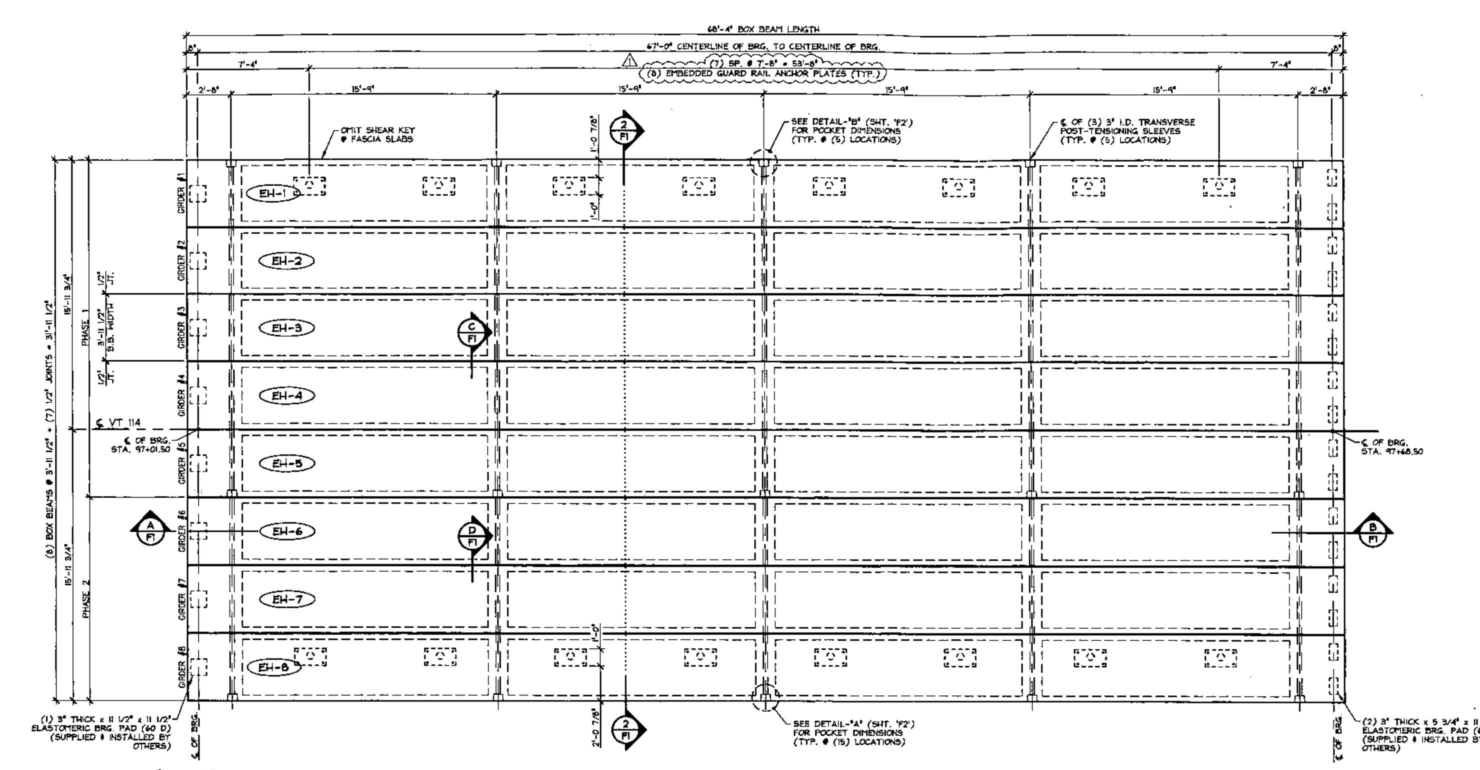
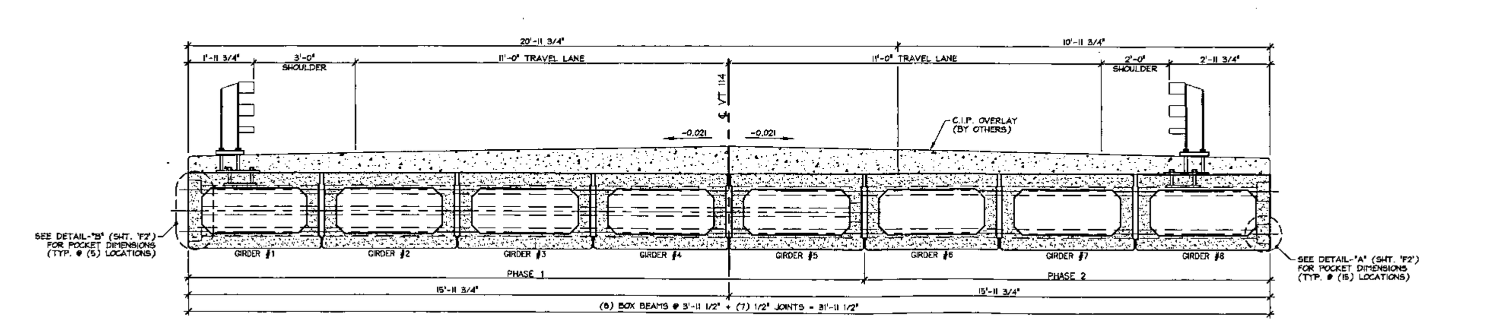


1/F1 PRESTRESSED BOX BEAM LAYOUT



2/F1 TRANSVERSE SECTION
1/2" = 1'-0"

GENERAL NOTES

1. MIN. CONCRETE STRENGTH AT 28 DAYS SHALL BE 7,000 PSI.
2. MIN. CONCRETE STRENGTH AT STRESS TRANSFER SHALL BE 5,500 PSI.
3. REINFORCING STEEL SHALL BE GR-60, ASTM A-615 (AASHTO M31) AND SHALL BE EPOXY COATED.
4. PRESTRESSING STRANDS SHALL CONFORM TO ASTM A-416 (AASHTO M203) AND SHALL CONSIST OF 0.60"Ø x 270 KSI 7-WIRE LOW RELAXATION STRANDS.
5. PRESTRESSING STRANDS SHALL EACH BE PULLED TO HAVE A NET TENSION OF 44.0 K AFTER ACCOUNTING FOR CHUCK SLIPPAGE. TENSION SHALL BE VERIFIED BY MEASURING STRAND ELONGATION. (SEE EXAMPLE ELONGATION CALCULATION AND TENSIONING PROCEDURE, THIS SHEET.)
6. ENDS OF PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH END OF BOX BEAMS (UNLESS NOTED OTHERWISE) AND EPOXY PAINTED.
7. ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4".
8. THE TOP OF BEAMS SHALL RECEIVE A TRANSVERSE RAKE FINISH ROUGHENED TO 1/4" AMPLITUDE.
9. SHEAR KEY SURFACES SHALL BE SAND BLASTED CLEAN. (1)
10. BEAMS SHALL BE HANDLED AND ERECTED USING THE LIFTING LOOPS ONLY. THE PINS OF THE SHACKLES SHALL BE PLACED THOUGH THE LIFTING LOOPS. SEE DETAIL, SHEET "F2". BEAMS SHALL BE STORED AND TRANSPORTED WITH TIMBER SUPPORTS WITHIN 2'-0" OF THE BEAM ENDS, UNLESS APPROVED BY J.P. CARRARA & SONS, INC.
11. MATERIAL SPECIFICATION AND MIX DESIGN SHALL CONFORM TO VERMONT SPEC. P510.02 AND P510.05 RESPECTIVELY.
    DESIGN MIX: J.P.C. BRIDGE MIX #425M
12. QUALITY CONTROL PROCEDURES ARE IN ACCORDANCE WITH PCI REQUIREMENTS. J.P. CARRARA & SONS, INC. IS A PCI CERTIFIED PLANT.
13. THE VOIDS MUST BE VENTED DURING CURING PERIOD.
14. CURING METHOD: AS SOON AS THE TOP OF BEAM IS FINISHED, A COVER OF POLY AND A LAYER OF HOMOSOTE (OR BLUE BOARD) WILL BE PLACED OVER THE BEAM. THE DESIRED CURING TEMPERATURE RANGE SHALL NOT DROP BELOW 70°F. THE TEMPERATURE SHALL BE RECORDED BY AUTOMATIC SENSOR INSTRUMENTS ON GRAPH CHARTS, SPACED NOT MORE THAN 100' APART AND WILL CONTINUE UNTIL RELEASE STRENGTH IS ACHIEVED, (NATURAL CURE WITH NO EXTERNAL HEAT APPLIED). EACH CHART SHALL BE MARKED.
15. TRANSVERSE POST-TENSTIONING SEQUENCE:
    - (2) A. ERECT PHASE 1 BOX BEAMS (GIRDERS #1 THRU #5), AND POST-TENSION CENTER TENDON TO APPROXIMATELY 5,000 LBS.
    - B. GROUT SHEAR KEYS.
    - C. ONCE SHEAR KEY GROUT HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI; POST TENSION TENDONS TO 47,000 LBS.
    - (2) D. ERECT PHASE 2 BOX BEAMS (GIRDERS #6 THRU #8), AND POST-TENSION TOP & BOTTOM TENDONS TO APPROXIMATELY 5,000 LBS.
    - E. GROUT SHEAR KEYS.
    - F. ONCE SHEAR KEY GROUT HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI; POST TENSION TENDONS TO 47,000 LBS.

EXAMPLE PRESTRESSING STRAND ELONGATION CALC. AND TENSIONING

(NOT TO BE USED FOR CONSTRUCTION)

SIZE & GRADE: 0.60"Ø x 270 KSI
AREA: 0.217 IN^2
TENSION: 44,000 LB. EACH STRANDS
GRIP-TO-GRIP: 192'-9 3/4" = 192.813'
Es = 28,600,000 PSI (ASSUMED FOR THESE CALCULATIONS; VALUE TO BE OBTAINED FOR STRAND SPOOL ACTUALLY USED)

EXAMPLE:

$$\Delta = \frac{PL}{AE} = \frac{(44,000 - 3,000) \times 192.813 \times 12}{0.217 \times 28,600,000} = 15.29"$$

THEREFORE: (TOLERANCES ± 5%)
Δ UPPER LIMIT = 1.05 x 15.29" = 16.05" = 16 1/16"
Δ LOWER LIMIT = 0.95 x 15.29" = 14.53" = 14 1/2"

EXTRA FORCE REQUIRED TO COMPENSATE FOR 1/2" CHUCK SLIPPAGE:

$$\Delta P = \frac{0.5 \times 41,000}{15.29} = 1,340 \text{ LBS.}$$

TOTAL TENSIONING FORCE = 44,000 + 1,340 = 45,340 LBS.

STRAND TENSIONING PROCEDURE:

1. PULL EACH STRAND INITIALLY TO 3,000* LBS. AND MARK STRAND.
2. THEN PULL EACH STRAND TO A TOTAL TENSION OF 45,340* LBS. AND MEASURE ELONGATION AFTER SEATING. IT MUST BE BETWEEN 14 1/2" & 16 1/16".

* NOTE: FORCES READ ON STRESSING JACK GAUGES MUST BE MADE TO CORRESPOND TO ABOVE VALUES BASED ON CALIBRATION DATA FOR SPECIFIC JACK USED.

Vermont Agency of Transportation
RECEIVED
CK'D BY JAG OK'D BY JTS
10:30 am, April 04,2012
RESUBMIT ____ APPROVED X
BY KMH DATE 4-04-12

NO.	DATE	REVISION	
2	4-4-12	REVISED AS NOTED	B.L.
1	3-1-12	REVISED PER ENGINEER COMMENTS	B.L.

STATE OF VERMONT
AGENCY OF TRANSPORTATION

DRAWN: B. LOPEZ
DESIGNED:
CHECKED:
APPROVED:

J.P. CARRARA & SONS INC.
Precast & Prestress Manufacturer
2464 CASE STR., MIDDLEBURY, VERMONT 05753
Phone:(802)388-6361
Fax:(802)388-9010
Double-Tees Hollow-Core Plank Flat Panels

AUSTIN CONSTRUCTION
CONCORD, VT

Project Name:
TOWN OF EAST HAVEN, VT
STATE ROUTE 114 - MAJOR COLLECTOR
BRIDGE NO. 18 PROJECT NO. BRF 0269(11)

SUPERSTRUCTURE PLAN & SECTION

SCALE:	JOB #:
NOTED	23363-011
DATE:	SHEET #:
1-20-11	F1

F:\VT-Bridges\23363-11 East Haven\23363-F1.dwg, 4/4/2012 9:58:18 AM