DIVISION 1 -GENERAL REQUIREMENTS

SAFETY AND PROTECTION

1. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

   a. All employees on the work and other persons who may be affected thereby.

   b. All the work and all materials or equipment to be incorporated therein, whether in storage on or off the site.

   c. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

2. Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss: and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owners of adjacent property and utilities when execution of the work may affect them.

3. Contractor's duties and responsibilities for the safety and protection of the work shall continue until such time as all the work is completed.

COLD WEATHER CONSTRUCTION PROCEDURES

1. It shall be the Contractor's responsibility to continuously protect soils, concrete, masonry and other building materials from damage due to cold temperatures, until the building has been turned over to the Owner. This shall include temporary enclosures, insulated blankets and temporary heating.

2. It shall be the Contractor's responsibility to repair and/or replace any damaged or defective work, in a manner approved by the Engineer.

3. All protective and corrective work shall be at the expense of the Contractor.

DIVISION 2 -SITEWORK

02200 EARTHWORK (BUILDING)

1. All organic material, debris and any other deleterious material shall be removed prior to placing the granular fill.

2. Granular fill shall be an approved, well graded bank run or crusher run gravel meeting the requirements of the following table:

SIEVE DESIGNATION	% PASSING
2"	100
No. 4	40–70
No. 100	5–20
No. 200	4–8

3. It shall be the Contractor's responsibility to obtain, from a testing firm approved by the Engineer, a sieve analysis and a laboratory moisture-density curve for the proposed granular fill. The results shall be submitted to the Engineer for review. The procedure shall be repeated until a material meeting the specifications is provided.

4. The granular fill material shall be placed in maximum 8" lifts and compacted to 95% of maximum density at optimum moisture content as determined by ASTM D1557, modified proctor.

5. All materials shall be placed in such a way as not to damage concrete foundations and footings.

6. The Owner will retain testing/inspection personnel to perform density tests on the compacted fill. See specifications for additional comments. If the material tests less than 95%, corrective action and additional testing will be required. The additional testing and corrective action will be paid for by the Contractor.

7. Footings were designed to rest on suitable undisturbed soil or compacted granular fill having a minimum bearing capacity of 3000 psf. Bottom-of-footing elevations are shown on plans but are subject to revision when actual soil conditions are uncovered by excavation. The Engineer shall be notified promptly of any weak strata, excessive water or any other condition contributing to poor bearing materials.

8. No rock ledge was uncovered during preliminary soil investigations. If ledge is encountered, immediately notify Engineer and await futher instructions.

9. The minimum frost depth, for footings, is 5 feet below finished grade.

10. Backfill on walls with fill on both sides shall be compacted in equal lifts on each side of wall. Fill layers shall be placed such that the difference between one side and the other shall not exceed 24". Walls to be backfilled from one side only shall have all supporting slabs and floor framing in place prior to placement of backfill, unless otherwise permitted by Engineer.

11. All foundation walls shall be adequately braced to withstand earth and construction load pressures. Frost walls must be at least seven days old before backfilling.

12. Unless otherwise noted, all footings and piers shall be centered under supported members.

13. Select backfill outside of foundation wall.

    A. An approved material free of boulders larger than 6", organic material, topsoil and debris.

    B. Place in maximum 8" level lifts and compact to 90% maximum density at optimum moisture content as defined by ASTM D-1557.

14. Contractor to design, furnish and install all temporary sheeting, shoring and bracing necessary to safely complete the construction.

15. The Contractor shall provide the necessary equipment to continuously dewater the site to facilitate construction and safe working conditions.

16. Provide 10 mil reinforced vapor retarder (Moistop Underslab by Fortifiber) below slab-on-grade. Place sheets parallel to the direction of the pour. All joints shall be lapped 6" and sealed with Moistop Tape. Lap and seal at foundation walls and interior footings. Seal all penetrations.

17. Soil boring information is provided in the Specifications, and are for reference only.

> BID ALTERNATE #2
> Provide Frost Protected Shallow Foundation System (FPSF) in lieu of standard shallow foundation system (i.e. B.O.F. = 5'-0" below grade). Refer to Drawing S3.1 for details for alternate FPSF System.

DIVISION 3 -CONCRETE

03300 -CAST-IN-PLACE CONCRETE

1. All structural drawings shall be used in conjunction with the site, architectural, mechanical, electrical and plumbing drawings and the specifications.

2. All concrete work shall comply with the latest recommendations and specifications of the American Concrete Institute (ACI) and the local building codes.

3. All concrete shall be normal weight having a minimum compressive strength of 4000 psi at 28 days with the following requirements:

Portland Cement	ASTM C150, Type II
Aggregate	ASTM C33, (Size No. 467 for slabs, Size No. 67 for walls & footings)
Water	Potable
Water/Cement Ratio	0.45 max (slab –on–grade), 0.50 max (walls & footings)
Slump	3" to 5".
Admixtures	Use air entraining agent conforming to ASTM C260 with 4–6% total air for all concrete EXCEPT INTERIOR S.O.G. Use water reducing agent conforming to ASTM C494 in all concrete. Calcium chloride may not be used to accelerate the setting time. Use "Eclipse Floor" shrinkage reducing admixture by Grace Construction Products in all concrete for slab–on–grade.

4. All reinforcing steel shall comply with ASTM A615, grade 60. Lap all bars 50 diameters minimum at splices unless indicated otherwise on the Drawings.

5. Reinforcement shall be securely tied in its proper place before and during placing operations using approved chairs and spacers as required (bricks may not be used as bar supports). No bars shall be cut or omitted in the field without the approval of the Engineer. Use plastic tipped accessories in concrete exposed to weather, water or view.

6. Where continuous bars are called for, indicated or required; they shall be run continuously around corners, doweled into intersecting walls and lapped at necessary splices with splices staggered wherever possible. All bar laps shall be 50 bar diameters (min) unless noted otherwise.

7. Concrete cover over reinforcement shall be 2 inches clear, unless otherwise noted on the Drawings or as noted below:

   A. Concrete placed against and permanently exposed to earth — 3 inches.
   B. Concrete beams and columns not exposed to earth or weather — 1½ inches.
   C. Slabs and walls not exposed to earth or weather — 1½ inches.

8. All bent reinforcement shall be bent cold, in the shop only, unless otherwise approved by the Engineer.

9. All exposed concrete edges shall be chamfered 3/4", unless otherwise noted.

10. Slab–on–grade control and construction joints shall be located as shown on the Drawings.

11. All re–entrant corners in slab–on–grade (or at discontinuance of construction joint) to be reinforced with (2) #4 x 2'-0" centered in slab.

12. Where concrete is to be placed by pumping, all work must conform to ACI 304.

13. Proper vibration of all concrete is essential. The Contractor shall make provisions for back–up vibration equipment.

14. The Concrete Contractor shall install (or give other trades ample opportunity to install) all anchors, bolts, plates, nailers, slots, chases, pipe sleeves, etc., as required by other trades. The Contractor shall verify all dimensions before setting screeds and forms.

15. Foundation walls shall be placed in alternate lengths, each pour not to exceed approximately 40 feet in length. No horizontal joints shall be permitted except as shown on plans.

16. Provide finished concrete slab surfaces with a steel trowel finish. Finished floor flatness/leveness measurements shall meet or exceed the following (specified overall value – minimum local value):

scratch and float finish =	Ff20/Fl15 – Ff15/Fl13
trowel finish: typical warehouse floor =	Ff36/Fl20 – Ff24/Fl15

17. Concrete temperature during the first seven days shall be maintained between 50° F and 90° F. Rapid drying must be prevented.

18. Curing:

    a. Curing of Slab–on–grade shall be completed as follows:
       - Surface shall be kept continuously wet for a minimum of 7 days with the use of wet burlap overlaid with a layer of plastic sheeting to prevent drying of wet burlap.
       - After 7 days, apply a curing/sealing compound (Kure–N–Seal WB by Sonneborn)

    b. Vertical surfaces shall receive 2 coats (one at time of stripping and another 3 days later) of Kure–N–Seal WB curing/sealing compound by Sonneborn.

19. Concrete Repairs: Contractor shall inspect concrete surfaces, after removal of forms, for areas of defective (rock pockets, honeycomb, etc...) concrete. Remove defective concrete by "chipping" questionable area until sound concrete has been obtained. Surface preparation and patching shall be performed as follows (where more stringent preparation is specified by the Manufacturer of the patching compound follow the Manufacturer's recommendations):

    a. Surface preparation – Concrete surfaces shall be clean and sound. Remove all dust, latence, grease and other bond–inhibiting materials from surfaces by mechanical means. Patch areas shall have vertical edges (minimum 3/4" deep) and shall be made rough by bushammering, sandblasting or other mechanical means acceptable to the Engineer. Surfaces to receive patch shall be damp or dry as recommended by the Manufacturer.

    b. Patching – Patch defective areas with Sikadur 365 (or equal as approved by the Engineer). Immediately preceding placement of the concrete patch, coat the existing concrete surface with an approved bonding agent, then apply patch in strict compliance with the Manufacturer's recommendations; including, but not limited to, surface preparation, ambient conditions, curing procedures and protection of fresh patch.

20. Submit a current (within 6 months) design mix, with 28–day compressive strength test results, to Engineer for approval a minimum of 15 days prior to beginning construction. The mix design shall contain, as a minimum; aggregate gradation, admixtures to be used, source of cement and type, batch quantities, and date of mix design and test results.

21. Steel reinforcement shop drawings (two copies), prepared by the Contractor in accordance with ACI standards, shall be submitted to the Engineer prior to construction.

22. The Owner will employ a qualified materials testing firm to perform standard field tests for concrete work. All corrective action and follow–up testing for unsuitable materials will be at the Contractor's expense.

DIVISION 4 -MASONRY

04200 -REINFORCED MASONRY

1. Concrete masonry shall comply with the applicable sections of the National Concrete Masonry Association, Portland Cement Association and American Concrete Institute codes.

2. Concrete masonry units shall be normal weight, hollow load–bearing, ASTM C90, Grade N, Type I, with a minimum compressive strength on the net area of 2000 psi, two cells with minimum 50% solid.

3. Mortar shall conform to ASTM C270, type S with a minimum compressive strength of 1800 psi at 28 days.

4. Grout shall conform to ASTM C476, fine or coarse type as appropriate, with a minimum compressive strength of 2000 psi at 28 days. Low–lift grouting shall be used in heights of less than four feet.

5. Horizontal and vertical reinforcing shall comply with the above codes. Deformed bars shall comply with ASTM A615 Grade 60, cold–drawn steel wire shall conform to ASTM A82 and deformed steel wire shall conform to ASTM A496.

6. Vertical reinforcement to be of type, size and spacing indicated on the Drawings. Horizontal reinforcement to be continuous 9 gage Dur–o–Wal, truss type, joint reinforcement at 16" o.c. vertically, unless noted otherwise.

7. The Contractor shall submit (prior to Construction) a design mix for the mortar and grout to the Engineer for review. They shall be in accordance with the appropriate ASTM specifications and include actual 28 day compressive strength tests.

8. The Contractor shall submit (prior to construction) test data on the proposed masonry units to the Engineer for review. They shall be in accordance with the appropriate ASTM specifications and include actual compressive strength, absorption, weight, moisture content and dimensions.

9. The Owner may employ an engineering firm to perform field testing during construction on the mortar, grout and masonry units.

10. Normal masonry construction weather conditions assumes the air temperatures to be between 40 and 90 degrees Fahrenheit with minimum wind and rain, plus average relative humidity. If conditions other than these occur, the Contractor must modify construction procedures in accordance with good construction practices and the above noted codes.

11. All bond beams, lintels and jam blocks, unless otherwise noted, shall be reinforced with (2) #4 rebar.

12. Fill all voids and block cells solidly with grout for a distance of 24" beneath and 12" each side of all beam reactions or other concentrated loads.

13. No splices in reinforcing bars shall be made except as detailed or approved by Structural Engineer. Where permitted, all splices shall be lapped 50 bar diameters.

DIVISION 5 -METALS

05120 -STRUCTURAL STEEL

1. All structural steel work shall conform to the AISC "Specification for Design, Fabrication and Erection of Structural Steel for Buildings" and to the requirements of the local building codes. All welding shall conform to the AWS "Code for Welding in Building Construction".

2. Dimensional tolerances shall comply with latest edition of "Code of Standard Practice for Steel Buildings and Bridges".

3. Steel materials shall conform to the following:

Structural W–Shapes:	ASTM A572 (Fy = 50,000 psi)
Misc. Structural Shapes:	ASTM A36 (Fy = 36,000 psi)
Structural Bolts:	ASTM A325
Anchor Bolts:	ASTM A307

4. All field connections shall be bolted except where welding is specifically called for.

5. Structural Steel Contractor shall provide all necessary guying and bracing required to erect and hold steel frame plumb and square until roof deck and permanent bracing are installed.

6. There will be no field burning cutting or other alterations of primary structural steel without the written permission of the Engineer.

7. All structural steel shall be shop painted (minimum 2 mils dry film thickness) with a primer coat of Series 10 Tnemec Primer, 10–99, red and with a top (finish) coat of Series 2H Hi–Build Tneme–Gloss, (color = Black "IN06"). Top coat application shall have minimum dft of 3.0 mils. Steel surface preparation and paint application shall be performed in strict conformance to manufacturer's recommendations. Field touch up of scratched or abraded areas will be required.

8. The Contractor shall submit shop drawings (two copies) to the Engineer for review prior to fabrication for the following items:

   -Structural Steel

9. Non–shrink grout (below column base plates and other specified locations) shall be Embeco 636 as manufactured by Master Builders (or approved equal). The grout shall be applied in accordance with Manufacturer's specifications. Min 28 days strength of 6000psi is required.

DIVISION 6 -WOOD AND PLASTICS

06100 -ROUGH CARPENTRY

1. All wood construction shall comply with the following codes and regulations in addition to the local Building Code:

   A. "Timber Construction Manual" by the American Institute of Timber Construction.

   B. "National Design Specification for Wood Construction" and "Design Values for Wood Construction" by the National Forest Products Association.

   C. "American Softwood Lumber Standard" by the National Bureau of Standards, Voluntary Product standard PS 20–70.

   D. "Plywood Design Specification" by the American Plywood Association.

   E. "Softwood Plywood, Construction and Industrial", U.S. Product Standard PS–66.

   F. Voluntary Product Standard PS 56–73, "Structural Glued Laminated Timber".

2. Lumber for structural framing (including joists, rafters, beams, columns and studs) shall be Spruce–Pine–Fir, No.1/No.2 grade or better. Minimum allowable design stresses shall be as follows: (100% Load Duration)

Fb	(Bending)	= 875 psi
Fv	(Shear)	= 70 psi
Fc	(Compression with grain)	= 1,100 psi
E	(Elastic modulus)	= 1,400,000 psi

3. Lumber for miscellaneous wood framing and blocking shall be Spruce–Pine–Fir, stud grade and better with a minimum allowable bending stress of 675 PSI.

4. All Dimension lumber shall be straight and new, in sound condition, kiln dried with a maximum moisture content of 19%. All lumber shall bear the grade and mark of the association under whose rules it is produced and a mark of mill identification.

5. Protection from the elements. The General Contractor shall take all precautions to keep the structural members dry during construction. Any staining or damage shall be corrected to the Engineer's satisfaction at the expense of the Contractor.

6. Exterior Plywood sheathing shall be C–D Exposure 1.

7. All wood framing construction shall be erected true to line and dimensions well fastened and properly braced.

8. Place all plywood with face grain perpendicular to supports and install continuously over at least two supports with joints centered over supports.

9. All wood members in contact with concrete, masonry, and/or ground shall be pressure treated.

DESIGN CRITERIA

The structural design was prepared using the following data except where noted:

1. Applicable Building Code: The BOCA National Building Code (1996)
2. Design soil bearing capacity:
   a. FOOTINGS — 3000 PSF
3. Design loads:
   a. DEAD LOAD:
      i. Roof: — 20 PSF
   b. LIVE LOAD:
      i. Mezzanine — 125 PSF
   c. SNOW LOAD: — 50 PSF
   d. WIND LOAD:
      i. Pv — 16.4 PSF
      ii. Importance Factor — 1.0
      iii. Exposure — C
   e. SEISMIC:
      i. Seismic Hazard Group — 1
      ii. Av — 0.10
      iii. Seismic Performance Category — C
      iv. Seismic Design Coeff. — 6%

SUBMITTALS:

Contractor shall submit shop drawings and/or submittals to the Engineer for the following items:

- Granular Fill
- Concrete Design Mix including aggregate gradation
- Rebar Shop Drawings
- Structural Steel Shop Drawings
- Metal Roof Deck Shop Drawings
- Concrete Masonry Units and Reinforcement

CONSTRUCTION CRITERIA

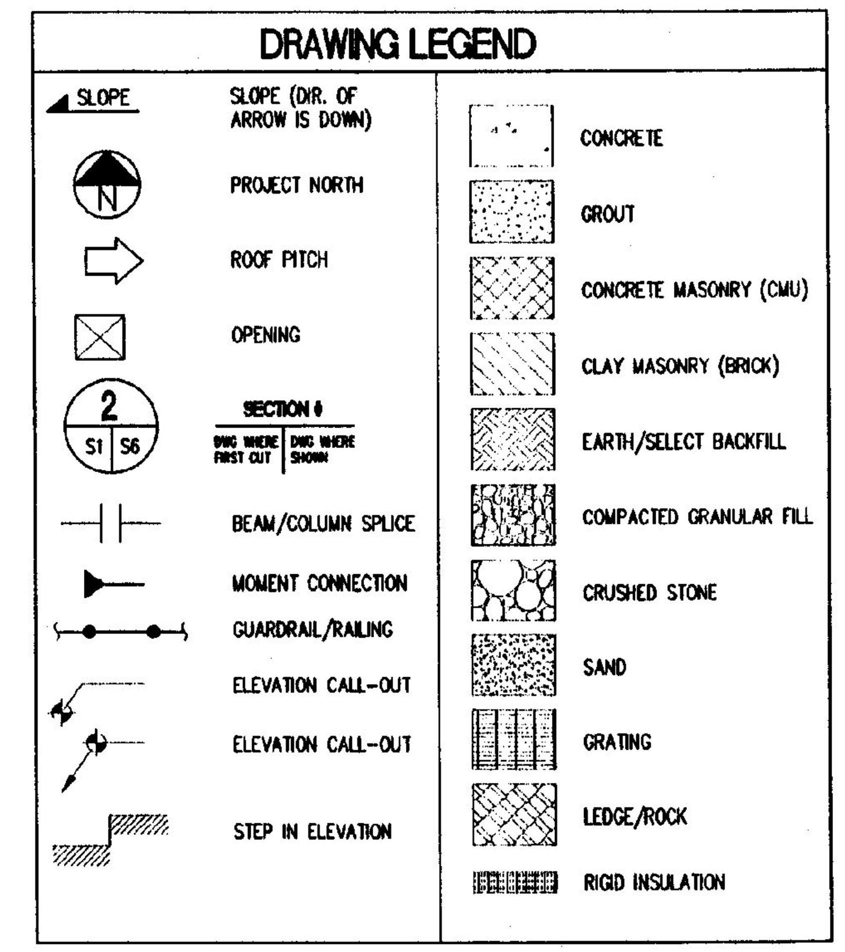
Comply with construction requirements/recommendations of the latest editions of the following:

CONCRETE	
ACI 301	Specifications for Structural Concrete for Buildings
ACI 302	Guide for Concrete Floor and Slab Construction
ACI 304	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting
ACI 315	Details and Detailing of Concrete Reinforcement
ASTM C94	Specification for Ready–Mix Concrete
MASONRY	
ACI 530	Building Code Requirements for Masonry Structures
ACI 530.1	Specification for Masonry Structures
STEEL	
AISC	Manual of Steel Construction (ASD or LRFD)
AWS D1.1	Structural Welding Code –Steel
AWS D1.3	Structural Welding Code –Sheet Metal
AWS D1.4	Structural Welding Code –Reinforced Steel
AISI	Specification for Design of Cold–Formed Steel Structural Members

ABBREVIATIONS

A.B.	Anchor Bolts	PL	Plate
AFF	Above Finish Floor	PT	Pressure Treated
B.O.F.	Bottom of Footing	SS	Stainless Steel
CFS	Cold Formed Steel	STD	Standard
E	Existing	T&B	Top & Bottom
EQ	Equal	T.O.C	Top of Concrete (slab)
EQUIV	Equivalent	T.O.G.	Top of Grating
E.W.	Each Way	T.O.S.	Top of Steel (rolled sections)
E.S.	Each Side	T.O.W.	Top of Wall
FNDN	Foundation	T	Tread
F.O.B.	Face of brick	UNO	Unless Noted Otherwise
F.O.F	Face of Foundation	WD	Wood
F.O.S.	Face of stud		
JB	Joist Bottom		
N.S.	Non–Shrink		
o/c	On Center		

DRAWING LEGEND



No.	DATE	REVISION
0	10/9/01	ISSUED FOR CONSTRUCTION
1	2/4/02	INCORPORATED OWNER COMMENTS

STATE OF VERMONT – TIMOTHY P. MALONEY – No. 5 – LICENSED PROFESSIONAL ENGINEER

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STATE OF VERMONT
READSBORO HIGHWAY GARAGE PROJECT
READSBORO, VERMONT

GENERAL STRUCTURAL NOTES
AND STANDARD DETAILS

DRAWN TPH	REVISION 1
CHECKED TPH	DATE 10/12/01
SCALE N.T.S.	Project No. 11851.000

S0.1