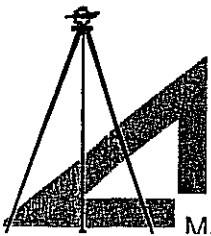


SITE OBSERVATIONS
AND
PRELIMINARY REPORT
FOR THE

**LAKE OF THE OAKS COMMUNITY
DAM SPILLWAY AND BRIDGE REVIEW**

**MECO PROJECT NO. 101-974
AUGUST 2006**



OWNER'S COPY

MECO ENGINEERING COMPANY, INC.
ENGINEERS - SURVEYORS

3120 HIGHWAY W
HANNIBAL, MO 63401

573-221-4048

**LAKE OF THE OAKS DAM SPILLWAY AND BRIDGE
PRELIMINARY OBSERVATIONS AND REPORT
AUGUST 2006**

INITIAL SCOPE OF WORK

Introduction:

An initial informational meeting was held at the offices of MECO Engineering Company, Inc. on Thursday, June 22, 2006 at approximately 10:00 A.M. in the conference room to determine the scope of the project. Those in attendance were: Hume Cale, Lake of the Oaks representative of the Lake of the Oaks Community, Max Middendorf P.E. and Lyn Heying R.G., both of MECO Engineering Company.

Mr. Cale discussed the problems the community had observed at the spillway location on the west abutment of the dam. The focus of the discussion was the condition of the dam spillway only. Mr. Cale reviewed several photographs he had taken of the spillway and the overturning walls of the spillway. The overturning of the spillway walls appeared to be approximately 8" to 9" – inches from the vertical, with significant cracking of the concrete through the entire wall sections. Also, spillway floor cracking was observed in the photographs presented by Mr. Cale.

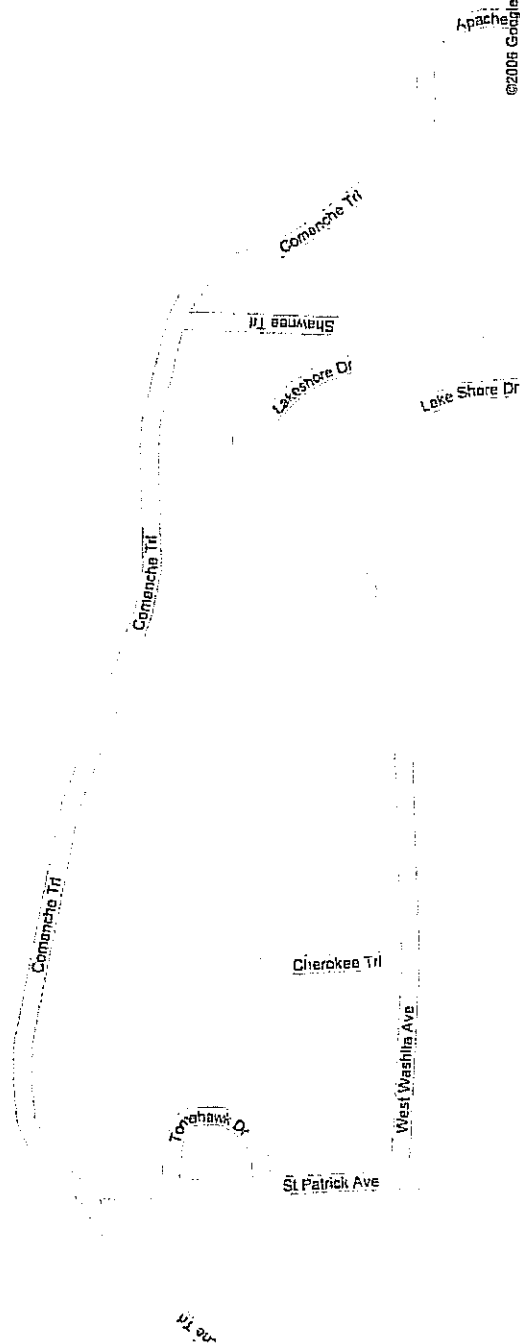
It was agreed by the parties in attendance that at least one on-site observation trip would be necessary to document general field conditions at the spillway location. Mr. Cale asked MECO Engineering Company, Inc. to submit a contract to the Lake of the Oaks Trustee Board to perform the necessary field trip observations as determined by the engineers. The lump sum of the authorization agreement was not to exceed \$1,500.00. The scope of the work is as follows: To perform preliminary inspections of the Lake of the Oaks (dam) spillway in Clark County, Missouri which includes visually observing the dam spillway, review background information, and present recommendations in a letter report to the Lake of the Oaks Community Association Board.

Due to some of the structural issues observed in the photographs, it was recommended that James D. Bensman, P.E./S.E. (MECO Engineering Professional and Structural Engineer) be briefed on the existing conditions and an additional site visit be required to address structural engineering concerns. Since the cost of repairs was a factor, Mr. Cale stressed the need to keep overall costs to a minimum.

Site Visits:

Max Middendorf requested that, an initial site visit be made by Lyn Heying P.G (Professional Geologist). That site visit was made on Thursday, July 6, 2006 at 1:30 P.M. Mr. Heying met Mr. Cale at the spillway of the Lake of the Oaks dam site. The

Google



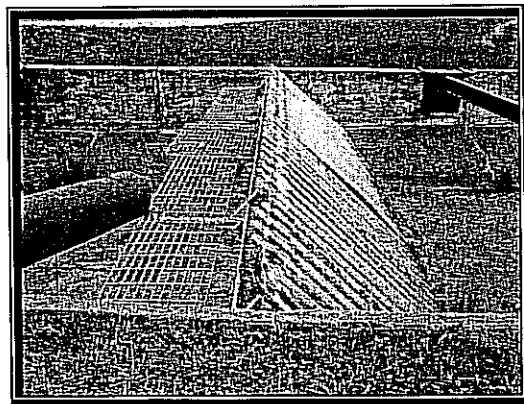
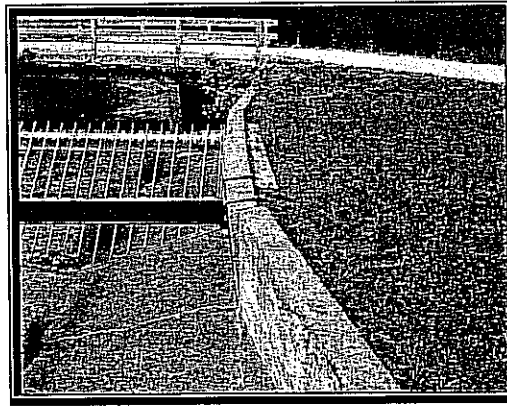
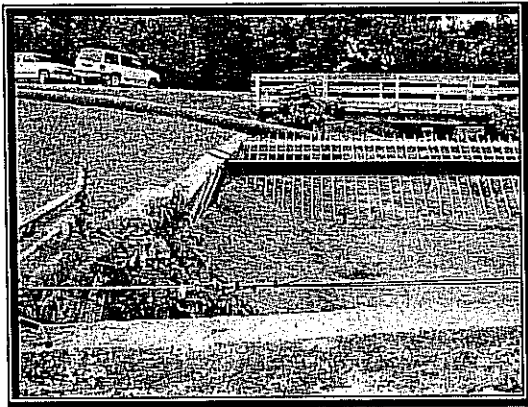
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cracking and overturning of the spillway was visually observed immediately. Before the observation begin, Mr. Lee Heinze, the President of the Board of Directors arrived on-site and was introduced by Mr. Cale. The three participants began the site inspection of the spillway.

During the site observation, additional observations were made of the existing conditions of the bridge crossing the spillway. The existing wooden bridge deck was, at one time, overlain with a poured concrete decking. It was noted that numerous bridge timbers were rotten and some were deflecting (sagging) significantly. After a cursory observation, it was determined that a more in-depth structural observation was necessary by Mr. Bensman.

Spillway Conditions, Thursday, July 6, 2006:

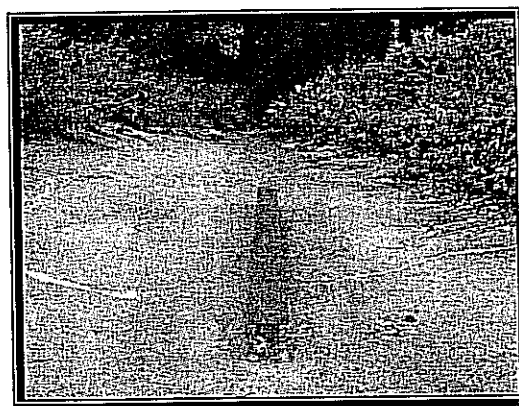
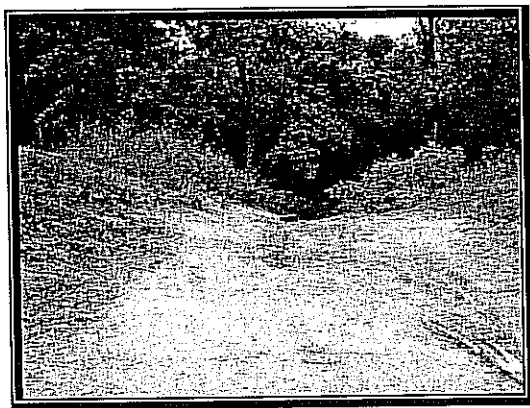
The scope of the work required a visual observation of the condition of the spillway. As indicated in Mr. Cale's photographs, the sidewalls of the spillway reflected an obvious overturning condition. It was observed that both walls were overturning approximately 8" to 9" – inches out-of-vertical. The overturning was inward toward the interior floor of the spillway, as indicated in the photographs below.



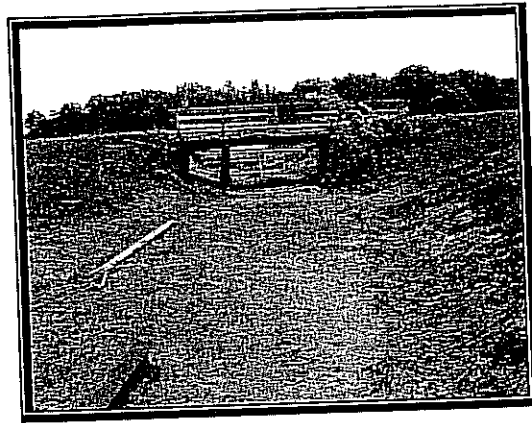
An attempt to reduce the overturning was made by the placement of a steel I-beam across the spillway structure, approximately 4-feet ahead of the spillway trash screen, as indicated in the photographs above. It was noted that somewhat regular attempts to seal the cracking of the concrete spillway had taken place in the past. However, no maintenance records were observed.

The primary overturning movements in the concrete walls appeared to be localized, between the bridge and the first vertical expansion joint, near the expansion joint inlet, on both sides of the spillway. The orientation of the photograph and the axis of the spillway are north to south. The view in the photograph is looking in a northerly direction and downstream of the reservoir. The cracking of the concrete in the floor varied from approximately slightly greater than hairline to slightly less than $\frac{3}{4}$ " - inch. The attempt to seal the cracks appeared to be successful. The primary discrepancy, which requires remedy, is the obvious overturning of the spillway walls. It is recommended that the walls be replaced soon.

The overall condition of the spillway downstream of the reservoir is characterized by moderate to heavy cracking of the floor of the spillway, some with detectable voids under the spillway slab. The testing of the spillway slab was accomplished by tapping with a carpenter's hammer to determine voids under the spillway floor slab. The observation of the spillway continued downstream and into the vegetated valley below the spillway. It was noted at the outlet, that no apparent stream scour had occurred in the past. The original constructor of the dam and spillway placed system concrete energy-dissipaters at the plunge pool of the spillway. The following photographs reflect the condition of the spillway at the time of the site visit only, July 6, 2006.



- Companion Photographs on the Next Page -



During the observation of the spillway, it was determined that spillway remediation and repair could be divided into two (2) sections: 1) The Primary Spillway Section (above the spillway bridge), and 2) The Secondary Spillway Section (below the spillway bridge). Due to budgetary constraints on the Lake of the Oaks Community, it was agreed to focus upon repairs to the Primary Spillway Section first.

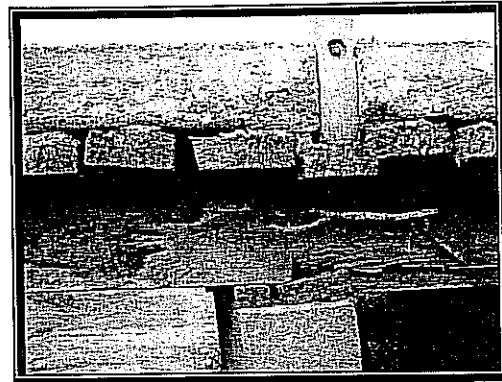
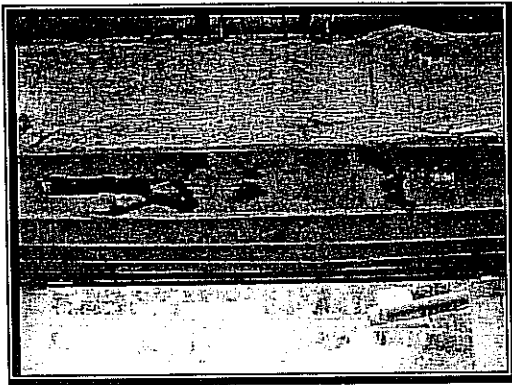
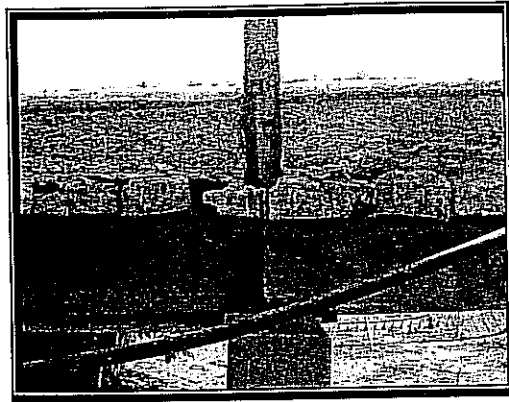
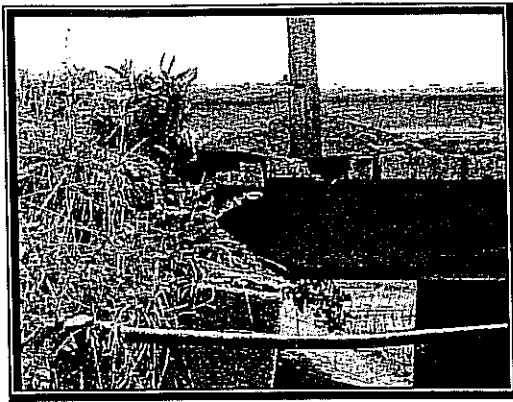
As the site observation participants were walking back upstream in the spillway, attention was directed to the existing condition of the bridge crossing the spillway. The condition of the bridge is described in the following section.

Spillway Bridge Conditions – August 1, 2006:

On Tuesday, August 1st, Mr. Bensman and Mr. Cale met at the spillway/bridge site. Other local residents stopped by during the field observations. The site observation participants observed that the spillway bridge was, at one time, an entirely wood bridge structure. However, a 6 to 8 – inch thick concrete bridge deck had been poured on top of the wood bridge structure and supporting members. The condition of the wooden supporting members reflected varying degrees of deterioration as shown in the following photographs. It was recommended to Mr. Cale and Mr. Heinze that a structural engineer inspect the bridge and that the community consider putting a 3-ton load limit on the bridge, until an evaluation is completed. Mr. Cale and Mr. Heinze agreed to allow James D. Bensman P.E./S.E. to inspect the bridge within the reported scope of work.

Although the conditions of the existing spillway bridge and the discrepancies of the bridge are illustrated in the following photographs, taken Thursday, July 6, 2006, the photographs represent the general field conditions on both dates (July 6th and August 1st) of the field inspections.

- Companion Photographs on the Next Page -

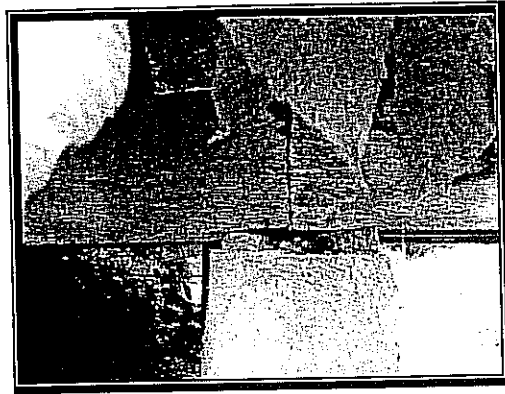


Spillway Bridge Conditions – August 1, 2006:

The bridge is a heavily deteriorated 3-span structure consisting of wood longitudinal stringers and transverse decking, and concrete abutment and intermediate pier foundations, and cast-in-place concrete slab over the wood decking. The majority of the wood elements of the bridge are heavily weathered, deteriorated, and damaged. Several stringers are damaged and appear to be incapable of adequately supporting vehicular loads.

The cast-in-place concrete deck slab appears to be in satisfactory condition, but inadequate information is known about the type, size, and location of concrete reinforcement (if any) to confirm its structural capacity or ability to perform for any defined length of time. The slab also has I-beams of unknown size embedded in it to assist with load transfer to the foundations. The I-beam end-bearing and intermediate-bearing locations appear to coincide with “blocked” concrete-filled areas that appear to transfer the beam/slab load reactions to the “blocked” areas, with the loads then transferring to the foundations.

- Companion Photographs on the Next Page -



The abutment walls, although relatively un-cracked, were observed to be leaning (the top edge deflecting/rotating) inward toward the interior of the bridge. Much of the leaning is probably attributed to movement that occurred earlier in the life of the structure, possibly before the concrete deck was placed.

The ability of the bridge to carry it's own weight and vehicular loads for any defined period of time is unknown. Due to wood deterioration in the structure, unknown composition of the concrete, and the unknown concrete-wood interaction, the integrity of the bridge is questionable. It is possible that the concrete portion of the bridge could function satisfactorily over the next few years, but hidden defects may also cause a failure(s) or distress that would limit the life of the structure. Even though the concrete structural elements/members appear to be presently performing in a satisfactory manner (most notably the intermediate piers, and to a lesser degree the abutments), further decomposition/damage/failure of the wood or other bridge components could lead to a failure of the structure earlier than expected.

Options of Repair and Associated Cost Ranges:

Several options have been identified and presented here and in the various Supporting Documentation located in the Appendix for addressing the problems identified with the existing bridge and primary spillway section sidewalls. Additional repair, replacement, or other possibilities not described here may also be available for consideration by the Lake of the Oaks Board of Directors.

- A. This first option includes leaving the existing structures (Bridge and the Primary Spillway Section Sidewalls) in its present condition, with no repairs or replacements.

Estimated Maintenance Cost Range: Minimal Annual Maintenance – \$1,500.00+/- to \$2,500.00 or less.

- B. Repair the existing (Bridge structure and completely replace the primary spillway section sidewalls) by removing and replacing the entire section of overturned spillway walls, and repairing the bridge structure, including the concrete deck, and abutment foundations. This option includes replacing the existing deck with a new reinforced concrete deck, abutments, and rebuilding

the primary spillway section sidewalls as a joint project by the same contractor. The existing intermediate piers may be able to remain thus reducing cost. A registered professional engineer, qualified in bridge design, should determine this during the design phase.

Estimated Construction Cost Range: \$50,000.00+/- to \$150,000.00+/- depending upon complexity of design and local in-kind labor from the Lake of the Oaks Community.

- C. This last option involves the complete replacement of both existing structures (Bridge and the Primary Spillway Section Sidewalls). In the following Appendix Section including the supporting documentation of this report are several replacement options including culvert installations, railroad flatcar installation, etcetera, that could be implemented to replace the existing bridge and spillway sidewalls.

Estimated Construction Cost Range: \$30,000.00+/- to \$100,000.00+/- depending on the system selected and local in-kind labor from the Lake of the Oaks Community.

Summary and Recommendations:

In summary, it is suggested the Lake of the Oaks Board of Directors review the Supporting Documentation in the Appendix and begin discussing the possible replacement outcomes the community desires to achieve. Based upon that scenario, contact should be made with a selected vendor, supplier, engineer and/or manufacturer to discuss on-site feasibility replacement and potential costs.

Two of the options, which have been discussed, previously, during the two site visits, are the use of metal or pre-cast concrete culverts sections and/or the use of salvaged railroad flat cars for the bridge replacement. These two options appear to fit within the budget of the Lake of the Oaks Community.

MECO Engineering Company, Inc. appreciates the opportunity to present these recommendations and options to the Board of Directors and would be happy to provide consulting assistance if call upon to do so. If there are any questions, please feel free to contact Mr. Bensman or Mr. Heying at the home office located in Hannibal, Missouri at 573. 221. 4048.

APPENDIX AND SUPPORTING DOCUMENTATION

- RECYCLING RAILROAD FLATCARS FOR BRIDGES
- McCANN CONCRETE PRODUCTS – PRECAST BOX CULVERTS
- CON/SPAN SMALL BRIDGE REPLACEMENT
- REDI-SPAN PRECAST CONCRETE PRODUCTS
- THOMPSON CULVERT COMPANY – METAL PIPE CULVERTS
- CONTECH CONSTRUCTION PRODUCTS
- CONTECT SUPER-SPAN



Bridges and structures for trails

Recycling railroad flatcars for bridges on the Frisco Highline Trail

The cost of using the salvaged railroad cars was comparative to the re-decking treatment other bridges received.

From the Fall 2005 issue of Trail Tracks, the magazine of American Trails

By Terry Whaley

Ozark Greenways, Inc.

Ozark Greenways, Inc., in southwest Missouri recently completed construction of the second-longest rail trail in Missouri. The Frisco Highline Trail was dedicated on September 24 with the "Mayors Meet in the Middle" event and 350 citizens from the six communities that the trail links.

In addition to great pastoral scenery this 35-mile long trail comes with 13 different railroad trestles ranging in length from 15 to 317 feet - over 2,000 feet of bridge surface in all.

One of the challenges with retrofitting the bridges to trail was that arsonists successfully damaged one, and destroyed two of the original trestles so badly that no support structure or piers were left to work with.

The normal routine for an Ozark Greenways retrofit included decking over the existing railroad ties and adding handrails. However, the burned bridges were going to require



► Related topics:

Building trails
Accessible trails
Rails to trails
Urban trails
Management and Maintenance
Wildlife and the environment
Planning

► More resources:

Bibliography
Quotations
Glossary
Acronyms
Tools
products & services

► For more opportunities for training on trail design, construction, and management see the National Trails Training Partnership area.

something different and the assumption was it would be very expensive.

Placing the flatcar bridge (photo from Ozark Greenways)



President Harry Truman rose from the dead for a special appearance at the dedication of the Frisco Highline Trail (photo by Debra Lee)

Ozark Greenway board members, trail supporters and members of the organizations technical committee made several trips to the bridge locations looking, thinking, and scratching their heads over the best approach to replacing these bridges. We hoped that an inspiration would hit us and the problem would be solved. On another front the group was involved in a capital campaign to raise the needed funds to develop the entire trail, so there was plenty of time for "thinking."

The solution came very routinely one day when Tom Netzer, a board member of Ozark Greenways, was reading a professional trade magazine and noticed an ad from a salvage company called Diversified Railcar located in Camden, Arkansas. The company was advertising used flat bed rail cars for the use of road bridges. Game on! Out to the field we went for some measuring, re-measuring, thinking and more head scratching.

After several calls to the salvage company, we learned that they had three flatcars that would fit our needs nicely. Arrangements were made for delivery of the flatcars to a local holding site, followed by logistic plans to move each car to its specific site and add handrails in the field.

The cost of using the salvaged railroad cars was comparative to the re-decking treatment other bridges received. The cost of a re-decked wooden bridge 50-foot in length, complete with handrails was \$10,065; while the 50-foot railroad car bridge was \$11,900 including the cost of the car, delivery, crane rental for setting it in place, and steel handrails which were built in sections then delivered to the site and welded in place.

Plans are underway to paint the flatcar bridges and some cost will be incurred with that as well. However, it is anticipated the maintenance of the three flatcar bridges will be much less than the wood decks. Ozark Greenways is proud to have these bridges on their trail. In addition to achieving a bit of unique railroad theme and some great conversation pieces along the trail, the recycling and reuse of these cars fits well into the overall philosophy of the organization.

Need trail skills and education? Do you provide training? Join the National Trails Training Partnership!

The NTTP Online Calendar connects you with courses, conferences, and trail-related training

Promote your trail through the National Recreation Trails Program

Updated May 3, 2006



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Precasting to Meet Your Needs

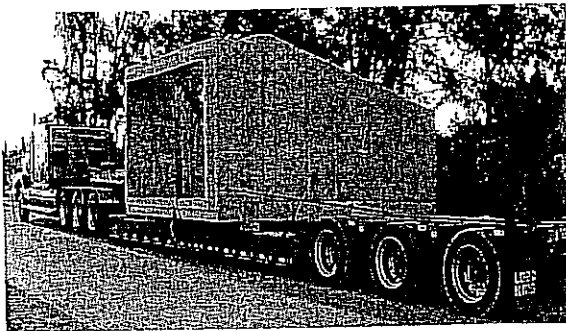
8709 State Route 159
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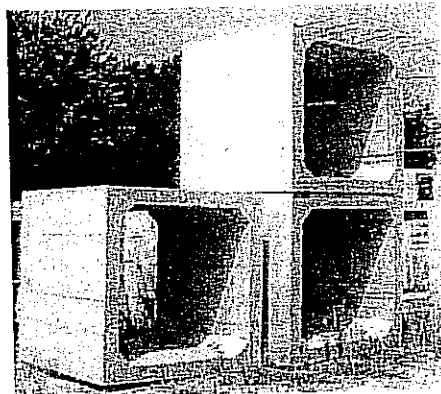


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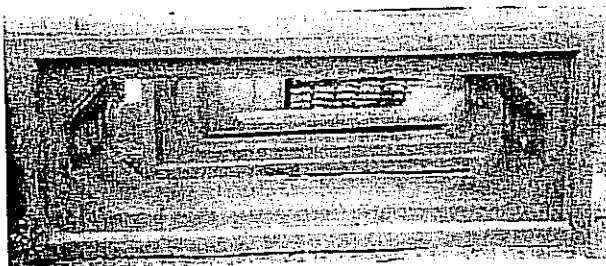
Box Culverts are available in a variety of shapes and sizes to fit your construction project. McCann Concrete offers Box Culverts from 2'x2' up to 12'x12'. While we do not manufacture round structures, we are able to offer square or rectangular substitutes for round structure. Box Culverts are available in single, double or triple units, depending on the job. Most headwalls and toe walls can be manufactured to match your box culvert structures.



12 x 7 Flared Wing wall
rebar



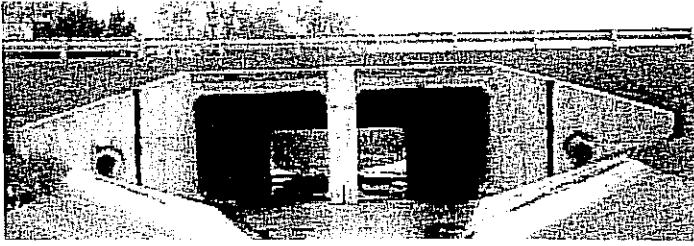
5x5 Box Culverts with exposed



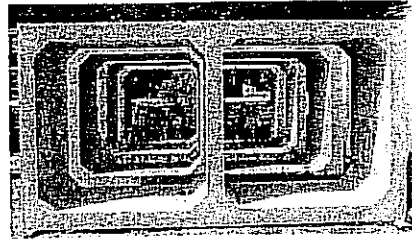
10 x 2 Box Culvert



Twin 8 x 4 Box Culvert



Twin 9x8 with flared precast wing walls



Twin 6x6 Box

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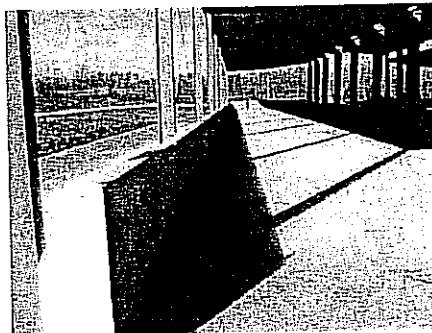
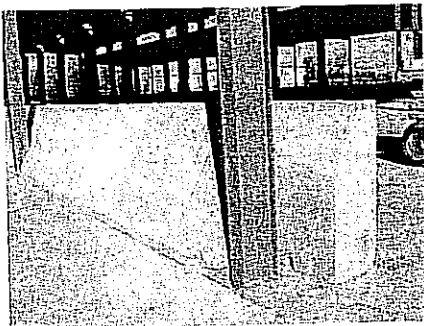
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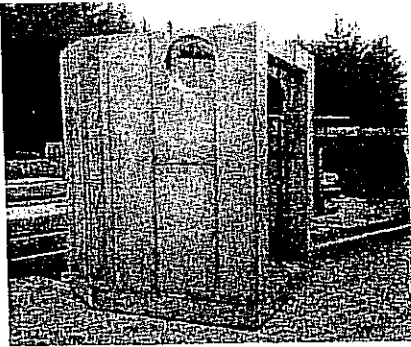
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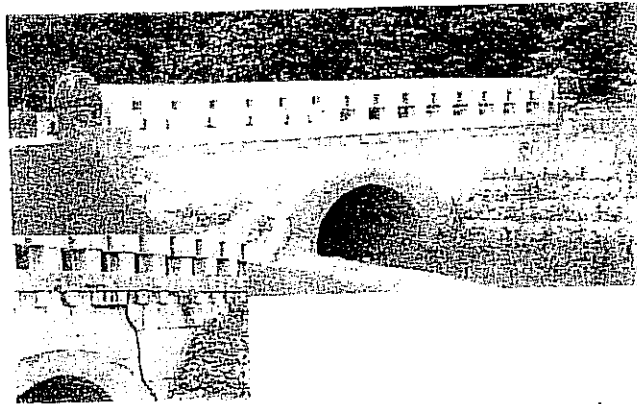
McCann Concrete Products has had many opportunities to show the uniqueness of precast concrete compared to cast-in-place products. We have produced special bridge blocks for a historic restoration project in Peoria, IL, architectural panels in St. Louis, double and triple box culverts, and 5-sided junction chambers. If your company or upcoming job requires special or a one-of-a-kind structure, be sure to contract McCann's for an estimate.



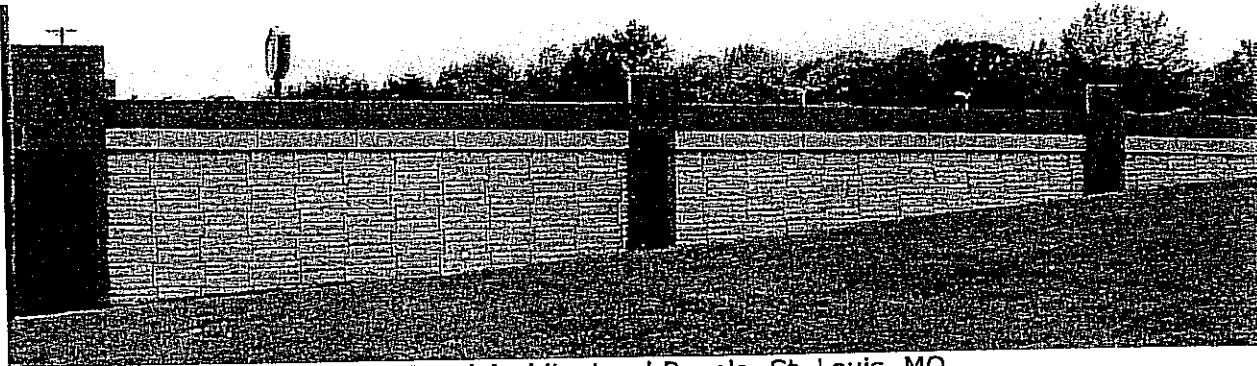
Push-block structures for the Bloomington, IL Waste Water Treatment Plant



5- sided Junction Chamber



Multi-blocks of various sizes & shapes stacked together to form this revamped historic bridge in Peoria, IL

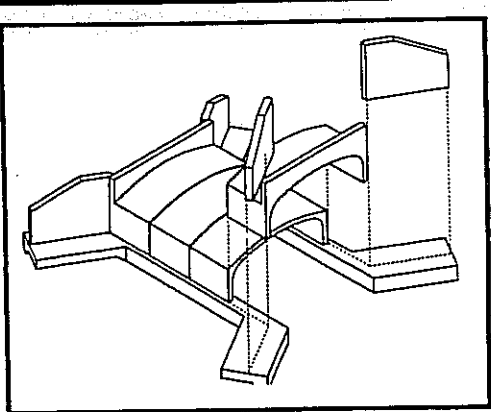
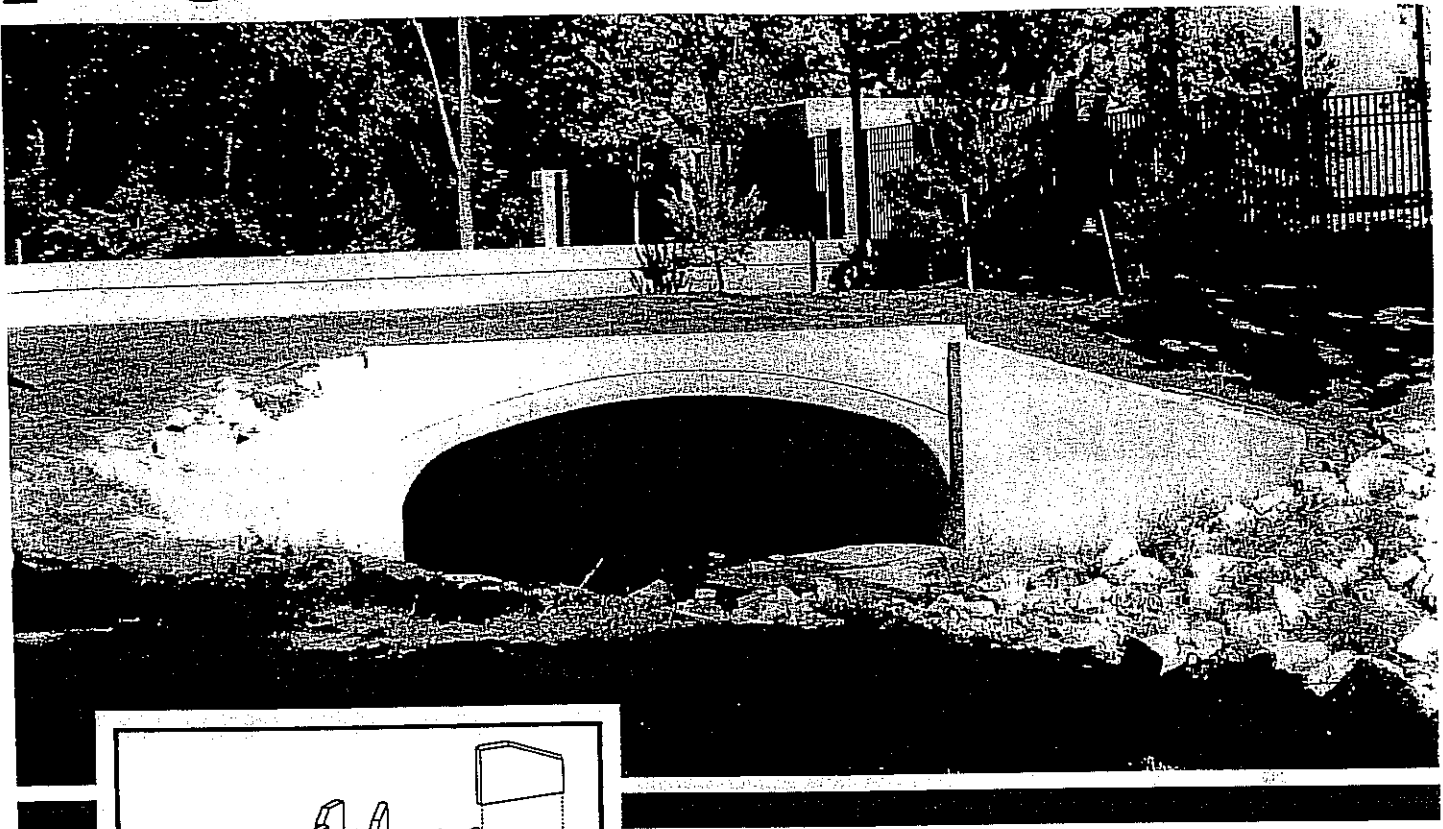


Chambers Road Architectural Panels- St. Louis, MO

Architectural structures are being specified on more jobs. The 35' tall architectural panels pictured above were originally designed as a cast-in-place. The contractor was alleviated of the difficult 35-foot vertical pour by using our precast panels. Precast materials allowed for expansion and contraction of both the MSE wall and the architectural panels and shortened the working days by three weeks.

updated: 10/20/2005

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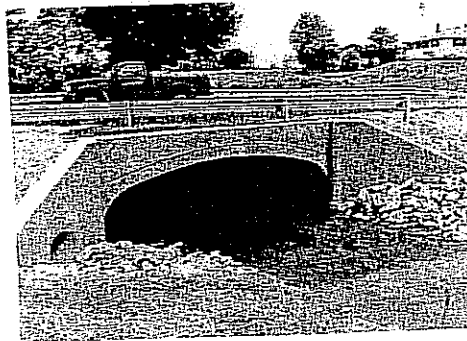
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*We've Moved-
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CON/SPAN[®] offers five important advantages you need every time!

1 Lower initial cost

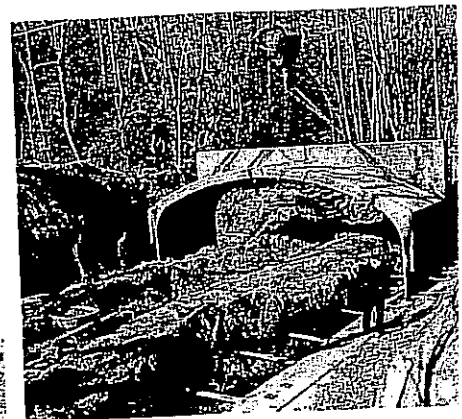
Your Con/Span culverts will cost less to buy and install for most site conditions. This 32-foot wide culvert system was constructed in 1986, using four 8-foot-wide sections with



a 20-foot span and 7-foot rise.

The total structural cost was about \$30,000, with the four precast Con/Span sections costing just under \$14,000. And that included the monolithic headwalls.

2 Quick installation



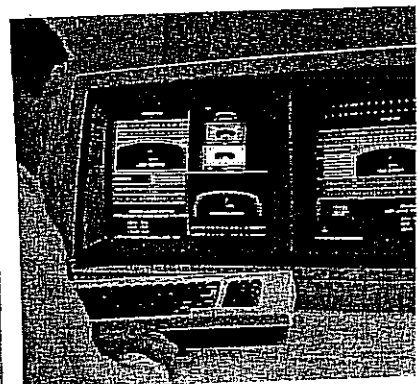
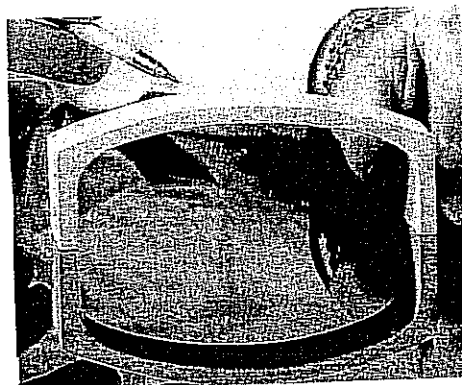
In any bridge replacement program, you want minimum installation time to ensure the road can be opened up again as promptly as possible.

For this particular site in Vandalia, Ohio, the existing culvert structure was removed; the footings and wingwalls were constructed; and the four 24-foot Con/Span culvert sections were placed and backfilled in just 16 working days.

CON/SPAN[®] shapes up as your wisest investment.

The advanced Con/Span design combines the proven technology used for metal arch culvert bridge structures with the lifetime benefits of precast concrete. The result? A very

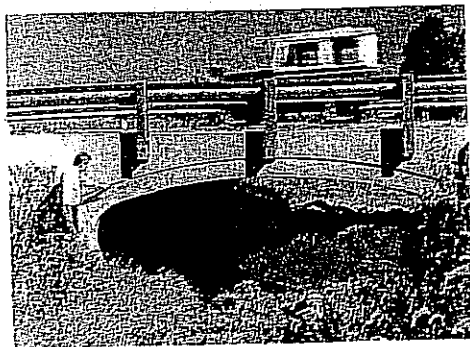
rugged, reinforced concrete arch with substantial structural load capacity and minimal restrictions on cover limitations and backfill requirements. The Con/Span culvert system has



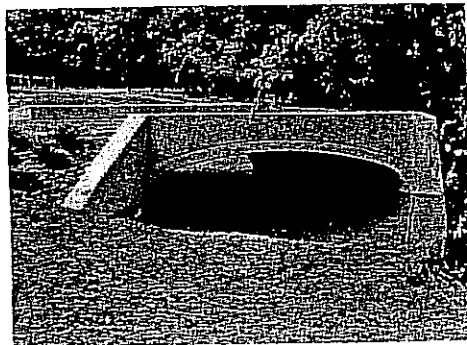
3 Lower maintenance cost

The outstanding corrosion resistance and built-in durability of concrete Con/Span culverts provide your third benefit — a very low life-cycle cost. These two important features help ensure your maintenance crew will be kept free to handle other assignments.

Base your purchasing decision on total cost over the life of the culvert and you will choose Con/Span every time!



4 Attractive appearance

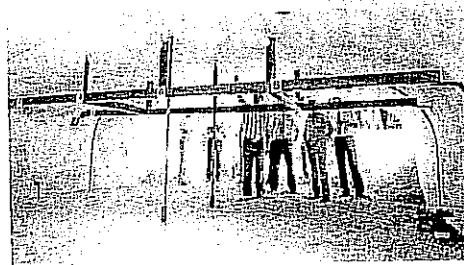


A fourth requirement of your culvert installations is a good-looking appearance that compliments the surroundings. Con/Span culverts' clear span design doesn't disturb the natural beauty of the creek bed.

As you can see, the clean and simple design of Con/Span culverts looks good from every angle!

5 Total reliability

Your fifth requirement for any small bridge replacement is the technical integrity of the culvert's design and the quality of each component — a vitally important requirement. The strength of Con/Span culverts was clearly demonstrated by this full-scale load test conducted for Ohio's Department of Transportation.



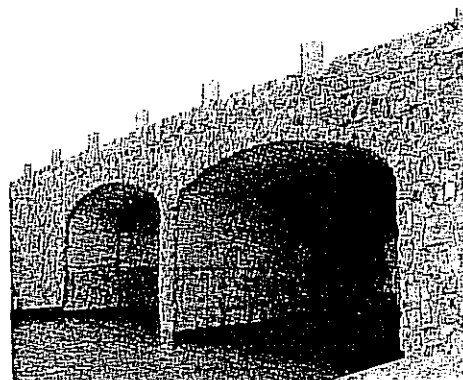
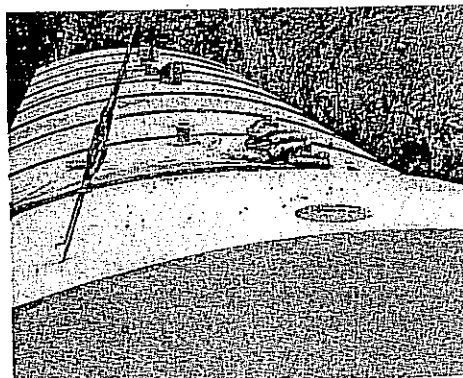
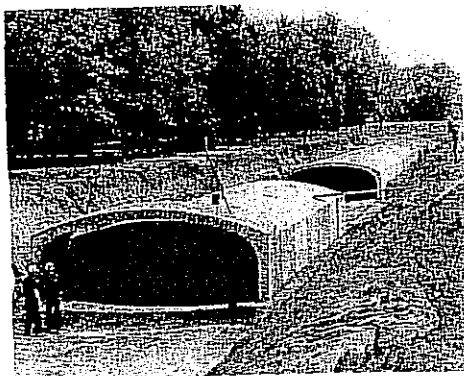
This minimally reinforced Con/Span unit greatly exceeded all standard performance requirements for full highway loading.

now permanently reshaped the plans of many engineers involved in bridge replacements ... and private developers involved in property improvements, water retention

reservoirs, major storm water systems, and other projects.

Realizing that your needs and your bridge replacement program are likely to be in some ways special and different from

other Con/Span users, we are eager to hear from you how and where Con/Span culvert systems might fit your future bridge replacement plans.



**Discover
today how
CON/SPAN®
can cost
you less
and serve
you longer!**

**Call 1-800-526-3999
Fax 1-513-293-5850**

Con/Span culverts cost less initially, install quickly, cost less to maintain, are attractive, and are totally reliable—five strong reasons for choosing Con/Span for all of your future culvert and short-span bridge replacements.



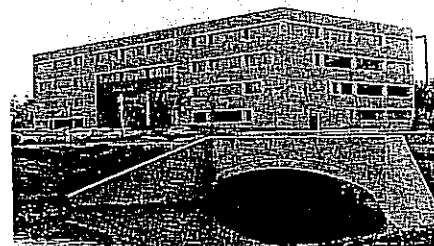
Your Con/Span supplier is ready to technically assist you and your engineering team.

We can provide a wealth of additional information and technical support to help you make the right decisions about your bridge replacements. We are also prepared to discuss with your project management staff the details of specifying, shipping, and installing your Con/Span culverts.

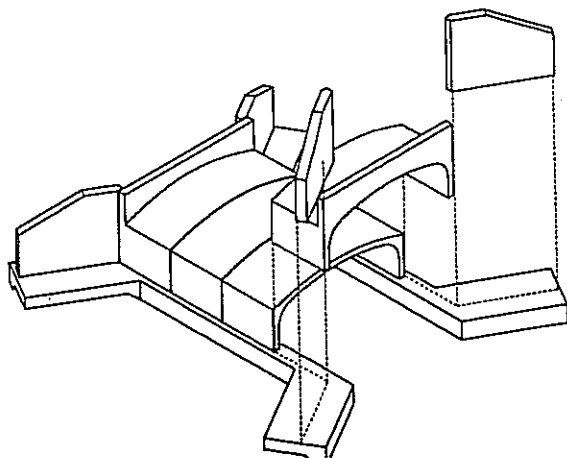
Waterway Area				
Rise (ft.)	Span (ft.)			
5	16	20	24	
6	71			
6	87	105		
7	103	125	145	
8	119	145	167	
9		165	191	
10			215	

We are eager to help you discover all the benefits of Con/Span culvert systems—including total satisfaction and lasting performance.

Specify Con/Span culverts whenever you want a new and better installation that meets your five most important needs... make the choice that will cost you less and serve you longer. Call us today!

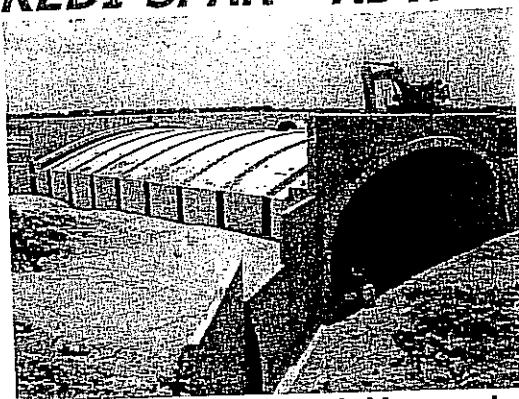


©1990 CON/SF



Best way to eliminate bridge-deck maintenance? Eliminate bridge deck

THE REDI-SPAN™ ADVANTAGE



Redi-Span™ reduces traffic impacts of bridge construction projects.

Redi-Span™ is fabricated off-site in a controlled environment. This reduces traffic disruption and saves time with production tasks such as curing and formwork construction.

Redi-Span™ makes construction more environment-friendly.

With an off-site production, Redi-Span™ will lessen the amount and the time that heavy equipment is used at the actual jobsite. This will create a less disruptive situation for the environment. Environmental specialists will value the Redi-Span's™ subdued environmental impact, as well as its adaptation to environmental designs.

Redi-Span™ increases construction zone protection.

Again, with Redi-Span's™ offsite fabrication, this will reduce the amount of time workers are required to operate on-site, which can improve construction zone safety for your employees. Jobsite restrictions such as power lines or tall landscape are also lessened with the offsite fabrication of the Redi-Span™.

Redi-Span™ enhances quality and reduce life-cycle expenses.

Redi-Span™ decreases the amount of time spent in the project schedule because of its fabrication in a controlled offsite location. Redi-Span™ lessens the importance placed on weather and increases the quality of the structure itself. By improving the quality of a structure, this will reduce the life-cycle costs.

Redi-Span™ offers an aesthetic approach to developments.

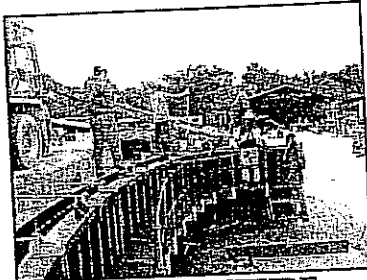
With Redi-Span's™ natural arch, it provides projects with a visually pleasing result. Further aesthetic advancement can be achieved by incorporating a variety of appealing finishes to compliment your project.

Redi-Span™ reduces fabrication costs.

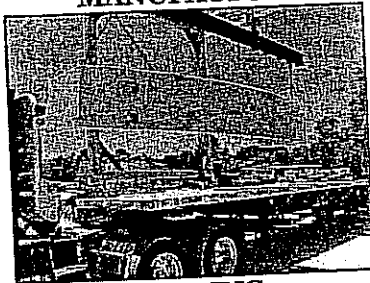
Because of the inherent advantages of the arch design, there is considerably less concrete and steel required for the spans, thus reducing fabrication costs. In addition, depending on the design requirements, arch spans can be offered with or without a paved bottom, which also will reduce material cost.

**For more information on Redi-Span™, please contact Tricon Precast, Ltd.
15055 Henry Rd. Houston, TX 77060 (281) 931-9832
www.triconprecast.com**

REDI-SPAN™ PROCESS



MANUFACTURE



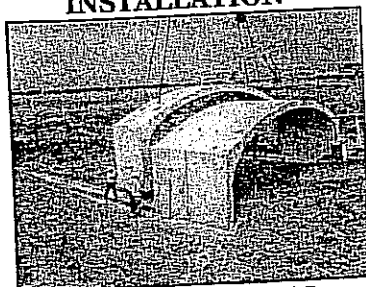
LOADING



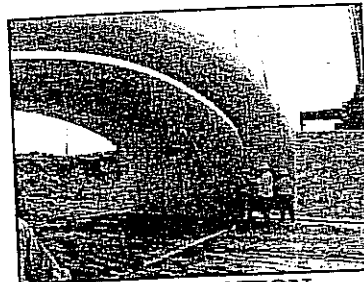
LOAD STAGING



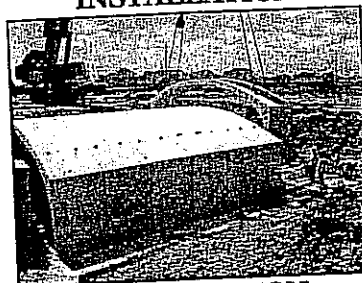
INSTALLATION



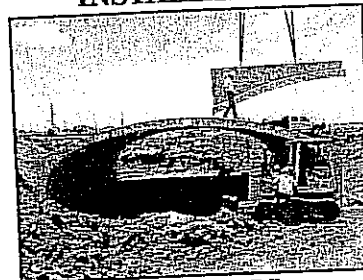
INSTALLATION



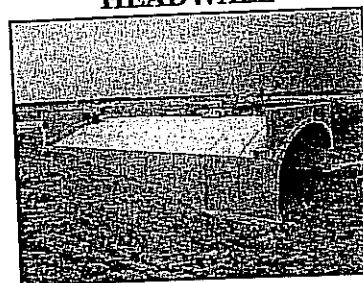
INSTALLATION



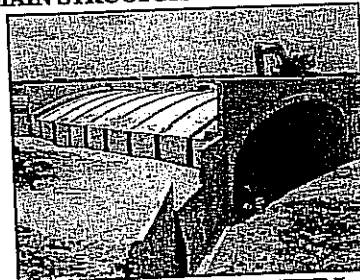
INSTALLATION



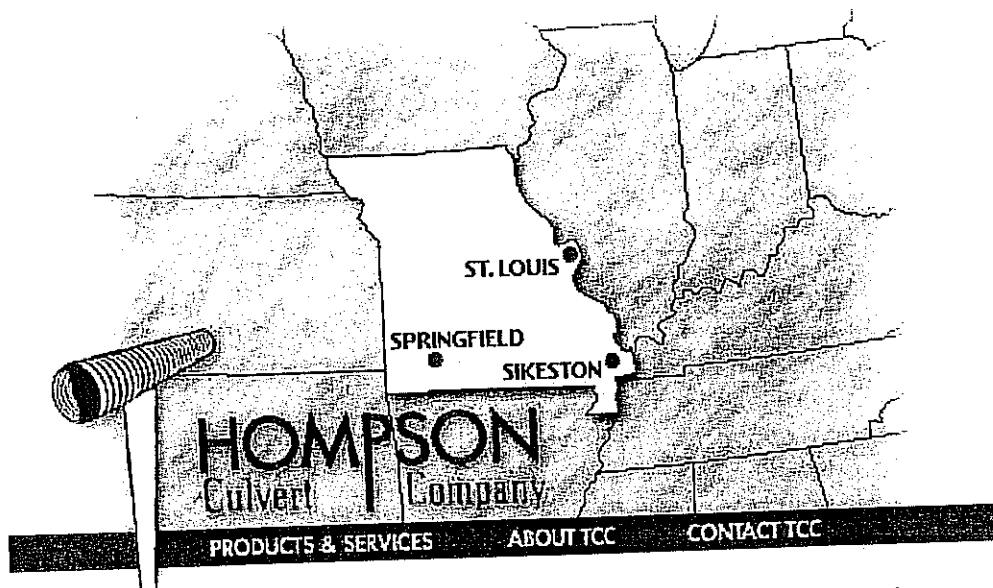
HEADWALL



MAIN STRUCTURE COMPLETION



WINGWALL/BACKFILL



Thompson Culvert Company is the construction industry's full-service source for heavy-duty steel drainage components, water control devices, and a wide range of associated products.

When **TCC** is on the job, our resources are yours: our three plants, our warehouses, our engineering staff, our fabrication shop. **TCC** is large enough to provide complete service to job sites throughout the midwest. Yet we're small enough to care about every customer and every project. Because your needs are important to us, **TCC** is the better choice.

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Inc.



Corrugated Steel Pipe

End Sections

Structural Plate

Gabions

Geotextiles

Stormwater Detention
Structures

Surface Drain

Water Control Gates

Highway & Bridge
Guardrail

Air Curtain Destructor

Fabricated Steel



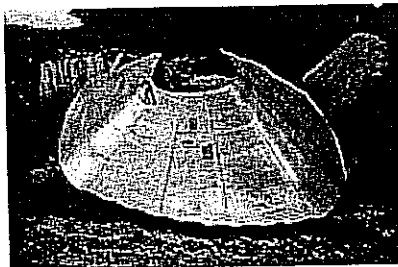
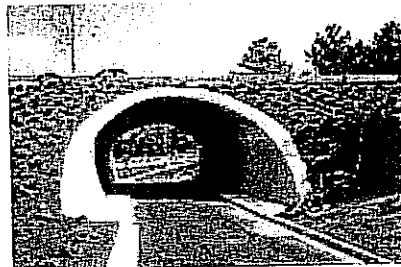
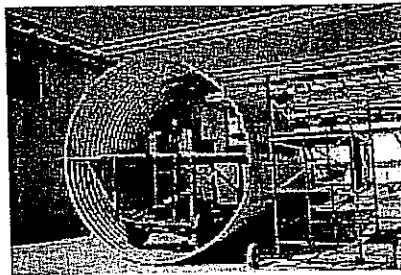
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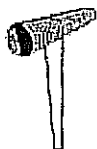


Structural Plate Products

Structural Plate Corrugated Steel Pipe products are fabricated from galvanized corrugated plates and assembled by bolting individual plates together to form pipes, pipe arches, arches, and a variety of other shapes. Generally, the plates are field-assembled, but certain sizes and shapes can be assembled in our plant and shipped to a jobsite ready to install.

Structural Plates have a 6" pitch by 2" depth corrugation profile and are manufactured in 10' and 12' standard lengths. Plate thickness ranges from 12 gage (.111") to 1 gage (.280").

Structural Plate has been used successfully for numerous applications where large structures are required such as storm drains, culverts, bridge replacement, stream enclosures, and vehicular underpasses.

[Corrugated Steel Pipe](#)[Shapes & Lengths](#)[Corrugations, Wall Thickness](#)[Coatings](#)[End Sections](#)[Hydraulics](#)[Coupling Systems](#)[Fittings](#)[Structural Plate](#)[Gabions](#)[Geotextiles](#)[Stormwater Detention
Structures](#)[Surface Drain](#)[Water Control Gates](#)[Highway & Bridge
Guardrail](#)[Air Curtain Destructor](#)[Fabricated Steel](#)

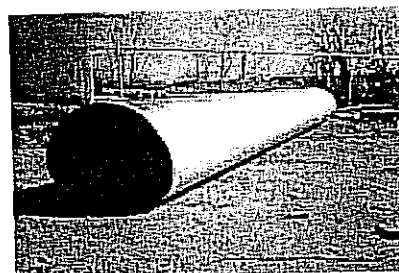
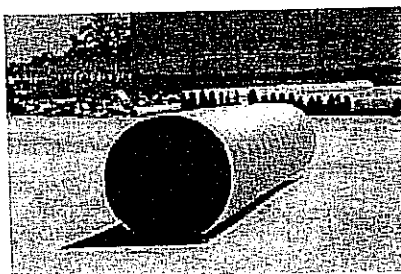
Home Page
Thompson Culvert Company
314-731-4242

[email](#)sales@thompsonculvert.commikeh@thompsonculvert.comrobr@thompsonculvert.com

Shapes and Lengths

Corrugated Steel is manufactured in two basic shapes: 1) Round Corrugated Steel Pipe, and 2) Corrugated Steel Pipe Arch. The round pipe is used in most applications; but for particular locations where there is limited headroom available, the designer can specify a pipe arch.

Corrugated Steel Pipe and Pipe Arch is manufactured in standard 20' and 24' lengths, but for special projects can be provided in lengths up to 60'.



Round Pipe is available in 6" - 144" diameters and Pipe Arch is available in 17" x 13" (15" round equivalent) up to 142" x 91" (120" round equivalent).

Pipe arch can also be desirable from a hydraulics standpoint due to the geometry of the pipe arch and the fact that a greater portion of the waterway area is in the lower portion of the conduit.

CONSTRUCTION PRODUCTS INC.

Sales Engineer

St. Louis Depot:
866-922-6222

www.contech-cpi.com

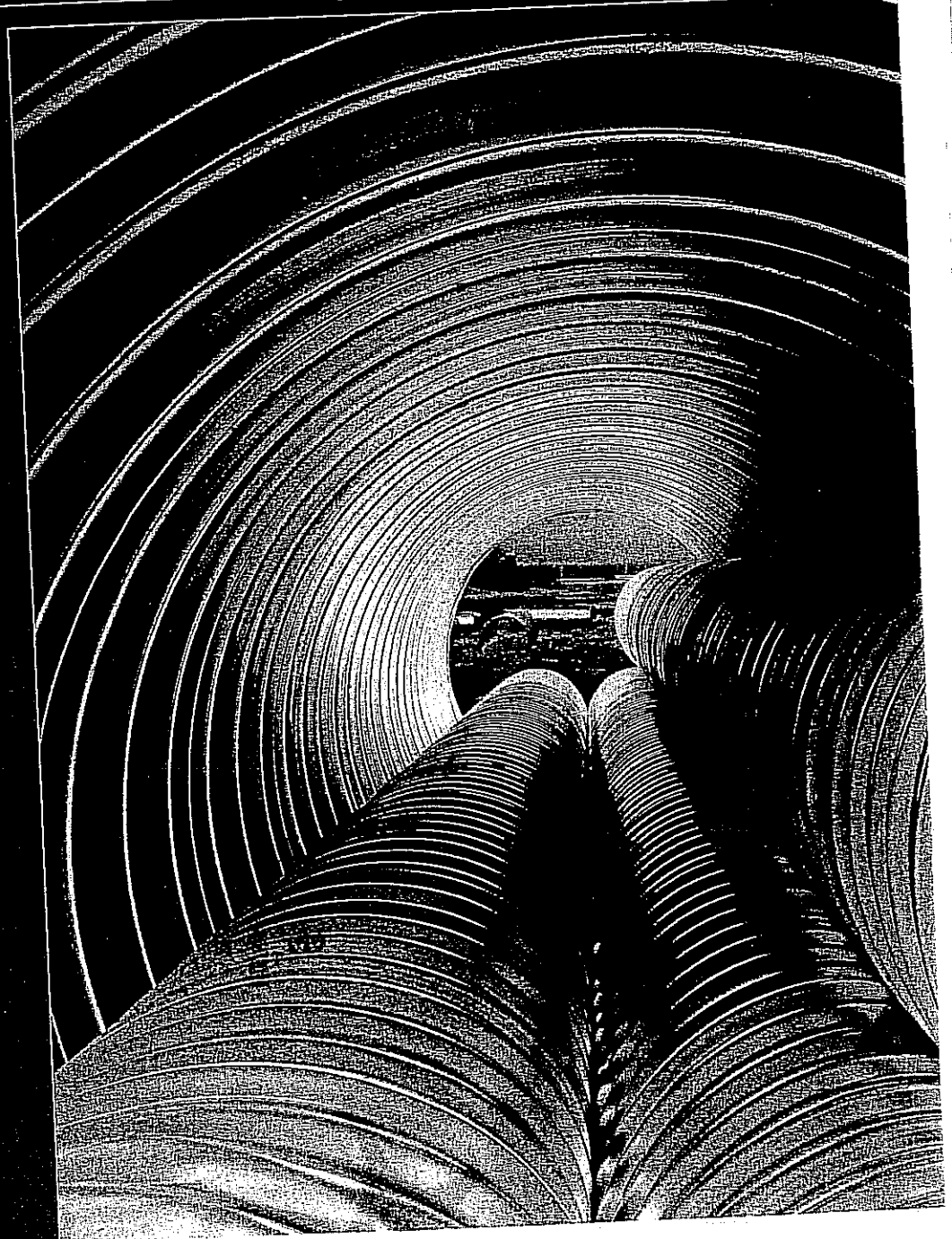
INNOVATIVE SITE SOLUTIONS &
STORMWATER MANAGEMENT

3 Countrywood Drive
St. Peters, MO 63376

OFFICE 636.278.9000
FAX 636.278.6600
mhouser@contech-cpi.com

CONTECH
CONSTRUCTION PRODUCTS INC.

Corrugated Metal Pipe





End Sections

CONTECH End Sections provide an economical, attractive, hydraulically efficient and durable inlet and outlet on culverts and storm sewers. End sections provide protection against erosion and scouring. They improve hydraulic capacity by channeling flow into and out of the pipe efficiently. They are also reusable if lengthening or relocating the drainage structure is necessary.

Galvanized End Sections present a clean-cut effect that is aesthetically pleasing. The tapered sides blend with the contour of the slope to increase roadside aesthetics. Compared with concrete headwalls, end sections are safer and easier to maintain. Weeds are cut easily with regular highway mowers. The wide opening minimizes collection of debris and silting.



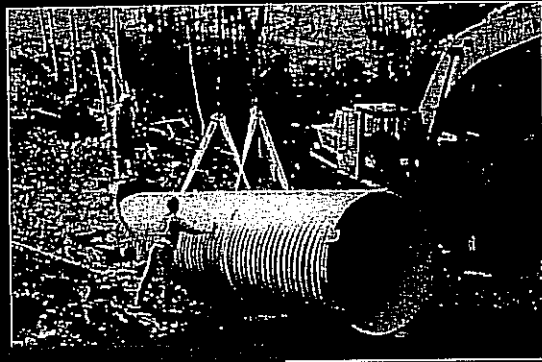
For multiple barrel applications, CONTECH manufactures multi-outlet end sections.

End sections provide protection against erosion and scouring.

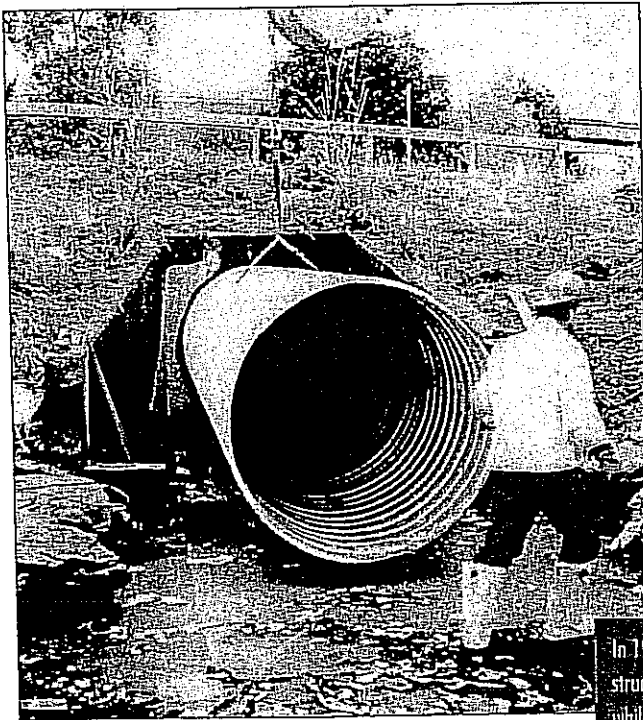
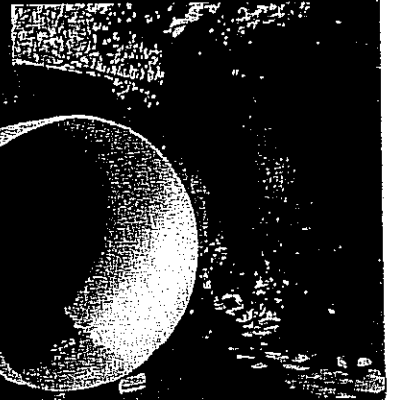
Rehabilitating Aging Structures

As our infrastructure ages, the roadway, water management and sewer control systems are deteriorating and losing integrity. Maintaining these critical structures is a major challenge.

However, it is often possible to salvage failing structures and eliminate the time, cost and safety problems of complete replacement. Restoring structural and/or hydraulic capacity without road closure is usually achieved with less time, expense and disruption than the replacement alternative. CONTECH offers a variety of products and systems to facilitate rehabilitation of storm and sanitary sewers, culverts and bridges

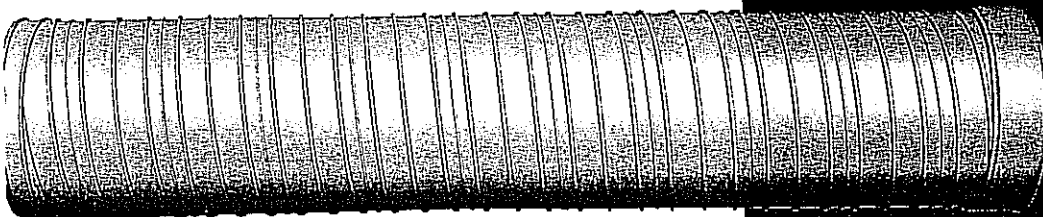


In less than four hours, 205 linear feet of 72" diameter HEL-COR CL pipe was used to reline an existing culvert. In addition to the easy installation, HEL-COR CL's concrete lining provided immediate hydraulic improvements.



CONTECH offers a variety of products and systems to facilitate rehabilitation

In 1993, the New York State department of Transportation relined this aging drainage structure with steel ULTRA-FLO pipe, restoring its hydraulic and structural properties while avoiding costly and time-consuming replacement.



Site Development Solutions

From normal to severe conditions, CONTECH provides a full-range of corrugated metal pipe for culverts, storm sewers, small bridges, stormwater detention systems and conduits.



For more information, call one of CONTECH's Regional Offices located in the following cities:

California (San Bernadino)	909-885-8800
Colorado (Denver)	303-431-8999
Florida (Tampa)	727-544-8811
Georgia (Atlanta)	770-409-0814
Indiana (Indianapolis)	317-842-7766
Kansas (Kansas City)	913-906-9200
Maryland (Columbia)	410-740-8490
Michigan (Clinton Township)	586-469-4240
Ohio (Middletown)	513-425-2393
Texas (Dallas)	972-659-0828

Toll Free: 1-800-338-1122

Visit our web site: www.contech-cpi.com

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TRENCHCOAT is a registered trademark of The Dow Chemical Company.

Your Local Sales Office is:



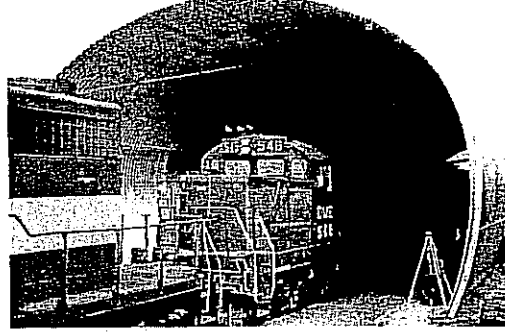
CONTECH
CONSTRUCTION PRODUCTS INC.

CONTECH
SUPER-SPAN

INNOVATIVE CIVIL ENGINEERING SOLUTIONS

Applications

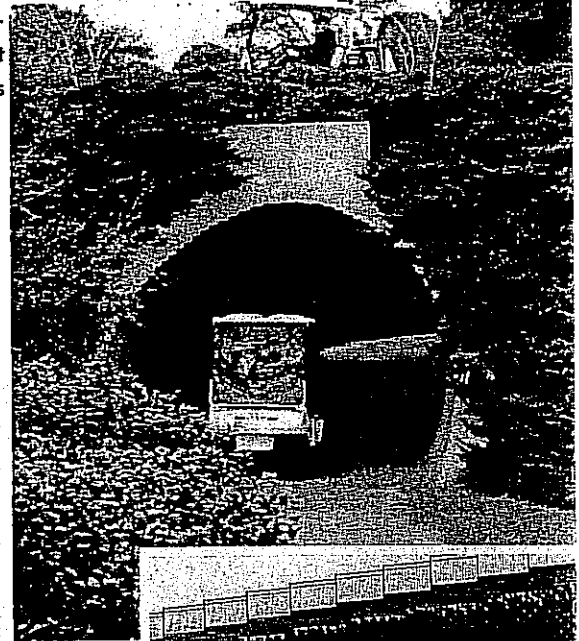
Pear Arch - Railroad Underpass



High Profile Arch - Stream Crossing



High Profile Arch -
Golf Cart
Underpass

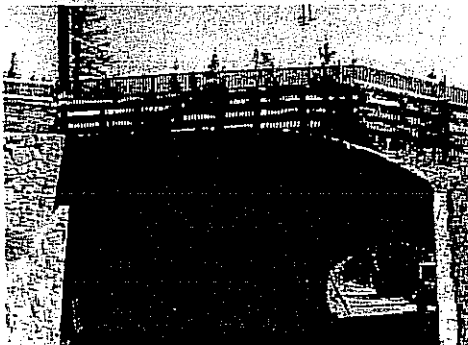
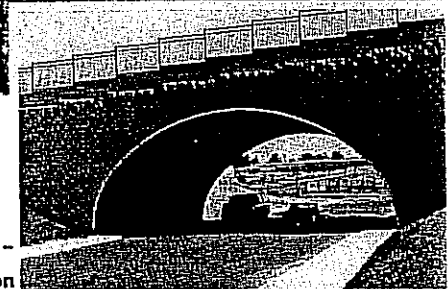


Low Profile Arch -
Wetlands Crossing

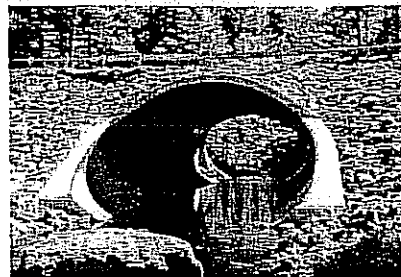


Horizontal Ellipse - Triple Span Bridge

Low Profile Arch -
Grade Separation



High Profile Arch - Grade Separation



Horizontal Ellipse - Stream Crossing



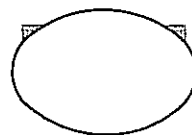
High Profile Arch - Underpass



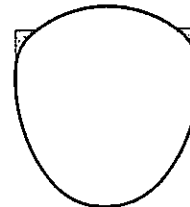
Low Profile Arch



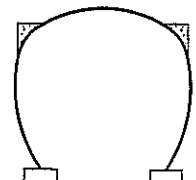
High Profile Arch



Ellipse



Pear



Pear Arch

End treatment

Attractive and practical end treatments

SUPER-SPAN ends can be step-beveled with concrete slope collars, slope paving, etc. Square-end structures can use partial or full headwalls, wingwalls, steel BIN-WALLS and modular block headwalls.

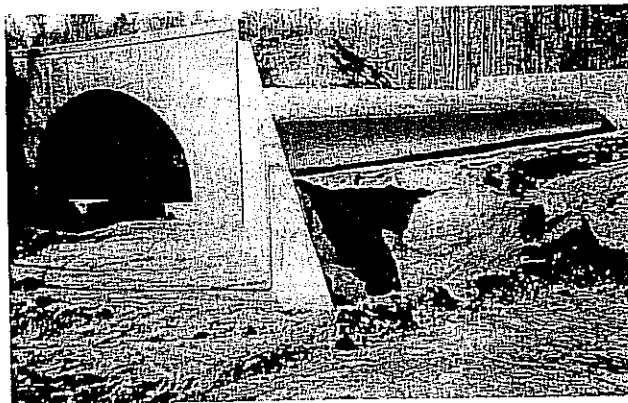
For hydraulic structures, special attention should be given to design of reinforcement of the metal edges at the inlet and outlet ends to secure them against hydraulic forces. Reinforced concrete or structural steel collars, tension tiebacks and partial headwalls are several of the methods used. Cut-off walls are required for all structures with metal inverts in hydraulic applications.

Headwalls or other end treatments should be designed by a qualified professional engineer. See installation precautions on Page 7.

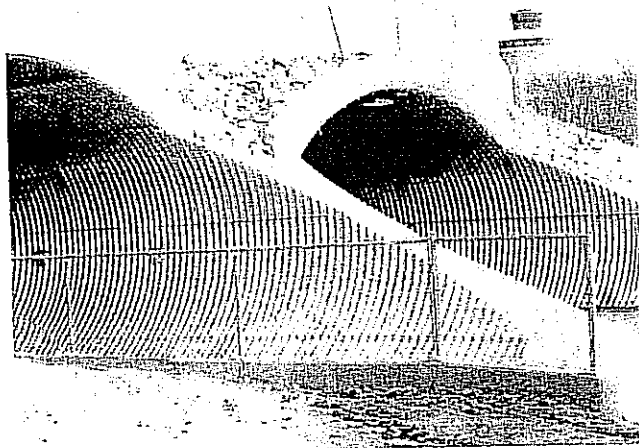
Multiple structures

Care must be exercised on the design of multiple, closely spaced structures to control unbalanced loading. Fills should be kept level over the series of structures when possible.

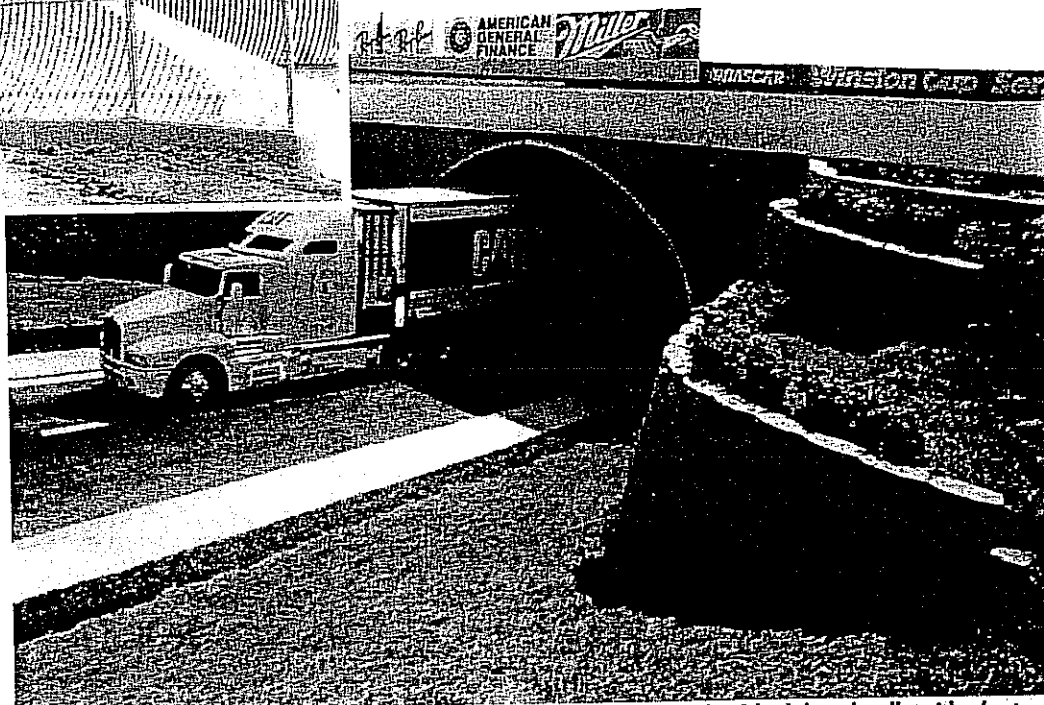
Significant roadway grades across a series of structures require checking the stability of the flexible structures under the resultant unbalanced loading.



Conventional cast-in-place concrete headwall and wing walls



Step bevel with concrete slope collars



Keystone modular block headwalls with planters

Site Development Solutions

Innovative Civil Engineering Solutions is the hallmark of CONTECH's nationwide team of sales engineer. Combined with our wide variety of site development products we can solve most civil engineering problems. Innovative applications for water detention systems, storm drainage, sewage lines, bridges, tunnels, retaining walls and erosion control begin at CONTECH.

HEL-COR® Corrugated Steel Pipe and CORLIX® Corrugated Aluminum Pipe ... Designed for drainage culverts, storm sewers, stream enclosures and underground conduits for highway, railway, industrial and municipal applications. Provided in a variety of linings and coatings to meet specific durability and hydraulic requirements.

HEL-COR CL Pipe ... Concrete-lined for top-flow capacity plus proven strength of corrugated steel design.

End Sections ... An end finish for culverts and sewer outfalls, either pipe or pipe-arch structures in steel or aluminum.

ULTRA FLO® Storm Sewer Pipe ... Offers improved hydraulic capacity and lightweight for storm sewers.

Slotted Drain® ... An efficient system for highways, parking lots, or other surface drainage involving only narrow slots on the surface.

Perforated Pipe ... Subdrainage applications for airports, highways and railroads. Available in metal and plastic pipe.

HEL-COR Pile Shell ... For foundations under buildings and bridges.

MULTI-PLATE Pipe, Pipe-Arch and Arch ... Use for bridges, stream enclosures and storm sewers.

SUPER-SPAN™ Structures ... Economically and aesthetically advantageous for new and replacement bridges.

Box Culverts ... Provides maximum water flow under minimum headroom. Aluminum's light weight means easier installation.

Keystone Retaining Walls ... Aesthetically pleasing high-strength, low-absorption concrete walls that can be used for projects up to 60 feet in height.

Bin-Type Retaining Walls ... Use for unstable slopes, limited right-of-way, shore and bank protection.

Liner Plate ... Designed for constructing new utility tunnels and relining structures under existing highways and railroads.

Bridge Plank ... Ideal for reflooring bridges and for new bridge construction.

Metric Sheeting ... Use for trenches, cofferdams, shore protection and cutoff walls.

A-2000™ PVC Pipe ... High-strength construction and smooth interior for sanitary collector sewers and storm sewers. Meets ASTM F 949.

A2 Liner Pipe™ ... Smooth interior for sliplining storm and sanitary sewers.

ABS and PVC TRUSS PIPE® ... Combines strength, stiffness, joint integrity and economy for gravity-flow sanitary sewers. Meets ASTM D 2680.

Geosynthetics ... TENSAR® Geogrids for soil reinforcement, base stabilization, slope reinforcement and retaining walls. • CONTECH Woven and Nonwoven Geotextiles for drainage, separation, filtration and stabilization. • STRIPDRAIN for highway edge drains and building foundation drainage. • CONTECH ERO-MAT™ and CONTECH Excelsior Mat for erosion control. • PavePrep® for retarding reflective cracking in pavements.

For more information, call one of CONTECH's Regional Offices located in the following cities:

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California (San Bernardino) 92408	909/885-8800
Colorado (Wheat Ridge) 80033	303/431-8999
Georgia (Norcross) 30071	770/409-0814
Illinois (Oak Brook) 60523	630/573-1110
Indiana (Indianapolis) 46250	317/842-7766
Kansas (Overland Park) 66210	913/906-9200
Massachusetts (Palmer) 01069	413/283-7611
North Carolina (Raleigh) 27609	919/781-8540
Texas (Irving) 75062	972/659-0828

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