Appendix B

Essential Fish Habitat Assessment

NOAA FISHERIES
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
Essential Fish Habitat (EFH) Consultation Guidance
EFH ASSESSMENT WORKSHEET

Introduction:

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) mandates that federal agencies conduct an essential fish habitat (EFH) consultation with NOAA Fisheries regarding any of their actions authorized, funded, or undertaken that may adversely affect EFH. An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

This worksheet has been designed to assist in determining whether a consultation is necessary and in preparing EFH assessments. This worksheet should be used as your EFH assessment or as a guideline for the development of your EFH assessment. At a minimum, all the information required to complete this worksheet should be included in your EFH assessment. If the answers in the worksheet do not fully evaluate the adverse effects to EFH, we may request additional information in order to complete the consultation.

An expanded EFH assessment may be required for more complex projects in order to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. While the EFH worksheet may be used for larger projects, the format may not be sufficient to incorporate the extent of detail required, and a separate EFH assessment may be developed. However, regardless of format, the analysis outlined in this worksheet should be included for an expanded EFH assessment, along with additional information that may be necessary. This additional information includes:

- the results of on-site inspections to evaluate the habitat and site-specific effects
- the views of recognized experts on the habitat or the species that may be affected
- a review of pertinent literature and related information
- an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

Your analysis of adverse effects to EFH under the MSA should focus on impacts to the habitat for all life stages of species with designated EFH, rather than individual responses of fish species. Fish habitat includes the substrate and benthic resources (e.g., submerged aquatic vegetation, shellfish beds, salt marsh wetlands), as well as the water column and prey species.

Consultation with us may also be necessary if a proposed action results in adverse impacts to other NOAA-trust resources. Part 6 of the worksheet is designed to help assess the effects of the action on other NOAA-trust resources. This helps maintain efficiency in our interagency coordination process. In addition, further consultation may be required if a proposed action impacts marine mammals or threatened and endangered species for which we are responsible. Staff from our Greater Atlantic Regional Fisheries Office, Protected Resources Division should be contacted regarding potential impacts to marine mammals or threatened and endangered species.

Instructions for Use:

Federal agencies must submit an EFH assessment to NOAA Fisheries as part of the EFH consultation. Your EFH assessment must include:

1) A description of the proposed action.
2) An analysis of the potential adverse effects of the action on EFH, and the managed species.
3) The federal agency's conclusions regarding the effects of the action on EFH.
4) Proposed mitigation if applicable.

In order for this worksheet to be considered as your EFH assessment, you must answer the questions in this worksheet fully and with as much detail as available. Give brief explanations for each answer.

Federal action agencies or the non-federal designated lead agency should submit the completed worksheet to NOAA Fisheries Greater Atlantic Regional Fisheries Office, Habitat Conservation Division (HCD) with the public notice or project application. Include project plans showing existing and proposed conditions, all waters of the U.S. on the project site, with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked and sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom habitat areas and shellfish beds, as well as any available site photographs.

For most consultations, NOAA Fisheries has 30 days to provide EFH conservation recommendations once we receive a complete EFH assessment. Submitting all necessary information at once minimizes delays in review and keeps review timelines consistent. Delays in providing a complete EFH assessment can result in our consultation review period extending beyond the public comment period for a particular project.

The information contained on the HCD website will assist you in completing this worksheet. The HCD website contains information regarding: the EFH consultation process; Guide to EFH Designations which provides a geographic species list; Guide to EFH Species Descriptions which provides the legal description of EFH as well as important ecological information for each species and life stage; and other EFH reference documents including examples of EFH assessments and EFH consultations.

Our website also includes a link to the NOAA EFH Mapper .
We would note that the EFH Mapper is currently being updated and revised. Should you use the EFH Mapper to identify federally managed species with designated EFH in your project area, we recommend checking this list against the Guide to Essential Fish Habitat Designations in the Northeast to ensure a complete and accurate list is provided.

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES (modified 3/2016)

PROJECT NAME: Day's End Public Art Installation at Gansevoort Peninsula

DATE: 6/2018

PROJECT NO.:

LOCATION (Water body, county, physical address):
Hudson River and Gansevoort Peninsula, Manhattan, terminus of Gansevoort Street

PREPARER: AKRF, Inc.

Step 1: Use the Habitat Conservation Division EFH webpage's Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally-managed species for the geographic area of interest. Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. The list can be included as an attachment to the worksheet. Make a preliminary determination on the need to conduct an EFH consultation.

1. INITIAL CONSIDERATIONS

EFH Designations	Yes	No
Is the action located in or adjacent to EFH designated for eggs? List the species: Winter flounder, windowpane flounder, scup, king mackerel, Spanish mackerel, cobia, bluefin tuna, smooth dogfish See Table 1	✔	☐
Is the action located in or adjacent to EFH designated for larvae? List the species: Red hake, winter flounder, windowpane flounder, Atlantic sea herring, Atlantic butterfish, summer flounder, scup, king mackerel, Spanish mackerel, cobia, bluefin tuna, smooth dogfish*, sand tiger shark*, dusky shark*, sandbar shark* *Species does not have a free-swimming larval stage; these are neonates and early juveniles See Table 1	✔	☐
Is the action located in or adjacent to EFH designated for juveniles? List the species: Red hake, winter flounder, windowpane flounder, Atlantic sea herring, bluefish, Atlantic butterfish, Atlantic mackerel, summer flounder, scup, black sea bass, king mackerel, Spanish mackerel, cobia, clearnose skate, little skate, winter skate, bluefin tuna, smooth dogfish See Table 1	✔	☐

Is the action located in or adjacent to EFH designated for adults or spawning adults? List the species: Adults: Red hake, winter flounder, windowpane flounder, Atlantic sea herring, bluefish, Atlantic butterfish, Atlantic mackerel, summer flounder, scup, black sea bass, king mackerel, Spanish mackerel, cobia, clearnose skate, little skate, winter skate, bluefin tuna, smooth dogfish, sandbar shark Spawning adults: winter flounder, windowpane flounder See Table 1	✔	☐

If you answered 'no' to all questions above, then an EFH consultation is not required - go to Section 5.

If you answered 'yes' to any of the above questions, proceed to Section 2 and complete the remainder of the worksheet.

Step 2: In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Identify the sources of the information provided and provide as much description as available. These should not be yes or no answers. Please note that there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts. Project plans that show the location and extent of sensitive habitats, as well as water depths, the HTL, MHW and MLW should be provided.

2. SITE CHARACTERISTICS

Site Characteristics	Description
Is the site intertidal, sub-tidal, or water column?	Intertidal, subtidal, and water column habitats are present at the installation site.
What are the sediment characteristics?	Sediments in the lower Hudson River are primarily composed of silt and clay with pockets of sand.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the SAV species and spatial extent.	There is no submerged aquatic vegetation at or adjacent to the installation site.
Are there wetlands present on or adjacent to the site? If so, describe the spatial extent and vegetation types.	NWI Estuarine and Marine Deepwater wetlands (E1UBL) are present in the vicinity of the proposed installation within the Hudson River. There is no vegetation associated with this wetland designation.

Is there shellfish present at or adjacent to the project site? If so, please describe the spatial extent and species present.	Hard clams (Mercenaria mercenaria) occur in soft substrates of the lower Hudson River year-round and could be present in the vicinity. Soft-shell clams may also occur in shallower waters of the installation site. There are no known oyster beds in the vicinity of the proposed installation.
Are there mudflats present at or adjacent to the project site? If so please describe the spatial extent.	There are no mudflats at or adjacent to the installation site.
Is there rocky or cobble bottom habitat present at or adjacent to the project site? If so, please describe the spatial extent.	There is no known rocky or cobble bottom habitat near the project site. Sediments are silt and clay with some pockets of sand.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so for which species, what type habitat type, size, characteristics?	There are no HAPCs designated at or near the installation site.
What is the typical salinity, depth and water temperature regime/range?	Based on NYCDEP water quality data from 2000-2017, salinity ranges from 0.3 to 25.1 psu in the study area, depending on the tidal direction and amount of freshwater inflow. Temperature typically ranges from 32 to 85 degrees Fahrenheit. Water depths in the installation site range from 4 to 15 feet (1.2 to 4.6 meters) at MLLW.
What is the normal frequency of site disturbance, both natural and man-made?	The existing underwater environment experiences disturbance from boat traffic, as well as natural disturbance from tidal action. Due to the level of existing shoreline development in the area, human activity along the shoreline is common. Major natural disturbances are infrequent, in the form of periodic extreme storm events.
What is the area of proposed impact (work footprint & far afield)?	The area of proposed impact includes up to 71.1 square feet of bottom habitat in the footprint of the piles, and the approximately 230-foot radius from the pile encompassing the maximum area of the river that will be ensonified during pile driving. The proposed installation will result in up to 476 square feet (0.011 acres) of coverage from 6 pile caps (either single or double foundation) spaced 65 feet apart and located below the water and at least one foot above the mudline. Sediment resuspension from pile driving and removal of test piles will be minimal and any increase in turbidity will be localized to the area around the pile being driven. Erosion and sediment control BMPs (eg, turbidity curtain, shoring box) will minimize discharge of sediment to the river during installation of the upland piles, including the pile at the edge of the Peninsula. Tidal currents will dissipate any resuspended sediments quickly, so far-field impacts are not anticipated. See Attachment 1 for engineering drawings.

Step 3: This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS

Impacts	Y	N	Description
Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.			The proposed installation is a pile-supported skeletal stainless steel sculpture that will outline the former Pier 52 shed building. There is no platform, roof, or side walls associated with the sculpture. In-water construction includes the installation of between 7 and 14 30" diameter steel pipe piles in waters ranging from about 7-12 ft in depth and the use of construction vessels. Three 12" diameter piles will be installed off the outer edges of the sculpture in order to hold safety lighting (solar-powered marine lanterns). Ten additional 12" piles will be installed on the Gansevoort Peninsula riprap shoreline using land- or barge-based equipment. A test pile program will be conducted with 12" piles over approx. 12 noncontiguous days. Pile driving will be conducted using a barge-mounted crane and will be completed during normal work hours over approx. 30 noncontiguous days. Piles in the Hudson River will be driven via vibratory hammer to their final tip elevation. Impact hammering using a cushion block and soft start may be necessary to seat the piles. Construction activities will be completed during the day and will not require artificial lighting over the water. In total, construction of the in-water foundation will last 4 months (May-Aug 2019). The installation will be operational by 2020.
Will the benthic community be disturbed? If no, why not? If yes, describe in detail how the benthos will be impacted.	✔		There will be a permanent loss of 34.4 sf of bottom habitat and benthic macroinvertebrates in the footprint of the single pile foundations supporting the sculpture, and an additional 2.4 sf in the footprint of the piles for the safety lighting, for a total of 36.8 sf. If double pile foundations are required, up to 68.7 sf of bottom habitat will be lost in the footprint of the piles, for a total of 71.1 square feet. This minimal loss will not significantly impact the benthic community, and the new piles will provide vertical surface for encrusting organisms. The 6 pile caps associated with the single pile foundations will result in approximately 154 square feet of over-mudline coverage (approx 25.7 square feet per pile cap, spaced 65 feet apart at the center). If double pile foundations are used, the pile caps will result in a maximum of 476 sf of over-mudline coverage (approx 79.3 sf per pile cap, spaced 65 feet apart at center). Sunlight may not be able to reach benthic habitat beneath the pile caps closest to the bottom, but there is no SAV at the installation site, and this minimal amount of shading will not result in significant adverse impacts to aquatic habitat. The sculpture will not result in substantial overwater coverage, as each pipe will be less than one foot in diameter and elevated above the water's surface.
Will SAV be impacted? If no, why not? If yes, describe in detail how the SAV will be impacted. Consider both direct and indirect impacts. Provide details of any SAV survey conducted at the site.		✔	There is no submerged aquatic vegetation in the study area.
Will salt marsh habitat be impacted? If no, why not? If yes, describe in detail how wetlands will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?		✔	There is no salt marsh habitat in the study area.

Will mudflat habitat be impacted? If no, why not? If yes, describe in detail how mudflats will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?		✔	There is no mudflat habitat in the study area.
Will shellfish habitat be impacted? If so, provide in detail how the shellfish habitat will be impacted. What is the aerial extent of the impact? Provide details of any shellfish survey conducted at the site.	✔		No shellfish surveys have been conducted at the installation site. Soft substrate suitable for hard and soft-shell clams and any other shellfish will be modified within the footprint of the piles. Shellfish will be able to continue colonizing soft bottom habitats in the vicinity of the installation site, and will not be adversely affected by the proposed installation. The steel pipe piles may provide vertical habitat for encrusting organisms, including shellfish that attach to hard substrate.
Will hard bottom (rocky, cobble, gravel) habitat be impacted at the site? If so, provide in detail how the hard bottom will be impacted. What is the aerial extent of the impact?		✔	There is no hard bottom habitat at the site.
Will sediments be altered and/or sedimentation rates change? If no, why not? If yes, describe how.	✔		Sediments within the footprint of the piles will be replaced with hard vertical surface. Sedimentation rates will not change as a result of the installation.
Will turbidity increase? If no, why not? If yes, describe the causes, the extent of the effects, and the duration.	✔		There may be temporary and localized increases in turbidity during pile driving and removal of test piles. In general, pile driving results in very minimal sediment resuspension, and any sediments will dissipate quickly with the tidal currents following the completion of pile driving. Pile installation will be completed over approximately 30 noncontiguous days within the 4-month in-water construction period during normal work hours (8 hours per day, 5 days per week). During upland pile installation, erosion and sediment control BMPs (e.g., turbidity curtain, shoring box) will minimize the discharge of sediments to the river.

Will water depth change? What are the current and proposed depths?		✔	The proposed installation will not affect water depth.
Will contaminants be released into sediments or water column? If yes, describe the nature of the contaminants and the extent of the effects.	✔		There may be temporary resuspension of sediments and associated contaminants, if present, during installation of the piles and removal of test piles. Any resuspension will be minor, and sediments and associated contaminants will settle over similar substrate quickly after construction.
Will tidal flow, currents, or wave patterns be altered? If no, why not? If yes, describe in detail how.		✔	The proposed installation will not alter tidal flow, currents, or wave patterns.
Will water quality be altered? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration of the impact.	✔		Installation of the steel pipe piles and removal of test piles may result in temporary and localized increases in turbidity, resulting in a temporary effect to water quality. Any resuspended sediments will settle quickly upon cessation of these activities, and no permanent effects to water quality are expected as a result of the proposed installation.
Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.	✔		In-water construction will result in temporary increases in underwater noise from vessel activity and pile driving. The use of two vessels for the duration of construction is an incremental increase in vessel activity in the area and will not result in significant adverse effects. Pile driving noise will be intermittent for the 12 noncontiguous days for the test pile program and 30 noncontiguous days for driving the 30-in piles. Pile driving will be completed via vibratory hammer to the extent possible. If an impact hammer is necessary, a soft start and cushion block will be used. Elevated noise levels are not expected to reach the threshold for injury to fishes. Fish will avoid the ensonified portion of the river (up to 230 ft from the pile being driven), representing a temporary loss of foraging habitat. However, similar habitat will continue to be available in the vicinity and this avoidance will not result in an adverse effect to EFH.
Does the action have the potential to impact prey species of federally managed fish with EFH designations?	✔		Sediment disturbance associated with pile installation, removal of test piles, and vessel movement will result in minor, short-term increases in suspended sediment, which will dissipate with the river currents. Fish and motile benthic organisms will be able to avoid the site during pile driving, as the river is over 4,000 feet wide at the installation site, and will not be affected by the temporary increase in turbidity. The area shaded by construction vessels will be minimal and will not have an effect on prey species. The proposed installation will result in the permanent loss of non-motile benthic organisms within the up to 71.1 sf footprint of the piles. While burrowing benthos will no longer be available to predators within this footprint, there is similar foraging habitat in the vicinity. It is expected that encrusting organisms will colonize the piles following completion of construction and will be available as prey. Additionally, the minimal occupation of the river bottom by the piles and minimal over-mudline coverage by the pile caps (0.011 ac) will not adversely affect habitat suitability for forage or EFH for designated species.

Step 4: This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species (from the list generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT			
Functions and Values	**Y**	**N**	**Describe habitat type, species and life stages to be adversely impacted**
Will functions and values of EFH be impacted for:			
Spawning If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.	✔	☐	Spawning winter flounder may be present during Jan-Apr, and windowpane could be present in May. The installation will comply with any in-water restrictions to protect these species, including the Nov 1 - Apr 30 time period pile driving is restricted in Hudson River Park. Installation of the piles and removal of test piles may result in a minor and temporary resuspension of sediments, which will dissipate with the tidal currents. Pile driving via vibratory/ impact hammer will be intermittent over 30 noncontiguous days. Fish will likely avoid portions of the river in the vicinity of pile installation, however, most of the width of the river would be non-ensonified, leaving room for these species to spawn in other areas in proximity to the installation site. The installation will not result in significant adverse effects to spawning.
Nursery If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.	✔	☐	A number of EFH species have juvenile life stages that could occur near the installation site (see Table 1). Larvae and juveniles in the study area could be temporarily impacted by minor increases in suspended sediment during pile driving and removal of test piles, which is the only in-water construction activity planned for the installation. The restricted time period for pile driving in Hudson River Park (Nov 1 - Apr 30) will protect any larvae present in the study area during this time. Use of a vibratory hammer or cushion block will minimize noise impacts to larvae if they are present outside of the restricted time period. The permanent loss of up to 71.1 square feet of bottom habitat in the footprint of the piles is minimal compared to the amount of similar habitat available in the vicinity of the installation and in the lower Hudson River. The piles will provide some habitat for structure-oriented larval and juvenile EFH species, if present.
Forage If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.	✔	☐	The installation will result in a minor temporary increase in suspended sediment and localized increases in turbidity during pile driving and removal of test piles, which could impact bottom dwelling foragers (e.g., windowpane, summer flounder, winter flounder, skates). Any sediment disturbed during this time will dissipate quickly with the tidal currents of the lower Hudson River. Pile driving will be temporary and intermittent and will minimize the effects of increased underwater noise through the use of a vibratory hammer, and the use of a soft start and cushion block during impact hammering. The loss of up to 71.1 square feet of benthic habitat in the footprint of the piles is minimal compared to the availability of similar soft bottom habitat in the area, and will not adversely affect foraging habitat for EFH species. Once installed, the piles will provide vertical hard surface for encrusting organisms, which may serve as prey for some fish.
Shelter If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.	✔	☐	The proposed project will create limited shelter habitat for EFH among the steel pipe piles where there previously was none. This may provide some habitat for EFH species associated with shelter.

Will impacts be temporary or permanent? Please indicate in description box and describe the duration of the impacts.			Temporary impacts include: increase in suspended sediment and turbidity during pile driving removal of test piles, and vessel movement, increase in noise during pile driving, and increase in vessel traffic and shading. Pile driving will be completed in approx 30 days during the in-water construction period. Installation of foundations would occur during this same period. Temporarily elevated underwater noise and suspended sediment levels will result in avoidance of the area by some fish, but they are expected to return to the area following completion of pile driving. Permanent impacts include: loss of up to 71.1 sf of bottom habitat in the footprint of the piles, and a total of up to 476 sf of overwater coverage (spaced over the entire footprint of the sculpture). The loss of bottom habitat is minimal compared to the availability of similar habitat in the vicinity, and the piles will provide vertical surface for encrusting organisms.
Will compensatory mitigation be used? If no, why not? Describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation plan, if applicable.	☐	✔	No compensatory mitigation will be used. Measures that will be implemented to minimize construction impacts include: use of a vibratory hammer to the extent possible and a soft start and cushion block if impact hammering is required in order to minimize underwater noise increases, and avoidance of pile driving during the restricted time period (November 1 through April 30). The permanent loss of bottom habitat from the piles will be minimal (up to 71.1 square feet). Over-mudline coverage from the pile caps will also be minimal (up to 476 square feet, or 0.011 acres).

<u>Step 5</u>: This section provides the federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

Please note: if information provided in the worksheet is insufficient to allow NOAA Fisheries to complete the EFH consultation additional information will be requested.

5. DETERMINATION OF IMPACT

Federal Agency's EFH Determination		
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: **(check the appropriate statement)**	☐	**There is no adverse effect on EFH or no EFH is designated at the project site.** **EFH Consultation is not required.**
	✔	**The adverse effect on EFH is not substantial. This means that the adverse effects are either no more than minimal, temporary, or that they can be alleviated with minor project modifications or conservation recommendations.** **This is a request for an abbreviated EFH consultation.**
	☐	**The adverse effect on EFH is substantial.** **This is a request for an expanded EFH consultation.**

Step 6: Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats as part of the Fish and Wildlife Coordination Act Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT

Species known to occur at site (list others that may apply)	Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.
alewife	See Attachment 2
American eel	See Attachment 2
American shad	See Attachment 2
Atlantic menhaden	See Attachment 2
blue crab	See Attachment 2
blue mussel	See Attachment 2
blueback herring	See Attachment 2

Eastern oyster	See Attachment 2
horseshoe crab	See Attachment 2
quahog	See Attachment 2
soft-shell clams	See Attachment 2
striped bass	See Attachment 2
other species:	Impacts to shortnose sturgeon, Atlantic sturgeon, and sea turtles are included in Attachment 2.

Useful Links

National Wetland Inventory Maps

EPA’s National Estuaries Program

Northeast Regional Ocean Council (NROC) Data

Mid-Atlantic Regional Council on the Ocean (MARCO) Data

Resources by State:

Maine

Eelgrass maps

Maine Office of GIS Data Catalog

Casco Bay Estuary Partnership

Maine GIS Stream Habitat Viewer

New Hampshire

New Hampshire's Statewide GIS Clearinghouse, NH GRANIT

New Hampshire Coastal Viewer

Massachusetts

Eelgrass maps

MADMF Recommended Time of Year Restrictions Document

Massachusetts Bays National Estuary Program

Buzzards Bay National Estuary Program

Massachusetts Division of Marine Fisheries

Massachusetts Office of Coastal Zone Management

Rhode Island

Eelgrass maps

Narraganset Bay Estuary Program

Rhode Island Division of Marine Fisheries

Rhode Island Coastal Resources Management Council

Connecticut

Eelgrass Maps

Long Island Sound Study

CT GIS Resources

CT DEEP Office of Long Island Sound Programs and Fisheries

CT Bureau of Aquaculture Shellfish

Maps CT River Watershed Council

New York

Eelgrass report

Peconic Estuary Program

NY/NJ Harbor Estuary

New Jersey

Submerged Aquatic Vegetation mapping

Barnegat Bay Partnership

Delaware

Partnership for the Delaware Estuary

Center for Delaware Inland Bays

Maryland

Submerged Aquatic Vegetation mapping

MERLIN

Maryland Coastal Bays Program

Virginia

Submerged Aquatic Vegetation mapping

Table 1

Essential Fish Habitat Designated Species in the Vicinity of the Proposed Installation

Species	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Red hake (*Urophycis chuss*)		M,S	M,S	M,S	
Winter flounder (*Pleuronectes americanus*)	M,S	M,S	M,S	M,S	M,S
Windowpane flounder (*Scopthalmus aquosus*)	M,S	M,S	M,S	M,S	M,S
Atlantic sea herring (*Clupea harengus*)		M,S	M,S	M,S	
Bluefish (*Pomatomus saltatrix*)			M,S	M,S	
Long finned squid (*Loligo pealei*)	n/a	n/a			
Short finned squid (*Illex illecebrosus*)	n/a	n/a			
Atlantic butterfish (*Peprilus triacanthus*)		M	M,S	M,S	
Atlantic mackerel (*Scomber scombrus*)			S	S	
Summer flounder (*Paralicthys dentatus*)		F,M,S	M,S	M,S	
Scup (*Stenotomus chrysops*)	S	S	S	S	
Black sea bass (*Centropristus striata*)			M,S	M,S	
Surf clam (*Spisula solidissima*)	n/a	n/a			
Ocean quahog (*Artica islandica*)	n/a	n/a			
Spiny dogfish (*Squalus acanthias*)	n/a	n/a			
King mackerel (*Scomberomorus cavalla*)	X	X	X	X	
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X	
Cobia (*Rachycentron canadum*)	X	X	X	X	
Clearnose skate (*Raja eglanteria*)			X	X	
Little skate (*Leucoraja erinacea*)			X	X	
Winter skate (*Leucoraja ocellata*)			X	X	
Bluefin tuna (*Thunnus thynnus*)	X	X	X	X	
Smooth dogfish (*Mustelus canis*)	X	X(1)	X	X	
Sand tiger shark (*Carcharias taurus*)		X(1)			
Dusky shark (*Carcharinus obscurus*)		X(1)			
Sandbar shark (*Carcharinus plumbeus*)		X(1)		X	

Notes:

S = EFH designation includes seawater salinity zone (salinity > 25%)

M = EFH designation includes mixing water / brackish salinity zone (0.5% < salinity < 25%)

F = EFH designation includes tidal freshwater salinity zone (0% < salinity < 0.5%)

n/a = Insufficient data for this life stage exists and no EFH designation has been made

(1) Species does not have a free-swimming larval stage; rather they are live bearers that give birth to fully formed juveniles. For the purposes of this table, "larvae" for sand tiger, dusky, and sandbar sharks refers to neonates and early juveniles.

Sources: NMFS "Summary of Essential Fish Habitat (EFH) Designation" at http://www.greateratlantic.fisheries.noaa.gov/hcd/STATES4/new_jersey/40407400.html; http://www.greateratlantic.fisheries.noaa.vog/hcd/ny3.html; http://www.nero.noaa.gov/hcd/skateefhmaps.htm; and NMFS EFH Mapper at http://www.habitat.noaa.gov/protection/efh/habitatmapper.html.

DRAWING LIST

C001	TOPOGRAPHIC SURVEY
C002	SITE PLAN
S001	GENERAL NOTES
S002	TYPICAL DETAILS
S101	FOUNDATION PLAN
S102	FRAMING DIAGRAM AND SCHEDULE
S103	FRAMING ELEVATIONS
S104	FRAMING ELEVATIONS
S201	COLUMNS
S202	BEAMS
S301	CASTINGS
S302	COUPLERS
S303	FOUNDATION DETAILS
S304	CONNECTION DETAILS

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Stamp

100% CONSTRUCTION DOCUMENTS
FOR REVIEW ONLY
30 MARCH 2018

No	Issue	Date
1	100% CONSTRUCTION DOCUMENTS	30 MAR 2018

Project

DAY'S END

New York NY

Title

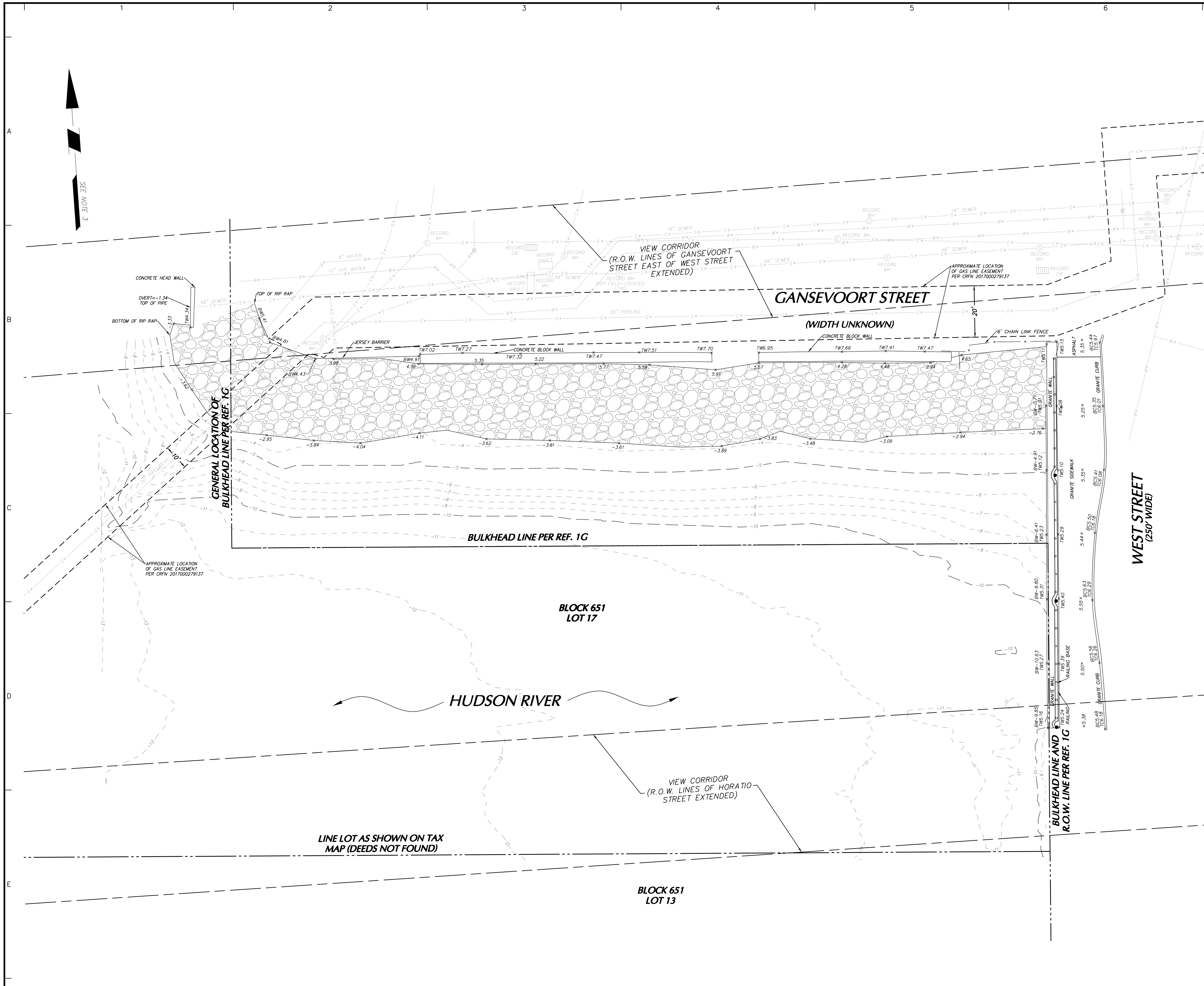
COVER SHEET

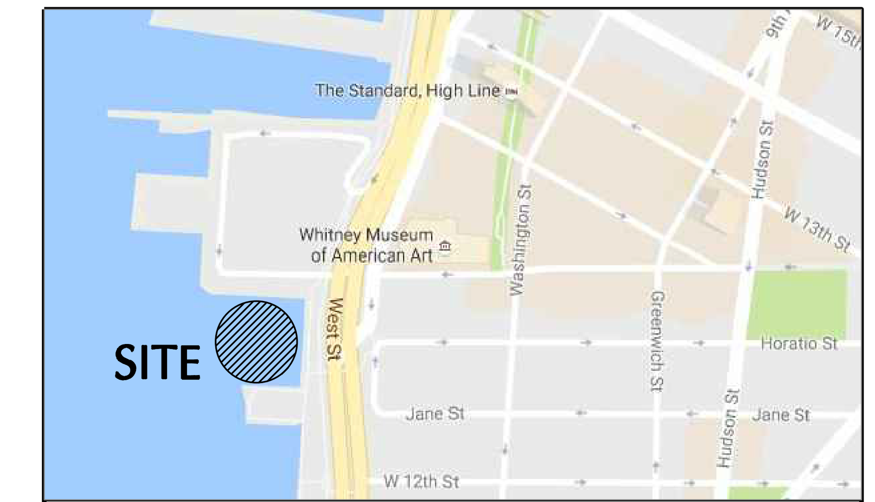
Project Phase
Construction Documents

Date
30 March 2018

Scale

Drawing Number





PROJECT LOCATION MAP

SCALE: N.T.S.

SOURCE: GOOGLE

NOTES

1. THIS SURVEY IS BASED UPON EXISTING PHYSICAL CONDITIONS FOUND AT THE SUBJECT SITE, AND THE FOLLOWING REFERENCES:
   A. CURRENT TAX MAP.
   B. "HYDROGRAPHIC SURVEY, PIER 52, HUDSON RIVER, MANHATTAN, NY", BY ROGERS SURVEYING, PLLC, PROJECT NO.: 41685, SHEET 1 OF 1, SURVEY DATE: 08/23/16, DRAFT DATE: 09/02/16.
   C. "SIDE SCAN SONAR SURVEY, PIER 52, HUDSON RIVER, MANHATTAN, NY", BY ROGERS SURVEYING, PLLC, PROJECT NO.: 41685, SHEET 1 OF 1, SURVEY DATE: 08/23/16, DRAFT DATE: 09/02/16.
   D. MAPPLUTO DATA (RELEASE 16V1) FOR THE BOROUGH OF MANHATTAN (https://www1.nyc.gov/site/planning/data-maps/open-data/dwn-pluto-mappluto.page).
   E. MANHATTAN SECTION MAP 29.
   F. "OFFICE OF THE PRESIDENT, DEPARTMENT OF PUBLIC WORKS, BUREAU OF ENGINEERING, MAP SHOWING A CHANGE IN THE STREET SYSTEM HERETOFORE LAID OUT WITHIN THE TERRITORY BOUNDED BY GANSEVOORT STREET, WEST STREET, W. 13TH ST, AND WASHINGTON ST. BY WIDENING WEST STREET ON ITS EASTERLY AND WESTERLY SIDES BETWEEN GANSEVOORT ST. AND LITTLE W. 12TH STREETS," DATED MARCH 15, 1927, ACC. NO. 25851.
   G. "PIERHEAD AND BULKHEAD LINES, HUDSON RIVER, N.Y. & N.J., C.R.R. OF N.J. TERMINAL TO CASTLE POINT, N.J., PIER "A" TO GANSEVOORT ST., N.Y. CITY," SHEET 21a, APPROVED BY THE WAR DEPARTMENT ON JULY 31, 1941.
   H. PLAN TITLED "GANSEVOORT STREET SANITATION FACILITY, 2 BLOOMFIELD STREET, BOROUGH OF MANHATTAN, TOPOGRAPHIC & PROPERTY LINE MAP" BY TECTONIC ENGINEERING CONSULTANTS, P.C., DATED JANUARY 8, 2001 AND LAST REVISED MAY 7, 2003.
   I. GAS LINE EASEMENT DEPICTED IN CITY REGISTER FILE NUMBER (CRFN) 2017000279137, RECORDED JULY 17, 2012.
2. THE SURVEYED PROPERTY IS SUBJECT BUT NOT LIMITED TO THE FOLLOWING FACTS AS REVEALED BY THE HEREON REFERENCED INFORMATION. THE INFORMATION SHOWN HEREON DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION THAT MAY AFFECT THE QUALITY OF TITLE TO BOTH THE SUBJECT AND ADJOINING PARCELS SHOULD BE VERIFIED BY AN ACCURATE AND CURRENT TITLE REPORT.
3. THE MERIDIAN OF THIS SURVEY IS REFERENCED TO THE NEW YORK STATE PLANE COORDINATE SYSTEM NYLI NAD 83 AS ESTABLISHED BY GPS METHODS.
4. ELEVATIONS SHOWN ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) ESTABLISHED BY GPS METHODS.
5. STREET NAMES, R.O.W. WIDTHS, BLOCK AND LOT NUMBERS AS PER MAP REFERENCED IN NOTE 1A.
6. PLANIMETRIC INFORMATION SHOWN HEREON HAS BEEN OBTAINED FROM GROUND SURVEYS BY LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING AND LANDSCAPE ARCHITECTURE, D.P.C. DURING AUGUST OF 2016. HYDROGRAPHIC INFORMATION AS PER MAPS REFERENCED IN NOTES 1B & 1C.
7. OFFSETS (IF SHOWN) ARE FOR SURVEY REFERENCES ONLY AND ARE NOT TO BE USED IN CONSTRUCTION OF ANY TYPE.
8. WETLANDS, ENVIRONMENTAL AND/OR HAZARDOUS MATERIALS LOCATION, IF ANY, NOT COVERED UNDER THIS CONTRACT.
9. UNLESS SPECIFICALLY NOTED HEREON, STORM AND SANITARY SEWER INFORMATION (INCLUDING PIPE INVERT, PIPE MATERIAL, AND PIPE SIZE) WAS OBSERVED AND MEASURED AT FIELD LOCATED STRUCTURES (MANHOLES/CATCH BASINS, ETC). CONDITIONS CAN VARY FROM THOSE ENCOUNTERED AT THE TIMES WHEN AND THE LOCATIONS WHERE DATA WAS OBTAINED. DESPITE MEETING THE REQUIRED STANDARD OF CARE THE SURVEYOR CANNOT AND DOES NOT WARRANT THAT PIPE MATERIAL AND/OR PIPE SIZE THROUGHOUT THE PIPE RUN ARE THE SAME AS THOSE OBSERVED AT EACH STRUCTURE, OR THAT THE PIPE RUN IS STRAIGHT BETWEEN THE LOCATED STRUCTURES.

   ADDITIONAL UTILITY (WATER, GAS, ELECTRIC ETC...) DATA MAY BE SHOWN FROM FIELD LOCATED SURFACE MARKINGS (BY OTHERS), EXISTING STRUCTURES, AND/OR FROM EXISTING DRAWINGS.

   UNLESS SPECIFICALLY NOTED HEREON THE SURVEYOR HAS NOT EXCAVATED TO PHYSICALLY LOCATE THE UNDERGROUND UTILITIES. THE SURVEYOR MAKES NO GUARANTEES THAT THE SHOWN UNDERGROUND UTILITIES ARE EITHER IN SERVICE, ABANDONED OR SUITABLE FOR USE, NOR ARE IN THE EXACT LOCATION OR CONFIGURATION INDICATED HEREON.

   PRIOR TO ANY DESIGN OR CONSTRUCTION THE PROPER UTILITY AGENCIES MUST BE CONTACTED FOR VERIFICATION OF UTILITY TYPE AND FOR FIELD LOCATIONS.

   UNLESS NOTED BELOW SUPPLEMENTAL DOCUMENTS WERE NOT USED TO COMPILE THE SUBSURFACE UTILITY INFORMATION SHOWN HEREON.
10. UNAUTHORIZED ALTERATION OR ADDITION TO A SURVEY MAP BEARING A LICENSED LAND SURVEYOR'S SEAL IS A VIOLATION OF SECTION 7209, SUB-DIVISION 2, OF THE NEW YORK STATE EDUCATION LAW.
11. THIS PLAN NOT VALID UNLESS EMBOSSED OR BLUE INK STAMPED WITH THE SEAL OF THE PROFESSIONAL.

LEGEND (NOT SHOWN TO SCALE)

●	BOLLARD
BW	BOTTOM OF WALL
TW	TOP OF WALL
BC	BOTTOM OF CURB
TC	TOP OF CURB
—322—	CONTOUR LINE
—·—·—	CHAINLINK FENCE

20 0 5 10 20
SCALE IN FEET

"I hereby state that this plan is based on a field survey made by me or under my immediate supervision in accordance with NYSPLS Code of Practice for Land Surveys, and to the best of my professional knowledge, information and belief, and in my professional opinion, correctly represents the conditions found on the date of the field survey at the subject property".

SIGNATURE — PAUL D. FISHER — DATE SIGNED
PROFESSIONAL LAND SURVEYOR
NY Lic. No. 050784-1

Langan Project No. 170433501

Scale 1"=20'

Drawn By LC, LB, DA | Checked By PDF

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LANGAN

PROJECT NO. 170433501

Stamp

100% CONSTRUCTION DOCUMENTS
FOR REVIEW ONLY
30 MARCH 2018

No	Issue	Date
1	100% CONSTRUCTION DOCUMENTS	30 MAR 2018

Project
DAY'S END

New York NY

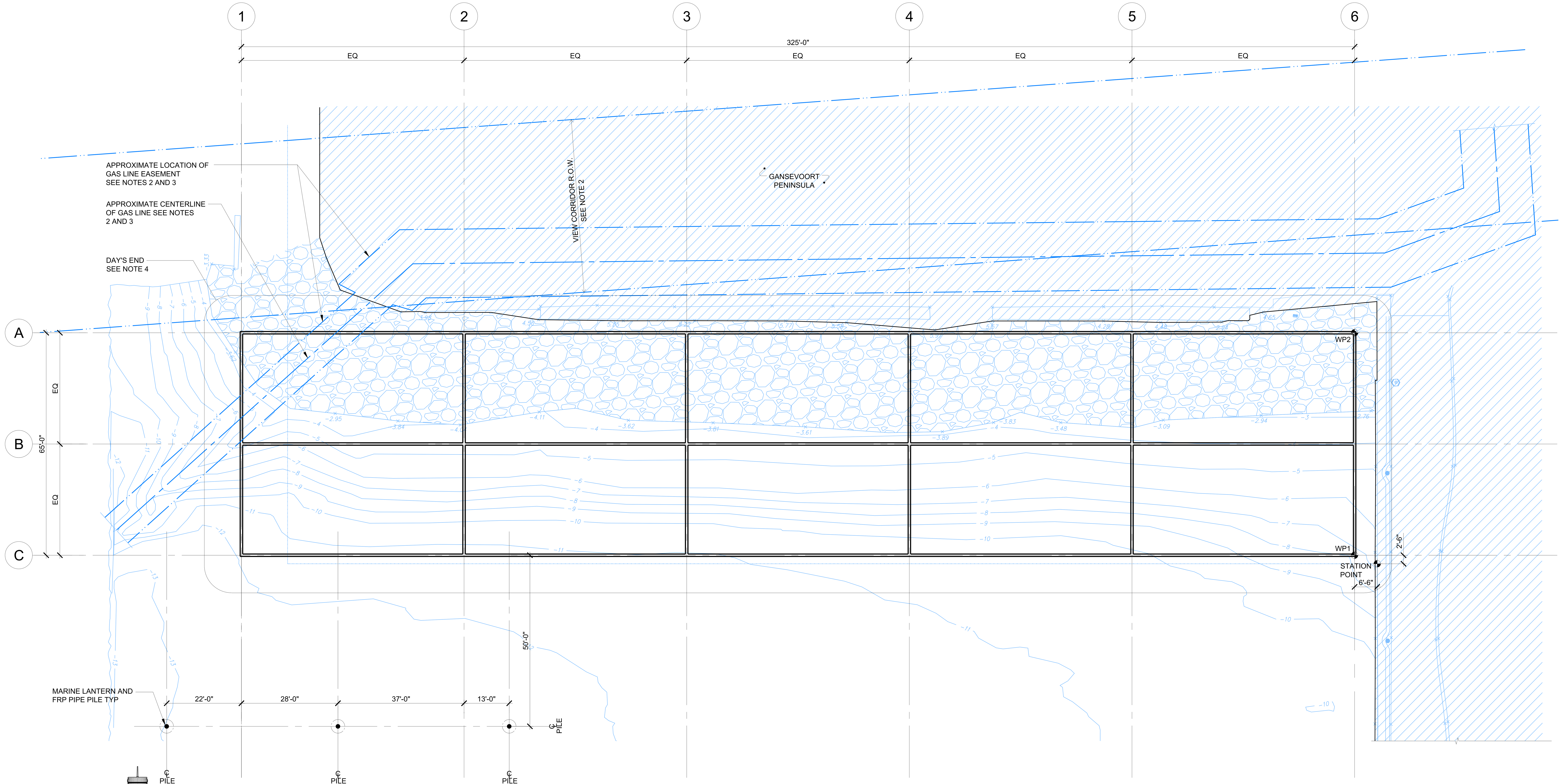
Title
TOPOGRAPHIC SURVEY

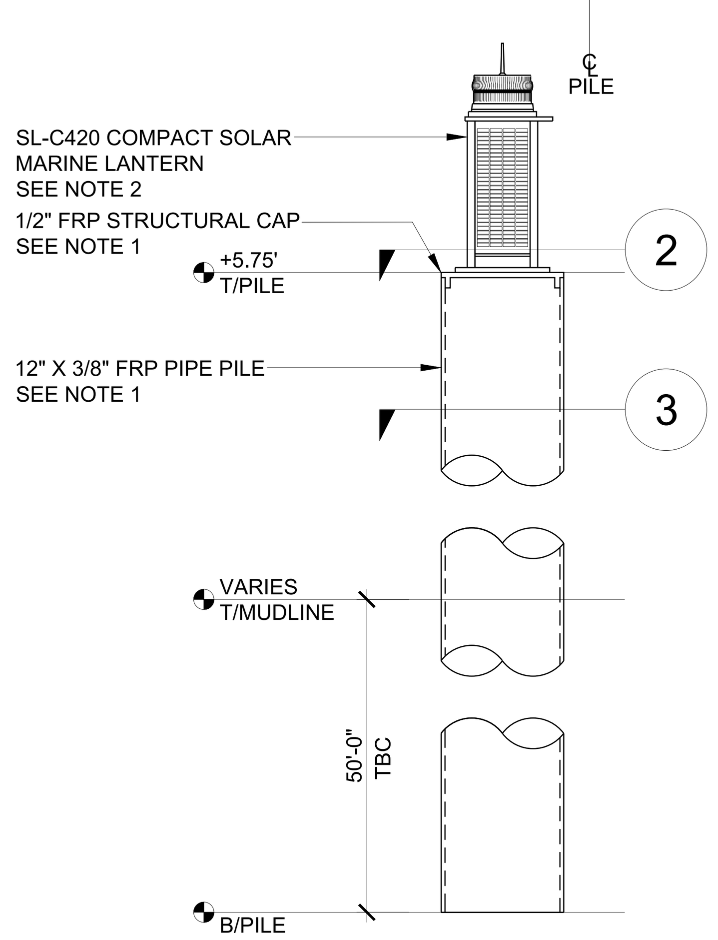
Project Phase
Construction Documents

Date
30 March 2018

Scale
1"=20'

Drawing Number
C001

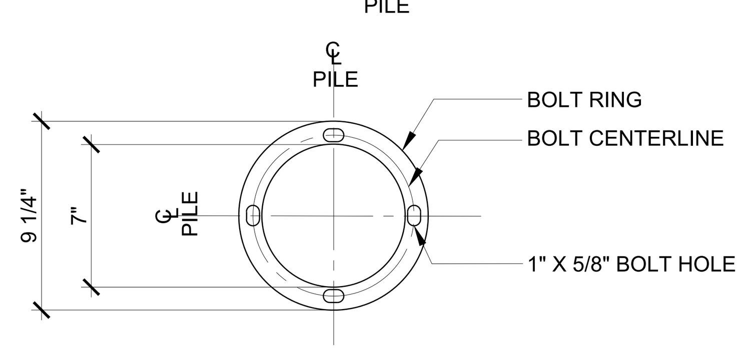




PILE ELEVATION

1 DETAIL

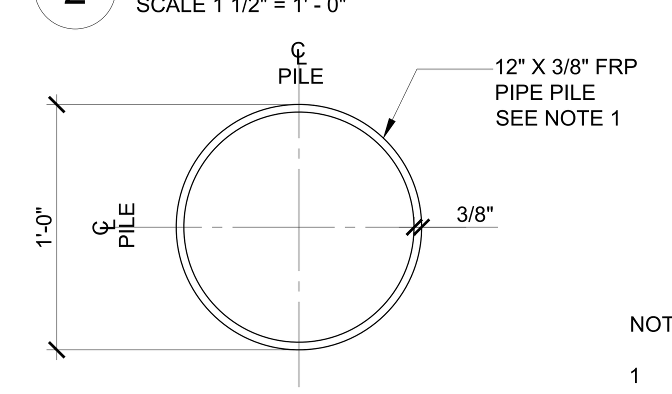
SCALE 3/4" = 1' - 0"



BOLT RING

2 PLAN SECTION

SCALE 1 1/2" = 1' - 0"



PILE CROSS-SECTION

3 PLAN SECTION

SCALE 1 1/2" = 1' - 0"

NOTES

1 SUPERPILE ROUND PILE AND FRP STRUCTURAL CAP AS MANUFACTURED BY LEE COMPOSITES OR EQUIVALENT AS APPROVED BY THE ENGINEER

2 SL-C420 COMPACT SOLAR MARINE LANTERN AS MANUFACTURED BY SEALITE OR EQUIVALENT AS APPROVED BY THE ENGINEER

N

SITE PLAN

SCALE 1/16" = 1' - 0"

NOTES

1 ALL ELEVATIONS ARE RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

2 SURVEY UNDERLAY IS FROM LANGAN TOPOGRAPHIC SURVEY PAGE V001 DRAFT DATED 07 JULY 2017 AND IS TO BE CONFIRMED PENDING FURTHER FIELD INVESTIGATION. SEE C001 FOR ADDITIONAL INFORMATION ON LOCATION OF UNDERGROUND UTILITIES, GAS LINE, AND VIEW CORRIDOR

3 GAS LINE AND EASEMENT LOCATION SHOWN IN APPROXIMATE LOCATION RELATIVE TO INSTALLATION. SEE C001 FOR ADDITIONAL INFORMATION

4 FOR INSTALLATION STRUCTURE SEE S101-S304

5 SEE SPECIFICATION 35 12 13 FOR MARINE SIGNALING EQUIPMENT

LEGEND

WP# — WORKPOINT

● — MARINE LANTERN SEE SECTIONS 1, 2, 3 AND NOTE 5

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100% CONSTRUCTION DOCUMENTS
FOR REVIEW ONLY
30 MARCH 2018

No	Issue	Date
1	100% CONSTRUCTION DOCUMENTS	30 MAR 2018

Project
DAY'S END

New York NY

Title
SITE PLAN

Project Phase
Construction Documents

Date
30 March 2018

Scale
As Indicated

Drawing Number
C002

GENERAL NOTES

A GENERAL

1 THE DRAWINGS HEREIN REPRESENT THE WORK DONE THROUGH THE 100% CONSTRUCTION DOCUMENTS PHASE OF THE PROJECT AND ARE NOT FOR CONSTRUCTION.

2 THE CONTRACTOR SHALL DETERMINE EXISTING CONDITIONS WHERE REQUIRED AND VERIFY ALL DRAWINGS. ANY DISCREPANCIES SHALL BE MARKED ON A PRINT AND IMMEDIATELY FORWARDED TO THE ENGINEER.

3 THE PRINTED (OR TRANSMITTED, WHEN ADHERING TO ALL REQUIRED WAIVERS AS REQUIRED BY STRUCTURAL ENGINEER OF RECORD) TWO DIMENSIONAL CONTRACT DRAWINGS AND SPECIFICATIONS SHALL BE THE LEGAL DOCUMENT FOR THIS PROJECT.

4 THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AT THE JOB SITE. DO NOT SCALE STRUCTURAL DRAWINGS.

5 THE CONTRACTOR SHALL MAKE NO DEVIATION FROM CONTRACT DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF THE ENGINEER.

6 THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS, INCLUDING BUT NOT LIMITED TO, INSTALLING TEMPORARY SUPPORTS, SHORING, AND BRACING SO AS TO ENSURE THAT THE CONSTRUCTION OPERATIONS PROCEED IN A SAFE MANNER AND WHICH SHALL NOT BE REMOVED DURING THE ENTIRE PERIOD OF CONSTRUCTION UNLESS OTHERWISE DIRECTED ON THE DRAWINGS OR BY THE ENGINEER. ALL TEMPORARY SUPPORTS, SHORING AND BRACING SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK. DETAILS OF ALL TEMPORARY INSTALLATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO INSTALLATION.

7 SCALES NOTED ON THE DRAWINGS ARE FOR GENERAL INFORMATION ONLY. NO DIMENSIONAL INFORMATION SHALL BE OBTAINED BY SCALING FROM THE DRAWINGS.

8 ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATIONS.

9 THE OWNER WILL RETAIN AN INDEPENDENT TESTING AGENCY. SEE THE PROJECT SPECIFICATIONS FOR SPECIFIC REQUIREMENTS. THE OWNER AND THE OWNER'S REPRESENTATIVE RESERVE THE RIGHT TO INSPECT ANY MATERIAL, FABRICATION, OR WORKMANSHIP AT ANY TIME IN FIELD OR SHOP FOR CONFORMANCE TO THE SPECIFICATIONS AND DRAWINGS.

10 THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR THE STRUCTURAL ENGINEER'S APPROVAL AS STATED IN THE SPECIFICATIONS.

11 IN THE EVENT THAT CERTAIN DETAILS OF THE CONSTRUCTION ARE NOT FULLY SHOWN OR NOTED ON THE DRAWINGS, THEIR CONSTRUCTION SHALL BE OF THE SAME TYPE AS FOR SIMILAR CONDITIONS WHICH ARE SHOWN AND NOTED, SUBJECT TO THE STRUCTURAL ENGINEER'S APPROVAL.

12 SEE SITE PLAN DRAWING C002 FOR THE FOLLOWING:

A MARINE LANTERN SAFETY LIGHTING

13 HOLES SHALL NOT BE CUT OR DRILLED INTO THE EXISTING STRUCTURAL MEMBERS TO REMAIN WITHOUT THE APPROVAL OF THE ENGINEER.

14 CONTROL OVER OR CHARGE OF AND RESPONSIBILITY FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK OF THE PROJECT, ARE SOLELY THE CONTRACTOR'S RESPONSIBILITY.

15 THE CONTRACTOR SHALL BE SOLELY AND FULLY RESPONSIBLE FOR THE SAFETY AND STABILITY OF NEW AND EXISTING ADJACENT STRUCTURES INCLUDING BUT NOT LIMITED TO BUILDINGS, SIDEWALKS, RAILROAD TRACKS, SLURRY WALLS, ROADWAYS AND UTILITIES. A DETAILED PLAN OUTLINING THE MEANS AND METHODS REQUIRED TO ENSURE SAFETY AND STABILITY SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO THE START OF WORK.

B DESIGN

1 CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE 2014 NEW YORK CITY BUILDING CODE.

2 ALL CONSTRUCTION SHALL COMPLY WITH THE PROVISIONS OF THE FOLLOWING CODES, SPECIFICATIONS AND STANDARDS EXCEPT WHERE NOTED TO THE CONTRARY ON DRAWINGS AND SPECIFICATIONS OR WHERE MORE STRINGENT REQUIREMENTS ARE SPECIFIED OR SHOWN:

ACI 318 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE 2011
ASCE/SEI 7 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES 2005 AND 2010
AISC 341 SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS 2010
AISC 360 SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS 2010

3 DESIGN LIVE LOADS

	DISTRIBUTED	CONCENTRATED
FRAME (MAINTENANCE ONLY)	NA	300 LBS -

4 DESIGN WIND LOADS

OCCUPANCY CATEGORY	II
EXPOSURE CATEGORY	D
BASIC WIND SPEED	V = 115 MPH
TOPOGRAPHIC FACTOR	Kzt = 1.0
GUST FACTOR	VARIES BY NATURAL FREQUENCY SEE RWDI REPORT DATED 15 SEPTEMBER 2016
DESIGN PRESSURE	P = 25 PSF PROJECTED AREA SEE RWDI REPORT DATED 15 SEPTEMBER 2016 REVISED MARCH 2018
BASE SHEAR	V = 51.9 KIPS IN N-S DIRECTION (ULT) V = 44.3 KIPS IN E-W DIRECTION SERVICE (ULT)

5 DESIGN SEISMIC LOADS

OCCUPANCY CATEGORY	II
SEISMIC USE GROUP	I
IMPORTANCE FACTOR	I = 1.0
SITE CLASS	F PER LANGAN GEOTECHNICAL REPORT DATED 5 APRIL 2018
DESIGN SHORT PERIOD SPECTRAL ACC.	Sds = APPROX 0.448g (TBC)
DESIGN 1-SEC PERIOD SPECTRAL ACC.	Sd1 = APPROX 0.167g (TBC)
SEISMIC DESIGN CATEGORY	B (TBC)
SEISMIC RESPONSE FACTOR	R = 3.5 (OSMF)
PROCEDURE	EQUIVALENT LATERAL FORCE (ELF)
BASE SHEAR COEFFICIENT	Cs = APPROX 3.18% (TBC)
BASE SHEAR	V = APPROX 7 KIPS (TBC)

6 DESIGN ATMOSPHERIC ICE LOADS

OCCUPANCY CATEGORY	II
CYLINDER DIAMETER	Dc = 8.625 IN
DESIGN ICE THICKNESS	td = 1.05 IN (PER RWDI REPORT DATED 31 MARCH 2017 FOR 500YR RETURN PERIOD)
TOPOGRAPHIC FACTOR	Kzt = 1.0
AREA OF ICE	Ai = 32 IN^2
FRAME LOAD	12.8 PLF
RELATED WIND LOAD VELOCITY	50 MPH

7 DESIGN MARINE ICE, WAVE AND CURRENT LOADS

SEE COWI BASIS OF DESIGN REPORT DATED APRIL 2018.

8 DESIGN TEMPERATURE LOADS

BASED ON TECHNICAL REPORT 65 EXPANSION JOINTS IN BUILDINGS BY THE NATIONAL ACADEMY OF SCIENCES.

LOCATION	NEW YORK NY
MEAN CONSTRUCTION TEMPERATURE	Tm = 59 DEG F
SUMMER 99% TEMPERATURE	Tw = 94 DEG F
WINTER 99% TEMPERATURE	Tc = 11 DEG F
TEMPERATURE DESIGN DELTA	35 DEG F EXPANSION 48 DEG F CONTRACTION

C TEMPORARY WORK

1 ALL TEMPORARY WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE 2014 NEW YORK CITY BUILDING CODE.

2 IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE PROPER SHORING AND BRACING WHEREVER NECESSARY. THE CONTRACTOR SHALL SUBMIT SIGNED CALCULATIONS BY LICENSED ENGINEER FOR ALL SHORING AND BRACING FOR REVIEW BY THE ENGINEER OF RECORD.

3 THE DESIGN, CONSTRUCTION, INSPECTION AND MAINTENANCE OF TEMPORARY STRUCTURES AND PROCEDURES INCLUDING BUT NOT LIMITED TO SUPPORTS FOR AND STABILITY OF CRANES OR HOISTS OR LIFTS OR OTHER SIMILAR EQUIPMENT, TEMPORARY GUYING OR BRACING, SCAFFOLDING, FORMWORK OR SHORING, DEWATERING, TEMPORARY EXCAVATION SUPPORT OR UNDERPINNING EXCAVATION WORK, PROTECTION OF SLOPES, CONSTRUCTION STORAGE OR STAGING AREAS, SIDEWALK BRIDGES OR CONSTRUCTION FENCES, TEMPORARY ENCLOSURES AT OPENINGS, AT THE BUILDING'S PERIMETER OR ELSEWHERE, ARE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR AND/OR CONTRACTORS AND/OR CONSULTANTS RETAINED BY THE GENERAL CONTRACTOR. DETAILED DRAWINGS SHALL BE PREPARED AND SEALED BY A STATE OF NEW YORK LICENSED PROFESSIONAL ENGINEER AND SUBMITTED FOR REVIEW.

4 THE CONTRACTOR SHALL SUBMIT PROCEDURES, DESIGN CALCULATIONS, AND DETAILED DRAWINGS OF ALL TEMPORARY CONDITIONS DURING CONSTRUCTION AS DIRECTED BY THE ENGINEER, AT NO ADDITIONAL COST TO THE OWNER FOR REVIEW BY THE ENGINEER PRIOR TO ANY FABRICATION AND CONSTRUCTION. ALL SUBMITTALS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK. THE CONTRACTOR CANNOT START WORK UNTIL THE DOCUMENTATION IS SUBMITTED TO THE ENGINEER AND THE ENGINEER HAS COMPLETED THE REVIEW.

5 CONSTRUCTION LOADS SHALL NOT EXCEED THE DESIGN LIVE LOADS PER SQUARE FOOT OR CONCENTRATED LOADS NOTED IN SECTION B. PROVIDE ADEQUATE SHORING AND/OR BEARING WHERE STRUCTURE HAS NOT ATTAINED DESIGN STRENGTH OR OTHERWISE NECESSARY FOR CONSTRUCTION LOADING.

6 SEQUENCING - THE DRAWINGS INDICATE THE COMPLETED STRUCTURE. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ALL TEMPORARY MEASURES NECESSARY FOR ERECTION.

7 ALL STRUCTURES HAVE BEEN DESIGNED TO RESIST THE DESIGN LOADS ONLY AS COMPLETED STRUCTURES. THE CONTRACTOR SHALL FULLY BRACE OR OTHERWISE PROTECT WORK IN PROGRESS UNTIL THE STRUCTURES ARE COMPLETED. THE CONTRACTOR SHALL ALSO ENSURE THAT HIS OPERATIONS AND PROCEDURE IMPOSE NO LOADS ON ANY MEMBER GREATER THAN THE DESIGN LOADS.

D EARTHWORK AND FOUNDATIONS

1 ALL EARTHWORK INCLUDING EXCAVATIONS, FILLING AND SUBGRADE PREPARATION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND THE GEOTECHNICAL REPORT DATED 5 APRIL 2018 BY LANGAN.

2 ALL FOUNDATIONS SHALL BE DESIGNED IN ACCORDANCE WITH THE SPECIFICATIONS AND THE GEOTECHNICAL REPORT DATED 5 APRIL 2018 BY LANGAN.

3 ALL FOOTINGS SHALL BE PLACED OVER COMPETENT NATURAL SOILS OR COMPACTED STRUCTURAL FILL PLACED OVER COMPETENT NATURAL SOILS.

4 ALL FOUNDATION EXCAVATION IS TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER. THE ELEVATIONS SHOWN ON THE DRAWINGS ARE ANTICIPATED AND ACTUAL ELEVATIONS ARE TO BE ESTABLISHED IN THE FIELD BY THE GEOTECHNICAL ENGINEER.

E CONCRETE

1 ALL NEW CONCRETE CONSTRUCTION SHALL CONFORM TO THE SPECIFICATIONS AND THE LATEST EDITION OF THE AMERICAN CONCRETE INSTITUTE (ACI) 318. THE CONTRACTOR SHALL SUBMIT MIX DESIGNS TO THE ENGINEER FOR APPROVAL BEFORE ORDERING CONCRETE TO THE JOB SITE.

2 ALL NEW REINFORCING SHALL BE DETAILED IN ACCORDANCE WITH THE LATEST EDITION OF ACI 315 DETAILING MANUAL.

3 MATERIAL PROPERTIES - CONCRETE

	F'C (PSI) AT 28 DAYS	MAX W/C RATIO	MAX SLUMP INCHES	NOTES
PILE CAPS AND COLUMNS	5,000	0.45	4	NW
UHPC	APPROX 30,000 PROPERTIES TO BE CONFIRMED FOR PROPRIETARY UHPC PRODUCT			

4 MATERIAL PROPERTIES - REINFORCING STEEL

	Fy (PSI)	ASTM
ALL BARS UNLESS OTHERWISE NOTED	60,000	A615/A767
BARS TO BE WELDED	60,000	A706/A767

5 MINIMUM CONCRETE PROTECTION SHALL BE PER THE LATEST EDITION OF ACI 318.

THE MINIMUM PROTECTION SHALL BE AS FOLLOWS FOR CAST IN PLACE NON-PRESTRESSED CONCRETE:

CAST AGAINST AND PERMANENTLY IN CONTACT WITH GROUND	3"
EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	2" (#6 THROUGH #18 BARS) 1 1/2" (#5 BAR AND SMALLER)
NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	
SLABS AND WALLS	3/4" (#11 BARS OR SMALLER)
BEAMS AND COLUMNS	1 1/2" (CLEAR TO TIES/STIRRUPS)

6 ALL REINFORCING TO BE GALVANIZED PER ASTM A767.

7 FIELD BENDING OF BARS TO BE IN ACCORDANCE WITH ACI 318 REQUIREMENTS

F STRUCTURAL STAINLESS STEEL

1 ALL CONSTRUCTION SHALL COMPLY WITH THE LATEST EDITION OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) STEEL CONSTRUCTION MANUAL. ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS) SHALL COMPLY WITH SECTION 10 OF THE AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND STAINLESS STEEL PER ADDITIONAL REQUIREMENTS OF DESIGN GUIDE 27.

2 MATERIAL PROPERTIES - SUPER DUPLEX STAINLESS STEEL

	Fy (PSI)	UNS	ASTM
PIPE	80,000	S32750	A790
PLATE	80,000	S32750	A240
CASTING	75,000	J93404	A890 GR 5A

3 MATERIAL PROPERTIES - AUSTENITIC STAINLESS STEEL

	Fy (PSI)	UNS	ASTM
PIPE	25,000-30,000	S30400, S30403	A269, A312
	25,000-30,000	S31600, S31603	A269, A312
PLATE	25,000-30,000	S30400, S30403	A240
	25,000-30,000	S31600, S31603	A240

4 CONNECTIONS SHALL BE WELDED OR BOLTED. BOLTED CONNECTIONS SHALL BE AS SPECIFICALLY DETAILED IN THE STRUCTURAL DRAWINGS.

5 STAINLESS STEEL FASTENERS AND ANCHOR BOLTS SHALL BE 2205 SERIES STAINLESS STEEL MEETING ASTM A1082 FOR SUPERSTRUCTURE AND MATCHING AUSTENITIC SERIES MEETING ASTM F593 AND F594 AT PILE CAPS.

6 A WELDING SEQUENCE AND DISTORTION CONTROL PLAN PREPARED BY CERTIFIED WELDING ENGINEER OR METALLURGIST SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION. MEMBERS TO BE WELDED SHALL BE BROUGHT INTO CORRECT ALIGNMENT PER THE SPECIFIED TOLERANCES AND HELD IN POSITION BY THE USE OF JIGS, FIXTURES OR OTHER SUITABLE DEVICES UNTIL WELDING IS COMPLETE. CONTRACTOR SHALL TEST THE PROCEDURES BEFORE THE START OF THE WORK TO DEMONSTRATE THAT THE WELD CAN BE MADE TO THE REQUIRED QUALITY AND THAT ANGULAR DEFORMATION CAUSED BY SHRINKAGE OF THE WELDING CAN BE COUNTERACTED BY SUITABLE MEASURES WITHOUT AFFECTING THE STRENGTH OF THE JOINT OR PARENT MATERIAL.

7 UNLESS OTHERWISE SHOWN ON THE PLANS, TERMINATIONS OF FILLET WELDS AND ALL WELD PASS STOPS AND STARTS VISIBLE IN THE FINAL WELD SHALL BE GROUND SMOOTH.

8 WELDING ELECTRODES SHALL CONFORM AWS 1.6 AND 5.4 REQUIREMENTS. FOR 2507 SUPER DUCTAL STAINLESS STEEL USE E2593-XX ELECTRODES AND 2593 FILLER MATERIAL WITH 110KSI TENSILE STRENGTH.

9 ALL WELDED CONNECTIONS SHALL CONFORM TO THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY (AWS) D1.6 STRUCTURAL WELDING CODE - STAINLESS STEEL. PROVISIONS SHALL BE MADE FOR FIELD INSPECTION AND TESTING OF WELDS.ALL WELDS SHALL BE QUALIFIED BY AWS 1.6 PROCEDURES. ALL WELDERS SHALL BE LICENSED AND QUALIFIED AS REQUIRED BY THE APPLICABLE BUILDING CODE.

10 THE CONTRACTOR IS TO EXAMINE THE WELDING DETAILS FOR SUSCEPTIBILITY TO LAMELLAR TEARING. THE CONTRACTOR SHALL USE PROCESSES WHICH HAVE BEEN DEMONSTRATED TO LESSEN THE RISK OF LAMELLAR TEARING. THE CONTRACTOR IS TO USE WHERE APPROPRIATE TECHNIQUES SUCH AS BUTTERING TO LESSEN THE RISK OF LAMELLAR TEARING. WEBS, FLANGES, AND BASE PLATES GREATER THAN 1 3/8" THICK SHALL COMPLY WITH ASTM A770 "THROUGH-THICKNESS TENSION TESTING OF STEEL PLATES FOR SPECIAL APPLICATIONS" AND BE TESTED PER THE SPECIFICATIONS FOR LAMINATIONS.

11 THE OWNER WILL RETAIN AN INDEPENDENT TESTING AGENCY TO ULTRASONICALLY TEST ALL GROOVE WELDS AND ALL FILLET WELDS OF LEG LENGTH GREATER THAN 3/8" IN WELDED MOMENT JOINTS AND IN BASE METAL GREATER THAN 1 3/8" THICK. THIS EXAMINATION IS TO CONFIRM THE ABSENCE OF BOTH LAMINATIONS AND LAMELLAR TEARING. THE PRESENCE OF EITHER WILL BE CONSIDERED A CAUSE FOR REJECTION. THE ULTRASONIC EXAMINATION SHALL INCLUDE THE PARENT MATERIAL TO A DISTANCE OF 6" ON EACH SIDE OF THE WELD.

12 THE SAME WILL BE ULTRASONICALLY INSPECTED A SECOND TIME A MINIMUM OF 2 WEEKS AFTER THE COMPLETION OF THE WELDS.

13 THE CONTRACTOR SHALL BE RESPONSIBLE FOR GEOMETRIC CONTROL OF CONSTRUCTION SO THAT THE COMPLETED STRUCTURE WILL CONFORM TO THE LINES, GRADES AND DIMENSIONS SHOWN ON THE CONTRACT DOCUMENTS. A GEOMETRIC CONTROL PLAN SHALL BE PROVIDED FOR REGULAR MONITORING THROUGHOUT THE ERECTION PROCEDURE. FINAL VERTICAL GEOMETRY SHALL BE SET SUCH THAT THE FINAL THEORETICAL GEOMETRY IS ACHIEVED WHEN CONSIDERING THE AFFECTS OF CREEP AND SHRINKAGE.

14 THE CONTRACTOR SHALL CHECK THE ELEVATIONS AND ALIGNMENT OF THE STRUCTURE AT EVERY STAGE OF THE CONSTRUCTION. ALL SURVEYING SHALL BE PERFORMED AT A TIME THAT WILL MINIMIZE THE INFLUENCE OF TEMPERATURE. SURVEYING WILL BE PROVIDED TO AN ACCURACY OF 0.005 FT. THE CONTRACTOR SHALL MAINTAIN A RECORD OF ALL SURVEYS, CHECK READINGS, ADJUSTMENTS, AND CORRECTIONS AND SHALL FILE SUCH DATA WITH THE ENGINEER UPON REQUEST.

15 DRILLING HOLES IN THE PERMANENT STRUCTURE FOR TEMPORARY CLAMPING WILL NOT BE ALLOWED EXCEPT AS APPROVED BY THE ENGINEER. THE DETAILS OF ANY FASTENINGS WHICH THE CONTRACTOR MAY REQUIRE IN ANY PART OF THE PERMANENT WORKS FOR ERECTION EQUIPMENT SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.

16 LOCAL APPLICATION OF HEAT OR MECHANICAL TREATMENT IS ONLY PERMITTED TO BE USED IN A CONTROLLED ENVIRONMENT TO INTRODUCE OR CORRECT CAMBER, CURVATURE AND STRAIGHTNESS. THE CONTRACTOR SHALL SUBMIT METHODS AND PROCEDURES FOR REVIEW BY THE ENGINEER FOR ANY HEAT OR MECHANICAL TREATMENT REQUIRED PRIOR TO USING THIS METHOD.

17 FINISH STAINLESS STEEL AS SPECIFIED AND IN ACCORDANCE WITH THE FOLLOWING SCHEDULE AT A MINIMUM:

EXTERIOR EXPOSED STAINLESS STEEL	2D NEAR-MIRROR MACHINED FINISH WITH A LIGHT CIRCUMFERENTIAL GRAIN POLISH

18 ALL CONTACT SURFACES OF COMPRESSION ELEMENTS SHALL BE "FINISHED" SURFACES, ALL SURFACES INDICATED AS FINISHED SHALL HAVE A MAXIMUM ANSI ROUGHNESS HEIGHT VALUE OF 500.

G SPECIAL INSPECTIONS

1 SPECIAL INSPECTIONS REQUIRED BY THE 2014 NYC BUILDING CODE SHALL BE PERFORMED BY A SPECIAL INSPECTOR ON BEHALF OF THE OWNER FOR THE FOLLOWING ITEMS:

A STRUCTURAL STEEL - WELDING (NYC BC 1704.3.1)
B STRUCTURAL STEEL - DETAILS (NYC BC 1704.3.2)
C STRUCTURAL STEEL - HIGH-STRENGTH BOLTS (NYC BC 1704.3.3)
D CONCRETE CONSTRUCTION (NYC BC 1704.4)
E CONCRETE TEST CYLINDERS (NYC BC 1905.6)
F CONCRETE DESIGN MIX (NYC BC 1904, 1905.2-1905.4)
G SOILS - SITE PREPARATION (NYC BC 1704.7.1)
H SOILS - FILL PLACEMENT & IN-PLACE DENSITY (NYC BC 1704.7.2, 1704.7.3)
I STRUCTURAL SAFETY DURING CONSTRUCTION OPERATIONS (NYC BC 1704.19)
J EXCAVATION - SHEETING, SHORING & BRACING (NYC BC 1704.19, 3304.4.1)

2 PROGRESS INSPECTIONS REQUIRED BY THE 2014 NYC BUILDING CODE SHALL BE PERFORMED BY AN APPROVED INSPECTION AGENCY PROVIDED BY THE OWNER FOR THE FOLLOWING ITEMS:
A FOOTINGS AND FOUNDATION (NYC BC 109.3.1)
B FRAME INSPECTION (NYC BC 109.3.3)

3 SPECIAL INSPECTOR OR INSPECTION AGENCY SHALL FILE ALL APPROPRIATE FORMS WITH THE BUILDING DEPARTMENT

H TIDAL DATA

1 TIDAL DATA IS PER NOAA AVERAGES BASED ON THE 1983-2001 EPOCH AND NOT GUARANTEED TO REPRESENT CONDITIONS WHICH MAY OCCUR DURING CONSTRUCTION. ACTUAL WATER LEVELS WILL VARY FROM LEVELS INDICATED. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN ESTIMATE OF WATER LEVELS WHICH MAY OCCUR DURING CONSTRUCTION.

TIDAL DATA IS BASED ON NOAA STATION NO 8518750, THE BATTERY, NY HARBOR AND IS AS FOLLOWS:

WATER LEVEL	EL NAVD88 (FT)
MEAN HIGHER-HIGH WATER (MHHW)	+2.28
MEAN HIGH WATER (MHW)	+1.96
NAVD88	0
MEAN LOW WATER (MLW)	-2.57
MEAN LOWER-LOW WATER (MLLW)	-2.77

2 SEA LEVEL RISE PROJECTIONS ARE PER THE NEW YORK PANEL ON CLIMATE CHANGE REPORT (NPCC, 2015) AND ARE AS FOLLOWS:

WATER LEVEL	EL NAVD88 (FT)		
	2017	2080 (75TH PERCENTILE)	2120 (75TH PERCENTILE)
MHHW	+2.51	+5.24	+7.29
MHW	+2.19	+4.92	+6.97
MLW	-2.34	+0.39	+2.44
MLLW	-2.54	+0.19	+2.24

STRUCTURAL ABBREVIATIONS

AB	ANCHOR BOLT IN CONCRETE
ACI	AMERICAN CONCRETE INSTITUTE
ADDIT	ADDITIONAL
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ALT	ALTERNATE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWS	AMERICAN WELDING SOCIETY
BET	BETWEEN
BLDG	BUILDING
BM	BEAM
B, BOT	BOTTOM
BP	BASE PLATE
BRG	BEARING
BS	BOTH SIDES
BYND	BEYOND
CA	COLUMN ABOVE
CANT	CANTILEVER
CB	COLUMN BELOW
CF	CUBIC FEET
CIP	CAST IN PLACE
CJ	CONSTRUCTION JOINT
CL	CENTERLINE
CLR	CLEAR
CM	CONSTRUCTION MANAGER
COL	COLUMN
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
CPL	COVER PLATE
DBL	DOUBLE
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DL	DEAD LOAD
DN	DOWN
DWG	DRAWING
EA	EACH
EF	EACH FACE
EL	ELEVATION
EQ	EQUAL
EQP	EQUIPMENT
EW	EACH WAY
EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERIOR
FAB	FABRICATED
FT	FEET
FDN	FOUNDATION
FP	FULL PENETRATION
FRAM	FRAMING
FS	FAR SIDE
FTG	FOOTING
GA	GAUGE
GALV	GALVANIZED
GEN	GENERAL
GND	GROUND
HK	HOOK
H, HORIZ	HORIZONTAL
HP	HIGH POINT
HSB	HIGH STRENGTH BOLT
IN	INCH
IF	INSIDE FACE
INT	INTERIOR
JT	JOINT
K	KIP=1000 LBS
KSF	KIPS PER SQUARE FOOT
LG	LONG
LIN	LINEAR OR LINEAL
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LP	LOW POINT
MACH	MACHINED
MAX	MAXIMUM
MB	MACHINE BOLT
MECH	MECHANICAL
MIN	MINIMUM
MISC	MISCELLANEOUS
NIC	NOT IN CONTRACT
NO	NUMBER
NS	NEAR SIDE
NTS	NOT TO SCALE
NW	NORMAL WEIGHT
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OH	OPPOSITE HAND
OPNG	OPENING
OPP	OPPOSITE
PC	PRECAST
PCF	POUNDS PER CUBIC FOOT
PEN	PENETRATION
PL	PLATE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT
P/T	POST TENSIONED
R, RAD	RADIUS
REINF	REINFORCE(ING)
REQ'D	REQUIRED
REV	REVISION
SCHED	SCHEDULE
SECT	SECTION
SIM	SIMILAR
SPECS	SPECIFICATIONS
SQ FT	SQUARE FEET
SQ IN	SQUARE INCHES
SS	STAINLESS STEEL
STD	STANDARD
STIFF	STIFFENER
STL	STEEL
SYM	SYMMETRICAL
T,T/	TOP OF
T & B	TOP AND BOTTOM
TBD	TO BE DETERMINED
TEMP	TEMPORARY
THK	THICK(NESS)
THRD	THREAD
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UHPC	ULTRA HIGH PERFORMANCE CONCRETE
V, VERT	VERTICAL
VIF	VERIFY IN FIELD
W/	WITH
W/O	WITHOUT
WP	WORK POINT

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Project
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New York NY

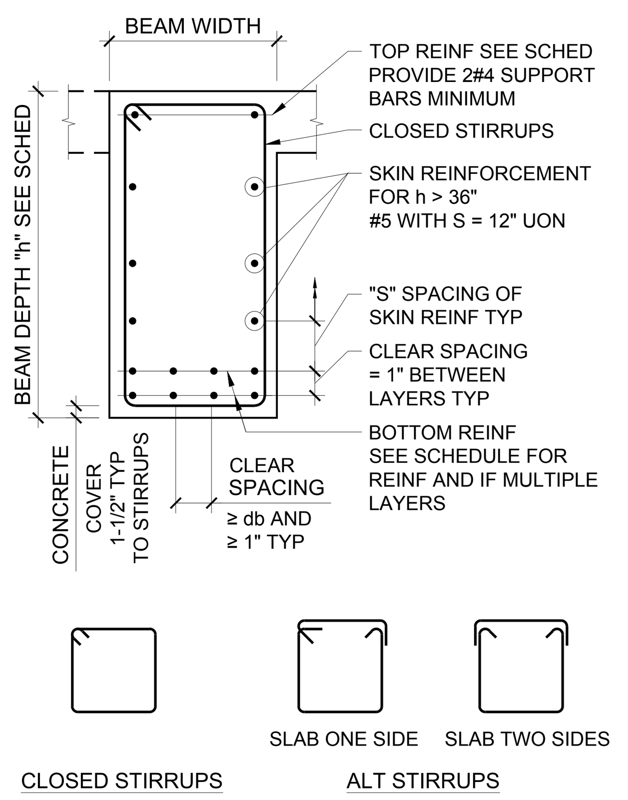
Title
GENERAL NOTES

Project Phase
Construction Documents

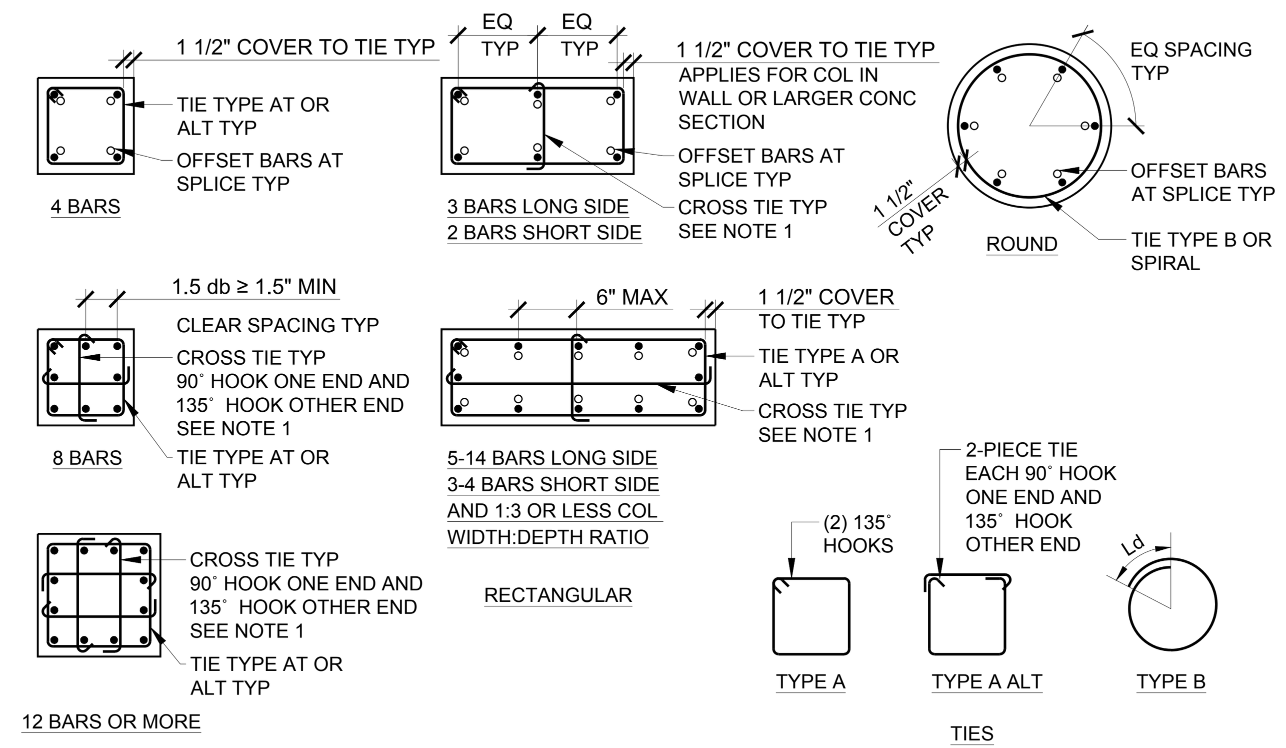
Date
30 March 2018

Scale

Drawing Number
S001



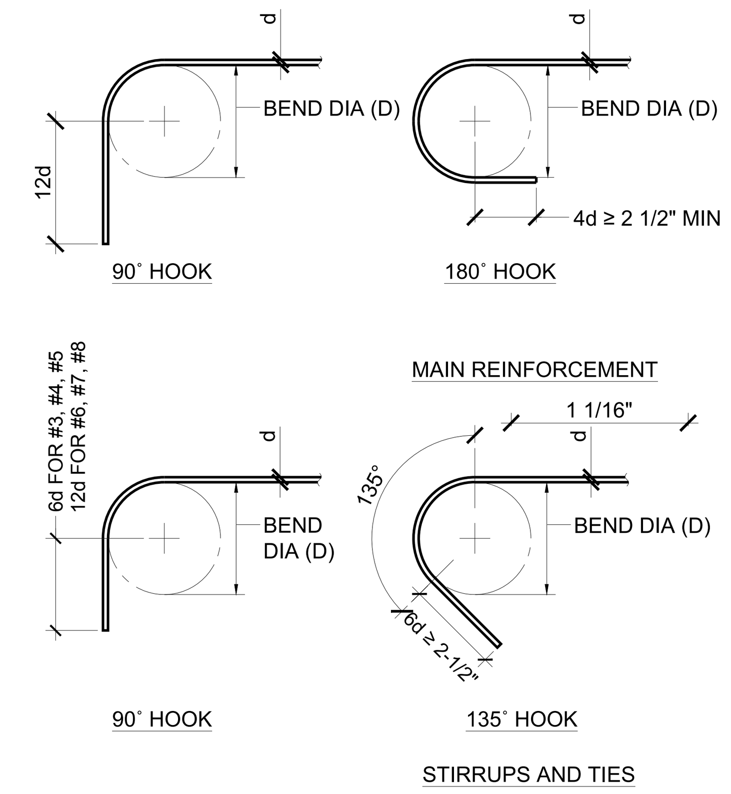
1 TYP BEAM REINF
SCALE: NTS



NOTES

1 CROSS TIES CAN BE TO ALTERNATING LONG BARS WHERE AVERAGE MAXIMUM CLEARANCE BETWEEN BARS IS ≤ 6"

2 TYPICAL COLUMN SECTIONS
SCALE: NTS



REBAR BEND

BAR SIZE	MIN BEND DIA (D)
#3 - #8	6 × BAR DIA (6d)
#9 - #11	8 × BAR DIA (8d)
#14 - #18	10 × BAR DIA (10d)

NOTES

1 ALL BENDS SHALL BE MADE COLD

BAR SIZE	MIN BEND DIA
#3 - #5	4 × BAR DIA (4d)
OTHERS	SAME AS MAIN REINF

NOTES

1 ALL BENDS SHALL BE MADE COLD

3 TYPICAL REINFORCING BAR HOOKS AND BENDS
SCALE: NTS

CONCRETE REINFORCING BAR DEVELOPMENT LENGTH TABLE

BAR SIZE	TENSION										COMPRESSION		
	DEVELOPMENT LENGTH (IN) SEE NOTE 3				CLASS B LAP SPLICE LENGTH (IN)				DEVELOPMENT LENGTH BAR - WITH STD HOOK (IN) SEE NOTE 4		DEVELOPMENT LENGTH (IN)		LAP SPLICE LENGTH (IN) SEE NOTE 5
	4000 PSI		5000 PSI		4000 PSI		5000 PSI		4000 PSI	5000 PSI	4000 PSI	5000 PSI	-
	clr ≥ db SEE NOTE 1	clr ≤ db SEE NOTE 2	clr ≥ db SEE NOTE 1	clr ≤ db SEE NOTE 2	clr ≥ db SEE NOTE 1	clr ≤ db SEE NOTE 2	clr ≥ db SEE NOTE 1	clr ≤ db SEE NOTE 2	-	-	-	-	-
3	15	21	13	20	20	28	17	26	8	7	8	7	12
4	19	28	17	26	25	37	23	34	10	9	10	9	15
5	24	36	22	32	32	47	29	42	12	11	12	12	19
6	29	43	26	39	38	56	34	51	15	13	15	14	23
7	42	63	38	56	55	82	50	73	17	15	17	16	27
8	48	72	43	64	63	94	56	84	19	17	19	18	30
9	54	81	48	72	71	106	63	94	22	20	22	21	34
10	61	91	54	81	80	119	71	106	25	22	25	23	39
11	67	101	60	90	88	132	78	117	27	24	27	26	43

NOTES

db = NOMINAL DIAMETER OF BAR
clr = CLEAR SPACING OF BARS

1 FOR clr ≥ db, CLEAR COVER ≥ db AND STIRRUPS THROUGH Ld ≥ CODE MINIMUM OR clr ≥ 2db AND CLEAR COVER ≥ db
2 FOR ALL OTHER CASES:
3 THE DEVELOPMENT LENGTHS IN THE TABLE ABOVE SHALL BE MODIFIED BY THE FOLLOWING FACTORS AS APPLICABLE:
 ÷ 0.75 FOR LIGHTWEIGHT CONCRETE
 × 1.3 FOR TOP BARS (WHEN MORE THAN 12" CONCRETE CAST BELOW)
 × 1.5 FOR COVER < 3db OR Clr <6db
 × 1.2 FOR ALL OTHER EPOXY-COATED BARS OR WIRES
4 THE DEVELOPMENT LENGTH FOR BARS WITH STD HOOKS SHALL BE MODIFIED BY THE FOLLOWING FACTORS AS APPLICABLE
 ÷ 0.75 FOR LIGHTWEIGHT CONCRETE
 × 1.2 FOR EPOXY-COATED REINFORCEMENT
5 ONLY VALID FOR fy = 60000 PSI OR LESS

4 CONCRETE REINFORCING BAR DEVELOPMENT LENGTH TABLE
SCALE: NTS

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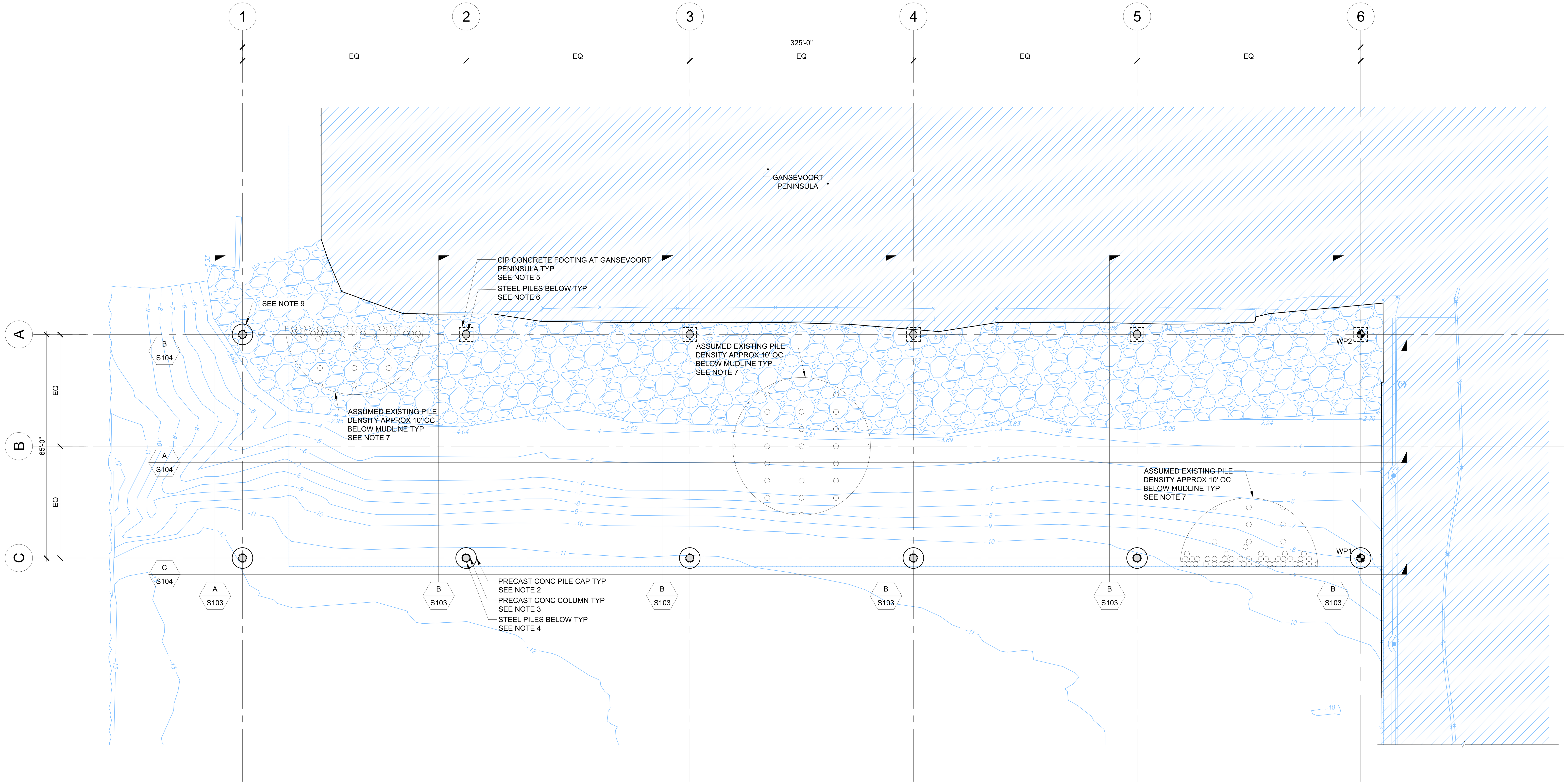
Title
TYPICAL DETAILS

Project Phase
Construction Documents

Date
30 March 2018

Scale
NTS

Drawing Number
S002



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FOUNDATION PLAN

SCALE 1/16" = 1' - 0"

NOTES

1. ALL ELEVATIONS ARE RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). TOP OF PRECAST CONCRETE COLUMN IS +5.75FT UNLESS OTHERWISE NOTED
2. FOR PRECAST CONCRETE PILE CAP WITH STAINLESS STEEL CONNECTION HARDWARE AT WATER LOCATIONS SEE ELEVATIONS A / B S103 AND B /C S104
3. FOR PRECAST CONCRETE COLUMN SEE FRAMING ELEVATIONS A, B / S103, B, C / S104 AND DETAIL SECTIONS 1, 2 / S303 FOR ADDITIONAL INFORMATION
4. FOR STEEL PILES BELOW PILE CAP SEE FRAMING ELEVATIONS A, B / S103, B, C / S104 AND DETAIL SECTIONS 1, 2 / S303 FOR ADDITIONAL INFORMATION
5. FOR CIP CONCRETE FOOTING / PILE CAP SEE FRAMING ELEVATION B / S103, B / S104, AND DETAIL SECTION 1 / S303 FOR ADDITIONAL INFORMATION
6. FOR STEEL PILES BELOW FOOTING / PILE CAP SEE FRAMING ELEVATIONS B / S103, B / S104 AND DETAIL SECTION 1 / S303 FOR ADDITIONAL INFORMATION. NOTE THAT REQUIREMENTS FOR PILES IN ADDITION TO FOOTINGS ARE TO BE CONFIRMED BY FORTHCOMING GEOTECHNICAL INVESTIGATION
7. APPROXIMATE LOCATION AND DENSITY OF EXISTING TIMBER PILES BELOW ARE BASED ON 1947 PONYA SURVEY AND HISTORIC PHOTOGRAPHS. SEE SECTION 2B / S303 FOR COORDINATION OF NEW CONSTRUCTION TO EXISTING PILES
8. FOR ADDITIONAL INFORMATION RELATED TO COORDINATION TO EXISTING UTILITIES AND LOCATION OF WORK POINTS RELATIVE TO STATION POINT SEE SITE PLAN C002
9. PILE CAP AT THIS LOCATION IN THE RIP RAP MAY REQUIRE EXCAVATION AND SHORING BOX FOR INSTALLATION. TO BE CONFIRMED BY CONTRACTOR

LEGEND

WP#	WORKPOINT
	FOOTING SEE NOTE 5
	PILE CAP SEE NOTE 2
	PRECAST CONC COLUMN SEE NOTE 3
	PILE SEE NOTE 4

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Title
FOUNDATION PLAN

Project Phase
Construction Documents

Date
30 March 2018

Scale
1/16"=1'-0"

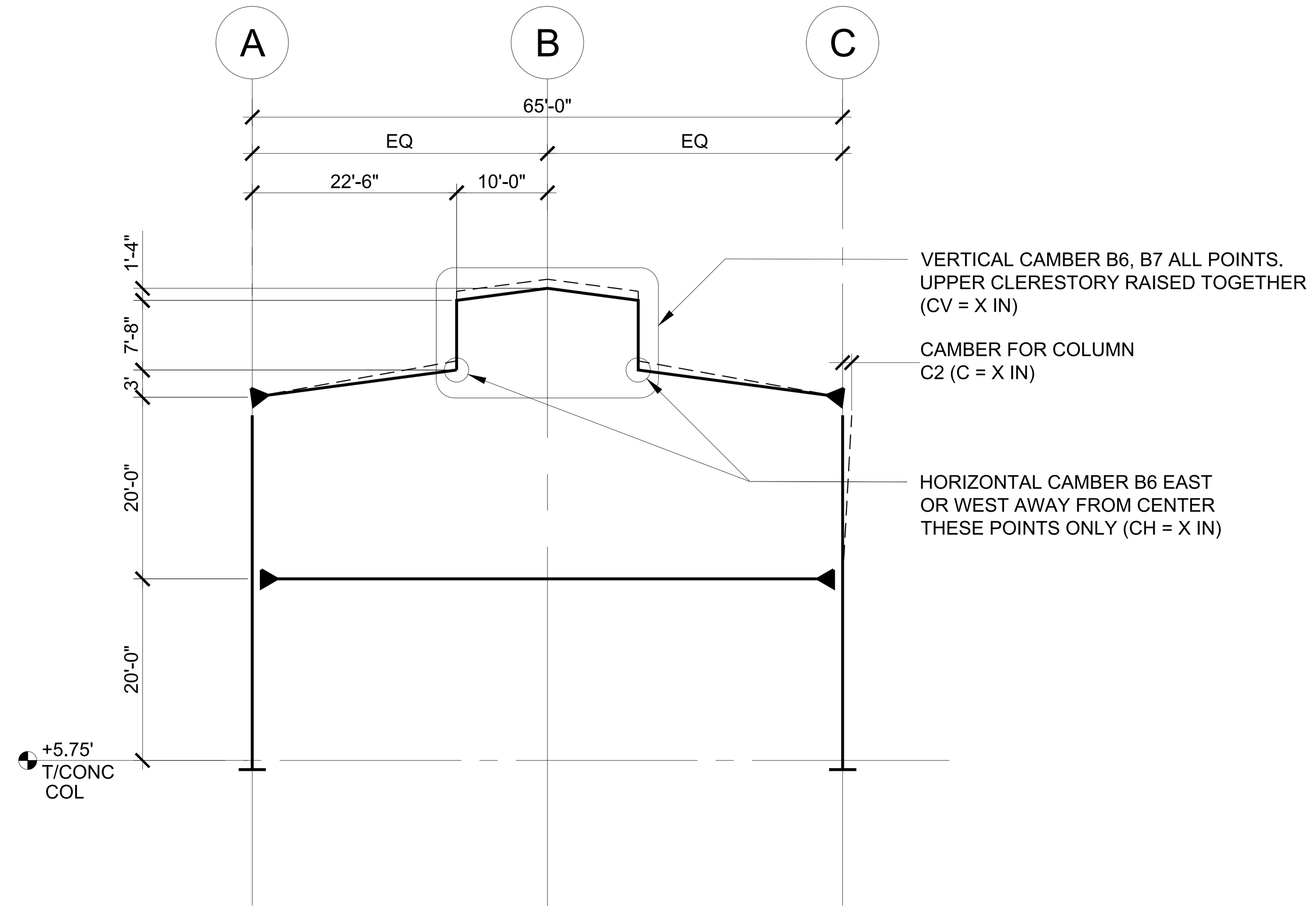
Drawing Number
S101

MEMBER SCHEDULE

SCHEME	MARK	REFERENCE PIECE DRAWING	NOTES
STAINLESS STEEL COLUMNS AND BEAMS	C1	COLUMN C1 S201	
	C2	COLUMN C2 S201	CAMBER FOR COLUMN C = 0.5 IN SEE 1 / S102
	B1	ST STEEL BEAM B1 S202	
	B2	ST STEEL BEAM B2 S202	
	B3	ST STEEL BEAM B3 S202	
	B4	ST STEEL BEAM B4 S202	
	B5	ST STEEL BEAM B5 S202	
	B6	ST STEEL BEAM B6 S202	CAMBER FOR BENT BEAM CV = 1.375 IN
	B7	ST STEEL BEAM B7 S202	CAMBER FOR BENT BEAM CV = 2.0 IN
	B8	ST STEEL BEAM B8 S202	
	B9	ST STEEL BEAM B9 S202	
	B10	ST STEEL BEAM B10 S202	CAMBER FOR BENT BEAM CV = 1.375 IN, CH = .5 IN

NOTES

1 CAMBERS FOR C2, B6 AND B7 SEE 1 / S102. CAMBER FOR B1-B5 ARE TYPICAL HIGH POINT AT MIDSPAN RELATIVE TO ENDS - SEE S202

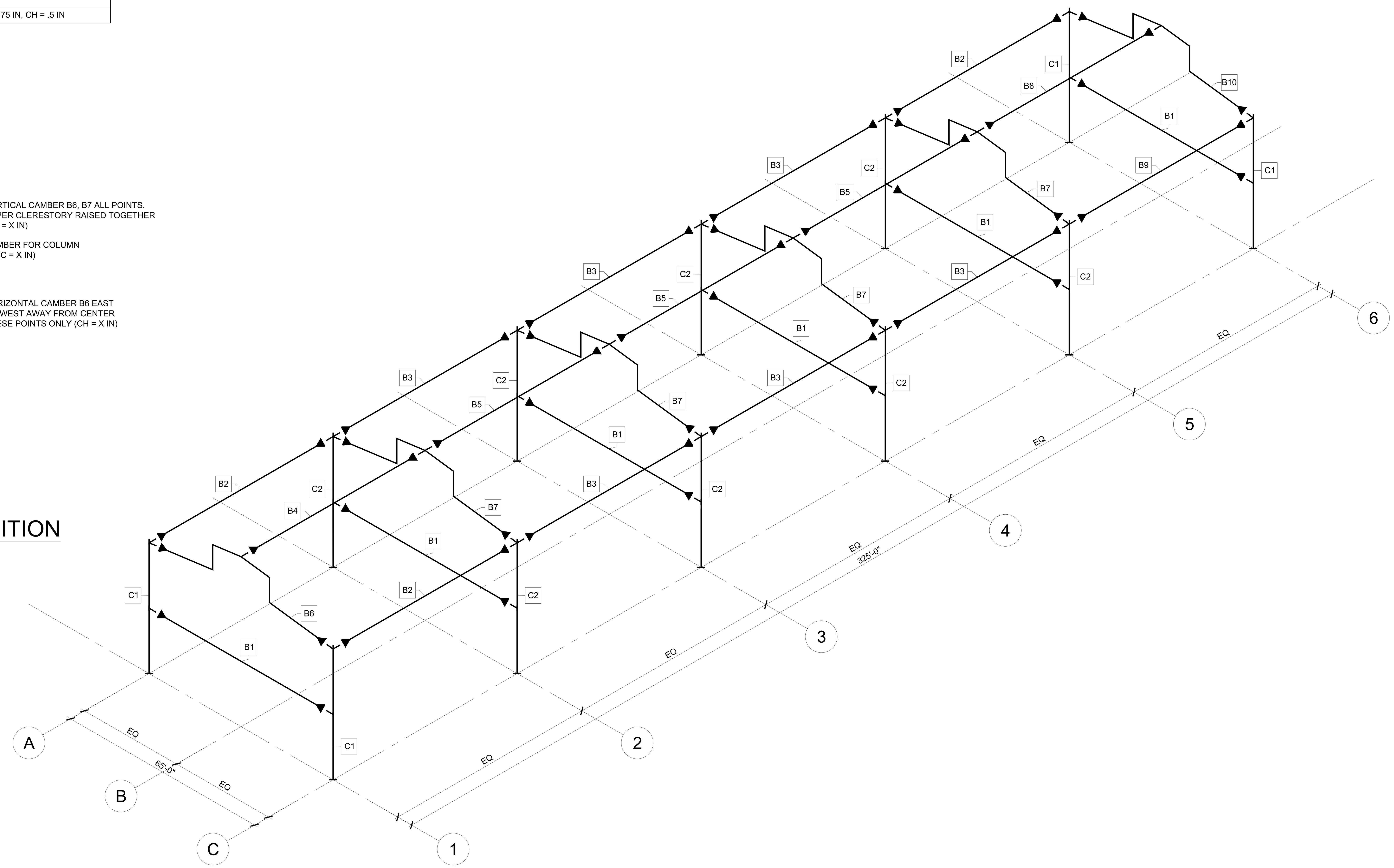


1 TRANSVERSE FRAME CAMBER DEFINITION

SCALE 1/16" = 1' - 0"

NOTES

1 ALL CAMBER C2, B6 AND B7 ARE FOR TRANSLATION OF ENDPOINTS (INCLUDING ENTIRE UPPER CLERESTORY FRAME ABOVE FOR CV) RESULTING IN NEW STRAIGHTLINE GEOMETRY BETWEEN CAMBER POINTS



ISOMETRIC FRAMING DIAGRAM

SCALE N/A

NOTES

1 DIAGRAM INDICATES MEMBER TYPES FOR FABRICATED BEAMS AND COLUMNS. SEE SCHEDULE FOR REFERENCE TO DETAILED DRAWINGS OF FABRICATED UNITS S201-S202. ALL SUPERSTRUCTURE FRAMING IS ARCHITECTURALLY EXPOSED STRUCTURAL STAINLESS STEEL - SEE GENERAL NOTES AND SPECIFICATIONS 05 13 00 FOR RELATED REQUIREMENTS

2 FOR ADDITIONAL INFORMATION FOR THE SUPERSTRUCTURE SEE FRAMING ELEVATIONS A, B / S103, A, B, C / S104

LEGEND

MOMENT CONNECTION BETWEEN SHIPPING PIECES

COL TO PRECAST CONC COLUMN CONNECTION

B# BEAM MARK SEE MEMBER SCHEDULE

C# COLUMN MARK SEE MEMBER SCHEDULE

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FRAMING DIAGRAM AND SCHEDULE

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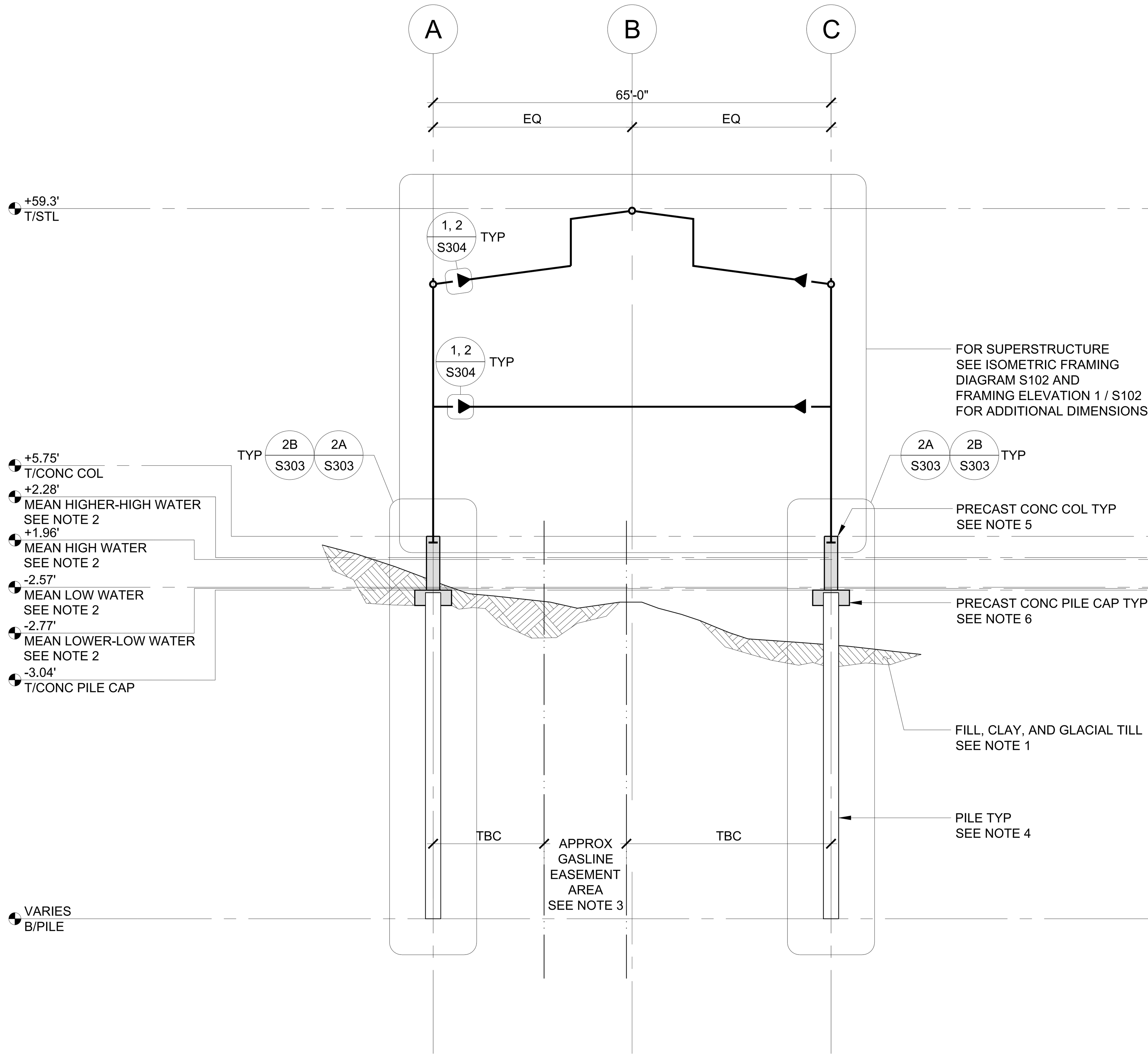
Construction Documents

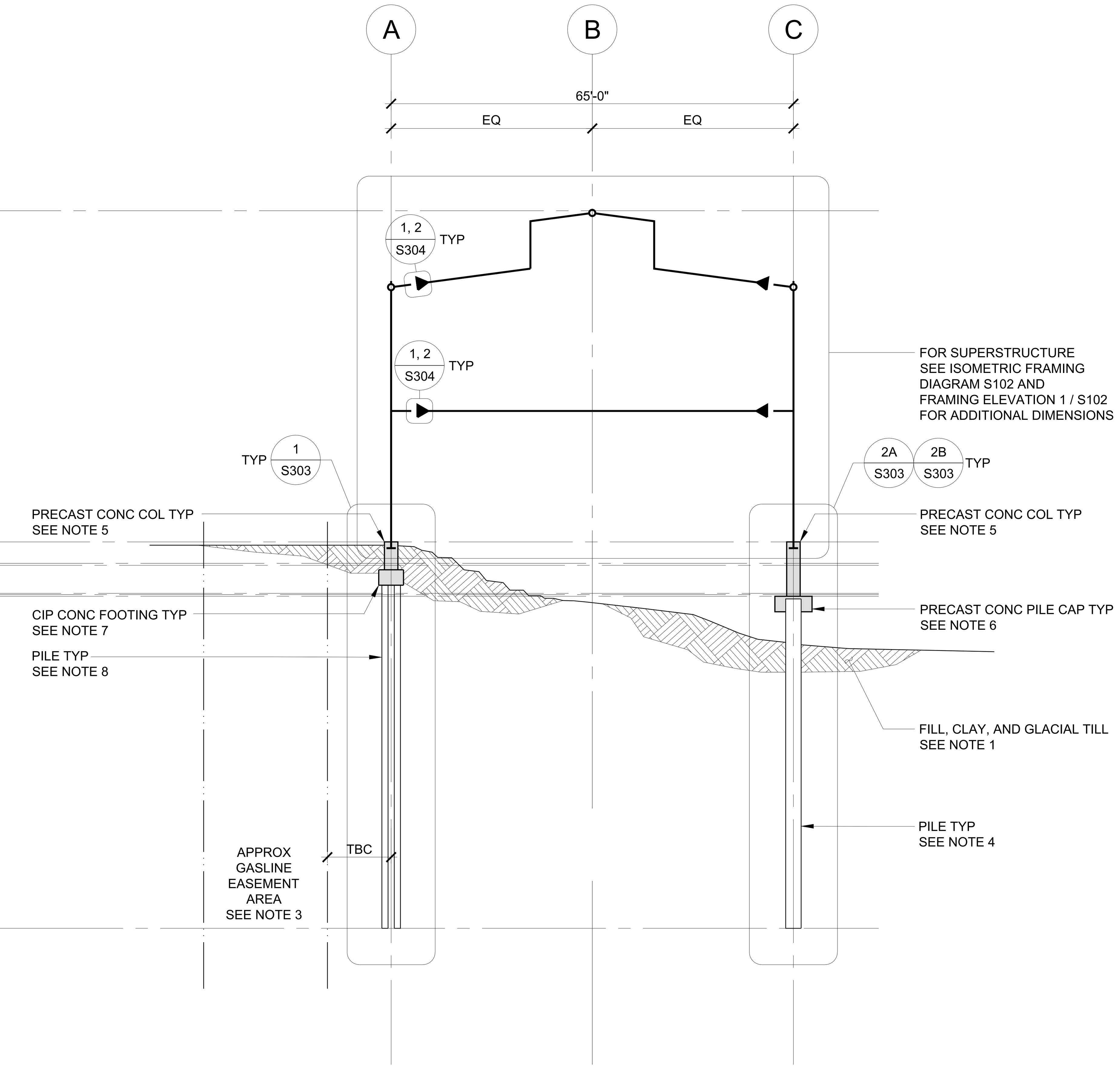
Date
30 March 2018

Scale
As Indicated

Drawing Number

S102





A FRAMING ELEVATION AT GL1

SCALE 1/16" = 1' - 0"

B TYPICAL FRAMING ELEVATION GL2-6

SCALE 1/16" = 1' - 0"

NOTES

1. GEOLOGIC STRATA ARE PER LANGAN GEOTECHNICAL REPORT DATED 05 APRIL 2018 AND ARE TO BE CONFIRMED BY FORTHCOMING GEOTECHNICAL INVESTIGATION
2. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). SEA LEVEL RISE PROJECTIONS ARE FROM THE NEW YORK PANEL ON CLIMATE CHANGE REPORT, 2015. SEE S001 GENERAL NOTES FOR ADDITIONAL INFORMATION
3. SEE SURVEY C001 FOR ADDITIONAL INFORMATION ON EXISTING TOPOGRAPHIC CONDITIONS AND SITE UTILITIES
4. PILES BELOW PILE CAP ARE HOLLOW STEEL TYPE TYPICAL 30" DIA X 1/2" WALL EACH WITH 50FT LONG DEPTH IN STRATA ABOVE ROCK. FOR ADDITIONAL INFORMATION SEE 2 / S303
5. CONCRETE COLUMN IS PRECAST CONCRETE. CONCRETE IS ARCHITECTURALLY EXPOSED CONCRETE. FOR ADDITIONAL INFORMATION SEE 1, 2 / S303
6. PILE CAP IS PRECAST CONCRETE (ARCHITECTURALLY EXPOSED CONCRETE) WITH STAINLESS STEEL CONNECTION HARDWARE. FOR ADDITIONAL INFORMATION SEE 2 / S303 AND C003
7. FOOTING / PILE CAP IS CIP CONCRETE. FOR ADDITIONAL INFORMATION SEE 1 / S303
8. PILES BELOW FOOTING ARE PAIRS OF HOLLOW STEEL TYPE TYPICAL 12" DIA X 1/2" WALL EACH WITH 50FT LONG DEPTH IN STRATA ABOVE ROCK. FOR ADDITIONAL INFORMATION SEE 1 / S303

LEGEND

COL TO FDN CONNECTION

MOMENT CONNECTION BETWEEN SHIPPING PIECES

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30 MARCH 2018

No	Issue	Date
1	100% CONSTRUCTION DOCUMENTS	30 MAR 2018

Project
DAY'S END

New York NY

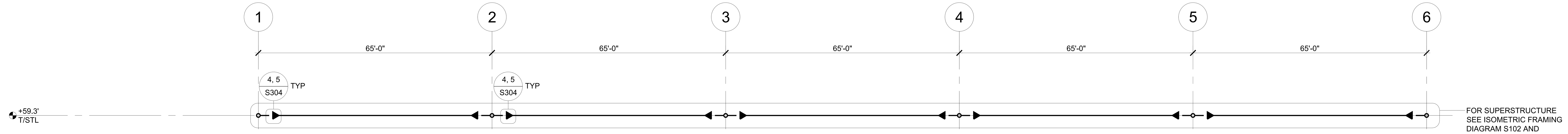
Title
FRAMING ELEVATIONS

Project Phase
Construction Documents

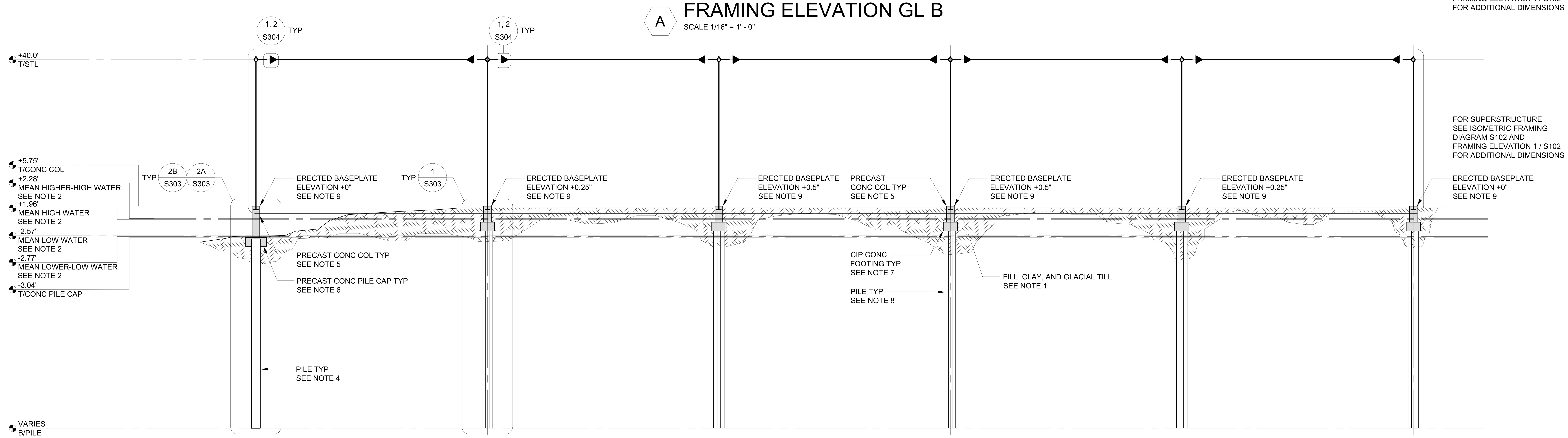
Date
30 March 2018

Scale
1/16"=1'-0"

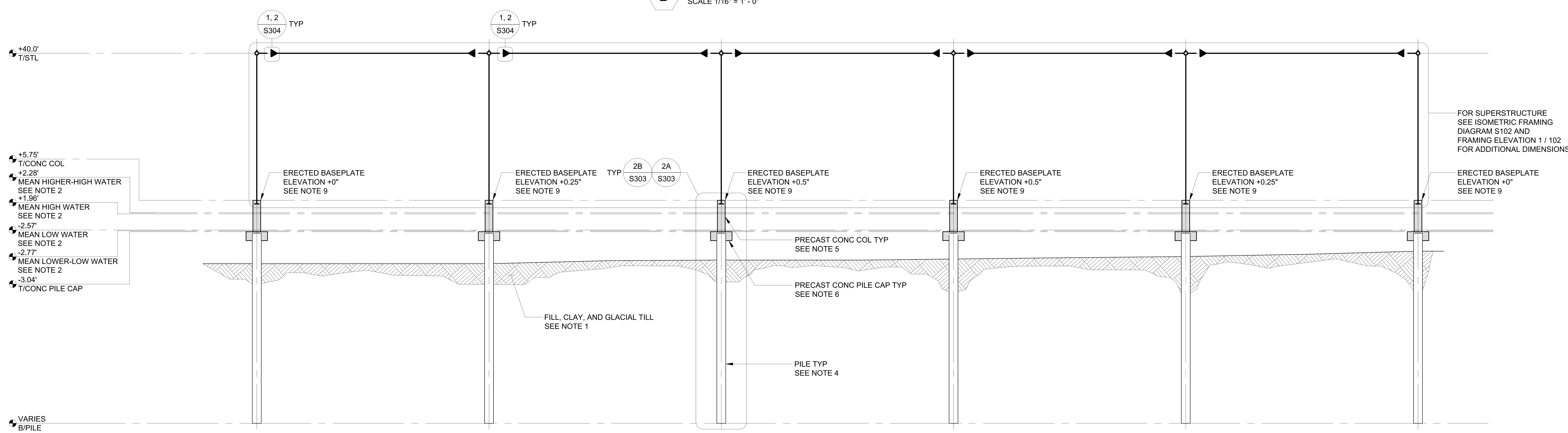
Drawing Number
S103



A **FRAMING ELEVATION GL B**
SCALE 1/16" = 1' - 0"



B **FRAMING ELEVATION GL A**
SCALE 1/16" = 1' - 0"



C **FRAMING ELEVATION GL C**
SCALE 1/16" = 1' - 0"

NOTES

1. GEOLOGIC STRATA ARE PER LANGAN GEOTECHNICAL REPORT DATED 05 APRIL 2018 AND ARE TO BE CONFIRMED BY FORTHCOMING GEOTECHNICAL INVESTIGATION
2. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). SEA LEVEL RISE PROJECTIONS ARE FROM THE NEW YORK PANEL ON CLIMATE CHANGE REPORT, 2015. SEE S001 GENERAL NOTES FOR ADDITIONAL INFORMATION
3. SEE SURVEY C001 FOR ADDITIONAL INFORMATION ON EXISTING TOPOGRAPHIC CONDITIONS AND SITE UTILITIES
4. PILES BELOW PILE CAP ARE HOLLOW STEEL TYPE TYPICAL 30" DIA X 1/2" WALL EACH WITH 50FT LONG DEPTH IN STRATA ABOVE ROCK. FOR ADDITIONAL INFORMATION SEE 2 / S303
5. CONCRETE COLUMN IS PC CONCRETE. CONCRETE IS ARCHITECTURALLY EXPOSED CONCRETE. FOR ADDITIONAL INFORMATION SEE 1, 2 / S303
6. PILE CAP IS PRECAST CONCRETE (ARCHITECTURALLY EXPOSED) WITH STAINLESS STEEL CONNECTION HARDWARE. FOR ADDITIONAL INFORMATION SEE 2 / S303 AND C003
7. FOOTING IS CIP CONCRETE. FOR ADDIT INFORMATION SEE 1 / S303
8. PILES BELOW FOOTING ARE PAIRS OF HOLLOW STEEL TYPE TYPICAL 12" DIA X 1/2" WALL EACH WITH 50FT LONG DEPTH IN STRATA ABOVE ROCK. FOR ADDITIONAL INFORMATION SEE 1 / S303
9. ERECTED BASE PLATE ELEVATIONS ARE RELATIVE TO NOMINAL ELEVATION IN 1, 2 / S303. ELEVATION TO BE APPLIED DURING ERECTION OF BASEPLATE AND ANCHOR BOLTS AND TO BE REVIEWED AND CONFIRMED BY STRUCTURAL ENGINEER IN THE FIELD

LEGEND

COL TO FDN CONNECTION

MOMENT CONNECTION BETWEEN SHIPPING PIECES

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Project
DAY'S END

New York NY

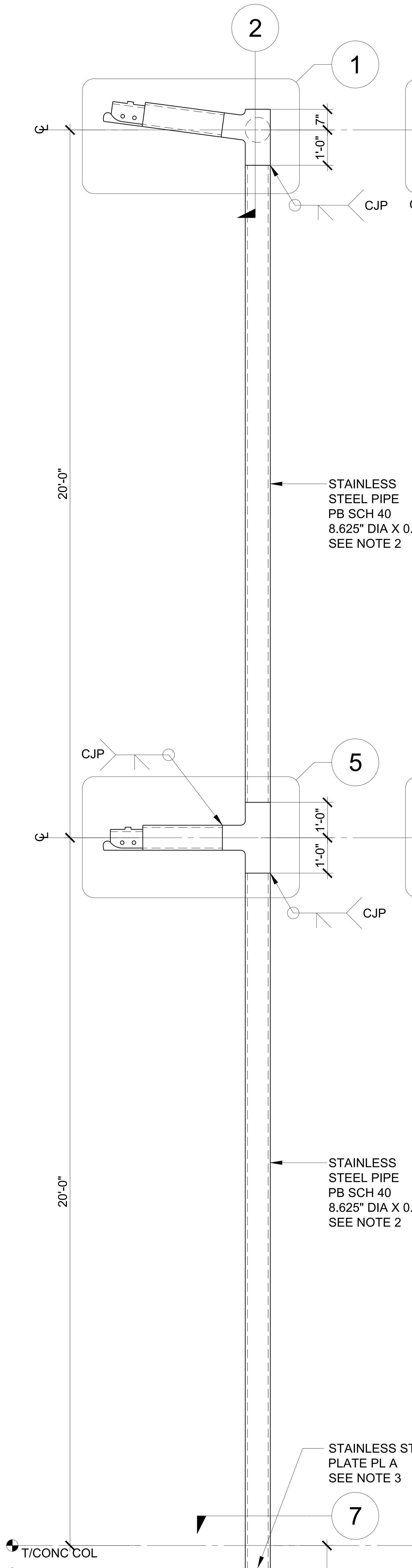
Title
FRAMING ELEVATIONS

Project Phase
Construction Documents

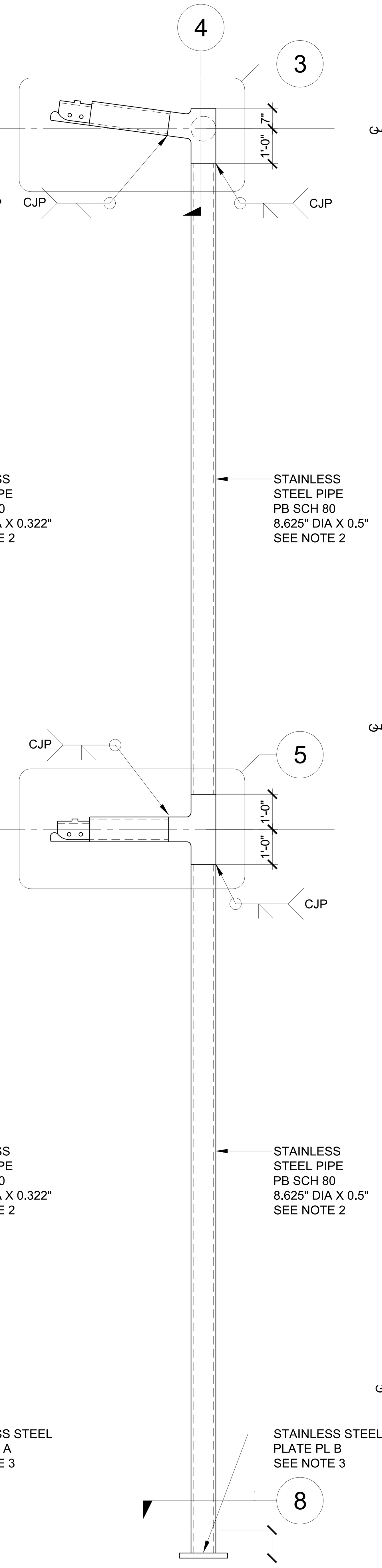
Date
30 March 2018

Scale
1/16"=1'-0"

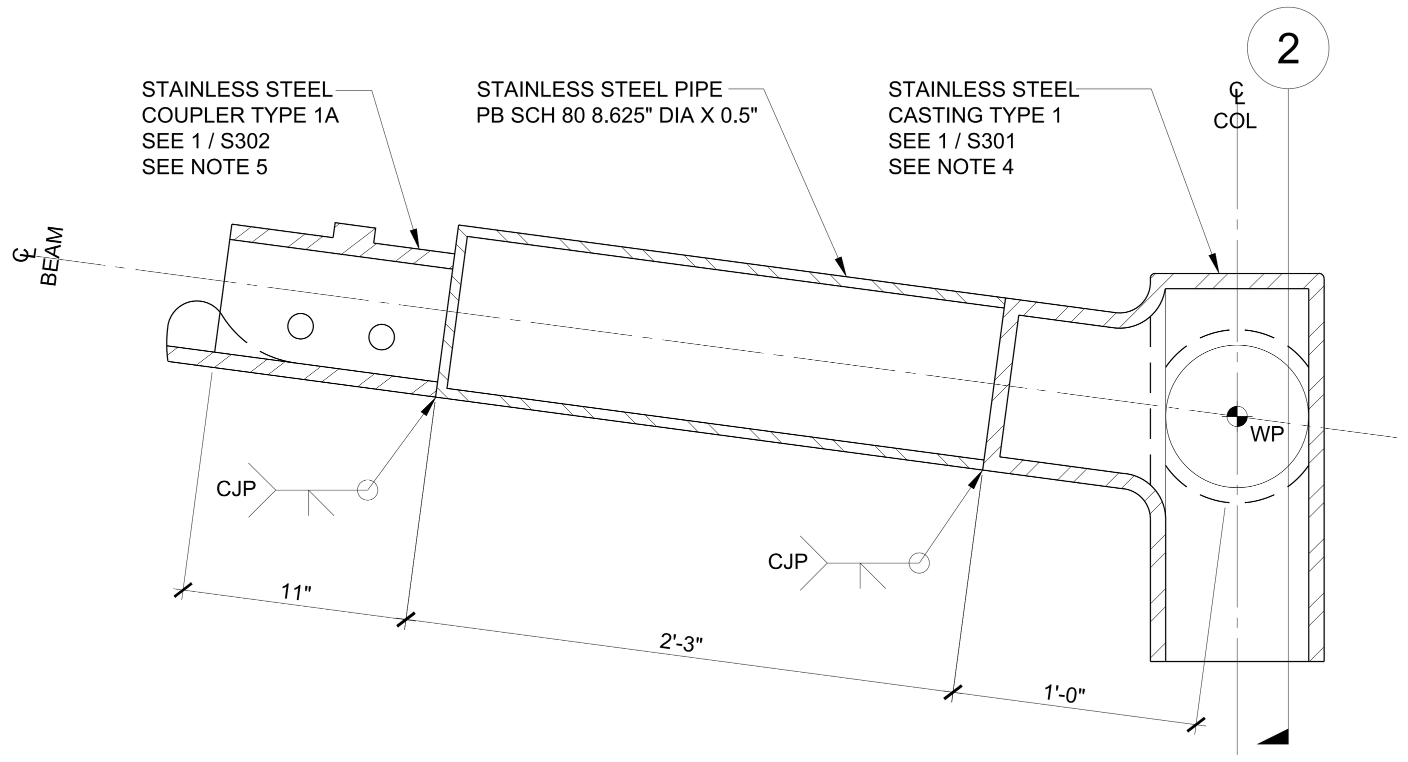
Drawing Number
S104



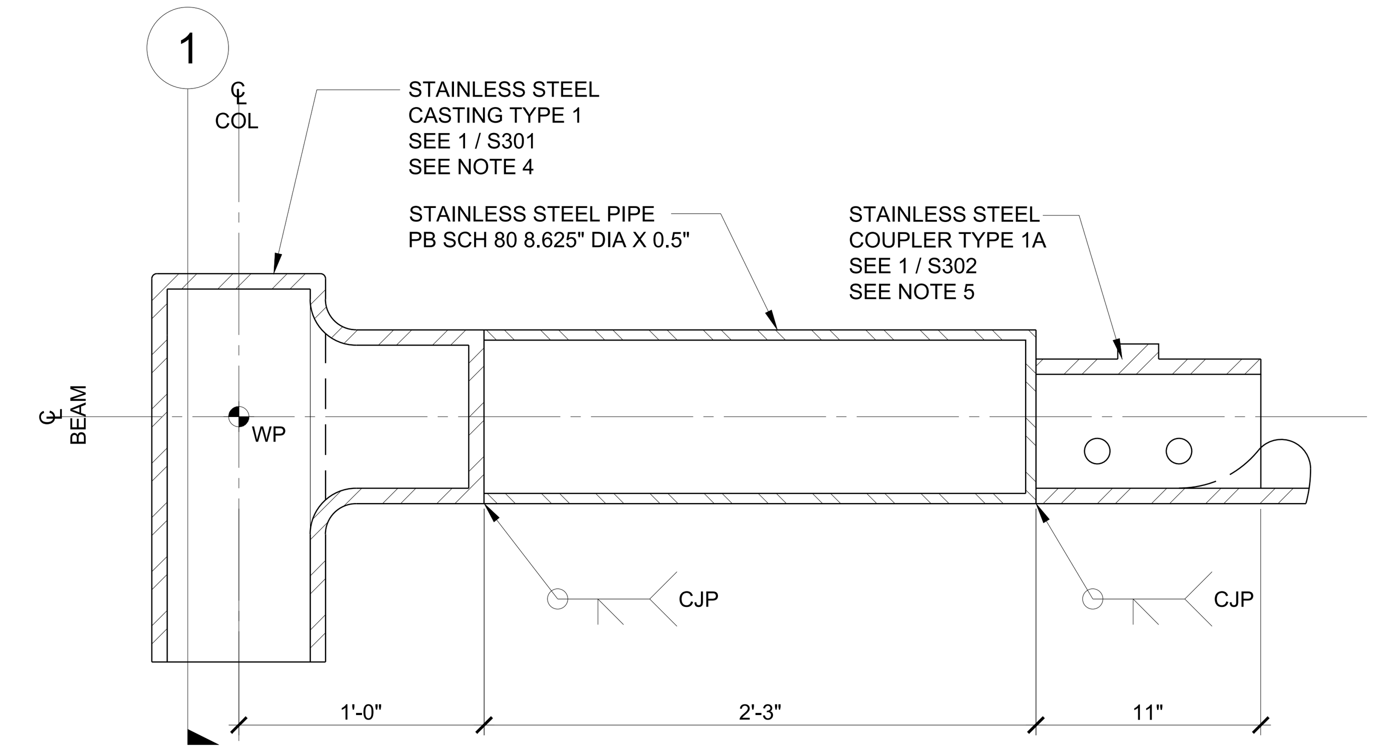
COLUMN C1
SCALE 3/8" = 1' - 0"



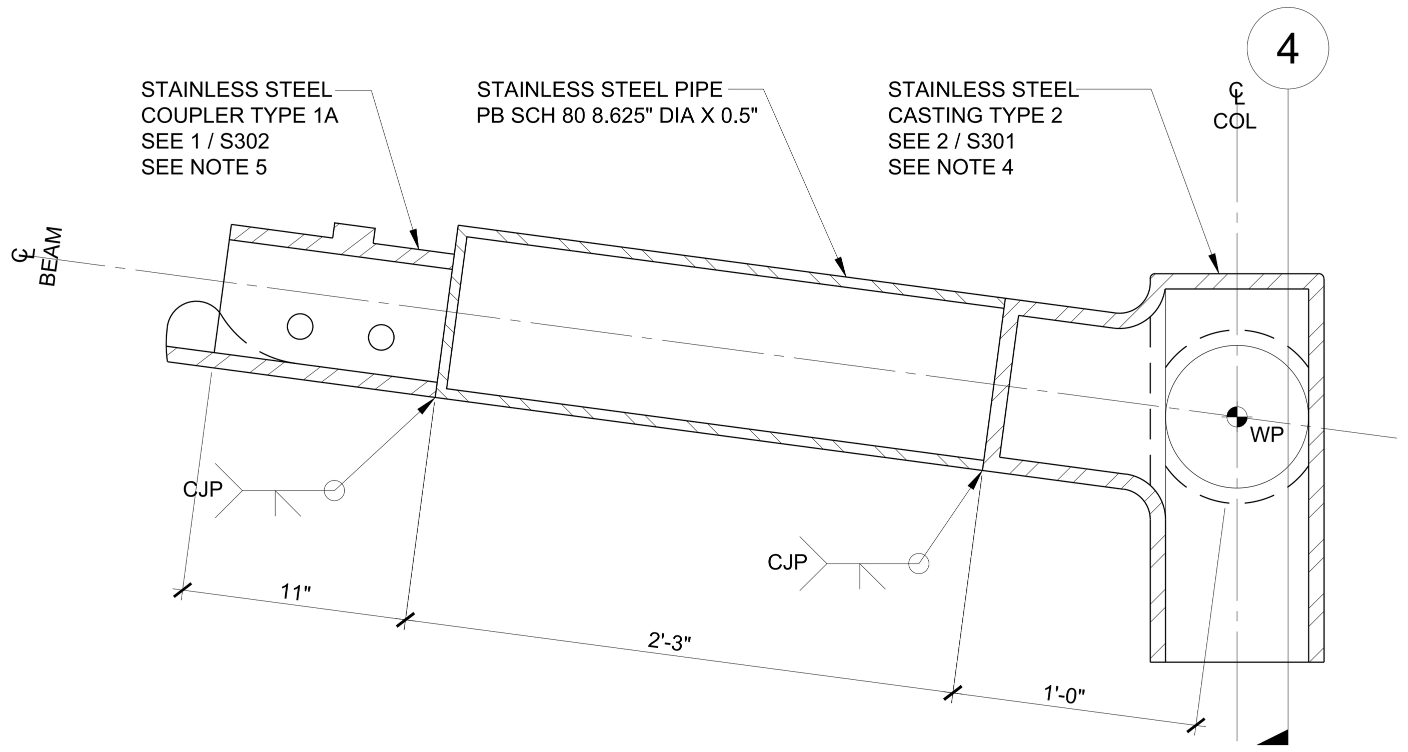
COLUMN C2
SCALE 3/8" = 1' - 0"



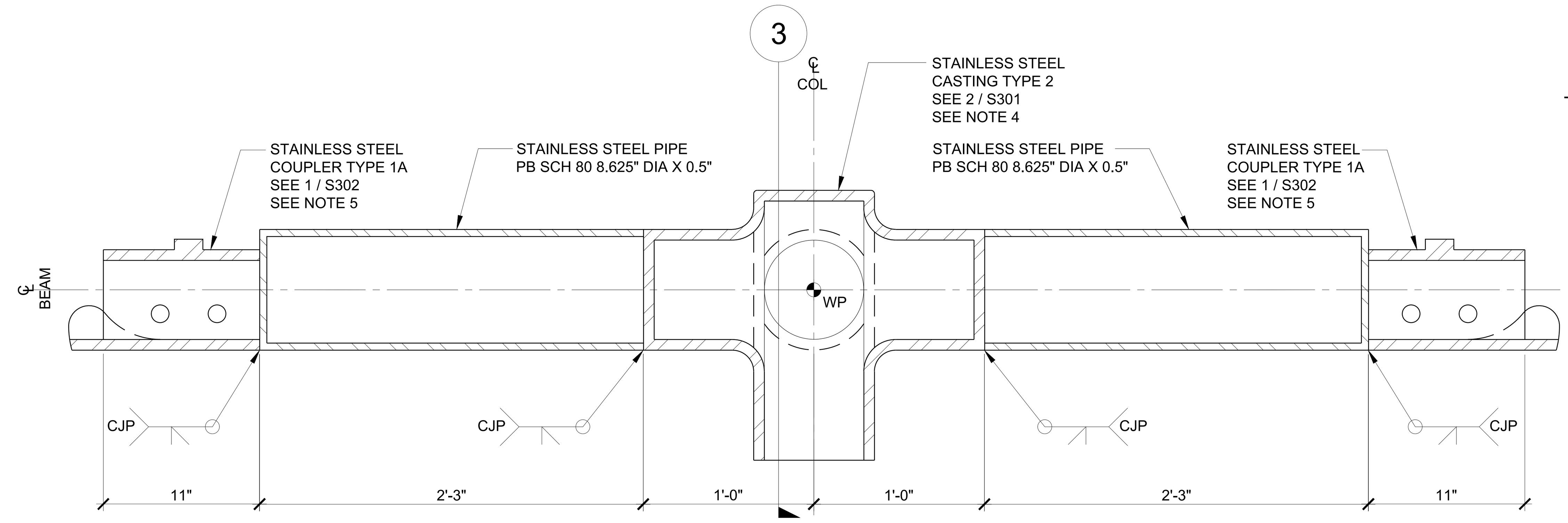
1 SECTION
SCALE 1 1/2" = 1' - 0"



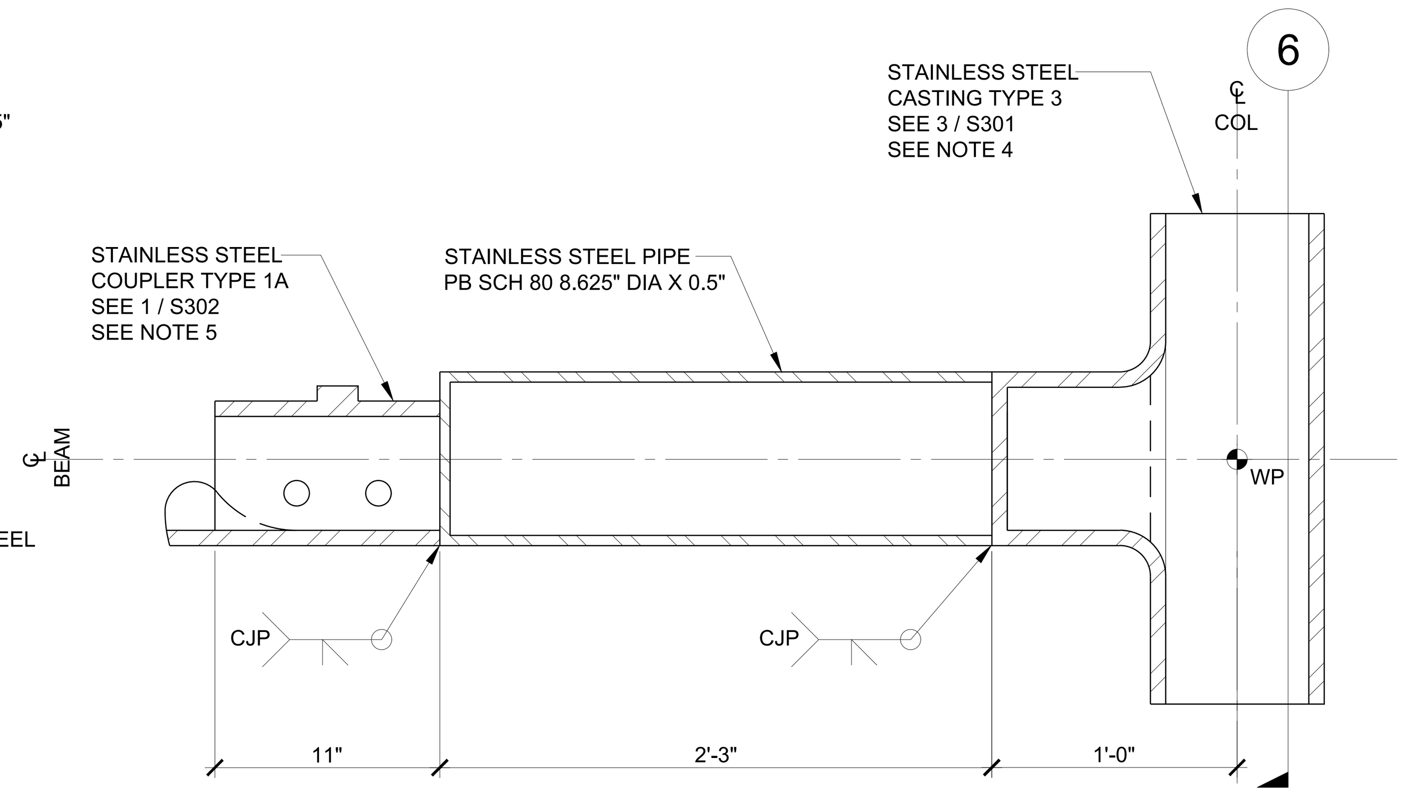
2 SECTION
SCALE 1 1/2" = 1' - 0"



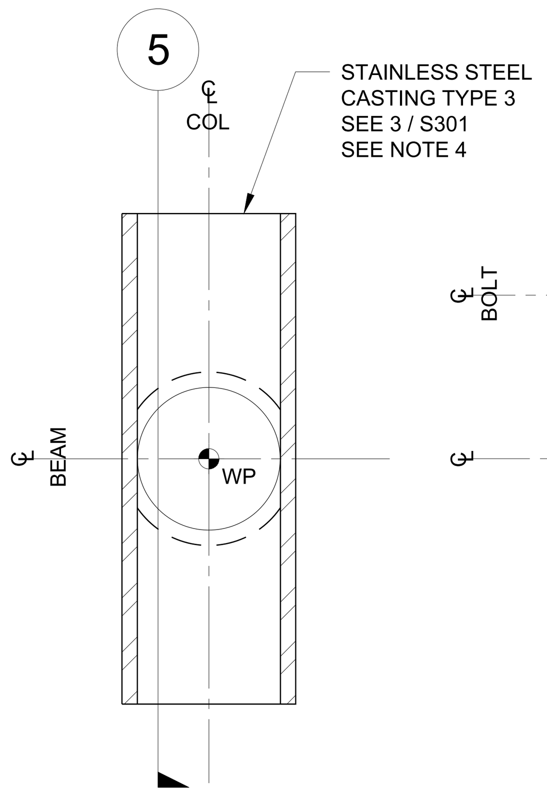
3 SECTION
SCALE 1 1/2" = 1' - 0"



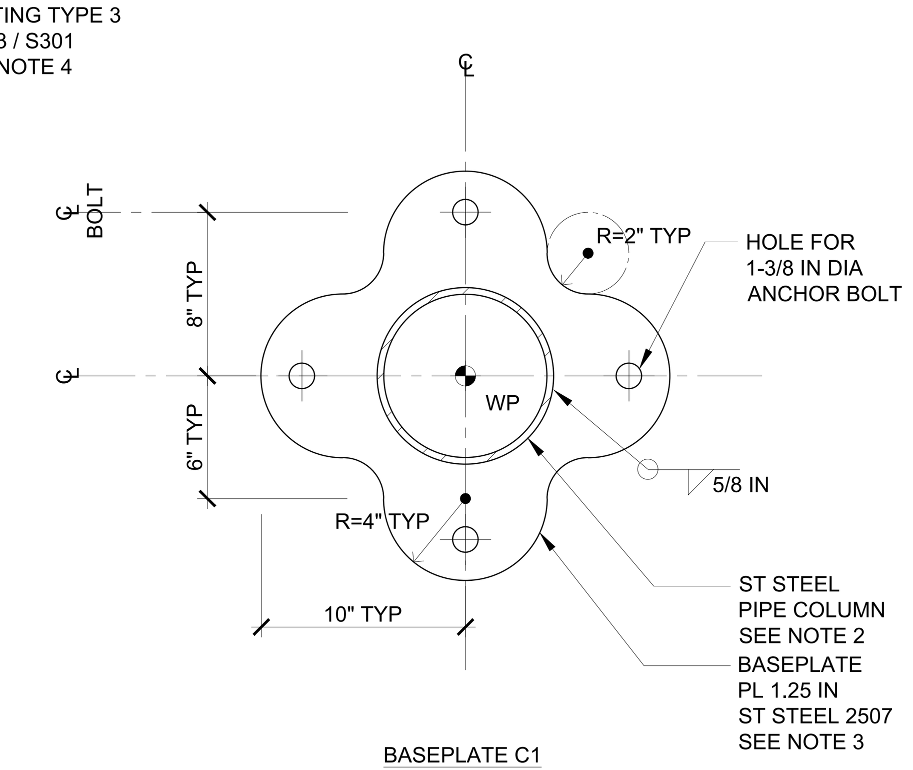
4 SECTION
SCALE 1 1/2" = 1' - 0"



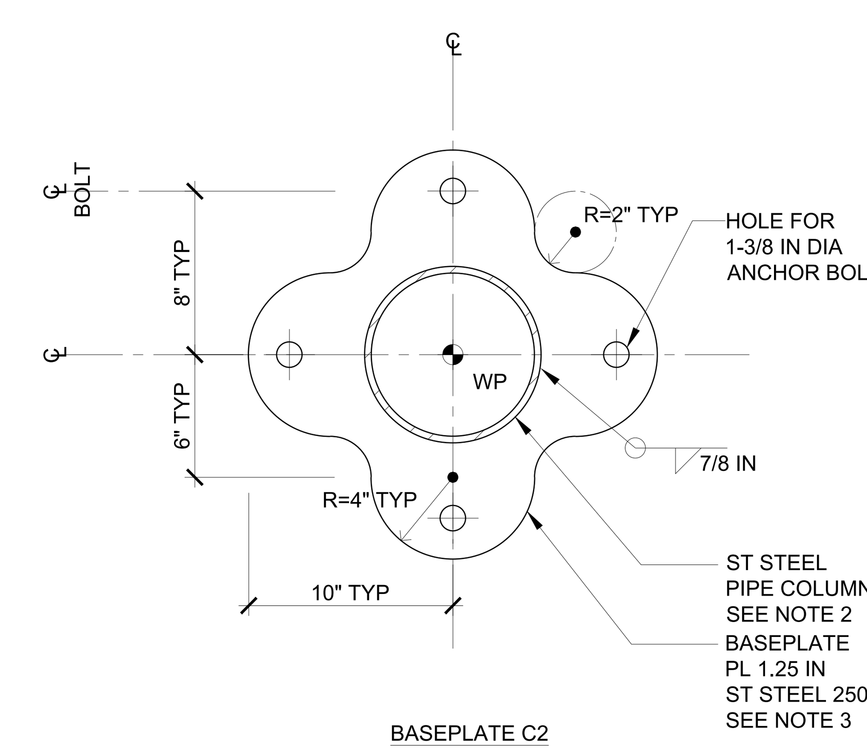
5 SECTION
SCALE 1 1/2" = 1' - 0"



6 SECTION
SCALE 1 1/2" = 1' - 0"



7 PLAN SECTION
SCALE 1 1/2" = 1' - 0"



8 PLAN SECTION
SCALE 1 1/2" = 1' - 0"

NOTES

1 ALL COLUMNS TO BE SHOP FABRICATED AS SINGLE SHIPPING PIECE FROM PIPE SECTIONS, NODE CASTINGS, COUPLERS, AND BASEPLATES AS SHOWN FOR COLUMNS 1 AND 2. NOTE THAT FABRICATRED DIMENSIONS WILL VARY FROM CENTERLINE INDICATED FOR FABRICATED COLUMN 2 FOR CAMBER INDICATED IN SCHEDULE ON S102

2 COLUMN PIPES ARE SUPER DUPLEX STAINLESS STEEL 2507 (S32750 AND ASTM A790) SEEMLESS AND WELDED PIPE WITH MINIMUM Fy=80ksi Fu=116ksi AND E=29,000ksi. SEE GENERAL NOTES S001 AND SPECIFICATIONS FOR ADDITIONAL INFORMATION

3 BASE PLATES ARE SUPER DUPLEX STAINLESS STEEL 2507 (S32750 AND ASTM A240) PLATE WITH MINIMUM Fy=80ksi Fu=116ksi AND E=29,000ksi. SEE GENERAL NOTES AND SPECIFICATIONS FOR ADDITIONAL INFORMATION

4 CASTINGS ARE SUPER DUPLEX STAINLESS STEEL 2507 (J93404 AND ASTM A890 GRADE 5A) WITH MINIMUM Fy=75ksi Fu=100ksi AND E=29,000ksi. SEE GENERAL NOTES AND SPECIFICATIONS FOR ADDITIONAL INFORMATION

5 COUPLERS ARE SUPER DUPLEX STAINLESS STEEL 2507 (S32750) WITH MINIMUM Fy=80ksi Fu=116ksi AND E=29,000ksi. ELEMENT TO BE MACHINED FROM SOLID ROD (ASTM A276) AND/OR WELDMENT COMPOSED OF PLATE/PIPE (ASTM A240 AND A790) TO MATCH ADJACENT ELEMENTS - TO BE DETERMINED. SEE GENERAL NOTES S001 AND SPECIFICATIONS FOR ADDITIONAL INFORMATION

6 ALL WELDS TO BE GROUND SMOOTH AND FABRICATED COLUMN ASSEMBLY TO HAVE 2D NEAR-MIRROR MACHINED FINISH WITH A LIGHT CIRCUMFERENTIAL GRAIN POLISH TO BE INCLUDED IN COST ESTIMATE

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Project
DAY'S END

New York NY

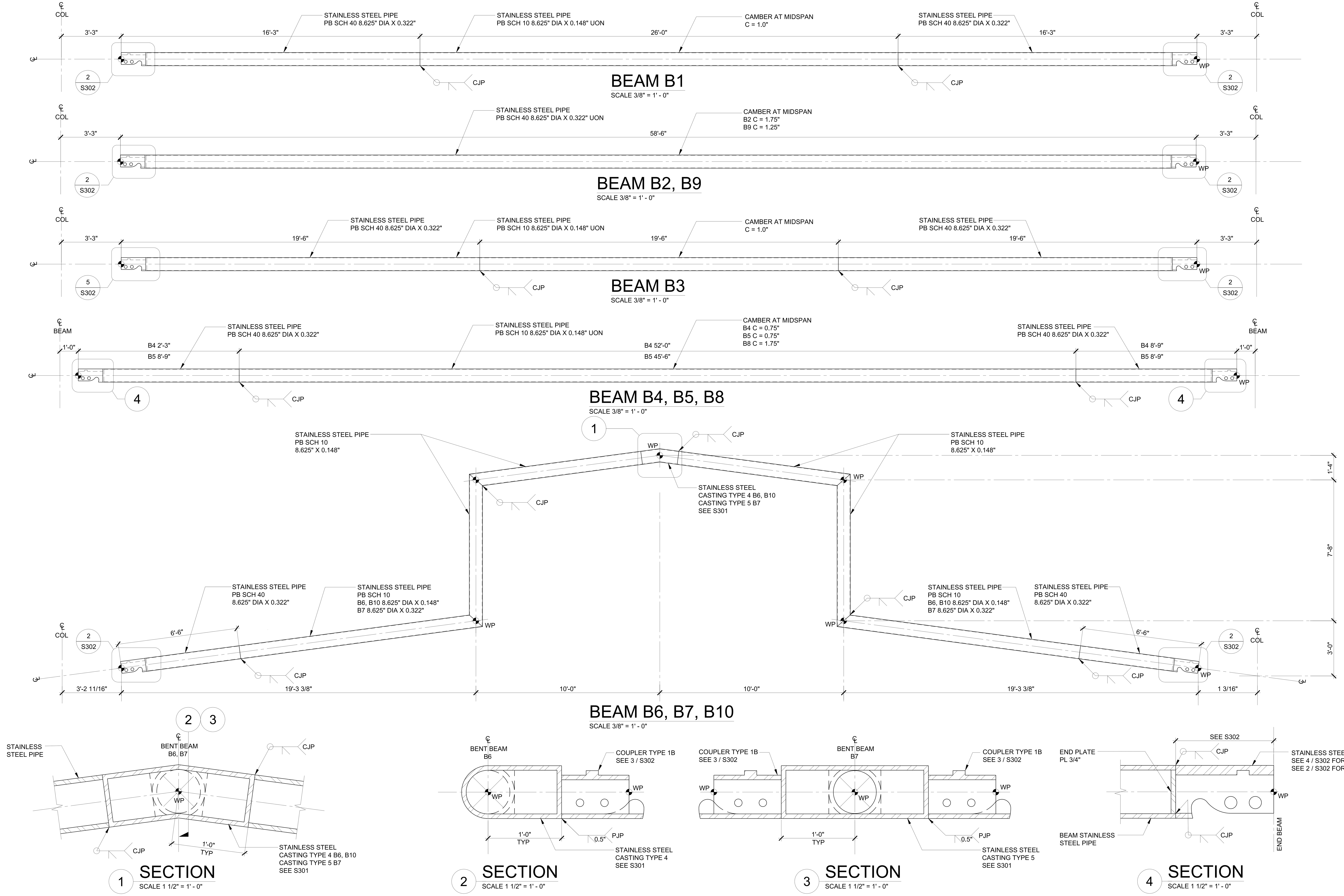
Title
COLUMNS

Project Phase
Construction Documents

Date
30 March 2018

Scale
As Indicated

Drawing Number
S201



NOTES

1. ALL BEAMS TO BE SHOP FABRICATED AS SINGLE SHIPPING PIECE FROM PIPE SECTIONS, NODE CASTINGS AND COUPLERS AS SHOWN FOR BEAM 1-10. NOTE THAT FABRICATED DIMENSIONS FOR BEAMS 6, 7, AND 10 WILL VARY FROM CENTERLINE INDICATED FOR FABRICATED BEAMS 6, 7, AND 10 GIVEN CAMBER FOR INTERSECTION POINTS INDICATED IN SCHEDULE ON S102
2. BEAM PIPES ARE SUPER DUPLEX STAINLESS STEEL 2507 (S32750 AND ASTM A790) SEEMLESS AND WELDED PIPE WITH MINIMUM Fy=80ksi Fu=116ksi AND E=29,000ksi. SEE GENERAL NOTES S001 AND SPECIFICATIONS FOR ADDITIONAL INFORMATION
3. CASTINGS ARE SUPER DUPLEX STAINLESS STEEL 2507 (J93404 AND ASTM A890 GRADE 4A) WITH MINIMUM Fy=75ksi Fu=110ksi AND E=29,000ksi. SEE GENERAL NOTES S001 AND SPECIFICATIONS FOR ADDITIONAL INFORMATION
4. COUPLERS ARE SUPER DUPLEX STAINLESS STEEL 2507 (S32750) WITH MINIMUM Fy=80ksi Fu=116ksi AND E=29,000ksi. ELEMENT TO BE MACHINED FROM SOLID ROD (ASTM A276) AND/OR WELDMENT COMPOSED OF PLATE/PIPE (ASTM A240 AND A790) TO MATCH ADJACENT ELEMENTS - TO BE DETERMINED. SEE GENERAL NOTES S001 AND SPECIFICATIONS FOR ADDITIONAL INFORMATION
5. ALL WELDS TO BE GROUND SMOOTH AND FABRICATED BEAM ASSEMBLY TO HAVE 2D NEAR-MIRROR MACHINED FINISH WITH A LIGHT CIRCUMFERENTIAL GRAIN POLISH TO BE INCLUDED IN COST ESTIMATE

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Project
DAY'S END

New York NY

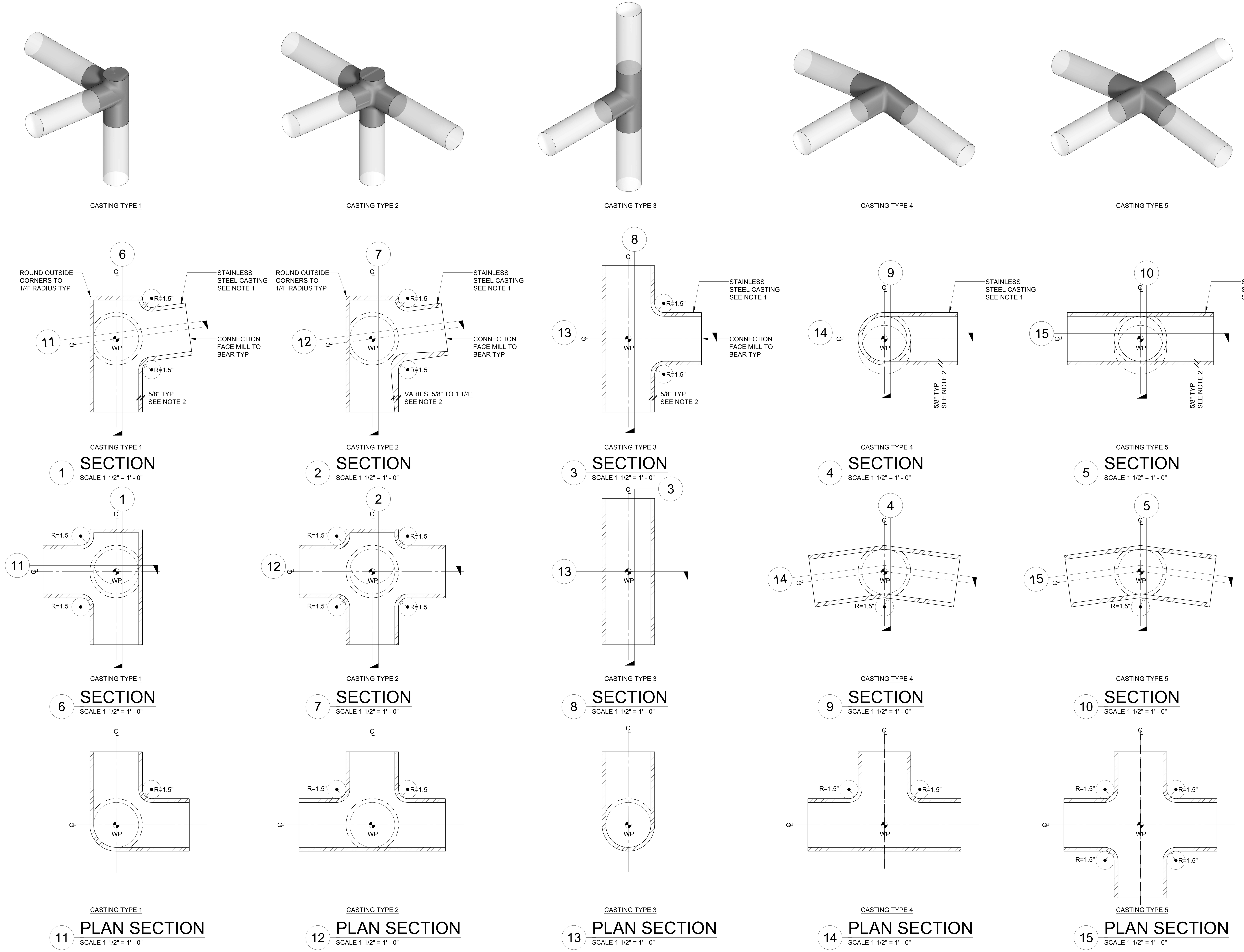
Title
BEAMS

Project Phase
Construction Documents

Date
30 March 2018

Scale
As Indicated

Drawing Number
S202



NOTES

1 CASTING ARE DUPLEX STAINLESS STEEL 2507 (J93404 AND ASTM A890 GRADE 5A) WITH MINIMUM Fy=75ksi Fu=100ksi AND E=29,000ksi. SEE GENERAL NOTES S001 AND SPECIFICATIONS FOR ADDITIONAL INFORMATION

2 WALL THICKNESSES INDICATED ARE MINIMUM AND BASED ON PRELIMINARY ANALYSIS OF MAXIMUM STRESS IN GEOMETRY OF CASTING SHOWN. THICKNESS MAY BE INCREASED LOCALLY AND INTERIOR CORNERS ROUNDED AS NECESSARY FOR THE CONVENTIONS OF CASTING AS APPROPRIATE BY CONTRACTOR WITH REVIEW BY THE STRUCTURAL ENGINEER. THICKNESS AT TYPE 2 GOVERNED BY LOCAL STRESSES AT INTERSECTIONS. METHODS TO INCREASE THICKNESS AT THESE LOCAL LOCATIONS WITH 5/8" ELSEWHERE TO BE COORDINATED WITH FABRICATOR.

3 RADII SHOWN AT INTERSECTION OF PIPES ARE DEFINED IN THE CENTERLINE PLANE OF SECTION SHOWN (VERTICAL PLANE, HORIZONTAL PLANE, OR PLANE ROTATED ABOUT HORIZONTAL AS INDICATED). SMOOTHING OF INTERSECTION BEYOND TO BE CONFIRMED BY CASTING CONTRACTOR WITH REVIEW BY THE STRUCTURAL ENGINEER

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Project
DAY'S END

New York NY

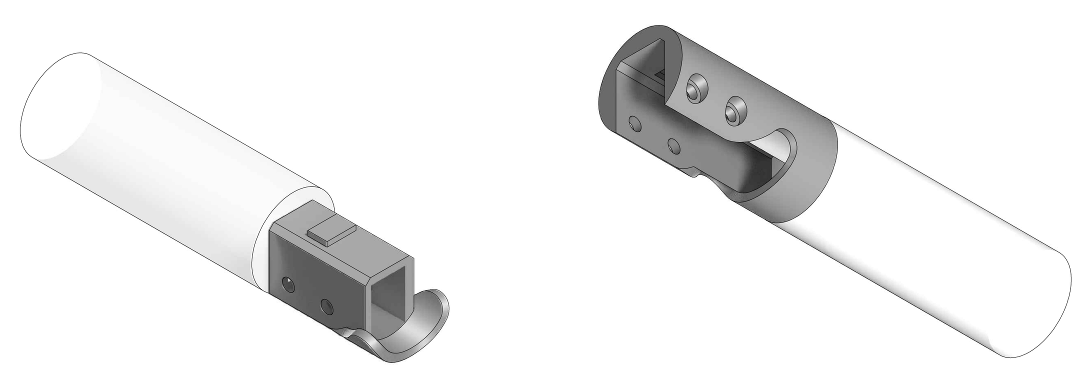
Title
CASTINGS

Project Phase
Construction Documents

Date
30 March 2018

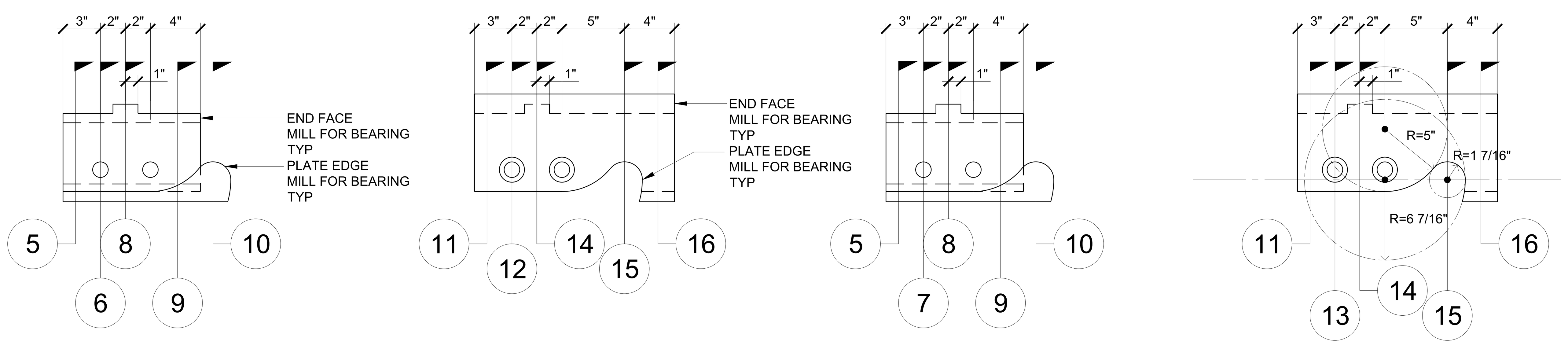
Scale
1 1/2" = 1' - 0"

Drawing Number
S301



BOTTOM COUPLER

TOP COUPLER

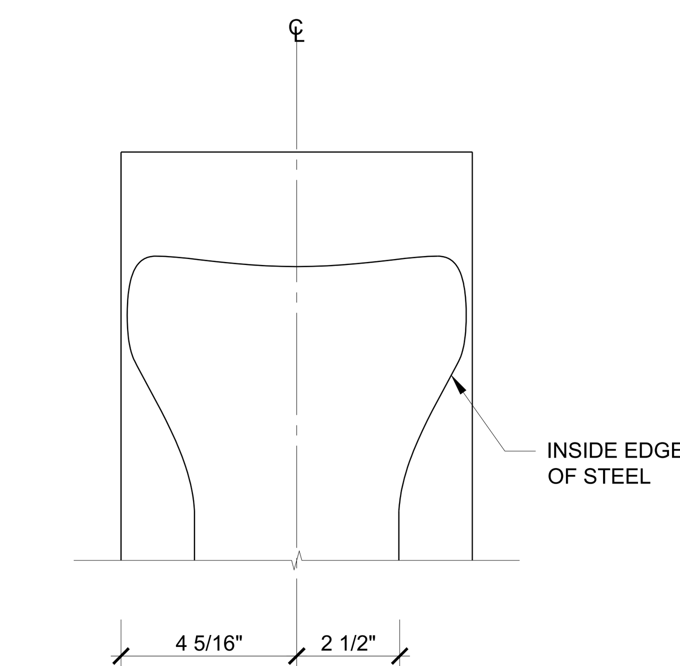


BOTTOM COUPLER 1A
1 DETAIL
SCALE 1 1/2" = 1' - 0"

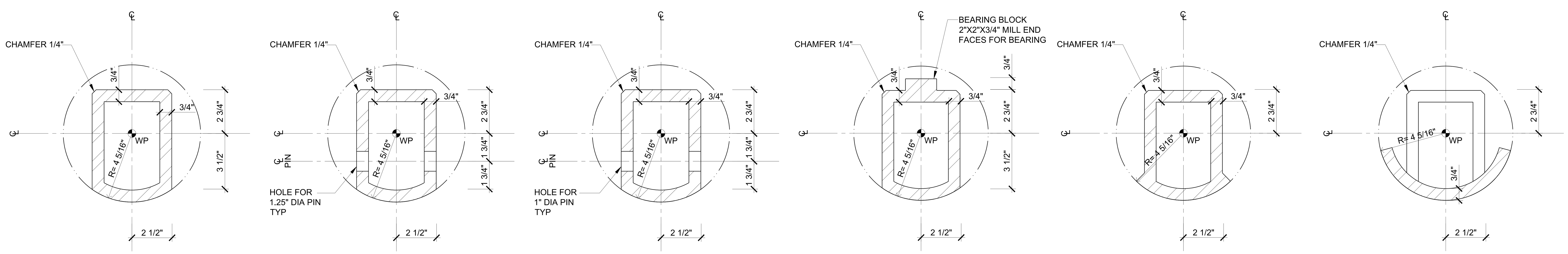
TOP COUPLER 1A
2 DETAIL
SCALE 1 1/2" = 1' - 0"

BOTTOM COUPLER 1B
3 DETAIL
SCALE 1 1/2" = 1' - 0"

TOP COUPLER 1B
4 DETAIL
SCALE 1 1/2" = 1' - 0"



TOP COUPLER
17 PLAN
SCALE 3" = 1' - 0"



5 SECTION
SCALE 3" = 1' - 0"

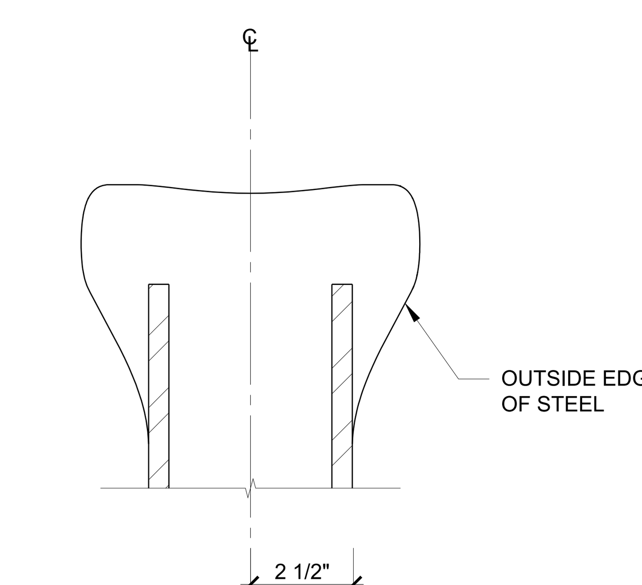
6 SECTION
SCALE 3" = 1' - 0"

7 SECTION
SCALE 3" = 1' - 0"

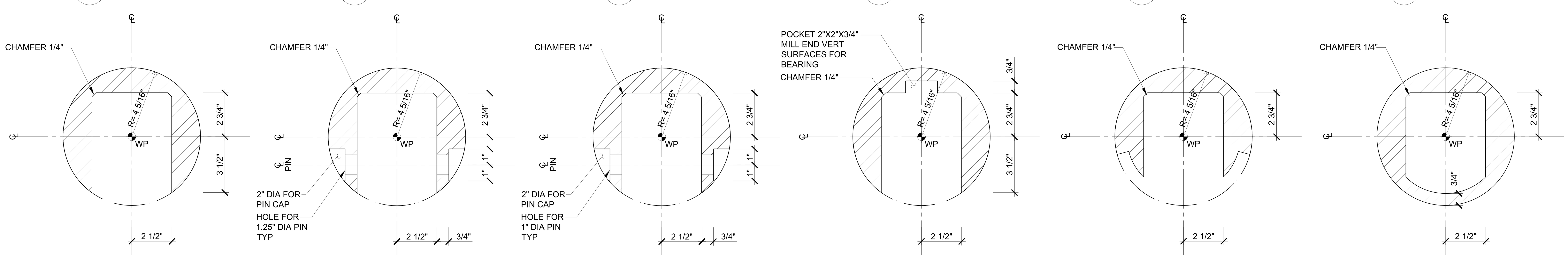
8 SECTION
SCALE 3" = 1' - 0"

9 SECTION
SCALE 3" = 1' - 0"

10 SECTION
SCALE 3" = 1' - 0"



BOTTOM COUPLER
18 PLAN
SCALE 3" = 1' - 0"



11 SECTION
SCALE 3" = 1' - 0"

12 SECTION
SCALE 3" = 1' - 0"

13 SECTION
SCALE 3" = 1' - 0"

14 SECTION
SCALE 3" = 1' - 0"

15 SECTION
SCALE 3" = 1' - 0"

16 SECTION
SCALE 3" = 1' - 0"

NOTES

1 COUPLERS ARE SUPER DUPLEX STAINLESS STEEL 2507 (S32750) WITH MINIMUM Fy=75ksi Fu=110ksi AND E=29,000ksi. ELEMENT TO BE MACHINED FROM SOLID ROD (ASTM A276) AND/OR WELDMENT COMPOSED OF PLATE/PIPE (ASTM A240 AND A790) TO MATCH ADJACENT ELEMENTS - TO BE DETERMINED. SEE GENERAL NOTES S001 AND SPECIFICATIONS FOR ADDITIONAL INFORMATION

2 IF ASSEMBLY OF COUPLER ELEMENTS FROM PLATE/PIPE AS A WELDMENT IS PREFERRED BY CONTRACTOR THEN CONTRACTOR TO PROVIDE COMPOSITION AND WELDING PATTERN FOR REVIEW BY THE STRUCTURAL ENGINEER

3 COUPLER FACES INDICATED FOR BEARING - TOP TO BOTTOM COUPLER AND HOLE FOR PIN TO BE MILLED FOR BEARING

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Project
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New York NY

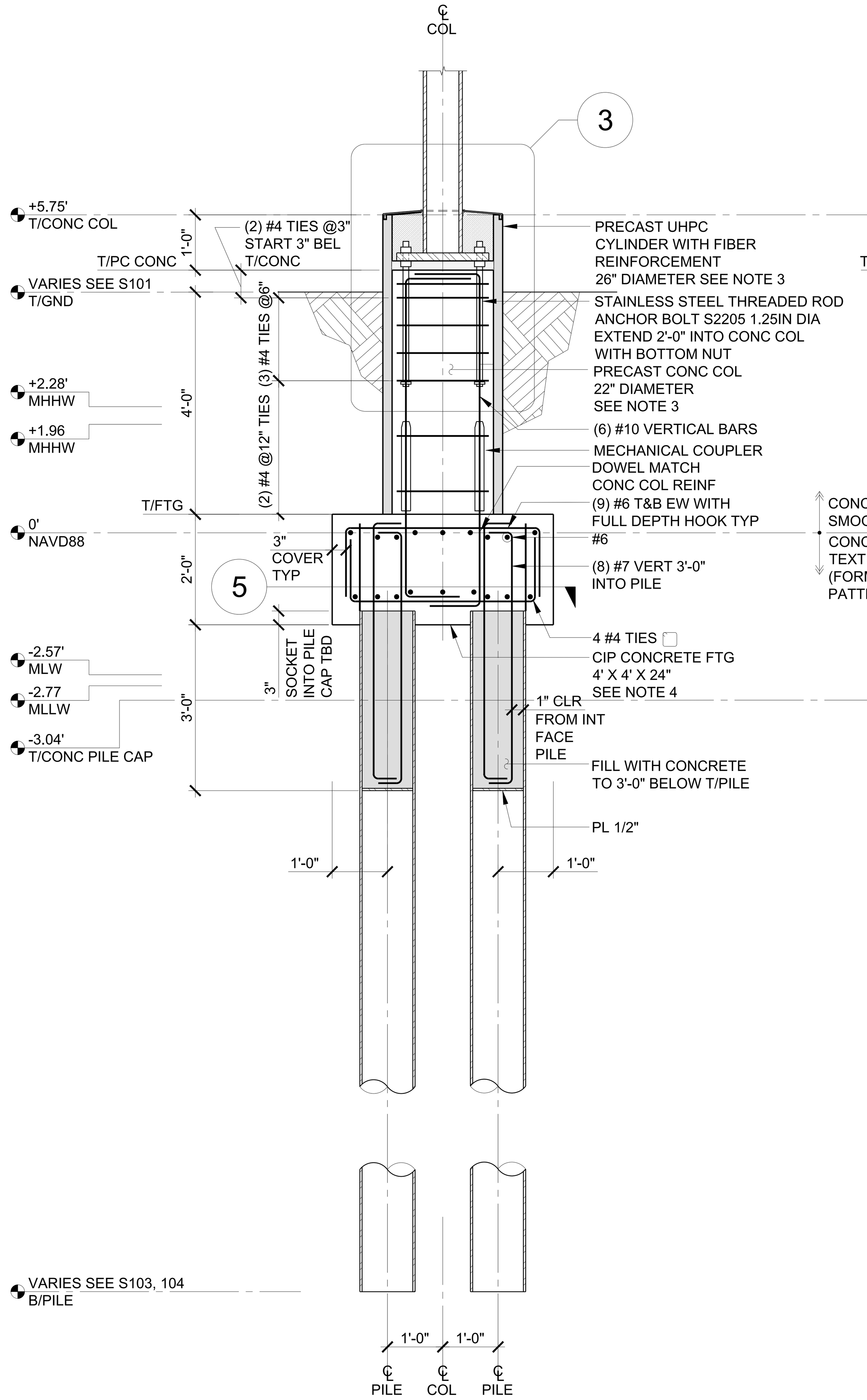
Title
COUPLERS

Project Phase
Construction Documents

Date
30 March 2018

Scale
As Indicated

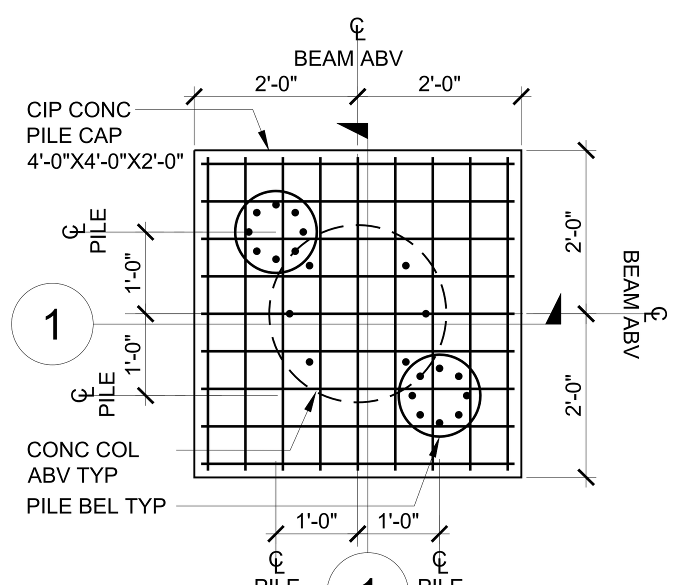
Drawing Number
S302



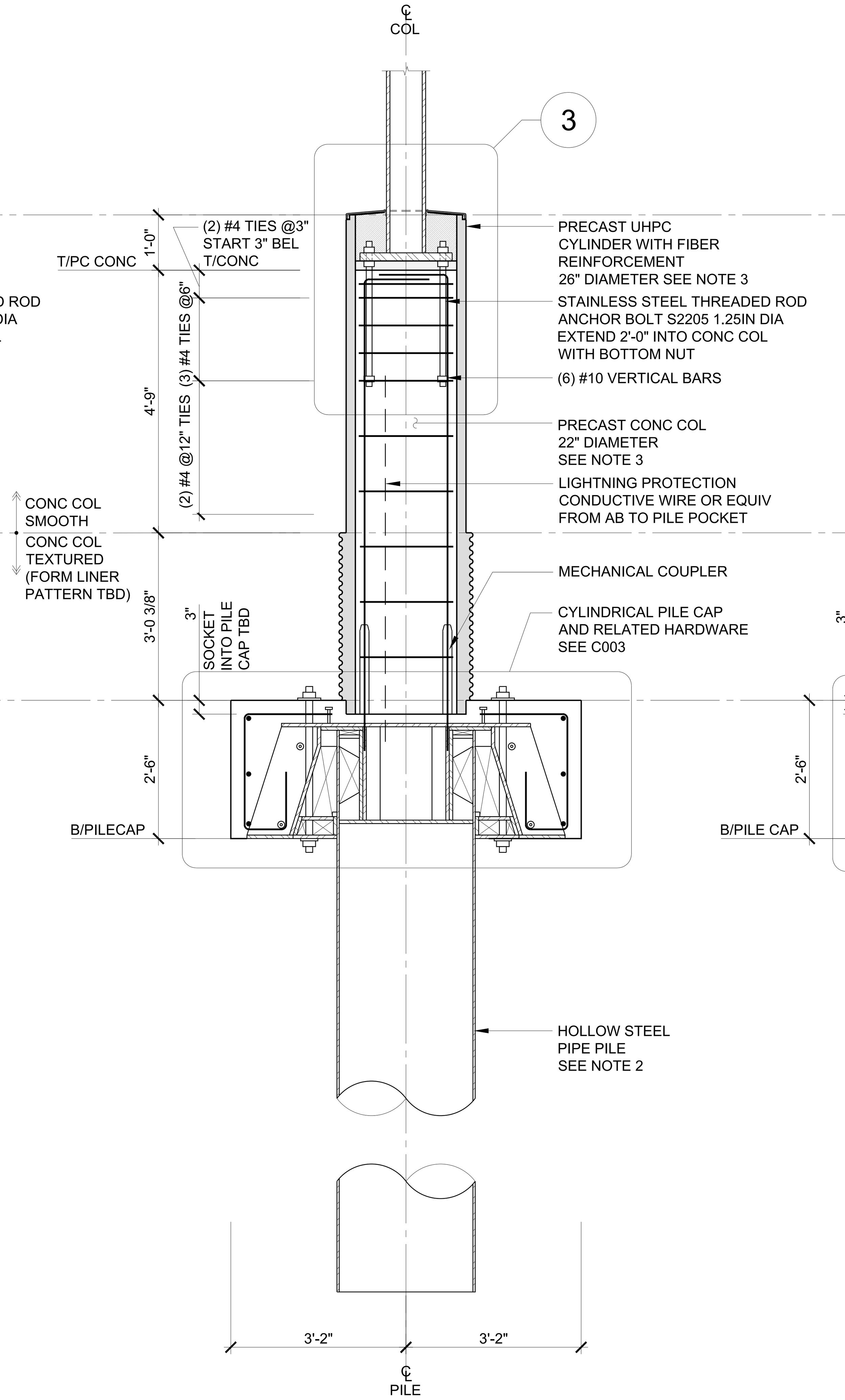
1 SECTION
SCALE 1/2" = 1' - 0"

NOTES

1. SEE FRAMING ELEVATIONS B / S103 AND C / S104 FOR ADDITIONAL INFORMATION FOR ELEVATIONS AND EXTENT OF PILES
2. PILES ARE PAIRS OF HOLLOW STEEL TYPE TYPICAL 12" DIA X 1/2" WALL EACH WITH 50FT LONG DEPTH IN STRATA ABOVE ROCK. PILES ARE EPOXY COATED WITH SELF-HEALING ADMIXTURE AND PASSIVE CATHODIC PROTECTION
3. CONCRETE COLUMN IS ARCHITECTURALLY EXPOSED PRECAST CONCRETE WITH UHPC EXTERIOR REINFORCED WITH FIBER REINFORCEMENT AND F'C=5KSI CONCRETE INTERIOR. NOTE THAT COLUMN IS TO BE PRECAST AS A SINGLE PIECE. CONCRETE TO HAVE MIGRATING CORROSION INHIBITOR AND WATERPROOFING ADMIXTURE. REINFORCEMENT TO BE GALVANIZED
4. FOOTING / PILE CAP IS CIP CONCRETE F'C=5KSI. CONCRETE TO HAVE MIGRATING CORROSION INHIBITOR AND WATERPROOFING ADMIXTURE. REINFORCEMENT TO BE GALVANIZED. BEARING OF FOOTING DIRECTLY ON SOIL OR ADDITION OF PILES SHOWN TO BE CONFIRMED BY FORTHCOMING GEOTECHNICAL INVESTIGATION



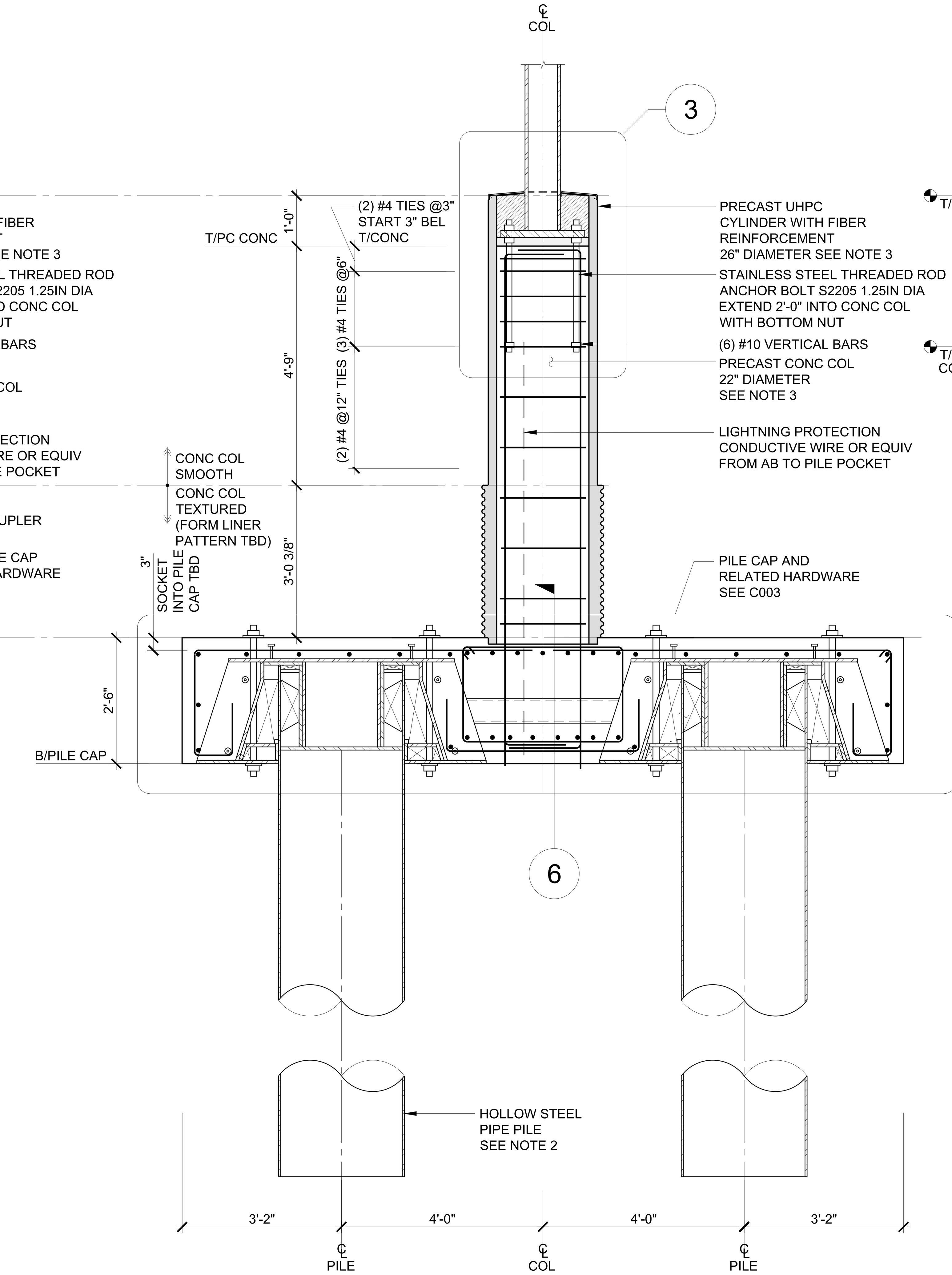
5 PLAN SECTION
SCALE 1/2" = 1' - 0"



2A SECTION
SCALE 1/2" = 1' - 0"

NOTES

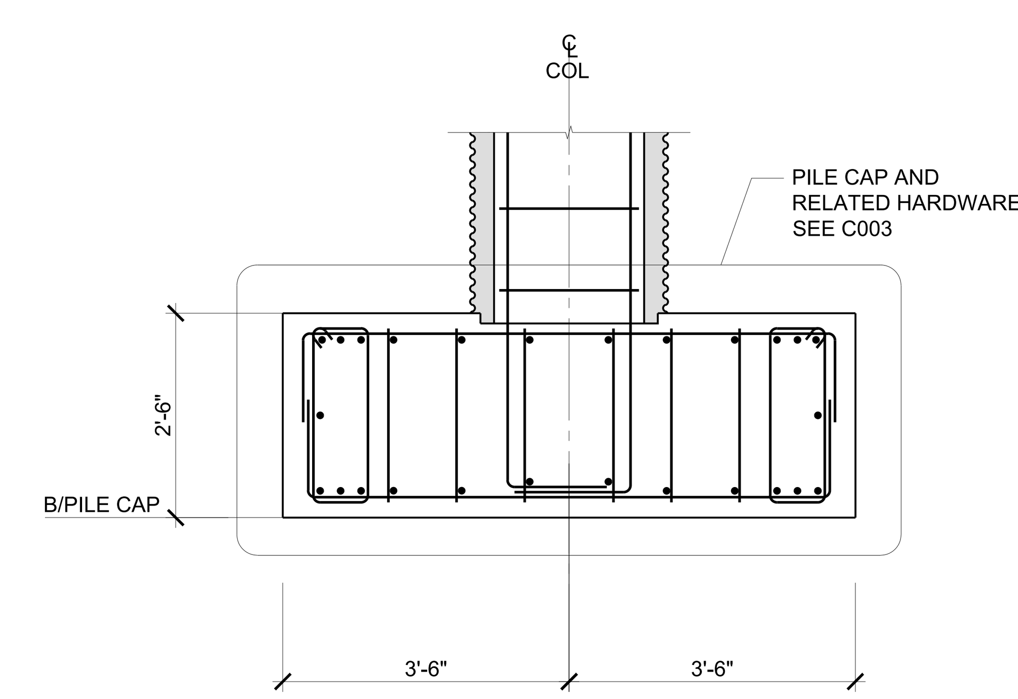
1. SEE FRAMING ELEVATIONS A, B / S103 AND B, C / S104 FOR ADDITIONAL INFORMATION FOR ELEVATIONS AND EXTENT OF PILES
2. PILES ARE PAIRS OF HOLLOW STEEL TYPE TYPICAL 30" DIA X 1/2" WALL EACH WITH 50FT LONG DEPTH IN STRATA ABOVE ROCK. PILES ARE EPOXY COATED WITH SELF-HEALING ADMIXTURE AND PASSIVE CATHODIC PROTECTION
3. CONCRETE COLUMN IS ARCHITECTURALLY EXPOSED PRECAST CONCRETE WITH UHPC EXTERIOR REINFORCED WITH FIBER REINFORCEMENT AND F'C=5KSI CONCRETE INTERIOR. NOTE THAT CONC COL IS TO BE PRECAST AS A SINGLE PIECE AND FABRICATED TO BE SINGLE UNIT WITH PILE CAP. CONCRETE TO HAVE MIGRATING CORROSION INHIBITOR AND WATERPROOFING ADMIXTURE. REINFORCEMENT TO BE GALVANIZED
4. PILE CAP IS ARCHITECTURALLY EXPOSED PC CONCRETE F'C=5KSI. CONCRETE TO HAVE MIGRATING CORROSION INHIBITOR AND WATERPROOFING ADMIXTURE. REINFORCEMENT TO BE GALVANIZED. PILE TO PILE CAP HARDWARE AND BOLTS TO BE 316 STAINLESS STEEL SEE C003
5. NOTE PRECAST CONCRETE PILE CAP TO BE FABRICATED TO ACCOMMODATE DEVIATION FROM PLAN POSITION AND DEVIATION FROM PLUMB THROUGH POSITION AND ORIENTATION OF STEEL POCKET BASED ON SURVEY OF PILES AFTER THEIR INSTALLATION COORDINATED TO AVOID EXISTING TIMBER PILES. SEE SPECIFICATION 31 62 23 FOR ADDITIONAL INFORMATION
6. FOR CASE OF INABILITY TO COORDINATE POSITION OF SINGLE PILE DUE TO EXISTING TIMBER PILES, CONTRACTOR TO APPLY SECTION 2B FOR ALTERNATE PAIR OF PILES WITH 180 DEG ROTATIONAL ADJUSTABILITY TO AVOID EXISTING TIMBER PILES



2B ALTERNATE SECTION
SCALE 1/2" = 1' - 0"

NOTES

1. SEE SECTION 2A NOTES 1-5.
2. ORIENTATION OF CONCRETE PILE CAP AND PILE PAIRS BELOW WILL VARY BASED ON ROTATION ADJUSTMENT ABOUT GRID LINE INTERSECTION TO AVOID OBSTRUCTION OF EXISTING TIMBER PILES BELOW - ROTATION TO BE VERIFIED IN FIELD BY CONTRACTOR DURING INSTALLATION



6 SECTION
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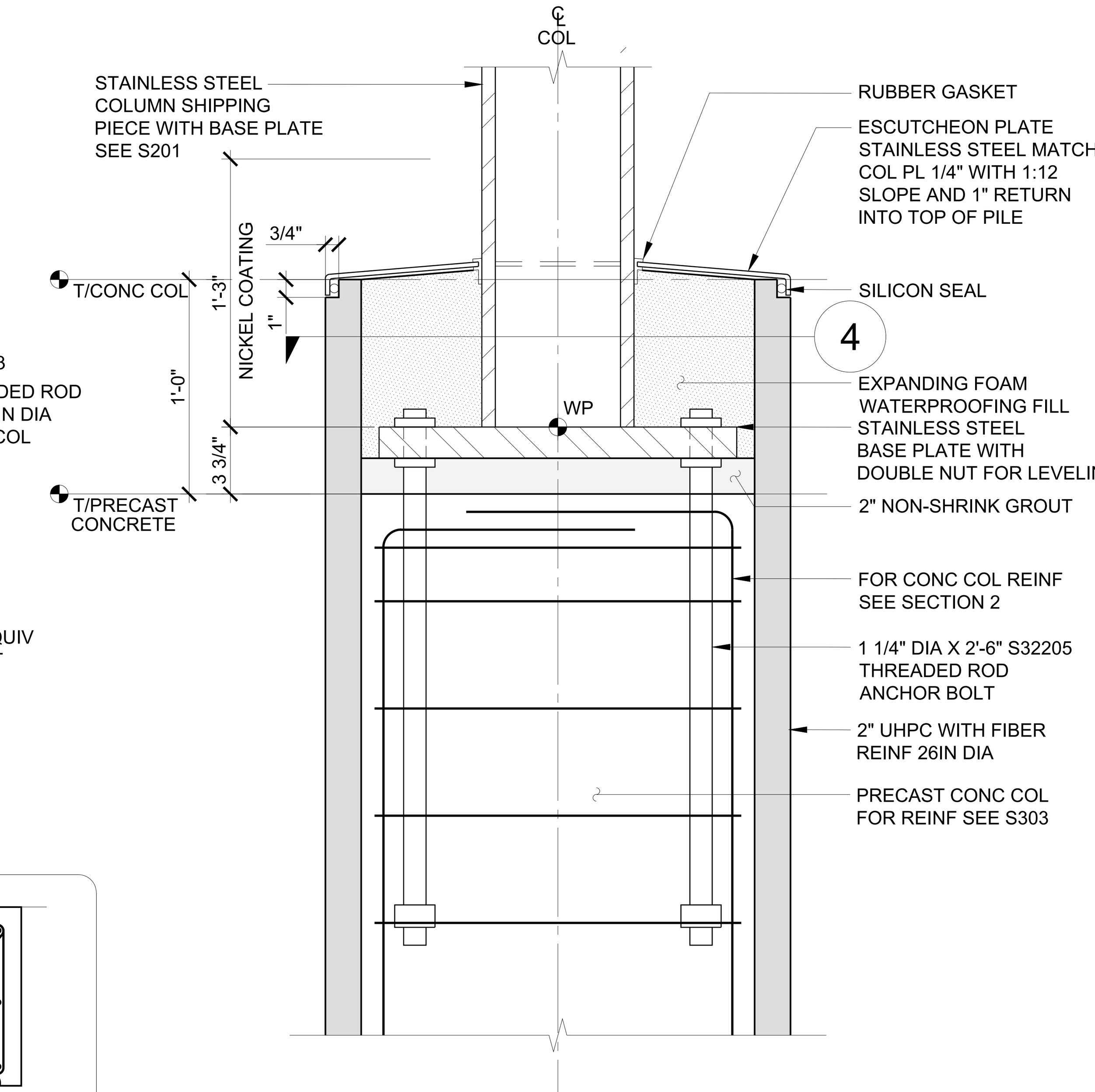

3 SECTION
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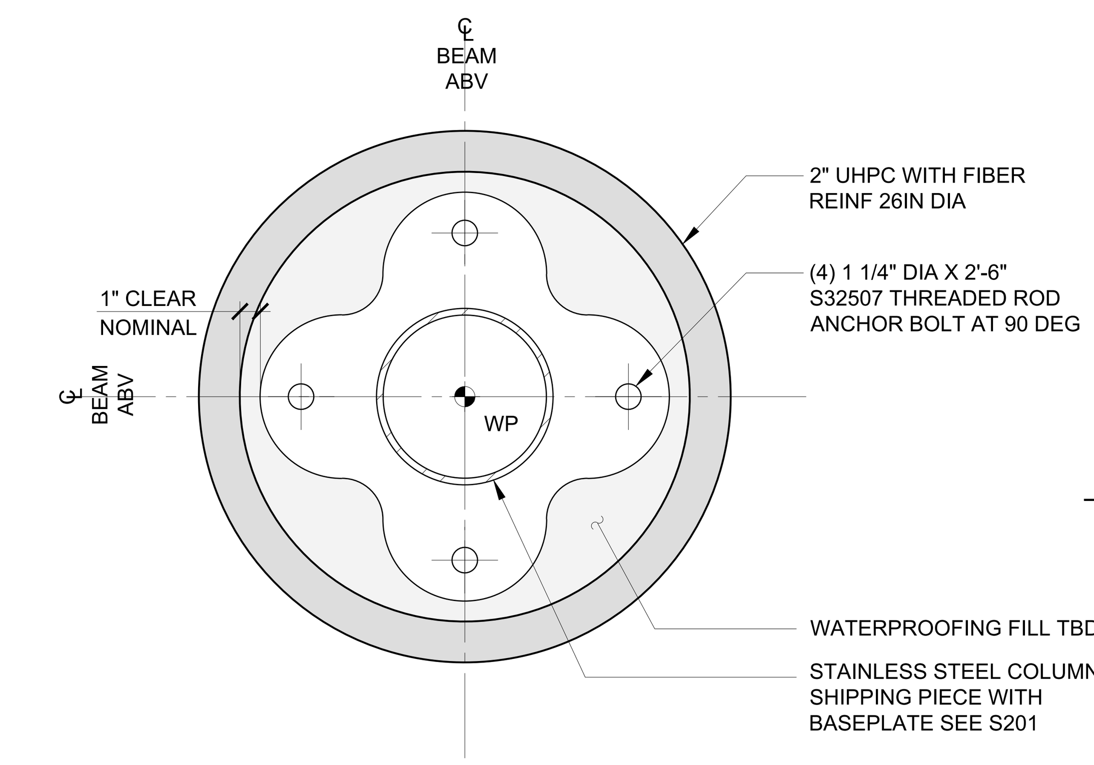

TYPICAL CONC COLUMN SECTION AT STL COLUMN

4 PLAN SECTION
SCALE 1 1/2" = 1' - 0"

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Stamp

100% CONSTRUCTION DOCUMENTS
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30 MARCH 2018

No	Issue	Date
1	100% CONSTRUCTION DOCUMENTS	30 MAR 2018

Project

DAY'S END

New York NY

Title

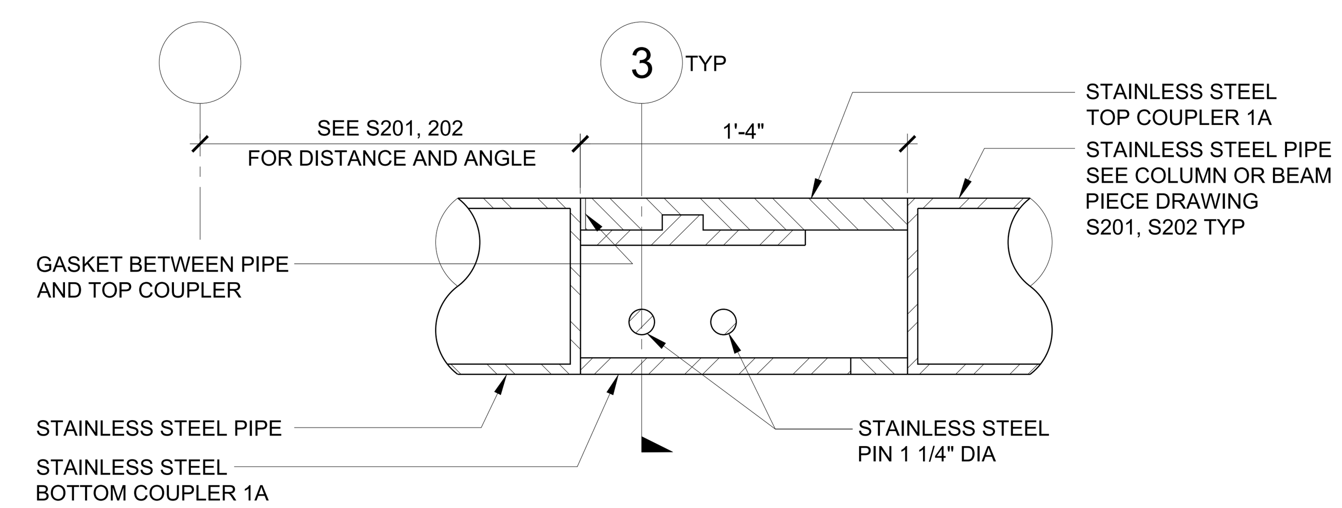
FOUNDATION AND CONNECTION DETAILS

Project Phase
Construction Documents

Date
30 March 2018

Scale
As Indicated

Drawing Number
S303



1 SECTION
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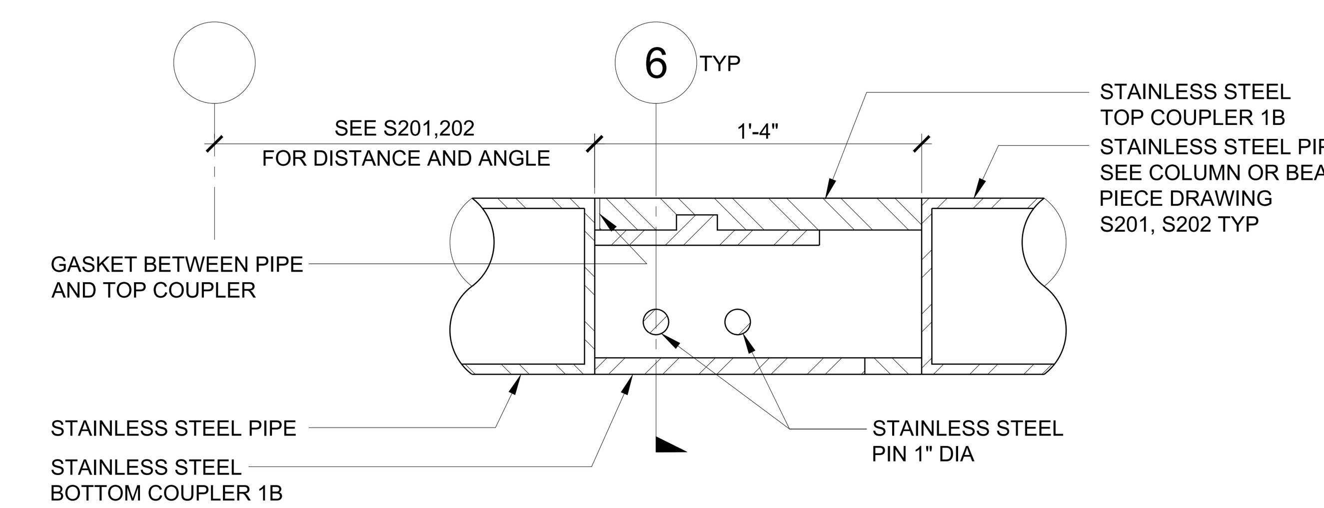

4 SECTION
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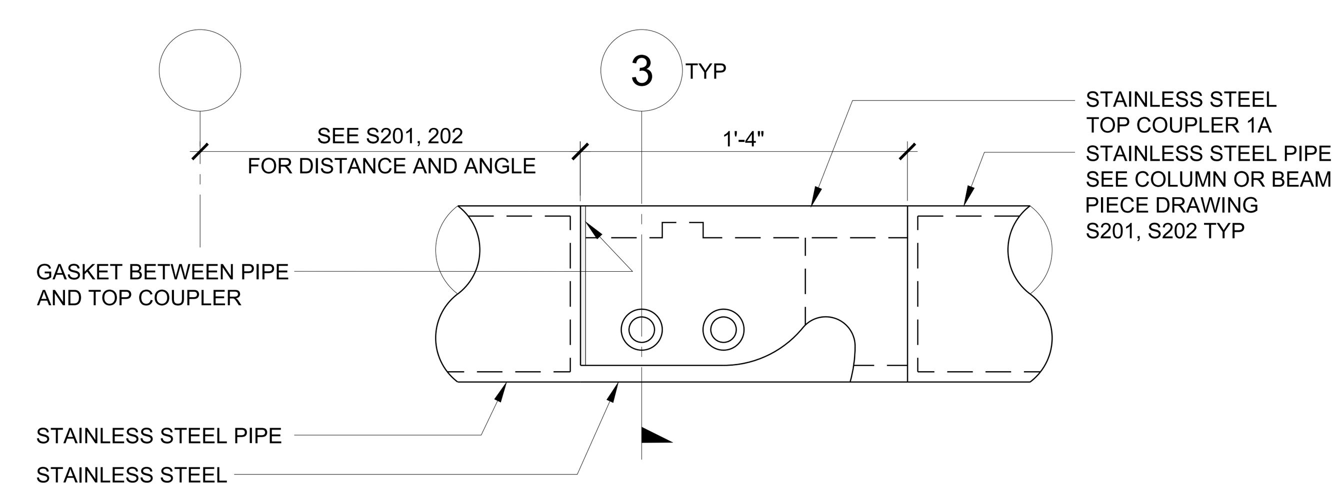

2 DETAIL
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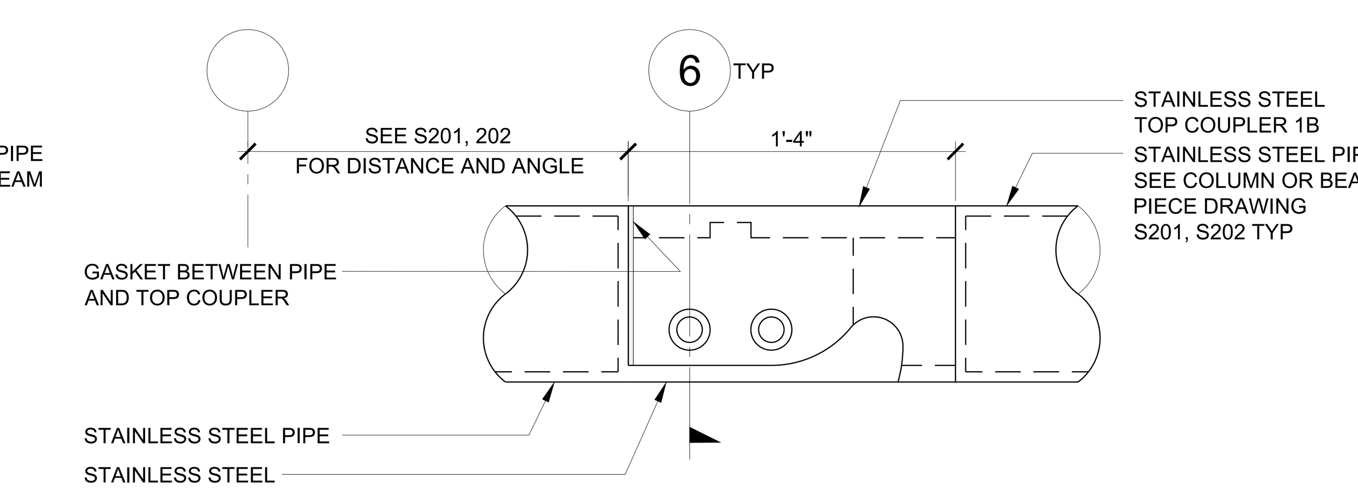

5 DETAIL
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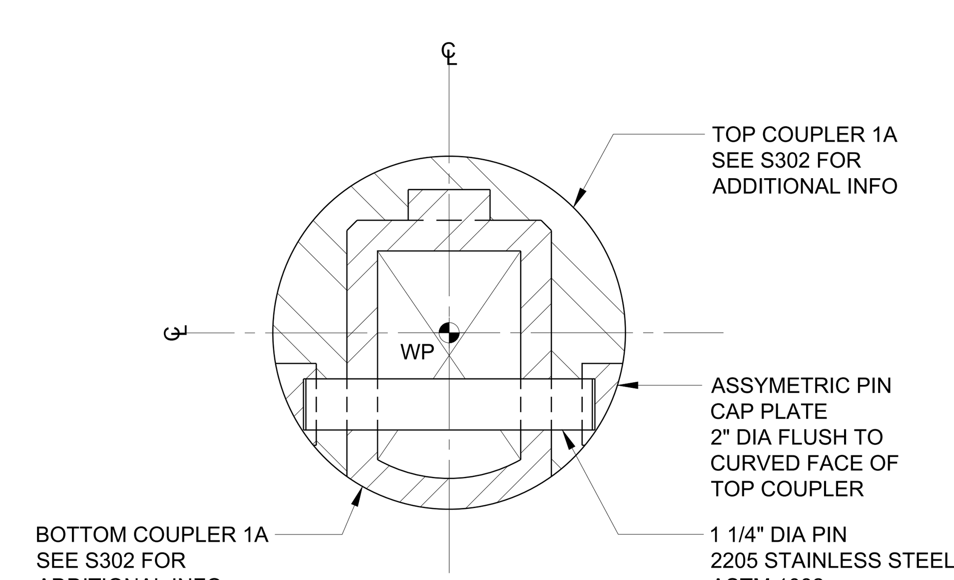
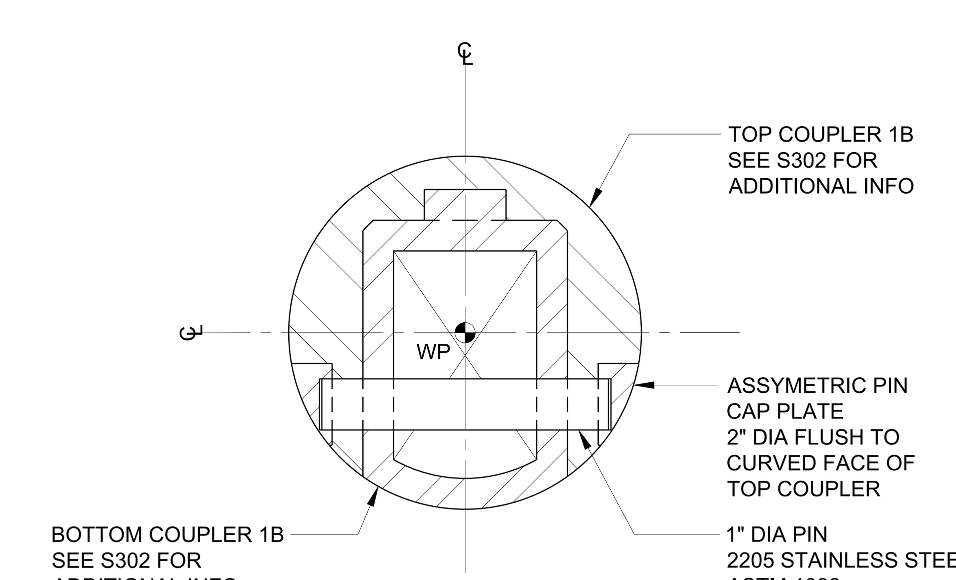


TYPICAL MECHANICAL COUPLER SPLICE

3 SECTION
SCALE 3" = 1' - 0"



TYPICAL MECHANICAL COUPLER SPLICE

6 SECTION
SCALE 3" = 1' - 0"

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1	100% CONSTRUCTION DOCUMENTS	30 MAR 2018

Project
DAY'S END

New York NY

Title
CONNECTION
DETAILS

Project Phase
Construction Documents

Date
30 March 2018

Scale
As Indicated

Drawing Number
S304

Attachment 2 Other NOAA-Trust Resources Impact Assessment

The following information is provided in response to Step 6 “Other NOAA-Trust Resources Impact Assessment” of the EFH Assessment Worksheet.

Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.

Alewife

Alewife (*Alosa pseudoharengus*) is a pelagic species that can occur in the Hudson River from spring to fall. During the spring months, this species migrates through the New York Harbor to spawning grounds in the Hudson, Raritan, and Navesink Rivers, where eggs are deposited in slow-flowing water over a variety of substrates (Mackenzie 1990, Pardue 1983). Peak abundance of larval alewife in estuaries occurs in waters with salinities of 1–5 parts per thousand (ppt) at the surface and 1–15 ppt at the bottom (Locke and Courtenay 1995). Most juveniles emigrate from freshwater estuarine nursery habitats in the rivers where they were spawned between June and November of their first year (Pardue 1983). Adult alewife school in open waters and occupy a variety of inshore ocean, estuarine, and freshwater habitats depending on the season (Hildebrand 1963). They are only associated with bottom structure or substrate during spawning, which occurs in rivers and tributaries. Larval and juvenile alewife feed on small invertebrates, and adults feed on fish eggs, insects, crustacean eggs and larvae, and smaller fish.

Given that alewife are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the proposed installation will not adversely affect this species. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporarily increased suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Noise from pile driving will be mitigated by allowing the piles to first sink into the sediment under their own weight, and then driving via vibratory hammer to the extent possible. Any impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. While alewife will likely avoid the area of the river ensonified during pile driving, they are expected to return following completion of in-water construction. The Hudson River is over 4,000 feet wide in the project location, and minimal increases in underwater noise and resuspended sediments during construction, as well as the presence of the sculpture once it is operational, would not impede alewife migration through the installation site to or from riverine habitats. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on alewife.

American Eel

American eel (*Anguilla rostrata*) can occur in the Hudson River year-round. This species is catadromous, spending most of its life in fresh water and spawning in salt water. They occur in streams and rivers with continuous flow over muddy or silty substrate (Scott and Scott 1988). During the day they tend to rest in undercut banks and deep pools near logs or boulders (Fischer 1978). At sexual maturity, adults migrate from the Hudson, Raritan, and Navesink Rivers and their tributaries to spawning grounds in the Sargasso Sea (Mackenzie 1990). American eels have several life stages: egg, glass, elver, yellow, and silver. Eggs hatch on the ocean surface in the Sargasso Sea and drift with currents for about a year as they develop into larvae before reaching the Atlantic coast (USFWS 2015). Glass eels, or larvae, are about 2–3 inches long by the time they reach the coast, and metamorphose into elvers, or juveniles, in nearshore areas of estuaries and tidal rivers (USFWS 2015, Fischer 1978). Elvers transform into yellow eels, which are sexually immature adults, and can spend up to 40 or more years living in freshwater habitats before they mature into silver eels and migrate to the Sargasso Sea to spawn; eels that remain in brackish waters tend to mature earlier than those in freshwater (USFWS 2015). American eels feed on a variety of things, including insects, fish, fish eggs, crabs, worms, clams, and frogs (USFWS 2011).

Given that American eel are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the proposed installation will not adversely affect this species. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporarily increased suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Noise from pile driving will be mitigated by allowing the piles to first sink into the sediment under their own weight, and then driving via vibratory hammer to the extent possible. Any impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. While eel will likely avoid the area of the river ensonified during pile driving, they are expected to return following completion of in-water construction. The Hudson River is over 4,000 feet wide in the installation location, and minimal increases in underwater noise and resuspended sediments during construction, as well as the presence of the sculpture once it is operational, would not impede American eel migration through the installation site to or from riverine habitats. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on American eel.

American Shad

American shad (*Alosa sapidissima*) is a schooling pelagic species that can occur in the lower Hudson River year-round. This species migrates from offshore waters to spawning grounds in the freshwater tidal areas of the Hudson River; they can tolerate moderate salinity but spawn in lower salinity waters over sand and gravel (Leggett 1976, Walberg and Nichols 1967). Spawning occurs over a variety of substrates, but preferably over sand and gravel bottom with sufficient water movement to eliminate silt deposits (Stier and Crance 1985). Larvae prefer brackish waters with salinities of 7 ppt or less (Leim 1924). Larvae and juveniles start to migrate into the open ocean during the fall, and adults spend most of their lives in offshore ocean waters. Larval and juvenile shad feed mainly on aquatic insects and crustaceans, and adults are primarily plankton feeders (Stier and Crance 1985).

Given that American shad are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the proposed installation will not adversely affect this species. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporarily increased suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Noise from pile driving will be mitigated by allowing the piles to first sink into the sediment under their own weight, and then driving via vibratory hammer to the extent possible. Any impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. While shad will likely avoid the area of the river ensonified during pile driving, they are expected to return following completion of in-water construction. The Hudson River is over 4,000 feet wide in the installation location, and minimal increases in underwater noise and resuspended sediments during construction, as well as the presence of the sculpture once it is operational, would not impede American shad migration through the installation site to or from riverine habitats. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on American shad.

Atlantic Menhaden

Atlantic menhaden (*Brevoortia tyrannus*) can occur in the Hudson River year-round. This species migrates seasonally along the Atlantic coast, moving north through the Mid-Atlantic Bight during spring, and south to Cape Hatteras during the fall (Able and Fahay 1998). Adults are found near surface waters, typically in shallow areas overlying the continental shelf, and they occur in greatest abundance adjacent to major estuaries (Jones et al. 1978). They move inshore during the summer and into deeper waters in the winter. Spawning occurs in continental shelf waters and in the lower reaches of estuaries and coastal bays in waters up to 10 meters deep (Dovel 1971, Rogers and Van Den Avyle 1989). Larvae and juveniles use estuaries during the summer before migrating offshore in the fall (Dovel 1971). Concentrations of young menhaden occur in inshore estuarine waters along the entire Atlantic coast (Rogers and Van Den Avyle 1989). Larvae feed on plankton, and juveniles and adults are filter feeders.

Given that Atlantic menhaden are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the proposed installation will not adversely affect this species. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporarily increased suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Noise from pile driving will be mitigated by allowing the piles to first sink into the sediment under their own weight, and then driving via vibratory hammer to the extent possible. Any impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. While menhaden will likely avoid the area of the river ensonified during pile driving, they are expected to return following completion of in-water construction. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on Atlantic menhaden.

Blue Crab

Blue crab (*Callinectes sapidus*) can occur in the lower Hudson River year-round. Mating season occurs from May through October in the mid-Atlantic in the upper areas of estuaries and lower portions of rivers (Hill et al. 1989). Females generally spawn in high salinity waters between 2 and 9 months after mating (Hill et al. 1989). Eggs are deposited as a cohesive mass that remains attached to the female until larvae, called zoeae, emerge (Hill et al. 1989). Zoeae molt multiple times over the course of about 1–1.5 months, transforming into megalops, or the second larval stage, which is crablike in appearance; development into the juvenile "first crab" stage is characterized by adult proportions and appearance after 6–20 additional days (Hill et al. 1989). Areas of submerged aquatic vegetation in high salinity estuarine waters are used as nursery areas (Heck and Thoman 1984). Juveniles gradually migrate into shallower, less saline waters of upper estuaries and rivers, where they grow and mature into adults through a series of molt and intermolt phases over the course of about 12–18 months (Hill et al. 1989). Blue crabs move from shallow areas and tributaries in the summer to deeper waters in the fall (Mackenzie 1990). When not mating, small blue crabs prefer shallow, high salinity waters over substrates of soft detritus, mud, or mud-shell; larger crabs generally prefer deeper estuarine waters with hard bottom substrates (Hill et al. 1989). As detritivores and scavengers, blue crabs feed on a variety of phytoplankton, invertebrates, fish, and other crabs.

The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporary increase in suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Blue crabs are motile and are not expected to be adversely impacted by installation activities. Noise from pile driving will be mitigated by allowing the piles to first sink into the sediment under their own weight, and then driving via vibratory hammer to the extent possible. Any impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. While blue crab will likely avoid the area of the river ensonified during pile driving, they are expected to return following completion of in-water construction. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on blue crab.

Blue Mussel

Blue mussel (*Mytilus edulis*) is a valuable commercial species and is widely distributed and locally abundant in the north and mid-Atlantic regions; it is most common in the littoral and sublittoral zones of oceanic and estuarine waters and can occur in the lower Hudson River year-round. This species is a bivalve mollusk that filter-feeds on phytoplankton and particulate detritus from the water (Rice 2010). Adult mussels typically reach shell lengths of about 4 inches and attach to hard surfaces, including large boulders, pebbles, and other mussels (Rice 2010, Newell 1989). Eggs are released into the water column for fertilization and hatch after about 5 hours (Newell 1989). Blue mussels go through several larval stages lasting between 15 days and 6 months after hatching. After about 6 months, the mussel temporarily attaches to filamentous substrates and develops as a juvenile for up to 2 years (Newell 1989). Juveniles grow to approximately 1.5 mm while attached to filamentous algae, and then are carried by currents until they reattach to a hard substrate (Newell and Moran 1989). Following the juvenile stage, adults live in habitats ranging from flat intertidal shores to vertical surfaces subject to wave splash (Newell 1989). They are typically found in subtidal and intertidal environments over a wide range of salinities (5–35 ppt) and depths ranging from 16 to 32 feet (Zagata et al. 2008).

While they are unlikely to be present in the generally soft substrate in the installation site, any blue mussels within the footprint of the piles will be lost. Blue mussels may colonize the vertical surfaces of the piles. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporary increase in suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on blue mussel.

Blueback Herring

Blueback herring (*Alosa aestivalis*) is a schooling pelagic species that can occur in the lower Hudson River. Blueback herring adults spend much of their lives in salt water and return to freshwater tributaries to spawn over gravel and sand substrates (Loesch 1969) and would likely only occur in the installation site between April and June during migrations into freshwater spawning habitats and back into inland coastal waters post-spawn. Spawning occurs in swift-flowing, deeper stretches of rivers over hard substrate, and in slower-flowing tributaries and flooded areas with soft substrates (Pardue 1983). Eggs adhere to vegetation, rocks, and debris in fresh water where they are deposited. Blueback herring remain in freshwater habitats as larvae and migrate to low salinity estuarine water as juveniles, generally between June and November of their first year (Loesch 1969, Pardue 1983). Larval and juvenile blueback herring feed on small invertebrates, and adults feed on fish eggs, insects, crustacean eggs and larvae, and smaller fish.

Given that blueback herring are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the proposed installation will not adversely affect this species. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporarily increased suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Noise from pile driving will be mitigated by allowing the piles to first sink into the sediment under their own weight, and then driving via vibratory hammer to the extent possible. Any impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. While blueback herring will likely avoid the area of the river ensonified during pile driving, they are expected to return following completion of in-water construction. The Hudson River is over 4,000 feet wide in the installation location, and minimal increases in underwater noise and resuspended sediments during construction, as well as the presence of the sculpture once it is operational, would not impede blueback herring migration through the installation site to or from riverine habitats. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on blueback herring.

Eastern Oyster

Eastern oyster (*Crassostrea virginica*) can occur in the deeper waters of the Hudson River and New York Harbor year-round. Adult oysters are non-motile and typically live in clumps, or beds. In mid-Atlantic waters, they prefer water depths ranging from 2 to 16 feet (MacKenzie, Jr. 1996). Spawning occurs via release of eggs into the water, where they are fertilized; eggs and young larvae remain in the water column for 2–3 weeks (Stanley and Sellers 1986). Juveniles, or spat, develop in the water column and attach to hard surfaces such as stones or other oyster shells, usually in established oyster beds, about 2–3 weeks after spawning. This species tolerates a wide range of salinity, generally between 5 and 32 ppt. Sufficient water currents are necessary to flush suspended sediments, remove debris, and transport food over oyster beds. Oyster larvae feed largely on plankton, while adult oysters filter-feed on diatom plankton, dinoflagellates, ostracods, small eggs, and anything else in the water that is 3–4 micrometers in size, including bacteria (Stanley and Sellers 1986).

There are no known natural or man-made oyster beds in the vicinity of the proposed installation. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles. Any temporary increase in suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on eastern oyster.

Horseshoe Crab

Horseshoe crab (*Limulus polyphemus*) can occur in the lower Hudson River. Adult horseshoe crabs migrate from deep offshore waters from April to July to spawn. Eggs are deposited on beaches in the upper portion of the intertidal zone and below the feeding zone of shorebirds (USACE 2009). Spawning habitat depends on ready access to open and undisturbed sandy beaches in relatively calm waters, with a portion of the beach at or above Mean High Water where eggs are laid and larvae develop (Baine et al. 2007). Beach quality, including slope, width, and sediment grain size, can influence spawning activity (Baine et al. 2007); beach slope between 7 and 10° is thought to be optimal for horseshoe crab spawning habitat (USACE 2009). Females make several nests during one beach trip and often return on successive tides to lay more eggs (MDNR 2016). After about one month, the eggs hatch and larvae remain in the intertidal flats or shoal waters where they were spawned until settling to the bottom to molt (USACE 2009, MDNR 2016). During its first 2–3 years, the horseshoe crab molts several times per year, and then about once annually until it reaches sexual maturity around 9–11 years in age (MDNR 2016). Adults remain in deep offshore habitats during most of the year, except during the spawning season. Horseshoe crabs feed mainly on marine worms and shellfish, and serve as an important food source to shorebirds and juvenile sea turtles. Migratory shorebirds rely on horseshoe crab eggs to survive their journey to breeding grounds (MDNR 2016). Horseshoe crab eggs and larvae are also a food source for a variety of species including crabs, whelks, striped bass, white perch, American eel, killifish, silver perch, weakfish, kingfish, silversides, summer flounder, and winter flounder (MDNR 2016).

There are no beaches near the Gansevoort Peninsula; therefore, horseshoe crab spawning will not be adversely affected by the proposed installation. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporarily increased suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Noise from pile driving will be mitigated by allowing the piles to first sink into the sediment under their own weight, and then driving via vibratory hammer to the extent possible. Any impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. While horseshoe crab will likely avoid the area of the river ensonified during pile driving, they are expected to return following completion of in-water construction. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on horseshoe crab.

Quahog

Northern quahog (*Mercenaria mercenaria*), also known as hard clams, can occur in the Hudson River year-round. Hard clams are found in the intertidal and subtidal zones of bays and estuaries in waters up to 15 meters deep, most often in higher salinity waters (Stanley and DeWitt 1983). They can be found in all sediment types, but prefer sediments that are a mixture of sand and mud with some coarse material. Adults burrow an average of 2 centimeters into sand, and an average of just one centimeter into softer substrates; adults can escape 10–50 cm of overburden if buried and can re-burrow if removed from the substrate (Stanley and DeWitt 1983). Eggs are released into the water column for fertilization and are carried by tidal and coastal currents for about 10 hours before hatching. Larvae develop 12–14 hours after hatching and drift up and down through the water column until they reach about 2–3 millimeters in length. At this time, the shell begins to thicken and larvae transform into seed clams, which begin a final migration to their ultimate habitat, settling as adults in their second summer (Stanley and De Witt 1983). Adult clams filter plankton and microorganisms from the water that are carried close to the bottom by currents.

Any hard clams within the footprint of the piles will be lost. Since this area represents a very small portion of available habitat within the Hudson River, hard clams are expected to continue to colonize or recolonize in suitable habitat in the vicinity. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporary increase in suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on hard clam.

Soft-shell Clams

Soft-shell clams (*Mya arenaria*) can occur in the lower Hudson River year-round. This species inhabits sandy, sand-mud, or sandy clay bottoms of inlets and bays, typically at water depths of 3–4 meters and salinities no less than 4–5 ppt (Abraham and Dillon 1986). Adults burrow up to 30 centimeters into the substrate, with siphons extending to the sediment surface to feed on detritus and plankton suspended in the water (Abraham and Dillon 1986). Soft-shell clams spawn biannually based on water temperatures, once in spring at 10–20°C and once in fall when temperature falls to 20°C. Eggs are broadcast into the water and develop into planktonic larvae about 12 hours after fertilization; after about 4–6 weeks, larvae settle to the bottom (Abraham and Dillon 1986). Juveniles are able to move to more favorable locations, usually sandy bottoms with less than 50% silt content, before burrowing into the substrate as adults (Abraham and Dillon 1986).

Any soft-shell clams within the footprint of the piles will be lost. Since this area represents a very small portion of available habitat within the Hudson River, soft-shell clams are expected to continue to colonize or recolonize in suitable habitat in the vicinity. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporary increase in suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on soft-shell clam.

Striped Bass

Striped bass (*Morone saxatillis*) can occur in the lower Hudson River from spring to fall. Striped bass can be found in the lower Hudson River during spawning migrations from coastal waters into freshwater spawning grounds between May and June, and back to coastal waters post-spawn in the fall (CHG&E et al. 1999). Larvae drift with the current, but remain in low salinity river waters; juveniles begin to move into higher salinity waters as they grow. Juveniles could be found in the New York Harbor by late summer (CHG&E et al. 1999, Dunning et al. 2009). Outside of spawning periods, adult striped bass migrate along the Atlantic coast and would not likely be found in the lower Hudson River. When they are present, they generally occur in open water, inter-pier, and semi-enclosed basin areas, especially offshore from sandy beaches or rocky shores where prey species are most abundant. Larvae feed mainly on copepods and chironomid larvae, adding larger aquatic invertebrates and small fishes to their diet as they grow (Fay et al. 1983). Larger striped bass begin to school while foraging and feed primarily on clupeids, including bay anchovy and Atlantic menhaden, but also continue to feed on invertebrates (Fay et al. 1983).

Given that striped bass are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the proposed installation will not adversely affect this species. The proposed installation will result in a minimal and temporary increase in suspended sediment and localized increases in turbidity during installation of the piles and removal of test piles. Any temporarily increased suspended sediments and localized turbidity will dissipate upon the cessation of sediment disturbing activities. Noise from pile driving will be mitigated by allowing the piles to first sink into the sediment under their own weight, and then driving via vibratory hammer to the extent possible. Any impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. While striped bass will likely avoid the area of the river ensonified during pile driving, they are expected to return following completion of in-water construction. The Hudson River is over 4,000 feet wide in the installation location, and minimal increases in underwater noise and resuspended sediments during construction, as well as the presence of the sculpture once it is operational, would not impede striped bass migration through the installation site to or from riverine habitats. Shading from the pile caps will be extremely minimal and will have no significant adverse impacts on aquatic habitat. Therefore, the proposed installation will not have significant adverse effects on striped bass.

Atlantic and Shortnose Sturgeon

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*; endangered) can occur in the Hudson River and may be present in the study area. Atlantic sturgeon is a bottom-dwelling fish that inhabits large freshwater rivers when spawning and primarily marine waters when not breeding. They can also be found in bays, river mouths, and estuaries. Atlantic sturgeon spend most of their lives in marine waters along the Atlantic coast, and in New York, return to the freshwater portions of the Hudson River to spawn from late May through mid-July. Adults are more often found in deeper offshore waters, and early life stages are relatively intolerant of salinity. Primary spawning habitat has been identified in Hyde Park, New York at river mile 83 (Bain et al. 2000), well upstream of the proposed installation location at the southern end of Manhattan. Atlantic sturgeon prefer waters between 10 and 15 meters (32 and 49 feet) in depth (Dunton et al. 2010), and no Atlantic sturgeon were collected during multi-year sampling of shallower interpier and underpier habitats in the lower Hudson River during sampling conducted intermittently between 1993 and 2004 (Able et al. 1995, Able et al. 1998, Bain et al. 2006). The installation site is located within an area designated as critical habitat for Atlantic sturgeon.[1] Critical habitat for atlantic sturgeon has been designated for the length of the tidal Hudson River from lower Manhattan to the Federal Dam at Troy. For Atlantic sturgeon, the physical or biological features of critical habitat that are essential to the conservation of the species include:

[1] 82 Federal Register 39160; August 17, 2017

- Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (0 to 0.5 ppt) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- Aquatic habitat with a gradual downstream salinity gradient of 0.5 to 30 ppt and soft substrate downstream of spawning sites for juvenile foraging and physiological development;
- Water of appropriate depth to support: unimpeded movement of adults to/from spawning sites, seasonal movement of juveniles, and staging/resting/holding of subadults or spawning condition adults. Water depths greater than or equal to 1.2 meters (3.9 feet) in the main river channel; and
- Water, especially in the bottom meter of the water column, with temperature, salinity, and oxygen values that support: spawning, annual, and interannual survival, and growth, development, and recruitment.

Shortnose sturgeon (*Acipenser brevirostrum*; endangered) can occur in the Hudson River as transients and may be present in the study area. Shortnose sturgeon are bottom-dwellers that spawn, develop, and overwinter in the Hudson River in its freshwater and brackish reaches, and occasionally use areas of the lower Hudson River downstream of the George Washington Bridge. Shortnose sturgeon prefer the deeper, colder waters of the river channel, and occur in greatest abundance north of river mile 46. Spawning in the Hudson River occurs between March and May in fresh waters over rock or gravel substrate well upstream of the installation location (NMFS 1998). Although larvae can be found in brackish areas of the river, juveniles are predominately confined to freshwater areas upstream from the saline area of the lower Hudson River and New York Harbor. Older juveniles, or sub-adults, tend to move downstream in fall and winter and upstream in the spring, and feed mostly in freshwater reaches during the summer. No shortnose sturgeon were collected during multi-year sampling of shallower interpier and underpier habitats in the lower Hudson River during sampling conducted intermittently between 1993 and 2004 (Able et al. 1998, Bain et al. 2006).

The proposed installation would not result in significant adverse impacts to critical habitat for Atlantic sturgeon. Given the location of the installation site, in-water construction activities would not occur in the vicinity of hard bottom substrate in low salinity waters, and the installation of piles would not remove any soft substrate used for juvenile foraging and physiological development. As the pile installation and removal of test piles would only produce minimal increases in suspended sediment, it would have insignificant effects on water depth, water flow, dissolved oxygen levels, salinity, temperature, or the ability for Atlantic sturgeon to migrate in the vicinity of the proposed installation. The sculpture would not add a physical barrier to passage between the river mouth and spawning sites necessary to support unimpeded movement of adults to and from spawning sites, seasonal movement of juveniles, and staging, resting, or holding of subadults or spawning condition adults. The loss of 71.1 square feet (0.002 acres) of soft bottom habitat in the footprint of the piles would modify designated critical habitat for Atlantic sturgeon. However, this represents a small area relative to the thousands of acres of available foraging habitat suitable for Atlantic sturgeon in the Hudson River. The installation site is also located in shallow waters less suitable for foraging compared to the deep waters of the navigation channel.

While they are not expected to occur in significant numbers in the study area, transient Atlantic sturgeon adults and sub-adults may be present in the vicinity. Because shortnose and Atlantic sturgeon are more likely to occur in deep waters of the Hudson River in the vicinity of the installation site during migration to and from upriver foraging, overwintering, and/or spawning grounds, it is unlikely that individuals of either species would occur at the installation site except as occasional transients. Migration of Atlantic sturgeon into the Hudson River during spring and migration from the river during summer and early fall would not be obstructed by pile driving activities, which would occur in shallow waters and would not result in increased underwater noise in the deeper navigation channel. Transient individuals of both sturgeon species that may occur would be expected to avoid the shallow waters in the installation site in favor of more suitable habitat. Adult and sub-adult sturgeon may use portions of the study area for foraging. The new piles will occupy up to 71.1 square feet of river bottom in waters up to about 12 feet deep. The footprint of the piles represents a very small portion of the available habitat in the Hudson River and New York Harbor, and sturgeon will be able to avoid the construction area in favor of suitable habitat in the vicinity. Once construction activities are complete, encrusting organisms will begin to colonize the vertical pile surfaces and sturgeon will again be able to forage for benthic fish and invertebrates in the area. Noise from pile driving will be mitigated by using a vibratory hammer to drive the piles to their tip elevation. If required, impact hammering would be used to drive the piles to their final depth. All impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. Through the use of a vibratory hammer and noise attenuation techniques, sound levels will remain below the threshold for physiological injury, and will only reach the threshold for behavioral disturbance a maximum of 230 feet from the pile. Given that the Hudson River is over 4,000 feet wide at the installation site, most of the river will remain unensonified at any given time during pile driving, which will allow sturgeon ample room to avoid the area in direct proximity to the noise disturbance. The Hudson River is over 4,000 feet wide in the installation location, and minimal increases in underwater noise and resuspended sediments during construction, as well as the presence of the sculpture once it is operational, would not impede Atlantic sturgeon migration through the installation site to or from riverine habitats. Therefore, the proposed installation may affect but is unlikely to adversely affect shortnose or Atlantic sturgeon.

Sea Turtles

New York and New Jersey waters may be warm enough to support loggerhead (*Caretta caretta*; federally threatened, state endangered) and Kemp's ridley (*Lepidochelys kempi*; endangered) turtles from May through mid-November, and green sea turtles (*Chelonia mydas*) from June through October; those that do occur in these waters are typically small juveniles. Leatherback sea turtles (*Dermochelys coriacea*; endangered) may be found in the waters off New York and New Jersey during the warmer months, but this species generally prefers deep, pelagic waters over shallow, nearshore waters, and would not be expected in the vicinity of the study area. The New York-New Jersey Harbor complex of which the lower Hudson River is a part is considered to be of marginal or lower quality sea turtle habitat, and observations of these species are infrequent (Ruben and Morreale 1999, USACE 2001). Overall, sea turtles have the potential to occur within the study area on rare occasions, and only as transient individuals, rather than for long-term occupation for breeding, wintering, or growth and development. Noise from pile driving will be mitigated by using a vibratory hammer to drive the piles to their tip elevation. If required, impact hammering would be used to drive the piles to their final depth. All impact hammering would be done in conjunction with a soft start and cushion block to attenuate noise. Therefore, the proposed installation may affect but is unlikely to adversely affect sea turtles.

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