DRAFT

TOWN OF VINALHAVEN
CARRYING PLACE BRIDGE REPLACEMENT
PRELIMINARY DESIGN REPORT



Carrying Place Bridge
Maine DOT Bridge #: 0601

Calderwood Neck Road
over
Tidal Waters of Fish Cove & Winter Harbor

Vinalhaven, Maine

November 6, 2017

SUBMITTED TO:
Town of Vinalhaven
19 Washington School Road
Vinalhaven, Maine 04863

PREPARED BY:

Gartley & Dorsky
ENGINEERING SURVEYING
59 Union Street Unit 1 P.O. Box 1031 Camden, ME 04843-1031
Ph. (207) 236-4365 Fax (207) 236-3055 Toll Free 1-888-282-4365
165 Main Street Suite 2F P.O. Box 1072 Damariscotta, ME 04543
Ph. (207) 790-5005

TABLE OF CONTENTS

BACKGROUND INFORMATION

TOWN:	Vinalhaven	**BRIDGE NUMBER:**	0601
FUNDING:	Local	**STATE ROUTE:**	Not Applicable
		LOCAL ROUTE:	Calderwood Neck Road

PROGRAM SCOPE: Bridge Replacement

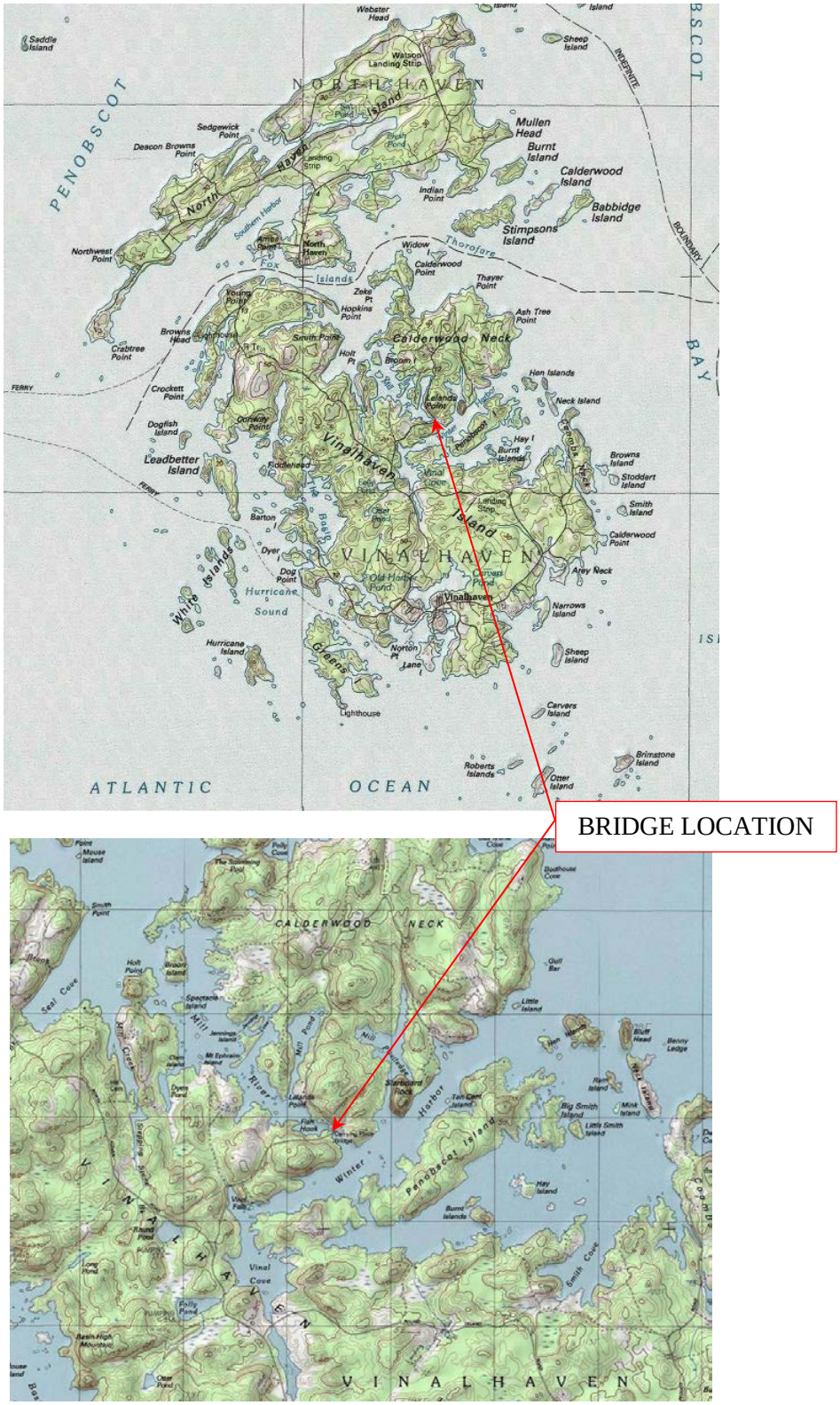
PROGRAM DESCRIPTION: Carrying Place Bridge (MaineDOT Bridge #: 0601) carries Calderwood Neck Road over tidal waters between Fish Hook cove and Winter Harbor. Calderwood Neck Road and Carrying Place Bridge are entirely in the Town of Vinalhaven This causeway and bridge connect Calderwood Neck to Vinalhaven Island. The bridge and causeway crosses tidal waters connecting Fish Hook Cove to the northwest and Winter Harbor to the Southeast. At mid-tide and lower, the area drains. The road and bridge are to be reconfigured and reconstructed to replace a structure at the end of its service life and to improve function and serviceability. During the project, maintenance of traffic will require construction of a temporary bypass road, minimum single lane with alternating lane control.

PROJECT BACKGROUND: Maine DOT reports this bridge was constructed in 1970. Local knowledge indicates the abutments are older. The bridge is a single span. The bridge is constructed of granite block abutments with steel I-beam girders, and timber decking over the span. The adjacent road is paved and the approaches are built as a causeway to the abutments and span. The bridge is the only crossing that connects Calderwood Neck with the island of Vinalhaven. The bridge structure is in poor condition and requires replacement to provide functionality. The town expresses interest in retention of the existing granite abutments and that climate resilience be a design factor for consideration.

Jurisdiction:	Town Way	Functional Classification:	local
MDOT Corridor Priority:	6	NHS:	No
Urban/Rural:	Rural	FHWA Sufficiency Rating:	N/.A
Load Posting:	N/A	Posted Speed:	45 mph (DOT)
Structurally Deficient:	Yes	Functionally Obsolete	N/A
Traffic: 2017 AADT (MDOT):	280	Accident Data, CRF (segment):	1.36
2034 AADT (MDOT):	413	DHV - estimate only:	50

Latitude: 44.092° N, Longitude: -68.831° W

LOCATION MAP



Latitude: 44.092° N, Longitude: -68.831° W

BRIDGE RECOMMENDATION FORM

TOWN: Vinalhaven **BRIDGE:** Carrying Place Bridge **BRIDGE NO.:** 0601

Prelim Design BY: G&D **DATE:** November 6, 2017

APPROVED BY: **DATE:**

PROJECT: Bridge replacement with ±300' of grading and realigned approaches, including transitions.

ALIGNMENT DESCRIPTION: Existing guard cable damage has been observed, indicating prior damage. The poor horizontal alignment of the existing travelway has been identified as necessary for correction. The existing alignment discontinuity is approximately 4 degrees from tangency. Horizontal alignment to be modified with improved curvature to full tangency. Travelway vertical alignment to be modified to accommodate preferred deck elevation, reducing sag curvature. travelway from the west at 1.96% slope with a 50' vertical crest curve beginning at station 11+25.00 and terminating with a slope of -1.17%. A 75' vertical sag curve then begins at station 12+12.50 and terminates ±3.5' higher than the existing bridge at a 1.33% slope. A second 75' vertical sag curve then begins at station 13+97.50 and terminates at a maximum slope of 5.47%.

APPROACH SECTION: Two 9' lanes with 2' minimum shoulders and galvanized steel guardrail per MaineDOT standards at both approaches.

SPANS: 14.5' – 30' - 15' approach spans necessitated by raising and widening travelway and retaining existing causeway structure.

LOADING: HL93

SUPERSTRUCTURE: Spans are planned to be precast, prestressed concrete planks, with a composite concrete deck, with membrane waterproofing and asphalt wearing surface. Nominal 22' curb-to-curb clearance with galvanized steel standard bridge mounted MDOT Type 3 guardrail.

ABUTMENTS: Per client instruction, retention of the existing abutment granite is required and the deck elevation shall be raised. Accordingly, structure support consists of two cast-in-place concrete abutments pinned to ledge on the west approach and two cast-in-place abutments with helical piles on the eastern approach.

OPENING AND CLEARANCE:

	EXISTING	PROPOSED
TOTAL OPENING:	±160 SF	±238 SF
CLEARANCE AT MHW (4.5'):	± 5.5	± 9.5

DISPOSITION OF EXISTING BRIDGE: Existing superstructure and concrete are to be removed and become property of the Contractor.

AVAILABLE SOILS INFORMATION: Summit Geoengineering Services performed a preliminary geotechnical investigation at the site. Two test borings were conducted in March of 2017. The geotechnical engineer observed four inches of bituminous asphalt at the surface over granular fill (3' in thickness) on top of granite cribbing (up to 13' in thickness) which is overlying marine deposit at depths of 13' to 24' in Boring B-1 on the northeast abutment. Bedrock was encountered at varying depths: 24.3 feet in Boring B-1 on the northeast abutment and 3.5' in Boring B-2 on the southwest abutment. The rock is estimated to have a hardness value of seven (7) and is considered generally hard and intact of competent quality, according to Summit's report.

ADDITIONAL DESIGN FEATURES: Improvements associated with the project begin at station 10+40 and end at station 15+64. With the bridge replacement, the work incorporates alignment modifications and revised road grading. Concrete retaining walls with guardrails are to be constructed on either side of the travelway for both approaches between stations 12+10 and 13+48.

MAINTENANCE OF TRAFFIC: Maintenance of traffic on the existing bridge throughout construction is not feasible, nor is a detour.

A temporary bypass with a 12' wide travelway and 1.5' shoulders is to be constructed with single lane traffic control effected by stop bars located at the approaches. The owner has identified a preference for an automated traffic regulating signalized system. Culverts are to be set in the existing channel under the temporary road bypass to provide equalization of uneven tide during construction. The work area will be protected from vehicular, pedestrian and boat traffic by barricades, markers, and signage, as applicable.

CONSTRUCTION SCHEDULE: Pending funding commitments, construction is anticipated for the low use period associated with Fall and Winter of 2018/2019.

ADVERTISING DATE: TBD

UTILITIES: There are no known utilities attached to or conveyed through this bridge. Adjacent to the alignment are overhead power and telecommunications lines.

EXCEPTIONS TO STANDARDS: The recommended increased travelway width is consistent with AASHTO standards for a low volume road. Modifications to road geometry are recommended to improve safety but improvements to approaches are limited by right of way and constructability. Recommend road Design speed be reduced to 20 mph.

COMMENTS BY ENGINEER OF DESIGN: A discontinuous alignment on the approach from Calderwood Neck has been eliminated in favor of a compound curve that improves conditions within feasible limitations. Deck elevation adjustments are commensurate with the requirements of the municipality with an objective of climate resilience.

SUMMARY OF EXPECTED IMPACTS

RIGHT-OF-WAY

NUMBER OF:	PROPERTY OWNERS =	4
	BUILDINGS TO BE TAKEN =	none

TYPE OF ACQUISITIONS:
- ☑ GRADING EASEMENT
- ☑ TEMPORARY ROAD EASEMENT

HISTORICAL/ARCHEOLOGICAL: No archaeological resources have been identified in the project area. The plan retains existing granite abutments, which are not sp.

COAST GUARD PERMIT: Not Applicable **FAA PERMIT:** Not Applicable

ENVIRONMENTAL

In Water Work Window: From: September 2018 To: November 2018 (Tentative)

Coastal Wetland Impacts

New Additional Footprint:	±0 SF
Fill Below HAT:	±2,400 SF (temporary)

Dredging and Mitigation

Mitigation Required?	No
Dredging Spoils Testing Required?	No

Stream Diversion: Not Applicable.

Expected Permit Regimen

DEP: Individual	ACOE: Prorammatic General
NPDES: Not Applicable	NEPA: NA unless required by funding

SUMMARY OF AVOIDANCE AND MINIMIZATION: Retaining walls on both sides of each approach are provided to avoid and minimize coastal wetland. A minimized shoulder and guardrail offset is also provided to minimize coastal wetland impacts. A de minimis footprint for the temporary bypass has been developed, employing waste blocks to retain the necessary fill section.

OTHER: US Fish and Wildlife Section 7 consultation is not anticipated for this project as there are no known critical habitats (Atlantic Sturgeon included) within the project area, and there is no standing water present within the work zone at low tide. Northern Long-Eared Bat habitat impacts are not anticipated, as there are no trees 3-inches-in-diameter, or greater (at breast height), to be cut in the summer for this project.

SUMMARY OF PRELIMINARY DESIGN

BACKGROUND

Carrying Place Bridge (MaineDOT Bridge #: 0601) carries Calderwood Neck Road over tidal waters between Fish Hook cove and Winter Harbor. Calderwood Neck Road and Carrying Place Bridge are entirely in the Town of Vinalhaven This causeway and bridge connect Calderwood Neck to Vinalhaven Island. The bridge and causeway crosses tidal waters connecting Fish Hook Cove to the northwest and Winter Harbor to the Southeast. At mid-tide and lower, the area drains. Carrying Place Bridge is the only crossing that connects Calderwood Neck with the island of Vinalhaven.

MaineDOT performed bridge inspections on December 14, 2010 and October 22, 2012. Then, in January of 2017, Kleinfelder Associates performed a Routine Highway Bridge Inspection that evaluated the condition of the bridge. The inspections are summarized in the below table.

ELEMENT	December 14, 2010 MaineDOT Inspection	October 22, 2012 MaineDOT Inspection	January 21, 2017 Kleinfelder Inspection
Deck:	5 - Fair	5 - Fair	5 – Fair Condition, Minor Section Loss
Superstructure:	4 - Poor	3 - Serious	3 – Serious Condition, Primary Structure Effected
Substructure:	5 - Fair	5 - Fair	5 – Fair Condition, Minor Section Loss
Channel Condition:	7 - Good	7 - Good	7 – Bank Protection, Needs Minor Repairs
Approach Condition:	4 - Poor	4 - Poor	4 – Meets minimum tolerable limits, to be left in place as is

As noted by DOT: The structure is categorized as deficient

BRIDGE REPLACEMENT

Gartley & Dorsky Engineering & Surveying evaluated several bridge configurations, following the MDOT bridge design matrix. Alignment and grade, along with necessary increases to accommodate travelway width determined the The following subsections discuss alignment/profile considerations, roadway width and approach details, bridge types and span arrangements, abutment details, and comparison of bridge configurations.

HORIZONTAL ALIGNMENT:

Horizontal alignment is to be improved by removing an existing alignment discontinuity of approximately 4 degrees on the departure from the span onto the Calderwood Neck approach. A straight course into the west causeway and Approach centerline radius is improved to 125 feet transitioning in a compound curve to 175’ on the span.

VERTICAL ALIGNMENT:

Travelway vertical alignment is to be modified to accommodate preferred deck elevation. Following the existing travelway from the west at 1.96% slope climb before the causeway. Transition with a 50' crest vertical curve, to -1.17%. to establish a low point off the span. Transition up via a 75' sag vertical curve to a 1.33% slope. This alignment establishes a road surface ±3.5' higher than the existing bridge. A second 75' sag vertical curve then transitions to the existing travel way with a slope of 5.47%.

ROADWAY WIDTH & APPROACH DETAILS:

The bridge and approach roadway widths provide minimum 9' lanes and 2' shoulders with galvanized steel guardrail per MaineDOT standards at both approaches. Approximately 200' of retaining wall are to be provided at the approaches to avoid resource and property impacts. The walls include base mounted guardrails that is in line with the approach guardrail.

The prescriptive pavement section includes 4" HMA over 6" minimum dense graded base material (MaineDOT Type "A") on 12" minimum dense graded subbase material (MaineDOT Type "D") with a separation geotextile beneath.

BRIDGE TYPE AND SPAN:

Pre-cast concrete planks and composite concrete deck on precast abutments, spanning 14.5', 30', and 14.5'.

ABUTMENT DETAILS:

Two cast-in-place concrete abutments pinned to ledge are to be constructed on the west approach and two cast-in-place abutments supported by helical piles are to be constructed on the eastern approach.

SUMMARY OF RECOMMENDATION:

In summary, Gartley & Dorsky evaluated bridge rehabilitation and found no suitable alternatives to recommend. The proposed span configuration resolves the town requirmenet to retain the existing abutments, and accommodate the grade, widening, and alignment modifications. Gartley & Dorsky recommends replacing the bridge, as outlined herein, as a practical option.

EXISTING BRIDGE SYNOPSIS

TOWN: Vinalhaven **BRIDGE:** Carrying Place Bridge (Bridge #: 0601) **YEAR BUILT:** 1970

SPAN LENGTHS: 27’ **CURB TO CURB WIDTH:** 22’-8”

TYPE OF SUPERSTRUCTURE: Single span, with six (6) lines of painted steel rolled girders with 8x8 timber decking and wearing surface.

GENERAL CONDITION: 3 - Serious

TYPE OF SUBSTRUCTURE: Shot-creted granite abutments and wingwalls.

GENERAL CONDITION: 5 - Fair

BRIDGE RATINGS: (Design Load Unknown)

OPERATING: 29.4 **INVENTORY:** 21.2

(Kleinfelder report dated January 21, 2017)

FHWA SUFFICIENCY RATING: (Unknown) **POSTED LOAD/DATE:** (Unknown)

MAINTANENCE PROBLEMS: None reported by town.

MAINTENANCE WORK: Town responsibility, seasonal snow removal.

PREVIOUS STRUCTURE: Probable, superstructure likely built on original abutment.

OTHER COMMENTS: Cable guard system deficient, evidence of prior impacts.

HYDRAULIC REPORT

Carrying Place Bridge spans tidal waters between Fish Hook cove and Winter Harbor separating Calderwood Neck from Vinalhaven proper in East Penobscot Bay. Tidal waters reach the bridge at or near mid tide equally from Fish Hook cove to the northwest and Winter Harbor to the Southeast. At low tide, the basin is drained under the bridge. The direction, velocity and quantity of water flowing under this bridge is dependent on tide, wind direction, and storm surge, and not a function of runoff from an adjacent watershed.

The 100-year flood elevation was obtained from the Federal Emergency Management Agency, National Flood Insurance Program. According to FEMA, Carrying Place Bridge is located within Flood Zone AE with a designated elevation of 12’ (NAVD 88). During this 100-year flood event, the existing road surface will be topped and Calderwood Neck will be cut off from the rest of Vinalhaven. As proposed, the new road surface is to maintain a centerline elevation greater than 15.7’, providing 3.7’ of freeboard during the current 100-year flood event.

Tidal Elevations were obtained from published information from the National Oceanic and Atmospheric (NOAA) and provided in the below table referenced to NAVD88.

Mean Higher High Water (MHHW)	4.95’
Mean High Water (MHW)	4.53’
Mean Tide Level (MTL)	-0.34’
Mean Low Water (MLW)	-5.22’

The special flood hazard area base flood elevation of this tidal waterbody is the design hydraulic event. As proposed, the existing granite abutments are to remain with no modification to the channel section. The vertical clearance is to increase over three (3) feet. Absent a history of instability, and given the reported tidal influence from both directions, a further qualitative geomorphic analysis is unnecessary for this bridge reconstruction project.

Appendix A

Preliminary Plans

PLAN REFERENCES:

1) "PROPOSED SUBDIVISION OF WINTER HARBOR VIEW IN THE TOWN OF VINALHAVEN KNOX COUNTY" BY E.S. COFFIN DATED JANUARY 9, 1988 AND RECORDED IN THE KNOX COUNTY REGISTRY OF DEEDS CABINET7, SHEET 169.

2)"AMENDMENTS TO LOTS 2 AND 4 OF WINTER HARBOR VIEW SUBDIVISION" BY D.C. WEBSTER DATED AUGUST 1991, LAST AMENDED 2003 AND RECORDED IN THE KNOX COUNTY REGISTRY OF DEEDS CABINET 9, SHEET 120.

3) "AMENDMENTS TO LOTS 2A, 4A, AND 7 OF WINTER HARBOR VIEW SUBDIVISION" BY D.C. WEBSTER DATED AUGUST 1991, LAST AMENDED 2003 AND RECORDED IN THE KNOX COUNTY REGISTRY OF DEEDS CABINET16, SHEET 26.

4) "PLAN SHOWING DARK BROOK SUBDIVISION FORMERLY OWNED BY TIMOTHY J. LANE IN VINALHAVEN, MAINE" BY D.C. WEBSTER DATED SEPTEMBER 1998 AND RECORDED IN THE KNOX COUNTY REGISTRY OF DEEDS CABINET16, SHEET 25.

SURVEYOR'S NOTES:

1) THIS IS NOT A BOUNDARY SURVEY. APPARENT PROPERTY LINES ARE TAKEN FROM TOWN OF VINALHAVEN TAX MAPS.

2) PLAN ORIENTATION IS REFERENCED TO THE MAINE COORDINATE SYSTEM OF 1983 (2011), EAST ZONE, BASED ON AN RTK GPS SURVEY. ALL DISTANCES ARE GRID DISTANCES.

3) ELEVATIONS ARE REFERENCED TO NAVD 1988 BASED ON STATIC GPS OBSERVATIONS PERFORMED ON AUGUST 10, 2016 AND PROCESSED THROUGH THE NATIONAL GEODETIC SURVEY'S ONLINE POSITIONING USER SERVICE (OPUS).

4) THIS PLAN IS THE RESULT OF AN ON THE GROUND FIELD SURVEY PERFORMED ON AUGUST 10, 2016.

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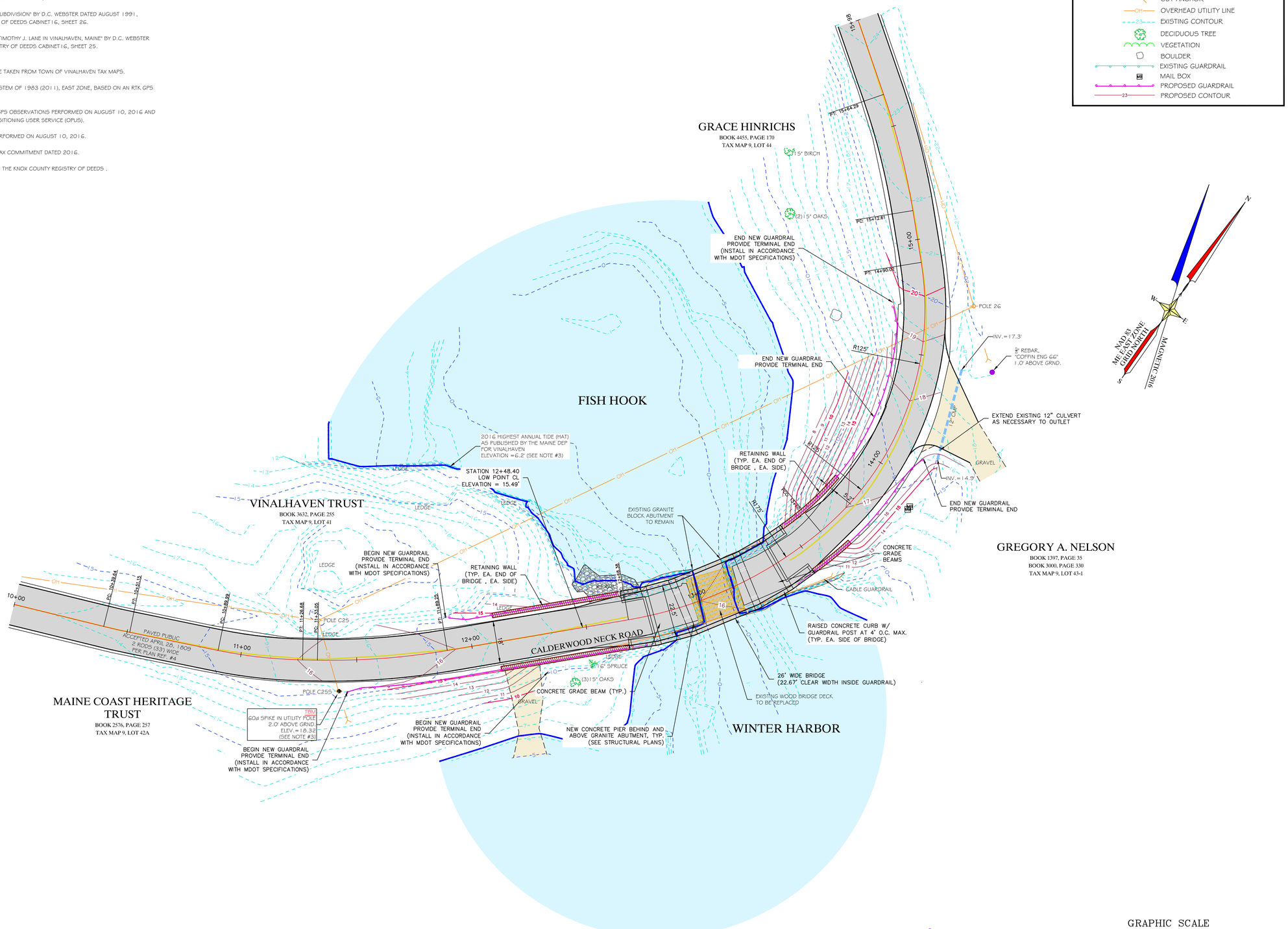
6) BOOKS AND PAGES REFERRED TO ON THIS PLAN ARE RECORDED IN THE KNOX COUNTY REGISTRY OF DEEDS .



LEGEND

- APPROXIMATE RIGHT-OF-WAY LINE
- IRON ROD FOUND
- UTILITY POLE
- GUY ANCHOR
- OVERHEAD UTILITY LINE
- EXISTING CONTOUR
- DECIDUOUS TREE
- VEGETATION
- BOULDER
- EXISTING GUARDRAIL
- MAIL BOX
- PROPOSED GUARDRAIL
- PROPOSED CONTOUR

NO.	REVISIONS	DATE

SHEET TITLE: **SITE PLAN**

CLIENT/PROJECT: **TOWN OF VINALHAVEN CARRYING PLACE BRIDGE**

LOCATION: CALDERWOOD NECK ROAD

TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

SCALE: 1" = 20'

DATE: AUGUST 15, 2017

DRAWN BY: JAM

CHECKED BY:

Gartley & Dorsky ENGINEERING SURVEYING
598 Union Street P.O. Box 1031 Camden, ME (04843-1031
Ph. (207) 236-4365 Fax (207) 236-3055 Toll Free 1-888-282-4365
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Ph. (207) 790-5005

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PROJ. NO. 2015-524

C1

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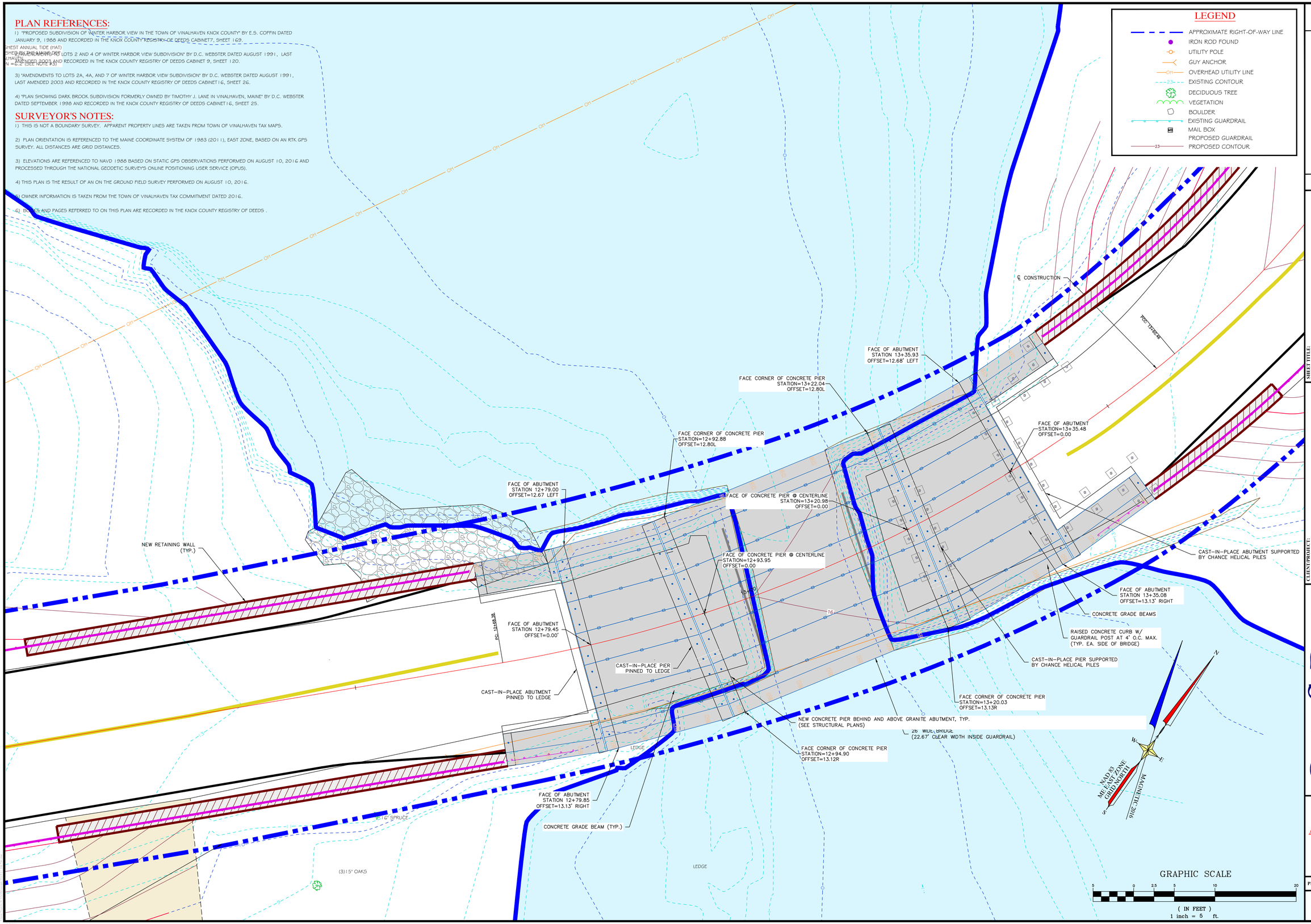

NO.	REVISIONS	DATE

SHEET TITLE: **BRIDGE SITE PLAN**

SCALE: 1" = 5' | DRAWN BY: JAM | CHECKED BY:

DATE: AUGUST 15, 2017

CLIENT/PROJECT: **TOWN OF VINALHAVEN CARRYING PLACE BRIDGE**

LOCATION: CALDERWOOD NECK ROAD

TOWN: VINALHAVEN | COUNTY: KNOX | STATE: MAINE

Gartley & Dorsky ENGINEERING SURVEYING
59R Union Street P.O. Box 1031 Camden, ME 04843-1031
Ph. (207) 236-4365 Fax (207) 236-3035 Toll Free 1-888-282-4365
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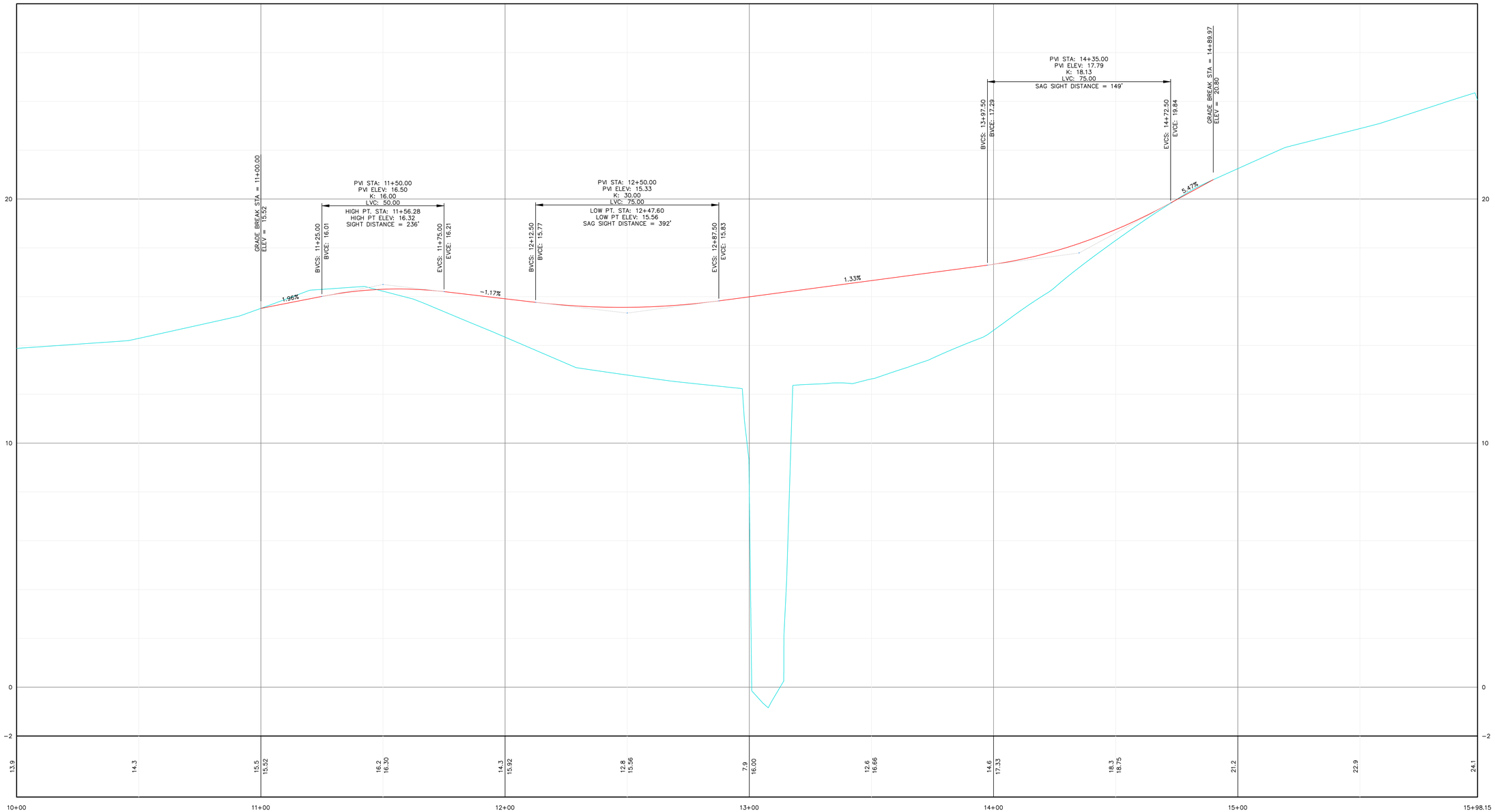

CALDERWOOD NECK ROAD
HORIZONTAL SCALE: 1" =20'
VERTICAL SCALE: 1"=2'

NO.	REVISIONS	DATE

SHEET TITLE: **CALDERWOOD NECK ROAD PROFILE**

SCALE: HORIZ.: 1"=20' VERT.: 1"=2'

DATE: AUGUST 15, 2017

DRAWN BY: JAM

CHECKED BY:

CLIENT/PROJECT: **TOWN OF VINALHAVEN CARRYING PLACE BRIDGE**

LOCATION: CALDERWOOD NECK ROAD

TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

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C3

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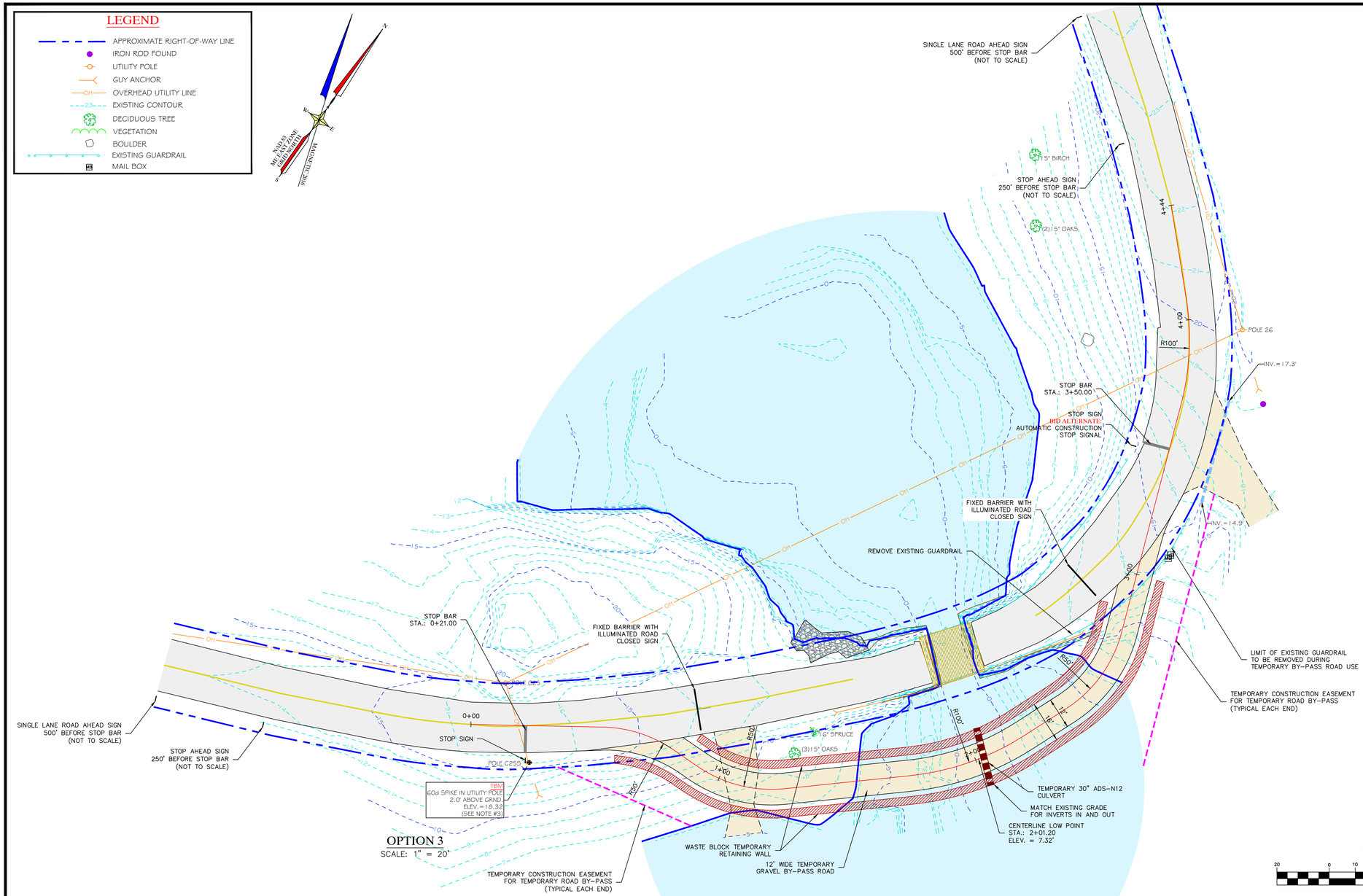
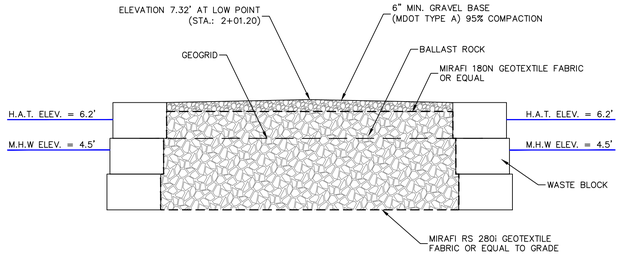


OPTION 3
SCALE: 1" = 20'

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.



TEMPORARY BY-PASS ROAD SECTION
SCALE: 1/4" = 1'-0"

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NO.	REVISIONS	DATE

SHEET TITLE: **TRAFFIC CONTROL PLAN**

CLIENT/PROJECT: **TOWN OF VINALHAVEN CARRYING PLACE BRIDGE**

LOCATION: CALDERWOOD NECK ROAD
TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

SCALE: AS SHOWN
DATE: AUGUST 15, 2017
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PROJ. NO. 2015-524

C4

PROJECT INFORMATION:

OWNER: TOWN OF VINALHAVEN, 19 WASHINGTON SCHOOL ROAD, VINALHAVEN, MAINE

GARTLEY & DORSKY ENGINEERING & SURVEYING HAS BEEN ENGAGED BY THE OWNER TO PROVIDE STRUCTURAL ENGINEERING SERVICES, INCLUDING DEVELOPMENT OF THESE STRUCTURAL PLANS. THE STRUCTURAL PLANS ARE BASED ON THE SURVEY AND CIVIL DRAWINGS PRODUCED BY G&D AND THE SUMMIT GEOENGINEERING SERVICES GEOTECHNICAL REPORT ISSUED MARCH 27, 2017.

GENERAL NOTES:

THE STRUCTURAL DESIGN OF THE BUILDING IS BASED ON THE FULL INTERACTION OF ALL ITS CONNECTED PARTS, INCLUDING ALL REINFORCED CONCRETE. NO PROVISIONS HAVE BEEN MADE FOR ANY TEMPORARY CONDITIONS THAT MAY ARISE DURING CONSTRUCTION PRIOR TO THE COMPLETION OF THE STRUCTURE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE DESIGN AND CONSTRUCTION OF ALL FORMS, SHORING AND TEMPORARY BRACING DURING THE PROGRESS OF THE PROJECT.

ALTERNATE CONNECTION DETAILS MAY BE USED IF SUCH DETAILS ARE SUBMITTED TO THE STRUCTURAL ENGINEER FOR REVIEW AND ACCEPTANCE IS GRANTED. HOWEVER, THE STRUCTURAL ENGINEER SHALL BE THE SOLE JUDGE OF ACCEPTABILITY AND THE CONTRACTOR'S BID SHALL ANTICIPATE THE USE OF THOSE SPECIFIC DETAILS SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ANY ALTERNATE DETAILS, WHICH HE PROPOSES.

WORK NOT INDICATED ON A PART OF THE DRAWINGS, BUT REASONABLY IMPLIED TO BE SIMILAR TO THAT SHOWN AT CORRESPONDING PLACES SHALL BE INCLUDED.

THE CONTRACTOR SHALL BE COMPLETELY RESPONSIBLE FOR THE SAFETY OF ADJACENT STRUCTURES, PROPERTY, AND THE PUBLIC. THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS.

ANY MODIFICATION OR ALTERATION OF THESE CONSTRUCTION DOCUMENTS OR CHANGES IN CONSTRUCTION FROM THE INTENT OF THESE DOCUMENTS BY THE CONTRACTOR WITHOUT WRITTEN APPROVAL OF THE ENGINEER SHALL REMOVE ALL PROFESSIONAL AND LIABLE RESPONSIBILITY ON THE PART OF THE ENGINEER.

ALL CONTRACTORS ARE REQUIRED TO EXAMINE THE DRAWINGS AND SPECIFICATIONS CAREFULLY, VISIT THE SITE AND FULLY INFORM THEMSELVES AS TO ALL EXISTING CONDITIONS AND LIMITATIONS, PRIOR TO SUBMITTING THE PROPOSAL. FAILURE TO VISIT THE SITE AND FAMILIARIZE THEMSELVES WITH THE EXISTING CONDITIONS AND LIMITATIONS WILL IN NO WAY RELIEVE THE SUCCESSFUL BIDDER FROM FURNISHING ANY MATERIALS OR PERFORMING ANY WORK IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS WITHOUT ADDITIONAL COST TO THE OWNER.

DO NOT SCALE FROM DRAWINGS.

DESIGN CRITERIA

DESIGN AND CONSTRUCTION SHALL CONFORM TO ALL APPLICABLE CODES, INCLUDING THE FOLLOWING:

AASHTO LRFD BRIDGE SPECIFICATION, THIRD EDITION
MAINEDOT BRIDGE DESIGN GUIDE, 2003 WITH 2017 UPDATES

DESIGN LOADS ON THE STRUCTURE ARE AS FOLLOWS:

TRUCK LIVE LOAD = HL-93

ALLOWABLE SOIL BEARING PRESSURE: VARIES PER GEOTECH REPORT

FOUNDATIONS:

CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO MAINTAIN STABILITY AND PREVENT UNDERMINING OF EXISTING FOUNDATIONS AT ALL TIMES.

NO FOUNDATIONS SHALL BE PLACED IN WATER OR ON FROZEN GROUND.

ALL FOOTINGS ARE TO BE EXCAVATED USING A BUCKET WITH A SMOOTH TOOTHLESS CUTTING EDGE. FOOTING EXCAVATIONS ARE TO BE FINISHED BY HAND FOR NOT LESS THAN THE LAST SIX INCHES.

STRUCTURAL FILL SHALL BE GRADED WITHIN THE FOLLOWING LIMITS:

SCREEN OR SIEVE SIZE	PERCENT FINER BY WEIGHT
4 INCH	100%
½ INCH	35% – 75%
¼ INCH	25% – 60%
NO. 40	0–25%
NO. 200	0–5%

STRUCTURAL FILL SHALL BE COMPACTED IN 6" LIFTS TO 95% OF ITS MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557.

FOUNDATION BACKFILL SHALL BE WELL DRAINING MATERIAL MEETING THE FOLLOWING GRADATION SPECIFICATIONS:

SCREEN OR SIEVE SIZE	PERCENT FINER BY WEIGHT
3 INCH	100%
¼ INCH	60% – 100%
NO. 40	0 – 50%
NO. 200	0 – 7%

THE FOUNDATION BACKFILL SHOULD BE PLACED IN 6 TO 12 INCH LIFTS AND SHOULD BE COMPACTED TO 95 PERCENT OF ITS MAXIMUM DRY DENSITY DETERMINED IN ACCORDANCE WITH ASTM D1557

DRAINAGE STONE SHALL CONSIST OF CLEAN ANGULAR FRAGMENTS OF QUARRIED ROCK WITH UNIFORM QUALITY AND BE GRADED AS FOLLOWS:

SCREEN OR SIEVE SIZE	PERCENT FINER BY WEIGHT
2½ INCH	100%
2 INCH	95% – 100%
1 INCH	0 – 30%
NO. 200	0 – 5%

AT LOCATIONS WHERE ANY PART OF FOOTING BEARS DIRECTLY ON LEDGE, SUFFICIENT LEDGE SHALL BE REMOVED TO PROVIDE A LEVEL-BEARING SURFACE IN ALL DIRECTIONS. THOROUGHLY CLEAN LEDGE SURFACE PRIOR TO PLACING CONCRETE.

UNLESS OTHERWISE NOTED, ALL FOUNDATION UNITS SHALL BE CENTERED UNDER SUPPORTED MEMBERS.

WHERE FOUNDATION ELEMENTS ARE TO HAVE FILL ON BOTH SIDES, EACH SIDE SHALL BE FILLED SIMULTANEOUSLY, MAINTAINING A COMMON ELEVATION.

CONTRACTOR SHALL PROVIDE CONTINUOUS DRAINAGE BY MECHANICAL METHODS TO CONTROL SURFACE AND UNDERGROUND WATER AS REQUIRED DURING CONSTRUCTION, SO THAT ALL EXCAVATIONS ARE DRY.

THE OWNER, THE STRUCTURAL ENGINEER AND THEIR CONSULTANTS ASSUME NO RESPONSIBILITY FOR THE VALIDITY OF THE SUBSURFACE CONDITIONS DESCRIBED ON THE DRAWINGS, SPECIFICATIONS, TEST BORINGS OR TEST PITS.

ALL LOCATIONS WHERE BEDROCK IS REMOVED SHALL BE FREE DRAINING SO THAT NO POCKETS OF UNDERGROUND WATER COLLECT.

CONCRETE:

ALL CONCRETE WORK SHALL CONFORM TO THE LATEST EDITIONS OF THE FOLLOWING:

ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE"
ACI 304 "GUIDE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE"
ACI 305 "HOT WEATHER CONCRETING"
ACI 306 "COLD WEATHER CONCRETING"
ACI 318 "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE"

IN CASE OF CONFLICT, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.

CONCRETE FOR FOOTINGS, FOUNDATION WALLS AND PIERS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3,000 PSI, MAXIMUM AGGREGATE SIZE OF ¾"(NOMINAL), MAXIMUM WATER-CEMENT RATIO OF 0.50, MAXIMUM SLUMP OF 4", AND A TOTAL AIR CONTENT OF 6 PERCENT.

CONCRETE FOR INTERIOR SLABS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3,500 PSI, MAXIMUM AGGREGATE SIZE OF ¾"(NOMINAL), MAXIMUM WATER-CEMENT RATIO OF 0.50, AND A MAXIMUM SLUMP OF 5"+/-1", NO AIR.

CONCRETE FOR EXTERIOR SLABS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI, MAXIMUM AGGREGATE SIZE OF ¾"(NOMINAL), MAXIMUM WATER-CEMENT RATIO OF 0.50, MAXIMUM SLUMP OF 5"+/-1", AND A TOTAL AIR CONTENT OF 6 PERCENT.

ALL FOOTINGS SHALL BE PLACED MONOLITHICALLY.

PIPES OR CONDUITS PLACED IN SLABS ON GRADE SHALL NOT BE PLACED CLOSER THAN 3 DIAMETERS ON CENTER AND SHALL HAVE AN OUTSIDE DIAMETER LESS THAN 1/4 OF THE SLAB THICKNESS. ALUMINUM COMPONENTS SHALL NOT BE PLACED IN CONCRETE. NO CONDUITS SHALL BE PLACED IN SLABS ON METAL DECK.

ALL EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE CHAMFERED ½" UNLESS SHOWN OTHERWISE ON DRAWINGS.

SEE ARCHITECTURAL DRAWINGS FOR DOOR AND WINDOW OPENINGS, DRIPS, WASHES, REGLETS, CONCRETE FINISHES, MASONRY ANCHORS, AND FOR MISCELLANEOUS EMBEDDED PLATES, BOLTS, ANCHORS, ANGLES, ETC. REFER TO MECHANICAL DRAWINGS FOR OTHER EMBEDMENT REQUIREMENTS.

INTERIOR CONCRETE SLABS SHALL BE MOIST CURED CONTINUOUSLY FOR 7 DAYS.

ALL CONCRETE SHALL BE REINFORCED, UNLESS INDICATED OTHERWISE.

ALL EMBEDMENTS IN CONCRETE, INCLUDING ANCHOR BOLTS, SHALL BE FIRMLY SECURED BY TIE WIRE TO PREVENT MOVEMENT DURING CONCRETE PLACEMENT.

ALL CONCRETE MATERIALS, REINFORCEMENT AND FORMS SHALL BE FREE FROM FROST.

CONCRETE SHALL BE MAINTAINED ABOVE 50 DEGREES F, AND IN MOIST CONDITION FOR AT LEAST THE FIRST SEVEN DAYS AFTER PLACEMENT.

CONSOLIDATE ALL CONCRETE WITH A VIBRATOR OR OTHER MEANS RECOMMENDED BY ACI 301. HONEYCOMBED SURFACES WILL NOT BE PERMITTED.

SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS OF DRAINS. SLOPE SLABS UNIFORMLY TO DRAINS.

DEFECTIVE CONCRETE IS DEFINED AS CONCRETE NOT CONFORMING TO REQUIRED LINES, DETAILS, DIMENSIONS, TOLERANCES OR SPECIFIED REQUIREMENTS. REPAIR OR REPLACEMENT OF DEFECTIVE CONCRETE WILL BE DETERMINED BY THE ENGINEER OR ARCHITECT. THE COST OF ADDITIONAL TESTING SHALL BE BORNE BY THE CONTRACTOR WHEN DEFECTIVE CONCRETE IS IDENTIFIED.

REINFORCING FOR CONCRETE:

ALL CONCRETE REINFORCING BARS SHALL CONFORM TO ASTM A615, GRADE 60 EXCEPT WHERE NOTED.

REINFORCING BARS SHALL BE EPOXY COATED PER ASTM A775. PRIOR TO CONCRETE PLACEMENT, DAMAGE (CUT ENDS, CRACKS, AND ABRASIONS) SHALL BE PATCHED USING A TWO-PART EPOXY REPAIR MATERIAL APPROVED BY THE COATING MANUFACTURER.

ALL WELDED WIRE FABRIC (W.W.F.) SHALL CONFORM TO ASTM 185. W.W.F. SHALL BE PROVIDED IN FLAT SHEETS.

DETAILING OF CONCRETE REINFORCEMENT AND ACCESSORIES SHALL BE IN ACCORDANCE WITH ACI 315 – "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES," LATEST EDITION.

PROVIDE AND SCHEDULE WITH THE SHOP DRAWINGS, ALL NECESSARY ACCESSORIES TO HOLD REINFORCING SECURELY IN POSITION. MINIMUM REQUIREMENTS SHALL BE:

HIGH CHAIRS 4'-0" ON CENTER
SLAB BOLSTERS 4'-0" ON CENTER
SUPPORT BARS FOR HIGH CHAIRS NO. 5

ALL LAPS IN W.W.F. SHALL BE ONE MESH PLUS TWO INCHES AT SPLICES. W.W.F. SHALL BE 6X6/W1.4XW1.4 (TYPICAL UNLESS NOTED OTHERWISE (U.N.O.))

REINFORCING BARS MAY NOT BE WELDED.

CONCRETE PROTECTION FOR REINFORCEMENT SHALL BE PROVIDED AS FOLLOWS:

FOOTINGS: 3"
FOUNDATION WALLS: 2"
EXTERIOR SLABS: 2"
INTERIOR SLABS: 1"
PIERS: 1½" TO TIES

MAXIMUM DEVIATION FROM THESE REQUIREMENTS SHALL BE ½ INCH FOR SECTIONS 10 INCHES THICK OR LESS; AND 1 INCH FOR SECTIONS OVER 10 INCHES THICK. SEE ACI 318-97, SECTION 7.7.1 FOR CONDITIONS NOT LISTED.

ALL HOOKS SHOWN ON DRAWINGS SHALL BE STANDARD HOOKS UNLESS NOTED OTHERWISE.

WHERE CONTINUOUS BARS ARE CALLED FOR, THEY SHALL RUN CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPLICES, OR HOOKED AT DISCONTINUOUS ENDS. LAP LENGTHS SHALL BE AS GIVEN IN THE SPLICE AND DEVELOPMENT TABLE. LAP BEAM TOP BARS AT MID-SPAN AND BEAM BOTTOM BARS AT SUPPORTS, UNLESS NOTED OTHERWISE.

STRUCTURAL STEEL:

ALL STRUCTURAL STEELWORK SHALL CONFORM TO THE RECOMMENDATIONS AND REQUIREMENTS CONTAINED IN THE "STEEL CONSTRUCTION MANUAL,"(AISC 13TH EDITION), AND "STRUCTURAL WELDED CODE – STEEL," (AWS D1.1 LATEST EDITION).

STRUCTURAL STEEL ROLLED SHAPES, PLATES, AND BARS SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:

ASTM A992:	WIDE FLANGE SHAPES (FY=50 KSI)
ASTM A36:	ALL OTHER SHAPES, PLATES, AND BARS, UNLESS NOTED OTHERWISE (FY=36 KSI)
ASTM 500, GRADE C:	STEEL TUBE (FY=50 KSI)
ASTM 500, GRADE C:	STEEP PIPE (FY=46 KSI)
ASTM A325:	ALL BOLTS CONNECTING STRUCTURAL MEMBERS, TYPE SC OR N
ASTM A307:	ALL ANCHOR BOLTS

ALL STEEL AND CONNECTION MATERIAL EXPOSED TO WEATHER SHALL BE HOT-DIP GALVANIZED. (UNO)

NO CHANGE IN SIZE OR POSITION OF THE STRUCTURAL ELEMENTS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE STRUCTURAL ENGINEER.

NONSHRINK GROUT SHALL BE 7000 PSI (MIN.) COMPRESSIVE STRENGTH.

TEMPORARY ERECTION BRACING SHALL BE PROVIDED TO HOLD STRUCTURAL STEEL SECURELY IN POSITION. REMOVE TEMPORARY BRACING AND CONNECTIONS ONLY AFTER PERMANENT MEMBERS ARE IN PLACE AND FINAL CONNECTIONS ARE IN PLACE.

SHOP CONNECTIONS, UNLESS OTHERWISE NOTED, SHALL BE MADE BY WELDING.

ALL SHOP AND FIELD WELDS SHALL BE MADE BY QUALIFIED WELDERS, AND SHALL CONFORM TO THE AMERICAN WELDING SOCIETY CODE, AWS D1.1, LATEST EDITION. CAREFULLY CONTROL WELDING TECHNIQUE TO AVOID DISTORTION.

ELECTRODES FOR ALL FIELD AND SHOP WELDING SHALL CONFORM TO AWS E70-18. MINIMUM WELD SIZE SHALL BE 3/16" FILLET.

CUTS, HOLES, COPING, ETC. REQUIRED FOR WORK OF OTHER TRADES SHALL BE SHOWN ON THE SHOP DRAWINGS AND MADE IN THE SHOP. CUTS OR BURNING OF HOLES IN STRUCTURAL STEEL MEMBERS IN THE FIELD WILL NOT BE PERMITTED, UNLESS APPROVED IN WRITING BY THE STRUCTURAL ENGINEER.

ALL BEAMS AND COLUMNS ENCASED IN MASONRY OR CONCRETE SHALL BE COVERED WITH A COAL TAR EPOXY COATING, 1/8" THICK, OR SHALL BE GALVANIZED.

STRUCTURAL STEEL PENETRATIONS REQUIRE WRITTEN APPROVAL FROM THE STRUCTURAL ENGINEER. PENETRATIONS SHALL BE DRILLED.

PLACE NONSHRINK GROUT UNDER ALL COLUMN BASE PLATES BEFORE ADDING ANY VERTICAL LOADS.

PRECAST CONCRETE:

DESIGNER QUALIFICATIONS: DESIGN PRECAST CONCRETE MEMBERS UNDER DIRECT SUPERVISION OF A PROFESSIONAL STRUCTURAL ENGINEER EXPERIENCED IN DESIGN OF PRECAST CONCRETE AND LICENSED IN THE STATE IN WHICH THE PROJECT IS LOCATED.

FABRICATOR QUALIFICATIONS: COMPANY SPECIALIZING IN MANUFACTURING PRODUCTS SPECIFIED IN THIS SECTION, WITH NOT LESS THAN THREE YEARS OF DOCUMENTED EXPERIENCE.

HANDLE PRECAST MEMBERS IN POSITION CONSISTENT WITH THEIR SHAPE AND DESIGN. LIFT AND SUPPORT ONLY FROM SUPPORT POINTS.

LIFTING OR HANDLING DEVICES: CAPABLE OF SUPPORTING MEMBER IN POSITIONS ANTICIPATED DURING MANUFACTURE, STORAGE, TRANSPORTATION, AND ERECTION.

PROTECT MEMBERS TO PREVENT STAINING, CHIPPING, OR SPALLING OF CONCRETE.

PRECAST STRUCTURAL CONCRETE UNITS: COMPLY WITH PCI MNL-116, PCI MNL-120, PCI MNL-123, PCI MNL-135, ACI 318 AND APPLICABLE CODES.

1. DESIGN COMPONENTS TO WITHSTAND DEAD LOADS AND DESIGN LOADS IN THE CONFIGURATION INDICATED ON THE DRAWINGS.
2. CALCULATE STRUCTURAL PROPERTIES OF FRAMING MEMBERS IN ACCORDANCE WITH ACI 318.
3. DESIGN SYSTEM TO ACCOMMODATE CONSTRUCTION TOLERANCES, DEFLECTION OF OTHER BUILDING STRUCTURAL MEMBERS AND CLEARANCES OF INTENDED OPENINGS.

TENSIONING STEEL TENDONS: ASTM A 416/A 416M, GRADE 250 (1725); SEVEN-WIRE STRANDED STEEL CABLE; LOW-RELAXATION TYPE; FULL LENGTH WITHOUT SPLICES; UNCOATED.

REINFORCING STEEL: ASTM A 615/A 615M GRADE 40 (280), PLAIN BILLET-STEEL BARS, UNFINISHED.

STEEL WELDED WIRE REINFORCEMENT: ASTM A 185/A 185M PLAIN TYPE OR ASTM A 497/A 497M DEFORMED TYPE; IN FLAT SHEETS; UNFINISHED.

BEARING PADS: HIGH DENSITY PLASTIC, VULCANIZED ELASTOMERIC COMPOUND MOLDED TO SIZE.

BOLTS, NUTS AND WASHERS: HIGH STRENGTH STEEL TYPE RECOMMENDED FOR STRUCTURAL STEEL JOINTS.

CONFORM TO FABRICATION PROCEDURES SPECIFIED IN PCI MNL-116.

MAINTAIN PLANT RECORDS AND QUALITY CONTROL PROGRAM DURING PRODUCTION OF PRECAST MEMBERS. MAKE RECORDS AVAILABLE UPON REQUEST.

ENSURE REINFORCING STEEL, ANCHORS, INSERTS, PLATES, ANGLES, AND OTHER CAST-IN ITEMS ARE EMBEDDED AND LOCATED AS INDICATED ON SHOP DRAWINGS.

PROVIDE EMBED ACCESSORIES AT INDICATED LOCATIONS.

CURE MEMBERS UNDER IDENTICAL CONDITIONS TO DEVELOP REQUIRED CONCRETE QUALITY, AND MINIMIZE APPEARANCE BLEMISHES SUCH AS NON-UNIFORMITY, STAINING, OR SURFACE CRACKING.

FINISH MEMBERS TO PCI MNL-116 COMMERCIAL GRADE.

CONFORM TO FABRICATION TOLERANCES SPECIFIED IN PCI MNL-135.

CONTRACTOR TO COORDINATE PRECAST WITH CAST-IN-PLACE CONCRETE AND STRUCTURAL STEEL TO ENSURE PROPER ALIGNMENT AND CONSTRUCTION.

CONTRACTOR SHALL VERIFY THAT SITE CONDITIONS ARE READY TO RECEIVE WORK AND FIELD MEASUREMENTS ARE AS SHOWN ON SHOP DRAWINGS.

ERECT MEMBERS WITHOUT DAMAGE TO STRUCTURAL CAPACITY, SHAPE, OR FINISH. REPLACE OR REPAIR DAMAGED MEMBERS. ALIGN AND MAINTAIN UNIFORM HORIZONTAL AND VERTICAL JOINTS, AS ERECTION PROGRESSES.

MAINTAIN TEMPORARY BRACING IN PLACE UNTIL FINAL SUPPORT IS PROVIDED.

PROVIDE TEMPORARY LATERAL SUPPORT TO PREVENT BOWING, TWISTING, OR WARPING OF MEMBERS.

SECURE UNITS IN PLACE. PERFORM WELDING IN ACCORDANCE WITH AWS D1.1.

ERECT MEMBERS LEVEL AND PLUMB WITHIN ALLOWABLE TOLERANCES.

WHEN MEMBERS CANNOT BE ADJUSTED TO CONFORM TO DESIGN OR TOLERANCE CRITERIA, CEASE WORK AND ADVISE ENGINEER. EXECUTE MODIFICATIONS AS DIRECTED.

SUBMITTALS AND INSPECTIONS:

A. SUBGRADE INSPECTIONS SHALL BE PERFORMED BY OWNERS REPRESENTATIVE AFTER INITIAL EXCAVATION IS COMPLETED AND PRIOR TO PLACEMENT OF CONCRETE OR CRUSHED STONE BASE.

B. SUBMIT CONCRETE DESIGN MIXTURES FOR EACH CLASS OF CONCRETE. SUBMIT ALTERNATE DESIGN MIXTURES WHEN CHARACTERISTICS OF MATERIALS, PROJECT CONDITIONS, WEATHER, TEST RESULTS, OR OTHER CIRCUMSTANCES WARRANT ADJUSTMENTS. SUBMIT DESIGN MIXTURES TO ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT OF WORK.
   1. INDICATE AMOUNTS OF MIXING WATER TO BE WITHHELD FOR LATER ADDITION AT PROJECT SITE.

C. CONCRETE TESTING: COMPRESSIVE STRENGTH TESTS SHALL BE PERFORMED ACCORDING TO ASTM C39/C39M. FOR EACH TEST, MOLD AND CURE THREE CONCRETE TEST CYLINDERS. ONE ADDITIONAL TEST CYLINDER SHALL BE TAKEN AND CURED ON THE JOB SITE UNDER THE SAME CONDITIONS AS THE CONCRETE IT REPRESENTS. PERFORM ONE SLUMP TEST FOR EACH SET OF TEST CYLINDERS TAKEN, FOLLOWING PROCEDURES OF ASTM C143/C143M. TEST SAMPLES SHALL BE TAKEN FOR EACH CLASS OF CONCRETE NOT LESS THAN ONCE A DAY, NOR LESS THAN ONCE FOR EACH 150 CY OF CONCRETE PLACED OR LESS THAN ONCE FOR EACH 5000 SQUARE FEET OF SURFACE AREA FOR SLABS OR WALLS. TESTING AGENCY SHALL COMPLY WITH ASTM C1077. THE CONTRACTOR MUST PROVIDE FREE ACCESS TO CONCRETE OPERATIONS AT THE PROJECT SITE AND COOPERATE WITH APPOINTED FIRM. SUBMIT TESTING RESULTS TO ENGINEER.

D. SHOP DRAWINGS: INDICATE LAYOUT, UNIT LOCATIONS, FABRICATION DETAILS, UNIT IDENTIFICATION MARKS, REINFORCEMENT, CONNECTION DETAILS, SUPPORT ITEMS, DIMENSIONS, OPENINGS, AND RELATIONSHIP TO ADJACENT MATERIALS. INDICATE DESIGN LOADS, DEFLECTIONS, CAMBERS, BEARING REQUIREMENTS, AND SPECIAL CONDITIONS.
   1. SUBMIT SHOP DRAWINGS AND DESIGN DATA TO ENGINEER FOR APPROVAL.
   2. SUBMIT PRODUCT DATA INDICATING STANDARD COMPONENT CONFIGURATIONS, DESIGN LOADS, DEFLECTIONS, CAMBERS, AND BEARING REQUIREMENTS.
   3. CONFIRM SPECIFIED PRECAST PLANK WITH PROPOSED TOPPING MEETS SPECIFIED DESIGN LIVE LOADS

E. STEEL REINFORCEMENT SHOP DRAWINGS: SUBMIT PLACEMENT DRAWINGS THAT DETAIL FABRICATION, BENDING, AND PLACEMENT. INCLUDE BAR SIZES, LENGTHS, MATERIAL, GRADE, BAR SCHEDULES, STIRRUP SPACING, BENT BAR DIAGRAMS, BAR ARRANGEMENT, SPLICES AND LAPS, MECHANICAL CONNECTIONS, TIE SPACING, HOOP SPACING, AND SUPPORTS FOR CONCRETE REINFORCEMENT.

FOR PRICING PURPOSES ONLY
NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE

SHEET TITLE: NOTES AND SPECIFICATIONS

SCALE:

DRAWN BY: EAP
CHECKED BY:

DATE: AUGUST 10, 2017

CLIENT/PROJECT: TOWN OF VINALHAVEN CARRYING PLACE BRIDGE

LOCATION: CALDERWOOD NECK ROAD
TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

Gartley & Dorsky ENGINEERING SURVEYING
50 Union Street, Unit 1, P.O. Box 1031 Camden, ME 04843-1031
Ph. (207) 236-4365 Fax (207) 236-3055 Toll Free 1-888-282-4365
163 Main Street Suite 2F P.O. Box 1072 Damariscotta, Maine 04543
Ph. (207) 791-5905

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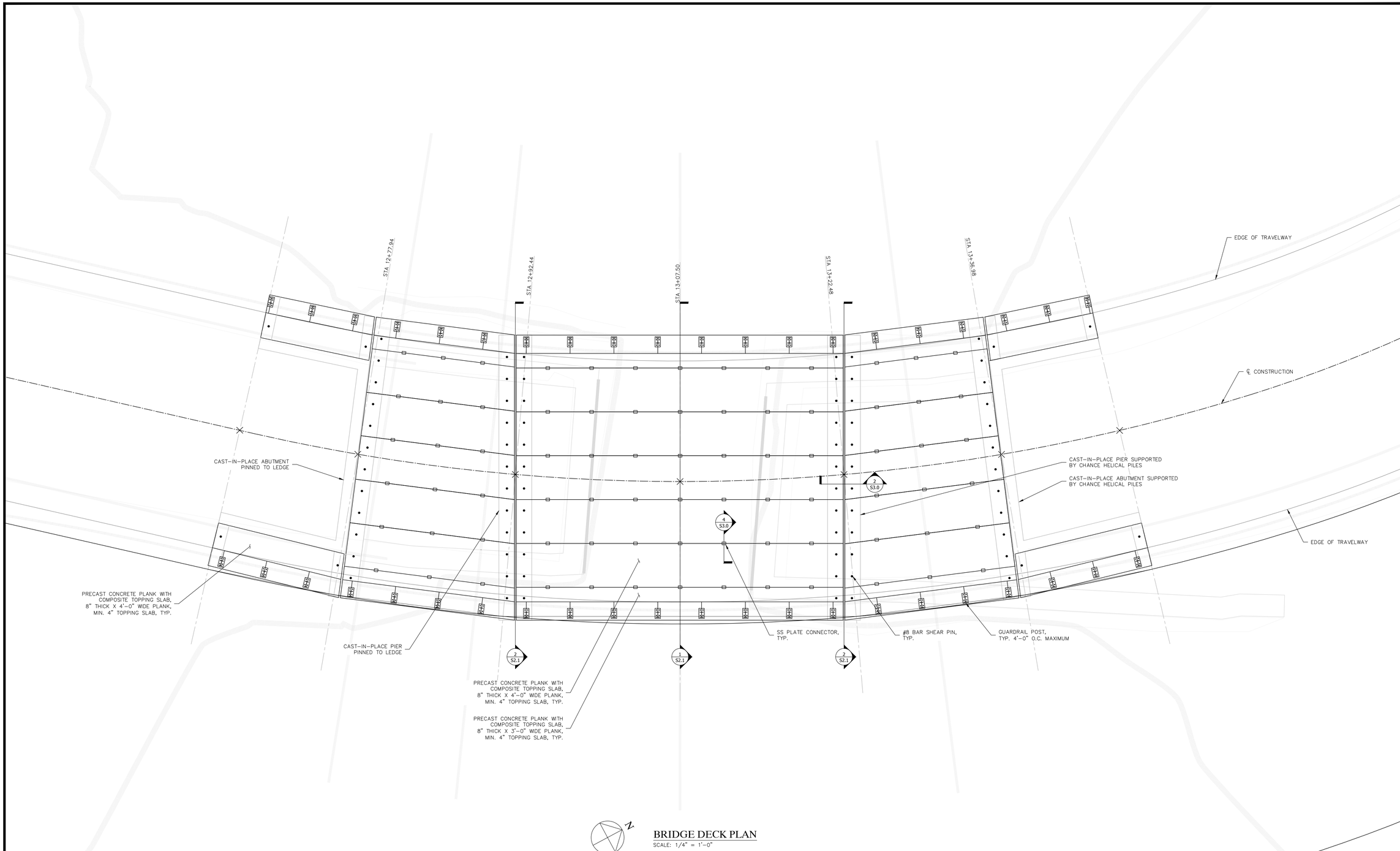

BRIDGE DECK PLAN

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

FOR PRICING PURPOSES ONLY

NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE

SHEET TITLE: **BRIDGE DECK PLAN**

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

DRAWN BY: EAP

CHECKED BY:

DATE: AUGUST 10, 2017

CLIENT/PROJECT: **TOWN OF VINALHAVEN CARRYING PLACE BRIDGE**

LOCATION: CALDERWOOD NECK ROAD

TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

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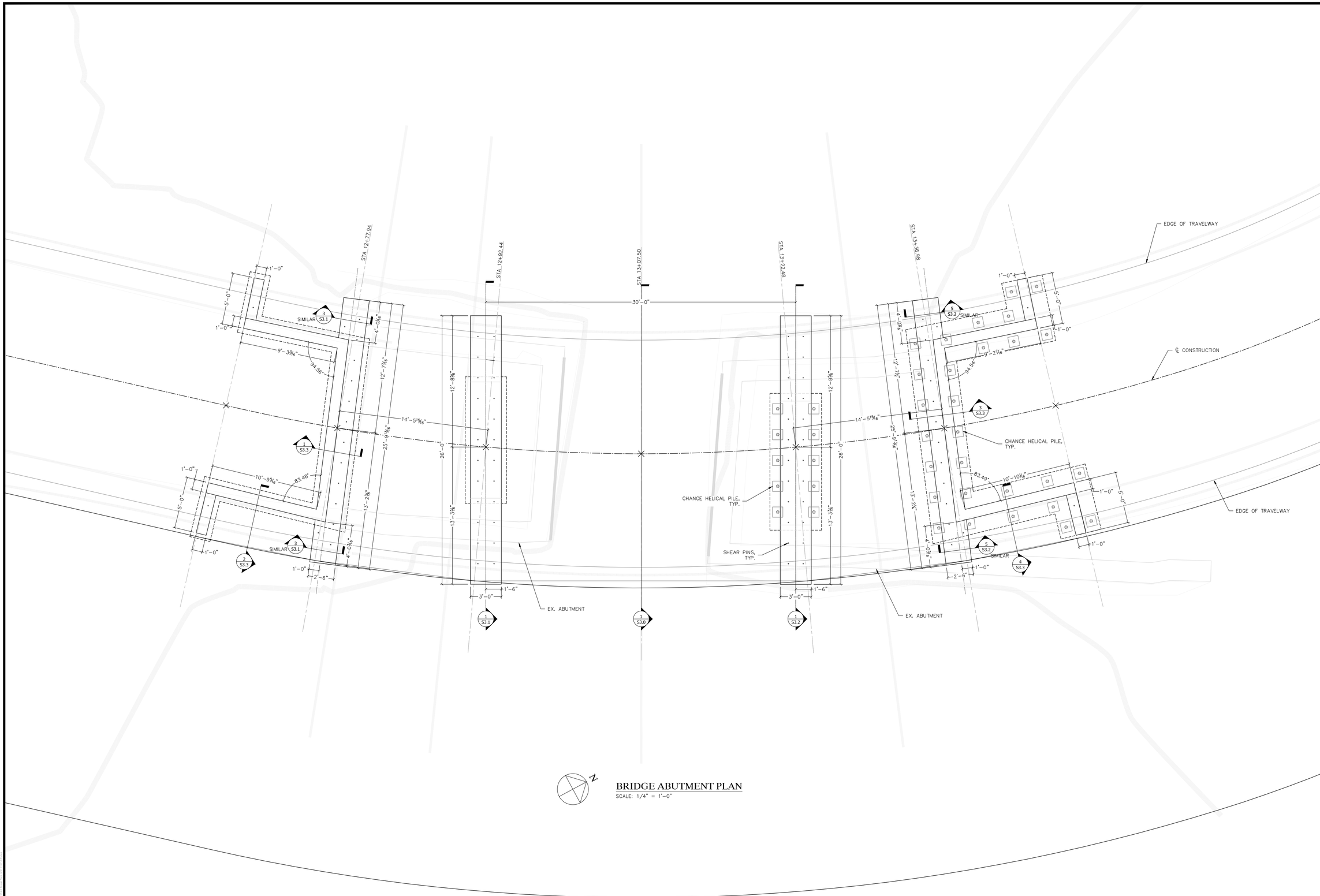

BRIDGE ABUTMENT PLAN
SCALE: 1/4" = 1'-0"

FOR PRICING PURPOSES ONLY
NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE

SHEET TITLE: **BRIDGE ABUTMENT PLAN**

SCALE: 1/4" = 1'-0" DRAWN BY: EAP
DATE: AUGUST 10, 2017 CHECKED BY:

CLIENT/PROJECT: **TOWN OF VINALHAVEN CARRYING PLACE BRIDGE**

LOCATION: CALDERWOOD NECK ROAD
TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

Gartley & Dorsky ENGINEERING SURVEYING
59 Union Street, Unit 1, P.O. Box 1031 Camden, ME 04843-1031
Ph (207) 236-4365 Fax (207) 236-3055 Toll Free 1-888-282-4365
165 Main Street Suite 2F P.O. Box 1072 Damariscotta, Maine 04543
Ph. (207) 790-5065

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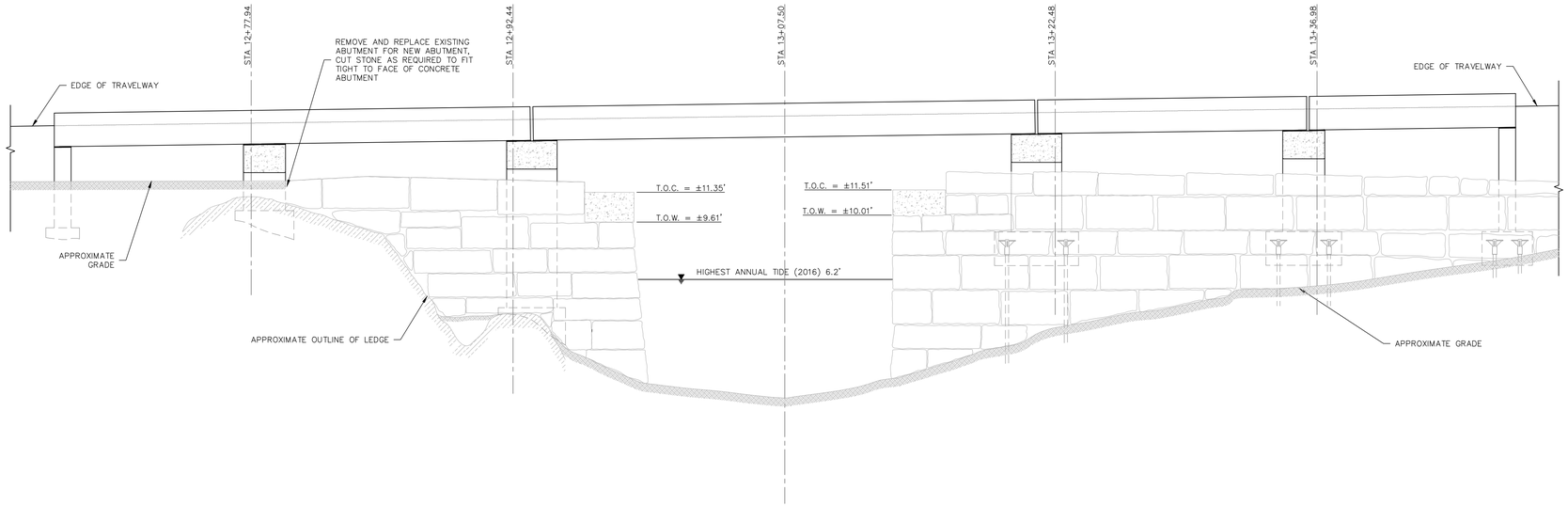
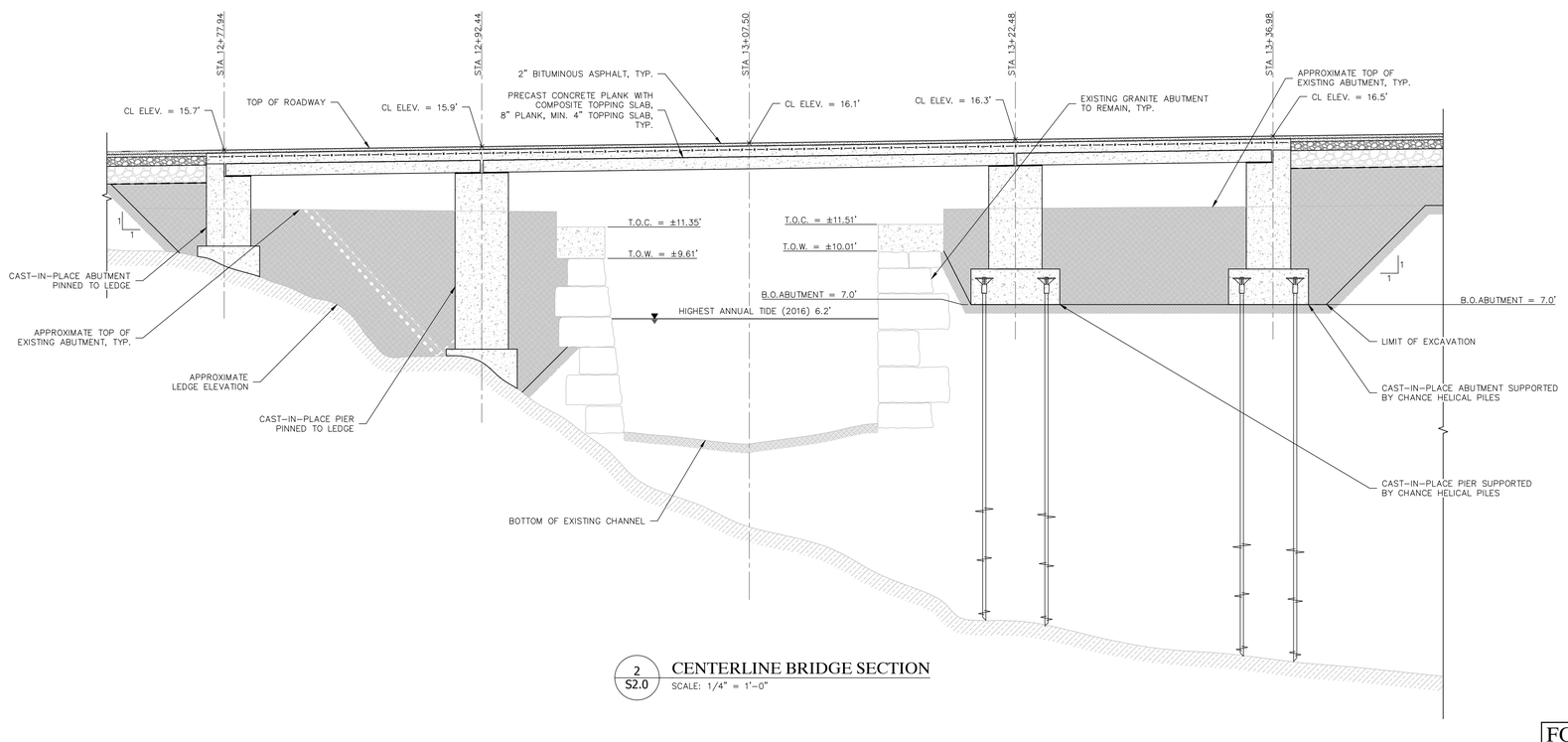


1 / S2.0 BRIDGE ELEVATION - EAST SIDE
SCALE: 1/4" = 1'-0"



2 / S2.0 CENTERLINE BRIDGE SECTION
SCALE: 1/4" = 1'-0"

FOR PRICING PURPOSES ONLY
NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE

SHEET TITLE: **BRIDGE ELEVATION AND SECTION**

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

DRAWN BY: JRN

CHECKED BY:

DATE: AUGUST 10, 2017

CLIENT/PROJECT: **TOWN OF VINALHAVEN CARRYING PLACE BRIDGE**

LOCATION: CALDERWOOD NECK ROAD

TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

Gartley & Dorsky ENGINEERING SURVEYING
59 Union Street, Unit 1, P.O. Box 1031 Camden, ME 04843-1031
Ph. (207) 236-4365 Fax (207) 236-3835 Toll Free 1-888-282-4365
165 Main Street Suite 2F P.O. Box 1072 Damariscotta, Maine 04543
Ph. (207) 790-5005

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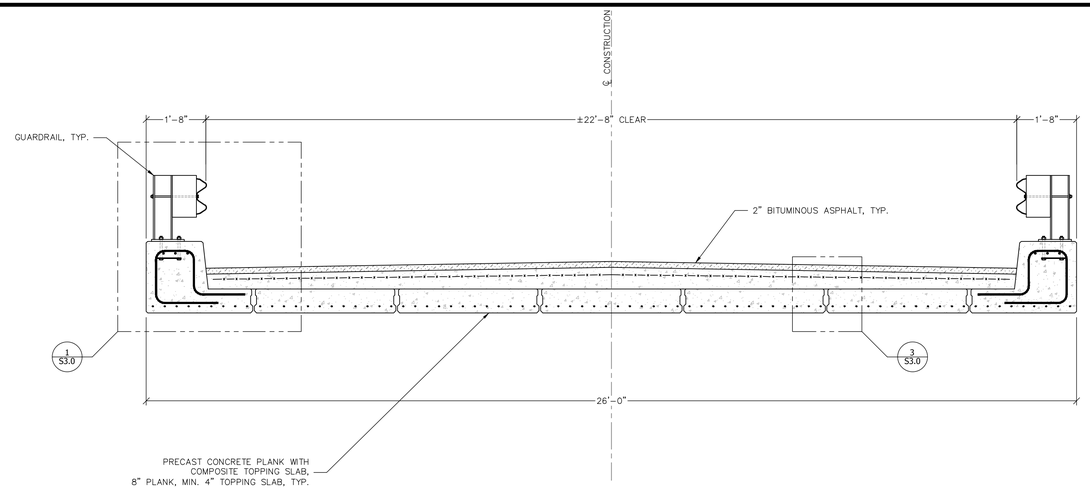
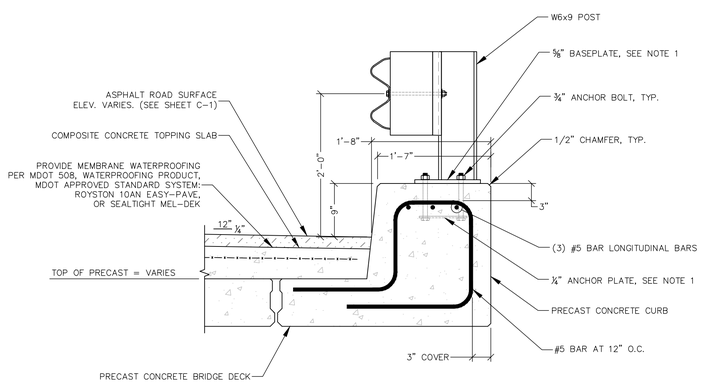


1 / S1.1 BRIDGE TRANSVERSE SECTION

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

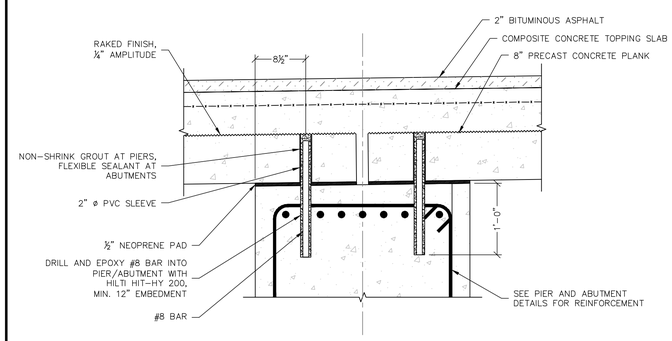
NOTE:
CONCRETE TOPPING SLAB SHALL BE CROWNED AT ¼" PER 1'-0"

NOTES:
1. BASEPLATE AND ANCHOR PLATE PER MDOT STANDARD DETAIL 606(17) "GUARDRAIL TYPE 3 – SINGLE RAIL BRIDGE MOUNTED".
2. ANCHOR BOLTS PER MDOT STANDARD DETAIL 606(17) "GUARDRAIL TYPE 3 – SINGLE RAIL BRIDGE MOUNTED".
3. POST PER MDOT MDOR STANDARD DETAIL GUARDRAIL TYPE 3 – SINGLE RAIL BRIDGE MOUNTED 606(18); W6x9.



1 / S3.0 TYPICAL GUARDRAIL SECTION

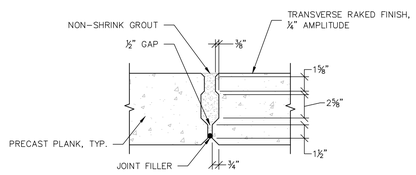
SCALE: 1" = 1'-0"



2 / S1.0 TYPICAL PRECAST TO ABUTMENT/PIER ATTACHMENT

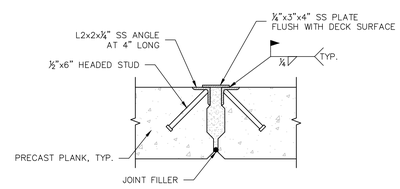
SCALE: 1" = 1'-0"

NOTE: DRILL 1¾" ø HOLE IN TOP OF ABUTMENT FOR BAR AND NON-SHRINK GROUT



3 / S3.0 PLANK SHEAR KEY DETAIL

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



4 / S1.0 PLANK ATTACHMENT DETAIL

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

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NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE

SHEET TITLE: **BRIDGE TRANSVERSE SECTION AND DETAILS**

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

DRAWN BY: EAP

CHECKED BY:

DATE: AUGUST 10, 2017

CLIENT/PROJECT: **TOWN OF VINALHAVEN CARRYING PLACE BRIDGE**

LOCATION: CALDERWOOD NECK ROAD

TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

Gartley & Dorsky ENGINEERING SURVEYING
59 Union Street, Unit 1, P.O. Box 1031 Camden, ME 04843-1031
Ph. (207) 236-4365 Fax (207) 236-3835 Toll Free 1-888-282-4365
165 Main Street Suite 2F P.O. Box 1072 Damariscotta, Maine 04543
Ph. (207) 790-5005

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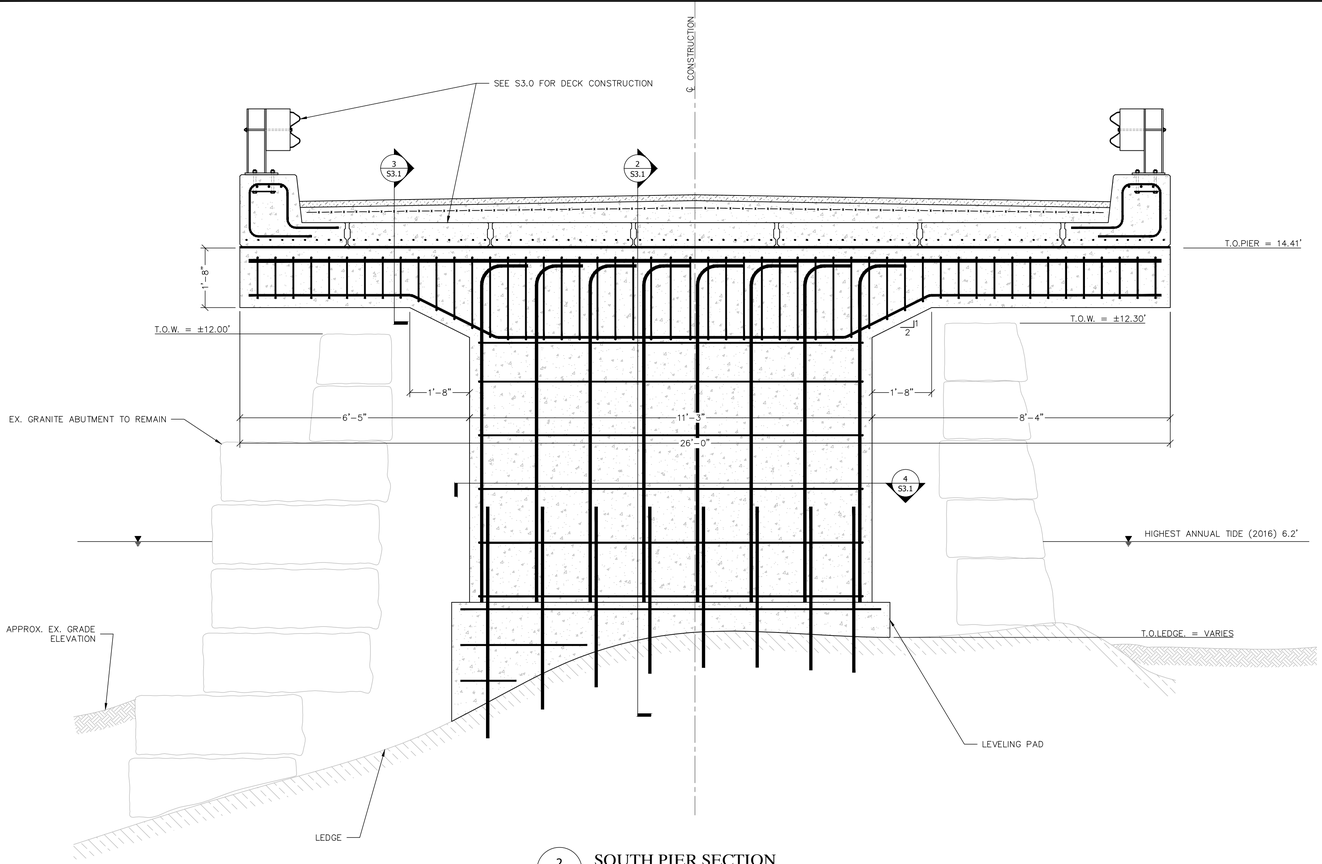
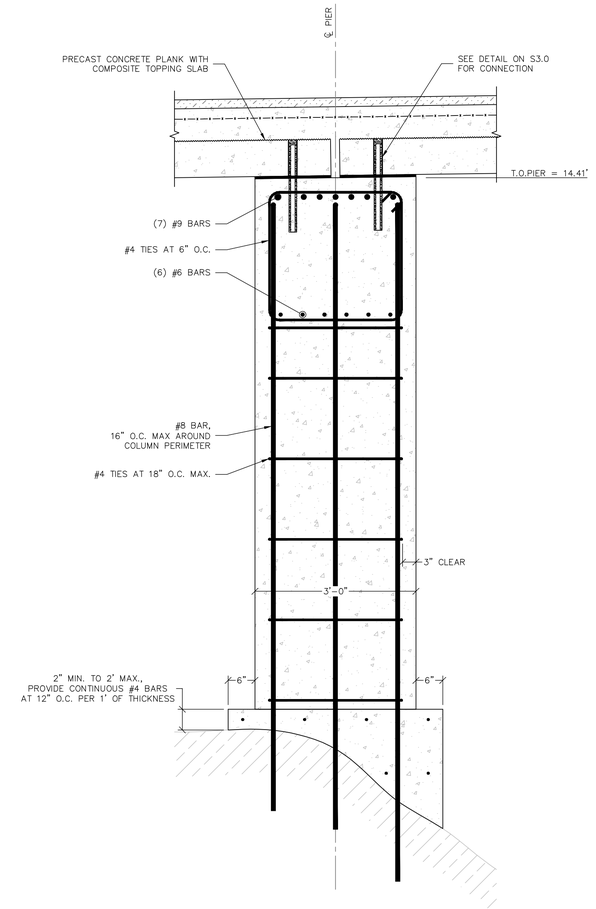
PROJ. NO. 2015-524

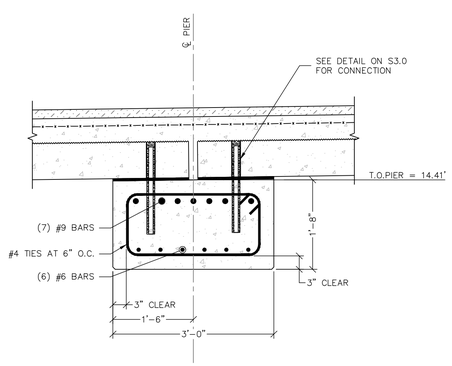
S3.0



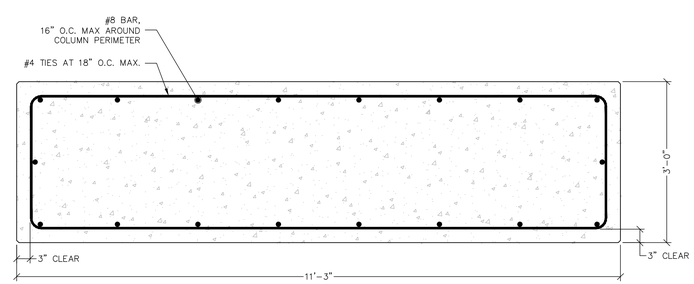
2 S1.1 SOUTH PIER SECTION
SCALE: 1/2" = 1'-0"



2 S3.1 PIER LONGITUDINAL SECTION
SCALE: 3/4" = 1'-0"



3 S3.1 PIER CAP SECTION
SCALE: 3/4" = 1'-0"



4 S3.1 PIER COLUMN SECTION
SCALE: 3/4" = 1'-0"

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NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE

SHEET TITLE: SOUTH PIER

SCALE: 1/4" = 1'-0"
DRAWN BY: JES
DATE: AUGUST 10, 2017
CHECKED BY:

CLIENT/PROJECT: TOWN OF VINALHAVEN CARRYING PLACE BRIDGE

LOCATION: CALDERWOOD NECK ROAD
TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

Gartley & Dorsky ENGINEERING SURVEYING
50 Union Street, Unit 1, P.O. Box 1031 Camden, ME 04843-1031
Ph. (207) 236-4365 Fax (207) 236-3055 Toll Free 1-888-282-4365
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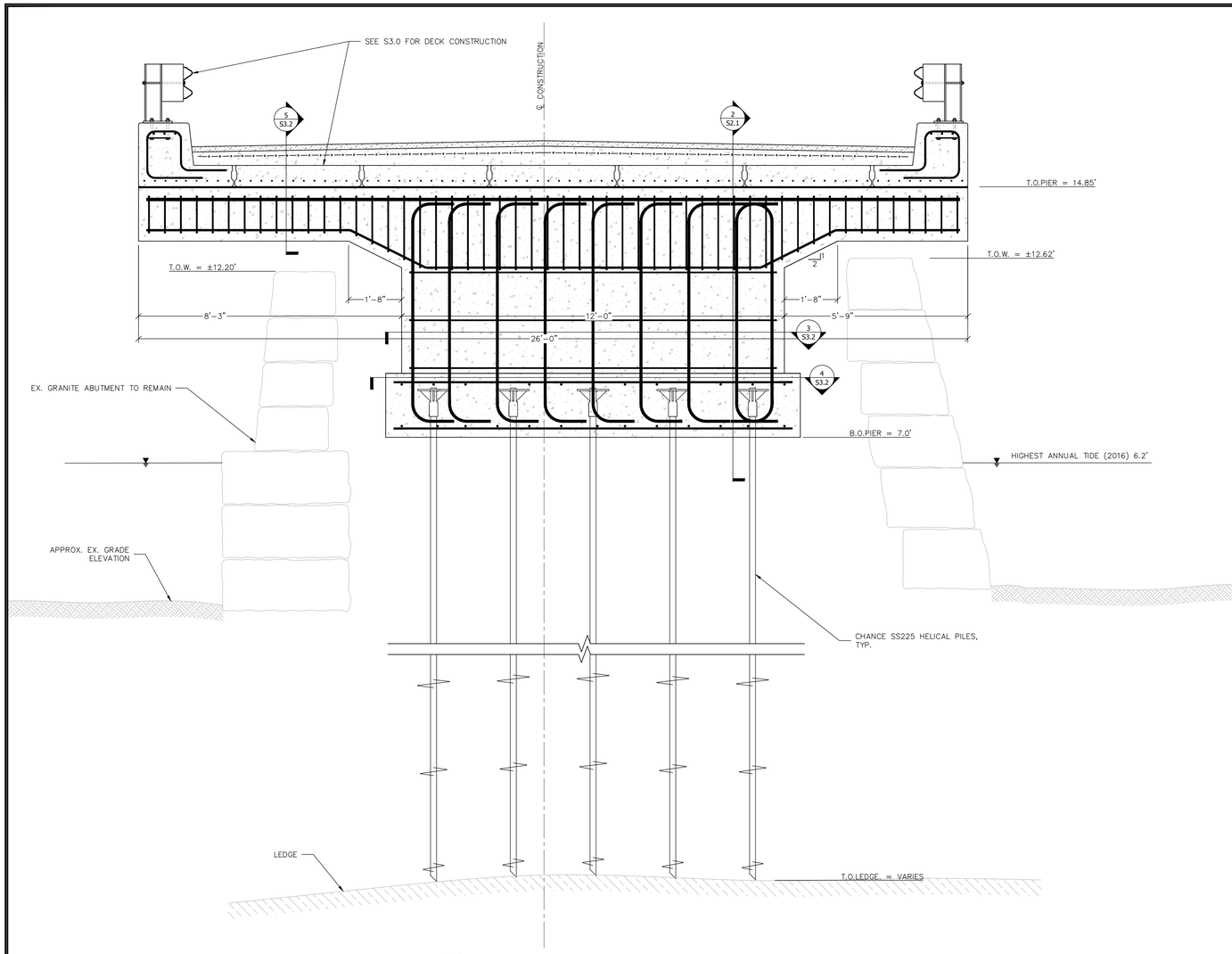
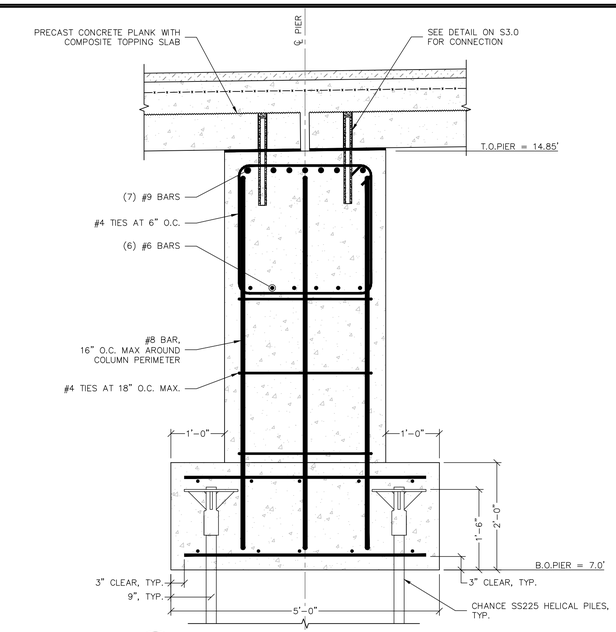
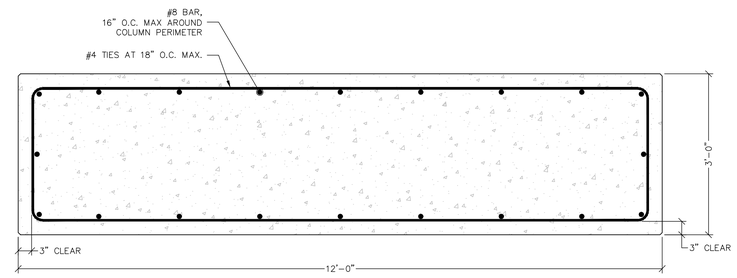
S3.1



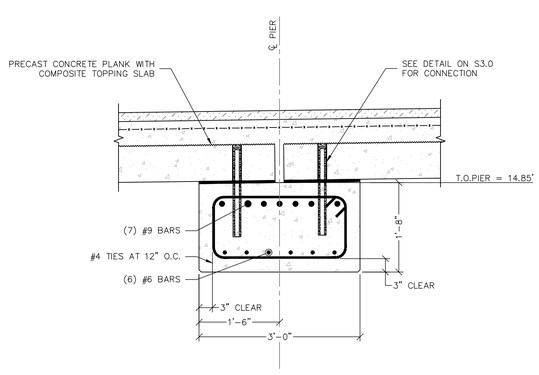
1 S1.1 NORTH ABUTMENT SECTION
SCALE: 1/2" = 1'-0"



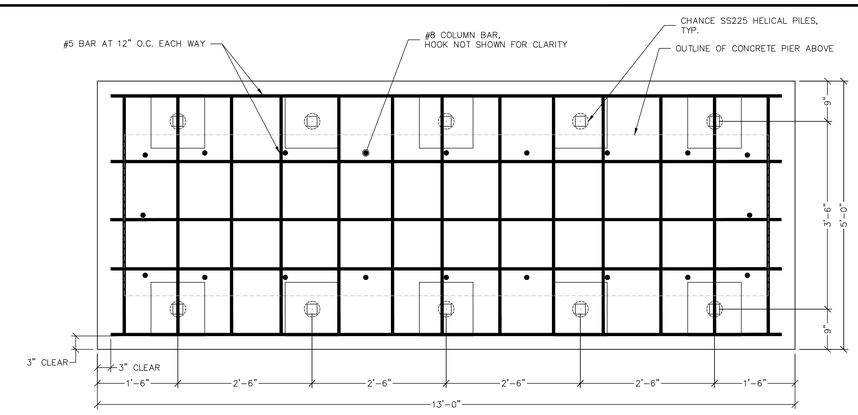
2 S3.2 PIER LONGITUDINAL SECTION
SCALE: 3/4" = 1'-0"



3 S3.1 PIER COLUMN SECTION
SCALE: 3/4" = 1'-0"



5 S3.1 PIER CAP SECTION
SCALE: 3/4" = 1'-0"



4 S3.1 PILE CAP SECTION
SCALE: 3/4" = 1'-0"

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NO.	REVISIONS	DATE

SHEET TITLE: NORTH PIER

SCALE: 1/4" = 1'-0" DRAWN BY: JRN

DATE: AUGUST 10, 2017 CHECKED BY:

CLIENT/PROJECT: TOWN OF VINALHAVEN CARRYING PLACE BRIDGE

LOCATION: CALDERWOOD NECK ROAD

TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

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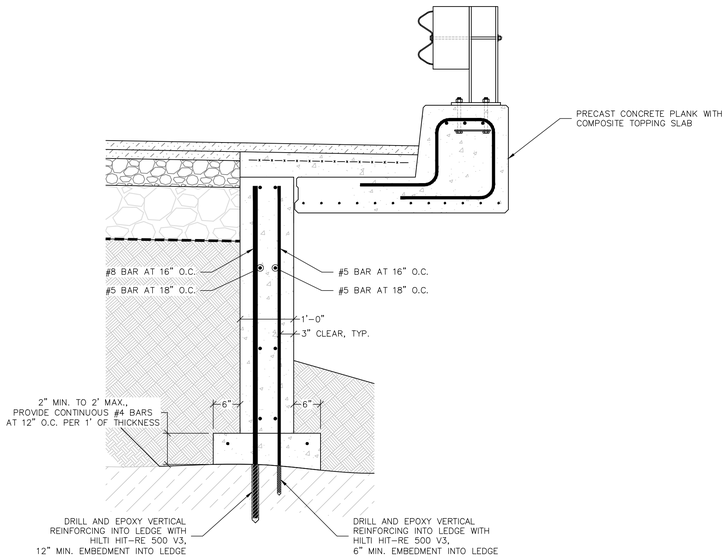
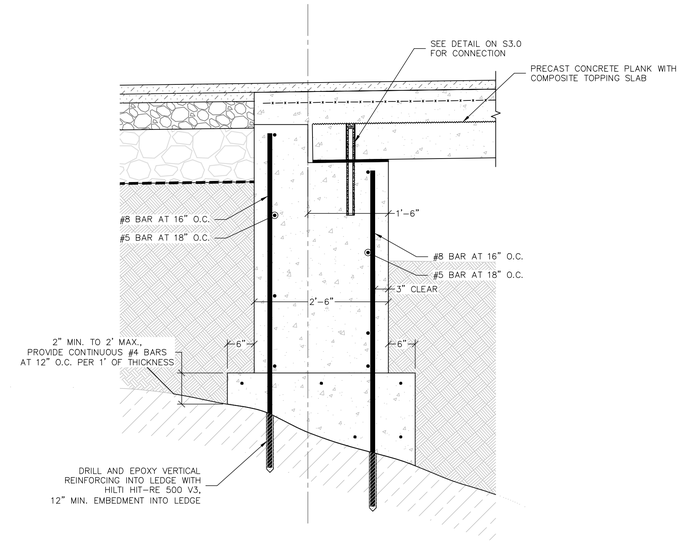
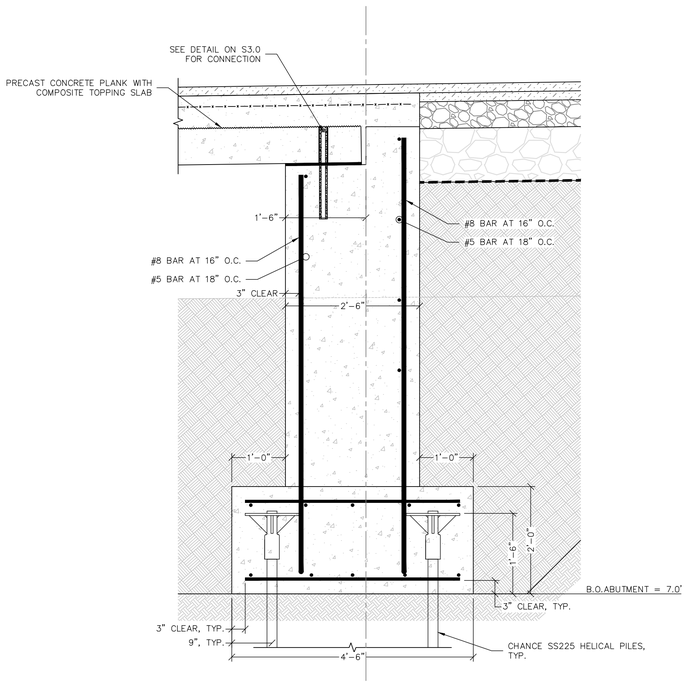
S3.2



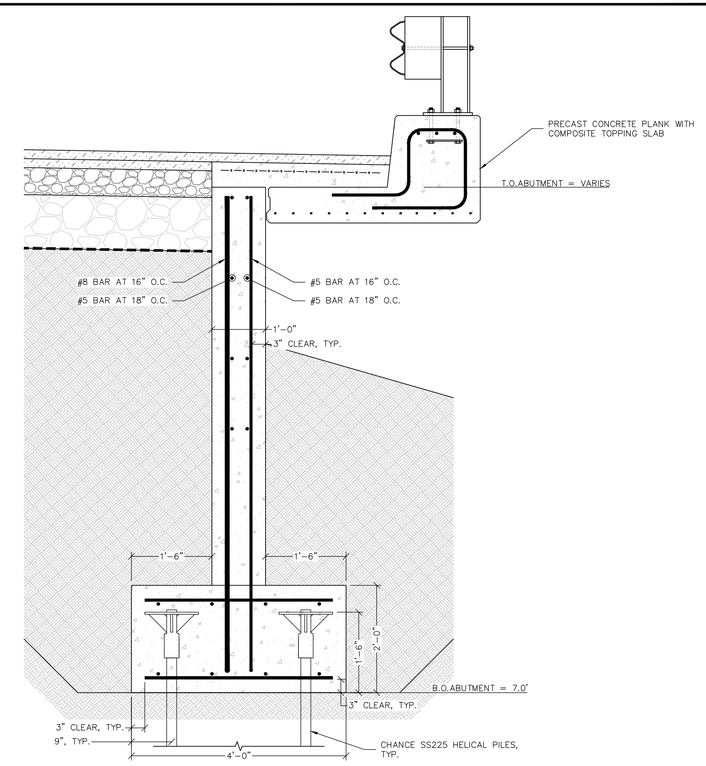
1 / S3.3 SOUTH ABUTMENT SECTION
SCALE: 3/4" = 1'-0"



2 / S3.3 SOUTH ABUTMENT SECTION
SCALE: 3/4" = 1'-0"



3 / S3.3 NORTH ABUTMENT SECTION
SCALE: 3/4" = 1'-0"



4 / S3.3 NORTH ABUTMENT SECTION
SCALE: 3/4" = 1'-0"

FOR PRICING PURPOSES ONLY
NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE

SHEET TITLE: **ABUTMENT DETAILS**

SCALE: 1/4" = 1'-0"
DRAWN BY: JRN
CHECKED BY:
DATE: AUGUST 10, 2017

CLIENT/PROJECT: **TOWN OF VINALHAVEN CARRYING PLACE BRIDGE**

LOCATION: CALDERWOOD NECK ROAD
TOWN: VINALHAVEN COUNTY: KNOX STATE: MAINE

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Ph. (207) 799-5065

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PROJ. NO. 2015-524

S3.3

Appendix B

Photographs

EXISTING CONDITIONS PHOTOGRAPHS

PICTURE 1: Facing Northeast
DATE: 08/12/2016

PICTURE 2: Facing Southwest
DATE: 08/12/2016

EXISTING CONDITIONS PHOTOGRAPHS

PICTURE 3: West Side of Structure & Abutments
DATE: 08/12/2016

PICTURE 4: West Side of Structure & SoutheastAbutment
DATE: 08/12/2016

EXISTING CONDITIONS PHOTOGRAPHS

PICTURE 5: West Side of Structure & Northeast Abutment
DATE: 08/12/2016

PICTURE 6: West Side of Structure & Southwest Abutment
DATE: 08/12/2016

EXISTING CONDITIONS PHOTOGRAPHS

PICTURE 7: Northeast Abutment, Steel Girders and Timber Deck
DATE: 08/12/2016

PICTURE 8: Southwest Abutment, Steel Girders and Timber Deck
DATE: 08/12/2016

EXISTING CONDITIONS PHOTOGRAPHS

PICTURE 9: Toe of Abutment and Bed Substrate
DATE: 08/12/2016

PICTURE 10: East Side of Abutments and Adjacent Bed Substrate
DATE: 08/12/2016

EXISTING CONDITIONS PHOTOGRAPHS

PICTURE 11: West Side of Abutments, Bed Substrate and Travelway Looking Northeast
DATE: 08/12/2016

PICTURE 12: West Side of Abutments, Bed Substrate and Travelway Looking Southwest
DATE: 08/12/2016

EXISTING CONDITIONS PHOTOGRAPHS

PICTURE 13: Approach from Northwest
DATE: 08/12/2016

PICTURE 14: Approach from Southeast
DATE: 08/12/2016

EXISTING CONDITIONS PHOTOGRAPHS

PICTURE 15: Approach and Deck from Southeast
DATE: 08/12/2016

PICTURE 16: Approach from Northwest
DATE: 08/12/2016

Appendix C

Traffic and Accident Data

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

- [x] **Crash Summary I - Single Element**
- [ ] **Section Detail**
- [x] **Crash Summary II**
- [ ] **1320 Public**
- [ ] **1320 Private**
- [x] **1320 Summary**

REPORT DESCRIPTION

206940

REPORT PARAMETERS

Year 2014, Start Month 1 through Year 2016 End Month: 12

Route:	**1305153**	Start Node:	**29407**	Start Offset:	**0**	[x] **Exclude First Node**
		End Node:	**29367**	End Offset:	**0**	[x] **Exclude Last Node**

Crash Summary I

Sections

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
29367	29407	206940	0 - 1.33	1305153 - 1.60	1.33	1	4	0	0	0	0	4	0.0	0.00138	963.72	709.66	1.36
Int of CALDERWOOD NECK RD N HAVEN RD				RD INV 13 05153											Statewide Crash Rate: 227.30		
Study Years: 3.00				**Section Totals:**	1.33		4	0	0	0	0	4	0.0	0.00138	963.72	709.66	1.36

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	Injury Crashes K	A	B	C	PD	Crash Report	Crash Date	Crash Mile Point	Injury Degree
29367	29407	206940	0 - 1.33	1305153 - 1.60	4	0	0	0	0	4	2014-3362	01/22/2014	1.65	PD
											2015-12596	04/04/2015	1.66	PD
											2014-35085	12/05/2014	1.93	PD
											2015-43932	09/24/2015	2.04	PD
				Totals:	4	0	0	0	0	4				

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM												PM													
	Hour of Day																									
Day Of Week	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Un**	**Tot**
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
THURSDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
FRIDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Totals	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2	0	**4**

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	1	23-Bicyclist	0
2-(Sport) Utility Vehicle	0	24-Witness	0
3-Passenger Van	0	25-Other	0
4-Cargo Van (10K lbs or Less)	0	**Total**	**4**
5-Pickup	3		
6-Motor Home	0		
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	0	0	0	0	0	1
Ran Off Roadway	2	0	0	0	0	0	2
Failed to Yield Right-of-Way	0	0	0	0	0	0	0
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	1	0	0	0	0	0	1
Improper Turn	0	0	0	0	0	0	0
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	0	0	0	0	0	0	0
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Total	**4**	**0**	**0**	**0**	**0**	**0**	**4**

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	3	0	0	0	0	0	3
Physically Impaired or Handicapped	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	1	0	0	0	0	0	1
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total	**4**	**0**	**0**	**0**	**0**	**0**	**4**

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	2	0	0	0	0	2
20-24	0	0	0	0	0	0
25-29	0	0	0	0	0	0
30-39	0	0	0	0	0	0
40-49	1	0	0	0	0	1
50-59	1	0	0	0	0	1
60-69	0	0	0	0	0	0
70-79	0	0	0	0	0	0
80-Over	0	0	0	0	0	0
Unknown	0	0	0	0	0	0
Total	**4**	**0**	**0**	**0**	**0**	**4**

Crash Summary II - Characteristics

Most Harmful Event

Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	**Total**	**4**
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	1		
13-Motor Vehicle in Transport	0		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	3		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post Pole or Support	0		

Traffic Control Devices

Traffic Control Device	Total
1-Traffic Signals (Stop & Go)	0
2-Traffic Signals (Flashing)	0
3-Advisory/Warning Sign	0
4-Stop Signs - All Approaches	0
5-Stop Signs - Other	0
6-Yield Sign	0
7-Curve Warning Sign	0
8-Officer, Flagman, School Patrol	0
9-School Bus Stop Arm	0
10-School Zone Sign	0
11-R.R. Crossing Device	0
12-No Passing Zone	0
13-None	3
14-Other	1
Total	**4**

Injury Data

Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	0	0
C	0	0
PD	4	0
Total	**4**	**0**

Road Character

Road Grade	Total
1-Level	1
2-On Grade	1
3-Top of Hill	2
4-Bottom of Hill	0
5-Other	0
Total	**4**

Light

Light Condition	Total
1-Daylight	1
2-Dawn	0
3-Dusk	0
4-Dark - Lighted	0
5-Dark - Not Lighted	3
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	**4**

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2014	2015	2016	Total
JANUARY	1	0	0	1
FEBRUARY	0	0	0	0
MARCH	0	0	0	0
APRIL	0	1	0	1
MAY	0	0	0	0
JUNE	0	0	0	0
JULY	0	0	0	0
AUGUST	0	0	0	0
SEPTEMBER	0	1	0	1
OCTOBER	0	0	0	0
NOVEMBER	0	0	0	0
DECEMBER	1	0	0	1
Total	**2**	**2**	**0**	**4**

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	2	0	0	0	0	0	0	0	0	0	0	2
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**4**

Appendix D

Inspection Reports

Maine Crash Report Summary

Crash Date: **1/22/2014** Time: **23:00** City: **Vinalhaven** Street/Highway: **CALDERWOOD NECK ROAD**

Start Node: **29367** **Int of CALDERWOOD NECK RD N HAVEN RD** End Node: **29407** **Non-Int CALDERWOOD NECK RD** Offset: **1.28**

OE Start Node: OE End Node:

Type of Crash: **7 - Went Off Road** Type of Location: **2 - Curved Road**

Weather: **1 - Clear** Light: **5 - Dark - Not Lighted**

Road Grade: **2 - On Grade** Surface Condition: **1 - Dry**

Traffic Control: **13 - None**

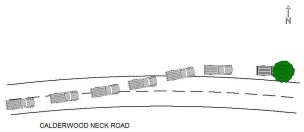
Cont. Circ. Env 1 **1 - None** Cont. Circ. Env 2

Cont. Circ. Road 1 **1 - None** Cont. Circ. Road 2 **1 - None**

Narrative

UNIT LEFT ROADWAY AND HIT TREE HEAD ON.

Diagram



Unit: 1

Type: **5 - Pickup** Veh. Travel Dir.: **3 - Eastbound**

Most Damaged Area: **12 - Front** Most Harmful Event: **31 - Tree (Standing)**

Pre-Crash Actions: **1 - Following roadway** Contrib Circ. - Vehicle: **1 - None**

Seq. Events 1: **9 - Went Off Roadway Left** Seq. Events 2: **39 - Tree (standing)**

Seq. Events 3: **50 - No Other Events** Seq. Events 4: **50 - No Other Events**

Driver Distracted By: **1 - Not Distracted** Cond. at Time Crash: **1 - Apparently Normal**

Driver Action 1: **9 - Drove Too Fast For Conditions** Driver Action 2: **2 - Ran Off Roadway**

Person Type	Age	Sex	Injury Degree
1 - Driver	**17**	**1 - Male**	**5 - No Injury**

Maine Crash Report Summary

Crash Date: **12/5/2014** Time: **17:00** City: **Vinalhaven** Street/Highway: **CALDERWOOD NECK ROAD**

Start Node: **29367** **Int of CALDERWOOD NECK RD N HAVEN RD** End Node: **29407** **Non-Int CALDERWOOD NECK RD** Offset: **1**

OE Start Node: OE End Node:

Type of Crash: **7 - Went Off Road** Type of Location: **2 - Curved Road**

Weather: **4 - Rain** Light: **5 - Dark - Not Lighted**

Road Grade: **3 - Top of Hill** Surface Condition: **2 - Wet**

Traffic Control: **13 - None**

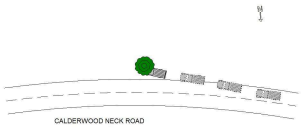
Cont. Circ. Env 1 **2 - Weather Conditions** Cont. Circ. Env 2 **1 - None**

Cont. Circ. Road 1 **1 - None** Cont. Circ. Road 2 **1 - None**

Narrative

UNIT LEFT ROADWAY AND STRUCK LARGE TREE.

Diagram



Unit: 1

Type: **5 - Pickup** Veh. Travel Dir.: **3 - Eastbound**

Most Damaged Area: **12 - Front** Most Harmful Event: **31 - Tree (Standing)**

Pre-Crash Actions: **1 - Following roadway** Contrib Circ. - Vehicle: **1 - None**

Seq. Events 1: **8 - Went Off Roadway Right** Seq. Events 2: **39 - Tree (standing)**

Seq. Events 3: **50 - No Other Events** Seq. Events 4: **50 - No Other Events**

Driver Distracted By: **5 - Outside the Vehicle (includes unspecified external distractions)** Cond. at Time Crash: **1 - Apparently Normal**

Driver Action 1: **2 - Ran Off Roadway** Driver Action 2: **1 - No Contributing Action**

Person Type	Age	Sex	Injury Degree
6 - Driver/Owner	**42**	**1 - Male**	**5 - No Injury**

Maine Crash Report Summary

Crash Date: **4/4/2015** Time: **13:24** City: **Vinalhaven** Street/Highway: **CALDERWOOD NECK**

Start Node: **29367** **Int of CALDERWOOD NECK RD N HAVEN RD** End Node: **29407** **Non-Int CALDERWOOD NECK RD** Offset: **1.27**

OE Start Node: OE End Node:

Type of Crash: **7 - Went Off Road** Type of Location: **2 - Curved Road**

Weather: **2 - Cloudy** Light: **1 - Daylight**

Road Grade: **3 - Top of Hill** Surface Condition: **2 - Wet**

Traffic Control: **13 - None**

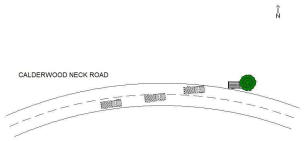
Cont. Circ. Env 1 **1 - None** Cont. Circ. Env 2

Cont. Circ. Road 1 **1 - None** Cont. Circ. Road 2 **1 - None**

Narrative

OPERATOR OF UNIT FALLS ASLEEP DRIVES OFF THE ROAD HITTING A TREE HEAD ON

Diagram



Unit: 1

Type: **5 - Pickup** Veh. Travel Dir.: **3 - Eastbound**

Most Damaged Area: **12 - Front** Most Harmful Event: **31 - Tree (Standing)**

Pre-Crash Actions: **1 - Following roadway** Contrib Circ. - Vehicle: **1 - None**

Seq. Events 1: **9 - Went Off Roadway Left** Seq. Events 2: **39 - Tree (standing)**

Seq. Events 3: **50 - No Other Events** Seq. Events 4: **50 - No Other Events**

Driver Distracted By: **1 - Not Distracted** Cond. at Time Crash: **5 - Asleep or Fatigued**

Driver Action 1: **2 - Ran Off Roadway** Driver Action 2: **1 - No Contributing Action**

Person Type	Age	Sex	Injury Degree
6 - Driver/Owner	**51**	**1 - Male**	**5 - No Injury**

Maine Crash Report Summary

Crash Date: **9/24/2015** Time: **23:58** City: **Vinalhaven** Street/Highway: **CALDERWOOD NECK RD**

Start Node: **29367** **Int of CALDERWOOD NECK RD N HAVEN RD** End Node: **29407** **Non-Int CALDERWOOD NECK RD** Offset: **0.89**

OE Start Node: ***29367*** ***Int of CALDERWOOD NECK RD N HAVEN RD*** OE End Node: ***29407*** ***Non-Int CALDERWOOD NECK RD***

Type of Crash: **17 - Deer**
Type of Location: **2 - Curved Road**
Weather: **1 - Clear**
Light: **5 - Dark - Not Lighted**
Road Grade: **1 - Level**
Surface Condition: **1 - Dry**
Traffic Control: **14 - Other**
Cont. Circ. Env 1 **1 - None**
Cont. Circ. Env 2
Cont. Circ. Road 1 **1 - None**
Cont. Circ. Road 2

Narrative

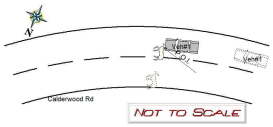
On Thursday, September 24, 2015 at 23:58:00, Sgt. Matthew Elwell received a report of a crash on CALDERWOOD NECK RD approximately 0.89 miles North of N HAVEN RD in Vinalhaven Maine. I took the report the following day. At the time of the crash, the weather was clear and the road surface was dry.

Vehicles...

Vehicle #1, operated by Ian Dyer, DOB 6/19/1998 was westbound following roadway. Vehicle #1 sustained functional damage to the front driver corner.

Vehicle #1 occupant(s) are listed below:
Driver: Ian Dyer DOB 6/19/1998 Injury: No Injury

Diagram



Unit: 1

Type: **1 - Passenger Car**
Veh. Travel Dir.: **4 - Westbound**
Most Damaged Area: **11 - Front Driver Corner**
Most Harmful Event: **12 - Animal**
Pre-Crash Actions: **1 - Following roadway**
Contrib Circ. - Vehicle: **1 - None**
Seq. Events 1: **21 - Motor Vehicle In Transport**
Seq. Events 2: **20 - Animal**
Seq. Events 3: **50 - No Other Events**
Seq. Events 4: **50 - No Other Events**
Driver Distracted By: **1 - Not Distracted**
Cond. at Time Crash: **1 - Apparently Normal**
Driver Action 1: **1 - No Contributing Action**
Driver Action 2:

Person Type	Age	Sex	Injury Degree
6 - Driver/Owner	**17**	**1 - Male**	**5 - No Injury**

Highway Bridge Inspection Report

CARRYING PLACE
CALDERWOOD NECK RD
over
MILL RIVER

Asset Code: 0601

Inspection Date: 01/21/2017

Inspected By: Kleinfelder Kleinfelder

Inspection Type(s): Routine

National Bridge Inventory

Status: 1 - SD Bridge Name: CARRYING PLACE Sufficiency Rating: 5.0

Inspections

(90) INSPECTION DATE	& (91) DESIGNATED INSPECTION FREQUENCY	24	01/21/2017
(92) CRITICAL FEATURE INSPECTION	& (93) CFI DATE		
(92A) FRACTURE CRITICAL DETAIL		N	
(92B) UNDERWATER INSPECTION		N	
(92C) OTHER SPECIAL INSPECTION		N	

Identification

(1) STATE CODE	231 - Maine
(8) STRUCTURE NUMBER	0601
(5) INVENTORY ROUTE	
(5A) RECORD TYPE	1: Route carried "on" the structure
(5B) ROUTE SIGNING PREFIX	5 - CITY STREET
(5C) DESIGNATED LEVEL OF SERVICE	0 - None
(5) INVENTORY ROUTE	0
(5) INVENTORY ROUTE	0 - NOT APPLICABLE
(2) HIGHWAY AGENCY DISTRICT	02 - Mid-Coast
(3) COUNTY CODE	013 Knox
(4) PLACE CODE	79130
(6) FEATURES INTERSECTED	MILL RIVER
(7) FACILITY CARRIED	CALDERWOOD NECK RD
(9) LOCATION	1.2 MI NE W.HAVEN RD
(11) MILEPOINT	1.600
(12) BASE HIGHWAY NETWORK	Inventory Route is not on the Base Network
(13) LRS INVENTORY ROUTE, SUBROUTE	
(13A) LRS INVENTORY ROUTE	0001305153
(13B) SUBROUTE NUMBER	00
(16) LATITUDE	44.09235
(17) LONGITUDE	-68.83144
(98A) BORDER BRIDGE CODE	
(98B) PERCENT RESPONSIBILITY	0
(99) BORDER BRIDGE STRUCT NO.	n/a

Structure Type and Material

(43) STRUCTURE TYPE, MAIN	
(43A) KIND OF MATERIAL/DESIGN	3 - Steel
(43B) TYPE OF DESIGN/CONSTR	02 - Stringer/Multi-beam or Girder
(44) STRUCTURE TYPE, APPROACH SPANS	
(44A) KIND OF MATERIAL/DESIGN	0 - Other
(44B) TYPE OF DESIGN/CONSTRUCTION	00 - Other
(45) NUMBER OF SPANS IN MAIN UNIT	1
(46) NUMBER OF APPROACH SPANS	0
(107) DECK STRUCTURE TYPE	8 - Wood or Timber
(108) WEARING SURFACE/PROTECTIVE SYSTEMS	
(108A) WEARING SURFACE	7 - Wood or Timber
(108B) DECK MEMBRANE	0 - None
(108C) DECK PROTECTION	0 - None

Age of Service

(27) YEAR BUILT	1970
(106) YEAR RECONSTRUCTED	-4
(42) TYPE OF SERVICE	
(42A) TYPE OF SERVICE ON BRIDGE	1 - Highway
(42B) TYPE OF SERVICE UNDER BRIDGE	5 - Waterway
(28) LANES	
(28A) LANES ON THE STRUCTURE	02
(28B) LANES UNDER THE STRUCTURE	00
(29) AVERAGE DAILY TRAFFIC	275
(30) YEAR OF AVERAGE DAILY TRAFFIC	2014
(109) AVERAGE DAILY TRUCK TRAFFIC	5
(19) BYPASS DETOUR LENGTH	100

Geometric Data

(48) LENGTH OF MAXIMUM SPAN (ft.)	18.0
(49) STRUCTURE LENGTH (ft.)	21.0
(50) CURB/SIDEWALK WIDTHS	
(50A) LEFT CURB SIDEWALK (ft.)	0
(50B) RIGHT CURB SIDEWALK (ft.)	0
(51) BRDG RDWY WIDTH CURB-TO-CURB (ft.)	18.3
(52) DECK WIDTH, OUT-TO-OUT (ft.)	19.5
(32) APPROACH ROADWAY WIDTH (ft.)	19.0
(33) BRIDGE MEDIAN	0 - No median
(34) SKEW (deg.)	0
(35) STRUCTURE FLARED	0 - No flare
(10) INV RTE, MIN VERT CLEARANCE (ft.)	328.05
(47) TOTAL HORIZONTAL CLEARANCE (ft.)	19.0
(53) VERTICAL CLEARANCE OVER BRIDGE ROADWAY (ft.)	327.76
(54) MIN VERTICAL UNDERCLEARANCE	
(54A) REFERENCE FEATURE	N - Feature not a highway or railroad
(54B) MIN VERTICAL UNDERCLEARENCE (ft.)	0
(55) MIN LATERAL UNDER CLEARANCE RIGHT	
(55A) REFERENCE FEATURE	N - Feature not a highway or railroad
(55B) MIN LATERAL UNDER CLEARANCE RIGHT (ft.)	327.76
(56) MIN LATERAL UNDER CLEARANCE (ft.)	99.9

Classification

(112) NBIS BRIDGE LENGTH	No
(104) HIGHWAY SYSTEM OF THE INVENTORY ROUTE	0 - Structure/Route is NOT on NHS
(26) FUNCTIONAL CLASSIFICATION OF INVENTORY ROUTE	09 - Rural - Local
(100) STRAHNET HIGHWAY DESIGNATION	Not a STRAHNET route
(101) PARALLEL STRUCTURE DESIGNATION	N - No parallel structure
(102) DIRECTION OF TRAFFIC	2-way traffic
(103) TEMP STRUCTURE	
(105) FEDERAL LANDS HIGHWAYS	Not Applicable
(110) DESIGNATED NATIONAL NETWORK	Inventory route not on network
(20) TOLL	3 - On Free Road
(21) MAINTENANCE RESPONSIBILITY	03 - Town or Township Highway Agency
(22) OWNER	03 - Town or Township Highway Agency
(37) HISTORICAL SIGNIFICANCE	4 - Not determinable

Condition

(58) DECK	5 - Fair Condition (minor section loss)
(59) SUPERSTRUCTURE	3 - Serious Condition (primary structure affected)
(60) SUBSTRUCTURE	5 - Fair Condition (minor section loss)
(61) CHANNEL & CHANNEL PROTECTION	7 - Bank protection needs minor repairs
(62) CULVERT	N - Not Applicable

Load Rating and Posting

(31) DESIGN LOAD	0 - Unknown
(63) METHOD USED TO DETERMINE OPERATING RATING	2 - Allowable Stress (AS)
(64) OPERATING RATING	29.4
(65) METHOD USED TO DETERMINE INVENTORY RATING	2 - Allowable Stress (AS)
(66) INVENTORY RATING	21.2
(70) BRIDGE POSTING	4 - 0.1-9.9% below legal loads
(41) STRUCTURE OPEN/POSTED/CLOSED	P - Posted for Load

Appraisal

(67) STRUCTURAL EVALUATION	3
(68) DECK GEOMETRY	3
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL	N
(71) WATERWAY ADEQUACY	9 - Bridge Above Flood Water Elevations
(72) APPROACH ROADWAY ALIGNMENT	4 - Meets minimum tolerable limits to be left in place as is
(36) TRAFFIC SAFETY FEATURE	
36A) BRIDGE RAILINGS:	0 - Does not meet acceptable standards/safety feature is required
36B) TRANSITIONS:	0 - Does not meet acceptable standards/safety feature is required
36C) APPROACH GUARDRAIL	0 - Does not meet acceptable standards/safety feature is required
36D) APPROACH GUARDRAIL ENDS	0 - Does not meet acceptable standards/safety feature is required
(113) SCOUR CRITICAL BRIDGES	T - Over tidal waters

Proposed Improvements

(75) TYPE OF WORK

(75A) TYPE OF WORK PROPOSED	
(75B) WORK DONE BY	
(76) LENGTH OF STRUCTURE IMPROVEMENT (ft.)	
(94) BRIDGE IMPROVEMENT COST (SK)	-2
(95) ROADWAY IMPROVEMENT COST (SK)	
(96) TOTAL PROJECT COST	
(97) YEAR OF IMPROVEMENT COST ESTIMATE	
(114) FUTURE ADT	413
(115) YEAR OF FUTURE ADT	2034

Navigation Data

(38) NAVIGATION CONTROL	0 - No navigation control on waterway (bridge
(111) PIER OR ABUTMENT PROTECTION	
(39) NAV VERT CLEARANCE	0
(116) MIN NAVIGATION VERT CLEARANCE, VERT LIFT BRIDGE	0
(40) NAV HORIZONTAL CLEARANCE	0

Inspection Notes

Structure Number: 0601 | Town: Vinalhaven

Structure Name: CARRYING PLACE | Inspection Date: 01/21/2017

Structure Notes

Single span, steel rolled girders on concrete capped and shot-creted stone masonry abutments and wingwalls.

Wearing Surface

No actual wearing surface on bridge. Approach roadway pavement in generally good condition. Guardrail is present although too high on the upstream side.

Deck **NBI Item 58:** 5

Deck is made up of 8x8 wooden timbers nailed to a nailing strip placed longitudinally on the girders. No rot noticed either underside or on top however, there is heavy wear in the wheel paths up to ½" deep (photo). Many nail heads are exposed.

Superstructure **NBI Item 59:** 3

6 Steel rolled girders. Interior 4 girders have varying degrees of defects from lack of paint on bottom flange to loss of section in both bottom and top flanges. Most bottom flanges are dimpled, some have rust sheeting/flaking. Webs are intact except for two locations near westerly abutment. The webs here are thinned down to a knife edge or have holes. Most webs have paint loss w/surface rusting at bearings, both abutments. Otherwise webs have varying degrees of paint including nearly complete and intact. Exterior girders also have paint loss/freckling however, only have scattered areas with minor section loss.

Substructure **NBI Item 60:** 5

Both abutments and wingwalls are dry laid granite blocks which have been shotcreted at some point. Abutments are topped with a concrete bridge seat. Overall very little movement has taken place after shotcrete was applied, as evidenced by lack of cracking. To note; northwest corner of abutment is undermined, 3' along the face and 2' along the wingwall. Undermining is 9" high at corner and tapers to 0". This has created a void in the wingwall approx. 18" high and 24" deep (photo). Otherwise abutments and wingwalls are stable. Full height vertical crack in concrete under 4th girder from US end, westerly abutment (photo).

Culvert **NBI Item 62:** N

Channel **NBI Item 61:** 7

Channel is not well armored. Bridge is over a tidal basin and was inspected at low tide. However, no moderate/major erosion seen.

Other

Special Inspection

Monitoring

Pontis Notes

Pictures

PHOTO 1 Elevation, Other

Description Looking downstream.

PHOTO 2 Elevation, Other

Description Looking upstream.

Pictures

PHOTO 3 Elevation, Condition

Description Northwest corner, abutment.

PHOTO 4 Elevation, Condition

Description Northwest corner, wingwall.

Pictures

PHOTO 5 Elevation

Description Westerly abutment.

PHOTO 6 Elevation

Description Easterly abutment.

Pictures

PHOTO 7 Elevation

Description Southerly elevation.

PHOTO 8 Condition

Description Westerly abutment, 2nd girder from US side. Holes in bottom flange and web.

Pictures

PHOTO 9 Condition

Description Westerly abutment, 5th girder form US end. Holes in bottom flange.

PHOTO 10 Condition

Description Easterly abutment, 3rd girder from US side. Thinning of bottom flange to knife's edge.

Pictures

PHOTO 11 Condition, Other

Description Underside of deck. Note defects in timbers.

PHOTO 12 Elevation, Condition

Description Westerly abutment, 4th girder from US end. Note cracking in concrete cap.

Pictures

PHOTO 13 Elevation

Description Superstructure view.

PHOTO 14 Elevation, Other

Description Approach looking easterly.

Pictures

PHOTO 15 Elevation, Condition

Description General deck view.

PHOTO 16 Elevation, Condition

Description Typical railing view.

Pictures

PHOTO 17 Elevation, Other

Description Looking easterly from bridge.

PHOTO 18 Elevation, Other

Description Looking westerly from bridge.

Pictures

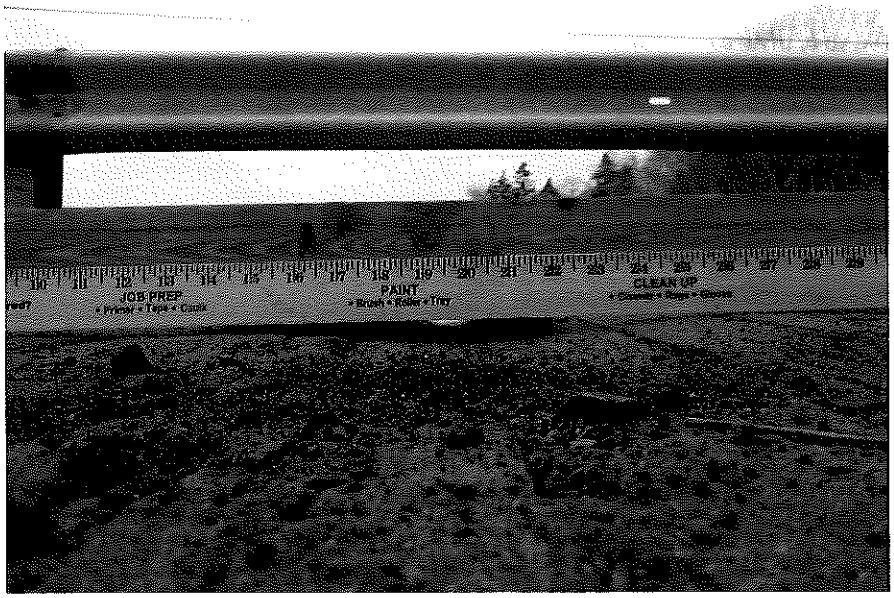


PHOTO 19 Condition

Description Typical wearing of deck in wheel path.

PHOTO 20 Elevation

Description Northerly elevation.

Structures in the Municipality of Vinalhaven

				CONDITION RATINGS		
TOWN1:	Vinalhaven	**TOWN2**	No town 2	**SUBSTRUCTURE CONDITION**	5	Fair
BRIDGE NO.:	0601	**BRIDGE REGION:**	Mid-Coast	**SUPERSTRUCTURE CONDITION**	3	Serious
LOCATION:	1.2 MI NE W.HAVEN RD	**YEAR BUILT**	1970	**DECK CONDITION**	5	Fair
BRDGNAME:	CARRYING PLACE	**SPAN MATERIAL**	1 Steel	**CHANNEL CONDITION:**	7	Good
OWNER:	4 Municipal	**SPAN TYPE:**	1 Girder	**CULVERT CONDITION:**	N	Not Applicable
MAINTAINER	4 Municipal	**NUMBER OF MAIN SPANS:**	1	**APPROACH CONDITION:**	4	Poor
FEATURE ON:	CALDERWOOD NECK RD	**STRUCTURE LENGTH IN FEET**	21	**DATE OF INSPECTION:**	10/22/2012	
FEATURE UNDER	MILL RIVER	**POSTING STATUS:**	3 Posted	**FEDERAL SUFFICIENCY RATING**	32.9	
ROAD INV NO:	0001305153	**POSTING TYPE:**	1 Weight Limit			
ROUTE NO:	00000					
ROAD WIDTH	18 **FEET**	**FEDERAL BRIDGE INDICATOR:**	N			
CLASS:	MINOR SPAN ON TOWN WAY					

Appendix E

Preliminary Cost Estimates

APPENDIX E
TOWN OF VINALHAVEN
CARRYING PLACE BRIDGE REPLACEMENT
PRELIMINARY COST ESTIMATE

Site Work Category	Qualifier	Unit	Quantity	Cost Per Unit	Total Cost
Site Preparation					
Mobilization	Single mob	LS	1	$4,000.00	$4,000
General Conditions and Layout		LS	1	$5,500.00	$5,500
Erosion and Sedimentation Control		LS	1	$8,000.00	$8,000

Site Work					
Temporary Bypass		LS	1	$55,000.00	$55,000.00
Traffic control		LS	1	$12,000.00	$12,000.00
Existing Bridge Demolition		LS	1	$11,200.00	$11,200.00
Concrete Abutment Excavation and Backfill		LS	1	$11,800.00	$11,800.00
Helical Piles		LS	1	$87,560.00	$87,560.00
Concete Abutment		CY	98	$400.00	$39,200.00
Concrete Span Precast		CY	49	$600.00	$29,400.00
Concrete Slab		CY	42	$400.00	$16,800.00
Retaining Wall Construction		SF	1,020	$31.25	$31,875.00
Fill to Subgrade & Approach Construction		LS	1	$25,000.00	$25,000.00
Aggregate Base Course	Type A	CY	143	$22.00	$3,146.00
Aggregate Subbase Course	Type D	CY	1,008	$18.00	$18,144.00
Installation & Grading Subbase		SF	11,960	$1.00	$11,960.00
Pavement (Road)		Ton	283	$132.00	$37,356.00
Fine Grading		SF	11,000	$0.35	$5,005.00
Stabilization	Loam & Hydroseed	LS	1	$8,000.00	$8,000.00
Demobilization		LS	1	$5,000.00	$5,000.00
Testing and QC		LS	1	$20,000.00	$20,000.00
Subtotal					**$426,000.00**
15 % Contingency					**$63,900.00**
Estimate of Probable Cost					**$489,900.00**

Appendix F

Existing Plans

NOTE:

NO DATA ON MDOT RESOURCE

DATA FROM TOWN ARCHIVE PENDING

Appendix G

Geotechnical Report

The key to success starts with a solid foundation.
ENGINEERING | EXPLORATION | EXPERIENCE

Geotechnical Report

Carrying Place Bridge

Calderwood Neck Road Vinalhaven, ME

3/27/2017

SUMMIT GEOENGINEERING SERVICES

PIN 17011

SUMMIT
GEOENGINEERING SERVICES

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173 Pleasant Street Rockland, Maine 04841 | (207) 318-7761
www.summitgeoeng.com

March 27, 2017
Summit #17011

Gartley & Dorsky Engineering & Surveying, Inc.
Attn: William T. Lane, P.E.
59B Union Street / PO Box 1031
Camden, Maine 04843

Reference: Geotechnical Engineering Services
Carrying Place Bridge – Calderwood Neck Road Vinalhaven, Maine

Dear Mr. Lane;

We have completed our preliminary geotechnical investigation for Carrying Place Bridge located on Calderwood Neck Road in Vinalhaven, Maine. Our scope of services included performing subsurface explorations at the site and preparing this report summarizing our findings and geotechnical recommendations. The geotechnical considerations identified for this site include:

- The presence of marine deposits and its impact to foundations
- The presence of bedrock and its impact to foundations
- The presence of granite block cribbing and its potential for reuse
- The presence of saltwater and its potential for corrosive conditions

This report includes preliminary design for foundations in accordance with AASHTO LRFD Bridge Design Specifications. In summary, we consider the following options for bridge support:

- Reuse of granite block abutments
- Mechanical stabilized earth (MSE) wall supported abutments
- Cast-in-place concrete abutments
- CON/SPAN® anchored wall with pre-cast drainage structure
- Pile support foundations

We appreciate the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

Sincerely yours,
Summit Geoengineering Services

Craig W. Coolidge, P.E.
Vice President & Principal Engineer

STATE OF MAINE
CRAIG W. COOLIDGE
NO# 11569
LICENSED
PROFESSIONAL ENGINEER

145 Lisbon Street (PO Box 7216) Lewiston, Maine 04243 | (207) 576-3313
173 Pleasant Street Rockland, Maine 04841 | (207) 318-7761
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TABLE OF CONTENTS

1.0 Project and Site Description

Summit Geoengineering Services (SGS) was asked to conduct a preliminary geotechnical investigation for Carrying Place Bridge located on Calderwood Neck Road in Vinalhaven, Maine.

Carrying Place Bridge at Low Tide (South Side)

The existing bridge is constructed of steel I-beams, wood decking, and granite block abutments. The east abutment consists of elevated granite block or fill overlying saltmarsh. The west abutment consists of granite block overlying dipping bedrock. The saltmarsh includes grass to frequent cobbles at the tidal channel. The site topography along the abutments are further described as follows:

- Northwest – Steep Fill to Grass Mud to Cobble Channel
- Northeast – Flat Grass Mud to Cobble Channel
- Southwest – Steep Bedrock to Mud to Cobble Channel
- Southeast – Dipping Bedrock to Mud/Ledge to Cobble Channel

Northwest Abutment - Steep Fill to Grass Mud to Cobble Channel

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Northeast Abutment – Flat Grass Mud to Cobble Channel

Southeast Abutment – Steep Bedrock to Mud to Cobble Channel

Southwest Abutment – Dipping Ledge to Mud/Ledge to Cobble Channel

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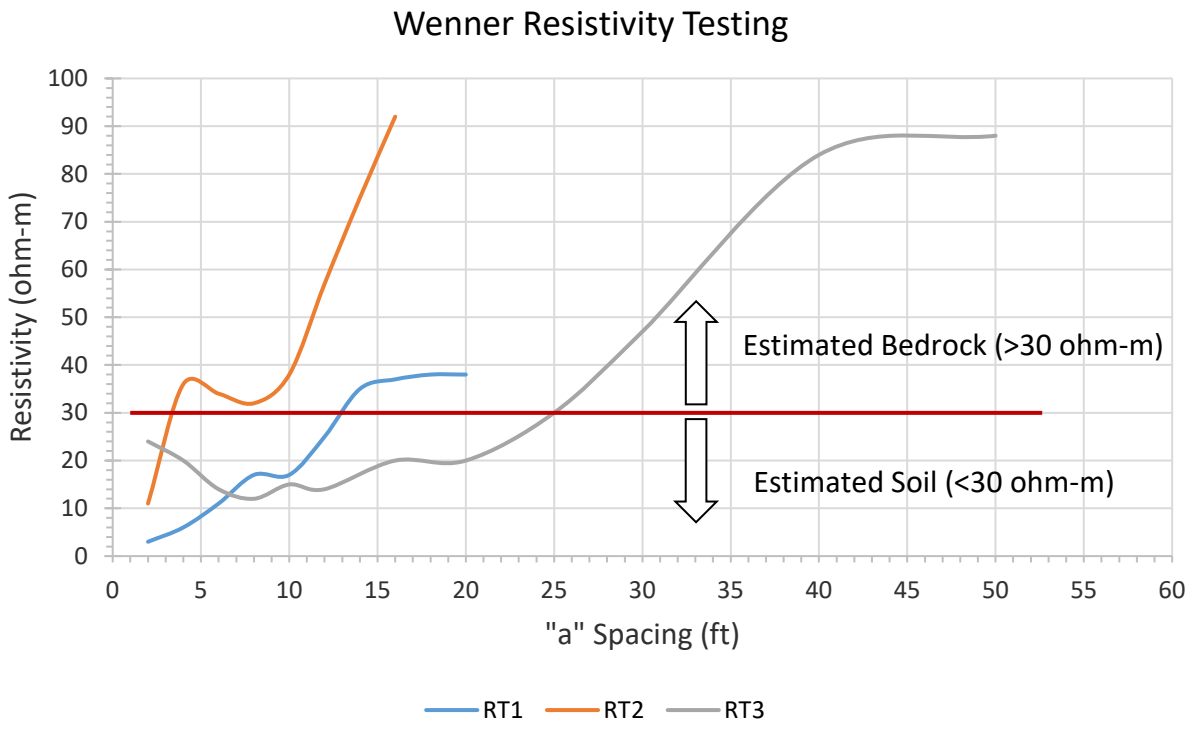
2.0 Explorations and Laboratory Testing

Summit Geoengineering Services (SGS) observed the subsurface conditions with 2 test borings. Borings were performed by East Coast Explorations using a CME 550 and advanced to depths of 8.5 to 24.3 feet using 3-inch casing with rotary wash. Soil was sampled with SPT split spoon per ASTM D1586 and rock sampled by ASTM D2113. Borings were backfilled upon completion.

Field resistivity testing was performed at 3 locations perpendicular to the abutments during low tide using the Wenner Four Probe method in accordance with ASTM G57. Probe spacing ranged from 2 to 50 feet. Graphic results of the resistivity testing are shown below:



Resistivity test RT-2 was conducted along the saltmarsh overlying bedrock outcrops at the southwest abutment. Test results from RT-2 were used to "calibrate" resistivity values for the granitic bedrock. Probe spacing from 4 to 16 feet resulted in values of 32 to 92 ohm-meter. Resistivity test RT-1 and RT-2 were performed along the north or east abutment where refusal was encountered at boring B-1 at a depth of 24 feet, elevation -11 feet. Resistivity values for RT-1 and RT-3 approach 30 ohm-meter or higher at approximate elevations of -11 feet (RT-1) to between -13 to -19 feet (RT-3) which correlates with the boring refusal. Resistivity test results are likely influence due to the presence of salt water resulting in lower than normal values.

Exploration locations are shown on the Exploration Location Plan in Appendix A. Boring logs and resistivity field reports are provided in Appendix B. The explorations (test borings and resistivity tests) were approximately located by SGS by taping from existing site features.

Two samples of the marine deposit were tested for moisture content in accordance with ASTM D2216 with moisture ranging from 26.0% to 33.1%. One sample was tested for Atterberg Limits in accordance with ASTM D4318. One sample of granular fill was tested for grain size analysis in accordance with ASTM D6913. Reports of the laboratory tests can be found in Appendix C. Summary of the laboratory test results are as follows:

LABORATORY TEST SUMMARY								
Boring	Depth	Moist. Content	Gradation Analysis			Atterberg		Notes
			Gravel	Sand	Fines	LL	PI	
B-2	0.5'-2.5'	8.8%	20%	68%	12%	--	--	Granular Fill
B-1	14'-16'	26.0%	--	--	--	28	10	Marine Deposit

3.0 Subsurface Conditions

The subsurface conditions consist of roadway ***granular fill*** overlying ***rock cribbing*** (granite) overlying ***marine deposit***. Bituminous ***pavement*** was present at the surface of the test borings with a thickness of 4 inches. ***Bedrock*** was encountered at depths of 3.5 to 24.3 feet.

3.1 Soil Layers

Granular Fill, 3 feet in thickness, is described as brown sand, some gravel, little silt and is classified as SW-SM in accordance with the USCS. Standard penetration tests (SPT-N_{60}) indicates compact conditions. The fill is frozen to humid.

Boring B-1 (0.5 to 2.5 feet) – Granular Fill (Gravelly Sand w/Ash)

Rock Cribbing, up to 13 feet in thickness, is described as reddish gray granite blocks mixed with occasional sand with little silt classified as SM in accordance with the USCS. Granite blocks range in thickness of 1 to 2 feet with various stacking. Voids are present within the cribbing. Shotcrete facing is present along portions of the outer granite blocks.

Granite Block Cribbing (Portions with Shotcrete) – Southwest Abutment

Marine deposit is described as an upper and lower subunit. The upper subunit consist of gray silty clay and is classifed as CL in accordance with USCS. Standard penetration tests (SPT-N_{60}) for the upper subunit indicates very soft conditions. Moisture content ranges from 26.0% to 33.1% with liquid limit of 28 and plasticity index of 10 suggesting the clay is mostly saturated (wet). The lower subunit consist of gray sand with some gravel and silt and is classified as SM in accordance with USCS. The lower marine deposit is compact and wet.

Boring B-1 (14 to 16 feet) – Marine Deposit (Gray Clay)

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3.2 Bedrock

Bedrock was encountered at depths of 3.5 feet (boring B-2) and 24.3 feet (boring B-1). Outcrops are widely present along the shoreline both north and south, particularly along the west abutment. Field resistivity testing indicate an approximate depth range of 4 to 25 feet, where performed.

Bedrock Outcrops South of Bridge at Low Tide (Winter Harbor)

Mapping by the Maine Geological Survey indicates bedrock is plutonic biotite-hornblende granite and quartz-monzonite. A rock core was obtained in boring B-2 from a depth of 3.5 to 8.5 feet.

Boring B-2 (3.5 to 8.5 feet) – Rock Core (Granite)

The rock is estimated as having a hardness value of 7 using the Mohs hardness scale. The percent recovery of the core, referred to as the ratio of total recovered sample length divided by the total coring length, was 88 percent. The Rock Quality Designation (RQD) of the rock core is expressed as the sum of rock pieces 4 inches or greater in length compared to the length of the core sample. The RQD of the cored rock was 96 percent. Detailed information of the rock core is provided on boring log B-2 in Appendix B. Results of the rock core and visual inspection of outcrops indicate the bedrock is generally hard and intact of competent quality.

3.3 Groundwater

Due to the close proximity of the bridge abutments to saltmarsh, we estimate groundwater is inundated saltwater with tidal ebb-flow. The highest annual tide is mapped as 6.2 feet. The channel appears mostly drained during low tide to an elevation of 0 feet. Seasonal runoff water through rain or snowmelt may infiltrate the granite cribbing and perch along the marine deposit and/or bedrock surface during wet periods.

4.0 Geotechnical Evaluation

The geotechnical considerations identified for this site include:

- The presence of marine deposits and its impact to foundations
- The presence of bedrock and its impact to foundations
- The presence of existing granite block cribbing and its impact to foundations
- The presence of saltwater and its potential for corrosive conditions

Marine deposits were encountered at the north or east abutment (boring B-1) from a depth of 13 to 24 feet, elevations 0 to -11 feet. The marine deposits include portions of soft clay which is considered compressible under long-term loading such as fill. Additionally, the soft clay will have lower bearing for foundation elements. Depending on the amount of fill or type of foundations, additional investigation to include consolidation testing and/or shear testing may be necessary to further evaluate the properties of the marine clay.

Bedrock was encountered at the south or west abutment (boring B-2) at a depth of 3.5 feet, elevation 9.5 feet. Bedrock is observed to be dipping along the southwest abutment. In general, the bedrock consists of hard and intact granite of competent quality for foundation anchors or pinning. Design for anchors or pinning should account for bedrock undulation and dipping beneath the existing abutment. The bedrock is considered suitable for high bearing of foundation elements.

Granite block cribbing is present for both abutments with a tapering thickness of 2 to 13 feet. The granite blocks are various in size, cut to sharp irregular blocks, and generally competent in nature. Voids have been filled locally with smaller rounded or square rocks. Outer portions of the blocks are coated with shotcrete or similar. While the overall abutments appear intact, it is difficult to evaluate the internal integrity for global stability and bearing capacity of foundations. Results from the test borings suggest loose rock or rubble fill was placed inside the outer block facing as fill. Ground penetrating radar (GPR) may provide better evaluation for the presence of voids.

Due to the location being adjacent to tidal (salt) water, corrosive conditions to concrete and steel should be considered. Corrosion protection such as concrete admixtures, coating of steel elements, or similar should be incorporated into new foundation design.

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5.0 Abutment Recommendations

The following are geotechnical recommendations for preliminary abutment concepts.

- Reuse of granite block abutments
- Mechanical stabilized earth (MSE) wall supported abutments
- Cast-in-place concrete abutments
- CON/SPAN® anchored wall with pre-cast drainage structure
- Pile support foundations

Preliminary design considerations for each of the abutment concepts are provided below.

5.1 Reuse of Granite Block Abutments

We understand consideration is being made for the reuse of the existing granite block abutments. In summary, the existing abutments are approximately 20 to 40 feet in length, 24 feet in width, and 2 to 13 feet in height. The granite blocks are stacked in a near vertical batter. Consideration and limitations to the reuse of the granite block abutments include:

- Potential for voids and unknown interlocking structure for design
- Relatively narrow width, limiting potential for roadway widening
- Difficulty in excavation or penetration for deep foundations

In summary, we consider the granite block abutments to be in fair to stable condition. However, reuse to support an increase bridge structure for width and elevation may be limited or difficult to meet current design standards. We recommend, if reused, the new bridge structure incorporate new abutments located behind existing cribbing as practical. Portions of the cribbing may be reconstructed to permit integration of new foundations suitable for support of new bridge structures.

5.2 Mechanical Stabilized Earth (MSE) Wall Support Abutments

An alternative to granite block abutments is mechanical stabilized earth (MSE) wall support abutments. Precast retaining walls to include a gravity block or a reinforced block such as Stone Strong or similar may be suitable to support short bridge foundation loads. Abutment foundations may include concrete spread footing or pile support foundation bearing within the reinforced or gravity block retaining wall. Use of a MSE wall support abutment would essentially replace the current granite block abutments. Construction of the mechanical stabilized earth wall support abutments would utilize relatively common construction methodology. Design should consider bearing capacity, settlement, and global stability of the underlying marine clay and bedrock. The precast wall system should be designed to accommodate a salt water application.

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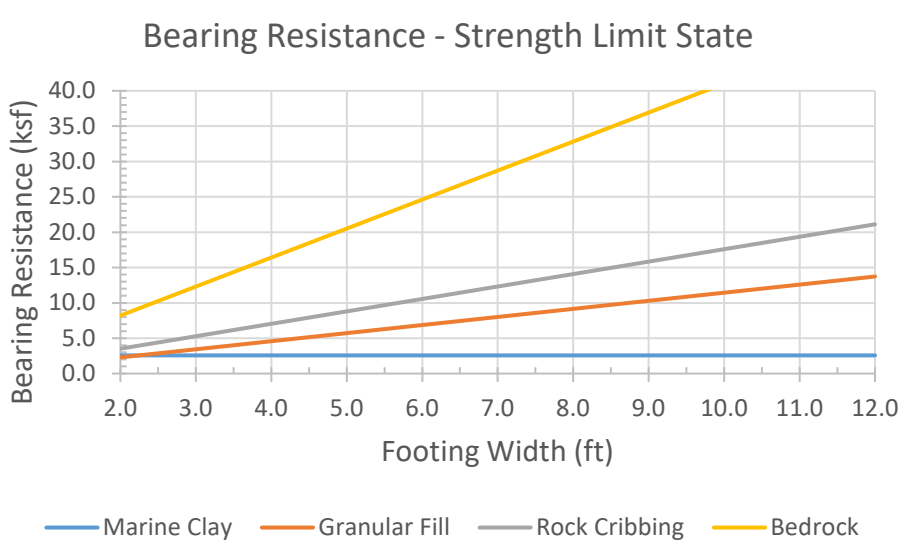
5.3 Cast-In-Place Concrete Abutments

Concrete abutments consist of cast-in-place concrete bearing on bedrock or soil. The abutments would be subject to compressive, uplift, and lateral loads imposed by the bridge loads and any retained soil or bedrock. We recommend the following preliminary design parameters for evaluation potential use for cast-in-place concrete foundations:

PARAMETER	GLACIAL MARINE	GRANULAR BACKFILL	ROCK CRIBBING	GRANITE BEDROCK
Natural Unit Weight (γ_t)	115 pcf	130 pcf	125 pcf	150 pcf
Friction Coefficient (f_c)	0.30	0.50	0.60	0.70
Friction Angle (ϕ')	--	33^0	36^0	40^0
Undrained Shear Strength (S_u)	500 psf	--	--	--
Active Earth Pressure (K_a)	--	0.32	0.26	0.22
Passive Earth Pressure (K_p)	--	3.40	3.85	4.60
Bearing Resistant Factor (φ_b)	0.50	0.45	0.45	0.45
Passive Resistant Factor (φ_{ep})	0.50	0.50	0.50	0.50
Sliding Resistant Factor (φ_s)	0.90	0.80	0.80	0.80

The following graph represents (un-factored) bearing resistance for Strength Limit State in accordance with AASHTO LRFD Bridge Design Specifications:



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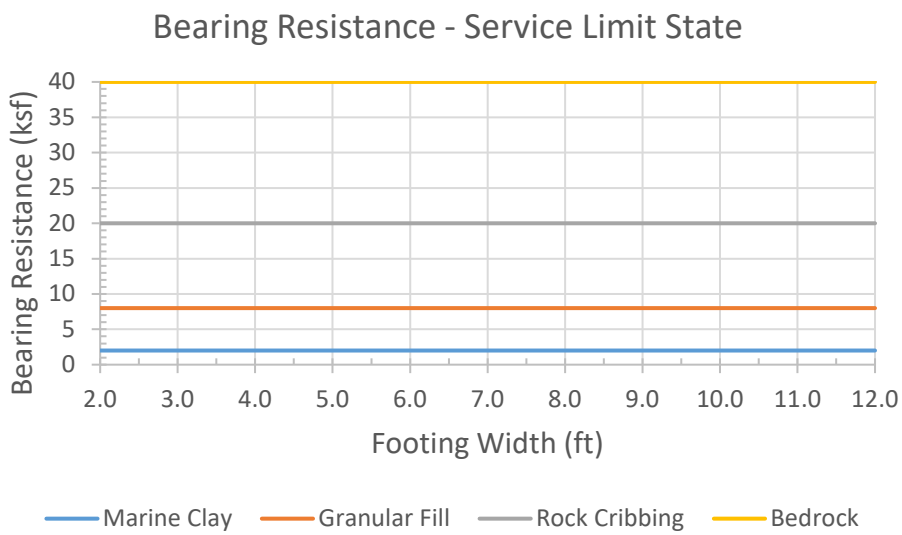
The following graph represents (un-factored) bearing resistance for Service Limit State in accordance with AASHTO LRFD Bridge Design Specifications:



Settlement associated with bearing resistance should be evaluated once foundation loads and dimensions are determined. We recommend SGS be made available to review foundation loads for evaluating settlement potential.

Cast-in-place concrete foundations should have a minimum embedment depth for frost protection using a design freezing index of 1,000*F-days as follows:

- Granular Fill (Depth = 5.5 feet)
- Marine Clay (Depth = 3.0 feet)
- Bedrock (No Minimum Depth)

Scour protection should be considered to prevent the undermining of foundations. At a minimum, we recommend foundations constructed with soil be placed a minimum of 2 feet below bottom of tidal channel. Alternatively, foundations may be constructed and pinned to bedrock or other suitable scour protection measures incorporated.

The following are bedrock design values from AASHTO LRFD Bridge Design Specifications:

- Rock Mass Rating (RMR) = 85
- Elastic Modulus (E_m) = 7,600 ksi
- Poisson's Ratio (ν) = 0.20
- Grout/Rock Ultimate Bond Stress = 36 ksf
- Anchor Pullout Resistance Factor = 0.50

5.4 CON/SPAN® Pre-Cast Structure

Due to the relatively short bridge span of approximately 20 feet or less, a CON/SPAN® anchored wall with pre-cast drainage structure may be applicable. We recommend prior to use, a preliminary design be prepared by a qualified CON/SPAN® contractor to evaluate suitable pre-fabricated structures available for the site conditions. Preliminary design to include foundation loads should then be made available to SGS for suitable bearing and settlement analysis.

5.5 Pile Foundations

Foundations constructed upon marine deposits (soft clay) may require pile support foundations. If used, we recommend the following piles for consideration:

- Timber Piles (Marine Application)
- Steel H or Pipe Piles (Epoxy Coated or Similar)
- Concrete/Grout Micropiles (Cast-in-place)
- Helical Anchor or Similar (To Be Determined)

Due to the low lateral loading capacity of the marine deposit (soft clay) and relatively short depth to bedrock, battered piles may be necessary for lateral loads. Alternatively, drilled socketing of piles into bedrock may be considered. Piles, if used, should be design to account for corrosive saltwater application.

5.6 Seismic Considerations

The seismic profile was evaluated using data from the test borings. Based on the results for standard penetration resistance and depth to bedrock, we recommend the following:

- NEHRP Site Classification = Site Class B (Bedrock), Site Class C (Soil)
- FHWA Seismic Hazard Level = Class I
- Peak Ground Acceleration (PGA) = 0.08g (Site Class B)
- Peak Ground Acceleration (PGA_M) = 0.10g (Site Class C)
- 0.2s Spectral Acceleration (S_{DS}) = 0.14g
- 1.0s Spectral Acceleration (S_{D1}) = 0.08g

The existing fill and marine deposit (clay) is considered resistance to earthquake induced liquefaction for the above mapped peak ground accelerations.

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6.0 Pavement Recommendations

The project may include new bituminous pavement sections. We recommend a minimum total bituminous pavement section thickness of 22 inches where subjected to moderate to heavy truckloads. We further recommend that the bituminous pavement sections consist of the following materials.

MATERIAL	THICKNESS (in)	SPECIFICATION
Asphalt Surface Course	1.5	MDOT 703.09 Type 9.5 mm or Type 12.5 mm
Asphalt Binder Course	2.5	MDOT 703.09 Type 19 mm
Base Soil	3	MDOT 703.06 Type A
Subbase Soil	15	MDOT 703.06 Type D

For portions of the bituminous pavement subjected to light traffic loads of cars and light trucks we recommend MDOT Type 9.5mm surface course. Where heavy duty sections are needed for trucks we suggest MDOT 703.09 Type 12.5mm for improved strength and durability of the asphalt surface.

Base and Subbase (MDOT Type A and Type D) should be free from organic matter, balls of clay, and other deleterious substances. The portion of soil passing a 3-inch sieve shall meet the following gradation specification:

Sieve Designation	Percent Passing a 3-inch Sieve	
	MDOT Type A (Base)	MDOT Type D (Subbase)
2 Inch	100	--
½ Inch	45 – 70	35 – 80
¼ Inch	30 – 55	25 – 65
No. 40	0 – 20	0 – 30
No. 200	0 – 6	0 – 7

Reference: MDOT Specification 703.06, Aggregate for Base and Subbase (2014)

Additional fill required beneath pavement sections should consist of compacted Granular Borrow, as specified in Section 5.6 Granular Borrow. Granular Borrow should be placed in 6 to 12 inch lifts and compacted to 95 percent of its maximum dry density determined in accordance with ASTM D1557.

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7.0 Earthwork Considerations

Foundations bearing on bedrock should incorporate provisions for inspection and account for potential of undulation and/or dipping. We recommend anchor or pinning within bedrock, if planned, should be reviewed and inspected by the geotechnical engineer to evaluate bedrock competency for support of foundation loads.

Subgrade stabilization or ground improvement such as preload may be necessary for abutment foundations constructed upon marine deposits (soft clay). Requirement for stabilization and/or ground improvement should be evaluated once abutment foundation type has been selected.

Depending on type of abutment foundations and construction methods selected, temporary cofferdams such as shallow sheeting and/or sand bags may be used to reduce the amount of tidal water infiltration within the excavation. We recommend submersible sump pumps be installed at the base of the rock fill behind the cofferdam to dewater the base of excavation. Excavation, placement of backfill, and/or wall blocks should be performed at or near low tide.

8.0 Closure

Our recommendations are based on professional judgment and generally accepted principles of geotechnical engineering and project information provided by others. Some changes in subsurface conditions from those presented in this report may occur. Should these conditions differ materially from those described in this report, SGS should be notified so that we can re-evaluate our recommendations.

We appreciate the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

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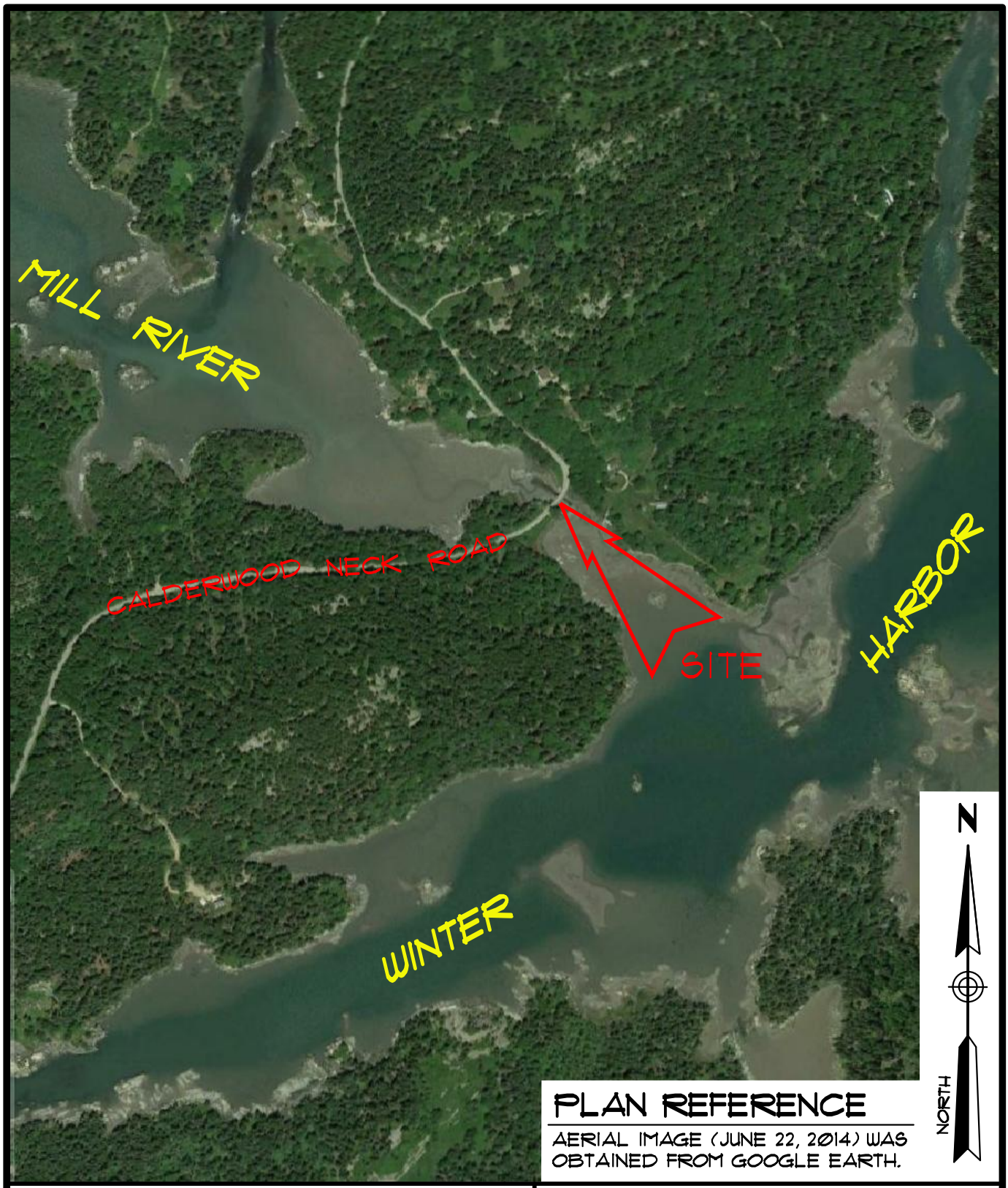
APPENDIX A

SITE LOCATION MAP

EXPLORATION LOCATION PLAN



PLAN REFERENCE

AERIAL IMAGE (JUNE 22, 2014) WAS OBTAINED FROM GOOGLE EARTH.

SITE LOCATION PLAN
CARRY PLACE BRIDGE

CALDERWOOD NECK ROAD - VINALHAVEN, MAINE

PREPARED FOR

GARTLEY & DORSKY

DATE: 3-29-2017	DRAWN BY: KRF	CHECKED BY: CWC
JOB: 17011	SCALE: 1" = 600'	FILE: 17011 MAPS

145 LISBON ST. - SUITE 601
LEWISTON, ME 04240
Tel.: (207) 576-3313

173 PLEASANT STREET
ROCKLAND, ME 04841
Tel.: (207) 318-7761

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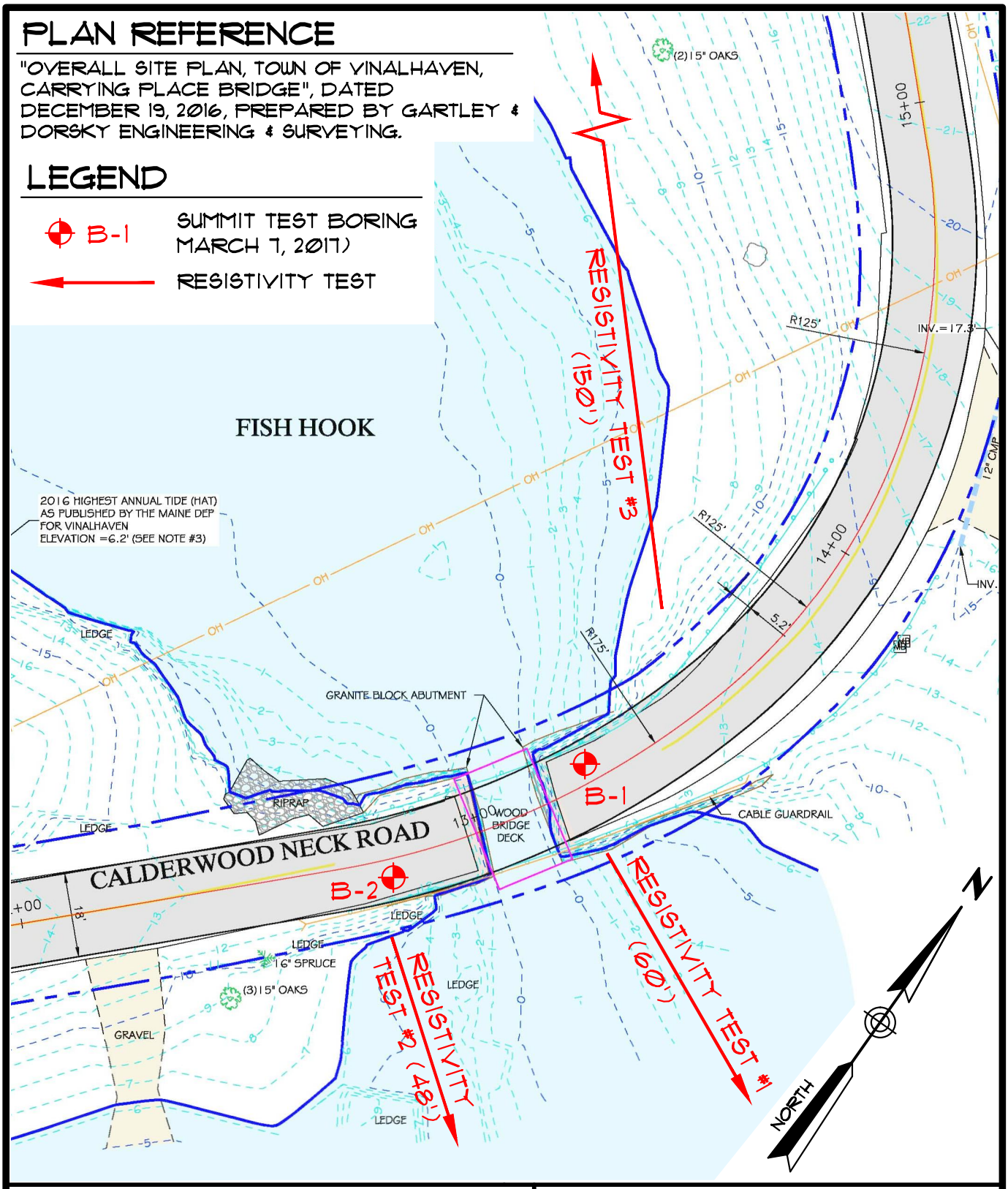
PLAN REFERENCE

"OVERALL SITE PLAN, TOWN OF VINALHAVEN, CARRYING PLACE BRIDGE", DATED DECEMBER 19, 2016, PREPARED BY GARTLEY & DORSKY ENGINEERING & SURVEYING.

LEGEND

B-1 SUMMIT TEST BORING MARCH 7, 2017

RESISTIVITY TEST



EXPLORATION LOCATION PLAN
CARRY PLACE BRIDGE

CALDERWOOD NECK ROAD - VINALHAVEN, MAINE

PREPARED FOR

GARTLEY & DORSKY

DATE: 3-14-2017	DRAWN BY: KRF	CHECKED BY: CWC
JOB: 17011	SCALE: 1" = 30'	FILE: 17011 MAPS

145 LISBON ST. - SUITE 601
LEWISTON, ME 04240
Tel.: (207) 576-3313

173 PLEASANT STREET
ROCKLAND, ME 04841
Tel.: (207) 318-7761

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APPENDIX B

TEST BORING LOGS

RESISTIVITY REPORTS

EXPLORATION COVER SHEET

The exploration logs are prepared by the geotechnical engineer from both field and laboratory data. Soil descriptions are based upon the Unified Soil Classification System (USCS) per ASTM D2487 and/or ASTM D2488 as applicable. Supplemental descriptive terms for estimated particle percentage, color, density, moisture condition, and bedrock may also be included to further describe conditions.

Drilling and Sampling Symbols:

S = Split Spoon Sample
UT = Thin Wall Shelby Tube
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RW = Rotary Wash
SV = Lab Shear Vane (Torvane)
PP = Pocket Penetrometer
C = Rock Core Sample
FV = Field Vane Shear Test
SP = Concrete Punch Sample

Hyd = Hydraulic Advancement of Drilling Rods
Push = Direct Push of Drilling Rods
WOH = Weight of Hammer
WOR = Weight of Rod
PI = Plasticity Index
LL = Liquid Limit
MC = Natural Moisture Content
USCS = Unified Soil Classification System
Su = Undrained Shear Strength
Su(r) = Remolded Shear Strength

Water Level Measurements:

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable groundwater levels. In impervious soils, the accurate determination of groundwater elevations may not be possible, even after several days of observations. Groundwater monitoring wells may be required to record accurate depths and fluctuation.

Gradation Description and Terminology:

Boulders:	Over 12 inches
Cobbles:	12 inches to 3 inches
Gravel:	3 inches to No.4 sieve
Sand:	No.4 to No. 200 sieve
Silt:	No. 200 sieve to 0.005 mm
Clay:	less than 0.005 mm

Trace:	Less than 5%
Little:	5% to 15%
Some:	15% to 30%
Silty, Sandy, etc.:	Greater than 30%

Density of Granular Soils and Consistency of Cohesive Soils:

CONSISTENCY OF COHESIVE SOILS		DENSITY OF GRANULAR SOILS	
SPT N-value blows/ft	**Consistency**	**SPT N-value blows/ft**	**Relative Density**
0 to 2	Very Soft	0 to 4	Very Loose
2 to 4	Soft	5 to 10	Loose
5 to 8	Firm	11 to 30	Compact
9 to 15	Stiff	31 to 50	Dense
16 to 30	Very Stiff	>50	Very Dense
>30	Hard		

SOIL BORING LOG

SUMMIT GEOENGINEERING SERVICES

Project:	Carrying Place Bridge	Boring #:	**B-1**
Location:	Calderwood Neck Road	Project #:	17011
City, State:	Vinalhaven, Maine	Sheet:	1 of 2
		Chkd by:	CWC

Drilling Co:	East Coast Explorations	Boring Elevation:	13 ft +/-
Driller:	Chris Palmer	Reference:	Existing Conditions & Topographic Survey Plan C-1 by Gartley & Dorsky
Summit Staff:	Craig Coolidge, P.E.	Date started: 3/7/2017	Date Completed: 3/7/2017

DRILLING METHOD		SAMPLER	
Vehicle:	ATV	Length:	24" SS
Model:	CME-550	Diameter:	2"OD/1.5"ID
Method:	Rotary Wash	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
3/7/2017	13 ft	0 ft	Observed moisture content

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
						4" Bituminous Pavement		PAVEMENT
1	S-1	24/12	0.5 - 2.5	40	12.7'	Brown SAND, Some Gravel, black Ash, frozen to humid, compact, SW-SM		0.3' GRANULAR FILL
				20				
2				7				
				3				
3								
					10'	Rocky drilling at 3', occasional voids		3' ROCK RUBBLE
4								
5								
	S-2	24/5	5 - 7	6		Reddish brown rock fragments (Granite), little Sand, compact, moist, SM		
6				12				
				7				
7				18				
8								
9								
	S-3	24/4	9 - 11	25		Reddish brown rock fragments (Granite), little Sand, loose, wet, SM		
10				5				
				2				
11				2				
12								
13								
					0'	Change to gray clay in drilling water		13' MARINE DEPOSIT
14								
	S-4	24/22	14 - 16	3		Gray Sandy SILT, little Clay, soft, wet, ML		
15				1				
				WOH	-2'	Gray Silty CLAY, trace Sand, soft, wet, CL	MC = 26.0%	15'
16				WOH			LL = 28	
							PI = 10	
17								
18								
19								
	S-5	24/5	19 - 21	WOH		Gray Silty CLAY, trace Sand, soft, wet, CL	MC = 33.1%	
20				1				
				WOH				
21				1				
22								
					-9	Change to sandy wash, denser drilling		22'

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: WOH = Weight of Hammer
LL = Liquid Limit, PI = Plastic Index, MC = Moisture Content

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	Carrying Place Bridge	Boring #:	**B-1**
Location:	Calderwood Neck Road	Project #:	17011
City, State:	Vinalhaven, Maine	Sheet:	2 of 2
		Chkd by:	CWC

Drilling Co:	East Coast Explorations	Boring Elevation:	13 ft +/-
Driller:	Chris Palmer	Reference:	Existing Conditions & Topographic Survey Plan C-1 by Gartley & Dorsky
Summit Staff:	Craig Coolidge, P.E.	Date started: 3/7/2017	Date Completed: 3/7/2017

DRILLING METHOD		SAMPLER	
Vehicle:	ATV	Length:	24" SS
Model:	CME-550	Diameter:	2"OD/1.5"ID
Method:	Rotary Wash	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
3/7/2017	13 ft	0 ft	Observed moisture content

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
23								MARINE DEPOSIT
24								
	S-6	3/3	24 - 24.3	50/3"		Gray SAND, some Gravel and Silt, compact, wet, SM		
25					-11.3	End of Exploration at 24.3', Bedrock Refusal		24.3' BEDROCK
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
$(S_u)_{fv}$ = Peak / Remolded Undrained Shear Strength

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SOIL BORING LOG

SUMMIT GEOENGINEERING SERVICES

Project:	Carrying Place Bridge	Boring #:	**B-2**
Location:	Calderwood Neck Road	Project #:	17011
City, State:	Vinalhaven, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	East Coast Explorations	Boring Elevation:	13 ft +/-
Driller:	Chris Palmer	Reference:	Existing Conditions & Topographic Survey Plan C-1 by Gartley & Dorsky
Summit Staff:	Craig Coolidge, P.E.	Date started: 3/7/2017	Date Completed: 3/7/2017

DRILLING METHOD		SAMPLER	
Vehicle:	ATV	Length:	24" SS
Model:	CME-550	Diameter:	2"OD/1.5"ID
Method:	Rotary Wash	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH			
Date	Depth	Elevation	Reference
3/7/2017	N/E	N/E	None Encountered

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
						4" Bituminous Pavement		PAVEMENT
1	S-1	24/16	0.5 - 2.5	40	12.7'	Brown SAND, some Gravel, little Silt, frozen to humid,		0.3'
				16		SW-SM	Gravel = 20%	GRANULAR FILL
2				9			Sand = 68%	
				7		Mottled soil color at 2.5'	Fines = 12%	
3	ROCK CORE DATA							
	RUN	RECOVERY	DEPTH	RQD				
4	C-1	88%	3.5 - 8.5	96%	9.5'	Hard, slightly weathered to fresh, sound, coarse-grained,		3.5'
						gray-white GRANITE w/fine Quartz		BEDROCK
5						Mohs Hardness = 7		
6						Joint at surface (3.5' to 4.0'), steep, slighty weathered		
7						Joint at 4.4', planar, rough, tight to loose		
8					4.5'	End of Exploration at 8.5'		8.5'
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: WOH = Weight of Hammer
LL = Liquid Limit, PI = Plastic Index, MC = Moisture Content
RQD = Rock Quality Designation

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

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WENNER 4 PIN RESISTIVITY FIELD REPORT

Date: 3/7/2017

Project: Carrying Place Bridge

Project #: 17011

Performed By: Craig Coolidge, P.E.

Site Location: Calderwood Neck Road, Vinalhaven, Maine

Elevation: 3 ft +/-

Test Procedure: Resistivity testing was performed using the Wenner Four Probe method in accordance with ASTM G57-06. Probe spacing ranged from 2 to 100 feet. Resistivity results for the pin spacing are presented in the following table. Resistivity values were calculated using the following equations:

Resistivity (p) in ohm-cm = $2*\pi*a*R$ (a=electrode spacing in cm, R=resistance in ohms)

Resistivity (p) in ohm-cm = 191.5*a*R (a=electrode spacing in ft, R=resistance in ohms)

Test Results:

Wenner 4 Pin Resistivity Test 1

Material	Spacing (feet)	Dial	Reading	Resistivity (ohm-cm)	Resistivity (ohm-m)
Soil	2	0.1	7.3	300	3
Soil	4	0.1	7.2	600	6
Soil	6	0.1	9.7	1,100	11
Soil	8	1.0	1.1	1,700	17
Soil	10	1.0	0.9	1,700	17
Soil	12	1.0	1.1	2,500	25
Bedrock	14	1.0	1.3	3,500	35
Bedrock	16	1.0	1.2	3,700	37
Bedrock	18	1.0	1.1	3,800	38
Bedrock	20	1.0	1.0	3,800	38
			MIN	300	3
			MAX	3,800	38
			AVG	2,489	25
			STD	1,258	13

Remarks: Performed at low tide along base of tidal water channel south of east bridge abutment.

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WENNER 4 PIN RESISTIVITY FIELD REPORT

Date: 3/7/2017

Project: Carrying Place Bridge

Project #: 17011

Performed By: Craig Coolidge, P.E.

Site Location: Calderwood Neck Road, Vinalhaven, Maine

Elevation: 4 to 5 ft +/-

Test Procedure: Resistivity testing was performed using the Wenner Four Probe method in accordance with ASTM G57-06. Probe spacing ranged from 2 to 100 feet. Resistivity results for the pin spacing are presented in the following table. Resistivity values were calculated using the following equations:

Resistivity (p) in ohm-cm = $2*\pi*a*R$ (a=electrode spacing in cm, R=resistance in ohms)

Resistivity (p) in ohm-cm = 191.5*a*R (a=electrode spacing in ft, R=resistance in ohms)

Test Results:

Wenner 4 Pin Resistivity Test 2

Material	Spacing (feet)	Dial	Reading	Resistivity (ohm-cm)	Resistivity (ohm-m)
Soil	2	1.0	3.0	1,100	11
Bedrock	4	1.0	4.7	3,600	36
Bedrock	6	1.0	3.0	3,400	34
Bedrock	8	1.0	2.1	3,200	32
Bedrock	10	1.0	2.0	3,800	38
Bedrock	12	1.0	2.5	5,700	57
Bedrock	14	1.0	2.8	7,500	75
Bedrock	16	1.0	3.0	9,200	92
			MIN	1,100	11
			MAX	9,200	92
			AVG	5,200	52
			STD	2,356	24

Remarks: Performed at low tide along bedrock outcrops south of west bridge abutment.

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WENNER 4 PIN RESISTIVITY FIELD REPORT

Date: 3/7/2017

Project: Carrying Place Bridge

Project #: 17011

Performed By: Craig Coolidge, P.E.

Site Location: Calderwood Neck Road, Vinalhaven, Maine

Elevation: 6 to 7 ft +/-

Test Procedure: Resistivity testing was performed using the Wenner Four Probe method in accordance with ASTM G57-06. Probe spacing ranged from 2 to 100 feet. Resistivity results for the pin spacing are presented in the following table. Resistivity values were calculated using the following equations:

Resistivity (p) in ohm-cm = 2*π*a*R (a=electrode spacing in cm, R=resistance in ohms)

Resistivity (p) in ohm-cm = 191.5*a*R (a=electrode spacing in ft, R=resistance in ohms)

Test Results:

Wenner 4 Pin Resistivity Test 3

Material	Spacing (feet)	Dial	Reading	Resistivity (ohm-cm)	Resistivity (ohm-m)
Soil	2	1.0	6.3	2,400	24
Soil	4	1.0	2.6	2,000	20
Soil	6	1.0	1.2	1,400	14
Soil	8	0.1	7.7	1,200	12
Soil	10	0.1	7.6	1,500	15
Soil	12	0.1	6.2	1,400	14
Soil	16	0.1	6.6	2,000	20
Soil	20	0.1	5.2	2,000	20
Bedrock	25	0.1	6.2	3,000	30
Bedrock	30	0.1	8.1	4,700	47
Bedrock	40	1.0	1.1	8,400	84
Bedrock	50	0.1	9.2	8,800	88
			MIN	1,200	12
			MAX	8,800	88
			AVG	3,309	33
			STD	2,797	28

Remarks: Performed at low tide along north of east bridge abutment along edge of high tide

APPENDIX C

LABORATORY TEST RESULTS

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GEOENGINEERING SERVICES

GRAIN SIZE ANALYSIS - ASTM D6913

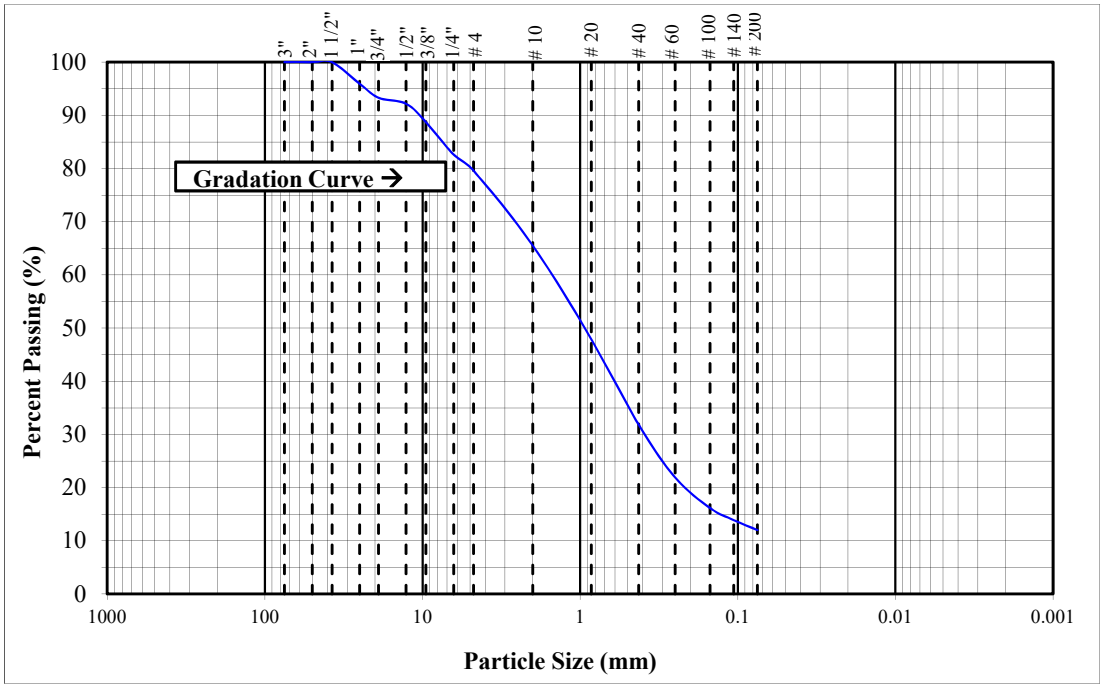
PROJECT NAME:	Carrying Place Bridge	PROJECT #:	17011
PROJECT LOCATION:	Calderwood Neck Rd, Vinalhaven, ME	EXPLORATION #:	B-2
CLIENT:	Gartley & Dorsky Engineering & Surveying	SAMPLE #:	S-1
TECHNICIAN:	Erika Stewart, E.I.	SAMPLE DEPTH:	0.5' - 2.5'
SOIL DESCRIPTION:	SAND, some Gravel, little Silt, SW-SM to SM	TEST DATE:	3/14/2017

TEST PROCEDURE

Sample Source: Split Spoon	**Sieve Stack:** Composite	**Specimen Procedure:** Moist
Test Method: Method A	**Separating Sieve(s):** 3/8 Inch	**Dispersion Type:** Tap Water

DATA

STANDARD SIEVE DESIGNATION (mm)	ALTERNATIVE SIEVE DESIGNATION (in)	PERCENT PASSING (%)
75	(3 in)	100
50	(2 in)	100
37.5	(1-1/2 in)	100
25.0	(1 in)	96
19.0	(3/4 in)	93
12.7	(1/2 in)	92
9.5	(3/8 in)	89
6.35	(1/4 in)	83
4.75	(No. 4)	80
2.00	(No. 10)	66
0.850	(No. 20)	48
0.425	(No. 40)	32
0.250	(No. 60)	22
0.150	(No. 100)	16
0.106	(No. 140)	14
0.075	(No. 200)	12



REMARKS: Moisture Content = 8.8%.

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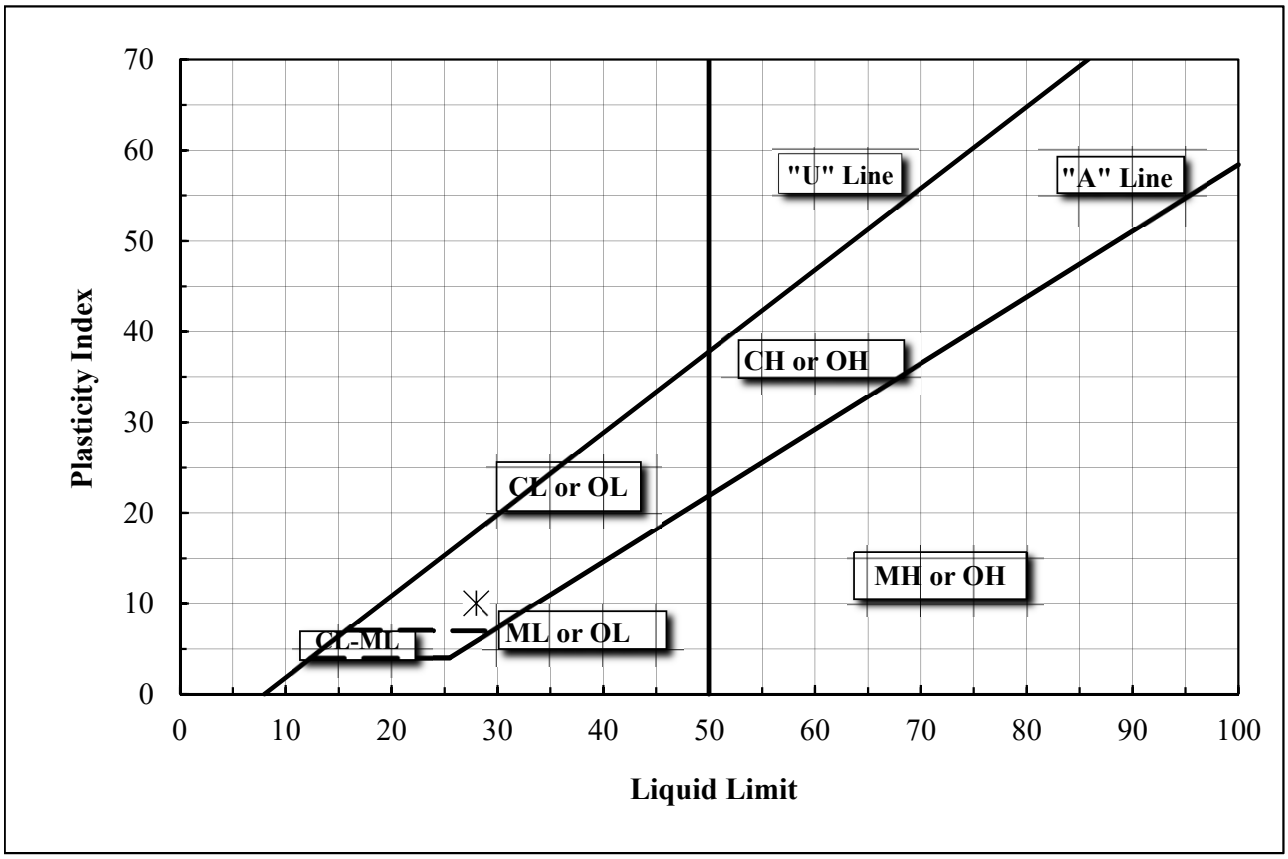
ATTERBERG LIMIT TEST - ASTM D4318

Method "A" (Multi-point)

PROJECT NAME:	Carrying Place Bridge	PROJECT NUMBER:	17011
CLIENT:	Gartley & Dorsky Engineering & Surveying	SAMPLE NUMBER:	S-4
SOURCE:	Boring B-4	DEPTH:	14' - 16'
TEST DATE:	3/14/2017	TECHNICIAN:	Erika Stewart, E.I.

DATA

Source	Depth	LL	PL	PI	Classification
B-4	14' - 16'	28	18	10	Gray Silty CLAY, trace Sand, CL



Notes: Moisture Content = 26.0%

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Laboratory Determination of Water (Moisture) Content of Soil ASTM D2216

PROJECT NAME:	Carrying Place Bridge	PROJECT #:	17011
PROJECT LOCATION:	Calderwood Neck Road	DRYING METHOD:	Oven Dried
CLIENT:	Gartley & Dorskey Engineering & Surveying	DESCRIPTION:	Glacial Marine Clay
SOURCE:	Test Borings	TECHNICIAN:	Erika Stewart, E.I.
COLLECTION DATE:	03/07/17	TESTING DATE:	03/14/17

Location	Sample No.	Depth	Moisture Content	Remarks
B-1	S-4	14' - 16'	26.0%	
B-1	S-5	19' - 21'	33.1%	

REMARKS:

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