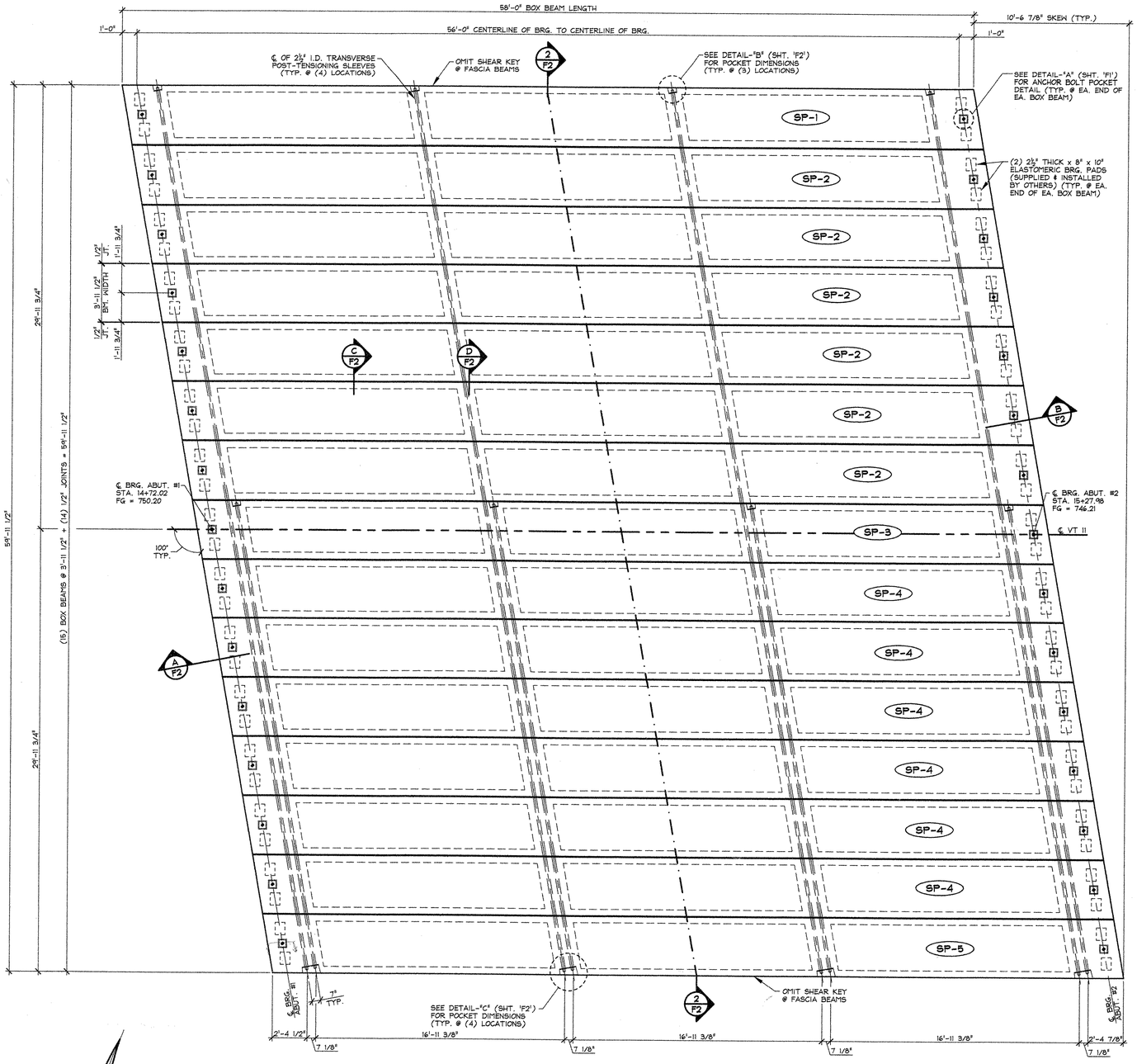
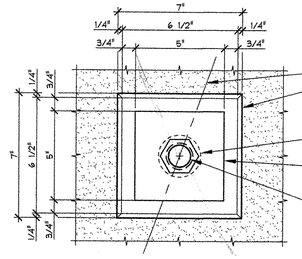
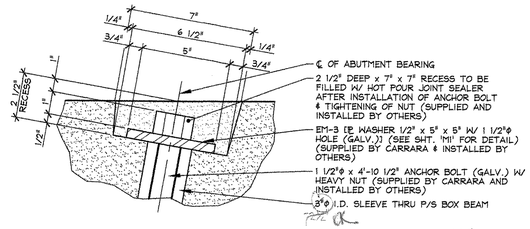


1/F1 PRESTRESSED BOX BEAM LAYOUT

1/4" = 1'-0"



PLAN @ BOX BEAM ℄



SECTION @ BOX BEAM ℄

DETAIL - "A"

3" = 1'-0"

(MIRROR IMAGE)

GENERAL NOTES

1. MIN. CONCRETE STRENGTH AT 28 DAYS SHALL BE 6,000 PSI. 4500
2. MIN. CONCRETE STRENGTH AT STRESS TRANSFER SHALL BE 4,000 PSI. (See Section 510-08)
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. TENSTION SHALL BE VERIFIED BY MEASURING STRAND ELONGATION. (SEE EXAMPLE ELONGATION CALCULATION AND TENSIONING PROCEDURE, THIS SHEET.)
6. ENDS OF PRESTRESSING STRANDS SHALL BE CUT, RECESSED & GROUTED FLUSH WITH END OF BOX BEAMS.
7. ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4".
8. THE TOP OF BEAMS SHALL RECEIVE A FLOAT FINISH.
9. SHEAR KEY SURFACES SHALL BE BLASTED CLEAN.
10. BEAMS SHALL BE HANDLED AND ERECTED USING THE LIFTING LOOPS ONLY. THE MINIMUM SLING ANGLE FROM THE HORIZONTAL SHALL BE 60°. 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. FS10.02 AND FS10.05 RESPECTIVELY.
    DESIGN MIX: J.P.C. BRIDGE MIX 430
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:
    A. ONCE VOIDED SLABS ARE ERECTED, POST-TENSION TENDONS TO APPROXIMATELY 5,000 LBS.
    B. GROUT SHEAR KEYS.
    C. ONCE SHEAR KEY GROUT HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI, POST TENSION TENDONS TO 30,000 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%)
△ UPPER LIMIT = 1.05 x 15.29" = 16.05" = 16 1/16"
△ LOWER LIMIT = 0.95 x 15.29" = 14.53" = 14 1/2"

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

$$\Delta P = \frac{0.5 \times 41{,}000}{15.29} = 1{,}341 \text{ LBS.}$$

TOTAL TENSIONING FORCE = 44,000 + 1,341 = 45,341 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 45,341* 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.

Structures

RECEIVED
OK'D BY DRP OK'D BY CWC
JUL 10 2007
RESUBMIT ___ APPROVED AS NOTED
BY RLW DATE 7/12/07

APPROVAL STAMP:

J.P. CARRARA & SONS INC. Precast & Prestress Manufacturer 2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010	J.A. McDONALD, INC. CONTRACTOR LYNDON, VERMONT
STATE OF VERMONT A.O.T. COUNTY OF WINDSOR	DATE: JUNE 20, 2007 SCALE: NOTED
TOWN OF SPRINGFIELD VERMONT ROUTE 11 BRIDGE NO.: 55 PROJECT NO.: ST CULV(5)	CHKD: D.F. DFTM: T.J.D. JOB NO: 23258-007
SUPERSTRUCTURE PLAN & DETAILS	DWG. NO: F1

#053

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