vary the canal cross sections you encounter on your project, the small Canal Liners are arranged so they may be resectionalized to adjust for changing canal bottom widths (BW), depths (D) and slopes. The canal mold includes a liquification hopper with baffles off the front to help hold the concrete on the slope, vibration, the slipform frame /

pan and a walkway off the rear with or without an optional transverse joint cutter ("guillotine").

The Canal Liners can either take its grade and alignment reference off the trimmed subgrade or off a single stringline to minimize concrete losses; however, the concrete losses using a Canal Liner will be greater than if a subgrade guided towed boat was used.

These smaller canal machines can be arranged to be self-moving e.g. so they do not require a crane to move around obstructions in the canal. The self-moving feature is important because these highly productive machines can do a kilometer of small canal in a day and if they cannot be moved quickly, one could spend more days moving the equipment than working. Consult with the G&Z factory on different options available to reduce you moving time and increase your canal lining time.

Consult with the Guntert & Zimmerman factory about your project's specific challenges.

Small Canal Liner Applications



Configuration	Full Span—1 1/2:1 Slope
Location	Iraq
Project	Suwaira Project



Configuration	Full Span—1 1/2:1 Slope
Location	Iraq
Project	Suwaira Project



Configuration	Full Span—1 1/2:1 Slope
Location	Iraq
Project	K-2 Khalis Project



Configuration	Full Span—1 1/2:1 Slope
Location	Iraq
Project	K-2 Khalis Project



Configuration	Full Span—1 1/2:1 Slope
Location	Algiers, Africa
Project	Mina Canal



Configuration	Full Span—1 1/2:1 Slope
Location	Algiers, Africa
Project	Mina Canal

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