

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES	
			J	1	2
2. AMENDMENT/MODIFICATION NO. 0001	3. EFFECTIVE DATE 15-Jul-2005	4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO.(If applicable) W912EQ-05-B-0015	
6. ISSUED BY US ARMY ENGINEER DISTRICT, MEMPHIS 167 N MAIN STREET B202 MEMPHIS TN 38103-1894	CODE W912EQ	7. ADMINISTERED BY (If other than item 6) See Item 6		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)			X	9A. AMENDMENT OF SOLICITATION NO. W912EQ-05-B-0015	
			X	9B. DATED (SEE ITEM 11) 23-Jun-2005	
				10A. MOD. OF CONTRACT/ORDER NO.	
				10B. DATED (SEE ITEM 13)	
CODE	FACILITY CODE				
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS					
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>1</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.					
12. ACCOUNTING AND APPROPRIATION DATA (If required)					
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.					
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.					
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).					
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:					
D. OTHER (Specify type of modification and authority)					
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.					
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) This solicitation for Fritz Landing Culvert Replacement, Lake County, Tennessee scheduled to open 26 July 2005 at 2:30 p.m. is amended as follows: SPECIFICATIONS 1. Section 01270A, Paragraph 1.2.11.1 - Delete paragraph in its entirety and substitute the following paragraph therefore: "1.2.11.1 Payment Payment for concrete will be made at the contract lump sum price for "Cast-in-Place Concrete," which price and payment shall constitute full compensation for furnishing concrete and accessories for the concrete trench located at the inlet of culvert; as specified in the Section 03301A -CAST-IN-PLACE CONCRETE."					
Continued on Next Page					
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.					
15A. NAME AND TITLE OF SIGNER (Type or print)			16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
			TEL: _____ EMAIL: _____		
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA		16C. DATE SIGNED	
_____ (Signature of person authorized to sign)		BY _____ (Signature of Contracting Officer)		15-Jul-2005	

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

The following items are applicable to this modification:

SECTION SF30 - BLOCK 14 CONTINUATION PAGE

BLOCK 14 CONTINUATION

2. Section 01357 – This section is deleted in its entirety and replaced with the attached revised Section 01357.
3. Section 02221 – Excavation – Add paragraph 3.5 to the end of this section:

“3.5 EXCESS EXCAVATED MATERIAL

Any excess excavated material will be spread evenly north of the outlet structure within the right-of-way limits.”

4. Section 02526 – Insert the attached Piezometer Detail and WES Forms 798 to the end of this Section.
5. Section 02542 – Insert the attached Plate I, Plate II, Plate III, Plate IV, Plate V, Plate VI and the Riprap Gradation Curves to the end of this Section.
6. Section 11283, Paragraph 2.1.9 – Delete this paragraph in its entirety.

PLANS

7. Drawing No. 2, SITE PLAN, file no. 002a0691 is deleted and replaced with revised Drawing No. 2, file no. 002b0691. The new revised drawing can be viewed under Plans on the webpage.
8. Drawing No. 7, FLAP GATE MISCELLANEOUS DETAILS, file no. 007a0691 – Please make the following pen and ink change to the Notes on this drawing: The Note No. 2 shall be revised to read ‘GATE FRAMES SHALL BE PROVIDED WITH BRONZE LINKS AND STAINLESS ANCHOR BOLTS AND AS WELL AS BRONZE SEATING FACES.’”
9. Drawing No. 11, STAGE HYDROGRAPHS, file no. 011a0691 – Please make the following pen and ink change to the drawing: The scale for the top three hydrographs should be shifted so 50 is the stage for the top line just like the bottom two hydrographs.

SECTION 01357

FRITZ LANDING CULVERT REPLACEMENT
STORM WATER POLLUTION PREVENTION PLAN
FOR STORM WATER GENERAL PERMIT
U.S. ARMY CORPS OF ENGINEERS, MEMPHIS DISTRICT

PART 1 LOCATION AND NATURE OF ACTIVITY

The Contractor shall implement and diligently pursue all measures required by this Storm Water Pollution Prevention Plan (SWPPP). The purpose of the SWPPP is to control soil erosion and the resulting sediment to the extent necessary to prevent sediment from leaving the contract rights-of-way and prevent pollution of any water body caused by the runoff from the areas of construction activities under this contract. The Contractor shall review the SWPPP to determine requirements for compliance. In addition, the Contractor shall ascertain that his subcontractors have reviewed the plan, and that they comply with its provisions. The Contractor shall ensure that all subcontractors sign the CERTIFICATION located at the end of this section.

This project consists of construction of two new reinforced concrete pipe (RCP) culverts and demolition of an existing outlet and inlet structures and grouting of the existing culvert in Lake County, Tennessee.

A set of construction drawings showing the project location and the details of the new culvert construction will be located on the construction site at all times.

A set of construction drawings showing the project location and the details of installation of the environmental protection measures will be located on the construction site at all times. Flow arrows indicating drainage patterns are shown on the contract drawings.

PART 2 AREA AFFECTED

The total area of the site, within the right-of-way limits, which will be impacted by construction, is approximately 20 acres, of which 1.05 acres may be disturbed during construction.

PART 3 CONTROL OF POLLUTANTS DURING CONSTRUCTION

Non-structural and/or structural measures shall be identified and constructed in a timely manner as to minimize the introduction of sediment into the stream as a result of storm water runoff. Controls shall be put in place prior to disturbance of soil and maintained until soils are stabilized.

3.1 NON-STRUCTURAL MEASURES

3.1.1 General

Prior to the beginning of any construction, the Contracting Officer will identify all land resources to be preserved within the right-of-way. The Contractor shall provide effective protection for land, water and vegetation

resources at all times. The Contractor shall construct or install temporary and/or permanent erosion and sedimentation control features as indicated herein to minimize pollutants entering the stream, other water bodies, or wetlands. The Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms outside the construction right-of-way.

3.1.2 Protection of Landscape

Trees, shrubs, vines, grasses, landforms and other landscape features indicated and defined on the contract drawings or as directed by the Contracting Officer to be preserved shall be clearly identified by marking, fencing, wrapping with boards, or other approved techniques.

3.1.3 Reduction of Exposure of Unprotected Erodible Soils

All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. Vegetative ground cover shall not be destroyed, removed or disturbed more than 20 calendar days prior to grading or earth moving. Clearing shall progress in reasonably sized increments as needed to use the areas developed. To the extent feasible, material embankments, side slopes, back slopes, berms and any other exposed surfaces shall be stabilized by temporary seeding, mulching, fabric mats or other approved stabilization methods, as soon as possible after material placement, or within 14 days on areas that will remain unfinished more than 21 calendar days. Should construction be halted, for any reason, temporarily or permanently, for more than 21 days, in any portion of the site, temporary or permanent turfing measures, or other approved temporary stabilization of exposed areas, such as mulching, shall be accomplished within 14 days after construction is halted.

3.2 STRUCTURAL MEASURES

3.2.1 General

Temporary erosion and sediment control measures such as silt fences, erosion control berms, check dams, and sedimentation basins shall be constructed and maintained until permanent drainage and erosion control facilities are complete and operative. Placement of perimeter controls shall commence with initiation of construction and shall remain in effect during the remainder of construction until final stabilization of those portions of the site upward of the perimeter control. Temporary erosion controls shall be maintained until final stabilization of exposed areas, after which they shall be removed. All structural devices shall be constructed in accordance with the standard drawing, TEMPORARY EROSION CONTROL DEVICES.

3.2.2 Silt Fences

Silt fences shall be constructed as a temporary structural measure to minimize erosion and sediment runoff. All necessary efforts shall be employed to minimize the entry of excavated material into the stream, other water bodies, or wetlands. Close attention shall be paid to the repair of damaged silt fences resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. Sediment removal shall include removal and disposition in a location where

it will not erode into construction areas, watercourses or wetlands. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded in accordance with the paragraph "ESTABLISHMENT OF TURF" below.

3.2.3 Erosion Control Berms

Erosion control berms shall be constructed as a temporary structural measure to minimize erosion and sediment runoff. All necessary efforts shall be employed to minimize the entry of excavated material into the stream, other water bodies, or wetlands. The erosion control berms shall be erected as work progresses. Erosion control berms shall be removed as needed for work to progress in the drainage area. Upon final removal of erosion control berms, they shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded in accordance with the paragraph "ESTABLISHMENT OF TURF" below. In the event that the erosion control berms begin to erode into the channel, the Contractor shall take action on the day that the erosion is noted, and protect the drainage area by installing straw bales at such locations as are necessary.

3.2.4 Check Dams

Check dams shall be constructed across inlet ditches, drains and swales using baled straw or equivalent devices to minimize sediment entry into the stream, other water bodies, or wetlands. Check dams shall be inspected for sediment accumulation after each significant rainfall and sediment deposits shall be removed when deposits reach one-third of the height of the barrier. Sediment removal shall include removal and disposition in a location where it will not erode into construction areas, watercourses or wetlands. Close attention shall be paid to the repair of damaged bales or bags, end runs and undercutting. Necessary repairs to barriers or replacement shall be accomplished promptly. Barrier rows used to retain sediment shall be turned uphill at each end of each row. When a check dam is no longer required, it shall be removed. The immediate area occupied by the check dam and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded in accordance with the paragraph "ESTABLISHMENT OF TURF" below.

3.2.5 Sediment Basins

Sediment from construction areas with 10 or more disturbed acres at one time shall be trapped in temporary or permanent Sediment Basins. After each storm, the basins shall be allowed to settle for 24 to 48-hours after which the basins shall be pumped dry. In order to maintain basin effectiveness, accumulated sediment shall be removed when the depth of sediment reaches one-third of the depth of structure in any part of the pool. Overflow shall be controlled by paved weir, by vertical overflow pipe draining from the surface, or by a spillway protected by baled straw filter barriers in the spillway and at the outlet toe of the spillway. The collected topsoil sediment shall be reused for fill on the construction site, and/or conserved for use at another site(s). If used, the basins shall provide at least 3,600 cubic feet of storage for each acre drained. Where such basins are not used, other equivalent sediment control measures are required.

3.2.6 Other Measures

Other temporary erosion and sediment control measures such as dikes, swales, and drains may be used with, or in lieu of, the above-mentioned measures provided they are consistent with Best Management Practices (BMPs). They shall be maintained until permanent drainage and erosion control facilities are complete and operative. Earthen erosion control features shall be compacted and stabilized immediately with vegetation as specified in the following paragraphs entitled "Seeding" and "Mulching."

3.2.7 Velocity Dissipation Devices

Should drains or swales be used, they shall be constructed with velocity dissipation devices (check dams) to reduce the need for more stringent erosion control practices in the swale or drain. These devices shall be removed after the erosive areas have been stabilized.

PART 4 CONTROL OF POLLUTANTS AFTER CONSTRUCTION

4.1 ESTABLISHMENT OF TURF

4.1.1 General

Turf shall be established as a permanent erosion control measure along any areas which are disturbed during construction. All material embankments, all berm areas, and any other disturbed areas shall be turfed. Turf shall be established in accordance with the Contract Specifications.

4.1.2 Fertilizer

Fertilizer shall be distributed uniformly over the areas to be seeded at a rate which will supply not less than 40 pounds of available nitrogen, 40 pounds of available phosphorous, and 40 pounds of potash per acre.

4.1.3 Seeding

Seed sown for permanent turfing shall be sown as specified in the technical specifications. Temporary seeding shall consist of grasses appropriate for the season when they are sown. A satisfactory method of sowing shall be employed, using approved mechanical power-drawn seeders, mechanical hand-seeders, broadcast-seeders, or other approved methods. When conditions are such by reason of drought, high winds, excessive moisture, or other factors that satisfactory results are not likely to be obtained, work shall be halted as directed by the Contracting Officer. Such work may resume only when conditions are favorable or when approved alternative or corrective measures and procedures have been identified and approved by the Contracting Officer. If inspection either during seeding operations or after there is a show of green indicates that areas have been left unplanted, additional seed shall be sown.

4.1.4 Mulching

If used, mulch shall be materials that do not contain noxious grass or weed seed that might be detrimental to the turf being established or to adjacent farmland. Mulch shall be spread uniformly in a continuous blanket, using two tons-per-acre of straw mulch or 1,200 pounds-per-acre of wood cellulose fiber mulch.

4.2 STATE AND LOCAL CONTROLS

There are no known State or local erosion and sediment control requirements applicable to this work other than those met by the requirements of this permit. In the event that there are State or local erosion and sediment control requirements, it shall be the responsibility of the Contractor to identify and comply with all applicable requirements. Chemical waste units shall be used at the site, with disposal in accordance with State and local regulations. Measures shall be in place to ensure compliance with State and local waste disposal, sanitary sewer, or septic system regulations. Water Quality Standards of receiving streams shall be maintained during and after construction in accordance with requirements of the State Water Quality Certification.

PART 5 RUNOFF COEFFICIENT, IMPERVIOUS AREAS, SOILS

The runoff coefficient prior to construction is estimated to range between 0.10 and 0.30. Once the material embankment and other disturbed areas have been re-vegetated, the runoff coefficient should remain in approximately the same range with no increase in impervious areas. Soils in the area are a silty clay material. For further information regarding soil borings contact the Memphis District Office of the U.S. Army Corps of Engineers.

PART 6 RECEIVING WATER

The existing surface waters within construction right-of-way limits are waters in agricultural and roadway ditches. Locations of storm water discharges will be more specifically identified by the Contractor in his Environmental Protection Plan submitted to the Government for approval 15 days after his receipt of Notice to Proceed. There are no TMDLs applicable for the immediate receiving waters and since control measures will be in place to minimize sediment discharge, the impact upon the ultimate receiving stream will be negligible. No non-storm water discharges are anticipated to be combined with storm water runoff.

PART 7 INSPECTIONS

7.1 GENERAL

Quality Control Representatives shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, structural control measures, and locations where vehicles enter or exit the site every seven calendar days and within 24-hours of the end of a storm that is 0.5-inches or greater. Where sites have been stabilized, inspections shall be conducted at least once every month.

7.2 DISTURBED AREAS AND AREAS USED FOR MATERIAL STORAGE

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the plan shall be observed to ensure correct operation. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impact to receiving waters. Locations where vehicles

enter or exit the site shall be inspected for evidence of off-site sediment tracking.

7.3 MODIFICATION OF POLLUTION PLAN

Based on the results of the inspection referenced in the paragraph entitled "DISTURBED AREAS AND AREAS USED FOR MATERIAL STORAGE," the site description identified in Part 1 and Part 2 of this plan shall be revised as appropriate, but in no case more than seven calendar days following the inspection. Such modification shall provide for timely implementation of any changes to the plan within seven calendar days following the inspection.

7.4 REPORTS

A report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the SWPPP, and actions taken shall be recorded and retained by the Contracting Officer as part of the SWPPP for at least three years from the date the site is finally stabilized.

PART 8 OTHER CONSIDERATIONS

8.1 LOCATION OF CONSTRUCTION IN REGARD TO WATERS CLASSIFIED IN 10 CSR 20-7.013

Construction is not within 1,000 feet of waters classified in 10 CSR 20-7.013, Water Quality Standards, as:

- a. Public drinking water supply lakes
- b. Outstanding National Resource Waters
- c. Outstanding State Resource Waters
- d. Streams designated for cold water sport fishery
- e. A lake in EPA's Clean Lakes Program

8.2 PROXIMITY OF SITE TO MAJOR RESERVOIRS

Construction is not within 100 feet of waters classified as major reservoirs.

PART 9 DEFINITIONS

9.1 BEST MANAGEMENT PRACTICES (BMPS)

Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPS also include treatment requirements, operation procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

9.2 COMMENCEMENT OF CONSTRUCTION

The initial disturbance of soils associated with clearing and grubbing, or other construction activities.

9.3 DRAINAGE SWALE

A drainage way with a lining of grass, riprap, asphalt, concrete, or other material installed to convey runoff without causing erosion.

9.4 CHECK DAM

Small temporary dams constructed across a swale or drainage ditch to reduce the velocity of runoff flows.

9.5 FINAL STABILIZATION

All soil-disturbing activities at the site have been completed, and a uniform perennial vegetative cover with a density of 85 percent of the cover for the area has been established or equivalent stabilization measures (such as the use of mulches or geo-textiles) have been employed.

PART 10 CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Dennis J. Kamper, P.E., Chief, Eng. and Const. Division, COE (901) 544-3227

Name & Official Title

Phone No.

Signature

Date Signed

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Name & Official Title of Contractor

Phone No.

Signature

Date Signed

Name & Official Title of Sub Contractor

Phone No.

Signature

Date Signed

For multiple Sub Contractors, attach additional Certification Sheets as necessary.

VENTED CAP FOR 4" DIAM. SCH. 40
GALVANIZED STEEL PIPE

4" DIAMETER, SCH. 40
GALVANIZED STEEL PIPE

3/4" DIAM. P.V.C. PIPE

CONCRETE COLLAR

10" MIN.

IMPERVIOUS BACKFILL

BENTONITE PELLET SEAL

2' X 2" O.D. P.V.C.
PIPE W/#15 SLOTS

CONCRETE FINE SAND
(ASTM C-33)

1" MAX.

3' - 0"

3' - 0"

2' - 0"

3' - 6"

TIP ELEVATION

2' - 0"

MIN.

OVERDRILL

6"

PIEZOMETER DETAIL

NTS

PIEZOMETER INSTALLATION REPORT

"EXAMPLE"

PROJECT: Nash Relief Wells				LEVEE DISTRICT: Little River Drainage District				
LOCATION (STA): 13/13+25			OFFSET FROM CENTER LINE: 160 feet			PIEZ NO.: 30		
PIEZ TYPE: Open Piezometer 2" o.d. pvc (2' length) #25 slob			DEPTH OF PIEZ: 40 ft.		RISER PIPE DIAM: 3/4" dia pvc			
PIEZ TIP SET IN (SOIL TYPE): sand			SOIL SAMPLE NO.: n/a		BORING DIAM: 6"			
METHOD OF INSTALLATION: Drill Rig - reverse rotary method								
TYPE OF PROTECTION FOR PIEZ: 4" dia sch. 40 galvanized pipe and three well guard posts				VENT: 14" dia hole in 4" cap				
GROUND ELEV: 334			ELEV TOP OF RISER: 337		ELEV PIEZ TIP: 294			
FILTER: Ottawa Sand		FROM ELEV: 292			TO ELEV: 297.5			
SEAL: Bentonite Pellet		FROM ELEV: 297.5			TO ELEV: 299.5			
INSTALLED BY: Memphis District				CONTRACT NO.: DACW66		FOREMAN: Louis Dyche		
DATE OF INSTALLATION: 17 July 1996				DATE OF OBSERVATIONS: 20 July 1996				
METHOD OF TESTING PIEZ: falling head test								
TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
0730	0	12.2	0735	5	6.6			
	1	0.5'	0736	6	7.2			
0732	2	3.5'	0741	11	9.2			
0733	3	5.5'	0746	16	10.8			
0734	4	6.1'	0751	21	11.7			
REMARKS: Static water level 12.2 feet below top riser pipe								
Passed falling head test 7.2' > 6.1' @ 5 minute mark								
Note: It may not be possible to fill piezometer to the top of the riser pipe.								

WES FORM 798
MAR '53
REVISED OCT. '53

Chip Newman
INSPECTOR

LMVD STANDARD TEST METHOD FOR GRADATION

December 14, 1998

- A. Select a representative sample (Note #1), weigh and dump on hard stand.
- B. Select four specific size stones to use as reference stones (a1, b1, c1, and d1) while performing the "individual weight larger than" test (see example & Note #2). Selected stone sizes should represent an evenly distributed cross section of the various size stones contained within the sample. Reference stone "a1" is typically the largest stone in the sample. Procedure is similar to the standard aggregate gradation test for "individual weight retained".
- C. Determine the largest size stone in the sample. (100% size)
- D. Separate the sample into piles starting with the stones that are larger than reference stone "b1" and proceeding to the smallest stones. The first pile should contain all stones larger than reference stone "b1" and smaller than "a1", the largest stone. Pile two should contain all stones larger than "c1" and smaller than "b1". Pile 3 should contain all stones larger than "d1" and smaller than "c1". The remaining pile should contain all stones smaller than "d1". Use reference stones for visual comparison in separating the obviously "larger than" stones. Stones that appear close to a specific size reference stone must be individually weighed. If a stone is heavier than the specific size reference stone, it should be placed in the pile containing the stones larger than the reference stone. Weigh each pile as a whole or cumulatively adding each stone in the individual piles.
- E. Paragraph D above will result in "individual weight retained" figures. Calculate individual percent retained (heavier than) and cumulative percent retained and cumulative percent passing (lighter than). Record test results on the "Gradation Test Data Sheet" (plate V) as shown on example plate III. Plot percent finer by weight, along with the specification curves on ENG Form 4055.
- F. See plate V and plate VI for a blank "Gradation Test Data Sheet" and a blank ENG Form 4055. Plates VII, VIII, and IX have been provided for the convenience of the contractor and can be used as necessary. These three plates have the upper and lower specification limits for "R-90", "R-200", and "R-650" pre-plotted on ENG Form 4055.

NOTES

- Sample Selection. The most important part of the test and the least precise is the selection of a representative sample. No "standard" can be devised; larger quarry run stone is best sampled at the shot or muck pile by given direction to the loader; small graded riprap is best sampled by random selection from the transporting vehicles. If possible, all parties should take part in the sample selection and agree before the sample is run that the sample is representative.
- Selection of Size for Separation. It is quite possible and accurate to run a gradation using any convenient sizes for the separation, without reference to the specifications. However, it is usually more convenient to select weights from the gradation limits, such as the 90 lbs., 40 lbs., 20 lbs., and 5 lbs. as shown in the following "R-90" example. After the test is plotted on ENG 4055 and a curve drawn, the gradation limits from the specifications shall be plotted.

(EXAMPLE)

Table From Specifications

TABLE I
(For Riprap "R 90")

<u>Percent Lighter by Weight (SSD)</u>	<u>Limits of Stone Weight, lb.</u>
100	90-40
50	40-20
15	20-5

(EXAMPLE)

GRADATION TEST DATA SHEET

Quarry AAA Quarry Inc. . Stone Tested R-90 .

Date of Test 24 May 79 . Testing Rate _____

TEST REPRESENTS

Contract No.	District	Tons
DACW66-79-C-0005	Memphis	16
	TOTAL	16

GRADATION

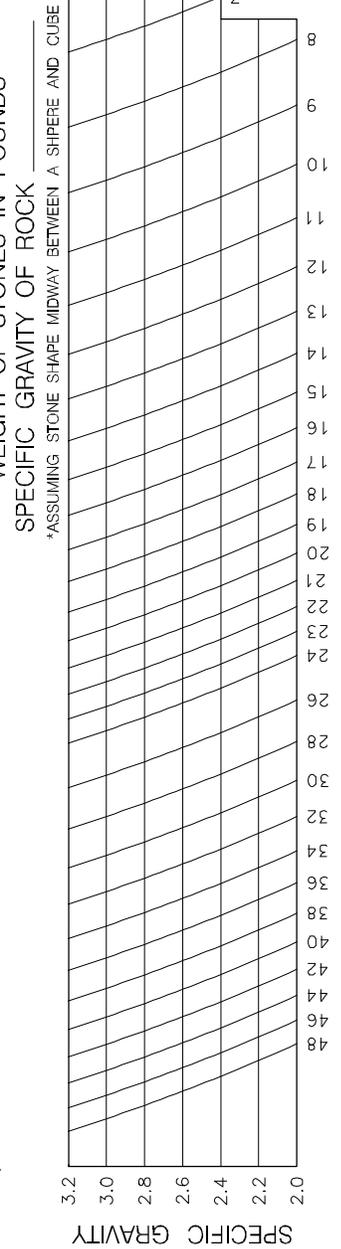
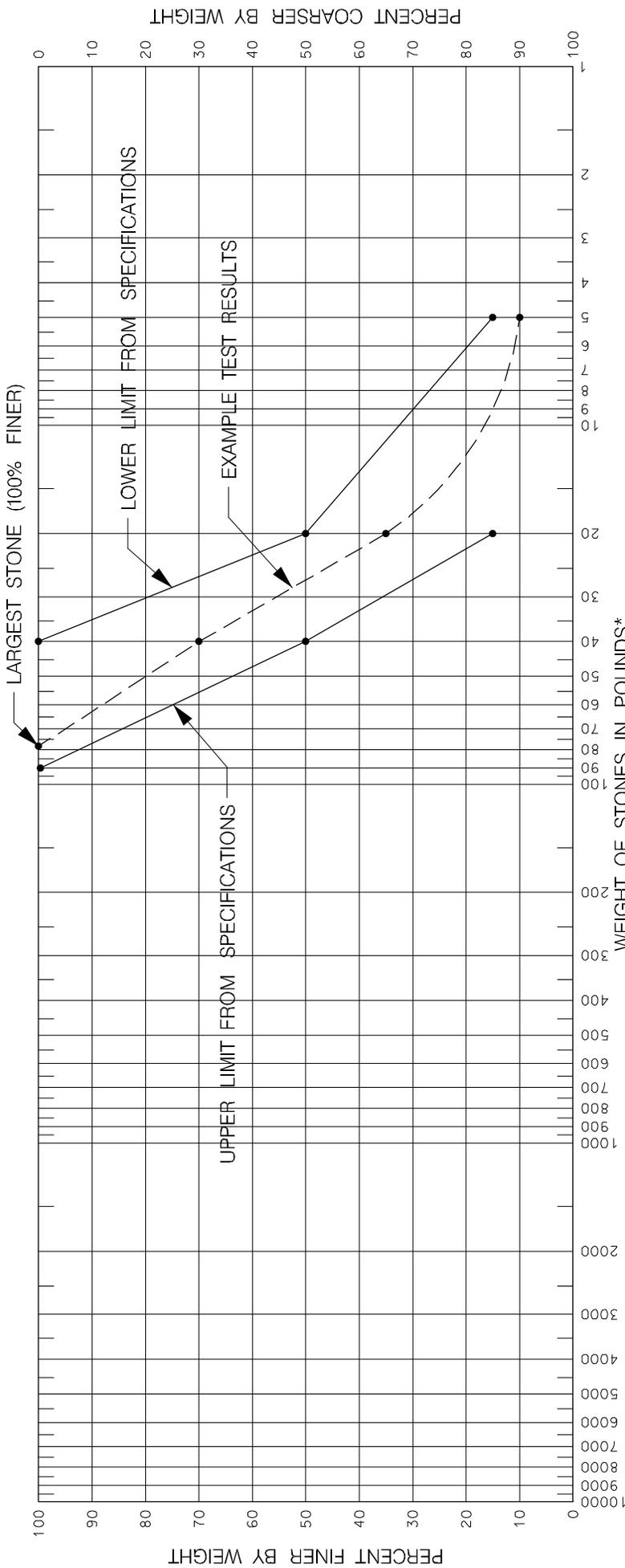
Stone Size (lbs.)	Individual Weight Retained	Individual % Retained	Cumulative %Coarser	%Finer	Specification % Finer by wt
90 "a1"	0	0	0	100	100
40 "b1"	9600	30	30	70	100-50
20 "c1"	11200	35	65	35	50-15
5 "d1"	8000	25	90	10	<15
< 5 "d1"	3200	10	100	-	
Total Weight	32000lbs				

Remarks: LARGEST STONE SIZE = 78 LBS .

I Certify that the above stone sample is representative of the total tonnage covered by this test report.

Contractor Representative: Representative's Name and Signature .

Government Representative: Representative's Name and Signature .



MEMPHIS DISTRICT - CORPS OF ENGINEERS
MEMPHIS, TENNESSEE

EXAMPLE "R-90" EXAMPLE

DACW66-79-C-0005
PROJECT: NEW FRANKLIN DITCH
DATE: 24 MAY 79

RIPRAP GRADATION CURVES

G R A D A T I O N T E S T D A T A S H E E T

Quarry _____ Stone Tested _____

Date of Test _____ Testing Rate _____

T E S T R E P R E S E N T S

Contract No.	District	Tons
TOTAL		

G R A D A T I O N

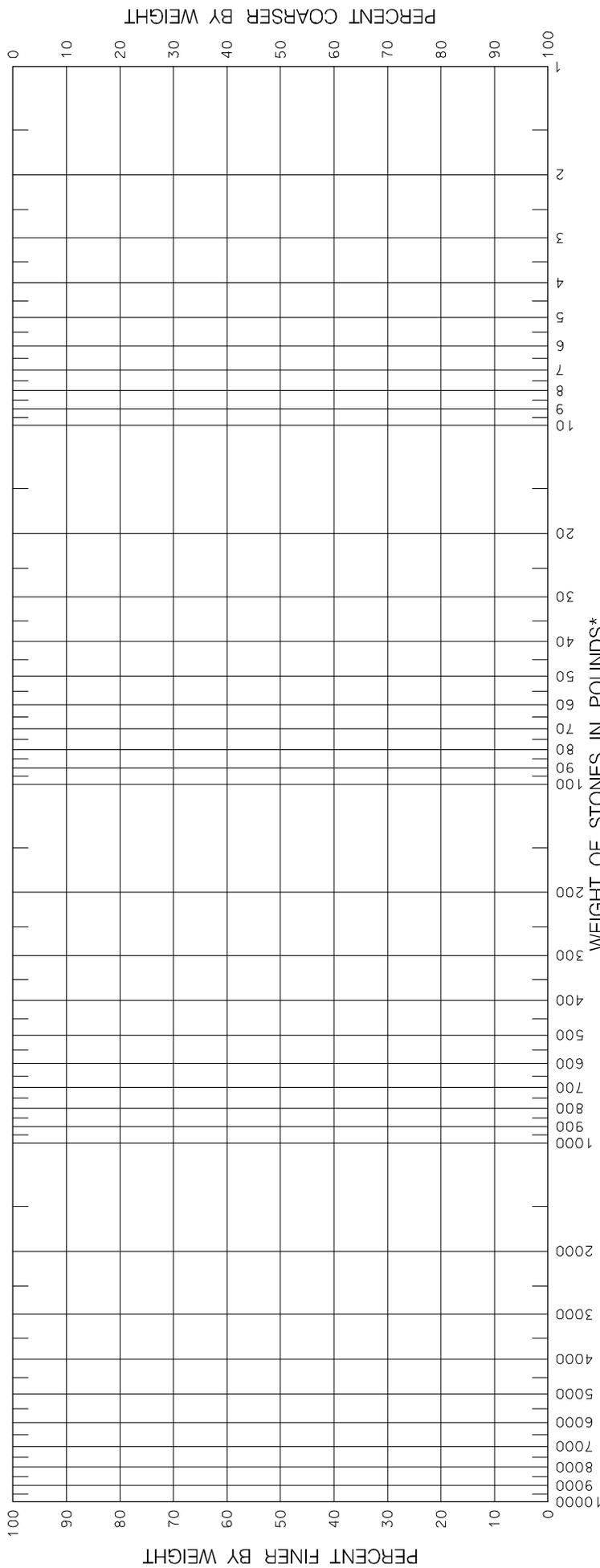
Stone Size (lbs)	Individual Weight Retained	Individual % Retained	Cumulative %Coarser	%Finer	Specification % Finer by wt
Total Weight					

Remarks: _____

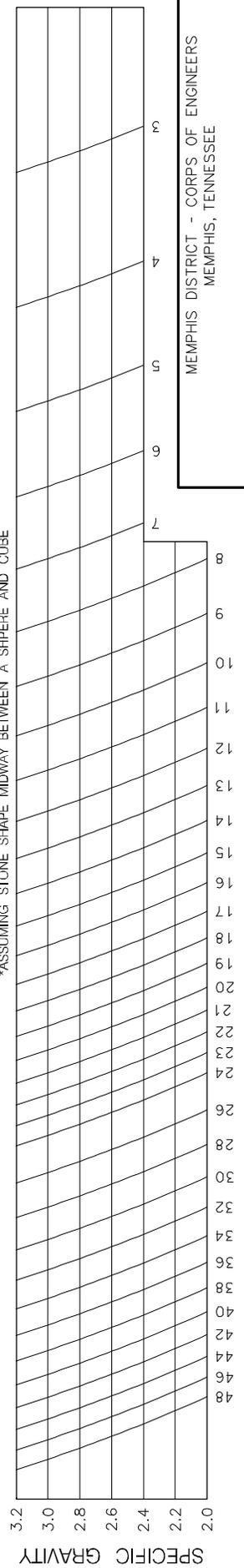
I Certify that the above stone sample is representative of the total tonnage covered by this test report.

Contractor Representative _____

Government Representative _____



WEIGHT OF STONES IN POUNDS*
 SPECIFIC GRAVITY OF ROCK _____
 *ASSUMING STONE SHAPE MIDWAY BETWEEN A SPHERE AND CUBE



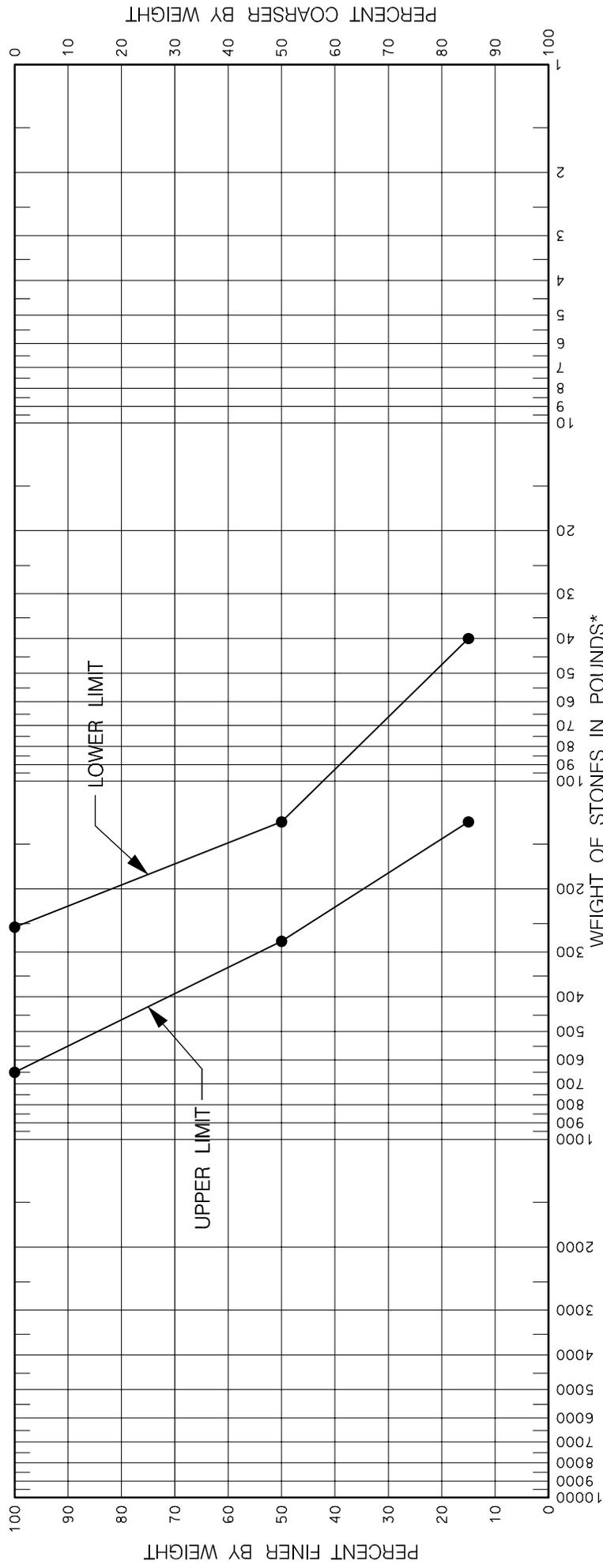
SIZE OF STONE IN INCHES

MEMPHIS DISTRICT - CORPS OF ENGINEERS
 MEMPHIS, TENNESSEE

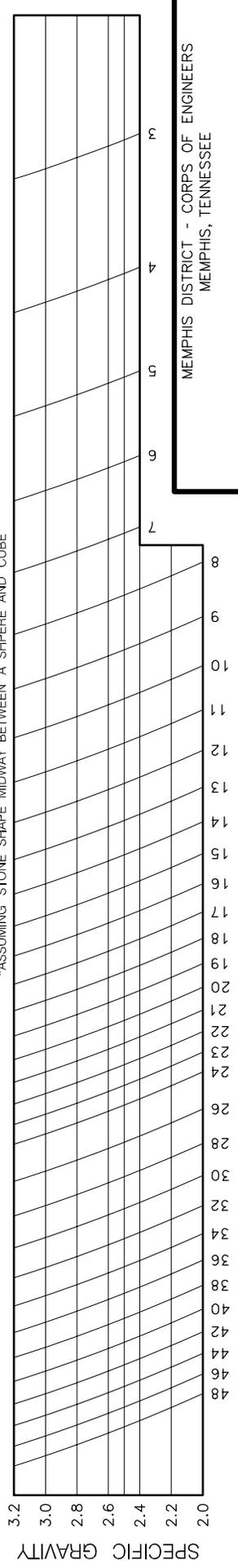
PROJECT: _____ DATE: _____

RIPRAP GRADATION CURVES

IV PLATE



WEIGHT OF STONES IN POUNDS*
 SPECIFIC GRAVITY OF ROCK
 *ASSUMING STONE SHAPE MIDWAY BETWEEN A SPHERE AND CUBE



MEMPHIS DISTRICT - CORPS OF ENGINEERS
 MEMPHIS, TENNESSEE

"R-650"

SIZE OF STONE IN INCHES

PROJECT: _____ DATE: _____

RIPRAP GRADATION CURVES