



US Army Corps of Engineers®

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Appendix F – Coastal Shoreline Condition

Draft Supplemental Environmental Assessment
Morgan Shoal Revetment Reconstruction (45th - 51st Street)

Coastal Shoreline Condition Morgan Shoal 2025

A coastal shoreline conditions assessment was conducted based upon multiple site visits from 2019 - 2025, CDOT/CPD shoreline assessment reports, 2022 drone footage, Google Earth imagery, and utilizing ESRI ArcGIS mapping.

Definitions

Intact: Shoreline protection structure that remains structurally sound without significant displacement, settling, or structural failure, and has maintained its stability to provide shoreline protection for the backshore

Temporarily Intact: Shoreline protection structure that is temporarily intact as described above, such that the expected lifespan is 5 to 10 years before the condition degrades to its previous condition.

Structural Failure: Shoreline protection structure has failed from a structural stability standpoint, however, still provides a degree of protection.

Functional Failure: After structural failure, functional failure begins, in which storm damage occurs to areas behind the shore protection structures. Characterized by loss of level of protection which the shore structures were intended to provide.

Signs of Structures Conditions

Intact

- Structural elements remain in their original placement
- Minimal erosion behind structure
- No large gaps or voids
- No major cracks, fractures in concrete/stone
- Effective wave dissipation

Temporarily Intact

- Same as above

Structural Failure

- Deterioration of timber piling, wales and sheeting in the vicinity of the tie rod anchorage in which the structure is no longer supported as intended in the original structural system
- Loss of retained crib fill material
- Large voids under concrete and limestone blocks
- Displaced capstone/concrete covering

Functional Failure

- Subsidence/loss of capstone or concrete covering
- Backshore erosion
- No protection for the backshore

Approximately 424 linear feet (LF) of the project area is structurally intact, approximately 1888 LF is structurally failed, and approximately 2642 LF is functionally failed. Approximately 1674 LF of shoreline is temporarily intact.

The temporarily intact shoreline condition overlaps with structurally and functionally failed sections of the shoreline as this section was included in the 2020 emergency repair work which has a 5-to-10-year lifespan.

That work included placement of riprap, grouting, and concrete blocks as a temporary fix to wave overtopping and backshore erosion. These measures were installed in the backshore, upper levels and on top of existing coastal structures.

The structurally and functionally failed structures remain below the temporarily intact emergency repair work, and it is anticipated that when the temporary emergency repairs expire that these sections would return to their structurally and functionally failed status. The showing of both the failed condition and temporarily intact condition on the map is an attempt to show the duality and the temporary nature of these sections.

The following map and aerial drone footage show the categorized shoreline conditions along the Morgan Shoal reach to better understand the existing coastal shoreline conditions and the need for long term coastal shoreline protection.

Intact: Shoreline protection structure that remains structurally sound without significant displacement, settling, or structural failure, and has maintained its stability to provide shoreline protection for the backshore.

Signs of intact structures

- Structural elements remain in their original placement
- Minimal erosion behind structure
- No large gaps or voids
- No major cracks, fractures in concrete/stone
- Effective wave dissipation

Temporarily Intact: Same as intact but with expected lifespan of 5 to 10 years.

Signs of intact structures

- Same as Intact

Structural Failure: Shoreline protection structure has failed from a structural stability standpoint, however, still provides a degree of protection.

Signs of structural failure:

- Deterioration of timber piling, wales and sheeting in the vicinity of the tie rod anchorage in which the structure is no longer supported as intended in the original structural system
- Loss of retained crib fill material
- Large voids under concrete and limestone blocks
- Displaced capstone/concrete covering.

Functional Failure: After structural failure, functional failure begins, in which storm damage occurs to areas behind the shore protection structures. Characterized by loss of level of protection which the shore structures were intended to provide.

Signs of function failure:

- Subsidence/loss of capstone or concrete covering
- Backshore erosion
- No protection for the backshore



Legend

Shoreline Condition

- Functional Failure
- Structural Failure
- Temporarily Intact
- Intact

**Coastal Shoreline Condition
Morgan Shoal – 2025**

A coastal shoreline conditions assessment was conducted based upon multiple site visits from 2019 - 2025, CDOT/CPD shoreline assessment reports, 2022 drone footage, Google Earth imagery, and utilizing ESRI ArcGIS mapping

Coastal Shoreline Condition Morgan Shoal 2025

Intact: 424 Linear Feet (LF) (9% of Project area)

Temporarily Intact*: 1674 LF (34% of Project area)

Structural Failure: 1888 LF (38% of Project area)

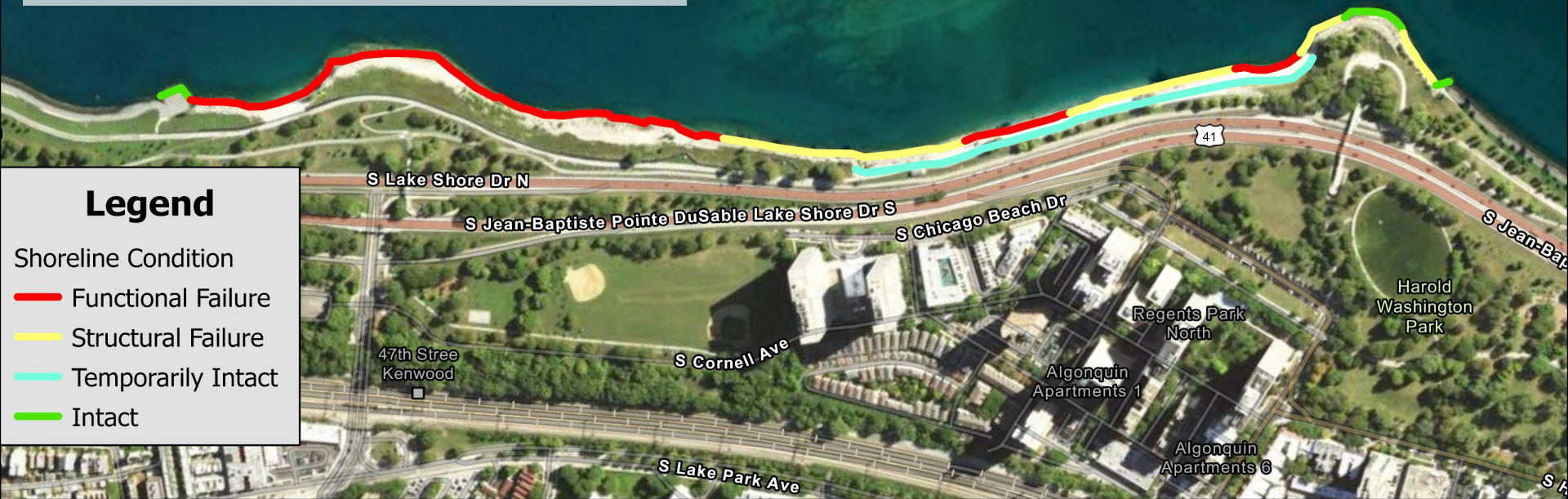
Functional Failure: 2642 LF (53% of Project area)

* The temporarily intact shoreline condition overlaps with structurally and functionally failed sections of the shoreline as the 2020 emergency repair work has a 5-to-10-year lifespan with the anticipation that these sections would return to their previous condition. This is an attempt to show the duality and temporary nature of these sections.

Legend

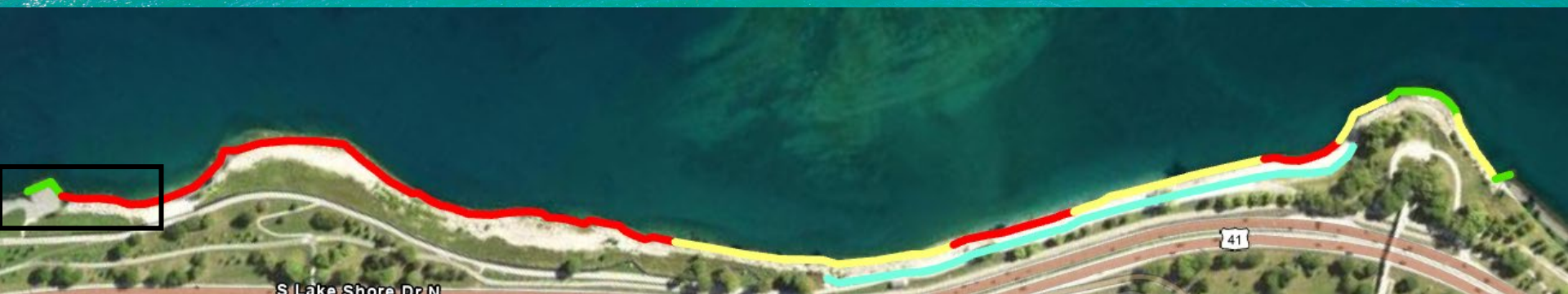
Shoreline Condition

- Functional Failure
- Structural Failure
- Temporarily Intact
- Intact



Functional Failure
1920's Limestone

Intact
2012 Limestone



Functional Failure
1920's Limestone



Functional Failure
1920's Limestone

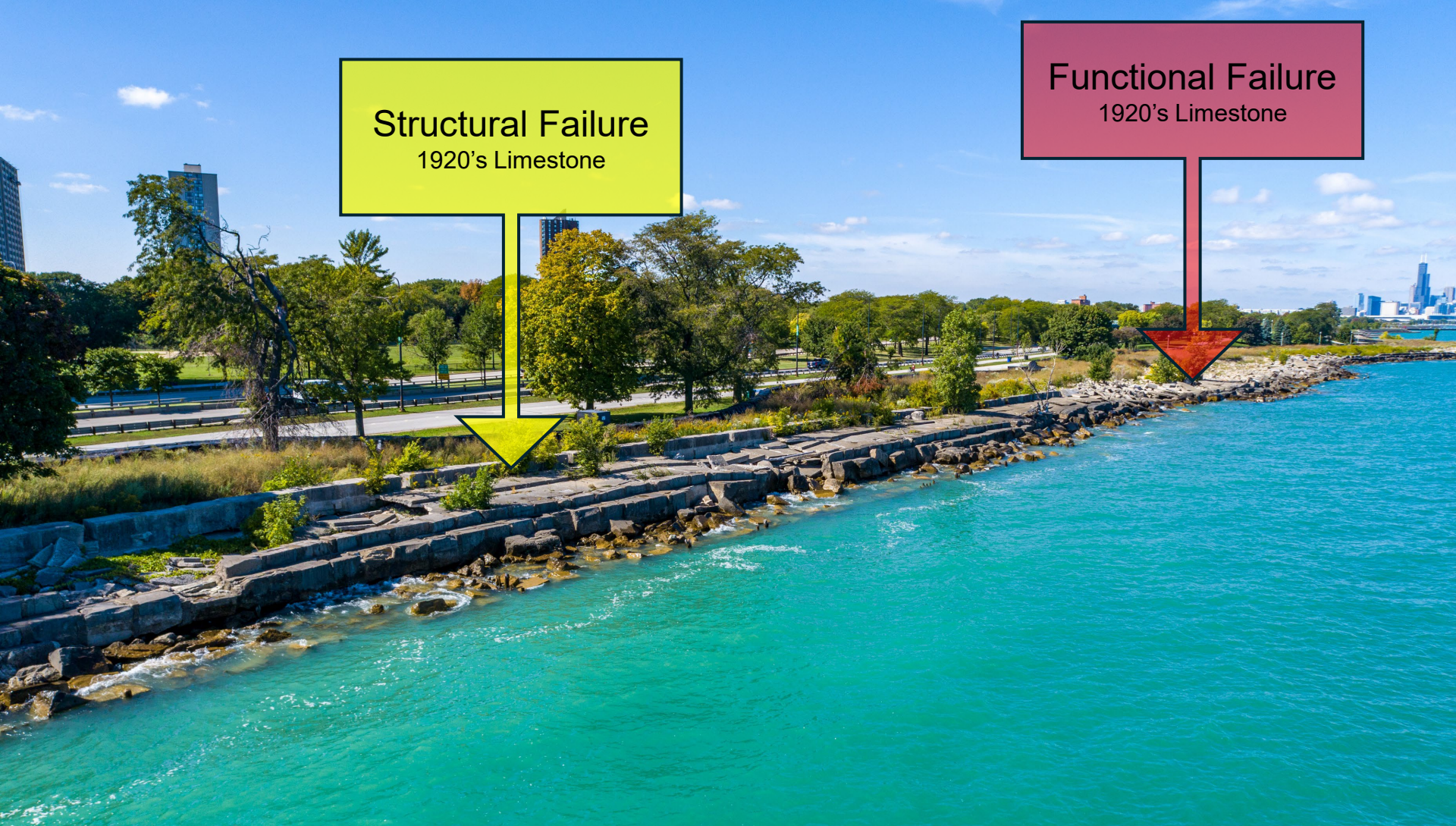


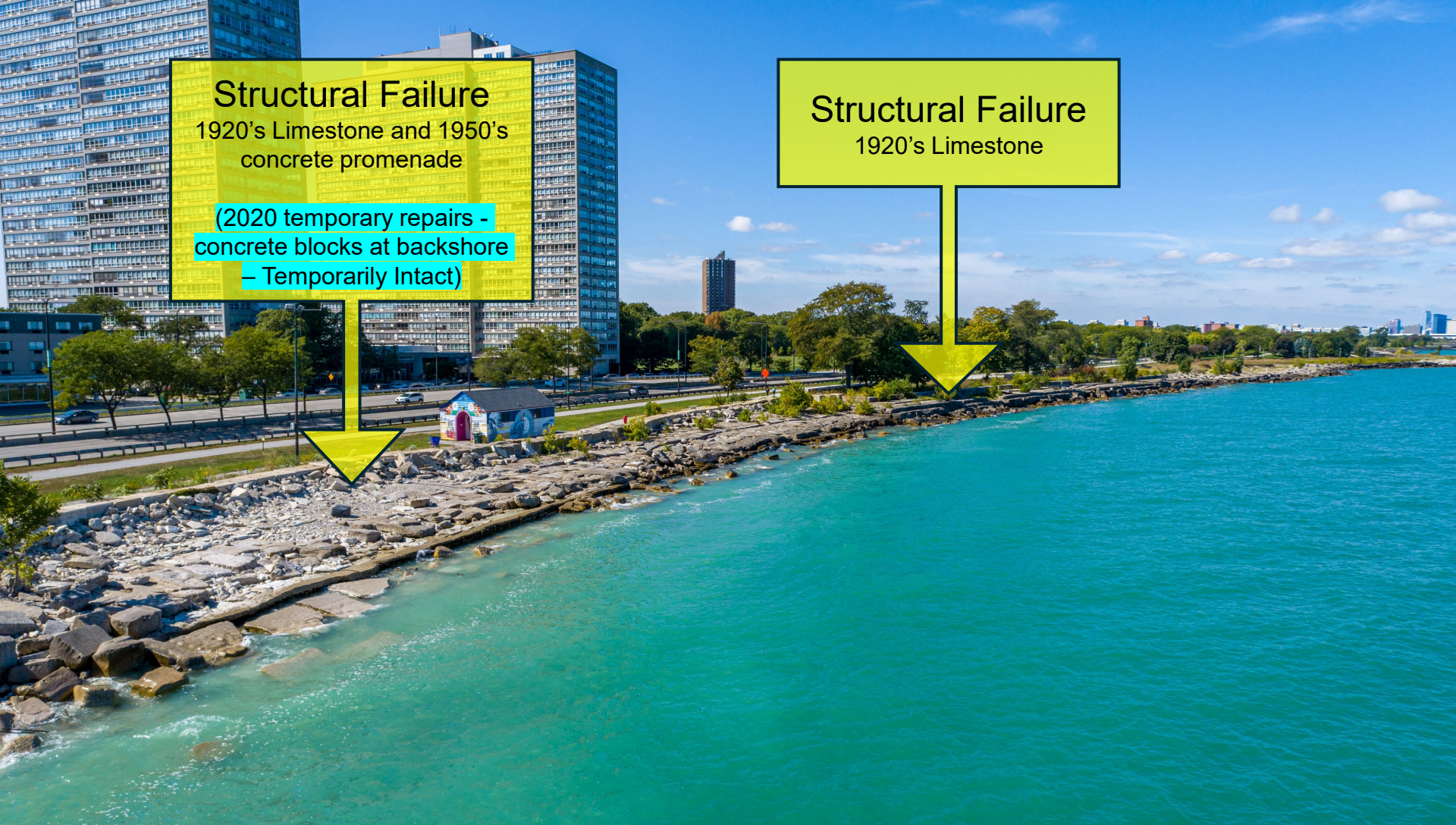
Functional Failure
1920's Limestone



Structural Failure
1920's Limestone

Functional Failure
1920's Limestone





Structural Failure
1920's Limestone and 1950's
concrete promenade
**(2020 temporary repairs -
concrete blocks at backshore
- Temporarily Intact)**

Structural Failure
1920's Limestone



S Lake Shore Dr N

41

Structural Failure

1920's Limestone

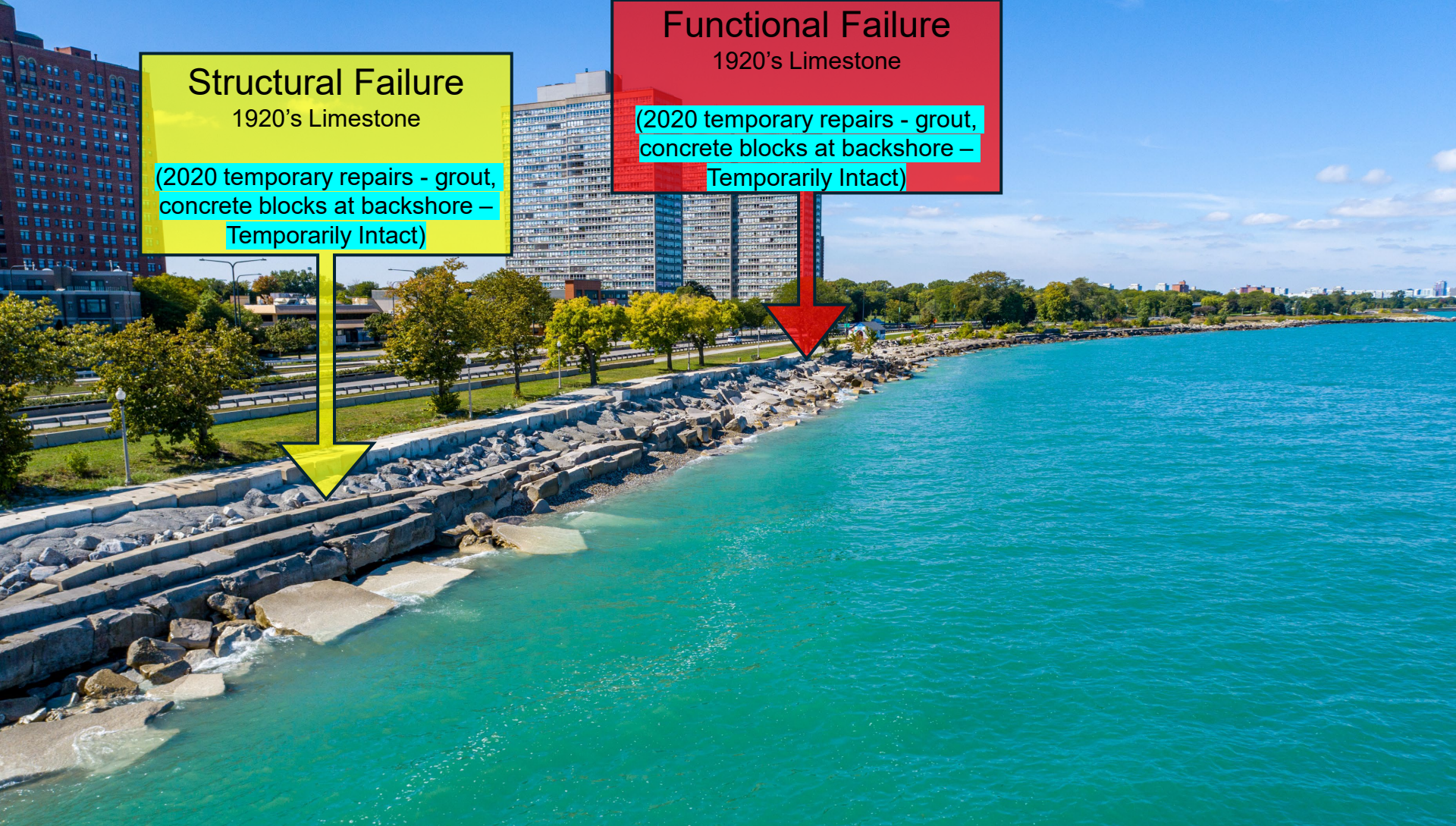
(2020 temporary repairs - grout, concrete blocks at backshore – Temporarily Intact)



Functional Failure

1920's Limestone

(2020 temporary repairs - grout, concrete blocks at backshore – Temporarily Intact)





Structural Failure

1920's Limestone

(2020 temporary repairs -
riprap at backshore -
Temporarily Intact)



Functional Failure

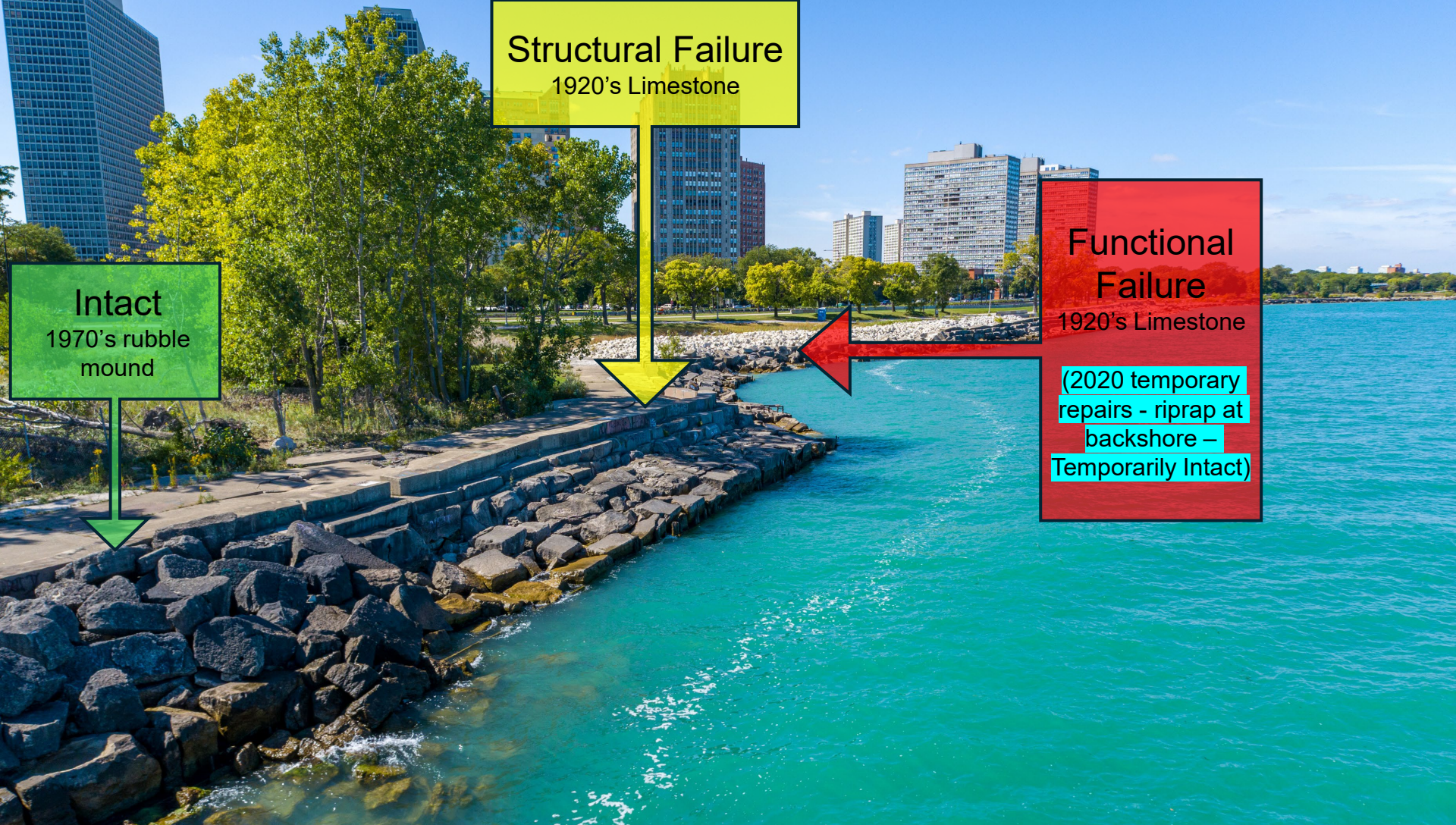
1920's Limestone

(2020 temporary repairs -
riprap at backshore -
Temporarily Intact)



S Lake Shore Dr N

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Structural Failure
1920's Limestone

Functional Failure
1920's Limestone
(2020 temporary repairs - riprap at backshore - Temporarily Intact)

Intact
1970's rubble mound



S Lake Shore Dr N

41

