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Appendix B - Supplemental Alternative Consideration Discussion

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

Appendix Purpose

The NEPA process requires that reasonable potential alternatives for a proposed action are evaluated for potential impacts to natural and cultural resources. Reasonable alternatives mean a reasonable range of alternatives that are technically and economically feasible that satisfies that project purpose and need. The “No Action” alternative is required to be included in the impacts analysis.

Section 2.3 – List of Alternatives in the main report discusses the two alternatives (no action and the preferred alternative) that are included in the evaluation for potential impacts. This does not mean that only these two alternatives were considered during the NEPA process. Instead, numerous alternatives were considered throughout the history of the proposed project.

Therefore, the purpose of this Appendix is to present the many ideas that were considered to address the coastal storm risk and flooding issues along the project reach and explain the justification for which measures and alternatives were included in the final detailed analysis in the Draft Supplemental Environmental Assessment for evaluating potential impacts to the natural and human environment.

Alternative structures, design features, and plans considered

Given the project’s decades long history as a piece of the larger Chicago Shoreline project, there were many ideas that were considered to address the coastal storm risk and flooding issues during the feasibility, pre-design, and design phases. It is worth noting that the alternatives considered range in complexity from simple ideas to individual design features, structures, and elements to conceptual designs and fully flushed out alternative plans. Therefore, the term “alternative elements” is used moving forward to fully encompass all the ideas that were considered throughout the project’s lifespan.

The following table describes the alternative elements considered in addition to the preferred alternative (Morgan Shoal Revetment Reconstruction), if it’s included in the preferred alternative, the reason why it was or was not carried forward, and the document or phase in which the consideration occurred. Alternative elements are organized in an approximate chronological order. Several alternative elements are similar to or encompass features of other elements and are retained in the table in an effort to show the full extent of considered elements throughout the planning process. Additionally, comments, suggestions, and ideas were gathered during the 2024 community involvement effort during the design phase (compiled in Appendix E) that were also considered, in which the main elements are included in the table.

Table 1: Alternative elements considered to address coastal storm risk and flooding at the 45th to 51st Street segment of the Chicago Shoreline

Alternative Element	Description	Included in preferred alternative	Reason why or why not included in proposed action	Comments	Document or Phase considered
Plan I – Base Plan: Low Berm Revetment (National Economic Development (NED) Plan)	Low Berm, wide crest rubble mound revetment for entire shoreline	No	Non-federal sponsors wanted to pursue Locally Preferred Plan (LPP) that focuses on both coastal protection and recreation.	Congress authorized the LPP, not the NED plan.	Illinois Shoreline Erosion Interim III Storm Damage Reduction – Final Feasibility and Environmental Assessment July 1993 (Herein “the 1993 Report) (Feasibility Phase)
Plan II – Breakwater/Corps of Engineers Plan	Breakwater, standard high crest, revetment with steel sheet pile/step stone	No	Not cost effective		The 1993 Report (Feasibility Phase)
Plan III – Breakwater/Park District Plan	Breakwater, deepwater, high crest	No	Not cost effective		The 1993 Report (Feasibility Phase)
Plan IV – Enhanced Base Plan (Steel Sheet-pile/step stone revetment) (LPP Plan)	Steel Sheet-pile/step stone revetment for entire shoreline	No	Infeasible to implement due to local geology along reach	This was the original LPP and was authorized by Congress in 1996	The 1993 Report (Feasibility Phase)
Non-Structural Plan	Set-back zone	No	Existing condition is essentially the non-structural plan and equivalent to future without project conditions	Non-structural plans are required to be included in the feasibility study	The 1993 Report (Feasibility Phase)
Chicago Shoreline Protection Commission Plan	Offshore breakwaters, repaired or rebuilt revetments	No	Expensive – not cost effective or efficient. Potential significant aquatic habitat impacts associated with construction on top of Morgan Shoal.	Included construction on top of Morgan Shoal	The 1993 Report, Appendix F Local Sponsor Plan Formulation (Feasibility Phase),
Chicago Park District Local Sponsor Plan	Offshore rubble stone breakwaters, tombolo land creation	No	Expensive and has high recreational focus (not a federal objective) Potential significant aquatic habitat impacts associated with construction on top of Morgan Shoal.	Included construction on top of Morgan Shoal	The 1993 Report, Appendix F Local Sponsor Plan Formulation (Feasibility Phase)
Breakwaters	Conventional high crest or moderate crest	No	Expensive		The 1993 Report, Appendix E Plan Formulation and Appendix A Coastal Engineering (Feasibility Phase)
Reefs	Underwater breakwater	Yes	Well suited for protection of dynamically stable shorelines (beach), relatively inexpensive to construct and maintain	The 1993 Report considered large scale reefs but needed research on breakwater/shoreline interaction. Smaller reef included in preferred alternative provides stability for dynamic revetment.	The 1993 Report, Appendix A Coastal Engineering (Feasibility Phase) and during the Design Phase for the Morgan Shoal Revetment Reconstruction first added as part of 60% design

Alternative Element	Description	Included in preferred alternative	Reason why or why not included in proposed action	Comments	Document or Phase considered
Conventional (Standard) revetment	High crest rubble mound revetment	No	Not cost effective		The 1993 Report, Appendix E Plan Formulation and Appendix A Coastal Engineering (Feasibility)
Low Berm revetment segment	Low berm rubble mound revetment segment	Yes	Cost effective, meets coastal standards, implementable along the reach given geology constraints	Main component of the NED plan. Preferred alternative includes this element along the northern and southern part of the project reach (called sloped rubble mound revetment)	The 1993 Report, Appendix E Plan Formulation and Appendix A Coastal Engineering (Feasibility), pre-design as part of the 2015 Morgan Shoal Framework Plan, and design phase as part of the Morgan Shoal Revetment Reconstruction
Composite (step-stone/steel sheet pile) revetment	Steel sheet pile support structure with step-stone superstructure (encompasses all material types for step-stone superstructure)	Yes and No	Yes – Meets coastal standards where feasible to implement No – Infeasible to construct along significant portion of reach due to local geology constraints	This design element is only feasible to construct along the southern most part of the reach around the 51 st Street peninsula because the bedrock profile is deeper and does not cause issue for driving in the steel sheet pilings. Various material types considered and materials for the superstructure must meet coastal standards. This approach could be considered along the northernmost reach based on geology, however, the termination detail at 45 th street was designed assuming that a rubble mound revetment would be adjacent.	The 1993 Report, Appendix E Plan Formulation and Appendix A Coastal Engineering (Feasibility), pre-design as part of the 2015 Morgan Shoal Framework Plan, and design phase as part of the Morgan Shoal Revetment Reconstruction
Complete Beach construction	Construct new beach	No	Required retainment structure i.e. groins, not applicable in high wave climate locations	This alternative design element includes the construction of a new beach where a beach did not already exist along the shoreline. While this is similar to ‘dynamic revetment’, they are separate in the table to specify that these elements were considered	The 1993 Report, Appendix E Plan Formulation and Appendix A Coastal Engineering (Feasibility)
Beach replenishment	Nourish existing beach, also can include expanding beach footprint	Yes	Enhances existing beach’s shore protection aspects; low cost	A component of the ‘dynamic revetment’ described later in the table	The 1993 Report, Appendix E Plan Formulation and Appendix A Coastal Engineering (Feasibility), 2015 Morgan Shoal Framework Plan, and MS Revetment Reconstruction (pre-design and design)

Alternative Element	Description	Included in preferred alternative	Reason why or why not included in proposed action	Comments	Document or Phase considered
Shoreline Rehabilitation	Timber pile revetment reconstruction synonymous with repair in kind	No	Shoreline already in significantly deteriorated state. Timber pilings subject to rot which shortens lifespan of support structure and do not meet coastal standards.	This element would include rehabilitating the existing structure including the timber pilings. Appendix A Coastal Engineering goes into extensive detail as to why this alternative element is not feasible.	The 1993 Report, Appendix E Plan Formulation, Plate 35, Appendix A Coastal Engineering (Feasibility)
Concrete stepped revetment	Steel sheet pile support structure with concrete stone superstructure previously implemented in other Chicago Shoreline segments	Yes and No	Yes – Meets coastal standards where feasible to implement No – Infeasible to construct along significant portion of reach due to local geology constraints	This design element is only feasible to construct around the 51 st Street peninsula, which is a small portion of the Morgan Shoal reach. Material specification same as the previously described ‘composite revetment’ alternative element. Element would include textured form liner to give appearance of limestone blocks.	Pre-design investigation during 1990s- 2000s associated with other segments of Chicago Shoreline Protection project. Pre-design as part of the 2015 Morgan Shoal Framework Plan, and design phase as part of the Morgan Shoal Revetment Reconstruction
Limestone stepped revetment	Rehabilitate or reconstruct revetment using steel sheet piling support structure and salvaged or new cut limestone blocks for superstructure	No	Stability concerns of stacking the blocks (uneven salvaged blocks) which would lead to shorter lifespan and not meeting coastal standards. Cost prohibitive option for both salvaged and new cut as there is not enough existing appropriately size blocks and new cut would be required. Not ADA compliant. Infeasible to construct along significant portion of reach due to the geology constraints.	This alternative design element is similar to the Composite (step-stone/steel sheet pile) revetment but with specified material use and similar to shoreline rehabilitation with a different support structure. This alternative was considered for the northern section as well as around 51 st Street but was rejected due to significant costs and durability concerns.	Pre-design investigation during 1990s- 2000s associated with other segments of Chicago Shoreline Protection project. Design phase as part of the Morgan Shoal Revetment Reconstruction
1999 Burnham Framework Plan	Lakefill to create cove and wetlands, segmented breakwater	No	Expensive and has high recreational focus (not a federal objective). Potential significant aquatic habitat impacts associated with construction on top of Morgan Shoal.	Included potential construction on top of Morgan Shoal with the segment assuming sheet pile and concrete stepped revetment.	Burnham Park Framework Plan 1999 (pre- design phase)

Alternative Element	Description	Included in preferred alternative	Reason why or why not included in proposed action	Comments	Document or Phase considered
Island peninsula – BauerLatoza conceptual design	Lakefill to create island peninsula over morgan shoal with sand and pebble beaches, submerged breakwater	No	Expensive and has high recreational focus (not a federal objective). Potential significant aquatic habitat impacts associated with construction on top of Morgan Shoal.	Included construction on top of Morgan Shoal. This concept was the non-selected final concept for the 2003 Concept Report	Morgan Shoal Concept Development Report 2004. Pre-design phase during early 2000s
Morgan Shoal Natural Area – BauerLatoza – 2004 Concept Development Report	Lakefill to create island peninsula over Morgan Shoal with backshore lagoon and wetland system, sand and pebble beaches, submerged breakwater.	No	Expensive and has high recreational focus (not a federal objective). Potential significant aquatic habitat impacts associated with construction on top of Morgan Shoal.	Included construction on top of Morgan Shoal. Design concept process included extensive public involvement	Morgan Shoal Concept Development Report 2004. Pre-design phase during early 2000s
2015 Morgan Shoal Framework Plan	Lakefill, rubble mound slope constructed with large, quarried stone, stepped stone revetment with a pebble beach as a dynamic revetment, transitional concrete stepped revetment, natural areas, overlooks, art opportunities, fitness station, lakefront trails	Yes	Meets coastal standards, constructable along the reach given the constraints, not cost prohibitive. Does not include construction on top of Morgan Shoal.	The conceptual design basis for the preferred alternative equivalent to a 15% design. Later evolved design iteration called “Morgan Shoal Revetment Reconstruction”	Pre-design as part of the 2015 Morgan Shoal Framework Plan, and design phase as part of the Morgan Shoal Revetment Reconstruction
Dynamic revetment	Expansion of pebble beach from the 2015 MS Framework Plan, inclusion of new cobble materials – smooth rounded pebbles, salvage and re-use of existing pebbles, ADA access location included	Yes	Enhances existing beach’s shore protection aspects; cost efficient to re-use materials. Community expressed high desire to save and re-use existing pebbles	The presence of Morgan Shoal provides a level of natural protection with a reduced wave climate making the dynamic revetment feasible at this location	Design phase as part of the Morgan Shoal Revetment Reconstruction
Headlands	Creation of headlands through lakefill to contain dynamic revetment	Yes	Headlands stabilize the dynamic revetment during storms	Shoreline interface would consist of sloped rubble mound	Design phase as part of the Morgan Shoal Revetment Reconstruction
Reconstruction of limestone stepped revetment at backshore	Reconstructing stepped revetment at backshore of dynamic revetment using salvaged original 1920’s/30’s limestone	Yes	Mimics historic limestone stepped revetment. There’s flexibility for meeting coastal standards as it is at the backshore of the dynamic revetment which meets coastal standards. Community expressed high desire to reuse limestone blocks and have limestone stepped revetment in the design	Includes increased height from community input to provide noise mitigation and more secluded feel. This arrangement was tested in the physical model and is an integral part of the overall coastal system.	Design phase as part of the Morgan Shoal Revetment Reconstruction

Alternative Element	Description	Included in preferred alternative	Reason why or why not included in proposed action	Comments	Document or Phase considered
Cut limestone with sheet pile foundation – option 1	Cut limestone blocks in 3 steps (superstructure) over steel sheet pile foundation (support structure) with minimum scour protection.	No	Cost prohibitive – not cost effective. Geologic constraints for installing steel sheet pilings still present and not feasible throughout significant portion of reach	If the entirety of the project outside the dynamic revetment were to be built using cut limestone steps, the additional cost is estimated to be in excess of \$40-\$50 million.	Design phase as part of the Morgan Shoal Revetment Reconstruction
Cut limestone with sheet pile foundation – option 2	Cut limestone blocks in 3 steps over steel sheet pile foundation with additional armor stone scour protection	No	Cost prohibitive – not cost effective. Geologic constraints for installing steel sheet pilings still present and not feasible throughout significant portion of reach		Design phase as part of the Morgan Shoal Revetment Reconstruction
Cut limestone with rubble mound foundation	Cut limestone blocks in 3 steps over rubble mound foundation	No	Cost prohibitive – not cost effective		Design phase as part of the Morgan Shoal Revetment Reconstruction
Limestone blocks used in section of 51 st Street risers/step stone	Use of limestone blocks in top tiers of superstructure at 51 st Street	No and Yes	No - Salvaged blocks present concerns regarding stacking stability and meeting coastal standards. New cut blocks present cost premium, not cost effective.	Option consideration included top tiers and top riser of superstructure. Yes - Salvaged limestone blocks incorporated as edging behind superstructure	Design phase as part of the Morgan Shoal Revetment Reconstruction
Repair underlying damage and reconstruct between 48 th and 50 th	Reconstruct timber cribs and limestone step stone	No	Timber cribs subject to rot and do not meet coastal standards. There is limited revetment structure remaining as it is severely deteriorated.	Similar to Shoreline rehabilitate alternative element but only a section of reach	The 1993 Report, Appendix E Plan Formulation and Appendix A Coastal Engineering (Feasibility), Design phase as part of the Morgan Shoal Revetment Reconstruction (as brought up during 2024 community involvement)
Restore the concrete platform	Restore the concrete promenade around 51 st peninsula upper revetment and from 48 th to 49 th Street	No	Restoration would not meet coastal standards as underlying support structures would not meet coastal standards.	There is limited concrete promenade remaining along the reach and any restoration of the superstructure must have a supporting structure that meets coastal standards	Design phase as part of the Morgan Shoal Revetment Reconstruction

Alternative Element	Description	Included in preferred alternative	Reason why or why not included in proposed action	Comments	Document or Phase considered
Salvage existing materials	Reuse of existing materials in designs: limestone blocks, broken concrete/rubble, sand from trapbags, carved limestone, pebbles, small/irregular limestone pieces, large concrete blocks, large limestone blocks	Yes	Provides cost savings opportunities through appropriate reuse. Community expressed high desire to salvage existing materials, specifically to salvage and preserve more carved limestone, and use only rounded stone at pebble beach	Incorporation in designs varies on appropriate reuse, examples include seating in park, within dynamic revetment near water's edge, backshore revetment, rubble mound edging, etc. See Section 3.4.2 of main report for specifics. Effort was made to incorporate natural, organic aesthetics in configurations	Design phase as part of the Morgan Shoal Revetment Reconstruction. Appendix E – 2024 Community Involvement in Design Phase
Reuse limestone blocks for revetment from 45 th to dynamic revetment and around 51 st St	Reuse existing limestone blocks in similar fashion to the cut limestone with sheet pile or rubble mound foundation alternative design element	No	Insufficient existing limestone blocks of the appropriate size to mitigate wave forces and uplift, because blocks have broken and been lost over time. New cut limestone would be needed and is cost prohibitive	Similar to cut limestone alternative elements but with reduced scope and reuse of material	Design phase as part of the Morgan Shoal Revetment Reconstruction
Reuse limestone blocks in rubble mound revetment	Incorporate salvaged limestone blocks into the armor stone rubble mound revetment (north and south segments)	No	Option considered but rejected based on concerns over quality control and physical properties of existing armor stone compared with newly quarried stone. Inventory of existing large stone indicated sufficient availability for other project features but not enough excess for use as part of the primary revetment.	Existing limestone lacking appropriate quantity needed for entire rubble mound. New armor stone would be needed to meet appropriate quantities	Design phase as part of the Morgan Shoal Revetment Reconstruction
ADA accessibility to pebble beach	ADA accessibility points	Yes	Complies with ADA requirements. Community expressed desire for ADA accessibility	Several configurations and material types were considered	Design phase as part of the Morgan Shoal Revetment Reconstruction
Accessible continuous path at water's edge	Install row of limestone in front of armor stone (base of rubble mound) to increase water access either in segments of reach or entirety	No	Placement would require additional structural support to prevent blocks from shifting limiting feasibility. Not cost effective	Blocks would be subjected to highest level of wave action	Design phase as part of the Morgan Shoal Revetment Reconstruction

Alternative Element	Description	Included in preferred alternative	Reason why or why not included in proposed action	Comments	Document or Phase considered
Accessible continuous path at top of revetment from 45 th to 51 st	Continuous path at top of revetment	Yes and No	Yes – continuous bike and pedestrian paths provides continuous access and meet non-federal objective No – Rubble mound revetment cannot be made accessible due to the uneven nature of the materials.	North revetment section incorporates salvaged limestone blocks at top of revetment and dynamic revetment salvaged limestone step stone at backshore offers walkable edge but may not be considered ADA accessible due to uneven surfaces. South revetment has path adjacent to top of revetment and is ADA accessible. Concrete steel sheet revetment at 51 st is accessible	Design phase as part of the Morgan Shoal Revetment Reconstruction
Accessible stepped limestone revetment	ADA accessible stepped limestone revetment from 45 th to 48 th and 50 th to 52 nd and behind a narrow strip of pebbles from 48 th to 50 th	No	Limestone blocks typically do not adhere to ADA compliance standards due to uneven surfaces	Wave uplift forces at the promenade level are such that individual limestone blocks can become misaligned to no longer meet ADA requirements.	Design phase as part of the Morgan Shoal Revetment Reconstruction
ADA accessibility only at 51 st Street	Limit ADA accessibility to only the transitional concrete stepped revetment around 51 st Street	No	ADA compliance is feasible at additional locations.		Design phase as part of the Morgan Shoal Revetment Reconstruction
ADA accessibility	ADA accessibility included where feasible	Yes	Includes ADA features where technically feasible. ADA compliance occurring for the following project features: transitional concrete stepped revetment around 51 st Street, dynamic revetment, restroom facility, viewpoints, plaza, and lakefront trails.		Design phase as part of the Morgan Shoal Revetment Reconstruction
Expansion of dynamic revetment	Extending the length of dynamic revetment north or throughout entire reach	No	Dynamic revetments only feasible in embayments such that high energy wave climates prohibit use outside proposed footprint	If expanded, would require more fill to meet coastal standards which is cost prohibitive and potentially increases impacts	Design phase as part of the Morgan Shoal Revetment Reconstruction

Alternative Element	Description	Included in preferred alternative	Reason why or why not included in proposed action	Comments	Document or Phase considered
Preserve the pebble beach	Keep pebble beach at same location while cleaning it up and making it safer through rebar removal	No	Does not meet coastal standards to meet federal objective of addressing coastal storm risk and flooding issues	Parallel to the 'no action' alternative with the lack of addressing the coastal storm risk and flooding issues	Design phase as part of the Morgan Shoal Revetment Reconstruction
Natural Shoreline	Naturalize the shoreline and keep the natural rocks in place	No	Does not meet coastal standard to meet federal objective of addressing coastal storm risk and flooding issues	Synonymous with future without project conditions as coastal processes already are naturalizing the shoreline	Design phase as part of the Morgan Shoal Revetment Reconstruction
Expansion of natural areas	Savanna, prairie, dune, arboretum habitat, reduce lawn areas	Yes	Provides natural habitat and recreational opportunities. Community expressed desire for more natural areas generally across project area and specifically at 47 th Street and 51 st Street	Parkland strives for balance of natural and human recreation with natural and lawn areas	Design phase as part of the Morgan Shoal Revetment Reconstruction
Noise and Safety barrier from DuSable LSD	Creation of berm, larger barrier, or increased height expansion of stepped revetment backshore to reduce noise and increase safety from DuSable Lakeshore Drive	Yes	Meets non-federal sponsor objective. Community expressed desire for barrier.	Various components considered. Decision was made to expand the height of the backshore limestone revetment	Design phase as part of the Morgan Shoal Revetment Reconstruction
Children's educational area	Addition of underwater viewing and educational area per the 2015 Morgan Shoal Framework Plan	No	Concerns with feasibility of observing the shoal from shore and maintenance of facility. Additional cost for non-federal sponsor	Educational area modified from original concept to include educational signage as a more cost- effective compromise	Design phase as part of the Morgan Shoal Revetment Reconstruction
No concrete materials	Not including concrete as a material for revetment. Use of hempcrete, natural materials, limestone, timber, wood, etc. suggested	No	Concrete material is limited in usage and is a cost-effective material and known to meet coastal standards. Hempcrete has higher cost and not ideal for coastal applications. Timber and wood do not meet coastal standards. New limestone is cost prohibitive at the sizes and density required for revetment stability.	Concrete steel sheet pile revetment restricted to 51 st Street peninsula which is a small part of preferred alternative. Use of salvaged existing materials (limestone, sand, pebbles, etc.) has been incorporated into design plans. Quarried or natural stone incorporated in rubble mound and dynamic revetments	Design phase as part of the Morgan Shoal Revetment Reconstruction

Alternative Element	Description	Included in preferred alternative	Reason why or why not included in proposed action	Comments	Document or Phase considered
Eliminate all rubble mound	Don't include rubble mound revetment in designs	No	Reach geologic constraints limit which revetment types are feasible for construction. Rubble mound is constructable in these conditions		The 1993 Report, Appendix E Plan Formulation and Appendix A Coastal Engineering (Feasibility), pre-design as part of the 2015 Morgan Shoal Framework Plan, and design phase as part of the Morgan Shoal Revetment Reconstruction
Construct in phases	Perform construction in phases as to not lose public's ability to reach water for 5 years	No	Sequential reach segment construction not feasible for non-construction segments to remain open. Site is too narrow for safe construction operations to have more than the proposed shared path open during construction.	There is no sanctioned public beach at this location, therefore construction safety and lakefront trail recreation usage were priority. Construction to occur in operational phases for staging, revetment demolition/reconstruction, landscaping, and clean up, but would not occur in sequential reach segments	Design phase as part of the Morgan Shoal Revetment Reconstruction
Fix bathhouse	Remodel old bathhouse	No	Not cost effective to rebuild severely deteriorated building		Design phase as part of the Morgan Shoal Revetment Reconstruction
New restroom facility	Creation of new restroom facility outside of coastal influences	Yes	Meets non-federal sponsor objective	Various materials, components, and configurations were considered during the design phase for the comfort station and plaza	Design phase as part of the Morgan Shoal Revetment Reconstruction
No bathhouse	Don't put in a new bathhouse	No	Does not meet non-federal sponsor objective		Design phase as part of the Morgan Shoal Revetment Reconstruction
Addition of benches and more bike racks	Installation of new drinking fountains, bike racks, standard benches, and recycle stone as seating	Yes	Meets non-federal sponsor objective, community expressed desire		Design phase as part of the Morgan Shoal Revetment Reconstruction

Focused discussion for which alternatives to include in impacts analysis

As part of the screening process for the supplemental EA analysis, USACE initially re-considered all of the following comprehensive alternative plans for inclusion in the impacts analysis:

- No Action Alternative
- Morgan Shoal Revetment Reconstruction Alternative (as presented in the Draft SEA main report)
- NED Plan (as presented in the 1993 Report and described in Section 2.1 – Alternative History of main report)
- Original LPP Plan (as presented in the 1993 Report and described in Section 2.1 – Alternative History)
- Concrete Stepped Revetment (as implemented in other completed Chicago Shoreline segments)
- 2015 Morgan Shoal Framework Plan (as presented in 2015 and in Appendix D)
- Repair-in-kind (timber crib with limestone stairsteps)

The matrix table is presented below with the discussion for including or not including the various alternative plans (Table 2). After reviewing these comprehensive plans, the two reasonable and feasible alternatives selected for a detailed impacts analysis were the no action alternative and the preferred alternative (Morgan Shoal Revetment Reconstruction).The other alternative plans were screened out for the reasons set forth in Table 2.

Table2: Matrix table of potential alternatives discussed for inclusion in NEPA document for potential impacts evaluation in Draft SEA main report

Alternative	Logic to consider inclusion in Draft SEA	Reasonable? Explanation Discussion	Comments	Included in Detailed Impacts Analysis
No Action	Required by law	Yes The 'No Action' alternative is required to be included in impacts analysis		Included
Morgan Shoal Revetment Reconstruction	Preferred Alternative	Yes - Meets USACE coastal standards, federal and non-federal sponsor objectives - Not cost prohibitive (non-federal sponsor able to pay non-federal cost share portion and efficient use of tax dollars) - Constructable given the limitations of the physical environment – local geology and soil constraints	Plan is the engineered design iteration of the 2015 Morgan Shoal Framework Plan	Included
NED Plan	Rubble mound revetment along the entire shoreline. The federally supported plan identified in the 1993 Report such that it maximizes NED benefits consistent with Federal objective	Yes - Meets USACE coastal standards and federal objectives - Cost effective No - Does not meet non-federal objective for recreation use	While it is constructable given the limitations of physical environment, congress authorized the LPP which includes recreation.	Not included
Original LPP	The selected plan from the 1993 Report	Yes - Meets USACE coastal standards, federal and non-federal sponsor objectives - Not cost prohibitive No - The local geology and soil profile limit the ability for steel sheet pile to be driven into the ground as part of the support structure for a significant portion of the project reach	Additional discussion of the infeasibility of implementing this plan is discussed in Section 2.2 – <i>Modified Locally Preferred Plan rationale</i> .	Not included
Concrete Stepped Revetment	Previously implemented in other Chicago Shoreline segments	Yes - Meets USACE coastal standards, federal and non-federal sponsor objectives - Not cost prohibitive No - The local geology and soil profile limit the ability for steel sheet piles to be driven into the ground as part of the support structure for a significant portion of the project reach	The same logic applies for the inability of driving in the steel sheet pile along a significant portion of this reach as the Original LPP	Not included
2015 Morgan Shoal Framework Plan	The modified LPP that the CPD initiated with input from community members and engineering studies	Yes - Meets USACE coastal standards, federal and non-federal sponsor objectives - Not cost prohibitive - Constructable given the limitations of the physical geologic environment	It was decided that this alternative technically isn't a separate alternative from the preferred alternative but is the conceptual design basis equivalent to a 15% design. The main design elements remain the same across the 2015 MS Framework Plan and the preferred alternative and differences are refined engineered design iterations.	Not included

Repair-in-kind	The public has expressed the interest in a repair-in-kind alternative	No • Does not meet USACE coastal standards or federal storm damage reduction objective • Cost prohibitive • The original revetment has deteriorated so severely such that a significant amount of material has been lost to Lake Michigan or broken and damaged beyond repair. • Timber cribs do not meet coastal standards which means the support structure would need to be modified to steel sheet pilings which is not implementable along a significant portion of the project reach due to geology and soil profile • Only feasible to repair revetment in fair to good condition which doesn't exist here • Since no lakefill would occur at the narrowest stretch along DuSable Lake Shore Drive, the repair-in-kind alternative would not fully address the objective	Since so much material has been lost, new material would need to be brought in, meaning that any repair-in-kind work would not be possible. Restoration might be possible to capture the historic form and features. However, the same justification applies of not meeting USACE coastal standards or the federal objective, along with being cost prohibitive, and the physical geologic limitations of implementing along a significant portion of reach.	Not included
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