# RAILROAD ARCH CULVERT
# PRELIMINARY ASSESSMENT
# GLENWOOD CHILDREN'S PARK
# MADISON, WISCONSIN

**ATTENTION OF:**
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Railroad Arch Culvert Preliminary Assessment

Glenwood Children's Park, Madison, WI

Prepared for: City of Madison
By: InSite Consulting Architects

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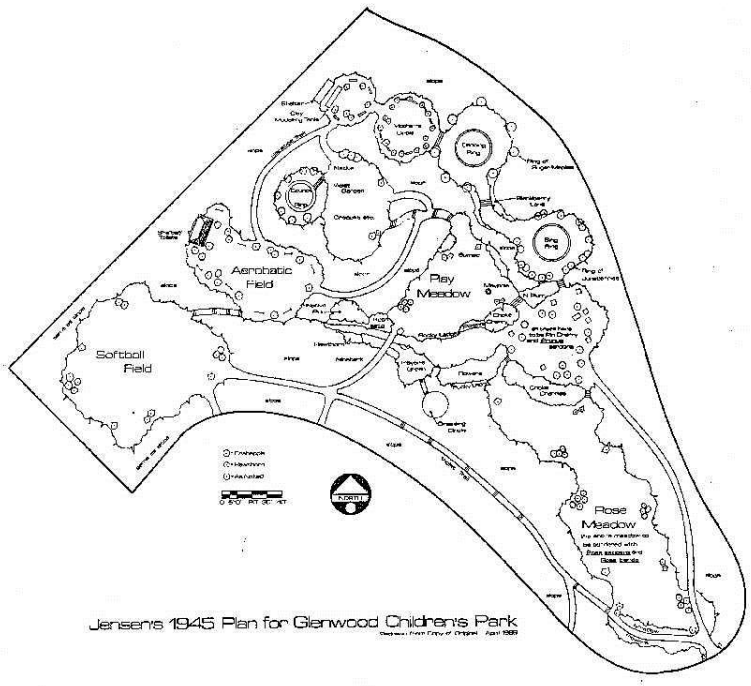
EXECUTIVE SUMMARY

General History:

The Glenwood Children's Park is in the Dudgeon-Monroe Neighborhood of Madison, WI. The park was dedicated on October 7th, 1949. The park is a city historic landmark. The site contained a former sandstone quarry. Jens Jensen designed this park around the existing features using his trademark stone council rings, a trademark feature of Jensen's design for creating outdoor rooms and spaces defined by trees, with each circle was designed with a different purpose in mind.

In the early 1960's expanding neighborhood were developed to the northwest of the park and the resulting runoff flowing through the railroad arch viaduct contributed to erosion problems in the park.



Jensen's 1945 Plan for Glenwood Children's Park

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Location:

Glenwood Children's Park
Roughly centered on the northwest property border along the southwest commuter path

Features and construction:
The historic railroad trestle was constructed of locally quarried sandstone of rusticated ashlar blocks and a dated keystone in the central arch wall and well fitted large rubble blocks in the wing walls.

Assessment:

This is a preliminary condition assessment of the historic stone railroad arch for the City of Madison conducted on May 29, 2018. The arch is within the historic 1949 Jens Jensen designed Glenwood Children's Park and was originally built to convey lower volume drainage from northwest of the site under an existing railroad ROW. In the 1960's the development north of the site dramatically increased the volume and peak flows generated during weather events. The stone for the arch likely was from the site which had been a Madison Sandstone quarry prior to the establishment of the park. The arch predates the historic park.

The general assessment is that the arch is deteriorating rapidly but is not in danger of eminent collapse.

The construction of the current Southwest Commuter Bike Path and stormwater culverts appear to be in good condition and not threatened by the condition of the arch. The stormwater controls placed immediately downstream of the arch are needed to protect the park from erosion that has plagued it since the 1960's.

The arch was originally constructed in 1887 of rusticated ashlar cut stone. The surrounding stone transitions to well fitted rustic and rubble blocks and overplayed on the uppermost courses with slightly overhanging slabs and soil.

The arch has two primary threats. The failing physical integrity of the weathering sandstone and the undercutting and settling of the base layer of sand, stone and earth.

The ashlar blocks of the arch are in better condition than the flanking stones that are in more direct contact with soil and may have been cut from less cohesive sandstone. The consistency of the sandstone varies from easily crumbled to touch to more solid on dryer faces where stone is not perpetually wet.

The settling and degradation of the base and surrounding stone is causing misalignment of the inner arch. Many of the surrounding stones are disintegrating so rapidly that only the mortar left suspended in space outlines where the stone head and bed faces had been.

The conclusion is that the entire masonry structure must be deconstructed and rebuilt as soon as funds are available. The stones of the inner arch are in good enough condition to be used as templates to fabricate replacements (as required). The face rustication includes the original lifting holes which add interest and still might be usable in disassembly.

The restoration will require removing the overburden above the natural stone arch and wing walls. The newer concrete culvert that supports the roadbed for the bike path appears in good condition and can remain after a more detailed assessment confirms there are no current issues or future needs that would impact the rebuilt arch.

It is noted that the temporary and ad hoc stormwater measures that are intended to slow the flow and force of stormwater affecting the park are contributing to the deterioration of the arch and wing walls. The original construction also does not deal with back pressure and moisture drive that contributes to the rate of aging and disintegration of the natural cut sandstone.

A full restoration will require surveying the complete historic structure and disassembly. Salvageable arch and surrounding stones can serve as templates. Cost will be significantly impacted by the suitability of exiting stone for reuse, the amount of overburden needed to be removed and replaced during the work and access to the site.

SUMMARY OF ESTIMATED COSTS (PRELIMINARY)

| RECONSTRUCTION OF HISTORIC RAILROAD ARCH CULVERT | | RANGE OF PROBABLE COSTS | | |
|---|---|---|---|---|
| TOTAL ESTIMATE | | $400,000 | - | $500,000 |

Notes regarding the Budget provided:

Stone Replacement: We will be working with The City of Madison on a study of Madison sandstone - specifically for Gates of Heaven. One of the primary goals of the study is to find a suitable replacement stone. Because that study will not be complete for some time, we have included stone replacement costs from other similar sandstone projects on our budgeting for this project. The stone that has typically been used for Madison sandstone, while excellent for use in some contexts, might not be appropriate here for a variety of reasons. The cost for ICA to provide stone sourcing assistance is $4,500 to $6,000, is included in the budget provided, but must be completed before bidding can occur. What is not included in the budget are design/engineering fees, which for a project of this relatively small size, prominence and complexity should be budgeted at 20% of the cost of construction. After the stone is sourced, the budget, including all design fees, can be adjusted as required.

Site Access: Access for this project is tricky. We have assumed a top-down approach to staging in our estimate. This minimizes impact in the park but would affect the adjacent bike path. We make this recommendation with input by any of the stakeholders, so we expect the actual access and staging plan will change. This can have a significant impact on cost.

If you have any questions, please do not hesitate to contact me.

Best regards,

InSite Consulting Architects

Stephen E. Mar-Pohl, AIA, NCARB

President

*Figure 1: Height of arch and overburden above.*

Overall rough dimensions:
Height varies  maximum ~8-9'
Central arch wall width varies: ~ 7' at base, ~13' at top
Wing-walls (splay backwards going up) at base: ~15' w.

*Figure 2: View of capstones and minimal overburden above the wing walls (additional soil over the ventral arch wall.)*

*Figure 3: Overall view of arch.*

*Figure 4: General disintegration of stone above the arch.*

*Figure 5: Right side of arch deflection and beginning of collapse.*

*Figure 6: Arch bearing condition at right.*

*Figure 7: Defaced Keystone needs to be deciphered.*

*Figure 8: Undercutting of the arch at left and 2-3' stone construction depth to the intact concrete culvert that conveys stormwater under the bike path.*

*Figure 9: Defaced keystone needs to be deciphered.*

*Figure 10: Degradation of the sandstone at the wing walls is most advanced at the face.*

*Figure 11: Degradation of the sandstone at the wing walls is most advanced at the face.*

*Figure 12: Degradation of the arch stones deeper in the wall is visible from the open joints where the arch has come out of alignment due to settling at the base at the right.*