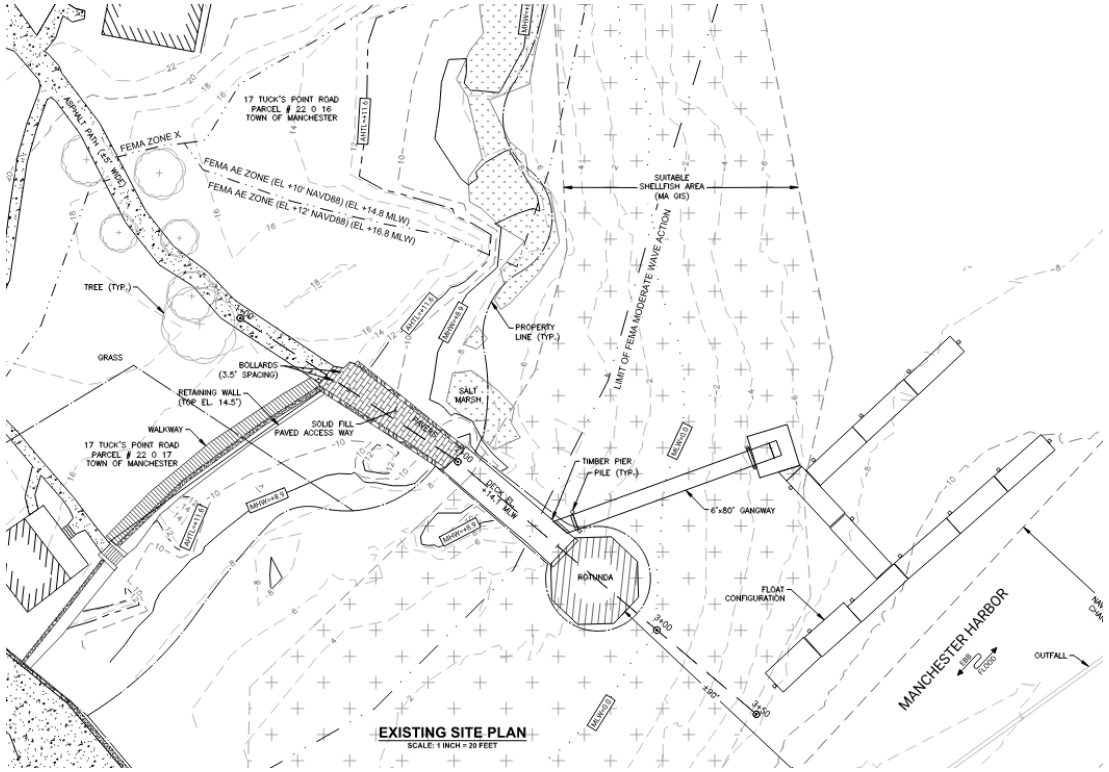
Tucks Point Facility
Phase 2: Pier Replacement & Rotunda Preservation

Pier Replacement & Rotunda Preservation
Conceptual Alternatives

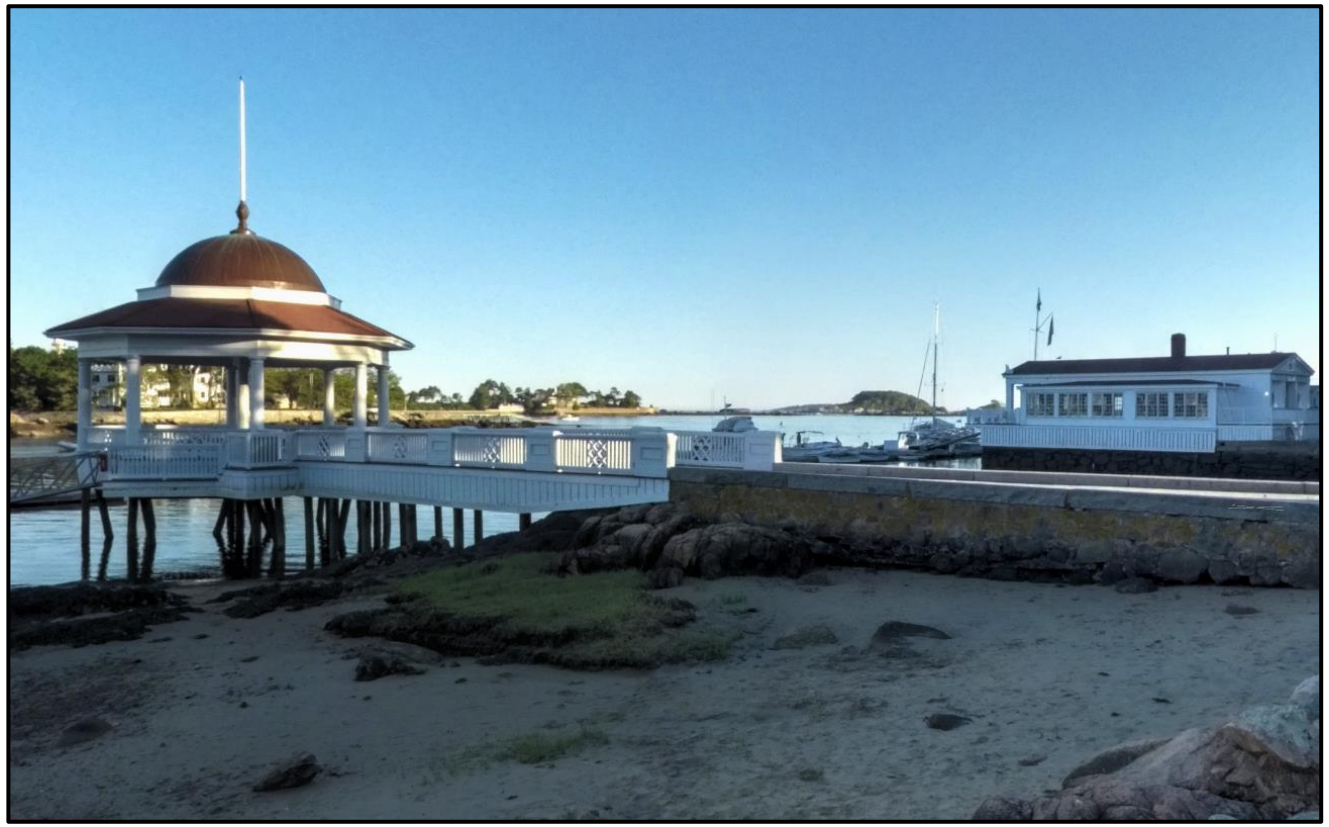
The Town of Manchester-by-the-Sea

A presentation to:
The Manchester-by-the-Sea Select Board

Project Site Overview



Site Aerial



Tucks Point Pier

Aging Infrastructure & Changing Environment

- A conditional assessment was performed by Foth in April 28, 2020, which determined that the remaining service life of the structure was estimated to be between 1 and 5 years, periodic inspections were recommended to ensure public safety until future replacement
- Currently, the pier is overtopped by extreme high/king tides
- Future replacement will require elevation increase to address current overtopping and projected FEMA flood and sea-level rise

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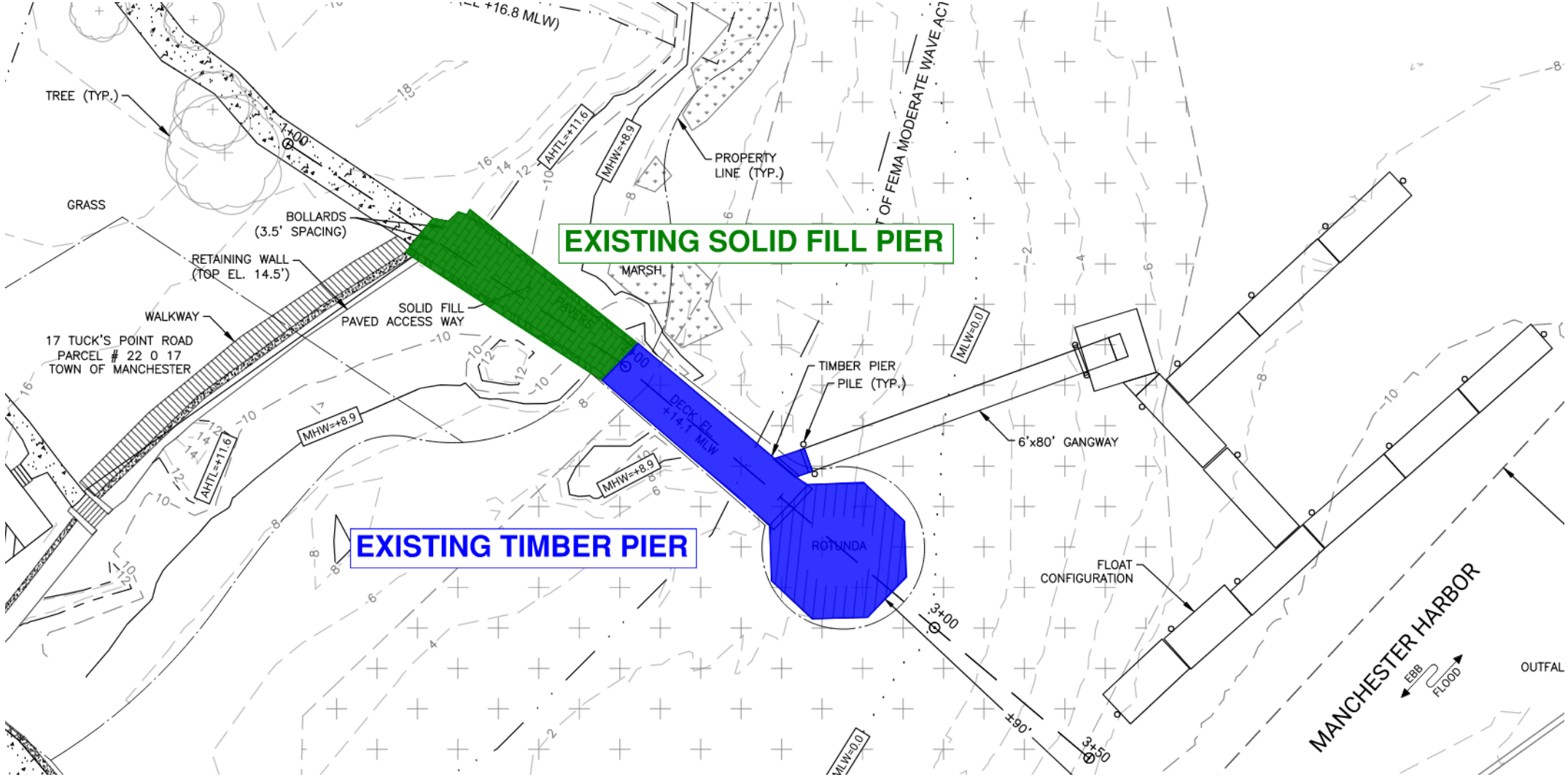
Existing Pier Site Plan



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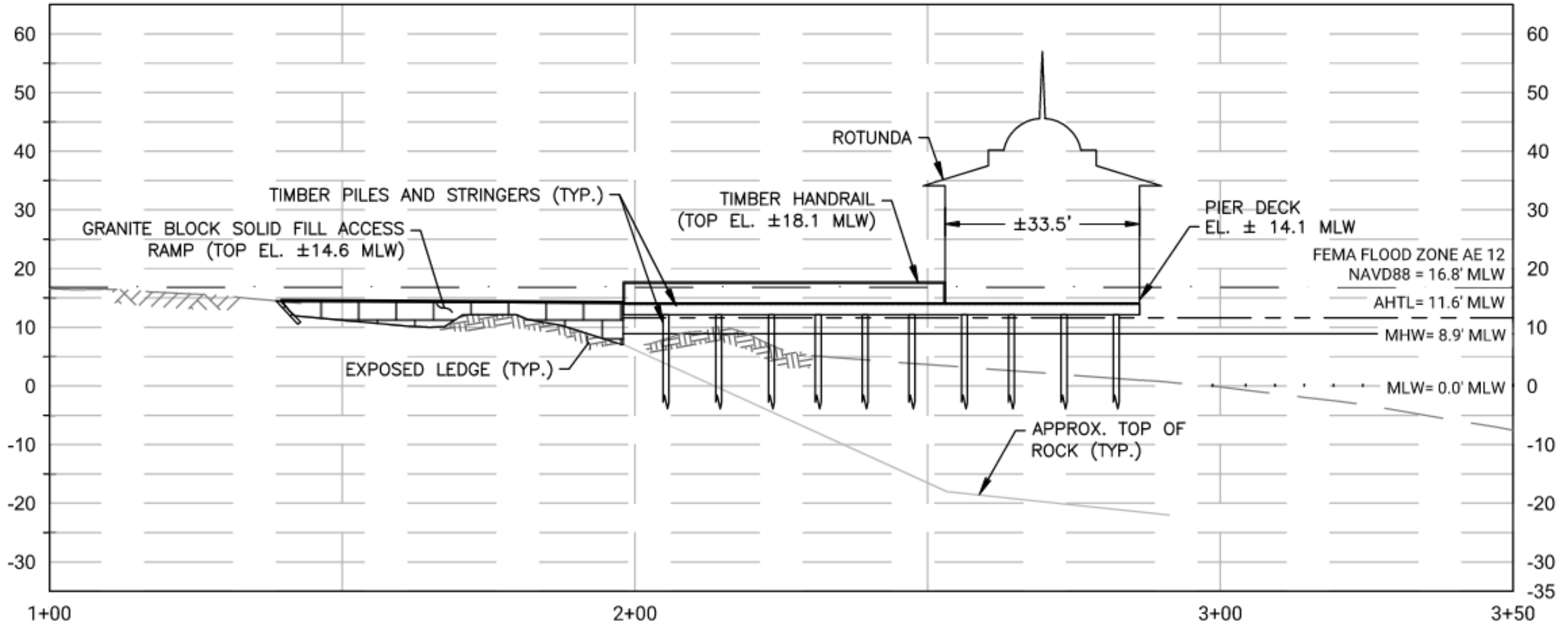
Existing Pier Section



EXISTING PIER PROFILE

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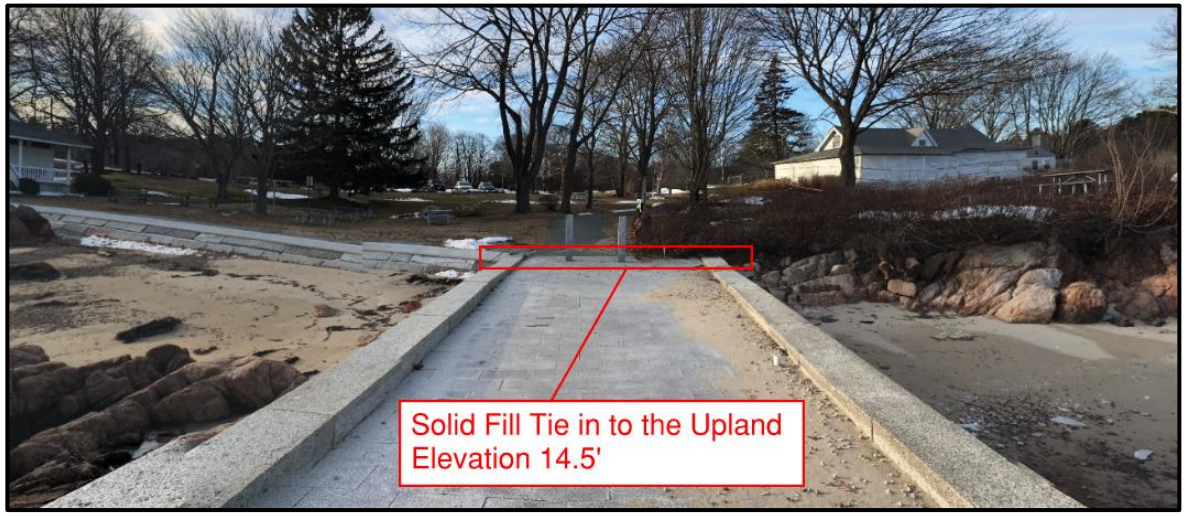
Proposed Alternative Design Considerations and Criteria

- Steel rock socketed piles are required due to weak overburden soils and poor quality/high bedrock conditions (same as encountered in Phase 1)
- The slope of the pier must be ADA compliant (5% grade)
- Pier Deck El. 19’ above Mean Low Water (MLW) for long-term resiliency against flooding (BFE 5’ above 100-year FEMA) and future sea-level rise (NOAA projections – “Intermediate Scenario”)
- The pier must tie into Phase 1 gangway landing and existing backland
- Rotunda and historic aesthetics to be preserved

Proposed Alternative Design Considerations and Criteria Cont.

Rock Socketed Piles previously Installed at the Site



Proposed Solid Fill Pier to tie into Existing Grade at El. 14.5

Existing Gangway Connection to be Raised with Pier
(Timber Façade to be replaced in-kind on new Pier and Rotunda)

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Consideration of Replacement Materials: Timber vs. Steel

- Pile Supported Pier Foundation
  - A timber pile-supported replacement pier is not feasible due to poor subsurface conditions and the inability to socket into bedrock
  - Rock socketed piles are required to resist lateral and uplift design forces (storm, wave, ice, etc.) = Steel Pipe Piles are required for all conceptual alternatives
- Pier Structure

	Material Properties	Longevity	Maintenance	Costs
Steel	**Approx. 30’ max span: less piles required**	**50-100 years**	**Less frequent**	**Lower Capital and Maintenance Cost**
Timber	Approx. 10’ max spans require more piles	25+ years	More frequent	Higher Capital and Maintenance Cost

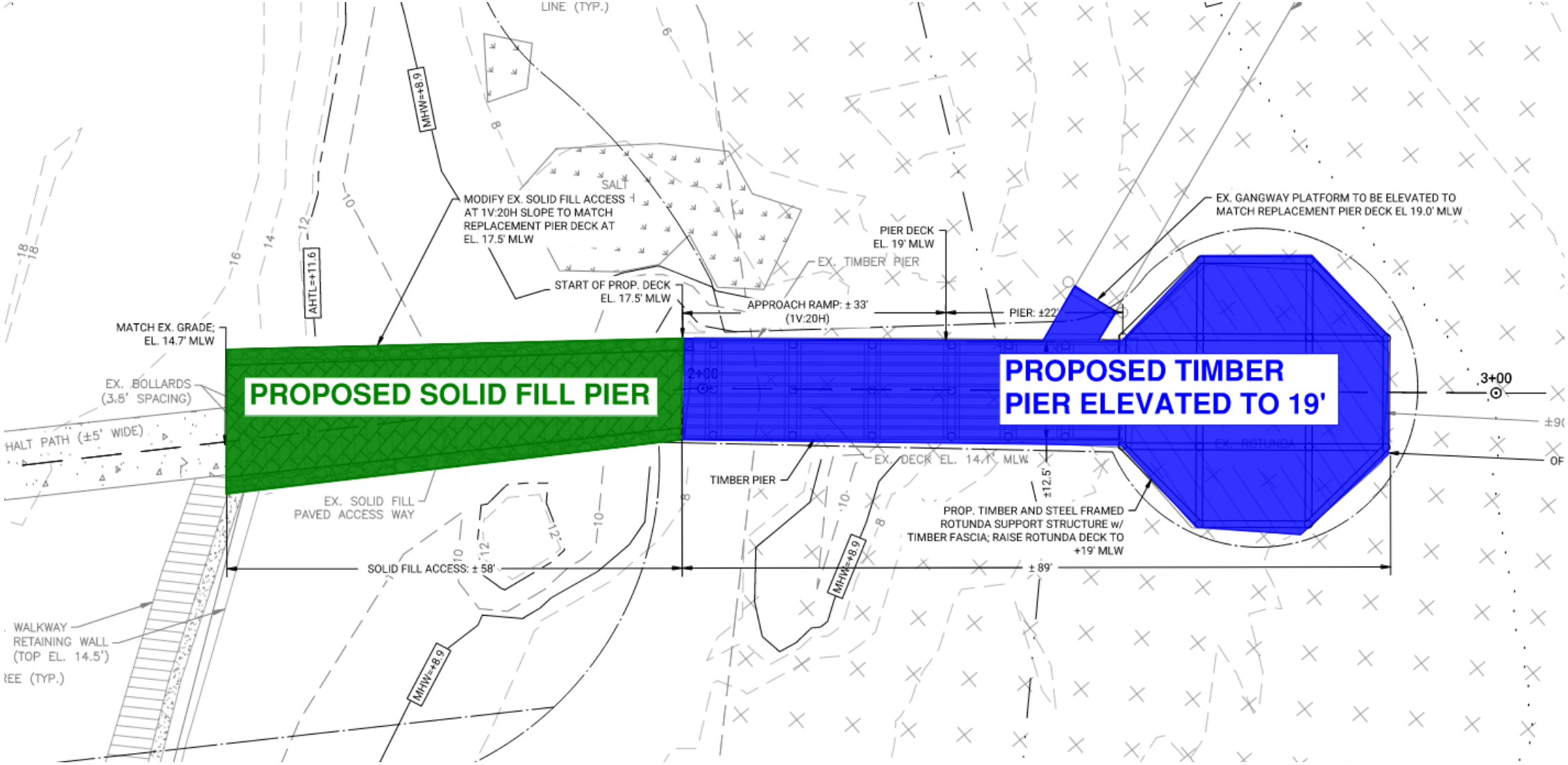
Proposed Alternatives

- Alternative 1:
  - Maintain existing footprint: Pier Deck = 19’ MLW
- Alternative 2:
  - Existing footprint extended ±38’: Pier Deck = 19’ MLW
- Alternative 3:
  - Maintain existing footprint: Pier Deck = 19’ MLW
  - Relocate Rotunda upland: El. = 19’ MLW
- Alternative 4:
  - Phase 1: Maintain existing footprint: Pier Deck = 17’ MLW
  - Phase 2: Elevate 2’: Pier Deck = 19’ MLW

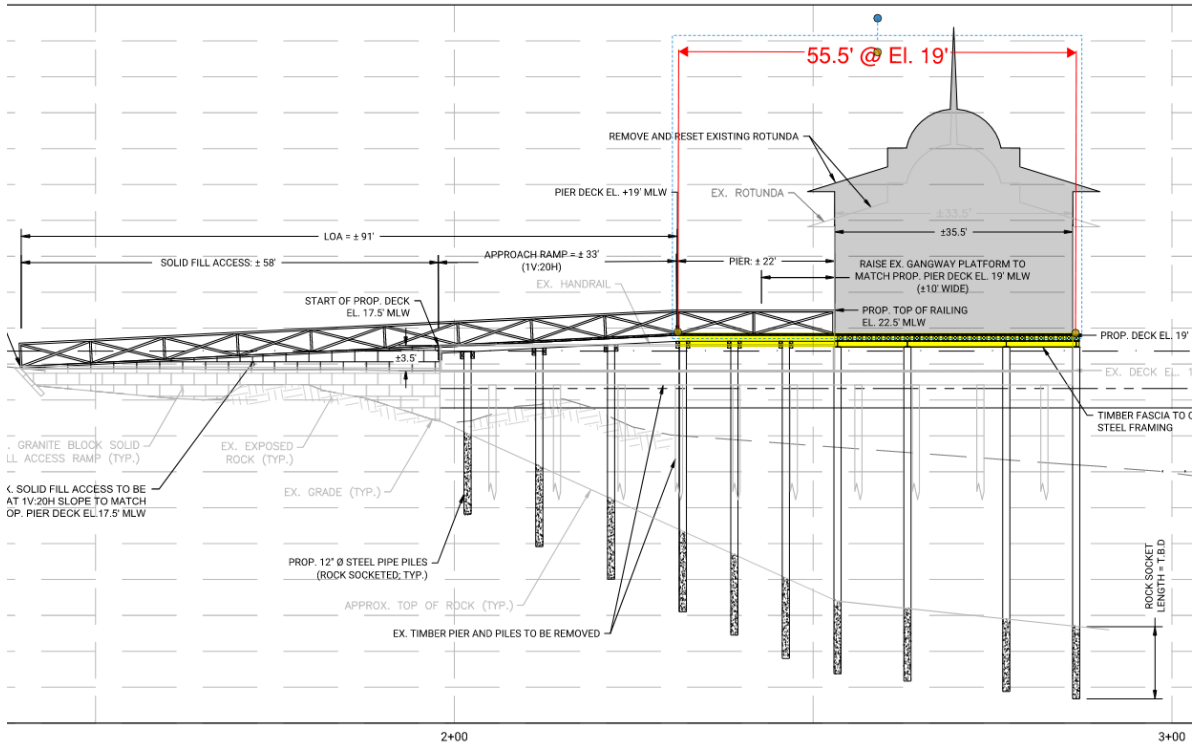
*Both timber and steel framing were evaluated for each alternative

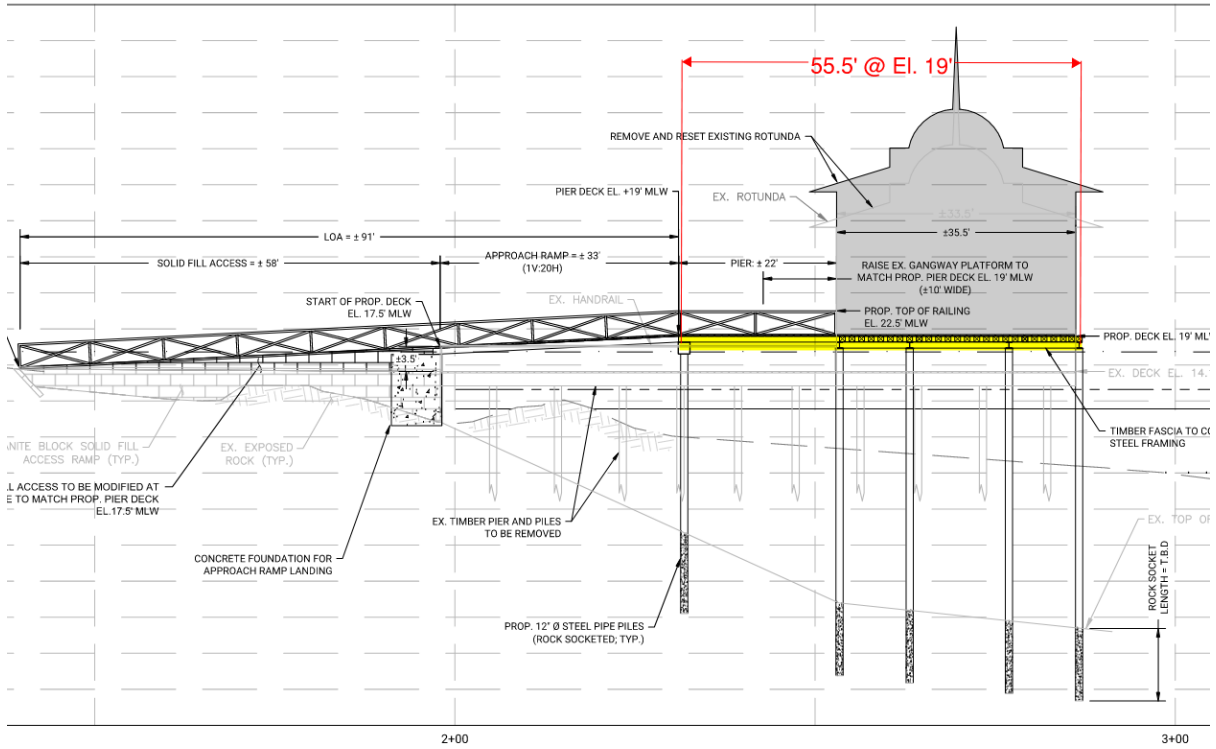
*All steel alternatives assume a timber façade so aesthetics remain consistent with the existing pier appearance

Alternative 1 Plan View: Existing footprint to El. 19’



Alternative 1: Replace and Extend 38’ to El. 19’





Alternative 1A: Timber (31 Piles)

Alternative 1B: Steel (16 Piles)

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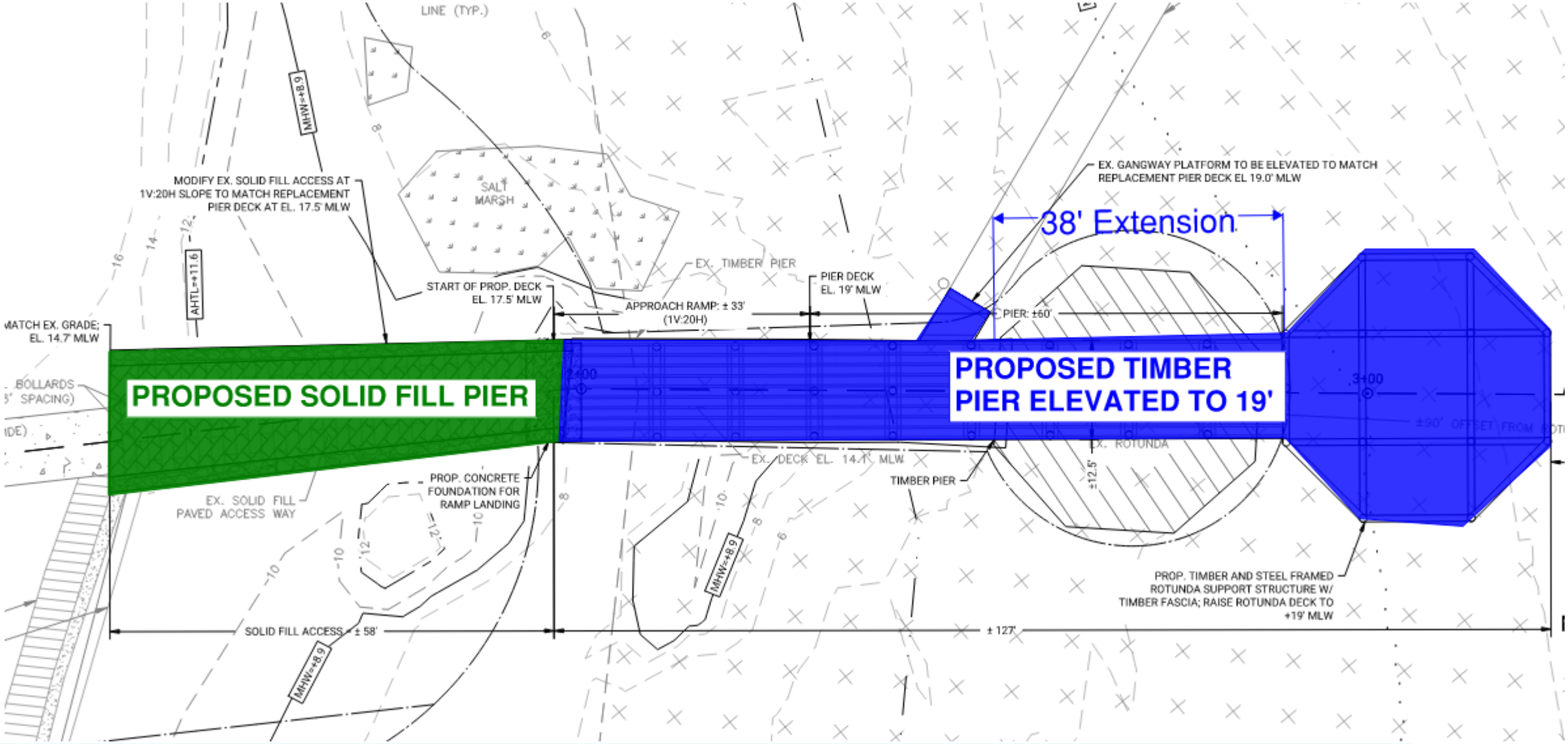
Alternative 2 Plan View: Replace and Extend 38’ to El. 19’



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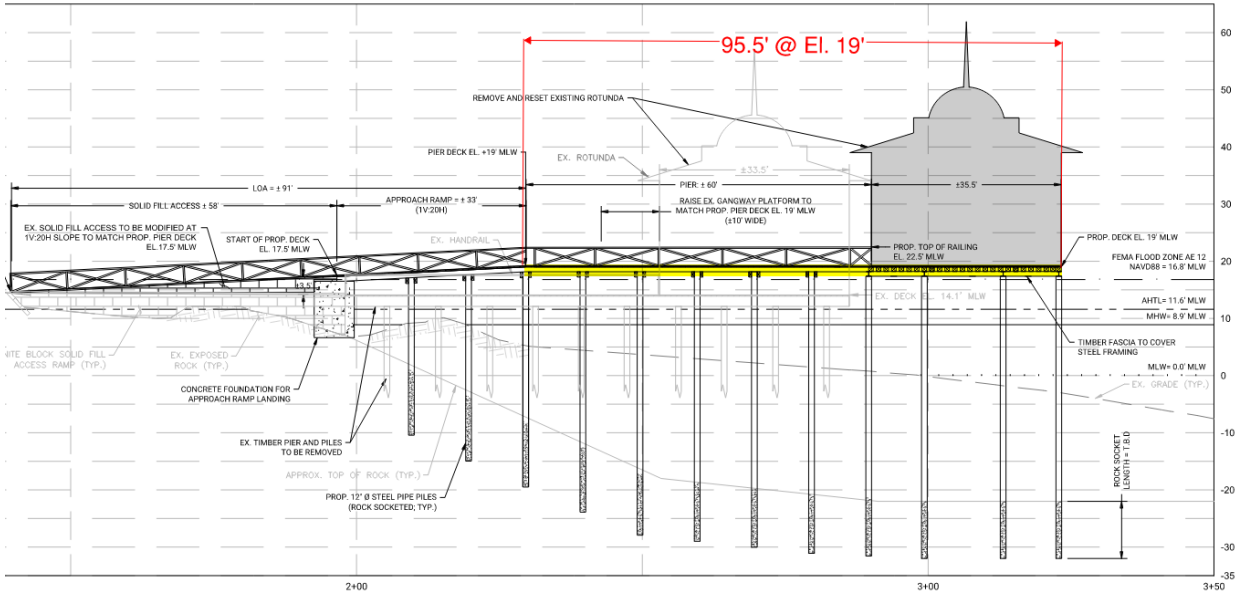
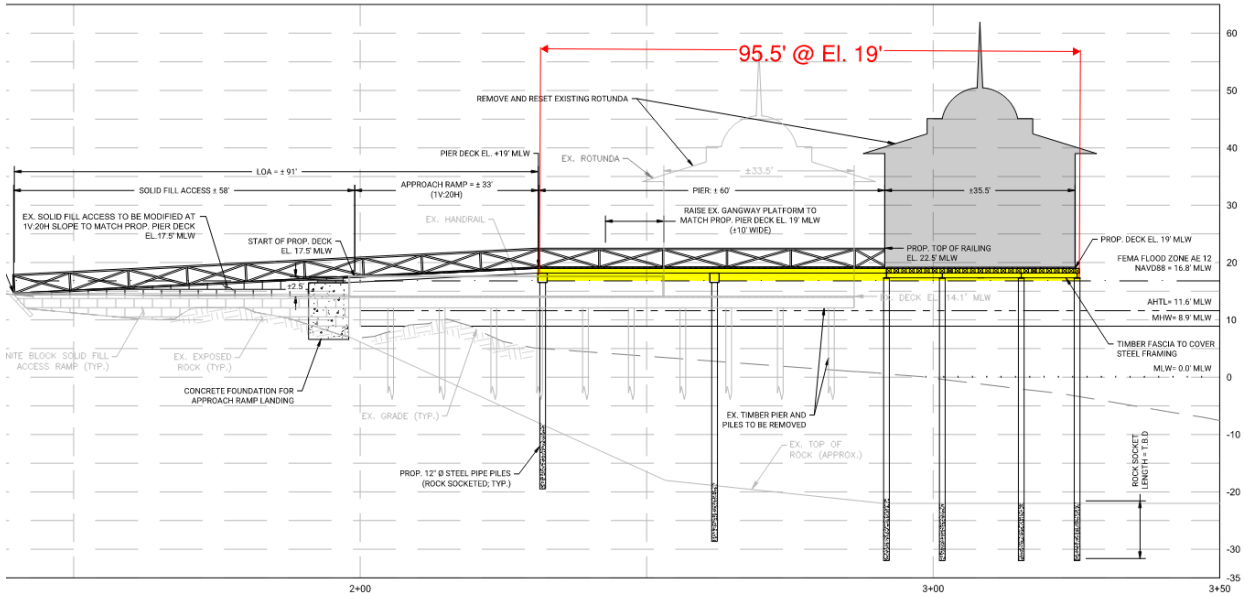
Alternative 2 Section: Replace and Extend 38’ to El. 19’





Alternative 2A: Timber (37 Piles)

Alternative 2B: Steel (19 Piles)

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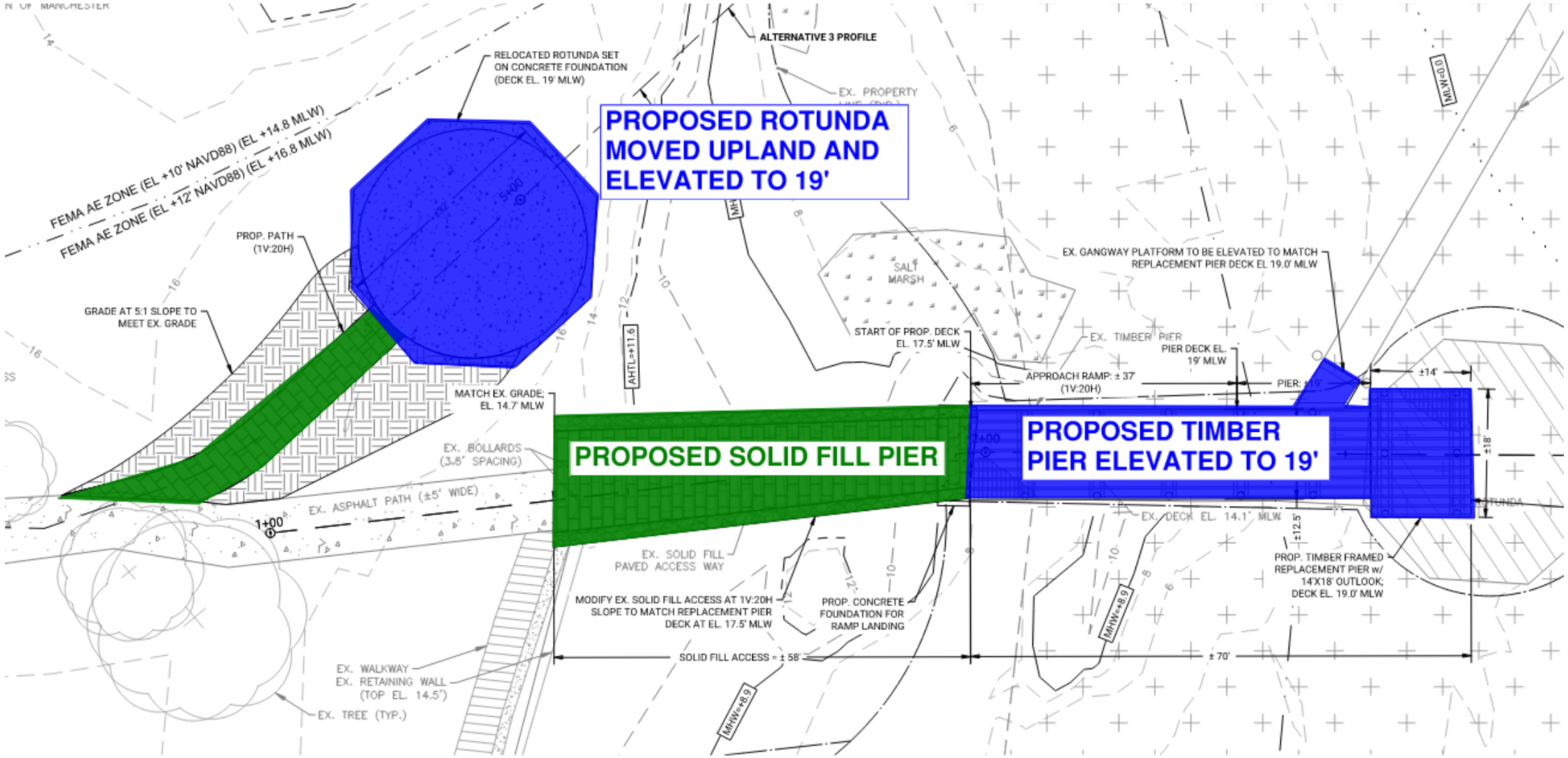
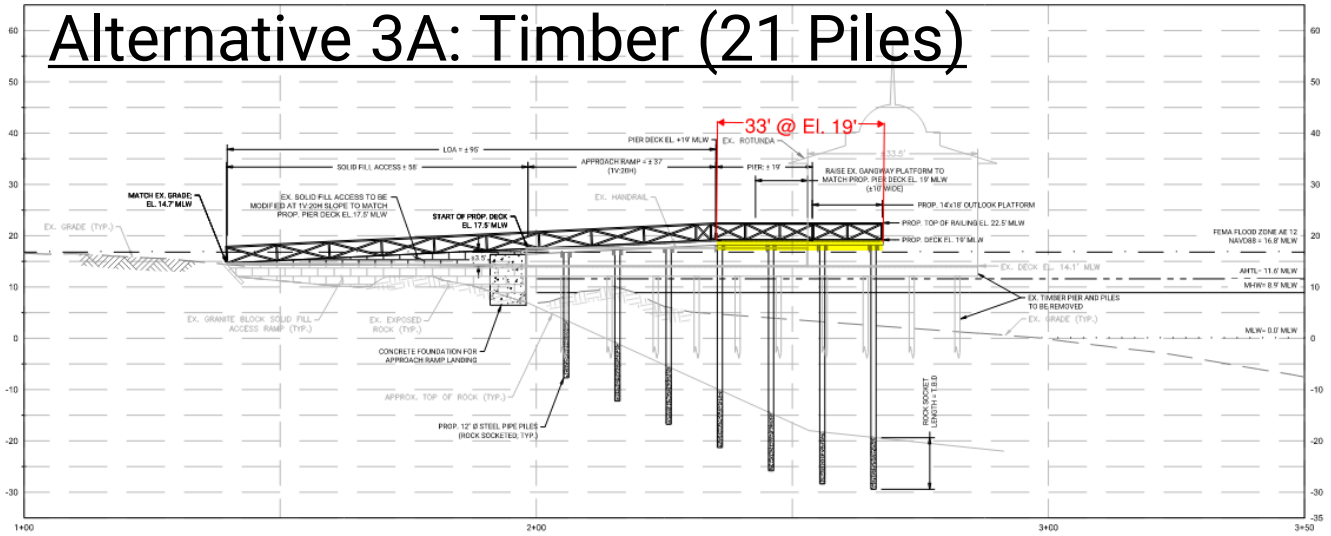
Alternative 3 Site Plan: Replace Pier in footprint and move Rotunda upland (both to el. 19')

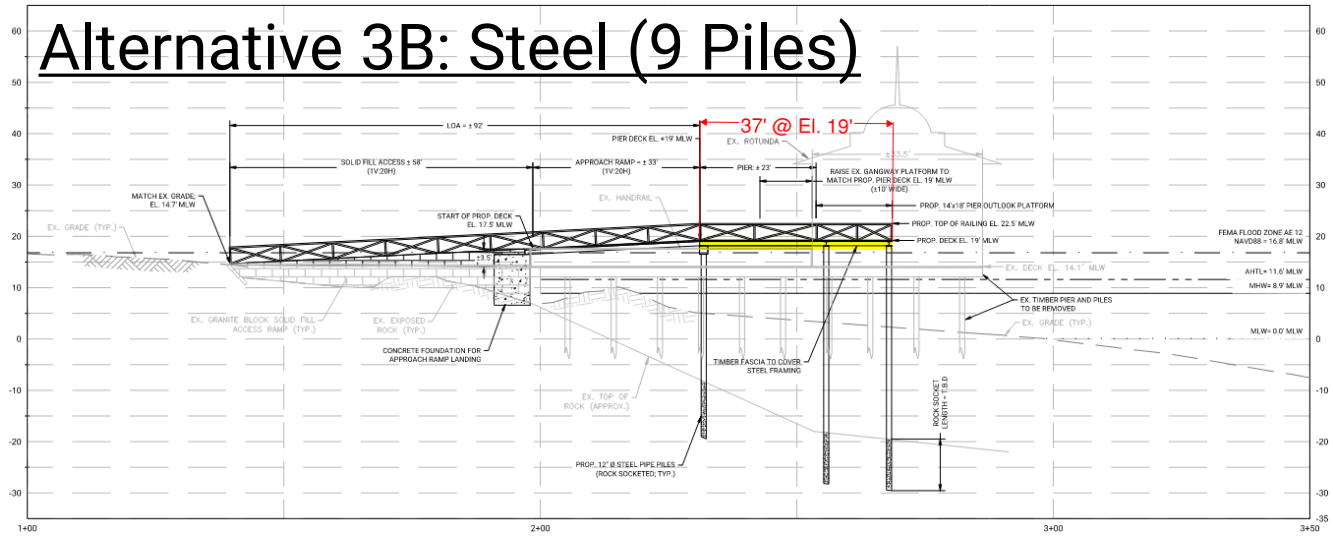


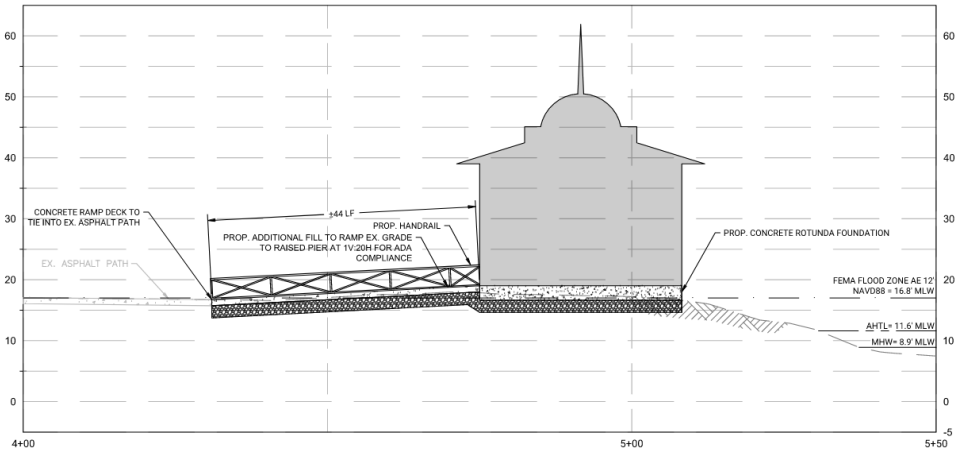
Alternative 3 Sections: Replace Pier in footprint and move Rotunda upland (both to el. 19')

Alternative 3A: Timber (21 Piles)

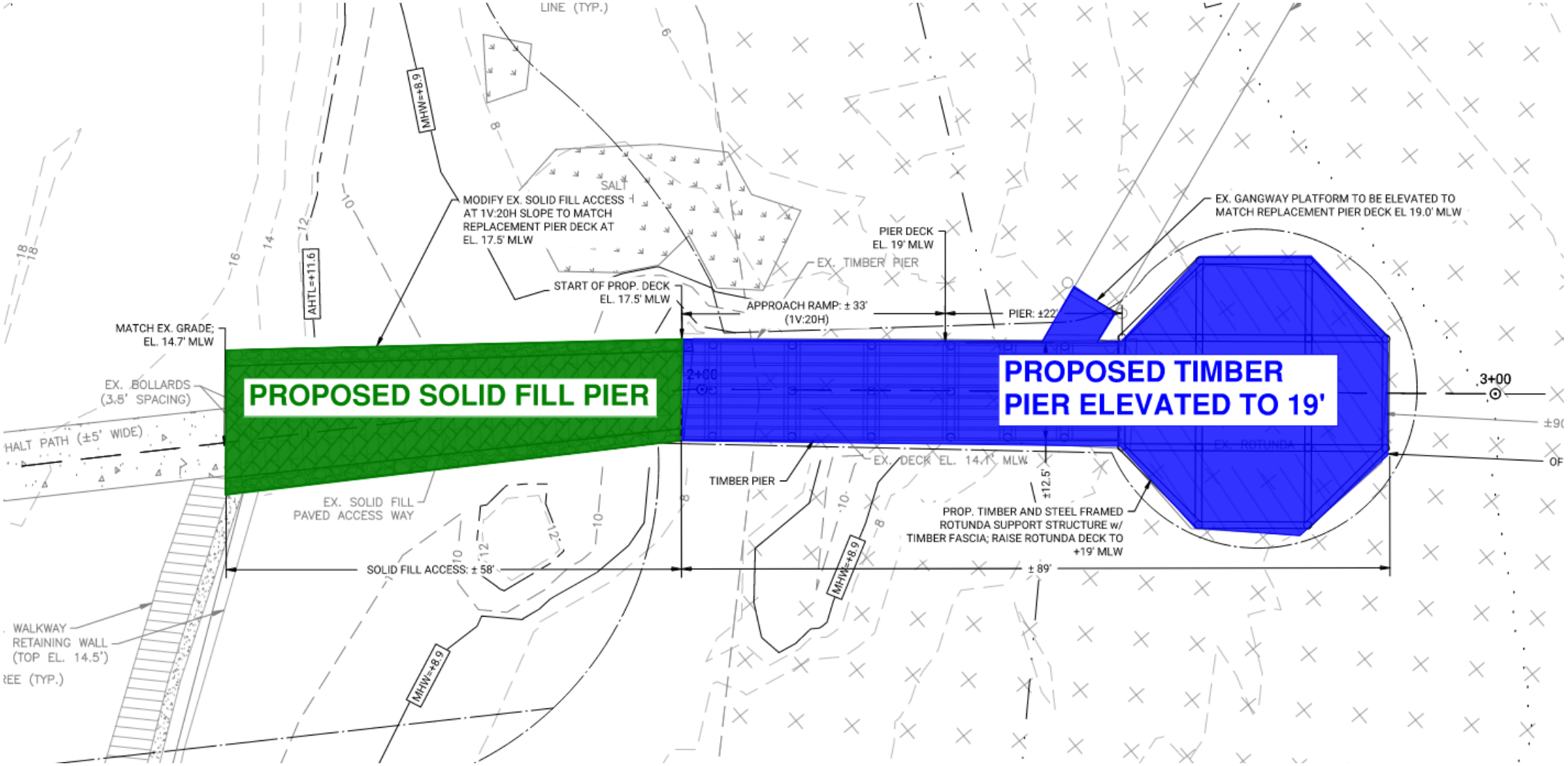


Alternative 3B: Steel (9 Piles)

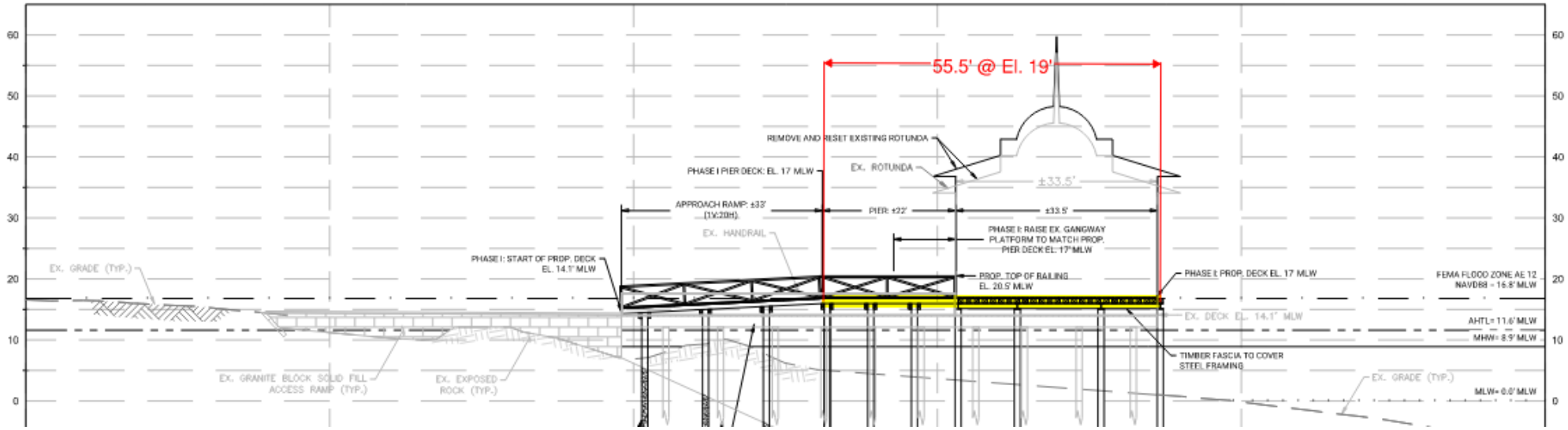




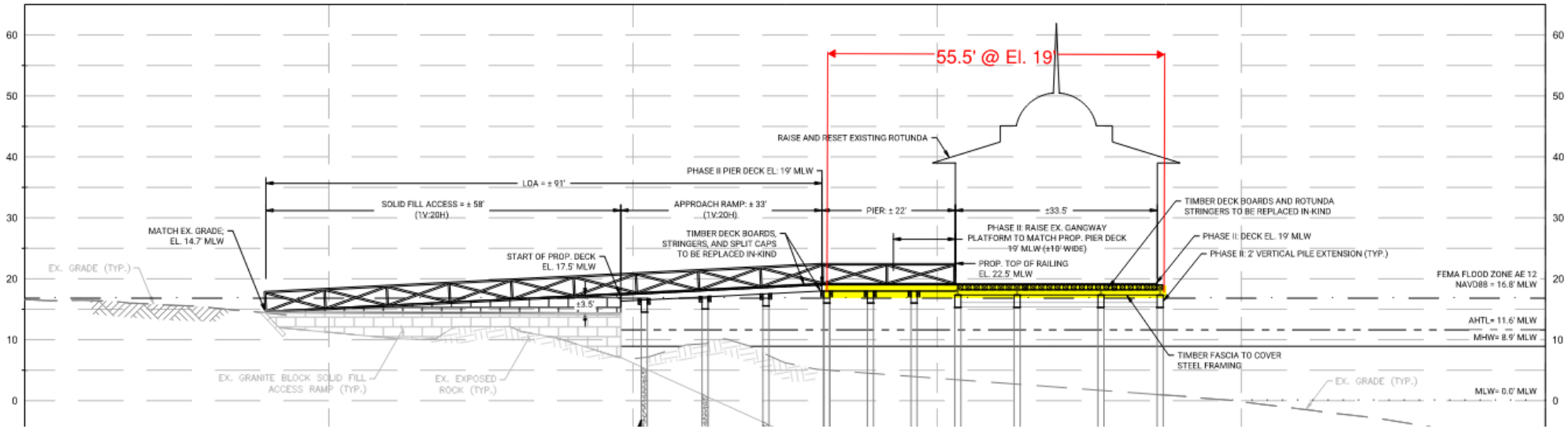
Alternative 4 Site Plan: Existing footprint to El. 17’ (Phase 1) and El. 19’ (Phase 2)



Alternative 4B (Steel) Sections: Existing footprint to El. 17’ (Phase 1) and El. 19’ (Phase 2)



Phase 1



Phase 2

Foth

Summary of Proposed Design Alternatives

	Footprint	Proposed Elevation	Rotunda	Costs: Steel Framing	Costs: Timber Framing
Alternative 1	Within existing pier footprint	El. 19’ MLW	Stays in place	$2.25M	$2.76M
Alternative 2	Extends existing pier seaward 38’	El. 19’ MLW	Moves out	$2.51M	$3.14M
Alternative 3	Within existing pier footprint and upland	El. 19’ MLW	Moved upland	$1.75M	$2.13M
Alternative 4 Phase 1	Within existing pier footprint	Phase 1: El. 17’ MLW	Stays in place	$2.16M	$2.69M
Alternative 4 Phase 2	Within existing pier footprint	Phase 2: El. 19’ MLW	Stays in place	$3.59M (Escalated 25yr costs projection)	$3.64M (Escalated 25yr cost projection)

Potential State Grant Funding Opportunities

MA EXECUTIVE OFFICE OF HOUSING AND ECONOMIC DEVELOPMENT (EOHED)

MA SEAPORT ECONOMIC COUNCIL

- **Eligible Projects:** Includes public coastal infrastructure improvement projects that focus on threats from SLR and extreme weather events and results in implementation of long-term sustainability and resiliency solutions.
- **Funding Limit:** Up to $1 million; Town Match = 20%
- **Funding Request Cycle:** Bi-annual; Typ. May and November Ea. Yr.

NOTE:

**Currently funding 80% of cost for engineering, permitting, final design and bid phase services for Phase 2 Tucks Point Pier Replacement*

**Funded Construction of Phase 1 Tucks Point Dock System in 2022*

MA EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS (EEA)

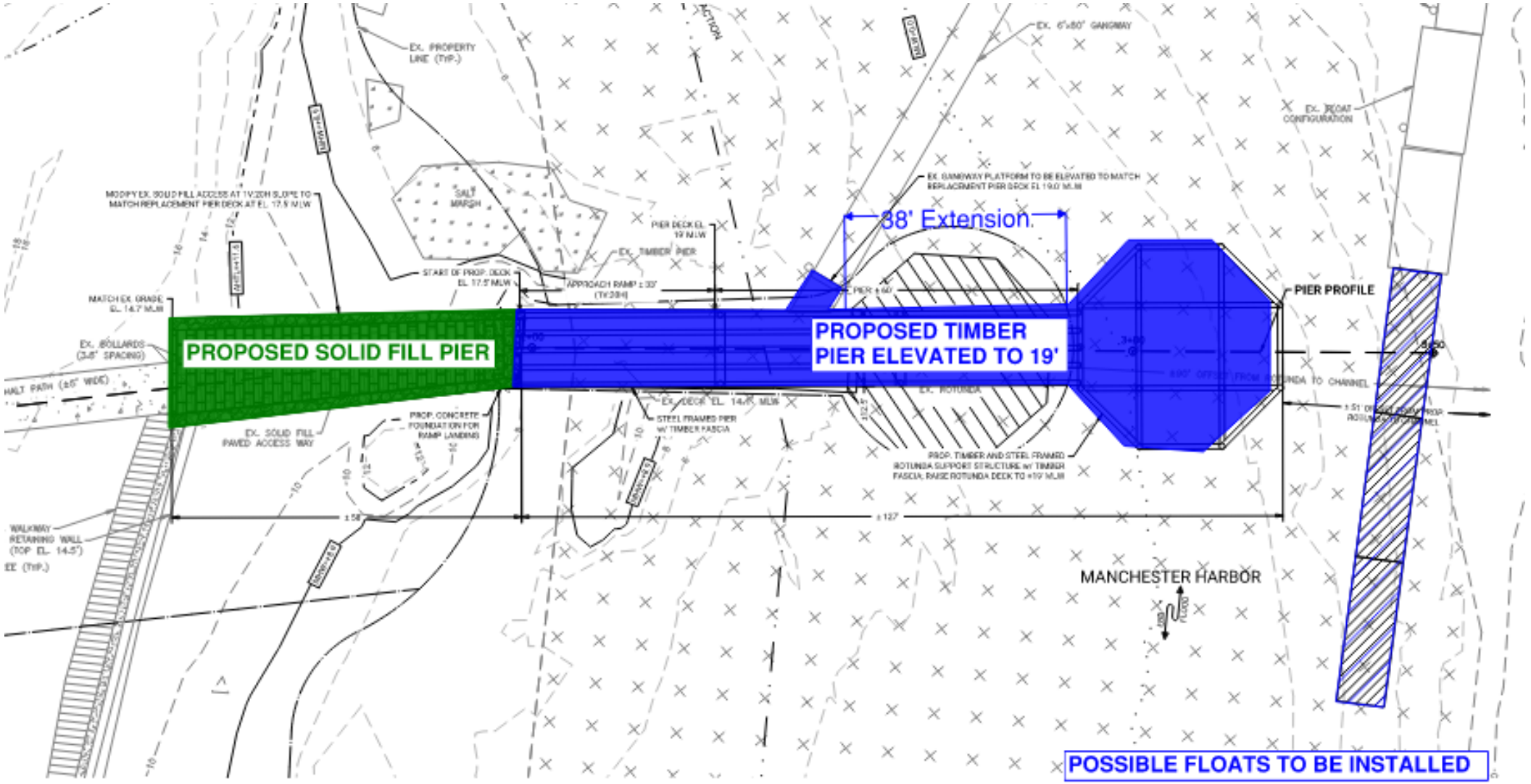
MA COASTAL ZONE MANAGEMENT (MACZM)

RESILIENCY GRANT PROGRAM

- **Eligible Projects:** Includes public coastal infrastructure improvement projects that focus on threats from SLR and extreme weather events and results in implementation of long-term sustainability and resiliency solutions.
- **Funding Limit:** Up to $2 million; Town Match = Town Match = 25% (optional, but recommended)
- **Funding Request Cycle:** Annual; Typ. May/June Ea. Yr.

Questions & Answers

Alternative 2 with Possible Float Extensions



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