

## SECTION 209 STRUCTURE EXCAVATION AND BACKFILL

**209.01**     **DESCRIPTION** - Delete the text of this subsection and substitute the following:

- a.     This work consists of excavating material for construction of concrete drainage structures, pipe culverts, concrete walkway, waterlines, water valve and water meter boxes, and for all other miscellaneous structure indicated on the plans. The work includes preserving channels, shoring and bracing, dewatering, excavating, preparing foundations, bedding and backfilling.
- b.     Excavation will be unclassified, regardless of nature of material encountered.
- c.     Refer to geotechnical report prepared by Marianas Geotech Services (MGS) for any additional requirements for structure excavation and foundation sub-grade preparation.
- d.     This work also includes the furnishing and placement of an approved foundation fill material to replace unsuitable material encountered below the foundation of structures.

**209.02**     **MATERIAL** - Delete the text of this subsection and substitute the following:

- a.     Bedding Material for Structures. Bedding material for structures shall be coral base course conforming to Section 301, subsection 301.02.B.
- b.     Backfill Material for Structures, Culverts and Water System. Backfill material for structures and culverts, and water system shall be coral subbase course conforming to Section 301, subsection 301.02.A.
- c.     Culverts and Water System Pipe Bedding and Envelope Material: Pipe bedding and envelope material shall be manufactured sand, free of excess moisture, muck, frozen lumps, roots, sod, organic matter, clay, or other unsuitable material and conforming to the following.
  1.     Material passing A 3/8 – inch sieve, AASHTO T27 100% max
  2.     Material passing A No. 200 sieve, AASHTO T27 and T11 10% max
- d.     Detectable Warning Tape: Warning tape shall be acid and alkali-resistant polyethylene film, 6 inches wide with minimum thickness of 0.004 inches. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be manufactures with integral wires, foil backing, or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The tape shall be a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Tape color shall be as follows:

| <u>Utility</u>                                    | <u>Tape Color</u> |
|---|-------------------|
| Electric  | Red               |
| Gas, oil, dangerous materials                     | Yellow            |
| Telephone, television, police/fire communications | Orange            |
| Water System                                      | Blue              |
| Drain/Sewer System                                | Green             |

**209.03**      **PREPARATION FOR STRUCTURE EXCAVATION** - Add the following to this subsection:

- a.      Obtain approval from the Contracting Officer to commence excavation work for each structure indicated on the plans.
- b.      Should topsoil be encountered, excavate and stockpile as directed by the Contracting Officer.

**209.04**      **GENERAL** - Revise the paragraph of this subsection to read as follows:

- a.      Excavate trenches or foundation pits to foundation grade without unduly disturbing the trench or foundation surface. Foundation grade is the elevation at the bottom of any bedding for installing the structure. Compact the foundation.
- i.      Add the following paragraph to this subsection.
- b.      Excavation shall conform to the dimensions and elevations indicated for structure construction, building, miscellaneous concrete structures, and footings except as specified, and shall include trenching for foundation drainage system to a point 5 feet beyond the building line of each building and structure. Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms. Excavations below indicated depths will not be permitted except to remove unsatisfactory material under subsection 209.08. Excavation will be unclassified regardless of the nature of material encountered. Satisfactory material removed below the depths indicated, without specific direction of the Contracting officer, shall be replaced, at no additional cost to the Contract, with satisfactory materials to the indicated excavation grade; except that concrete footings shall be increased in thickness to the bottom of the over-depth excavations and over-break in rock excavation. Satisfactory material shall be placed and compacted as specified in subsection 209.11. Determination of elevations and measurements of approved over-depth excavation of unsatisfactory material below grades indicated shall be performed under the direction of the Contracting Officer. The elevations of the bottoms of footings, walkway slab-on-grade and concrete drainage structures as shown on the plans, shall be considered as approximately only and the Contracting Officer may order, in writing, such changes in the dimensions or elevations of footings as may be

deemed necessary, to secure a satisfactory foundation. After each excavation is completed, the Contractor shall notify the Contracting Officer and no footing, sub-base, base or bedding material shall be placed until the Contracting Officer has approved the depth of excavation and the character of the encountered foundation material.

- c. Excavation will be unclassified regardless of the nature of material encountered.
- d. No blasting will be permitted.
- e. Surface water shall be directed away from excavation to prevent erosion and undermining of foundations and structural compacted fill materials. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site, the area immediately surrounding the side, and the area affecting operations at the site shall be continually and effectively drained.
- f. Shoring shall be furnished and installed when required per OSHA Regulations to protect workmen and structures. Shoring, bracing, and sheeting shall be designed by a Registered Civil Engineer in the CNMI and licensed to practice in the CNMI. Remove shoring as excavation is being backfilled in a manner to prevent caving.

**209.05**      **CHANNEL PRESERVATION** - Add the following sentence to the text of this subsection:

Preserve all existing channels unless otherwise indicated in the plans.

**209.07**      **DEWATERING** - Add the following to the text of this subsection:

Obtain approval from the Contracting Officer for the methods used for dewatering and for the intended discharge location.

**209.08**      **FOUNDATION PREPARATION** - Delete the text of this subsection and substitute the following:

- a. When the exposed foundation grade material is soft, or mucky or otherwise unsuitable, as determined by the Contracting Officer, the Contractor shall remove the unsuitable material and backfill with approved material. Determination of elevations and measurements of approved over-depth excavations of unsatisfactory material below the foundation grades indicated, shall be performed under the direction of the Contracting Officer. Place and compact the approved material per subsections 209.09 and 209.11.
- b. When the exposed foundation grade material is suitable, the surface shall be scarified to a depth of 6 inches before the structural fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the structural fill material will bond with the existing material. When subgrades are less than the specified density, the

ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. Material shall not be placed on surfaces that are muddy. Refer to the geotechnical report for this project for any other pertinent recommendations.

- c. When the exposed foundation grade material is rock or hard material, clean area free of all loose material and cut a firm surface, either level, stepped, or serrated as directed by the Contracting Officer. All seams or crevices shall be clean and grouted. All loose and disintegrated rock and thin strata shall be removed.
- i. The Contractor is responsible to use only excavation methods that will leave the foundation rock in a solid un-shattered condition.
- d. When the footing is to rest on material other than rock, excavation to final grade shall not be made until just before the footing is to be placed.
- e. Approximately level surfaces shall be roughened, and sloped surfaces shall be cut as indicated into rough steps or benches to provide a satisfactory bond.

**209.09**

**BEDDING** - Place bedding material as follows:

- a. Structures other than culverts. Delete the text of this subsection and substitute the following:
  - 1. Bedding material for structures shall be base course conforming to subsection 301.02.B.
  - 2. The base course material shall be placed, spread uniformly, and compacted in layers not to exceed 6 inches in thickness.
- b. Culverts. Delete the text of this subsection and substitute the following:
  - 1. Bed culvert on a prepared foundation.
  - 2. Bedding and envelope material for culverts shall be manufactured sand conforming to subsection 209.02.C.
  - 3. Gravel, rock, or coral shall not be allowed within 12 inches of buried culvert or cable.
  - 4. Placement. Place pipe bedding as follows:
    - a. Level bottom layer at proper grade to receive and uniformly support pipe barrel throughout its length.
    - b. Form depression under each joint such that no part of bell or coupling is in contact with trench when pipe is placed in position.
    - c. Add second layer simultaneously to both sides of the pipe and

with care to avoid displacement.

- d. Complete promptly after completion of jointing operations and approval to proceed.

**209.10**      **BACKFILL** - Backfill as follows. Delete the text of this subsection and substitute the following:

(a)      Structure and Culverts Trenches:

1. Backfill material for excavated areas of concrete structures and trenches for culverts shall be aggregate sub-base material conforming to subsection 301.02.A, except at above sub-grade level for paved areas where backfill shall be base course material.
2. Obtain Contracting Officer's approval to commence backfilling work.
3. Placement for structures:

Excavated areas for miscellaneous concrete drainage structures, concrete structure foundations, retaining walls, slabs-on-grade shall be backfilled with approved structural fill material as specified herein. Place structural fill in horizontal layers not over ten (10) inches in thickness loose and compact and test in-place density as specified herein. Repeat these procedures until the required structural fill bedding or sub-grade thickness is attained per plans. Each layer may be moistened or dried as required and compacted with the appropriate machines or tampers. Test-in-place densities for each layer as specified herein.

(b)      Placement for culverts: Backfilling work for trenches of culverts may commence after completion of the following:

1. Contracting Officer gives approval for the backfilling work to commence;
2. Contractor has completed the pipe bedding and envelope work as specified;
3. For concrete encasement of culverts, only after concrete encasement has obtained initial set. Determination of initial set shall be a clear ringing sound when encasement is struck with a trowel; and
4. Upon completion of setting detectable warning tape.

Use hand methods to place backfill 12 inches above top of pipe barrel, conduit, or duct Banks.

Use approved mechanical method where hand backfill is not required.

Place backfill in lifts within the compacting ability of equipment used but shall not exceed 12 inches in compacted thickness.

Do not drop backfill material over 5 feet in distance until the compacted depth over the culvert or pipe exceeds 3 feet. The drop distance maybe increased 2 feet for each additional foot of cover.

Check in-place density for each compacted lift layer as specified herein.

**209.11**      **COMPACTING** - Delete the text of this subsection and substitute the following:

(a)      General:

1.      Determine optimum moisture content and maximum density for the material per Section 301.
2.      Compaction shall be accomplished by sheeps-foot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. All embankments adjacent to structures shall be constructed in horizontal layers and compacted as prescribed herein except that mechanical tampers are to be used for compaction. Care shall be taken to prevent any wedging action against the structure and slopes bounding or within the areas to be filled shall be benched or serrated to prevent wedge action. The placing of embankment and the benching of slopes shall continue in a manner that at all times there will be a horizontal berm of compacted material for a distance at least equal to the height of the abutment or wall to be backfilled against except for undisturbed material obtruding upon the area. When shown on the Construction Drawings, broken rock or coarse sand and gravel shall be provided for a drainage filter at weep holes. Approved compacted subgrades that are disturbed by the Contractor's operations or adverse weather shall be scarified and compacted as specified herein before to the required density prior to further construction thereon.
3.      The structure bedding material and each lift of backfill shall be compacted to not less than 95 percent of the maximum dry density, with exception of the culvert bedding which shall be compacted firm with a well-suited plate compactor. In place density test shall be per ASTM D2922 as specified in section 301 with the frequency of testing indicated in subsection 301.05.B.
4.      In-place density tests failing to meet the required densities shall be removed or scarified, re-compacted and retested until meeting or exceeding the specified density required. Costs of replacement of material, retests, and subsequent re-inspections from the Contracting Officer shall be the Contractor's responsibility.

Add the following subsection:

**209.11A      EXCAVATED MATERIALS:**

1.      Upon the instruction of the Contracting Officer, satisfactory excavated material, which may be used for fill for other work items, shall be stockpiled.
2.      Satisfactory excavated material shall not be reused for foundation bedding for any concrete structure, including the walkway slab-on-grade.
3.      Satisfactory excavated material may not be used as foundation bedding and envelope of culverts.
4.      Satisfactory excavated material may be used as backfill, provided that the material meets the physical characteristics of subsection 301.01.A or 301.02.b, and that the Contracting Officer approves it for such backfill use.
5.      Excess satisfactory material and all unsatisfactory material are to be hauled and disposed to approve CNMI dump sites. Payment of tipping fees shall be the responsibility of the Contractor.

**209.12      ACCEPTANCE - Delete the text of this subsection and substitute the following:**

- A.      Material for backfill, bedding, and foundation fill will be evaluated under subsections 106.02 and 106.04. Refer to Section 301 for sampling and testing requirements.
- B.      Concrete for bedding or backfill will be evaluated under Section 601.
- C.      Structural excavation and backfill work will be evaluated under subsections 106.02 and 106.04.
- D.      Shoring and bracing will be evaluated under subsections 106.02 and 106.04.
- E.      Clearing will be evaluated under Sections 201 and 203.

**209.13      MEASUREMENT AND PAYMENT - Delete the text of this subsection and substitute the following:**

- A.      Do not measure structure excavation and backfill for concrete structures, slab-on-grade, drainage structures, and culverts separately for payment. These works as described herein are considered as a subsidiary obligation of the Contractor under other pay items in the Bid Schedule.

**END OF SECTION 209**