



**Planning, Development and Real Estate Committee**

**Board Action Item A.**

**April 12, 2007**

**Alkali-Silica Reaction (ASR) Rehabilitation  
for Various Rail Structures**

**Washington Metropolitan Area Transportation Authority  
Board Action/Information Summary**

Action  
 Information

MEAD Number:  
99772

Resolution:  
 Yes  No

**PURPOSE**

To initiate and award a competitive contract for structural Alkali-Silica Reaction rehabilitation for various Rail Structures.

**DESCRIPTION**

Alkali-Silica Reaction (ASR) is produced from the reaction of silica aggregates and alkalis in the portland cement. The swelling pressures caused by ASR result in visible cracking (often map cracking) on the exterior of the concrete. Metrorail structures constructed prior to mid 80`s used river-run (silica) aggregate for concrete mix. These structures are now showing signs of damage caused by ASR such as map-cracking and surface spalling of concrete.

Structural evaluation was performed to identify the presence of ASR and specific deteriorated areas of the structures and concrete. The presence of ASR was verified by petrographic analysis of the concrete samples collected from the structures. Preventive measures to stop the ASR deterioration of concrete are necessary to achieve expected life of various structures on the Red, Blue and Orange Lines: exposed walls, piers, pier caps, etc.

The concrete surfaces of the structures will be coated with a corrosion inhibitor and a silicone-based elastomeric coating. Deteriorated concrete will be removed and replaced. To prevent future extensive repairs or replacement of these structures the coatings must be applied, otherwise further deterioration will continue from a combination of ASR, freeze-thaw and corrosion of the reinforcing steel.

**FUNDING IMPACT**

Program: Proposed FY 08 Capital Improvement Program

Project: ROW Structural Rehabilitation

	FY08	FY09	Total
Budget:	\$15,350,000	\$19,262,000	\$34,612,000
This Action:	650,000	650,000	1,300,000
Prior Approval:	3,876,184	2,619,909	6,496,093
Remaining Budget:	\$10,823,816	\$15,992,091	\$26,815,907

Remarks: There is no operating impact resulting from this procurement.

**RECOMMENDATION**

To initiate and award a competitive contract for structural ASR rehabilitation for various Rail Structures.



# Alkali-Silica Reaction (ASR) Rehabilitation for Various Rail Structures

*Presented to the Board of Directors:*

**Planning, Development and  
Real Estate Committee**

April 12, 2007





# Background

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- Alkali-Silica Reaction (ASR) is produced from the reaction of silica-containing aggregates and alkalis in the portland cement resulting in cracking on the exterior of reinforced concrete structures.



Rhode Island Avenue Aerial Structure – Pier Cap over CSX



# Background

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- Prior to mid 1980's silica containing river run aggregates were used in concrete. Crushed stone has been used since.



Medical Center Portal Wall



# Background

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- Presence of ASR has been verified by Petrographic Analysis of concrete samples collected from various structures on the Red, Blue and Orange Lines:
  - Entrance, portal and common walls
  - Vent and fan shaft walls
  - Pier caps and abutments



**First Street Bridge South Abutment**





# Rehabilitation: Repairs & Coatings

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- Preventive measures are necessary to achieve expected life of structures:
  - Coat concrete surfaces with Corrosion Inhibitor followed by a silicone-based breathable elastomeric coating
  - Remove and replace badly deteriorated concrete prior to application of coatings



**Rhode Island Avenue Aerial Structure**





# Recommendations

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- Approval to initiate and award a competitive contract for structural Alkali-Silica Reaction rehabilitation of various Rail Structures estimated at \$1,300,000.