City of Minneapolis Storm Tunnels

Tunnel Condition Ranking

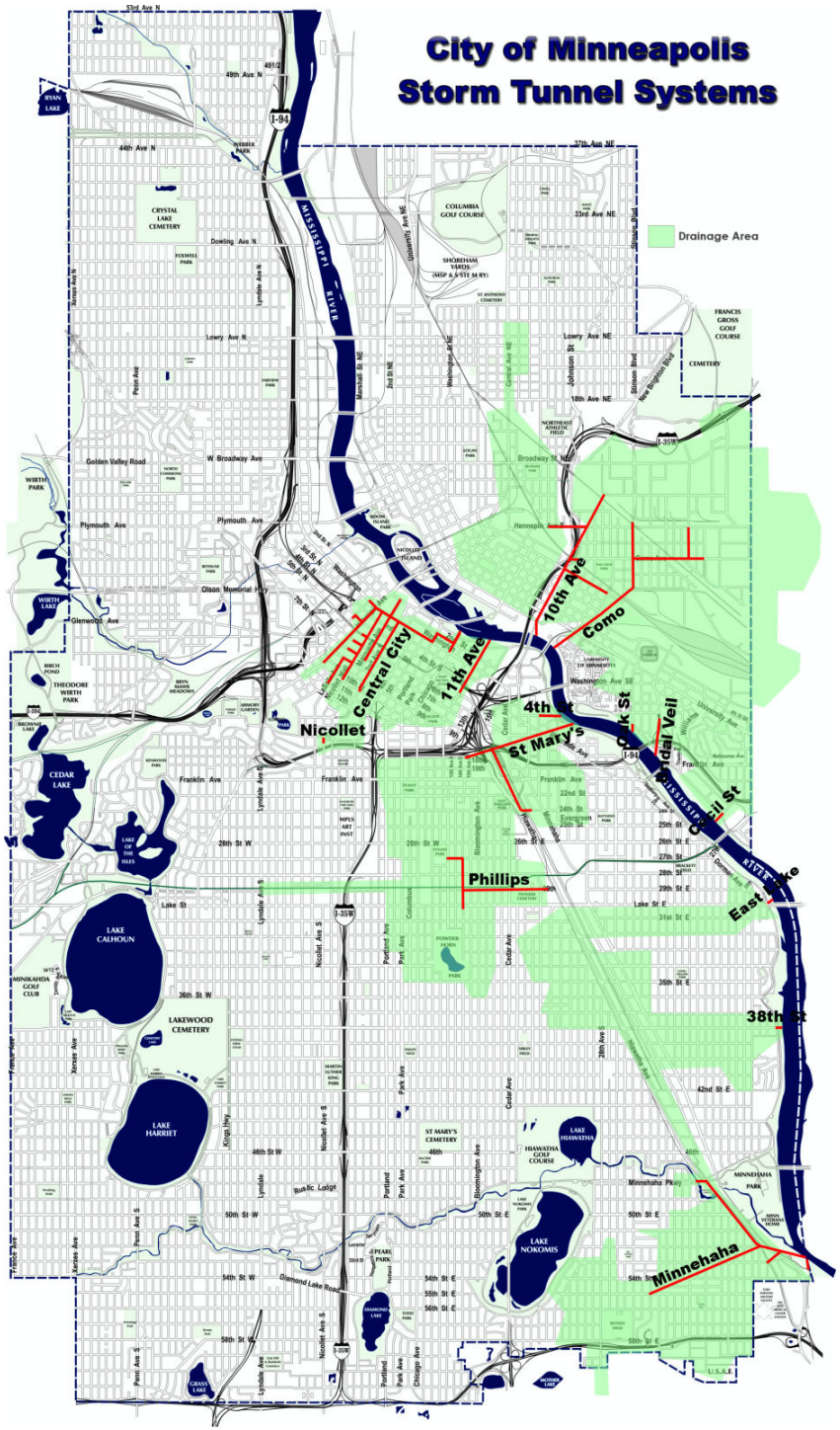
Why Do We Have Storm Tunnels?

Collect storm water from the smaller collection systems, and then convey the storm water to a nearby accepting body of water (i.e. Lake, creek, or river).

Tunnel Locations

- Minneapolis Storm Tunnels

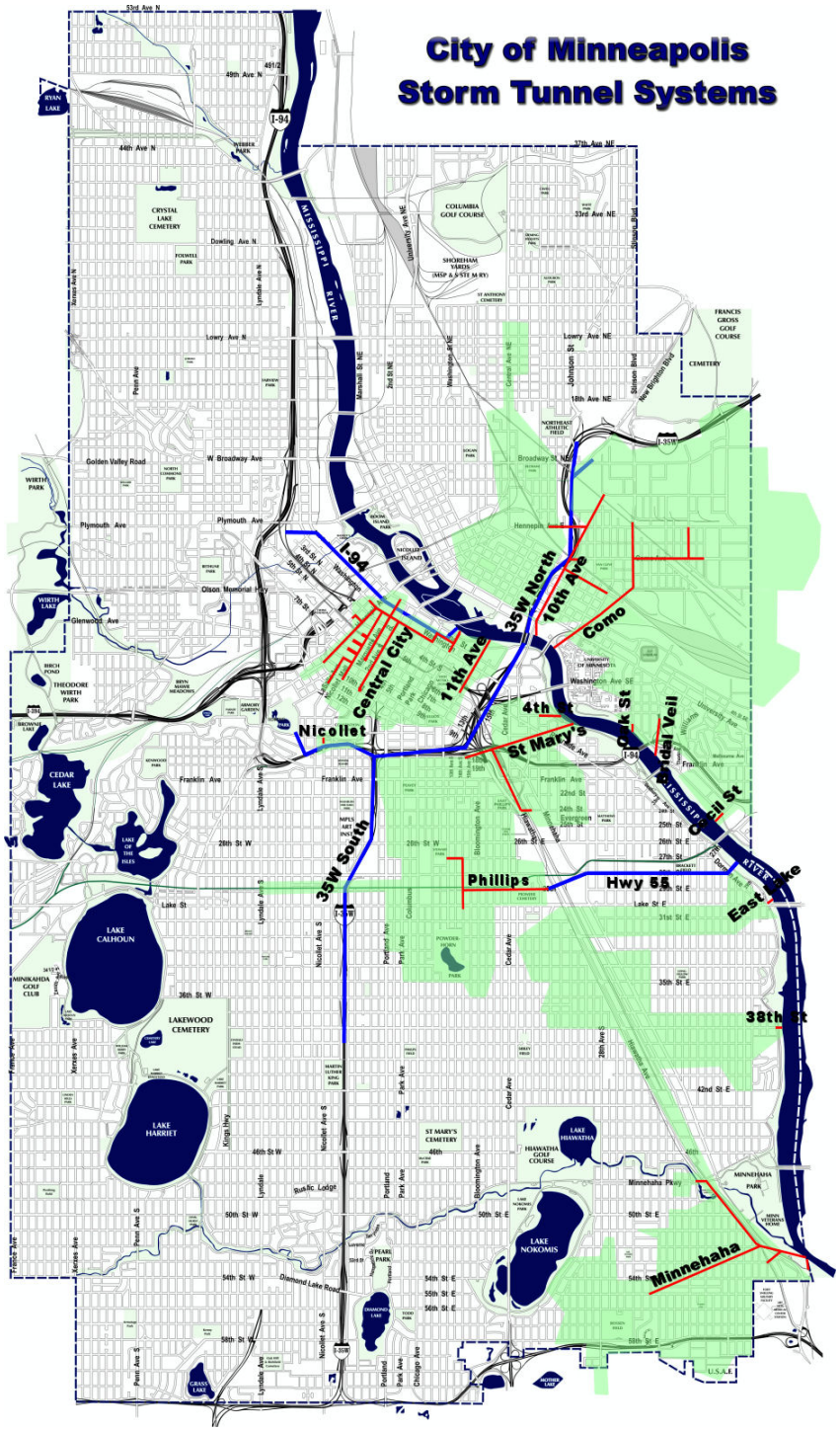
Minneapolis storm tunnels drain approximately 4,800 acres of 37,376 acres total.



Tunnel Locations

- Minneapolis Storm Tunnels
- Mn/DOT Storm Tunnels

Minneapolis and Mn/DOT storm tunnels combined, drain approximately 10,000 acres or 27% of the City.

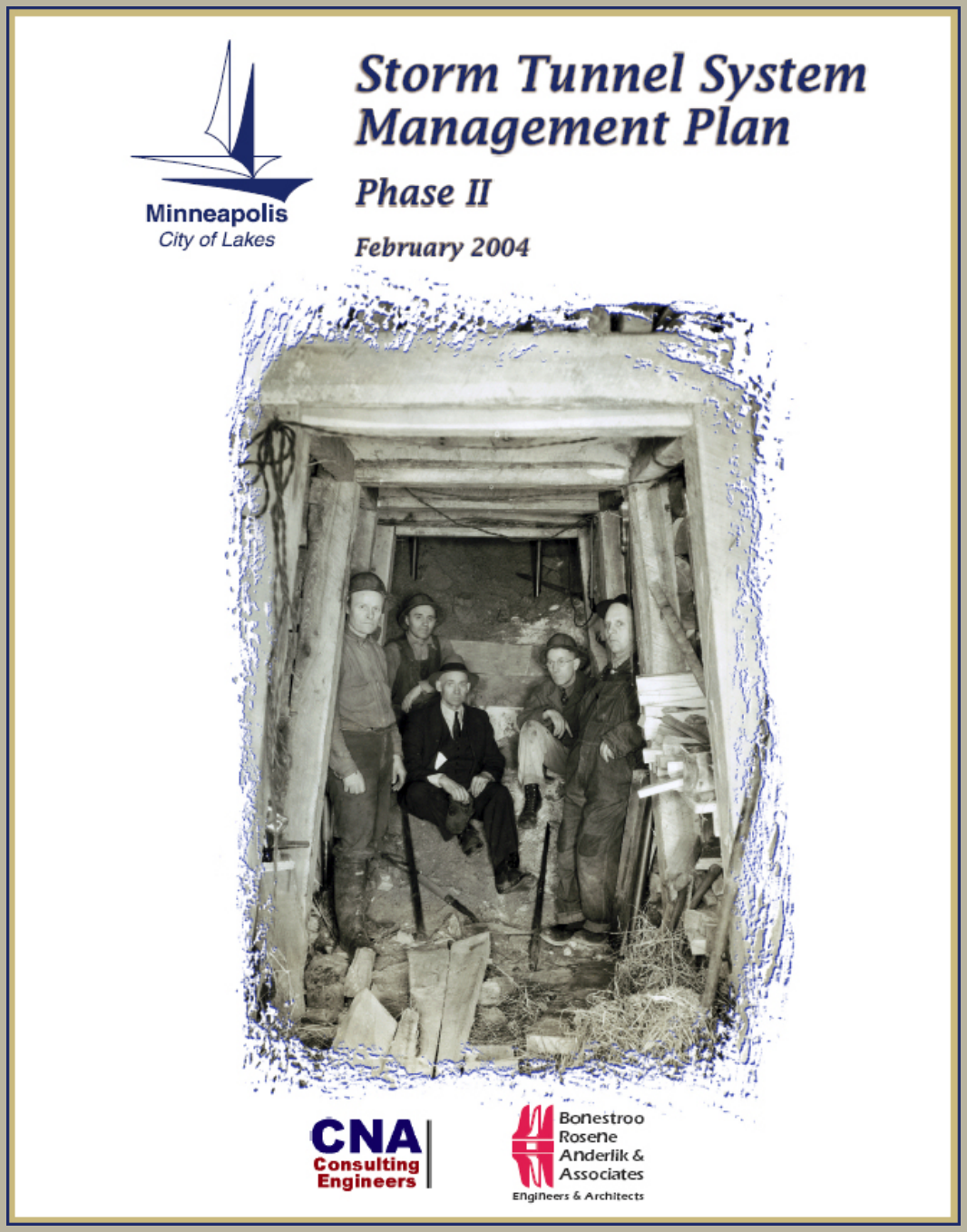


Tunnel Facts & History

- Minneapolis has 14.7 miles of storm tunnels.
- The majority of existing storm tunnels were built between 1930 and 1970, with one as early as 1882.
- Storm tunnels range from 65 to 100 feet below the surface in the St Peter sandstone formation.
- Most tunnels were excavated by hand using picks and shovels. Tunnels were then lined with concrete and/or brick.

Tunnel Reports

- **2002** – Preliminary Tunnel System Inventory
- **2004** – Storm Tunnel System Investigation
- **2007** – Storm Tunnel Management Plan



Tunnel Condition Ranking Criteria

- Structural Condition

- Hydraulic Capacity

- Ranking Criteria is based off of a modified version of the criteria used by the National Association of Sewer Service Companies and the WRC Sewerage Rehabilitation Manual.

City of Minneapolis

Minneapolis
City of Lakes

Tunnel System Management Plan

SYSTEM MAP SUMMARY

Minnehaha and Snelling Avenue Tunnel Systems

N
W E
S

Feet
750 0 750

February, 2004

CNA Consulting Engineers

Bonestroo Rosene Anderlik & Associates Engineers & Architects

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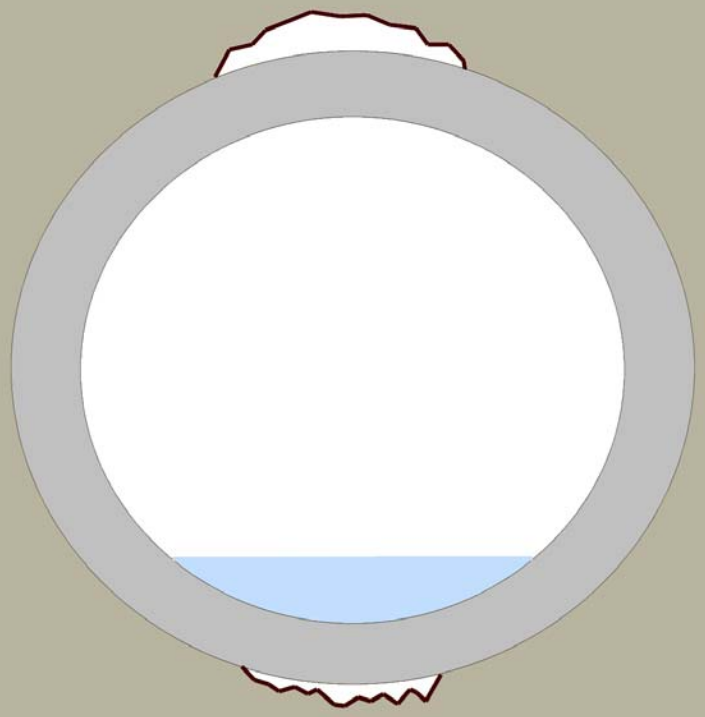
Tunnel Condition Ranking Levels

- Good - The tunnel is structurally adequate and defects are not causing deterioration. *The tunnel requires monitoring.*
- Fair - The tunnel is structurally adequate but defects are causing deterioration. *The tunnel requires monitoring and maintenance.*
- Poor - The tunnel is structurally inadequate and defects have caused advanced deterioration.

  The tunnel requires rehabilitation.
- Urgent - The tunnel is structurally inadequate. *The tunnel requires immediate attention.*

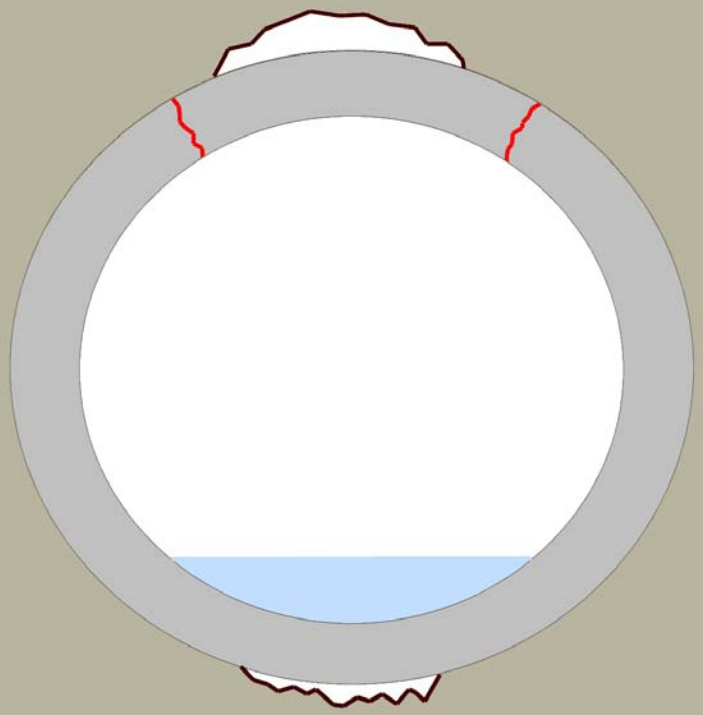
Good Condition

- Voids and loose sandstone exist in tunnel crown due to failing of sandstone.



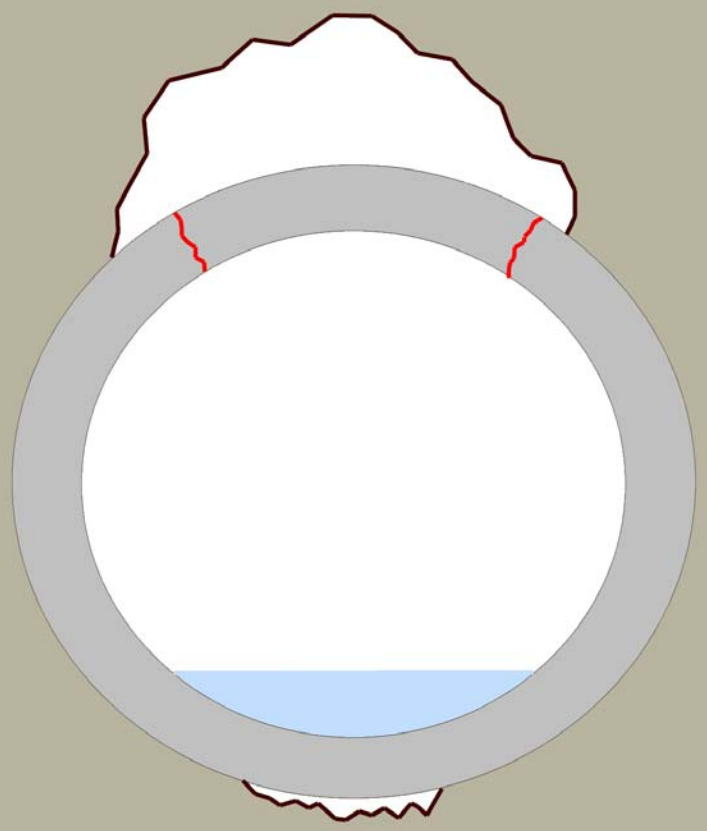
Fair Condition

- Cracks begin to appear due to the pressurization of the tunnel.
- Tunnel pressurization forces the storm water through the cracks.



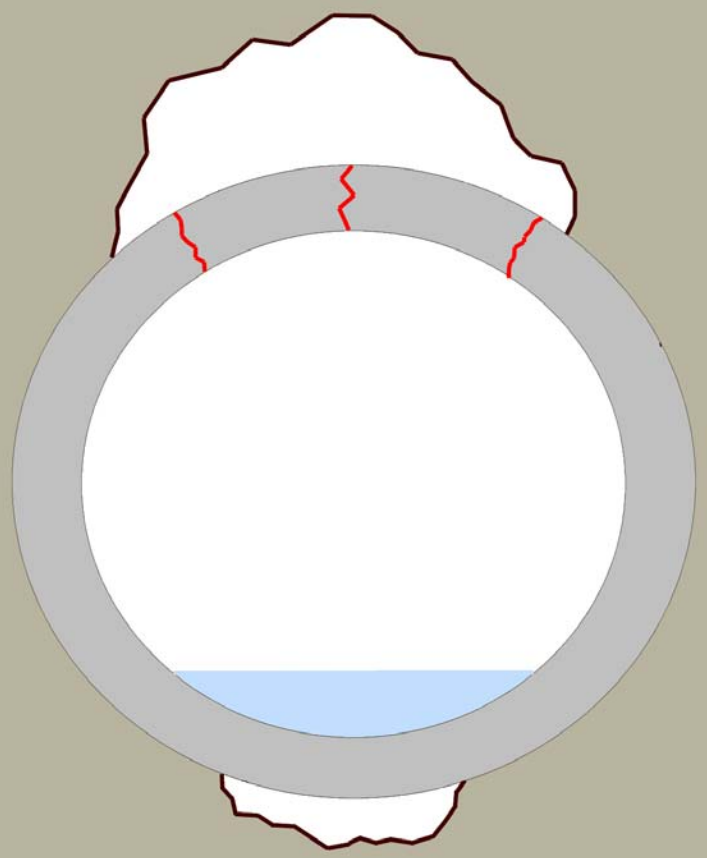
Fair Condition

- Cracks begin to appear due to the pressurization of the tunnel.
- Tunnel pressurization forces the storm water through the cracks.
- The storm water and ground water infiltrate back through the cracks into the tunnel, carrying with it sandstone that was eroded away. This action creates larger voids around the tunnel.



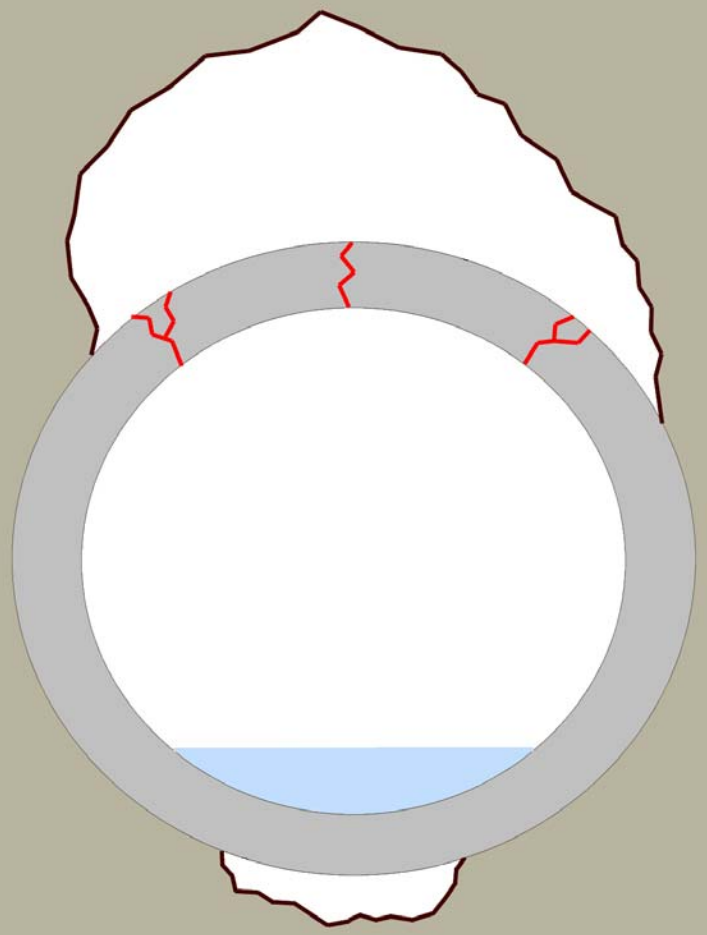
Poor Condition

- Cracks widen due to the pressurization and become fractures.
- Fractures allow more flow of water through them, eroding away the sandstone more quickly.



Poor Condition

- Cracks widen due to the pressurization and become fractures.
- Fractures allow more flow of water through them, eroding away the sandstone more quickly.
- Voids become larger as the erosion continues.

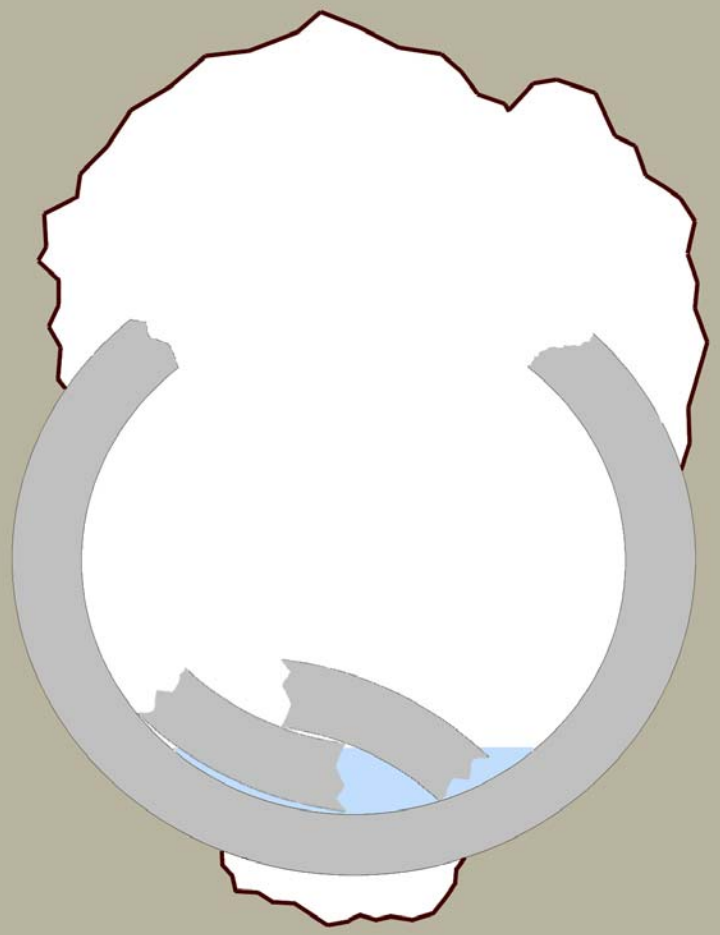


FIRM GRIP

Urgent Condition

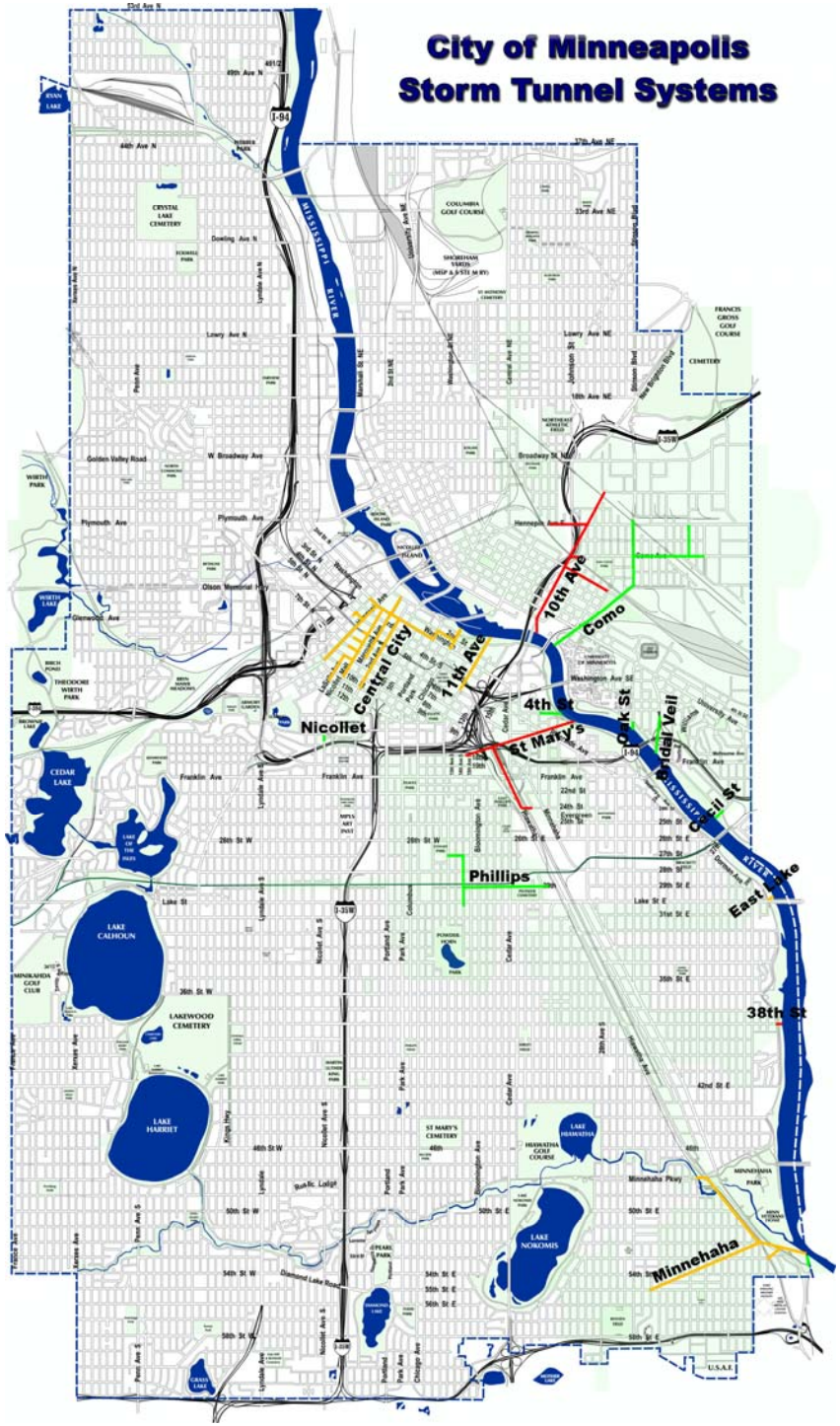
- Sections of the tunnel liner at the fractures become dislodged and fall into the tunnel.

- Voids continue to increase in size and migrate upwards towards the surface.



Tunnel Conditions

- Good – 27%
- Fair – 51%
- Poor – 22%



Tunnels – Where Do We Go From Here?

Create a comprehensive tunnel management program consisting of:

Annual tunnel inspections and monitoring;

Energizer

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Create a comprehensive tunnel management program consisting of:

Annual tunnel inspections and monitoring;

Annual tunnel maintenance & rehabilitation programs;

Cost estimates for projects.

Funding

Stormwater Enterprise Fund

Storm Tunnel Capital Program