

SECTION 02600
MISCELLANEOUS SEWER AND WATER CONSTRUCTION

PART 1 GENERAL

1.01 - Section Includes

- A. Adjustment of Existing Structure.
- B. Cast-in-place Concrete.
- C. Flowable Mortar and Grout.
- D. Revetment.
- E. Gabions.
- F. Agricultural Drain Tile.
- G. Repair of Existing Structure.

1.02 - Description of Work

- A. Adjustment of Existing Structure: includes all materials and labor required to adjust an existing water, sanitary sewer, or storm sewer structure to the finished grade in accordance with the Contract Documents. This also includes installing shims on manhole covers.
- B. Cast-in-place Concrete: includes the furnishing, mixing, and placing of or structural concrete and any required reinforcing steel in accordance with the Contract Documents. This includes, but is not limited to, toe walls, thrust blocks, pipe encasement, pipe collars, pads, cast-in-place manholes and other structures.
- C. Flowable Mortar and Grout: includes the furnishing, mixing, and placing of flowable mortar, hand packed grout, non-shrink grout, and hydraulic cement in accordance with the Contract Documents.
- D. Revetment: includes the furnishing and installation of revetment stone in accordance with the Contract Documents. This includes the discharge areas of storm sewer and culvert pipe, and as erosion stabilization in drainageways.
- E. Gabions: includes the furnishing and installation of wire baskets and gabion stone in accordance with the Contract Documents. This includes the discharge areas of storm sewer and culvert pipe, and as erosion stabilization in drainageways.
- F. Agricultural Drain Tile: includes the furnishing and installation of agricultural drain tile in accordance with the Contract Documents.
- G. Repair of Existing Structure: includes all materials and labor required to repair an existing water, sanitary sewer, or storm sewer structure to the finished grade in accordance with the Contract Documents.

1.03 - Submittals

- A. Submit weight receipts daily.
- B. Submit certificate of compliance indicating materials and samples incorporated into the Work comply with the Contract Documents.

1.04 - Delivery, Storage and Handling

- A. Store material in accordance with the manufacturers' recommendations and in locations which will minimize the interference with operations, minimize environmental damage, minimize inconvenience to the general public, and protect adjacent areas from flooding, runoff and sediment disposition.
- B. Rock shall be delivered in such a manner as to not cause damage to vehicles or pedestrians.

1.05 - Scheduling and Conflicts

Schedule work to minimize disruption of public streets and facilities.

1.06 - Special Requirements

- A. All work and materials incorporated into this project shall conform to all applicable local, state, and federal requirements.
- B. Contractor shall be responsible to notify all applicable private utility companies to adjust utility fixtures within the Project Site.

PART 2 PRODUCTS

2.01 - Adjustment of Existing Structure

- A. Metal grade adjusting rings shall be solid cast iron rings, Neenah R-1979 or approved equivalent. Segmented rings shall not be allowed.

- B. Grade adjusting rings shall conform to Section 2300 of these specifications.
- C. Concrete used for adjustment shall be Iowa DOT (IDOT) Class M.

2.02 - Cast-in-place Concrete

- A. Concrete incorporated into the work shall be as set forth in the IDOT Standard Specification 2403, with the following characteristics:
 - 1. Class C concrete unless otherwise specified.
 - 2. Minimum compressive strength of 4,000 psi at 28 days.
 - 3. Entrained air content of 6.5% ± 1%.
 - 4. Admixtures conforming to applicable IDOT Standard Specifications and to IDOT I.M. 403 shall be subject to approval by the Engineer prior to incorporating the material into the work. Use of chlorides as an admixture shall not be allowed.
- B. Reinforcing steel incorporated into the work shall Grade 60 meeting requirements of ASTM A615, A616, or A617. Provide epoxy-coated reinforcing steel as required in the Contract Documents.

2.03 - Flowable Mortar and Grout

- A. Flowable mortar shall meet IDOT Standard Specification 2506.02.
- B. Grout incorporated into the work shall be equal parts by weight of portland cement and concrete sand, and one part hydrated lime, mixed with sufficient water to form a stiff slurry.
- C. Non-shrink grout shall have no drying shrinkage greater than the equivalent sand, cement, and water mix as tested per ASTM C596. Initial set of grout not less than 60 minutes per ASTM C191 and shall not show expansion after set per ASTM C827.
- D. Hydraulic cement incorporated into the Work shall be subject to Engineer's approval before use.

2.04 - Revetment

- A. Material for revetment shall be sound and durable broken limestone, dolomite, quartzite or broken concrete. A minimum of 50 percent of the stone or broken concrete revetment shall be composed of beds or slabs more than 5 inches thick. A minimum of 10 percent of the beds or slabs shall be thick enough to produce the required weight of either the stone or concrete with the greatest dimension not more than 2 times the smallest dimension.
- B. Stone shall meet the freeze-thaw test requirements as determined by IDOT Materials Laboratory Test Method 211 on stone crushed to 3/4 to 1-1/2 inch nominal maximum size.
 - 1. For Class A and B revetment: 10 percent, Method A,
 - 2. For Class D revetment: 10 percent, Method C,
 - 3. For Class E revetment: 10 percent, Method A,
- C. Abrasion loss for revetment stone when tested under AASHTO T96 shall not exceed 50 percent.
- D. Portland cement concrete revetment shall have all steel trimmed so that protrusions are less than 1/2 inch. All materials shall meet additional requirements for the class of revetment as specified in the Contract Documents.
- E. Class A Revetment Stone
 - 1. Individual stones of Class A revetment shall weigh between 50 and 400 pounds, with minimum 75 percent greater than 140 pounds. The stones shall have at least one flat face with one dimension at least 15 inches.

- F. Class B Revetment Stone shall comply with the following size limitations:

Stone weight (lb)	650	500	275	25
Minimum % larger than stone weight	0	20	50	90

- G. Class D and Class E Revetment Stone

- 1. Class D and Class E revetment stone shall be taken from blasted rock or broken concrete with no additional processing necessary, but the method of loading shall be such that assures reasonable compliance with these requirements for each load.
- 2. Revetment shall be well-graded material with a maximum weight of at least 250 pounds and meeting the following additional size limitations:

Stone weight (lb)	90	5
Minimum % larger than stone weight	50	90

- H. Revetment bedding when required by the Contract Documents, shall be Macadam Stone meeting the requirements of 02200, 2.01A.

2.05 - Gabions

A. Baskets

1. Baskets shall be made of galvanized steel wire fabricated into hexagonal triple twist mesh units so bound as to prevent unraveling. For gabions, the mesh opening shall not exceed 4½ inches, and its area shall not exceed 8 square inches. For mattresses, the maximum linear dimension of mesh opening shall not exceed 3¼ inches.

2. Wire

- a. Wire shall be of the following minimum sizes:

	<u>Gabions</u>	<u>Mattresses</u>
Mesh	11-gauge	13½-gauge
Edges and selvage	9-gauge	11-gauge
Lacing and connecting	13½-gauge	13½-gauge

- b. Wire shall have a tensile strength of 60,000-85,000 psi. Galvanizing shall be according to ASTM A 90, except that all wire shall be coated with 0.80 ounce of zinc per foot.

3. Basket Fabrication

- a. Fabricate baskets as shown in the Contract Documents. Standard sizes are as follows:

<u>Dimensions (ft)*</u>			<u>Number of cells</u>	<u>Capacity</u>
<u>Length</u>	<u>Width</u>	<u>Height</u>	<u>or compartments</u>	<u>(cu yd)</u>
6	3	3	2	2.0
9	3	3	3	3.0
12	3	3	4	4.0
6	3	1.5	2	1.0
9	3	1.5	3	1.5
12	3	1.5	4	2.0
6	3	1	2	0.66
9	3	1	3	1.0
12	3	1	4	1.33

* Dimensions are subject to a tolerance of 3 percent.

- b. Baskets shall be fabricated into panels so that the base, sides, and ends can be assembled into a single rectangular unit of the specified size. All perimeter edges of the baskets shall be selvaged with the specified wire so that the selvaged connections have the same strengths as the body of the mesh.
- c. The gabion units shall be furnished with the necessary diaphragms secured in proper position on the base, so that no additional tying at this juncture will be necessary.

- B. Anchor Stakes shall be 2-inch nominal diameter galvanized, standard weight pipe meeting requirements of ASTM A 120. The length will be shown in the Contract Documents.

- C. Gabion Stone: Gabion stone for filling baskets shall be broken stone or gravel boulders meeting the following requirements. All stone and boulders for the project shall be from one source or from sources similar in geological origin.

1. Freeze-thaw per Laboratory Test Method 211, Method A not exceeding 10 percent.
2. Abrasion loss shall not exceed 45 percent, according to AASHTO T 96, Grading A or B.
3. Unless otherwise specified, gabion stone shall range from 4 inches to 8 inches (nominal).

2.06 - Agricultural Drain Tile

Drain tile shall meet requirements of AASHTO M 178, standard quality, extra quality, or special quality, as specified, or AASHTO M 179, standard, extra quality, or heavy duty, as specified. When the quality is not specified, use "extra quality" roadway embankments, and "standard quality" in other locations. For tile repairs of 20 feet in length or less, non-perforated pipe is acceptable.

2.07 - Engineering Fabric

Engineering fabric shall meet IDOT Standard Specification 4196.01C (1M 496.01)

PART 3 EXECUTION

3.01 - Adjustment of Existing Structure

- A. The Contractor shall be responsible to notify the Engineer of any damaged castings or damage to the existing structure prior to commencing any work. If a damaged casting or damage to a structure is not reported to the Engineer prior to commencing Work, any Work necessary to correct the condition will be the responsibility of the Contractor. The Contractor shall be responsible to protect the structure during all phases of the Work. The Contractor shall modify removal and adjustment procedures as required to protect the structure.
- B. The Contractor shall excavate the area around the structure as necessary to complete the adjustment. The outside of the structure shall be cleaned of foreign material prior to paving around the structure.
- C. The materials necessary to make the adjustment shall be incorporated into the structure.
- D. The Contractor shall adjust the existing structure in accordance with the Contract Documents. The final grade and slope of the casting shall conform to the elevation of the paving or earth around the structure.
- E. Existing utility structures that conflict with proposed sidewalk locations shall be relocated according to the Engineer or Contract Documents.
- F. Metal grade adjusting rings, if required, shall be **solid**, fit inside the existing frame and accept the existing lid.
- G. Contractor shall install or re-install shims as needed to provide a tight fit between the manhole cover and receiving frame. The space between the manhole cover and frame shall be no greater than 1/8 inch without shims and the manhole cover shall not rock under the weight of traffic.
 1. Shims shall be field fabricated from gray iron or ductile iron bars, minimum width 1 inch.
 2. Shims shall be required if manhole cover is loose within frame and, in the opinion of the Engineer, could be dislodged under traffic.
- H. Type "A" Manhole Adjustment
 1. Adjustment rings shall be installed after placement and compaction of the ACC leveling course. If ACC surface course is not be placed immediately, an asphaltic wedge shall be placed around adjustment ring, to allow for use of roadway.
 2. Contractor shall repair cracked or damaged bricks and/or concrete adjusting rings with a suitable non-shrink cementitious grout. After repairs, the inside of bricks and/or concrete rings shall be grouted from the casting to the manhole structure.
- I. Type "B" Manhole Adjustment
 1. Existing concrete boxout shall be demolished. Boxout shall be backfilled with compacted crushed stone and capped with a 2-inch lift of cold-mix asphalt for temporary surface.
 2. Existing P.C. concrete, brick paving, and asphaltic surfaces shall be sawn full-depth. Saw and seal new asphaltic surface according to Section 02800. Adjust size of boxout as required by Engineer.
 3. Remove brick and damaged concrete adjusting rings and set new rings as required. Existing rings can be reused if undamaged. Grout inside and outside of rings.
 4. External chimney seals shall be installed in conjunction with manhole adjustment at locations designated in Contract Documents or by the Engineer.
- J. Valve Box Adjustment
 1. Report pre-existing casting damage to Engineer prior to removal.
 2. Report valve boxes containing debris to the Engineer prior to removal or adjustment.
 3. Contractor shall adjust existing valve boxes and plug abandoned valve boxes as described herein.
 4. Jurisdictional Water Department will supply valve boxes and valve box blacktop extensions as needed. Contractor is responsible for local pickup and delivery to job site.
 5. Valve boxes in streets, driveways, and sidewalks shall be adjusted to the final grade.
 6. Use blacktop extensions to extend existing boxes to final grade for ACC overlay of PCC pavements.
 7. Use screw-type boxes for ACC pavements. Pour PCC collar around valve box top section in ACC pavement. Collar shall extend from bottom of payment to finish grade.
 8. Remove valve box extensions prior to milling existing pavements to prevent damage.

9. Fill abandoned valve boxes with sand or crushed rock and plug top 12 inches with PCC or flowable mortar. Remove top section of abandoned valve boxes if necessary to assure that no part of the box is visible in the rehabilitated pavement.
10. Do not abandon any valve box without approval of the Jurisdictional Water Department.

3.02 - Cast-in-place Concrete

- A. IDOT Standard Specification 2403 shall apply for installation of forms, placement of reinforcing steel, placement, finishing, and cold weather protection of concrete, and related Work.
- B. Place forms in locations as required by the Contract Documents. Forms shall be metal or plywood lined for any exposed surface. The forms shall be coated with a non-staining oil prior to placing reinforcing steel.
- C. All reinforcing steel shall be clean and free of dirt, scale, and other materials that might impair the concrete bond.
- D. Furnish and install all reinforcing steel in accordance with the Contract Documents.
- E. The Contractor shall furnish and install all concrete. The area to receive concrete, including reinforcing steel and forms, shall be thoroughly wetted with water.
- F. Care shall be taken to prevent segregation of the concrete during placement. In no case shall the concrete be allowed to fall more than four feet vertically.
- G. Concrete shall be thoroughly consolidated with the means appropriate for the type and size of the placement.
- H. Placing Reinforcement
 1. Except where noted, bars shall be placed the following minimum distances:
Wall Bars 1-1/2" clear, 2" clear if exposed to weather or water
Slab bottom and top bars 3/4" clear, 2" clear if exposed to weather or water
Footing top bars..... 2" clear
Footing bottom bars..... 3" clear, unless otherwise noted
Beams and column bars..... 1-1/2" clear, 2" clear if exposed to weather or water
Slab on grade Top bar 2" clear, bottom bar 3" clear
 2. These distances apply to the bars closest to the surface.
 3. Lap splices and embedment lengths for all reinforcing bars are shown on the plans.
 4. Field bending of Grade 60 steel will not be permitted.

3.03 - Flowable Mortar and Grout

- A. The Contractor shall furnish and install flowable mortar only in those locations as indicated in the Contract Documents. Flowable mortar shall not be used in other locations without the approval of the Engineer.
- B. Care shall be taken to place and consolidate flowable mortar to provide for the elimination of voids. Care shall be taken to avoid placing flowable mortar at locations not called for in the Contract Documents.
- C. The Contractor shall furnish and install grout only in those locations as indicated in the Contract Documents. Grout shall not be used in other locations without the approval of the Engineer.
- D. Grout shall be placed within 60 minutes of mixing.
- E. Mixing and placement of non-shrink grout and hydraulic cements shall be according to manufacturer's recommendations.

3.04 - Revetment

- A. The Contractor shall excavate a trench at the toe of the proposed revetment in accordance with the standard details. The excavated material shall be placed, sloped, or disposed of so it will not interfere with the function of the revetment.
- B. The Contractor shall shape the areas upon which the revetment is to be placed such that the revetment surface shall conform to the lines and grades indicated in the contract documents.
- C. The revetment, bedding, and engineering fabric shall be furnished and installed by the Contractor from the toe trench in an upstream direction. Engineering fabric shall not be damaged or slip during riprap placement.
- D. Handle riprap shall in a manner that minimizes segregation of sizes. Excessive pushing of riprap causes segregation and should be avoided.
- E. Engineering fabric shall be installed in accordance with the manufacturer's requirements. Engineering fabric shall be protected from punching, cutting, or tearing. Any damage other than

an occasional small hole shall be repaired by placing another piece of geotextile over the damaged piece or by completely replacing the geotextile. All overlaps whether for repairs or for joining two pieces of engineering fabric shall be a minimum of one foot.

3.05 - Gabions

- A. The area shall be excavated and/or smoothed, as necessary for proper placement of the gabions, as shown in the Contract Documents. The Contract Documents may also require compaction of the prepared surface, or placement of selected or special backfill material in preparing the surface.
- B. When designated in the Contract Documents, engineering fabric shall be placed under and behind the baskets. The fabric shall be placed in vertical strips, or transverse to the flow line, lapped at least 3 inches with the downstream strip to the outside of the structure.
- C. Assemble baskets at the construction site into rectangular baskets of the specified sizes. They shall be of single unit construction; the base, lid, and sides shall be woven into a single unit, and the ends shall be connected to the base section, in a manner so that strength and flexibility at the point of connection is at least equal to that of the mesh.
- D. Place baskets carefully into their proper positions, for slope and alignment as shown in the Contract Documents. When the slope is not shown, the faces of gabions shall be sloped 1 (horizontal) to 6 (vertical).
- E. Connect adjacent baskets in a manner so that the connection is strong enough that a failure will occur in the mesh, rather than the lacing. Adjoining gabions are to be connected at vertical corner edges and diaphragms. Stacked gabions are to be also connected at the horizontal edges, front and back. All connections shall be laced with loops at approximate 4 inch intervals, and as recommended by the manufacturer. Gabions 3 feet high placed in a line shall be tensioned with a come-along or other means during filling to achieve proper alignment.
- F. Fill each basket carefully with the gabion stone specified. Machine placement will be permitted. However, considerable handwork is necessary and will be required to assure orientation for maximum density without bulges, a compact and dense exposed face, and maximum aggregate contact with the lid and other baskets placed or to be placed in the structure.
- G. Fill gabions 3 feet high, one foot at a time, orienting the stones with each lift as necessary.
- H. When a 3 foot high cell is to be exposed in the finished structure, two connecting wires shall be securely installed between each lift, connecting each cell face to be exposed with the opposite face or diaphragm. The wires shall be located with equal horizontal spacing. Install wires by looping each end around two mesh openings, then wrapping the wire tightly around itself with at least four full wraps. Lock the end of the wire in place by lacing it under the previous lap. (For each 3-foot high cell with one face to be exposed, four connecting wires are required. For the same cell as an end unit, there are two exposed faces and eight connecting wires are required).
- I. Fastens the lids and diaphragms in place as specified above.
- J. When the structure is completed, finish earthwork shown in the Contract Documents.

3.06 - Agricultural Drain Tile

- A. Relocated or replaced tile shall be installed so as to cause a minimum of disturbance to existing field tile. Connections of lines to existing tile drains shall be made in such a way as to leave the existing drain tiles in a functional condition.
- B. Cap blind ends of tile with a metal cap or by other methods approved by the Engineer.
- C. Place tile along compacted trench bottom, and backfilled with suitable excavated material.

END OF SECTION 02600