OVERHEAD SIGN SUPPORT NOTES

1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE STATE OF VERMONT AGENCY OF TRANSPORTATION'S "STANDARD SPECIFICATIONS FOR CONSTRUCTION", DATED 2006, WITH CURRENT MODIFICATIONS.

2. OVERHEAD SIGN SUPPORTS SHALL CONFORM TO AASHTO'S PUBLICATION ENTITLED "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS", DATED 2009 AND ITS LATEST INTERIMS.

3. THE DESIGN CALCULATIONS SHALL TAKE INTO ACCOUNT THE FOLLOWING CRITERIA:

   STRUCTURE CRITERIA
   - DESIGN LIFE: 50 YEARS
   - WIND LOAD: 90 MPH, UNLESS SPECIAL SITE CONDITIONS DICTATE
   - ICE LOAD PER AASHTO'S PUBLICATION ENTITLED 'STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS', DATED 2009

   FATIGUE CRITERIA
   - FATIGUE CATEGORY: I FOR MAST ARM SIGN STRUCTURES, 2 FOR SIGNAL MAST ARMS
   - VORTEX SHEDDING: INCLUDE
   - NATURAL WIND GUST: INCLUDE
   - TRUCK INDUCED WIND GUSTS: INCLUDE FOR ROADWAYS WHERE SPEED LIMIT IS 40 MPH OR GREATER
   - GALLOPING: DO NOT INCLUDE IN DESIGN CALCULATIONS

   FOUNDATION CRITERIA
   - CONCRETE: CONCRETE, HIGH PERFORMANCE CLASS B, STATE OF VERMONT, AGENCY OF TRANSPORTATION'S 'STANDARD SPECIFICATIONS FOR CONSTRUCTION', DATED 2006, SECTION 501
   - REINFORCING STEEL: STATE OF VERMONT, AGENCY OF TRANSPORTATION'S 'STANDARD SPECIFICATIONS FOR CONSTRUCTION', DATED 2006, SUB-SECTION 713.01

   ALLOWABLE BEARING CAPACITY: IN ACCORDANCE WITH GEOTECHNICAL REPORT
   INTERNAL SOIL FRICTION ANGLE, ϕ: IN ACCORDANCE WITH GEOTECHNICAL REPORT
   WHICH IS MADE PART OF THIS CONTRACT.

4. ANCHOR BOLTS

   A MINIMUM OF FOUR STAINLESS STEEL ANCHOR BOLTS WITH TWO HEXAGON NUTS, ONE WASHER AND ONE LOCK WASHER PER BOLT SHALL BE FURNISHED WITH EACH POLE. ANCHOR BOLT PLATES, WHEN USED, SHALL ALSO BE STAINLESS STEEL. STATE OF VERMONT, AGENCY OF TRANSPORTATION'S 'STANDARD SPECIFICATIONS FOR CONSTRUCTION', DATED 2006, SUB-SECTION 714.09.

5. FLANGE BOLTS

   ALL FLANGE BOLTS AND HEX NUTS SHALL BE HIGH STRENGTH STEEL AND SHALL CONFORM TO STATE OF VERMONT, AGENCY OF TRANSPORTATION'S 'STANDARD SPECIFICATIONS FOR CONSTRUCTION', DATED 2006, SUB-SECTION 714.05.

6. HORIZONTAL AND VERTICAL MEMBERS

   STEEL TUBES SHALL BE FORMED AND WELDED WITH ONE CONTINUOUS LONGITUDINAL WELD ONLY. AFTER FORMING AND WELDING THEY SHALL BE COLD ROLLED TO ENSURE UNIFORMITY OF SIZE AND SMOOTHNESS OF WELD. THERE SHALL BE NO TRANSVERSE WELDING EXCEPT AT THE FLANGE CONNECTIONS AND POLE BASE PLATES, WHERE THE TUBES SHALL TELESCOPE THE FLANGES AND PLATES AND BE CONTINUOUSLY WELDED BOTH SIDES INSIDE AND OUT TO WITHSTAND THE FULL TRANSFER OF THE BENDING STRENGTH TO THE BOLTS. OPTIONALLY, THE MEMBERS MAY BE A SERIES OF TWO OR THREE DIFFERENT DIAMETER PIPES WELDED TOGETHER. STEEL TUBES SHALL BE CONSTRUCTED FROM MATERIALS CONFORMING TO STATE OF VERMONT, AGENCY OF TRANSPORTATION'S 'STANDARD SPECIFICATIONS FOR CONSTRUCTION', DATED 2006, SUB-SECTION 752.02.

7. GALVANIZING

   ANY STEEL COMPONENTS, EXCEPT CONCRETE REINFORCING AND STAINLESS STEEL HARDWARE THAT ARE NOT CALLED OUT TO BE PAINTED BLACK, ARE TO BE HOT DIPPED GALVANIZED AFTER FABRICATION. THE ASSEMBLIES SHALL BE DESIGNED AND FABRICATED TO PERMIT GALVANIZING ON ALL INTERIOR AND EXTERIOR SURFACES AND SHALL BE FREE OF POCKETS AND OTHER STRUCTURAL OBSTRUCTIONS THAT WILL NOT PERMIT PROPER DEPOSITION OF ZINC COATING. GALVANIZING SHALL BE IN ACCORDANCE WITH STATE OF VERMONT, AGENCY OF TRANSPORTATION'S 'STANDARD SPECIFICATIONS FOR CONSTRUCTION', DATED 2006, SUB-SECTION 752.02.

8. WELDING

   ALL DESIGN DETAILS, WORKMANSHIP, PROCEDURES AND INSPECTION SHALL CONFORM TO VTRANS SPECIFICATIONS SUB-SECTION 506.10.

9. FOUNDATIONS

   A. FOUNDATIONS SHALL BE DESIGNED IN ACCORDANCE WITH THE MREI 10-01 GUIDELINES ISSUED BY THE AGENCY.

   B. FOUNDATIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING NOTES:

      1. ALL FOUNDATIONS FOR SIGN STRUCTURES SHALL BE CYLINDRICAL. SPREAD FOOTINGS SHALL NOT BE PERMITTED. ALL SIGN STRUCTURE FOUNDATIONS SHALL BE DESIGNED TO BE CONTAINED ENTIRELY WITHIN STATE OR TOWN RIGHTS-OF-WAY.

      2. EXCEPT FOR THE UPPERMOST 2 FEET OF SOIL, DRILLED SHAFT FOUNDATIONS SHALL BE POURED AGAINST UNDISTURBED MATERIAL; THE TOP 2 FEET OF SOIL SHALL BE NEGLECTED FOR DESIGN PURPOSES. A DISPOSABLE CIRCULAR CONCRETE FORM, IF USED, SHALL NOT BE PLACED DEEPER THAN 2 FEET, IN ORDER NOT TO REDUCE THE FRICTION BETWEEN THE SOIL AND THE CONCRETE.

      3. AS AN ALTERNATIVE TO THE DRILLED HOLES, FOUNDATIONS MAY BE POURED IN EXCAVATED HOLES USING THE PROPER FORMS, WHICH SHALL BE REMOVED. THE EXCAVATED HOLES SHALL BE AT LEAST 2 FEET CLEAR OF THE FOUNDATION SIDES AND 1 FOOT DEEPER THAN THE FOUNDATION. CARE SHALL BE TAKEN TO AVOID EXCAVATING AROUND THE TOP OF THE FOUNDATION. DESIGN LIMITS AS FOR AN AUGURED FOUNDATION APPLY.

      4. BACKFILL MATERIAL PLACED ADJACENT TO THE FOUNDATION SHALL MEET THE REQUIREMENTS FOR GRANULAR BACKFILL FOR STRUCTURES, VTRANS SPECIFICATION SUB-SECTION 704.08. BACKFILL MATERIAL SHALL BE COMPACTED AS DESCRIBED IN VTRANS CONSTRUCTION SPECIFICATIONS SUB-SECTION 204.08.

      5. CONCRETE FOR FOUNDATION SHALL CONFORM TO THE REQUIREMENTS OF SECTION 501. IF DRILLED SHAFT FOUNDATIONS ARE REQUIRED, THE CONCRETE SPECIFICATIONS MAY NEED TO BE ADJUSTED FOR CONSTRUCTIBILITY ISSUES. HOWEVER, IF REQUIRED, THE CONTRACTOR SHALL SUBMIT ANY CHANGES TO THE CONCRETE SPECIFICATION FOR REVIEW BY THE VTRANS PROJECT MANAGER.

      6. STEEL PILES SHALL MEET THE REQUIREMENTS OF SECTION 505.

      7. WHEN THE DESIGN DEPTH OF A FOUNDATION CANNOT BE OBTAINED DUE TO UNFORESEEN FIELD CONDITIONS AS DETERMINED BY THE ENGINEER, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND CONTACT THE MANUFACTURER TO OBTAIN A REVISED FOUNDATION DESIGN. SUCH A REVISION SHALL BE SUBMITTED TO THE VERMONT, AGENCY OF TRANSPORTATION, PROJECT MANAGER AND MAY REQUIRE UP TO A 4 WEEK REVIEW PERIOD BY VTRANS.

   C. SIGNS SHALL BE INSTALLED AND LEVELED AND POLES SHALL BE PLUMB PRIOR TO PLACING GROUT UNDER POLE BASE. GROUT MATERIAL SHALL BE NON-SHRINKING MORTAR CONFORMING TO SUB-SECTION 707.03 (MORTAR TYPE IV).

10. EACH OVERHEAD TRAFFIC SIGN SUPPORT SHALL BE GROUNDED. THE GROUND SHALL CONSIST OF:

    A) AN INTERNAL GROUND LUG OPPOSITE THE HAND HOLE.

    B) A #6 AWG. (MIN.) SOFT DRAWN COPPER GROUNDING ELECTRODE CONDUCTOR.

    C) A $\frac{5}{8}$" X 8' (MIN.) COPPER CLAD GROUNDING ELECTRODE. THE RESISTANCE TO GROUND SHALL BE 25 OHMS OR LESS. ADDITIONAL GROUNDING ELECTRODES MAY BE REQUIRED (MINIMUM SPACING SHALL BE 6 FEET).

    WHEN A POWER SERVICE, METER AND DISCONNECT ARE ATTACHED TO A POLE, THERE SHALL BE A CONTINUOUS GROUNDING ELECTRODE CONDUCTOR FROM THE METER AND DISCONNECT WHICH MAY RUN INTERNAL TO THE UPRIGHT, THROUGH THE $\frac{1}{2}$ INCH FLEXIBLE TUBING IN THE CONCRETE BASE TO THE REQUIRED GROUNDING ELECTRODE(S). THE GROUNDING ELECTRODE CONDUCTOR FROM THE POLE GROUNDING LUG, CONTROLLER CABINET AND/OR LUMINAIRE MAY ATTACH TO THIS CONTINUOUS GROUNDING ELECTRODE CONDUCTOR FROM THE SERVICE METER AND DISCONNECT. THE CONTRACTOR SHALL PERFORM A RESISTANCE TO GROUND TEST ON THE CONTINUOUS GROUNDING ELECTRODE CONDUCTOR FROM THE SERVICE METER AND DISCONNECT AND PROVIDE A WRITTEN STATEMENT TO THE AREA ELECTRICAL INSPECTOR THAT THE GROUNDING ELECTRODE CONDUCTOR IS CONTINUOUS FROM THE SERVICE METER AND DISCONNECT AND THE RESISTANCE TO GROUND IS 25 OHMS OR LESS.

11. HORIZONTAL MEMBERS SHALL BE CAMBERED AND THE VERTICAL POLES BACK RAKED (WHERE APPLICABLE) TO THE ANTICIPATED DEAD LOAD DEFLECTION PLUS THE CAMBER, IF ANY, SPECIFIED ON THE PLANS.

12. AN EQUIVALENT ALTERNATE DESIGN MAY BE SUBSTITUTED FOR THE DETAILS AND MATERIALS SHOWN. THE VERMONT AGENCY OF TRANSPORTATION SHALL HAVE THE SOLE AUTHORITY AND RETAIN THE DISCRETION TO DETERMINE IF THE CONTRACTOR'S ALTERNATE DESIGN IS EQUIVALENT AND ACCEPTABLE.

13. THE DETAILS OF DESIGN FOR THE STRUCTURE AND FOUNDATION(S) ARE TO BE SUPPLIED BY THE CONTRACTOR AND/OR BY THE MANUFACTURER. THE STRUCTURE SHALL BE DESIGNED TO RESIST THE MAXIMUM LOADING AS OUTLINED IN THE AASHTO STANDARD SPECIFICATIONS (SEE NOTE 2 AND 14G). ALL DESIGN CALCULATIONS FOR THE STRUCTURE AND THE FOUNDATION(S) SHALL BE CHECKED AND STAMPED BY AN ENGINEER REGISTERED IN THE STATE OF VERMONT PRIOR TO SUBMITTAL OF THE FABRICATION DRAWINGS TO THE VERMONT AGENCY OF TRANSPORTATION.

14. THE CONTRACTOR SHALL SUBMIT THREE (3) COPIES OF THE DESIGN CALCULATIONS TO THE VERMONT AGENCY OF TRANSPORTATION, PROJECT MANAGER, SHOWING THE FOLLOWING INFORMATION FOR EACH OF THE VERTICAL AND HORIZONTAL COMPONENTS OF THE STRUCTURE AND FOUNDATION:

    A. THE DESIGN AXIAL AND SHEAR FORCES AND BENDING AND TORSIONAL MOMENTS ACTING AT THE TOP OF THE FOUNDATION.

    B. THE DESIGN AXIAL, BENDING AND SHEAR STRESSES AND THE COMBINED STRESS RATIO.

    C. THE ALLOWABLE AXIAL, BENDING, AND SHEAR STRESSES.

    D. ITEMS A, B, C - SHALL BE SHOWN FOR EACH OF THE GROUP LOADINGS (I,II,III) AND FOR THE BASIC WIND LOAD APPLIED TO THE TWO CASES OUTLINED IN THE AASHTO STANDARD SPECIFICATIONS (SEE NOTE 2) SECTION 1.2.5 (D) (4).

    E. FAILURE TO SUPPLY THE PROPER DESIGN INFORMATION SHALL BE CAUSE FOR REJECTION OF THE STRUCTURE.

    F. A MINIMUM OF FOUR (4) WEEKS SHALL BE REQUIRED FOR REVIEW BY THE VERMONT AGENCY OF TRANSPORTATION AND THE ENGINEER OF RECORD (VANASSE HANGEN BRUSTLIN, INC).

    G. EVERY MEMBER AND CONNECTION IN AN OVERHEAD TRAFFIC SIGN SUPPORT SHALL HAVE A MAXIMUM DESIGN RATIO OF 85% TO PROVIDE RESIDUAL CAPACITY FOR FUTURE MODIFICATIONS TO SIGN SIZE OR CONFIGURATIONS.

15. FABRICATION DRAWINGS (6 COPIES OF EACH) SHALL BE SUBMITTED TO THE STATE OF VERMONT, AGENCY OF TRANSPORTATION, PROJECT MANAGER FOR APPROVAL PRIOR TO FABRICATION. THE FABRICATION DRAWINGS SHALL INCLUDE THE FOLLOWING INFORMATION:

    A. DETAILED DRAWING OF EACH COMPONENT OF THE STRUCTURE.

    B. MATERIAL SPECIFICATION FOR EACH COMPONENT OF THE STRUCTURE, EITHER BY COMPLETE SPECIFICATION OR REFERENCE TO APPLICABLE ASTM STANDARDS.

    C. NOTATION OF PROJECT NAME, PROJECT NUMBER, ROUTE NUMBER, AND STRUCTURE STATIONING (TO BE INCLUDED ON EACH SHEET).

    D. DETAILS FOR LOCATION OF SIGNS AND ATTACHMENT HARDWARE FOR THE SUPPORT STRUCTURE.

    E. ALL ELEVATIONS AND DIMENSIONS NECESSARY TO PROVIDE A COMPLETE SET OF RECORD PLANS.

    F. DEAD LOAD DEFLECTION AND CAMBER INFORMATION.

    G. WELDING DETAILS AND PROCEDURES ARE REQUIRED FOR ALL WELDS. PROCEDURES SHALL BE SUBMITTED FOR APPROVAL WITH REFERENCE TO EACH WELD IDENTIFIED ON THE FABRICATION DRAWINGS. (SEE SUB-SECTION 506.10).

    H. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETION OF THE STRUCTURE AND FOUNDATION DATA ON THE DETAIL SHEETS.

16. BASE PLATES SHALL BE STAMPED WITH THE VERTICAL POLE DIAMETER, HEIGHT, YIELD STRENGTH, GAUGE AND THE HORIZONTAL MEMBER DIAMETER, LENGTH, YIELD STRENGTH, GAUGE, ALTERNATELY. THE INFORMATION MAY BE STAMPED ON A METAL TAG RIVETED TO THE POLE NEAR THE HAND HOLE.

17. SEE STANDARD E-171A FOR ADDITIONAL NOTES.

18. SEE SHEETS 110-129 FOR SIGN DESIGNS

19. SEE SPECIAL PROVISIONS FOR ADDITIONAL DETAILS FOR PAINTED SIGN STRUCTURES.

PROJECT NAME:	BARRE CITY
PROJECT NUMBER:	FEGC F 026-I(34) C/2
FILE NAME: z09B240_TSPS-Notes.dgn	PLOT DATE: 3/9/2011
PROJECT LEADER: G. BAKOS	DRAWN BY: DMP / JAR
DESIGNED BY: DMP / MDS	CHECKED BY:
OVERHEAD SIGN SUPPORT NOTES	SHEET 95 OF 339

VHB Vanasse Hangen Brustlin, Inc.