Type, Size, and Location Report for the Hampton Harbor Bridge

Seabrook-Hampton 15904

Bridge. No. 235/025

HDR Engineering, Inc.

March 26, 2020

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1 EXECUTIVE SUMMARY

1.1 Description

The Neil R. Underwood Memorial Bridge (Hampton Harbor Bridge) carries NH Route 1A (Ocean Boulevard) over the Hampton River in Hampton, NH, supporting up to 18,000 vehicles per day during peak times. The bridge, built in 1949, is structurally deficient and functionally obsolete, and is considered both scour critical and fracture critical. It has been on the New Hampshire Department of Transportation (NHDOT) Red List of deficient bridges since 1999 due to the poor condition of the superstructure and is considered New Hampshire's No. 1 priority Red-Listed bridge. It will be referred to as the Hampton Harbor Bridge for purposes of this project.

There have been numerous efforts to repair and rehabilitate the bridge over its life, with recent repairs including a deck replacement in 2010 and emergency repairs to the bascule span mechanical system in 2018. The Hampton Harbor Bridge Project, Seabrook-Hampton 15904, will address the long-term needs of the state and region by assessing, designing, and constructing a rehabilitation or replacement of this bridge and its roadway approaches.

This report evaluates four alternatives for addressing the bridge structure:

- Alternative 1 – Rehabilitation of the Existing Bridge
- Alternative 2 – Bridge Replacement with a New Movable Bridge
- Alternative 3 – Bridge Replacement with a Fixed (Non-Movable) Bridge
- Alternative 4 – Twin Bridges, consisting of a rehabilitation of the existing bridge and the construction of a second movable bridge immediately to the west of the existing bridge.

This Type, Size & Location Report (TS&L) incorporates recommendations from two previously developed documents:

- A Rehabilitation Report by HDR, dated November 2018 and revised June 2019, assessed various options for rehabilitating the existing bridge and improving the existing roadway. This TS&L Report incorporates the recommended approach to rehabilitation as Alternative 1 – Bridge Rehabilitation.
- An *Alignment and Profile Study* by HDR, dated June 2019, assessed options for roadway typical sections, alignments and profiles. The recommended typical roadway section, alignment, and profile are incorporated into this TS&L Report as Alternative 2 – Bridge Replacement with Movable Bridge and Alternative 3 – Bridge Replacement with Fixed Bridge Alternatives.

The assessment of the four alternatives, further described below, will address their suitability in meeting the purpose and need of this project by providing a safe, reliable, and structurally sound crossing that provides access for the traveling public through proper vehicle, bicycle, pedestrian and maritime accommodations. All alternatives will provide a curb-to-curb roadway width of at least 38'-0", comprised of two 11' wide lanes with 8' wide shoulders, and two 6' wide sidewalks.

- Alternative 1 – Bridge Rehabilitation: This alternative widens the roadway to the east, holding the western edge of the roadway to minimize impacts to the existing bascule pier/operator house, which has been determined to be a character-defining feature of this National Historic Register-eligible bridge. This alternative requires superstructure replacement and widening of all substructure units. It also requires replacement of the mechanical and electrical systems for the bascule span. The current navigational channel width will be maintained through the bridge. The horizontal clearance of the channel is 40'. The vertical channel clearance is 20' with the bridge in the lowered position, but is

posted as 18'. For purposes of this report, the channel vertical clearance is listed as 20'. Vertical clearance is unlimited with the bridge raised.

- Alternative 2 – Replacement with a Movable Bridge: This alternative replaces the existing bridge with a new bascule structure on an alignment located west of the existing. This alternative also improves the existing navigational channel by increasing the horizontal channel width to 80' and the vertical underclearance to 34' with the bascule span in the lowered position – reducing the frequency of lifts required for vessel passage. Vertical clearance will be unlimited with the bascule raised.
- Alternative 3 – Replacement with a Fixed Bridge: This alternative replaces the existing bridge with a new high-level fixed structure on an alignment located to the west of the existing. Under this alternative, both steel and concrete superstructure options have been considered. The fixed bridge alternative provides a 150' wide navigational channel through the bridge with a vertical underclearance of 48'.
- Alternative 4 – Twin Bridge: This alternative was recommended for study upon completion of the *Hampton Harbor Bridge Rehabilitation Study*. It rehabilitates the existing bridge substructures and replaces the existing bridge superstructure, including the bascule span, to provide a 33'-6" out-to-out deck width, supporting one lane of northbound traffic. In addition, it installs a new "twin" movable bridge to the west, with the same 33'-6" out-to-out width and a similar bascule lift span over the existing channel, supporting one lane of southbound traffic. The new twin bridge would have three spans from each abutment to the bascule piers, and would have a total bridge length of approximately 1,300 feet. This alternative would provide no additional vertical or horizontal clearance for maritime traffic. Vertical clearance would be unlimited with both bridges raised.

In studying these alternatives, benefits and challenges associated with a number of factors have been considered. These include proper serviceability to multi-modal transportation, impacts to environmental and cultural resources, needs of the community, impacts to utilities and right-of-way, as well as costs and constructability of the proposed alternatives. Additionally, extensive outreach to the communities of Seabrook and Hampton, maritime users in the area, and other stakeholders has occurred over the past 14 months with two public informational meetings, four meetings with the project's Public Advisory Committee, and one meeting with maritime users in the area. This outreach, gathering of input, and feedback will continue throughout the project development process.

Coordination with reviewing agencies such as the United States Coast Guard (USCG), the US Army Corps of Engineers (USACE), the National Oceanic and Atmospheric Administration (NOAA), US Fish and Wildlife Service (USFWS), NH Division of Historic Resources (NHDHR) and NH Department of Environmental Services (NHDES) will continue throughout the project and has informed this report's assessment of impacts to natural and cultural resources. These resources include protected plant, animal and marine species, wetlands, as well as historically significant properties and districts.

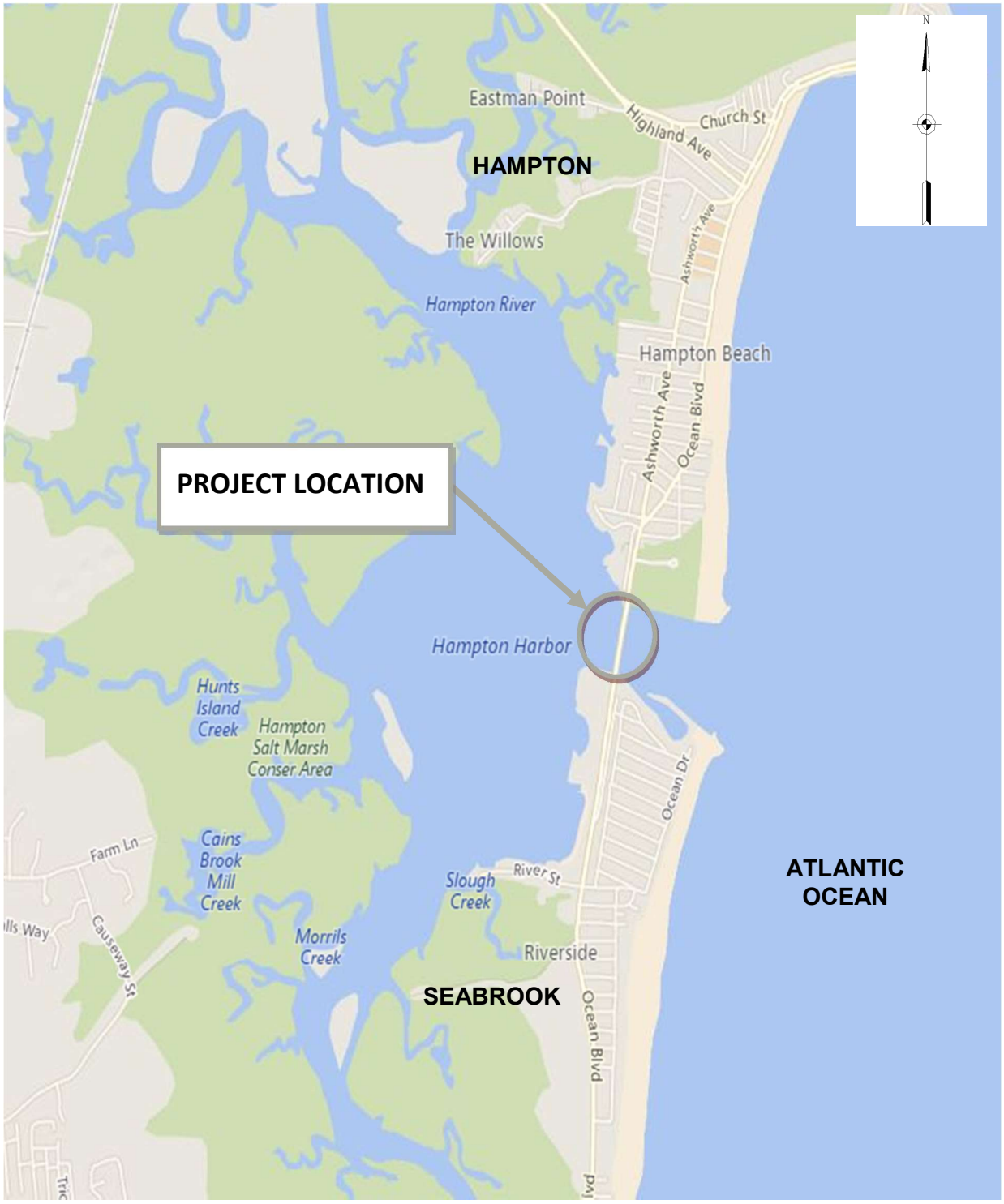
Cost estimates for each alternative have been developed, accounting for both initial construction and life cycle costs. Life cycle cost estimates are based on a 100-year service life and account for maintenance, repairs, and rehabilitations required for each alternative over that service life. These costs are summarized below:

Alternative	Initial Construction Cost	Life Cycle Cost (Constant Dollars)	Life Cycle Cost (Present Day Dollars)
Alternative 1: Rehabilitation	$84,799,000	$155,677,000	$97,299,000
Alternative 2: Movable Bascule Bridge	$100,249,000	$180,630,000	$114,067,000
Alternative 3A: Fixed Bridge - Steel	$66,789,000	$84,647,000	$70,998,000
Alternative 3B: Fixed Bridge - Concrete	$70,417,000	$89,122,000	$73,352,000
Alternative 4: Twin Bridge	$109,726,000	$211,998,000	$127,248,000

1.2 Recommendations

The recommended alternative is Alternative 3A - the Fixed Bridge with the steel superstructure, shown in Appendix A3. The fixed bridge alternatives are significantly more economical, and still provide the desired project outcomes. The structural steel superstructure option accomplishes this at a lower cost and with simplified construction techniques, and is therefore selected as the recommended alternative.

2 LOCATION MAP



NH ROUTE 1A (OCEAN BOULEVARD) OVER HAMPTON RIVER

HAMPTON, NH

3 DESCRIPTION OF EXISTING CONDITIONS

3.1 NH Route 1A – Roadway Description

NH Route 1A (Ocean Boulevard) is classified as a NH Tier 2, Urban Minor Arterial road within the anticipated project limits. It begins in Seabrook at the New Hampshire-Massachusetts state line and travels north approximately 18.4 miles through the towns of Hampton, North Hampton, and Rye to the intersection with U.S. Route 1 in Portsmouth. The Hampton Harbor Bridge is located at mile marker 1.6, on the town line between Seabrook and Hampton. The bridge is a vital link for traffic, with an Average Annual Daily Traffic (AADT) of 9,466 vehicles per day (VPD) (2017), which increases to over 18,000 VPD per day during peak times and special events.

The project study area begins at the intersection of NH Route 1A and River Street in Seabrook and ends at the intersection of NH Route 1A and Epping Avenue in Hampton. The existing roadway consists of a long 0.8 mile horizontal tangent throughout the study area, beginning approximately 3,600' south of the bridge and ending approximately 600' north of the bridge at the entrance to Hampton Beach State Park. From Hampton Beach State park north to Epping Avenue, the horizontal alignment consists of two broken back curves, with 2546.7' and 573' radii respectively, prior to Epping Avenue. NHDOT District 6 is responsible for the maintenance and operation of NH Route 1A within the study limits.

The existing vertical geometry is relatively flat with grades less than 1.0%, except for the immediate bridge approaches. The 1940s record plans indicate that both south and north approaches have a vertical tangent grade of 3% and that there is a 1,300' crest vertical curve over the channel. The roadway profile for all existing vertical curves within the study limits meet or exceed current design standard standards. The existing roadway and bridge typical section vary within the project limits as this segment of NH Route 1A transitions from a rural roadway in Seabrook to a more densely populated urban arterial within the Hampton Beach Village District. For the purposes of the Seabrook-Hampton Rehabilitation and Engineering Studies, the roadway segments include:

<u>NH-MA State Line to 500' South of the Hampton Harbor Bridge</u>

- Posted Speed – 35 mph
- Four 11'-0" travel lanes – two northbound and two southbound
- Uncurbed shoulders which vary between 8' and 12' in width
- No sidewalk or guardrail
- Sand berm located between NH Route 1A and Eisenhower Street
- Uncontrolled parking on wider gravel shoulders and paved parking areas adjacent to the Yankee Fisherman's Co-op

<u>500' South of Hampton Harbor Bridge to Hampton Beach State Park Entrance</u>

- Posted Speed – 30 mph
- Two 11'-0" travel lanes – one northbound and one southbound
- Curbed shoulders which vary between 1' and 5' in width
- 5' sidewalk adjacent to the roadway along the south approach connected via boardwalks or paths to Eisenhower Street, 4'-7" sidewalk on the Hampton Harbor Bridge, and 5' separated sidewalk along the north approach.
- Only one access point at Hampton Beach State Park.

Hampton Beach State Park Entrance to Harbor Road

- Posted Speed – 30 mph
- Two 11'-0" travel lanes – one northbound and one southbound
- One 11'-0" southbound left turn lane for access to Hampton Beach State Park
- Curbed shoulders which vary between 1' to 5' in width
- 5' to 7' separated sidewalk
- Accessed by only one driveway and two intersections (Epping Avenue and Harbor Road)

Lastly, the study area is utilized by vehicles, pedestrians, and bicycles, as well as other recreationalists and transit vehicles. This segment of NH Route 1A is a designated section of U.S. Bicycle Route 1, State Bicycle Route, the NH Coastal Scenic Byway, and the on-road route for the East Coast Greenway through New Hampshire, and as a result there is a larger public interest in and higher usage of the corridor.

3.2 Hampton Harbor Description

The Hampton Harbor Bridge crosses the Hampton Harbor Inlet, a federal channel maintained by the USACE. The harbor itself lies west of the bridge and is formed by the confluence of the Blackwater River, which flows from the south, and the Hampton River, which flows from the northwest. The Atlantic Ocean lies to the east of the inlet where a stone breakwater has been installed. The width of the Hampton Harbor Inlet is approximately 1,025'. The bridge crossing is tidal, with typically four stages each tidal cycle: Mean Higher-High Water (MHHW), Mean High Water (MHW), Mean Low Water (MLW) and Mean Lower-Low Water (MLLW). The elevations at the bridge for these four stages are 3.83', 3.43', -4.87' and -5.17', respectively, based on the NAVD88 datum.

There is a navigation channel beneath the bridge maintained by the USACE. The navigational channel narrows to 40' wide as it passes below the bascule lift span of the existing bridge. The approximate vertical clearance to the bridge structure at the channel when the bascule is closed is 20' at MHW, but is posted at 18' of vertical underclearance. For purposes of this report, the underclearance will be referenced as 20'. The approximate depth of the channel at MLLW is 8' and is periodically dredged by the USACE to maintain that depth. Dredging operations began in October 2019 and the previous dredging was in 2013.

The estimated minimum depth of waterway in the channel, based on a USACE survey dated 11/09/17, is 6.3' at MLLW. A layout of the maintained navigation channels in the bridge area is shown in Figure 1. The navigable Hampton Channel runs nearly parallel to the bridge approximately 70'-90' to the west, and is 100' to 150' wide. The Seabrook Channel meets the Hampton Channel immediately west of the bascule span and extends south-southwesterly at 200' to 250' wide. The Entrance Channel to the east of the bridge is 150' wide and approximately 2,000' long.

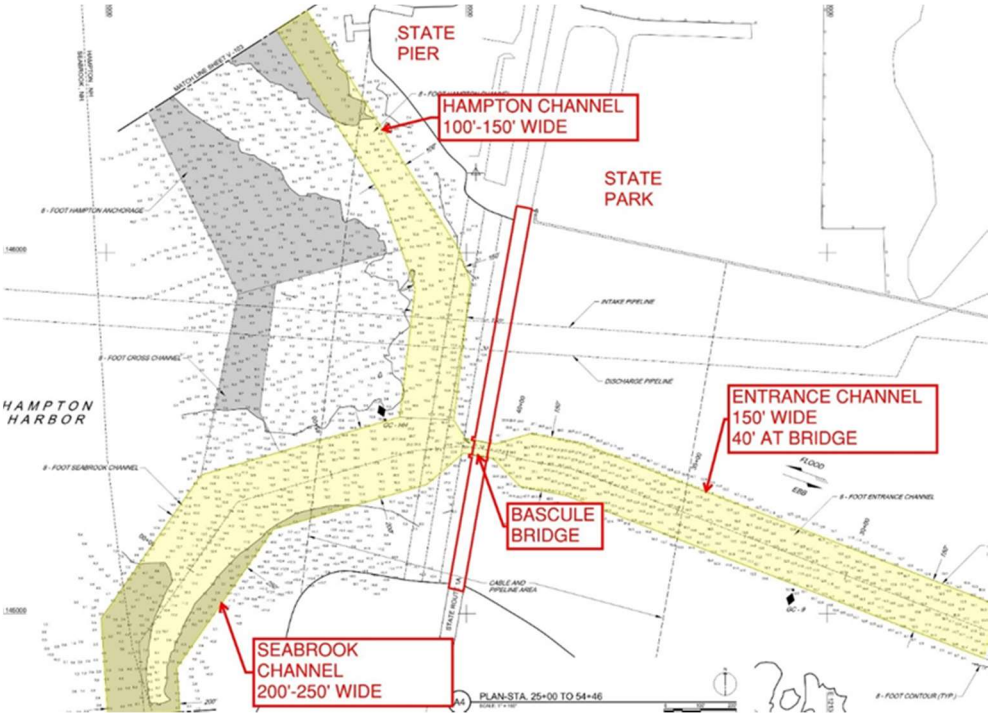


Figure 1 – USACE Maintained Channels in Hampton Harbor

3.3 Hampton Harbor Bridge Description

The existing bridge is owned by NHDOT and was constructed in 1949 as part of NHDOT project F-318(1) to replace the previous timber "Mile-long Bridge", which was built in 1901 by Wallace Lovell and located just to the west. It was named the Neil R. Underwood Memorial Bridge in 1953 in honor of Hampton native Lt. Neil R. Underwood, Jr., a US Army Air Corps pilot shot down over France in August 1944. The existing bridge consists of thirteen spans – six approach spans to the south, six approach spans to the north, and a movable bascule span in the center at the navigational channel – with an overall length of 1,193' long. The bridge width is 34'-9" out-to-out and conveys a roadway of 26'-0" curb-to-curb and a 4'-7" sidewalk on the east side. The twelve approach spans are each 94' in length and are comprised of two steel girders supporting floor beams and stringers with a composite concrete deck. The approach substructure units consist of reinforced concrete piers and abutments. Piers 2S to 6S, 3N, and 5N are founded on timber piles, while the remaining piers – including the bascule pier – and the abutments are supported on spread footings. The substructure components have no skew and are square to the roadway baseline. The center span is a single-leaf steel bascule with an open steel grid deck. It is 65'-6" long and rotates to 79 degrees when fully opened, providing unlimited vertical clearance for the 40'-wide navigational channel. In the lowered position, there is 20' of vertical underclearance. The control house, counterweight, and mechanical systems are north of the bascule span.

The structure has both functional and structural inadequacies including:

- "E-2" Load Posting restricting certified vehicular loads from the bridge
- Narrow 26'-0" curb to curb roadway width comprised of 12'-0" lanes and 1'-0" shoulders
- 4'-7" sidewalk that narrows at the barrier gates and does not meet current Federal Highway Administration (FHWA) width requirements
- Substandard bridge rail, approach rail, and terminal units
- Two-girder superstructure is non-redundant and fracture critical

- Deteriorated steel components including open grid deck, girders, stringers, and floor beams
- Spalling and cracking of concrete piers
- Scour critical based on historic scour observations
- Deteriorated steel bearings with section loss and pack rust
- Mechanical and electrical systems in poor to severe condition
- FHWA National Bridge Inventory status of “Structurally Deficient”
- No. 1 priority on NHDOT Red List of deficient bridges
- FHWA Sufficiency rating of 26%

Figure 2 – Existing Bridge, looking northwest from south bank

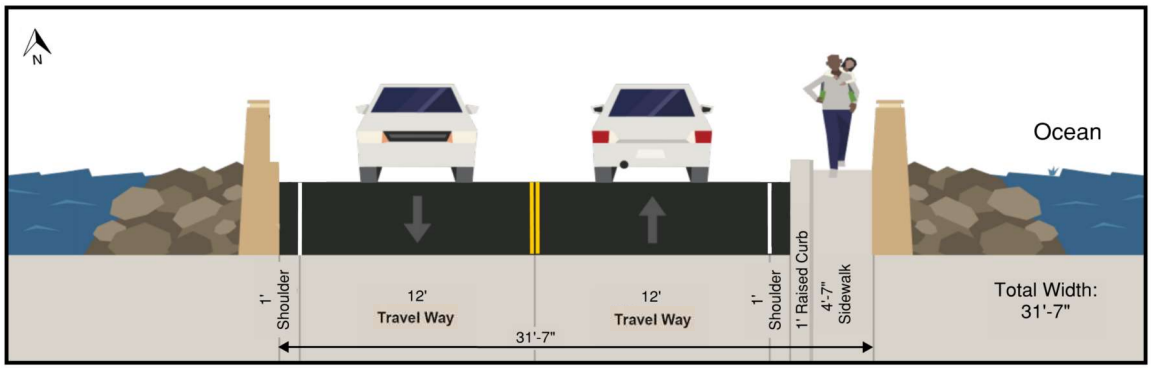


Figure 3 – Existing Typical Roadway Section at Bridge

The bridge has been repaired or rehabilitated at least six times since its construction. Table 1 contains a list of available information on repairs and rehabilitation that have been implemented on the bridge.

Project Description	Plan Set Date	DOT Project #	Plan Set Description
Original Bridge Construction	1946	1600	Design plans
	1947	1600	Bridge shop drawings
	1946	1600	Design plans with fed aid project cover sheet
Pier Repair	1957	Unknown	Jacking of Pier 4N to plumb.
Scour Mitigation	1963	P-2737	Install rip-rap at Piers 3N through 6N
Bridge Painting	1976	S-2842	Painting of bridge structural steel
Bridge Approach Rail	1978	P-2295-H	Replace bridge approach rail
Scour mitigation	1978	P-3212	Channel survey
Fender Installation	1978	PSNH	Fender system installation
Rehabilitation	1983	S3314A	Deck repair, bascule span repairs, control house repairs, bridge rail replacement.
Scour mitigation	1990	P7400	Channel survey
Bascule span repairs	2002	13676A	Limited mechanical, electrical, and structural repairs of lift mechanism.
Rehabilitation	2008	14188	Approach Deck Replacement, made composite, miscellaneous rehabilitation
Emergency Repairs	2018	41510	Emergency repairs of pinion coupling

Table 1 – Partial Repair and Rehabilitation History of the Hampton Harbor Bridge

3.4 Hampton Harbor Bridge – Condition of Structural System

To inform our assessment of the bridge's structural condition, HDR reviewed the following available Inspection Reports Developed by Others:

- August 2019 Inspection Report by NHDOT
- October 2010 Coating Assessment by KTA-Tator, Inc.
- July 2015 Underwater Inspection Report by Terracon Consulting Engineers

In addition to the above information, HDR performed a field assessment of the bridge's structural elements utilizing an Unmanned Aerial Vehicle (UAV) in August 2018.

The NBIS condition ratings based on the August 2019 Inspection Report are:

- Deck – Very Good Condition
- Superstructure – Poor Condition
- Substructure – Satisfactory Condition

The following key findings were noted:

- As noted above, the bridge is both scour and fracture critical and therefore requires supplemental inspection criteria.
- Superstructure elements exhibit paint failure and areas of surface rust throughout.
- Pack rust was noted between girder plate elements in numerous areas throughout the bridge.
- Bracing and floor beams have areas of corrosion and pack rust throughout the bridge.
- Significant section loss was noted on structural elements adjacent to deck joints.
- The majority of piers have steel sheet pilings and/or rip rap installed around the pier to mitigate scour. Sheeting was exposed in a number of locations to varying heights, and scour pockets were noted around Pier 4S.
- Pier 4N is tilted out of plumb. It should be noted that repair plans dated 1957 addressed a repair to this pier, which was shown to be approximately 1'-4" out of plumb. The tilting observed in the field during HDR's field visit appears to be less than 1'-4".
- Pier 4N has significant spalling and cracking on its cap.
- Bearings at deck joints has severe corrosion on the assemblies, especially at anchor bolt nuts.

Other findings include damage to deck joints, minor cracking in deck, and corrosion on stairway supports. These findings were further summarized in the *Hampton Harbor Bridge Rehabilitation Study* by HDR, dated November 2018 with revisions dated June 2019.

3.5 Hampton Harbor Bridge – Existing Mechanical and Electrical System

The bascule span is operated by two 15 horsepower (HP) motors under its normal operation, and is controlled via the four-level operator house located at the northwest corner.

- The upper level (first level) contains the control desk and is where the operator is located during span operation.
- The span level (second level) contains the motor control center (MCC), control relays, secondary motor resistors, two lighting panels, and the emergency (auxiliary) drive control panel.
- The motor level (third level) contains the two main motors, brakes, rotating cam limit switch, and span level indicator.
- The generator level (fourth level) contains the emergency diesel engine generator, an air compressor, two lighting panels, and the submarine cable termination box.

Operations of the bridge are controlled from the control house on the first level. During span operation, the span stops automatically when it reaches the nearly closed or nearly open positions. The operator then drives the bridge manually at a slower speed to fully open or fully closed positions. The bridge power is fed from a utility feeder at the north abutment. The submarine cables provide power and control to the span lock motors and instruments, span seated limit switches, traffic gates, warning bell, and traffic lights on the south side.

The main drive system for the bridge uses one set of open gearing after the main motors, differential reduction gearing above the machinery pier (which shares torque between the two main pinions), and secondary open gearing before each main pinion. The main pinions operate the bridge via the curved racks which are mounted to each of the bascule girders.

The bridge is also equipped with an emergency auxiliary drive system located at the machinery level. The auxiliary system couples to the main drive shafts from the first set of open gearing using a disconnect coupling. The system consists of a motor with rear mounted brake, enclosed gear reducer, and three sets of open gear reduction. Hand wheel operation of the bridge is also provided through two of the open gear sets in the auxiliary machinery room on the machinery pier.

The two span locks located on the rest pier are operated using a motor with rear mounted brake and enclosed speed reducer. The output shafts on the speed reducer rotate the crank arms which drive and pull the lock bars. The live load supports are also located at the rest pier and mate with live load shoes on the bottom of the bascule girders to support the bridge against load due to traffic on the span.

3.6 Hampton Harbor Bridge – Condition of Mechanical and Electrical Systems

At the time of our field observations, HDR found that the mechanical and electrical systems are generally in poor condition with a few components found to be in severe condition. While no critical electrical or mechanical deficiencies were noted to need immediate attention, several deficiencies should receive attention within the next few years. The systems are unlikely to reliably operate the bascule span for the next 10 years and most systems would need replacement for an expected service life up to 50 years.

The instrumentation machinery and limit switches are generally outdated and in poor condition due to damaged linkages and physical deterioration.

The motor control center and control system are in poor condition due to deterioration and periodic false tripping of motor overloads. There is very limited space around the MCC and not enough working clearances per the requirements of the current National Electrical Code (NEC). The control desk is in poor condition due to several inoperable components including the voltmeters and current meters. The condition of the secondary resistors is poor due to deterioration of wires and a lack of safety guards on the open resistors.

The main operating machinery, instrumentation machinery, and electrical equipment are in fair to poor condition due to several deficiencies, including but not limited to the items listed in Appendix J.

3.7 Existing Roadway Traffic Conditions

As part of the bridge alternatives investigation, traffic data was collected from the *NHDOT Bureau of Traffic* based on a permanent traffic count recorder located south of the bridge on the Seabrook and Hampton town line. This permanent count location provides a summary of average annual daily traffic (AADT) as is shown within Table 2.

Data Source	Date	Location on North Pembroke Rd	AADT
NHDOT	2017	NH Route 1A (Ocean Boulevard), Seabrook NH (Seabrook – Hampton town line)	9,466

Table 2 – NHDOT Traffic Data

An assessment of the roadway configuration, as well as present and future traffic conditions was performed under a November 5, 2018 Roadway and Bridge Section Multi-Modal Traffic Analysis memorandum. This memorandum outlined a traffic analysis of present and future use to recommend a number of travel lanes and provided recommendations for a typical roadway section with multi-modal accommodation.

HDR initiated the analysis by reviewing 24 hour Automatic Traffic Recorder (ATR) data taken from the NH Route 1A location at the Seabrook and Hampton Town line.

The typical weekday AM and PM peak hours for the roadway are 9:00 AM and 6:00 PM, respectively. The weekend AM, mid-day and PM peak hours are 9:00 AM, 12:00 PM and 3:45 PM respectively. The Average Daily Traffic (ADT) over the July 11th to July 15th time period was 15,800 with the Annual Average Daily Traffic being 9,800 for 2017.

In addition to reviewing the ATR data published by the NHDOT, which provided the ADT, video turning movement counts (VTMC) were conducted for all vehicles, pedestrians and bicyclists on the bridge. Turning movements were taken at the south and north ends of the bridge, as well as at the intersection of NH Route 1A and the State Park Entrance. The periods chosen for the VMTC counts were based on review of traffic data collected from the NHDOT permanent count location, and are the following time intervals:

- Weekday: Wednesday, July 11, 2018 (6:00 AM-10:00 AM; 3:00 PM-7:00 PM)
- Weekend: Sunday, July 15, 2018 (6:15 AM-5:00 PM)

The following are the peak numbers found by the video turning movement counts for each mode of transportation:

- Vehicular: 733 Vehicles Per Hour, Southbound Traffic at Bridge
- Pedestrian: 93 Pedestrians Per Hour, at State Park Entrance
- Bicycles on Roadway: 17 Per Hour, Northbound at Bridge
- Bicycles on Sidewalk: 11 Per Hour, Northbound at Bridge

See Appendix G for more a more detailed breakdown of traffic information, including a graphic breakdown of traffic count data.

In addition to assessing average annual daily traffic, peak hour volumes and turning movements, bridge lifts were considered in the assessment of existing conditions. Available bridge lift data was collected to understand the effect bridge lift operations have on traffic along NH Route 1A. Based on review of bridge lift logs, a reasonably conservative estimate of two bridge lifts per peak hour was considered to evaluate the effect on traffic operations. A typical bridge lift cycle was determined to be 360 seconds and could potentially occur two times during the weekday peak AM and PM peak hours. A Synchro 9.0 software model was used to determine the traffic capacity impacts. Bridge lift cycles of 400 seconds occurring once an hour for the AM peak and twice per hour for both the mid-day and PM peaks were assumed for the analysis. This frequency, in conjunction with collected traffic data, was utilized in the analysis of future conditions considered in Section 8.1.

3.8 Existing Maritime Traffic Conditions

Maritime vessels of significant size are restricted to travel within the dredged channel and require lifting of the bascule span in order to transit the bridge. The maritime traffic at the bridge has been gathered by reviewing the lift logs for the bascule from September 2016 to June of 2018, as well as through information gained at project-related public meetings through discussion with boat owners. A summary of the lift log bridge use statistics for that timeframe is provided in Table 7.

Item	Quantity	Percentage of Vessel Passages w/Lift
Total Bridge Lifts:	1,722	
Total Bridge Lifts (less test lifts):	1,607	
Total Vessel Passages:	2,118	100%
Passages by Vessels Requiring > 15 Lifts:	2,008	95%
Passages by Vessels Requiring > 100 Lifts:	1,879	89%
Passages by Vessels Requiring < 15 Lifts:	202	10%
Passages by Vessels Requiring < 15 but > 2 Lifts:	130	6.1%
Passages by Vessels with Known Vessel Height:	1,913	90%
Passages by Sail Boats:	30	1.4%
Passages by Sail Boats, less sailboats known to no longer use Hampton Harbor:	21	1.0%

Table 7 – Summary of Vessel use at USACE Maintained Channels in Hampton Harbor

The vessels that transit the bridge are primarily motorized charter vessels for day cruises and day fishing outings. An infrequent number of sailboats enter and leave the harbor, typically during the summer. Special vessels using the harbor include channel maintenance (dredging) vessels, and emergency operations vessels of the Hampton Fire Department and the US Coast Guard, New Castle Station. Much of the dredging done in the navigation channel by the USACE east of the bridge crossing is done by their vessel *Currituck*. However, it is too large to transit the bridge, so other vessels are contracted by USACE to perform dredging at and west of the bridge.

Many users of vessels with lower vertical clearance requirements prefer to cross beneath the bridge outside the navigation channel, as the 40' posted horizontal width is narrower than the width of the existing bridge approach spans (which is typically ~90' between piers). Users reported they often remove rigging from their vessels to avoid bridge lifts. Bascule span lifts affect vehicular and pedestrian traffic on the bridge, as traffic must be stopped in both directions.

3.9 Existing Utilities

This project has verified utilities in a manner consistent with the NHDOT *Utility Accommodation Manual*, incorporating utility verifications and coordination information from the Hampton 14188 project, completed in 2011. This would include incorporating Available utility information has been compiled in Appendix D.

A brief description of the existing utilities within the project limits include:

- *Aerial Utilities*

  The aerial utilities on both approaches to the bridge stop a significant distance from the existing bridge. Aerial utilities in Seabrook were identified along the east shoulder of NH Route 1A stop approximately 500' south of the existing south abutment. In Hampton, aerial utilities cross NH Route 1A from west to east just south of the entrance to Hampton Beach State Park and continue a short distance south but are well outside the limits of the existing roadway.

- *Water*

  An 8" cast iron water line crosses NH Route 1A approximately 200' south of the existing Hampton Harbor Bridge, just north of the Seabrook-Hampton town line, continuing westerly

into Hampton Harbor. This line splits into two 4" flexible submarine pipelines and continues north across the harbor approximately 100' west of the bridge. Approximately 125' north of the bridge under the State Pier parking lot, the water lines are rejoined into an 8" ductile iron pipe before again crossing NH Route 1A to Hampton Beach State Park before continuing north on the east side of the road. A separate 12" asbestos-cement (transite) water line was identified on the west side of NH Route 1A north of the bridge. This line continues north beyond the project limits, remaining on the west side of the road.

- *Sewer*

  A sewer line from a metering station east of NH Route 1A near Campton Street crosses westerly approximately 150' south of the existing Hampton Harbor Bridge and north of the water line discussed above. This line continues west into Hampton Harbor approximately 65' west of the bridge before turning north and crossing the harbor, remaining on the west side of the roadway until reaching a sewer manhole in the southwest corner of the State Pier parking lot.

- *Gas*

  Separate gas lines were identified on each side of NH Route 1A south of the bridge. The easterly gas line crosses the roadway and joins the westerly line approximately 340' south of the bridge. The combined gas line continues north across Hampton Harbor between 20' and 50' west of the bridge, and separates into two lines approximately 125' north of the bridge. The two separate gas lines continue north on the west side of NH Route 1A through the remainder of the project limits.

- *Power Plant Cooling Tunnels*

  Seabrook Station nuclear power plant is owned and operated by NextEra Energy Resources, and is located less than two miles west of the Hampton Harbor Bridge. The intake and discharge cooling tunnels for the plant are 19' in diameter and extend into the ocean approximately three miles from the power plant, passing directly under Hampton Harbor and the Hampton Harbor Bridge.

- *Bridge-Mounted Utilities*

  According to the 2011 rehabilitation plans, conduits carrying power, telecommunications and gas run from the north abutment to the control house under the west deck overhang, attached to the west girder outboard stiffeners. Power from the control house to the north barrier gate is supported on the bridge. Power to the south barrier gate is supplied via submarine cable. There is a transformer vault under the southbound lane behind the north abutment. Overhead lighting is found on the west side of the bridge, and is a continuation of approach roadway lighting circuits. Power to the poles is provided via bridge-mounted conduit.

3.10 Existing Right-Of-Way

The project team has performed the initial right-of-way review to define the existing highway right-of-way and easements, and document the limitations of the existing layout for future identification of proposed acquisitions, if needed. The existing Hampton Harbor Bridge was constructed to the east of the previous bridge crossing the channel. For that reason, the existing state-owned right-of-way is significantly wider to the west of the current bridge. The Seabrook and Hampton harbor navigation channels are located just to the west of the existing right-of-way within the harbor. The Hampton Beach State Park parcel is immediately to the northeast of the existing bridge and several private residences are to the immediate southeast of the existing bridge. The State Pier,

home to several rental business properties, is immediately adjacent to the northwest approach of the existing bridge.

A challenge of the investigation was the boundary between the highway right-of-way and Hampton Beach State Park. Review of right-of-way information found that information defining the right-of-way line between the roadway and Hampton Beach State Park is not available. In future project phases, the project team will work with the New Hampshire Division of Parks and Recreation, as well as the state park to locate a right-of-way line. Draft Right-of-Way Plans are included in Appendix E.

3.11 Existing Drainage and Stormwater Treatment

The existing drainage and stormwater collection review was conducted through record plans and a brief field review to identify how stormwater runoff is collected within the project area. Study segments include the northern and southern roadway approaches as well as the existing bridge. A formal drainage study has not been performed at this time; however, based on record plans and a site walk, there does not appear to be any existing stormwater treatment or pretreatment within the project limits. For each segment, stormwater runoff is collected and conveyed to an outlet as described below.

- South Approach – Runoff appears to collect along the existing curb and sand berm, before being directed off the pavement. Drop inlets and outlets were indicated within the record plans, however the outlet pipes or structures were not found during the review.
- Hampton Harbor Bridge – Bridge scuppers are spaced along the bridge approach spans collecting runoff from the deck surface and outletting directly into the channel.
- North Approach – Stormwater runoff is collected along the existing curb and by a closed drainage system, which conveys runoff northerly. From record plan review, the system collects runoff along NH Route 1A and the historic alignment/Ocean Boulevard, as well as areas of Ashworth Avenue, Dustin Avenue, Harbor Road, and Dover Avenue in a closed drainage system, which is conveyed to an outlet identified on historic plans near Hampton Marina.

4 DESCRIPTION OF EXISTING ENVIRONMENTAL AND CULTURAL RESOURCES

4.1 Harbors and Waterways

An expansive complex of salt marshes extends west from Hampton Harbor. The harbor and inlet are used by both commercial fishermen and recreational boaters. Hampton Harbor was dredged in 2013; however, significant shoaling has occurred since that time restricting access to portions of the harbor at low tide, prompting the October 2019 dredging operations. The project team will coordinate with the USACE to implement the as-constructed results of this dredging operation into future design phases of this project.

4.2 Tidal Wetlands

A field wetland delineation conducted in the summer of 2018, found no vegetated tidal wetlands or inland wetlands located within the project area. The closest potential vegetated tidal wetlands are approximately 2,400' to the west and northwest of the bridge (see Appendix F). The non-vegetated wetlands within the project area consist of both tidal and sub-tidal estuarine wetlands under and adjacent to the bridge. Tidal estuarine wetlands consist predominantly of regularly-flooded sand flats. Tidal wetlands exist to the east of the bridge, near the mouth of the harbor. If work takes place within the tidal and subtidal estuarine zones, the applicable permits will be secured prior to start of construction. Along with all other natural resource areas, estuarine wetlands will be considered for construction, access, and staging areas, and Best Management Practices (BMPs) will be closely followed and monitored in order to protect these wetlands and other local resources.

4.3 Historic Resources

An Area of Potential Effect (APE) for above-ground resources (visual APE) was defined through field survey conducted in June 2018 based on the potential for the proposed improvements to be visible from surrounding properties (see Appendix F). Historic resources initially identified within the APE include the Hampton Harbor Bridge and the Eastern Railroad Line Historic District (National Historic Register-eligible). At the time of the initial APE definition, the bridge had not been formally evaluated for National Historic Register eligibility, but it has since been determined eligible as one of two remaining bascule bridges in the state. Additionally, a National Historic Register-eligible historic district, the Hampton Beach Cottages Historic District, has been identified north of the bridge within a portion of the APE. The New Hampshire Division of Historical Resources concluded that another property, 54 River Street in Seabrook, met the criteria for eligibility; however, NHDOT determined that various alterations to the property, coupled with its limited individual significance, compromised its individual eligibility.

4.4 Archeological Resources

A Direct APE has been defined for the project based on the potential for ground disturbance, and therefore, adverse effects to archaeological resources (see Appendix F). A Phase 1A Archaeological Assessment was completed and a supplemental Addendum was prepared which assessed the potential for submerged archaeological resources. The Phase 1A assessment identified the remnants of 81 wooden piles which are visible at low tide. These piles are likely associated with installation of temporary work platforms during construction of the existing Hampton Harbor Bridge. Additionally, an iron rod and eight plank stubs were identified adjacent to the southern-most approach span of the existing bridge. The iron pin is of unknown origin; the plank stubs may be related to the construction of a cofferdam around one of the piers. A potentially archaeologically sensitive area was also identified at the northern end of the project

limits. The wooden piles, iron pin and plank stubs were mapped as part of the Phase 1B investigation.

Consultation with NHDHR and Consulting Parties will continue throughout the design process.

4.5 Threatened/Endangered Species, Wildlife, and Fisheries Habitat

The project area is rich with natural resources due to its location on the coast and adjacency to important habitats. The site is classified as "Highest Ranked Wildlife Habitat by Ecological Condition" in the *New Hampshire Wildlife Action Plan* (New Hampshire Fish and Game, 2015). Coordination with natural resource agencies has identified federal and state listed terrestrial and aquatic species, and important fisheries and aquatic resources. The following summarizes this coordination:

- New Hampshire Natural Heritage Bureau (NHNHB) identified three community types including: Beach Grass Grassland, Intertidal Flats, and Subtidal System. NHNHB also identified nine state-listed plant species and two state-listed avian species which could occur in the project area (see Appendix F). One of the avian species, the Piping Plover, is also a federally-listed species (threatened).
- The National Oceanic and Atmospheric Administration (NOAA) identified several federally listed threatened or endangered species of fish that may occur within Hampton Harbor and its associated bays and tributaries, including: the New York Bight, Chesapeake Bay, South Atlantic and Carolina distinct population segments (DPS) of Atlantic sturgeon (*Acipenser oxyrhynchus*) (endangered); Gulf of Maine DPS of Atlantic sturgeon (threatened); and the Shortnose sturgeon (*Acipenser brevirostrum*) (endangered). Four federally-listed threatened or endangered sea turtles could occur in the project area: the Northwest Atlantic Ocean DPS of loggerhead sea turtle (*Caretta caretta*) (threatened); the North Atlantic DPS of green sea turtle (*Chelonia mydas*) (threatened); the Kemp's ridley sea turtle (*Lepidochelys kempii*) (endangered); and the leatherback sea turtle (*Dermochelys coriacea*) (endangered) (see Appendix F). NOAA also identified other non-Endangered Species Act (ESA) resources including: 26 designated essential fish habitat (EFH) species; trust resources, such as American lobster, blue mussel, and soft-shell clam; and diadromous species which may be prey for federally designated species. An Essential Fish Habitat Assessment and Biological Assessment are underway for these aquatic species.
- The U.S. Fish and Wildlife Service identified two federally-listed species through an initial Information, Planning, and Consultation (IPaC) process, one being the Northern long-eared bat. Subsequent consultation with USFWS has identified the presence of two additional avian species within the project area. NHDOT and FHWA determined that the Northern long-eared bat would not be affected by the project and USFWS concurred. As such, no further consultation under Section 7 of the Endangered Species Act is required for this species. Consultation is ongoing regarding potential effects to the three avian species.

4.6 Social and Economic Resources

The 2010 Census Tract 063002 in Seabrook and Tract 065008 in Hampton make up the majority of the project area. American Community Survey (ACS) data indicates the percentage of minority residents in the two census tracts is between three and four percent. The median income in the Seabrook Tract is $25,722 and 72% of the homes are owner-occupied. In the Hampton Tract, the median income is $30,075 and 53% of the homes are owner-occupied. The largest employers in the area are NextEra, the operators of the Seabrook Station Nuclear Power Plant, and Wal-

Mart in Seabrook. In Hampton, the largest employer is Foss Manufacturing, an automotive and specialty fabric manufacturer. Commercial fishing is also an important industry in the region, and the Yankee Fisherman's Cooperative lies southwest of the bridge on Hampton Harbor.

4.7 Water Quality

The New Hampshire Department of Environmental Services (NHDES) 2016 data rates surface water quality of the Hampton Harbor "unit", located west of the bridge, as *Good* for swimming and boating and *Poor* for aquatic life and fish consumption. The Atlantic Ocean to the east of the bridge is rated, based on 2014 data: *Likely Good* for aquatic life, swimming and boating and *Poor* for fish consumption. A rating of *Good* signifies full support of the identified use; *Likely Good* signifies insufficient information, but likely full support of the identified use; and a rating of *Poor* signifies a lack of support.

4.8 Public and Conserved Land

Several parks and conservation lands lie in the vicinity of the bridge, the largest of these being Hampton Beach State Park. The State Park encompasses approximately 50 acres, extending north from the Hampton Inlet over a mile and a half along the shoreline. The park, owned by the State of New Hampshire, provides a range of recreational amenities including parking, restrooms, an RV campground, a park store and picnic pavilion in the area immediately northeast of the bridge. Further north, between Ocean Boulevard and the Atlantic Ocean, additional amenities include a Visitor Information Center, a playground, the Seashell Pavilion, and the Marine Memorial. Hampton Beach State Park received funding through the Land and Water Conservation Fund (LWCF) and is thus a 6(f) resource to preserve, develop, and assure accessibility to outdoor recreation.

Additional public recreational resources are located northwest and southwest of the bridge. The Hampton State Pier is located immediately to the northwest and serves commercial fishermen, charter services, and recreational boaters, and includes a public boat launch. Constructed in the 1960s, the pier was fully renovated in 2014 and is considered part of the Hampton Beach State Park under LWCF 6(f). The Hampton-Seabrook Dunes Wildlife Management encompasses the dunes immediately southwest of the bridge, and Seabrook's Harborside Park lies south of the conservation area and north of the Yankee Fisherman's Co-op. Harborside Park is also a Section 6(f) resource.

The project has the potential to impact public parks and conservation lands in the vicinity of the bridge. As discussed in Section 3.10, no information is available defining the right-of-way line between the roadway and Hampton Beach State Park.

5 PROJECT BACKGROUND

The Purpose and Need for the Seabrook-Hampton 15904 Project is:

Purpose

- To provide a safe, reliable, and structurally sound crossing over Hampton Harbor.
- To improve mobility for the traveling public (drivers, bicyclists and pedestrians), and maritime users.

Need

- The existing bridge is structurally deficient and functionally obsolete.
- Many of the mechanical components are original to the structure and are in need of rehabilitation or replacement. The electrical system is outdated and does not meet many modern standards.
- The current bridge carries substandard shoulder and sidewalk widths.

This TS&L Report is the third of three steps taken in the development of alternatives that will rehabilitate or replace this bridge and its roadway approaches. An outline of the steps is provided below:

5.1 Rehabilitation Study

The first step was the *Hampton Harbor Bridge Rehabilitation Study*, completed by HDR in November 2018 and updated in June 2019. The study assessed the existing condition of the bridge by reviewing previous inspection reports and performing visual inspections to inform an analysis of the bridge. The study then analyzed the bridge components to evaluate a number of factors, including adequate serviceability for multi-modal transportation, impacts to the structure as a potential historic resource, impacts to natural resources in the area, and the feasibility of the design, constructability, and service life of the rehabilitated structure. The result of this rehabilitation study was a recommendation to develop two separate preservation alternatives which would both be included in the TS&L Report:

- Alternative 1 – Bridge Rehabilitation: This alternative calls for widening the structure roadway width from 32’-2” to 50’-0” to meet minimum acceptable lane, shoulder and sidewalk widths. This calls for replacement of all superstructure elements, and widening at all piers and abutments, and the construction of a new bascule span over the navigational channel.
- Alternative 4 - Twin Bridge: This alternative was identified for inclusion based on reviews with the State Historic Preservation Office in early 2019 and proposes the rehabilitation of the existing bridge and the construction of a new second bridge adjacent to the existing. The Twin Bridge Alternative splits the travel lanes, shoulders, and sidewalks between the two structures, with the northbound direction on the rehabilitated existing bridge and the southbound direction on the new bridge.

5.2 Alignment and Profile Study

The second step in the study process was a roadway *Alignment and Profile Study*, completed by HDR in June 2019. This entailed the evaluation of probable horizontal and vertical geometries to accommodate the bridge replacement alternatives (Replacement with Movable Bridge and Replacement with Fixed Bridge). Specific criteria used in that assessment included:

- Review vessel usage to determine a vertical channel clearance for the two replacement alternatives. This included determining a bascule alternative that effectively minimizes bridge

lifts and a fixed bridge alternative that allows for improved use of the navigable channel by the maritime community.
- Evaluate conceptual typical sections to determine potential roadway and bridge layouts.
- Review resource, right-of-way, and infrastructure impacts of potential alignments located east, west, and along the existing roadway alignment.
- Evaluate constructability, traffic management concepts, and the impact on traffic flow for each alignment and profile option.

To minimize right-of-way impacts to private property per public comments, the *Alignment and Profile Study* recommended a westerly alignment be used for the two replacement alternatives, the Twin Bridge alternative and any required temporary bridges. Additionally, vertical underclearances at MHW at the navigational channel of 34' for the Replacement with Movable Bridge Alternative (Alternative 2) and 48' for the Fixed Bridge Alternative (Alternative 3) were recommended.

These recommendations are implemented into this report and reflected in the design of all four alternatives.

5.3 Type, Size & Location Study

The third and final step in the study process is this Type, Size, and Location Report, which implements and builds on the Bridge Rehabilitation and Alignment/Profile studies and develops four alternatives for consideration.

5.4 Overview of Public Involvement Process

In addition to the design development, this study is informed by extensive efforts to garner input from the public. The Design Team also created a Public Involvement Plan to gather input from local residents from a series of two Public Informational Meetings. A Public Advisory Committee (PAC), comprised of NH State Representatives and a State Senator, Town officials from Seabrook and Hampton, project abutters, and other stakeholders was established at the outset of the project.

Input received from the PAC and in Public Informational Meetings has driven decisions made by the Design Team in the development of alternatives. Some key suggestions and concerns given during the Public Involvement process include:

- Improvement upon existing roadway width is important to allow for the passage of emergency vehicles.
- Improvement on existing sidewalks is important, as this bridge has narrow shoulders and is frequently used by pedestrians.
- Impacts to abutter's properties should be avoided or minimized. Property takings and impacts to private property should be avoided regardless of alternative selected.
- Scenic overlooks should be added to the bridge structure where practical.
- Reduce or eliminate the need to stop vehicular traffic on the bridge due to bascule span lifts.
- Improvement of horizontal navigational clearances and no reduction of vertical clearances for vessels that currently use the channel.

6 DESIGN CRITERIA

6.1 General Roadway Design

This proposed typical section was developed based on a review of existing vehicular, pedestrian, and bicycle volumes collected by automatic traffic recorder, and video turning movement counts conducted. These data sets are summarized in Figures 1 through 5 of Appendix G2. The multi-modal traffic data collection was supplemented through a review of video footage of pedestrian and bicycle activity on the bridge to understand cyclists' comfort and experience levels along with pedestrian desire lines and travel behavior.

The roadway geometry and typical section utilized design guidance in accordance with current AASHTO and NHDOT design specifications. In addition for this evaluation, the following references were utilized:

- AASHTO *A Policy on Geometric Design of Highways and Streets, 6th Edition*
- AASHTO *Guide for the Development of Bicycle Facilities, 4th Edition*
- NACTO *Urban Street Design*
- NACTO *Urban Bikeway Design*
- NHDOT *Bridge Design Manual (NHDOT BDM), v2.0*
- NHDOT *Highway Design Manual, Vol. 1*
- NHDOT *New Hampshire Statewide Bicycle and Pedestrian Plan*
- United States Access Board *Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (Technical Requirements)*

The recommended design criteria based on guidelines can be found in Appendix G3.

These guidelines, the traffic assessment, as well as the Purpose and Need of the project informed the design of the roadway and typical section. The roadway and bridge configuration must provide adequate widths for multi-modal use, therefore, the recommended minimum configuration is as follows:

- Two 11'-0" lanes
- Two 8'-0" shoulders
- Two 6'-0" sidewalks
- These minimums result in 50'-0" rail-to-rail width and 53'-0" out-to-out bridge width for the Rehabilitation, Replacement with Movable, and Replacement with Fixed Bridge Alternatives (Alternatives 1-3).
- These minimums result in twin bridges, each with one 11-0" lane, one 8'-0" shoulder, one 5-0" shoulder and one 6'-0" sidewalk for a 33'-6" out-to-out width for the Twin Bridge Alternative (Alternative 4).

This minimum configuration includes 11' lane widths which are slightly narrower than shown in the design criteria. The *Hampton Harbor Bridge Rehabilitation Study* recommended 11' lanes to more readily conform to the existing NH Route 1A approach roadways. All other aspects of the proposed roadway designs conform to the design criteria and guidelines.

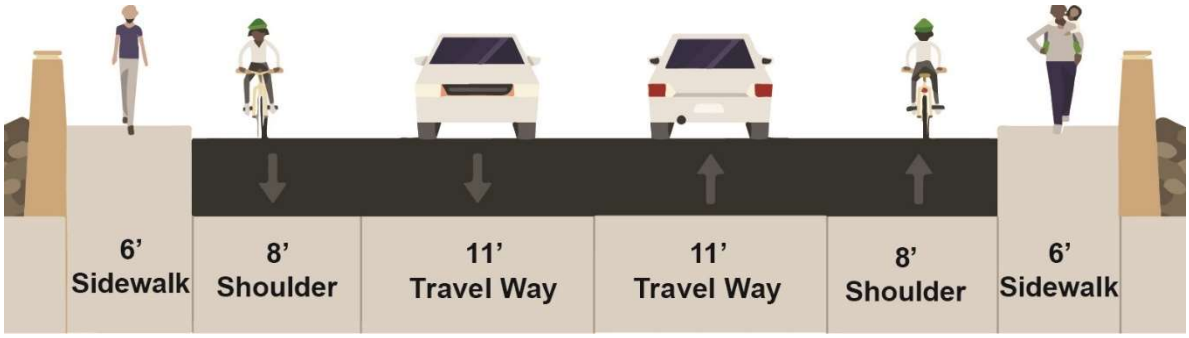


Figure 4 – Recommended Typical Roadway Section

6.2 General Bridge Design

The replacement or rehabilitated bridge will be designed in accordance with current AASHTO and NHDOT bridge design specifications.

Recommended bridge design criteria:

- Design Loading: HL-93
- Seismic Performance Zone: 1 (preliminary, pending future subsurface investigation)
- Railing Height: 42" min

Recommended bridge design specifications:

- *AASHTO Load and Resistance Factor Design Bridge Design Specifications* (AASHTO LRFD), 8th Ed.
- *AASHTO LRFD Movable Highway Bridge Design Specifications*, 2nd Ed. with Interim Revisions through 2018
- NHDOT *Bridge Design Manual* (NHDOT BDM), v2.0.
- NHDOT *Standard Specifications for Road and Bridge Construction*, 2016.

6.3 Navigational Clearances

The minimum vertical and horizontal clearances are based on assessments performed in the *Navigational Impact Report* dated July 2019 and the *Alignment and Profile Study* dated June 2019. Clearances have been established for each alternative as follows:

- Minimum Vertical Clearance
  - Existing – 20'
  - Alternative 1 – Rehabilitation: 20' with bascule span closed, unlimited with bascule span open (matching existing)
  - Alternative 2 – Replacement with Movable Bridge: 34' with bascule span closed, unlimited with bascule span open
  - Alternative 3 – Replacement with Fixed Bridge: 48' permanent
  - Alternative 4 – Twin Bridge: 20' with bascule span closed, unlimited with bascule span open (matching existing)
- Minimum Horizontal Clearance
  - Existing – 20'
  - Alternative 1 – Rehabilitation: 40', matching existing
  - Alternative 2 – Replacement with Movable Bridge: 80'

- Alternative 3 – Replacement with Fixed Bridge: 150'
- Alternative 4 – Twin Bridge: 40', matching existing

6.4 Machinery Systems

Both hydraulic and electromechanical systems were initially considered for operating the bascule span. Hydraulic cylinders were a promising option for the Rehabilitation Alternative because of the space limitations on the existing pier. A hydraulic system at this location would become the only hydraulic bridge in New Hampshire and would require special training for operation and maintenance. The initial cost of hydraulic systems is approximately 25% lower than an electromechanical system, but the service life is only 25 years – about half that of the mechanical system. Mechanical gear driven systems are better suited to winter operations and all other NHDOT movable bridges are gear driven, so a conventional electromechanical system is proposed in the design criteria for all movable bridge alternatives. The electromechanical systems will meet the following minimum criteria:

- Conformance with AASHTO LRFD Movable Highway Bridge Design Specifications 2nd Ed - 2018 Interims.
- The mechanical system will be designed for a 50-year service life.
- A central enclosed mechanical gear drive system, located in a machinery room beneath the roadway at the bascule pier, will be used to open and close the bascule span.
- Two motors (main and emergency for the new bridge, or redundant main motors for the Twin Bridge Alternative) shall drive the central mechanical gear system.
- Two span lock bar machinery system will be located at the toe end of the span to keep the bridge locked in the down position to prevent raising the bascule span with the bridge open to traffic.

For details on the mechanical system design criteria, see Appendix J.

6.5 Electrical Systems

- All electrical systems for the bridge will be in conformance with AASHTO *LRFD Movable Highway Bridge Design Specifications* and the NEC.
- The electrical system shall be designed for a 50-year service life.
- A new drive system will be installed. The drive system will consist of two modes of bridge operation, normal and emergency. During normal bridge operation, the bridge can be operated with maximum speed and during emergency mode, the span will operate at a reduced speed. The emergency mode will be used to operate the bridge in the event the main mode is not operational. In the case of the Twin Bridge alternative, the new bridge will be equipped with a fully redundant drive system, a main and an alternate drive system as mentioned in the electrical design criteria.

For details on the electrical system design criteria, see Appendix J.

6.6 Operation Time for Bascule Span

An electromechanical system will be utilized in the bascule operation. The approximate time to open or close the bascule span exclusive to lock or unlock the span will be as follows:

- Typical operations with main motor:
  - Rehabilitation and Replacement with Bascule Alternatives: 90 seconds with one motor arrangement
  - Twin Bridge Alternative: 90 seconds with redundant (2) motor arrangement.
- Emergency motor operations: 9 minutes.

7 DESCRIPTION OF ALTERNATIVES

This project assesses four alternatives that will rehabilitate or replace this bridge and its roadway approaches. All four alternatives provide sidewalks on both sides of the bridge, while the existing bridge provides only a single sidewalk on the northbound side. There are currently no pedestrian accommodations on the southbound side of either approach roadway of NH Route 1A, and the connection of the southbound sidewalk to existing pedestrian facilities was not included as part of this report. It is intended to be further developed for the selected alternative in future design phases. In Seabrook, options include providing direct access to the dunes at the southwest quadrant and possibly looping back under the bridge in front of the south abutment. In Hampton, the west sidewalk will consider the future improvements of the Ocean Boulevard project.

The descriptions are summarized below:

1. Alternative 1 – Bridge Rehabilitation: This alternative was studied under the *Hampton Harbor Bridge Rehabilitation Study* and provides a widened roadway on the existing structure. This alternative will require superstructure replacement and widening of all substructure units.
2. Alternative 2 – Replacement with a Movable Bridge: This alternative replaces the existing bridge with a new bascule structure on an alignment located to the west of the existing bridge.
3. Alternative 3 – Replacement with a Fixed Bridge: This alternative replaces the existing bridge with a new high-level fixed structure on an alignment located to the west of the existing bridge. Under this alternative, both steel and concrete superstructure options have been considered.
4. Alternative 4 – Twin Bridge: This alternative was recommended for study upon completion of the *Hampton Harbor Bridge Rehabilitation Study* and consists of a rehabilitation of the existing movable bascule bridge and the construction of a second bascule bridge on the same westerly alignment as the two replacement alternatives.

As discussed under the Design Criteria included in this report, all alternatives providing a bascule span utilize an electromechanical system.

7.1 Alternative 1 – Bridge Rehabilitation

7.1.1 General Description

The Rehabilitation Alternative utilizes the existing structure as much as practical and replaces the superstructure to provide necessary structural capacity. It meets the purpose and need of the project by improving multi-modal transportation safety, but results in major in-water work due to the widening of all piers and abutments. The piers not founded on piles would remain scour critical, and would need to be analyzed to determine if they can carry the additional loads. A conceptual assessment and cost estimate was performed for this alternative to determine the scope of efforts that would be required to rehabilitate the structure with a 50’ roadway and sidewalk width and an alignment shift of 11’-10” to the east. During construction, traffic will be maintained on a temporary bridge located west of the existing structure. The temporary bridge is assumed to include a movable lift span at the navigation channel to provide adequate access for maritime traffic. Conceptual roadway plans and structure general plan for this alternative were developed and are included in Appendix A1.

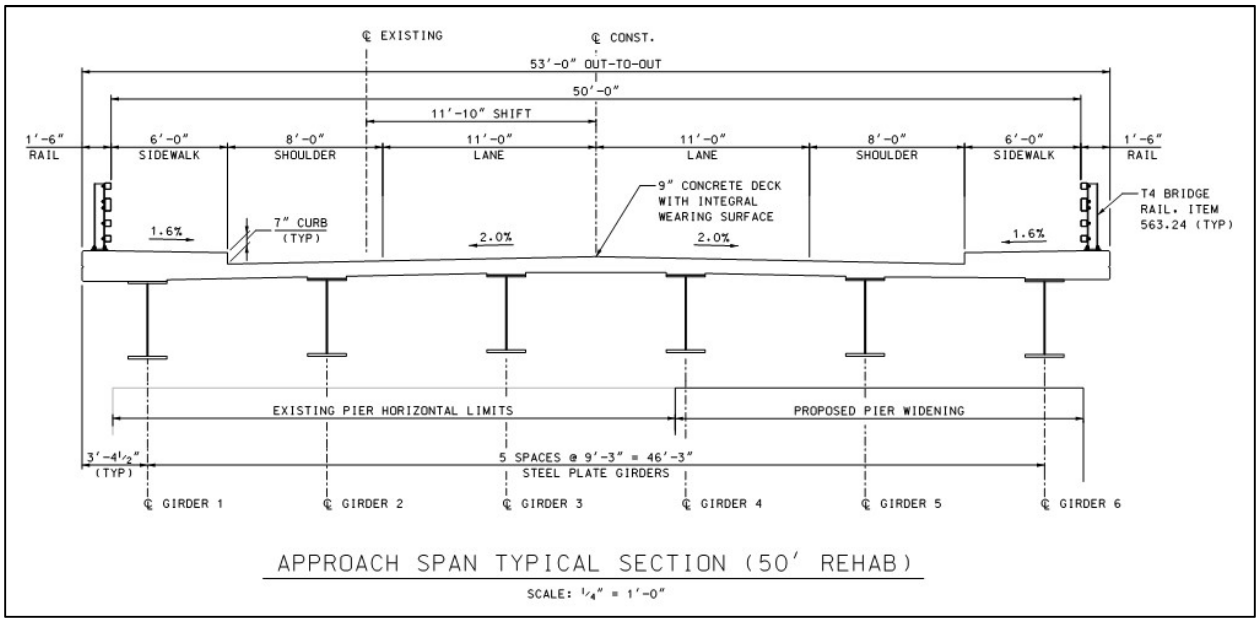


Figure 5 – Superstructure replacement (50' bridge width) with shifted alignment and pier widening

7.1.2 Alignment and Profile

To avoid impacts to the operator house and accommodate the typical section and superstructure improvements, the bridge centerline was shifted 11'-10" to the east, while maintaining the vertical profile to utilize the existing substructures as much as possible.

To accommodate the shift within the southern approach, a reverse curve is proposed immediately south of the bridge. At the north approach, a reverse curve was required in order to tie into the horizontal curve at the Hampton State Park driveway.

The vertical geometry for the immediate roadway approaches and bridge matches the existing vertical geometry to minimize impacts to the abutments and piers. The conceptual superstructure section depth is less than the existing allowing the crown line to match the existing.

A rehabilitation alternative will offer no substantial improvement on the vertical underclearance or horizontal clearance of the navigational channel, and will therefore not improve navigation in the area.

7.1.3 Superstructure Description

- Approach Spans

In order to support the new roadway width, the entire superstructure must be replaced. The replacement approach spans, shown in Figure 5, will consist of six steel plate girders with a composite concrete deck.

The framing plan will provide two three-span continuous for each approach, with an overall length of 563'-6" on the south approach and 562'-6" on the north approach. The fixed bearings are located at Piers 5S, 2S, 1N, and 5N, and results in bridge deck expansion joints at Piers 4S and 4N in addition to those at the abutments. It is preferable to minimize the number of bridge deck expansion joints because they are subject to leaking and require on-going maintenance, however this span layout matches the existing bridge and maintains the current restraint conditions.

The approach span girder will be shallower than the existing girders to better accommodate the bascule span counterweight. Bearing seat pedestals will be constructed at the piers and abutments to make up the difference between existing and proposed girder heights.

- Bascule Span

The replacement bascule span will retain the same span length as the existing, and will consist of a two-girder system supporting floor beams and stringers with a half-filled steel grid deck. Similar to the approach span, the superstructure will be substantially wider than the existing bridge and an inspection/maintenance walkway will be located below the roadway between the girders.

The backspan, which supports the counterweight, will require steel framing between girders in order to support the heavier counterweight. The counterweight will have block-outs as necessary to clear the approach span girders.

7.1.4 Substructure Description

Substructure modifications will be substantial. Both abutments and all piers will require widening to the east to accommodate the widened superstructure. Piers 2S and 2N would require widening beyond the 53'-0" superstructure to support for the barrier gates if the gate supports aren't cantilevered from the approach span girders. Concrete pedestals will be installed atop all abutments and piers to accommodate new bridge seat elevations and bearing assemblies for the shallower girders, and new bearing pads will be required on the rest pier to account for the revised spacing of the bascule girders. Additional steel piles are anticipated to support all new portions of the substructure widening.

The abutments will require reinforcement or replacement and the existing eastern wingwalls will be removed. The existing piers do not have suitable capacity for modern seismic or longitudinal design forces and must be strengthened to sustain required design forces.

The deteriorated conditions of Pier 4N found during the August 2018 field visit would require repairs to spalls and epoxy injection in cracks of the concrete pier cap. This pier is also tilted out of plumb and will be monitored during construction.

Scour mitigation will be required at Pier 4S, which was noted to have pocket scour in the 2015 underwater inspection report. Mitigation options for the scour critical piers will be investigated. Since the bridge is scour critical, mitigation at additional piers will likely be required.

The bascule pier will require modifications to support the widened superstructure, trunnion and trunnion bearings. The westerly wall of the counterweight pit will need to be widened to support new columns. The pier will be widened to the east and new buttress walls will be installed on the east side of the pier to support the new girders and the portion of the deck over the bascule pier. Additionally, new columns will be installed to support the approach span girders at the bascule pier. These operations will likely result in temporary impacts to the navigational channel.

Modifications to the operator house would be minimized, as this was determined to be a defining feature of the structure during the historic review process. The walls of the existing operator house do not appear sufficient to adequately support cantilevered additions, so enlarging the operator house was not considered to be feasible. Equipment within the operator house would be replaced, as discussed in the following section.

7.1.5 Mechanical and Electrical Systems

The proposed mechanical system would consist of the following:

- A primary reducer with three input shafts is proposed to accommodate two redundant vector duty motors and an auxiliary gear motor.
- A spring released, electrically engaged clutch shall be specified to engage the auxiliary drive system. The auxiliary drive system shall not rotate when the main drive motors are operable.
- Remaining gear reduction will be achieved through intermediate sets of open gearing, shafting, and antifriction pillow block bearings.
- All shaft couplings are anticipated to be gear type flex-rigid or full flex couplings as appropriate. Motor couplings shall be fully flexible tapered grid couplings with a dual load path.
- New racks and pinions are proposed since the existing racks and pinions do not rate. The racks will be installed to the bottom flange of each bascule girder.
- Motor brakes shall be provided for each span motor and mounted either off the main motor shaft extensions or extended drive shafts.
- Two machinery brakes shall be provided and located in the drive train as close as practical to the main pinions.

With replacement of the structural and mechanical systems, all major components of the electrical system would also be replaced, including control relays, motor control centers, motors and breakers. This will pose a number of challenges due to the limited space in the existing operator house. According to the findings during field visit, outlined in the Bridge Rehabilitation Report, the existing electrical equipment does not have the required work space clearance per the NEC.

To support the widened structure and new mechanical systems, the electrical system will have to be upsized which will result in the installation of larger electrical cabinets. Given the space limitations, a bridge rehabilitation would not be able to conform to NEC requirements. Major modification to, or replacement of the bascule pier would be required to meet the NEC requirements, by providing larger equipment rooms for the installation of larger electrical equipment. Compliance to these workspace clearance requirements is not strictly required, but is strongly recommended.

7.2 Alternative 2 – Replacement with Movable Bridge

7.2.1 General Description

The Replacement with Movable Bridge Alternative will construct a new bridge with a movable span over the navigational channel. This bridge will be constructed west of the existing alignment.

The proposed span arrangement maintains the existing navigational channel alignment with a new single-leaf bascule span and multi-girder approach spans. The proposed bascule pier will be located south of the navigational channel, minimizing impacts to the Seabrook and Hampton Channels.

The overall proposed bridge length is 1299’-1” between centerlines of bearing at the abutments, with a 116’-7” bascule span over the navigational channel. This span will provide for an 80’-0” navigational channel, improving upon the existing 40’ width. Conceptual design plans for roadway, structural, mechanical and electrical systems are provided in Appendix A2.

7.2.2 Alignment and Profile

The proposed alignment places the new bridge west of the existing, utilizing a slight reverse curve on the south approach to transition the existing roadway to the new bridge alignment. This curve carries across the bridge with a radius of 10,592.0'. On the north approach, this curve transitions to a tangent just north of the proposed bridge abutment and continues to the north end of the project limits, where it ties into the existing roadway.

The proposed vertical clearance is based on an assessment of navigational usage of the channel, and coordination with the USACE and USCG. It was determined that a proposed vertical underclearance of 34' at MHW would reduce the number of bridge lifts by at least 55%. The 34' underclearance assesses vessel usage for a 30' underclearance and includes 4' of additional clearance for potential future sea-level rise. The height of sea-level rise is based on the "Intermediate-High" range of the estimated year 2100 rise by the New Hampshire Coastal Risk and Hazards Commission 2016 Report (actual number provided in this report is 3.9', but is rounded for purposes of this conceptual design). Similar to the existing bridge, this alternative will provide unlimited vertical clearance when the bascule span is open. The proposed profile at the bridge utilizes a 4% maximum grade on the approaches and a 500' crest vertical curve at the center of the bridge to provide this underclearance.

7.2.3 Superstructure Description

When considering superstructure types, NHDOT and the Design Team decided to utilize a bascule-type movable span for the following reasons:

- A bascule span would maintain one of only two bascule bridges in New Hampshire.
- A bascule span would maintain the aesthetics of the original structure as much as practical, realizing it is a new structure and design.
- A bascule span would minimize impacts to vertical clearances of the navigable channel, although it offers a reduced improvement over a high-level fixed structure when the span is down.
- A bascule span is an efficient choice for a movable span, requiring a smaller footprint than a swing bridge and provides an unrestricted vertical underclearance, which cannot be achieved using vertical lift bridges.

The bascule span will consist of two structural steel edge girders supporting a steel floor beam and stringer system with a partially-filled steel grid deck. A structural steel bascule is most commonly used because a steel structure is lighter than concrete, requiring less mechanical and electrical effort to raise and lower the span. The edge girders will be spaced 38'-0" apart and the proposed 116'-7" span length will provide a navigational clear span width of 80'. The girders and floor system will be straight to simplify the framing and mechanical system connections, but the overhangs on the bascule span will vary to accommodate the curvature of the roadway. A bascule pier span length of 34'-6" (along centerline of the roadway) is proposed. The angle of the fully lifted position will be 78 degrees, which will fully clear the navigational channel. The bascule girder depth will vary from 9' at the toe to 12' at the trunnion, and will provide a minimum vertical underclearance of 34'-0" over MHW in the lowered position.

Both concrete and steel girders were initially considered for the approach spans. Based on the Fixed Bridge Alternative cost estimates, the concrete approach spans have a higher initial construction cost. They also require more extensive construction effort because they must be supported until all segments are in place. Steel girders provide greater cost and constructability benefits. Furthermore, steel approach span girders provide a consistent material type throughout

the superstructure, matching the steel girder bascule span and maintaining the general aesthetic of the original structure as much as practical.

Three-span continuous approach units are proposed on each side of the bascule span, with each three-span unit having a generally balanced span arrangement. The center of the navigational channel remains in the same location, but the span layout for the south and north approaches are different. Hampton Harbor is wider to the west of the existing bridge, requiring a slightly longer bridge. Additionally, the back span at the bascule pier is now on the south side of the navigational channel. The south approach will consist of a three-span 543'-0" unit with individual spans of 166'-6", 210'-0" and 166'-6". The north approach will consist of another 3-span unit with a total length of 602'-0" with individual spans of 186'-0", 230'-0" and 186'-0". The fixed bearings will be located at the bascule piers, with bridge deck expansion joint at each abutment.

The proposed approach span cross-section consists of six steel plate girders spaced at 9'-3" composite with a concrete bridge deck, with 3'-4 ½" overhangs and a total out-to-out width of 53'-0". The proposed girders have a constant web depth of 81" to match the aesthetics of the bascule span. The girders will be horizontally-curved to carry the curved roadway, with a baseline radius of 10,592'.

The bridge is in a marine environment, with severe exposure for corrosion of steel members. In order to achieve the desired service life of 100 years, the steel components of the bridge superstructure will be shop metalized.

Scenic overlooks are proposed at Piers 2 and 5. This was requested by the Public Advisory Committee, and will provide a place for pedestrians to enjoy the views of Hampton Harbor and the Atlantic Ocean. The proposed overlook is a sidewalk bumpout that is 5' wide, 8' long, with a 2:1 bridge rail transition to satisfy AASHTO *Roadside Design Guide* requirements.

7.2.4 Substructure Description

The proposed approach spans are supported on reinforced concrete hammerhead piers. The foundation type will be developed during preliminary design phase, subsequent to completion of soil borings. It is anticipated that drilled shaft foundations will be used at all pier locations.

The proposed bascule pier will be a fully-enclosed reinforced concrete pier. The pier will include housing for the machinery platform and counterweight. Accommodations for bridge operators, including work space and restrooms will be included within the bascule pier footprint.

The proposed operator house would provide sufficient room for the control systems described in Section 7.2.5. The exteriors of the house will provide sloped facades and windows to minimize glare for operator observations.

The proposed abutments will utilize U-shaped reinforced concrete wingwalls supported on steel bearing piles. A retaining wall approximately 130' in length will be used to minimize impacts to the northwest quadrant. Retaining walls can be investigated in future design phases to reduce impacts in the southwest quadrant of the bridge as well.

7.2.5 Mechanical and Electrical Systems

The mechanical system for the Replacement Alternative will consist of an entirely new machinery design. The movable span, including the bascule leaf and counterweight, will be supported by two live load bearings at the toe of the bascule girders as well as four bronze-bushed trunnion bearings at the bascule pier. Trunnion shafts, mounted through hubs in each bascule girder web, will be simply supported by the trunnion bearings.

The prime movers for the movable span will be comprised of two electric motors., one 150 HP main (normal drive) motor and the other 25 HP as a backup emergency drive "gearmotor", coupled to a primary differential reducer. The gearmotor will have an electric clutch that can be remotely engaged and disengaged by the operator to allow for changing over to the emergency drive without leaving the control house. As another option, the main motors can be redundant 150 HP motors that operate alternately.

The primary reducer will drive two output shafts on opposite sides, which will each couple to a parallel shaft secondary reducer. The output shaft of the secondary reducer will drive an integral main pinion shaft that is simply supported by two bronze-bushed bearings. As the pinions rotate, force is applied to the radius racks, which are attached to the bottom of the bascule girders. This results in turning the movable span about the trunnions.

The braking system will include four drum-type brakes, including two motor brakes and two machinery brakes. The main motor brake will be located at the back of the motor, similar to the existing bridge. For the emergency drive gearmotor, the brake will be located between the clutch and the primary reducer, such that it remains in service even while the clutch is disengaged. The machinery brakes will be located adjacent to each secondary reducer input shaft.

The span locks will consist of two machinery assemblies located at the toe of the movable span and will utilize a front and rear guide on the bascule leaf and a receiver on the approach span. The locks will be driven by marine rated, heavy-duty electric linear actuators and include magnetic proximity switches to control travel. The locks will be sized appropriately to not allow the bridge to move should the operator inadvertently try to lift the bridge before releasing the locks as well as to keep the bridge from bouncing on the live load shoes under traffic. This not only prevents damage to the bridge but also helps prevent premature wear to the machinery.

The electrical system will be entirely new. All of the electrical distribution and controls will be placed in the pier directly below the control house in an electrical room. The electrical room will house all major electrical equipment, such as the automatic transfer switch (ATS), a motor control center (MCC), two motor drive cabinets, a programmable logic controller (PLC) cabinet, a transformer, and panelboards. The control console will be located in the operator rooms of the control house located on the roadway level above the electrical room and the bridge will be operated from the control desk. The electrical system will be installed per the design criteria listed in Appendix J.

7.3 Alternative 3 – Replacement with Fixed Bridge

7.3.1 General Description

The Replacement with Fixed Bridge Alternative will construct a new bridge westerly of the existing. The span arrangement proposed will center the proposed navigational channel about the current centerline of channel. The overall total bridge length is 1,300'-0" from centerline of bearing to centerline of bearing to optimize the bridge span efficiency. The 195'-0" span over the navigational channel allows a 150' navigational channel, matching the full width of the Entrance Channel that approaches the bridge.

Conceptual design plans for roadway and structural design are provided in Appendix A3.

7.3.2 Alignment and Profile

The proposed horizontal alignment is similar to that of Alternative 2 – Replacement with Movable Bridge, with the proposed alignment placed west of the existing, utilizing a slight reverse curve on the south approach to shift the roadway to the new bridge alignment. This curve carries across the bridge with a radius of 10,592.0' and transitions to a tangent just north of the proposed bridge

abutment, where it continues to the north end of the project limits and ties into the existing roadway.

The proposed vertical clearance is based on an assessment of navigational usage of the channel, and coordination with the USACE and USCG. The proposed vertical underclearance of 48' is based on 44' from vessel assessment plus an additional 4' for sea-level rise. This underclearance accommodates all regular users of the channel. This clearance would also allow for future use of USACE dredging equipment such as the *Currituck* in the Hampton and Seabrook Channels. To achieve these clearances, the proposed profile utilizes a 5% maximum approach grades and a 500' crest vertical curve over the navigation channel.

7.3.3 Superstructure Description

The fixed bridge span configuration is based on a 1,300' bridge length between bearings at the abutments. In order to efficiently establish a 150' wide navigational channel with at least 48' vertical clearance beneath the bridge at the center span, variable-depth girders and an odd number of spans were utilized. The span layout that best achieves this is a seven-span continuous arrangement, with the end spans measuring 162'-6" long and the five interior spans each measuring 195'-0" long. Similar to the bascule span alternative, scenic overlooks are proposed at Piers 2 and 5.

Both structural steel and prestressed concrete girder options were evaluated for this alternative and are designated Alternatives 3A and 3B, respectively. Each option is based on the same span arrangement, horizontal alignment, and vertical profile. The design depth of the girders is 66" at the limits of the proposed 150' navigation channel, which is centered below Span 4 of the bridge. Fixed bearings will be located at Pier 4, with expansion bearings at all other piers and at the abutments. There will be no intermediate expansion joints in the deck, but modular expansion joints are anticipated at each abutment.

Alternative 3A, the proposed structural steel bridge cross-section, has six variable-depth, horizontally-curved composite steel girders spaced at 9'-3", with bridge deck overhangs at the fascia girders of 3'-4½" and a total out-to-out width of 53'-0". The girder web depth is 54" in the center of each span and increases to 84" depth at each pier. The girders are continuous for the full length of the bridge. The bridge is in a marine environment, with severe exposure for corrosion of steel members. In order to achieve the desired service life of 100 years, the steel components of the bridge superstructure will be shop metalized.

The concrete superstructure of Alternative 3B is well-suited for the marine environment of the bridge. The proposed prestressed concrete cross-section has seven straight variable-depth girders spaced at 7'-8", with variable-width bridge deck overhangs and a constant total out-to-out width of 53'-0". Each girder consists of a variable-depth segment over each pier and a drop-in segment placed in the center of each span, between the pier segments. New England Bulb Tee (NEBT) beams will be used for all segments. The drop-in segments and end spans consist of constant-depth NEBT 55 beams. The NEBT 55 pier segments taper from 55" (4'-7") at the ends to a total depth of 7'-4" over the piers. The precast pier and drop-in segments are straight members while the cast-in-place closure diaphragms at each splice location will have an angle point, allowing a chorded framing plan to accommodate the roadway curved alignment. The segments will be connected with longitudinal post-tensioning, making them continuous for the full length of the bridge. The angles in the closure diaphragms create horizontal harp points in the post-tensioning strands, so each of the twelve closure diaphragms will likely have to be transversely post-tensioned to restrain the lateral forces. The closure diaphragms themselves must be large enough to allow an appropriate radius at the angle points.

7.3.4 Substructure Description

Both Alternatives 3A and 3B would require constructing six piers and two abutments, and the same substructure is assumed for both these steel and concrete options. It is anticipated that all piers would be supported on deep foundations using drilled shafts. The drilled shafts would be cast into a reinforced concrete pile cap. Above each pile cap, a reinforced concrete column and hammerhead pier cap would support the girders and their bearings.

The span configuration has been chosen to minimize impacts with the substructures of the existing bridge and to minimize the effect that the new piers will have due to scour on the existing bridge while it is still in service.

The proposed abutments will include U-shaped reinforced concrete wingwalls supported on steel bearing piles, with a 250' retaining wall in the northwest quadrant of the bridge to minimize impacts in this area. Retaining walls can also be investigated in future design phases to reduce impacts in the southeast quadrant of the bridge.

7.4 Alternative 4 – Twin Bridge

7.4.1 General Description

The Twin Bridge Alternative will rehabilitate the existing bascule bridge and also construct a new (twin) bascule bridge immediately to the west of the existing bridge. Northbound traffic will remain on the rehabilitated existing bridge and southbound traffic will be moved to the new twin bridge. The new bridge will be similar in width and include a bascule span configuration similar to the existing bridge. The rehabilitation of the existing bridge will not significantly modify the roadway width and will result in a bridge that is the most historically accurate version of the current bridge. The roadway of each bridge has sufficient width to maintain two lanes of traffic in a temporary (with reduced shoulders) configuration for staged construction and future maintenance and rehabilitation.

The new westerly twin bridge will have a pier layout that matches the existing bascule piers (1S and 1N) and aligns with existing piers 3S and 3N in order to minimize impacts to the tidal hydraulics of the channel. The number of spans will be reduced from six to three on each approach to the bascule. The navigational channel will be unchanged from the current condition and will have two independent bascule spans requiring simultaneous lifts for maritime traffic to transit the crossing.

Conceptual design plans for roadway and structural design are provided in Appendix A4.

7.4.2 Alignment and Profile

The proposed horizontal alignment of the existing bridge is unchanged. The proposed horizontal alignment of the westerly twin bridge is similar to that of the Replacement with Movable Bridge and Fixed Bridge alternatives, incorporating slight a reverse curve on the south approach to tie the southbound roadway to the existing bridge alignment approximately 800' south of the existing bridge abutment. On the north approach, the horizontal curve transitions to a tangent just north of the proposed bridge abutment and continues to the north end of the project limit, where it ties into the existing roadway.

The typical bridge section is configured so that the proposed 11' lane, 8' outside shoulder and 6' sidewalk are to the west of the profile grade line, with a 5' inside shoulder and 2' brush curb to the east. This results in sufficient lateral clearance between the two bridges at the navigation channel to locate the operator house east of the new twin span and adjacent to the existing

operator house, minimizing impacts to the Hampton and Seabrook navigation channels as they approach the bridge.

The proposed vertical clearance of the Twin Bridge Alternative is approximately the same as the existing condition. The channel geometry is unchanged and the structural depth of the bascule spans will not be increased. In addition, the low steel of the approach spans of the new twin bridge is designed to be higher than the low steel of the current bridge. To achieve these clearances, the proposed profile at the new twin bridge will be raised approximately 6" when compared to the existing bridge along its entire length. The approach grades at both bridges will be 3% maximum.

7.4.3 Superstructure Description

- Existing Bridge (Northbound Traffic)

Similar to Alternative 1, the Rehabilitation Alternative, the entire superstructure of the existing bridge will be replaced with six approach spans on either side of a movable bascule span over the navigational channel. This new superstructure will retain the overall 1,193' length of the existing bridge and remain on the same alignment, carrying the northbound traffic. The roadway includes one 11'-0" travel lane, a 5'-6" left shoulder, an 8'-0" right shoulder, and a 6'-0" sidewalk on the east side. The left shoulder increases from the approach shoulder width of 5'-0" to allow for 24'-0" of horizontal clearance between curbs, in the event that one bridge is required to carry all traffic in a temporary condition.

Sidewalk scenic overlooks will be located at existing Pier 3S and Pier 3N.

The approach spans are carried by four structural steel girders spaced at 8'-6", spanning 94'-0" between the existing piers. These girders are composite with a reinforced concrete bridge deck, and the 4'-0" deck overhangs bring the overall bridge width to 33'-6". This girder spacing and deck overhang arrangement was selected so the existing piers would not require widening. Steel approach span girders were chosen to mimic the appearance of the existing bridge and to match the movable bascule span. All steel girders will be shop metallized. The bascule span will retain the same 65'-0" length as the existing, and consists of a two-girder system supporting floor beams and stringers with a half-filled steel grid deck. The back span and counterweight will be configured to accommodate the approach spans and existing pier.

The fixed bearings are located at Piers 5S, 2S, 1N, and 5N, and results in bridge deck expansion joints at Piers 4S and 4N and at the abutments. This span layout matches the existing bridge and will most closely duplicate the current pier behavior.

- Twin Bridge (Southbound Traffic)

The twin bridge will be constructed on the same curving alignment to west as the other replacement alternatives, with an overall bridge length 1298'-0". It is also similar to Alternative 2, the Replacement with Movable Bridge, with a bascule span over the navigational channel and three approach spans one each side. Like the existing bridge, the roadway includes one 11'-0" travel lane, a 5'-6" left shoulder, an 8'-0" right shoulder. Similar to the Existing Bridge, the left should is increased to allow for 24'-0" of clearance between curbs to accommodate temporary traffic conditions. On the twin bridge, however, the 6'-0" sidewalk is on the west side and the scenic overlooks are located at Pier 2 and Pier 5.

The approach spans are carried by four structural steel girders spaced at 8'-6", arranged in balanced three-span continuous units on each side of the bascule span. These girders are composite with a reinforced concrete bridge deck. Metalized steel girders were selected for a

uniform and consistence appearance with the rehabilitated existing bridge and new bascule span. The 4'-0" deck overhangs and the overall bridge width of 33'-6" match the replacement superstructure of the existing bridge. The 40' navigational channel is maintained under the twin bridge, but the new bascule span is longer, at 76'-0". This longer span reflects the current bascule bridge design practice favoring an enclosed bascule pier to afford more protection to the machinery and moving parts. This span also consists of a two-girder system and a half-filled steel grid deck.

7.4.4 Substructure Description

- Existing Bridge (Northbound Traffic)

Substructure modifications will be substantially similar to the Rehabilitation Alternative, but will generally not require widening. Concrete pedestals will be installed atop all abutments and piers as required to accommodate new bridge seat elevations and bearing assemblies for the new girders, and new bearing pads will be required on the rest pier to account for the revised girder spacing. Piers 2S and 2N may require widening to support for the barrier gates. The existing piers do not have suitable capacity for modern seismic or longitudinal design forces and must be strengthened to sustain required design forces. The abutments may also require strengthening.

As previously noted, the deteriorated conditions of Pier 4N found during the August 2018 field visit would require repairs to spalls and epoxy injection in cracks of the concrete pier cap. This pier is also tilted out of plumb and will be monitored during construction.

Scour mitigation will be required at Pier 4S, which was noted to have pocket scour in the 2015 underwater inspection report. Mitigation options for the scour critical piers will be investigated. Since the bridge is scour critical, mitigation at additional piers will likely be required.

The bascule pier will require some modifications to support the new superstructure, trunnion and trunnion bearings. Modifications to the operator house would be minimized, as this remains a defining feature of the existing structure.

- Twin Bridge (Southbound Traffic)

The Twin Bridge Alternative would require constructing two new abutments and six new piers, including a fully-enclosed reinforced concrete bascule pier to house the machinery platform and counterweight. Accommodations for mechanical and electrical equipment and control systems, and a complete operator house will also be included in the within bascule pier. Approach spans will be supported on reinforced concrete hammerhead piers. It is expected that all piers would be supported on deep foundations using drilled shafts and a pile cap.

The proposed abutments will utilize U-shape reinforced concrete wingwalls and will be supported on steel bearing piles. A retaining wall will be used to minimize impacts to the northwest quadrant.

7.4.5 Mechanical and Electrical Systems

The mechanical system for the Twin Bridge Alternative will consist of new enclosed central reduction gearing for both the rehabilitated and new bridge. The central gearing may include right angle gear reducers to better fit the electric motors and brakes in the limited available space. These components will all be fully accessible for maintenance.

New trunnion shafts and bearings will be designed to support the entire bridge dead load during operation. Together with the trunnion bearings, live load bearings at the toe of the bridge will support the traffic loads as well as bridge imbalance in the bridge seated position.

Span locks will be of the lock bar type with electromechanical linear actuators. The lock machinery will be mounted to the bascule span and engage sockets that are anchored to the approach pier. These will serve to keep the bridge locked in the seated position when open to traffic.

The electrical system in this alternative will also consist of an entirely new electrical system on the rehabilitated bridge and on the new bridge. All of the electrical distribution and controls equipment will be placed in an electrical room within the bascule pier directly below the control house of the new bridge. Bridge operation will be from the control desk located in the control house of the existing bridge. The existing bridge control house is at a higher elevation and provides the operator with a better view of the channel and the roadway. Conduit will run below the roadway, along a structural platform connecting the electrical equipment on both bridges.

8 TRAFFIC CONSIDERATIONS

8.1 Roadway Traffic

The recommended typical section provides two 11' wide lanes, 8' wide shoulders and 6' wide sidewalks. As all alternatives meet this criteria, each alternative will improve multi-modal use in the community and will provide a roadway with sufficient capacity to meet traffic needs of the community. Future phases of this project will continue coordination with stakeholders and subsequent projects will address traffic management along NH Route 1A north of the project limits.

The following summarizes the traffic analysis:

- *Background Traffic Development*

  Historical ATR data and the growth projections from the 2001 *Hampton Beach Area Master Plan* and Rockingham Planning Commission (RPC) were used to determine future growth rates used in the development of 2023 opening year traffic projections. Based on discussions with RPC staff, current growth rates along the corridor are averaging about 1% annually but further discussions with the Town of Hampton indicated that a continued densification of Hampton Beach might support a higher growth rate around 1.5%. Therefore, a sensitivity analysis was performed that included traffic analysis for both a 1% and 1.5% annual background growth rate. These rates were applied to the existing traffic data discussed under Section 3.

- *Traffic Analysis*

  The traffic analysis included a capacity review of both two-, three-, and four-lane roadway configurations. In order to document the existing and future traffic operations of both movable and fixed bridge alternatives, Synchro software was used to analyze volume to capacity ratios (V/C), vehicle delays and queue lengths. The study area analysis did not take into account upstream or downstream traffic congestion that may occur and influence the vehicle throughput across the bridge. The analysis assumed free flow conditions on the upstream and downstream sides of the bridge. Overall, the weekday and weekend PM peak hours present the highest traffic demand and thus are documented throughout the following analysis as the worst case scenario within the project study area. A two-lane roadway configuration was recommended, for reasons including:

  - A typical single travel lane capacity ranges from 1,200-1,500 vehicles per hour per lane along semi-rural/urban contexts with minimal driveways and parking maneuvers (per the National Cooperative Highway Research Program (NCHRP) Report 825 and the FHWA Simplified Highway Capacity Calculation Method for the Highway Performance Monitoring System). The projected 2023 peak hour lane volume along NH Route 1A is less than 800 vehicles in a single direction which is below the referenced peak hour lane capacity.

    - A review of existing traffic volumes did not show a large peaking trend during any portion of the day that would support an unbalanced lane configuration with two lanes of travel in one direction and one lane in the opposite direction. The typical directional split for both travel directions along NH Route 1A is generally within 10%.

    - Multiple northbound lanes on NH Route 1A will create operational challenges with the intersection Ashworth Street north of the project site.

- *Bascule Bridge Operations*

  During the weekday PM peak period conditions, the 2018 queue lengths are anticipated to exceed 100 vehicles in both northbound and southbound directions during the bridge lift condition. Vehicle queue lengths, delays and V/C ratios are only slightly higher during the future 2023 conditions with one lane each direction. Under a three- or four-lane scenario with two northbound lanes, northbound queue lengths are reduced by half and the V/C ratio reduces from 0.46 to 0.24. A three- or four-lane scenario with two southbound lanes similarly reduces southbound queues in half and the V/C ratio from 0.57 to 0.30. While the queue lengths and V/C ratios are lower with the additional roadway capacity, the operations during and after a bridge lift still allow for very acceptable traffic operations. Recall this analysis did not consider traffic congestion outside the study area, so even if additional lanes were added, it is likely that the roadway performance would be largely influenced by the surrounding roadway network and the noted improvements may not be realized. The limited improvements offered over the two-lane (one lane each direction) scenario would not support the additional expense necessary to achieve a marginal level of improvement.

- *Fixed Bridge Alternative*

  There are no anticipated vehicle queues caused by delays within the study area with the Fixed Bridge Alternative (Alternative 3). The analysis performed did not take into account the effect of downstream traffic operations and the impacts that vehicle queue spill-back may have on vehicle throughput across the bridge. The fixed bridge analysis was conducted using both Synchro and HCM analysis tools. Volume to Capacity analysis for the fixed bridge indicates that one lane each direction is adequate.

8.2 Maritime Traffic

A key consideration in assessing potential alternatives is the impact to the USACE maintained channels.

- *Horizontal Clearances*

  The Rehabilitation Alternative (Alternative 1) and the Twin Bridge Alternative (Alternative 4) offer no improvement to navigation. The increased overall bridge widths of these alternatives will lengthen the narrow portion of the channel, further restricting navigation.

  The Replacement with Movable Bridge Alternative (Alternative 2) will place a portion of the bascule pier within the Seabrook Channel, where it transitions from the Entrance Channel west of the existing bridge. Additional dredging in this area will likely be required. The navigation through the bascule span will be improved from 40’ clear width to 80’ clear width.

  Replacement with Fixed Bridge (Alternative 3) will place bridge piers outside of the Hampton and Seabrook Channels. Additionally, it will provide a 150’ width through the bridge, matching the full width of the Entrance Channel.

- *Vertical Clearance*

  The proposed vertical clearance is based on an assessment of navigational usage of the channel, and coordination with the USACE and USCG. Currently, the bascule span provides unlimited vertical clearance, but the draft of the channel and the existing horizontal clearance currently limit the size of the vessels which can access Hampton Harbor. The provided vertical clearances were described in Section 7 and are summarized below:

- The Rehabilitation Alternative (Alternative 1) and the Twin Bridge Alternative (Alternative 4) maintain the current navigational clearances.
- The Replacement with Movable Bridge Alternative (Alternative 2) will provide unlimited underclearance with the bridge raised and an underclearance of 34' (which includes a 4' allowance for sea-level rise) when the bridge is down, reducing the number of lifts by at least 55% based on historic usage, reducing delays for vehicles, pedestrians, and boaters alike.
- Alternative 3 – Replacement with Fixed Bridge Alternative will clear all regular users of the channel and USACE dredging equipment. Based on studies done as part of the *Navigational Impact Report*, no vessels which use Hampton Harbor were identified to be restricted by this clearance.

9 IMPACTS TO UTILITIES

The existing utilities and their approximate locations have been incorporated into the base plans used for the roadway alignment and profile layouts. Additional field verification will be necessary prior to completion of final design plans. Costs associated with any required utility relocations have been included the cost estimates for each of the bridge alternatives.

- *Aerial Utilities*

  Aerial utilities are not expected to impact construction activities significantly, regardless of the rehabilitation or replacement alternative chosen.

- *Water*

  The Alternative 1 Rehabilitation temporary bridge and the proposed Replacement and Twin Bridge alternatives (Alternatives 2-4) require installation of abutments and piers that are close enough to the water line to be considered a conflict for the entire length of the crossing of the harbor. It is unlikely that engineering control could be enacted to ensure conflicts/impacts. The most likely solution to the conflict with the water utility is to relocate the water line to a new location outside the limits of construction prior to the start of construction.

- *Sewer*

  The underground sewer line beneath the harbor should be sufficiently clear of either the western detour bridge or the western alignments for Replacement or Twin Bridge Alternatives (Alternatives 2-4). Under Alternative 1, the Rehabilitation Alternative, the roadway approach would be located over the existing sewer line, requiring that the sewer line be considered and protected during construction and removal of the temporary roadway approach. The abutment of a temporary bridge would be located north of the sewer line to avoid any conflicts. Under the remaining alternatives, the south approaches would have conflicts should retaining walls be implemented at this location. It is likely that those walls can be constructed to avoid needing to relocate the sewer line.

- *Gas*

  The temporary bridge of the Rehabilitation Alternative (Alternative 1), the two Replacement alternatives (Alternatives 2 and 3), and the Twin Bridge Alternative (Alternative 4) all require installation of abutments and piers that conflict with the gas line for the entire length of the crossing of the harbor. It is unlikely that engineering control could be enacted to prevent this interference. The most likely solution to the interference with the gas utility is to relocate the gas line to a new location outside the limits of construction prior to the start of construction in the area of the existing gas line.

- *Power Plant Cooling Tunnels*

  The concrete-lined cooling tunnels from Seabrook Station were bored through bedrock approximately 200’ below ground and are not expected to be affected by the project or by bridge foundations.

- *Bridge-Mounted Utilities*

  The existing bascule span operator house has electric, lighting, telecommunications and gas services that are supported on the existing structure. These services are fed from Hampton and must be maintained as long as the bascule remains in service on the existing bridge. This may require installation of temporary services and relocation of these utilities in the area of

the north approach of the bridge during construction of the detour or new bridge substructures and temporary support of excavation. Similarly, the roadway lighting on the approaches and over the bridge will need to be kept in service as long as the bridge remains in use. The construction of the detour bridge or the new bridge structures on a west alignment is not expected to impact these utilities. These utilities will need to be provided as required for the selected bridge alternative.

- *Miscellaneous*

  There is an abandoned water pump station located in the northwest quadrant of the existing bridge that must be removed to construct the detour or new roadway alignment to the west. This structure will need to be categorized for hazardous material prior to removal. At a minimum, asbestos abatement will be likely required.

10 IMPACTS TO RIGHT-OF-WAY

The right-of-way impacts vary depending on the alternative. Existing Right-of-Way Plans are included in Appendix E.

- *Rehabilitation Right-of-Way Impacts (Alternative 1)*

  The Rehabilitation Alternative is located on the current alignment and widens the existing bridge and roadway by approximately 20 feet to the east. This alternative reuses much of the current bridge substructures and is the least impact to existing right-of-way.

  The primary impact will be during installation of a two-lane detour bridge to the west of the existing bridge. The detour bridge and temporary roadway will require temporary impacts to the State Pier. The temporary impacts will exceed six months in duration, and therefore may be considered a permanent impact under Section 6(f). With the use of retaining walls, it is not anticipated that there will be impacts to the buildings housing businesses northwest of the existing bridge, but parking in the area will be impacted. South of the bridge, the temporary diversion will be located within the right-of-way, but will temporarily impact the environmentally-sensitive dune area in the southwest corner of the bridge.

  The easterly widening will impact the sand berm area between existing NH Route 1A and Eisenhower Street south of the bridge, and will impact the frontage of Hampton Beach State Park north of the bridge.

- *Replacement and Twin Bridge Alternatives Right-of-Way Impacts (Alternatives 2-4)*

  The recommended alignments for the Replacement alternatives, including the Twin Bridge Alternative, are anticipated to remain within the existing right-of-way on the south approach to the bridge. Construction of the north approach spans of the bridge and the north roadway approach will require impacts to the State Pier. Retaining walls northwest of the bridge are anticipated to prevent impacts to the buildings of businesses, but parking in the area will be impacted.

11 IMPACTS TO DRAINAGE

The project area was reviewed to determine existing drainage systems and flow patterns and to evaluate potential conceptual drainage solutions under the proposed conditions. As presented, each of the proposed alternatives will increase the impervious area along NH Route 1A through widening of the existing roadway and bridge footprint. The conceptual approach to stormwater collection and treatment is described below and will generally be similar across each of the alternatives.

The proposed bridge will include a new drainage collection and conveyance system to replace the existing scuppers in order to eliminate direct discharge into the harbor. Proposed catchment areas are bisected to the north and south by the roadway profile high point at approximately the center of the bridge. The drainage collection system will be carried through the abutment back walls at both the south and north approaches and continue in a closed conduit system to new catch basins (with sumps) and discharge off each approach.

The proposed drainage discharges described above will be routed through new treatment swales at each approach following Best Management Practices (BMPs) to achieve a level of sediment and nutrient removal before flowing through normal watercourses into the harbor.

The flow of stormwater on the southern roadway approach (off-bridge) will generally mimic existing conditions with sheet flow off the pavement and onto embankments, where buffer areas will be utilized to treat stormwater each side of the roadway.

Stormwater flow on the northern roadway approach (off-bridge) will be channeled in a curbed section to new catch basins (with sumps) north of the bridge. This area from the crest of the proposed bridge to the new drainage structures will be diverted to the proposed BMP located to the northeast of the bridge.

Based on a preliminary review of the existing drainage system at the state park entrance, the contributing areas to this system will be significantly reduced by the aforementioned drainage structures thereby reducing current flows to the existing outfall to Hampton Harbor to the west. The current design assumes that the existing catch basin grates at the state park entrance will be adjusted to match the intended pavement overlay in this project approach area.

If it is determined through future design phases that this existing system must be treated through a BMP, the system may be routed southerly to the proposed treatment swale however doing so will require a moderate increase in land impacts on the state park property due to the lower elevation required for the BMP bottom, and will likely result in impact to the 8” water line located north of the proposed BMP location.

Seabrook and Hampton are both Municipal Separate Storm Sewer System (MS4) communities, which are part of an EPA permit program that requires treatment of all runoff from all impervious areas within the project limits. Coordination with the NHDOT Bureau of Environment to confirm treatment expectations will proceed in future design phases.

12 IMPACTS TO ENVIRONMENTAL AND CULTURAL RESOURCES

- *Harbors and Waterways*

  The Rehabilitation Alternative (Alternative 1) would have the smallest permanent impact and footprint in the harbor, since work in the water is limited to widening the existing foundations. A temporary detour bridge would add significant temporary impacts during construction. The Rehabilitation Alternative would result in no improvement on the navigational channels of the harbor.

  The Replacement alternatives (Alternatives 2 and 3) would reduce the number of piers in the harbor, which represents a positive impact when compared to both the existing condition and Rehabilitation Alternative. It would also improve the available width and vertical underclearance at the navigation channel below the bridge, and would require dredging of the channel at the bridge location to accommodate that widening. The Replacement with Movable Bridge alternative will impact the Seabrook Channel and additional dredging may be required in this area to maintain existing channel widths west of the bridge.

  The Twin Bridge Alternative (Alternative 4) places new bridge piers in the harbor and will not remove any of the existing bridge piers, representing the biggest negative permanent impact to the marine environment. In addition, the Twin Bridge Alternative would not improve vertical or horizontal clearances at the navigation channel, and impacts to the Seabrook and Hampton Channels may require additional dredging to maintain the current channel widths west of the bridge.

  All alternatives will result in impacts to the harbor and waterways during construction. The project has endeavored to minimize or eliminate temporary and permanent impacts to the Seabrook and Hampton navigation channels within the harbor, as discussed in Sections 7 and 8.2.

- *Tidal Wetlands*

  It is anticipated that all of the alternatives would require disturbance within the tidal and subtidal estuarine zones below and adjacent to the existing bridge structure. Applicable permits will be secured prior to start of construction. Estuarine wetlands will also be impacted for construction access and staging areas, and BMPs will be installed and monitored in order to protect these wetlands and other environmental resources.

- *Historic and Archaeological Resources*

  The rehabilitation and replacement alternatives would impact the historic existing bridge by eliminating the existing superstructure. The replacement alternatives would also remove the entire substructure.

  Coordination to determine potential effects to the bridge and other historic or archeological resources is on-going.

- *Endangered Species, Wildlife and Fisheries Habitat*

  The replacement alternatives and the twin bridge alternative would both relocate the bridge approximately 55’ to the west, into the dune habitat. This direct impact could be reduced if retaining walls were employed, but this creates additional permanent features that may not best serve the wildlife. Although this area to the west would be disturbed, the removal of the existing bridge for the two replacement alternatives would provide an opportunity for the

reestablishment of dune habitat. The twin bridge alternative would not remove the existing bridge, and would result in the biggest final structural footprint in the dunes area.

The temporary bridge of the Alternative 1 rehabilitation would, like the replacement alternatives, disturb areas would reach approximately 100' west of the existing structure. However, upon removal of the temporary bridge, the habitat could be restored.

Throughout the planning process for the project, there will continue be close coordination between the project team, the NHDOT and the affected Natural Resource Agencies to minimize impacts.

- *Social and Economic Resources*

  The project is not anticipated to affect median incomes, demographics, or rates of owner occupancy.

- *Water Quality*

  As discussed in Section 11, project drainage will be designed utilizing Best Management Practices to minimize impacts to water quality in the area. It is anticipated the multiple permits associated with water quality will be required.

- *Public and Conserved Land*

  As discussed in Section 10, impacts to the State Pier may occur under both the replacement and rehabilitation alternatives. In addition, the rehabilitation alternative could also impact Hampton Beach State Park. These impacts will require Section 6(f) coordination.

13 LIFE CYCLE COST ANALYSIS

A Life Cycle Cost Analysis (LCCA) was performed on the alternatives to determine which is most cost-effective. Life-cycle cost analyses determine the cost of constructing a bridge and maintaining it over its 100-year service life, and include costs associated with regular maintenance, structural repairs, operations of movable bridge systems (where applicable), and any required costs for rehabilitation. The analysis presents two sets of information: The life cycle costs in Present Day dollars, and the costs in Constant Dollars. The following two subsections provide the approach of the economic analysis for each of these two estimates. Subsequent to that, a summary of the maintenance and operational efforts estimated in the analyses is provided.

- *Present Day Life Cycle Cost Estimate*

  The Present Day estimates provided in today's dollars account for the time-reduction value of the dollar, and make an "apples-to-apples" comparison of alternatives given that future expenditures are valued less than present-day expenditures. This analysis discounts future expenses at 4% per year per guidelines of the Federal Highway Administration (FHWA).

  The dollars are discounted over time because dollars spent in the future are valued less than dollars spent in the present. In other words, even with zero inflation, the value attached to $1 received one year from now is less than the value attached to $1 received today. The same principle applies to the world of investing, where $1 today is worth more than $1 ten years from now as one could invest the $1 and earn interest on it to be worth more in the future.

  The need for discounting is not related to inflation, it is in addition to inflation. There are two types of discount rates that can be used to assess life cycle costs in Present Day dollars. The first is expressed in "nominal" dollars, and is used for future consumption. This is not applicable to the needs of this report, which is intended to select an alternative by comparing costs instead of assessing required expenditures in "nominal", or inflated dollars. The second method is used for cash flow, and is expressed in "real" terms (in dollars of constant purchasing power relative to a base year; that is, after the effects of inflation have been removed). Given that Life-Cycle Cost Analysis uses costs in today's dollars applied to future expenditures, a "real" discount rate is used in this analysis to bring the future costs back to the present value.

  While Present Day life cycle cost estimates are a tool for understanding which alternatives provide the lowest value of costs over its life cycle, they do not convey the magnitude of the differences, nor actual costs for purpose of financial planning.

- *Constant Dollar Life Cycle Cost Estimate*

  To provide another tool for comparison, the life cycle costs are also provided in Constant Dollars. The Constant Dollar estimates provide the total of operations and maintenance costs in today's dollar value, without any discount rates nor inflation applied. While this does not provide an inflated cost for purposes of financial planning, it provides another measure of comparison which focuses on the total operations and maintenance effort of the life of the structure.

- *Description of Operations and Maintenance*

  For each alternative, the LCCA addresses rehabilitation and repairs for all spans, as well as operation and mechanical/electrical maintenance where applicable. Minor maintenance that is generally similar across alternatives, such as joint cleaning, site work and power washing are not included in this analysis. Inspection costs are included in the alternatives, as the

bascule spans would be considered complex structures and may be inspected by a consultant.

Mechanical and electrical maintenance for the bascule span were categorized under two items:

- Monthly maintenance – addressing small frequently performed tasks such as greasing machinery.
- Miscellaneous maintenance – addressing tasks such as minor repairs and operations testing.

Operator costs are assumed to be similar across the Rehabilitation, Twin Bridge and Replacement with Movable Bridge alternatives (Alternatives 1, 2, and 4). It is assumed that both bascule spans will be operated from one location for the Twin Bridge Alternative, and will therefore not have increased costs associated with multiple operators.

For the Fixed Bridge alternatives (Alternatives 3A and 3B) and the approach spans of the bascule alternatives, maintenance costs included periodic repairs of bridge elements, including deck, bridge coating and fender systems. Maintenance and repair cycles and costs were based the NHDOT *Asset Management Plan for Pavements & Bridges on the National Highway System* (June 2019), the *Annual Report 2018 NHDOT Bridge Condition and Bridge Program* (January 2019), and several other state DOT sources. For the movable span options, periodic costs such as machinery repairs, trunnion bearing replacement, and span lock replacements were considered. Structural steel members are assumed to be metalized, and due to the coastal environment, to have a coating maintenance interval of 20 years. Approach roadway maintenance and site work were not included.

The life cycle costs associated with bascule bridges are substantially higher due to maintenance of the mechanical and electrical systems, as well maintenance of the movable bridge components. Alternative 1 – Rehabilitation and Alternative 4 – Twin Bridge also require additional maintenance efforts such as repointing the granite façades of the existing piers.

- *Summary*

The following table summarizes costs associated with each alternative. The first column, Construction Cost, presents the cost of the initial construction in today's dollars. The second column, Life Cycle Cost (Constant Dollars) provides the sum of all costs associated with constructing and maintaining each alternative over a 100-year period. This column presents the dollar value as if all money was being spent today. The third column, Life Cycle Cost (Present Day Dollars), also provides cost associated with the bridge over its 100-year period, but accounts for all costs associated with constructing and maintaining each alternative over a 100-year service life presented in discounted dollars.

Alternative	Initial Construction Cost	Life Cycle Cost (Constant Dollars)	Life Cycle Cost (Present Day Dollars)
Alternative 1: Rehabilitation	$84,799,000	$155,677,000	$97,299,000
Alternative 2: Movable Bascule Bridge	$100,249,000	$180,630,000	$114,067,000
Alternative 3A: Fixed Bridge - Steel	$66,789,000	$84,647,000	$70,998,000
Alternative 3B: Fixed Bridge - Concrete	$70,417,000	$89,122,000	$73,352,000
Alternative 4: Twin Bridge	$109,726,000	$211,998,000	$127,248,000

Table 8 – Summary of Life Cycle Cost Analysis

Table 8 illustrates the impacts operation and maintenance have on the overall cost, particularly with the movable bridge alternatives. Using the FHWA discounted Present Day

Dollars, the operation and maintenance costs associated with the fixed bridge alternatives average approximately 5.2% of the initial construction cost. The movable bascule bridge alternatives have operation and maintenance costs that average approximately 14.9% of initial construction costs.

Refer to Appendices H and I for construction and life-cycle cost estimates.

14 CONSTRUCTION SCHEDULE

Construction phasing and order-of magnitudes estimates of construction durations have been developed for each alternative using a conceptual-level design. The expected construction schedules shown below are based on a Notice-To-Proceed of June 2023.

14.1 Alternative 1 – Bridge Rehabilitation

The scope of construction activities for the Bridge Rehabilitation Alternate are discussed in section 7.2 of this report.

- *Stage 1 – Construct Temporary Detour Bridge – 16 months duration*

  The first construction activity will be to install a full temporary detour bridge to the west of the existing structure, complete with roadway approaches and a temporary lift span at the navigation channel to fully support maritime traffic. This will include installation of temporary substructures in the river and temporary abutments and retaining walls at each end of the bridge. Work will be scheduled around limitations required by natural resource agencies due to the presence of piping plovers in the Seabrook dunes area and in order to reduce impacts from construction on fish species.

- *Stage 2 – Widening of Existing Bridge Substructures and installation of new Bascule Span Mechanical and Control Systems – 18 months duration*

  This will require removal of the existing bridge superstructure to support pier rehabilitation and widening. It would include all work to install the electrical and mechanical systems supporting the new bascule span.

- *Stage 3 – Construct New Bridge Superstructure and Deck and Construct Bridge approach roadways – 8 months duration*

  This will include all activities required to open the fully rehabilitated bridge to traffic. The temporary bridge would then be dismantled and any final site work would be performed.

- Estimated total construction duration would be 3 years, 6 months from notice to proceed.

14.2 Alternatives 2-4 – Bridge Replacement Alternatives: Phased End Spans

The general construction phases will be similar across replacement and Twin Bridge alternatives.

- *Stage 1 – Construct Replacement Bridge Substructures*

  - Alternative 2 – Movable Bridge: 18 months duration
  - Alternative 3 – Fixed Bridge: 12 months duration
  - Alternative 4 – Twin Bridge: 18 months duration

  This work would be all off-line. The first construction activities will be to install the new bridge piers and westerly half of the abutments west of the existing bridge. Work will be scheduled around limitations required by natural resource agencies due to the presence of piping plovers in the Seabrook dunes area and in-water work limitations to reduce impacts from construction on fish species. Pier construction would include installing drilled shafts and then installing partially-precast pier caps so that the top of pier cap is above the level of ordinary high water. Construction of pier column/stem and hammerhead would be in the dry.

- *Stage 2 – Install Phase 1 Superstructure on Replacement Bridge, Construct New Bridge Approaches and Move Traffic to New Bridge – 12 months duration; Twin Bridge Alternative with one lane in each direction.*

  This work would all be off-line. At completion of this stage, the existing bridge would be fully removed from of service. Two lanes of traffic would be carried on the new bridge, with limited pedestrian facilities. Careful coordination with the USCG will be required to minimize impacts to the navigational channel through the bridge as well as the Hampton Channel west of the bridge.

- *Stage 3 – Install Phase 2 Superstructure on Replacement Bridge, Complete Abutments, Roadway Approaches and Remove Existing Bridge - 12 months duration; Rehabilitate Existing Bridge (Twin Bridge Alternative), open to one-way traffic and reconfigure Twin Bridge for one-way traffic – 18 months duration*

  This would include complete the new bridge, including completion of abutments, roadway approaches, end spans of the new structure. The existing bridge would be dismantled in a sequence to support completion of the new abutments first and any final site work would be performed. For the Twin Bridge Alternative, this would be the full rehabilitation of the existing bridge (superstructure replacement, substructure rehab) with traffic on the new twin bridge and then the effort to modify the bridge approaches to switch traffic to one-way on each bridge.

- *Estimated total construction duration from notice to proceed:*
  - Alternative 2 – Movable Bridge: 3 years 6 months
  - Alternative 3 – Fixed Bridge: 3 years
  - Alternative 4 – Twin Bridge: 4 years

15 ALTERNATIVES ANALYSIS

All four of the evaluated alternatives effectively address the purpose of this project to provide a safe, reliable, and structurally-sound crossing over Hampton Harbor that improves mobility for vehicle, bicycle, pedestrian, and maritime users. All four also meet the needs of the project by correcting the deficient structural capacity, substandard roadway and sidewalk widths, and the outdated and deteriorated mechanical and electrical systems of the existing bascule span. However, each alternative has different economic and social impacts that must be considered.

Alternative 1 – Bridge Rehabilitation preserves much of the substructure and the operator house from the existing bridge, while providing a new and wider superstructure to meet current vehicular traffic needs. Because the existing horizontal alignment is shifted only slightly to the east and vertical profile is retained, the approach roadway impacts are minimized. This alternative will be a blend of old and new, but the new portions of the bridge will possibly overshadow the preservation of the old, resulting in a discordant appearance. It is possible that the extent of the necessary structural upgrades may leave little of the existing structure exposed to view. The Rehabilitation Alternative is also the only alternative that requires a temporary bridge to be installed and maintained for three years. This is a costly alternative that may not fully address some of the existing foundation or scour deficiencies, and offers no improvement to maritime navigation.

Alternative 2 – Replacement with Movable Bridge represents the modern version of the existing bridge. It provides significant roadway improvements to accommodation vehicles, bicycles, and pedestrians, and also offers expanded navigational horizontal width and vertical underclearance. The higher roadway profile is anticipated to reduce the number of bridge lifts by 55%, limiting delays to the roadway traffic. The construction cost of this alternative is approximately 10% greater than the Rehabilitation Alternative, but is comprised of all new components.

Alternative 4 – Twin Bridge will most closely maintain the current appearance of the existing Hampton Harbor Bridge. It will also provide two structures each capable of carrying both lanes of NH Route 1A in a temporary configuration, allowing vehicular and pedestrian traffic to be maintained in the event one of the bridges must be closed. This alternative also maintains the existing navigational clearances serving maritime traffic, however the length of the restricted channel is longer because it passed under both bridges. The Twin Bridge Alternative has both the highest initial construction cost and the greatest operation and maintenance costs, making this by far the overall most expensive alternative.

Alternative 3 – Fixed Bridge offers substantial cost savings over the other alternatives, both in initial construction and on-going maintenance, offering a 30% reduction in initial construction cost alone. A brief review of the cost summary in Table 8 reveals the financial implications of building and maintaining a large movable structure. Without complex moving parts and machinery, fixed bridges require only the routine maintenance typical other coastal New Hampshire bridges. This alternative offers the shortest construction duration and minimal impacts to the traveling public. This is also the only alternative that allows a horizontal channel matching the 150’ width of the Entrance Channel. The vertical underclearance of this alternative is 14’ higher than that of the new bascule bridge alternative, and is expected to clear all current vessels known to pass through the channel. However, this is the only alternative that does not allow the possibility of unlimited vertical clearance into Hampton Harbor.

The steel and concrete superstructure options will both meet the needs of the Fixed Bridge Alternative. Prestressed concrete components are well-suited to marine environments and require little maintenance. However, concrete superstructures must generally meet the same span layout as structural steel girders to remain cost-competitive. To accomplish this, a spliced

girder arrangement of the concrete option is necessary, but requires a more complicated construction process that includes lateral post-tensioning at the splice locations. The steel girders will be horizontally-curved, avoiding the complications associated with the angle point. Additionally, the steel girders themselves are lighter than the concrete girders, which offers more flexibility on how they are erected. Unlike concrete girders, all portions of the steel girders or visible and accessible for routine inspection and steel is more readily repairable than prestressed concrete. Steel girders bridges are also easily widened. Alternative 3A, the steel girder option of the Fixed Bridge Alternative, provides the best overall solution.

16 RECOMMENDATIONS

Alternative 3A – Fixed Bridge with the structural steel superstructure is recommended to advance as the selected alternative. This is the most cost-effective alternative, and best satisfies the purpose of the project and balances the needs of the affected stakeholders.

The existing movable bascule bridge is uncommon and has been part of the Seabrook and Hampton communities for many years, but these structures have certain drawbacks that must be considered. The ability to allow unrestricted vertical clearance into Hampton Harbor is advantageous, but Hampton Harbor itself cannot support large vessels. Each bridge lift is a delay and inconvenience to the vehicles, bicycles, and pedestrians on the roadway. The proposed roadway profile and structure depths provide sufficient vertical underclearance to accommodate all Hampton Harbor vessels while also proving a wider channel and fewer obstructions for smaller vessels. The installation and on-going maintenance needs of the mechanical and electrical systems require investment of time and resources not necessary for non-movable bridge types.

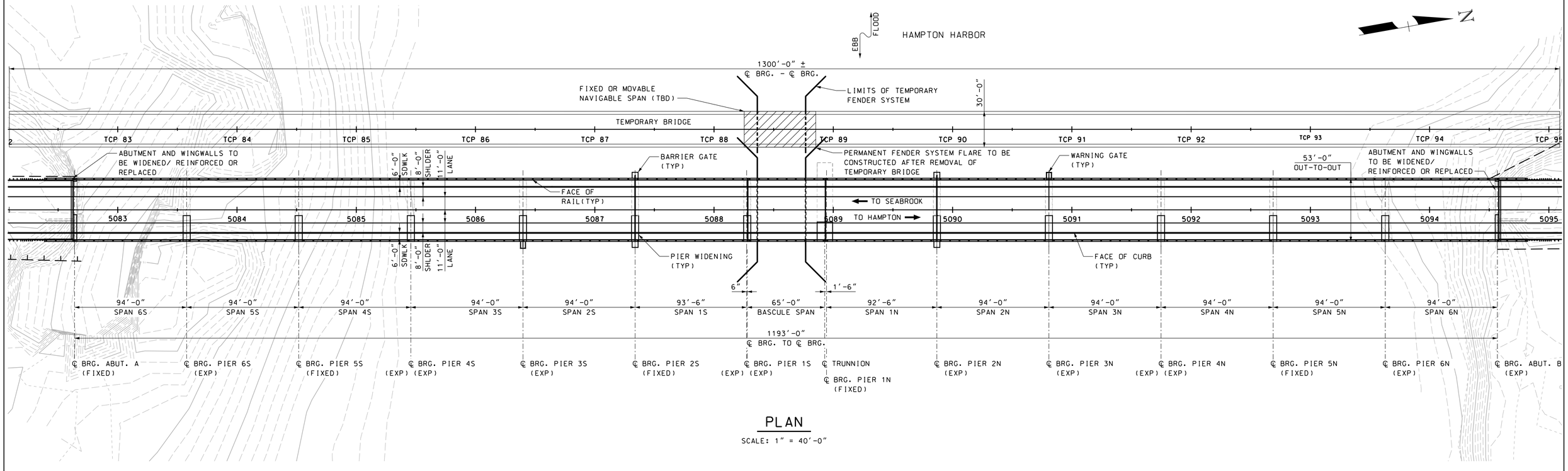
With many competing demands on limited funding, the Fixed Bridge Alternative offers substantial cost benefits that cannot be overlooked. Both the steel and concrete superstructure options of this alternative afford the shortest duration, simplified construction, and limited temporary impacts to traveling public. The structural steel option accomplishes this at a lower cost and with simplified construction techniques, and is therefore the recommended alternative.

APPENDIX A

Conceptual Bridge and Roadway Plans

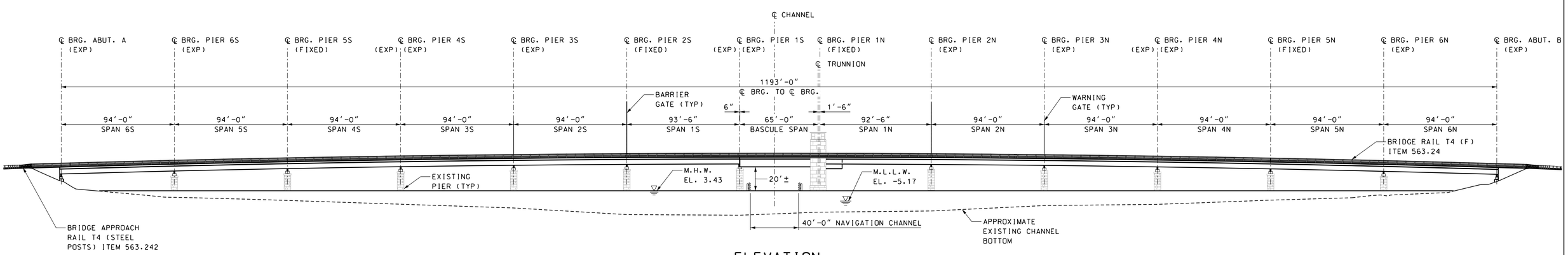
APPENDIX A1

Alternative 1 - Bridge Rehabilitation



PLAN

SCALE: 1" = 40'-0"



ELEVATION

SCALE: 1" = 40'-0"

SUPERSTRUCTURE REPLACEMENT

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

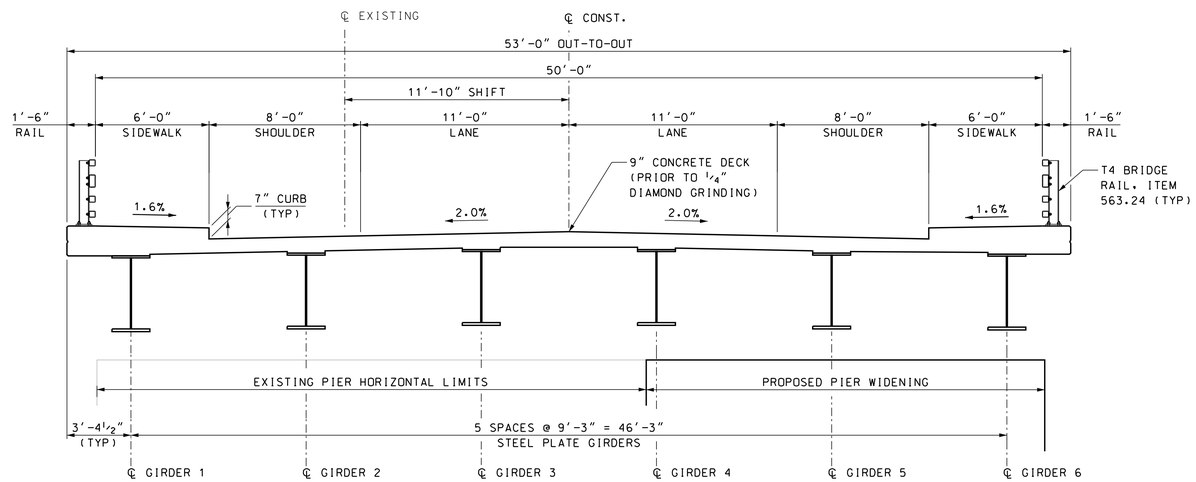
GENERAL PLAN AND ELEVATION - REHAB. ALT.

BRIDGE SHEET 1 OF 2

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	8/18	CHECKED	JFM	9/18
	DRAWN	NDC	8/18	CHECKED	JFM	9/18
	QUANTITIES	---	--/--	CHECKED	---	--/--

FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904Rehab_GenPlan50	AS NOTED	REV. DATE	--	1	17



APPROACH SPAN TYPICAL SECTION (50' REHAB)

SCALE: 1/4" = 1'-0"

SUPERSTRUCTURE REPLACEMENT

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

TYPICAL SECTIONS - REHAB. ALTERNATIVE (50')

BRIDGE SHEET 2 OF 2

FILE NUMBER -

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	08/18	CHECKED	JFM	09/18
	DRAWN	NDC	08/18	CHECKED	JFM	09/18
	QUANTITIES	---	--/--	CHECKED	---	--/--

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
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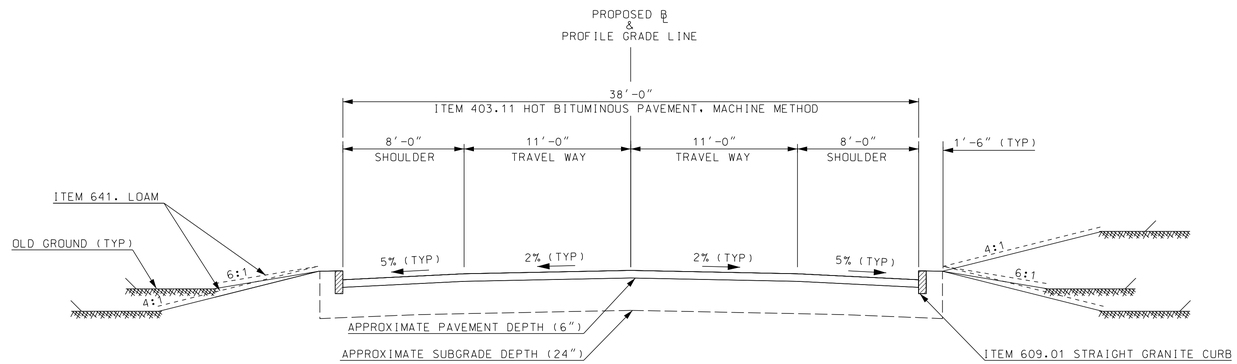
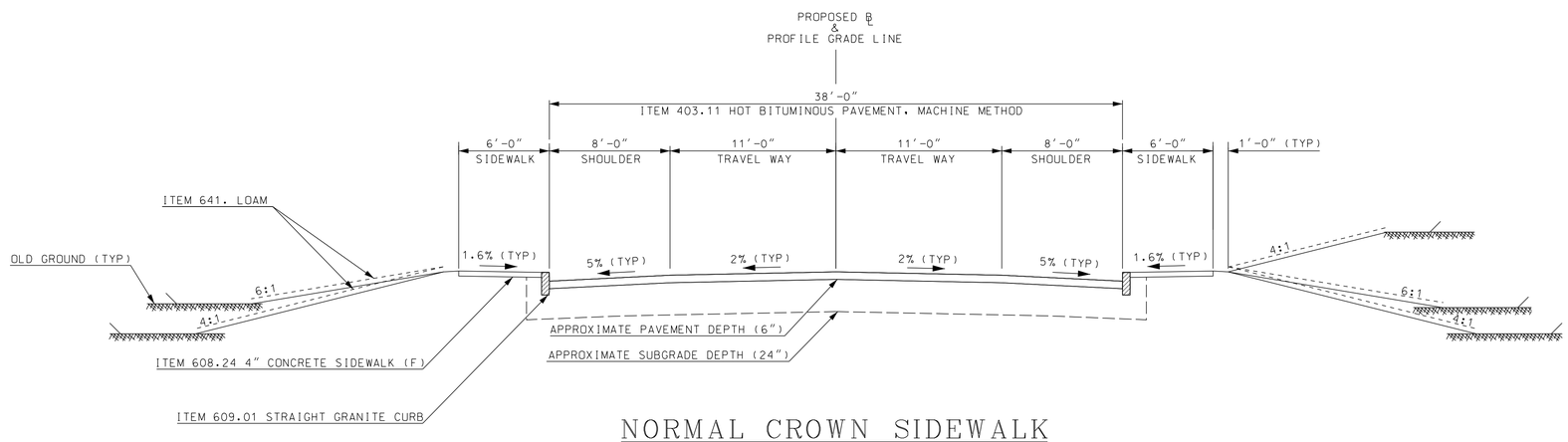


NORMAL CROWN CURBED

NOT TO SCALE



NORMAL CROWN SIDEWALK

NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904typical	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

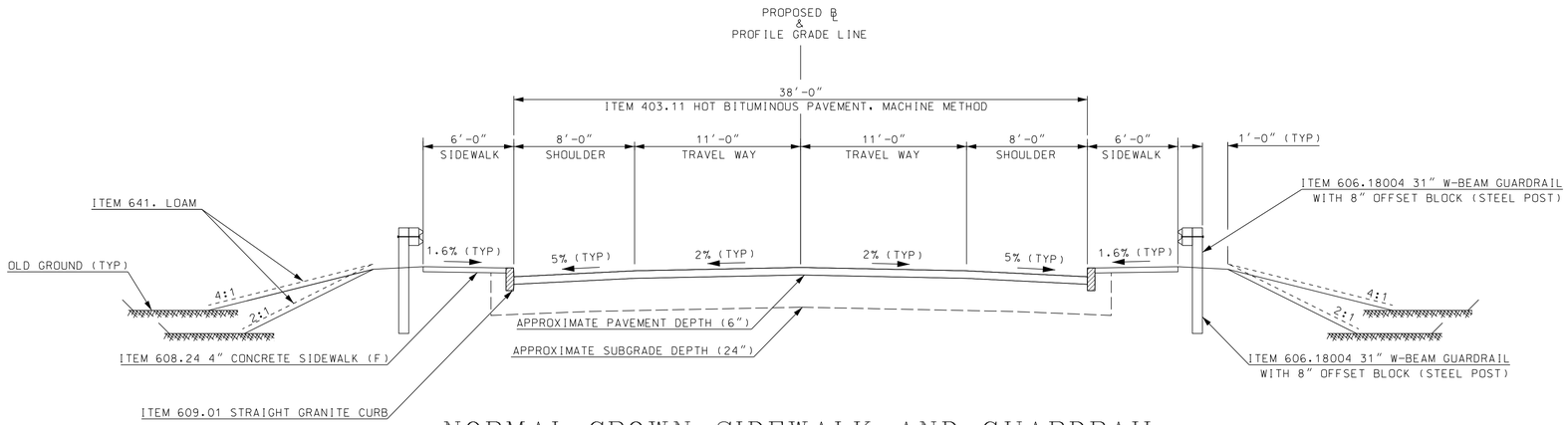
ROADWAY TYPICAL SECTIONS

SHEET 1 OF 4

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KLH	09/19	CHECKED	RDL	09/19
	DRAWN	KLH	09/19	CHECKED	RDL	09/19
	QUANTITIES			CHECKED		
	ISSUE DATE					
	REV. DATE					

FILE NUMBER -

FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
-	3	17



NORMAL CROWN SIDEWALK AND GUARDRAIL

NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904typical	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

ROADWAY TYPICAL SECTIONS

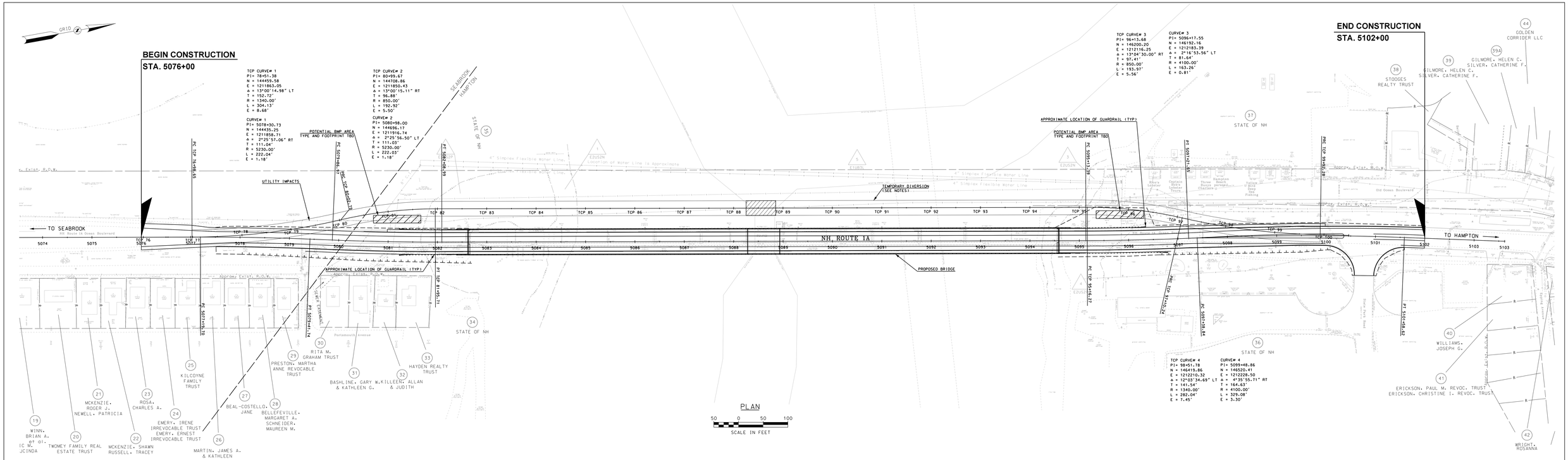
SHEET 2 OF 4

REVISIONS AFTER PROPOSAL

	BY	DATE		BY	DATE
DESIGNED	KLH	09/19	CHECKED	RDL	09/19
DRAWN	KLH	09/19	CHECKED	RDL	09/19
QUANTITIES			CHECKED		

FILE NUMBER -

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	4	17



NOTES:
1. TEMPORARY DIVERSION WILL SUPPORT TRAFFIC AND PEDESTRIANS DURING REHABILITATION OF EXISTING BRIDGE.
2. TEMPORARY DIVERSION SHALL PROVIDE A CLEAR WIDTH OF 50' AT AT THE NAVIGATIONAL CHANNEL.
3. LAYOUT OF TEMPORARY DIVERSION REFLECTS FEASIBLE ALTERNATIVE BASED ON CONCEPTUAL ASSESSMENT OF PROJECT AREA.

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904_genplan	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

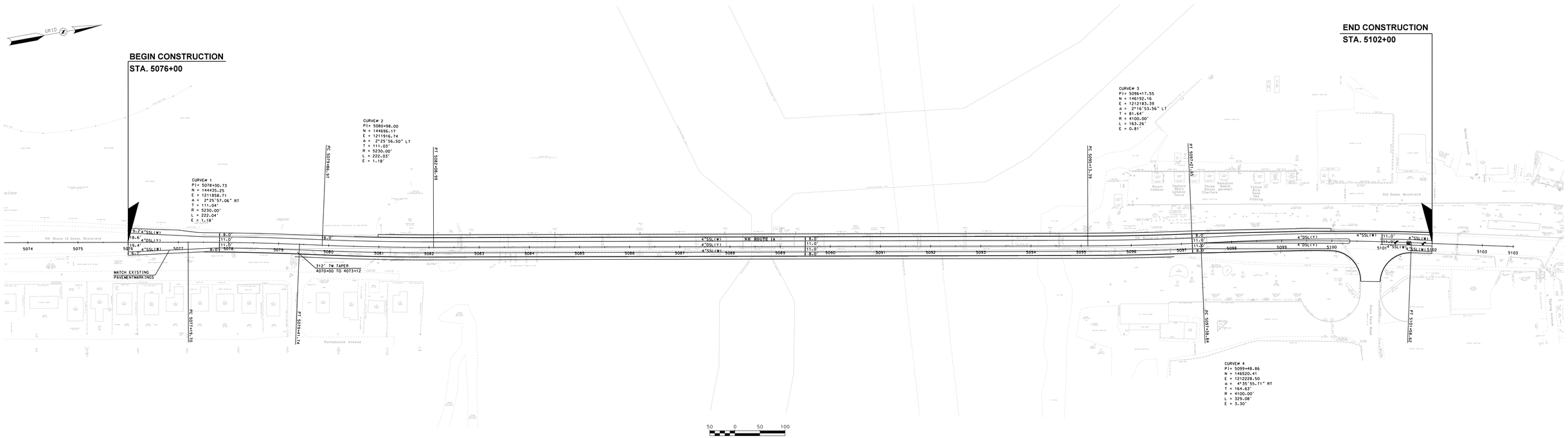
GENERAL PLAN AND PROFILE (REHAB ALT.)

SHEET 3 OF 4

REVISIONS AFTER PROPOSAL	BY	DATE		BY	DATE
DESIGNED	KLH	09/19	CHECKED	RDL	09/19
DRAWN	KLH	09/19	CHECKED	RDL	09/19
QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	5	17

FILE NUMBER -



STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PAVEMENT MARKING PLAN (REHAB ALT.)

SHEET 4 OF 4

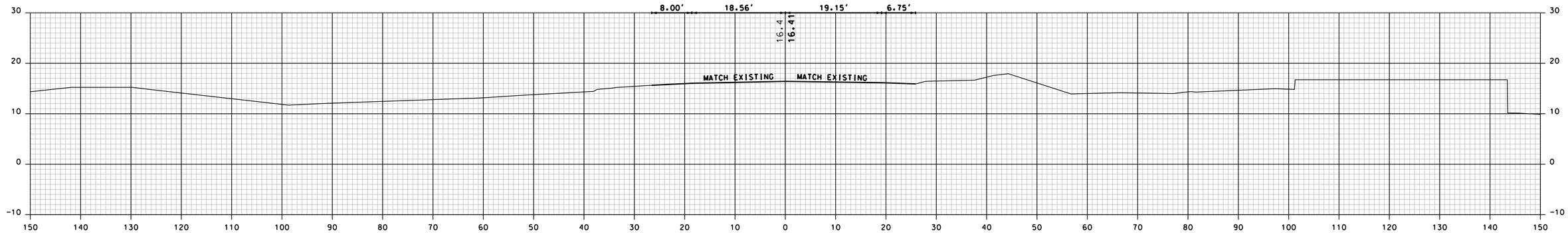
REVISIONS AFTER PROPOSAL			BY	DATE		BY	DATE
		DESIGNED	KLH	09/19	CHECKED	RDL	09/19
		DRAWN	KLH	09/19	CHECKED	RDL	09/19
		QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	6	17

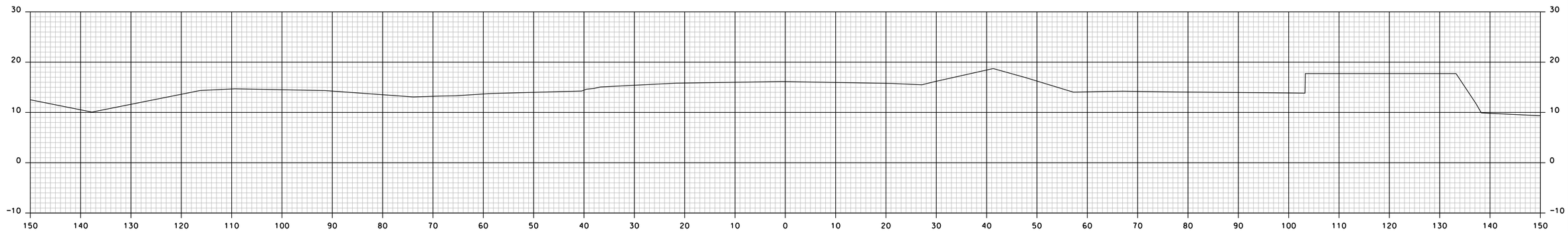
FILE NUMBER -

CONCEPTUAL PLANS
3/11/2020

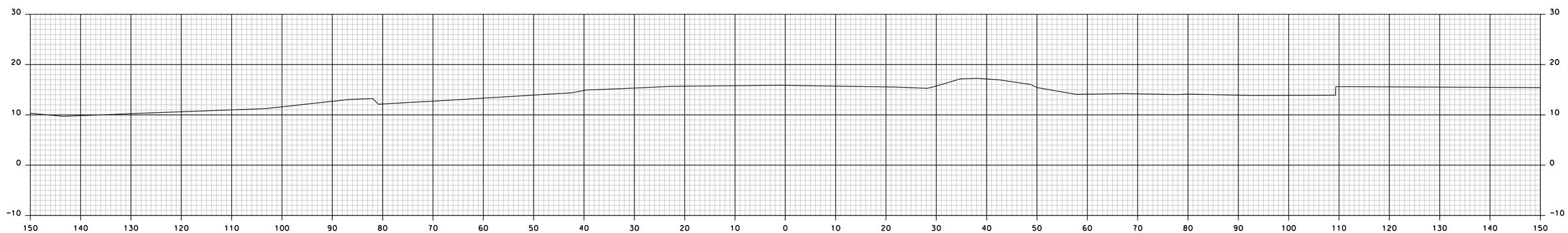
PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904_pvmplan	AS NOTED



5076+00



5075+50



5075+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	7	17

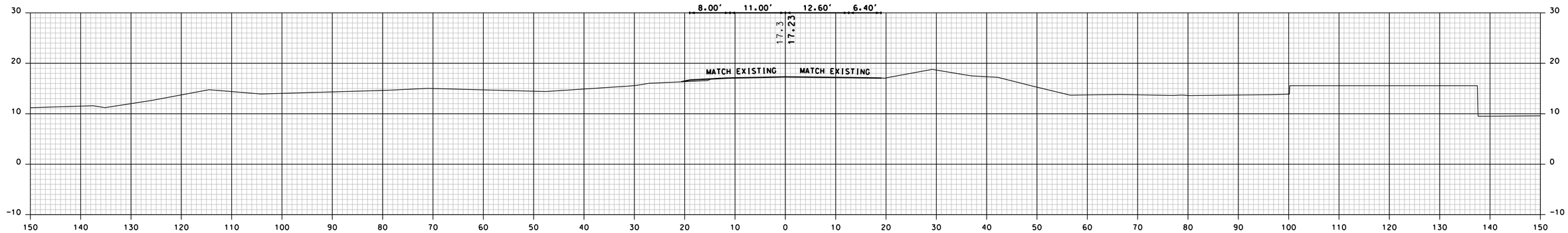
REHAB BRIDGE SECTIONS

STA. 5075+00 TO STA. 5076+00

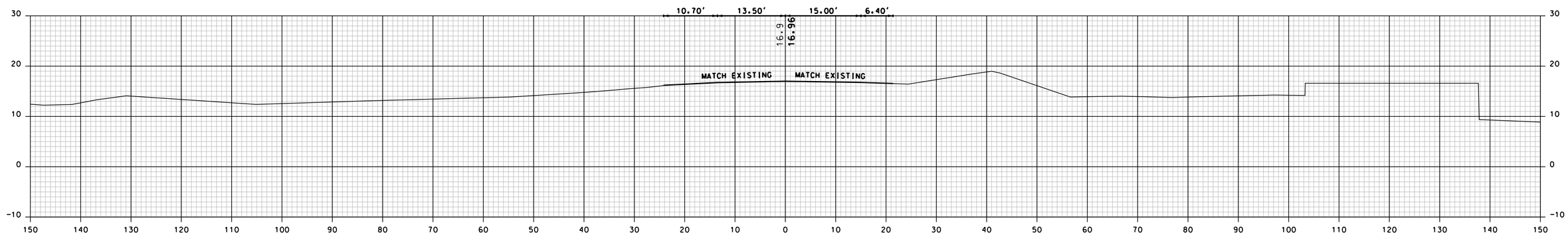
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

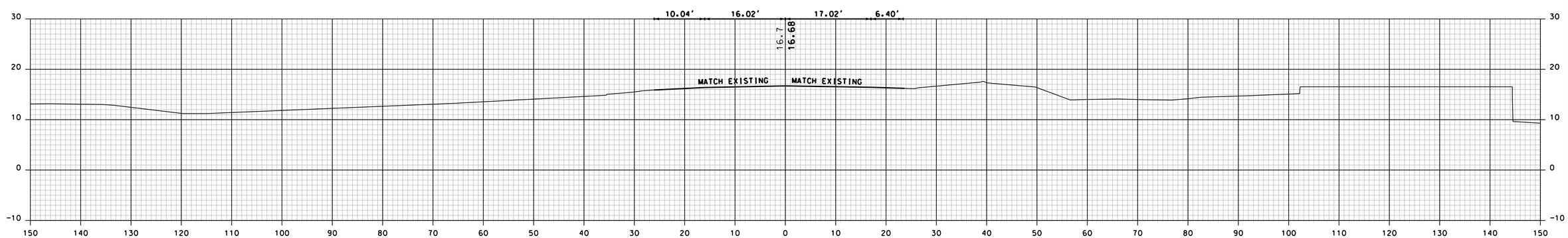
SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



5077+50



5077+00



5076+50

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	8	17

REHAB BRIDGE SECTIONS

STA. 5076+50 TO STA. 5077+50

REVISIONS AFTER PROPOSAL

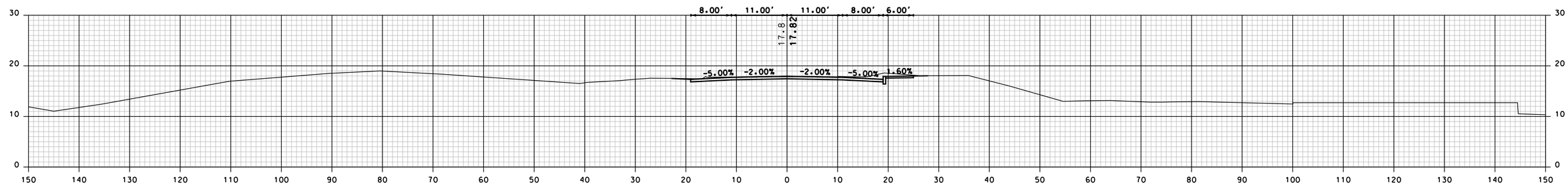
NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



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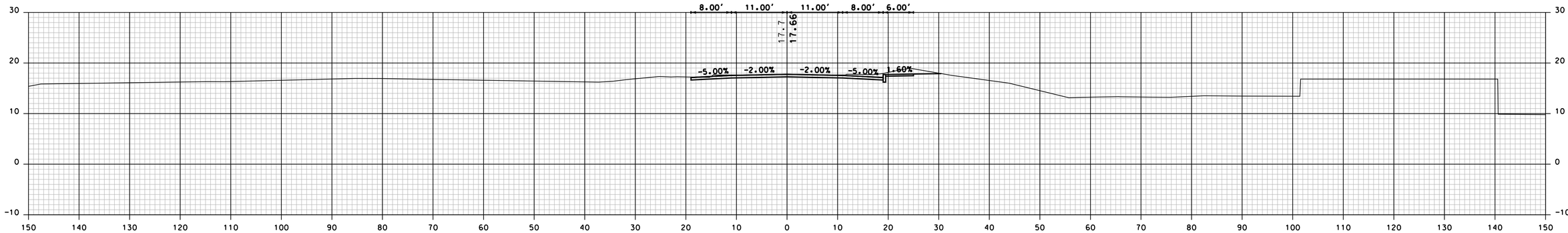
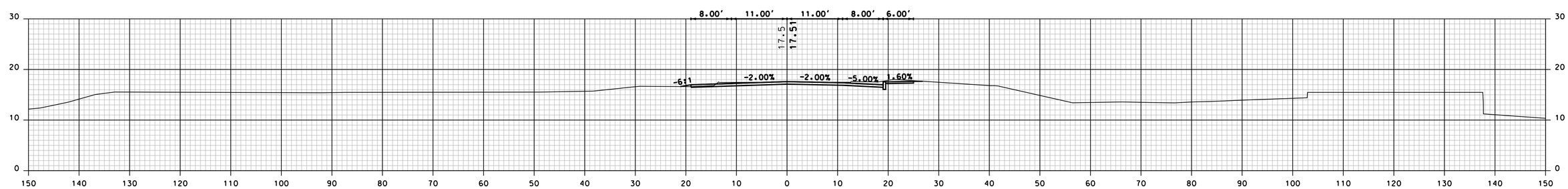


5078+50



5078+00

CONCEPTUAL PLANS
3/11/2020

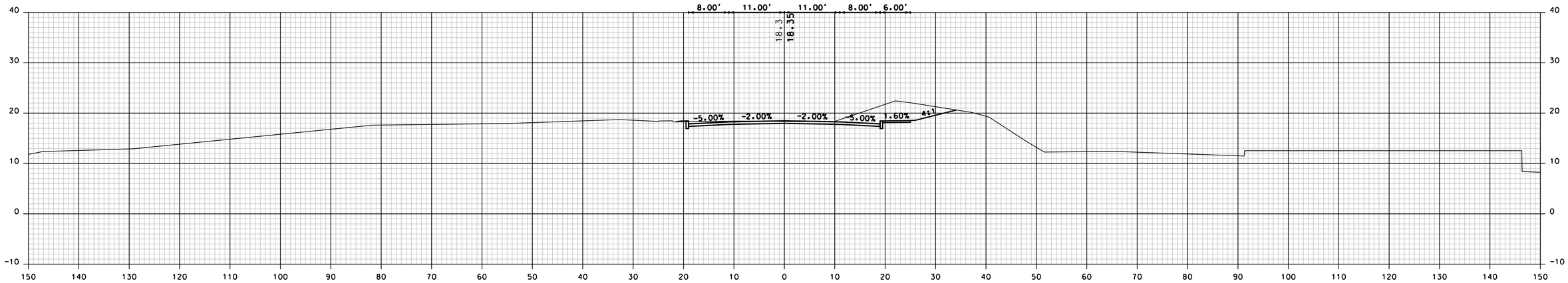
SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	9	17

REHAB BRIDGE SECTIONS

STA. 5078+00 TO STA. 5079+00



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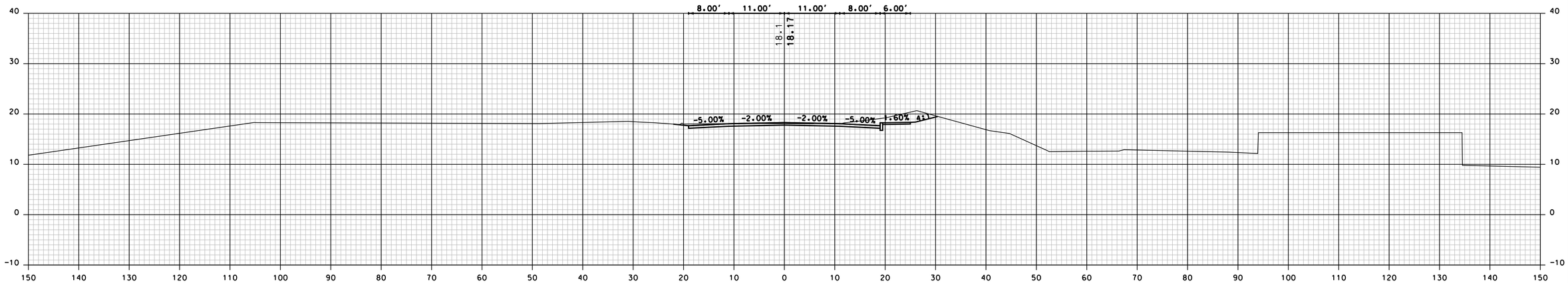

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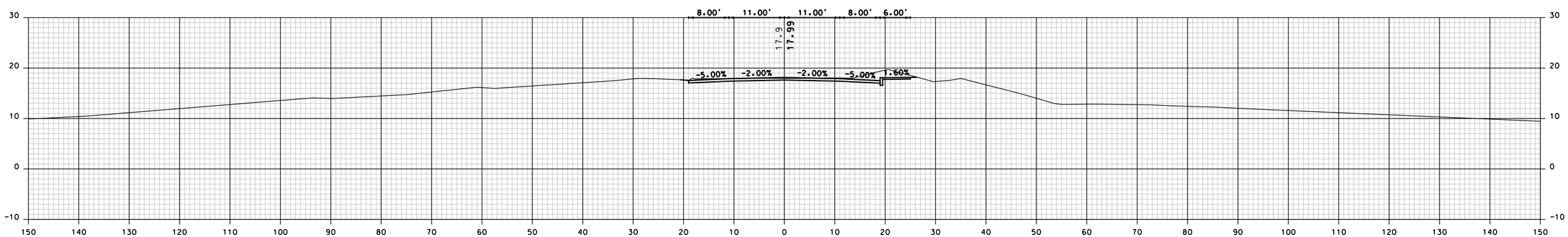


5079+50

REHAB BRIDGE SECTIONS

STA. 5079+50 TO STA. 5080+50

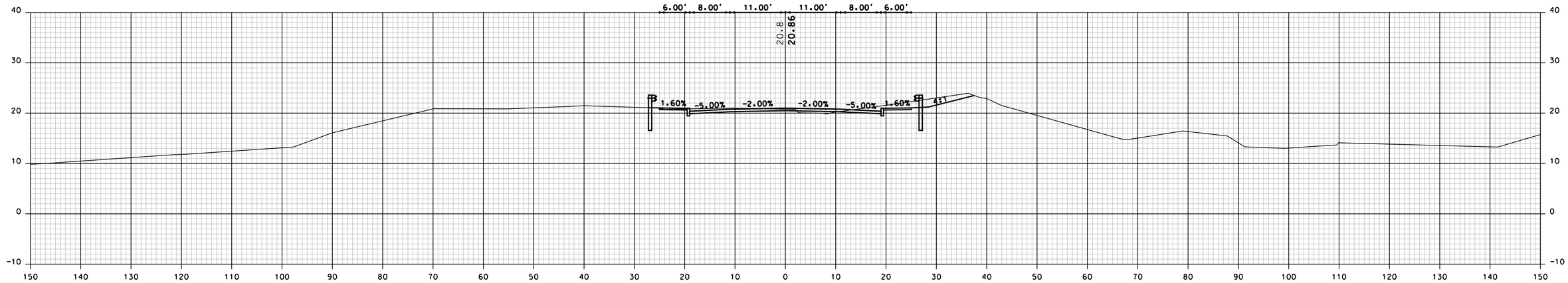
CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	10	17

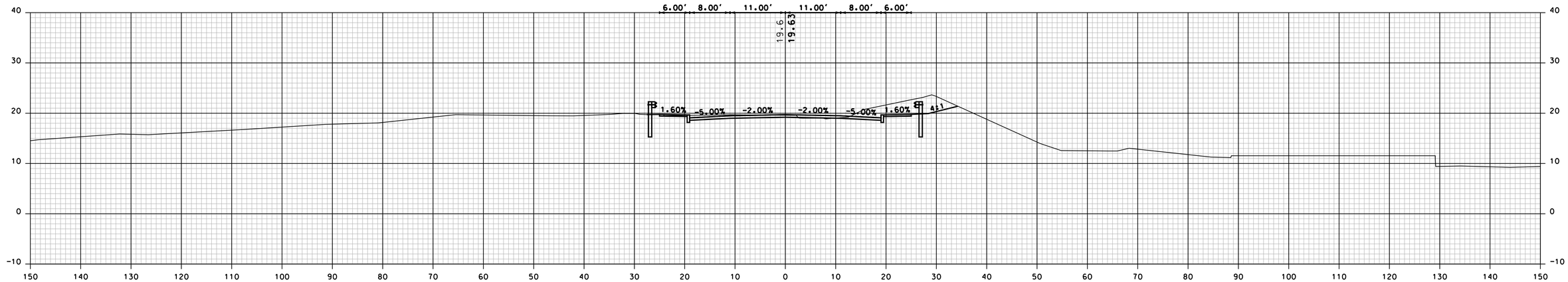
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

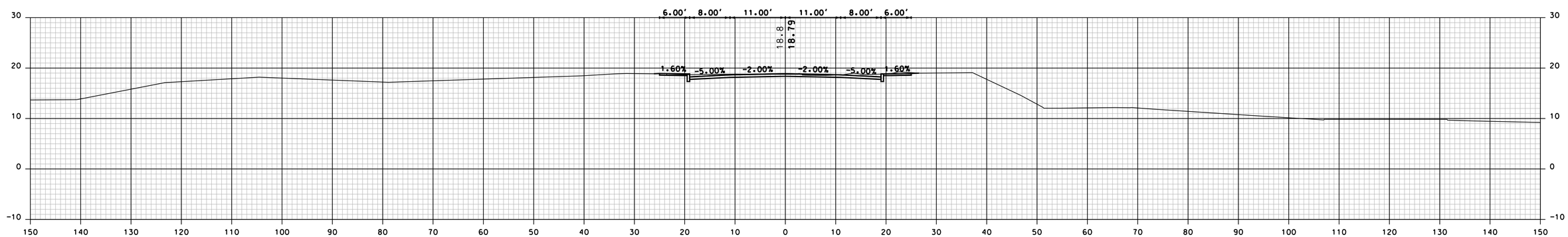
	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



5082+00



5081+50



5081+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	11	17

REHAB BRIDGE SECTIONS

STA. 5081+00 TO STA. 5082+00

REVISIONS AFTER PROPOSAL

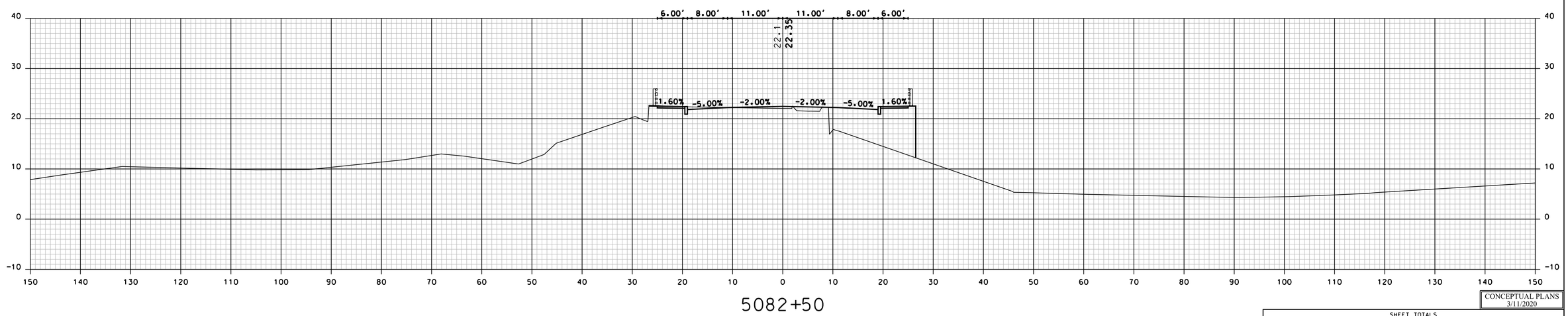
NUMBER	DATE	STATION	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



5082+50

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

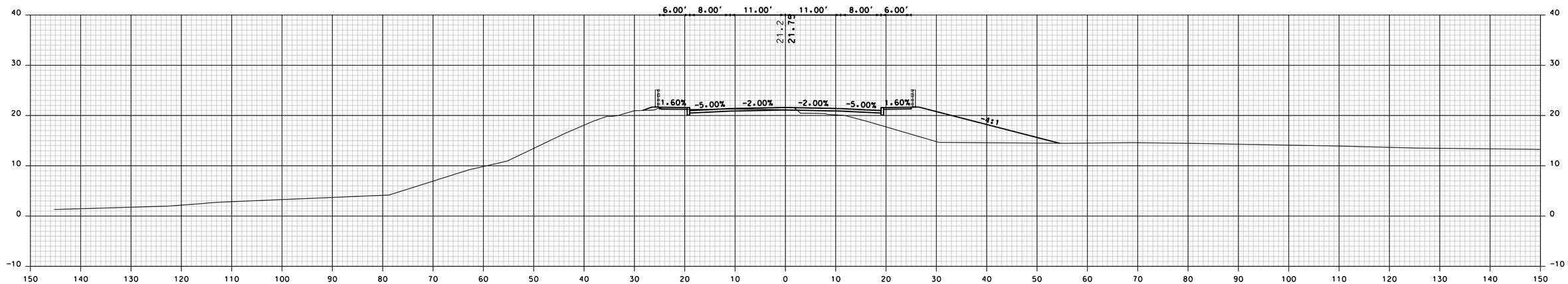
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	12	17

REHAB BRIDGE SECTIONS

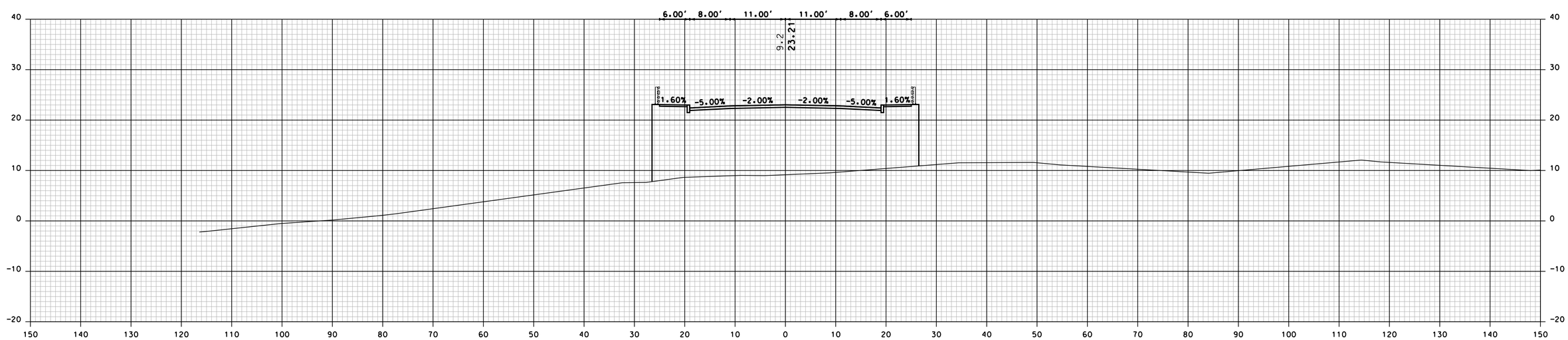
STA. 5082+50

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION



5095+00



5094+50

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

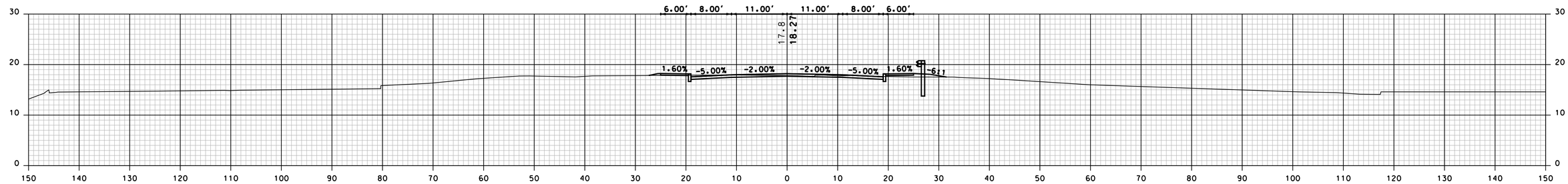
SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	13	17

REHAB BRIDGE SECTIONS

STA. 5094+50 TO STA. 5095+00



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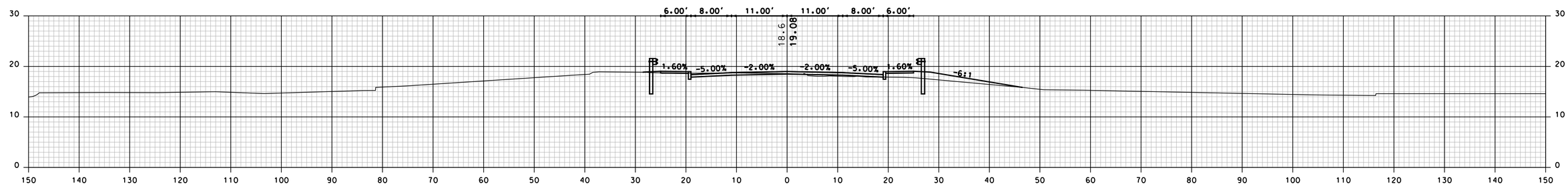

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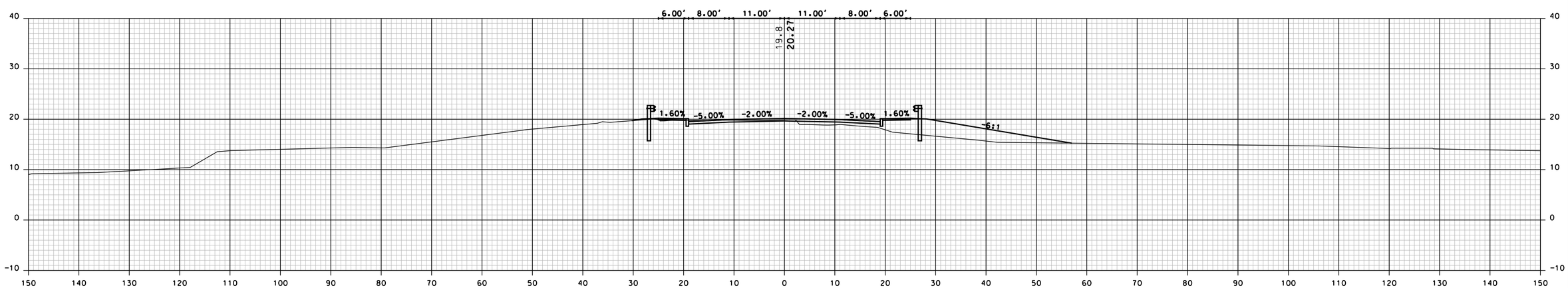


5095+50

REHAB BRIDGE SECTIONS

STA. 5095+50 TO STA. 5096+50

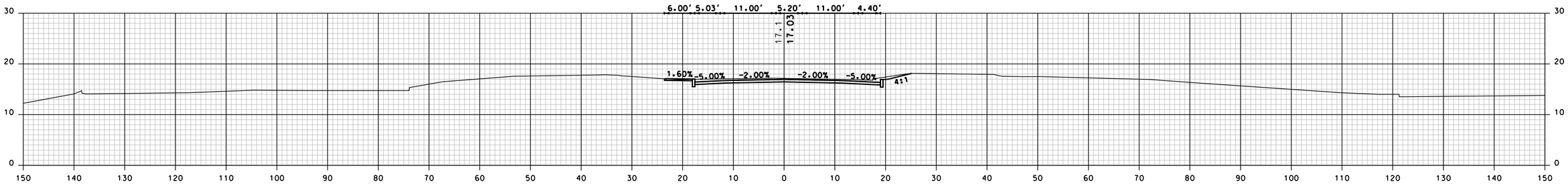
CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	14	17

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



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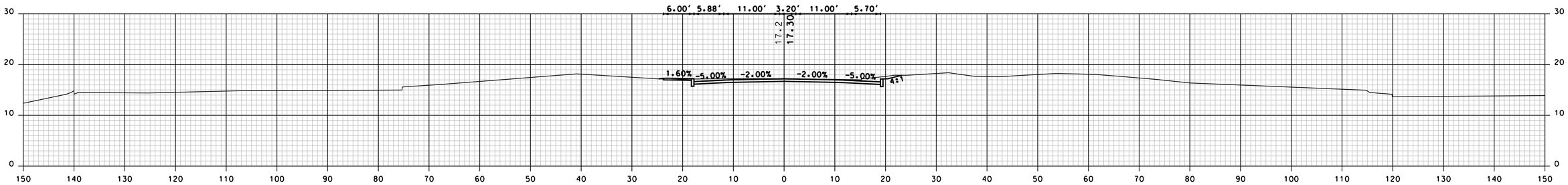

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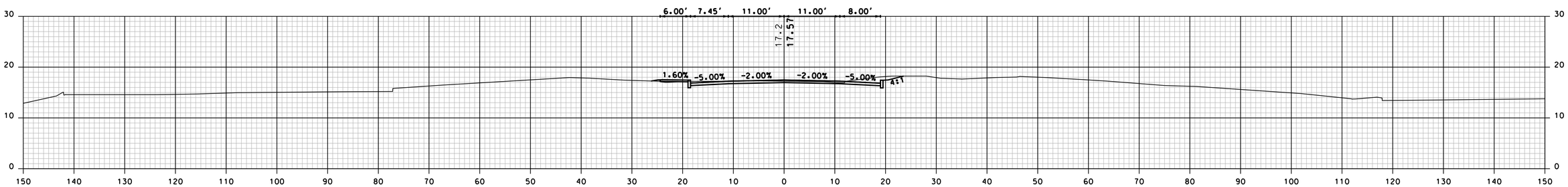
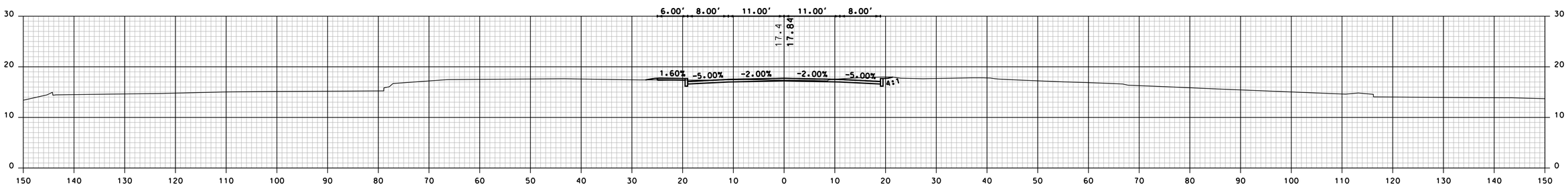


5097+50



5097+00

REHAB BRIDGE SECTIONS

STA. 5097+00 TO STA. 5098+50

CONCEPTUAL PLANS
3/11/2020

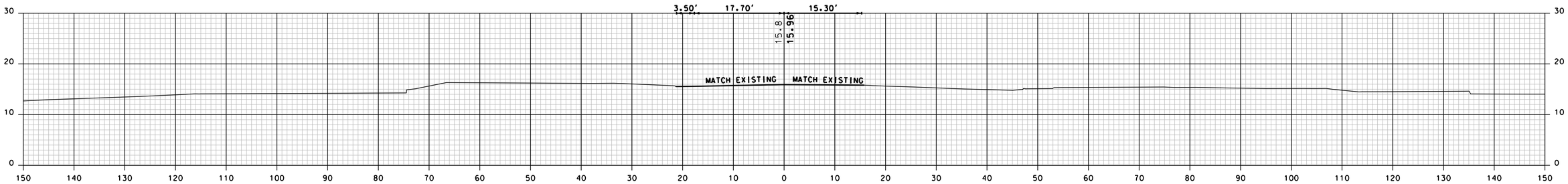
SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	15	17

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



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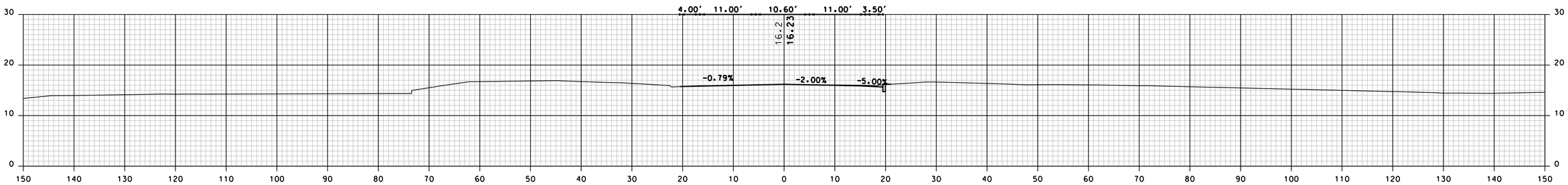

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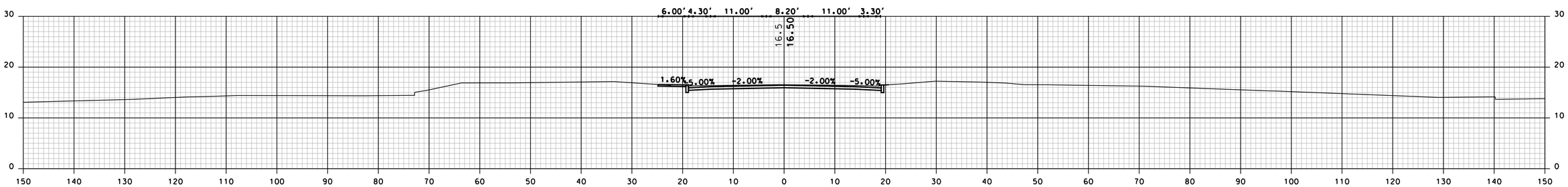
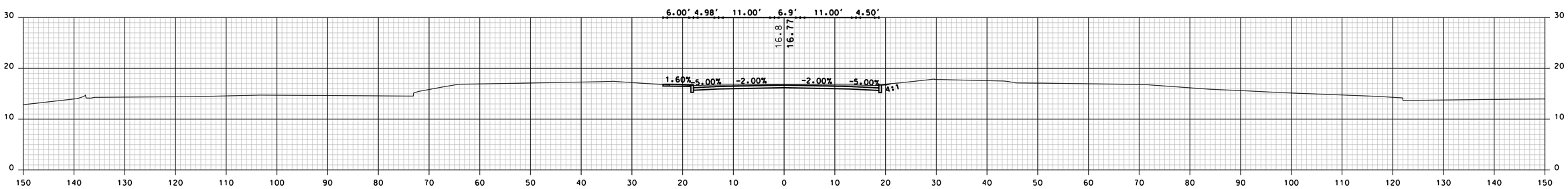


5099+50



5099+00

REHAB BRIDGE SECTIONS

STA. 5099+00 TO STA. 5100+50

CONCEPTUAL PLANS
3/11/2020

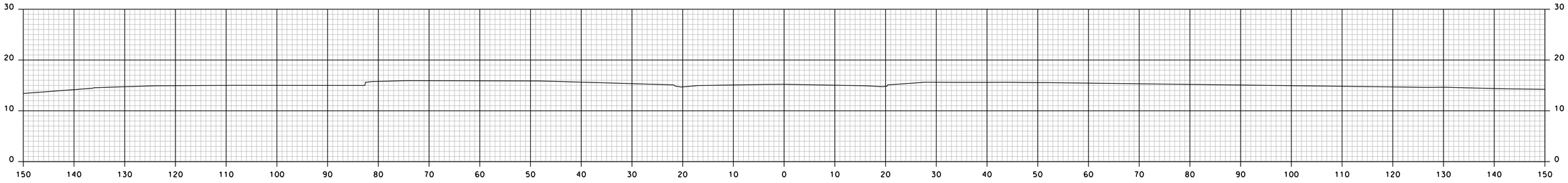
SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	16	17

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



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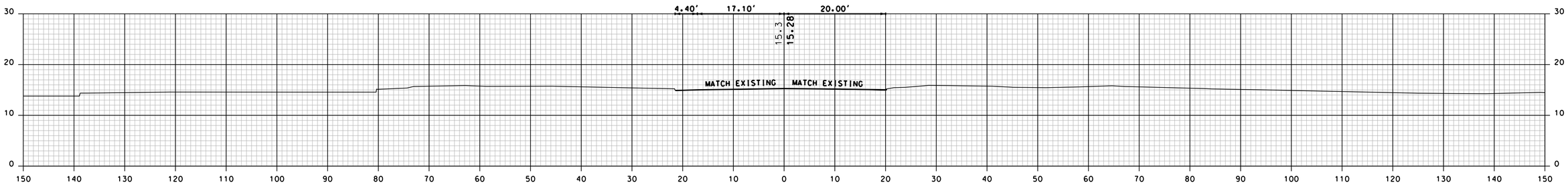
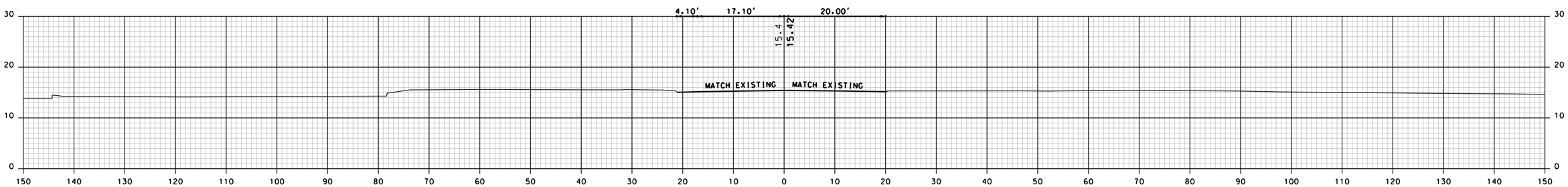
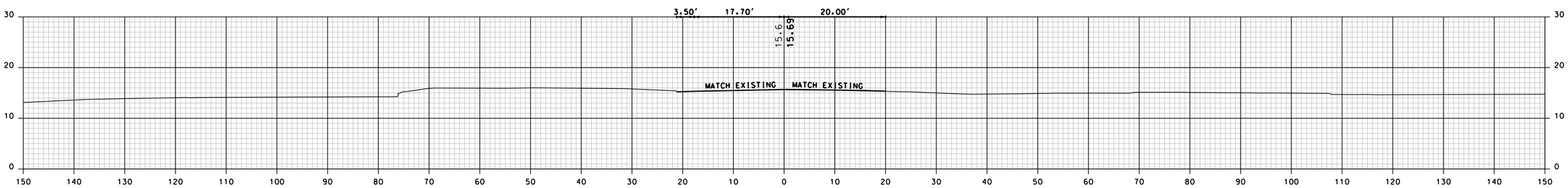


5102+00



5101+50



5101+00

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

SDR PROCESSED

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

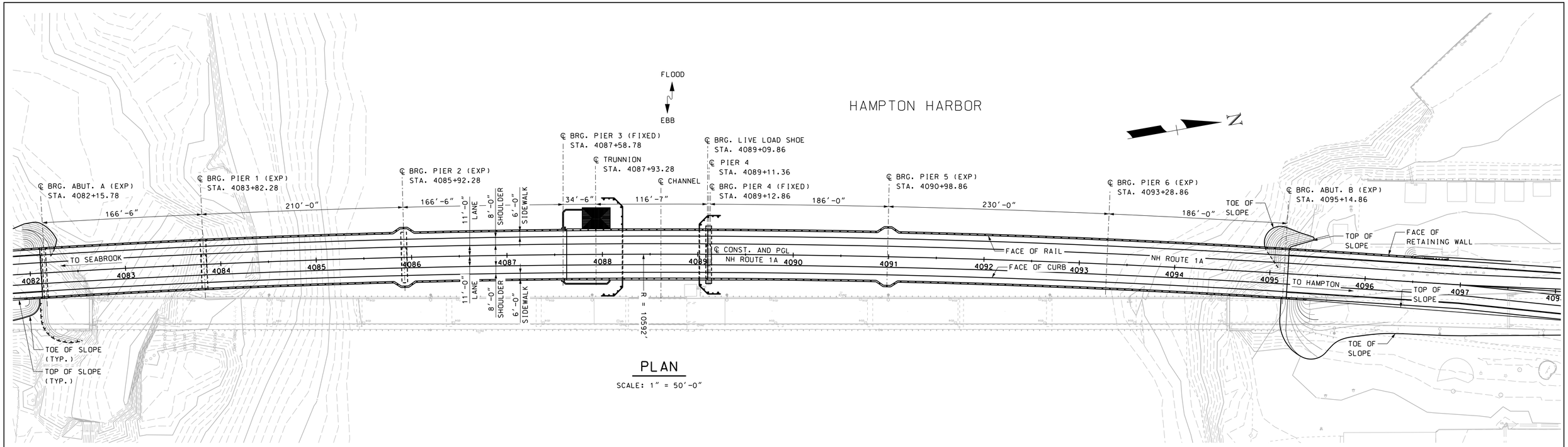
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	17	17

REHAB BRIDGE SECTIONS

STA. 5101+00 TO STA. 5102+50

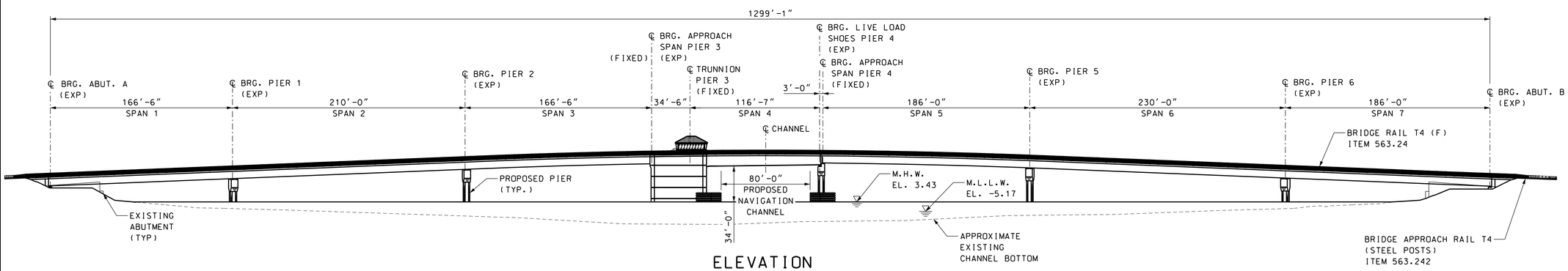
APPENDIX A2

Alternative 2 – Replacement with Movable Bridge



PLAN

SCALE: 1" = 50'-0"



ELEVATION

SCALE: 1" = 50'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

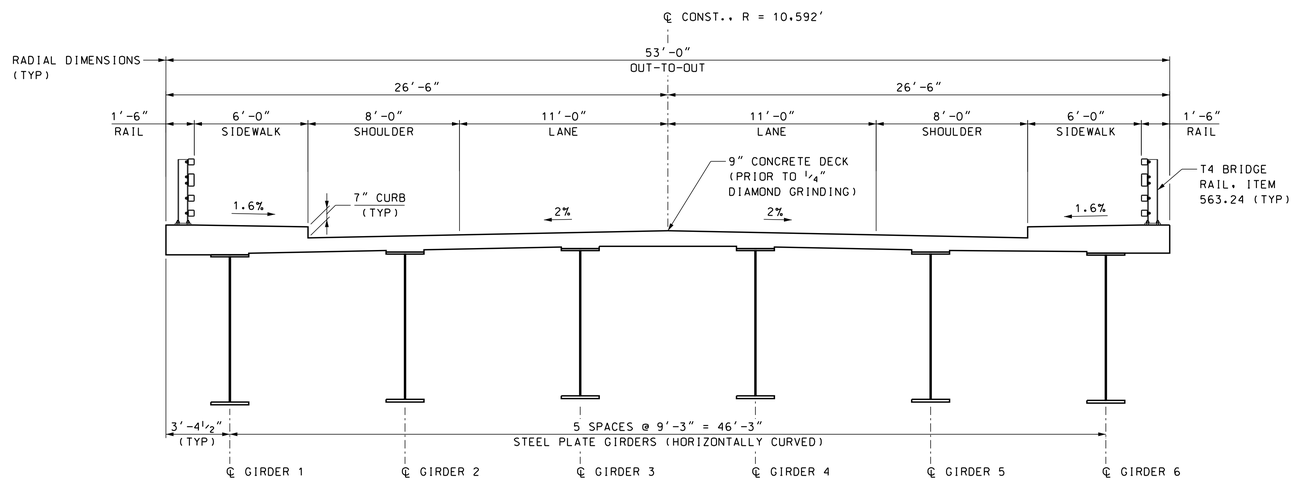
BASCULE BRIDGE GENERAL PLAN AND ELEVATION

BRIDGE SHEET 1 OF 9

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	09/19	CHECKED	SLB	09/19
	DRAWN	NDC	09/19	CHECKED	JFM	10/19
	QUANTITIES			CHECKED		

FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904brd_moveable	AS NOTED	REV. DATE	--	1	30



STEEL PLATE GIRDERS

SCALE: 1/4" = 1'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

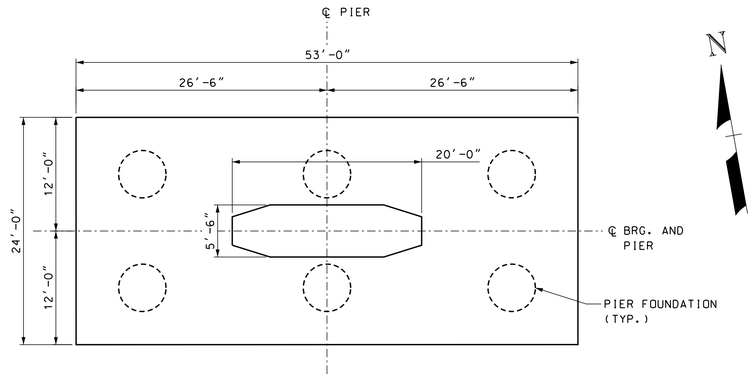
APPROACH BRIDGE TYPICAL SECTION

BRIDGE SHEET 2 OF 9

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	09/19	CHECKED	SLB	09/19
	DRAWN	NDC	09/19	CHECKED	JFM	10/19
	QUANTITIES			CHECKED		

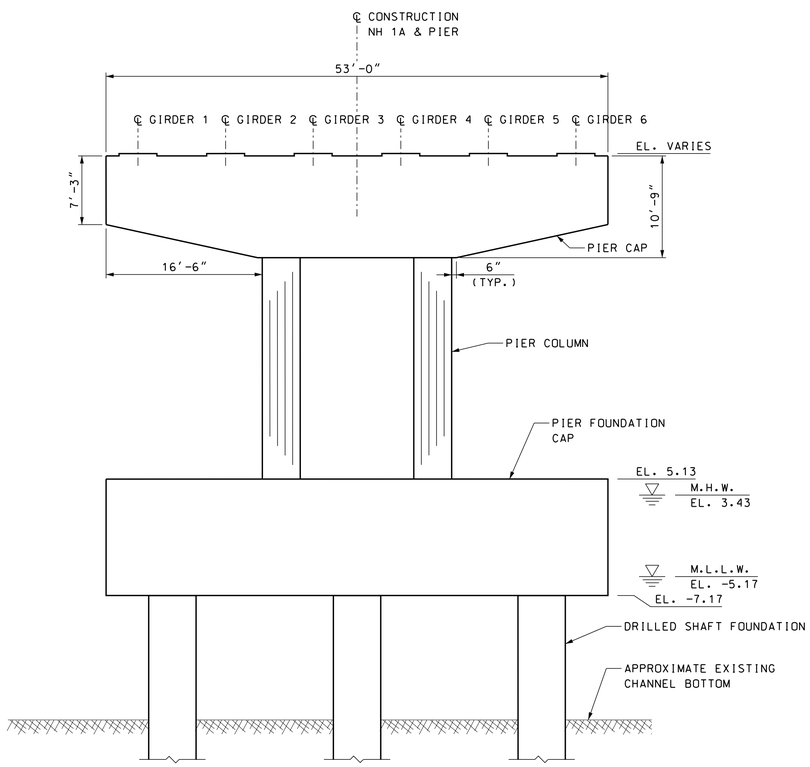
FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904brd_moveable	AS NOTED	REV. DATE	--	2	30



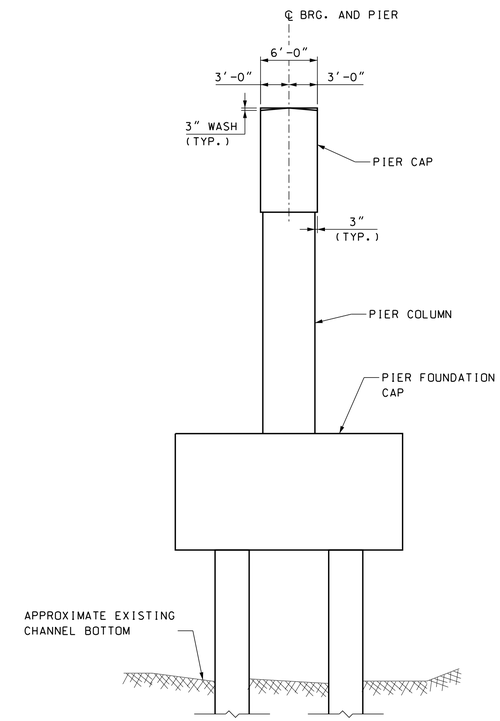
PIER FOOTING PLAN

SCALE: 1/8" = 1'-0"



SOUTH ELEVATION

SCALE: 1/8" = 1'-0"



PIER SECTION

SCALE: 1/8" = 1'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PIER PLAN AND ELEVATION

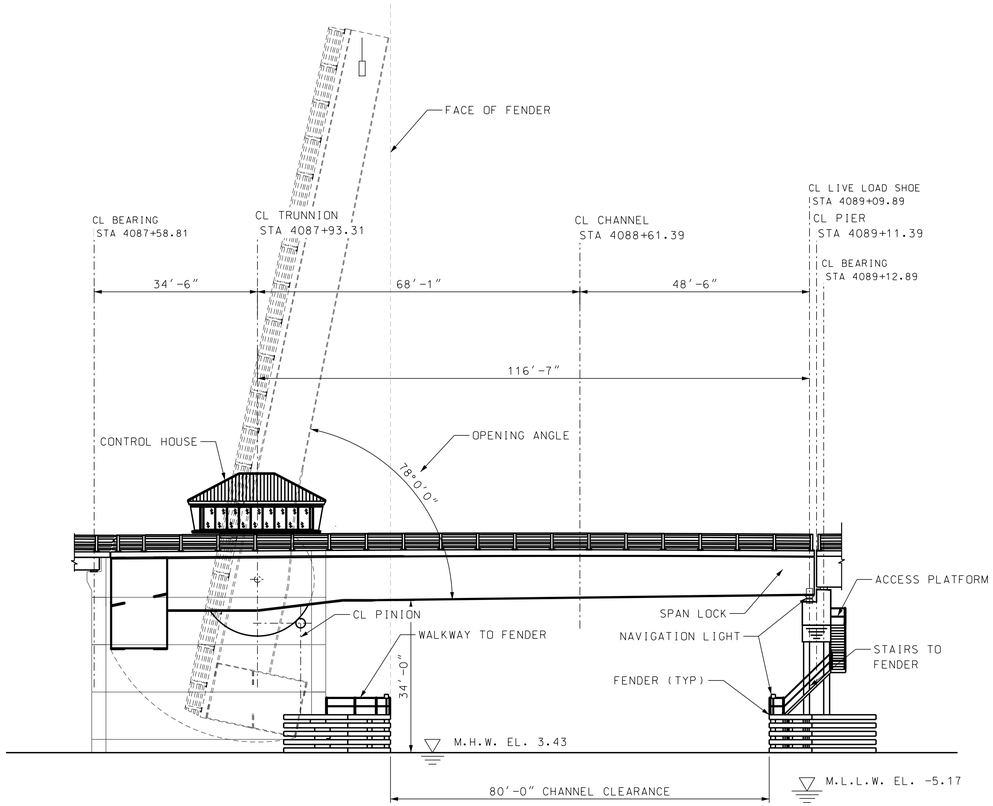
BRIDGE SHEET 3 OF 9

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	07/19	CHECKED	SLB	07/19
	DRAWN	NDC	07/19	CHECKED	JFM	10/19
	QUANTITIES			CHECKED		

FILE NUMBER -

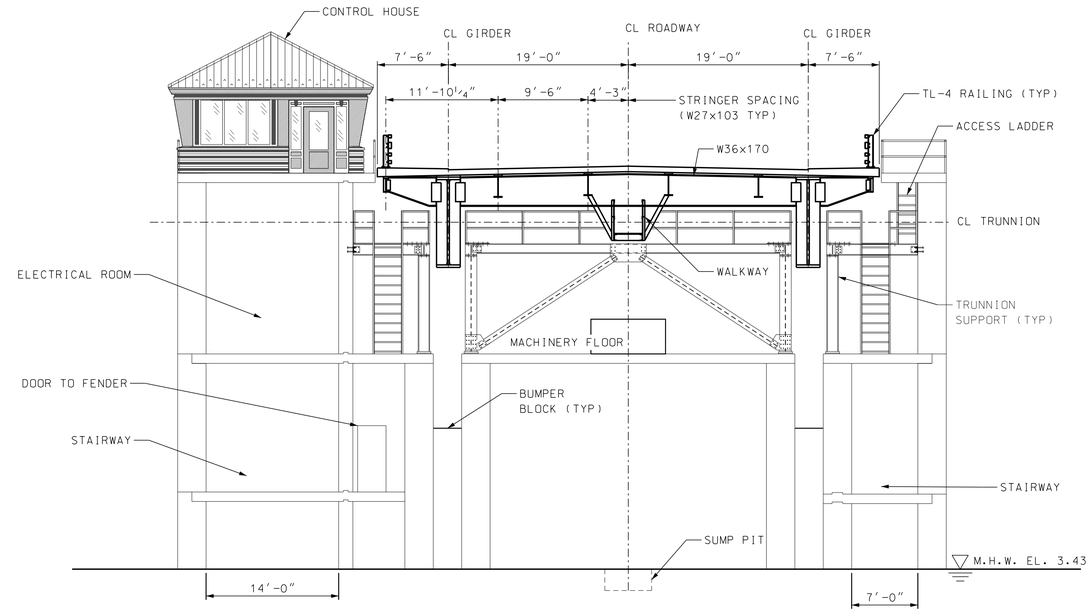
ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	3	30

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904Pier	AS NOTED



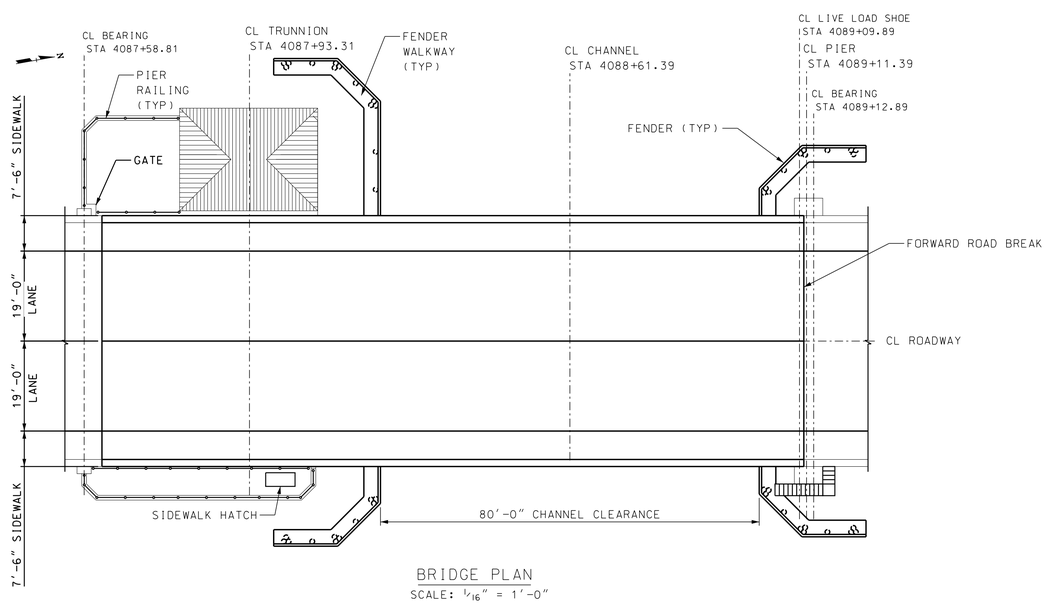
BRIDGE ELEVATION

SCALE: 1/16" = 1'-0"



CROSS SECTION THROUGH PIER

SCALE: 1/8" = 1'-0"



BRIDGE PLAN

SCALE: 1/16" = 1'-0"

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

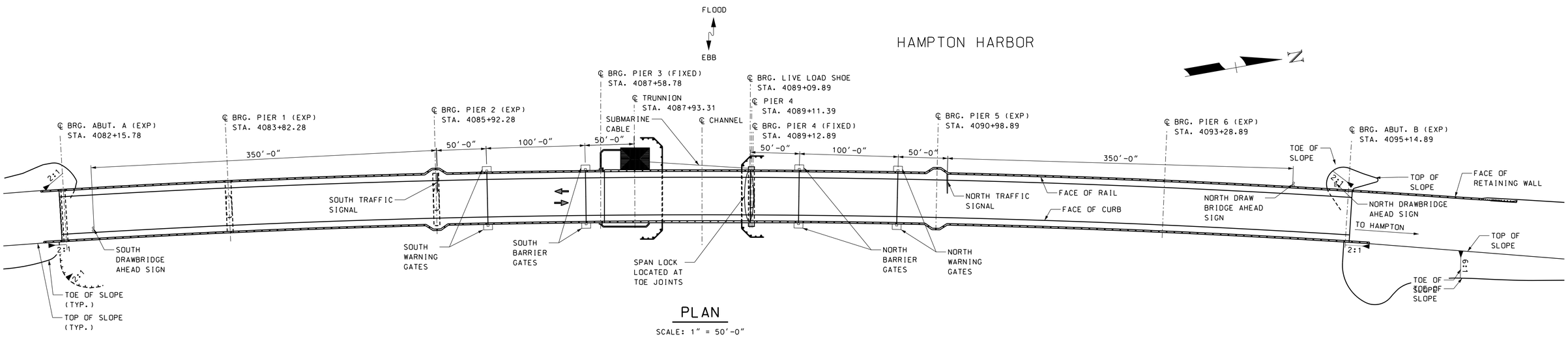
MOVABLE BRIDGE

BRIDGE SHEET 4 OF 9

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	SS	10/19	CHECKED	SS	10/19
	DRAWN	SS	10/19	CHECKED	HFP	10/19
	QUANTITIES			CHECKED		

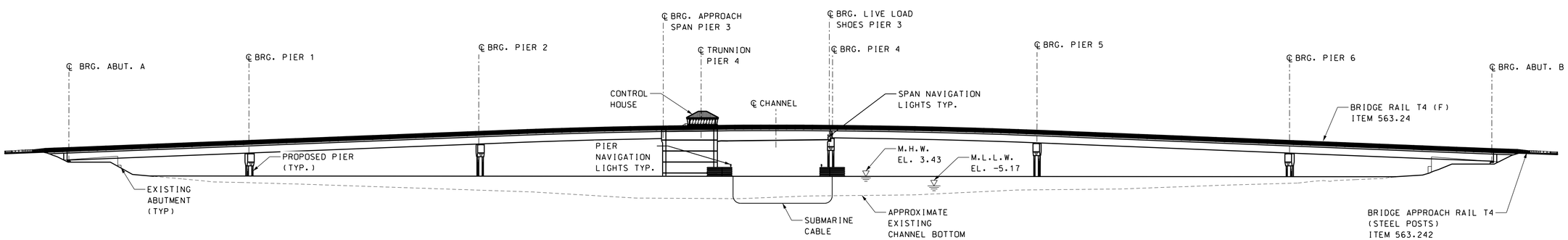
FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	Pier	AS NOTED	REV. DATE	--	4	30



PLAN

SCALE: 1" = 50'-0"



ELEVATION

SCALE: 1" = 50'-0"

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

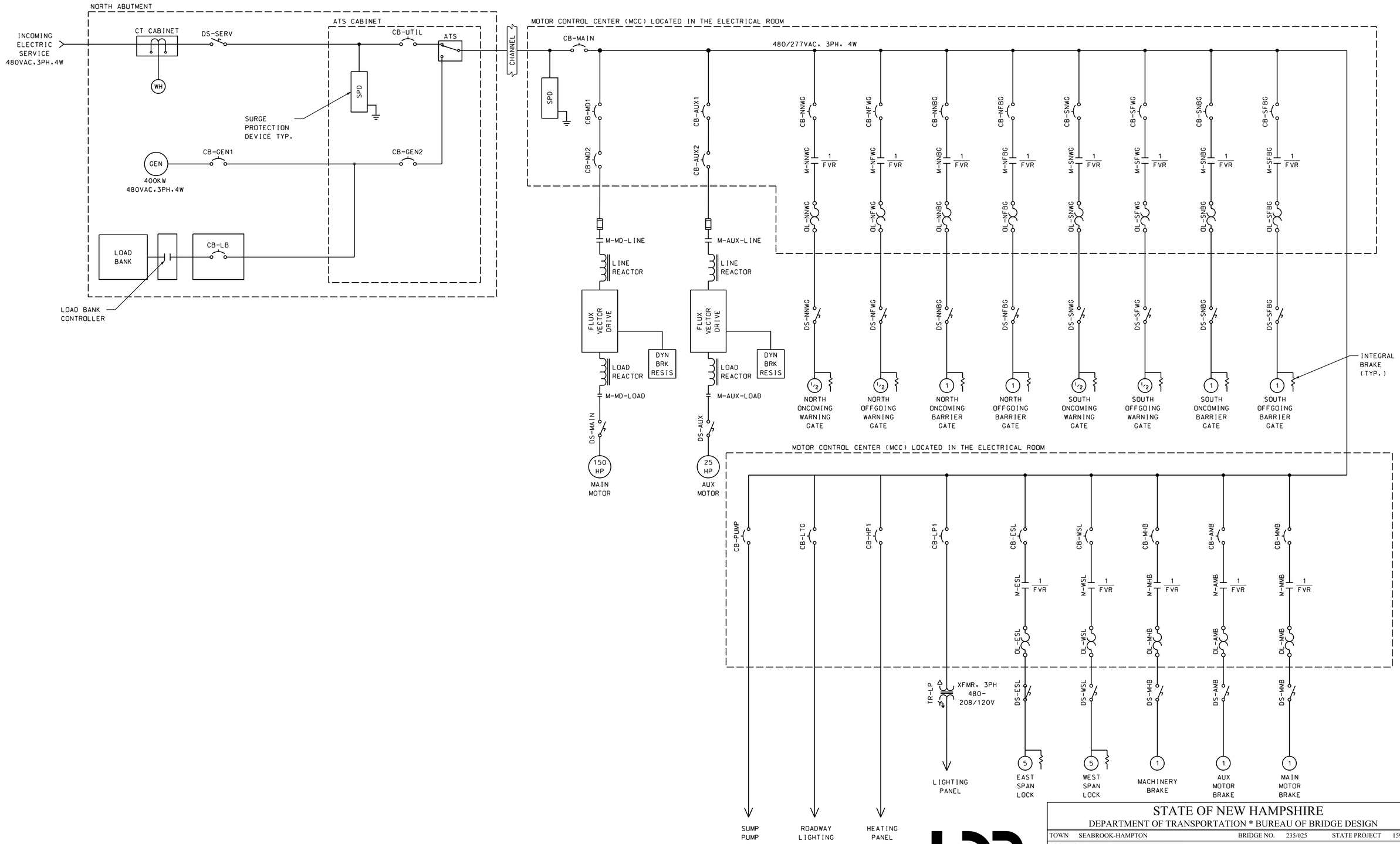
ELECTRICAL GENERAL PLAN AND ELEVATION

BRIDGE SHEET 5 OF 9

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	YA	10/19	CHECKED	KH	10/19
	DRAWN	YA	10/19	CHECKED	KH	10/19
	QUANTITIES			CHECKED		

FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904brd_GP&E	AS NOTED	REV. DATE	--	5	30



ONE LINE DIAGRAM

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904brd_one line diagram	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

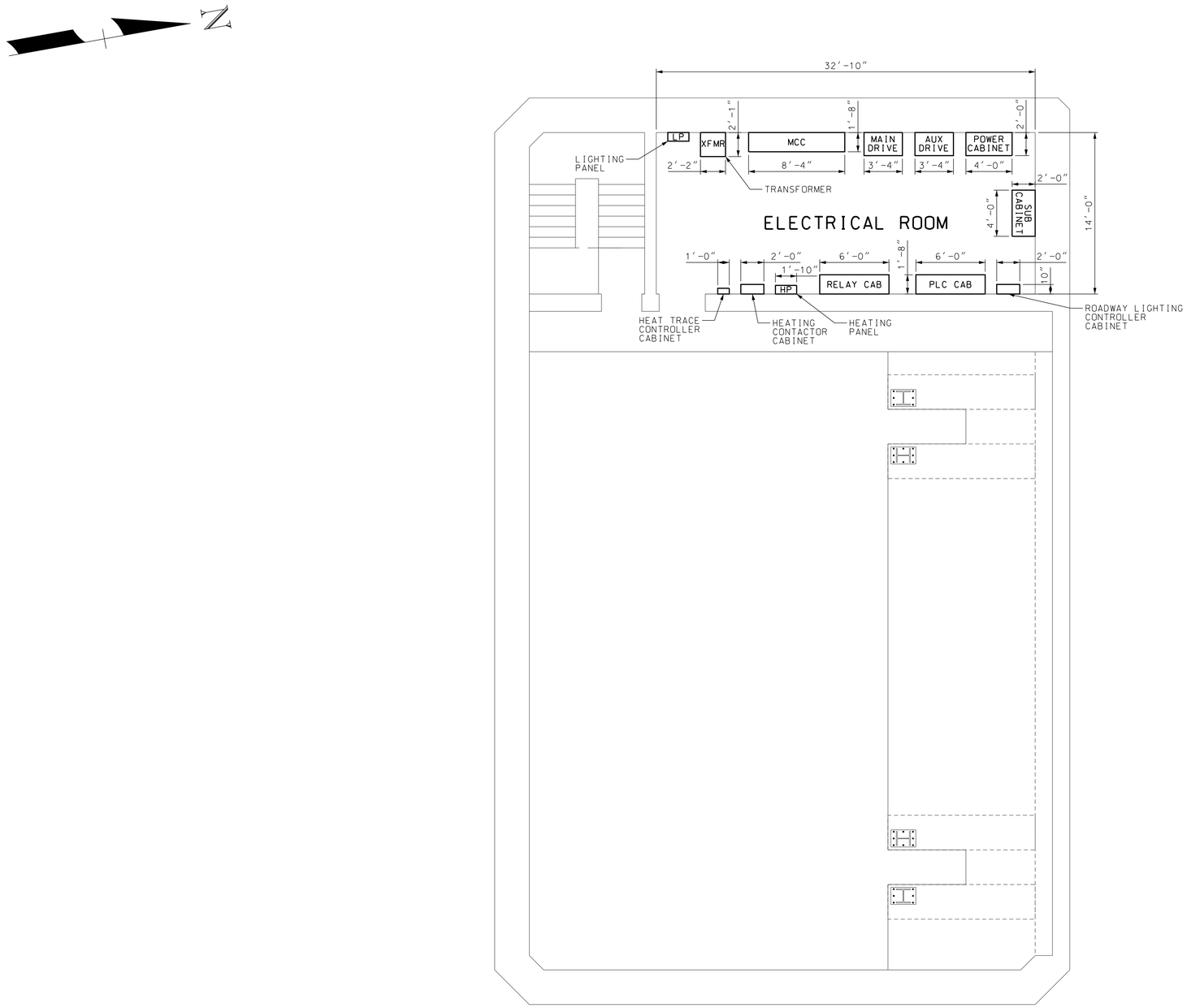
ONE LINE DIAGRAM

BRIDGE SHEET 6 OF 9

FILE NUMBER -

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	YA	10/19	CHECKED	KH	10/19
	DRAWN	YA	10/19	CHECKED	KH	10/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	6	30



ELECTRICAL ROOM LAYOUT

SCALE: 3/16" = 1'-0"

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

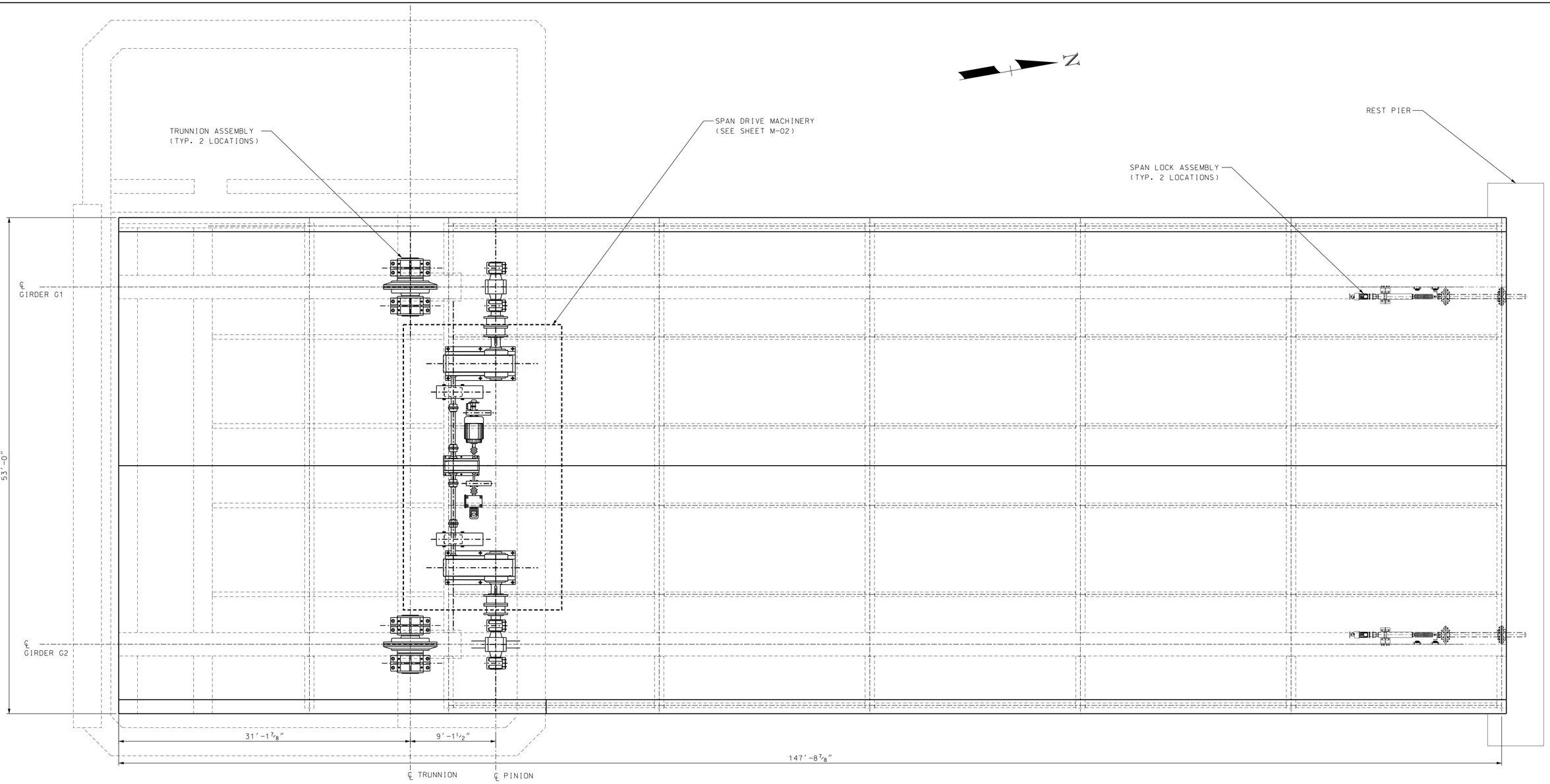
ELECTRICAL ROOM LAYOUT

BRIDGE SHEET 7 OF 9

FILE NUMBER -

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	YA	10/19	CHECKED	KH	10/19
	DRAWN	YA	10/19	CHECKED	KH	10/19
	QUANTITIES			CHECKED		

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904brd_room layout	AS NOTED	REV. DATE	--	7	30



MACHINERY LOCATION PLAN

SCALE: NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

BASCULE SPAN MACHINERY LOCATION

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	IZ	09/19	CHECKED	PJJ	09/19
	DRAWN	IZ	09/19	CHECKED	PJJ	09/19
	QUANTITIES			CHECKED		

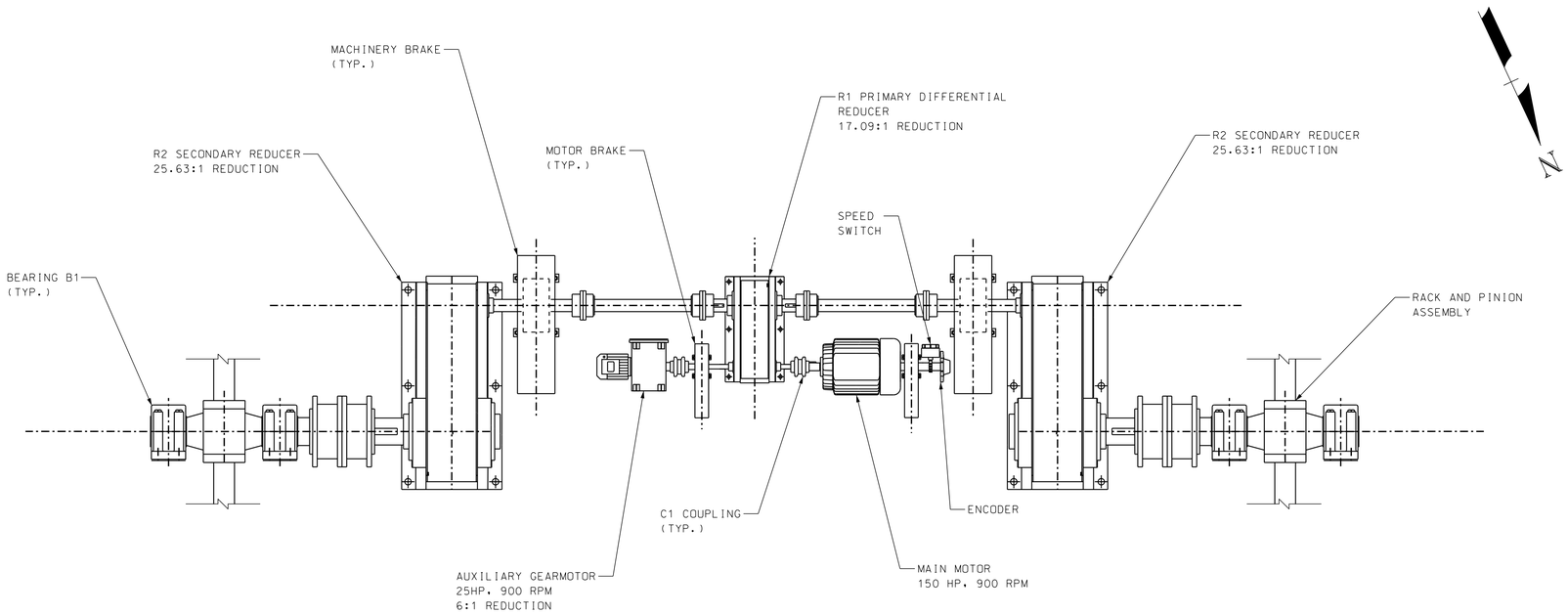
ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.
REV. DATE	--	8

BRIDGE SHEET 8 OF 9

FILE NUMBER -

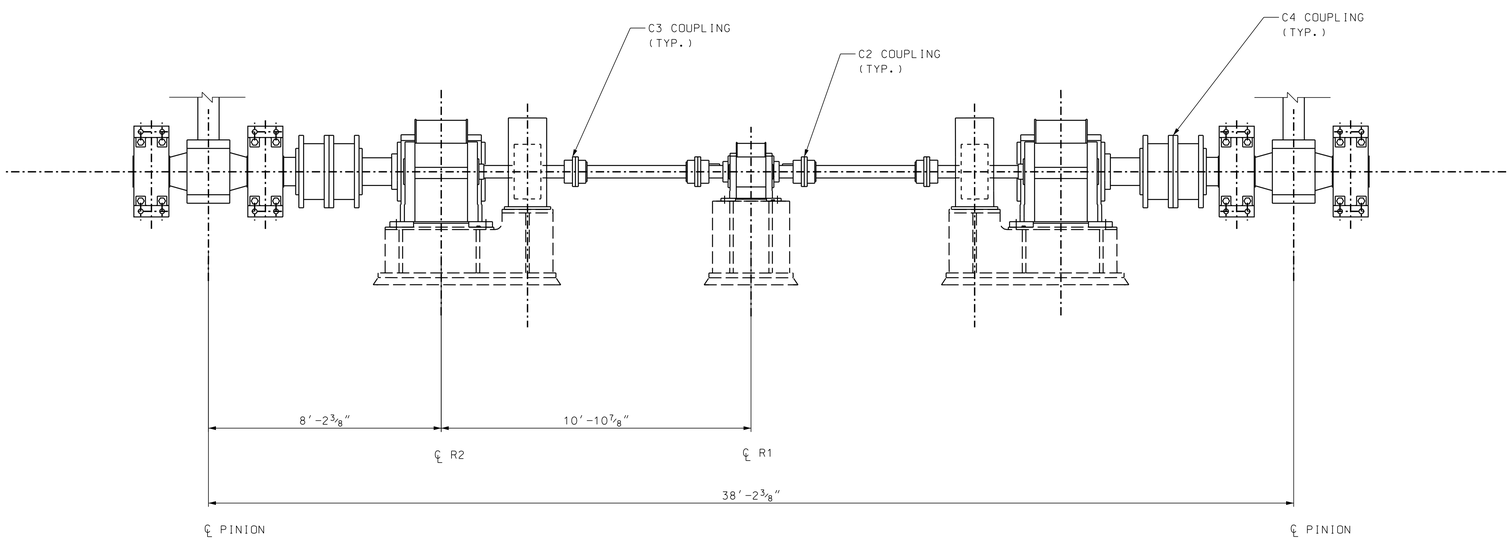
TOTAL SHEETS 30

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	M-01 Bascule Span Machinery Location Plan	AS NOTED



SPAN DRIVE MACHINERY PLAN

SCALE: NOT TO SCALE



SPAN DRIVE MACHINERY ELEVATION

SCALE: NOT TO SCALE
(MOTORS AND BRAKES NOT SHOWN FOR CLARITY)

MECHANICAL NOTES:

DETAILS OF MACHINERY SHALL CONFORM TO THE 2017 MOVABLE HIGHWAY BRIDGE DESIGN SPECIFICATIONS WITH INTERIM REVISIONS PUBLISHED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, UNLESS OTHERWISE NOTED.

OPERATING TIME:

THE OPERATING MACHINERY IS DESIGNED TO ACCELERATE THE SPAN SMOOTHLY, RUN AT CONSTANT SPEED, AND THEN DECELERATE SMOOTHLY FOR A NORMAL OPERATING TIME OF 90 SECONDS. THE AUXILIARY MACHINERY IS DESIGNED TO ACCELERATE THE SPAN SMOOTHLY, RUN AT CONSTANT SPEED, AND THEN DECELERATE SMOOTHLY FOR AN AUXILIARY OPERATING TIME OF 7.5 MINUTES.

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

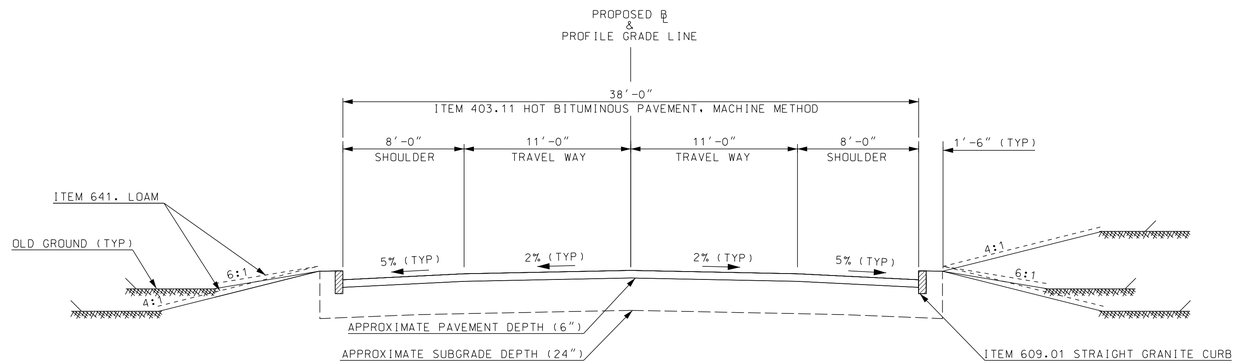
SPAN DRIVE MACHINERY ASSEMBLY

BRIDGE SHEET 9 OF 9

FILE NUMBER -

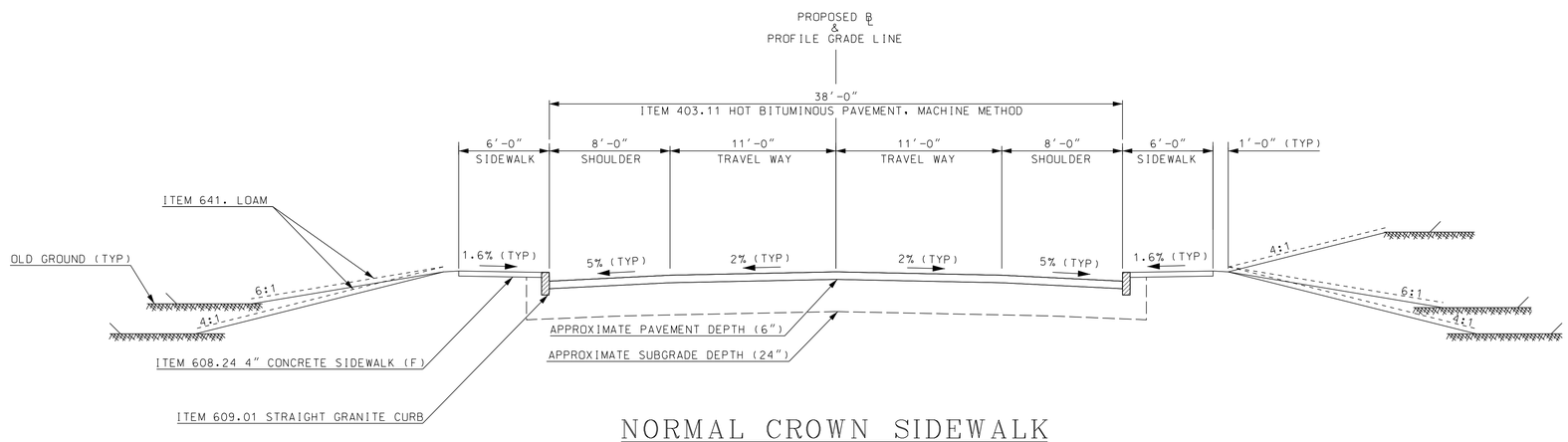
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	IZ	09/19	CHECKED	PJJ	09/19
	DRAWN	IZ	09/19	CHECKED	PJJ	09/19
	QUANTITIES			CHECKED		

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	M-02 Span Drive Machinery Assembly	AS NOTED	REV. DATE	--	9	30



NORMAL CROWN CURBED

NOT TO SCALE



NORMAL CROWN SIDEWALK

NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904typical	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

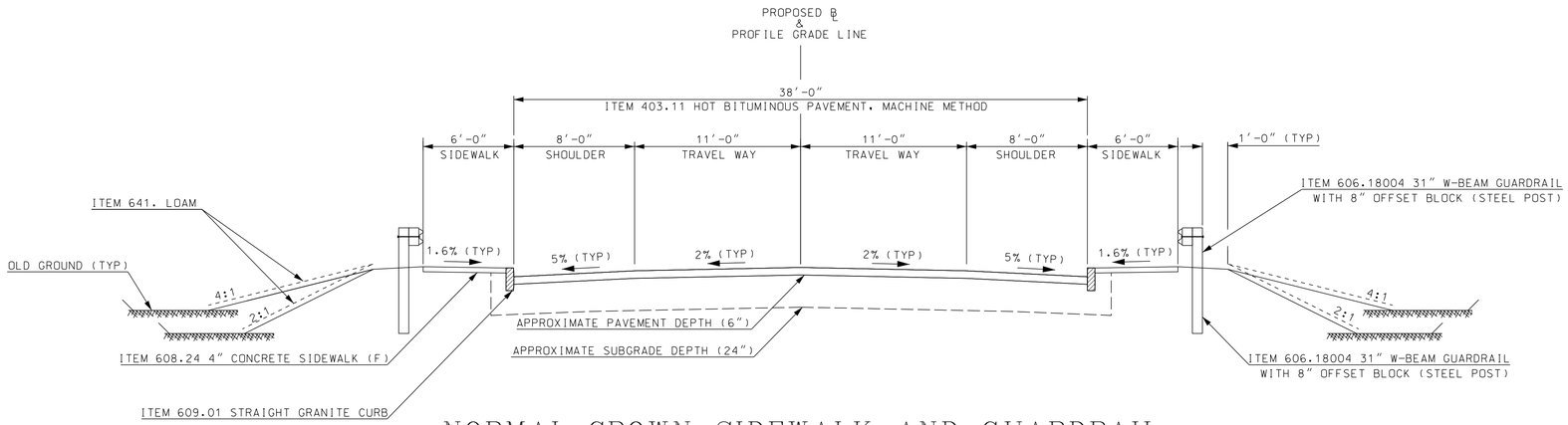
ROADWAY TYPICAL SECTIONS

SHEET 1 OF 4

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KLH	09/19	CHECKED	RDL	09/19
	DRAWN	KLH	09/19	CHECKED	RDL	09/19
	QUANTITIES			CHECKED		

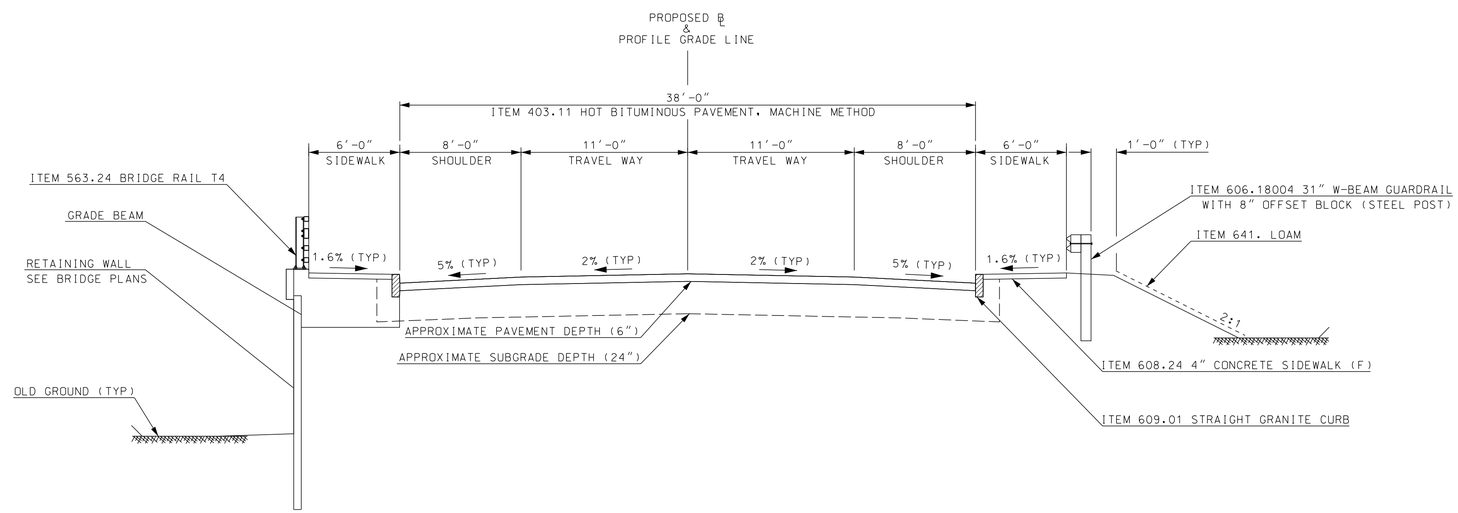
FILE NUMBER -

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	10	30



NORMAL CROWN SIDEWALK AND GUARDRAIL

NOT TO SCALE



NORMAL CROWN SIDEWALK, GUARDRAIL & RETAINING WALL

NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904typical	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

ROADWAY TYPICAL SECTIONS

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KLH	09/19	CHECKED	RDL	09/19
	DRAWN	KLH	09/19	CHECKED	RDL	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	11	30

SHEET 2 OF 4

FILE NUMBER -

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904gen_plan	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

GENERAL PLAN AND PROFILE (BASCULE ALT.)

SHEET 3 OF 4

REVISIONS AFTER PROPOSAL

	BY	DATE		BY	DATE
DESIGNED	KLH	09/19	CHECKED	CPD	09/19
DRAWN	KLH	09/19	CHECKED	RDL	09/19
QUANTITIES			CHECKED		

FILE NUMBER -

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	12	30

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904pvm_plan	AS NOTED

HDR

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON   BRIDGE NO. 235/025   STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

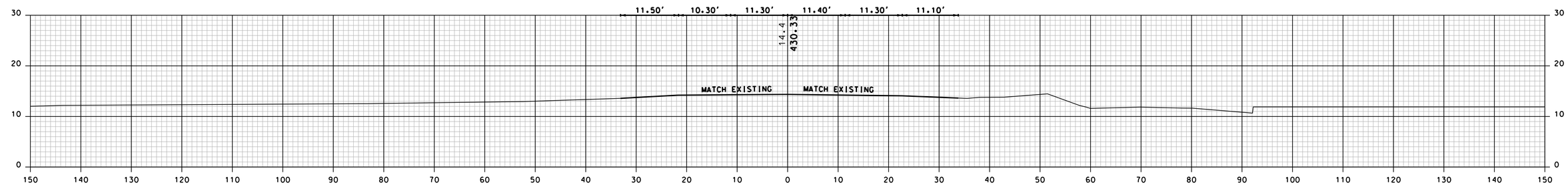
PAVEMENT MARKING PLAN (REPLACEMENT OPT.)

SHEET 4 OF 4

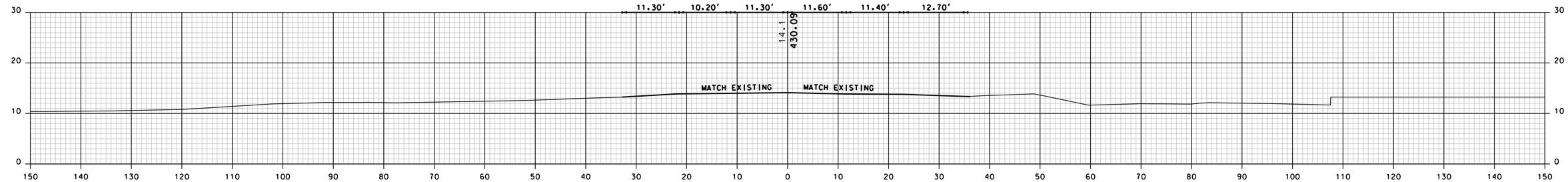
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KLH	09/19	CHECKED	RDL	09/19
	DRAWN	KLH	09/19	CHECKED	RDL	09/19
	QUANTITIES			CHECKED		

FILE NUMBER -

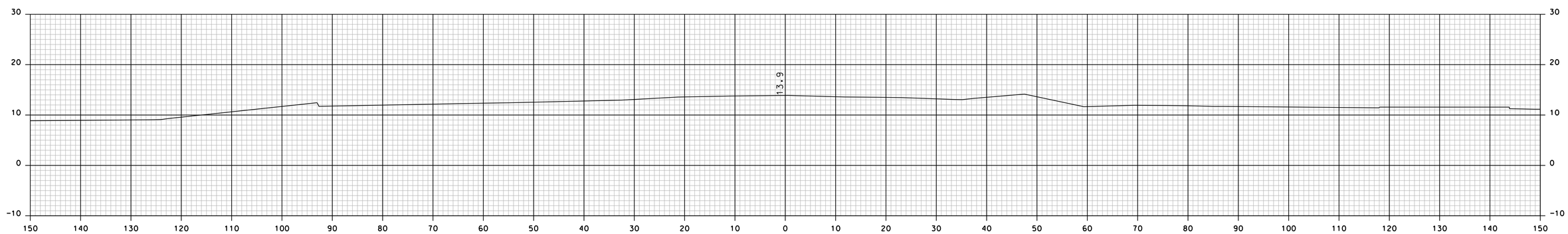
ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	13	30



4069+00



4068+50



4068+00

REVISIONS AFTER PROPOSAL			
NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

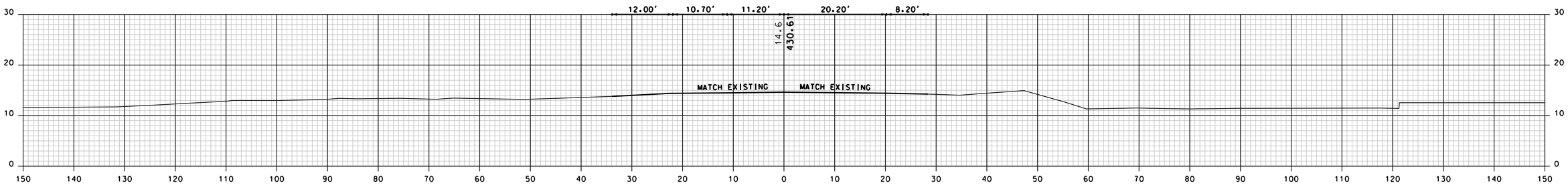
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	14	30

BASCULE BRIDGE SECTIONS

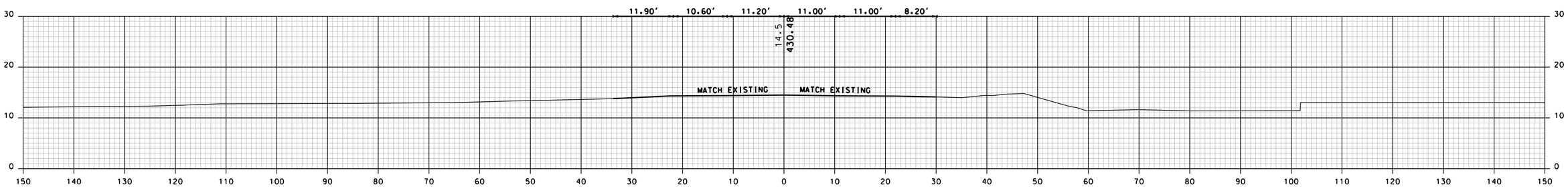
STA. 4068+00 TO STA. 4069+00

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION



4070+50



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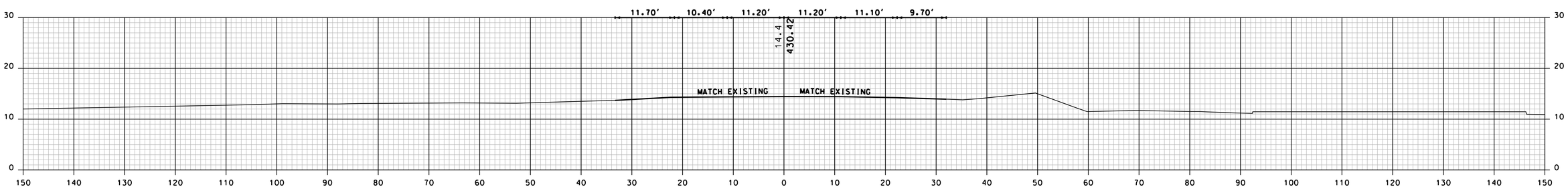


4069+50

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

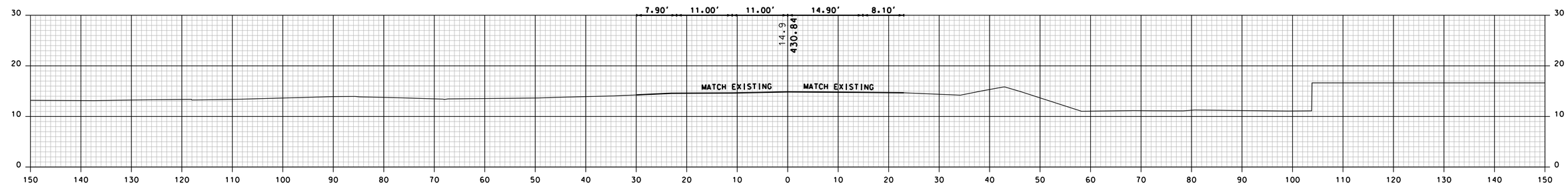
SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

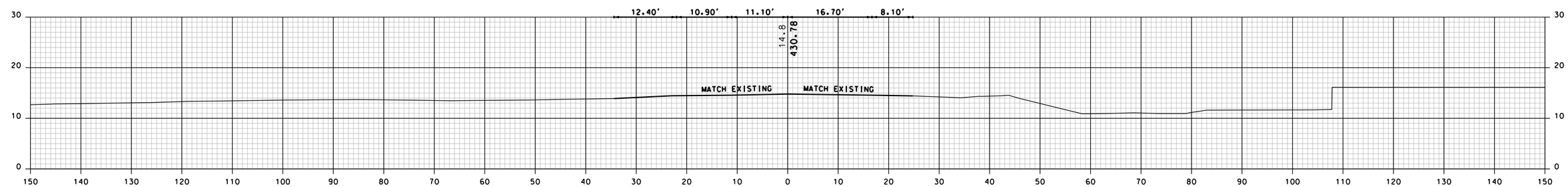
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	15	30

BASCULE BRIDGE SECTIONS

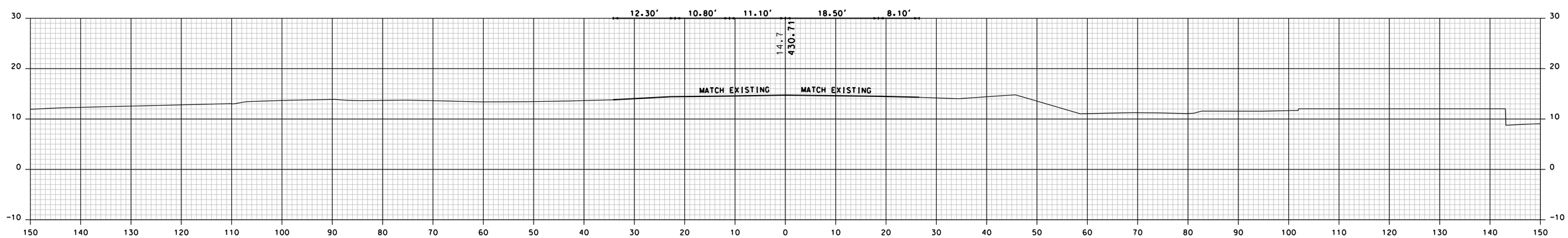
STA. 4069+50 TO STA. 4070+50



4072+00



4071+50



4071+00

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

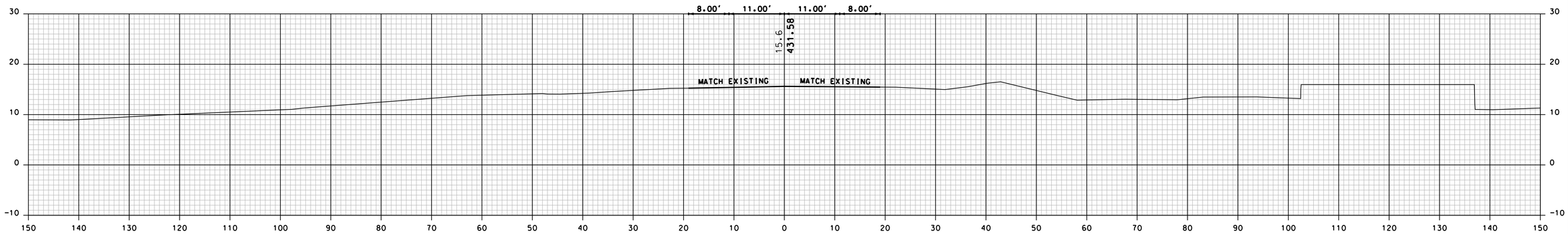
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	16	30

BASCULE BRIDGE SECTIONS

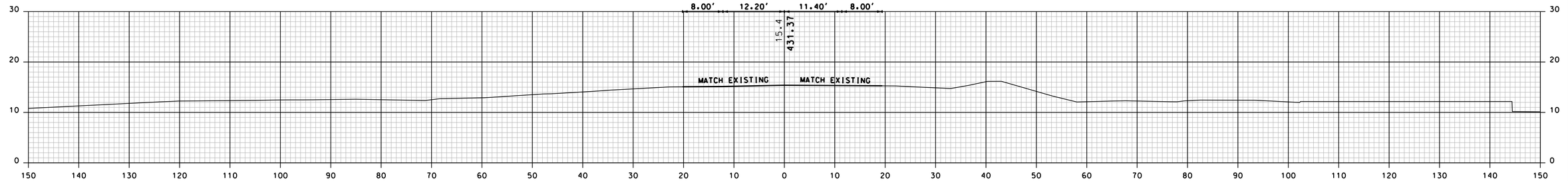
STA. 4071+00 TO STA. 4072+00

REVISIONS AFTER PROPOSAL

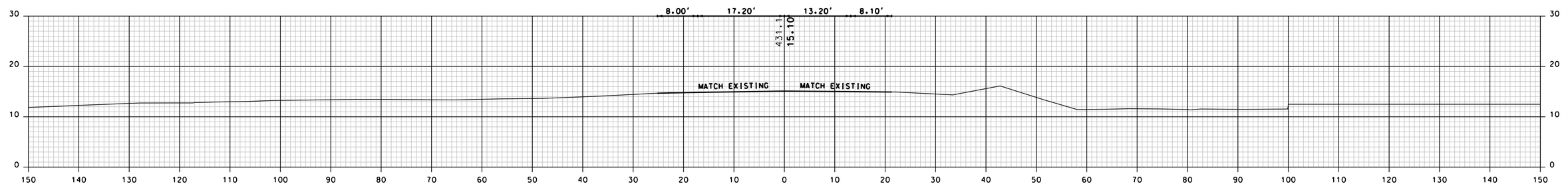
NUMBER	DATE	STATION	STATION	DESCRIPTION



4073+50



4073+00



4072+50

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	17	30

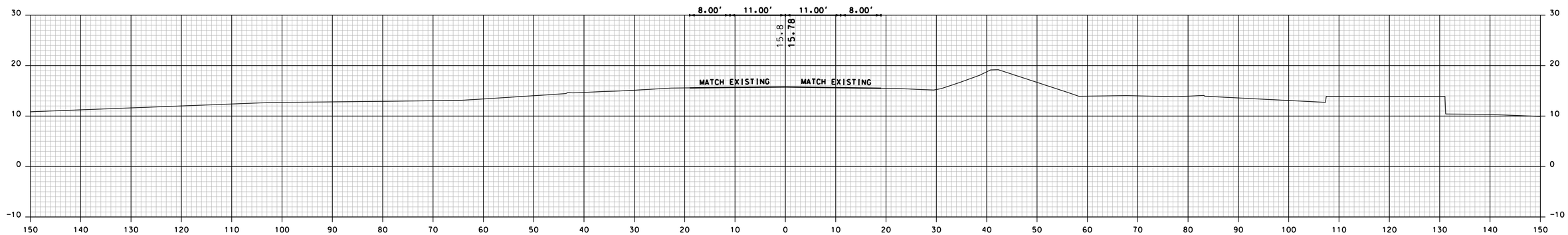
BASCULE BRIDGE SECTIONS

STA. 4072+50 TO STA. 4073+50

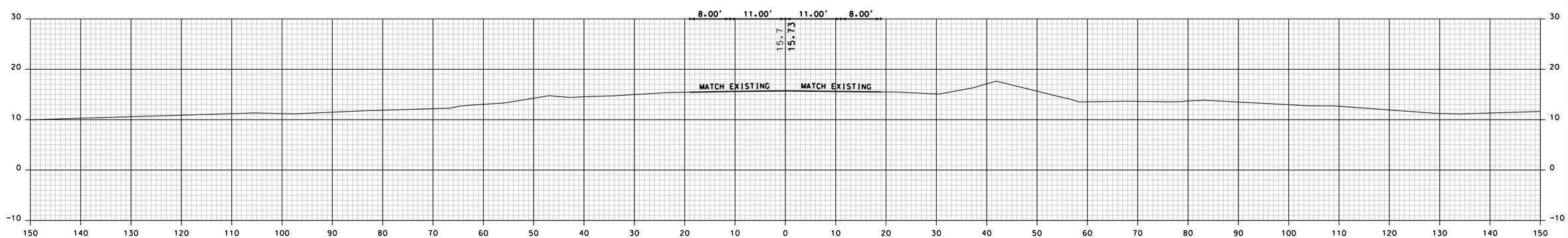
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



4074+50



4074+00

CONCEPTUAL PLANS
3/11/2020

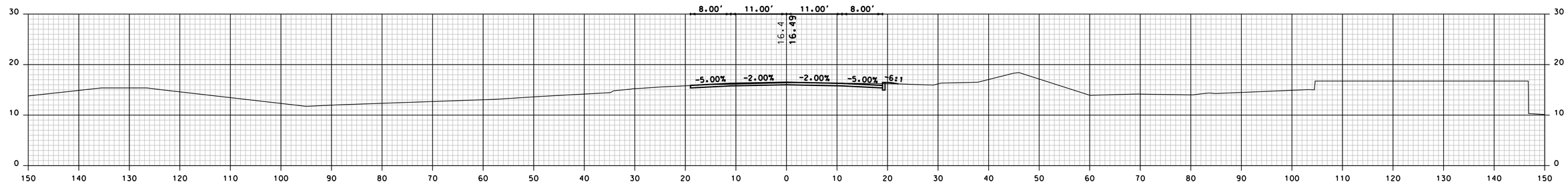
SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

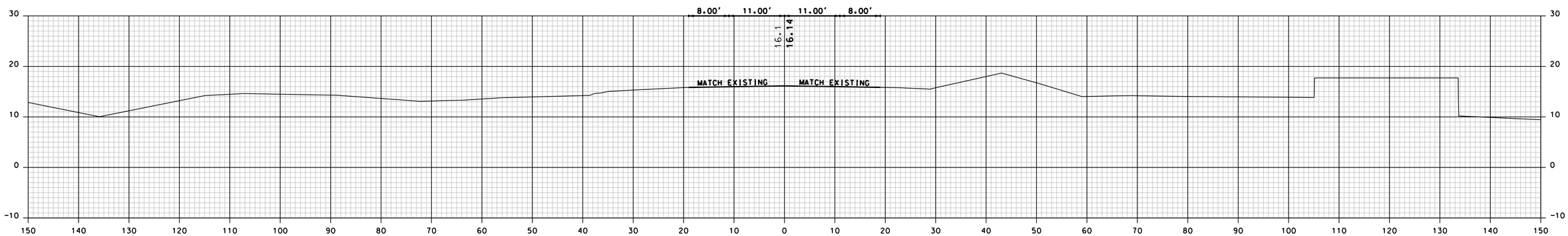
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	18	30

BASCULE BRIDGE SECTIONS

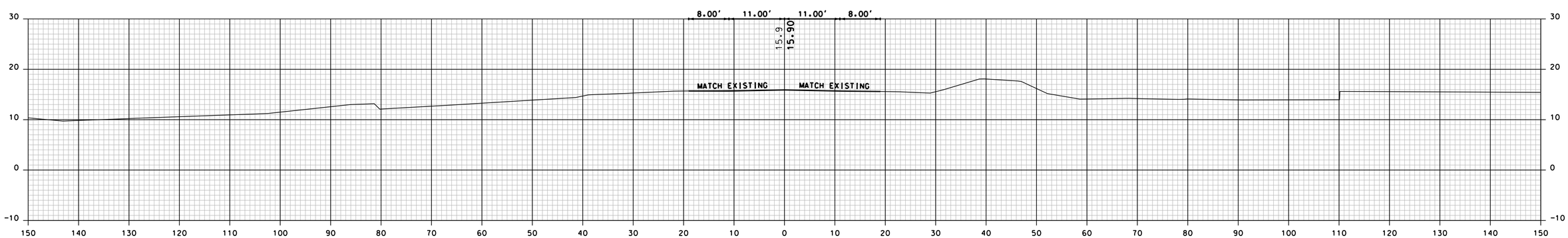
STA. 4074+00 TO STA. 4074+50



4076+00



4075+50



4075+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	19	30

BASCULE BRIDGE SECTIONS

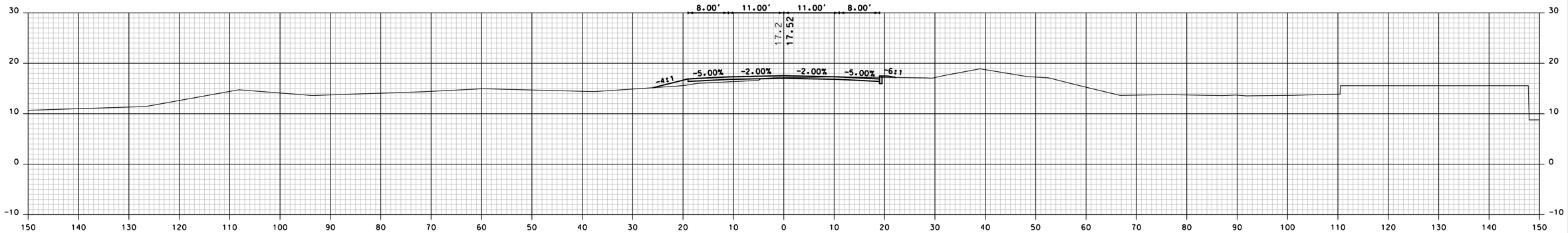
STA. 4075+00 TO STA. 4076+00

REVISIONS AFTER PROPOSAL

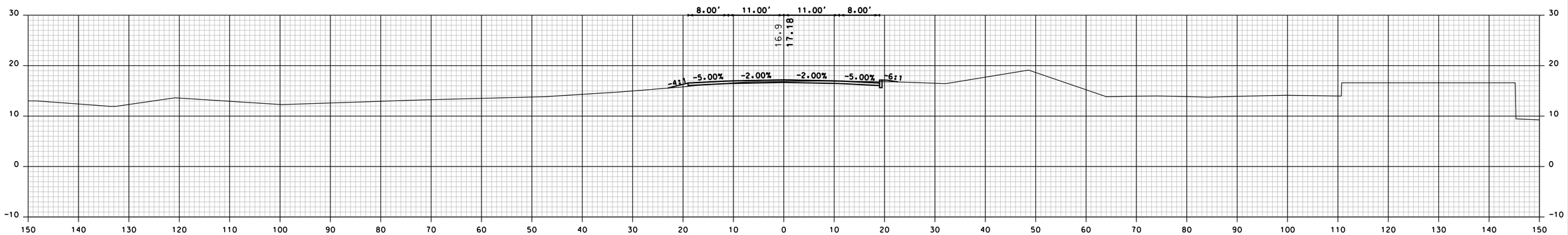
NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019

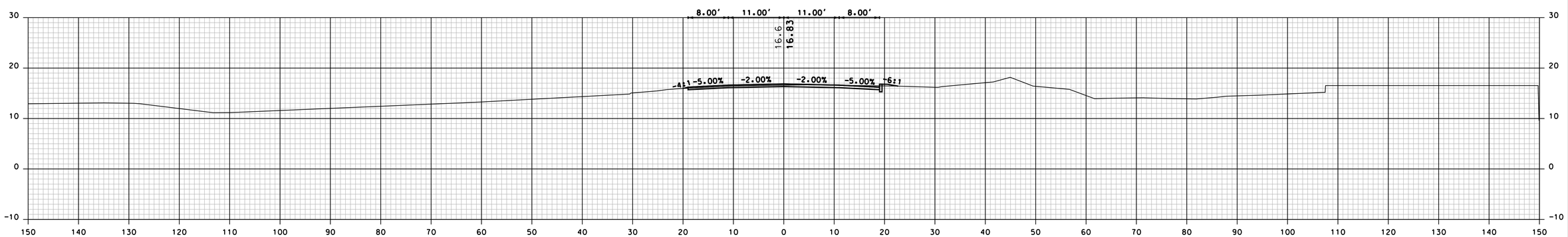
AS BUILT DETAILS DATE



4077+50



4077+00



4076+50

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	20	30

BASCULE BRIDGE SECTIONS

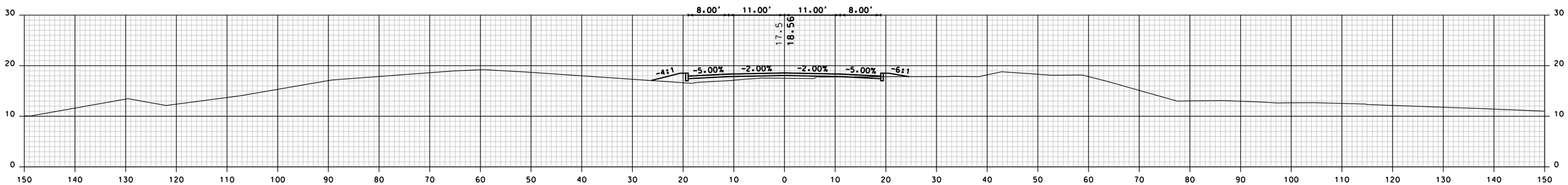
STA. 4076+50 TO STA. 4077+50

REVISIONS AFTER PROPOSAL

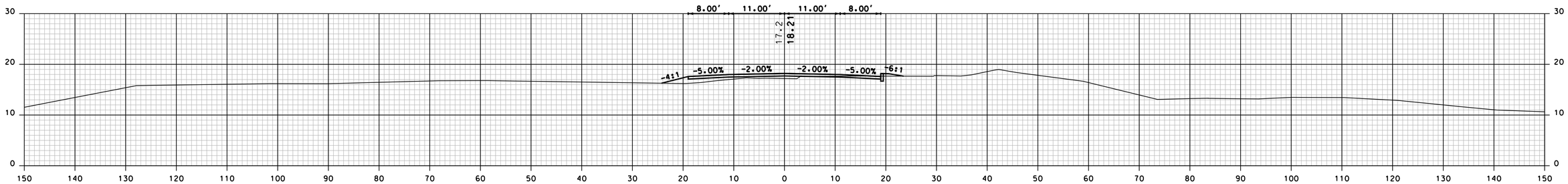
NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019

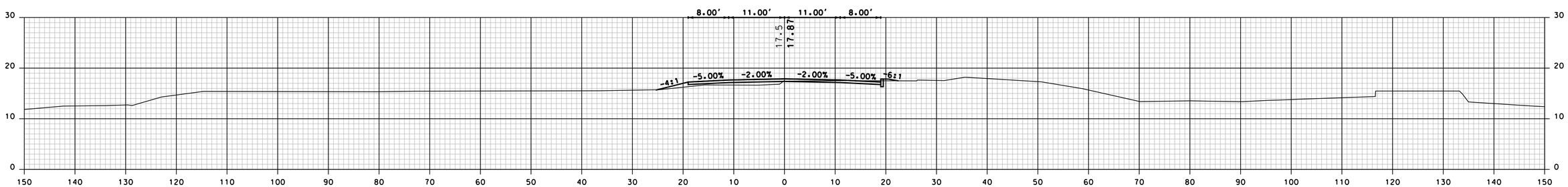
AS BUILT DETAILS DATE



4079+00



4078+50



4078+00

BASCULE BRIDGE SECTIONS

STA. 4078+00 TO STA. 4079+00

CONCEPTUAL PLANS
3/11/2020

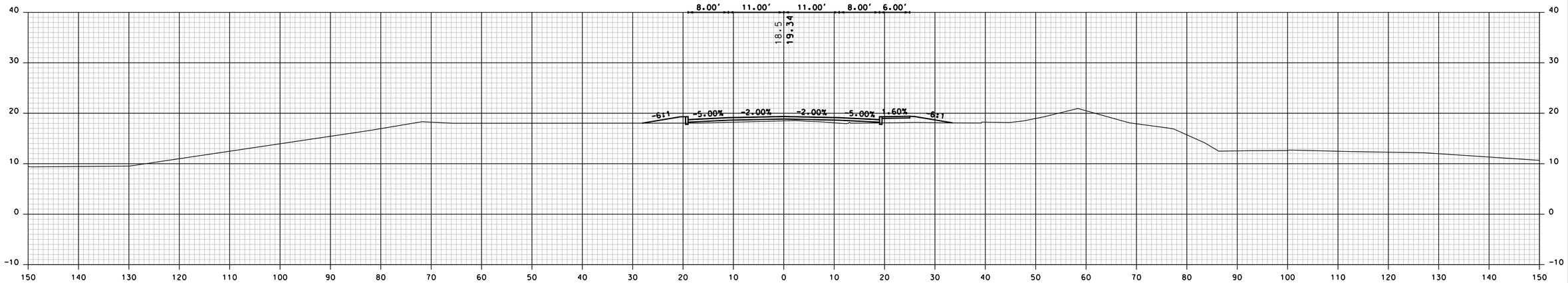
SHEET TOTALS			
COMMON EXCAV. – C.Y.	ROCK EXCAV. – C.Y.		
FILL – C.Y.	MUCK EXCAV. – C.Y.		
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	21	30

REVISIONS AFTER PROPOSAL

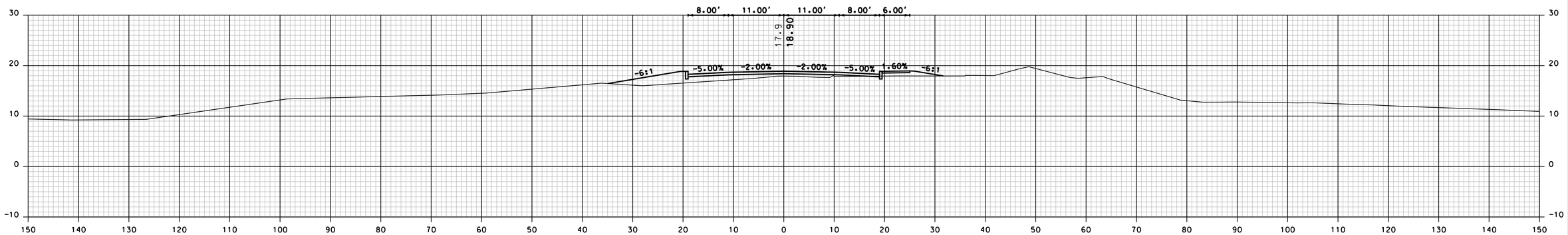
NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019

AS BUILT DETAILS DATE



4080+00



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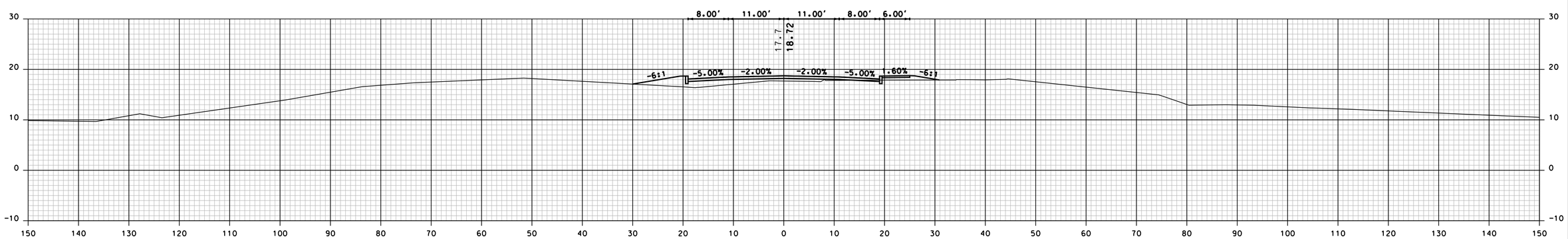


4079+23

BASCULE BRIDGE SECTIONS

STA. 4079+23 TO STA. 4080+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	22	30

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019

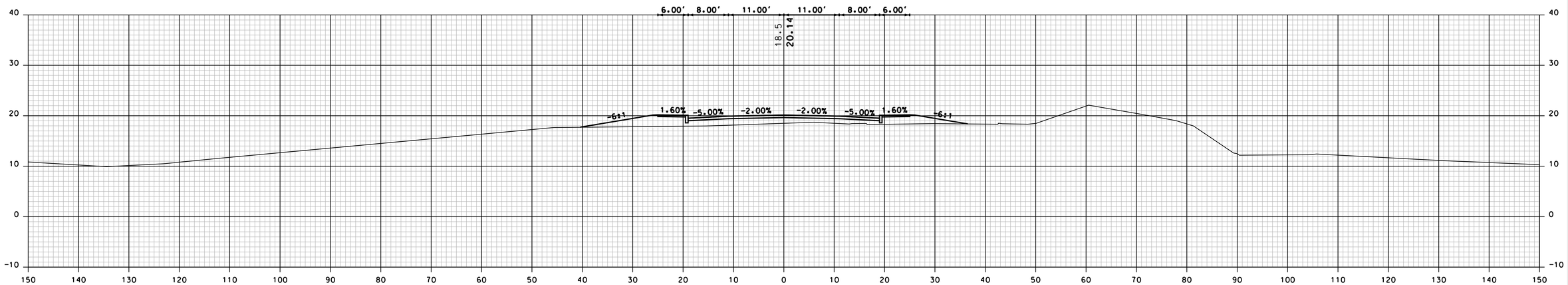
AS BUILT DETAILS DATE

REVISIONS AFTER PROPOSAL

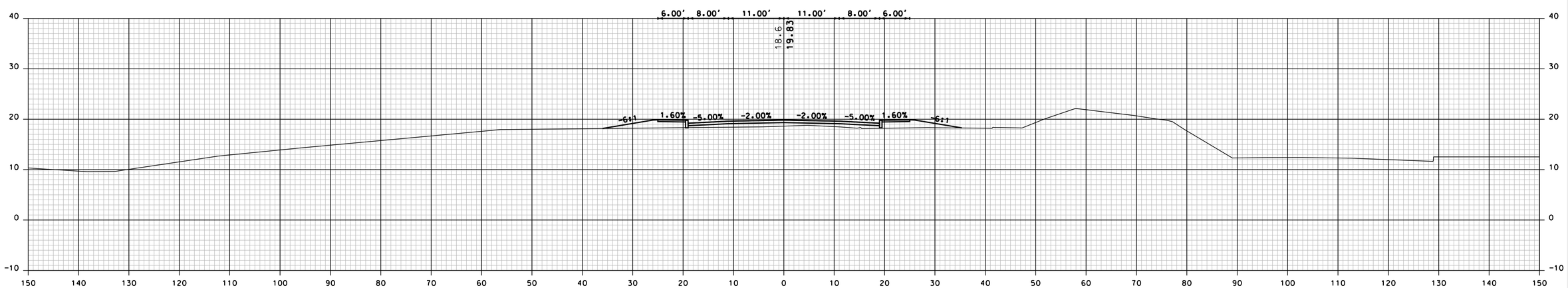
NUMBER	DATE	STATION	STATION	DESCRIPTION

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019

AS BUILT DETAILS DATE



4080+50



4080+33

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

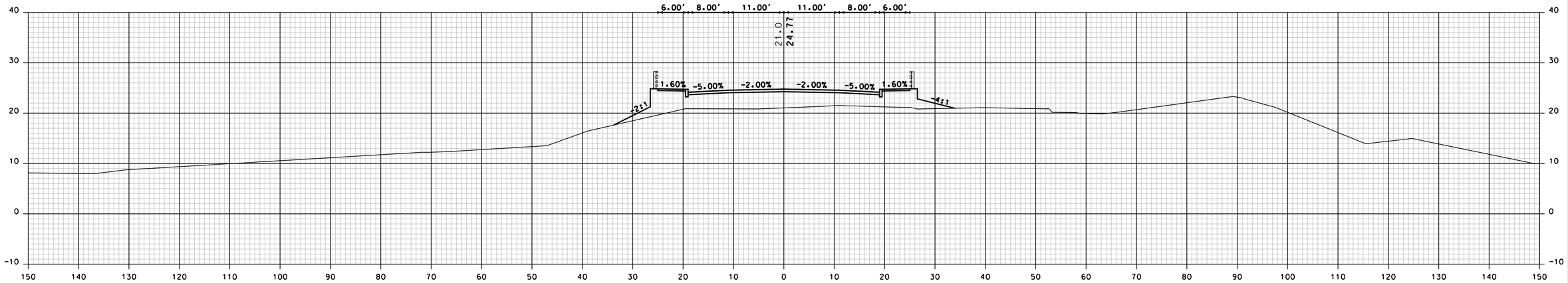
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	23	30

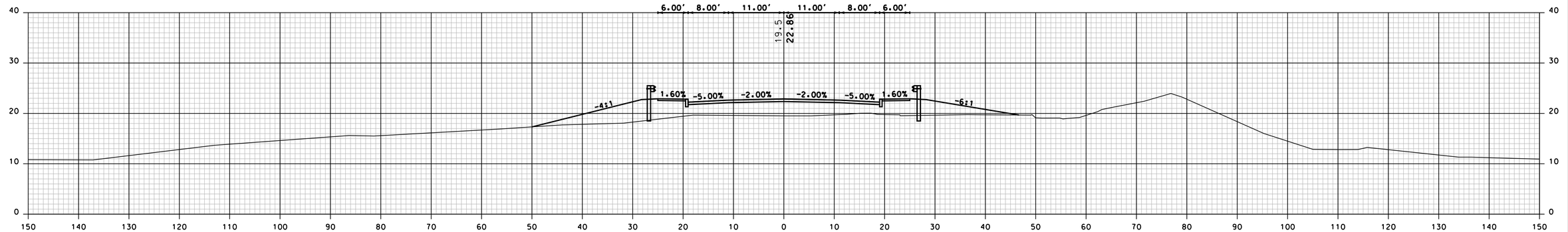
BASCULE BRIDGE SECTIONS

STA. 4080+33 TO STA. 4080+50

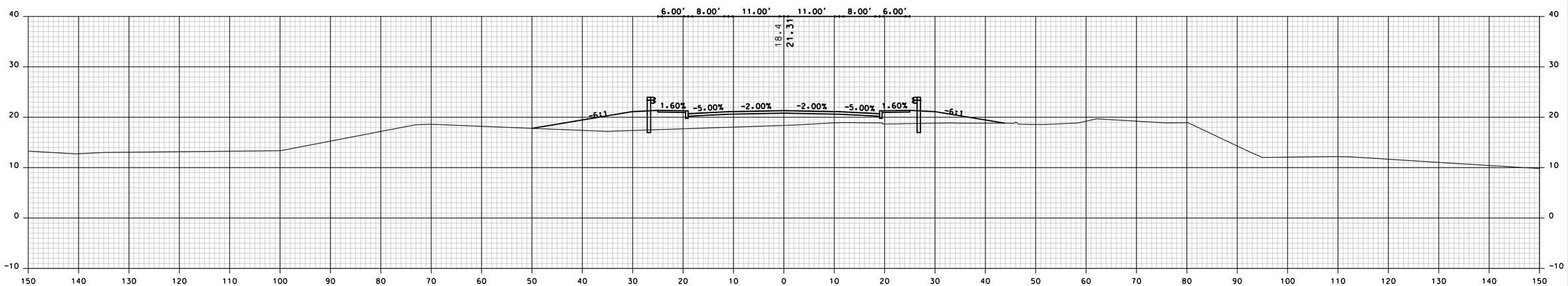
BEGIN BRIDGE STA. 4082+08.37



4082+00



4081+50



4081+00

BASCULE BRIDGE SECTIONS

STA. 4081+00 TO STA. 4082+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

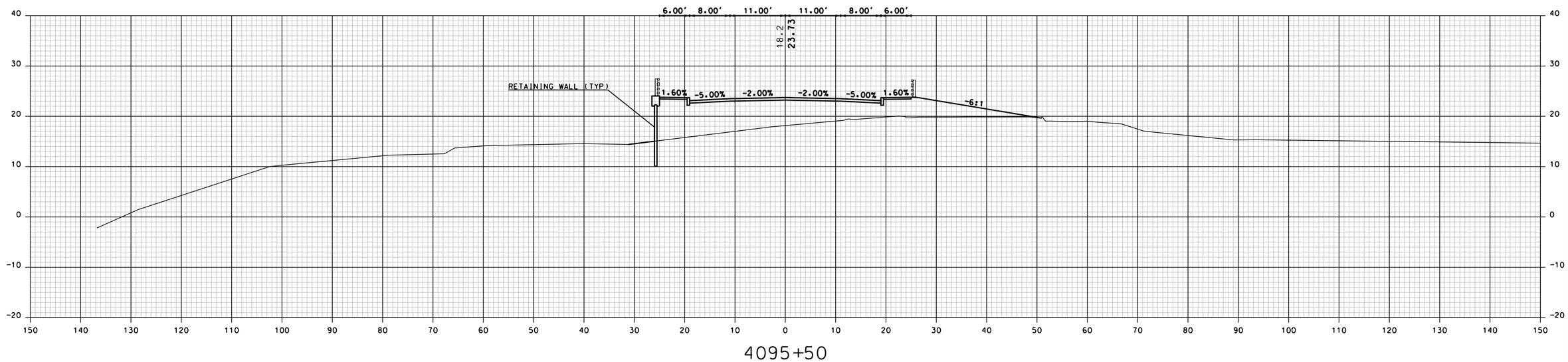
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	24	30

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019

AS BUILT DETAILS DATE



END BRIDGE STA. 4095+14.37

BASCULE BRIDGE SECTIONS

STA. 4095+00 TO STA. 4095+50

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

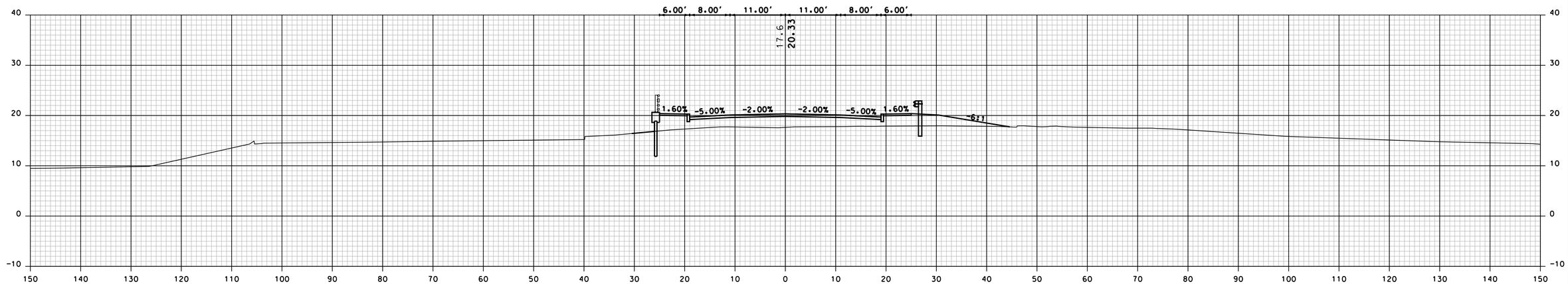
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	25	30

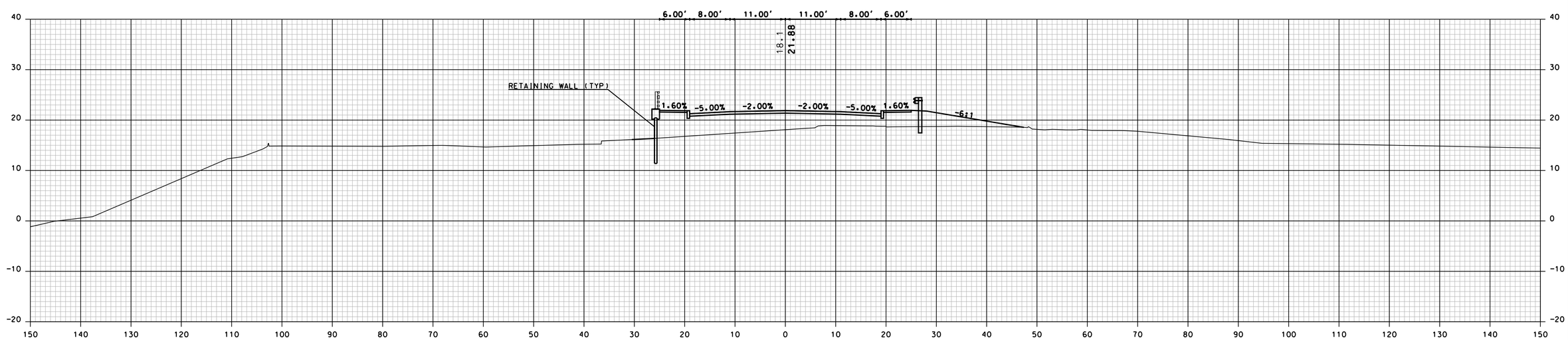
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



4096+50



4096+00

BASCULE BRIDGE SECTIONS

STA. 4096+00 TO STA. 4096+50

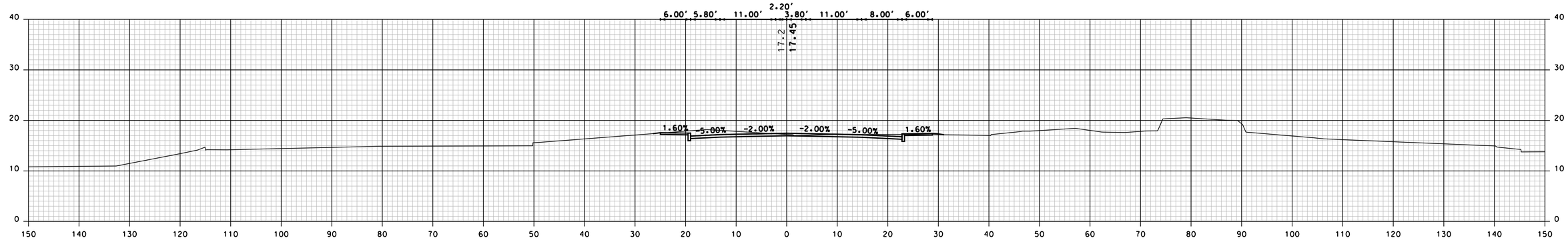
CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	26	30

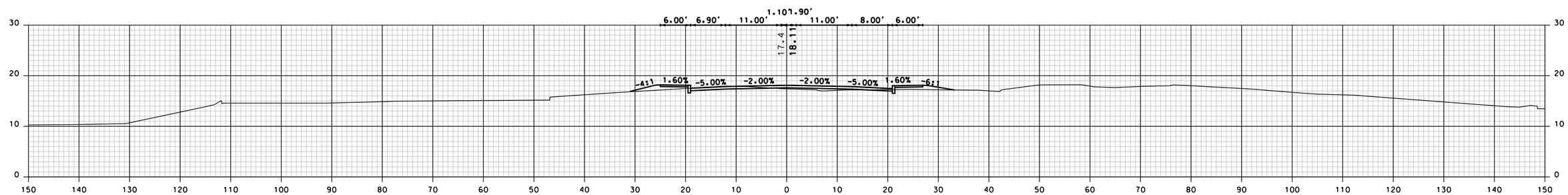
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

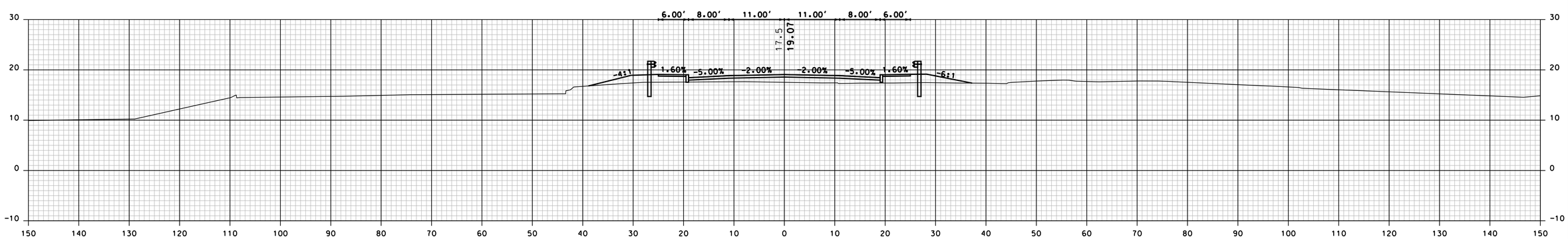
SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



4098+00



4097+50



4097+00

BASCULE BRIDGE SECTIONS

STA. 4097+00 TO STA. 4098+00

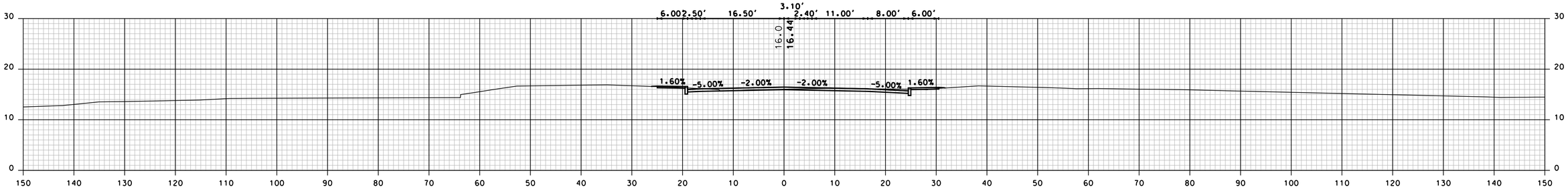
CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	27	30

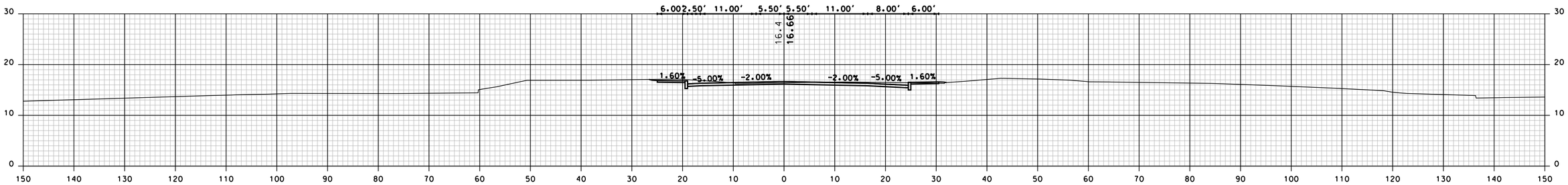
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

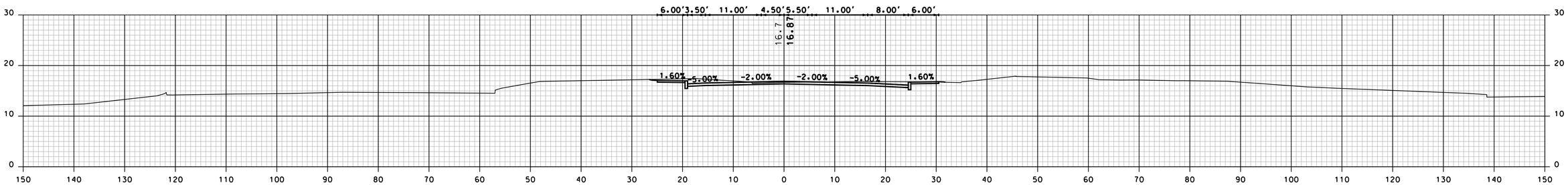
SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



4100+00



4099+50



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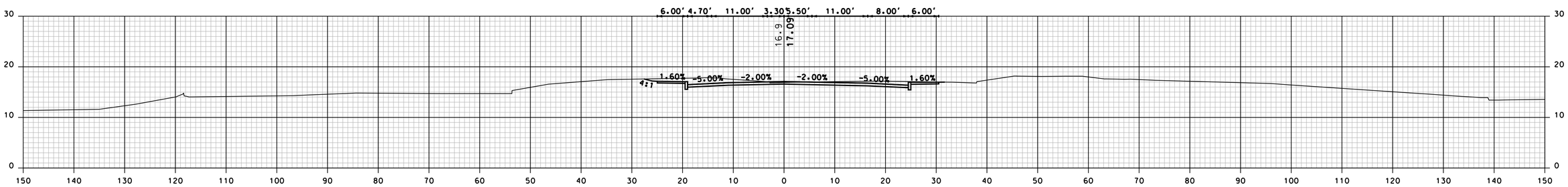


4098+50

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	28	30

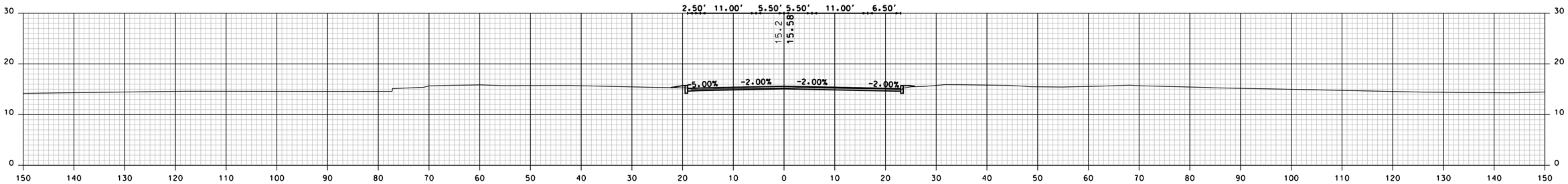
BASCULE BRIDGE SECTIONS

STA. 4098+50 TO STA. 4100+00

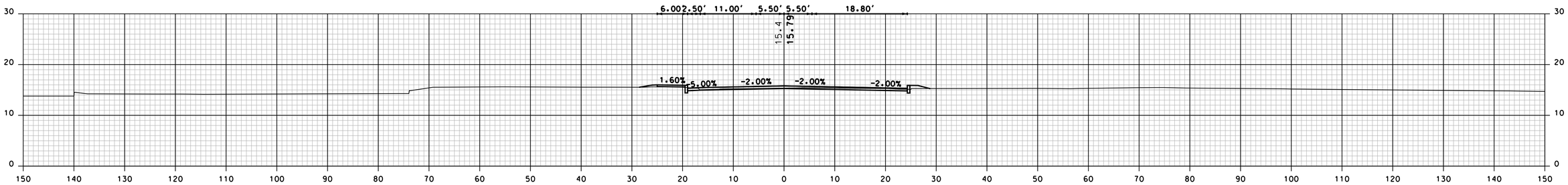
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

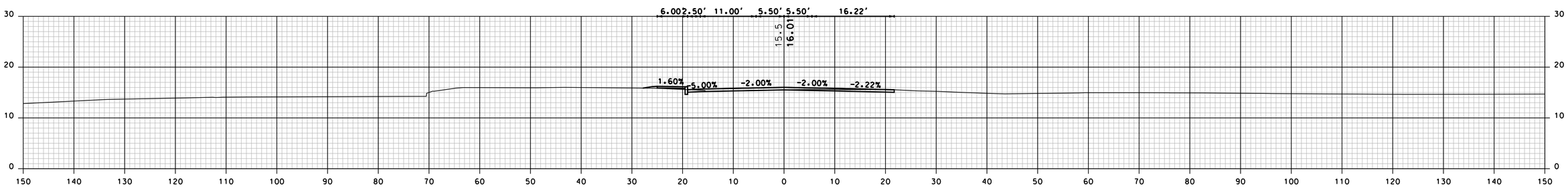
SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



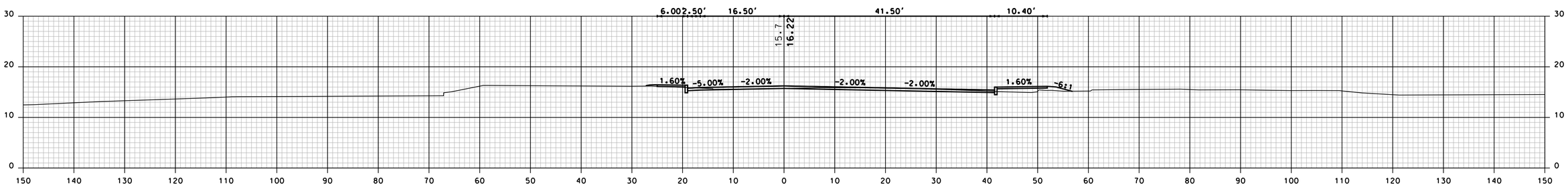
4102+00



4101+50



4101+00



4100+50

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	29	30

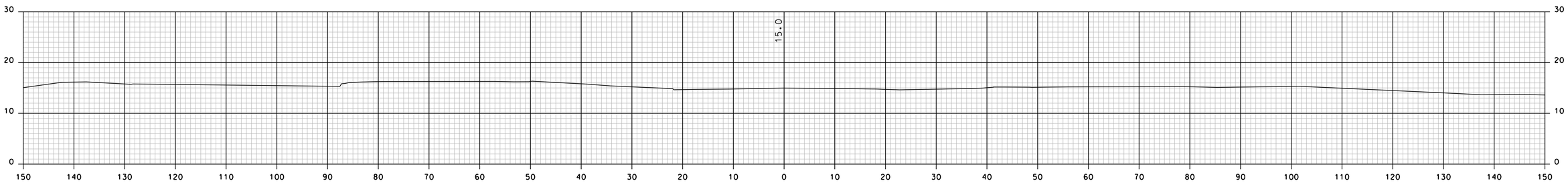
BASCULE BRIDGE SECTIONS

STA. 4100+50 TO STA. 4102+00

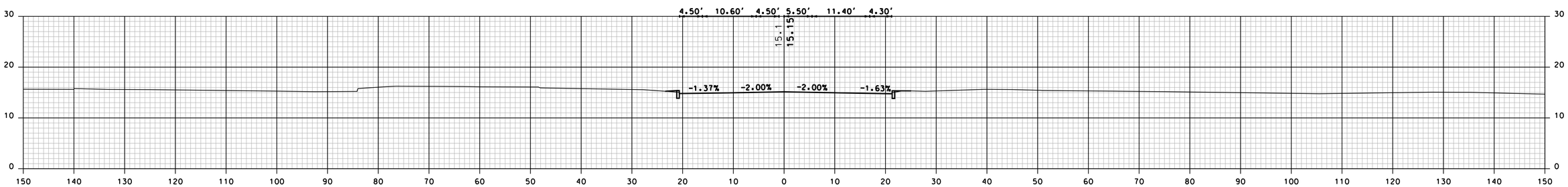
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

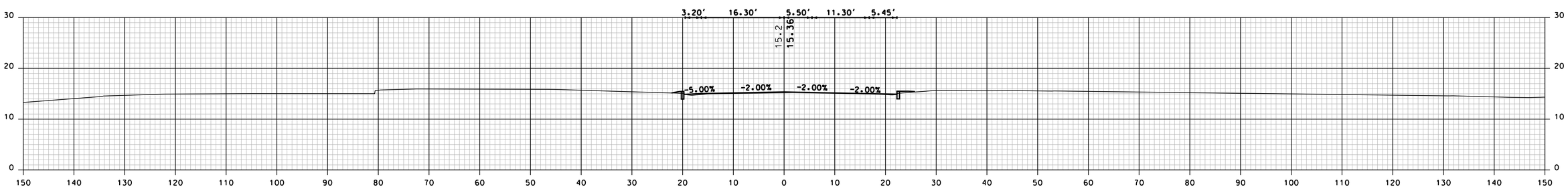
SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



4103+50



4103+00



4102+50

BASCULE BRIDGE SECTIONS

STA. 4102+50 TO STA. 4104+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	30	30

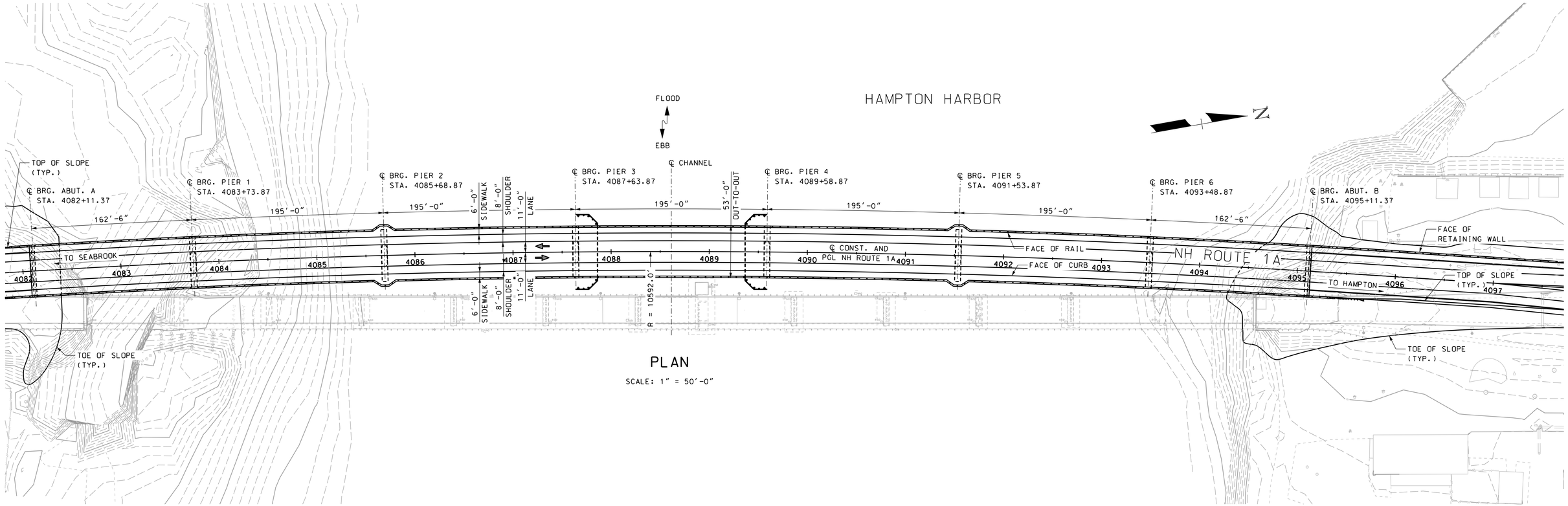
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

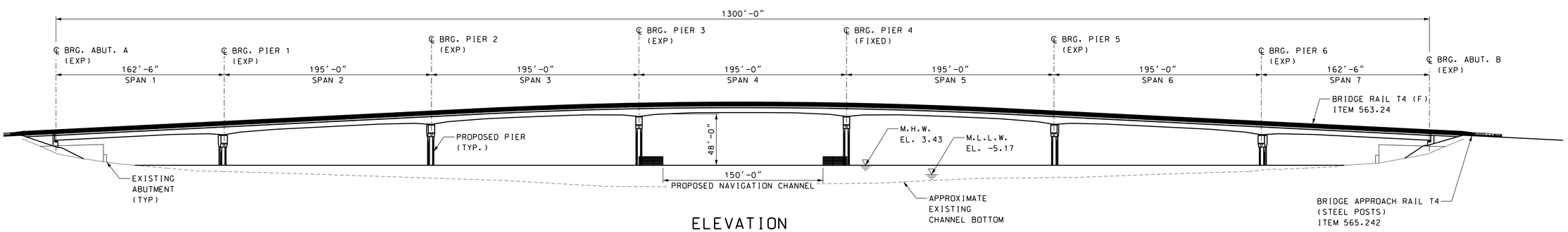
APPENDIX A3

Alternative 3 – Replacement with Fixed Bridge



PLAN

SCALE: 1" = 50'-0"



ELEVATION

SCALE: 1" = 50'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

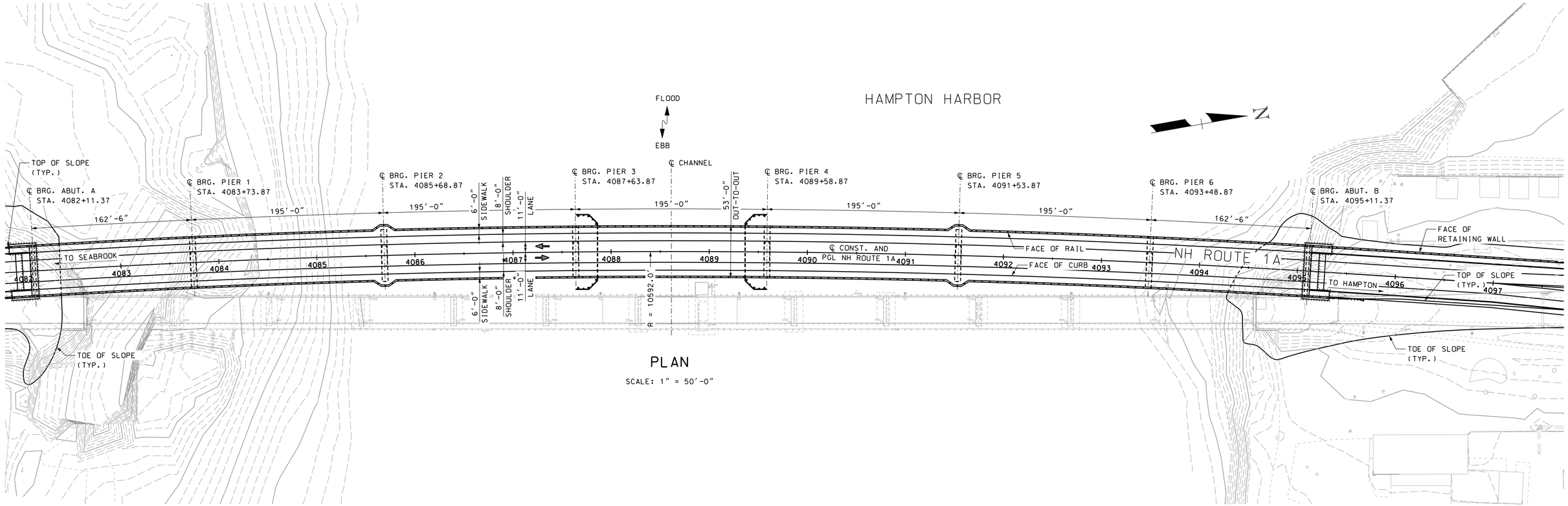
STEEL FIXED BRIDGE PLAN AND ELEVATION

BRIDGE SHEET 1 OF 4

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	02/19	CHECKED	SLB	09/19
	DRAWN	NDC	07/19	CHECKED	JFM	10/19
	QUANTITIES			CHECKED		

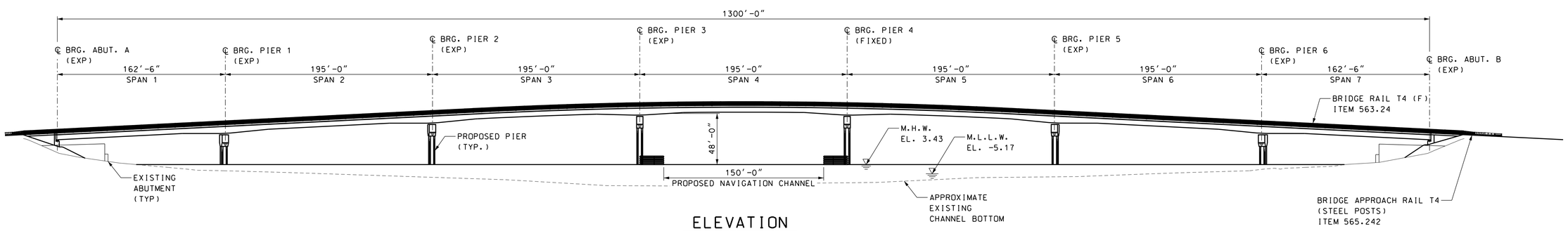
FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904brd_fixed 7 span	AS NOTED	REV. DATE	--	1	25



PLAN

SCALE: 1" = 50'-0"



ELEVATION

SCALE: 1" = 50'-0"

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

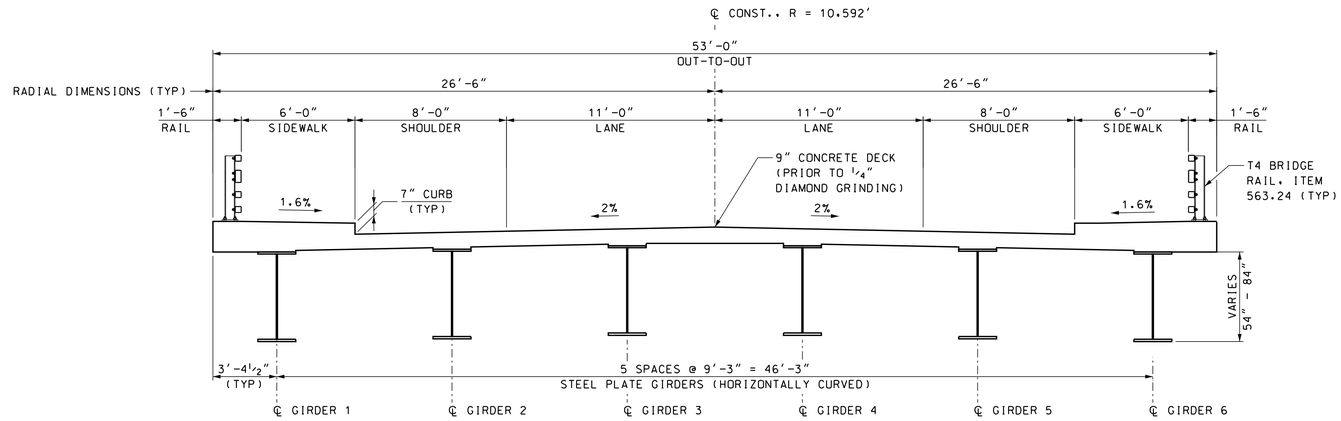
CONCRETE FIXED BRIDGE PLAN AND ELEVATION

BRIDGE SHEET 2 OF 4

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	SLB	09/19	CHECKED	NDC	09/19
	DRAWN	MCC	10/19	CHECKED	NDC	10/19
	QUANTITIES			CHECKED		

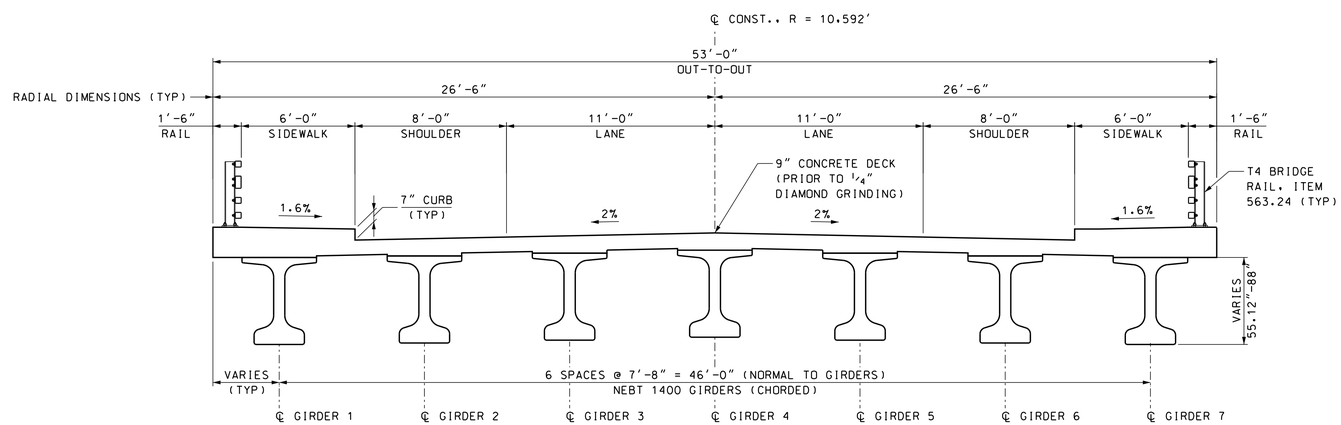
FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904brd_fixed 7 span	AS NOTED	REV. DATE	--	2	25



STEEL PLATE GIRDERS

SCALE: 1/4" = 1'-0"



SPLICED CONCRETE GIRDERS

SCALE: 1/4" = 1'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

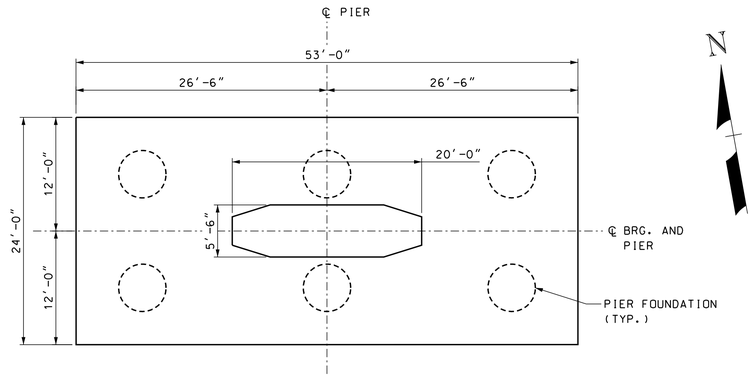
STEEL AND CONCRETE BRIDGE TYPICAL SECTIONS

BRIDGE SHEET 3 OF 4

FILE NUMBER -

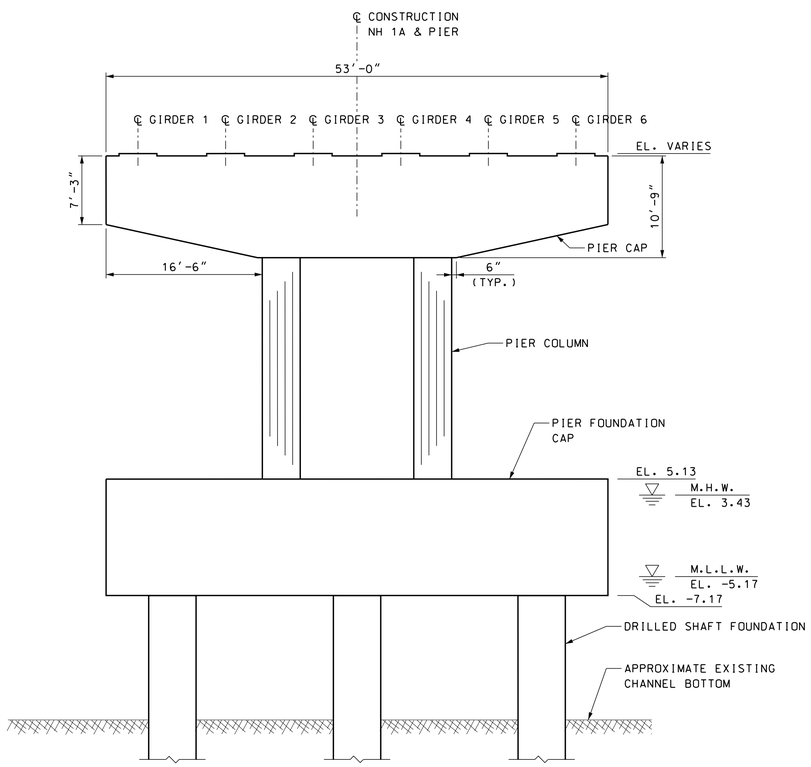
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC/SLB	09/19	CHECKED	SLB/NDC	09/19
	DRAWN	NDC/MCC	10/19	CHECKED	JFM/NDC	10/19
	QUANTITIES			CHECKED		

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904brd_fixed 7 span	AS NOTED	REV. DATE	--	3	25



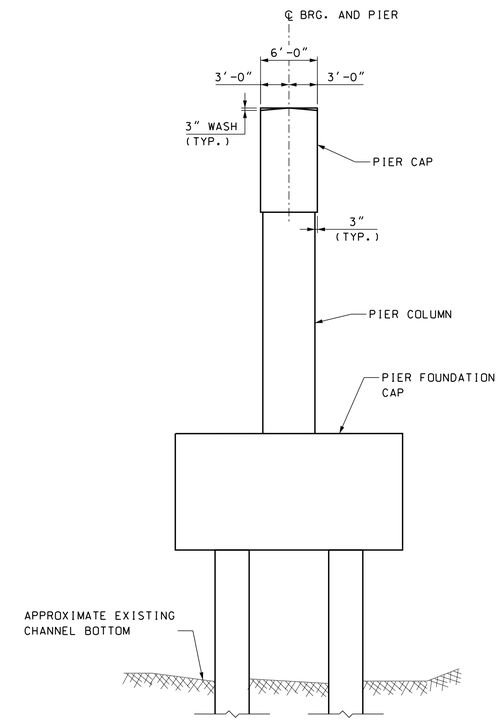
PIER FOOTING PLAN

SCALE: 1/8" = 1'-0"



SOUTH ELEVATION

SCALE: 1/8" = 1'-0"



PIER SECTION

SCALE: 1/8" = 1'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PIER PLAN AND ELEVATION

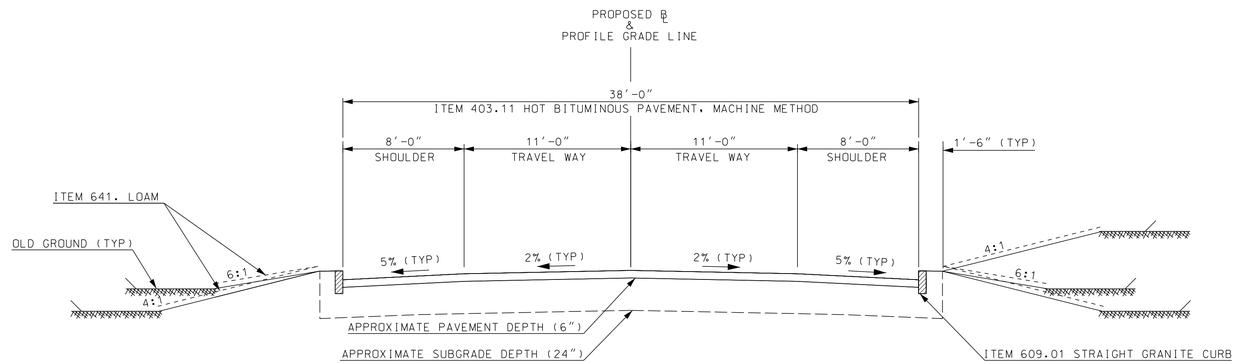
BRIDGE SHEET 4 OF 4

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	07/19	CHECKED	SLB	07/19
	DRAWN	NDC	07/19	CHECKED	JFM	10/19
	QUANTITIES			CHECKED		

FILE NUMBER -

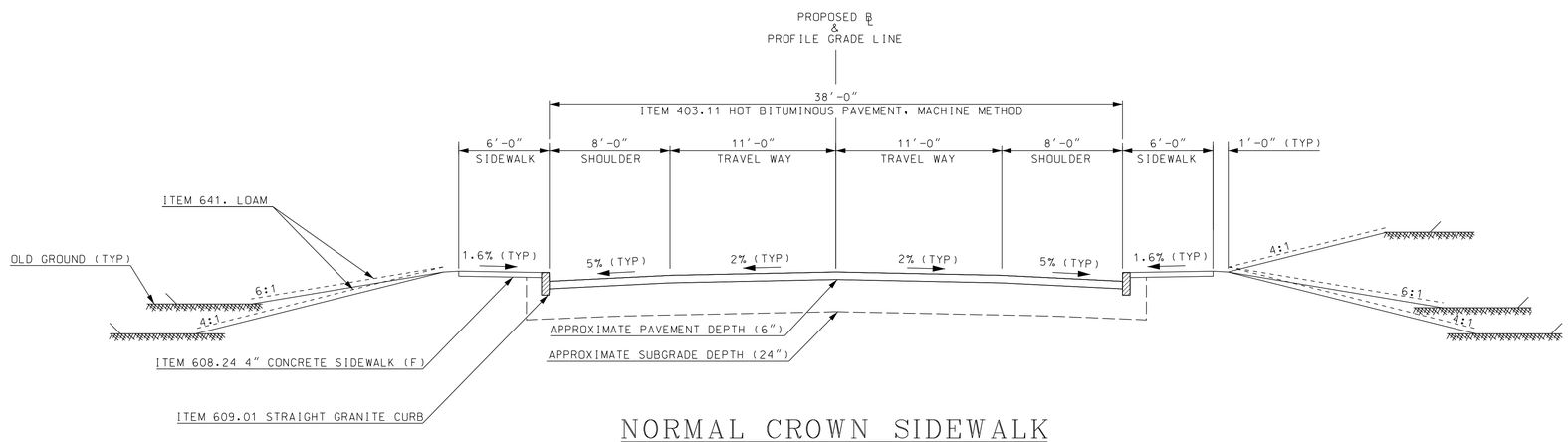
ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	4	25

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904Pier	AS NOTED



NORMAL CROWN CURBED

NOT TO SCALE



NORMAL CROWN SIDEWALK

NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904typical	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

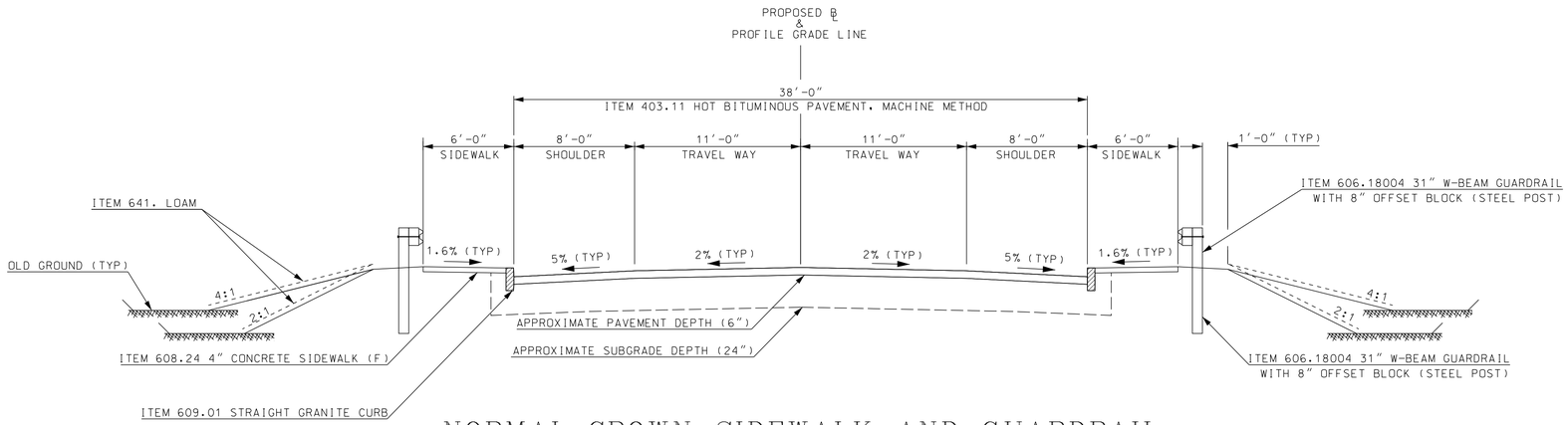
ROADWAY TYPICAL SECTIONS

SHEET 1 OF 4

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KLH	09/19	CHECKED	RDL	09/19
	DRAWN	KLH	09/19	CHECKED	RDL	09/19
	QUANTITIES			CHECKED		
	ISSUE DATE					
	REV. DATE					

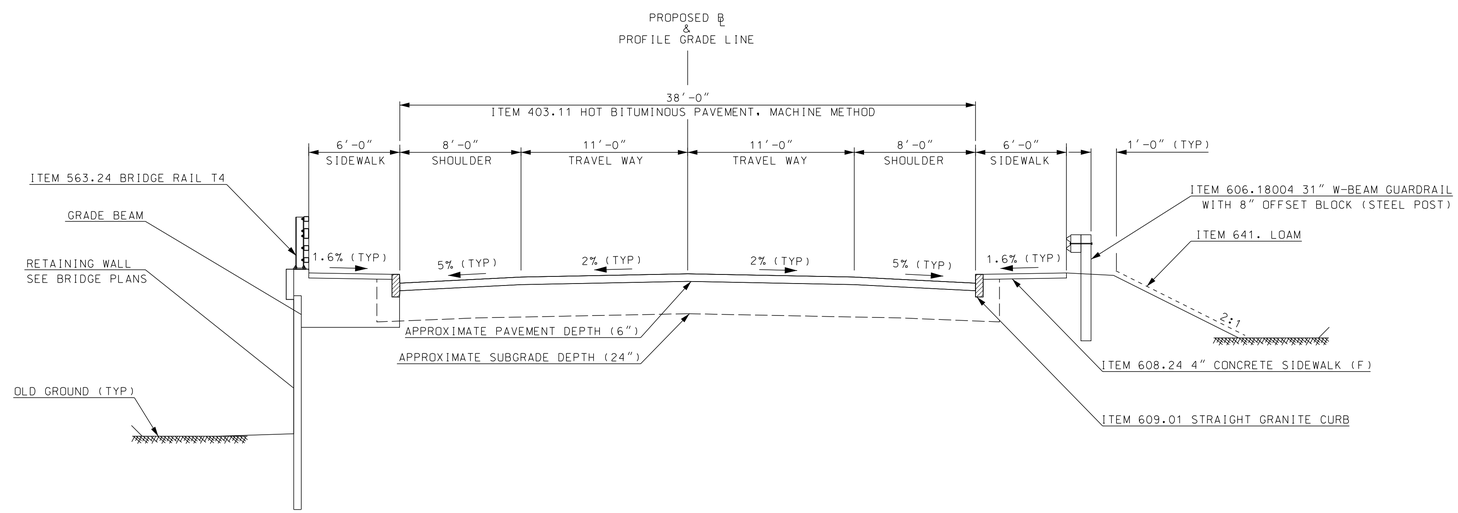
FILE NUMBER -

FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
-	5	25



NORMAL CROWN SIDEWALK AND GUARDRAIL

NOT TO SCALE



NORMAL CROWN SIDEWALK, GUARDRAIL & RETAINING WALL

NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904typical	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

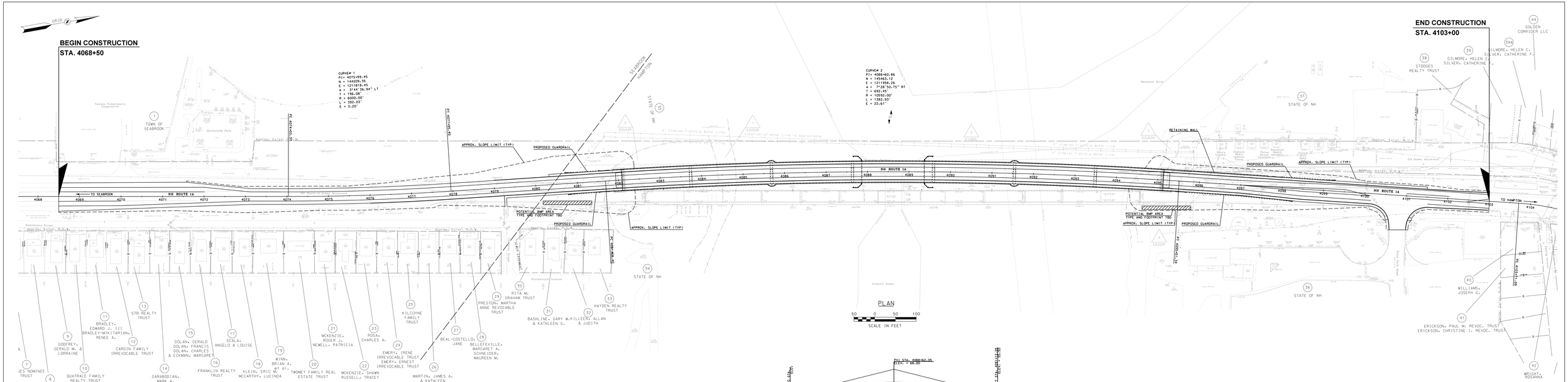
ROADWAY TYPICAL SECTIONS

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KLH	09/19	CHECKED	RDL	09/19
	DRAWN	KLH	09/19	CHECKED	RDL	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	6	25

SHEET 2 OF 4

FILE NUMBER -



CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904gen_plan	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

GENERAL PLAN AND PROFILE (FIXED ALT.)

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KLH	09/19	CHECKED	CPD	09/19
	DRAWN	KLH	09/19	CHECKED	RDL	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.
REV. DATE	-	7

SHEET	FILE NUMBER	TOTAL SHEETS
3 OF 4	-	25

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904pvm_plan	AS NOTED

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PAVEMENT MARKING PLAN (REPLACEMENT OPT.)

SHEET 4 OF 4

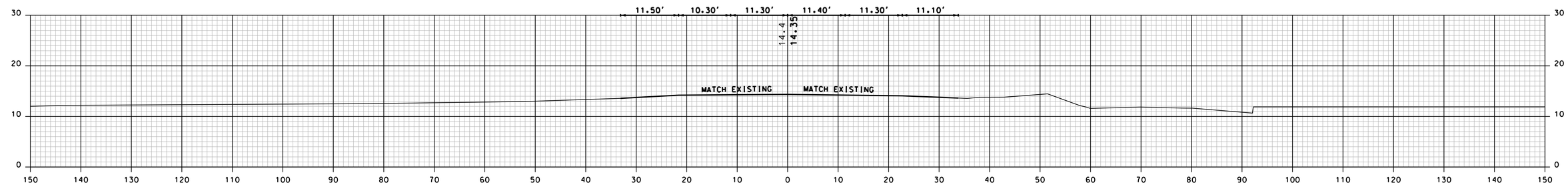
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KLH	09/19	CHECKED	RDL	09/19
	DRAWN	KLH	09/19	CHECKED	RDL	09/19
	QUANTITIES			CHECKED		

FILE NUMBER -

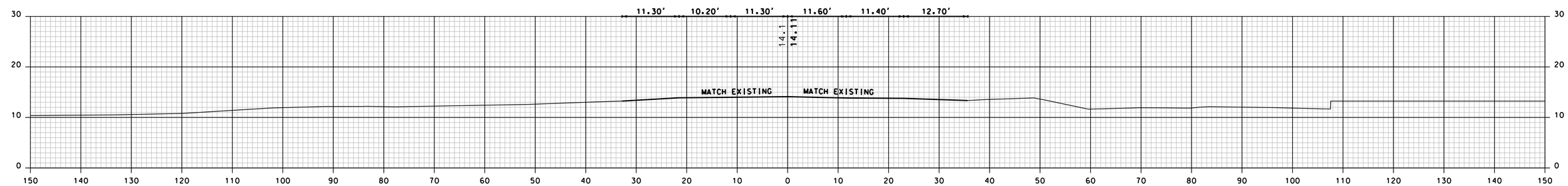
ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	8	25

REVISIONS AFTER PROPOSAL

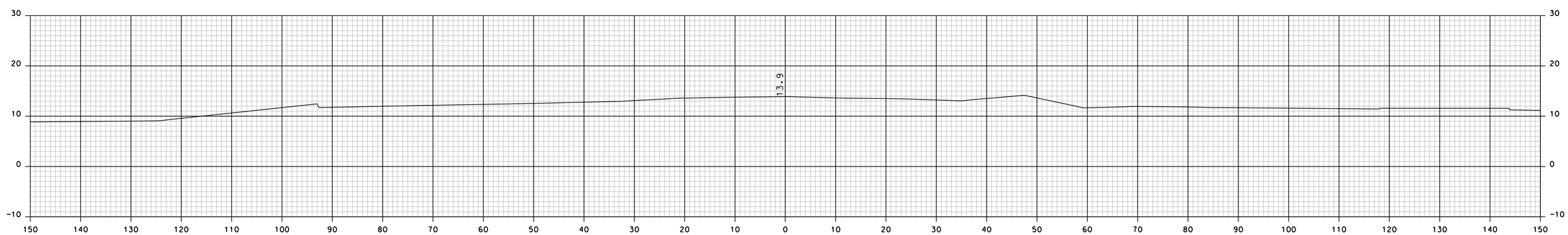
NUMBER	DATE	STATION	STATION	DESCRIPTION



4069+00



4068+50



4068+00

	NAME1	DATE	DATE1
SDR PROCESSED		DATE	
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

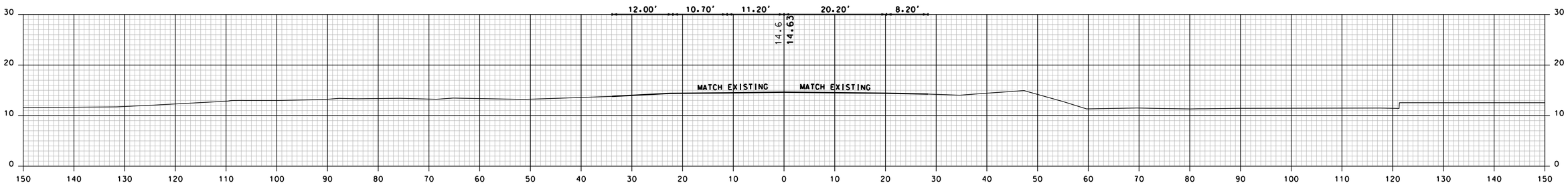
COMMON EXCAV. – C.Y. ROCK EXCAV. – C.Y.

FILL – C.Y. MUCK EXCAV. – C.Y.

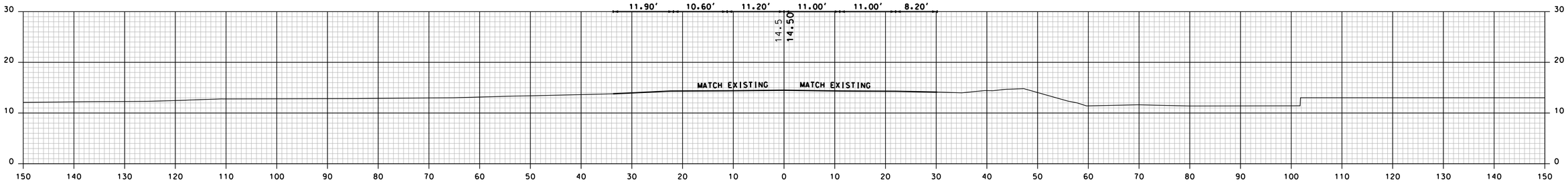
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	9	25

FIXED BRIDGE SECTIONS

STA. 4068+00 TO STA. 4069+00



4070+50



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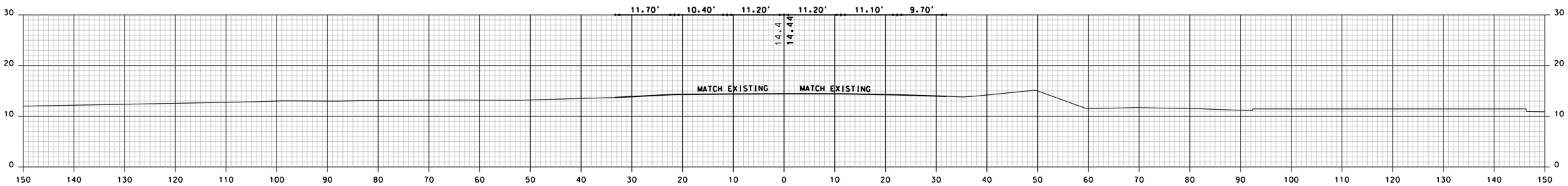


4069+50

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	10	25

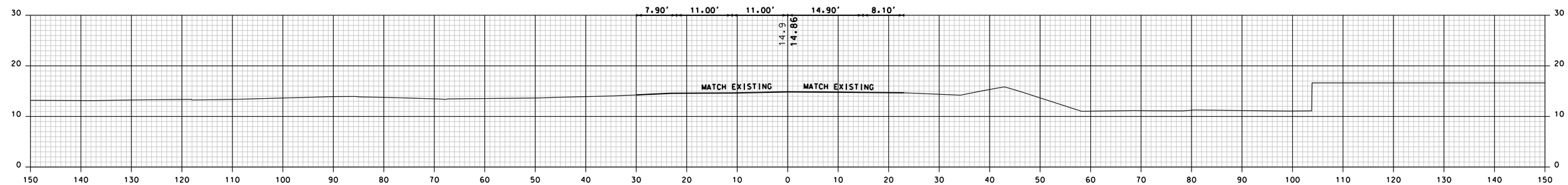
FIXED BRIDGE SECTIONS

STA. 4069+50 TO STA. 4070+50

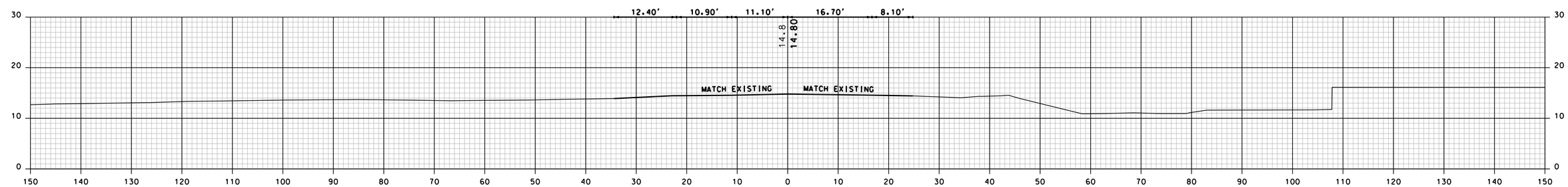
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

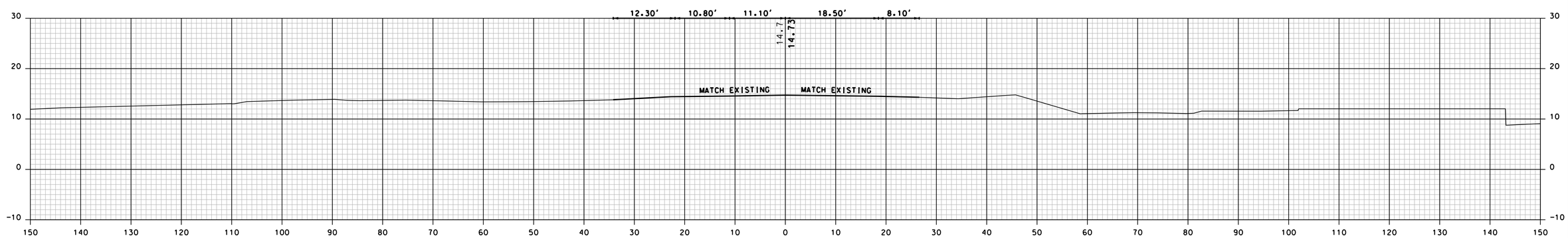
	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



4072+00



4071+50



4071+00

FIXED BRIDGE SECTIONS

STA. 4071+00 TO STA. 4072+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	11	25

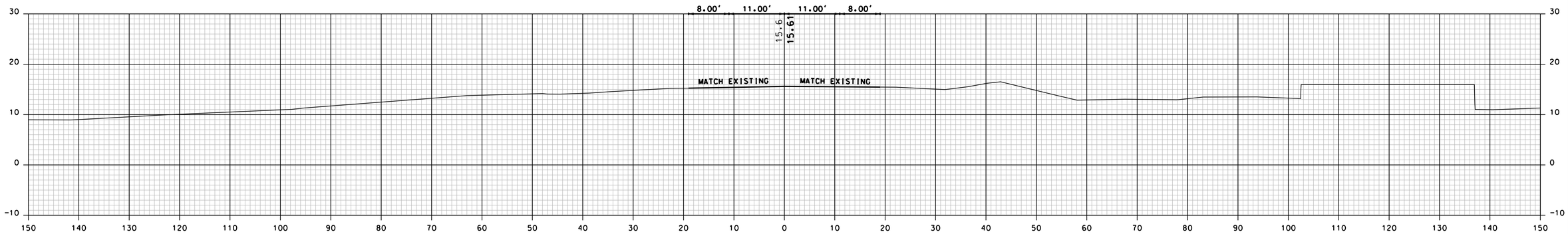
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION



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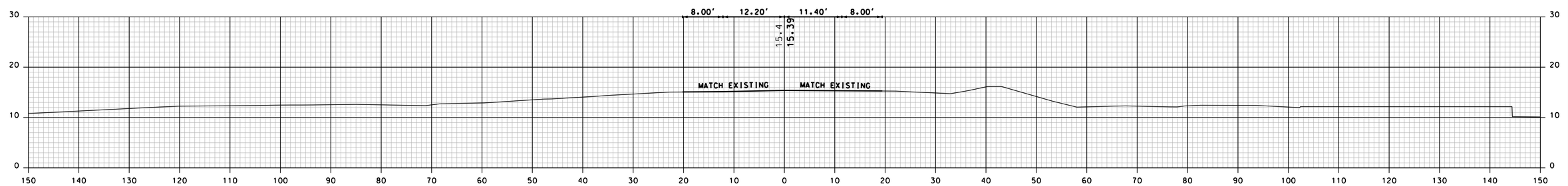

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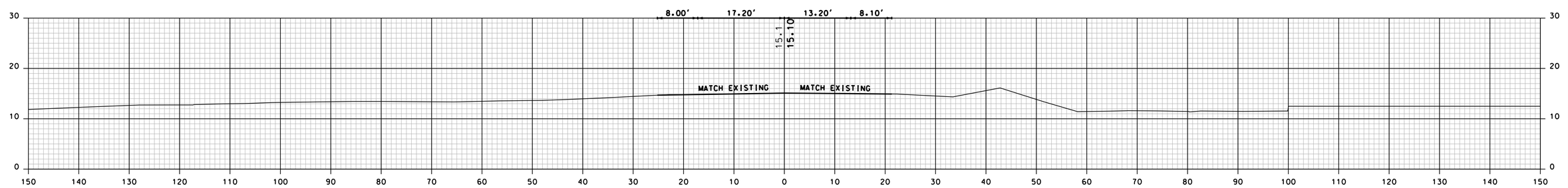


4072+50

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	12	25

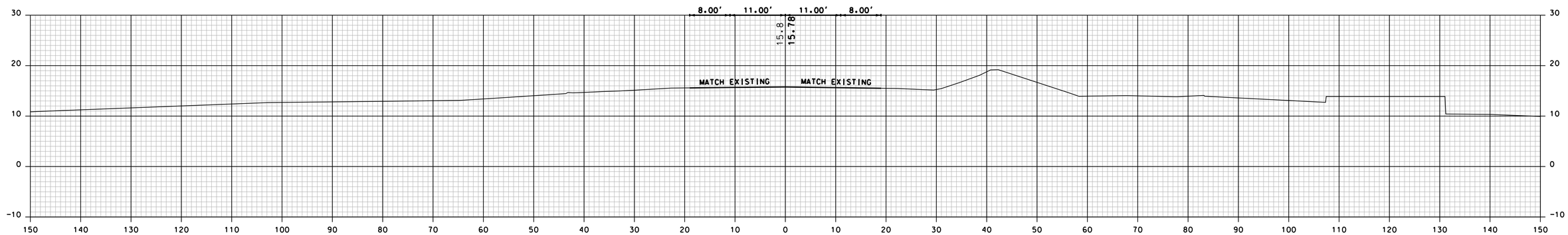
FIXED BRIDGE SECTIONS

STA. 4072+50 TO STA. 4073+50

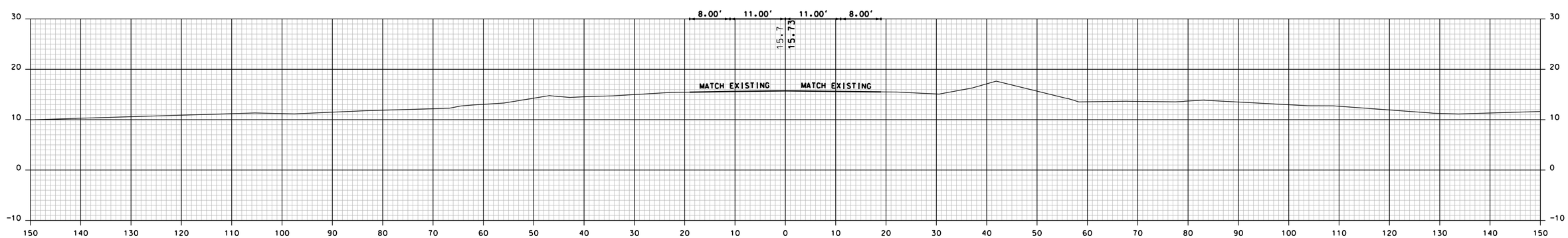
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



4074+50



4074+00

CONCEPTUAL PLANS
3/11/2020

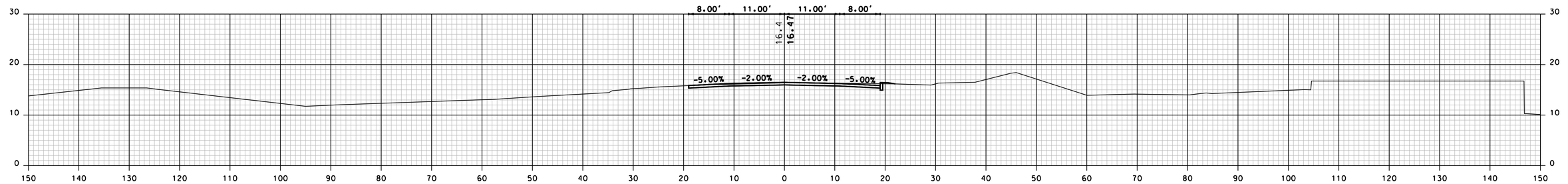
SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

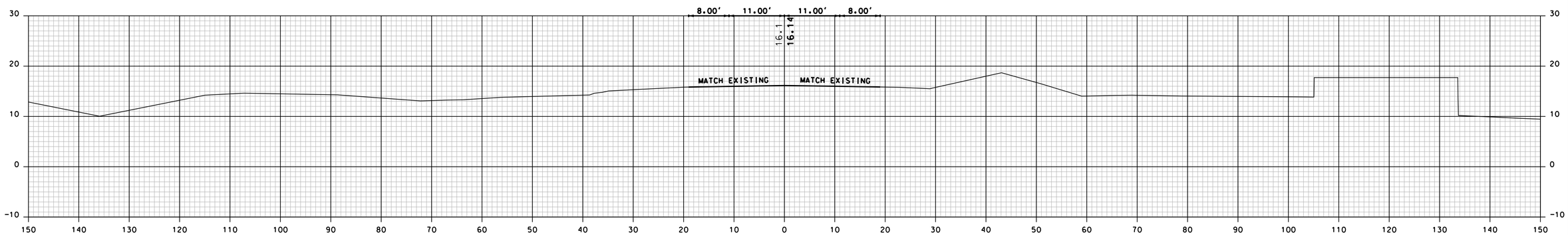
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	13	25

FIXED BRIDGE SECTIONS

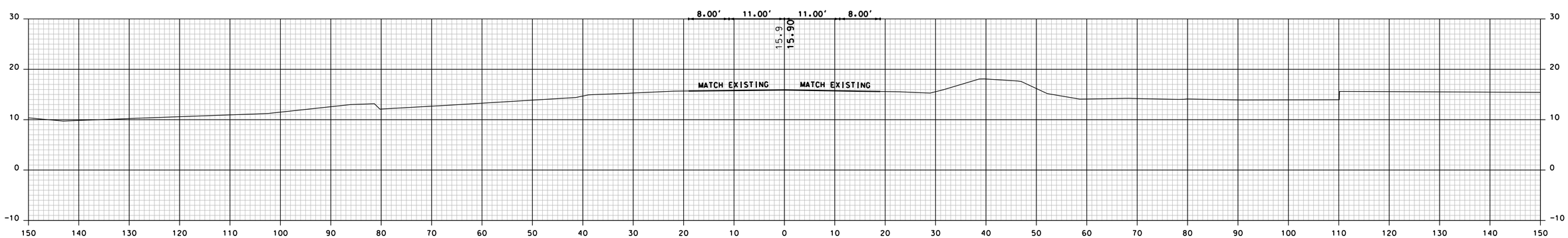
STA. 4074+00 TO STA. 4074+50



4076+00



4075+50



4075+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	14	25

FIXED BRIDGE SECTIONS

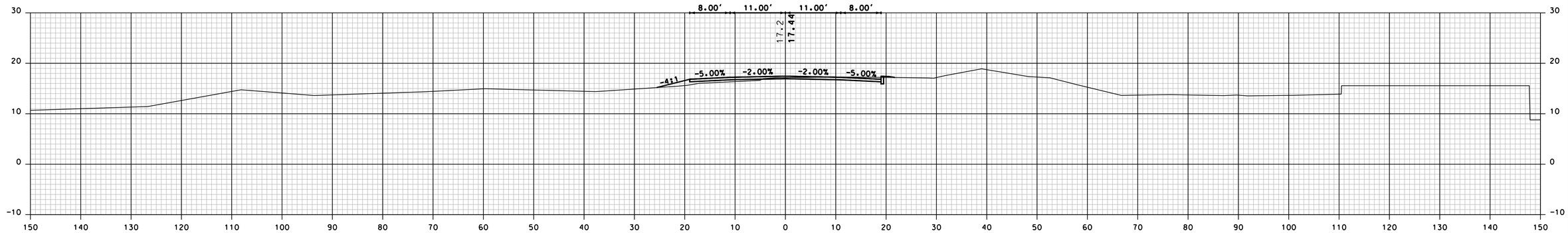
STA. 4075+00 TO STA. 4076+00

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019

AS BUILT DETAILS DATE



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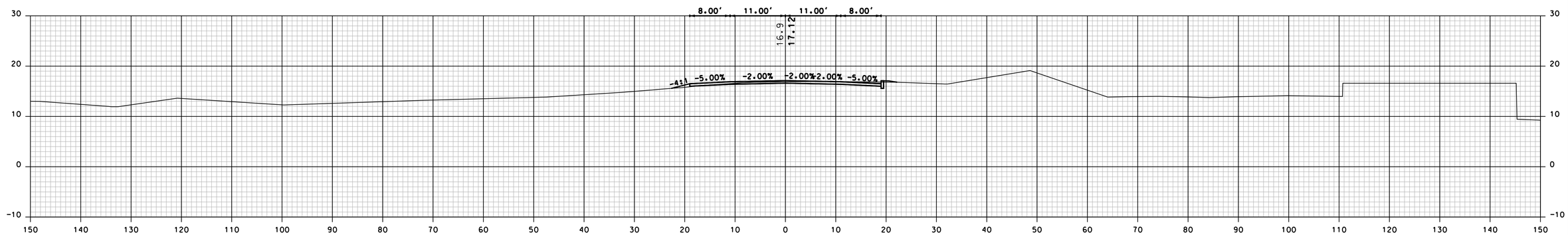

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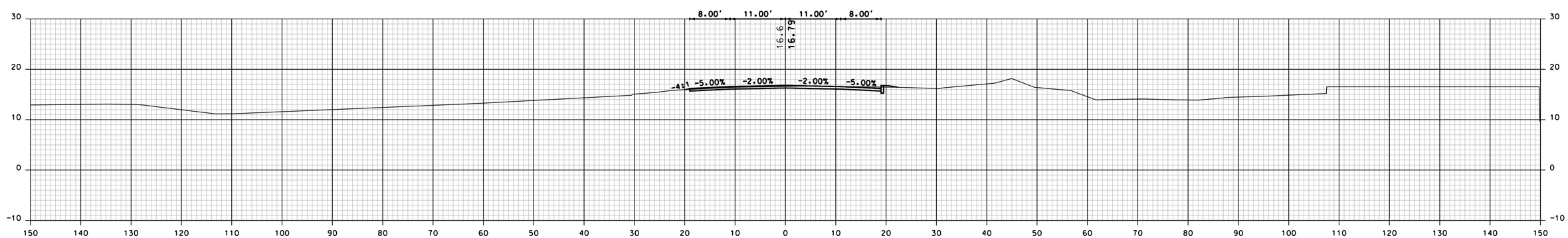


4076+50

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	15	25

FIXED BRIDGE SECTIONS

STA. 4076+50 TO STA. 4077+50

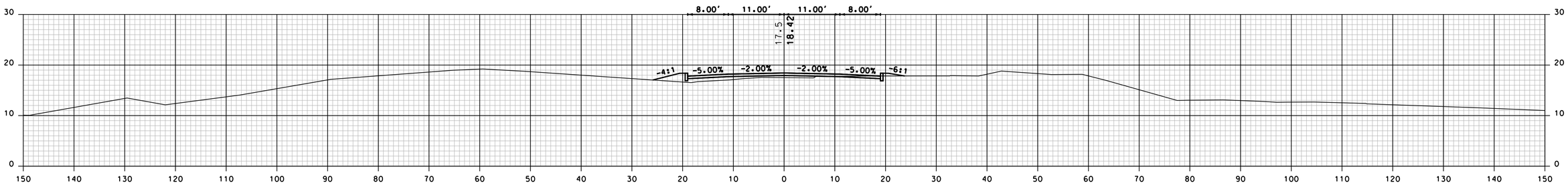
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

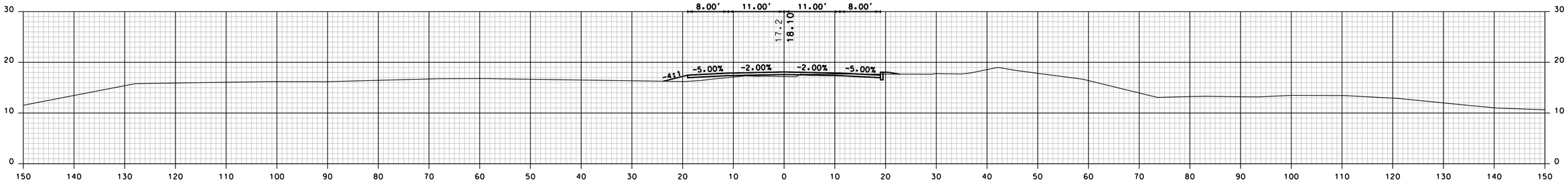
	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

REVISIONS AFTER PROPOSAL

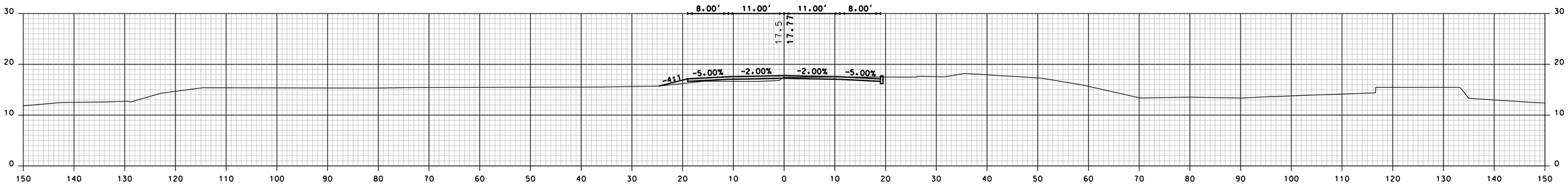
NUMBER	DATE	STATION	STATION	DESCRIPTION



4079+00



4078+50



4078+00

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

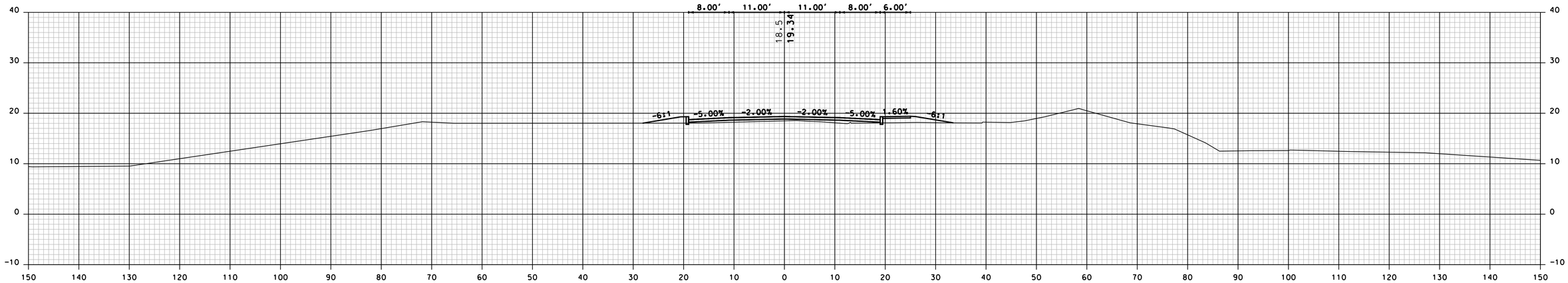
SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

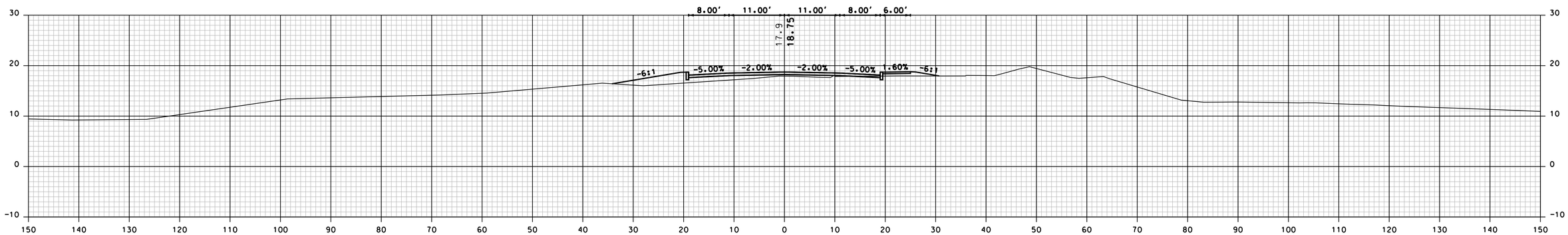
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	16	25

FIXED BRIDGE SECTIONS

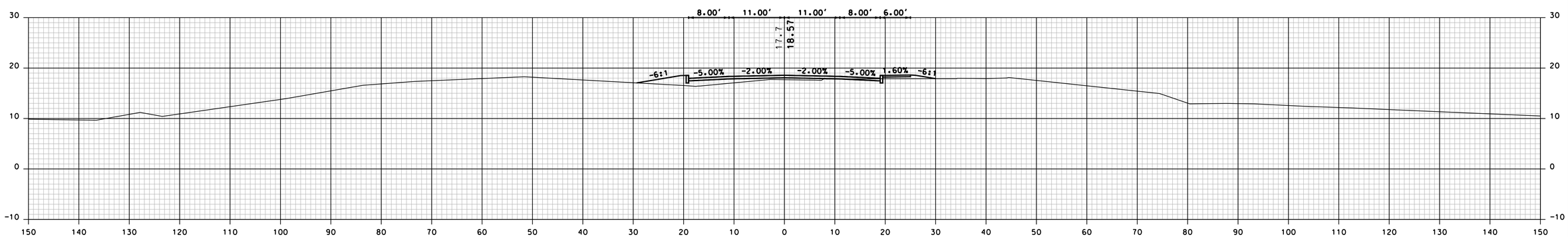
STA. 4078+00 TO STA. 4079+00



4080+00



4079+50



4079+23

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	17	25

FIXED BRIDGE SECTIONS

STA. 4079+23 TO STA. 4080+00

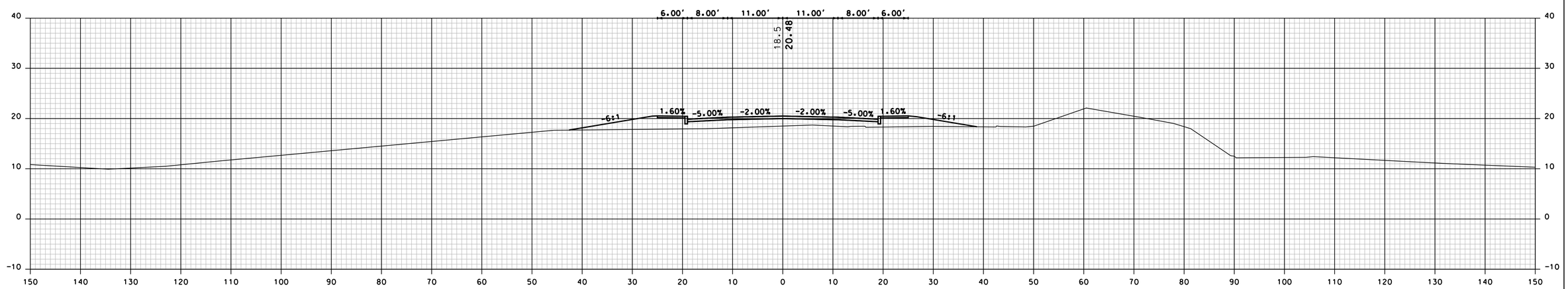
REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

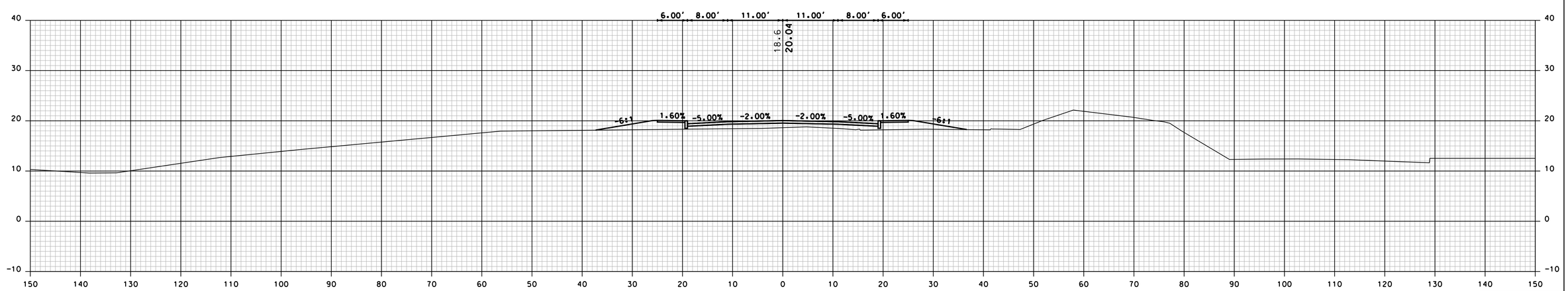
	NAME1	DATE	DATE1
SDR PROCESSED		DATE	
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION



4080+50



4080+33

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS

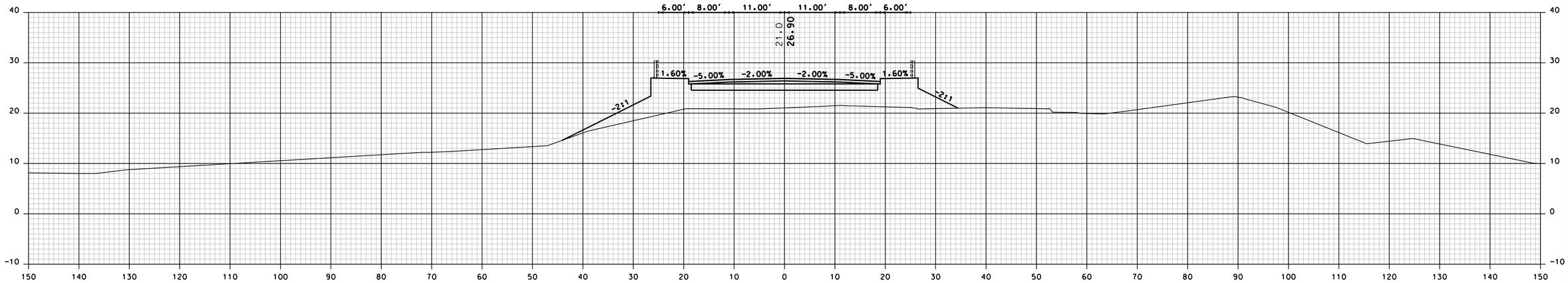
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	18	25

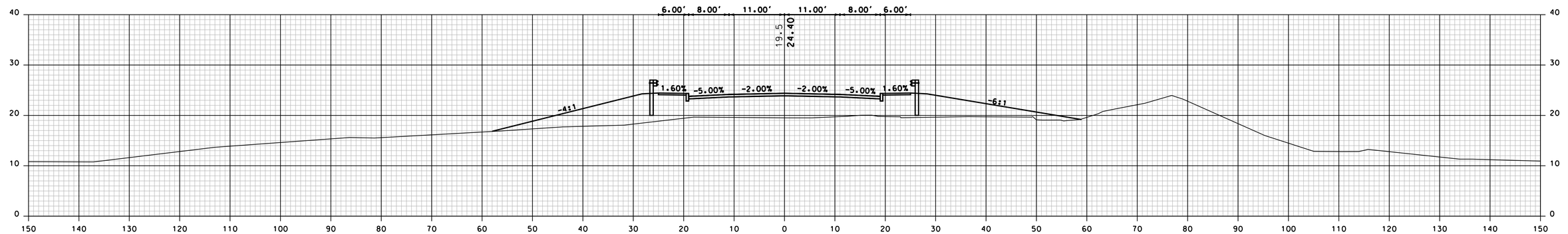
FIXED BRIDGE SECTIONS

STA. 4080+33 TO STA. 4080+50

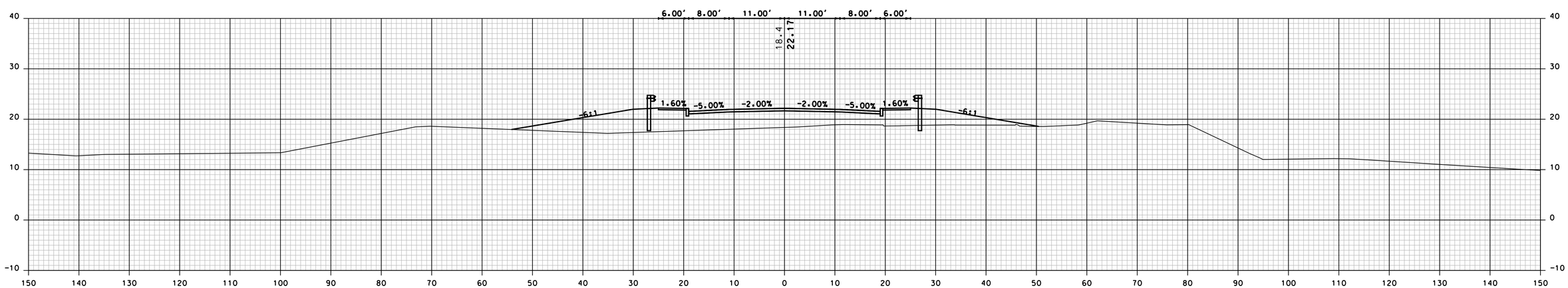
BEGIN BRIDGE STA. 4082+08.37



4082+00



4081+50



4081+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	19	25

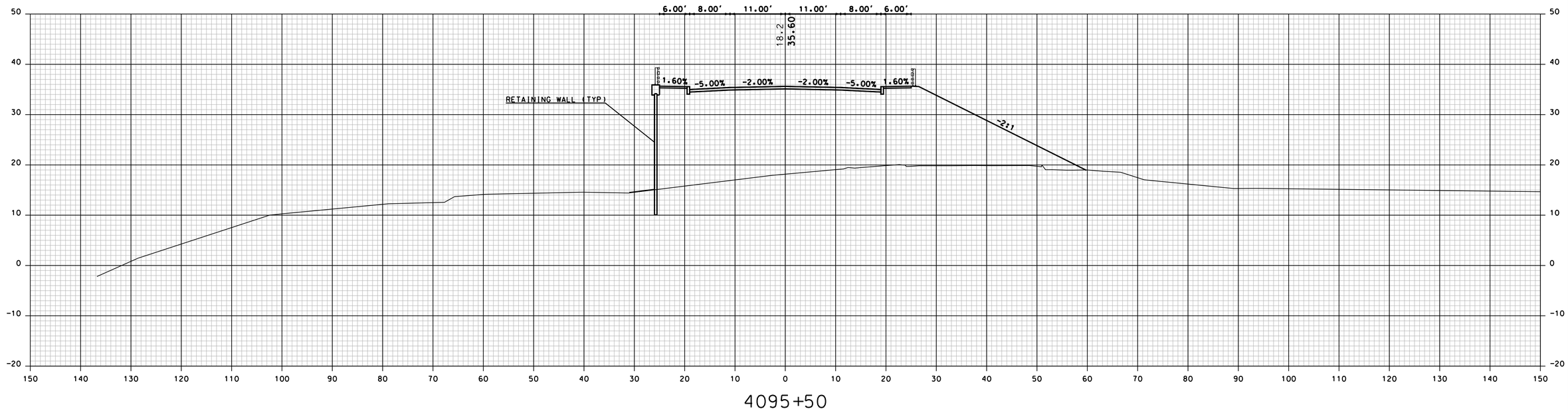
FIXED BRIDGE SECTIONS

STA. 4081+00 TO STA. 4082+00

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



END BRIDGE STA. 4095+14.37

REVISIONS AFTER PROPOSAL			
NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

FIXED BRIDGE SECTIONS

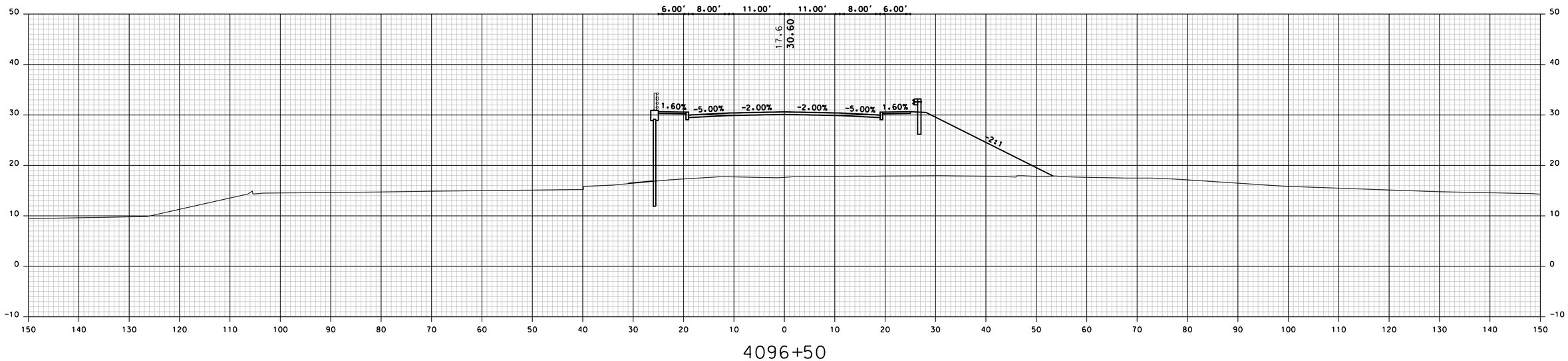
STA. 4095+00 TO STA. 4095+50

CONCEPTUAL PLANS
3/11/2020

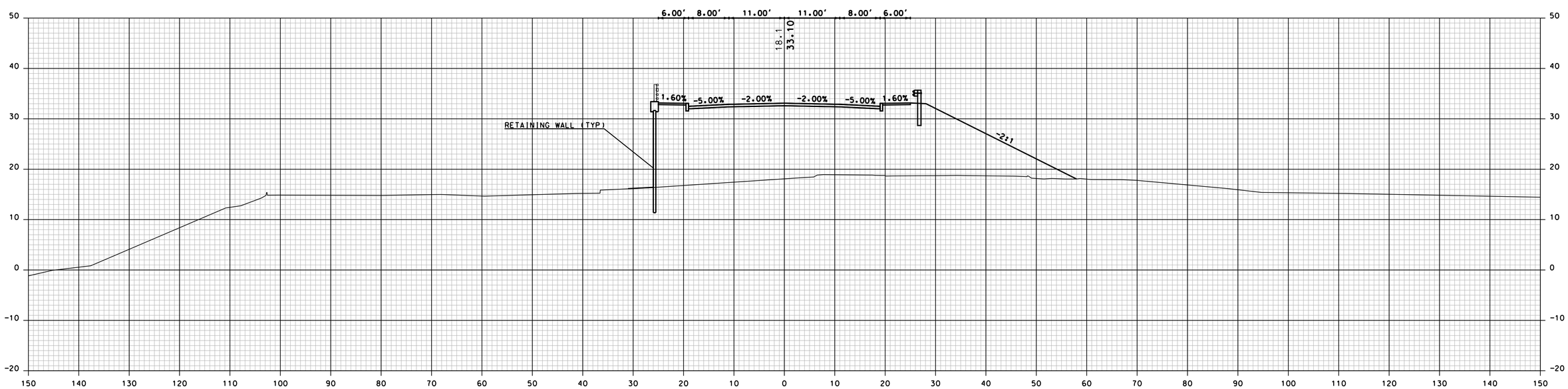
SHEET TOTALS

COMMON EXCAV.	- C.Y.	ROCK EXCAV.	- C.Y.
FILL	- C.Y.	MUCK EXCAV.	- C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	20	25



4096+50



4096+00

NUMBER	DATE	STATION	STATION	DESCRIPTION
REVISIONS AFTER PROPOSAL				

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

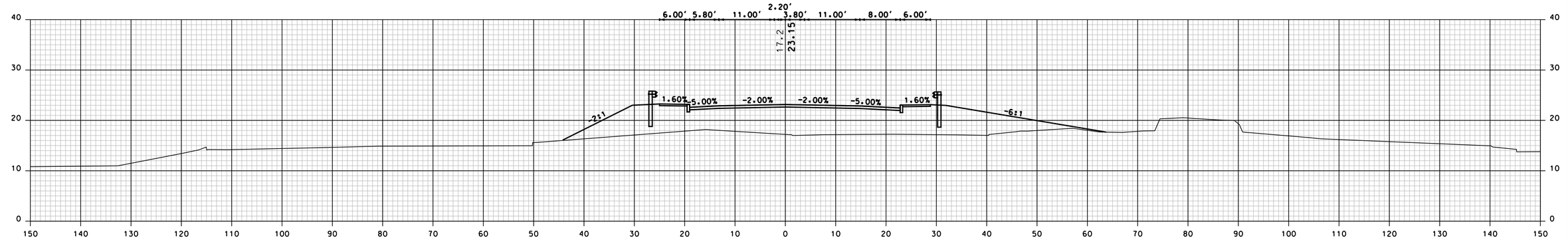
SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	21	25

FIXED BRIDGE SECTIONS

STA. 4096+00 TO STA. 4096+50



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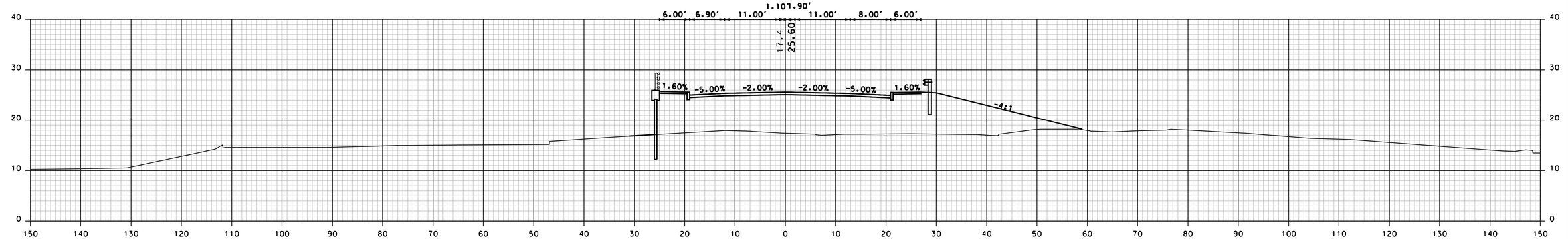
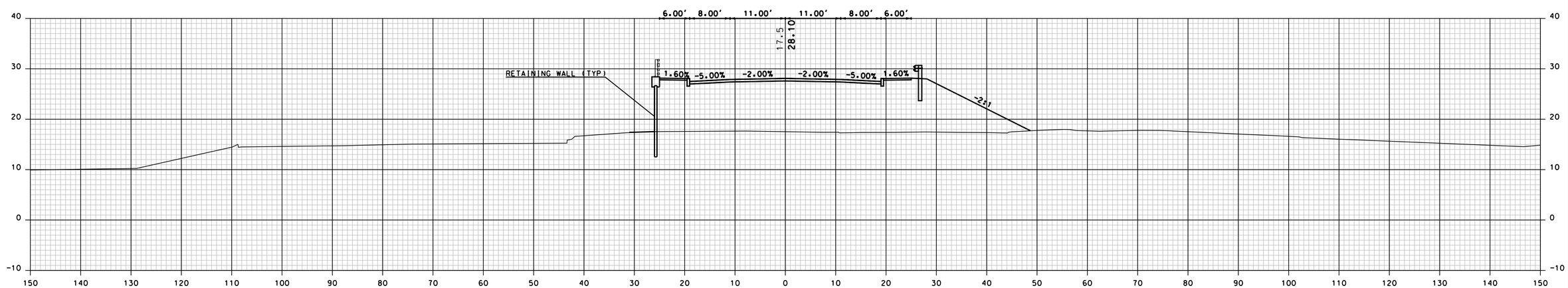


4097+50



4097+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV. – C.Y.		ROCK EXCAV. – C.Y.	
FILL – C.Y.		MUCK EXCAV. – C.Y.	
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	22	25

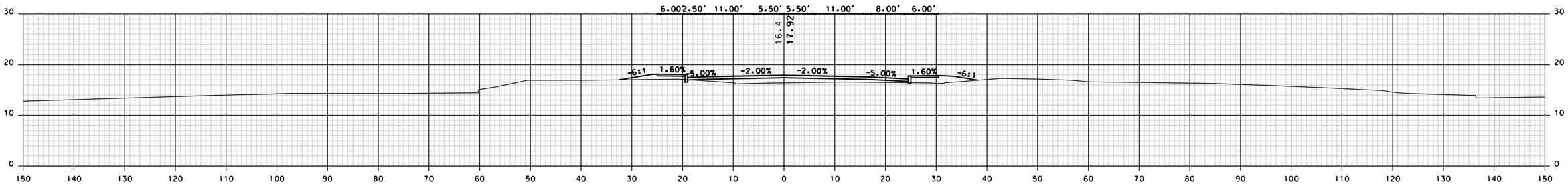
FIXED BRIDGE SECTIONS

STA. 4097+00 TO STA. 4098+00

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

	NAME1	DATE	DATE1
SDR PROCESSED			
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



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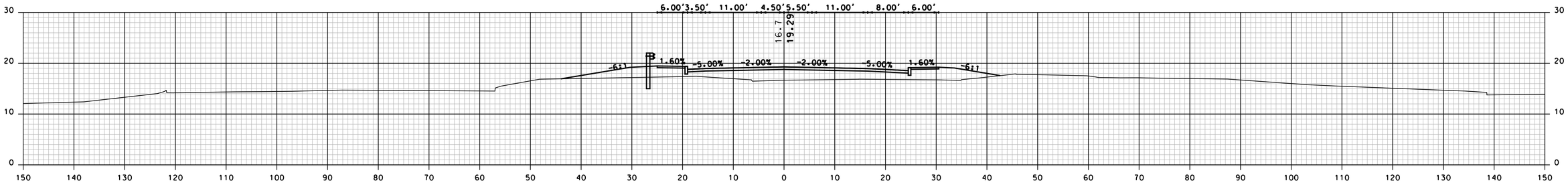
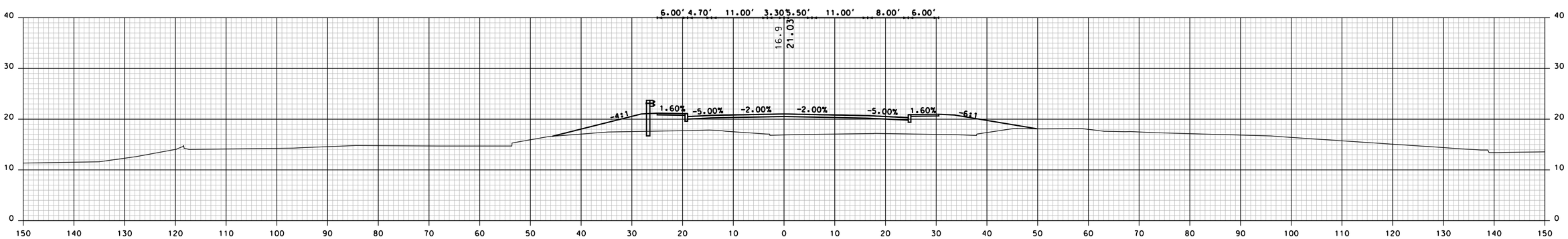


4099+00



4098+50

FIXED BRIDGE SECTIONS

STA. 4098+50 TO STA. 4099+50

CONCEPTUAL PLANS
3/11/2020

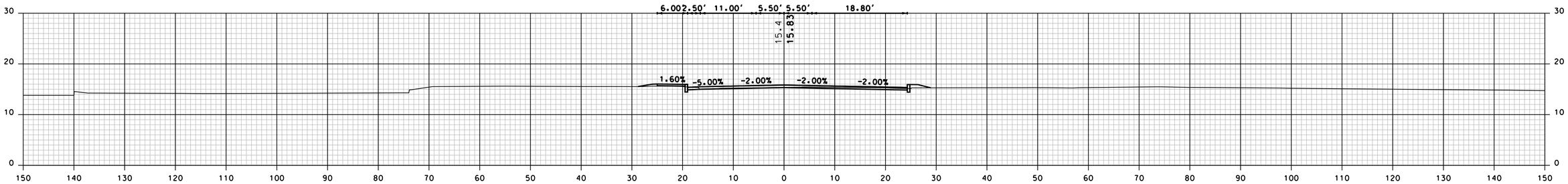
SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	23	25

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	



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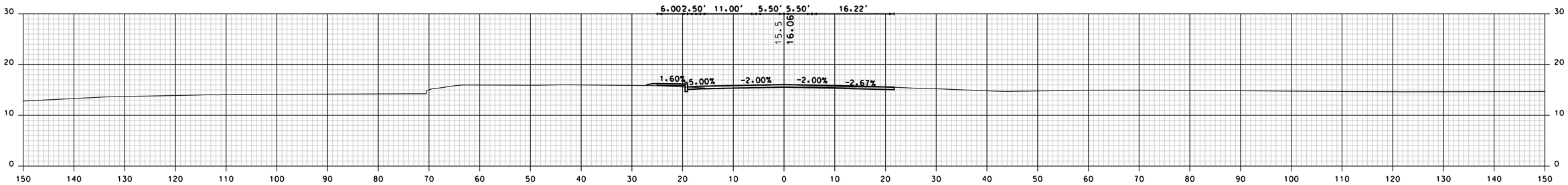

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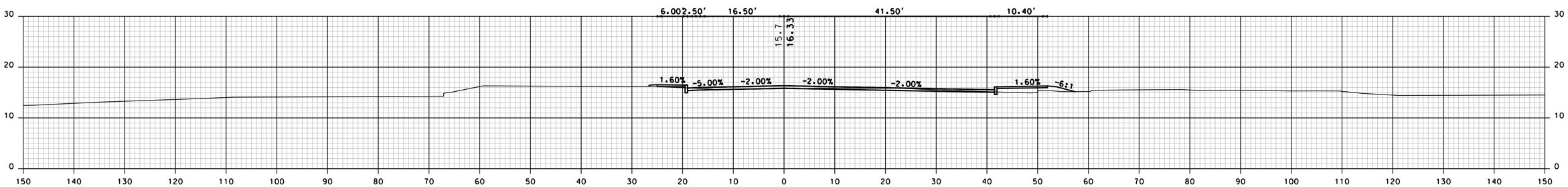
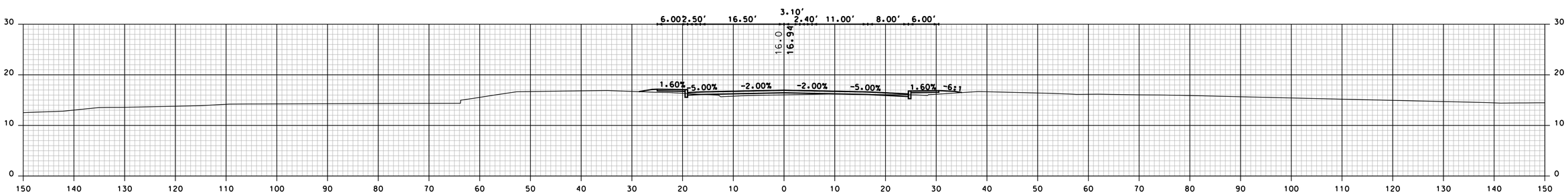


4100+50



4100+00

REVISIONS AFTER PROPOSAL

DESCRIPTION	STATION	STATION	DATE	NUMBER

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

CONCEPTUAL PLANS
3/11/2020

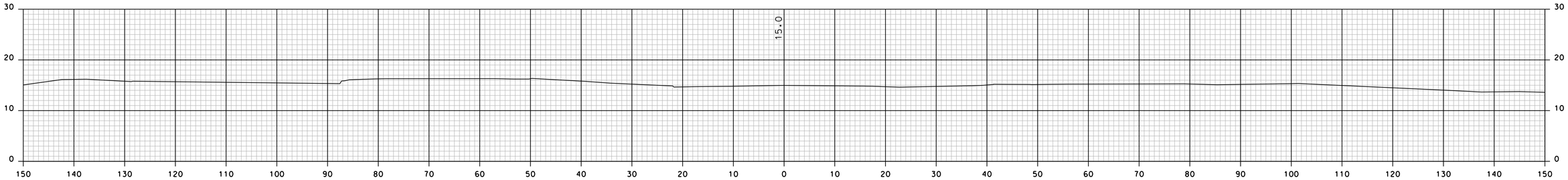
SHEET TOTALS

COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

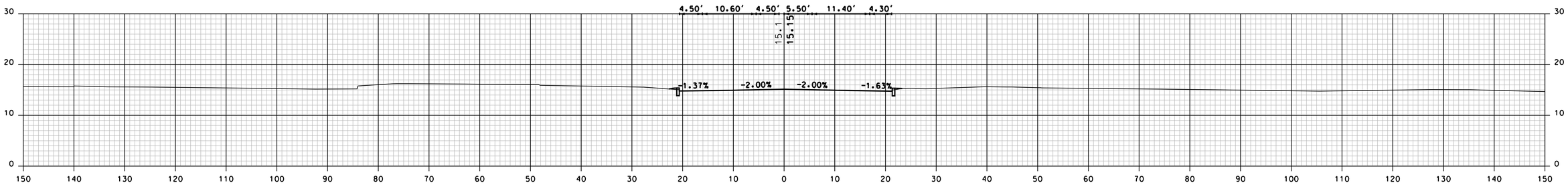
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	24	25

FIXED BRIDGE SECTIONS

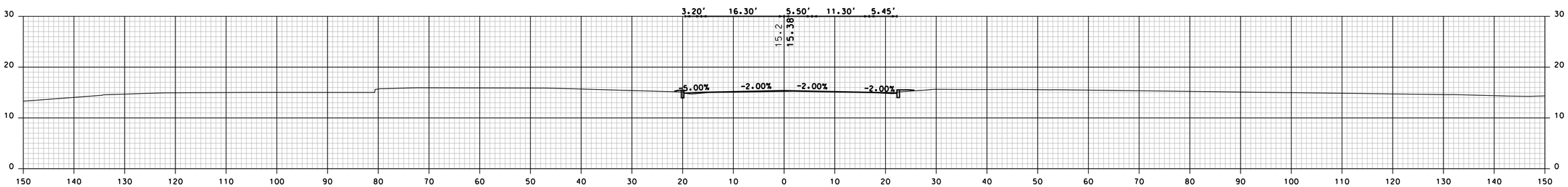
STA. 4100+00 TO STA. 4101+50



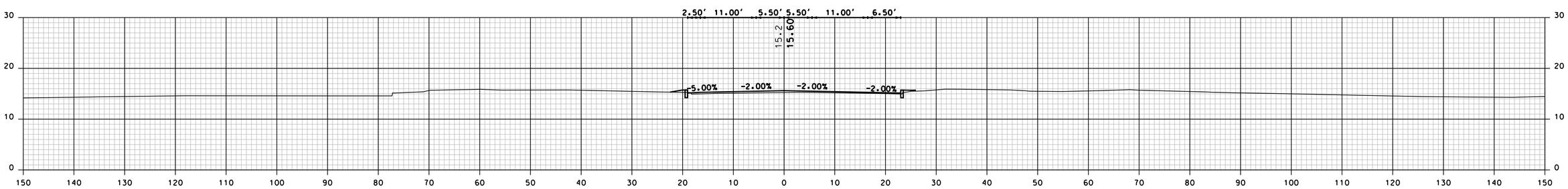
4103+50



4103+00



4102+50



4102+00

CONCEPTUAL PLANS
3/11/2020

SHEET TOTALS			
COMMON EXCAV.	– C.Y.	ROCK EXCAV.	– C.Y.
FILL	– C.Y.	MUCK EXCAV.	– C.Y.

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
15904xs	15904	25	25

FIXED BRIDGE SECTIONS

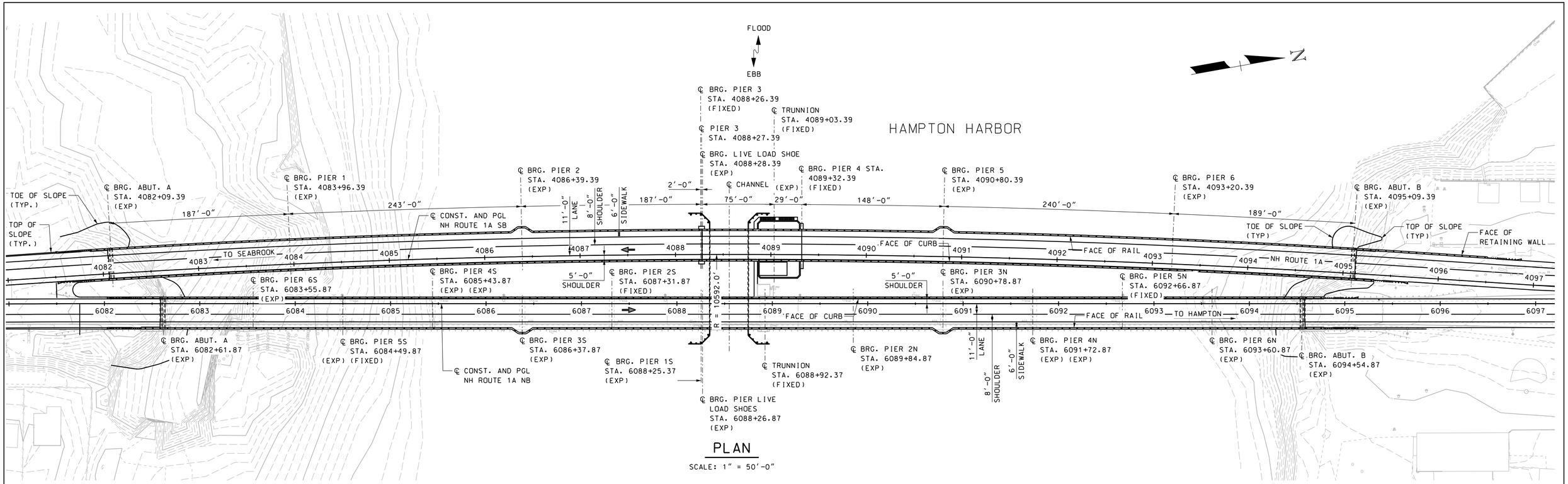
STA. 4102+00 TO STA. 4103+50

NUMBER	DATE	STATION	STATION	DESCRIPTION

REVISIONS AFTER PROPOSAL

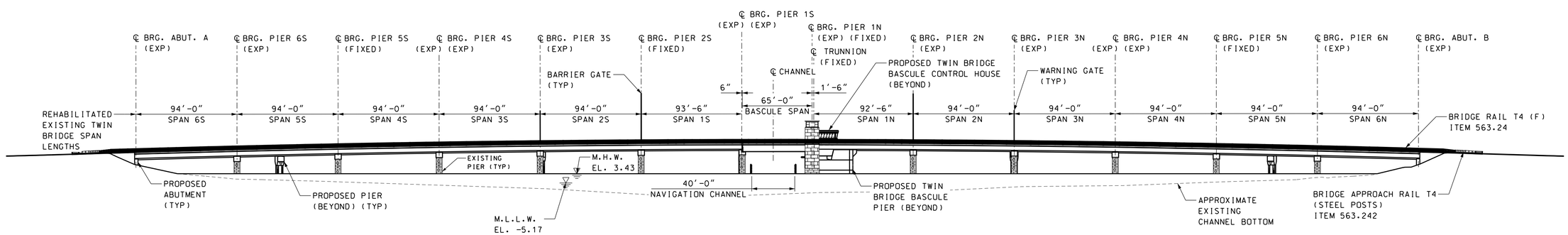
SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	K. HOWE	DATE	09/30/2019
SHEET CHECKED	C. DIETRICH	DATE	09/30/2019
AS BUILT DETAILS		DATE	

APPENDIX A4
Alternative 4 – Twin Bridge



PLAN

SCALE: 1" = 50'-0"



ELEVATION

SCALE: 1" = 50'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904TwinBridgeAlternative	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

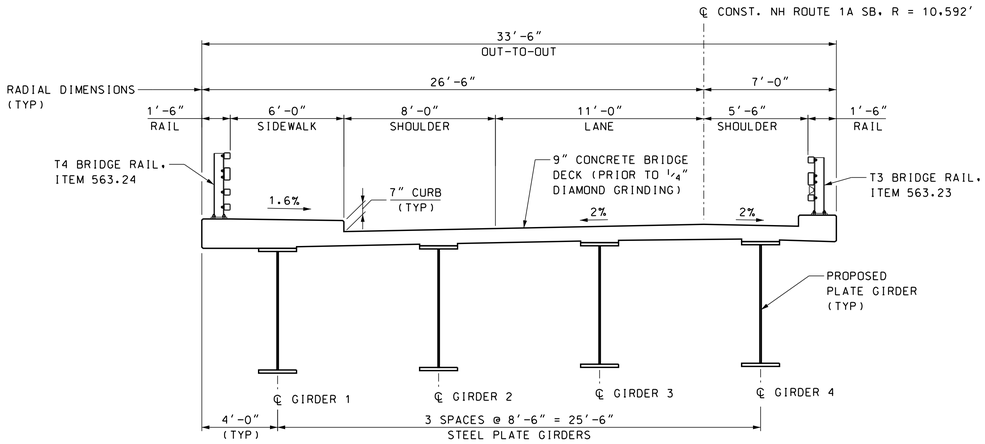
TWIN BRIDGE GENERAL PLAN AND ELEVATION

BRIDGE SHEET 1 OF 10

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	JRP/PJL	11/19	CHECKED	SLB	11/19
	DRAWN	NDC	11/19	CHECKED	JFM	10/19
	QUANTITIES			CHECKED		

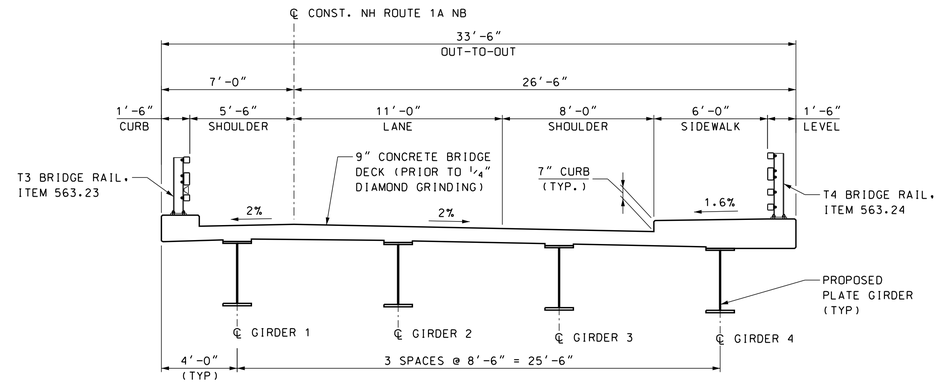
FILE NUMBER -

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	1	14



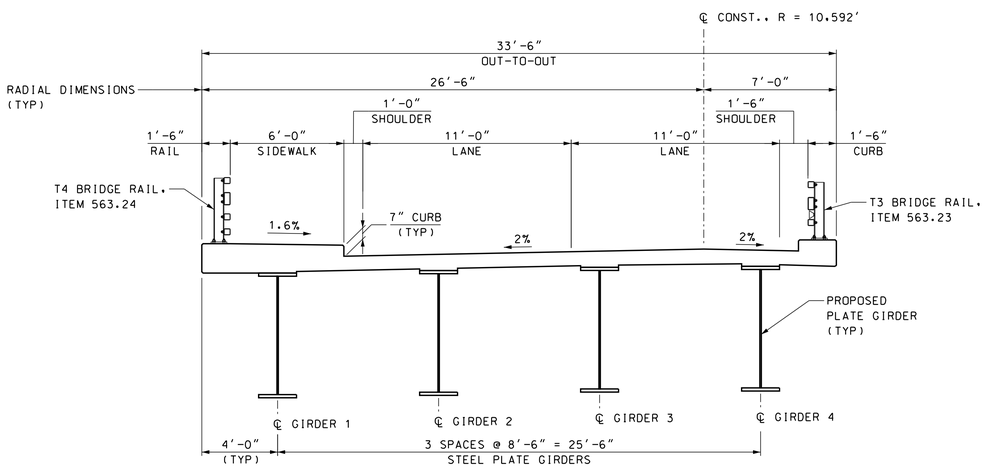
TWIN BRIDGE TYPICAL APPROACH SPAN SECTION

SCALE: 1" = 1'-0"



REHAB TYPICAL APPROACH SPAN SECTION

SCALE: 1/4" = 1'-0"



TEMPORARY TRAFFIC CONDITION

SCALE: 1" = 1'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

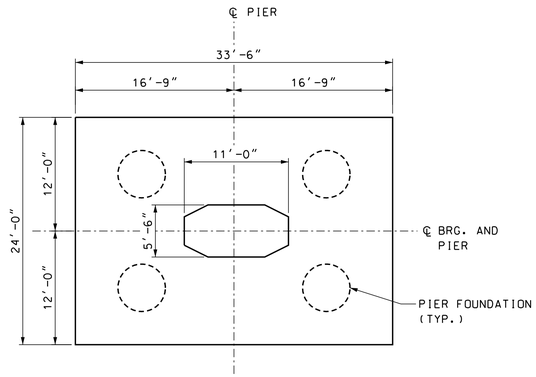
TWIN BRIDGE APPROACH SPANS TYPICAL SECTIONS

BRIDGE SHEET 2 OF 10

FILE NUMBER -

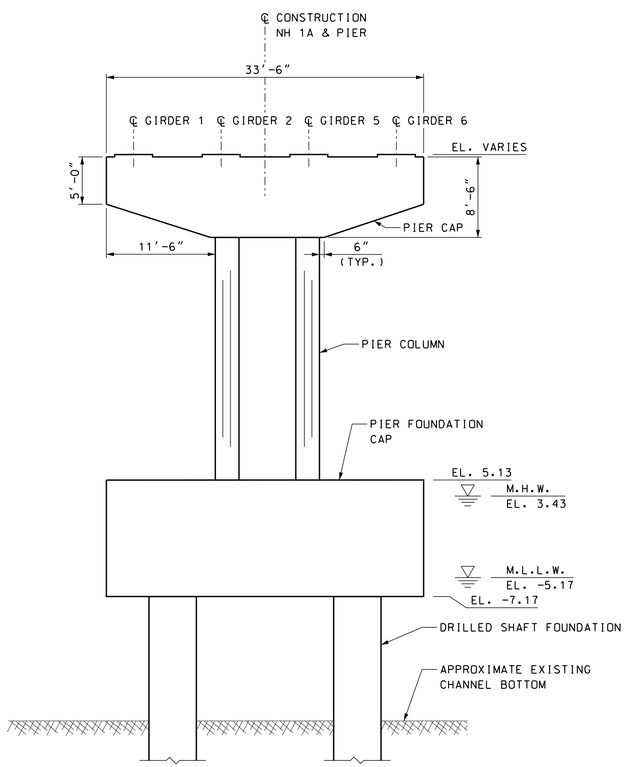
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	JRP/PJL	11/19	CHECKED	SLB	11/19
	DRAWN	NDC	11/19	CHECKED	JFM	11/19
	QUANTITIES			CHECKED		

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904TwinBridgeAlternative	AS NOTED	REV. DATE	--	2	14



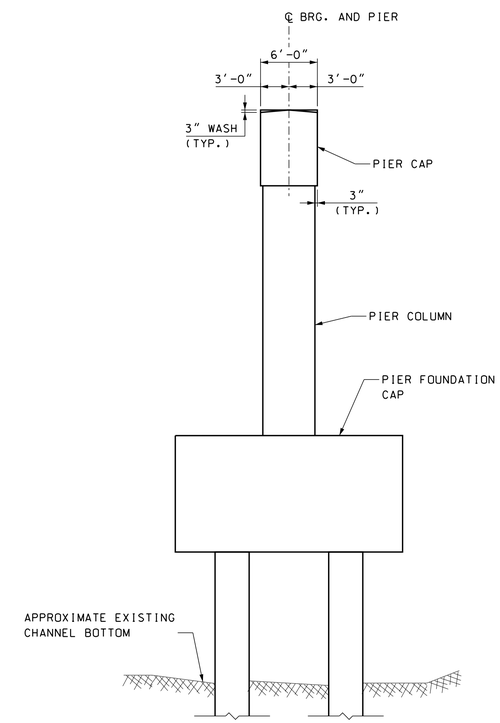
PIER FOOTING PLAN

SCALE: 1/8" = 1'-0"



SOUTH ELEVATION

SCALE: 1/8" = 1'-0"



PIER SECTION

SCALE: 1/8" = 1'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

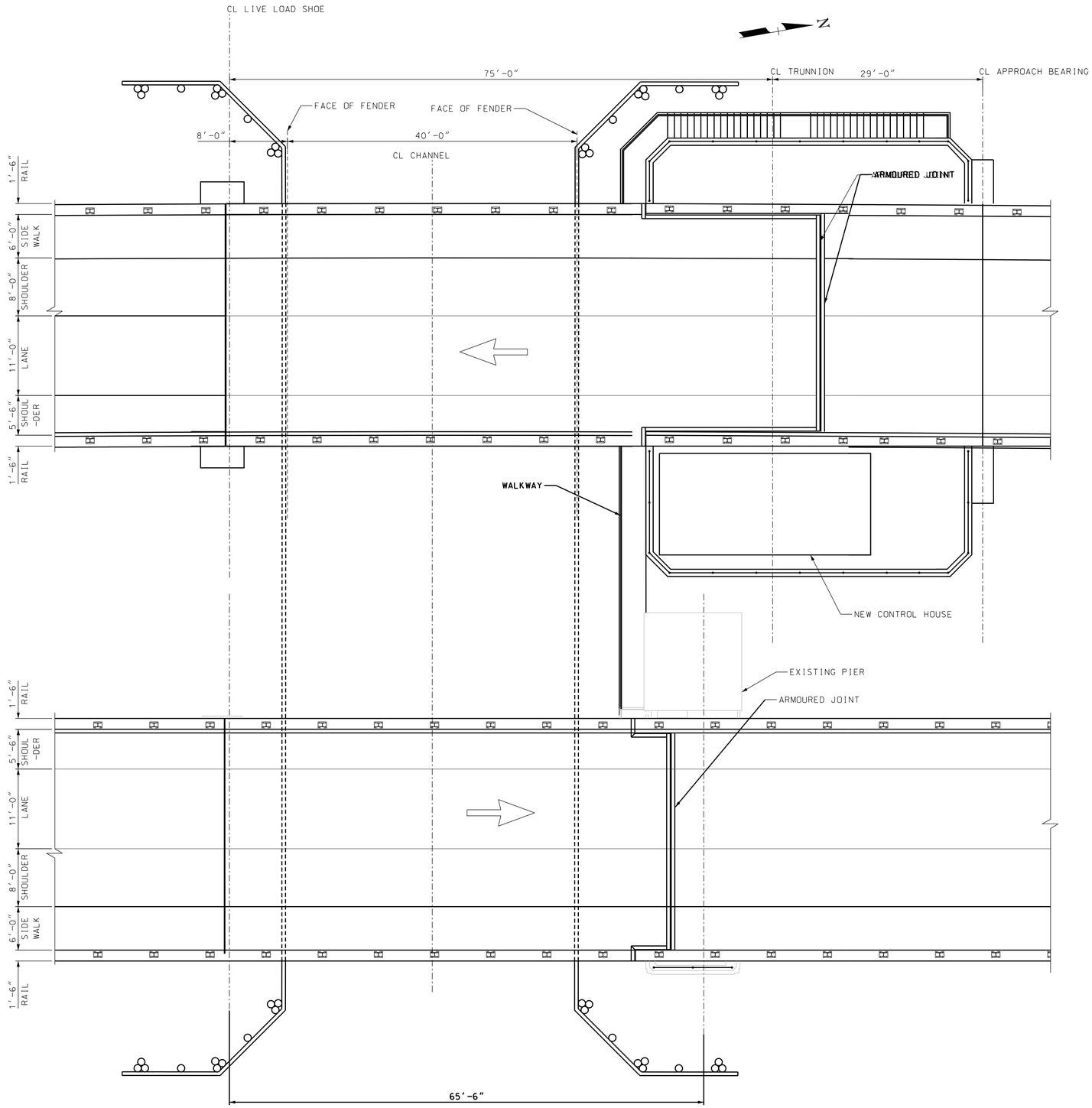
PIER PLAN AND ELEVATION

BRIDGE SHEET 3 OF 10

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	07/19	CHECKED	SLB	07/19
	DRAWN	NDC	10/19	CHECKED	JFM	10/19
	QUANTITIES			CHECKED		

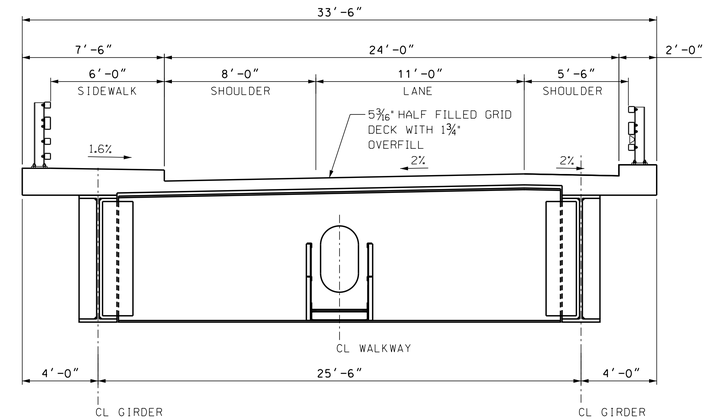
FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904Pier	AS NOTED	REV. DATE	--	3	14



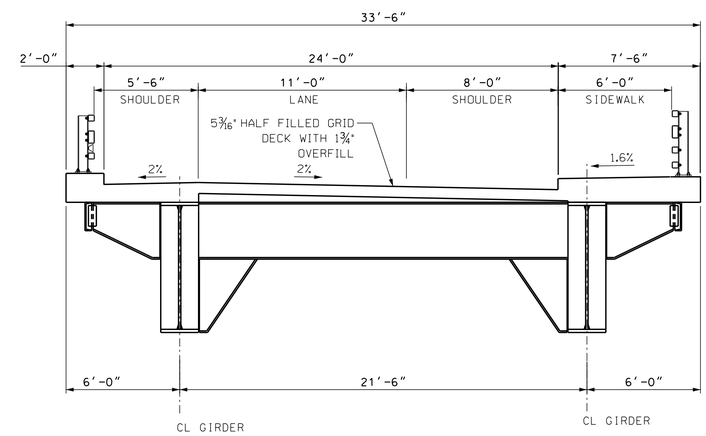
PLAN

SCALE: 1/8" = 1'-0"



TYPICAL NEW BASCULE SECTION

SCALE: 1/4" = 1'-0"



TYPICAL BASCULE REHAB SECTION

SCALE: 1/4" = 1'-0"

HDR

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904TwinBridgeAlternative-MM	AS NOTED

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

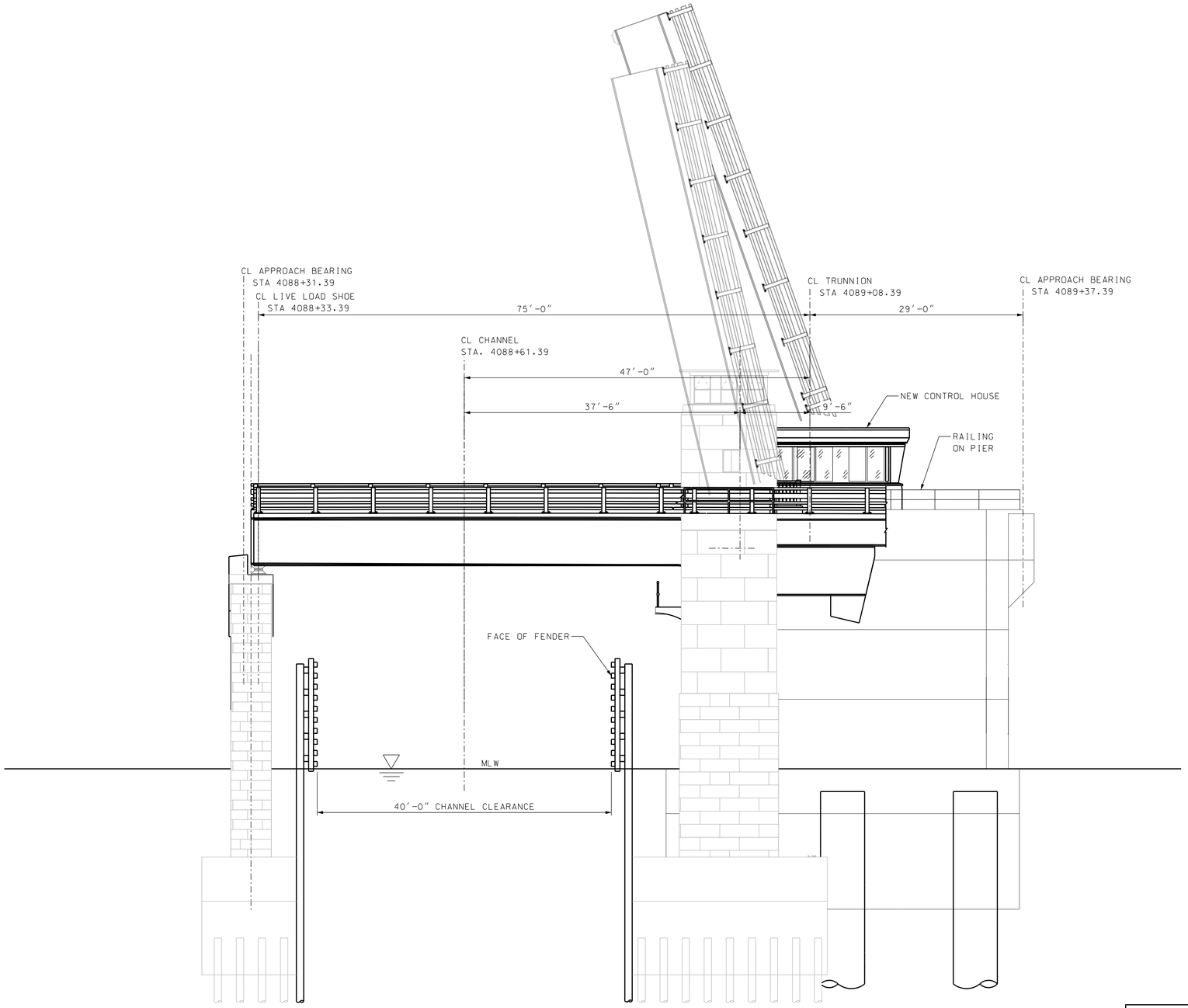
BASCULE PLAN TYPICAL VIEWS

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	HFP	09/19	CHECKED	SS	09/19
	DRAWN	SS	09/19	CHECKED	HFP	10/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	4	14

BRIDGE SHEET 4 OF 10

FILE NUMBER -



ELEVATION

SCALE: 1/8" = 1'-0"

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

BASCULE BRIDGE GENERAL ELEVATION

BRIDGE SHEET 5 OF 10

REVISIONS AFTER PROPOSAL

	BY	DATE		BY	DATE
DESIGNED	HFP	09/19	CHECKED	SS	09/19
DRAWN	SS	09/19	CHECKED	HFP	10/19
QUANTITIES			CHECKED		

FILE NUMBER -

ISSUE DATE

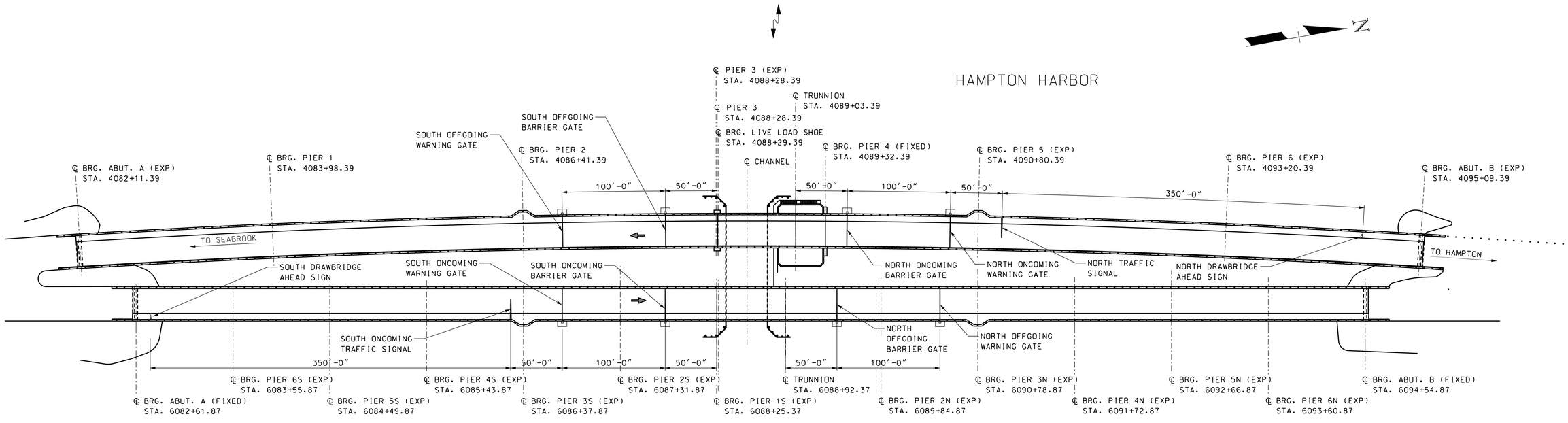
REV. DATE

FEDERAL PROJECT NO. --

SHEET NO. 5

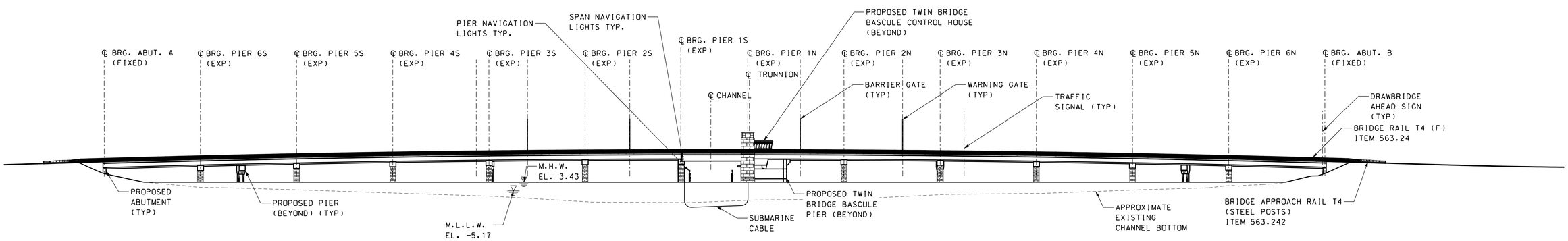
TOTAL SHEETS 14

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904TwinBridgeAlternative-MM	AS NOTED



PLAN

SCALE: 1" = 50'-0"



ELEVATION FACING WEST

SCALE: 1" = 50'-0"

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

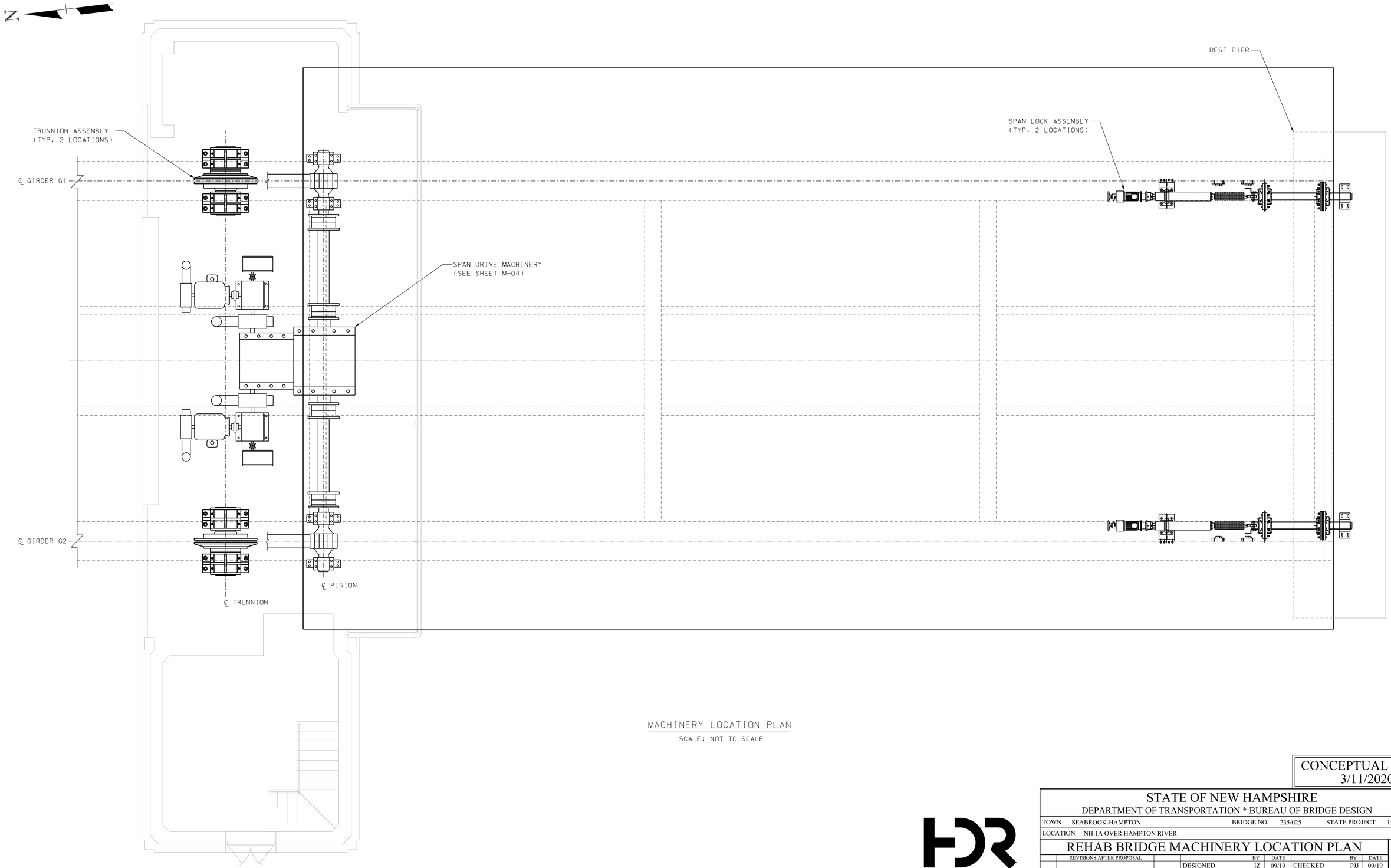
BASCULE BRIDGE GENERAL PLAN AND ELEVATION

BRIDGE SHEET 6 OF 10

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	---	09/19	CHECKED	---	09/19
	DRAWN	ADM	12/19	CHECKED	JFM	10/19
	QUANTITIES			CHECKED		

FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904brd_TWIN_GP&E	AS NOTED	REV. DATE	--	6	14



MACHINERY LOCATION PLAN

SCALE: NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

REHAB BRIDGE MACHINERY LOCATION PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	IZ	09/19	CHECKED	PJJ	09/19
	DRAWN	IZ	09/19	CHECKED	PJJ	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	7	14

BRIDGE SHEET 7 OF 10

FILE NUMBER -

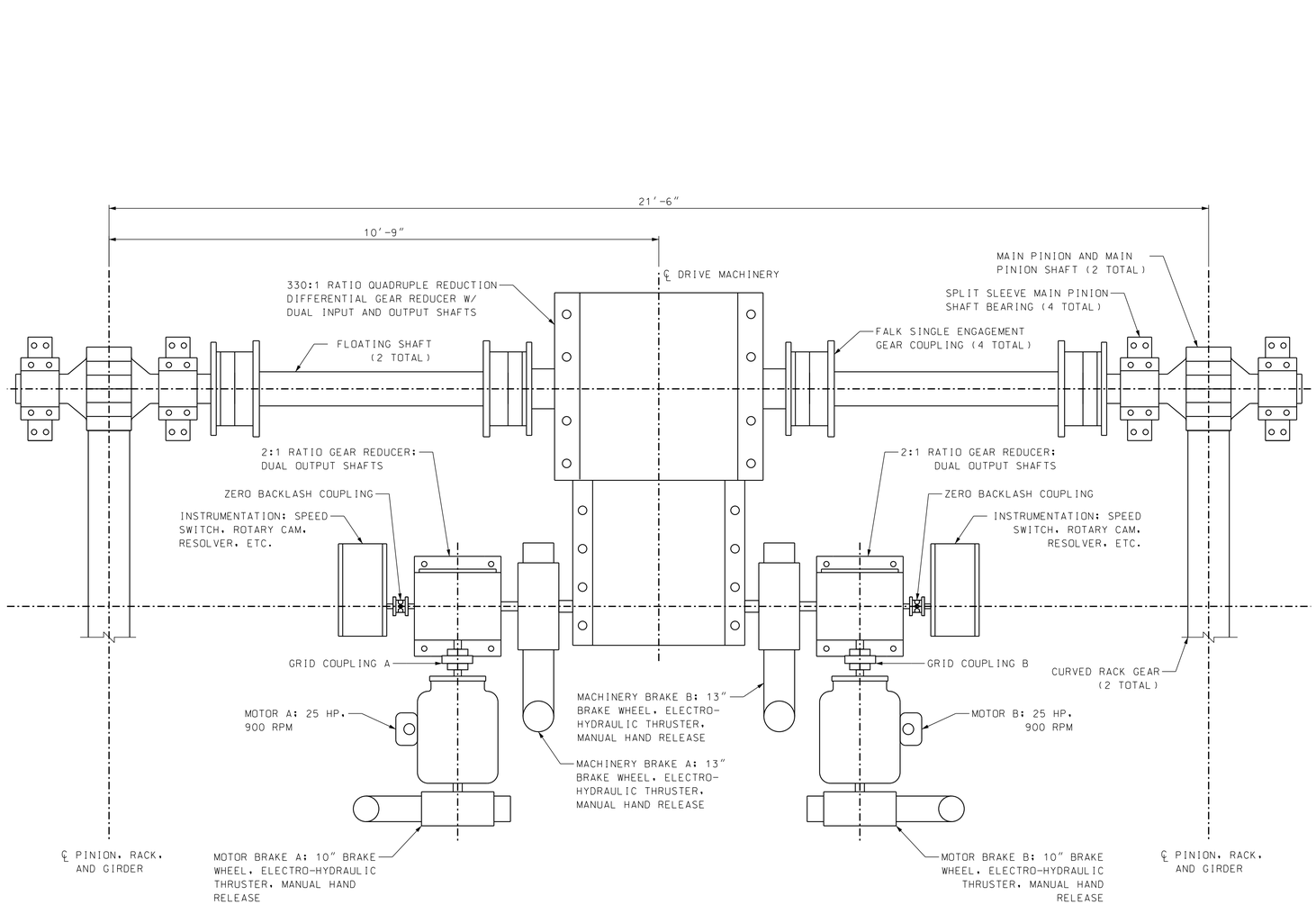
PLOT DATE	.DGN LOCATOR	SHEET SCALE
M-03 Replacement	Bridge Span Drive Machinery Layout.dgn	AS NOTED

MECHANICAL NOTES:

DETAILS OF MACHINERY SHALL CONFORM TO THE 2017 MOVABLE HIGHWAY BRIDGE DESIGN SPECIFICATIONS WITH INTERIM REVISIONS PUBLISHED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, UNLESS OTHERWISE NOTED.

OPERATING TIME:

THE OPERATING MACHINERY IS DESIGNED TO ACCELERATE THE SPAN SMOOTHLY, RUN AT CONSTANT SPEED, AND THEN DECELERATE SMOOTHLY FOR A NORMAL OPERATING TIME OF 90 SECONDS. EITHER MOTOR A OR MOTOR B IS INTENDED TO OPERATE THE BRIDGE SOLELY.



SPAN DRIVE MACHINERY PLAN

SCALE: NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

REHAB BRIDGE SPAN DRIVE MACHINERY PLAN

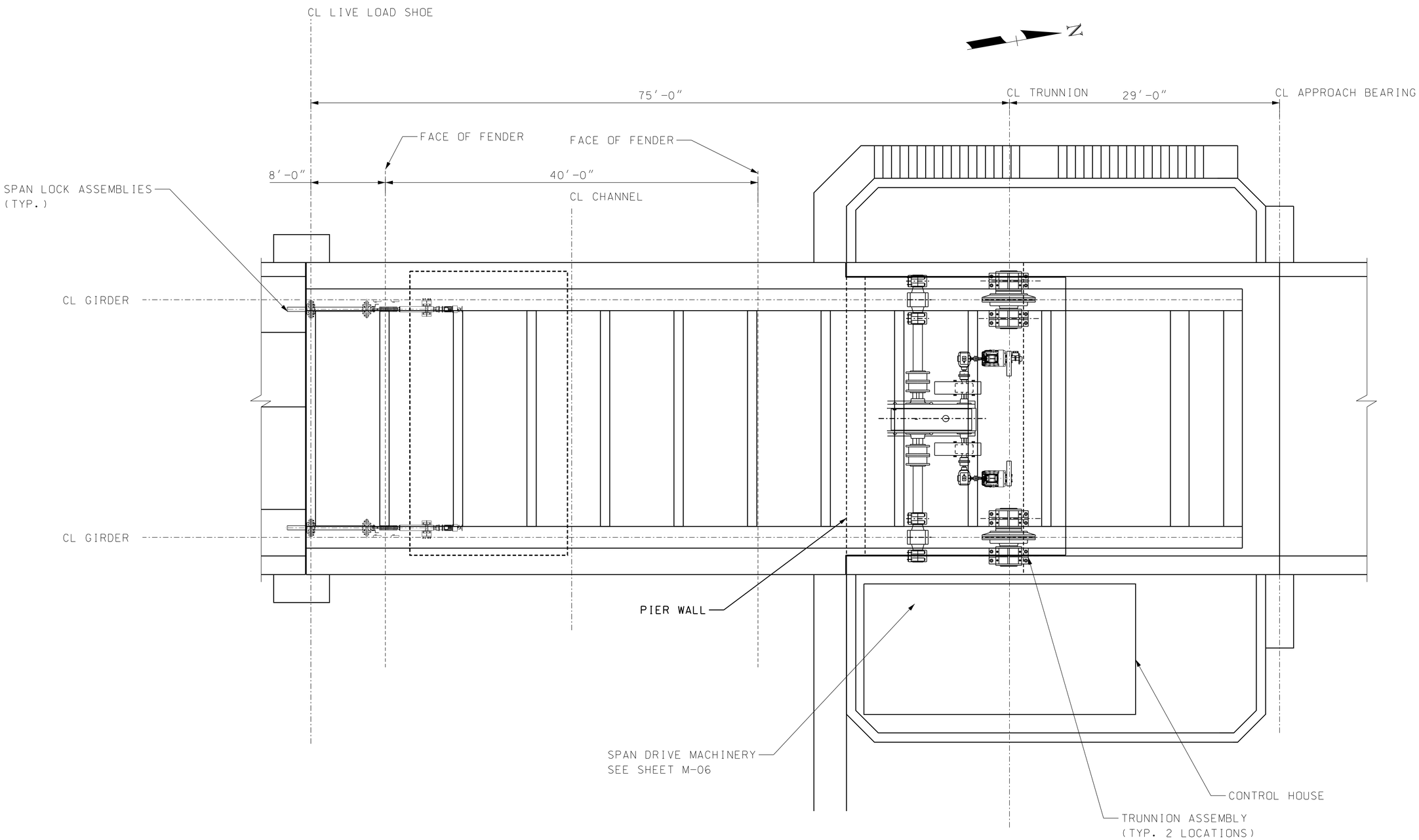
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	IZ	09/19	CHECKED	PJJ	09/19
	DRAWN	IZ	09/19	CHECKED	PJJ	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	8	14

BRIDGE SHEET 8 OF 10

FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	Replacement Bridge Span Drive Machinery.dgn	AS NOTED



MACHINERY LOCATION PLAN

SCALE: NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

BASCULE SPAN MACHINERY LOCATION

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	IZ	11/19	CHECKED	PJJ	11/19
	DRAWN	IZ	11/19	CHECKED	PJJ	11/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	9	14

BRIDGE SHEET 9 OF 10

FILE NUMBER -

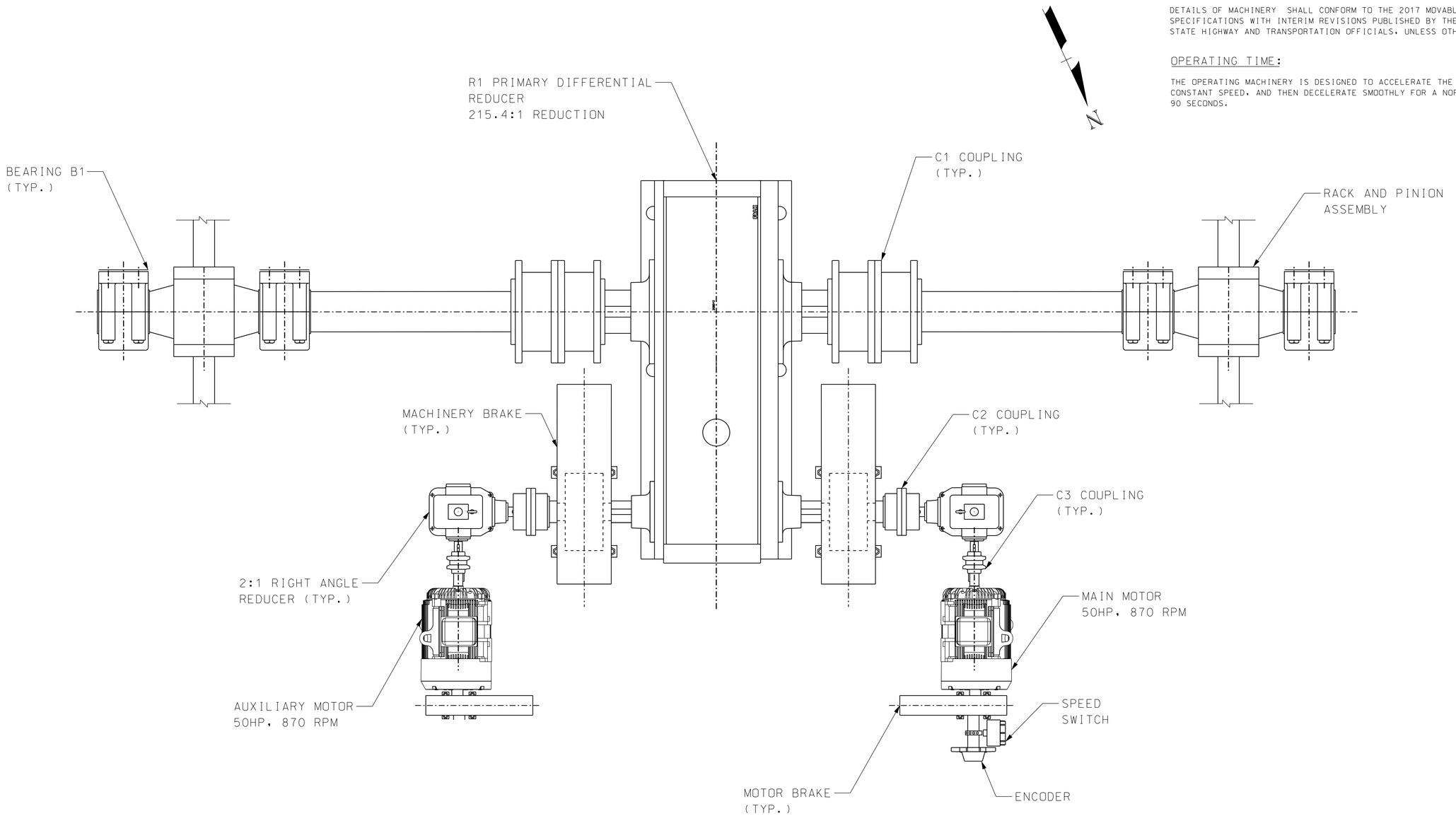
PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904 in Bridge Bascule Span Machinery Location.dgn	AS NOTED

MECHANICAL NOTES:

DETAILS OF MACHINERY SHALL CONFORM TO THE 2017 MOVABLE HIGHWAY BRIDGE DESIGN SPECIFICATIONS WITH INTERIM REVISIONS PUBLISHED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, UNLESS OTHERWISE NOTED.

OPERATING TIME:

THE OPERATING MACHINERY IS DESIGNED TO ACCELERATE THE SPAN SMOOTHLY, RUN AT CONSTANT SPEED, AND THEN DECELERATE SMOOTHLY FOR A NORMAL OPERATING TIME OF 90 SECONDS.



SPAN DRIVE MACHINERY PLAN

SCALE: NOT TO SCALE

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

SPAN DRIVE MACHINERY ASSEMBLY

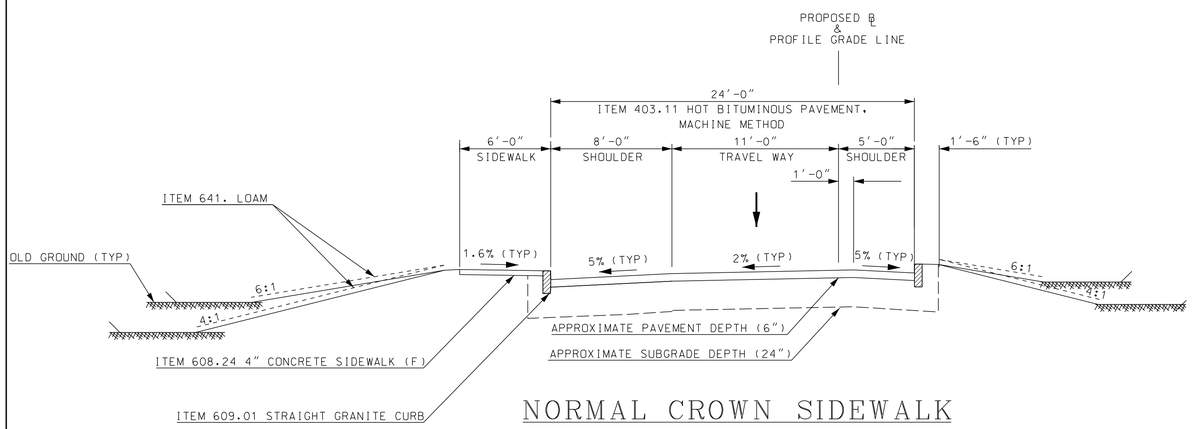
BRIDGE SHEET 10 OF 10

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	IZ	11/19	CHECKED	PJJ	11/19
	DRAWN	IZ	11/19	CHECKED	PJJ	11/19
	QUANTITIES			CHECKED		

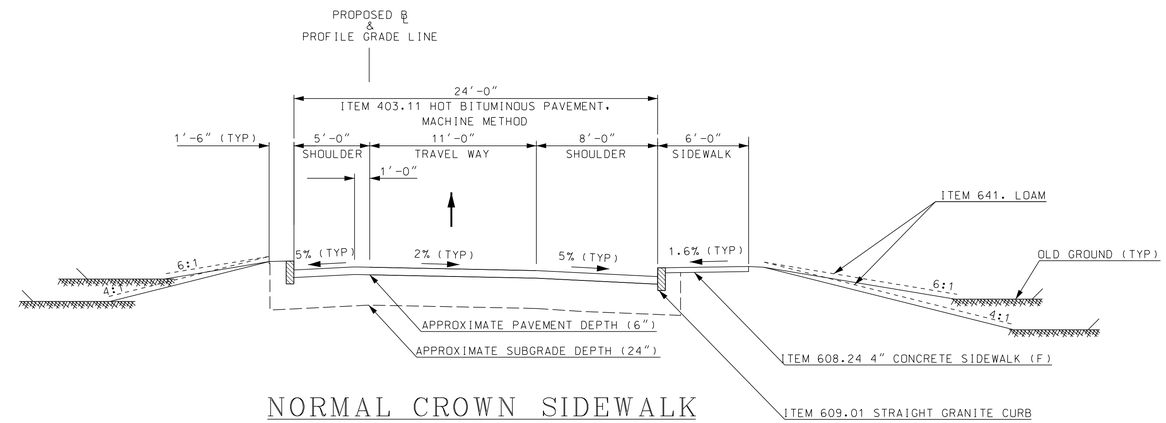
ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	10	14

FILE NUMBER -

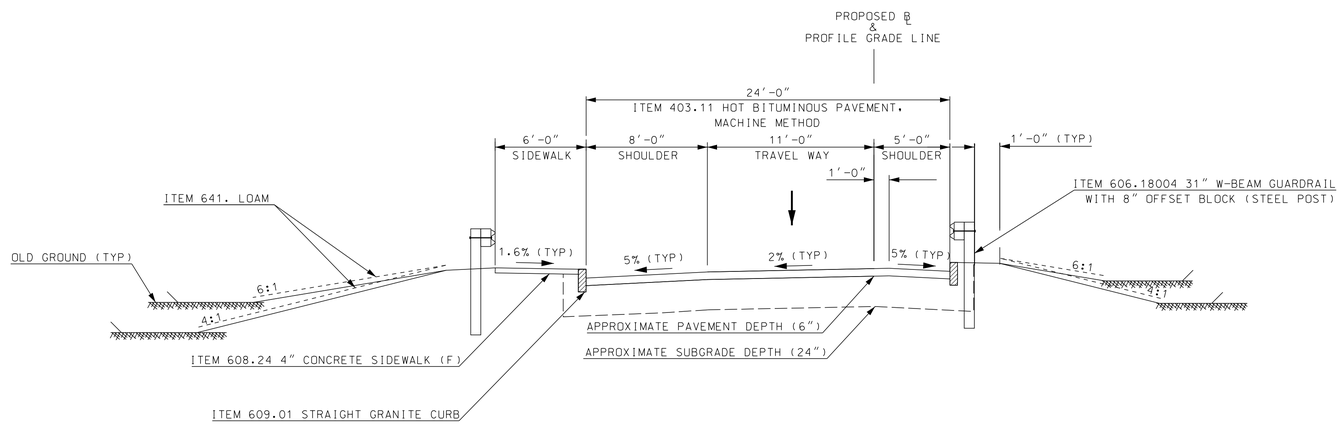
PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904 Twin Bridge Span Drive Machinery Assembly	NOTED



NORMAL CROWN SIDEWALK
(SOUTHBOUND-NEW STRUCTURE)
NOT TO SCALE



NORMAL CROWN SIDEWALK
(NORTHBOUND-REHABILITATED STRUCTURE)
NOT TO SCALE



NORMAL CROWN SIDEWALK AND GUARDRAIL
(SOUTHBOUND-NEW STRUCTURE)

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904typical_twin_bridge	AS NOTED

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

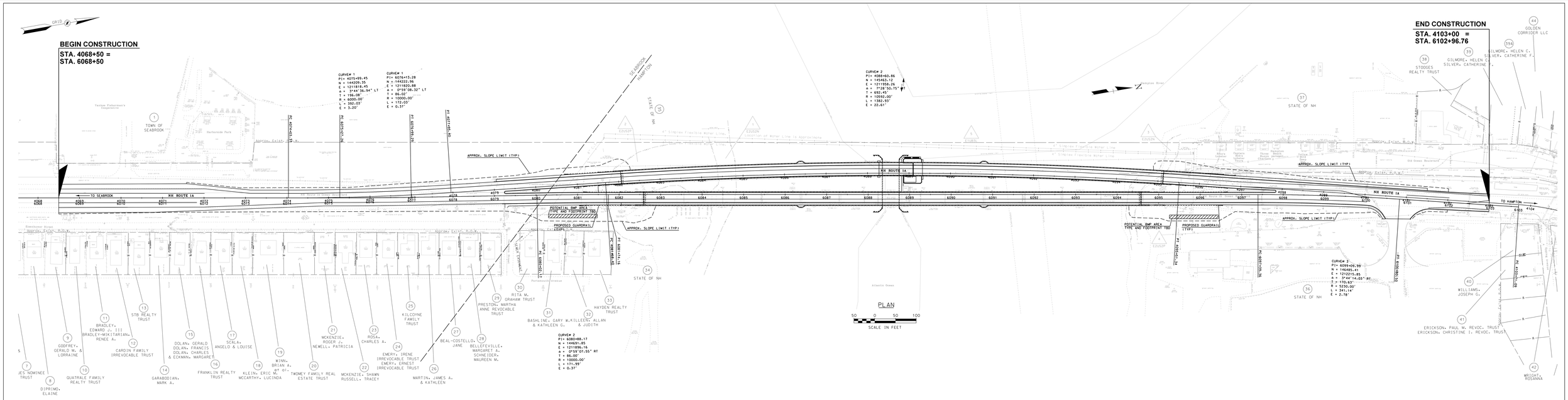
ROADWAY TYPICAL SECTIONS

SHEET 1 OF 4

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KH	10/19	CHECKED	RL	10/19
	DRAWN	KH	10/19	CHECKED	RL	10/19
	QUANTITIES			CHECKED		

FILE NUMBER -

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	11	14



CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904gen_plan	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

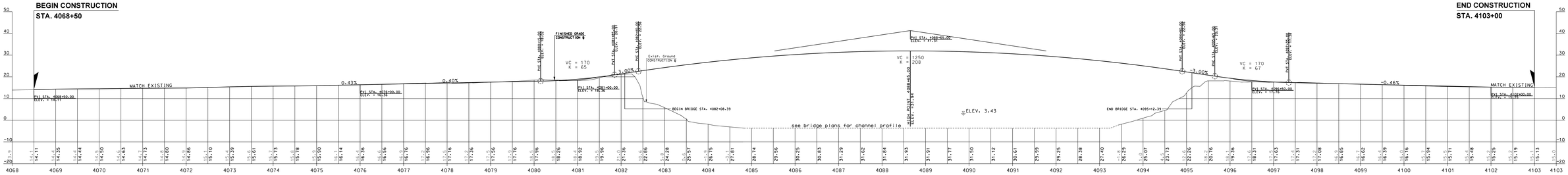
LOCATION NH 1A OVER HAMPTON RIVER

GENERAL PLAN (TWIN BRIDGE ALTERNATIVE)

SHEET 2 OF 4

FILE NUMBER -

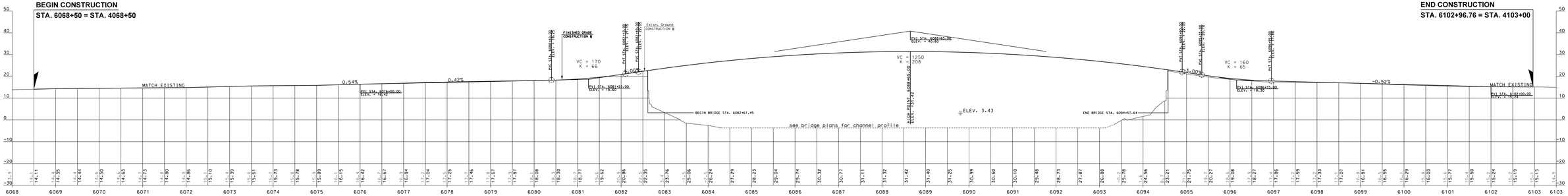
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	KLH	10/19	CHECKED	CPD	10/19
	DRAWN	KLH	10/19	CHECKED	RDL	10/19
	QUANTITIES			CHECKED		
	ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.	TOTAL SHEETS
	REV. DATE		-		12	14



SOUTHBOUND - NEW STRUCTURE

PROFILE

SCALE:
1"= 50' HORIZ.
1"= 10' VERT.



NORTHBOUND - REHABILITATED STRUCTURE

PROFILE

SCALE:
1"= 50' HORIZ.
1"= 10' VERT.

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904gen_plan	AS NOTED

STATE OF NEW HAMPHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PROFILES (TWIN BRIDGE ALTERNATIVE)

SHEET 3 OF 4

REVISIONS AFTER PROPOSAL

	BY	DATE		BY	DATE
DESIGNED	KLH	10/19	CHECKED	CPD	10/19
DRAWN	KLH	10/19	CHECKED	RDL	10/19
QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	13	14

FILE NUMBER
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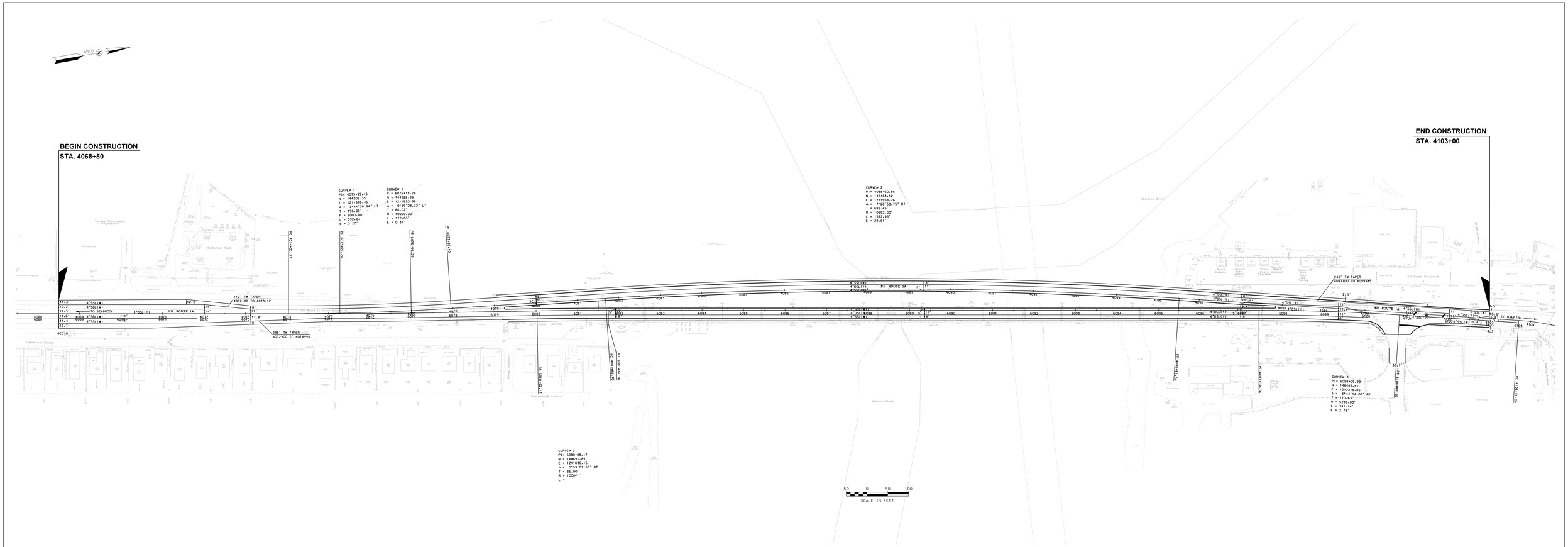


CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904pvm_plan	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PAVEMENT MARKING PLAN (TWIN ALT.)

SHEET 4 OF 4

REVISIONS AFTER PROPOSAL

	BY	DATE		BY	DATE
DESIGNED	KLH	11/19	CHECKED	RDL	12/19
DRAWN	KLH	11/19	CHECKED	RDL	12/19
QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	14	14

FILE NUMBER -

APPENDIX A5
Traffic Control Plan

Notes:

- Traffic Control Plans contained herein depict Alternative 3 – Replacement with Fixed Bridge.
- Traffic control for Alternative 2 – Replacement with Movable Bridge is similar.
- Traffic control for Alternative 1 – Bridge Rehabilitation will be provided via temporary bridge structure. See General Plan in Appendix A1.
- Traffic control for Alternative 4 – Twin Bridge will be provided via phased construction of the new southbound bridge.

BEGIN CONSTRUCTION

STA. 4068+50

CURVE# 1
PI= 4075+99.45
N = 144209.35
E = 1211818.45
Δ = 3°44'36.94" LT
T = 196.08'
R = 6000.00'
L = 392.03'
E = 3.20'

PC 4074+03.37

PT 4077+95.40

PC 4081+68.40

IMPACT ATTENUATOR (TYP)

WORKZONE (TYP)

TEMPORARY BARRIER (TYP)

MATCH TO NEXT SHEET

GRID

Yankee Fisherman's Cooperative

Harborside Park

Approx. Exist. R.O.W.

NH ROUTE 1A

NH Route 1A Ocean Boulevard

11.42'
11.72'

11'
11'

4069 4070 4071 4072 4073 4074 4075 4076 4077 4078 4079 4080 4081 4082

TRAFFIC IN EXISTING CONFIGURATION

R.O.W.

Approx. Exist. R.O.W.

Approx. Exist. R.O.W.

SEWER EASEMENT

Cecelian Street

Portsmouth Avenue

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL

PHASE 1 TRAFFIC

1'-0"	11'-0"	11'-0"	1'-0"
SHOULDER	TRAVELWAY	TRAVELWAY	SHOULDER

PHASE 1 WZ

SOUTH APPROACH SECTION
NOT TO SCALE

50 0 50 100
SCALE IN FEET

NOTES:
PHASE 1
CONSTRUCT WESTERN PORTION OF BRIDGE
WIDEN TO THE WEST OFF OF THE EXISTING PAVEMENT
SHIFT NB AND SB TRAFFIC TO THE EAST. CLOSE LEFT TURN ONLY LANE
AT STATE PARK ENTRANCE.

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

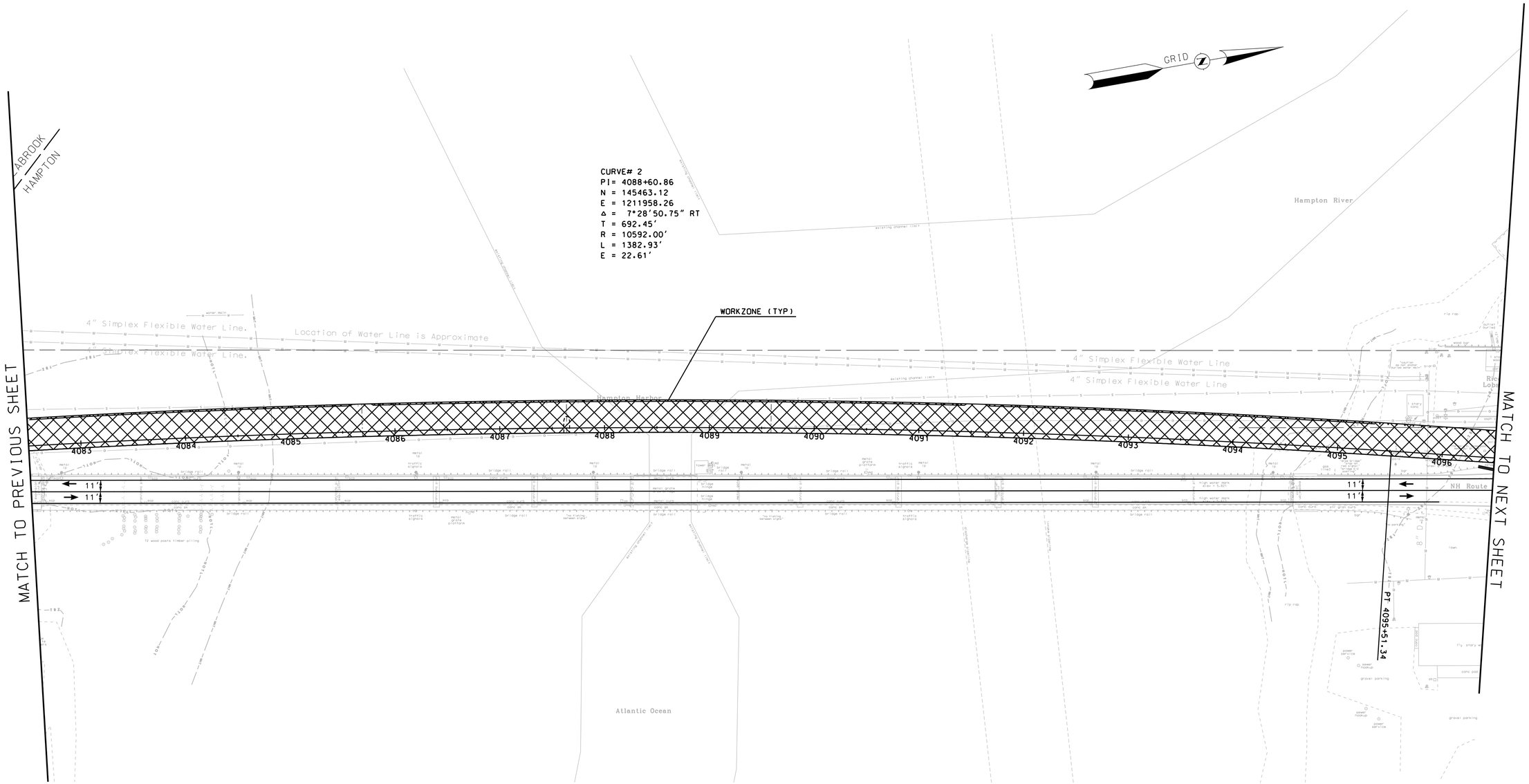
PHASE 1 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	CD	09/19	CHECKED	RL	09/19
	DRAWN	KH	09/19	CHECKED	RL	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	1	16

SHEET 1 OF 3

FILE NUMBER -



NOTES:
PHASE 1
CONSTRUCT WESTERN PORTION OF BRIDGE
WIDEN TO THE WEST OFF OF THE EXISTING PAVEMENT
SHIFT NB AND SB TRAFFIC TO THE EAST. CLOSE LEFT TURN ONLY LANE
AT STATE PARK ENTRANCE.

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

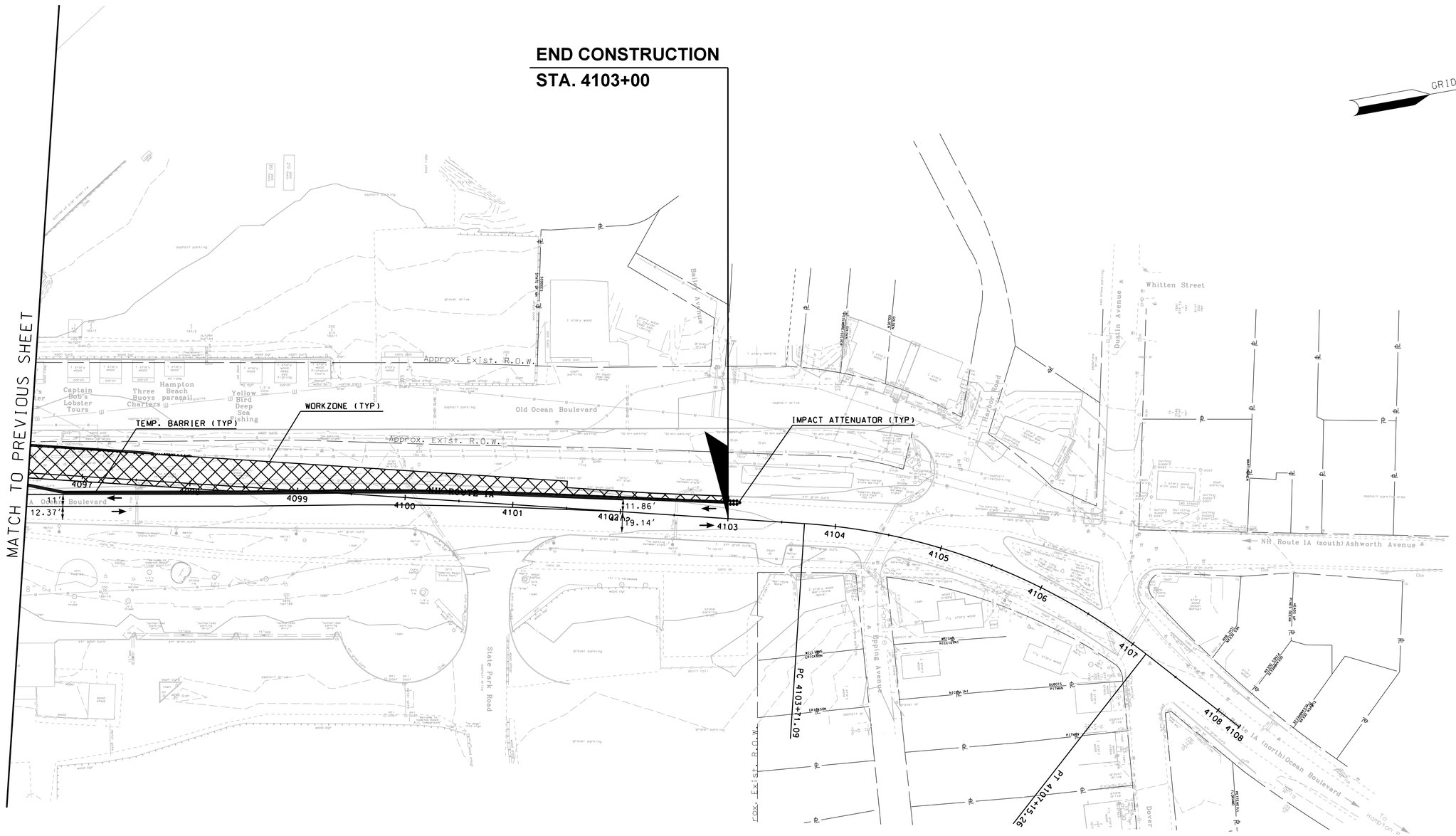
PHASE 1 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	CD	09/19	CHECKED	RL	09/19
	DRAWN	KH	09/19	CHECKED	RL	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	2	16

SHEET 2 OF 3

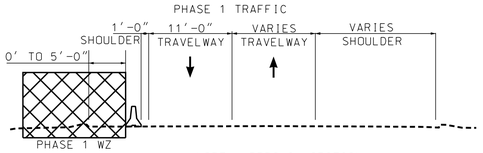
FILE NUMBER -



NOTES:
PHASE 1
CONSTRUCT WESTERN PORTION OF BRIDGE
WIDEN TO THE WEST OFF OF THE EXISTING PAVEMENT
SHIFT NB AND SB TRAFFIC TO THE EAST. CLOSE LEFT TURN ONLY LANE
AT STATE PARK ENTRANCE.

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL



NORTH APPROACH SECTION
NOT TO SCALE

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

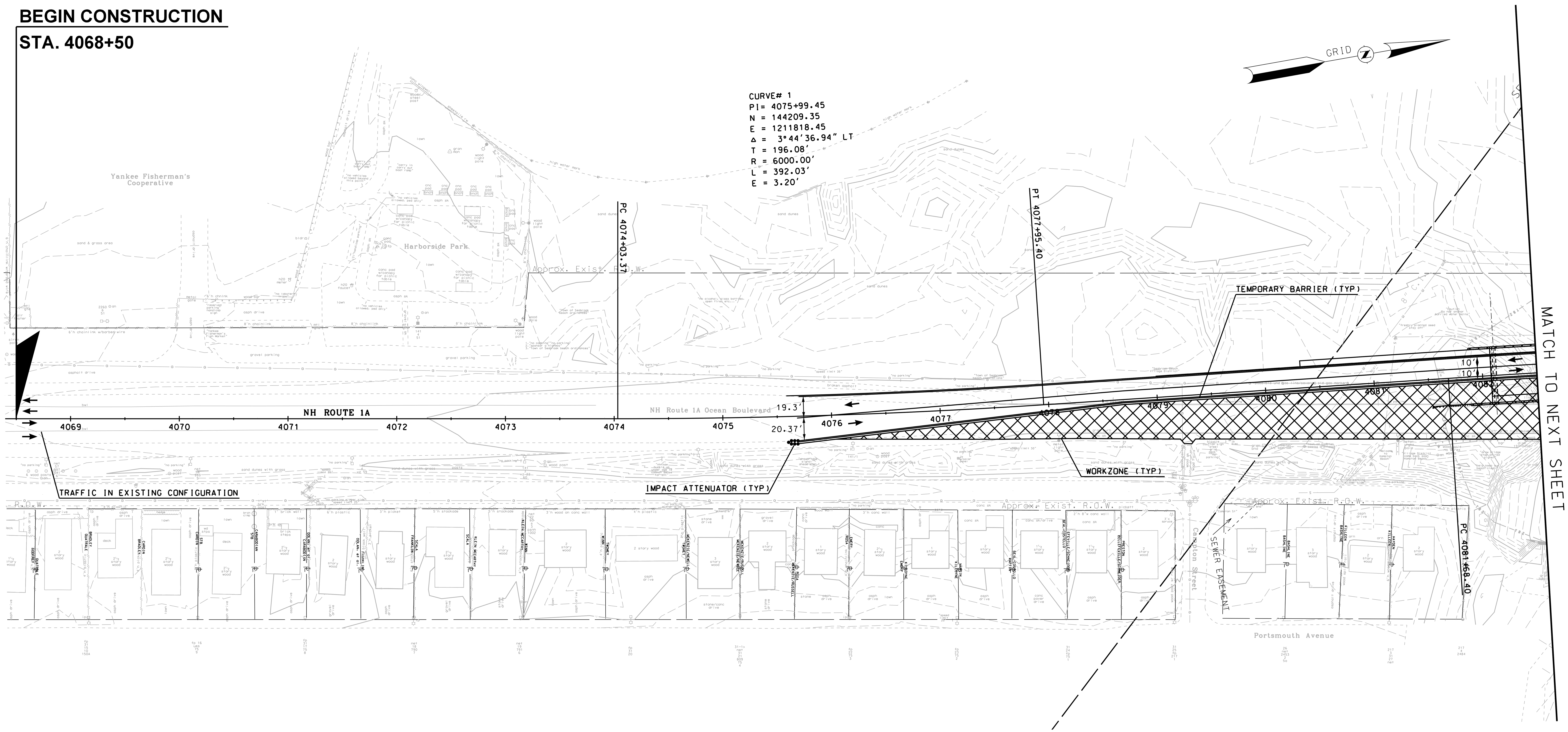
PHASE 1 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	CD	09/19	CHECKED	RL	09/19
	DRAWN	KH	09/19	CHECKED	RL	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	3	16

SHEET 3 OF 3

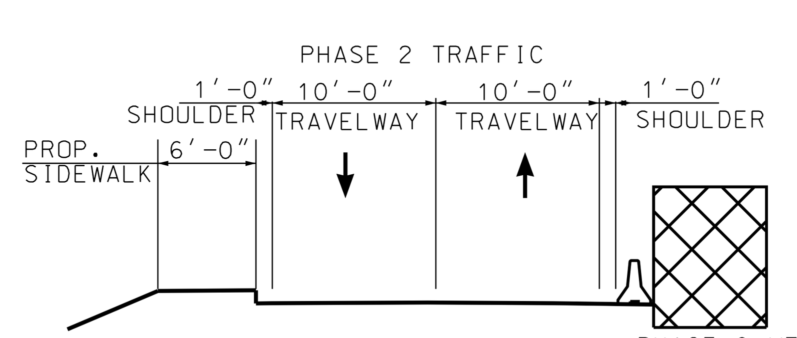
FILE NUMBER -



NOTES:
PHASE 2
CONSTRUCT EASTERN PORTION OF BRIDGE
DECONSTRUCT EXISTING BRIDGE
CONSTRUCT EASTERN PORTION OF ROADWAY
SHIFT NB AND SB TRAFFIC TO THE NEW BRIDGE UTILIZING WIDENING CONSTRUCTED IN PHASE 1

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL



SOUTH APPROACH SECTION
NOT TO SCALE

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904
LOCATION NH 1A OVER HAMPTON RIVER

PHASE 2 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	CD	09/19	CHECKED	RL	09/19
	DRAWN	KH	09/19	CHECKED	RL	09/19
	QUANTITIES			CHECKED		
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	REV. DATE					

SHEET 1 OF 3
FILE NUMBER -
FEDERAL PROJECT NO. -
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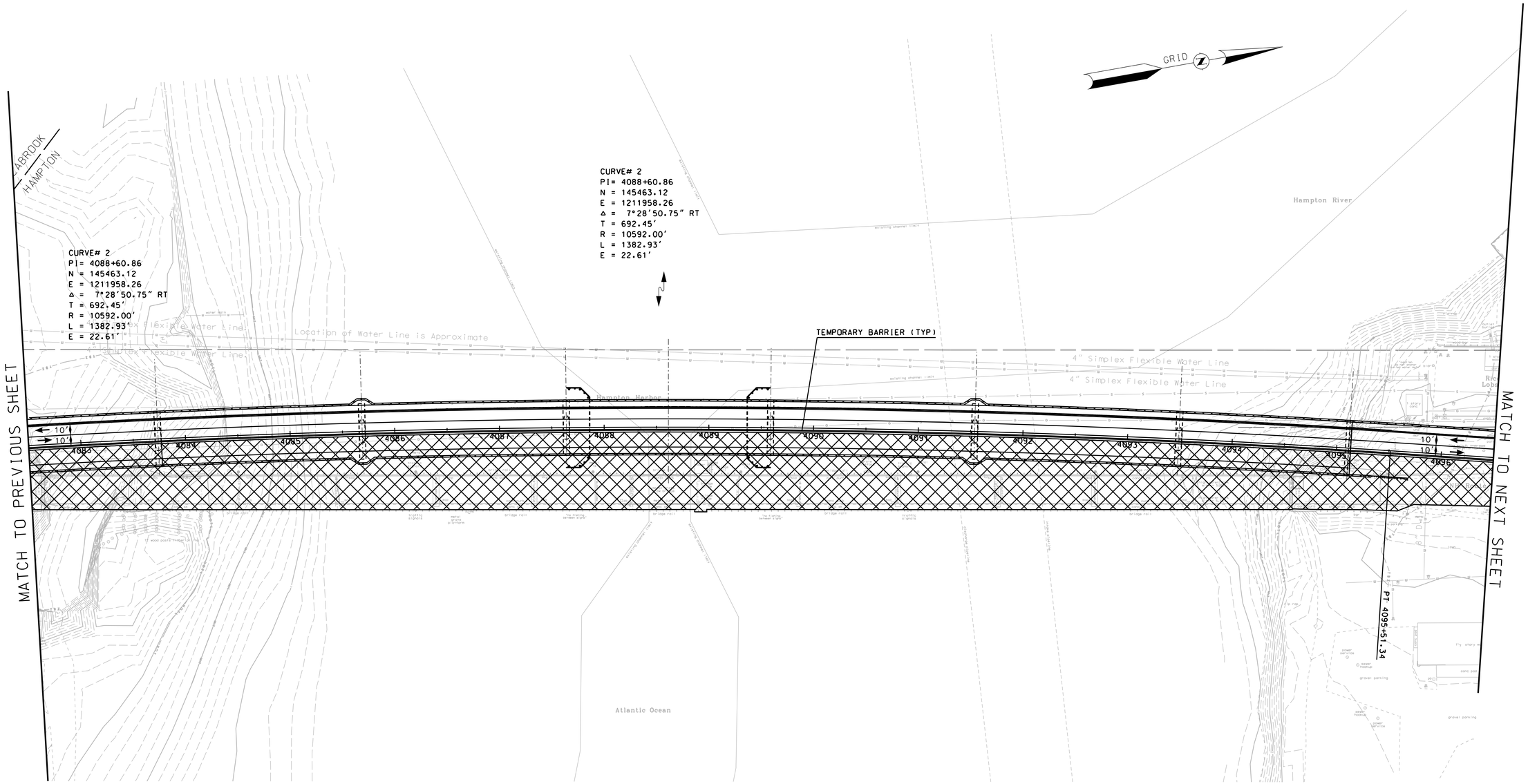
TOTAL SHEETS 16



NOTES:
PHASE 2
CONSTRUCT EASTERN PORTION OF BRIDGE
DECONSTRUCT EXISTING BRIDGE
CONSTRUCT EASTERN PORTION OF ROADWAY
SHIFT NB AND SB TRAFFIC TO THE NEW BRIDGE UTILIZING WIDENING CONSTRUCTED IN PHASE 1

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

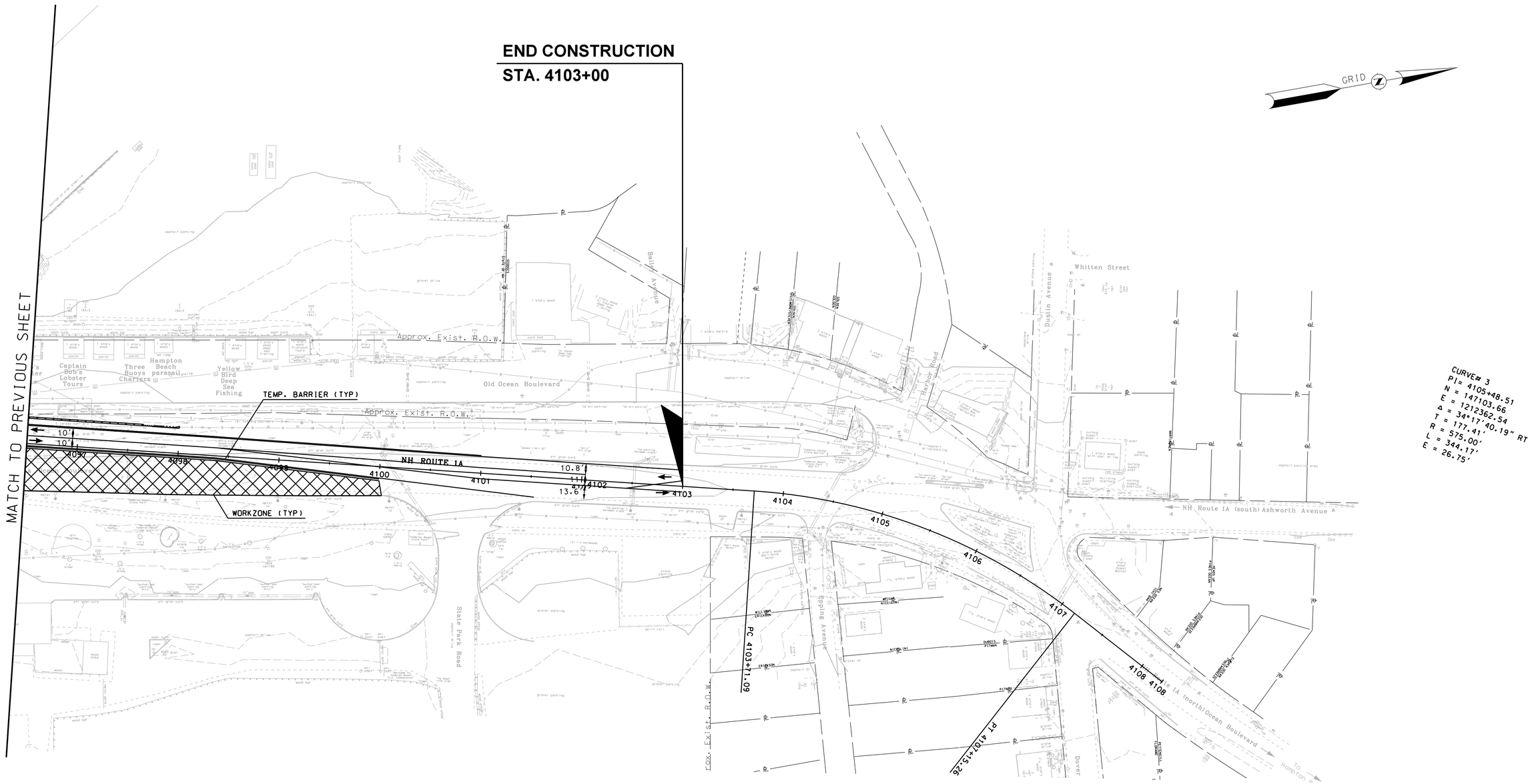
LOCATION NH 1A OVER HAMPTON RIVER

PHASE 2 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	CD	09/19	CHECKED	RL	09/19
	DRAWN	KH	09/19	CHECKED	RL	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.
REV. DATE	-	5

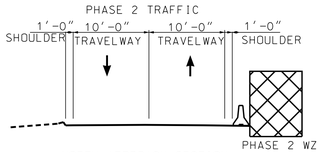
SHEET 2 OF 3
FILE NUMBER -
TOTAL SHEETS 16



NOTES:
PHASE 2
CONSTRUCT EASTERN PORTION OF BRIDGE
DECONSTRUCT EXISTING BRIDGE
CONSTRUCT EASTERN PORTION OF ROADWAY
SHIFT NB AND SB TRAFFIC TO THE NEW BRIDGE UTILIZING WIDENING CONSTRUCTED IN PHASE 1

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL



NORTH APPROACH SECTION
NOT TO SCALE

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PHASE 2 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
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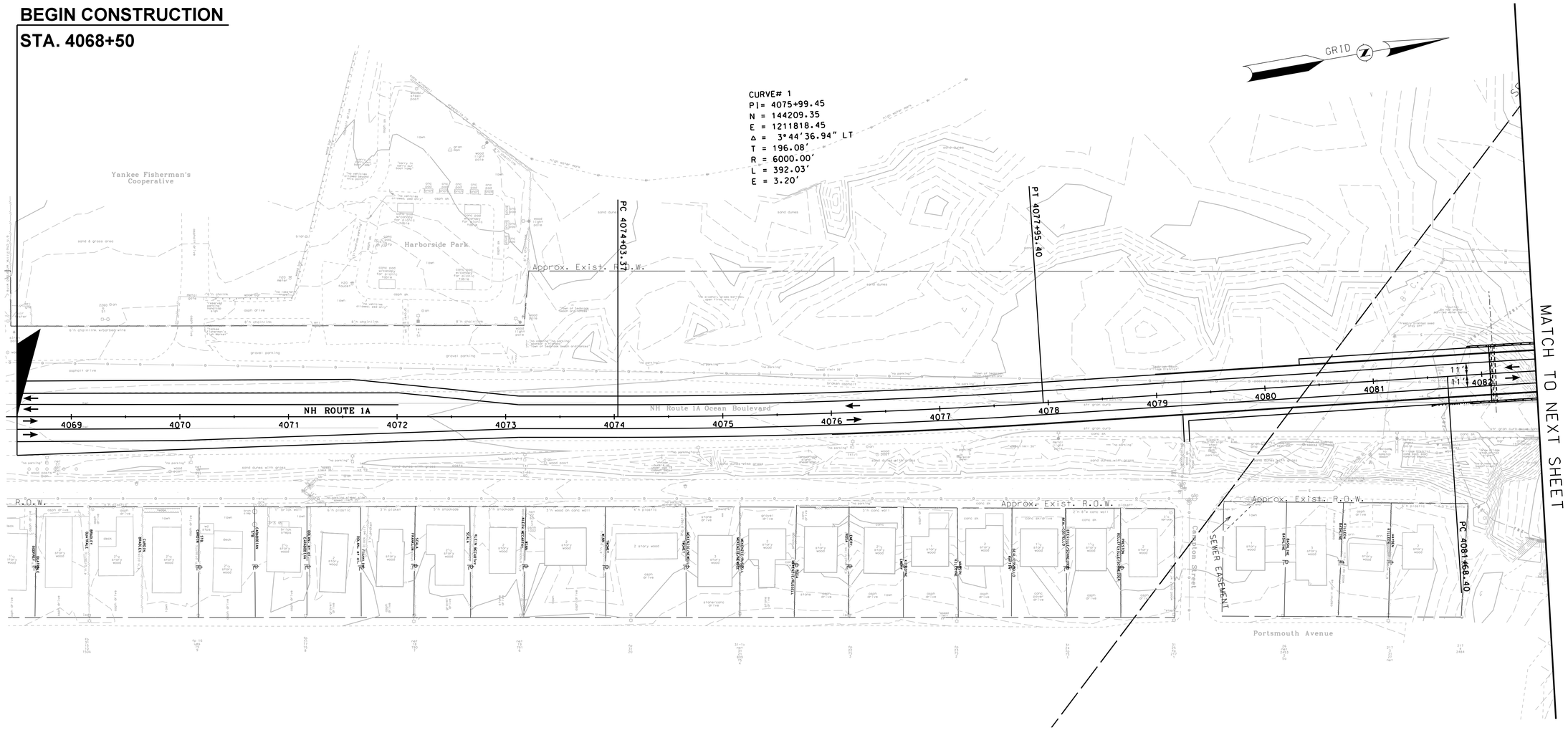
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.
REV. DATE	-	6

SHEET 3 OF 3
FILE NUMBER -
TOTAL SHEETS 16

BEGIN CONSTRUCTION

STA. 4068+50



NOTES:

PHASE 3
CONSTRUCT MIDDLE PORTION OF NORTHERN APPROACH UTILIZING OFF PEAK LANE CLOSURES AS NEEDED
SOUTH APPROACH ALL TRAFFIC ON PROPOSED LAYOUT
NORTH APPROACH SHIFT NB TRAFFIC WESTERLY TO PROPOSED GRADE CONSTRUCTED IN PHASE 2
NORTH APPROACH SHIFT SB TRAFFIC EASTERLY TO WIDENED PORTION OF ROADWAY CONSTRUCTED IN PHASE 1

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PHASE 3 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	CD	09/19	CHECKED	RL	09/19
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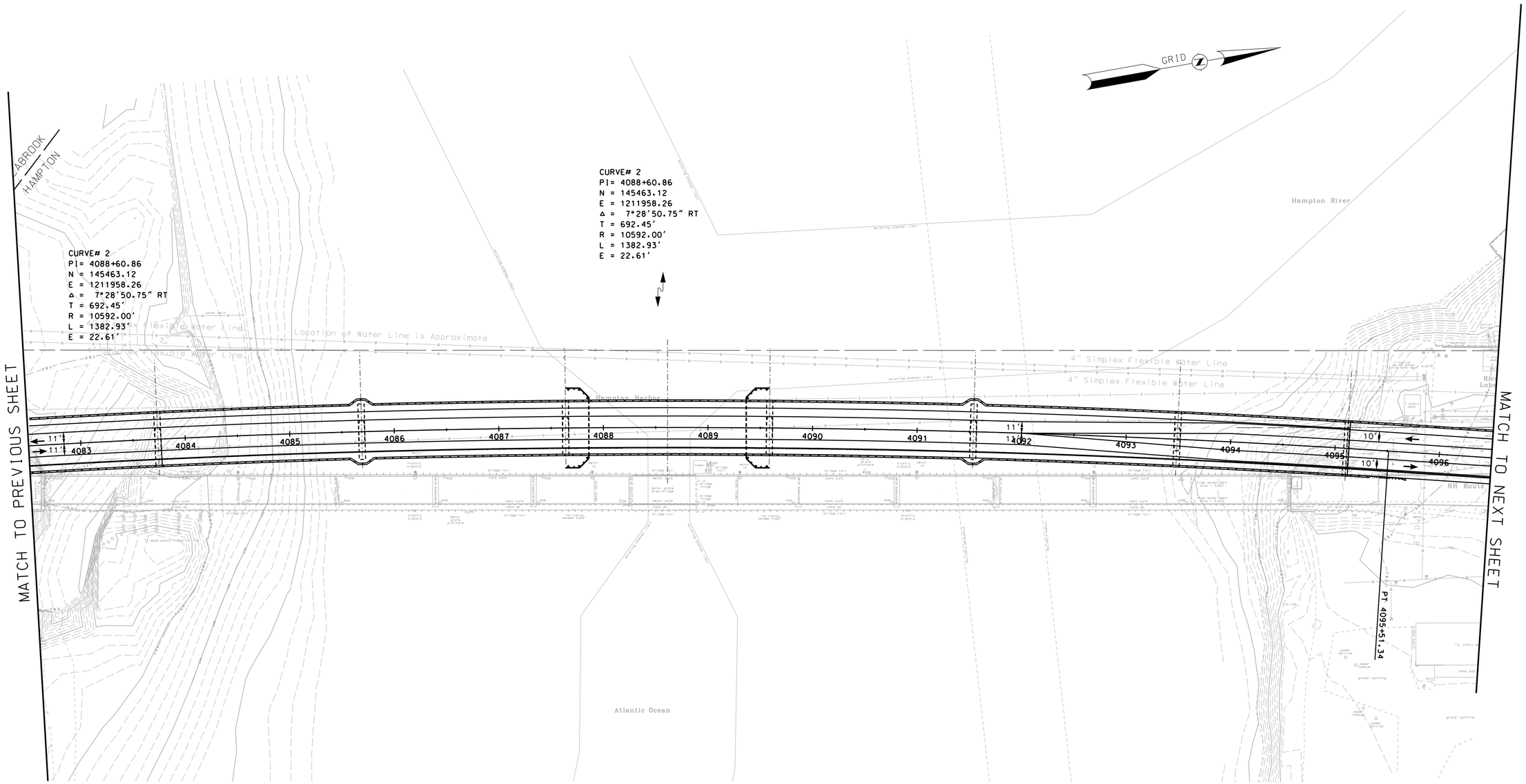
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.
REV. DATE	-	7

SHEET	FILE NUMBER	TOTAL SHEETS
1 OF 3	-	16



NOTES:

PHASE 3
CONSTRUCT MIDDLE PORTION OF NORTHERN APPROACH UTILIZING OFF PEAK LANE CLOSURES AS NEEDED
SOUTH APPROACH ALL TRAFFIC ON PROPOSED LAYOUT
NORTH APPROACH SHIFT NB TRAFFIC WESTERLY TO PROPOSED GRADE CONSTRUCTED IN PHASE 2
NORTH APPROACH SHIFT SB TRAFFIC EASTERLY TO WIDENED PORTION OF ROADWAY CONSTRUCTED IN PHASE 1

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PHASE 3 TRAFFIC CONTROL PLAN

SHEET 2 OF 3

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
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	DRAWN	KH	09/19	CHECKED	RL	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	8	16

FILE NUMBER
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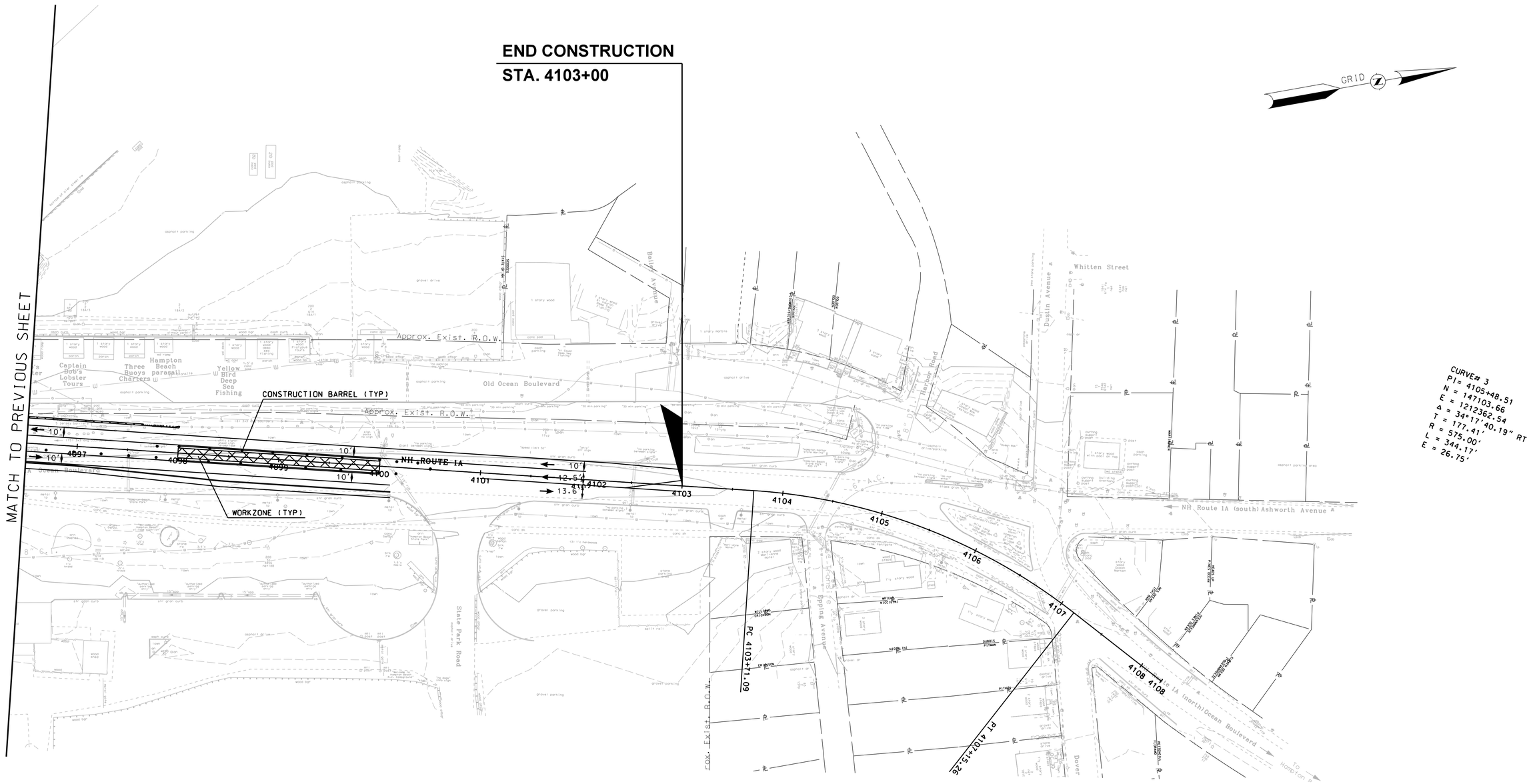
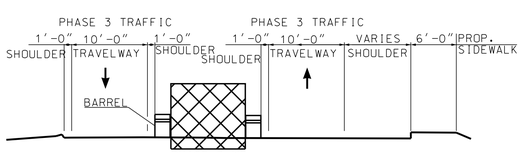


NOTES:

PHASE 3
CONSTRUCT MIDDLE PORTION OF NORTHERN APPROACH UTILIZING OFF PEAK LANE CLOSURES AS NEEDED
SOUTH APPROACH ALL TRAFFIC ON PROPOSED LAYOUT
NORTH APPROACH SHIFT NB TRAFFIC WESTERLY TO PROPOSED GRADE CONSTRUCTED IN PHASE 2
NORTH APPROACH SHIFT SB TRAFFIC EASTERLY TO WIDENED PORTION OF ROADWAY CONSTRUCTED IN PHASE 1

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL



NORTH APPROACH SECTION
NOT TO SCALE

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PHASE 3 TRAFFIC CONTROL PLAN

SHEET 3 OF 3

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	CD	09/19	CHECKED	RL	09/19
	DRAWN	KH	09/19	CHECKED	RL	09/19
	QUANTITIES			CHECKED		

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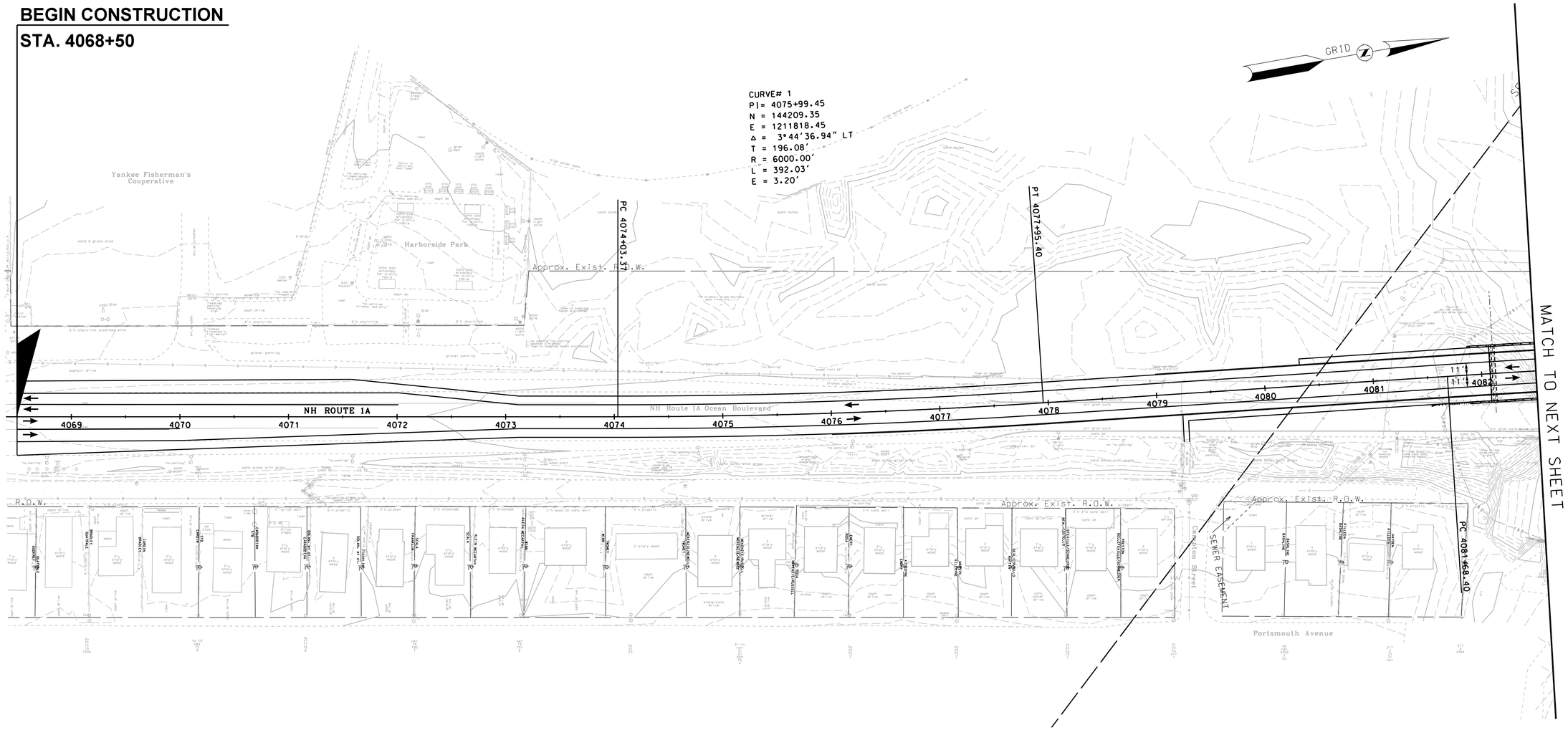
REV. DATE	-	9	16

FILE NUMBER -

BEGIN CONSTRUCTION

STA. 4068+50



NOTES:
PHASE 4
CONSTRUCT REMAINDER OF WESTERN PORTION NORTHERN APPROACH
SOUTH APPROACH ALL TRAFFIC ON PROPOSED LAYOUT
NORTH APPROACH SHIFT NB TRAFFIC EASTERLY TO PROPOSED ROADWAY CONSTRUCTED IN PHASE 3
NORTH APPROACH SB TRAFFIC IN PHASE 3 CONFIGURATION

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

PHASE 4 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL	BY	DATE		BY	DATE
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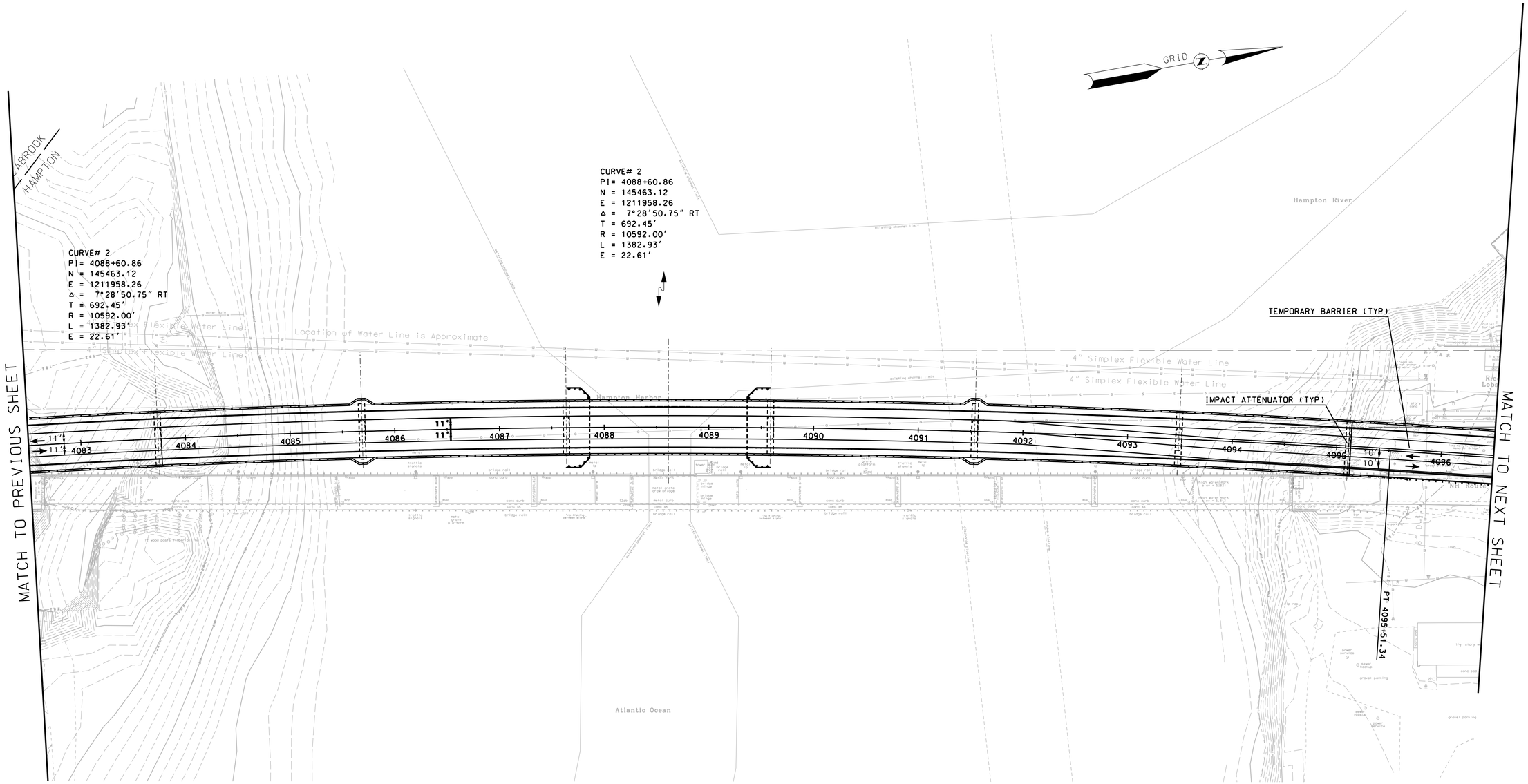
	DRAWN	KH	09/19	CHECKED	RL 09/19
	QUANTITIES			CHECKED	

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	10	16

SHEET 1 OF 3

FILE NUMBER -



NOTES:
PHASE 4
CONSTRUCT REMAINDER OF WESTERN PORTION NORTHERN APPROACH
SOUTH APPROACH ALL TRAFFIC ON PROPOSED LAYOUT
NORTH APPROACH SHIFT NB TRAFFIC EASTERLY TO PROPOSED ROADWAY CONSTRUCTED IN PHASE 3
NORTH APPROACH SB TRAFFIC IN PHASE 3 CONFIGURATION

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

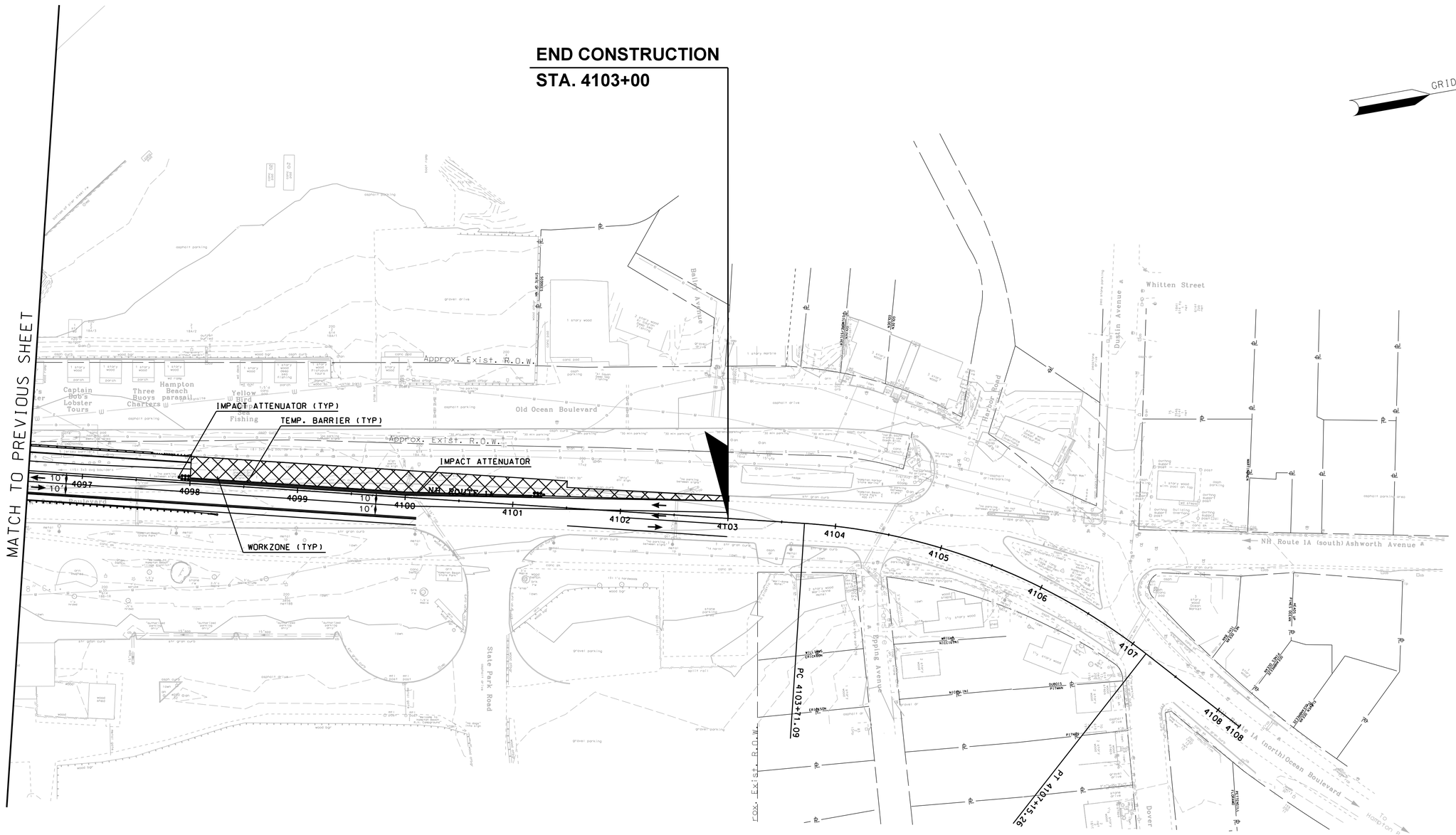
PHASE 4 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	CD	09/19	CHECKED	RL	09/19
	DRAWN	KH	09/19	CHECKED	RL	09/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	11	16

SHEET 2 OF 3

FILE NUMBER -

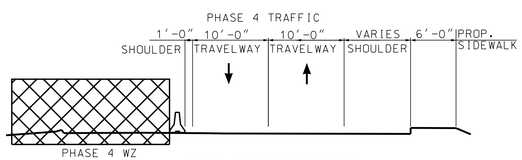


CURVE# 3
PI= 4105+48.51
N = 147103.66
E = 1212362.54
Δ = 34°17'40.19" RT
T = 177.41'
R = 575.00'
L = 344.17'
E = 26.75'

NOTES:
PHASE 4
CONSTRUCT REMAINDER OF WESTERN PORTION NORTHERN APPROACH
SOUTH APPROACH ALL TRAFFIC ON PROPOSED LAYOUT
NORTH APPROACH SHIFT NB TRAFFIC EASTERLY TO PROPOSED ROADWAY CONSTRUCTED IN PHASE 3
NORTH APPROACH SB TRAFFIC IN PHASE 3 CONFIGURATION

LEGEND

- IMPACT ATTENUATOR
- WORK ZONE
- TRAFFIC DIRECTION
- TEMPORARY BARRIER
- CONSTRUCTION BARREL



NORTH APPROACH SECTION
NOT TO SCALE

50 0 50 100
SCALE IN FEET

CONCEPTUAL PLANS
3/11/2020

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904tcp_plans	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

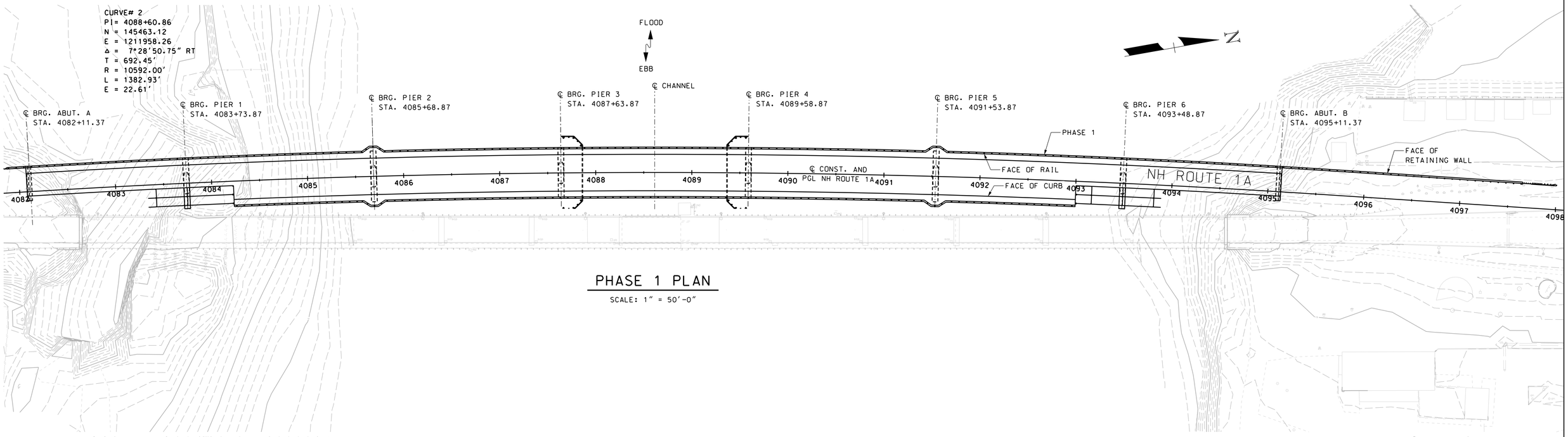
TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904
LOCATION NH 1A OVER HAMPTON RIVER

PHASE 4 TRAFFIC CONTROL PLAN

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	CD	09/19	CHECKED	RL	09/19
	DRAWN	KH	09/19	CHECKED	RL	09/19
	QUANTITIES			CHECKED		

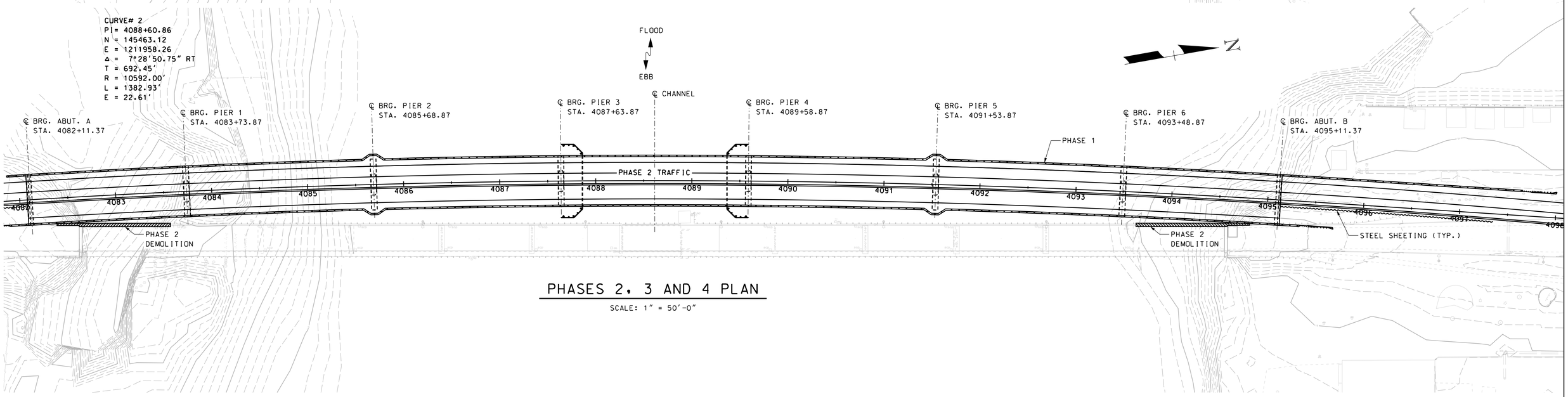
ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	-	12	16

SHEET 3 OF 3
FILE NUMBER -



PHASE 1 PLAN

SCALE: 1" = 50'-0"



PHASES 2, 3 AND 4 PLAN

SCALE: 1" = 50'-0"

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

BRIDGE CONSTRUCTION PHASING

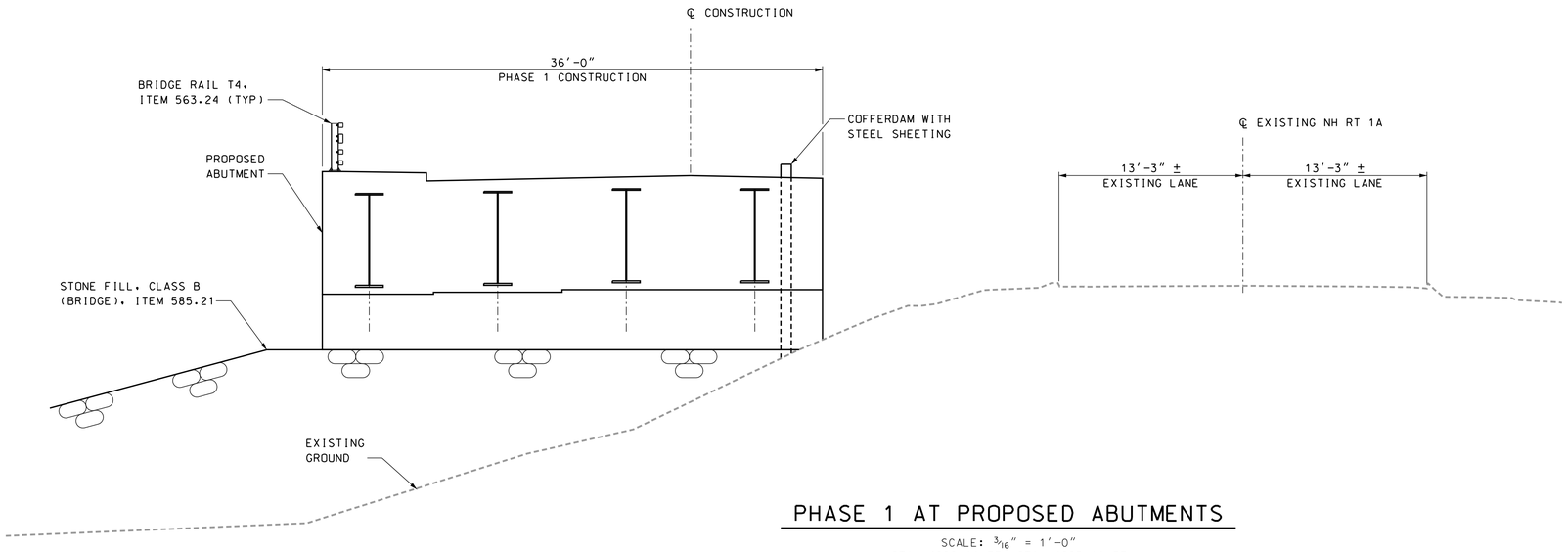
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	10/19	CHECKED	SLB	10/19
	DRAWN	NDC	10/19	CHECKED	SLB	10/19
	QUANTITIES			CHECKED		

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	13	16

BRIDGE SHEET 1 OF 4

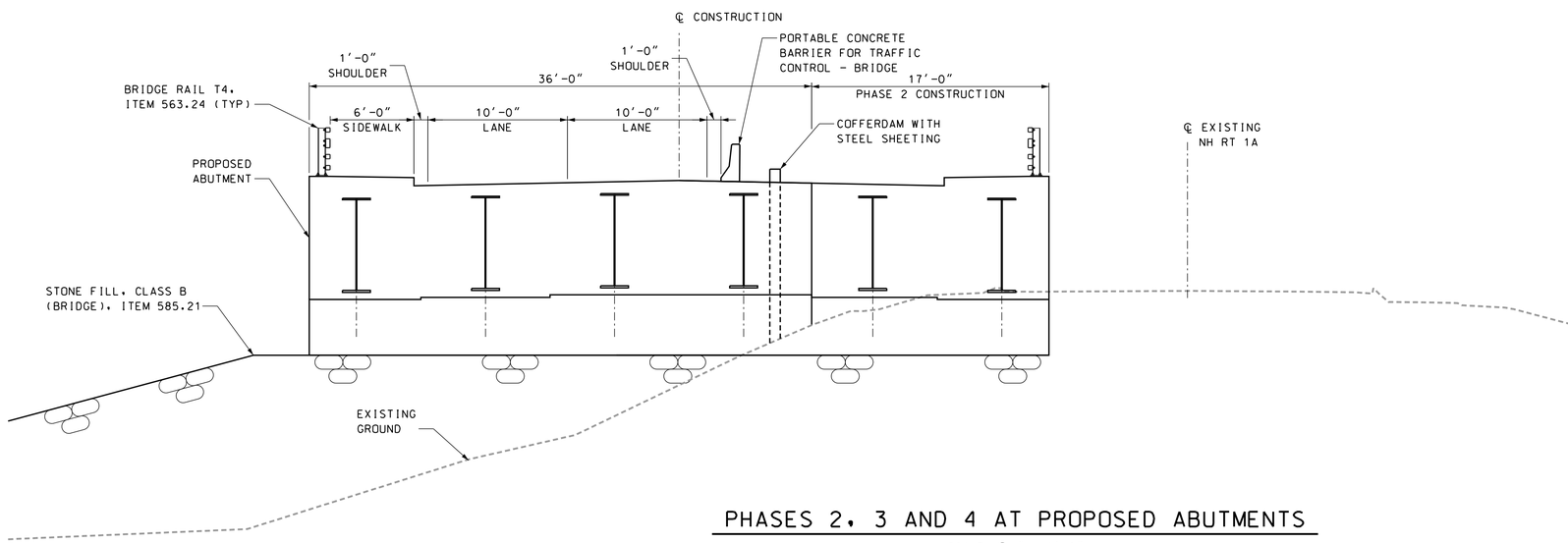
FILE NUMBER -

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904brd_fixed_phase	AS NOTED



PHASE 1 AT PROPOSED ABUTMENTS

SCALE: 3/16" = 1'-0"
STA. 4082+11.37, STA. 4095+11.37



PHASES 2, 3 AND 4 AT PROPOSED ABUTMENTS

SCALE: 3/16" = 1'-0"
STA. 4082+11.37, STA. 4095+11.37

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

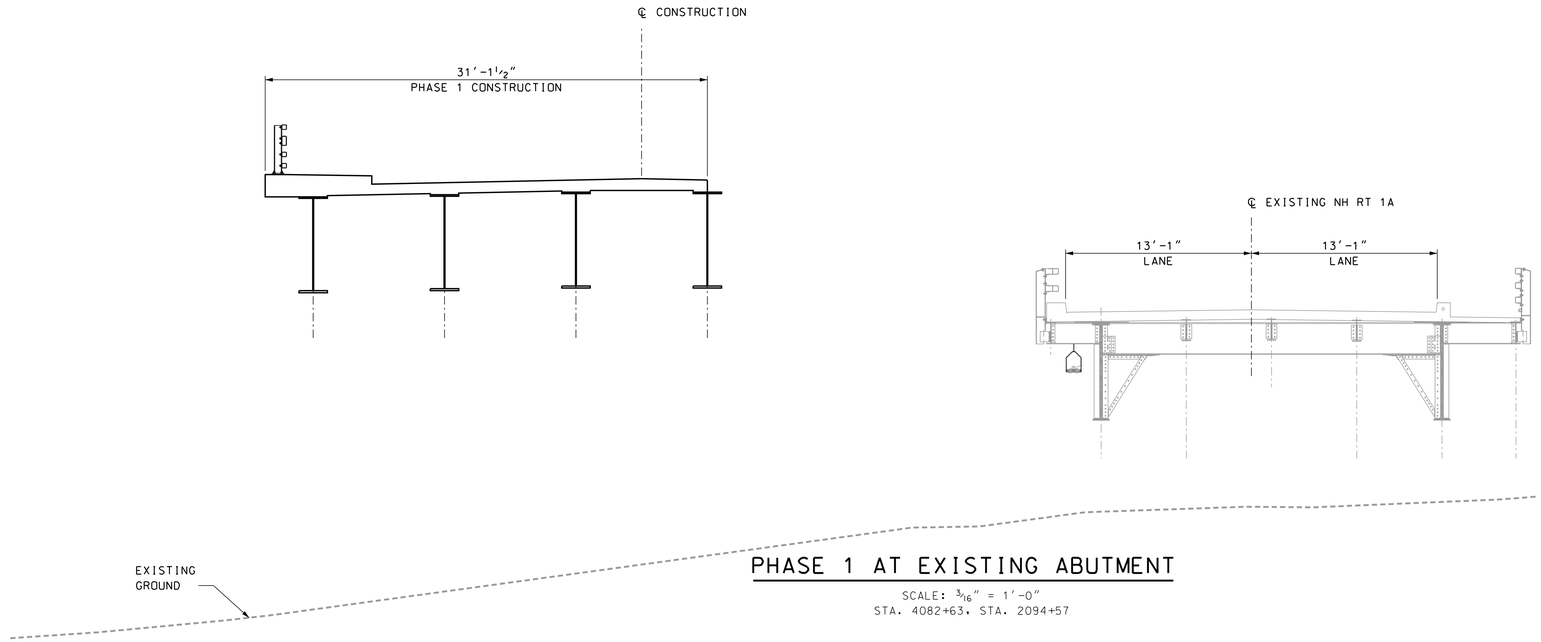
BRIDGE PHASING SECTIONS (SHEET 1 OF 3)

BRIDGE SHEET 2 OF 4

FILE NUMBER -

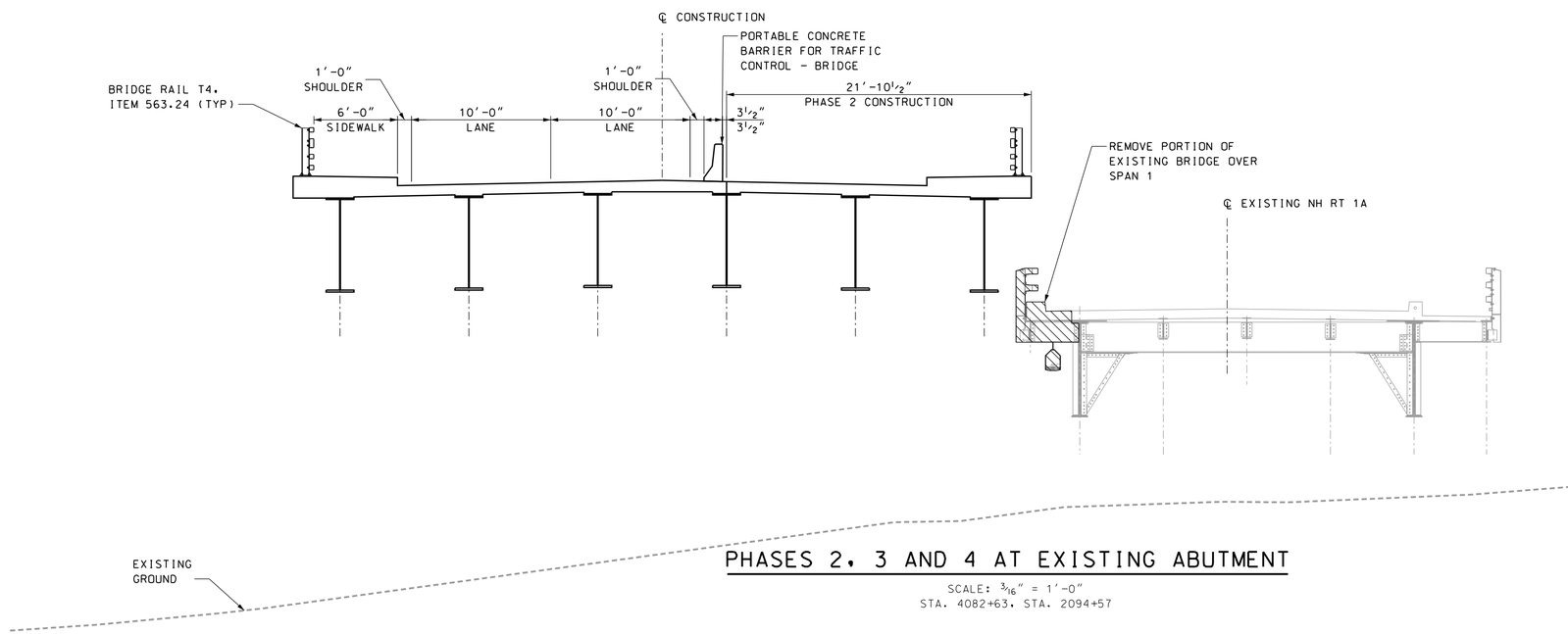
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	10/19	CHECKED	SLB	10/19
	DRAWN	NDC	10/19	CHECKED	SLB	10/19
	QUANTITIES			CHECKED		

PLOT DATE	.DGN LOCATOR	SHEET SCALE	ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
3/11/2020	15904brd_fixed_phase	AS NOTED	REV. DATE	--	14	16



PHASE 1 AT EXISTING ABUTMENT

SCALE: 3/16" = 1'-0"
STA. 4082+63, STA. 2094+57



PHASES 2, 3 AND 4 AT EXISTING ABUTMENT

SCALE: 3/16" = 1'-0"
STA. 4082+63, STA. 2094+57

CONCEPTUAL PLANS
3/11/2020

HDR

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON BRIDGE NO. 235/025 STATE PROJECT 15904

LOCATION NH 1A OVER HAMPTON RIVER

BRIDGE PHASING SECTIONS (SHEET 2 OF 3)

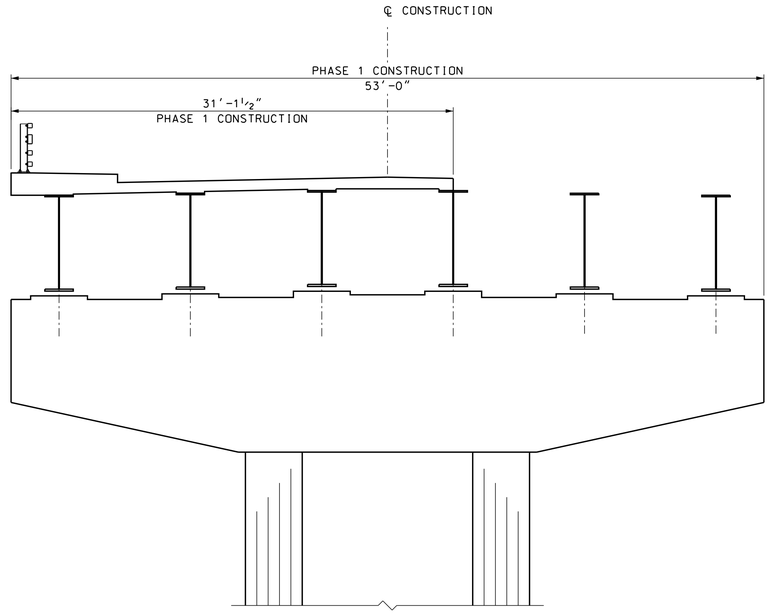
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	10/19	CHECKED	SLB	10/19
	DRAWN	NDC	10/19	CHECKED	SLB	10/19
	QUANTITIES			CHECKED		

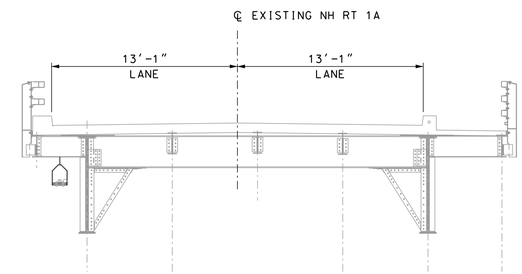
ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	--	15	16

BRIDGE SHEET 3 OF 4

FILE NUMBER -

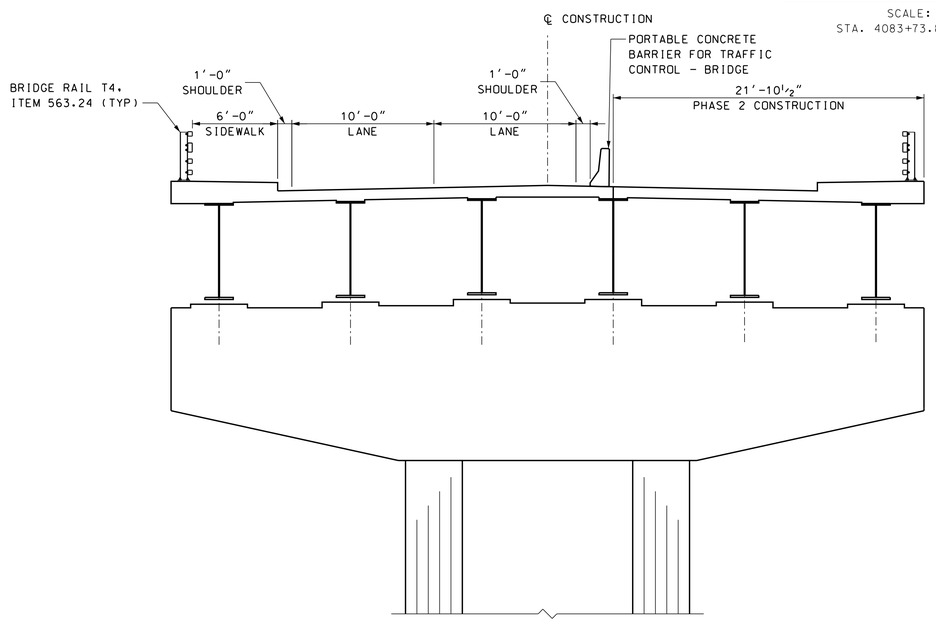
PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904brd_fixed_phase	AS NOTED

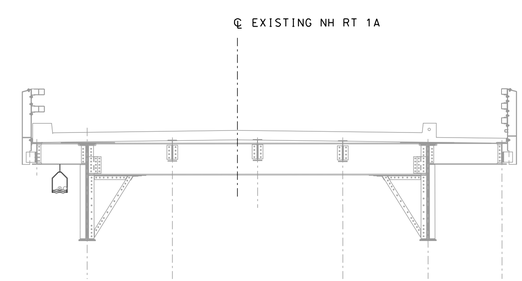




PHASE 1 AT PIERS 1 & 6

SCALE: 3/16″ = 1′-0″
STA. 4083+73.87, STA. 4093+48.87





PHASES 2, 3 AND 4 AT PIERS 1 & 6

SCALE: 3/16″ = 1′-0″
STA. 4083+73.87, STA. 4093+48.87

CONCEPTUAL PLANS
3/11/2020

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN SEABROOK-HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 15904
LOCATION NH 1A OVER HAMPTON RIVER

BRIDGE PHASING SECTIONS (SHEET 3 OF 3)

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	NDC	10/19	CHECKED	SLB	10/19
	DRAWN	NDC	10/19	CHECKED	SLB	10/19
	QUANTITIES			CHECKED		
	ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.	
	REV. DATE		--		16	

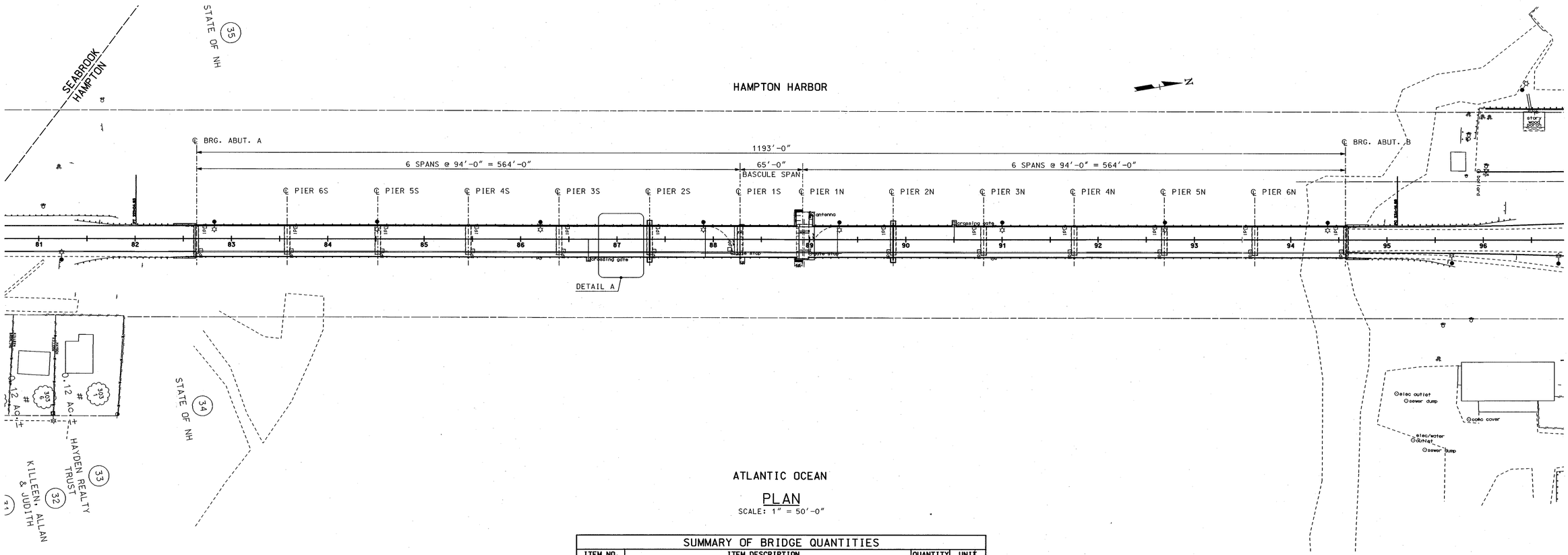
BRIDGE SHEET 4 OF 4
FILE NUMBER -
TOTAL SHEETS 16

PLOT DATE	.DGN LOCATOR	SHEET SCALE
3/11/2020	15904brd_fixed_phase	AS NOTED

APPENDIX B
Existing Bridge and Roadway Plans

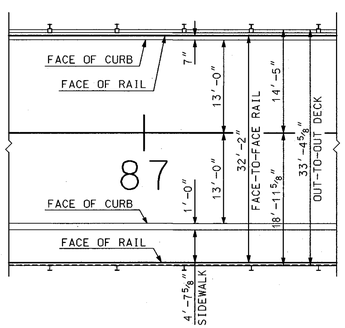
APPENDIX B1

Select Sheets from 2011 Rehabilitation Plans



PLAN

SCALE: 1" = 50'-0"



DETAIL A

SCALE: 1" = 10'-0"

SUMMARY OF BRIDGE QUANTITIES

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT
206.19	COMMON STRUCTURE EXCAVATION - EXPLORATORY	~~10~~ 0	CY
502.101	REMOVAL OF EXISTING BRIDGE STRUCTURE	1	U
502.1011	REMOVAL OF EXISTING BRIDGE STRUCTURE (ASBESTOS CEMENT PIPE)	1	U
512.0201	PREPARATION FOR CONCRETE REPAIRS, CLASS II *	~~15~~ 67.50	SY
520.01	CONCRETE CLASS AA	~~3~~ 6.6	CY
520.7002	CONCRETE BRIDGE DECK (QC/QA) (F)	900	CY
534.1	WATER REPELLENT (LINSEED OIL)	~~3~~ 5	GAL
534.3	WATER REPELLENT (SILANE-SILOXANE)	~~125~~ 325	GAL
540.1	EPOXY-URETHANE WATERPROOFING OVERLAY FOR BRIDGE DECKS	3265	SY
540.2	FENDER SYSTEM	1	U
544.2	REINFORCING STEEL, EPOXY COATED (F)	266925	LB
544.21	REINFORCING STEEL, EPOXY COATED, MECHANICAL CONNECTORS (F)	35451	LB
547.101	SHEAR CONNECTORS (F)	15028	EA
550.1101	STRUCTURAL STEEL (F) (PLATFORM FRAMING)	27000	LB
550.1102	STRUCTURAL STEEL (F) (STRINGER REPLACEMENT)	3300	LB
550.1103	STRUCTURAL STEEL (F) (BRIDGE RAIL MODIFICATIONS)	2000	LB
556	PAINTING EXISTING STRUCTURAL STEEL	1	U
559.5	SILICONE JOINT SEALANT (F)	95	LF
563.841	TEMPORARY BRIDGE RAIL	660	LF
606.95	TEMPORARY TRAFFIC CONTROL BARRIER	~~1000~~ 1366	LF
618.61	UNIFORMED OFFICERS WITH VEHICLE	*	$
618.7	FLAGGERS	~~5000~~ 2807	HR
619.1	MAINTENANCE OF TRAFFIC	1	U
619.25	PORTABLE CHANGEABLE MESSAGE SIGN	2	U
621.5	RETROREFLECTIVE BRIDGE RAIL DELINEATOR	~~12~~ 6	EA
632.0104	REFLECTIVE PAINT PAVE. MARKING, 4" LINE	~~6800~~ 11951	LF
632.1104	PREFORMED RETROREFLECTIVE TAPE, TYPE 1 (REMOVABLE) 4" LINE	~~9500~~ 0	LF
632.1118	PREFORMED RETROREFLECTIVE TAPE, TYPE 1 (REMOVABLE) 18" LINE	~~89~~ 212	LF
632.9104	OBLITERATE PAVEMENT MARKING, 4" LINE	~~4000~~ 3827	LF
645.3	EROSION STONE	~~50~~ 0	CY
645.531	SILT FENCE	~~200~~ 0	LF
645.7	STORM WATER POLLUTION PREVENTION PLAN	1	U
645.71	MONITORING SWPPP AND EROSION AND SEDIMENT CONTROLS	~~150~~ 0	HR
670.95	TEMPORARY SAFETY FENCE	~~2000~~ 400	LF
692	MOBILIZATION	1	U
693	ON-THE-JOB TRAINING OF UNSKILLED WORKERS	* ~~498~~	$
698.12	FIELD OFFICE TYPE B	~~36~~ 21	MON
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	*	$
902.1	RACEWAY AND WIRING	1	U
910.1	BARRIER GATE	1	U
1002.1	REPAIRS OR REPLACEMENTS AS NEEDED	*	$
1010.15	FUEL ADJUSTMENT	*	$
1010.41	QUALITY CONTROL QUALITY ASSURANCE (QC/QA) FOR CONCRETE	*	$

AS-BUILT PLANS

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

GENERAL PLAN

BRIDGE SHEET: XX OF XX

FILE NUMBER: 109-6-1

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	JAS	8/07	CHECKED	SWJ	4/08
	DRAWN	SMG	8/07	CHECKED	SWJ	4/08
	QUANTITIES	SWJ	4/08	CHECKED	JAS/WPS	4/08

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	----------	5	35

SUBDIRECTORY	DGN LOCATOR	SHEET SCALE
BRD/BR-SITE	genplan	AS NOTED

...\Cadd\BRD\Bridge\Site\general.dgn 04/09/2008 12:44:25 PM nibsw1

DESIGN LOADS, MATERIALS AND SPECIFICATIONS

(1) DESIGN LIVE LOADING: HS20

(2) DECK DESIGN METHOD: STRENGTH DESIGN METHOD (LFD) FOR SUPERSTRUCTURE & SUBSTRUCTURE

(3) SPECIFICATIONS: AASHTO 2002 WITH INTERIMS

(4) NHDOT 2006 STANDARD SPECIFICATIONS AS AMENDED

(5) WELDING PER AASHTO/AWS D1.5-02 & NHDOT STANDARD

(6) SPECIFICATIONS FOR ROAD & BRIDGE CONSTRUCTION

(7) REINFORCING STEEL: AASHTO M31 (ASTM A615) GRADE 60
ALL REINFORCEMENT SHALL BE EPOXY COATED

(8) STRUCTURAL STEEL:
STRINGERS: AASHTO M270, GRADE 50 (ASTM A709, GRADE 50), PAINTED
TUBES: ASTM A500, GRADE B
PIPES: ASTM A53, GRADE B
PLATFORM FRAMING - ROLLED SHAPES: ASTM A992, GRADE 50
PLATFORM FRAMING - CHANNELS/ANGLES: ASTM A572, GRADE 50
HANGER ANGLES - ASTM A572, GRADE 50
CHECKERED PLATE - ASTM A786 AND ASTM A36, GRADE 36

(9) CONCRETE:
BRIDGE DECK, BRUSH CURBS, & COPINGS: f'c = 4,000 PSI, ITEM 520.7002, CONCRETE BRIDGE DECK (QC/QA) (F)
ABUTMENT/WINGWALL REPAIRS: f'c = 3,000 PSI, ITEM 520.01, CONCRETE CLASS AA

(10) PLATFORMS ARE DESIGNED FOR AN 8000 LB GATE AND THE FOLLOWING CONCURRENT IMPACT LOADS (APPLIED 2'-0" ABOVE THE ROADWAY CROWN):
LONGITUDINAL LOAD OF 29,650 LB
INWARD TRANSVERSE LOAD OF 39,900 LB
TORQUE OF 178,000 FT - LB

GENERAL NOTES

(1) NO EXISTING MONUMENTS, BOUNDS, OR BENCHMARKS SHALL BE DISTURBED WITHOUT FIRST MAKING PROVISIONS FOR RELOCATION.

(2) THE CONTRACTOR SHOULD BE AWARE THAT EXISTING STRUCTURE DIMENSIONS AND ELEVATIONS SHOWN ON THESE PLANS WERE TAKEN FROM ORIGINAL BRIDGE PLANS AND REHABILITATION PLANS AND DO NOT NECESSARILY REPRESENT "AS-BUILT" DIMENSIONS AND ELEVATIONS. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS OF THE EXISTING STRUCTURE AND BE PREPARED TO MAKE ANY ADJUSTMENTS REQUIRED TO PROPERLY REHABILITATE THE BRIDGE. ANY DISCREPANCIES IN DIMENSIONS, CHARACTER, OR EXTENT OF THE EXISTING FEATURES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO ADVANCING THE WORK. THE EXISTING PLANS (FILE NO. 3-1-2-1) MAY BE VIEWED AT THE NHDOT, BUREAU OF BRIDGE DESIGN OFFICE DURING THE BIDDING PERIOD. AFTER THE CONTRACT IS AWARDED, A COMPLETE SET OF THE EXISTING PLANS WILL BE FORWARDED TO THE CONTRACTOR UPON REQUEST.

(3) THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO INSURE THAT DEBRIS INCLUDING SLURRY FROM SAWCUTTING DOES NOT FALL INTO THE WATERWAY BELOW THE EXISTING STRUCTURE. ALL COST SHALL BE PAID UNDER ITEM 502.101.

(4) THE WELDING OF ATTACHMENTS TO GIRDERS FOR CONSTRUCTION PURPOSES SHALL NOT BE PERMITTED UNLESS APPROVED BY NHDOT, BUREAU OF BRIDGE DESIGN.

(5) NO SCAFFOLDS SHALL BE ERECTED OR OPERATIONS CONDUCTED IN THE WATERWAY, UNLESS APPROVED BY THE CONTRACT ADMINISTRATOR. SEE SPECIAL PROVISIONS FOR COAST GUARD PERMIT RESTRICTIONS.

(6) ALL EXPOSED EDGES OF PROPOSED CONCRETE SURFACES SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.

(7) TRANSVERSE FILLET WELDS SHALL TERMINATE 1/4" FROM ENDS OF PLATES.

BRIDGE REMOVAL NOTES

(1) THE CONTRACTOR SHALL SUBMIT, FOR DOCUMENTATION IN ACCORDANCE WITH SECTION 105.02, A DETAILED OUTLINE OR PLAN OF THE PROPOSED METHOD FOR REMOVAL OF THE EXISTING BRIDGE COMPONENTS PRIOR TO COMMENCEMENT OF ANY REMOVAL OPERATIONS.

(2) ITEM 502.101, REMOVAL OF EXISTING BRIDGE STRUCTURE, SHALL INCLUDE COMPLETE REMOVAL OF THE EXISTING CONCRETE BRIDGE DECK AND REMOVAL OF TWO EXISTING STEEL STRINGERS.

ALL OTHER STRUCTURAL STEEL FRAMING, THE EXISTING EXPANSION JOINTS, RAILS, BARRIER GATES, LIFT SPAN DECKING AND FRAMING, BRIDGE RAIL, LIGHTS, SIGNALS, AND WARNING GATES SHALL REMAIN IN PLACE. DURING REMOVAL OPERATIONS, EXTREME CARE SHALL BE TAKEN NOT TO DAMAGE EXISTING STRUCTURAL STEEL FRAMING OR OTHER BRIDGE COMPONENTS TO REMAIN. ANY DAMAGE SHALL BE IMMEDIATELY REPORTED TO THE BUREAU OF BRIDGE DESIGN AND REPAIRED, AS DIRECTED, AT THE CONTRACTOR'S EXPENSE.

(3) TEMPORARY SUPPORTS FOR THE DECK SLAB SHALL BE DESIGNED FOR HS20-44 LIVE LOAD BY A PROFESSIONAL ENGINEER, WHO IS LICENSED IN THE STATE OF NEW HAMPSHIRE. PLANS AND CALCULATIONS SHALL BE SUBMITTED FOR DOCUMENTATION IN ACCORDANCE WITH SECTION 105.02. WELDING TO EXISTING STRUCTURAL STEEL IS NOT PERMITTED. BOLT HOLES REQUIRED FOR ATTACHMENT TO EXISTING STRUCTURAL STEEL SHALL BE FILLED WITH HIGH STRENGTH BOLTS AFTER CONSTRUCTION. ALL COSTS FOR TEMPORARY SUPPORTS SHALL BE INCLUDED IN ITEM 502.101. THE TEMPORARY SUPPORTS SHOWN ON THE PLANS ARE SCHEMATIC ONLY AND ARE NOT INTENDED TO INDICATE A PREFERRED METHOD OF CONSTRUCTION. TEMPORARY DECK SUPPORTS SHALL BE IN PLACE TO SUPPORT THE EXISTING CONCRETE DECK PRIOR TO REMOVAL OPERATIONS.

(4) ASBESTOS CEMENT CONDUIT IN THE EAST CURB AND UNDER THE NORTHEAST SIDEWALK SHALL BE REMOVED AND DISPOSED UNDER ITEM 502.1011. ALL WORK SHALL BE PERFORMED BY QUALIFIED PERSONNEL IN ACCORDANCE WITH THE SPECIAL PROVISION.

SUBSTRUCTURE REHABILTATION NOTES

(1) THE EXISTING SOUTH ABUTMENT AND WINGWALLS SHALL BE INSPECTED FOR DETERIORATED CONCRETE JOINTLY BY THE CONTRACT ADMINISTRATOR AND CONTRACTOR. ALL DETERIORATED CONCRETE SHALL BE REMOVED. THE OUTSIDE LIMITS OF REMOVAL SHALL BE SAW CUT TO A 1" DEPTH TO PROVIDE CLEAN REMOVAL LINES. THE EXISTING CONCRETE SHALL BE BLAST CLEANED PRIOR TO PLACING NEW CONCRETE. ALL INSPECTION, REMOVAL AND CLEANING SHALL BE AS SPECIFIED IN SECTION 512 AND PAID UNDER ITEM 512.0201, PREPARATION FOR CONCRETE REPAIRS, CLASS II.

(2) ALL EXPOSED CONCRETE SURFACES ON THE SOUTH ABUTMENT WINGS AND ANY REPAIRED AREAS ON THE ABUTMENT FACE SHALL BE LIGHTLY SANDBLASTED AS DIRECTED BY THE CONTRACT ADMINISTRATOR AND COATED WITH WATER REPELLENT. ALL COSTS TO BE PAID UNDER ITEM 534.1, WATER REPELLENT (LINSEED OIL).

SUPERSTRUCTURE NOTES

(1) NEW PLATFORM FRAMING INCLUDING ROLLED SHAPES, ANGLES, CHANNELS, RAILING, AND CHECKERED PLATE SHALL BE PAID UNDER ITEM 550.1101 (F).

(2) REPLACEMENT OF THE TWO EXISTING 12WF50'S SHOWN ON THE PLANS, INCLUDING CONNECTING ANGLES AND PLATES, SHALL BE PAID UNDER ITEM 550.1102 (F). NOTCH TOUGHNESS REQUIREMENTS OF NHDOT STANDARD SPECIFICATIONS SHALL APPLY TO THE STRINGERS. PROVIDE ANY NATURAL CAMBER UP. TOLERANCE IS +1/2", -0.

(3) NEW BRIDGE RAIL STEEL AND MODIFICATIONS TO EXISTING BRIDGE RAIL SHALL BE PAID UNDER ITEM 550.1103 (F).

(4) ONCE THE DECK IS REMOVED, THE TOP FLANGES OF THE STRINGERS, FLOOR BEAMS, AND THE BUILT-UP PLATE GIRDERS, SHALL BE CLEANED AND VISUALLY INSPECTED FOR STRUCTURAL DEFICIENCIES (e.g. SIGNIFICANT STEEL LOSS, CRACKS, MISSING/DETERIORATED RIVETS, ETC) BY THE CONTRACTOR AND THE CONTRACT ADMINISTRATOR. COST FOR INSPECTION AND CLEANING SHALL BE SUBSIDIARY TO ITEM 502.101. ANY ADDITIONAL REPAIRS REQUIRED BY THE DEPARTMENT SHALL BE PERFORMED BY THE CONTRACTOR AND PAID UNDER ITEM 1002.1, REPAIRS OR REPLACEMENTS AS NEEDED.

(5) THE CONTRACTOR SHALL SUBMIT A HANDLING AND ERECTION PLAN TO THE ENGINEER PRIOR TO HANDLING THE STRUCTURAL STEEL IN ACCORDANCE WITH SECTIONS 550.3.14 AND 550.3.15. THE ERECTION PLAN SHALL INDICATE THE LOCATION AND NUMBER OF LIFTING POINTS.

(6) ALL SHEAR CONNECTORS SHALL BE FIELD WELDED TO THE TOP FLANGE WITH AUTOMATICALLY TIMED STUD WELDING EQUIPMENT.

(7) ALL BOLTED CONNECTIONS SHALL BE SLIP-CRITICAL (CLASS-B) MADE WITH 7/8" ϕ HIGH STRENGTH BOLTS IN 15/16" ϕ HOLES (UNLESS NOTED OTHERWISE). ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE REQUIREMENTS FOR AASHTO M164 (ASTM A325) TYPE 1, GALVANIZED, BOLTS.

(8) ANY SHOP OR FIELD WELDING OF ATTACHMENTS TO ANY PORTION OF THE EXISTING OR PROPROSED SUPERSTRUCTURE STEEL FOR CONSTRUCTION PURPOSES WILL NOT BE PERMITTED, UNLESS APPROVED BY THE BUREAU OF BRIDGE DESIGN, NHDOT.

(9) HOLES IN REPLACEMENT MEMBERS SHALL BE PRE-DRILLED TO MATCH THE EXISTING HOLE LOCATIONS, SPACING AND TO FIT PROPOSED BEARING ELEVATIONS.

(10) RIVETS SHALL BE REMOVED BY MECHANICAL MEANS ONLY AND THE CONTRACTOR SHALL SUBMIT THE PROCEDURE, WHICH WILL NOT DAMAGE OR SCORE REMAINING STEEL MEMBERS, FOR APPROVAL BY THE CONTRACT ADMINISTRATOR BEFORE ADVANCING THE WORK.

(11) WHEN APPROVED BY THE CONTRACT ADMINISTRATOR, CORRECTION OF MIS-ALIGNED HOLES FOR BOLT INSTALLATION SHALL BE DONE BY REAMING. REAMED HOLES IN NEW STEEL SHALL BE TOUCHED UP WITH A ZINC RICH PRIMER PRIOR TO INSERTING BOLTS.

(12) 1/2" ϕ ADHESIVE ANCHORS SHALL HAVE AN ALLOWABLE SHEAR CAPACITY OF 1300 LB WITH A FACTOR OF SAFETY OF 4.0

(13) THE NHDOT WILL INSPECT THE SHOP FABRICATION OF THE STRUCTURAL STEEL.

PAINTING NOTES

(1) ALL NEW STRUCTURAL STEEL FOR PLATFORM FRAMING AND STRINGER REPLACEMENT SHALL BE PAINTED; COST INCLUDED IN ITEMS 550.1101, AND 550.1102; STRUCTURAL STEEL FOR BRIDGE RAIL MODIFICATIONS SHALL BE GALVANIZED AND PAINTED PER SPECIFICATION SECTION 708, APPENDIX A TO MATCH EXISTING RAIL; COST INCLUDED IN ITEM 550.1103.

(2) EXISTING STEEL AT PROPOSED CONNECTION LOCATIONS SHALL BE CLEANED AND APPROPRIATELY PRIMED FOR SLIP-CRITICAL (CLASS B) CONNECTIONS BEFORE INSTALLING NEW STEEL. AFTER INSTALLATION OF NEW STEEL, PRIMED AREAS SHALL BE FINISH PAINTED IN ACCORDANCE WITH SPECIAL PROVISION 556. ALL COSTS SHALL BE PAID UNDER ITEM 556.

BRIDGE DECK NOTES

(1) THE BRIDGE DECK, SIDEWALK, AND CURB CONCRETE SHALL BE PAID UNDER ITEM 520.7002, CONCRETE BRIDGE DECK (QC/QA) (F).

(2) THE BRIDGE DECK POURING SEQUENCE SHALL BE SUBMITTED IN ACCORDANCE WITH SECTION 105.02 AND BE SUBJECT TO APPROVAL BY THE BUREAU OF BRIDGE DESIGN. BRIDGE DECK CONCRETE SHALL REMAIN PLASTIC THROUGHOUT THE ENTIRE POURING SEQUENCE.

(3) SCREED RAIL SUPPORTS REQUIRED FOR THE PLACEMENT OF THE DECK SLAB CONCRETE SHALL BE LOCATED AT THE CENTERLINE OF GIRDERS/STRINGERS.

(4) THE ENTIRE BRIDGE DECK (CURB-TO-CURB) SHALL BE COATED WITH ITEM 540.1, EPOXY-URETHANE WATERPROOFING OVERLAY FOR BRIDGE DECKS. THE OVERLAY SHALL NOT BE PLACED UNTIL THE ENTIRE PROPOSED BRIDGE DECK HAS BEEN PLACED AND CURED.

REINFORCING NOTES

(1) REINFORCING LEGEND: SP = SPACE, SPL = SPLICE, FS = FAR SIDE, NS = NEAR SIDE, BOT = BOTTOM, ALT = ALTERNATING, MC = MECHANICAL CONNECTORS.

(2) ALL REINFORCING SHALL BE EPOXY COATED.

(3) ANY EPOXY COATED REBARS CUT TO FIT SHALL BE TOUCHED UP WITH AN APPROVED EPOXY COATING MATERIAL. ALL COSTS SHALL BE INCLUDED IN ITEM 544.2 AND 544.21.

(4) ALL REINFORCEMENT SHALL HAVE 2 1/2" MINIMUM CLEAR COVER, UNLESS OTHERWISE NOTED.

(5) PLACE REINFORCING STEEL TO AVOID SCUPPERS, OPENINGS IN THE DECK, AND EXPANSION JOINT STEEL.

PIER FENDER NOTES

(1) PIER FENDER SYSTEM INSTALLATION SHALL BE PAID UNDER ITEM 540.2. COSTS FOR REMOVAL OF THE EXISTING FENDER SYSTEM SHALL BE SUBSIDIARY TO ITEM 540.2.

(2) FENDER TIMBER SHALL BE NO. 1 OR BETTER EASTERN HEMLOCK/TAMARACK 8x12 & 10x12 AS SHOWN ON THE PLANS. TIMBER SHALL BE GRADED PER NeLMA (NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION) 2006 STANDARD GRADING RULES FOR NORTHEASTERN LUMBER.

(3) ALL TIMBER SHALL BE PRESSURE TREATED WITH CHROMATED COPPER ARSENATE (CCA) TO A RETENTION OF 2.5 LB/CF.

(4) ALTERNATIVE TIMBER SPECIES WITH THE SAME OR BETTER DESIGN VALUES MAY BE CONSIDERED FOR DIMENSION LUMBER SUBJECT TO THE APPROVAL OF THE ENGINEER. THE CONTRACTOR SHALL SUBMIT SUCH REQUESTS IN WRITING TO THE ENGINEER FOR APPROVAL.

(5) RUBBER FENDER MATERIAL SHALL BE "D" SERIES "D" SHAPED WITH 70 DURAMETER, BLACK EPDM: ASTM DESIGNATION D-2000 3BA720 A14, B13, C12, F19, Z1, Z2, Z3.

(6) ALL FENDER STRUCTURAL STEEL SHALL BE AASHTO M 270, GRADE 50 (ASTM A 709, GRADE 50).

(7) ALL LAG BOLTS SHALL CONFORM TO ASTM A 307 GRADE 36 STEEL, HOT DIP GALVANIZED.

(8) ALL BOLTS,INCLUDING SUITABLE NUTS AND WASHERS SHALL CONFORM TO REQUIREMENTS OF AASHTO M164 (ASTM A325) TYPE 1, HOT DIP GALVANIZED.

(9) EXPANSION ANCHORS SHALL BE BE 3/4" ϕ STAINLESS STEEL WITH 4 1/8" MINIMUM EMBEDMENT AND AN ALLOWABLE WORKING LOAD IN SHEAR OF 7000 LBS. ALL STAINLESS STEEL STALL BE MARINE GRADE, TYPE 316.

(10) ALL STEEL COMPONENTS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN CONFORMANCE TO AASHTO M232 (ASTM A153) AND AASHTO M111 (ASTM A123). GALVANIZED SURFACE SHALL HAVE A UNIFORM APPEARANCE & GALVANIZED MATERIAL SHALL BE PROPERLY STORED.

(11) CONNECTIONS INTENDED TO SLIDE SHALL BE DOUBLE NUTTED, LEAVING NUTS 1/8" CLEAR FROM THE CONTACT SURFACE.

TRAFFIC CONTROL NOTES

(1) SEE SPECIAL PROVISIONS FOR CONSTRUCTION WORK WINDOWS, COORDINATION WITH TEMPORARY SIGNAL WORK, AND TRAFFIC MAINTENANCE REQUIREMENTS.

(2) ALL TRAFFIC CONTROL INCLUDING TEMPORARY TRAFFIC CONTROL BARRIER AND TEMPORARY BRIDGE RAIL SHALL BE IN PLACE BEFORE REMOVAL OPERATIONS BEGIN FOR EACH CONSTRUCTION PHASE.

(3) NEW BARRIER GATES SHALL BE INSTALLED AND OPERATIONAL PRIOR TO INSTALLATION OF TEMPORARY BRIDGE RAIL OR TEMPORARY TRAFFIC CONTROL BARRIER. RAIL POST MODIFICATIONS, ON THE SIDEWALK SIDE, MUST BE MADE PRIOR TO GATE INSTALLATION. ACCESS OPENINGS IN THE RAIL (SIDEWALK AND TRAFFIC SIDES) SHALL BE CONSTRUCTED DURING THE PHASES WHERE OPENINGS ARE PROTECTED BY TRAFFIC BARRIER.

(4) PRIOR TO INSTALLATION OF THE TEMPORARY BRIDGE RAIL ON THE LIFT SPAN, THE CONTRACTOR SHALL CALCULATE THE ADDITIONAL WEIGHT REQUIRED IN THE COUNTERWEIGHT AND SUBMIT THE CALCULATIONS FOR DOCUMENTATION IN ACCORDANCE WITH SECTION 105.02. COSTS FOR ANALYSIS, PLACING, AND REMOVING ADDITIONAL COUNTERWEIGHT SHALL BE SUBSIDIARY TO ITEM 563.841.

(5) RETROREFLECTIVE BRIDGE RAIL DELINEATORS, ITEM 621.5, SHALL BE INSTALLED ON EXISTING BRIDGE RAIL POSTS AT 250 FEET ON CENTER, PRIOR TO INSTALLATION OF TEMPORARY BRIDGE RAIL OR TEMPORARY TRAFFIC CONTROL BARRIER.

BARRIER GATE NOTES

(1) BARRIER GATE INSTALLATION SHALL BE PAID UNDER ITEM 910.1 (SEE SPECIAL PROVISIONS).

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/BR-SITE	SWJNOTES	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON — BRIDGE NO. 235\025 — STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

NOTES

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	SWJ	04/08	CHECKED	WPS	04/08
	DRAWN	SWJ	04/08	CHECKED	WPS	04/08
	QUANTITIES	SWJ	04/08	CHECKED	WPS	04/08
	ISSUE DATE					
	REV. DATE					

BRIDGE SHEET	FILE NUMBER	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
XX OF XX	109-6-1	------------	6	35

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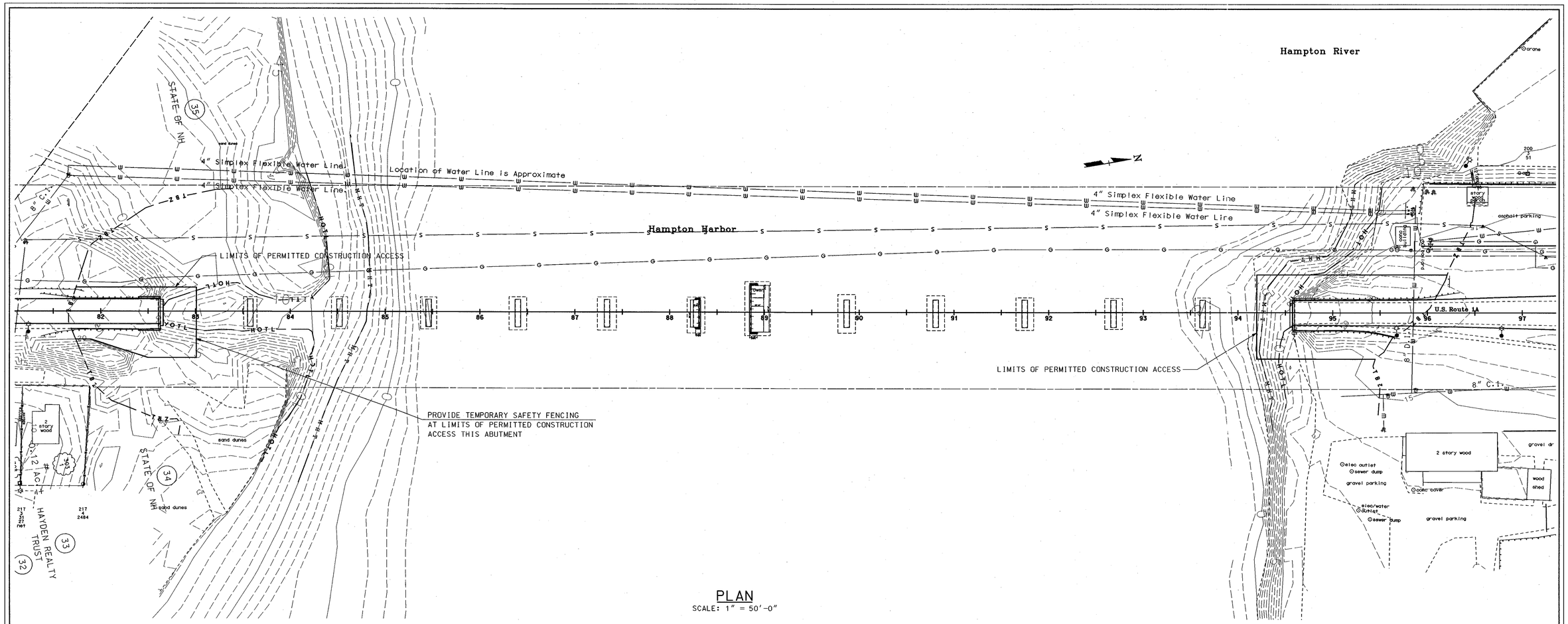

PLAN

SCALE: 1" = 50'-0"

LEGEND

MHT - MEAN HIGH TIDE
TBZ - TIDAL BUFFER ZONE
HOTL - HIGHEST OBSERVABLE TIDAL LINE

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/BR-SITE	siteplan	AS NOTED

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235\025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

SITE PLAN

REVISIONS AFTER PROPOSAL

	BY	DATE		BY	DATE
DESIGNED	JAS	8/07	CHECKED	SWJ	4/08
DRAWN	SMG	8/07	CHECKED	SWJ	4/08
QUANTITIES	--	--	CHECKED	--	--

ISSUE DATE
REV. DATE

FEDERAL PROJECT NO. ----------

SHEET NO. 7

BRIDGE SHEET XX OF XX

FILE NUMBER 109-6-1

TOTAL SHEETS 35

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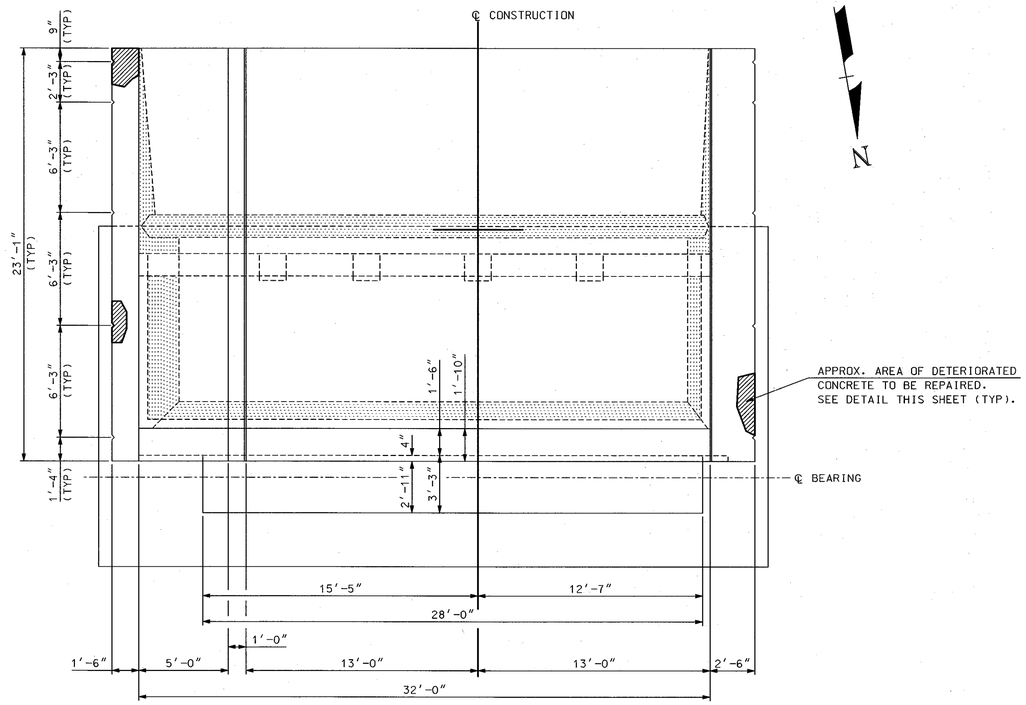
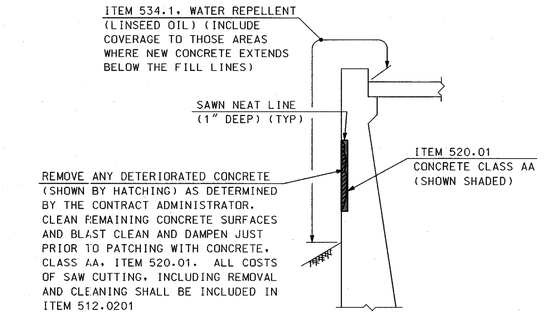


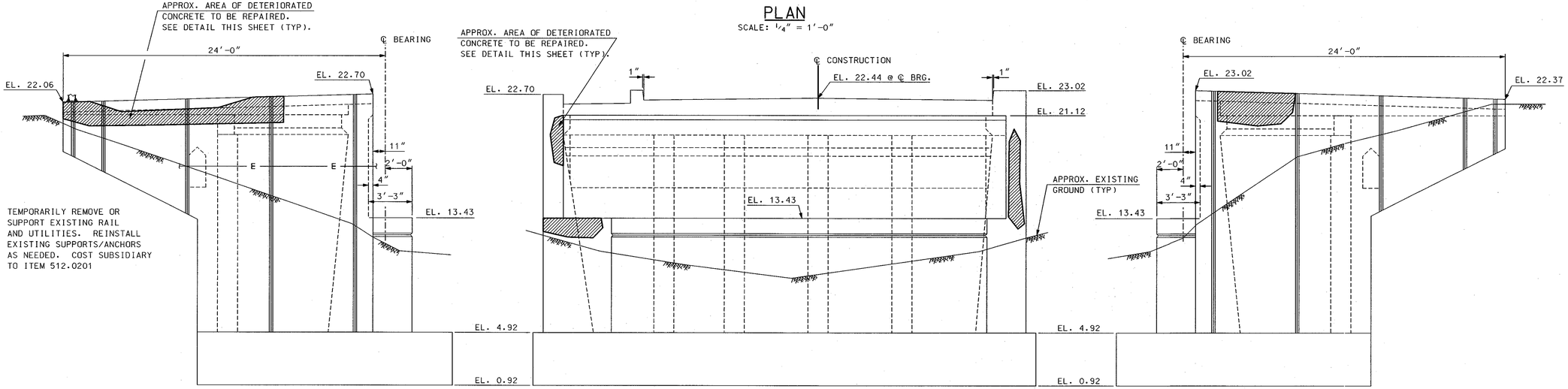
PLAN

SCALE: 1/4" = 1'-0"



TYPICAL WING DETAIL - CONCRETE REPAIRS

SCALE: 1/4" = 1'-0"



ELEVATION

SCALE: 1/4" = 1'-0"

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235\025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

SOUTH ABUTMENT REHABILITATION

REVISIONS AFTER PROPOSAL				BY	DATE		BY	DATE
			DESIGNED	JAS	09/07	CHECKED	SWJ	4/08
			DRAWN	SMG	09/07	CHECKED	SWJ	4/08
			QUANTITIES	JAS	04/08	CHECKED	SWJ	04/08
			ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.	
			REV. DATE		----------		8	

BRIDGE SHEET XX OF XX

FILE NUMBER 109-6-1

TOTAL SHEETS 35

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/ABUTA	14188AbutA	AS NOTED

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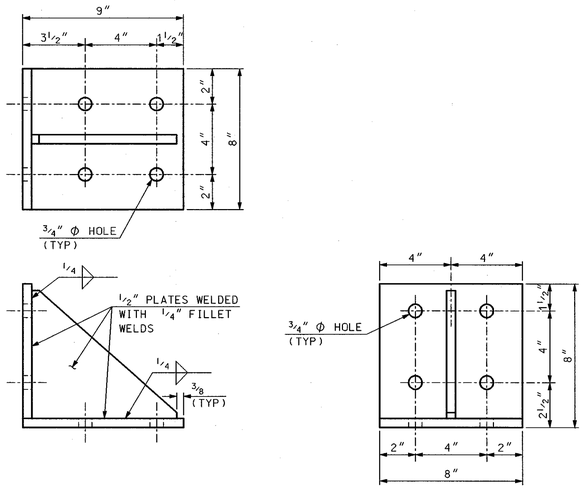
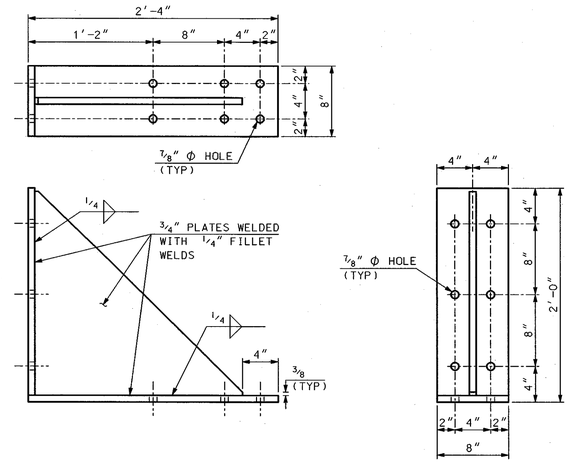


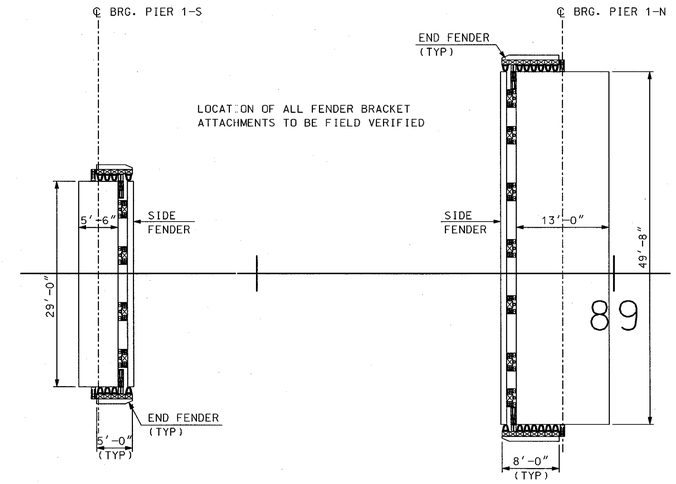
TYPE I FENDER SUPPORT BRACKET

(104 REQUIRED)
SCALE: 3" = 1'-0"



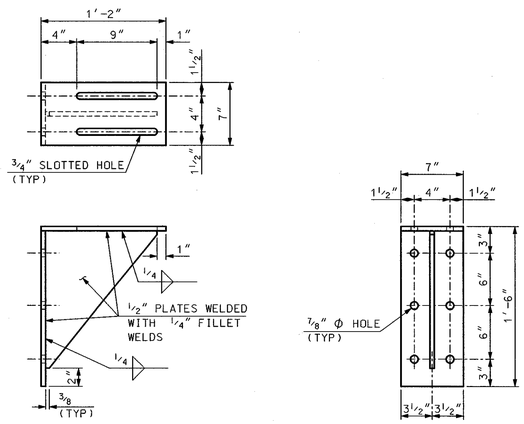
TYPE II FENDER SUPPORT BRACKET

(16 REQUIRED)
SCALE: 1 1/2" = 1'-0"



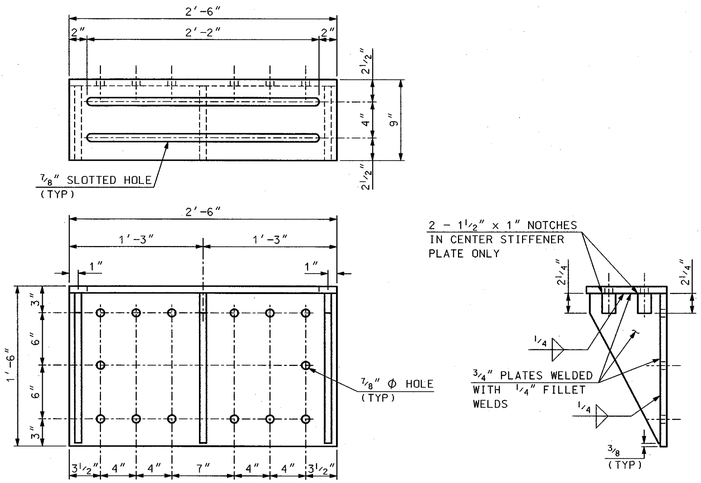
FENDER SYSTEM PLAN VIEW

SCALE: 1" = 10'-0"



TYPE A BRIDGE ATTACHMENT BRACKET

(88 REQUIRED)
SCALE: 1 1/2" = 1'-0"



TYPE B BRIDGE ATTACHMENT BRACKET

(16 REQUIRED)
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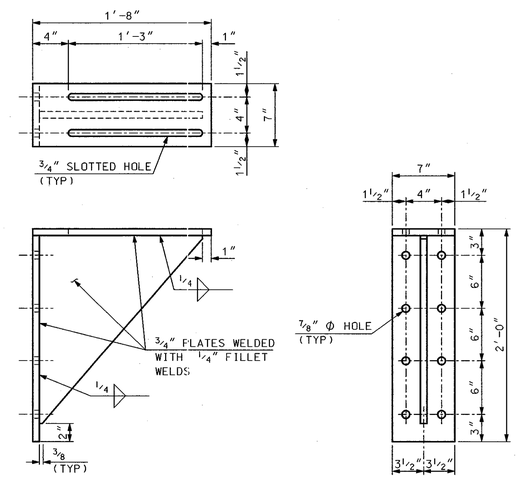


TYPE C BRIDGE ATTACHMENT BRACKET

(16 REQUIRED)
SCALE: 1 1/2" = 1'-0"

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235\025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

FENDER SYSTEM BRACKETS & PLAN VIEW

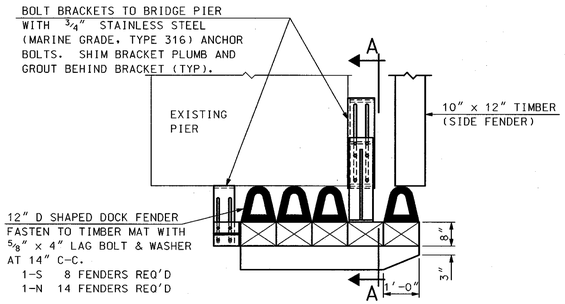
BRIDGE SHEET: XX OF XX

FILE NUMBER: 109-6-1

REVISIONS AFTER PROPOSAL				BY	DATE		BY	DATE
			DESIGNED	JAS	10/07	CHECKED	WPS	4/08
			DRAWN	SMG	10/07	CHECKED	WPS	4/08
			QUANTITIES	JAS	4/08	CHECKED	WPS	4/08
			ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.	TOTAL SHEETS
			REV. DATE		----------		9	35

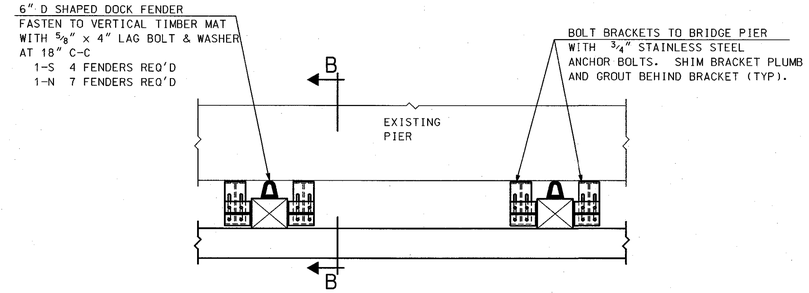
SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/BR-SITE	FenderSystem	AS NOTED

...\brd\BrSite\FenderSystem.dgn 04/08/2008 04:23:04 PM n18sw



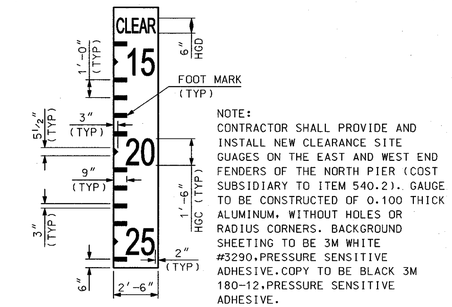
END FENDER PLAN

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



SIDE FENDER PLAN

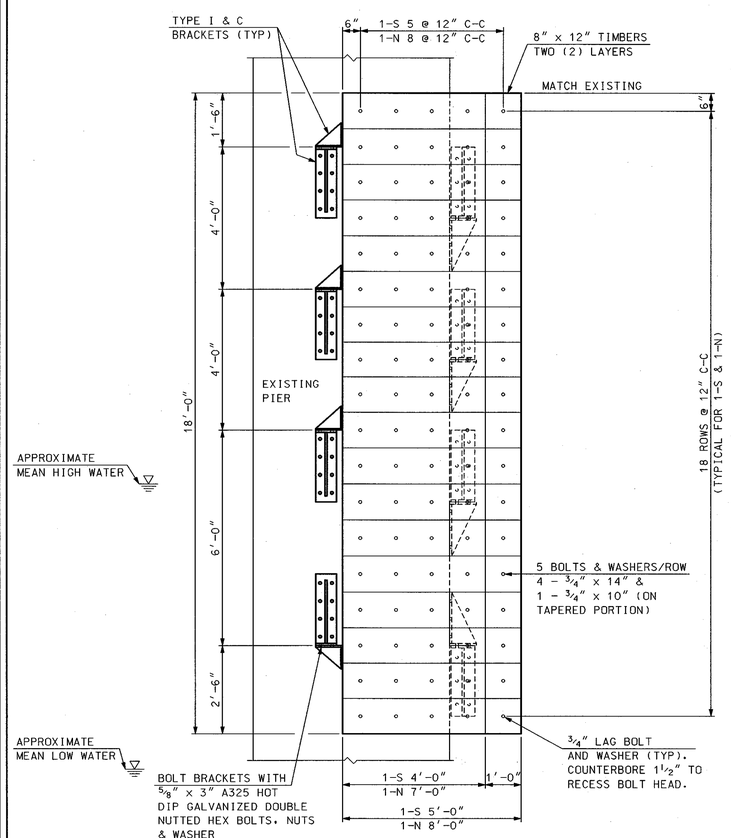
SCALE: 1/2" = 1'-0"



NOTE:
CONTRACTOR SHALL PROVIDE AND INSTALL NEW CLEARANCE SITE GUAGES ON THE EAST AND WEST END FENDERS OF THE NORTH PIER (COST SUBSIDIARY TO ITEM 540.2). GAUGE TO BE CONSTRUCTED OF 0.100 THICK ALUMINUM, WITHOUT HOLES OR RADIUS CORNERS. BACKGROUND SHEETING TO BE 3M WHITE #3290,PRESSURE SENSITIVE ADHESIVE.COPY TO BE BLACK 3M 180-12,PRESSURE SENSITIVE ADHESIVE.

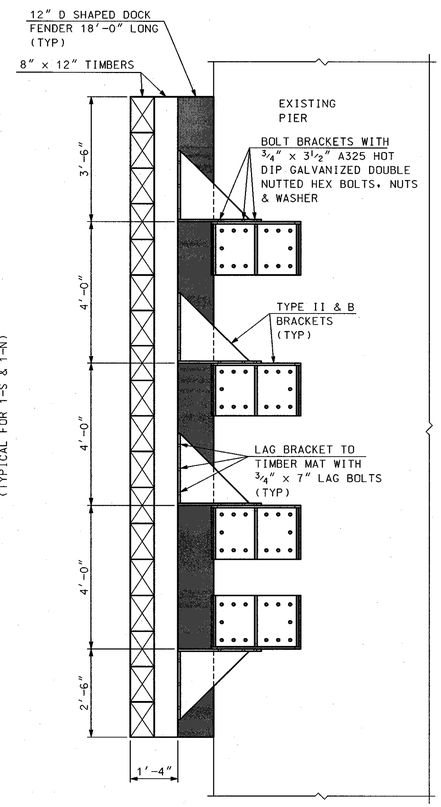
CLEARANCE SIGHT GAUGE

SCALE: 1/4" = 1'-0"



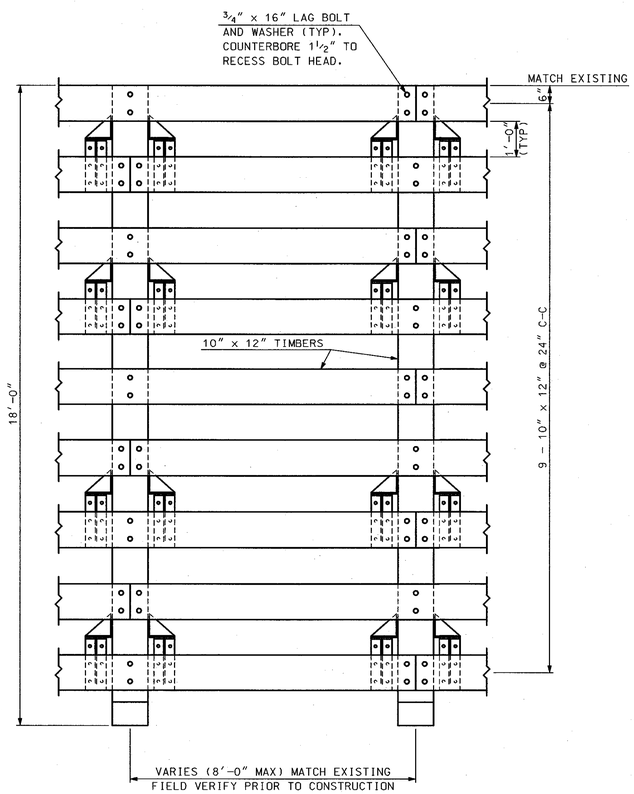
END FENDER ELEVATION

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



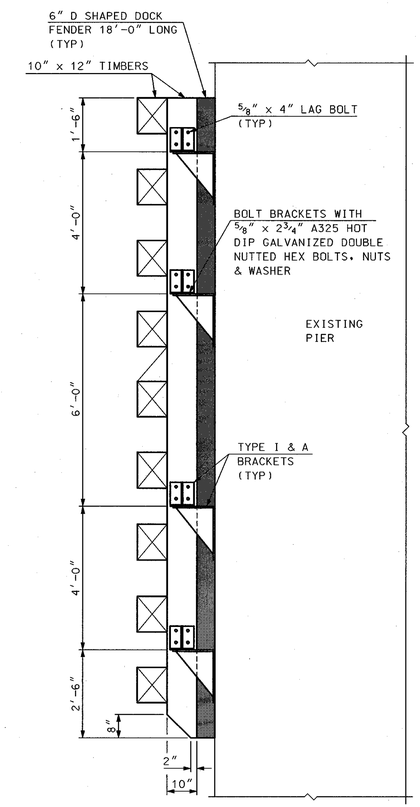
SECTION A-A

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



SIDE FENDER ELEVATION

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



SECTION B-B

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

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235\025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

FENDER SYSTEM DETAILS

BRIDGE SHEET XX OF XX

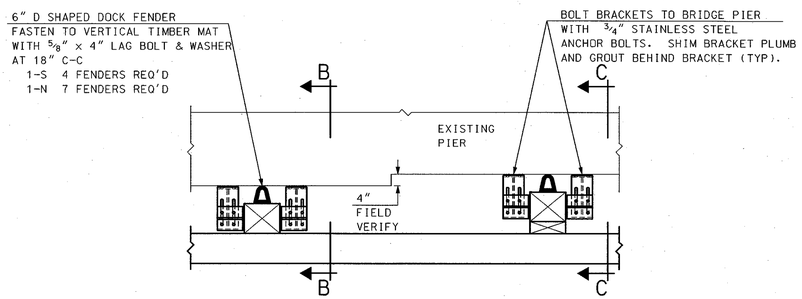
REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	JAS	10/07	CHECKED	WPS	4/08
	DRAWN	SMG	10/07	CHECKED	WPS	4/08
	QUANTITIES	JAS	4/08	CHECKED	WPS	4/08
	ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.	
	REV. DATE		----------		10	

FILE NUMBER 109-6-1

TOTAL SHEETS 35

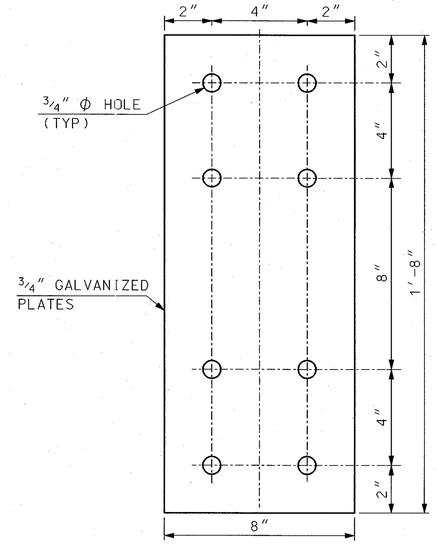
SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/BR-SITE	FenderSystem	AS NOTED

...\BRD\BR-Site\FenderSystem.dgn 04/09/2008 01:06:06 PM n:\Bsw\



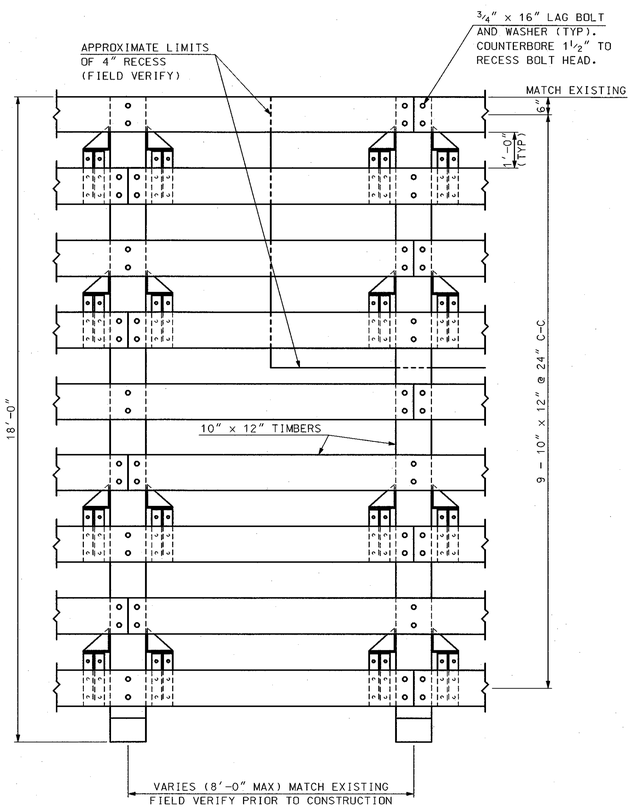
SIDE FENDER PLAN

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



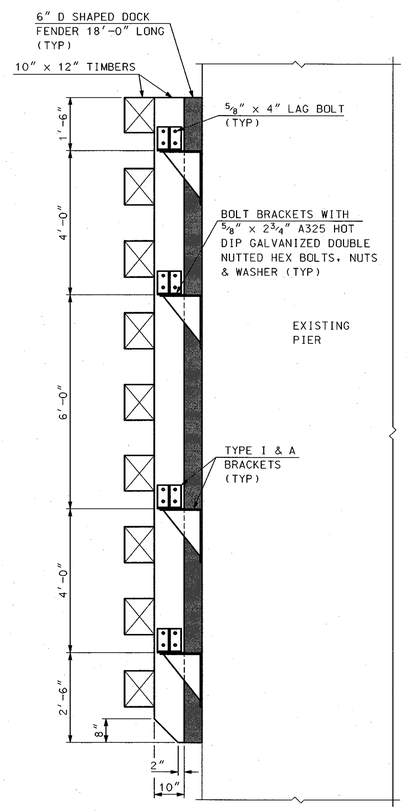
FENDER SPLICE BRACKET

SCALE: 3" = 1'-0"



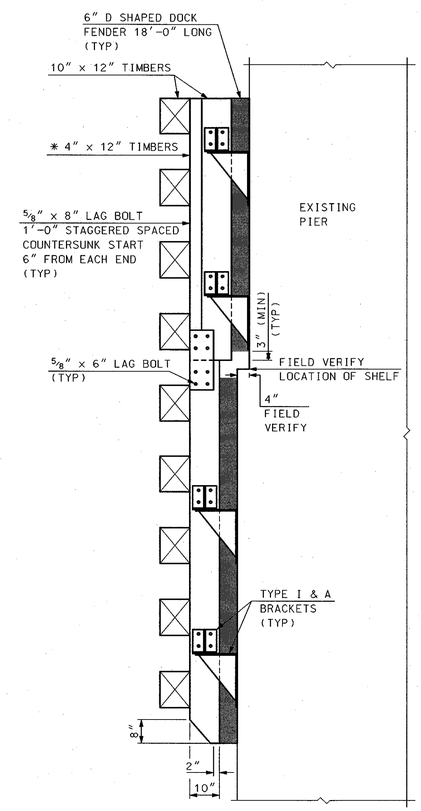
SIDE FENDER ELEVATION

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



SECTION B-B

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



SECTION C-C

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

* 4" DIMENSION SHOULD BE ADJUSTED TO MATCH RECESS DEPTH

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/BR-SITE	FenderSys rev 5-09	AS NOTED

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235\025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

REVISED FENDER SYSTEM DETAILS - NORTH PIER

REVISIONS AFTER PROPOSAL

	BY	DATE		BY	DATE
DESIGNED	JAS	5/09	CHECKED	WPS SWJ	5/09
DRAWN	JAS	5/09	CHECKED	WPS SWJ	5/09
QUANTITIES	JAS	5/09	CHECKED	WPS SWJ	5/09

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.
REV. DATE	----------	10 A

BRIDGE SHEET	FILE NUMBER	TOTAL SHEETS
XX OF XX	109-6-1	35

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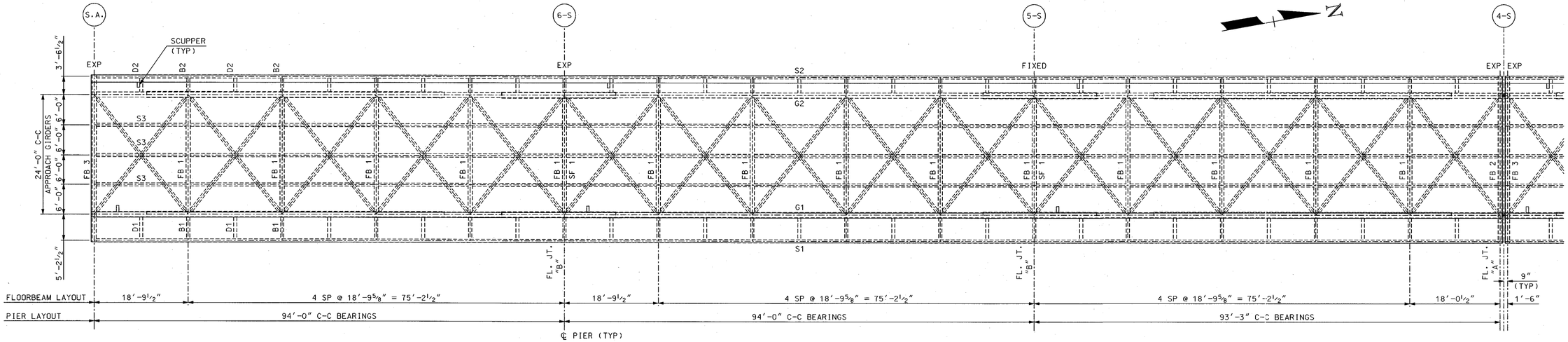

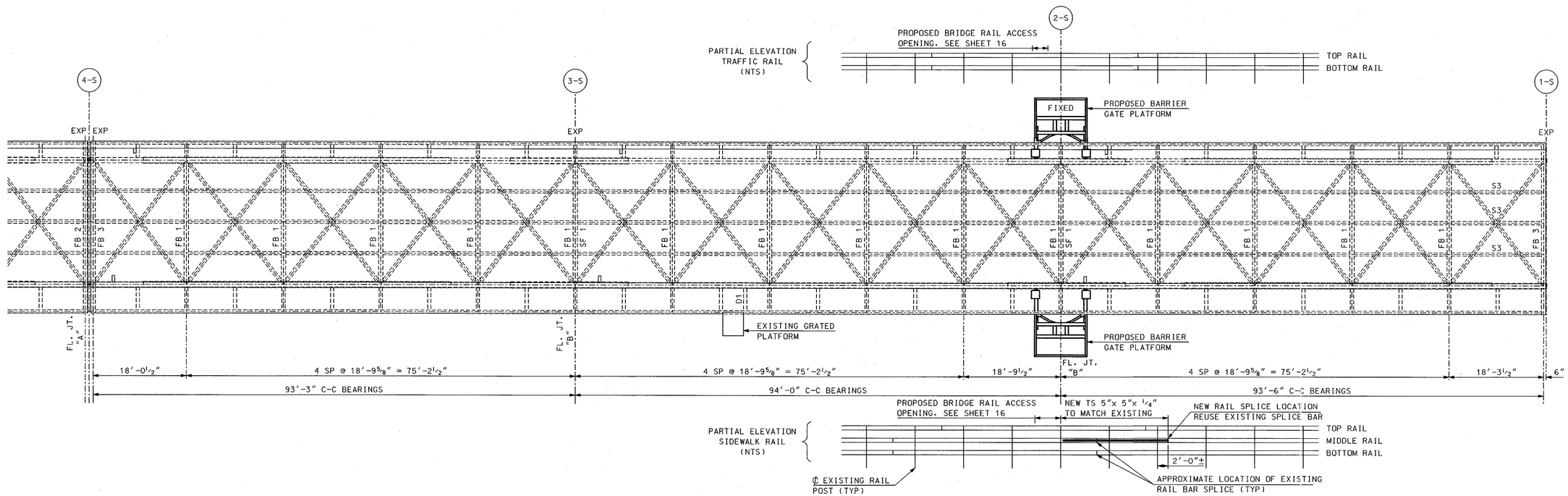

LEGEND

G1	WELDED PLATE GIRDER	
G2	WELDED PLATE GIRDER	
FB1	27WF98	INTER. FLOORBEAM
FB2	21WF103	END FLOORBEAM
FB3	27WF91	END FLOORBEAM
FB4	27WF98	INTER. FLOORBEAM
S1	18WF47	FASCIA STRINGER
S2	18WF47	FASCIA STRINGER
S3	18WF47	ROADWAY STRINGER
S4	12WF50	ROADWAY STRINGER
S4A	12WF58	ROADWAY STRINGER

B1	18WF47	BRACKET
B2	18WF47	BRACKET
C1	∠ 3½ × 3 × ⅜	UTILITY SUPPORT
C2	∠ 3½ × 3 × ⅜	UTILITY SUPPORT
D1	CLIPPED 18WF47	BRACKET
D2	CLIPPED 18WF47	BRACKET
SF1	SWAY FRAME LOCATION	

NOTES:
1. FOR PROPOSED BARRIER GATE PLATFORM FRAMING, SEE SHEET 14.
2. EXISTING FRAMING SHOWN FOR INFORMATION ONLY.
3. LOCATIONS OF EXISTING RAIL BAR SPLICES ARE APPROXIMATE. THE CONTRACTOR SHALL FIELD MEASURE THE ACTUAL SPLICE LOCATIONS AND SUBMIT THEM WITH THE SHOP DRAWINGS. NEW AND EXISTING RAIL TUBES SHALL BE CONTINUOUS OVER A MINIMUM OF 2 POSTS. EXISTING RAIL MODIFICATIONS, POSTS, CONNECTIONS, ACCESS OPENING COMPONENTS, SPLICE RAILS, ETC. SHALL BE PAID UNDER ITEM 550.1103.

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188Framplan	1" = 10'-0"

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235\025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

FRAMING PLAN - SOUTH APPROACH

REVISIONS AFTER PROPOSAL	BY	DATE		BY	DATE
DESIGNED	JAS	7/07	CHECKED	SWJ	4/08
DRAWN	SMG/WPS	7/07	CHECKED	SWJ	4/08
QUANTITIES	SWJ	4/08	CHECKED	WPS	4/08

ISSUE DATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE	----------	11	35

BRIDGE SHEET XX OF XX

FILE NUMBER 109-6-1

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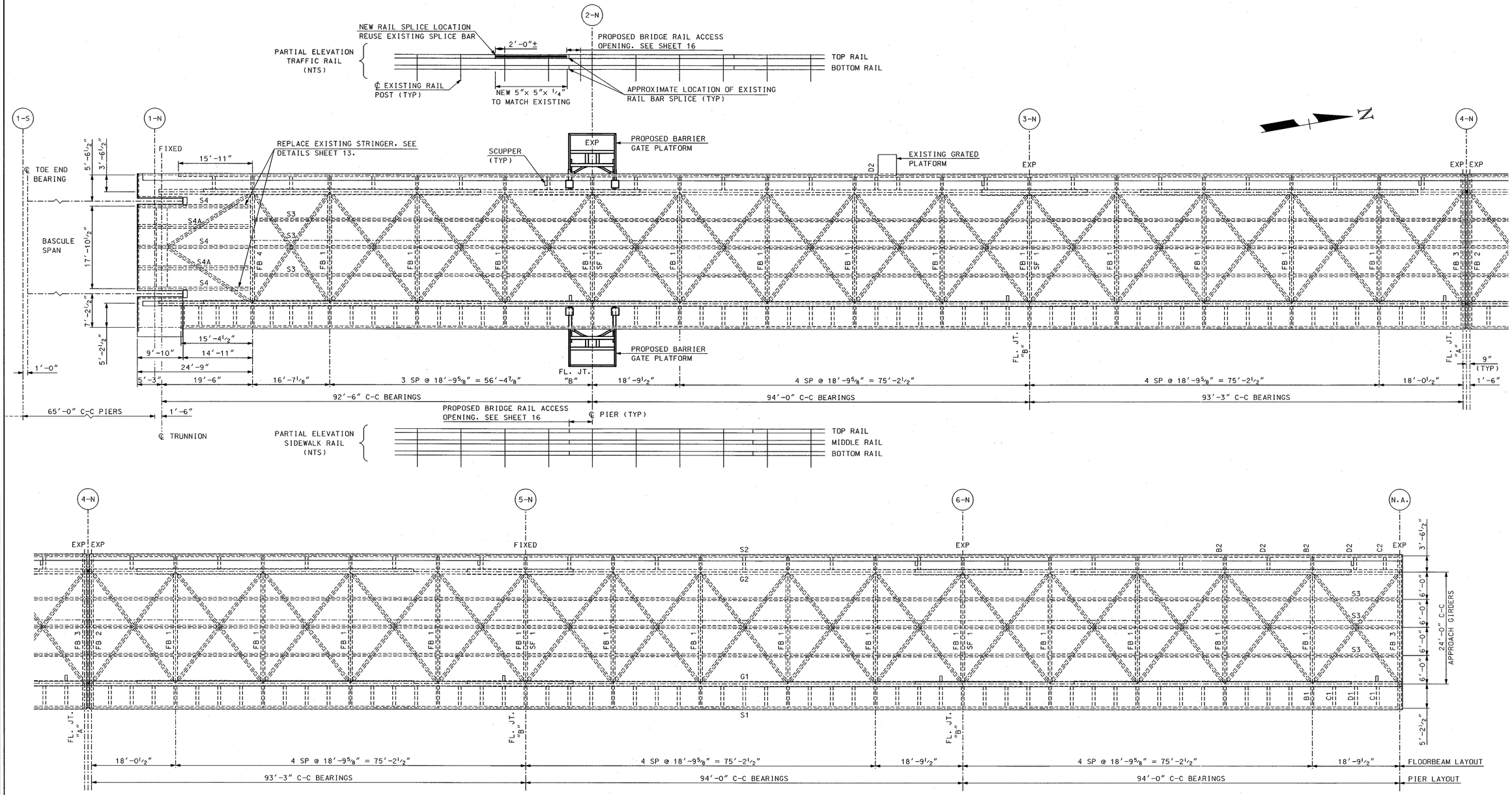

LEGEND

G1	WELDED PLATE GIRDER		B1	18WF47	BRACKET
G2	WELDED PLATE GIRDER		B2	18WF47	BRACKET
FB1	27WF98	INTER. FLOORBEAM	C1	∠ 3 1/2 x 3 x 3/8	UTILITY SUPPORT
FB2	21WF103	END FLOORBEAM	C2	∠ 3 1/2 x 3 x 3/8	UTILITY SUPPORT
FB3	27WF91	END FLOORBEAM	D1	CLIPPED 18WF47	BRACKET
FB4	27WF98	INTER. FLOORBEAM	D2	CLIPPED 18WF47	BRACKET
S1	18WF47	FASCIA STRINGER	SF1	SWAY FRAME LOCATION	
S2	18WF47	FASCIA STRINGER			
S3	18WF47	ROADWAY STRINGER			
S4	12WF50	ROADWAY STRINGER			
S4A	12WF58	ROADWAY STRINGER			

NOTES:
1. FOR PROPOSED BARRIER GATE PLATFORM FRAMING. SEE SHEET 14.
2. EXISTING FRAMING SHOWN FOR INFORMATION ONLY.
3. LOCATIONS OF EXISTING RAIL BAR SPLICES ARE APPROXIMATE. THE CONTRACTOR SHALL FIELD MEASURE THE ACTUAL SPLICE LOCATIONS AND SUBMIT THEM WITH THE SHOP DRAWINGS. NEW AND EXISTING RAIL TUBES SHALL BE CONTINUOUS OVER A MINIMUM OF 2 POSTS. EXISTING RAIL MODIFICATIONS, POSTS, CONNECTIONS, ACCESS OPENING COMPONENTS, SPLICE RAILS, ETC. SHALL BE PAID UNDER ITEM 550.1103.

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188Framplan	1" = 10'-0"

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON | BRIDGE NO. 235\025 | STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

FRAMING PLAN - NORTH APPROACH

REVISIONS AFTER PROPOSAL	BY	DATE		BY	DATE
DESIGNED	JAS	7/07	CHECKED	SWJ	4/08
DRAWN	SMG/WPS	7/07	CHECKED	SWJ	4/08
QUANTITIES	SWJ	4/08	CHECKED	WPS	4/08
ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.	
REV. DATE		----------		12	

BRIDGE SHEET XX OF XX
FILE NUMBER 109-6-1
TOTAL SHEETS 35

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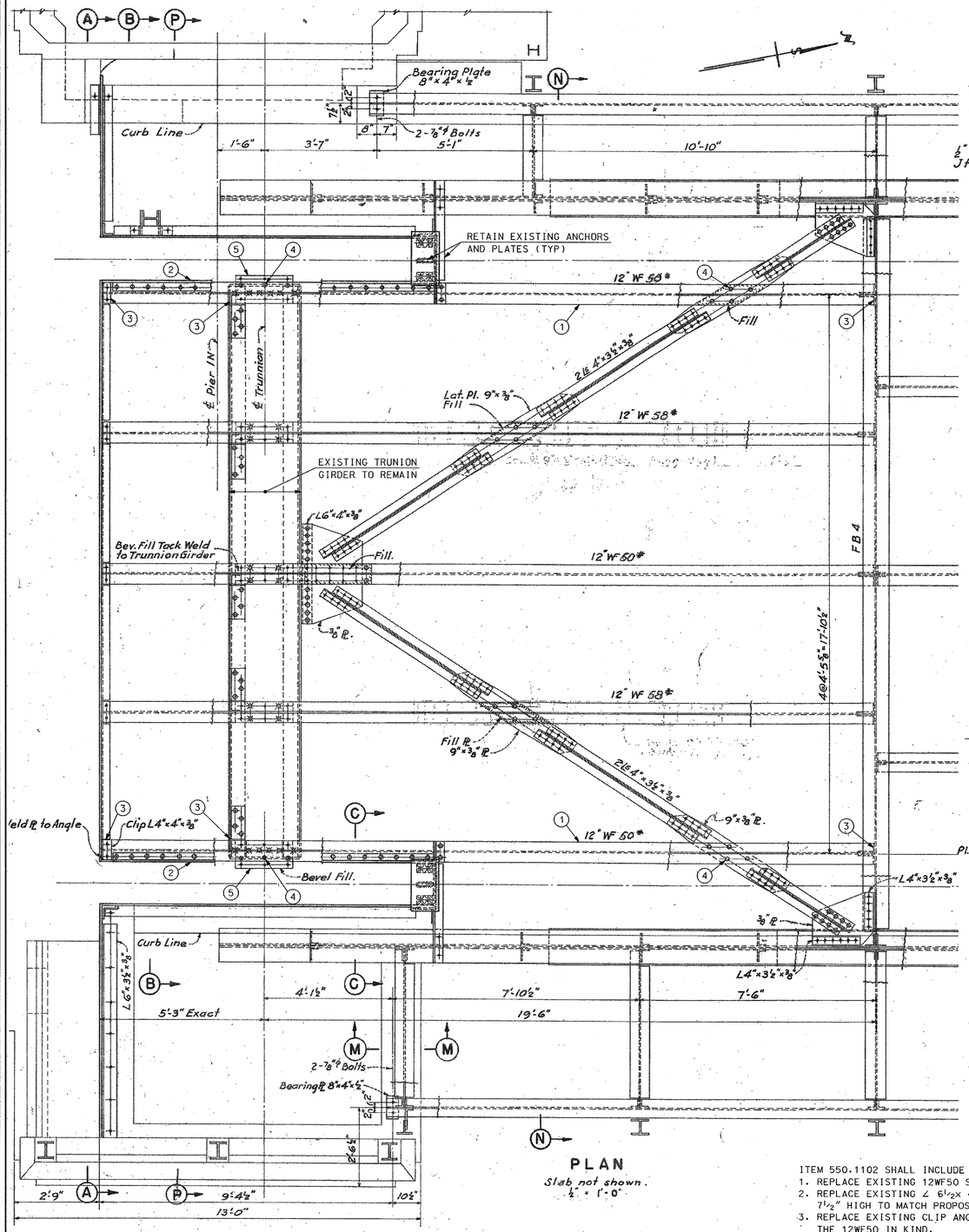
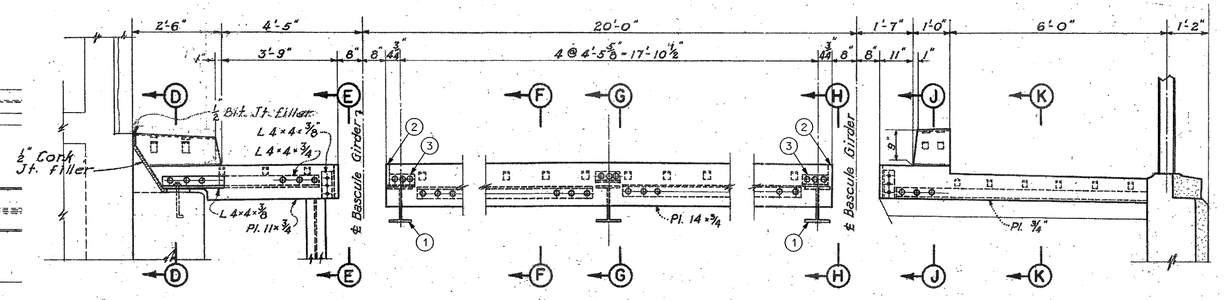
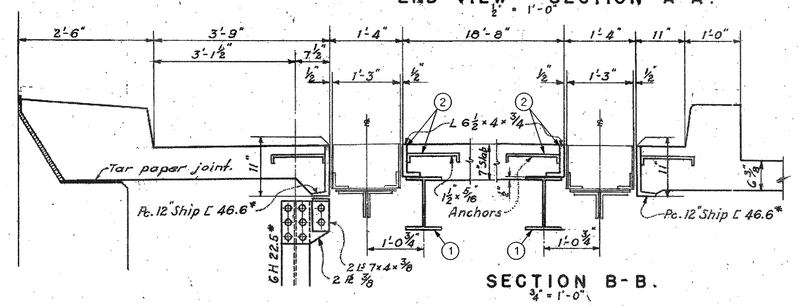


PLAN

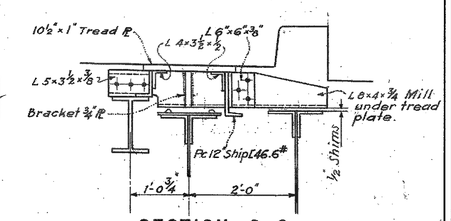
Slab not shown.
½" = 1'-0"



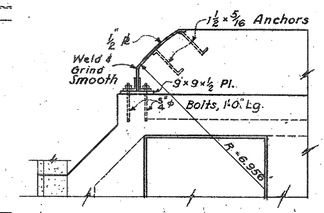
END VIEW SECTION A-A.
½" = 1'-0"



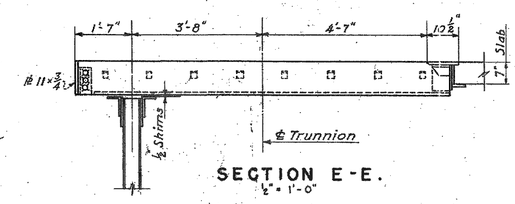
SECTION B-B.
¾" = 1'-0"



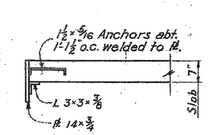
SECTION C-C.
¾" = 1'-0"



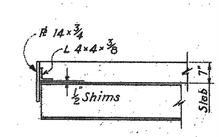
SECTION D-D.
½" = 1'-0"



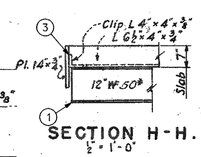
SECTION E-E.
½" = 1'-0"



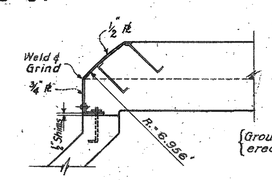
SECTION F-F.
½" = 1'-0"



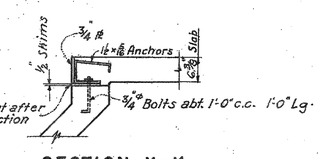
SECTION G-G.
½" = 1'-0"



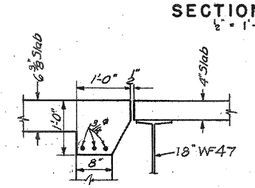
SECTION H-H.
½" = 1'-0"



SECTION J-J.
½" = 1'-0"



SECTION K-K.
½" = 1'-0"



SECTION M-M
¾" = 1'-0"

NOTES

Material - Structural Carbon Steel
Rivets - ⅞"ϕ
Open Holes - 15/16"ϕ } Except as noted.
For Slab Reinforcement Details See Sections P-P And N-N On Sheet 23

ITEM 550.1102 SHALL INCLUDE THE FOLLOWING:

1. REPLACE EXISTING 12WF50 STRINGERS W12x50 STRINGERS.
2. REPLACE EXISTING ∠ 6½x 4x¾ WITH ∠ 8x 4x¾ CUT TO 7½" HIGH TO MATCH PROPOSED DECK.
3. REPLACE EXISTING CLIP ANGLES AND ANCHOR RODS ATTACHED TO THE 12WF50 IN KIND.
4. REPLACE EXISTING RIVETS WITH HIGH STRENGTH BOLTS.
5. RETAIN AND REUSE BEVEL PLATE.

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188Stringer	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON | BRIDGE NO. 235\025 | STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

STRINGER REPLACEMENT DETAILS

REVISIONS AFTER PROPOSAL							
				DESIGNED	SWJ	3/08	CHECKED WPS 4/08
				DRAWN	SMG	3/08	CHECKED SWJ 3/08
				QUANTITIES	SWJ	4/08	CHECKED WPS 4/08
				ISSUE DATE			FEDERAL PROJECT NO. ----------
				REV. DATE			

BY | DATE

BRIDGE SHEET XX OF XX
FILE NUMBER 109-6-1
SHEET NO. 13
TOTAL SHEETS 35

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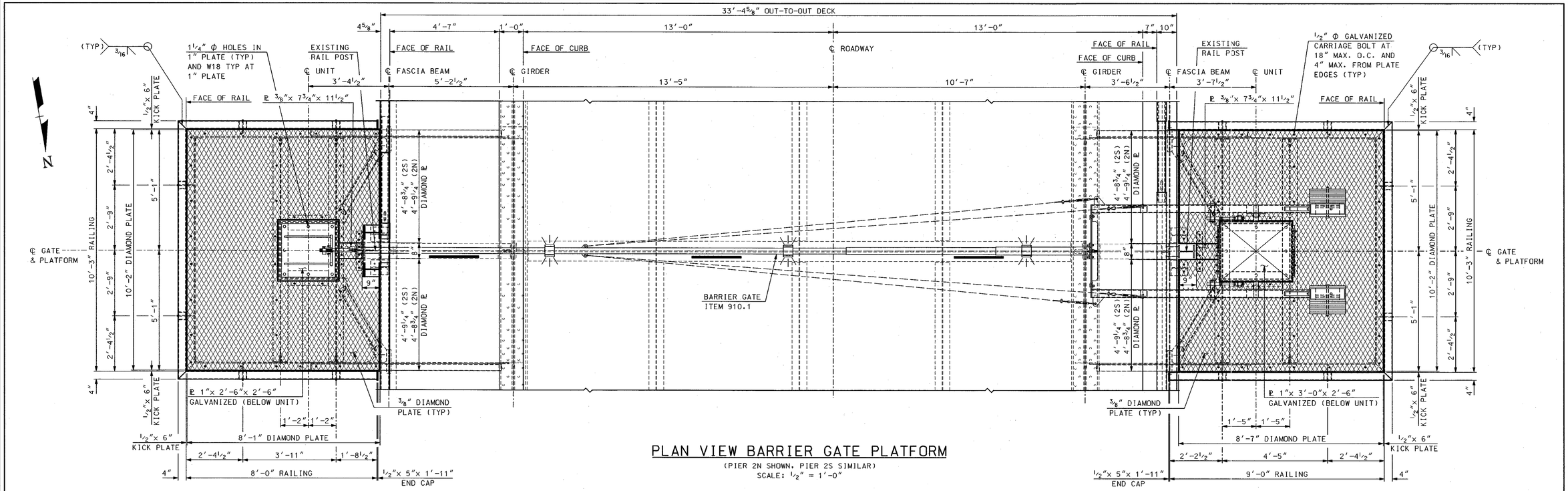
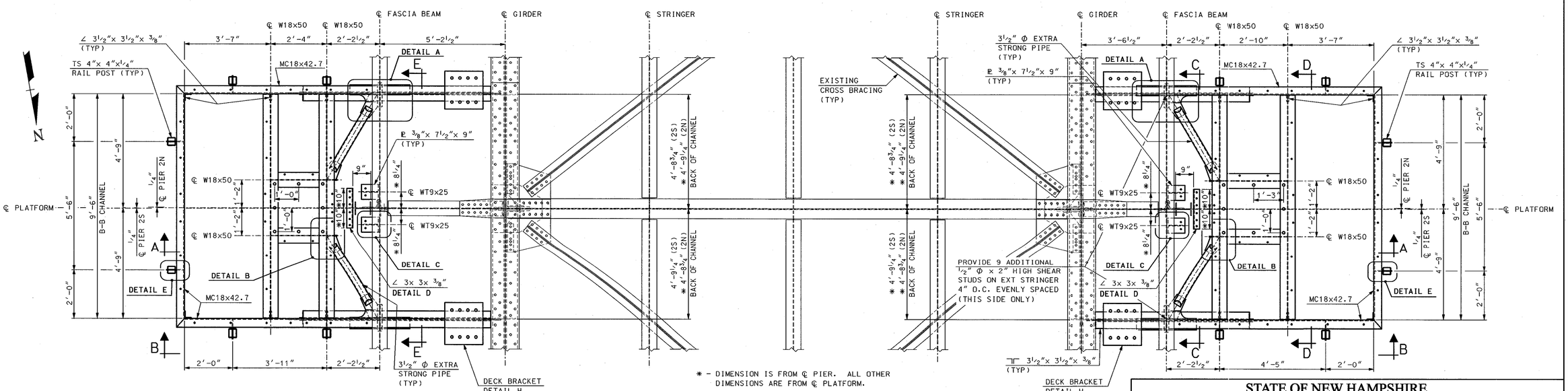


PLAN VIEW BARRIER GATE PLATFORM

(PIER 2N SHOWN, PIER 2S SIMILAR)
SCALE: 1/2" = 1'-0"



PLAN VIEW BARRIER GATE PLATFORM SUPPORT STRUCTURE

(DECK & DIAMOND PLATE REMOVED FOR CLARITY, PIER 2N SHOWN, PIER 2S SIMILAR)
SCALE: 1/2" = 1'-0"

* - DIMENSION IS FROM ℄ PIER. ALL OTHER DIMENSIONS ARE FROM ℄ PLATFORM.

NOTE:
FOR CONNECTION DETAILS SEE BRIDGE SHEETS 15 - 18.

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188barriergate	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON | BRIDGE NO. 235\025 | STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

BARRIER GATE PLAN VIEWS

REVISIONS AFTER PROPOSAL	BY	DATE		BY	DATE
DESIGNED	SWJ	11/07	CHECKED	WPS	4/08
DRAWN	SMG	11/07	CHECKED	SWJ	4/08
QUANTITIES	SWJ	4/08	CHECKED	WPS	4/08
ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.	
REV. DATE		----------		14	

BRIDGE SHEET XX OF XX
FILE NUMBER 109-6-1
TOTAL SHEETS 35

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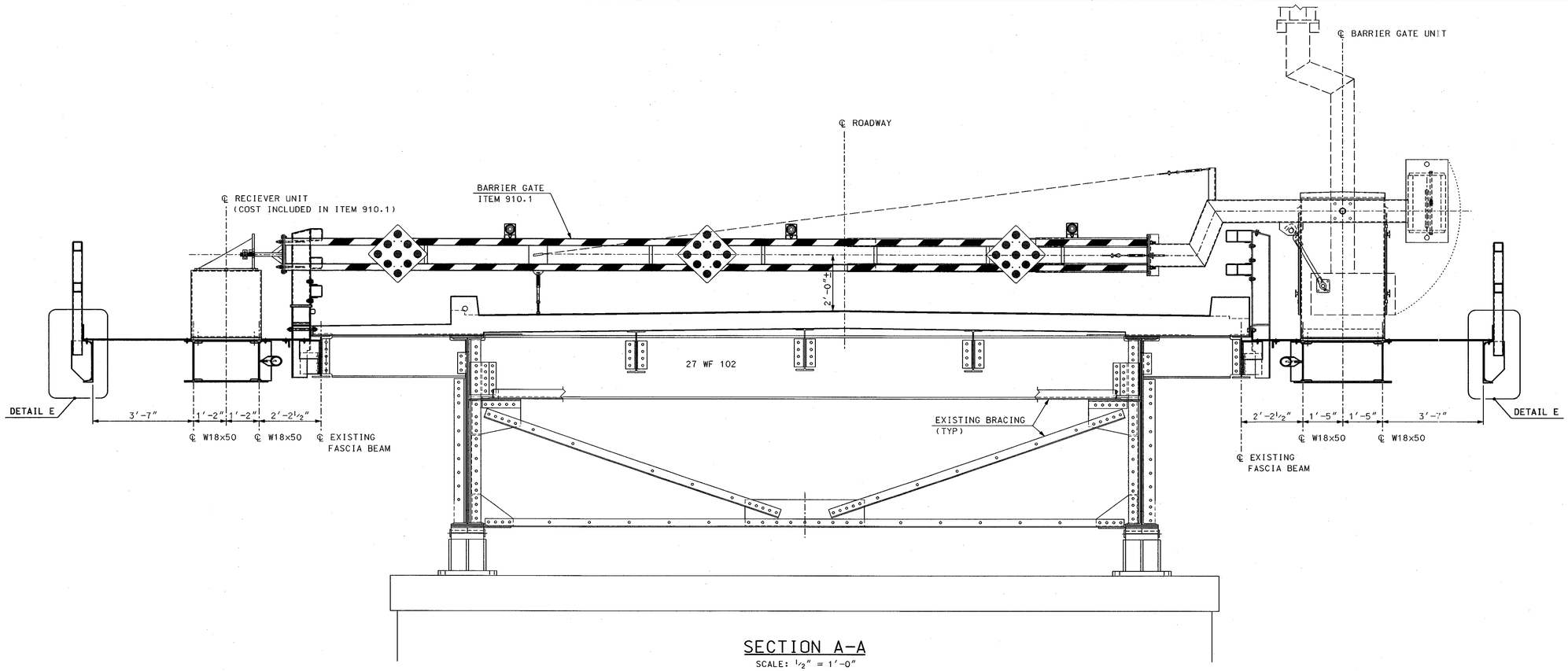
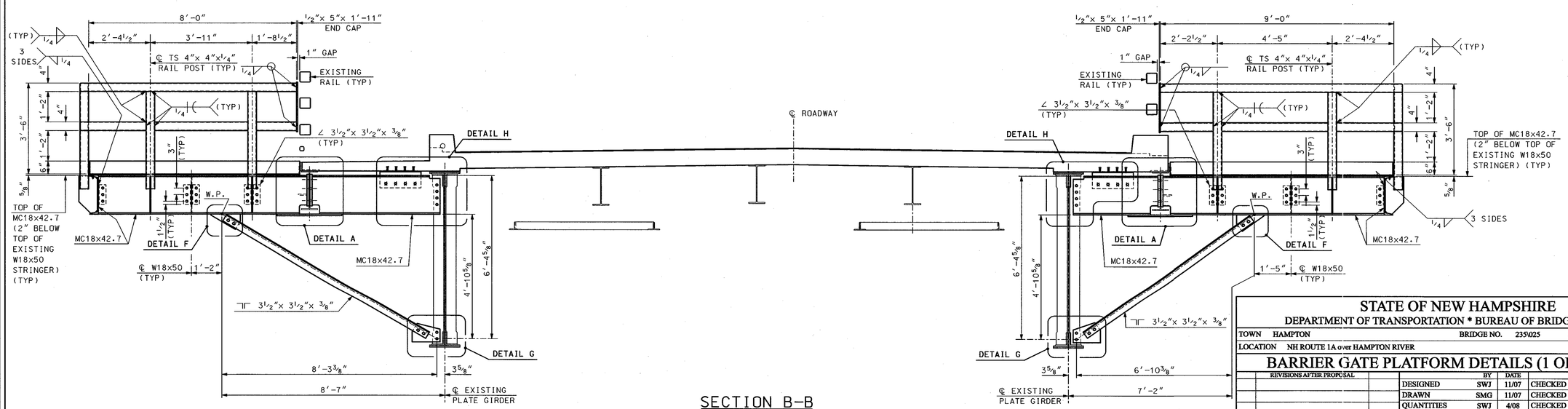


NOTE:
FOR CONNECTION DETAILS SEE
SHEETS 16 - 18.

SECTION A-A

SCALE: ½" = 1'-0"



SECTION B-B

SCALE: ½" = 1'-0"

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188barriergate	AS NOTED

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON | BRIDGE NO. 235\025 | STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

BARRIER GATE PLATFORM DETAILS (1 OF 4)

REVISIONS AFTER PROPOSAL

	BY	DATE		BY	DATE
DESIGNED	SWJ	11/07	CHECKED	WPS	4/08
DRAWN	SMG	11/07	CHECKED	SWJ	4/08
QUANTITIES	SWJ	4/08	CHECKED	WPS	4/08

ISSUE DATE
REV. DATE

FEDERAL PROJECT NO. ----------

BRIDGE SHEET	FILE NUMBER	SHEET NO.	TOTAL SHEETS
XX OF XX	109-6-1	15	35

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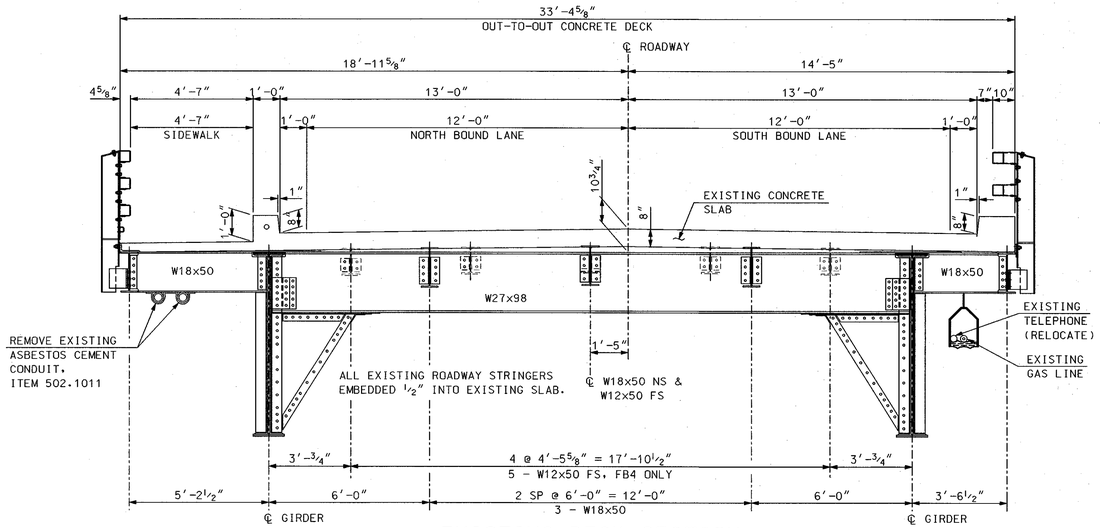
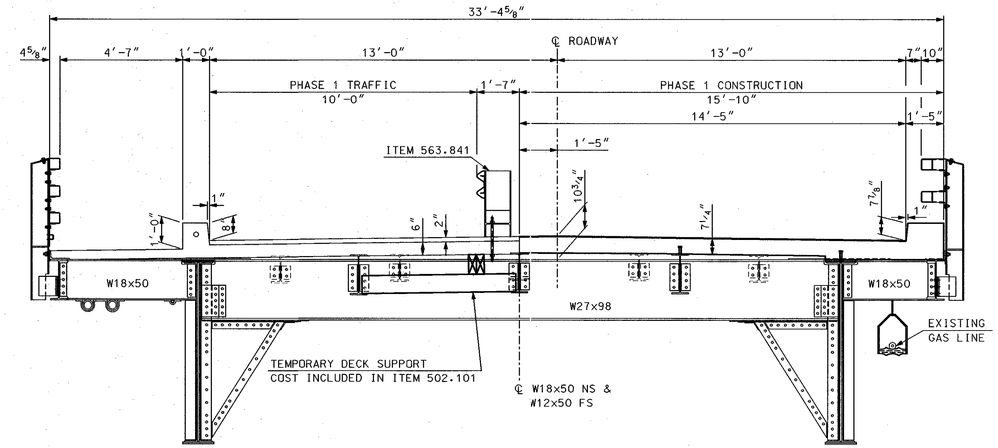


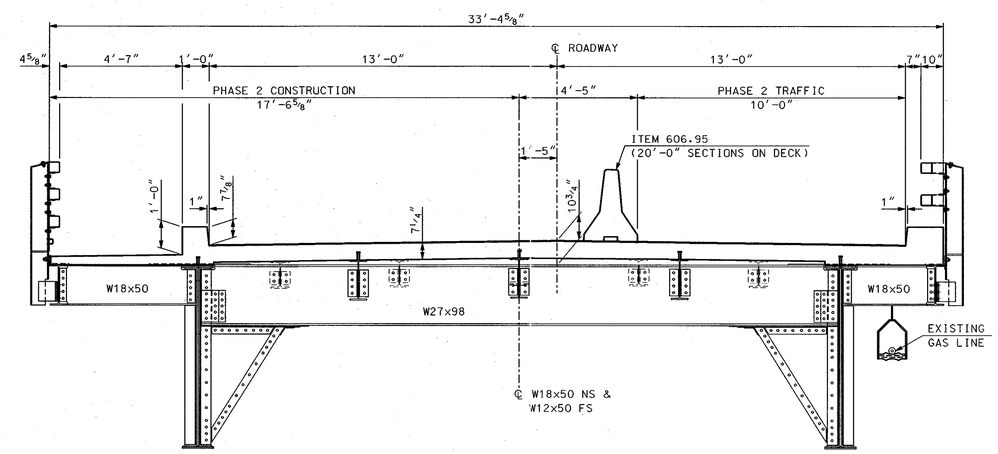
EXISTING DECK SECTION AT FLOORBEAM 1 & 4

SCALE: 3/8" = 1'-0"



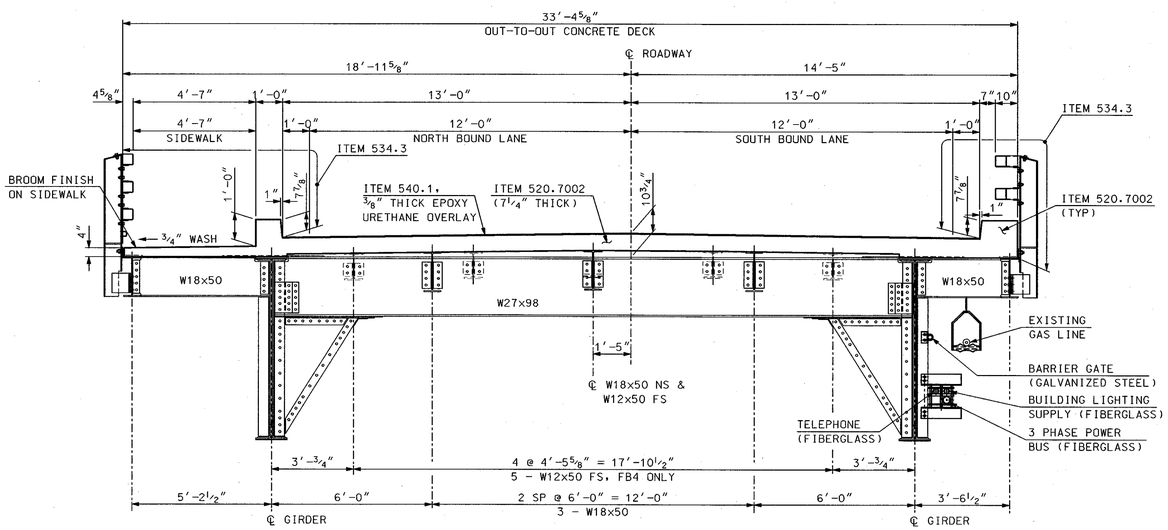
PHASE 1 & 3 CONSTRUCTION AT FLOORBEAM 1 & 4

SCALE: 3/8" = 1'-0"



PHASE 2 & 4 CONSTRUCTION AT FLOORBEAM 1 & 4

SCALE: 3/8" = 1'-0"



PROPOSED DECK SECTION AT FLOORBEAM 1 & 4

SCALE: 3/8" = 1'-0"

NOTE: ALL SECTIONS LOOKING SOUTH

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

DECK SECTIONS AND PHASING

BRIDGE SHEET: XX OF XX

REVISIONS AFTER PROPOSAL	BY	DATE		BY	DATE
DESIGNED	JAS	8/07	CHECKED	SWJ	4/08
DRAWN	SMG	8/07	CHECKED	SWJ	4/08
QUANTITIES	JAS	4/08	CHECKED	WPS	4/08

FILE NUMBER: 109-6-1

ISSUE DATE		FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE		----------	21	35

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188decksect	AS NOTED

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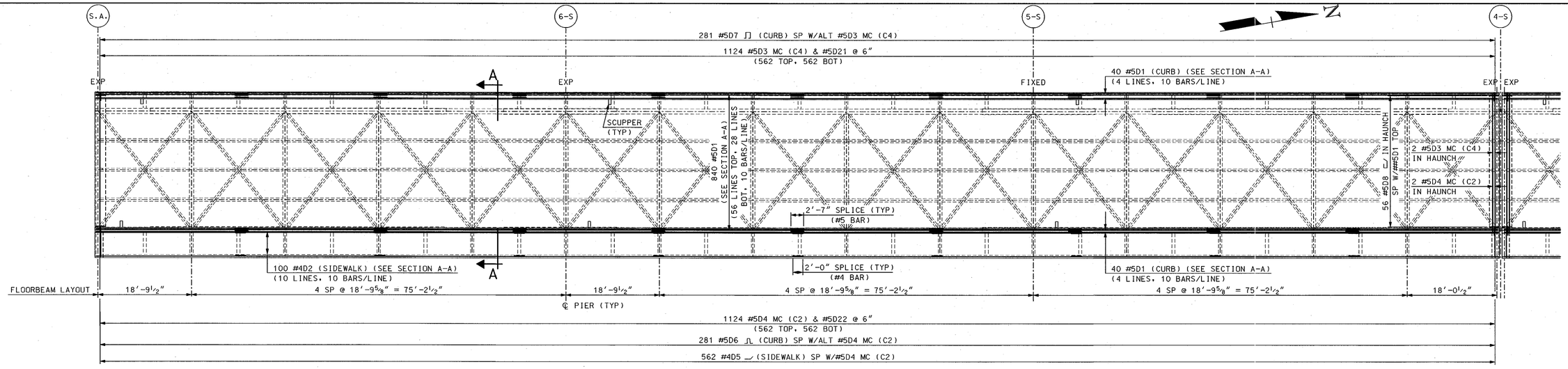
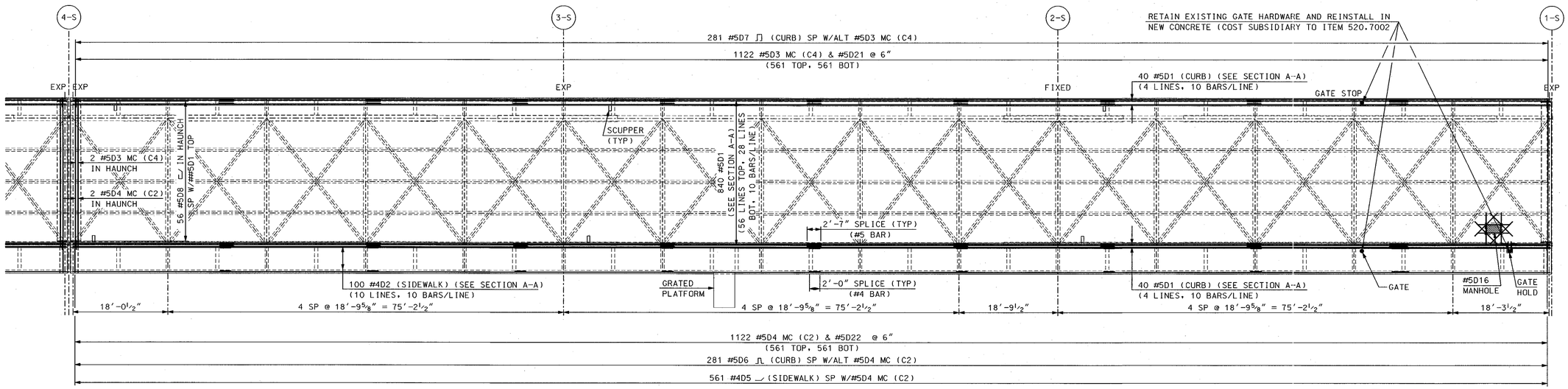
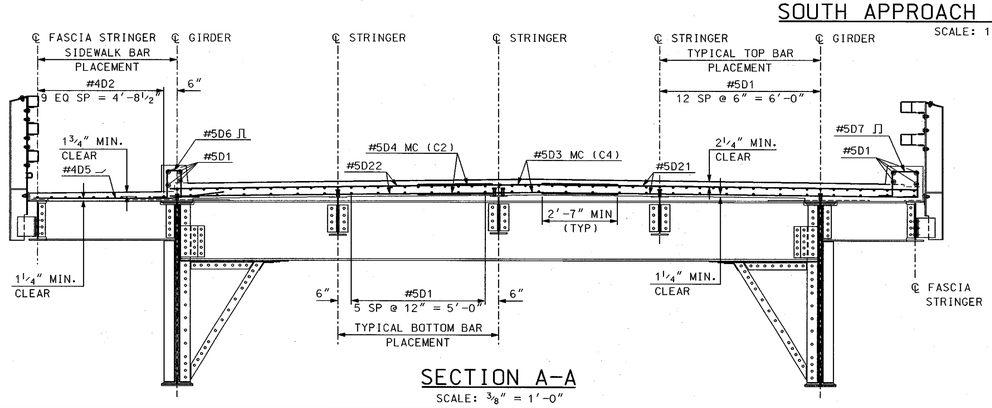




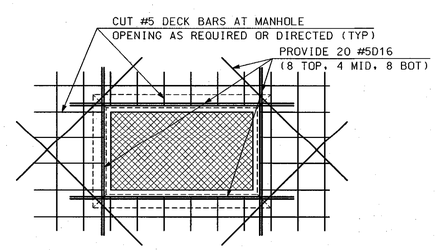
SOUTH APPROACH REINFORCING PLAN

SCALE: 1" = 10'-0"



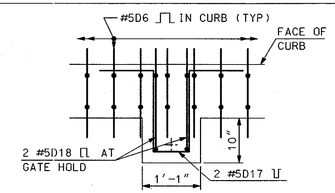
SECTION A-A

SCALE: ⅜" = 1'-0"



MANHOLE REINFORCING

N.T.S.



GATE HOLD DETAIL

SCALE: ¾" = 1'-0"

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188Deckbars	1" = 10'-0"

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235\025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

SOUTH APPROACH REINFORCING PLAN & SECTION

REVISIONS AFTER PROPOSAL							

	BY	DATE		BY	DATE
DESIGNED	WPS	10/07	CHECKED	JAS	4/08
DRAWN	SMG/GMC	10/07	CHECKED	JAS	4/08
QUANTITIES	WPS	4/08	CHECKED	JAS	4/08
ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.	
REV. DATE		----------		22	

BRIDGE SHEET XX OF XX

FILE NUMBER 109-6-1

TOTAL SHEETS 35

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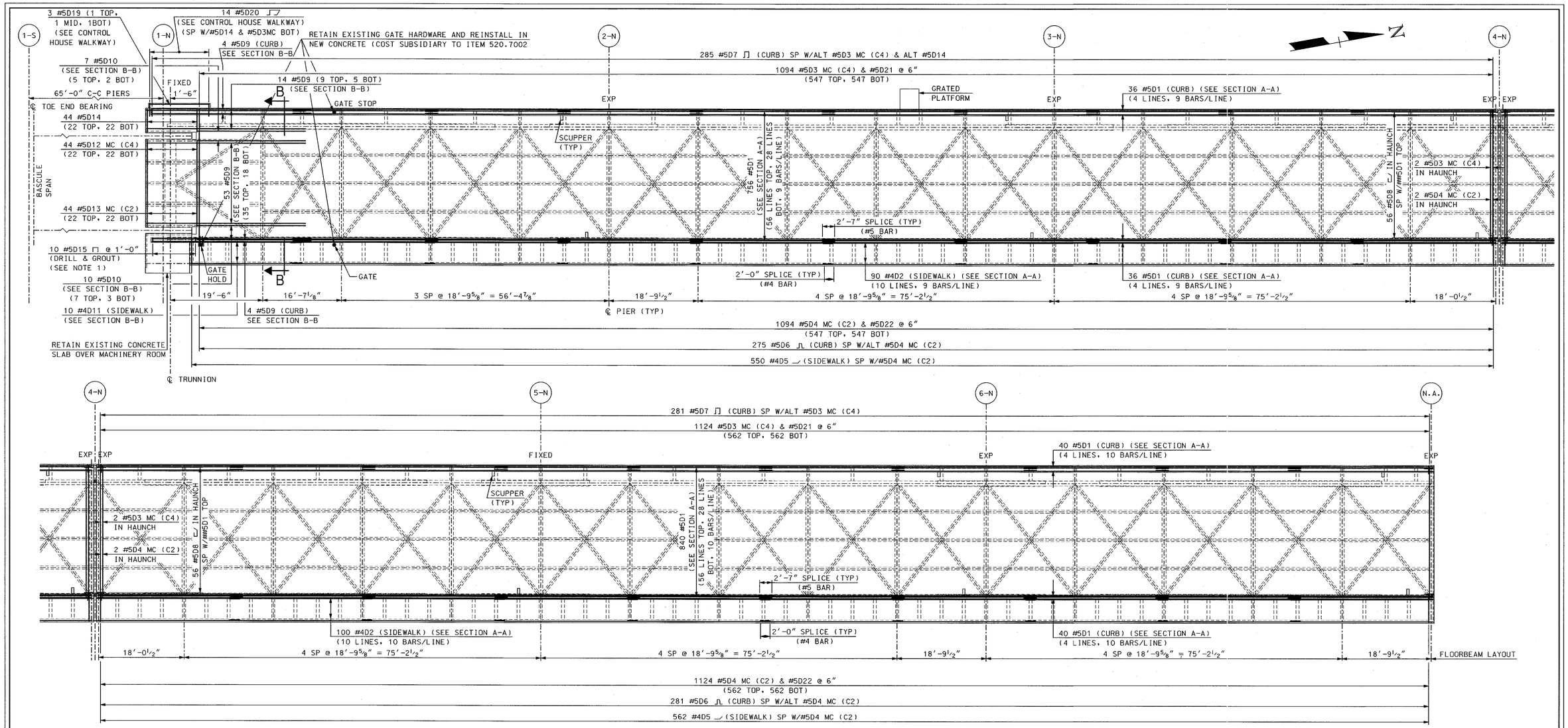
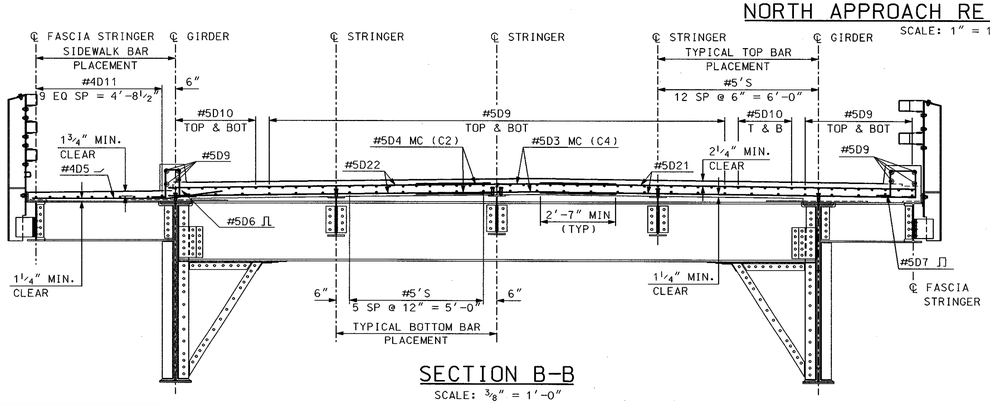


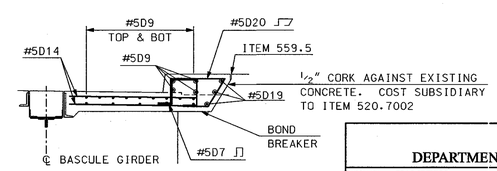
NORTH APPROACH REINFORCING PLAN

SCALE: 1" = 10'-0"



SECTION B-B

SCALE: 3/8" = 1'-0"



CONTROL HOUSE WALKWAY

SCALE: 3/8" = 1'-0"

NOTE 1:
DRILL 1 1/8" Φ × 4" LONG HOLES INTO EXISTING CONCRETE SLAB. FILL WITH AN APPROVED NONSHRINK GROUT. COST SUBSIDIARY TO ITEM 544.2.

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188Deckbars	1" = 10'-0"

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON — BRIDGE NO. 235\025 — STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

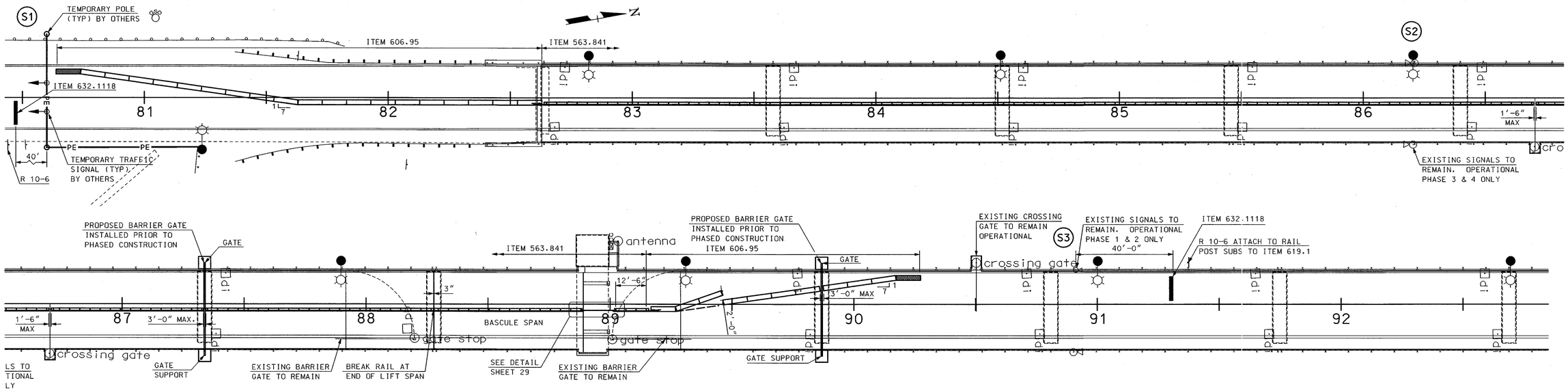
NORTH APPROACH REINFORCING PLAN

REVISIONS AFTER PROPOSAL	BY	DATE

	BY	DATE		BY	DATE
DESIGNED	WPS	7/07	CHECKED	JAS	4/08
DRAWN	SMG/GMC	7/07	CHECKED	JAS	4/08
QUANTITIES	WPS	4/08	CHECKED	JAS	4/08
ISSUE DATE			FEDERAL PROJECT NO.		
REV. DATE			----------		

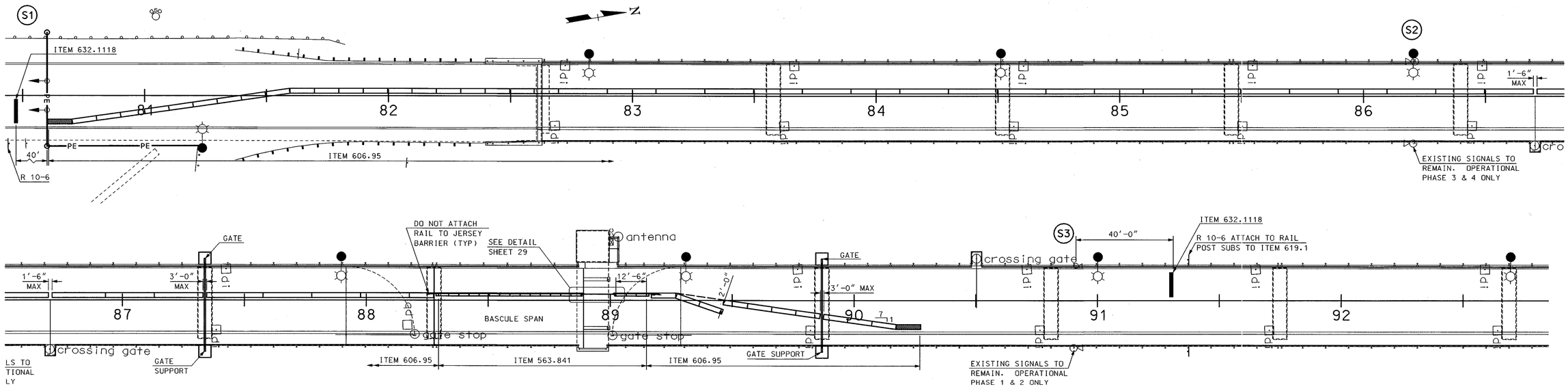
BRIDGE SHEET XX OF XX
FILE NUMBER 109-6-1
SHEET NO. 23
TOTAL SHEETS 35

...\brd\Super\14188Deckbars.dgn 04/08/2008 04:23:22 PM n18swj



PHASE 1 DECK CONSTRUCTION

SCALE: 1" = 20'-0"



PHASE 2 DECK CONSTRUCTION

SCALE: 1" = 20'-0"

NOTE: 20' LONG CONCRETE BARRIER SECTIONS ARE REQUIRED ON THE BRIDGE DECK IN PHASES 2 & 4. COST INCLUDED IN ITEM 606.95.

DENOTES IMPACT ATTENUATOR COSTS INCLUDED IN ITEM 606.95

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/BR-SITE	Laneclosure	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235\025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

PHASE 1 AND 2 TRAFFIC CONTROL

REVISIONS AFTER PROPOSAL		BY	DATE		BY	DATE
	DESIGNED	JAS	8/07	CHECKED	SWJ	4/08
	DRAWN	SMG/GMC	8/07	CHECKED	SWJ	4/08
	QUANTITIES	SWJ	4/08	CHECKED	JAS	4/08
	ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.	
	REV. DATE		----------		27	

BRIDGE SHEET XX OF XX

FILE NUMBER 109-6-1

TOTAL SHEETS 35

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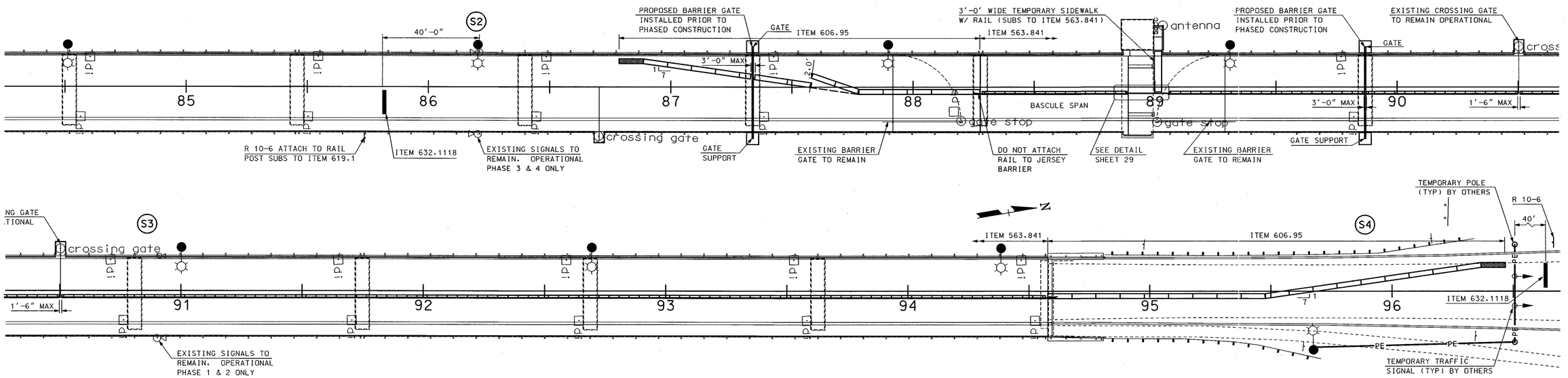
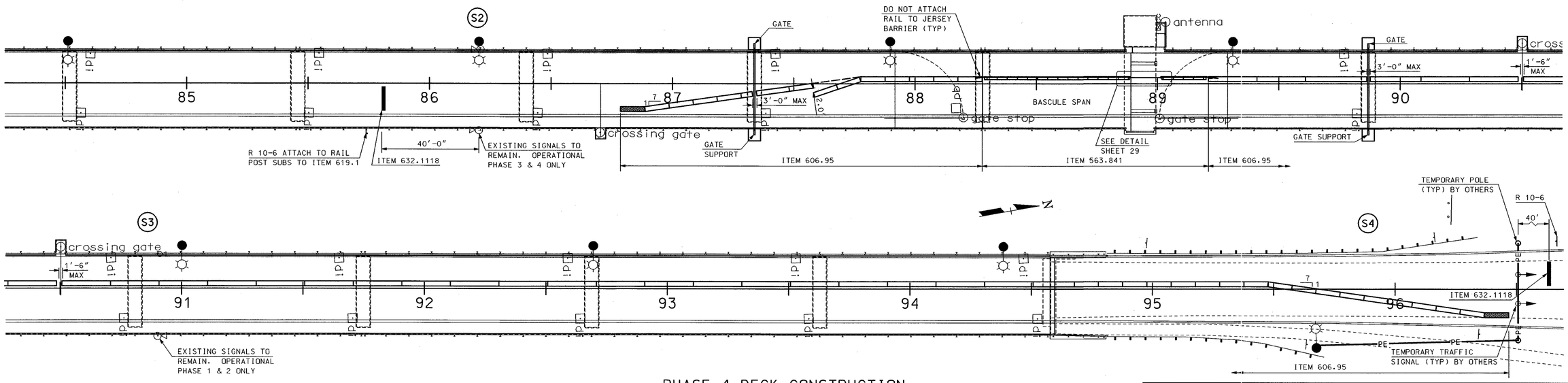


PHASE 3 DECK CONSTRUCTION

SCALE: 1" = 20'-0"



PHASE 4 DECK CONSTRUCTION

SCALE: 1" = 20'-0"

NOTE: 20' LONG CONCRETE BARRIER SECTIONS ARE REQUIRED ON THE BRIDGE DECK IN PHASES 2 & 4. COST INCLUDED IN ITEM 606.95.

DENOTES IMPACT ATTENUATOR COSTS INCLUDED IN ITEM 606.95

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/BR-SITE	Laneclosure	AS NOTED

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235\025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

PHASE 3 AND 4 TRAFFIC CONTROL

REVISIONS AFTER PROPOSAL			

	BY	DATE		BY	DATE
DESIGNED	JAS	8/07	CHECKED	SWJ	4/08
DRAWN	SMG/GMC	8/07	CHECKED	SWJ	4/08
QUANTITIES	SWJ	4/08	CHECKED	JAS	4/08

ISSUE DATE		FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
REV. DATE		----------	28	35

BRIDGE SHEET XX OF XX

FILE NUMBER 109-6-1

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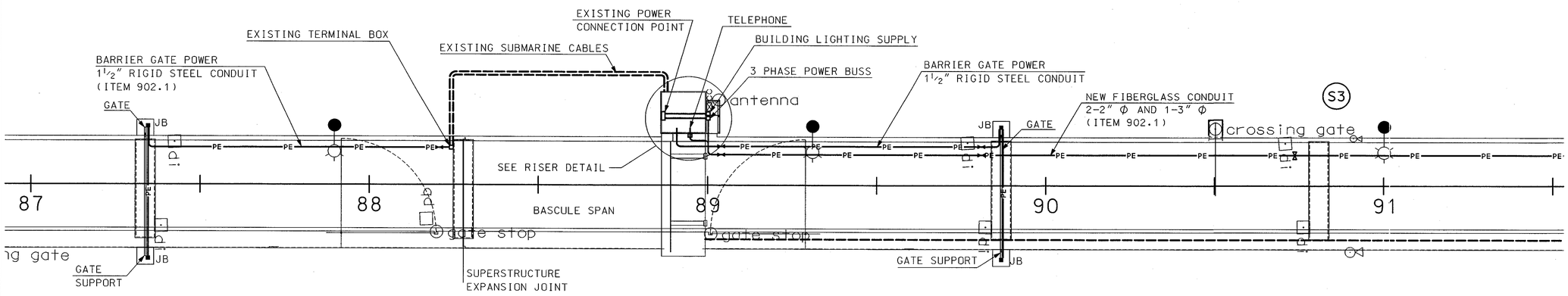
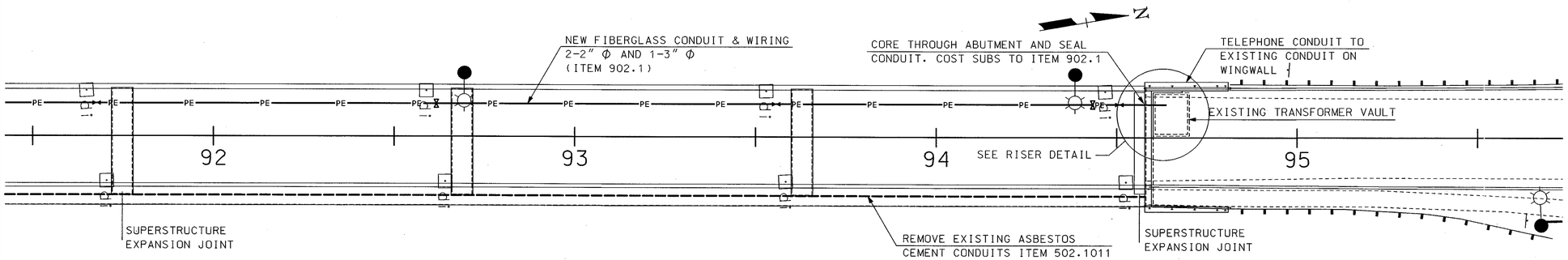


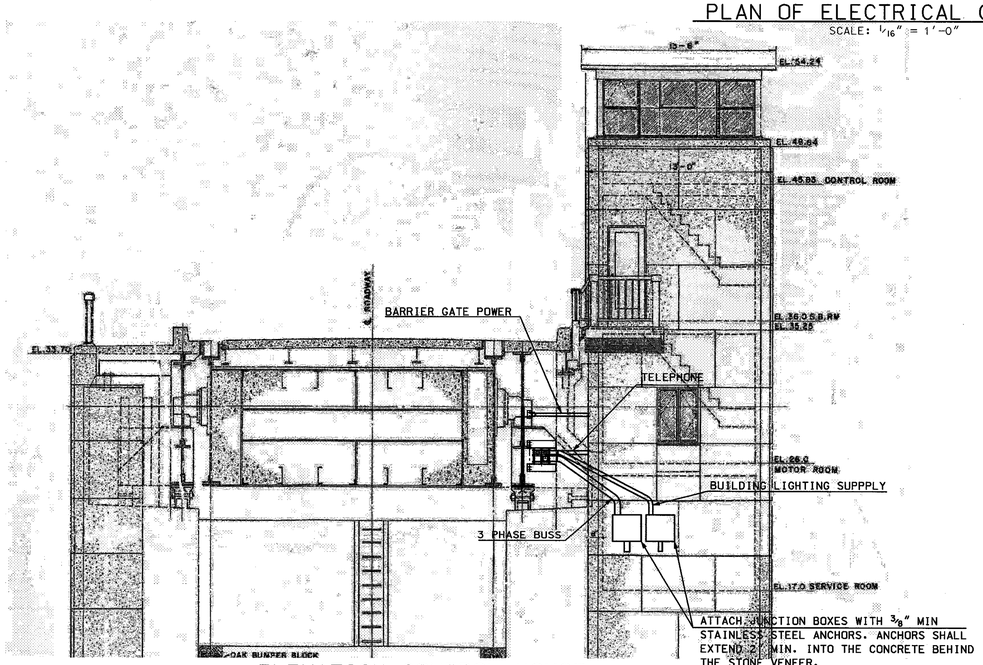


PLAN OF ELECTRICAL CONCIUT

SCALE: 1/16" = 1'-0"

LEGEND

- FIXED FIBERGLASS CONDUIT SUPPORT
- CONDUIT EXPANSION FITTINGS
- JUNCTION BOXES
- PE - CONDUIT
- SUBMARINE CABLE

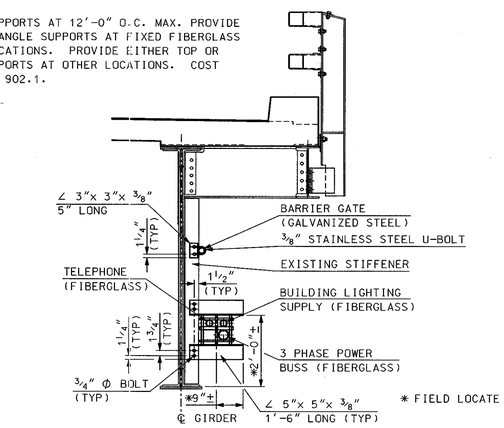


ELEVATION CONTROL HOUSE

SCALE: 1" = 5'-0"

NOTE:
COST ASSOCIATED WITH ALL JUNCTION BOXES, FIXED CONDUIT SUPPORT, CONDUIT EXPANSION FITTINGS AND BARRIER GATE POWER CONDUIT SHALL BE INCLUDED IN ITEM 902.1.

NOTE: PROVIDE CONDUIT SUPPORTS AT 12'-0" O.C. MAX. PROVIDE BOTH TOP & BOTTOM ANGLE SUPPORTS AT FIXED FIBERGLASS CONDUIT SUPPORT LOCATIONS. PROVIDE EITHER TOP OR BOTTOM CONDUIT SUPPORTS AT OTHER LOCATIONS. COST SUBSIDIARY TO ITEM 902.1.



CONDUIT SUPPORT DETAIL

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

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/BR-SITE	ConduitLayout	AS NOTED

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON — BRIDGE NO. 235\025 — STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

CONDUIT LAYOUT

REVISIONS AFTER PROPOSAL							
			DESIGNED	SWJ	3/08	CHECKED	GG 4/08
			DRAWN	GMC	3/08	CHECKED	SWJ 4/08
			QUANTITIES	--	--	CHECKED	-- --
			ISSUE DATE		FEDERAL PROJECT NO.		SHEET NO.
			REV. DATE		----------		34

BRIDGE SHEET: XX OF XX
FILE NUMBER: 109-6-1
TOTAL SHEETS: 35

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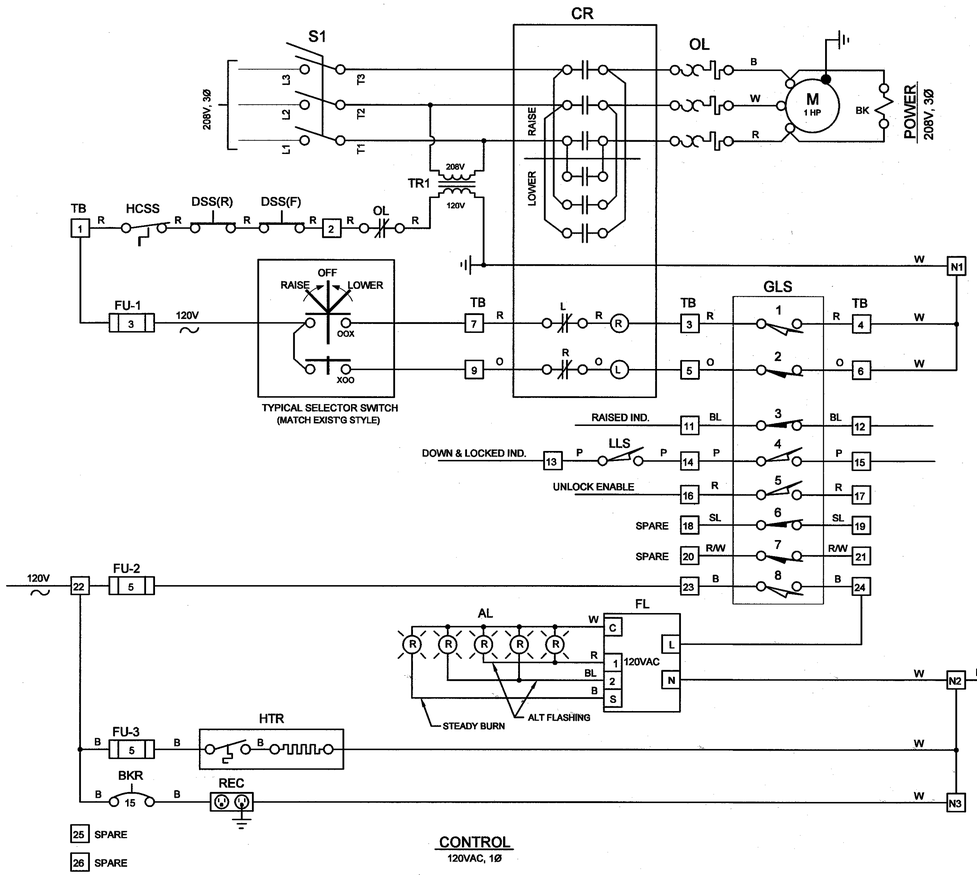
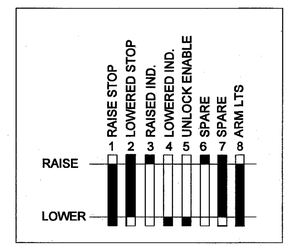


CONTROL
120VAC, 1Ø

ELECTRICAL PARTS LIST (PER GATE)

I.D.	QTY.	PART NO.	DESCRIPTION
AL:	5	ALT-C4-120V	ARM LIGHT, 4", RED 2-WAY, W/ 120V LAMP
BK:	1	-	BRAKE SOLENOID, PART OF MOTOR
BKR:	1	POL-BKR-15A-DIN	CIRCUIT BREAKER, 15A, 120V, DIN RAIL MTG
CR:	1	PMC-ERC-18TOII	REVERSING MOTOR STARTER, 480V, 3 PH, 120V COILS
DSS:	2	PSW-2DM409	DOOR SAFETY SWITCH, DPDT, PULL TO OVERRIDE
FL:	1	PFL-120VAC-10A	FLASHER, 120VAC, 10A, 2 CIRCUIT + STEADY BURN
FU-1:	1	PFU-FNM-3	FUSE, CONTROL CIRCUIT, 3A, 120V
FU-2:	1	PFU-FNM-5	FUSE, ARM LIGHT CIRCUIT, 5A, 120V
FU-3:	1	PFU-FNM-5	FUSE, HEATER CIRCUIT, 5A, 120V
GLS:	1	ALS-A001	GATE LIMIT SWITCH ASSEMBLY, 8CCT
HCSS:	1	PSW-BZE62RN	HAND CRANK SAFETY SWITCH, 15A, SPDT
HTR:	1	PHT-A001	HEATER & THERMOSTAT ASSEMBLY
LLS:	1	PSW-81-10517-B3	MAGNETIC PROX SWITCH W/MAGNET TARGET
M:	1	PMO-1-3-BK	MOTOR, 1 HP, 3Ø, 208V, 1725 RPM, W/BRAKE, TENV
N	-	-	NEUTRAL BUSS, PART OF TERMINAL BLOCK ASSY
OL:	1	POL-ERELAY-5	MOTOR OVERLOAD RELAY, 4.0 - 6.0 AMP, ADJUSTABLE
REC:	1	PSO-5252BKA	DUPLEX RECEPTICLE, 120V, 15A, GFI
S1:	1	PSW-7813PMD	SWITCH, DISCONNECT, 30A, 600V
TB:	1	TE-T26-F3-N3	TERMINAL BLOCK ASSEMBLY
TR1	1	YT-TBD	CONTROL TRANSFORMER, 208 Pri, 120 Sec, 100VA



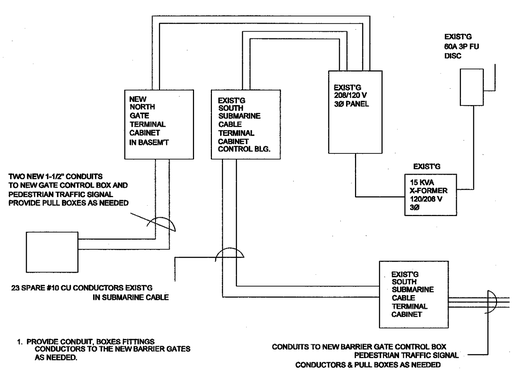
GATE LIMIT SWITCH SETTINGS

COLOR CODING

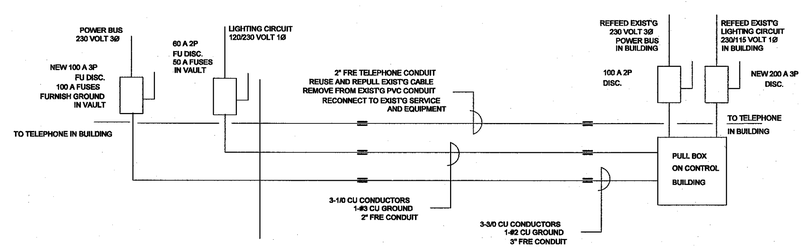
B -	BLACK
BR -	BROWN
BL -	BLUE
G -	GREEN
O -	ORANGE
P -	PURPLE
SL -	SLATE (GREY)
W -	WHITE
Y -	YELLOW
B/R -	BLACK W/RED STRIPE
B/W-	BLACK W/WHITE STRIPE
BL/B-	BLUE W/BLACK STRIPE
BL/R-	BLUE W/RED STRIPE
BL/W-	BLUE W/WHITE STRIPE
R/B -	RED W/BLACK STRIPE
R/W -	RED W/WHITE STRIPE

NOTES:

1. CIRCUIT SHOWN WITH GATE FULLY RAISED.
2. ALL CONDUCTORS SHALL BE #10 AWG MINIMUM STRANDED WIRE.
3. ALL CONDUCTORS TO BE NUMBERED OR COLOR CODED.
4. INSTALL BYPASS SWITCHES FOR ALL LIMIT SWITCHES.



BARRIER GATE RISER DIAGRAM



POWER/ TELEPHONE RISER DIAGRAM

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON | BRIDGE NO. 235/025 | STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

ELECTRICAL SCHEMATICS

BRIDGE SHEET: XX OF XX

REVISIONS AFTER PROPOSAL

	BY	DATE		BY	DATE
DESIGNED	GG	3/08	CHECKED	SWJ	3/08
DRAWN	GG	3/08	CHECKED	SWJ	3/08
QUANTITIES	--	--	CHECKED	--	--
ISSUE DATE					
REV. DATE					

FEDERAL PROJECT NO.: ----------

SHEET NO.: 35

TOTAL SHEETS: 35

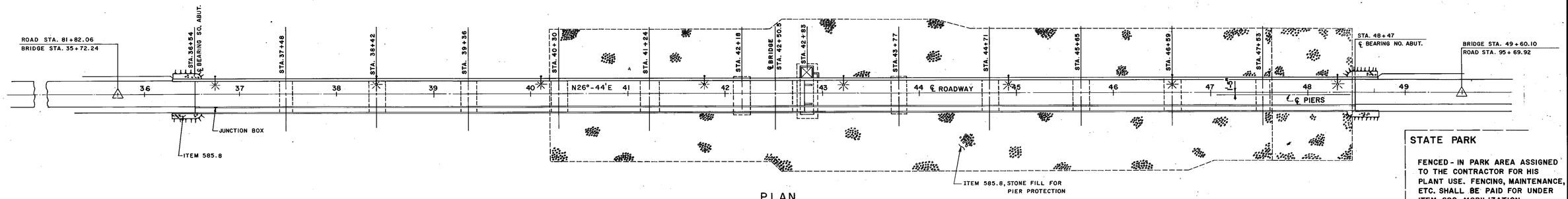
FILE NUMBER: 109-6-1

SUBDIRECTORY	.DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188riser1	NTS

...\Data\BRD\Super\14188riser1.dgn 04/09/2008 01:06:57 PM nidaw1

APPENDIX B2

Select Sheets from 1983 Rehabilitation Plans

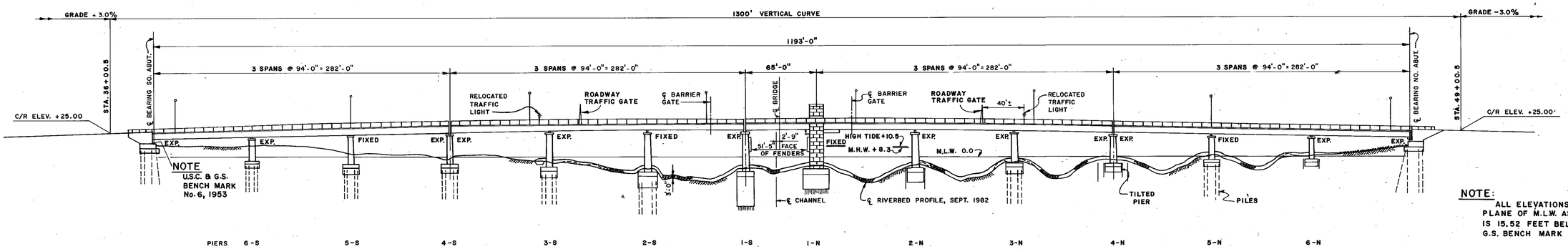


PLAN

SCALE: 1"= 50'

STATE PARK

FENCED - IN PARK AREA ASSIGNED TO THE CONTRACTOR FOR HIS PLANT USE. FENCING, MAINTENANCE, ETC. SHALL BE PAID FOR UNDER ITEM 692, MOBILIZATION.
SEE TITLE SHEET FOR PROPOSED STAGING AREAS.

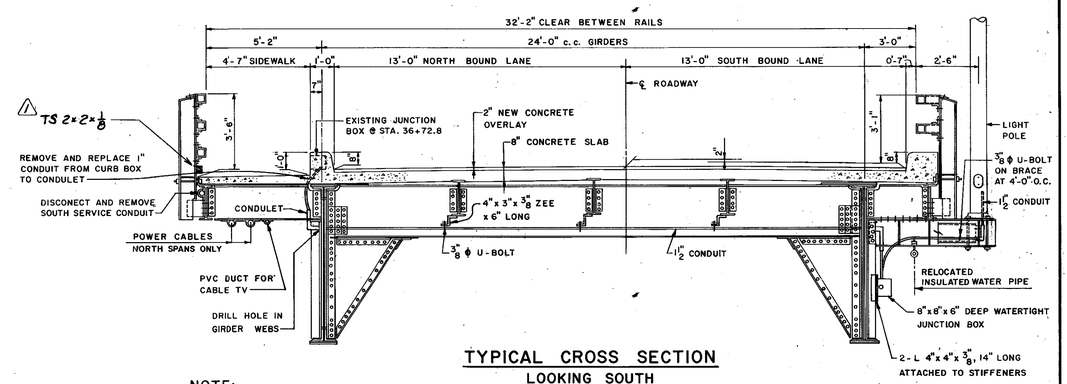


NOTE:
ALL ELEVATIONS REFER TO PLANE OF M.L.W. AS 0.0. WHICH IS 15.52 FEET BELOW U.S.C. & G.S. BENCH MARK No. 1

NOTE:
AS BUILT DRAWINGS SHOW PIERS 1-S AND 1-N CONSTRUCTED ON ROCK LEDGE.
ROADWAY LIGHTS SHOWN IN RELOCATED POSITION.

ELEVATION

SCALE: 1"=50'



TYPICAL CROSS SECTION

LOOKING SOUTH
NO SCALE

NOTE:
FOR SCUPPER LOCATION AND DETAILS, SEE BRIDGE SHEET 8.

LIST OF BRIDGE SHEETS

1. TITLE SHEET
2. QUANTITIES AND GENERAL NOTES
3. GENERAL PLAN, ELEVATION AND SECTION
4. APPROACH SPANS DECK REPAIRS - 1
5. APPROACH SPANS DECK REPAIRS - 2
6. BASCULE SPAN DECK REPAIRS - 1
7. BASCULE SPAN DECK REPAIRS - 2
8. SCUPPERS
9. EXPANSION JOINT AT ABUTMENTS
10. EXPANSION JOINT AT PIERS 4-N & 4-S
11. STEEL BRIDGE RAILING - 1
12. STEEL BRIDGE RAILING - 2
13. BRIDGE LIGHTING POLE SUPPORT
14. REPLACEMENT OF RIVETS AND BOLTS - 1
15. REPLACEMENT OF RIVETS AND BOLTS - 2
16. MISCELLANEOUS STEEL REPAIRS
17. SHOE REHABILITATION
18. CONTROL HOUSE UPGRADING - 1
19. CONTROL HOUSE UPGRADING - 2
20. CONTROL HOUSE UPGRADING - 3
21. CONTROL HOUSE UPGRADING - 4
22. CONTROL HOUSE UPGRADING - 5
23. DOORS
24. PIER 1-N HANDRAIL
25. PIER EROSION PROTECTION
26. STREAMBED SECTIONS - 1
27. STREAMBED SECTIONS - 2
28. OPERATING MACHINERY HOUSING
29. EMERGENCY OPERATING MACHINERY SUPPORTS
30. EMERGENCY OPERATING MACHINERY
31. BASCULE POSITION DRIVES
32. OPERATING MACHINERY REHABILITATION
33. LOCK MACHINERY REHABILITATION - 1
34. LOCK MACHINERY REHABILITATION - 2
35. WIRING DIAGRAM - ORIGINAL ELECTRICAL FACILITIES - 1
36. WIRING DIAGRAM - ORIGINAL ELECTRICAL FACILITIES - 2
37. MODIFIED WIRING DIAGRAMS - 1
38. MODIFIED WIRING DIAGRAMS - 2
39. MODIFIED WIRING DIAGRAMS - 3
40. ELECTRICAL WORKS ON APPROACHES
41. ELECTRICAL DETAILS
42. SCHEMATIC CONDUIT DIAGRAM
43. BARRIER GATES

SHEET SCALE: AS NOTED

	DESCRIPTION	BY	DATE
1	ADD LOWER PEDESTRIAN RAIL	JFM	9/84

REVISIONS

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF - 039 - 1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

GENERAL PLAN, ELEVATION AND SECTION

	BY	DATE		BY	DATE
DESIGNED	—		CHECKED	E.S.T.	9/82
DRAWN	V.V.	10/82	CHECKED	R.E.T.	10/82
TRACED	—		CHECKED	—	
QUANTITIES	—		CHECKED	—	

BRIDGE SHEET NO. 3 OF 43
FILE NUMBER 3-1-2-1

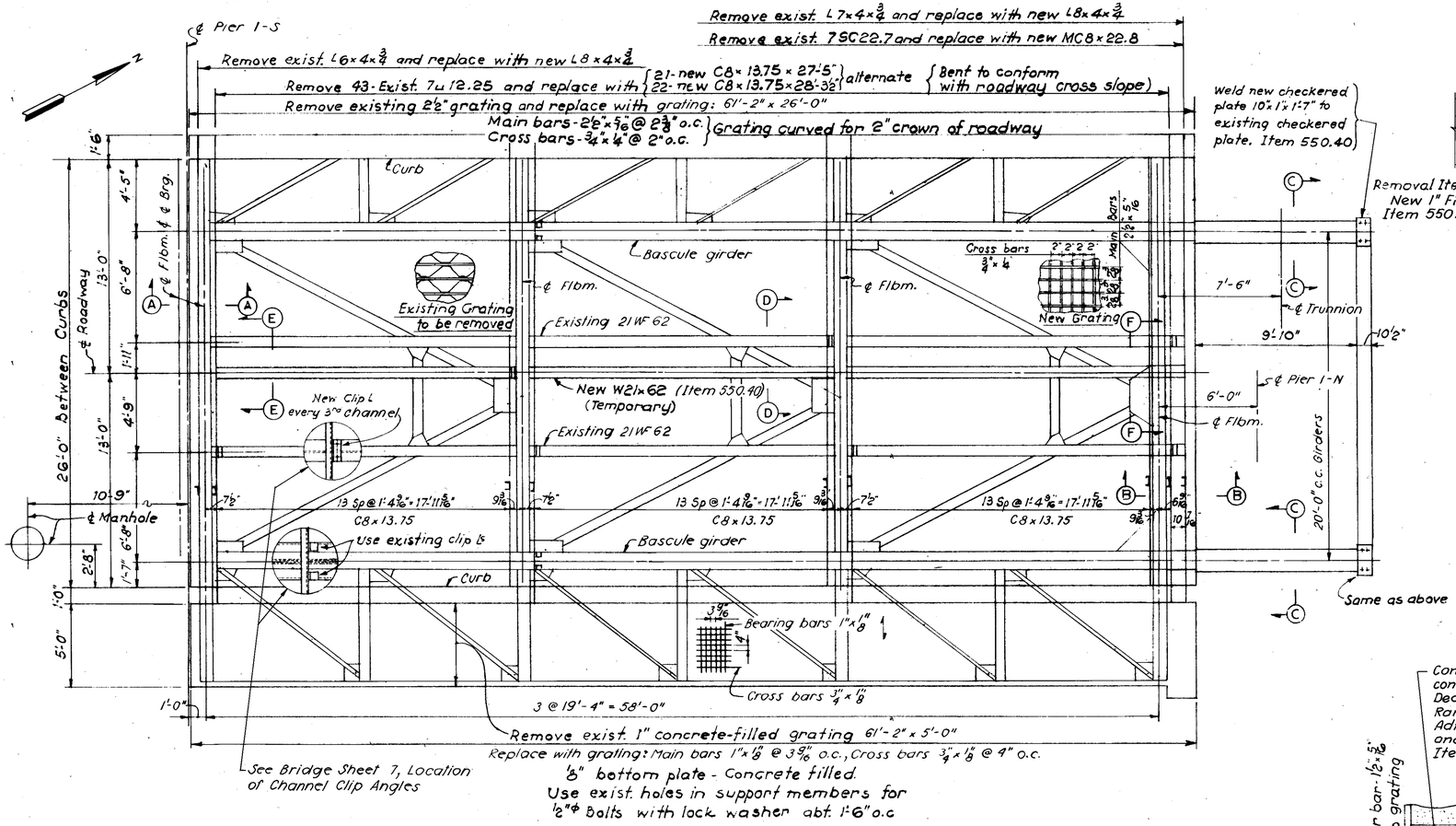
HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

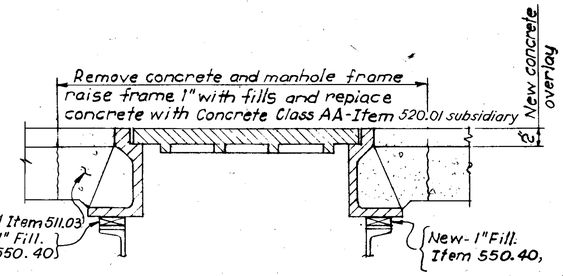
Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



PLAN OF BASCULE SPAN

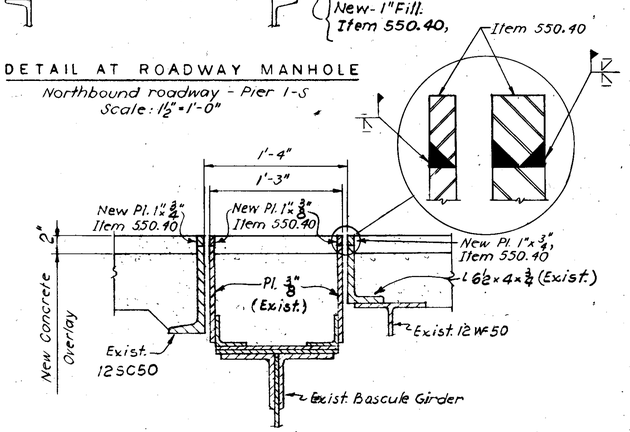
Scale: ¼" = 1'-0"



DETAIL AT ROADWAY MANHOLE

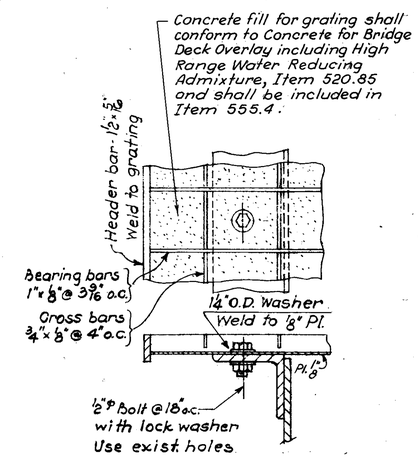
Northbound roadway - Pier 1-S

Scale: 1½" = 1'-0"



SECTION C-C

Scale: 1½" = 1'-0"

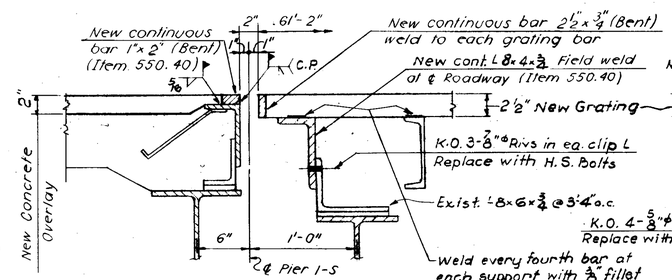


SIDEWALK GRATING SUPPORT

Scale: 3" = 1'-0"

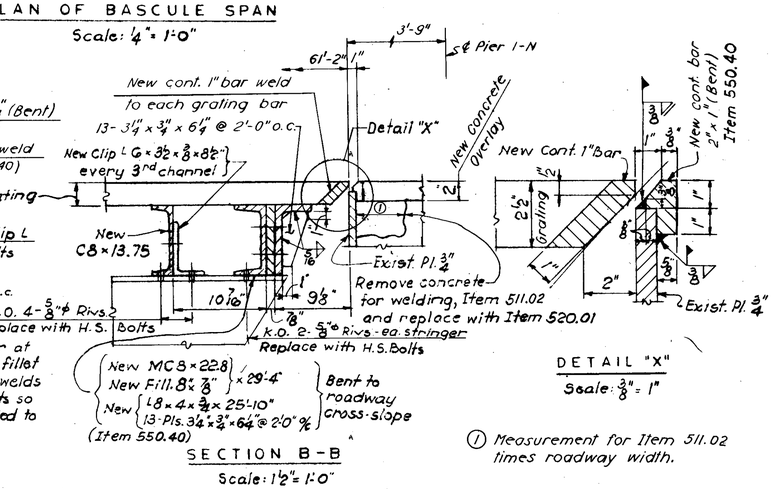
NOTES:

1. Roadway grating to be paid for under Item 555.1, Steel Grid Floor (Open).
2. Sidewalk grating to be paid for under Item 555.4, Steel Grid Sidewalk (Filled). This Item includes removal, disposal and replacement of existing sidewalk. Sidewalk concrete fill shall conform to Item 520.85 and shall be included in Item 555.4.
3. New roadway grating channel supports to be paid for under Item 550.40, Structural Steel (Miscellaneous Steel), including erection and removal of temporary supports. This item shall include the removal and disposal of the existing open roadway grating and its channel supports. After removal of temporary steel supports, the open holes shall be filled with H.S. Bolts. To be paid for as Item 550.44.
4. See Shop Drawing 21, Phoenix Bridge Corp. for roadway channel details. (NHDPW & H).
5. For Sections D-D, E-E and F-F see Bridge Sheet 7.
6. All new steel material, including grating, shall be A.S.T.M. A36 and bolts shall be A.S.T.M. A307.
7. The Contractor shall keep in balance the bascule span at all times during rehabilitation of the bascule deck. Balancing of the bascule span shall be included in Item 692, Mobilization.
8. Item 555.1 Steel Grid Floor (Open) shall be galvanized.
9. For cast iron balance block detail, see Bridge Sheet 16.
10. Salvaged existing roadway grating shall be delivered to the State.



SECTION A-A

Scale: 1½" = 1'-0"



SECTION B-B

Scale: 1½" = 1'-0"

DETAIL "X"

Scale: ⅜" = 1"

① Measurement for Item 511.02 times roadway width.

Sheet Scale: As Noted

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

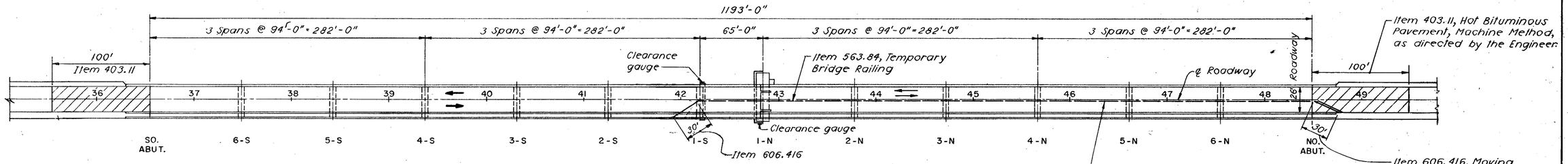
BASCULE SPAN DECK REPAIRS - 1

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED W.W.G.		8/82	CHECKED T.E.S.		8/82	6 OF 43
DRAWN E.R.S.		8/82	CHECKED W.W.G.		8/82	FILE NUMBER
TRACED —			CHECKED —			3-1-2-1
QUANTITIES T.E.S.		9/82	CHECKED W.W.G.		9/82	

REVIEWED BY	PROJ. NO.	SHEET NO.	TOTAL SHEETS
	BHF-039-1(2)		44

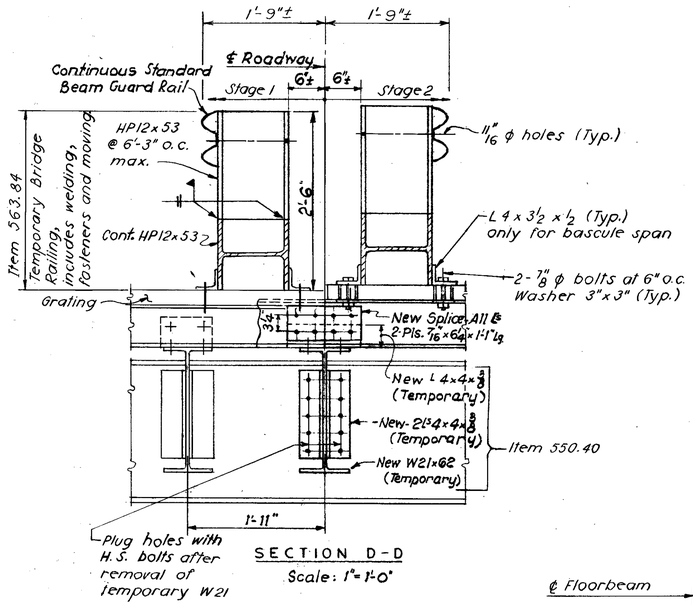
Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

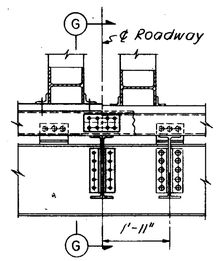


PLAN
Scale: 1" = 50'

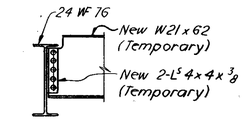
NOTE:
No more than one-half lane shall be closed to vehicular traffic at any one time. See Traffic Control Plan.



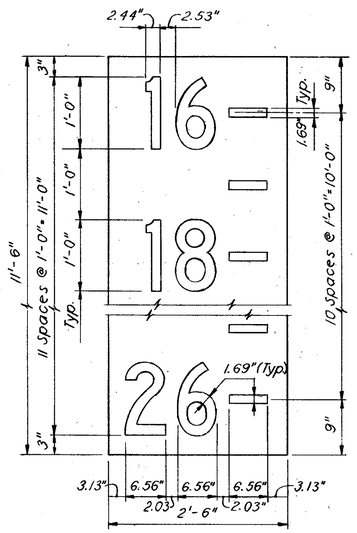
SECTION D-D
Scale: 1" = 1'-0"



SECTION E-E
Scale: ½" = 1'-0"



SECTION G-G
Scale: ½" = 1'-0"

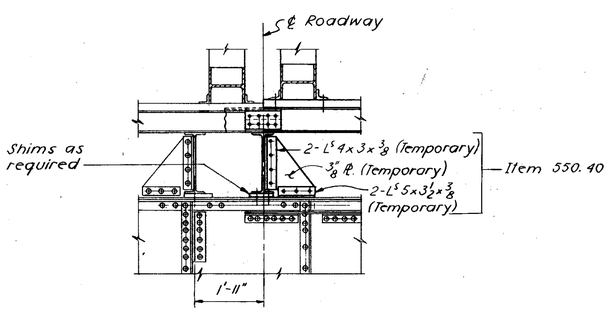


CLEARANCE GAUGE
Scale: 1" = 1'-0"
2-Req'd

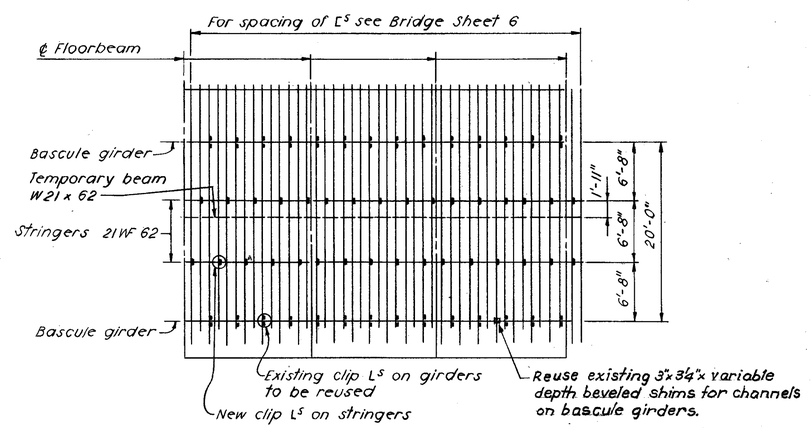
For clearance gauge locations, see Plan above. For clearance gauge materials see Specifications. Furnishing and erecting clearance gauges shall be included in Item 571.01, Pointing Stone Masonry-Pier 1-N, as subsidiary.

NOTES:

1. Deck repairs to be made in two stages beginning with traffic maintained on West Side of Roadway.
2. New channel splice plates to be installed prior to the removal of the temporary stringer.
3. All new steel material shall shall be ASTM A36. Nuts and bolts shall be ASTM A307.
4. For location of Sections D-D, E-E and F-F, see Bridge Sheet 6.



SECTION F-F
Scale: ½" = 1'-0"



LOCATION OF CHANNEL CLIP ANGLES
No Scale

Sheet Scale: As Noted

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

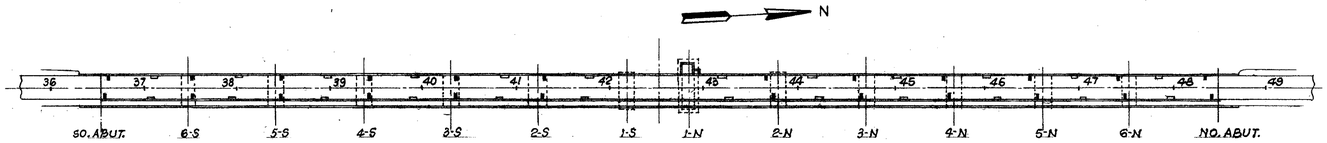
BASCULE SPAN DECK REPAIRS-2

		BY	DATE			BY	DATE	BRIDGE SHEET NO.
DESIGNED	T.E.S.		3-83	CHECKED	W.W.C.		3-83	7 OF 43
DRAWN	V.V.		3-83	CHECKED	T.E.S.		4-83	FILE NUMBER
TRACED	—			CHECKED	—			
QUANTITIES	T.E.S.		3-83	CHECKED	W.W.C.		3-83	3-1-2-1

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

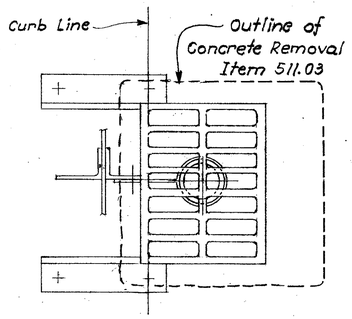
Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

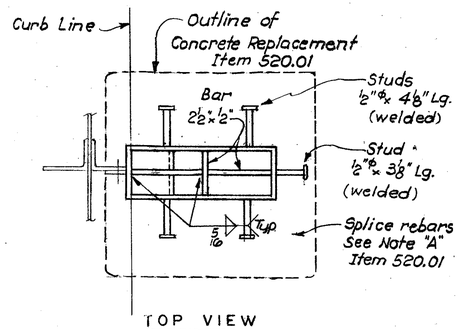


SCUPPER LOCATION PLAN
No Scale

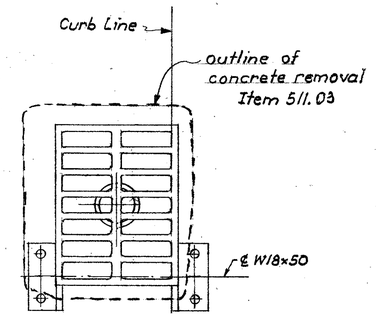
LEGEND
□ - Existing Scupper and Downspout to be removed
▮ - Existing Scupper and Downspout to be removed and replaced with new Scupper.



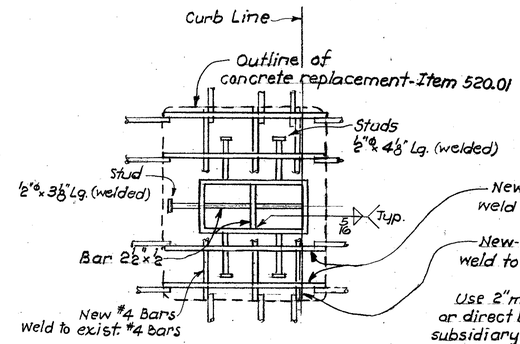
TOP VIEW



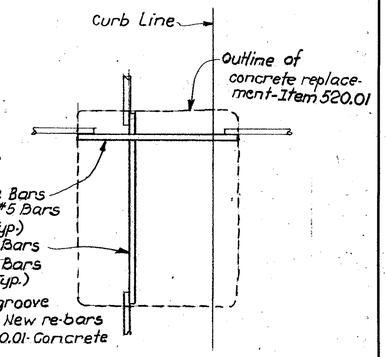
TOP VIEW



TOP VIEW

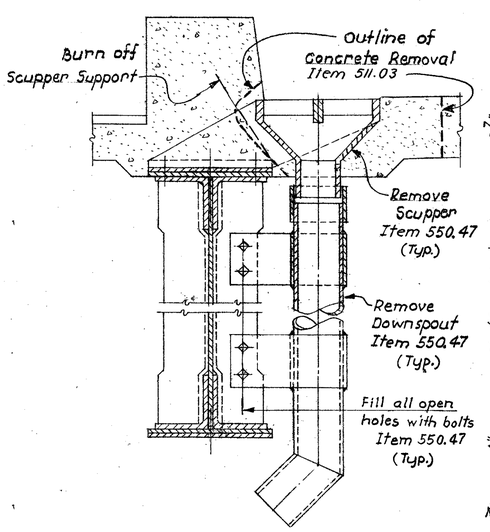


TOP VIEW

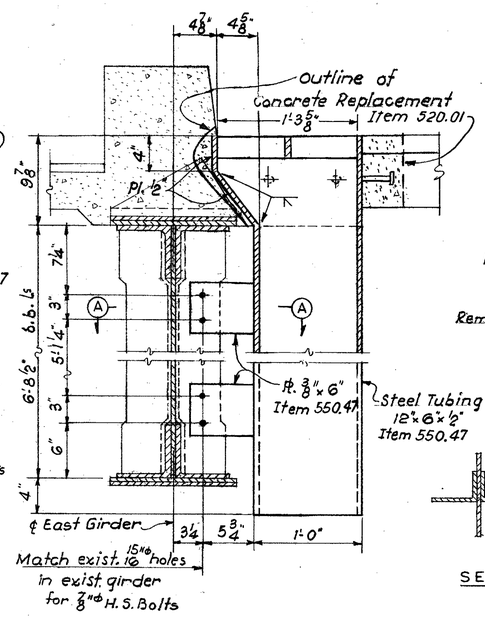


Note "A"
New-#5 Splice Bars weld to exist. #5 Bars T&B-(Typ.)
New-#4 Splice Bars weld to exist. #4 Bars T&B-(Typ.)
Use 2" min. lap V-groove or direct butt weld. New re-bars subsidiary to Item 520.01-Concrete Class AA.

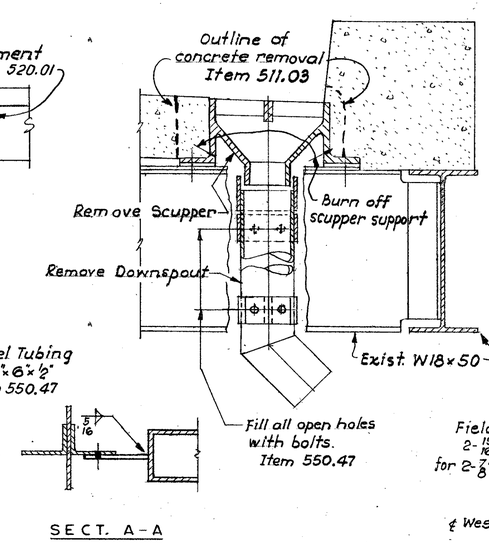
RE-BARS FOR LOCATIONS WHERE SCUPPER IS NOT REPLACED
(At 24 Locations)



AT EAST CURB-(EXISTING)
24-Exist. Scuppers & Downspouts to be removed

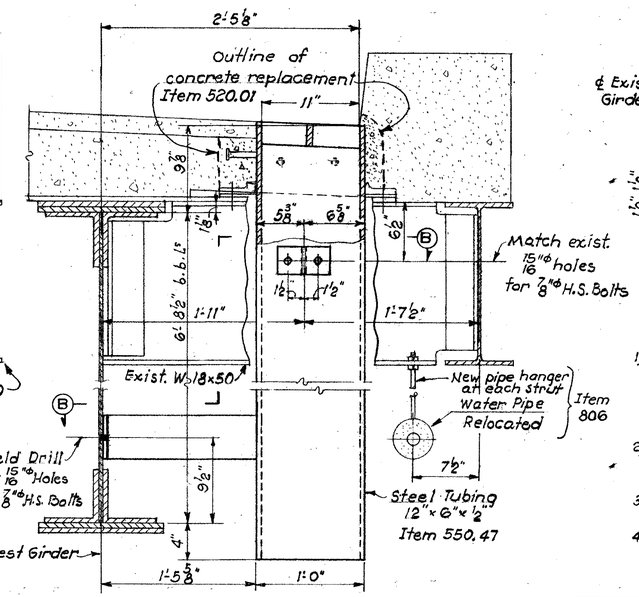


AT EAST CURB-(MODIFIED)
12-New Scuppers Req'd

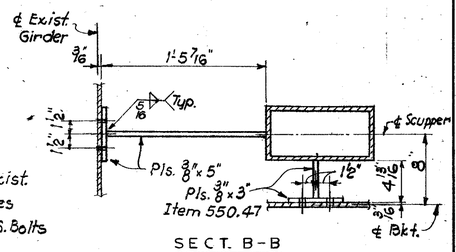


SECT. A-A

AT WEST CURB-(EXISTING)
24-Exist. Scuppers & Downspouts to be removed.



AT WEST CURB-(MODIFIED)
12-New Scuppers Req'd



SECT. B-B

NOTES
1) All structural steel shall be ASTM A36, galvanized and shop painted with a light bronze color galv. vinyl resin, paid for under Item 550.47- Removing and Replacing Scuppers.
2) Concrete removal shall be paid for under Item 511.03-Preparation For Full Depth Concrete Bridge Deck Repairs.
3) New concrete backfill and re-bars shall be paid for under Item 520.01- Concrete Class AA.
4) Fill open holes with bolts, paid for under Item 550.47.

NEW STRUCTURAL STEEL SCUPPERS
Scale: 1½"=1'-0"
(Sections Looking South)

Sheet Scale: As Noted

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

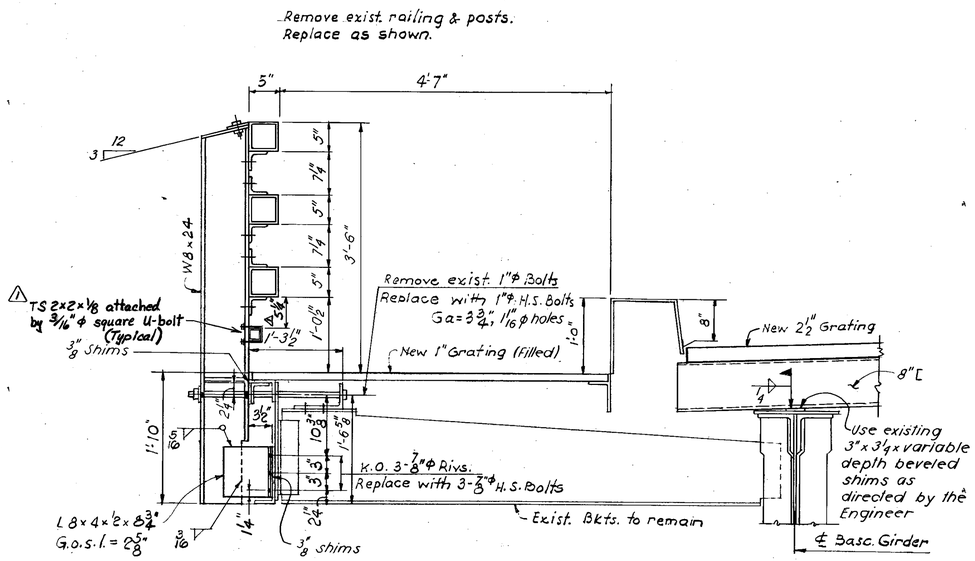
SCUPPERS

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED	T.E.S.	7-82	CHECKED	E.R.S.	7-82	8 OF 43
DRAWN	E.R.S.	8-82	CHECKED	T.E.S.	8-82	FILE NUMBER
TRACED	—		CHECKED	—		
QUANTITIES	T.E.S.	5-83	CHECKED	W.W.C.	5-83	3-1-2-1

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

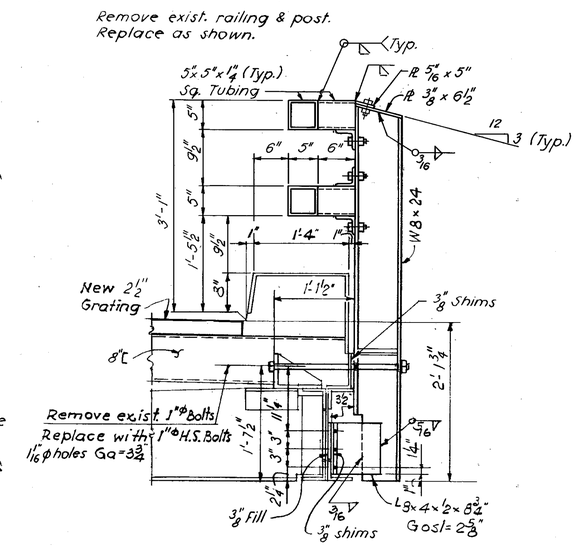
Proj. Engr. E.S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



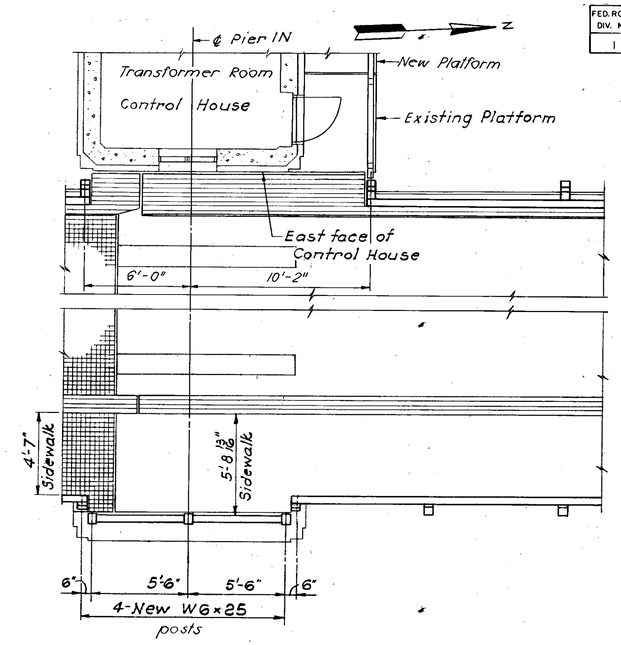
EAST SIDE RAILING-BASCULE SPAN

Scale: 1"=1'-0"



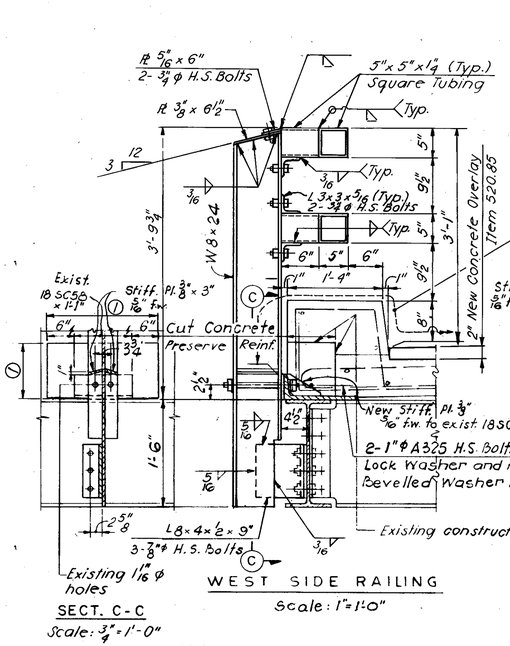
WEST SIDE RAILING-BASCULE SPAN

Scale: 1"=1'-0"



PLAN AT BASCULE PIER

Scale: 1/4"=1'-0"

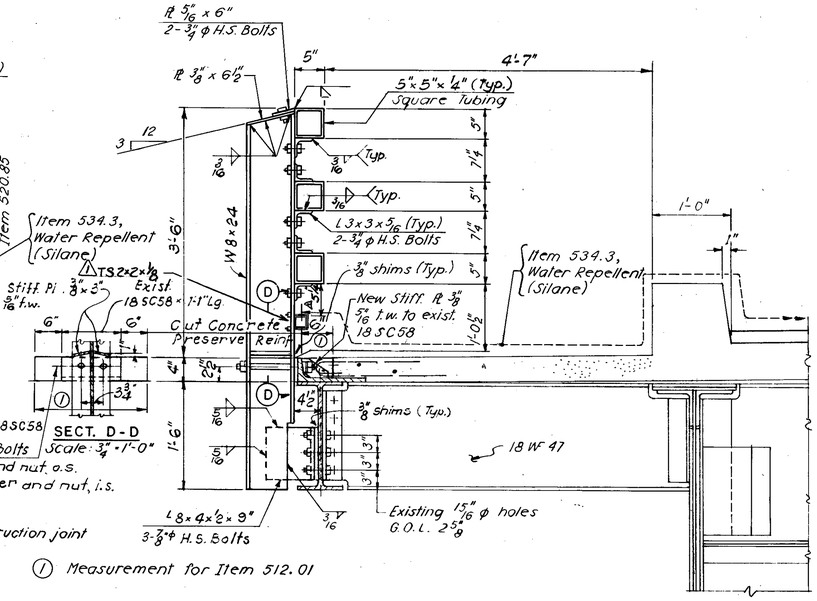


SECT. C-C

Scale: 3/4"=1'-0"

WEST SIDE RAILING

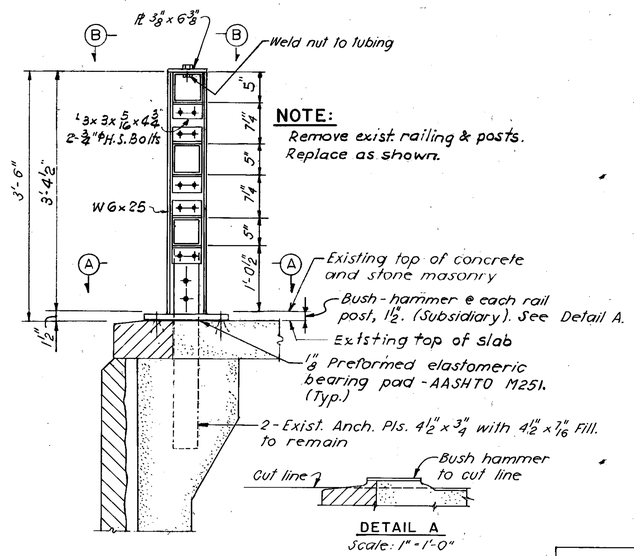
Scale: 1"=1'-0"



EAST SIDE RAILING

Scale: 1"=1'-0"

Ⓘ Measurement for Item 512.01



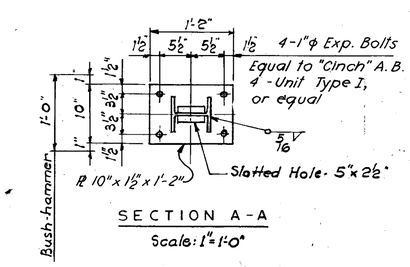
NOTE:
Remove exist. railing & posts.
Replace as shown.

DETAIL A

Scale: 1"=1'-0"

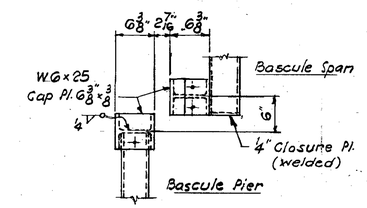
EAST SIDE RAILING-BASCULE PIER

Scale: 1"=1'-0"



SECTION A-A

Scale: 1"=1'-0"



SECTION B-B

Scale: 1"=1'-0"

NOTES:

1. The new railing shall be paid for under Item 563.65, Bridge Railing E, Galvanized - Colorgalv, (light bronze), complete in place, including removal and disposal of the existing railing. All new railing material to be A36 steel, galvanized-painted.
2. The location of all existing holes to be used for the new railing shall be verified in the field by the Contractor.
3. The cut concrete slot at each post shall be paid for under Item 512.01, Preparation for Concrete Repairs and filled with Item 520.02, Concrete Class P for Patching.
4. △ The TS2×2 rail shall be continuous thru a minimum of 3 rail panels and shall only be spliced at a ℄ of post.
5. △ The splice for the TS2×2 rail shall consist of end capping each tube and providing a 1/4" gap between end caps. End caps shall be drive fitted after galvanizing all rail members.

Sheet Scale: As Noted

△	ADD LOWER PEDESTRIAN RAIL	JFM	9/84
△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

STEEL BRIDGE RAILING-1

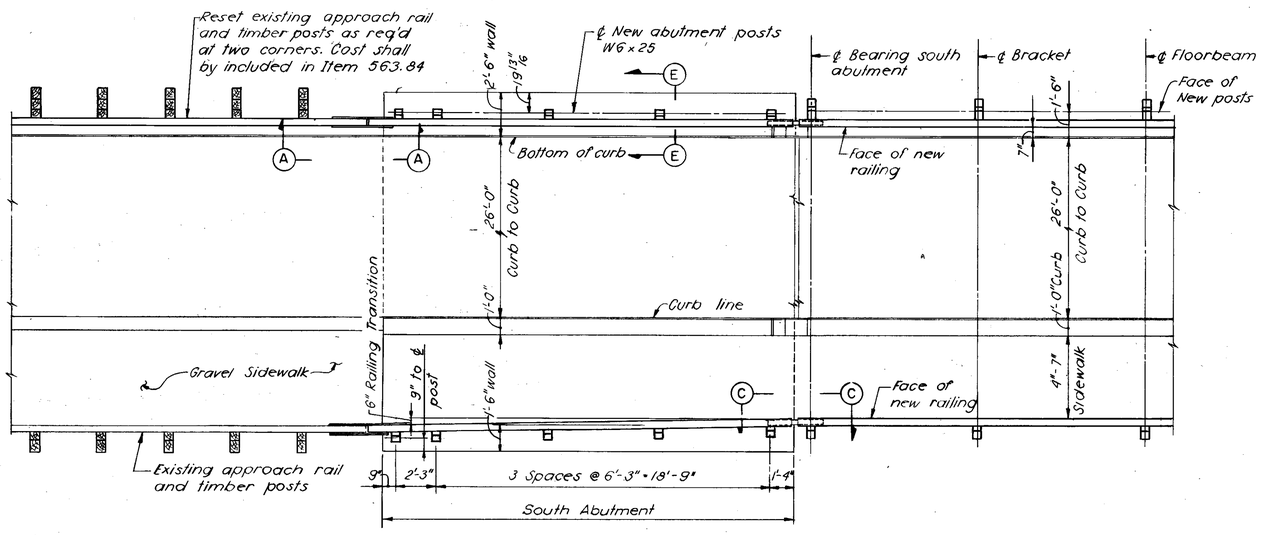
	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED T.E.S		1/83	CHECKED W.W.C.		2/83	11 OF 43
DRAWN E.R.S		1/83	CHECKED W.W.C.		2/83	FILE NUMBER
TRACED —			CHECKED —			3-1-2-1
QUANTITIES T.E.S		4/83	CHECKED W.W.C.		4/83	

REVIEWED BY

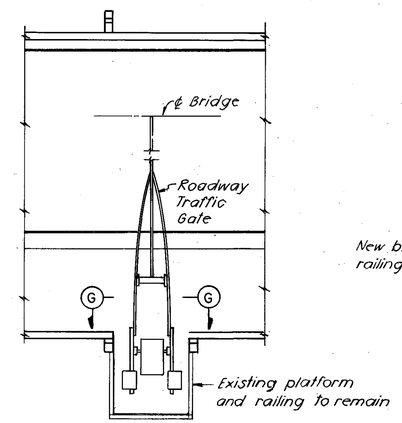
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

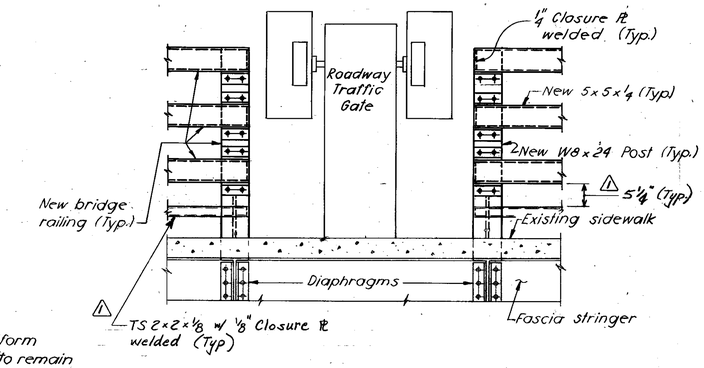
Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

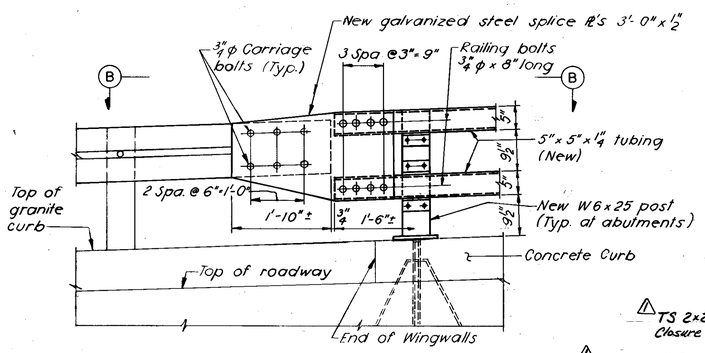


PLAN
Scale: 1/4" = 1'-0"

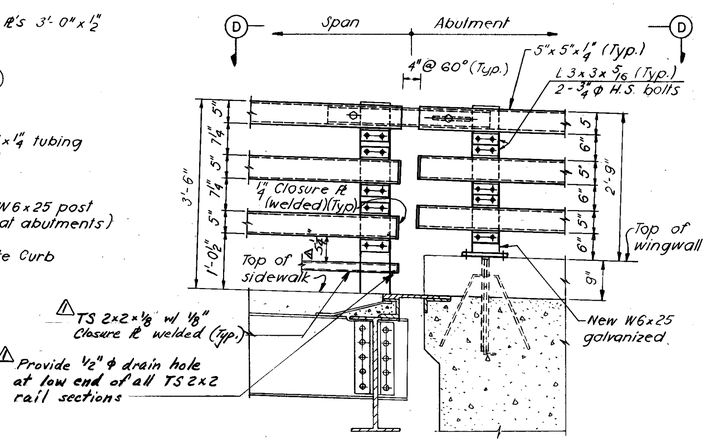




SECTION G - G
Scale: 3/4" = 1'-0"



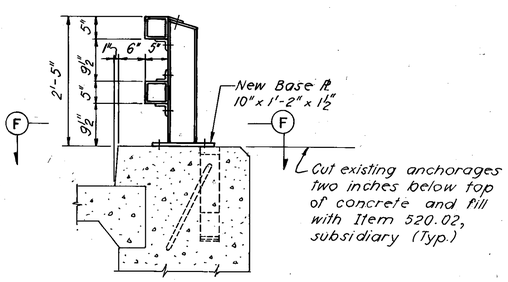
SECTION A - A
Scale: 3/4" = 1'-0"



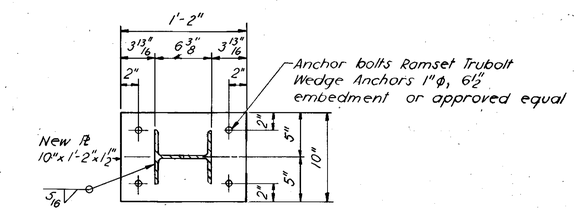
SECTION C - C
Scale: 3/4" = 1'-0"

NOTE:

For railing details see Bridge Sheet 11.

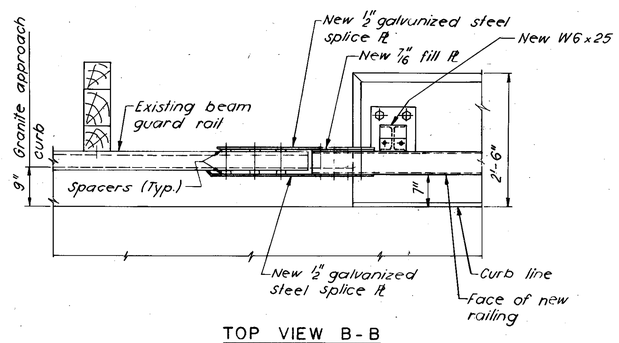


SECTION E - E
Scale: 3/4" = 1'-0"

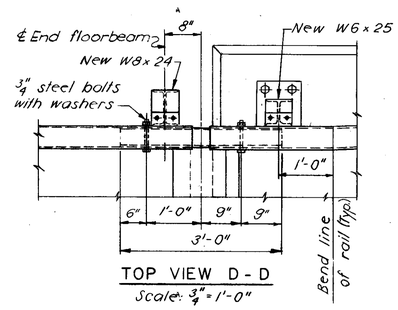


SECTION F - F
Scale: 1 1/2" = 1'-0"

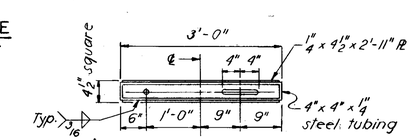
NOTE:
1. Railing details at north abutment and north traffic gate are similar to south abutment and south traffic gate.
2. For general railing notes see Bridge Sheet No. 11



TOP VIEW B - B
Scale: 3/4" = 1'-0"



TOP VIEW D - D
Scale: 3/4" = 1'-0"



TUBING SPLICE DETAIL
Scale: 3/4" = 1'-0"

Sheet Scale: As Noted

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF - 039 - 1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

	DESCRIPTION	BY	DATE
△	ADD LOWER PEDESTRIAN RAIL	JFM	9/84

REVISIONS

	BY	DATE		BY	DATE
DESIGNED R.E.T.		1/83	CHECKED W.W.C.		2/83
DRAWN V.V.		1/83	CHECKED R.E.T.		2/83
TRACED —			CHECKED		
QUANTITIES T.E.S.		4/83	CHECKED W.W.C.		4/83

STEEL BRIDGE RAILING-2

BRIDGE SHEET NO. 12 OF 43
FILE NUMBER 3-1-2-1

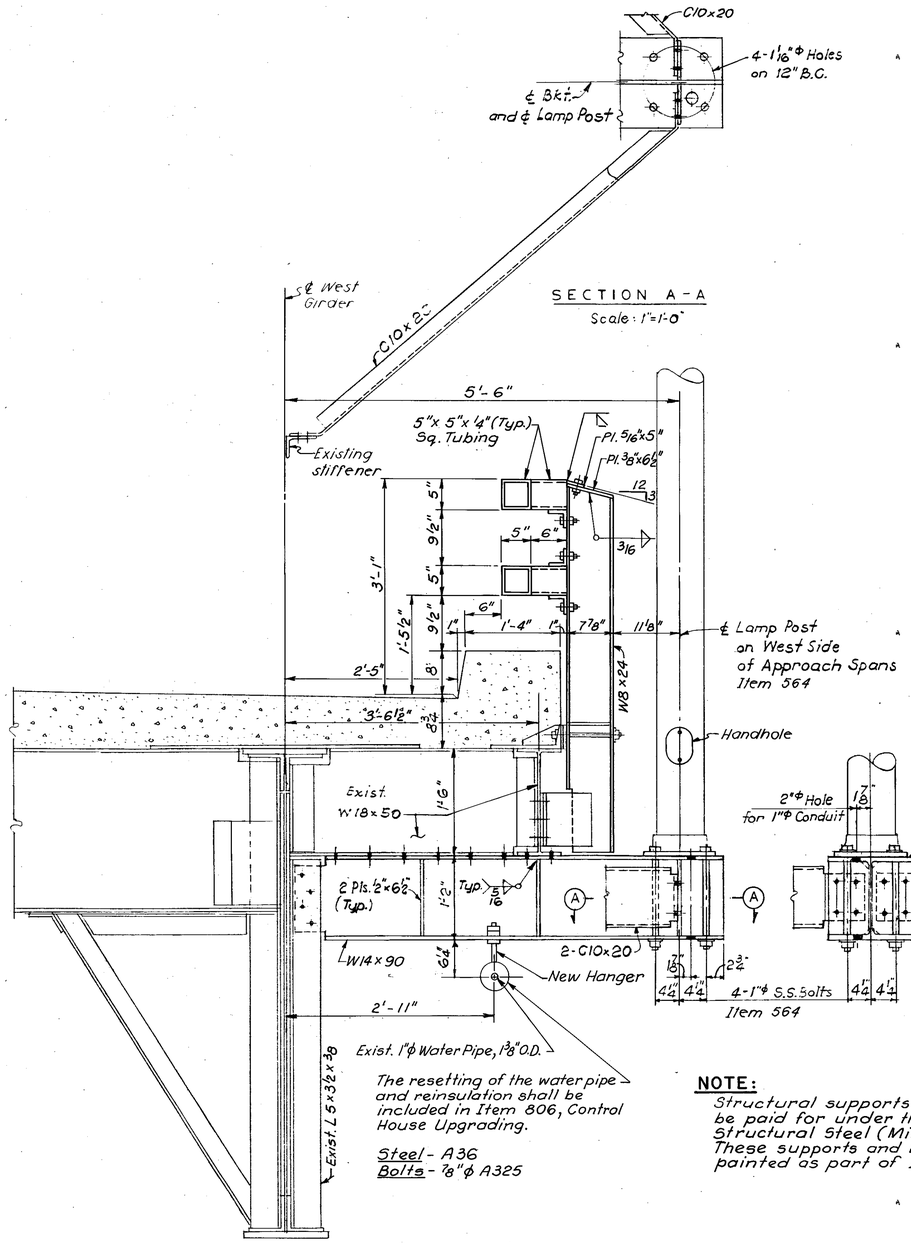
HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF - 039 - 1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



SECTION A-A

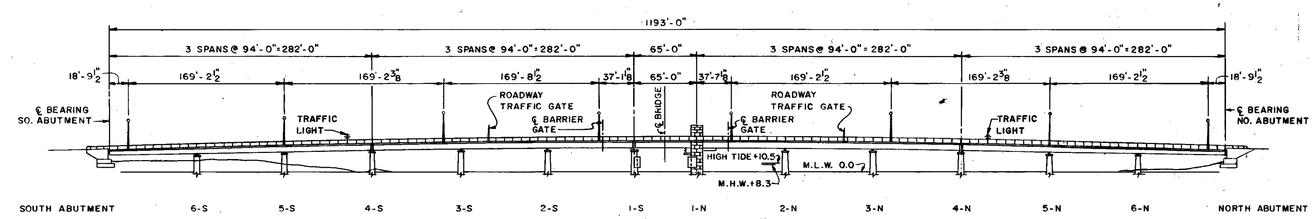
Scale: 1"=1'-0"

The resetting of the water pipe and reinsulation shall be included in Item 806, Control House Upgrading.

Steel - A36
Bolts - 7/8"Φ A325

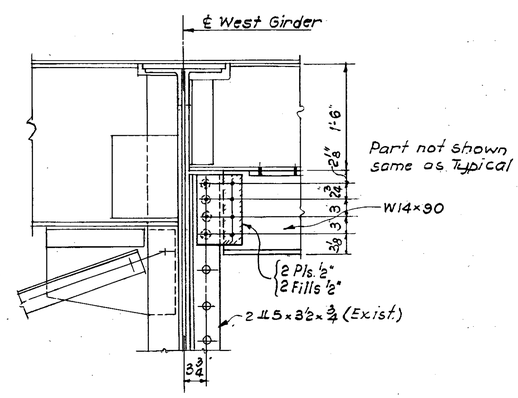
TYPICAL LAMP POST SUPPORT
EXCEPT AT PIERS 5N & 5S

Scale: 1"=1'-0"



ELEVATION - LOCATION OF LIGHT POLES

NO SCALE



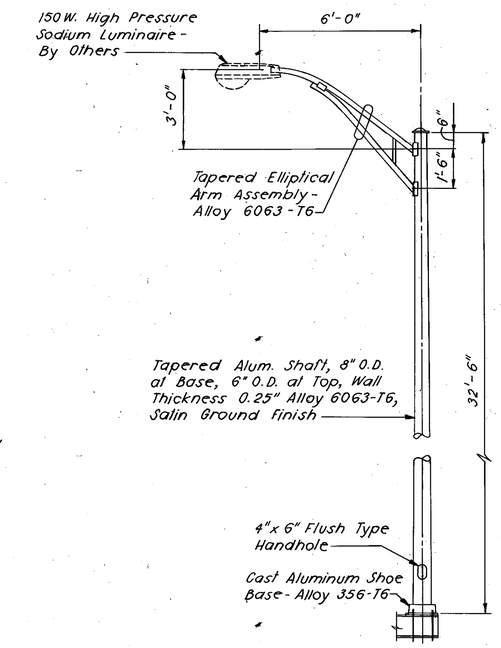
Part not shown same as Typical

LAMP POST SUPPORT
AT PIER 5N & 5S

Scale: 1"=1'-0"

⊕ = Remove 7/8"Φ Rivet & replace with 7/8"Φ H.S. Bolt.

NOTE:
Structural supports and brackets shall be paid for under the Item 550.40, Structural Steel (Miscellaneous Steel). These supports and brackets shall be painted as part of Item 550.40.



DETAIL OF BRIDGE LIGHTING POLE

Scale: 3/8" = 1'-0"

Proj. Engr. E. S. Tulich

Sheet Scale: As Noted

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

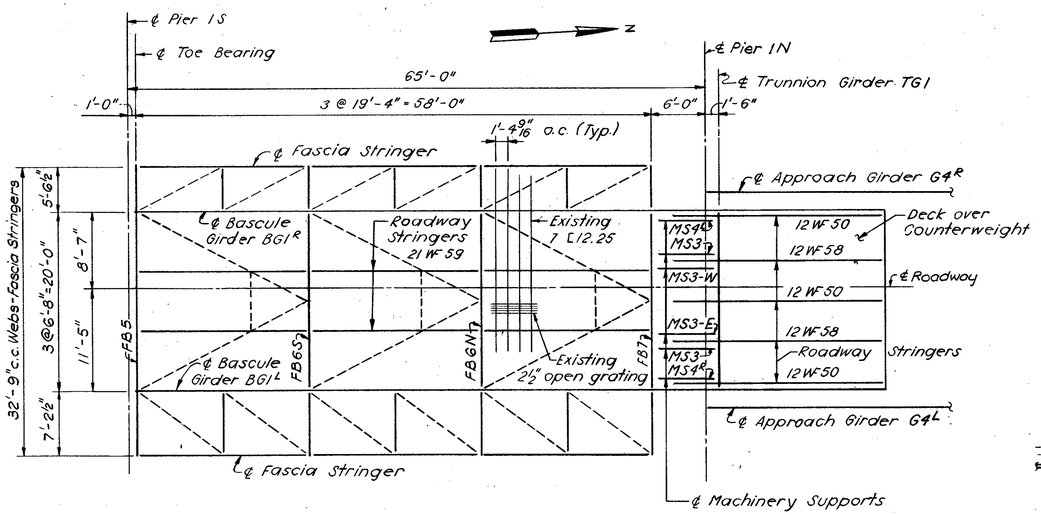
BRIDGE LIGHTING POLE SUPPORT

	BY	DATE		BY	DATE
DESIGNED	W.W.C.	2/83	CHECKED	E.S.T.	3/83
DRAWN	E.R.S.	2/83	CHECKED	E.S.T.	3/83
TRACED	—		CHECKED	—	
QUANTITIES	T.E.S.	4/83	CHECKED	W.W.C.	4/83

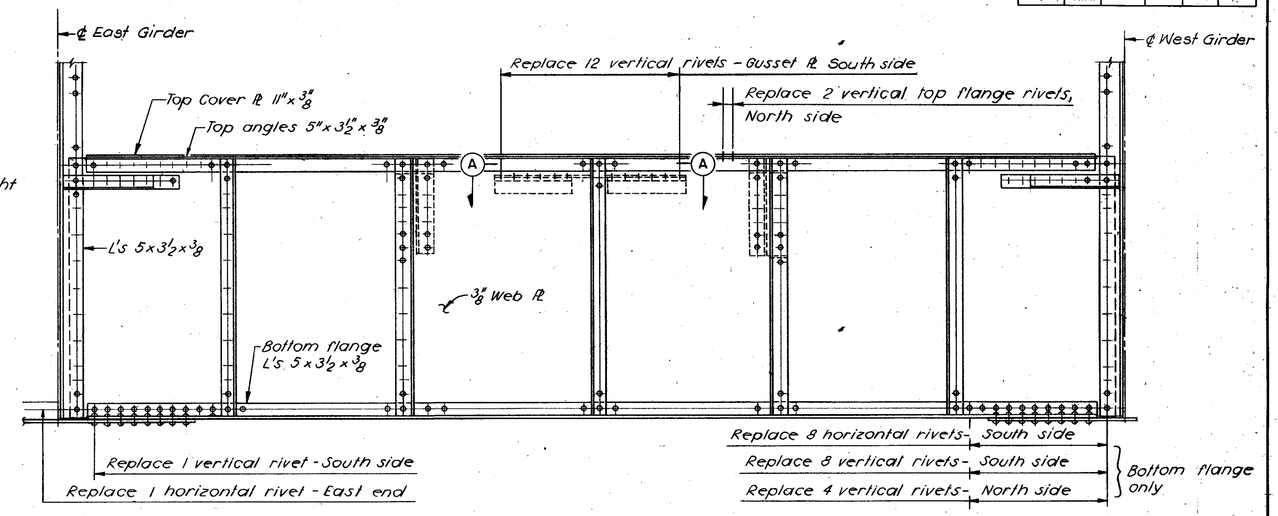
BRIDGE SHEET NO.	FILE NUMBER
13 OF 43	3-1-2-1

REVIEWED BY	PROJ. NO.	SHEET NO.	TOTAL SHEETS
	BHF-039-1(2)		44

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



LOCATION PLAN
BASCULE SPAN
Scale: 1/8" = 1'-0"

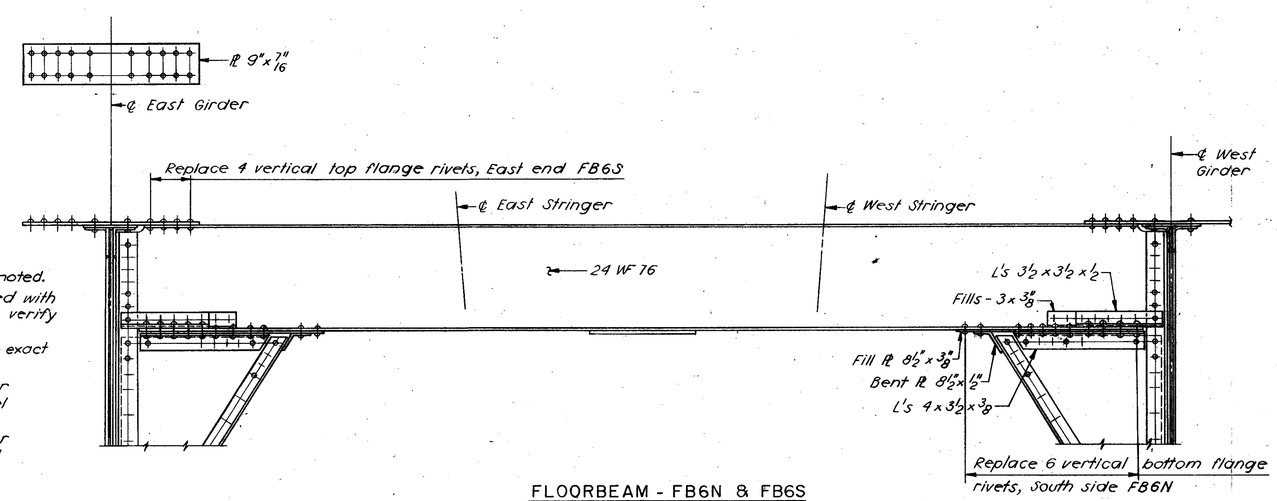


FLOORBEAM - FB7
NORTH ELEVATION
Scale: 3/4" = 1'-0"

REPLACEMENT TABLE - RIVETS		
MEMBER	LOCATION	QUANTITY
FLOORBEAM FB7	CENTER-TOP FLANGE	2
	CENTER-TOP GUSSET	12
	WEST-BOTTOM FLANGE	20
	EAST-BOTTOM FLANGE	2
FLOORBEAM FB6N	WEST-BOTTOM FLANGE	6
FLOORBEAM FB6S	EAST-TOP FLANGE	4
BASCULE GIRDER BG1R	SOUTH END TOP FLANGE	20
	BOTTOM FLANGE AT TRUNNION	12
BASCULE GIRDER BG1L	SOUTH END TOP FLANGE	7
	BOTTOM FLANGE AT TRUNNION	8
APPROACH GIRDER G4R	SOUTH END BOTTOM FLANGE	12
APPROACH GIRDER G4L	SOUTH END BOTTOM FLANGE	16
TRUNNION GIRDER TG1	WEST TOP FLANGE	9
	BOTTOM FLANGE	62
BOTTOM LATERALS		8
	TOTAL	200

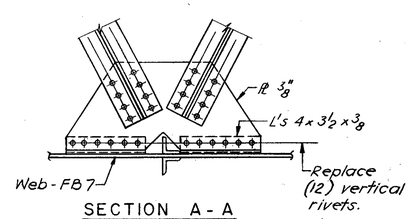
NOTES:

1. Rivets shall be replaced with 7/8"φ A325 High Strength Bolts unless otherwise noted.
2. All 1 1/16" φ turned bolts shall be replaced with 1 1/16"φ A325 H.S. Bolts. Contractor shall verify length in the field.
3. The field Engineer shall determine the exact rivets and bolts to be replaced.
4. All rivet replacements shall be paid for under Item No. 550.43, Structural Steel (Replace Rivets).
5. All bolt replacements shall be paid for under Item No. 550.44, Structural Steel (Replace Bolts).



FLOORBEAM - FB6N & FB6S
NORTH ELEVATION
Scale: 3/4" = 1'-0"

REPLACEMENT TABLE - TURNED BOLTS		
MEMBER	LOCATION	QUANTITY
BASCULE GIRDER BG1R	BASCULE RACK	28
BASCULE GIRDER BG1L	BASCULE RACK	17
MACHINERY SUPPORT MS3-W	TOP FLANGE - BEARING BLOCK	
	CASTING	8
MACHINERY SUPPORT MS3-E	TOP FLANGE - BEARING BLOCK	
	CASTING	12
	TOTAL	65



SECTION A - A
Scale: 3/4" = 1'-0"

Sheet Scale: As Noted

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF - 039 - 1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

REPLACEMENT OF RIVETS AND BOLTS - I

	BY	DATE		BY	DATE
DESIGNED	—		CHECKED	—	
DRAWN	V.V., J.K.	7-82	CHECKED	R.E.T.	7-82
TRACED	—		CHECKED	—	
QUANTITIES	R.E.T.	4-83	CHECKED	T.E.S.	4-83

BRIDGE SHEET NO. 14 OF 43
FILE NUMBER 3-1-2-1

△	DESCRIPTION	BY	DATE
	REVISIONS		

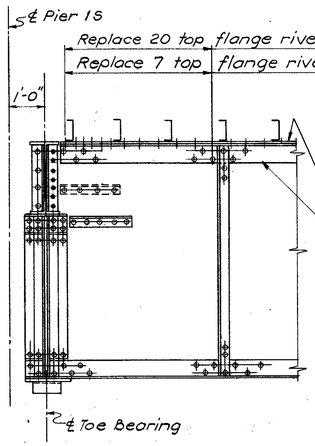
HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

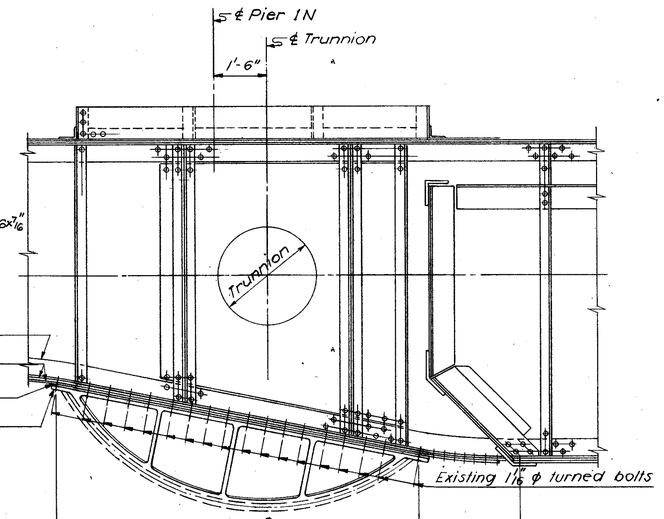
REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF - 039 - 1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

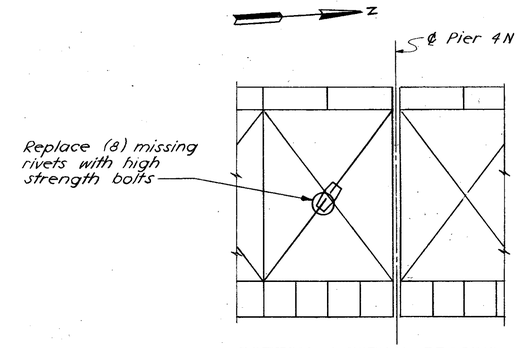




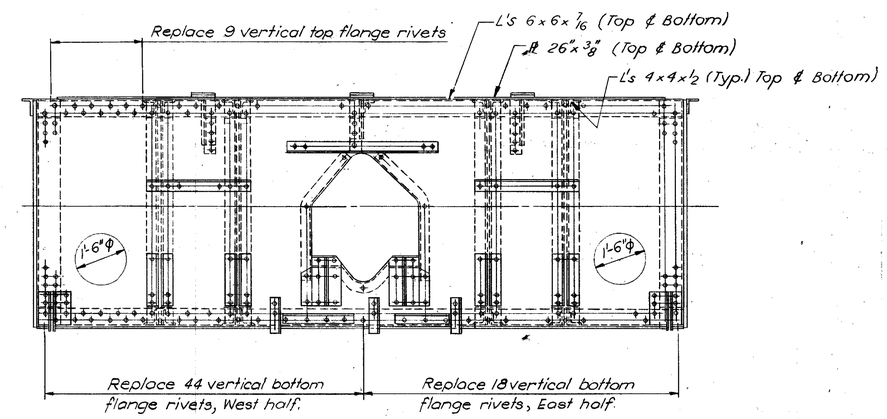
West bottom flange, BG1R-Replace 10 bolts	Replace 8	rivets
East bottom flange, BG1R-Replace 18 bolts	Replace 4	rivets
West bottom flange, BG1L-Replace 8 bolts	Replace 4	rivets
East bottom flange, BG1L-Replace 9 bolts	Replace 4	rivets

} Bottom flange only

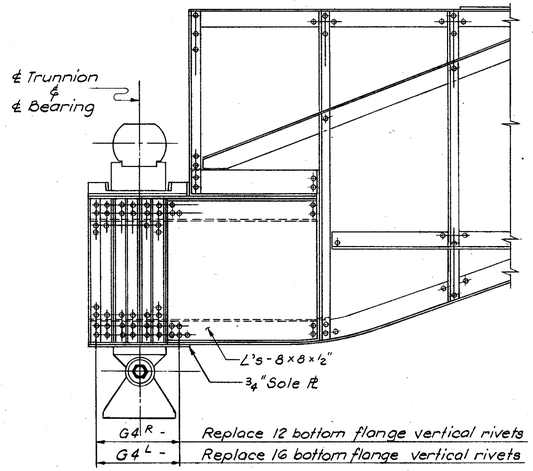
BASCULE GIRDERS BG1RL
Scale: 1/2" = 1'-0"



BOTTOM LATERAL BRACING
Scale: 1" = 10'

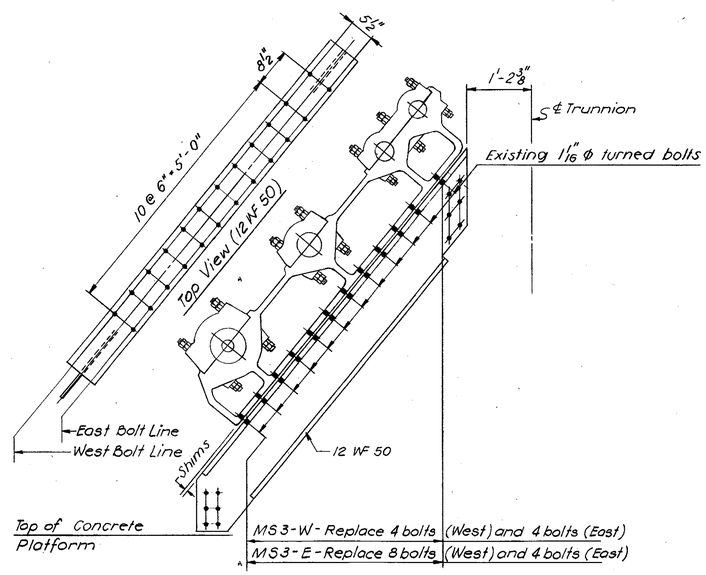


SOUTH ELEVATION
TRUNNION GIRDER TG1
Scale: 1/2" = 1'-0"



G4R -	Replace 12 bottom flange vertical rivets
G4L -	Replace 16 bottom flange vertical rivets

SOUTH END OF GIRDERS G4RL
Scale: 1/2" = 1'-0"



MS3-W-Replace 4 bolts	(West) and 4 bolts (East)
MS3-E-Replace 8 bolts	(West) and 4 bolts (East)

MACHINERY SUPPORTS
Scale: 3/4" = 1'-0"

NOTES:

1. Refer to Location Plan, Bridge Sheet No. 14.
2. See Bridge Sheet No. 2 for typical notes.

Sheet Scale: As Noted

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

REPLACEMENT OF RIVETS AND BOLTS-2

	BY	DATE		BY	DATE
DESIGNED	—		CHECKED		
DRAWN	J.K.	7-82	CHECKED	R.E.T.	7-82
TRACED	—		CHECKED		
QUANTITIES	R.E.T.	4-83	CHECKED	T.E.S.	4-83

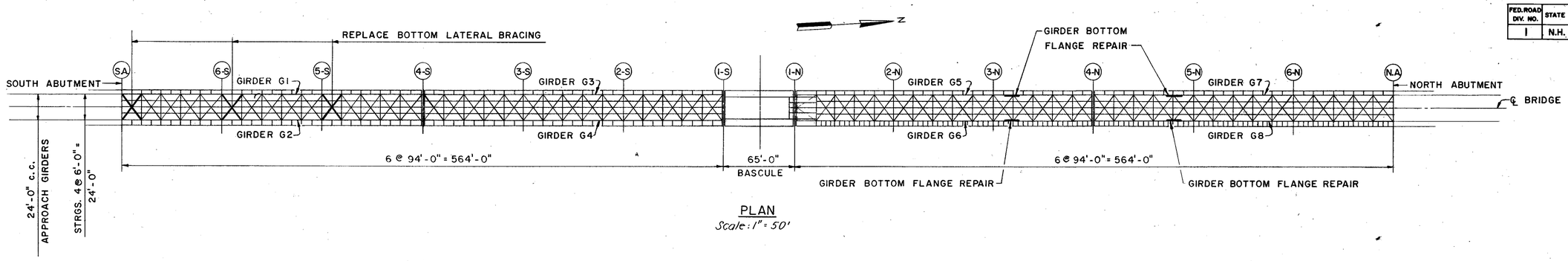
REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

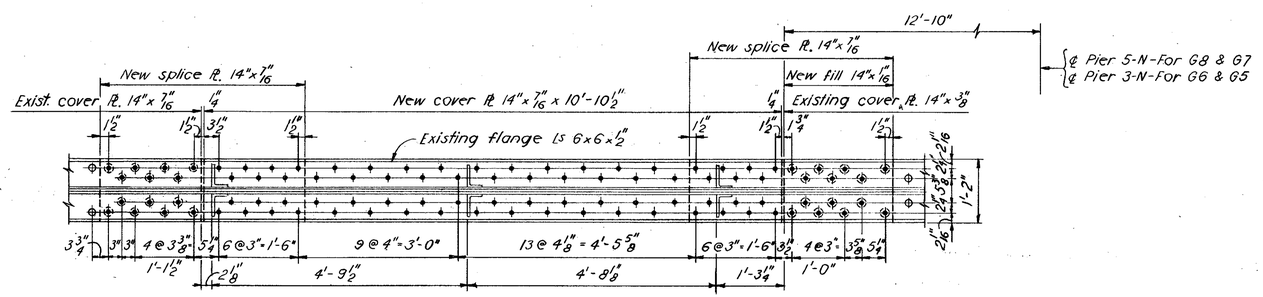
BRIDGE SHEET NO. 15 OF 43
FILE NUMBER 3-1-2-1

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



PLAN
Scale: 1" = 50'



BOTTOM FLANGE-GIRDERS G8 & G7 - AS SHOWN

BOTTOM FLANGE-GIRDERS G6 & G5 - OPP. HAND

Scale: 3/4" = 1'-0"

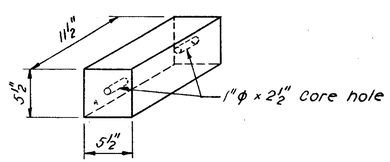
⊕ = Remove 7/8" φ rivet & replace with 7/8" φ A325 H.S. bolt

✦ = Drill 15/16" φ hole for 7/8" A325 H.S. bolt

All new material A36 steel

NOTE:

1. Where existing bottom flange angles are kinked and/or bent, damaged areas shall be heat straightened and repaired, prior to installation of new cover plates and splices. All dimensions shown on existing members to be verified in the field.
2. Girder bottom flange repairs shall be paid for under Item 550.41, Structural Steel (Rehabilitation of Girder Flanges), including removal and replacement of rivets with high strength bolts.

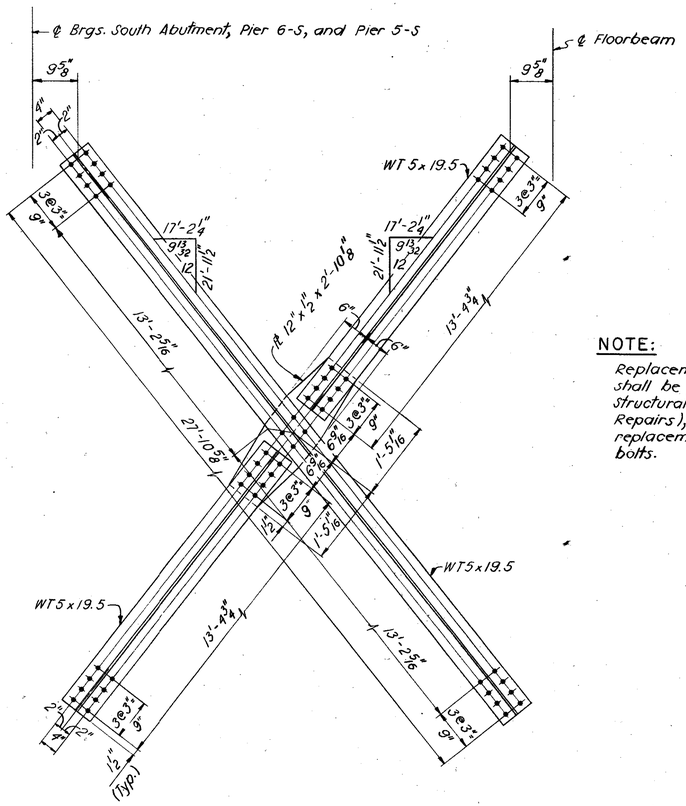


CAST IRON BALANCE BLOCK

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

NOTES:

1. Furnish 100 blocks. Approximate weight = 90 lbs. per block.
2. Balance blocks to be paid for under Item 692, Mobilization and to remain the property of the Department.



LATERAL BRACING

Scale: 3/4" = 1'-0"

Dimension to be verified in field by the Contractor.

NOTE:

Replacement of bottom lateral bracing shall be paid for under Item 550.42, Structural Steel (Miscellaneous Steel Repairs), including removal and replacement of rivets with high strength bolts.

Sheet Scale: As Noted

Δ	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

MISCELLANEOUS STEEL REPAIRS

	BY	DATE		BY	DATE
DESIGNED	W.W.C	8-82	CHECKED	E.S.T.	8-82
DRAWN	V.V.	9-82	CHECKED	W.W.C.	9-82
TRACED	—		CHECKED	—	
QUANTITIES	T.E.S.	5-83	CHECKED	W.W.C.	5-83

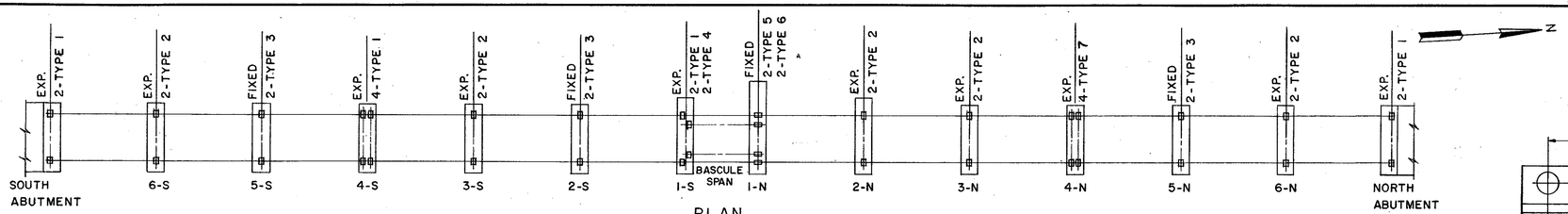
REVIEWED BY

BRIDGE	SHEET NO.	OF	43
FILE NUMBER	3-1-2-1		

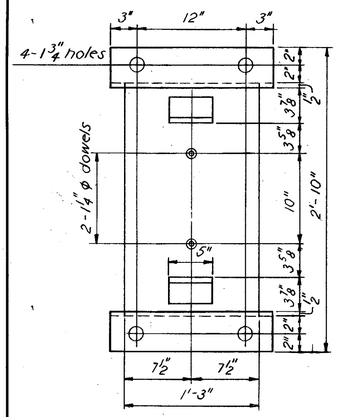
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

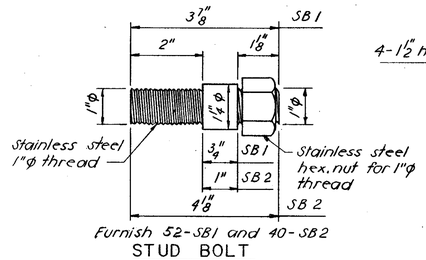
Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

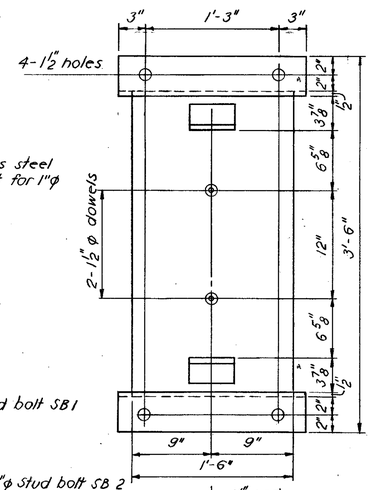


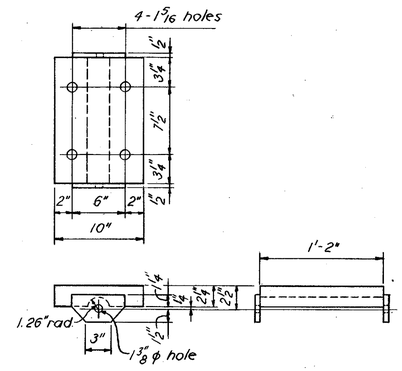
PLAN
No Scale



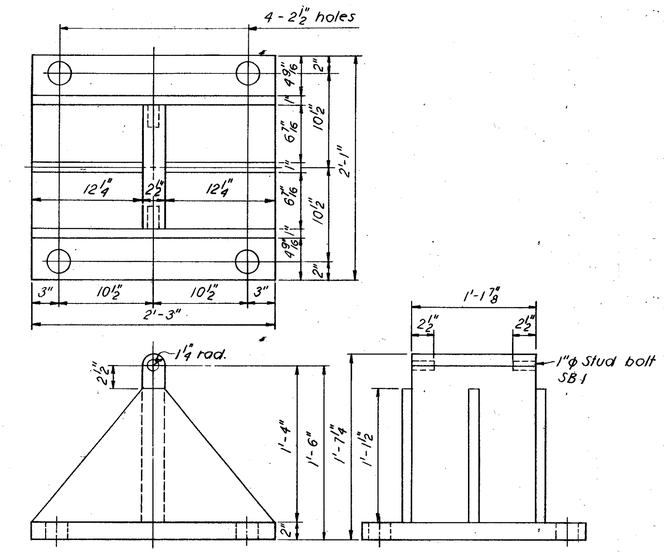


STUD BOLT
Scale: 6" = 1'-0"

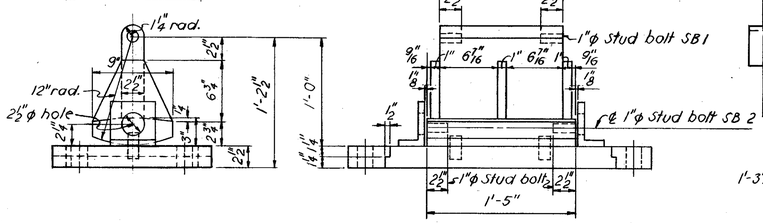




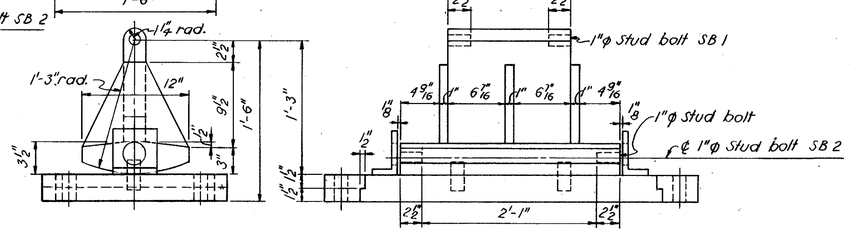
TOP BEARING FOR TYPE 1, 2 AND 3
Scale: 1 1/2" = 1'-0"



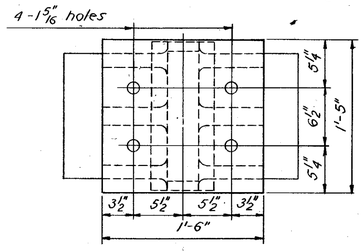
TYPE 3 BEARING AT PIERS 5-S, 2-S, AND 5-N
Scale: 1 1/2" = 1'-0"



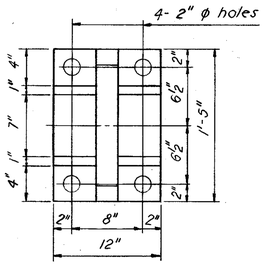
TYPE 1 BEARING AT SO. & NO. ABUTMENTS, PIERS 4-S AND 1-S
Scale: 1 1/2" = 1'-0"



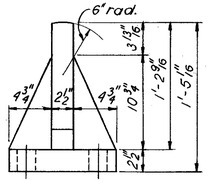
TYPE 2 BEARING AT PIERS 6-S, 3-S, 2-N, 3-N AND 6-N
Scale: 1 1/2" = 1'-0"



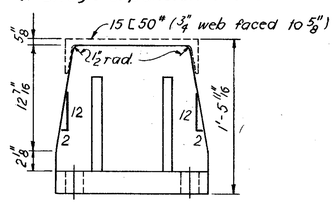
NOTE:
Shoe details are shown for information only.

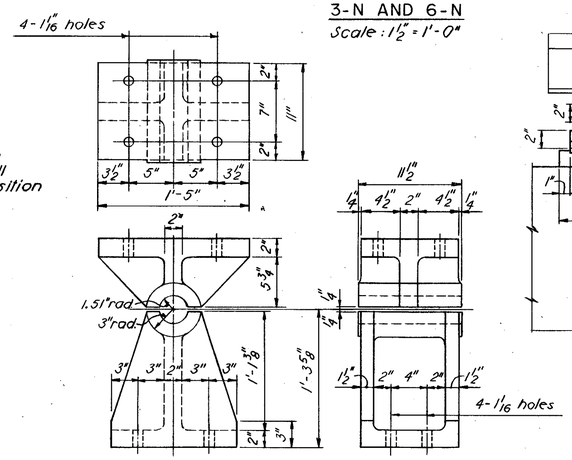


NOTE:
Rehabilitation of shoes, including replacement of stud bolts, shall be paid for under Item 552.11, Rehabilitation of Fixed Bridge Shoes and Item 552.21, Rehabilitation of Expansion Bridge Shoes.
Resetting of bridge expansion shoes to a reasonable conformance of the original design or as directed by the Engineer, shall be paid for under Item 552.31, Reposition of Bridge Expansion Shoes.

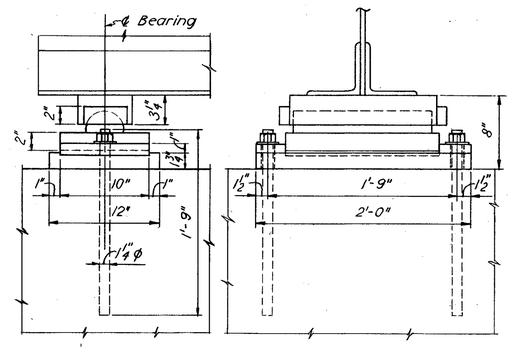


TYPE 4 BEARING AT PIER 1-S
Scale: 1 1/2" = 1'-0"

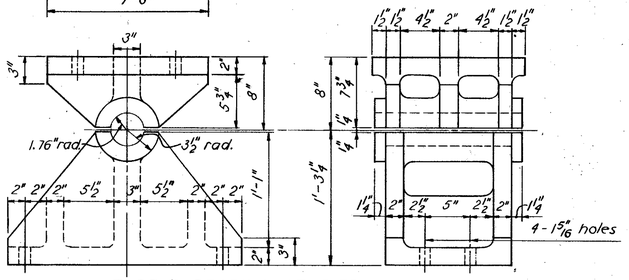




TYPE 5 BEARING AT PIER 1-N
Scale: 1 1/2" = 1'-0"



TYPE 7 SHOES AT PIER 4-N
Scale: 1 1/2" = 1'-0"



TYPE 6 BEARING AT PIER 1-N
Scale: 1 1/2" = 1'-0"

Sheet Scale: As Noted

Δ	DESCRIPTION	BY	DATE

REVISIONS

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

SHOE REHABILITATION

	BY	DATE		BY	DATE
DESIGNED	T.E.S.	1-83	CHECKED	W.W.C.	2-83
DRAWN	V.V.	2-83	CHECKED	T.E.S.	2-83
TRACED			CHECKED		
QUANTITIES	T.E.S.	5-83	CHECKED	W.W.C.	5-83

BRIDGE SHEET NO. 17 OF 43
FILE NUMBER 3-1-2-1

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

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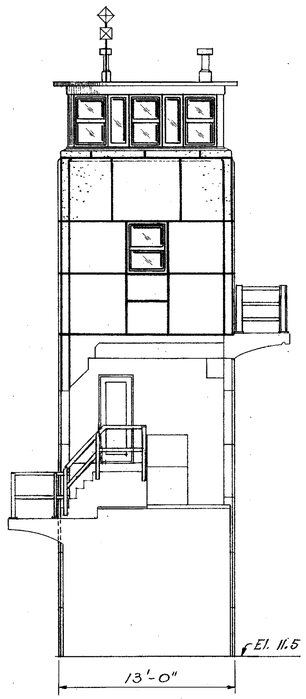
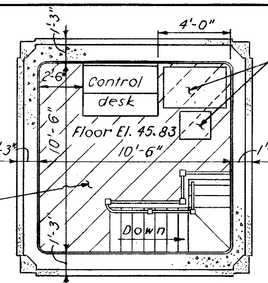
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



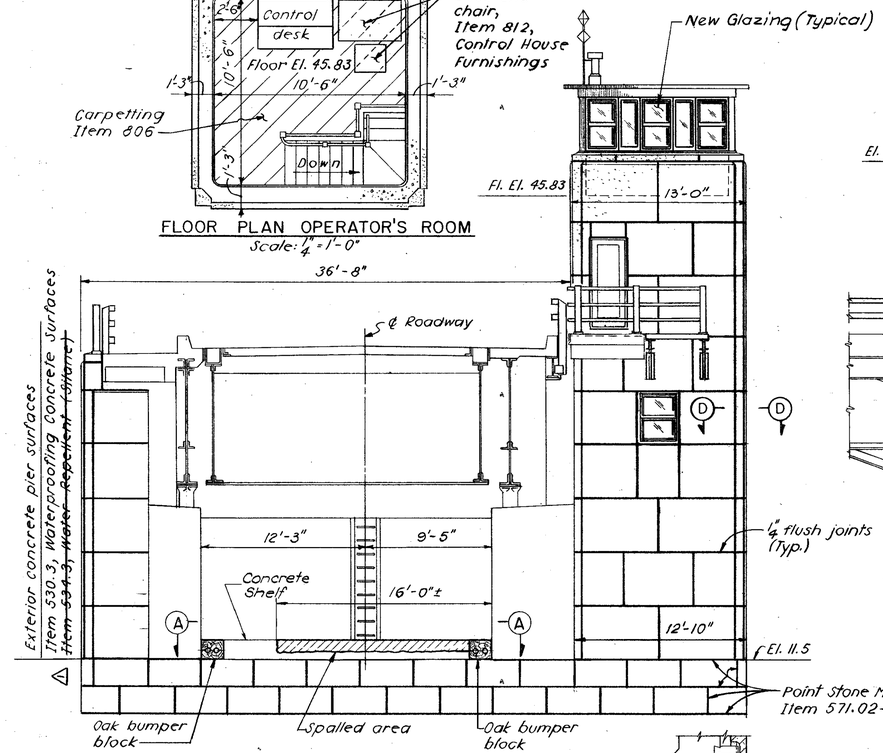
EAST ELEVATION
Scale: 3/16" = 1'-0"



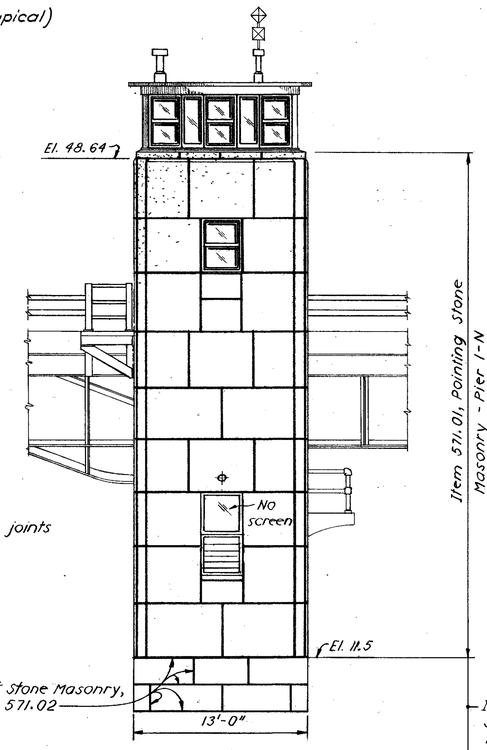
Desk and chair, Item 812, Control House Furnishings

Carpetting Item 806

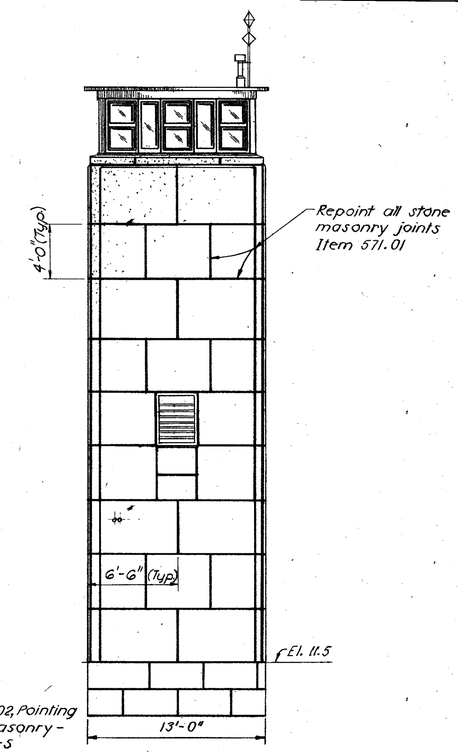
FLOOR PLAN OPERATOR'S ROOM
Scale: 1/4" = 1'-0"



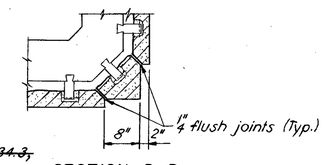
NORTH ELEVATION - PIER 1-N
Scale: 3/16" = 1'-0"



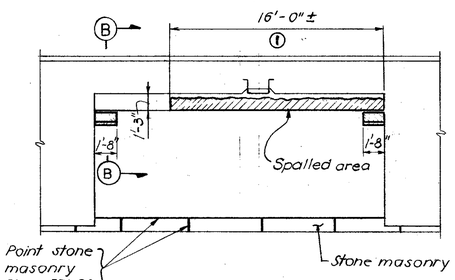
WEST ELEVATION
Scale: 3/16" = 1'-0"



SOUTH ELEVATION
Scale: 3/16" = 1'-0"

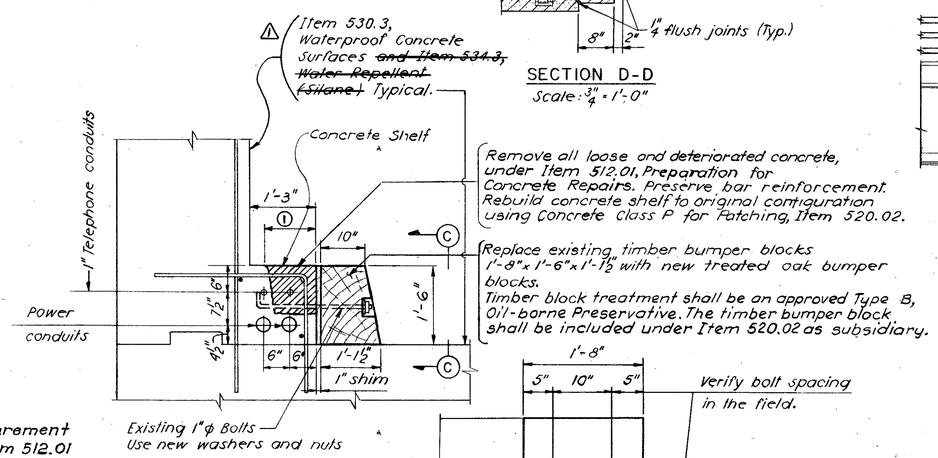


SECTION D-D
Scale: 3/4" = 1'-0"



TOP VIEW A-A
Scale: 3/16" = 1'-0"

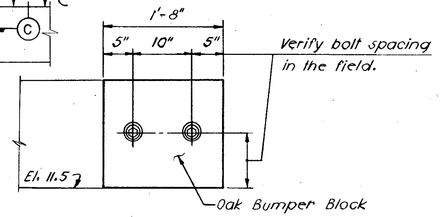
1 = Measurement for Item 512.01



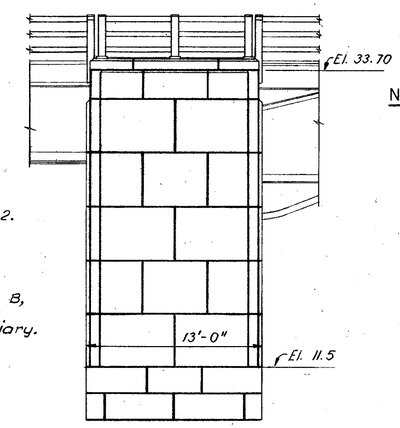
Remove all loose and deteriorated concrete, under Item 512.01, Preparation for Concrete Repairs. Preserve bar reinforcement. Rebuild concrete shelf to original configuration using Concrete Class P for Patching, Item 520.02.

Replace existing timber bumper blocks 1'-8" x 1'-6" x 1'-1½" with new treated oak bumper blocks.
Timber block treatment shall be an approved Type B, Oil-borne Preservative. The timber bumper block shall be included under Item 520.02 as subsidiary.

SECTION B-B
Scale: 3/4" = 1'-0"



VIEW C-C
Scale: 1" = 1'-0"



EAST ELEVATION
Scale: 3/16" = 1'-0"
Sheet Scale: As Noted

NOTES:

1. Replace existing windows with new aluminum double hung insulated double-glazed windows. See Bridge Sheet No. 19 for window details.
2. Heavy duty screen on all windows, except as noted.
3. Repointing stone masonry shall by paid for under Item 571.01, Pointing Stone Masonry - Pier 1-N, and Item 571.02, Pointing Stone Masonry - Piers 6-S Through 6-N.
4. All pointing shall be surface coated with Item 534.3 Water Repellent (Silane)

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

CONTROL HOUSE UPGRADING - 1

	BY	DATE		BY	DATE
DESIGNED T.E.S.		6-82	CHECKED R.E.T.		7-82
DRAWN J.K.		7-82	CHECKED R.E.T.		7-82
TRACED —			CHECKED —		
QUANTITIES T.E.S.		4-83	CHECKED W.W.C.		4-83

BRIDGE SHEET NO. 18 OF 43
FILE NUMBER 3-1-2-1

1	Eliminate It. 534.3 from It. 530.3 surfaces	JFM	4/17/84
△	DESCRIPTION	BY	DATE

REVISIONS

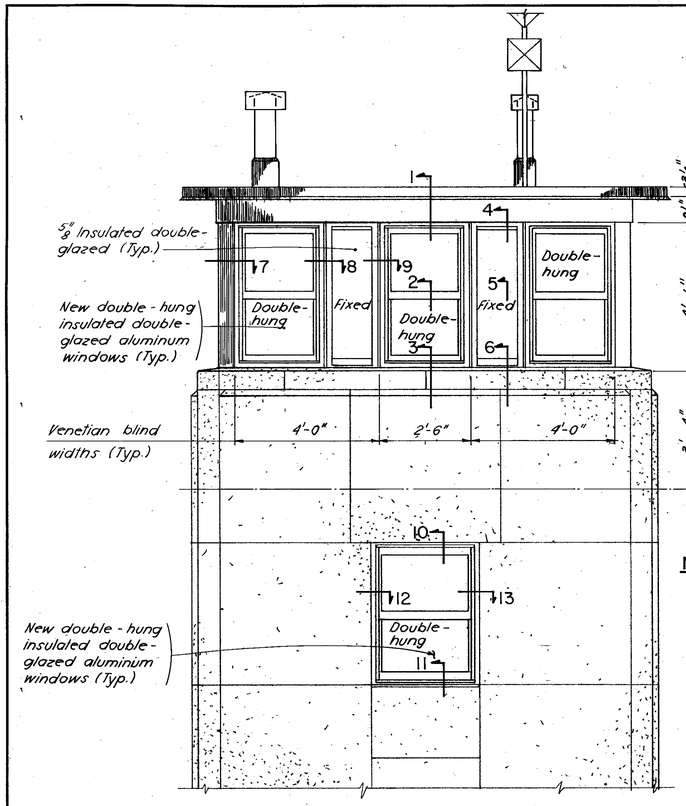
HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

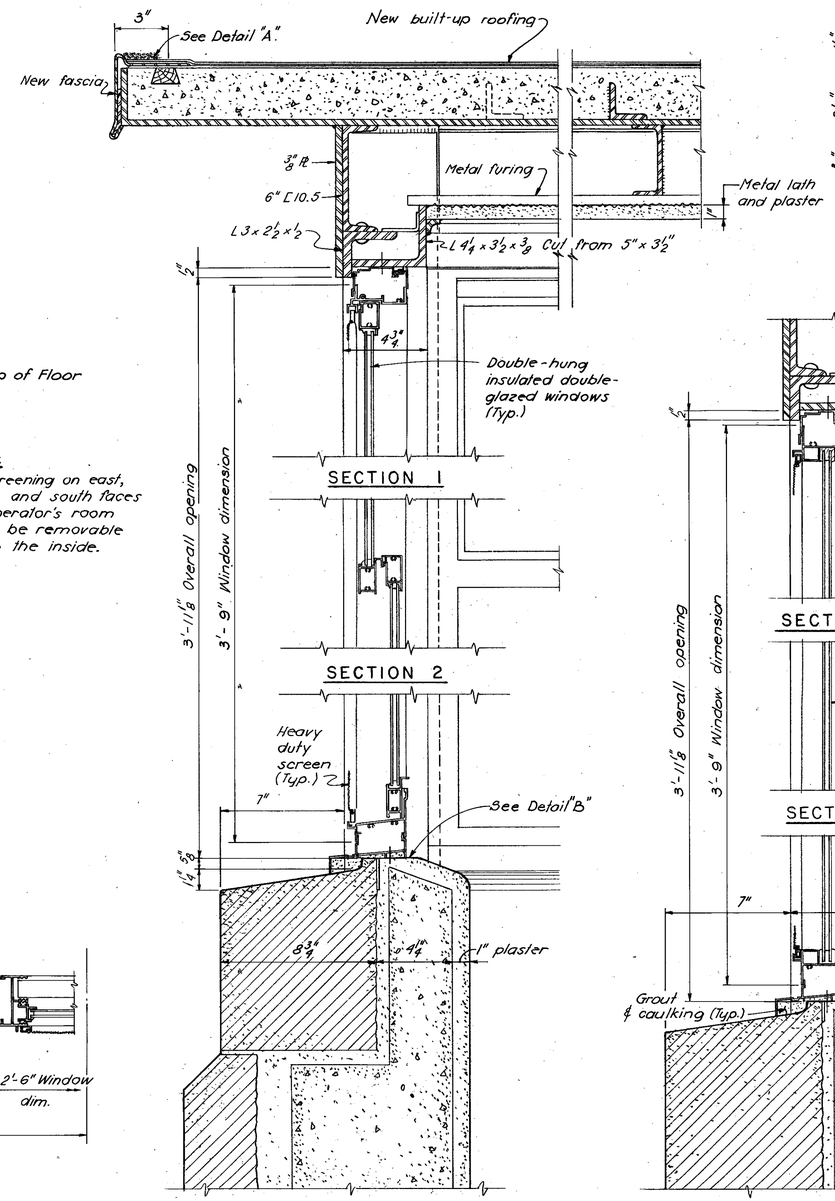
FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

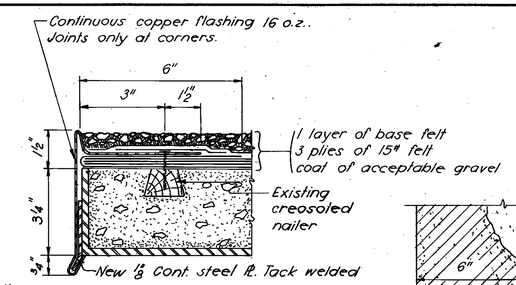


WEST ELEVATION
Scale: 1/2"=1'-0"

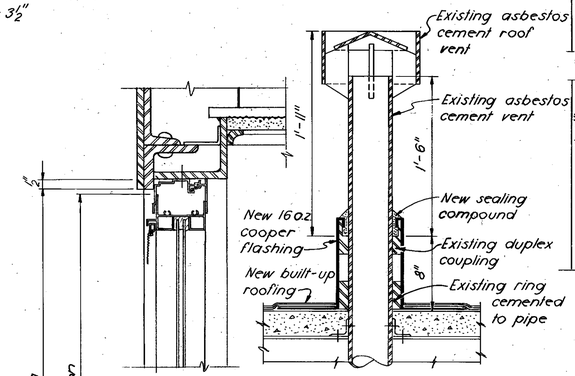
Note: North, south and east elevations of Control Tower are the same as west elevation

NOTE:
All screening on east, north and south faces of operator's room shall be removable from the inside.

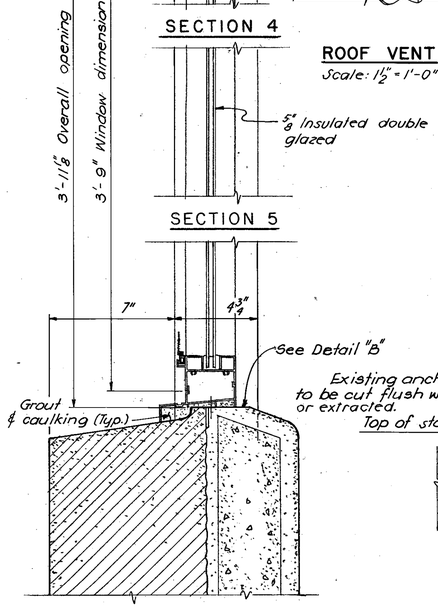




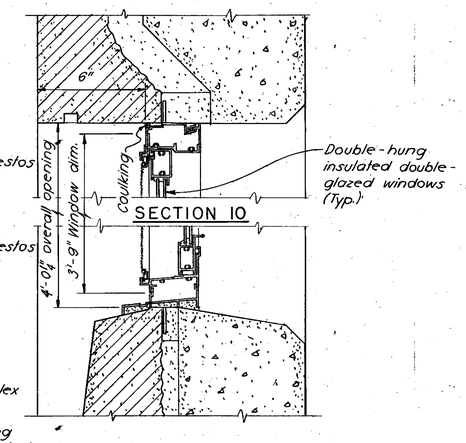
DETAIL "A"



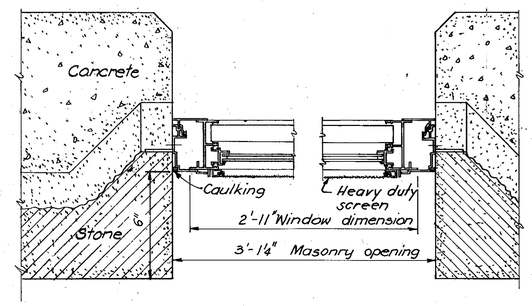
ROOF VENT
Scale: 1 1/2"=1'-0"



SECTION 6
Scale: 3"=1'-0"

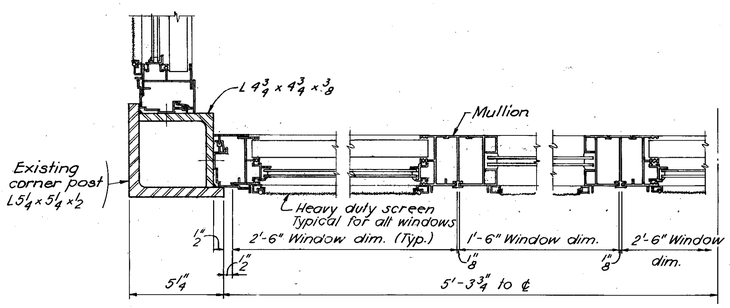


SECTION 11
Scale: 3"=1'-0"



SECTION 12

SECTION 13
Scale: 3"=1'-0"

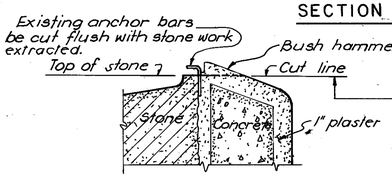


SECTION 7

SECTION 8
Scale: 3"=1'-0"

SECTION 9

NOTE:
Removal and replacement of all windows, new roofing, carpeting, interior painting and other items of work listed in the specifications shall by paid for under Item 806, Control House Upgrading.



DETAIL "B"
Scale: 3"=1'-0"

NOTE:
Existing head and jamb sections shall be prepared in like manner prior to installation of new window framework.

Sheet Scale: As Noted

	DESCRIPTION	BY	DATE
Δ			

REVISIONS

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF - 039 - 1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

CONTROL HOUSE UPGRADING - 2

	BY	DATE		BY	DATE
DESIGNED	T.E.S.	6/82	CHECKED	R.E.T.	7/82
DRAWN	J.K	7/82	CHECKED	R.E.T.	8/82
TRACED	—		CHECKED	—	
QUANTITIES	T.E.S.	4/83	CHECKED	W.W.C	4/83

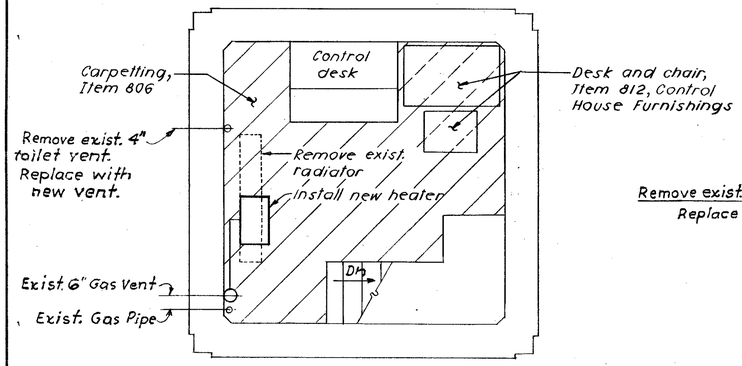
REVIEWED BY _____

BRIDGE SHEET NO.	FILE NUMBER
19 OF 43	3-1-2-1

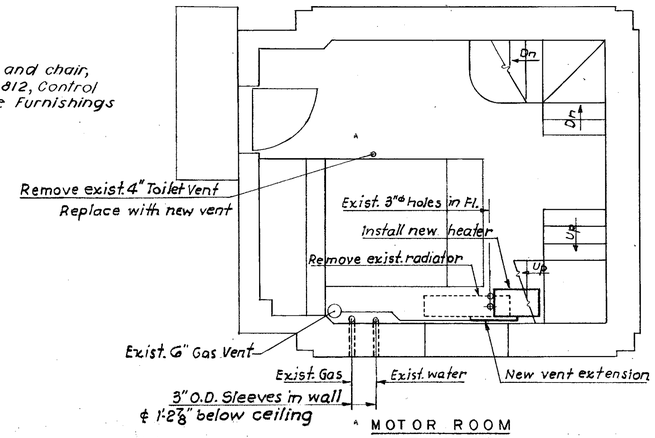
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

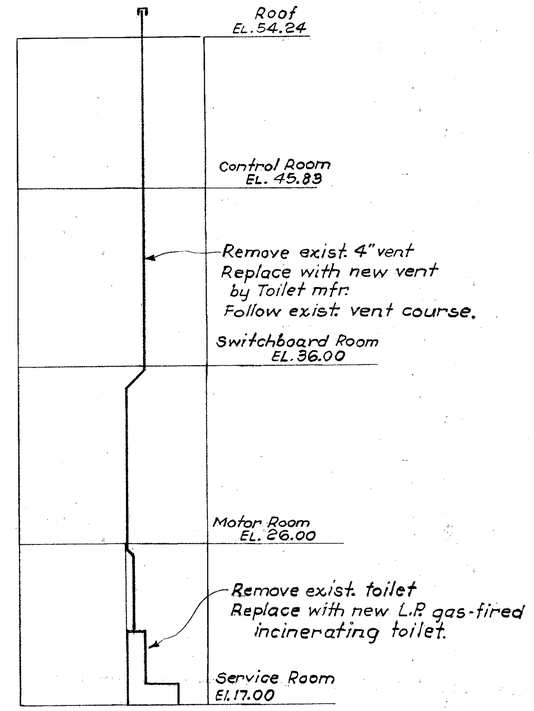


CONTROL ROOM
FL. EL. 45.83

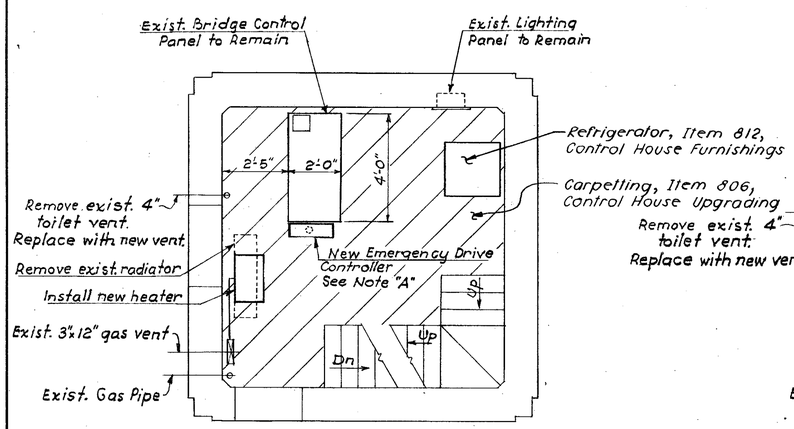


MOTOR ROOM
FL. EL. 26.00

Note
See Bridge Sheet No. 19 for Roof Detail at Vent.

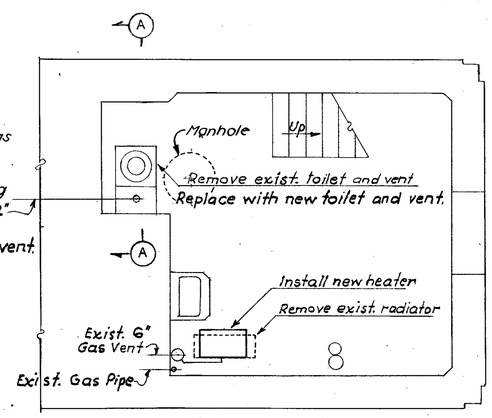


SECTION A-A
Scale: ¼" = 1'-0"



SWITCHBOARD ROOM
FL. EL. 36.00

Note A
Mount controller on end of Control Panel enclosure at convenient height above floor. Mount new relay panel above the Controller. Item 810, Electrical Work.



SERVICE ROOM
FL. EL. 17.00

Note: For additional upgrading in this Room, see Bridge sheet No. 21

NOTES

1. Item 806, Control House Upgrading, includes the removal of the existing natural gas heaters and the gas supply lines; installation of the new L.P. gas-fired heaters and the L.P. gas supply lines; and connections of the heaters to the existing vent pipes.
2. Item 806, Control House Upgrading, includes the removal of the existing waterless toilet and the four-inch vent line; and replacing same with an L.P. gas-fired incinerating toilet and vent line recommended by the manufacturer. The holes in the floors and roof shall be enlarged as required.
3. Item 806, Control House Upgrading, includes the carpetting of Control Room and Switchboard Room.
4. Item 812, Control House Furnishings, includes refrigerator, desk and chair.
5. Paint control desk with two (2) coats of enamel approved by the Engineer.

Sheet Scale: ⅜" = 1'-0" & as noted

△	DESCRIPTION	BY	DATE

REVISIONS

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

CONTROL HOUSE UPGRADING - 3

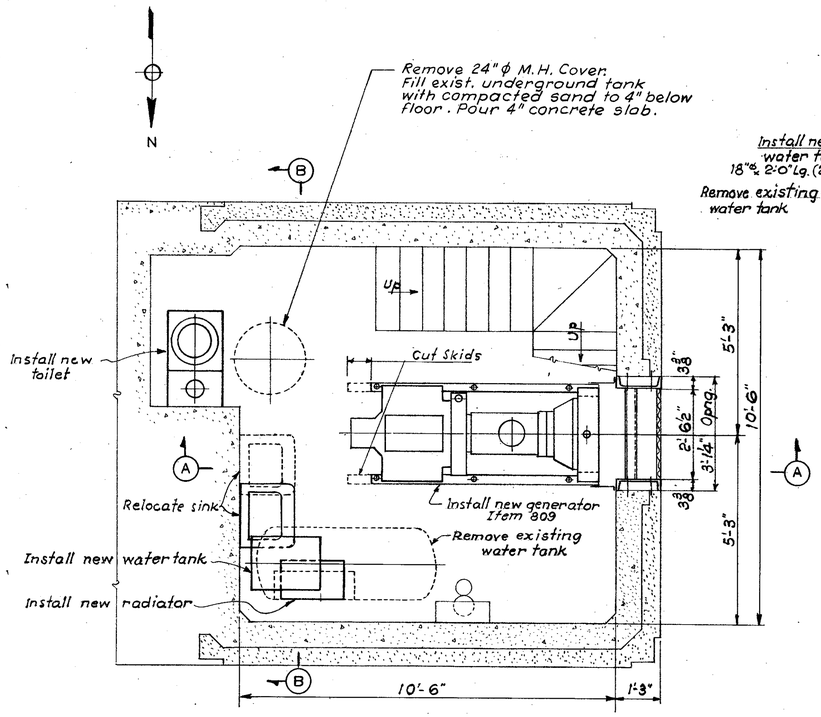
	BY	DATE		BY	DATE
DESIGNED	E.S.T.	5-83	CHECKED	W.W.C.	5-83
DRAWN	E.R.S.	6-83	CHECKED	E.S.T.	6-83
TRACED	—		CHECKED	—	
QUANTITIES	T.E.S.	5-83	CHECKED	W.W.C.	5-83

BRIDGE SHEET NO.	FILE NUMBER
20 OF 43	3-1-2-1

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

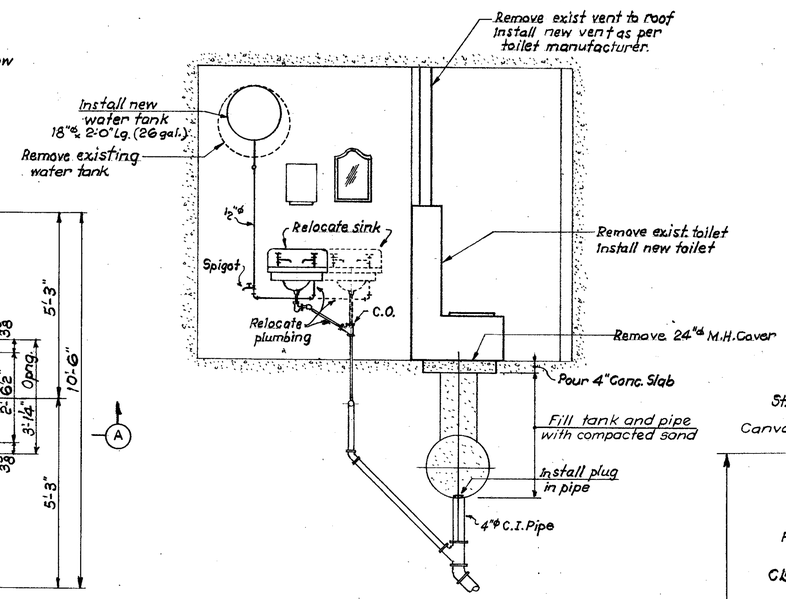
FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



PLAN-SERVICE ROOM

Scale: ½"=1'-0"

Note: For additional upgrading in this Room see Bridge Sheet No. 20

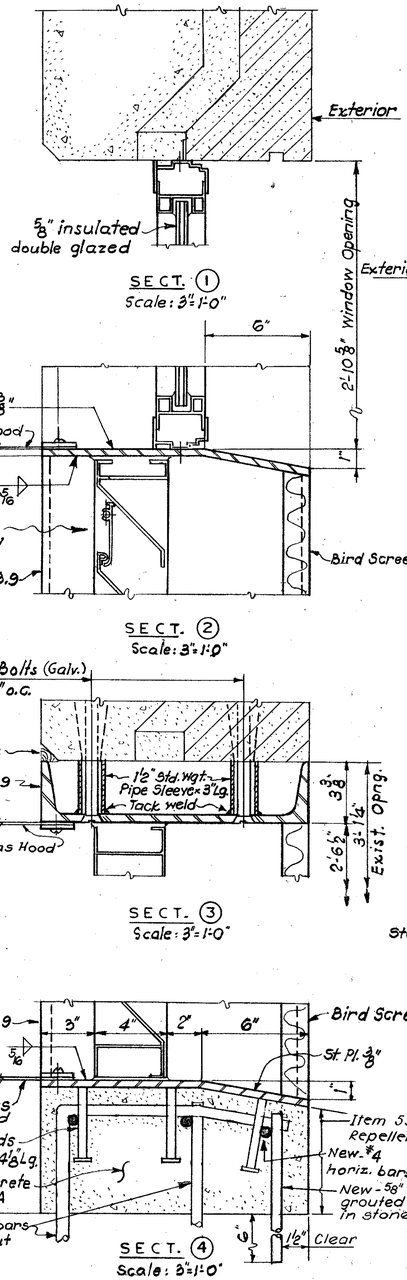


SECTION B-B

Scale: ½"=1'-0"

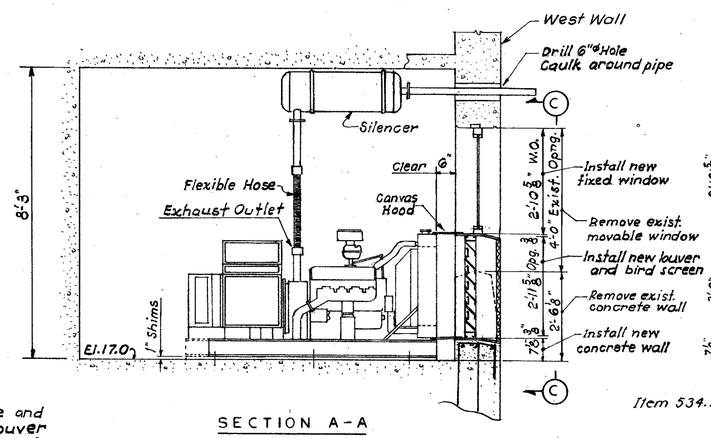
NOTE

All work on this sheet shall be paid for under Item 806, Control House Upgrading, except the standby engine generator and accessories.



Note: All steel A588-painted except alum. window & louvers.

Sheet Scale: ½"=1'-0" & as noted

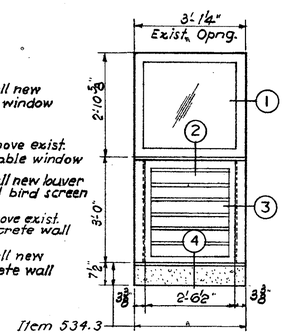


Note

Saw-cut stone and concrete for louver and preserve reinforcement bars.

SECTION A-A

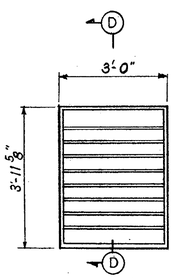
Scale: ½"=1'-0"



VIEW C-C

Scale: ½"=1'-0"

1) Install alum. fixed window.
2) Install combination stationary and adjustable aluminum louvers for automatic operation. Type KX827, as mfd. by The Airolite Co., Marietta, Ohio, or equal.



WINDOW ELEVATION
SOUTH WALL
MOTOR ROOM

Scale: ½"=1'-0"

1) Remove existing window
2) Install aluminum adjustable louvers, motor operated, wired in conjunction with Engine Generator, Type T6456, as mfd. by The Airolite Co., Marietta, Ohio, or equal.

Note: Aluminum parts in contact with steel, to be painted with zinc oxide.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
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TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

△	DESCRIPTION	BY	DATE
	REVISIONS		

CONTROL HOUSE UPGRADING - 4

		BY	DATE			BY	DATE
DESIGNED	E.R.S.		5-83	CHECKED	E.S.T.		5-83
DRAWN	E.R.S.		5-83	CHECKED	E.S.T.		5-83
TRACED	—			CHECKED	—		
QUANTITIES	T.E.S.		6-83	CHECKED	W.W.C.		6-83

BRIDGE SHEET NO. 21 OF 43
FILE NUMBER 3-1-2-1

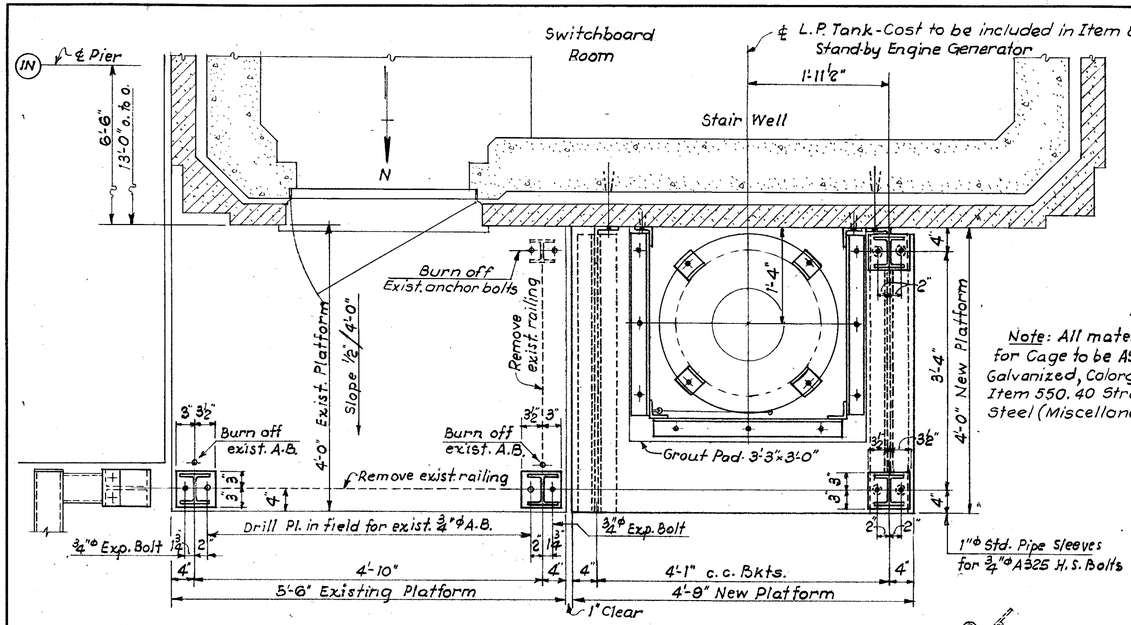
HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

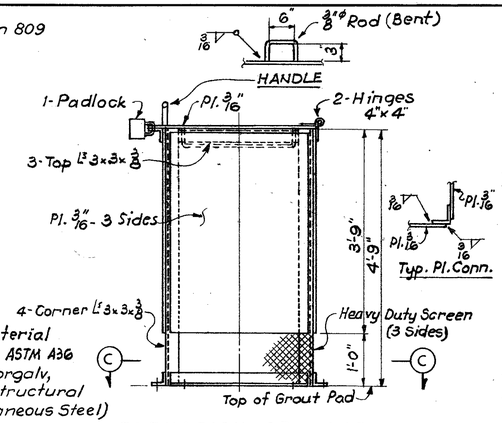
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

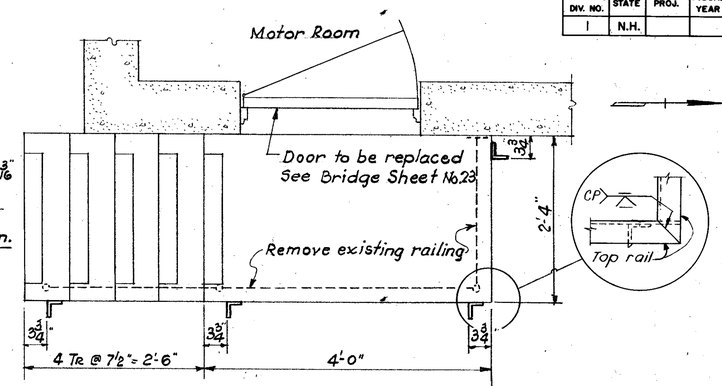


PLAN AT SWITCHBOARD ROOM
NEW PLATFORM FOR PROPANE TANK SUPPORT

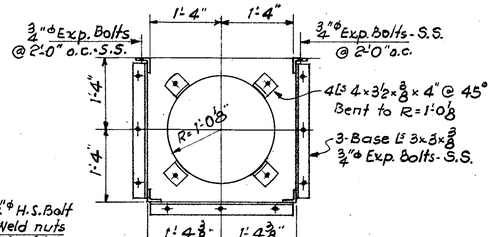


Note: All material for Cage to be ASTM A36 Galvanized, Colorgalv, Item 550.40 Structural Steel (Miscellaneous Steel)

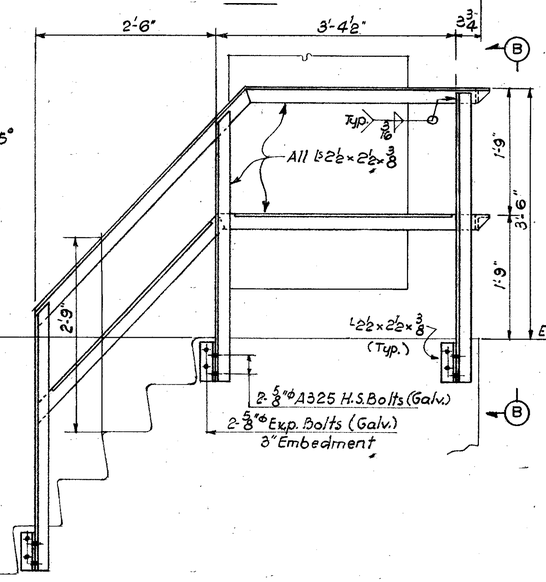
ELEVATION OF CAGE
Scale: ¾" = 1'-0"



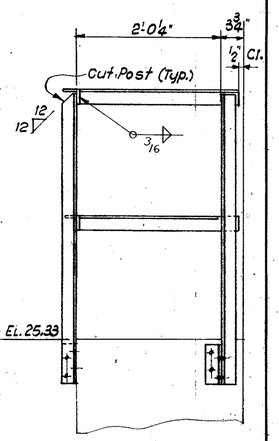
PLAN



SECTION C-C
Scale: ¾" = 1'-0"

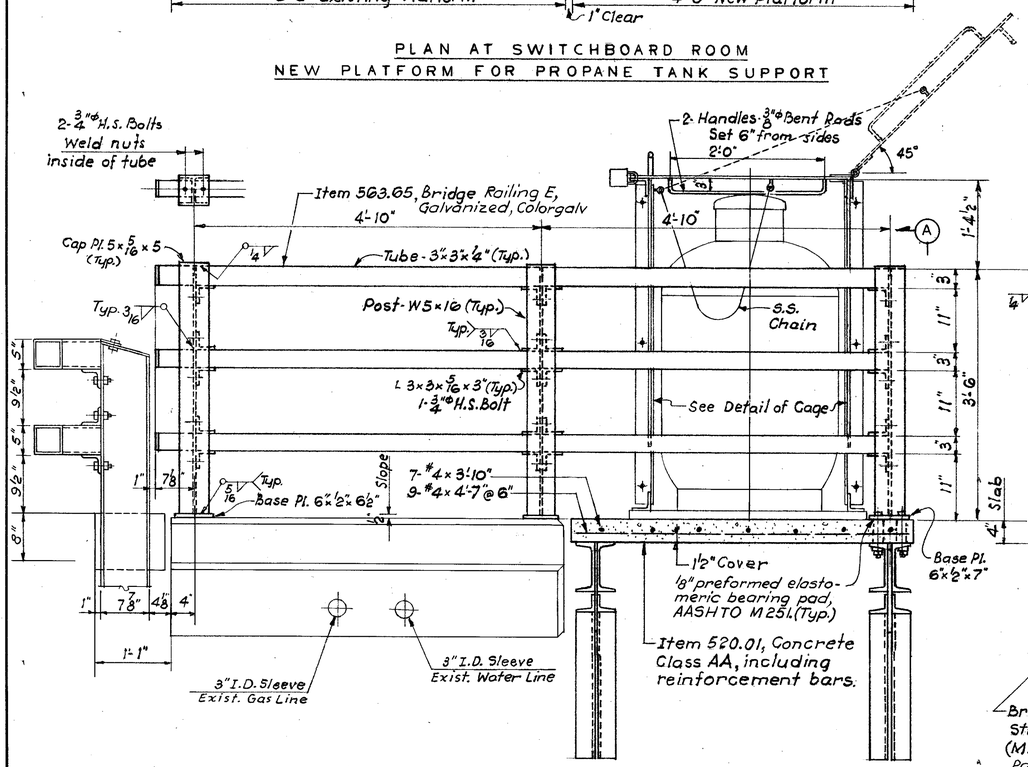


ELEVATION - NEW RAILING
STAIR TO MOTOR ROOM



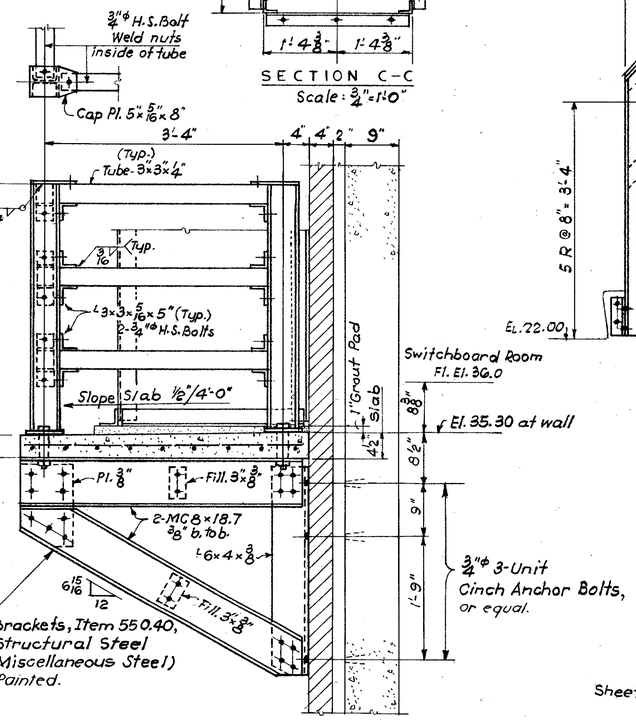
SECTION B-B

Material: ASTM A36 - Galvanized - Colorgalv, (Light Bronze) Typ.
Item 563.601, Bridge Pedestrian Rail E, Galvanized - Colorgalv, (Light Bronze)



ELEVATION

Material - Steel ASTM A36
Holes: 13/16"φ
Bolts: ¾"φ A325 H.S.



SECTION A-A

Sheet Scale: 1" = 1'-0" & as noted

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

CONTROL HOUSE UPGRADING - 5

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED	E.R.S.	4-83	CHECKED	E.S.T.	4-83	22 OF 43
DRAWN	E.R.S.	5-83	CHECKED	E.S.T.	5-83	FILE NUMBER
TRACED	—		CHECKED			
QUANTITIES	T.E.S.	6-83	CHECKED	W.W.C.	6-83	3-1-2-1

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

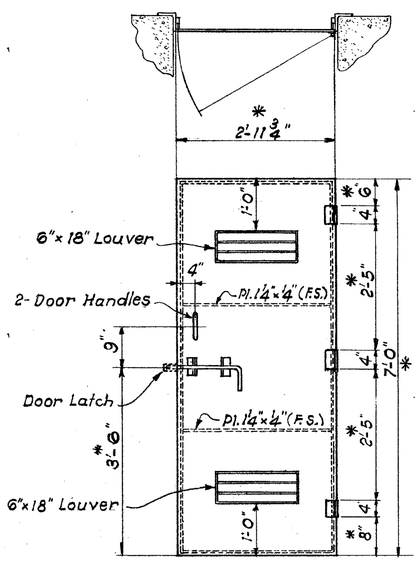
REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.		—		

Transformer Room
West side - North Abutment

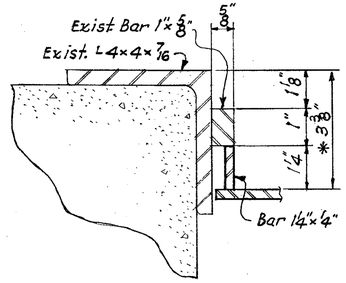


REMOVE EXIST. STEEL PL. DOOR & REPLACE WITH NEW 1/4" STEEL PL. DOOR TO TRANSFORMER ROOM

Scale: 3/4" = 1'-0"

* = Dimension to be determined in field.

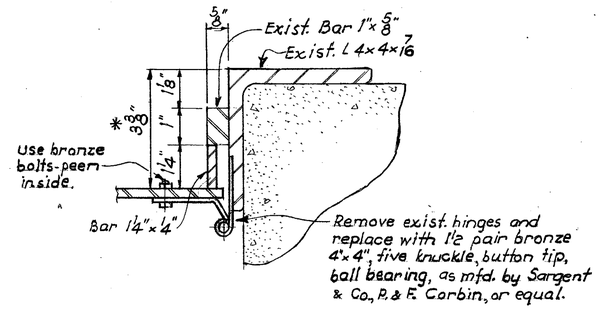
Item 550.45, Structural Steel
(Replace Vault Door in North Abutment.)



HEAD SILL & JAMB DETAIL

Scale: 6" = 1'-0"

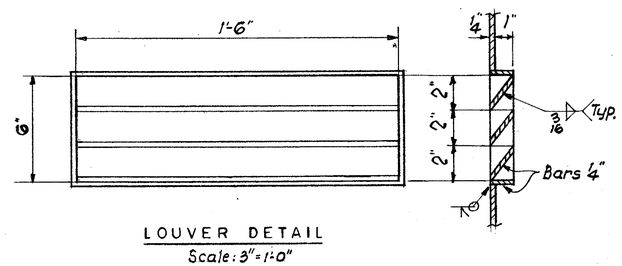
* = Dimension to be determined in field.



HINGE DETAIL

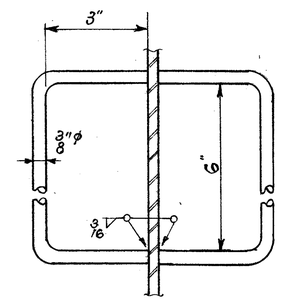
Scale: 6" = 1'-0"

* = Dimension to be determined in field.



LOUVER DETAIL

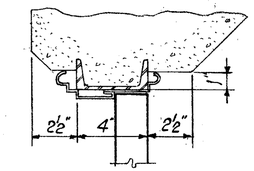
Scale: 3" = 1'-0"



DOOR HANDLE

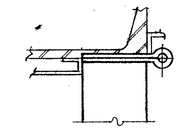
Scale: 6" = 1'-0"

Note: All new steel material to be ASTM A36, galvanized.



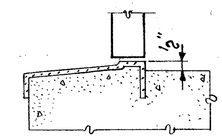
HEAD & JAMB SECT.

Scale: 3" = 1'-0"



HINGE DETAIL

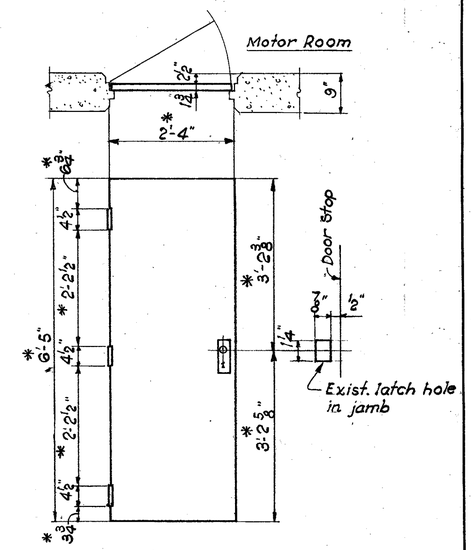
Scale: 6" = 1'-0"



SILL SECT.

Scale: 3" = 1'-0"

Note: For hardware and material, see Specs.

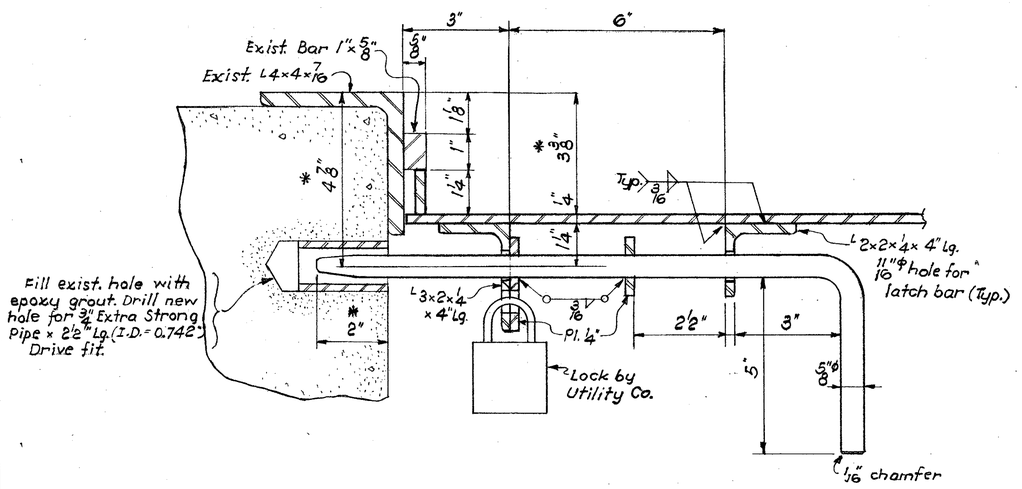


REMOVE EXIST. HOLLOW METAL STEEL DOOR & REPLACE WITH NEW 1 3/4" HOLLOW METAL STEEL DOOR TO MOTOR ROOM

Scale: 3/4" = 1'-0"

* = Dimension to be determined in field

Item 806, Control House Upgrading



DOOR LATCH

Scale: 6" = 1'-0"

* = Dimension to be determined in field.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF - 039 - 1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

DOORS

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED	E.R.S.	3-83	CHECKED	E.S.T.	3-83	23 OF 43
DRAWN	E.R.S.	3-83	CHECKED	E.S.T.	3-83	FILE NUMBER
TRACED	—		CHECKED	—		
QUANTITIES	T.E.S.	5-83	CHECKED	W.W.C.	5-83	3-1-2-1

△	DESCRIPTION	BY	DATE
	REVISIONS		

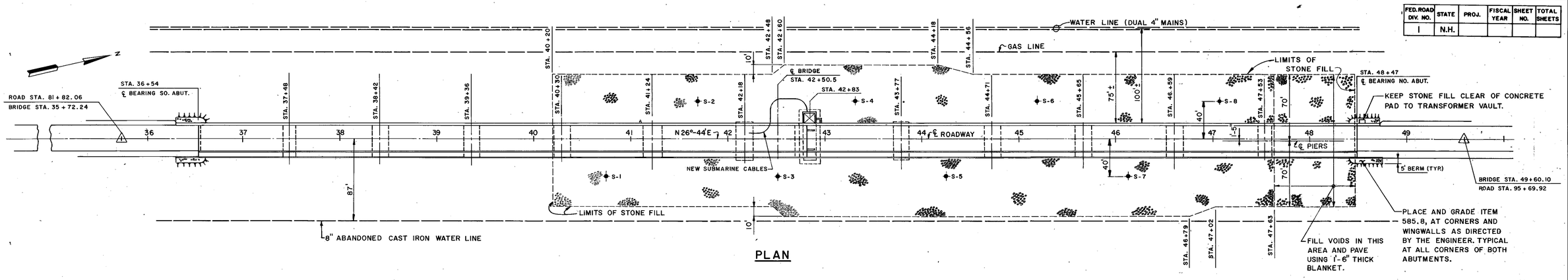
HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

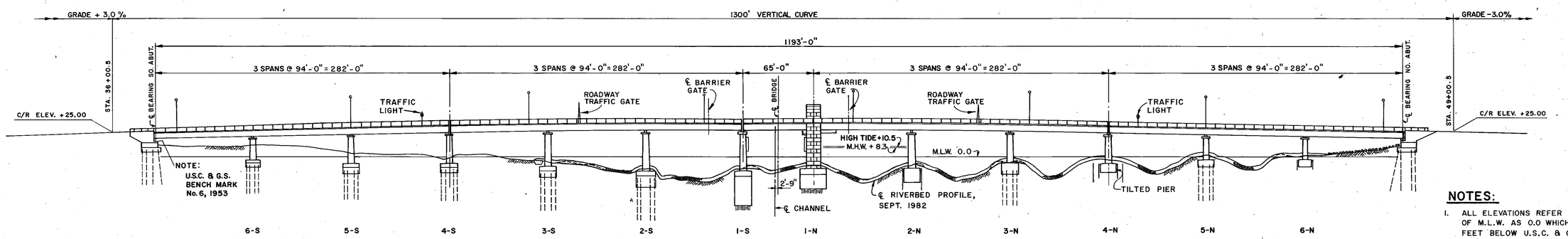
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF - 039 - 1(2)		44

Proj. Engr. E.S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



PLAN



ELEVATION

NOTES:

1. ALL ELEVATIONS REFER TO PLANE OF M.L.W. AS 0.0 WHICH IS 15.52 FEET BELOW U.S.C. & G.S. BENCH MARK No. 1.
2. SHEET PILING LEFT-IN-PLACE AT PIERS 1-S TO 3-S, 1-N TO 4-N & 6-N.
3. APPROXIMATE DEPTH OF STONE FILL IS 3'-0" MINIMUM. STONE FILL SHALL BE PAID FOR UNDER ITEM 585.8, STONE FILL FOR PIER PROTECTION, INCLUDING NECESSARY EXCAVATION.

UTILITIES

WATER LINE

HAMPTON WATER WORKS COMPANY
HAMPTON, N.H.

GAS LINE

NORTHERN UTILITIES INC.
ALLIED GAS DIVISION
PORTSMOUTH, N.H.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
MATERIALS AND RESEARCH DIVISION

GRAIN SIZE ANALYSIS (MECHANICAL)

PROJECT	HAMPTON	PROJECT NO.	S-3314-A
LABORATORY NO.		FIELD NO.	S-1 TO S-8
TYPE OF MATERIAL	HARD, SAND	PURPOSE USED (ITEM)	IN SITU
SUBMITTED BY	R. GREENWOOD	REPORT TO	
SAMPLED 9-15, 19 82	FROM RIVER BED	QUANTITY REPRESENTED	
SOURCE OF MATERIAL	RIVER BED	TOWN	HAMPTON
EXAMINE FOR	GRAIN SIZE DIST.	TESTED BY	R.E. DATE 9-30-82

S-1

Total Wt Sample 367.1	Minus #4 Fraction			In Total
Sieve Size	Accum. Weight Retained	Percent Retained	Percent Passing	Percent Passing
#4	0	0		100
#10	11	0		100
#20	45.3	12		88
#40	262.2	71		29
#100	362.9	99		1
#200	366.4	99.8		0.2
Percent Moisture				

S-2

Total Wt Sample 526.9	Minus #4 Fraction			In Total
Sieve Size	Accum. Weight Retained	Percent Retained	Percent Passing	Percent Passing
#4	12	2		98
#10	61	12		88
#20	290.4	55		45
#40	479.2	91		9
#100	521.9	99		1
#200	524.6	99.6		0.4
Percent Moisture				

S-3

Total Wt Sample 558.8	Minus #4 Fraction			In Total
Sieve Size	Accum. Weight Retained	Percent Retained	Percent Passing	Percent Passing
#4	10.6	2		98
#10	110.9	20		80
#20	429.9	77		33
#40	480.5	86		14
#100	545.2	98		2
#200	555.6	99.5		0.5
Percent Moisture				

S-4

Total Wt Sample 579.2	Minus #4 Fraction			In Total
Sieve Size	Accum. Weight Retained	Percent Retained	Percent Passing	Percent Passing
#4	5.3			99
#10	27.6	5		95
#20	193.9	33		67
#40	242.2	45		55
#100	515.8	92		8
#200	561.8	98.5		1.5
Percent Moisture				

S-5

Total Wt Sample 478.0	Minus #4 Fraction			In Total
Sieve Size	Accum. Weight Retained	Percent Retained	Percent Passing	Percent Passing
#4	13.1	3		97
#10	29.0	6		94
#20	67.4	14		86
#40	331.7	67		33
#100	471.1	99		1
#200	476.5	99.7		0.3
Percent Moisture				

S-6

Total Wt Sample 530.8	Minus #4 Fraction			In Total
Sieve Size	Accum. Weight Retained	Percent Retained	Percent Passing	Percent Passing
#4	196.6	37		63
#10	242	46		54
#20	264.7	51		49
#40	311.4	59		41
#100	502.5	95		5
#200	523.4	99.5		0.5
Percent Moisture				

S-7

Total Wt Sample 288.4	Minus #4 Fraction			In Total
Sieve Size	Accum. Weight Retained	Percent Retained	Percent Passing	Percent Passing
#4	3.3	1		99
#10	16.5	2		98
#20	34.5	12		88
#40	107.0	37		63
#100	260.2	90		10
#200	286.6	99.4		0.6
Percent Moisture				

S-8

Total Wt Sample 535.3	Minus #4 Fraction			In Total
Sieve Size	Accum. Weight Retained	Percent Retained	Percent Passing	Percent Passing
#4	5.3	0		100
#10	31.9	6		94
#20	227.0	61		39
#40	506.5	95		5
#100	532.7	99		1
#200	533.8	99.7		0.3
Percent Moisture				

SHEET SCALE: 1" = 50'

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF - 039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

PIER EROSION PROTECTION

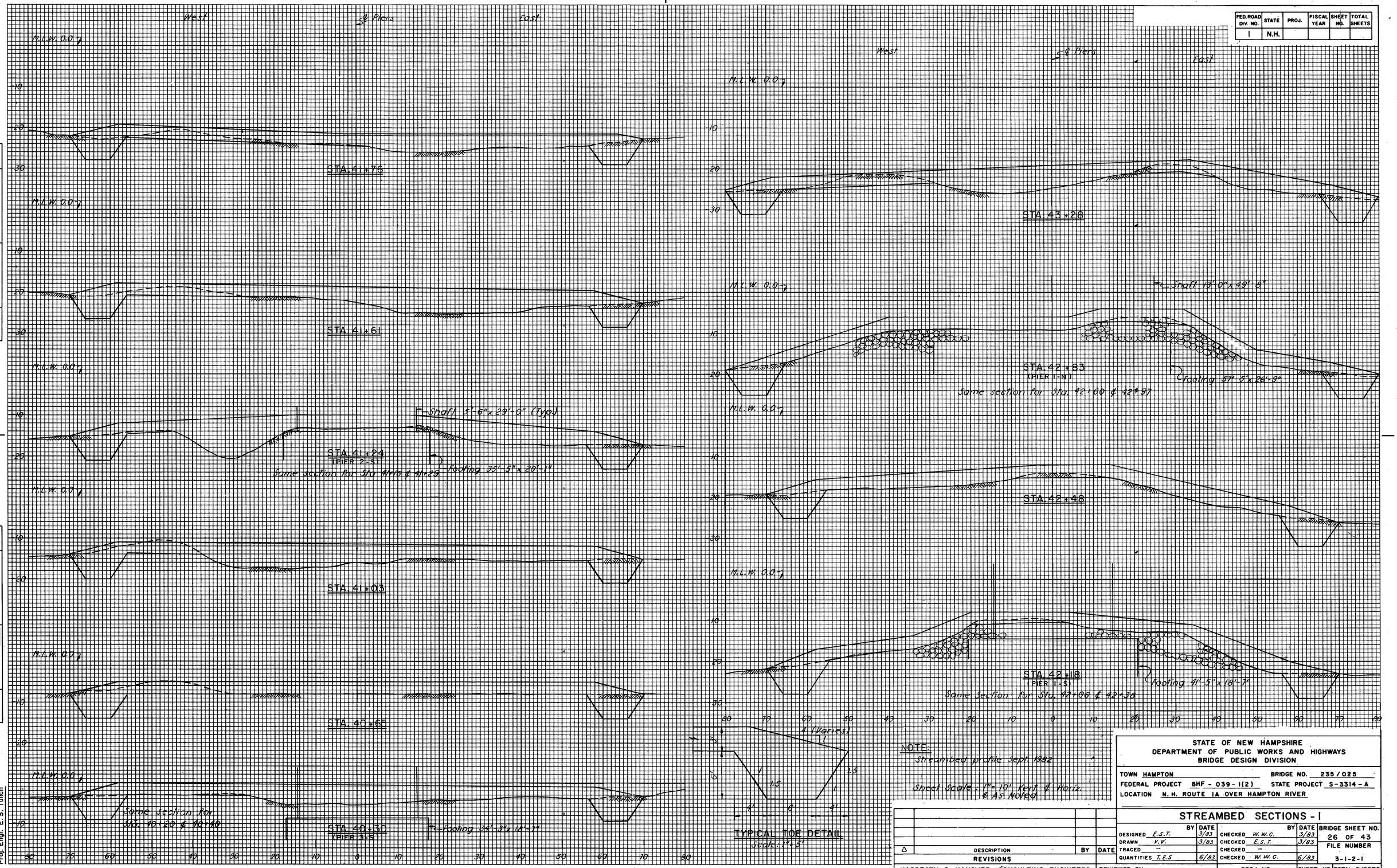
	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED	E.S.T.	7/82	CHECKED	W.W.C.	7/82	25 OF 43
DRAWN	V.V.	7/82	CHECKED	E.S.T.	7/82	FILE NUMBER
TRACED	—		CHECKED	—		3-1-2-1
QUANTITIES	T.E.S.	5/83	CHECKED	W.W.C.	5/83	

REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



NOTE:
Streambed profile Sept. 1982

Sheet Scale: 1" = 10' Vert. & Horiz. & As Noted

FINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK NO.		

ORIGINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK NO.		

Proj. Engr. E. S. Tulich

Δ	DESCRIPTION	BY	DATE

REVISIONS

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

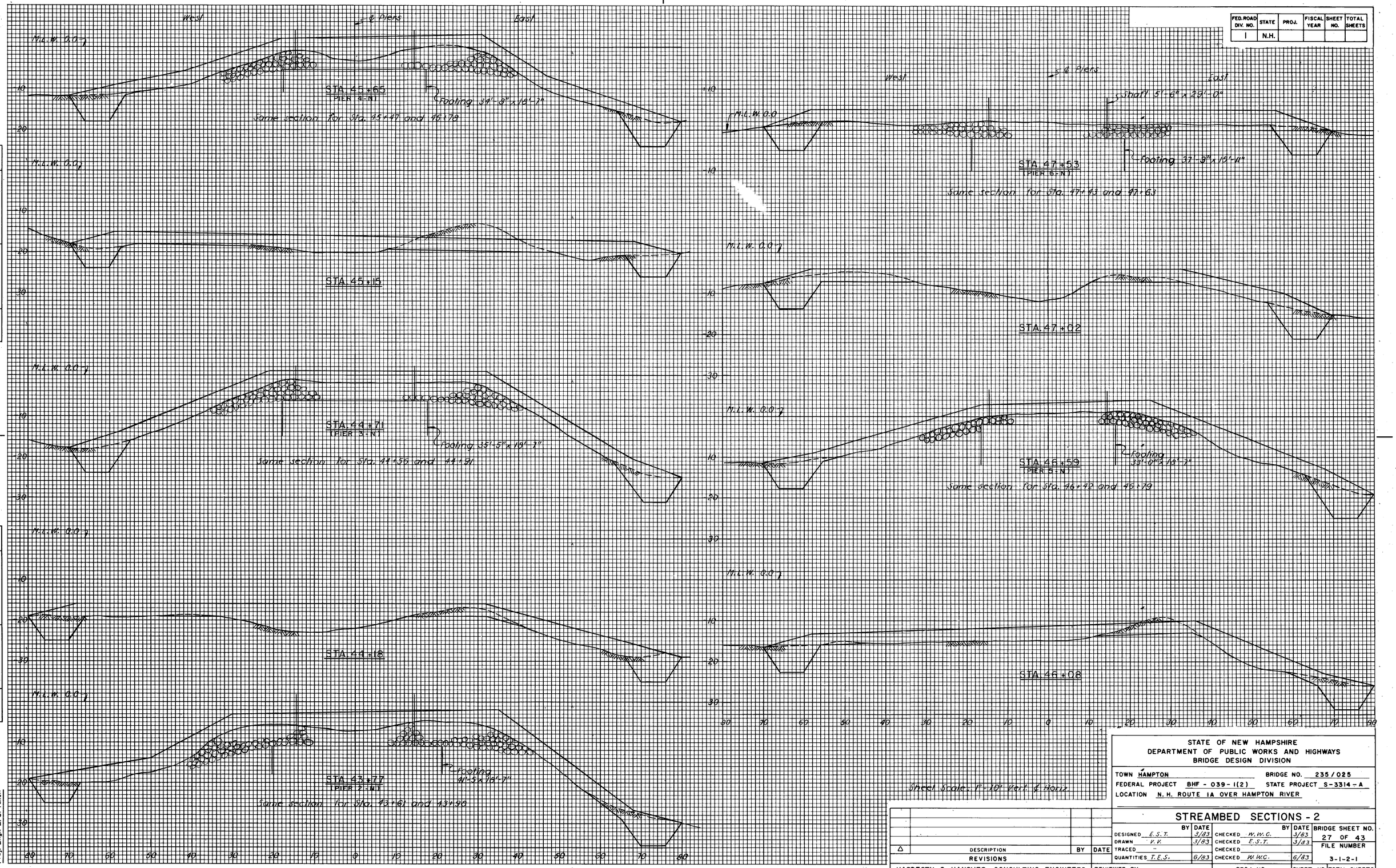
STREAMBED SECTIONS - I

	BY	DATE		BY	DATE
DESIGNED E.S.T.		3/83	CHECKED W.W.C.		3/83
DRAWN V.V.		3/83	CHECKED E.S.T.		3/83
TRACED —			CHECKED —		
QUANTITIES T.E.S.		6/83	CHECKED W.W.C.		6/83

BRIDGE SHEET NO.	FILE NUMBER
26 OF 43	3-1-2-1

REVIEWED BY	PROJ. NO.	SHEET NO.	TOTAL SHEETS
	BHF-039-1(2)		44

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



FINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TRANSFERRED		
AREAS		
AREAS CHECKED		
NOTE BOOK NO.		

ORIGINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TRANSFERRED		
AREAS		
AREAS CHECKED		
NOTE BOOK NO.		

Proj. Engr. E. S. Tulich

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF - 039 - 1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

STREAMBED SECTIONS - 2

	BY	DATE		BY	DATE
DESIGNED E.S.T.		3/83	CHECKED W.W.C.		3/83
DRAWN V.V.		3/83	CHECKED E.S.T.		3/83
TRACED —			CHECKED		
QUANTITIES T.E.S.		6/83	CHECKED W.W.C.		6/83

BRIDGE SHEET NO. 27 OF 43
FILE NUMBER 3-1-2-1

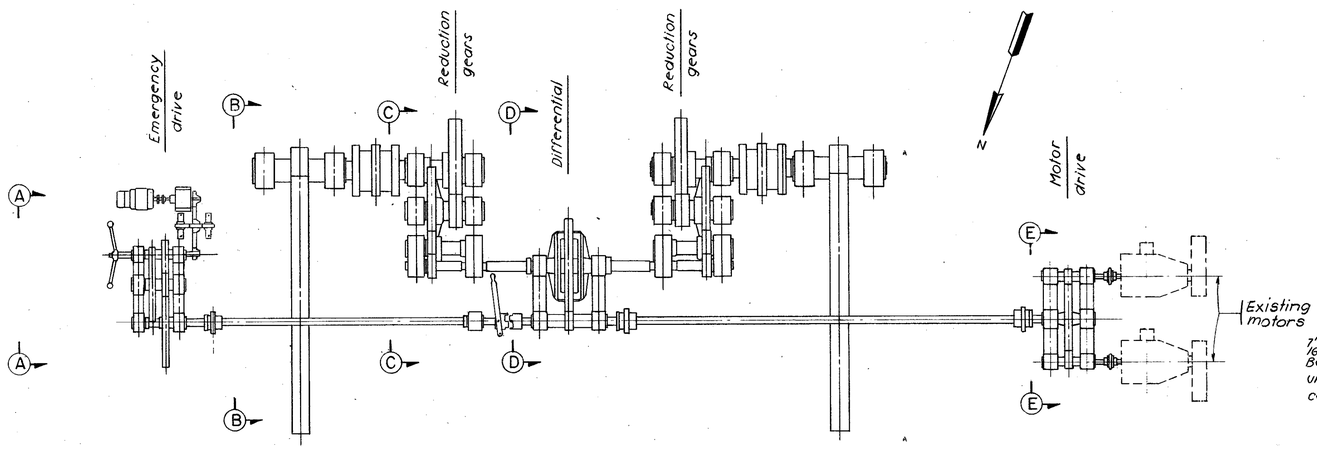
△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

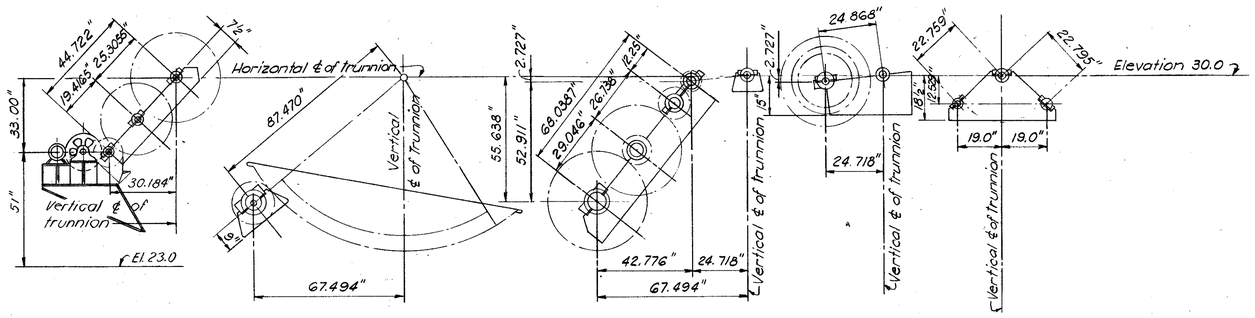
REVIEWED BY

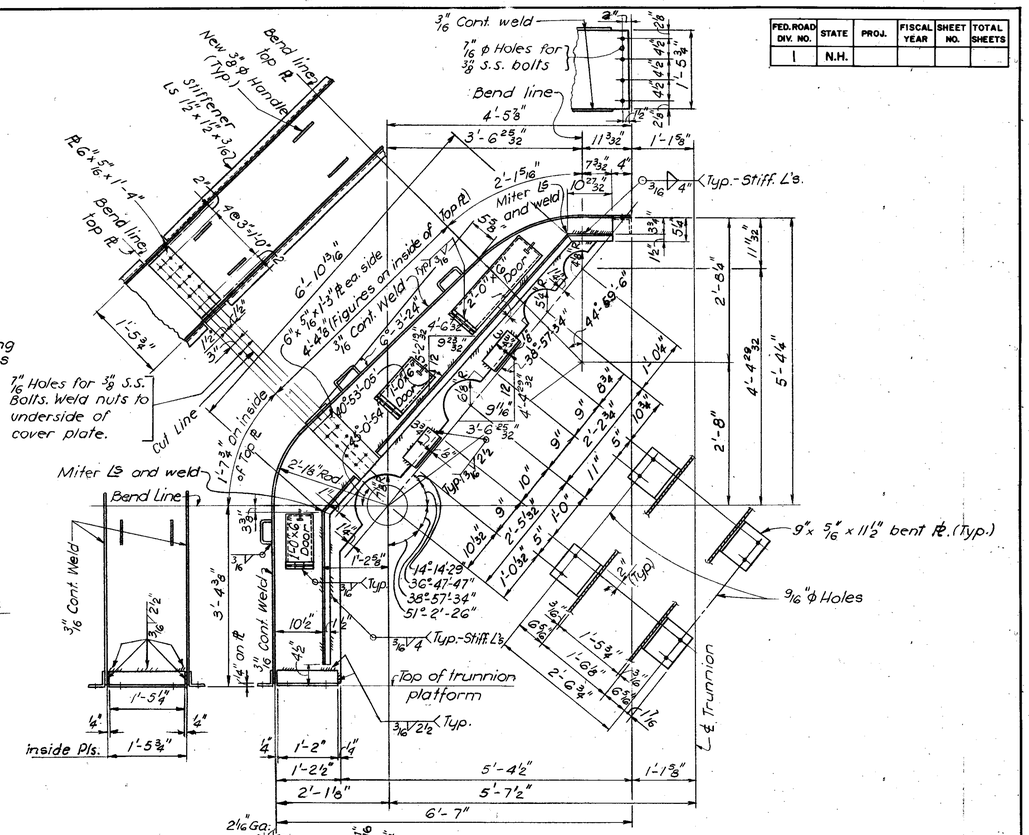
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

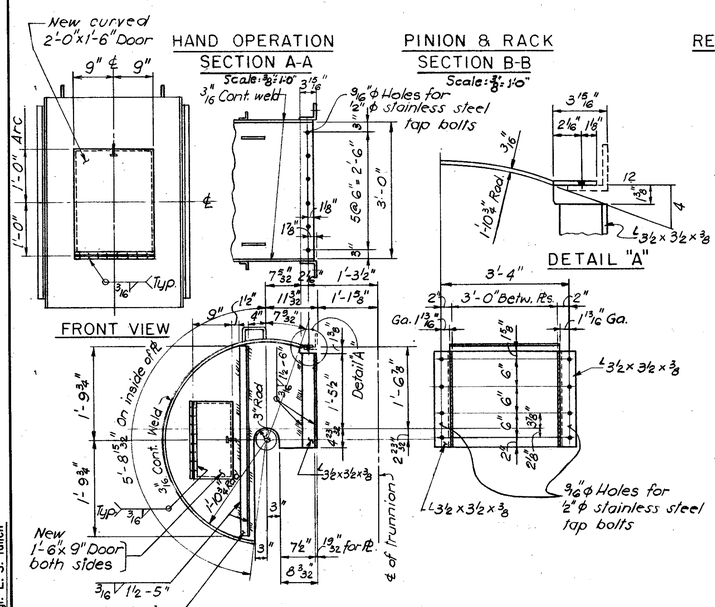
FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



LOCATION PLAN
Scale: 3/8" = 1'-0"



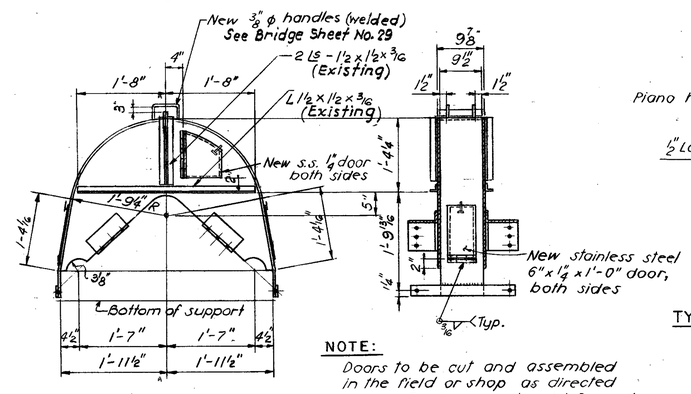




REDUCTION GEARS
SECTION C-C
Scale: 3/8" = 1'-0"

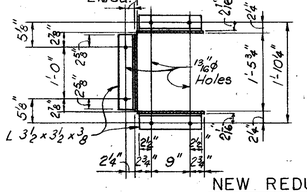
DIFFERENTIAL
SECTION D-D
Scale: 3/8" = 1'-0"

ELECTRIC DRIVE
SECTION E-E
Scale: 3/8" = 1'-0"



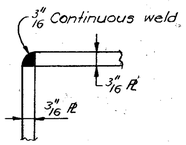
NOTE:
Doors to be cut and assembled in the field or shop as directed by the Engineer and paid for under Item 550.46.

EXISTING ELECTRIC DRIVE HOUSING MODIFIED

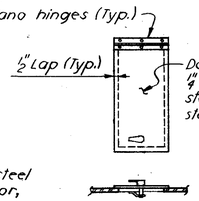


NOTE:
Furnish doors both sides of housing.

NEW REDUCTION GEARS HOUSING
(2 Required)



TYPICAL CORNER GEAR COVER
Scale: 6" = 1'-0"



TYPICAL DETAIL LATCH AND HINGES
Scale: 1½" = 1'-0"

NOTES:

1. All new machinery covers shall be 3/16" stainless steel plate, except modified electric drive housing.
2. All doors shall be equipped with stainless steel hinges and latches.
3. All new expansion bolts shall be stainless steel.
4. Removal of existing housing, and furnishing and installation of new machinery housing shall be paid for under Item 550.46, Structural Steel (Operating Machinery Housing).
5. Stainless steel machinery housing and accessories shall not be painted.

Sheet Scale: 3/4" = 1'-0" - As Noted

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

OPERATING MACHINERY HOUSING

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED	S.D.	7-83	CHECKED	T.E.S.	7-83	28 OF 43
DRAWN	J.K.	7-83	CHECKED	R.E.T.	7-83	FILE NUMBER
TRACED	—		CHECKED	—		3-1-2-1
QUANTITIES	T.E.S.	4-83	CHECKED	W.W.C.	5-83	

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

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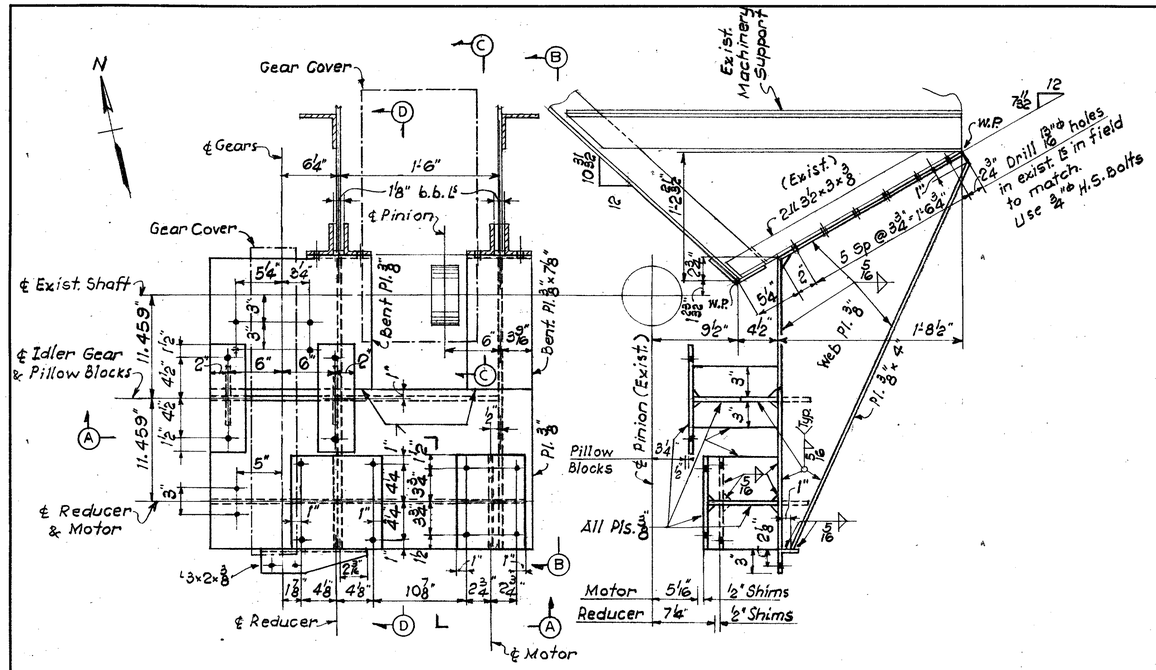
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

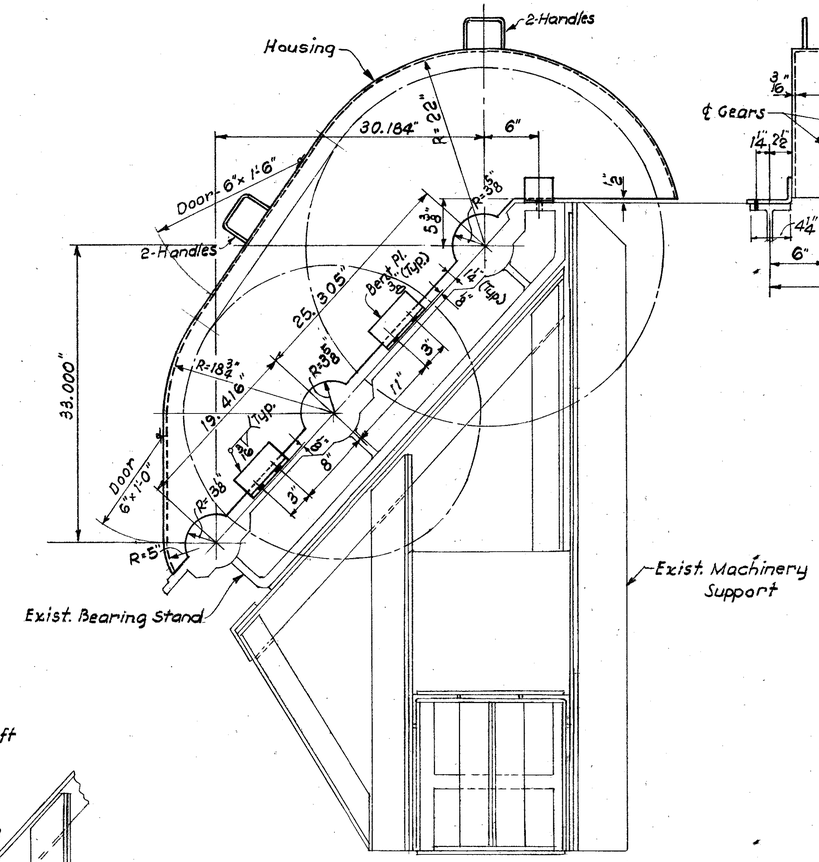
Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

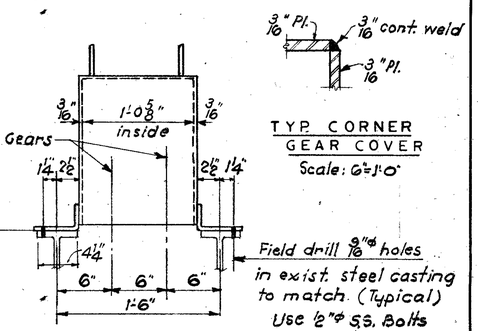


PLAN OF MACHINERY SUPPORTS
Scale: 1½"=1'-0"

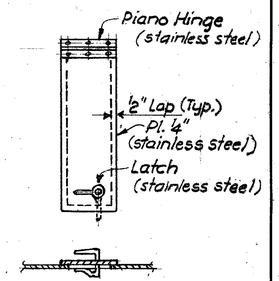
SECTION B-B
Scale: 1½"=1'-0"



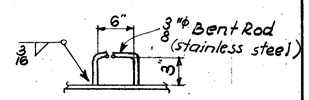
SECTION C-C
Scale: 1½"=1'-0"



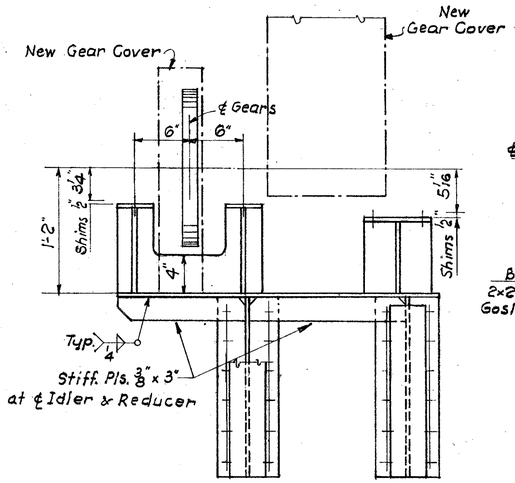
TYP. CORNER
GEAR COVER
Scale: 6"=1'-0"



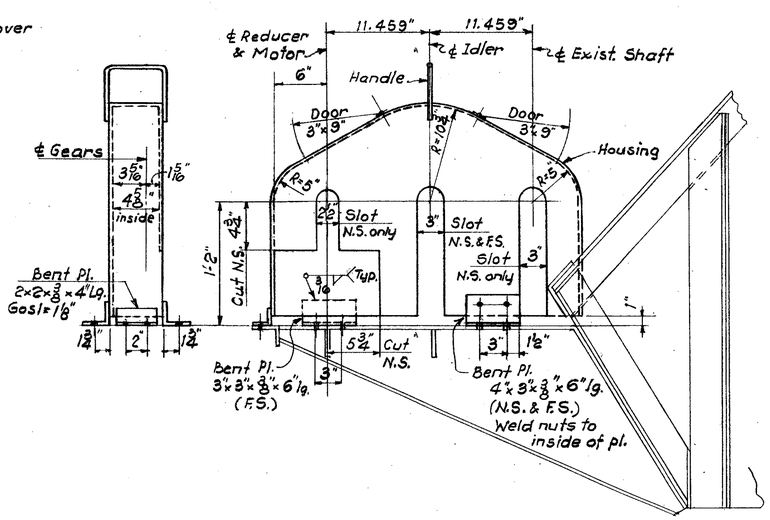
TYP. DOOR
Scale: 1½"=1'-0"



TYP. HANDLE
Scale: 1½"=1'-0"



SECTION A-A
Scale: 1½"=1'-0"



SECTION D-D
Scale: 1½"=1'-0"

NOTES

Material for Machinery Supports - A36 steel.
Material for Gear Covers - 3/16" stainless steel plate.
Machinery Support brackets:
Holes: 13/16"φ
Bolts: ¾"φ H.S. A325
Machinery Equipment:
Holes and Bolts to suit
Gear Covers:
Holes: 9/16"φ
Bolts: ½"φ stainless steel

NOTE

1) Emergency operating machinery supports will be paid for under Item 550.40, Structural Steel (Miscellaneous Steel)
2) Machinery housing shall be paid for under Item 550.46, Structural Steel (Operating Machinery Housing.)
3) Stainless steel machinery housing and accessories shall not to be painted.

Sheet Scale: As Noted

△	DESCRIPTION	BY	DATE
	REVISIONS		

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NEW YORK, N.Y.

REVIEWED BY

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

EMERGENCY OPERATING MACHINERY SUPPORTS

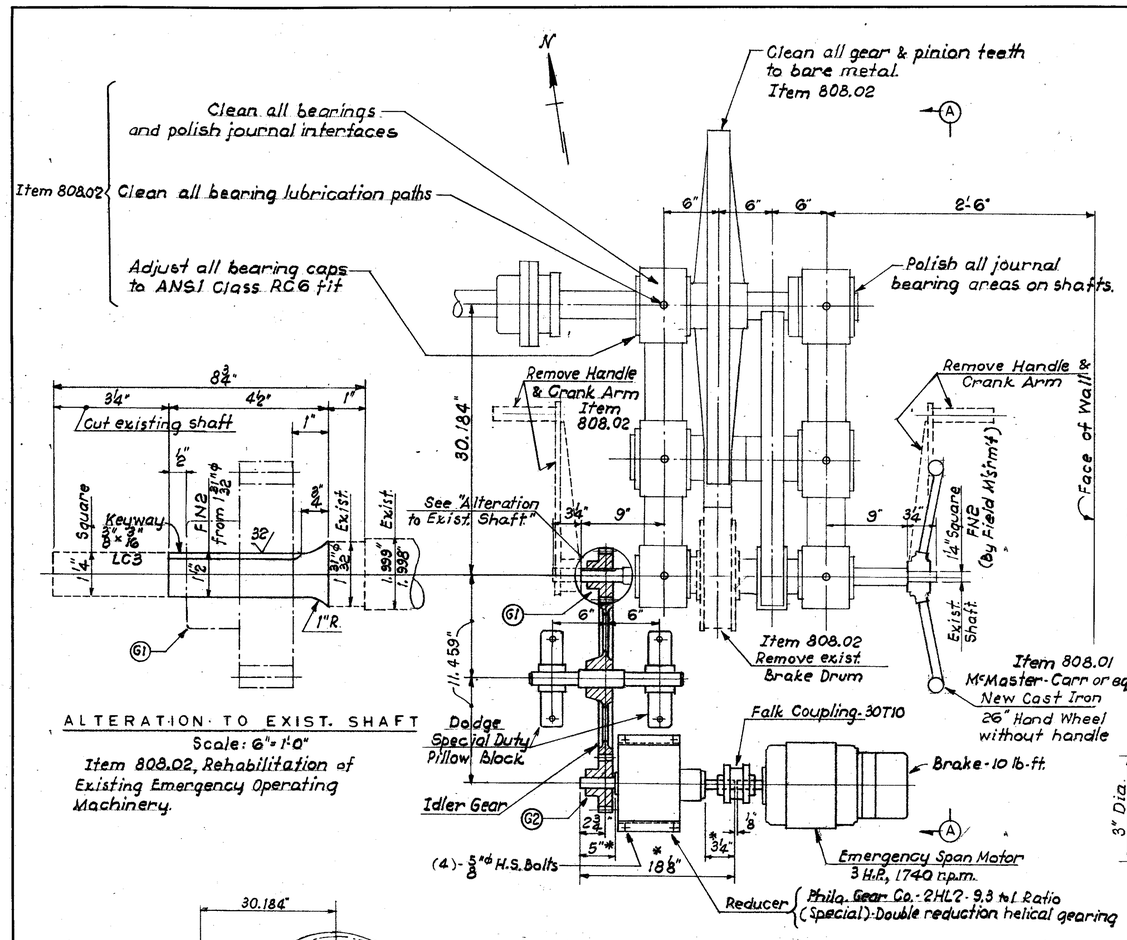
	BY	DATE		BY	DATE
DESIGNED	E.R.S.	3-83	CHECKED	T.E.S.	3-83
DRAWN	E.R.S.	3-83	CHECKED	T.E.S.	4-83
TRACED	—		CHECKED	—	
QUANTITIES	T.E.S.	4-83	CHECKED	W.W.C.	5-83

BRIDGE SHEET NO. 29 OF 43
FILE NUMBER 3-1-2-1

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

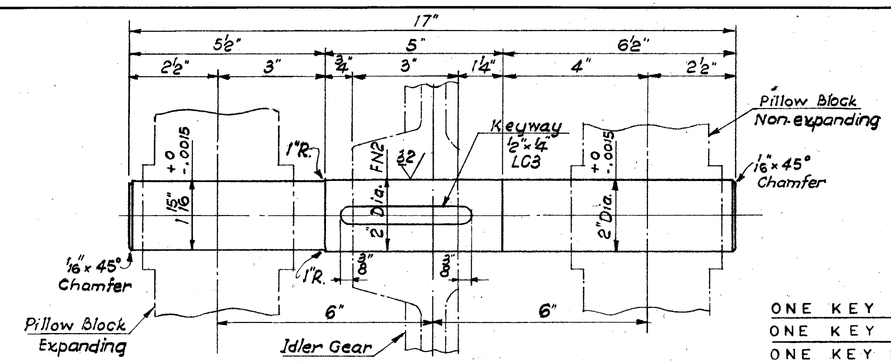
FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



PLAN-NEW EMERGENCY OPERATING MACHINERY

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

Note: * = Special Shaft Length

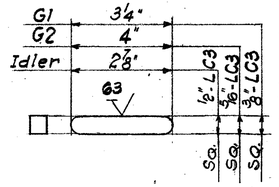


IDLER GEAR SHAFT-ONE REQ'D

Scale: 6" = 1'-0"

Material: Hot Rolled Steel T.G.P.

Spec.: ASTM A108 SAE 1040



ONE KEY REQ'D - PINION GEAR G1

ONE KEY REQ'D - PINION GEAR G2

ONE KEY REQ'D - IDLER GEAR

Pinion Gear - C.F. Carbon Steel with requirements of ASTM A675 - Grade 80

Idler Gear - Forged Carbon Steel - ASTM A668 - Class D

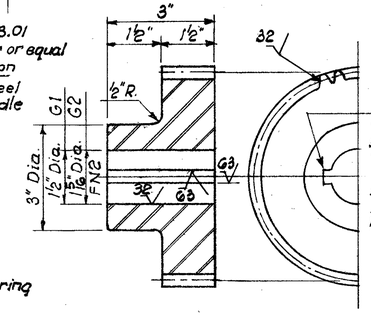
Note

All new emergency operating machinery on this sheet shall be paid for under Item 808.01, Power Emergency Operating Machinery, except for the emergency span motor, which shall be paid for under Item 810, Electrical Work.

ALTERATION TO EXIST. SHAFT

Scale: 6" = 1'-0"

Item 808.02, Rehabilitation of Existing Emergency Operating Machinery.



PINION DATA	
Pitch	1/2" C.P.
No. Teeth	36
Tooth	20° Inv. Spur
P.D.	5.730"
O.D.	6.048"
Face	1 1/2"

Full Depth

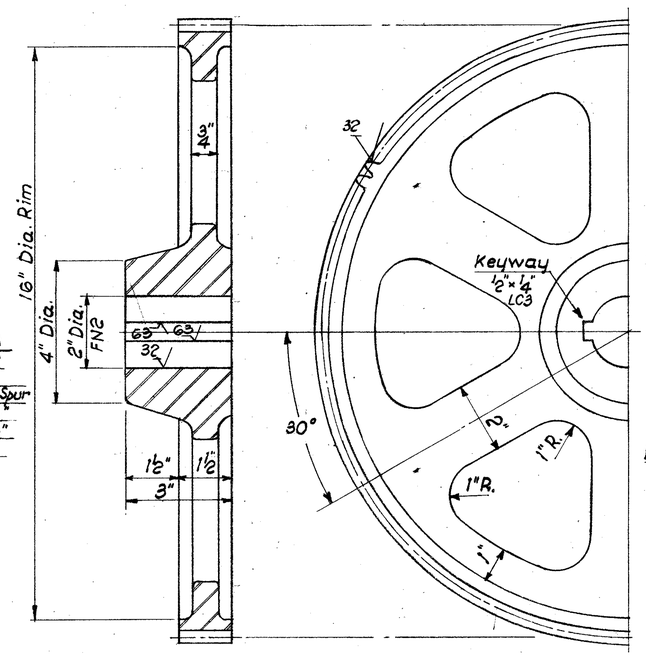
PINION GEAR G1 - ONE REQ'D

PINION GEAR G2 - ONE REQ'D

Material: Forged Alloy Steel

Spec.: ASTM A291 Class 3

Teeth: 225-260 BHN



GEAR DATA	
Pitch	1/2" C.P.
No. Teeth	108
Tooth	20° Inv. Spur
P.D.	17.189"
O.D.	17.507"
Face	1 1/2"

Full Depth

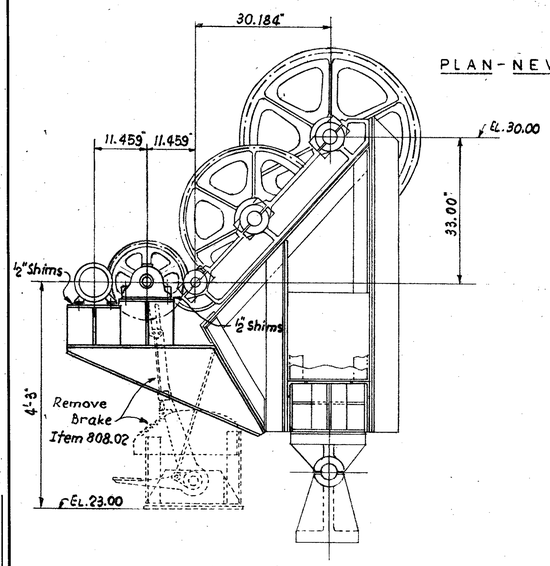
IDLER GEAR-ONE REQ'D

Scale: 6" = 1'-0"

Material: Cast Steel

Spec.: ASTM A148 GR. 90-60

Teeth: 190-225 BHN



SECTION A-A

Scale: 3/4" = 1'-0"

GENERAL MACHINERY NOTES

1) Design of machinery shall conform to the Standard Specifications for Movable Bridges of the American Association of State Highway and Transportation Officials, unless otherwise shown on the Plans, or provided for in the specifications.

2) All dimensions for machine finished surfaces shall be held to ± 0.010 inches, except as otherwise required by the plans or specifications.

3) Fits and Finishes for Machinery shall be as follows:

Surface	Fit	Finish
Machinery base on steel	—	250
Machinery base on masonry	—	500
Shaft journals	RC6	8
Journal bushing	RC6	16
Hubs on shafts (to 2 in. [50.8 mm] bore)	FN2	32
Hubs on shafts (over 2 in. [50.8 mm] bore)	FN2	63
Turned bolts in finished holes	LC6	63
Sliding bearings	RC6	32
Keys and keyways	LC3	63
Machinery parts in fixed contact	—	125
Teeth of open spur gears:		
Under 1 in. (25.4 mm) circular pitch	—	32

Sheet Scale: As Noted

△	DESCRIPTION	BY	DATE
	REVISIONS		

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STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025

FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A

LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

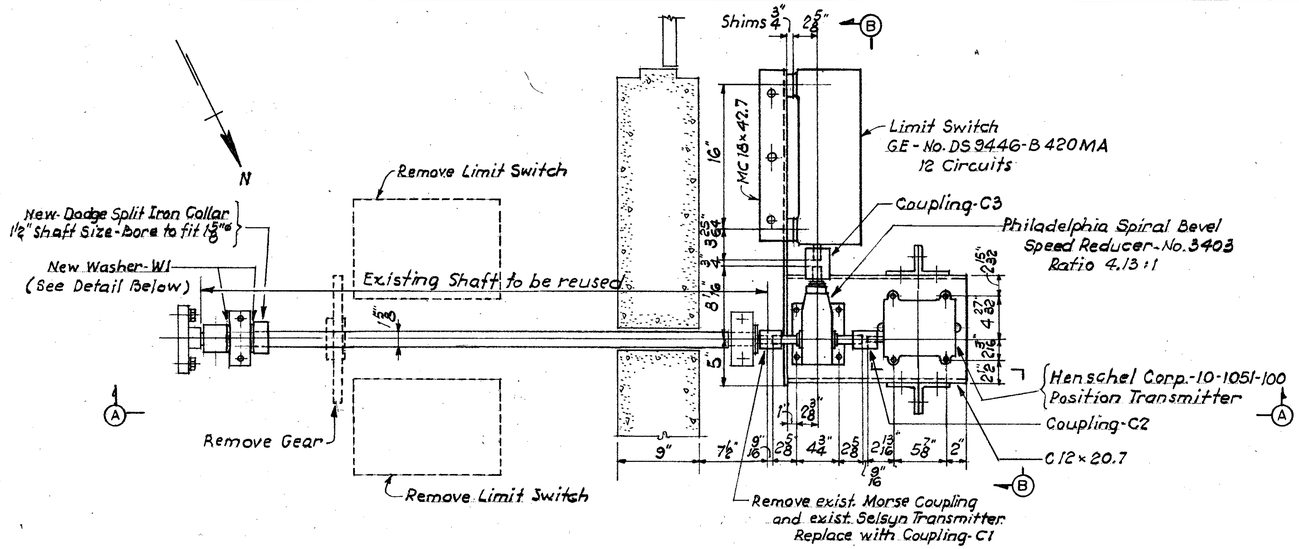
EMERGENCY OPERATING MACHINERY

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED	L.N.	11-82	CHECKED	B.M.T	12-82	30 OF 43
DRAWN	E.R.S.	12-82	CHECKED	B.M.T.	12-82	FILE NUMBER
TRACED	—		CHECKED	—		3-1-2-1
QUANTITIES	—		CHECKED	—		

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



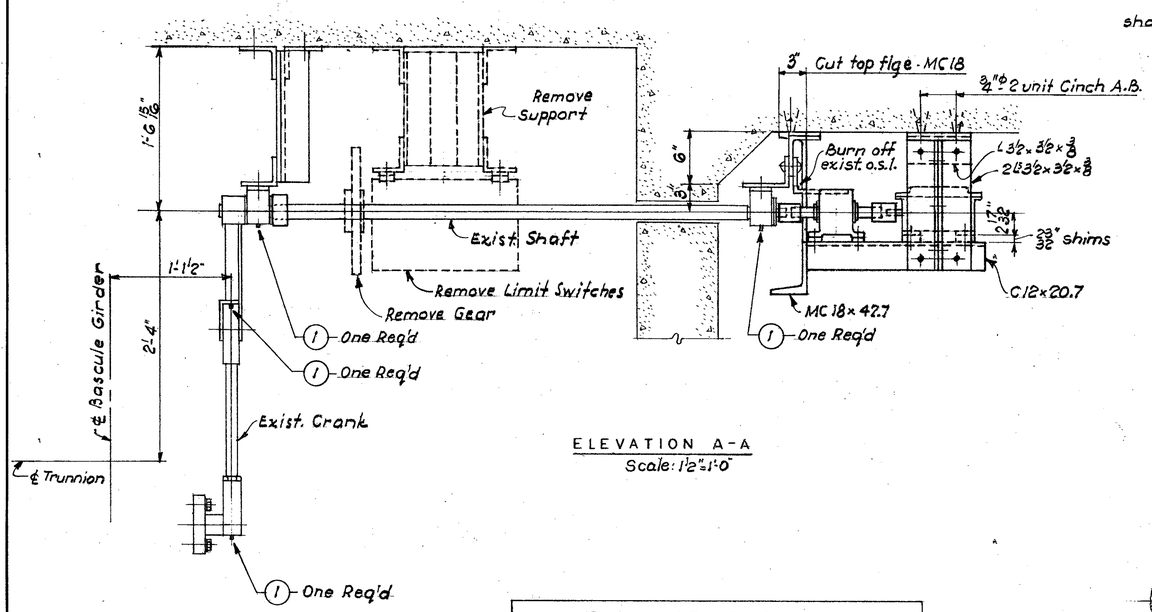
PLAN-INSTRUMENT DRIVE

Scale: 1½"=1'-0"

Note

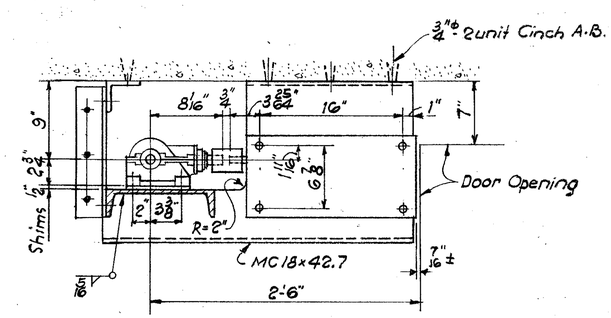
All position drive machinery on this sheet shall be paid for under Item 808.03, Drives for Leaf Limit Switch and Position Transmitter, except as noted.

The limit switch and position transmitter shall be paid for under Item 810, Electrical Work.



ELEVATION A-A

Scale: 1½"=1'-0"



SECTION B-B

Scale: 1½"=1'-0"

NOTES

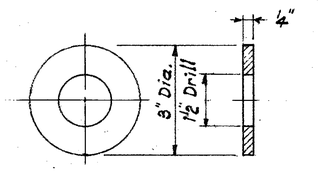
1) Structural Steel Supports - A36, Item 550.40
2) Holes 13/16"φ for ¾"φ H.S. Bolts, unless noted
3) Holes and Bolts for Machinery Equipment - to suit
4) For Gen. Machinery Notes, see Bridge Sheet No. 30
5) All dimensions shown on existing equipment shall be verified in the field by the Contractor.

(1) - Remove and replace 4 existing grease fittings in bearing blocks and connecting rod clevis eyes.

TABLE OF COUPLINGS

MARK	Q'TY	DRIVING HALF NOM. BORE	DRIVING HALF KEY	DRIVEN HALF NOM. BORE	DRIVEN HALF KEY	MODEL	
C1	ONE	1"	4" CROSS PIN	1⅛"	¼" SQ.	Browning Jaw Type. JP4	with Bronze inserts
C2	ONE	1⅛"	1" ¼ SQ	½"	Woodruff N-404 ⅛"x½"	Browning Jaw Type-JP4	
C3	ONE	*13/16"	3/16" SQ	¾"	3/16" SQ.	Browning Jaw Type. JP5	

* Special Bore Size



Chamfer Corners 1/32" x 45°

THRUST WASHER-W1

TWO REQ'D

Material: Bronze SAE #40

Scale: 6"=1'-0"

Sheet Scale: As Noted

△	DESCRIPTION	BY	DATE
	REVISIONS		

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

BASCULE POSITION DRIVES

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED	L.M.	11-82	CHECKED	B.M.T.	12-82	31 OF 43
DRAWN	E.R.S.	12-82	CHECKED	B.M.T.	1-83	FILE NUMBER
TRACED	—		CHECKED	—		
QUANTITIES	—		CHECKED	—		3-1-2-1

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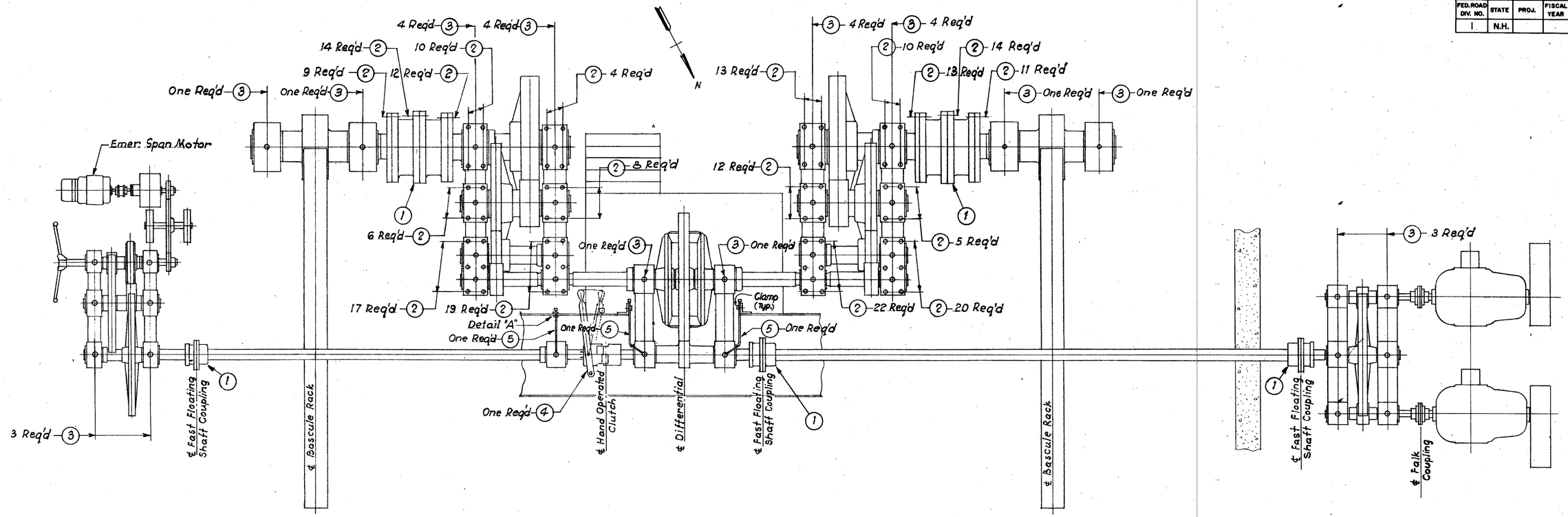
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



PLAN - OPERATING MACHINERY

Scale: 3/4" = 1'-0"

OPERATING MACHINERY FASTENERS			
	COUPLINGS	BEARINGS	UNITS
NUTS	73	146	219
BOLTS (STANDARD)	36*	–	72
BOLTS (TURNED)	–	28*	112
			403

* ESTIMATED

UNIT OF MEASURE FOR PAYMENT

NUT = 1
STD. BOLT = 2
TURNED BOLT = 4

(1) - Rehabilitate Flexible Couplings

Matchmark, dismantle, clean, examine, re-assemble and lubricate (5) flexible gear couplings.

Item 808.06, Dismantling and Examination of Flexible Couplings.

(2) - Replace Nuts and Lockwashers

Total - 73 nuts and lockwashers at couplings
Total - 146 nuts at bearing caps.

Turned stud bolts and cap screws to be replaced if found necessary by the Engineer.

Item 808.04, Replacement of Machinery Fasteners.

(3) - Remove and replace (34) existing grease fittings in bearing caps.

Item 808.05, Lubrication System.

(4) - Rehabilitate Hand-Operated Clutch

Item 808.02, Rehabilitation of Existing Emergency Operating Machinery.

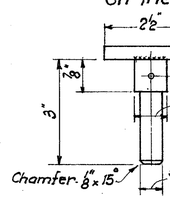
Clean the internal and external spline to bare metal.

Clean and free the shifting lever mechanism.

The external spline shall be slightly reduced, if and where it is found to cause interference.

Install new keeper pin and retaining chain. (See Detail)

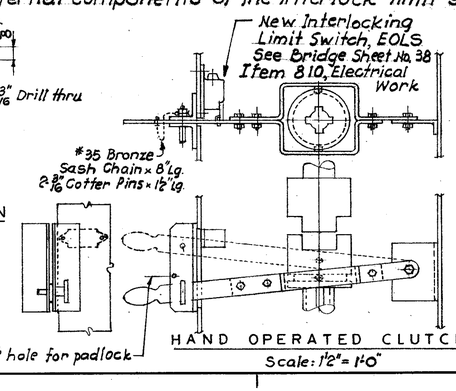
Readjust and repair the actuation of the shift lever on the external components of the interlock limit switch.



KEEPER PIN

Scale: 6" = 1'-0"

Material: A36 F.A.O.

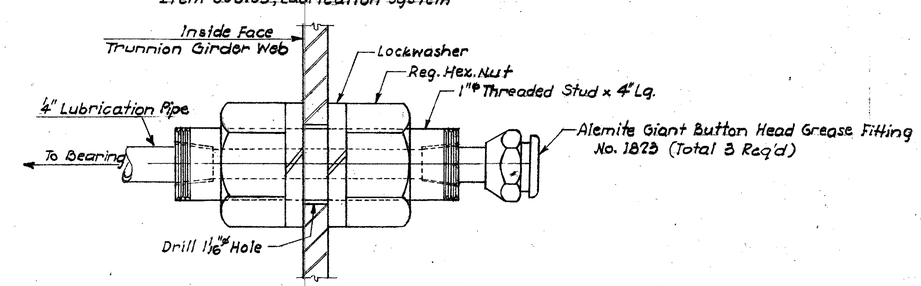


HAND OPERATED CLUTCH

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

(5) - Install 1/4" lubrication piping for (3) bearings

Item 808.05, Lubrication System



DETAIL "A"

Scale: Full Size

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF - 039 - 1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

△	DESCRIPTION	BY	DATE
	REVISIONS		

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NEW YORK, N.Y.

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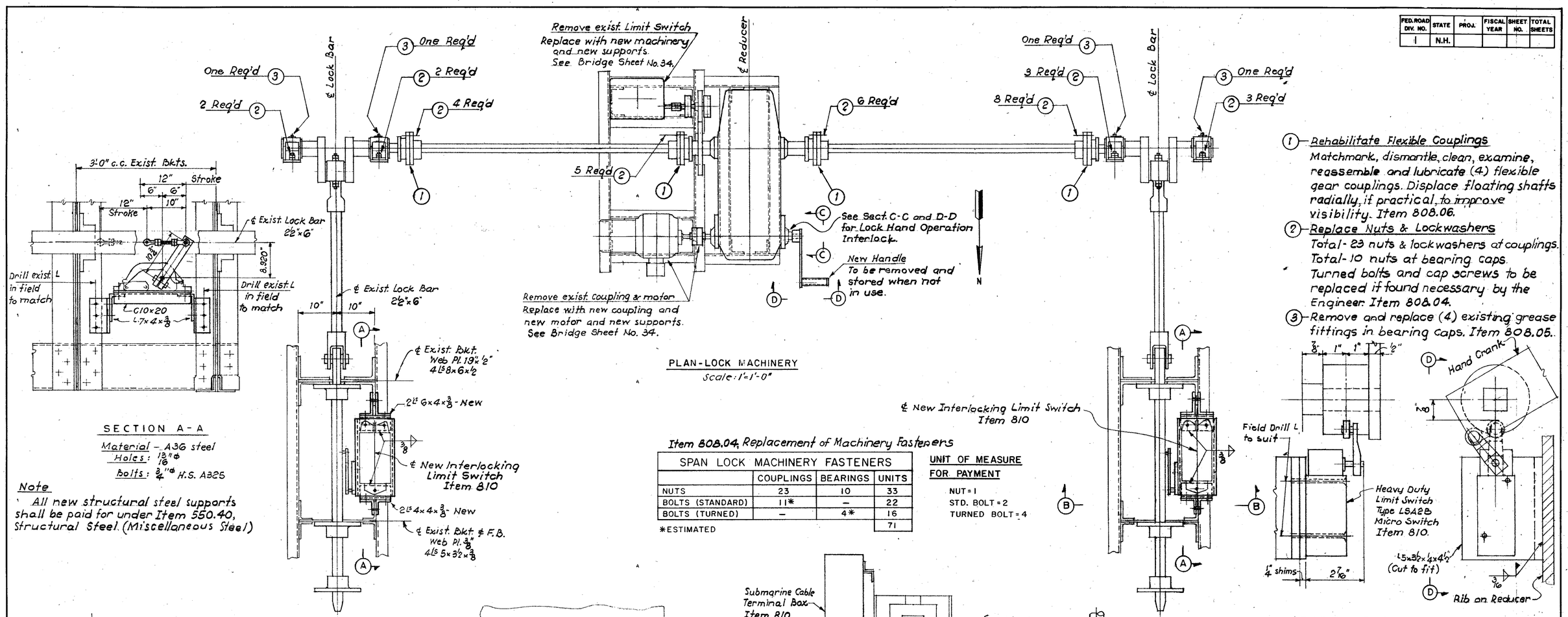
OPERATING MACHINERY REHABILITATION

		BY	DATE			BY	DATE	BRIDGE SHEET NO.
DESIGNED	B.M.T.		1-83	CHECKED	T.E.S.		1-83	32 OF 43
DRAWN	E.R.S.		1-83	CHECKED	B.M.T.		1-83	FILE NUMBER
TRACED	—			CHECKED				
QUANTITIES	B.M.T.		4-83	CHECKED	T.E.S.		4-83	3-1-2-1

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF - 039 - 1(2)		44

Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



PLAN - LOCK MACHINERY
Scale: 1"=1'-0"

SECTION A-A

Material - A36 steel
Holes: 13/16"φ
Bolts: ¾"φ H.S. A325

Note
All new structural steel supports shall be paid for under Item 550.40, Structural Steel. (Miscellaneous Steel)

Item 808.04, Replacement of Machinery Fasteners

SPAN LOCK MACHINERY FASTENERS			
	COUPLINGS	BEARINGS	UNITS
NUTS	23	10	33
BOLTS (STANDARD)	11*	—	22
BOLTS (TURNED)	—	4*	16
			71

*ESTIMATED

UNIT OF MEASURE FOR PAYMENT

NUT = 1
STD. BOLT = 2
TURNED BOLT = 4

(1) Rehabilitate Flexible Couplings
Matchmark, dismantle, clean, examine, reassemble and lubricate (4) flexible gear couplings. Displace floating shafts radially, if practical, to improve visibility. Item 808.06.

(2) Replace Nuts & Lockwashers
Total - 23 nuts & lockwashers at couplings.
Total - 10 nuts at bearing caps.
Turned bolts and cap screws to be replaced if found necessary by the Engineer. Item 808.04.

(3) Remove and replace (4) existing grease fittings in bearing caps. Item 808.05.

SECTION D-D
Scale: 6"=1'-0"

SECTION C-C
Scale: 6"=1'-0"

DETAILS OF LOCK HAND OPERATION INTERLOCK

DETAIL "A"
TYPICAL SUPPORT FOR ARMORED SUBMARINE CABLE
Scale: 1½"=1'-0"

SECTION B-B
Scale: 1"=1'-0"

Item 808.07, Span Lock Bar Limit Switches
INTERLOCK LIMIT SWITCH LINKAGE ASSEMBLY
Scale: 6"=1'-0"
2 Req'd - As Shown

Sheet Scale: 1"=1'-0" & as noted

Δ	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

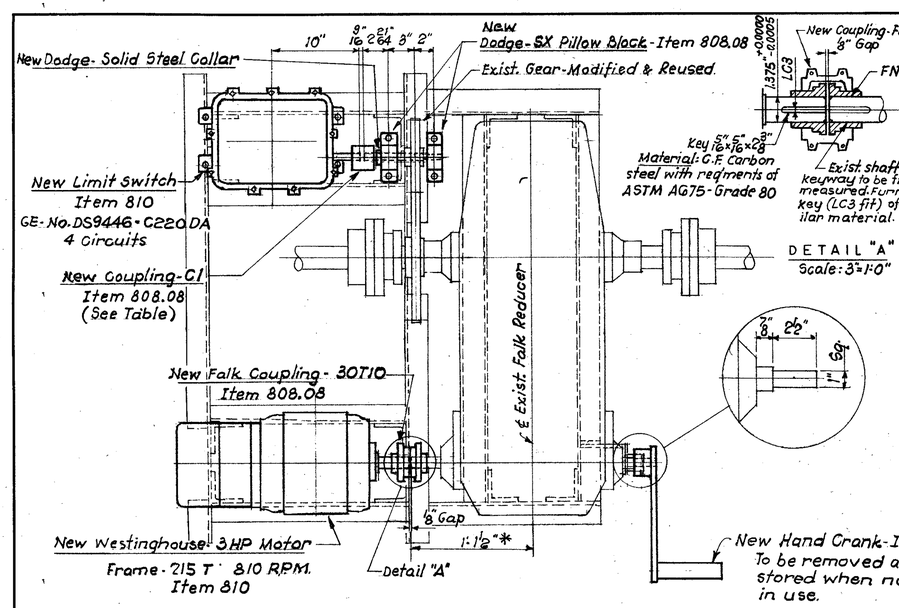
LOCK MACHINERY REHABILITATION - I

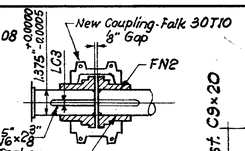
	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED	B.M.T., H.B.H	4-83	CHECKED	H.B.H., B.M.T.	4-83	33 OF 43
DRAWN	E.R.S.	4-83	CHECKED	H.B.H., B.M.T.	4-83	FILE NUMBER
TRACED	—		CHECKED	—		3-1-2-1
QUANTITIES	—		CHECKED	—		

REVIEWED BY	PROJ. NO.	SHEET NO.	TOTAL SHEETS
	BHF-039-1(2)		44

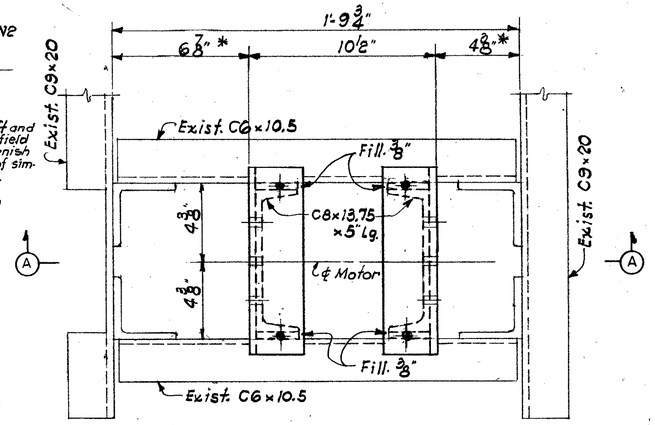
Proj. Engr. E. S. Tulich

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

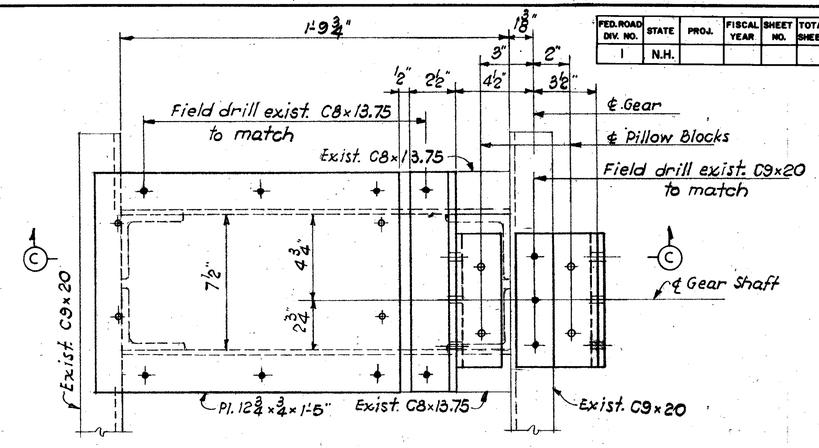




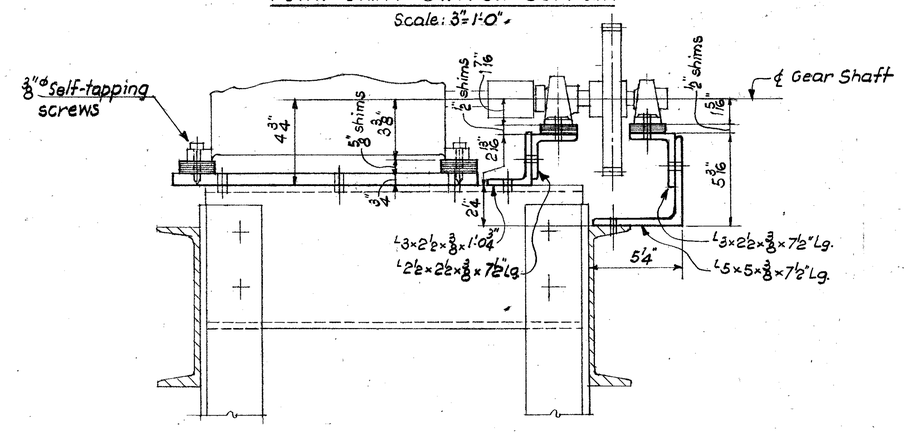
DETAIL "A"
Scale: 3"=1'-0"



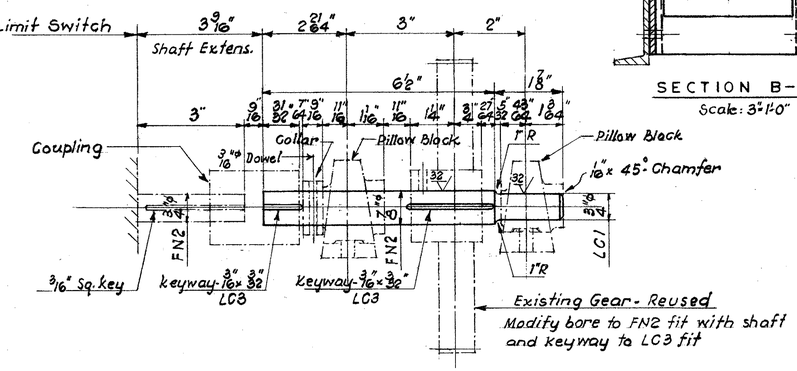
PLAN-MOTOR SUPPORT
Scale: 3"=1'-0"
✱ = Dimension to be verified in field



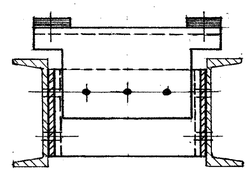
PLAN-LIMIT SWITCH SUPPORT
Scale: 3"=1'-0"



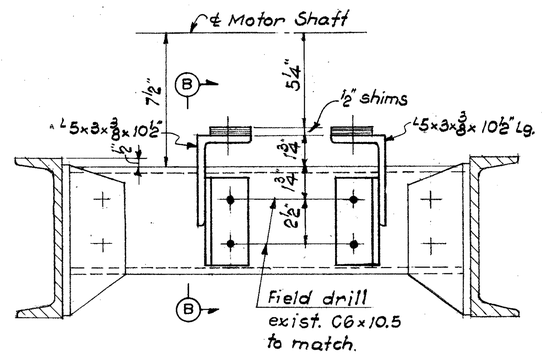
SECTION C-C
Scale: 3"=1'-0"



PLAN-LOCK MACHINERY REPLACEMENTS
Scale: 1 1/2"=1'-0"
✱ = Dimension to be verified in field



SECTION B-B
Scale: 3"=1'-0"



SECTION A-A
Scale: 3"=1'-0"

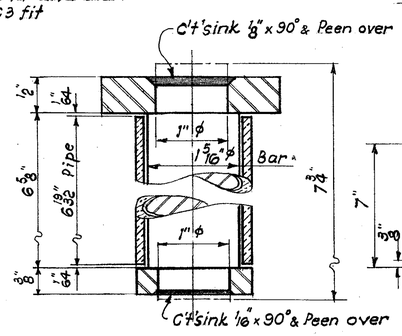
Note
All new machinery and electrical unit supports shall be paid for under Item 550.40, Structural Steel (Miscellaneous Steel).

NOTES
1) Structural Steel Supports - A36
2) Holes 13/16"φ for 3/4"φ A325 H.S. Bolts - unless noted.
3) Holes and Bolts for Machinery Equip't - to suit.
4) For General Machinery Notes, see Sheet No. 30
5) All dimensions shown on existing equipment shall be verified in the field by the Contractor.

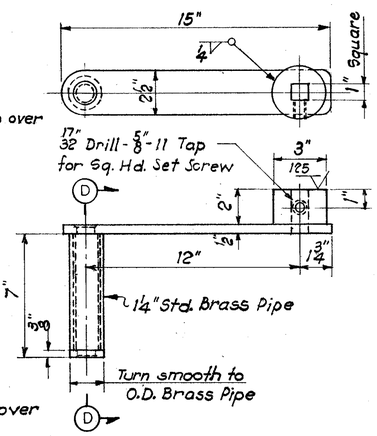
GEAR SHAFT-ONE REQ'D
Scale: 6"=1'-0"

Material: Hot Rolled Steel T.G.P.
Spec.: ASTM A108-SAE 1040
Item 808.08

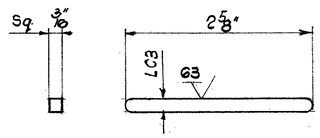
TABLE OF COUPLING						
Mark	Q't'y	Driving Half		Driven Half		Model
		Nom. Bore	Key	Nom. Bore	Key	
C1	One	3/4"φ	3/16" Sq.	7/8"φ	3/16" Sq.	Browning Jaw Type JP4 with bronze insert



SECTION D-D
Scale: Full Size



CRANK FOR SPEED REDUCER
Scale: 3"=1'-0"
ONE REQ'D - Item 808.08



ONE KEY REQ'D-EXIST. GEAR
Material: C.F. Carbon Steel with requirements of ASTM A675-Grade 80.
Scale: Full Size

Sheet Scale: As Noted

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

LOCK MACHINERY REHABILITATION - 2

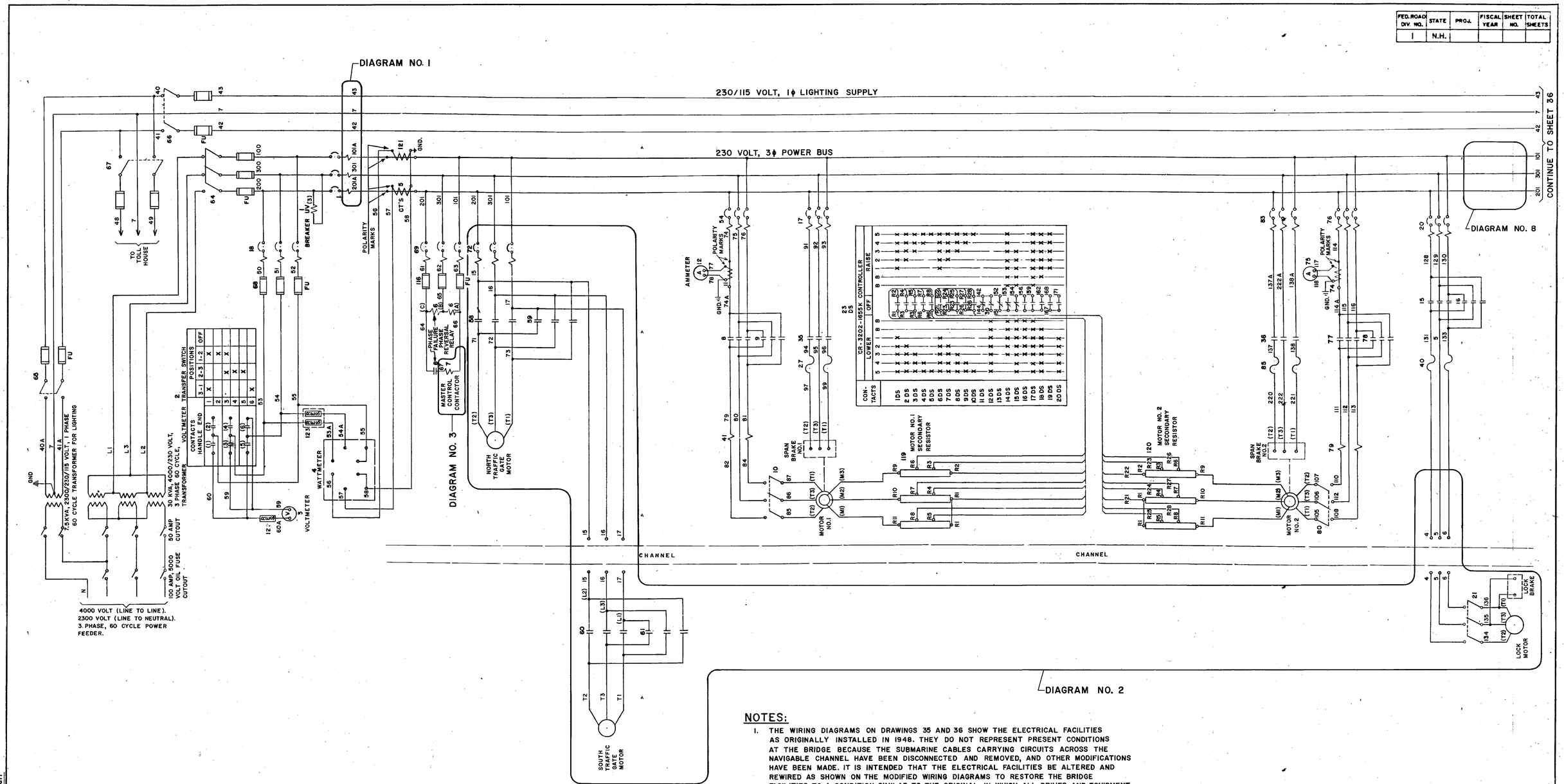
	BY	DATE		BY	DATE
DESIGNED	H.B.H., B.M.T.	5-83	CHECKED	B.M.T., H.B.H.	5-83
DRAWN	E.R.S.	5-83	CHECKED	B.M.T., H.B.H.	5-83
TRACED	—		CHECKED	—	
QUANTITIES	—		CHECKED	—	

BRIDGE SHEET NO. 34 OF 43
FILE NUMBER 3-1-2-1

REVIEWED BY	PROJ. NO.	SHEET NO.	TOTAL SHEETS
	BHF-039-1(2)		44

Proj. Engr. E.S. Tullch

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



NOTES:

1. THE WIRING DIAGRAMS ON DRAWINGS 35 AND 36 SHOW THE ELECTRICAL FACILITIES AS ORIGINALLY INSTALLED IN 1948. THEY DO NOT REPRESENT PRESENT CONDITIONS AT THE BRIDGE BECAUSE THE SUBMARINE CABLES CARRYING CIRCUITS ACROSS THE NAVIGABLE CHANNEL HAVE BEEN DISCONNECTED AND REMOVED, AND OTHER MODIFICATIONS HAVE BEEN MADE. IT IS INTENDED THAT THE ELECTRICAL FACILITIES BE ALTERED AND REWIRED AS SHOWN ON THE MODIFIED WIRING DIAGRAMS TO RESTORE THE BRIDGE FACILITIES TO A CONDITION SIMILAR TO THE ORIGINAL, IN WHICH ALL DRIVES AND EQUIPMENT WILL BE UNDER DIRECT CONTROL OF THE OPERATOR IN THE BRIDGE CONTROL HOUSE.
2. EXCEPT WHERE OTHERWISE SHOWN ON THE MODIFIED WIRING DIAGRAMS, THE NEW SPAN LIMIT SWITCH IS TO BE CONNECTED TO THE EXISTING CIRCUITS AND EQUIPMENT AS SHOWN HEREON.
3. APPARATUS AND WIRING WITHIN EACH AREA ENCLOSED BY A HEAVY LINE SHALL BE MODIFIED OR REPLACED, AND REWIRED AS SHOWN ON THE MODIFIED WIRING DIAGRAMS.

SHEET SCALE: NO SCALE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

WIRING DIAGRAM-ORIGINAL ELECTRICAL FACILITIES-I

	BY	DATE		BY	DATE
DESIGNED W.B.B.		12/82	CHECKED H.B.H.		1/83
DRAWN V.V.		1-83	CHECKED H.B.H.		3/83
TRACED —			CHECKED —		
QUANTITIES —			CHECKED —		

BRIDGE SHEET NO. 35 OF 43
FILE NUMBER 3-1-2-1

△	DESCRIPTION	BY	DATE
	REVISIONS		

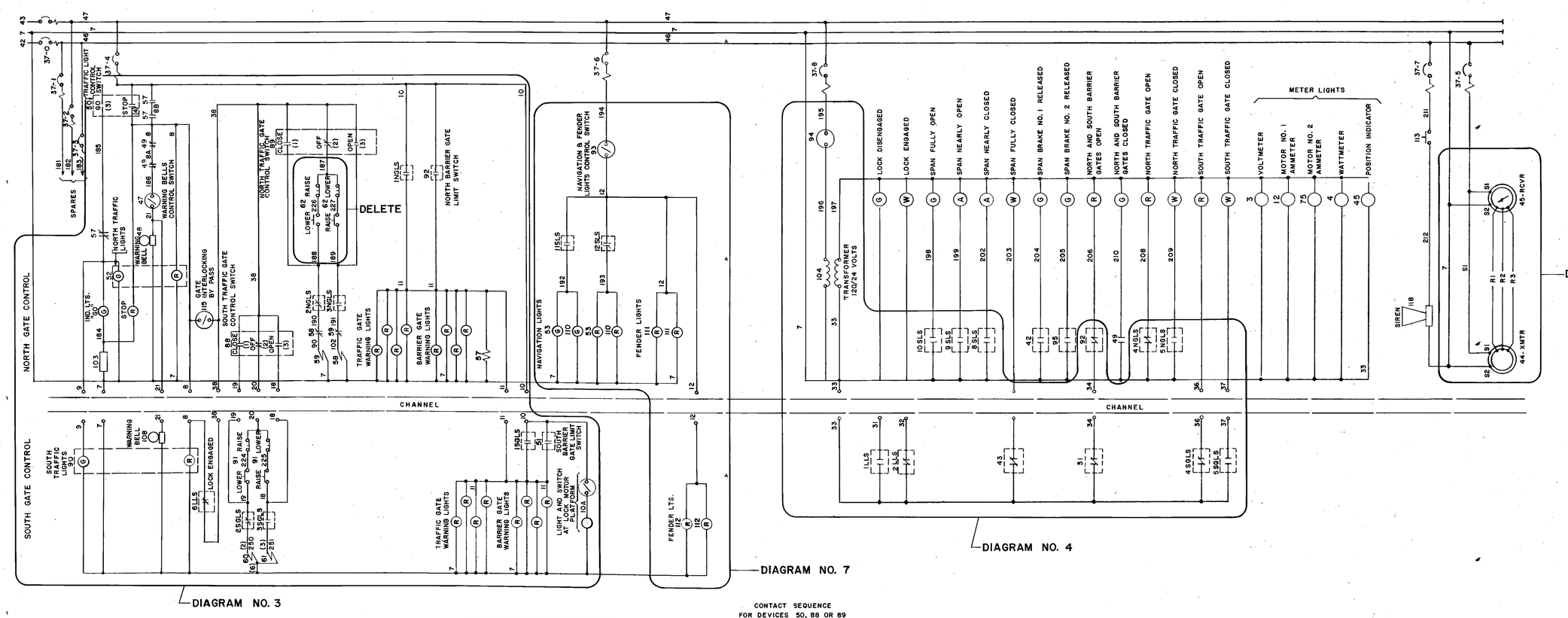
HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

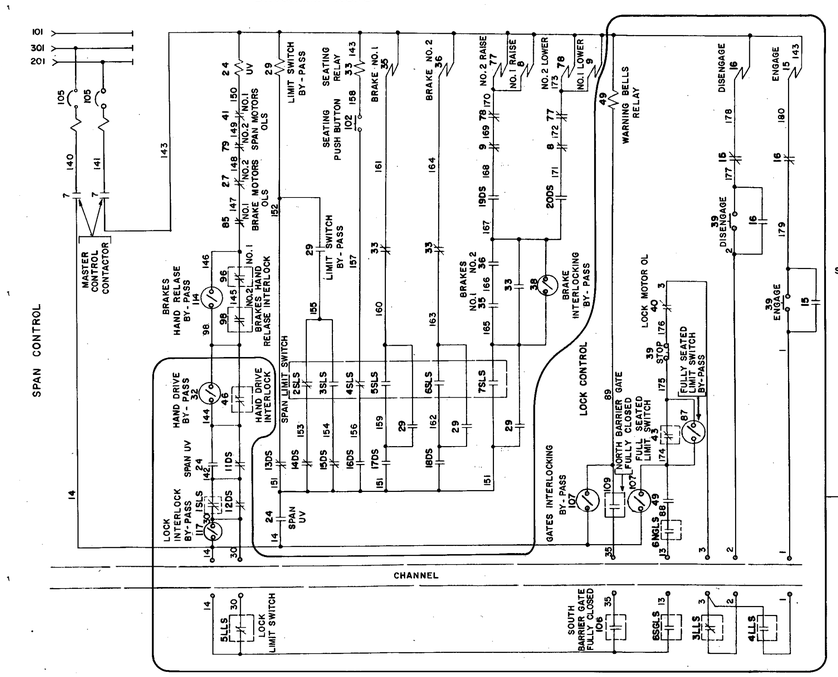
REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich — Elec. Engr. H. B. Hyatt

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				





CONTACT SEQUENCE
FOR DEVICES 50, 88 OR 89
(SWITCHES SHOWN IN OFF POSITION ABOVE)

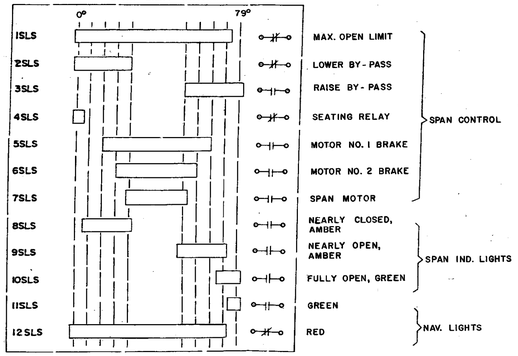
CONTACTS HANDLE END	DEV. NO.	SWITCH MARKING 88 OPEN	89 OFF	50 CLOSE
(1) (2)	1	X		
	2		X	
(3) (4)	3			X
	4	X		
(5) (6)	5		X	
	6			X

101 SGLS
SOUTH TRAFFIC GATE LIMIT SWITCH
CONTACT SEQUENCE SAME AS NGLS

100 NGLS
NORTH TRAFFIC GATE LIMIT SWITCH

	CLOSED	OPENED	
1NGLS			TRAFFIC AND WARNING LIGHT INTERLOCK
2NGLS			CLOSE GATE
3NGLS			OPEN GATE
4NGLS			FULLY OPEN IND. LT.
5NGLS			FULLY CLOSED IND. LT.
6NGLS			LOCK INTERLOCK

22 SLS
SPAN LIMIT SWITCH



SHEET SCALE: NO SCALE

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE
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TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

WIRING DIAGRAM-ORIGINAL ELECTRICAL FACILITIES-2

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED	H.B.H. & W.B.B.	12/82	CHECKED	H.B.H.	2/83	36 OF 43
DRAWN	V.V.	1-83	CHECKED	H.B.H.	5/83	FILE NUMBER
TRACED	—		CHECKED	—		3-1-2-1
QUANTITIES	—		CHECKED	—		

REVIEWED BY	PROJ. NO.	SHEET NO.	TOTAL SHEETS
	BHF-039-1(2)		44

Proj. Engr. E.S. Tulich — Elec. Engr. H.B. Hyatt

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

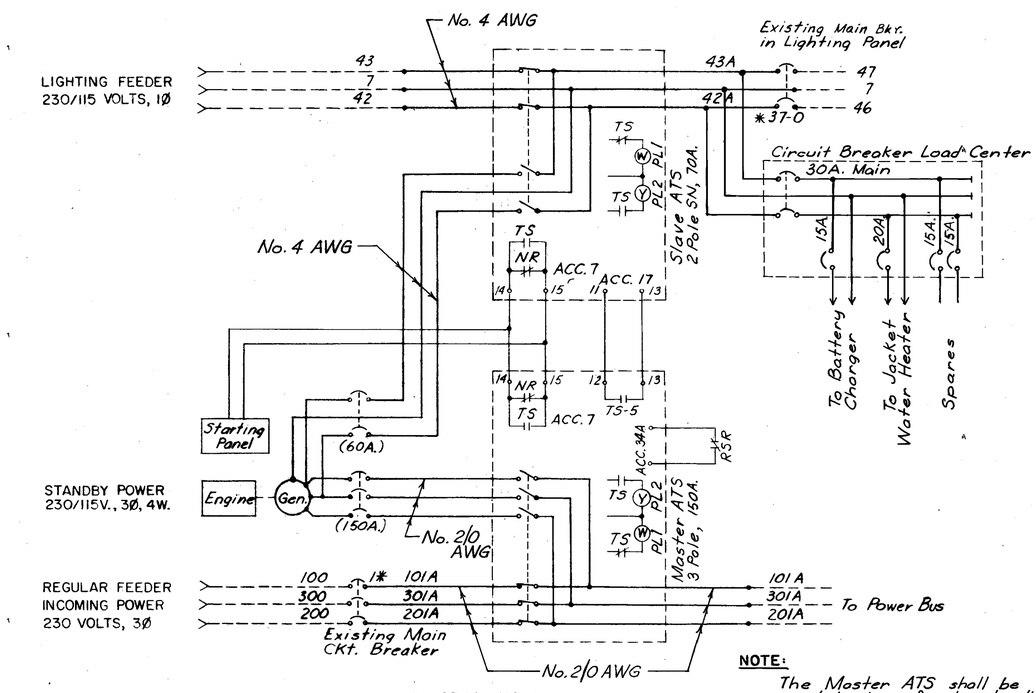

DIAGRAM NO. 1
POWER DISTRIBUTION

NOTE:

The Master ATS shall be arranged to transfer to standby upon failure of the incoming power supply. The Slave ATS shall be arranged to transfer to standby when the Master ATS transfers, or upon failure of the lighting supply. Each ATS shall be provided with two sets of spare transfer switch auxiliary contacts.

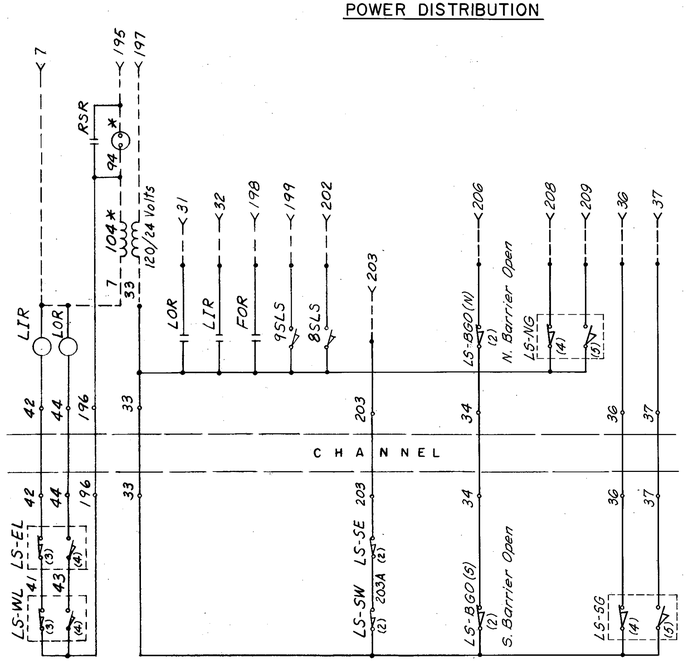

DIAGRAM NO. 4
INDICATING LIGHTS

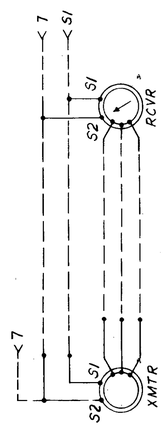

DIAGRAM NO. 5
POSITION INDICATOR

LEGEND

* — Denotes existing equipment. The Contractor is to connect thereto as indicated.

——— — New Wiring

– – – — Existing Wiring

Notes:

1. For arrangement of connections into existing circuits, see Bridge Sh. 35 and 36.
2. Limit switch contacts are shown for gates open, locks engaged and span seated.

STATE OF NEW HAMPSHIRE
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BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

△	DESCRIPTION	BY	DATE
	REVISIONS		

	BY	DATE		BY	DATE
DESIGNED W.B.B.		2/83	CHECKED H.B.H.		3/83
DRAWN H.B.		3/83	CHECKED H.B.H.		3/83
TRACED —			CHECKED		
QUANTITIES —			CHECKED		

MODIFIED WIRING DIAGRAMS - 1

BRIDGE SHEET NO. 37 OF 43
FILE NUMBER 3-1-2-1

HARDESTY & HANOVER CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich — Elec. Engr. H. B. Hyatt

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

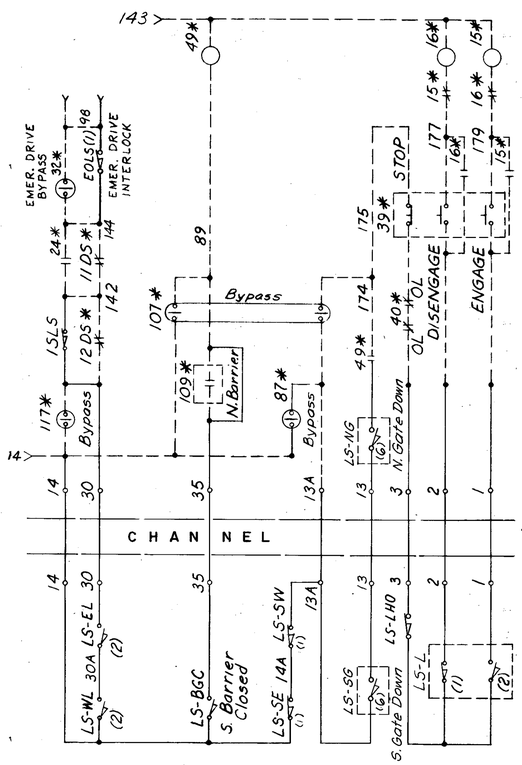


DIAGRAM NO. 6
LOCK CONTROL CIRCUIT

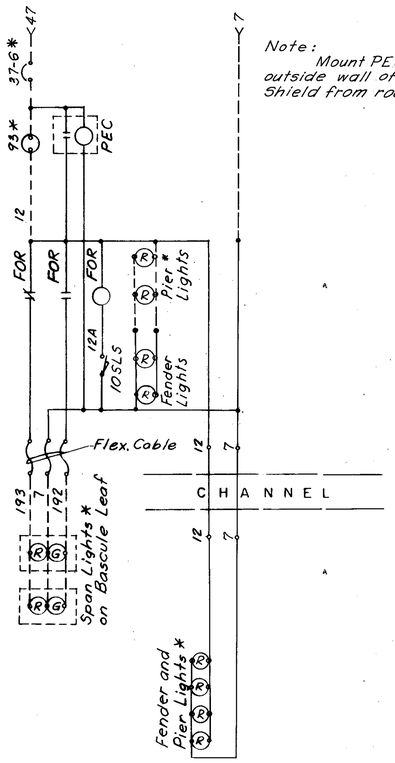


DIAGRAM NO. 7
NAVIGATION LIGHTS

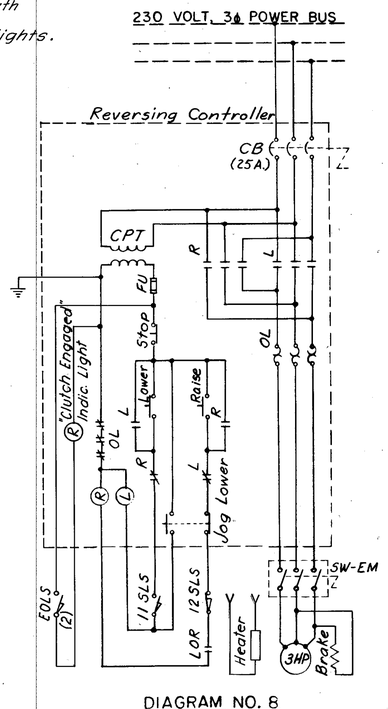
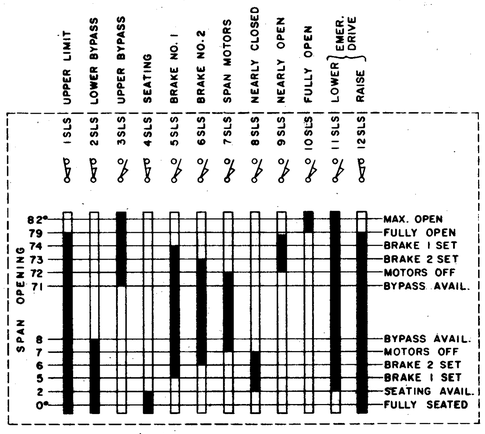
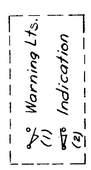


DIAGRAM NO. 8
EMERGENCY SPAN DRIVE

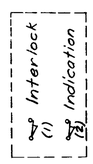
SCHEDULE OF CONTROL APPARATUS			
ITEM	NO. REQ'D	DESCRIPTION	FUNCTION (OR NAMEPLATE)
ATS (MASTER)	1	AUTOMATIC TRANSFER SWITCH, 3 PDT, 150 A., 240 V., ELECTRICALLY-OPERATED, MECHANICALLY-HELD	STANDBY POWER TRANSFER
ATS (SLAVE)	1	AUTOMATIC TRANSFER SWITCH, 2 PDT, 70 A., 240 V., ELECTRICALLY-OPERATED, MECHANICALLY-HELD	STANDBY LIGHTING TRANSFER
SW-L	1	ENCLOSED DISCONNECT SWITCH, 3 PST, 30 A., 240 V., IN NEMA 4 STAINLESS STEEL ENCLOSURE	"IN SIGHT" DISCONNECT
LS-L	1	LIMIT SWITCH, ROTARY, CAM-OPERATED, 4-CIRCUIT REVERSING, IN NEMA 4 WATERTIGHT ENCLOSURE	SPAN LOCKS TRAVEL
LS-WL, LS-EL	2	LIMIT SWITCH, LEVER-OPERATED, SPRING-RETURN, 2-CIRCUIT, WATERTIGHT	SPAN LOCKS - INTERLOCKING
LS-SW, LS-SE	2	LIMIT SWITCH, PLUNGER-OPERATED, 2-CIRCUIT, WATERTIGHT	SPAN FULLY SEATED
LS-BGO (N & S)	2	LIMIT SWITCH, LEVER-OPERATED, SPRING-RETURN, 2-CIRCUIT, WITH PROTECTIVE ENCLOSURE	BARRIER GATE OPEN
LS-BGC (N & S)	2	LIMIT SWITCH, LEVER-OPERATED, SPRING-RETURN, 2-CIRCUIT, WEATHERPROOF	BARRIER GATE CLOSED
TR-TS	1	TIMING RELAY, MOTOR-DRIVEN, 0-15 SEC. ON-DELAY	TRAFFIC LIGHT TIMING
RSR	1	MAGNETIC AUXILIARY RELAY, 8-POLE, 10 A., 120 V.	RED STOP SIGNALS
LIR, LOR	2	MAGNETIC AUXILIARY RELAY, 4-POLE, 10 A., 120 V.	SPAN LOCKS - POSITION
FOR	1	MAGNETIC AUXILIARY RELAY, 4-POLE, 10 A., 120 V.	SPAN FULLY OPEN
PEC	1	PHOTOELECTRIC CONTROL UNIT	NAVIGATION LIGHTS
SLS	1	LIMIT SWITCH, ROTARY, CAM-OPERATED, 12-CIRCUIT REVERSING IN NEMA 1 ENCLOSURE	SPAN TRAVEL
XMTR	1	SYNCHRO-TRANSMITTER, HIGH-ACCURACY, 120 V.	SPAN POSITION TRANSMITTER
RCVR	1	SYNCHRO-RECEIVER, HIGH-ACCURACY, 120 V.	SPAN POSITION RECEIVER
SW-EM	1	ENCLOSED DISCONNECT SWITCH, 3 PST, 30 A., 240 V., IN NEMA 4 STAINLESS STEEL ENCLOSURE	"IN SIGHT" DISCONNECT
EOLS	1	LIMIT SWITCH, LEVER-OPERATED, SNAP-ACTION, 2-CIRCUIT	EMERGENCY DRIVE INTERLOCK
LS-LHO	1	LIMIT SWITCH, LEVER-OPERATED, SPRING-RETURN	LOCK HAND OPER. INTERLOCK
LS-NG, LS-SG	2	LIMIT SWITCH, CAM-OPERATED, 6 CIRCUIT, REVERSING, PART OF GATE MECHANISM.	GATE TRAVEL AND CONTROL



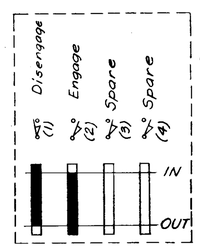
SPAN LIMIT SWITCH
5LS



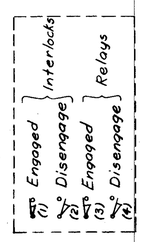
BARRIER OPEN
LS-BGO(N) and LS-BGO(S)



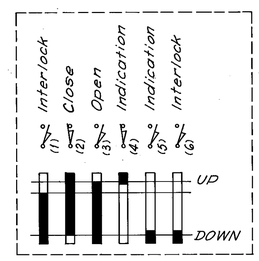
FULLY SEATED
LS-SW and LS-SE



LOCK LIMIT SWITCH
LS-L



LOCK INTERLOCKS
LS-WL and LS-EL



GATE LIMIT SWITCHES
LS-NG and LS-SG

LIMIT SWITCH DEVELOPMENTS

LEGEND

* - Denotes existing equipment. The Contractor is to connect thereto as indicated.

——— - New Wiring

– – – – - Existing Wiring

Notes:

1. For arrangement of connections into existing circuits, see Bridge Sheets 35 and 36.
2. Limit switch contacts are shown for gates open, locks engaged and span seated.

LIST OF SYMBOLS

- COIL OF MAGNETIC CONTACTOR OR RELAY
- THERMAL OVERLOAD RELAY
- CONTACT OF MAGNETIC CONTACTOR OR RELAY, N.O.
- CONTACT OF MAGNETIC CONTACTOR OR RELAY, N.C.
- LIMIT SWITCH CONTACT, NORMALLY OPEN
- LIMIT SWITCH CONTACT, NORMALLY CLOSED
- CIRCUIT BREAKER
- PUSHBUTTON, NORMALLY OPEN
- PUSHBUTTON, NORMALLY CLOSED
- TUMBLER SWITCH, SPST
- LIGHTING FIXTURE
- CONVENIENCE RECEPTACLE, WT

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

MODIFIED WIRING DIAGRAMS - 2

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED W.B.B.		3/83	CHECKED H.B.H.		3/83	38 OF 43
DRAWN H.B.		3/83	CHECKED H.B.H.		3/83	FILE NUMBER
TRACED —			CHECKED —			3-1-2-1
QUANTITIES —			CHECKED —			

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich — Elec. Engr. H. B. Hyatt

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				

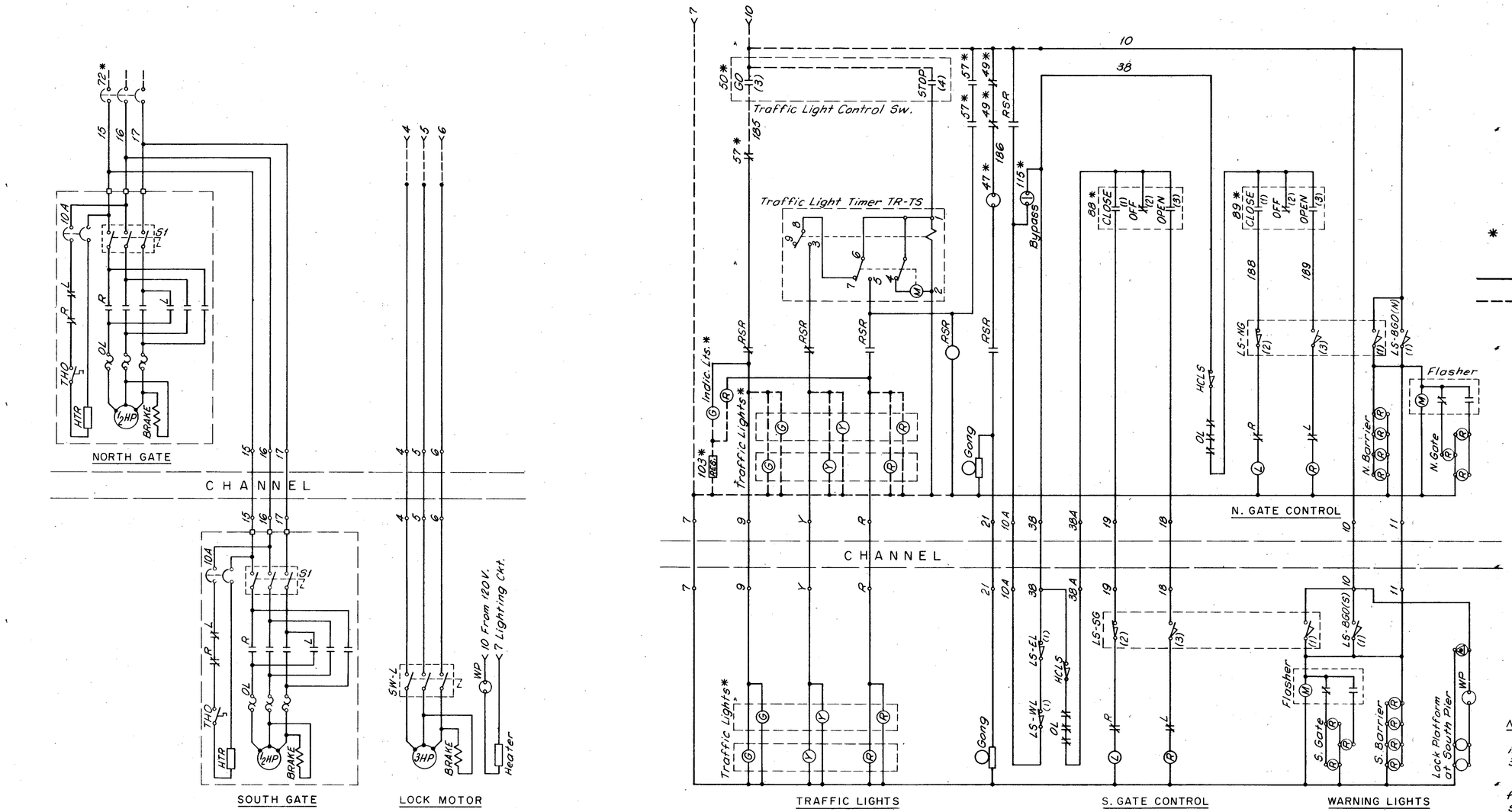


DIAGRAM NO. 2

DIAGRAM NO. 3

LEGEND

* - Denotes existing equipment. The Contractor is to connect thereto as indicated.

—— - New Wiring

- - - - Existing Wiring

Notes:

1. For arrangement of connections into existing circuits, see Bridge Sh. 35 and 36.

2. Limit switch contacts are shown for gates open, locks engaged and span seated.

Proj. Engr. E.S. Tulich Elec. Engr. H. B. Hyatt

Δ	DESCRIPTION	BY	DATE

REVISIONS

HARDESTY & HANOVER CONSULTING ENGINEERS
NEW YORK, N.Y.

STATE OF NEW HAMPSHIRE,
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON BRIDGE NO. 235/025
FEDERAL PROJECT BHF - 039 - 1(2) STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

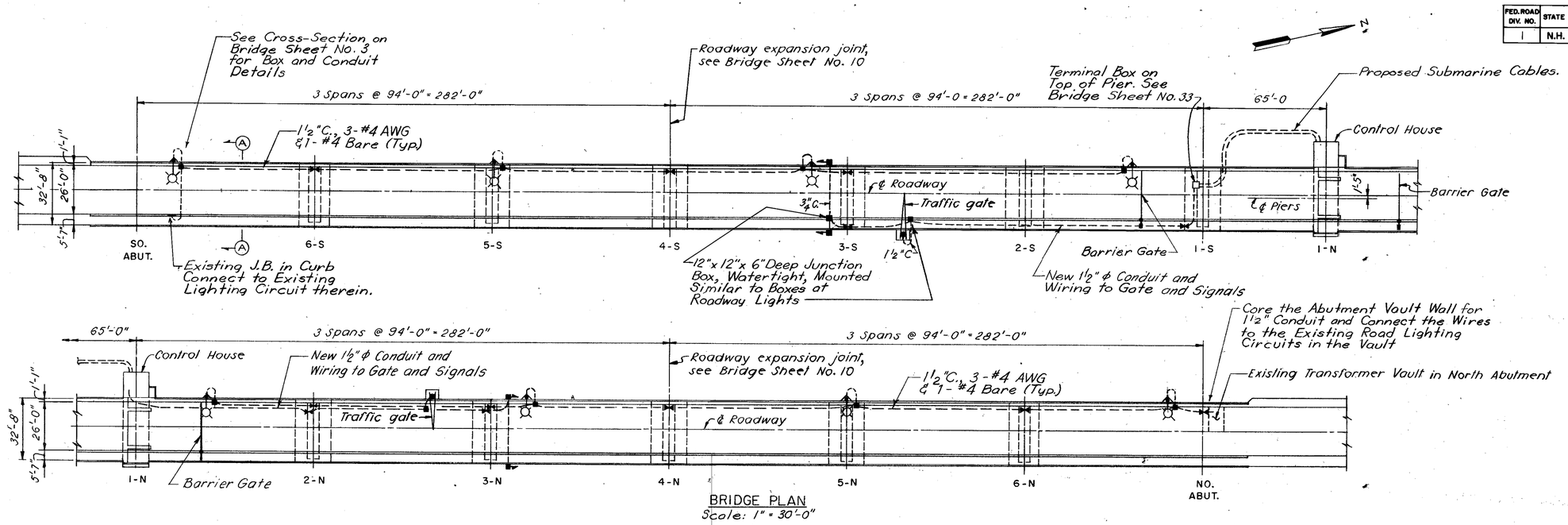
MODIFIED WIRING DIAGRAMS - 3

	BY	DATE		BY	DATE
DESIGNED H.B.H.		9/83	CHECKED H.B.H.		9/83
DRAWN T.Y.		9/83	CHECKED H.B.H.		9/83
TRACED —			CHECKED		
QUANTITIES —			CHECKED		

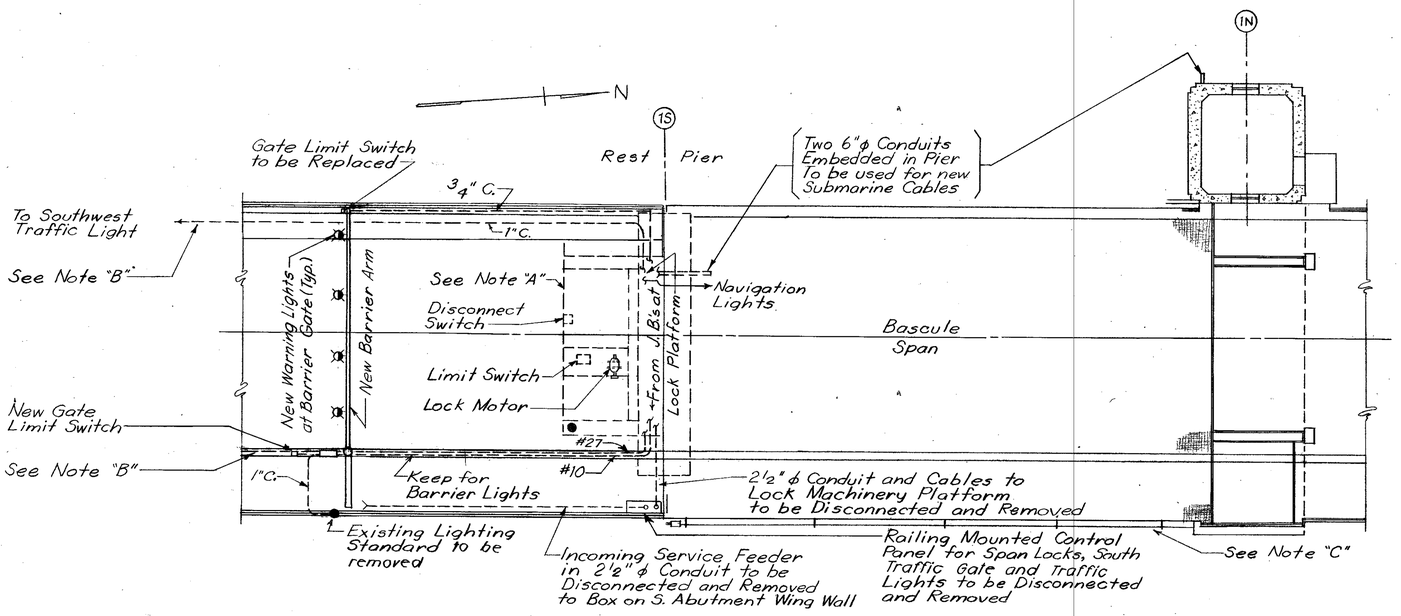
BRIDGE SHEET NO.	FILE NUMBER
39 OF 43	3-1-2-1

REVIEWED BY	PROJ. NO.	SHEET NO.	TOTAL SHEETS
	BHF - 039 - 1 (2)		44

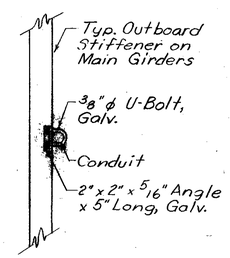
FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



BRIDGE PLAN
Scale: 1" = 30'-0"



BASCULE PLAN
Scale: ⅛" = 1'-0"



SECTION "A-A"
Scale: ¾" = 1'-0"

NOTES:

"A" - The Existing Equipment at the Lock Machinery Platform Below the Roadway Deck, Including the Lock Motor, Disconnect Switch, Lock Limit Switches, Fully Seated Limit Switch, and all Conduits, Boxes and Cables, shall be Disconnected and Removed.

"B" - The Existing Conduits and Cables for Circuits to the South Traffic Gate and Traffic Lights shall be Disconnected and Removed except Conduit in Concrete shall be Abandoned.

"C" - Flexible Cable for Emergency Power Supply to Control Panel. This Control Panel is Mounted on the Railing. Disconnect and Remove the Cable.

LIST OF SYMBOLS

- New Bridge Lighting Pole (Luminaire by Others)
- Rigid Steel Conduit
- Conduit Expansion Fitting
- New Traffic Gate
- C.I. Junction Box (Size as noted)
- Relocated Traffic Lights

Sheet Scale: As Shown

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

ELECTRICAL WORK ON APPROACHES

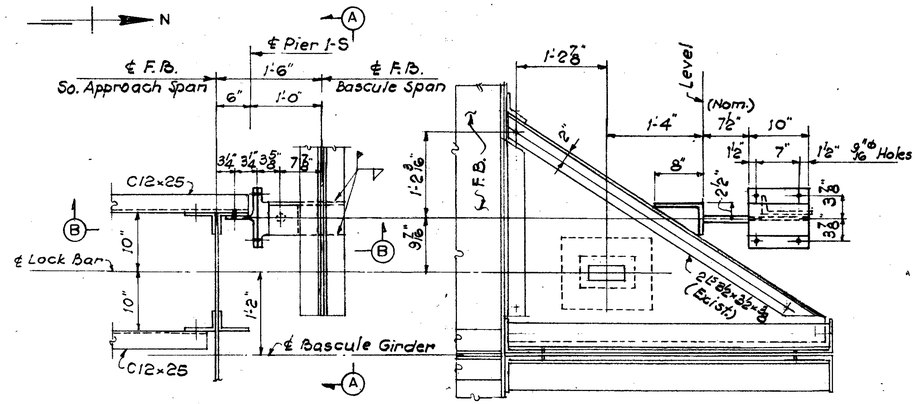
	BY	DATE		BY	DATE
DESIGNED W.B.B.		5/83	CHECKED H.B.H.		5/83
DRAWN H.B.		6/83	CHECKED H.B.H.		6/83
TRACED —			CHECKED —		
QUANTITIES —			CHECKED —		

BRIDGE SHEET NO. 40 OF 43
FILE NUMBER 3-1-2-1

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

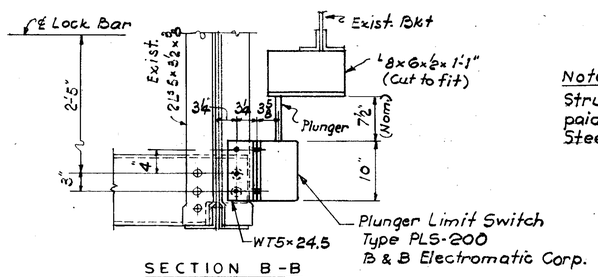
Proj. Engr. E.S. Tulich — Elec. Engr. H.B. Hyatt

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.				



PLAN AT EAST LOCK BAR - SHOWN
PLAN AT WEST LOCK BAR - OPP. HD.
Scale: 1"=1'-0"

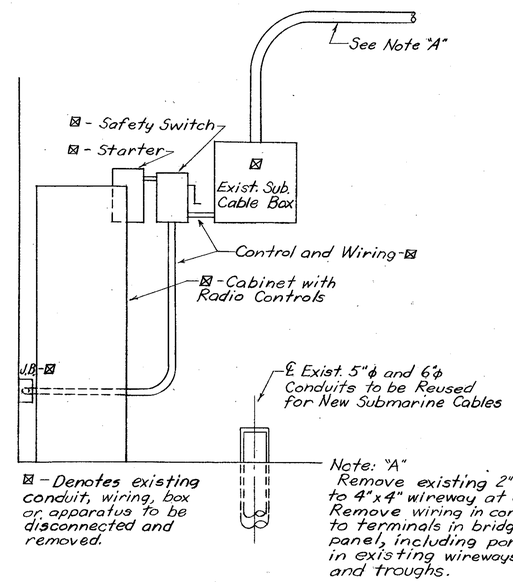
SECTION A-A
Scale: 1"=1'-0"



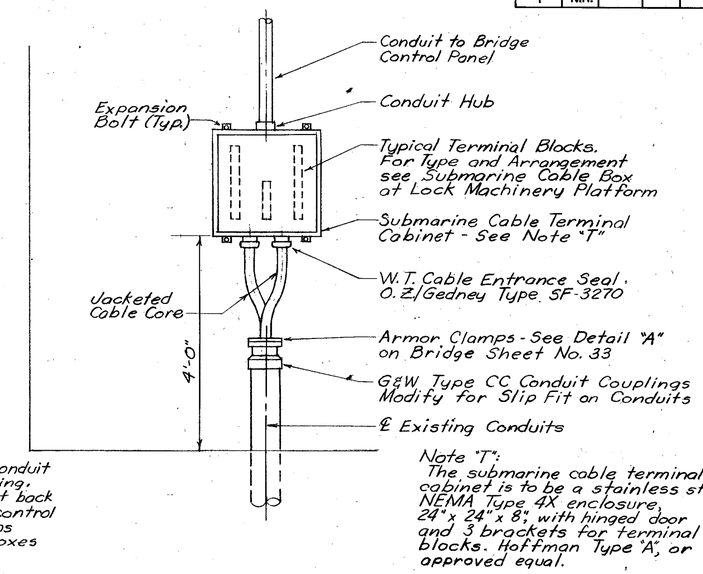
SECTION B-B
Scale: 1"=1'-0"

⊕ = K.O. ¾"φ Rivet and replace with ¾"φ A325 H.S. Bolt
✚ = Drill 13/16"φ hole in exist. L for ¾"φ A325 H.S. Bolt

Note
Structural steel supports shall be paid for under Item 550.40, Structural Steel (Miscellaneous Steel).



ELEVATION
NORTH WALL OF SERVICE ROOM
SHOWING EXISTING EQUIPMENT
Not to Scale

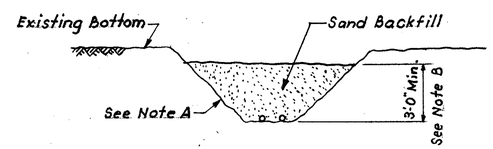


ELEVATION
NORTH WALL OF SERVICE ROOM
SHOWING NEW SUBMARINE CABLES
Not to Scale

NOTES FOR EQUIPMENT REMOVAL

THE FOLLOWING IS A PARTIAL LIST OF EXISTING EQUIPMENT TO BE DISCONNECTED AND REMOVED. OTHER EQUIPMENT TO BE REMOVED IS CALLED OUT ELSEWHERE IN THE PLANS AND DESCRIBED IN THE SUPPPLEMENTARY SPECIFICATIONS:

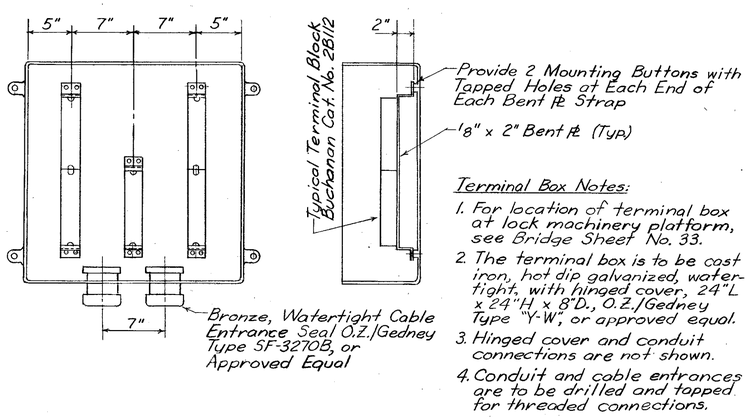
1. ALL ABANDONED CONDUITS, BOXES AND WIRING ON THE BRIDGE, EXCEPT WHERE CONDUITS ARE EMBEDDED IN CONCRETE.
2. THE RADIO CONTROL, CABINETS IN THE CONTROL HOUSE AND AT PIER 1S.
3. CONDUITS, BOXES AND WIRING FOR THE CIRCUITS TO THE EXISTING SPAN LIMIT SWITCHES AND POSITION TRANSMITTER.
4. FLEXIBLE CABLE LOOPS BETWEEN THE FIXED PIER AND THE BASCULE SPAN, FOR THE NAVIGATION LIGHTS AND EMERGENCY POWER SUPPLY.
5. THE EXISTING HAND DRIVE INTERLOCKING LIMIT SWITCH (46) TOGETHER WITH CONDUIT AND WIRING CONNECTING THERETO.
6. THE TWO EXISTING TRAFFIC GATES TOGETHER WITH ALL CONTROLS, CONDUITS AND WIRING EXTENDING THE CIRCUITS THERETO.



DETAIL OF SUBMARINE CABLE TRENCH
Scale: ¼"=1'-0"

NOTES FOR SUBMARINE CABLE INSTALLATION

A. Excavate trench to provide required depth and to permit the material of the trench sides to stand at its natural slope.
B. Across the navigable channel the submarine cables are to be buried not less than 3 feet below the existing bottom but not less than 11 feet below M.L.W.
C. The Contractor is to excavate the bottom where necessary to provide access to the existing conduits in the piers.



Terminal Box Notes:

1. For location of terminal box at lock machinery platform, see Bridge Sheet No. 33.
2. The terminal box is to be cast iron, hot dip galvanized, watertight, with hinged cover, 24"L x 24"H x 8"D., O.Z./Gedney Type "Y-W", or approved equal.
3. Hinged cover and conduit connections are not shown.
4. Conduit and cable entrances are to be drilled and tapped for threaded connections.

DETAILS OF
SUBMARINE CABLE TERMINAL BOX
AT LOCK MACHINERY PLATFORM
Scale: 1½"=1'-0"

Elec. Engr. H. B. Hyatt
Proj. Engr. E. S. Tulich

Sheet Scale: As Noted

△	DESCRIPTION	BY	DATE
	REVISIONS		

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NEW YORK, N.Y.

REVIEWED BY

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N.H. ROUTE 1A OVER HAMPTON RIVER

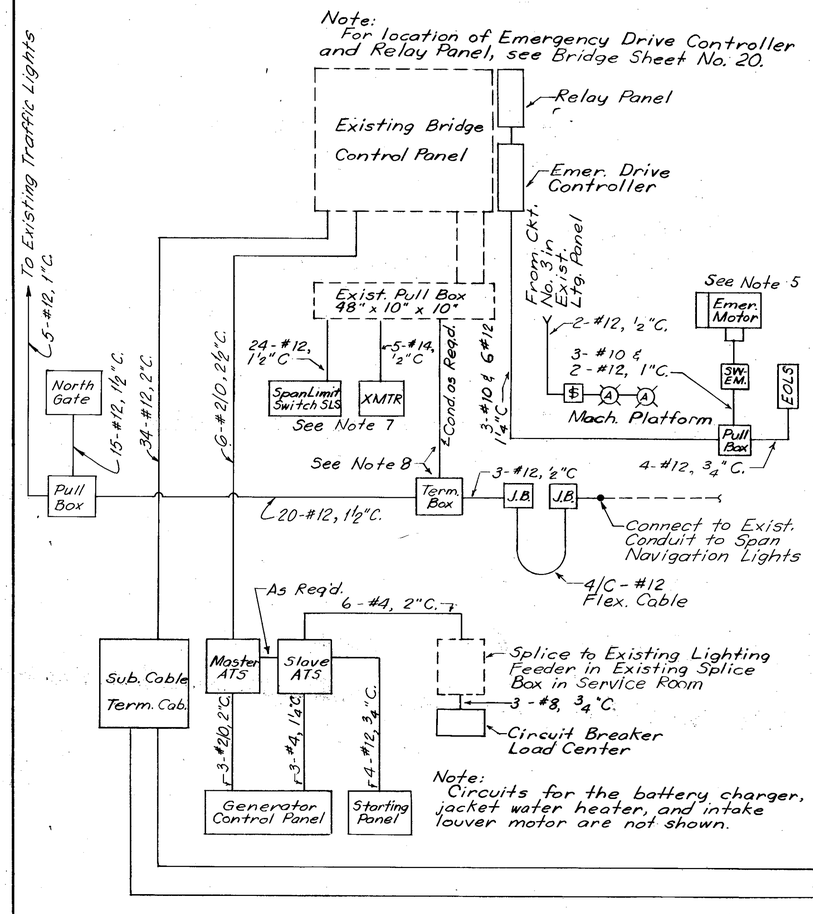
ELECTRICAL DETAILS

	BY	DATE		BY	DATE
DESIGNED W.B.B.			CHECKED H.B.H.		5/83
DRAWN H.B. & E.R.S.			CHECKED H.B.H.		6/83
TRACED —			CHECKED —		
QUANTITIES —			CHECKED —		

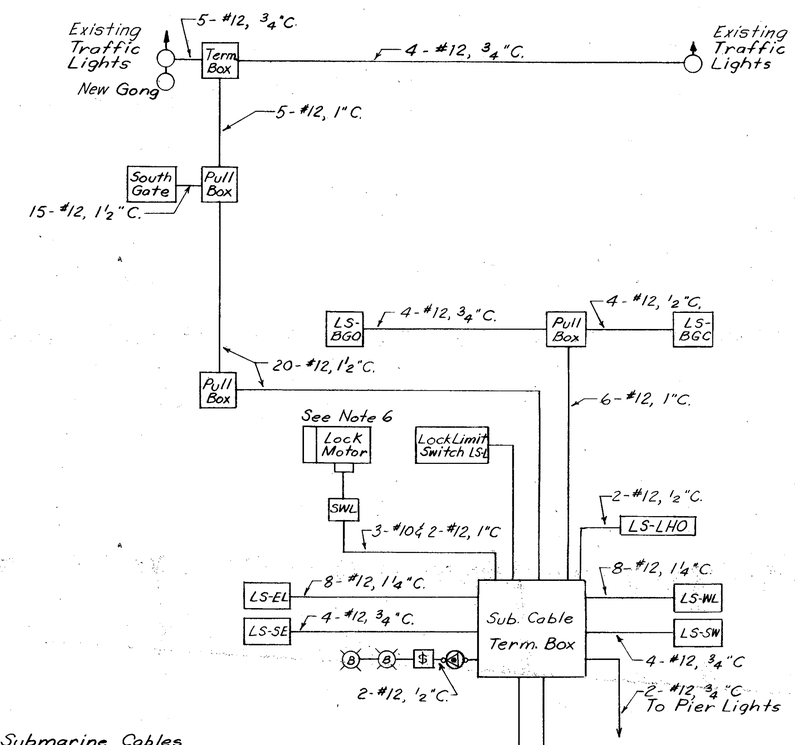
BRIDGE SHEET NO. 41 OF 43
FILE NUMBER 3-1-2-1

PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

FED. ROAD DIV. NO.	STATE	PROJ.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	N.H.	.			



CONTROL HOUSE AND BASCULE PIER 1N



REST PIER 1S AND SOUTH APPROACH

NOTES FOR SCHEMATIC CONDUIT DIAGRAM

1. INTERCONNECTIONS IN EXISTING WIREWAYS AND DUCTS REQUIRED TO CONNECT THE NEW RELAY PANEL AND SUBMARINE CABLES TO THE EXISTING BRIDGE CONTROL PANEL, CONTROL DESK AND LIGHTING PANEL ARE NOT SHOWN. THE CONTRACTOR SHALL MAKE ALL SUCH INTERCONNECTIONS REQUIRED TO PROVIDE A COMPLETE FUNCTIONING SYSTEM IN ACCORDANCE WITH THE MODIFIED WIRING DIAGRAMS.

2. THE NUMBER OF WIRES AND SIZES OF CONDUCTORS SHOWN IN CONDUITS AND CABLES ARE BASED ON THE MODIFIED WIRING DIAGRAMS AND ARE THE MINIMUM PERMISSIBLE. SPARE WIRES HAVE BEEN INCLUDED IN CERTAIN DUCTS.

3. THE SCHEMATIC CONDUIT DIAGRAM DOES NOT PURPORT TO SHOW ALL PULL AND TERMINAL BOXES THAT MAY BE REQUIRED. THE CONTRACTOR SHALL FURNISH AND INSTALL ANY ADDITIONAL BOXES REQUIRED FOR PROPER INSTALLATION OF CABLES IN ACCORDANCE WITH SPECIFIED REQUIREMENTS LIMITING THE NUMBER OF CONDUIT BENDS BETWEEN BOXES.

4. CONDUIT BODIES (CONDULETS) SHALL NOT BE INSTALLED IN ANY PORTION OF THE EXTERIOR CONDUIT SYSTEM, EXCEPT WHERE SPECIFICALLY PERMITTED BY THE ENGINEER. PULL BOXES SHALL BE USED WHEREVER NECESSARY TO FACILITATE THE INSTALLATION OF THE CABLES.

5. THE WINDING HEATER FOR THE EMERGENCY DRIVE MOTOR SHALL BE CONNECTED TO THE CIRCUIT FEEDING THE NEW MACHINERY PLATFORM LIGHTS.

6. THE WINDING HEATER FOR THE NEW LOCK MOTOR SHALL BE CONNECTED TO THE CIRCUIT FEEDING THE NEW LOCK PLATFORM LIGHTS.

7. NEW WIRING FOR THE NEW SPAN LIMIT SWITCH AND POSITION TRANSMITTER SHALL BE EXTENDED AS REQUIRED IN EXISTING TROUGHS AND RACEWAYS AND CONNECTED TO THE PROPER TERMINALS IN THE EXISTING BRIDGE CONTROL PANEL.

8. NEW WIRING FOR THE CIRCUITS TO THE NEW TRAFFIC GATES AND SPAN NAVIGATION LIGHTS SHALL BE EXTENDED AS REQUIRED IN EXISTING TROUGHS AND RACEWAYS AND CONNECTED TO THE PROPER TERMINALS IN THE EXISTING BRIDGE CONTROL PANEL.

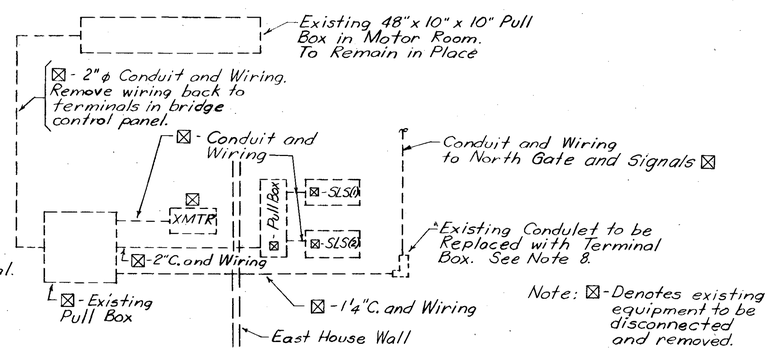
SCHEDULE OF LIGHTING EQUIPMENT

(A) – Vaportight lighting fixture, cast brass, junction box type for ceiling mounting, 100/150 watt size, with type SV vibration-proof lampholder. Furnish with 100-watt rough service lamp. Russellstoll Cat. LVJB 15-G-5V, or approved equal.

(B) – Vaportight lighting fixture, cast brass, junction box type for wall mounting, 100/150 watt size, with type SV vibration-proof lampholder. Furnish with 100-watt rough service lamp. Russellstoll Cat. LVWB 15G-5V, or approved equal.

[$] – Tumbler switch, SPST, 20-amp., 125-volts, specification grade, waterproof enclosure, Russellstoll Cat. No. 3725-S27, or approved equal.

(⊕) – Marine duplex outlet, polarized, grounding-type, 3-wire, 15 amp., 125-volts A-C, fabricated of yellow melamine. Hubbell Cat. No. 52CM62, or approved equal. Mount in cast brass FD box and provide with yellow fiberglass weatherproof lift plate No. 52CM21.



EXISTING FACILITIES AT EAST WALL OF MOTOR ROOM

Note: ⊠-Denotes existing equipment to be disconnected and removed.

LIST OF SYMBOLS

- – – – – – – Existing conduit or cable
- ———— Conduit or cable to be installed under this Contract
- [ ] – Existing box or apparatus enclosure
- [ ] – Box or apparatus enclosure to be installed under this Contract
- 5-#12, 1"C. (Typ.) – Denotes number and size of wires and size of conduit

STATE OF NEW HAMPSHIRE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BRIDGE DESIGN DIVISION

TOWN HAMPTON — BRIDGE NO. 235/025
FEDERAL PROJECT BHF-039-1(2) — STATE PROJECT S-3314-A
LOCATION N. H. ROUTE 1A OVER HAMPTON RIVER

SCHEMATIC CONDUIT DIAGRAM

	BY	DATE		BY	DATE	BRIDGE SHEET NO.
DESIGNED W.B.B.		4/83	CHECKED H.B.H.		5/83	42 OF 43
DRAWN H.B.		5/83	CHECKED H.B.H.		6/83	FILE NUMBER
TRACED –			CHECKED –			
QUANTITIES –			CHECKED –			3-1-2-1

△	DESCRIPTION	BY	DATE
	REVISIONS		

HARDESTY & HANOVER, CONSULTING ENGINEERS
NEW YORK, N.Y.

REVIEWED BY

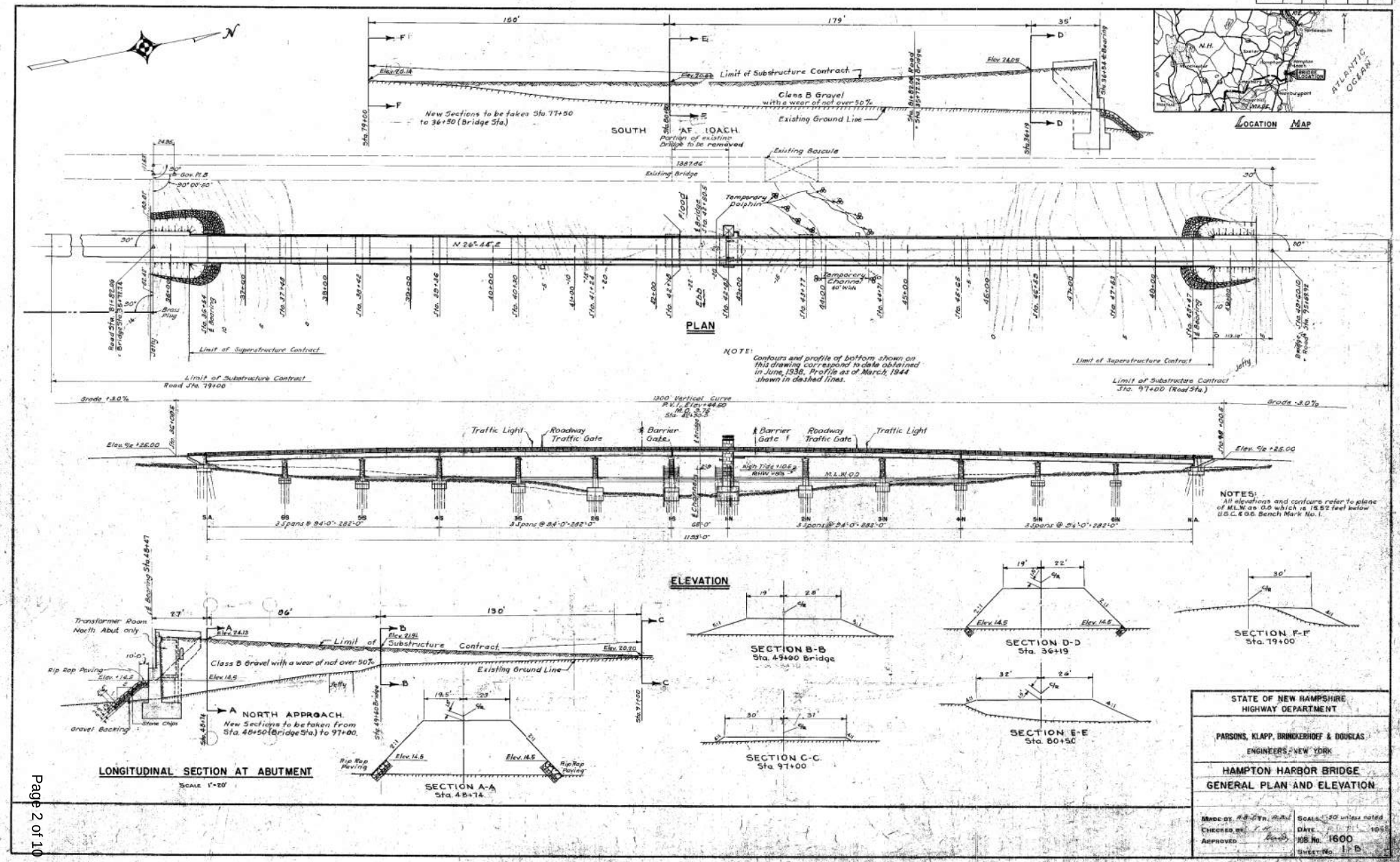
PROJ. NO.	SHEET NO.	TOTAL SHEETS
BHF-039-1(2)		44

Proj. Engr. E. S. Tulich — Elec. Engr. H. B. Hyatt

APPENDIX B3

Select Sheets from 1946 Design Plans

FED. HWY. DIST. NO.	STATE	F.A. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	N.H.	F-318(1)		1-B	68



STATE OF NEW HAMPSHIRE
HIGHWAY DEPARTMENT

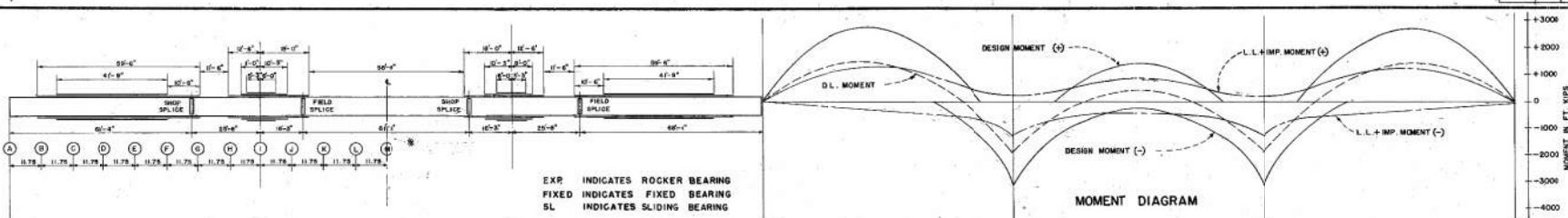
PARSONS, KLAPP, BRINCKERHOFF & DOUGLAS
ENGINEERS - NEW YORK

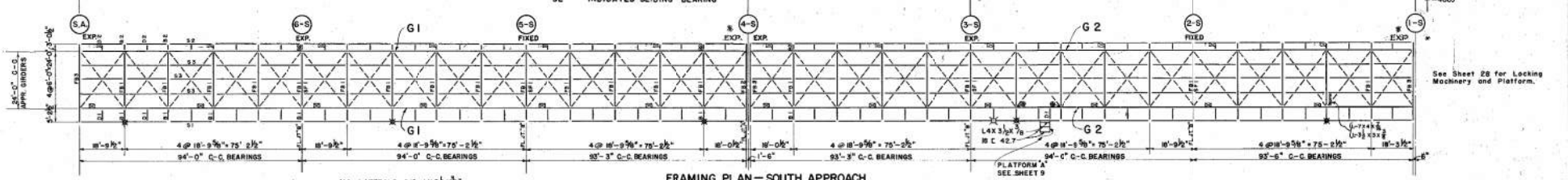
HAMPTON HARBOR BRIDGE
GENERAL PLAN AND ELEVATION

MADE BY R.B.E. Jr. R.A.L. | SCALE 1"=20' unless noted
CHECKED BY J.A. | DATE 1955
APPROVED | JOB No. 1600
SHEET No. 1-B

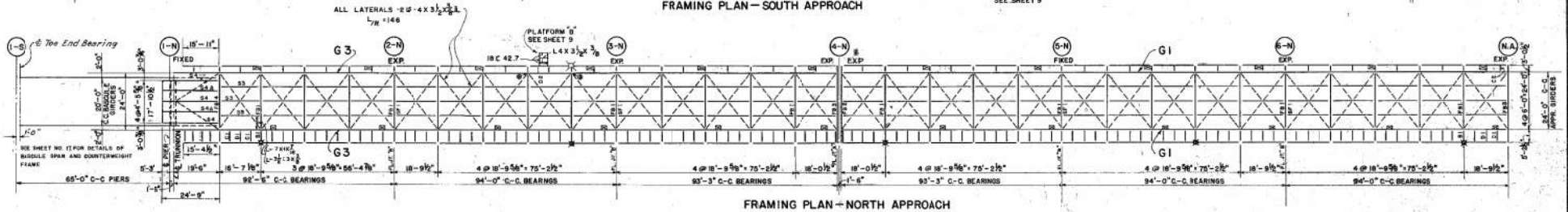
3-15-2-1

FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	N.H.	F-318(1)		7	64





FRAMING PLAN — SOUTH APPROACH



FRAMING PLAN — NORTH APPROACH

GIRDER

SECTION		A	B	C	D	E	F	G	H	I	J	K	L	M
FLANGE	PL	6X6X½	6X6X½	6X6X½	6X6X½	6X6X½	6X6X½	6X6X½	6X6X½	6X6X½	6X6X½	6X6X½	6X6X½	6X6X½
	Cov.			14X3/8	14X3/8	14X3/8	14X3/8			14X3/8	14X3/8			
	Cov.			14X3/8	14X3/8	14X3/8				14X3/8				
	Cov.									14X3/8				
WEB PLATE		80X3/8	80X3/8	80X3/8	80X3/8	80X3/8	80X3/8	80X3/8	80X3/8	80X3/8	80X3/8	80X3/8	80X3/8	80X3/8
NET AREA OF FLANGE SQ. IN.	PL	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50
	½ Web	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
	Cov.			5.25	5.25	5.25	5.25			4.50	4.50			
	Cov.			5.25	5.25	5.25				4.50				
	Cov.									4.50				
	Σ	13.25	13.25	23.75	23.75	23.75	19.50	13.25	13.25	26.75	17.75	13.25	13.25	13.25
MAXIMUM WEB SHEAR KIPS	D.L.	+78.7	+84.0	+29.3	+3.0	-13.0	-14.7	-69.4	-94.1	-119.4	+73.9	+49.2	+16.0	0
	L.L.	+59.7	+46.9	+35.5	+36.7	-39.3	-40.1	-50.8	-61.9	-73.9	+58.4	+47.0	+46.3	+41.0
	I	+10.3	+8.2	+6.3	+6.7	-7.1	-7.0	-8.7	-10.8	-12.2	+9.9	+8.1	+8.1	+7.2
	Σ	+148.7	+109.1	+71.1	+46.4	-59.4	-61.8	-128.9	-166.5	-205.1	+142.2	+104.3	+70.4	+48.2
MAX. POSITIVE MOMENT FT. KIPS	D.L.	0	+775	+2265	+1465	+1380	+995	+331				-101	+291	+434
	L.L.	0	+531	+890	+1074	+1091	+939	+643				+448	+662	+761
	I	0	+81	+147	+176	+178	+153	+105				+77	+114	+127
	Σ	0	+1400	+2302	+2716	+2649	+2087	+1079				+424	+1067	+1323
MAX. NEGATIVE MOMENT FT. KIPS	D.L.							+232	-630	-1881	-873	-144	+204	+304
	L.L.							-434	-584	-1063	-625	-444	-421	-355
	I							-70	-93	-165	-98	-71	-66	-60
	Σ							-272	-1307	-3129	-1596	-659	-285	-154
DESIGN MOMENT		0	+1400	+2302	+2716	+2649	+2087	+1215	-1307	-3129	-1596	-671	+1229	+1490
EFFECTIVE DEPTH FT.		6.43	6.43	6.61	6.61	6.61	6.54	6.43	6.43	6.65	6.53	6.43	6.43	6.43
NET FLG. REQD @ 18 ksi		0	12.1 □"	19.4 □"	22.8 □"	22.3 □"	17.8 □"	10.5 □"	11.3 □"	26.2 □"	13.6 □"	7.6 □"	10.6 □"	12.1 □"

DESIGN MOMENT = MAX (+) OR (-) MOMENT PLUS ½ THE SMALLER MOMENT

FLOORBEAMS

MARK		END F.B. F.B.2	END F.B. F.B.3	INTERM. F.B. F.B.1	INTERM. F.B. F.B.4
MAX. PANEL LENGTH		18'-0½"	18'-9½"	18'-9⅝"	19'-8"
SECTION		21 WF 103#	27 WF 91#	27 WF 98#	
GROSS S.M. (IN.³)		213.1	233.2	255.3	
MAX. SHEAR IN KIPS	D.L.	10	10	17	18
	L.L.	34	34	34	34
	I	10	10	10	10
	Σ	54	54	61	62
MAX. MOMENT IN FT. KIPS	D.L.	72	74	129	122
	L.L.	179	181	181	182
	I	54	54	54	55
	Σ	306	309	364	359
S.M. REQD @ 18 ksi		204	206	242	240

STRINGERS

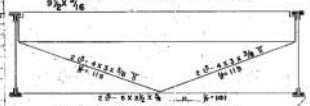
MARK		FASCIA STRINGERS S.1	FASCIA STRINGERS S.2	ROADWAY STRINGERS S.3	ROADWAY STRINGERS S.4	ROADWAY STRINGERS S.4A
MAX. PANEL LENGTH		18'-9⅝"	18'-9⅝"	19'-9⅝"	19'-8"	19'-6"
SECTION			18 WF 47#		12 WF 50#	12 WF 58#
GROSS S.M. (IN.³)			82.3		94.7	78.1 *
MAX. SHEAR IN KIPS	D.L.	3	5	5	5	5
	L.L.	5	12	16	11	11
	I	–	2	3	3	3
	Σ	8	19	25	19	19
MAX. MOMENT IN FT. KIPS	D.L.	14	28	20	18	18
	L.L.	29	67	68	52	51
	I	–	11	20	16	15
	Σ	43	100	113	86	84**
S.M. REQD @ 18 ksi		30	67	76	57	56

* NET S.M. = 64.0 IN.³
** MAXIMUM MOMENT AT LATERAL CONNECTION.

BRACKETS

MARK		B 1	B 2
MAX. PANEL LENGTH		18'-9⅝"	18'-9⅝"
SECTION		18 WF 47#	
GROSS S.M.		82.5 IN.³	
MAX. SHEAR IN KIPS	D.L.	6	9
	L.L.	12	21
	I	–	2
	Σ	18	32
MAX. MOMENT IN FT. KIPS	D.L.	30	30
	L.L.	56	63
	I	–	7
	Σ	86	100
S.M. REQD @ 18 ksi		64	67
STRESS IN TIE		64 K	67 K
NET AREA REQD IN		3.56 □"	3.72 □"
* TIE & USED		9½ X ½	9½ X ½
NET AREA OF TIE		3.75 □"	3.75 □"

* D.L. MOMENTS FOR BRACKETS B1 AND B2 ON EACH SIDE OF PLATFORMS "A" AND "B" ARE 13% GREATER THAN IS SHOWN IN THE ABOVE TABLE. MAKE TIE PLATES AT THESE POINTS 9½ X ½ X 16



(INTERMEDIATE BRACKETS (D1) & (D2) - 18 WF 47 UTILITY SUPPORT (C1) + (C2) - IL 3½ X 3 X 5/8

TYPICAL SWAY FRAME SF1
SCALE 1" = 15'-0"

SHOE LOADS IN KIPS

	LOADS	END REACTION	INTERIOR REACTION
NORM. VERTICAL	D.L.	78.7	217.5
	L.L.	59.7	121.9
	I	10.3	19.0
	Σ	148.7	358.4
	TRANSV. WIND	13.6	36.3
	LONG. WIND	22.0	22.0

▩ INDICATES LAMP POST BASE

▨ LOCATION OF SCUPPERS

FOR LOCATION OF UTILITY CONDUITS SEE SHEET NO. 34

⌶ TRAFFIC LIGHT STANDARD

NOTES

MATERIAL: STRUCTURAL CARBON STEEL.

RIVETS: CARBON RIVET STEEL ⅞" ϕ UNLESS NOTED.

CAMBER: GIRDERS SHALL BE CAMBERED FOR FULL DEAD LOAD AND THE VERTICAL CURVE OF THE ROADWAY.

SPECIFICATIONS: 1941 A.I.S.H.O. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES

LOADING: H-15 LOADING

THIS BRIDGE HAS BEEN CHECKED FOR A SINGLE LANE OF H20 LOADING AND WAS STRENGTHENED FOR THAT LOADING CONDITION.

STATE OF NEW HAMPSHIRE
HIGHWAY DEPARTMENT

PARSONS, KLAPP, BRINCKERHOFF & DOUGLAS
ENGINEERS-NEW YORK

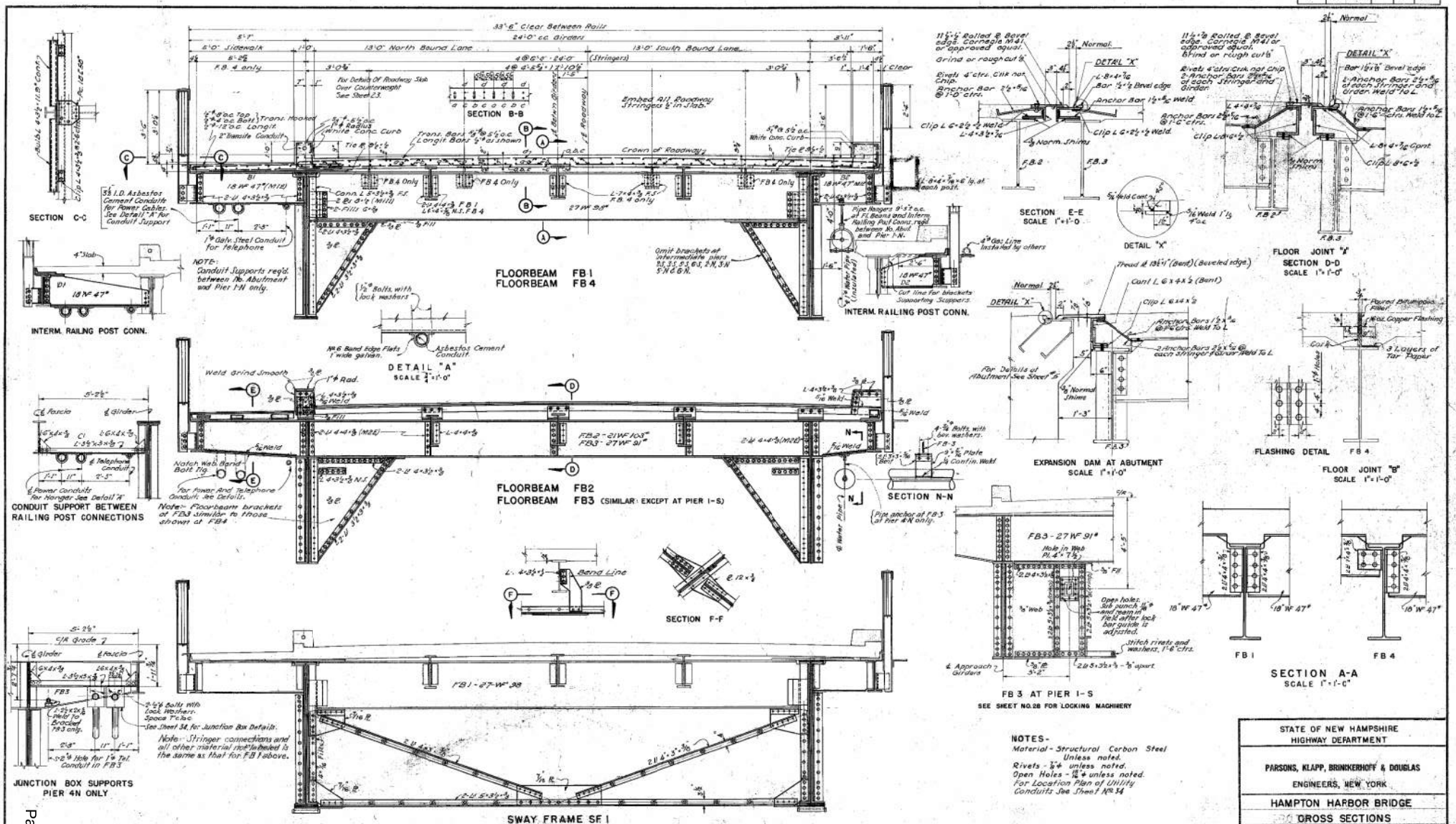
HAMPTON HARBOR BRIDGE
STRESS SHEET
APPROACH SPANS

MADE BY F.P. TR. T.F.K.
CHECKED BY M.E.F.
APPROVED
SCALE 1" = 20' AND AS NOTED
DATE MARCH 1946
JOB No. 1600
SHEET No. 7

REVISIONS
* Bearing at 1-S changed to SL 8/1/49
* Note on field splice removed
S.L. Bearings changed to Exp. 8/1/49

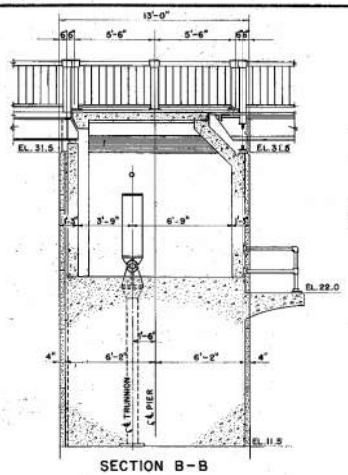
3-1-2-1

FED. ROAD DIST. NO.	STATE	P.A. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	N.H.	F-9180(1)		8	64

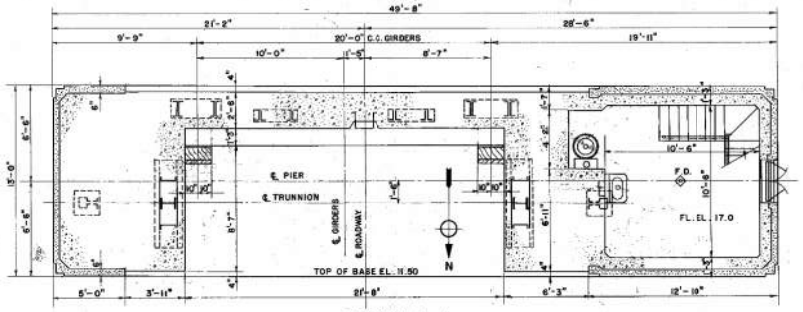


3-1-2-1

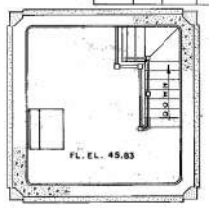
FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	N.H.	F-3(50)		11	64



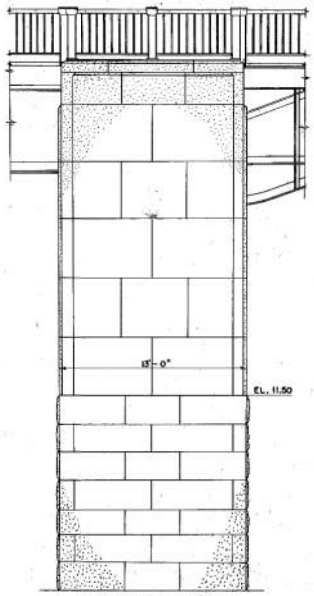
SECTION B-B



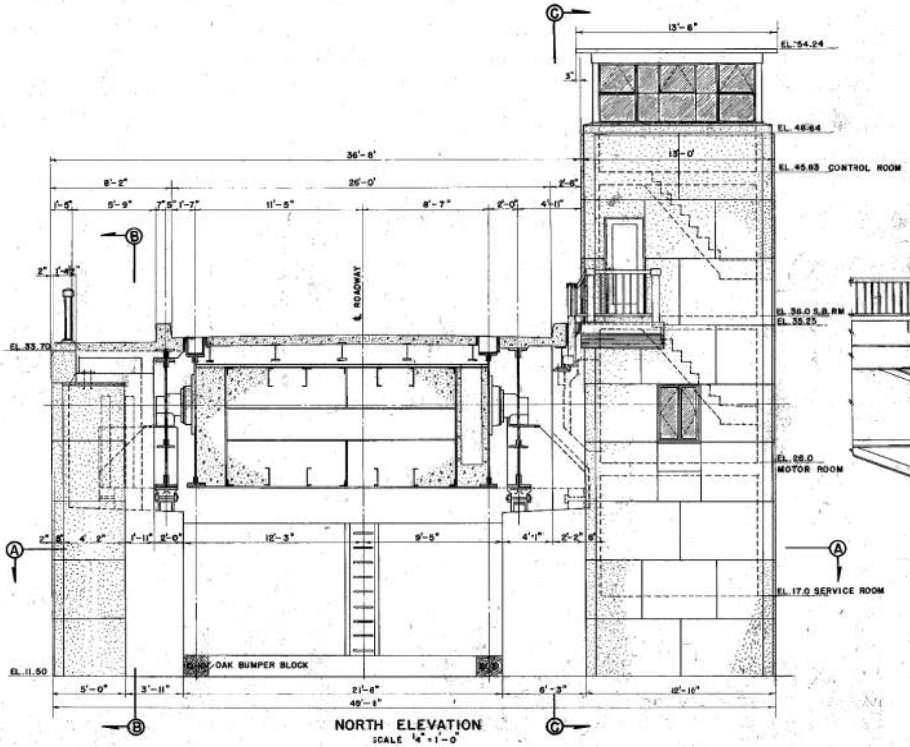
SECTION A-A



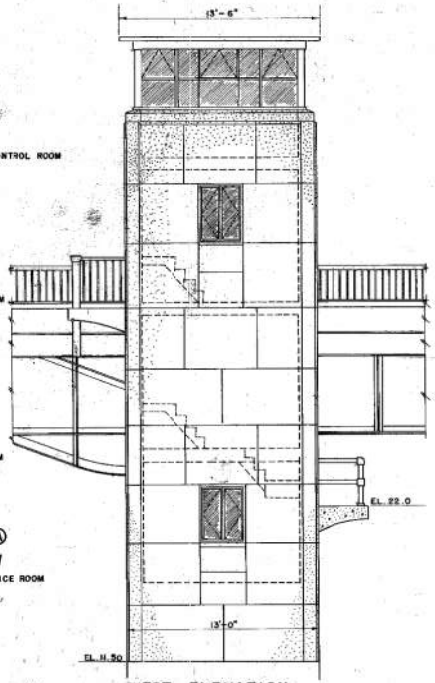
PLAN OF CONTROL ROOM



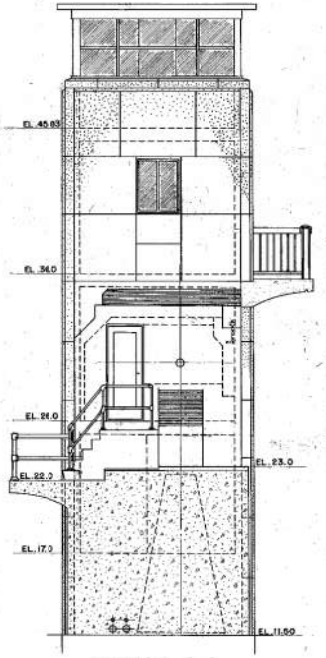
EAST ELEVATION



NORTH ELEVATION
SCALE 1/4" = 1'-0"



WEST ELEVATION



SECTION C-C

STATE OF NEW HAMPSHIRE
HIGHWAY DEPARTMENT

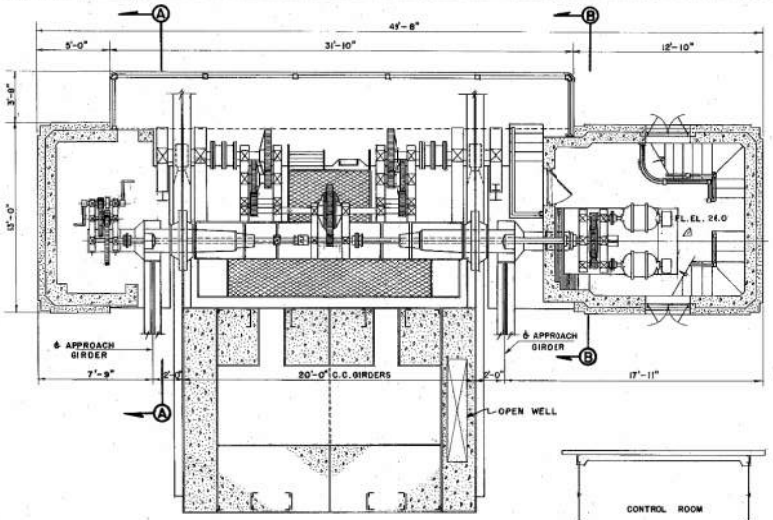
PARSONS, KLAPP, BRINCKERHOFF & DOUGLAS
ENGINEERS, NEW YORK

HAMPTON HARBOR BRIDGE
ELEVATIONS & SECTIONS
BASCULE PIER

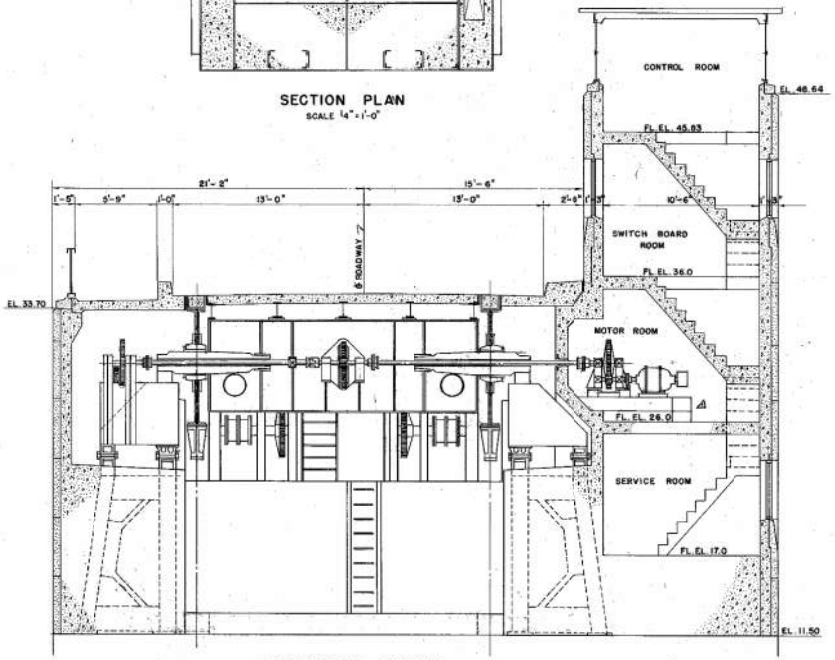
MADE BY R.F.Z. TR. T.F.K. SCALE 1/4" = 1'-0"
CHECKED BY L.C.T. DATE MARCH 1938
APPROVED JOB No. 1600
SHEET No. 11

3-1-2-1

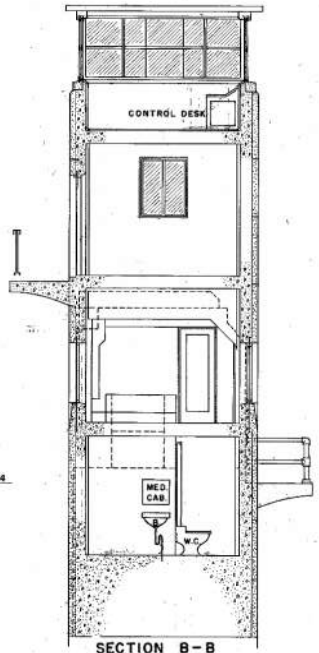
FED. ROAD DIST. NO.	STATE	F.A. PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	N.H.	P-5180(1)		12	64



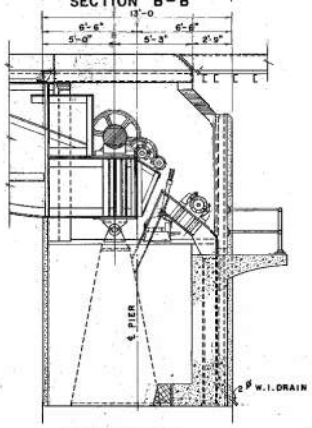
SECTION PLAN
SCALE ¼" = 1'-0"



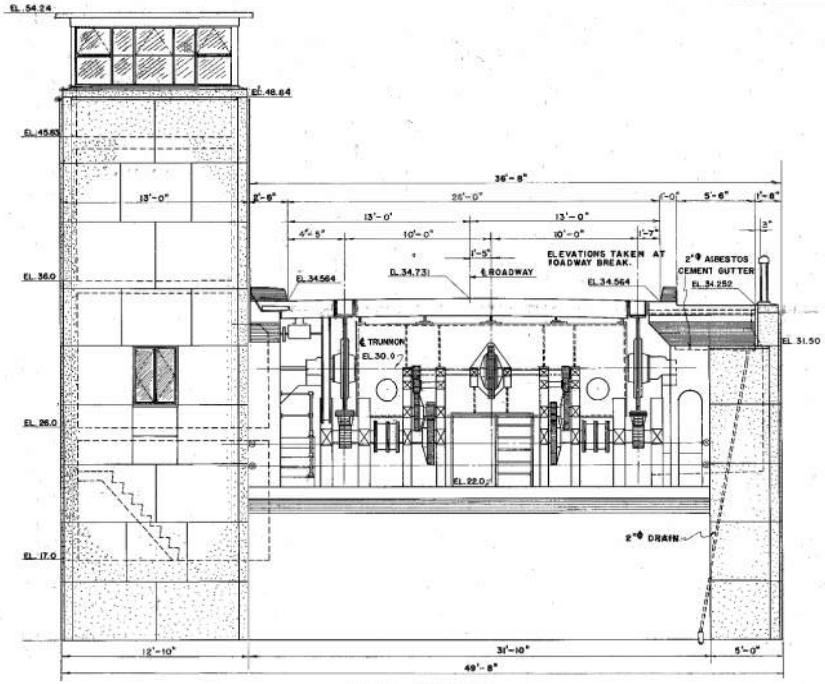
TRANSVERSE SECTION
LOOKING SOUTH
SCALE ¼" = 1'-0"



SECTION B-B



SECTION A-A



SOUTH ELEVATION

FOR LOCATION OF PLUMBING AND HEATING FACILITIES SEE SHEET NO. 33

STATE OF NEW HAMPSHIRE
HIGHWAY DEPARTMENT

PARSONS, KLAPP, BRINCKERHOFF & DOUGLAS
ENGINEERS, NEW YORK

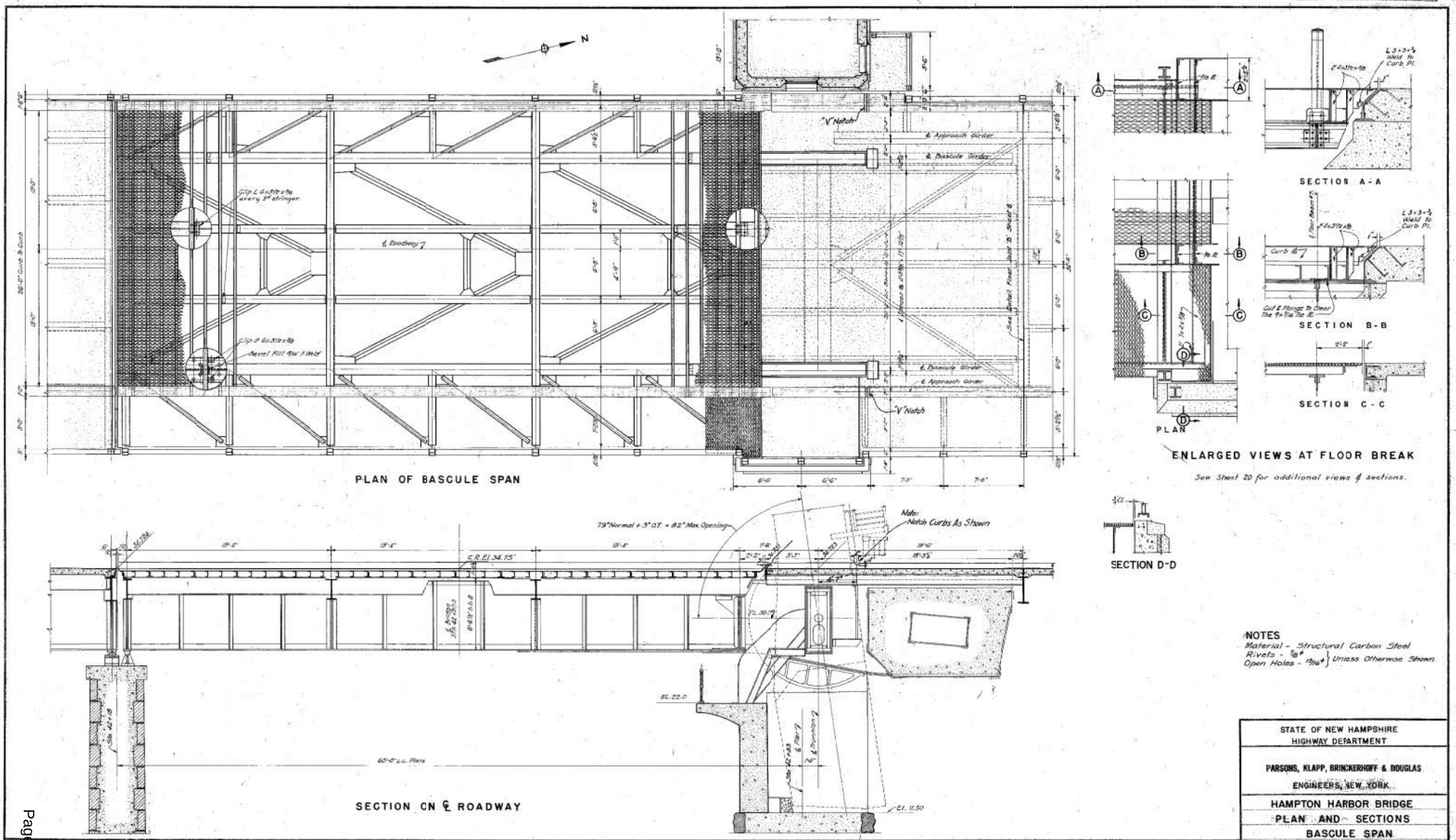
HAMPTON HARBOR BRIDGE
MACHINERY LAYOUT
BASCULE PIER

REVISIONS
△ Motor base revised 8/15/49

MADE BY R.F.Z. TR. T.F.K. | SCALE ¼" = 1'-0"
CHECKED BY L.G.T. | DATE MARCH 1946
APPROVED | JOB No. 1600
SHEET No. 12

3-1-2-1

FED. ROAD DIV. NO.	STATE	FOR. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	N.H.	F 312(1)		18	64



NOTES
Material - Structural Carbon Steel
Rivets - 7/8"
Open Holes - 15/16" } Unless Otherwise Shown.

STATE OF NEW HAMPSHIRE
HIGHWAY DEPARTMENT

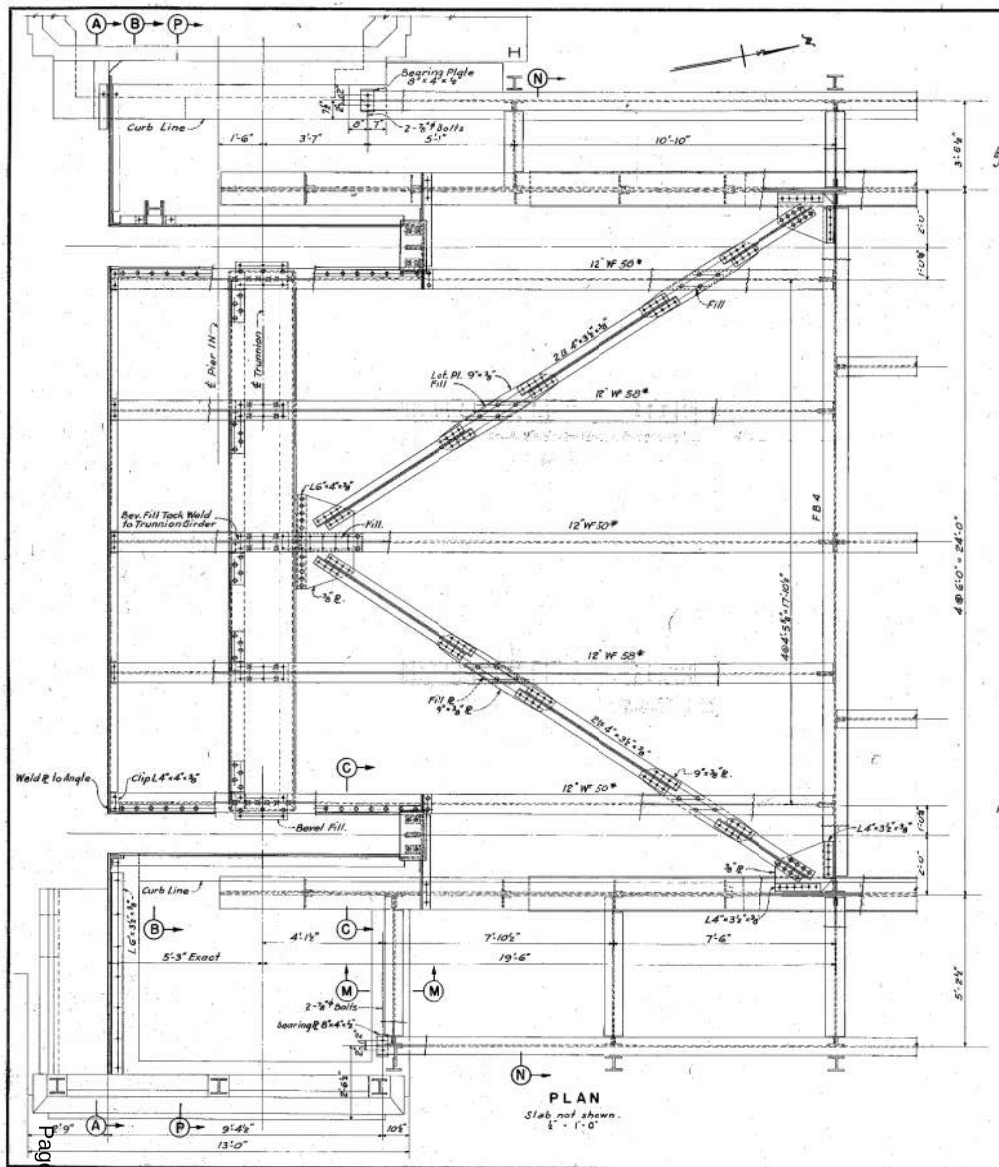
PARSONS, KLAPP, BRINCKERHOFF & DOUGLAS
ENGINEERS, NEW YORK

HAMPTON HARBOR BRIDGE
PLAN AND SECTIONS
BASCULE SPAN

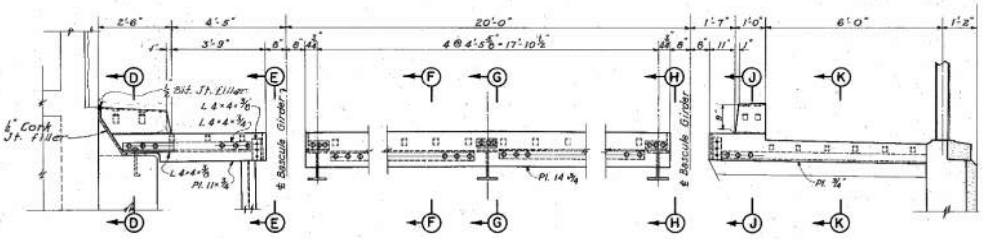
MADE BY R.F.Z. TR. R.O.S.	SCALE 1/8" = 1'-0"
CHECKED BY M.E.F.	DATE MARCH 1948
APPROVED	JOB NO. 1600
	SHEET NO. 18

3-1-2-1

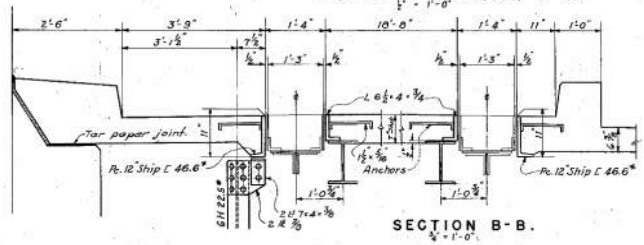
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	N.H.	F-368(1)		19	64



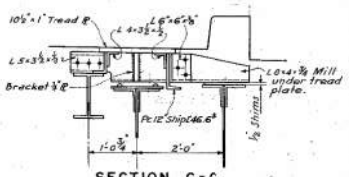
PLAN
Slab not shown.
½" = 1'-0"



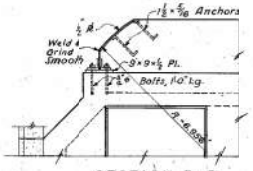
END VIEW SECTION A-A.
½" = 1'-0"



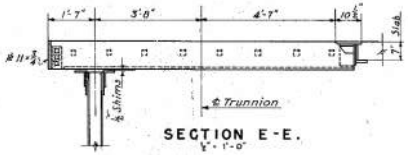
SECTION B-B.
½" = 1'-0"



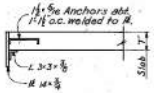
SECTION C-C.
½" = 1'-0"



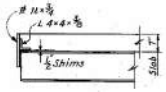
SECTION D-D.
½" = 1'-0"



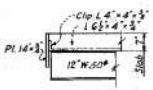
SECTION E-E.
½" = 1'-0"



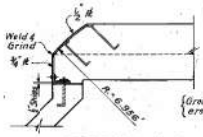
SECTION F-F.
½" = 1'-0"



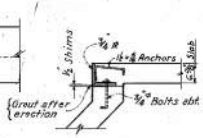
SECTION G-G.
½" = 1'-0"



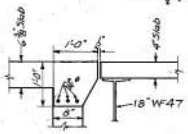
SECTION H-H.
½" = 1'-0"



SECTION J-J.
½" = 1'-0"



SECTION K-K.
½" = 1'-0"



SECTION M-M
½" = 1'-0"

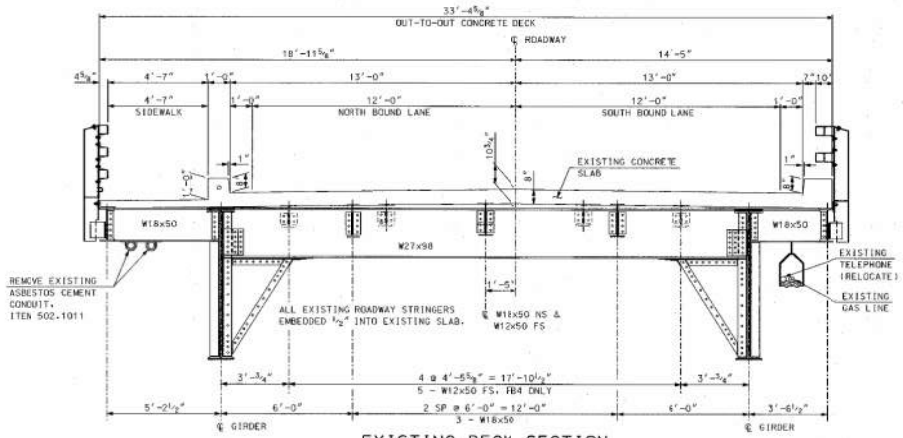
NOTES

Material - Structural Carbon Steel
Rivets - ⅞"φ
Open Holes - 15/16"φ } Except as noted.

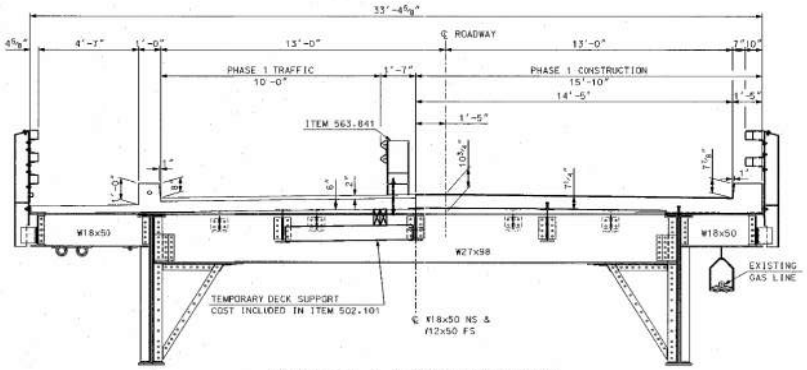
For Slab Reinforcement Details See Sections P-P And N-N On Sheet 23

STATE OF NEW HAMPSHIRE HIGHWAY DEPARTMENT	
PARSONS, KLAPP, BRINCKERHOFF & DOUGLAS ENGINEERS, NEW YORK	
HAMPTON HARBOR BRIDGE FLOOR SYSTEM OVER COUNTERWEIGHT	
MADE BY D.C. TR. A.R.	SCALE AS NOTED
CHECKED BY F.P.	DATE MARCH 1946
APPROVED	JOB No. 1600
	SHEET No. 19

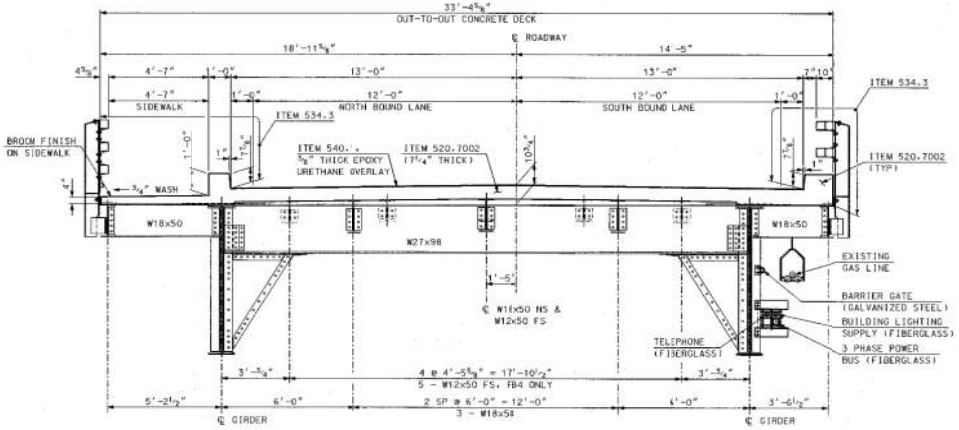
3-1-2-1



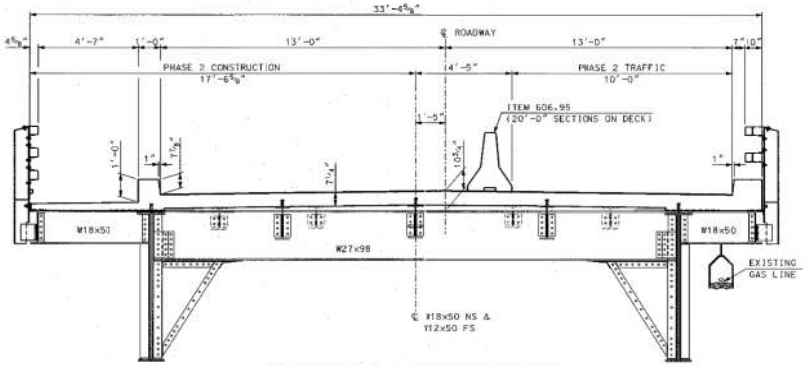
EXISTING DECK SECTION
AT FLOORBEAM 1 & 4
SCALE: ⅜" = 1'-0"



PHASE 1 & 3 CONSTRUCTION
AT FLOORBEAM 1 & 4
SCALE: ⅜" = 1'-0"



PROPOSED DECK SECTION
AT FLOORBEAM 1 & 4
SCALE: ⅜" = 1'-0"



PHASE 2 & 4 CONSTRUCTION
AT FLOORBEAM 1 & 4
SCALE: ⅜" = 1'-0"

NOTE: ALL SECTIONS LOOKING SOUTH

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

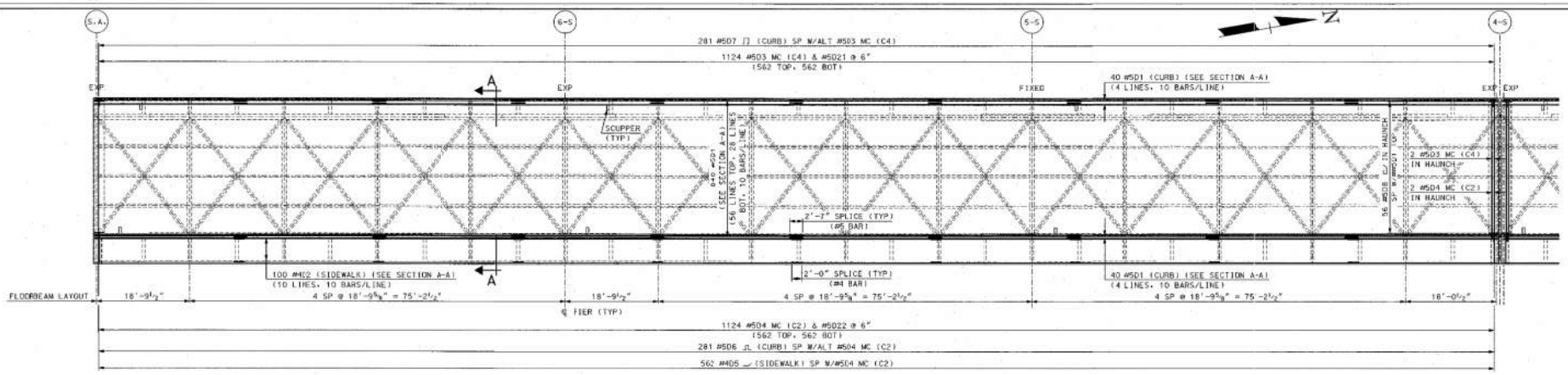
TOWN HAMPTON BRIDGE NO. 235/025 STATE PROJECT 14188
LOCATION NH ROUTE 1A over HAMPTON RIVER

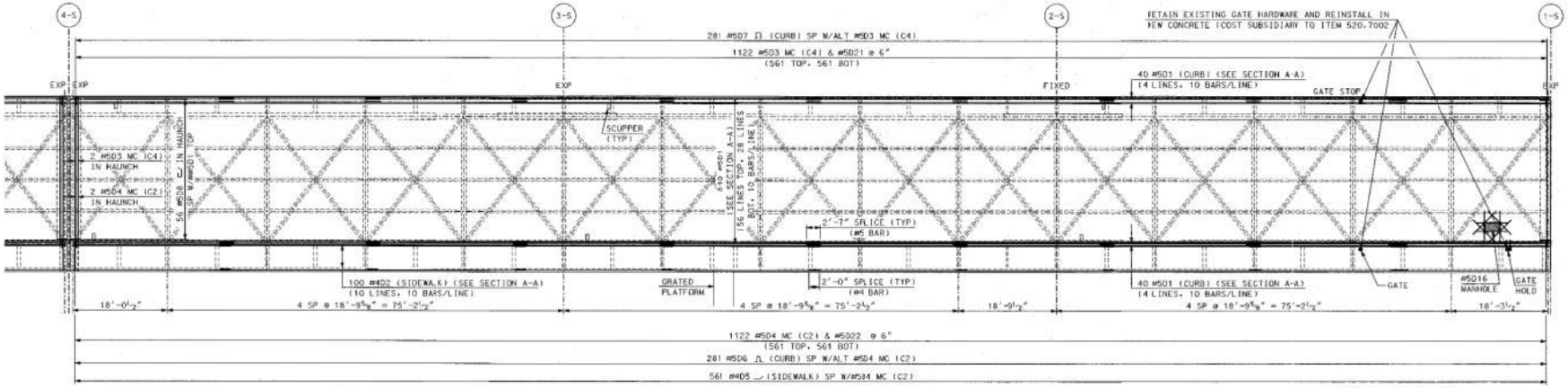
DECK SECTIONS AND PHASING

REVISIONS AFTER PRELIMINARY	BY	DATE		BY	DATE
DESIGNED	JAS	8/07	CHECKED	SWJ	4/08
DRAWN	SAG	8/07	CHECKED	SWJ	4/08
QUANTITIES	JAS	4/08	CHECKED	WPS	4/08
ISSUE DATE			FEDERAL PROJECT NO.		
REV. DATE			————		

BRIDGE SHEET XX OF XX
FILE NUMBER 109-6-1
SHEET NO. 21
TOTAL SHEETS 35

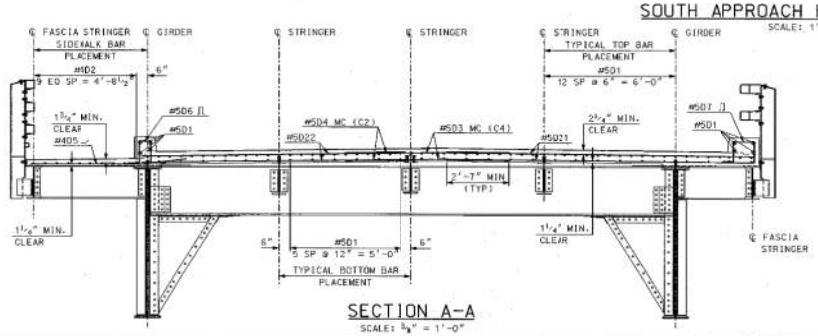
SUBDIRECTORY	DGN LOCATOR	SHEET/SCALE
BRD/SUPER	14188deckset	AS NOTED





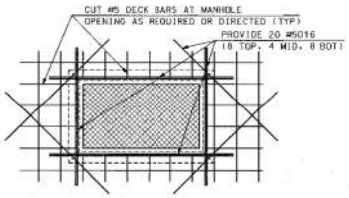
SOUTH APPROACH REINFORCING PLAN

SCALE: 1" = 10'-0"



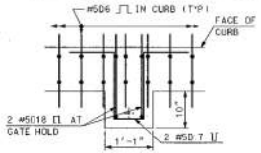
SECTION A-A

SCALE: ¾" = 1'-0"



MANHOLE REINFORCING

N.T.S.



GATE HOLD DETAIL

SCALE: ¾" = 1'-0"

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF BRIDGE DESIGN

TOWN HAMPTON — BRIDGE NO. 235/025 — STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

SOUTH APPROACH REINFORCING PLAN & SECTION

REVISIONS AFTER PROPOSAL	BY	DATE		BY	DATE
DESIGNED	WPS	10/07	CHECKED	JAS	4/08
DRAWN	SMO/CMC	10/07	CHECKED	JAS	4/08
QUANTITIES	WPS	4/08	CHECKED	JAS	4/08
ISSUE DATE			FEDERAL PROJECT NO.		
REV. DATE			----------		

BRIDGE SHEET: XX OF XX
FILE NUMBER: 109-6-1
SHEET NO.: 22
TOTAL SHEETS: 35

SUBDIRECTORY	DGN LOCATOR	SHEET SCALE
BRD/SUPER	14188Deckbars	1"=10'-0"

APPENDIX C
Bridge and Site Photographs

Photo G-01: Bridge Looking West.

Photo G-02: Bridge Looking East.

Photo G-03: South Approach.

Photo G-04: North Approach.

Photo G-05: Bascule Span and Pier looking southwest.

Photo G-06: Typical Approach Span Pier.

Photo G-07: South Abutment.

Photo G-08: Bridge Looking North

Photo S-01: Typical bascule span deck overhang condition.

Photo S-02: Typical bascule girder condition.

Photo S-03: Approach span typical condition.

Photo S-04: Approach span at bascule span typical condition.

Photo S-05: Bascule span typical girder condition.

Photo S-06: Pack rust causing prying of cover plates over Pier 6S.

Photo S-07: General utility condition.

Photo S-08: Approach span stringer typical condition.

Photo S-09: Approach span floor beam and cross bracing typical condition.

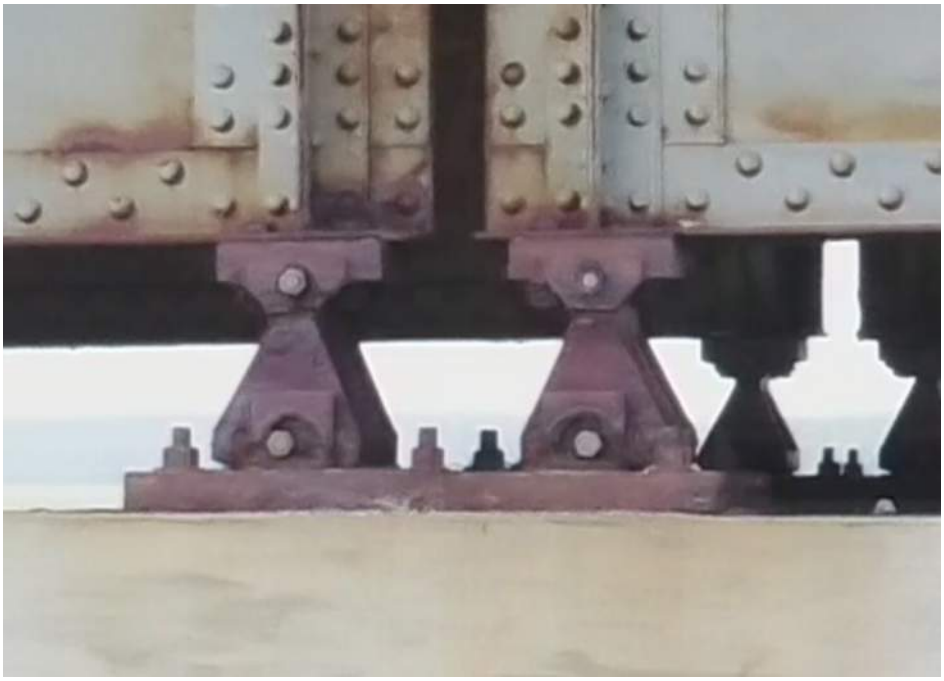


Photo S-20: Rusted bearings at Pier 4S.

Photo S-31: Severely corroded bearings a Pier 4N.

Photo S-42: Typical bearing conditions over piers without expansion joints.

Photo S-53: Typical condition of bearings at abutments.

Photo E-01: Motor Control Center (MCC)

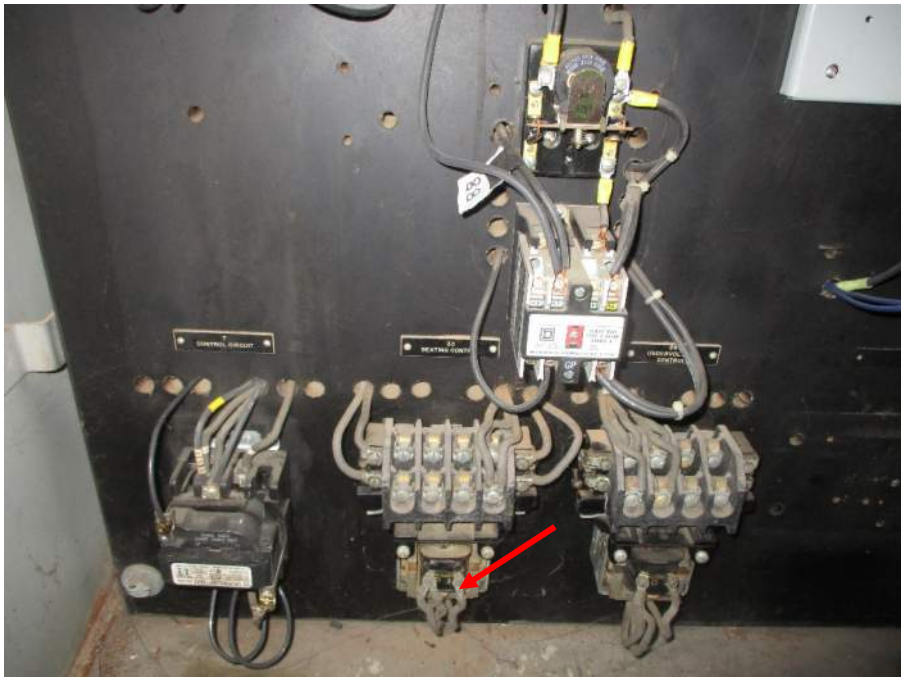


Photo E-02: Motor Starters Showing Deterioration

Photo E-03: MCC Insufficient Working Clearance from East Wall

Photo E-04: Inside View of Main Span Motor 1 Showing Grease Build Up

Photo E-05: Inside View of Main Span Motor 2 Showing Dirt/Dust Build Up

Photo E-06: Emergency Motor Exhibiting Corrosion & Rust

Photo E-07: Emergency Motor Control Panel

Photo E-08: Control Desk

Photo E-09: Secondary Resistors (located above the MCC)

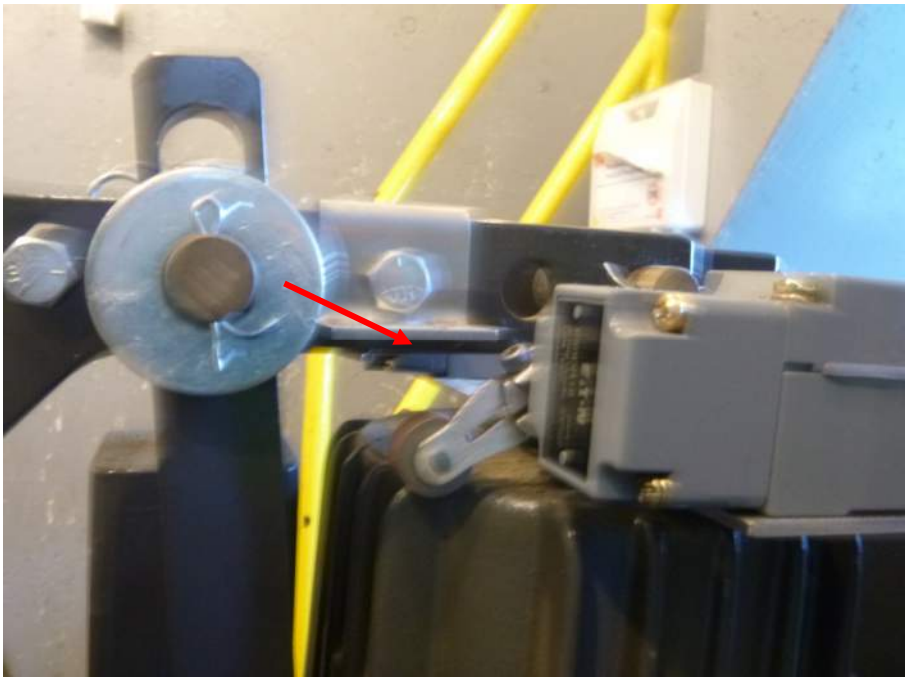


Photo M-06: The brake "set" limit switches are not connected to indicate when the brakes are set.

Photo M-07: The bolts for Brake #2 are not full engaged with the nuts.

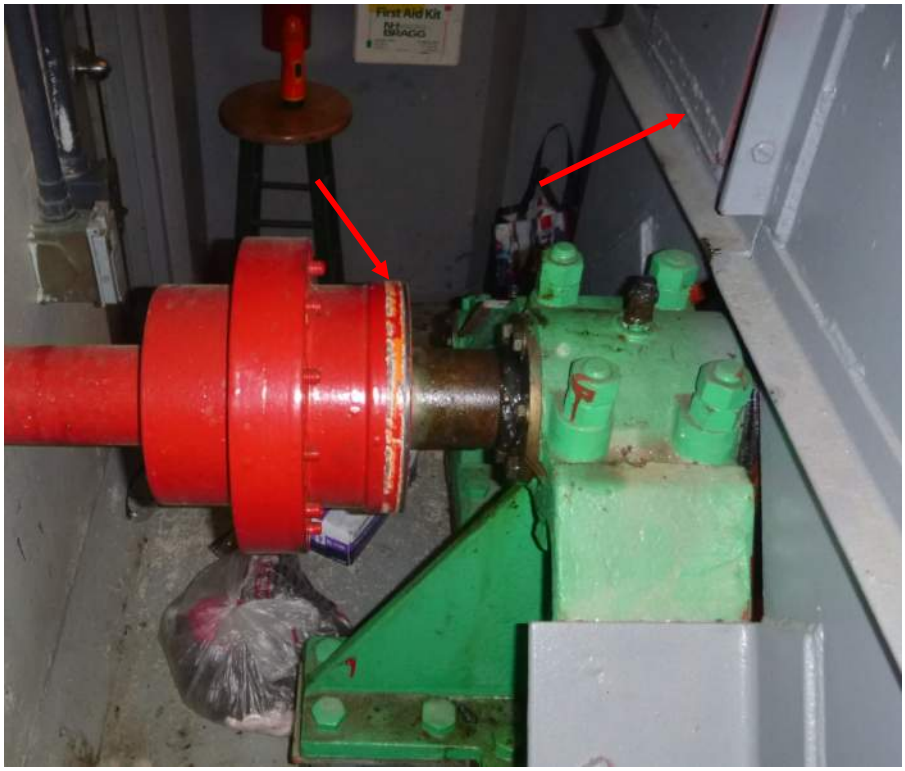


Photo M-08: The machinery coupling from the primary open gear set is scored from the maintenance hatch on the housing for the open gearing.

Photo M-09: The main pinion shaft coupling grease is leaking through the connecting shafts.

Photo M-05: The auxiliary motor and brake exhibit moderate to severe corrosion and have not been operated in several years.

Photo M-06: The hand wheel shaft and limit switch are corroded and the limit switch lever arm has seized in place due to dirt and debris.

Photo M-07: The span lock machinery couplings exhibit corrosion and section loss on the flanges around the fasteners.

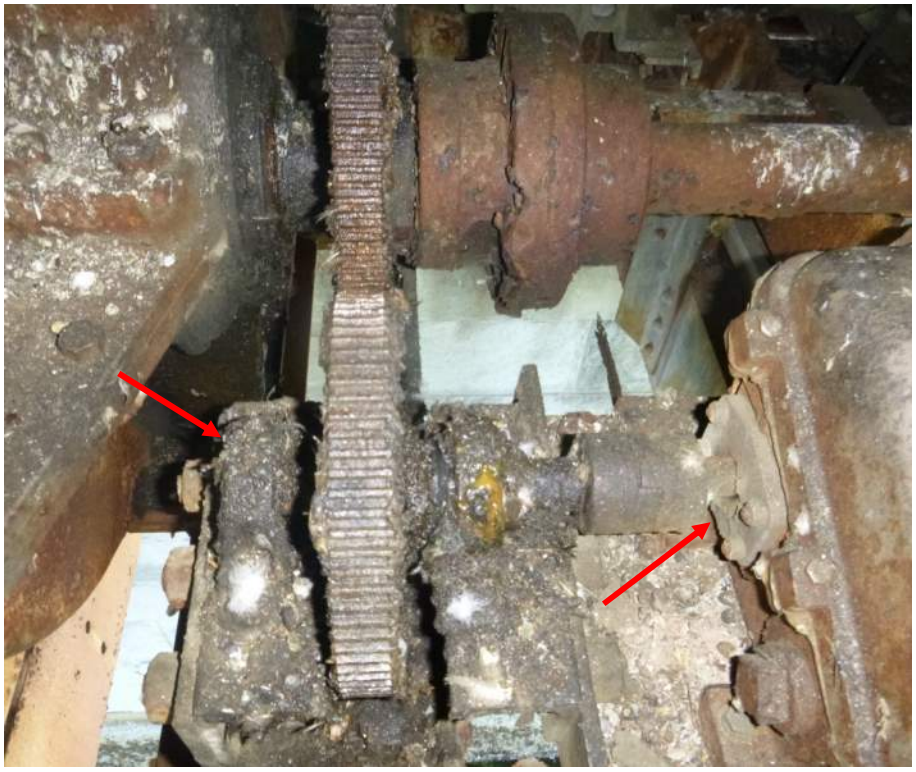


Photo M-08: The span drive instrumentation machinery is in poor condition.

Photo M-09: The live load shoe rivets exhibit severe corrosion and section loss.

APPENDIX D
Existing Utility Information

VICTORIA F. SHEEHAN
COMMISSIONER

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
JOHN O. MORTON BUILDING, P.O. BOX 483, CONCORD, NH 03301

LETTER OF TRANSMITTAL

RECEIVED
OCT - 4 2016
BUREAU OF BRIDGE DESIGN
NH DEPT. OF TRANSPORTATION

BUREAU OF HIGHWAY DESIGN
UTILITY SECTION

TO: **David Scott**
In-House Design Chief
Bureau of Bridge Design

DATE: October 4, 2016
PROJECT: Seabrook-Hampton
15904

WE ARE SENDING YOU THE FOLLOWING: ☒ Attached ☐ Under Separate Cover via _____the following:

☒ Shop Drawings ☐ Prints ☐ Specifications ☒ Plans
☒ Copy of Letter ☐ Falsework ☐ Catalog Cuts ☐ Other

COPIES	DATE(S)	NO. OF SHEETS	DESCRIPTION
1	October 4, 2016	5	Shop Drawings from FairPoint Communications showing their telephone facilities
1	October 4, 2016	1	Copy of Letter from FairPoint Communications describing their telephone facilities

THESE ARE TRANSMITTED as checked below:

☐ For Approval ☐ Approved As Submitted ☐ RETURNED for Corrections
☒ For Your Use ☐ Approved As Noted ☐ RETURN Originals
☐ As Requested ☒ For Review and Comment ☐ RESUBMIT copies for approval ___ Ea.
☐ For Info. Only ☐ Investigate and Report ☐ SUBMIT for distribution ___ Ea.

REMARKS: Please incorporate this information into a base plan. There will be anticipated impacts to the telephone facilities. If you have any questions feel free to ask Brett McCrea in Design Services – Utilities.

COPY TO: Utility File

SIGNED: Brett S. McCrea
Brett McCrea
Utility Coordinator

FairPoint communications

RECEIVED
OCT 09 2015
NHDOT
Highway Design

October 6, 2015

Brett McCrea
NHDOT
Bureau of Highway Design
7 Hazen Drive
Concord, NH. 03302

Hampton-Seabrook
NH DOT#15904
Route 1A Bridge Replacement

Dear Brett,

Enclosed are the marked up Google photos/plans showing our aerial facilities in the area of the proposed bridge work. I used the Google photos due to the 1950 as builts that were sent were lacking in many of the existing land and roadway features which exist out here today. We have a buried service wire in a 2" conduit which feeds off a State owned riser pole opposite P614/18 that feeds the control tower on the bridge high lighted in yellow. The exact location of that conduit going along the island area would need to be verified in the field via DIG-SAFE if needed in the future.

If you have any questions please call me at 433-2119.

Sincerely,

David Kestner
Fairpoint Engineer

EXISTING HIGHWAY
STA 77+50 TO 108+50

26' S.T. GRAVEL	1044' = 0.198 MI.
TIMBER TRESTLE BRIDGE	1374' = 0.260 "
26'-44' MOD. ASPHALT	752' = 0.142 "
TOTAL	3170' = 0.600 "

STAS. ON NEW ℄, DIST ON EXIST HIGHWAY

3	F.A. (3180)	44	64

APR. 10, 1947, ADDED NOTE-REMOVE EXISTING BRIDGE

SEABROOK END

NO FAIRPOINT POLES ON SEABROOK END NEAR BRIDGE

77+58-79+98 LT.
CONST. 240' STR GRANITE
CURB A MK. C-2

77+50-77+58 LT.
CONST. 8.2' CURV. GRANITE CURB
TYPE A MK C-1 ROUND END

77+50 LT.
CONST. 15'x3' COBBLE GUTTER
CEMENT GROUTED TYPE B

SEABROOK
HAMPTON

SLOPE LINE

N 26°-44'E

TO SALISBURY, MASS

75+50-77+50
CONST. APPROACH

B.M.#7
C.Bd.

F 318(1)

77+50 RT.
CONST. PROJ. MARKER
(VIEW FROM ℄ OF ROADWAY)

EXISTING R.O.W.

STATION 77+50
BEGINNING OF F-318(1)

1400+ 1300
SIGHT DIST.

B.M.#7 CONC. BD. 74+90 82.5' RT. EL. 16.80

GRADE LINE CENTER OF FINISHED ROADWAY

GRADE LINE - FUTURE CONSTRUCTION

-0.42%

17.05 V.C. 300'

+0.34%

APPROACH GRADE

62 DATUM = 0.00

16" G.B.B.C.

77+58-79+98 LT.
CONST. 240' STR. GRANITE
CURB A MK C-2

80+02-36+30 LT.
CONST. 227.8' STR. GRANITE
CURB A MK C-3

3" GAS MAIN

80+00
CONST. D.I.-A LT.
GRAN. CURB INLET
21"x12" S.S.R.C.P.

SLOPE LINE

4" GAS MAIN AND
CONNECTION TO EXISTING
MAIN BY E.&H. GAS CO.

36+20-36+30 LT.
CONST. 10' STR. GRANITE
CURB A MK. C-79
DETAILS SEE SHEET 43

HAMPTON RIVER BRIDGE

REMOVE EXISTING BRIDGE
SALVAGE TO THE STATE:- ALL STRUCTURAL STEEL RAIL INCLUDING POSTS, PLATE RAIL, CABLE, LAG SCREWS AND ALL FITTINGS; ALL OPERATING MACHINERY, INCLUDING MOTOR AND MOTOR CONTROL; AND THE I BEAMS IN THE EXISTING TRESTLE AND DRAW SPAN.

N 26°-44'E

80+00
CONST. C.B.-A RT.
" GRAN. CURB INLET
28"x12" S.S.R.C.P.

SLOPE LINE

EXISTING R.O.W.

C.Bd.

77+50-36+51.25 RT.
CONST. 507.05' x 5' CONC. SIDEWALK.

EQUATION = +460.32

36+40.75-36+50.75 RT.
CONST. 10' STR. GRANITE
CURB A MK C-6
DETAILS SEE SHEET 43

STA. 36+51.25 TO 48+49.75
BRIDGE 1 OF FAP 318
CONST. 13 SPAN CONT. DECK GIRDER
12 FIXED SPANS OF 94'
1 BASCULE SPAN OF 65'
CLEAR ROADWAY 26'
V.C. 1300'

77+50-79+98 RT.
CONST. 250.4' STR. GRANITE
CURB A MK C-4

80+02-36+40.75 RT.
CONST. 248.05 STR. GRANITE
CURB A MK C-5

1400+ 1300
SIGHT DIST.

1200

1050

950

V.C. 170'

+0.34%

-22.40%

LIMITS OF FILL
SUBSTRUCTURE CONTRACT

STA. 82.06 = BR. SUM 35+72.24

44.50

GRADE LINE - CENTER OF FINISHED ROADWAY

+3.00%

-3.00%

78 DATUM = 0.00

16" G.B.B.C.

F 318(1) | 44 | 64

NOTE
SEE SUMMARY SHEETS FOR LOCATION AND QUANTITIES OF ALL DRAINAGE, UTILITIES, CURBING AND SIDEWALKS.
CURBING SHOWN ON THIS SHEET BY MARK NUMBER, C-8 ETC.

Hampton END

Hampton River Bridge

STA. 36+51.25 TO 48+49.75
BRIDGE 1 OF FAP 318
CONST. 13 SPAN CONTINUOUS DECK GIRDER
12 FIXED SPANS OF 94'
1 BASCULE SPAN OF 65'
CLEAR ROADWAY - 26'

SYMBOLS

UNDERGROUND CONSTRUCTION

GAS	G — G By E.N.H. Gas Co.
ELECTRIC	E — E
WATER	
TELEPHONE	T — T Cable by N.E.T.&T. Co.
STORM SEWERS	C.B.
SANITARY SEWERS	S — S

SANITARY SEWER, GAS, AND WATER PIPES TO 1 FT. OUTSIDE OF FOUNDATION ARE INCLUDED IN ITEM 200, TOLL HOUSE.

STATE OF NEW HAMPSHIRE

B.M. So. Pt. Δ Conc. Base for Gas Pumps 106+82 45' Lt. El. 16.98

STATION 108+50
END OF F-318 (1)

TRAFFIC DENSITY
1936-7 ANNUAL DAILY AVERAGE

GRADE LINE - CENTER OF FINISHED ROADWAY

-0.35%

-0.95885%

+0.392%

V.C. 199'

V.C. 300'

V.C. 295.10'

EQUATION = -4609.82

EQUATION -2.45'

LIMITS OF FILL SUBSTRUCTURE CONTRACT

48 DATUM

16" G.B.B.C.

C = CUST POLE
HAS 2" CONDUIT W/ 6 PR BSW IN IT

COLOR LEGEND

= POLE # + APX LOC

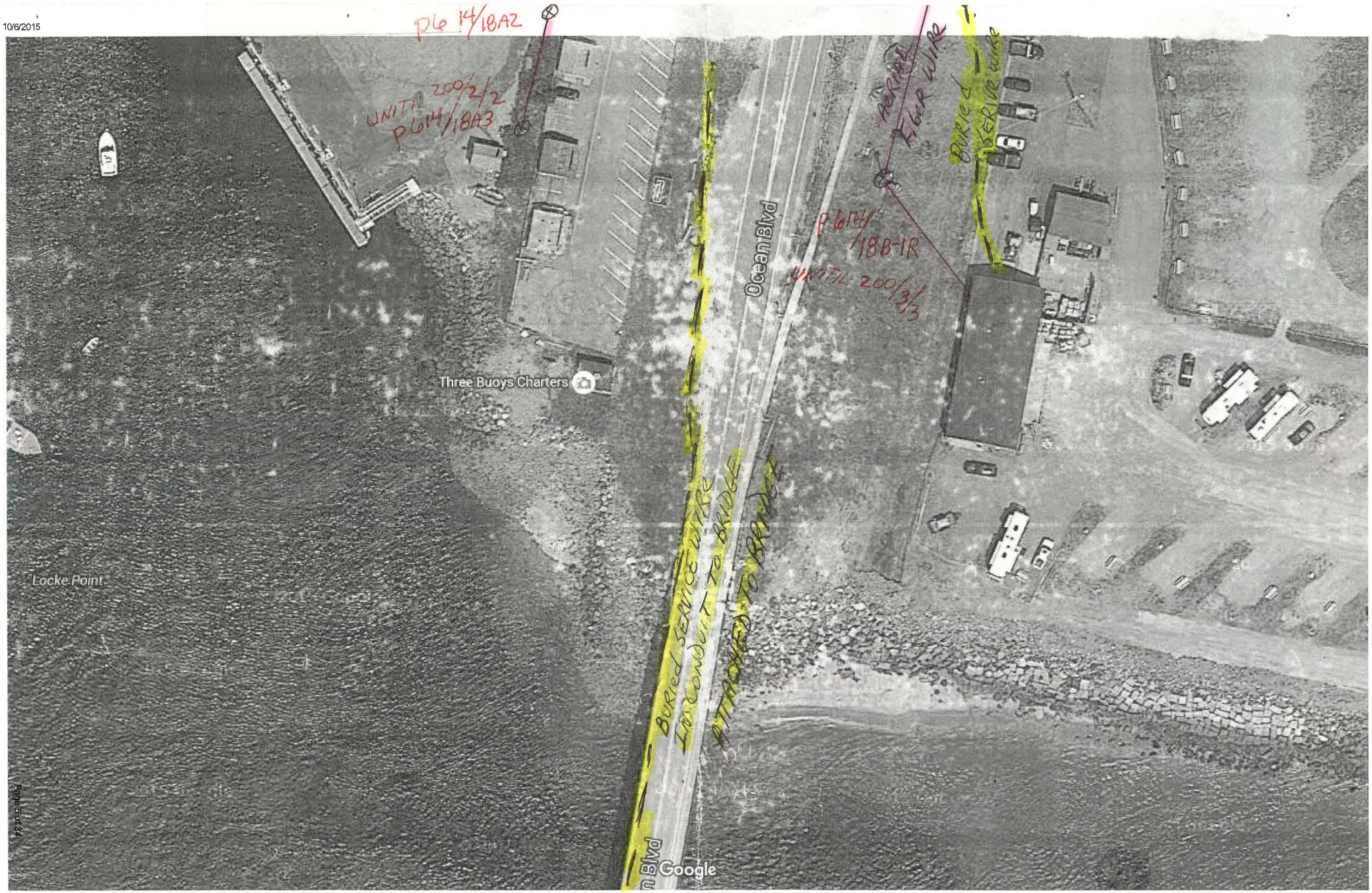
= BURIED WIRE PATH APX

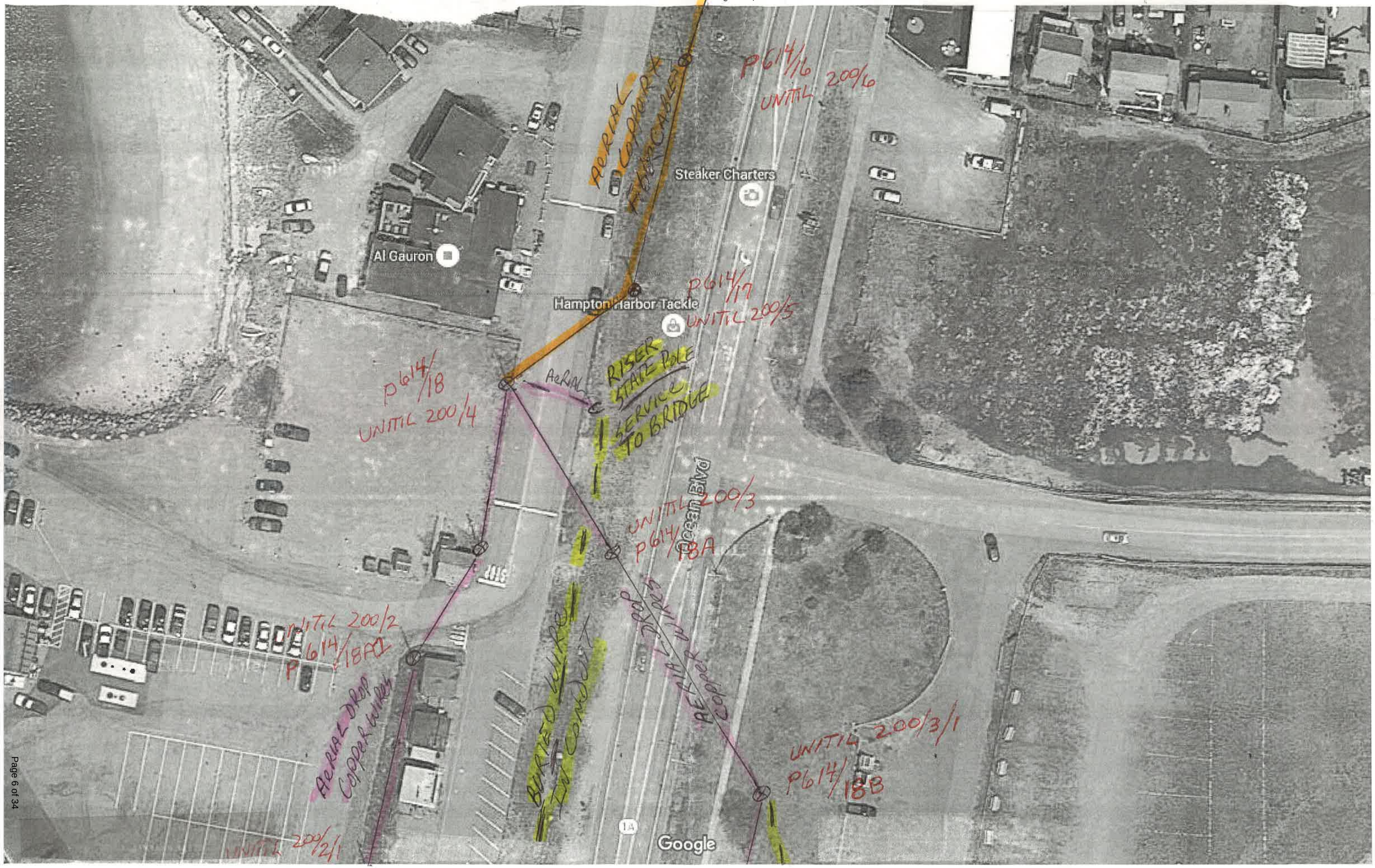
= CUSTOMER POLE + CONDUIT (STATE)

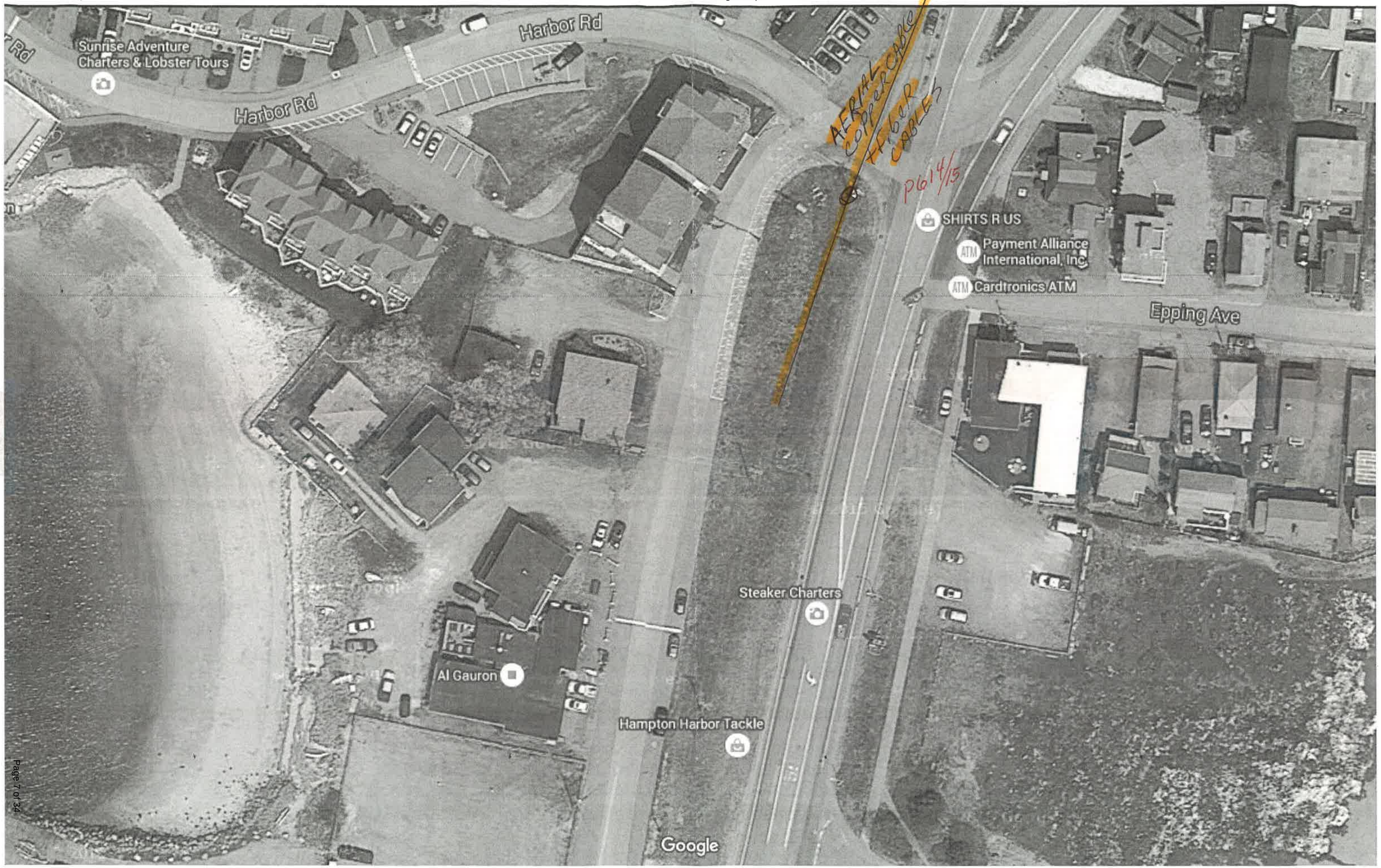
= AERIAL ~~CABLE~~ WIRES

= AERIAL CABLES

Page 4 of 34


P6 14/18A2
UNTIL 200/2/2
P6 14/18A3
Three Buoys Charters
Locke Point
Ocean Blvd
P6 14/18B-1R
UNTIL 200/3/3
AERIAL FIBER WIRE
BURIED SERVICE WIRE
BURIED SERVICE WIRE TO BRIDGE
ATTACHED TO BRIDGE
Google


Steaker Charters
Al Gauron
Hampton Harbor Tackle
Ocean Blvd
Google
AERIAL COPPER + FIBER CABLES
P614/16
UNITIL 200/6
P614/17
UNITIL 200/5
P614/18
UNITIL 200/4
AERIAL
RISER
STATE POLE
SERVICE TO BRIDGE
UNITIL 200/3
P614/18A
UNITIL 200/2
P614/18A2
AERIAL DROP COPPER WIRES
BURIED WIRE IN CONDUIT
AERIAL DROP COPPER WIRES
UNITIL 200/3/1
P614/18B
UNITIL 200/2/1


Harbor Rd
Sunrise Adventure Charters & Lobster Tours
Harbor Rd
AERIAL COPPER & FIBER CABLES
P6 14/15
SHIRTS R US
Payment Alliance International, Inc.
Cardtronics ATM
Epping Ave
Steaker Charters
Al Gauron
Hampton Harbor Tackle
Google

VICTORIA F. SHEEHAN
COMMISSIONER

RECEIVED
OCT - 4 2016
BUREAU OF BRIDGE DESIGN
NH DEPT OF TRANSPORTATION

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
JOHN O. MORTON BUILDING, P.O. BOX 483, CONCORD, NH 03301

LETTER OF TRANSMITTAL

BUREAU OF HIGHWAY DESIGN
UTILITY SECTION

TO: **David Scott**
In-House Design Chief
Bureau of Bridge Design

DATE: October 4, 2016
PROJECT: Seabrook-Hampton
15904

WE ARE SENDING YOU THE FOLLOWING: ☒ Attached ☐ Under Separate Cover via _____ the following:

☒ Shop Drawings ☐ Prints ☐ Specifications ☒ Plans
☒ Copy of Letter ☐ Falsework ☐ Catalog Cuts ☐ Other

COPIES	DATE(S)	NO. OF SHEETS	DESCRIPTION
1	October 4, 2016	2	Shop Drawings from Hampton Public Works Department showing their sewer facilities
1	October 4, 2016	1	Email from Hampton Public Works Department describing their sewer facilities

THESE ARE TRANSMITTED as checked below:

☐ For Approval ☐ Approved As Submitted ☐ RETURNED for Corrections
☒ For Your Use ☐ Approved As Noted ☐ RETURN Originals
☐ As Requested ☒ For Review and Comment ☐ RESUBMIT copies for approval ___ Ea.
☐ For Info. Only ☐ Investigate and Report ☐ SUBMIT for distribution ___ Ea.

REMARKS: Please incorporate this information into a base plan. There will be anticipated impacts to Hampton Public Works Department's sewer facilities. If you have any questions feel free to ask Brett McCrea in Design Services – Utilities.

COPY TO: Utility File

SIGNED: Brett S. McCrea
Brett McCrea
Utility Coordinator

McCrea, Brett

From:	Brett McCrea
Sent:	Thursday, October 01, 2015 12:53 PM
To:	'tspainhower@town.hampton.nh.us'
Cc:	Lennart Suther
Subject:	Seabrook-Hampton 15904 NH 1A Bridge over Hampton River
Attachments:	14188 As-Built General Plan.pdf; 14188 Site Plan.pdf; 1950 As-Built Roadway Plan.pdf; 1950 As-Built Roadway Plan (2).pdf

Tracking:	**Recipient**	**Read**
	'tspainhower@town.hampton.nh.us'	
	Lennart Suther	Read: 10/1/2015 12:58 PM

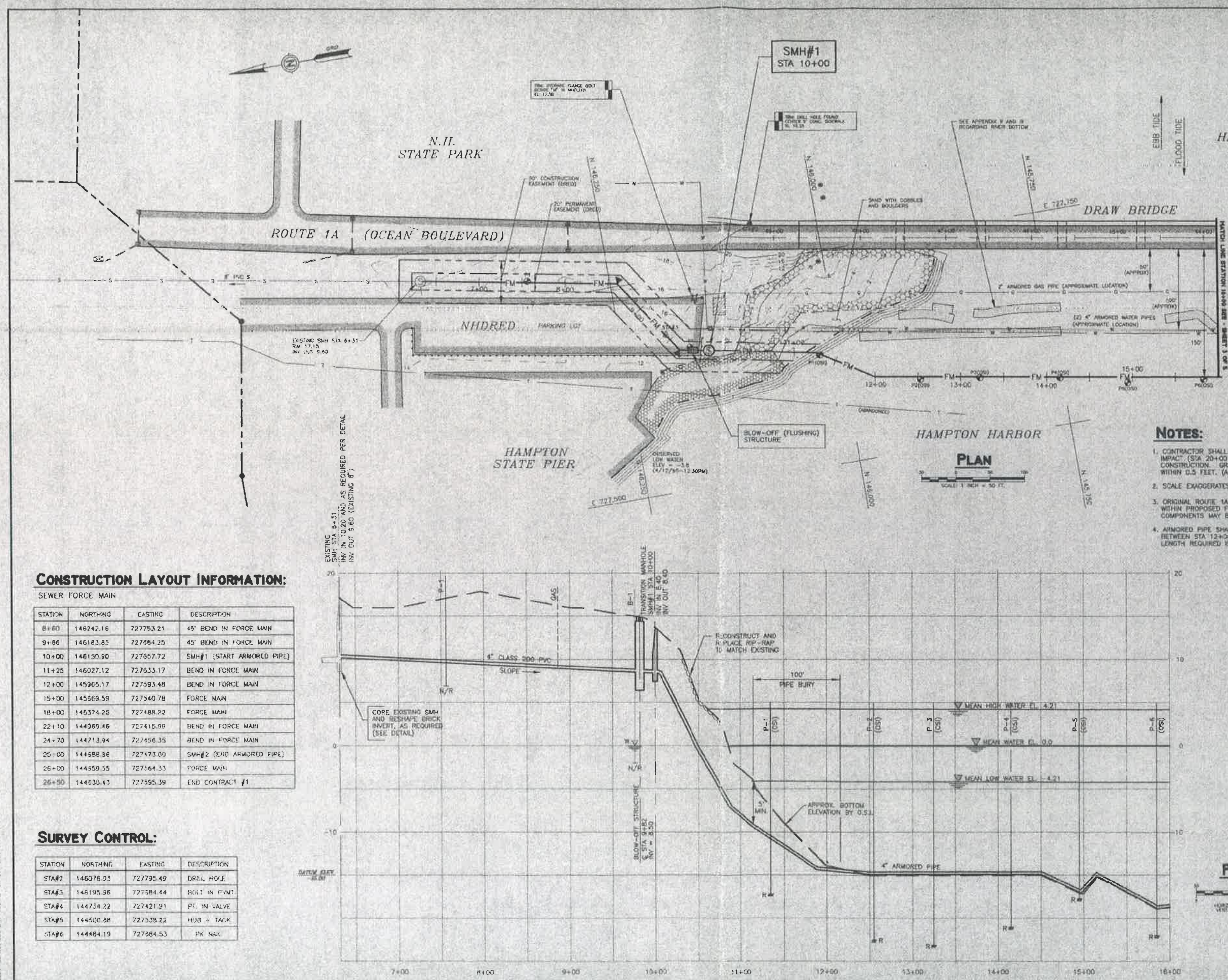
Tobey,

The State requests your company in the re-verification of your sewer facilities for the above noted State project. This project is the currently being advertised as the removal of lead based paint, rehabilitation and recoating of steel stringers on the NH 1A bridge over the Hampton River in Seabrook and Hampton, New Hampshire. This bridge painting project is currently being re-evaluated as a potential bridge replacement project and the Department's normal verification process is not being used for this study. The bridge deck was recently rehabilitated in the Hampton 14188 project that was completed in 2010.

Hampton Public Works Department verified the sewer facilities for that project in 2005 and stated that there is sewer force main from a manhole on the south end of the bridge continuing under the harbor to the north end of the bridge to a manhole near the existing pump house. The Department requests your department update and mark up the attached "as-built" plans with the size, type of pipe, and depth below the existing grade of all existing sewer main lines and services along with the abandoned sewer facilities if any on the plan. Attached for your review process is the 14188 general plan and site plan and the 1950 roadway plans north and south of the bridge. Please reply with this information by October 23, 2015 as an internal Department meeting to discuss the study is scheduled for November 2, 2015. If you have any questions feel free to ask.

Sincerely,

Brett McCrea
Utility Coordinator
New Hampshire Department of Transportation
John O. Morton Building
7 Hazen Drive
P.O. Box 483
Concord, NH 03302-0483
Tel (603) 271-1988
Fax (603) 271-7025
bmccrea2@dot.state.nh.us



NOTES:

1. CONTRACTOR SHALL SURVEY AREA OF PROPOSED IMPACT (STA 20+00 TO STA 26+50) PRIOR TO CONSTRUCTION. GRADES SHALL BE RESTORED TO WITHIN 0.5 FEET. (ABOVE MLW ONLY).
2. SCALE EXAGGERATES TOPOGRAPHY.
3. ORIGINAL ROUTE 1A BRIDGE WAS LOCATED APPROXIMATELY WITHIN PROPOSED FORCE MAIN CORRIDOR. ABANDONED COMPONENTS MAY BE PRESENT.
4. ARMORED PIPE SHALL BE INSTALLED WITH 2% SLACK BETWEEN STA 12+00 AND 19+00. ACTUAL PIPE LENGTH REQUIRED IS APPROXIMATELY 1520 FEET.

CONSTRUCTION LAYOUT INFORMATION:

SEWER FORCE MAIN

STATION	NORTHING	EASTING	DESCRIPTION
8+60	146242.16	727753.21	45° BEND IN FORCE MAIN
9+86	146183.85	727664.25	45° BEND IN FORCE MAIN
10+00	146150.90	727667.72	SMH#1 (START ARMORED PIPE)
11+25	146027.12	727633.17	BEND IN FORCE MAIN
12+00	145905.17	727593.48	BEND IN FORCE MAIN
15+00	145569.58	727540.78	FORCE MAIN
18+00	145374.25	727488.22	FORCE MAIN
22+10	144969.46	727415.99	BEND IN FORCE MAIN
24+70	144713.94	727456.35	BEND IN FORCE MAIN
25+00	144688.36	727473.00	SMH#2 (END ARMORED PIPE)
26+00	144359.55	727564.33	FORCE MAIN
26+50	144635.43	727595.39	END CONTRACT #1

SURVEY CONTROL:

STATION	NORTHING	EASTING	DESCRIPTION
STA#2	146076.03	727795.49	DRILL HOLE
STA#3	146195.96	727584.44	BOLT IN PVMT
STA#4	144734.22	727421.91	PT. IN VALVE
STA#5	144500.88	727538.22	HUB + TACK
STA#6	144484.19	727364.53	PK NAIL

NO.	REVISIONS	APP'D
1		
2		
3		
4		
5		

ISSUE FOR
APPROVAL 10/27/98 BY JKC
CONSTRUCTION 1/29/99 BY JKC
RECORD DRAWING

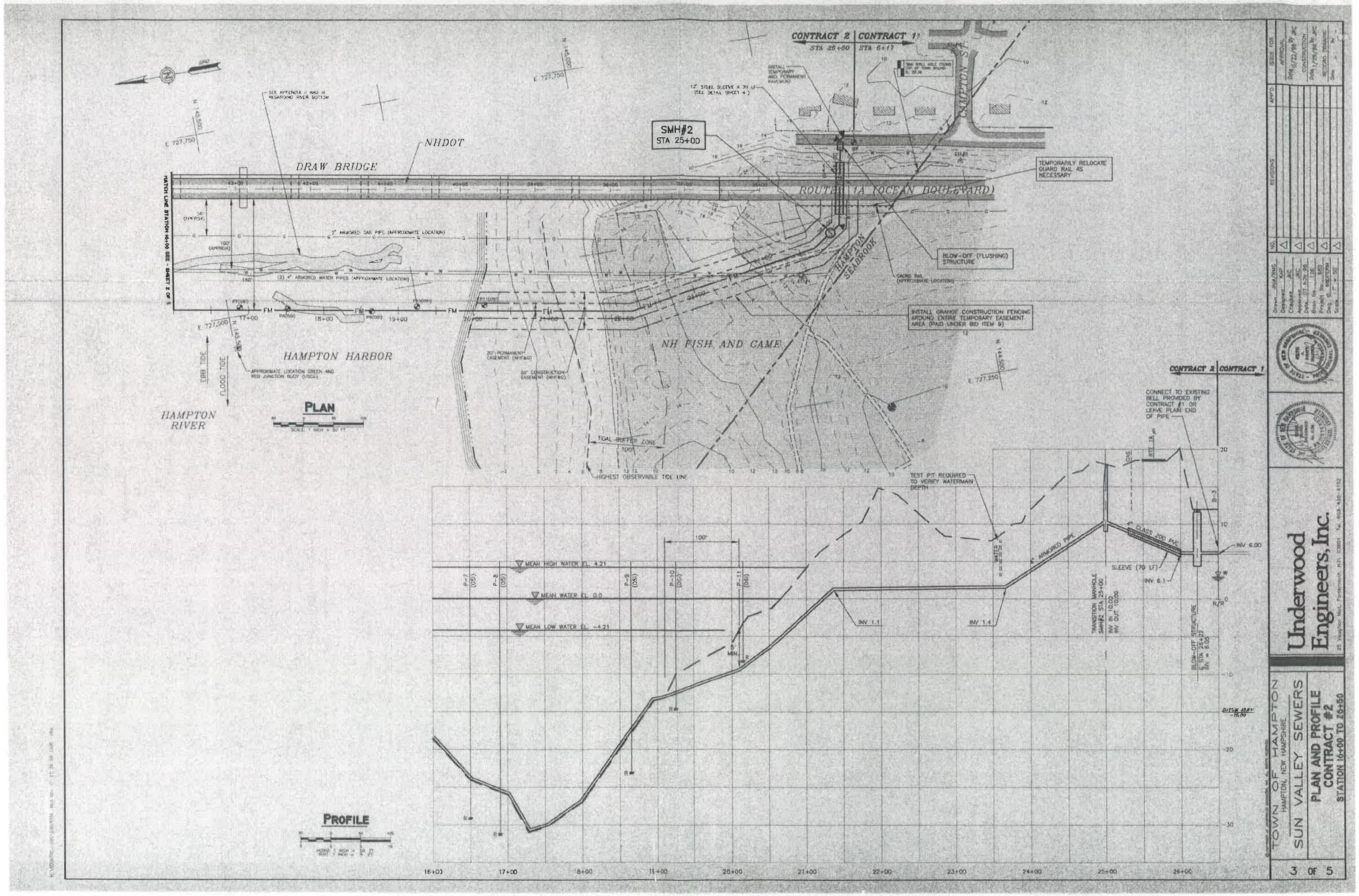
Drawn JRM/RMG
Designed KAF
Checked JKC
Approved JKC
Date 07 NOV 98
Book no. 126
Project No. 6362
Dwg. ID 6362PLPRF
Scale 1" = 50'

STATE OF NEW HAMPSHIRE
ROSTER OF PROFESSIONAL ENGINEERS
No. 6362

Underwood Engineers, Inc.
25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-8192

TOWN OF HAMPTON
HAMPTON, NEW HAMPSHIRE
SUN VALLEY SEWERS
PLAN AND PROFILE
CONTRACT #2
STATION 6+31 TO 16+00

2 OF 5


CONTRACT 2 | CONTRACT 1
STA 26+50
STA 6+17
SMH#2
STA 25+00
NHDOT
DRAW BRIDGE
ROUTE 1A (OCEAN BOULEVARD)
HAMPTON SEABROOK
TEMPORARILY RELOCATE GUARD RAIL AS NECESSARY
BLOW-OFF (FLUSHING) STRUCTURE
INSTALL ORANGE CONSTRUCTION FENCING AROUND ENTIRE TEMPORARY EASEMENT AREA (PAID UNDER BID ITEM 9)
NH FISH AND GAME
HAMPTON HARBOR
HAMPTON RIVER
EBB TIDE
FLOOD TIDE
PLAN
TIDAL BUFFER ZONE
HIGHEST OBSERVABLE TIDE LINE
TEST PIT REQUIRED TO VERIFY WATERMAN DEPTH
CONNECT TO EXISTING BELL PROVIDED BY CONTRACT #1 OR LEAVE PLAIN END OF PIPE
MEAN HIGH WATER EL. 4.21
MEAN WATER EL. 0.0
MEAN LOW WATER EL. -4.21
INV 1.1
INV 1.4
INV 6.00
INV 6.1
SLEEVE (70 LF)
TRANSITION MANHOLE SMH#2 STA 25+00
BLOW-OFF STRUCTURE
PROFILE
Underwood Engineers, Inc.
TOWN OF HAMPTON
HAMPTON, NEW HAMPSHIRE
SUN VALLEY SEWERS
PLAN AND PROFILE
CONTRACT #2
STATION 16+00 TO 26+50
3 OF 5

VICTORIA F. SHEEHAN
COMMISSIONER

RECEIVED
OCT - 4 2016
BUREAU OF BRIDGE DESIGN
NH DEPT OF TRANSPORTATION

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
JOHN O. MORTON BUILDING, P.O. BOX 483, CONCORD, NH 03301

LETTER OF TRANSMITTAL

BUREAU OF HIGHWAY DESIGN
UTILITY SECTION

TO: **David Scott**
In-House Design Chief
Bureau of Bridge Design

DATE: October 4, 2016
PROJECT: Seabrook-Hampton
15904

WE ARE SENDING YOU THE FOLLOWING: ☒ Attached ☐ Under Separate Cover via _____the following:

☒ Shop Drawings ☐ Prints ☐ Specifications ☒ Plans
☒ Copy of Letter ☐ Falsework ☐ Catalog Cuts ☐ Other

COPIES	DATE(S)	NO. OF SHEETS	DESCRIPTION
1	October 4, 2016	2	Shop Drawings from Seabrook Water Department showing their water facilities
1	October 4, 2016	1	Copy of Letter from Seabrook Water Department describing their water facilities

THESE ARE TRANSMITTED as checked below:

☐ For Approval ☐ Approved As Submitted ☐ RETURNED for Corrections
☒ For Your Use ☐ Approved As Noted ☐ RETURN Originals
☐ As Requested ☒ For Review and Comment ☐ RESUBMIT copies for approval ___ Ea.
☐ For Info. Only ☐ Investigate and Report ☐ SUBMIT for distribution ___ Ea.

REMARKS: Please incorporate this information into a base plan. There will be anticipated impacts to Seabrook Water Department's water facilities. If you have any questions feel free to ask Brett McCrea in Design Services – Utilities.

COPY TO: Utility File

SIGNED: Brett S. McCrea
Brett McCrea
Utility Coordinator

Seabrook Water Department
Groundwater Treatment Facility
550 Route 107 ~ PO Box 456
Seabrook, NH 03874
(603) 474-9921

October 6, 2015

Brett McCrea, Utility Coordinator
New Hampshire DOT
John O. Morton Building
7 Hazen Drive
P.O. Box 483
Concord, NH 03302-0483

Re: SEABROOK-HAMPTON 15904 NH 1A Bridge over Hampton River

Dear Mr. McCrea:

Per your request we have enclosed two drawings showing our water system facilities in the area south of the Seabrook-Hampton Route 1A Bridge.

Should you have any questions, please call.

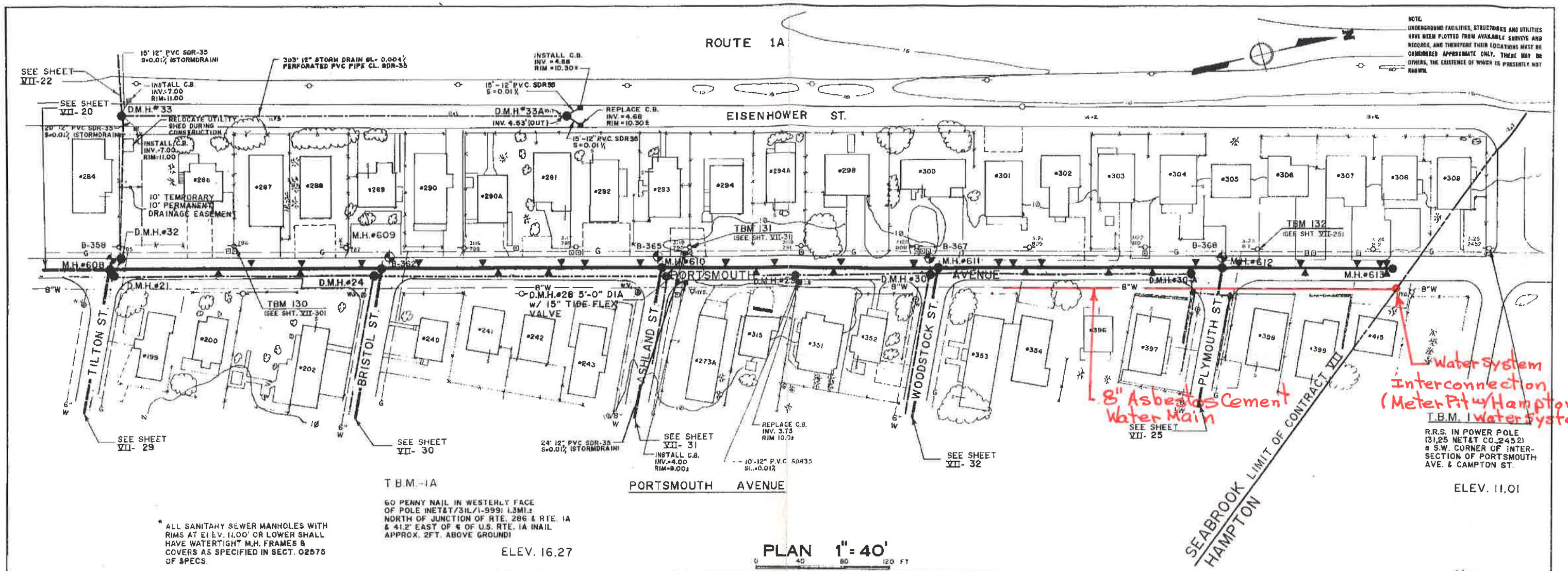
Very truly yours,

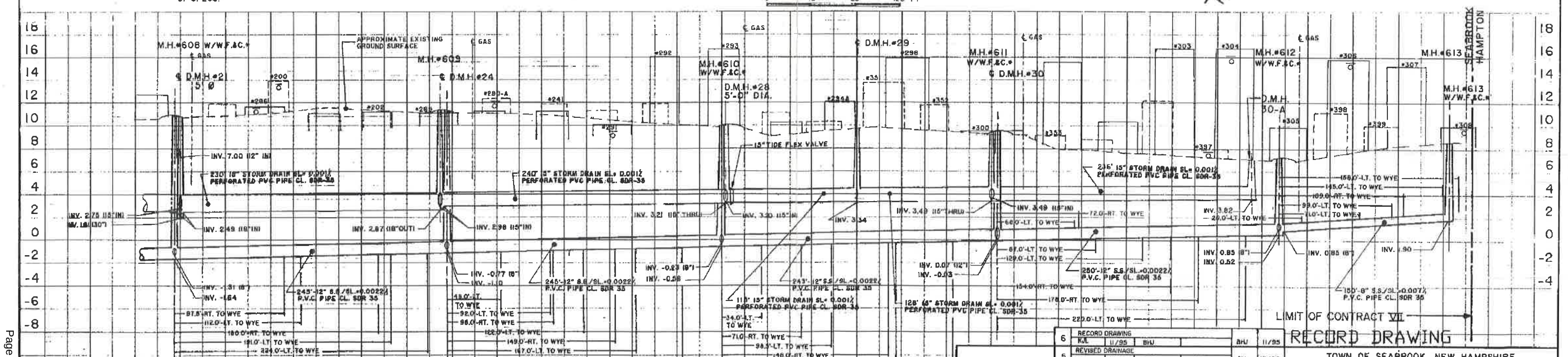
Seabrook Water Department

Curtis Slayton
Water Superintendent

Enclosures

RECEIVED
OCT 08 2015
NHDOT
Highway Design





6	RECORD DRAWING KJL	11/95	BHJ		BHJ	11/95	
5	REVISED DRAINAGE SDC	12/94	BHJ	SDC	BHJ	12/94	
4	ADDED PERFORATED PIPE & TIDE FLEX VALVE EM	5/94		BHJ	BHJ	5/94	
3	REVISE EASEMENT EM	10/93	JEC	JEC	BHJ	10/93	
2	REVISE DRAINAGE EM	9/93	RBJ	RBJ	RBJ	9/93	
1	ADDED DRAINAGE WM	7/92	RBJ	RBJ	RBJ	7/92	
0	ISSUED FOR APPROVAL SB/JOE	12/90	JAH	SB	JAH	1/91	
ISSUE NO.	DRAWN	DATE	CHECKED	DESIGNER	APPROVED	DATE	

PROJECT SUPERVISOR — APPROVED

THE STATE OF NEW HAMPSHIRE JOHN A. HIGGINS No. 7546 LICENSED PROFESSIONAL ENGINEER

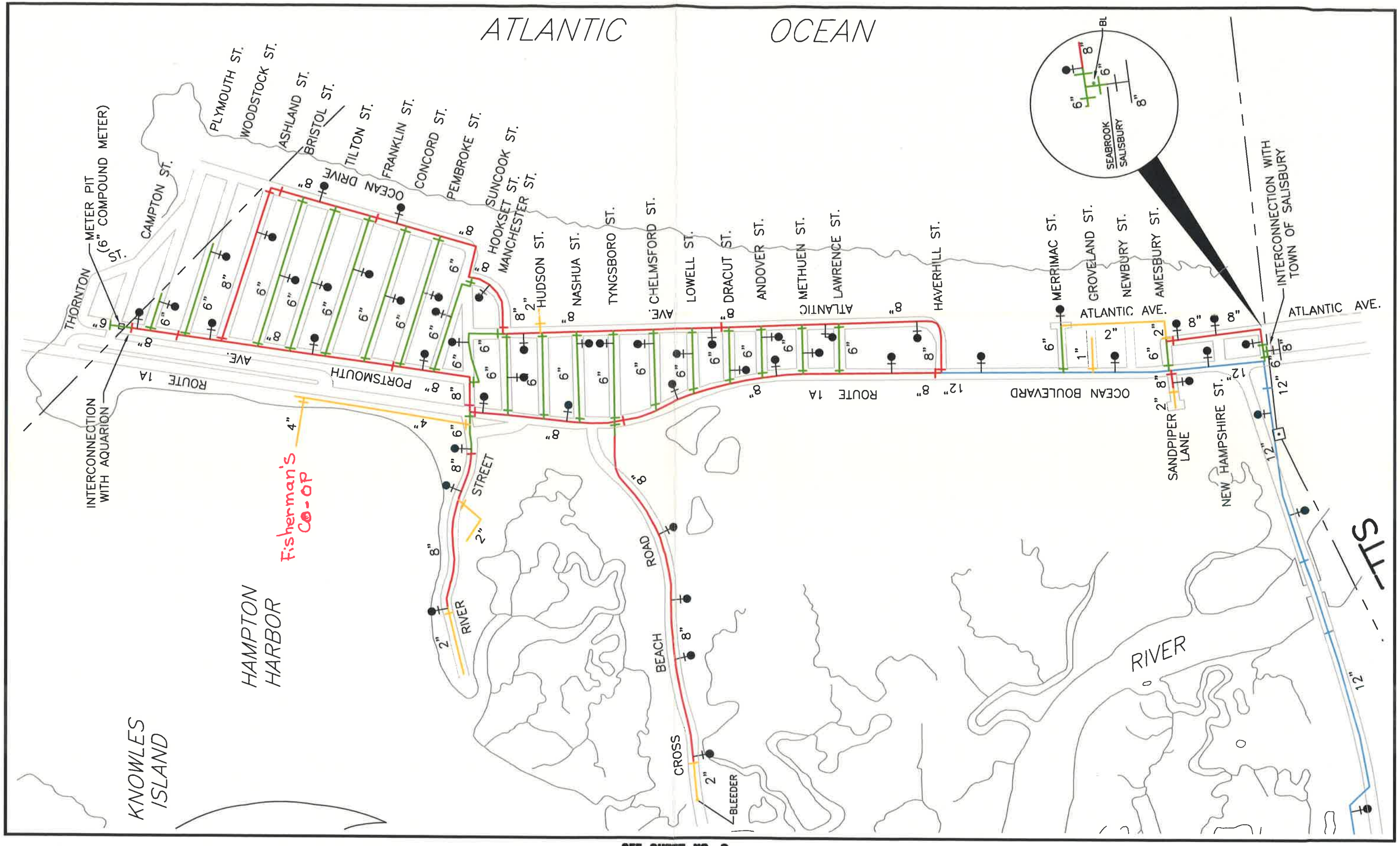
TOWN OF SEABROOK, NEW HAMPSHIRE

SANITARY SEWER CONSTRUCTION

PORTSMOUTH AVE.
(MANHOLE NO.608)-(MANHOLE NO.613)
(D.M.H. NO.21)-(D.M.H. NO.30)

Jones & Beach / Stearns & Wheler
JOINT VENTURE ~ CONSULTING ENGINEERS
STRATHAM, NEW HAMPSHIRE

JOB NO. 1444/8704 | CONTRACT NO. VII | SHEET 21 OF 57



MARCH 2009 PROJECT NO. 46630

AECOM

SEE SHEET NO. 9

SHEET 10
SEABROOK, NEW HAMPSHIRE
WATER SYSTEM MAP

SCALE: 1" = 600'

VICTORIA F. SHEEHAN
COMMISSIONER

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
JOHN O. MORTON BUILDING, P.O. BOX 483, CONCORD, NH 03301

LETTER OF TRANSMITTAL

RECEIVED
OCT - 4 2016
BUREAU OF BRIDGE DESIGN
NH DEPT. OF TRANSPORTATION

BUREAU OF HIGHWAY DESIGN
UTILITY SECTION

TO: **David Scott**
In-House Design Chief
Bureau of Bridge Design

DATE: October 4, 2016
PROJECT: Seabrook-Hampton
15904

WE ARE SENDING YOU THE FOLLOWING: ☒ Attached ☐ Under Separate Cover via _____the following:

☒ Shop Drawings ☐ Prints ☐ Specifications ☒ Plans
☒ Copy of Letter ☐ Falsework ☐ Catalog Cuts ☐ Other

COPIES	DATE(S)	NO. OF SHEETS	DESCRIPTION
1	October 4, 2016	2	Shop Drawings from Unitil Energy Systems showing their electric facilities

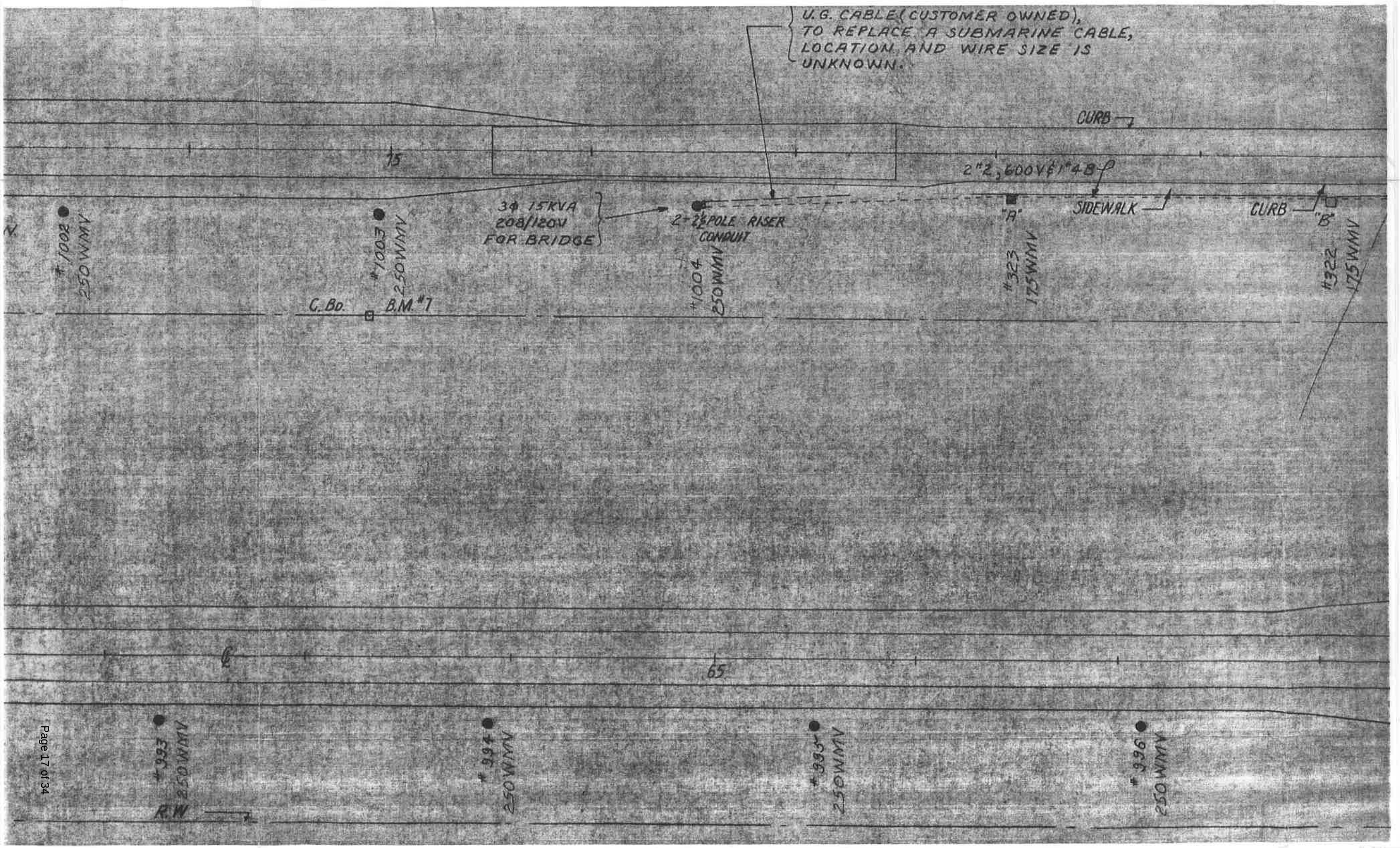
THESE ARE TRANSMITTED as checked below:

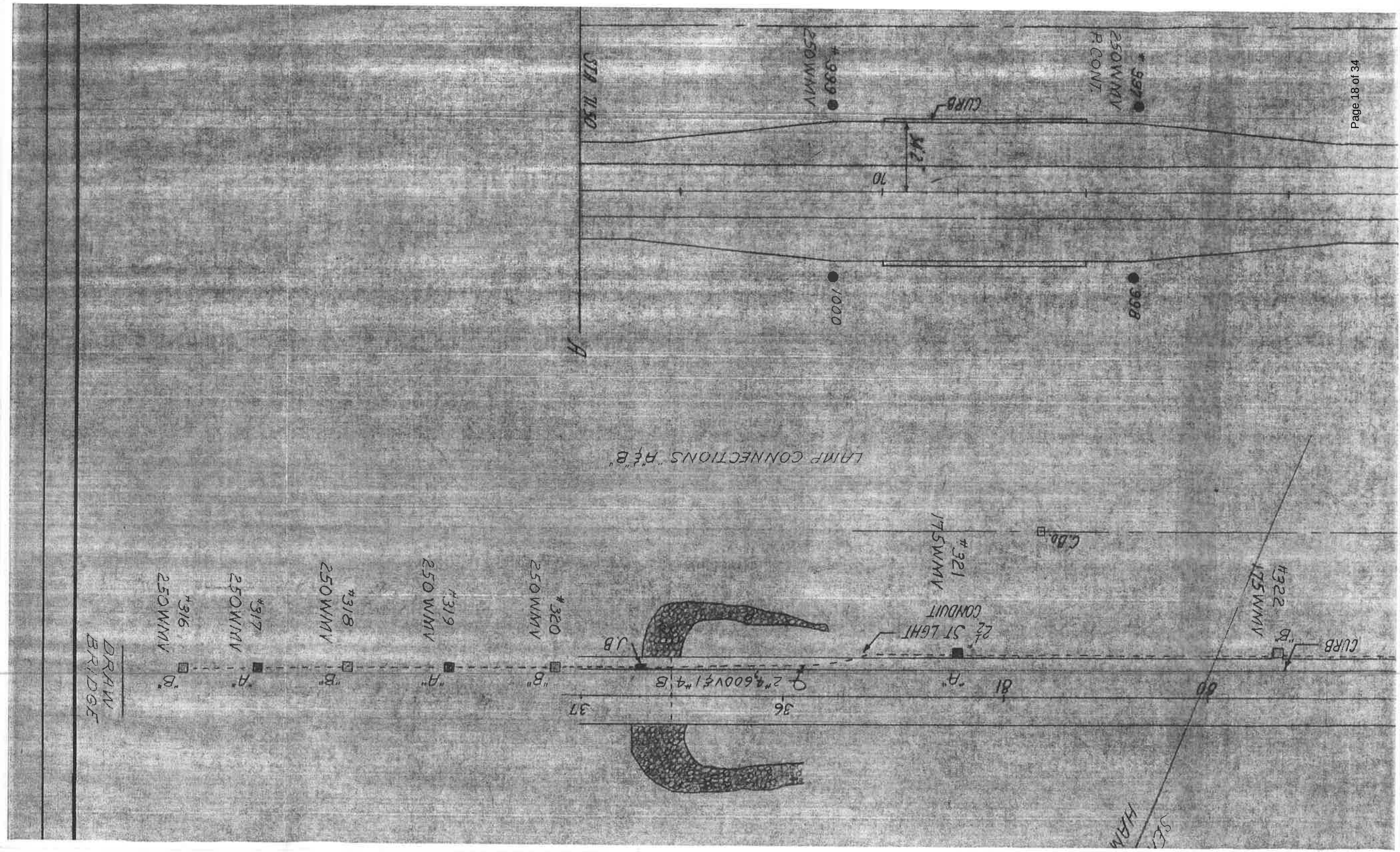
☐ For Approval ☐ Approved As Submitted ☐ RETURNED for Corrections
☒ For Your Use ☐ Approved As Noted ☐ RETURN Originals
☐ As Requested ☒ For Review and Comment ☐ RESUBMIT copies for approval ___ Ea.
☐ For Info. Only ☐ Investigate and Report ☐ SUBMIT for distribution ___ Ea.

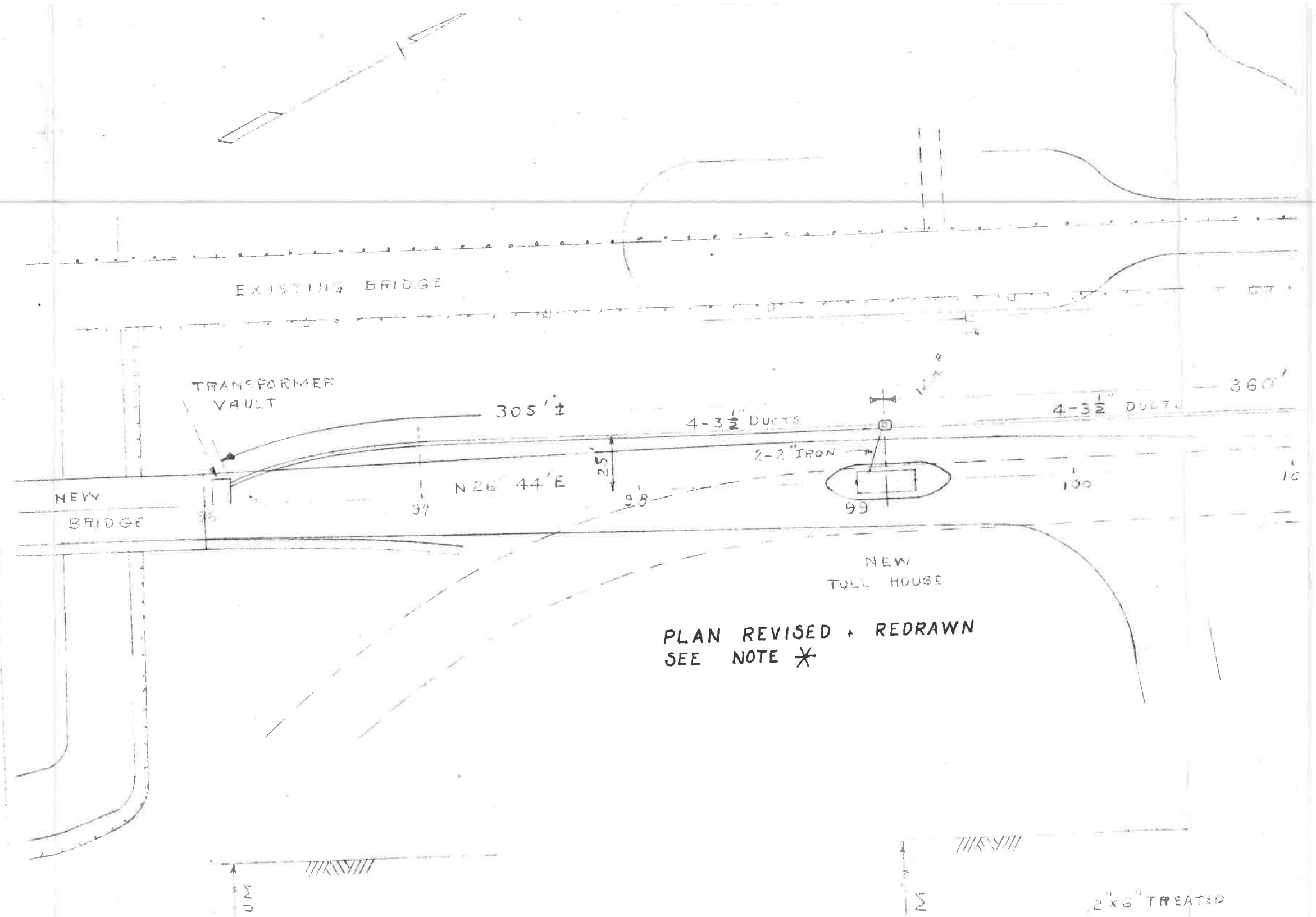
REMARKS: Please incorporate this information into a base plan. There will be anticipated impacts to the electric facilities. If you have any questions feel free to ask Brett McCrea in Design Services – Utilities.

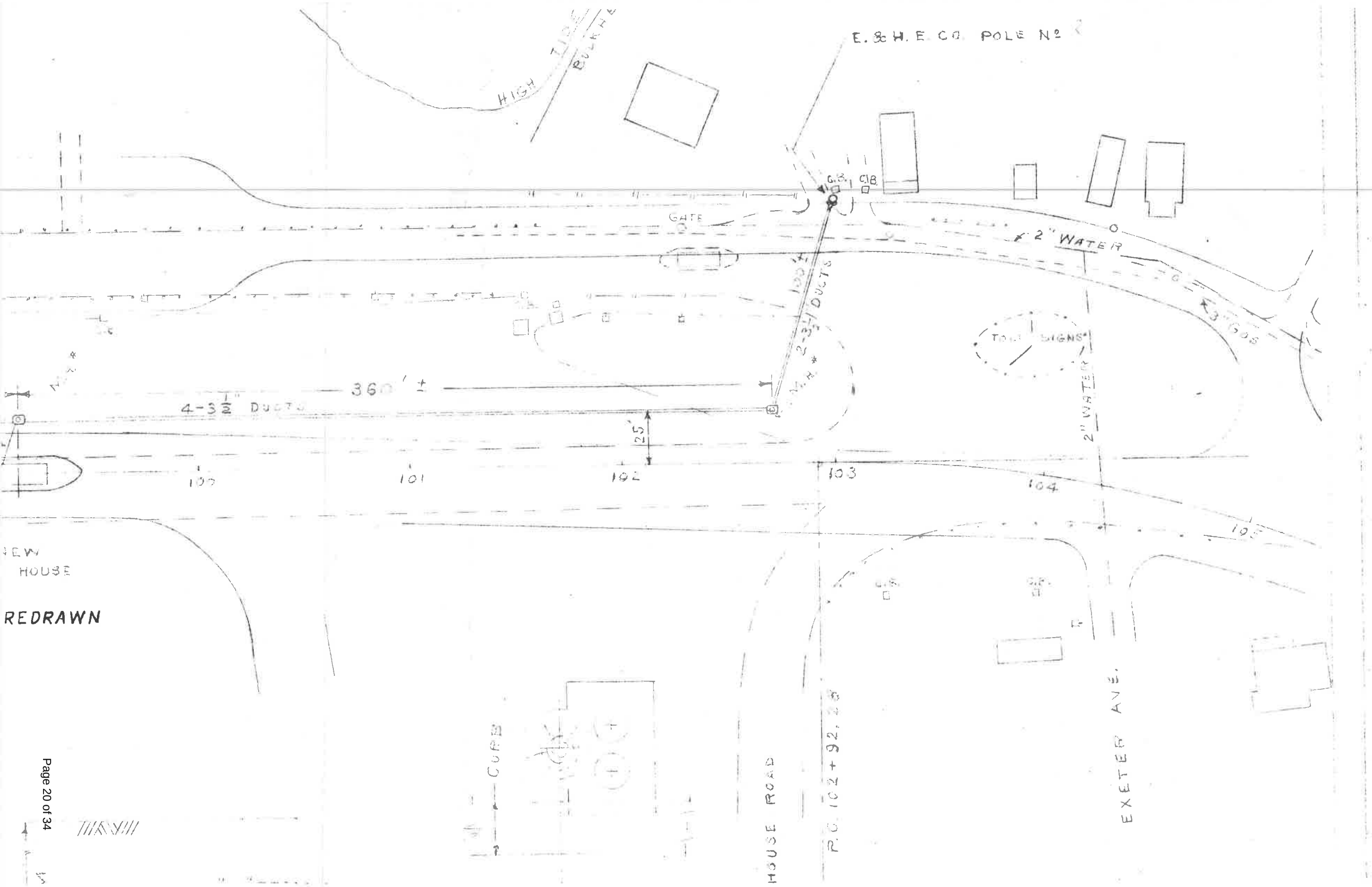
COPY TO: Utility File

SIGNED: Brett S. McCrea
Brett McCrea
Utility Coordinator


U.G. CABLE (CUSTOMER OWNED), TO REPLACE A SUBMARINE CABLE, LOCATION AND WIRE SIZE IS UNKNOWN.
CURB
15
2"2,600V & 1"4B
3Φ 15KVA 208/120V FOR BRIDGE
2-2½ POLE RISER CONDUIT
"A"
SIDEWALK
CURB
"B"
#1002 250 WMV
#1001 250 WMV
#1004 250 WMV
#323 175 WMV
#322 175 WMV
C. Bd.
B.M. #7
65
#997 250 WMV
#996 250 WMV
#993 250 WMV
RW


LAMP CONNECTIONS "A" & "B"
STA 11+50
250WMV
#999
250WMV
PCONT.
#997
CURB
10
1000
998
DRAW BRIDGE
"B"
250WMV
#316
"A"
250WMV
#317
"B"
250WMV
#318
"A"
250WMV
#319
"B"
250WMV
#320
J.B
2"ø 600V ⅜ / #4 B
36
37
"A"
81
22' ST LIGHT CONDUIT
175WMV
#321
C.B.
60
125WMV
#322
"B"
CURB
HAM


EXISTING BRIDGE
TRANSFORMER VAULT
305'±
4-3½" DUCTS
4-3½" DUCTS
360
2-2" IRON
25
N 26° 44' E
NEW BRIDGE
97
98
99
100
NEW TOLL HOUSE
PLAN REVISED + REDRAWN
SEE NOTE *
2"x6" TREATED


E. & W. E. CO. POLE Nº
HIGH TIDE
BULKHEAD
G.B.
C.I.B.
GATE
2" WATER
TOW SIGNS
2" WATER
4-3½" DUCTS
360' ±
25'
100
101
102
103
104
105
NEW HOUSE
REDRAWN
CURB
HOUSE ROAD
EXETER AVE.

VICTORIA F. SHEEHAN
COMMISSIONER

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
JOHN O. MORTON BUILDING, P.O. BOX 483, CONCORD, NH 03301

LETTER OF TRANSMITTAL

RECEIVED
OCT - 4 2016
BUREAU OF BRIDGE DESIGN
NH DEPT. OF TRANSPORTATION

BUREAU OF HIGHWAY DESIGN
UTILITY SECTION

TO: **David Scott**
In-House Design Chief
Bureau of Bridge Design

DATE: October 4, 2016
PROJECT: Seabrook-Hampton
15904

WE ARE SENDING YOU THE FOLLOWING: ☒ Attached ☐ Under Separate Cover via _____the following:

☒ Shop Drawings ☐ Prints ☐ Specifications ☒ Plans
☒ Copy of Letter ☐ Falsework ☐ Catalog Cuts ☐ Other

COPIES	DATE(S)	NO. OF SHEETS	DESCRIPTION
1	October 4, 2016	12	Shop Drawings from Unitil Service Corp showing their gas facilities
1	October 4, 2016	1	Email from Unitil Service Corp describing their gas facilities

THESE ARE TRANSMITTED as checked below:

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☒ For Your Use ☐ Approved As Noted ☐ RETURN Originals
☐ As Requested ☒ For Review and Comment ☐ RESUBMIT copies for approval ___ Ea.
☐ For Info. Only ☐ Investigate and Report ☐ SUBMIT for distribution ___ Ea.

REMARKS: Please incorporate this information into a base plan. There will be anticipated impacts to Unitil's gas facilities. If you have any questions feel free to ask Brett McCrea in Design Services – Utilities.

COPY TO: Utility File

SIGNED: Brett S. McCrea
Brett McCrea
Utility Coordinator

Brett McCrea

From: Powell, Sean <powells@unitil.com>
Sent: Wednesday, October 07, 2015 8:22 AM
To: Brett McCrea
Cc: Bickford, Timothy; Dunn, Michael; Dupuis, Mark; Patterson, Timothy
Subject: Hampton Seabrook Draw Bridge - Unitil Gas Co. Services
Attachments: Hamption-Seabrook Bridge.pdf; Main and service location.pdf

Mr. McCrea,

My name is Sean Powell and I work for Unitil Gas. I have researched our information regarding our piping in that location as well as customer services near the bridge. Attached I have the locations of our 2" distribution main that runs parallel to the bridge under water. There is gas service from our gas distribution main to the meter fit on the pump house. There is a 2" service from the meter to the bridge tower. New Hampshire DOT owns this 2" service from the outlet of the meter to the bridge tower. If you have any questions, just let me know.

Thanks,

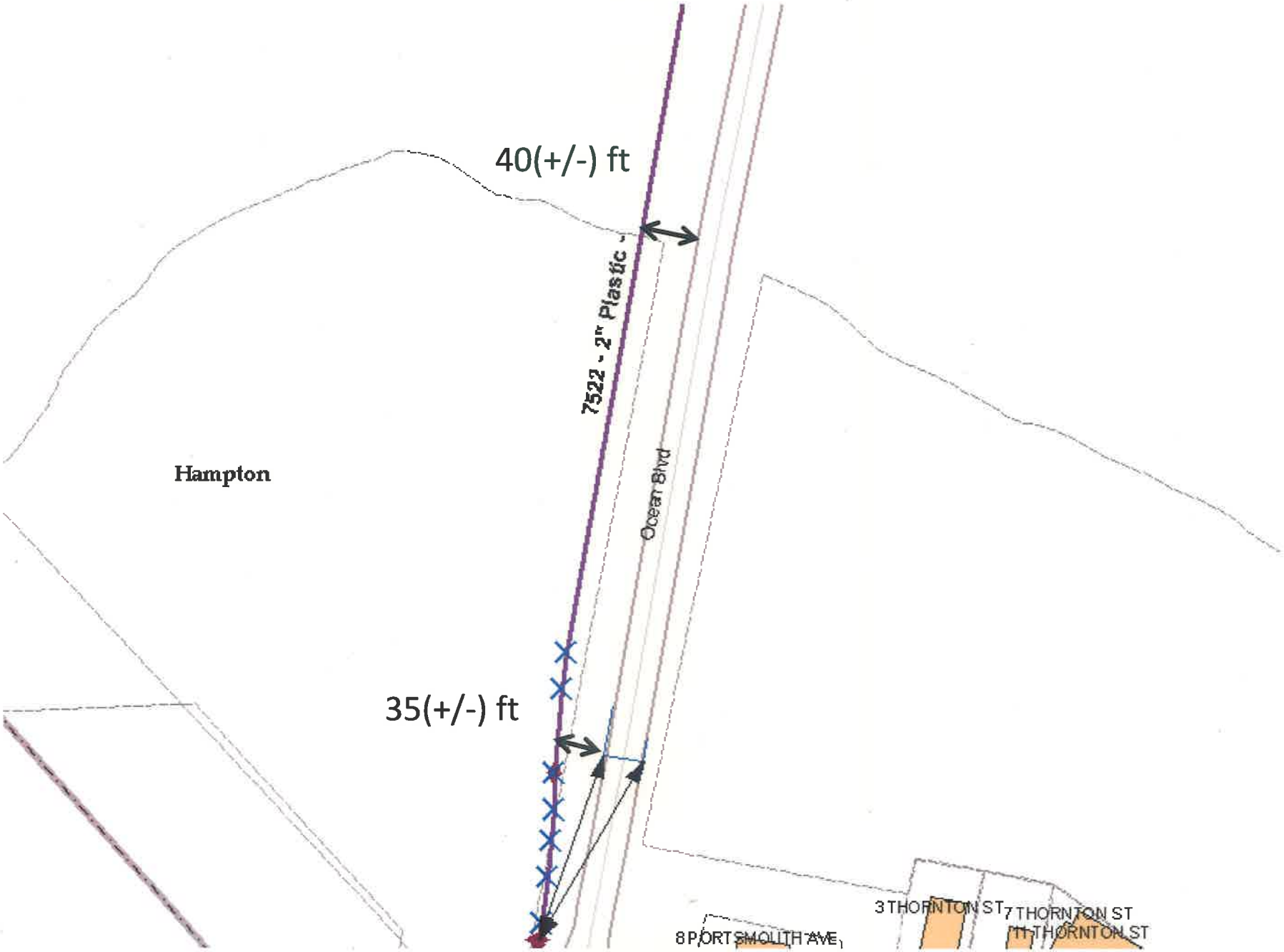
Sean Powell
Gas Engineering Intern
powells@unitil.com
C: (617)-285-8863

Unitil Service Corp (Gas)

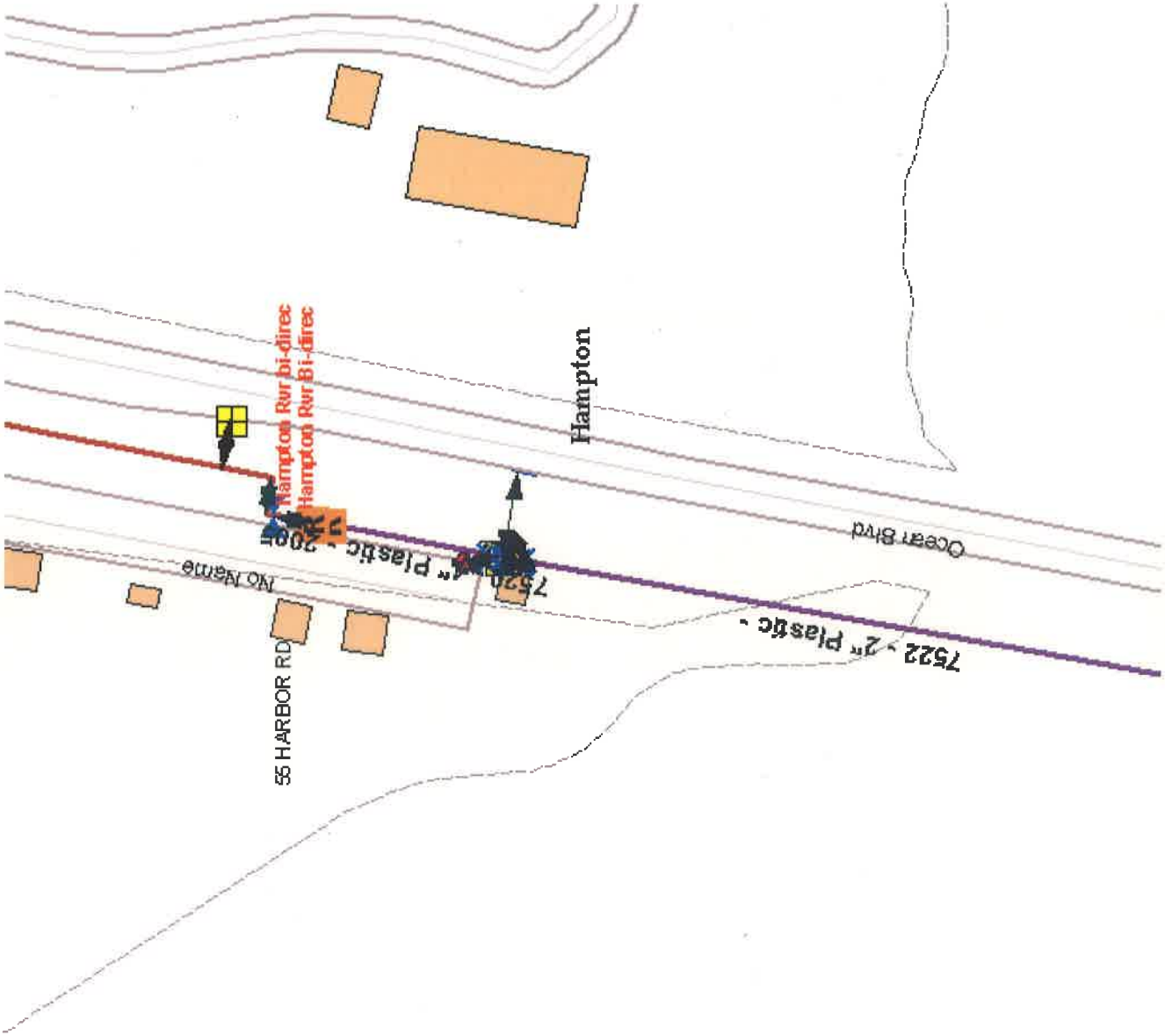
Hampton-Seabrook Bridge
0 Ocean Blvd, Hampton, NH

Records of our distribution line under water next to bridge

Seabrook Side of Bridge



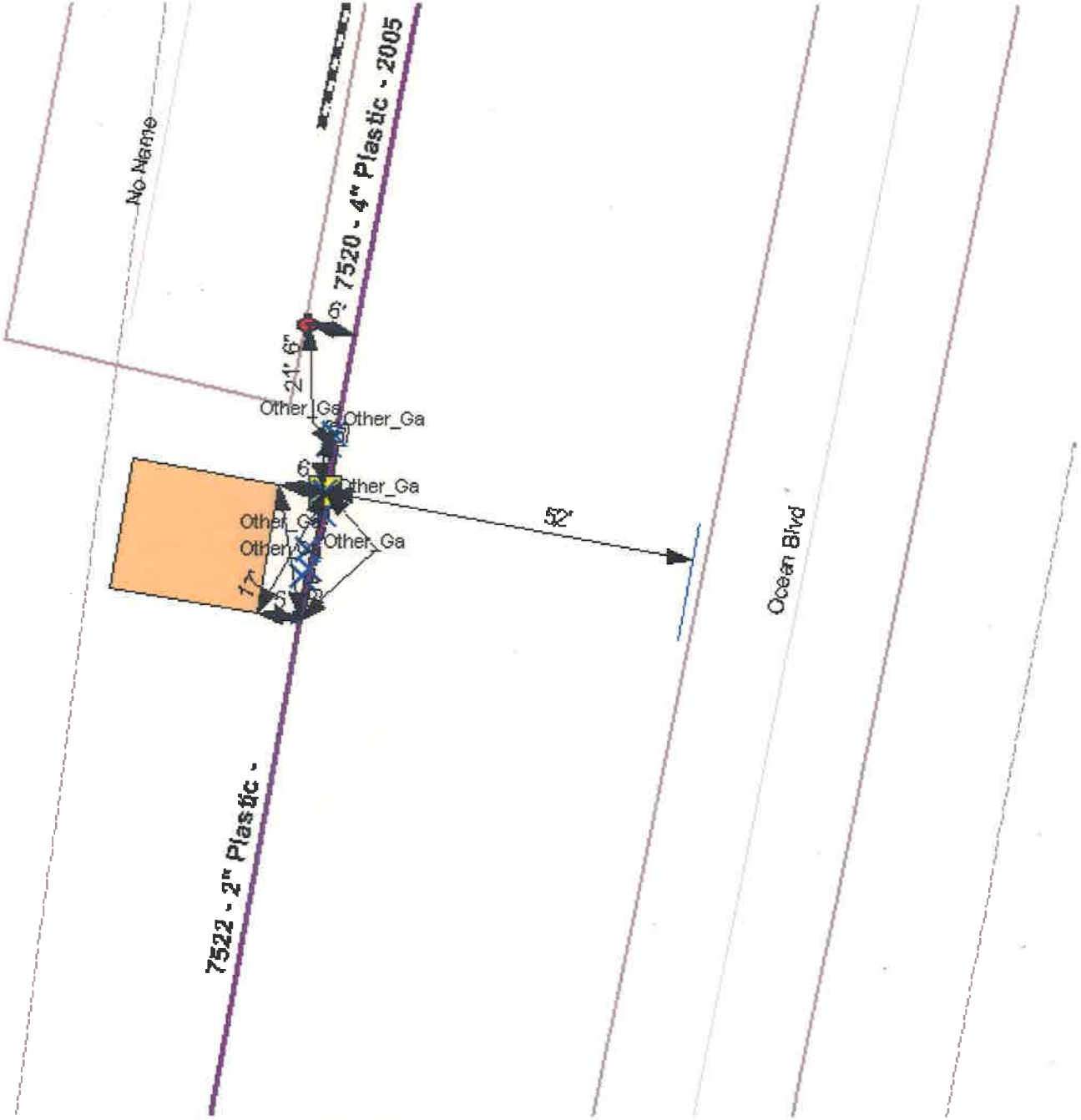
Hampton Side of Bridge

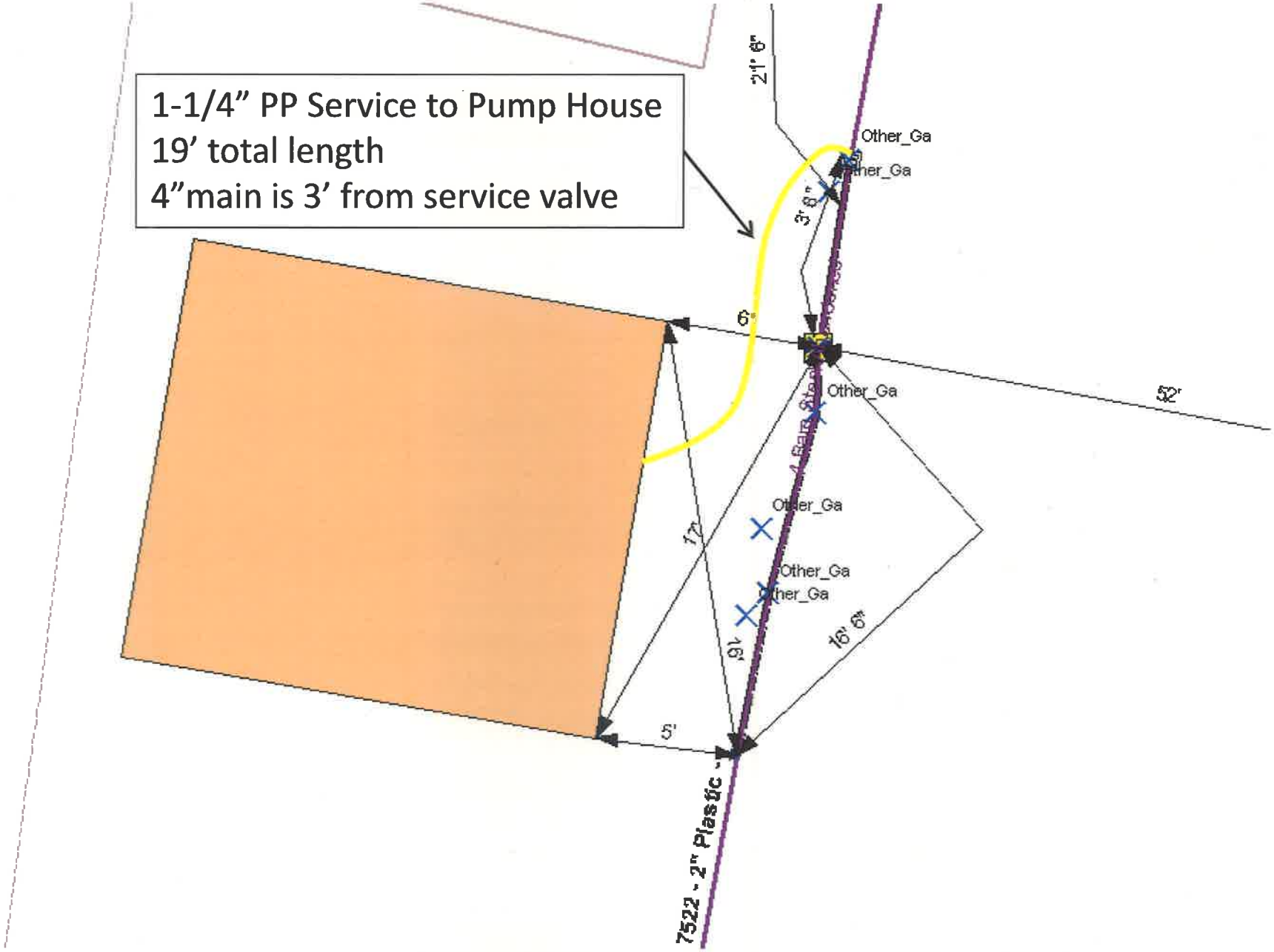


Gas Main is 52 ft away from roadway

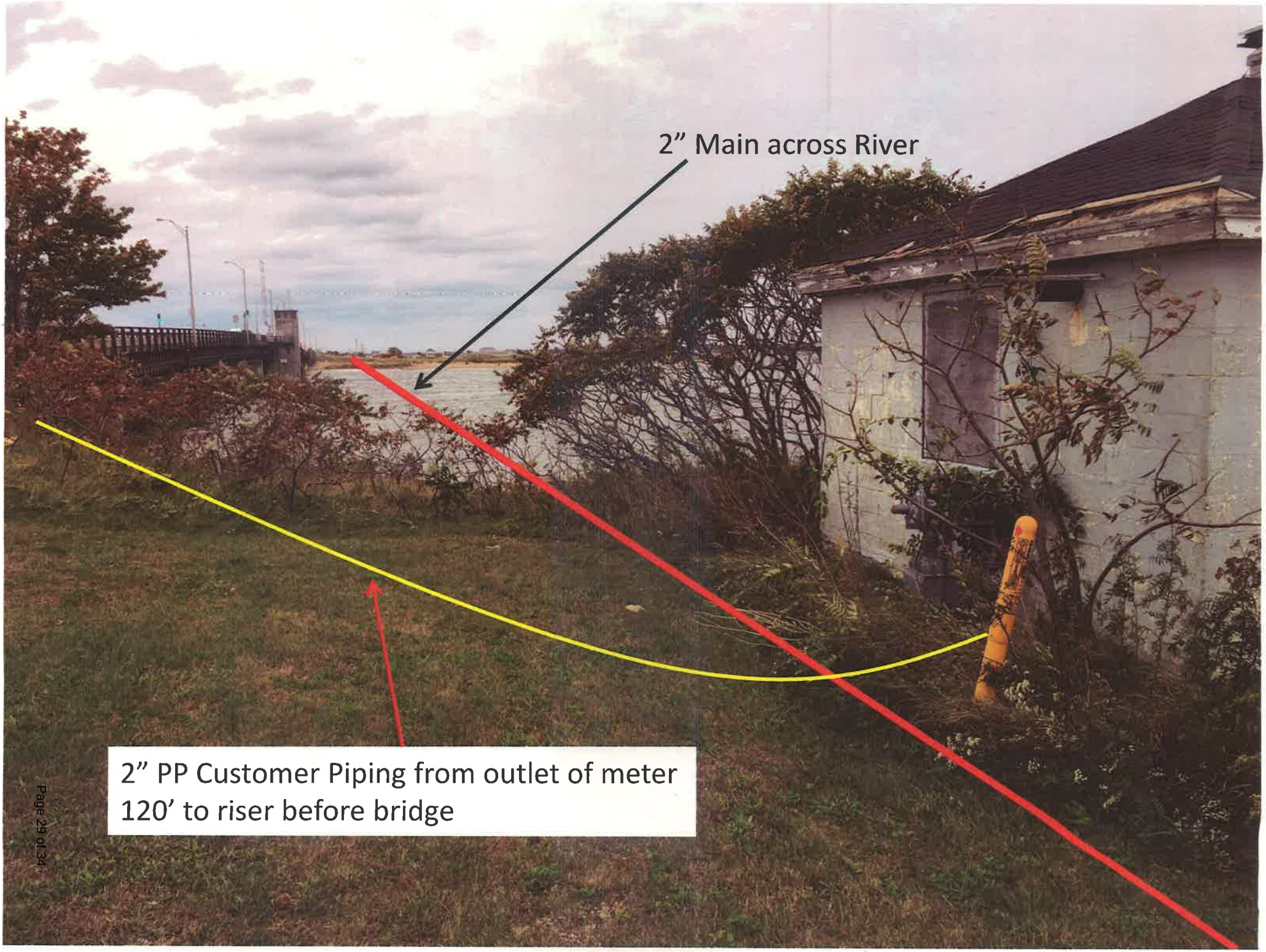
55 HARBOR RD

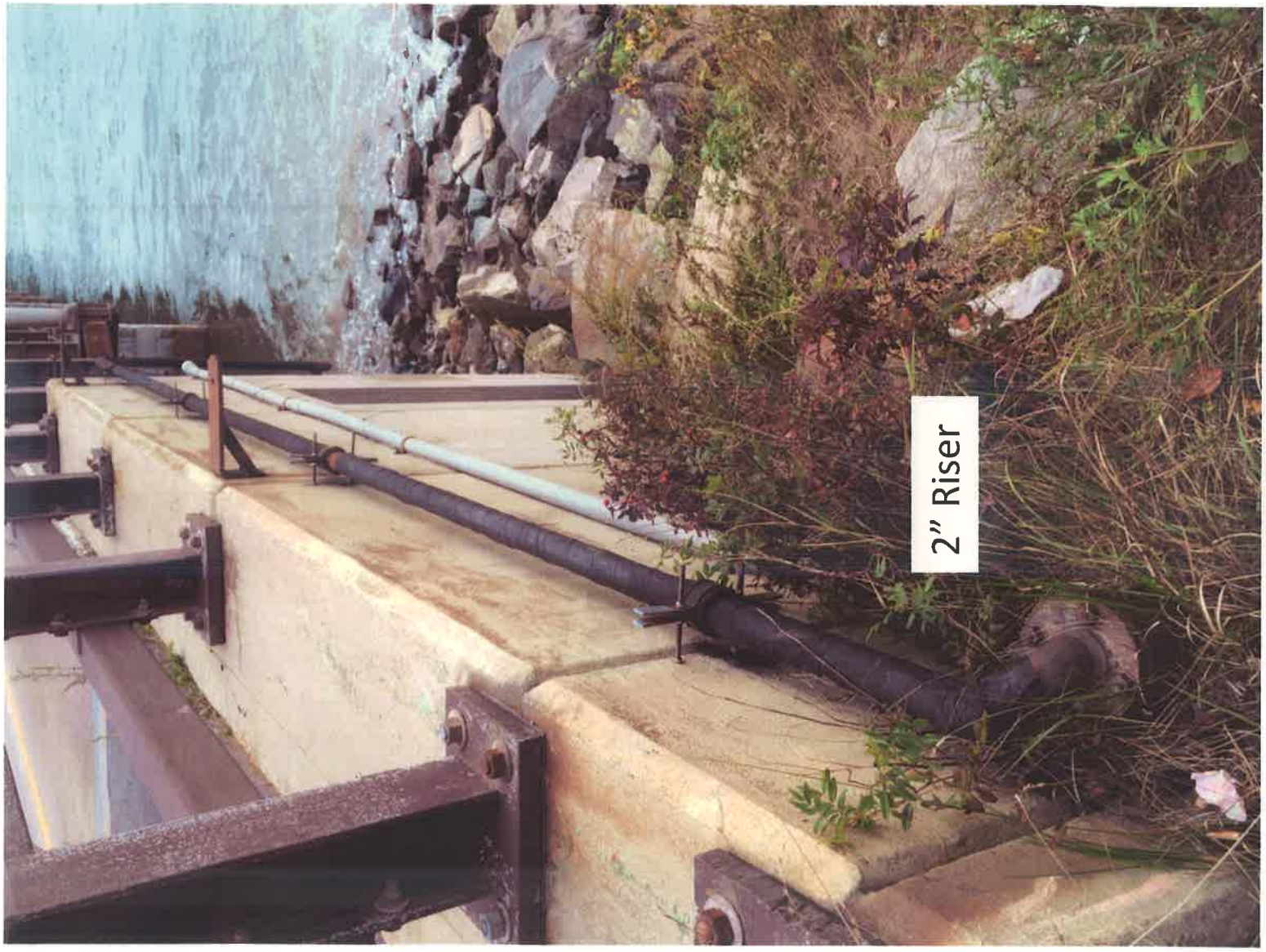
Hampton




1-1/4" PP Service to Pump House
19' total length
4"main is 3' from service valve
21' 6"
3' 6"
6'
52'
17'
16'
16' 6"
5'
Other_Ga
Other_Ga
Other_Ga
Other_Ga
Other_Ga
Other_Ga
7522 - 2" Plastic

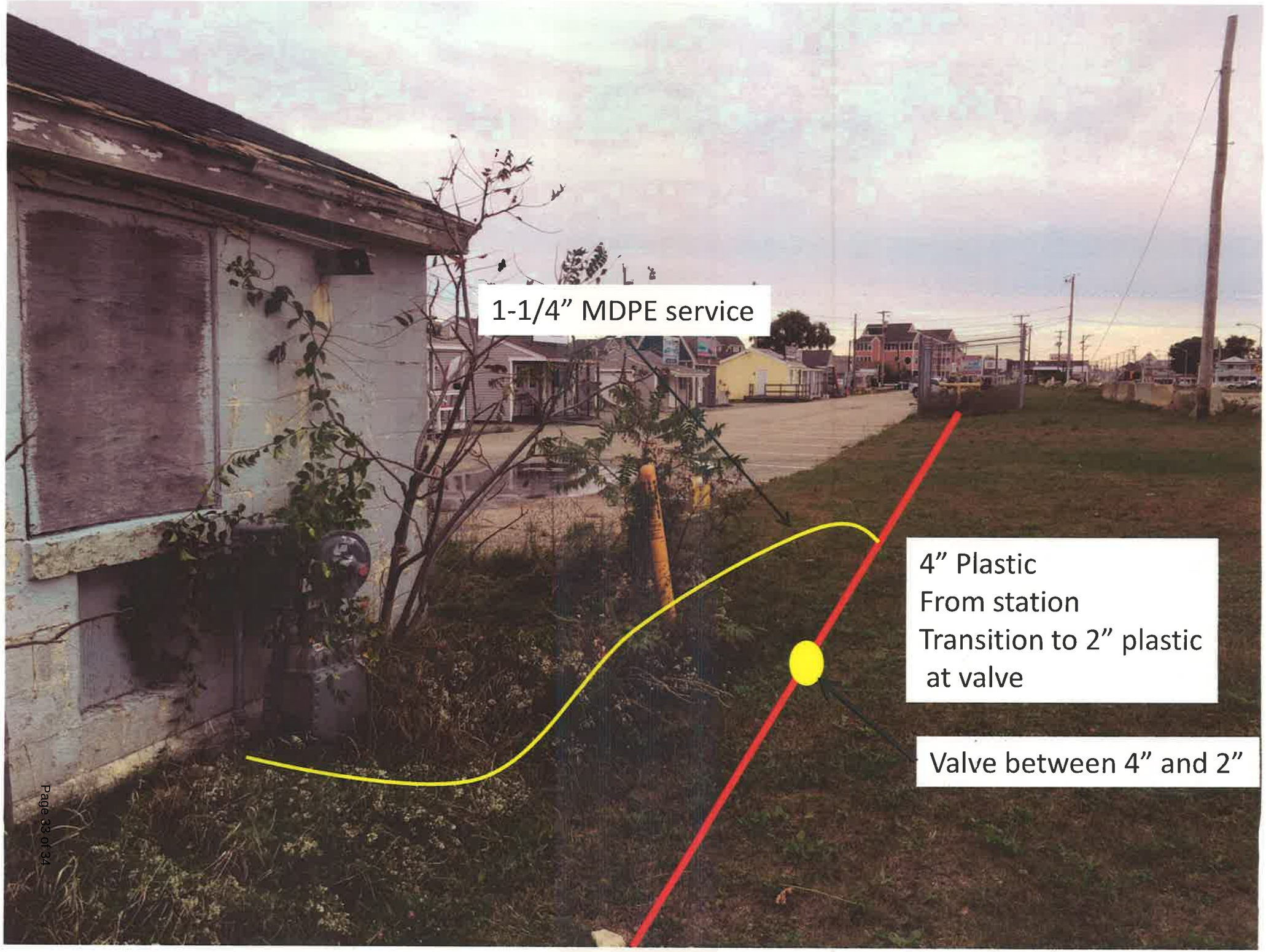
RBOR RD

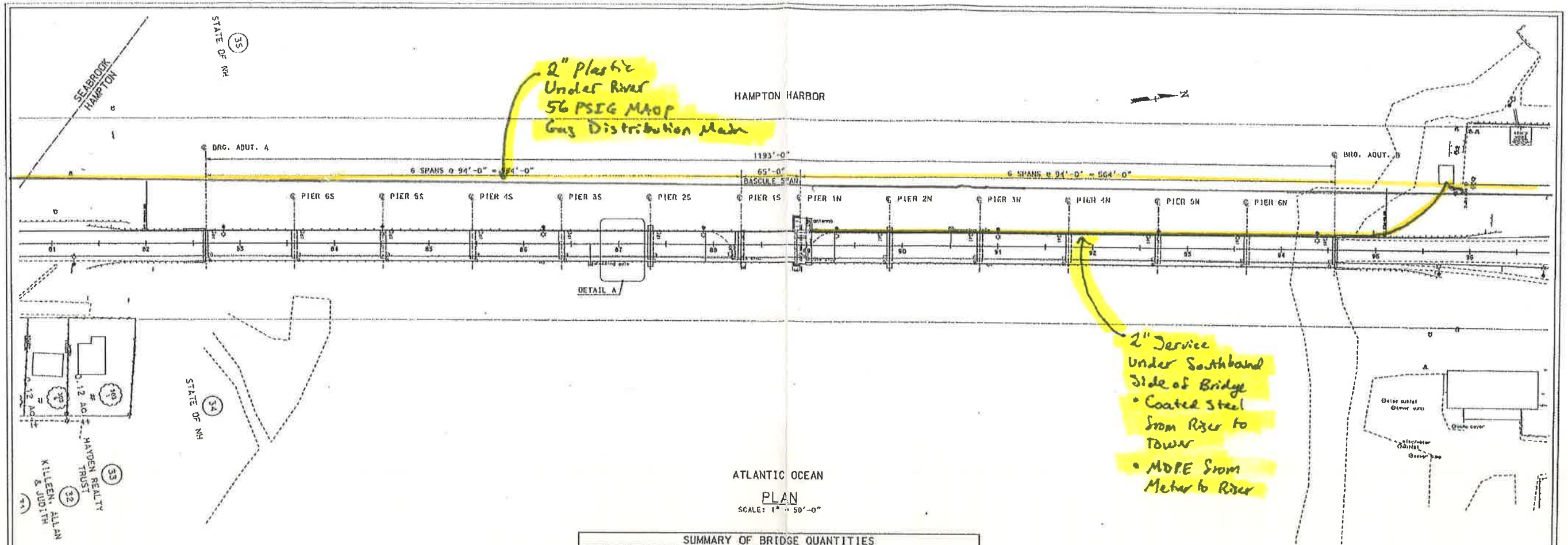

2” Main across River
2” PP Customer Piping from outlet of meter
120’ to riser before bridge


2" Riser

NO
FISHING
THIS
SIDE
2" Coated Steel Service line to
Bridge tower(Black Pipe)
Yellow line follows path

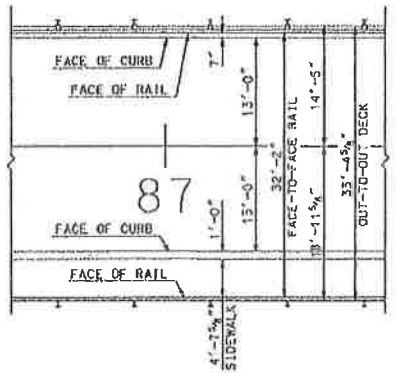
From Seabrook
Looking north


1-1/4" MDPE service
4" Plastic
From station
Transition to 2" plastic
at valve
Valve between 4" and 2"



PLAN
SCALE: 1" = 50'-0"

SUMMARY OF BRIDGE QUANTITIES			
ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT
206.19	COMMON STRUCTURE EXCAVATION - EXPLORATORY	~~40~~ 0	CY
502.101	REMOVAL OF EXISTING BRIDGE STRUCTURE	1	U
502.1011	REMOVAL OF EXISTING BRIDGE STRUCTURE (ASBESTOS CEMENT PIPE)	1	U
512.0201	PREPARATION FOR CONCRETE REPAIRS, CLASS II *	~~1570~~ 1570	SY
520.01	CONCRETE CLASS AA	~~8~~ 44	CY
520.7002	CONCRETE BRIDGE DECK (CC/OA) (F)	900	CY
534.1	WATER REPELLENT (LINSEED OIL)	~~4~~ 5	GAL
534.3	WATER REPELLENT (SILANE-SILOXANE)	~~186~~ 128	GAL
540.1	EPOXY-URETHANE WATERPROOFING OVERLAY FOR BRIDGE DECKS	3265	SY
540.2	FENDER SYSTEM	1	U
544.2	REINFORCING STEEL, EPOXY COATED (F)	260929	LB
544.21	REINFORCING STEEL, EPOXY COATED, MECHANICAL CONNECTORS (F)	35451	LB
547.101	SHEAR CONNECTORS (F)	15028	EA
550.1101	STRUCTURAL STEEL (F) (PLATFORM FRAMING)	27000	LB
550.1102	STRUCTURAL STEEL (F) (STRINGER REPLACEMENT)	3300	LB
550.1103	STRUCTURAL STEEL (F) (BRIDGE RAIL MODIFICATIONS)	2000	LB
556	PAINTING EXISTING STRUCTURAL STEEL	1	U
559.5	SILICONE JOINT SEALANT (F)	95	LF
563.041	TEMPORARY BRIDGE RAIL	660	LF
606.95	TEMPORARY TRAFFIC CONTROL BARRIER	~~1000~~ 0	LF
618.61	UNIFORMED OFFICERS WITH VEHICLE	*	$
618.7	FLAGGERS	~~5000~~ 2079	HR
619.1	MAINTENANCE OF TRAFFIC	1	U
619.25	PORTABLE CHANGEABLE MESSAGE SIGN	2	U
621.5	RETROREFLECTIVE BRIDGE RAIL DELINEATOR	~~12~~ 2	EA
632.0104	REFLECTIVE PAINT PAVE. MARKING, 4" LINE	~~6800~~ 1181	LF
632.1104	PREFORMED RETROREFLECTIVE TAPE, TYPE I (REMOVABLE) 4" LINE	~~2500~~ 0	LF
632.1118	PREFORMED RETROREFLECTIVE TAPE, TYPE I (REMOVABLE) 18" LINE	~~2212~~ 212	LF
632.9104	DOUBLE DIRECTIONAL PAVEMENT MARKING, 4" LINE	~~4000~~ 3877	LF
645.3	EROSION STONE	~~50~~ 0	CY
645.531	SILT FENCE	~~200~~ 0	LF
645.7	STORM WATER POLLUTION PREVENTION PLAN	1	U
645.71	MONITORING SWPPP AND EROSION AND SEDIMENT CONTROLS	~~150~~ 0	MO
670.95	TEMPORARY SAFETY FENCE	~~2000~~ 18	LF
692	MOBILIZATION	1	U
693	ON-THE-JOB TRAINING OF UNSKILLED WORKERS	~~4000~~ 0	$
698.12	FIELD OFFICE TYPE B	~~36~~ 21	MOH
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	*	$
902.1	RACEWAY AND WIRING	1	U
910.1	BARRIER GATE	1	U
1002.1	REPAIRS OR REPLACEMENTS AS NEEDED	*	$
1010.15	FUEL ADJUSTMENT	*	$
1010.41	QUALITY CONTROL QUALITY ASSURANCE (CC/OA) FOR CONCRETE	*	$



DETAIL A
SCALE: 1" = 10'-0"

AS-BUILT PLANS

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN

TOWN HAMPTON BRIDGE NO. 235/025 STATE PROJECT 14188

LOCATION NH ROUTE 1A over HAMPTON RIVER

GENERAL PLAN

REVISIONS AFTER PROPOSAL	BY	DATE

	BY	DATE		BY	DATE
DESIGNED	JAS	8/07	CHECKED	SWJ	4/08
DRAWN	SMG	8/07	CHECKED	SWJ	4/08
QUANTITIES	SWJ	4/08	CHECKED	JAS/WPS	4/08
ISSUE DATE					
REV. DATE					

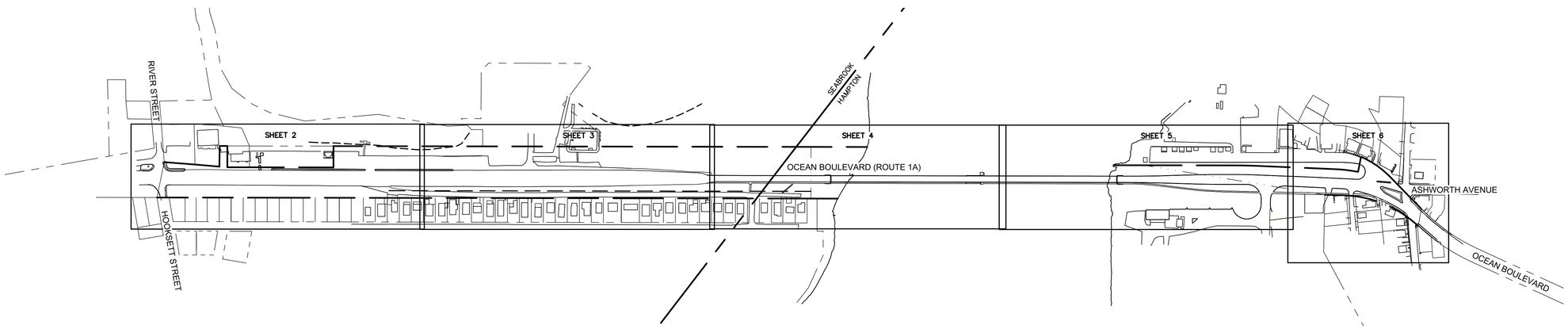
FEDERAL PROJECT NO. ———— SHEET NO. 5 TOTAL SHEETS 35

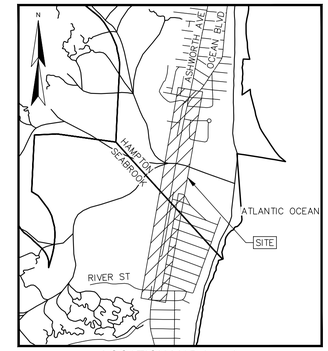
TOTAL SHEETS XX OF XX

FILE NUMBER 109-6-1

SUBDIRECTORY	DGN LOCATOR	SHEET SCALE
BRD/HR-SITE	complan	AS NOTED

APPENDIX E
Existing Right-of-Way Plans





LOCATION MAP (n.t.s.)

LEGEND

	APPROXIMATE ABUTTERS LOT LINE
	EXISTING RIGHT OF WAY
	EXISTING LIMITED ACCESS RIGHT OF WAY
	FENCE
	GUARD RAIL
	BOUND FOUND
	DRILL HOLE FOUND
	IRON PIPE/ROD FOUND
BND. FND.	BOUND FOUND
D.H.F.	DRILL HOLE FOUND
I.P.F.	IRON PIPE FOUND
I.R.F.	IRON ROD FOUND
I.R.S.	IRON ROD SET
R.S.F.	RAILROAD SPIKE FOUND
EP	EDGE OF PAVEMENT
VGC	VERTICAL GRANITE CURB
ETW	EDGE OF TRAVELLED WAY
ROW	RIGHT OF WAY
LAROW	LIMITED ACCESS RIGHT OF WAY

250 0 250 500

SCALE: 1 INCH = 250 FT.

NOTES:

1. REFERENCE: ROUTE 1A (OCEAN BOULEVARD)
   HAMPTON & SEABROOK, NH
2. FIELD SURVEY PERFORMED BY SNF, LPS & GAN BETWEEN SEPTEMBER & DECEMBER, 2018 USING A TRIMBLE S6 TOTAL STATION WITH A TRIMBLE TSC3 DATA COLLECTOR. TRAVERSE ADJUSTMENT BASED ON LEAST SQUARE ANALYSIS.
3. HORIZONTAL ORIENTATION BASED ON NH STATE PLANE COORDINATES NAD83/86 HOLDING DISKS 197–0450 & 197–0440.
4. THE EDGE OF THE ROUTE 1A ROW ON THE SEABROOK SIDE IS BASED ON R.C.R.D. BOOK 954, PAGES 332 & 333, AS WELL AS REFERENCE PLAN 1. IN ADDITION, REFERENCE IS ALSO HEREBY MADE TO THE FOLLOWING.
   –1900 LAYOUT BETWEEN THE MASSACHUSETTS STATE LINE AND FORT POINT IN NEW CASTLE, NH
   –1901, 1905 & 1906 AMENDMENTS/ALTERATIONS (DOCUMENTATION OF THE 1901 & 1905 AMENDMENTS WAS NOT FOUND)
   –PLAN 2365 & PLAN 51176 ON FILE AT NHDOT
   –R.C.R.D. BOOK 368 PAGE 266, BOOK 368 PAGE 329, BOOK 638 PAGE 276, BOOK 901 PAGE 471, & BOOK 954 PAGE 332
   –A REPORT ON THE HISTORY OF OCEAN BOULEVARD ON FILE AT NHDOT
5. THE EDGE OF THE ROUTE 1A ROW ON THE HAMPTON SIDE IS BASED ON REFERENCE PLANS 2 & 3. REFERENCE IS ALSO HEREBY MADE TO R.C.R.D. BOOK 894, PAGE 44.
6. SEE "AGREEMENT RELATIVE TO THE TRANSFER OF ADMINISTRATION OF CERTAIN STATE LAND IN THE TOWN OF HAMPTON", WHEREBY ADMINISTRATION WAS TRANSFERRED FROM THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS TO THE FORESTRY AND RECREATION COMMISSION,, WHICH WAS DONE IN ACCORDANCE WITH AUTHORITY GRANTED BY THE GOVERNOR AND COUNCIL ON 5/29/53. SAID AGREEMENT IS ON FILE AT NHDOT. NO SUCH AGREEMENT WAS FOUND FOR THE HAMPTON BEACH STATE PARK ON THE EAST SIDE OF ROUTE 1A.
7. PLANIMETRIC DATA SHOWN HEREON (PAVEMENT, CURBING, BUILDINGS, FENCES, RETAINING WALLS, ETC.) IS BASED ENTIRELY ON DIGITAL FILES PROVIDED BY NHDOT, AND IS SHOWN HEREON FOR REFERENCE ONLY.
8. APPROXIMATE MEAN HIGH WATER IN THE NOTED AREAS IS DEPICTED AS ELEVATION 4' BASED ON GIS DATA (2015 USACE NAE TOPOBATHY LIDAR, HORIZONTAL DATUM: NAD83).
9. COORDINATES AND DISTANCES SHOWN HEREON ARE GROUND IN US SURVEY FEET. TO CONVERT THESE GROUND DISTANCES TO GRID DISTANCES, MULTIPLY BY A COMBINED FACTOR OF 1.00002910 (AS CALCULATED BY TRIMBLE BUSINESS CENTER OFFICE SOFTWARE, USING DISK 197–0450 AS THE BASE POINT). ACCORDING TO NHDOT SURVEY, THE PUBLISHED COORDINATES ON DISK 197–0450 ARE INCORRECT. THE COORDINATES THEY PROVIDED (AND WHICH WERE USED) ARE: NORTHING=144835.79, EASTING=1211947.93.

REFERENCE PLANS:

1. "STATE OF NEW HAMPSHIRE HIGHWAY DEPARTMENT, TOWNS–SALISBURY–SEABROOK, PROJECT–RIGHT OF WAY, LOCATION–ROUTE NO. 1–A, ROAD–OCEAN, DRAWN 8/20/35" ON FILE AT NHDOT (NO. 31142).
2. "HAMPTON BEACH & HIGHWAY LAND, DETAIL SHEET NO. 14, RECORDED AS PLAN NO. 3431N, NEW HAMPSHIRE STATE HIGHWAY DEPARTMENT", NOT DATED, ON FILE AT NHDOT.
3. "HAMPTON BEACH & HIGHWAY LAND, DETAIL SHEET NO. 15, RECORDED AS PLAN NO. 3431O, NEW HAMPSHIRE STATE HIGHWAY DEPARTMENT", NOT DATED, ON FILE AT NHDOT.
4. "PLAN–SOUTH APPROACH HAMPTON RIVER TOLL BRIDGE" PROJECT S1873, DATED 5/19/50, ON FILE AT NHDOT.
5. "STATE OF N.H. PLAN OF AN AREA OF LAND LYING WESTERLY FROM THE ORIGINAL HAMPTON RIVER BRIDGE IN THE TOWN OF HAMPTON, N.H." DATED MARCH 1950 BY H.G. HERSEY, ON FILE AT NHDOT.
6. "STATE OF NEW HAMPSHIRE STATE HIGHWAY IN TOWN OF SEABROOK" PLAN DATED AUGUST 1906, SURVEYED BY WM. A. GROVER, ON FILE AT NHDOT (FILE NO. 1910).
7. "STATE OF NEW HAMPSHIRE HIGHWAY DEPARTMENT, PLAN SHOWING PROPOSED LOCATION OF 40 FT. ROADWAY WITH LAND TAKING NECESSARY TO COMPLETE 100 FT. RIGHT OF WAY FROM MARSH AVE. HAMPTON TO MASS.–N.H. STATE LINE" DRAWN BY E.B.C. DATED MARCH 27, 1935, ON FILE AT NHDOT (NO. 51176).
8. "STATE OF NEW HAMPSHIRE HIGHWAY DEPARTMENT, PLANS OF PROPOSED FEDERAL AID PROJECT NO F 318(1), OCEAN ROAD" N.H. PROJECT NO. 0–2032 DATED MARCH 25, 1946, ON FILE AT NHDOT.
9. "PROPERTY MAP, STATE OF NEW HAMPSHIRE DEPT. OF RESOURCES & ECONOMIC DEVELOPMENT, HAMPTON BEACH STATE PARK" DATED MARCH 19, 1963, ON FILE AT THE NEW HAMPSHIRE DEPARTMENT OF NATURAL AND CULTURAL RESOURCES, DIVISION OF FORESTS AND LANDS.
10. THE FOLLOWING PLANS ON FILE AT THE ROCKINGHAM COUNTY REGISTRY OF DEEDS; 0938, 0959, 01129, B–7795, B–26189, C–31488, D–12566, D–12567, D–17451, D–19464, D–33316, D–37217, D–37218, 00262, 00302, 0840, 0858, 01019, 01304, C–21665, C–22734, C–24923, C–31550, D–18975, D–30363, D–31087, D–33281, & D–35645.

PURSUANT TO RSA 676:18, III:

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I CERTIFY THAT THIS SURVEY AND PLAN WERE PREPARED BY ME OR BY THOSE UNDER MY DIRECT SUPERVISION AND FALLS UNDER THE URBAN SURVEY CLASSIFICATION OF THE NH CODE OF ADMINISTRATIVE RULES OF THE BOARD OF LICENSURE FOR LAND SURVEYORS. I CERTIFY THAT THIS SURVEY WAS MADE ON THE GROUND AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

_____ L.L.S. #916

_____ DATE

THE CERTIFICATIONS SHOWN HEREON ARE INTENDED TO MEET REGISTRY OF DEED REQUIREMENTS AND ARE NOT A CERTIFICATION TO TITLE OR OWNERSHIP OF PROPERTY SHOWN. OWNERS OF ADJOINING PROPERTIES ARE ACCORDING TO CURRENT TOWN ASSESSORS RECORDS.

STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION

NHDOT PROJECT "SEABROOK- HAMPTON 15904"

NH ROUTE 1A (OCEAN BOULEVARD)

EXISTING RIGHT-OF-WAY PLANS

TOWNS OF SEABROOK & HAMPTON

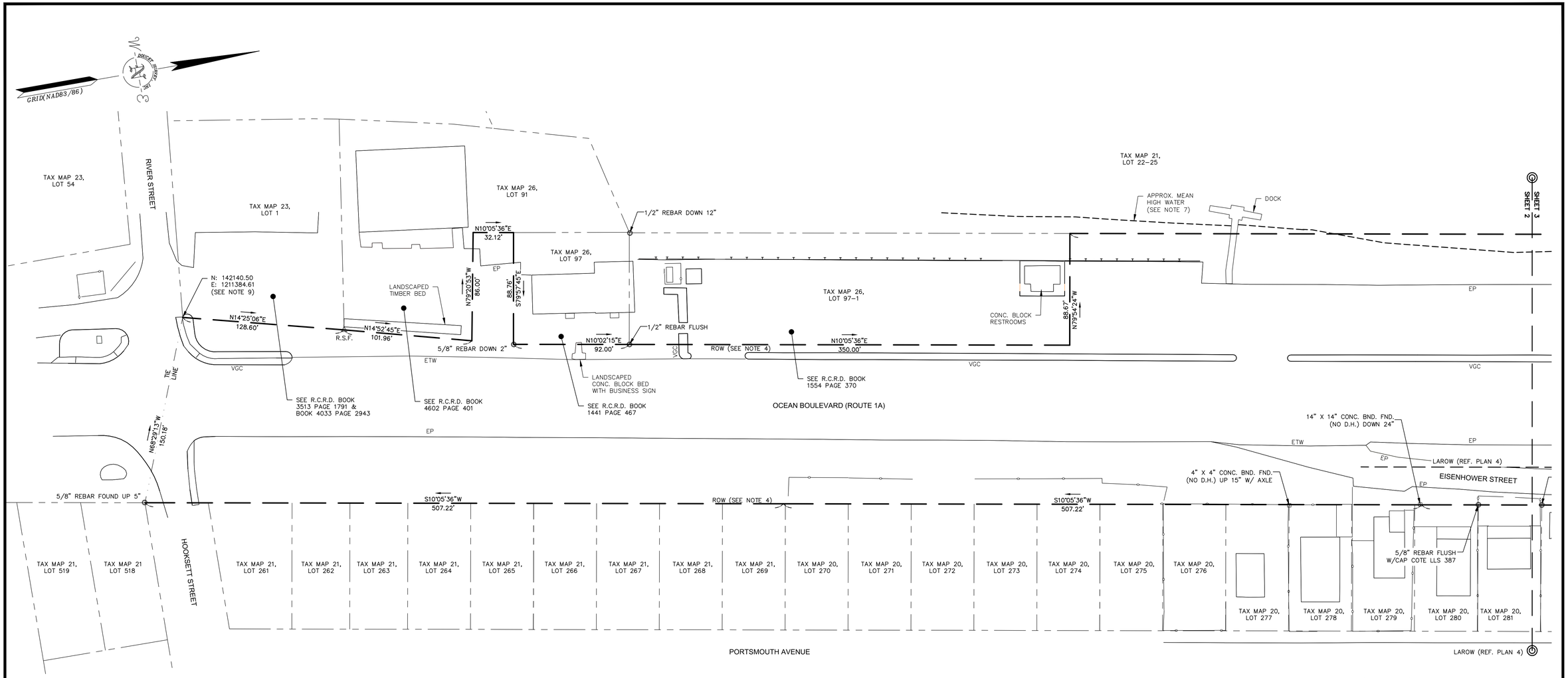
ROCKINGHAM COUNTY

NO.	DATE	DESCRIPTION	BY

DRAWN BY:	B.T.	DATE:	FEBRUARY, 2019
CHECKED BY:	S.V.M.	DRAWING NO.:	4827A Ground
JOB NO.:	4827	SHEET 1	OF 6

DOUCET SURVEY INC
Serving Your Professional Surveying & Mapping Needs
102 Kent Place, Newmarket, NH 03857 (603) 659-6560
2 Commerce Drive (Suite 202) Bedford, NH 03110 (603) 614-4060
10 Storer Street (Riverview Suite) Kennebunk, ME (207) 502-7005
http://www.doucetsurvey.com

FILE NAME: C:\Civil 3D FILES\Survey\Activities_4827\4827A Ground.dwg LAYOUT NAME: SHEET 1 (TITLE) PLOTTED: Friday, February 15, 2019 - 2:29pm



ABUTTERS LIST:

TAX MAP 23, LOT 54
RIGA TRUST
PO BOX 412
HAMPTON FALLS, NH 03844
R.C.R.D. BOOK 5881, PAGE 149

TAX MAP 23, LOT 1
207 OCEAN BLVD, LLC
279 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 5223, PAGE 438

TAX MAP 26, LOT 91
HARBORSIDE RESTAURANT GROUP, LLC
209 OCEAN BLVD
SEABROOK, NH 03874
R.C.R.D. BOOK 4999, PAGE 1103

TAX MAP 26, LOT 97
SEABROOK BEACH PRECINCT
PO BOX 2660
SEABROOK, NH 03874
R.C.R.D. BOOK 1441, PAGE 467

TAX MAP 26, LOT 97-1
TOWN OF SEABROOK
PO BOX 456
SEABROOK, NH 03874
R.C.R.D. BOOK 1554, PAGE 370

TAX MAP 21, LOT 22-25
TOWN OF SEABROOK
C/O HARBOR BEACH
PO BOX 456
SEABROOK, NH 0387

TAX MAP 21, LOT 519
PAUL & MAUREEN ESSIGNMANN
519 OCEAN BLVD
SEABROOK, NH 03874
R.C.R.D. BOOK 3357, PAGE 1727

TAX MAP 21, LOT 518
WILLIAM P. & MARY JANE BOORAS
10 WESTOVER DR
LYNNFIELD, MA 01940
R.C.R.D. BOOK 5712, PAGE 1116

TAX MAP 21, LOT 261
DAVID H. & RUTH A. CLEAVALL
261 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 2890, PAGE 2559

TAX MAP 21, LOT 262
QUINN REALTY TRUST
107 MUFFLIN DR
NORTH ANDOVER, MA 01845
R.C.R.D. BOOK 5504, PAGE 640

TAX MAP 21, LOT 263
ROBERT L. QUINN JR. & TERESA M. QUINN
6 TYNGSBORO ST
SEABROOK, NH 03874
R.C.R.D. BOOK 5208, PAGE

TAX MAP 21, LOT 264
THERESA A. KYLE
264 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 3463, PAGE 1800

TAX MAP 21, LOT 265
CATALANO FAMILY REALTY TRUST
281 MERRIMACK ST
LAWRENCE, MA 01843
R.C.R.D. BOOK 3388, PAGE 2241

TAX MAP 21, LOT 266
MARJACK REALTY TRUST
226 GREENE ST
NORTH ANDOVER, MA 01845-4225
R.C.R.D. BOOK 5075, PAGE 2860

TAX MAP 21, LOT 267
EVERETT T. & ELIZABETH A. LITTLE
130 BRIDGE ST
SALEM, MA 01970
R.C.R.D. BOOK 2313, PAGE 740

TAX MAP 21, LOT 268
TWO SEABROOK REALTY TRUST CONDOMINIUM
268 PORTSMOUTH AVE
PORTSMOUTH, NH 03874
R.C.R.D. BOOK 4179, PAGE 791

TAX MAP 21, LOT 269
CARGILL FAMILY REV. TRUST
10 HARRISON ST
LAWRENCE, MA 01843
R.C.R.D. BOOK 3407, PAG 841

TAX MAP 20, LOT 270
THE FRANCIS FAMILY TRUST
270 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 4600, PAGE 2869

TAX MAP 20, LOT 271
271 PORTSMOUTH AVE. CONDOMINIUM
271 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 4953, PAGE 1736

TAX MAP 20, LOT 272
JOSEPH E. & MICHAEL TITONE
272 PORTSMOUTH AVE
SEABROOK, NH 03874

TAX MAP 20, LOT 273
ELLEN M. GOGGIN
273 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 2914, PAGE 81

TAX MAP 20, LOT 274
HARTSCAPE REALTY TRUST
274 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 4517, PAGE 1260

TAX MAP 20, LOT 275
ROLAND & MARIKAY GUTHRIE
95 MARYLAND AVE
LOWELL, MA 01851
R.C.R.D. BOOK 3124, PAGE 1750

TAX MAP 20, LOT 276
KENNETH J. DUNN
3815 APPALOOSA DR
WOODBRIDGE, VA 22192
R.C.R.D. BOOK 2313, PAGE 267

TAX MAP 20, LOT 277
PIPER REALTY TRUST
327 MAIN ST
AMESBURY, MA 01913
R.C.R.D. BOOK 5643, PAGE 1670

TAX MAP 20, LOT 278
GUSTAVE L. COMEAU REV. TRUST &
JOAN M. COMEAU REV. TRUST
520 E. BROADWAY
BOSTON, MA 02127
R.C.R.D. BOOK 3518, PAGE 2723

TAX MAP 20, LOT 278
GUSTAVE L. COMEAU REV. TRUST &
JOAN M. COMEAU REV. TRUST
520 E. BROADWAY
BOSTON, MA 02127
R.C.R.D. BOOK 3518, PAGE 2723

TAX MAP 20, LOT 279
SAM G. & STEFANIE CATALANO
279 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 5118, PAGE 729

TAX MAP 20, LOT 280
DANIEL R. OCONNELL & CAROL CUNNINGHAM
280 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 3218, PAGE 1416

TAX MAP 20, LOT 281
MICHAEL E. & JANET DUQUETTE
65 SYCAMORE ST
LOWELL, MA 01852
R.C.R.D. BOOK 3359, PAGE 1565

40 0 40 80
SCALE: 1 INCH = 40 FT.

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STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION

NHDOT PROJECT "SEABROOK- HAMPTON 15904"

NH ROUTE 1A (OCEAN BOULEVARD)

EXISTING RIGHT-OF-WAY PLANS

TOWNS OF SEABROOK & HAMPTON

ROCKINGHAM COUNTY

NO.	DATE	DESCRIPTION	BY

DRAWN BY:	B.T.	DATE:	FEBRUARY, 2019
CHECKED BY:	S.V.M.	DRAWING NO.:	4827A Ground
JOB NO.:	4827	SHEET 2	OF 6

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2 Commerce Drive (Suite 202) Bedford, NH 03110 (603) 614-4060
10 Storer Street (Riverview Suite) Kennebunk, ME (207) 502-7005
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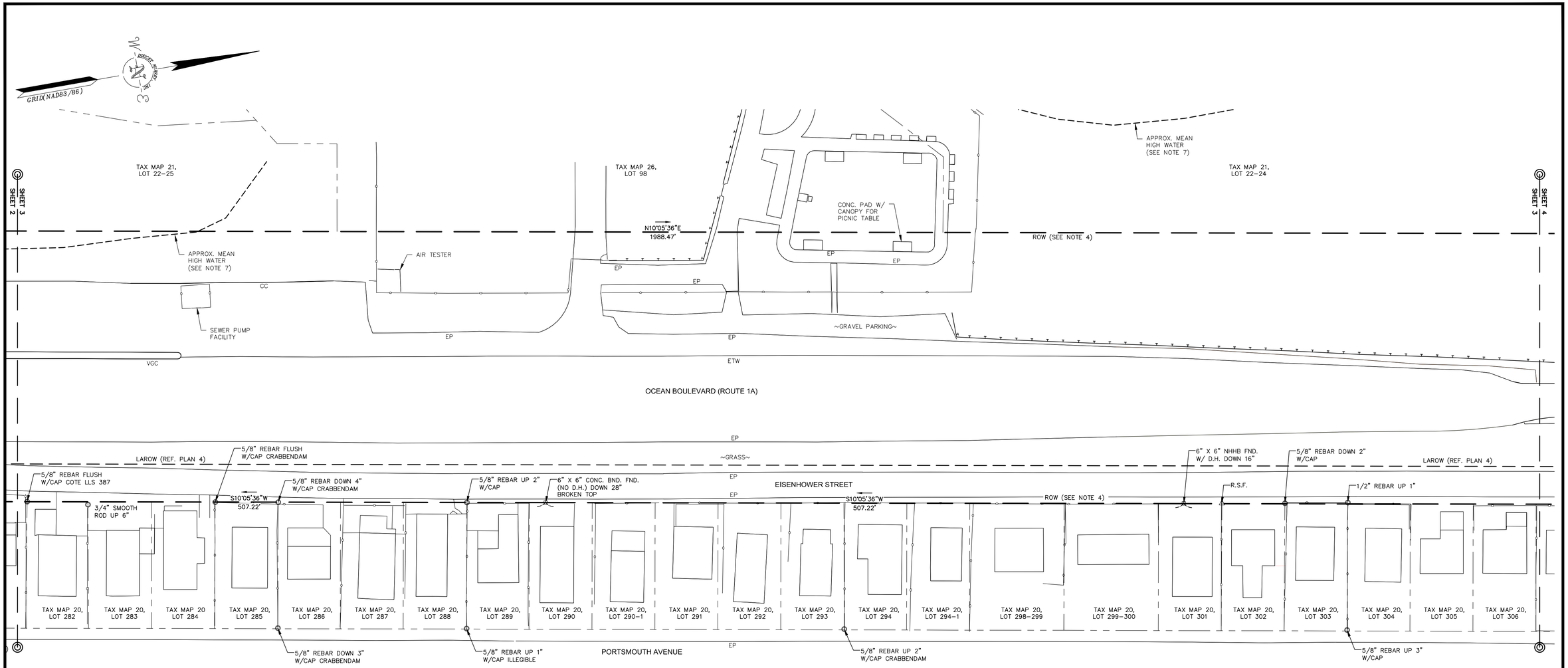
FILE NAME: C:\CIVL 3D FILES\temp\AcPublish_6740\4827A Ground.dwg LAYOUT NAME: SHEET 2 PLOTTED: Friday, February 15, 2019 - 2:29pm



STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION

NHDOT PROJECT "SEABROOK- HAMPTON 15904"

NH ROUTE 1A (OCEAN BOULEVARD)

EXISTING RIGHT-OF-WAY PLANS

TOWNS OF SEABROOK & HAMPTON

ROCKINGHAM COUNTY

ABUTTERS LIST:

TAX MAP 21, LOT 22-25
TOWN OF SEABROOK
C/O HARBOR BEACH
PO BOX 456
SEABROOK, NH 03874

TAX MAP 26, LOT 98
TOWN OF SEABROOK
C/O BARGE FACILITY
PO BOX 456
SEABROOK, NH 03874
R.C.R.D. BOOK 3179, PAGE 174

TAX MAP 21, LOT 22-24
STATE OF NH FISH & GAME
11 HAZEN DR
CONCORD, NH 03301

TAX MAP 20, LOT 282
LEEANNE FALVEY
282 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 3684, PAGE 60

TAX MAP 20, LOT 283
SOMEDAY HAPPENED, LLC
5 BRADEN ST
CHELMSFORD, MA 01863
R.C.R.D. BOOK 5515, PAGE 345

TAX MAP 20, LOT 284
RICHARD C. & MARY LOU DION
284 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 3570, PAGE 2620

TAX MAP 20, LOT 285
JACQUES NOMINEE TRUST
285 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 3178, PAGE 142

TAX MAP 20, LOT 286
DIPRIMO FAMILY REALTY TRUST II
154 CORLISS HILL RD
HAVERHILL, MA 01830
R.C.R.D. BOOK 5675, PAGE 444

TAX MAP 20, LOT 287
ANDRI MOLI
16 GEDNEY DR
PEABODY, MA 01960
R.C.R.D. BOOK 5799, PAGE 1511

TAX MAP 20, LOT 288
THE BAREN/HIRSCH REV. TRUST OF 2012
34 SENECAL PLACE
EAST LONGMEADOW, MA 01028
R.C.R.D. BOOK 5359, PAGE 2664

TAX MAP 20, LOT 289
EDWARD J. BRADLEY, III &
RENEE A. MIKITARIAN-BRADLEY
28 LEXINGTON CIR
HOLDEN, MA 01520
R.C.R.D. BOOK 3118, PAGE 154

TAX MAP 20, LOT 290
RICHARD R. & PATRICIA A. CARDIN
290 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 5607, PAGE 1807

TAX MAP 20, LOT 290-1
STB REALTY TRUST
18 MICHIGAN RD
TYNGSBORO, MA 01879
R.C.R.D. BOOK 4353, PAGE 117

TAX MAP 20, LOT 291
MARK A. GARABODIAN
291 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 3059, PAGE 2871

TAX MAP 20, LOT 292
ELLEN MCHUGH
5 PILLSBURY AVE
DRACUT, MA 01826
R.C.R.D. BOOK 5264, PAGE 2409

TAX MAP 20, LOT 293
JANE CHEEVERS REV. LIVING TRUST
PO BOX 5525
LAKELAND, FL 33807-5525
R.C.R.D. BOOK 5367, PAGE 995

TAX MAP 20, LOT 294
SCALA FAMILY TRUST OF 2015
294 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 5630, PAGE 150

TAX MAP 20, LOT 294-1
LUCINDA A. MCCARTHY
294A PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 3407, PAGE 956

TAX MAP 20, LOT 298-299
DEBORAH J. WINN ROBINSON & JACQUELINE A. MAHONEY & MARCIA LIBBEY & JEANNIE FITZPATRICK & ALLISON & MICHELLE WINN
43 GOULD ST
WAKEFIELD, MA 01880
R.C.R.D. BOOK 5826, PAGE 196

TAX MAP 20, LOT 299-300
ROBERT L. QUINN, JR. & TERESA PAUGH-QUINN
6 TYNGSBORO ST
SEABROOK, NH 03874
R.C.R.D. BOOK 5341, PAGE 64

TAX MAP 20, LOT 301
ROGER J. MCKENZIE, JR. & TROY MCKENZIE
302 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 5712, PAGE 2522

TAX MAP 20, LOT 302
SHAWN MCKENZIE & TRACEY RUSSEL
121 CHALK CREEK CT
MARTINEZ, CA 94553
R.C.R.D. BOOK 3317, PAGE 2129

TAX MAP 20, LOT 303
MARY L. ROSA REV. TRUST OF 2017
303 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 5825, PAGE 421

TAX MAP 20, LOT 304
IRENE V. EMERY IRR. TRUST & ERNEST A. EMERY IRR. TRUST
304 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 4285, PAGE 1227

TAX MAP 20, LOT 305
KILCOYNE FAMILY TRUST
305 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 3641, PAGE 879

TAX MAP 20, LOT 306
306 PORTSMOUTH AVE REALTY TRUST
306 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 5331, PAGE 56

40 0 40 80

SCALE: 1 INCH = 40 FT.

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NO.	DATE	DESCRIPTION	BY

DRAWN BY:	B.T.	DATE:	FEBRUARY, 2019
CHECKED BY:	S.V.M.	DRAWING NO.:	4827A Ground
JOB NO.:	4827	SHEET 3	OF 6

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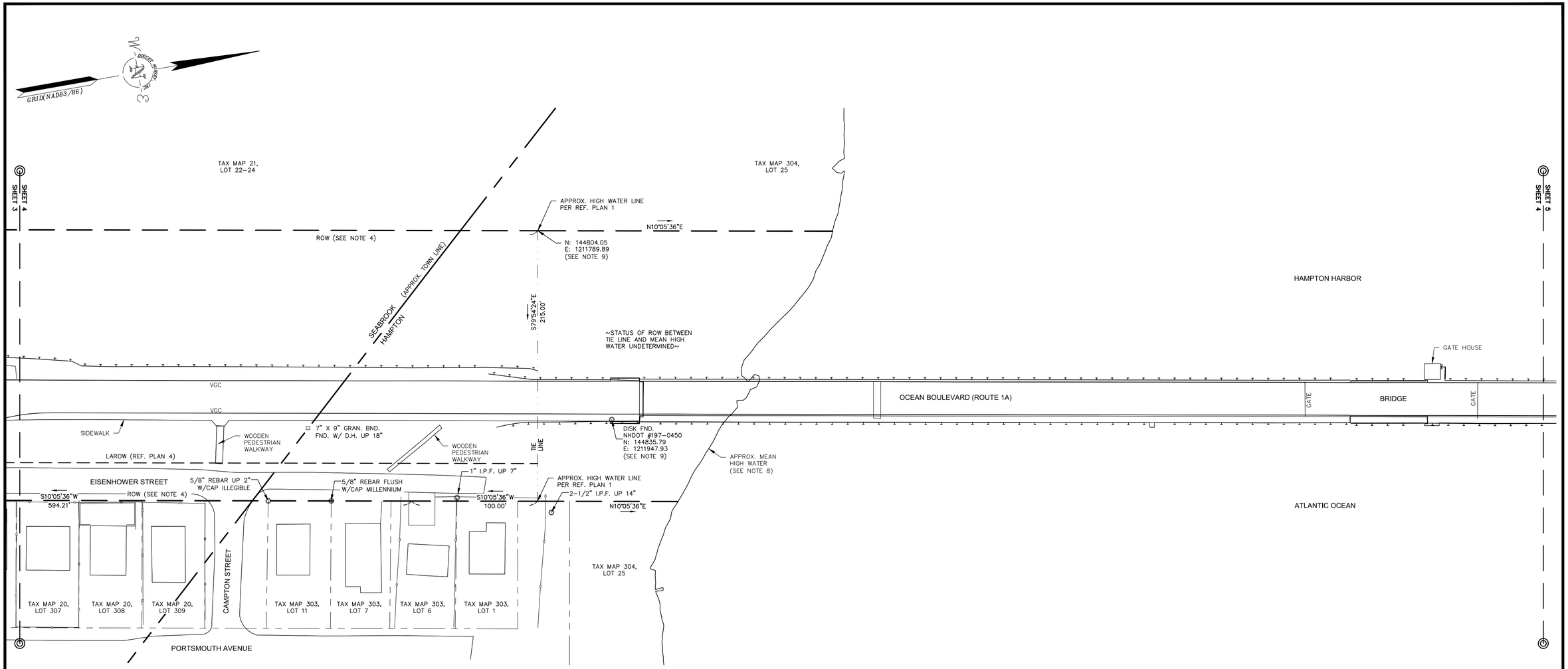
FILE NAME: C:\CIVIL 3D FILES\proj\Auftrag_2\7470\4827A Ground.dwg LAYOUT NAME: SHEET 3 PLOTTED: Friday, February 15, 2019 - 2:29pm



SEABROOK ABUTTERS LIST:

TAX MAP 21, LOT 22-24
STATE OF NH FISH & GAME
11 HAZEN DR
CONCORD, NH 03301

TAX MAP 20, LOT 307
JANE BEAL-COSTELLO REV. TRUST
307 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 5694, PAGE 1284

TAX MAP 20, LOT 308
ALFIO RAGONESE
308 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 5837, PAGE 584

TAX MAP 20, LOT 309
MARTHA ANNE PRESTON REV. TRUST
309 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 3685, PAGE 1440

HAMPTON ABUTTERS LIST:

TAX MAP 303, LOT 11
GARY W. & KATHLEEN A. BASHLINE
16 PORTSMOUTH AVE
SEABROOK NH, 03874
R.C.R.D. BOOK 4289, PAGE 658

TAX MAP 303, LOT 7
GARY W. & KATHLEEN G. BASHLINE
16 PORTSMOUTH AVE
SEABROOK, NH 03874
R.C.R.D. BOOK 4289, PAGE 660

TAX MAP 303, LOT 6
ALLEN J. KILLEEN REV. TRUST
PO BOX 645
KITTERY, ME 03904
R.C.R.D. BOOK 5170, PAGE 671

TAX MAP 303, LOT 1
TERRENCE M. O'BRIEN
8 PORTSMOUTH AVE
SEABROOK, NH 03874-5106
R.C.R.D. BOOK 5717, PAGE 1047

TAX MAP 304, LOT 25
TOWN OF HAMPTON
100 WINNACUNNET RD
HAMPTON, NH 03842-2119
R.C.R.D. BOOK 2319, PAGE 1588

40 0 40 80
SCALE: 1 INCH = 40 FT.

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I CERTIFY THAT THIS SURVEY AND PLAN WERE PREPARED BY ME OR BY THOSE UNDER MY DIRECT SUPERVISION AND FALLS UNDER THE URBAN SURVEY CLASSIFICATION OF THE NH CODE OF ADMINISTRATIVE RULES OF THE BOARD OF LICENSURE FOR LAND SURVEYORS. I CERTIFY THAT THIS SURVEY WAS MADE ON THE GROUND AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

_____ L.L.S. #916

_____ DATE

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STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
NHDOT PROJECT "SEABROOK- HAMPTON 15904"
NH ROUTE 1A (OCEAN BOULEVARD)
EXISTING RIGHT-OF-WAY PLANS
TOWNS OF SEABROOK & HAMPTON
ROCKINGHAM COUNTY

NO.	DATE	DESCRIPTION	BY

DRAWN BY:	B.T.	DATE:	FEBRUARY, 2019
CHECKED BY:	S.V.M.	DRAWING NO.:	4827A Ground
JOB NO.:	4827	SHEET 4	OF 6

DOUCET SURVEY LLC
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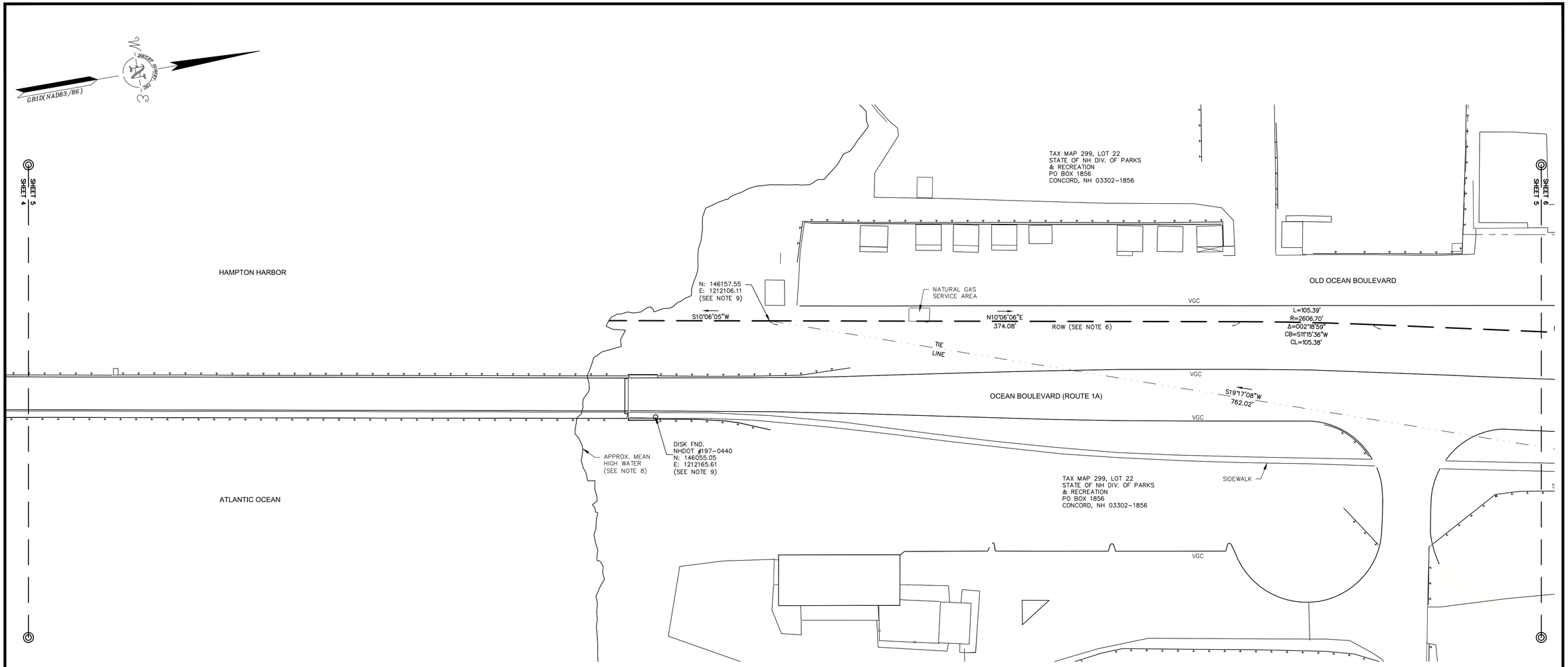
2 Commerce Drive (Suite 202) Bedford, NH 03110 (603) 614-4060
10 Storer Street (Riverview Suite) Kennebunk, ME (207) 502-7005
http://www.doucetsurvey.com

FILE NAME: C:\CIVIL 3D FILES\Jenny\AcPublish_FY40\4827A Ground.dwg LAYOUT NAME: SHEET 4 PLOTTED: Friday, February 15, 2019 - 2:29pm



40 0 40 80

SCALE: 1 INCH = 40 FT.

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STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION

NHDOT PROJECT "SEABROOK- HAMPTON 15904"

NH ROUTE 1A (OCEAN BOULEVARD)

EXISTING RIGHT-OF-WAY PLANS

TOWNS OF SEABROOK & HAMPTON

ROCKINGHAM COUNTY

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CHECKED BY:	S.V.M.	DRAWING NO.:	4827A Ground
JOB NO.:	4827	SHEET 5	OF 6

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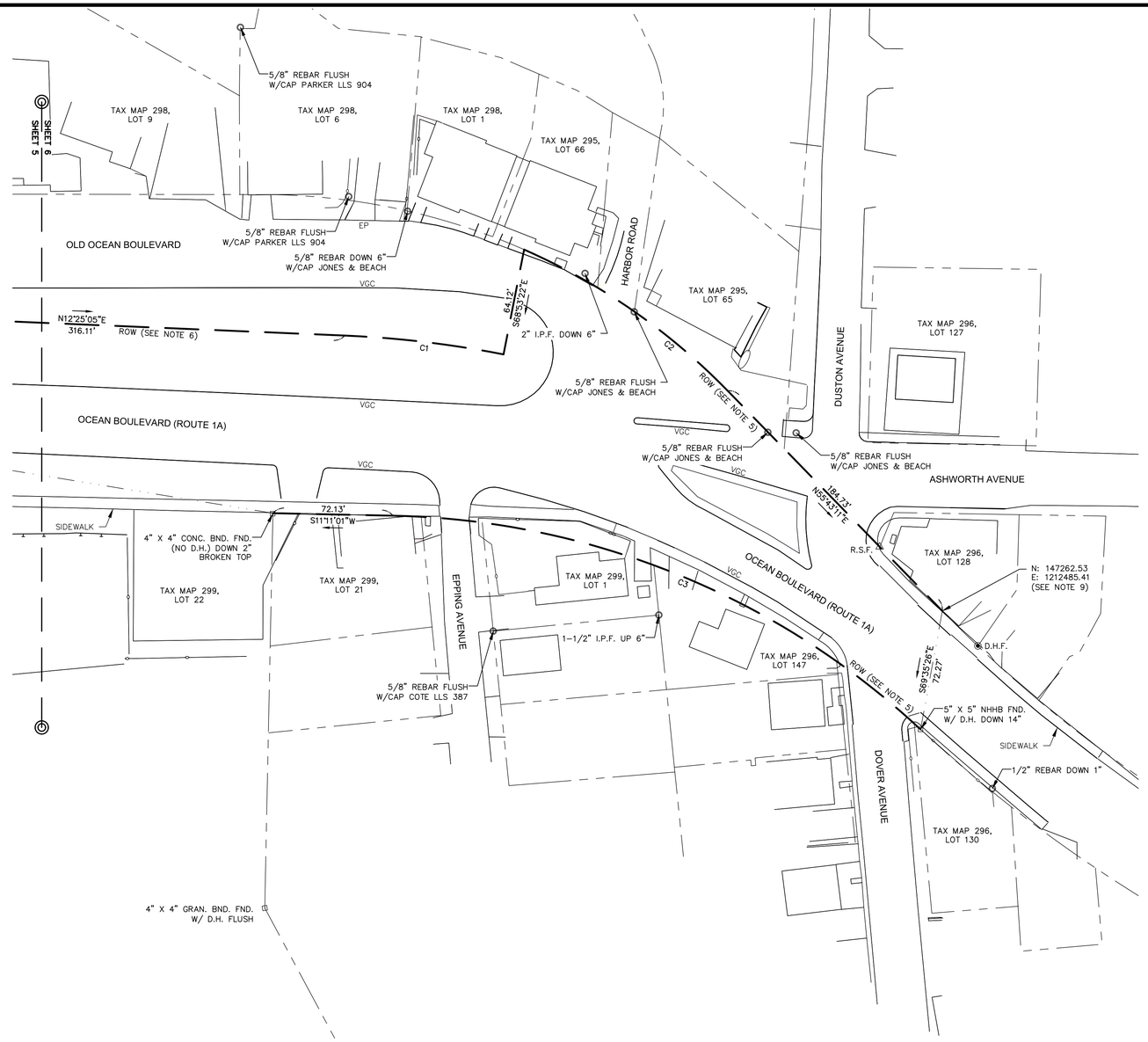
FILE NAME: C:\CIVIL 3D FILES\temp\AcPublish_6740\4827A Ground.dwg LAYOUT NAME: SHEET 5 PLOTTED: Friday, February 15, 2019 - 2:29pm



CURVE TABLE					
CURVE	ARC LENGTH	RADIUS	DELTA ANGLE	CHORD BEARING	CHORD LENGTH
C1	96.03'	633.00'	8°41'32"	S16°45'51"W	95.94'
C2	149.60'	390.00'	21°58'42"	S44°43'50"W	148.69'
C3	349.51'	480.00'	41°43'11"	S32°02'35"W	341.84'

ABUTTERS LIST:

TAX MAP 298, LOT 9
STOOGES REALTY TR
1 OCEAN BLVD
HAMPTON, NH 03842
R.C.R.D. BOOK 2968, PAGE 554

TAX MAP 298, LOT 6
CATHERINE F. SILVER
99 WOODMAN RD
SOUTH HAMPTON, NH 03827-3606
R.C.R.D. BOOK 3403, PAGE 2637

TAX MAP 298, LOT 1
OCEAN'S FIVE CONDOMINIUM
5 OCEAN BLVD
HAMPTON, NH 03842
R.C.R.D. BOOK 4960, PAGE 622

TAX MAP 295, LOT 66
OCEAN'S FIVE A CONDOMINIUM
5 OCEAN BLVD
HAMPTON, NH 03842
R.C.R.D. BOOK 4960, PAGE 653

TAX MAP 295, LOT 65
ANN-LUNG, LLC
7 OCEAN BLVD
HAMPTON, NH 03842
R.C.R.D. BOOK 5233, PAGE 236

TAX MAP 296, LOT 127
NISHAT INCORPORATED
210 ASHWORTH AVE
HAMPTON, NH 03842
R.C.R.D. BOOK 5106, PAGE 898

TAX MAP 296, LOT 128
ICHI-BAN, INC
13057 CEDAR CREEK DR
PORT CHARLOTTE, FL 33953
R.C.R.D. BOOK 3100, PAGE 1542

TAX MAP 299, LOT 22
STATE OF NH DIV. OF PARKS & RECREATION
PO BOX 1856
CONCORD, NH 03302-1856

TAX MAP 299, LOT 21
JOSEPH G. WILLIAMS
2 OCEAN BLVD
HAMPTON, NH 03842
R.C.R.D. BOOK 2589, PAGE 1970

TAX MAP 299, LOT 1
PAUL G. HEESE
5 EPPING AVE
HAMPTON, NH 03842
R.C.R.D. BOOK 5863, PAGE 2024

TAX MAP 296, LOT 147
WILLIAM P. & MARGARET M. FARNAM
18 SHANE LN
BILLERICA, MA 01821
R.C.R.D. BOOK 5289, PAGE 842

TAX MAP 296, PAGE 130
PATRICIA A. & THOMAS J. FLORAMO
308 LYNN FELLS PKWY
SAUGUS, MA 01906
R.C.R.D. BOOK 5363, PAGE 275

40 0 40 80
SCALE: 1 INCH = 40 FT.

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FILE NAME: C:\CIVIL 3D FILES\proj\Active_STATE\4827A Ground.dwg LAYOUT NAME: SHEET 6 PLOTTED: Friday, February 15, 2019 - 2:29pm

APPENDIX F
Natural Resource Maps

CONFIDENTIAL – NH Dept. of Environmental Services review

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

To: Daniel Hageman, Fitzgerald & Halliday, Inc.
72 Cedar Street
Hartford, CT 06106

From: Amy Lamb, NH Natural Heritage Bureau
Date: 7/2/2018 (valid for one year from this date)
Re: Review by NH Natural Heritage Bureau
NHB File ID: NHB18-2036 Town: Seabrook, Hampton Location: NH Rte. 1A bridge over the Hampton River (Neil R. Underwood Bridge)

Description: Rehabilitation or replacement of NH Rte. 1A bridge and associated improvements. An Environmental Assessment is currently being prepared for the project, which is located in Seabrook and Hampton. The bridge is structurally deficient and functionally obsolete, and is on the NHDOT "red list". There have been numerous efforts to repair and rehabilitate the bridge over its life, with recent repairs including a deck replacement in 2010 and emergency repairs to the bascule span mechanical system in 2018. A structural analysis and assessments of mechanical and electrical systems will be performed as part of this study and will serve as the basis for developing rehabilitation options. The impact area provided includes the maximum potential disturbance, including a replacement alternative.

cc: Kim Tuttle

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

Comments: Please address the potential for impacts to the following rare plant species and exemplary natural communities. Please contact the NH Fish & Game Department to address wildlife concerns.

Natural Community	State[1]	Federal	Notes
Beach grass grassland	--	--	Dune communities are sensitive to trampling or recreational use that harms the vegetation, since plants growing in the sand serve a critical function in anchoring it in place.
Intertidal flat*	--	--	Threats to these communities are primarily alterations to the hydrology of the wetland (such as ditching or tidal restrictions that might affect the sheet flow of tidal waters across the intertidal flat) and increased input of nutrients and pollutants in storm runoff.
Subtidal system	--	--	Threats to these communities are primarily alterations to the hydrology of the wetland (such as alterations that might affect the sheet flow of tidal waters across the intertidal flat) and increased input of nutrients and pollutants in storm runoff.

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

CONFIDENTIAL – NH Dept. of Environmental Services review

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

Plant species	State[1]	Federal	Notes
dwarf glasswort (*Salicornia bigelovii*)*	E	--	Threats are primarily alterations to the hydrology of the wetland, such as ditching or tidal restrictions that might affect the sheet flow of tidal waters across the intertidal flat, activities that eliminate plants, and increased input of nutrients and pollutants in storm runoff.
field wormwood (*Artemisia campestris ssp. caudata*)	E	--	This species grows in dry dune systems and is sensitive to disturbances that eliminate its habitat or disturb the natural dynamics of the dune area.
Gray's umbrella sedge (*Cyperus grayi*)	E	--	This species grows in sandplains and disturbed openings, and is sensitive to disturbances that eliminate its habitat.
hairy hudsonia (*Hudsonia tomentosa*)	T	--	This species requires periodic disturbance to its habitat (disturbed openings, river and streambanks). However, existing plants are very sensitive to trampling when growing on open sand.
long-spined sandbur (*Cenchrus longispinus*)	E	--	This species grows in sandplains and disturbed openings, and is sensitive to disturbances that eliminate its habitat.
sand dropseed (*Sporobolus cryptandrus*)*	E	--	This species grows in dry dune systems and is sensitive to disturbances that eliminate its habitat or disturb the natural dynamics of the dune area.
seaside sandmat (*Euphorbia polygonifolia*)	E	--	This species grows on sandy coastal beaches and is sensitive to excessive distubances such as trampling and ATV use as well as a significant reduction in disturbance (loss of dynamic dune movement) from habitat fragmentation.
seaside threeawn (*Aristida tuberculosa*)	E	--	This species grows in dry dune systems and is sensitive to disturbances that eliminate its habitat or disturb the natural dynamics of the dune area.
seaside-sandwort (*Honckenya peploides ssp. robusta*)*	E	--	Threats are primarily alterations to the hydrology of the wetland, such as ditching or tidal restrictions that might affect the sheet flow of tidal waters across the intertidal flat, activities that eliminate plants, and increased input of nutrients and pollutants in storm runoff.

Vertebrate species	State[1]	Federal	Notes
Least Tern (*Sterna antillarum*)	E	--	Contact the NH Fish & Game Dept (see below).
Piping Plover (*Charadrius melodus*)	E	T	Contact the NH Fish & Game Dept and the US Fish & Wildlife Service (see below).

[1]Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (*) indicates that the most recent report for that occurrence was more than 20 years ago.

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

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CONFIDENTIAL – NH Dept. of Environmental Services review

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

Contact for all animal reviews: Kim Tuttle, NH F&G, (603) 271-6544.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

NHB18-2036

N
Least Tern
field wormwood*
sand dropseed*
Beach grass grassland
Piping Plover
Intertidal flat
field wormwood
Beach grass grassland
Gray's umbrella sedge
hairy hudsonia
Subtidal system
sand dropseed*
seaside threeawn
sand dropseed*
seaside threeawn
dwarf glasswort*
seaside-sandwort*
field wormwood
Piping Plover
long-spined sandbur
Least Tern
seaside sandmat
Legend
Site bounds
Plant (14)
Animal (3)
Community (3)
System (1)
0 0.1 0.2 0.3 0.4 0.5
Miles

New Hampshire Natural Heritage Bureau - Community Record

Beach grass grassland

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Fair quality, condition and/or landscape context ('C' on a scale of A-D).

Comments on Rank:

Detailed Description: 2006: Community observed and photographed.1997: This community occurs on the foredune remnant and is dominated by *Ammophila breviligulata* (beach grass). Common associates include *Solidago sempervirens* (salt marsh goldenrod) and *Lathyrus maritimus* (beach pea). In addition to the beach grass, two other rare plants found in this community are *Artemisia campestris* ssp. *caudata* (tall wormwood) and *Sporobolus cryptandrus* (sand drop-seed).

General Area: 1997: A sandy beach to the east of the foredune is visited by a great number of beach-goers during the summer months. Beyond the park to the north, residential and commercial development have destroyed the dune system. The southern end of the foredune borders Hampton Harbor Inlet.

General Comments: 1997: Coastal dune systems are characterized by actively shifting sand and consist of several community types that correspond to three broad zones, the foredune, interdune, and backdune. The foredune is most exposed to onshore winds and salt spray and typically forms a beach grass grassland dominated by Ammophila breviligulata (beach grass) with few other species. The interdune is also usually dominated by beach grass, but with a broader diversity of species. Maritime dune forest/woodlands, bayberry-beach plum maritime shrublands, and coastal interdunal marsh/swales characterize the more protected backdune zone. The primary physical processes that produce these different communities are the degree of exposure or protection to on-shore winds and therefore degree of sand stabilization, and soil moisture. At Hampton Beach State Park the interdune and backdune have been destroyed by development. In 1997, two pair of the globally rare *Charadrius melodus* (piping plover) hatched chicks but none survived.

Management Comments: 2006: The dune remnants have been roped off and stay-off-the-dune signs have been placed in several locations.

Location

Survey Site Name: Hampton Beach State Park
Managed By: Hampton Beach State Park

County: Rockingham
Town(s): Hampton
Size: 4.2 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: From the junction of Routes 101 and 1A at Hampton Beach, take Rte. 1A south to the parking lot entrance for Hampton Beach State Park, just north of Hampton Harbor Inlet. The dune remnant is directly to the east of the parking lot, extending north to residential development and south to the jetty at Hampton Harbor Inlet.

Dates documented

First reported: 1997-09-17 Last reported: 2006-07-06

CONFIDENTIAL – NH Dept. of Environmental Services review

New Hampshire Natural Heritage Bureau - Community Record

Beach grass grassland

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Fair quality, condition and/or landscape context ('C' on a scale of A-D).

Comments on Rank:

Detailed Description: 2007: Community observed and photographed.1997: Characterized by *Ammophila breviligulata* (beach grass), *Lathyrus maritimus* (beach pea), and open areas of sand. Less common species included *Artemisia stelleriana* (dusty miller), *Artemisia vulgaris* (common mugwort), *Oenothera biennis* (biennial evening primrose), *Carex silicea* (sandy sedge), *Cyperus lupulinus* (perennial umbrella-sedge), *Polygonella articulata* (jointweed), *Silene antirrhina* (sleepy catchfly), and *Solidago sempervirens* (seaside goldenrod). Rare plants present other than beach grass were *Aristida tuberculosa* (sea-beach needlegrass), *Artemisia campestris* ssp. *caudata* (tall wormwood), *Cyperus grayi* (Gray's umbrella-sedge), *Hudsonia tomentosa* (hairy hudsonia), and *Sporobolus cryptandrus* (sand drop-seed).

General Area: 1997: The site supports six plants rare in New Hampshire and nesting habitat for the globally rare *Charadrius melodus* (piping plover). Several trails leading to the water from Route 1A traverse the grassland. The beach along Hampton Harbor and the inlet is heavily used by beachgoers during the summer months. This beach grass grassland is one of only three remaining in the state larger than 0.4 ha (1 ac). Prior to development, the beach grass grassland at this site was part of a larger dune system that occurred behind much of Seabrook and Hampton Beach and northward along smaller coastal stretches into North Hampton, Rye, and Portsmouth. The largest remnants of this dune system still remaining include this site, The Sands (Seabrook), and Hampton Beach State Park (Hampton). The destruction of most of the state's dune system and the degree of recreational activity occurring on the three largest remaining dune remnants have severely reduced the natural processes, functions, and quality of these areas.

General Comments: 2007: Proposed bridge repairs may impact the dunes near the bridge abutments.1997: A pair of the globally rare *Charadrius melodus* (piping plover) were last documented as nesting here in 1971, producing 4 eggs and 2 fledglings. In 1984, a pair were seen performing a distraction display but a nest was not found.

Management Comments:

Location

Survey Site Name: Hampton Harbor Inlet
Managed By: Former Barge Facility Land

County: Rockingham
Town(s): Seabrook
Size: 9.3 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Dune remnant, primarily on west side of Ocean Blvd (Rte. 1A) just south of bridge at inlet, on northern tip of Seabrook Beach.

Dates documented

First reported: 1997-07-12 Last reported: 2007-05-09

CONFIDENTIAL – NH Dept. of Environmental Services review

New Hampshire Natural Heritage Bureau - Community Record

Intertidal flat

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Rare or uncommon

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank: Ranks are for an area at Seabrook School Salt Marsh.

Detailed Description: 1997: Observed. No details.

General Area: 1997: The Blackwater - Hampton River Estuary contains the majority of the estimated 6,200 acres of salt marsh in the state. The Blackwater River portion of the estuary continues south into Salisbury, MA. The estuarine system extends seaward to an imaginary line drawn across Hampton Harbor Inlet and upstream and landward to where ocean-derived salts are less than or equal to 0.5 parts per thousand during the period of average annual low freshwater flow (Cowardin et al. 1979). This estuary is surrounded by moderate levels of residential and commercial development. Several exemplary subtidal and intertidal communities occur in this estuary. Subtidal communities include the undifferentiated ***saline/brackish subtidal channel/bay bottom*** and ***tidal creek bottom***. Other intertidal communities are ***brackish marsh***, ***coastal shoreline strand/swale***, and ***high*** and ***low salt marsh***. Exemplary ***dry Appalachian oak - hickory forest*** occurs at the site as "salt marsh islands," forested uplands surrounded by salt marsh. Most of the estuary is unaffected by restricted tidal flow. Other areas are described as having an adequate tidal inlet by the USDA Soil Conservation Service (1994). The largest portions of the estuary determined to have inadequate tidal inlets include the Meadow Pond area, the Taylor River / Drakes River area west of the railroad track, and the Browns River west of the railroad track (USDA Soil Conservation Service 1994).

General Comments: 1997: Extensive areas of this community type were found within the Blackwater - Hampton River Estuary. Intertidal sand and mud flats are gently sloping, sparsely vegetated, habitats. The substrate, exposed completely at extra low spring tide, ranges in composition from sands to muds and silts. Benthic diatoms and other microalgae occurring in this environment are important contributors to the primary productivity of the total estuarine system (Sickley 1989). Macroalgae is typically uncommon across the exposed substrate. Characteristic invertebrates found in New Hampshire's intertidal mudflats include polychaete worms (including Nereis virens, Nephtys caeca, Clymenella tortquata, and Scoloplos spp.) and mollusks (including soft-shelled clam [Mya arenaria], Baltic Macoma [Macoma balthica], gem shell [Gemma gemma], and swamp Hydrobia [Hydrobia minuta]) (NAI 1973). Arthropods are also well represented and include green crabs (Carcinus maenus), rock crabs (Cancer irroratus), flat-clawed hermit crabs (Pagurus pollicaris), and horseshoe crabs (Limulus polyphemis). During the diurnal (twice daily) tidal flooding several species of fish and other aquatic species feed on the benthos and epibenthic algae. This community also provides important foraging habitat for shorebirds and other animals when the intertidal flat is exposed. The diverse variety of primary foods (microalgae, phytoplankton, and detritus) available to consumers supports the high productivity found on intertidal flats. The substrate is composed of sand or silt and clay rich in organic matter. Vascular plants are sparse to more typically absent.

Management Comments: 1997: In the last four years, several salt marsh restoration projects have begun in this estuary (Ammann, A.P. pers. comm., 1997).

Location

Survey Site Name: Hampton Harbor
Managed By: Former Barge Facility Land

County: Rockingham
Town(s): Seabrook

Size: 324.1 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Large area more or less framed by Rte. 1 to the west, Rte. 101 to the north, Rte. 1A to the east, and the Massachusetts state line to the south. Occurs between estuarine marshes or other coastal communities landward and subtidal communities seaward and includes portions of tidal creek channels that are exposed at low tide.

Dates documented

First reported: 1997-07-05 Last reported: 1997-10-08

New Hampshire Natural Heritage Bureau - System Record

Subtidal system

Legal Status		Conservation Status	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Rare or uncommon

Description at this Location

Conservation Rank: Good quality, condition and landscape context ('B' on a scale of A-D).
Comments on Rank:

Detailed Description: A relatively short main channel to Hampton Harbor that quickly branches into large and small tributaries, including the Hampton and Blackwater rivers.
General Area: Borders ***intertidal flat*** community and **salt marsh system** landward.
General Comments:
Management Comments:

Location

Survey Site Name: Hampton Harbor
Managed By: Hampton Beach State Park

County: Rockingham
Town(s): Hampton
Size: 870.6 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Subtidal creeks and bay bottoms in the Hampton Marsh estuary.

Dates documented

First reported: 1997-07-05 Last reported: 2007-10-13

New Hampshire Natural Heritage Bureau - Plant Record

dwarf glasswort (*Salicornia bigelovii*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank: Sub-population of a large "A-" population.

Detailed Description: 1982: "Just a few plants." 1971: Specimen collected. 1966: Specimen collected.
General Area: 1982: Low marsh area, inundated at high tides.
General Comments:
Management Comments:

Location

Survey Site Name: The Sands
Managed By: Seabrook Back Dunes

County: Rockingham
Town(s): Seabrook
Size: 2.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Seabrook Back Dune. Low area at north end, south of Cross Beach and adjacent to Rte. 1A.

Dates documented

First reported: 1966 Last reported: 1982-10-11

New Hampshire Natural Heritage Bureau - Plant Record

field wormwood (*Artemisia campestris ssp. caudata*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Fair quality, condition and/or landscape context ('C' on a scale of A-D).
Comments on Rank:

Detailed Description: 2007: Population size likely greater than 1000 individuals. Vigor and reproduction appear normal. 1982: Individual plants about 6 inches tall and none in flower. Specimen at NHA. 1958: Specimen collected.

General Area: 2007: Area 1: a remnant patch of ***Hudsonia maritime shrubland*** and the adjacent ***beach grass grassland***. The most common associates are lichens, *Ammophila breviligulata* (beach grass), and *Hudsonia tomentosa* (hairy hudsonia). Less frequent are *Cyperus grayi* (Gray's umbrella sedge), *Cyperus lupulinus* (perennial umbrella sedge), *Carex silicea* (sea-beach sedge), *Festuca rubra* (red fescue), *Bromus tectorum* (drooping brome grass), *Aristida dichotoma* (churchmouse three-awn), *Aristida tuberculosa* (sea-beach needle grass), *Sporobolus cryptandrus* (sand dropseed), *Lechea maritima* (seabeach pinweed), *Polygonella articulata* (jointweed), *Lathyrus japonicus* (beach pea), and *Solidago sempervirens* (seaside goldenrod). Area 2: ***beach grass grassland***, back side of foredune (ca. 60 m wide). The fore and interdune remnant is traversed by boardwalks between the high density residential houses and the heavily impacted recreational beach. 1982: Sea level and few feet above. Sand dunes running north and south, full sun and very dry, loose sand with *Ammophila breviligulata* (beach grass), *Artemisia stelleriana* (dusty miller), and *Lathyrus maritimus* (beach pea).

General Comments: 1982: Plants subjected to foot travel across foredune, some residences have excavated dunes to increase visibility of ocean.

Management Comments:

Location

Survey Site Name: Seabrook Beach
Managed By: Seabrook Dunes and Beach

County: Rockingham
Town(s): Seabrook
Size: 7.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2007: Area 1: From Rte. 1A, head east on Manchester Street to beach. Area 2: [beach east of end of Haverhill St.]1982: Area 1: Found in dunes from State Line Street, north to Manchester Street, includes the foredune of Seabrook Beach east of Rte. 1A.

Dates documented

First reported: 1958-09-09 Last reported: 2007-09-06

CONFIDENTIAL – NH Dept. of Environmental Services review

New Hampshire Natural Heritage Bureau - Plant Record

field wormwood (*Artemisia campestris ssp. caudata*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank:	Fair quality, condition and/or landscape context ('C' on a scale of A-D).
Comments on Rank:	
Detailed Description:	2007: More than 30 scattered clumps observed throughout dune area west of Rte. 1A. 1997: West of the road: at least 50 stems distributed across an 8 acre (3.4 ha) area. East of the road: present (< 1% cover).
General Area:	2007: Small sand dune area. Plants in the immediate vicinity include: *Ammophila breviligulata* (beach grass), *Oenothera biennis* (biennial evening primrose), *Lathyrus japonicus* var. *maritimus* (smooth beach pea) and *Artemisia vulgaris* (common mugwort), and *Hudsonia tomentosa* (hairy hudsonia).1997: Dune remnant community characterized by *Ammophila breviligulata* (beach grass), *Lathyrus maritimus* (beach pea), and open areas of sand. Rare plants present other than beach grass were *Aristida tuberculosa* (sea-beach needlegrass), *Artemisia campestris* ssp. *caudata* (tall wormwood), *Cyperus grayi* (Gray's umbrella-sedge), *Hudsonia tomentosa* (hairy hudsonia), and *Sporobolus cryptandrus* (sand drop-seed). Associated dominant species include: *Lathyrus maritimus* var. *glaber*, and *Ammophila breviligulata*. Other associated species include: *Artemisia stelleriana*, *Artemisia vulgaris*, and *Oenothera biennis*. The site also supports nesting habitat for the globally rare Charadrius melodus (piping plover).
General Comments:	2007: DOT will be conducting bridge repairs sometime in the future and this will impact the dunes on both sides of the southern portion of the bridge.
Management Comments:	1997: The beach along Hampton Harbor and the inlet is heavily used by beachgoers during the summer months. Several trails leading to the water from Route 1A traverse the grassland.

Location

Survey Site Name:	Hampton Harbor Inlet
Managed By:	Former Barge Facility Land
County:	Rockingham
Town(s):	Seabrook
Size:	10.0 acres
Elevation:	
Precision:	Within (but not necessarily restricted to) the area indicated on the map.
Directions:	2007: West side of Ocean Blvd (Rte 1A) just south of bridget. Throughout sand dune area.1997: Both sides of Ocean Blvd (Rte 1A), just south of bridge at inlet.

Dates documented

First reported:	1997-07-12	Last reported:	2007-05-09

New Hampshire Natural Heritage Bureau - Plant Record

field wormwood (*Artemisia campestris ssp. caudata*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1997: Over 500 plants distributed across a 5-acre area. 1982: Few plants observed in sand dunes, not flowering (7/1). 100 or more plants, occasional in patches in sand dunes, half were flowering (8/19). Plants mostly on landward side of dune crests. Specimens at NHA and NEBC. 1876: Specimen.

General Area: 1997: ***Beach grass grassland*** on foredune remnant, dominated by *Ammophila breviligulata* (beach grass). Associated dominant species include: *Lathyrus maritimus* var. *glaber* (smooth beach pea), *Solidago sempervirens* (seaside goldenrod), and *Poa compressa* (Canada bluegrass). Other associated species include: *Cakile edentula* (sea-rocket), *Carex silicea* (sandy sedge), *Cyperus lupulinus* (perennial umbrella-sedge), and *Aster ericoides* (white wreath aster). 1982: Full sun and dry loose sand, seaside sand dunes which run north and south, with *Ammophila breviligulata* (beach grass), *Artemisia stelleriana* (dusty miller), and *Lathyrus maritimus* (beach pea).

General Comments: 1997: The beach is heavily used by beachgoers during the summer months. Beyond the park to the north, residential and commercial development have destroyed the dune system. The southern end of the foredune borders Hampton Harbor Inlet.

Management Comments:

Location

Survey Site Name: Hampton Beach State Park
Managed By: Hampton Beach State Park

County: Rockingham
Town(s): Hampton
Size: 2.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Just north of Hampton Harbor Inlet. Park in lot at Hampton Beach State Park, just west of dune remnant (lot entrance off of Rte. 1A).

Dates documented

First reported: 1876 Last reported: 1997-09-17

New Hampshire Natural Heritage Bureau - Plant Record

Gray's umbrella sedge (*Cyperus grayi*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank:	Good quality, condition and landscape context ('B' on a scale of A-D).
Comments on Rank:	
Detailed Description:	2007: 3 clumps with 4-5 of last year's dried up stems still present.1997: 101-1000 mature fruiting ramets in a 100-1000 square meter area.
General Area:	1997: Sand dune. Associated plant species include *Ammophila breviligulata* (beach grass), *Solidago sempervirens* (seaside goldenrod), *Carex silicea* (sandy sedge), *Rosa virginiana* (Virginia rose), and *Polygonella articulata* (jointweed). *Cyperus lupulinus* (perennial umbrella- sedge) also occurs at this site.
General Comments:	2007: Probably much larger population but site visit was too early in the growing season, only last year's remnant stems present.
Management Comments:	1997: Beachgoers crossing the dunes are a threat.

Location

Survey Site Name:	Hampton Harbor Inlet		
Managed By:	Former Barge Facility Land		
County:	Rockingham		
Town(s):	Seabrook		
Size:	2.8 acres	Elevation:	

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Follow Rte. 1A south from Hampton Beach and cross the bridge over Hampton Harbor Inlet. Proceed to the dune remnant on either side of Ocean Blvd. just south of the bridge.

Dates documented

First reported:	1997-07-12	Last reported:	2007-05-09

New Hampshire Natural Heritage Bureau - Plant Record

hairy hudsonia (*Hudsonia tomentosa*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Threatened	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank:	Poor quality, condition and/or landscape context ('D' on a scale of A-D).
Comments on Rank:	Marginal habitat condition and defensibility, poor quality and viability.
Detailed Description:	2007: 8 plants total, one clump of 2 and one clump of 6 plants.1997: 2 plants; 1 mature, in fruit; the other a small immature plant.
General Area:	2007: Remnant sand dune. Associates include: *Ammophila breviligulata* (beach grass), *Cyperus grayi* (Gray's umbrella sedge), and *Lathyrus japonicus* (beach pea).1997: Sand dune. Associated plant species include *Ammophila breviligulata* and *Lathyrus japonicus*.
General Comments:	2007: Could be more plants, area not extensively searched. Search was mostly focused on area surrounding bridge that could be impacted by DOT bridge repairs. No hairy hudsonia was found in immediate vicinity of bridge.
Management Comments:	

Location

Survey Site Name:	Hampton Harbor Inlet		
Managed By:	Former Barge Facility Land		
County:	Rockingham		
Town(s):	Seabrook		
Size:	2.8 acres	Elevation:	

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Follow Rte. 1A south from Hampton Beach and cross the bridge over Hampton Harbor Inlet. Proceed to the dune remnant on either side of Ocean Blvd. just south of the bridge.

Dates documented

First reported:	1997-07-12	Last reported:	2007-05-09

New Hampshire Natural Heritage Bureau - Plant Record

long-spined sandbur (*Cenchrus longispinus*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2014: Area 2: More than 170 plants in a 400-square-foot area. Varying in size from 3-30 cm. 60% of plants with obvious fertile stems, most seed had dispersed.
1958: Area 1: Specimen collected.

General Area: 1958: In sand dunes near beach.
2014: Front/middle sand dune interface, sterile swale. Associated species: beach grass (*Ammophila breviligulata*), field wormwood (*Artemisia campestris* ssp. *caudata*), beach pinweed (*Lechea maritima*), seaside goldenrod (*Solidago sempervirens*), seaside threeawn (*Aristida tuberculosa*), sand dropseed (*Sporobolus cryptandrus*), and seaside sandmat (*Euphorbia polygonifolia*).

General Comments: 2014: They are immediately in back of 2 homes that abut the dunes. Often owners have modified these areas as extensions of their yard. This is a plant that would likely be extirpated due to its painful nature. Vulnerable due to location.

Management Comments:

Location

Survey Site Name: Seabrook Beach
Managed By: Seabrook Dunes and Beach

County: Rockingham
Town(s): Seabrook
Size: 39.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Seabrook Beach.
2014: The challenge is finding parking. Somewhere around the intersection of Rte 286 and Rte 1A near the NH/MA border. Proceed to Atlantic Rd. and head for coordinates. (42.87333N - 70.81709W)

Dates documented

First reported: 1958-09-17 Last reported: 2014-11-10

New Hampshire Natural Heritage Bureau - Plant Record

sand dropseed (*Sporobolus cryptandrus*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1982: ca. 10 plants in roadside weedy area, next to houses along highway. Specimen collected.
General Area: 1982: Dry sand, flat, full sun.
General Comments: 1982: Residential area.
Management Comments:

Location

Survey Site Name: Bound Rock
Managed By:

County: Rockingham
Town(s): Seabrook
Size: 2.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Seabrook. Bound Rock area, east of Rte. 1A about 0.5 mile south of Hampton Harbor Inlet.

Dates documented

First reported: 1982 Last reported: 1982-08-26

New Hampshire Natural Heritage Bureau - Plant Record

sand dropseed (*Sporobolus cryptandrus*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1997: One culm noticed during a quick search of the immediate area along the roadside. More likely present. 1982: 3 or 4 plants in weedy area beside houses. Specimen collected.

General Area: 1997: A 3.4 ha (8 ac) dune remnant community characterized by *Ammophila breviligulata* (beach grass), *Lathyrus maritimus* (beach pea), and open areas of sand. Less common species included *Artemisia stelleriana* (dusty miller), *Artemisia vulgaris* (common mugwort), *Oenothera biennis* (biennial evening primrose), *Carex silicea* (sandy sedge), *Cyperus lupulinus* (perennial umbrella-sedge), *Polygonella articulata* (jointweed), *Silene antirrhina* (sleepy catchfly), and *Solidago sempervirens* (seaside goldenrod). Rare plants present other than Sporobolus were *Aristida tuberculosa* (sea-beach needlegrass), *Artemisia campestris* ssp. *caudata* (tall wormwood), *Cyperus grayi* (Gray's umbrella-sedge), and *Hudsonia tomentosa* (hairy hudsonia). The site also supports nesting habitat for the globally rare Charadrius melodus (piping plover).

General Comments: Residential area.

Management Comments: 1997: The beach along Hampton Harbor and the inlet is heavily used by beachgoers during the summer months. Several trails leading to the water from Route 1A traverse the grassland. Plant in more compact soil near the road.

Location

Survey Site Name: Hampton Harbor Inlet
Managed By:

County: Rockingham
Town(s): Hampton
Size: 2.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Just south of bridge at Hampton Harbor Inlet, east of Rte 1A.

Dates documented

First reported: 1982-08-26 Last reported: 1997-07-12

New Hampshire Natural Heritage Bureau - Plant Record

sand dropseed (*Sporobolus cryptandrus*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 1997: At least 200 culms distributed across a 5-acre area. 1982: About 20 plants scattered in park.

General Area: 1997: ***Beach grass grassland*** on foredune remnant, dominated by *Ammophila breviligulata* (beach grass). Associated dominant species include: *Lathyrus maritimus* var. *glaber*, *Solidago sempervirens*, and *Poa compressa*. Other associated species include: *Cakile edentula*, *Carex silicea*, *Cyperus lupulinus*, and *Aster ericoides*. 1982: Dry sandy site, full sun, flat ground.

General Comments: 1997: The beach is heavily used by beachgoers during the summer months. Beyond the park to the north, residential and commercial development have destroyed the dune system. The southern end of the foredune borders Hampton Harbor Inlet.

Management Comments:

Location

Survey Site Name: Hampton Beach State Park
Managed By: Hampton Beach State Park

County: Rockingham
Town(s): Hampton
Size: 2.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Hampton State Park at Hampton Harbor Inlet, plants in dry sand surrounding parking lot.

Dates documented

First reported: 1898 Last reported: 1997-09-17

New Hampshire Natural Heritage Bureau - Plant Record

seaside sandmat (*Euphorbia polygonifolia*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank:	Fair quality, condition and/or landscape context ('C' on a scale of A-D).
Comments on Rank:	Small to medium population in high recreational use area. Multiple (small) patches provide some safeguard. Sea level rise could become a factor.
Detailed Description:	2014: 20 plants total in three widely scattered patches.Good to excellent condition, large plants. All with seed capsules, dehisced capsules and/or achenes. Sub 4: 6 plants, 4 x 8 ft. area. Sub 5: 3 plants, 5 x 5 ft. area. Sub 6: 11 plants, 12 x 12 ft. area. Area 7: >40 plants in 10 x 15 ft. area. 2013: 46 plants total in three widely scattered patches. All with seed capsules, dehisced capsules and/or achenes. Sub 1: 1 4-inch plant. Sub 2: 24 plants, 60 x 30 ft. area. Sub 3: 21 plants, 40 x 40 ft. area.
General Area:	2014, 2013: ***Beach grass grassland***. Associated species include beach grass (*Ammophila breviligulata*), Gray's umbrella sedge (*Cyperus grayi*), field wormwood (*Artemisia campestris* ssp. *caudata*), beach pinweed (*Lechea maritima*), little evening-primrose (*Oenothera perennis*), seaside goldenrod (*Solidago sempervirens*), and seaside threeawn (*Aristida tuberculosa*).
General Comments:	2014: This seed must have an extended dormancy period, as The Sands plants were not in evidence in this location last year.
Management Comments:	2014: Apparently this plant prefers some dune disturbance, because it prefers to grow alone. Some foot traffic adjacent to boardwalks may keep other plants at bay. Yet they are susceptible to being stepped on.

Location

Survey Site Name:	Seabrook Beach
Managed By:	Seabrook Dunes and Beach
County:	Rockingham
Town(s):	Seabrook
Size:	.2 acres
Elevation:	
Precision:	Within (but not necessarily restricted to) the area indicated on the map.
Directions:	All plants within view of the many dune boardwalks (adjacent to Atlantic Way between Methuen and Haverhill Streets) on the eastern side of The Sands. 2014: Area 2: three locations. Sub 4 at 42.88182 N, -70.821W; Sub 5 at 42.88149 N, -70.82075W; Sub 6 at 42.88521 N, -70.81538W. 2013: Area 1: three locations. Sub 1 at 42.88073N, -70.81614W; Sub 2 at 42.88053 N, -70.81583W; Sub 3 at 42.87868 N, -70.81601W.

Dates documented

First reported:	2013-10-21	Last reported:	2014-10-14

New Hampshire Natural Heritage Bureau - Plant Record

seaside threeawn (*Aristida tuberculosa*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2014: >200,000 plants observed.
2007: Area 3: Population size at least 10-100 culms. Vigor and reproduction appear normal.
1982: Area 1: 50+ plants common along east side of Rte. 1A.

General Area: 2007: Area 3: Occurs in a remnant patch of **Hudsonia maritime shrubland** and the adjacent **beach grass grassland**. The most common associates are lichens, *Ammophila breviligulata* (beach grass), and *Hudsonia tomentosa* (hairy hudsonia). Less frequent are *Cyperus grayi* (Gray's umbrella sedge), *Cyperus lupulinus* (perennial umbrella sedge), *Carex silicea* (sea-beach sedge), *Festuca rubra* (red fescue), *Bromus tectorum* (drooping brome grass), *Aristida dichotoma* (churchmouse three-awn), *Sporobolus cryptandrus* (sand dropseed), *Lechea maritima* (seabeach pinweed), *Polygonella articulata* (jointweed), *Lathyrus japonicus* (beach pea), *Artemisia campestris* ssp. *caudata* (tall wormwood), and *Solidago sempervirens* (seaside goldenrod). The fore and interdune remnant is traversed by boardwalks between the high density residential houses and the heavily impacted recreational beach.
1982: Area 1: Open, dry sand, flat, full sun.

General Comments:
Management Comments:

Location

Survey Site Name: Seabrook Beach
Managed By: Seabrook Dunes and Beach

County: Rockingham
Town(s): Seabrook
Size: 65.6 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Seabrook Beach. Area 1: East of Rte. 1A Seabrook in vacant lot. Area 2: The Sands. Area 3: From Route 1A, head east on Manchester Street to beach.

Dates documented

First reported: 1982-08 Last reported: 2014-11-10

New Hampshire Natural Heritage Bureau - Plant Record

seaside threeawn (*Aristida tuberculosa*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Fair quality, condition and/or landscape context ('C' on a scale of A-D).
Comments on Rank: Good quality and viability, marginal habitat condition and defensibility.

Detailed Description: 2014: >55,000 plants observed.
1997: 101-1000 mature plants, 15% in bud.
General Area: 1997: Sand dune. Associated plant species include *Ammophila breviligulata* (beach grass), *Solidago sempervirens* (seaside goldenrod), *Carex silicea* (sandy sedge), *Rosa virginiana* (Virginia rose), and *Polygonella articulata* (jointweed).
General Comments:
Management Comments:

Location

Survey Site Name: Hampton Harbor Inlet
Managed By: Former Barge Facility Land

County: Rockingham
Town(s): Seabrook
Size: 5.3 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Follow Rte. 1A south from Hampton Beach and cross the bridge over Hampton Harbor Inlet. Proceed to the dune remnant on either side of Ocean Blvd. just south of the toll bridge.

Dates documented

First reported: 1997-07-12 Last reported: 2014-10-06

New Hampshire Natural Heritage Bureau - Plant Record

seaside-sandwort (*Honckenya peploides ssp. robusta*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Endangered	State:	Not ranked (need more information)

Description at this Location

Conservation Rank: Historical records only - current condition unknown.
Comments on Rank:

Detailed Description: 2005: Searched for but not found. 2004: Searched for but not found. 1982: Single plant. 1973: Small colony. Specimen collected.

General Area: 1982: Back dune, near pavement of Rte. 1A. Loose, sandy site just above strandline. Gentle, west-facing slope, inundated only during very high tides. With *Ammophila breviligulata* (beach grass) and *Lathyrus* sp. (beach pea).1973: Sand dune.

General Comments: 2005: As *Honckenya peploides* seems to require sunlight and open space, it may be that the relatively dense *Spartina* (cordgrass) grasses have out-competed it in the flat areas. The slopes leading up to the roadway were thick with shrubby vegetataion such as beach rose and another, unidentified shrub. Only small patches of open sand were present at the site. Presume extirpated. 2004: Also checked a location west of Rte. 1 ca. 100 m south of bridge. In both locations, searched areas just above strand line. Site description of Cross Beach Rd and Rte. 1A intersection by Dunlop et al 1983 still holds. 1982: Only state occurrence.

Management Comments:

Location

Survey Site Name: The Sands
Managed By: Seabrook Back Dunes

County: Rockingham
Town(s): Seabrook
Size: 2.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Seabrook back dune. Where Cross Beach Rd meets Rte. 1A. Just above the strand line, very close to pavement of Rte. 1A.

Dates documented

First reported: 1973 Last reported: 1982-10-11

New Hampshire Natural Heritage Bureau - Animal Record

Least Tern (*Sterna antillarum*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Apparently secure but with cause for concern
State:	Listed Endangered	State:	Not ranked (need more information)

Description at this Location

Conservation Rank: Not ranked
Comments on Rank:

Detailed Description: 2017: Area 1: 1 pair observed nesting. Area 2: 3 pairs observed nesting.
2015: Area 1: 2 pairs observed nesting, 1 chick fledged.
General Area:
General Comments: 2015: First confirmed nesting since 1950s.
Management Comments:

Location

Survey Site Name: Hampton Beach State Park
Managed By: Hampton Beach State Park

County: Rockingham
Town(s): Hampton
Size: .9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions:

Dates documented

First reported: 2015-06-30 Last reported: 2017

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Piping Plover (*Charadrius melodus*)

Legal Status		**Conservation Status**	
Federal:	Listed Threatened	Global:	Rare or uncommon
State:	Listed Endangered	State:	Not ranked (need more information)

Description at this Location

Conservation Rank: Fair quality, condition and/or landscape context ('C' on a scale of A-D).
Comments on Rank: Rank is for the combined sub-populations.

Detailed Description: 2008: 1 nesting pair, 3 chicks fledged.2007: 1-3 nesting pairs, 3 chicks hatched (re-nest by one pair after storm destroys first 3 nests).2006: 2 nesting pairs, 5 chicks hatched, 2 may have fledged. No known surviving chicks.2005: 1 nesting pair, 3 chicks hatched, 0 fledged.2004: 2 nesting pairs, 7 chicks hatched, 3 fledged.2003: 2 nesting pairs, 3 chicks hatched, 3 fledged.2002: 2 nesting pairs, 1 chick hatched, 1 fledged.2001: 2 nesting pairs, 4 chicks hatched, 3 fledged.2000: 1 nesting pair, 4 chicks hatched, 2 fledged.1999: 1 nesting pair, 4 chicks hatched, 1 fledged.1998: No nesting pairs.1997: 2 nesting pairs, 6 chicks hatched, 0 fledged.
General Area: 2002: Seacoast shore. 1997: Sand beach.
General Comments:
Management Comments: 2006: Eggs at two nests lost. One probably due to trampling, one to an unknown predator. Recommend an improved predator control program and enhanced communication with law enforcement and lifeguard staff, as well as the general public.2005: Storms and feral cats contributed to losses.2003: One nest lost due to storms (tidal overwash, wind-blown sand).2002: Two nests lost due to bad weather.2000: Two chicks lost 1-2 days after a severe storm. Vehicle traffic (emergency rescue) or a domestic cat (tracks found near nest exclosure) may have played a role.

Location

Survey Site Name: Hampton Beach State Park
Managed By: Hampton Beach State Park

County: Rockingham
Town(s): Hampton
Size: 7.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Hampton Beach State Park, south of Hampton Beach and north of Hampton Harbor Inlet. 2002: A pair nested in front of the dune that is just south of the concrete path from the park to the beach. GPS coordinates are for the location of enclosure that was set up around the nest (Obs_id 215). Another pair nested in front of dune closest to jetty. The GPS coordinates indicate the location of the second nest. The first nest was very close but data was not collected before the nest was lost. (Obs_id 214).

Dates documented

First reported: 1997 Last reported: 2008-08

The U.S. Fish & Wildlife Service has jurisdiction over Federally listed species. Please contact them at 70 Commercial Street, Suite 300, Concord NH 03301 or at (603) 223-2541.

New Hampshire Natural Heritage Bureau - Animal Record

Piping Plover (*Charadrius melodus*)

Legal Status		**Conservation Status**	
Federal:	Listed Threatened	Global:	Rare or uncommon
State:	Listed Endangered	State:	Not ranked (need more information)

Description at this Location

Conservation Rank:	Fair quality, condition and/or landscape context ('C' on a scale of A-D).
Comments on Rank:	Highly impacted habitat (parking lots, residential, beach use) but 5-6 pairs fledging 2-15 young most years. Rank is for the combined sub-populations.
Detailed Description:	2008: 2 nesting pairs, 3 chicks fledged.2007: 0 fledged.2006: 1 nesting pair, 4 chicks hatched, 0 fledged.2005: 2 nesting pairs, 4 chicks hatched, 0 fledged.2004: 2 nesting pairs, 4 chicks hatched, 1 fledged.2003: 5 nesting pairs, 12 chicks hatched, 4 fledged.2002: 5 nesting pairs, 11 chicks hatched, 0 fledged.2001: 5 nesting pairs, 15 chicks hatched, 12 fledged.2000: 5 nesting pairs, 14 chicks hatched, 12 fledged.1999: 5 nesting pairs, 16 chicks hatched, 15 fledged.1998: 5 nesting pairs, 16 chicks hatched, 12 fledged.1997: 3 nesting pairs, 12 chicks hatched, 3 fledged.
General Area:	2002: Seacoast shore. 1997: Sand beach.
General Comments:	
Management Comments:	2006: Four chicks lost, probably to predation.2003: One nest was lost to predation, one to bad weather, and two to unspecified causes. 2002: Several nests and chicks were lost to severe weather, and others (including one parent) were lost to suspected predation.2000: Two chick deaths may have been due to cat predation, or in one case vehicular traffic. Enforcement of the town ordinance related to dogs at the beach continues to be needed. 1998: Threats included a bad storm in June (6 inches of rain in one day), high tides (to within 10 feet of the nests), predators such as skunks, dogs, gulls, and especially young children. Cages, signs, fences, and pamphlets were all employed to increase protection.

Location

Survey Site Name:	Seabrook Beach
Managed By:	Seabrook Dunes and Beach

County: Rockingham
Town(s): Seabrook
Size: 35.1 acres Elevation:

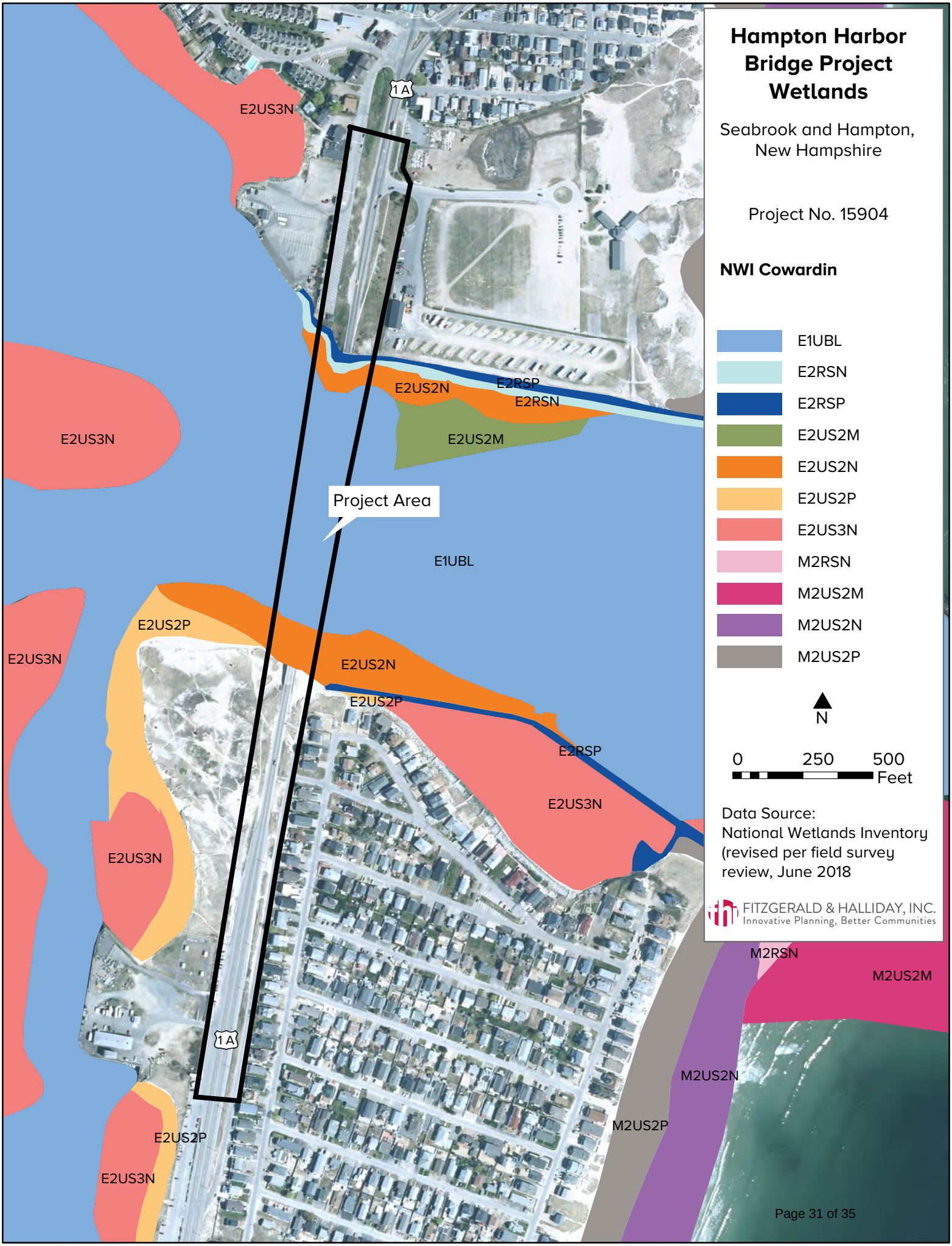
Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: Seabrook Beach opposite The Sands area. Nest locations: 2006: North of Hookset Street. 2003: Ocean side of Tilton/Hooksett St. in open beach (Obs_id 327); ocean side of Andover St. in dune slope (Obs_id 326); ocean side of Haberhill St., south in toe of dune (Obs_id 329), north in toe of dune (Obs_id 330); ocean side of Lowell St., toe of dune (Obs_id 328); ocean side of New Hampshire St. in open beach (Obs_id 331). 2002: One nest just south of the beach entrance from Tyngsboro Street and one just south of the beach entrance from Chelmsford Street. The GPS coordinates are for the location of the second nest (Obs_id 216). Two nests near the beach entrance from Dracut Street (Obs_id 217). Three nests just north of the beach entrance from Haverhill Street (Obs_id 218). Two nests just south of the beach entrance from Haverhill Street. The GPS coordinates are for the second nest (Obs_id 219). One nest in the center of the path which leads from the New Hampshire street entrance to the beach. This is at the very south end of Seabrook beach and borders the Mass. state line (Obs_id 220). 2001: Near beach entrance from Groveland Street (Obs_id 227). Near beach entrance from Tyngsboro Street. GPS coordinates are for the second nest (Obs_id 223). Near Hooksett Street (Obs_id 224). Near beach entrance from Dracut Street (Obs_id 226). Near beach entrance from Lawrence Street (Obs_id 225).

Dates documented

First reported: 1997 Last reported: 2008-08

The U.S. Fish & Wildlife Service has jurisdiction over Federally listed species. Please contact them at 70 Commercial Street, Suite 300, Concord NH 03301 or at (603) 223-2541.


Hampton Harbor Bridge Project Wetlands
Seabrook and Hampton, New Hampshire
Project No. 15904
NWI Cowardin
E1UBL
E2RSN
E2RSP
E2US2M
E2US2N
E2US2P
E2US3N
M2RSN
M2US2M
M2US2N
M2US2P
N
0
250
500
Feet
Data Source:
National Wetlands Inventory (revised per field survey review, June 2018
FITZGERALD & HALLIDAY, INC.
Innovative Planning, Better Communities
Project Area
1 A
E2US3N
E2US2N
E2RSP
E2RSN
E2US2M
E1UBL
E2US2P
E2US3N
E2US2N
E2US2P
E2RSP
E2US3N
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E2US3N
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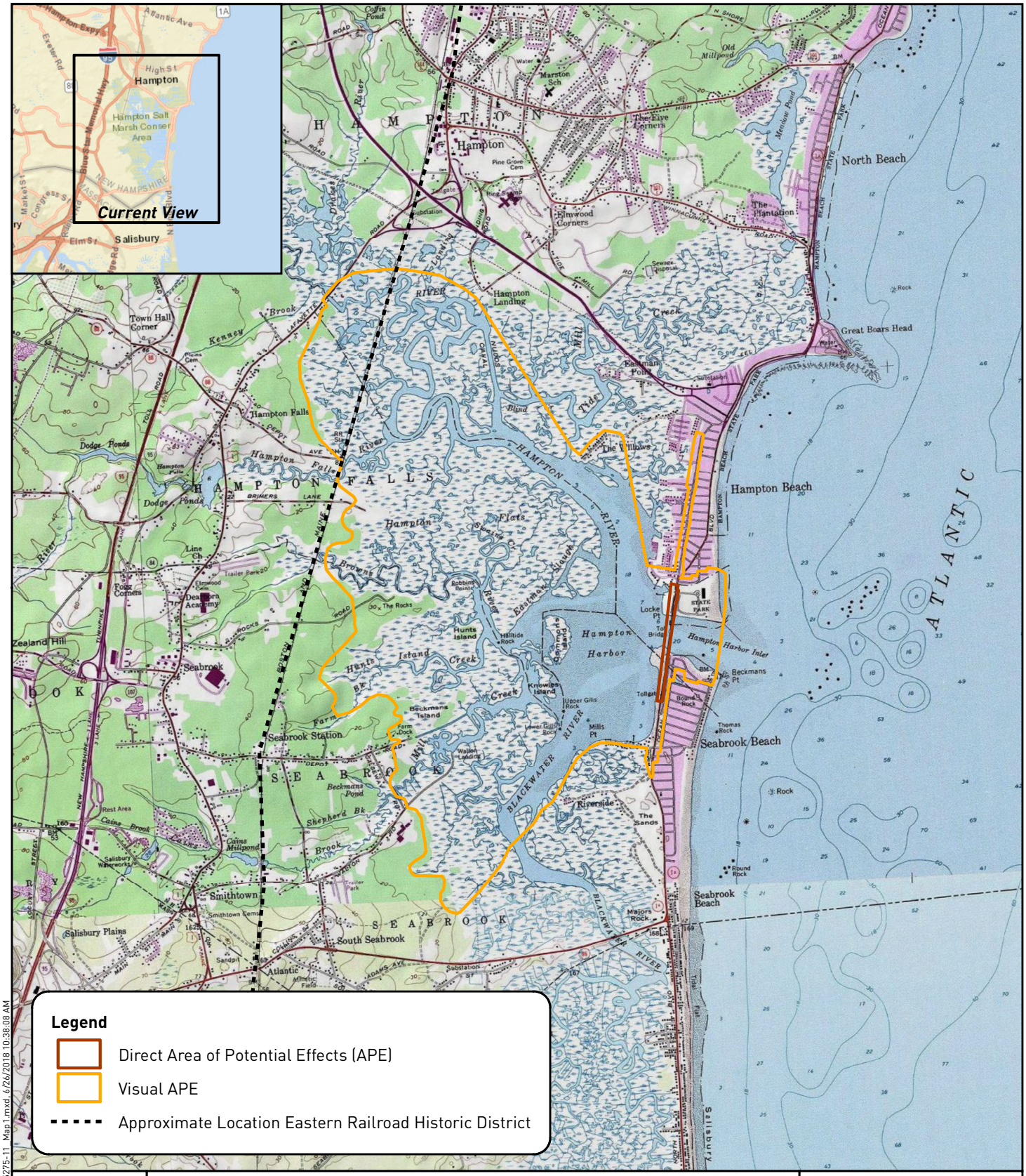


2,000 0 2,000 4,000 Feet

600 0 600 1,200 Meters

Note: Contour interval is 20 feet.

Project Location

USGS 7.5' Quadrangles: Exeter, 1992, Newburyport, 1987; GIS Services Accessed 6/27/2018: Environmental Systems Research Institute, Inc., World Street Map

HARTGEN archeological associates inc

Map 1

G:\5275\GIS\Documents\HAA_5275-11_Map1.mxd, 6/26/2018 10:38:08 AM

From:	Edith Carson - NOAA Federal
To:	Marc.Laurin@dot.nh.gov
Cc:	Jamie Sikora; Mike Johnson; Reczek, Jennifer; James Murphy; Stephanie Dyer-Carroll; Dan Hageman
Subject:	Re: Seabrook-Hampton, 15904 - Environmental Assessment
Date:	Friday, July 13, 2018 11:37:00 AM

Mr. Laurin,

We received your email on July 10, 2018, regarding the proposed rehabilitation or replacement of the Neil R. Underwood Bridge (NHDOT No. 235/025) and associated roadway improvements. In your letter, you requested any information on the presence of threatened or endangered aquatic species under our jurisdiction. We offer the following comments.

Endangered Species Act

Sea Turtles
Four species of Endangered Species Act (ESA) listed threatened or endangered sea turtles under our jurisdiction are seasonally present in Hampton Harbor including its bays and tributaries: the threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead, the threatened North Atlantic DPS of green, and the endangered Kemp's ridley and leatherback sea turtles. Sea turtles typically occur along the New Hampshire coast from May to mid-November, with the highest concentration of sea turtles present from June through October.

Atlantic Sturgeon
Atlantic sturgeon are present in the waters of Hampton Harbor and its adjacent bays and tributaries. The New York Bight, Chesapeake Bay, South Atlantic and Carolina DPS of Atlantic sturgeon are endangered; the Gulf of Maine DPS is threatened. Adult and subadult Atlantic sturgeon originating from any of these DPS could occur in the proposed project area. As young remain in their natal river/estuary until approximately age 2, and early life stages are not tolerant of saline waters, no eggs, larvae, or juvenile Atlantic sturgeon will occur within the waters of Hampton Harbor and its adjacent bays and tributaries.

Shortnose Sturgeon
Shortnose sturgeon could be present in the waters of Hampton Harbor and could occur in their adjacent bays and tributaries. Shortnose sturgeon are listed as endangered throughout their range. As early life stages are not tolerant of saline waters, no eggs, larvae, or juvenile shortnose sturgeon will occur within the saline waters of Hampton Harbor and its adjacent bays and tributaries.

As project details develop, we recommend you consider the following effects of the project on sea turtles and sturgeon:

- For any impacts to habitat or conditions that temporarily render affected water bodies unsuitable for the above-mentioned species, consider the use of timing restrictions for in-water work.
- For activities that increase levels of suspended sediment, consider the use of silt management and/or soil erosion best practices (i.e., silt curtains and/or cofferdams).
- For pile driving or other activities that may affect underwater noise levels, consider the use of cushion blocks and other noise attenuating tools to avoid reaching noise levels that will cause injury or behavioral disturbance to sea turtles and sturgeon - see the table below for more information regarding noise criteria for injury/behavioral disturbance in sea turtles and sturgeon.

Organism	Injury	Behavioral Modification
Sturgeon	206 dB re 1 µPaPeak and 187 dB cSEL	150 dB re 1 µPaRMS
Sea Turtles	180 dB re 1 µPaRMS	166 dB re 1 µPaRMS

Depending on the amount and duration of work that takes place in the water, listed species of sea turtles and sturgeon may occur within the vicinity of your proposed project.The federal action agency will be responsible for determining whether the proposed action may affect listed species. If they determine that the proposed action may

affect a listed species, they should submit their determination of effects, along with justification and a request for concurrence to the attention of the Section 7 Coordinator, NMFS, Greater Atlantic Regional Fisheries Office, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930 or nmfs.gar.esa.section7@noaa.gov. Please be aware that we have recently provided on our website guidance and tools to assist action agencies with their description of the action and analysis of effects to support their determination. See - http://www.greateratlantic.fisheries.noaa.gov/section7. After receiving a complete, accurate comprehensive request for consultation, in accordance to the guidance and instructions on our website, we would then be able to conduct a consultation under section 7 of the ESA. Should project plans change or new information become available that changes the basis for this determination, further coordination should be pursued. If you have any questions regarding these comments, please contact me (978-282-8490; Edith.Carson@noaa.gov).

Essential Fish Habitat

In addition, we have received a request for information regarding an Essential Fish Habitat (EFH) consultation under the Magnuson-Stevens Fisheries Conservation and Management Act. The information in your letter for federally-managed species and their EFH appears to be correct. In addition, several other NOAA-trust resources are known to occur in the project area, including American lobster, shellfish (e.g., blue mussel, soft-shell clam), and diadromous fish (e.g., alewife, blueback herring, rainbow smelt, American eel, and striped bass). Some of these species are also prey for federally-managed species, and are therefore considered a component of the EFH for them. Therefore, adverse effects to the species and their habitats should be assessed in the EFH consultation.

An EFH assessment to evaluate the potential adverse effect on EFH for federally-managed species should be prepared and sent to Michael Johnson, Habitat Conservation Division. His contact information is mike.r.johnson@noaa.gov, 978-281-9130.

Thank you,

Edith

Edith Carson-Supino, M.Sc.
Section 7/Shortnose Sturgeon Fish Biologist
NOAA Fisheries
U.S. Department of Commerce
Greater Atlantic Regional Fisheries Office
Phone: 978-282-8490
edith.carson@noaa.gov

For ESA Section 7 guidance please see:
https://www.greateratlantic.fisheries.noaa.gov/section7

On Fri, Jul 13, 2018 at 10:32 AM, Edith Carson - NOAA Federal <edith.carson@noaa.gov> wrote:

> Hi Marc,
>
> Thank you for your request. I will review this and send you my comments shortly.

Thanks!

Edith

Edith Carson-Supino, M.Sc.
Section 7/Shortnose Sturgeon Fish Biologist
NOAA Fisheries
U.S. Department of Commerce
Greater Atlantic Regional Fisheries Office
Phone: 978-282-8490
edith.carson@noaa.gov

For ESA Section 7 guidance please see:
https://www.greateratlantic.fisheries.noaa.gov/section7

---------- Forwarded message ----------
From: **Laurin, Marc** < Marc.Laurin@dot.nh.gov>
Date: Tue, Jul 10, 2018 at 2:37 PM
Subject: Seabrook-Hampton, 15904 - Environmental Assessment
To: Max Tritt <max.tritt@noaa.gov>
Cc: Jamie Sikora <jamie.sikora@dot.gov>, Mike Johnson <Mike.R.Johnson@noaa.gov>, "Reczek, Jennifer" <Jennifer.Reczek@dot.nh.gov>, James Murphy <James.Murphy@hdrinc.com>, Stephanie Dyer-Carroll <sdyer-carroll@fhiplan.com>, Dan Hageman <DHageman@fhiplan.com>

Max,

The NH Department of Transportation is in the process of gathering information on the environmental resources present to prepare an Environmental Assessment on the proposed rehabilitation or replacement of the US Route 1A bridge over Hampton Harbor Inlet in Seabrook and Hampton, NH.

Attached is letter with further details on the project. Your input on the resources of concern is much appreciated.

Please contact me if you have any questions.

Marc

APPENDIX G

Roadway and Traffic Design Information

APPENDIX G1

Detailed Description of Existing Traffic Conditions

As part of the bridge alternatives investigation, traffic data was collected from the *NHDOT Bureau of Traffic* based on a permanent traffic count recorder located south of the bridge on the Seabrook and Hampton town line. This permanent count location provides a summary of average annual daily traffic (AADT) as is shown within Table G.1.

Data Source	Date	Location on North Pembroke Rd	AADT
NHDOT	2017	NH Route 1A (Ocean Boulevard), Seabrook NH (Seabrook – Hampton town line)	9,466

Table G.1 – NHDOT Traffic Data

An assessment of the roadway configuration, as well as present and future traffic conditions was performed under a November 5, 2018 Roadway and Bridge Section Multi-Modal Traffic Analysis memorandum. This memorandum outlined a traffic analysis of present and future use to recommend a number of travel lanes and provided recommendations for a typical roadway section with multi-modal accommodation.

HDR initiated the analysis by reviewing existing peak hour data collected on Wednesday, July 11, 2018 and Sunday, July 15, 2018 along with 24 hour Automatic Traffic Recorder (ATR) data taken from the NH Route 1A location at the Seabrook and Hampton Town line. The typical weekday AM and PM peak hours are 9:00 AM and 6:00 PM, respectively. The weekend AM, mid-day and PM peak hours are 9:00 AM, 12:00 PM and 3:45 PM respectively. The Average Daily Traffic over the July 11th to July 15th time period was 15,800 with the Annual Average Daily Traffic being 9,800 for 2017.

In addition to AADT published by the NHDOT, video turning movement counts (VTMC) were conducted for all travel modes on the bridge during weekday and weekend periods in July 2018 during the following time intervals:

- Weekday: Wednesday, July 11, 2018 (6:00 AM-10:00 AM; 3:00 PM-7:00 PM)
- Weekend: Sunday, July 15, 2018 (6:15 AM-5:00 PM)

The Wednesday and Sunday periods were chosen based on review of traffic data collected from the NHDOT permanent count location. See Appendix G2 for a graphical breakdown of this information. Location and corresponding count data for the weekday periods are summarized in Table G.2 below.

Video Turning Movement Count Location	Approach	Vehicles Per Hour		Pedestrians Per Hour		Bicycles Per Hour		Bicycles on Sidewalk Per Hour	
		AM	PM	AM	PM	AM	PM	AM	PM
NH Route 1A, Seabrook (South of Bridge)	NB Thru	351	626	27	24	13	4	3	8
	EB/WB (South of Bridge) No existing crosswalk	-	-	3	0	-	-	-	-
NH Route 1A, Hampton (North of Bridge)	SB Thru	346	556	11	0	6	3	0	0
NH Route 1A & Hampton Beach State Park	NB Thru	318	595	-	-	13	3	4	8
	NB Right	22	19	-	-	0	0	0	0
	SB Left	27	14	-	-	0	0	0	4
	SB Thru	341	473	-	-	6	1	3	5
	WB Left	7	25	-	-	1	0	2	0
	WB Right	15	18	-	-	1	1	0	0
	NB/SB	-	-	57	22	-	-	-	-
	EB/WB (North of Intersection) No existing crosswalk	-	-	10	4	-	-	-	-

Table G.2 – Wednesday Turning Movement Count Summary

Locations and counts for a weekend period are summarized in Table G.3 below.

Roadway/ Intersection	Approach	Vehicles (Per Hour)			Pedestrians (Per Hour)			Bicycles (Per hour)			Bicycles on Sidewalk (Per Hour)		
		AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM
NH Route 1A, Seabrook (South of Bridge)	NB Thru	429	523	484	31	48	32	17	11	8	3	11	10
	EB/WB (South of Bridge) No existing crosswalk	-	-	-	0	2	3	-	-	-	-	-	-
NH Route 1A, Hampton (North of Bridge)	SB Thru	389	594	733	0	4	6	9	18	10	0	0	0
NH Route 1A & Hampton Beach State Park	NB Thru	411	504	474	-	-	-	16	13	7	6	5	9
	NB Right	33	30	23	-	-	-	0	2	0	0	1	1
	SB Left	66	45	20	-	-	-	1	1	0	2	0	0
	SB Thru	384	580	717	-	-	-	15	17	15	1	8	8
	WB Left	11	16	34	-	-	-	0	2	0	0	0	0
	WB Right	15	27	62	-	-	-	1	2	0	2	1	0
	NB/SB	-	-	-	54	93	42	-	-	-	-	-	-
	EB/WB (North of Intersection) No existing crosswalk	-	-	-	8	2	0	-	-	-	-	-	-
	EB/WB (South of Intersection) No existing crosswalk	-	-	-	7	2	3	-	-	-	-	-	-

Table G.3 – Sunday Turning Movement Count Summary

The respective peak hour times for each mode based on review of the VTMC data for the weekday and weekend periods are summarized in Tables G.4 and G.5 below. As is shown in the referenced tables, the respective peak hour for each travel mode differs greatly. For simplicity purposes, the peak hour volume data shown in subsequent analysis within this study were aggregated such that each travel modes respective peak hour volume data is being shown to represent the highest total volume for all modes.

Video Turning Movement Count Location	Vehicles		Pedestrians		Bicycles		Bicycles on Sidewalk	
	AM	PM	AM	PM	AM	PM	AM	PM
NB Approach of the Bridge	9:00 AM	6:00 PM	8:00 AM	4:30 PM	8:30 AM	5:30 PM	8:45 AM	3:00 PM
SB Approach of the Bridge	9:00 AM	5:30 PM	7:30 AM	3:00 PM	7:45 AM	6:00 PM	6:00 AM	3:00 PM
Ocean Blvd at State Park Rd	9:00 AM	6:00 PM	8:45 AM	4:45 PM	8:45 AM	5:15 PM	8:15 AM	3:00 PM

Table G.4 – Wednesday Peak Hour Time Summary

Video Turning Movement Count Location	Vehicles			Pedestrians			Bicycles			Bicycles on Sidewalk		
	AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM
NB Approach of the Bridge	9:00 AM	12:00 PM	2:00 PM	9:00 AM	10:30 AM	4:30 PM	8:00 AM	10:00 AM	4:30 PM	6:15 AM	1:00 PM	3:45 PM
SB Approach of the Bridge	9:00 AM	12:00 PM	3:45 PM	8:30 AM	10:00 AM	2:00 PM	8:30 AM	10:15 AM	3:00 PM	8:45 AM	1:00 PM	3:30 PM
Ocean Blvd at State Park Rd	9:00 AM	12:00 PM	3:45 PM	8:30 AM	10:30 AM	2:00 PM	8:30 AM	10:00 AM	3:00 PM	8:45 AM	1:00 PM	3:30 PM

Table G.5 – Sunday Peak Hour Time Summary

In addition to assessing average annual daily traffic, peak hour volumes and turning movements, bridge lifts were considered in the assessment of existing conditions. Available bridge lift data was collected to understand the effect bridge lift operations have on traffic along NH Route 1A. Based on review of bridge lift logs, a reasonably conservative estimate of two bridge lifts per peak hour was considered to evaluate the effect on traffic operations. A typical bridge lift cycle was determined to be 360 seconds and could potentially occur two times during the weekday peak AM and PM peak hours. A Synchro 9.0 software model was used to determine the traffic capacity impacts. Bridge lift cycles of 400 seconds occurring once an hour for the AM peak and twice per hour for both the mid-day and PM peaks were assumed for the analysis. This frequency, in conjunction with collected traffic data, was utilized in the analysis of future conditions considered in Section 8.1 of the report.

APPENDIX G2

Traffic Count Data

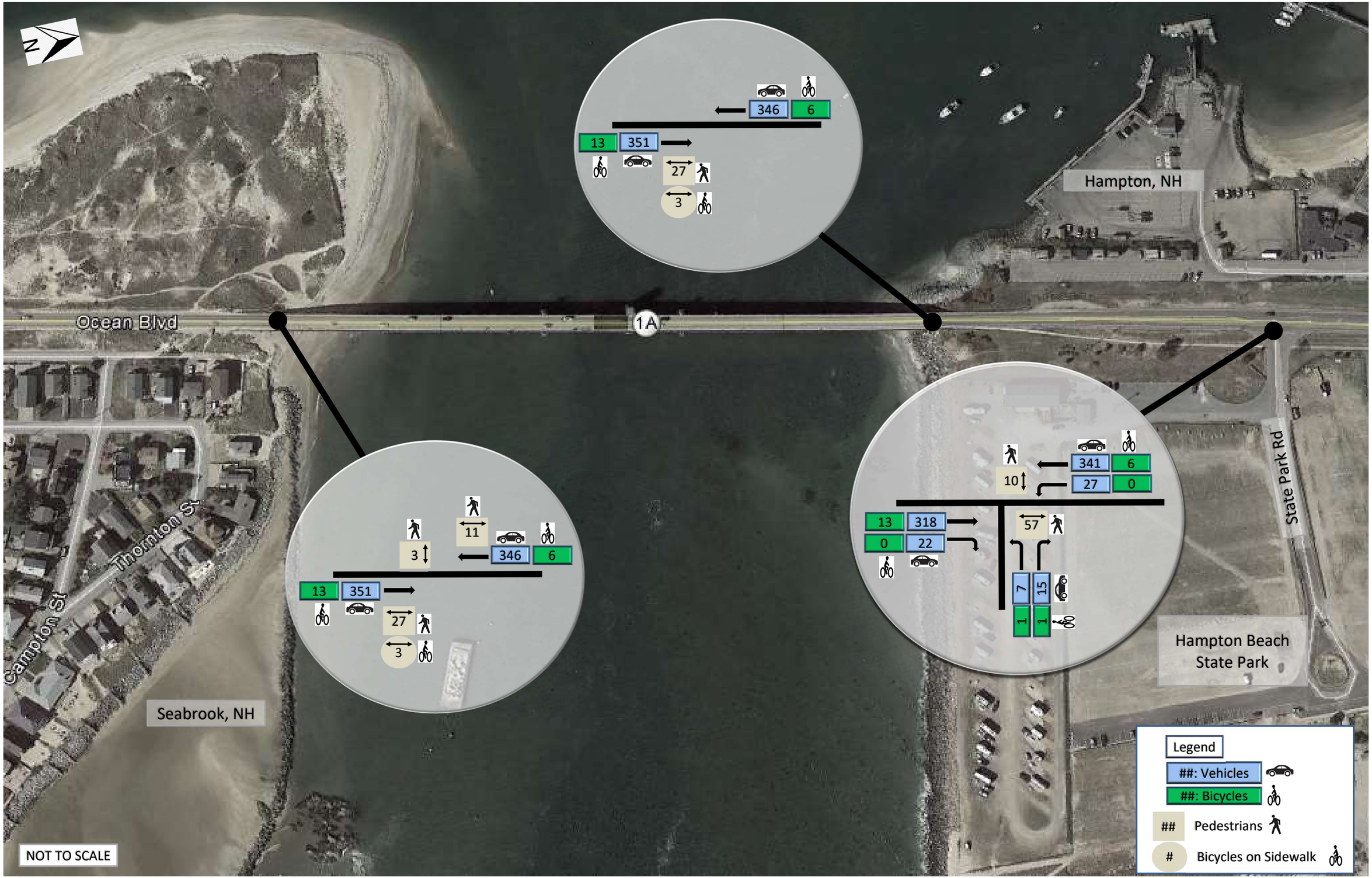
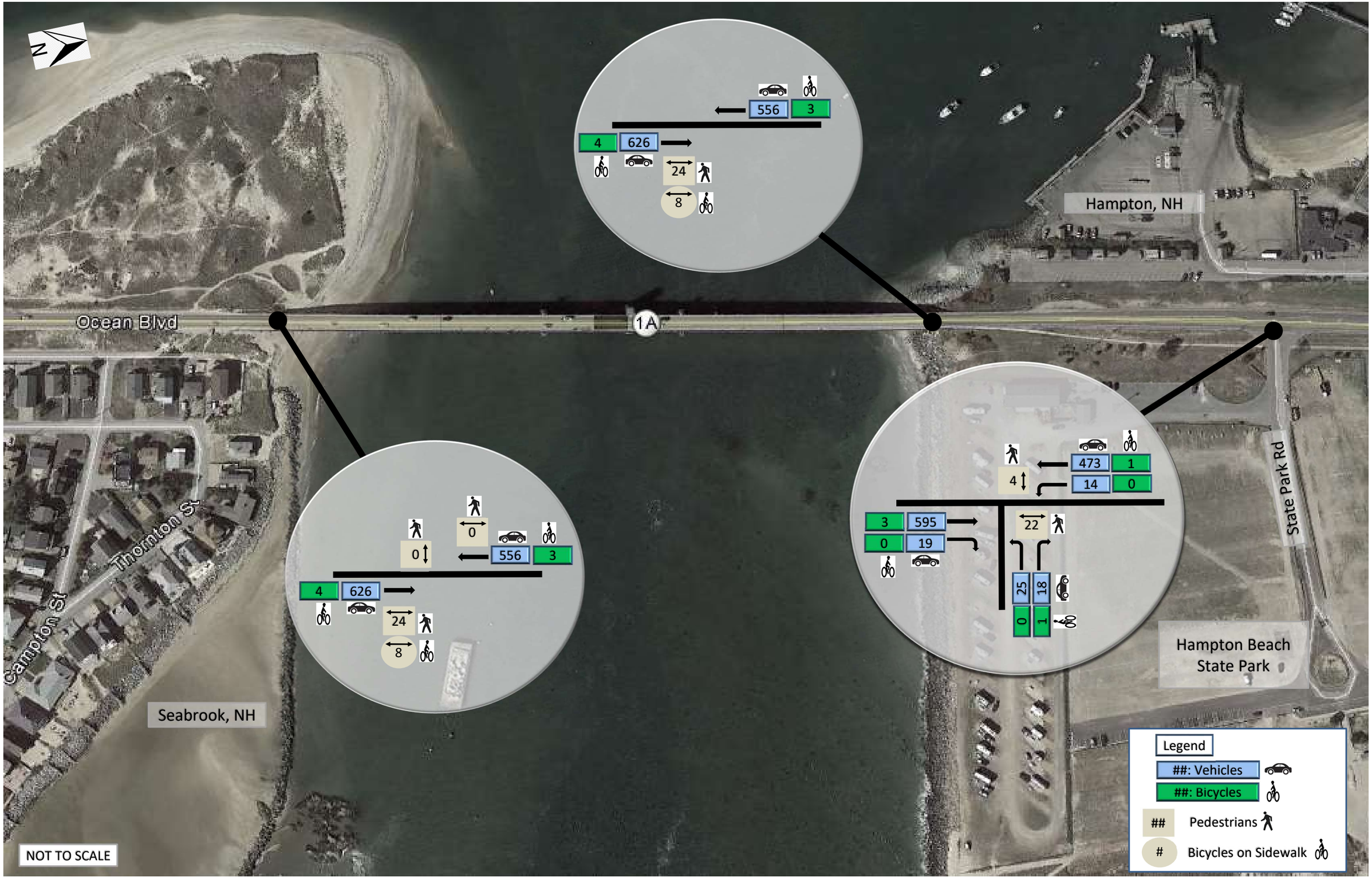


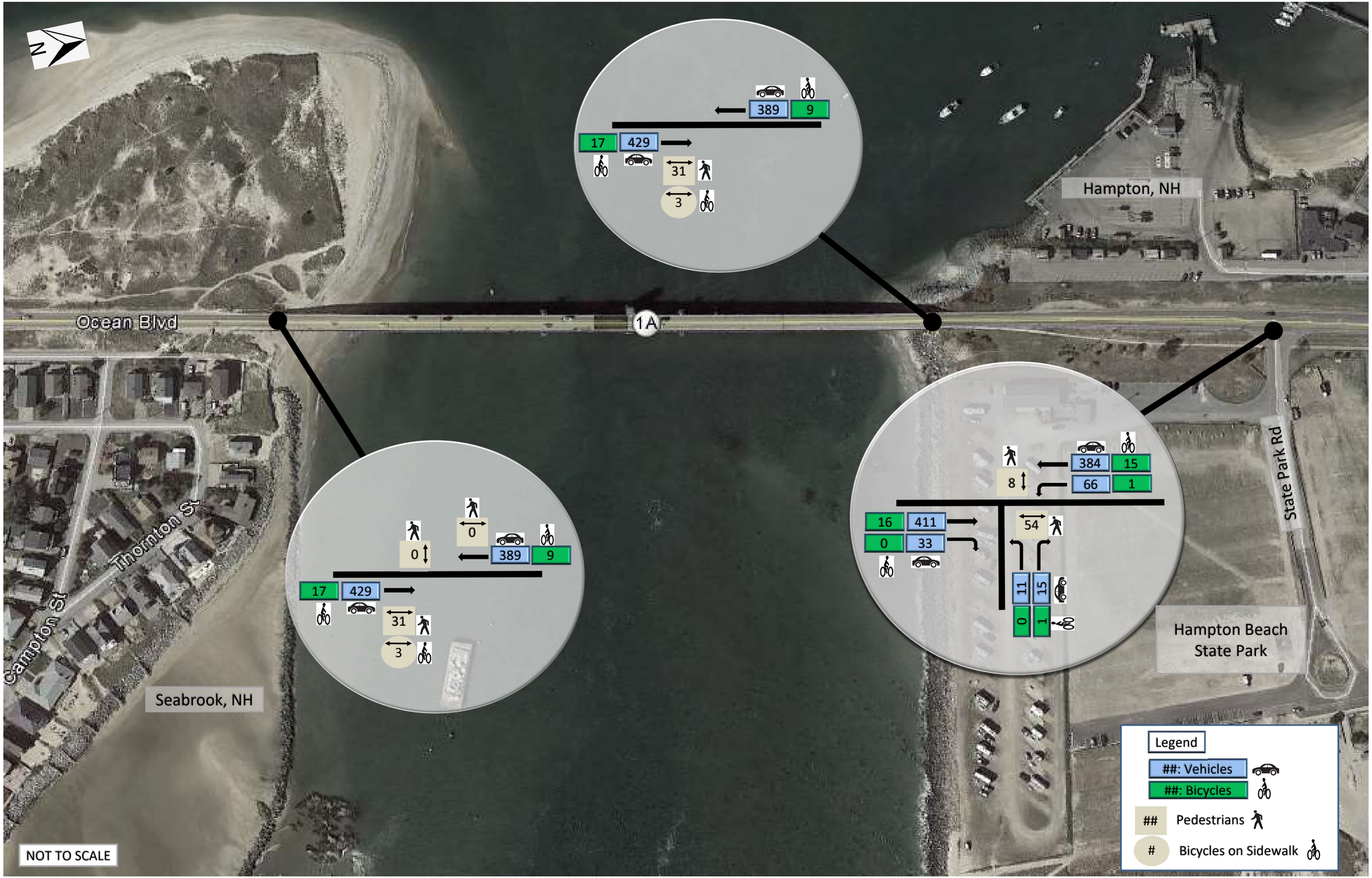
Figure G.1
Seabrook-Hampton, NH
8/10/2018

2018 Existing Weekday Morning (6:00 AM-10:00 AM)
Turning Movement Counts



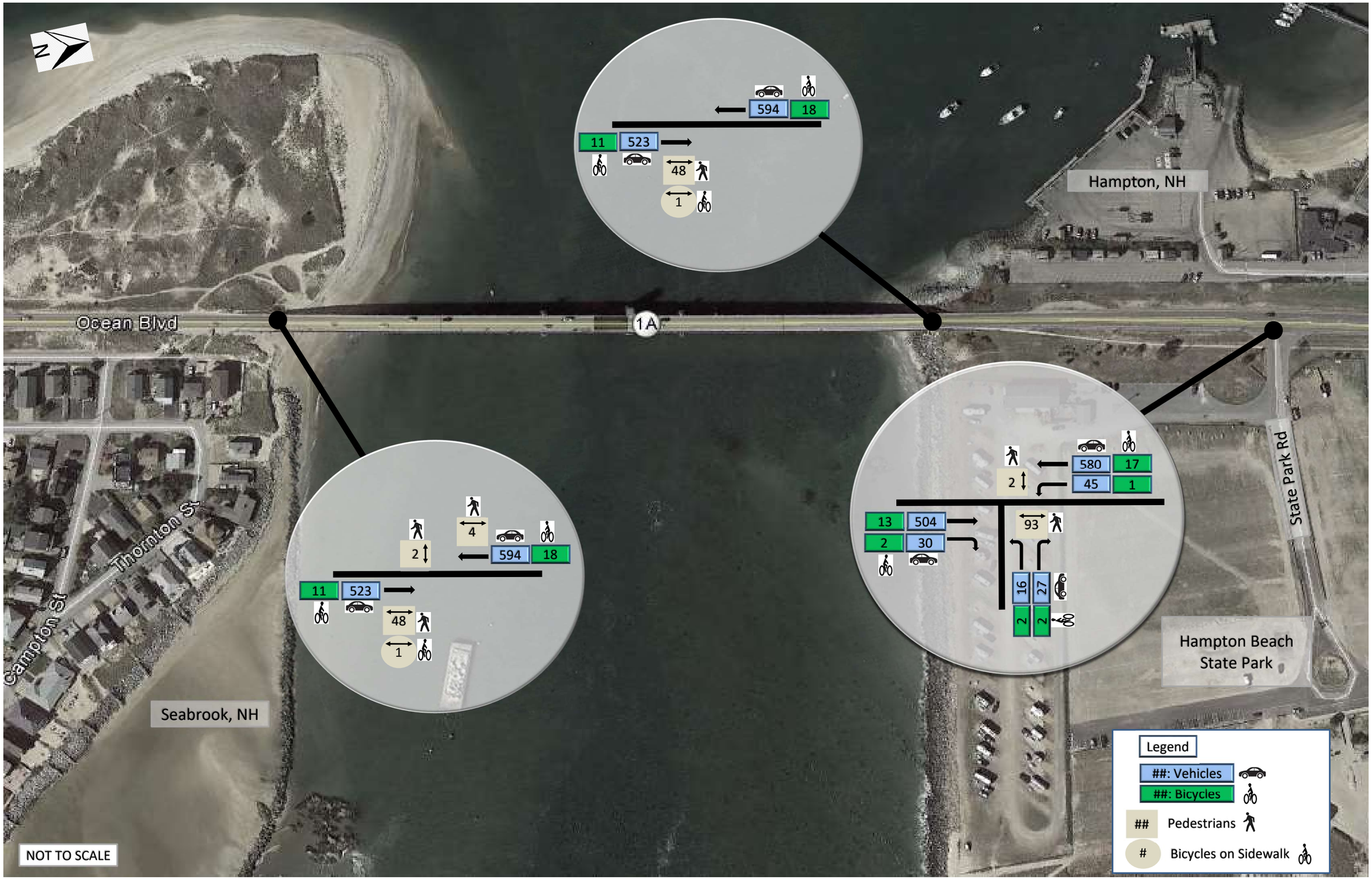
2018 Existing Weekday Afternoon (3:00 PM-7:00 PM)
Turning Movement Counts

Figure G.2
Seabrook-Hampton, NH
8/10/2018



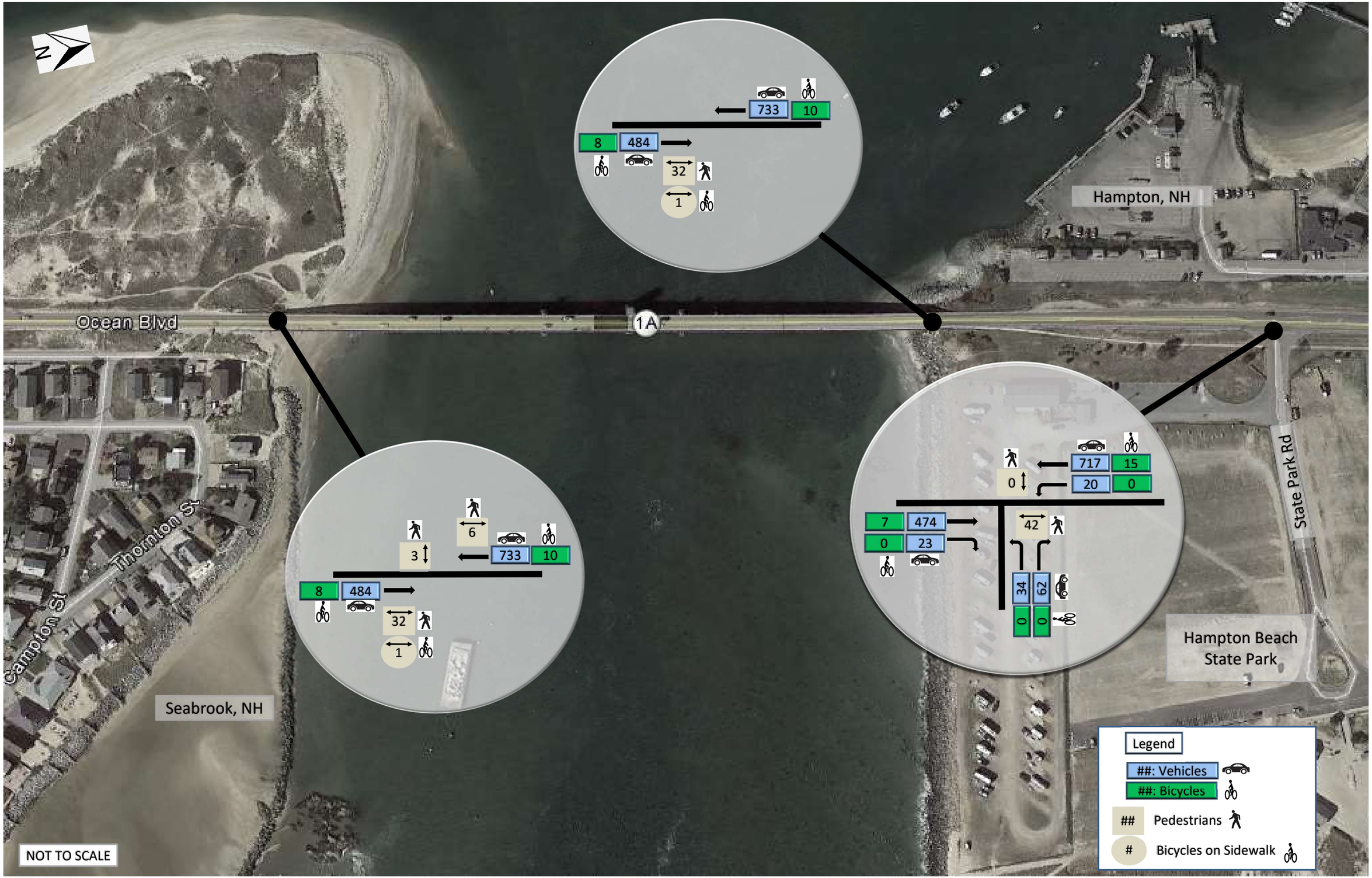
2018 Existing Weekend Morning (6:15 AM-10:00 AM)
Turning Movement Counts

Figure G.3
Seabrook-Hampton, NH
8/10/2018



2018 Existing Weekend Mid-Day (10:00 AM-2:00 PM)
Turning Movement Counts

Figure G.4
Seabrook-Hampton, NH
8/10/2018



2018 Existing Weekend Afternoon (2:00 PM-5:00 PM)
Turning Movement Counts

Figure G.5
Seabrook-Hampton, NH
8/10/2018

APPENDIX G3

Detailed Roadway Design Criteria

General Roadway Design

- Functional Classification: Urban Minor Arterial
- NHS or non-NHS: Non-NHS
- Legal Use for 53' Semi-trailers: No
- Design Speed: 40 mph
- Typical Section: 12' Travelway, 8' Shoulder
- Superelevation: e_{max} = 4%
- Clear Zone: 14' to 16' – 6:1 or flatter foreslope
  16' to 18' – steeper than 6:1 foreslope
  16' to 18' – all backslopes
- Horizontal Alignment: e_{max} = 4%
  - Minimum radius: 533'
  - Minimum radius with RC: 3220'
  - Minimum radius with NC: 4770'
  - Minimum Curve Length: 600'
- Vertical Alignment:
  - Minimum grade: 0.5% (min 0.3% with accurately sloped pavement)
  - Maximum grade: Level 7%, Rolling 8%, Mountainous 10%
  - Minimum K Crest (SSD): K=0.44 (SSD = 305')
  - Minimum K Sag: K=0.64 (SSD = 305')
- Stopping Sight Distance (Level): 305'
- Stopping Sight Distance on grades:
  - 3% downgrade: 315'
  - 6% downgrade: 333'
  - 9% downgrade: 354'
  - 3% upgrade: 289'
  - 6% upgrade: 278'
  - 9% upgrade: 269'
- Decision Sight Distance: 330' to 825'
- Passing Sight Distance: 600'

A Recommended Typical Section has been produced by utilizing design guidance in accordance with current AASHTO and NHDOT bridge design specifications. In addition for this evaluation, the following references were utilized:

- AASHTO *A Policy on Geometric Design of Highways and Streets, 6th Edition*
- AASHTO *Guide for the Development of Bicycle Facilities, 4th Edition*
- NACTO *Urban Street Design*
- NACTO *Urban Bikeway Design*
- NHDOT *Bridge Design Manual (NHDOT BDM), v2.0*
- NHDOT *Highway Design Manual, Vol. 1*
- NHDOT *New Hampshire Statewide Bicycle and Pedestrian Plan*
- United States Access Board *Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (Technical Requirements)*

This proposed typical section was developed based on a review of existing vehicular, pedestrian, and bicycle volumes collected by automatic traffic recorder, and video turning movement counts conducted. These data sets are summarized in Figures 1 through 5 of Appendix G2. The multi-modal traffic data collection was supplemented through a review of video footage of pedestrian and bicycle activity on the bridge to understand cyclists' comfort and experience levels along with pedestrian desire lines and travel behavior.

To provide a roadway that meets the purpose and need of the project, the roadway and bridge must provide adequate widths for multi-modal use. Minimum recommended configuration is:

- Two 11'-0" lanes
- Two 8'-0" shoulders
- Two 6'-0" sidewalks
- These minimums result in 50'-0" rail-to-rail width, 53'-0" out-to-out bridge width for the Rehabilitation, Replacement with Movable, and Replacement with Fixed Bridge Alternatives.
- These minimums result in twin bridges, each with one 11-0" lane, one 8'-0" shoulder, one 5-0" shoulder and one 6'-0" sidewalk for a 33'-6" out-to-out width for the Twin Bridge Alternative.

This minimum configuration includes 11' lane widths which are slightly narrower than shown in the design criteria. The *Hampton Harbor Bridge Rehabilitation Study* recommended 11' lanes to more readily conform to the existing NH Route 1A approach roadways.

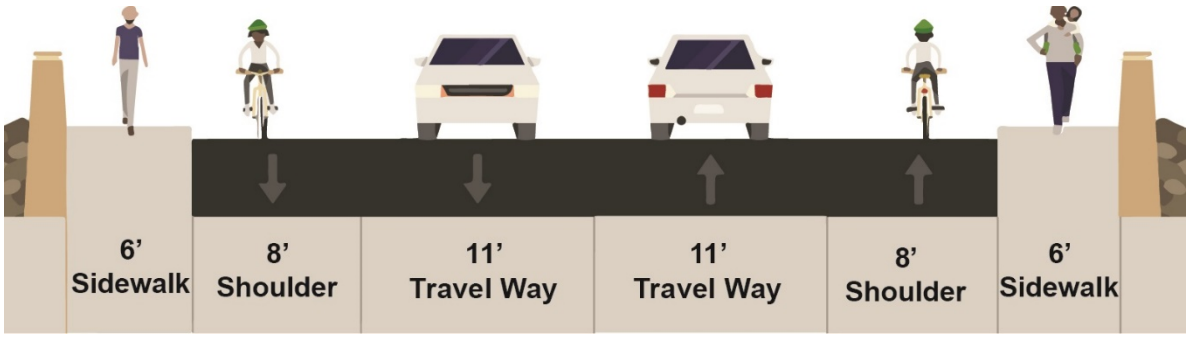


Figure G.6 – Recommended Typical Roadway Section

APPENDIX H
Construction Cost Estimates

Quantity and Construction Cost Estimate Assumptions:

- Boring depths for the existing bridge were taken in 1938 and ranged from EL. -10 to EL. -60 without encountering bedrock. Boulders were noted on only two of the twenty-one borings (Piers 1-N and 4-N), however the existing plans note ledge at Pier 1-N at a depth above the boulders noted in the Pier 1-N boring. This discrepancy suggests that Pier 1-N may perhaps be located on a large boulder or that the bedrock surface may be highly variable. Considering none of the borings identified a ledge location, the bedrock surface is assumed to be EL. -150 based on a diagram of the Seabrook Station Nuclear Power Plan discharge tunnel. Overburden depths on this diagram appear to vary between 80 feet and 150 feet in the vicinity of the bridge. A bedrock location of EL. -150 was taken to be a reasonable maximum at the stage of project development.
- All steel bearing piles used at pier rehabilitations and all abutments are assumed to be HP12x84 sections driven to bedrock.
- All drilled shafts for replacement pier foundations are assumed to be 4’-0” diameter and to extend to the bedrock surface at EL. -150. A 10-ft rock socket is assumed for all drilled shafts.
- At this stage approximate concrete volumes have been determined based on assumed member sizes, and commonly-used reinforcing steel densities (LB reinforcing steel per CY of concrete) were used for reinforcing steel weight.
- All bridge deck reinforcing is assumed to be stainless steel.
- A “Miscellaneous Items” line is included for all bridge span estimates to capture additional pay items not quantified at this stage of project development, and is set as a percentage of the estimated cost of the calculated quantities. A base percentage of 3% is used for the replacement alternatives (Alternatives 2 and 3) and the new southbound Twin Bridge (Alternative 4). An additional 3% (total 6%) is applied to the rehabilitation portions of the alternatives (Alternative 1 and the rehabilitated northbound Twin Bridge (Alternative 4) to account for additional uncertainty regarding the existing bridge substructure.
- A closed bridge drainage system is anticipated to be included for all alternatives. A detailed estimate of this system was omitted from the quantities, and is assumed to be included in the “Miscellaneous Items” line.
- Additional scour mitigation measures may be required for Alternatives 1 and 4, where the existing bridge substructure is maintained. These costs are assumed to be included in the “Miscellaneous Items” line.
- The temporary bridge in Alternative 1 is assumed to have one movable or lift span to accommodate maritime traffic.
- Unit prices are based on the NHDOT Weighted Average Unit Prices and may be adjusted to reflect smaller or larger quantities, previous project experience, or specific features of the work or project site.

BY	*JRP*	DATE	*12/03/19*	SHEET	1	OF	1
CHKD BY	*NDC*	DATE	*12/11/19*	PROJECT	*10116323*		
UPDATED	*JGS*	DATE	*03/25/20*				
		SUBJECT	*Seabrook Hampton TS&L - Summary of Alternatives Costs*				

SUMMARY OF SEABROOK HAMPTON TSL ALTERNATIVES COSTS

	Alternative 1 Rehabilitation	Alternative 2 Movable Bascule	Alternative 3A Fixed Bridge Steel	Alternative 3A Fixed Bridge Concrete	Alternative 4 Twin Bridge
Rehabilitated Structure Fixed Spans =	$25,210,547	-	-	-	$19,887,503
Rehabilitated Structure Bascule Span =	$3,356,540	-	-	-	$2,501,619
Rehabilitated Mechanical Bascule Span =	$4,238,585	-	-	-	$3,886,796
Rehabilitated Electrical Bascule Span =	$6,582,454	-	-	-	$4,787,693
Replacement Structure Fixed Spans =	-	$41,898,565	$46,257,672	$48,873,962	$26,728,066
Replacement Structure Bascule Span =	-	$16,519,818	-	-	$10,353,609
Replacement Mechanical Bascule Span =	-	$4,850,555	-	-	$4,118,625
Replacement Electrical Bascule Span =	-	$7,117,812	-	-	$4,652,193
Temporary Bridge =	$20,000,000	-	-	-	-
Civil Roadway =	$1,747,542	$1,905,030	$1,905,030	$1,905,030	$2,209,597
Contingency (20%)=	$12,227,134	$14,458,356	$9,632,540	$10,155,798	$15,825,140
Mobilization (8%) =	$5,869,024	$6,940,011	$4,623,619	$4,874,783	$7,596,067
Construction Engineering (7%) =	$5,546,228	$6,558,310	$4,369,320	$4,606,670	$7,178,284
Total Cost =	**$84,778,054**	**$100,248,457**	**$66,788,182**	**$70,416,244**	**$109,725,192**
Say =	**$84,779,000**	**$100,249,000**	**$66,789,000**	**$70,417,000**	**$109,726,000**

APPENDIX H1
Alternative 1 – Bridge Rehabilitation Construction Cost Estimate

BY	JRP	DATE	11/10/19	SHEET	1	OF	2
CHKD BY	NDC	DATE	11/22/19	PROJECT	10116323		

SUBJECT *Seabrook-Hampton 15904 Alt 1 Rehabilitation - Approach Spans*

Engineer's Estimate - Summary

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
207.3	UNCLASSIFIED CHANNEL EXCAVATION	CY	1200	$25.00	$30,000.00
209.201	GRANULAR BACKFILL (BRIDGE) (F)	CY	970	$35.00	$33,950.00
500.02	ACCESS FOR BRIDGE CONSTRUCTION	U	1	$2,000,000.00	$2,000,000.00
502	REMOVAL OF EXISTING BRIDGE STRUCTURE	U	1	$2,010,000.00	$2,010,000.00
503.201	COFFERDAMS	U	1	$955,000.00	$955,000.00
504.1	COMMON BRIDGE EXCAVATION (F)	CY	1860	$20.00	$37,200.00
504.2	ROCK BRIDGE EXCAVATION	CY	95	$200.00	$19,000.00
508	STRUCTURAL FILL	CY	105	$55.00	$5,775.00
510.1	PILE DRIVING EQUIPMENT	U	1	$40,000.00	$40,000.00
510.2	PILE LOADING TESTS	EA	14	$5,000.00	$70,000.00
510.61	FURNISHING & DRIVING STEEL BEARING PILES	LB	1487720	$0.75	$1,115,790.00
510.611	FURNISHING AND DRIVING STEEL BEARING PILES (14"X1/2")	LB	123680	$0.75	$92,760.00
510.65	DRIVING-POINTS FOR STEEL BEARING PILES	EA	136	$250.00	$34,000.00
510.9	PILE SPLICES	EA	136	$500.00	$68,000.00
520.0102	CONCRETE CLASS AA (QC/QA) (F)	CY	2080	$1,400.00	$2,912,000.00
520.0302	CONCRETE CLASS AA APPROACH SLABS (QC/QA) (F)	CY	60	$400.00	$24,000.00
520.21	CONCRETE CLASS B, FOOTINGS (F)	CY	910	$500.00	$455,000.00
520.70026	CONCRETE BRIDGE DECK (QC/QA)(PANEL OPTION)(F)	CY	2350	$1,200.00	$2,820,000.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	147	$75.00	$11,025.00
538.2	BARRIER MEMBRANE, PEEL AND STICK - VERTICAL SURFACES (F)	SY	45	$35.00	$1,575.00
544	REINFORCING STEEL (F)	LB	211860	$1.10	$233,046.00
544.2	REINFORCING STEEL, EPOXY COATED (F)	LB	41530	$1.50	$62,295.00
544.51	REINFORCING STEEL, STAINLESS STEEL (F)	LB	705000	$3.50	$2,467,500.00
548.21	ELASTOMERIC BEARING ASSEMBLIES (F)	EA	84	$3,000.00	$252,000.00
550.1	STRUCTURAL STEEL (F)	LB	1999180	$2.60	$5,197,868.00
561.2	PREFABRICATED MODULAR BRIDGE JOINT SYSTEM (F)	LF	265	$1,000.00	$265,000.00
563.24	BRIDGE RAIL T4	LF	2462	$250.00	$615,500.00
565.242	BRIDGE APPROACH RAIL T4 (STEEL POSTS)	U	4	$7,500.00	$30,000.00
570.2	MORTAR SQUARED STONE MASONRY (F)	CY	600	$2,500.00	$1,500,000.00
585.21	STONE FILL, CLASS B (BRIDGE)	CY	300	$45.00	$13,500.00
593.211	GEOTEXTILE; SEPARATION CL.1, NON-WOVEN	SY	425	$2.00	$850.00
593.421	GEOTEXTILE; PERM CONTROL CL.2, NON-WOVEN	SY	300	$3.00	$900.00
1010.41	QUALITY CONTROL QUALITY ASSURANCE (QC/QA) FOR CONCRETE	$	1	$410,000.00	$410,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (6% OF ITEMS ABOVE)			6%	$1,427,012.04

BY	*JRP*	DATE	*11/10/19*	SHEET 2	OF 2
CHKD BY	*NDC*	DATE	*11/22/19*	PROJECT	*10116323*
SUBJECT	*Seabrook-Hampton 15904 Alt 1 Rehabilitation - Approach Spans*				

STRUCTURE TOTAL = $25,210,546.04

BY	*HFP*	DATE	*11/27/19*	HEET 1	OF 1
CHKD BY	*SS*	DATE	*11/27/19*	JECT	
SUBJECT	*Seabrook Hampton TS&L -Alt 1 Rehabilitation Bascule Span*				

Engineer's Estimate - Summary

	STRUCTURAL				
550.1	STRUCTURAL STEEL	LB	385020	$3.50	$1,347,570.57
502	CONCRETE REMOVAL	CY	37	$800.00	$29,600.00
	HALF FILLED GRID DECK	SF	3425	$105.00	$359,625.00
544.2	REINFORCING STEEL, EPOXY COATED	LB	120865	$1.50	$181,297.50
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	56	$75.00	$4,198.50
563.24	BRIDGE RAIL T4	LF	72	$250.00	$17,875.00
	FENDER	LS	1	$500,000.00	$500,000.00
	ARCHITECTURE	LS	1	$200,000.00	$200,000.00
	BALANCE BLOCKS	LB	76963	$2.00	$153,925.20
	LIVE LOAD SHOES	LS	1	$18,750.00	$18,750.00
	BRIDGE RAIL T4	LF	72	$250.00	$18,000.00
520.0102	NEW PIER CONCRETE	CY	199	$1,400.00	$278,600.00
520.70026	CONCRETE FOR SIDEWALKS AND CURBS	CY	18	$1,200.00	$21,600.00
520.0102	CONCRETE FOR SLABS, WALLS, STAIRS AND WALKWAYS	CY	5	$1,400.00	$7,000.00
520.21	CONCRETE CLASS FOR COUNTERWEIGHT	CY	57	$500.00	$28,504.67
	PILES (NCLUDED IN APPROACH SPAN ESTIMATE)				
	MISCELLANEOUS ITEMS NOT INCLUDED (6% OF ITEMS ABOVE)			6%	$189,992.79
	MECHANICAL				
	TRUNNION ASSEMBLIES	LS	1	$1,027,680.00	$1,027,680.00
	SPAN OPERATING MACHINERY	LS	1	$2,169,432.00	$2,169,432.00
	SPAN LOCK MACHINERY	LS	1	$550,752.00	$550,752.00
	STEEL BALANCE PLATES	LS	1	$163,300.80	$163,300.80
	HVAC	LS	1	$87,500.00	$87,500.00
	MISCELLANEOUS ITEMS NOT INCLUDED (6% OF ITEMS ABOVE)			6%	$239,919.89
	ELECTRICAL				
	Utility Service and Standby Generator	LS	1	$854,001.60	$854,001.60
	Bridge Electrical Equipment	LS	1	$1,171,389.60	$1,171,389.60
	Bridge Control System	LS	1	$1,025,347.20	$1,025,347.20
	Traffic Control System	LS	1	$1,178,486.40	$1,178,486.40
	Submarine Cable System	LS	1	$1,226,970.00	$1,226,970.00
	Grounding and Bonding	LS	1	$83,630.40	$83,630.40
	Lightning Protection System	LS	1	$151,891.20	$151,891.20
	CCTV System	LS	1	$158,145.60	$158,145.60
	Commissioning and Testing	LS	1	$240,000.00	$240,000.00
	As-Built Documentation/Operations and Maintenance Manual	LS	1	$120,000.00	$120,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (6% OF ITEMS ABOVE)			6%	$372,591.72

Bridge Items =	$3,356,539.23
Mechanical Items =	$4,238,584.69
Electrical Items =	$6,582,453.72
Bridge Total =	**$3,356,540.00**
Mechanical Total =	**$4,238,585.00**
Electrical Total =	**$6,582,454.00**

Project:	Seabrook - Hampton TSL	Computed:	KLH	Date:	10/18/19
Project ID:	15904	Checked:	CPD	Date:	10/18/19
HDR Job #:	10116323	Type, Size & Location Study			

TYPE, SIZE & LOCATION (TSL) ROADWAY ESTIMATE
ALTERNATIVE 1 - BRIDGE REHABILITATION

Item No.	Item Description	Unit	Quantity	Unit Price	Cost
201.1	CLEARING AND GRUBBING (F)	A	1	$11,000.00	$11,000.00
203.1	COMMON EXCAVATION	CY	500	$15.00	$7,500.00
203.6	EMBANKMENT-IN-PLACE (F)	CY	750	$12.00	$9,000.00
214.	FINE GRADING	U	1	$15,000.00	$15,000.00
304.1	SAND (F)	CY	750	$23.00	$17,250.00
304.3	CRUSHED GRAVEL (F)	CY	1,000	$30.00	$30,000.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	TON	1,000	$147.00	$147,000.00
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	TON	30	$168.00	$5,040.00
417.	COLD PLANING BITUMINOUS SURFACES	SY	2,000	$5.00	$10,000.00
606.1455	BEAM GUARDRAIL (TERMINAL UNIT TYPE EAGRT, TL 2)	U	8	$900.00	$7,200.00
606.18001	31" W-BEAM GUARDRAIL WITH 8" OFFSET BLOCK (STEEL POST)	LF	348	$25.00	$8,700.00
608.24	4" CONCRETE SIDEWALK (F)	SY	850	$70.00	$59,500.00
609.01	STRAIGHT GRANITE CURB	LF	2,000	$45.00	$90,000.00
609.02	CURVED GRANITE CURB	LF	200	$45.00	$9,000.00
				SUBTOTAL A	**$426,190.00**
MISC.					
	MISC. ITEMS (PAVEMENT MARKINGS, LOAM, SEED, SIGNS) (15% OF SUBTOTAL A)	15%			$63,928.50
	UTILITY RELOCATION				$250,000.00
				SUBTOTAL B	**$490,118.50**
DRAINAGE					
	DRAINAGE ITEMS (20% OF SUBTOTAL B)	20%			$98,023.70
				SUBTOTAL C	**$588,142.20**
TCP					
501.1	TEMPORARY BRIDGE	U	1	$20,000,000.00	$20,000,000.00
606.417	PORTABLE CONCRETE BARRIER FOR TRAFFIC CONTROL	LF	2,600	$30.00	$78,000.00
618.61	UNIFORMED OFFICERS WITH VEHICLE	$	1	$5,000.00	$5,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	$20,000.00	$20,000.00
	MISC. TRAFFIC CONTROL (TEMP. BARRIER, VMS, IMPACT ATTEN.) (55% OF 619.1)	55%	1	$11,000.00	$11,000.00
	EROSION, SEDIMENT AND POLLUTION CONTROL, HAY BALES, SILT FENCE, TEMP. WATER POLLUTION CONTROL (10% DRAINAGE COST)	10%	1	$9,802.37	$9,802.37
				SUBTOTAL D	**$20,711,944.57**
ADDITIONAL ITEMS					
	ROADWAY CONTINGENCIES	0%			$0.00
	ADDITIONAL MISC. ITEMS (LANDSCAPING, FUEL ADJUSTMENT, ALTERATIONS)	5%			$1,035,597.23
				TOTAL	**$21,747,542**

APPENDIX H2

Alternative 2 – Replacement with Movable Bridge

Construction Cost Estimate

BY	JRP	DATE	11/20/19	SHEET	1	OF	2
CHKD BY	NDC	DATE	11/22/19	PROJECT	10116323		

SUBJECT *Seabrook Hampton TS&L - Bascule Bridge Steel Option*

Engineer's Estimate - Bascule Bridge Steel Option Approach Spans

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
207.3	UNCLASSIFIED CHANNEL EXCAVATION	CY	1500	$25.00	$37,500.00
209.201	GRANULAR BACKFILL (BRIDGE) (F)	CY	832	$35.00	$29,120.00
209.5	GRANULAR BACKFILL FOR MSE WALLS	CY	619	$45.00	$27,855.00
500.02	ACCESS FOR BRIDGE CONSTRUCTION	U	1	$2,500,000.00	$2,500,000.00
502	REMOVAL OF EXISTING BRIDGE STRUCTURE	U	1	$4,020,000.00	$4,020,000.00
503.201	COFFERDAMS	U	1	$2,595,000.00	$2,595,000.00
504.1	COMMON BRIDGE EXCAVATION (F)	CY	1040	$20.00	$20,800.00
504.2	ROCK BRIDGE EXCAVATION	CY	55	$200.00	$11,000.00
508	STRUCTURAL FILL	CY	105	$55.00	$5,775.00
509.1	MOBILIZATION AND DEMOBILIZ. OF DRILLED SHAFT DRILLING EQUIPMENT	U	1	$175,000.00	$175,000.00
509.2	DRILLED SHAFT	LF	4285	$1,100.00	$4,713,500.00
509.3	OBSTRUCTION REMOVAL	LF	215	$3,500.00	$752,500.00
509.4	ROCK SOCKET EXCAVATION	LF	300	$4,000.00	$1,200,000.00
509.51	CROSSHOLE SONIC LOGGING (CSL) TESTS	EA	30	$1,700.00	$51,000.00
509.52	THERMAL INTEGRITY PROFILING (TIP) TESTS	EA	30	$8,000.00	$240,000.00
509.62	DRILLED SHAFT REINFORCING STEEL, STAINLESS	LB	945900	$3.50	$3,310,650.00
510.1	PILE DRIVING EQUIPMENT	U	1	$40,000.00	$40,000.00
510.22	HIGH-STRAIN DYNAMIC TESTING	EA	6	$5,000.00	$30,000.00
510.61	FURNISHING & DRIVING STEEL BEARING PILES	LB	1487720	$0.75	$1,115,790.00
510.65	DRIVING-POINTS FOR STEEL BEARING PILES	EA	124	$250.00	$31,000.00
510.9	PILE SPLICES	EA	372	$500.00	$186,000.00
520.0102	CONCRETE CLASS AA (QC/QA) (F)	CY	1210	$1,400.00	$1,694,000.00
520.0302	CONCRETE CLASS AA APPROACH SLABS (QC/QA) (F)	CY	60	$400.00	$24,000.00
520.21	CONCRETE CLASS B, FOOTINGS (F)	CY	3190	$500.00	$1,595,000.00
520.70026	CONCRETE BRIDGE DECK (QC/QA)(PANEL OPTION)(F)	CY	2260	$1,200.00	$2,712,000.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	285	$75.00	$21,375.00
538.2	BARRIER MEMBRANE, PEEL AND STICK - VERTICAL SURFACES (F)	SY	45	$35.00	$1,575.00
544	REINFORCING STEEL (F)	LB	177540	$1.10	$195,294.00
544.2	REINFORCING STEEL, EPOXY COATED (F)	LB	120750	$1.50	$181,125.00
544.51	REINFORCING STEEL, STAINLESS (F)	LB	678000	$3.50	$2,373,000.00
548.21	ELASTOMERIC BEARING ASSEMBLIES (F)	EA	48	$3,000.00	$144,000.00
550.1	STRUCTURAL STEEL (F)	LB	3617090	$2.60	$9,404,434.00
561.1	PREFABRICATED STRIP SEAL EXPANSION JOINT (F)	LF	159	$1,000.00	$159,000.00
563.24	BRIDGE RAIL T4	LF	2486	$250.00	$621,500.00

565.242	BRIDGE APPROACH RAIL T4 (STEEL POSTS)	U	4	$7,500.00	$30,000.00
585.21	STONE FILL, CLASS B (BRIDGE)	CY	400	$45.00	$18,000.00
592.1	MECHANICALLY STABILIZED EARTH RETAINING WALL	SF	1625	$55.00	$89,375.00
593.211	GEOTEXTILE; SEPARATION CL.1, NON-WOVEN	SY	425	$2.00	$850.00
593.421	GEOTEXTILE; PERM CONTROL CL.2, NON-WOVEN	SY	400	$3.00	$1,200.00
1010.41	QUALITY CONTROL QUALITY ASSURANCE (QC/QA) FOR CONCRETE	$	1	$320,000.00	$320,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$1,220,346.54

STRUCTURE TOTAL = $41,898,564.54

BY	SS	DATE	11/11/19	SHEET 1	OF 1
CHKD BY	HFP	DATE	11/11/19	PROJECT	
SUBJECT	Seabrook Hampton TS&L - Alt 2 Movable Bridge Bascule Span				

Engineer's Estimate - Summary

	STRUCTURAL				
550.1	STRUCTURAL STEEL	LB	922180	$3.50	$3,227,630.00
	CONCRETE TREMIE	CY	3744	$300.00	$1,123,200.00
	HALF FILLED GRID DECK	SF	7872	$105.00	$826,569.45
544.2	REINFORCING STEEL, EPOXY COATED	LB	1169448	$1.50	$1,754,172.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	63	$75.00	$4,742.25
563.24	BRIDGE RAIL T4	LF	297	$250.00	$74,250.00
520.0102	CONCRETE CLASS AA (QC,QA) (F)	CY	1493	$1,400.00	$2,090,200.00
	ARCHITECTURE	LS	1	$700,000.00	$700,000.00
	FENDER	LS	1	$500,000.00	$500,000.00
503.201	COFFERDAM	LS	1	$20,000.00	$20,000.00
	BALANCE BLOCKS	LB	165632	$2.00	$331,264.00
	LIVE LOAD SHOES	LS	1	$18,750.00	$18,750.00
	DRILLED SHAFTS (Item 509.2, 509.3, 509.4, and 509.62)	LF	1716	$2,330.00	$3,998,280.00
	DRILLED SHAFTS (Item 509.51 and 509.52)	EA	12	$9,700.00	$116,400.00
520.70026	DECK CONCRETE	CY	7	$1,200.00	$8,400.00
520.0102	CONCRETE CLASS A	CY	272	$1,400.00	$380,800.00
520.21	CONCRETE CLASS B, FOOTING (F)	CY	1728	$500.00	$864,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$481,159.73
	MECHANICAL				
	TRUNNION ASSEMBLIES	LS	1	$1,196,928.00	$1,196,928.00
	SPAN OPERATING MACHINERY	LS	1	$2,494,464.00	$2,494,464.00
	SPAN LOCK MACHINERY	LS	1	$714,240.00	$714,240.00
	STEEL BALANCE PLATES	LS	1	$216,144.00	$216,144.00
	HVAC	LS	1	$87,500.00	$87,500.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$141,278.28
	ELECTRICAL				
	Utility Service and Standby Generator	LS	1	$1,103,093.00	$1,103,093.00
	Bridge Electrical Equipment	LS	1	$1,281,710.40	$1,281,710.40
	Bridge Control System	LS	1	$1,293,129.60	$1,293,129.60
	Traffic Control System	LS	1	$1,178,486.40	$1,178,486.40
	Submarine Cable System	LS	1	$1,300,410.00	$1,300,410.00
	Grounding and Bonding	LS	1	$83,630.40	$83,630.40
	Lightning Protection System	LS	1	$151,891.20	$151,891.20
	CCTV System	LS	1	$158,145.60	$158,145.60
	Commissioning and Testing	LS	1	$240,000.00	$240,000.00
	As-Built Documentation/Operations and Maintenance Manual	LS	1	$120,000.00	$120,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$207,314.90

Bridge Items =	$16,519,817.43
Mechanical Items =	$4,850,554.28
Electrical Items =	$7,117,811.50
Bridge Total =	**$16,519,818.00**
Mechanical Total =	**$4,850,555.00**
Electrical Total =	**$7,117,812.00**

Project:	Seabrook - Hampton TSL	Computed:	KLH	Date:	10/7/19
Project ID:	15904	Checked:	CPD	Date:	10/18/19
HDR Job #:	10116323	Type, Size & Location Study			

TYPE, SIZE & LOCATION (TSL) ROADWAY ESTIMATE
ALTERNATIVE 2 and 3 - WEST ALIGNMENT ROADWAY ESTIMATE

Item No.	Item Description	Unit	Quantity	Unit Price	Cost
201.1	CLEARING AND GRUBBING (F)	A	1	$11,000.00	$11,000.00
203.1	COMMON EXCAVATION	CY	2,000	$15.00	$30,000.00
203.6	EMBANKMENT-IN-PLACE (F)	CY	10,000	$12.00	$120,000.00
214.	FINE GRADING	U	1	$15,000.00	$15,000.00
304.1	SAND (F)	CY	1,200	$23.00	$27,600.00
304.3	CRUSHED GRAVEL (F)	CY	1,400	$30.00	$42,000.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	TON	3,250	$147.00	$477,750.00
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	TON	44	$168.00	$7,392.00
417.	COLD PLANING BITUMINOUS SURFACES	SY	8,000	$5.00	$40,000.00
606.1455	BEAM GUARDRAIL (TERMINAL UNIT TYPE EAGRT, TL 2)	U	8	$900.00	$7,200.00
606.18001	31" W-BEAM GUARDRAIL WITH 8" OFFSET BLOCK (STEEL POST)	LF	420	$25.00	$10,500.00
608.24	4" CONCRETE SIDEWALK (F)	SY	1,100	$70.00	$77,000.00
609.01	STRAIGHT GRANITE CURB	LF	3,900	$45.00	$175,500.00
609.02	CURVED GRANITE CURB	LF	200	$45.00	$9,000.00
				SUBTOTAL A	**$1,049,942.00**
MISC.					
	MISC. ITEMS (PAVEMENT MARKINGS, LOAM, SEED, SIGNS) (15% OF SUBTOTAL A)	15%			$157,491.30
	UTILITY RELOCATION				$250,000.00
				SUBTOTAL B	**$1,457,433.30**
DRAINAGE					
	DRAINAGE ITEMS (20% OF SUBTOTAL B)	20%			$241,486.66
				SUBTOTAL C	**$1,698,919.96**
TCP					
606.417	PORTABLE CONCRETE BARRIER FOR TRAFFIC CONTROL	LF	2,600	$30.00	$78,000.00
618.61	UNIFORMED OFFICERS WITH VEHICLE	$	1	$5,000.00	$5,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	$13,000.00	$13,000.00
	MISC. TRAFFIC CONTROL (TEMP. BARRIER, VMS, IMPACT ATTEN.) (55% OF 619.1)	55%	1	$7,150.00	$7,150.00
	EROSION, SEDIMENT AND POLLUTION CONTROL, HAY BALES, SILT FENCE, TEMP. WATER POLLUTION CONTROL (10% DRAINAGE COST)	10%	1	$24,148.67	$24,148.67
				SUBTOTAL D	**$1,826,218.63**
ADDITIONAL ITEMS					
	ROADWAY CONTINGENCIES	0%			$0.00
	ADDITIONAL MISC. ITEMS (LANDSCAPING, FUEL ADJUSTMENT, ALTERATIONS)	5%			$78,810.93
				TOTAL	**$1,905,030**

APPENDIX H3A

Alternative 3A – Fixed Bridge Steel Superstructure Option Construction Cost Estimate

Engineer's Estimate - Fixed Steel Bridge Summary

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
207.3	UNCLASSIFIED CHANNEL EXCAVATION	CY	2000	$25.00	$50,000.00
209.201	GRANULAR BACKFILL (BRIDGE) (F)	CY	992	$35.00	$34,720.00
209.5	GRANULAR BACKFILL FOR MSE WALLS	CY	2271	$45.00	$102,195.00
500.02	ACCESS FOR BRIDGE CONSTRUCTION	U	1	$2,500,000.00	$2,500,000.00
502	REMOVAL OF EXISTING BRIDGE STRUCTURE	U	1	$4,020,000.00	$4,020,000.00
503.201	COFFERDAMS	U	1	$2,595,000.00	$2,595,000.00
504.1	COMMON BRIDGE EXCAVATION (F)	CY	530	$20.00	$10,600.00
504.2	ROCK BRIDGE EXCAVATION	CY	30	$200.00	$6,000.00
508	STRUCTURAL FILL	CY	105	$55.00	$5,775.00
509.1	MOBILIZATION AND DEMOBILIZ. OF DRILLED SHAFT DRILLING EQUIPMENT	U	1	$175,000.00	$175,000.00
509.2	DRILLED SHAFT	LF	5145	$1,100.00	$5,659,500.00
509.3	OBSTRUCTION REMOVAL	LF	260	$3,500.00	$910,000.00
509.4	ROCK SOCKET EXCAVATION	LF	360	$4,000.00	$1,440,000.00
509.51	CROSSHOLE SONIC LOGGING (CSL) TESTS	EA	36	$1,700.00	$61,200.00
509.52	THERMAL INTEGRITY PROFILING (TIP) TESTS	EA	36	$8,000.00	$288,000.00
509.62	DRILLED SHAFT REINFORCING STEEL, STAINLESS	LB	1135350	$3.50	$3,973,725.00
510.1	PILE DRIVING EQUIPMENT	U	2	$40,000.00	$80,000.00
510.22	HIGH-STRAIN DYNAMIC TESTING	EA	4	$5,000.00	$20,000.00
510.61	FURNISHING & DRIVING STEEL BEARING PILES	LB	1487720	$0.75	$1,115,790.00
510.65	DRIVING-POINTS FOR STEEL BEARING PILES	EA	124	$250.00	$31,000.00
510.9	PILE SPLICES	EA	372	$500.00	$186,000.00
520.0102	CONCRETE CLASS AA (QC/QA) (F)	CY	1760	$1,400.00	$2,464,000.00
520.0302	CONCRETE CLASS AA APPROACH SLABS (QC/QA) (F)	CY	60	$400.00	$24,000.00
520.21	CONCRETE CLASS B, FOOTINGS (F)	CY	3780	$500.00	$1,890,000.00
520.70026	CONCRETE BRIDGE DECK (QC/QA)(PANEL OPTION)(F)	CY	2570	$1,200.00	$3,084,000.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	355	$75.00	$26,625.00
538.2	BARRIER MEMBRANE, PEEL AND STICK - VERTICAL SURFACES (F)	SY	50	$35.00	$1,750.00
544	REINFORCING STEEL (F)	LB	336170	$1.10	$369,787.00
544.2	REINFORCING STEEL, EPOXY COATED (F)	LB	135650	$1.50	$203,475.00
544.51	REINFORCING STEEL, STAINLESS (F)	LB	771000	$3.50	$2,698,500.00
548.21	ELASTOMERIC BEARING ASSEMBLIES (F)	EA	48	$3,000.00	$144,000.00
550.1	STRUCTURAL STEEL (F)	LB	3357320	$2.60	$8,729,032.00
561.2	PREFABRICATED MODULAR BRIDGE JOINT SYSTEM (F)	LF	106	$1,000.00	$106,000.00
563.24	BRIDGE RAIL T4	LF	2911	$250.00	$727,750.00

565.242	BRIDGE APPROACH RAIL T4 (STEEL POSTS)	U	4	$7,500.00	$30,000.00
585.21	STONE FILL, CLASS B (BRIDGE)	CY	400	$45.00	$18,000.00
592.1	MECHANICALLY STABILIZED EARTH RETAINING WALL	SF	4390	$55.00	$241,450.00
593.211	GEOTEXTILE; SEPARATION CL.1, NON-WOVEN	SY	425	$2.00	$850.00
593.421	GEOTEXTILE; PERM CONTROL CL.2, NON-WOVEN	SY	400	$3.00	$1,200.00
1010.41	QUALITY CONTROL QUALITY ASSURANCE (QC/QA) FOR CONCRETE	$	1	$400,000.00	$400,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$1,332,747.72
				BRIDGE TOTAL =	**$45,757,671.72**
	FENDER SYSTEM	U	1	$500,000.00	$500,000.00
				STRUCTURE TOTAL =	**$46,257,671.72**

Project:	Seabrook - Hampton TSL	Computed:	KLH	Date:	10/7/19
Project ID:	15904	Checked:	CPD	Date:	10/18/19
HDR Job #:	10116323	Type, Size & Location Study			

TYPE, SIZE & LOCATION (TSL) ROADWAY ESTIMATE
ALTERNATIVE 2 and 3 - WEST ALIGNMENT ROADWAY ESTIMATE

Item No.	Item Description	Unit	Quantity	Unit Price	Cost
201.1	CLEARING AND GRUBBING (F)	A	1	$11,000.00	$11,000.00
203.1	COMMON EXCAVATION	CY	2,000	$15.00	$30,000.00
203.6	EMBANKMENT-IN-PLACE (F)	CY	10,000	$12.00	$120,000.00
214.	FINE GRADING	U	1	$15,000.00	$15,000.00
304.1	SAND (F)	CY	1,200	$23.00	$27,600.00
304.3	CRUSHED GRAVEL (F)	CY	1,400	$30.00	$42,000.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	TON	3,250	$147.00	$477,750.00
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	TON	44	$168.00	$7,392.00
417.	COLD PLANING BITUMINOUS SURFACES	SY	8,000	$5.00	$40,000.00
606.1455	BEAM GUARDRAIL (TERMINAL UNIT TYPE EAGRT, TL 2)	U	8	$900.00	$7,200.00
606.18001	31" W-BEAM GUARDRAIL WITH 8" OFFSET BLOCK (STEEL POST)	LF	420	$25.00	$10,500.00
608.24	4" CONCRETE SIDEWALK (F)	SY	1,100	$70.00	$77,000.00
609.01	STRAIGHT GRANITE CURB	LF	3,900	$45.00	$175,500.00
609.02	CURVED GRANITE CURB	LF	200	$45.00	$9,000.00
				SUBTOTAL A	**$1,049,942.00**
MISC.					
	MISC. ITEMS (PAVEMENT MARKINGS, LOAM, SEED, SIGNS) (15% OF SUBTOTAL A)	15%			$157,491.30
	UTILITY RELOCATION				$250,000.00
				SUBTOTAL B	**$1,457,433.30**
DRAINAGE					
	DRAINAGE ITEMS (20% OF SUBTOTAL B)	20%			$241,486.66
				SUBTOTAL C	**$1,698,919.96**
TCP					
606.417	PORTABLE CONCRETE BARRIER FOR TRAFFIC CONTROL	LF	2,600	$30.00	$78,000.00
618.61	UNIFORMED OFFICERS WITH VEHICLE	$	1	$5,000.00	$5,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	$13,000.00	$13,000.00
	MISC. TRAFFIC CONTROL (TEMP. BARRIER, VMS, IMPACT ATTEN.) (55% OF 619.1)	55%	1	$7,150.00	$7,150.00
	EROSION, SEDIMENT AND POLLUTION CONTROL, HAY BALES, SILT FENCE, TEMP. WATER POLLUTION CONTROL (10% DRAINAGE COST)	10%	1	$24,148.67	$24,148.67
				SUBTOTAL D	**$1,826,218.63**
ADDITIONAL ITEMS					
	ROADWAY CONTINGENCIES	0%			$0.00
	ADDITIONAL MISC. ITEMS (LANDSCAPING, FUEL ADJUSTMENT, ALTERATIONS)	5%			$78,810.93
				TOTAL	**$1,905,030**

APPENDIX H3B
Alternative 3B – Fixed Bridge Concrete Superstructure Option Construction Cost Estimate

BY	JRP	DATE	10/31/19	SHEET	1	OF	2
CHKD BY	NDC	DATE	11/01/19	PROJECT	10116323		

SUBJECT *Seabrook Hampton TS&L - Alternative 3B Fixed Bridge Concrete*

Engineer's Estimate - Fixed Concrete Bridge Summary

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
207.3	UNCLASSIFIED CHANNEL EXCAVATION	CY	2000	$25.00	$50,000.00
209.201	GRANULAR BACKFILL (BRIDGE) (F)	CY	998	$35.00	$34,930.00
209.500	GRANULAR BACKFILL FOR MSE WALLS	CY	2271	$45.00	$102,195.00
500.02	ACCESS FOR BRIDGE CONSTRUCTION	U	1	$2,500,000.00	$2,500,000.00
502	REMOVAL OF EXISTING BRIDGE STRUCTURE	U	1	$4,020,000.00	$4,020,000.00
503.201	COFFERDAMS	U	1	$2,595,000.00	$2,595,000.00
504.1	COMMON BRIDGE EXCAVATION (F)	CY	540	$20.00	$10,800.00
504.2	ROCK BRIDGE EXCAVATION	CY	30	$200.00	$6,000.00
508	STRUCTURAL FILL	CY	105	$55.00	$5,775.00
509.1	MOBILIZATION AND DEMOBILIZ. OF DRILLED SHAFT DRILLING EQUIPMENT	U	1	$175,000.00	$175,000.00
509.2	DRILLED SHAFT	LF	5145	$1,100.00	$5,659,500.00
509.3	OBSTRUCTION REMOVAL	LF	260	$3,500.00	$910,000.00
509.4	ROCK SOCKET EXCAVATION	LF	360	$4,000.00	$1,440,000.00
509.51	CROSSHOLE SONIC LOGGING (CSL) TESTS	EA	36	$1,700.00	$61,200.00
509.52	THERMAL INTEGRITY PROFILING (TIP) TESTS	EA	36	$8,000.00	$288,000.00
509.62	DRILLED SHAFT REINFORCING STEEL, STAINLESS	LB	1135350	$3.50	$3,973,725.00
510.1	PILE DRIVING EQUIPMENT	U	2	$40,000.00	$80,000.00
510.22	HIGH-STRAIN DYNAMIC TESTING	EA	4	$5,000.00	$20,000.00
510.61	FURNISHING & DRIVING STEEL BEARING PILES	LB	0	$0.75	$0.00
510.65	DRIVING-POINTS FOR STEEL BEARING PILES	EA	124	$250.00	$31,000.00
510.9	PILE SPLICES	EA	124	$500.00	$62,000.00
520.0102	CONCRETE CLASS AA (QC/QA) (F)	CY	2220	$1,400.00	$3,108,000.00
520.0302	CONCRETE CLASS AA APPROACH SLABS (QC/QA) (F)	CY	60	$400.00	$24,000.00
520.21	CONCRETE CLASS B, FOOTINGS (F)	CY	3780	$500.00	$1,890,000.00
520.70026	CONCRETE BRIDGE DECK (QC/QA)(PANEL OPTION)(F)	CY	2570	$1,200.00	$3,084,000.00
528.1118	PRESTRESSED CONCRETE GIRDERS, NEBT 1800 (F)	LF	9100	$1,200.00	$10,920,000.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	455	$75.00	$34,125.00
538.2	BARRIER MEMBRANE, PEEL AND STICK - VERTICAL SURFACES (F)	SY	50	$35.00	$1,750.00
544	REINFORCING STEEL (F)	LB	343560	$1.10	$377,916.00
544.2	REINFORCING STEEL, EPOXY COATED (F)	LB	202230	$1.50	$303,345.00
544.51	REINFORCING STEEL, STAINLESS (F)	LB	771000	$3.50	$2,698,500.00
548.21	ELASTOMERIC BEARING ASSEMBLIES (F)	EA	56	$3,000.00	$168,000.00
550.191	TEMPORARY GIRDER SUPPORT SYSTEM	U	1	$765,000.00	$765,000.00
561.2	PREFABRICATED MODULAR BRIDGE JOINT SYSTEM (F)	LF	106	$1,000.00	$106,000.00

BY	JRP	DATE	10/31/19	SHEET	2	OF	2
CHKD BY	NDC	DATE	11/01/19	PROJECT	10116323		

SUBJECT *Seabrook Hampton TS&L - Alternative 3B Fixed Bridge Concrete*

563.24	BRIDGE RAIL T4	LF	2911	$250.00	$727,750.00
565.242	BRIDGE APPROACH RAIL T4 (STEEL POSTS)	U	4	$7,500.00	$30,000.00
585.21	STONE FILL, CLASS B (BRIDGE)	CY	400	$45.00	$18,000.00
592.1	MECHANICALLY STABILIZED EARTH RETAINING WALL	SF	4390	$55.00	$241,450.00
593.211	GEOTEXTILE; SEPARATION CL.1, NON-WOVEN	SY	425	$2.00	$850.00
593.421	GEOTEXTILE; PERM CONTROL CL.2, NON-WOVEN	SY	400	$3.00	$1,200.00
1010.41	QUALITY CONTROL QUALITY ASSURANCE (QC/QA) FOR CONCRETE	$	1	$440,000.00	$440,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$1,408,950.33
				STRUCTURE TOTAL =	**$48,373,961.33**
	FENDER SYSTEM	U	1	$500,000.00	$500,000.00
				STRUCTURE TOTAL =	**$48,873,961.33**

Project:	Seabrook - Hampton TSL	Computed:	KLH	Date:	10/7/19
Project ID:	15904	Checked:	CPD	Date:	10/18/19
HDR Job #:	10116323	Type, Size & Location Study			

TYPE, SIZE & LOCATION (TSL) ROADWAY ESTIMATE
ALTERNATIVE 2 and 3 - WEST ALIGNMENT ROADWAY ESTIMATE

Item No.	Item Description	Unit	Quantity	Unit Price	Cost
201.1	CLEARING AND GRUBBING (F)	A	1	$11,000.00	$11,000.00
203.1	COMMON EXCAVATION	CY	2,000	$15.00	$30,000.00
203.6	EMBANKMENT-IN-PLACE (F)	CY	10,000	$12.00	$120,000.00
214.	FINE GRADING	U	1	$15,000.00	$15,000.00
304.1	SAND (F)	CY	1,200	$23.00	$27,600.00
304.3	CRUSHED GRAVEL (F)	CY	1,400	$30.00	$42,000.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	TON	3,250	$147.00	$477,750.00
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	TON	44	$168.00	$7,392.00
417.	COLD PLANING BITUMINOUS SURFACES	SY	8,000	$5.00	$40,000.00
606.1455	BEAM GUARDRAIL (TERMINAL UNIT TYPE EAGRT, TL 2)	U	8	$900.00	$7,200.00
606.18001	31" W-BEAM GUARDRAIL WITH 8" OFFSET BLOCK (STEEL POST)	LF	420	$25.00	$10,500.00
608.24	4" CONCRETE SIDEWALK (F)	SY	1,100	$70.00	$77,000.00
609.01	STRAIGHT GRANITE CURB	LF	3,900	$45.00	$175,500.00
609.02	CURVED GRANITE CURB	LF	200	$45.00	$9,000.00
				SUBTOTAL A	**$1,049,942.00**
MISC.					
	MISC. ITEMS (PAVEMENT MARKINGS, LOAM, SEED, SIGNS) (15% OF SUBTOTAL A)	15%			$157,491.30
	UTILITY RELOCATION				$250,000.00
				SUBTOTAL B	**$1,457,433.30**
DRAINAGE					
	DRAINAGE ITEMS (20% OF SUBTOTAL B)	20%			$241,486.66
				SUBTOTAL C	**$1,698,919.96**
TCP					
606.417	PORTABLE CONCRETE BARRIER FOR TRAFFIC CONTROL	LF	2,600	$30.00	$78,000.00
618.61	UNIFORMED OFFICERS WITH VEHICLE	$	1	$5,000.00	$5,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	$13,000.00	$13,000.00
	MISC. TRAFFIC CONTROL (TEMP. BARRIER, VMS, IMPACT ATTEN.) (55% OF 619.1)	55%	1	$7,150.00	$7,150.00
	EROSION, SEDIMENT AND POLLUTION CONTROL, HAY BALES, SILT FENCE, TEMP. WATER POLLUTION CONTROL (10% DRAINAGE COST)	10%	1	$24,148.67	$24,148.67
				SUBTOTAL D	**$1,826,218.63**
ADDITIONAL ITEMS					
	ROADWAY CONTINGENCIES	0%			$0.00
	ADDITIONAL MISC. ITEMS (LANDSCAPING, FUEL ADJUSTMENT, ALTERATIONS)	5%			$78,810.93
				TOTAL	**$1,905,030**

APPENDIX H4

Alternative 4 – Twin Bridge Construction Cost Estimate

BY	JRP	DATE	11/22/19	SHEET	1	OF	1
CHKD BY	NDC	DATE	11/27/19	PROJECT	10116323		

SUBJECT *Seabrook Hampton Alt 4 Twin Bridge NB Approach Spans Rehab*

Engineer's Estimate - Summary

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
500.02	ACCESS FOR BRIDGE CONSTRUCTION	U	1	$2,000,000.00	$2,000,000.00
502	REMOVAL OF EXISTING BRIDGE STRUCTURE	U	1	$2,010,000.00	$2,010,000.00
520.0102	CONCRETE CLASS AA (QC/QA) (F)	CY	50	$1,400.00	$70,000.00
520.0302	CONCRETE CLASS AA APPROACH SLABS (QC/QA) (F)	CY	40	$400.00	$16,000.00
520.70026	CONCRETE BRIDGE DECK (QC/QA)(PANEL OPTION)(F)	CY	1410	$1,200.00	$1,692,000.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	10	$75.00	$750.00
538.2	BARRIER MEMBRANE, PEEL AND STICK - VERTICAL SURFACES (F)	SY	25	$35.00	$875.00
544	REINFORCING STEEL (F)	LB	0	$1.10	$0.00
544.2	REINFORCING STEEL, EPOXY COATED (F)	LB	14390	$1.50	$21,585.00
544.51	REINFORCING STEEL, STAINLESS STEEL (F)	LB	423000	$3.50	$1,480,500.00
548.21	ELASTOMERIC BEARING ASSEMBLIES (F)	EA	56	$3,000.00	$168,000.00
550.1	STRUCTURAL STEEL (F)	LB	4056100	$2.60	$10,545,860.00
561.2	PREFABRICATED MODULAR BRIDGE JOINT SYSTEM (F)	LF	75	$1,000.00	$75,000.00
563.23	BRIDGE RAIL T3	LF	1191	$175.00	$208,425.00
563.24	BRIDGE RAIL T4	LF	1191	$250.00	$297,750.00
565.232	BRIDGE APPROACH RAIL T3 (STEEL POSTS)	U	2	$7,500.00	$15,000.00
565.242	BRIDGE APPROACH RAIL T4 (STEEL POSTS)	U	2	$7,500.00	$15,000.00
585.21	STONE FILL, CLASS B (BRIDGE)	CY	300	$45.00	$13,500.00
593.211	GEOTEXTILE; SEPARATION CL.1, NON-WOVEN	SY	325	$2.00	$650.00
593.421	GEOTEXTILE; PERM CONTROL CL.2, NON-WOVEN	SY	300	$3.00	$900.00
1010.41	QUALITY CONTROL QUALITY ASSURANCE (QC/QA) FOR CONCRETE	$	1	$130,000.00	$130,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (6% OF ITEMS ABOVE)			6%	$1,125,707.70

STRUCTURE TOTAL = $19,887,502.70

BY	*HFP*	DATE	*11/27/19*	SHEET 1	OF 2
CHKD BY	*SS*	DATE	*11/27/19*	SUBJECT	
SUBJECT	*Seabrook Hampton TS&L - Alternative 4 Twin Bridge NB Bascule Span Rehab*				

Engineer's Estimate - Summary

	STRUCTURAL				
550.1	STRUCTURAL STEEL	LB	301493	$3.50	$1,055,226.86
	CONCRETE REMOVAL	CY	22	$800.00	$17,600.00
	HALF FILLED GRID DECK	SF	2295	$105.00	$240,948.75
544.2	REINFORCING STEEL, EPOXY COATED	LB	49755	$1.50	$74,632.50
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	49	$75.00	$3,654.00
563.24	BRIDGE RAIL T4	LF	72	$250.00	$17,875.00
520.0102	CONCRETE CLASS AA (QC,QA) (F)	CY	15	$1,400.00	$21,000.00
	FENDER	LS	1	$500,000.00	$500,000.00
	ARCHITECTURE	LS	1	$200,000.00	$200,000.00
	BALANCE BLOCKS	LB	60267	$2.00	$120,534.38
	LIVE LOAD SHOES	LS	1	$18,750.00	$18,750.00
	BRIDGE RAIL T3	LF	72	$250.00	$17,875.00
	NEW PIER CONCRETE	CY	15	$1,400.00	$21,000.00
	CONCRETE CLASS _ FOR SIDEWALKS AND CURBS	CY	18	$1,200.00	$21,600.00
	CONCRETE CLASS _ FOR SLABS, WALLS, STAIRS AND WALKWAYS	CY	5	$1,400.00	$7,000.00
	CONCRETE CLASS FOR COUNTERWEIGHT	CY	45	$500.00	$22,321.18
	MISCELLANEOUS ITEMS NOT INCLUDED (6% OF ITEMS ABOVE)			6%	$141,601.06
	MECHANICAL				
	Trunnion Assemblies	LS	1	$973,920.00	$973,920.00
	Span Operating Machinery	LS	1	$1,991,088.00	$1,991,088.00
	Span Lock Machinery	LS	1	$500,208.00	$500,208.00
	Steel Balance Plates	LS	1	$114,072.00	$114,072.00
	HVAC	LS	1	$87,500.00	$87,500.00
	MISCELLANEOUS ITEMS NOT INCLUDED (6% OF ITEMS ABOVE)			6%	$220,007.28
	ELECTRICAL				
	Utility and Standby Generator	LS	1	$551,546.40	$551,546.40
	Bridge Electrical Equipment	LS	1	$1,115,904.00	$1,115,904.00
	Bridge Control System	LS	1	$718,564.80	$718,564.80
	Traffic Control System	LS	1	$1,064,464.80	$1,064,464.80
	Submarine Cable System *	LS	1	$620,205.00	$620,205.00
	Grounding and Bonding	LS	1	$59,630.40	$59,630.40
	Lightning Protection	LS	1	$78,945.60	$78,945.60
	CCTV System	LS	1	$97,430.40	$97,430.40
	Commissioning & Start Up	LS	1	$150,000.00	$150,000.00
	As-Built Documentation/ Operation & Maintenace Manual	LS	1	$60,000.00	$60,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (6% OF ITEMS ABOVE)			6%	$271,001.48

Bridge Items =	$2,501,618.73
Mechanical Items =	$3,886,795.28
Electrical Items =	$4,787,692.88
Bridge Total =	**$2,501,619.00**
Mechanical Total =	**$3,886,796.00**
Electrical Total =	**$4,787,693.00**

BY	JRP	DATE	11/22/19	SHEET	1	OF	2
CHKD BY	NDC	DATE	11/27/19	PROJECT	10116323		

SUBJECT *Seabrook Hampton TS&L - Alternative 4 Twin Bridge SB New Bridge*

Engineer's Estimate - Twin Bridge SB Approach Spans

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
207.3	UNCLASSIFIED CHANNEL EXCAVATION	CY	1200	$25.00	$30,000.00
209.201	GRANULAR BACKFILL (BRIDGE) (F)	CY	874	$35.00	$30,590.00
209.5	GRANULAR BACKFILL FOR MSE WALLS	CY	386	$45.00	$17,370.00
500.02	ACCESS FOR BRIDGE CONSTRUCTION	U	1	$2,500,000.00	$2,500,000.00
503.201	COFFERDAMS	U	1	$866,000.00	$866,000.00
504.1	COMMON BRIDGE EXCAVATION (F)	CY	1375	$20.00	$27,500.00
504.2	ROCK BRIDGE EXCAVATION	CY	70	$200.00	$14,000.00
508	STRUCTURAL FILL	CY	75	$55.00	$4,125.00
509.1	MOBILIZATION AND DEMOBILIZ. OF DRILLED SHAFT DRILLING EQUIPMENT	U	1	$175,000.00	$175,000.00
509.2	DRILLED SHAFT	LF	2860	$1,100.00	$3,146,000.00
509.3	OBSTRUCTION REMOVAL	LF	143	$3,500.00	$500,500.00
509.4	ROCK SOCKET EXCAVATION	LF	200	$4,000.00	$800,000.00
509.51	CROSSHOLE SONIC LOGGING (CSL) TESTS	EA	20	$1,700.00	$34,000.00
509.52	THERMAL INTEGRITY PROFILING (TIP) TESTS	EA	20	$8,000.00	$160,000.00
509.62	DRILLED SHAFT REINFORCING STEEL, STAINLESS	LB	630900	$3.50	$2,208,150.00
510.1	PILE DRIVING EQUIPMENT	U	1	$40,000.00	$40,000.00
510.22	HIGH-STRAIN DYNAMIC TESTING	EA	6	$5,000.00	$30,000.00
510.61	FURNISHING & DRIVING STEEL BEARING PILES	LB	1271760	$0.75	$953,820.00
510.65	DRIVING-POINTS FOR STEEL BEARING PILES	EA	106	$250.00	$26,500.00
510.9	PILE SPLICES	EA	318	$500.00	$159,000.00
520.0102	CONCRETE CLASS AA (QC/QA) (F)	CY	690	$1,400.00	$966,000.00
520.0302	CONCRETE CLASS AA APPROACH SLABS (QC/QA) (F)	CY	40	$400.00	$16,000.00
520.21	CONCRETE CLASS B, FOOTINGS (F)	CY	2040	$500.00	$1,020,000.00
520.70026	CONCRETE BRIDGE DECK (QC/QA)(PANEL OPTION)(F)	CY	1483	$1,200.00	$1,779,600.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	240	$75.00	$18,000.00
538.2	BARRIER MEMBRANE, PEEL AND STICK - VERTICAL SURFACES (F)	SY	40	$35.00	$1,400.00
544	REINFORCING STEEL (F)	LB	79250	$1.10	$87,175.00
544.2	REINFORCING STEEL, EPOXY COATED (F)	LB	63400	$1.50	$95,100.00
544.51	REINFORCING STEEL, STAINLESS (F)	LB	444900	$3.50	$1,557,150.00
548.21	ELASTOMERIC BEARING ASSEMBLIES (F)	EA	32	$3,000.00	$96,000.00
550.1	STRUCTURAL STEEL (F)	LB	2933430	$2.60	$7,626,918.00
561.1	PREFABRICATED STRIP SEAL EXPANSION JOINT (F)	LF	101	$1,000.00	$101,000.00
563.23	BRIDGE RAIL T3	LF	1194	$175.00	$208,950.00
563.24	BRIDGE RAIL T4	LF	1351	$250.00	$337,750.00

BY	JRP	DATE	11/22/19	SHEET	1	OF	2
CHKD BY	NDC	DATE	11/27/19	PROJECT	10116323		

SUBJECT *Seabrook Hampton TS&L - Alternative 4 Twin Bridge SB New Bridge*

565.232	BRIDGE APPROACH RAIL T3 (STEEL POSTS)	U	2	$7,500.00	$15,000.00
565.242	BRIDGE APPROACH RAIL T4 (STEEL POSTS)	U	2	$7,500.00	$15,000.00
585.21	STONE FILL, CLASS B (BRIDGE)	CY	300	$45.00	$13,500.00
592.1	MECHANICALLY STABILIZED EARTH RETAINING WALL	SF	1290	$55.00	$70,950.00
593.211	GEOTEXTILE; SEPARATION CL.1, NON-WOVEN	SY	315	$2.00	$630.00
593.421	GEOTEXTILE; PERM CONTROL CL.2, NON-WOVEN	SY	300	$3.00	$900.00
1010.41	QUALITY CONTROL QUALITY ASSURANCE (QC/QA) FOR CONCRETE	$	1	$200,000.00	$200,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$778,487.34

STRUCTURE TOTAL = $26,728,065.34

BY	SS	DATE	11/27/19	SHEET 1	OF 2
CHKD BY	HFP	DATE		SUBJECT	
SUBJECT	Seabrook Hampton TS&L - Alternative 4 Twin Bridge SB New Bascule Span				

Engineer's Estimate - Summary

	STRUCTURAL				
	STRUCTURAL STEEL	LB	560240	$3.50	$1,960,840.00
	COCNRETE TREMIE	CY	2449	$300.00	$734,700.00
	HALF FILLED GRID DECK	SF	3484	$105.00	$365,820.00
544.2	REINFORCING STEEL, EPOXY COATED	LB	379200	$1.50	$568,800.00
534.3	WATER REPELLENT (SILANE/SILOXANE)	GAL	68	$75.00	$5,075.25
563.24	BRIDGE RAIL T4	LF	208	$250.00	$52,000.00
520.0102	CONCRETE CLASS AA (QC,QA) (F)	CY	1004	$1,400.00	$1,405,600.00
	ARCHITECTURE	LS	1	$350,000.00	$350,000.00
	FENDER	LS	1	$500,000.00	$500,000.00
	COFFERDAM	LS	1	$20,000.00	$20,000.00
	BALANCE BLOCKS	LB	68376	$2.00	$136,751.84
	LIVE LOAD SHOES	LS	1	$18,750.00	$18,750.00
	DRILLED SHAFTS (Item 509.2, 509.3, 509.4, and 509.62)	LF	1287	$2,330.00	$2,998,710.00
	DRILLED SHAFTS (Item 509.51 and 509.52)	LF	9	$9,700.00	$87,300.00
	HVAC	LS	1	$87,500.00	$87,500.00
	DECK CONCRETE CLASS B	CY	4	$1,200.00	$4,800.00
520.1	CONCRETE CLASS A	CY	136	$1,400.00	$190,400.00
520.21	CONCRETE CLASS B, FOOTING (F)	CY	1130	$500.00	$565,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$301,561.41
	MECHANICAL				
	Trunnion Assemblies	LS	1	$1,027,680.00	$1,027,680.00
	Span Operating Machinery	LS	1	$2,169,432.00	$2,169,432.00
	Span Lock Machinery	LS	1	$550,752.00	$550,752.00
	Steel Balance Plates	LS	1	$163,300.80	$163,300.80
	HVAC	LS	1	$87,500.00	$87,500.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$119,959.94
	ELECTRICAL				
	Utility and Standby Generator	LS	1	$551,546.40	$551,546.40
	Bridge Electrical Equipment	LS	1	$1,115,904.00	$1,115,904.00
	Bridge Control System	LS	1	$718,564.80	$718,564.80
	Traffic Control System	LS	1	$1,064,464.80	$1,064,464.80
	Submarine Cable System *	LS	1	$620,205.00	$620,205.00
	Grounding and Bonding	LS	1	$59,630.40	$59,630.40
	Lightning Protection	LS	1	$78,945.60	$78,945.60
	CCTV System	LS	1	$97,430.40	$97,430.40
	Commissioning & Start Up	LS	1	$150,000.00	$150,000.00
	As-Built Documentation/ Operation & Maintenace Manual	LS	1	$60,000.00	$60,000.00
	MISCELLANEOUS ITEMS NOT INCLUDED (3% OF ITEMS ABOVE)			3%	$135,500.74

Bridge Items =	$10,353,608.50
Mechanical Items =	$4,118,624.74
Electrical Items =	$4,652,192.14
Bridge Total =	**$10,353,609.00**
Mechanical Total =	**$4,118,625.00**
Electrical Total =	**$4,652,193.00**

Project:	Seabrook - Hampton TSL	Computed:	KLH	Date:	12/1/19
Project ID:	15904	Checked:	PJL	Date:	12/10/19
HDR Job #:	10116323	Type, Size & Location Study			

TYPE, SIZE & LOCATION (TSL) ROADWAY ESTIMATE
ALTERNATIVE 4 - TWIN BRIDGE

Item No.	Item Description	Unit	Quantity	Unit Price	Cost
201.1	CLEARING AND GRUBBING (F)	A	1	$11,000.00	$11,000.00
203.1	COMMON EXCAVATION	CY	500	$15.00	$7,500.00
203.6	EMBANKMENT-IN-PLACE (F)	CY	1,400	$12.00	$16,800.00
214.	FINE GRADING	U	1	$15,000.00	$15,000.00
304.1	SAND (F)	CY	2,200	$23.00	$50,600.00
304.3	CRUSHED GRAVEL (F)	CY	2,500	$30.00	$75,000.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	TON	3,700	$147.00	$543,900.00
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	TON	50	$168.00	$8,400.00
417.	COLD PLANING BITUMINOUS SURFACES	SY	6,000	$5.00	$30,000.00
606.1455	BEAM GUARDRAIL (TERMINAL UNIT TYPE EAGRT, TL 2)	U	4	$900.00	$3,600.00
606.18001	31" W-BEAM GUARDRAIL WITH 8" OFFSET BLOCK (STEEL POST)	LF	888	$25.00	$22,200.00
608.24	4" CONCRETE SIDEWALK (F)	SY	2,000	$70.00	$140,000.00
609.01	STRAIGHT GRANITE CURB	LF	3,300	$45.00	$148,500.00
609.02	CURVED GRATNITE CURB	LF	150	$45.00	$6,750.00
				SUBTOTAL A	**$1,079,250.00**
MISC.					
	MISC. ITEMS (PAVEMENT MARKINGS, LOAM, SEED, SIGNS) (15% OF SUBTOTAL A)	15%			$161,887.50
	ASSUMED UTILITY RELOCATION COSTS				$500,000.00
				SUBTOTAL B	**$1,741,137.50**
DRAINAGE					
	DRAINAGE ITEMS (20% OF SUBTOTAL B)	20%			$248,227.50
				SUBTOTAL C	**$1,989,365.00**
TCP					
606.417	PORTABLE CONCRETE BARRIER FOR TRAFFIC CONTROL	LF	2,600	$30.00	$78,000.00
618.61	UNIFORMED OFFICERS WITH VEHICLE	$	1	$5,000.00	$5,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	$20,000.00	$20,000.00
	MISC. TRAFFIC CONTROL (TEMP. BARRIER, VMS, IMPACT ATTEN.) (55% OF 619.1)	55%	1	$11,000.00	$11,000.00
	EROSION, SEDIMENT AND POLLUTION CONTROL, HAY BALES, SILT FENCE, TEMP. WATER POLLUTION CONTROL (10% DRAINAGE COST)	10%	1	$24,822.75	$24,822.75
				SUBTOTAL D	**$2,128,187.75**
ADDITIONAL ITEMS					
	ROADWAY CONTINGENCIES	0%			$0.00
	ADDITIONAL MISC. ITEMS (LANDSCAPING, FUEL ADJUSTMENT, ALTERATIONS)	5%			$81,409.39
				TOTAL	**$2,209,597**

APPENDIX I
Life Cycle Cost Estimates

BY *JRP / PJL*	DATE *12/03/19*	SHEET 1	OF 1
CHKD BY *NDC*	DATE *12/12/19*	PROJECT *10116323*	
UPDATED *JGS*	DATE *03/25/20*		

SUBJECT *Seabrook Hampton TS&L - Summary of Life Cycle Cost Analysis*

SUMMARY OF SEABROOK HAMPTON TSL LIFE CYCLE COST ANALYSIS

Alternative	Initial Construction Cost	Life Cycle Cost (Constant Dollars)	Life Cycle Cost (Present Day Dollars)
Alternative 1: Bridge Rehabilitation	$84,799,000	$155,677,000	$97,299,000
Alternative 2: Movable Bascule Bridge Replacement	$100,249,000	$180,630,000	$114,067,000
Alternative 3A: Fixed Bridge Replacement - Steel	$66,789,000	$84,647,000	$70,998,000
Alternative 3B: Fixed Bridge Replacement - Concrete	$70,417,000	$89,122,000	$73,352,000
Alternative 4: Twin Bridge	$109,726,000	$211,998,000	$127,248,000

APPENDIX I1

Alternative 1 – Bridge Rehabilitation Life Cycle Cost Estimates

Project:	Hampton Harbor Btridge	Computed:	JRP	Date:	12/2/2019
Subject:	Alt 1 - Rehabilitation Alternative	Checked:	NDC	Date:	12/12/2019
Task:	Life Cycle Cost Analysis	Updated:	JGS	Date:	3/25/2020
Job:	10116323				

Hampton Harbor Bridge Rehabilitation

Life Cycle Cost Analysis Input - Rehabilitation Option

Discount Rate	4%	Typically between 3% and 5%, per FHWA LCCA Primer. Enter number as integer.
Start Year - Bridge Replacement	0	Input start year.
Useful Life (Years)	100	Between 0 and 100 years. Useful life is counted from Start Year, not Discount Year.
Discount Year	0	Year 0 if counted years are utilized. 2015 if calendar years are utilized.
Approach Span Deck Area (sq.ft.)	59678	
Bascule Span Deck Area (sq.ft.)	3445	

Life Cycle Cost Analysis Summary - Rehabilitation Option

	Total Cost (Constant Year 0$)	Total Cost (Present Value $)
Initial Capital Costs	$ 84,779,000	$ 84,779,000
Regular Maintenance, Inspection and Bridge Operation	$ 26,868,630	$ 6,570,447
Maintenance and Rehabilitation of Structural Components	$ 20,641,785	$ 2,961,244
Maintenance and Rehabilitation of Mechanical/Electrical Systems	$ 23,387,386	$ 2,988,235
Total	**$ 155,676,801**	**$ 97,298,926**

Life Cycle Cost Analysis Breakdown - Rehabilitation Option

No.	Description	Cost Per Occurrence (Constant Dollars)	Recurrence Interval	Start Year	Subsequent Years of Occurance through 100									Total Cost (Constant Year 0$)	Total Cost (Present Value $)
1	Capital Expenditure - Rehabilitation of Existing Structure	$ 84,779,000	99	0	-	-	-	-	-	-	-	-	-	$ 84,779,000	$ 84,779,000
Regular Maintenance, Inspection and Bridge Operation															
2	Bridge Cleaning ($0.025/sf Approach Spans; $0.025/sf Bascule Span)	$ 1,578	1	1	2	3	4	6	7	8	9	11	>>>>	$ 157,808	$ 38,671
3	Seal Substructure ($0.025/sf Appr; $0.025/sf Bascule)	$ 1,578	1	1	2	3	4	6	7	8	9	11	>>>>	$ 157,808	$ 38,671
4	Clean Bridge Drains ($0.025/sf Appr; $0.025/sf Bascule)	$ 1,578	1	1	2	3	4	6	7	8	9	11	>>>>	$ 157,808	$ 38,671
5	Clear Vegetation ($0.025/sf Appr; $0.025/sf Bascule)	$ 1,578	1	1	2	3	4	6	7	8	9	11	>>>>	$ 157,808	$ 38,671
6	Navigation Lighting Maintenance	$ 6,400	2	2	4	6	8	12	14	16	18	22	>>>>	$ 313,600	$ 76,270
7	Highway Lighting Maintenance	$ 6,800	6	6	12	18	24	30	36	42	48	54	>>>>	$ 108,800	$ 25,036
8	Bridge Inspection of Approaches	$ 10,100	2	2	4	6	8	10	12	14	16	18	>>>>	$ 505,000	$ 121,324
9	Bridge Inspection of Bascule (Structural, Mechanical, Electrical)	$ 37,800	2	2	4	6	8	10	12	14	16	18	>>>>	$ 1,890,000	$ 454,063
10	Monthly Maintenance of Bridge Mechanical Components (Annualized)	$ 19,200	1	1	2	3	4	5	6	7	8	9	>>>>	$ 1,920,000	$ 470,496
11	Miscellaneous M&E Maintenance	$ 55,000	1	1	2	3	4	5	6	7	8	9	>>>>	$ 5,500,000	$ 1,347,775
12	Moveable Bridge Operator Costs	$ 160,000	1	1	2	3	4	5	6	7	8	9	>>>>	$ 16,000,000	$ 3,920,800
Maintenance and Rehabilitation of Structural Components															
13	Joint Replacement ($10/sf Approach Spans; $40/sf Bascule Span)	$ 734,580	20	20	40	60	80	100	-	-	-	-	-	$ 3,672,900	$ 604,501
14	Deck Repairs (Concrete Patching) ($10/sf Appr; $40/sf Bascule)	$ 734,580	20	20	40	60	80	100	-	-	-	-	-	$ 3,672,900	$ 604,501
15	Deck Replacement ($20/sf Appr; $70/sf Bascule)	$ 1,434,710	60	60	-	-	-	-	-	-	-	-	-	$ 1,434,710	$ 136,384
16	Zinc Coating Touch-Up of Structural Steel ($0.50/sf Appr; $2/sf Bascule)	$ 36,729	20	20	40	60	80	100	-	-	-	-	-	$ 183,645	$ 30,225
17	Bridge Railing Replacement ($10/sf Appr; $40/sf Bascule)	$ 734,580	60	60	-	-	-	-	-	-	-	-	-	$ 734,580	$ 69,829
18	Bridge Coping Replacement ($10/sf Appr; $40/sf Bascule)	$ 734,580	60	60	-	-	-	-	-	-	-	-	-	$ 734,580	$ 69,829
19	Replace Navigation Lighting	$ 23,200	10	10	20	30	40	50	60	70	80	90	>>>>	$ 232,000	$ 47,352
20	Substructure Repairs ($10/sf Appr; $40/sf Bascule)	$ 734,580	25	25	50	75	100	-	-	-	-	-	-	$ 2,938,320	$ 432,237
21	Fender System Repairs	$ 38,500	10	10	20	30	40	50	60	70	80	90	>>>>	$ 385,000	$ 78,580
22	Structural Steel Repairs	$ 2,980,250	60	60	-	-	-	-	-	-	-	-	-	$ 2,980,250	$ 283,304
23	Bearing Rehabilitation/Replacement ($10/sf Appr; $40/sf Bascule)	$ 734,580	20	20	40	60	80	100	-	-	-	-	-	$ 3,672,900	$ 604,501
Maintenance and Rehabilitation of Mechanical/Electrical Systems															
24	Span Lock Repair/Replacement	$ 500,210	20	20	40	60	80	100	-	-	-	-	-	$ 2,501,050	$ 411,633
25	Operation Machinery Intermediate Repairs	$ 750,000	25	25	50	75	100	-	-	-	-	-	-	$ 3,000,000	$ 441,310
26	Operation Machinery Rehabilitation	$ 1,500,000	50	50	100	-	-	-	-	-	-	-	-	$ 3,000,000	$ 240,769
27	Repair Trunnion Bearings	$ 140,000	50	50	100	-	-	-	-	-	-	-	-	$ 280,000	$ 22,472
28	Control System Repairs	$ 1,293,200	20	20	40	60	80	100	-	-	-	-	-	$ 6,466,000	$ 1,064,201
29	Live Load Shoe Replacement	$ 20,000	25	25	50	75	100	-	-	-	-	-	-	$ 80,000	$ 11,768
30	Submarine Cable Replacement	$ 1,240,410	50	50	100	-	-	-	-	-	-	-	-	$ 2,480,820	$ 199,102
31	Bridge Electrical System Intermediate Repairs	$ 557,950	25	25	75	-	-	-	-	-	-	-	-	$ 1,115,900	$ 238,747
32	Bridge Electrical System Rehabilitation	$ 2,231,808	50	50	100	-	-	-	-	-	-	-	-	$ 4,463,616	$ 358,233

Total	$ 155,676,801	$ 97,298,926
SAY =>	$ 155,677,000	$ 97,299,000
	CONSTANT $	**PRESENT VALUE**

APPENDIX I2

Alternative 2 – Replacement with Movable Bridge

Life Cycle Cost Estimates

Project:	15904 Hampton Harbor Bridge	Computed:	PJL	Date:	11/27/2019
Subject:	Alternative 2 Movable Bridge	Checked:	NDC	Date:	12/12/2019
Task:	Life Cycle Cost Analysis	Updated:	JGS	Date:	3/25/2020
Job:	207354				

Hampton Harbor Bridge Replacement

Life Cycle Cost Analysis Input

Discount Rate	4%	Typically between 3% and 5%, per FHWA LCCA Primer. Enter number as integer.
Start Year - Bridge Replacement	0	Input start year.
Useful Life (Years)	100	Between 0 and 100 years. Useful life is counted from Start Year, not Discount Year.
Discount Year	0	Year 0 if counted years are utilized. 2015 if calendar years are utilized.
Approach Span Deck Area (sq.ft.)	60685	
Bascule Span Deck Area (sq.ft.)	8008	

Life Cycle Cost Analysis Summary

	Total Cost (Constant Year 0$)	Total Cost (Present Value $)
Initial Capital Costs	$ 100,249,000	$ 100,249,000
Regular Maintenance, Inspection and Bridge Operation	$ 27,073,013	$ 6,617,677
Maintenance and Rehabilitation of Structural Components	$ 27,767,723	$ 3,882,922
Maintenance and Rehabilitation of Mech/Elec Components	$ 25,539,900	$ 3,316,539
Total	**$ 180,629,635**	**$ 114,066,138**

Life Cycle Cost Analysis Breakdown

No.	Description	Cost Per Occurrence (Constant Dollars)	Recurrence Interval	Start Year	Subsequent Years of Occurance through 100									Total Cost (Constant Year 0$)	Total Cost (Present Value $)
					1	2	3	4	5	6	7	8	9		
1	Capital Expenditure - Bridge Replacement	$ 100,249,000	99	0	-	-	-	-	-	-	-	-	-	$ 100,249,000	$ 100,249,000
Regular Maintenance, Inspection and Bridge Operation															
2	Bridge Cleaning ($0.025/sf Approach Spans; $0.025/sf Bascule Span)	$ 1,717	1	1	2	3	4	6	7	8	9	11	>>>>	$ 170,015	$ 41,920
3	Seal Substructure ($0.025/sf Appr; $0.025/sf Bascule)	$ 1,717	1	1	2	3	4	6	7	8	9	11	>>>>	$ 171,733	$ 42,083
4	Clean Bridge Drains ($0.025/sf Appr; $0.025/sf Bascule)	$ 1,717	1	1	2	3	4	6	7	8	9	11	>>>>	$ 171,733	$ 42,083
5	Clear Vegetation ($0.025/sf Appr; $0.025/sf Bascule)	$ 1,717	1	1	2	3	4	6	7	8	9	11	>>>>	$ 171,733	$ 42,083
6	Navigation Lighting Maintenance	$ 6,400	2	2	4	6	8	12	14	16	18	22	>>>>	$ 320,000	$ 76,878
7	Highway Lighting Maintenance	$ 15,800	6	6	12	18	24	30	36	42	48	54	>>>>	$ 252,800	$ 58,172
8	Bridge Inspection of Approaches	$ 10,100	2	2	4	6	8	10	12	14	16	18	>>>>	$ 505,000	$ 121,324
9	Bridge Inspection of Bascule (Structural, Mechanical, Electrical)	$ 37,800	2	2	4	6	8	10	12	14	16	18	>>>>	$ 1,890,000	$ 454,063
10	Monthly Maintenance of Bridge Mechanical Components (Annualized)	$ 19,200	1	1	2	3	4	5	6	7	8	9	>>>>	$ 1,920,000	$ 470,496
11	Miscellaneous M&E Maintenance	$ 55,000	1	1	2	3	4	5	6	7	8	9	>>>>	$ 5,500,000	$ 1,347,775
12	Moveable Bridge Operator Costs	$ 160,000	1	1	2	3	4	5	6	7	8	9	>>>>	$ 16,000,000	$ 3,920,800
Maintenance and Rehabilitation of Structural Components															
13	Joint Replacement ($10/sf Approach Spans; $40/sf Bascule Span)	$ 927,170	20	20	40	60	80	100	-	-	-	-	-	$ 4,635,850	$ 762,987
14	Deck Repairs (Concrete Patching) ($10/sf Appr; $40/sf Bascule)	$ 927,170	20	20	40	60	80	100	-	-	-	-	-	$ 4,635,850	$ 762,987
15	Deck Replacement ($20/sf Appr; $70/sf Bascule)	$ 1,774,260	60	60	-	-	-	-	-	-	-	-	-	$ 1,774,260	$ 168,662
16	Zinc Coating Touch-Up of Structural Steel ($0.50/sf Appr; $2/sf Bascule)	$ 46,359	20	20	40	60	80	100	-	-	-	-	-	$ 231,793	$ 38,149
17	Bridge Railing Replacement ($10/sf Appr; $40/sf Bascule)	$ 927,170	60	60	-	-	-	-	-	-	-	-	-	$ 927,170	$ 88,137
18	Bridge Coping Replacement ($10/sf Appr; $40/sf Bascule)	$ 927,170	60	60	-	-	-	-	-	-	-	-	-	$ 927,170	$ 88,137
19	Replace Navigation Lighting	$ 23,200	10	10	20	30	40	50	60	70	80	90	>>>>	$ 232,000	$ 47,352
20	Substructure Repairs ($10/sf Appr; $40/sf Bascule)	$ 927,170	25	25	50	75	100	-	-	-	-	-	-	$ 3,708,680	$ 545,559
21	Fender System Repairs	$ 38,500	10	10	20	30	40	50	60	70	80	90	>>>>	$ 385,000	$ 78,580
22	Structural Steel Repairs	$ 5,674,100	60	60	-	-	-	-	-	-	-	-	-	$ 5,674,100	$ 539,382
23	Bearing Rehabilitation/Replacement ($10/sf Appr; $40/sf Bascule)	$ 927,170	20	20	40	60	80	100	-	-	-	-	-	$ 4,635,850	$ 762,987
Maintenance and Rehabilitation of Mech/Elec Components															
24	Span Lock Repair/Replacement	$ 714,300	20	20	40	60	80	100	-	-	-	-	-	$ 3,571,500	$ 587,812
25	Operation Machinery Intermediate Repairs	$ 912,400	25	25	50	75	100	-	-	-	-	-	-	$ 3,649,600	$ 536,868
26	Operation Machinery Rehabilitation	$ 1,824,700	50	50	100	-	-	-	-	-	-	-	-	$ 3,649,400	$ 292,887
27	Repair Trunnion Bearings	$ 200,000	50	50	100	-	-	-	-	-	-	-	-	$ 400,000	$ 32,103
28	Control System Repairs	$ 1,293,200	20	20	40	60	80	100	-	-	-	-	-	$ 6,466,000	$ 1,064,201
29	Live Load Shoe Replacement	$ 18,800	25	25	50	75	100	-	-	-	-	-	-	$ 75,200	$ 11,062
30	Submarine Cable Replacement	$ 1,300,500	50	50	100	-	-	-	-	-	-	-	-	$ 2,601,000	$ 208,747
31	Bridge Electrical System Intermediate Repairs	$ 640,900	25	25	75	-	-	-	-	-	-	-	-	$ 2,563,600	$ 377,114
32	Bridge Electrical System Rehabilitation	$ 1,281,800	50	50	100	-	-	-	-	-	-	-	-	$ 2,563,600	$ 205,745
													Total	$ 180,629,635	$ 114,066,138
													SAY =>	**$ 180,630,000**	**$ 114,067,000**
														CONSTANT $	**PRESENT VALUE**

APPENDIX I3A

Alternative 3A – Fixed Bridge Steel Superstructure Option Life Cycle Cost Estimates

Project:	15904 Hampton Harbor Bridge	Computed:	PJL	Date:	11/27/2019
Subject:	Alternative 3A Fixed Bridge Steel	Checked:	NDC	Date:	12/4/2019
Task:	Life Cycle Cost Analysis	Updated:	JGS	Date:	3/25/2020
Job:					

Hampton Harbor Bridge Replacement

Life Cycle Cost Analysis Input

Discount Rate	4%

Typically between 3% and 5%, per FHWA LCCA Primer. Enter number as integer.

Start Year - Bridge Replacement	0
Useful Life (Years)	100
Discount Year	0

Input start year.
Between 0 and 100 years. Useful life is counted from Start Year, not Discount Year.
Year 0 if counted years are utilized. 2015 if calendar years are utilized.

Approach Span Deck Area (sq.ft.)	68900
Bascule Span Deck Area (sq.ft.)	0

Life Cycle Cost Analysis Summary

	Total Cost (Constant Year 0$)	Total Cost (Present Value $)
Initial Capital Costs	$ 66,789,000	$ 66,789,000
Regular Maintenance, Inspection and Bridge Operation	$ 1,766,800	$ 1,766,800
Maintenance and Rehabilitation of Structural Components	$ 16,090,550	$ 2,442,189
Total	**$ 84,646,350**	**$ 70,997,989**

Life Cycle Cost Analysis Breakdown

No.	Description	Cost Per Occurrence (Constant Dollars)	Recurrence Interval	Start Year	1	2	3	4	5	6	7	8	9	Total Cost (Constant Year 0$)	Total Cost (Present Value $)
					Subsequent Years of Occurance through 100										
1	Capital Expenditure - Bridge Replacement	$ 66,789,000	99	0	-	-	-	-	-	-	-	-	-	$ 66,789,000	$ 66,789,000
Regular Maintenance, Inspection and Bridge Operation															
2	Bridge Cleaning ($0.025/sf)	$ 1,723	1	1	2	3	4	6	7	8	9	11	>>>>	$ 172,250	$ 172,250
3	Seal Substructure ($0.025/sf)	$ 1,723	1	1	2	3	4	6	7	8	9	11	>>>>	$ 172,250	$ 172,250
4	Clean Bridge Drains ($0.025/sf)	$ 1,723	1	1	2	3	4	6	7	8	9	11	>>>>	$ 172,250	$ 172,250
5	Clear Vegetation ($0.025/sf)	$ 1,723	1	1	2	3	4	6	7	8	9	11	>>>>	$ 172,250	$ 172,250
6	Navigation Lighting Maintenance	$ 6,400	2	2	4	6	8	12	14	16	18	22	>>>>	$ 320,000	$ 320,000
7	Highway Lighting Maintenance	$ 15,800	6	6	12	18	24	30	36	42	48	54	>>>>	$ 252,800	$ 252,800
8	Bridge Inspection	$ 10,100	2	2	4	6	8	10	12	14	16	18	>>>>	$ 505,000	$ 505,000
Maintenance and Rehabilitation of Structural Components															
9	Joint Replacement ($10/sf)	$ 689,000	20	20	40	60	80	100	-	-	-	-	-	$ 3,445,000	$ 566,992
10	Deck Repairs (Concrete Patching) ($10/sf)	$ 689,000	20	20	40	60	80	100	-	-	-	-	-	$ 2,756,000	$ 501,496
11	Deck Replacement ($20/sf)	$ 1,378,000	60	60	-	-	-	-	-	-	-	-	-	$ 1,378,000	$ 130,993
12	Zinc Coating Touch-Up of Structural Steel ($0.50/sf)	$ 34,450	20	20	40	60	80	100	-	-	-	-	-	$ 172,250	$ 28,350
13	Bridge Railing Replacement ($10/sf)	$ 689,000	60	60	-	-	-	-	-	-	-	-	-	$ 689,000	$ 65,497
14	Bridge Coping Replacement ($10/sf)	$ 689,000	60	60	-	-	-	-	-	-	-	-	-	$ 689,000	$ 65,497
15	Replace Navigation Lighting	$ 23,200	10	10	20	30	40	50	60	70	80	90	>>>>	$ 232,000	$ 47,352
16	Substructure Repairs ($10/sf)	$ 689,000	25	25	50	75	100	-	-	-	-	-	-	$ 2,756,000	$ 405,417
17	Fender System Repairs	$ 38,500	20	20	40	60	80	100	-	-	-	-	-	$ 192,500	$ 31,682
18	Structural Steel Repairs (2% of steel weight @ $5/lb)	$ 335,800	60	60	-	-	-	-	-	-	-	-	-	$ 335,800	$ 31,921
19	Bearing Rehabilitation/Replacement ($10/sf)	$ 689,000	20	20	40	60	80	100	-	-	-	-	-	$ 3,445,000	$ 566,992

Total	$ 84,646,350	$ 70,997,989
SAY =>	**$ 84,647,000**	**$ 70,998,000**
	CONSTANT $	**PRESENT VALUE**

APPENDIX I3B
Alternative 3B – Fixed Bridge Concrete Superstructure Option Life Cycle Cost Estimates

Project:	15904 Hampton Harbor Bridge	Computed:	PJL	Date:	11/27/2019
Subject:	Alternative 3B - Fixed Bridge Concrete	Checked:	NDC	Date:	12/4/2019
Task:	Life Cycle Cost Analysis	Updated:	JGS	Date:	3/25/2020
Job:	10116323				

Hampton Harbor Bridge Replacement

Life Cycle Cost Analysis Input

Discount Rate	4%	Typically between 3% and 5%, per FHWA LCCA Primer. Enter number as integer.
Start Year - Bridge Replacement	0	Input start year.
Useful Life (Years)	100	Between 0 and 100 years. Useful life is counted from Start Year, not Discount Year.
Discount Year	0	Year 0 if counted years are utilized. 2015 if calendar years are utilized.
Approach Span Deck Area (sq.ft.)	68900	
Bascule Span Deck Area (sq.ft.)	0	

Life Cycle Cost Analysis Summary

	Total Cost (Constant Year 0$)	Total Cost (Present Value $)
Initial Capital Costs	$ 70,417,000	$ 70,417,000
Regular Maintenance, Inspection and Bridge Operation	$ 1,749,575	$ 421,697
Maintenance and Rehabilitation of Structural Components	$ 16,954,700	$ 2,512,360
Total	**$ 89,121,275**	**$ 73,351,058**

Life Cycle Cost Analysis Breakdown

No.	Description	Cost Per Occurrence (Constant Dollars)	Recurrence Interval	Start Year	1	2	3	4	5	6	7	8	9	Total Cost (Constant Year 0$)	Total Cost (Present Value $)
					Subsequent Years of Occurance through 100										
1	Capital Expenditure - Bridge Replacement	$ 70,417,000	99	0	-	-	-	-	-	-	-	-	-	$ 70,417,000	$ 70,417,000
Regular Maintenance, Inspection and Bridge Operation															
2	Bridge Cleaning ($0.025/sf)	$ 1,723	1	1	2	3	4	6	7	8	9	11	>>>>	$ 155,025	$ 38,694
3	Seal Substructure ($0.025/sf)	$ 1,723	1	1	2	3	4	6	7	8	9	11	>>>>	$ 172,250	$ 42,210
4	Clean Bridge Drains ($0.025/sf)	$ 1,723	1	1	2	3	4	6	7	8	9	11	>>>>	$ 172,250	$ 42,210
5	Clear Vegetation ($0.025/sf)	$ 1,723	1	1	2	3	4	6	7	8	9	11	>>>>	$ 172,250	$ 42,210
6	Navigation Lighting Maintenance	$ 6,400	2	2	4	6	8	12	14	16	18	22	>>>>	$ 320,000	$ 76,878
7	Highway Lighting Maintenance	$ 15,800	6	6	12	18	24	30	36	42	48	54	>>>>	$ 252,800	$ 58,172
8	Bridge Inspection	$ 10,100	2	2	4	6	8	10	12	14	16	18	>>>>	$ 505,000	$ 121,324
Maintenance and Rehabilitation of Structural Components															
9	Joint Replacement ($10/sf)	$ 689,000	20	20	40	60	80	100	-	-	-	-	-	$ 3,445,000	$ 566,992
10	Deck Repairs (Concrete Patching) ($10/sf)	$ 689,000	20	20	40	60	80	100	-	-	-	-	-	$ 3,445,000	$ 566,992
11	Deck Replacement ($20/sf)	$ 1,378,000	60	60	-	-	-	-	-	-	-	-	-	$ 1,378,000	$ 130,993
12	Concrete Girder Repairs (Patch 5% of surface area @ $560 /sf)	$ 683,200	60	60	-	-	-	-	-	-	-	-	-	$ 683,200	$ 64,945
13	Bridge Railing Replacement ($10/sf)	$ 689,000	60	60	-	-	-	-	-	-	-	-	-	$ 689,000	$ 65,497
14	Bridge Coping Replacement ($10/sf)	$ 689,000	60	60	-	-	-	-	-	-	-	-	-	$ 689,000	$ 65,497
15	Replace Navigation Lighting	$ 23,200	10	10	20	30	40	50	60	70	80	90	>>>>	$ 232,000	$ 47,352
16	Substructure Repairs ($10/sf)	$ 689,000	25	25	50	75	100	-	-	-	-	-	-	$ 2,756,000	$ 405,417
17	Fender System Repairs	$ 38,500	20	20	40	60	80	100	-	-	-	-	-	$ 192,500	$ 31,682
18	Bearing Rehabilitation/Replacement ($10/sf)	$ 689,000	20	20	40	60	80	100	-	-	-	-	-	$ 3,445,000	$ 566,992

Total	**$ 89,121,275**	**$ 73,351,058**
SAY =>	**$ 89,122,000**	**$ 73,352,000**
	CONSTANT $	**PRESENT VALUE**

APPENDIX I4

Alternative 4 – Twin Bridge

Life Cycle Cost Estimates

Project:	15904 Hampton Harbor Bridge	Computed:	PJL	Date:	11/27/2019
Subject:	Alternative 4 - Twin Bridge	Checked:	NDC	Date:	12/12/2019
Task:	Life Cycle Cost Analysis	Updated:	JGS	Date:	3/25/2020
Job:					

Hampton Harbor Bridge Replacement

Life Cycle Cost Analysis Input

Discount Rate	4%	Typically between 3% and 5%, per FHWA LCCA Primer. Enter number as integer.
Start Year - Bridge Replacement	0	Input start year.
Useful Life (Years)	100	Between 0 and 100 years. Useful life is counted from Start Year, not Discount Year.
Discount Year	0	Year 0 if counted years are utilized. 2015 if calendar years are utilized.
Approach Span Deck Area (sq.ft.)	77720	
Bascule Span Deck Area (sq.ft.)	5662	

Life Cycle Cost Analysis Summary

	Total Cost (Constant Year 0$)	Total Cost (Present Value $)
Initial Capital Costs	$ 109,726,000	$ 109,726,000
Regular Maintenance, Inspection and Bridge Operation	$ 34,859,420	$ 8,508,656
Maintenance and Rehabilitation of Structural Components	$ 29,571,360	$ 4,178,138
Maintenance and Rehabilitation of Mech/Elec Components	$ 37,840,400	$ 4,834,366
Total	**$ 211,997,180**	**$ 127,247,159**

Life Cycle Cost Analysis Breakdown

No.	Description	Cost Per Occurrence (Constant Dollars)	Recurrence Interval	Start Year	Subsequent Years of Occurance through 100									Total Cost (Constant Year 0$)	Total Cost (Present Value $)
					1	2	3	4	5	6	7	8	9		
1	Construction of NB and SB Bridges	$ 109,726,000	99	0	-	-	-	-	-	-	-	-	-	$ 109,726,000	$ 109,726,000
Regular Maintenance, Inspection and Bridge Operation															
2	Bridge Cleaning ($0.025/sf Approach Spans; $0.025/sf Bascule Span)	$ 2,085	1	1	2	3	4	6	7	8	9	11	>>>>	$ 208,455	$ 51,082
3	Seal Substructure ($0.025/sf Appr; $0.025/sf Bascule)	$ 2,085	1	1	2	3	4	6	7	8	9	11	>>>>	$ 208,455	$ 51,082
4	Clean Bridge Drains ($0.025/sf Appr; $0.025/sf Bascule)	$ 2,085	1	1	2	3	4	6	7	8	9	11	>>>>	$ 208,455	$ 51,082
5	Clear Vegetation ($0.025/sf Appr; $0.025/sf Bascule)	$ 2,085	1	1	2	3	4	6	7	8	9	11	>>>>	$ 208,455	$ 51,082
6	Navigation Lighting Maintenance	$ 12,800	2	2	4	6	8	12	14	16	18	22	>>>>	$ 640,000	$ 153,757
7	Highway Lighting Maintenance	$ 31,600	6	6	12	18	24	30	36	42	48	54	>>>>	$ 505,600	$ 116,343
8	Bridge Inspection of Bascule Span	$ 75,600	2	2	4	6	8	10	12	14	16	18	>>>>	$ 3,780,000	$ 908,126
9	Bridge Inspection of Approach Spans	$ 20,200	2	2	4	6	8	10	12	14	16	18	>>>>	$ 1,010,000	$ 242,648
10	Monthly Maintenance of Bridge Mech. Components (Annualized)	$ 38,400	1	1	2	3	4	5	6	7	8	9	>>>>	$ 3,840,000	$ 940,992
11	Miscellaneous M&E Maintenance	$ 82,500	1	1	2	3	4	5	6	7	8	9	>>>>	$ 8,250,000	$ 2,021,662
12	Moveable Bridge Operator Costs	$ 160,000	1	1	2	3	4	5	6	7	8	9	>>>>	$ 16,000,000	$ 3,920,800
Maintenance and Rehabilitation of Structural Components															
13	Joint Replacement ($10/sf Approach Spans; $40/sf Bascule Span)	$ 1,003,680	20	20	40	60	80	100	-	-	-	-	-	$ 5,018,400	$ 825,949
14	Deck Repairs (Concrete Patching) ($10/sf Appr; $40/sf Bascule)	$ 1,003,680	20	20	40	60	80	100	-	-	-	-	-	$ 4,014,720	$ 730,539
15	Deck Replacement ($20/sf Appr; $70/sf Bascule)	$ 1,950,740	60	60	-	-	-	-	-	-	-	-	-	$ 1,950,740	$ 185,438
16	Zinc Coating Touch-Up of Structural Steel ($0.50/sf Appr; $2/sf Bascule)	$ 50,184	20	20	40	60	80	100	-	-	-	-	-	$ 250,920	$ 41,297
17	Bridge Railing Replacement ($10/sf Appr; $40/sf Bascule)	$ 1,003,680	60	60	-	-	-	-	-	-	-	-	-	$ 1,003,680	$ 95,410
18	Bridge Coping Replacement ($10/sf Appr; $40/sf Bascule)	$ 1,003,680	60	60	-	-	-	-	-	-	-	-	-	$ 1,003,680	$ 95,410
19	Replace Navigation Lighting	$ 46,400	10	10	20	30	40	50	60	70	80	90	>>>>	$ 464,000	$ 94,704
20	Substructure Repairs ($10/sf Appr; $40/sf Bascule)	$ 1,003,680	25	25	50	75	100	-	-	-	-	-	-	$ 4,014,720	$ 590,578
21	Fender System Repairs	$ 39,800	10	10	20	30	40	50	60	70	80	90	>>>>	$ 398,000	$ 81,234
22	Structural Steel Repairs	$ 6,434,100	60	60	-	-	-	-	-	-	-	-	-	$ 6,434,100	$ 611,628
23	Bearing Rehabilitation/Replacement ($10/sf Appr; $40/sf Bascule)	$ 1,003,680	20	20	40	60	80	100	-	-	-	-	-	$ 5,018,400	$ 825,949
Maintenance and Rehabilitation of Mech/Elec Components															
24	Span Lock Repair/Replacement	$ 1,051,000.00	20	20	40	60	80	100	-	-	-	-	-	$ 5,255,000	$ 864,890
25	Operation Machinery Intermediate Repairs	$ 1,645,100.00	25	25	50	75	100	-	-	-	-	-	-	$ 6,580,400	$ 967,998
26	Operation Machinery Rehabilitation	$ 3,290,100.00	50	50	100	-	-	-	-	-	-	-	-	$ 6,580,200	$ 528,103
27	Trunnion Bearings Replacement	$ 340,000.00	50	50	100	-	-	-	-	-	-	-	-	$ 680,000	$ 54,574
28	Control System Replacement	$ 1,437,200.00	20	20	40	60	80	100	-	-	-	-	-	$ 7,186,000	$ 1,182,702
28	Live Load Shoe Replacement	$ 37,500.00	25	25	50	75	100	-	-	-	-	-	-	$ 150,000	$ 22,065
30	Submarine Cable Replacement	$ 1,240,500.00	50	50	100	-	-	-	-	-	-	-	-	$ 2,481,000	$ 199,116
31	Bridge Electrical System Intermediate Repairs	$ 1,116,000.00	25	25	50	75	100	-	-	-	-	-	-	$ 4,464,000	$ 656,669
32	Bridge Electrical System Rehabilitation	$ 2,231,900.00	50	50	100	-	-	-	-	-	-	-	-	$ 4,463,800	$ 358,248

	CONSTANT $	PRESENT VALUE
Total	**$ 211,997,180**	**$ 127,247,159**
SAY =>	**$ 211,998,000**	**$ 127,248,000**

APPENDIX J
Mechanical and Electrical Systems

1 Mechanical and Electrical Systems

1.1 Existing Condition of Mechanical and Electrical Systems

- The machinery is substantially exposed to the elements and corrosive effects of the salt air.
- There currently are no machinery brakes.
- There are no “brake set” limit switches on the motor brakes.
- The bridge has no reliable redundant means of operation. The emergency drive system is in poor condition and inoperable due to severe physical deterioration of the motor, brake, bearings, and reducer.
- The emergency drive system is also difficult to engage, it is not interlocked with the normal drive system brakes, and has poor accessibility for maintenance.
- Severe section loss was noted on machinery support and bearing fasteners
- There is evidence of previous lubrication leakage at the shaft couplings.
- The span lock machinery and live load bearings are in poor condition due to physical deterioration of couplings and fasteners, gaps at the live load shoes, and a lack of adjustability in the system.

1.2 Mechanical System Design Criteria

- The primary gear reducer will be a differential type, parallel shaft, enclosed reducer consisting of through-hardened gearing.
- Right angle input gear boxes shall be incorporated in order to accommodate the limited space with the twin bridge alternative. Optionally, planetary type gear reducers in conjunction with a primary differential gear unit can be used as secondary gear reducers to achieve a higher reduction with a smaller footprint. These would direct drive the main pinion shafts.
- Bridge open gearing (racks & pinions) will be sized for a minimum service life of 75-100 years of operation. The pinions shall be integral with their shafts and simply supported in two bearings.
- Span instrumentation gearing and mechanisms will be incorporated where necessary to operate electrical control and interlocking equipment.
- The trunnion shafts will have a bore through theirs centers in order to facilitate field alignment within the trunnion bearings.
- The trunnion bearings will be adjusted through the use of full-sized stainless steel shims during installation. The bearings will be bronze-bushed and set in cast steel pillow blocks with steel bearing caps. The caps will have eye loops for accommodating future inspection removal. Brass liners will be included between the caps and the bearing to allow for adjustment of trunnion journal clearance. Grease grooves will be machine cut into the bushings (not the shaft journals) and provided with standard accessible grease fittings.
- All shaft couplings will be gear type flex-rigid or full flex couplings as appropriate. Motor couplings will be fully flexible tapered grid couplings with a dual load path.
- Motor Brakes - Motor brakes will be thrustor operated and provided for each span motor and mounted either off main motor shaft extensions or extended gear reducer input shafting.
- Machinery Brakes. – Two thrustor operated machinery brakes will be and located in the drive train as close as practical to the main pinions.
- For the new bridge alternative, a spring released, electrically engaged clutch will be

specified to engage the emergency drive system. The emergency drive system will be prevented from rotating (backdriving) when the main drive motors are operable. Engagement of the clutch shall be from a switch on the control desk within the operator's house.

- Hot rolled steel or forged steel TGP (turned, ground, and polished) shafting will be specified depending upon final diameter of the shaft.
- Two span lock bars will be provided, one per girder at the toe, at the ends of the bascule span. Each lock bar will be driven by a heavy duty standard manufactured lock bar operator complete with a hand crank, brake release, and safety interlock for emergency operation. Span locks will be located adjacent to the live load bearings, engaging through a receiving socket mounted to the rest pier. The span lock operators will be mounted to the bascule span steel. The lock bars will be sized to prevent inadvertent lifting of the span under motor stall torque conditions.
- Air buffers will not be required on the lift span if the control system provides for ramp down at seating with sufficient adjustment.
- All span guides will be of the shoe-type with shimmable and replaceable wear plates.
- All machinery will be designed for ease of maintenance accessibility.

1.3 Electrical System Design Criteria

- The bridge will be equipped with two drive systems for redundancy. Main for normal mode of operation (normal speed) and an emergency drive system (reduced speed) which can be used if the main drive system fails.
    a. For the bridge replacement alternative, the main drive system will consist of a 150HP vector duty motor and a variable frequency drive, and the emergency drive system will consist of a 25HP vector duty motor with a variable frequency drive.
    b. For the twin bridge alternative:
        i. The existing bridge drive system will be rehabilitated and consist of two 25HP vector duty motors and variable frequency drives (main and an alternate drive system). Only one set of motor-drive combination will be used to operate the bridge at a time. The second set will provide redundancy in the system and it will ensure even wear as the use of the main and alternate drive system will be alternated.
        ii. The new bridge will be equipped with two 50HP vector duty motors and variable frequency drives (main and an alternate drive system). Only one set of motor-drive combination will be used to operate the bridge at a time. The second set will provide redundancy in the system and it will ensure even wear as the use of the main and alternate drive system will be alternated.

  The flux vector drives will enable speed control of the motors without the addition of bulky resistors and relay logic to control the speed.
- The bridge control system, aside from the required hardwired safety logic (emergency stop circuit), will be entirely PLC (Programmable Logic Controller) based. All field devices will be controlled and monitored by the PLC system. A redundant PLC system (system A and system B) with cold back up configuration will be installed. The redundant system will consist of a redundant controller and redundant input and output cards. Separate PLC rack/chassis will be installed for the two systems. Redundancy will be established inside the PLC system; field wiring and wiring from the control desk will be spliced within the PLC cabinet and routed to the two PLC system. In the event that one of the PLC system fails, the operator will switch to the second PLC system for bridge operation. All components of the PLC system will be installed in a PLC cabinet located in the electrical room.

- The bridge control equipment will include a Human-Machine Interface (HMI) for bridge control, status and alarm monitoring. The HMI will be located on the new control desk. Bridge operation will be performed using a Human Machine Interface (HMI) on the control desk and all fault will be displayed on the HMI. All push buttons, selector switches and indicator lights will be simulated on the HMI. The hard wired E-Stop and a bridge angle position indicator will be physically located on the control desk. All bridge operational activities and faults can be time stamped, logged, and stored.
- A new MCC will be installed. The MCC will serve as the load center for the bridge electrical equipment. It will contain all circuit breakers, contactors, motor starters and overload.
- A lighting transformer (low voltage) will be provided for bridge control and bridge lighting.
- A new submarine cable system will be installed. The interconnection between bascule piers will be via Submarine HDPE duct that are buried at least 7' below navigation channel bottom level as established by the United States Coast Guard (USCG). The duct will permit the installation of submersible electrical cables. Submarine cable termination cabinets will be installed at the piers adjacent to the navigable channel (Piers 3 and 4).
- A new incoming electrical service will be installed at the north abutment. The incoming electrical service conduits will be routed on the western fascia (or under the west deck) of the fixed spans to a submarine cable termination cabinet at Pier 3. Submersible electrical cables will be installed in the HDPE ducts for connection to the submarine cable termination cabinet at Pier 4 and to the bridge electrical distribution equipment.
- A standby diesel engine generator capable of powering the bridge under normal and emergency mode will also be installed at the north abutment, within the right-of-way, next to the incoming service equipment. The generator will be provided with a fuel tank capable of operating the bridge for a period of 24 hours (including 24 span openings). The generator will be located in a weather proof, sound attenuated enclosure. Backup power will be selected automatically via the ATS installed in the bridge electrical room.
- As an alternative to having a standby generator provide backup power, the installation of a redundant electrical service will be investigated. To improve reliability, this option will only be considered if the electrical service on the south side is from a different power source compared to that on the north side. If the installation of the north and south electrical service provide redundancy, an automatic transfer switch will be installed at the bridge for selection between the two electrical services.
- Traffic equipment will be install at each approach as required. A new traffic control system which includes traffic signs, traffic lights, traffic warning gates, traffic barrier gates, drawbridge ahead and warning gongs will be installed. The traffic control system/equipment will be in compliance with the Manual on Uniform Traffic Control Devices (MUTCD).
- The bascule pier will be equipped with a sump pump system. The Sump pumps will prevent water from accumulating in the bascule pier. The sump pump will consist of a controller with dual pumps. Each pump will be sized for peak flow and only one pump will be operate at a time. The controller will be equipped with an alternating relay which will allow for even wear of both pumps and provide redundancy. Alarm from the pumps can be monitored on the control desk HMI
- All external water and sewer connections above the frost line will be heat traced on a temperature controlled circuit to prevent pipes from freezing. The heat trace will be connected to a controller in the electrical room.
- A PA system will installed in the bascule pier, equipment room, and control room and machinery areas to facilitate communication between maintenance staff and the bridge operator.

- A CCTV system will be installed. CCTV cameras will be installed in the machinery area and at roadway level. The CCTV controller and monitors will be will be located in the operator's room.
- The bascule pier, equipment room and control room will be equipped with a fire and an intrusion alarm system tied to the Transportation Management Center (TMC) and the local emergency services as required.
- Lightning protection will be installed at the bridge and surge protection devices will be installed as required to prevent damage to the bridge equipment due to power surges.
- A new grounding system will be installed at the bridge and at the abutment where electrical equipment are installed. All electrical equipment and the bridge structural steel will be grounded and bonded in accordance with the national electric code
- The bridge lighting system will include work area lighting in the bascule pier, electrical room, control room, machinery platform, roadway lighting, and navigational lighting. Navigation lighting will be per USCG requirements.
- All other devices required for control, safety interlocking and monitoring of the bridge control, drive and traffic control system will also be installed. Such devices will include encoders, a resolver, speed switches, and limit switches.

1 Mechanical and Electrical Systems

1.1 Existing Condition of Mechanical and Electrical Systems

- The machinery is substantially exposed to the elements and corrosive effects of the salt air.
- There currently are no machinery brakes.
- There are no “brake set” limit switches on the motor brakes.
- The bridge has no reliable redundant means of operation. The emergency drive system is in poor condition and inoperable due to severe physical deterioration of the motor, brake, bearings, and reducer.
- The emergency drive system is also difficult to engage, it is not interlocked with the normal drive system brakes, and has poor accessibility for maintenance.
- Severe section loss was noted on machinery support and bearing fasteners
- There is evidence of previous lubrication leakage at the shaft couplings.
- The span lock machinery and live load bearings are in poor condition due to physical deterioration of couplings and fasteners, gaps at the live load shoes, and a lack of adjustability in the system.

1.2 Mechanical System Design Criteria

- The primary gear reducer will be a differential type, parallel shaft, enclosed reducer consisting of through-hardened gearing.
- Right angle input gear boxes shall be incorporated in order to accommodate the limited space with the twin bridge alternative. Optionally, planetary type gear reducers in conjunction with a primary differential gear unit can be used as secondary gear reducers to achieve a higher reduction with a smaller footprint. These would direct drive the main pinion shafts.
- Bridge open gearing (racks & pinions) will be sized for a minimum service life of 75-100 years of operation. The pinions shall be integral with their shafts and simply supported in two bearings.
- Span instrumentation gearing and mechanisms will be incorporated where necessary to operate electrical control and interlocking equipment.
- The trunnion shafts will have a bore through theirs centers in order to facilitate field alignment within the trunnion bearings.
- The trunnion bearings will be adjusted through the use of full-sized stainless steel shims during installation. The bearings will be bronze-bushed and set in cast steel pillow blocks with steel bearing caps. The caps will have eye loops for accommodating future inspection removal. Brass liners will be included between the caps and the bearing to allow for adjustment of trunnion journal clearance. Grease grooves will be machine cut into the bushings (not the shaft journals) and provided with standard accessible grease fittings.
- All shaft couplings will be gear type flex-rigid or full flex couplings as appropriate. Motor couplings will be fully flexible tapered grid couplings with a dual load path.
- Motor Brakes - Motor brakes will be thrustor operated and provided for each span motor and mounted either off main motor shaft extensions or extended gear reducer input shafting.
- Machinery Brakes. – Two thrustor operated machinery brakes will be and located in the drive train as close as practical to the main pinions.
- For the new bridge alternative, a spring released, electrically engaged clutch will be

specified to engage the emergency drive system. The emergency drive system will be prevented from rotating (backdriving) when the main drive motors are operable. Engagement of the clutch shall be from a switch on the control desk within the operator's house.

- Hot rolled steel or forged steel TGP (turned, ground, and polished) shafting will be specified depending upon final diameter of the shaft.
- Two span lock bars will be provided, one per girder at the toe, at the ends of the bascule span. Each lock bar will be driven by a heavy duty standard manufactured lock bar operator complete with a hand crank, brake release, and safety interlock for emergency operation. Span locks will be located adjacent to the live load bearings, engaging through a receiving socket mounted to the rest pier. The span lock operators will be mounted to the bascule span steel. The lock bars will be sized to prevent inadvertent lifting of the span under motor stall torque conditions.
- Air buffers will not be required on the lift span if the control system provides for ramp down at seating with sufficient adjustment.
- All span guides will be of the shoe-type with shimmable and replaceable wear plates.
- All machinery will be designed for ease of maintenance accessibility.

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