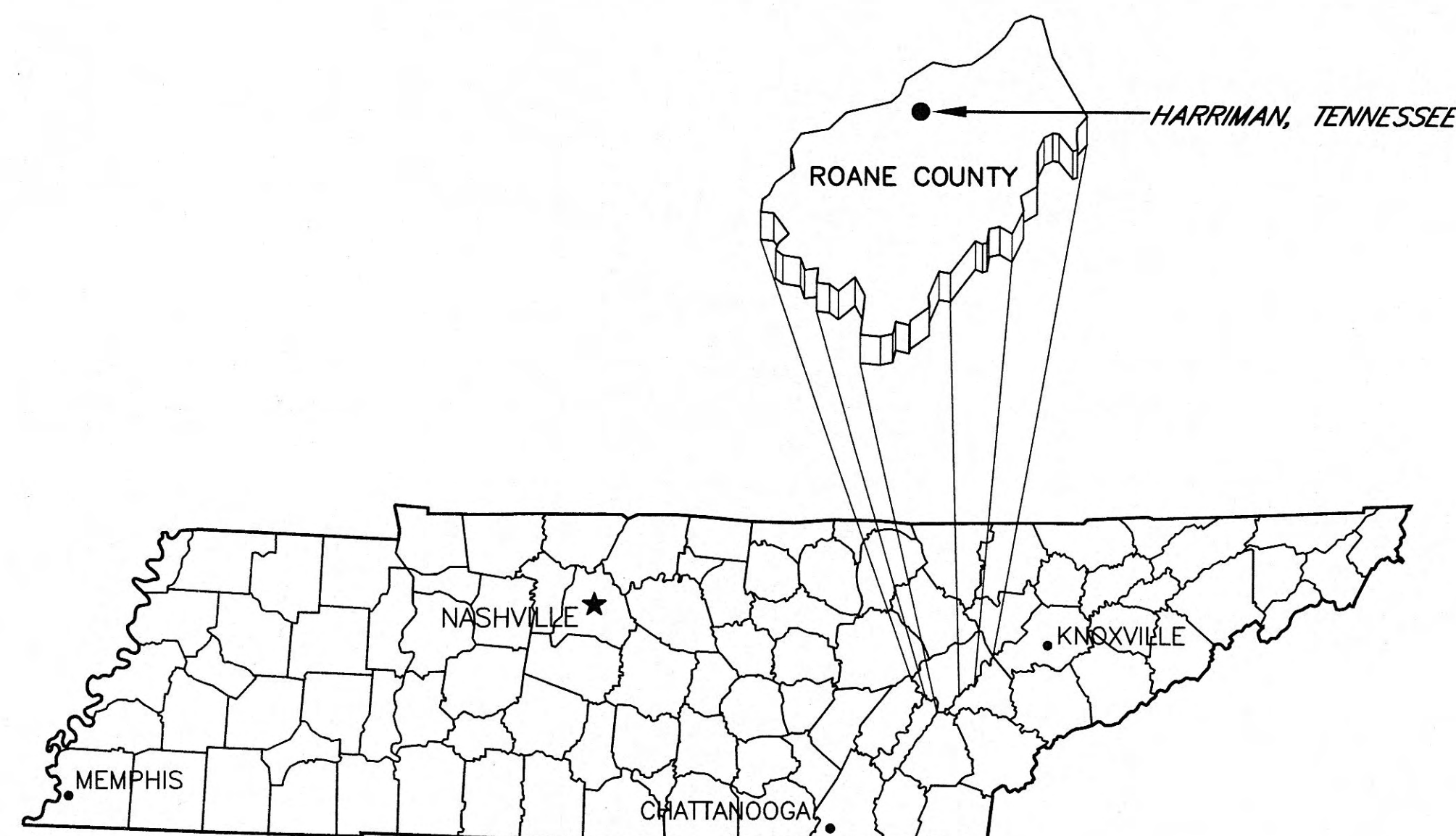


SEWER REHABILITATION AERIAL SEWER CROSSING FOR HARRIMAN UTILITY BOARD

ROANE COUNTY
HARRIMAN, TENNESSEE
CONTRACT: S08-01



TENNESSEE VICINITY MAP
NOT TO SCALE

DWG. No. INDEX OF DRAWINGS

- C-1 - PROJECT LOCATION MAP
- C-2 - AERIAL SEWER LINE CROSSING - STA. 0+00 TO STA. 1+59.7
- C-3 - STANDARD SEWER LINE DETAILS
- C-4 - EROSION CONTROL DETAILS



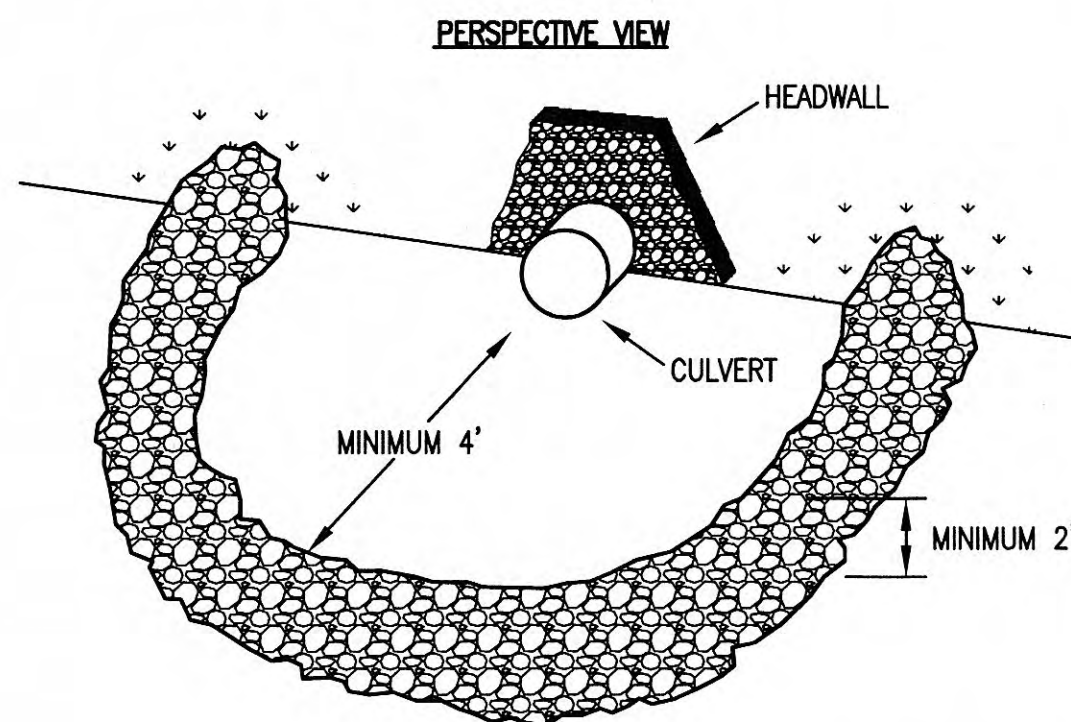
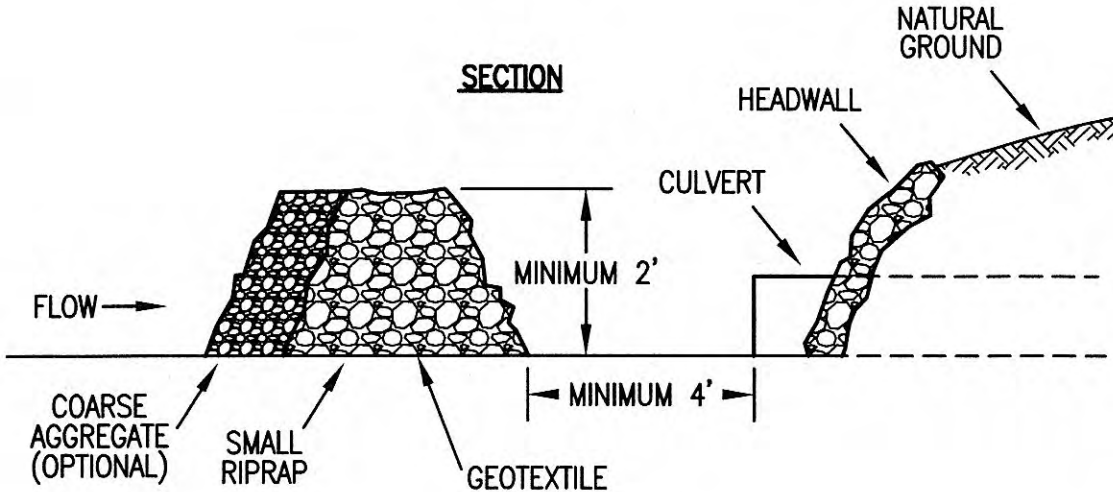
GRW Engineers, Inc.
Engineers, Architects, Planners

801 CORPORATE DRIVE - LEXINGTON, KY. 40503
PH. (859)223-3999 FAX (859)223-8917
LEXINGTON LOUISVILLE NASHVILLE INDIANAPOLIS
FORT MITCHELL KNOXVILLE ARLINGTON

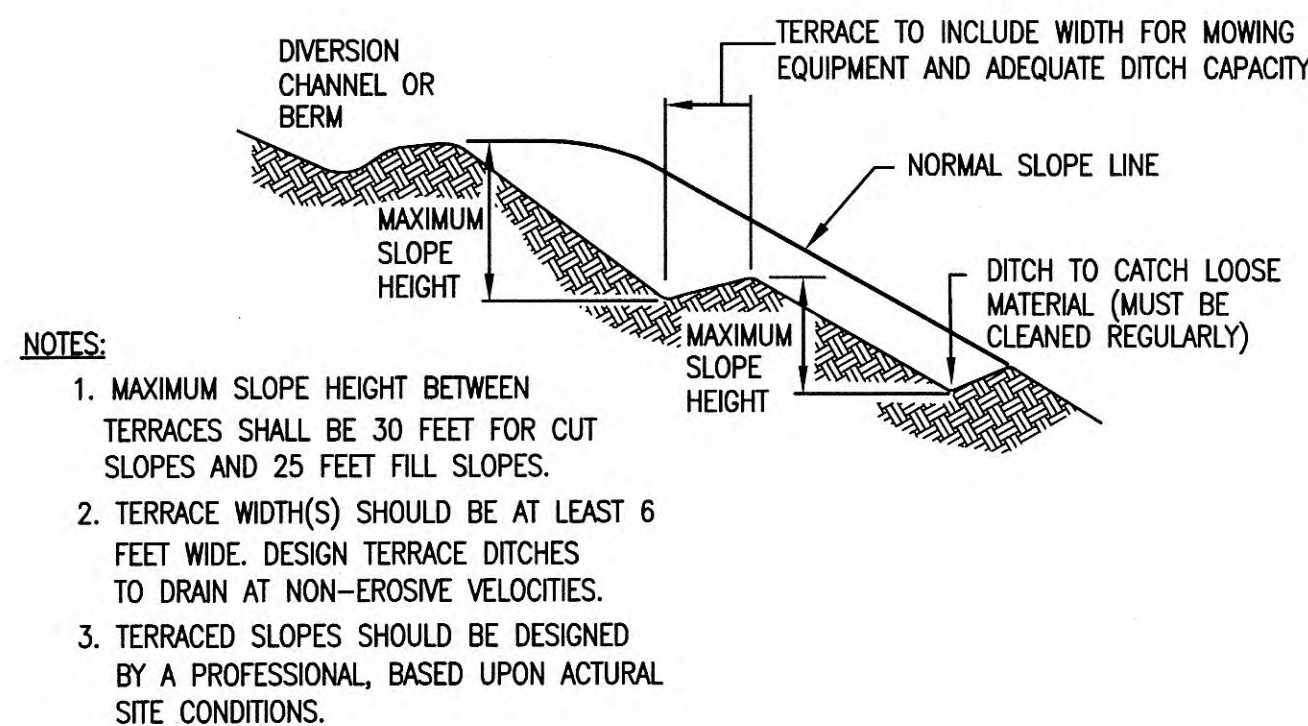


OCTOBER 2008

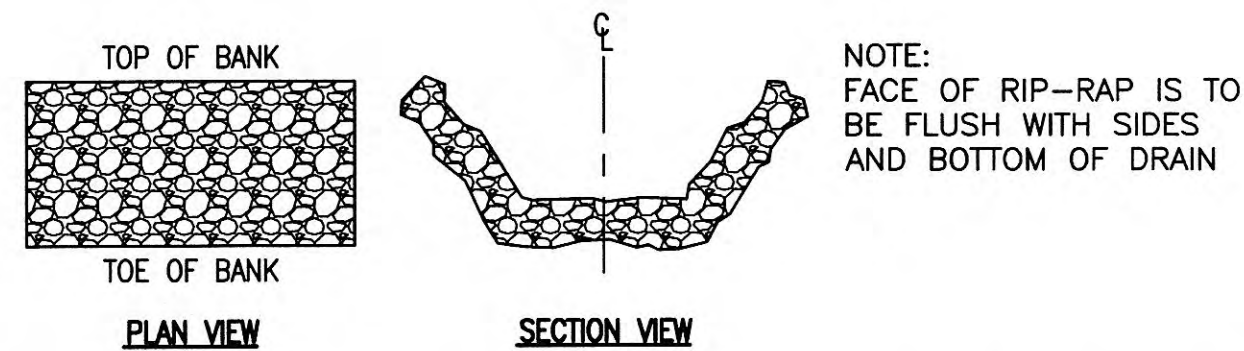
GRW PROJECT NO. 7534-03



STONE FILTER RING
SCALE: NTS



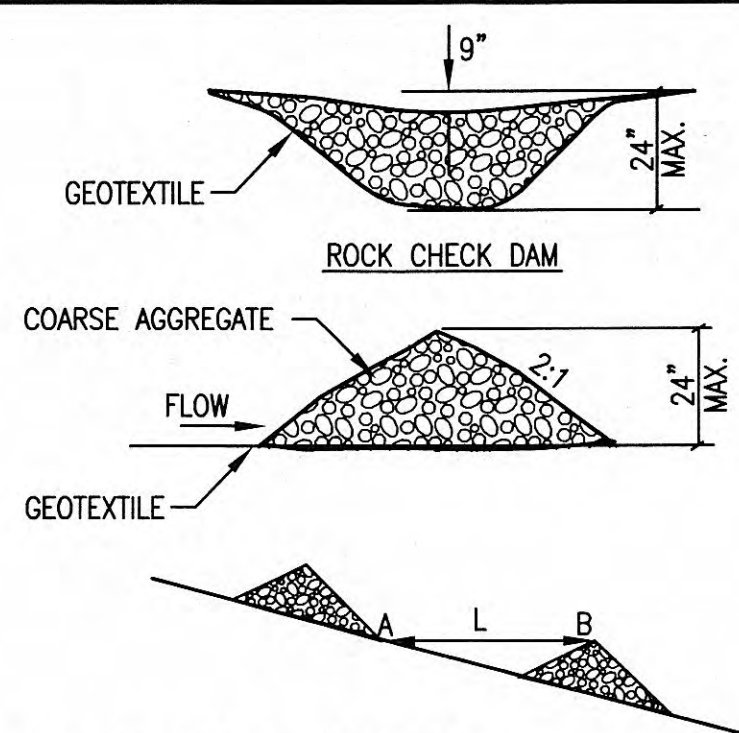
TERRACED SLOPE DETAIL
SCALE: NTS



RIP-RAP STABILIZATION WHERE NOTED WILL CONSIST OF HAND-PLACED NATIVE LIMESTONE, HAVING A MAXIMUM LENGTH/WIDTH DIMENSION OF 12" IN EITHER DIRECTION AND A MAXIMUM THICKNESS OF 6". TREATMENT WILL BE PLACED IN TWO INTERLOCKING (NESTING) LAYERS. RIP-RAP SHALL BE PLACED FOR THE FULL WIDTH OF AREA DISTURBED BY PIPE LAYING OPERATIONS. LIMIT OF WIDTH FOR PAYMENT OF RIP-RAP SHALL BE AS FOLLOWS:

PIPE DIAMETER	RIP-RAP WIDTH
8"	5'
10"	5.5'
12"	6'
15-16"	8'
18"	8.5'
21"	9'
24"	10'

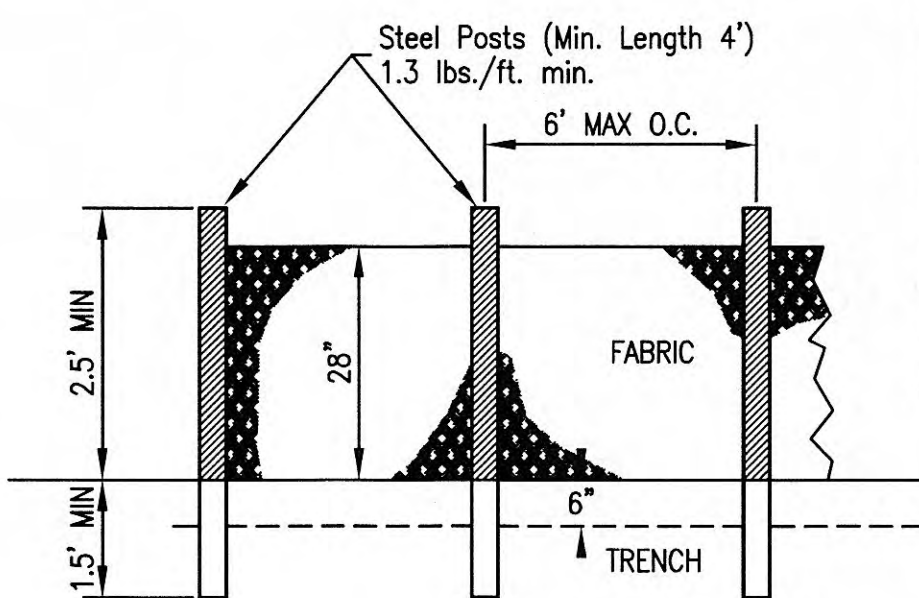
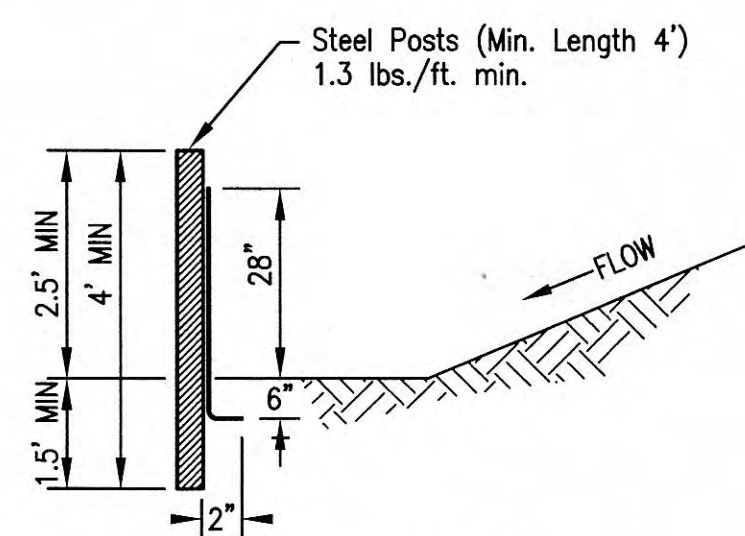
RIP-RAP DETAIL
SCALE: NTS



L = THE DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION

SPACING BETWEEN CHECK DAMS

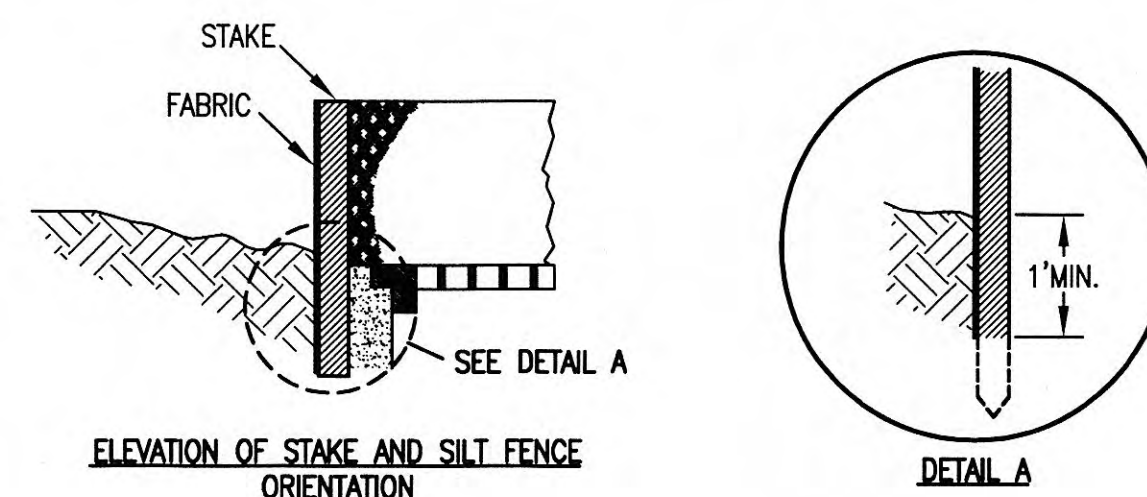
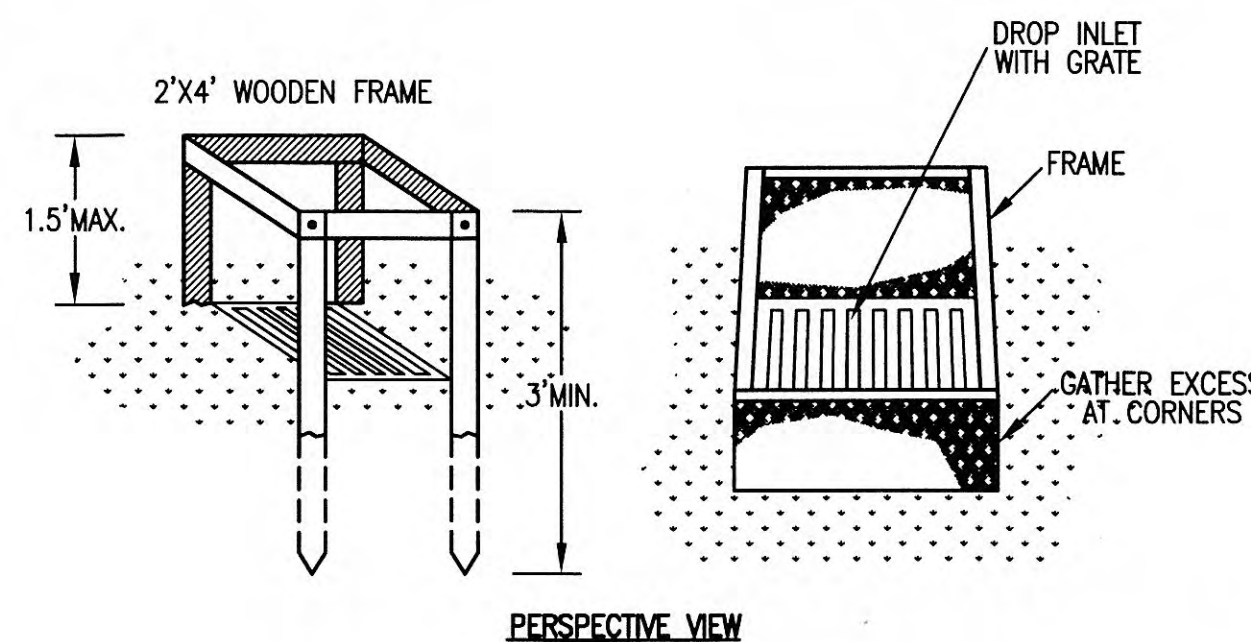
CHECK DAM DETAILS
SCALE: NTS



SILT FENCE - TYPE A
SCALE: NTS

SILT FENCE SPECIFICATIONS

TYPE FENCE	A	B	C
Tensile Strength (Lbs. Min.)(1) (ASTM D-4632)	Warp - 120 Fill - 100	Warp - 120 Fill - 100	Warp - 280 Fill - 180
Elongation (% Max.) (ASTM D-4632)	40	40	40
AOS (Apparent Opening Size) (Max. Sieve Size)(ASTM D-4751)	#30	#30	#30
Flow Rate (Gal/Min/Sq.Ft.) (GDT-87)	25	25	70
Ultraviolet Stability (2) (ASTM D-4632 after 300 hours weathering in accordance with ASTM D-4355)	80	80	80
Bursting Strength (PSI Min.) (ASTM D-5786 Diaphragm Bursting Strength Tester)	175	175	175
Minimum Fabric Width (Inches)	36	22	36



SILT FENCE INLET PROTECTION IP-SF
SCALE: NTS

MINIMUM TOP WIDTH (W) REQUIRED FOR SEDIMENT TRAP EMBANKMENTS ACCORDING TO HEIGHT OF EMBANKMENT (FEET)

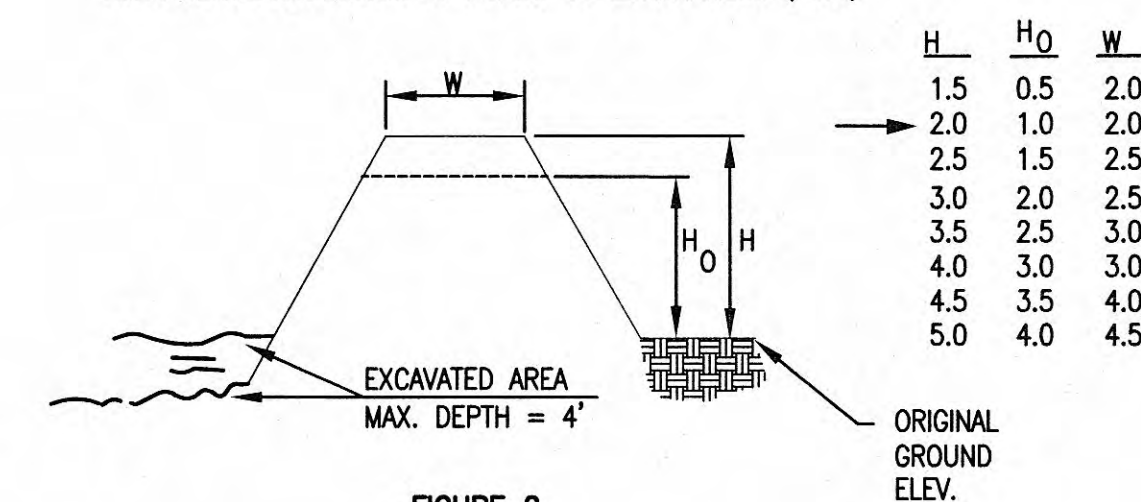
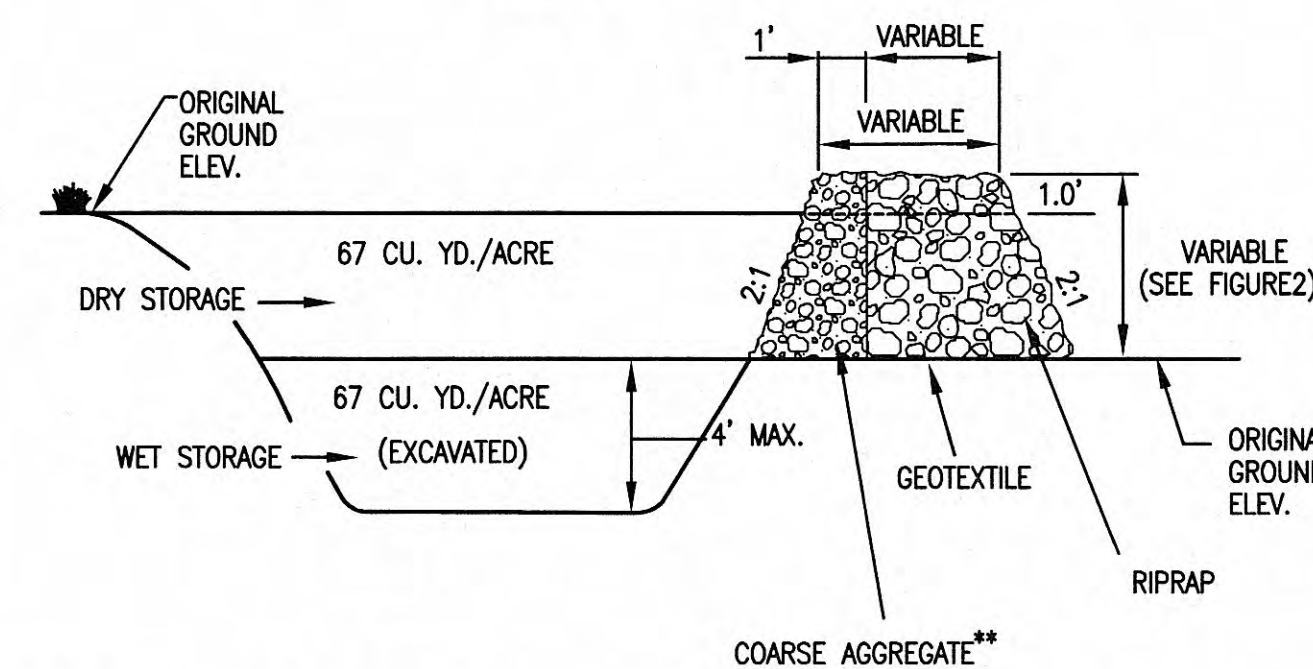
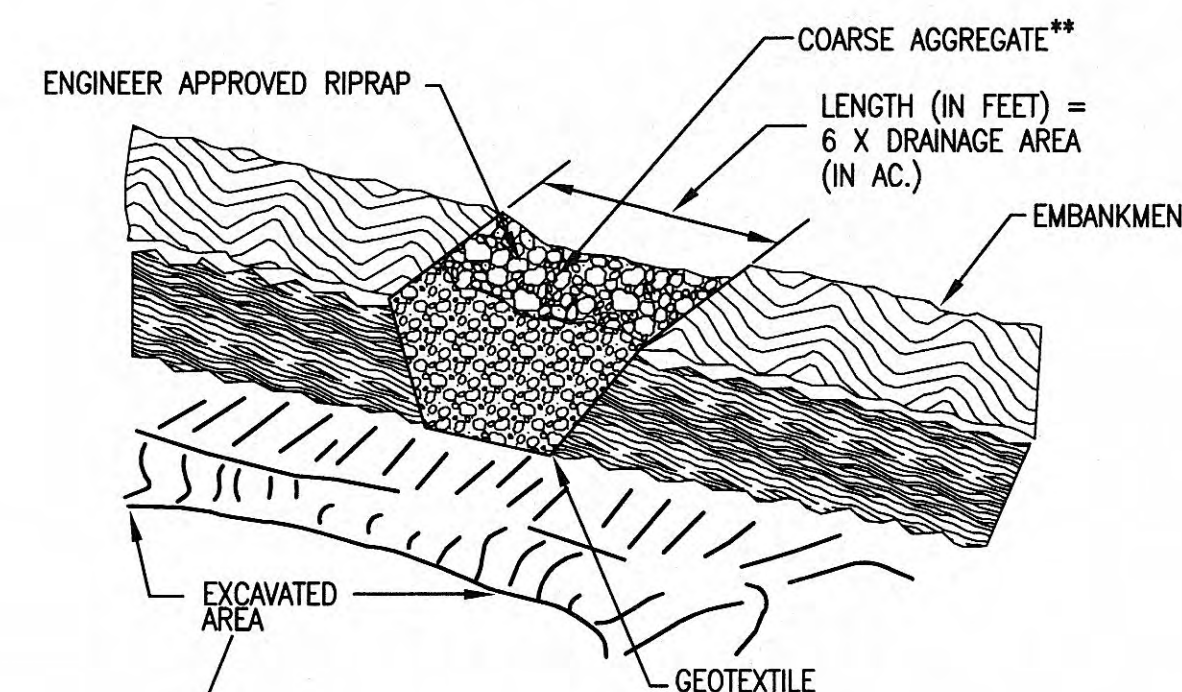


FIGURE 2

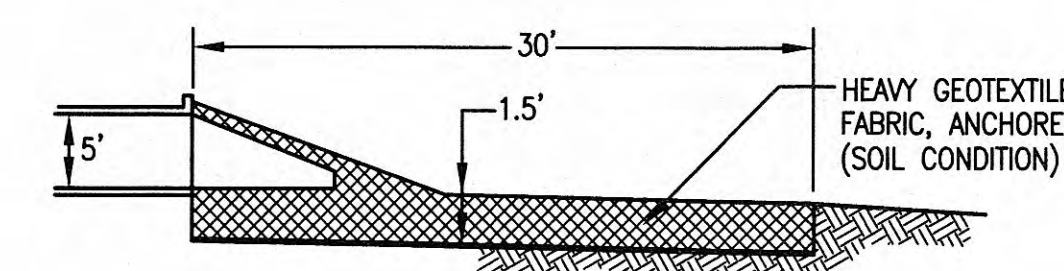
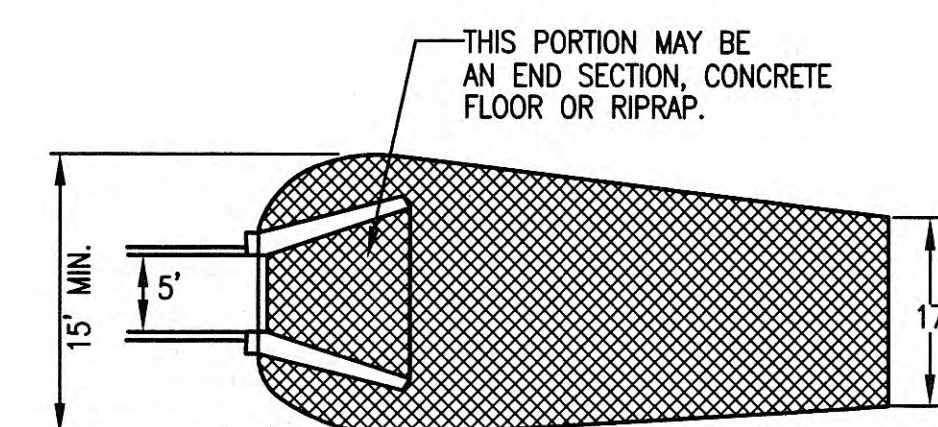


**COARSE AGGREGATE SHOULD BE ENGINEER APPROVED

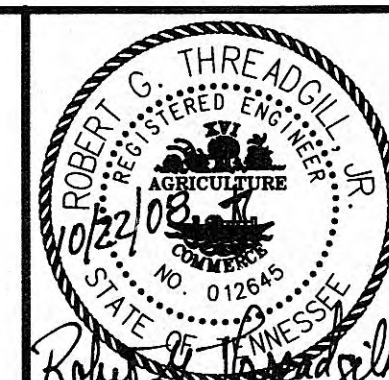
CROSS SECTION OF OUTLET



OUTLET (PERSPECTIVE VIEW)
SEDIMENT TRAP DETAIL
SCALE: NTS



RIPRAP OUTLET PROTECTION DETAIL
SCALE: NTS



GRW PROJECT NO. 3401-01
CLIENT PROJECT NO. XXXX
ALL RIGHTS RESERVED
THIS DOCUMENT IS THE PROPERTY OF
GRW ENGINEERS, INC. AND SHALL NOT
BE REPRODUCED OR TRANSMITTED IN ANY
FORM OR BY ANY MEANS, ELECTRONIC OR
MECHANICAL, WITHOUT WRITTEN PERMISSION.

GRW
ENGINEERS - ARCHITECTS - PLANNERS
www.grwinc.com

EROSION CONTROL DETAILS
HARRIMAN UTILITY BOARD
HARRIMAN, TENNESSEE

DESIGNED: RGT
DRAWN: SG
REVIEWED: RGT
APPROVED: RGT

REVISIONS	DATE	DESCRIPTION
NO.		

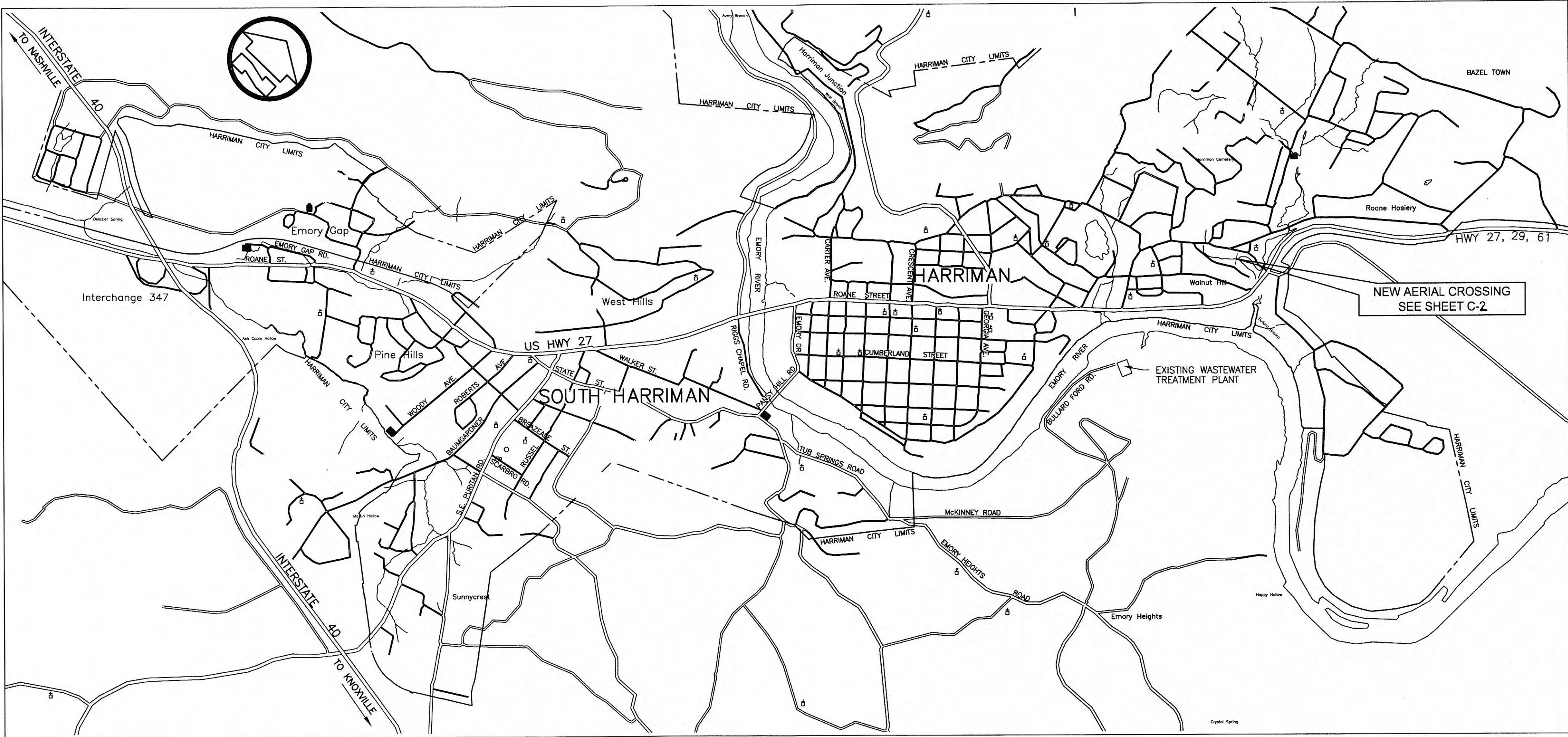
DATE: OCTOBER 2008
SCALE: XXX
SHEET NO.

PRINTED: 10/7/2008 @ 5:06PM

FILE NAME: I:\Harriman UB - 7534-03 (General Eng.)\Aerial Sewer Crossing\CA001 Working Drawings\7534-03 Sheet 01.dwg

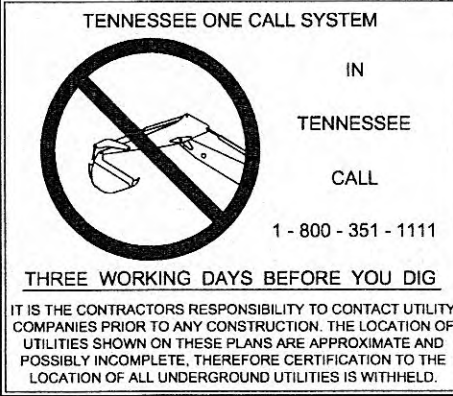
GENERAL NOTES

- 1) THE CONTRACTOR SHALL RESTORE ALL CULVERTS, FENCES, WALLS, SMALL ORNAMENTAL TREES, CULTIVATED SHRUBS, FLOWERS, SIGNS, LIGHTS AND POWER POLES, STREET MARKERS, MAIL BOXES, WATER AND GAS LINES, WATER AND GAS METERS AND BOXES INCLUDING SHUT-OFFS, AND LAWNS DISTURBED BY CONSTRUCTION OPERATIONS TO THEIR ORIGINAL CONDITIONS. THE COST OF THIS WORK SHALL BE MERGED IN THE UNIT BID AND CONTRACT PRICES FOR THE PROPOSED WORK.
- 2) WHERE IN EASEMENTS THE CONTRACTOR SHALL PROTECT AND RESTORE SAID PROPERTY TO CONDITION SIMILAR OR EQUAL TO THAT EXISTING AT THE COMMENCEMENT OF CONSTRUCTION, EXCEPT AS NOTED.
- 3) THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK IN EACH AREA. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES. BEFORE CONSTRUCTION.
- 4) CONTRACTOR SHALL NOT PLACE ANY VALVES OR OTHER ABOVE GRADE DEVICES IN ANY DITCH LINE ON STATE HIGHWAY RIGHT OF WAY.
- 5) SUFFICIENT PRECAUTIONS SHALL BE TAKEN DURING CONSTRUCTION TO MINIMIZE THE RUN-OFF OF POLLUTING SUBSTANCES SUCH AS SILT, CLAY, FULES, OILS, BITUMENS, CALCIUM CHLORIDE, OR OTHER POLLUTING MATERIALS HARMFUL TO HUMANS, FISH OR OTHER LIFE, INTO THE SUPPLIES AND SURFACE WATERS OF THE STATE. POLLUTION SEDIMENT AND EROSION CONTROL MEASURES MUST BE IN OCCORDANCE WITH THE BMP'S OUTLINED BY THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION IN THE MARCH 2002 EROSION AND SEDIMENT CONTROL HANDBOOK AND MUST BE ADEQUATE TO ASSURE THAT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS ARE MET. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ENSURING THAT THE LAWS AND REGULATIONS ARE MET AND IS RESPONSIBLE FOR ENSURING THAT CONSTRUCTION DOES NOT HARM THE WATERS OF TENNESSEE. THE PROTECTION OF THE SITE SHALL CONTINUE THROUGHOUT THE CONSTRUCTION PERIOD. SPECIAL PRECAUTIONS SHALL BE TAKEN IN THE USE OF CONSTRUCTION EQUIPMENT TO PREVENT OPERATIONS WHICH PROMOTE EROSION. THE TEMPORARY POLLUTION CONTROL PROVISIONS SHALL BE COORDINATED WITH THE PERMANENT REOSION CONTROL MEASURES, TO ENSURE ECONOMICAL, EFFECTIVE AND CONTINUOUS EROSION CONTROL THROUGHOUT THE CONSTRUCTION AND POST-CONSTRUCTION PERIOD OF THE PROJECT. NATURAL COVER SHOULD BE MAINTAINED AS LONG AS POSSIBLE AND GRADED AREAS SHOULD BE STABILIZED AS SOON AS POSSIBLE. CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPING A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND IN IT IDENTIFYING LOCATIONS FOR BMP'S, AND TYPES OF BMP'S INSTALLED. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AND INSPECTION OF BMP'S. CONTRACTOR SHALL EXECUTE THE NOTICE OF INTENT, IN CONJUNCTION WITH THE OWNER PRIOR TO COMMENCEMENT OF CONSTRUCTION.
- 6) THE CONTRACTOR SHALL OBTAIN ALL PERMITS FROM THE STATE AND/OR COUNTY HIGHWAY DEPARTMENT TO CROSS ALL HIGHWAYS AND STREETS.
- 7) IF ANY EXISTING STORM SEWERS ARE SUBSTANTIALLY DAMAGED AS DETERMINED BY THE A/E AND OR OWNER, THE REPAIR SHALL BE MADE WITH R.C.P. PIPE FROM STRUCTURE-TO-STRUCTURE. PIPE SIZE SHALL BE EQUAL TO EXISTING.
- 8) CONTRACTOR SHALL BE RESPONSIBLE FOR CONNECTING ALL LIVE SERVICES TO THE NEW SEWER.



LOCATION MAP
SCALE: 1" = 1500'

CALL BEFORE YOU DIG



PROJECT NO. 3401-01

CLIENT PROJECT NO. XXXX

ALL RIGHTS RESERVED.
THIS DOCUMENT IS THE PROPERTY OF
G&B ENGINEERS - ARCHITECTS - PLANNERS
AND SHALL BE REPRODUCED IN WHOLE OR IN PART
WITHOUT WRITTEN PERMISSION
FROM G&B ENGINEERS - ARCHITECTS - PLANNERS

PROJECT LOCATION MAP

HARRIMAN UTILITY BOARD

HARRIMAN, TENNESSEE

DESIGNED: RGT

DRAWN: SG

REVIEWED: RGT

APPROVED: RGT

NO

DATE

DESCRIPTION

BY

DATE

SCALE

SHEET NO.

C-1

ROBERT C. THREAGILL, JR.
REGISTERED ENGINEER
AGRICULTURE
STATE OF TENNESSEE
NO. 012645

GRW PROJECT NO. 3401-01

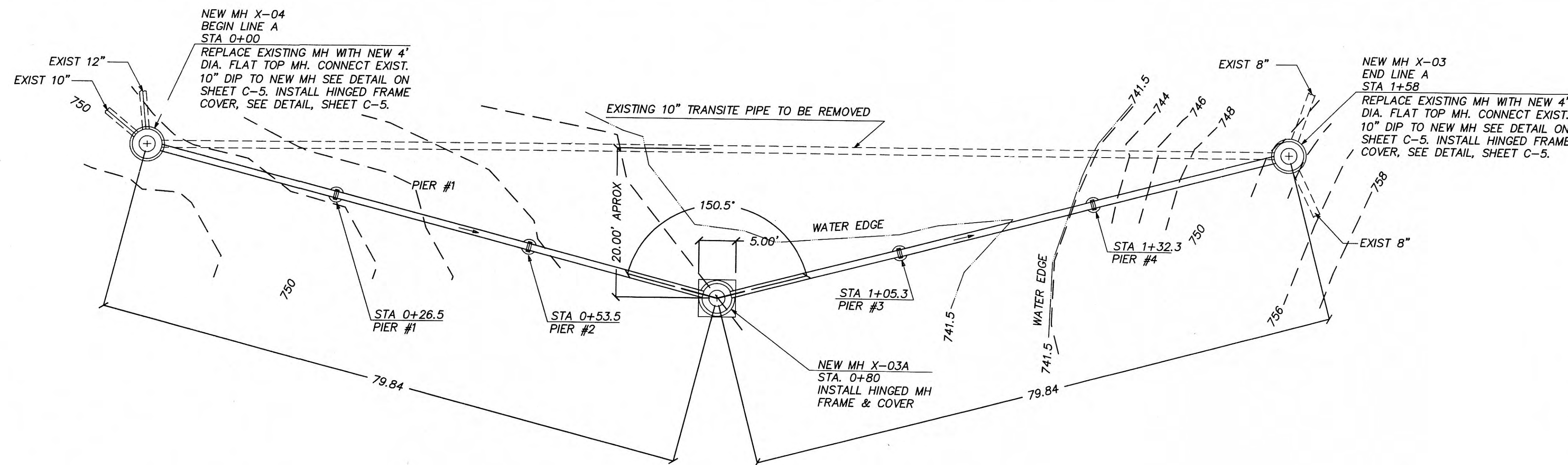
CLIENT PROJECT NO. XXXX

ALL RIGHTS RESERVED.
THIS DOCUMENT IS THE PROPERTY OF
G&B ENGINEERS - ARCHITECTS - PLANNERS
AND SHALL BE REPRODUCED IN WHOLE OR IN PART
WITHOUT WRITTEN PERMISSION
FROM G&B ENGINEERS - ARCHITECTS - PLANNERS

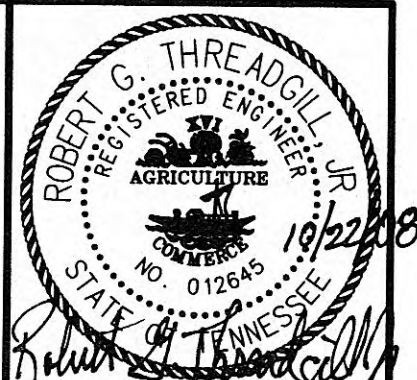
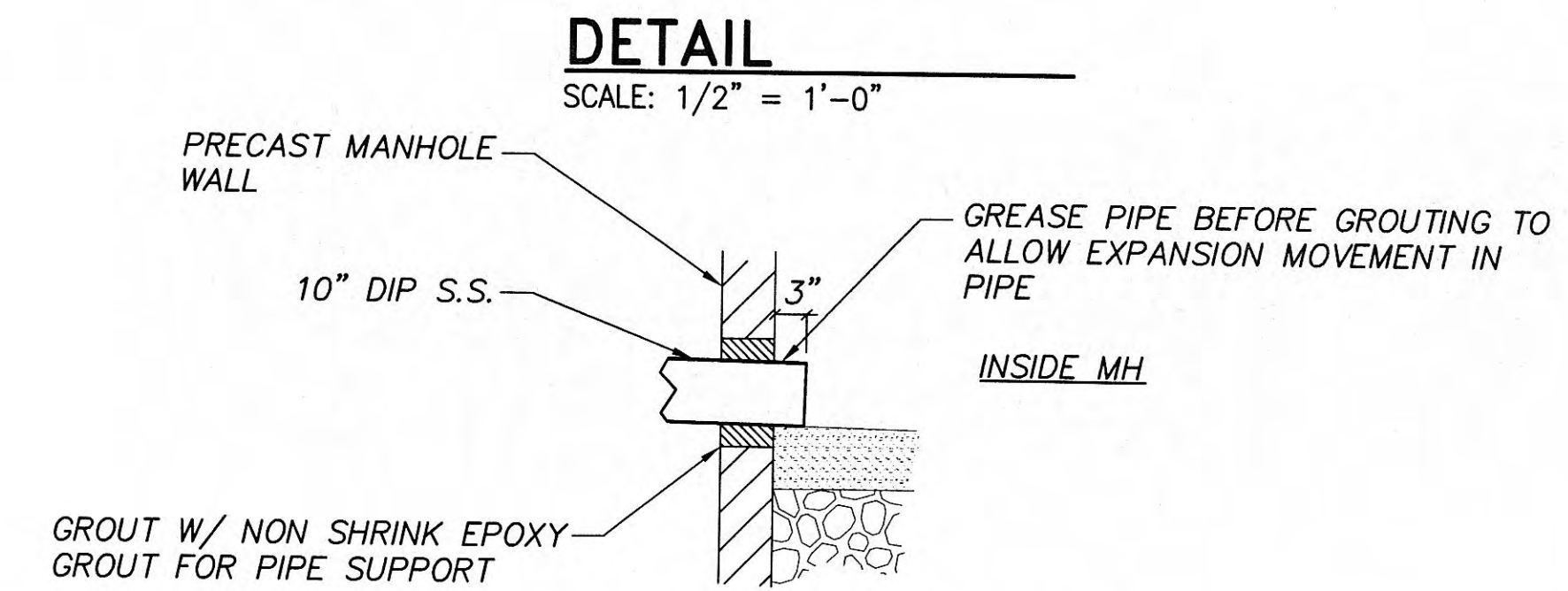
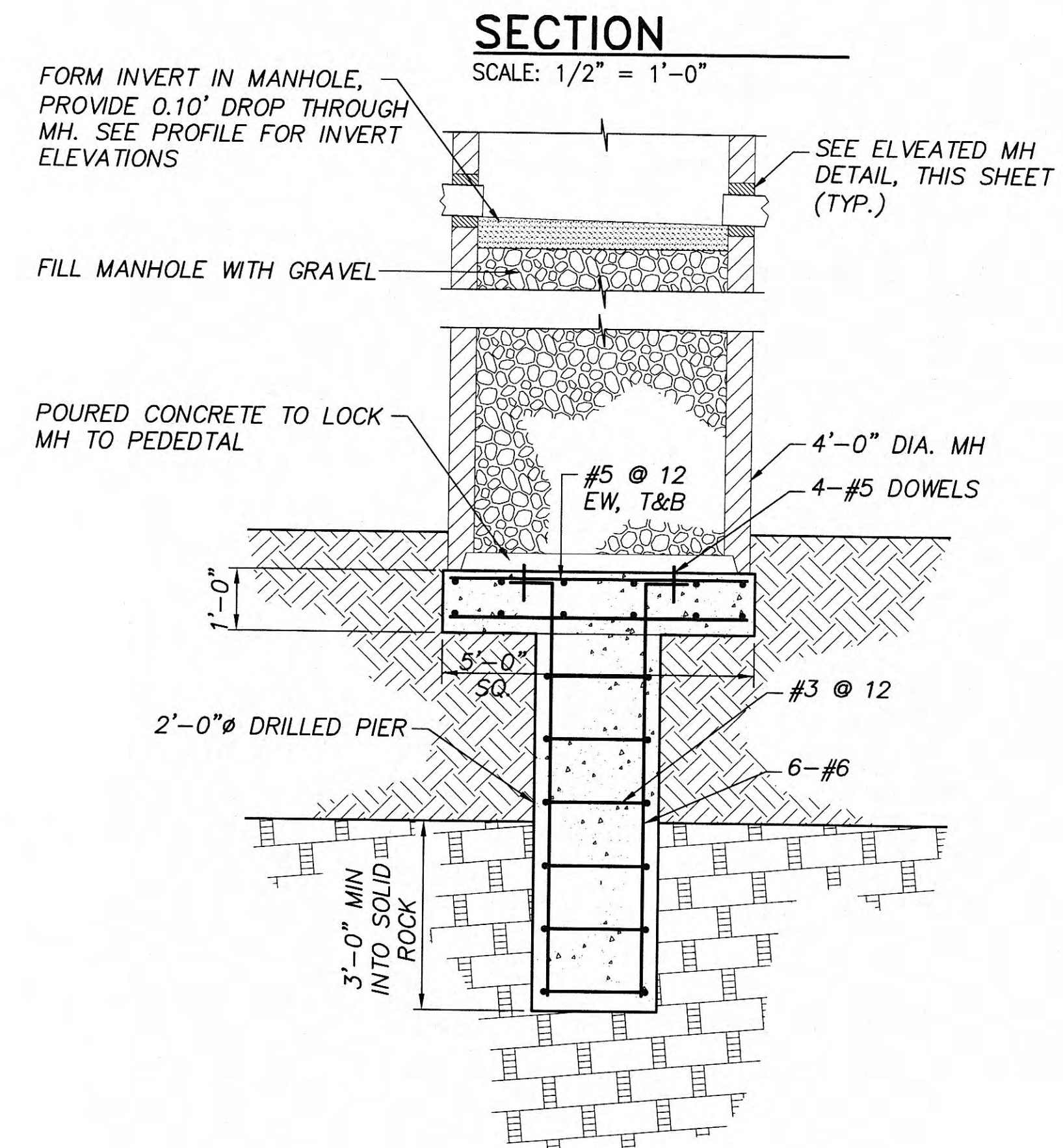
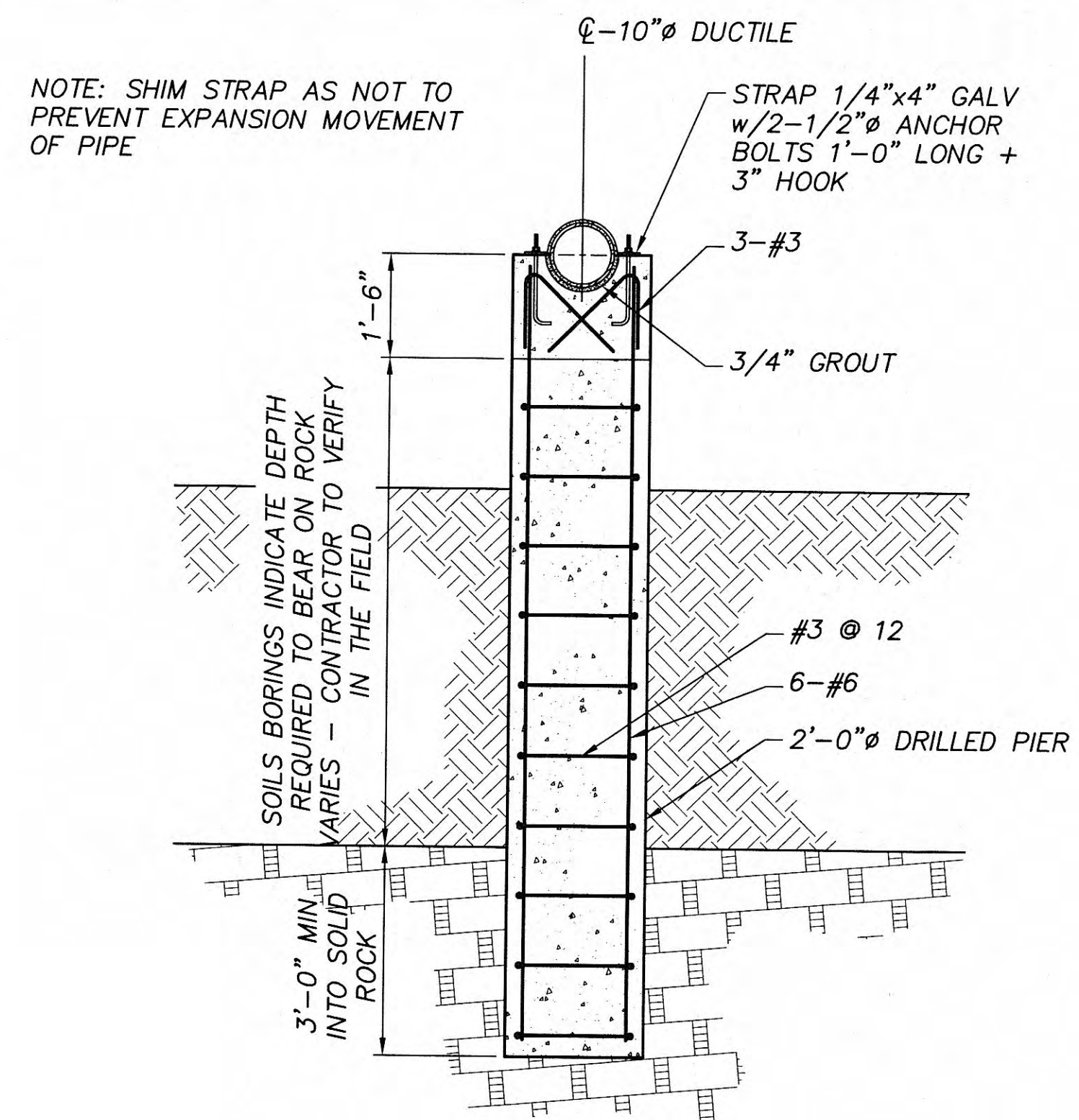
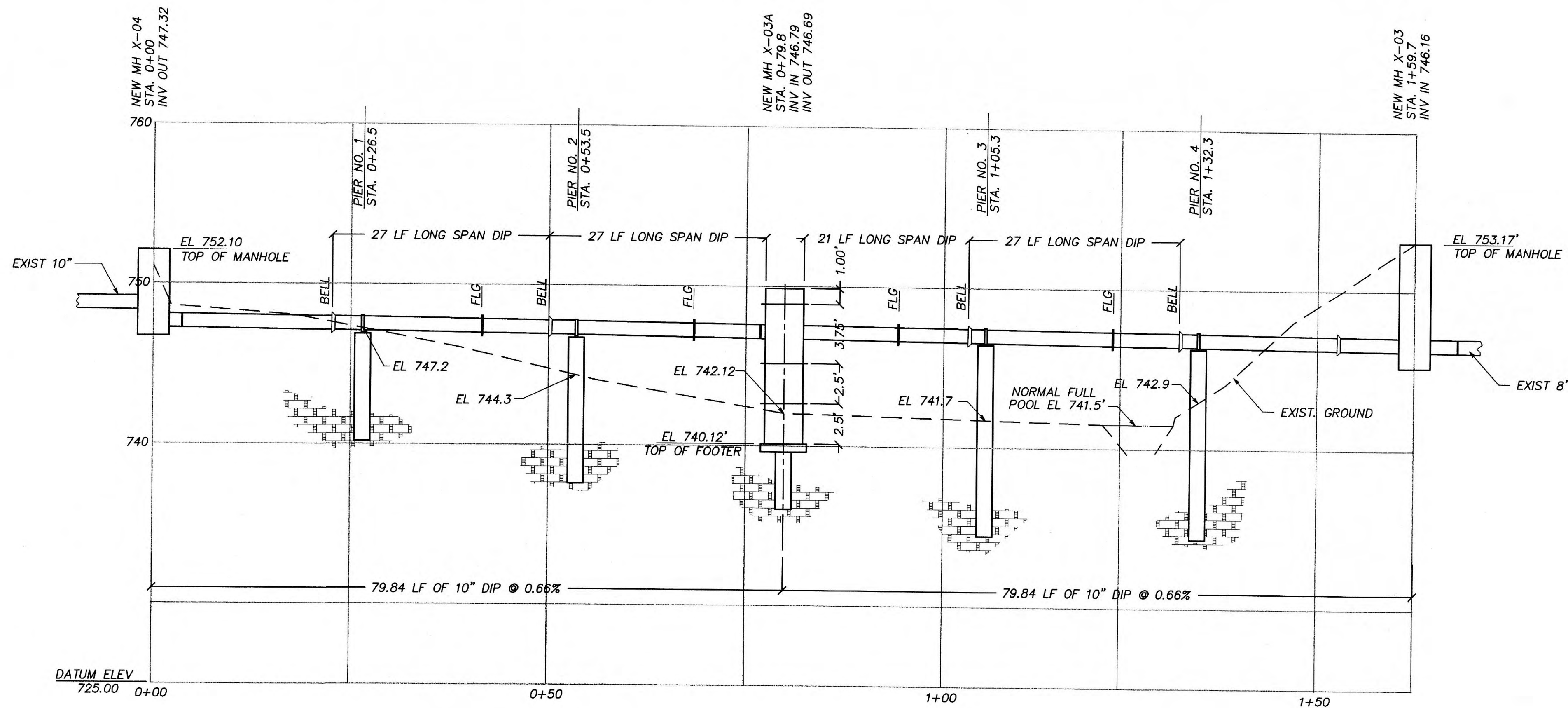
G&B

ENGINEERS - ARCHITECTS - PLANNERS

www.grwinc.com



NOTE: CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS AND DISTANCES BEFORE ORDERING MATERIALS.



GRV PROJECT NO. 3401-01
CLIENT PROJECT NO. XXXX



AERIAL SEWER CROSSING
HARRIMAN UTILITY BOARD
HARRIMAN, TENNESSEE

DESIGNED	RGH	DRAWN	SG	REVIEWED	RGH	APPROVED	RGH
DATE							
NO							

DATE: OCTOBER 2008
SCALE: AS NOTED
SHEET NO.

The diagram illustrates Method "A" for open terrain, showing two cross-sections of pipe installation: one for Ductile Iron Pipe and one for PVC Pipe. Both sections show a 6-inch minimum embedment of the pipe in the ground. The backfill material is specified as "BACKFILL MAT'L AS SPECIFIED". Above the backfill, there is a layer of "NO. 67 CRUSHED STONE BACKFILL" with a height of 12 inches. The top of the stone backfill is labeled "HEAP OVER OR LEVEL AS DIRECTED". The pipe diameter is indicated as "2'-0\" PLUS PIPE DIAMETER MAXIMUM".

DUCTILE IRON PIPE

PVC PIPE

METHOD "A"
(IN OPEN TERRAIN)

The diagram illustrates the cross-section of a pipe replacement using Method B. It shows a central pipe with a diameter of 2'-0" plus, surrounded by a 6" minimum layer of No. 67 crushed stone backfill. This is topped by a 12" layer of backfill material as specified, and a final 6" layer of earth. A temporary backfill of crushed stone or gravel is shown above the earth layer, intended for final surface restoration. The diagram is labeled with dimensions and material specifications.

TEMPORARY BACKFILL OF CRUSHED STONE OR GRAVEL. SEE "PAVEMENT REPLACEMENT DETAIL" - THIS SHEET FOR FINAL SURFACE RESTORATION.

6"

EARTH

12"

BACKFILL MAT'L AS SPECIFIED

NO. 67 CRUSHED STONE BACKFILL

2'-0" PLUS
PIPE DIAMETER
MAXIMUM

6" MIN.

METHOD "B"
(UNDER SIDEWALKS & UNPAVED DRIVEWAYS)

COMPACTED DENSE GRADED AGGREGATE - 6" BELOW BOTTOM OF PAVEMENT TO GRADE. REMOVE AS NECESSARY FOR PAVEMENT RESTORATION. SEE "PAVEMENT REPLACEMENT DETAIL" THIS SHEET.

6"

EARTH

12"

NO. 67 CRUSHED STONE BACKFILL

2'-0" PLUS PIPE DIAMETER MAXIMUM

METHOD "C"

(UNDER PAVED STREETS, ROADS & DRIVEWAYS)

Diagram illustrating the construction details of a manhole structure, showing a cross-section of the precast concrete elements and the internal components.

Key components and dimensions labeled:

- HINGED FRAME AND COVER (SEE DETAIL)
- SET FRAME IN MASTIC AND ANCHOR TO CONC. W/4-5/8" Ø ANCHOR BOLTS
- PRECAST CONC. TOP
- 24" DIA.
- MANHOLE STEPS (PLASTIC W/ENCAPSULATED 1/2" STEEL ROD)
- VERTICAL JOINT-SEE DETAIL "A"
- 16"
- 4'-0" DIA.
- ALL PRECAST ELEMENTS TO MEET LATEST APPLICABLE A.S.T.M. SPEC.
- SELECT BK'FL
- CLASS "C" CONC. OR BRICK & MORTAR
- #4's @ 12" O.C.E.W.
- 2" MIN.
- 6" MIN.
- FLEXIBLE PIPE TO M.H. CONNECTOR
- 6" MIN. CRUSHED STONE BENEATH ALL MANHOLES. M.H.'S 14" DEEP OR DEEPER SHALL HAVE 6'X6' CLASS "A" CONC. PAD.

EDGE OF CONC. PAD
OR LIMITS OF STONE

BUTYL SEALANT

DETAIL "A"

PRECAST M.H. RING
POURED IN PLACE
CONC. SLAB

8" CONC. SLAB OR
6" STONE (SEE NOTE)

PLAN OF M.H. BOTTOM

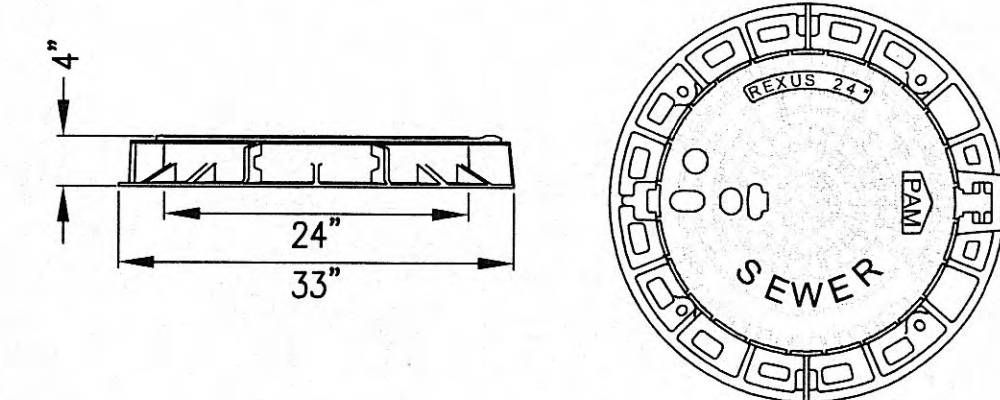
ALT. M.H. BOTTOM

FLAT TOP MANHOLE DETAIL

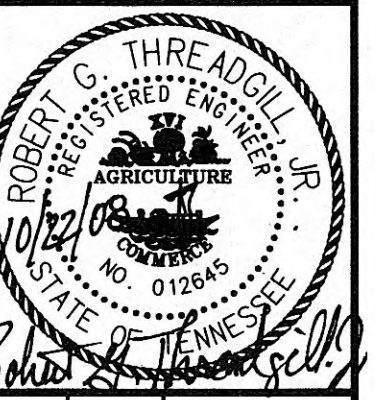
NOT TO SCALE

1. MANHOLE COVER AND FRAME SHALL BE REXUS OR APPROVED EQUAL. COVER AND FRAME SHALL BE MANUFACTURED FROM DUCTILE IRON.
2. COVERS SHALL BE HINGED AND INCORPORATE A 90° BLOCKING SYSTEM TO PREVENT ACCIDENTAL CLOSURE. COVERS SHALL BE ONE MAN OPERABLE USING STANDARD TOOLS AND SHALL BE CAPABLE OF WITHSTANDING A TEST LOAD OF 80,000 LBS.
3. FRAMES SHALL BE CIRCULAR, INCORPORATE A SEATING RING AND A FITTED PLUG IN THE HINGE HOUSING, AND BE AVAILABLE IN A 24" CLEAR OPENING. THE FRAME DEPTH SHALL NOT EXCEED 4", AND THE FLANGE SHALL INCORPORATE BEDDING SLOTS, BOLT HOLES AND LIFTING EYES.
4. ALL COMPONENTS SHALL BE BLACK COATED.

FRAME WEIGHT: 64 LBS.
COVER WEIGHT: 91 LBS.
TOTAL WEIGHT: 155 LBS.
REFERENCE NUMBER: RE 60 R8 FD



DUCTILE IRON HINGED MANHOLE
FRAME & COVER
NOT TO SCALE



GRW PROJECT NO. 3401-01

CLIENT PROJECT NO. XXXX

ALL RIGHTS RESERVED:
THIS DOCUMENT IS THE PROPERTY OF
GRW ENGINEERS, INC. AND SHALL NOT
BE REPRODUCED IN WHOLE OR IN PART
OR USED FOR CONSTRUCTION OF
OTHER THAN THIS SPECIFIC PROJECT
WITHOUT WRITTEN PERMISSION

ENGINEERS - ARCHITECTS - PLANNERS

www.grtwinc.com

SANITARY SEWER STANDARD DETAILS

**HARRIMAN UTILITY BOARD
HARRIMAN, TENNESSEE**

[illegible]

DATE:
OCTOBER 2008

SCALE:
AS NOTED

SHEET NO.

C-3