

GENERAL NOTES SOLDIER PILE AND LAGGING WALL US ROUTE 5

GENERAL NOTES - EARTH RETENTION SYSTEM

SPECIFICATIONS: REFER TO PROJECT SPECIFICATIONS FOR DETAILED REQUIREMENTS FOR MATERIAL AND WORKMANSHIP.

ELEVATIONS & DIMENSIONS: ALL ELEVATIONS AND DIMENSIONS SHOWN FOR NEW CONSTRUCTION ARE BASED ON THE CONTRACT DESIGN DRAWINGS FOR THE NEW STRUCTURE. FIELD VERIFY ALL ELEVATIONS AND DIMENSIONS BEFORE PROCEEDING WITH CONSTRUCTION.

BUILDING CODE: AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO).

GEOTECHNICAL REPORTS: THE CONTRACTOR SHALL BE RESPONSIBLE FOR READING, UNDERSTANDING AND IMPLEMENTING THE RECOMMENDATIONS OUTLINED IN THE REPORT BY GZA GEOTECHNICAL, INC. ENTITLED "RETAINING WALL RECOMMENDATIONS" DATED SEPTEMBER 30, 2002, AND THE REPORT ENTITLED "DESIGN SUMMARY REPORT" DATED NOVEMBER 22, 2005.

SHOP DRAWING AND SUBMITTALS: THE CONTRACTOR SHALL SUBMIT COMPLETE DRAWINGS AND MATERIAL DATA SHEETS FOR ALL ELEMENTS OF THE EARTH RETENTION SYSTEM FOR REVIEW BY THE GEOTECHNICAL ENGINEER OF RECORD (GZA). DO NOT START FABRICATION OF THE EARTH RETENTION SYSTEM UNTIL ALL SHOP DRAWINGS AND MATERIAL DATA SHEETS HAVE BEEN REVIEWED AND APPROVED BY GZA.

MATERIALS (EARTH RETENTION SYSTEM EXCEPT TIEBACKS)

- SOLDIER PILES: STRUCTURAL STEEL MEMBERS, COVER PLATES, SLEEVES THROUGH PILES AND BEARING PLATES, ASTM A572 GRADE 50 STANDARD STRUCTURAL STEEL SECTIONS OF MINIMUM 50 KSI YIELD STRENGTH.
- PRECAST CONCRETE PANELS: PANELS, REINFORCEMENT AND CONNECTIONS DESIGNED BY CONTRACTORS AND SUBMITTED FOR APPROVAL TO ENGINEER.
- TIMBER LAGGING: PRESSURE TREATED STRUCTURAL LUMBER ASTM D1760, CONSTRUCTION GRADE OF A SPECIES PROVIDING AT LEAST 1,200 PSI ALLOWABLE BENDING STRESS.
- WELDING ELECTRODES: CONFORM TO AWS D1.1 SPECIFICATION, USE ELECTRODES BASED ON WELDING PROCESS AND THE TYPE AND GRADE OF STEEL.
- DRAINAGE STRIP: MRAFI G1000 - WALL DRAIN OR APPROVED EQUAL.
- RIGID INSULATION: EXTRUDED POLYSTYRENE INSULATION BOARD WITH A MINIMUM R-VALUE = 3.0, ASTM C 578 TYPE IV AND MINIMUM COMPRESSIVE STRENGTH OF 40 PSI. BOARD EDGES SHALL BE TONGUE-AND-GROOVE.

POST-TENSIONED TIEBACK ANCHORS

MATERIALS:

- PRESTRESSING STEEL:** PRESTRESSING STEEL SHALL BE 7-WIRE STRAND, GRADE 270K, STRESS RELIEVED, LOW RELAXATION STEEL, ASTM A-416 (LATEST EDITION).
- BEARING PLATES:** BEARING PLATES SHALL BE FABRICATED FROM STEEL CONFORMING TO ASTM A36 GRADE 36, ASTM A709 GRADE 36, OR ASTM A572 GRADE 50.
- STEEL TRUMPETS:** THE TRUMPET SHALL BE FABRICATED FROM A STEEL PIPE OR TUBE, STEEL PIPE OR TUBE SHALL CONFORM TO THE REQUIREMENTS OF ASTM A53 FOR PIPE OR ASTM A500 FOR TUBING. STEEL TRUMPETS SHALL HAVE A MINIMUM WALL THICKNESS OF 0.2 IN.
- ANCHORAGE COVERS:** COVERS SHALL BE FABRICATED FROM STEEL OR PLASTIC WITH A MINIMUM THICKNESS OF 0.1 IN. THE JOINT BETWEEN THE COVER AND THE BEARING PLATE SHALL BE WATERTIGHT.
- TENDON WEDGES:** TENDON WEDGES SHALL BE DESIGNED TO PRECLUDE PREMATURE FAILURE OF THE PRESTRESSING STEEL DUE TO NOTCH OR PINCHING EFFECTS UNDER STATIC AND DYNAMIC STRENGTH REQUIREMENTS OF SECTION 3.1.6 (1) AND SECTION 3.1.6 (1) AND 3.1.6 (2) OF THE PTI "POST TENSIONING MANUAL"; WEDGES SHALL NOT BE REUSED.
- CEMENT GROUT:** TYPE II PORTLAND CEMENT CONFORMING TO ASTM C 150 SHALL BE USED FOR GROUT. THE GROUT SHALL BE A PUMPABLE NEAT MIXTURE OF CEMENT AND WATER AND SHALL BE STABLE (BLEED LESS THAN 2%), FLUID, AND PROVIDE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF AT LEAST 4000 PSI MEASURED IN ACCORDANCE WITH ASTM C109 AT TIME OF STRESSING. CEMENT USED SHALL BE FRESH AND SHALL NOT CONTAIN LUMPS OR OTHER INDICATIONS OF HYDRATION.
- CENTRALIZERS:** CENTRALIZERS SHALL BE FABRICATED FROM PLASTIC, STEEL OR MATERIAL WHICH IS NONDETIMENTAL TO THE PRESTRESSING STEEL. WOOD SHALL NOT BE USED. THE CENTRALIZER SHALL BE ABLE TO SUPPORT THE TENDON IN THE DRILL HOLE AND POSITION THE TENDON SO A MINIMUM OF 0.5 IN. OF GROUT COVER IS PROVIDED AND SHALL PERMIT GROUT TO FREELY FLOW AROUND THE TENDON AND UP THE DRILL HOLE.
- CORROSION INHIBITING COMPOUND:** THE CORROSION INHIBITING COMPOUND PLACED IN EITHER THE FREE LENGTH OR THE TRUMPET AREA SHALL BE AN ORGANIC COMPOUND (I.E., GREASE OR WAX) WITH APPROPRIATE POLAR MOISTURE DISPLACING, CORROSION INHIBITING ADDITIVES AND SELF-HEALING PROPERTIES. THE COMPOUND SHALL PERMANENTLY STAY VISCOUS AND BE CHEMICALLY STABLE AND NONREACTIVE WITH THE PRESTRESSING STEEL, THE SHEATHING MATERIAL, AND THE ANCHOR GROUT.
- SPACERS:** SPACERS SHALL BE USED TO SEPARATE ELEMENTS OF A MULTI-ELEMENT TENDON AND SHALL PERMIT GROUT TO FREELY FLOW AROUND THE TENDON AND UP THE DRILL HOLE. SPACERS SHALL BE FABRICATED FROM PLASTIC, STEEL OR MATERIAL WHICH IS NONDETIMENTAL TO THE PRESTRESSING STEEL. WOOD SHALL NOT BE USED. A COMBINATION CENTRALIZER-SPACER MAY BE USED.
- TENDON POLYMER SHEATHING:** POLYMER SHEATHING USED FOR EXTRUSION COATING OF THE STRAND SHALL BE HIGH DENSITY TYPE III POLYETHYLENE, AS DEFINED BY STM D-3350 AND ASTM D-1248 (OR APPROVED EQUAL).
- TENDON CORRUGATED SHEATHING:** THE CORRUGATED SHEATHING SHALL BE A WATERPROOF POLYETHYLENE MATERIAL, BE NON-REACTIVE TO THE CEMENT GROUT AND FREE OF HARMFUL AMOUNTS OF CHLORIDES THAT COULD HARM THE PRE-STRESSING STEEL.

ANCHOR INSTALLATION

- ANCHOR PREPARATION - HOLES FOR INSTALLATION OF BONDED SOIL ANCHORS SHALL BE DRILLED AT THE LOCATIONS AND HAVE LENGTHS, DIAMETERS, AND ORIENTATIONS AS INDICATED ON THE TIEBACK SCHEDULE.
- ALL DRILL HOLES SHALL BE FLUSHED WITH WATER OR DRILLING MUD INTRODUCED AT THE BOTTOM OF THE HOLE UPON COMPLETION OF DRILLING AND AGAIN IMMEDIATELY BEFORE INSTALLATION OF ANCHORS. THE LENGTH OF EACH DRILL HOLE SHALL BE CHECKED TO ENSURE THE ANCHOR WILL HAVE THE REQUIRED EMBEDMENT AND WILL PROJECT THE REQUIRED LENGTH FROM THE SURFACE. HOLES SHALL BE OVER DRILLED AT LEAST ONE FOOT IN LENGTH.
- CENTRALIZERS SHALL BE INSTALLED AT APPROXIMATELY 10 FEET O.C. STARTING AT 2 FEET FROM THE BOTTOM OF THE ANCHOR. GROUT TUBES SHALL BE FASTENED ALONG THE LENGTH OF THE ANCHOR.
- GROUT SHALL BE THOROUGHLY MIXED IN A GROUT PLANT APPROVED BY THE RESIDENT ENGINEER. SHALL BE FREE FROM LUMPS, AND SHALL BE PUMPED INTO THE HOLE. PLACEMENT METHODS SHALL ENSURE THAT THE ENTIRE ANNULAR SPACE SURROUNDING EACH ANCHOR IS COMPLETELY FILLED. PUMPING SHALL CONTINUE UNTIL A STEADY STREAM IS NOTED FLOWING FROM AROUND THE TRUMPET.
- GROUT FOR ANCHORING THE ANCHOR SHALL ATTAIN A COMPRESSIVE STRENGTH OF 4,000 PSI BEFORE PERFORMANCE OR PROOF TESTING.

ANCHOR TESTING

- A PERFORMANCE TEST SHALL BE PERFORMED ON 10% OF THE ANCHORS BY INCREMENTALLY LOADING AND UNLOADING THE ANCHOR IN ACCORDANCE WITH THE FOLLOWING SCHEDULE. AT EACH INCREMENT, THE MOVEMENT OF THE ANCHOR SHALL BE RECORDED TO THE NEAREST 0.001 INCHES WITH RESPECT TO AN INDEPENDENT FIXED REFERENCE POINT. IF POSSIBLE, THE JACK LOAD SHALL BE MONITORED WITH A PRESSURE GAUGE OR LOAD CELL. THE INCREMENT OF THE LOAD SHALL BE:

PERFORMANCE TEST:

AL = ALIGNMENT LOAD

0.25P* (SEE NOTE 4)

0.25P

0.50P* (SEE NOTE 4)

AL

0.25P

0.50P

0.75P

1.00P* (SEE NOTE 4)

AL

0.25P

0.50P

1.00P

1.20P* (SEE NOTE 4)

AL

0.25P

0.50P

1.00P

1.20P

1.33P* (SEE NOTE 4) (HOLD FOR CREEP TEST) ADJUST TO LOCK-OFF LOAD

P = DESIGN LOAD FOR THE ANCHOR

AL = ALIGNMENT LOAD

THE TEST SHALL BE HELD FOR 10 MINUTES AT THE HIGHEST LOAD INCREMENT. TOTAL MOVEMENTS WITH RESPECT TO THE FIXED REFERENCE POINT SHALL BE RECORDED AT 1 MINUTE, 2, 3, 4, 5, 6 AND 10 MINUTES. IF THE TOTAL MOVEMENT BETWEEN 1 MINUTE AND 10 MINUTES EXCEEDS 0.04 IN., THE TEST LOAD SHALL BE HELD FOR AN ADDITIONAL 50 MINUTES. TOTAL MOVEMENTS SHALL BE RECORDED AT 15 MINUTES, 20, 25, 30, 45, AND 60 MINUTES.

- ALL PRODUCTION ANCHORS THAT ARE NOT PERFORMANCE TESTED SHALL BE PROOF-TESTED. THE PROOF TEST SHALL BE PERFORMED BY INCREMENTALLY LOADING THE ANCHOR IN ACCORDANCE WITH THE FOLLOWING SCHEDULE. AT EACH INCREMENT, THE MOVEMENT OF THE ANCHOR SHALL BE RECORDED TO THE NEAREST 0.001 INCHES WITH RESPECT TO AN INDEPENDENT FIXED REFERENCE POINT. IF POSSIBLE, THE LOAD SHALL BE HELD AT EACH INCREMENT JUST LONG ENOUGH TO OBTAIN THE MOVEMENT READING BUT NO LONGER THAN 1 MINUTE. THE JACK LOAD SHALL BE MONITORED WITH A PRESSURE GAUGE OR LOAD CELL. THE INCREMENTS OF THE LOAD SHALL BE:

PROOF TEST

0

0.25P

0.50P

0.75P

1.00P

1.20P

TEST LOAD ADJUST TO LOCK-OFF LOAD

P = DESIGN LOAD FOR THE ANCHOR

AL = ALIGNMENT LOAD

THE PROOF TEST RESULTS SHOULD BE COMPARED TO THE PERFORMANCE TEST RESULTS. ANY SIGNIFICANT VARIATION FROM THE PERFORMANCE TEST RESULTS WARRANTS PERFORMING A PERFORMANCE TEST ON THE NEXT ADJACENT ANCHOR.

- LOAD SHALL BE APPLIED USING A CENTER PULL JACK. THE JACK SHALL HAVE BEEN CALIBRATED WITHIN 60 DAYS PRIOR TO THE WORK. THE LOAD SHALL BE APPLIED USING A SUITABLE LOAD FRAME. DURING THE LOAD PERIODS, THE ANCHOR LOAD SHALL NOT BE ALLOWED TO DEVIATE FROM THE TEST PRESSURE BY MORE THAN 50 PSI. REFUMPING BACK TO TEST LOAD WILL COMPENSATE FOR SMALL MOVEMENTS, HYDRAULIC OIL SEEPAGE AND CHANGES IN TEMPERATURE OF THE HYDRAULIC OIL. THE LOAD SHALL ALWAYS BE RETURNED TO THE SPECIFIED TEST LOAD PRIOR TO TAKING THE MOVEMENT READING AT THE SPECIFIED INTERVAL. THE TEST LOAD SHALL NOT BE EXCEEDED DURING THE PERIOD OF OBSERVATION.
- A GRAPH SHALL BE CONSTRUCTED SHOWING A PLOT OF TIEBACK MOVEMENT VERSUS LOAD FOR EACH LOAD INCREMENT MARKED WITH AN ASTERISK (*) IN THE PERFORMANCE TEST SCHEDULE AND A PLOT OF THE RESIDUAL TIEBACK MOVEMENT OF THE BAR AT EACH ALIGNMENT LOAD VERSUS THE HIGHEST PREVIOUSLY APPLIED LOAD. GRAPH FORMAT SHALL BE AGREED TO BY THE GEOTECHNICAL ENGINEER PRIOR TO USE.

ACCEPTANCE CRITERIA

- THE TOTAL ELASTIC MOVEMENT OBTAINED FROM A PERFORMANCE TEST SHOULD EXCEED 80% OF THE THEORETICAL ELASTIC ELONGATION OF THE STRESSING LENGTH PLUS 50% OF THE BOND LENGTH.
 - THE CREEP MOVEMENT DOES NOT EXCEED 0.08 INCHES DURING THE REQUIRED HOLD TIME INCREMENT OF THE PERFORMANCE TEST REGARDLESS OF ANCHOR LENGTH AND LOAD.
 - THE GEOTECHNICAL ENGINEER SHALL DETERMINE WHETHER AN ANCHOR, WHICH FAILS TO MEET THE ABOVE MINIMUM ACCEPTANCE CRITERIA, MAY BE INCORPORATED IN THE WORK.
- ANY ANCHOR FAILING TO HOLD ITS LOAD OR FAILING ITS CREEP TEST SHALL BE REGROUTED IN-PLACE OR REMEDIATED BY THE CONTRACTOR UPON APPROVAL BY THE GEOTECHNICAL ENGINEER.
 - A LIFTOFF TEST SHALL BE PERFORMED ON EACH ANCHOR A MINIMUM OF 48 HOURS AFTER THE INITIAL LOCK-OFF LOAD. THE LIFTOFF TEST SHALL SHOW AN ANCHOR LOAD WITHIN 5% OF THE SPECIFIED LOCK-OFF LOAD.

EXCAVATION

- THE CONTRACTOR SHALL BE FAMILIAR WITH THE SEQUENCE OF WALL EXCAVATION DESCRIBED IN THE PROJECT PLANS. THE CONTRACTOR SHALL EXCAVATE DOWN TO THE ANCHOR LEVELS AS INDICATED ON THE PROJECT PLANS. TIMBER LAGGING SHALL BE INSTALLED DURING THE EXCAVATION BETWEEN THE SOLDIER PILES AS SHOWN ON THE PROJECT PLANS. EXCAVATION SHALL PROCEED IN STAGES NO MORE THAN 4 FEET VERTICALLY BEFORE LAGGING IS INSTALLED.
- THE CONTRACTOR SHALL EXCAVATE DOWN NO MORE THAN 2 FEET BELOW THE FIRST ANCHOR LEVEL TO INSTALL THE FIRST LEVEL OF ANCHORS. EXCAVATION TO THE NEXT ANCHOR LEVEL SHALL NOT COMMENCE BELOW THE FIRST LEVEL UNTIL ANCHORS AT THE FIRST LEVEL HAVE BEEN INSTALLED, LOAD TESTED, LOCKED-OFF, AND ACCEPTED BY THE ENGINEER. ONCE THE ENGINEER HAS ACCEPTED THE FIRST LEVEL ANCHORS, THE CONTRACTOR SHALL EXCAVATE DOWN TO NO MORE THAN 2 FEET BELOW THE SECOND ANCHOR LEVEL. THE CONTRACTOR SHALL REPEAT THE PROCESS DISCUSSED FOR THE FIRST LEVEL ANCHORS AND CONTINUE TO THE THIRD AND FOURTH ANCHOR LEVELS AS SHOWN ON THE PROJECT PLANS.
- AFTER A TIEBACK LEVEL HAS BEEN LOCKED OFF, THE MAXIMUM VERTICAL DISTANCE BETWEEN THE LOWEST TIEBACK LEVEL AND THE LOWEST POINT OF THE BOTTOM OF THE EXCAVATION SHALL NOT EXCEED 12 FEET.
- EXCAVATION SHALL PROCEED AT A PACE THAT PREVENTS MOVEMENT OF UNSUPPORTED SOIL. IF UNSTABLE MATERIAL IS ENCOUNTERED DURING EXCAVATION, TAKE SUITABLE MEASURES TO STABILIZE IT AND PREVENT GROUND DISPLACEMENT.
- MAINTAIN A SUFFICIENT QUANTITY OF MATERIAL ON HAND FOR LAGGING, TIEBACKS, AND OTHER OPERATIONS FOR PROTECTION OF THE WORK AND FOR USE IN CASE OF AN ACCIDENT OR AN EMERGENCY.
- PROVIDE DEWATERING AND DRAINAGE FOR EACH STAGE OF THE EXCAVATION AS REQUIRED TO CONTROL SURFACE RUNOFF.

GROUTING

THE GROUT SHALL BE INJECTED FROM THE LOWEST POINT OF THE DRILL HOLE. THE GROUT MAY BE PUMPED THROUGH GROUT TUBES, CASING, OR DRILL RODS. THE QUANTITY OF THE GROUT AND THE GROUT PRESSURES SHALL BE RECORDED AND REPORTED. THE GROUT PRESSURES AND GROUT TAKES SHALL BE CONTROLLED TO PREVENT EXCESSIVE HEAVE OF THE GROUND OR FRACTURING OF SOIL OR ROCK AROUND THE HOLE.

PROJECT NAME: HARTFORD
PROJECT NUMBER: RS 0113(40)

FILE NAME: ****FILENAME*** PLOT DATE: 30-DEC-2005
PROJECT LEADER: KEVIN MARSHIA DRAWN BY: P. MILEWSKI
DESIGNED BY: J. HODKINSON CHECKED BY: K. ISHIKURA
EARTH RETENTION SYSTEM SHEET S1 ROW SHEET 6 OF 62